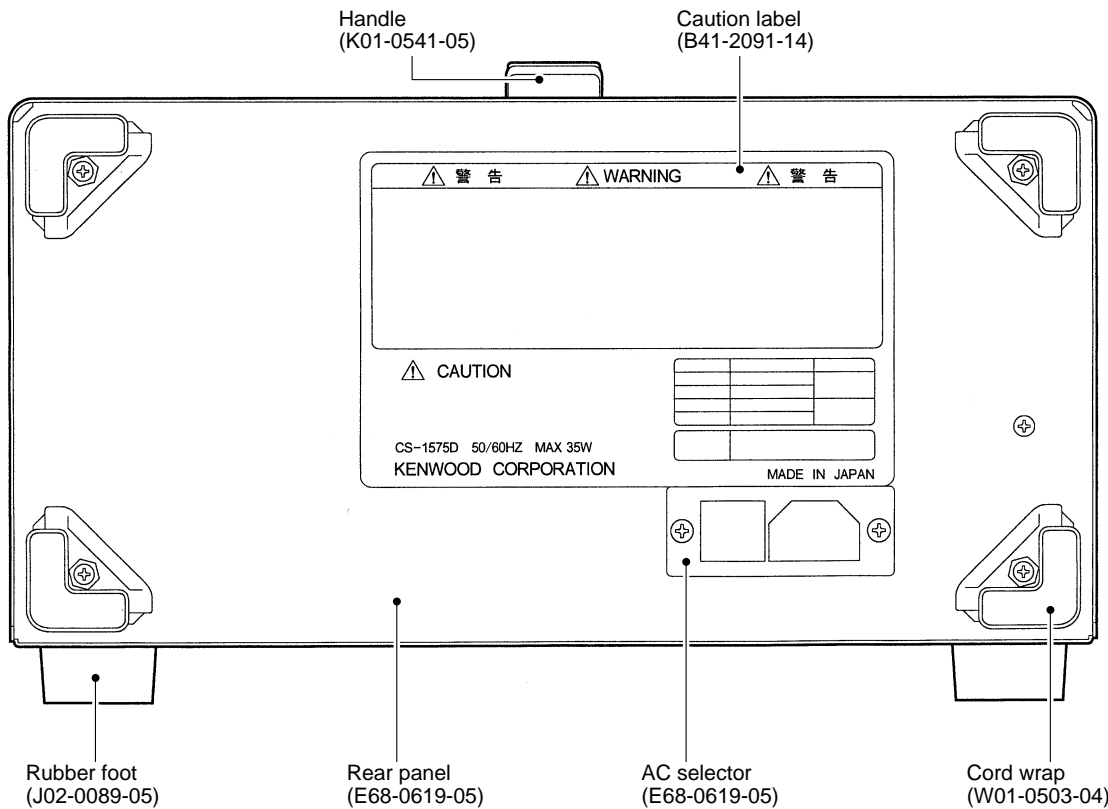
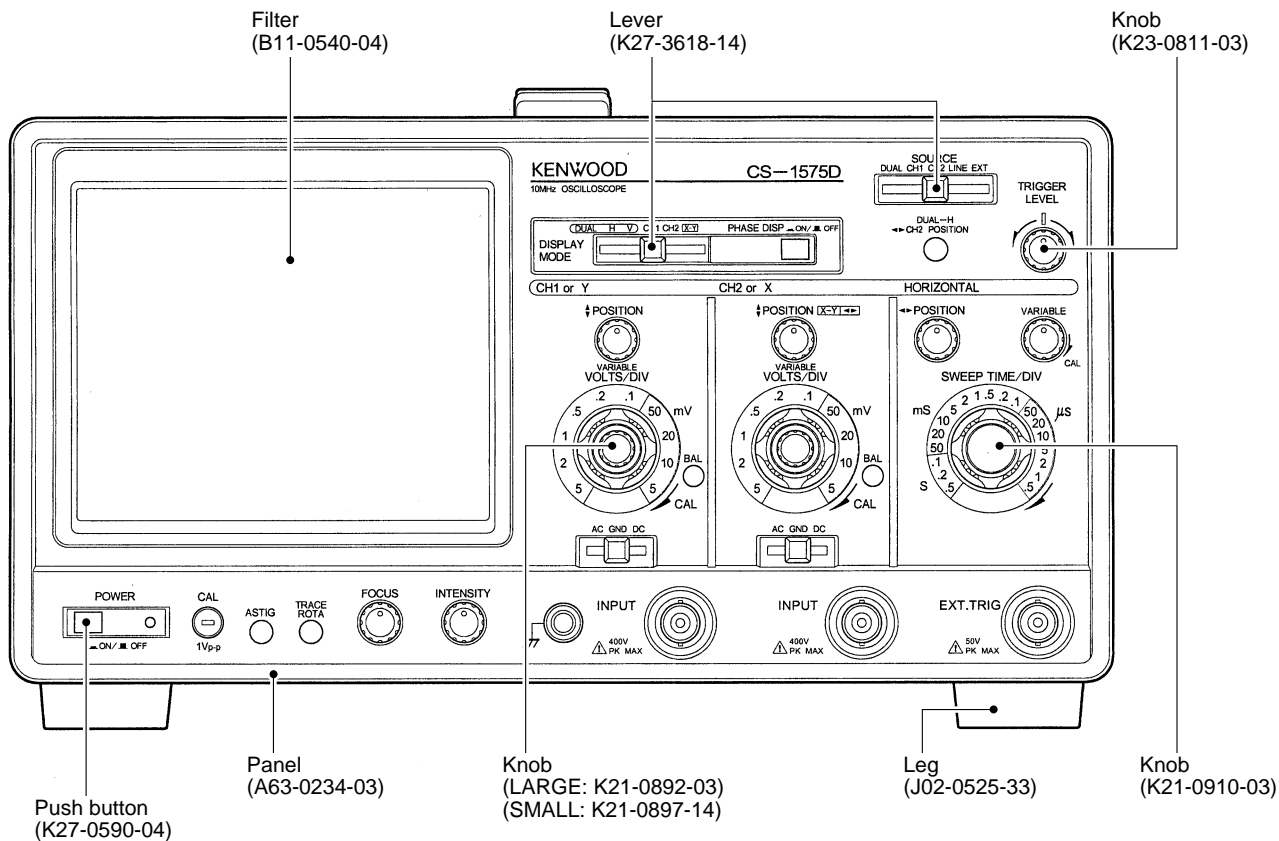


10MHz OSCILLOSCOPE
CS-1575D
 SERVICE MANUAL

KENWOOD
 KENWOOD TMI CORPORATION

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CS-1575D

WARNING

The following instructions are for use by qualified personnel only. To avoid electric shock, do not perform any servicing other than contained in the operating instructions unless you are qualified to do so.

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SPECIFICATIONS

CRT

Type.....	Rectangular CRT with inner graticule
Acceleration voltage	Approx. 2kV
Effective display area	8x10divisions (1div.=10mm)
Vertical Axis (Common to CH1 and CH2)	
Operation modes	DUAL-H : Horizontal dual-trace mode DUAL-V : Vertical dual-trace mode CH1 : CH1 only CH2 : CH2 only X-Y : CH1=Y-axis, CH2=X-axis
Dual-trace selection.....	CHOP operation when SWEEP TIME/DIV is set to 1ms or less. ALT operation when SWEEP TIME/DIV is set to 0.5 ms or more.
Phase display	X-Y Lissajous' pattern is displayed simultaneously by pressing PHASE DISP. Zero-phase Lissajous' pattern is displayed simultaneously in X-Y operation mode.
Sensitivity	5mV to 5V/div.±3%
Attenuator	1-2-5 steps, 10 ranges, finely controllable in ranges
Input impedance	1MΩ+2%, approx. 38pF
Frequency response.....	DC : DC to 10MHz, -3dB or less AC: 5Hz to 10MHz, -3dB or less
Rise time.....	Approx. 35ns
Cross talk.....	-40 dB or less
CHOP frequency	Approx. 250kHz
△Max. input withstand voltage	800Vp-p or 400V (DC+ACpeak)

Horizontal Axis

Operation modes	X-Y mode is selected with DISPLAY MODE. CH1 : Y-axis CH2 : X-axis
Sensitivity	Same as vertical axis CH2.
Input impedance	Same as vertical axis CH2.
Frequency response.....	DC : DC to 1MHz, -3dB or less AC : 5Hz to 1MHz, -3dB or less
X-to-Y phase difference.....	3° or less at 50kHz
△ Max. input withstand voltage	Same as vertical axis CH2.

Sweep

Sweep type.....	Auto free run sweep
Sweep time.....	0.5us/div. to 0.5s/div.±3% 1-2-5 steps, 19 ranges Finely controllable in ranges

Linearity.....±3%

CS-1575D

SPECIFICATIONS

Triggering

Trigger signal sourceDUAL: Trigger signals are selected automatically according to CH1 and CH2 waveforms.

CH1 : CH1 input signal

CH2 : input signal

LINE : Commercial power source frequency

EXT: Signal input to EXT. TRIG

External triggering

input impedance1M Ω , approx. 35 pF

△ Max, input withstand voltage100Vp-p or 50V (DC+ACpeak)

Triggering signal coupling.....AC coupling

Triggering sensitivity.....DUAL, CH1 & CH2 : 0.5div. (50Hz to 3MHz)
1div. (20Hz to 10MHz)
EXT : 0.2Vp-p (50Hz to 3MHz)
0.5Vp-p (20Hz to 10MHz)

Calibration Signal

WaveformSquare wave, positive polarity

Voltage1Vp-p \pm 3%

Frequency.....100Hz or 120Hz (Twice as high as commercial power source frequency)

Trace Rotation

Control.....Semi-fixed control on panel

Power Source

Source voltage.....100, 120, 220 or 230VAC \pm 10%

Frequency.....50 or 60 Hz

Power consumptionmax. 35W

Dimensions and Weight (Values enclosed in parentheses include projections)

Width290mm (290mm)

Height150mm (170mm)

Depth380mm (440mm)

WeightApprox. 7kg

Operating Temperature & Humidity

Within spec. temp & humid.10 to 35°C, 85% or less (No dew condensation)

Operating temp. & humid.0 to 40°C, 85% or less (No dew condensation)

Accessories

Signal connection cable.....CA-41, two cables

Instruction manual1 copy

Power cable.....1

Replacement fuse.....1

SAFETY

SAFETY

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

Line voltage

This instrument operates using ac-power input voltages that 100/120/220/230 V at frequencies from 50 Hz to 60Hz.

Power cord

The ground wire of the 3-wire ac power plug places the chassis and housing of the oscilloscope at earth ground. Do not attempt to defeat the ground wire connection or float the oscilloscope ; to do so may pose a great safety hazard. The appropriate power cord is supplied by an option that is specified when the instrument is ordered. The optional power cords are shown as follows in Fig.1

Line fuse

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

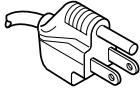
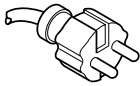
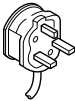
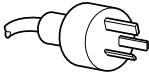
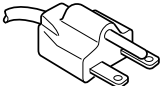
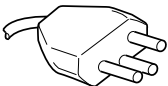
Plug configuration	power cord and plug type	Factory installed instrument fuse	Line cord plug fuse	Parts No. for power cord
	North American 120 volt/60 Hz Rated 15 amp (12 amp max ; NEC)	0.7A, 250V slow blow 5x20mm	None	E30-1951-05
	Universal Europe 220 volt/50 Hz Rated 16 amp	0.3A, 250V slow blow 5x20 mm	None	E30-1952-05
	U.K. 240 volt/50 Hz Rated 5 amp	0.3A, 250V slow blow 5x20 mm	5A Type C	E30-1963-15
	Australian 240 volt/50 Hz Rated 10 amp	0.3A, 250V slow blow 5x20 mm	None	E30-1953-05
	North American 240 volt/60 Hz Rated 15 amp (12 amp max ; NEC)	0.3A, 250V slow blow 5x20mm	None	-
	Switzerland 230 volt/50Hz Rated 10 amp	0.3A, 250V slow blow 5x20 mm	None	-

Fig.1 Power Input Voltage Configuration

CIRCUIT DESCRIPTION

Vertical Attenuator Circuit

The attenuators for CH1 and CH2 consist of rotary switches and passive elements on a PC board.

Vertical input signals from the BNC input receptacle enter into the first-stage attenuator circuit via the path selected by the AC-GND-DC switch. They then pass through either attenuator 1/1, 1/10 or 1/100, along the path selected by the vertical rotary switch, and enter into the first-stage buffer amplifier.

The first-stage buffer amplifier consists of Q24 and Q1(CH2: Q25 and Q2). Input signals, impedance-converted by the buffer amplifier, are sent to the second-stage attenuator. They then

pass through either attenuator 1/1, 1/2, 1/4 or 1/10, and enter into the vertical preamplifier. Q1(Q2) located on the input circuit provides a function as an equivalent diode for protecting the elements (Q24 and Q25) during a great amplitude input.

TC1(51) and TC3(53) are an input capacitance regulator for attenuators 1/10 and 1/100 respectively. TC2(52) and TC4(54) are a 1kHz square wave characteristic regulator for attenuators 1/10 and 1/100 respectively. VR2(52) is a step DC balance regulator for the attenuators. VR1(51) is a step DC balance regulator with an adjustment on the front panel. VR1 is for user use.

Vertical Preamplifier Circuit

Signals output from the attenuator circuit are then input into the 2nd preamplifier which consists of a hybrid IC, 3(4). This IC has a gain of approximately 12-fold. VR5(55) is a 1kHz square wave characteristic regulator available for sensitivity of 10mV/div. VR3(53) is a VAR BAL regulator.

Signals, after sufficiently amplified by the 2nd amplifier, pass through the vertical axis sensitivity variable circuit that uses the controller of the attenuator rotary switch, and then enter into the 3rd amplifier.

The 3rd amplifier is a hybrid IC, 5(6). Signals input into this amplifier become complementary signals and are output to the 4th amplifier as electric current signals. The IC contains CH1 (CH2) position circuit and CH switch circuit. The position circuit is controlled by the controller on the panel unit. The switch circuit is controlled by vertical mode switch signals from the horizontal side. VR57 is a vertical axis sensitivity regulator for CH2. TC56 is a higher-frequency characteristic regulator for CH2.

CH1(CH2) trigger signals from the 3rd terminal of IC5(6) are amplified by the feedback amplifier Q16(19), then converted into electric signals by Q17(20), and then sent to the trigger signal switch circuit located in the horizontal side. CH2 trigger signals from the collector Q19 are amplified by Q21, then converted into X-axis signals via the emitter follower Q22, and then sent to the horizontal signal switch circuit located in the horizontal side. Q23 conditions the CH2 position signals with respect to the operating point and sensitivity, and then send them as X-axis position signals. VR151 is a sensitivity regulator for X-axis signals. VR152 is an X posi-

tion regulator: regulating the DC level of X signals.

The electric current signals which were switched over by the 3rd amplifier are input into the 4th amplifier consisting of Q4 and Q5, and then sent to the vertical output amplifier as voltage signals. The 4th amplifier is a feedback amplifier which can operate the vertical output amplifier with a low output impedance.

Vertical Output Amplifier Circuit

Signals from the 4th amplifier are amplified about 45-fold by the output amplifiers consisting of Q6 through Q15, and drive the Y deflecting plate of the CRT.

The output amplifier is a feedback amplifier. The final stage Q12 and Q14 are driven by the complementary emitter followers Q8/Q10 and Q9/Q11 respectively. By doing so, the linearity of the first and last transition high frequencies is improved, and the input impedance is made higher. Q13 and Q15 work to obtain sufficient gain during constant-current loss in Q12 and Q14 respectively. Negative feedback is sufficiently applied as well. Consequently, this circuit achieves low impedance output of large amplitude signals with good linearity.

VR103 is a sensitivity regulator based on CH1 signals for the entire vertical amplifiers. TC101 is a frequency characteristic regulator for the entire vertical amplifiers in general and for the output amplifier in particular. VR104 is an operating point voltage regulator for the output amplifier.

Trigger Circuit

This equipment has two trigger pulse generating circuits. CH1 trigger signals for the vertical system are fed into the waveform shaping circuits Q604 through Q608 and IC601(1/4 and 2/4). External trigger signals from the buffer amplifier such as CH2 from the vertical system, line signals from the power system and Q202 pass through the trigger source selection circuit consisting of Q601/602/603 and D601/602/603. Trigger signals selected by the source switch on the panel unit are fed into the waveform shaping circuits Q609 through Q613 and IC601(3/4 and 4/4).

The waveform shaping circuits constitute a Schmitt circuit whose threshold level is adjustable using the trigger level controller on the panel unit. VR601 is a regulator for obtaining the two identical trigger levels.

CH1 trigger signals shaped are fed into IC204(1/4 and 2/4) whereby they become pulse signals. CH2, line and external signals shaped are fed into IC204(3/4 and 4/4) whereby they become pulse signals.

The selection circuit IC202(1/4, 2/4 and 4/4) selects CH1 or others, or CH1 and CH2 alternately in DUAL status. The selected signals are input into IC205(4/4) and IC205(3/4), and used as trigger gate signals for driving Q217. The gate signals are controlled by the sweep stop signals. If there are no trigger signals, the sweep circuit will free-run under the control of the Auto circuit comprising D205(208), D206(209) and Q213(214).

CIRCUIT DESCRIPTION

Display Switch Circuit

IC206(1/4 and 2/4) is a transmitter for displaying chops. IC207(1/2 and 2/2) is a vertical and horizontal mode control circuit.

Sweep Circuit

Trigger gate signals drive Q217 to control the hybrid IC201. The IC201 contains a constant current, charged type ramp wave generating circuit whose time constant is determined using the S201 code and C219 or C220. If the value of the S201 code is not greater than 1ms/Div, Q216 is turned ON, C219 is selected, and the time constant adjusting circuit for Q215 is activated so that VR201 adjusts the time constant. Ramp waves produced here are input into the upper limit circuit consisting of Q220, IC205(1/4 and 2/4), D219, D222, C228 and C229, and the hold-off circuit via the buffer amplifier of the emitter follower Q218, and then generate sweep stop signals and hold-off end signals. Ramp waves are input also into the horizontal output amplifier via the sweep circuit and X-signal switch circuit. VR202 is a regulator for controlling the gain of ramp waves.

Horizontal output Circuit

By giving Q301 horizontal signals and giving Q302 voltage signals representing the horizontal position, the collectors Q307/309 and Q308/310 are given differential signals for driving the X deflecting plate of the CRT. Q303 through Q310 are a constant current load type feedback amplifier with good linearity and low power consumption. VR302 is a regulator for operating point voltage.

