ICOM

SERVICE MANUAL

MARINE RADAR

MR-610

Icom Inc.

INTRODUCTION

This service manual describes the latest information for the **MR-610** MARINE RADAR at the time of publication.

DANGER

HIGH VOLTAGE WARNING

High voltages of up to hundreds of thousands of volts are used in this unit. BEWARE of high voltage when removing the outer cover of the unit. When working on the interior, avoid direct contact with the high voltage circuitry especially on the CRT unit and the transmit circuit.

Electric shock of 1000 volts or more causes instant electrocution and death; and, even an electric shock of only 100 volts can kill you.

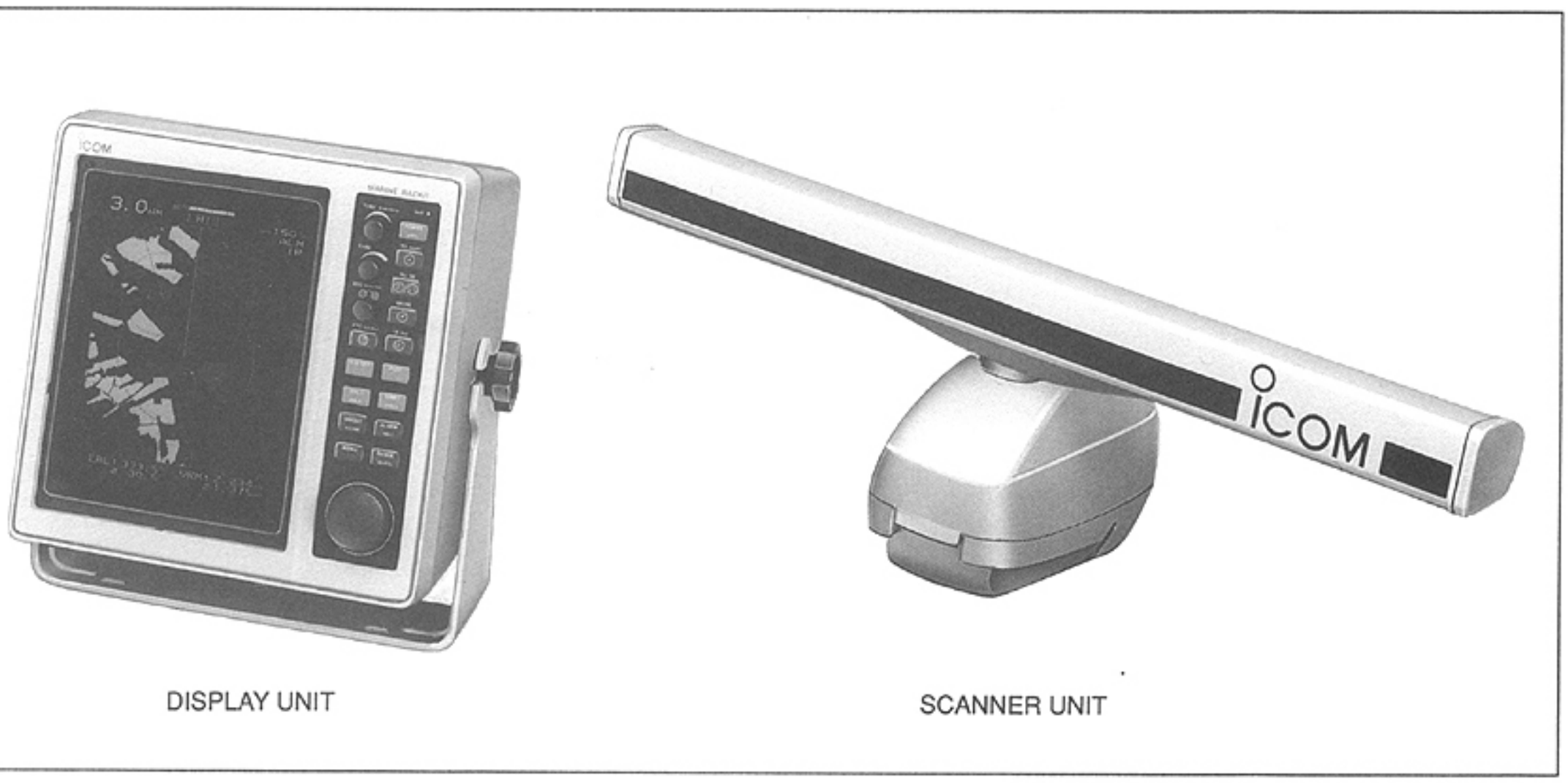
ELECTRIC SHOCK

PREVENTING ELECTRIC SHOCK

Before opening the display unit cover, wait more than 1 min. from disconnecting the DC power cable in order to discharge the capacitor inside the unit.

FIRST AID IN CASE OF ELECTRIC SHOCK

A stable foothold is essential to prevent more extensive or additional injuries. When injured by electric shock, disinfect the burn completely and begin first aid as soon as possible. To avoid electric shock, all adjustments should be made using an insulated turning tool.



DISPLAY UNIT

SCANNER UNIT

ORDERING PARTS

Be sure to include the following four points when ordering replacement parts:

1. 10-digit order numbers
2. Component part number and name
3. Equipment model name and unit name
4. Quantity required

<SAMPLE ORDER>

1140004220	IC	HD64180R1P6	MR-610	MAIN UNIT	5 pieces
8810001280	Screw	PH M5 x 20 SUS	MR-610	FRONT UNIT	8 pieces

Addresses are provided on the inside back cover for your convenience.

REPAIR NOTES

1. Make sure a problem is internal before disassembling the unit.
2. **DO NOT** open the unit until the unit is disconnected from the power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits of electronic parts. An insulated tuning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the unit is defective.
8. **READ** the instructions of the test equipment thoroughly before connecting equipment to the unit.

TABLE OF CONTENTS

SECTION 1 SPECIFICATIONS

■ General

- Minimum range : 25 m; 82 ft (when measurement range is 1/8 nm)
- Maximum range : 48 nm (when measurement range is 48 nm)
- Measurement range :

RANGE (nm)	1/8	1/4	1/2	3/4	1.5	3.0	6.0	12	24	32	48
FIXED RING (nm)	1/16	1/8	1/4	1/4	1/4	1/2	1.0	2.0	4.0	8.0	8.0
NUMBER	2	2	2	3	6	6	6	6	6	4	6

- Preheat time : 2 min.
- Connection length between display and antenna : 15 m; 49.2 ft. (standard), 30m; 98.4 ft (optional)

■ Scanner unit

- Type : 1200 mm open-type slot array
- Revolution speed : Approx. 24 r.p.m
- Beam width : Horizontal beam 2° at –3 dB point
  : Vertical beam 25° at –3 dB point
- Side lobe : –24 dB
- Polarization : Horizontal
- Transmission frequency : 9410 MHz ±30 MHz (X band)
- Peak output power : 4 kW
- Pulse width :

RANGE (nm)	NORMAL PULSE	LONG PULSE
1/8, 1/4, 1/2, 3/4, 1.5	0.08 µsec./1800 Hz	0.2 µsec./900 Hz
3	0.2 µsec./900 Hz	0.4 µsec./900 Hz
6	0.4 µsec./900 Hz	0.75 µsec./600 Hz
12, 24, 32, 48	0.75 µsec./600 Hz	

- Modulation system : FET switching
- Transmit/receive switching : Circulator
- Intermediate frequency : 60 MHz
- IF circuit characteristics : Linear
- Dimensions : 1200 (L) x 400 (W) x 360 (H); 47.2 (L) x 15.7 (W) x 14.2 (H) in
- Usable temperature range : –10°C to +60°C (+14°F to +140°F)
- Weight : 17 kg; 37.5 lb (Not including the cable's weight)

■ Display unit

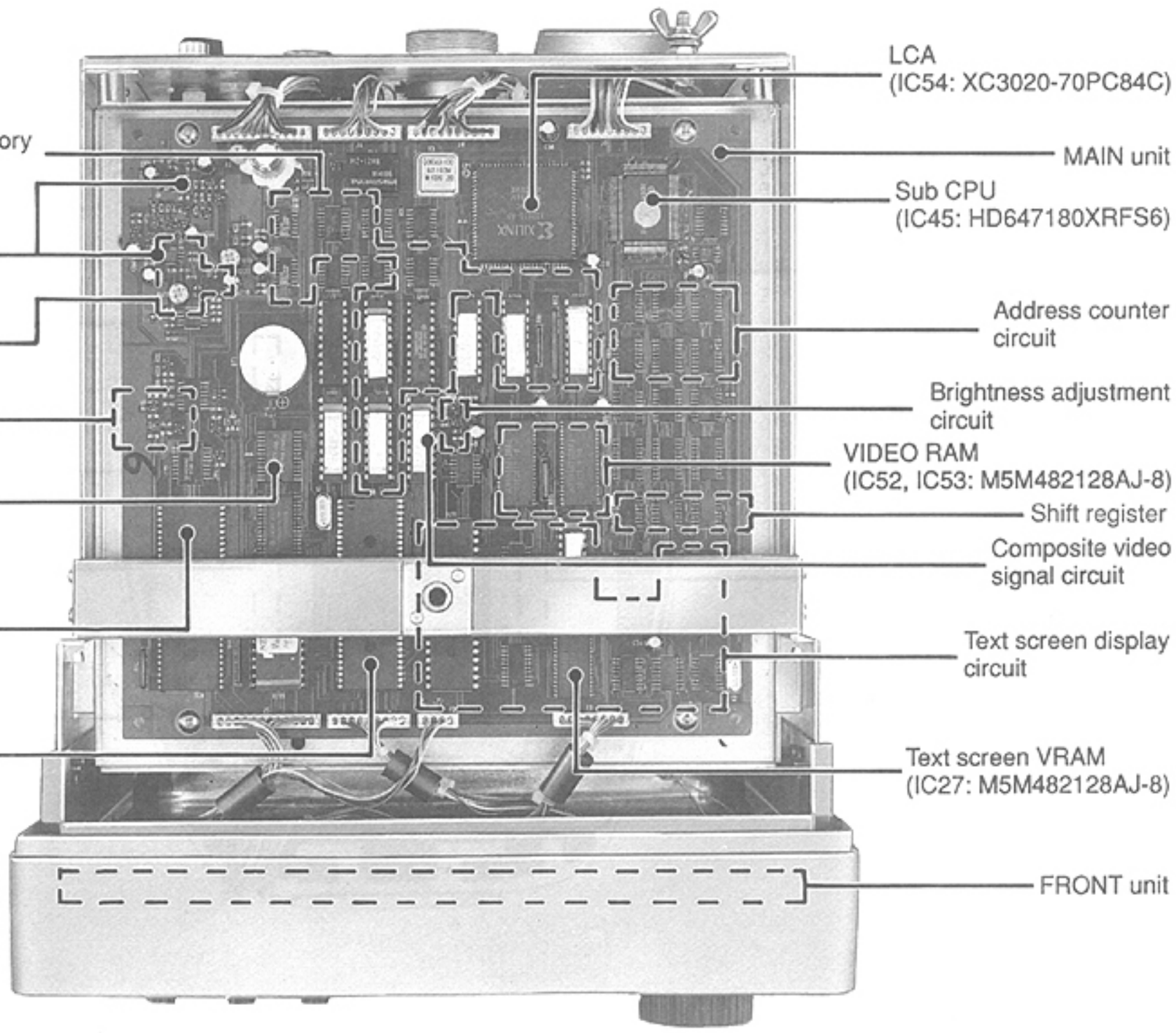
- System : Raster scan method
- CRT display : 9-inch green display
- Pixels : 640 x 512 dots (327680 pixels)
- CRT mounting : Vertical
- Input : NMEA0182 or NMEA0183 format (for navigation receiver)
  N+1 Data format (flux gate compass sensor)
- Output : Alarm zone output (relay)
- Power supply requirement : 11 to 40 V DC
- Power consumption : Approx. 60 W at wind velocity zero
- External alarm current : Less than 1 A (24 V DC)
- Usable temperature range : 0°C to +55°C (+32°F to +131°F)
- Relative humidity : Less than 95% at +35°C (+95°F)
- Dimensions : 250 (W) x 157 (H) x 288 (D) mm; 9.8 (W) x 6.2 (H) x 11.3 (D) in
- Weight : 6.7 kg; 14.8 lb

All stated specifications are approximate and subject to change without notice or obligation.

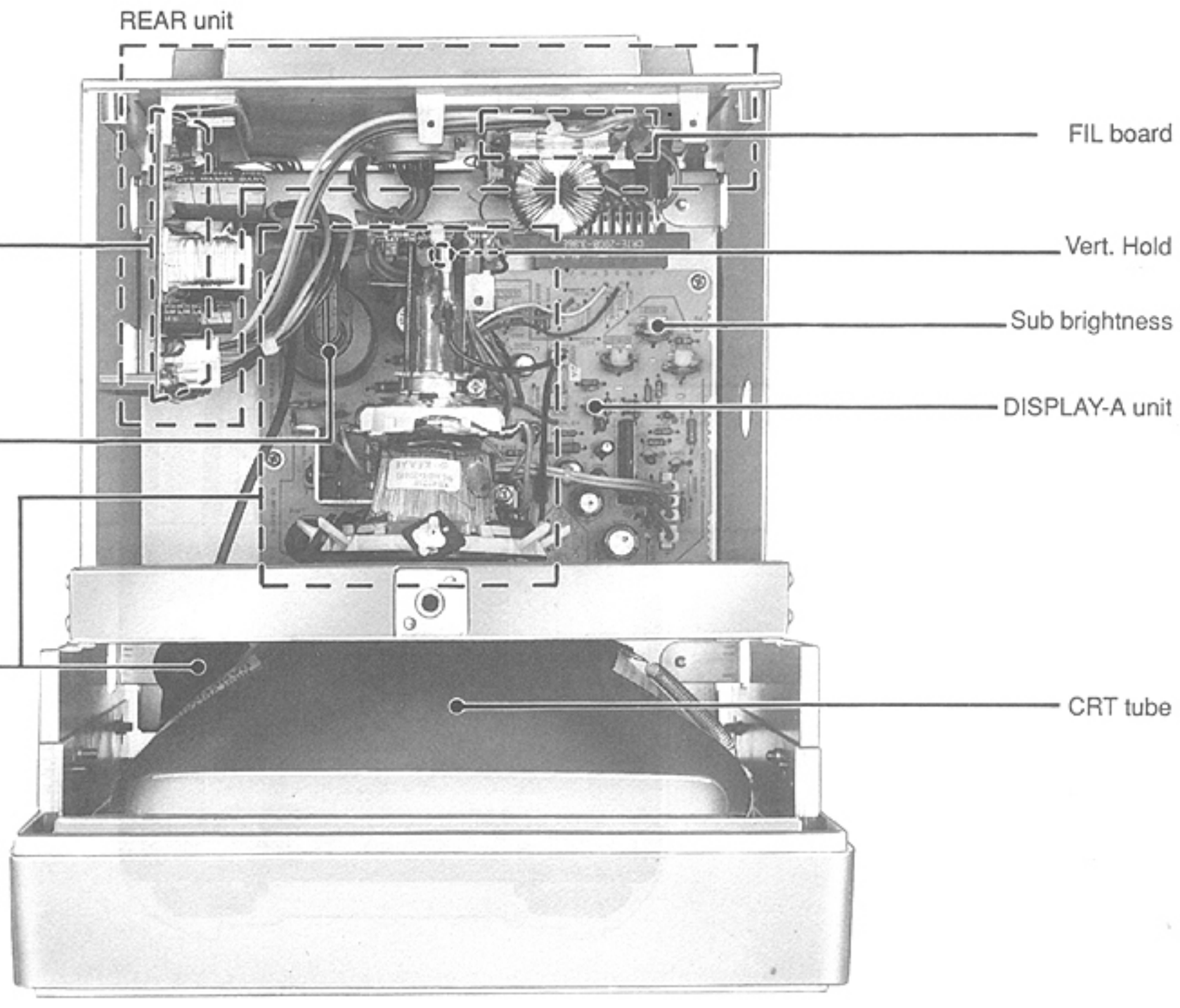
SECTION 2 INSIDE VIEWS

2-1 DISPLAY UNIT

• MAIN UNIT



• DISPLAY-A UNIT

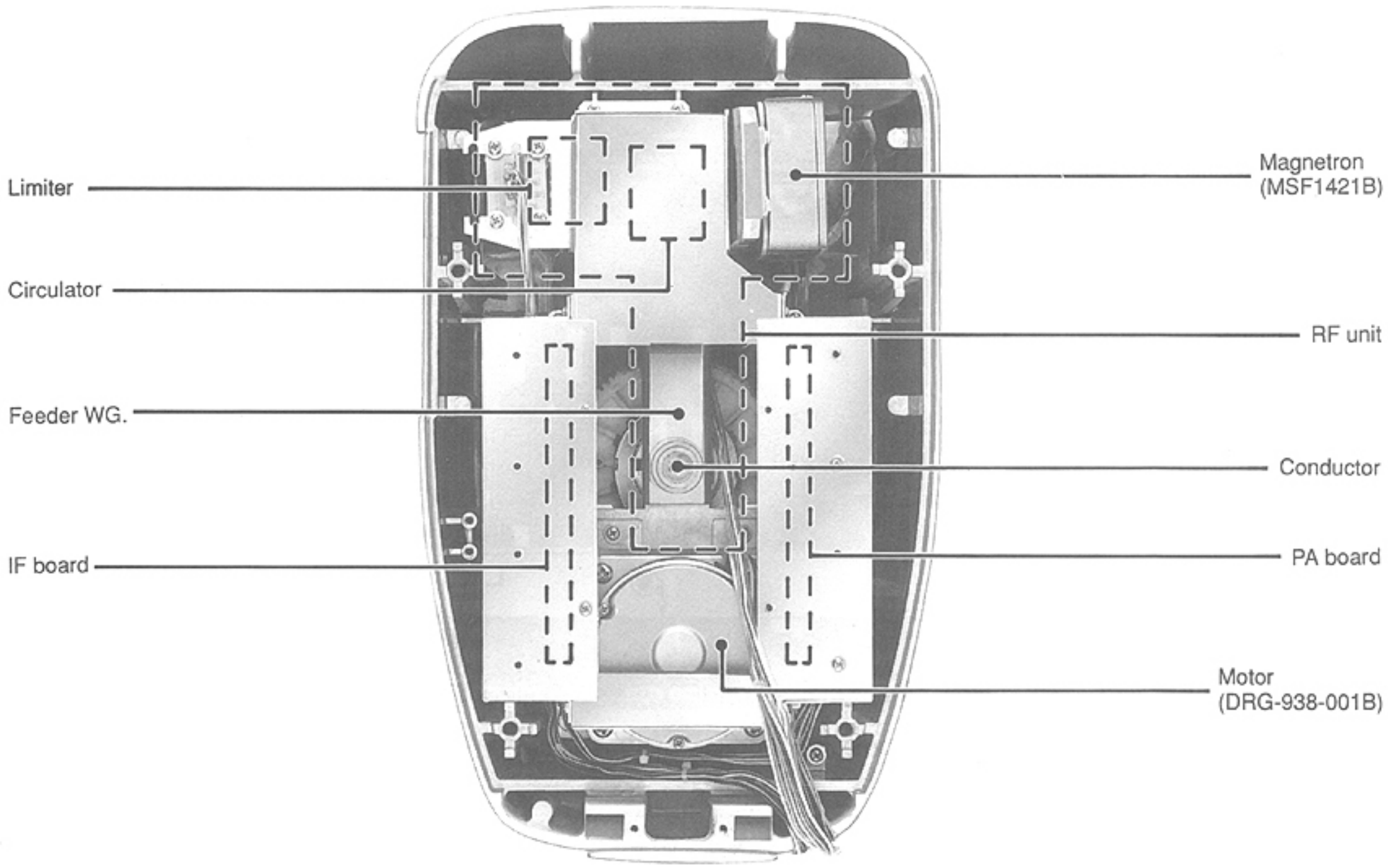


⚠ DANGER HIGH VOLTAGE

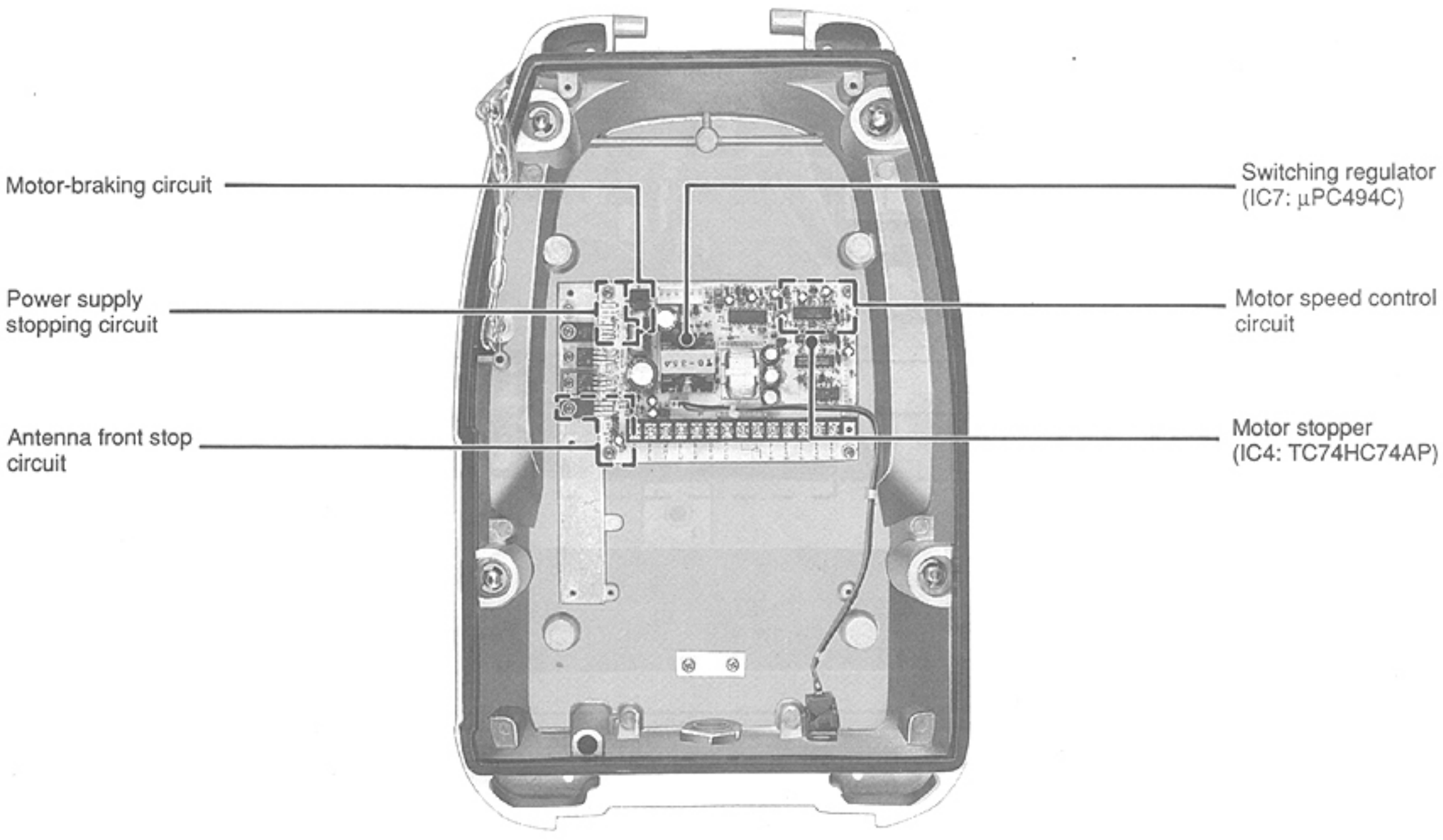
NEVER touch these parts while DC power cable is connected.

