MODEL 1021

20MHz OSCILLOSCOPE

SERVICE MANUAL

****

《WARNING》

This service manual is for use by qualified personnel only. To avoid electrical shock, do not perform any service in this manual unless qualified to do so.

****

CONTENTS

1. SPECIFICATIONS

CRT Display Type

	150 ㎜ Rectangular, Internal-graticule and Flat Face with illumination lamps and Percentage scale.
Accelerating Potential	2KV regulated
Effective display area	8 × 10 div. (1 div = 10㎜)
Beam Rotator	Adjustment on front panel
Graticule illumination	Variable.
Intensity Modulation	Blanked by TTL Level Signal.

Vertical Amplifier (CH1 and 2)

Sensitivity	5mV/div. to 5V/div. (full bandwidth), 1mV/div. to 2mV/div (7MHz : MAG × 5) in 10 steps, 1-2-5 sequence, continuously variable between steps.
Calibration Accuracy	±3% (±5% : MAG × 5)
Bandwidth (−3dB, 6div. ref.)	
DC coupled	DC to 20MHz (DC to 7MHz : MAG × 5)
AC coupled	10Hz to 20MHz
Rise Time	17.5ns (50ns : MAG × 5)
Input Impedance	1MΩ ±1.5%, 30pF within ±5pF(Tolerance : within± 2pF)
Input Coupling	AC, GND, DC
Maximum Input	300V (DC + ACp-p)
Display Modes	CH1, CH2, CHOP, ALT, ADD
Polarity Invert	CH2, INVERT
CH 1 Output	Apporx. 20mV/div. in to 50Ω (50Hz to 4MHz −3dB)

Horizontal Section

Sweep Method	Trigger sweep and Automatic trigger sweep.
Sweep Time	0.2 us/div. to 0.2s/div., 1-2-5 sequence in 19 steps with continuous adjuster.
Calibration Accuracy	±3%
Hold-off variable	Variable.
Magnifier	10 times ±5%, Note the MAG × 10 in 0.2 or 0.5 us/div. ranges are not calibrated. & ± 10% at 1uS/div range.
Max. Sweep Time	100 ns/div. (MAG × 10 ON)

Synchronization

Signal Sources	CH1, CH2, LINE, EXT
Coupling	AC, HF-REJ, LF-REJ, TV-V, TV-H, DC
Slope	+ or −
Sensitivity	

	Bandwidth	INT.	EXT.
NORM	DC to 2MHz	0.5 div.	0.2Vp-p
	2MHz to 20MHz	1.5 div.	0.8Vp-p
AUTO	30Hz to 2MHz	0.5 div.	0.2Vp-p
	2MHz to 20MHz	1.5 div.	0.8Vp-p

TV Synchronization

Extracts the synchronizing signal from composite video signal and provides stable synchronization.

X-Y Mode (X=CH1, Y=CH2)

Sensitivity	X axis : 5mV/div. to 5V/div.
	Y axis : 5mV/div. to 5V/div.
X axis Bandwidth	DC or 10Hz to 500KHz (−3 dB, 5 div. ref.)
X-Y phase	Less than 3° at 20KHz

Calibrator

Output Voltage	0.5Vp-p ±3%
Frequency	Approx. 1KHz, square wave

Power Requirements

Line Voltage	AC 100, 120, 220, 240V, ±10% (250V MAX), 50/60/400Hz
Power Consumption	Approx. 55W

Size and Weight

290(W) × 145(H) × 375(D) mm, 7.5kg

2. TEST EQUIPMENT REQUIRED

The following test equipment is required for calibration and servicing of the Model 1021. The suggested specifications are the minimum necessary for proper calibration of this instrument.

Test Equipment	Minimum Specifications
– Multimeter	Accuracy <0.1% *LEADER Model LDM-852A
– High Voltage Meter	2000VDC full scale Accuracy <1%
– Oscilloscope	10mV sensitivity 60MHz bandwidth *LEADER Model LBO-526 Low capacitance probe *LEADER Model LP-061
– Amplitude Calibrator	1KHz square wave lmV to 20Vp-p Accuracy <0.5% *LEADER Model LOC-7005
– Square Wave Generator	100Hz to 100KHz Rise time <5ns *LEADER Model LOC-7005
– Sine Wave Generator	10Hz to 20MHz Flatness <0.2dB
– Time Mark Generator	0.2s to 0.02us Accuracy <0.5% *LEADER Model LOC-7005
– Capacitance Meter	30pF

3. CALIBRATION PROCEDURE

3-1. General

Calibration should performed after a 30 minutes warm up period.
It should also be confirmed that the unit is connected to the rated power line voltage.

All adjustments should be completed in the given order.
Some adjustments may interact with others.

During the adjustment procedure, remove the case only when necessary and replace immediately after making an adjustment. This will maintain all circuits at constant operating temperature.

* * * WARNING * * *

Electrical shock hazards exist inside this instrument when covers are removed.

To prevent personal injury extreme caution must be used when working in the high voltage section.

3-2. Initial Control Settings

The initial control settings used for each check and adjustment are listed below. Any variations are stated in the applicable paragraphs.

Front panel

−Display

INTEN	As desired
FOCUS	Best focused display
ILLUM	As desired

−Vertical

POSITION	Center	(CH-1 & CH-2)
CH-2 INV	Push	
VOLTS/DIV	0.1V	(CH-1 & CH-2)
VARIABLE	CAL'D	(CH-1 & CH-2)
× 5 MAG	Off	(CH-1 & CH-2)
AC-DC-GND	DC	(CH-1 & CH-2)
V MODE	CH-1	

－Time base

POSITION	Center
TIME/DIV	0.5ms
VARIABLE	CAL'D

－Trigger

LEVEL	0
NORM/AUTO	AUTO
HOLDOFF	NORM
COUPLING	AC
SOURCE	CH-1
SLOPE	+

3-3. Power Supply

(1) Low Voltage Power Supply

- Connect the DC voltmeter between test point on the SC-8 (power supply) and chassis
- Check the voltage according to Table 3-1.

Test point	Voltage	Tolerance
TP 1 (SC-8)	+140V	+135V to +145V
TP 2 (SC-8)	+55V	+50.0V to +60.0V
TP 3 (SC-8)	+12V	+11.5V to +12.5V
TP 4 (SC-8)	+5V	+4.8V to +5.2V
TP 5 (SC-8)	−12V	−11.5V to −12.5V
TP 8 (SC-8)	+195V	+190V to +200V
Pin 1 of P804	+18V	+17V to +19V

Table 3-1

(2) High Voltage Power Supply

* * * WARNING * * *

To prevent personal injury extreme caution must be used when working in the high voltage section.

- Connect the DC high voltage meter to TP6 (SC-9, CRT socket board) (SC-6, horizontal board).
- Check the voltage −1900V
- Tolerance is −1995V to −1805V

3-4. Display

(1) Intensity

- Set : TIME/DIV 5ms
  AC-GND-DC GND
- Set the INTEN control midway between 10 and 11 o'clock position
- Adjust VR612, INTEN (SC-6, horizontal board) so the trace is just visible.

(2) Focus

- Set : FOCUS Center
- Apply CAL 0.5Vp-p to CH-1 INPUT connector.
- Turn the FOCUS volume (front panel) fully clockwise. Adjust VR801 ASTIG (SC-8, power supply board) for optimum trace sharpness.

3-5. Vertical Amplifier

(1) DC Balance

- Set : VOLTS/DIV 10mV
  VARIABLE CAL'D
  AC-GND-DC GND
- Position the trace to the center horizontal graticule line using the V POSITION control.
- Set : VOLTS/DIV 5mV
  VARIABLE CAL'D
  ×5 MAG ON
- If the trace moves 1 division or more, adjust VR201, CH-1 ATT BAL (SC-3, vertical board) for minimum trace shift when repeat the settings above mentioned.
- Apply the same procedure for CH-2 by adjusting VR301, CH-2 ATT BAL (SC-3, vertical board).

(2) ADD Balance

- Set : V MODE ALT
  AC-GND-DC GND
- Position the CH1, CH2 trace to the center horizontal graticule line using the V POSITION control.
- Adjust VR501, ADD BAL (SC-3, vertical board) for a minmum trace shift between on and off.

(3) Position Centering

- Set : V MODE ALT
  V POSITION Center (CH-1, CH-2)
  AC-GND-DC GND (CH-1, CH-2)
- Adjust VR205, CH-1 POS CENT (SC-3, vertical board) so that trace is positioned to the center horizontal graticule line.
- Apply the same procedure for CH-2 by adjusting VR305 CH-2 POS CENT (SC-3, vertical board).

(4) ×1 AC GAIN

- Set : VOLTS/DIV 5mV
  VARIABLE CAL'D
  V MODE CH-1
  AC-GND-DC DC
- Connect the square wave generator to CH-1 INPUT connector and set the frequency to 1KHz, output level for 5 divisions display.
- Adjust VR202, CH-1 (AC GAIN) (SC-3, vertical board) for a best flat-top square wave.
- Apply the same procedure for CH-2 by adjusting VR302, CH-2 (AC GAIN) (SC-3, vertical board).

(5) Gain

- Set : VOLTS/DIV 10mV
  VARIABLE CAL'D
  V MODE CH-1
  AC-GND-DC DC
- Connect the amplitude calibrator to CH-1 INPUT connector and set the output level to 50mV.
- Adjust VR204, CH-1 GAIN (SC-3, vertical board) for a 5 divisions display.
- Apply the same procedure for CH-2 by adjusting VR304, CH-2 GAIN (SC-3, vertical borad).
- Check accuracy for all settings of VOLTS/DIV switch.

(6) Attenuator Phase Compensation

- Set : VOLTS/DIV 0.1V
  V MODE CH-1
  AC-GND-DC DC
- Connect the waveform for a flat-top square wave with 3% or less overshoot and roll-off on the leading edge.
- If not, adjust VC204, Cc (SC-3, vertical board) for best flat-top square wave.
- Apply the same procedure for all other VOLTS/DIV position and CH-2 according to Table 3-2.

VOLTS/DIV	CH-1	CH-2
0.1V	VC204	VC304
1V	VC202	VC303

Table 3-2

(7) Input Capacitance

- Set : VOLTS/DIV 5mV
  V MODE CH-1
- Connect the capacitance meter to CH-1 INPUT connector.
  Note the capacitance reading. (30pF typical)

- Check the capacitance on all other VOLTS/DIV positions and if value difference is greater than 1pF, adjust Ci (SC-3, vertical board) for the same reading as noted above. Refer to Table 3-3.

- Apply the same procedure for CH-2 according to Table 3-3.

VOLTS/DIV	CH-1	CH-2
0.1V	VC203	VC302
1V	VC201	VC301

Table 3-3

- Repeat '(6)' and '(7)' as necessary.

(8) High Frequency Compensation

NOTE This step mentions a high freqency compensations of the vertical amplifier, however, the adjustment is very critical. Therefore, if problem is no evident, do not attempt for the following adjustments.
If may be necessary to compromise the bandwidth and the step response adjustments for best frequency response.

- Set : VOLTS/DIV 5mV

- Connect the square wave generator to CH-1 INPUT connector and set the frequency to 100KHz, adjust generator output level for 5 divisions display.

- Check the waveform for a flat-top square wave with 5% or less overshoot and roll-off on the leading edge.

- Adjust following adjustments to obtain a best flat-top square wave.
  VC502, VR403(MF COMP) (SC-3, vertical board)
  VC501 (HF COMP) (SC-3, vertical board)

- Remove the square wave generator.

- Connect the sine wave generator to CH-1 INPUT connector and set the frequency to 50KHz, output level for 6 divisions display.

- Increase the generator frequency until the amplitude decreased to 4.2 divisions.

- The generator frequency should be 20MHz or higher.

- Adjust VC306 for CH-2 HF COMP (SC-3, Vertical board)

3-6. Time Base/Horizontal Amplifier

(1) ×1 Gain, TIME/DIV

- Set : TIME/DIV 0.5ms
  VARIABLE CAL'D
- Connect the time mark generator to CH-1 INPUT connector and set the time to 0.5ms.
- Adjust VR603, SWP LNTH (SC-6, horizontal board) to obtain a 13 markers on the trace as shown in Figure 3-1.

* NOTE * 2 markers out of 13 markers may be positioned off graticule. Use H POSITION control to confirm the markers.

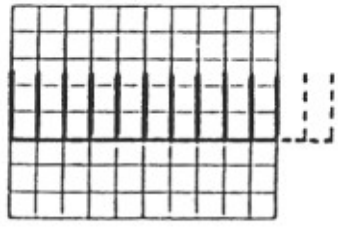


Figure 3-1.

- Adjust VR608, H GAIN (SC-6, horizontal board) for 1 marker/division.
- Set : TIME/DIV 5ms
- Set the time mark generator to 5ms.
- Adjust VR602, 5MS ADJ (SC-6, horizontal board) for 1 marker/division.
- Set : TIME/DIV 10ms.
- Set the time mark generator to 10ms.
- Adjust VC601, (TIME) (SC-6, horizontal board) for 1 marker/division.
- Check all range to verify that the accuracy is within +, −3%.

(2) ×10 MAG Gain

- Set : TIME/DIV 1ms
  ×10 MAG ON
- Connect the time mark generator to CH-1 INPUT connector and set the time to 0.1ms.
- Adjust VR609, ×10 MAG GAIN (SC-6, horizontal board) for 1 maker/division.

(3) Position Centering

- Set : TIME/DIV 0.2ms
  H POSITION Center
- Connect the time mark generator to CH-1 INPUT connector and set the time to 1ms.
- Set : ×10 MAG ON
- Position the 1st marker to the center vertical graticule line by using H POSITION control.
- Set : ×10 MAG OFF
- Adjust VR611, ×10 MAG CENT (SC-6, horizontal board) to position the 1st pulse to the center vertical graticule line.

3-7. Trigger

(1) Trigger Level

- Set : V MODE CH-1
  TRIG COUPLING AC
  TRIG LEVEL 0
- Connect the sine wave generator to CH-1 INPUT connector and set the frequency to 1KHz, output level for 0.5 division display.
- Adjust VR605, TRIG LEVEL CENT (SC-6, horizontal board) to obtain a stable display.

(2) Trigger Balance

- Setup : Same as step '(1)'
- Adjust VR206, CH-1 (TRIG BAL) (SC-3, vertical board) to obtain a stable display when COUPLING knob is switched between AC and DC.
- Apply the same procedure for CH-2 by adjusting VR306, CH-2 TRIG CENT (SC-3, vertical board).

3-8. X-Y Operation

(1) X Gain

- V MODE — X-Y
  X VOLTS/DIV — 10mV
  AC-GND-DC — DC
- Connect the amplitude calibrator to X INPUT connector and set the output level to 50mVp-p.
- Adjust VR606, X GAIN (SC-6, horizontal board) for a horizontal deflection of 5 divisions.

(2) X Position Centering

- Set : X POSITION — Center
  AC-GND-DC — GND
- Adjust VR607, X CENT (SC-3, vertical board) so that the dot is positioned at the center vertical graticule line.

3-9. CAL 0.5Vp-p

NOTE : Do not touch the adjustment VR402, 1KH GAIN (SC-3, vertical board) except the precision peak-voltage measuring device such as well-calibrated oscilloscope* is available.

: Vertical sensitivity and time base of the test oscilloscope* must be calibrated within 1% or better

- Connect the test oscilloscope* to CAL tip on the front panel.
- Adjust VR407, 1KH GAIN (SC-3, vertical board) for an amplitude of 0.5Vp-p.
- Connect the test oscilloscope* to CAL tip on the front panel.
- Adjust VR401, (CAL) (SC-3, vertical board) for an frequency of 1KHz.

4. TROUBLESHOOTING PROCEDURE

4-1. General

Confirm that the any equipment used with the Model 1021 is operating correctly.

Check all control settings. Incorrect setting can make a good unit appear defective. For instance, if the waveform is not stable, TRIG SOURCE switch may be set to external trigger mode instead of internal.
If there is any question about the function, refer to the Instruction Manual for a correct operation.

Check all circuit for visual defects such as broken component, loose connection, open wire, poor soldering etc.

Some troubles can be solved with proper adjustment. For instance, if the trace moves up and down by rotating V VARIABLE control, it can be corrected by adjusting DC BAL on that channel.

Start with the power supply.
Typical voltage are obtained under the same conditions as '3.2 Initial Control Settings'

* * * WARNING * * *

Electrical shock hazards exist inside this instrument when covers removed.

4-2. Theory of Operation

The oscilloscope is divided into five major sections :
Vertical amplifier, Time base generator, Horizontal amplifier, Unblanking circuit and Power supply. Refer to '7. Block Diagram'.

- Vertical Section
The vertical section consists of the input attenuator, preamplifier, channel select gate and final amplifier, all DC coupled balanced circuits.

The signal is applied to CH-1 and/or CH-2 INPUT connector. The input signal is attenuated by the VOLTS/DIV switch and applied to the vertical preamplifier.

The input stage of the vertical preamplifier provides signal amplification, gain contol and ×5 magnification of the input signal. The output stage provides for positioning of the display and picks-off parts of the input signal for internal triggeing. The CH-2 preamplifier circuit is used to provide for the CH-2 INV mode.

The output signals of both vertical preamplifiers are applied to a channel select gate control by the channel select logic.

The selected channel signal (s) are applied to the vertical final amplifier.

The vertical final amplifier converts the current signal to a voltage signal of sufficient amplitude to drive the vertical deflection plates of the CRT.

The vertical display mode is controlled by the channel select logic via the V MODE switches.

CH-1, CH-2	:	Control signal selects either the CH-1 or CH-2 input signal for a single trace display.
CHOP, ALT	:	CH-1 and CH-2 signals are displayed either chopped or alternately.
ADD	:	CH-1 and CH-2 signals are algebraically added or subtracted when CH-2 INV switch is ON.

— Time Base Generator

The trigger pick-off circuit samples the input signal at the vertical preamplifier, and applies it to the trigger generator. The trigger generator produces a trigger pulse to activate the sweep generator.

The triggering signals can be obtained from the following sources :

CH-1	:	CH-1 signal
CH-2	:	CH-2 signal
LINE	:	Signal connected from the power Line (mains).
EXT	:	Signal connected to the EXT TRIG input.

The trigger generator contains Coupling, Slope, Level and Source control switches.

AC	: Synchronization to be made with an AC signal.
TV-V	: Incorporates a TV Vertical sync separator circuit composite video input signal applied to the oscilloscope.
TV-H	: Incorporates a TV Horizontal sync separator circuit to strip the horizontal sync pulse from the composite video input signal applied to the oscilloscope.
SLOPE	: Selects the positive or negative polarity of incoming signal trigger point.
HF REJ	: Low pass filter rejects approximately 4KHz or higher component of input waveform.
LF REJ	: High pass filter rejects approximately 4KHz or lower component of input waveform.
DC	: Synchronization to be made with an DC signal.

At AUTO free run mode, the sweep generator produces a sweep ramp automatically with or without input signal. When the signal is applied to vertical input connector, the sweep generator synchronizes to the input signal for a stable display.

When the NORMal mode selected, the sweep ramp and unblanking signals are activated by the trigger generator. In this mode, the signal can only be seen when the trigger generator is activated by the incoming signal.

- Horizontal Amplifier

The sweep ramp from the sweep generator is amplified in the horizontal amplifier to drive the beam from left to right on the CRT.

The horizontal amplifier has a ×10 magnifier function to increase the sweep rate 10 times at any TIME/DIV switch setting.

When the X-Y mode is selected, the sweep generator is disable.
The CH-1 OR X IN input is applied to the horizontal amplifier to be used as the X axis deflection is applied from CH-2 OR Y IN connector.

- Unblanking

The Z axis amplifier controls the display intensity and the blanking levels. Unblanking signal of the sweep generator is applied to the Z axis amplifier to unblank the display.
The chop blanking and the Z AXIS signals are added in the Z axis amplifier to determine display intensity.

- Power Supply

  The high voltage power supply produces −1900VDC to accelerate the electron beam of the CRT.

  It consists of a high voltage generator, feed back amplifier and high voltage multiplier. The feed back amplifier controls the high voltage generator circuitry to maintain a stable high voltage output.

- Secondary winding of the high voltage transformer is connected to the rectifier to control display focus and intensity.

- Calibrator

  The amplifier calibrator provides a 1KHz square wave with accurate voltage output.

4-3. Troubleshooting Aid

* * * WARNING * * *

Electrical shock hazards exist inside this instrument when covers are removed.

(1) Overall operation is not satisfactory or no trace visible with the same conditions as Paragraph '3.2 Initial control settings'.

Connect the AC power to mains and trun power switch on.

a. Power lamp not on

Check fuse, F101 on the rear panel for open.

2A normal blow fuse for 90V - 132V operation.

1A normal blow fuse for 180V - 250V operation.

* CAUTION : Use specified fuse when replace it.

Secondary voltage of the power transformer.

b. Check low voltage power supply.
Connect the DC voltmeter between test point on the SC-8 (power supply board) and chassis.

Test point	Voltage	Tolerance
TP 1 (SC-8)	+140V	+135V to +145V
TP 2 (SC-8)	+55V	+50.0V to +60.0V
TP 3 (SC-8)	+12V	+11.5V to +12.5V
TP 4 (SC-8)	+5V	+4.8V to +5.2V
TP 5 (SC-8)	−12V	−11.5V to −12.5V
TP 8 (SC-8)	+195V	+190V to +200V
Pin 1 of P804	+18V	+17V to +19V

Table 3-1.

Yes : Proceed to step 'c'.
no : Troubleshoot the each power supply.

+18V : U802 (SC-8, power supply board) and associated circuit.

+12V : U804 (SC-8, power supply board) and associated circuit.

−12V : U803 (SC-8, power supply board) and associated circuit.

+5V : U805 (SC-8, power supply board) and associated circuit.

+140V : U801 (SC-8, power supply board) and associated circuit.

+195V : +195V line, D806 (SC-8, power supply board) and associated circuit.

c. High voltage power supply

* * * WARNING * * *

To prevent personal injury extreme caution must
be used when working in the high voltage section.

Check voltage at cathode of CR630 (SC-6, horizontal board) for −1900VDC.

Yes : Proceed to step 'f'.

No : Troubleshoot high voltage generator, feed back amplifier (SC-8, power supply board)

Check F801, 500mA normal blow fuse (SC-6, Horizontal board) for open.

* CAUTION : Use specified fuse when replace it. (0.5A NORMAL BLO)

d. Vertical amplifier

Short pins Y^- and Y^+ (SC-3, vertical board) with clip lead.

Trace appears.

Yes : Short both bases of Q501 and Q502 (SC-3, vertical board) with clip lead.
Trace appears.

Yes − Continue the same procedure to input stage to locate the amplifier unbalancing.