Power System (x80-1420-00)

The power system consists of a low voltage circuit, high voltage circuit and blanking circuit.

Low Voltage Circuit

IC401 is an HIC for controlling four systems of $\pm 8V$, +140V and +5V. The voltage for each system comprising control-purpose transistors Q401 through Q405 is determined based on the -8V system. VR401 is a regulator for the -8V system. The rectifier diode D401 for the +140V system gives switching signals for CAL signals.

The +10V circuits D406 and C410 are unstable, and constitute a power source for the horizontal sweep HIC(IC201).

High Voltage Blanking Circuit

Q408 oscillates at approximately 60 kHz making use of the reactance of the converter transformer T401. The oscillation voltage appearing in the high voltage coil is kept stable at -1800V thanks to the voltage doubler rectifier circuits C425, C426, D409 and D410, and the control circuits Q409 and IC402. T401 contains a CRT heater coil which is turned on via R452.

Voltage signals of approximately 300Vpp are taken from the high voltage coil, and used as modulated signals for blanking. This is necessary for employing signals from blanking amplifiers Q406, 407 and 415 for the cathode potential. The

modulated signals drive the DC regeneration circuits D411-414, C423 and C424, and provides signals for controlling the brightness of the CRT G1 electrode.

Q410, 411 and 412 are a transistor for focus control.

Q416 gives the CRT G2 electrode the required voltage.

Q413 and Q414 drive the trace rotation coil. VR402 is a brightness regulator. VR403 is a focus regulator.

Other Circuits(x80-1420-00 H/8)

Q501 is turned on/off by CAL signals from the power source. Q501 provides the calibration voltage (100 or 120 Hz).

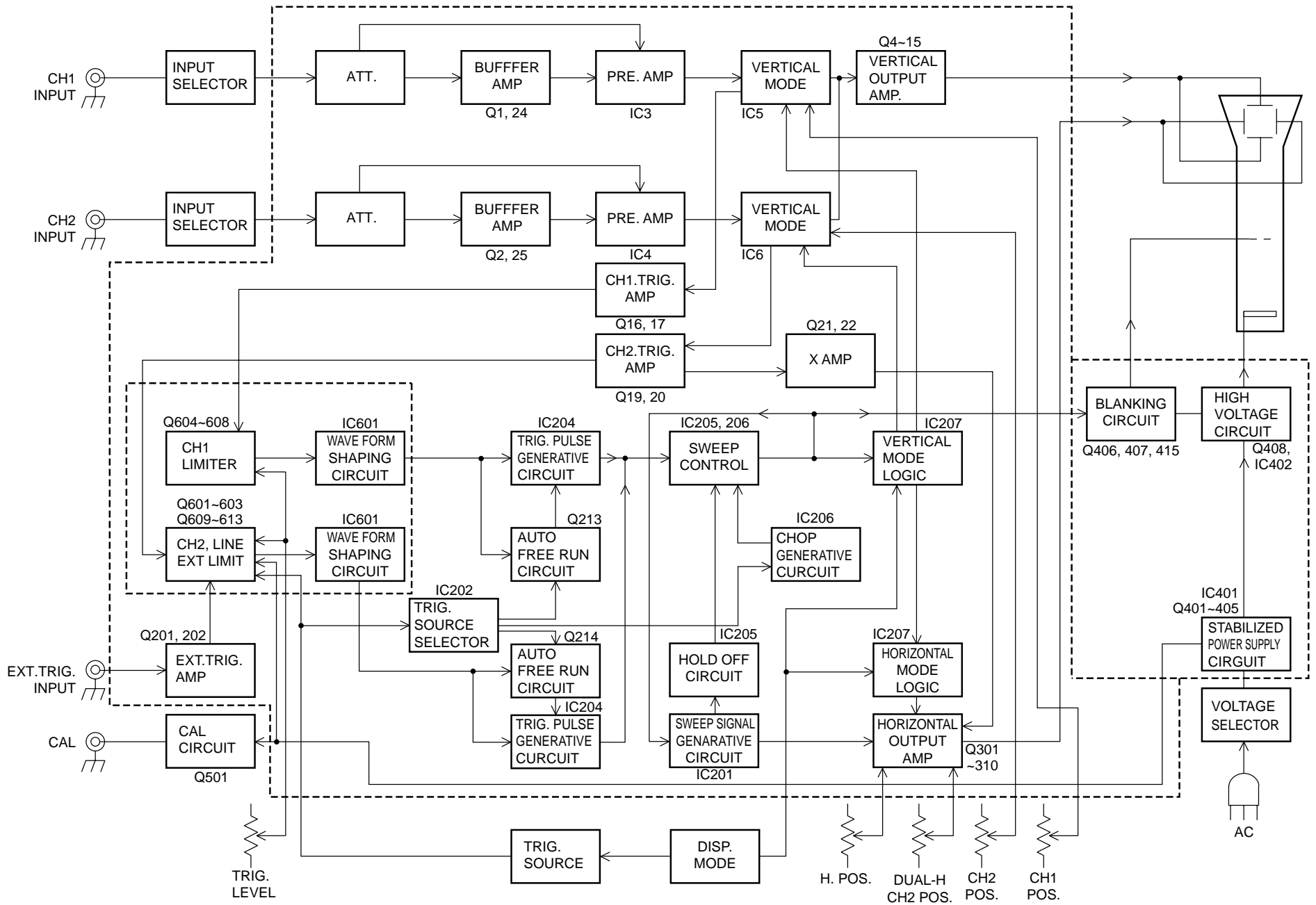
VR507 is an ASTIG regulator. VR508 is a trace rotation regulator. VR509 is a focus regulator. VR510 is a brightness regulator.

Panel Circuit(x80-1420-00 c/8)

S501 is a trigger source changeover switch. S502 is a display mode changeover switch. S503 is a phase display ON/OFF switch.

VR501 provides adjustment of SWEEP variables. VR503 and VR502 provide adjustment of the vertical position of CH1 and CH2 respectively. VR504 provides adjustment of the horizontal position. VR505 provides adjustment of the horizontal position of CH2 in the DUAL-H display mode. VR506 provides adjustment of trigger level.

BLOCK DIAGRAM



ADJUSTMENT

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

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

TEST EQUIPMENT REQUIERD

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

Test Equipment	Model	Minimum Specification
Digital Multi-Meter	DL-712 (KENWOOD)	Impedance : More than 10M Ω , Measuring range : 0.2V to 1000V
Sine-Wave Generator	651B (YHP)	Frequency : 10Hz to 10MHz, constant voltage over tuning range
Sine-Wave Generator	SG-503 (Tektronix)	Frequency : 50kHz to 100MHz, Output impedance : 50 Ω , constant voltage over tuning range
Square-Wave Generator	PG-506 (Tektronix)	Output signal : 1 kHz, Amplitude : 10mVp-p to 10 Vp-p, Accuracy : within ± 1 %, Rise time : 35ns or less 100 kHz, Rise time : 1 ns or less
Color Pattern Generator	CG-921 (KENWOOD)	—
Oscilloscope	CS-6040 (KENWOOD)	Sensitivity : more than 1 mV Frequency response : More than 150 MHz
Time-Marker Generator	TG-501 (Tektronix)	Time mark : 0.5 s to 0.1 μ s repetitive waveform
High-Voltage Probe	—	Input Impedance : 1000M Ω
Termination	—	Impedance : 50 Ω Accuracy : within 3 %
Termination	—	3 watts type impedance : 50 Ω
Capacitance meter	TC-1100 (KENWOOD)	—
DC standard	R6142 (Advantest)	—

PREPARATION FOR ADJUSTMENT

Control Settings

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

Exceptions to these settings will be noted as they occur. After completing a adjustment, return the controls to the following settings.

NAME OF KNOBS	POSITION
INTEN	12 O'clock
FOCUS	12 O'clock
POSITION	12 O'clock
TRIGGER LEVEL	12 O'clock
VARIABLE (GND)	Fully clock wise
VARIABLE (ATT)	Fully counter clock wise
SWEEP TIME / DIV	Fully counter clock wise
SOURCE	DUAL
DISPLAY MODE	DUAL H
AC-GND-DC	AC
PHASE DISP	<input type="checkbox"/> OFF
POWER	<input type="checkbox"/> OFF

Table 2

ADJUSTMENT

No.	Item	Adjustment point	Procedure						
1	-8V	VR401	-8.0V Adjustment range : -7.96V to -8.04V ($\pm 0.5\%$) Apply the digital multimeter probe to Pin of CN25 and adjust to the adjustment range.						
2	Vertical AMP operating voltage	VR4	<table border="1"> <tr> <td>DISP. MODE : CH1</td> <td>VOLTS : 50mV (both CH)</td> </tr> <tr> <td>AC-DC : GND (both CH)</td> <td>SWEEP TIME : 1 ms</td> </tr> <tr> <td>V. VARIABLE : CAL (both CH)</td> <td>H.VARIABLE : CAL</td> </tr> </table> <p>1) Move the luminescent line to the CRT center by operating the POSI controls. 2) Plug the dedicated connector into CN3. 3) Adjust so that the multimeter is 70.0V. (Adjustment range : 59.9V to 70.1V) 4) After adjustment, unplug the connector. * In case the dedicated connector is not available, adjust so that the center value of the + and - electrodes is 70.0V. (Example) When the + electrode (adjustment) is 70.0V and the - electrode (check) is 72.0V ; the + electrode (adjustment) should be 59.0V and the - electrode (check) should be 71.0V.</p>	DISP. MODE : CH1	VOLTS : 50mV (both CH)	AC-DC : GND (both CH)	SWEEP TIME : 1 ms	V. VARIABLE : CAL (both CH)	H.VARIABLE : CAL
DISP. MODE : CH1	VOLTS : 50mV (both CH)								
AC-DC : GND (both CH)	SWEEP TIME : 1 ms								
V. VARIABLE : CAL (both CH)	H.VARIABLE : CAL								
3	Horizontal AMP operating voltage	VR302	<table border="1"> <tr> <td>DISP. MODE : X-Y</td> <td>VOLTS : 50mV (both CH)</td> </tr> <tr> <td>AC-DC : GND (both CH)</td> <td>V. VARIABLE : CAL (both CH)</td> </tr> </table> <p>1) Move the luminescent line to the CRT center by operating the POSI controls. 2) Plug the dedicated connector into CN17 3) Adjust so that the multimeter is 70.0V. (Adjustment range : 69.9V to 70.1V) 4) After adjustment, unplug the connector. * In case the dedicated connector is not available, adjust so that the center value of the + and - electrodes is 70.0V. (Example) When the + electrode (adjustment) is 70.0V and the - electrode (check) is 72.0V ; the + electrode (adjustment) should be 69.5V and the - electrode (check) should be 71.0V</p>	DISP. MODE : X-Y	VOLTS : 50mV (both CH)	AC-DC : GND (both CH)	V. VARIABLE : CAL (both CH)		
DISP. MODE : X-Y	VOLTS : 50mV (both CH)								
AC-DC : GND (both CH)	V. VARIABLE : CAL (both CH)								
4	Focus center and ASTIG	VR403 (Focus) VR507 (ASTIG)	<table border="1"> <tr> <td>DISP. MODE : X-Y</td> <td>FOCUS : 12 o'clock</td> </tr> <tr> <td>AC-DC : GND (both CH)</td> <td>INTEN : Arbitrary</td> </tr> <tr> <td>V. VARIABLE : CAL (both CH)</td> <td>VOLTS : 50mV (both CH)</td> </tr> </table> <p>1) Set FOCUS on the panel to the 12 o'clock position. Adjust VR403 and ASTIG VR (VR507) to move the spot to the best point.</p> <p style="text-align: center;">NG best point NG ● → ● ← ●</p>	DISP. MODE : X-Y	FOCUS : 12 o'clock	AC-DC : GND (both CH)	INTEN : Arbitrary	V. VARIABLE : CAL (both CH)	VOLTS : 50mV (both CH)
DISP. MODE : X-Y	FOCUS : 12 o'clock								
AC-DC : GND (both CH)	INTEN : Arbitrary								
V. VARIABLE : CAL (both CH)	VOLTS : 50mV (both CH)								
5	INTENSITY	VR402	<table border="1"> <tr> <td>DISP. MODE : X-Y</td> <td>VOLTS : 50mV (both CH)</td> </tr> <tr> <td>AC-DC : GND (both CH)</td> <td></td> </tr> <tr> <td>V. VARIABLE : CAL (both CH)</td> <td></td> </tr> </table> <p>1) Set INTEN to the 9 o'clock position. 2) At the 9 o'clock position, adjust so that the spot disappears. 3) Set INTEN to the fully counterclockwise position then rotate it clockwise until the fully clockwise position and check that the luminous intensity increases uniformly. * In the following adjustments, the INTEN control can be set in any arbitrary position.</p>	DISP. MODE : X-Y	VOLTS : 50mV (both CH)	AC-DC : GND (both CH)		V. VARIABLE : CAL (both CH)	
DISP. MODE : X-Y	VOLTS : 50mV (both CH)								
AC-DC : GND (both CH)									
V. VARIABLE : CAL (both CH)									
6	CH1 STEP ATT Balance (CH1 5mV to 10mV)	VR2	<table border="1"> <tr> <td>DISP. MODE : CH1</td> <td>VOLTS : 5mV (both CH)</td> </tr> <tr> <td>AC-DC : GND (both CH)</td> <td>V. VARIABLE : CAL (both CH)</td> </tr> </table> <p>1) Adjust so that the luminescent line does not move when VOLTS is switched from 5mV to 10mV. * Adjust after switching to 5mV with reference to the 10mV position.</p>	DISP. MODE : CH1	VOLTS : 5mV (both CH)	AC-DC : GND (both CH)	V. VARIABLE : CAL (both CH)		
DISP. MODE : CH1	VOLTS : 5mV (both CH)								
AC-DC : GND (both CH)	V. VARIABLE : CAL (both CH)								

ADJUSTMENT

No.	Item	Adjustment point	Procedure		
7	CH1 VARIABLE Balance	VR3	<table border="1"> <tr> <td>DISP. MODE : CH1 AC-DC : GND (both CH)</td> <td>VOLTS : 5mV (both CH) V. VARIABLE : CAL (both CH)</td> </tr> </table> <p>1) Adjust by setting VARIABLE to the MIN (fully counterclockwise) position with reference to the MAX (CAL) position. * Ensure that the luminescent line does not move when VARIABLE is switched between MIN — MAX.</p>	DISP. MODE : CH1 AC-DC : GND (both CH)	VOLTS : 5mV (both CH) V. VARIABLE : CAL (both CH)
DISP. MODE : CH1 AC-DC : GND (both CH)	VOLTS : 5mV (both CH) V. VARIABLE : CAL (both CH)				
8	CH2 STEP ATT Balance (CH2 5mV to 10mV)	VR52	<table border="1"> <tr> <td>DISP. MODE : CH2 AC-DC : GND (both CH)</td> <td>VOLTS : 5mV (both CH) V. VARIABLE : CAL (both CH)</td> </tr> </table> <p>1) Adjust so that the luminescent line does not move when VOLTS is switched from 5mV to 10mV. * Adjust after switching to 5mV with reference to the 10mV position.</p>	DISP. MODE : CH2 AC-DC : GND (both CH)	VOLTS : 5mV (both CH) V. VARIABLE : CAL (both CH)
DISP. MODE : CH2 AC-DC : GND (both CH)	VOLTS : 5mV (both CH) V. VARIABLE : CAL (both CH)				
9	CH2 VARIABLE Balance	VR53	<table border="1"> <tr> <td>DISP. MODE : CH2 AC-DC : GND (both CH)</td> <td>VOLTS : 1mV (both CH) V. VARIABLE : CAL (both CH)</td> </tr> </table> <p>1) Adjust by setting VARIABLE VR to the MIN (fully counterclockwise) position with reference to the MAX (CAL) position. * Ensure that the luminescent line does not move when VARIABLE is switched between MIN — MAX.</p>	DISP. MODE : CH2 AC-DC : GND (both CH)	VOLTS : 1mV (both CH) V. VARIABLE : CAL (both CH)
DISP. MODE : CH2 AC-DC : GND (both CH)	VOLTS : 1mV (both CH) V. VARIABLE : CAL (both CH)				
10	CH1 10mV 100Hz square wave	VR5	<table border="1"> <tr> <td>DISP. MODE : CH1 AC-DC : DC V. VARIABLE : CAL</td> <td>VOLTS : 10mV H. MODE : AUTO</td> </tr> </table> <p>1) Input a 100Hz square wave signal to CH1 INPUT and set it so that it extends by 6 divisions. 2) Adjust so that the waveform is flat.</p>	DISP. MODE : CH1 AC-DC : DC V. VARIABLE : CAL	VOLTS : 10mV H. MODE : AUTO
DISP. MODE : CH1 AC-DC : DC V. VARIABLE : CAL	VOLTS : 10mV H. MODE : AUTO				
11	CH2 10mV 100Hz square wave	VR55	<table border="1"> <tr> <td>DISP. MODE : CH2 AC-DC : DC V. VARIABLE : CAL</td> <td>VOLTS : 10mV SWEEP TIME : 2ms</td> </tr> </table> <p>1) Input a 100Hz square wave signal to CH2 INPUT and set it so that it extends by 6 divisions. 2) Adjust so that the waveform is flat.</p>	DISP. MODE : CH2 AC-DC : DC V. VARIABLE : CAL	VOLTS : 10mV SWEEP TIME : 2ms
DISP. MODE : CH2 AC-DC : DC V. VARIABLE : CAL	VOLTS : 10mV SWEEP TIME : 2ms				
12	CH1 V. GAIN	VR103	<table border="1"> <tr> <td>DISP. MODE : CH1 AC-DC : DC</td> <td>VOLTS : 10mV V. VARIABLE : CAL</td> </tr> </table> <p>1) Input a 50mV square wave signal to CH1 INPUT. 2) Adjust so that the amplitude 5 divisions. (10mV ranges)</p>	DISP. MODE : CH1 AC-DC : DC	VOLTS : 10mV V. VARIABLE : CAL
DISP. MODE : CH1 AC-DC : DC	VOLTS : 10mV V. VARIABLE : CAL				
13	CH2 V. GAIN	VR57	<table border="1"> <tr> <td>DISP. MODE : CH2 AC-DC : DC</td> <td>VOLTS : 10mV V. VARIABLE : CAL</td> </tr> </table> <p>1) Input a 50mV square wave signal to CH2 INPUT. 2) Adjust so that the amplitude 5 divisions. (10mV ranges)</p>	DISP. MODE : CH2 AC-DC : DC	VOLTS : 10mV V. VARIABLE : CAL
DISP. MODE : CH2 AC-DC : DC	VOLTS : 10mV V. VARIABLE : CAL				
14	CH1 waveform shaping	TC2 (0.1V) TC4 (1V)	<table border="1"> <tr> <td>DISP. MODE : CH1 AC-DC : DC</td> <td>VOLTS : 10mV (ideal waveform) V. VARIABLE : CAL</td> </tr> </table> <p>1) Input a 1kHz square wave signal to CH2 INPUT and set it so that it extends by CRT 6 divisions. (ideal waveform) 2) Adjust so that the same capacity value for ideal waveform is obtained in both waveforms at 0.1V and 1V.</p>	DISP. MODE : CH1 AC-DC : DC	VOLTS : 10mV (ideal waveform) V. VARIABLE : CAL
DISP. MODE : CH1 AC-DC : DC	VOLTS : 10mV (ideal waveform) V. VARIABLE : CAL				
15	CH2 waveform shaping	TC52 (0.1V) TC54 (1V)	<table border="1"> <tr> <td>DISP. MODE : CH2 AC-DC : DC</td> <td>VOLTS : 10mV (ideal waveform) V. VARIABLE : CAL</td> </tr> </table> <p>1) Input a 1kHz square wave signal to CH2 INPUT and set it so that it extends by CRT 6 divisions. (ideal waveform) 2) Adjust so that the same capacity value for ideal waveform is obtained in both waveforms at 0.1V and 1V.</p>	DISP. MODE : CH2 AC-DC : DC	VOLTS : 10mV (ideal waveform) V. VARIABLE : CAL
DISP. MODE : CH2 AC-DC : DC	VOLTS : 10mV (ideal waveform) V. VARIABLE : CAL				