2-2 SCANER UNIT

• CTRL UNIT



• HARNESS UNIT



SECTION 3 CIRCUIT DESCRIPTION

3-1 ANTENNA UNIT (SCANNER)

The antenna unit consists of a waveguide slot array, a horn-type reflector, a cross polarization suppression element and a power-feeding waveguide.

The waveguide slot array has 45 slots to realize a low side lobe (for a small false image) and a small beam width (for high resolution). The waveguide adopts a travelling-wave driving system to achieve sufficient antenna performance, compensating for shifts in the magnetron oscillating frequency.

The horn-type reflector focuses the beam in a vertical plane to obtain 25° to 30° of vertical beam.

3-2 PA UNIT (SCANNER)

The trigger signal from the IF amplifier enters the pulse width determining circuit (IC1, IC9, Q17 ~ Q19, R45 ~ R52) where the width is determined by R49 ~ R52. The signal is then amplified by a pulse amplifier (IC7, Q12 ~ Q16) and input to a power MOSFET (Q5, Q6).

A DC-DC converter (IC6, Q1 ~ Q4) converts the ship's supply voltage into +16 V, +7 V. Another DC-DC converter (IC2, Q9, Q10) produces +270 V using R24. D7, R3, C41 and R62 prevent possible damage to the power MOSFET from abnormal oscillation, etc.

3-3 IF UNIT (SCANNER)

The IF unit consists of an IF frequency amplifier, a detector circuit, an STC/GAIN control circuit, an MBS circuit, a tuning level amplification circuit, an automatic tuning circuit, a serial-parallel conversion circuit and a beaming pulse generation circuit.

3-3-1 IF AMPLIFIER AND DETECTOR

The IF amplifier circuit consists of 3 stages. The first stage is a low-noise FET amplifier (Q9) and the 2nd and 3rd stages are monolithic amplifiers (IC3, IC4). All of these are controlled by the STC/GAIN control signal.

An amplified IF frequency is detected at IC5, is amplified at Q17, Q18 and Q20, and is then applied to the display unit.

3-3-2 STC/GAIN CONTROL CIRCUIT

The STC/GAIN circuit controls the sensitivity of the receiver in response to the [STC GAIN] control setting on the front panel.

When a trigger signal from the display unit is applied to a mono-multivibrator (IC14), this circuit generates an STC gate signal which is determined by C83 and R148. The STC gate signal is buffer amplified and then applied to an STC curve generator circuit (R142 ~ R144, C29 ~ C31). The STC curve signal is mixed with the GAIN control signal and STC control signal from the display unit at D24, D27 and D33 and is then buffer amplified and applied to the 2nd and 3rd stages of the IF amplifier.

3-3-3 MBS CIRCUIT

The MBS circuit controls the 1st stage gain to prevent saturation from leaked signals. The trigger signal from IC13 is applied to the 1st stages' FET gate via Q8 and Q9.

3-3-4 TUNING LEVEL AMPLIFIER CIRCUIT

This circuit deflects the tuning level meter. It performs peak hold (Q2, D7, IC7c) by picking up the 60 MHz signal from Q1 and Q7.

3-3-5 AUTOMATIC TUNING CIRCUIT

This circuit is similar to the tuning level amplifier circuit and performs peak hold by picking up the 56 MHz and 64 MHz signals.

Automatic tuning output is added to the tuning control voltage and supplied to the front end. Q10 and Q11 reset peak hold. Q13 and Q21 turn automatic tuning OFF and ON.

3-3-6 SERIAL-PARALLEL CONVERSION CIRCUIT

Some of the control signals from the display unit are sent to the antenna after being turned into serial signals. The serial-parallel conversion circuit returns these serial signals to their original state.

STR, CLK and DAT signals from the display unit are input to IC1 and IC2 via a buffer amplifier (Q14 ~ Q16). IC1 performs serial-parallel conversion to output 7 signals: tuning preset, tuning, gain, STC, tuning level center control, automatic tuning center control and gain preset.

IC2 uses a shift register for serial-parallel conversion of 8 signals: motor control, automatic tuning ON/OFF, transmission pulse width switches 1 and 2 and the IF amplification circuits pass band switches 1, 2 and 3.

Furthermore, preset voltages (IC10a, IC11a, IC11b) are added, respectively, to the tuning, gain control and STC control signals before these signals are output.

3-3-7 BEARING PULSE GENERATION CIRCUIT

The FG signal from the HARNESS unit is multiplied by 6 at the PLL circuit (IC6, IC8, Q22) and then output as a bearing signal of 1800 pulses.

This signal is combined with the ship's heading signal at Q24 and Q25 and then sent to the display unit via Q29.

3-3-8 DC-DC CONVERTER

–12 V and +20 V are produced by the DC-DC converter circuit (IC9, D17 ~ D22).

3-4 RF UNIT (SCANNER)

The RF unit consists of a magnetron, a circulator, a diode limiter and a front end.

The magnetron generates high energy oscillation for the input pulse. The circulator is used as a transmit/receive switch. The diode limiter is used to protect the receiving section at the front end.

The front end consists of an amplifier, local oscillator and a diode mixer. The microwave signal input from the circulator is amplified by the low-noise amplifier and then enters the diode mixer. A microwave signal is then mixed with the local oscillator signal to be converted to a 60 MHz IF frequency. The frequency of the local oscillator circuit is adjusted with the tuning voltage.

3-5 HARNESS UNIT (SCANNER)

The motor control circuit makes a loop to stabilize the motor rotation. The motor rotation is fed back to the motor control circuit as pulse signals. The pulse signals are converted to voltage with the f/v converter. The voltage is compared with the reference voltage to control the switching pulse width.

A pulse signal (FG) synchronized with the motor rotation is input via J6 (pin 4). The number of pulse are doubled by detecting the leading and trailing edge at the differential circuit (Q18, C23, C24, R34, R35, D13 D14).

These pulses enter the 1-shot multiplier (IC5) to be converted to DC voltages. The output voltages are amplified and temperature compensated at the buffer amplifier (Q24) to obtain voltages proportional to the antenna's rotational speed.

These voltages are compared with a reference voltage (Q9 emitter) which is determined by R22 ~ R24. Thus, the pulse width of the switching regulator IC output is controlled. The output from IC7 is applied to the switching circuit (Q12 ~ Q15) and is then boosted at T1. The boosted voltage is rectified at D7 to obtain DC voltage.

Q4, Q5 and Q8 is a power supply delay circuit which produces power until the antenna rotates to a forward direction. At stop, Q6 and Q7 further ground the motor power line to make a breaking circuit. R1 is an over-current detection resistor and D12 prevents excessive voltage.

At standby, SLOW voltage is emitted from IC4 and the reference voltage (Q9 emitter) is lowered by Q11 for slow rotation. Then, the heading pulse is input via J5 (pin 2) and STOP voltage is emitted from IC4 to lower the reference voltage completely. At the same time, the supply voltage is cut and the power is shorted to stop the motor completely (in a forward direction).

At power ON, a power circuit (Q19, Q20, Q23, D15) starts operating via Q21. During rotation, Q22 turns ON by MOVE (/STOP) voltage to continue the power supply. At the same time, supply voltage rises to the motor and is controlled by IC7 and IC6a (R7, R49, C14).

Doubled pulses pass through IC5 and are output via the isolator as FG output.

3-6 PPI IMAGE PROCESSING CIRCUITS (MAIN UNIT in DISPLAY)

3-6-1 ANALOG-DIGITAL CONVERSION CIRCUITS

The FTC circuit is a differential circuit with a variable time constant for removing low frequency component echoes as a result of rain and snow.

The video signal (J8, pin 2) is input from the IF unit, passes through the FTC circuit (IC30b, IC60a, D11) and is then converted into a negative-logic 4 value (0 ~ 3) quantization signal in IC57 and IC58.

The time constant of the FTC circuit is controlled at a variable diode (D11) using bias control voltage from the D/A converter (IC25). IC57 and IC58 are high speed comparators.

3-6-2 SAMPLING CIRCUITS

After having its voltage base quantized by IC57 and IC58, the video signal's time base is quantized by IC55 and IC64 and is then converted into a 2-bit + 2-bit (time division) digital signal by IC59. It is then sampled in the sampling memory IC (IC37) per trigger pulse.

The sampling frequency changes according to the setting range and the maximum sampling frequency is 31.08 MHz.

3-6-3 COORDINATES CONVERSION CIRCUIT

The video data memorized in sampling memory (IC37) is arrayed in coordinates of distance-bearing. A gate array IC (IC54) converts the distance-bearing to X-Y coordinates in order to indicate the sampled signal on the CRT display. The converted signal is then applied to the X and Y axis counters (IC32 ~ IC36).

3-6-4 INTERFERENCE REDUCTION AND ECHO STRETCH FUNCTIONS

The interference reduction circuit (IC46) correlates the sampling data and trigger pulse to reduce interference. The echo stretch circuit (IC38) expands the sampling signals.

3-6-5 VIDEO MEMORY

The MAIN unit has 3 video RAM ICs for the PPI screen (IC53), PLOT function (IC52) and TEXT screen (IC27). The read-modify-write IC modifies necessary data only in the video RAM, since the video RAM adopts an 8-bit parallel device.

The read-modify-write procedure for the plot function perform 1 only even though the procedure for the PPI screen performs 1 and 0. The plot function retains the data when targets change their position.

3-6-6 PPI VIDEO SIGNAL GENERATOR

Coordinate-converted video data is output from VRAM per address via GSC clock timing.

The parallel video signal output from VRAM is loaded to the shift register (IC39 ~ IC41) by SLCK clock timing and is serial converted by the dot clock DCK timing.

These 3 video signals are combined with the text video signal in IC17 to make a composite video signal which is output to the CRT.

3-6-7 TIMING CONTROL CIRCUIT

IC45 (SUB CPU) and IC54 (gate array IC) generate the timing signal required for the PPI image processing circuit.

IC54 generates the following clock or switching signals:

① A sampling clock.

② A sampling memory address counting clock.

③ A timing signal for data transfer.

④ A coordinate conversion address counting clock.

⑤ A PPI video memory read-modify-write timing signal.

⑥ A switching signal for data sampling, data transfer and hold (pause).

IC54's basic operation clock is 62.160 MHz.

3-7 TRIGGER PULSE GENERATION CIRCUITS (MAIN UNIT in DISPLAY)

3-7-1 SEPARATION CIRCUIT OF BEARING PULSE AND HEADING MARKER

The signal separation circuit (IC3e, IC3f, Q8, D12) separates the bearing pulse/heading marker composite signal (BP/SHM) input from the scanner (IF unit).

The heading marker signal (SHM) is detected using D12 and Q8, smoothed by R72 and C132, shaped by IC3e and is then applied to IC45 and IC54.

At the same time, the bearing pulse signal (BP) is input to IC3f via the high voltage protection circuit (R57, D13), shaped and then input to the sub CPU via the status-holding flip-flop IC (IC65) as an interrupt signal.

3-7-2 TRIGGER PULSE GENERATION CIRCUIT

The sub CPU (IC45) processes the following when receiving a BP signal:

① Counts the internal bearing counter (resets the counter when receiving an SHM signal).

② Outputs trigonometric data to LCA (IC54).

③ Outputs a trigger signal via pin 35 when a condition is matched (in TX and when IC54 is not in the sampling data transfer condition).

④ Outputs an alarm trigger signal (AGT) when a blip is in the alarm zone.

Trigger signal output from IC45 (pin 35) is pulse-width-adjusted in IC50 and is then applied to the scanner as a TRIG signal via the buffer IC (IC28e).

At the same time, the sampling trigger (PTRG) is output to IC54 with a delay time. This delay time compensates for transmit/receive signals exceeding the delay time and the scanner/display connection cable propagation delay time. The delay time is produced in the integral circuit of IC50 using IC25 and IC61.

3-8 REG BOARD (DISPLAY)

3-8-1 ON/OFF CIRCUIT

The power ⊕ voltage is applied to the Q9 collector. When the [POWER] switch is pushed while power off, the ⊕ voltage is applied to Q9 base; Q9 applies the power voltage to IC4. IC4 sets RL1 to turn ON via Q11. When the [POWER] switch is pushed for 1 sec. while power on, IC4 resets RL1 to turn OFF.

RL1 is a latching relay which retains its condition until receiving a set or reset signal.

3-8-2 CONTROL CIRCUIT

IC2 is a pulse width control type switching regulator which controls output voltage using a dead time control input (pin 4). The dead time control is provided by IC2. Q5 ~ Q7 is a power source circuit for IC2. IC2 output (pins 9, 10) controls the switching transistors (Q1 ~ Q4).

3-8-3 RECTIFIER CIRCUIT

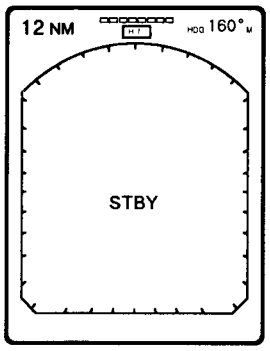
AC voltage, produced at the switching transistors (Q1 ~ Q4), is converted at the transformer (T1). These voltages are rectified by D4, D6 and D5/D9 for +12V, CRT12V and –5V respectively. +12V is regulated at the differential amplifier circuit (Q12, Q17, Q18). CRT12V, regulated at Q13, Q15 and Q16, is used to drive the CRT. Q14 uses this voltage for the power save function.

SECTION 4 ADJUSTMENTS via FRONT PANEL

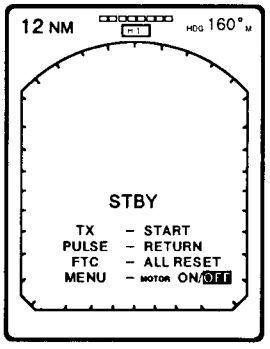
4-1 SELECTING SERVICE MODE

The radar has a pre-set mode called "service mode." Slight adjustment of the automatic tuning function can be performed without removing and opening the scanner unit. Select the service mode as follows.

① Push [POWER] to turn power ON and wait 2 min.
- Standby mode is selected.
- Push [TX] when the PPI screen has been selected.

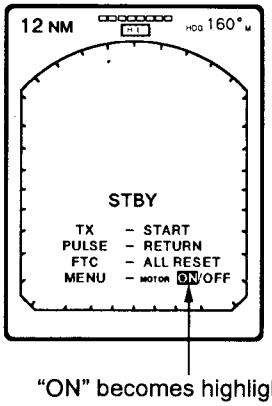


② While pushing [EBL1] and [VRM1], push [H.M OFF] to select the service mode.



③ If the backup battery on the MAIN unit is replaced, push and hold [FTC] for 2 sec. to reset memory contents.
- A beep tone sounds for verification.

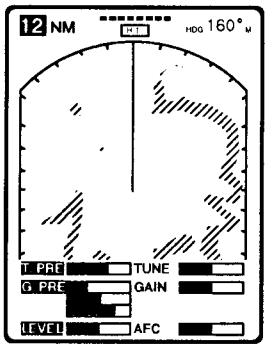
④ Push [MENU] to select the scanner motor ON.
- If you perform any maintenance without scanner motor rotation, skip this step.



"ON" becomes highlighted.

⑤ Push [TX] to enter the service mode setting condition and start adjustment.
- If you have skipped step ④, targets are shown as circles in the display.
- Controls act as follows:

CONTROL	Alternates by pushing [STC] / Alternates by pushing [TUNE]		
[TUNE]	T.PRE	TUNE	Deactivate
[GAIN]	G.PRE	GAIN	GAIN
[STC]	LEVEL		AFC
[DIAL]	Range selection		

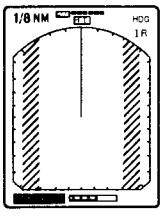


⑥ Perform the adjustments on the next page.
⑦ Push [TX] to exit the setting condition.
⑧ Push [PULSE] to exit the service mode and return to Standby mode.

4-2 SERVICE MODE SETTINGS

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
TUNING LEVEL INDICATOR PRE-SETTING	1	• Service mode • Select 12 nm range using [DIAL].	Display unit	Screen	Maximum resolution of blips	Front panel	[TUNE] control (T.PRE)
GAIN PRE-SETTING	2	• "GAIN" indicator : Maximum (Push [TUNE], rotate [GAIN] clockwise and then push [TUNE].)			2 clicks counter-clockwise from maximum noise level		[GAIN] control (G.PRE)
	3	• "GAIN" indicator : Center (Push [TUNE], rotate [GAIN] and then push [TUNE].)			Verify the noise level.		Verify
	4	• Select 6.0 nm range using [DIAL].			Same noise level as step 3		[GAIN] control (G.PRE)
	5	• Select 1.5 nm range using [DIAL].			Same noise level as step 3		[GAIN] control (G.PRE)
TUNING LEVEL INDICATOR (AUTOMATIC TUNING CORREC-TION)	6	• Select 12 nm range using [DIAL].			Maximum resolution of blips		[TUNE] control (TUNE)
	7			Tuning level indicator 	Maximum (Center position of the full scale range)		[STC] control (LEVEL)
AFC (AUTOMATIC TUNING CORREC-TION)	8	• Auto tuning : ON (Push [STC]. "AUTO" appears.)		Screen	Maximum resolution of blips		[STC] control (AFC)

4-3 CABLE LENGTH CORRECTION

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
CABLE LENGTH CORREC-TION	1	• Navigation mode • Display a straight target. • Range : 1/8 nm • Push and hold [MENU] until "H.M. ADJ." appears; then, push [MENU] again. ("LINE ADJ." appears.)	Display unit	Screen	Adjust the target blip so it is straight. 	Front panel	[DIAL]

SECTION 5 INTERNAL ADJUSTMENT

5-1 PREPERATION BEFORE SERVICING

■ CTRL UNIT REMOVEMENT

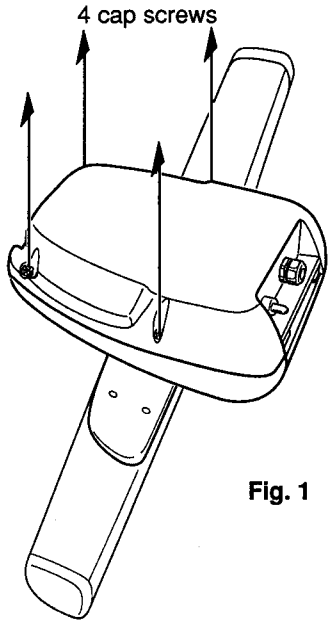


Fig. 1

① Remove 4 cap screws, to open the bottom case.

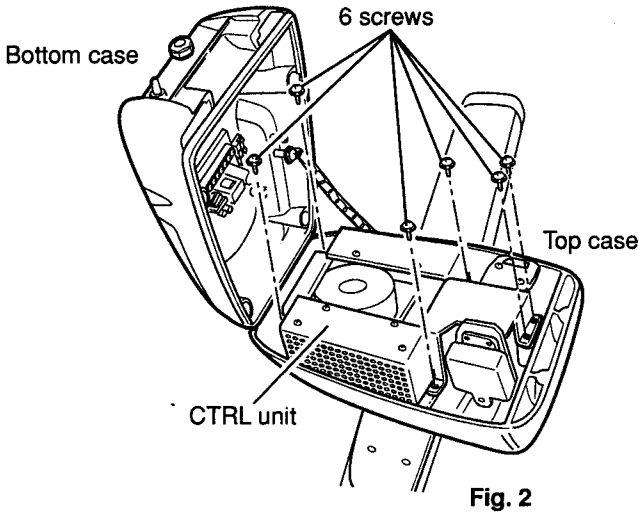


Fig. 2

② Remove 6 screws, (silver, 10 mm), to remove the CTRL unit.
③ Pull out the CTRL unit from the top case.

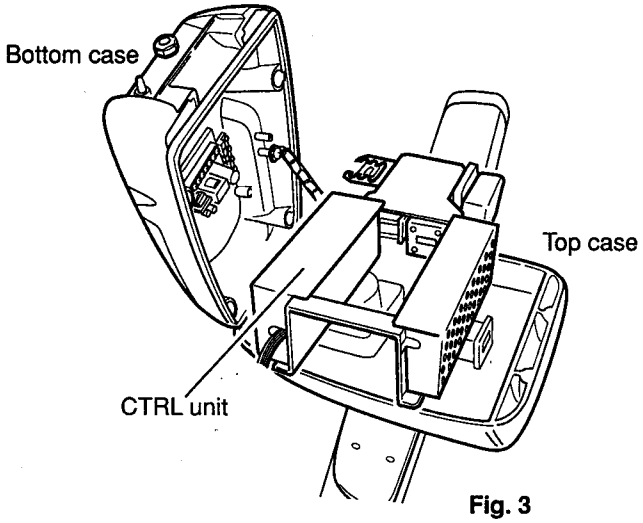


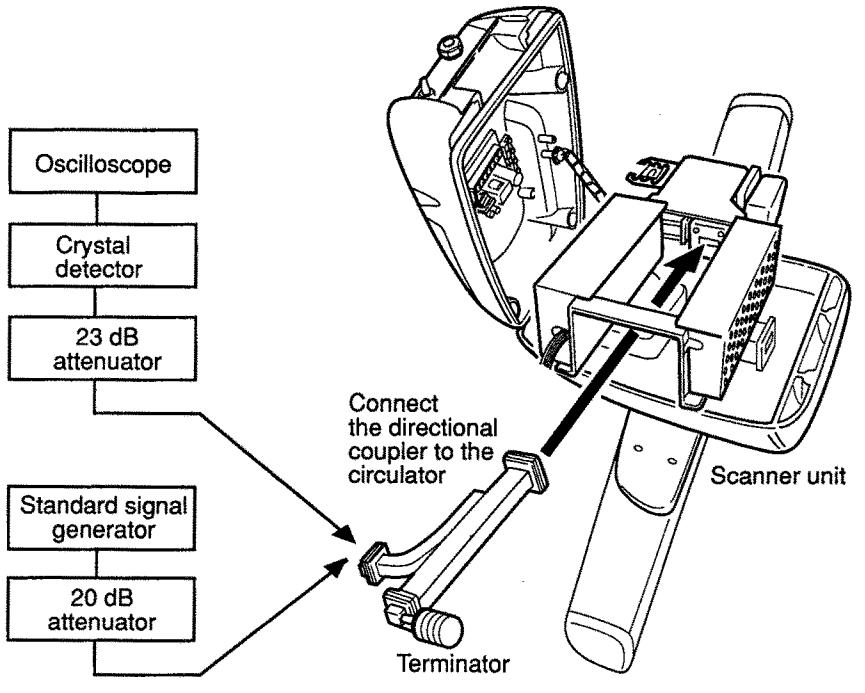
Fig. 3

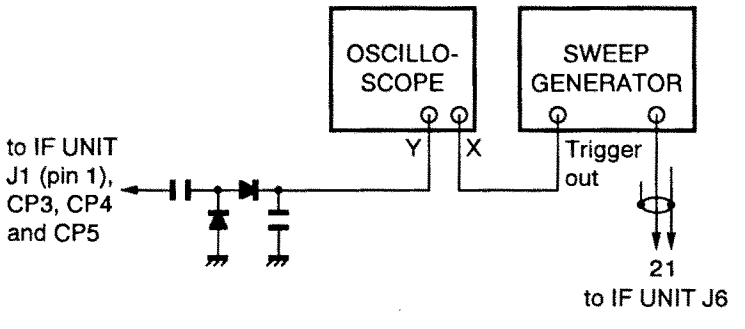
④ Put the CTRL unit on the top case. See Fig. 3.