No − Troubleshoot the vertical final amplifier for unbalance.

No : Proceed to step 'e'.

e. Horizontal amplifier

Set TIME/DIV switch to X-Y position.

spot appears.

Yes : Proceed to step '(3)'.

No : Short X^+, X^- (SC-6, horizontal board) with short clip lead.

Spot appears.

Yes — Troubleshoot the horizontal amplifier for unbalance.

No — Proceed to step 'f'.

f. Unblanking circuit.

Check that unblanking pulse is present at R681 (SC-6, horizontal board)

Yes : Troubleshoot CRT control circuit (SC-6, horizontal board)

Adjust VR612 as necessary. Refer to paragraph '3.4 (1)'.

No : Trace the unblanking signal (sweep gate) to time base generator to locate the defective circuit.

(2) Vertical Amplifier Section

a. No waveform appears on the CRT.

Apply the CAL 0.5Vp-p square wave to CH-1 and/or CH-2 INPUT connector and set the VOLTS/DIV switch to 0.1V position.

Trace the square waveform the input stage to the output stage to locate the defective circuit.

Check that the square wave present at both bases of Q501 and Q502 (SC-3, vertical board)

Yes : Troubleshoot vertical final amplifier.

No : Check that the square wave present at base of Q206 (SC-3, vertical board) for CH-1, base of Q306 (SC-3, vertical board) for CH-2.

Yes — Troubleshoot preamplifier and channel select gate.

No — Troubleshoot the input amplifier and attenuator.

b. Vertical sensitivity out of tolerance
Adjust VR204 (SC-3, vertical board) for CH-1, VR304 (SC-3, vertical board) for CH-2, Refer to paragraph '3.5 (4)'.

c. V MODE switch not working correctly
Trouleshoot MODE switch S401, (SC-3, vertical board), channel select gate and control circuit.

CH-1 : U401-403 (SC-3, vertical board) and associated circuit.
CH-2 : U401-403 (SC-3, vertical board) and associated circuit.
CHOP: Check waveform at pin 3 of U402 (SC-3, vertical board) for witching signal.
Yes — Channel select gate.
No — S401 (SC-3, vertical board), multivibrator (U606, SC-6, horizontal board) control circuit.
ALT : U601 (SC-6, horizontal board) and associated circuit.

d. CH-2 INV not working
Check Q314, Q315 (SC-3, vertical board) and control circuit.

e. ×5 MAG mode not working correctly
check S206 (SC-3, vertical board) for CH-1, S306 (SC-3, vertical board) for CH-2 and associated circuit.

(3) Time base/Horizontal Amplifier Section

a. No trace appears on sweep mode (only spot appears)
Check that the sawtooth wave present at emitter of Q602 (SC-6, horizontal board)
Yes : Troubleshoot horizontal amplifier.
No : Check that the trigger signal is present at pin 8 of U604 (SC-6, horizontal board)
Yes : Troubleshoot sweep gate and sweep generator.
No : Proceed to step '(4)'.

b. Sweep time out of tolerance
Adjust VR603, 608 and VR602, VC601 (SC-6, horizontal board).
Refer to paragraph '3.6 (1)'.

c. ×10 MAG mode not working correctly
Check Q618, 619 (SC-6, horizontal board) and control circuit.

(4) Trigger Section

a. Display is unstable
The trigger signal must be applied from vertical amplifier to sweep generator via trigger pickoff circuit.

Check waveform at pin 8 of U604 (SC-6, horizontal board)
Yes : Troubleshoot sawtooth generator.
No : Troubleshoot trigger pickoff circuit, trigger amplifier and pulse shaper.

b. TRIG COUPLING not working correctly
Check that the contact of COUPLING switch, S603 (SC-6, horizontal board) and control circuit.

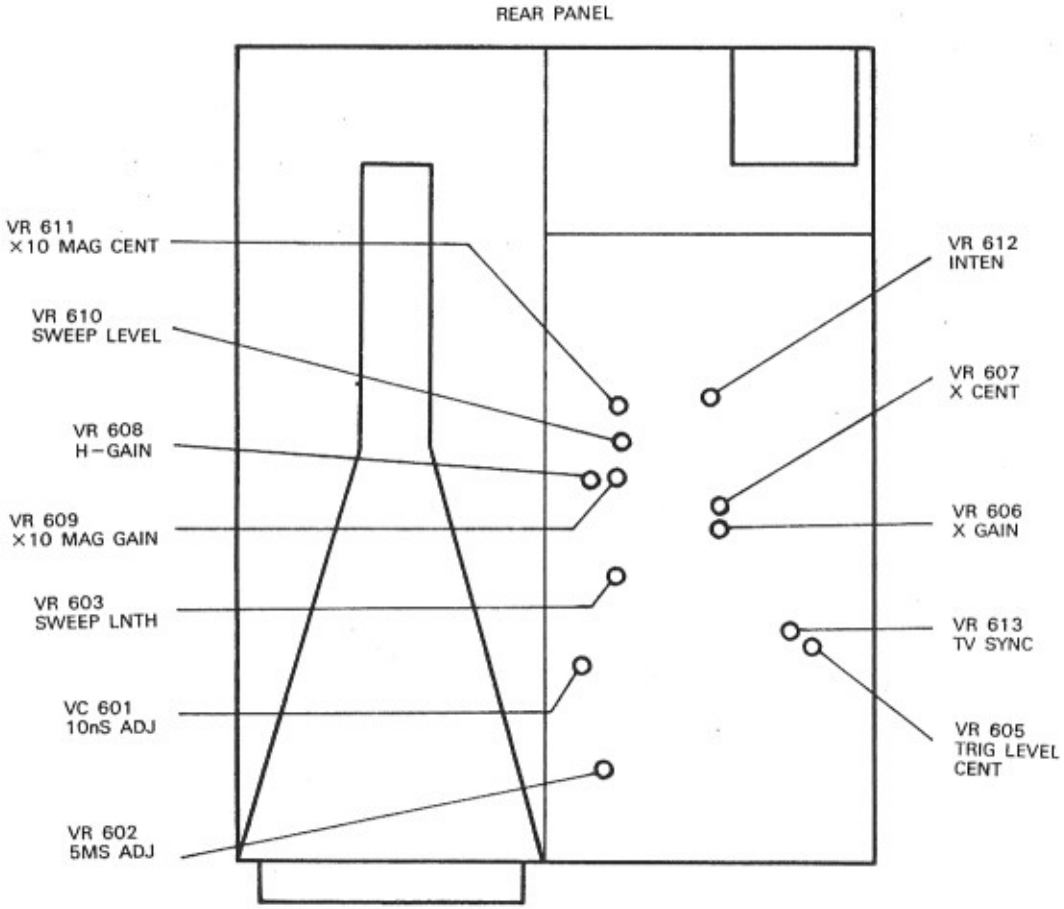
c. TRIG SOURCE not working correctly
Check that the contact of SOURCE switch, S604 (SC-6, horizontal board) and control circuit.

(5) Others

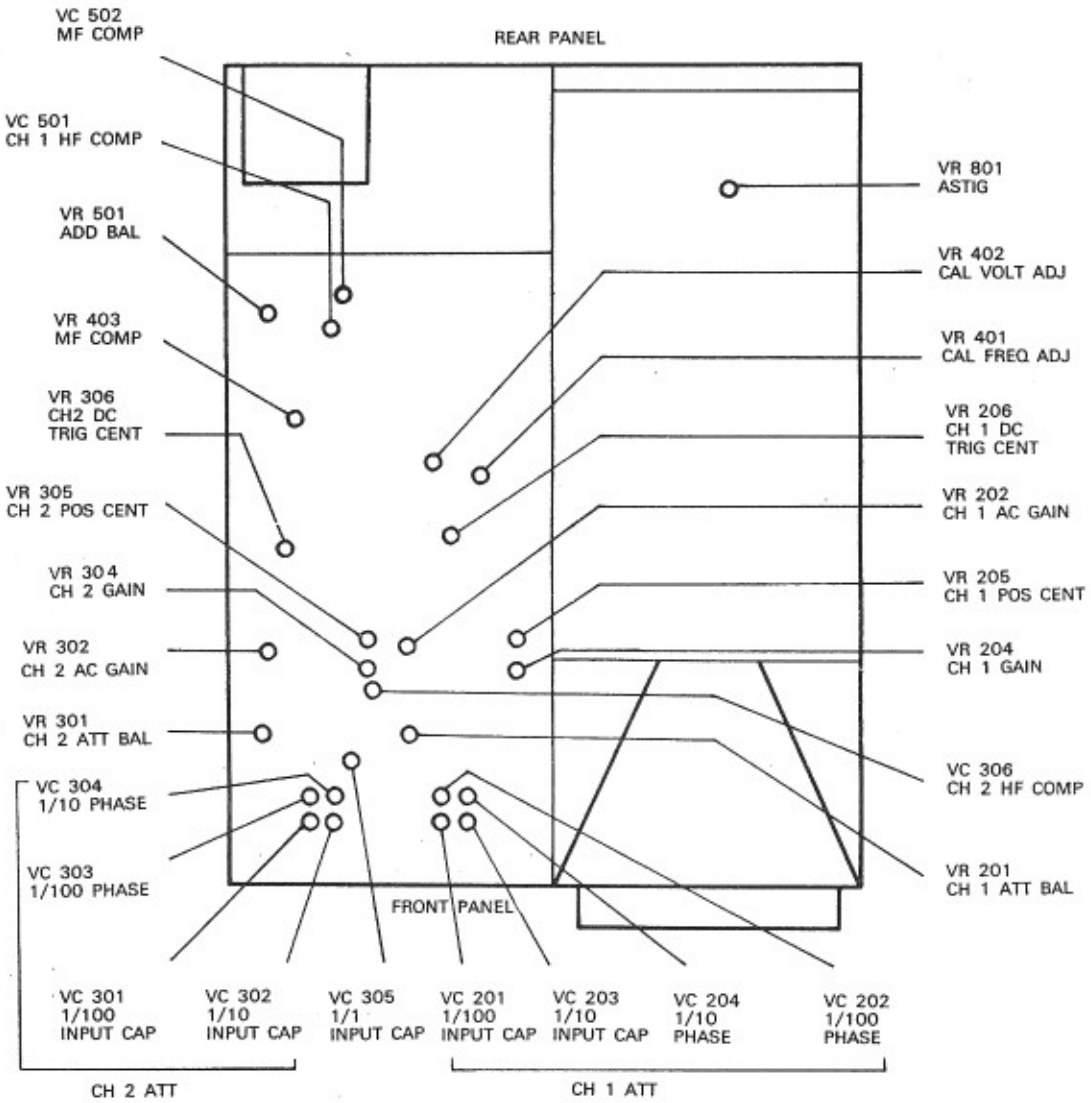
a. No TRACE ROTATION works
Check rotation coil for open.

b. CAL signal not present
Troubleshoot U401, 403 (SC-3, vertical board) and associated circuit.
Adjust VR401, 402 (SC-3, vertical board) if necessary. Refer to paragraph '3.9'.

5. ADJUSTMENT LOCATIONS

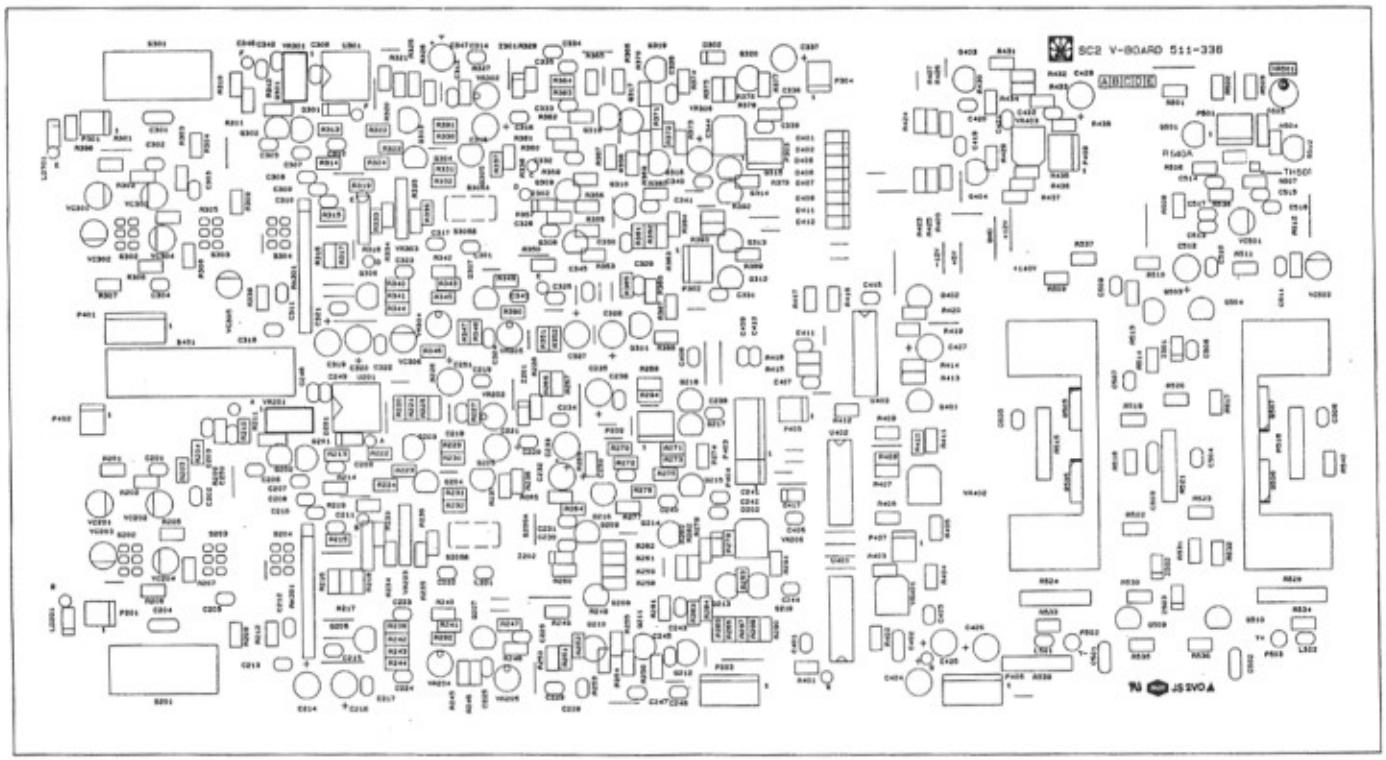


TOP VIEW

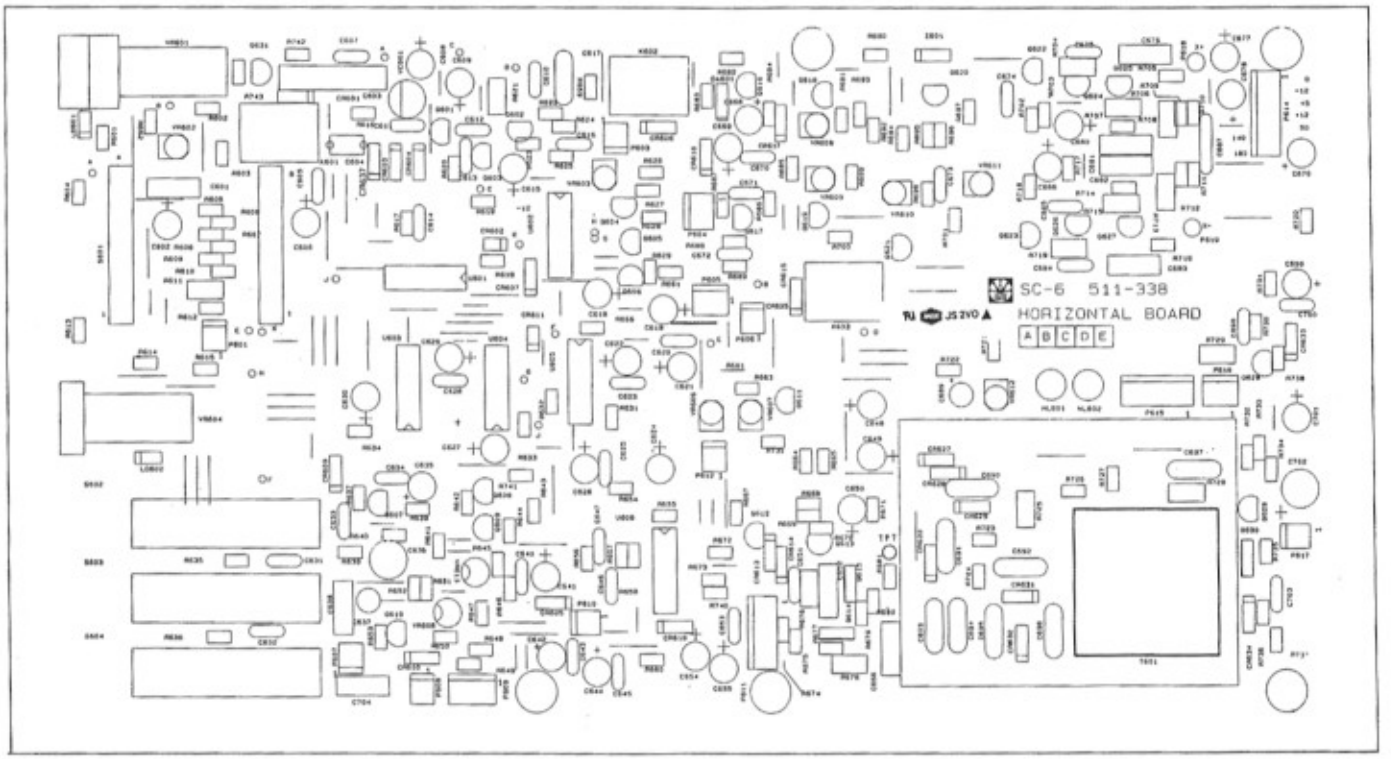

VC 502
MF COMP
REAR PANEL
VC 501
CH 1 HF COMP
VR 801
ASTIG
VR 501
ADD BAL
VR 402
CAL VOLT ADJ
VR 403
MF COMP
VR 401
CAL FREQ ADJ
VR 306
CH2 DC
TRIG CENT
VR 206
CH 1 DC
TRIG CENT
VR 305
CH 2 POS CENT
VR 202
CH 1 AC GAIN
VR 304
CH 2 GAIN
VR 205
CH 1 POS CENT
VR 302
CH 2 AC GAIN
VR 204
CH 1 GAIN
VR 301
CH 2 ATT BAL
VC 306
CH 2 HF COMP
VC 304
1/10 PHASE
VC 303
1/100 PHASE
VR 201
CH 1 ATT BAL
FRONT PANEL
VC 301
1/100
INPUT CAP
VC 302
1/10
INPUT CAP
VC 305
1/1
INPUT CAP
VC 201
1/100
INPUT CAP
VC 203
1/10
INPUT CAP
VC 204
1/10
PHASE
VC 202
1/100
PHASE
CH 2 ATT
CH 1 ATT

