

GoldStar

ASK & CO. ELEKTRONIKK
LYNGBØVEIEN 52
LAKSEVÅG
TLF. 55 34 48 93 FAX 55 34 11 10

OSCILLOSCOPE OS-9020P

SERVICE MANUAL



GoldStar Precision Co., Ltd.

GoldStar



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NORWAY



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Servicing Precautions

Please read all instructions in the service manual thoroughly before servicing.

Disconnect power cord from power source before opening the enclosure.

Instructions

1. To maintain the precision and reliability of the product use it.
2. After turning on power, please allow a 15-minute per-heating period before use.
3. Triple-line power cord is to be used for the product. But when you are using the doubleline cord, make sure to connect the earth terminal of the product to the earth at the power source for safety.
4. For quality improvement the exterior design and specifications of the product can be changed without prior notice.

Warranty

Warranty service covers a period of one year from the date of original purchase.

In case of technical failure within one year, repair service will be provided by our service center.

We charge for repairs after the one year warranty period expires.

When the failure is a result of user's neglect, natural disaster or accident, we charge for repairs regardless of the warranty period.

Notice

This Service Manual describes the most typical product of this model. If there are any specific differences between this Manual and the servicing unit, please contact GoldStar Precision Co., Ltd.

GoldStar Precision Co., Ltd.

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1. SPECIFICATIONS

PART	SPECIFICATIONS
* CRT	
1) Configuration and useful screen	6-inch rectangular screen with internal graticule ; 8x10 Div (1 div = 1 Cm) , marking for measurement of rise time. 2mm subdivisions along the central axis.
2) Accelerating potential	+1.9KV approx. (ref. cathode)
3) Phosphor	P43
4) Focussing	possible
5) Trace rotation	provided
6) Intensity control	provided
* Z-Axis input (Intensity Modulation)	
1) Input signal	Positive going signal decreases intensity +5Vp-p or more signal cases noticeable modulation at normal intensity settings.
2) Band-width	DC - 2MHz (-3dB)
3) Coupling	DC
4) Input impedance	20K - 30Kohms
5) Maximum input voltage	30V (DC+peak AC)
* Vertical Deflection	
1) Band-width (-3dB) DC coupled	DC to 20MHz normal DC to 10MHZ magnified (CH1 only)
AC coupled	10Hz to 20MHz normal 10Hz to 10MHZ magnified (CH1 only)
2) Modes	CH1, CH2, ADD, DUAL (CHOP ; Time/div switch - 0.2s to 5mS , ALT ; Time/div switch 2mS to 0.2uS)
3) Deflection Factor	5mV/div to 5V/div in 10 calibrated steps of a 1-2-5 sequence. Continuously variable between steps at least 1:2.5 x5 MAG ; 1mV/div to 1V/div in 10 calibrated steps. (CH1 only)
4) Accuracy	normal ; $\pm 3\%$, magnified ; $\pm 5\%$ (CH1 only)
5) Input impedance	approx. 1M-ohm in parallel with 30pF
6) Maximum input voltage	Direct;250V(DC+peak AC), with probe;refer to probe specification
7) Input coupling	DC - GND - AC

PART	SPECIFICATIONS											
8) Rise time	17.5nS or less (35nS or less; x5 MAG)											
9) CH1 out	25mV/div±20% into 50 ohms ; 20Hz to 10MHz(-3dB)											
10) Polarity inversion	CH2 only											
* Horizontal Deflection												
1) Display modes	A , X-Y , x10 , VARIABLE											
2) Time base	0.2us/div to 0.2S/div in 19 calibrated steps, 1-2-5 sequence. uncalibrated continuous control between steps at least 1:2.5											
3) Sweep magnification	10 times (maximum sweep rate ; 20nS/div) Note ; 50nS/div, 20nS/div of TIME BASE are uncalibrated.											
4) Accuracy	±3%, ±5% (0℃ to 40℃), additional error for magnifier ±2%											
* Trigger System												
1) Modes	auto , norm , TV-V , TV-H											
2) Source	INT (CH1, CH2, VERT) , LINE , EXT											
3) Coupling	AC											
4) Slope	+ or -											
5) Sensitivity and Frequency												
AUTO, NORM	<table><tr><td></td><td>20Hz-2MHz</td><td>20Hz-20MHz</td></tr><tr><td>INT (VERT)</td><td>0.5 div (2.0)</td><td>1.5 div (3.0)</td></tr><tr><td>EXT</td><td>0.2 Vp-p</td><td>0.8 Vp-p</td></tr></table>				20Hz-2MHz	20Hz-20MHz	INT (VERT)	0.5 div (2.0)	1.5 div (3.0)	EXT	0.2 Vp-p	0.8 Vp-p
	20Hz-2MHz	20Hz-20MHz										
INT (VERT)	0.5 div (2.0)	1.5 div (3.0)										
EXT	0.2 Vp-p	0.8 Vp-p										
TV-V, TV-H	at least 1 div or 1.0Vp-p											
6) External trigger												
Input impedance	approx. 1 M-ohm											
Max. input voltage	250V (DC + peak AC)											

PART	SPECIFICATIONS											
* X-Y Operation 1) X-axis	(same as CH1 except for the following) Deflection factor ; same as that of CH1 Accuracy ; ±5% Frequency response; DC to 500KHz (-3dB)											
2) Y-axis	same as CH2											
3) X-Y phase difference	3 ° or less (at DC to 50KHz)											
* Calibrator (probe adj.)	1KHz(±20%) frequency, 0.5V(±10%) square wave duty ratio : 40 - 60%											
* Power supply 1) Voltage range	<table><tr><th>voltage range</th><th>fuse</th></tr><tr><td>100 (90 - 110V) / AC</td><td>2A250V</td></tr><tr><td>120 (108 - 132V) / AC</td><td>2A250V</td></tr><tr><td>220 (198 - 242V) / AC</td><td>1A250V</td></tr><tr><td>240 (216 - 250V) / AC</td><td>1A250V</td></tr></table>		voltage range	fuse	100 (90 - 110V) / AC	2A250V	120 (108 - 132V) / AC	2A250V	220 (198 - 242V) / AC	1A250V	240 (216 - 250V) / AC	1A250V
voltage range	fuse											
100 (90 - 110V) / AC	2A250V											
120 (108 - 132V) / AC	2A250V											
220 (198 - 242V) / AC	1A250V											
240 (216 - 250V) / AC	1A250V											
2) Frequency	50 / 60Hz											
3) Power consumption	approx. 35W											
* Physical Charac. 1) Weight	7.5Kg											
2) Dimension	320 mm (W) x 140 mm (H) x 430 mm (L)											
* Environmental Charac- teristic 1) Temperature range for rated operation	+10 ° C to +35 ° C (+50 ° F to +95 ° F)											
2) Max. ambient operating temperature	0 ° C to +40 ° C (+32 ° F to +104 ° F)											
3) Max. storage temerature	-20 ° C to +70 ° C (-4 ° F to +158 ° F)											
4) Humidity range for rated operation	45% to 85% RH											
5) Max.ambient operating humidity	35% to 85% RH											

2. ACCESSORIES

(1) Operation manual	-----	1
(2) Probe (option)	-----	2
(3) Spare Fuse	-----	1
(4) Power cord	-----	1

3. PREVENTIVE MAINTENANCE

Preventive maintenance, when performed on a regular basis, can prevent instrument breakdown and may improve the reliability of the oscilloscope. The severity of environment to which this instrument is subjected will determine the frequency of maintenance. A convenient time to perform preventive maintenance is preceding recalibration of the instrument.

Disassembly

Remove the screws in the top cover of the instrument. Gently separate the top cover from the instrument and lay aside. Most of the internal parts of the instrument are now accessible.

Cleaning

The instrument should be cleaned as often as operating conditions require. Accumulation of dirt in the instrument can cause component breakdown.

The covers provide protection against dust in the interior of the instrument. Loose dust accumulated on these covers can be removed with a soft cloth or small brush.

Dirt that remains can be removed with a soft cloth dampened in a mild detergent and water solution. Abrasive cleaners should not be used. Cleaning the interior should only be occasionally necessary. The best way to clean the interior is to blow off the dust with a dry, low-velocity stream of air. A soft-bristle brush or a cottontipped applicator is useful for cleaning in narrow spaces or for cleaning more delicate components.

Visual Inspection

The instrument should be inspected occasionally for such defects as broken connections, improperly seated transistors, damaged circuit boards, and heat-damaged parts. The corrective procedure for most visible defects is apparent ; however, particular care must be taken if heat-damaged components are found. Overheating usually indicates other trouble in the instrument ; therefore, correcting the cause of the overheating is important to prevent recurrence of the damage.

4. CIRCUIT DESCRIPTION

The block diagram (page 43) shows the overall relationship between all of the circuits. Complete schematics of each circuit are also given in section schematics diagrams (page 44 to 57).

Refer to these diagrams throughout the following circuit description for electrical values and relationship.

ATTENUATOR

----- (1)

Signals applied to the input connector can be either AC coupled or DC coupled, or they can be disconnected to the internal circuit when S901 (S902) is GND position.

Attenuation is determined by the setting of the VOLT / DIV switch.

The attenuator that is controlled by the VOLT / DIV switch has $\div 2$, $\div 4$, $\div 10$, $\div 100$ circuit.

$\div 2$, $\div 4$, $\div 10$ circuits are in RA101 (RA102) and $\div 10$, $\div 100$ circuits are between S101-A2 (S102-A2) and S101-B2 (S102-B2).

CH1 (CH2) INPUT AMPLIFIER

----- (2 , 3)

Signal from the input attenuator is connected to source follower Q101 (Q105). When excessively high-amplitude signals are applied to the source follower, the signals will be Q103 (Q106) and the gate-source junction of Q101 (Q105). When S801 is open ($\times 5$ MAG), the signal that is feed back to OP AMP through R109 amplifies the output signal of Q104 by 5 times.

And the signal of Q206 (Q306) base is converted from a single-ended signal to a paraphase signal by differential amplifier.

CH1 (CH2) PREAMP & TRIGGER PICK OFF

---- (4 , 5)

Vertical preamp circuits provide control of vertical position.

They also contain a stage to provide a sample of the input signal to the trigger preamp circuit for internal triggering from the CH1 or CH2 signal only. And the trigger preamp of CH1 provides the CH1 input signal to the horizontal amplifier in the X-Y position of the TIME / DIV switch.

The trigger preamp circuit amplifies the internal trigger signal to the level necessary to drive the trigger generator circuit.

VERTICAL CONTROL

----- (6)

The vetical switching circuit determines the input signal or combination of input signals to be connected to the vertical main amp.

Input signal combinations that can be displayed are selected by D FLIP-FLOP that is controlled by the vertical mode switches and the X-Y position of the TIME / DIV switch.

In the ALT and CHOP modes, both channels are alternately displayed on a shared time basis.

VERTICAL MAIN AMPLIFIER

(7)

The vertical main amplifier circuit provides the final maplification for the vertical deflection signal before it is applied to the vertical deflection plates of the CRT.

TRIGGER AMPLIFIER

(8)

The Trigger Amplifier circuit produces trigger pulses to start the sweep generator circuit.

The Trigger Generator circuit consists of the trigger source, trigger mode switch, TV synchronization circuit, trigger amplifier, U109 and etc. The Trigger Source Switch selects one signal of the signals from the vertical trigger preamps, power line source applied to this instrument, external trigger input BNC connector connected to front panel.

The Trigger Generator Circuit has the circuit to control the trigger level and slope.

The signal type is AC.

The Trigger mode Switch determines the operating mode for the trigger generator circuit.

In the NORM mode, the sweep signal is generated only the trigger signal is generated, Operation in the AUTO, TV-V mode is the same operation as NORM mode, except that a free running trace is displayed when a trigger pulse is not present or the aplitude of the trigger signal is not adequate. The Base Signal of Q130 which enters through three switches, Q347 and etc is amplified by Q345, Q346.

The amplified signal, the collector signal of Q346, enters the NO.2 pin of U109, outputs in NO.8 pin of U109.

The NO.8 pin signal of U109 is called trigger signal or trigger pulse.

SWEEP GENERATOR

(9)

Sweep generator circuit consists of sweep gate circuit and miller integrator.

The sweep gate is on, a very little negative going signal is generated in the gate of Q129, input Miller Integrator, by R-C network.

The signal in the gate of Q129 is amplified by Miller Integrator, the amplified signal appear in the Emitter of Q342, is called sweep signal and enters the Base of Q327 through R551.

This sweep signal is generated on commend (trigger pulse) from the trigger generator circuit.

The sweep gate circuit produces an unblanking gate to unblank the CRT during sweep time.

HORIZONTAL OUTPUT AMPLIFIER

(12)

The Horizontal Output Amplifier provides the final signal amplification to drive the CRT horizontal deflection plates.

The Horizontal Output Amplifier consists of five cascade stage amplifiers. The first stage horizontal main amplifier has a low input impedance and require very little voltage change at the input to produce the desired output change.

The output signal from complementary amplifier Q125, Q127 drives the right horizontal deflection plate.

The output signal from complementary amplifier Q126, Q128 drives the left horizontal deflection plate.

The Horizontal Output Amplifier has the horizontal magnification and the horizontal position functions.

In all position of the TIME / DIV select switch except X-Y the input signal of the horizontal output amplifier is the sawtooth signal from the sweep generator. In the X-Y position of the TIME / DIV select switch the input signal of the Horizontal Output Amplifier is the signal from the channel 1 preamp circuit of the vertical deflection system.

POWER SUPPLY

(14)

The low voltage Power Supply Circuit provides five regulated sources (-12 Volts, +5 Volts, +12 Volts, +56 Volts, +140 Volts) and three unregulated source (+195 Volts) used to operate the vertical deflection system, horizontal deflection system and CRT driving circuit.

CRT CIRCUIT

(13)

The CRT Circuit provides the voltage levels and control circuits to operate CRT. The circuitry consists of the z-axis amplifier, high voltage oscillator, high voltage regulator, high voltage rectifier and the CRT controls.

The calibrator circuit produces a square wave output signal with accurate amplitude and frequency.

This output signal available as a square wave Voltage at the PROBE ADJUST 0.5Vp-p (1KHz) connector.

5. CALIBRATION

GoldStar Precision Co., Ltd. provides complete instrument repair and calibration. Contact the GoldStar Precsion Co., Ltd. office.

5-1. Calibration interval

To maintain instrument accuracy, perform the calibration of the OS-9020P at least every 1000 hours of operations or every six month if used frequently.

5-2. Test equipment required

The following test equipment(Table 5-1 ; see page 23) and accessories, or equivalent, are required for the complete calibration of the OS-9020P.

The given specifications for the test equipment are the minimum necessary for accurate calibration.

Therefore, the specifications of any test equipment used must meet or exceed the list specifications.

All the test equipment ia assumed to be correctly calibrated and operating within the listed specification. Operating instructions for the test equipment are not given in this procedure. Refer to the instruction manual for the test equipment if more information is needed.

5-3. Preliminary procedure

This instrument should be calibrated at an ambient temperature of $+20^{\circ}\text{C}$ ($\pm 5^{\circ}\text{C}$) for best overall accuracy.

1. Connect the instrument to AC line voltage, 50/60Hz line source.
2. Set the instrument controls as given in the Preliminary Control Setting. Allow at least fifteen minutes of warmup before proceeding.
3. See the Adjustment Locations in the pullout pages(see page 25).

5-4. Preliminary control settings

Preset the instrument controls to the settings given below, when starting the calibration procedures.

Controls	Settings	Controls	Settings
Ⓐ FOCUS	Midrange	- HORIZONTAL -	
Ⓑ TRACE ROTATION	As desired	Ⓐ H-POSITION	Midrange
Ⓒ INTENSITY	Midrange	Ⓑ x10MAG	Normal
- VERTICAL -		Ⓐ TIME/DIV	1 mS
Ⓐ V-POSITION	Midrange	Ⓑ VARIABLE	CAL
Ⓑ V-VARIABLE	CAL (fully clockwise)	- TRIG -	
Ⓒ INPUT COUPLING	GND (AC-GND-DC)	Ⓐ LEVEL	Midrange, nomal
Ⓓ VOLTS/DIV	5 mV/DIV	Ⓑ SLOPE	+ (pull)
Ⓔ V-MODE	CH1	Ⓐ MODE	Auto
Ⓕ CH2 INVERT	Normal	Ⓑ TRIG SOURCE	INT (CH1)

5-5. Initial starting procedure

1. Push the POWER switch.
2. Wait a few seconds for the cathode ray tube (CRT) to warm up.
A trace should appear on the display of the CRT.
3. If the trace disappears, increase (clockwise) the INTENSITY control setting until the trace is easily observed
4. Adjust FOCUS control for the best focused display.
5. Readjust POSITION controls if necessary, to center the trace.

POWER SUPPLY SYSTEM

NOTE : Before you begin, see ADJUSTMENT LOCATIONS in the pullout pages.
(see page 25)

Control settings

Preset the controls as given in the Preliminary Control Settings.

[1] Check Low-voltage Supply, if necessary.

- a. Connect the digital voltmeter (DVM) from the +12 volt line.
: +11.75V to +12.25V ----- (PB101-9)
- b. Connect the DVM from the -12 volt line.
: -11.75V to -12.25V ----- (PB101-6)
- c. Connect the DVM from the +5 volt line.
: +4.75V to +5.25V ----- (PB101-12)
- d. Connect the DVM from the +56 volt line.
: +54V to +58V ----- (R183-down)
- e. Connect the DVM from the +140 volt line.
: +137V to +142V ----- (R183-up)
- f. Connect the DVM from the +195 volt line. (unregulated)
: +185V to +210V ----- (J1A)

[2] Check High-voltage Supply.

- a. Connect the DVM to the H.V test point (H.V and CRT DRV BD)
by High-voltage Probe.
- b. Check for DVM reading as -1705 ~ -1895V ---- (P106-6)

DISPLAY

Control Setting

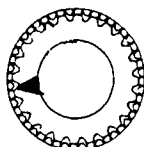
Preset the controls as given in the Preliminary Control Setting.

[3] Check/Adjust CRT Bias.

MODE switch to the AUTO position, and TIME/DIV switch to the 1mS.

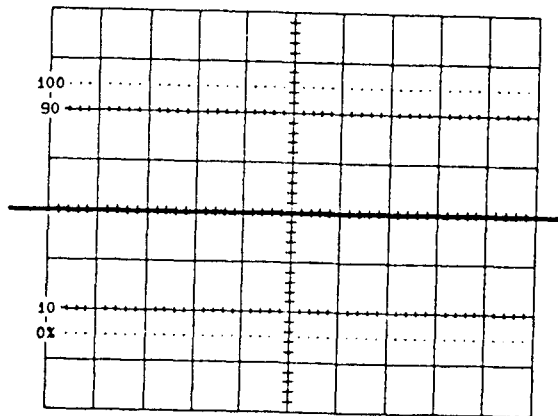
- a. Rotate the INTENSITY to the direction of 9 o'clock.
- b. Observe the trace of CRT.
- c. Adjust the CRT Bias Adjustment VR119 so that the trace makes an appear.

INTEN



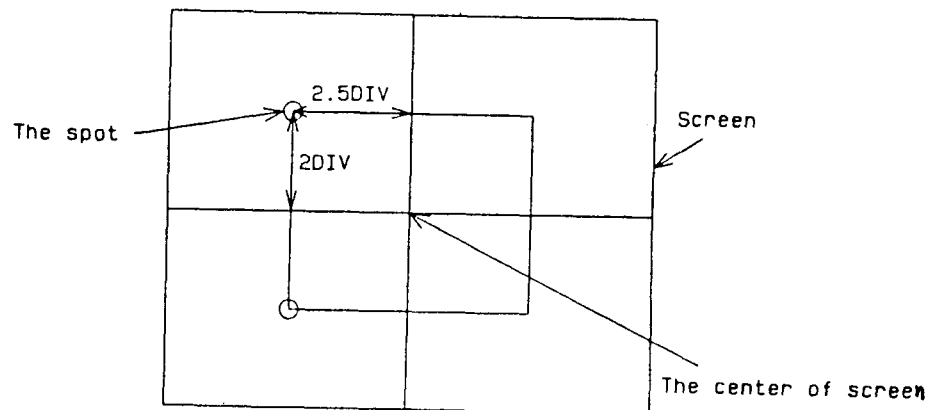
[4] Check/Adjust Trace Rotation.

- a. Check that the trace is parallel to the horizontal center line.
- b. Adjust the TRACE ROTATION for a trace that is parallel with the horizontal graticule lines.



[5] Check/Adjust ASTIGmatism and FOCUS

- a. TIME/DIV switch to the X-Y position, and AC-GND-DC to DC.
- b. Set the INTENSITY control for a small spot, as the following figure, using position controls.



- c. Check that the spot is round.
- d. Adjust the FOCUS adjustment and ASTIG adjustment VR117 for a round spot.

HORIZONTAL SYSTEM

Control settings

Preset the controls as given in the Preliminary Control Settings.

[6] Check/Adjust Horizontal Gain.

- a. Set the input AC-GND-DC to DC.
- b. TIME/DIV switch to the 1ms.
- c. Check that the time marks align with the graticule line over the center eight DIVisions, within 3%
- d. Adjust the H GAIN adjustment VR114 so that the time marks align with the center eight graticule lines.

[7] Check/Adjust Horizontal $\times 10$ MAG Gain.

- a. Set the TIME/DIV switch to the 1mS.
- b. Set $\times 10$ MAG
- c. Check that the one-cycle time marks align with the ten division graticule lines, within 5%.
- d. Adjust the MAG GAIN adjustment VR115 so that the one-cycle time marks align with the ten division graticule lines.

[8] Check/Adjust MAG CENT.

- a. Set the TIME/DIV switch to the 0.1 mS.
- b. Being the $\times 10$ MAG switch to the $\times 10$ MAG, the left end of the trace is brought to the center point and then the $\times 10$ MAG switch to the $\times 1$ position.
- c. Observe the movement of the left end of the trace.
- d. Adjust the MAG CENT adjustment VR116 for the movement of the end of the trace within ± 0.2 DIV.

[9] Check/Adjust low spaced sweep accuracy.

- a. Set the time mark generator for 5mS time marks.
- b. Set the TIME/DIV switch to 5mS.
- c. Check that the time marks align with the graticule line over the middle eighth divisions, within 3%
- d. Adjust the 5mS/DIV adjustment VR106 so that the time marks coincide with the middle eight graticule lines.

[10] Check/Adjust High speed sweep accuracy.

- a. Set the input coupling switch to DC
- b. Set the time mark generator for 10μ S time marks.
- c. Set the TIME/DIV switch to the 10μ S.
- d. Check that the time marks align with the graticule lines over the middle eight division.
- e. Adjust VC113 that the time marks coincide whth middle eight graticule lines.

VERTICAL SYSTEM

Control settings

Preset the controls as given in the Preliminary Control Settings.

[11] Check/Adjust DC Balance (Step attenuator balance).

- a. Set the VOLTS/DIV switch to the 5mV position.
- b. Position the trace to the horizontal center line.
- c. Change the VOLTS/DIV switch to the 10mV position.
- d. Check that the trace is within 0.1 division of the horizontal center line.
- e. Adjust the CH1 (CH2) DC BAL adjustment, VR101 (CH1) or VR109 (CH2), for a trace at the horizontal center line.
- f. Repeat part (a) through (e) until less than 0.05 division shift is noted when changing the VOLTS/DIV setting.

[12] Check/Adjust ADD BALANCE.

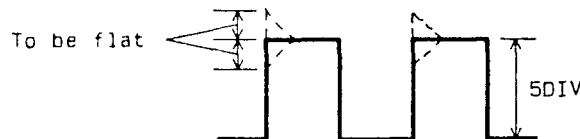
- a. Set the TIME/DIV switch to the 1mS position, the MODE switch to AUTO position.
- b. Set the CH1 and CH2 AC-GND-DC switches to GND.
- c. Set the V-MODE switch to [DUAL].
- d. Next, Adjust the vertical Position control that the trace is identical with the horizontal center graticule line.
- e. Set the V-MODE switch to [ADD].
- f. Check that the trace is identical with the horizontal center graticule line within ± 0.5 division.
- g. Adjust the ADD BALANCE adjustment VR118 for two times of the difference with the horizontal center graticule line.

[13] Check/Adjust Vertical Position Center.

- a. Confirm the vertical POSITION control at the midrange.
- b. Check that the trace is within 1 division.
- c. Adjust the Position Center adjustment VR103 (CH1), VR112 (CH2) for a trace at the horizontal center line.

[14] Check/Adjust $\times 1$ AC GAIN.

- a. Set the TIME/DIV switch to the 1mS position.
- b. Set the VOLTS/DIV switch to the 10mV position.
- c. Set the AC-GND-DC switch to DC.
- d. Connect the square-wave generator (using 1KHz output range).
- e. Adjust the output amplitude of that generator for 5 division deflection of screen.
- f. Check that the high-voltage level of pulse is flat.



- g. Adjust the $\times 1$ AC GAIN adjustment VR102 (CH1) VR110 (CH2) for a flat level.

[15] Check/Adjust Vertical Gain.

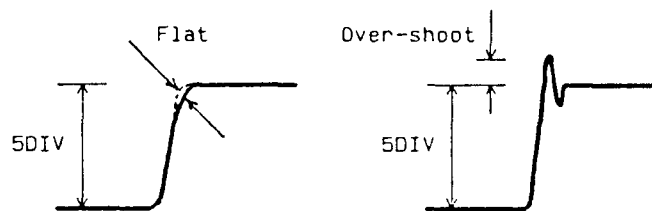
- a. Set the VOLTS/DIV switch to the 10mV position and AC-GND-DC switch to DC.
- b. Connect the standard amplitude calibrator to the input.
- c. Set the standard amplitude calibrator for a 50mVp-p signal.
- d. Check for a display of five divisions.
- e. Adjust the GAIN adjustment VR104 (CH1), VR111 (CH2) for a display of 5 divisions within 2%.
- f. Check all the VOLTS/DIV switch settings.