ADJUSTMENT

No.	Item	Adjustment point	Procedure						
16	CH1 Input Capacity	TC1 (0.1V) TC3 (1V)	<table border="1" style="width: 100%;"> <tr> <td>DISP. MODE : CH1</td> <td>VOLTS : 10mV (reference)</td> </tr> <tr> <td>AC-DC : DC</td> <td>V. VARIABLE : CAL</td> </tr> </table> <p>1) Connect a capacity meter to the CH1 INPUT. 2) Measure the capacity of the 10mV. (38pF±3pF) 3) At 0.1V and 1V, adjust to obtain the same values as 10mV.</p>	DISP. MODE : CH1	VOLTS : 10mV (reference)	AC-DC : DC	V. VARIABLE : CAL		
DISP. MODE : CH1	VOLTS : 10mV (reference)								
AC-DC : DC	V. VARIABLE : CAL								
17	CH2 Input Capacity	TC51 (0.1V) TC53 (1V)	<table border="1" style="width: 100%;"> <tr> <td>DISP. MODE : CH2</td> <td>VOLTS : 10mV (reference)</td> </tr> <tr> <td>AC-DC : DC</td> <td>V. VARIABLE : CAL</td> </tr> </table> <p>1) Connect a capacity meter to the CH2 INPUT. 2) Measure the capacity of the 10mV. (38pF±3pF) 3) At 0.1V and 1V, adjust to obtain the same values as 10mV.</p>	DISP. MODE : CH2	VOLTS : 10mV (reference)	AC-DC : DC	V. VARIABLE : CAL		
DISP. MODE : CH2	VOLTS : 10mV (reference)								
AC-DC : DC	V. VARIABLE : CAL								
18	SWEEP TIME 0.1 ms	VR202	<table border="1" style="width: 100%;"> <tr> <td>DISP. MODE : CH1</td> <td>VOLTS : Arbitrary</td> </tr> <tr> <td>SWEEP TIME : 0.1 ms</td> <td>AC - DC : DC</td> </tr> <tr> <td>H. VARIABLE : CAL</td> <td></td> </tr> </table> <p>1) Input a 0.1 ms marker signal to CH1 INPUT. 2) Adjust so that the marker peak and scale coincides at every divisions. (Use H.POSI to do this operation, because the marker will move horizontally.)</p>	DISP. MODE : CH1	VOLTS : Arbitrary	SWEEP TIME : 0.1 ms	AC - DC : DC	H. VARIABLE : CAL	
DISP. MODE : CH1	VOLTS : Arbitrary								
SWEEP TIME : 0.1 ms	AC - DC : DC								
H. VARIABLE : CAL									
19	SWEEP TIME 1 ms	VR201	<table border="1" style="width: 100%;"> <tr> <td>DISP. MODE : CH1</td> <td>VOLTS : Arbitrary</td> </tr> <tr> <td>SWEEP TIME : 1 ms</td> <td>AC - DC : DC</td> </tr> <tr> <td>H. VARIABLE : CAL</td> <td></td> </tr> </table> <p>1) Input a 0.1 ms marker signal to CH1 INPUT. 2) Adjust so that the marker peak and scale coincides at every divisions. (Not necessary to use H.POSI for this operation, because the start point does not move.) 3) Select 0.1 ms range and make sure that there is no offset.</p>	DISP. MODE : CH1	VOLTS : Arbitrary	SWEEP TIME : 1 ms	AC - DC : DC	H. VARIABLE : CAL	
DISP. MODE : CH1	VOLTS : Arbitrary								
SWEEP TIME : 1 ms	AC - DC : DC								
H. VARIABLE : CAL									
20	X-POSITION	VR152	<table border="1" style="width: 100%;"> <tr> <td>DISP. MODE : X-Y</td> <td>V.POSITION : 12 o'clock (both CH)</td> </tr> <tr> <td>AC - DC : GND (both CH)</td> <td></td> </tr> </table> <p>1) Adjust the spot to the center of Horizontal direction scale.</p>	DISP. MODE : X-Y	V.POSITION : 12 o'clock (both CH)	AC - DC : GND (both CH)			
DISP. MODE : X-Y	V.POSITION : 12 o'clock (both CH)								
AC - DC : GND (both CH)									
21	X-GAIN	VR151	<table border="1" style="width: 100%;"> <tr> <td>DISP. MODE : X-Y</td> <td>CH2 AC-DC : AC</td> </tr> <tr> <td>CH2 VOLTS : 10mV</td> <td>X-Y : ON</td> </tr> <tr> <td>CH2 V. VARIABLE : CAL</td> <td></td> </tr> </table> <p>1) Input a 50 mV square wave signal to CH2 INPUT. 2) Adjust so that the amplitude is 5 divisions. (10mV ranges) * Make the adjustment to 5 divisions, at the CRT center.</p> <div style="text-align: center;"> </div>	DISP. MODE : X-Y	CH2 AC-DC : AC	CH2 VOLTS : 10mV	X-Y : ON	CH2 V. VARIABLE : CAL	
DISP. MODE : X-Y	CH2 AC-DC : AC								
CH2 VOLTS : 10mV	X-Y : ON								
CH2 V. VARIABLE : CAL									
22	CH1 1 MHz square wave	TC101	<table border="1" style="width: 100%;"> <tr> <td>DISP. MODE : CH1</td> <td>AC-DC : DC (both CH)</td> </tr> <tr> <td>CH1 VOLTS : 10mV</td> <td>H.MODE : AUTO</td> </tr> <tr> <td>V. VARIABLE : CAL</td> <td>* Use a 50-ohm terminator.</td> </tr> </table> <p>1) Input a 1 MHz square wave to CH1 INPUT and set it so that it extends by 6 divisions. 2) Adjust so that the overshoot is 0.2 divisions.</p>	DISP. MODE : CH1	AC-DC : DC (both CH)	CH1 VOLTS : 10mV	H.MODE : AUTO	V. VARIABLE : CAL	* Use a 50-ohm terminator.
DISP. MODE : CH1	AC-DC : DC (both CH)								
CH1 VOLTS : 10mV	H.MODE : AUTO								
V. VARIABLE : CAL	* Use a 50-ohm terminator.								

ADJUSTMENT

No.	Item	Adjustment point	Procedure
23	CH2 1 MHz square wave	TC56	<div style="border: 1px solid black; padding: 2px;"> DISP. MODE : CH2 CH2 VOLTS : 10mV * Use a 50-ohm terminator. </div> <div style="border: 1px solid black; padding: 2px; margin-top: 2px;"> AC-DC : DC (both CH) V. VARIABLE : CAL </div> <p>1) Input a 1 MHz square wave to CH2 INPUT and set it so that it extends by 6 divisions. 2) Adjust so that the overshoot is 0.2 divisions.</p>
24	CH2 TRIG POINT	VR601	<div style="border: 1px solid black; padding: 2px;"> DISP. MODE : DUAL-V VOLTS : 10mV (both CH) V. VARIABLE : CAL (both CH) </div> <div style="border: 1px solid black; padding: 2px; margin-top: 2px;"> AC-DC : DC (both CH) SOURCE : DUAL </div> <p>1) Input a 1 kHz sine wave to CH1 and CH2 INPUT and set it so that it extends by 6 divisions. 2) Bring the CH1 and CH2 start point to see by operating H.POSITION. 3) Fix a CH2 V.POSITION and adjust VR601 and CH1 V.POSITION so that the start point (waveform) on the same position.</p>

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Y70-2100-00				
			B41-2091-14 B42-3819-05 B42-3820-05 B63-0297-00 B63-0298-00	CAUTION LABEL S/NO.LABEL LABEL INSTRUCTION MANUAL;JAPANESE INSTRUCTION MANUAL;ENGLISH
			E30-1950-05 E30-1952-05 F05-4016-05 F05-3112-05 G16-0609-04	JIS POWER CORD CEE POWER CORD FUSE T0.4A/250V(5*20) FUSE T0.315A/250V(5*20) SHEET
			H10-2848-02 H10-2849-02 H20-1727-04 H53-0255-14 J19-1622-05	FOAMED STYRENE PAD;FRONT FOAMED STYRENE PAD;REAR VINYL COVER CARTON BOX HOLDER
			J42-0570-05 LN322GP N14-0622-05 RD14BB2C102J W03-2309-05	BUSHING LED;GREEN NUT,WITH TOOTH RES. CARBN CABLE
1			A01-1225-22	CASE
2			A10-1458-22	CHASSIS
3			A13-0946-12	FRAME
4			A13-0947-13	FRAME
5			A40-0715-03	BOTTOM PLATE
6			A63-0234-03	PANEL
7			A63-0235-01	MOLD PANEL
8			A83-0101-12	REAR PANEL
9			B11-0540-04	FILTER
10			E21-0660-04	TERMINAL;CAL
11			E68-0619-05	AC SELECTOR
12			F11-1512-04	CRT SHIELD
13			G10-0804-04	FELT
14			J02-0089-05	RUBBER FOOT
15			J02-0525-33	LEG
16			J19-1653-23	HOLDER;FOR CRT
17			J21-4695-03	BRACKET;FOR CRT
18			J21-4696-04	BRACKET;FOR POWER SW
19			K01-0541-05	HANDLE
20			K21-0892-03	KNOB;VOLTS/DIV
21			K21-0897-14	KNOB;VOLTS/DIV
22			K21-0910-03	KNOB;SWEEP TIME/DIV
23			K23-0811-03	KNOB;7 USED
24			K27-0590-04	PUSH BUTTON;GRAY WHITE
25			K27-3618-14	KNOB;LEVER
26			L07-1540-15	POWER TRANSFORMER
27			L39-0531-05	ROTATION COIL
28			W01-0503-04	CORD WRAP
29			X80-1420-00	COMPLEX UNIT
30			150BTB31A(IG)	CRT

L : Scandinavia

Y : PX(Far East, Hawaii)

Y : AAFES(Europe)

K : USA

T : Europe

X : Australia

P : Canada

E : Europe

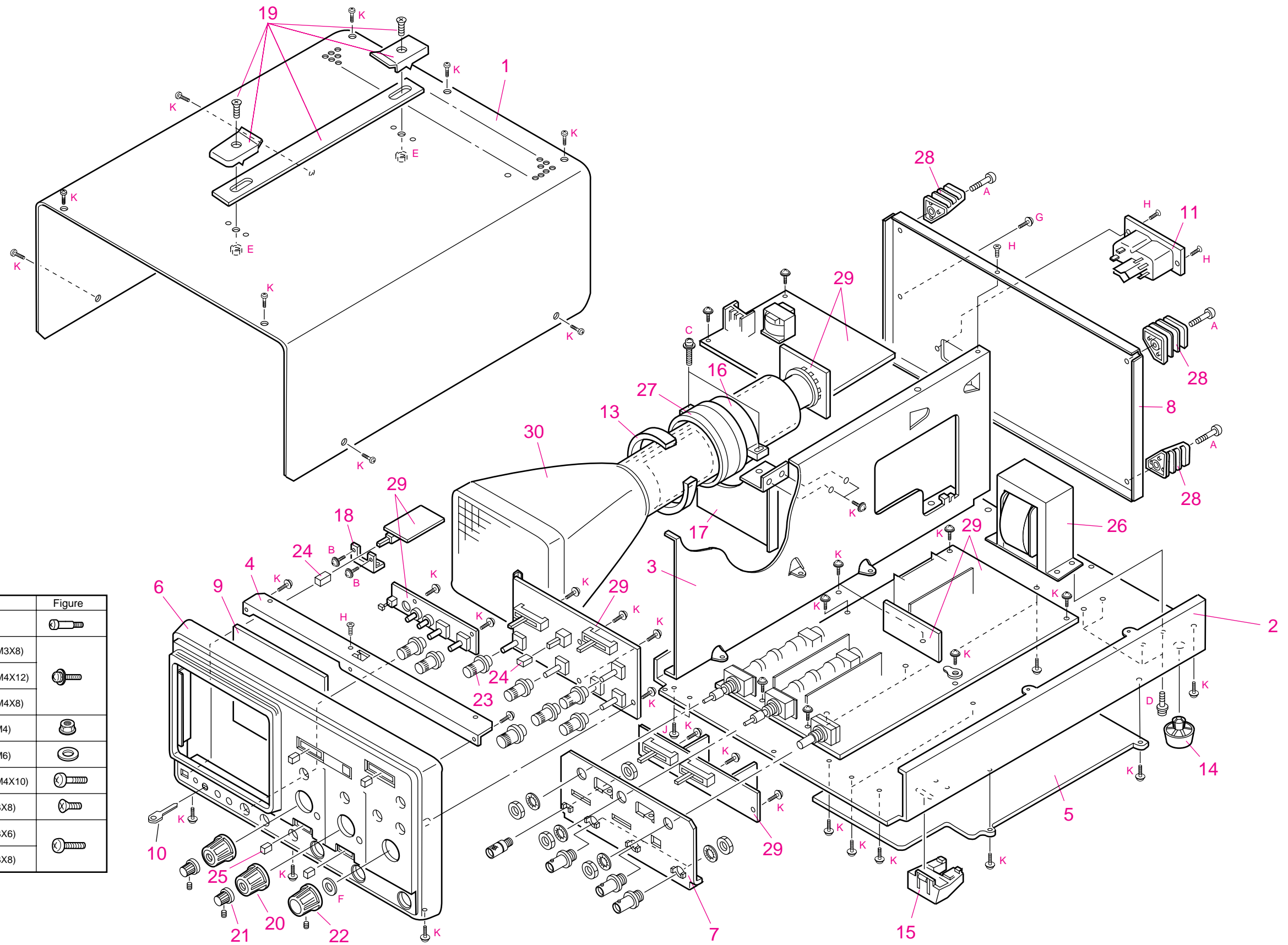
M : Other Areas

R : Mexico




G : Germany

 indicates safety critical components.

DISASSEMBLY



SCREWS

Parts No.	Parts Name	Figure
A N08-0611-04	SCREW (For CORD WRAP)	
B N09-0623-04	SCREW, SEMS PAN HD (M3X8)	
C N09-0748-04	SCREW, SEMS PAN HD (M4X12)	
D N67-4008-05	SCREW, SEMS PAN HD (M4X8)	
E N14-0620-05	FLANGE NUT (M4)	
F N19-0709-05	WASHER (M6)	
G N30-4010-41	SCREW, PAN HD (M4X10)	
H N88-3008-41	SCREW, FLAT HD TAPTITE (3X8)	
J N89-3006-41	SCREW, BINDING TAPTITE (3X6)	
K N89-3008-41	SCREW, BINDING TAPTITE (3X8)	

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Ref. No	Add-ress	New Parts	Parts No.	Description
COMPLEX UNIT (X80-1420-00)				
			A22-0878-13 E04-0259-15 E21-0667-05 E23-0557-14 E31-2170-05	SUB PANEL RF COAXIAL CONNECTOR TERMINAL EARTH LUG JUMPING WIRE
			E33-4578-05 F01-0867-05 F01-0879-05 F01-0889-05 F10-1627-04	PROCESSED WIRE KIT HEAT SINK HEAT SINK HEAT SINK SHIELD PLATE
			F10-1628-04 N09-0623-04 N89-3008-41 R92-1061-05 J73-0465-02	SHIELD PLATE SEMS SCREW SCREW, BANDING TAPTITE JUMPING RES. PCB(UNMOUNTED)
C1			CC45FCH1H330J	CAP. CERAMIC 33P J 50V
C2			CC93FCH1H301J	CAP. CERAMIC 300P J 50V
C3			CF93AN2G103K	CAP. METALIZED 0.01U K 400V
C4			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C5			CC45FSL1H680J	CAP. CERAMIC 68P J 50V
C6			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C7			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C8			C91-1231-05	CAP. CERAMIC 4.7P - 50V
C9			CC45FCH1H330J	CAP. CERAMIC 33P J 50V
C10			CC45FSL1H221J	CAP. CERAMIC 220P J 50V
C11			CC45FCH1H390J	CAP. CERAMIC 39P J 50V
C12			CC45FSL1H101J	CAP. CERAMIC 100P J 50V
C13			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C14			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C15			CC45FCH1H070D	CAP. CERAMIC 7P D 50V
C51			CC45FCH1H330J	CAP. CERAMIC 33P J 50V
C52			CC93FCH1H301J	CAP. CERAMIC 300P J 50V
C53			CF93AN2G103K	CAP. METALIZED 0.01U K 400V
C54			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C55			CC45FSL1H680J	CAP. CERAMIC 68P J 50V
C56			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C57			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C58			C91-1231-05	CAP. CERAMIC 4.7P - 50V
C59			CC45FCH1H270J	CAP. CERAMIC 27P J 50V
C60			CC45FSL1H221J	CAP. CERAMIC 220P J 50V
C61			CC45FCH1H390J	CAP. CERAMIC 39P J 50V
C62			CC45FSL1H101J	CAP. CERAMIC 100P J 50V
C63			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C64			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C101			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C102			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C103			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C104			CC45FCH1H270J	CAP. CERAMIC 27P J 50V
C105			C91-2538-05	CAP. FILM 0.1U - 63V
C106			CC45FCH1H030C	CAP. CERAMIC 3P C 50V
C107			CC45FCH1H030C	CAP. CERAMIC 3P C 50V
C108			C91-1361-05	CAP. FILM 0.01U - 100V
C109			C91-1361-05	CAP. FILM 0.01U - 100V
C110			C91-2673-05	CAP. FILM 0.01U - 250V
C111			C91-2673-05	CAP. FILM 0.01U - 250V