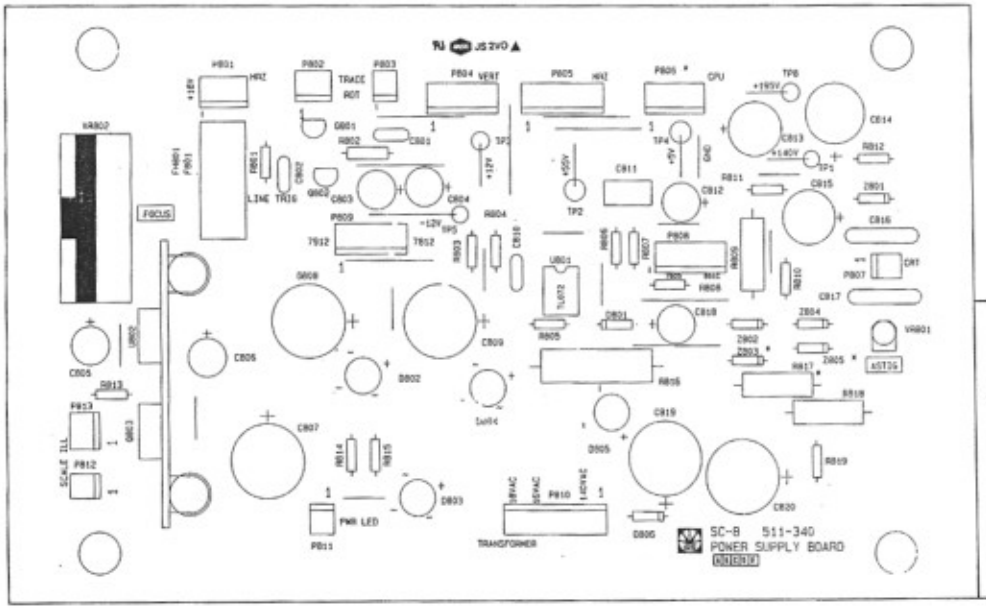
BOTTOM VIEW

6. PRINTED CIRCUIT BOARD

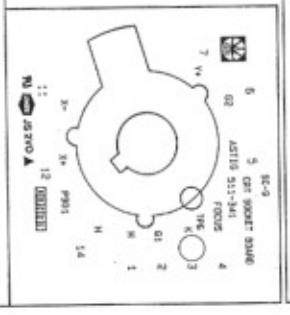


VERTICAL BOARD


SC-6 511-338
HORIZONTAL BOARD
A B C D E



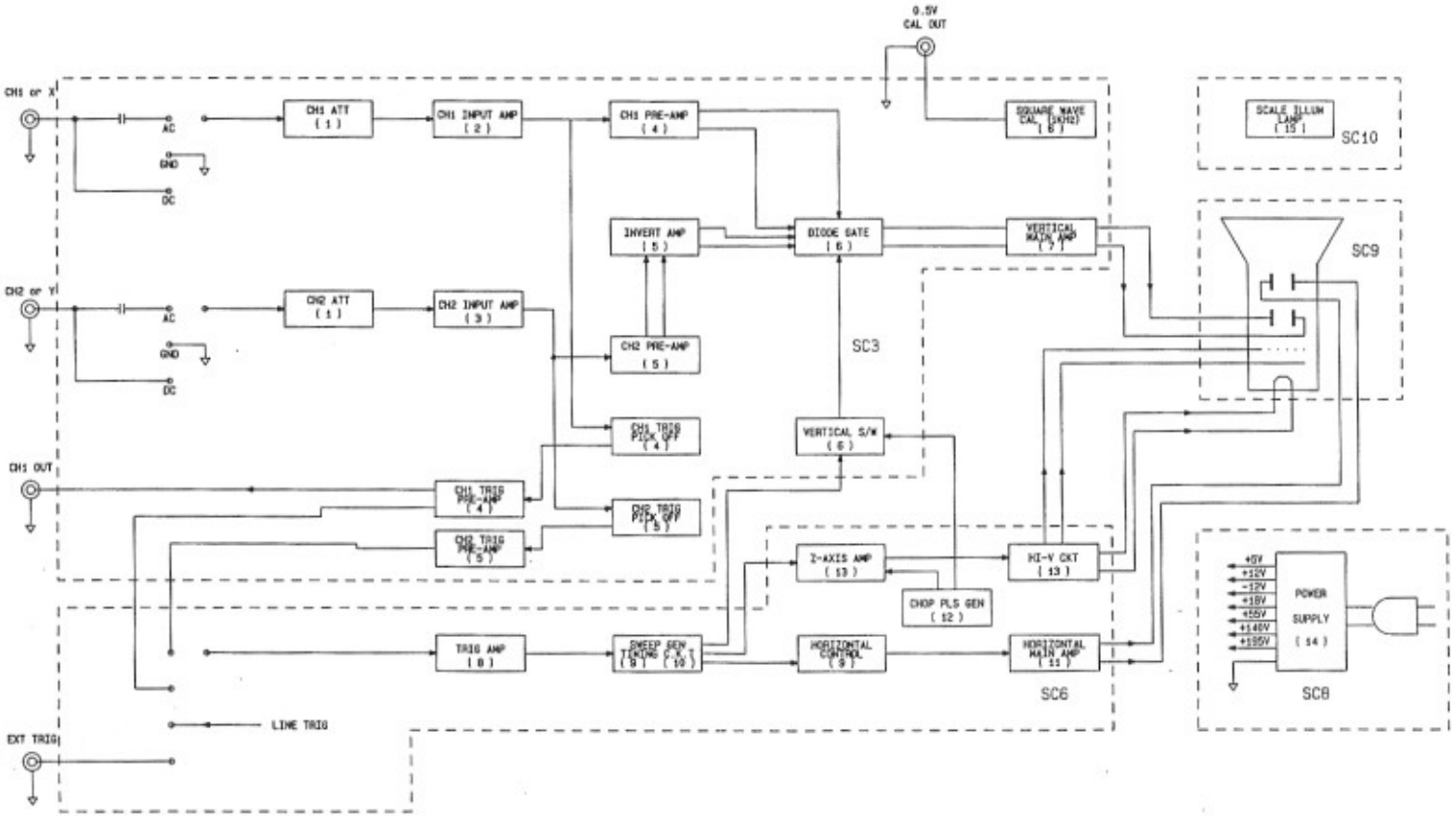
SC-8
POWER SUPPLY BOARD
6-3
1021



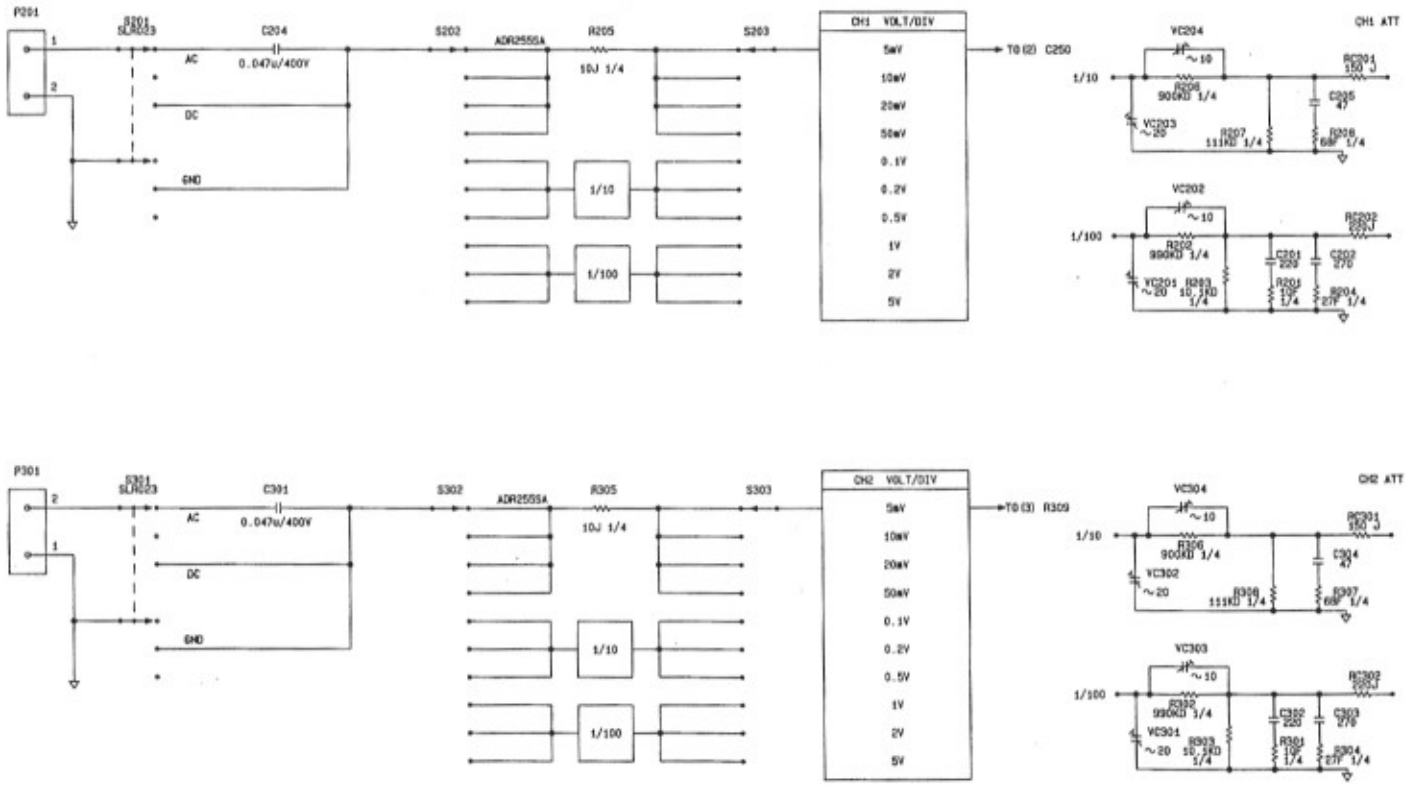
SC-9
CRT .SOCKET BOARD

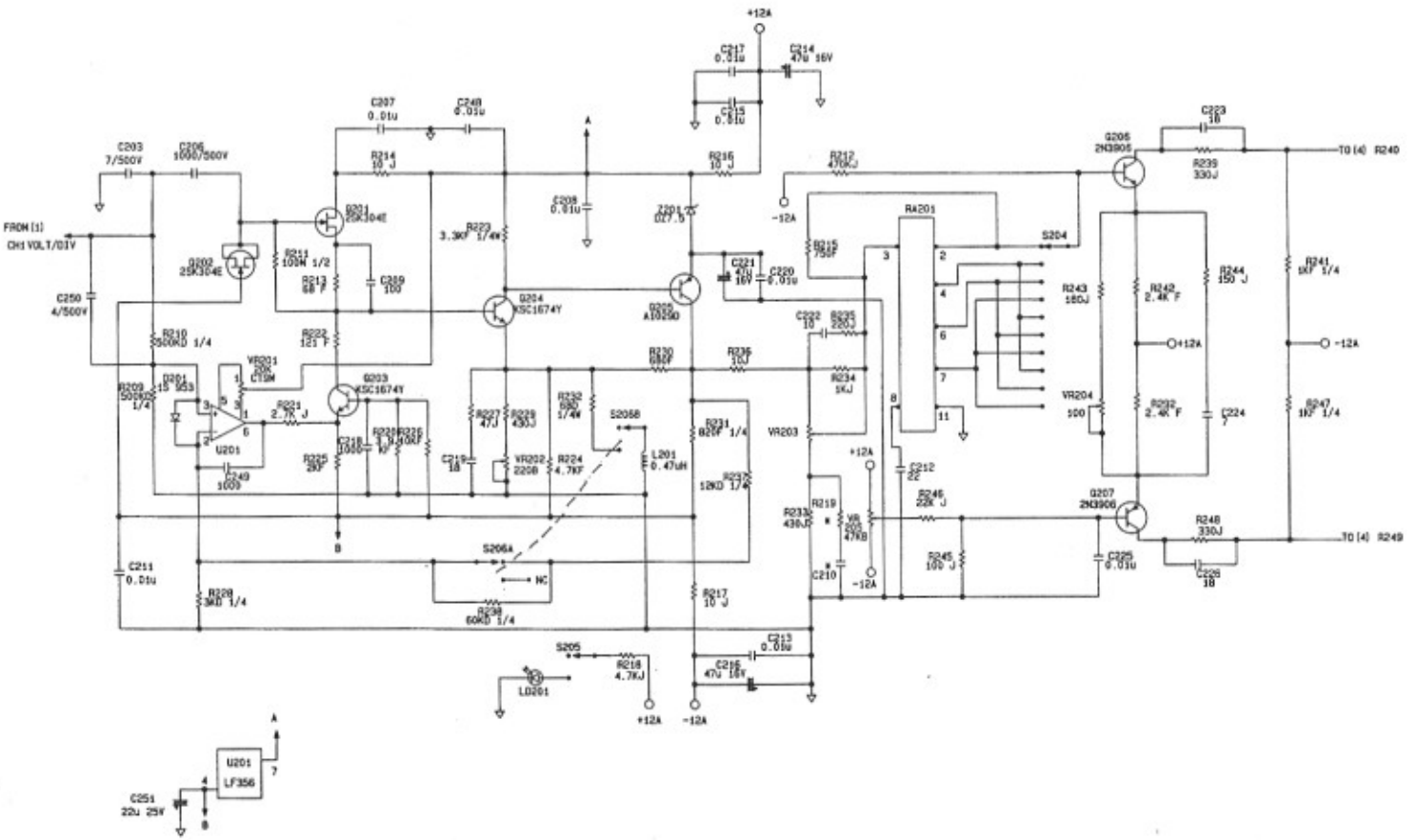
SC-10
SCALE ILLUM.
LAMP BOARD

7. BLOCK DIAGRAM / SCHEMATIC DIAGRAM

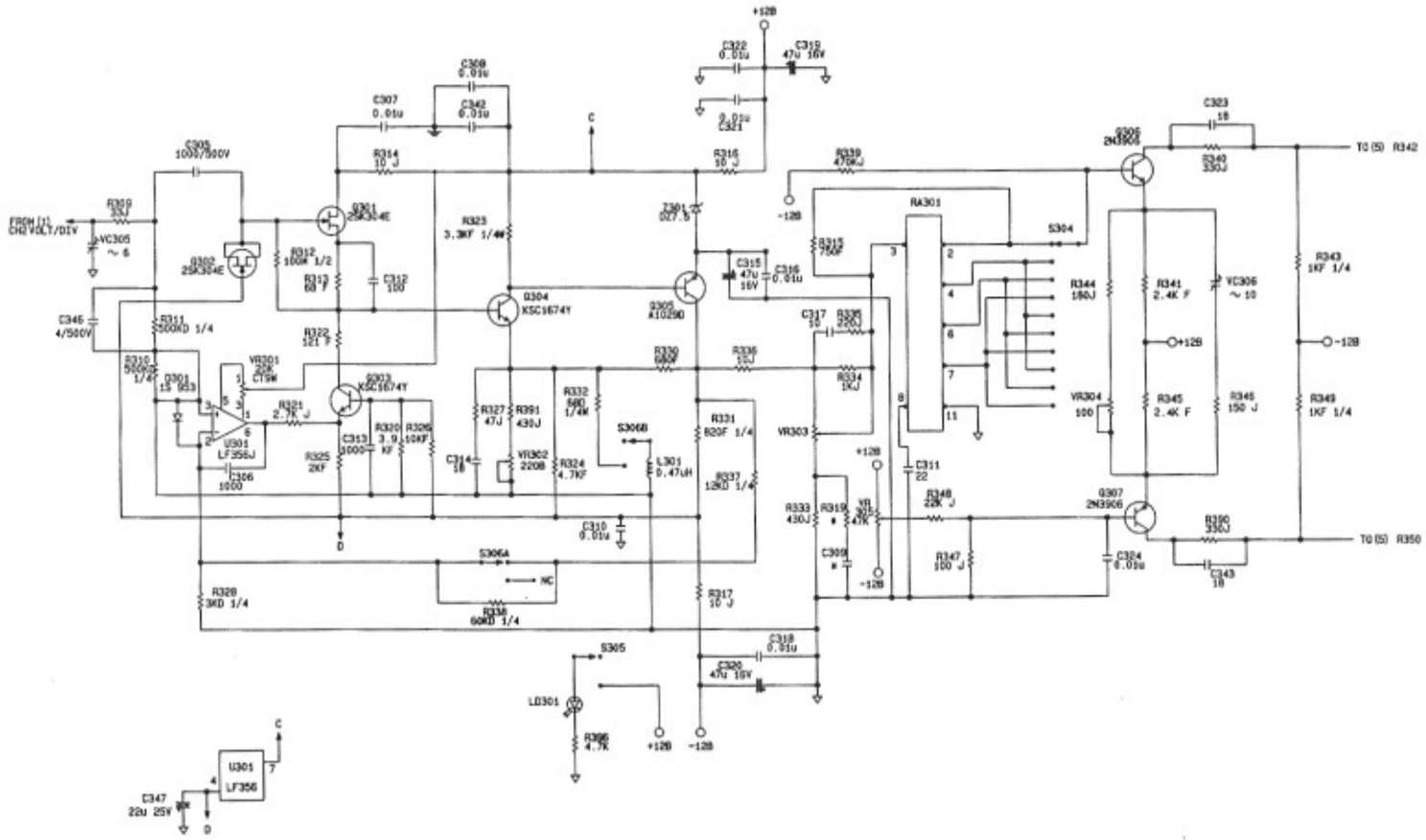


BLOCK DIAGRAM

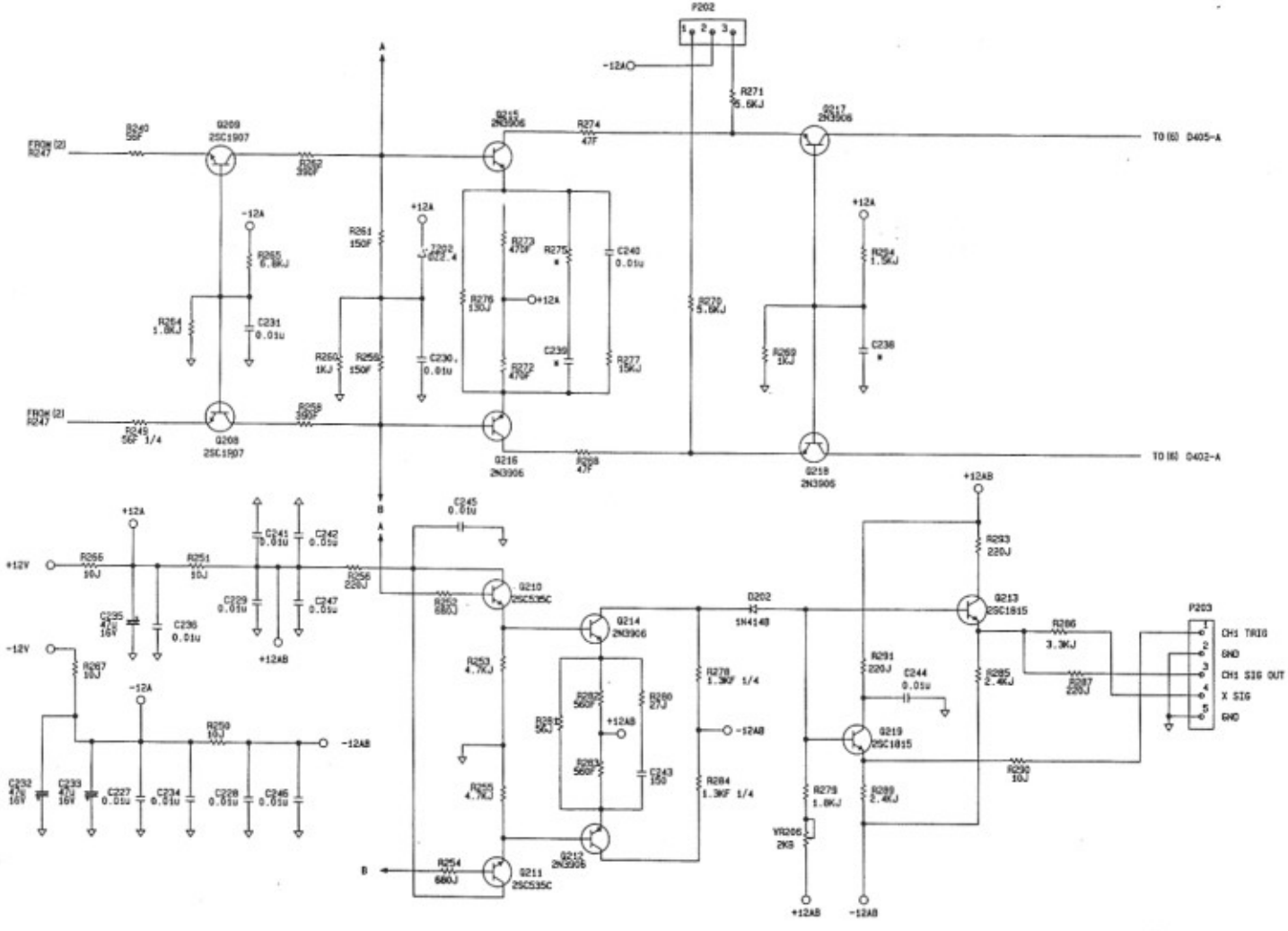

P201
1
2
R201
SLR023
C204
0.047u/400V
AC
DC
GND
S202
ADR255A
R205
10J 1/4
1/10
1/100
S203
CH1 VOLT/DIV
5mV
10mV
20mV
50mV
0.1V
0.2V
0.5V
1V
2V
5V
TO(2) C250
CH1 ATT
VC204
~10
1/10
R208
900KΩ 1/4
VC203
~20
R207
111KΩ 1/4
RC201
150 J
C205
47
R206
68P 1/4
VC202
~10
1/100
R209
990KΩ 1/4
VC201
~20
R203
10.3KΩ
1/4
C201
220
R201
1/4
C202
270
R204
270 1/4
RC202
150J
P301
2
1
R301
SLR023
C301
0.047u/400V
AC
DC
GND
S302
ADR255A
R305
10J 1/4
1/10
1/100
S303
CH2 VOLT/DIV
5mV
10mV
20mV
50mV
0.1V
0.2V
0.5V
1V
2V
5V
TO(3) R309
CH2 ATT
VC304
~10
1/10
R306
900KΩ 1/4
VC302
~20
R308
111KΩ 1/4
RC301
150 J
C304
47
R307
68P 1/4
VC303
~10
1/100
R309
990KΩ 1/4
VC301
~20
R303
10.3KΩ
1/4
C302
220
R301
1/4
C303
270
R304
270 1/4
RC302
150J



