SERVICE MANUAL

CS-1562A
CS-1559A

TRIO

FEATURE

The model CS-1562A Dual-Trace and CS-1559A Single-Trace oscilloscopes are laboratory -quality professional instruments for observing and measuring waveform in electronic circuits.

Dual vertical inputs (CS-1562A) are provide for simultaneous viewing waveform are chopped at a 200 kHz rate to provide for permits simultaneous viewing of high-speed, high repetition-rate waveform. The dual-trace feature, together with the 10 MHz bandwidth, wide range of sweep speeds, and high sensitivity provide, make this the ideal oscilloscope for a broad range of applications, including troubleshooting and repairing electronic equipment, research and development, and laboratory instruction. And CS-1559A performs all measurements made with conventional oscilloscope, usually with greater stability and better resolution. In addition, it includes greater bandwidth, sweep speed, and sensitivity, plus extra features to provide the electronic sophistication required for servicing color television and other state-of-the-art devices.

CONTENTS

SPECIFICATIONS

	CS-1562A	CS-1559A
Type of Cathode Ray Tube	C529P31B or 130BEB31	Same as CS-1562A
Acceleration Voltage	2 kV	Same as CS-1562A

VERTICAL AXIS	(for both CH1 and CH2)	CH1 only
Sensitivity	10 mV/div—20 V/div ±5%	Same as CS-1562A
Attenuator	10 mV/div—20 V/div, 1-2-5 step (1 div = 1 cm) Precisely adjustable in all ranges Sensitivity error between ranges is ±5%	Same as CS-1562A
Input Impedance	1 MΩ ±5%	Same as CS-1562A
Input Capacitance	22 pF ±3 pF	Same as CS-1562A
Frequency Response	DC: DC—10 MHz (less than −3 dB) AC: 2 Hz—10 MHz (less than −3 dB)	Same as CS-1562A
Rising Time	Less than 35 nsec	Same as CS-1562A
Overshoot	Less than 3% (at 100 kHz square wave)	Same as CS-1562A
Cross-talk	Better than 70 dB at 1 kHz	—
Operating Mode		
CH1	Channel 1 only	—
CH2	Channel 2 only	
DUAL	2-channel (CHOP and ALT are automatically selected by SWEEP TIME/DIV) 0.5 μs/div—0.5 ms/div ALT (alternate sweep) 1 ms/div—0.5 s/div CHOP (200 kHz switching)	
CHOP Frequency	200 kHz ±20%	—
Maximum Input Voltage	600 Vp-p or 300 V (DC + AC peak)	Same as CS-1562A

SWEEP CIRCUIT		
Sweep System	Triggering sweep and auto sweep (free-running sweep at no-signal time)	Same as CS-1562A
Sweep Time:	1 μs/div—0.5 s/div ±5% and "X-Y", 1-2-5 step. Fine adjustment in all 18 ranges	1 μs/div—0.5 s/div ±5% and "EXT", 1-2-5 step. Fine adjustment in all 18 ranges
Magnifier	5 times ±10% (PULL×5MAG)	Same as CS-1562A
Linearity	Less than 3% (5 μs/div—0.5 s/div) Less than 5% (1μs/div—2 μs/div)	Same as CS-1562A

TRIGGERING			
Source			
	INT	Changeover by MODE switch (DUAL: CH1 input signal only)	Vertical input signal
	EXT	EXT TRIG input signal	EXT TRIG input signal
Sync Section			
	NOR	Positive and negative	Same as CS-1562A
	TV	Positive and negative (TVH and TVV are automatically switched by SWEEP TIME/DIV)	
	TVH (TV-Line)	1 μs/div—50 μs/div	
	TVV (TV-Frame)	0.1 ms/div—0.5 s/div	
Triggering	**INT**	Amplitude on CRT screen, more than 1 div	Same as CS-1562A
	EXT	More than 1 Vp-p	
Triggering Range	**INT**	20 Hz—10 MHz	Same as CS-1562A
	EXT	DC—10 MHz	

HORIZONTAL AXIS	CH2 input	
Operating Mode	X-Y mode is selected by SWEEP TIME/DIV CH1: Y axis CH2: X axis	EXT H mode selected by SWEEP TIME/DIV
Sensitivity	Same as CH2 (10 mV/div—20 V/div ±5%)	150 mV/div (within ±20%) (HOR GAIN MAX)
Frequency Response	DC: DC—1 MHz (less than —3 dB) AC: 2 Hz—1 MHz (less than —3 dB)	DC—1 MHz (less than —3 dB)
Input Impedance	Same as CH2 (1 MΩ ±5%)	100 kΩ/35 pF
Calibrating Voltage	1 Vp-p ±5% (50/60 Hz square wave)	Same as CS-1562A

INTENSITY MODULATION		
Input Voltage	Less than 5 Vp-p (modulation)	Same as CS-1562A
Input Impedance	10 kΩ ±20%	Same as CS-1562A

POWER REQUIREMENTS		
Power Supply Voltage	100/117/220/240 V ±10% 50/60 Hz	Same as CS-1562A
Trace Rotation	Trace angle is adjustable by panel surface adjuster	Same as CS-1562A
Power Consumption	20 W	Same as CS-1562A

DIMENSIONS AND WEIGHT (Figures in ( ) show maximum sizes.)		
Width	260 mm (277 mm)	Same as CS-1562A
Height	190 mm (204 mm)	Same as CS-1562A
Depth	375 mm (433 mm)	Same as CS-1562A
Weight	8 kg	8 kg

ACCESSORY

Probe PC-21 Damping: 1/10 Input impedance: 10 MΩ Input capacitance less than 18 pF		2	1
Pin-plug Non-shorting type		1	1
AC Power Cord		1	1
Instruction Manual		1	1
Replacement Fuse	0.3 A	2	2
	0.7 A	2	2

CRT 130BEB31 SPECIFICATIONS

Screen and Shape	
Dimensions:	
Overall length:	365 ±10 mm
Face plate dimension:	133 ±3 mm
Screen shape:	Round and flat face
Focusing:	Electrostatic deflection Electrostatic focusing
Color:	Green
Persistence:	Midium short
Display Area:	78.8×78.8 mm²
Heating	
Heater voltage (Ef):	6.3 V ±10%
Heater current (If):	0.3 A ±10%
2nd plate voltage:	1500 V
Capacitance	
G1 to all other element:	7.5 pF
K to all other element:	5.0 pF

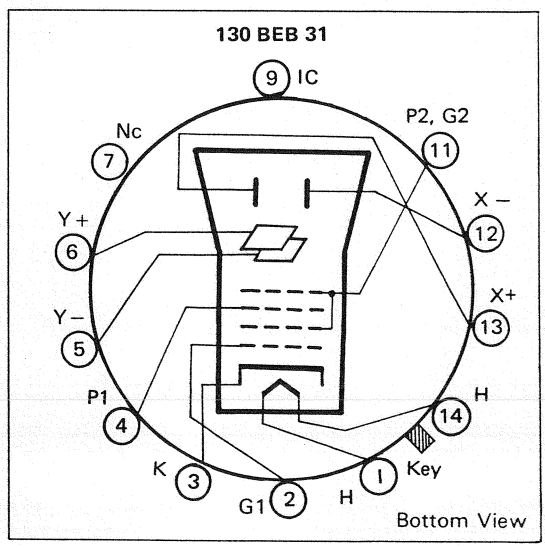
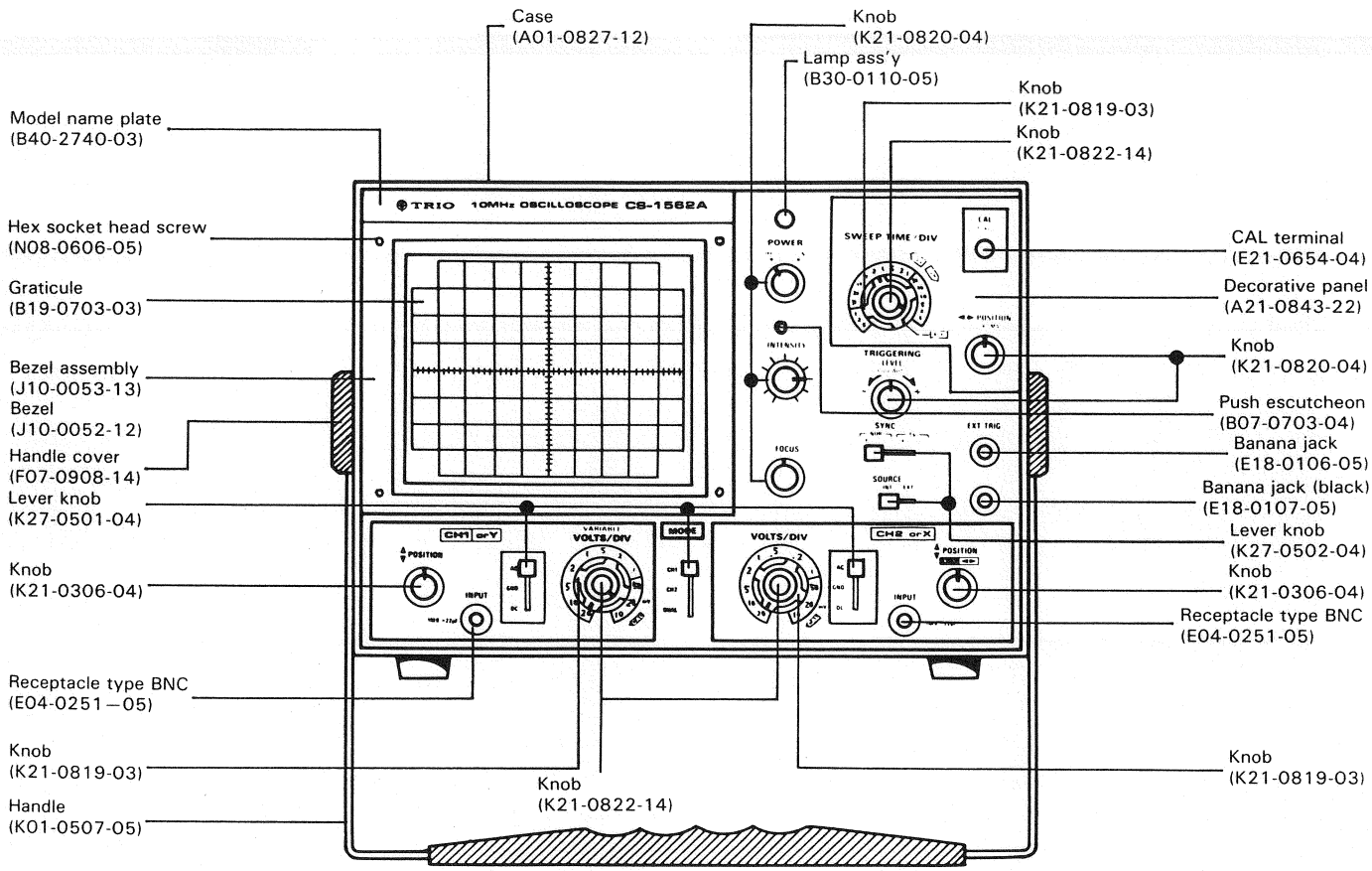


Fig. 1 CRT Basing

EXTERNAL VIEW AND NAME OF PARTS



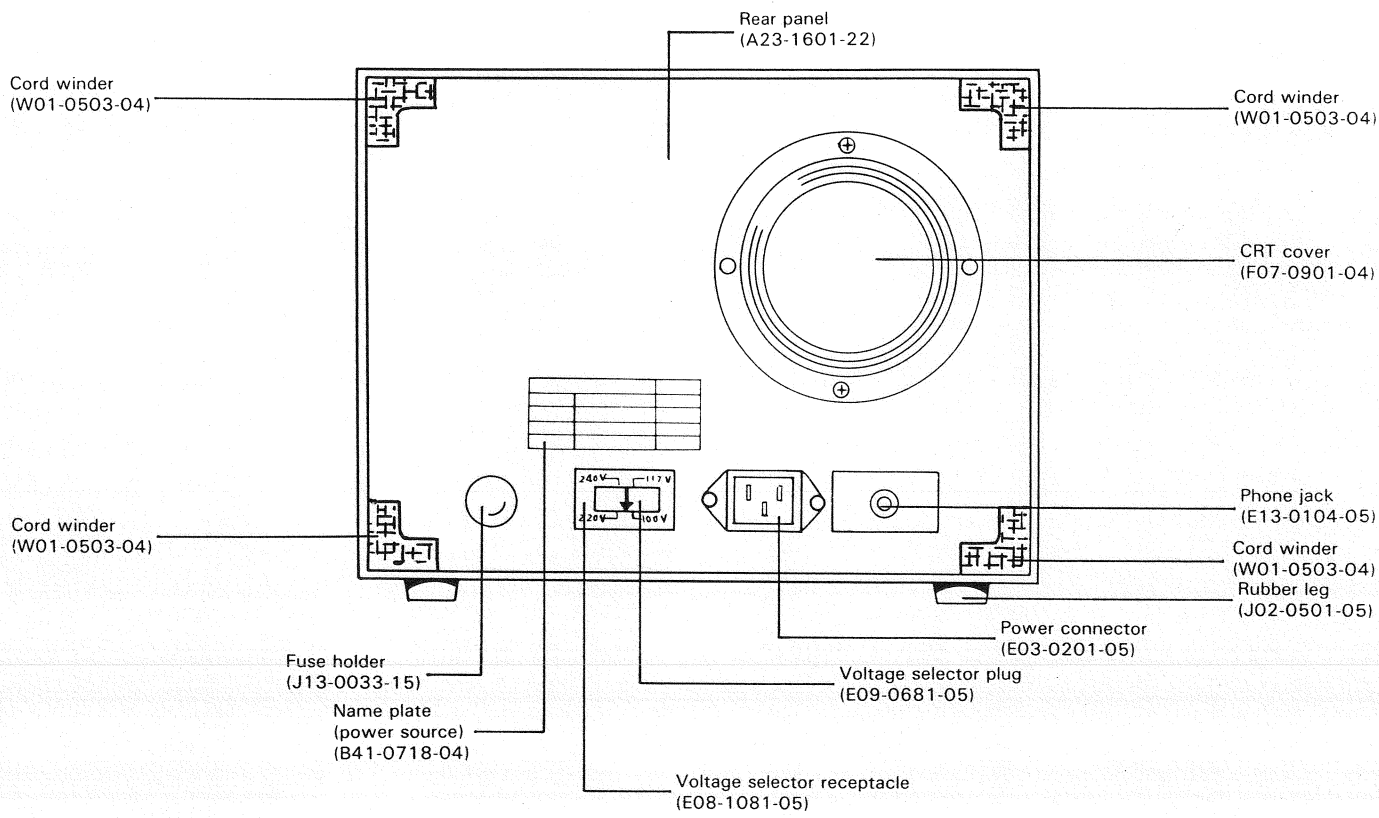


Fig. 2

CIRCUIT DESCRIPTION

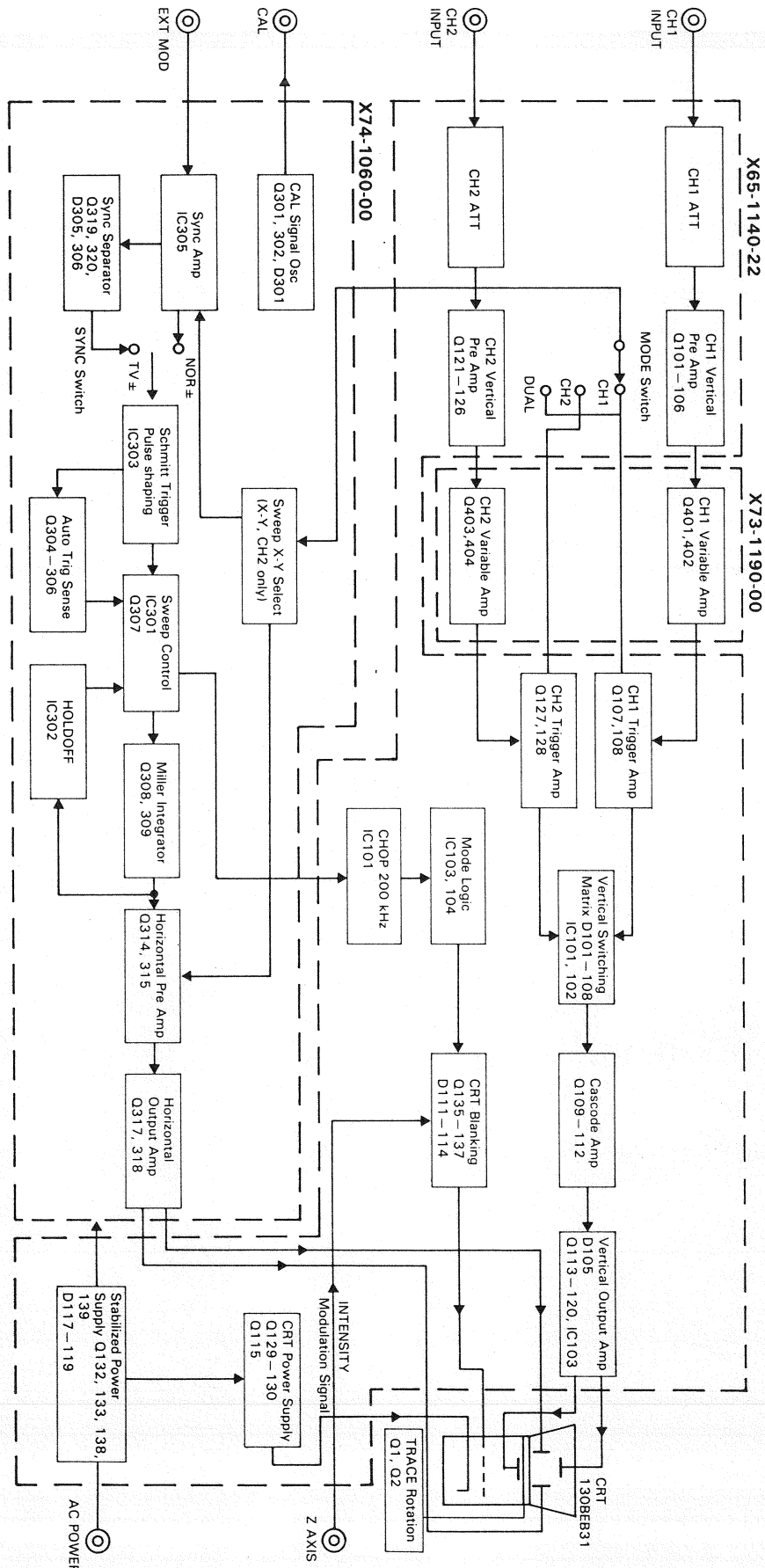


Fig. 3 BLOCK DIAGRAM (CS-1562A)

Note: CS-1559A: The vertical amplifier of CH1 and the switching circuits for dual trace are not used in the unit X65-1140-22 of CS-1562A.

CIRCUIT DESCRIPTION

The block diagram, Fig. 3 outlines the circuit breakdown of the oscilloscope. Circuit details are obtained by reference to the schematic diagram.

GENERAL

Basically, the oscilloscope consists of two identical vertical preamplifiers, each having its own input attenuator network. The outputs of the vertical preamplifiers can be switched, as desired, into the main vertical amplifier. The switching of the CH1 and CH2 preamplifiers is determined by the position of the MODE switch and MODE LOGIC. The main vertical amplifier feeds the VERTICAL OUTPUT AMPLIFIER, which drives the vertical deflection plates of the CRT.

Horizontal deflection is provided by the horizontal amplifier. Drive to the horizontal amplifier is furnished by calibrated sweep speed circuits or by the signal from the CH2 preamplifier when X-Y operation is selected.

All supply voltages are fully regulated and a DC-to-DC converter provides a regulated, 2 kV, accelerated potential to the CRT.

VERTICAL PREAMPLIFIERS (CS-1562A)

Channel1 and Channel2 preamplifiers contain identical circuitry and circuit operation is the same for both. CH1 will be described below.

The vertical preamplifier consists of dual FET input transistor Q101 which forms a balanced differential amplifier with output signals of opposite polarity. VR101 is the side panel DC BAL control. Emitter follows Q103 and Q104 drive the differential amplifier Q105 and Q106. Stage gain is changed in the emitters of Q105 and Q106 to provide gain of 5, 2, and 1.

The front panel POSITION control VR102 provides a DC component to move the trace vertically across the screen.

Transistor array IC101 is turned on or off by the MODE LOGIC circuitry.

Trigger amplifier Q107 and Q108 buffers the signal from IC101 and delivers the signal to the trigger amplifier.

MODE LOGIC (CS-1562A)

The mode of operation (CH1, CH2, and DUAL) is controlled by IC103 and IC104. When CH1 is selected by the front panel MODE switch, the Q output of IC103 goes LOW, turning on the CH1 preamplifier and trigger amplifier. When CH2 is selected the $\overline{Q}$ output of IC103 goes low turning on the CH2 preamplifier and trigger amplifier. When DUAL is selected the Q and $\overline{Q}$ outputs of IC103 are switched on and off at a 200 kHz rate for the CHOPPED mode, and after each sweep when in ALTERNATE mode. When in DUAL, the CH1 trigger amplifier is turned on, providing a trigger signal to the sweep circuits.

When the SWEEP TIME/DIV switch is in CH2 position, the CH2 trigger amplifier signal is applied to the horizontal amplifier.

VERTICAL AMPLIFIER (CS-1562A)

The selected signal from the preamplifiers is applied to the vertical output stage consisting of transistors Q113 to Q120, which amplifiers the signal to the levels required to drive the vertical deflection plates of the CRT. VR105 is a DC balance control, while VR104 and TC113 are high-frequency compensation adjustments.

VERTICAL AMPLIFIER (CS-1559A)

The signal to be displayed is applied to the VERT INPUT jack and passes through the input attenuator section. Attenuation values of ×1, ×10, ×100, and ×1000 are selected by VOLTS/DIV switch S104.

The input signal is then applied to the vertical preamplifier stage. Q121, a dual FET, forms a balanced differential amplifier input stage with output signals of opposite polarity.

VR111 is the side panel DC BALANCE control. Emitter followers Q123 and Q124 drive differential amplifier Q125 and Q126. Stage gain is changed at the emitters of Q125 and Q126 by S104 to provide fixed gains of 5, 2, and 1. Variable control VR115 adjusts the signal level to the inputs of Q403 and Q404 while VERTICAL POSITION, VR112, and amplifier calibration VR113 are accomplished at the emitters of Q143 and Q144.

The vertical amplifier stage consists of transistors Q109 through Q120, which amplifiers the signal to the levels required to drive the vertical deflection plates of the CRT.

VR105 is the trace centering adjustment, while VR104 and TC113 are high-frequency compensation adjustments.

Transistor Q127 and Q128 form the TRIGGER AMPLIFIER which provides a sample of the vertical signal to the sync amplifier for internal triggering.

TRIGGER CIRCUIT (CS-1562A)

The trigger source, either CH1 or CH2, is selected by MODE switch S105. Selecting either CH1 or DUAL enables trigger amplifier Q107 and Q108, CH2 enables trigger amplifier Q127 and Q128. The trigger amplifier output is fed thru transistor switch Q313. Q313 is turned on in all positions of the SWEEP TIME/DIV switch except CH2.

SYNC AMPLIFIER AND INVERTER (CS-1562A and CS-1559A)

Source switch S303 selects either INTERNAL (from preamplifiers) or EXTERNAL trigger signal is then fed to differential amplifier IC305. Either the inverted (SLOPE−) or non-inverted (SLOPE+) signal is selected by SYNC switch S304. LEVEL control VR310 adds a DC COMPONENT to the output of IC305.

CIRCUIT DESCRIPTION

SYNC SEPARATOR (CS-1562A and CS-1559A)

When VIDEO+ or − is selected, the output of IC305 is routed to the SYNC SEPARATOR circuit consisting of Q320 and Q319.

Q320 is held at cutoff by a negative voltage developed across C332 corresponding to an average value of the input signal.

Positive-going pulses drive Q320 out of cutoff. The output of Q320 corresponds to the sync tips of the composite video signal. When in the FRAME position of the SWEEP TIME/DIV switch (0.1 ms to 0.5 sec.), Q319 is on; this allows C331 to filter out the horizontal sync pulses, permitting only vertical sync pulses to pass the sweep circuit. In the LINE positions, 50 μs to 1 μs, Q319 is turned off, removing C331 and allowing horizontal sync pulses to pass to the sweep circuit.

SWEEP CIRCUIT (CS-1562A and CS-1559A)

The trigger signal passes thru emitter follower Q303, and to the SCHMITT TRIGGER circuit consisting of two gates of IC303.

The output pulses from IC303 clock the SWEEP CONTROL flip-flop IC301. On the negative edge of the clock waveform, the Q output of IC301. On the negative edge of the clock waveform, the Q output of IC301 goes low, turning off Q307 to initiate the sweep.

Transistors Q308 and Q309 and the timing capacitors and resistors selected by the SWEEP TIME/DIV switch, form a MILLER INTEGRATING circuit to provide a linear ramp voltage. The sweep ramp from the collector of Q309 is fed to the holdoff circuit IC302 and IC303.