■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 11 – 40 V DC Current capacity : 6 A or more	Standard signal generator (SSG) (Antenna unit adjustment and sensitivity check only)	Frequency range : 1.0 – 10 GHz Output level : 1.0 μV – 3.2 V (– 107 to 3 dBm)
Directional coupler	Power attenuation : 20 dB Capacity : 10 W or more		
Sweep generator	Frequency range : 20 – 100 MHz Sweep bandwidth : At least 30 MHz Output impedance : 50 Ω	Spectrum analyzer (Antenna unit adjustment only)	Frequency range : At least 10 GHz Spectrum bandwidth: ± 100 MHz or more
AC milli-voltmeter	Measuring range : 10 mV – 10 V	Terminator	Resistance : 50 Ω Peak power level : At least 6 kW Average power level: At least 5 W
Oscilloscope	Frequency range : DC – 100 MHz Measuring range : 0.01 – 10 V		
Frequency counter	Frequency range : 0.1 – 200 kHz Frequency accuracy: ± 1 ppm or better Sensitivity : 100 mV or better	Attenuator	Power attenuation : 20 and 23 dB Peak power level : At least 6 kW Average power level: At least 5 W
Crystal detector	Input frequency : At least 10 GHz Peak input level : At least 1 W Average input level : At least 100 mW	Digital multi-meter	Input impedance : 1 MΩ/DC or better

■ CONNECTION

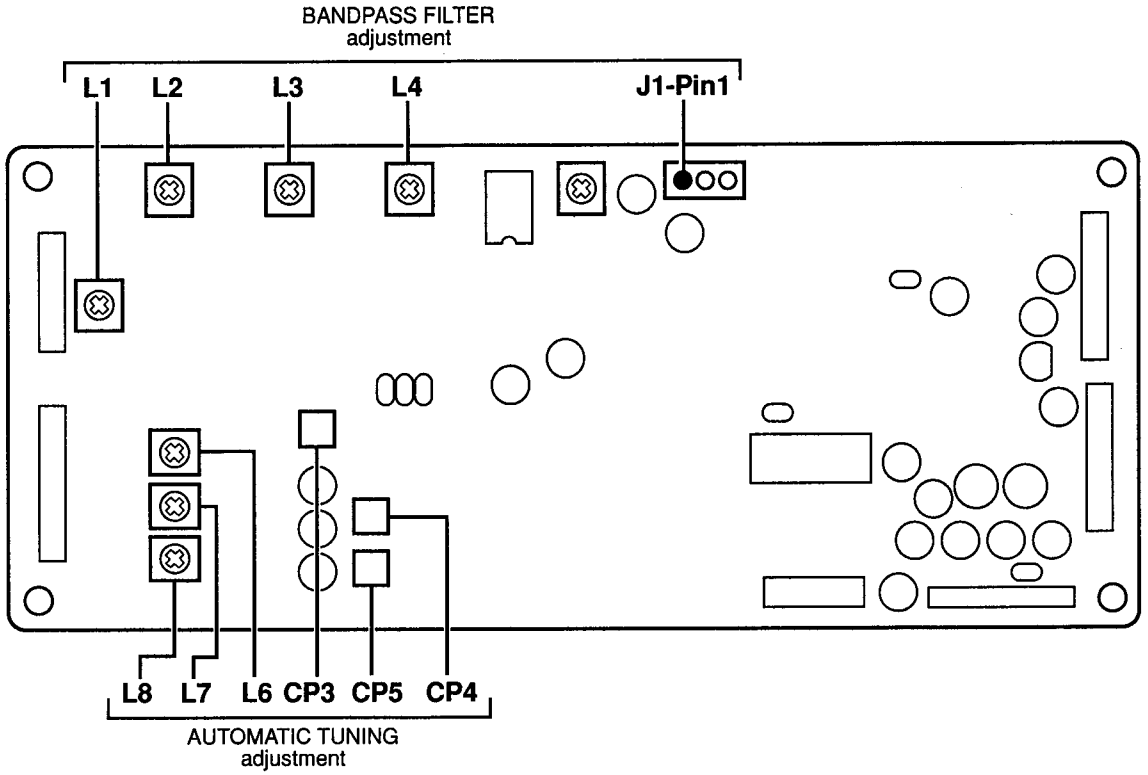




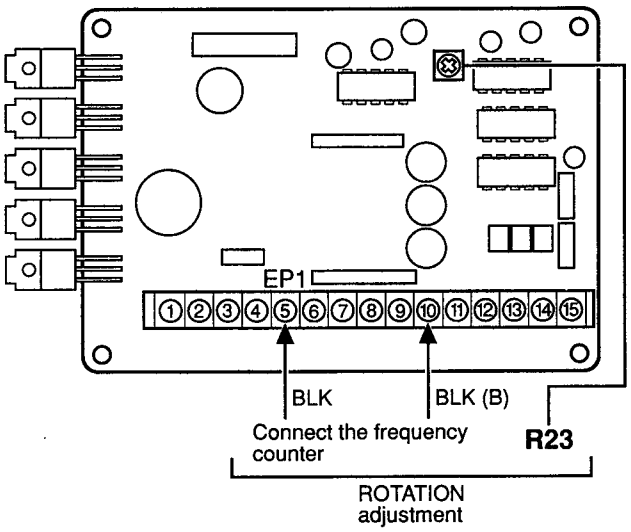
5-2 MAJOR RECEIVER ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
BANDPASS FILTER	1	• Connect the sweep generator to J6, pins 1 and 2 (IF unit); and set as: Center frequency : 60 MHz Level : 71 μV (−70 dBm) • Range : 12 nm • Navigation mode • Adjust [GAIN], if required.	IF	Connect the oscilloscope to J1 pin 1.	Maximum waveform	IF	L1 − L4
	2	• Range : 1.5 and 3 nm			Verify that the waveform has changed from the above adjustment on both ranges.		Verify
AUTOMATIC TUNING		NOTE: Using service mode, slight adjustment can also be performed without removing and opening the scanner unit.					
	1	Preset the following settings to center using "Service mode." (p. 5-1) • "LEVEL" indicator : Center (Rotate [STC] control.) • "AFC" indicator : Center (Push [STC] then rotate [STC] control.)					
	2	• Connect the sweep generator to J6, pins 1 and 2 (IF unit); and set as: Center frequency : 60 MHz Level : 71 mV (−10 dBm) • Navigation mode	IF	Connect the oscilloscope to CP3.	Maximum waveform	IF	L6
	3	• Set the sweep generator: Center frequency : 62 MHz		Connect the oscilloscope to CP4.	Maximum waveform		L7
	4	• Set the sweep generator: Center frequency : 58 MHz		Connect the oscilloscope to CP5.	Maximum waveform		L8
		NOTE: Verify this adjustment from step 2.					
ANTENNA ROTATION	1	• Set the frequency counter: Gate time : 1 sec. • Navigation mode	HARNESS	Connect the frequency counter to EP1, BLK and BLK (B).	1800 Hz	HARNESS	R23
SUB BRIGHTNESS	1	• Navigation mode	Display unit	Screen	Adjust the retrace line until it disappears.	MAIN	R2
NOTE: After these adjustments, perform "Adjustment via front panel" on p. 5-1 or proceed to the receiver adjustment on p. 5-4.							

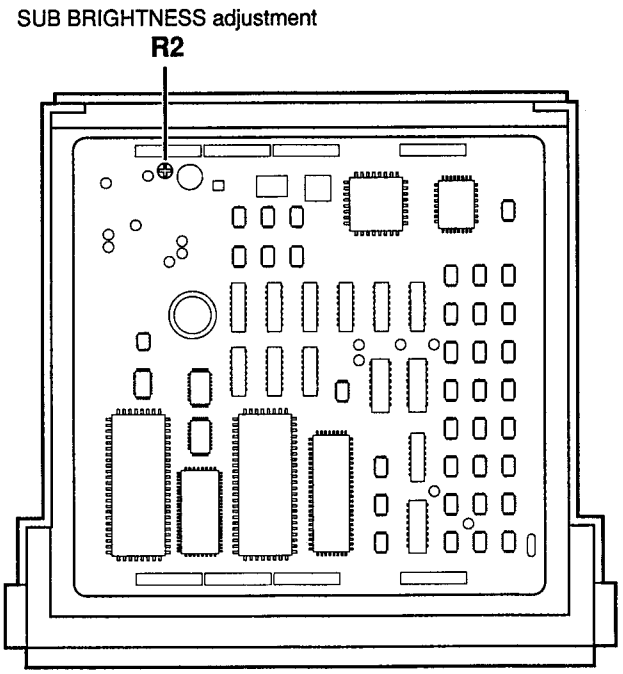
• IF UNIT



• HARNESS UNIT



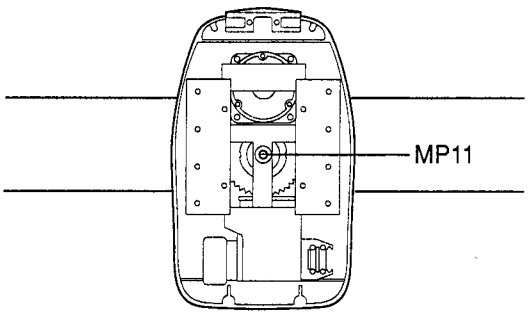
• MAIN UNIT



5-3 RECEIVER ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
ANTENNA UNIT TUNING	1	• Connect the signal generator as shown in Fig 5-1 and 5-2; and set as: Frequency : 9.41G Hz • Set the spectrum analyzer as: Center frequency : 9.41 GHz Span : 200 MHz • Do not place any objects within 5 meters. (Place a wave absorber on the front of the scanner radiator.)	ANTEN-NA	Connect the signal generator and spectrum analyzer to the directional coupler as shown in Fig 5-1.	Preset the waveform to 0 dBm.	SSG	SSG output level
	2			Connect the spectrum analyzer to the antenna unit as shown in Fig 5-2.	Minimum level	CHAS-SIS	MP11
SENSITIVITY CHECK	1	• Range : 12 nm • [GAIN] control : Maximum • STC function : OFF • Connect the signal generator to the circulator via the 20 dB attenuator; and set as: Frequency : 9.41 GHz Level : 0.22 mV (−60 dBm) • Navigation mode	HAR-NESS	Connect the AC milli-voltmeter to EP1.	Minimum level	Front panel	[TUNE] control
	2	• Set the signal generator: OFF			Maximum noise level (0 dB)		[GAIN] control
	3	• Set the signal generator: ON			10 dB lower than the level displayed on the AC milli-voltmeter in step 2 above.	SSG	SSG output level
		NOTE: Verify that the signal generator output level, in step 3 above, plus the insertion loss is less than −65 dBm.					
NOTE: After these adjustments, perform "Adjustment via front panel" on p. 4-1 or proceed to the transmitter adjustment on the next page.							

• CHASSIS UNIT



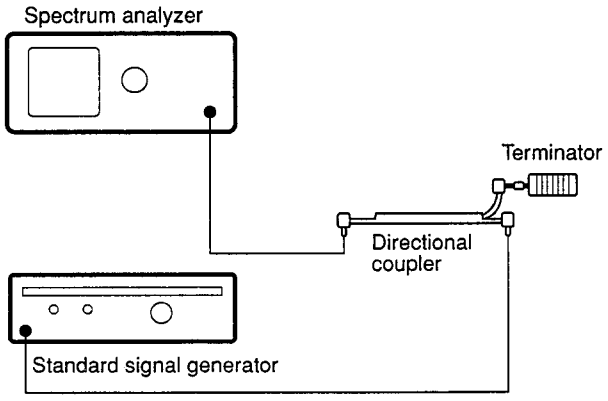
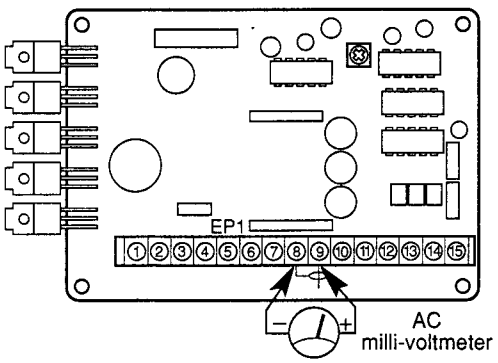


Fig. 5-1

• HARNESS UNIT



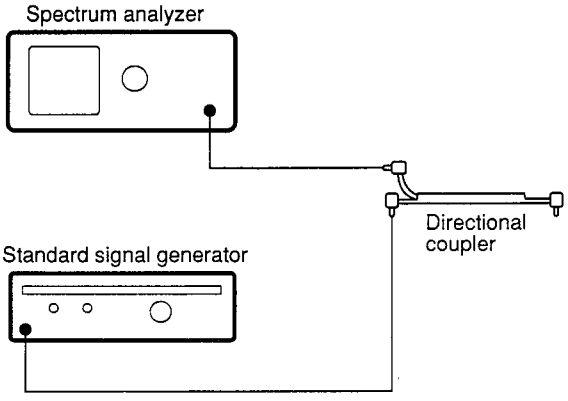
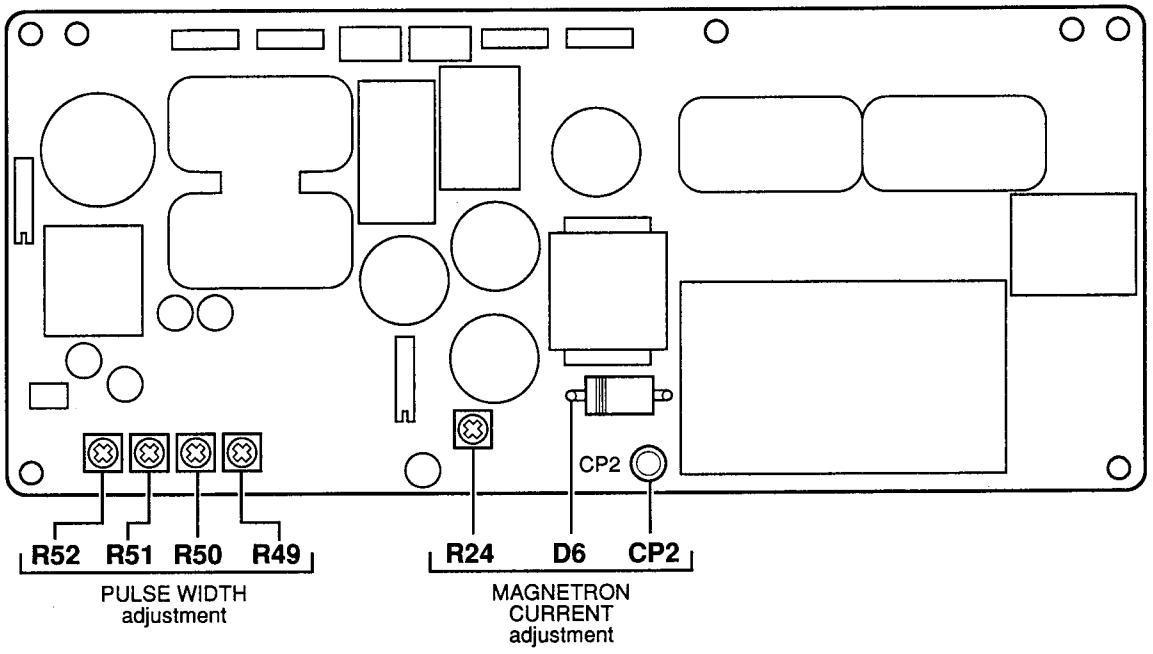


Fig. 5-2

5-4 TRANSMITTER ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
MAGNE-TRON CURRENT	1	• R49 (PA) : Center • R50 (PA) : Center • R51 (PA) : Center • R52 (PA) : Max. CCW	PA	Connect the Digital multi-meter to CP2.	7.6 V DC (± 0.6 V)	PA	Verify
	2			Connect the Digital multi-meter to the cathode of D6.	260 V DC		R24
	3	• Range : 12 nm • Navigation mode		Connect the oscillo-scope to the magne-tron lead through a current probe.	3.2 A at 400 nsec. after the current rises.		R24
PULSE WIDTH		NOTE: In this adjustment, pulse width is measured when the detector output voltage is more than 70% of the maximum.					
	1	• Range : 12 nm • Pulse width : Normal • Navigation mode	PA	Connect the oscillo-scope to the circulator through the detector.	Adjust for 750 nsec. pulse width.	PA	R52
	2	• Range : 6 nm			Adjust for 400 nsec. pulse width.		R51
	3	• Range : 3 nm			Adjust for 200 nsec. pulse width.		R50
	4	• Range : 1.5 nm			Adjust for 80 nsec. pulse width.		R49
		NOTE: Verify this adjustment from step 1.					
NOTE: After these adjustments, perform "Adjustment via front panel" on p. 4-1.							

• **PA UNIT**



SECTION 6 PARTS LIST

[MAIN UNIT]

REF. NO.	PARTS NO.	DESCRIPTION	
IC1	1120002390	S.IC	TC74AC166F
IC2	1120002390	S.IC	TC74AC166F
IC3	1130005290	S.IC	TC74HC14AF
IC4	1130005250	S.IC	TC74HC08AF
IC5	1120002300	S.IC	TC74AC04F
IC6	1170000180	IC	PC817D
IC7	1110001500	S.IC	S-8054ALR-LN-T1
IC8	1130005770	S.IC	MB4052PF-G-BND
IC9	1140000940	IC	TMP82C255AN-2-Z
IC10	1140001220	IC	HD64180R1P6
IC11	1130005510	IC	µPD72020C-8
IC12	1130006010	S.IC	HM6264ALFP15LD
IC13	1140003120	IC	SC-1234
IC14	1140003020	IC	SC-1226
IC15	1120002330	S.IC	TC74AC573F
IC16	1120002330	S.IC	TC74AC573F
IC17	1140003030	IC	SC-1227
IC18	1130005120	S.IC	TC74HC74AF (TP1)
IC19	1120002310	S.IC	TC74AC161F
IC20	1120002380	S.IC	TC74AC175F
IC21	1130005740	S.IC	TC74AC74F
IC22	1130005740	S.IC	TC74AC74F
IC23	1130005420	S.IC	TC74HC175AF
IC24	1140003070	IC	SC-1231
IC25	1140002320	S.IC	µPD6325G
IC26	1140002240	S.IC	TMP82C54M-2
IC27	1130006790	S.IC	M5M482128AJ-8
IC28	1120002370	S.IC	HD74LS06FP
IC29	1110001240	S.IC	µPC358G2-T1
IC30	1110001240	S.IC	µPC358G2-T1
IC31	1130005430	S.IC	TC74HC191AF
IC32	1130005430	S.IC	TC74HC191AF
IC33	1130005430	S.IC	TC74HC191AF
IC34	1130005430	S.IC	TC74HC191AF
IC35	1130005430	S.IC	TC74HC191AF
IC36	1130005430	S.IC	TC74HC191AF
IC37	1110003050	IC	HM6268P25D
IC38	1130005550	S.IC	µPD74HC123AGS
IC39	1120002390	S.IC	TC74AC166F
IC40	1120002390	S.IC	TC74AC166F
IC41	1120002390	S.IC	TC74AC166F
IC42	1130005380	S.IC	TC74HC161AF
IC43	1130005380	S.IC	TC74HC161AF
IC44	1140003040	IC	SC-1228
IC45	1140003140	S.IC	HD647180X0FS6
IC46	1140003080	IC	SC-1229
IC47	1140003100	IC	SC-1232
IC48	1140003130	IC	SC-1235
IC49	1140003050	IC	SC-1230
IC50	1130005550	S.IC	µPD74HC123AGS
IC51	1120002320	S.IC	TC74AC245F
IC52	1130006790	S.IC	M5M482128AJ-8
IC53	1130006790	S.IC	M5M482128AJ-8
IC54	1110003040	S.IC	XC3020-70PC84C
IC55	1130005740	S.IC	TC74AC74F
IC56	1130005380	S.IC	TC74HC161AF
IC57	1110003120	S.IC	NE521D
IC58	1110003120	S.IC	NE521D
IC59	1140003110	IC	SC-1233
IC60	1110003130	S.IC	MC14577 BF
IC61	1110001240	S.IC	µPC358G2-T1
IC62	1120002330	S.IC	TC74AC573F
IC63	1120002330	S.IC	TC74AC573F
IC64	1130005740	S.IC	TC74AC74F

[MAIN UNIT]