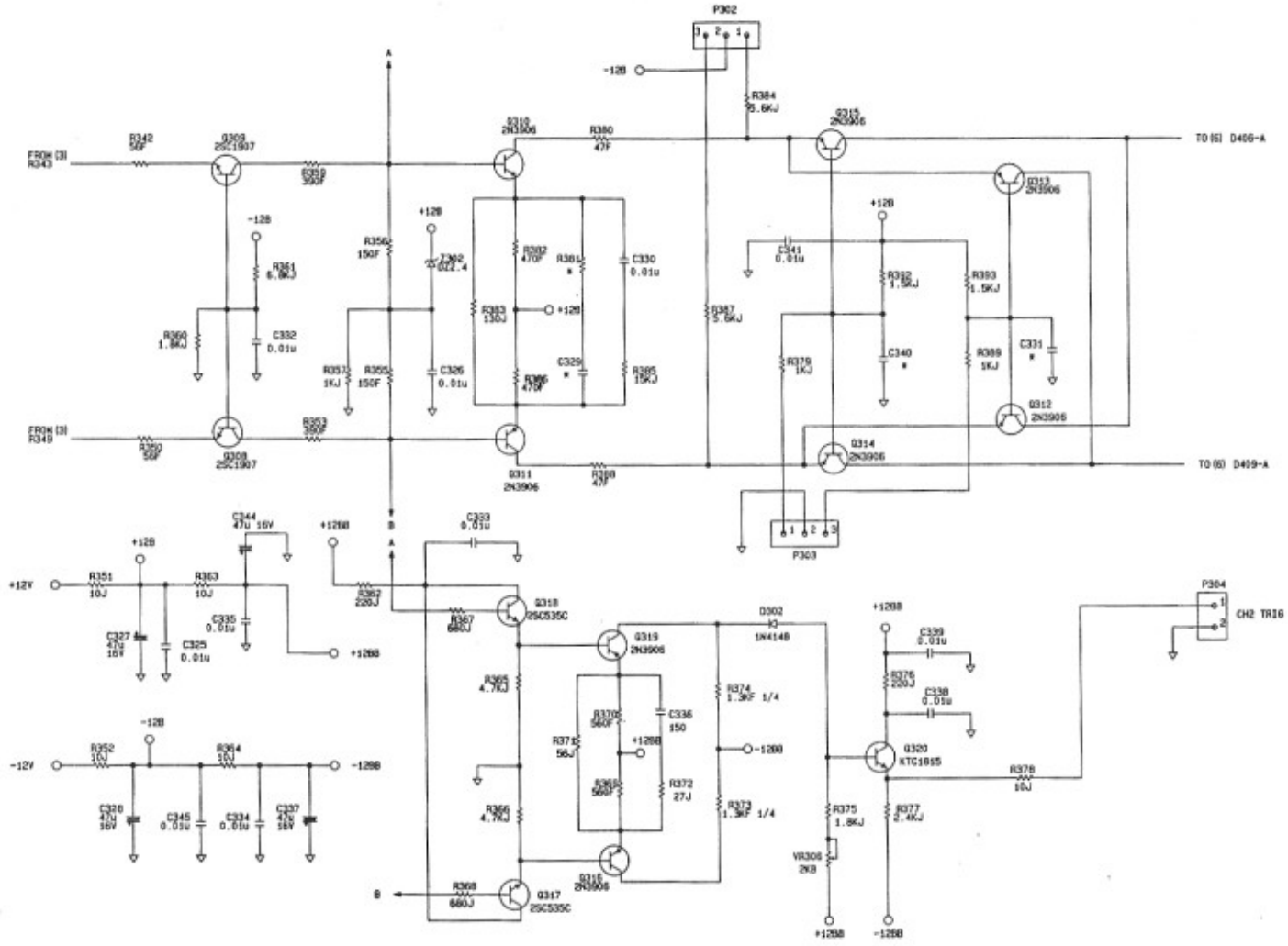
CH1 INPUT AMPLIFIER



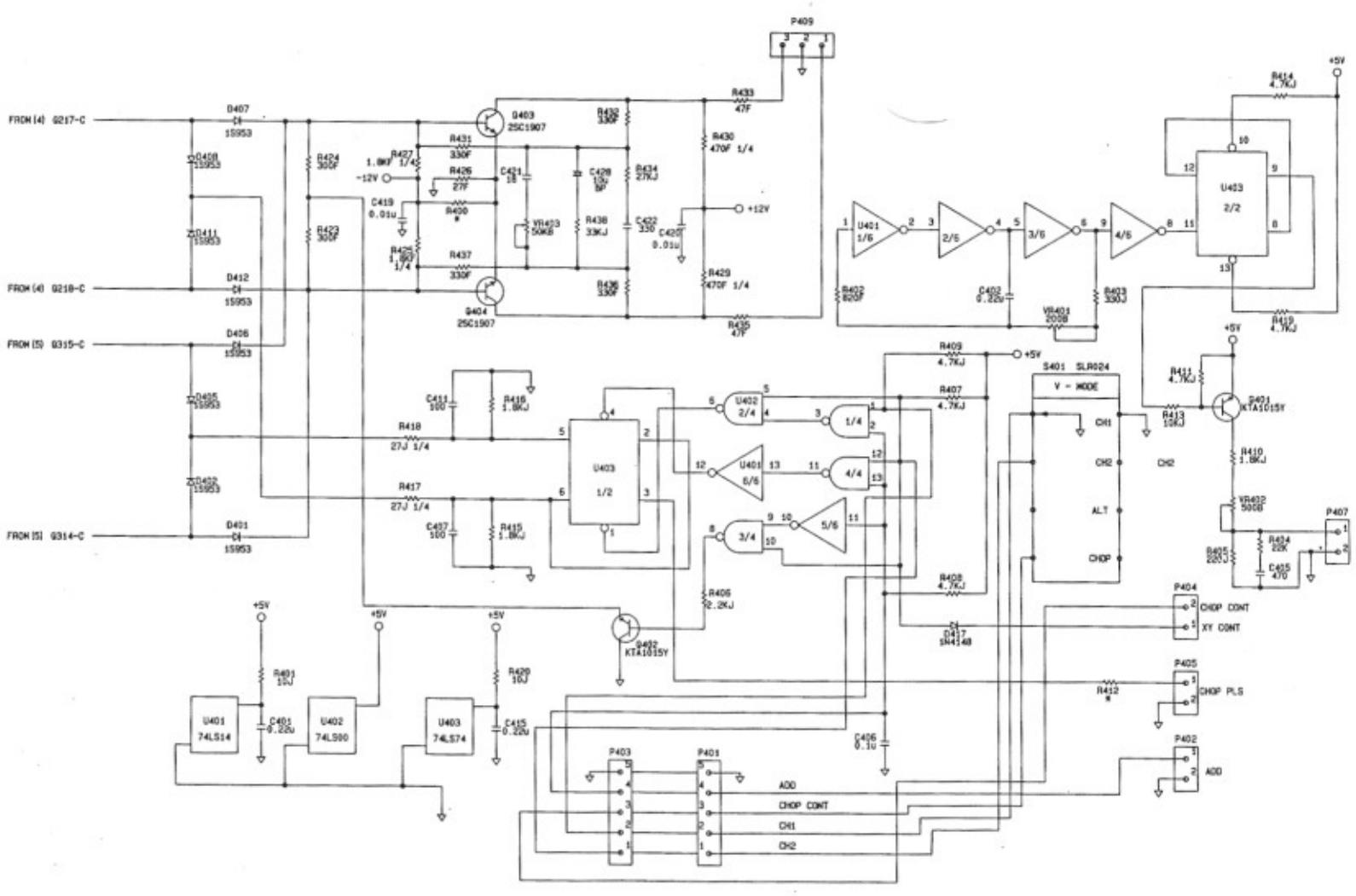
CH2 INPUT AMPLIFIER



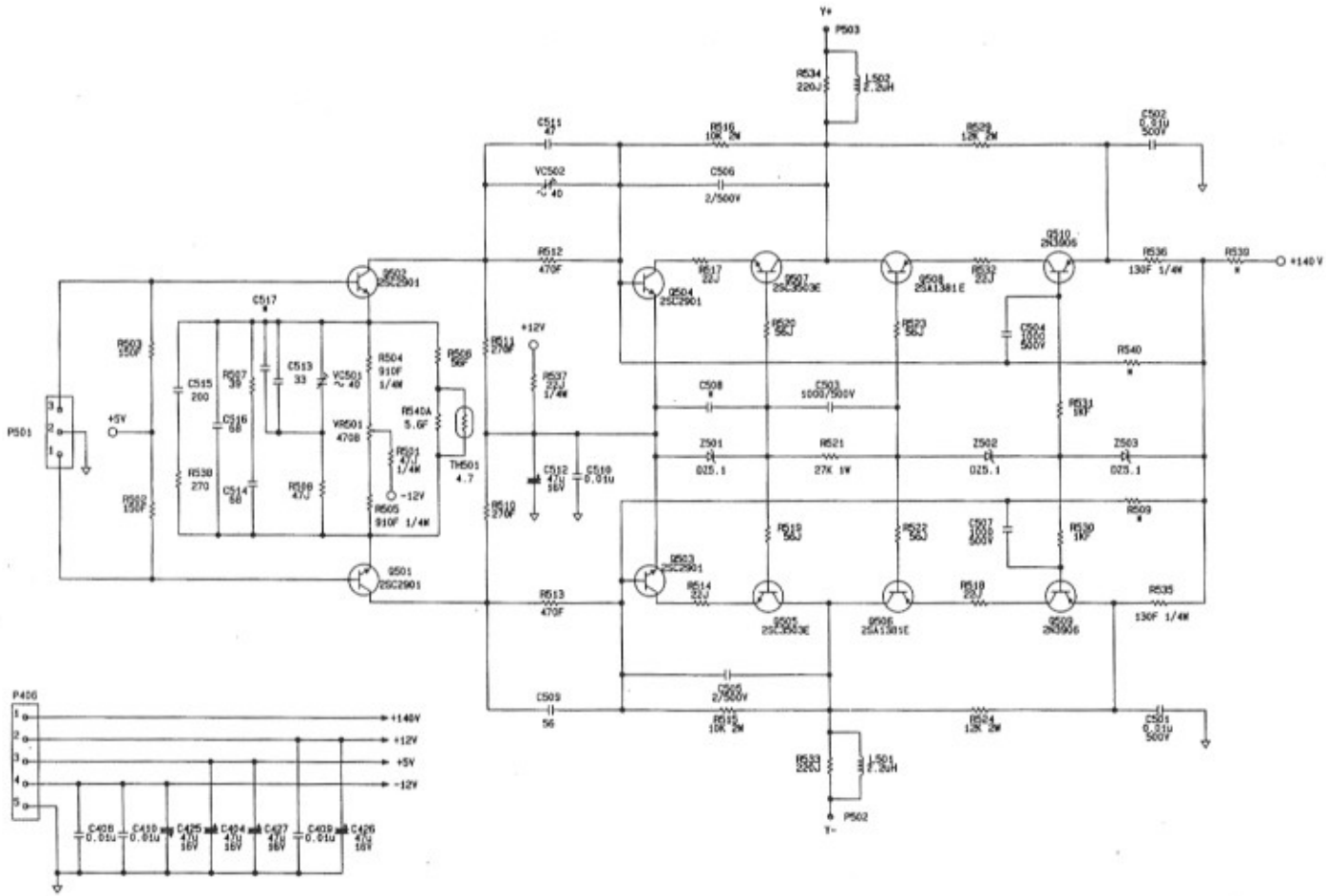
CH1 PRE AMP & TRIG PICK OFF

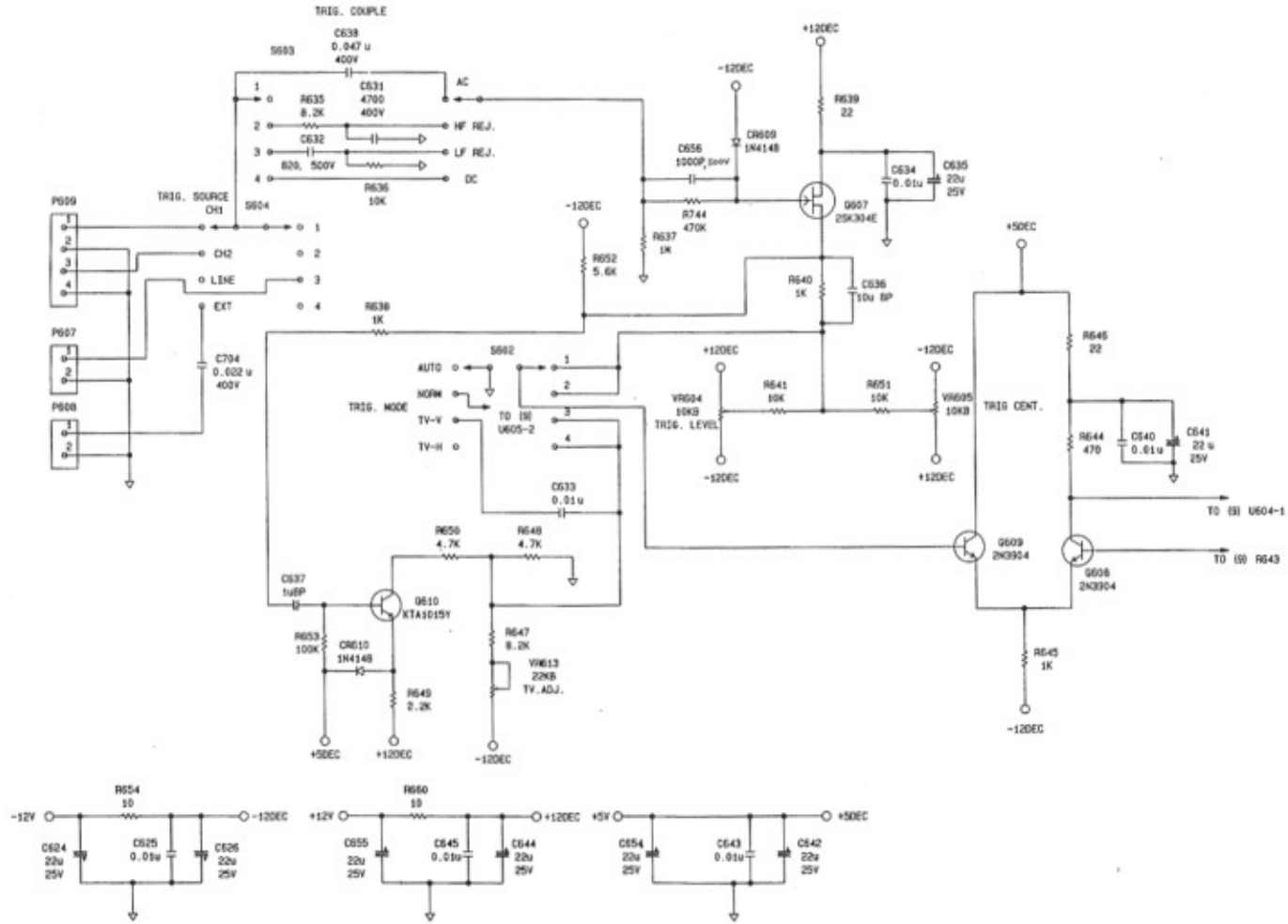


CH2 PRE AMP & TRIG PICK OFF

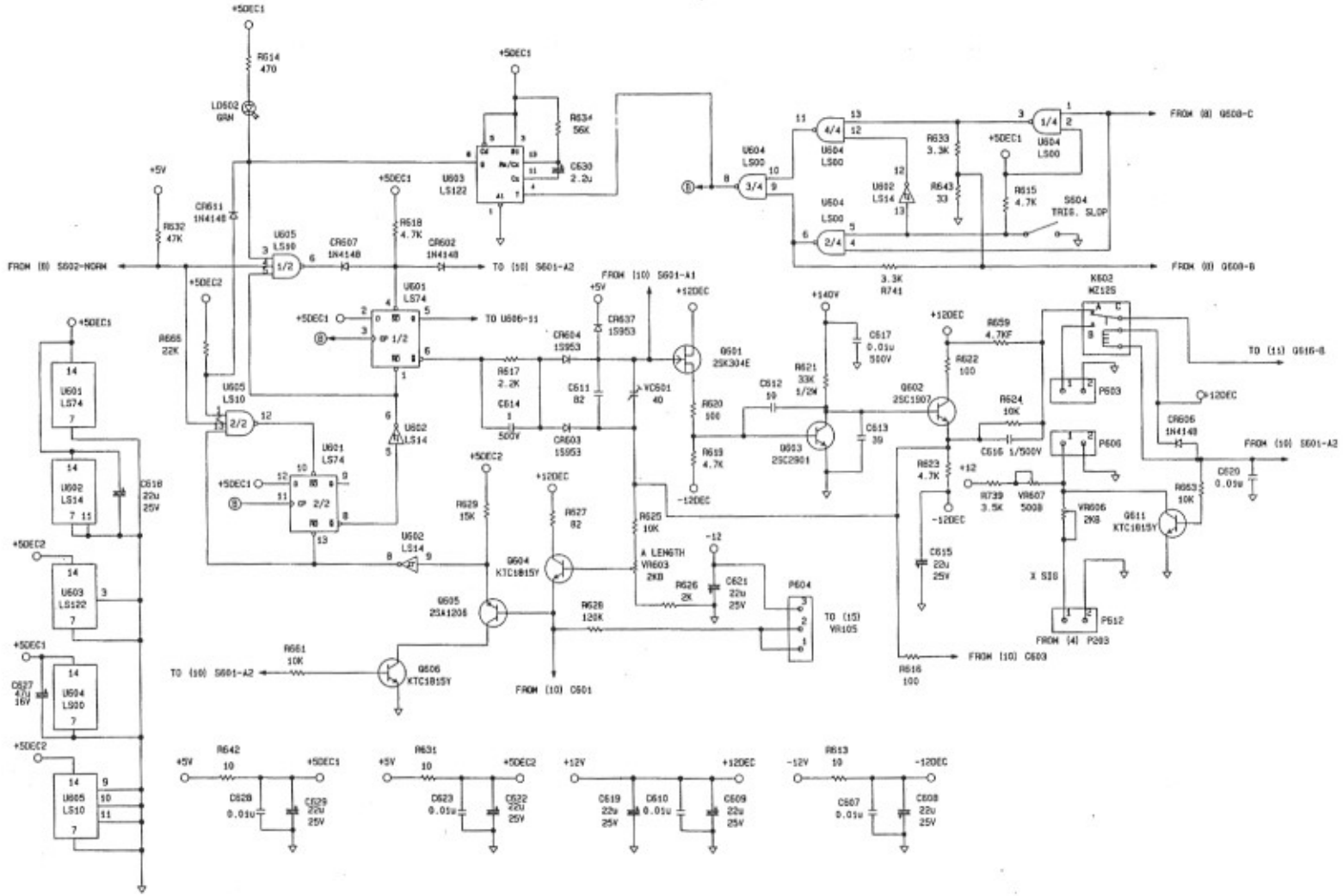


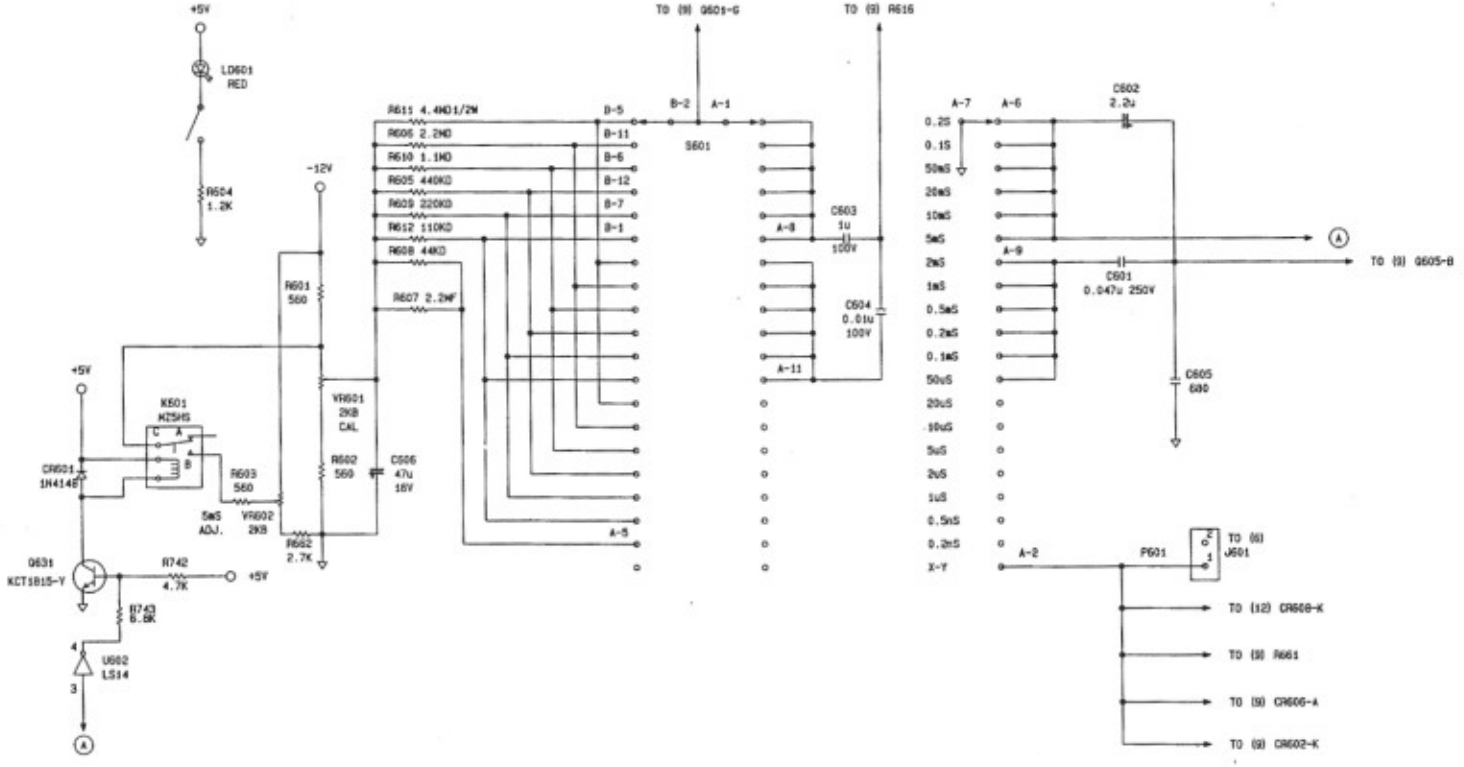
VERTICAL CONTROL


Y+
P503
R534 220J
L503 2.2uH
C511 47
R516 10K 2W
R529 10K 2W
C502 0.01U 500V
VC502 ~ 40
C506 2/500V
R512 470F
Q502 2SC2901
C517
R502 150F
R501 150F
P501
+5V
C515 200
R527 39
C513 33
VC503 ~ 40
R504 910F 1/4W
R508 56F
C516 68
VR501 470B
R540A 5.6F
TH501 4.7
R538 270
C514 68
R506 47U
R503 910F 1/4W
-12V
Q501 2SC2901
+12V
R511 270F
R537 22J 1/4W
C512 47U 16V
C510 0.01U
R510 270F
R513 470F
Q503 2SC2901
R514 22J
Q504 2SC2901
R517 22J
Q507 2SC3503E
Q505 2SA1381E
R532 22J
Q510 2SJ306
R536 130F 1/4W
R530
+140V
R520 56J
R523 56J
C504 1000 500V
R540
C508
C503 1000/500V
R531 1MF
Z501 025.1
R521 27K 1W
Z502 025.1
Z503 025.1
R509
R519 56J
R522 56J
C507 1000 500V
R539 1MF
R518 56J
Q506 2SA1381E
Q508 2SJ306
R535 130F 1/4W
C509 56
C505 2/500V
R515 10K 2W
R524 10K 2W
C501 0.01U 500V
R533 220J
L501 2.2uH
P502
Y-
P406
+140V
+12V
+5V
-12V
C408 0.01u
C410 0.01u
C425 47U 16V
C424 47U 16V
C427 47U 16V
C409 0.01u
C426 47U 16V