Ref. No	Add-ress	New Parts	Parts No.	Description
C112			CC45FCH2H030C	CAP. CERAMIC 3P C 500V
C113			CC45FCH2H030C	CAP. CERAMIC 3P C 500V
C114			CK45FB2H472K	CAP. CERAMIC 4700P K 500V
C115			C91-2538-05	CAP. FILM 0.1U - 63V
C116			CK45FB2H472K	CAP. CERAMIC 4700P K 500V
C117			C91-2672-05	CAP. FILM 0.1U - 250V
C118			C91-2672-05	CAP. FILM 0.1U - 250V
C119			CE04LW2C3R3M	CAP. ELECTRO 3.3U M 160V
C120			C90-3016-05	CAP. ELECTRO 47U - 10V
C121			CC45FCH2H040C	CAP. CERAMIC 4P C 500V
C122			CC45FCH2H040C	CAP. CERAMIC 4P C 500V
C123			CC45FCH2H040C	CAP. CERAMIC 4P C 500V
C124			CC45FCH2H040C	CAP. CERAMIC 4P C 500V
C151			CC45FSL1H120J	CAP. CERAMIC 12P J 50V
C152			C91-1235-05	CAP. CERAMIC 10P - 50V
C156			CC45FSL1H120J	CAP. CERAMIC 12P J 50V
C157			C91-1235-05	CAP. CERAMIC 10P - 50V
C158			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C159			CC45FSL1H101J	CAP. CERAMIC 100P J 50V
C160			CC45FCH2H010C	CAP. CERAMIC 1P C 500V
C201			CQ92FM1H103K	CAP. PLASTIC 0.01U K 50V
C202			CE04HW1E220M	CAP. ELECTRO 22U M 25V
C211			CE04HW1H010M	CAP. ELECTRO 1U M 50V
C212			CE04HW1H010M	CAP. ELECTRO 1U M 50V
C213			CC45FCH1H330J	CAP. CERAMIC 33P J 50V
C214			CE04HW1H010M	CAP. ELECTRO 1U M 50V
C215			CE04HW1H010M	CAP. ELECTRO 1U M 50V
C216			CC45FCH1H330J	CAP. CERAMIC 33P J 50V
C217			CK45FB1H472K	CAP. CERAMIC 4700P K 50V
C218			CK45FB1H472K	CAP. CERAMIC 4700P K 50V
C219			C91-1316-05	CAP. FILM 2.2U - 100V
C220			CQ93HP2A222J	CAP. PLASTIC 2200P J 100V
C221			CE04LW1H010M	CAP. ELECTRO 1U M 50V
C222			CK45FF1H103Z	CAP. CERAMIC 0.01U Z 50V
C223			CK45FF1H103Z	CAP. CERAMIC 0.01U Z 50V
C224			CK45FF1H103Z	CAP. CERAMIC 0.01U Z 50V
C225			CC45FCH1H181J	CAP. CERAMIC 180P J 50V
C227			CC45FCH1H050C	CAP. CERAMIC 5P C 50V
C228			CK45FB1H472K	CAP. CERAMIC 4700P K 50V
C229			CE04LW1H010M	CAP. ELECTRO 1U M 50V
C232			CC45FSL1H120J	CAP. CERAMIC 12P J 50V
C233			CK45FF1H103Z	CAP. CERAMIC 0.01U Z 50V
C235			CC45FSL1H220J	CAP. CERAMIC 22P J 50V
C251			CE04LW2C3R3M	CAP. ELECTRO 3.3U M 160V
C252			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C253			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C254			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C255			CE04LW1C100M	CAP. ELECTRO 10U M 16V
C256			C91-2538-05	CAP. FILM 0.1U - 63V
C258			C91-2538-05	CAP. FILM 0.1U - 63V
C259			C91-2538-05	CAP. FILM 0.1U - 63V
C260			C91-2538-05	CAP. FILM 0.1U - 63V
C261			C91-2538-05	CAP. FILM 0.1U - 63V
C262			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C263			CE04LW1A470M	CAP. ELECTRO 47U M 10V

L : Scandinavia K : USA P : Canada R : Mexico
Y : PX(Far East, Hawaii) T : Europe E : Europe G : Germany
X : Australia M : Other Areas

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C264			CC45FSL1H121J	CAP. CERAMIC 120P J 50V
C265			CC45FSL1H330J	CAP. CERAMIC 33P J 50V
C303			CK45FB2H222K	CAP. CERAMIC 2200P K 500V
C304			CK45FB2H222K	CAP. CERAMIC 2200P K 500V
C306			CK45FB2H222K	CAP. CERAMIC 2200P K 500V
C308			CK45FB2H222K	CAP. CERAMIC 2200P K 500V
C309			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C310			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C311			CQ92FM1H473K	CAP. PLASTIC 0.047U K 50V
C313			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C401			CE04W2E101M	CAP. ELECTRO 100U M 250V
C402			CE04EW1C472M	CAP. ELECTRO 4700U M 16V
C403			CE04EW1C472M	CAP. ELECTRO 4700U M 16V
C404			CE04LW2C3R3M	CAP. ELECTRO 3.3U M 160V
C405			CE04LW1A221M	CAP. ELECTRO 220U M 10V
C406			CE04LW1A221M	CAP. ELECTRO 220U M 10V
C407			CE04LW1A221M	CAP. ELECTRO 220U M 10V
C408			CE04LW2E010M	CAP. ELECTRO 1U M 250V
C409			CE04HW1H010M	CAP. ELECTRO 1U M 50V
C410			CE04LW1C101M	CAP. ELECTRO 100U M 16V
C411			CK45FB2H472K	CAP. CERAMIC 4700P K 500V
C412			CK45FB2H472K	CAP. CERAMIC 4700P K 500V
C413			CK45FB2H472K	CAP. CERAMIC 4700P K 500V
C414			CE04LW2C3R3M	CAP. ELECTRO 3.3U M 160V
C416			CK45FB1H222K	CAP. CERAMIC 2200P K 50V
C417			CE04LW1A470M	CAP. ELECTRO 47U M 10V
C418			CE04EW1A470M	CAP. ELECTRO 47U M 10V
C420			CE04LW1V221M	CAP. ELECTRO 220U M 35V
C421			CE04LW1C101M	CAP. ELECTRO 100U M 16V
C422			CK45FB2H102K	CAP. CERAMIC 1000P K 500V
C423			C91-1317-05	CAP. CERAMIC 0.01U - 2KV
C424			C91-1317-05	CAP. CERAMIC 0.01U - 2KV
C425			CK45E3D102P	CAP. CERAMIC 1000P P 2KV
C426			C91-1317-05	CAP. CERAMIC 0.01U - 2KV
C427			C91-1317-05	CAP. CERAMIC 0.01U - 2KV
C428			C91-1317-05	CAP. CERAMIC 0.01U - 2KV
C429			CK45E3D102P	CAP. CERAMIC 1000P P 2KV
C430			CK45FF1H103Z	CAP. CERAMIC 0.01U Z 50V
C431			CK45FB2H472K	CAP. CERAMIC 4700P K 500V
C432			CK45FB2H472K	CAP. CERAMIC 4700P K 500V
C433			CK45FB2H472K	CAP. CERAMIC 4700P K 500V
C434			C91-1309-05	CAP. CERAMIC 0.01U - 500V
C435			CK45FF1H103Z	CAP. CERAMIC 0.01U Z 50V
C501			CK45FF1H103Z	CAP. CERAMIC 0.01U Z 50V
C502			C91-2674-05	CAP. FILM 0.047U - 630V
C503			C91-2674-05	CAP. FILM 0.047U - 630V
C602			CK45FF1H103Z	CAP. CERAMIC 0.01U Z 50V
C603			CE04LW1H2R2M	CAP. ELECTRO 2.2U M 50V
C604			C91-0769-05	CAP. CERAMIC 0.01U - 16V
C606			CK45FF1H103Z	CAP. CERAMIC 0.01U Z 50V
C607			CE04LW1H2R2M	CAP. ELECTRO 2.2U M 50V
C608			C91-0769-05	CAP. CERAMIC 0.01U - 16V
C609			C91-2538-05	CAP. FILM 0.1U - 63V
C610			C91-0769-05	CAP. CERAMIC 0.01U - 16V
C611			C91-0769-05	CAP. CERAMIC 0.01U - 16V

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Ref. No	Add-ress	New Parts	Parts No.	Description
C612			C91-0769-05	CAP. CERAMIC 0.01U - 16V
C801			CE04EW1H010M	CAP. ELECTRO 1U M 50V
CN1			E40-3240-05	CONNECTOR 5P - -
CN2			E40-3239-05	CONNECTOR 4P - -
CN3			E40-3238-05	CONNECTOR 3P - -
CN11			E40-3238-05	CONNECTOR 3P - -
CN12			E40-5066-05	CONNECTOR 9P - -
CN13			E40-3242-05	CONNECTOR 7P - -
CN14			E40-3238-05	CONNECTOR 3P - -
CN16			E40-3238-05	CONNECTOR 3P - -
CN17			E40-3238-05	CONNECTOR 3P - -
CN21			E40-3242-05	CONNECTOR 7P - -
CN22			E40-5069-05	CONNECTOR 12P - -
CN23			E40-7518-05	CONNECTOR 6P - -
CN24			E40-7515-05	CONNECTOR 3P - -
CN25			E40-5067-05	CONNECTOR 10P - -
CN26			E40-3237-05	CONNECTOR 2P - -
CN27			E01-0103-05	SOCKET - - -
CN28			E40-7420-05	CONNECTOR - - -
CN301			E40-0218-05	CONNECTOR - - -
CN601			E40-7429-05	BORDE CONNECTOR 2P - -
CN602			E40-7429-05	BORDE CONNECTOR 10P - -
CN603			E40-7421-05	BORDE CONNECTOR 2P - -
D205			1SS133	DIODE
D206			1SS133	DIODE
D208			1SS133	DIODE
D209			1SS133	DIODE
D211			1SS133	DIODE
D212			1SS133	DIODE
D213			1SS133	DIODE
D214			1SS133	DIODE
D215			1SS133	DIODE
D216			1SS133	DIODE
D217			1SS133	DIODE
D218			1SS133	DIODE
D219			1SS133	DIODE
D220			1SS133	DIODE
D221			1SS133	DIODE
D222			1SS133	DIODE
D223			MA700	DIODE
D224			MA700	DIODE
D225			MA700	DIODE
D226			1SS133	DIODE
D301			1SS83	DIODE
D302			1SS83	DIODE
D401			S1VB60	DIODE, BRIDGE
D402			D2SBA20	DIODE, BRIDGE
D403			1SS133	DIODE
D404			MTZ10JC	DIODE, ZENER
D405			MTZ10JC	DIODE, ZENER
D406			1SS133	DIODE
D407			1SS133	DIODE
D408			1SS133	DIODE

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Ref. No	Add-ress	New Parts	Parts No.	Description
D409			DHM3FJ60	DIODE
D410			DHM3FJ60	DIODE
D411			1SS83	DIODE
D412			1SS83	DIODE
D413			1SS83	DIODE
D414			1SS83	DIODE
D415			1SS83	DIODE
D416			1SS133	DIODE
D501			MA700	DIODE
D502			1SS133	DIODE
D503			1SS133	DIODE
D504			1SS133	DIODE
D505			1SS133	DIODE
D506			MA700	DIODE
D507			1SS133	DIODE
D508			1SS133	DIODE
D509			1SS133	DIODE
D601			1SS133	DIODE
D602			1SS133	DIODE
D603			1SS133	DIODE
F401			F53-0107-05	THERMAL FUSE
IC3			KMC17	HIC
IC4			KMC17	HIC
IC5			KMC02	HIC
IC6			KMC02	HIC
IC201			KMD02	HIC
IC202			SN74ALS00AN	IC, QUAD 2-INPUT NAND GATE
IC204			TC74HC00AP	IC, QUAD 2-INPUT NAND GATE
IC205			SN74ALS00AN	IC, QUAD 2-INPUT NAND GATE
IC206			SN74ALS00AN	IC, QUAD 2-INPUT NAND GATE
IC207			SN74ALS112AN	IC, DUAL JK F-F WITH PRE. & CLE.
IC401			KMA01	HIC
IC402			NJM4558D	IC, OP AMP
IC601			SN74ALS00AN	IC, QUAD 2-INPUT NAND GATE
L101			L40-2201-17	FERRI INDUCTOR 27UH 10%
L102			L40-2201-17	FERRI INDUCTOR 27UH 10%
L201			L40-1011-17	FERRI INDUCTOR
L401			L40-1011-50	FERRI INDUCTOR 100UH 10%
L402			L40-1011-50	FERRI INDUCTOR 100UH 10%
NL401			RA-201P-V6-2A	NEON LAMP 100UH 10%
P101			E23-1520-05	GROUND TERMINAL
P102			E23-1520-05	GROUND TERMINAL
P103			E23-1520-05	GROUND TERMINAL
P104			E23-1520-05	GROUND TERMINAL
P401			E23-1520-05	GROUND TERMINAL
P501			E23-1520-05	GROUND TERMINAL
P502			E23-1520-05	GROUND TERMINAL
P503			E23-1520-05	GROUND TERMINAL
Q1			2SC1923(O)	TR.SI,NPN
Q2			2SC1923(O)	TR.SI,NPN
Q4			2SA933S(R,S)	TR.SI,PNP
Q5			2SA933S(R,S)	TR.SI,PNP
Q6			2SC1923(O)	TR.SI,NPN

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Q7			2SC1923(O)	TR.SI,NPN
Q8			2SC1923(O)	TR.SI,NPN
Q9			2SC1923(O)	TR.SI,NPN
Q10			2SA1005(K)	TR.SI,PNP
Q11			2SA1005(K)	TR.SI,PNP
Q12			2SC3787(S,T)	TR.SI,NPN
Q13			2SA1477(S,T)	TR.SI,PNP
Q14			2SC3787(S,T)	TR.SI,NPN
Q15			2SA1477(S,T)	TR.SI,PNP
Q16			2SA933S(R,S)	TR.SI,PNP
Q17			2SC1740S(R,S)	TR.SI,NPN
Q19			2SA933S(R,S)	TR.SI,PNP
Q20			2SC1740S(R,S)	TR.SI,NPN
Q21			2SC1740S(R,S)	TR.SI,NPN
Q22			2SC1740S(R,S)	TR.SI,NPN
Q23			2SC1740S(R,S)	TR.SI,NPN
Q24			2SK389(BL)	FET
Q25			2SK389(BL)	FET
Q201			2SC1740S(R,S)	TR.SI,NPN
Q202			2SK161(GR)	FET
Q213			2SC1740S(R,S)	TR.SI,NPN
Q214			2SC1740S(R,S)	TR.SI,NPN
Q215			2SA933S(R,S)	TR.SI,PNP
Q216			2SC1740S(R,S)	TR.SI,NPN
Q217			2SC3732(L)	TR.SI,NPN
Q218			2SC1740S(R,S)	TR.SI,NPN
Q220			2SC1740S(R,S)	TR.SI,NPN
Q222			2SA933S(R,S)	TR.SI,PNP
Q223			2SC1740S(R,S)	TR.SI,NPN
Q224			2SC1740S(R,S)	TR.SI,NPN
Q225			2SC1740S(R,S)	TR.SI,NPN
Q226			2SC1740S(R,S)	TR.SI,NPN
Q227			2SA933S(R,S)	TR.SI,PNP
Q228			2SC1740S(R,S)	TR.SI,NPN
Q229			2SC1740S(R,S)	TR.SI,NPN
Q301			2SC1740S(R,S)	TR.SI,NPN
Q302			2SC1740S(R,S)	TR.SI,NPN
Q303			2SA933S(R,S)	TR.SI,PNP
Q304			2SA933S(R,S)	TR.SI,PNP
Q305			2SC1740S(R,S)	TR.SI,NPN
Q306			2SC1740S(R,S)	TR.SI,NPN
Q307			2SC2911(S,T)	TR.SI,NPN
Q308			2SC2911(S,T)	TR.SI,NPN
Q309			2SA1209(S,T)	TR.SI,PNP
Q310			2SA1209(S,T)	TR.SI,PNP
Q401			2SA1156(L)	TR.SI,PNP
Q402			2SC2909(S,T)	TR.SI,NPN
Q403			2SC3940A(R)	TR.SI,NPN
Q404			2SA1534A(R)	TR.SI,PNP
Q405			2SC3940A(R)	TR.SI,NPN
Q406			2SA1208(S)	TR.SI,PNP
Q407			2SC2910(S)	TR.SI,NPN
Q408			2SD1406(Y)	TR.SI,NPN
Q409			2SA933S(R,S)	TR.SI,PNP
Q410			2SA1091(O)	TR.SI,PNP