[16] Check/Adjust Input Capacity (ATT : $\div 1$).

- a. Set the VOLTS/DIV switch to 10mV position.
- b. Set the AC-GND-DC switch to DC.
- c. Connect the L-C meter to the input terminals.
- d. Check the input capacity for approximately 30pF.

[17] Check/Adjust Vertical Step Response.

- a. Set the VOLTS/DIV switch to the 10mV position.
- b. Set the TIME/DIV switch to the $20\mu\text{S}$ position.
- c. Connect the fast-rise, positive output (50mV, 1MHz) of the square-wave generator to the input. Use a 50Ω termination and cable.
- d. Set the square-wave generator to 1MHz. Adjust the square-wave generator output for a 5 divisions display.
- e. CH1 : Set the VC112 for a square wave that is flat.
Then, adjust VC111 for over-shoot that is $+0.2\text{DIV}$.
CH2 : Adjust the VC110 for over-shoot that is $+0.2\text{DIV}$.



[18] Check/Adjust Attenuation Compensation (ATT $\div 10$, $\div 100$).

- Set the AC-GND-DC switch to DC
- Connect the square-wave generator to the CH1 (CH2) input terminals, check for a square-wave that is flat (flat top) under the following settings.

ATT	VOLTS/DIV	The square-wave generator output
$\div 10$	0.1 V	0.5 V
$\div 100$	1 V	5 V

- Adjust the trimmer condenser for a square-wave (flat top) under the following settings.

ATT	VOLTS/DIV	The square-wave generator output	Adjust CH1 (CH2)
$\div 10$	0.1 V	0.25 V	VC104 (VC108)
$\div 100$	1 V	2.5 V	VC102 (VC106)

[19] Check/Adjust Input Capacity.

- Connect the L-C meter to the input terminal.
- Check the input capacity for a approximately 30pF.
- Adjust the trimmer condensers for a 30 pF input capacity under the following settings.

ATT	VOLTS/DIV	Adjust CH1 (CH2)
$\div 1$	10 mV	(VC109)
$\div 10$	0.1 V	VC103 (VC107)
$\div 100$	1 V	VC101 (VC105)

TRIGGERING SYSTEM

[20] Check/Adjust TRIG CENT.

- a. Set the TRIG SOURCE switch to the CH1, the TRIG SLOPE knob pull position, the VOLTS/DIV switch to 10mV and the TIME/DIV switch to the 20 μ S.
- b. Connect the sine-wave generator to the input connector for a 0.3DIV (50KHz).
- c. Set the TRIG LEVEL knob to the midposition.
- d. Adjust the VR105 so that synchronization is effected on the waveform, 0.3DIV on the screen.
- e. Next, set the TRIG SLOPE to - (push : inner state) and insure that synchronization is effected. After confirmation, leave the TRIG-SLOPE in the depressed state. Readjust when stepped out.

[21] Check/Adjust Trigger Balance

- a. Set the VOLTS/DIV switch to 50mV (CH1 and CH2), the TIME/DIV switch to 10 μ S, the TRIGGER SOURCE switch to INT, the INT TRIG switch to VERT, the V-MODE switch to DUAL, and CH1 position knob to the mid-position.
- b. Connect the sine wave generator to the input connectors (CH1 and CH2) for a five division (50KHz)
- c. Adjust CH2 position control so that CH2 waveform comes to CH1.
- d. Next, adjust VR113 so that both waveforms (CH1 and CH2) coincide.

[22] X-Y Operation

[22-1] Check/Adjust X Gain.

- a. Set the V-MODE switch to CH1, the TIME/DIV switch to the [X-Y], the AC-GND-DC switch of CH1 to DC, the AC-GND-DC switch of CH2 to GND.
- b. Set the VOLTS/DIV switch to the 10mV, with $\times 1$ GAIN.
- c. Connect the standard amplitude calibrator to the CH1 input connector.
- d. Set the standard amplitude calibrator for a 50mV.
- e. Check for a display of 5 divisions.
- f. Adjust the X GAIN adjustment VR108 for a display of 5 divisions within 3%.

[22-2] Check/Adjust X Position Center.

- a. Set the TIME/DIV switch to the [X-Y], the V-MODE switch to CH1, the horizontal POSITION control to the midposition and the AC-GND-DC switch to GND.
- b. Check to see that round spot is near the center graticule and is within 0.2 division against the horizontal line.
- c. Adjust the X CENT adjustment VR107 to position spot at the graticule center.

[22-3] Check/Adjust X-Y Phasing.

- a. Set the AC-GND-DC switch of CH1 and CH2 to DC.
- b. Connect the constant amplitude signal generator to CH1 and CH2 inputs through 50Ω cable and 50Ω termination.
- c. Adjust the constant amplitude signal generator for an 8 division horizontal display of 50KHz.
- d. Center the display vertically and horizontally with the CH1 and CH2 POSITION controls.
- e. Check the CRT display for an opening at the horizontal center line of 0.4 division or less.

CALIBRATOR

[23] Check/Adjust PROBE ADJUST terminal (0.5Vp-p, 1KHz).

- a. Connect the PROBE ADJUST termination to the Digital Frequency Counter.
- b. Check for the PROBE ADJUST frequency of 1KHz, within 20%(800Hz - 1200Hz).
- c. Next, connect the PROBE ADJUST termination to the Digital Multimeter.
- d. Check for the PROBE ADJUST output of 0.25V, within 10%(0.225 - 0.275V).

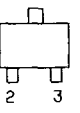
Table 5-1.

TEST EQUIPMENT REQUIRED

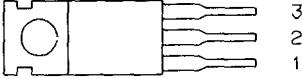
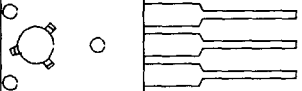
Description	Minimum Specification	Example of Usage
1. Constant Amplitude Signal Generator	50KHz reference frequency ; maximum frequency 50MHz ; variable amplitude	Check horizontal, vertical and trigger bandwidth.
2. Standard Amplitude Calibrator	Amplitude accuracy : 0.25% , variable amplitude ; 5mV to 40V ; frequency : 1KHz square wave	Check horizontal and Vertical gain.
3. Square - wave Generator	Variable frequency : 10Hz to 1MHz ; output amplitude : 10mV to 100V ($t_r < 3nS$)	Check probe and vertical compensation.
4. Digital Multimeter	0.1% accuracy	Check power supply.
5. Digital Frequency Counter	0.1% accuracy	Check PROBE ADJUST frequency.
6. Time Mark Generator	0.1% accuracy	Check horizontal timing.
7. Cable	Impedance : 50 Ω ; type : RG-58/U ; length : 42 inches ; connectors : BNC.	External trigger operation check. Horizontal gain check and adjustment.
8. Termination	Impedance : 50 Ω ; Connectors : BNC.	Vertical Amplifier compensation checks and adjustment.
9. Attenuator	Ratio : 10 $\times$; connectors : BNC ; impedance : 50 Ω	Vertical Amplifier bandwidth check.
10. T - Connector	Connectors : BNC.	External trigger operation checks.

6. SEMICONDUCTOR LEAD CONFIGURATION

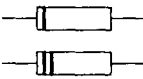
MARKING FOR TRANSISTOR ELECTRODE (TOP VIEW)

TYPE OF TRANSISTOR	ELECTRODE MARKING
2SA1206 KSC1674 2SC2901	 1. EMITTER 2. BASE 3. COLLECTOR
2SK304E	 1. SOURCE 2. GATE 3. DRAIN
2SC1907 KSC1730 2SA1029	 1. EMITTER 2. COLLECTOR 3. BASE
2SC3779	 1. BASE 2. EMITTER 3. COLLECTOR
2SC3775 KTC3875 MMBT3906 KTA1504 MMBT3904	 1. COLLECTOR 2. BASE 3. EMITTER

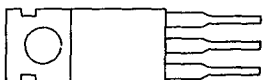
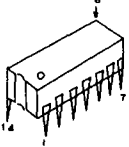
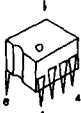
MARKING FOR TRANSISTOR ELECTRODE (FRONT VIEW)

TYPE OF TRANSISTOR	ELECTRODE MARKING
KTA968A 2SD362R KSD288Y	 1. BASE 2. COLLECTOR 3. EMITTER
KSA1381 KSC3503	 1. EMITTER 2. COLLECTOR 3. BASE

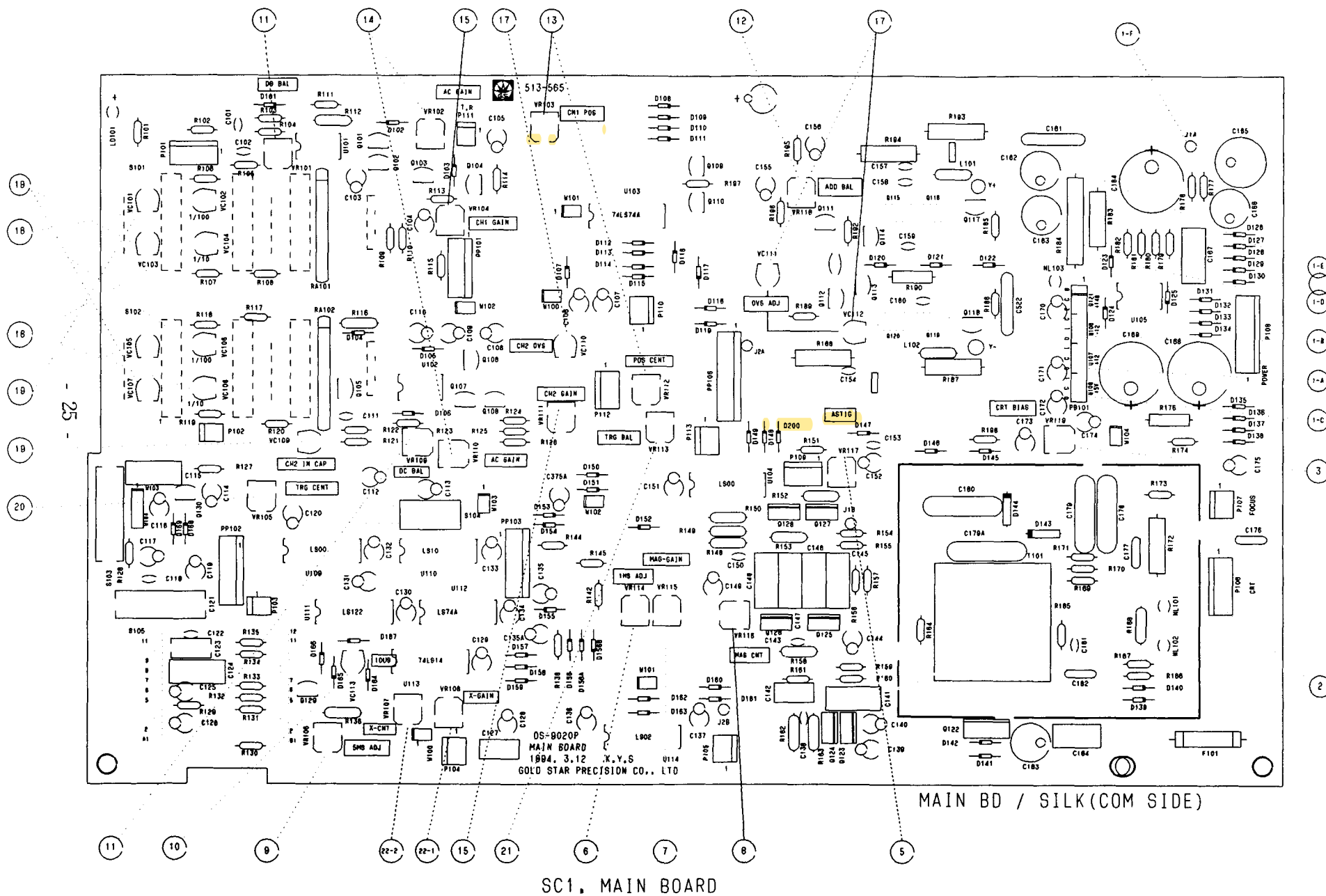
MARKING FOR DIODE ELECTRODE

TYPE OF DIODE	ELECTRODE MARKING	POLARITY
RL105 MA185 1N4005 AG01A 1SS133 ESJA52-12		
DZ-5.1B DZ-6.8B DZ-7.5B DZ-8.2B DZ-12B DZ-22B		

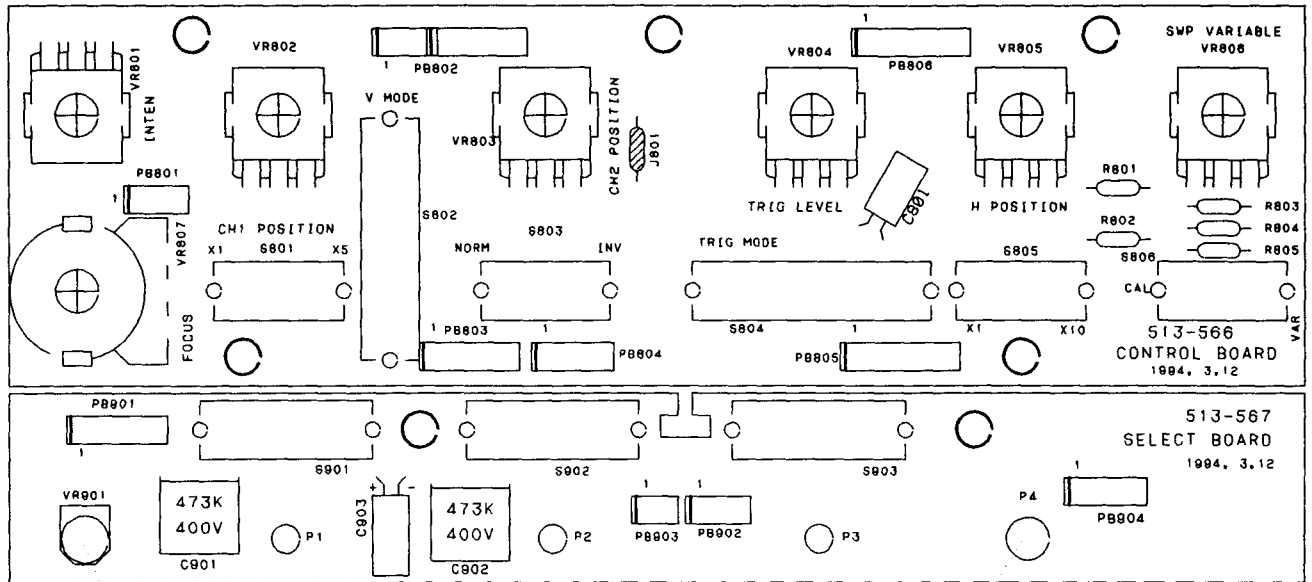
MARKING FOR ICS

TYPE OF IC	PACKAGE OUTLINE
GL7912	 1. COMMON 2. INPUT 3. OUTPUT
GL7805 GL7812	 1. INPUT 2. COMMON 3. OUTPUT
74LS122N 74LS74AP 74LS14 74LS02 74LS10 74LS00	
LF356J MC4558CN	

7. ELECTRICAL PARTS ARRANGEMENT WITH ADJUSTMENT LOCATIONS



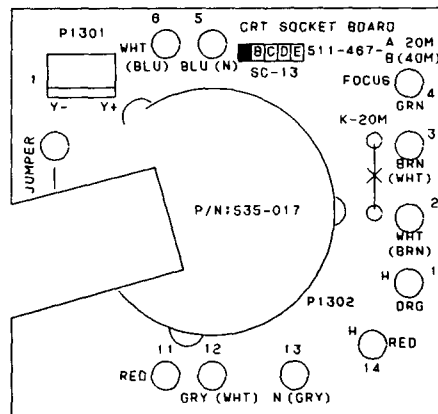
CONTROL BD (COMP. SILK)



4

23

SC8.9 : CONTROL & SELECT BOARD



SC13. CRT SOCKET BOARD

8. ELECTRICAL PARTS LIST

(1). ATTENUATORS

PAGE : 1

NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C302	CAP SMD, 50V, J, 220PF(2012)	CK1HI221J	2	C303	CAP SMD, 50V, J, 270PF(2012)	CK1HI271J
3	C304	CAP SMD, 50V, J, 47PF(2012)	CK1HI470J	4	C305	NOT USED	NOT
5	C355	CAP SMD, 50V, J, 220PF(2012)	CK1HI221J	6	C356	CAP SMD, 50V, J, 270PF(2012)	CK1HI271J
7	C357	CAP SMD, 50V, J, 47PF(2012)	CK1HI470J	8	C358	NOT USED	NOT
9	C901	CAP M. F, 400V, K, 0. 047UF	CH2GL473K	10	C902	CAP M. F, 400V, K, 0. 047UF	CH2GL473K
11	C903	CAP ELE, 16V, M, 47UF(SMS)	CE1CR476M	12	P101	CONNECTOR WAFER, LW-0640-05	531-018-7
13	P102	CONNECTOR WAFER, LW-0640-02	531-001-7	14	R105	RES M. F, 1/4W, 0. 5%, 10. 1K	RMBP1012D
15	R106	RES M. F, 1/4W, 0. 5%, 990K	RMBP9903D	16	R107	RES M. F, 1/4W, 0. 5%, 900K	RMBP9003D
17	R108	RES M. F, 1/4W, 0. 5%, 111K	RMBP1113D	18	R117	RES M. F, 1/4W, 0. 5%, 10. 1K	RMBP1012D
19	R118	RES M. F, 1/4W, 0. 5%, 990K	RMBP9903D	20	R119	RES M. F, 1/4W, 0. 5%, 900K	RMBP9003D
21	R120	RES M. F, 1/4W, 0. 5%, 111K	RMBP1113D	22	R302	RES SMD, 0. 1W, 5%, 22(2012)	RM0I22R0J
23	R303	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J	24	R304	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J
25	R305	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J	26	R306	NOT USED	NOT
27	R307	RES SMD, 0. 1W, 1%, 82(2012)	RM0I82R0F	28	R308	RES SMD, 0. 1W, 1%, 150(2012)	RM0I1500F
29	R309	RES SMD, 0. 1W, 5%, 27(2012)	RM0I27R0J	30	R310	RES SMD, 0. 1W, 5%, 27(2012)	RM0I27R0J
31	R311	RES SMD, 0. 1W, 5%, 15(2012)	RM0I15R0J	32	R474	RES SMD, 0. 1W, 5%, 27(2012)	RM0I27R0J
33	R475	RES SMD, 0. 1W, 5%, 15(2012)	RM0I15R0J	34	R476	RES SMD, 0. 1W, 5%, 27(2012)	RM0I27R0J
35	R477	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J	36	R478	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J
37	R479	RES SMD, 0. 1W, 5%, 22(2012)	RM0I22R0J	38	R480	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J
39	R481	RES SMD, 0. 1W, 1%, 150(2012)	RM0I1500F	40	R482	RES SMD, 0. 1W, 1%, 82(2012)	RM0I82R0F
41	R483	NOT USED	NOT	42	S101	SW ROTARY, ADR255S, E773-1102	522-029-1
43	S102	SW ROTARY, ADR255S, E773-1102	522-029-1	44	S901	SW SLIDE, SSSU023NC CH1COU	521-112
45	S902	SW SLIDE, SSSU023NC CH2COU	521-112	46	VC101	CAP TRIMMER, TZ03N100FR, WHT	581-133-1
47	VC102	CAP TRIMMER, TZ03N100FR, WHT	581-133-1	48	VC103	CAP TRIMMER, TZ03N100FR, WHT	581-133-1
49	VC104	CAP TRIMMER, TZ03N100FR, WHT	581-133-1	50	VC105	CAP TRIMMER, TZ03N100FR, WHT	581-133-1
51	VC106	CAP TRIMMER, TZ03N100FR, WHT	581-133-1	52	VC107	CAP TRIMMER, TZ03N100FR, WHT	581-133-1
53	VC108	CAP TRIMMER, TZ03N100FR, WHT	581-133-1				

(2). CH1 INPUT AMP.

PAGE : 2

NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C101	CAP CER, 500V, C, 1PF(T. C BLACK)	CT2HR010C	2	C102	CAP CER, 500V, K, 1000PF	CK2HR102K
3	C103	CAP ELE, 16V, M, 47UF(SMS)	CE1CR476M	4	C104	CAP ELE, 16V, M, 47UF(SMS)	CE1CR476M
5	C105	CAP ELE, 16V, M, 47UF(SMS)	CE1CR476M	6	C306	CAP SMD, 50V, J, 15PF(2012)	CK1HI150J
7	C307	CAP SMD, 50V, C, 5PF(2012)	CK1HI050C	8	C307A	CAP SMD, 50V, J, 12PF(2012)	CK1HI120J
9	C308	CAP SMD, 50V, K, 1000PF(2012)	CK1HI102K	10	C309	CAP SMD, 50V, J, 100PF(2012)	CK1HI101J
11	C310	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	12	C313	CAP SMD, 50V, J, 100PF(2012)	CK1HI101J
13	D101	DIODE, 1SS133	585-120	14	D102	DIODE, 1SS133	585-120
15	D103	DIODE ZENER, DZ-7.5B	585-075	16	PP101	CONNECTOR HOUSING, CS250-05	531-409
17	Q101	FET, 2SK304-E	611-140	18	Q102	TRANSISTOR, KSC1674-Y	611-130-1
19	Q103	TRANSISTOR, KSC1674-Y	611-130-1	20	Q104	TRANSISTOR, 2SA1029-D	611-133
21	R103	RES M. F, 1/4W, 0.5%, 500K	RMBP5003D	22	R104	RES M. F, 1/4W, 0.5%, 500K	RMBP5003D
23	R109	RES M. F, 1/4W, 0.5%, 60K	RMBP6002D	24	R110	RES M. F, 1/4W, 0.5%, 12K	RMBP1202D
25	R111	RES M. F, 1/4W, 0.5%, 3K	RMBP3001D	26	R112	RES M. G, 1/2W, 5%, 16M	RG0CP166J
27	R113	RES M. F, 1/4W, 0.5%, 680	RMBP6800D	28	R114	RES M. F, 1/4W, 1%, 820	RMBP8200F
29	R115	RES M. F, 1/4W, 0.5%, 68	RMBP68R0D	30	R312	RES SMD, 0.1W, 5%, 22K(2012)	RM0I2202J
31	R313	RES SMD, 0.1W, 1%, 750(2012)	RM0I7500F	32	R314	RES SMD, 0.1W, 1%, 68(2012)	RM0I68R0F
33	R315	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J	34	R316	RES SMD, 0.1W, 5%, 2.2K(2012)	RM0I2201J
35	R317	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	36	R318	RES SMD, 0.1W, 1%, 3.9K(2012)	RM0I3901F
37	R319	RES SMD, 0.1W, 1%, 4.7K(2012)	RM0I4701F	38	R320	RES SMD, 0.1W, 1%, 120(2012)	RM0I1200F
39	R321	RES SMD, 0.1W, 1%, 430(2012)	RM0I4300F	40	R321A	RES SMD, 0.1W, 1%, 4.99K(2012)	RM0I4991F
41	R322	RES SMD, 0.1W, 1%, 430(2012)	RM0I4300F	42	R323	RES SMD, 0.1W, 5%, 1K(2012)	RM0I1001J
43	R324	RES SMD, 0.1W, 1%, 12K(2012)	RM0I1202F	44	R337	RES SMD, 0.1W, 1%, 10K(2012)	RM0I1002F
45	R338	RES SMD, 0.1W, 1%, 3.3K(2012)	RM0I3301F	46	R339	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J
47	R344	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J	48	RA101	RES ARRAY, RA-OSC-V	591-325
49	S801	SW SLIDE, SSSU022NB011 x5	521-111	50	U101	IC OP AMP, LF356J	591-324
51	VR101	RES SR, VG068TL1B-20KB	572-324-1	52	VR102	RES SR, VG068TL1B-200B	572-316-1

(3). CH2 INPUT AMP.