REF. NO.	PARTS NO.	DESCRIPTION	
IC65	1130005740	S.IC	TC74AC74F
IC66	1130003830	S.IC	TC7S04F (TE85R)
IC67	1130005120	S.IC	TC74HC74AF (TP1)
IC68	1130006440	S.IC	TC7S08F (TE85R)
IC69	1110002070	IC	TA78L08S
Q1	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q2	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q3	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q4	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q5	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q6	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q7	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q8	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q9	1590000420	S.TRANSISTOR	RN1404 (TE85R)
Q10	1590000480	S.TRANSISTOR	RN2402 (TE85R)
D1	1750000060	S.DIODE	1SS196 (TE85R)
D2	1750000060	S.DIODE	1SS196 (TE85R)
D3	1750000060	S.DIODE	1SS196 (TE85R)
D4	1750000060	S.DIODE	1SS196 (TE85R)
D5	1750000060	S.DIODE	1SS196 (TE85R)
D6	1750000060	S.DIODE	1SS196 (TE85R)
D7	1750000060	S.DIODE	1SS196 (TE85R)
D8	1750000020	S.DIODE	1SS184 (TE85R)
D9	1750000060	S.DIODE	1SS196 (TE85R)
D10	1750000060	S.DIODE	1SS196 (TE85R)
D11	1720000030	VARICAP	1SV149C
D12	1730000730	S.ZENER	RD6.2M-T2B2
D13	1750000060	S.DIODE	1SS196 (TE85R)
D14	1750000060	S.DIODE	1SS196 (TE85R)
D15	1750000060	S.DIODE	1SS196 (TE85R)
D16	1750000060	S.DIODE	1SS196 (TE85R)
D17	1750000060	S.DIODE	1SS196 (TE85R)
X1	6050008310	XTAL	DOC-492 12.288MHz
X2	6050008320	XTAL	DOC-49S2 40.000MHz
X3	6050008330	XTAL	DOC-431CC 62.160MHz
R1	7030000580	S.RESISTOR	MCR10EZHJ 47KΩ (473)
R2	7310000800	TRIMMER	RH0651CJ5J01A (224)
R3	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R4	7030000440	S.RESISTOR	MCR10EZHJ 3.3KΩ (332)
R5	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R6	7030000340	S.RESISTOR	MCR10EZHJ 470Ω (471)
R7	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R8	7030000400	S.RESISTOR	MCR10EZHJ 1.5KΩ (152)
R9	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R10	7030000340	S.RESISTOR	MCR10EZHJ 470Ω (471)
R11	7030000400	S.RESISTOR	MCR10EZHJ 1.5KΩ (152)
R12	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R13	7410000070	ARRAY	RMX- 4 472K
R14	7410000050	ARRAY	RMX- 4 103K
R15	7410000210	ARRAY	RMX- 8 472K
R16	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R17	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R18	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R19	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R20	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R21	7030000510	S.RESISTOR	MCR10EZHJ 12KΩ (123)

S. = Surface mount

[MAIN UNIT]

REF. NO.	PARTS NO.	DESCRIPTION	
R22	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R23	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R24	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R25	7030000140	S.RESISTOR	MCR10EZHJ 10Ω (100)
R26	7030000690	S.RESISTOR	MCR10EZHJ 390KΩ (394)
R27	7030000540	S.RESISTOR	MCR10EZHJ 22KΩ (223)
R28	7030000580	S.RESISTOR	MCR10EZHJ 47KΩ (473)
R29	7030000640	S.RESISTOR	MCR10EZHJ 150KΩ (154)
R30	7030000600	S.RESISTOR	MCR10EZHJ 68KΩ (683)
R31	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R32	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R33	7030000590	S.RESISTOR	MCR10EZHJ 56KΩ (563)
R34	7030000510	S.RESISTOR	MCR10EZHJ 12KΩ (123)
R35	7030000580	S.RESISTOR	MCR10EZHJ 47KΩ (473)
R36	7030000590	S.RESISTOR	MCR10EZHJ 56KΩ (563)
R37	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R38	7030000580	S.RESISTOR	MCR10EZHJ 47KΩ (473)
R39	7030000520	S.RESISTOR	MCR10EZHJ 15KΩ (153)
R40	7030000700	S.RESISTOR	MCR10EZHJ 470KΩ (474)
R41	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R42	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R43	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R44	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R45	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R46	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R47	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R49	7030000400	S.RESISTOR	MCR10EZHJ 1.5KΩ (152)
R50	7030000400	S.RESISTOR	MCR10EZHJ 1.5KΩ (152)
R51	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R52	7410000210	ARRAY	RMX- 8 472K
R53	7410000070	ARRAY	RMX- 4 472K
R54	7030000540	S.RESISTOR	MCR10EZHJ 22KΩ (223)
R55	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R56	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R57	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R58	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R59	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R60	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R61	7030000340	S.RESISTOR	MCR10EZHJ 470Ω (471)
R62	7030000370	S.RESISTOR	MCR10EZHJ 820Ω (821)
R67	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R68	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R69	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R72	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R73	7030000640	S.RESISTOR	MCR10EZHJ 150KΩ (154)
R74	7030000640	S.RESISTOR	MCR10EZHJ 150KΩ (154)
R75	7030000400	S.RESISTOR	MCR10EZHJ 1.5KΩ (152)
R76	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R77	7030000430	S.RESISTOR	MCR10EZHJ 2.7KΩ (272)
R78	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R79	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R80	7410000070	ARRAY	RMX- 4 472K
R81	7410000070	ARRAY	RMX- 4 472K
R82	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R84	7030000330	S.RESISTOR	MCR10EZHJ 390Ω (391)
R85	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R86	7030000590	S.RESISTOR	MCR10EZHJ 56KΩ (563)
R88	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R89	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R91	7030000490	S.RESISTOR	MCR10EZHJ 8.2KΩ (822)
R92	7030000600	S.RESISTOR	MCR10EZHJ 68KΩ (683)
R93	7030000580	S.RESISTOR	MCR10EZHJ 47KΩ (473)
R94	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R95	7030000470	S.RESISTOR	MCR10EZHJ 5.6KΩ (562)
R96	7030000470	S.RESISTOR	MCR10EZHJ 5.6KΩ (562)
R97	7030000020	S.RESISTOR	MCR10EZHJ 1Ω (010)
R98	7030000370	S.RESISTOR	MCR10EZHJ 820Ω (821)
R100	7030000430	S.RESISTOR	MCR10EZHJ 2.7KΩ (272)
R101	7030000400	S.RESISTOR	MCR10EZHJ 1.5KΩ (152)
R102	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R104	7030000480	S.RESISTOR	MCR10EZHJ 6.8KΩ (682)

[MAIN UNIT]

REF. NO.	PARTS NO.	DESCRIPTION	
R105	7030000440	S.RESISTOR	MCR10EZHJ 3.3KΩ (332)
R106	7030000740	S.RESISTOR	MCR10EZHJ 1MΩ (105)
R107	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R108	7030000160	S.RESISTOR	MCR10EZHJ 15Ω (150) (#02)
C1	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C2	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C3	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C4	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C5	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C6	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C7	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C8	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C9	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C10	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C11	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C12	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C13	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C14	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C15	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C16	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C17	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C18	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C19	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C20	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C21	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C22	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C23	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C24	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C25	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C26	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C27	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C28	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C29	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C30	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C31	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C32	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C33	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C34	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C35	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C36	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C37	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C38	4510004990	ELECTROLYTIC	16 MV 100 HC
C39	4510003910	ELECTROLYTIC	16 MV 47 HW
C40	4510003890	ELECTROLYTIC	16 MV 10 HW
C41	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C42	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C43	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C44	4030008550	S.CERAMIC	C2012 JF 1H 473Z-T-A
C45	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C46	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C47	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C48	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C49	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C50	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C51	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C52	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C53	4510003910	ELECTROLYTIC	16 MV 47 HW
C54	4510004490	ELECTROLYTIC	25 MV 22 HW
C55	4510004610	ELECTROLYTIC	16 MV 1000 AG
C56	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C57	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C58	4510003910	ELECTROLYTIC	16 MV 47 HW
C59	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C60	4510004830	ELECTROLYTIC	50 MV 1 NPDW
C61	4030004730	S.CERAMIC	C2012 JB 1H 222K-T-A
C63	4030004730	S.CERAMIC	C2012 JB 1H 222K-T-A
C64	4510003960	ELECTROLYTIC	50 MV 1 HW
C65	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C66	4510003910	ELECTROLYTIC	16 MV 47 HW

S. = Surface mount

[MAIN UNIT]

REF. NO.	PARTS NO.	DESCRIPTION	
C67	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C68	4510003890	ELECTROLYTIC	16 MV 10 HW
C69	4030004710	S.CERAMIC	C2012 JB 1H 471K-T-A
C70	4030005030	S.CERAMIC	C2012 CH 1H 221J-T-A
C71	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C72	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C73	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C74	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C75	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C76	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C77	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C78	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C79	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C80	4030009340	S.CERAMIC	C2012 JF 1H 472Z-T-A
C81	4030009340	S.CERAMIC	C2012 JF 1H 472Z-T-A
C82	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C83	4510003900	ELECTROLYTIC	16 MV 22 HW
C85	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T-A
C96	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C97	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C98	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C99	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C100	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C101	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C102	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C103	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C104	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C105	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C106	4030009340	S.CERAMIC	C2012 JF 1H 472Z-T-A
C107	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C108	4510003910	ELECTROLYTIC	16 MV 47 HW
C109	4510003910	ELECTROLYTIC	16 MV 47 HW
C110	4510003960	ELECTROLYTIC	50 MV 1 HW
C111	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C112	4030002280	S.CERAMIC	GRM40 SH 151J 50PT
C113	4030009340	S.CERAMIC	C2012 JF 1H 472Z-T-A
C114	4030004750	S.CERAMIC	C2012 JB 1H 103K-T-A
C115	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C116	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C118	4510003890	ELECTROLYTIC	16 MV 10 HW
C119	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C120	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C121	4510003910	ELECTROLYTIC	16 MV 47 HW
C122	4510003910	ELECTROLYTIC	16 MV 47 HW
C123	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C124	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C125	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C127	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C128	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C129	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C130	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C131	4030004950	S.CERAMIC	C2012 CH 1H 470J-T-A
C132	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T-A
C133	4030005030	S.CERAMIC	C2012 CH 1H 221J-T-A
C134	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C135	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
RL1	6330000180	RELAY	MZ-12HG
BT1	3020000070	LITHIUM BATTERY	BR2032-1HF
EP1	910036054	PCB	B 3514D

[FRONT UNIT] (VR BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
S1	7600000140	ENCODER	SW-144 (RK09710HL)
S2	7600000150	ENCODER	SW-145 (RK09710HH)
S3	7600000140	ENCODER	SW-144 (RK09710HL)
EP1	910035432	PCB	B 3517B 3 pieces

[FRONT UNIT] (SENSOR BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
S1	2250000020	ENCODER	SRB18100 25KC
EP1	910035441	PCB	B 3518A

[FRONT UNIT] (SW BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
Q1	1590000340	TRANSISTOR	RN1202
Q2	1530000100	TRANSISTOR	2SC2458-Y
D1	1710000160	DIODE	1SS133
D2	1710000160	DIODE	1SS133
D3	1710000160	DIODE	1SS133
D4	1710000160	DIODE	1SS133
D5	1710000160	DIODE	1SS133
D6	1710000160	DIODE	1SS133
D7	1710000160	DIODE	1SS133
D8	1710000160	DIODE	1SS133
D9	1710000160	DIODE	1SS133
D10	1710000160	DIODE	1SS133
D11	1710000160	DIODE	1SS133
D12	1710000160	DIODE	1SS133
D13	1710000160	DIODE	1SS133
R1	7010004190	RESISTOR	R20J 1KΩ
R3	7010004140	RESISTOR	R20J 390Ω
R4	7010004090	RESISTOR	R20J 150Ω
R5	7010004090	RESISTOR	R20J 150Ω
R6	7010003350	RESISTOR	ELR20J 390Ω
DS1	5040001750	LED	TLRC160
DS2	5040000820	LED	SLN-210MC
DS3	5040000820	LED	SLN-210MC
DS4	5040000820	LED	SLN-210MC
S1	2260000851	SWITCH	SKHQFA018B
S2	2260000861	SWITCH	SKHQFB015B
S3	2260000861	SWITCH	SKHQFB015B
S4	2260000861	SWITCH	SKHQFB015B
S5	2260000861	SWITCH	SKHQFB015B
S6	2260000861	SWITCH	SKHQFB015B
S7	2260000861	SWITCH	SKHQFB015B
S8	2260000861	SWITCH	SKHQFB015B
S9	2260000861	SWITCH	SKHQFB015B
S10	2260000861	SWITCH	SKHQFB015B
S11	2260000861	SWITCH	SKHQFB015B
S12	2260000861	SWITCH	SKHQFB015B

S. = Surface mount

[FRONT UNIT] (SW BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
S13	2260000861	SWITCH	SKHQFB015B
S14	2260000861	SWITCH	SKHQFB015B
SP1	2520000070	PIEZO BUZZER	EFBRQ38C01
EP1	910035462	PCB	B 3516B

[REAR UNIT]

REF. NO.	PARTS NO.	DESCRIPTION	
F2	5210000070	FUSE	FGB 10A

[REAR UNIT] (REG BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
IC1	1110001950	IC	µPC494C
IC2	1110002260	IC	µPC1093J
IC3	1170000180	IC	PC817D
IC4	1130000050	IC	TC4013BP (NEW)
Q1	1510000070	TRANSISTOR	2SA1048-Y
Q2	1560000600	FET	2SK740
Q3	1560000600	FET	2SK740
Q4	1510000070	TRANSISTOR	2SA1048-Y
Q5	1510000720	TRANSISTOR	2SA1428-Y
Q6	1510000070	TRANSISTOR	2SA1048-Y
Q7	1530000100	TRANSISTOR	2SC2458-Y
Q9	1540000150	TRANSISTOR	2SD1225M R
Q10	1590000350	TRANSISTOR	RN1204
Q11	1590000350	TRANSISTOR	RN1204
Q12	1520000230	TRANSISTOR	2SB909M Q
Q13	1520000290	TRANSISTOR	2SB1015-Y
Q14	1510000070	TRANSISTOR	2SA1048-Y
Q15	1530000100	TRANSISTOR	2SC2458-Y
Q16	1530000100	TRANSISTOR	2SC2458-Y
Q17	1530000100	TRANSISTOR	2SC2458-Y
Q18	1530000100	TRANSISTOR	2SC2458-Y
D1	1710000040	DIODE	1S953
D2	1710000040	DIODE	1S953
D4	1790000740	DIODE	MA693
D5	1790000760	DIODE	RG-2A
D6	1790000740	DIODE	MA693
D8	1730000250	ZENER	RD12E B2
D9	1790000760	DIODE	RG-2A
D10	1710000160	DIODE	1SS133
D11	1710000160	DIODE	1SS133
D12	1710000160	DIODE	1SS133
D13	1710000160	DIODE	1SS133
D14	1710000160	DIODE	1SS133
D15	1710000160	DIODE	1SS133
D16	1730001830	ZENER	RD10E B1
D17	1710000160	DIODE	1SS133
D18	1710000160	DIODE	1SS133
D19	1790000700	DIODE	DSA3A1
D20	1790000700	DIODE	DSA3A1

[REAR UNIT] (REG BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
L1	6190000640	COIL	TF2528S-102Y5R0-01
L2	6190000810	COIL	HP-012Z
L3	6190000800	COIL	HP-011Z
L4	6170000140	COIL	LW-15
R2	7010003980	RESISTOR	R20J 18Ω
R3	7010003400	RESISTOR	ELR20J 1KΩ
R4	7010003400	RESISTOR	ELR20J 1KΩ
R5	7010003980	RESISTOR	R20J 18Ω
R6	7010004840	RESISTOR	R50XJ 39Ω
R7	7010004840	RESISTOR	R50XJ 39Ω
R8	7010003490	RESISTOR	ELR20J 5.6KΩ
R9	7010003350	RESISTOR	ELR20J 390Ω
R10	7010003530	RESISTOR	ELR20J 10KΩ
R11	7010003420	RESISTOR	ELR20J 1.5KΩ
R12	7010003540	RESISTOR	ELR20J 12KΩ
R13	7010003440	RESISTOR	ELR20J 2.2KΩ
R15	7010003400	RESISTOR	ELR20J 1KΩ
R16	7010003400	RESISTOR	ELR20J 1KΩ
R17	7080000260	RESISTOR	CRB25FX 4.7KΩ
R19	7080000260	RESISTOR	CRB25FX 4.7KΩ
R21	7010003530	RESISTOR	ELR20J 10KΩ
R22	7010003580	RESISTOR	ELR20J 22KΩ
R23	7010003580	RESISTOR	ELR20J 22KΩ
R24	7010003400	RESISTOR	ELR20J 1KΩ
R25	7010003700	RESISTOR	ELR20J 220KΩ
R26	7010003400	RESISTOR	ELR20J 1KΩ
R27	7010003530	RESISTOR	ELR20J 10KΩ
R28	7010003660	RESISTOR	ELR20J 100KΩ
R29	7010003680	RESISTOR	ELR20J 150KΩ
R30	7010003480	RESISTOR	ELR20J 4.7KΩ
R31	7010003620	RESISTOR	ELR20J 47KΩ
R32	7010003280	RESISTOR	ELR20J 100Ω
R33	7010003490	RESISTOR	ELR20J 5.6KΩ
R34	7540000060	ABSORBER	ERZ-C05DK 560
R35	7540000060	ABSORBER	ERZ-C05DK 560
R36	7010003400	RESISTOR	ELR20J 1KΩ
R37	7010003400	RESISTOR	ELR20J 1KΩ
R38	7010003360	RESISTOR	ELR20J 470Ω
R39	7010003490	RESISTOR	ELR20J 5.6KΩ
R40	7010003510	RESISTOR	ELR20J 6.8KΩ
R41	7070000220	RESISTOR	CRH100X R-02J 470Ω (471)
R42	7010004090	RESISTOR	R20J 150Ω
R43	7010004210	RESISTOR	R20J 1.5KΩ
R44	7010003410	RESISTOR	ELR20J 1.2KΩ
R45	7010003530	RESISTOR	ELR20J 10KΩ
R46	7010003380	RESISTOR	ELR20J 680Ω
R47	7010003530	RESISTOR	ELR20J 10KΩ
C1	4510004770	ELECTROLYTIC	50 MV 1000 EZ
C2	4010004130	CERAMIC	DD09 B 222K 500V
C3	4010004130	CERAMIC	DD09 B 222K 500V
C4	4510003970	ELECTROLYTIC	50 MV 2R2 HW
C5	4510003910	ELECTROLYTIC	16 MV 47 HW
C6	4510003960	ELECTROLYTIC	50 MV 1 HW
C7	4510003960	ELECTROLYTIC	50 MV 1 HW
C8	4310000330	MYLAR	50 F2D 102J
C9	4310000330	MYLAR	50 F2D 102J
C10	4510004490	ELECTROLYTIC	25 MV 22 HW
C11	4510003910	ELECTROLYTIC	16 MV 47 HW
C12	4510003960	ELECTROLYTIC	50 MV 1 HW
C13	4510004750	ELECTROLYTIC	25 MV 470 AG
C14	4510005030	ELECTROLYTIC	10 MV 1000 AG
C15	4510005060	ELECTROLYTIC	25 MV 220 HW
C16	4510003940	ELECTROLYTIC	25 MV 4R7 HW
C17	4510005260	ELECTROLYTIC	25 MV 10 HW
C18	4510004490	ELECTROLYTIC	25 MV 22 HW
C19	4510003960	ELECTROLYTIC	50 MV 1 HW
C20	4510005260	ELECTROLYTIC	25 MV 10 HW

[REAR UNIT] (REG BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
C21	4510005260	ELECTROLYTIC	25 MV 10 HW
C22	4510004490	ELECTROLYTIC	25 MV 22 HW
C23	4010000560	CERAMIC	DD106 F 103Z 50V
C24	4010000560	CERAMIC	DD106 F 103Z 50V
C25	4010000560	CERAMIC	DD106 F 103Z 50V
C26	4510005570	ELECTROLYTIC	50 MV 330 HW
C27	4510004940	ELECTROLYTIC	50 MV 33 NPDW
C28	4510004940	ELECTROLYTIC	50 MV 33 NPDW
C29	4010000560	CERAMIC	DD106 F 103Z 50V
C30	4010000560	CERAMIC	DD106 F 103Z 50V
C31	4010000560	CERAMIC	DD106 F 103Z 50V
C32	4510004610	ELECTROLYTIC	16 MV 1000 AG
C33	4510003910	ELECTROLYTIC	16 MV 47 HW
C34	4010004840	CERAMIC	DD305 F 104Z 12V
C35	4510004490	ELECTROLYTIC	25 MV 22 HW
C36	4010000330	CERAMIC	DD105 SL 101J 50V
T1	5920000530	TRANSFOMER	TO-33
RL1	6330000940	RELAY	G6EK-134P-1-US DC9V
EP1	910035403	PCB	B 3507C

[REAR UNIT] (FIL BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
L1	6180002940	COIL	TF3233S-102Y10R0-01
L2	6910000670	COIL	BT01RN1-A61-001
L3	6910000670	COIL	BT01RN1-A61-001
C1	4510004940	ELECTROLYTIC	50 MV 33 NPDW
C2	4510005570	ELECTROLYTIC	50 MV 330 HW
C3	4510004940	ELECTROLYTIC	50 MV 33 NPDW
C4	4010000590	CERAMIC	DD110 F 473Z 50V
C5	4010000590	CERAMIC	DD110 F 473Z 50V
C6	4010000590	CERAMIC	DD110 F 473Z 50V
C7	4010000590	CERAMIC	DD110 F 473Z 50V
C8	4010000590	CERAMIC	DD110 F 473Z 50V
C9	4010000560	CERAMIC	DD106 F 103Z 50V
C10	4010000560	CERAMIC	DD106 F 103Z 50V
F1	5210000060	FUSE	FGB 5A
EP1	910036541	PCB	B 3630A

[CTRL UNIT] (RF)

REF. NO.	PARTS NO.	DESCRIPTION	
EP1	6910004880	MAGNETRON	MSF1421B
EP2	6910004870	FRONTEND	NJT1946
EP3	6910004860	CIRCULATOR	NJC3901D
EP4	6910004850	LIMITTER	NJS6930

[CTRL UNIT] (IF BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
IC1	1130006950	IC	μPD6326C
IC2	1130006350	S.IC	TC4094BF (TP1)
IC3	1110002590	S.IC	MC1350 D
IC4	1110002590	S.IC	MC1350 D
IC5	1110002300	IC	MC1330 AP
IC6	1130005010	IC	HD14046BP
IC7	1110001200	S.IC	μPC324G2
IC8	1130005380	S.IC	TC74HC161AF
IC9	1110000240	IC	BA222-V
IC10	1110001240	S.IC	μPC358G2-T1
IC11	1110001240	S.IC	μPC358G2-T1
IC12	1180000010	IC	TA78L005AP
IC13	1130002760	S.IC	μPD4584BG-T1
IC14	1130003710	S.IC	TC4S71F (TE85R)
IC15	1130003710	S.IC	TC4S71F (TE85R)
Q1	1530002030	S.TRANSISTOR	2SC3772-3-TA
Q2	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q3	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q4	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q5	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q6	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q7	1530002030	S.TRANSISTOR	2SC3772-3-TA
Q8	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q9	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q10	1590000520	S.FET	2SJ106-GR (TE85R)
Q11	1590000520	S.FET	2SJ106-GR (TE85R)
Q12	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q13	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q14	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q15	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q16	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q17	1510000110	S.TRANSISTOR	2SA1162-Y (TE85R)
Q18	1510000110	S.TRANSISTOR	2SA1162-Y (TE85R)
Q19	1580000390	S.FET	3SK131K-T1
Q20	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q21	1590000480	S.TRANSISTOR	RN2402 (TE85R)
Q22	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q23	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q24	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q25	1590000480	S.TRANSISTOR	RN2402 (TE85R)
Q26	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q27	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q28	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q29	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q30	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q31	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q32	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q33	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q34	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q35	1510000110	S.TRANSISTOR	2SA1162-Y (TE85R)
D1	1720000220	S.VARICAP	1SV166-T2B
D2	1720000220	S.VARICAP	1SV166-T2B
D3	1720000220	S.VARICAP	1SV166-T2B
D4	1750000060	S.DIODE	1SS196 (TE85R)
D5	1750000060	S.DIODE	1SS196 (TE85R)
D6	1750000060	S.DIODE	1SS196 (TE85R)
D7	1750000060	S.DIODE	1SS196 (TE85R)
D8	1750000060	S.DIODE	1SS196 (TE85R)
D9	1750000060	S.DIODE	1SS196 (TE85R)
D10	1750000060	S.DIODE	1SS196 (TE85R)
D11	1750000060	S.DIODE	1SS196 (TE85R)
D12	1750000060	S.DIODE	1SS196 (TE85R)
D13	1750000060	S.DIODE	1SS196 (TE85R)
D14	1790000960	S.DIODE	1SS317-T
D15	1750000060	S.DIODE	1SS196 (TE85R)
D16	1750000060	S.DIODE	1SS196 (TE85R)
D17	1750000060	S.DIODE	1SS196 (TE85R)