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Ref. No	Add-ress	New Parts	Parts No.	Description
Q411			2SA1091(O)	TR.SI,NPN
Q412			2SA1091(O)	TR.SI,NPN
Q413			2SC3940A(R)	TR.SI,NPN
Q414			2SA1534A(R)	TR.SI,NPN
Q415			2SA933S(R,S)	TR.SI,NPN
Q416			2SC2909(S,T)	TR.SI,NPN
Q501			2SC1740S(R,S)	TR.SI,NPN
Q601			2SC1740S(R,S)	TR.SI,NPN
Q602			2SC1740S(R,S)	TR.SI,NPN
Q603			2SC1740S(R,S)	TR.SI,NPN
Q604			2SC1740S(R,S)	TR.SI,NPN
Q605			2SA933S(R,S)	TR.SI,NPN
Q606			2SC1740S(R,S)	TR.SI,NPN
Q607			2SC1740S(R,S)	TR.SI,NPN
Q608			2SC1740S(R,S)	TR.SI,NPN
Q609			2SC1740S(R,S)	TR.SI,NPN
Q610			2SA933S(R,S)	TR.SI,NPN
Q611			2SC1740S(R,S)	TR.SI,NPN
Q612			2SC1740S(R,S)	TR.SI,NPN
Q613			2SC1740S(R,S)	TR.SI,NPN
R1			RD14BB2C220J	RES. CARBN
R2			RN14BK2E9003D	RES. METAL FILM
R3			RN14BK2E1113D	RES. METAL FILM
R4			RD14BB2C470J	RES. CARBN
R5			RD14BB2C101J	RES. CARBN
R6			RD14BB2C331J	RES. CARBN
R7			RN14BK2E9903D	RES. METAL FILM
R8			RN14BK2E1012D	RES. METAL FILM
R9			RD14BB2C360J	RES. CARBN
R10			RD14BB2C391J	RES. CARBN
R11			RD14BB2C220J	RES. CARBN
R12			RN14BK2E1004F	RES. METAL FILM
R13			RD14BB2C684J	RES. CARBN
R14			RD14BB2C390J	RES. CARBN
R15			RN14BK2C3003F	RES. METAL FILM
R16			RD14BB2C390J	RES. CARBN
R17			RD14BB2C303J	RES. CARBN
R18			RD14BB2C510J	RES. CARBN
R19			RN14BK2C3000D	RES. METAL FILM
R20			RN14BK2C1500D	RES. METAL FILM
R21			RD14BB2C390J	RES. CARBN
R22			RN14BK2C90R0D	RES. METAL FILM
R23			RD14BB2C101J	RES. CARBN
R24			RN14BK2C60R0D	RES. METAL FILM
R25			RN14BK2C1004F	RES. METAL FILM
R26			RN14BK2C1001F	RES. METAL FILM
R29			RN14BK2C1100F	RES. METAL FILM
R30			RD14BB2C101J	RES. CARBN
R31			RN14BK2C1302F	RES. METAL FILM
R34			RD14BB2C241J	RES. CARBN
R36			RD14BB2C102J	RES. CARBN
R37			RD14BB2C220J	RES. CARBN
R38			RD14BB2C220J	RES. CARBN
R39			RD14BB2C183J	RES. CARBN
R40			RD14BB2C122J	RES. CARBN

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R41			RD14BB2C221J	RES. CARBN
R42			RD14BB2C911J	RES. CARBN
R43			RD14BB2C623J	RES. CARBN
R44			RD14BB2C152J	RES. CARBN
R45			RN14BK2C3001F	RES. METAL FILM
R46			RD14BB2C101J	RES. CARBN
R51			RD14BB2C220J	RES. CARBN
R52			RN14BK2E9903D	RES. METAL FILM
R53			RN14BK2E1113D	RES. METAL FILM
R54			RD14BB2C470J	RES. CARBN
R55			RD14BB2C101J	RES. CARBN
R56			RD14BB2C331J	RES. CARBN
R57			RN14BK2E9903D	RES. METAL FILM
R58			RN14BK2E1012D	RES. METAL FILM
R59			RD14BB2C360J	RES. CARBN
R60			RD14BB2C301J	RES. CARBN
R61			RD14BB2C220J	RES. CARBN
R62			RN14BK2E1004F	RES. METAL FILM
R63			RD14BB2C684J	RES. CARBN
R64			RD14BB2C390J	RES. CARBN
R65			RN14BK2C3003F	RES. METAL FILM
R66			RD14BB2C390J	RES. CARBN
R67			RD14BB2C303J	RES. CARBN
R68			RD14BB2C510J	RES. CARBN
R69			RN14BK2C3000D	RES. METAL FILM
R70			RN14BK2C1500D	RES. METAL FILM
R71			RD14BB2C390J	RES. CARBN
R72			RN14BK2C90R0D	RES. METAL FILM
R73			RD14BB2C101J	RES. CARBN
R74			RN14BK2C60R0D	RES. METAL FILM
R75			RN14BK2C1004F	RES. METAL FILM
R76			RN14BK2C1001F	RES. METAL FILM
R79			RN14BK2C1100F	RES. METAL FILM
R80			RD14BB2C101J	RES. CARBN
R81			RN14BK2C1302F	RES. METAL FILM
R84			RD14BB2C241J	RES. CARBN
R86			RD14BB2C102J	RES. CARBN
R87			RD14BB2C220J	RES. CARBN
R88			RD14BB2C220J	RES. CARBN
R89			RD14BB2C183J	RES. CARBN
R90			RD14BB2C122J	RES. CARBN
R91			RD14BB2C221J	RES. CARBN
R92			RD14BB2C681J	RES. CARBN
R93			RD14BB2C623J	RES. CARBN
R94			RD14BB2C152J	RES. CARBN
R95			RN14BK2C3001F	RES. METAL FILM
R96			RD14BB2C101J	RES. CARBN
R106			RN14BK2C1001F	RES. METAL FILM
R107			RN14BK2C1001F	RES. METAL FILM
R108			RN14BK2C6201F	RES. METAL FILM
R109			RN14BK2C6201F	RES. METAL FILM
R110			RN14BK2C9100F	RES. METAL FILM
R111			RN14BK2C9100F	RES. METAL FILM
R112			RD14BB2C470J	RES. CARBN
R113			RD14BB2C470J	RES. CARBN

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R114			RN14BK2C1801F	RES. METAL FILM	1.8K	F	1/6W
R115			RN14BK2C1801F	RES. METAL FILM	1.8K	F	1/6W
R116			RD14BB2C271J	RES. CARBN	270	J	1/6W
R117			RD14BB2C271J	RES. CARBN	270	J	1/6W
R118			RD14BB2C100J	RES. CARBN	10	J	1/6W
R119			RN14BK2C3901F	RES. METAL FILM	3.9K	F	1/6W
R120			RN14BK2C3901F	RES. METAL FILM	3.9K	F	1/6W
R121			RD14BB2C101J	RES. CARBN	100	J	1/6W
R122			RD14BB2C101J	RES. CARBN	100	J	1/6W
R123			RD14BB2C470J	RES. CARBN	47	J	1/6W
R124			RD14BB2C470J	RES. CARBN	47	J	1/6W
R125			RD14BB2C471J	RES. CARBN	470	J	1/6W
R126			RD14BB2C471J	RES. CARBN	470	J	1/6W
R127			RD14BB2C220J	RES. CARBN	22	J	1/6W
R128			RD14BB2C220J	RES. CARBN	22	J	1/6W
R129			RD14BB2C471J	RES. CARBN	470	J	1/6W
R130			RD14BB2C471J	RES. CARBN	470	J	1/6W
R131			RN14BK2C1100F	RES. METAL FILM	110	F	1/6W
R132			RN14BK2C1100F	RES. METAL FILM	110	F	1/6W
R133			RD14BB2C151J	RES. CARBN	150	J	1/6W
R134			R92-1654-05	RESISTOR	22K	-	2W
R135			R92-1654-05	RESISTOR	22K	-	2W
R136			RN14BK2C5601F	RES. METAL FILM	5.6K	F	1/6W
R137			RN14BK2C1603F	RES. METAL FILM	160K	F	1/6W
R138			RD14BB2C271J	RES. CARBN	270	J	1/6W
R139			R92-1689-05	RESISTOR	18K	-	2W
R140			RN14BK2C5601F	RES. METAL FILM	5.6K	F	1/6W
R141			RN14BK2C1603F	RES. METAL FILM	160K	F	1/6W
R142			RD14BB2C271J	RES. CARBN	270	J	1/6W
R143			R92-1689-05	RESISTOR	18K	-	2W
R144			RD14BB2E470J	RES. CARBN	47	J	1/4W
R145			RD14BB2E470J	RES. CARBN	47	J	1/4W
R146			RD14BB2C100J	RES. CARBN	10	J	1/6W
R151			RD14BB2C182J	RES. CARBN	1.8K	J	1/6W
R152			RD14BB2C822J	RES. CARBN	8.2K	J	1/6W
R154			RD14BB2C362J	RES. CARBN	3.6K	J	1/6W
R155			RD14BB2C132J	RES. CARBN	1.3K	J	1/6W
R156			RD14BB2C470J	RES. CARBN	47	J	1/6W
R157			RD14BB2C220J	RES. CARBN	22	J	1/6W
R159			RD14BB2C392J	RES. CARBN	3.9K	J	1/6W
R160			RD14BB2C751J	RES. CARBN	750	J	1/6W
R167			RD14BB2C182J	RES. CARBN	1.8K	J	1/6W
R168			RD14BB2C822J	RES. CARBN	8.2K	J	1/6W
R170			RD14BB2C362J	RES. CARBN	3.6K	J	1/6W
R171			RD14BB2C132J	RES. CARBN	1.3K	J	1/6W
R172			RD14BB2C470J	RES. CARBN	47	J	1/6W
R173			RD14BB2C220J	RES. CARBN	22	J	1/6W
R175			RD14BB2C392J	RES. CARBN	3.9K	J	1/6W
R176			RD14BB2C751J	RES. CARBN	750	J	1/6W
R177			RD14BB2C332J	RES. CARBN	3.3K	J	1/6W
R178			RD14BB2C162J	RES. CARBN	1.6K	J	1/6W
R179			RD14BB2C302J	RES. CARBN	3K	J	1/6W
R180			RD14BB2C220J	RES. CARBN	22	J	1/6W
R181			RD14BB2C182J	RES. CARBN	1.8K	J	1/6W
R182			RD14BB2C751J	RES. CARBN	750	J	1/6W

Ref. No	Add-ress	New Parts	Parts No.	Description			
R183			RD14BB2C163J	RES. CARBN	16K	J	1/6W
R184			RD14BB2C681J	RES. CARBN	680	J	1/6W
R185			RD14BB2C473J	RES. CARBN	47K	J	1/6W
R186			RN14BK2C6200F	RES. METAL FILM	620	F	1/6W
R187			RD14BB2C104J	RES. CARBN	100K	J	1/6W
R188			RD14BB2C104J	RES. CARBN	100K	J	1/6W
R189			RD14BB2C223J	RES. CARBN	22K	J	1/6W
R190			RD14BB2C154J	RES. CARBN	150K	J	1/6W
R191			RD14BB2C133J	RES. CARBN	13K	J	1/6W
R192			RD14BB2C302J	RES. CARBN	3K	J	1/6W
R193			RD14BB2C750J	RES. CARBN	75	J	1/6W
R194			RD14BB2C911J	RES. CARBN	910	J	1/6W
R195			RD14BB2C911J	RES. CARBN	910	J	1/6W
R201			RD14BB2C105J	RES. CARBN	1M	J	1/6W
R202			RD14BB2C104J	RES. CARBN	100K	J	1/6W
R203			RD14BB2C182J	RES. CARBN	1.8K	J	1/6W
R204			RD14BB2C162J	RES. CARBN	1.6K	J	1/6W
R205			RD14BB2C302J	RES. CARBN	3K	J	1/6W
R206			RD14BB2C470J	RES. CARBN	47	J	1/6W
R231			RD14BB2C104J	RES. CARBN	100K	J	1/6W
R232			RD14BB2C104J	RES. CARBN	100K	J	1/6W
R233			RD14BB2C132J	RES. CARBN	1.3K	J	1/6W
R237			RD14BB2C104J	RES. CARBN	100K	J	1/6W
R238			RD14BB2C104J	RES. CARBN	100K	J	1/6W
R239			RD14BB2C132J	RES. CARBN	1.3K	J	1/6W
R240			RD14BB2E472J	RES. CARBN	4.7K	J	1/4W
R241			RD14BB2C102J	RES. CARBN	1K	J	1/6W
R242			RD14BB2C472J	RES. CARBN	4.7K	J	1/6W
R243			RD14BB2C621J	RES. CARBN	620	J	1/6W
R244			RD14BB2C621J	RES. CARBN	620	J	1/6W
R245			RD14BB2C122J	RES. CARBN	1.2K	J	1/6W
R246			RD14BB2C102J	RES. CARBN	1K	J	1/6W
R247			RD14BB2C201J	RES. CARBN	200	J	1/6W
R248			RD14BB2C103J	RES. CARBN	10K	J	1/6W
R249			RD14BB2C203J	RES. CARBN	20K	J	1/6W
R250			RD14BB2C472J	RES. CARBN	4.7K	J	1/6W
R251			RD14BB2C102J	RES. CARBN	1K	J	1/6W
R252			RD14BB2C103J	RES. CARBN	10K	J	1/6W
R253			RD14BB2C472J	RES. CARBN	4.7K	J	1/6W
R254			RD14BB2C102J	RES. CARBN	1K	J	1/6W
R255			RD14BB2C471J	RES. CARBN	470	J	1/6W
R256			RD14BB2C472J	RES. CARBN	4.7K	J	1/6W
R257			RD14BB2C472J	RES. CARBN	4.7K	J	1/6W
R258			RD14BB2C472J	RES. CARBN	4.7K	J	1/6W
R259			RD14BB2C472J	RES. CARBN	4.7K	J	1/6W
R260			RD14BB2C472J	RES. CARBN	4.7K	J	1/6W
R261			RD14BB2C472J	RES. CARBN	4.7K	J	1/6W
R262			RD14BB2C272J	RES. CARBN	2.7K	J	1/6W
R263			RD14BB2C122J	RES. CARBN	1.2K	J	1/6W
R264			RD14BB2C332J	RES. CARBN	3.3K	J	1/6W
R265			RD14BB2C222J	RES. CARBN	2.2K	J	1/6W
R266			RD14BB2C472J	RES. CARBN	4.7K	J	1/6W
R267			RD14BB2C332J	RES. CARBN	3.3K	J	1/6W
R268			RD14BB2E103J	RES. CARBN	10K	J	1/4W
R270			RN14BK2C4702F	RES. METAL FILM	47K	F	1/6W

L : Scandinavia
Y : PX(Far East, Hawaii)
Y : AAFES(Europe)

K : USA
T : Europe
X : Australia

P : Canada
E : Europe
M : Other Areas

R : Mexico
G : Germany


 indicates safety critical components.