PAGE : 3

E : 2

P / N
2HR102K
CR476M
HI150J
HI120J
HI101J
HI101J
5-120
-409
-130-1
-133
P5003D
P1202D
CP166J
P8200F
I2202J
I68R0F
I2201J
I3901F
I1200F
I4991F
I1001J
I1002F
I10R0J
-325
-324
-316-1

NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C108	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M	2	C109	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M
3	C110	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M	4	C111	CAP CER, 500V, K, 1000PF	CK2HR102K
5	C350	CAP SMD, 50V, K, 1000PF(2012)	CK1HI102K	6	C351	CAP SMD, 50V, D, 7PF(2012)	CK1HI070D
7	C351A	CAP SMD, 50V, C, 5PF(2012)	CK1HI050C	8	C352	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K
9	C353	CAP SMD, 50V, J, 100PF(2012)	CK1HI101J	10	C354	CAP SMD, 50V, J, 22PF(2012)	CK1HI220J
11	D104	DIODE, 1SS133	585-120	12	D105	DIODE ZENER, DZ-7.5B	585-075
13	D106	DIODE, 1SS133	585-120	14	Q105	FET, 2SK304-E	611-140
15	Q106	TRANSISTOR, KSC1674-Y	611-130-1	16	Q107	TRANSISTOR, KSC1674-Y	611-130-1
17	Q108	TRANSISTOR, 2SA1029-D	611-133	18	R116	RES M, G, 1/2W, 5%, 16M	RG0CP166J
19	R121	RES M, F, 1/4W, 0.5%, 500K	RMBP5003D	20	R122	RES M, F, 1/4W, 0.5%, 500K	RMBP5003D
21	R123	RES M, F, 1/4W, 0.5%, 3K	RMBP3001D	22	R124	RES M, F, 1/4W, 1%, 820	RMBP8200F
23	R125	RES M, F, 1/4W, 0.5%, 12K	RMBP1202D	24	R126	RES M, F, 1/4W, 0.5%, 680	RMBP6800D
25	R327	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J	26	R449	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J
27	R459	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J	28	R460	RES SMD, 0.1W, 1%, 3.3K(2012)	RM0I3301F
29	R461	RES SMD, 0.1W, 1%, 10K(2012)	RM0I1002F	30	R462	RES SMD, 0.1W, 5%, 2.2K(2012)	RM0I2201J
31	R463	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	32	R464	RES SMD, 0.1W, 1%, 120(2012)	RM0I1200F
33	R465	RES SMD, 0.1W, 5%, 22K(2012)	RM0I2202J	34	R466	RES SMD, 0.1W, 1%, 4.7K(2012)	RM0I4701F
35	R467	RES SMD, 0.1W, 1%, 12K(2012)	RM0I1202F	36	R468	RES SMD, 0.1W, 1%, 430(2012)	RM0I4300F
37	R468A	RES SMD, 0.1W, 5%, 15K(2012)	RM0I1502J	38	R469	RES SMD, 0.1W, 1%, 3.9K(2012)	RM0I3901F
39	R470	RES SMD, 0.1W, 1%, 430(2012)	RM0I4300F	40	R471	RES SMD, 0.1W, 5%, 1K(2012)	RM0I1001J
41	R472	RES SMD, 0.1W, 1%, 68(2012)	RM0I68R0F	42	R473	RES SMD, 0.1W, 1%, 750(2012)	RM0I7500F
43	RA102	RES ARRAY, RA-OSC-V	591-325	44	U102	IC OP AMP, LF356J	591-324
45	VC109	CAP TRIMMER, TZ03Z070FR, BLU	581-145-1	46	VR109	RES SR, VG068TL1B-20KB	572-324-1
47	VR110	RES SR, VG068TL1B-200B	572-316-1				

(4). CH1 PREAMP. & TRIGGER PICK-OFF

PAGE ; 4

NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C106	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M	2	C107	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M
3	C311	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	4	C312	CAP SMD, 50V, J, 18PF(2012)	CK1HI180J
5	C314	CAP SMD, 50V, J, 82PF(2012)	CK1HI820J	6	C315	CAP SMD, 50V, J, 680PF(2012)	CK1HI681J
7	C316	CAP SMD, 50V, J, 68PF(2012)	CK1HI680J	8	C317	NOT USED	NOT
9	C318	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	10	C320	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K
11	C321	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	12	C322	CAP SMD, 50V, J, 27PF(2012)	CK1HI270J
13	C323	CAP SMD, 50V, J, 27PF(2012)	CK1HI270J	14	C325	NOT USED	NOT
15	D107	DIODE ZENER, DZ-7.5B	585-075	16	P110	CONNECTOR WAFER, LW-0640-03	531-002-1
17	Q303	TRANSISTOR SMD, 2SC3775-0Y3	611-656	18	Q304	TRANSISTOR SMD, 2SC3775-0Y3	611-656
19	Q305	TRANSISTOR SMD, KTC3875-Y	611-670	20	Q306	TRANSISTOR SMD, MMBT3904-1A	611-654
21	Q307	TRANSISTOR SMD, MMBT3904-1A	611-654	22	Q308	TRANSISTOR SMD, MMBT3906-2A	611-653
23	Q309	TRANSISTOR SMD, MMBT3906-2A	611-653	24	R325	RES SMD, 0.1W, 5%, 100(2012)	RM0I1000J
25	R326	RES SMD, 0.1W, 1%, 330(2012)	RM0I3300F	26	R328	RES SMD, 0.1W, 1%, 330(2012)	RM0I3300J
27	R329	RES SMD, 0.1W, 1%, 680(2012)	RM0I6800F	28	R330	RES SMD, 0.1W, 1%, 330(2012)	RM0I3300J
29	R331	RES SMD, 0.1W, 5%, 1.8K(2012)	RM0I1801J	30	R332	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J
31	R333	RES SMD, 0.1W, 1%, 82(2012)	RM0I8200F	32	R334	RES SMD, 0.1W, 5%, 10(2012)	RM0I1000J
33	R335	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	34	R336	RES SMD, 0.1W, 1%, 68(2012)	RM0I6800J
35	R340	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	36	R341	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J
37	R342	RES SMD, 0.1W, 5%, 10K(2012)	RM0I1002J	38	R343	RES SMD, 0.1W, 5%, 100(2012)	RM0I1000J
39	R345	RES SMD, 0.1W, 5%, 22K(2012)	RM0I2202J	40	R346	RES SMD, 0.1W, 5%, 10(2012)	RM0I1000J
41	R347	RES SMD, 0.1W, 5%, 1K(2012)	RM0I1001J	42	R348	RES SMD, 0.1W, 1%, 1.2K(2012)	RM0I1201J
43	R350	RES SMD, 0.1W, 5%, 270K(2012)	RM0I2703J	44	R351	RES SMD, 0.1W, 1%, 330(2012)	RM0I3300J
45	R352	RES SMD, 0.1W, 5%, 100(2012)	RM0I1000J	46	R353	RES SMD, 0.1W, 1%, 68(2012)	RM0I6800J
47	R354	RES SMD, 0.1W, 5%, 47(2012)	RM0I4700J	48	R355	RES SMD, 0.1W, 1%, 2.7K(2012)	RM0I2701J
49	R356	RES SMD, 0.1W, 1%, 82(2012)	RM0I8200F	50	R358	RES SMD, 0.1W, 5%, 47(2012)	RM0I4700J
51	R359	RES SMD, 0.1W, 5%, 1K(2012)	RM0I1001J	52	R360	RES SMD, 0.1W, 1%, 1.2K(2012)	RM0I1201J
53	R361	RES SMD, 0.1W, 1%, 1.5K(2012)	RM0I1501F	54	R362	RES SMD, 0.1W, 5%, 1K(2012)	RM0I1001J
55	R363	NOT USED	NOT	56	VR103	RES SR, VG068TL1B-50KB	572-320-1
57	VR104	RES SR, VG068TL1B-100B	572-327	58	VR802	RES VAR, V012L-PV30KS 10KB VP1	571-325

N	NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
176M	1	C346	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	2	C347	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K
80J	3	C348	CAP SMD, 50V, J, 27PF(2012)	CK1HI270J	4	C349	CAP SMD, 50V, J, 27PF(2012)	CK1HI270J
81J	5	C370	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	6	C371	CAP SMD, 50V, J, 82PF(2012)	CK1HI820J
03K	7	C372	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	8	C373	CAP SMD, 50V, J, 680PF(2012)	CK1HI681J
70J	9	C446A	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	10	P112	CONNECTOR WAFER, LW-0640-04	531-003-7
02-7	11	Q311	TRANSISTOR SMD, MMBT3906-2A	611-653	12	Q312	TRANSISTOR SMD, MMBT3906-2A	611-653
6	13	Q313	TRANSISTOR SMD, MMBT3906-2A	611-653	14	Q314	TRANSISTOR SMD, MMBT3906-2A	611-653
4	15	Q315	TRANSISTOR SMD, MMBT3904-1A	611-654	16	Q316	TRANSISTOR SMD, MMBT3904-1A	611-654
3	17	Q317	TRANSISTOR SMD, 2SC3775-0Y3	611-656	18	Q318	TRANSISTOR SMD, 2SC3775-0Y3	611-656
00J	19	R440	RES SMD, 0.1W, 5%, 47(2012)	RM0I47R0J	20	R441	RES SMD, 0.1W, 5%, 47(2012)	RM0I47R0J
00F	21	R442	RES SMD, 0.1W, 1%, 1.5K(2012)	RM0I1501F	22	R443	RES SMD, 0.1W, 1%, 1K(2012)	RM0I1001F
00F	23	R444	RES SMD, 0.1W, 1%, 1.5K(2012)	RM0I1501F	24	R445	RES SMD, 0.1W, 1%, 1K(2012)	RM0I1001F
01J	25	R446	RES SMD, 0.1W, 5%, 22K(2012)	RM0I2202J	26	R447	RES SMD, 0.1W, 1%, 1.2K(2012)	RM0I1201F
R0J	27	R448	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	28	R450	RES SMD, 0.1W, 5%, 1K(2012)	RM0I1001J
R0F	29	R451	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J	30	R452	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J
01J	31	R453	RES SMD, 0.1W, 1%, 1.2K(2012)	RM0I1201F	32	R454	RES SMD, 0.1W, 5%, 1K(2012)	RM0I1001J
00J	33	R455	RES SMD, 0.1W, 5%, 10K(2012)	RM0I1002J	34	R456	RES SMD, 0.1W, 1%, 68(2012)	RM0I68R0F
01F	35	R457	RES SMD, 0.1W, 5%, 270K(2012)	RM0I2703J	36	R458	RES SMD, 0.1W, 5%, 100(2012)	RM0I1000J
00F	37	R557	RES SMD, 0.1W, 5%, 100(2012)	RM0I1000J	38	R560	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J
R0J	39	R561	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	40	R562	RES SMD, 0.1W, 5%, 82(2012)	RM0I82R0J
01F	41	R563	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	42	R564	RES SMD, 0.1W, 1%, 2.2K(2012)	RM0I2201F
00F	43	R565	RES SMD, 0.1W, 1%, 3.9K(2012)	RM0I3901F	44	R566	RES SMD, 0.1W, 1%, 150(2012)	RM0I1500F
01F	45	R567	RES SMD, 0.1W, 5%, 15K(2012)	RM0I1502J	46	R568	RES SMD, 0.1W, 1%, 330(2012)	RM0I3300F
R0J	47	S803	SW SLIDE, SSSU022NB011 INV	521-111	48	VC110	CAP TRIMMER, TZ03T200FR, PNK	581-144-1
01F	49	VR111	RES SR, VG068TL1B-100B	572-327	50	VR112	RES SR, VG068TL1B-50KB	572-320-1
01J	51	VR113	RES SR, VG068TL1B-10KB	572-314-1	52	VR803	RES VAR, V012L-PV30KS 10KB VP2	571-325

(6). VERTICAL CONTROL

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NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C151	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M	2	C155	CAP ELE, 50V, M, 1UF(BP)	581-117
3	C319	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	4	C324	CAP SMD, 50V, J, 680PF(2012)	CK1HI681
5	C326	CAP SMD, 50V, J, 680PF(2012)	CK1HI681J	6	C327	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103
7	C328	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	8	C329	CAP SMD, 50V, K, 4700PF(2012)	CK1HI472
9	C330	CAP SMD, 50V, J, 220PF(2012)	CK1HI221J	10	C331	CAP SMD, 50V, J, 220PF(2012)	CK1HI221
11	C332	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	12	C344	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103
13	C345	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	14	C369	CAP SMD, 50V, J, 82PF(2012)	CK1HI820
15	C374	CAP SMD, 50V, J, 68PF(2012)	CK1HI680J	16	C375	CAP SMD, 50V, J, 68PF(2012)	CK1HI680
17	C375A	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M	18	D108	DIODE, 1SS133	585-120
19	D109	DIODE, 1SS133	585-120	20	D110	DIODE, 1SS133	585-120
21	D111	DIODE, 1SS133	585-120	22	D112	DIODE, 1SS133	585-120
23	D113	DIODE, 1SS133	585-120	24	D114	DIODE, 1SS133	585-120
25	D115	DIODE, 1SS133	585-120	26	D116	DIODE, 1SS133	585-120
27	D117	DIODE, 1SS133	585-120	28	D118	DIODE, 1SS133	585-120
29	D119	DIODE, 1SS133	585-120	30	D148	DIODE, 1SS133	585-120
31	D149	DIODE, 1SS133	585-120	32	D150	DIODE, 1SS133	585-120
33	D151	DIODE, 1SS133	585-120	34	D153	DIODE ZENER, DZ-8, 2B	585-162
35	D154	DIODE, 1SS133	585-120	36	D200	DIODE, 1SS133	585-120
37	P113	CONNECTOR WAFER, LW-0640-03	531-002-7	38	PP106	CONNECTOR HOUSING, CS250-08	531-401
39	Q109	TRANSISTOR, KSC1730-Y	611-669	40	Q110	TRANSISTOR, KSC1730-Y	611-669
41	Q310	TRANSISTOR SMD, KTC3875-Y	611-670	42	Q319	TRANSISTOR SMD, KTC3875-Y	611-670
43	Q320	TRANSISTOR SMD, KTC3875-Y	611-670	44	Q321	TRANSISTOR SMD, KTA1504-Y	611-672
45	R197	RES M, F, 1/4W, 1%, 1.2K	RMBP1201F	46	R349	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0
47	R357	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	48	R364	RES SMD, 0.1W, 5%, 27(2012)	RM0I27R0
49	R365	RES SMD, 0.1W, 1%, 300(2012)	RM0I3000F	50	R366	RES SMD, 0.1W, 5%, 1.8K(2012)	RM0I1801
51	R367	RES SMD, 0.1W, 5%, 1.8K(2012)	RM0I1801J	52	R368	RES SMD, 0.1W, 5%, 220(2012)	RM0I2200
53	R369	RES SMD, 0.1W, 5%, 220(2012)	RM0I2200J	54	R370	RES SMD, 0.1W, 5%, 27(2012)	RM0I27R0
55	R371	RES SMD, 0.1W, 1%, 300(2012)	RM0I3000F	56	R372	RES SMD, 0.1W, 1%, 2.7K(2012)	RM0I2701
57	R373	RES SMD, 0.1W, 1%, 2.7K(2012)	RM0I2701F	58	R374	RES SMD, 0.1W, 1%, 330(2012)	RM0I3300
59	R375	RES SMD, 0.1W, 1%, 330(2012)	RM0I3300F	60	R376	RES SMD, 0.1W, 1%, 2K(2012)	RM0I2001
61	R377	RES SMD, 0.1W, 1%, 82(2012)	RM0I82R0F	62	R378	RES SMD, 0.1W, 5%, 82K(2012)	RM0I8202
63	R379	RES SMD, 0.1W, 1%, 220K(2012)	RM0I2203F	64	R380	RES SMD, 0.1W, 5%, 82K(2012)	RM0I8202
65	R381	RES SMD, 0.1W, 5%, 100K(2012)	RM0I1003J	66	R382	RES SMD, 0.1W, 1%, 330(2012)	RM0I3300
67	R383	RES SMD, 0.1W, 1%, 330(2012)	RM0I3300F	68	R384	RES SMD, 0.1W, 1%, 2K(2012)	RM0I2001
69	R385	RES SMD, 0.1W, 1%, 82(2012)	RM0I82R0F	70	R388	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701
71	R389	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	72	R390	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701
73	R391	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	74	R436	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701
75	R438	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	76	R439	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701
77	R555	RES SMD, 0.1W, 5%, 47(2012)	RM0I47R0J	78	R556	RES SMD, 0.1W, 1%, 1.2K(2012)	RM0I1201
79	R558	RES SMD, 0.1W, 1%, 1.5K(2012)	RM0I1501F	80	R559	RES SMD, 0.1W, 5%, 1.8K(2012)	RM0I1801
81	R569	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J	82	R570	RES SMD, 0.1W, 5%, 470(2012)	RM0I4700
83	R571	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	84	R572	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701
85	R573	RES SMD, 0.1W, 5%, 470(2012)	RM0I4700J	86	S802	SW SLIDE, SSSU024NB VMODE	521-113
87	S903	SW SLIDE, SSSU023NC TRGMD	521-112	88	U103	IC TTL, GD74LS74AP GSS	591-163
89	U104	IC TTL, GD74LS00	591-001-9				

(7). VERTICAL MAIN AMP.

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P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
-117	1	C154	CAP CER, 500V, C, 1PF(T. C BLACK)	CT2HR010C	2	C156	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M
HI681J	3	C157	CAP CER, 500V, C, 1PF(T. C BLACK)	CT2HR010C	4	C158	CAP CER, 500V, K, 1000PF	CK2HR102K
HI103K	5	C159	CAP CER, 500V, K, 4700PF	CK2HL472K	6	C160	CAP CER, 500V, K, 1000PF	CK2HR102K
HI472K	7	C161	CAP CER, 500V, K, 0.01UF	CK2HL103K	8	C333	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K
HI221J	9	C334	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	10	C335	CAP SMD, 50V, J, 68PF(2012)	CK1HI680J
HI103K	11	C336	CAP SMD, 50V, J, 18PF(2012)	CK1HI180J	12	C337	NOT USED	NOT
HI820J	13	C338	CAP SMD, 50V, J, 270PF(2012)	CK1HI271J	14	C339	CAP SMD, 50V, J, 180PF(2012)	CK1HI181J
HI680J	15	C340	CAP SMD, 50V, J, 47PF(2012)	CK1HI470J	16	C522	CAP CER, 500V, K, 0.01UF	CK2HL103K
-120	17	D120	DIODE ZENER, DZ-5.1B	585-111	18	D121	DIODE ZENER, DZ-5.1B	585-111
-120	19	D122	DIODE ZENER, DZ-5.1B	585-111	20	L101	INDUCTOR, 2.2UH/LAL04NA2R2M	628-179
-120	21	L102	INDUCTOR, 2.2UH/LAL04NA2R2M	628-179	22	Q111	TRANSISTOR, 2SC2901	611-151
-120	23	Q112	TRANSISTOR, 2SC2901	611-151	24	Q113	TRANSISTOR, 2SC3779	611-650
-120	25	Q114	TRANSISTOR, 2SC3779	611-650	26	Q115	TRANSISTOR, KSA1381-E	611-169-9
-120	27	Q116	TRANSISTOR, KSC3503-E	611-159-9	28	Q117	TRANSISTOR, 2SA1206	611-021
-120	29	Q118	TRANSISTOR, 2SA1206	611-021	30	Q119	TRANSISTOR, KSA1381-E	611-169-9
-120	31	Q120	TRANSISTOR, KSC3503-E	611-159-9	32	R185	RES M. F, 1/4W, 1%, 115	RMBP1150F
-162	33	R186	RES M. F, 1/4W, 1%, 115	RMBP1150F	34	R187	RES M. O, 2W, 5%, 12K	RS02P123J
-120	35	R188	RES M. O, 2W, 5%, 10K	RS02P103J	36	R189	RES C. F, 1/4W, 5%, 100	RD0BP101J
-401	37	R190	RES M. O, 1W, 5%, 27K	RS01P273J	38	R192	RES C. F, 1/4W, 5%, 910	RD0BP911J
-669	39	R193	RES M. O, 2W, 5%, 12K	RS02P123J	40	R194	RES M. O, 2W, 5%, 10K	RS02P103J
-670	41	R195	RES C. F, 1/4W, 5%, 47	RD0BP470J	42	R196	RES C. F, 1/4W, 5%, 910	RD0BP911J
-672	43	R386	RES SMD, 0.1W, 5%, 4.7K(2012)	RM014701J	44	R387	RES SMD, 0.1W, 1%, 150(2012)	RM011500F
10R0J	45	R392	RES SMD, 0.1W, 1%, 150(2012)	RM011500F	46	R393	RES SMD, 0.1W, 5%, 0 (2012)	RM010000J
27R0J	47	R394	NOT USED	NOT	48	R395	RES SMD, 0.1W, 1%, 1.37K(2012)	RM011371F
1801J	49	R396	RES SMD, 0.1W, 5%, 10(2012)	RM0110R0J	50	R397	RES SMD, 0.1W, 5%, 10(2012)	RM0110R0J
2200J	51	R397A	RES SMD, 0.1W, 5%, 27(2012)	RM0127R0J	52	R398	RES SMD, 0.1W, 1%, 270(2012)	RM012700F
27R0J	53	R399	RES SMD, 0.1W, 5%, 470(2012)	RM014700J	54	R400	RES SMD, 0.1W, 5%, 100(2012)	RM011000J
2701F	55	R401	RES SMD, 0.1W, 5%, 100(2012)	RM011000J	56	R402	RES SMD, 0.1W, 5%, 47(2012)	RM0147R0J
3300F	57	R403	RES SMD, 0.1W, 1%, 180(2012)	RM011800F	58	R404	RES SMD, 0.1W, 5%, 47(2012)	RM0147R0J
2001F	59	R405	RES SMD, 0.1W, 5%, 1K(2012)	RM011001J	60	R406	RES SMD, 0.1W, 5%, 1K(2012)	RM011001J
8202J	61	R407	RES SMD, 0.1W, 5%, 100(2012)	RM011000J	62	R408	RES SMD, 0.1W, 5%, 100(2012)	RM011000J
8202J	63	R409	RES SMD, 0.1W, 5%, 47(2012)	RM0147R0J	64	R410	RES SMD, 0.1W, 5%, 470(2012)	RM014700J
3300F	65	R411	RES SMD, 0.1W, 1%, 270(2012)	RM012700F	66	R412	RES SMD, 0.1W, 5%, 47(2012)	RM0147R0J
2001F	67	R413	RES SMD, 0.1W, 1%, 180(2012)	RM011800F	68	TH101	THERMISTOR, NTC-4.7-OHM	579-015
4701J	69	VC111	CAP TRIMMER, TZ03P450FR, YEL	581-132-1	70	VC112	CAP TRIMMER, TZ03P450FR, YEL	581-132-1
4701J	71	VR118	RES SR, VG068TL1B-500B	572-319-1				

(8). TRIGGER AMPLIFIER

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NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C112	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	2	C113	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
3	C114	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	4	C115	CAP M, F, 400V, K, Ø. 047UF	CH2GL473
5	C116	CAP ELE, 50V, M, 1UF(BP)	581-117	6	C117	CAP ELE, 50V, M, 10UF(BP)	581-143
7	C118	CAP CER, 500V, J, 47PF	CK2HR470J	8	C119	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
9	C120	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	10	C359	CAP SMD, 50V, C, 5PF(2012)	CK1HI050
11	C362	CAP SMD, 50V, K, Ø. 01UF(2012)	CK1HI103K	12	C801	CAP MYLAR, 50V, K, Ø. 01UF	CP1HR103
13	D168	DIODE, 1SS133	585-120	14	D169	DIODE, 1SS133	585-120
15	P103	CONNECTOR WAFER, LW-0640-02	531-001-7	16	PP102	CONNECTOR HOUSING, CS250-06	531-410
17	Q130	FET, 2SK304-E	611-140	18	Q345	TRANSISTOR SMD, 2SC3775-0Y3	611-656
19	Q346	TRANSISTOR SMD, 2SC3775-0Y3	611-656	20	Q347	TRANSISTOR SMD, KTA1504-Y	611-672
21	R127	RES C. F, 1/4W, 5%, 470K	RD0BP474J	22	R128	RES C. F, 1/4W, 5%, 470K	RD0BP474
23	R484	RES SMD, Ø. 1W, 5%, 220(2012)	RM0I2200J	24	R485	RES SMD, Ø. 1W, 5%, 22(2012)	RM0I2200
25	R486	RES SMD, Ø. 1W, 1%, 2.7K(2012)	RM0I2701F	26	R487	RES SMD, Ø. 1W, 5%, 22(2012)	RM0I2200
27	R488	RES SMD, Ø. 1W, 1%, 47K(2012)	RM0I4702F	28	R489	RES SMD, Ø. 1W, 5%, 1K(2012)	RM0I1001
29	R490	RES SMD, Ø. 1W, 5%, 5.6K(2012)	RM0I5601J	30	R491	RES SMD, Ø. 1W, 1%, 1.2K(2012)	RM0I1201
31	R492	RES SMD, Ø. 1W, 5%, 4.7K(2012)	RM0I4701J	32	R494	RES SMD, Ø. 1W, 5%, 4.7K(2012)	RM0I4701
33	R495	RES SMD, Ø. 1W, 5%, 15K(2012)	RM0I1502J	34	R496	RES SMD, Ø. 1W, 5%, 10K(2012)	RM0I1002
35	R497	RES SMD, Ø. 1W, 5%, 1K(2012)	RM0I1001J	36	R499	RES SMD, Ø. 1W, 5%, 24K(2012)	RM0I2400
37	R515	RES SMD, Ø. 1W, 5%, 470(2012)	RM0I4700J	38	R516	RES SMD, Ø. 1W, 5%, 22(2012)	RM0I2200
39	R519	RES SMD, Ø. 1W, 5%, 10(2012)	RM0I1000J	40	R521	RES SMD, Ø. 1W, 5%, 0(2012)	RM0I0000
41	S103	SW SLIDE, SSSU123NC TRGSOU	521-114	42	S804	SW SLIDE, SSSU024NB TRGMOD	521-113
43	VR105	RES SR, VG068TL1B-10KB	572-314-1	44	VR804	RES VAR, V012L-PV30KS 10KB TRGL	571-325