As soon as the Q output of IC301 goes low, the reset of IC301 is held low by IC303 to exclude any new clock pulses until the sweep ramp is terminated. When the sweep ramp exceeds the level set by VR309 (SWEEP LENGTH), IC302 places a low on the set input of IC301. A low on the set input forces the Q output of IC301 high which turns on Q307, terminating the sweep.

AUTO SWEEP (CS-1562A and CS-1559A)

Transistors Q304, Q305, and Q306 form the AUTO SWEEP circuit. When the trigger level control is pulled out (AUTO) and no signal is present at the trigger amplifier, C303 charges and turns Q306 on, this places a low on the reset of IC301 and allows a sweep to recirculate at a rate determined by the resistor selected by the SWEEP TIME/DIV switch. When a trigger signal is present, transistors Q304 and Q305 discharge C303, turning Q306 off and enabling the sweep to trigger on the incoming signal.

HORIZONTAL AMPLIFIER (CS-1562A and CS-1559A)

The sweep ramp from the collector of Q309 is applied thru VR306 (timing adj.) to the input of the horizontal amplifier consisting of Q314, Q315, Q317, and Q318. VR305 is horizontal centering adjustment and VR3 is the horizontal position control.

When in the X-Y mode, transistor Q313 is turned off thru IC303 and the CH2 signal is applied to both Q312 and the horizontal amplifier. The output of transistors Q317 and Q318 is applied to the horizontal deflection plates of the CRT. VR303 is the ×5 magnification adjustment and VR304 is the magnification centering adjustment.

CHOPPING OSCILLATOR (CS-1562A)

Two NAND gates from IC304 and IC305 form a 200 kHz CHOPPING OSCILLATOR activated in the CHOP positions of the SWEEP TIME/DIV switch when DUAL is selected. IC304 provides a pulse for blanking the trace during retrace and when chopping.

1 VOLT CAL SIGNAL (CS-1562A and CS-1559A)

Transistors Q301 and Q302 provide a 50/60 Hz square wave. VR301 adjusts the amplitude of the CAL SIGNAL.

POWER SUPPLY (CS-1562A and CS-1559A)

The power supply provides all voltages necessary for operating the oscilloscope.

Regulated output voltages of +10, and −8, and +5 are provided for all logic and amplifier circuits. Amplifier output stages require the 180 V.

The accelerating voltage for the CRT is drived from a DC-to-DC converter consisting of Q142 and T101. The output of T101 is rectified and filtered and applied thru voltage dividers to the CRT. A portion of the high voltage is fed to a regulator circuit consisting of Q129 and Q130 to provide a constant accelerating potential under varied operating conditions.

MAINTENANCE

TRACE ROTATION ADJUSTMENT

Strong magnetic fields, present in many locations where an oscilloscope may be used, may cause the trace to be tilted. The degree of tilt may vary as the scope is moved from on location to another. The TRACE ROTATION control provides an electrically adjustable offset to compensate for trace tilt.

Perform the adjustment as follows.

1. Set oscilloscope controls to produce a horizontal trace with no input signal (triggering MODE switch in AUTO)
2. Use POSITION control as required to position the trace along a horizontal line of the graticule scale.
3. Adjust TRACE ROTATION so trace parallel with the reference line on the graticule scale.

AC VOLTAGE CONVERSION

When operating the unit on voltage other than 240 V, set AC voltage selector switch to 100 V, 117 V or 220 V according to your local AC current. The voltage selector switch is locate on the rear panel of the unit as indicated by the arrow mark. When operating on 100 V or 117 V, remove the 0.3A fuse and replace it with one rate at 0.7A.

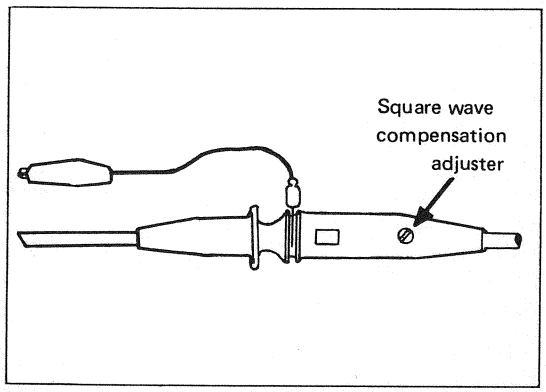


Fig. 4 Probe compensation adjuster

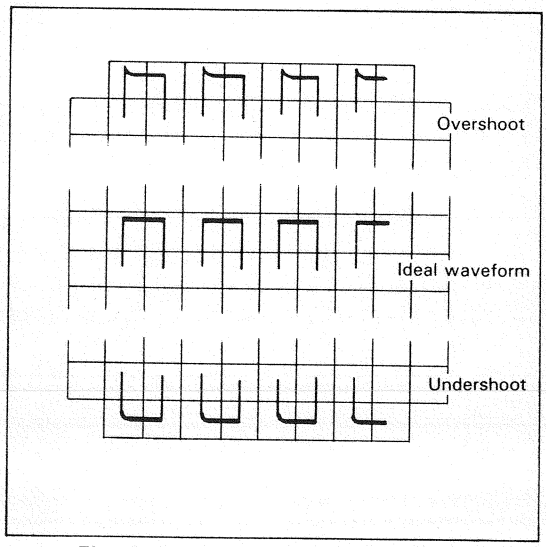


Fig. 5 Probe compensation adjuster

REMOVING THE CASE

The case is removed as follow.

Remove 6 screws: 2 on left side, 2 on right side, and 2 on top. Lift cover off scope.

WARNING

1. The following instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.
2. High voltage up to 2000 V is present on the CRT and vertical amplifier & power supply board when the oscilloscope is operating. Up to 180 V DC is present on the sweep board. Line voltage (120 or 240 V AC) is present on the vertical amplifier & power supply board, power transformer, and the POWER on-off switch 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.

PROBE COMPENSATION

Probe compensation adjustment matches the probe to the input of scope. For best result, compensation of both should be adjusted initially, then the same probe always used with CH1 and CH2 respectively. Probe compensation should be readjusted whenever a probe from a different oscilloscope is used, or CH1 and CH2 probes are interchanged.

1. Connect probes to both V. INPUT terminal.
   Connect ground clip of probes to oscilloscope ground terminal and touch tips of both probes to CAL 1 kHz⎍⎍1 $V_{p\text{-}p}$terminal.
2. Select signal trace operation of CH1 and CH2 for steps 3 and 4.
3. Set oscilloscope control to display 3 or 4 cycles of CAL square wave at 5 or 6 divisions amplitude.
4. Adjust compensation trimmer on probe for optimum square wave, waveshape (minimum overshoot, rouding off and tilt).

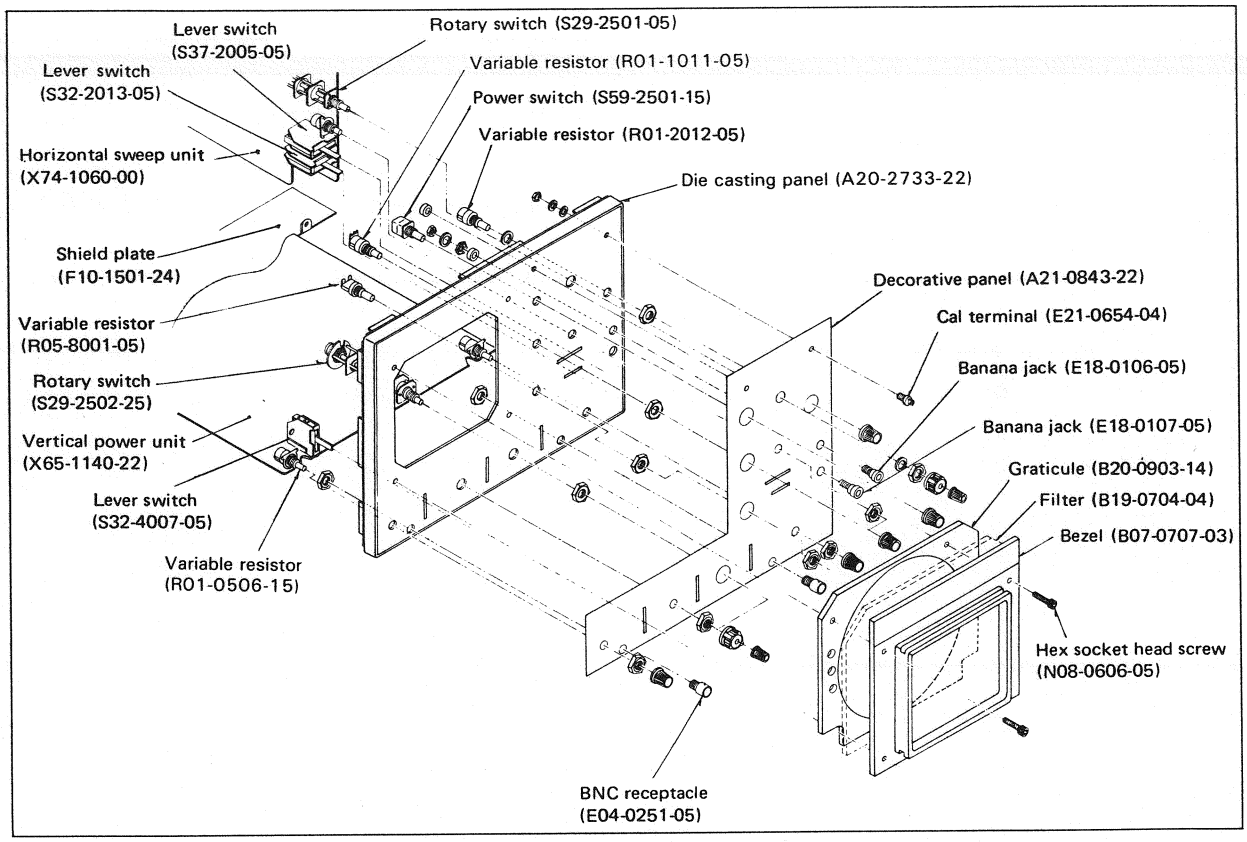


Fig. 6. Removing The CRT Bezel and Front Panel

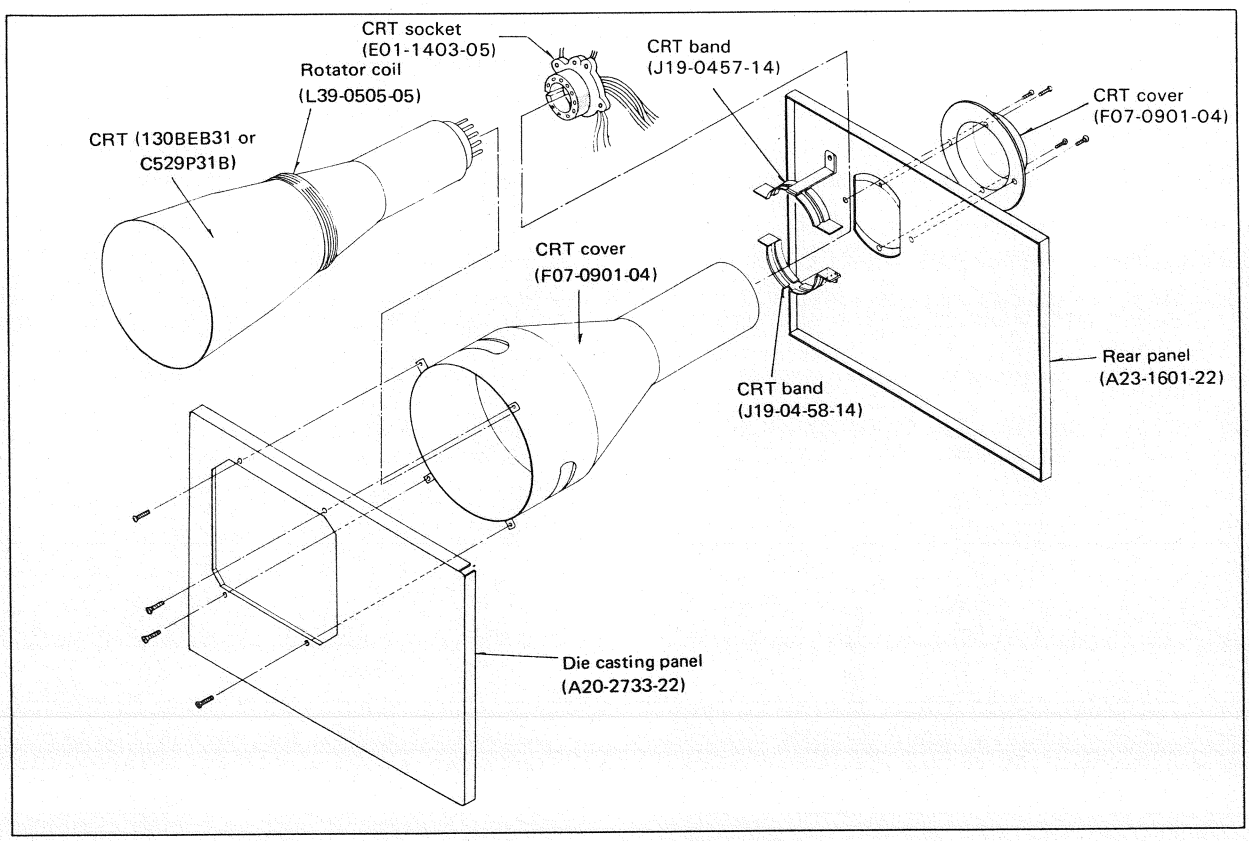


Fig. 7. Removing The CRT.

ADJUSTMENT

The following points have been already adjusted. However, observe the following notes before making readjustment:

1. Calibrating the power source voltage.
2. For adjustment, use a well-insulated flat-blade screwdriver.
3. For optimum adjustment, turn the power on and warm up the oscilloscope sufficiently before starting.
4. All adjustment should follow the following order.
   If this order reversed or only a partial adjustment is attempted, this may influence on the other part of the circuit.
5. Accurate measuring instruments should be employed.
6. Before making adjustment, set the operating controls unless otherwise specified a follows.

Name of knob	Position
SWEEP TIME/DIV	1 ms
SWEEP VARIABLE	CAL
◀▶H. POSITION VR	Mechanical center
◀▶H. POSITION ×5 MAG	PUSH
INTENSITY	3 o'clock position
TRIG LEVEL VR	Mechanical center
TRIG LEVEL AUTO	PULL
SYNC	SLOPE
SOURCE	INT
FOCUS	Optimum position
CH1 V. POSITION	Mechanical center
CH1 AC-GND-DC	AC
CH1 VOLTS/DIV	10mV
CH1 V. VARIABLE	CAL
CH2 V. POSITION	Mechanical center
CH2 AC-GND-DC	AC
CH2 VOLTS/DIV	10mV
CH2 V. VARIABLE	CAL

POWER AND CRT CIRCUIT ADJUSTMENTS

−1.9 kV Adjustment

1. Connect a DC voltmeter to measure the voltage at the CRT's socket pin 1 or 3 with respect to chassis.
2. Adjust VR107 for a −1.9 kV reading on the meter.

+180 V Adjustment

1. Connect a DC voltmeter to measure the voltage at the pin 15 of P118 with respect to chassis.
2. Adjust VR109 for +180 V reading on the meter.

INTENSITY Adjustment

1. Pull the PULL AUTO knob to display a horizontal trace.
2. Adjust VR108 so that the trace disappears when the INTENSITY control setting is reduced to the 10-o'clock position.

ASTIG Adjustment

1. Set the SWEEP TIME/DIV control to X-Y position and both CH1 and CH2 AC-GND-DC switches to GND position.
   This will produce a spot on the screen.
2. Adjust the FOCUS and ASTIG controls on the front panel for the sharpest, roundest spot. If the spot does not round and sharp, adjust VR106 for the sharpest, roundest spot.
   Do not readjust the ASTIG control after this step.

VERTICAL AXIS ADJUSTMENT

DC BAL adjustments

VARI ATT BAL and STEP ATT BAL Adjustments

1. Set scope controls for a single horizontal trace on CH1 with the CH1 AC-GND-DC switch set to GND position and set the SWEEP TIME/DIV control to 1 ms position.
2. Rotate the CH1 VARIABLE control from maximum clockwise to maximum counterclockwise, while observing the trace.
3. If the trace moves vertically, adjust VR101 for minimum or zero vertical movement when performing step 2.
4. Rotate the CH1 VOLTS/DIV CONTROL through the 1 mV, 50 mV and 20 V position while observing the trace.
5. If the trace moves vertically, adjust VR401 for minimum or zero vertical movement when performing step 4.
6. Repeat the entire procedure for CH2, adjusting VR111 for VARIABLE balance and VR402 (VOLTS/DIV) STEP balance.

NOTE:

After adjusting VARI, be sure adjust STEP.

▲▼ POSITION and CRT Centering Adjustment

1. Set the CH1 AC-GND-AC switch to the GND position, the MODE switch to the DUAL position and SWEEP TIME/DIV control to 1 ms position.
2. Set the CH1 and CH2 ▲▼ POSITION controls to these mechanical center.
3. Pull the PULL AUTO knob to display a trace.
4. Short-circuit the test terminal TP101 and TP102 of the vertical amplifier board.
5. Adjust VR105 to center the trace vertically.

ADJUSTMENT

Vertical Gain Adjustment

1. Set the MODE switch to the CH1 position.
2. Connect the CH1 input terminal to the CAL⌐¬1 Vp-p terminal.
3. Set the CH1 VARIABLE control to the CAL position, and the VOLTS/DIV control to 20 mV (probe set for DIRECT measurement).
4. Adjust VR103 for exactly 5 divisions vertical amplitude of 1 kHz square wave signal display.
5. Repeat the entire procedure for CH2, adjusting VR113.

1 kHz Square Wave Compensation

1. Set the VOLTS/DIV control to 1 mV and apply a 1 kHz, 50 mV square wave signal.
2. Rotate the VOLTS/DIV control to 10 mV (10:1), 1 V (100:1) and 10 V (1000:1) position.
3. Adjust TC101 (10:1), TC102 (100:1) and TC103 (1000:1) to make sure that the vertical amplitude is set to 5 divisions on the screen.
4. Repeat the entire procedure for CH2, adjusting TC104 (10:1), TC105 (100:1) and TC106 (1000:1).

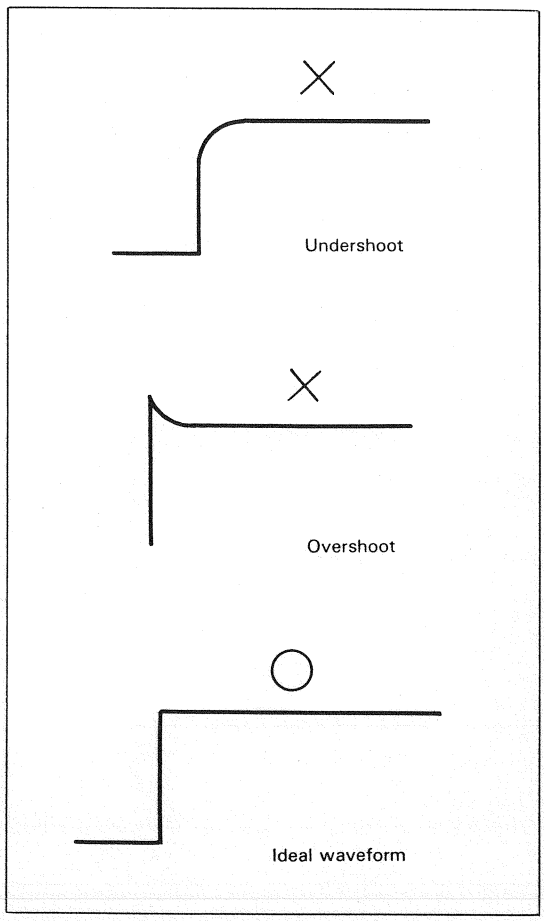


Fig. 8. 1 kHz Square wave compensation

100 kHz Square Wave Compensation

1. Set the VOLTS/DIV control 1 mV, the MODE switch to CH1 position.
2. Apply a 100 kHz square wave signal through a 50 Ω terminator to the CH1 input and adjust the vertical amplitude to 5 divisions on the screen.
3. Rotate the VOLTS/DIV control to 10 mV, 1 V and 10 V position.
4. Adjust TC113 and VR104 to make sure that the vertical amplitude is set to 5 divisions on the screen.

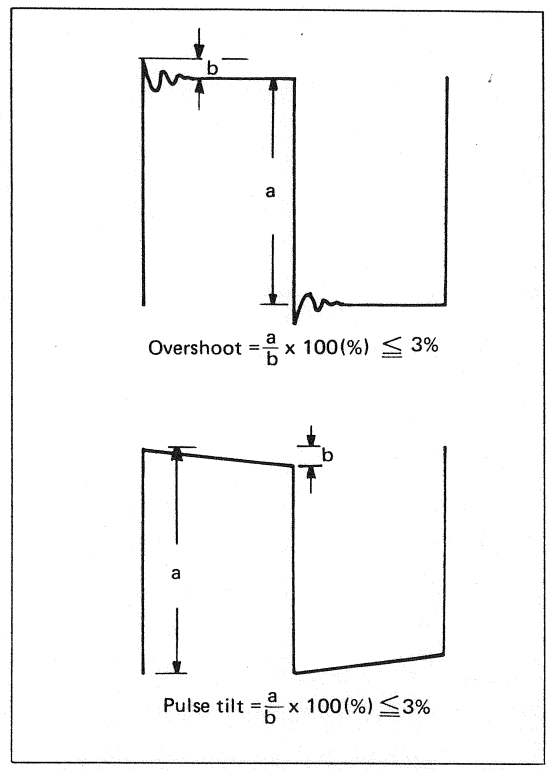


Fig. 9. 100kHz Squarewave Compensation

Input Capacity Adjustment

1. Connect a Q meter to measure the input terminal and make sure that the input capacity is 22pF ± 3pF.
2. Rotate the VOLTS/DIV control through 10 mV, 1 V and 10 V position, adjusting TC107 (10:1), TC108 (100:1) and TC109 (1000:1) so that the input capacity of each range is 22pF ± 3pF.
3. Repeat the entire procedure for CH2, adjusting TC110, TC111 and TC112.

ADJUSTMENT

CALIBRATING VOLTAGE ADJUSTMENT

1. Connect out of CAL 1 kHz ⎍ 1 Vp-p terminal to frequency counter and check the frequency to 1 kHz indication on frequency counter.
2. Connect output of CAL 1 kHz ⎍ 1 Vp-p terminal to CH1 input and set oscilloscope controls to display one cycle of square wave.
3. Adjust VR301 so that the square wave is symmetrical, that is so that positive and negative portions of the trace are equal in length.
4. The CH1 attenuator must be previously calibrated as prescribed in this manual to perform this step.
   Set CH1 VOLTS/DIV control to 0.2 V position and VARIABLE control to CAL, adjust VR301 for 5 divisions amplitude.

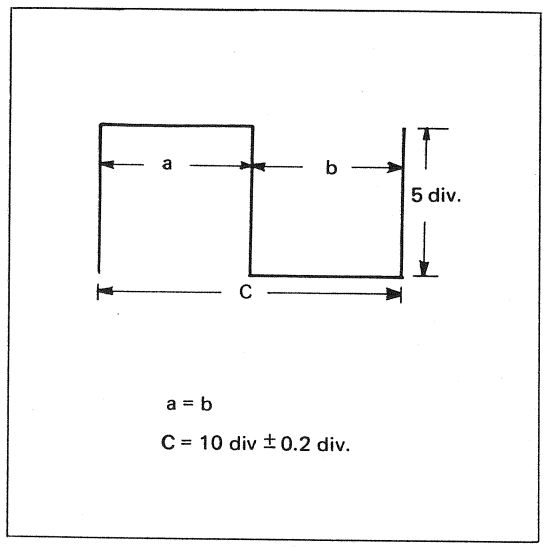


Fig. 10

HORIZONTAL SWEEP AXIS ADJUSTMENT

Sweep Time and Length Adjustments.

1. Set SWEEP TIME/DIV control to 0.1 ms position and VARIABLE control to CAL.
2. Apply 1 ms marker signal to CH1 input terminal.
1. Adjust VR306 so that the 10 visible marker occupy exactly 9 divisions of horizontal deflection as shown in Fig. 11.
3. Adjust VR309 for a total sweep length of 10-1/2 divisions.

◀▶POSITION Adjustment

1. Set ◀▶ POSITION control at its mechanical center.
2. Set oscilloscope controls to display a single horizontal trace.
3. With the SWEEP TIME/DIV control, set to 0.1 ms, apply 1 ms marker signal to the CH1 to display 3 wave on the screen as shown in Fig. 12.
4. Next, adjust VR305 until the center of the 3 waves corresponds to the Y-axis on the graticule scale.