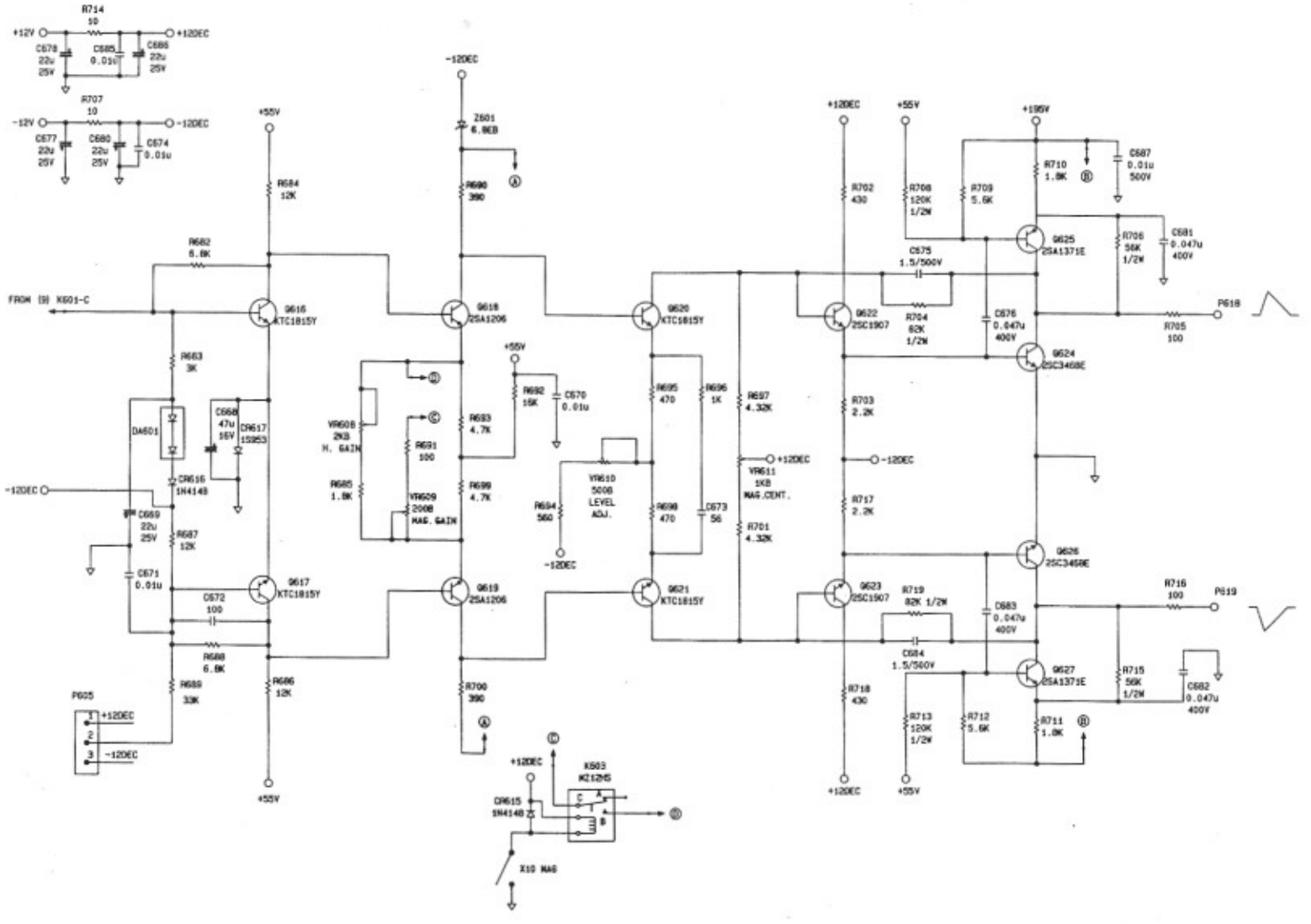


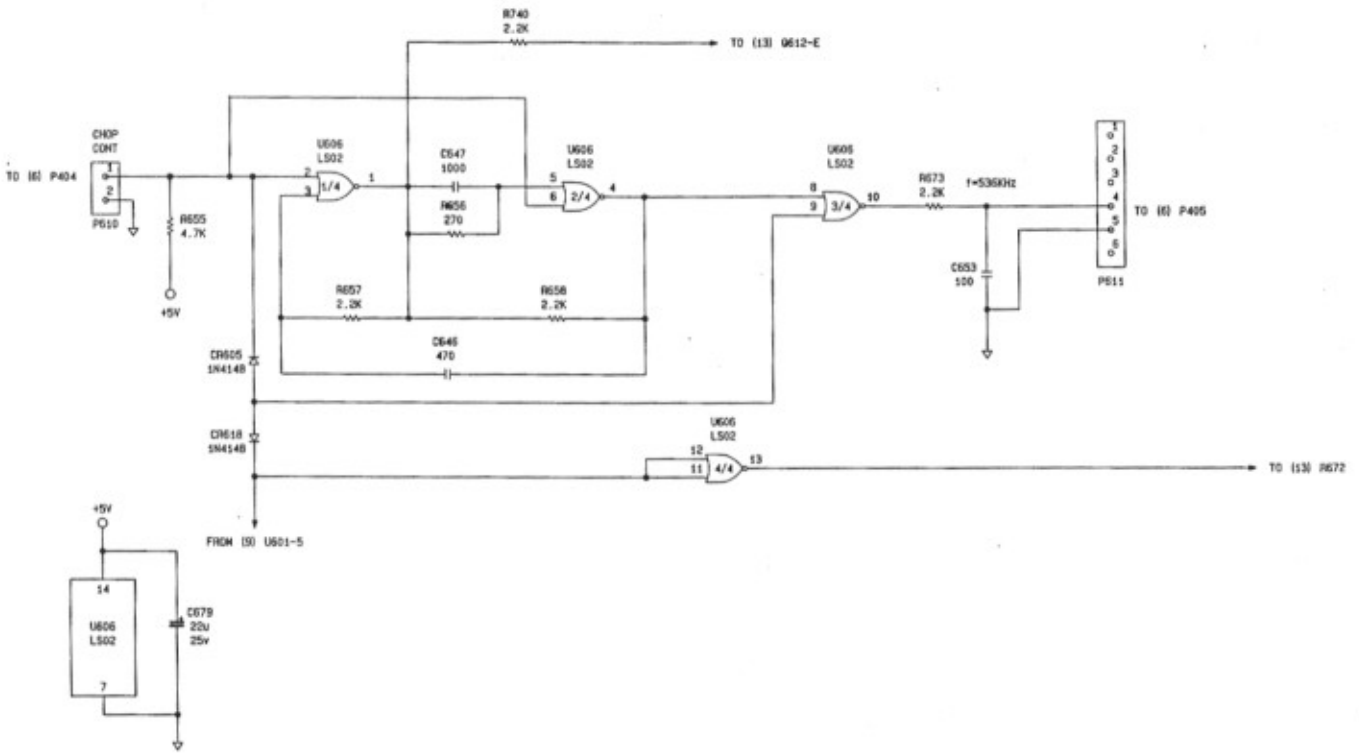
TRIGGER AMPLIFIER


+5DEC1
R614 470
LD602 GRN
+5V
R632 47K
CR611 1N4148
FROM (8) S602-NORM
U605 LS00 1/2
CR607 1N4148
R618 4.7K
CR602 1N4148
TO (10) S601-A2
+5DEC2
R665 22K
U605 LS10 2/2
U601 LS74
U602 LS14
U603 LS122
R634 56K
C630 2.2u
FROM (10) S601-A1
TO U606-11
CR604 1S953
CR637 1S953
CR603 1S953
R617 2.2K
C614 1 500V
C611 82
VC601 40
Q601 2SK304E
R620 100
R619 4.7K
-12DEC
+12DEC
+140V
C617 0.01u 500V
R621 33K 1/2W
C612 10
Q603 2SC2901
C613 39
Q602 2SC1907
R622 100
R624 10K
C616 1/500V
R659 4.7KF
K602 MZ12S
TO (11) Q616-B
P603
P606
CR606 1N4148
FROM (10) S601-A2
C620 0.05u
R653 10K
Q611 KTC1815Y
VR606 2KB
X SIG
P612
FROM (4) P203
R823 4.7K
+12
R739 3.5K
VR607 500B
C615 22u 25V
FROM (10) C603
R616 100
C618 22u 25V
C627 47u 16V
U604 LS00
U602 LS14
C621 22u 25V
R626 2K
A LENGTH VR603 2KB
R625 10K
R627 82
R629 15K
Q604 KTC1815Y
Q605 2SA1208
R628 120K
P604
TO (15) VR105
FROM (10) C601
R661 10K
Q606 KTC1815Y
TO (10) S601-A2
R642 10
C628 0.01u
C629 22u 25V
R631 10
C623 0.01u
C622 22u 25V
C619 22u 25V
C610 0.01u
C609 22u 25V
R653 10
C607 0.01u
C608 22u 25V
U604 LS00 4/4
U604 LS00 3/4
U604 LS00 2/4
U602 LS14
R633 3.3K
R643 33
R615 4.7K
S604 TRIG. SLOP
3.3K R741
FROM (8) Q608-C
FROM (8) Q608-B

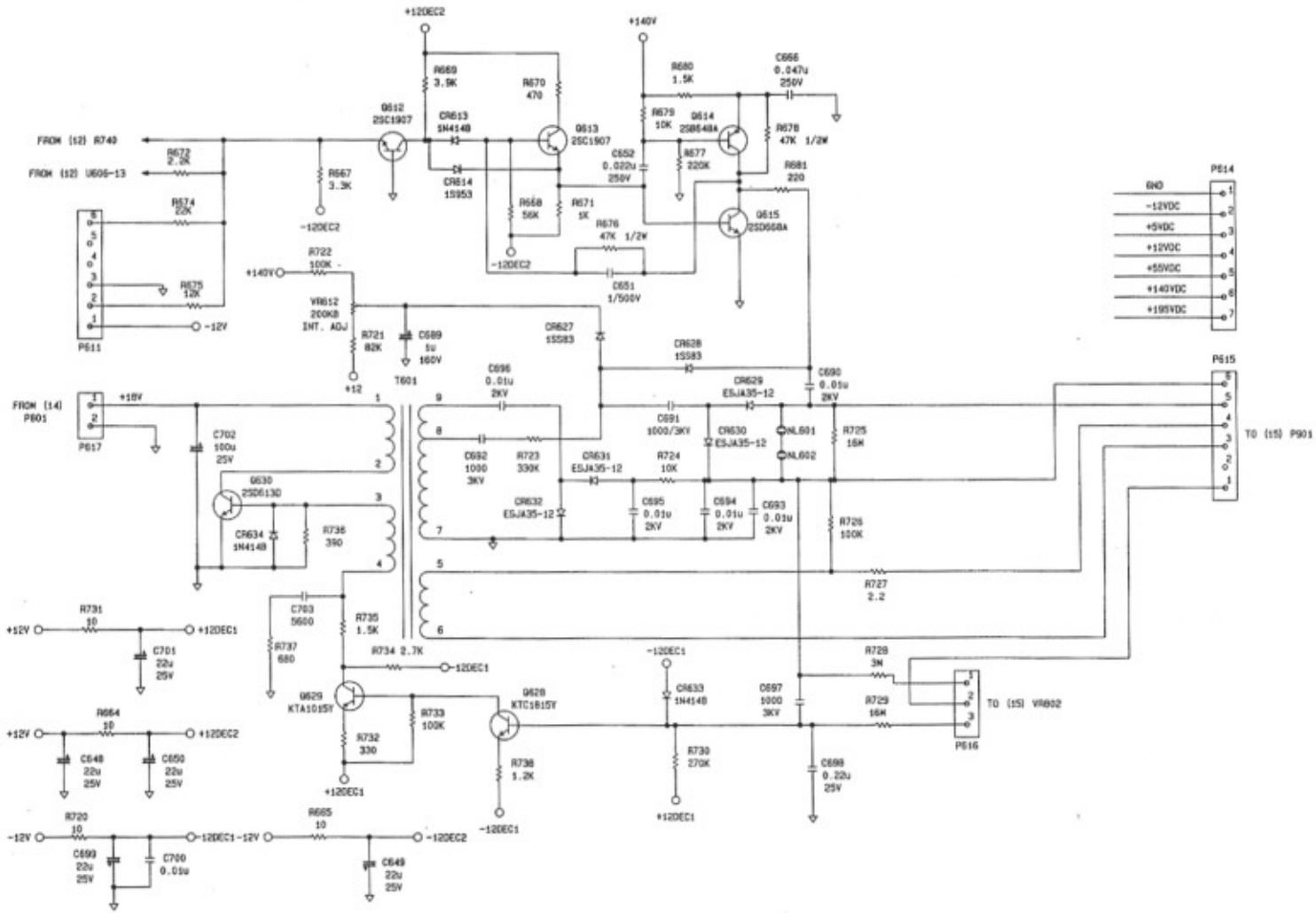


TIMING CIRCUIT

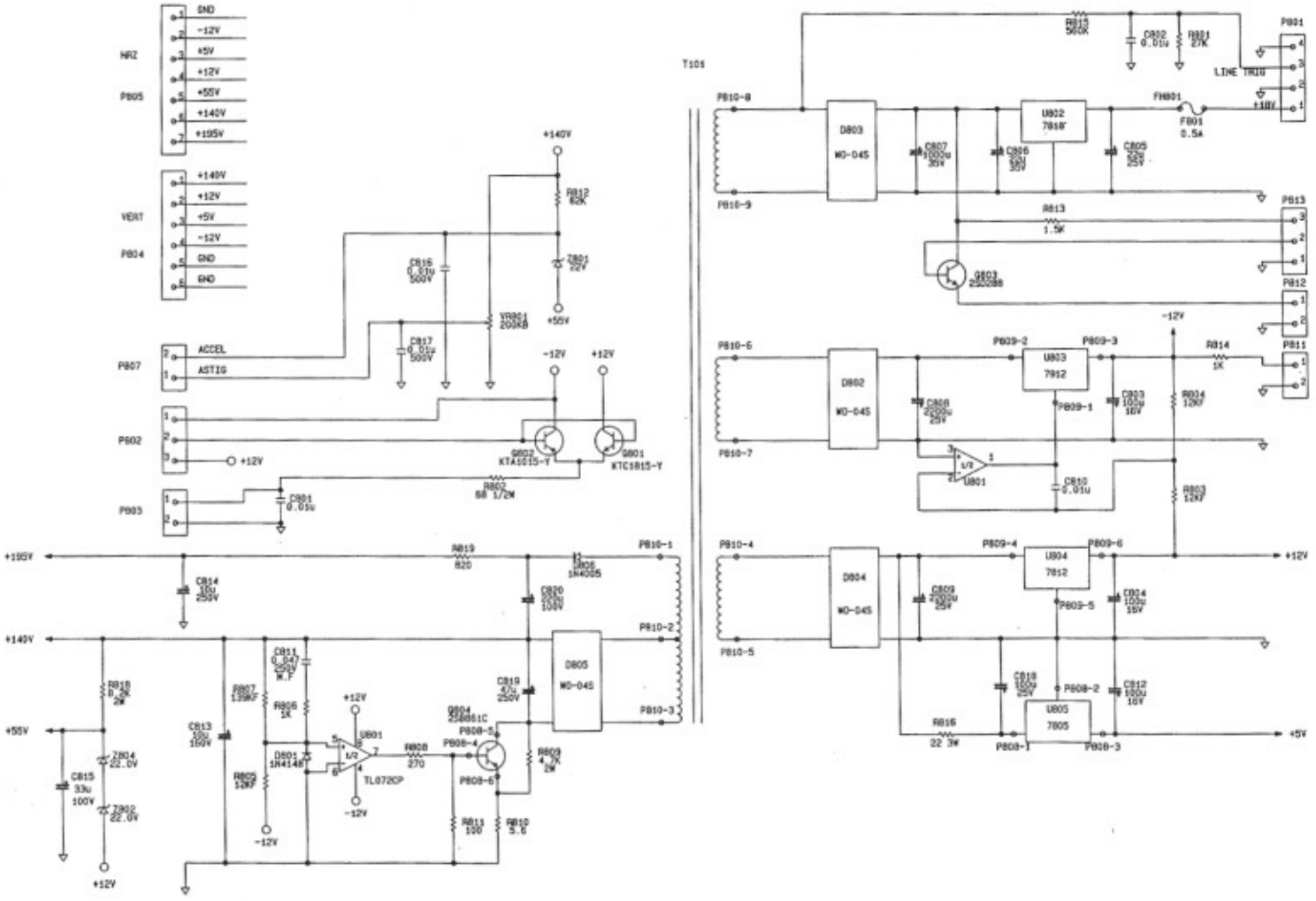

R714
10
+12V
+120EC
C678
22u
25V
C685
0.01u
C686
22u
25V
R707
10
-12V
-120EC
C677
22u
25V
C680
22u
25V
C674
0.01u
+55V
R684
12K
R682
6.8K
FROM (5) K601-C
Q616
KTC1815Y
R683
3K
DA601
C668
47u
16V
CR617
1S953
CR616
1N4148
-120EC
C669
22u
25V
R687
12K
C671
0.01u
Q617
KTC1815Y
C672
100
R688
6.8K
R689
33K
R686
12K
P605
1
2
3
+120EC
-120EC
+55V
-120EC
Z601
6.8CB
R690
390
Q618
2SA1206
Q619
2SA1206
R700
390
+55V
R692
15K
C670
0.01u
VR608
2KB
H. GAIN
R691
100
VR609
200B
MAG. GAIN
R685
1.8K
R693
4.7K
R699
4.7K
R694
560
VR610
500B
LEVEL
ADJ.
-120EC
Q620
KTC1815Y
Q621
KTC1815Y
R695
470
R696
1K
R698
470
C673
56
R697
4.32K
+120EC
VR611
1KB
MAG.CENT.
R701
4.32K
+120EC
+55V
+195V
R702
430
R708
120K
1/2W
R709
5.6K
R710
1.8K
C687
0.01u
500V
Q625
2SA1371E
R706
56K
1/2W
C681
0.047u
400V
C675
1.5/500V
Q622
2SC1907
R704
82K
1/2W
C676
0.047u
400V
P618
R705
100
Q624
2SC3468E
R703
2.2K
-120EC
R717
2.2K
Q626
2SC3468E
Q623
2SC1907
R719
82K 1/2W
C683
0.047u
400V
R716
100
P619
C684
1.5/560V
Q627
2SA1371E
R715
56K
1/2W
C682
0.047u
400V
R718
430
R713
120K
1/2W
R712
5.6K
R711
1.0K
+120EC
+55V
+120EC
K503
KZ12H5
CR615
1N4148
X10 MAG



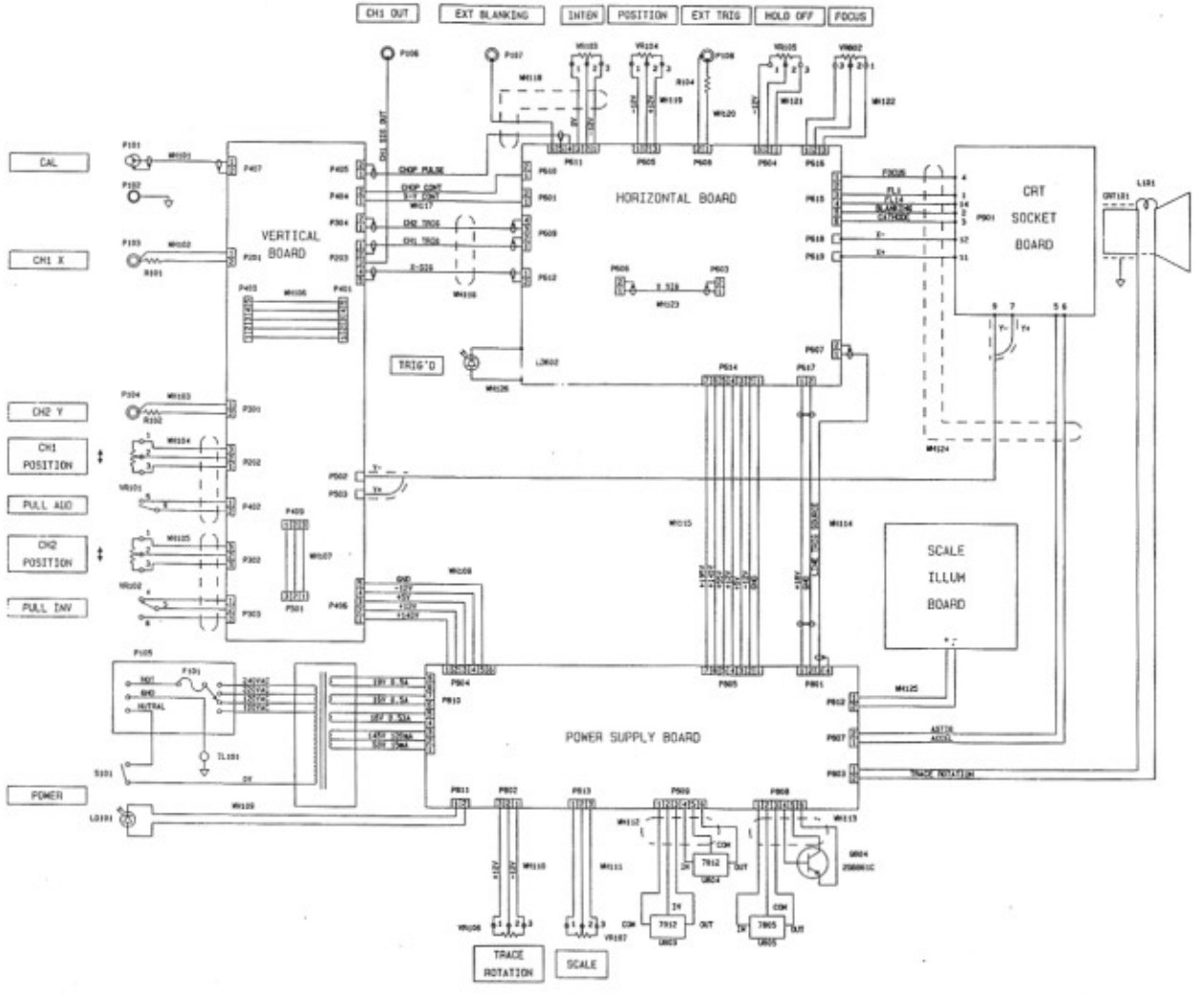
CHOP PULSE GENERATOR



H.V. CRT DRIVER


HRZ
P805
GND
-12V
+5V
+12V
+55V
+140V
+195V
VERT
P804
+140V
+12V
+5V
-12V
GND
GND
P807
ACCEL
ASTIG
P802
P803
+12V
C816 0.01u 500V
C817 0.01u 500V
VR801 200KB
R812 62K
ZD01 22V
+55V
+140V
-12V
+12V
Q802 KTA1015-Y
Q801 KTC1815-Y
R802 68 1/2W
C801 0.01u
+195V
+140V
+55V
+12V
R819 820
C814 10u 250V
C820 680u 100V
D806 1N4005
P810-1
P810-2
P810-3
D805 WO-04S
C811 0.047u 400V M.F
R807 139KF
R806 1K
C813 10u 160V
R805 12KF
D801 1N4148
U801 1/2 TL072CP
R808 270
Q804 2SB861C
P808-5
P808-4
P808-6
R809 4.7K 2W
C819 47u 250V
R813 100
R810 5.6
R810 2W
C815 33u 100V
ZD04 22.0V
ZD02 22.0V
+12V
-12V
T101
P810-8
P810-9
D803 WO-04S
C807 1000u 35V
C806 35V
C805 35V
U802 7818
FH801
F801 0.5a
C802 0.01u
R801 27K
LINE TRIO
+18V
P801
P813
P812
R813 1.5K
Q803 2SD288
P810-6
P810-7
D802 WO-04S
C808 2200u 25V
U803 7912
P809-2
P809-3
P809-1
C803 100u 16V
R814 1K
R804 12KF
R803 12KF
C810 0.01u
P810-4
P810-5
D804 WO-04S
C809 2200u 25V
U804 7812
P809-4
P809-6
P809-5
C814 100u 16V
C818 100u 25V
C812 100u 16V
U805 7805
P808-2
P808-1
P808-3
R816 22 3W
+12V
+5V
P815

8. WIRING DIAGRAM



9. PART LIST

(1) , ATTENUATORS

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C201	CAP CER,50V,J,220PF(T.C BLACK)	CT1HL221J	1	EA
2	C202	CAP CER,50V,J,270PF(T.C BLACK)	CT1HL271J	1	EA
3	C204	CAP M.F,400V,K,0.047UF	CH2GL473K	1	EA
4	C205	CAP CER,50V,J,47PF(T.C BLACK)	CT1HL470J	1	EA
5	C301	CAP M.F,400V,K,0.047UF	CH2GL473K	1	EA
6	C302	CAP CER,50V,J,220PF(T.C BLACK)	CT1HL221J	1	EA
7	C303	CAP CER,50V,J,270PF(T.C BLACK)	CT1HL271J	1	EA
8	C304	CAP CER,50V,J,47PF(T.C BLACK)	CT1HL470J	1	EA
9	P201	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
10	P301	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
11	R201	RES M.F,1/4W,1%,10	RMBP10R0F	1	EA
12	R202	RES M.F,1/4W,0.5%,990K	RMBP9903D	1	EA
13	R203	RES M.F,1/4W,0.5%,10.1K	RMBP1012D	1	EA
14	R204	RES M.F,1/4W,1%,27	RMBP27R0F	1	EA
15	R205	RES C.F,1/4W,5%,10	RD0BP100J	1	EA
16	R206	RES M.F,1/4W,0.5%,900K	RMBP9003D	1	EA
17	R207	RES M.F,1/4W,0.5%,111K	RMBP1113D	1	EA
18	R208	RES M.F,1/4W,1%,68	RMBP68R0F	1	EA
19	R301	RES M.F,1/4W,1%,10	RMBP10R0F	1	EA
20	R302	RES M.F,1/4W,0.5%,990K	RMBP9903D	1	EA
21	R303	RES M.F,1/4W,0.5%,10.1K	RMBP1012D	1	EA
22	R304	RES M.F,1/4W,1%,27	RMBP27R0F	1	EA
23	R305	RES C.F,1/4W,5%,10	RD0BP100J	1	EA
24	R306	RES M.F,1/4W,0.5%,900K	RMBP9003D	1	EA
25	R307	RES M.F,1/4W,1%,68	RMBP68R0F	1	EA
26	R308	RES M.F,1/4W,0.5%,111K	RMBP1113D	1	EA
27	RC202	RES CHIP,GCR-P-221JB	574-054	1	EA
28	RC301	RES CHIP,GCR-P-151JB	574-049	1	EA
29	RC302	RES CHIP,GCR-P-221JB	574-054	1	EA
30	S201	SWITCH LEVER,SLR-023	521-071	1	EA
31	S202	ATTENUATOR,ADR255SA,8398827B	522-029	1	EA
32	S301	SWITCH LEVER,SLR-023	521-071	1	EA
33	S302	ATTENUATOR,ADR255SA,8398827B	522-029	1	EA
34	VC201	CAP TRIMMER,CT5-N-20,0~20PF	581-144	1	EA
35	VC202	CAP TRIMMER,CT5-N-10,0~10PF	581-133	1	EA
36	VC203	CAP TRIMMER,CT5-N-20,0~20PF	581-144	1	EA
37	VC204	CAP TRIMMER,CT5-N-10,0~10PF	581-133	1	EA
38	VC301	CAP TRIMMER,CT5-N-20,0~20PF	581-144	1	EA
39	VC302	CAP TRIMMER,CT5-N-20,0~20PF	581-144	1	EA
40	VC303	CAP TRIMMER,CT5-N-10,0~10PF	581-133	1	EA
41	VC304	CAP TRIMMER,CT5-N-10,0~10PF	581-133	1	EA

(2), CH1 INPUT AMP.