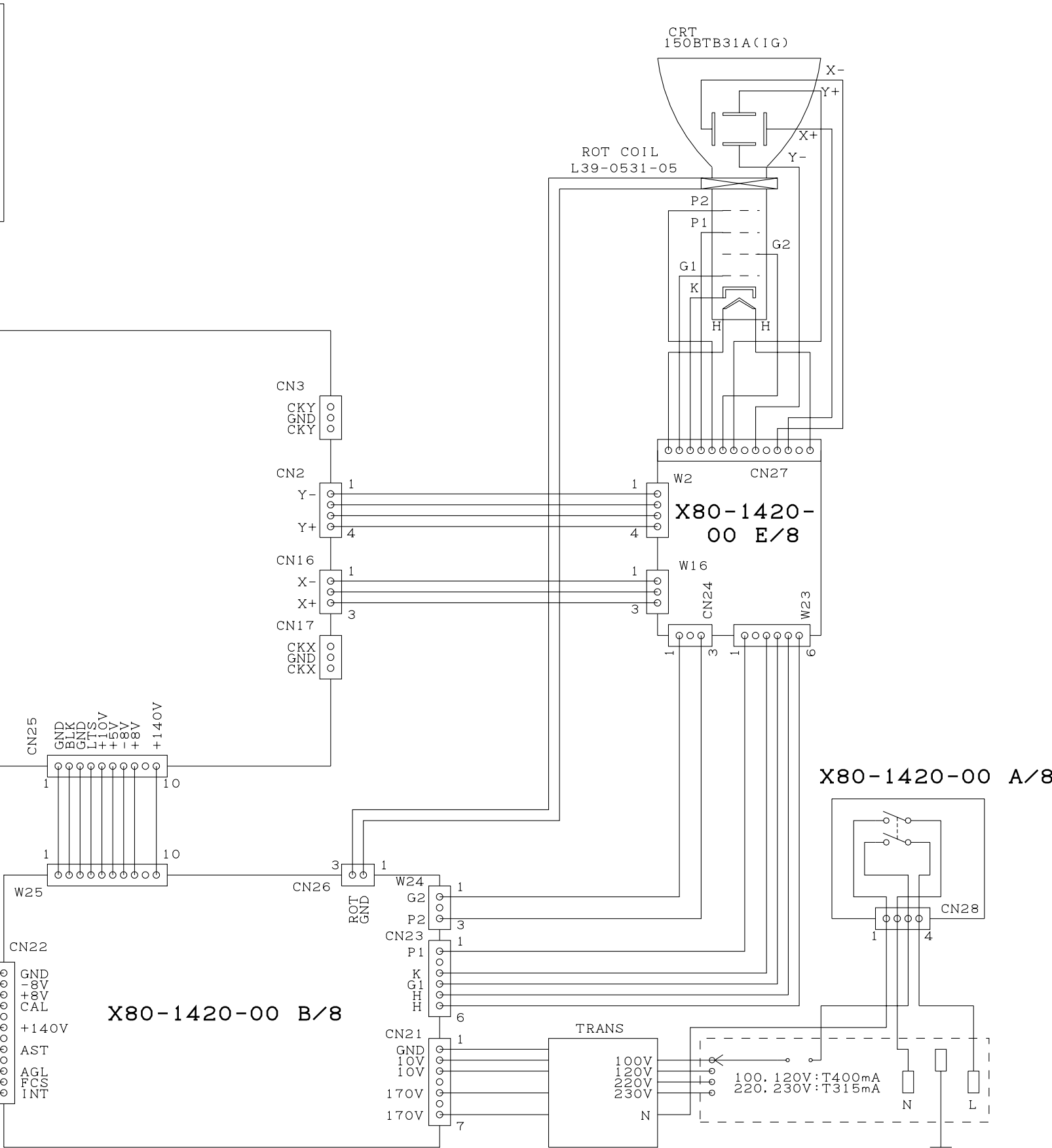
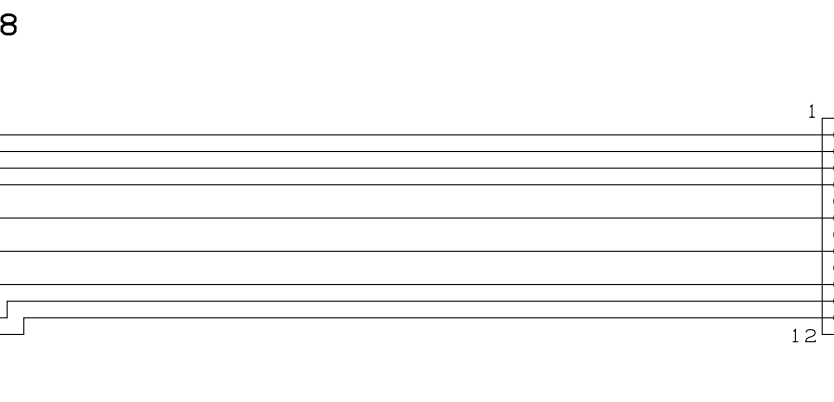
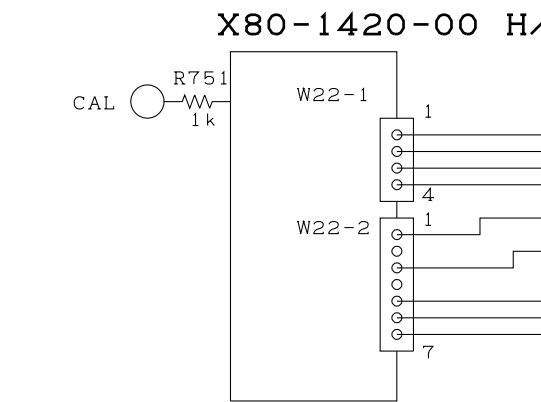
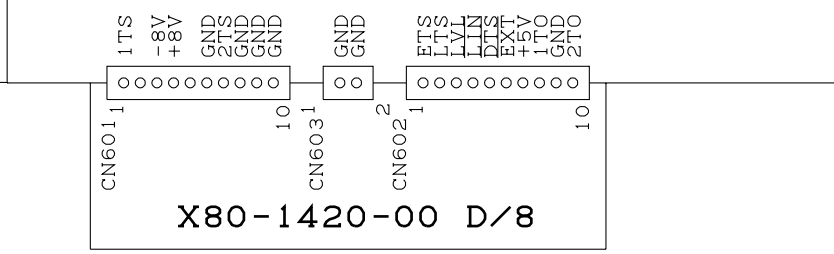
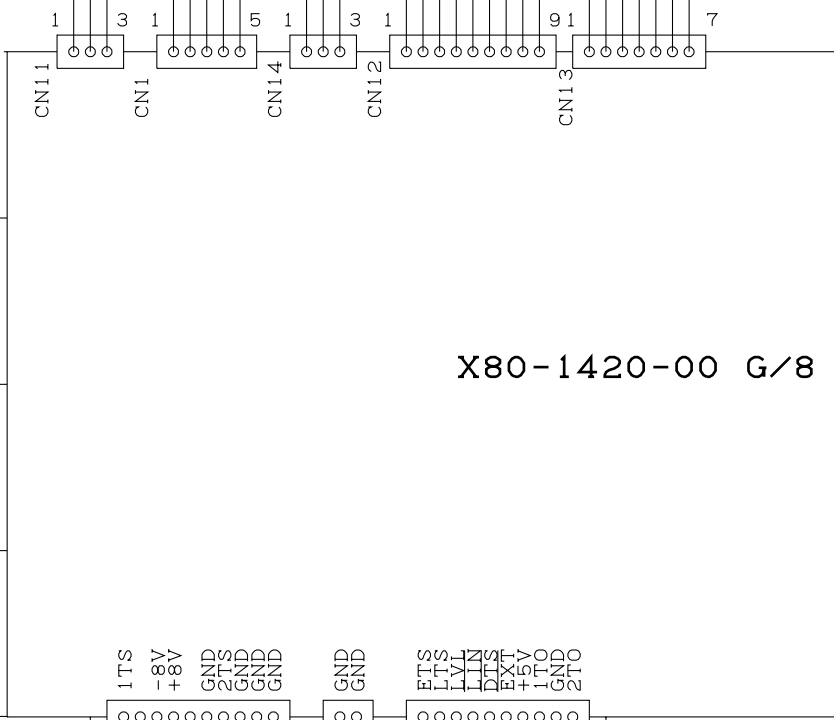
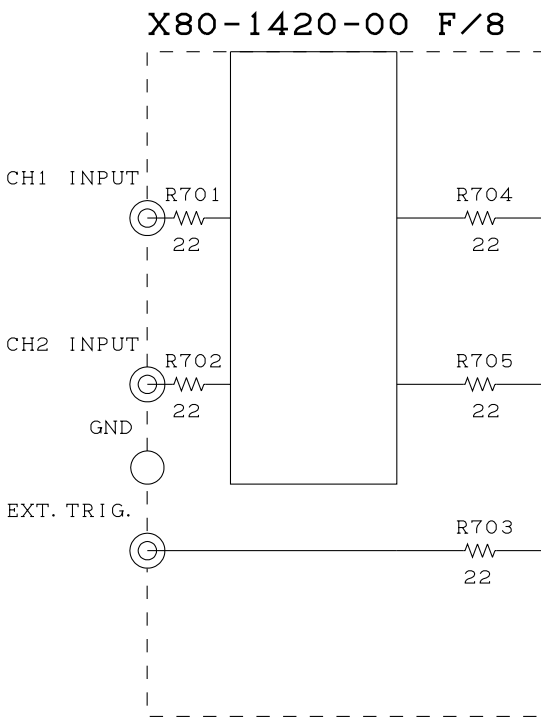
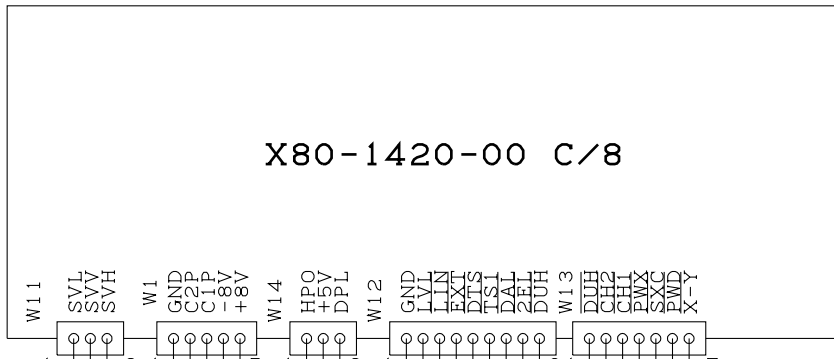
L : Scandinavia
Y : PX(Far East, Hawaii)
Y : AAFES(Europe)

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E : Europe
M : Other Areas

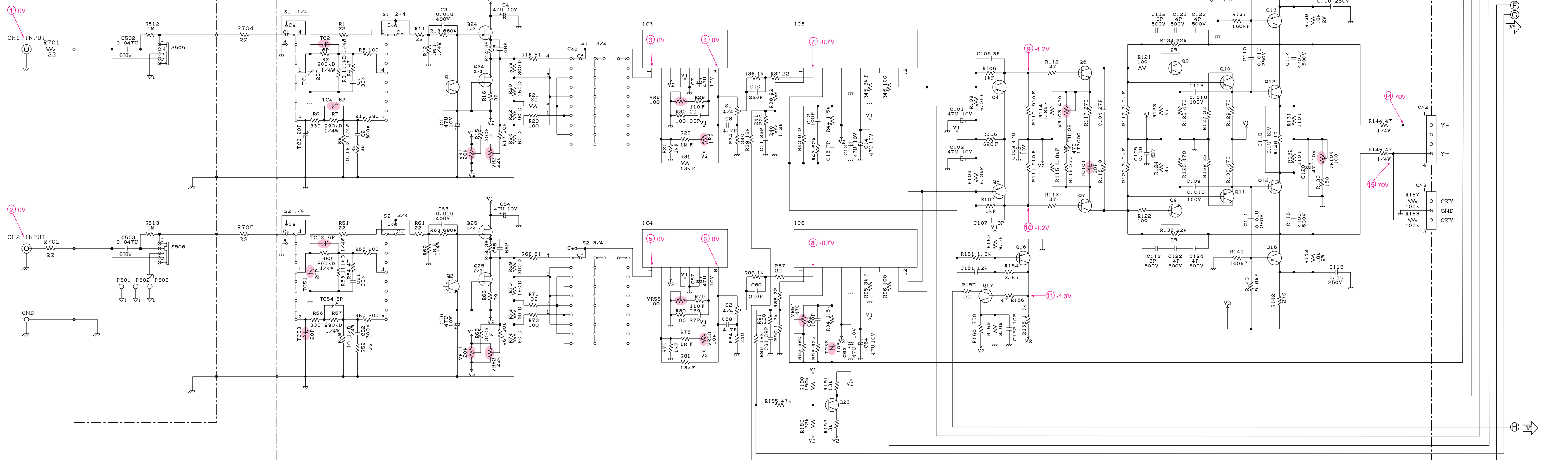
R : Mexico
G : Germany

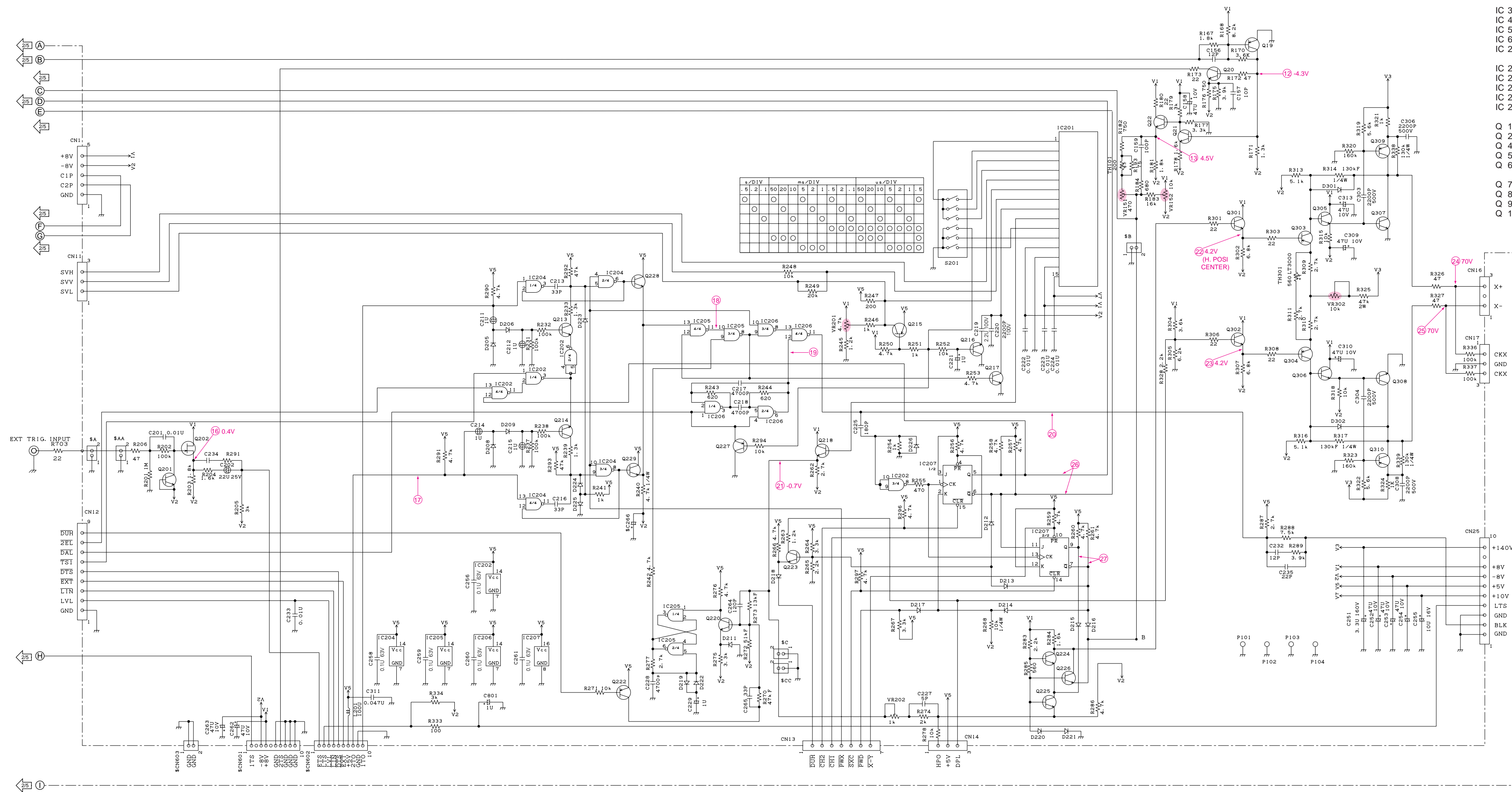
 indicates safety critical components.



X80-1420-00 F/8

X80-1420-00 G/8





- IC 3 KMC17
- IC 4 KMC17
- IC 5 KMC02
- IC 6 KMC02
- IC 201 KMD02

- IC 202 SN74ALS00AN
- IC 204 TC74HC00AP
- IC 205 SN74ALS00AN
- IC 206 SN74ALS00AN
- IC 207 SN74ALS112AN

- Q 1 2SC1923(O)
- Q 2 2SC1923(O)
- Q 4 2SA933S(R,S)
- Q 5 2SA933S(R,S)
- Q 6 2SC1923(O)

- Q 7 2SC1923(O)
- Q 8 2SC1923(O)
- Q 9 2SC1923(O)
- Q 10 2SA1005(K)

- Q 11 2SA1005(K)
- Q 12 2SC3787(S,T)
- Q 13 2SA1477(S,T)
- Q 14 2SC3787(S,T)
- Q 15 2SA1477(S,T)
- Q 16 2SA933S(R,S)

- Q 17 2SC1740S(R,S)
- Q 19 2SA933S(R,S)
- Q 20 2SC1740S(R,S)
- Q 21 2SC1740S(R,S)
- Q 22 2SC1740S(R,S)

- Q 23 2SC1740S(R,S)
- Q 24 2SK389(BL)
- Q 25 2SK389(BL)
- Q 201 2SC1740S(R,S)
- Q 202 2SK161(GR)

- Q 218 2SC1740S(R,S)
- Q 220 2SC1740S(R,S)
- Q 222 2SA933S(R,S)
- Q 223 2SC1740S(R,S)
- Q 224 2SC1740S(R,S)

- Q 225 2SC1740S(R,S)
- Q 226 2SC1740S(R,S)
- Q 227 2SA933S(R,S)
- Q 228 2SC1740S(R,S)
- Q 229 2SC1740S(R,S)

- Q 301 2SC1740S(R,S)
- Q 302 2SC1740S(R,S)
- Q 303 2SA933S(R,S)
- Q 304 2SA933S(R,S)
- Q 305 2SC1740S(R,S)

- Q 306 2SC1740S(R,S)
- Q 307 2SC2911(S,T)
- Q 308 2SC2911(S,T)
- Q 309 2SA1209(S,T)
- Q 310 2SA1209(S,T)

- D 205 1SS133
- D 206 1SS133
- D 208 1SS133
- D 209 1SS133
- D 211 1SS133

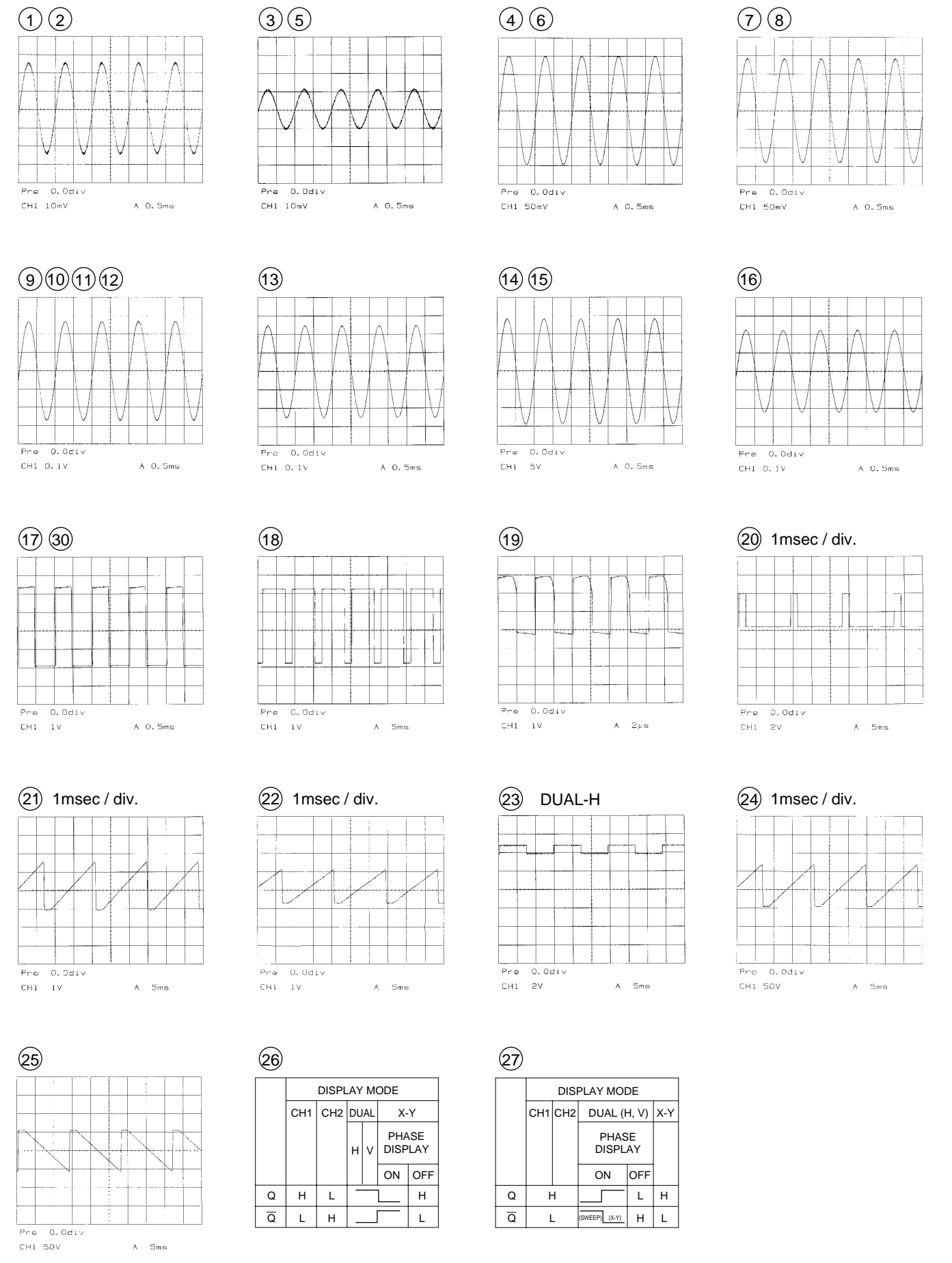
- D 212 1SS133
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- D 215 1SS133
- D 216 1SS133