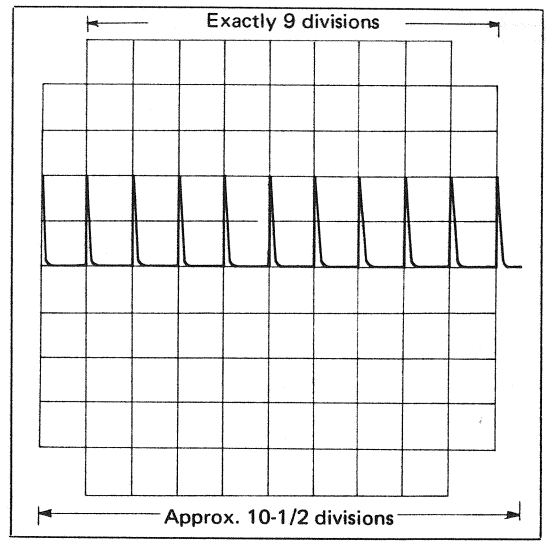


Fig. 11. Sweep Length

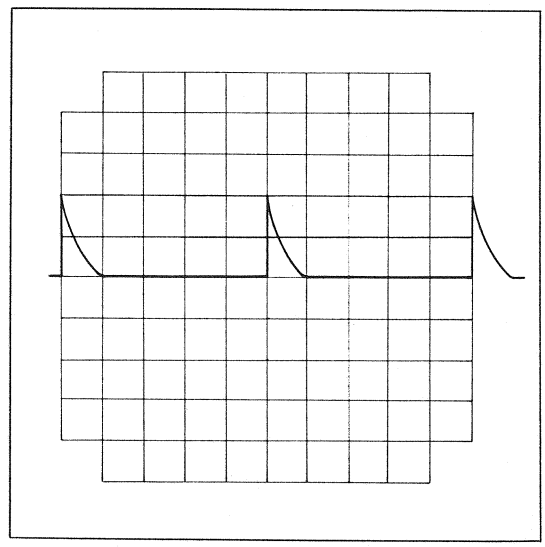


Fig. 12

10 μs Range Adjustment

1. Set the SWEEP TIME/DIV control to 10 μs and apply 10 μs marker signal to the CH1 input terminal.
2. Adjust TC301 to duplicate the conditions shown in Fig. 10.

MAG Centering and MAG Gain Adjustment

1. With the SWEEP TIME/DIV control to 0.1 ms, apply a 1 ms marker signal to the CH1 input terminal to display 11 pulses on the screen.
2. Alternately pull and push the ×5 MAG knob. Adjust VR305 (MAG centering) so that the center marker remain stationary whether the PULL × MAG switch is on or off. Do not rotate the ◀▶POSITION control.
3. Adjust VR305 (MAG gain) so that the marker is one division apart in normal operation are ecactly 5 divisions apart in ×5 MAG operation.

ADJUSTMENT

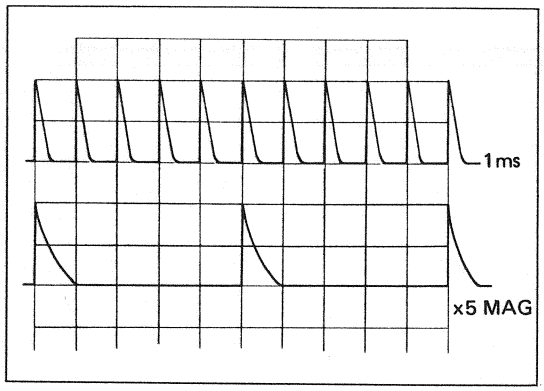


Fig. 13.

X POSITION and Gain Adjustment

1. Set the CH2 ▲▼ POSITION control to its mechanical center.
2. Set the CH2 AC-GND-DC switch to GND position.
3. Set the SWEEP TIME/DIV control to X-Y position. A spot should appear on the screen.
4. Adjust the VR308 (X position) to center the spot horizontally on the screen.
5. Set the CH2 VOLTS/DIV control to 0.1 mV position and VARIABLE knob to CAL.
6. Set the CH2 AC-GND-DC switch to AC position and apply a calibrated 1 kHz, 50 mVp-p sine wave to the CH2 input terminal.
7. Adjust VR110 (X gain) for exactly 5 divisions horizontal deflection on the screen.

Triggering Level Adjustment

1. Apply a 1 kHz sine wave and set the oscilloscope controls to display waveform on the screen at 5 divisions amplitude.
2. Adjust VR311 to make waveform stable with TRIG LEVEL control at its mechanical center.
3. Triggering should be satisfactory when amplitude is less than 1 division through a frequency range of 20 Hz to 10 MHz.

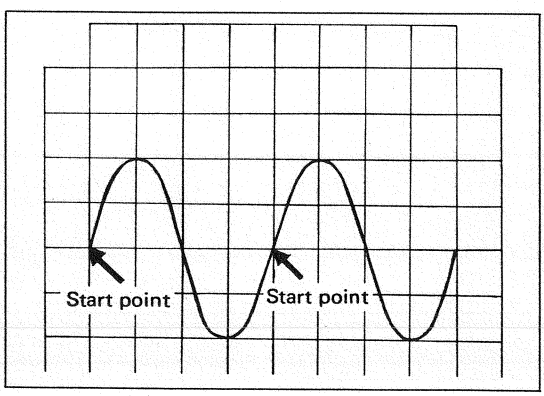


Fig. 14

FUNCTION OF ADJUSTMENTS ON EACH UNIT

Vertical Amplifier Board (X65-1140-22)

VR101	CH1 DC BAL (VARI) adj.
VR103	CH1 V. gain adj.
VR104	High frequency waveform compensation
VR105	CRT centering adj.
VR106	ASTIG adj.
VR107	−1.9 kV adj.
VR108	INTENSITY adj.
VR109	+180 V adj.
VR110	X gain adj.
VR111	CH2 DC BAL (STEP) adj.
VR113	CH1 gain adj.
TC101	CH1 10:1 attenuate square wave compensation
TC102	CH1 100:1 attenuate square wave compensation
TC103	CH1 1000:1 attenuate square wave compensation
TC104	CH2 10:1 attenuate square wave compensation
TC105	CH2 100:1 attenuate square wave compensation
TC106	CH2 1000:1 attenuate square wave compensation
TC107	CH1 10:1 attenuate input capacity adj.
TC108	CH1 100:1 attenuate input capacity adj.
TC109	CH1 1000:1 attenuate input capacity adj.
TC110	CH2 10:1 attenuate input capacity adj.
TC111	CH2 100:1 attenuate input capacity adj.
TC112	CH2 1000:1 attenuate input capacity adj.
TC113	Mid frequency overshoot adj.

Variable Amplifier Board (X73-1190-00)

VR401	CH1 DC BAL (VARI)
VR402	CH2 DC BAL (STEP)

Horizontal Sweep Board (X74-1060-00)

VR301	CAL adj.
VR303	×5 MAG gain adj.
VR304	×5 MAG centering adj.
VR305	◀▶H. POSITION adj.
VR306	Sweep time adj.
VR308	X. position adj.
VR309	Sweep length adj.
VR311	TRIG LEVEL adj.
TC301	Sweep time adj. (1 μs−50 μs)

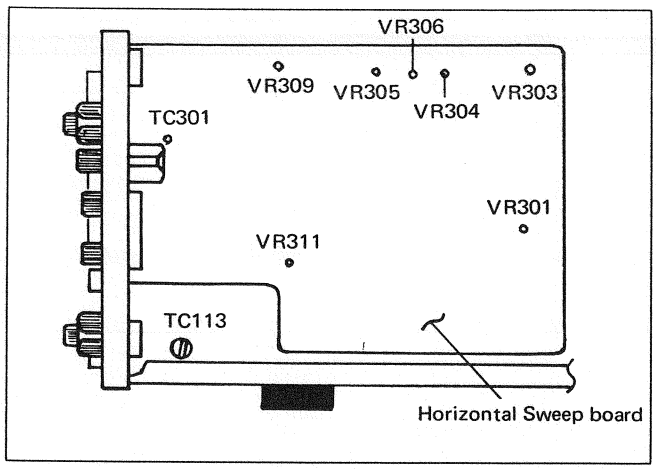


Fig. 15. Location of Adjustment, right side of scope

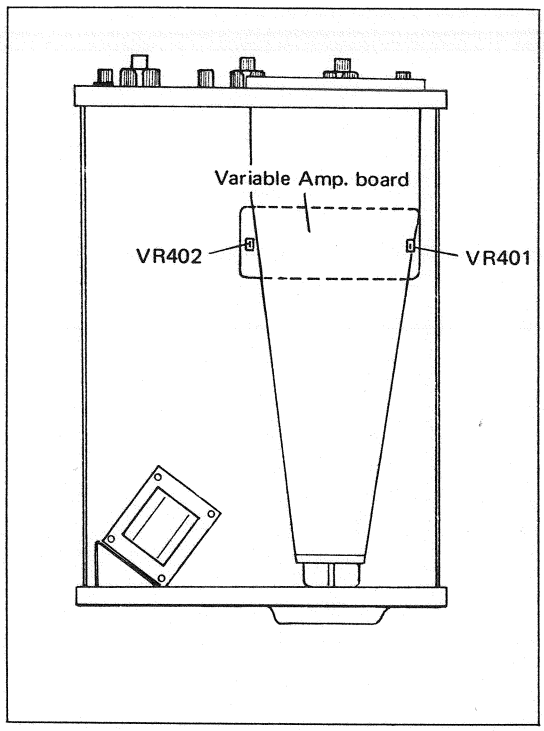


Fig. 16. Location of Adjustment top side of view

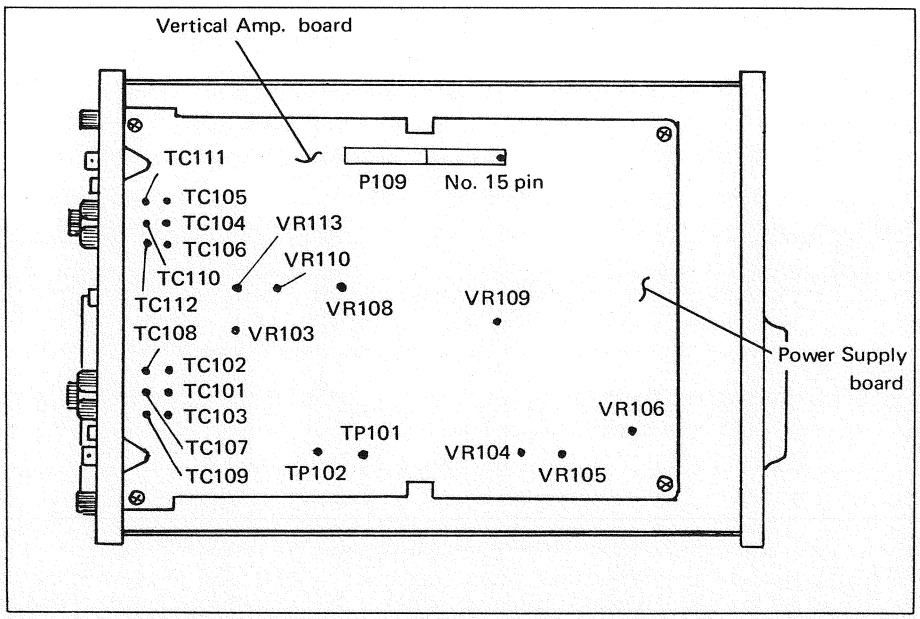
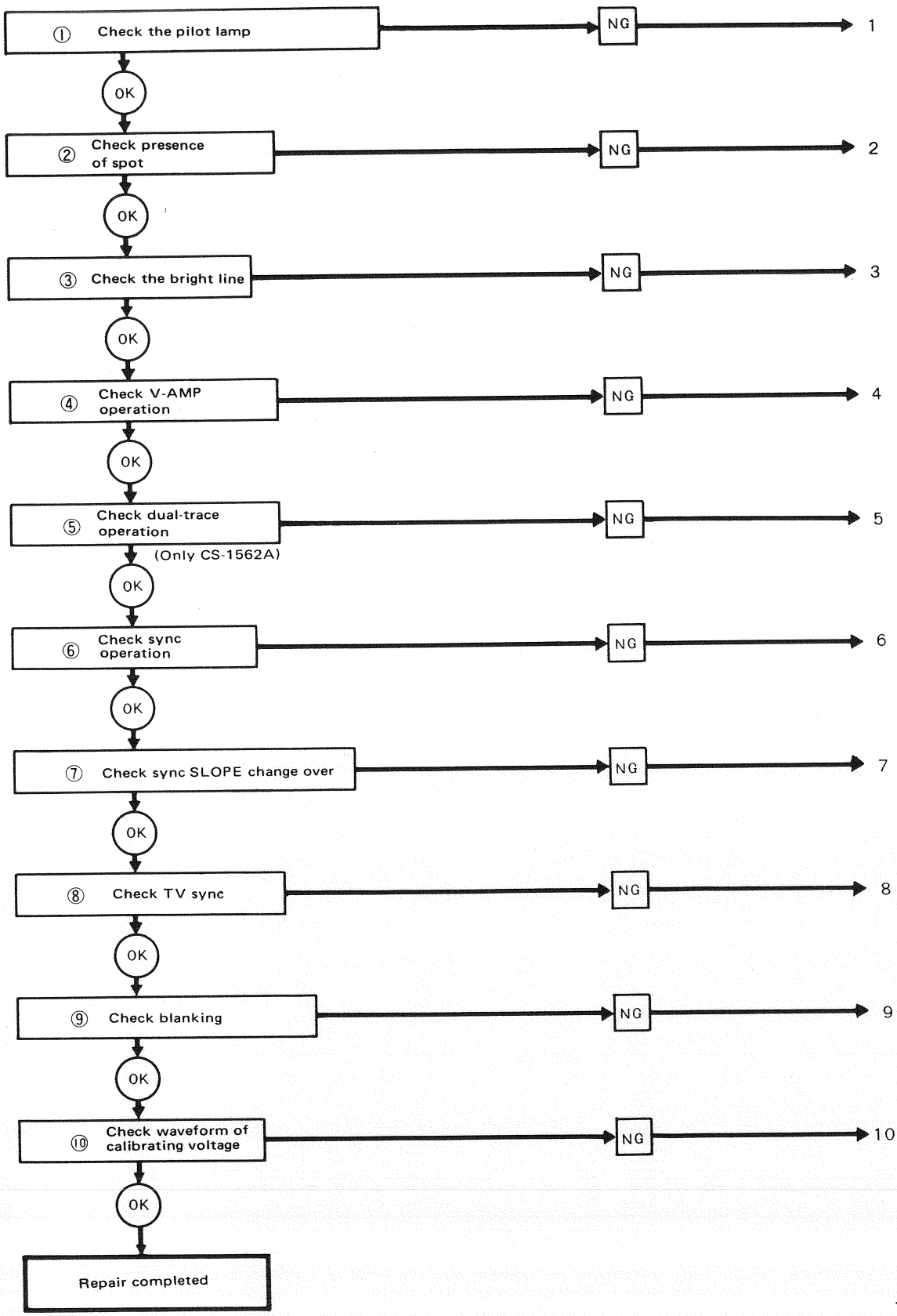


Fig. 17. Location of Adjustment (bottom side of view)

TROUBLESHOOTING

TROUBLESHOOTING

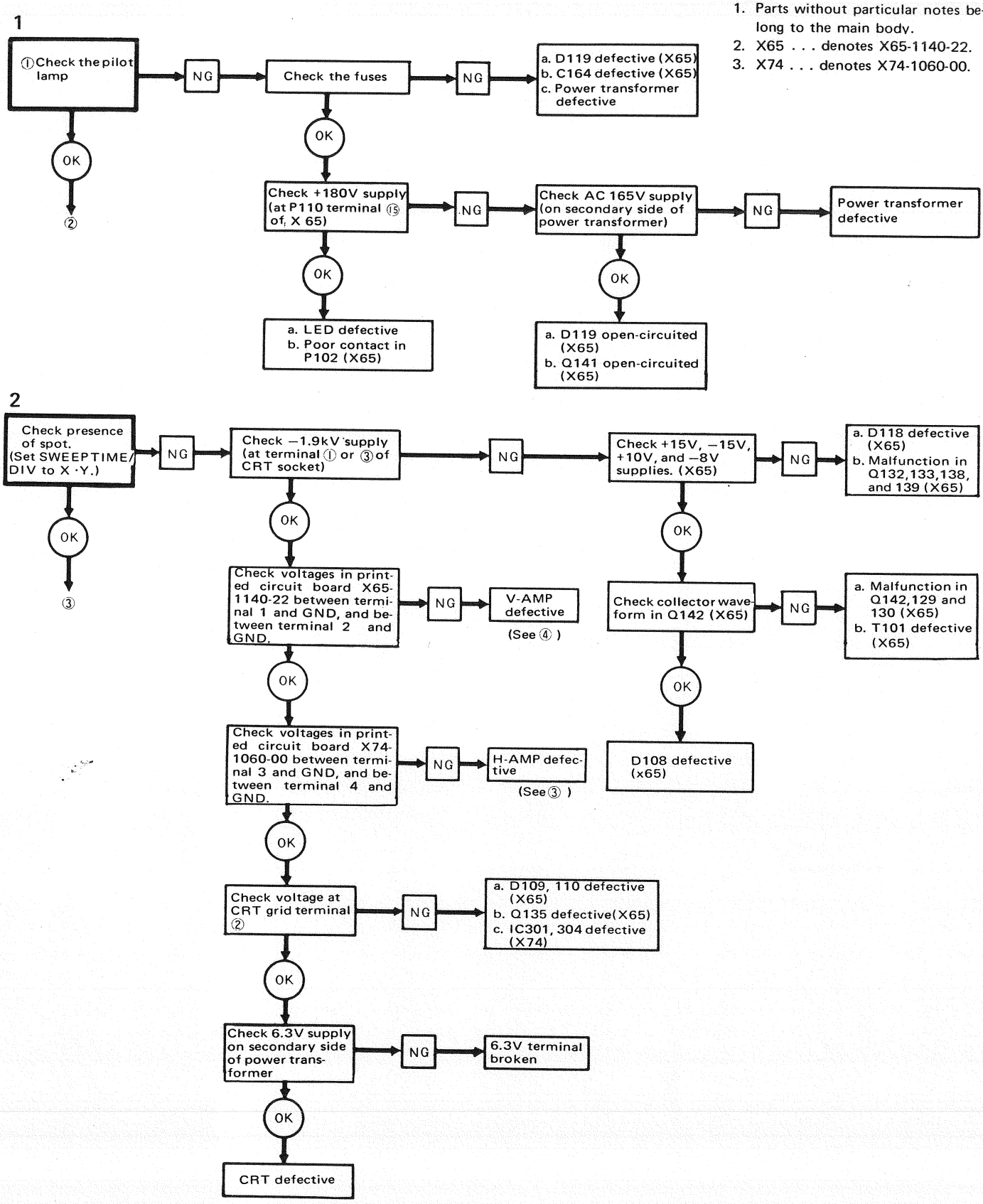


TROUBLESHOOTING

(Common to CS-1562 and CS-1559A)

Notes:

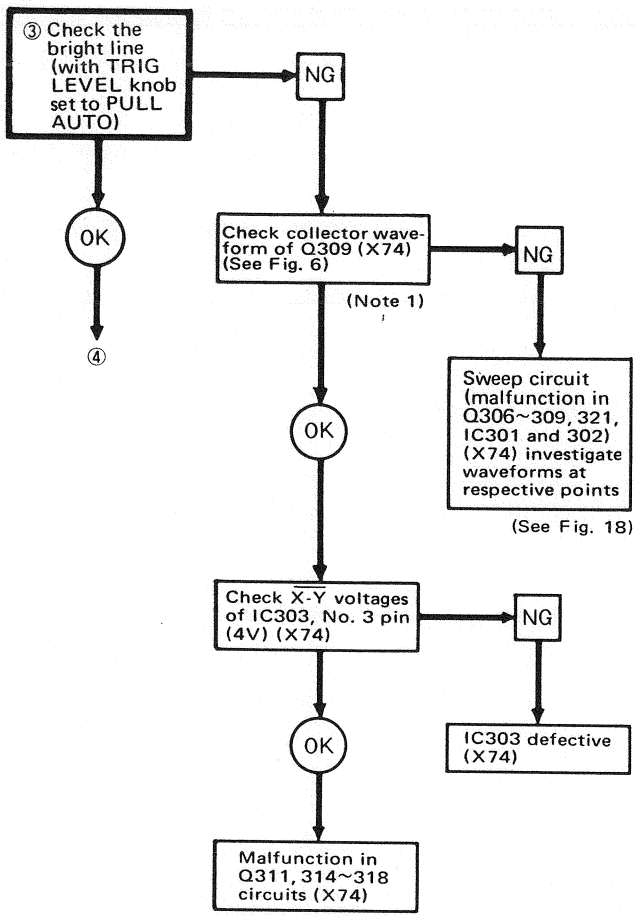
1. Parts without particular notes belong to the main body.
2. X65 . . . denotes X65-1140-22.
3. X74 . . . denotes X74-1060-00.



TROUBLESHOOTING

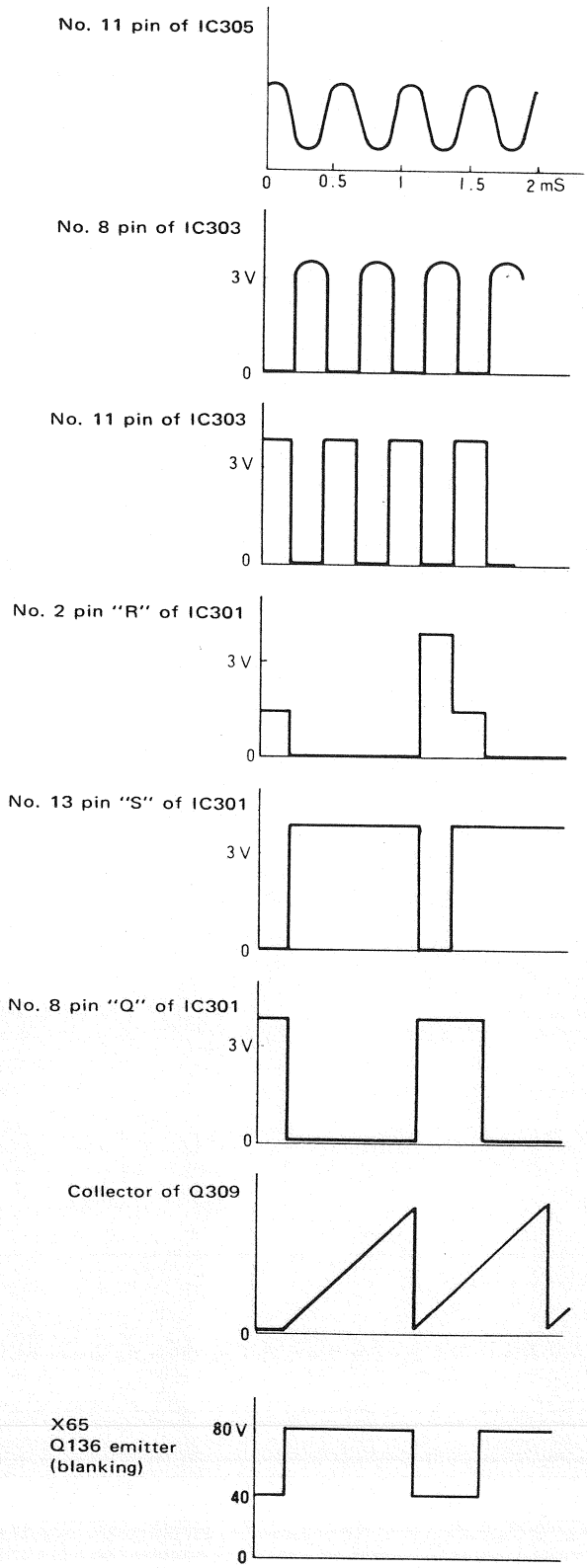
(CS-1562A only)

3



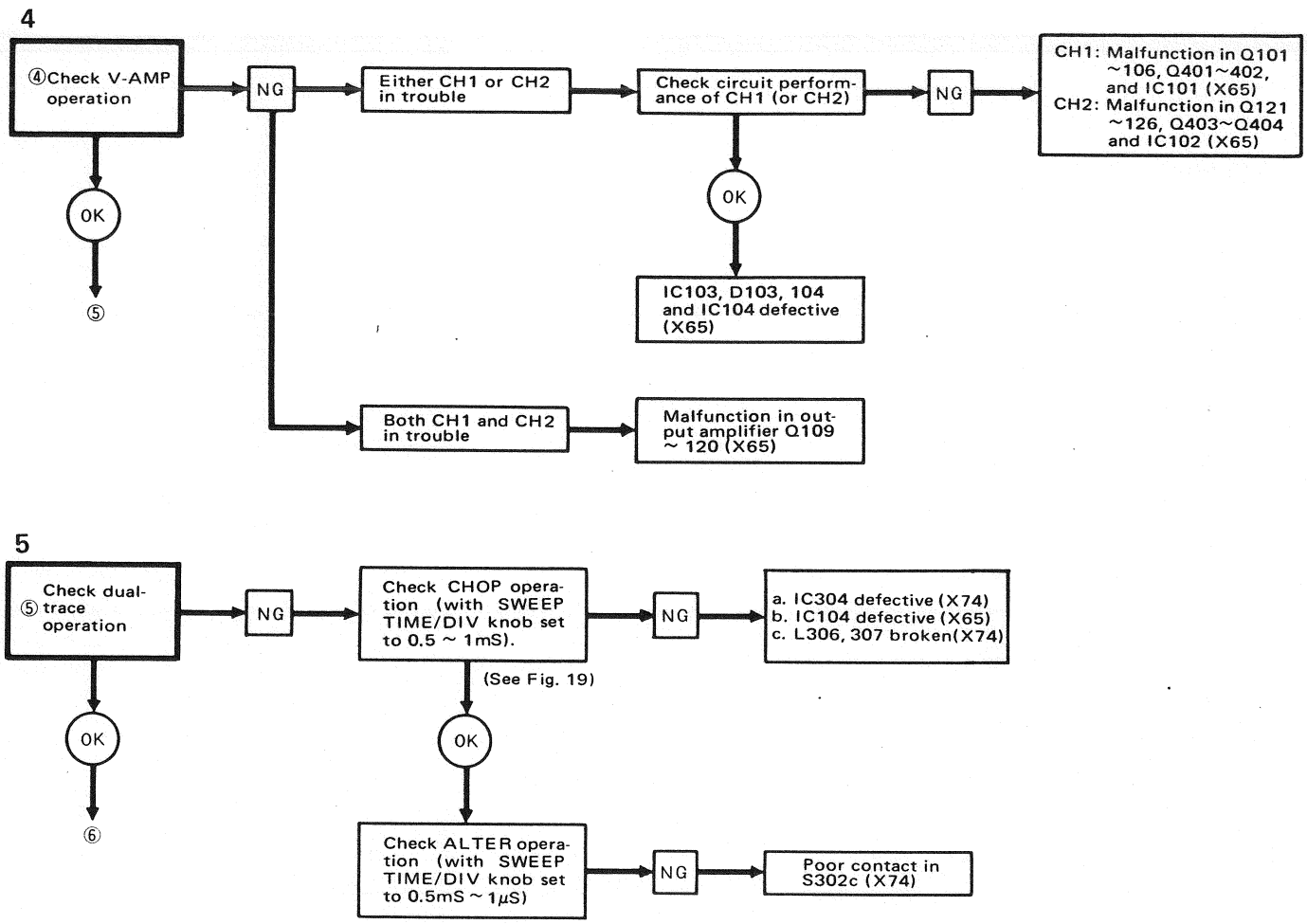
Note 1:
Add sine wave of 2 kHz to CH1 or CH2 vertical input terminal.