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C203	CAP CER,500V,D,7PF(T.C BLACK)	CT2HL070D	1	EA
2	C206	CAP CER,500V,K,1000PF	CK2HL103K	1	EA
3	C207	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
4	C208	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
5	C209	CAP CER,50V,J,100PF(T.C BLACK)	CT1HL101J	1	EA
6	C211	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
7	C212	CAP CER,50V,J,22PF(T.C BLACK)	CT1HL220J	1	EA
8	C213	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
9	C214	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
10	C216	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
11	C217	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
12	C218	CAP CER,50V,K,1000PF	CK1HL102K	1	EA
13	C219	CAP CER,50V,J,18PF(T.C BLACK)	CT1HL180J	1	EA
14	C220	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
15	C221	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
16	C222	CAP CER,50V,J,10PF(T.C BLACK)	CT1HL100J	1	EA
17	C223	CAP CER,50V,J,18PF(T.C BLACK)	CT1HL180J	1	EA
18	C224	CAP CER,50V,D,7PF(T.C BLACK)	CT1HL070D	1	EA
19	C225	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
20	C226	CAP CER,50V,J,18PF(T.C BLACK)	CT1HL180J	1	EA
21	C249	CAP CER,50V,K,1000PF	CK1HL102K	1	EA
22	C250	CAP CER,500V,D,4PF(T.C BLACK)	CT2HL040D	1	EA
23	C251	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
24	D201	DIODE,1S953	585-147	1	EA
25	L201	INDUCTOR,0.47UH/BAL04SKR47M	628-178	1	EA
26	LD201	LED RED,KLR124E	588-031	1	EA
27	Q201	FET,2SK304E	611-140	1	EA
28	Q202	FET,2SK304E	611-140	1	EA
29	Q203	TRANSISTOR,KSC1674-Y	611-130-1	1	EA
30	Q204	TRANSISTOR,KSC1674-Y	611-130-1	1	EA
31	Q205	TRANSISTOR,2SA1029D	611-133	1	EA
32	Q206	TRANSISTOR,2N3906	611-022-1	1	EA
33	Q207	TRANSISTOR,2N3906	611-022-1	1	EA
34	R209	RES M.F,1/4W,0.5%,500K	RMBP5003D	1	EA
35	R210	RES M.F,1/4W,0.5%,500K	RMBP5003D	1	EA
36	R211	RES M.G,1/2W,5%,10M	RG0CP106J	1	EA
37	R212	RES C.F,1/8W,5%,470K	RD0AP474J	1	EA
38	R213	RES M.F,1/8W,1%,68	RMAP68R0F	1	EA
39	R214	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
40	R215	RES M.F,1/8W,1%,750	RMAP7500F	1	EA
41	R216	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
42	R217	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
43	R218	RES C.F,1/8W,5%,4.7K	RD0AP472J	1	EA
44	R220	RES M.F,1/8W,1%,3.9K	RMAP3901F	1	EA
45	R221	RES C.F,1/8W,5%,2.7K	RD0AP272J	1	EA
46	R222	RES M.F,1/8W,1%,121	RMAP1210F	1	EA
47	R223	RES M.F,1/4W,1%,3.3K	RMBP3301F	1	EA
48	R224	RES M.F,1/8W,1%,4.7K	RMAP4701F	1	EA
49	R225	RES M.F,1/8W,1%,2K	RMAP2001F	1	EA
50	R226	RES M.F,1/8W,1%,10K	RMAP1002F	1	EA

(2). CH1 INPUT AMP.

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
51	R227	RES C.F,1/8W,5%,47	RD0AP470J	1	EA
52	R228	RES M.F,1/4W,0.5%,3K	RMBP3001D	1	EA
53	R229	RES M.F,1/8W,1%,430	RMAP4300F	1	EA
54	R230	RES M.F,1/8W,1%,680	RMAP6800F	1	EA
55	R231	RES M.F,1/4W,1%,820	RMBP8200F	1	EA
56	R232	RES M.F,1/4W,0.5%,68	RMBP68R0D	1	EA
57	R233	RES C.F,1/8W,5%,430	RD0AP431J	1	EA
58	R234	RES C.F,1/8W,5%,1K	RD0AP102J	1	EA
59	R235	RES C.F,1/8W,5%,220	RD0AP221J	1	EA
60	R236	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
61	R237	RES M.F,1/4W,0.5%,12K	RMBP1202D	1	EA
62	R238	RES M.F,1/4W,0.5%,60K	RMBP6002D	1	EA
63	R239	RES C.F,1/8W,5%,330	RD0AP331J	1	EA
64	R241	RES M.F,1/4W,1%,1K	RMBP1001F	1	EA
65	R242	RES M.F,1/8W,1%,2.4K	RMAP2401F	1	EA
66	R243	RES C.F,1/8W,5%,180	RD0AP181J	1	EA
67	R244	RES M.F,1/8W,1%,150	RMAP1500F	1	EA
68	R245	RES C.F,1/8W,5%,100	RD0AP101J	1	EA
69	R246	RES C.F,1/8W,5%,22K	RD0AP223J	1	EA
70	R247	RES M.F,1/4W,1%,1K	RMBP1001F	1	EA
71	R248	RES C.F,1/8W,5%,330	RD0AP331J	1	EA
72	R292	RES M.F,1/8W,1%,2.4K	RMAP2401F	1	EA
73	RA201	RES ARRAY,RA-OSC-V	591-325	1	EA
74	U201	IC OP AMP,LF356N	591-324	1	EA
75	VR201	RES SEMI-FIXED,20KB(CT-9W)	572-312	1	EA
76	VR202	RES SEMI-FIXED,H0621A-220B	572-056	1	EA
77	VR204	RES SEMI-FIXED,H0621A-100B	572-035	1	EA
78	VR205	RES SEMI-FIXED,H0621A-47KB	572-060	1	EA
79	Z201	DIODE ZENER,DZ-7.5B	585-075	1	EA

(3) . CH2 INPUT AMP.

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C305	CAP CER,500V,K,1000PF	CK2HL103K	1	EA
2	C306	CAP CER,50V,K,1000PF	CK1HL102K	1	EA
3	C307	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
4	C308	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
5	C310	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
6	C311	CAP CER,50V,J,22PF(T.C BLACK)	CT1HL220J	1	EA
7	C312	CAP CER,50V,J,100PF(T.C BLACK)	CT1HL101J	1	EA
8	C313	CAP CER,50V,K,1000PF	CK1HL102K	1	EA
9	C314	CAP CER,50V,J,18PF(T.C BLACK)	CT1HL180J	1	EA
10	C315	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
11	C316	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
12	C317	CAP CER,50V,J,10PF(T.C BLACK)	CT1HL100J	1	EA
13	C318	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
14	C319	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
15	C320	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
16	C322	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
17	C323	CAP CER,50V,J,18PF(T.C BLACK)	CT1HL180J	1	EA
18	C324	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
19	C343	CAP CER,50V,J,18PF(T.C BLACK)	CT1HL180J	1	EA
20	C346	CAP CER,500V,D,4PF(T.C BLACK)	CT2HL040D	1	EA
21	C347	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
22	D301	DIODE,1S953	585-147	1	EA
23	L301	INDUCTOR,0.47UH/BAL04SKR47M	628-178	1	EA
24	LD301	LED RED,KLR124E	588-031	1	EA
25	Q219	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
26	Q301	FET,2SK304E	611-140	1	EA
27	Q302	FET,2SK304E	611-140	1	EA
28	Q303	TRANSISTOR,KSC1674-Y	611-130-1	1	EA
29	Q304	TRANSISTOR,KSC1674-Y	611-130-1	1	EA
30	Q305	TRANSISTOR,2SA1029D	611-133	1	EA
31	Q306	TRANSISTOR,2N3906	611-022-1	1	EA
32	Q307	TRANSISTOR,2N3906	611-022-1	1	EA
33	R309	RES C.F,1/8W,5%,33	RD0AP330J	1	EA
34	R310	RES M.F,1/4W,0.5%,500K	RMBP5003D	1	EA
35	R311	RES M.F,1/4W,0.5%,500K	RMBP5003D	1	EA
36	R312	RES M.G,1/2W,5%,10M	RG0CP106J	1	EA
37	R313	RES M.F,1/8W,1%,68	RMAP68R0F	1	EA
38	R314	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
39	R315	RES M.F,1/8W,1%,750	RMAP7500F	1	EA
40	R316	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
41	R317	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
42	R320	RES M.F,1/8W,1%,3.9K	RMAP3901F	1	EA
43	R321	RES C.F,1/8W,5%,2.7K	RD0AP272J	1	EA
44	R322	RES M.F,1/8W,1%,121	RMAP1210F	1	EA
45	R323	RES M.F,1/4W,1%,3.3K	RMBP3301F	1	EA
46	R324	RES M.F,1/8W,1%,4.7K	RMAP4701F	1	EA
47	R325	RES M.F,1/8W,1%,2K	RMAP2001F	1	EA
48	R326	RES M.F,1/8W,1%,10K	RMAP1002F	1	EA
49	R327	RES C.F,1/8W,5%,47	RD0AP470J	1	EA
50	R328	RES M.F,1/4W,0.5%,3K	RMBP3001D	1	EA

(3) , CH2 INPUT AMP.

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
51	R330	RES M.F,1/8W,1%,680	RMAP6800F	1	EA
52	R331	RES M.F,1/4W,1%,820	RMBP8200F	1	EA
53	R332	RES M.F,1/4W,0.5%,68	RMBP68R0D	1	EA
54	R333	RES C.F,1/8W,5%,430	RD0AP431J	1	EA
55	R334	RES C.F,1/8W,5%,1K	RD0AP102J	1	EA
56	R335	RES C.F,1/8W,5%,220	RD0AP221J	1	EA
57	R336	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
58	R337	RES M.F,1/4W,0.5%,12K	RMBP1202D	1	EA
59	R338	RES M.F,1/4W,0.5%,60K	RMBP6002D	1	EA
60	R339	RES C.F,1/8W,5%,470K	RD0AP474J	1	EA
61	R340	RES C.F,1/8W,5%,330	RD0AP331J	1	EA
62	R341	RES M.F,1/8W,1%,2.4K	RMAP2401F	1	EA
63	R343	RES M.F,1/4W,1%,1K	RMBP1001F	1	EA
64	R344	RES C.F,1/8W,5%,180	RD0AP181J	1	EA
65	R345	RES M.F,1/8W,1%,2.4K	RMAP2401F	1	EA
66	R346	RES C.F,1/8W,5%,150	RD0AP151J	1	EA
67	R347	RES C.F,1/8W,5%,100	RD0AP101J	1	EA
68	R348	RES C.F,1/8W,5%,22K	RD0AP223J	1	EA
69	R349	RES M.F,1/4W,1%,1K	RMBP1001F	1	EA
70	R390	RES C.F,1/8W,5%,330	RD0AP331J	1	EA
71	R391	RES M.F,1/8W,1%,430	RMAP4300F	1	EA
72	R396	RES C.F,1/8W,5%,4.7K	RD0AP472J	1	EA
73	RA301	RES ARRAY,RA-OSC-V	591-325	1	EA
74	RC201	RES CHIP,GCR-P-151JB	574-049	1	EA
75	U301	IC OP AMP,LF356N	591-324	1	EA
76	VC305	CAP TRIMMER,CT5-N-6,0~6PF	581-145	1	EA
77	VC306	CAP TRIMMER,CT5-N-10,0~10PF	581-133	1	EA
78	VR301	RES SEMI-FIXED,20KB(CT-9W)	572-312	1	EA
79	VR302	RES SEMI-FIXED,H0621A-220B	572-056	1	EA
80	VR304	RES SEMI-FIXED,H0621A-100B	572-035	1	EA
81	VR305	RES SEMI-FIXED,H0621A-47KB	572-060	1	EA
82	Z301	DIODE ZENER,DZ-7.5B	585-075	1	EA

(4), CH1 PREAMP & TRIG PICK OFF

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C228	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
2	C230	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
3	C231	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
4	C233	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
5	C234	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
6	C235	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
7	C236	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
8	C238	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
9	C240	CAP CER,50V,K,0.01UF	CK1HL103K	1	EA
10	C243	CAP CER,50V,J,220PF	CK1HL221J	1	EA
11	C244	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
12	C245	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
13	C246	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
14	C247	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
15	C429	CAP CER,50V,K,1500PF	CK1HL152K	1	EA
16	D202	DIODE,1N4148	585-002	1	EA
17	P202	CONNECTOR WAFER,LW-0640-03	531-002-7	1	EA
18	P203	CONNECTOR WAFER,LW-0640-05	531-018-7	1	EA
19	Q208	TRANSISTOR,2SC1907	611-184	1	EA
20	Q209	TRANSISTOR,2SC1907	611-184	1	EA
21	Q210	TRANSISTOR,2SC535C	611-155	1	EA
22	Q211	TRANSISTOR,2SC535C	611-155	1	EA
23	Q212	TRANSISTOR,2N3906	611-022-1	1	EA
24	Q213	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
25	Q214	TRANSISTOR,2N3906	611-022-1	1	EA
26	Q215	TRANSISTOR,2N3906	611-022-1	1	EA
27	Q216	TRANSISTOR,2N3906	611-022-1	1	EA
28	Q217	TRANSISTOR,2N3906	611-022-1	1	EA
29	Q218	TRANSISTOR,2N3906	611-022-1	1	EA
30	R240	RES C.F,1/8W,5%,56	RD0AP560J	1	EA
31	R249	RES C.F,1/4W,5%,56	RD0BP560J	1	EA
32	R250	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
33	R251	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
34	R252	RES C.F,1/8W,5%,680	RD0AP681J	1	EA
35	R253	RES C.F,1/8W,5%,4.7K	RD0AP472J	1	EA
36	R254	RES C.F,1/8W,5%,680	RD0AP681J	1	EA
37	R255	RES C.F,1/8W,5%,4.7K	RD0AP472J	1	EA
38	R256	RES C.F,1/8W,5%,220	RD0AP221J	1	EA
39	R258	RES M.F,1/8W,1%,390	RMAP3900F	1	EA
40	R259	RES M.F,1/8W,1%,150	RMAP1500F	1	EA
41	R260	RES C.F,1/8W,5%,1K	RD0AP102J	1	EA
42	R261	RES M.F,1/8W,1%,150	RMAP1500F	1	EA
43	R262	RES M.F,1/8W,1%,390	RMAP3900F	1	EA
44	R264	RES C.F,1/8W,5%,1.8K	RD0AP182J	1	EA
45	R265	RES C.F,1/8W,5%,6.8K	RD0AP682J	1	EA
46	R266	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
47	R267	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
48	R268	RES C.F,1/8W,5%,47	RD0AP470J	1	EA
49	R269	RES C.F,1/8W,5%,1K	RD0AP102J	1	EA
50	R270	RES C.F,1/8W,5%,5.1K	RD0AP512J	1	EA

(4), CH1 PREAMP & TRIG PICK OFF

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
51	R271	RES C.F,1/8W,5%,5.1K	RD0AP512J	1	EA
52	R272	RES C.F,1/8W,5%,470	RD0AP471J	1	EA
53	R273	RES C.F,1/8W,5%,470	RD0AP471J	1	EA
54	R274	RES C.F,1/8W,5%,47	RD0AP470J	1	EA
55	R276	RES C.F,1/8W,5%,130	RD0AP131J	1	EA
56	R277	RES C.F,1/8W,5%,15K	RD0AP153J	1	EA
57	R278	RES M.F,1/4W,1%,1.3K	RMBP1301F	1	EA
58	R279	RES C.F,1/8W,5%,1.8K	RD0AP182J	1	EA
59	R281	RES C.F,1/8W,5%,56	RD0AP560J	1	EA
60	R282	RES M.F,1/8W,1%,560	RMAP5600F	1	EA
61	R283	RES M.F,1/8W,1%,560	RMAP5600F	1	EA
62	R284	RES M.F,1/4W,1%,1.3K	RMBP1301F	1	EA
63	R285	RES C.F,1/8W,5%,2.4K	RD0AP242J	1	EA
64	R286	RES C.F,1/8W,5%,3.3K	RD0AP332J	1	EA
65	R287	RES C.F,1/8W,5%,220	RD0AP221J	1	EA
66	R289	RES C.F,1/8W,5%,2.4K	RD0AP242J	1	EA
67	R290	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
68	R291	RES C.F,1/8W,5%,220	RD0AP221J	1	EA
69	R293	RES C.F,1/8W,5%,220	RD0AP221J	1	EA
70	R294	RES C.F,1/8W,5%,1.5K	RD0AP152J	1	EA
71	VR206	RES SR,2KB,VG067TL1B202	572-318	1	EA
72	Z202	DIODE ZENER,DZ-2.4B	585-151	1	EA

(5), CH2 PREAMP & TRIG PICK OFF

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C325	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
2	C326	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
3	C327	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
4	C328	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
5	C330	CAP CER,50V,K,0.01UF	CK1HL103K	1	EA
6	C331	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
7	C332	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
8	C333	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
9	C334	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
10	C335	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
11	C336	CAP CER,50V,J,220PF	CK1HL221J	1	EA
12	C337	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
13	C338	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
14	C339	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
15	C340	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
16	C341	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
17	C344	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
18	C345	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
19	D302	DIODE,1N4148	585-002	1	EA
20	P302	CONNECTOR WAFER,LW-0640-03	531-002-7	1	EA
21	P303	CONNECTOR WAFER,LW-0640-03	531-002-7	1	EA
22	P304	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
23	Q308	TRANSISTOR,2SC1907	611-184	1	EA
24	Q309	TRANSISTOR,2SC1907	611-184	1	EA
25	Q310	TRANSISTOR,2N3906	611-022-1	1	EA
26	Q311	TRANSISTOR,2N3906	611-022-1	1	EA
27	Q312	TRANSISTOR,2N3906	611-022-1	1	EA
28	Q313	TRANSISTOR,2N3906	611-022-1	1	EA
29	Q314	TRANSISTOR,2N3906	611-022-1	1	EA
30	Q315	TRANSISTOR,2N3906	611-022-1	1	EA
31	Q316	TRANSISTOR,2N3906	611-022-1	1	EA
32	Q317	TRANSISTOR,2SC535C	611-155	1	EA
33	Q318	TRANSISTOR,2SC535C	611-155	1	EA
34	Q319	TRANSISTOR,2N3906	611-022-1	1	EA
35	Q320	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
36	R342	RES C.F,1/8W,5%,56	RD0AP560J	1	EA
37	R350	RES C.F,1/8W,5%,56	RD0AP560J	1	EA
38	R351	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
39	R352	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
40	R353	RES M.F,1/8W,1%,390	RMAP3900F	1	EA
41	R355	RES M.F,1/8W,1%,150	RMAP1500F	1	EA
42	R356	RES M.F,1/8W,1%,150	RMAP1500F	1	EA
43	R357	RES C.F,1/8W,5%,1K	RD0AP102J	1	EA
44	R359	RES M.F,1/8W,1%,390	RMAP3900F	1	EA
45	R360	RES C.F,1/8W,5%,1.8K	RD0AP182J	1	EA
46	R361	RES C.F,1/8W,5%,6.8K	RD0AP682J	1	EA
47	R362	RES C.F,1/8W,5%,220	RD0AP221J	1	EA
48	R363	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
49	R364	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
50	R365	RES C.F,1/8W,5%,4.7K	RD0AP472J	1	EA