(9). SWEEP GENERATOR

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/ N	NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
EL226M	1	C128	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	2	C129	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
GL473K	3	C130	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	4	C131	CAP ELE, 50V, M, 2. 2UF(SMS)	CE1HL225M
-143	5	C132	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	6	C133	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
EL226M	7	C134	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	8	C360	NOT USED	NOT
HI050C	9	C363	CAP SMD, 50V, J, 82PF(2012)	CK1HI820J	10	C364	NOT USED	NOT
HR103K	11	C366	CAP SMD, 50V, J, 15PF(2012)	CK1HI150J	12	C367	CAP SMD, 50V, K, 0. 01UF(2012)	CK1HI103K
-120	13	D157	DIODE, 1SS133	585-120	14	D158	DIODE, 1SS133	585-120
-410	15	D159	DIODE, 1SS133	585-120	16	D164	DIODE, 1SS133	585-120
-656	17	D165	DIODE, 1SS133	585-120	18	D166	NOT USED	NOT
-672	19	D167	DIODE, 1SS133	585-120	20	Q129	FET, 2SK304-E	611-140
BP474J	21	Q339	TRANSISTOR SMD, KTC3875-Y	611-670	22	Q341	TRANSISTOR SMD, MMBT3904-1A	611-654
I22R0J	23	Q342	TRANSISTOR SMD, KTC3875-Y	611-670	24	Q343	TRANSISTOR SMD, MMBT3906-2A	611-653
I22R0J	25	Q344	TRANSISTOR SMD, KTC3875-Y	611-670	26	R136	RES C, F, 1/2W, 5%, 68K	RD0CP683J
I1001J	27	R493	NOT USED	NOT	28	R498	RES SMD, 0. 1W, 5%, 100(2012)	RM0I1000J
I1201F	29	R500	RES SMD, 0. 1W, 5%, 100(2012)	RM0I1000J	30	R501	RES SMD, 0. 1W, 1%, 3. 3K(2012)	RM0I3301F
I4701J	31	R502	RES SMD, 0. 1W, 5%, 100K(2012)	RM0I1003J	32	R503	RES SMD, 0. 1W, 5%, 4. 7K(2012)	RM0I4701J
I1002J	33	R504	RES SMD, 0. 1W, 1%, 12K(2012)	RM0I1202F	34	R505	RES SMD, 0. 1W, 1%, 82(2012)	RM0I82R0F
I2402J	35	R506	RES SMD, 0. 1W, 5%, 100(2012)	RM0I1000J	36	R507	RES SMD, 0. 1W, 5%, 82K(2012)	RM0I8202J
I22R0J	37	R508	RES SMD, 0. 1W, 5%, 100(2012)	RM0I1000J	38	R509	RES SMD, 0. 1W, 5%, 4. 7K(2012)	RM0I4701J
I0000J	39	R510	RES SMD, 0. 1W, 5%, 15K(2012)	RM0I1502J	40	R511	RES SMD, 0. 1W, 1%, 3. 3K(2012)	RM0I3301F
-113	41	R512	RES SMD, 0. 1W, 1%, 3. 3K(2012)	RM0I3301F	42	R513	RES SMD, 0. 1W, 5%, 47(2012)	RM0I47R0J
-325	43	R514	RES SMD, 0. 1W, 5%, 56K(2012)	RM0I5602J	44	R517	RES SMD, 0. 1W, 5%, 4. 7K(2012)	RM0I4701J
	45	R518	RES SMD, 0. 1W, 5%, 4. 7K(2012)	RM0I4701J	46	R520	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J
	47	R522	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J	48	R523	RES SMD, 0. 1W, 5%, 100(2012)	RM0I1000J
	49	R524	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J	50	R525	RES SMD, 0. 1W, 5%, 2. 2K(2012)	RM0I2201J
	51	R525A	NOT USED	NOT	52	R526	RES SMD, 0. 1W, 1%, 3. 3K(2012)	RM0I3301F
	53	R532	RES SMD, 0. 1W, 5%, 10K(2012)	RM0I1002J	54	R533	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J
	55	R534	RES SMD, 0. 1W, 5%, 10K(2012)	RM0I1002J	56	R548	RES SMD, 0. 1W, 1%, 4. 7K(2012)	RM0I4701F
	57	R549	RES SMD, 0. 1W, 5%, 470(2012)	RM0I4700J	58	R550	RES SMD, 0. 1W, 1%, 1K(2012)	RM0I1001F
	59	R551	RES SMD, 0. 1W, 1%, 10K(2012)	RM0I1002F	60	R552	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J
	61	R553	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J	62	R554	RES SMD, 0. 1W, 5%, 4. 7K(2012)	RM0I4701J
	63	S104	SW PUSH, SPPJ3-E SLOPE	521-104	64	U109	IC TTL, GD74LS00	591-001-9
	65	U110	IC TTL, GD74LS10	591-045-9	66	U111	IC TTL, HD74LS122P	591-212
	67	U112	IC TTL, GD74LS74AP GSS	591-163-9	68	U113	IC TTL, GD74LS14	591-075-9
	69	VC113	CAP TRIMMER, TZ03P450FR, YEL	581-132-1	70	VR107	RES SR, VG068TL1B-1KB	572-315-1
	71	VR108	RES SR, VG068TL1B-1KB	572-315-1				

(10). TIMING CIRCUITS

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NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C121	CAP M. F, 250V, G, 1UF	CH2EL105G	2	C122	CAP CER, 500V, K, 1000PF	CK2HR102K
3	C123	CAP M. F, 400V, G, 0.01UF	CH2GL103G	4	C124	CAP M. F, 400V, K, 0.047UF	CH2GL473K
5	C125	CAP ELE, 50V, M, 2, 2UF(SMS)	CE1HL225M	6	C126	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
7	C361	CAP SMD, 50V, J, 470PF(2012)	CK1HI471J	8	C365	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K
9	D152	DIODE, 1SS133	585-120	10	Q340	TRANSISTOR SMD, KTA1504-Y	611-672
11	R129	RES M. F, 1/4W, 0.5%, 32.5K	RMBP3252D	12	R130	RES M. F, 1/4W, 0.5%, 82.5K	RMBP8252D
13	R131	RES M. F, 1/4W, 0.5%, 1.65M	RMBP1654D	14	R132	RES M. F, 1/4W, 0.5%, 825K	RMBP8253D
15	R133	RES M. F, 1/4W, 0.5%, 165K	RMBP1653D	16	R134	RES M. F, 1/4W, 0.5%, 1.65M	RMBP1654D
17	R135	RES M. F, 1/4W, 0.5%, 165K	RMBP1653D	18	R527	RES SMD, 0.1W, 1%, 3.3K(2012)	RM0I3301F
19	R528	RES SMD, 0.1W, 5%, 10K(2012)	RM0I1002J	20	R529	RES SMD, 0.1W, 5%, 1K(2012)	RM0I1001J
21	R530	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J	22	R531	RES SMD, 0.1W, 1%, 1.5K(2012)	RM0I1501F
23	R801	RES C. F, 1/4W, 5%, 680	RD0BP681J	24	R802	RES C. F, 1/4W, 5%, 680	RD0BP681J
25	R803	RES C. F, 1/4W, 5%, 2.7K	RD0BP272J	26	R804	RES C. F, 1/4W, 5%, 560	RD0BP561J
27	R805	RES C. F, 1/4W, 5%, 2.7K	RD0BP272J	28	S105	SW ROTARY, BTR30220 BELTON	522-027-9
29	S806	SW SLIDE, SSSU022NB011 HVAR	521-111	30	VR106	RES SR, VG068TL1B-50KB	572-320-1
31	VR806	RES VAR, V012L-PV30KS 10KB HVAR	571-325				

(11). CHOP PULSE GENERATOR

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NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C127	CAP MYLAR, 100V, J, 0.1UF	CP1HL104J	2	C136	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
3	C137	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	4	C378	CAP SMD, 50V, J, 390PF(2012)	CK1HI391J
5	C378A	CAP SMD, 50V, J, 100PF(2012)	CK1HI101J	6	D162	DIODE, 1SS133	585-120
7	D163	DIODE, 1SS133	585-120	8	P104	CONNECTOR WAFER, LW-0640-03	531-002-7
9	Q336	TRANSISTOR SMD, KTA1504-Y	611-672	10	Q337	TRANSISTOR SMD, KTC3875-Y	611-670
11	Q338	TRANSISTOR SMD, KTC3875-Y	611-670	12	R437	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J
13	R535	RES SMD, 0.1W, 1%, 6.8K(2012)	RM0I6801F	14	R536	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J
15	R537	RES SMD, 0.1W, 5%, 10K(2012)	RM0I1002J	16	R538	RES SMD, 0.1W, 1%, 270(2012)	RM0I2700F
17	R538A	RES SMD, 0.1W, 1%, 432(2012)	RM0I4320F	18	R539	RES SMD, 0.1W, 1%, 1.5K(2012)	RM0I1501F
19	R540	RES SMD, 0.1W, 5%, 2.2K(2012)	RM0I2201J	20	R541	RES SMD, 0.1W, 5%, 2.2K(2012)	RM0I2201J
21	R541A	RES SMD, 0.1W, 5%, 2.2K(2012)	RM0I2201J	22	R542	RES SMD, 0.1W, 5%, 5.6K(2012)	RM0I5601J
23	R543	RES SMD, 0.1W, 5%, 2.2K(2012)	RM0I2201J	24	R544	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J
25	R545	RES SMD, 0.1W, 5%, 10K(2012)	RM0I1002J	26	R546	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J
27	R547	RES SMD, 0.1W, 1%, 6.8K(2012)	RM0I6801F	28	R586	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J
29	U114	IC TTL, GD74LS02	591-054-9				

(12). HORIZONTAL MAIN AMPLIFIER

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NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C135	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	2	C135A	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
3	C143	CAP CER, 500V, C, 1PF(T. C BLACK)	CT2HR010C	4	C144	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
5	C145	CAP M. F, 400V, K, Ø. 047UF	CH2GL473K	6	C146	CAP M. F, 400V, K, Ø. 047UF	CH2GL473K
7	C147	CAP M. F, 400V, K, Ø. 047UF	CH2GL473K	8	C148	CAP M. F, 400V, K, Ø. 047UF	CH2GL473K
9	C149	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	10	C150	CAP CER, 500V, C, 1PF(T. C BLACK)	CT2HR010C
11	C368	CAP SMD, 50V, K, Ø. 01UF(2012)	CK1HI103K	12	C376	CAP SMD, 50V, J, 100PF(2012)	CK1HI101J
13	C377	CAP SMD, 50V, J, 68PF(2012)	CK1HI680J	14	D155	DIODE, 1SS133	585-120
15	D156	DIODE ZENER, DZ-6. 8B	585-161	16	D156A	DIODE, 1SS133	585-120
17	D156B	DIODE, 1SS133	585-120	18	P109	CONNECTOR WAFER, LW-0640-04	531-003-7
19	PP103	CONNECTOR HOUSING, CS250-06	531-410	20	Q125	TRANSISTOR, KSC3503-E	611-159-9
21	Q126	TRANSISTOR, KSC3503-E	611-159-9	22	Q127	TRANSISTOR, KSA1381-E	611-169-9
23	Q128	TRANSISTOR, KSA1381-E	611-169-9	24	Q322	TRANSISTOR SMD, MMBT3906-2A	611-653
25	Q323	TRANSISTOR SMD, MMBT3906-2A	611-653	26	Q324	TRANSISTOR SMD, KTC3875-Y	611-670
27	Q325	TRANSISTOR SMD, KTC3875-Y	611-670	28	Q326	TRANSISTOR SMD, KTC3875-Y	611-670
29	Q327	TRANSISTOR SMD, KTC3875-Y	611-670	30	Q328	TRANSISTOR SMD, MMBT3906-2A	611-653
31	Q329	TRANSISTOR SMD, MMBT3906-2A	611-653	32	Q330	TRANSISTOR SMD, KTC3875-Y	611-670
33	Q331	TRANSISTOR SMD, KTC3875-Y	611-670	34	R138	RES M. F, 1/4W, 1%, 16K	RMBP1602F
35	R142	RES M. F, 1/4W, 1%, 16K	RMBP1602F	36	R144	RES M. F, 1/4W, 1%, 16K	RMBP1602F
37	R145	RES M. F, 1/4W, 1%, 16K	RMBP1602F	38	R148	RES M. F, 1/2W, 1%, 82K	RMCP8202F
39	R149	RES M. F, 1/2W, 1%, 120K	RMCP1203F	40	R150	RES M. F, 1/2W, 1%, 120K	RMCP1203F
41	R152	RES C. F, 1/2W, 5%, 56K	RD0CP563J	42	R153	RES C. F, 1/2W, 5%, 56K	RD0CP563J
43	R154	RES M. F, 1/4W, 1%, 5. 6K	RMBP5601F	44	R155	RES M. F, 1/4W, 1%, 1. 5K	RMBP1501F
45	R156	RES M. F, 1/4W, 1%, 5. 6K	RMBP5601F	46	R157	RES M. F, 1/4W, 1%, 1. 5K	RMBP1501F
47	R158	RES M. F, 1/2W, 1%, 82K	RMCP8202F	48	R433	RES SMD, Ø. 1W, 5%, 10(2012)	RM0I10R0J
49	R434	RES SMD, Ø. 1W, 5%, 100(2012)	RM0I1000J	50	R435	RES SMD, Ø. 1W, 5%, 100(2012)	RM0I1000J
51	R574	RES SMD, Ø. 1W, 1%, 4. 32K(2012)	RM0I4321F	52	R575	RES SMD, Ø. 1W, 1%, 4. 7K(2012)	RM0I4701F
53	R576	RES SMD, Ø. 1W, 1%, 4. 7K(2012)	RM0I4701F	54	R577	RES SMD, Ø. 1W, 1%, 120(2012)	RM0I1200F
55	R577A	RES SMD, Ø. 1W, 1%, 430(2012)	RM0I4300F	56	R578	RES SMD, Ø. 1W, 1%, 4. 7K(2012)	RM0I4701F
57	R579	RES SMD, Ø. 1W, 5%, 2. 2K(2012)	RM0I2201J	58	R580	RES SMD, Ø. 1W, 1%, 4. 7K(2012)	RM0I4701F
59	R581	RES SMD, Ø. 1W, 1%, 6. 8K(2012)	RM0I6801F	60	R582	RES SMD, Ø. 1W, 5%, 24K(2012)	RM0I2402J
61	R582A	RES SMD, Ø. 1W, 1%, 18K(2012)	RM0I1802F	62	R583	RES SMD, Ø. 1W, 5%, 5. 6K(2012)	RM0I5601J
63	R583A	RES SMD, Ø. 1W, 1%, 180(2012)	RM0I1800F	64	R583B	RES SMD, Ø. 1W, 1%, 180(2012)	RM0I1800F
65	R583C	RES SMD, Ø. 1W, 1%, 180(2012)	RM0I1800F	66	R583D	RES SMD, Ø. 1W, 1%, 180(2012)	RM0I1800F
67	R583E	RES SMD, Ø. 1W, 1%, 12K(2012)	RM0I1202F	68	R584	RES SMD, Ø. 1W, 1%, 6. 8K(2012)	RM0I6801F
69	R585A	RES SMD, Ø. 1W, 1%, 750(2012)	RM0I7500F	70	R587	RES SMD, Ø. 1W, 1%, 2K(2012)	RM0I2001F
71	R587A	RES SMD, Ø. 1W, 1%, 430(2012)	RM0I4300F	72	R587B	RES SMD, Ø. 1W, 1%, 470(2012)	RM0I4700F
73	R587C	RES SMD, Ø. 1W, 1%, 470(2012)	RM0I4700F	74	R588	RES SMD, Ø. 1W, 5%, 10(2012)	RM0I10R0J
75	R589	RES SMD, Ø. 1W, 1%, 2. 2K(2012)	RM0I2201F	76	R590	RES SMD, Ø. 1W, 1%, 2. 2K(2012)	RM0I2201F
77	R591	RES SMD, Ø. 1W, 1%, 4. 32K(2012)	RM0I4321F	78	S805	SW SLIDE, SSSU022NB011 x10	521-111
79	VR114	RES SR, VG068TL1B-2KB	572-318-1	80	VR115	RES SR, VG068TL1B-200B	572-316-1
81	VR116	RES SR, VG068TL1B-1KB	572-315-1	82	VR805	RES VAR, V012L-PV30KS 10KB HPOS	571-325

NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1		SHOULDER BUSHING	919-003	2		INSULATOR SILICON APEX-AR	919-016
3	C138	CAP CER, 500V, C, 1PF(T. C BLACK)	CT2HR010C	4	C139	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
5	C140	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	6	C141	CAP M. F, 400V, K, Ø. 047UF	CH2GL473K
7	C142	CAP MYLAR, 400V, K, Ø. 022UF	CP2GR223K	8	C152	CAP ELE, 160V, M, 1UF(SMS)	CE2CL105M
9	C153	CAP CER, 500V, Z, Ø. 01UF	CK2HR103Z	10	C173	CAP ELE, 160V, M, 1UF(SMS)	CE2CL105M
11	C175	CAP ELE, 35V, M, 100UF(SMS)	CE1VL107M	12	C176	CAP CER, 2KV, K, 1000PF, B	CK2FL102K
13	C177	CAP CER, 2KV, K, 1000PF, B	CK2FL102K	14	C178	CAP CER, 2KV, Z, Ø. 01UF, E	CK2FL103Z
15	C179	CAP CER, 2KV, Z, Ø. 01UF, E	CK2FL103Z	16	C179A	CAP CER, 2KV, Z, Ø. 01UF, E	CK2FL103Z
17	C180	CAP CER, 2KV, Z, Ø. 01UF, E	CK2FL103Z	18	C181	CAP CER, 500V, K, 1000PF	CK2HR102K
19	C182	CAP CER, 2KV, K, 1000PF, B	CK2FL102K	20	C183	CAP ELE, 35V, M, 33UF(SMS)	CE1VL336M
21	C184	CAP MYLAR, 100V, J, Ø. 22UF	CP2AR224J	22	C301	CAP SMD, 50V, K, Ø. 01UF(2012)	CK1HI103K
23	C343	CAP SMD, 50V, K, 4700PF(2012)	CK1HI472K	24	D135	DIODE, RL105	585-154-1
25	D136	DIODE, RL105	585-154-1	26	D137	DIODE, RL105	585-154-1
27	D138	DIODE, RL105	585-154-1	28	D139	DIODE, MA185	585-259
29	D140	DIODE, MA185	585-259	30	D141	DIODE, 1SS133	585-120
31	D142	DIODE, 1SS133	585-120	32	D143	DIODE, ESJA52-12	585-149
33	D144	DIODE, ESJA52-12	585-149	34	D145	DIODE, AG01A	585-265
35	D146	DIODE, AG01A	585-265	36	D147	DIODE ZENER, DZ-22B	585-118-1
37	D160	DIODE, 1SS133	585-120	38	D161	DIODE, 1SS133	585-120
39	F101	FUSE, 125V Ø. 5A, 5MM WITH LEAD	563-032	40	K-20M	BUS WIRE, 10MM, PI-Ø. 6	871-056
41	LD101	LED POWER, KLG114E GRN KEC	588-027	42	NL101	NEON LAMP, NE-98	561-022
43	NL102	NEON LAMP, NE-98	561-022	44	P105	CONNECTOR WAFER, LW-0640-03	531-002-7
45	P106	CONNECTOR WAFER, LW-0640-06	531-005-7	46	P107	CONNECTOR WAFER, LW-0640-03	531-002-7
47	P111	CONNECTOR WAFER, LW-0640-02	531-001-7	48	Q122	TRANSISTOR, KSD362-R	611-668
49	Q123	TRANSISTOR, KSC3503-E	611-159-9	50	Q124	TRANSISTOR, KSA1381-E	611-169-9
51	Q301	TRANSISTOR SMD, KTC3875-Y	611-670	52	Q302	TRANSISTOR SMD, KTA1504-Y	611-672
53	Q332	TRANSISTOR SMD, KTC3875-Y	611-670	54	Q333	TRANSISTOR SMD, KTC3875-Y	611-670
55	Q334	TRANSISTOR SMD, KTA1504-Y	611-672	56	Q335	TRANSISTOR SMD, KTC3875-Y	611-670
57	R101	RES M. F, 1/4W, 1%, 1. 5K	RMBP1501F	58	R102	RES C. F, 1/4W, 5%, 220	RD0BP221J
59	R151	RES C. F, 1/4W, 5%, 56K	RD0BP563J	60	R159	RES M. F, 1/4W, 1%, 1. 5K	RMBP1501F
61	R160	RES C. F, 1/4W, 5%, 10K	RD0BP103J	62	R161	RES C. F, 1/4W, 5%, 220K	RD0BP224J
63	R162	RES C. F, 1/2W, 5%, 47K	RD0CP473J	64	R163	RES C. F, 1/2W, 5%, 47K	RD0CP473J
65	R164	RES C. F, 1/4W, 5%, 220	RD0BP221J	66	R165	RES C. F, 1/4W, 5%, 470K	RD0BP474J
67	R166	RES C. F, 1/4W, 5%, 47	RD0BP470J	68	R167	RES C. F, 1/4W, 5%, 47	RD0BP470J
69	R168	RES M. G, 1/2W, 5%, 16M	RG0CP166J	70	R169	RES C. F, 1/4W, 5%, 2. 2	RD0BP2R2J
71	R170	RES C. F, 1/4W, 5%, 100K	RD0BP104J	72	R171	RES C. F, 1/4W, 5%, 10K	RD0BP103J
73	R172	RES M. G, 1W, 1%, 8M	RG1P8004F	74	R173	RES M. F, 1/4W, Ø. 5%, 750K	RMBP7503D
75	R198	RES C. F, 1/4W, 5%, 100K	RD0BP104J	76	R301	RES SMD, Ø. 1W, 1%, 1. 2K(2012)	RM0I1201F
77	R421A	RES SMD, Ø. 1W, 5%, 82K(2012)	RM0I8202J	78	R422	RES SMD, Ø. 1W, 1%, 430(2012)	RM0I4300F
79	R423	RES SMD, Ø. 1W, 1%, 1. 2K(2012)	RM0I1201F	80	R424	RES SMD, Ø. 1W, 1%, 680(2012)	RM0I6800F
81	R425	RES SMD, Ø. 1W, 1%, 220K(2012)	RM0I2203F	82	R426	RES SMD, Ø. 1W, 1%, 12K(2012)	RM0I1202F
83	R427	RES SMD, Ø. 1W, 1%, 1. 5K(2012)	RM0I1501F	84	R428	RES SMD, Ø. 1W, 5%, 470(2012)	RM0I4700J
85	R429	RES SMD, Ø. 1W, 1%, 2. 7K(2012)	RM0I2701F	86	R430	RES SMD, Ø. 1W, 5%, 100K(2012)	RM0I1003J
87	R431	RES SMD, Ø. 1W, 5%, 10(2012)	RM0I10R0J	88	R432	RES SMD, Ø. 1W, 5%, 10(2012)	RM0I10R0J
89	R592	RES SMD, Ø. 1W, 5%, 24K(2012)	RM0I2402J	90	R593	RES SMD, Ø. 1W, 1%, 3. 9K(2012)	RM0I3901F

(13). Z-AXIS & H. V DRIVE

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NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
91	R594	RES SMD, 0. 1W, 5%, 470(2012)	RM0I4700J	92	R595	RES SMD, 0. 1W, 5%, 1K(2012)	RM0I1001J
93	R596	RES SMD, 0. 1W, 5%, 82K(2012)	RM0I8202J	94	R597	RES SMD, 0. 1W, 1%, 3. 01K(2012)	RM0I3011F
95	R598	RES SMD, 0. 1W, 5%, 22K(2012)	RM0I2202J	96	T101	TRANSFORMER, HVT-3D(4011)	622-017-8
97	VR117	RES SR, VG068TL1B-200KB	572-317-1	98	VR119	RES SR, VG068TL1B-200KB	572-317-1
99	VR801	RES VAR, V012L-PV30KB 10KB INTE	571-325	100	VR807	RES VAR, V0161PV25KSB2M-OHM FCS	571-324
101	VR901	RES SR, VG068TL1B-10KB	572-314-1				