Fig.18 Waveform in SWEEP Circuit (Input Signal 2 kHz, Sine Wave) (SWEEP TIME 0.1 mS/DIV) (X74-1060-00)



TROUBLESHOOTING

(CS-1562A only)



Note:
Add sine wave of 2 kHz to CH1 or CH2 vertical input terminal when checking items No. 4 ~ 9 (except No. 8).

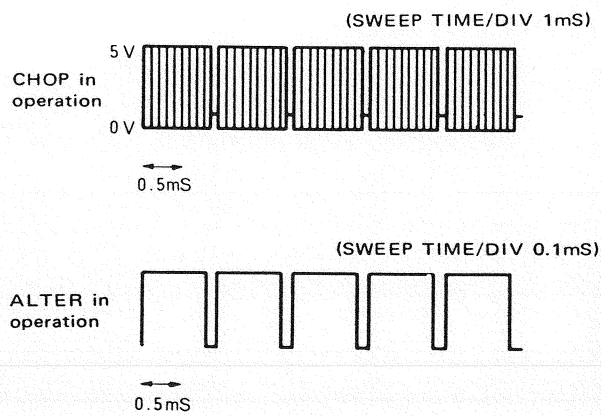
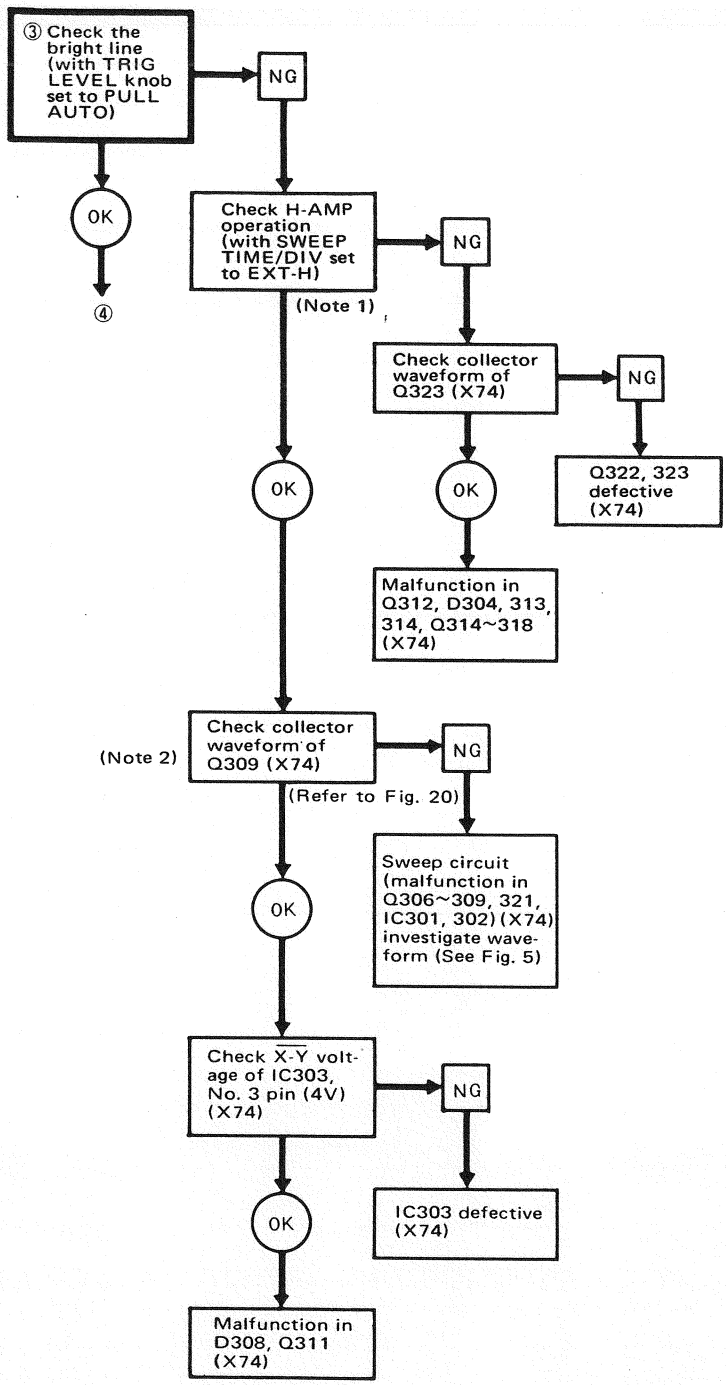


Fig. 19 C, P Waveforms at No. 8 Pin of J310

TROUBLESHOOTING

(CS-1559A only)

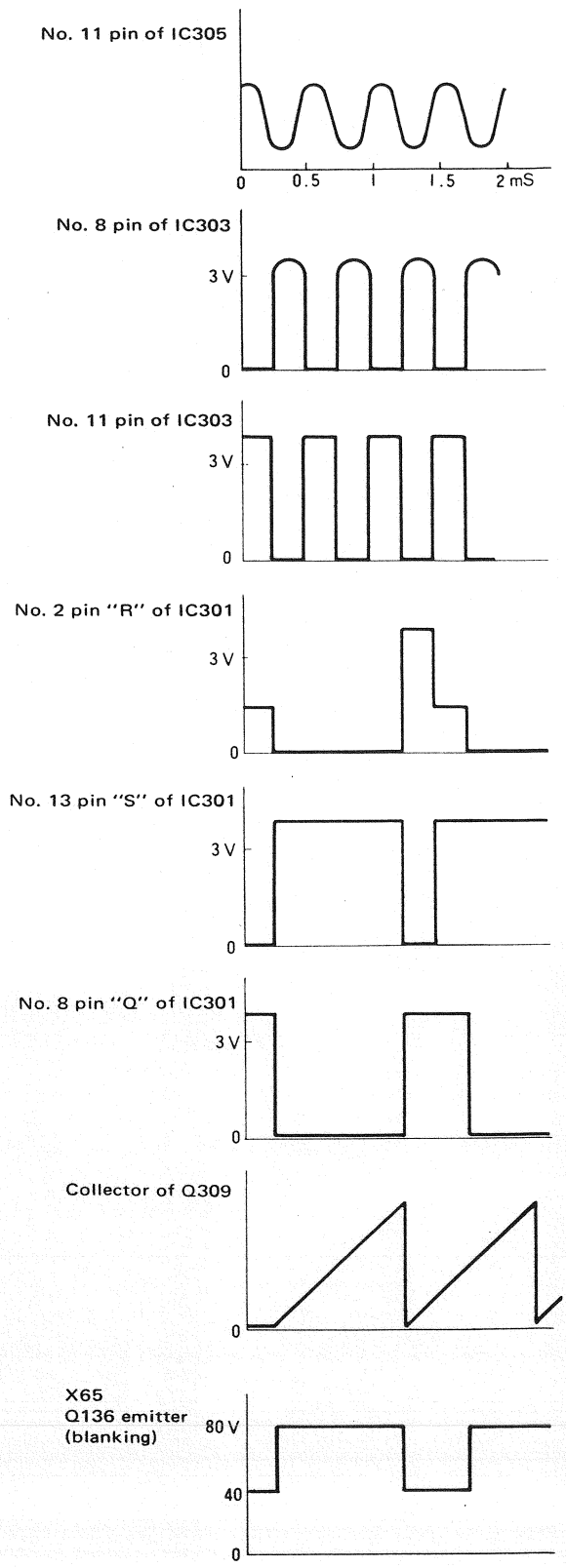
3



Notes:

1. Add sine wave of 1 kHz, 2V to HOR, INPUT terminal.
2. Add sine wave of 2 kHz to vertical input terminal.

Fig. 20 Waveform in SWEEP Circuit (Input Signal 2 kHz, Sine Wave) (SWEEP TIME 0.1 mS/DIV) (X74-1060-01)

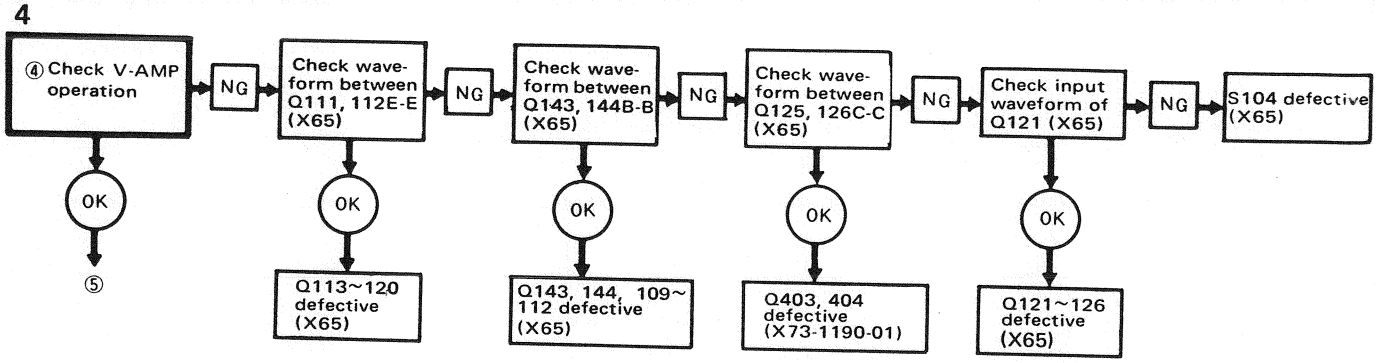


TROUBLESHOOTING

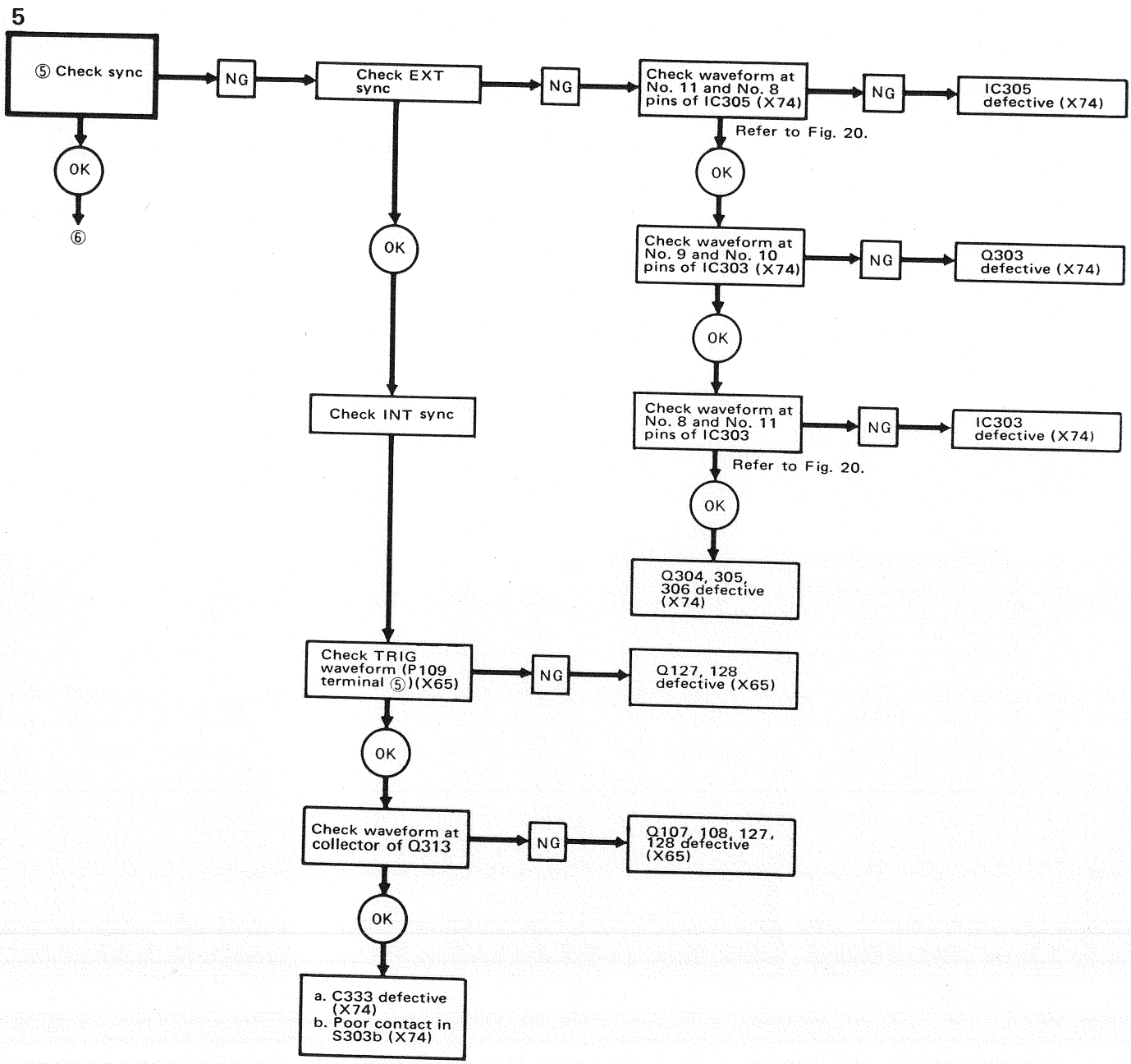
(CS-1559A only)

Note: Add sine wave of 2 kHz to vertical input terminal when checking items No. 4~8 (except No. 7).

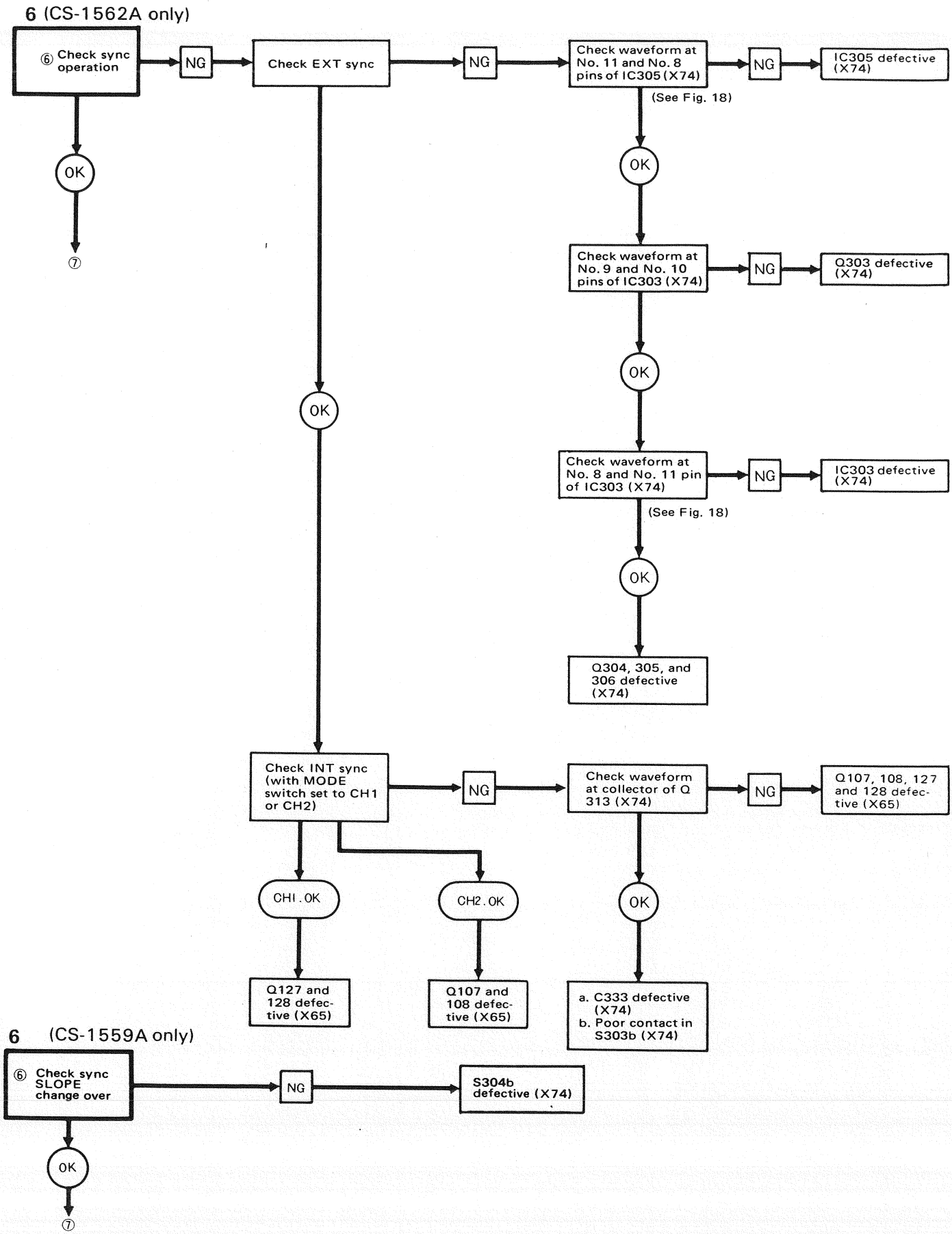
4



5

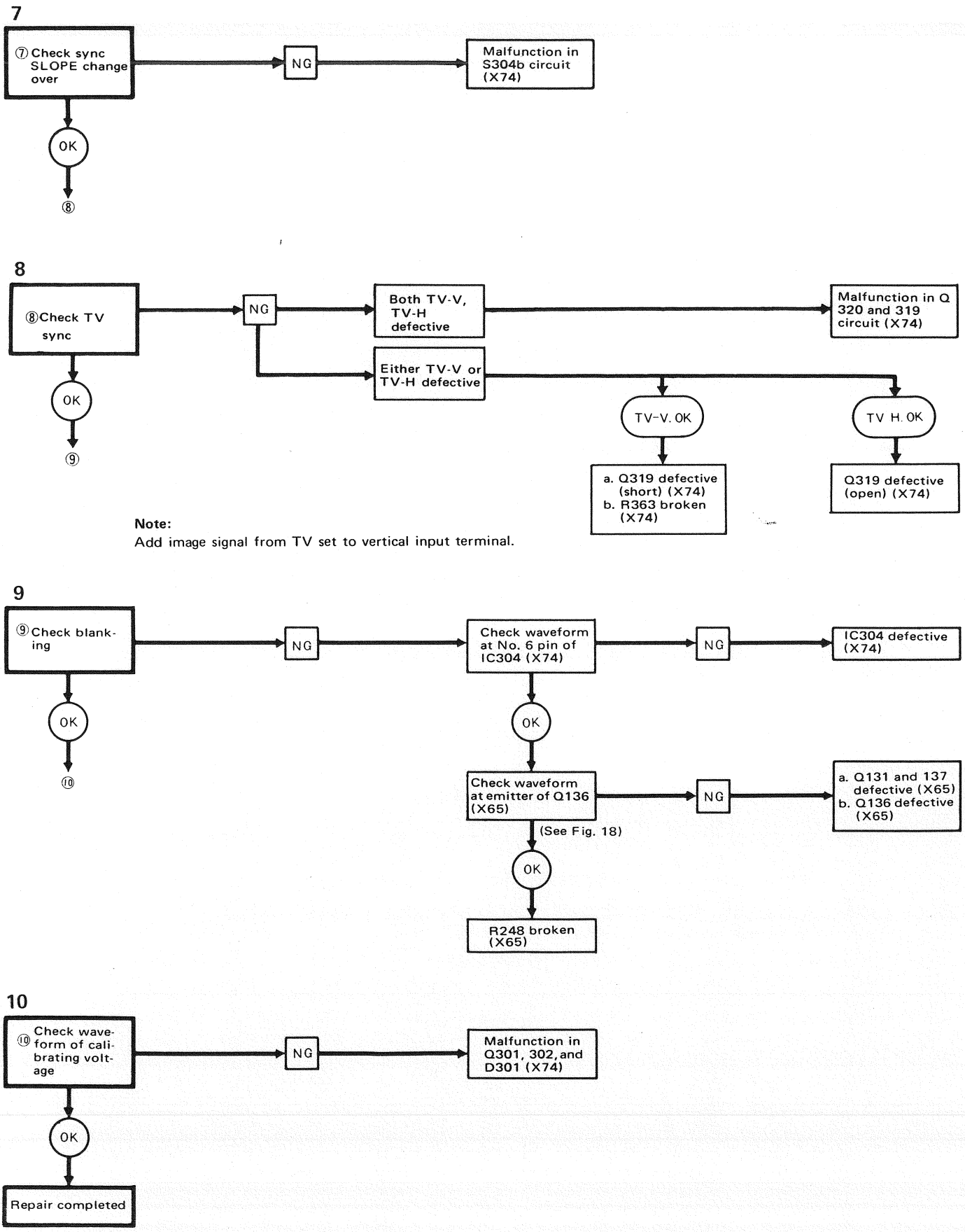


TROUBLESHOOTING



TROUBLESHOOTING

(Common to CS-1562A and CS-1559A)



PARTS LIST

CHASSIS (CS-1562A)

Ref. No.	Parts No.	Description
–	A01-0827-12	Case
–	A10-1402-42	Chassis
–	A21-0843-22	Decorative panel
–	A20-2733-22	Die casting panel
–	A23-1601-22	Rear panel
–	A40-0701-23	Bottom plate
–	B07-0707-03	Bezel frame
–	B19-0704-04	Filter
–	B20-0903-14	Graticule
–	B30-0110-05	Lamp ass'y
–	B40-0765-14	Name plate (Serial No.)
–	B41-0701-14	Name plate (Power source)
–	B50-2867-00	Instruction manual
–	B40-2740-03	Name plate (Model)
–	E01-1403-05	CRT socket
–	E03-0201-05	Power connector
–	E04-0251-05	BNC receptacle
–	E21-0654-04	CAL terminal
–	E13-0104-05	Phono jack
–	E14-0101-05	Phono plug
–	E18-0106-05	Banana jack
–	E18-0107-05	Banana jack (Black)
–	E22-0481-05	Grounding lug
–	E23-0501-14	Grounding plate
–	E30-0551-35	Lead wire with connector (1P)
–	E30-0554-15	Lead wire with connector (3P)
–	E30-0555-15	Lead wire with connector (4P)
–	E31-0502-05	Lead wire with connector (3P)
–	E31-0507-15	Lead wire with connector (4P)
–	E31-0532-05	Lead wire with connector (1P) (For GND)
–	E31-0627-15	Lead wire with connector (1P) (For CAL)
–	E30-1818-05	Power cord (JIS)
–	F05-3011-05	Fuse 0.3A
–	F05-7011-05	Fuse 0.7A
–	F07-0901-04	CRT cover
–	F07-0908-14	Handle cover
–	F10-1525-24	Shield cover (For bezel)
–	F10-1501-24	Shield plate
–	F11-0230-13	Shield case
–	F11-0902-13	Shield cover (For CRT)
–	F15-0186-04	Felt
–	F15-0138-04	Felt
–	G02-0603-14	Spring (For handle)
–	G13-0090-04	Mounting rubber (For CRT)
–	J02-0501-05	Rubber leg
–	J10-0053-13	Bezel ass'y
–	J10-0052-12	Bezel
–	J13-0033-15	Fuse holder
–	J61-0039-05	Clip (For wire)
–	J19-0457-14	CRT band (1)
–	J19-0458-14	CRT band (2)
–	J21-2801-03	Bracket (For power transformer)
–	J21-2802-04	Bracket (For P.C. Board)
–	J21-2875-15	Mounting hardware (For handle)
–	J21-2876-05	Mounting hardware (For handle)
–	J61-0049-05	Cable band
–	J61-0501-05	Support (For P.C. Board)
–	J41-0003-05	Bushing (For power cord)
–	K21-0819-03	Knob
–	K21-0820-04	Knob
–	K21-0822-14	Knob
–	K27-0501-04	Lever knob (Black)
–	K27-0502-04	Lever knob (Grey)
–	K21-0825-04	Knob
–	K01-0507-05	Handle