S. = Surface mount

[CTRL UNIT] (IF BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
D18	1750000060	S.DIODE	1SS196 (TE85R)
D19	1750000060	S.DIODE	1SS196 (TE85R)
D20	1750000060	S.DIODE	1SS196 (TE85R)
D21	1750000040	S.DIODE	1SS190 (TE85R)
D22	1750000060	S.DIODE	1SS196 (TE85R)
D23	1750000060	S.DIODE	1SS196 (TE85R)
D24	1750000060	S.DIODE	1SS196 (TE85R)
D25	1750000060	S.DIODE	1SS196 (TE85R)
D26	1730000730	S.ZENER	RD6.2M-T2B2
D27	1750000060	S.DIODE	1SS196 (TE85R)
D28	1790000960	S.DIODE	1SS317-T
D29	1790000960	S.DIODE	1SS317-T
D30	1790000960	S.DIODE	1SS317-T
D31	1750000060	S.DIODE	1SS196 (TE85R)
D32	1750000060	S.DIODE	1SS196 (TE85R)
D33	1750000060	S.DIODE	1SS196 (TE85R)
D34	1750000070	S.DIODE	1SS226 (TE85R)
D35	1750000070	S.DIODE	1SS226 (TE85R)
D36	1750000060	S.DIODE	1SS196 (TE85R)
D37	1750000070	S.DIODE	1SS226 (TE85R)
L1	6150002430	COIL	LS-254
L2	6150002430	COIL	LS-254
L3	6150002430	COIL	LS-254
L4	6150002430	COIL	LS-254
L5	6150002430	COIL	LS-254
L6	6150002430	COIL	LS-254
L7	6150002430	COIL	LS-254
L8	6150002430	COIL	LS-254
L9	6180000690	COIL	LAL 03NA R22M
R1	7030000740	S.RESISTOR	MCR10EZHJ 1MΩ (105)
R2	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R3	7030000300	S.RESISTOR	MCR10EZHJ 220Ω (221)
R4	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R5	7030000470	S.RESISTOR	MCR10EZHJ 5.6KΩ (562)
R6	7030000660	S.RESISTOR	MCR10EZHJ 220KΩ (224)
R7	7030000340	S.RESISTOR	MCR10EZHJ 470Ω (471)
R8	7030000530	S.RESISTOR	MCR10EZHJ 18KΩ (183)
R9	7030000530	S.RESISTOR	MCR10EZHJ 18KΩ (183)
R10	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R11	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R12	7030000340	S.RESISTOR	MCR10EZHJ 470Ω (471)
R13	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R14	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R15	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R16	7030000320	S.RESISTOR	MCR10EZHJ 330Ω (331)
R17	7030000440	S.RESISTOR	MCR10EZHJ 3.3KΩ (332)
R18	7030000450	S.RESISTOR	MCR10EZHJ 3.9KΩ (392)
R19	7030000450	S.RESISTOR	MCR10EZHJ 3.9KΩ (392)
R20	7030000140	S.RESISTOR	MCR10EZHJ 10Ω (100)
R21	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R22	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R23	7030000180	S.RESISTOR	MCR10EZHJ 22Ω (220)
R24	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R25	7030000300	S.RESISTOR	MCR10EZHJ 220Ω (221)
R26	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R27	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R28	7030000440	S.RESISTOR	MCR10EZHJ 3.3KΩ (332)
R29	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R30	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R31	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R32	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R33	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R34	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R35	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R36	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R37	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R38	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)

[CTRL UNIT] (IF BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
R39	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R40	7030000640	S.RESISTOR	MCR10EZHJ 150KΩ (154)
R41	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R42	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R43	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R44	7030000480	S.RESISTOR	MCR10EZHJ 6.8KΩ (682)
R45	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R46	7030000480	S.RESISTOR	MCR10EZHJ 6.8KΩ (682)
R47	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R48	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R49	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R50	7030000540	S.RESISTOR	MCR10EZHJ 22KΩ (223)
R51	7030000540	S.RESISTOR	MCR10EZHJ 22KΩ (223)
R52	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R53	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R54	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R55	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R56	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R57	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R58	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R59	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R60	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R62	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R64	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R65	7030000440	S.RESISTOR	MCR10EZHJ 3.3KΩ (332)
R66	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R67	7030000740	S.RESISTOR	MCR10EZHJ 1MΩ (105)
R68	7030000630	S.RESISTOR	MCR10EZHJ 120KΩ (124)
R69	7030000630	S.RESISTOR	MCR10EZHJ 120KΩ (124)
R70	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R71	7030000560	S.RESISTOR	MCR10EZHJ 33KΩ (333)
R72	7030000220	S.RESISTOR	MCR10EZHJ 47Ω (470)
R73	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R74	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R75	7030000540	S.RESISTOR	MCR10EZHJ 22KΩ (223)
R76	7030000540	S.RESISTOR	MCR10EZHJ 22KΩ (223)
R77	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R79	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R80	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R81	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R82	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R83	7030000450	S.RESISTOR	MCR10EZHJ 3.9KΩ (392)
R84	7030000490	S.RESISTOR	MCR10EZHJ 8.2KΩ (822)
R85	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R86	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R87	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R88	7030000540	S.RESISTOR	MCR10EZHJ 22KΩ (223)
R89	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R90	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R91	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R92	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R93	7030000540	S.RESISTOR	MCR10EZHJ 22KΩ (223)
R94	7030000490	S.RESISTOR	MCR10EZHJ 8.2KΩ (822)
R96	7030000540	S.RESISTOR	MCR10EZHJ 22KΩ (223)
R97	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R98	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R99	7030000440	S.RESISTOR	MCR10EZHJ 3.3KΩ (332)
R100	7030000340	S.RESISTOR	MCR10EZHJ 470Ω (471)
R101	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R102	7030000340	S.RESISTOR	MCR10EZHJ 470Ω (471)
R103	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R104	7030000490	S.RESISTOR	MCR10EZHJ 8.2KΩ (822)
R105	7030000430	S.RESISTOR	MCR10EZHJ 2.7KΩ (272)
R106	7030000480	S.RESISTOR	MCR10EZHJ 6.8KΩ (682)
R107	7030000430	S.RESISTOR	MCR10EZHJ 2.7KΩ (272)
R108	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R109	7030000490	S.RESISTOR	MCR10EZHJ 8.2KΩ (822)
R110	7030000580	S.RESISTOR	MCR10EZHJ 47KΩ (473)
R111	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R112	7030000580	S.RESISTOR	MCR10EZHJ 47KΩ (473)
R113	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)

S. = Surface mount

[CTRL UNIT] (IF BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
R114	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R115	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R116	7030000470	S.RESISTOR	MCR10EZHJ 5.6KΩ (562)
R117	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R118	7030000480	S.RESISTOR	MCR10EZHJ 6.8KΩ (682)
R119	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R120	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R121	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R122	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R124	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R125	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R126	7030000450	S.RESISTOR	MCR10EZHJ 3.9KΩ (392)
R127	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R130	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R131	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R132	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R133	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R134	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R135	7030000440	S.RESISTOR	MCR10EZHJ 3.3KΩ (332)
R136	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R137	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R138	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R139	7030000300	S.RESISTOR	MCR10EZHJ 220Ω (221)
R140	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R142	7030000140	S.RESISTOR	MCR10EZHJ 10Ω (100)
R143	7030000430	S.RESISTOR	MCR10EZHJ 2.7KΩ (272)
R144	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R145	7030000490	S.RESISTOR	MCR10EZHJ 8.2KΩ (822)
R146	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R147	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R148	7030000650	S.RESISTOR	MCR10EZHJ 180KΩ (184)
R149	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R150	7030000580	S.RESISTOR	MCR10EZHJ 47KΩ (473)
R152	7030000580	S.RESISTOR	MCR10EZHJ 47KΩ (473)
R153	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R154	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R155	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R156	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R157	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R158	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R159	7030000440	S.RESISTOR	MCR10EZHJ 3.3KΩ (332)
R160	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R161	7030000580	S.RESISTOR	MCR10EZHJ 47KΩ (473)
R162	7030000540	S.RESISTOR	MCR10EZHJ 22KΩ (223)
R163	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R164	7030000640	S.RESISTOR	MCR10EZHJ 150KΩ (154)
R165	7030000440	S.RESISTOR	MCR10EZHJ 3.3KΩ (332)
R166	7030000440	S.RESISTOR	MCR10EZHJ 3.3KΩ (332)
R167	7030000440	S.RESISTOR	MCR10EZHJ 3.3KΩ (332)
R168	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R169	7030000360	S.RESISTOR	MCR10EZHJ 680Ω (681)
R170	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R171	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R172	7030000460	S.RESISTOR	MCR10EZHJ 4.7KΩ (472)
R173	7030000430	S.RESISTOR	MCR10EZHJ 2.7KΩ (272)
R174	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R175	7030000490	S.RESISTOR	MCR10EZHJ 8.2KΩ (822)
R176	7030000400	S.RESISTOR	MCR10EZHJ 1.5KΩ (152)
C1	4030004840	S.CERAMIC	C2012 CH 1H 070D-T-A
C2	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C3	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C4	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C5	4030004470	S.CERAMIC	C2012 SL 1H 100D-T-A
C6	4030004470	S.CERAMIC	C2012 SL 1H 100D-T-A
C7	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C8	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C9	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C10	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C11	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A

[CTRL UNIT] (IF BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
C12	4030004580	S.CERAMIC	C2012 SL 1H 560J-T-A
C13	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C14	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C15	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C16	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C17	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C18	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C19	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C20	4030009640	S.CERAMIC	C2012 CH 1H 300J-T-A
C21	4030009640	S.CERAMIC	C2012 CH 1H 300J-T-A
C22	4030009640	S.CERAMIC	C2012 CH 1H 300J-T-A
C23	4030006450	S.CERAMIC	C2012 JF 1H 103Z-T-A
C24	4030006450	S.CERAMIC	C2012 JF 1H 103Z-T-A
C25	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C26	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C27	4310000360	MYLAR	50 F2D 103J
C28	4510003890	ELECTROLYTIC	16 MV 10 HW
C29	4310000610	MYLAR	50 F2D 472J
C30	4310000610	MYLAR	50 F2D 472J
C31	4310000590	MYLAR	50 F2D 332J
C33	4030004630	S.CERAMIC	C2012 SL 1H 151J-T-A
C34	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C35	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C36	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C37	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C38	4030006450	S.CERAMIC	C2012 JF 1H 103Z-T-A
C39	4510003890	ELECTROLYTIC	16 MV 10 HW
C40	4310000360	MYLAR	50 F2D 103J
C41	4510005530	ELECTROLYTIC	50 MV 10 EZ
C42	4510005200	ELECTROLYTIC	25 MV 47 HW (6.3X11)
C43	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C44	4510004990	ELECTROLYTIC	16 MV 100 HC
C45	4510003910	ELECTROLYTIC	16 MV 47 HW
C46	4510005200	ELECTROLYTIC	25 MV 47 HW (6.3X11)
C47	4510005200	ELECTROLYTIC	25 MV 47 HW (6.3X11)
C48	4510005530	ELECTROLYTIC	50 MV 10 EZ
C49	4510005530	ELECTROLYTIC	50 MV 10 EZ
C50	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C51	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C52	4030004610	S.CERAMIC	C2012 SL 1H 101J-T-A
C54	4030004570	S.CERAMIC	C2012 SL 1H 470J-T-A
C55	4030004810	S.CERAMIC	C2012 CH 1H 040C-T-A
C56	4030004810	S.CERAMIC	C2012 CH 1H 040C-T-A
C57	4030004810	S.CERAMIC	C2012 CH 1H 040C-T-A
C58	4030004810	S.CERAMIC	C2012 CH 1H 040C-T-A
C59	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C60	4510003890	ELECTROLYTIC	16 MV 10 HW
C61	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C62	4510003890	ELECTROLYTIC	16 MV 10 HW
C63	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C64	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C65	4510003910	ELECTROLYTIC	16 MV 47 HW
C66	4510003910	ELECTROLYTIC	16 MV 47 HW
C67	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C68	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C69	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C70	4030004420	S.CERAMIC	C2012 SL 1H 050C-T-A
C71	4030004420	S.CERAMIC	C2012 SL 1H 050C-T-A
C72	4030004420	S.CERAMIC	C2012 SL 1H 050C-T-A
C73	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C74	4510003940	ELECTROLYTIC	25 MV 4R7 HW
C76	4030004580	S.CERAMIC	C2012 SL 1H 560J-T-A
C77	4030004580	S.CERAMIC	C2012 SL 1H 560J-T-A
C78	4030004470	S.CERAMIC	C2012 SL 1H 100D-T-A
C80	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C81	4510003890	ELECTROLYTIC	16 MV 10 HW
C82	4510003890	ELECTROLYTIC	16 MV 10 HW
C83	4010000880	CERAMIC	DD106 CH 560J 50V
C84	4510004990	ELECTROLYTIC	16 MV 100 HC
C85	4510003890	ELECTROLYTIC	16 MV 10 HW
C86	4510003890	ELECTROLYTIC	16 MV 10 HW

S. = Surface mount

[CTRL UNIT] (IF BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
C87	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C88	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C89	4030006460	S.CERAMIC	C2012 SL 1H 102J-T-A
C90	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C91	4030004750	S.CERAMIC	C2012 JB 1H 103K-T-A
C92	4030004750	S.CERAMIC	C2012 JB 1H 103K-T-A
C93	4030004750	S.CERAMIC	C2012 JB 1H 103K-T-A
C94	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C95	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
EP1	910035413	PCB	B 3504C

[CTRL UNIT] (PA BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
IC1	1130003710	S.IC	TC4S71F (TE85R)
IC2	1110003070	S.IC	µPC494GS
IC3	1110001820	S.IC	µPC1093T
IC4	1170000180	IC	PC817D
IC5	1180000450	IC	NJM7812A
IC6	1110003070	S.IC	µPC494GS
IC7	1130000580	S.IC	µPD4050BG
IC8	1170000190	IC	TLP521-1 (BL)
IC9	1130003710	S.IC	TC4S71F (TE85R)
Q1	1510000110	S.TRANSISTOR	2SA1162-Y (TE85R)
Q2	1560000600	FET	2SK740
Q3	1560000600	FET	2SK740
Q4	1510000110	S.TRANSISTOR	2SA1162-Y (TE85R)
Q5	1560000700	FET	2SK1449
Q6	1560000700	FET	2SK1449
Q7	1510000720	TRANSISTOR	2SA1428-Y
Q8	1530000160	S.TRANSISTOR	2SC2712-Y (TE85RTEM)
Q9	1510000110	S.TRANSISTOR	2SA1162-Y (TE85R)
Q10	1560000600	FET	2SK740
Q11	1510000110	S.TRANSISTOR	2SA1162-Y (TE85R)
Q12	1530002790	S.TRANSISTOR	2SC2859-Y (TE85R)
Q13	1520000200	S.TRANSISTOR	2SB798-T2 DK
Q14	1520000200	S.TRANSISTOR	2SB798-T2 DK
Q15	1540000250	S.TRANSISTOR	2SD999-T2 CK
Q16	1510000610	S.TRANSISTOR	2SA1182-Y (TE85R)
Q17	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q18	1590000460	S.TRANSISTOR	RN1402 (TE85R)
Q19	1590000460	S.TRANSISTOR	RN1402 (TE85R)
D1	1750000060	S.DIODE	1SS196 (TE85R)
D2	1750000060	S.DIODE	1SS196 (TE85R)
D3	1790000740	DIODE	MA693
D4	1730001000	S.ZENER	RD16M-T2B2
D6	1790000760	DIODE	RG-2A
D7	1790000760	DIODE	RG-2A
D8	1750000070	S.DIODE	1SS226 (TE85R)
D9	1790000740	DIODE	MA693
D10	1750000060	S.DIODE	1SS196 (TE85R)
D11	1750000070	S.DIODE	1SS226 (TE85R)
D12	1750000060	S.DIODE	1SS196 (TE85R)
D13	1730001000	S.ZENER	RD16M-T2B2
L1	6190000800	COIL	HP-011Z
L2	6190000810	COIL	HP-012Z
L3	6140000700	COIL	LR-92
L4	6140000700	COIL	LR-92

[CTRL UNIT] (PA BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
R1	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R2	7030001110	S.RESISTOR	MCR50JZHJ 68Ω (680)
R3	7070000530	RESISTOR	CRH200 R-02J 33Ω (330)
R4	7030000140	S.RESISTOR	MCR10EZHJ 10Ω (100)
R5	7030000140	S.RESISTOR	MCR10EZHJ 10Ω (100)
R6	7010005140	RESISTOR	R50XJ 1Ω
R7	7030000180	S.RESISTOR	MCR10EZHJ 22Ω (220)
R8	7030000180	S.RESISTOR	MCR10EZHJ 22Ω (220)
R9	7030001080	S.RESISTOR	MCR50JZHJ 39Ω (390)
R10	7030001080	S.RESISTOR	MCR50JZHJ 39Ω (390)
R11	7030000470	S.RESISTOR	MCR10EZHJ 5.6KΩ (562)
R12	7030000470	S.RESISTOR	MCR10EZHJ 5.6KΩ (562)
R13	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R14	7030000510	S.RESISTOR	MCR10EZHJ 12KΩ (123)
R15	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R16	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R17	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R18	7030002800	S.RESISTOR	MCR10EZHFX 2.7KΩ (272)
R19	7030000470	S.RESISTOR	MCR10EZHJ 5.6KΩ (562)
R20	7030000470	S.RESISTOR	MCR10EZHJ 5.6KΩ (562)
R21	7030000580	S.RESISTOR	MCR10EZHJ 47KΩ (473)
R22	7030000550	S.RESISTOR	MCR10EZHJ 27KΩ (273)
R23	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R24	4610001620	TRIMMER	EVM-MSGA01 B13
R25	7030001540	S.RESISTOR	MCR50JZHJ 180KΩ (184)
R26	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R27	7030000620	S.RESISTOR	MCR10EZHJ 100KΩ (104)
R28	7070000270	RESISTOR	CRH100X R-02J 100Ω (101)
R29	7030000170	S.RESISTOR	MCR10EZHJ 18Ω (180)
R30	7030000340	S.RESISTOR	MCR10EZHJ 470Ω (471)
R31	7030000440	S.RESISTOR	MCR10EZHJ 3.3KΩ (332)
R33	7030000580	S.RESISTOR	MCR10EZHJ 47KΩ (473)
R34	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R35	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R36	7030000580	S.RESISTOR	MCR10EZHJ 47KΩ (473)
R37	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R38	7030000380	S.RESISTOR	MCR10EZHJ 1KΩ (102)
R39	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R40	7030000330	S.RESISTOR	MCR10EZHJ 390Ω (391)
R41	7030002830	S.RESISTOR	MCR10EZHFX 4.7KΩ (472)
R42	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R44	7100000010	RESISTOR	SRW1P 0R1Ω (0R1)
R45	7030000400	S.RESISTOR	MCR10EZHJ 1.5KΩ (152)
R46	7030000470	S.RESISTOR	MCR10EZHJ 5.6KΩ (562)
R47	7030000510	S.RESISTOR	MCR10EZHJ 12KΩ (123)
R48	7030000540	S.RESISTOR	MCR10EZHJ 22KΩ (223)
R49	4610001630	TRIMMER	EVM-MSGA01 B23
R50	4610001640	TRIMMER	EVM-MSGA01 B53
R51	4610001660	TRIMMER	EVM-MSGA01 B24
R52	4610001650	TRIMMER	EVM-MSGA01 B14
R53	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R55	7030002890	S.RESISTOR	MCR10EZHFX 15KΩ (153)
R56	7030001540	S.RESISTOR	MCR50JZHJ 180KΩ (184)
R57	7030000420	S.RESISTOR	MCR10EZHJ 2.2KΩ (222)
R58	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R59	7030000260	S.RESISTOR	MCR10EZHJ 100Ω (101)
R60	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R61	7030000500	S.RESISTOR	MCR10EZHJ 10KΩ (103)
R62	7030001010	S.RESISTOR	MCR50JZHJ 10Ω (100)
R65	7030000140	S.RESISTOR	MCR10EZHJ 10Ω (100)
R66	7030000140	S.RESISTOR	MCR10EZHJ 10Ω (100)
C1	4310000440	MYLAR	50 F2D 473J
C2	4030008550	S.CERAMIC	C2012 JF 1H 473Z-T-A
C3	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C4	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T-A
C5	4310000910	MYLAR	ECW F4105KZ
C6	4310000910	MYLAR	ECW F4105KZ
C7	4560000010	CERAMIC	D55X5T 1H 104M51
C8	4510004770	ELECTROLYTIC	50 MV 1000 EZ

S. = Surface mount

[CTRL UNIT] (PA BOARD)