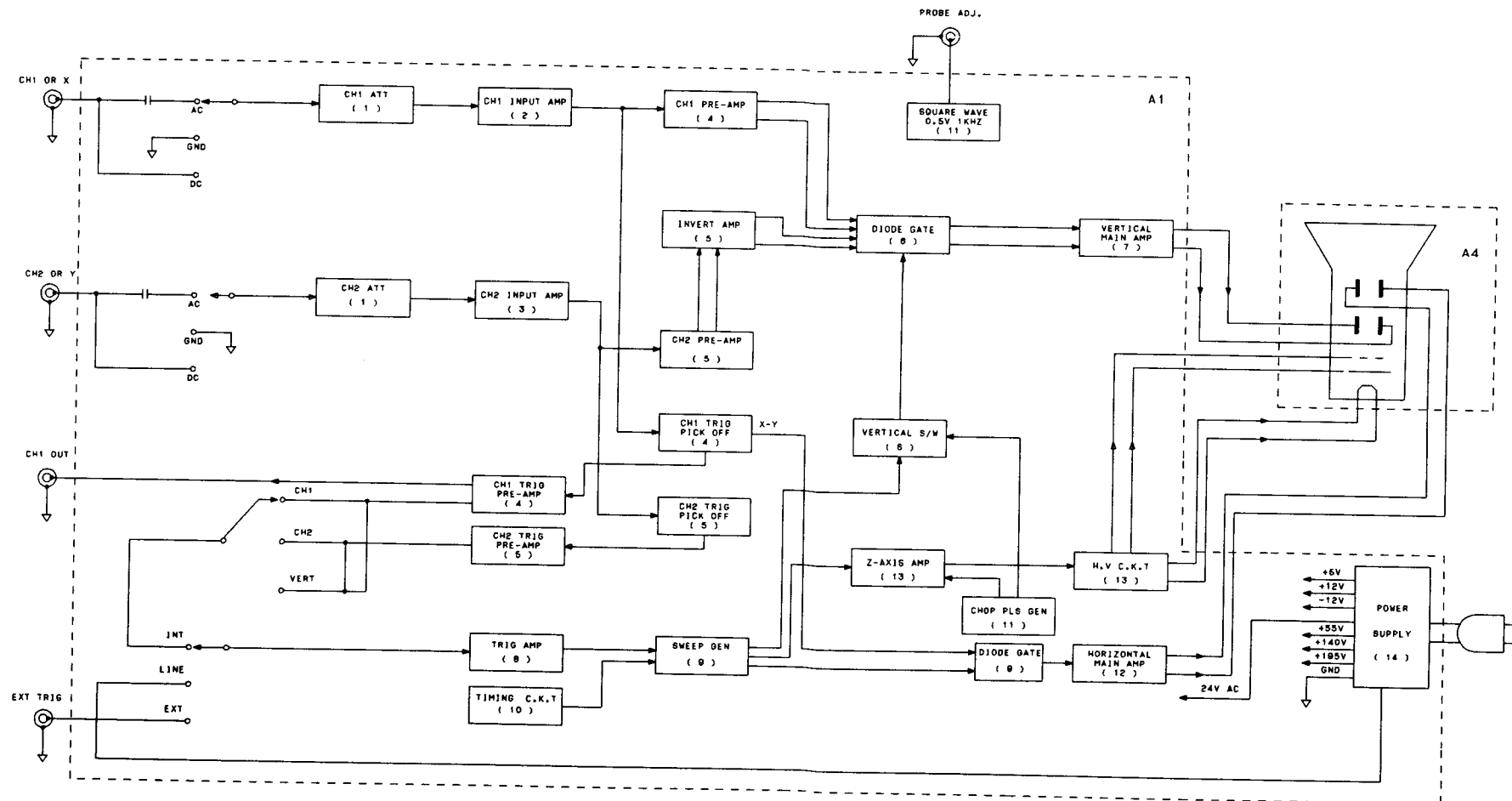
NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1		SHOULDER BUSHING	919-003	2		INSULATOR SILICON APEX-AR	919-016
3	C162	CAP ELE, 160V, M, 10UF(SMS)	CE2CL106M	4	C163	CAP ELE, 100V, M, 33UF(SMS)	CE2AL336M
5	C164	CAP ELE, 250V, M, 47UF(SMS)	CE2EL476M	6	C165	CAP ELE, 250V, M, 10UF(SMS)	CE2EL106M
7	C166	CAP ELE, 100V, M, 47UF(SMS)	CE2AL476M	8	C167	CAP M, F, 400V, K, 0.047UF	CH2GL473K
9	C168	CAP ELE, 25V, M, 2200UF(SMS)	581-142	10	C169	CAP ELE, 25V, M, 2200UF(SMS)	581-142
11	C170	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M	12	C171	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M
13	C172	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M	14	C174	CAP ELE, 25V, M, 100UF(SMS)	CE1EL107M
15	C341	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	16	C342	CAP SMD, 50V, K, 1000PF(2012)	CK1HI102K
17	D123	DIODE ZENER, DZ-22B	585-118-1	18	D124	DIODE ZENER, DZ-22B	585-118-1
19	D125	DIODE, 1SS133	585-120	20	D126	DIODE, RL105	585-154-1
21	D127	DIODE, RL105	585-154-1	22	D128	DIODE, RL105	585-154-1
23	D129	DIODE, RL105	585-154-1	24	D130	DIODE, RL105	585-154-1
25	D131	DIODE, RL105	585-154-1	26	D132	DIODE, RL105	585-154-1
27	D133	DIODE, RL105	585-154-1	28	D134	DIODE, RL105	585-154-1
29	NL103	NEON LAMP, NE-98	561-022	30	P108	CONNECTOR WAFER, LW-0640-08	531-006-7
31	Q121	TRANSISTOR, KSA968-A	611-667	32	R174	RES C, F, 1/4W, 5%, 2.2M	RD0BP225J
33	R176	RES M, O, 1W, 5%, 47	RS01P470J	34	R177	RES C, F, 1/4W, 5%, 390	RD0BP391J
35	R178	RES C, F, 1/4W, 5%, 470K	RD0BP474J	36	R179	RES M, F, 1/4W, 1%, 139K	RMBP1393F
37	R180	RES C, F, 1/4W, 5%, 100	RD0BP101J	38	R181	RES C, F, 1/4W, 5%, 390	RD0BP391J
39	R182	RES C, F, 1/4W, 5%, 5.6	RD0BP56J	40	R183	RES M, O, 2W, 5%, 8.2K	RS02P822J
41	R184	RES M, O, 3W, 5%, 1.8K	RS03P182J	42	R414	RES SMD, 0.1W, 5%, 1K(2012)	RM0I1001J
43	R415	RES SMD, 0.1W, 1%, 12K(2012)	RM0I1202F	44	R416	RES SMD, 0.1W, 1%, 12K(2012)	RM0I1202F
45	R417	RES SMD, 0.1W, 1%, 12K(2012)	RM0I1202F	46	R418	RES SMD, 0.1W, 5%, 47K(2012)	RM0I4702J
47	R419	RES SMD, 0.1W, 5%, 47K(2012)	RM0I4702J	48	R420	RES SMD, 0.1W, 5%, 470(2012)	RM0I4700J
49	R421	RES SMD, 0.1W, 5%, 82K(2012)	RM0I8202J	50	U105	IC OP AMP, MC4558CN	591-267-9
51	U106	IC REG, GL7912	595-009	52	U107	IC REG, GL7812	591-209-9
53	U108	IC REG, GL7805	591-310-9				

NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1		TUBE, SHIRINK, GSHS-1605 15MM3	884-021	2	F1	FUSE, 125V2A MF51NM TYPE	563-035
3	GND	WIRING HARNESS, WH109-2	550-170-C	4	J105	WIRING HARNESS, WH15	550-775-A
5	J106	WIRING HARNESS, WH08	550-635-A	6	J109	WIRING HARNESS, WH07	550-768-A
7	J110	WIRING HARNESS, WH16	550-775-A	8	J1A	WIRING HARNESS, JW1	550-780-A
9	J2A	WIRING HARNESS, JW2	550-781-A	10	J801	BUS WIRE, 10MM, PI-0.6	871-056
11	L1	ROTATION COIL	638-005	12	P1	CONNECTOR, BNC (CH1, X)	531-164
13	P1301	CONNECTOR WAFER, LW-0640-04	531-003-7	14	P1302	SOCKET, CRT	535-017-9
15	P2	CONNECTOR, BNC (CH2, Y)	531-164	16	P3	CONNECTOR, BNC (EXT TRG)	531-164
17	P4	TERMINAL, PROBE ADJUST	539-010	18	P5	TERMINAL, GROUND Z-048	537-018
19	P6	CONNECTOR, BNC (CH1 OUT)	531-164	20	P7	CONNECTOR, BNC (EXT BLANKING)	531-164
21	P8	AC INLET, BACI-03 BELTON	535-037	22	PB101	WIRING HARNESS, WH17	550-777-A
23	PB801	WIRING HARNESS, WH06	550-767-A	24	PB802	WIRING HARNESS, WH03	550-764-A
25	PB803	WIRING HARNESS, WH04	550-765-A	26	PB804	WIRING HARNESS, WH05	550-766-A
27	PB805	WIRING HARNESS, WH01	550-762-A	28	PB806	WIRING HARNESS, WH02	550-763-A
29	PB901	WIRING HARNESS, WH14	550-774-A	30	PB902	WIRING HARNESS, WH11	550-771-A
31	PB903	WIRING HARNESS, WH13	550-773-A	32	PB904	WIRING HARNESS, WH10	550-770-A
33	PS1	WIRING HARNESS, PS1	550-782-A	34	PS2	WIRING HARNESS, PS2	550-783-A
35	PS3	WIRING HARNESS, PS3	550-784-A	36	R901	RES C. F, 1/4W, 5%, 470	RD0BP471J
37	S1	SW POWER, SY13-4-18Q	521-097-1	38	SC1	PCB, MAIN BOARD 180x300	513-565R1
39	SC13	PCB, CRT SOCKET BOARD	513-467R1	40	SC8	PCB, CONTROL BOARD 180x52	513-566
41	SC89	PCB, CONT ARRY BOARD 200x239	513-5667A	42	SC9	PCB, SELECTOR BOARD 180x26	513-567
43	T1	TRANSFORMER, POWER OS-9020P	622-036R1	44	V1	CRT, D14-363GY/123	631-007-2
45	W100	WIRING HARNESS, JW3	550-797-A	46	W101	WIRING HARNESS, JW4	550-797-A
47	W102	WIRING HARNESS, JW6	550-779-A	48	W103	WIRING HARNESS, JW5	550-778-A
49	WH130	WIRING HARNESS, WH130	550-649-A	50	Y+Y-	WIRING HARNESS, WH09	550-769-A

PART-LISTS of MODEL OS-9020P Rev. B // The End

Printed Date : 1994. 8. 16

9. BLOCK DIAGRAM

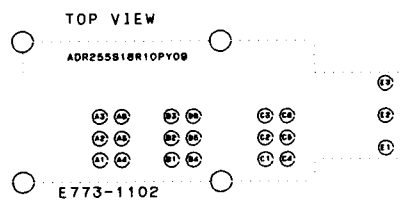
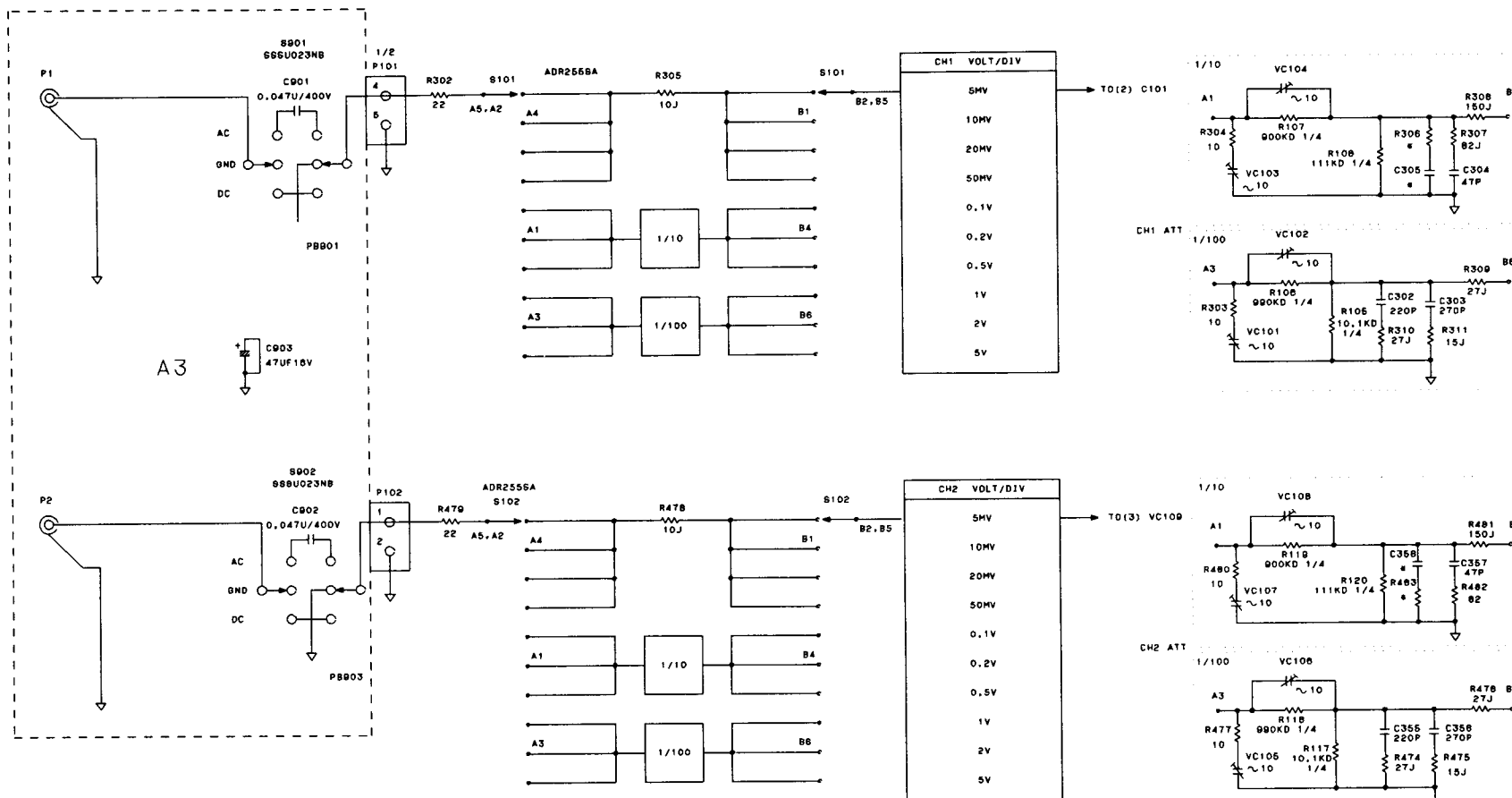


BLOCK REV. 1.3
1994. 8.7

05-9020P

BLOCK DIAGRAM

10. SCHEMATIC DIAGRAMS



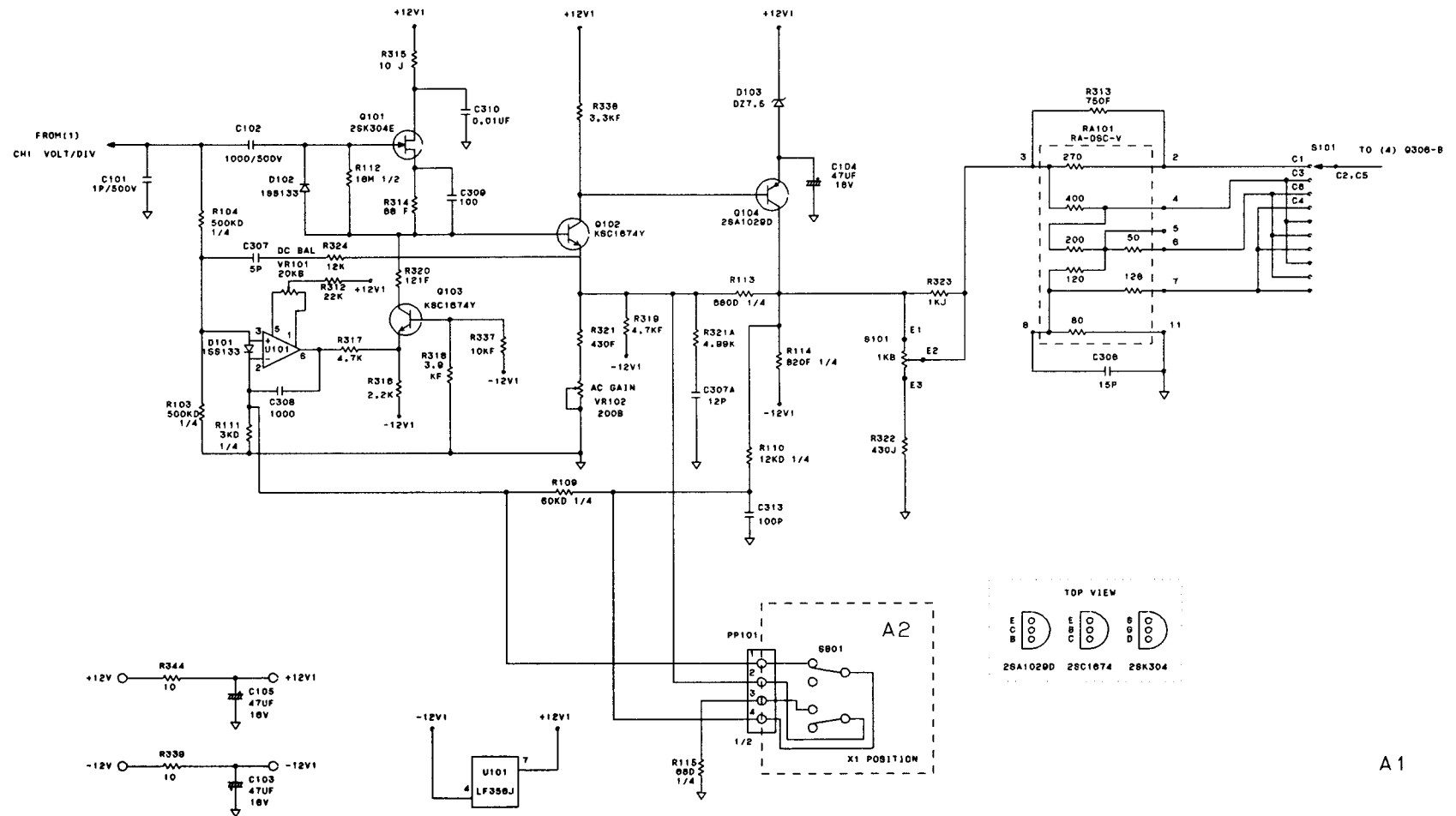
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ATTNT

REV. 2.4
1994. 8.7

OS-9020P
ATTENUATOR (1)

NOTE — *NOT USED



A1

INCH1 REV. 2.5
1994. 6.7

OS-8020P
CH1 INPUT AMP (2)

(6). VERTICAL CONTROL

PAGE : 6

NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C151	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M	2	C155	CAP ELE, 50V, M, 1UF(BP)	581-117
3	C319	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	4	C324	CAP SMD, 50V, J, 680PF(2012)	CK1HI681
5	C326	CAP SMD, 50V, J, 680PF(2012)	CK1HI681J	6	C327	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103
7	C328	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	8	C329	CAP SMD, 50V, K, 4700PF(2012)	CK1HI472
9	C330	CAP SMD, 50V, J, 220PF(2012)	CK1HI221J	10	C331	CAP SMD, 50V, J, 220PF(2012)	CK1HI221
11	C332	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	12	C344	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103
13	C345	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	14	C369	CAP SMD, 50V, J, 82PF(2012)	CK1HI820
15	C374	CAP SMD, 50V, J, 68PF(2012)	CK1HI680J	16	C375	CAP SMD, 50V, J, 68PF(2012)	CK1HI680
17	C375A	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M	18	D108	DIODE, 1SS133	585-120
19	D109	DIODE, 1SS133	585-120	20	D110	DIODE, 1SS133	585-120
21	D111	DIODE, 1SS133	585-120	22	D112	DIODE, 1SS133	585-120
23	D113	DIODE, 1SS133	585-120	24	D114	DIODE, 1SS133	585-120
25	D115	DIODE, 1SS133	585-120	26	D116	DIODE, 1SS133	585-120
27	D117	DIODE, 1SS133	585-120	28	D118	DIODE, 1SS133	585-120
29	D119	DIODE, 1SS133	585-120	30	D148	DIODE, 1SS133	585-120
31	D149	DIODE, 1SS133	585-120	32	D150	DIODE, 1SS133	585-120
33	D151	DIODE, 1SS133	585-120	34	D153	DIODE ZENER, DZ-8, 2B	585-162
35	D154	DIODE, 1SS133	585-120	36	D200	DIODE, 1SS133	585-120
37	P113	CONNECTOR WAFER, LW-0640-03	531-002-7	38	PP106	CONNECTOR HOUSING, CS250-08	531-401
39	Q109	TRANSISTOR, KSC1730-Y	611-669	40	Q110	TRANSISTOR, KSC1730-Y	611-669
41	Q310	TRANSISTOR SMD, KTC3875-Y	611-670	42	Q319	TRANSISTOR SMD, KTC3875-Y	611-670
43	Q320	TRANSISTOR SMD, KTC3875-Y	611-670	44	Q321	TRANSISTOR SMD, KTA1504-Y	611-672
45	R197	RES M, F, 1/4W, 1%, 1.2K	RMBP1201F	46	R349	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0
47	R357	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	48	R364	RES SMD, 0.1W, 5%, 27(2012)	RM0I27R0
49	R365	RES SMD, 0.1W, 1%, 300(2012)	RM0I3000F	50	R366	RES SMD, 0.1W, 5%, 1.8K(2012)	RM0I1801
51	R367	RES SMD, 0.1W, 5%, 1.8K(2012)	RM0I1801J	52	R368	RES SMD, 0.1W, 5%, 220(2012)	RM0I2200
53	R369	RES SMD, 0.1W, 5%, 220(2012)	RM0I2200J	54	R370	RES SMD, 0.1W, 5%, 27(2012)	RM0I27R0
55	R371	RES SMD, 0.1W, 1%, 300(2012)	RM0I3000F	56	R372	RES SMD, 0.1W, 1%, 2.7K(2012)	RM0I2701
57	R373	RES SMD, 0.1W, 1%, 2.7K(2012)	RM0I2701F	58	R374	RES SMD, 0.1W, 1%, 330(2012)	RM0I3300
59	R375	RES SMD, 0.1W, 1%, 330(2012)	RM0I3300F	60	R376	RES SMD, 0.1W, 1%, 2K(2012)	RM0I2001
61	R377	RES SMD, 0.1W, 1%, 82(2012)	RM0I82R0F	62	R378	RES SMD, 0.1W, 5%, 82K(2012)	RM0I8202
63	R379	RES SMD, 0.1W, 1%, 220K(2012)	RM0I2203F	64	R380	RES SMD, 0.1W, 5%, 82K(2012)	RM0I8202
65	R381	RES SMD, 0.1W, 5%, 100K(2012)	RM0I1003J	66	R382	RES SMD, 0.1W, 1%, 330(2012)	RM0I3300
67	R383	RES SMD, 0.1W, 1%, 330(2012)	RM0I3300F	68	R384	RES SMD, 0.1W, 1%, 2K(2012)	RM0I2001
69	R385	RES SMD, 0.1W, 1%, 82(2012)	RM0I82R0F	70	R388	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701
71	R389	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	72	R390	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701
73	R391	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	74	R436	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701
75	R438	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	76	R439	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701
77	R555	RES SMD, 0.1W, 5%, 47(2012)	RM0I47R0J	78	R556	RES SMD, 0.1W, 1%, 1.2K(2012)	RM0I1201
79	R558	RES SMD, 0.1W, 1%, 1.5K(2012)	RM0I1501F	80	R559	RES SMD, 0.1W, 5%, 1.8K(2012)	RM0I1801
81	R569	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J	82	R570	RES SMD, 0.1W, 5%, 470(2012)	RM0I4700
83	R571	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J	84	R572	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701
85	R573	RES SMD, 0.1W, 5%, 470(2012)	RM0I4700J	86	S802	SW SLIDE, SSSU024NB VMODE	521-113
87	S903	SW SLIDE, SSSU023NC TRGMD	521-112	88	U103	IC TTL, GD74LS74AP GSS	591-163
89	U104	IC TTL, GD74LS00	591-001-9				

(7). VERTICAL MAIN AMP.

PAGE ; 7

P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
-117	1	C154	CAP CER, 500V, C, 1PF(T. C BLACK)	CT2HR010C	2	C156	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M
HI681J	3	C157	CAP CER, 500V, C, 1PF(T. C BLACK)	CT2HR010C	4	C158	CAP CER, 500V, K, 1000PF	CK2HR102K
HI103K	5	C159	CAP CER, 500V, K, 4700PF	CK2HL472K	6	C160	CAP CER, 500V, K, 1000PF	CK2HR102K
HI472K	7	C161	CAP CER, 500V, K, 0.01UF	CK2HL103K	8	C333	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K
HI221J	9	C334	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K	10	C335	CAP SMD, 50V, J, 68PF(2012)	CK1HI680J
HI103K	11	C336	CAP SMD, 50V, J, 18PF(2012)	CK1HI180J	12	C337	NOT USED	NOT
HI820J	13	C338	CAP SMD, 50V, J, 270PF(2012)	CK1HI271J	14	C339	CAP SMD, 50V, J, 180PF(2012)	CK1HI181J
HI680J	15	C340	CAP SMD, 50V, J, 47PF(2012)	CK1HI470J	16	C522	CAP CER, 500V, K, 0.01UF	CK2HL103K
-120	17	D120	DIODE ZENER, DZ-5.1B	585-111	18	D121	DIODE ZENER, DZ-5.1B	585-111
-120	19	D122	DIODE ZENER, DZ-5.1B	585-111	20	L101	INDUCTOR, 2.2UH/LAL04NA2R2M	628-179
-120	21	L102	INDUCTOR, 2.2UH/LAL04NA2R2M	628-179	22	Q111	TRANSISTOR, 2SC2901	611-151
-120	23	Q112	TRANSISTOR, 2SC2901	611-151	24	Q113	TRANSISTOR, 2SC3779	611-650
-120	25	Q114	TRANSISTOR, 2SC3779	611-650	26	Q115	TRANSISTOR, KSA1381-E	611-169-9
-120	27	Q116	TRANSISTOR, KSC3503-E	611-159-9	28	Q117	TRANSISTOR, 2SA1206	611-021
-120	29	Q118	TRANSISTOR, 2SA1206	611-021	30	Q119	TRANSISTOR, KSA1381-E	611-169-9
-120	31	Q120	TRANSISTOR, KSC3503-E	611-159-9	32	R185	RES M. F, 1/4W, 1%, 115	RMBP1150F
-162	33	R186	RES M. F, 1/4W, 1%, 115	RMBP1150F	34	R187	RES M. O, 2W, 5%, 12K	RS02P123J
-120	35	R188	RES M. O, 2W, 5%, 10K	RS02P103J	36	R189	RES C. F, 1/4W, 5%, 100	RD0BP101J
-401	37	R190	RES M. O, 1W, 5%, 27K	RS01P273J	38	R192	RES C. F, 1/4W, 5%, 910	RD0BP911J
-669	39	R193	RES M. O, 2W, 5%, 12K	RS02P123J	40	R194	RES M. O, 2W, 5%, 10K	RS02P103J
-670	41	R195	RES C. F, 1/4W, 5%, 47	RD0BP470J	42	R196	RES C. F, 1/4W, 5%, 910	RD0BP911J
-672	43	R386	RES SMD, 0.1W, 5%, 4.7K(2012)	RM014701J	44	R387	RES SMD, 0.1W, 1%, 150(2012)	RM011500F
10R0J	45	R392	RES SMD, 0.1W, 1%, 150(2012)	RM011500F	46	R393	RES SMD, 0.1W, 5%, 0 (2012)	RM010000J
27R0J	47	R394	NOT USED	NOT	48	R395	RES SMD, 0.1W, 1%, 1.37K(2012)	RM011371F
1801J	49	R396	RES SMD, 0.1W, 5%, 10(2012)	RM0110R0J	50	R397	RES SMD, 0.1W, 5%, 10(2012)	RM0110R0J
2200J	51	R397A	RES SMD, 0.1W, 5%, 27(2012)	RM0127R0J	52	R398	RES SMD, 0.1W, 1%, 270(2012)	RM012700F
27R0J	53	R399	RES SMD, 0.1W, 5%, 470(2012)	RM014700J	54	R400	RES SMD, 0.1W, 5%, 100(2012)	RM011000J
2701F	55	R401	RES SMD, 0.1W, 5%, 100(2012)	RM011000J	56	R402	RES SMD, 0.1W, 5%, 47(2012)	RM0147R0J
3300F	57	R403	RES SMD, 0.1W, 1%, 180(2012)	RM011800F	58	R404	RES SMD, 0.1W, 5%, 47(2012)	RM0147R0J
2001F	59	R405	RES SMD, 0.1W, 5%, 1K(2012)	RM011001J	60	R406	RES SMD, 0.1W, 5%, 1K(2012)	RM011001J
8202J	61	R407	RES SMD, 0.1W, 5%, 100(2012)	RM011000J	62	R408	RES SMD, 0.1W, 5%, 100(2012)	RM011000J
8202J	63	R409	RES SMD, 0.1W, 5%, 47(2012)	RM0147R0J	64	R410	RES SMD, 0.1W, 5%, 470(2012)	RM014700J
3300F	65	R411	RES SMD, 0.1W, 1%, 270(2012)	RM012700F	66	R412	RES SMD, 0.1W, 5%, 47(2012)	RM0147R0J
2001F	67	R413	RES SMD, 0.1W, 1%, 180(2012)	RM011800F	68	TH101	THERMISTOR, NTC-4, 7-OHM	579-015
4701J	69	VC111	CAP TRIMMER, TZ03P450FR, YEL	581-132-1	70	VC112	CAP TRIMMER, TZ03P450FR, YEL	581-132-1
4701J	71	VR118	RES SR, VG068TL1B-500B	572-319-1				