Ref. No.	Parts No.	Description
Q1		Transistor 2SA733 (Q,R)
Q2		Transistor 2SC945 (P)
–	L01-9006-25	Power transformer
–	L40-3391-41	Ferri-inductor 3.3μH
R1,2	RD14BB2E331J	Carbon resistor 330Ω ±5% 1/4W
VR1	R05-8001-05	Variable resistor 3MΩ
VR2	R01-1011-05	Variable resistor 1kΩ B
VR3	R01-2012-05	Variable resistor (with S2 switch)
VR4	R19-9501-05	Variable resistor (For trace rotation) 10kΩ B
–		CRT C529P31B or 130BEB31
S1	S59-2501-15	Power switch
–	L39-0505-05	Rotator coil
–	N08-0606-05	Hex socket head screw
–	H25-0029-04	Polyethylene bag
–	H20-1701-24	Protection cover
–	H01-2855-04	Packing case
–	H12-0522-04	Cushion plate
–	H10-2807-02	Pad (foamed styrene)
–	X65-1140-22	Vertical power unit
–	X73-1190-00	Variable amplifier unit
–	X74-1060-00	Sweep circuit unit
–	X77-1020-00	Voltage selector unit

MAIN CHASSIS (CS-1559A)

Ref. No.	Parts No.	Description
R1,2	RD14BB2E331J	Carbon resistor 330Ω ±5% 1/4W
VR1	R05-8001-05	Variable resistor 3MΩ
VR2,S1	R03-1021-05	Variable resistor w/switch 1kΩ B
VR3	R08-2501-05	Variable resistor w/switch 5kΩ B×2
VR4	R01-3027-05	Variable resistor (For trace rotation) 10kΩ B
Q1		Transistor 2SA733 (Q,R)
Q2		Transistor 2SC945 (P)
L1,2	L40-3391-14	Ferri-inductor 3.3μH
–	L39-0505-05	Rotator coil
T1	L01-9006-25	Power transformer
–	N08-0606-05	Hex socket head screw
–		CRT 130BEB31 or C529P31B
–	A01-0822-12	Case
–	A10-1402-42	Chassis
–	A20-2733-25	Panel
–	A21-0844-22	Decorative panel
–	A23-1601-22	Rear panel
–	A40-0701-23	Bottom plate
–	B19-0704-04	Filter
–	B20-0903-14	Graticule
–	B30-0110-05	Lamp ass'y
–	B40-2765-04	Name plate
–	B40-2741-03	Model name plate
–	B41-0701-14	Name plate (Power source)
–	B50-2868-00	Instruction manual

PARTS LIST

Ref. No.	Parts No.	Description
–	E01-1403-05	CRT socket
J11	E03-0201-05	Power connector
J1	E04-0251-05	BNC Receptacle
J10	E13-0104-05	Phone jack
J5	E21-0654-04	CAL terminal
–	E14-0101-05	Phone plug
J6,9	E18-0106-05	Banana jack
J7	E18-0107-05	Banana jack (Black)
–	E21-0481-05	Grounding lug
–	E23-0501-14	Grounding plate
–	E30-0551-35	Lead wire w/1P connector
–	E30-0554-15	Lead wire w/3P connector
–	E30-0555-15	Lead wire w/4P connector
–	E31-0502-05	Lead wire w/3P connector
–	E31-0507-15	Lead wire w/4P connector
–	E31-0532-05	Lead wire w/1P connector
–	F05-3011-05	Fuse 0.3A
–	F05-7011-05	Fuse 0.7A
–	F07-0901-04	Cover
–	F07-0908-14	Handle cover
–	F10-1501-24	Shield plate
–	F11-0230-13	Shield case
–	F11-0902-01	Shield cover (For CRT)
–	F15-0186-04	Felf (170×10)
–	F15-0701-04	Felt (420×20×t2)
–	G02-0603-14	Spring (For handle)
–	G13-0090-04	Mounting rubber CRT ×2
–	G53-0601-04	Bezel bush
–	G53-0015-14	Antenna bush
–	H10-2807-02	Pad, foamed styrene
–	H10-2806-04	Packing case
–	H12-0522-04	Cushion plate
–	H20-1701-24	Protection cover
–	H25-0029-04	Polyethylene bag
–	J02-0501-05	Rubber leg
–	J10-0054-13	Bezel assembly
–	J10-0052-12	Bezel
–	J13-0033-15	Fuse holder
–	J19-0389-05	Wire clip
–	J19-0457-14	CRT band (1)
–	J19-0458-14	CRT band (2)
–	J21-2801-03	Bracket (For power transformer)
–	J21-2802-04	Bracket (For P.C. Board)
–	J21-2805-05	Grip mounting hardware
–	J21-2876-05	Support (For P.C. Board)
–	J30-0601-04	Spacer (volume)
–	J42-0501-04	Bush
–	J61-0501-05	Support × 3
–	J61-0049-05	Cable band × 5
–	K01-0507-05	Grip assembly
–	K21-0819-03	Knob × 2
–	K21-0820-04	Knob × 2
–	K21-0822-14	Knob × 3
–	K27-0501-04	Lever knob × 2
–	K27-0502-04	Lever knob × 3
–	W01-0058-04	Cord winder
–	X65-1150-00	Vertical power unit
–	X73-1190-01	Veriable AMP unit
–	X74-1060-01	Sweep circuit unit
–	X77-1020-00	Voltage selector unit
–	E30-1818-05	JIS cord
–	Y87-1180-01	Probe (PC-21)

VERTICAL POWER UNIT (X65-1140-22)

Ref. No.	Parts No.	Description			
		RESISTOR			
R101	RD14BB2E470J	Carbon	47Ω	±5%	1/4W
R102	RN14BK2H9003F	Metal film	900kΩ	±1%	1/2W
R103	RN14BK2H9903F	Metal film	990kΩ	±1%	1/2W
R104	RN14BH2H9993F	Metal film	999kΩ	±1%	1/2W
R105	RN14BK2E1113F	Metal film	111kΩ	±1%	1/4W
R106	RN14BK2E1012F	Metal film	10.1kΩ	±1%	1/4W
R107	RN14BK2E1001F	Metal film	1kΩ	±1%	1/4W
R108	RN14BK2H1004F	Metal film	1MΩ	±1%	1/2W
R109	RD14BY2E104J	Carbon	100kΩ	±5%	1/4W
R110~115	RD14CB2E101J	Carbon	100Ω	±5%	1/4W
R116	RD14CB2E102J	Carbon	1kΩ	±5%	1/4W
R117,118	RD14CB2E153J	Carbon	15kΩ	±5%	1/4W
R119,120	RN14BK2E8201F	Metal film	8.2kΩ	±1%	1/4W
R121,122	RN14BK2E4301F	Metal film	4.3kΩ	±1%	1/4W
R123,124	R92-0704-15	Metal film	560Ω	±1%	1/4W
R125	RN14BK2E7410F	Metal film	741Ω	±1%	1/4W
R126	RN14BK2E3920F	Metal film	392Ω	±1%	1/4W
R127	RN14BK2E1150F	Metal film	115Ω	±1%	1/4W
R128	RD14BB2E4R7J	Carbon	4.7Ω	±5%	1/4W
R129	RD14BB2E100J	Carbon	10Ω	±5%	1/4W
R130,131	R92-0745-05	Metal film	3kΩ	±1%	1/4W
R132	RD14CB2E470J	Carbon	47Ω	±5%	1/4W
R133	RD14BB2E470J	Carbon	47Ω	±5%	1/4W
☆R134	RD14BB2E220J	Carbon	22Ω	±5%	1/4W
☆R135	RD14BB2E102J	Carbon	1kΩ	±5%	1/4W
R136	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R137~139	RD14BB2E472J	Carbon	4.7kΩ	±5%	1/4W
R140,141	RD14BB2E392J	Carbon	3.9kΩ	±5%	1/4W
☆R142	RD14BB2E222J	Carbon	2.2kΩ	±5%	1/4W
R143~148	RD14BB2E470J	Carbon	47Ω	±5%	1/4W
R149	RD14BB2E331J	Carbon	330Ω	±5%	1/4W
R150,151	RD14BB2E470J	Carbon	47Ω	±5%	1/4W
R152	RN14BK2H9003F	Metal film	900kΩ	±1%	1/2W
R153	RN14BK2H9903F	Metal film	990kΩ	±1%	1/2W
R154	RN14BK2H9993F	Metal film	999kΩ	±1%	1/2W
R155	RN14BK2E1113F	Metal film	111kΩ	±1%	1/4W
R156	RN14BK2E1012F	Metal film	10.1kΩ	±1%	1/4W
R157	RN14BK2E1001F	Metal film	1kΩ	±1%	1/4W
R158	RN14BK2H1004F	Metal film	1MΩ	±1%	1/2W
R159	RD14BB2E104J	Carbon	100kΩ	±5%	1/4W
R160~165	RD14CB2E101J	Carbon	100Ω	±5%	1/4W
R166	RD14CB2E102J	Carbon	1kΩ	±5%	1/4W
R167,168	RD14CB2E153J	Carbon	15kΩ	±5%	1/4W
R169,170	RN14BK2E8201F	Metal film	8.2kΩ	±1%	1/4W
R171,172	RN14BK2E4301F	Metal film	4.3kΩ	±1%	1/4W
R173,174	R92-0704-05	Metal film	560Ω	±1%	1/4W
R175	RN14BK2E7410F	Metal film	741Ω	±1%	1/4W
R176	RN14BK2E3920F	Metal film	392Ω	±1%	1/4W
R177	RN14BK2E1150F	Metal film	115Ω	±1%	1/4W
R178	RD14BB2E4R7J	Carbon	4.7Ω	±5%	1/4W
R179	RD14BB2E100J	Carbon	10Ω	±5%	1/4W
R180,181	R92-0745-05	Metal film	3kΩ	±1%	1/4W
R182	RD14BB2E470J	Carbon	47Ω	±5%	1/4W
R183	RD14CB2E470J	Carbon	47Ω	±5%	1/4W
R184	RD14BB2E220J	Carbon	22Ω	±5%	1/4W
R185	RD14BB2E102J	Carbon	1kΩ	±5%	1/4W
R186	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R187~189	RD14BB2E472J	Carbon	4.7kΩ	±5%	1/4W
R190,191	RD14BB2E392J	Carbon	3.9kΩ	±5%	1/4W
R192	RD14BB2E222J	Carbon	2.2kΩ	±5%	1/4W
R193~198	RD14BB2E470J	Carbon	47Ω	±5%	1/4W
R199	RD14BB2E181J	Carbon	180Ω	±5%	1/4W
R200	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R201	RD14BB2E331J	Carbon	330Ω	±5%	1/4W
R202,203	RD14BB2E102J	Carbon	1kΩ	±5%	1/4W
R204,205	RD14BB2E222J	Carbon	2.2kΩ	±5%	1/4W
R206~208	RD14BB2E470J	Carbon	47Ω	±5%	1/4W
R209	RD14BB2E471J	Carbon	470Ω	±5%	1/4W
R210	RD14BB2E474J	Carbon	470kΩ	±5%	1/4W
R211	RD14BB2E223J	Carbon	22kΩ	±5%	1/4W

PARTS LIST

Ref. No.	Parts No.	Description			
R212,213	RD14BB2E472J	Carbon	4.7kΩ	±5%	1/4W
R214,215	RD14BB2E473J	Carbon	47kΩ	±5%	1/4W
R216,217	RD14BB2E331J	Carbon	330Ω	±5%	1/4W
R218,219	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R220,221	RD14BB2E124J	Carbon	120kΩ	±5%	1/4W
R222	RD14BY2H683J	Carbon	68kΩ	±5%	1/2W
R223,224	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R225	RD14BB2E331J	Carbon	330Ω	±5%	1/4W
R226,227	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R228,229	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R230	RD14BB2E224J	Carbon	220kΩ	±5%	1/4W
R231	RD14BB2E104J	Carbon	100kΩ	±5%	1/4W
R232~235	R92-0146-05	Carbon	2.2MΩ	±5%	1W
R236	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R237	RC05GF2H105J	Carbon	1MΩ	±5%	1/2W
R238	RC05GF2H473J	Carbon	47kΩ	±5%	1/2W
R239,240	RC05GF2H226K	Carbon	22MΩ	±10%	1/2W
R241	RD14BB2E473J	Carbon	47kΩ	±5%	1/4W
R242	RD14BB2E471J	Carbon	470Ω	±5%	1/4W
R243	RD14BB2E472J	Carbon	4.7kΩ	±5%	1/4W
R244	RD14BB2E104J	Carbon	100kΩ	±5%	1/4W
R245	RD14BB2E470J	Carbon	47Ω	±5%	1/4W
R246	RD14BB2E102J	Carbon	1kΩ	±5%	1/4W
R247	RD14BB2E224J	Carbon	220kΩ	±5%	1/4W
R248	RD14BB2E333J	Carbon	33kΩ	±5%	1/4W
R249	RD14BB2E223J	Carbon	22kΩ	±5%	1/4W
R250,251	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R252,253	RD14BB2E102J	Carbon	1kΩ	±5%	1/4W
R254	RD14BB2E154J	Carbon	150kΩ	±5%	1/4W
R255	RD14BB2E683J	Carbon	68kΩ	±5%	1/4W
R256	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R257	RD14BB2E472J	Carbon	4.7kΩ	±5%	1/4W
R259	RD14BB2E682J	Carbon	6.8kΩ	±5%	1/4W
R260	RD14BB2E2R2J	Carbon	2.2Ω	±5%	1/4W
R261	RN14BK2E4301F	Metal film	4.3kΩ	±1%	1/4W
R262	RN14BK2E8210F	Metal film	8.2kΩ	±1%	1/4W
R263	RD14BB2E332J	Carbon	3.3kΩ	±5%	1/4W
R264	RD14BB2E2R2J	Carbon	2.2Ω	±5%	1/4W
R265	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R266	RD14BB2E332J	Carbon	3.3kΩ	±5%	1/4W
R267	RD14BB2E2R2J	Carbon	2.2Ω	±5%	1/4W
R268	RD14BB2E472J	Carbon	4.7kΩ	±5%	1/4W
R269	RD14BB2E123J	Carbon	12kΩ	±5%	1/4W
R270	RN14BK2E3003F	Metal film	300kΩ	±1%	1/4W
R271	RD14BB2E221J	Carbon	220Ω	±5%	1/4W
R272,273	RD14BB2E220J	Carbon	22Ω	±5%	1/4W
R274	RD14BB2E102J	Carbon	1kΩ	±5%	1/4W
R275	RD14BB2E104J	Carbon	100kΩ	±5%	1/4W
R276,277	RD14BB2E470J	Carbon	47Ω	±5%	1/4W
R278	RN14BK2E1332F	Metal film	13.3kΩ	±1%	1/4W
R279,280	RD14BB2E221J	Carbon	220Ω	±5%	1/4W
R281	RD14BB2E223J	Carbon	22kΩ	±5%	1/4W
	R92-0150-05	Jumper resistor			
CAPACITOR					
C101	C90-0021-05	Metal film	0.1μF	±5%	
C102	CM93BD2A470J	Mica	47pF	±5%	
C103	CM93BD2A471J	Mica	470pF	±5%	
C104	CQ93M1H332K	Mylar	3300pF	±10%	
C105	C91-0504-05	Polyester	0.0047μF		
C106	CK45F1H103Z	Ceramic	0.01μF	+80%,−20%	
C107	CC45CH1H100D	Ceramic	10pF	±0.5pF	
C108	CC45SL1H330J	Ceramic	33pF	±5%	
C109	CE04W1A101	Electrolytic	100μF	10WV	
C110	CK45F1H103Z	Ceramic	0.01μF	+80%,−20%	
C111	CC45SL1H220J	Ceramic	22pF	±5%	
C112	CE04W1C470	Electrolytic	47μF	16WV	
C113	CK45F1H103Z	Ceramic	0.01μF	+80%,−20%	
C114	CE04W1E330	Electrolytic	33μF	25WV	
C115	CK45F1H103Z	Ceramic	0.01μF	+80%,−20%	
C116	CC45CH1H100D	Ceramic	10pF	±0.5pF	
C117	C90-0298-05	Semiconductor ceramic	0.1μF	+80%,−20%	

Ref. No.	Parts No.	Description		
C118	CC45CH1H180J	Ceramic	18pF	±5%
C119	CK45F1H103Z	Ceramic	0.01μF	+80%,−20%
C121	C90-0021-05	Metal film	0.1μF	±5%
C122	CM93BD2A470J	Mica	47pF	±5%
C123	CM93BD2A471J	Mica	470pF	±5%
C124	CQ93M1H332K	Mylar	3300pF	±10%
C125	C91-0504-05	Polyester	0.0047μF	
C126	CK45F1H103Z	Ceramic	0.01μF	+100%,−0%
C127	CC45CH1H100D	Ceramic	10pF	±0.5pF
C128	CC45SL1H330J	Ceramic	33pF	±5%
C129	CE04W1A101	Electrolytic	100μF	10WV
C130	CK45F1H103Z	Ceramic	0.01μF	+80%,−20%
C131	CC45SL1H220J	Ceramic	22pF	±5%
C132,133	CE04W1A101	Electrolytic	100μF	10WV
C134,135	CC45CH2H010C	Ceramic	1pF	±0.25pF
C136	CK45D2H103M	Ceramic	0.01μF	±20%
C137,138	CK45D2H332M	Ceramic	3300pF	±20%
C139,140	CK45D2H103M	Ceramic	0.01μF	±20%
C141	CK45E3D102P	Ceramic	1000pF	+100%,−0%
C142~145	CK45E3D103P	Ceramic	0.01μF	+100%,−0%
C146	CQ93M1H224K	Mylar	0.22μF	±10%
C147	CK45F1H103Z	Ceramic	0.01μF	+100%,−0%
C148	CE04W1H471	Electrolytic	470μF	50WV
C149	CQ93M1H223K	Mylar	0.022μF	±10%
C150	CK45D2H103M	Ceramic	0.01μF	±20%
C151,152	C90-0298-05	Semiconductor ceramic	0.1μF	+80%,−20%
C153	C90-0231-05	Polyester	0.01μF	
C154,155	CC45CH1H050D	Ceramic	5pF	±0.5pF
C156	CE04W2E010	Electrolytic	1μF	250WV
C157	CE04W1E330	Electrolytic	33μF	25WV
C158,159	CE04W1A101	Electrolytic	100μF	10WV
C160	CE04W1C470	Electrolytic	47μF	16WV
C161	CK45D2H103M	Ceramic	0.01μF	±20%
C162	CE04W1E102	Electrolytic	1000μF	25WV
C163	CE04W1E330	Electrolytic	33μF	25WV
C164	CE02W2E470	Electrolytic	47μF	250WV
C165	CE04W1E102	Electrolytic	1000μF	25WV
C166	C90-0298-05	Semiconductor ceramic	0.1μF	+80%,−20%
C167~169	CC45SL1H221J	Ceramic	220pF	±5%
C170,171	CC45CH2H050D	Ceramic	5pF	±0.5pF
C172,173	CC45SL1H101J	Ceramic	100pF	±5%
C174~176	CC45CH2H010C	Ceramic	1pF	±0.25pF
SEMICONDUCTOR				
Q101		FET 2SK185-2-1 (M) or (N)		
Q102		Transistor 2SK30A-O		
Q103,104		Transistor 2SC945-P		
Q105,106		Transistor 2SC535-C		
Q107,108		Transistor 2SA733-Q		
Q109~112		Transistor 2SC945-P		
Q113,114		Transistor 2SC535-C		
Q115,116		Transistor 2SC1628-Y		
Q117,118		Transistor 2SA818-Y		
Q119,120		Transistor 2SC945-P		
Q121		FET 2SK185-2-1 (M) or (N)		
Q122		Transistor 2SK30A-O		
Q123,124		Transistor 2SC945-P		
Q125,126		Transistor 2SC535-C		
127~129		Transistor 2SA733-Q		
Q130		Transistor 2SC945-P		
Q131		Transistor 2SC535-C		
Q132,133		Transistor 2SC945-P		
Q134~137		Transistor 2SC983-Y		
Q138		Transistor 2SC1213A (C)		
Q139		Transistor 2SC1419C		
Q140		Transistor 2SA755-C		
Q141		Transistor 2SB536 (2) LM		
Q142		Transistor 2SD401A (K)		
Q143,144 (CS-1559A only)		Transistor 2SC945 (P)		
Q145		Transistor 2SC535-C		

PARTS LIST

Ref. No.	Parts No.	Description	
IC101,102		IC AN904	
IC103		IC TD3472AP	
IC104		IC TD3403AP	
IC105		IC RC4558T	
D101~106 (☆D101~D104)		Diode 1S1555	
D107		Diode WZ100	
D108		Diode Y16JA	
D109~111		Diode W06C	
D112		Diode 1SS83	
D113		Diode WZ050	
D114,115		Diode 1S1555	
D116		Diode WZ100	
D117		Diode WZ090	
D118,119		Diode S1QB60	
D120,121		Diode 1S11555	
POTENTIOMETER			
VR101	R12-1023-05	Semi-fixed resistor	150Ω
VR102	R01-0506-15	Variable resistor	500Ω (B)
VR103	R12-0051-05	Semi-fixed resistor	150Ω
VR104	R12-1002-05	Semi-fixed resistor	1kΩ
VR105	R12-3004-05	Semi-fixed resistor	47kΩ
VR106	R12-6005-05	Semi-fixed resistor	330kΩ
VR107,108	R12-3004-05	Semi-fixed resistor	47kΩ
VR109	R12-1026-05	Semi-fixed resistor	3.3kΩ
VR110	R12-0003-05	Semi-fixed resistor	470Ω
VR111	R12-1023-05	Semi-fixed resistor	150Ω
VR112	R01-0502-05	Variable resistor	500Ω (B)
VR113	R12-0051-05	Semi-fixed resistor	150Ω
VR114,115	R03-2502-05	Variable resistor	5kΩ (A)
S101	S32-4007-05	Lever switch	
S102	S29-2502-25	Rotary switch	
S103	S32-4007-05	Lever switch	
S104	S29-2502-25	Rotary switch	
S105	S32-4007-05	Lever switch	
T101	L19-0019-05	Converter transformer	
TC101~106	C05-0065-05	Ceramic trimmer 6pF	
TC107~113	C05-0066-05	Ceramic trimmer 10pF	
MISCELLANEOUS			
L101,102	L40-4704-03	Ferri-inductor 47μH	
L103,104	L40-6801-03	Ferri-inductor 68μH	
L107	L40-4711-03	Ferri-inductor 470μF	
L108	L40-4791-02	Ferri-inductor 4.7μH	
P102	E40-0303-05	Connector 3P	
P103	E40-0403-05	Connector 4P	
P104	E40-0303-05	Connector 3P	
P108	E40-0532-05	Connector 5P	
P109	E40-0836-05	Connector 8P	
P110	E40-0736-05	Connector 7P	
P111	E04-1013-05	Connector 10P	
P112	E40-1113-05	Connector 11P	
N101,102		Neon lamp NE-2	
–	E23-0047-04	Terminal	
–	E23-0502-14	Grounding plate	
–	F01-0230-04	Heat sink	
–	F01-0231-14	Heat sink	
–	F11-0147-24	Shield case	
–	J13-0041-05	Fuse clip	
–	J25-2803-52	Printed circuit board	

VARIABLE AMP UNIT (X73-1190-22)