- D 217 1SS133
- D 218 1SS133
- D 219 1SS133
- D 220 1SS133
- D 221 1SS133

- D 222 1SS133
- D 223 MA700
- D 224 MA700
- D 225 MA700
- D 226 1SS133

- D 301 1SS83
- D 302 1SS83

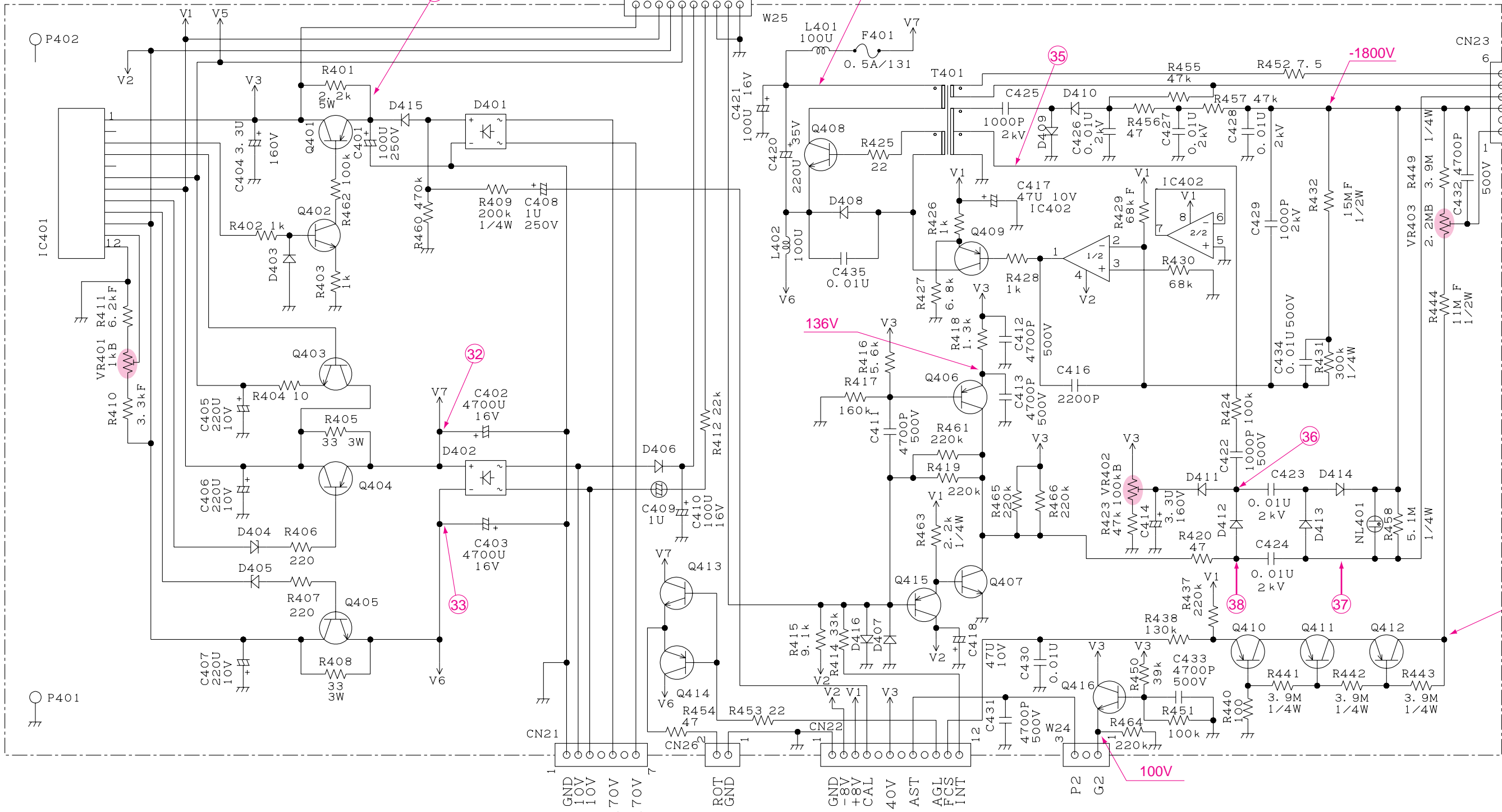
CS-1575D(K) (5/5)



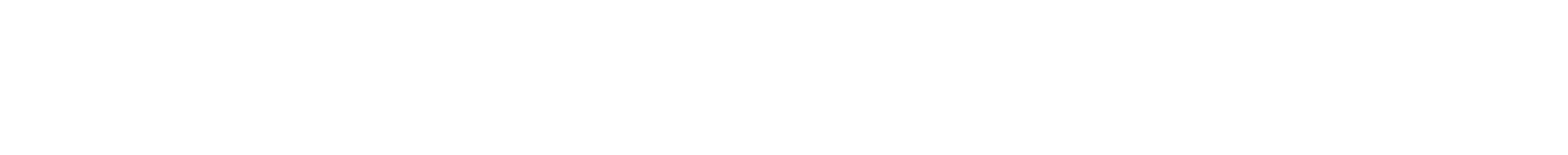
DISPLAY MODE			
CH1	CH2	DUAL	X-Y
ON	ON	H V	PHASE DISPLAY
ON	OFF	ON	OFF
Q	H	L	H
Q	L	H	L

DISPLAY MODE			
CH1	CH2	DUAL (H, V)	X-Y
ON	ON	PHASE DISPLAY	PHASE DISPLAY
ON	OFF	ON	OFF
Q	H	L	H
Q	L	H	L

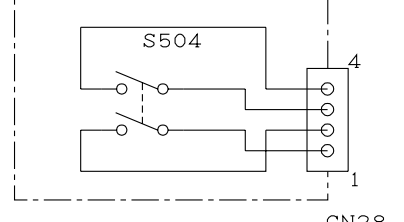
X80-1420-00 B/8



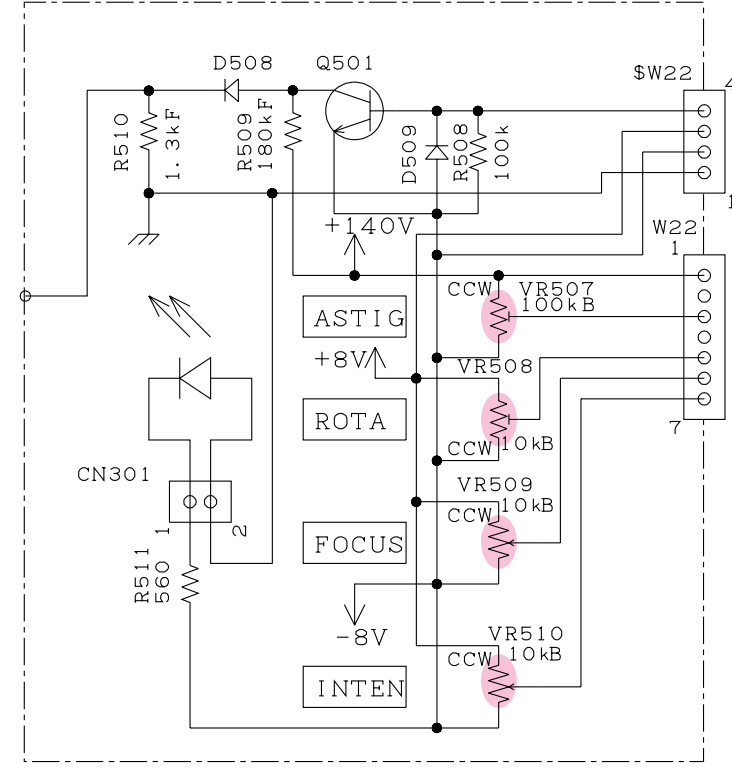
X80-1420-00 C/8



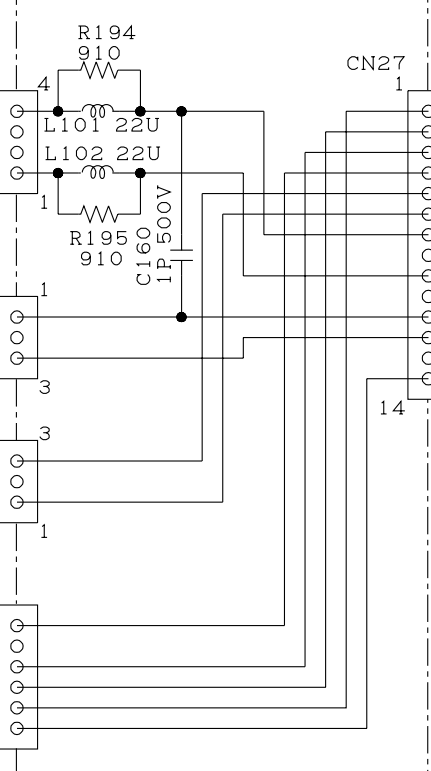
X80-1420-00 A/8



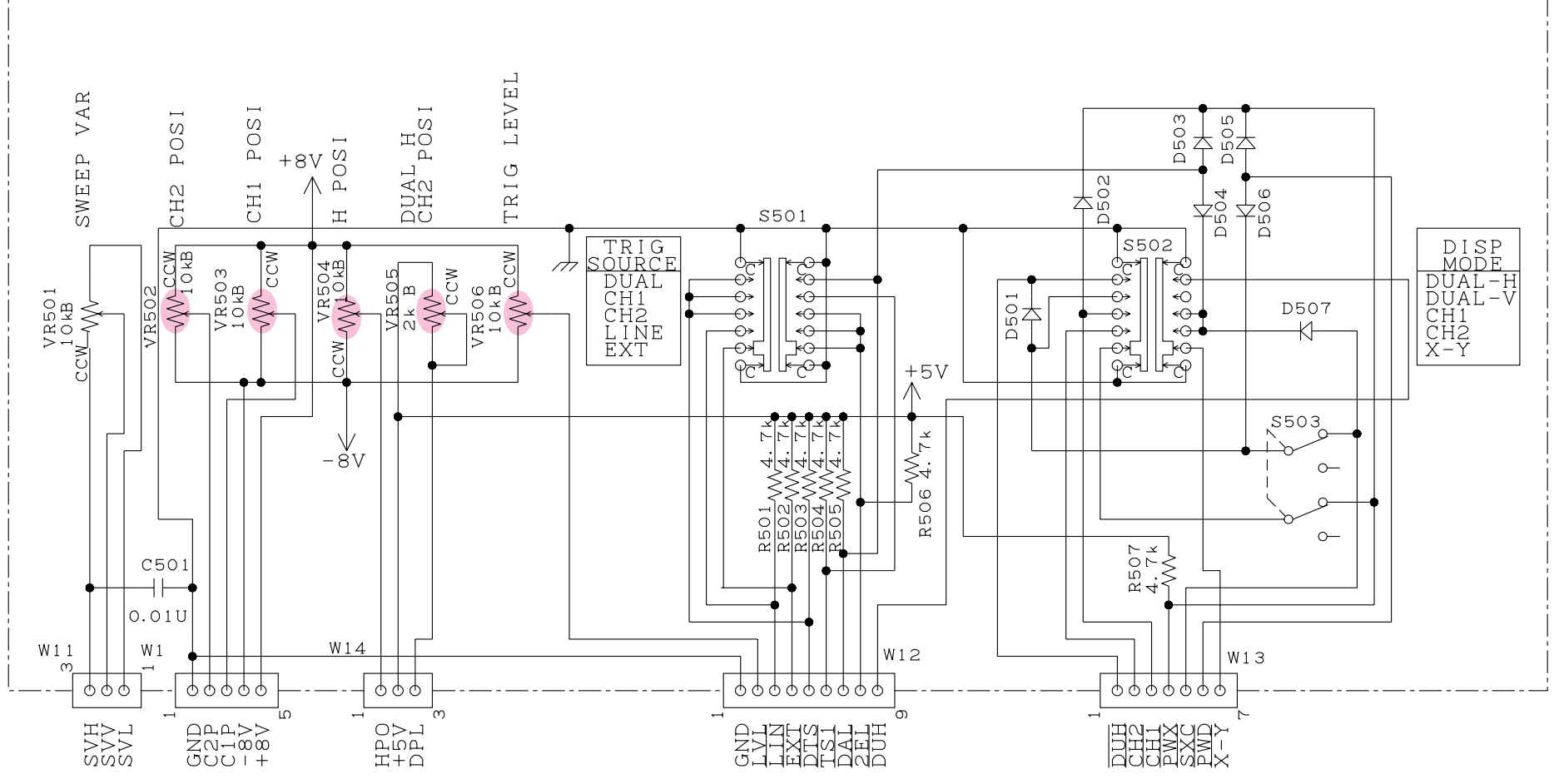
X80-1420-00 H/8



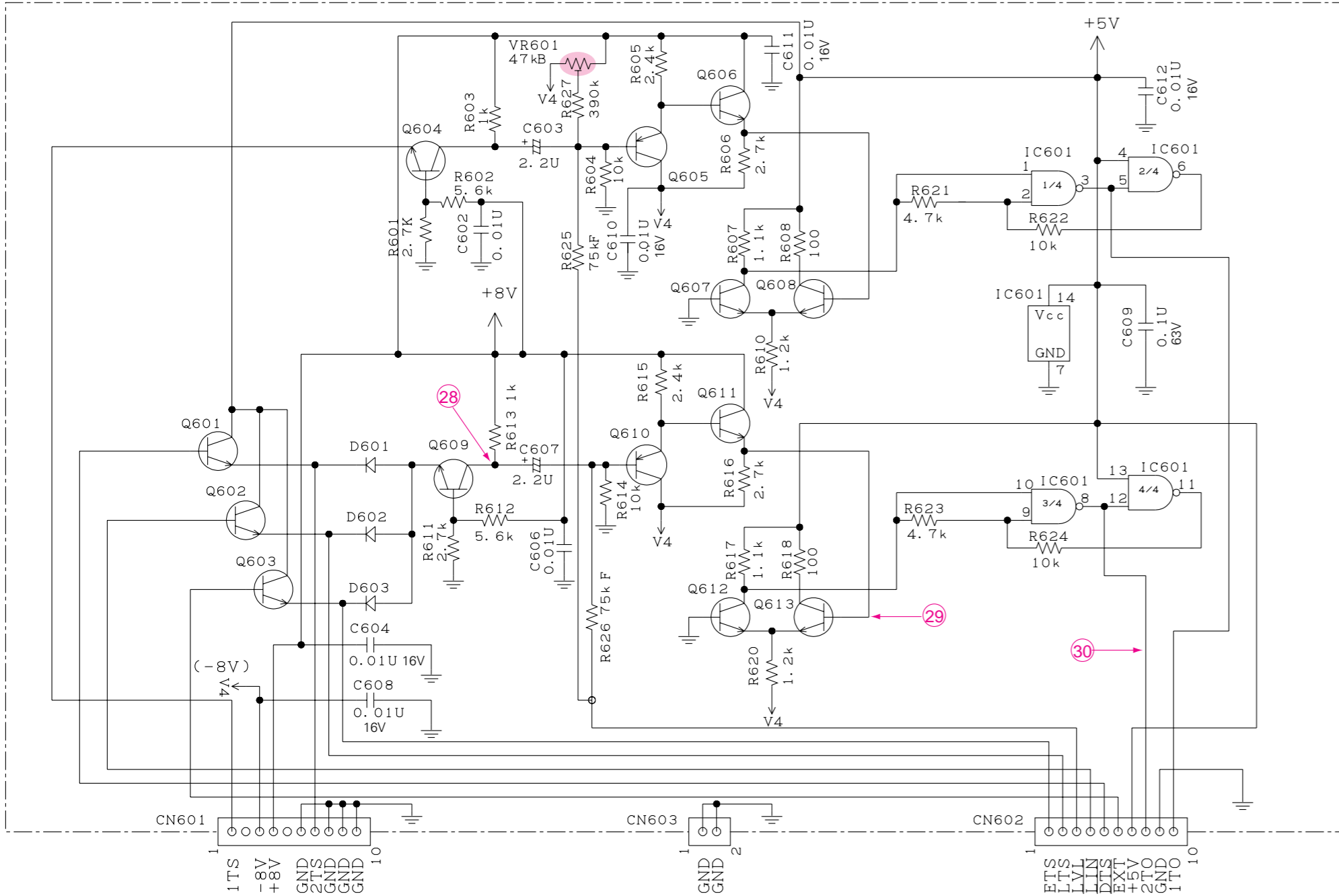
X80-1420-00 E/8



X80-1420-00 C/8



X80-1420-00 D/8



CS-1575D(K) (5/5)

- IC 401 KMA01
- IC 402 NJM4558D
- IC 601 SN74ALS00AN

- Q 401 2SA1156(L)
- Q 402 2SC2909(S,T)
- Q 403 2SC3940A(R)
- Q 404 2SA1534A(R)
- Q 405 2SC3940A(R)

- Q 406 2SA1208(S)
- Q 407 2SC2910(S)
- Q 408 2SD1406(Y)
- Q 409 2SA933S(R,S)
- Q 410 2SA1091(O)
- Q 411 2SA1091(O)
- Q 412 2SA1091(O)
- Q 413 2SC3940A(R)
- Q 414 2SA1534A(R)
- Q 415 2SA933S(R,S)

- Q 416 2SC2909(S,T)
- Q 501 2SC1740S(R,S)
- Q 601 2SC1740S(R,S)
- Q 602 2SC1740S(R,S)
- Q 603 2SC1740S(R,S)

- Q 604 2SC1740S(R,S)
- Q 605 2SA933S(R,S)
- Q 606 2SC1740S(R,S)
- Q 607 2SC1740S(R,S)
- Q 608 2SC1740S(R,S)

- Q 609 2SC1740S(R,S)
- Q 610 2SA933S(R,S)
- Q 611 2SC1740S(R,S)
- Q 612 2SC1740S(R,S)
- Q 613 2SC1740S(R,S)