(8). TRIGGER AMPLIFIER

PAGE : 8

NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C112	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	2	C113	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
3	C114	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	4	C115	CAP M, F, 400V, K, Ø. 047UF	CH2GL473
5	C116	CAP ELE, 50V, M, 1UF(BP)	581-117	6	C117	CAP ELE, 50V, M, 10UF(BP)	581-143
7	C118	CAP CER, 500V, J, 47PF	CK2HR470J	8	C119	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
9	C120	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	10	C359	CAP SMD, 50V, C, 5PF(2012)	CK1HI050
11	C362	CAP SMD, 50V, K, Ø. 01UF(2012)	CK1HI103K	12	C801	CAP MYLAR, 50V, K, Ø. 01UF	CP1HR103
13	D168	DIODE, 1SS133	585-120	14	D169	DIODE, 1SS133	585-120
15	P103	CONNECTOR WAFER, LW-0640-02	531-001-7	16	PP102	CONNECTOR HOUSING, CS250-06	531-410
17	Q130	FET, 2SK304-E	611-140	18	Q345	TRANSISTOR SMD, 2SC3775-0Y3	611-656
19	Q346	TRANSISTOR SMD, 2SC3775-0Y3	611-656	20	Q347	TRANSISTOR SMD, KTA1504-Y	611-672
21	R127	RES C. F, 1/4W, 5%, 470K	RD0BP474J	22	R128	RES C. F, 1/4W, 5%, 470K	RD0BP474
23	R484	RES SMD, Ø. 1W, 5%, 220(2012)	RM0I2200J	24	R485	RES SMD, Ø. 1W, 5%, 22(2012)	RM0I2200
25	R486	RES SMD, Ø. 1W, 1%, 2.7K(2012)	RM0I2701F	26	R487	RES SMD, Ø. 1W, 5%, 22(2012)	RM0I2200
27	R488	RES SMD, Ø. 1W, 1%, 47K(2012)	RM0I4702F	28	R489	RES SMD, Ø. 1W, 5%, 1K(2012)	RM0I1001
29	R490	RES SMD, Ø. 1W, 5%, 5.6K(2012)	RM0I5601J	30	R491	RES SMD, Ø. 1W, 1%, 1.2K(2012)	RM0I1201
31	R492	RES SMD, Ø. 1W, 5%, 4.7K(2012)	RM0I4701J	32	R494	RES SMD, Ø. 1W, 5%, 4.7K(2012)	RM0I4701
33	R495	RES SMD, Ø. 1W, 5%, 15K(2012)	RM0I1502J	34	R496	RES SMD, Ø. 1W, 5%, 10K(2012)	RM0I1002
35	R497	RES SMD, Ø. 1W, 5%, 1K(2012)	RM0I1001J	36	R499	RES SMD, Ø. 1W, 5%, 24K(2012)	RM0I2402
37	R515	RES SMD, Ø. 1W, 5%, 470(2012)	RM0I4700J	38	R516	RES SMD, Ø. 1W, 5%, 22(2012)	RM0I2200
39	R519	RES SMD, Ø. 1W, 5%, 10(2012)	RM0I10R0J	40	R521	RES SMD, Ø. 1W, 5%, 0(2012)	RM0I0000
41	S103	SW SLIDE, SSSU123NC TRGSOU	521-114	42	S804	SW SLIDE, SSSU024NB TRGMOD	521-113
43	VR105	RES SR, VG068TL1B-10KB	572-314-1	44	VR804	RES VAR, V012L-PV30KS 10KB TRGL	571-325

(9). SWEEP GENERATOR

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/ N	NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
EL226M	1	C128	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	2	C129	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
GL473K	3	C130	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	4	C131	CAP ELE, 50V, M, 2. 2UF(SMS)	CE1HL225M
-143	5	C132	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	6	C133	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
EL226M	7	C134	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	8	C360	NOT USED	NOT
HI050C	9	C363	CAP SMD, 50V, J, 82PF(2012)	CK1HI820J	10	C364	NOT USED	NOT
HR103K	11	C366	CAP SMD, 50V, J, 15PF(2012)	CK1HI150J	12	C367	CAP SMD, 50V, K, 0. 01UF(2012)	CK1HI103K
-120	13	D157	DIODE, 1SS133	585-120	14	D158	DIODE, 1SS133	585-120
-410	15	D159	DIODE, 1SS133	585-120	16	D164	DIODE, 1SS133	585-120
-656	17	D165	DIODE, 1SS133	585-120	18	D166	NOT USED	NOT
-672	19	D167	DIODE, 1SS133	585-120	20	Q129	FET, 2SK304-E	611-140
BP474J	21	Q339	TRANSISTOR SMD, KTC3875-Y	611-670	22	Q341	TRANSISTOR SMD, MMBT3904-1A	611-654
I22R0J	23	Q342	TRANSISTOR SMD, KTC3875-Y	611-670	24	Q343	TRANSISTOR SMD, MMBT3906-2A	611-653
I22R0J	25	Q344	TRANSISTOR SMD, KTC3875-Y	611-670	26	R136	RES C, F, 1/2W, 5%, 68K	RD0CP683J
I1001J	27	R493	NOT USED	NOT	28	R498	RES SMD, 0. 1W, 5%, 100(2012)	RM0I1000J
I1201F	29	R500	RES SMD, 0. 1W, 5%, 100(2012)	RM0I1000J	30	R501	RES SMD, 0. 1W, 1%, 3. 3K(2012)	RM0I3301F
I4701J	31	R502	RES SMD, 0. 1W, 5%, 100K(2012)	RM0I1003J	32	R503	RES SMD, 0. 1W, 5%, 4. 7K(2012)	RM0I4701J
I1002J	33	R504	RES SMD, 0. 1W, 1%, 12K(2012)	RM0I1202F	34	R505	RES SMD, 0. 1W, 1%, 82(2012)	RM0I82R0F
I2402J	35	R506	RES SMD, 0. 1W, 5%, 100(2012)	RM0I1000J	36	R507	RES SMD, 0. 1W, 5%, 82K(2012)	RM0I8202J
I22R0J	37	R508	RES SMD, 0. 1W, 5%, 100(2012)	RM0I1000J	38	R509	RES SMD, 0. 1W, 5%, 4. 7K(2012)	RM0I4701J
I0000J	39	R510	RES SMD, 0. 1W, 5%, 15K(2012)	RM0I1502J	40	R511	RES SMD, 0. 1W, 1%, 3. 3K(2012)	RM0I3301F
-113	41	R512	RES SMD, 0. 1W, 1%, 3. 3K(2012)	RM0I3301F	42	R513	RES SMD, 0. 1W, 5%, 47(2012)	RM0I47R0J
-325	43	R514	RES SMD, 0. 1W, 5%, 56K(2012)	RM0I5602J	44	R517	RES SMD, 0. 1W, 5%, 4. 7K(2012)	RM0I4701J
	45	R518	RES SMD, 0. 1W, 5%, 4. 7K(2012)	RM0I4701J	46	R520	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J
	47	R522	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J	48	R523	RES SMD, 0. 1W, 5%, 100(2012)	RM0I1000J
	49	R524	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J	50	R525	RES SMD, 0. 1W, 5%, 2. 2K(2012)	RM0I2201J
	51	R525A	NOT USED	NOT	52	R526	RES SMD, 0. 1W, 1%, 3. 3K(2012)	RM0I3301F
	53	R532	RES SMD, 0. 1W, 5%, 10K(2012)	RM0I1002J	54	R533	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J
	55	R534	RES SMD, 0. 1W, 5%, 10K(2012)	RM0I1002J	56	R548	RES SMD, 0. 1W, 1%, 4. 7K(2012)	RM0I4701F
	57	R549	RES SMD, 0. 1W, 5%, 470(2012)	RM0I4700J	58	R550	RES SMD, 0. 1W, 1%, 1K(2012)	RM0I1001F
	59	R551	RES SMD, 0. 1W, 1%, 10K(2012)	RM0I1002F	60	R552	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J
	61	R553	RES SMD, 0. 1W, 5%, 10(2012)	RM0I10R0J	62	R554	RES SMD, 0. 1W, 5%, 4. 7K(2012)	RM0I4701J
	63	S104	SW PUSH, SPPJ3-E SLOPE	521-104	64	U109	IC TTL, GD74LS00	591-001-9
	65	U110	IC TTL, GD74LS10	591-045-9	66	U111	IC TTL, HD74LS122P	591-212
	67	U112	IC TTL, GD74LS74AP GSS	591-163-9	68	U113	IC TTL, GD74LS14	591-075-9
	69	VC113	CAP TRIMMER, TZ03P450FR, YEL	581-132-1	70	VR107	RES SR, VG068TL1B-1KB	572-315-1
	71	VR108	RES SR, VG068TL1B-1KB	572-315-1				

(10). TIMING CIRCUITS

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NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C121	CAP M. F, 250V, G, 1UF	CH2EL105G	2	C122	CAP CER, 500V, K, 1000PF	CK2HR102K
3	C123	CAP M. F, 400V, G, 0.01UF	CH2GL103G	4	C124	CAP M. F, 400V, K, 0.047UF	CH2GL473K
5	C125	CAP ELE, 50V, M, 2, 2UF(SMS)	CE1HL225M	6	C126	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
7	C361	CAP SMD, 50V, J, 470PF(2012)	CK1HI471J	8	C365	CAP SMD, 50V, K, 0.01UF(2012)	CK1HI103K
9	D152	DIODE, 1SS133	585-120	10	Q340	TRANSISTOR SMD, KTA1504-Y	611-672
11	R129	RES M. F, 1/4W, 0.5%, 32.5K	RMBP3252D	12	R130	RES M. F, 1/4W, 0.5%, 82.5K	RMBP8252D
13	R131	RES M. F, 1/4W, 0.5%, 1.65M	RMBP1654D	14	R132	RES M. F, 1/4W, 0.5%, 825K	RMBP8253D
15	R133	RES M. F, 1/4W, 0.5%, 165K	RMBP1653D	16	R134	RES M. F, 1/4W, 0.5%, 1.65M	RMBP1654D
17	R135	RES M. F, 1/4W, 0.5%, 165K	RMBP1653D	18	R527	RES SMD, 0.1W, 1%, 3.3K(2012)	RM0I3301F
19	R528	RES SMD, 0.1W, 5%, 10K(2012)	RM0I1002J	20	R529	RES SMD, 0.1W, 5%, 1K(2012)	RM0I1001J
21	R530	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J	22	R531	RES SMD, 0.1W, 1%, 1.5K(2012)	RM0I1501F
23	R801	RES C. F, 1/4W, 5%, 680	RD0BP681J	24	R802	RES C. F, 1/4W, 5%, 680	RD0BP681J
25	R803	RES C. F, 1/4W, 5%, 2.7K	RD0BP272J	26	R804	RES C. F, 1/4W, 5%, 560	RD0BP561J
27	R805	RES C. F, 1/4W, 5%, 2.7K	RD0BP272J	28	S105	SW ROTARY, BTR30220 BELTON	522-027-9
29	S806	SW SLIDE, SSSU022NB011 HVAR	521-111	30	VR106	RES SR, VG068TL1B-50KB	572-320-1
31	VR806	RES VAR, V012L-PV30KS 10KB HVAR	571-325				

(11). CHOP PULSE GENERATOR

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NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C127	CAP MYLAR, 100V, J, 0.1UF	CP1HL104J	2	C136	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
3	C137	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	4	C378	CAP SMD, 50V, J, 390PF(2012)	CK1HI391J
5	C378A	CAP SMD, 50V, J, 100PF(2012)	CK1HI101J	6	D162	DIODE, 1SS133	585-120
7	D163	DIODE, 1SS133	585-120	8	P104	CONNECTOR WAFER, LW-0640-03	531-002-7
9	Q336	TRANSISTOR SMD, KTA1504-Y	611-672	10	Q337	TRANSISTOR SMD, KTC3875-Y	611-670
11	Q338	TRANSISTOR SMD, KTC3875-Y	611-670	12	R437	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J
13	R535	RES SMD, 0.1W, 1%, 6.8K(2012)	RM0I6801F	14	R536	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J
15	R537	RES SMD, 0.1W, 5%, 10K(2012)	RM0I1002J	16	R538	RES SMD, 0.1W, 1%, 270(2012)	RM0I2700F
17	R538A	RES SMD, 0.1W, 1%, 432(2012)	RM0I4320F	18	R539	RES SMD, 0.1W, 1%, 1.5K(2012)	RM0I1501F
19	R540	RES SMD, 0.1W, 5%, 2.2K(2012)	RM0I2201J	20	R541	RES SMD, 0.1W, 5%, 2.2K(2012)	RM0I2201J
21	R541A	RES SMD, 0.1W, 5%, 2.2K(2012)	RM0I2201J	22	R542	RES SMD, 0.1W, 5%, 5.6K(2012)	RM0I5601J
23	R543	RES SMD, 0.1W, 5%, 2.2K(2012)	RM0I2201J	24	R544	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J
25	R545	RES SMD, 0.1W, 5%, 10K(2012)	RM0I1002J	26	R546	RES SMD, 0.1W, 5%, 4.7K(2012)	RM0I4701J
27	R547	RES SMD, 0.1W, 1%, 6.8K(2012)	RM0I6801F	28	R586	RES SMD, 0.1W, 5%, 10(2012)	RM0I10R0J
29	U114	IC TTL, GD74LS02	591-054-9				

(12). HORIZONTAL MAIN AMPLIFIER

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NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1	C135	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	2	C135A	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
3	C143	CAP CER, 500V, C, 1PF(T. C BLACK)	CT2HR010C	4	C144	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
5	C145	CAP M. F, 400V, K, Ø. 047UF	CH2GL473K	6	C146	CAP M. F, 400V, K, Ø. 047UF	CH2GL473K
7	C147	CAP M. F, 400V, K, Ø. 047UF	CH2GL473K	8	C148	CAP M. F, 400V, K, Ø. 047UF	CH2GL473K
9	C149	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	10	C150	CAP CER, 500V, C, 1PF(T. C BLACK)	CT2HR010C
11	C368	CAP SMD, 50V, K, Ø. 01UF(2012)	CK1HI103K	12	C376	CAP SMD, 50V, J, 100PF(2012)	CK1HI101J
13	C377	CAP SMD, 50V, J, 68PF(2012)	CK1HI680J	14	D155	DIODE, 1SS133	585-120
15	D156	DIODE ZENER, DZ-6. 8B	585-161	16	D156A	DIODE, 1SS133	585-120
17	D156B	DIODE, 1SS133	585-120	18	P109	CONNECTOR WAFER, LW-0640-04	531-003-7
19	PP103	CONNECTOR HOUSING, CS250-06	531-410	20	Q125	TRANSISTOR, KSC3503-E	611-159-9
21	Q126	TRANSISTOR, KSC3503-E	611-159-9	22	Q127	TRANSISTOR, KSA1381-E	611-169-9
23	Q128	TRANSISTOR, KSA1381-E	611-169-9	24	Q322	TRANSISTOR SMD, MMBT3906-2A	611-653
25	Q323	TRANSISTOR SMD, MMBT3906-2A	611-653	26	Q324	TRANSISTOR SMD, KTC3875-Y	611-670
27	Q325	TRANSISTOR SMD, KTC3875-Y	611-670	28	Q326	TRANSISTOR SMD, KTC3875-Y	611-670
29	Q327	TRANSISTOR SMD, KTC3875-Y	611-670	30	Q328	TRANSISTOR SMD, MMBT3906-2A	611-653
31	Q329	TRANSISTOR SMD, MMBT3906-2A	611-653	32	Q330	TRANSISTOR SMD, KTC3875-Y	611-670
33	Q331	TRANSISTOR SMD, KTC3875-Y	611-670	34	R138	RES M. F, 1/4W, 1%, 16K	RMBP1602F
35	R142	RES M. F, 1/4W, 1%, 16K	RMBP1602F	36	R144	RES M. F, 1/4W, 1%, 16K	RMBP1602F
37	R145	RES M. F, 1/4W, 1%, 16K	RMBP1602F	38	R148	RES M. F, 1/2W, 1%, 82K	RMCP8202F
39	R149	RES M. F, 1/2W, 1%, 120K	RMCP1203F	40	R150	RES M. F, 1/2W, 1%, 120K	RMCP1203F
41	R152	RES C. F, 1/2W, 5%, 56K	RD0CP563J	42	R153	RES C. F, 1/2W, 5%, 56K	RD0CP563J
43	R154	RES M. F, 1/4W, 1%, 5. 6K	RMBP5601F	44	R155	RES M. F, 1/4W, 1%, 1. 5K	RMBP1501F
45	R156	RES M. F, 1/4W, 1%, 5. 6K	RMBP5601F	46	R157	RES M. F, 1/4W, 1%, 1. 5K	RMBP1501F
47	R158	RES M. F, 1/2W, 1%, 82K	RMCP8202F	48	R433	RES SMD, Ø. 1W, 5%, 10(2012)	RM0I10R0J
49	R434	RES SMD, Ø. 1W, 5%, 100(2012)	RM0I1000J	50	R435	RES SMD, Ø. 1W, 5%, 100(2012)	RM0I1000J
51	R574	RES SMD, Ø. 1W, 1%, 4. 32K(2012)	RM0I4321F	52	R575	RES SMD, Ø. 1W, 1%, 4. 7K(2012)	RM0I4701F
53	R576	RES SMD, Ø. 1W, 1%, 4. 7K(2012)	RM0I4701F	54	R577	RES SMD, Ø. 1W, 1%, 120(2012)	RM0I1200F
55	R577A	RES SMD, Ø. 1W, 1%, 430(2012)	RM0I4300F	56	R578	RES SMD, Ø. 1W, 1%, 4. 7K(2012)	RM0I4701F
57	R579	RES SMD, Ø. 1W, 5%, 2. 2K(2012)	RM0I2201J	58	R580	RES SMD, Ø. 1W, 1%, 4. 7K(2012)	RM0I4701F
59	R581	RES SMD, Ø. 1W, 1%, 6. 8K(2012)	RM0I6801F	60	R582	RES SMD, Ø. 1W, 5%, 24K(2012)	RM0I2402J
61	R582A	RES SMD, Ø. 1W, 1%, 18K(2012)	RM0I1802F	62	R583	RES SMD, Ø. 1W, 5%, 5. 6K(2012)	RM0I5601J
63	R583A	RES SMD, Ø. 1W, 1%, 180(2012)	RM0I1800F	64	R583B	RES SMD, Ø. 1W, 1%, 180(2012)	RM0I1800F
65	R583C	RES SMD, Ø. 1W, 1%, 180(2012)	RM0I1800F	66	R583D	RES SMD, Ø. 1W, 1%, 180(2012)	RM0I1800F
67	R583E	RES SMD, Ø. 1W, 1%, 12K(2012)	RM0I1202F	68	R584	RES SMD, Ø. 1W, 1%, 6. 8K(2012)	RM0I6801F
69	R585A	RES SMD, Ø. 1W, 1%, 750(2012)	RM0I7500F	70	R587	RES SMD, Ø. 1W, 1%, 2K(2012)	RM0I2001F
71	R587A	RES SMD, Ø. 1W, 1%, 430(2012)	RM0I4300F	72	R587B	RES SMD, Ø. 1W, 1%, 470(2012)	RM0I4700F
73	R587C	RES SMD, Ø. 1W, 1%, 470(2012)	RM0I4700F	74	R588	RES SMD, Ø. 1W, 5%, 10(2012)	RM0I10R0J
75	R589	RES SMD, Ø. 1W, 1%, 2. 2K(2012)	RM0I2201F	76	R590	RES SMD, Ø. 1W, 1%, 2. 2K(2012)	RM0I2201F
77	R591	RES SMD, Ø. 1W, 1%, 4. 32K(2012)	RM0I4321F	78	S805	SW SLIDE, SSSU022NB011 x10	521-111
79	VR114	RES SR, VG068TL1B-2KB	572-318-1	80	VR115	RES SR, VG068TL1B-200B	572-316-1
81	VR116	RES SR, VG068TL1B-1KB	572-315-1	82	VR805	RES VAR, V012L-PV30KS 10KB HPOS	571-325

NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1		SHOULDER BUSHING	919-003	2		INSULATOR SILICON APEX-AR	919-016
3	C138	CAP CER, 500V, C, 1PF(T. C BLACK)	CT2HR010C	4	C139	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M
5	C140	CAP ELE, 25V, M, 22UF(SMS)	CE1EL226M	6	C141	CAP M. F, 400V, K, Ø. 047UF	CH2GL473K
7	C142	CAP MYLAR, 400V, K, Ø. 022UF	CP2GR223K	8	C152	CAP ELE, 160V, M, 1UF(SMS)	CE2CL105M
9	C153	CAP CER, 500V, Z, Ø. 01UF	CK2HR103Z	10	C173	CAP ELE, 160V, M, 1UF(SMS)	CE2CL105M
11	C175	CAP ELE, 35V, M, 100UF(SMS)	CE1VL107M	12	C176	CAP CER, 2KV, K, 1000PF, B	CK2FL102K
13	C177	CAP CER, 2KV, K, 1000PF, B	CK2FL102K	14	C178	CAP CER, 2KV, Z, Ø. 01UF, E	CK2FL103Z
15	C179	CAP CER, 2KV, Z, Ø. 01UF, E	CK2FL103Z	16	C179A	CAP CER, 2KV, Z, Ø. 01UF, E	CK2FL103Z
17	C180	CAP CER, 2KV, Z, Ø. 01UF, E	CK2FL103Z	18	C181	CAP CER, 500V, K, 1000PF	CK2HR102K
19	C182	CAP CER, 2KV, K, 1000PF, B	CK2FL102K	20	C183	CAP ELE, 35V, M, 33UF(SMS)	CE1VL336M
21	C184	CAP MYLAR, 100V, J, Ø. 22UF	CP2AR224J	22	C301	CAP SMD, 50V, K, Ø. 01UF(2012)	CK1HI103K
23	C343	CAP SMD, 50V, K, 4700PF(2012)	CK1HI472K	24	D135	DIODE, RL105	585-154-1
25	D136	DIODE, RL105	585-154-1	26	D137	DIODE, RL105	585-154-1
27	D138	DIODE, RL105	585-154-1	28	D139	DIODE, MA185	585-259
29	D140	DIODE, MA185	585-259	30	D141	DIODE, 1SS133	585-120
31	D142	DIODE, 1SS133	585-120	32	D143	DIODE, ESJA52-12	585-149
33	D144	DIODE, ESJA52-12	585-149	34	D145	DIODE, AG01A	585-265
35	D146	DIODE, AG01A	585-265	36	D147	DIODE ZENER, DZ-22B	585-118-1
37	D160	DIODE, 1SS133	585-120	38	D161	DIODE, 1SS133	585-120
39	F101	FUSE, 125V Ø. 5A, 5MM WITH LEAD	563-032	40	K-20M	BUS WIRE, 10MM, PI-Ø. 6	871-056
41	LD101	LED POWER, KLG114E GRN KEC	588-027	42	NL101	NEON LAMP, NE-98	561-022
43	NL102	NEON LAMP, NE-98	561-022	44	P105	CONNECTOR WAFER, LW-0640-03	531-002-7
45	P106	CONNECTOR WAFER, LW-0640-06	531-005-7	46	P107	CONNECTOR WAFER, LW-0640-03	531-002-7
47	P111	CONNECTOR WAFER, LW-0640-02	531-001-7	48	Q122	TRANSISTOR, KSD362-R	611-668
49	Q123	TRANSISTOR, KSC3503-E	611-159-9	50	Q124	TRANSISTOR, KSA1381-E	611-169-9
51	Q301	TRANSISTOR SMD, KTC3875-Y	611-670	52	Q302	TRANSISTOR SMD, KTA1504-Y	611-672
53	Q332	TRANSISTOR SMD, KTC3875-Y	611-670	54	Q333	TRANSISTOR SMD, KTC3875-Y	611-670
55	Q334	TRANSISTOR SMD, KTA1504-Y	611-672	56	Q335	TRANSISTOR SMD, KTC3875-Y	611-670
57	R101	RES M. F, 1/4W, 1%, 1. 5K	RMBP1501F	58	R102	RES C. F, 1/4W, 5%, 220	RD0BP221J
59	R151	RES C. F, 1/4W, 5%, 56K	RD0BP563J	60	R159	RES M. F, 1/4W, 1%, 1. 5K	RMBP1501F
61	R160	RES C. F, 1/4W, 5%, 10K	RD0BP103J	62	R161	RES C. F, 1/4W, 5%, 220K	RD0BP224J
63	R162	RES C. F, 1/2W, 5%, 47K	RD0CP473J	64	R163	RES C. F, 1/2W, 5%, 47K	RD0CP473J
65	R164	RES C. F, 1/4W, 5%, 220	RD0BP221J	66	R165	RES C. F, 1/4W, 5%, 470K	RD0BP474J
67	R166	RES C. F, 1/4W, 5%, 47	RD0BP470J	68	R167	RES C. F, 1/4W, 5%, 47	RD0BP470J
69	R168	RES M. G, 1/2W, 5%, 16M	RG0CP166J	70	R169	RES C. F, 1/4W, 5%, 2. 2	RD0BP2R2J
71	R170	RES C. F, 1/4W, 5%, 100K	RD0BP104J	72	R171	RES C. F, 1/4W, 5%, 10K	RD0BP103J
73	R172	RES M. G, 1W, 1%, 8M	RG1P8004F	74	R173	RES M. F, 1/4W, Ø. 5%, 750K	RMBP7503D
75	R198	RES C. F, 1/4W, 5%, 100K	RD0BP104J	76	R301	RES SMD, Ø. 1W, 1%, 1. 2K(2012)	RM0I1201F
77	R421A	RES SMD, Ø. 1W, 5%, 82K(2012)	RM0I8202J	78	R422	RES SMD, Ø. 1W, 1%, 430(2012)	RM0I4300F
79	R423	RES SMD, Ø. 1W, 1%, 1. 2K(2012)	RM0I1201F	80	R424	RES SMD, Ø. 1W, 1%, 680(2012)	RM0I6800F
81	R425	RES SMD, Ø. 1W, 1%, 220K(2012)	RM0I2203F	82	R426	RES SMD, Ø. 1W, 1%, 12K(2012)	RM0I1202F
83	R427	RES SMD, Ø. 1W, 1%, 1. 5K(2012)	RM0I1501F	84	R428	RES SMD, Ø. 1W, 5%, 470(2012)	RM0I4700J
85	R429	RES SMD, Ø. 1W, 1%, 2. 7K(2012)	RM0I2701F	86	R430	RES SMD, Ø. 1W, 5%, 100K(2012)	RM0I1003J
87	R431	RES SMD, Ø. 1W, 5%, 10(2012)	RM0I10R0J	88	R432	RES SMD, Ø. 1W, 5%, 10(2012)	RM0I10R0J
89	R592	RES SMD, Ø. 1W, 5%, 24K(2012)	RM0I2402J	90	R593	RES SMD, Ø. 1W, 1%, 3. 9K(2012)	RM0I3901F