Ref. No.	Parts No.	Description			
RESISTOR					
R401	PD14BB2E201J	Carbon	200Ω	±5%	1/4W
R402	PD14BB2E681J	Carbon	680Ω	±5%	1/4W
R404	RN14BK2E1820F	Metal film	182Ω	±1%	1/4W
R405	PD14BB2E100J	Carbon	10Ω	±5%	1/4W
R406	RN14BK2E1820F	Metal film	182Ω	±1%	1/4W
R407~409	PD14CB2E470J	Carbon	47Ω	±5%	1/4W
R410,411	PD14BB2E682J	Carbon	6.8kΩ	±5%	1/4W
R412	PD14BB2E621J	Carbon	620Ω	±5%	1/4W
R421	PD14BB2E201J	Carbon	200Ω	±5%	1/4W
R422	PD14BB2E681J	Carbon	680Ω	±5%	1/4W
R424	RN14BK2E1820F	Metal film	182Ω	±1%	1/4W
R425	PD14BY2E100J	Carbon	10Ω	±5%	1/4W
R426	RN14BK2E1820F	Metal film	182Ω	±1%	1/4W
R427~429	PD14CB2E470J	Carbon	47Ω	±5%	1/4W
R430,431	PD14BY2E682J	Carbon	6.8kΩ	±5%	1/4W
R432	PD14BB2E621J	Carbon	470Ω	±5%	1/4W
CAPACITOR					
C401	CC45CH1H100D	Ceramic	10pF	±0.5pF	
C402	CE04W1A470	Electrolytic	47μF	10WV	
C403,404	C90-0298-05	Semiconductor ceramic	0.1μF	+80%,−20%	
C405	CE04W1A470	Electrolytic	47μF	10WV	
C421	CC45CH1H100D	Ceramic	10pF	±0.5pF	
C422	CE04W1A470	Electrolytic	47μF	10WV	
C423,424	C90-0298-05	Semiconductor ceramic	0.1μF	+80%,−20%	
C425	CE04W1A470	Electrolytic	47μF	10WV	
SEMICONDUCTOR					
Q401~404		Transistor 2SC535-C			
POTENTIOMETER					
VR401	R12-0049-05	Semi-fixed resistor	100Ω		
VR402	R12-0056-05	Semi-fixed resistor	100Ω		
MISCELLANEOUS					
–	E23-0046-04	Terminal			
–	E23-0047-04	Terminal			
–	E31-0518-05	Lead wire w/10P connector			
–	E31-0519-05	Lead wire w/11P connector			
–	J25-2802-03	Printed circuit board			

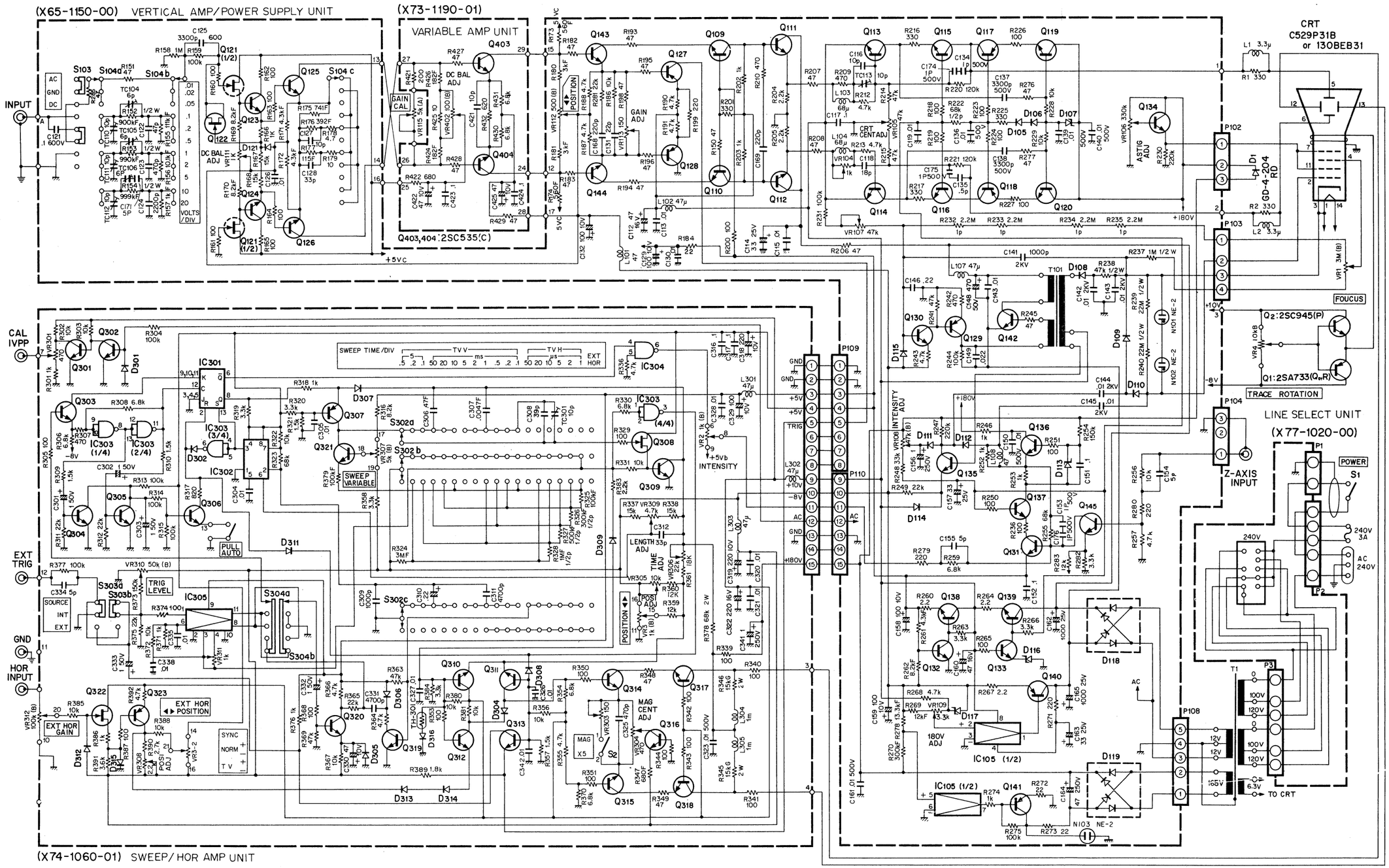
SWEEP CIRCUIT UNIT (X74-1060-00)

Ref. No.	Parts No.	Description			
RESISTOR					
R301	RD14BB2E102J	Carbon	1kΩ	±5%	1/4W
R302,303	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R304	RD14BB2E104J	Carbon	100kΩ	±5%	1/4W
R305	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R306	RD14BB2E682J	Carbon	6.8kΩ	±5%	1/4W
R307	RD14BB2E471J	Carbon	470Ω	±5%	1/4W
R308	RD14BB2E682J	Carbon	6.8kΩ	±5%	1/4W
R309,310	RD14BB2E152J	Carbon	1.5kΩ	±5%	1/4W
R311,312	RD14BB2E223J	Carbon	22kΩ	±5%	1/4W
R313~315	RD14BB2E104J	Carbon	100kΩ	±5%	1/4W
R316	RD14BB2E822J	Carbon	8.2kΩ	±5%	1/4W
R317	RD14BB2E821J	Carbon	820Ω	±5%	1/4W
R318	RD14BB2E102J	Carbon	1kΩ	±5%	1/4W
R319,320	RD14BB2E332J	Carbon	3.3kΩ	±5%	1/4W
R321	RD14BB2E152J	Carbon	1.5kΩ	±5%	1/4W
R322	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R323	RD14BB2E683J	Carbon	68kΩ	±5%	1/4W
R324	R92-0709-05	Metal graze	3MΩ	±1%	1/4W
R325	RN14BK2E1003F	Metal film	100kΩ	±1%	1/4W
R326	RN14BK2E1003F	Metal film	300kΩ	±1%	1/4W

PARTS LIST

Ref. No.	Parts No.	Description			
R327	RN14BK2H5003F	Metal film	500kΩ	±1%	1/2W
R328	RN14BK2H1004F	Metal film	1MΩ	±1%	1/2W
R329	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R330	RD14BB2E682J	Carbon	6.8kΩ	±5%	1/4W
R331	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R332,333	RD14BB2E152J	Carbon	1.5kΩ	±5%	1/4W
R334,335	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R336	RD14BB2E472J	Carbon	4.7kΩ	±5%	1/4W
R337,338	RD14BB2E153J	Carbon	15kΩ	±5%	1/4W
R339~344	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R345,346	RS14GB3D153G	Oxidized metal film			
			15kΩ	±2%	2W
R347	RN14BK2E6800F	Metal film	680Ω	±1%	1/4W
R348,349	RD14BB2E470J	Carbon	47Ω	±5%	1/4W
R350,351	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R353	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R354	RD14BB2E682J	Carbon	6.8kΩ	±5%	1/4W
R355	RD14BB2E472J	Carbon	4.7kΩ	±5%	1/4W
R356	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R357	RD14BB2E152J	Carbon	1.5kΩ	±5%	1/4W
R358	RD14BB2E332J	Carbon	3.3kΩ	±5%	1/4W
R359,360	RD14BB2E123J	Carbon	12kΩ	±5%	1/4W
R361	RD14BB2E183J	Carbon	18kΩ	±5%	1/4W
R362	RD14BB2E222J	Carbon	2.2kΩ	±5%	1/4W
R363	RD14BB2E473J	Carbon	47kΩ	±5%	1/4W
R364	RD14BB2E472J	Carbon	4.7kΩ	±5%	1/4W
R365	RD14BB2E223J	Carbon	22kΩ	±5%	1/4W
R366	RD14BB2E472J	Carbon	4.7kΩ	±5%	1/4W
R367	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R368	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R369	RD14BB2E473J	Carbon	47kΩ	±5%	1/4W
R370	RD14BB2E682J	Carbon	6.8kΩ	±5%	1/4W
R371	RD14BB2E102J	Carbon	1kΩ	±5%	1/4W
R372	RD14BB2E103J	Carbon	10kΩ	±5%	1/4W
R373	RD14BB2E154J	Carbon	150kΩ	±5%	1/4W
R374	RD14BB2E101J	Carbon	100Ω	±5%	1/4W
R375	RD14BB2E223J	Carbon	22kΩ	±5%	1/4W
R376	RD14BB2E102J	Carbon	1kΩ	±5%	1/4W
R377	RD14BB2E104J	Carbon	100kΩ	±5%	1/4W
R378	RS14GB3D683J-B	Oxidized metal film			
			68kΩ	±5%	2W
R379	RN14BK2E1003F	Metal film	100kΩ	±1%	1/4W
R380,381	RD14BY2E103J	Carbon	10kΩ	±5%	1/4W
R382	RD14BY2H101J	Carbon	100Ω	±5%	1/2W
R383	RD14BY2E682J	Carbon	6.8kΩ	±5%	1/4W
R384	RD14BY2E222J	Carbon	2.2kΩ	±5%	1/4W
R385	RD14CB2E103J	Carbon	10kΩ	±5%	1/4W
R386	RD14CB2E102J	Carbon	1kΩ	±5%	1/4W
R387	RD14BB2E101J (CS-1559A only)	Carbon	100Ω	±5%	1/4W
R388	RD14CB2E103J	Carbon	10kΩ	±5%	1/4W
R389	RD14BB2E182J	Carbon	1.8kΩ	±5%	1/4W
R389	RD14BB2E472J (CS-1559A only	Carbon	4.7kΩ	±5%	1/4W
R390	RD14BY2E272J	Carbon	2.7kΩ	±5%	1/4W
R391	RD14CB2E362J	Carbon	3.6kΩ	±5%	1/4W
–	R92-0150-05	Jumper resistor			
CAPACITOR					
C301~303	CE04W1H010	Electrolytic	1μF		50WV
C304,305	CK45F1H103Z	Ceramic	0.1μF		+80%,–20%
C306	C90-0320-05	Polyester	0.47μF		±1%
C307	C90-0321-05	Polyester	4700pF		±1%
C308	CC45CH1H390J	Ceramic	39pF		±5%
C309	CK45B1H102K	Ceramic	1000pF		±10%
C310	CS15E1VR22M	Tantalum	0.22μF		25WV
C311	CQ93M1H472K	Mylar	4700pF		±10%
C312	CC45CH1H330J	Ceramic	33pF		±5%
C313,314	CQ93M1H152K	Mylar	1500pF		±10%
C315	CC45SL1H151K	Ceramic	150pF		±10%
C316,317	C90-0298-05	Semiconductor ceramic			
			0.1μF		+80%,–20%

Ref. No.	Parts No.	Description		
C318,319	CE04W1A221	Electrolytic	220μF	10WV
C320,321	CK45F1H103Z	Ceramic	0.01μF	+80%,–20%
C322	CE04W1C221	Electrolytic	220μF	16WV
C323	CK45D2H103M	Ceramic	0.01μF	±20%
C324	CQ93M1H152K	Mylar	1500pF	±10%
C325	CK45BL1H471K	Ceramic	470pF	±10%
C326~328	CK45E1H103P	Ceramic	0.01μF	+100%,–0%
C329	CE04W1A101	Electrolytic	100μF	10WV
C330	CE04W1A470	Electrolytic	47μF	10WV
C331	CQ93M1H472K	Mylar	4700pF	±10%
C332,333	CE04W1H010	Electrolytic	1μF	50WV
C334	CC45CH1H050D	Ceramic	5pF	±0.5pF
C335,336	CK45F1H103Z	Ceramic	0.01μF	+80%,–20%
C337	CC45SL1H151K	Ceramic	150pF	±10%
C338	CK45F1H103Z	Ceramic	0.01μF	+80%,–20%
C341	CE04W2E010	Electrolytic	1μF	250WV
C342,343	CK45E1H103P	Ceramic	0.01μF	+100%,–0%
C344	C90-0298-05	Semiconductor ceramic		
			0.1μF	+80%,–20%
C345	CC45CH1H101J	Ceramic	100pF	±5%
SEMICONDUCTOR				
Q301~306		Transistor	2SC945P	
Q307		Transistor	2SA733Q	
Q308		FET	2SK30A-O	
Q309~316		Transistor	2SC945P	
Q317,318		Transistor	2SC1507	
Q319~321		Transistor	2SC945P	
Q322 (CS-1559A only)		FET	2SK30A (O)	
Q323 (CS-1559A only)		Transistor	2SA733 (Q)	
IC301		IC	TD3472AP	
IC302		IC	NJM555D	
IC303,304		IC	TD3400AP	
IC305		IC	AN606	
D301~306		Diode	1S1555	
D307		Diode	1S1587	
D308~311		Diode	1S1555	
D313,314		Diode	1S1555	
D316		Diode	STV3H	
D319		Diode	1S1555	
POTENTIOMETER				
VR301	R12-0003-05	Semi-fixed resistor	470Ω	
VR303	R12-0051-05	Semi-fixed resistor	150Ω	
VR304	R12-0003-05	Semi-fixed resistor	470Ω	
VR305	R12-3002-05	Semi-fixed resistor	10kΩ	
VR306	R12-3005-05	Semi-fixed resistor	22kΩ	
VR307	R03-2501-05	Variable resistor	5kΩ (B)	
VR308,309	R12-1004-05	Semi-fixed resistor	4.7kΩ	
VR310,S305	R01-4024-15	Variable resistor	50kΩ (B)	
VR311	R12-1002-05	Semi-fixed resistor	1kΩ	
S302	S29-2501-05	Rotary switch		
S303	S32-2013-05	Lever switch (2 circuit, 2 point of contact)		
S304	S37-2005-05	Lever switch (2 circuit, 4 point of contact)		
MISCELLANEOUS				
L301~303	L40-4701-03	Ferri-inductor	47μH	
L304,305	L40-1025-03	Ferri-inductor	1mH	



(X74-1060-01) SWEEP/HOR AMP UNIT

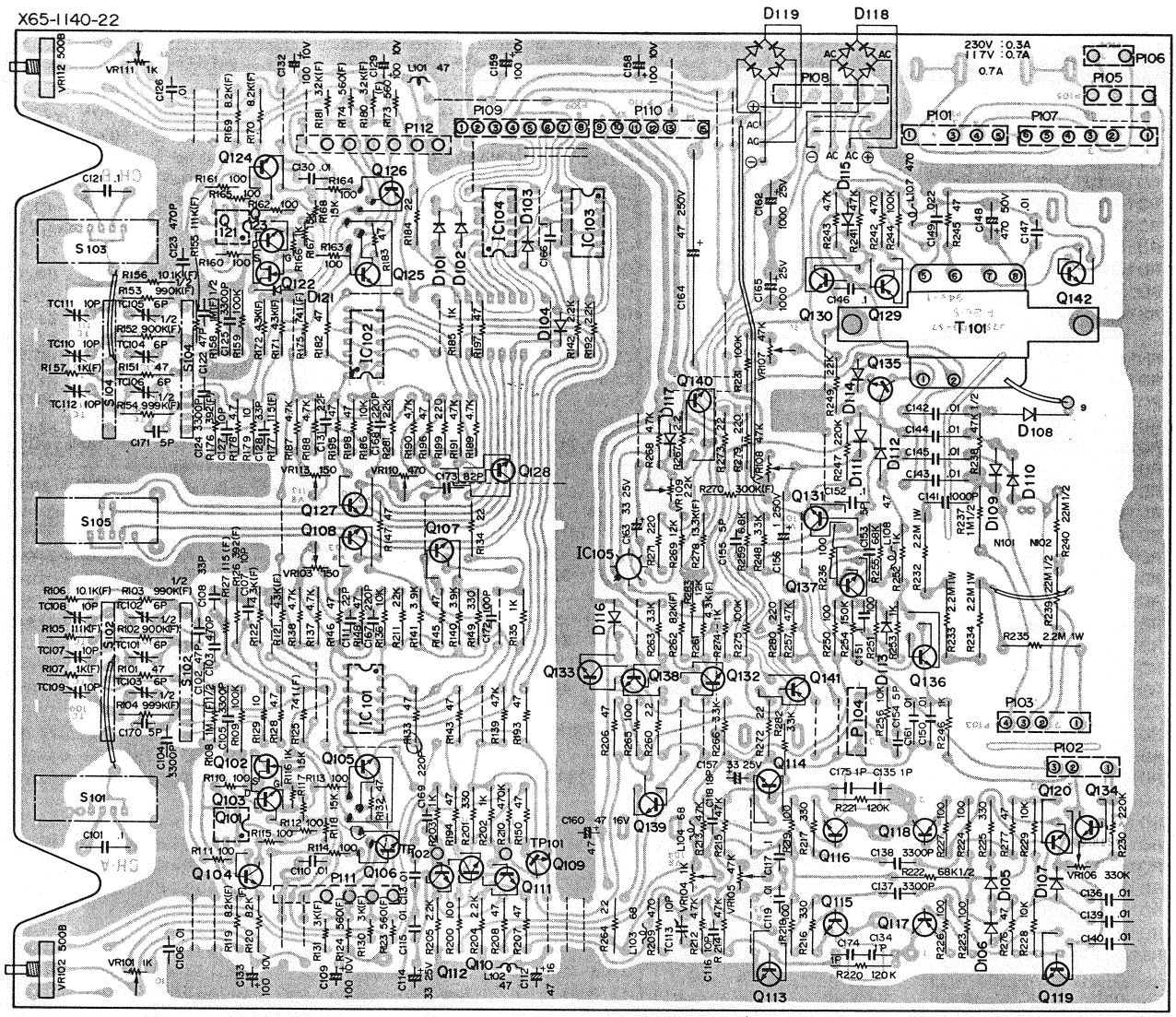
Q301~306,309~316,319~321:2SC945(P), Q307,323:2SA733(Q), Q308,322:2SK30A(O), Q317,318:2SC1507
D301~306,308,309,311~315:1S1555, D307:1S1587, D316:STV-3H
IC301:TD3472AP, IC302:NJM555D, IC305:AN606
TH301:SDT-1000

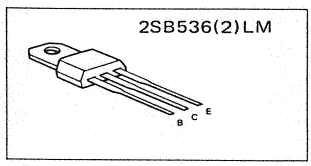
Q109~112,119,120,123,124,130,132,133,143~145:2SC945(P), Q113,114:2SC535(C), Q115,116:2SC1628(Y)
Q117,118:2SA818(Y), Q121:2SK185-2-(M)or(N), Q122:2SK30A(O), Q125,126:2SC535(C), Q127~129:2SA733(Q)
Q134,135:2SC983(Y), Q138:2SC1213(C), Q139:2SC1419(C), Q140:2SA755(C), Q141:2SB536(2)LM, Q131:2SC535
Q142:2SD401, Q143,144,145:2SC535(C), Q136,137:2SC1566
D105,106,114,115,121:1S1555, D107,116:WZ-100, D108:Y16JA, D109~111:W06C, D112:1S1705, D113:WZ-050
D117:WZ-090, D118,119:SIQB60, IC105:RC4558T

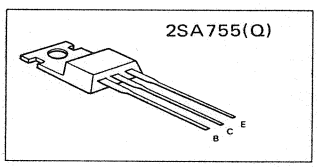
RESISTANCE VALUES IN Ω, 1/4W, CAPACITANCE IN μF, F AND INDUCTANCE IN H UNLESS OTHERWISE SPECIFIED.

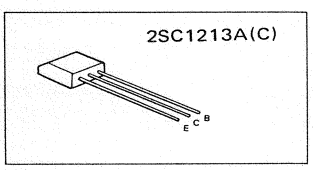
P.C. BOARD

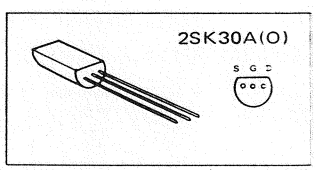
X65-1140-22

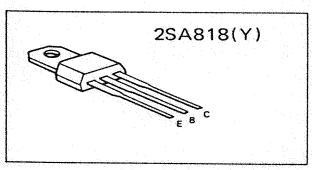


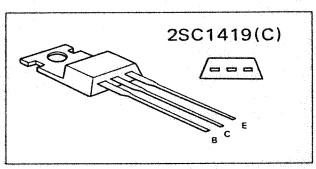


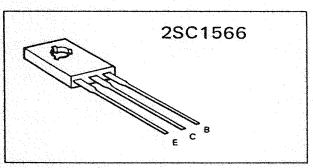


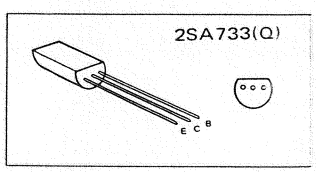


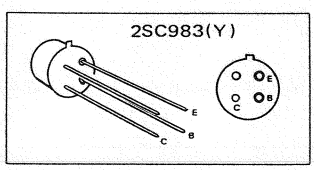


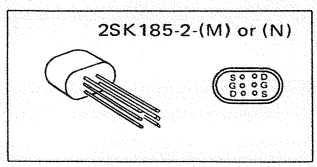


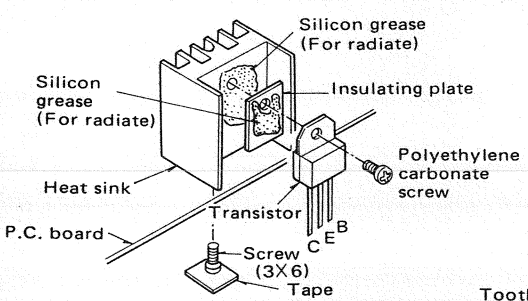




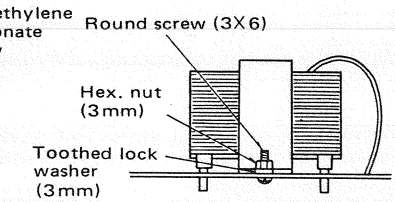






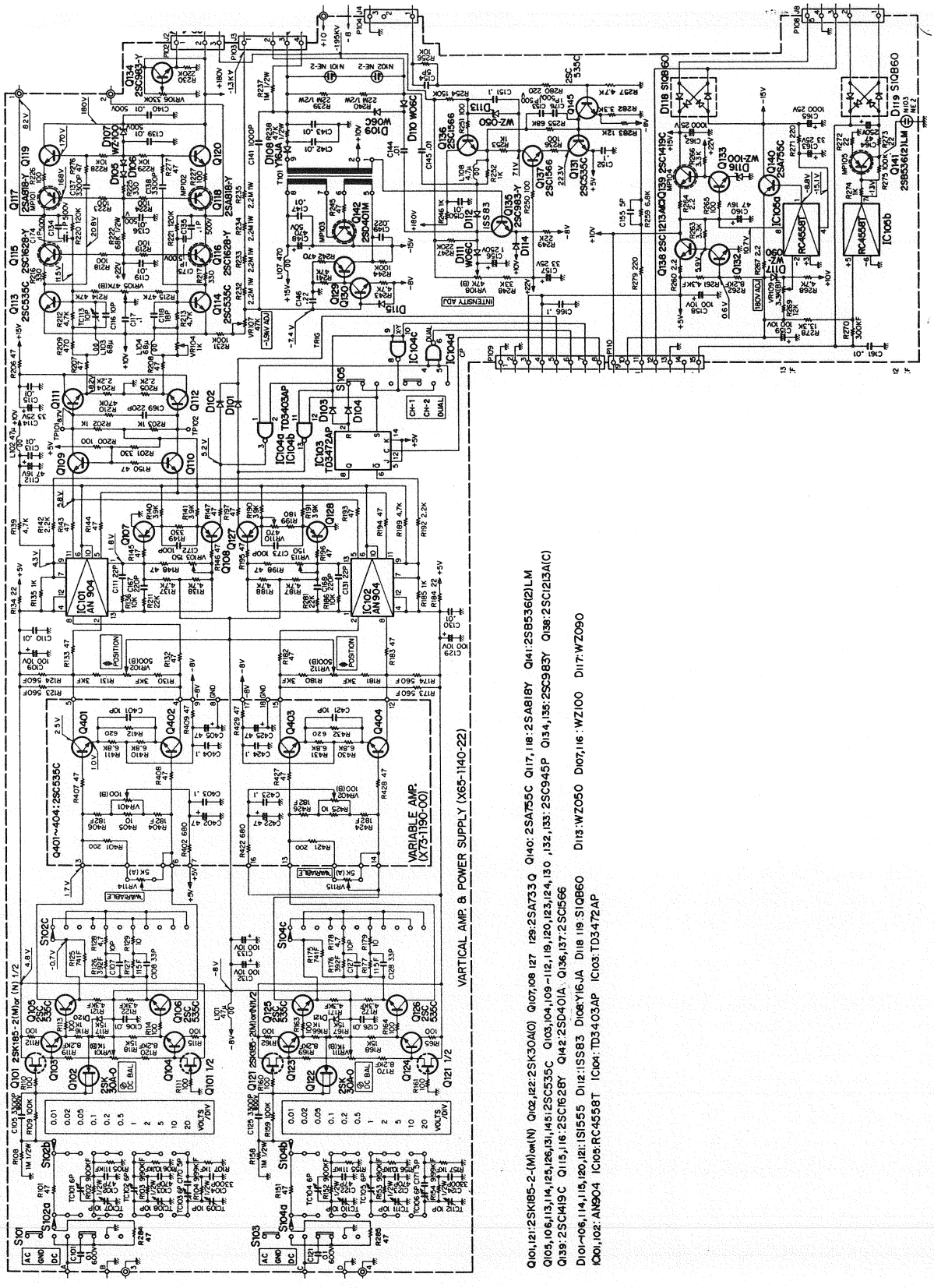


Attachment Method of the Transistor (Q115~118, Q142)