(5), CH2 PREAMP & TRIG PICK OFF

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
51	R366	RES C.F,1/8W,5%,4.7K	RD0AP472J	1	EA
52	R367	RES C.F,1/8W,5%,680	RD0AP681J	1	EA
53	R368	RES C.F,1/8W,5%,680	RD0AP681J	1	EA
54	R369	RES M.F,1/8W,1%,560	RMAP5600F	1	EA
55	R370	RES M.F,1/8W,1%,560	RMAP5600F	1	EA
56	R371	RES C.F,1/8W,5%,56	RD0AP560J	1	EA
57	R373	RES M.F,1/4W,1%,1.3K	RMBP1301F	1	EA
58	R374	RES M.F,1/4W,1%,1.3K	RMBP1301F	1	EA
59	R375	RES C.F,1/8W,5%,1.8K	RD0AP182J	1	EA
60	R376	RES C.F,1/8W,5%,220	RD0AP221J	1	EA
61	R377	RES C.F,1/8W,5%,2.4K	RD0AP242J	1	EA
62	R378	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
63	R379	RES C.F,1/8W,5%,1K	RD0AP102J	1	EA
64	R380	RES C.F,1/8W,5%,47	RD0AP470J	1	EA
65	R382	RES C.F,1/8W,5%,470	RD0AP471J	1	EA
66	R383	RES C.F,1/8W,5%,130	RD0AP131J	1	EA
67	R384	RES C.F,1/8W,5%,5.1K	RD0AP512J	1	EA
68	R385	RES C.F,1/8W,5%,15K	RD0AP153J	1	EA
69	R386	RES C.F,1/8W,5%,470	RD0AP471J	1	EA
70	R387	RES C.F,1/8W,5%,5.1K	RD0AP512J	1	EA
71	R388	RES C.F,1/8W,5%,47	RD0AP470J	1	EA
72	R389	RES C.F,1/8W,5%,1K	RD0AP102J	1	EA
73	R392	RES C.F,1/8W,5%,1.5K	RD0AP152J	1	EA
74	R393	RES C.F,1/8W,5%,1.5K	RD0AP152J	1	EA
75	VR306	RES SR,2KB,VG067TL1B202	572-318	1	EA
76	Z302	DIODE ZENER,DZ-2.4B	585-151	1	EA

(6) , VERTICAL CONTROL

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C401	CAP CER,25V,Z,0.22UF	CK1EL224Z	1	EA
2	C402	CAP MYLAR,50V,J,0.22UF	CP1HL224J	1	EA
3	C405	CAP CER,50V,J,470PF	CK1HL471J	1	EA
4	C406	CAP CER,50V,Z,0.1UF	CK1HL104Z	1	EA
5	C407	CAP CER,50V,J,100PF(T.C BLACK)	CT1HL101J	1	EA
6	C411	CAP CER,50V,J,100PF(T.C BLACK)	CT1HL101J	1	EA
7	C415	CAP CER,25V,Z,0.22UF	CK1EL224Z	1	EA
8	C419	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
9	C420	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
10	C421	CAP CER,50V,J,18PF(T.C BLACK)	CT1HL180J	1	EA
11	C422	CAP CER,50V,J,330PF	CK1HL331J	1	EA
12	C428	CAP ELE,16V,M,10UF(BP)	581-090	1	EA
13	D401	DIODE,1S953	585-147	1	EA
14	D402	DIODE,1S953	585-147	1	EA
15	D405	DIODE,1S953	585-147	1	EA
16	D406	DIODE,1S953	585-147	1	EA
17	D407	DIODE,1S953	585-147	1	EA
18	D408	DIODE,1S953	585-147	1	EA
19	D411	DIODE,1S953	585-147	1	EA
20	D412	DIODE,1S953	585-147	1	EA
21	D417	DIODE,1N4148	585-002	1	EA
22	P401	CONNECTOR WAFER,LW-0640-05	531-018-7	1	EA
23	P402	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
24	P403	CONNECTOR WAFER,LW-0640-05	531-018-7	1	EA
25	P404	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
26	P405	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
27	P407	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
28	P409	CONNECTOR WAFER,LW-0640-03	531-002-7	1	EA
29	Q401	TRANSISTOR,KTA1015-Y	611-014-1	1	EA
30	Q402	TRANSISTOR,KTA1015-Y	611-014-1	1	EA
31	Q403	TRANSISTOR,2SC1907	611-184	1	EA
32	Q404	TRANSISTOR,2SC1907	611-184	1	EA
33	R401	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
34	R402	RES M.F,1/8W,1%,820	RMAP8200F	1	EA
35	R403	RES C.F,1/8W,5%,330	RD0AP331J	1	EA
36	R404	RES M.F,1/8W,1%,22K	RMAP2202F	1	EA
37	R405	RES C.F,1/8W,5%,220	RD0AP221J	1	EA
38	R406	RES C.F,1/8W,5%,2.2K	RD0AP222J	1	EA
39	R407	RES C.F,1/8W,5%,4.7K	RD0AP472J	1	EA
40	R408	RES C.F,1/8W,5%,4.7K	RD0AP472J	1	EA
41	R409	RES C.F,1/8W,5%,4.7K	RD0AP472J	1	EA
42	R410	RES C.F,1/8W,5%,1.8K	RD0AP182J	1	EA
43	R411	RES C.F,1/8W,5%,4.7K	RD0AP472J	1	EA
44	R413	RES C.F,1/8W,5%,10K	RD0AP103J	1	EA
45	R414	RES C.F,1/8W,5%,4.7K	RD0AP472J	1	EA
46	R415	RES C.F,1/8W,5%,1.8K	RD0AP182J	1	EA
47	R416	RES C.F,1/8W,5%,1.8K	RD0AP182J	1	EA
48	R417	RES C.F,1/4W,5%,27	RD0BP270J	1	EA
49	R418	RES C.F,1/4W,5%,27	RD0BP270J	1	EA
50	R419	RES C.F,1/8W,5%,4.7K	RD0AP472J	1	EA

(6), VERTICAL CONTROL

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
51	R420	RES C.F,1/8W,5%,10	RD0AP100J	1	EA
52	R423	RES M.F,1/8W,1%,300	RMAP3000F	1	EA
53	R424	RES M.F,1/8W,1%,300	RMAP3000F	1	EA
54	R425	RES M.F,1/4W,1%,1.8K	RMBP1801F	1	EA
55	R426	RES M.F,1/8W,1%,27	RMAP27R0F	1	EA
56	R427	RES M.F,1/4W,1%,1.8K	RMBP1801F	1	EA
57	R429	RES M.F,1/4W,1%,470	RMBP4700F	1	EA
58	R430	RES M.F,1/4W,1%,470	RMBP4700F	1	EA
59	R431	RES C.F,1/8W,5%,330	RD0AP331J	1	EA
60	R432	RES C.F,1/8W,5%,330	RD0AP331J	1	EA
61	R433	RES C.F,1/8W,5%,47	RD0AP470J	1	EA
62	R434	RES C.F,1/8W,5%,27K	RD0AP273J	1	EA
63	R435	RES C.F,1/8W,5%,47	RD0AP470J	1	EA
64	R436	RES C.F,1/8W,5%,330	RD0AP331J	1	EA
65	R437	RES C.F,1/8W,5%,330	RD0AP331J	1	EA
66	R438	RES C.F,1/8W,5%,33K	RD0AP333J	1	EA
67	S401	SWITCH LEVER,SLR-024	521-049K	1	EA
68	U401	IC TTL,GD74LS14	591-075-9	1	EA
69	U402	IC TTL,GD74LS00	591-001-9	1	EA
70	U403	IC TTL,GD74LS74A	591-074-9	1	EA
71	VR401	RES SR,200B,VG067TL1B201	572-316	1	EA
72	VR402	RES SR,500B,VG067TL1B501	572-319	1	EA
73	VR403	RES SR,50KB,VG067TL1B503	572-320	1	EA

(7) , VERTICAL MAIN AMP.

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C425	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
2	C426	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
3	C427	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
4	C501	CAP CER,500V,Z,0.01UF	CK2HL103Z	1	EA
5	C502	CAP CER,500V,Z,0.01UF	CK2HL103Z	1	EA
6	C503	CAP CER,500V,K,1000PF	CK2HL102K	1	EA
7	C504	CAP CER,500V,K,1000PF	CK2HL102K	1	EA
8	C505	CAP CER,500V,C,2PF	CK2HL020C	1	EA
9	C506	CAP CER,500V,C,2PF	CK2HL020C	1	EA
10	C507	CAP CER,500V,K,1000PF	CK2HL102K	1	EA
11	C509	CAP CER,50V,J,56PF(T.C BLACK)	CT1HL560J	1	EA
12	C510	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
13	C511	CAP CER,50V,J,47PF(T.C BLACK)	CT1HL470J	1	EA
14	C512	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
15	C513	CAP CER,50V,J,33PF(T.C BLACK)	CT1HL330J	1	EA
16	C514	CAP CER,50V,J,68PF(T.C BLACK)	CT1HL680J	1	EA
17	C515	CAP CER,50V,J,200PF(T.C BLACK)	CT1HL201J	1	EA
18	C516	CAP CER,50V,J,68PF(T.C BLACK)	CT1HL680J	1	EA
19	L501	INDUCTOR,2.2UH/BAL04SK2R2M	628-179	1	EA
20	L502	INDUCTOR,2.2UH/BAL04SK2R2M	628-179	1	EA
21	P406	CONNECTOR WAFER,LW-0640-05	531-018-7	1	EA
22	P501	CONNECTOR WAFER,LW-0640-03	531-002-7	1	EA
23	P502	CONNECTOR PIN,5115	532-007	1	EA
24	P503	CONNECTOR PIN,5115	532-007	1	EA
25	Q501	TRANSISTOR,2SC2901	611-151	1	EA
26	Q502	TRANSISTOR,2SC2901	611-151	1	EA
27	Q503	TRANSISTOR,2SC2901	611-151	1	EA
28	Q504	TRANSISTOR,2SC2901	611-151	1	EA
29	Q505	TRANSISTOR,2SC3503E	611-159	1	EA
30	Q506	TRANSISTOR,2SA1381E	611-169	1	EA
31	Q507	TRANSISTOR,2SC3503E	611-159	1	EA
32	Q508	TRANSISTOR,2SA1381E	611-169	1	EA
33	Q509	TRANSISTOR,2N3906	611-022-1	1	EA
34	Q510	TRANSISTOR,2N3906	611-022-1	1	EA
35	R501	RES C.F,1/4W,5%,47	RD0BP470J	1	EA
36	R502	RES M.F,1/8W,1%,150	RMAP1500F	1	EA
37	R503	RES M.F,1/8W,1%,150	RMAP1500F	1	EA
38	R504	RES C.F,1/4W,5%,910	RD0BP911J	1	EA
39	R505	RES C.F,1/4W,5%,910	RD0BP911J	1	EA
40	R506	RES M.F,1/8W,1%,56	RMAP56R0F	1	EA
41	R507	RES M.F,1/8W,1%,39	RMAP39R0F	1	EA
42	R508	RES C.F,1/8W,5%,47	RD0AP470J	1	EA
43	R510	RES M.F,1/8W,1%,270	RMAP2700F	1	EA
44	R511	RES M.F,1/8W,1%,270	RMAP2700F	1	EA
45	R512	RES C.F,1/8W,5%,470	RD0AP471J	1	EA
46	R513	RES C.F,1/8W,5%,470	RD0AP471J	1	EA
47	R514	RES C.F,1/8W,5%,22	RD0AP220J	1	EA
48	R515	RES M.O,2W,5%,10K	RS02P103J	1	EA
49	R516	RES M.O,2W,5%,10K	RS02P103J	1	EA
50	R517	RES C.F,1/8W,5%,22	RD0AP220J	1	EA

(7) , VERTICAL MAIN AMP.

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
51	R518	RES C.F,1/8W,5%,22	RD0AP220J	1	EA
52	R519	RES C.F,1/8W,5%,56	RD0AP560J	1	EA
53	R520	RES C.F,1/8W,5%,56	RD0AP560J	1	EA
54	R521	RES M.O,1W,5%,27K	RS01P273J	1	EA
55	R522	RES C.F,1/8W,5%,56	RD0AP560J	1	EA
56	R523	RES C.F,1/8W,5%,56	RD0AP560J	1	EA
57	R524	RES M.O,2W,5%,12K	RS02P123J	1	EA
58	R529	RES M.O,2W,5%,12K	RS02P123J	1	EA
59	R530	RES M.F,1/8W,1%,1K	RMAP1001F	1	EA
60	R531	RES M.F,1/8W,1%,1K	RMAP1001F	1	EA
61	R532	RES C.F,1/8W,5%,22	RD0AP220J	1	EA
62	R533	RES C.F,1/8W,5%,220	RD0AP221J	1	EA
63	R534	RES C.F,1/8W,5%,220	RD0AP221J	1	EA
64	R535	RES M.F,1/4W,1%,130	RMBP1300F	1	EA
65	R536	RES M.F,1/4W,1%,130	RMBP1300F	1	EA
66	R537	RES C.F,1/4W,5%,22	RD0BP220J	1	EA
67	R538	RES M.F,1/8W,1%,270	RMAP2700F	1	EA
68	R540A	RES M.F,1/8W,1%,5.6	RMAP5R60F	1	EA
69	TH501	THERMISTOR,4.7 OHM	579-015	1	EA
70	VC501	CAP TRIMMER,CT5-N-40,0~40PF	581-132	1	EA
71	VC502	CAP TRIMMER,CT5-N-40,0~40PF	581-132	1	EA
72	VR501	RES SEMI-FIXED,H0621A-470B	572-057	1	EA
73	Z501	DIODE ZENER,DZ-5.1B	585-111	1	EA
74	Z502	DIODE ZENER,DZ-5.1B	585-111	1	EA
75	Z503	DIODE ZENER,DZ-5.1B	585-111	1	EA

(8), TRIGGER AMP.

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C631	CAP MYLAR,400V,K,4700PF	CP2GL472K	1	EA
2	C632	CAP CER,500V,K,820PF	CK2HL821K	1	EA
3	C633	CAP CER,50V,K,0.01UF	CK1HL103K	1	EA
4	C634	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
5	C635	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
6	C636	CAP ELE,50V,M,10UF(BP)	581-143	1	EA
7	C637	CAP ELE,50V,M,1UF(BP)	581-117	1	EA
8	C638	CAP M.F,400V,K,0.047UF	CH2GL473K	1	EA
9	C640	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
10	C641	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
11	C642	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
12	C643	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
13	C644	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
14	C654	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
15	C656	CAP CER,500V,K,1000PF	CK2HL102K	1	EA
16	C704	CAP M.F,400V,K,0.022UF	CH2GL223K	1	EA
17	CR609	DIODE,1N4148	585-002	1	EA
18	CR610	DIODE,1N4148	585-002	1	EA
19	P607	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
20	P608	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
21	P609	CONNECTOR WAFER,LW-0640-04	531-003-7	1	EA
22	Q607	FET,2SK304E	611-140	1	EA
23	Q608	TRANSISTOR,2N3904	611-006-1	1	EA
24	Q609	TRANSISTOR,2N3904	611-006-1	1	EA
25	Q610	TRANSISTOR,KTA1015-Y	611-014-1	1	EA
26	R635	RES C.F,1/4W,5%,8.2K	RD0BP822J	1	EA
27	R636	RES C.F,1/4W,5%,10K	RD0BP103J	1	EA
28	R637	RES C.F,1/4W,5%,1M	RD0BP105J	1	EA
29	R638	RES C.F,1/4W,5%,1K	RD0BP102J	1	EA
30	R639	RES C.F,1/4W,5%,22	RD0BP220J	1	EA
31	R640	RES C.F,1/4W,5%,1K	RD0BP102J	1	EA
32	R641	RES C.F,1/4W,5%,10K	RD0BP103J	1	EA
33	R644	RES C.F,1/4W,5%,470	RD0BP471J	1	EA
34	R645	RES C.F,1/4W,5%,1K	RD0BP102J	1	EA
35	R646	RES C.F,1/4W,5%,22	RD0BP220J	1	EA
36	R647	RES C.F,1/4W,5%,8.2K	RD0BP822J	1	EA
37	R648	RES C.F,1/4W,5%,4.7K	RD0BP472J	1	EA
38	R649	RES C.F,1/4W,5%,2.2K	RD0BP222J	1	EA
39	R650	RES C.F,1/4W,5%,4.7K	RD0BP472J	1	EA
40	R651	RES C.F,1/4W,5%,10K	RD0BP103J	1	EA
41	R652	RES C.F,1/4W,5%,5.6K	RD0BP562J	1	EA
42	R653	RES C.F,1/4W,5%,100K	RD0BP104J	1	EA
43	R740	RES C.F,1/4W,5%,2.2K	RD0BP222J	1	EA
44	R744	RES C.F,1/8W,5%,470K	RD0AP474J	1	EA
45	S602	SWITCH LEVER,SLR-024	521-049K	1	EA
46	S603	SWITCH LEVER,SLR-024	521-049K	1	EA
47	S604	SWITCH LEVER,SLR-024	521-049K	1	EA
48	VR604	RES VAR,V16L4(E113D-10061)	571-057	1	EA
49	VR605	RES SEMI-FIXED,H0621A-10KB	572-042	1	EA
50	VR613	RES SEMI-FIXED,H0621A-22KB	572-334	1	EA

(9), SWEEP GENERATOR

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C607	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
2	C608	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
3	C609	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
4	C610	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
5	C611	CAP CER,50V,J,82PF(T.C BLACK)	CT1HL820J	1	EA
6	C612	CAP CER,50V,J,10PF(T.C BLACK)	CT1HL100J	1	EA
7	C614	CAP CER,500V,D,1PF	CK2HL010D	1	EA
8	C615	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
9	C616	CAP CER,500V,D,1PF	CK2HL010D	1	EA
10	C617	CAP CER,500V,Z,0.01UF	CK2HL103Z	1	EA
11	C618	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
12	C620	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
13	C621	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
14	C622	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
15	C623	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
16	C627	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
17	C628	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
18	C629	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
19	C630	CAP ELE,50V,M,2.2UF(SM)	CE1HL225M	1	EA
20	CR602	DIODE,1N4148	585-002	1	EA
21	CR603	DIODE,1S953	585-147	1	EA
22	CR604	DIODE,1S953	585-147	1	EA
23	CR606	DIODE,1N4148	585-002	1	EA
24	CR607	DIODE,1N4148	585-002	1	EA
25	CR611	DIODE,1N4148	585-002	1	EA
26	CR614	DIODE,1S953	585-147	1	EA
27	CR637	DIODE,1S953	585-147	1	EA
28	K602	RELAY,MZ-12HS	526-020	1	EA
29	LD602	LED GRN,KLG124E	588-032	1	EA
30	P603	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
31	P604	CONNECTOR WAFER,LW-0640-03	531-002-7	1	EA
32	P606	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
33	P612	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
34	Q601	FET,2SK304E	611-140	1	EA
35	Q602	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
36	Q603	TRANSISTOR,2N3904	611-006-1	1	EA
37	Q604	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
38	Q605	TRANSISTOR,2N3906	611-022-1	1	EA
39	Q611	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
40	R613	RES C.F,1/4W,5%,10	RD0BP100J	1	EA
41	R614	RES C.F,1/4W,5%,470	RD0BP471J	1	EA
42	R615	RES C.F,1/4W,5%,4.7K	RD0BP472J	1	EA
43	R616	RES C.F,1/4W,5%,100	RD0BP101J	1	EA
44	R617	RES C.F,1/4W,5%,2.2K	RD0BP222J	1	EA
45	R618	RES C.F,1/4W,5%,4.7K	RD0BP472J	1	EA
46	R619	RES C.F,1/4W,5%,4.7K	RD0BP472J	1	EA
47	R620	RES C.F,1/4W,5%,100	RD0BP101J	1	EA
48	R621	RES C.F,1/2W,5%,33K	RD0CP333J	1	EA
49	R622	RES C.F,1/4W,5%,100	RD0BP101J	1	EA
50	R623	RES C.F,1/4W,5%,4.7K	RD0BP472J	1	EA

(9), SWEEP GENERATOR

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
51	R624	RES C.F,1/4W,5%,10K	RD0BP103J	1	EA
52	R625	RES C.F,1/4W,5%,10K	RD0BP103J	1	EA
53	R626	RES C.F,1/4W,5%,2K	RD0BP202J	1	EA
54	R627	RES C.F,1/4W,5%,82	RD0BP820J	1	EA
55	R628	RES C.F,1/4W,5%,120K	RD0BP124J	1	EA
56	R629	RES C.F,1/4W,5%,15K	RD0BP153J	1	EA
57	R631	RES C.F,1/4W,5%,10	RD0BP100J	1	EA
58	R632	RES C.F,1/4W,5%,47K	RD0BP473J	1	EA
59	R633	RES C.F,1/4W,5%,3.3K	RD0BP332J	1	EA
60	R634	RES C.F,1/4W,5%,56K	RD0BP563J	1	EA
61	R642	RES C.F,1/4W,5%,10	RD0BP100J	1	EA
62	R643	RES C.F,1/4W,5%,33	RD0BP330J	1	EA
63	R659	RES M.F,1/4W,1%,4.7K	RMBP4701F	1	EA
64	R663	RES C.F,1/4W,5%,10K	RD0BP103J	1	EA
65	R666	RES C.F,1/4W,5%,22K	RD0BP223J	1	EA
66	R739	RES M.F,1/4W,1%,3.5K	RMBP3501F	1	EA
67	R741	RES C.F,1/4W,5%,3.3K	RD0BP332J	1	EA
68	U601	IC TTL,HD74LS74P	591-074-1	1	EA
69	U602	IC TTL,GD74LS14	591-075-9	1	EA
70	U603	IC TTL,HD74LS122P	591-212	1	EA
71	U604	IC TTL,HD74LS00P	591-001Y	1	EA
72	U605	IC TTL,GD74LS10	591-045-9	1	EA
73	VC601	CAP TRIMMER,CT5-N-40,0~40PF	581-132	1	EA
74	VR603	RES SR,2KB,VG067TL1B202	572-318	1	EA
75	VR606	RES SR,2KB,VG067TL1B202	572-318	1	EA
76	VR607	RES SR,1KB,VG067TL1B102	572-315	1	EA

(10), TIMING CIRCUIT

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C601	CAP M.F,250V,K,0.047UF	CH2EL473K	1	EA
2	C602	CAP ELE,50V,M,2.2UF(SM)	CE1HL225M	1	EA
3	C603	CAP M.F,100V,F,1UF	CH2AL105F	1	EA
4	C604	CAP M.F,100V,F,0.01UF	CH2AL103F	1	EA
5	C605	CAP CER,50V,K,680PF	CK1HL681K	1	EA
6	C606	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
7	CR601	DIODE,1N4148	585-002	1	EA
8	K601	RELAY,MZ-5HS	526-025	1	EA
9	LD601	LED RED,KLR124E	588-031	1	EA
10	P601	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
11	Q631	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
12	R601	RES C.F,1/4W,5%,560	RD0BP561J	1	EA
13	R602	RES C.F,1/4W,5%,560	RD0BP561J	1	EA
14	R603	RES C.F,1/4W,5%,560	RD0BP561J	1	EA
15	R604	RES C.F,1/4W,5%,1.2K	RD0BP122J	1	EA
16	R605	RES M.F,1/4W,0.5%,440K	RMBP4403D	1	EA
17	R606	RES M.F,1/4W,0.5%,2.2M	RMBP2204D	1	EA
18	R607	RES M.F,1/4W,1%,2.2M	RMBP2204F	1	EA
19	R608	RES M.F,1/4W,0.5%,44K	RMBP4402D	1	EA
20	R609	RES M.F,1/4W,0.5%,220K	RMBP2203D	1	EA
21	R610	RES M.F,1/4W,0.5%,1.1M	RMBP1104D	1	EA
22	R611	RES M.G,1/2W,0.5%,4.4M	RGCP4404D	1	EA
23	R612	RES M.F,1/4W,0.5%,110K	RMBP1103D	1	EA
24	R662	RES C.F,1/4W,5%,2.7K	RD0BP272J	1	EA
25	R742	RES C.F,1/4W,5%,4.7K	RD0BP472J	1	EA
26	R743	RES C.F,1/4W,5%,6.8K	RD0BP682J	1	EA
27	S601	SW ROTARY,TIME DIV(8394003)	522-027	1	EA
28	VR601	RES VAR,V16L5ZS(E113-3201)	571-305	1	EA
29	VR602	RES SR,2KB,VG067TL1B202	572-318	1	EA

(11) , HORIZONTAL MAIN AMP.