(13). Z-AXIS & H. V DRIVE

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NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
91	R594	RES SMD, 0. 1W, 5%, 470(2012)	RM0I4700J	92	R595	RES SMD, 0. 1W, 5%, 1K(2012)	RM0I1001J
93	R596	RES SMD, 0. 1W, 5%, 82K(2012)	RM0I8202J	94	R597	RES SMD, 0. 1W, 1%, 3. 01K(2012)	RM0I3011F
95	R598	RES SMD, 0. 1W, 5%, 22K(2012)	RM0I2202J	96	T101	TRANSFORMER, HVT-3D(4011)	622-017-8
97	VR117	RES SR, VG068TL1B-200KB	572-317-1	98	VR119	RES SR, VG068TL1B-200KB	572-317-1
99	VR801	RES VAR, V012L-PV30KB 10KB INTE	571-325	100	VR807	RES VAR, V0161PV25KSB2M-OHM FCS	571-324
101	VR901	RES SR, VG068TL1B-10KB	572-314-1				

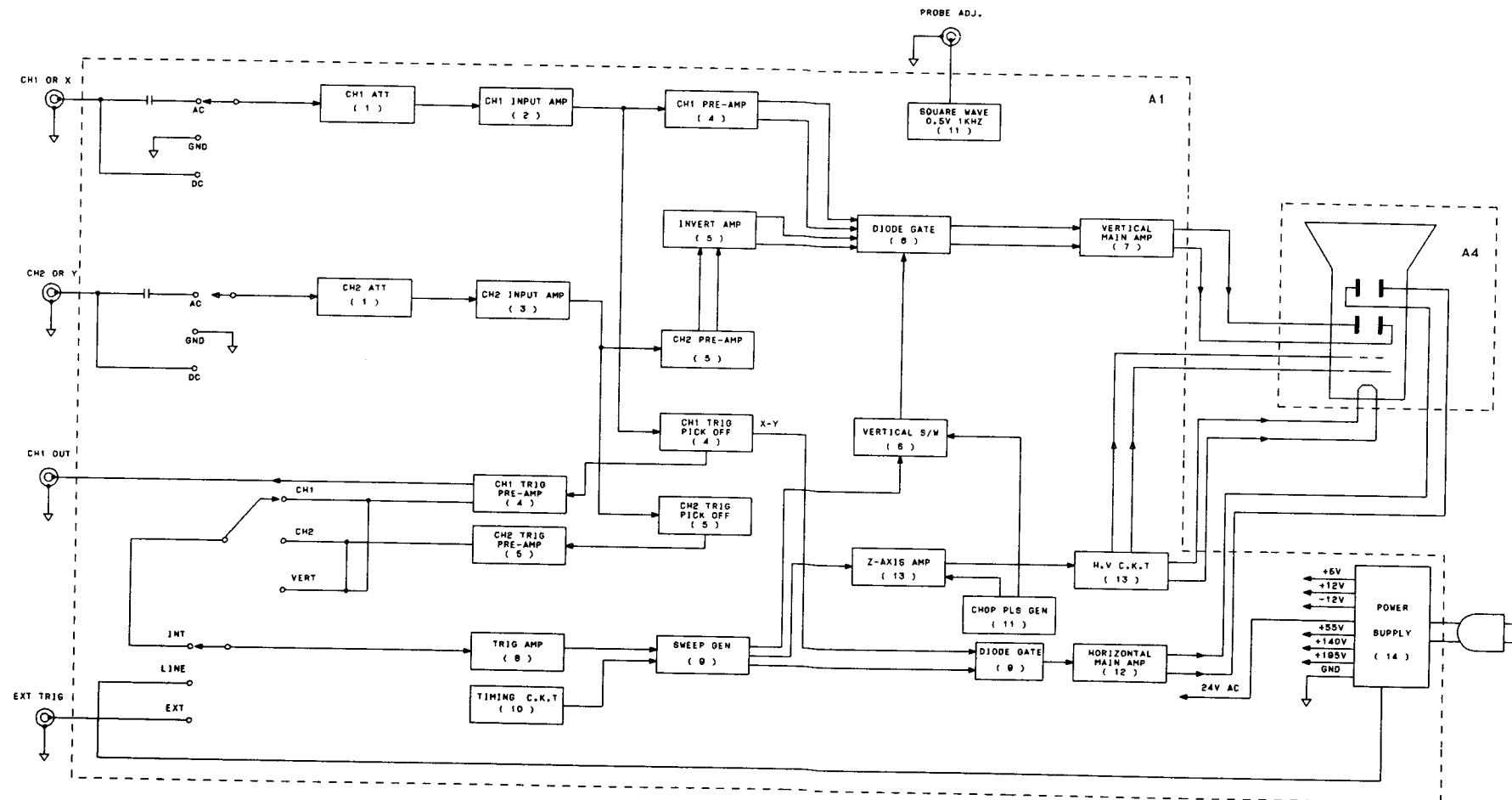
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1		SHOULDER BUSHING	919-003	2		INSULATOR SILICON APEX-AR	919-016
3	C162	CAP ELE, 160V, M, 10UF(SMS)	CE2CL106M	4	C163	CAP ELE, 100V, M, 33UF(SMS)	CE2AL336M
5	C164	CAP ELE, 250V, M, 47UF(SMS)	CE2EL476M	6	C165	CAP ELE, 250V, M, 10UF(SMS)	CE2EL106M
7	C166	CAP ELE, 100V, M, 47UF(SMS)	CE2AL476M	8	C167	CAP M, F, 400V, K, Ø. 047UF	CH2GL473K
9	C168	CAP ELE, 25V, M, 2200UF(SMS)	581-142	10	C169	CAP ELE, 25V, M, 2200UF(SMS)	581-142
11	C170	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M	12	C171	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M
13	C172	CAP ELE, 16V, M, 47UF(SMS)	CE1CL476M	14	C174	CAP ELE, 25V, M, 100UF(SMS)	CE1EL107M
15	C341	CAP SMD, 50V, K, Ø. 01UF(2012)	CK1HI103K	16	C342	CAP SMD, 50V, K, 1000PF(2012)	CK1HI102K
17	D123	DIODE ZENER, DZ-22B	585-118-1	18	D124	DIODE ZENER, DZ-22B	585-118-1
19	D125	DIODE, 1SS133	585-120	20	D126	DIODE, RL105	585-154-1
21	D127	DIODE, RL105	585-154-1	22	D128	DIODE, RL105	585-154-1
23	D129	DIODE, RL105	585-154-1	24	D130	DIODE, RL105	585-154-1
25	D131	DIODE, RL105	585-154-1	26	D132	DIODE, RL105	585-154-1
27	D133	DIODE, RL105	585-154-1	28	D134	DIODE, RL105	585-154-1
29	NL103	NEON LAMP, NE-98	561-022	30	P108	CONNECTOR WAFER, LW-0640-08	531-006-7
31	Q121	TRANSISTOR, KSA968-A	611-667	32	R174	RES C, F, 1/4W, 5%, 2. 2M	RD0BP225J
33	R176	RES M, O, 1W, 5%, 47	RS01P470J	34	R177	RES C, F, 1/4W, 5%, 390	RD0BP391J
35	R178	RES C, F, 1/4W, 5%, 470K	RD0BP474J	36	R179	RES M, F, 1/4W, 1%, 139K	RMBP1393F
37	R180	RES C, F, 1/4W, 5%, 100	RD0BP101J	38	R181	RES C, F, 1/4W, 5%, 390	RD0BP391J
39	R182	RES C, F, 1/4W, 5%, 5. 6	RD0BP5R6J	40	R183	RES M, O, 2W, 5%, 8. 2K	RS02P822J
41	R184	RES M, O, 3W, 5%, 1. 8K	RS03P182J	42	R414	RES SMD, Ø. 1W, 5%, 1K(2012)	RM0I1001J
43	R415	RES SMD, Ø. 1W, 1%, 12K(2012)	RM0I1202F	44	R416	RES SMD, Ø. 1W, 1%, 12K(2012)	RM0I1202F
45	R417	RES SMD, Ø. 1W, 1%, 12K(2012)	RM0I1202F	46	R418	RES SMD, Ø. 1W, 5%, 47K(2012)	RM0I4702J
47	R419	RES SMD, Ø. 1W, 5%, 47K(2012)	RM0I4702J	48	R420	RES SMD, Ø. 1W, 5%, 470(2012)	RM0I4700J
49	R421	RES SMD, Ø. 1W, 5%, 82K(2012)	RM0I8202J	50	U105	IC OP AMP, MC4558CN	591-267-9
51	U106	IC REG, GL7912	595-009	52	U107	IC REG, GL7812	591-209-9
53	U108	IC REG, GL7805	591-310-9				

NO.	FND NO	DESCRIPTION & SPEC.	P / N	NO.	FND NO	DESCRIPTION & SPEC.	P / N
1		TUBE, SHIRINK, GSHS-1605 15MM3	884-021	2	F1	FUSE, 125V2A MF51NM TYPE	563-035
3	GND	WIRING HARNESS, WH109-2	550-170-C	4	J105	WIRING HARNESS, WH15	550-775-A
5	J106	WIRING HARNESS, WH08	550-635-A	6	J109	WIRING HARNESS, WH07	550-768-A
7	J110	WIRING HARNESS, WH16	550-775-A	8	J1A	WIRING HARNESS, JW1	550-780-A
9	J2A	WIRING HARNESS, JW2	550-781-A	10	J801	BUS WIRE, 10MM, PI-0.6	871-056
11	L1	ROTATION COIL	638-005	12	P1	CONNECTOR, BNC (CH1, X)	531-164
13	P1301	CONNECTOR WAFER, LW-0640-04	531-003-7	14	P1302	SOCKET, CRT	535-017-9
15	P2	CONNECTOR, BNC (CH2, Y)	531-164	16	P3	CONNECTOR, BNC (EXT TRG)	531-164
17	P4	TERMINAL, PROBE ADJUST	539-010	18	P5	TERMINAL, GROUND Z-048	537-018
19	P6	CONNECTOR, BNC (CH1 OUT)	531-164	20	P7	CONNECTOR, BNC (EXT BLANKING)	531-164
21	P8	AC INLET, BACI-03 BELTON	535-037	22	PB101	WIRING HARNESS, WH17	550-777-A
23	PB801	WIRING HARNESS, WH06	550-767-A	24	PB802	WIRING HARNESS, WH03	550-764-A
25	PB803	WIRING HARNESS, WH04	550-765-A	26	PB804	WIRING HARNESS, WH05	550-766-A
27	PB805	WIRING HARNESS, WH01	550-762-A	28	PB806	WIRING HARNESS, WH02	550-763-A
29	PB901	WIRING HARNESS, WH14	550-774-A	30	PB902	WIRING HARNESS, WH11	550-771-A
31	PB903	WIRING HARNESS, WH13	550-773-A	32	PB904	WIRING HARNESS, WH10	550-770-A
33	PS1	WIRING HARNESS, PS1	550-782-A	34	PS2	WIRING HARNESS, PS2	550-783-A
35	PS3	WIRING HARNESS, PS3	550-784-A	36	R901	RES C. F, 1/4W, 5%, 470	RD0BP471J
37	S1	SW POWER, SY13-4-18Q	521-097-1	38	SC1	PCB, MAIN BOARD 180x300	513-565R1
39	SC13	PCB, CRT SOCKET BOARD	513-467R1	40	SC8	PCB, CONTROL BOARD 180x52	513-566
41	SC89	PCB, CONT ARRY BOARD 200x239	513-5667A	42	SC9	PCB, SELECTOR BOARD 180x26	513-567
43	T1	TRANSFORMER, POWER OS-9020P	622-036R1	44	V1	CRT, D14-363GY/123	631-007-2
45	W100	WIRING HARNESS, JW3	550-797-A	46	W101	WIRING HARNESS, JW4	550-797-A
47	W102	WIRING HARNESS, JW6	550-779-A	48	W103	WIRING HARNESS, JW5	550-778-A
49	WH130	WIRING HARNESS, WH130	550-649-A	50	Y+Y-	WIRING HARNESS, WH09	550-769-A

PART-LISTS of MODEL OS-9020P Rev. B // The End

Printed Date : 1994. 8. 16

9. BLOCK DIAGRAM

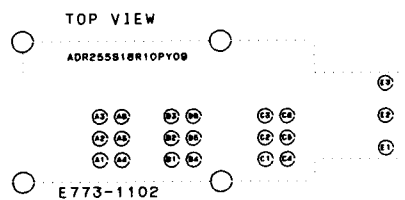
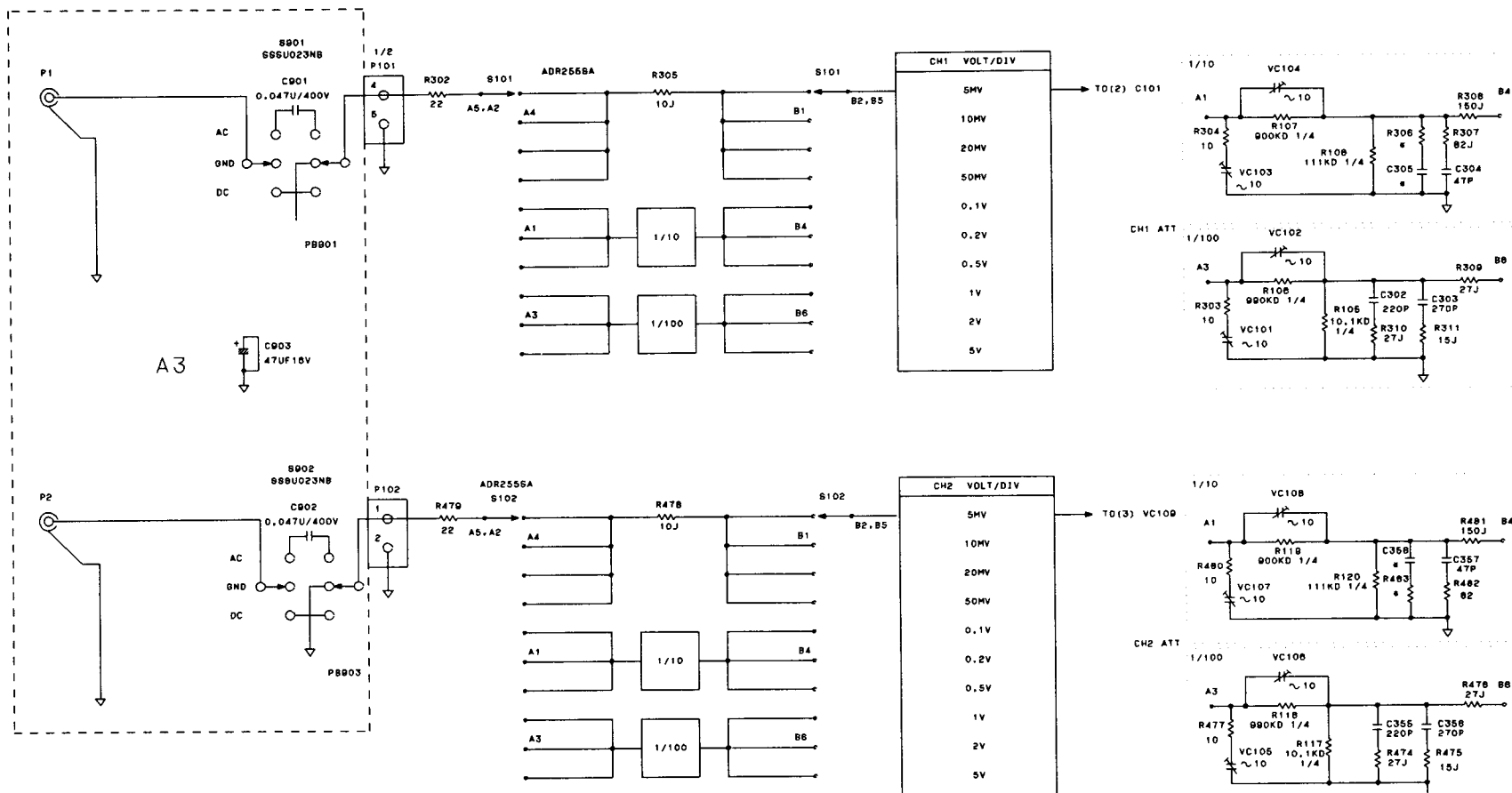


BLOCK REV. 1.3
1994. 8.7

05-9020P

BLOCK DIAGRAM

10. SCHEMATIC DIAGRAMS

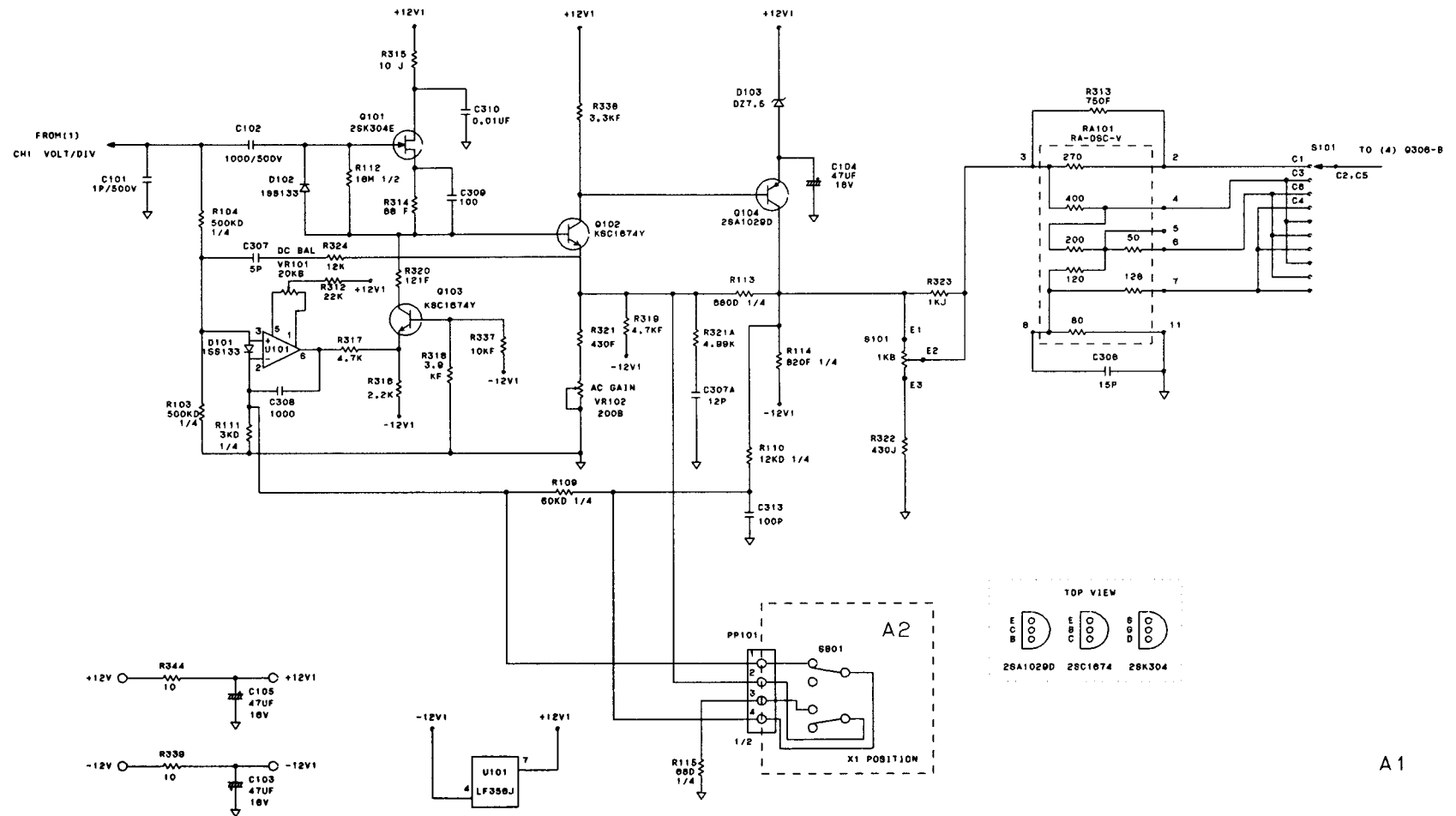


ATTNT

REV. 2.4
1994. 8.7

OS-9020P
ATTENUATOR (1)

NOTE — *NOT USED

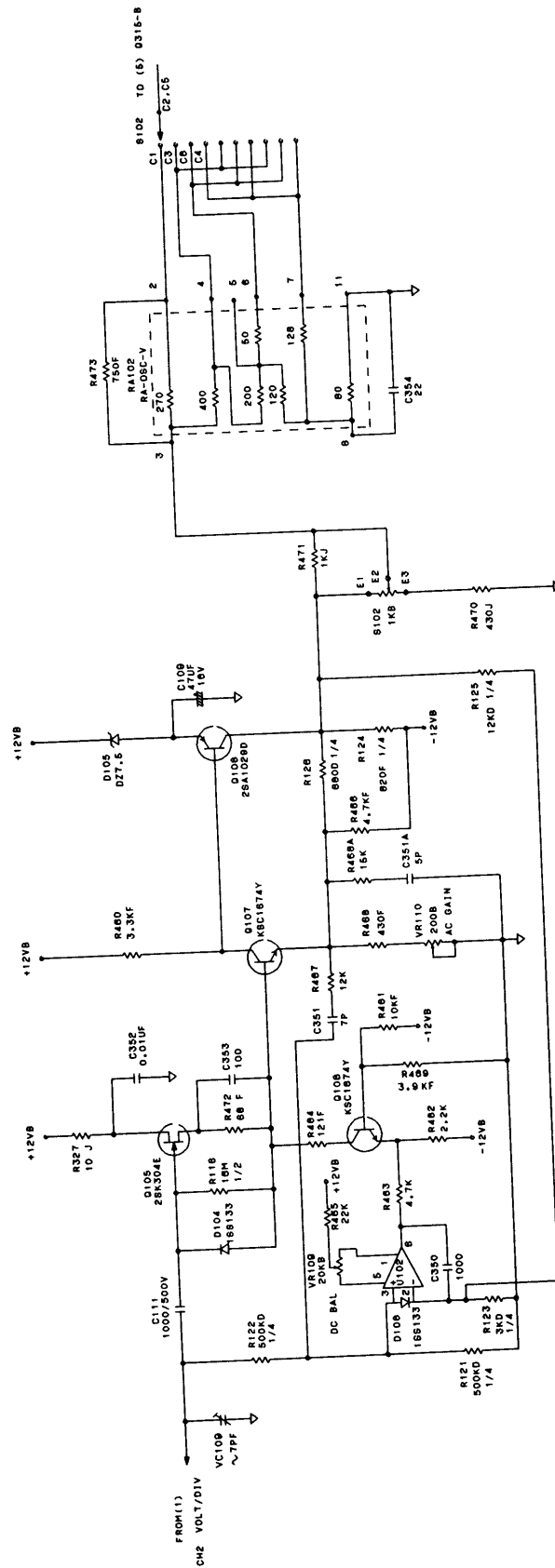


A1

INCH1 REV. 2.5
1994. 6.7

OS-8020P
CH1 INPUT AMP (2)