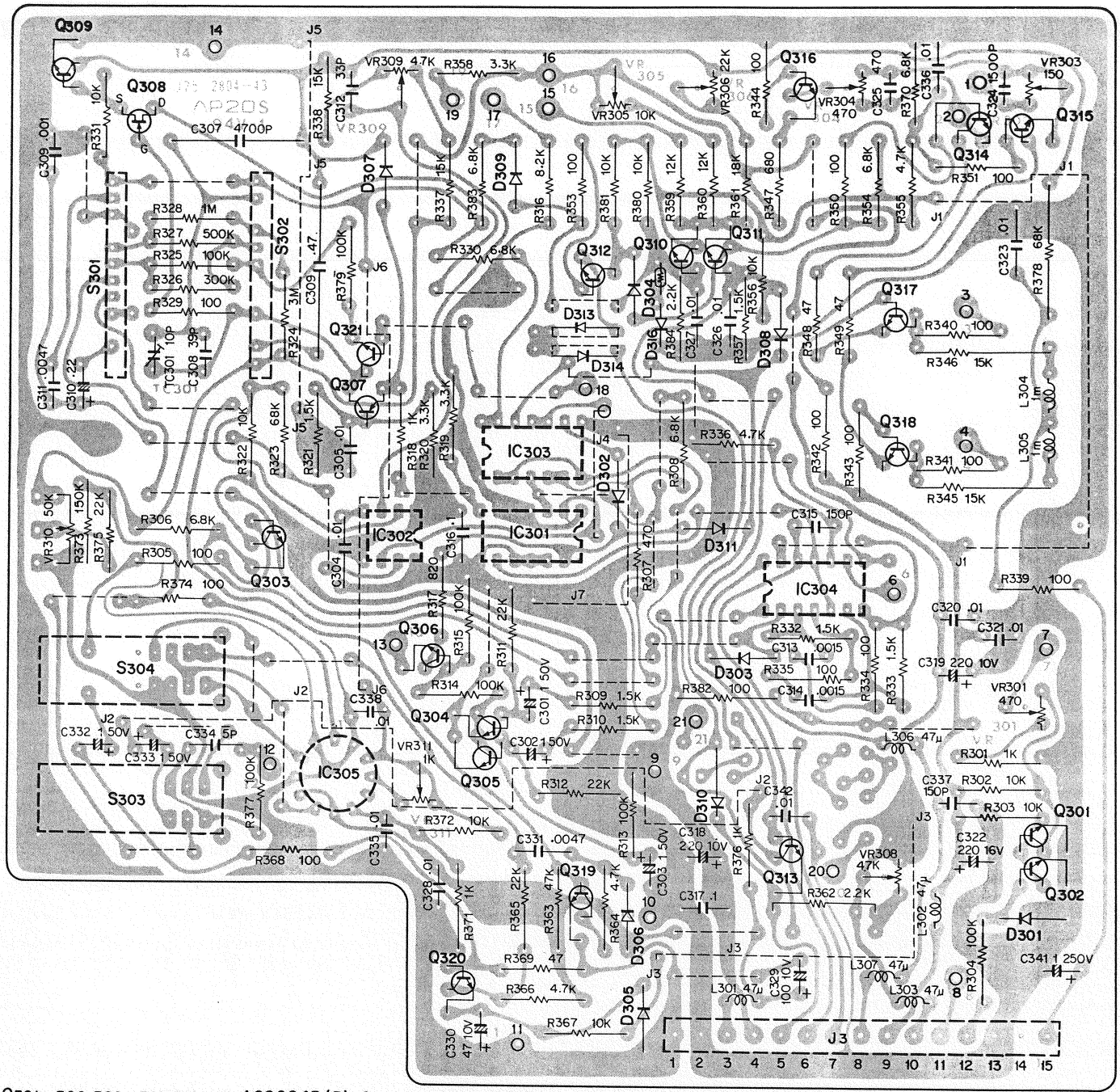
Attachment Method of the Transformer (T101)

CIRCUIT DIAGRAM

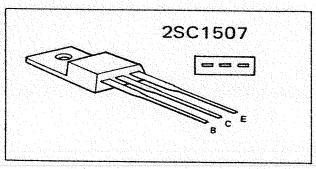


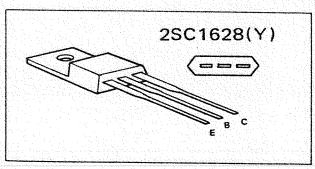
P.C. BOARD

X74-1060-00

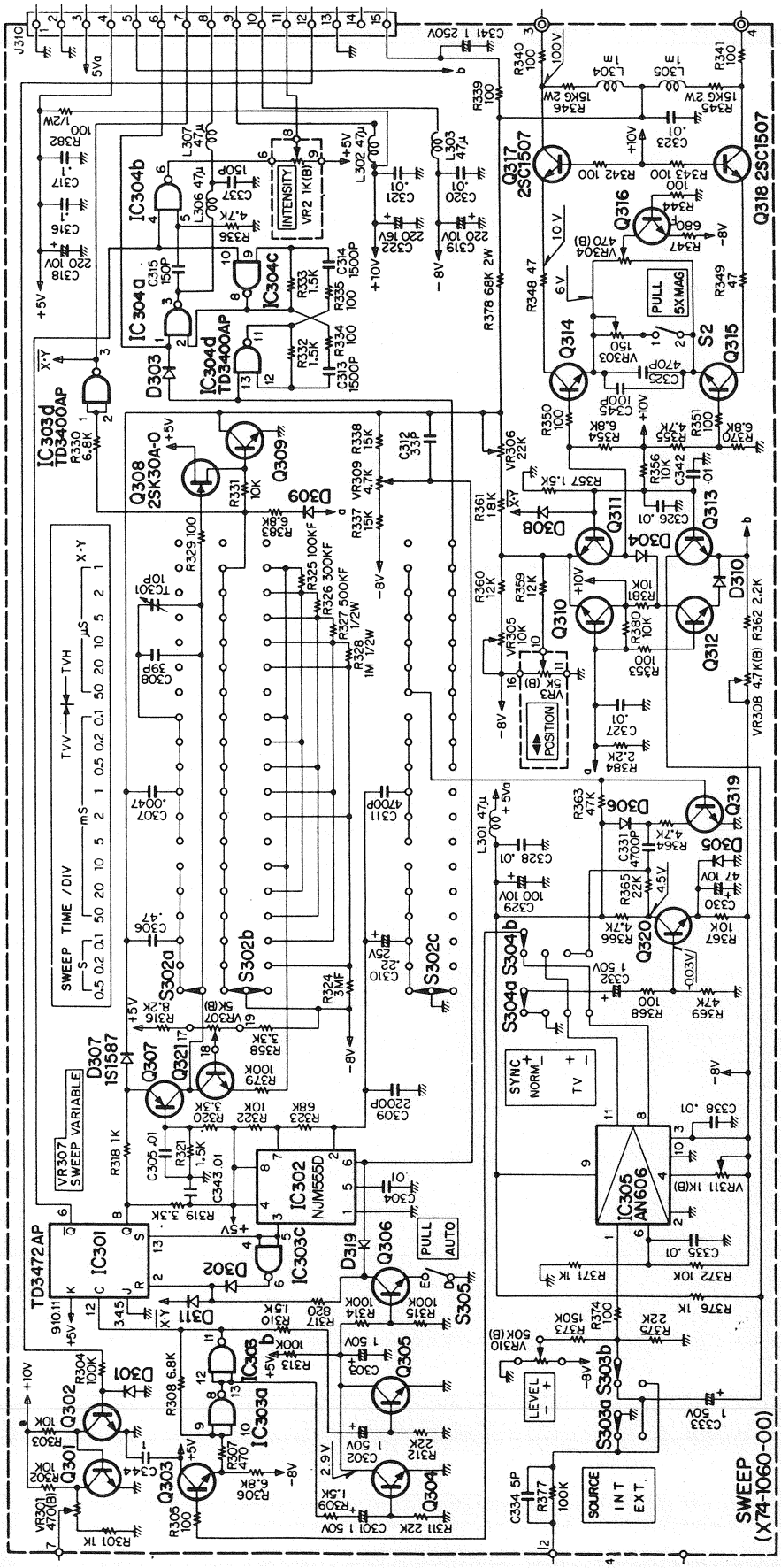


Q301~306,309~316,319~321: 2SC945(P), Q307,323: 2SA733(Q), Q308,322: 2SK30A(O), Q317,318: 2SC1507
D301~306,308~315: 1S1555, D307: 1S1587, IC301: TD3472AP, IC302: RC555DN, IC303,304: TD3400AP, IC305: AN606



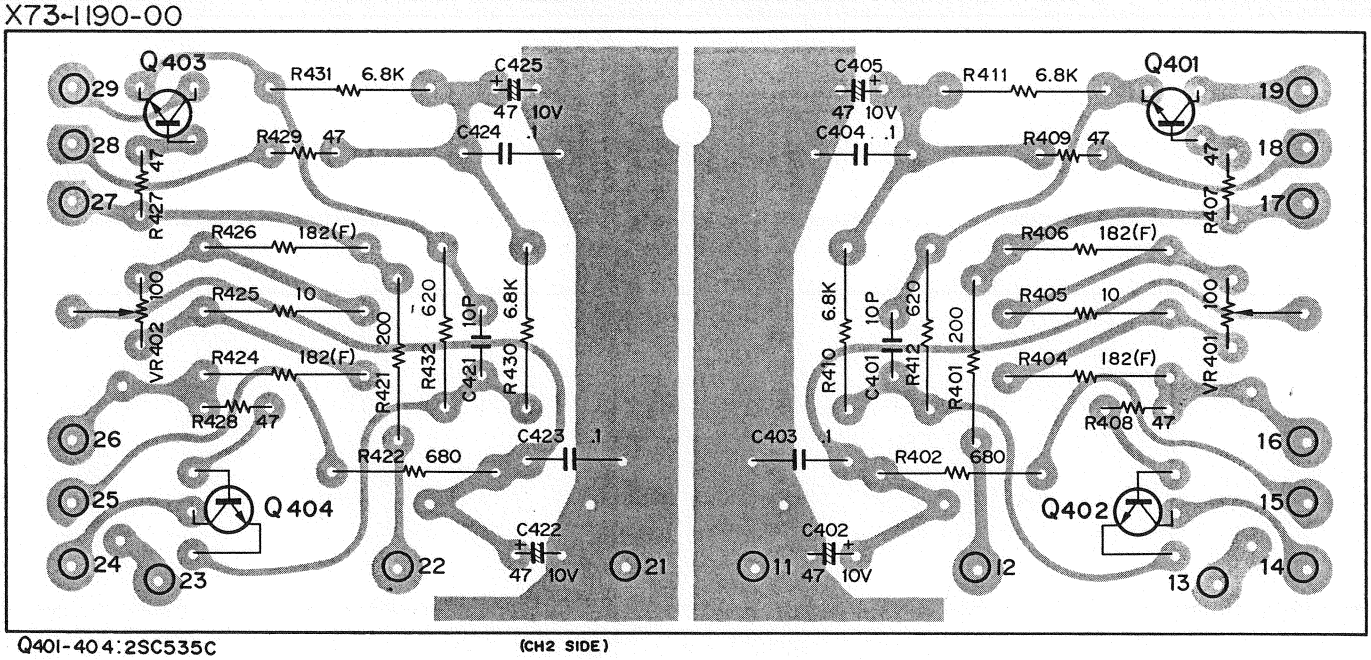


CIRCUIT DIAGRAM

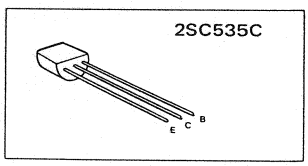


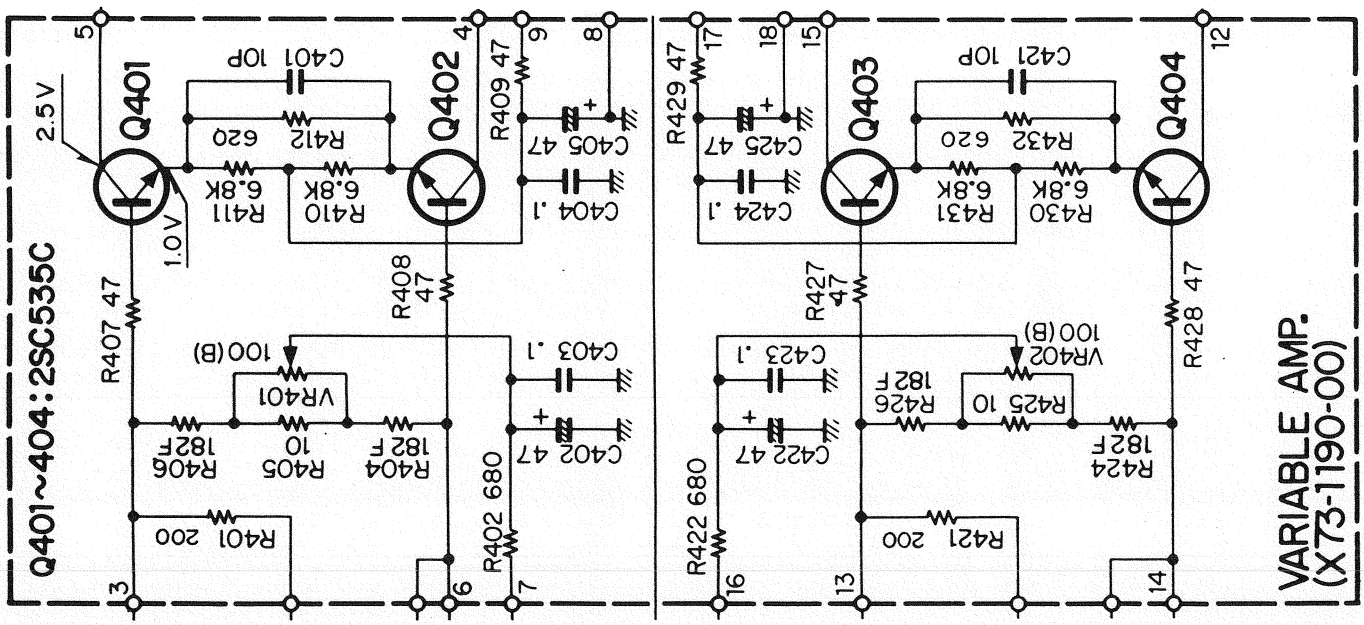
P.C. BOARD/CIRCUIT DIAGRAM

X73-1190-00



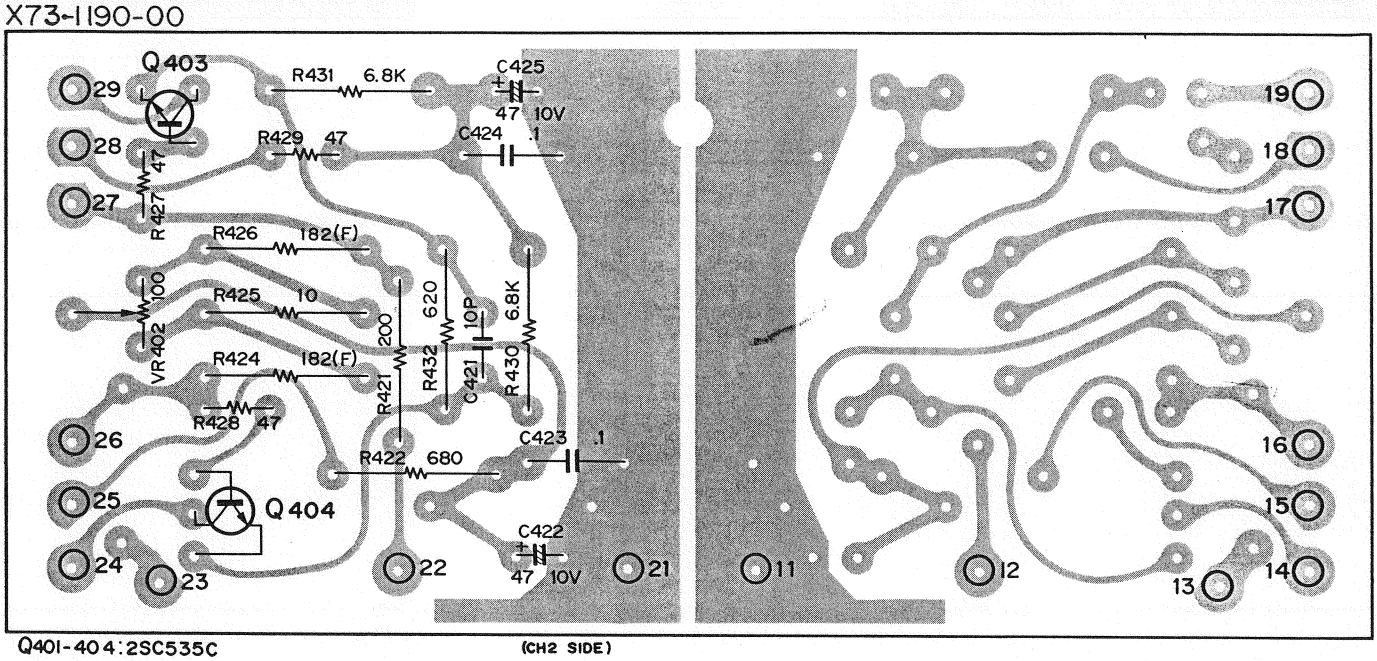
Q401-404:2SC535C (CH2 SIDE)





P.C. BOARD/CIRCUIT DIAGRAM

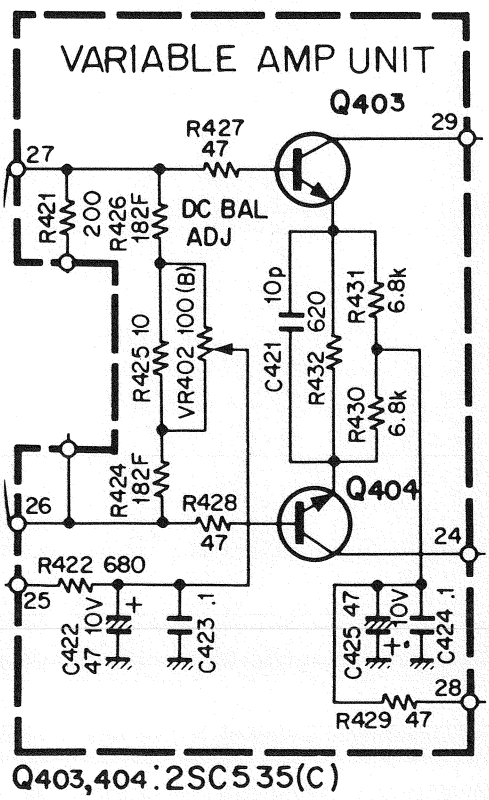
X73-1190-00



Q401-404:2SC535C

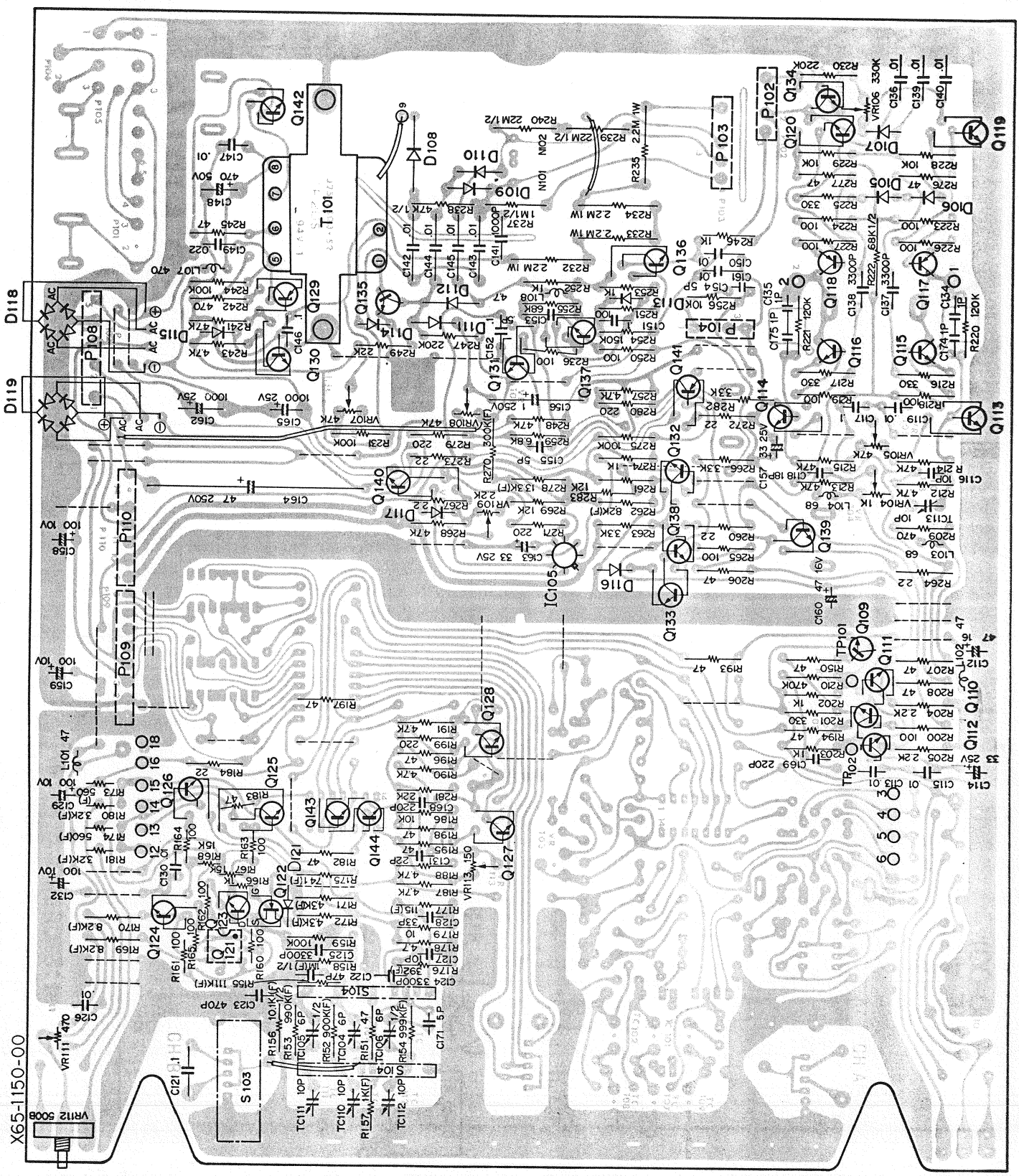
(CH2 SIDE)

(X73-1190-01)