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C668	CAP ELE,16V,M,47UF(SM)	CE1CL476M	1	EA
2	C669	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
3	C670	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
4	C671	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
5	C672	CAP CER,50V,K,100PF(T.C BLACK)	CT1HL101K	1	EA
6	C673	CAP CER,50V,J,56PF	CK1HL560J	1	EA
7	C674	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
8	C675	CAP CER,500V,C,1PF(T.C BLACK)	CT2HL010C	1	EA
9	C676	CAP M.F,400V,K,0.047UF	CH2GL473K	1	EA
10	C677	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
11	C678	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
12	C680	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
13	C681	CAP M.F,400V,K,0.047UF	CH2GL473K	1	EA
14	C682	CAP M.F,400V,K,0.047UF	CH2GL473K	1	EA
15	C683	CAP M.F,400V,K,0.047UF	CH2GL473K	1	EA
16	C684	CAP CER,500V,C,1PF(T.C BLACK)	CT2HL010C	1	EA
17	C685	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
18	C686	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
19	C687	CAP CER,500V,Z,0.01UF	CK2HL103Z	1	EA
20	CR615	DIODE,1N4148	585-002	1	EA
21	CR616	DIODE,1N4148	585-002	1	EA
22	CR617	DIODE,1S953	585-147	1	EA
23	DA601	DIODE ARRAY,DA203	585-163	1	EA
24	K603	RELAY,MZ-12HS	526-020	1	EA
25	P605	CONNECTOR WAFER,LW-0640-03	531-002-7	1	EA
26	P618	CONNECTOR PIN,5115	532-007	1	EA
27	P619	CONNECTOR PIN,5115	532-007	1	EA
28	Q616	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
29	Q617	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
30	Q618	TRANSISTOR,2N3906	611-022-1	1	EA
31	Q619	TRANSISTOR,2N3906	611-022-1	1	EA
32	Q620	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
33	Q621	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
34	Q622	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
35	Q623	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
36	Q624	TRANSISTOR,2SC3468E	611-616	1	EA
37	Q625	TRANSISTOR,2SA1371E	611-615	1	EA
38	Q626	TRANSISTOR,2SC3468E	611-616	1	EA
39	Q627	TRANSISTOR,2SA1371E	611-615	1	EA
40	R682	RES C.F,1/4W,5%,6.8K	RD0BP682J	1	EA
41	R683	RES M.F,1/4W,1%,3K	RMBP3001F	1	EA
42	R684	RES C.F,1/4W,5%,12K	RD0BP123J	1	EA
43	R685	RES C.F,1/4W,5%,1.8K	RD0BP182J	1	EA
44	R686	RES C.F,1/4W,5%,12K	RD0BP123J	1	EA
45	R687	RES C.F,1/4W,5%,12K	RD0BP123J	1	EA
46	R688	RES C.F,1/4W,5%,6.8K	RD0BP682J	1	EA
47	R689	RES M.F,1/4W,1%,30K	RMBP3002F	1	EA
48	R690	RES C.F,1/4W,5%,390	RD0BP391J	1	EA
49	R691	RES C.F,1/4W,5%,100	RD0BP101J	1	EA
50	R692	RES M.F,1/4W,1%,16K	RMBP1602F	1	EA

(1 1) , HORIZONTAL MAIN AMP.

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
51	R693	RES C.F,1/4W,5%,4.7K	RD0BP472J	1	EA
52	R694	RES C.F,1/4W,5%,560	RD0BP561J	1	EA
53	R695	RES C.F,1/4W,5%,470	RD0BP471J	1	EA
54	R696	RES C.F,1/4W,5%,1K	RD0BP102J	1	EA
55	R697	RES M.F,1/4W,1%,4.32K	RMBP4321F	1	EA
56	R698	RES C.F,1/4W,5%,470	RD0BP471J	1	EA
57	R699	RES C.F,1/4W,5%,4.7K	RD0BP472J	1	EA
58	R700	RES C.F,1/4W,5%,390	RD0BP391J	1	EA
59	R701	RES M.F,1/4W,1%,4.32K	RMBP4321F	1	EA
60	R702	RES M.F,1/4W,1%,430	RMBP4300F	1	EA
61	R703	RES C.F,1/4W,5%,2.2K	RD0BP222J	1	EA
62	R704	RES M.F,1/2W,1%,82K	RMCP8202F	1	EA
63	R705	RES C.F,1/4W,5%,100	RD0BP101J	1	EA
64	R706	RES C.F,1/2W,5%,56K	RD0CP563J	1	EA
65	R707	RES C.F,1/4W,5%,10	RD0BP100J	1	EA
66	R708	RES C.F,1/2W,5%,120K	RD0CP124J	1	EA
67	R709	RES C.F,1/4W,5%,5.6K	RD0BP562J	1	EA
68	R710	RES M.F,1/4W,1%,1.8K	RMBP1801F	1	EA
69	R711	RES M.F,1/4W,1%,1.8K	RMBP1801F	1	EA
70	R712	RES C.F,1/4W,5%,5.6K	RD0BP562J	1	EA
71	R713	RES C.F,1/2W,5%,120K	RD0CP124J	1	EA
72	R714	RES C.F,1/4W,5%,10	RD0BP100J	1	EA
73	R715	RES C.F,1/2W,5%,56K	RD0CP563J	1	EA
74	R716	RES C.F,1/4W,5%,100	RD0BP101J	1	EA
75	R717	RES C.F,1/4W,5%,2.2K	RD0BP222J	1	EA
76	R718	RES M.F,1/4W,1%,430	RMBP4300F	1	EA
77	R719	RES M.F,1/2W,1%,82K	RMCP8202F	1	EA
78	VR608	RES SR,2KB,VG067TL1B202	572-318	1	EA
79	VR609	RES SR,200B,VG067TL1B201	572-316	1	EA
80	VR610	RES SR,500B,VG067TL1B501	572-319	1	EA
81	VR611	RES SR,1KB,VG067TL1B102	572-315	1	EA
82	Z601	DIODE ZENER,DZ-6.8B	585-161	1	EA

(12), CHOP PULSE GENERATOR

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C646	CAP CER,50V,K,470PF	CK1HL471K	1	EA
2	C647	CAP CER,50V,K,1000PF	CK1HL102K	1	EA
3	C653	CAP CER,50V,K,100PF(T.C BLACK)	CT1HL101K	1	EA
4	C679	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
5	CR605	DIODE,1N4148	585-002	1	EA
6	CR618	DIODE,1N4148	585-002	1	EA
7	P610	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
8	P611	CONNECTOR WAFER,LW-0640-06	531-005-7	1	EA
9	R655	RES C.F,1/4W,5%,4.7K	RD0BP472J	1	EA
10	R656	RES C.F,1/4W,5%,270	RD0BP271J	1	EA
11	R657	RES C.F,1/4W,5%,2.2K	RD0BP222J	1	EA
12	R658	RES C.F,1/4W,5%,2.2K	RD0BP222J	1	EA
13	R673	RES C.F,1/4W,5%,2.2K	RD0BP222J	1	EA
14	U606	IC TTL,GD74LS02	591-054-9	1	EA

(13). HIGH VOLT & CRT DRIVE

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C648	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
2	C649	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
3	C650	CAP ELE,25V,M,22UF(SM)	CE1EL226M	1	EA
4	C651	CAP CER,500V,D,1PF(T.C BLACK)	CT2HL010D	1	EA
5	C652	CAP M.F,250V,K,0.022UF	CH2EL223K	1	EA
6	C666	CAP M.F,250V,K,0.047UF	CH2EL473K	1	EA
7	C689	CAP ELE,160V,M,1UF(SM)	CE2CL105M	1	EA
8	C690	CAP CER,2KV,Z,0.01UF	CK2FL103Z	1	EA
9	C691	CAP CER,3KV,M,1000PF	CK3FL102M	1	EA
10	C692	CAP CER,3KV,M,1000PF	CK3FL102M	1	EA
11	C693	CAP CER,2KV,Z,0.01UF	CK2FL103Z	1	EA
12	C694	CAP CER,2KV,Z,0.01UF	CK2FL103Z	1	EA
13	C695	CAP CER,2KV,Z,0.01UF	CK2FL103Z	1	EA
14	C696	CAP CER,2KV,Z,0.01UF	CK2FL103Z	1	EA
15	C697	CAP CER,3KV,M,1000PF	CK3FL102M	1	EA
16	C698	CAP MYLAR,50V,K,0.22UF	CP1HL224K	1	EA
17	C702	CAP ELE,25V,M,100UF(SM)	CE1EL107M	1	EA
18	C703	CAP CER,50V,K,5600PF	CK1HL562K	1	EA
19	CR613	DIODE,1N4148	585-002	1	EA
20	CR614	DIODE,1S953	585-147	1	EA
21	CR627	DIODE,1SS83	585-132	1	EA
22	CR628	DIODE,1SS83	585-132	1	EA
23	CR629	DIODE,ESJA52-12	585-149	1	EA
24	CR630	DIODE,ESJA52-12	585-149	1	EA
25	CR631	DIODE,ESJA52-12	585-149	1	EA
26	CR632	DIODE,ESJA52-12	585-149	1	EA
27	CR633	DIODE,1N4148	585-002	1	EA
28	CR634	DIODE,1N4148	585-002	1	EA
29	NL601	NEON LAMP,NE-98	561-022	1	EA
30	NL602	NEON LAMP,NE-98	561-022	1	EA
31	P614	CONNECTOR WAFER,LW-0640-07	531-059-7	1	EA
32	P615	CONNECTOR WAFER,LW-0640-06	531-005-7	1	EA
33	P616	CONNECTOR WAFER,LW-0640-03	531-002-7	1	EA
34	P617	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
35	Q612	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
36	Q613	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
37	Q614	TRANSISTOR,2SA1371E	611-615	1	EA
38	Q615	TRANSISTOR,2SC3468E	611-616	1	EA
39	Q628	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
40	Q629	TRANSISTOR,KTA1015-Y	611-014-1	1	EA
41	Q630	TRANSISTOR,2SD613D	611-125Y	1	EA
42	R664	RES C.F,1/4W,5%,10	RD0BP100J	1	EA
43	R665	RES C.F,1/4W,5%,10	RD0BP100J	1	EA
44	R667	RES C.F,1/4W,5%,3K	RD0BP302J	1	EA
45	R668	RES C.F,1/4W,5%,56K	RD0BP563J	1	EA
46	R669	RES C.F,1/4W,5%,3.9K	RD0BP392J	1	EA
47	R670	RES C.F,1/4W,5%,470	RD0BP471J	1	EA
48	R671	RES C.F,1/4W,5%,1K	RD0BP102J	1	EA
49	R672	RES C.F,1/4W,5%,2.2K	RD0BP222J	1	EA
50	R674	RES C.F,1/4W,5%,22K	RD0BP223J	1	EA

(1 3) , HIGH VOLT & CRT DRIVE

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
51	R675	RES C.F,1/4W,5%,12K	RD0BP123J	1	EA
52	R676	RES C.F,1/2W,5%,47K	RD0CP473J	1	EA
53	R677	RES C.F,1/4W,5%,220K	RD0BP224J	1	EA
54	R678	RES C.F,1/2W,5%,47K	RD0CP473J	1	EA
55	R679	RES C.F,1/4W,5%,10K	RD0BP103J	1	EA
56	R680	RES C.F,1/4W,5%,1.5K	RD0BP152J	1	EA
57	R681	RES C.F,1/4W,5%,220	RD0BP221J	1	EA
58	R721	RES C.F,1/4W,5%,82K	RD0BP823J	1	EA
59	R722	RES C.F,1/4W,5%,100K	RD0BP104J	1	EA
60	R723	RES C.F,1/4W,5%,330K	RD0BP334J	1	EA
61	R724	RES C.F,1/4W,5%,10K	RD0BP103J	1	EA
62	R725	RES M.G,1/2W,5%,16M	RG0CP166J	1	EA
63	R726	RES C.F,1/4W,5%,100K	RD0BP104J	1	EA
64	R727	RES C.F,1/4W,5%,2.2	RD0BP2R2J	1	EA
65	R728	RES M.G,1/2W,1%,3M	RGCP3004F	1	EA
66	R729	RES M.G,1/2W,1%,16M	RGCP1605F	1	EA
67	R730	RES M.F,1/4W,1%,270K	RMBP2703F	1	EA
68	R732	RES C.F,1/4W,5%,330	RD0BP331J	1	EA
69	R733	RES C.F,1/4W,5%,100K	RD0BP104J	1	EA
70	R734	RES C.F,1/4W,5%,2.7K	RD0BP272J	1	EA
71	R735	RES C.F,1/4W,5%,1.5K	RD0BP152J	1	EA
72	R736	RES C.F,1/4W,5%,390	RD0BP391J	1	EA
73	R737	RES C.F,1/4W,5%,680	RD0BP681J	1	EA
74	R738	RES C.F,1/4W,5%,1.2K	RD0BP122J	1	EA
75	T601	TRANSFORMER H.V,HVT-3D(4011)	622-017	1	EA
76	VR612	RES SR,200KB,VG067TL1B204	572-317	1	EA

(1 4) , POWER SUPPLY

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1	C801	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
2	C802	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
3	C803	CAP ELE,16V,M,100UF(SM)	CE1CL107M	1	EA
4	C804	CAP ELE,16V,M,100UF(SM)	CE1CL107M	1	EA
5	C807	CAP ELE,35V,M,1000UF(SM)	CE1VL108M	1	EA
6	C808	CAP ELE,25V,M,2200UF(SMS)	581-142	1	EA
7	C809	CAP ELE,25V,M,2200UF(SMS)	581-142	1	EA
8	C810	CAP CER,50V,Z,0.01UF	CK1HL103Z	1	EA
9	C811	CAP M.F,250V,K,0.047UF	CH2EL473K	1	EA
10	C812	CAP ELE,16V,M,100UF(SM)	CE1CL107M	1	EA
11	C813	CAP ELE,160V,M,10UF(SM)	CE2CL106M	1	EA
12	C814	CAP ELE,250V,M,10UF(SM)	CE2EL106M	1	EA
13	C815	CAP ELE,100V,M,33UF(SM)	CE2AL336M	1	EA
14	C816	CAP CER,500V,Z,0.01UF	CK2HL103Z	1	EA
15	C817	CAP CER,500V,Z,0.01UF	CK2HL103Z	1	EA
16	C818	CAP ELE,25V,M,100UF(SM)	CE1EL107M	1	EA
17	C819	CAP ELE,250V,M,47UF(SM)	CE2EL476M	1	EA
18	C820	CAP ELE,100V,M,47UF(SM)	CE2AL476M	1	EA
19	D801	DIODE,1N4148	585-002	1	EA
20	D802	DIODE BRIDGE,WO-04S(400V,1.5A)	585-153	1	EA
21	D803	DIODE BRIDGE,WO-04S(400V,1.5A)	585-153	1	EA
22	D804	DIODE BRIDGE,WO-04S(400V,1.5A)	585-153	1	EA
23	D805	DIODE BRIDGE,WO-04S(400V,1.5A)	585-153	1	EA
24	D806	DIODE,1N4005	585-154	1	EA
25	F801	FUSE,250V0.5A,MF51NM LEAD TYPE	563-032	1	EA
26	P801	CONNECTOR WAFER,LW-0640-04	531-003-7	1	EA
27	P802	CONNECTOR WAFER,LW-0640-03	531-002-7	1	EA
28	P803	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
29	P804	CONNECTOR WAFER,LW-0640-06	531-005-7	1	EA
30	P805	CONNECTOR WAFER,LW-0640-07	531-059-7	1	EA
31	P807	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
32	P810	CONNECTOR WAFER,LW-0640-09	531-025-7	1	EA
33	P811	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
34	P812	CONNECTOR WAFER,LW-0640-02	531-001-7	1	EA
35	P813	CONNECTOR WAFER,LW-0640-03	531-002-7	1	EA
36	Q801	TRANSISTOR,KTC1815-Y	611-001-1	1	EA
37	Q802	TRANSISTOR,KTA1015-Y	611-014-1	1	EA
38	Q803	TRANSISTOR,KSD288-Y	611-599	1	EA
39	Q804	TRANSISTOR,2SB861C	611-189	1	EA
40	R801	RES C.F,1/4W,5%,27K	RD0BP273J	1	EA
41	R802	RES C.F,1/2W,5%,68	RD0CP680J	1	EA
42	R803	RES M.F,1/4W,1%,12K	RMBP1202F	1	EA
43	R804	RES M.F,1/4W,1%,12K	RMBP1202F	1	EA
44	R805	RES M.F,1/4W,1%,12K	RMBP1202F	1	EA
45	R806	RES C.F,1/4W,5%,1K	RD0BP102J	1	EA
46	R807	RES M.F,1/4W,1%,139K	RMBP1393F	1	EA
47	R808	RES C.F,1/4W,5%,270	RD0BP271J	1	EA
48	R809	RES M.O,2W,5%,4.7K	RS02P472J	1	EA
49	R810	RES C.F,1/4W,5%,5.6	RD0BP5R6J	1	EA
50	R811	RES C.F,1/4W,5%,100	RD0BP101J	1	EA

(14), POWER SUPPLY

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
51	R812	RES C.F,1/4W,5%,82K	RD0BP823J	1	EA
52	R813	RES C.F,1/4W,5%,1.5K	RD0BP152J	1	EA
53	R814	RES C.F,1/4W,5%,1K	RD0BP102J	1	EA
54	R815	RES C.F,1/4W,5%,560K	RD0BP564J	1	EA
55	R816	RES M.O,3W,5%,22	RS03P220J	1	EA
56	R818	RES M.O,2W,5%,8.2K	RS02P822J	1	EA
57	R819	RES C.F,1/4W,5%,820	RD0BP821J	1	EA
58	T101	TRANSFORMER ASS'Y,POWER	622-020	1	EA
59	U801	IC OP AMP,TL072CP	591-323	1	EA
60	U803	IC VOLT REG,GL7912	595-009	1	EA
61	U804	IC VOLT REG,GL7812	591-209-9	1	EA
62	U805	IC VOLT REG,GL7805	591-310-9	1	EA
63	VR801	RES SR,200KB,VG067TL1B204	572-317	1	EA
64	Z801	DIODE ZENER,DZ-22.0V	585-118-1	1	EA
65	Z802	DIODE ZENER,DZ-22.0V	585-118-1	1	EA
66	Z804	DIODE ZENER,DZ-22.0V	585-118-1	1	EA

(15), PANEL & OTHERS

NO.	FND NO	DESCRIPTION & SPEC.	PART NUMBER	QTY	UNIT
1		PCB,SC-10/SCALE ILL BOARD	513-342	1	EA
2		PCB,SC-2/VERTICAL BOARD	513-336	1	EA
3		PCB,SC-6/HORIZONTAL BOARD	513-338	1	EA
4		PCB,SC-8/POWER SUPPLY BOARD	513-340	1	EA
5		PCB,SC-9/CRT SOCKET BOARD	513-341	1	EA
6	CRT101	CRT,150BTB31A	631-007	1	EA
7	F101	FUSE,125V2A,MF51NM TYPE	563-035	1	EA
8	L101	ROTATION COIL,20MHz	638-005	1	EA
9	LD101	LED,GRN,KLG114E	588-020	1	EA
10	P101	TERMINAL,CAL OUT	539-010	1	EA
11	P103	CONN,BNC-RB(UG-1094/U)NI,4P	531-164	1	EA
12	P104	CONN,BNC-RB(UG-1094/U)NI,4P	531-164	1	EA
13	P105	AC INLET,GSS42R34-3121-200	531-170	1	EA
14	P106	CONN,BNC-RB(UG-1094/U)NI,4P	531-164	1	EA
15	P107	CONN,BNC-RB(UG-1094/U)NI,4P	531-164	1	EA
16	P108	CONN,BNC-RB(UG-1094/U)NI,4P	531-164	1	EA
17	P901	SOCKET CRT,S-B0891-01	535-017	1	EA
18	PL1001	LAMP,14V100mA	561-020	1	EA
19	PL1002	LAMP,14V100mA	561-020	1	EA
20	PL1003	LAMP,14V100mA	561-020	1	EA
21	R101	RES C.F,1/4W,5%,10	RD0BP100J	1	EA
22	R102	RES C.F,1/4W,5%,10	RD0BP100J	1	EA
23	R104	RES C.F,1/4W,5%,10	RD0BP100J	1	EA
24	S101	SWITCH POWER,SDLA1P	521-070	1	EA
25	TL101	TERMINAL LUG,GP840074	537-037	1	EA
26	VR101	RES VAR,V16L4 LUG(E113-10092)	571-055	1	EA
27	VR102	RES VAR,V16L4 LUG(E113-10092)	571-055	1	EA
28	VR103	RES VAR,K161100-10KB	571-056-1	1	EA
29	VR104	RES VAR,K161100-10KB	571-056-1	1	EA
30	VR105	RES VAR,K16110-500KB	571-059S	1	EA
31	VR106	RES VAR,K161100-10KB	571-056	1	EA
32	VR107	RES VAR,K161100-10KB	571-056-1	1	EA
33	VR802	RES VAR,VM16N(E708-1068),2M	571-058	1	EA

~~~~~~~~~~~~~~~~~~~ PART-LIST of MODEL 1021 Rev. C // The End ~~~~~~~~~

Printed Date : 1990. 5. 24
~~~~~~~~~~~~~~~~~~~