REF. NO.	PARTS NO.	DESCRIPTION	
C9	4010004130	CERAMIC	DD09 B 222K 500V
C10	4010004130	CERAMIC	DD09 B 222K 500V
C11	4510003970	ELECTROLYTIC	50 MV 2R2 HW
C12	4510005200	ELECTROLYTIC	25 MV 47 HW (6.3X11)
C13	4510003900	ELECTROLYTIC	16 MV 22 HW
C14	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C15	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C16	4310000330	MYLAR	50 F2D 102J
C17	4510005470	ELECTROLYTIC	25 MV 1000 AG
C18	4510004310	ELECTROLYTIC	450 TWS 10μF (12.5X25)
C19	4510005470	ELECTROLYTIC	25 MV 1000 AG
C20	4510005470	ELECTROLYTIC	25 MV 1000 AG
C21	4010004100	CERAMIC	DD14 SL 331K 500V
C23	4030009240	S.CERAMIC	GRM40 CH 102J 50PT
C24	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C25	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C26	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C27	4310000440	MYLAR	50 F2D 473J
C28	4510003910	ELECTROLYTIC	16 MV 47 HW
C29	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C30	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C31	4560000010	CERAMIC	D55X5T 1H 104M51
C32	4030008550	S.CERAMIC	C2012 JF 1H 473Z-T-A
C33	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T-A
C34	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T-A
C35	4030008550	S.CERAMIC	C2012 JF 1H 473Z-T-A
C37	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C38	4030004970	S.CERAMIC	C2012 CH 1H 680J-T-A
C39	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C40	4030004750	S.CERAMIC	C2012 JB 1H 103K-T-A
C41	4010004130	CERAMIC	DD09 B 222K 500V
C43	4030008550	S.CERAMIC	C2012 JF 1H 473Z-T-A
C44	4030008550	S.CERAMIC	C2012 JF 1H 473Z-T-A
C45	4030008550	S.CERAMIC	C2012 JF 1H 473Z-T-A
C46	4030008550	S.CERAMIC	C2012 JF 1H 473Z-T-A
C47	4030008550	S.CERAMIC	C2012 JF 1H 473Z-T-A
C48	4030008550	S.CERAMIC	C2012 JF 1H 473Z-T-A
C49	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C50	4030004760	S.CERAMIC	C2012 JF 1E 104Z-T-A
C51	4510004140	ELECTROLYTIC	50 MV 10 HW
F1	5210000230	FUSE	MC 2 1/2
T1	5920000560	TRANSFORMER	TO-37
T2	5920000510	TRANSFORMER	TO-26
T3	5920000540	TRANSFORMER	TO-34
EP1	910035333	PCB	B 3505C

[HARNESS UNIT]

REF. NO.	PARTS NO.	DESCRIPTION	
IC1	1170000180	IC	PC817D
IC2	1170000180	IC	PC817D
IC3	1170000180	IC	PC817D
IC4	1130004480	IC	TC74HC74AP
IC5	1130005540	IC	μPD74HC123AC
IC6	1130005150	IC	TC74HC14AP
IC7	1110001950	IC	μPC494C
IC8	1180000010	IC	TA78L005AP
Q1	1590000340	TRANSISTOR	RN1202

[HARNESS UNIT]

REF. NO.	PARTS NO.	DESCRIPTION	
Q2	1590000340	TRANSISTOR	RN1202
Q3	1590000340	TRANSISTOR	RN1202
Q4	1540000200	TRANSISTOR	2SD1406 Y
Q5	1510000070	TRANSISTOR	2SA1048-Y
Q6	1540000200	TRANSISTOR	2SD1406 Y
Q7	1530000100	TRANSISTOR	2SC2458-Y
Q8	1590000340	TRANSISTOR	RN1202
Q9	1530000100	TRANSISTOR	2SC2458-Y
Q10	1590000340	TRANSISTOR	RN1202
Q11	1590000340	TRANSISTOR	RN1202
Q12	1560000600	FET	2SK740
Q13	1510000070	TRANSISTOR	2SA1048-Y
Q14	1560000600	FET	2SK740
Q15	1510000070	TRANSISTOR	2SA1048-Y
Q16	1510000070	TRANSISTOR	2SA1048-Y
Q17	1590000340	TRANSISTOR	RN1202
Q18	1590000350	TRANSISTOR	RN1204
Q19	1520000290	TRANSISTOR	2SB1015-Y
Q20	1510000070	TRANSISTOR	2SA1048-Y
Q21	1590000350	TRANSISTOR	RN1204
Q22	1590000340	TRANSISTOR	RN1202
Q23	1530000100	TRANSISTOR	2SC2458-Y
Q24	1530000100	TRANSISTOR	2SC2458-Y
D1	1710000160	DIODE	1SS133
D2	1710000160	DIODE	1SS133
D3	1710000160	DIODE	1SS133
D4	1710000160	DIODE	1SS133
D5	1710000160	DIODE	1SS133
D6	1710000160	DIODE	1SS133
D7	1790000740	DIODE	MA693
D9	1710000160	DIODE	1SS133
D10	1710000040	DIODE	1S953
D11	1710000040	DIODE	1S953
D12	1730000280	ZENER	RD24E B2
D13	1710000160	DIODE	1SS133
D14	1710000160	DIODE	1SS133
D15	1730000250	ZENER	RD12E B2
D16	1710000160	DIODE	1SS133
L1	6190000640	COIL	TF2528S-102Y5R0-01
L2	6190000790	COIL	HP-023Z
R1	7010003740	RESISTOR	ELR20J 470KΩ
R2	7010003660	RESISTOR	ELR20J 100KΩ
R3	7010003620	RESISTOR	ELR20J 47KΩ
R4	7010003620	RESISTOR	ELR20J 47KΩ
R5	7010003620	RESISTOR	ELR20J 47KΩ
R6	7010003480	RESISTOR	ELR20J 4.7KΩ
R7	7010003620	RESISTOR	ELR20J 47KΩ
R8	7010003360	RESISTOR	ELR20J 470Ω
R9	7010003360	RESISTOR	ELR20J 470Ω
R10	7010003620	RESISTOR	ELR20J 47KΩ
R11	7100000010	RESISTOR	SRW1P 0R1Ω (0R1)
R12	7010003530	RESISTOR	ELR20J 10KΩ
R13	7010003490	RESISTOR	ELR20J 5.6KΩ
R14	7010003530	RESISTOR	ELR20J 10KΩ
R15	7010003540	RESISTOR	ELR20J 12KΩ
R16	7010003660	RESISTOR	ELR20J 100KΩ
R17	7010003400	RESISTOR	ELR20J 1KΩ
R18	7010003400	RESISTOR	ELR20J 1KΩ
R19	7010003400	RESISTOR	ELR20J 1KΩ
R20	7010003580	RESISTOR	ELR20J 22KΩ
R21	7010003580	RESISTOR	ELR20J 22KΩ
R22	7010003430	RESISTOR	ELR20J 1.8KΩ
R23	4610001640	TRIMMER	EVM-MSGA01 B53
R24	7010003470	RESISTOR	ELR20J 3.9KΩ
R25	7010003360	RESISTOR	ELR20J 470Ω

S. = Surface mount

[HARNESS UNIT]

REF. NO.	PARTS NO.	DESCRIPTION	
R26	7010003580	RESISTOR	ELR20J 22KΩ
R27	7010003400	RESISTOR	ELR20J 1KΩ
R28	7010003190	RESISTOR	ELR20J 18Ω
R29	7010003400	RESISTOR	ELR20J 1KΩ
R30	7010003190	RESISTOR	ELR20J 18Ω
R31	7010003490	RESISTOR	ELR20J 5.6KΩ
R32	7010003580	RESISTOR	ELR20J 22KΩ
R33	7010003530	RESISTOR	ELR20J 10KΩ
R34	7010003660	RESISTOR	ELR20J 100KΩ
R35	7010003660	RESISTOR	ELR20J 100KΩ
R36	7010003620	RESISTOR	ELR20J 47KΩ
R37	7010003400	RESISTOR	ELR20J 1KΩ
R38	7010003400	RESISTOR	ELR20J 1KΩ
R39	7010003400	RESISTOR	ELR20J 1KΩ
R41	7010003360	RESISTOR	ELR20J 470Ω
R43	7010003530	RESISTOR	ELR20J 10KΩ
R44	7010003490	RESISTOR	ELR20J 5.6KΩ
R45	7010003490	RESISTOR	ELR20J 5.6KΩ
R46	7010003530	RESISTOR	ELR20J 10KΩ
R47	7010003530	RESISTOR	ELR20J 10KΩ
R48	7010003480	RESISTOR	ELR20J 4.7KΩ
R49	7010003620	RESISTOR	ELR20J 47KΩ
R50	7010003580	RESISTOR	ELR20J 22KΩ
R53	7010003400	RESISTOR	ELR20J 1KΩ
R54	7010003660	RESISTOR	ELR20J 100KΩ
R55	7010003400	RESISTOR	ELR20J 1KΩ
R56	7010003400	RESISTOR	ELR20J 1KΩ
C1	4560000060	CERAMIC	D33Y5V 1H 104Z21
C2	4560000060	CERAMIC	D33Y5V 1H 104Z21
C3	4560000060	CERAMIC	D33Y5V 1H 104Z21
C4	4510004940	ELECTROLYTIC	50 MV 33 NPDW
C5	4510004940	ELECTROLYTIC	50 MV 33 NPDW
C6	4510005570	ELECTROLYTIC	50 MV 330 HW
C7	4310000360	MYLAR	50 F2D 103J
C8	4310000380	MYLAR	50 F2D 153J
C9	4040000260	BARRIER	UZE 08X 104M
C10	4010000500	CERAMIC	DD104 B 102K 50V
C11	4510003910	ELECTROLYTIC	16 MV 47 HW
C12	4310000360	MYLAR	50 F2D 103J
C13	4310000330	MYLAR	50 F2D 102J
C14	4510003910	ELECTROLYTIC	16 MV 47 HW
C15	4040000260	BARRIER	UZE 08X 104M
C16	4510005470	ELECTROLYTIC	25 MV 1000 AG
C17	4310000330	MYLAR	50 F2D 102J
C18	4510003910	ELECTROLYTIC	16 MV 47 HW
C19	4510001770	ELECTROLYTIC	16 RBP 10μF
C20	4510004990	ELECTROLYTIC	16 MV 100 HC
C21	4510004770	ELECTROLYTIC	50 MV 1000 EZ
C23	4310000360	MYLAR	50 F2D 103J
C24	4310000360	MYLAR	50 F2D 103J
C25	4510003970	ELECTROLYTIC	50 MV 2R2 HW
C26	4510003910	ELECTROLYTIC	16 MV 47 HW
C27	4560000020	CERAMIC	D33Y5V 1E 104Z21
C28	4560000020	CERAMIC	D33Y5V 1E 104Z21
C29	4510003970	ELECTROLYTIC	50 MV 2R2 HW
C30	4510003890	ELECTROLYTIC	16 MV 10 HW
C31	4310000360	MYLAR	50 F2D 103J
C34	4510004140	ELECTROLYTIC	50 MV 10 HW
C35	4560000060	CERAMIC	D33Y5V 1H 104Z21
C36	4040000260	BARRIER	UZE 08X 104M
T1	5920000550	TRANSFORMER	TO-35
EP2	910035353	PCB	B 3506C

[MARKER UNIT]

REF. NO.	PARTS NO.	DESCRIPTION	
IC1	1170000230	PHOTO IN	GP1S50
R1	7010003330	RESISTOR	ELR20J 270Ω
R2	7010003530	RESISTOR	ELR20J 10KΩ
C1	4560000020	CERAMIC	D33Y5V 1E 104Z21
EP1	910035450	PCB	B 3519

[DISP-A UNIT]

REF. NO.	PARTS NO.	DESCRIPTION	
DS1	5070000080	CRT	MG981F-IC

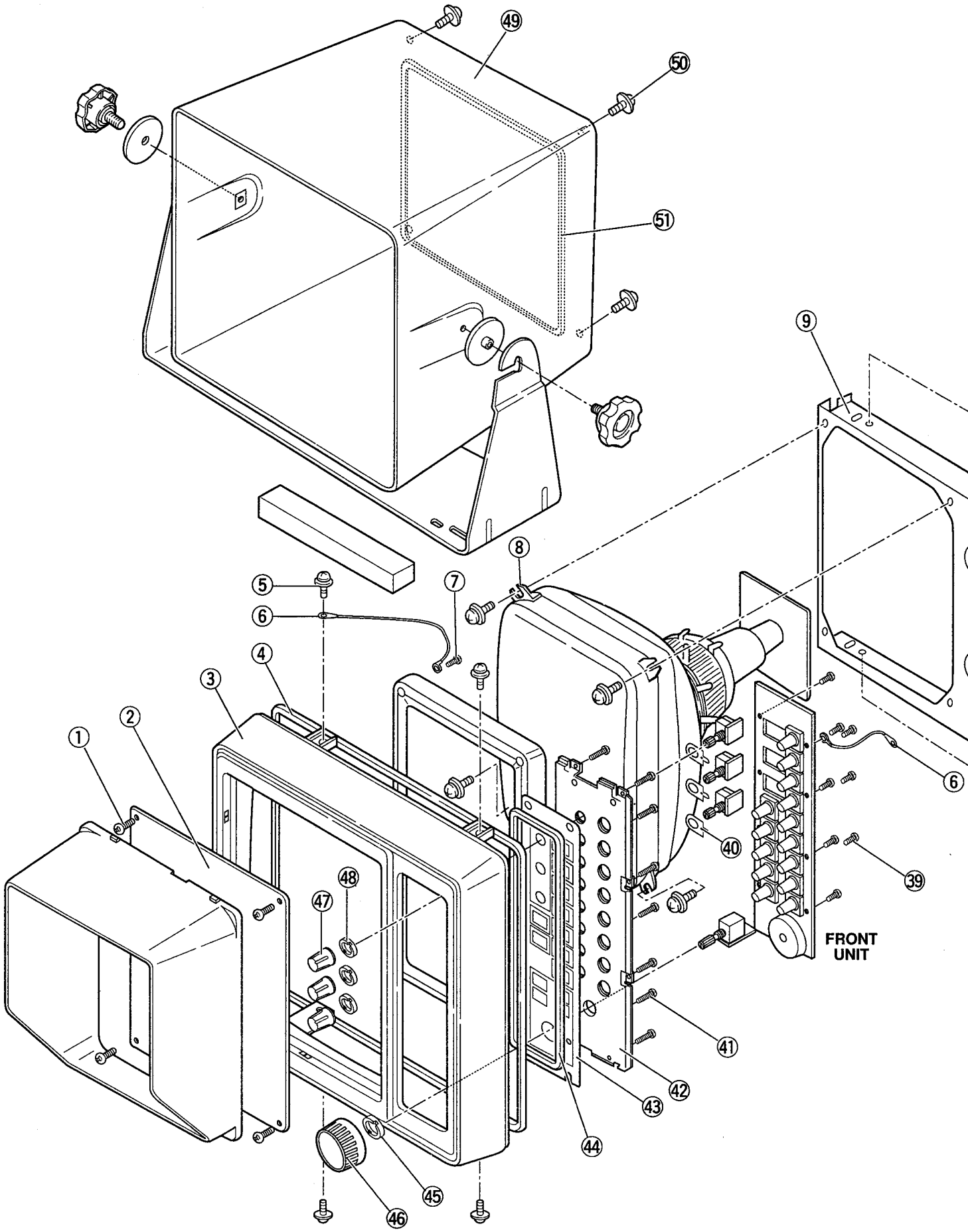
SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

7-1 FRONT PANEL AND CHASSIS PARTS

LABEL NO.	ORDER NO.	DESCRIPTION	QTY.
①	8820000740	Spacer screw	4
②	8010010631	749 Screen-1	1
③	8210008050	749 Front panel-1	1
④	8930019211	Front seal rubber-1	1
⑤	8810003390	Set screw (C) 4 x 8	4
⑥	8900003970	OPC-379	5
⑦	8810003960	Set screw (A) 2.6 x 5	4
⑧	8900002890	CRT harness	1
⑨	8010010420	749 Sub chassis	1
⑩	8010010340	749 Bracket holder	2
⑪	8810003360	Set screw (C) 3 x 6	18
⑫	8010010400	Top side chassis	1
⑬	8810003760	Icom screw (C) 10	4
⑭	5210000060	Fuse FGB 5A	1
⑮	8930006070	Half thread spacer (B)	4
⑯	6510003390	Connector B03B-EH-S	1
⑰	8810002510	Screw FH M3 x 6 SUS	4
⑱	5220000140	Fuse holder FH-042	1
⑲	5210000070	Fuse FGB 10A	1
⑳	6510007560	Connector FM14-4S	1
㉑	6510011420	Connector 31 - 10	1
㉒	6510012160	Connector FM14-8S	1
㉓	8810006360	Set screw (A) 348 SUS	4
㉔	8900003880	Connector OPC-378	1
㉕	8010006350	Set screw (A) 3 x 20 SUS	2
㉖	8830000370	Wing nut M5 SUS	1

LABEL NO.	ORDER NO.	DESCRIPTION	QTY.
㉗	8850000180	Flat washer M5 SUS	2
㉘	8830000250	Nut M5 SUS	1
㉙	8850000500	Spring washer M5 SUS	1
㉚	8010010181	749 Rear panel-1	1
㉛	8850000600	Star washer M5 SUS	1
㉜	8810000700	Screw (PH) M5 x 20 SUS	1
㉝	8010010440	Right side chassis	1
㉞	8930019310	Radiator sheet	1
㉟	8930001410	TR sponge (L)	1
㊱	8930019390	FET-holder	1
㊲	8010010381	Bottom side chassis-1	1
㊳	8930000520	Thread spacer (B)	2
㊴	8810001280	Tapping screw (PH) B1 2.6 x 6	8
㊵	8860000820	1188 Grounding lug	3
㊶	8810001290	Tapping screw (PH) B1 2.6 x 8	8
㊷	8010014150	1188 Switch board panel	1
㊸	8310026930	1188 Switch sheet	1
㊹	8930019240	Key board seal rubber	1
㊺	883000050	VR nut (B)	1
㊻	8610006810	Knob-63 (B)	1
㊼	8610008320	Knob-163 (A)	3
㊽	8830000550	VR nut (E)	3
㊾	8010010610	749 case	1
㊿	8810006320	Set screw (C) 4 x 10 SUS	4
(51)	8930019200	Rear panel seal	1

Screw abbreviations PH : Pan head FH : Flat head
SUS : Stainless


49
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FRONT
UNIT
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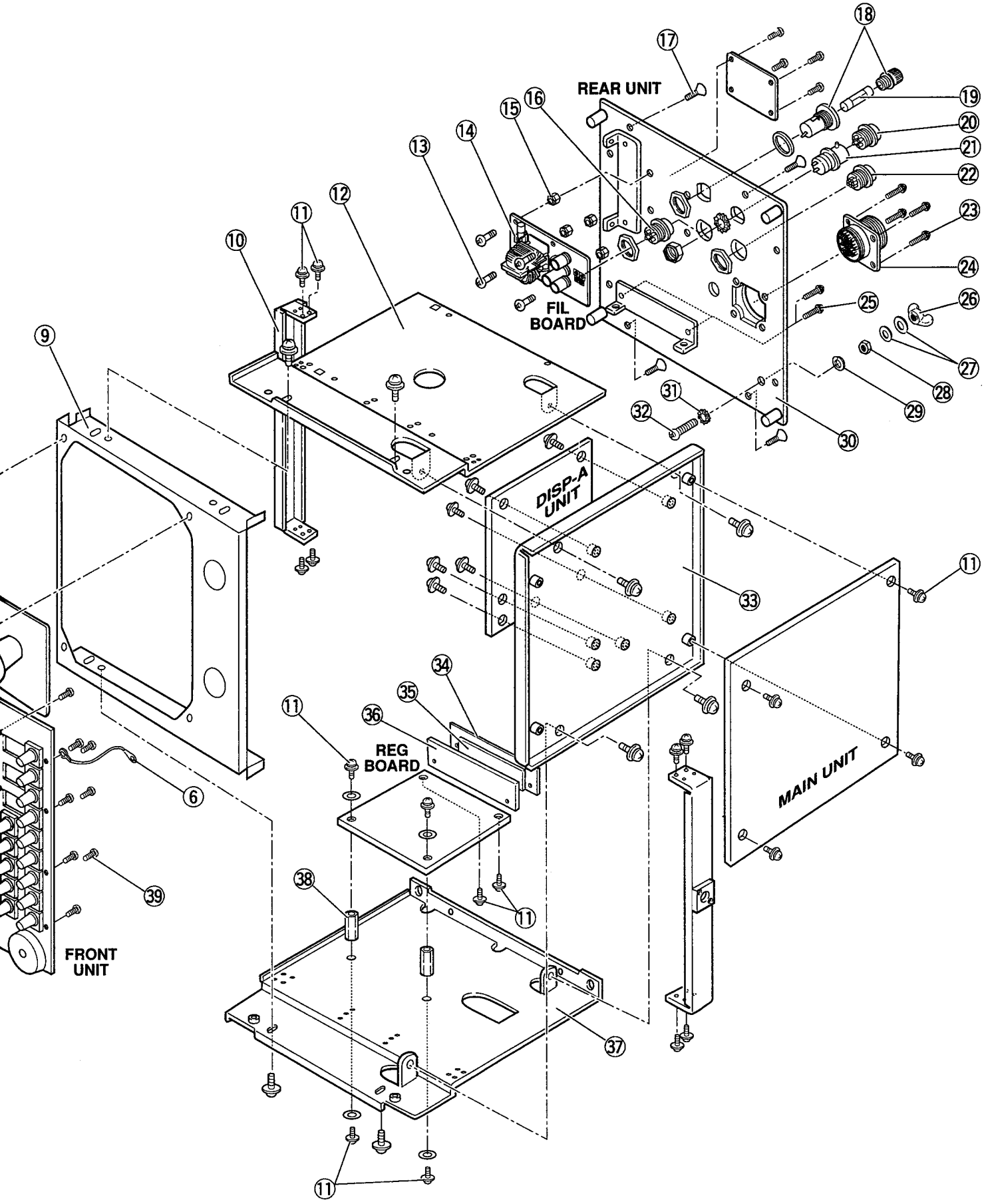
REAR UNIT
FIL BOARD
DISP-A UNIT
REG BOARD
MAIN UNIT
FRONT UNIT
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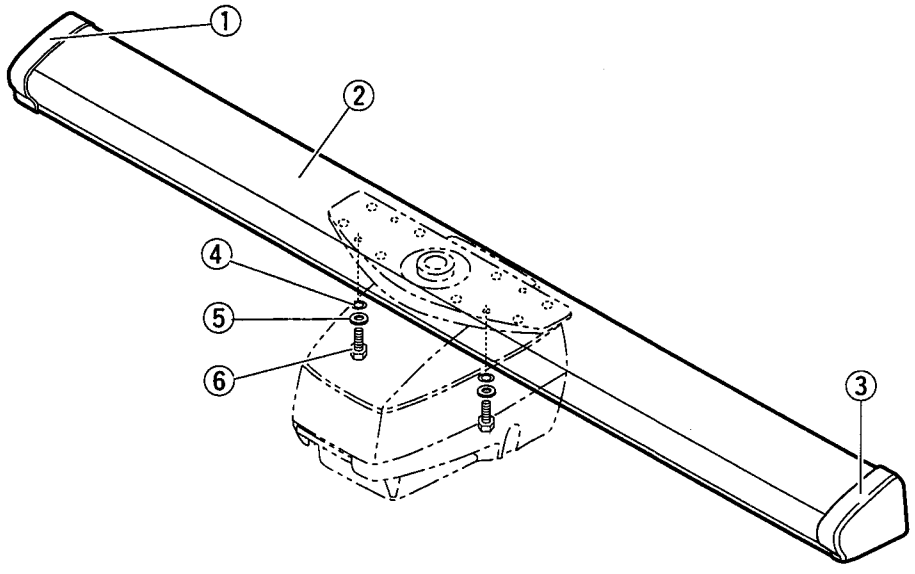
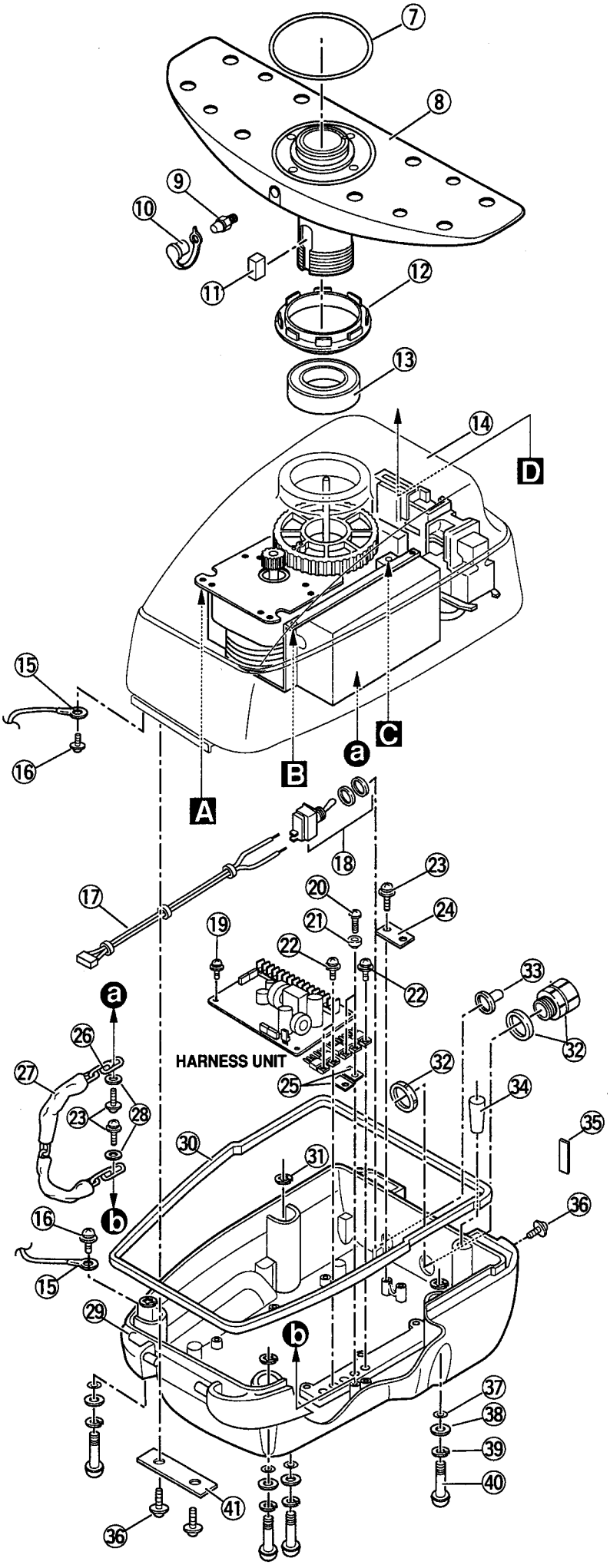
7-2 SCANER PARTS