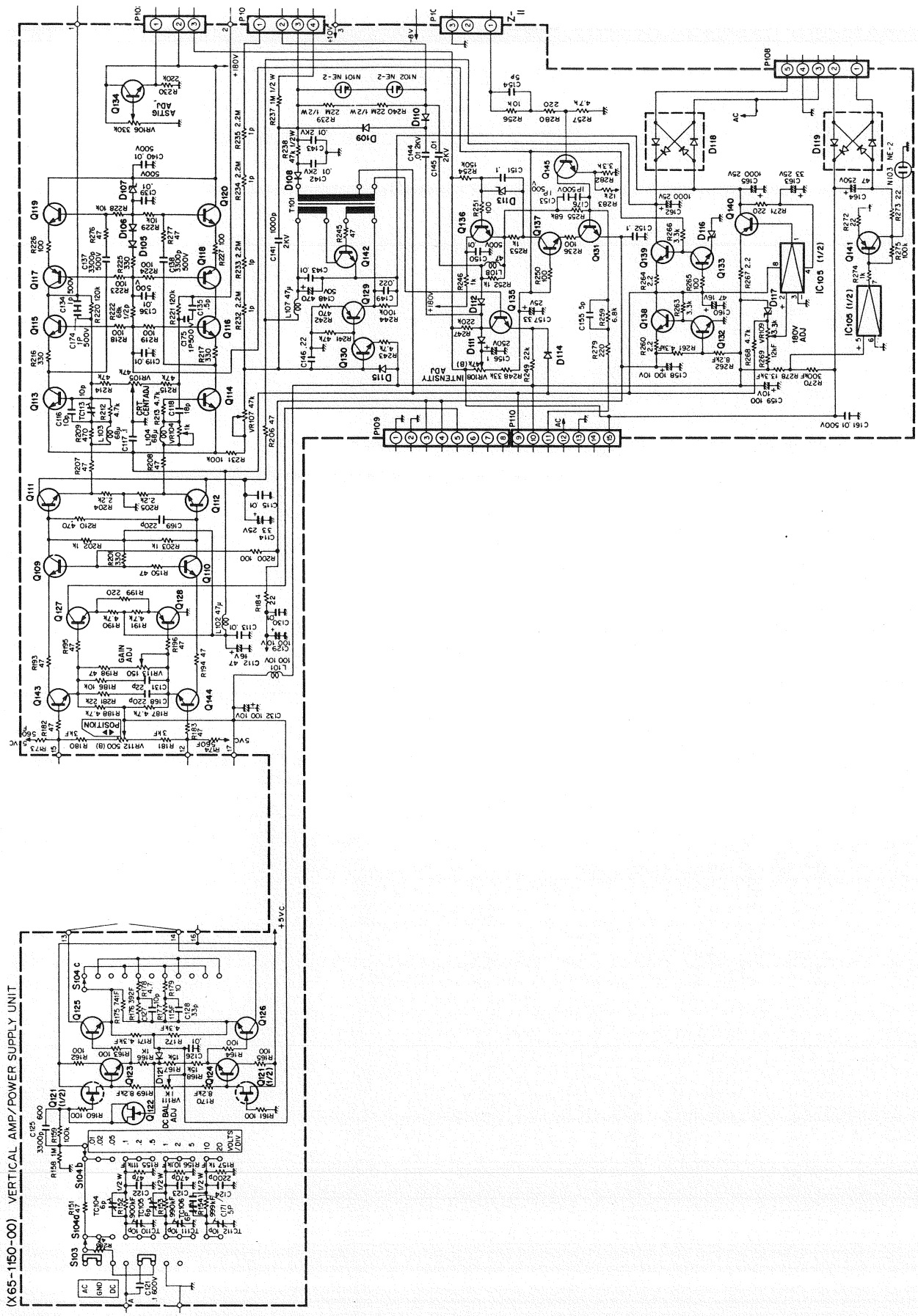


Q403,404:2SC535(C)

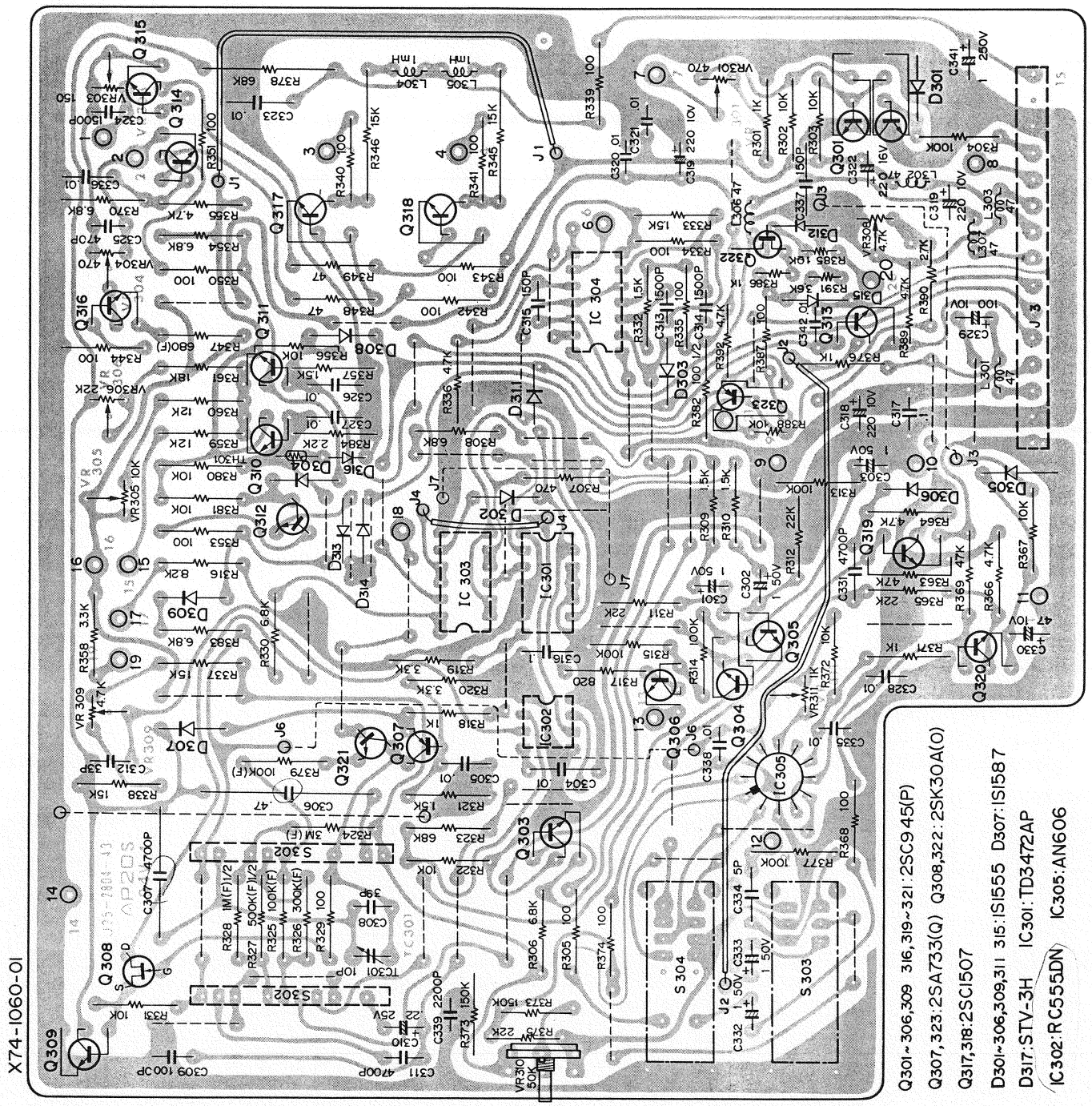
P.C. BOARD



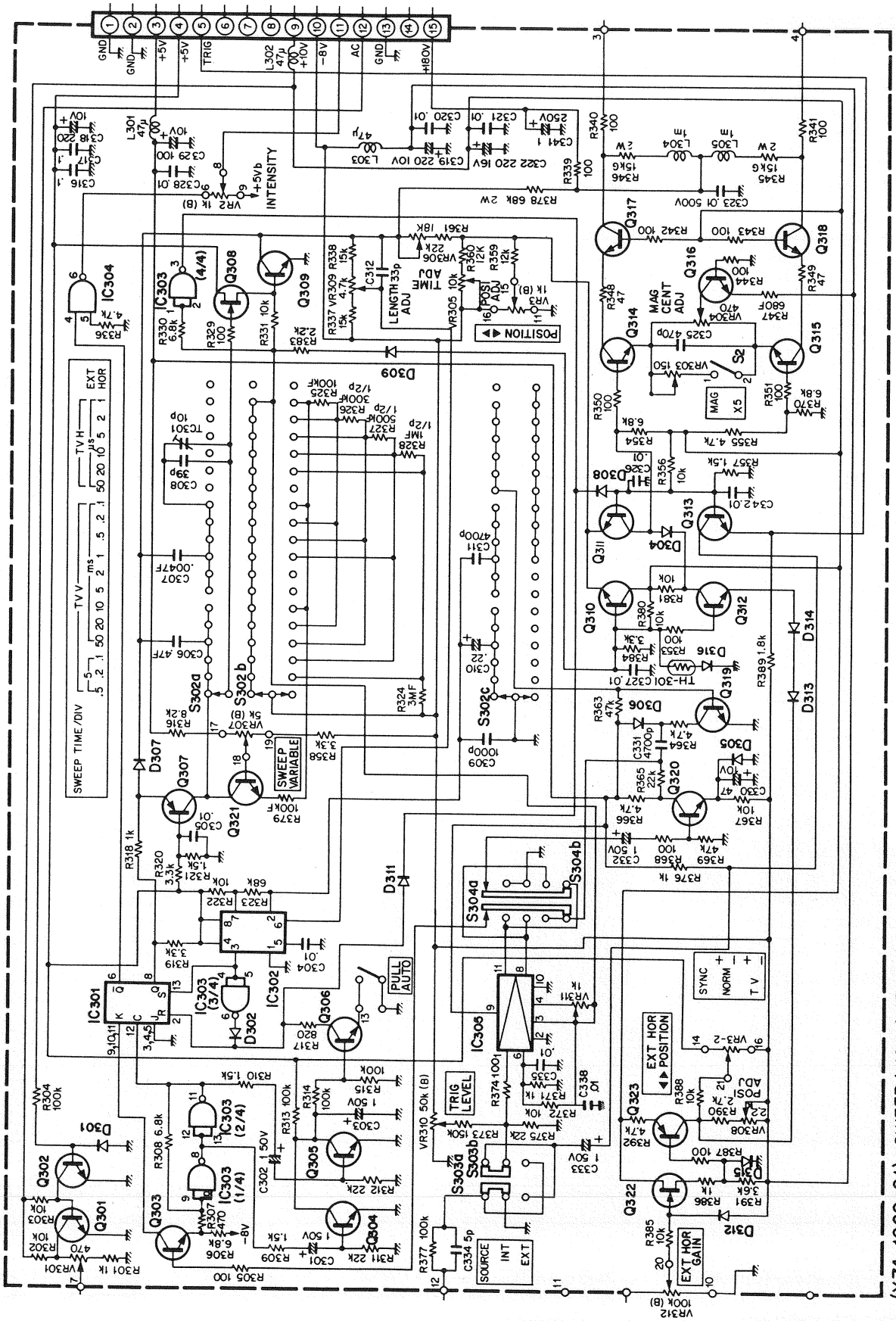
CIRCUIT DIAGRAM



P.C. BOARD

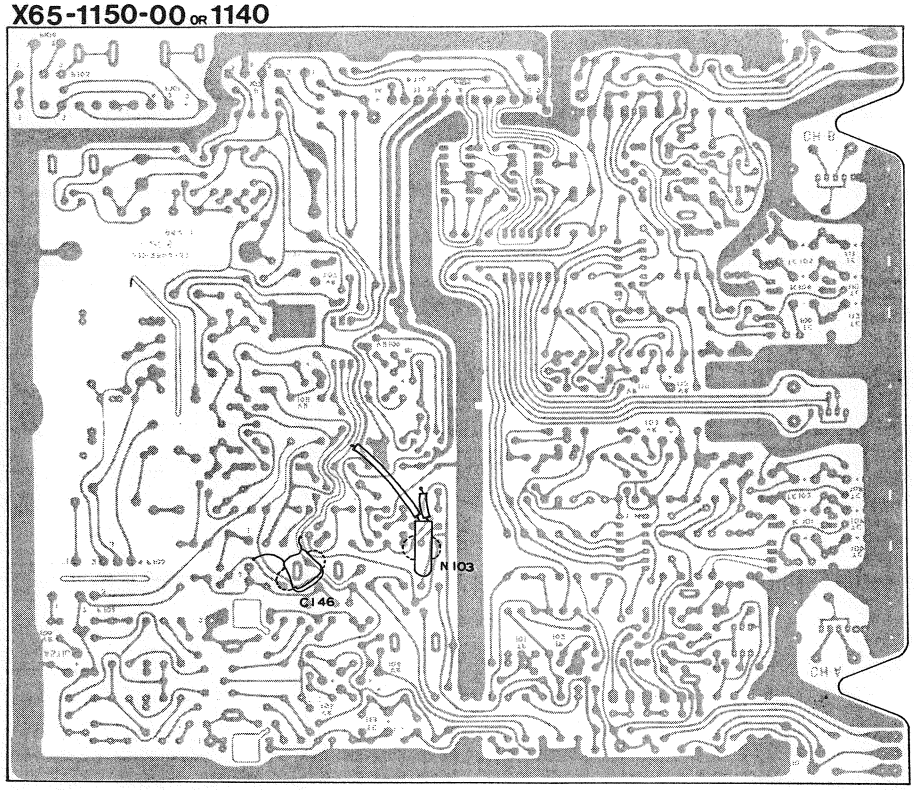

X74-1060-01
Q301~306,309 316,319~321:2SC945(P)
Q307,323:2SA733(Q) Q308,322:2SK30A(O)
Q317,318:2SC1507
D301~306,309,311 315:1S1555 D307:1S1587
D317:STV-3H IC301:TD3472AP
IC302:RC555DN IC305:AN606

CIRCUIT DIAGRAM

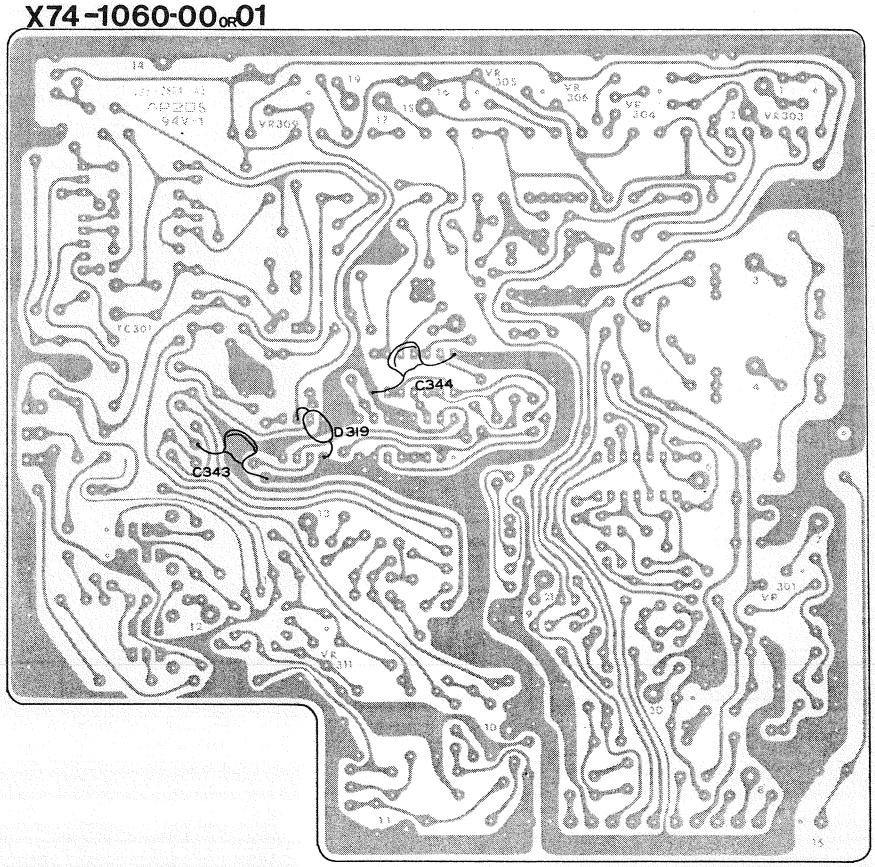


P.C. BOARD

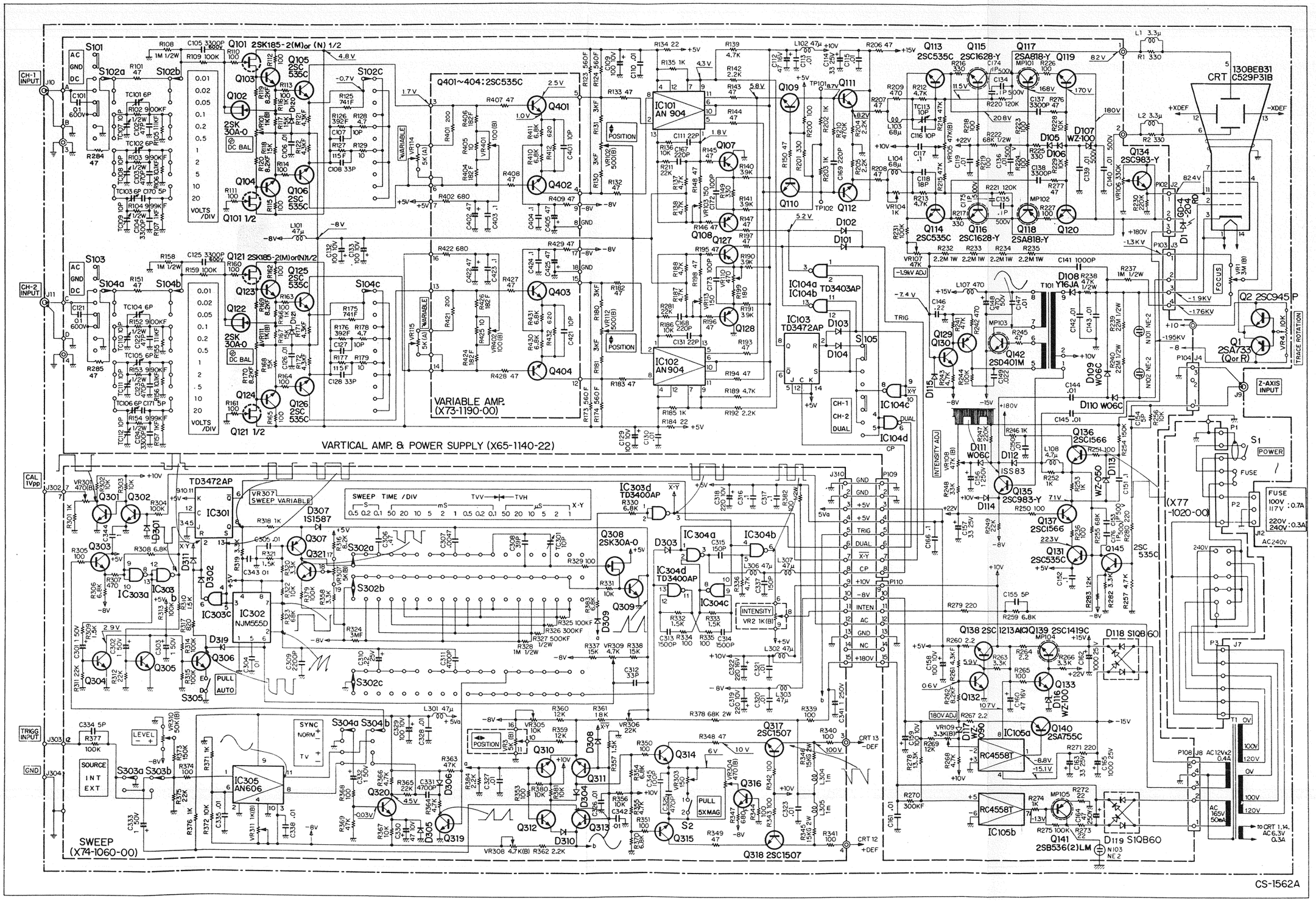
X65-1150-00 OR 1140



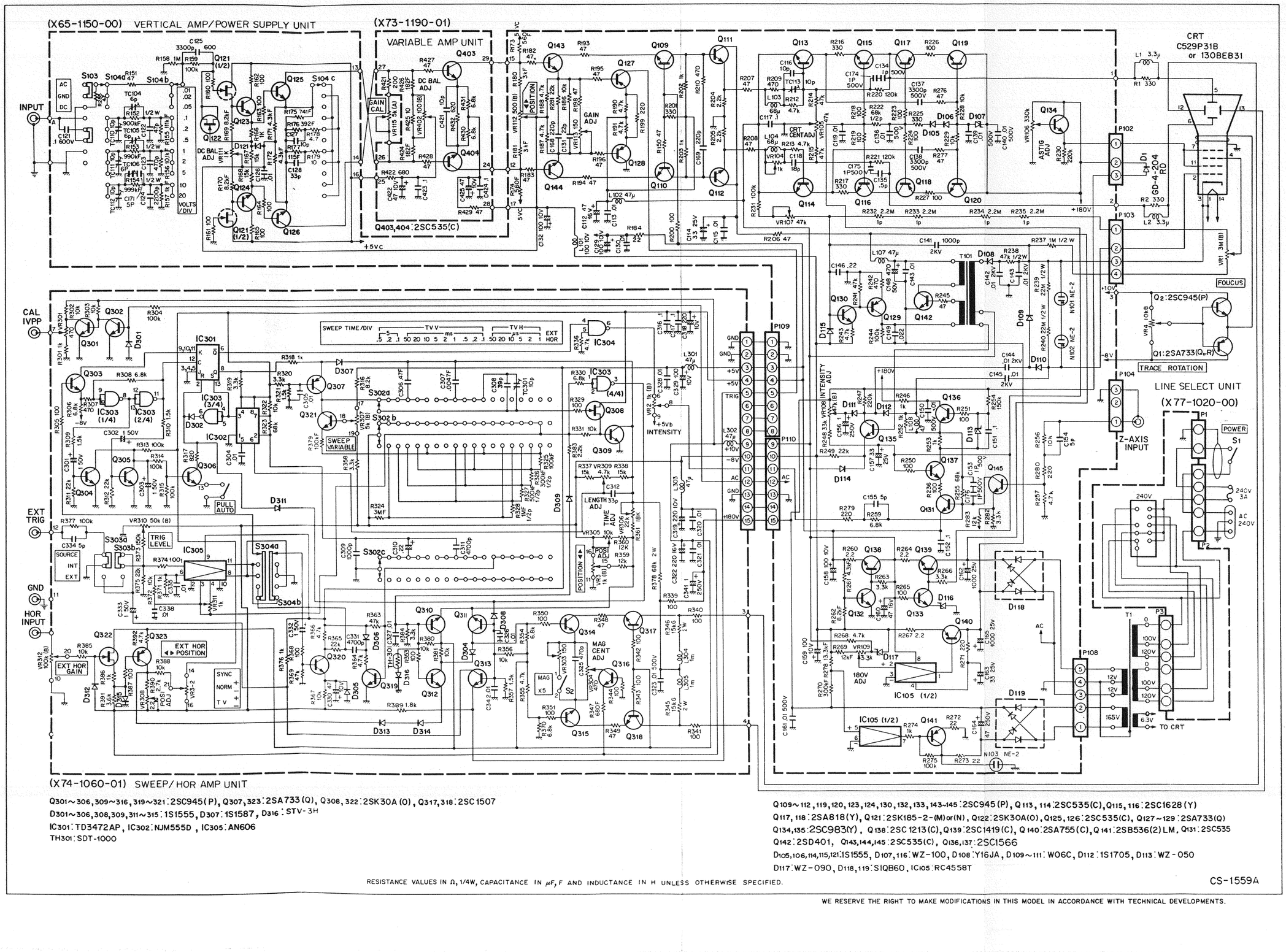
X74-1060-00 OR 01



SCHEMATIC DIAGRAM (CS-1562A)



SCHEMATIC DIAGRAM (CS-1559A)



(X74-1060-01) SWEEP/HOR AMP UNIT

Q301~306,309~316,319~321:2SC945(P), Q307,323:2SA733(Q), Q308,322:2SK30A(O), Q317,318:2SC1507
D301~306,308,309,311~315:1S1555, D307:1S1587, D316:STV-3H
IC301:TD3472AP, IC302:NJM555D, IC305:AN606
TH301:SDT-1000

Q109~112,119,120,123,124,130,132,133,143~145:2SC945(P), Q113,114:2SC535(C), Q115,116:2SC1628(Y)
Q117,118:2SA818(Y), Q121:2SK185-2-(M)or(N), Q122:2SK30A(O), Q125,126:2SC535(C), Q127~129:2SA733(Q)
Q134,135:2SC983(Y), Q138:2SC1213(C), Q139:2SC1419(C), Q140:2SA755(C), Q141:2SB536(2)LM, Q131:2SC535
Q142:2SD401, Q143,144,145:2SC535(C), Q136,137:2SC1566
D105,106,114,115,121:1S1555, D107,116:WZ-100, D108:Y16JA, D109~111:W06C, D112:1S1705, D113:WZ-050
D117:WZ-090, D118,119:S1QB60, IC105:RC4558T

RESISTANCE VALUES IN Ω, 1/4W, CAPACITANCE IN μF, F AND INDUCTANCE IN H UNLESS OTHERWISE SPECIFIED.

CS-1559A

A product of
TRIO-KENWOOD CORPORATION
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