NOTE — *NOT USED



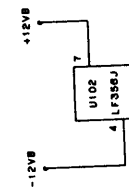
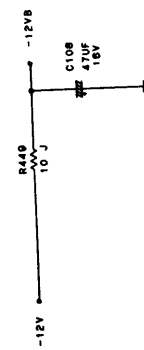
A1

1 INCH

REV. 6.1
1984. 6.1

OS-9020P

CH2 INPUT AMP (3)



A: 1

— — — PRECIPITATION

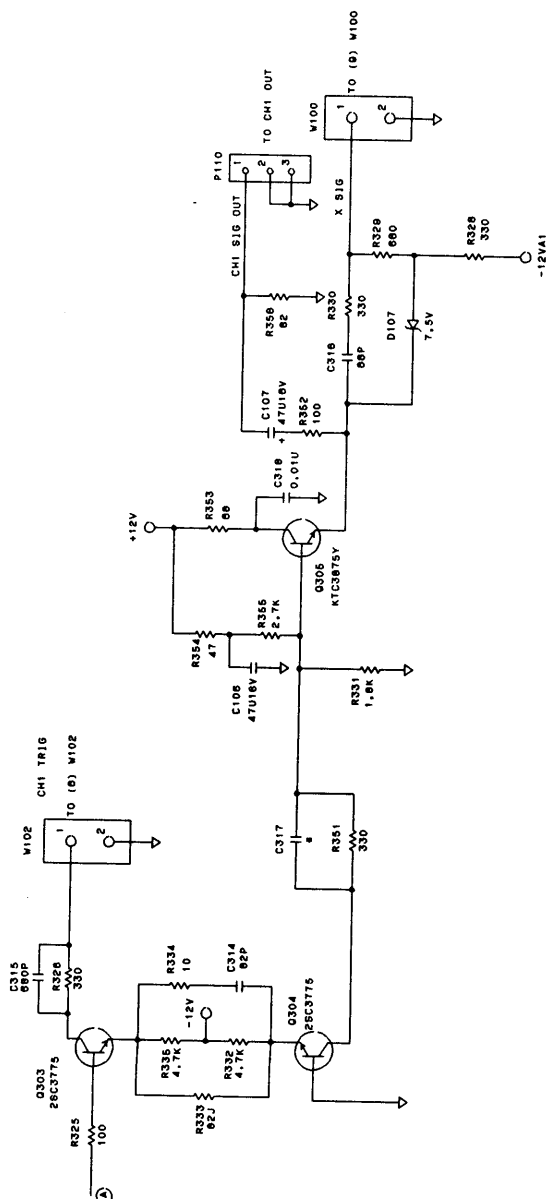
REV. 2.0
161994, 0.7

OS-99020P

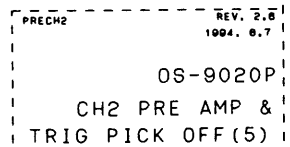
CH1 PRE AMP &
TRIG PICK OFF (4)

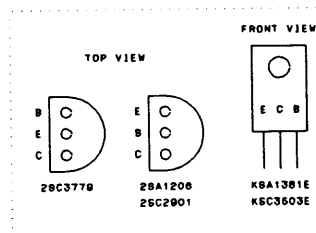
The schematic diagram illustrates the internal circuitry of the A2 module. It is a multi-stage amplifier using three transistors: 2N3904 (Q308, Q307), 2N3906 (Q306), and 2N3904 (Q309). The input stage (Q308) is biased with a +12V supply through resistors R301, R302, and R303. The signal path continues through Q306 and Q307, which are also biased with +12V and -12V supplies. A variable gain control (VR104) is used to adjust the output level. The output stage (Q309) is biased with a +12V supply through resistors R347, R348, and R349. The circuit includes various coupling and bypass capacitors (C301-C325) and a feedback network (R350, R351, R352, R353, R354, R355, R356, R357, R358, R359, R360, R361, R362, R363, R364, R365, R366, R367, R368, R369, R370, R371, R372, R373, R374, R375, R376, R377, R378, R379, R380, R381, R382, R383, R384, R385, R386, R387, R388, R389, R390, R391, R392, R393, R394, R395, R396, R397, R398, R399, R400, R401, R402, R403, R404, R405, R406, R407, R408, R409, R410, R411, R412, R413, R414, R415, R416, R417, R418, R419, R420, R421, R422, R423, R424, R425, R426, R427, R428, R429, R430, R431, R432, R433, R434, R435, R436, R437, R438, R439, R440, R441, R442, R443, R444, R445, R446, R447, R448, R449, R450, R451, R452, R453, R454, R455, R456, R457, R458, R459, R460, R461, R462, R463, R464, R465, R466, R467, R468, R469, R470, R471, R472, R473, R474, R475, R476, R477, R478, R479, R480, R481, R482, R483, R484, R485, R486, R487, R488, R489, R490, R491, R492, R493, R494, R495, R496, R497, R498, R499, R500, R501, R502, R503, R504, R505, R506, R507, R508, R509, R510, R511, R512, R513, R514, R515, R516, R517, R518, R519, R520, R521, R522, R523, R524, R525, R526, R527, R528, R529, R530, R531, R532, R533, R534, R535, R536, R537, R538, R539, R540, R541, R542, R543, R544, R545, R546, R547, R548, R549, R550, R551, R552, R553, R554, R555, R556, R557, R558, R559, R560, R561, R562, R563, R564, R565, R566, R567, R568, R569, R570, R571, R572, R573, R574, R575, R576, R577, R578, R579, R580, R581, R582, R583, R584, R585, R586, R587, R588, R589, R590, R591, R592, R593, R594, R595, R596, R597, R598, R599, R600, R601, R602, R603, R604, R605, R606, R607, R608, R609, R610, R611, R612, R613, R614, R615, R616, R617, R618, R619, R620, R621, R622, R623, R624, R625, R626, R627, R628, R629, R630, R631, R632, R633, R634, R635, R636, R637, R638, R639, R640, R641, R642, R643, R644, R645, R646, R647, R648, R649, R650, R651, R652, R653, R654, R655, R656, R657, R658, R659, R660, R661, R662, R663, R664, R665, R666, R667, R668, R669, R670, R671, R672, R673, R674, R675, R676, R677, R678, R679, R680, R681, R682, R683, R684, R685, R686, R687, R688, R689, R690, R691, R692, R693, R694, R695, R696, R697, R698, R699, R700, R701, R702, R703, R704, R705, R706, R707, R708, R709, R710, R711, R712, R713, R714, R715, R716, R717, R718, R719, R720, R721, R722, R723, R724, R725, R726, R727, R728, R729, R730, R731, R732, R733, R734, R735, R736, R737, R738, R739, R740, R741, R742, R743, R744, R745, R746, R747, R748, R749, R750, R751, R752, R753, R754, R755, R756, R757, R758, R759, R760, R761, R762, R763, R764, R765, R766, R767, R768, R769, R770, R771, R772, R773, R774, R775, R776, R777, R778, R779, R780, R781, R782, R783, R784, R785, R786, R787, R788, R789, R790, R791, R792, R793, R794, R795, R796, R797, R798, R799, R800, R801, R802, R803, R804, R805, R806, R807, R808, R809, R810, R811, R812, R813, R814, R815, R816, R817, R818, R819, R820, R821, R822, R823, R824, R825, R826, R827, R828, R829, R830, R831, R832, R833, R834, R835, R836, R837, R838, R839, R840, R841, R842, R843, R844, R845, R846, R847, R848, R849, R850, R851, R852, R853, R854, R855, R856, R857, R858, R859, R860, R861, R862, R863, R864, R865, R866, R867, R868, R869, R870, R871, R872, R873, R874, R875, R876, R877, R878, R879, R880, R881, R882, R883, R884, R885, R886, R887, R888, R889, R890, R891, R892, R893, R894, R895, R896, R897, R898, R899, R900, R901, R902, R903, R904, R905, R906, R907, R908, R909, R910, R911, R912, R913, R914, R915, R916, R917, R918, R919, R920, R921, R922, R923, R924, R925, R926, R927, R928, R929, R930, R931, R932, R933, R934, R935, R936, R937, R938, R939, R940, R941, R942, R943, R944, R945, R946, R947, R948, R949, R950, R951, R952, R953, R954, R955, R956, R957, R958, R959, R960, R961, R962, R963, R964, R965, R966, R967, R968, R969, R970, R971, R972, R973, R974, R975, R976, R977, R978, R979, R980, R981, R982, R983, R984, R985, R986, R987, R988, R989, R990, R991, R992, R993, R994, R995, R996, R997, R998, R999, R1000, R1001, R1002, R1003, R1004, R1005, R1006, R1007, R1008, R1009, R1010, R1011, R1012, R1013, R1014, R1015, R1016, R1017, R1018, R1019, R1020, R1021, R1022, R1023, R1024, R1025, R1026, R1027, R1028, R1029, R1030, R1031, R1032, R1033, R1034, R1035, R1036, R1037, R1038, R1039, R1040, R1041, R1042, R1043, R1044, R1045, R1046, R1047, R1048, R1049, R1050, R1051, R1052, R1053, R1054, R1055, R1056, R1057, R1058, R1059, R1060, R1061, R1062, R1063, R1064, R1065, R1066, R1067, R1068, R1069, R1070, R1071, R1072, R1073, R1074, R1075, R1076, R1077, R1078,

A2

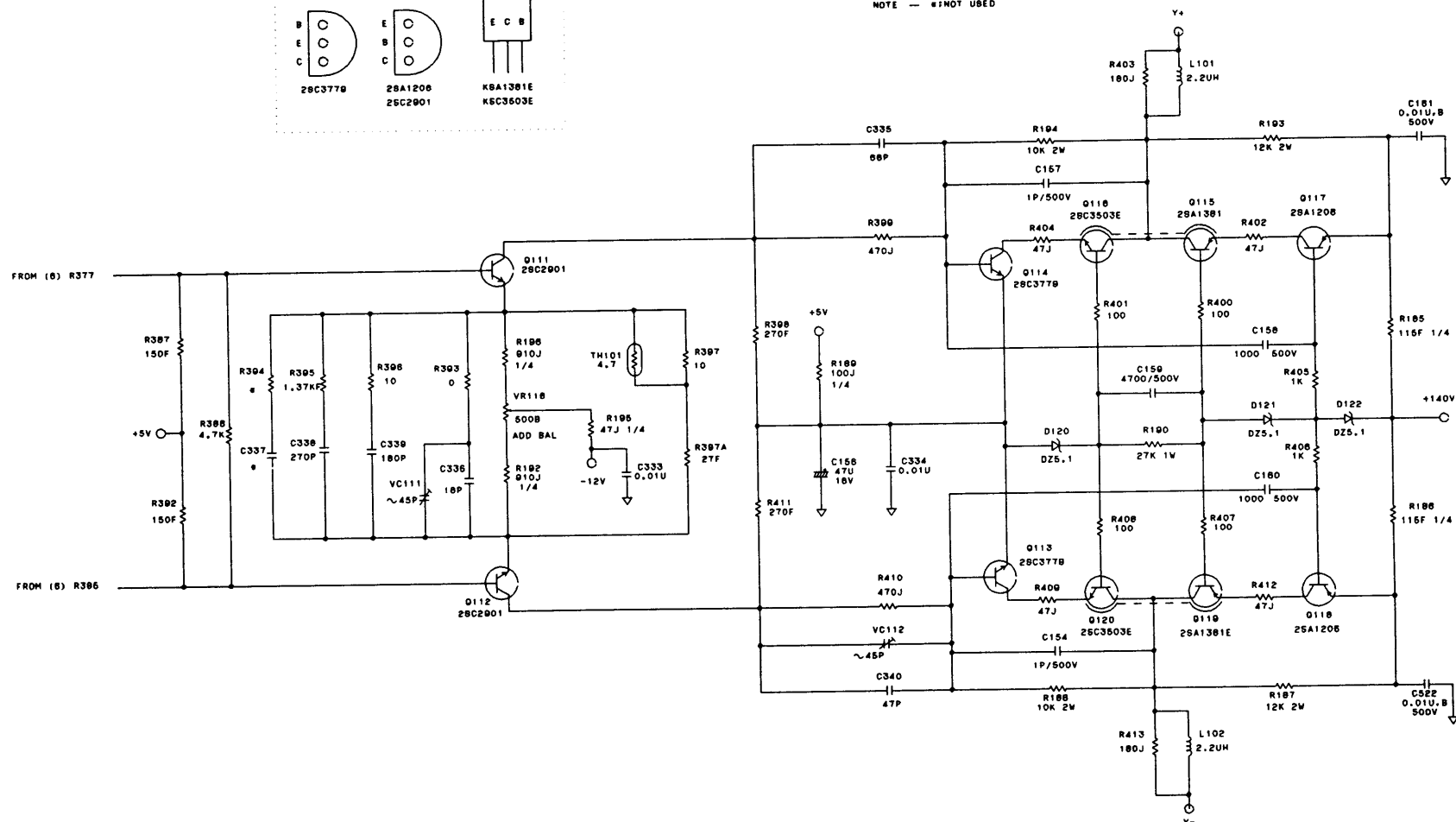


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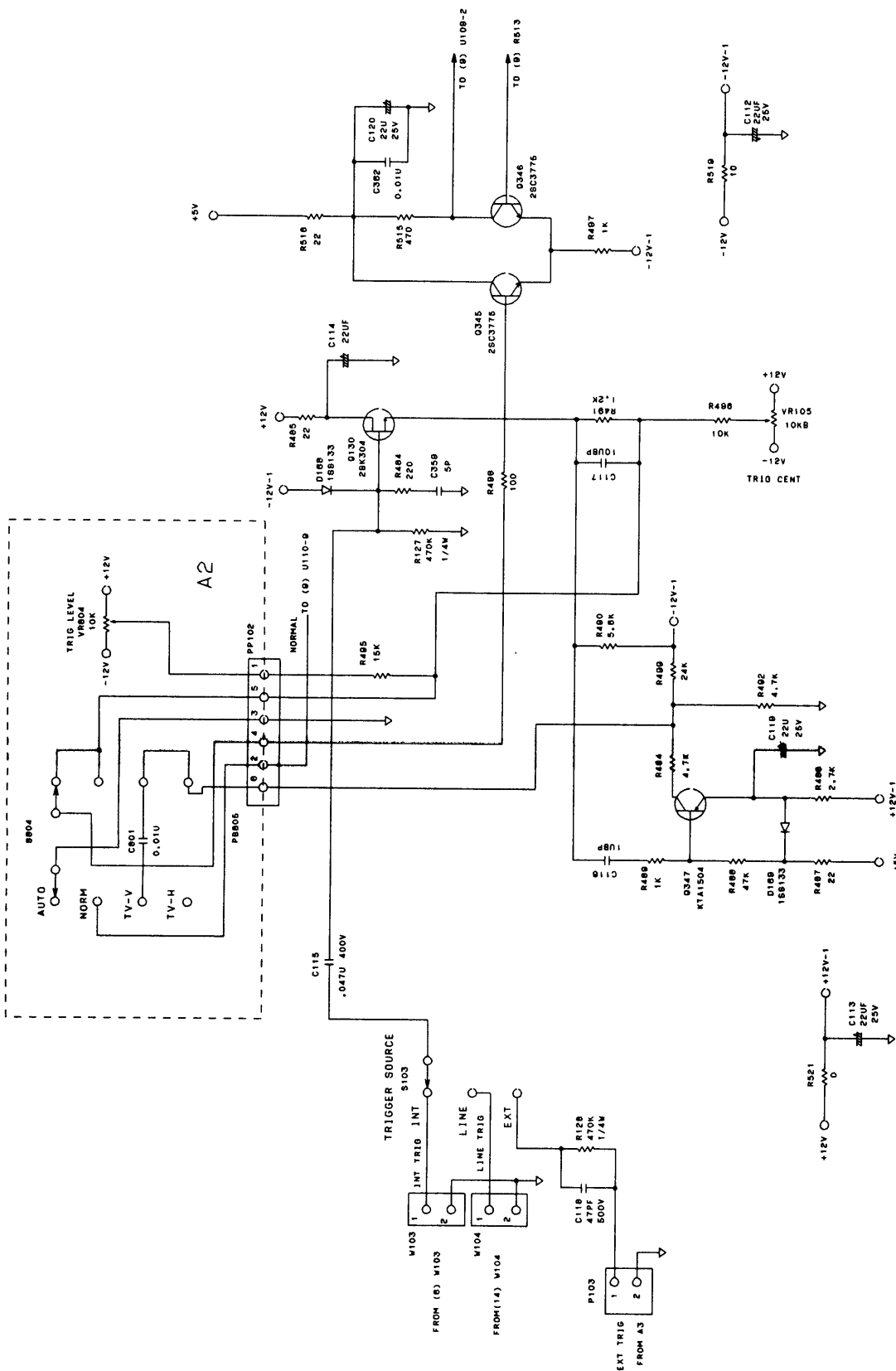
NOTE — #: NOT USED

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REV. 2.6
1994. 0.7

OS-9020P

VERTICAL MAINAMP(7)

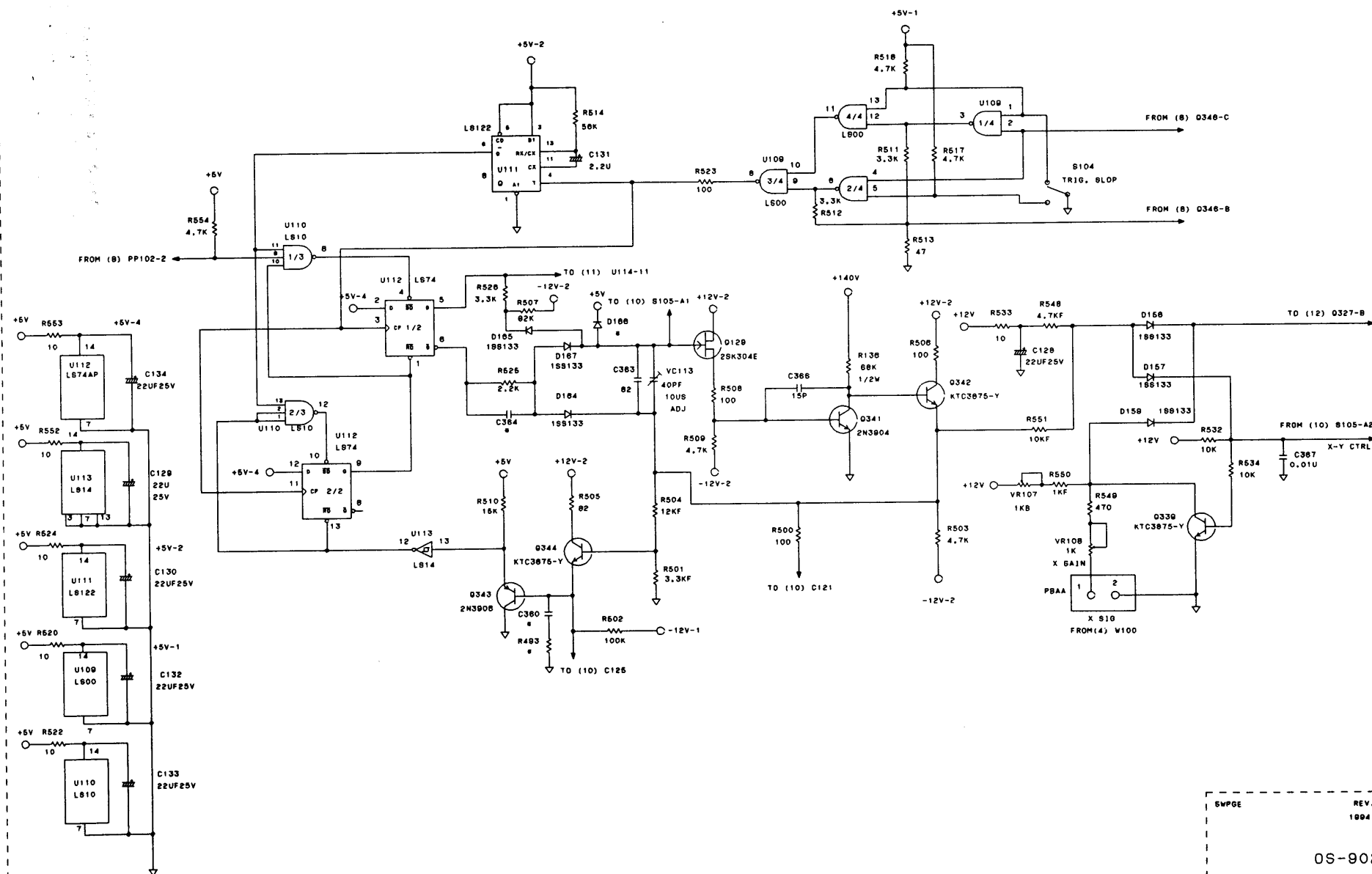


A1

REV. 2.6
1984. 6.7

OS-9020P
TRIG. AMP (8)

Ask & Co. Elektronikk
Lynghoveien 52, N-5163 Laksevåg, Norway
Tlf. (47)55344893 Fax. 55341110 Mob. 90764111
post@ask.hi.no www.ask.hi.no
Orgnr 946 417 637



SWPGE

REV. 2.5
1994. 6.7

OS-9020P
SWEEP GEN. (9)

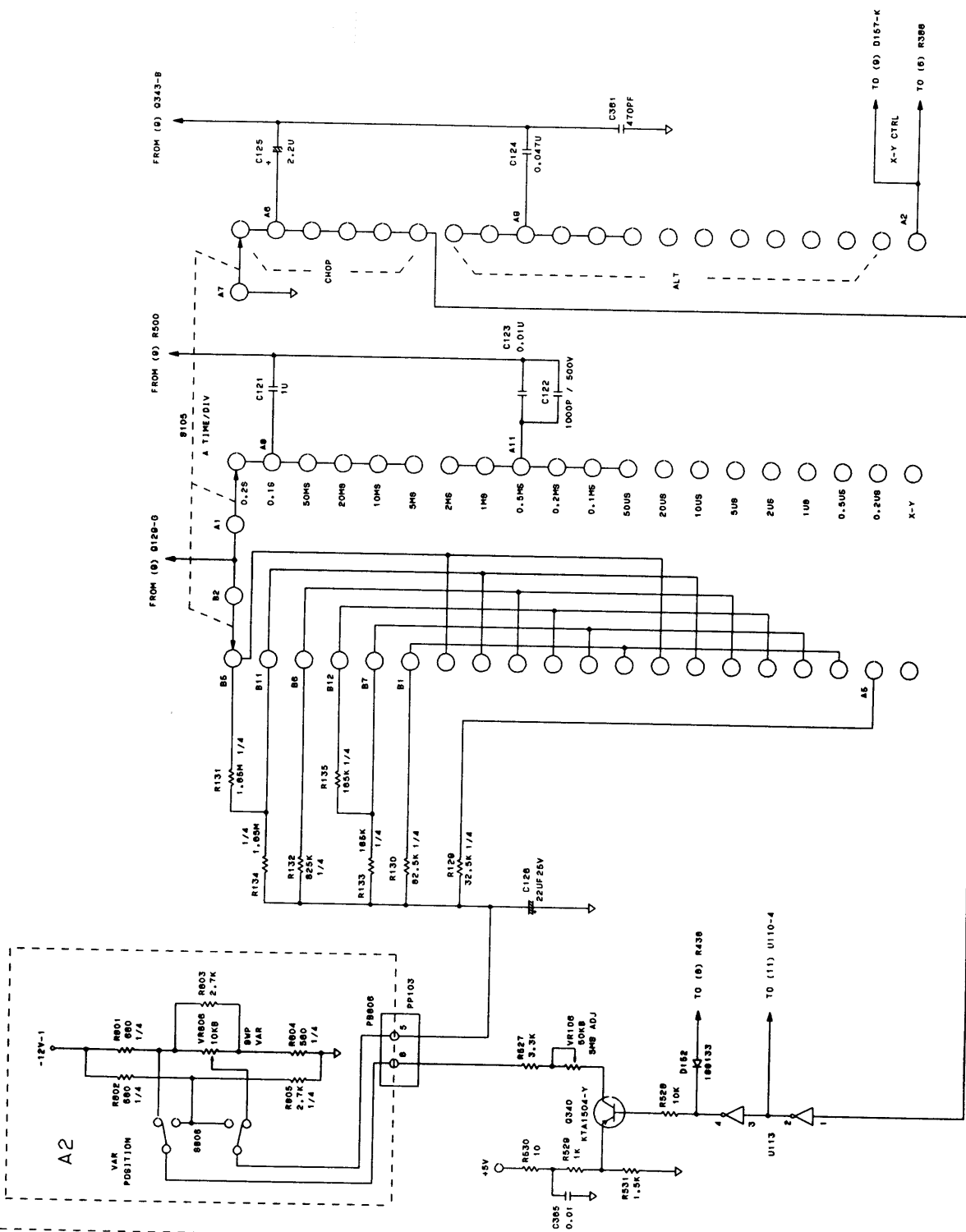
Ask & Co. Elektronik
 Lyngboveien 52, N-5163 Laksevåg, Norway
 Tlf. (47)55344893 Fax. 55341110 Mob. 90764111
 post@ask.hl.no www.ask.hl.no
 Orgnr 946 417 637

OS-9020P

TIMING C.K.T(10)

A1

IMM REV. 2.3
1994. 6.7



TOP VIEW

FROM (0) 0343-B

FROM (9) R500

FROM (C) 0120-0

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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[illegible]

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07 08 09

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④ ⑨ ⑨ ④ ⑨ ⑨

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