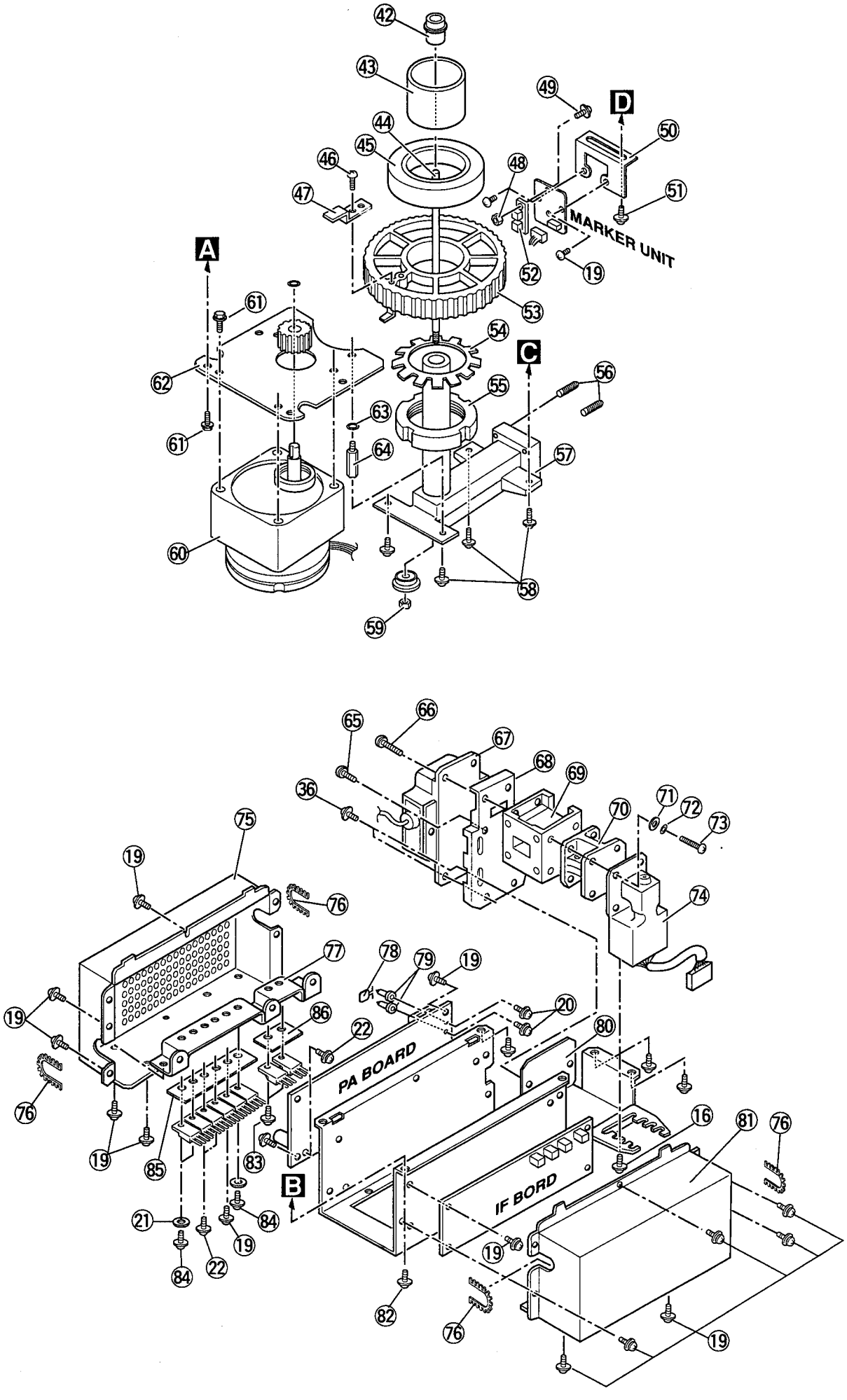
LABEL NO.	ORDER NO.	DESCRIPTION	QTY.
①	8010013040	1188 Radome cap (R)	1
②	8010013050	1188 Radome	1
③	8010013030	1188 Radome cap (L)	1
④	8930026770	O ring JIS P8	4
⑤	8850000210	Flat washer M8 SUS	4
⑥	8810007460	Hexagon Bolt M8 x 18 SUS	4
⑦	8930026760	O ring IN80 NBR-40	1
⑧	8930024650	1188 Antenna holder	1
⑨	8950002660	Grease nipples A-6 x 0.75 NI	1
⑩	8950002810	Grease nipples cap M6	1
⑪	8930025770	1188 key	1
⑫	8310026920	1188 Holder seal	1
⑬	8950002770	Bearing 6009ZZ-C3BN	1
⑭	8010013070	1188 U-scanner body	1
⑮	8900000960	Grounding lead OPC-094	1
⑯	8810003390	Set screw (C) M4 x 8	6
⑰	8600029540	Connector P01CH	1
⑱	2260001280	Switch AJ41100	1
⑲	8810003360	Set screw (C) 3 x 6	28
⑳	8810003160	Set screw (A) 3 x 6	4
㉑	6910000281	B24 Isolating bush	5

LABEL NO.	ORDER NO.	DESCRIPTION	QTY.
㉒	8810003370	Set screw (C) 3 x 8	5
㉓	8810006310	Set screw (C) 4 x 16 SUS	4
㉔	8930026060	1188 Cord plate	1
㉕	8950000230	Isolating sheet T045A T=0.4	2
㉖	8950002840	1188 chain	1
㉗	8950002850	1188 tube	2
㉘	8850000040	Binding washer	2
㉙	8010013060	1188 L-Scanner body	1
㉚	8930025290	1188 Scanner rubber seal	1
㉛	8860000790	E ring M7	4
㉜	6910005010	SCL-14B	1
㉝	6910004900	Switch cover cap WD1911	1
㉞	8930026890	Bio-silico N-12-BL	1
㉟	8310028850	1188 ON-OFF seal (AC)	1
㊱	8810006320	Set screw (C) 4 x 10 SUS	7
㊲	8930026770	O ring JIS P8	4
㊳	8850000210	Flat washer M8 SUS	4
㊴	8850000520	Spring washer M8 SUS	4
㊵	8820000730	1188 Cap screw	4
㊶	8930024710	1188 Hinge plate	1

Screw abbreviations SUS: Stainless NI: Nickel




HARNESS UNIT


MARKER UNIT
PA BOARD
IF BORD
A
B
C
D

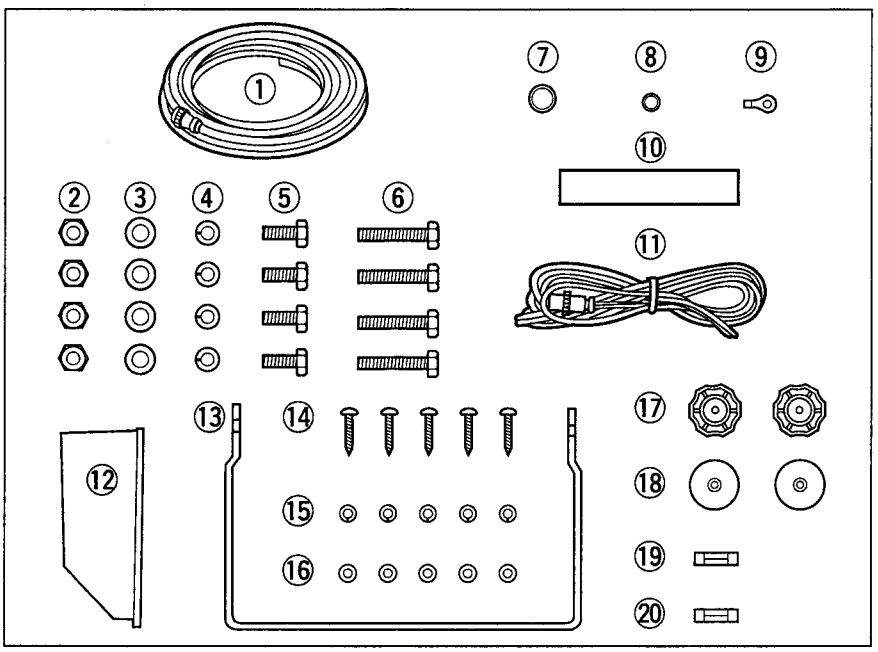
7-3 SCANER INSIDE PARTS

LABEL NO.	ORDER NO.	DESCRIPTION	QTY.
㊷	8930024620	1188 Insulator	1
㊸	8930024690	Bearing spacer (A)	1
㊹	8930025280	1188 Center conductor	1
㊺	8950002770	Bearing 6009ZZC3B3N	1
㊻	8810001350	Tapping screw (PH) B1 3 x 6	1
㊼	8930024660	1188 Sensor plate	1
㊽	8830000100	Nut M3	2
㊾	8810003710	Set screw (A) 3 x 8	2
㊿	8010012470	1188 Sensor angle	1
(51)	8810003860	Set screw (A) 4 x 8	2
(52)	1170000230	GP1S50	1
(53)	8930025310	1188 B-Gear	1
(54)	8850001290	Washer AW09X	1
(55)	8830000800	Nut AN09	1
(56)	8860000810	Spring pin (wave-type) 4 x 14 SUS	2
(57)	8930024750	1188 Feeder WG.	1
(58)	8810005980	Set screw (C) 4 x 15	4
(59)	8830000100	Nut M3	1
(60)	8930026430	Motor DRG-938-001B	1
(61)	8810007680	Set screw (I) 6 x 12 SUS	8
(62)	8930024670	1188 Mounting plate	1
(63)	8850000430	Spring washer M4 NI	2
(64)	8930025780	Standoff (J)	2

LABEL NO.	ORDER NO.	DESCRIPTION	QTY.
(65)	8810006580	Set screw (A) 4 x 10 SUS	2
(66)	8810007620	Set screw (C) 4 x 20 SUS	2
(67)	6910001880	Magnetron MSF1421B	1
(68)	8010013080	1188 Corner WG.	1
(69)	6910001860	Circulator NJC3901D	1
(70)	6910004850	Limitter NJS6930	1
(71)	8850000170	Flat washer M4 SUS	4
(72)	8850000490	Spring washer M4 SUS	4
(73)	8810007660	Screw (PH) M4 x 40 SUS	1
(74)	6910004870	Frontend NST 1946	1
(75)	8010013820	1188 L-shield cover	1
(76)	6910002320	Edge cover KG-012 L49	4
(77)	8410001850	Heatsink	1
(78)	4560000010	Capacitor C31 0.1 50V	1
(79)	2610000340	ST-A2	2
(80)	8930024680	1188 Main plate	1
(81)	8010013570	1188 R-Shield	1
(82)	8810003400	Set screw (C) 4 x 10	6
(83)	8810003380	Set screw (C) 3 x 10	2
(84)	8810003170	Set screw (A) 3 x 8	3
(85)	8930026000	A-sheet	1
(86)	8930026010	B-sheet	1

Screw abbreviations PH: Pan head SUS: Stainless
NI : Nickel

7-4 SUPPLIED ACCESSORIES



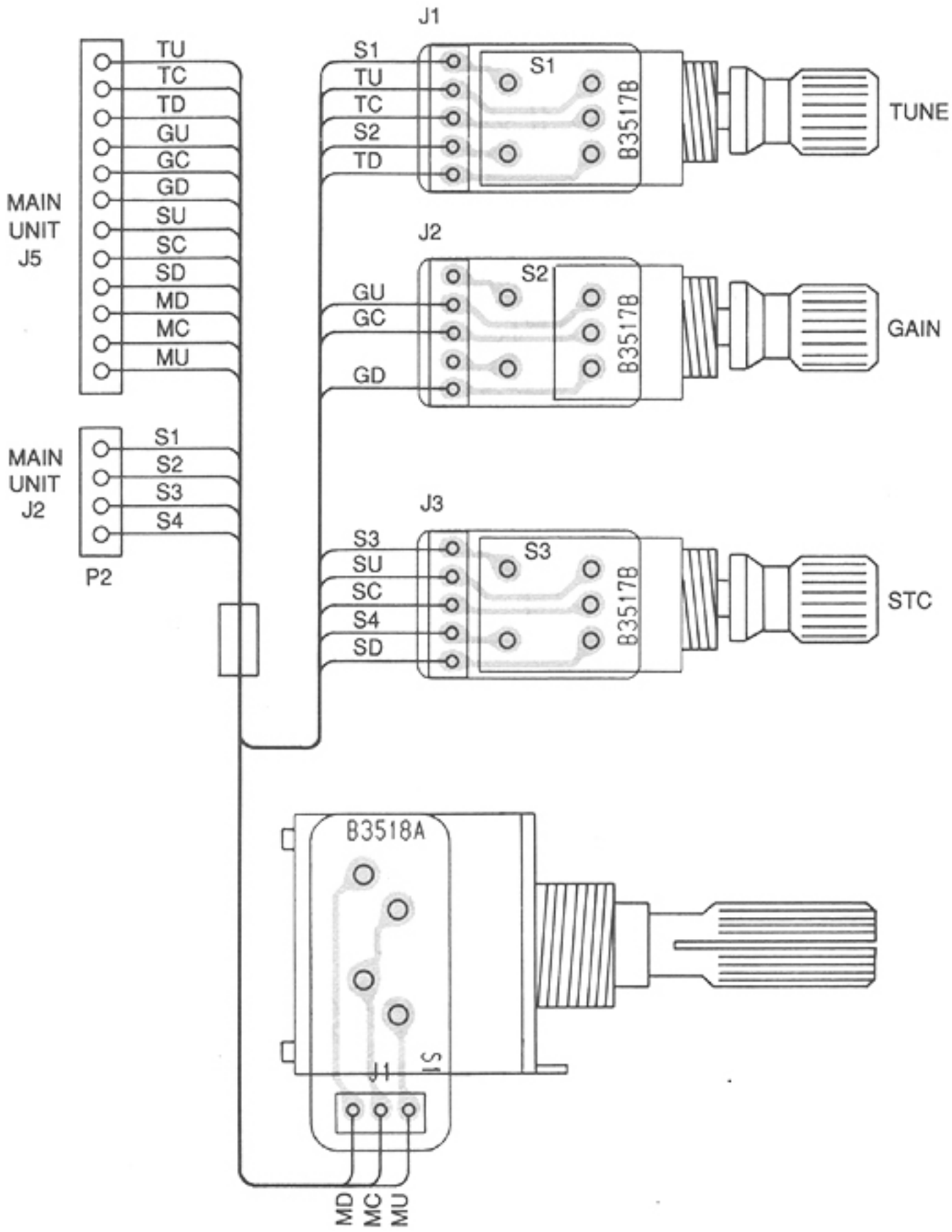
LABEL NO.	ORDER NO.	DESCRIPTION			QTY.
①	8900003870	OPC-377 system cable			1
②	8830000270	Nut	M 10	SUS	4
③	8850001150	Flat washer	M 10	SUS	4
④	8850001140	Spring washer	M 10	SUS	4
⑤	8810006420	Hexagon bolt	M 10 x 25	SUS	4
⑥	8810006380	Hexagon bolt	M 10 x 50	SUS	4
⑦	8930010000	Connector cover			1
⑧	8930019500	BNC-R connector cap			1
⑨	6510012870	Cable lug R5.5-6			1
⑩	8930019690	Sponge (CK)			1
⑪	8900002810	OPC-275 DC power cable			1
⑫	8010010601	749 hood-1			1
⑬	8010010390	Bracket			1
⑭	8810001500	Screw PH	M 6 x 30	SUS	5
⑮	8850000510	Spring washer	M 6	SUS	5
⑯	8850000190	Flat washer	M 6 (6 x 13 x 1.0)	SUS	5
⑰	8820000610	Mounting screw knob G2-6-20			2
⑱	8930015280	Bracket rubber			1
⑲	5210000070	Fuse FGB 10A			1
⑳	5210000060	Fuse FGB 5A			1

SCREW ABBREVIATIONS PH: Pan head SUS: Stainless

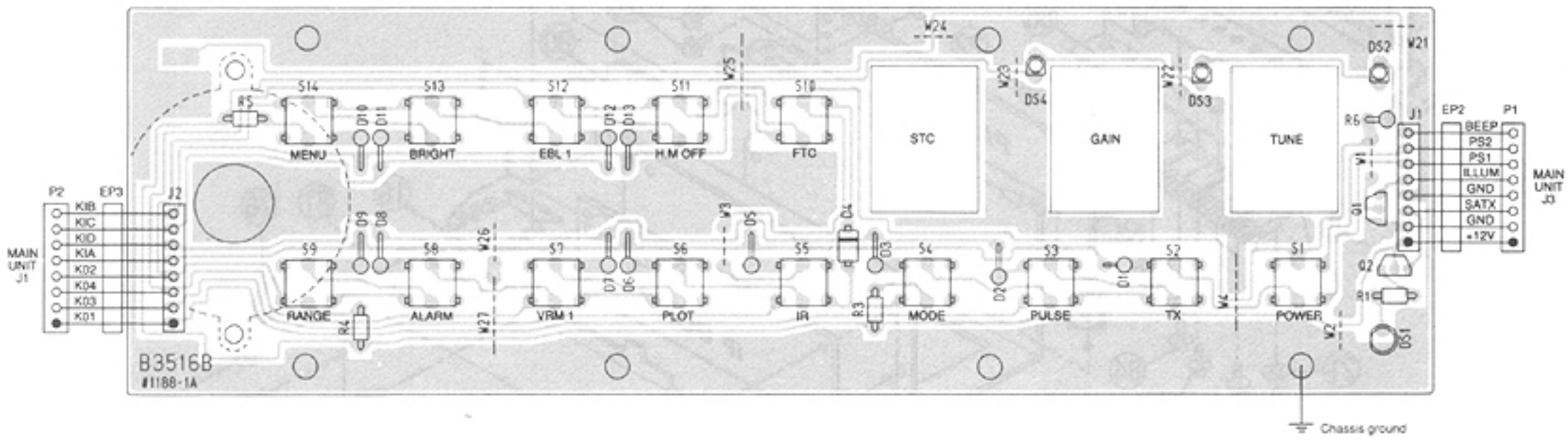
SECTION 8 BOARD LAYOUTS

8-1 FRONT UNIT (VR BOARD, SENSOR BOARD AND SW BOARD)