- D 401 S1VB60
- D 402 D2SBA20
- D 403 1SS133

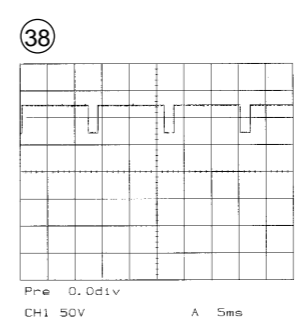
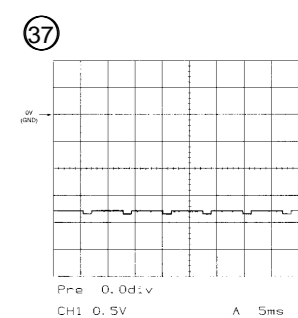
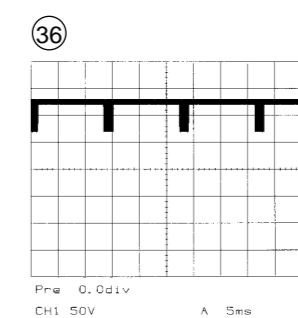
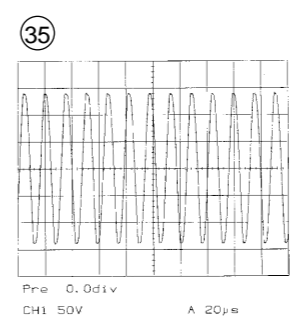
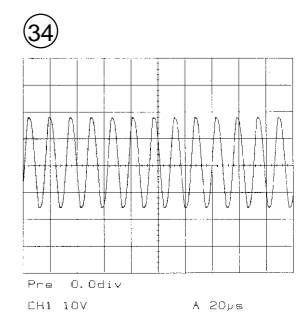
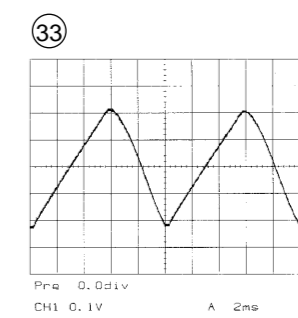
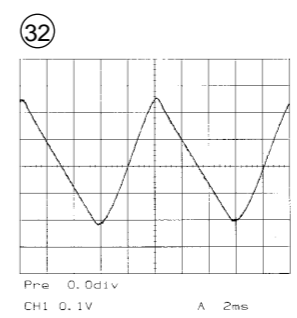
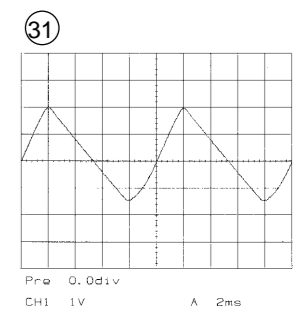
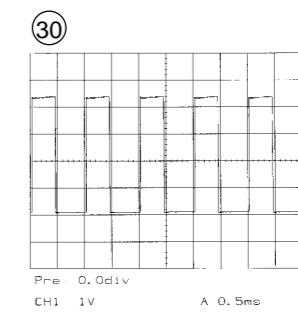
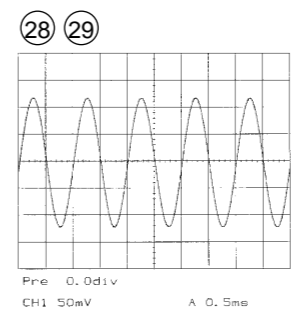
- D 404 MTZ10JC
- D 405 MTZ10JC
- D 406 1SS133
- D 407 1SS133
- D 408 1SS133

- D 409 DHM3FJ60
- D 410 DHM3FJ60
- D 411 1SS83
- D 412 1SS83
- D 413 1SS83

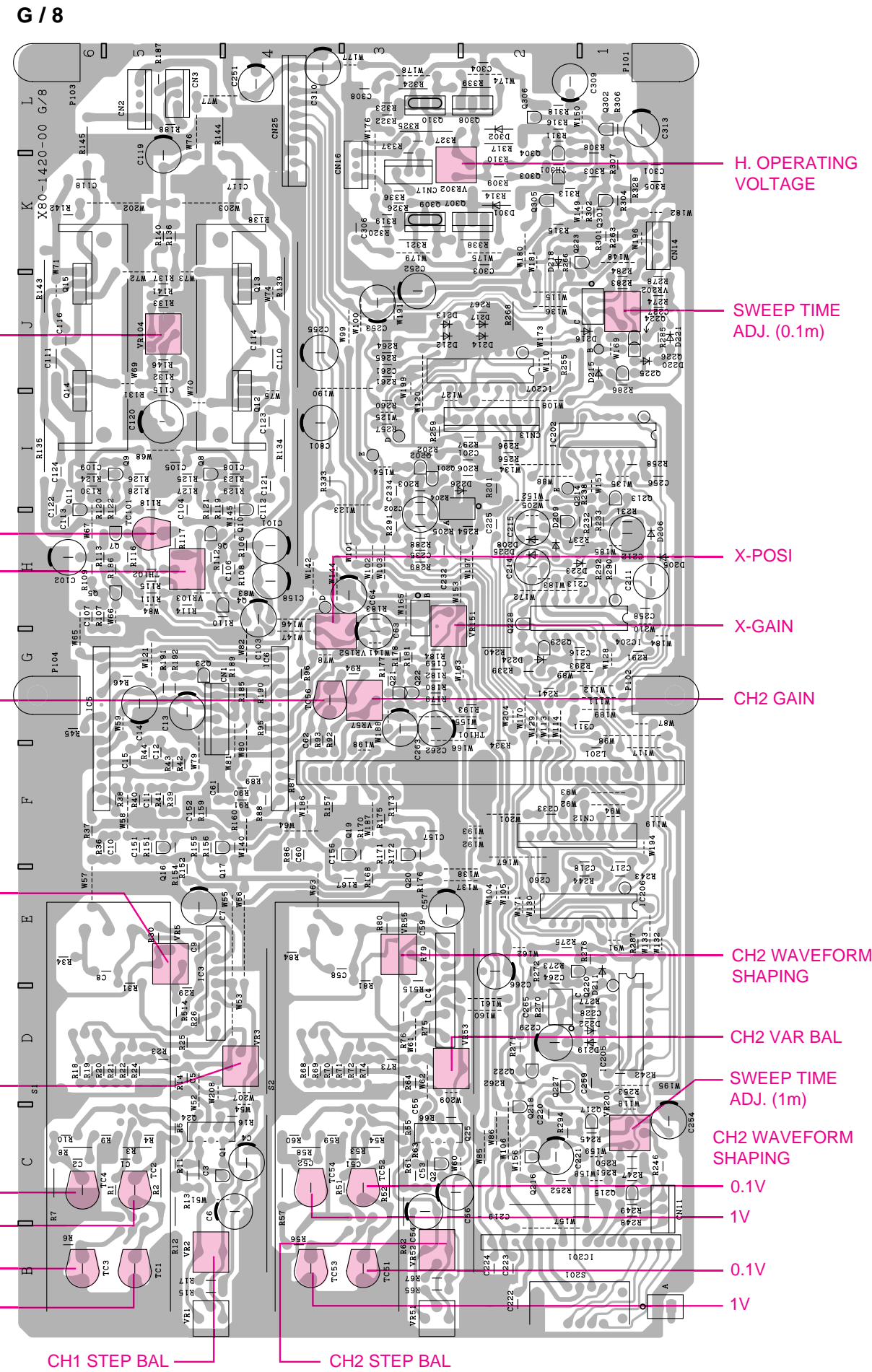
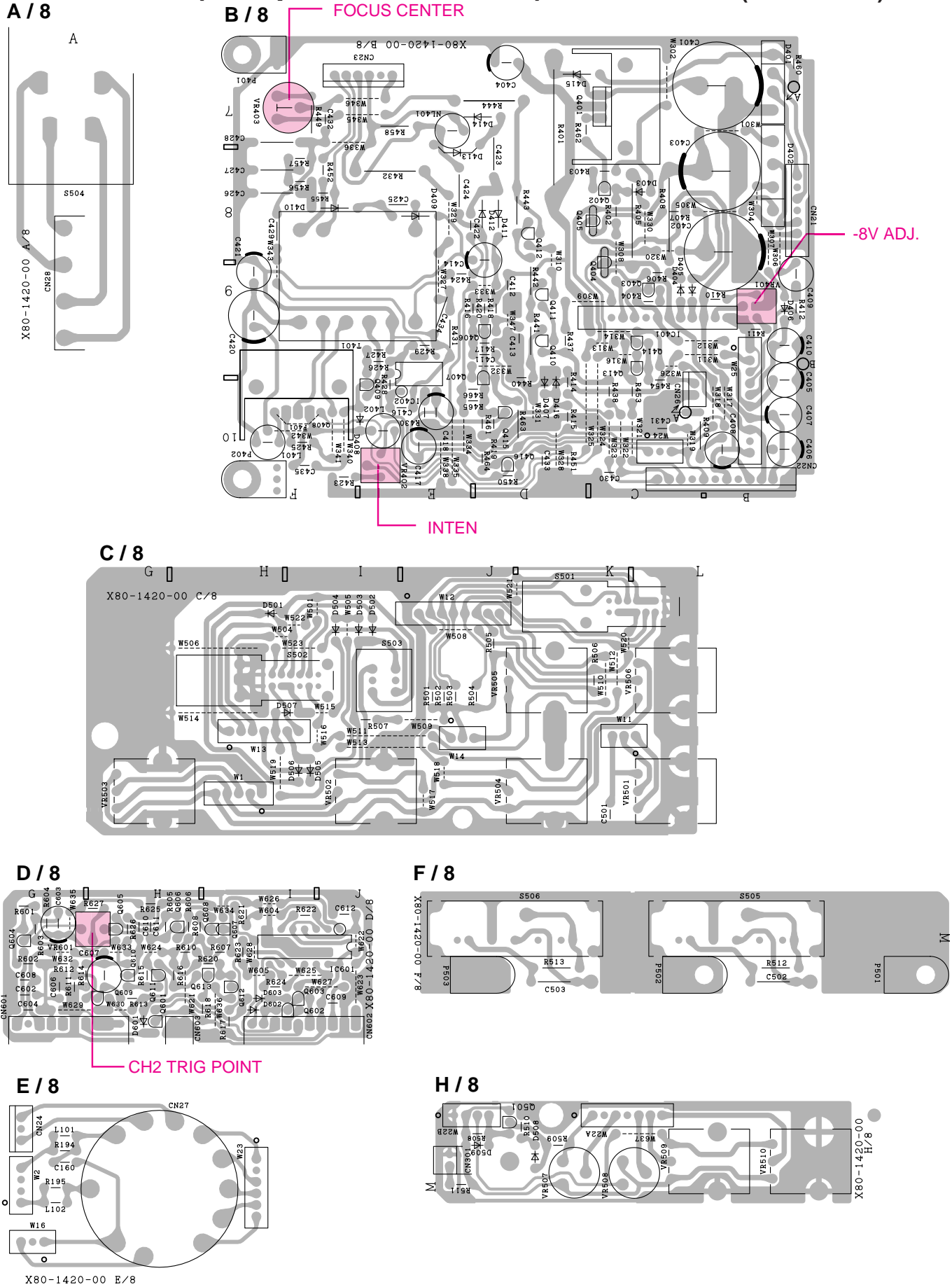
- D 414 1SS83
- D 415 1SS83
- D 416 1SS133
- D 501 MA700
- D 502 1SS133

- D 503 1SS133
- D 504 1SS133
- D 505 1SS133
- D 506 MA700
- D 507 1SS133

- D 508 1SS133
- D 509 1SS133
- D 601 1SS133
- D 602 1SS133
- D 603 1SS133



PC BOARD (Component side view) COMPLEX UNIT(X80-1420-00)



Refer to the schematic diagram for the values of resistors and capacitors.

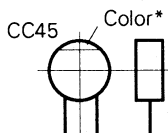
CS-1575D

PARTS DESCRIPTIONS

CAPACITORS

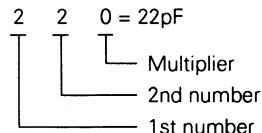
CC 45 TH 1H 220 J
 1 2 3 4 5 6

- 1 = Type ... ceramic, electrolytic, etc.
- 2 = Shape ... round, square, ect.
- 3 = Temp. coefficient
- 4 = Voltage rating
- 5 = Value
- 6 = Tolerance



Capacitor value

- 010 = 1pF
- 100 = 10pF
- 101 = 100pF
- 102 = 1000pF = 0.001μF
- 103 = 0.01μF



Temperature coefficient

1st Word	C	L	P	R	S	T	U
Color*	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	-80	-150	-220	-330	-470	-750

2nd Word	G	H	J	K	L
ppm/°C	±30	±60	±120	±250	±500

Example : CC45TH = -470 ± 60ppm/°C

Tolerance (More than 10pF)

Code	C	D	G	J	K	M	X	Z	P	No code
(%)	±0.25	±0.5	±2	±5	±10	±20	+40 -20	+80 -20	+100 -0	More than 10μF -10 ~ +50 Less than 4.7μF -10 ~ +75

(Less than 10pF)

Code	B	C	D	F	G
(pF)	±0.1	±0.25	±0.5	±1	±2

Voltage rating

2nd word \ 1st word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	-
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	-
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	-

Chip capacitors

(EX) C C 7 3 F S L 1 H 0 0 0 J
 1 2 3 4 5 6 7

(Chip) (CH, RH, UJ, SL)

(EX) C K 7 3 F F 1 H 0 0 0 Z
 1 2 3 4 5 6 7

(Chip) (B, F)

Refer to the table above.

- 1 = Type
- 2 = Shape
- 3 = Dimension
- 4 = Temp. coefficient
- 5 = Voltage rating
- 6 = Value
- 7 = Tolerance

Dimension (Chip capacitors)

Dimension code	L	W	T
Empty	5.6 ± 0.5	5.0 ± 0.5	Less than 2.0
A	4.5 ± 0.5	3.2 ± 0.4	Less than 2.0
B	4.5 ± 0.5	2.0 ± 0.3	Less than 2.0
C	4.5 ± 0.5	1.25 ± 0.2	Less than 1.25
D	3.2 ± 0.4	2.5 ± 0.3	Less than 1.5
E	3.2 ± 0.2	1.6 ± 0.2	Less than 1.25
F	2.0 ± 0.3	1.25 ± 0.2	Less than 1.25
G	1.6 ± 0.2	0.8 ± 0.2	Less than 1.0

RESISTORS

Chip resistor (Carbon)

(EX) R K 7 3 E B 2 B 0 0 0 J
 1 2 3 4 5 6 7

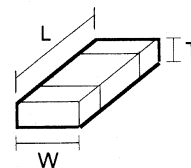
(Chip) (B,F)

Carbon resistor (Normal type)

(EX) R D 1 4 B B 2 C 0 0 0 J
 1 2 3 4 5 6 7

- 1 = Type
- 2 = Shape
- 3 = Dimension
- 4 = Temp. coefficient
- 5 = Rating wattage
- 6 = Value
- 7 = Tolerance

Dimension



Dimension (Chip resistor)

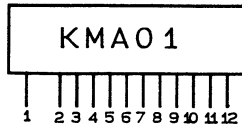
Dimension code	L	W	T
E	3.2 ± 0.2	1.6 ± 0.2	1.0
F	2.0 ± 0.3	1.25 ± 0.2	1.0
G	1.6 ± 0.2	0.8 ± 0.2	0.5 ± 0.1

Rating wattage

Code	Wattage	Code	Wattage	Code	Wattage
1J	1/16W	2C	1/6W	3A	1W
2A	1/10W	2E	1/4W	3D	2W
2B	1/8W	2H	1/2W		

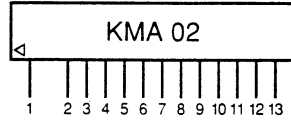
SEMICONDUCTORS

KMA01



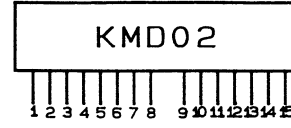
- 1.OPH
- 2.AJH
- 3.DRH
- 4.DR5
- 5.AJ5
- 6.OP5
- 7.OPP
- 8.DRP
- 9.DRN
- 10.OPN
- 11.AJN
- 12.GND

KMA02



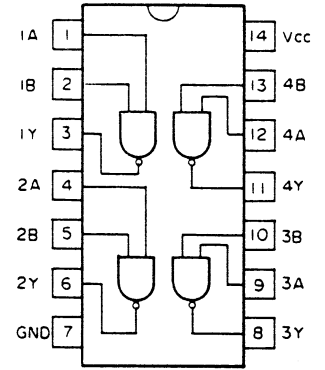
- 1. +140 V output
- 2. +140 V control
- 3. +55 V control
- 4. +55 V output
- 5. +12 V control
- 6. +12 V output
- 7. -12 V control
- 8. -12 V output
- 9. +5 V control
- 10. +5 V output
- 11. Sweep time reference voltage output
- 12. External capacitor connection
- 13. GND

KMD02

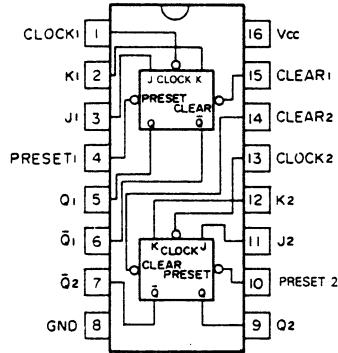


- 1.SWEEP
- 2.LOW
- 3.MID
- 4.HIGH
- 5.VARH
- 6.REF
- 7.VAR
- 8.CAP
- 9.SWP
- 10.CNTB
- 11.CNTA
- 12.Vss
- 13.GND
- 14.VDD
- 15.Vcc

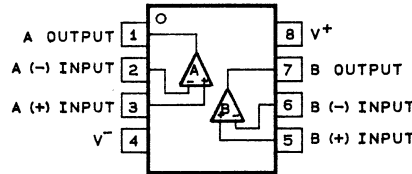
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TC74HC00AP



SN74ALS112AN

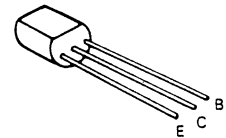


NJM4558D

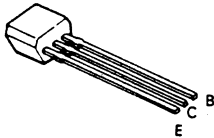


- 2SA1005(K)
- 2SA1091(O)
- 2SA1208(O)
- 2SA1534A(R)
- 2SC1740S(R,S)

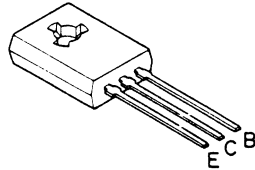
- 2SC1923(O)
- 2SC2909(S,T)
- 2SC2910(S)
- 2SC3940A(R)



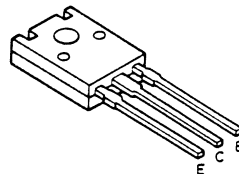
2SA933S(R,S)



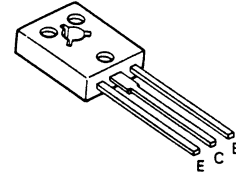
2SA1156(L)



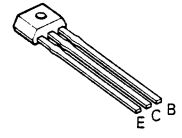
2SA1477(S,T)
2SC3787(S)



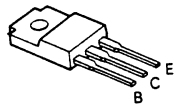
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2SC2911(S,T)



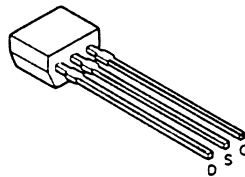
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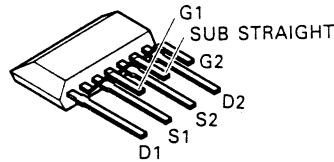
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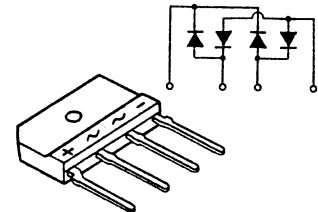
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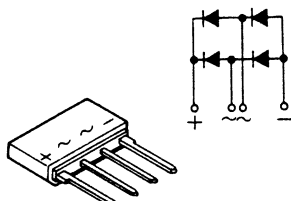
2SK389(BL)



D2SBA20



S1VB60



CS-1575D

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