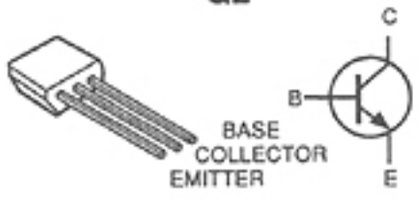
• **VR BOARD (TOP VIEW)**



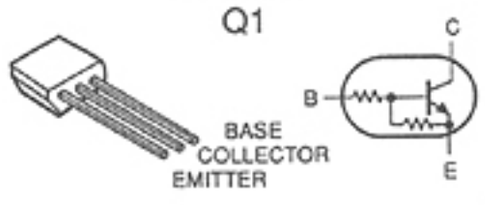
• **SW BOARD (TOP VIEW)**



2SC2458-Y
Q2

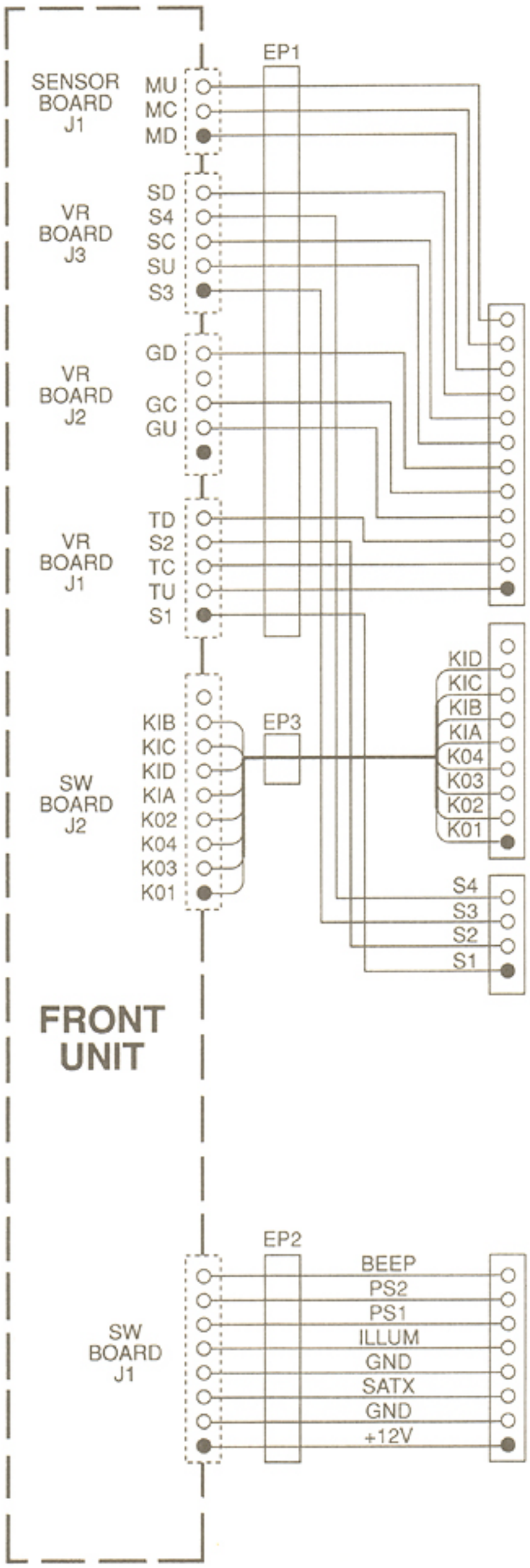


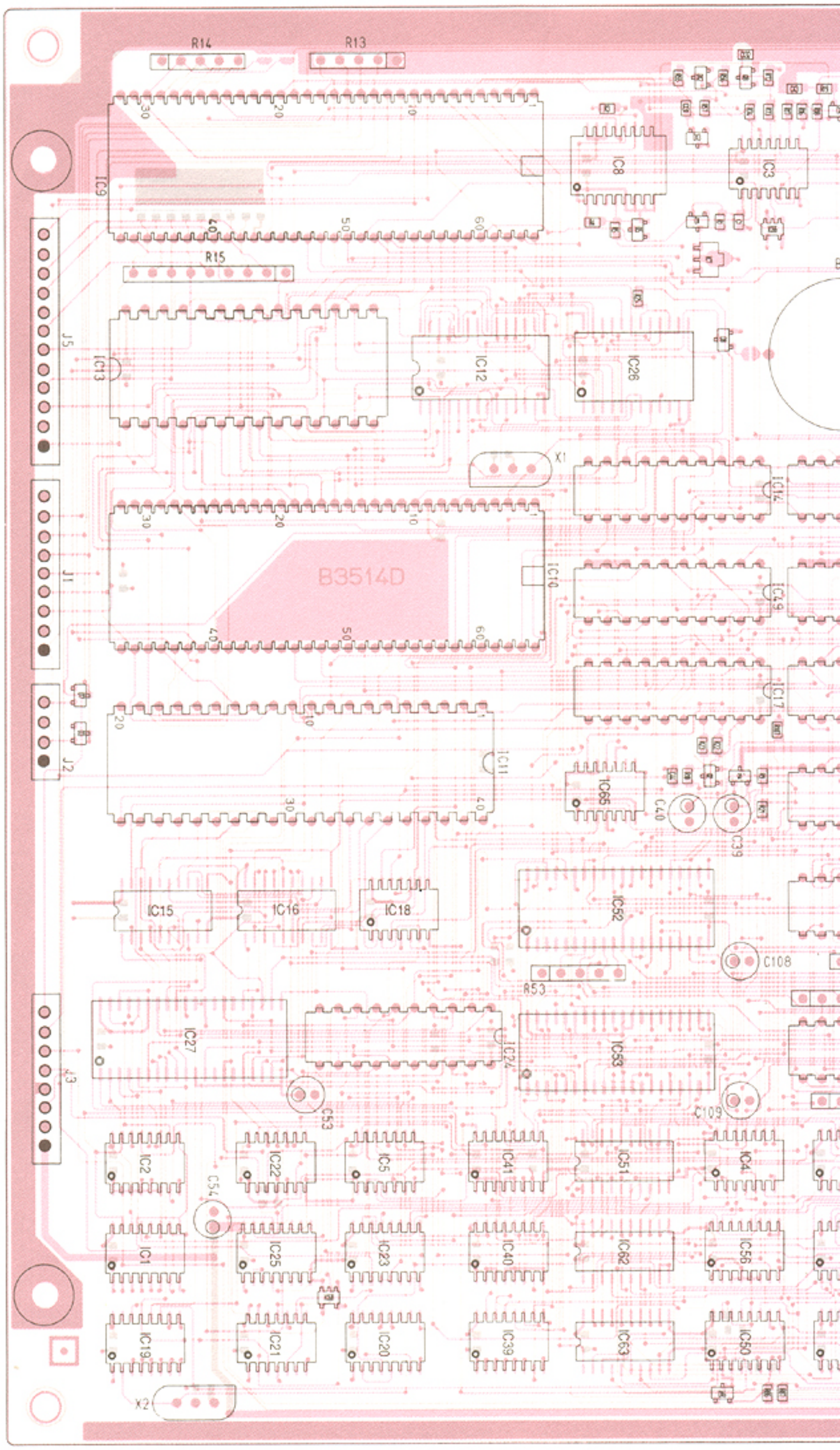
RN1202
Q1



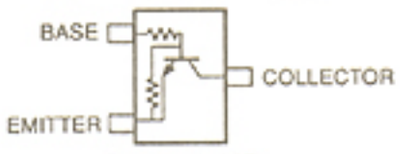
8-2 MAIN UNIT

• MAIN UNIT (TOP VIEW)



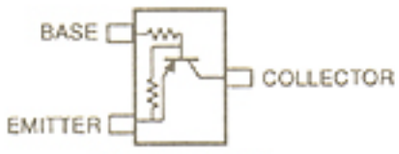


RN1404
Q3 ~ Q5, Q7 ~ Q9



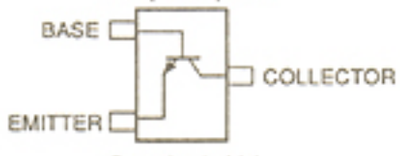
Symbol: XD

RN2402
Q10



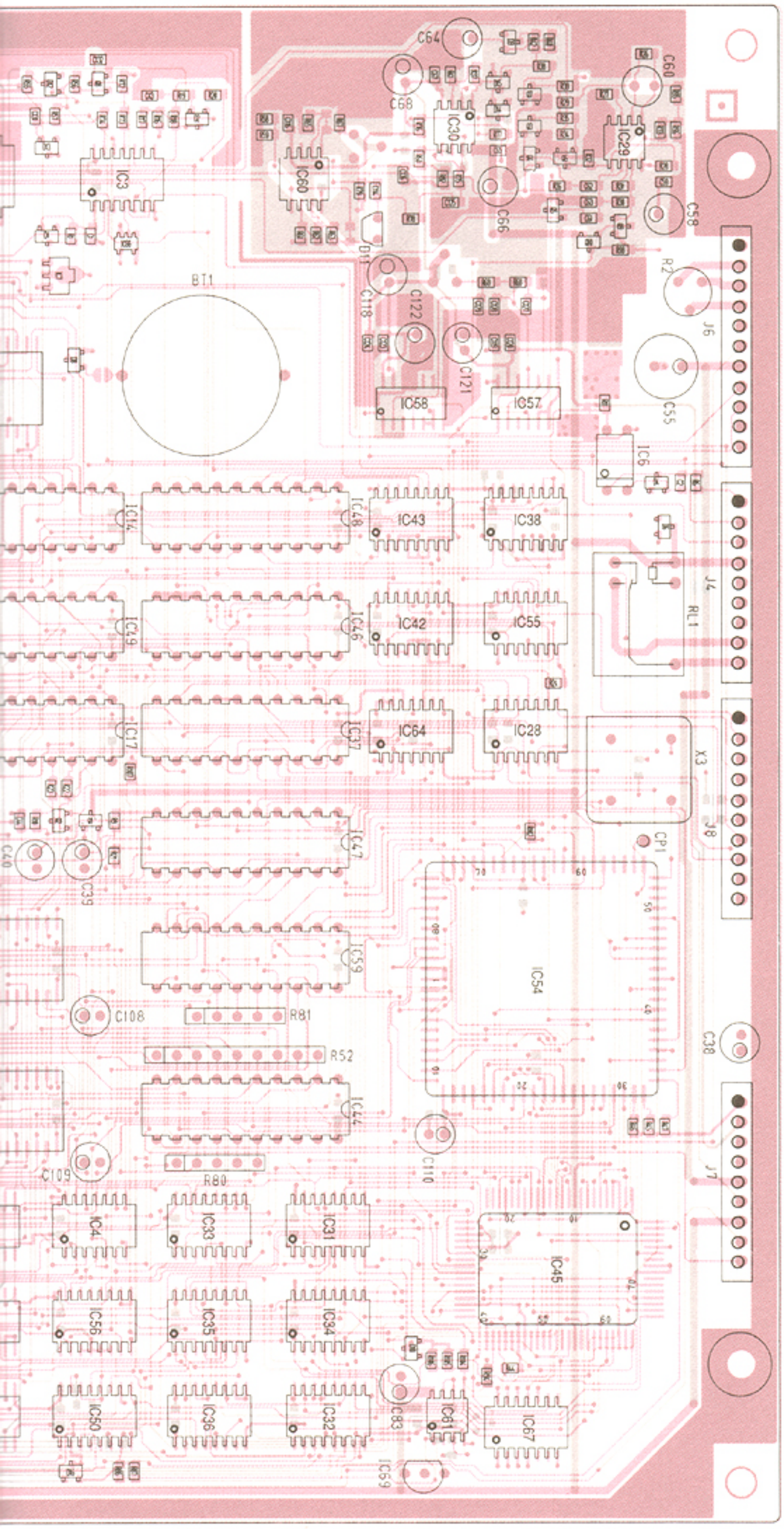
Symbol: YB

2SC2712-Y
Q1, Q2, Q6

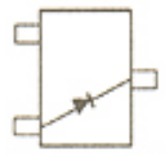


Symbol: LY

The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

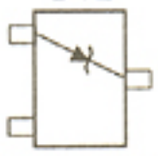


1SS196
D1~D10, D13 ~ D16

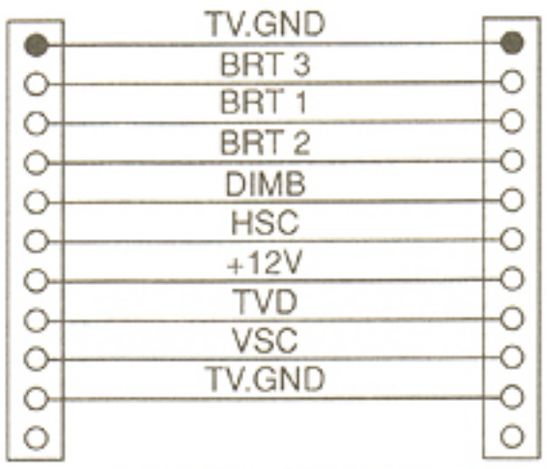


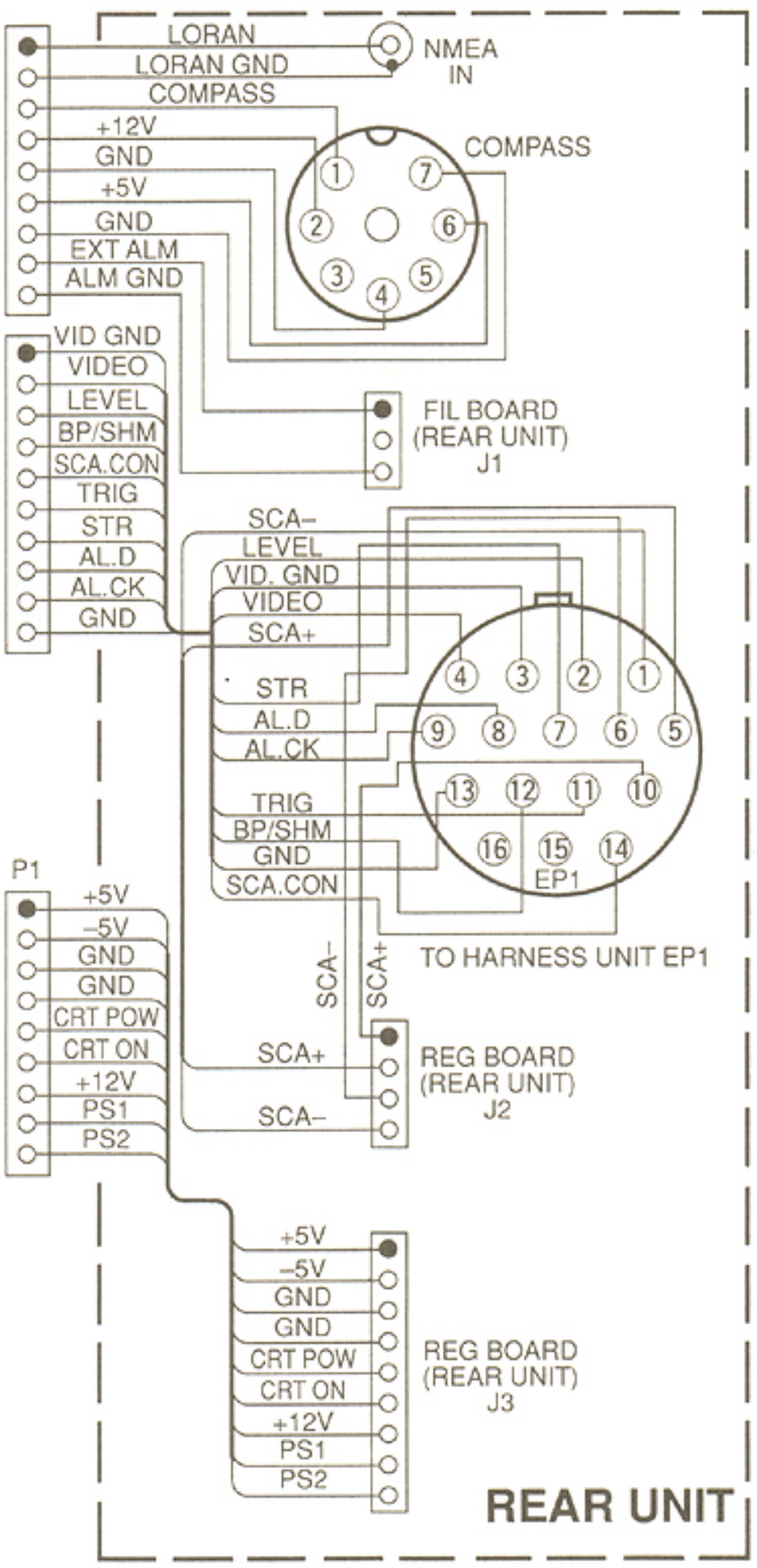
Symbol: G3

RD6.2M-T2B2
D12

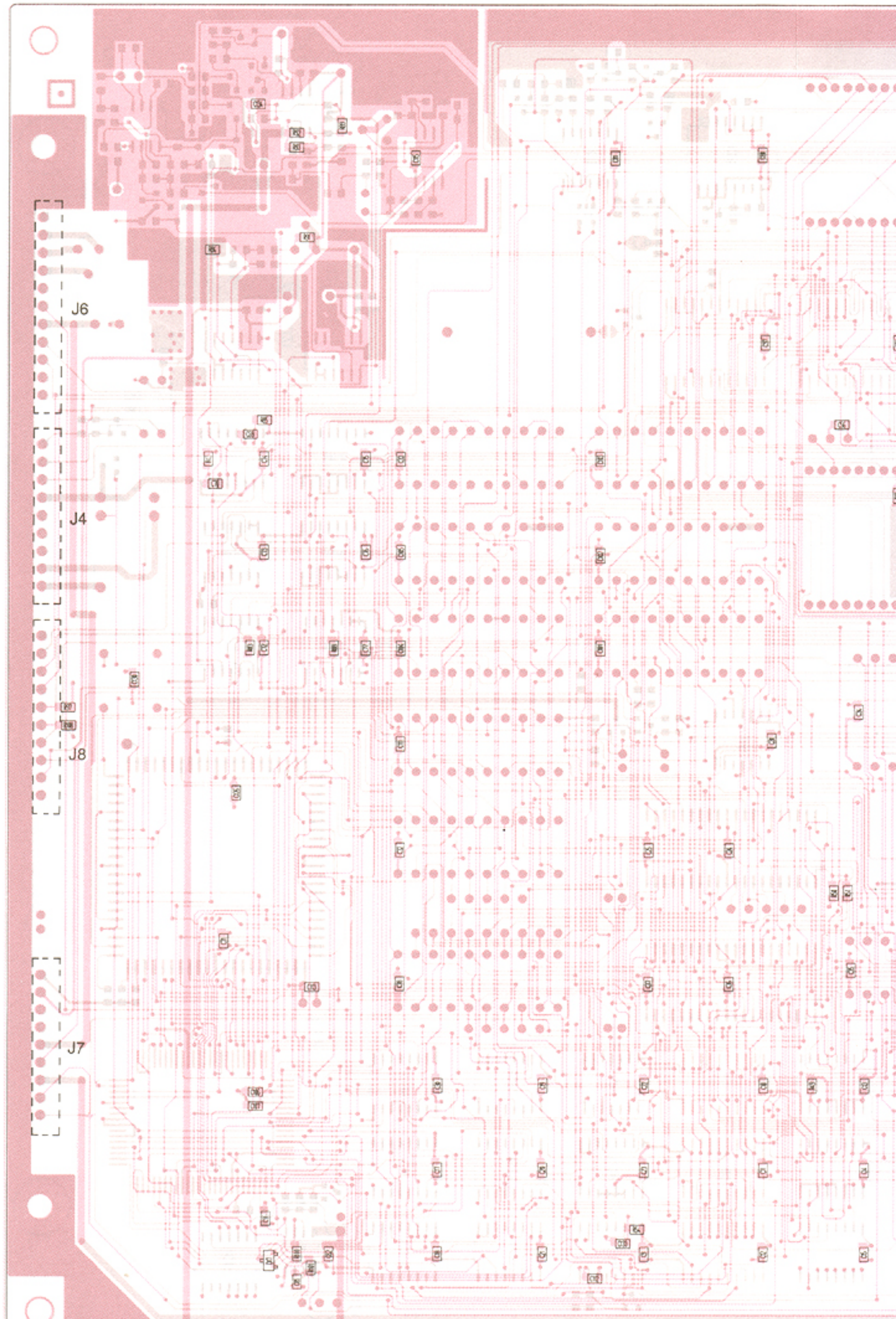


Symbol: 622

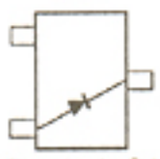




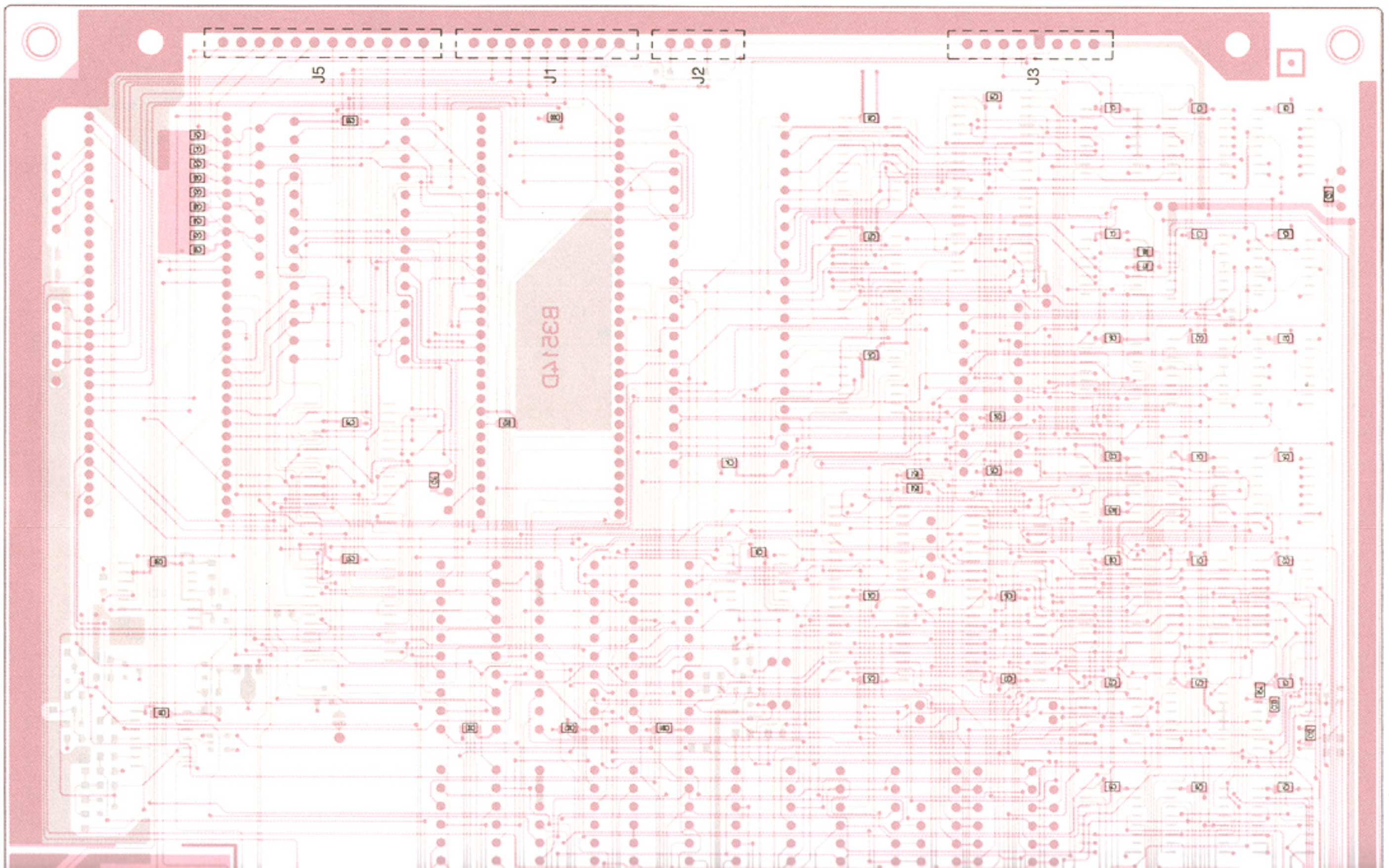
• MAIN UNIT (BOTTOM VIEW)



1SS196
D17



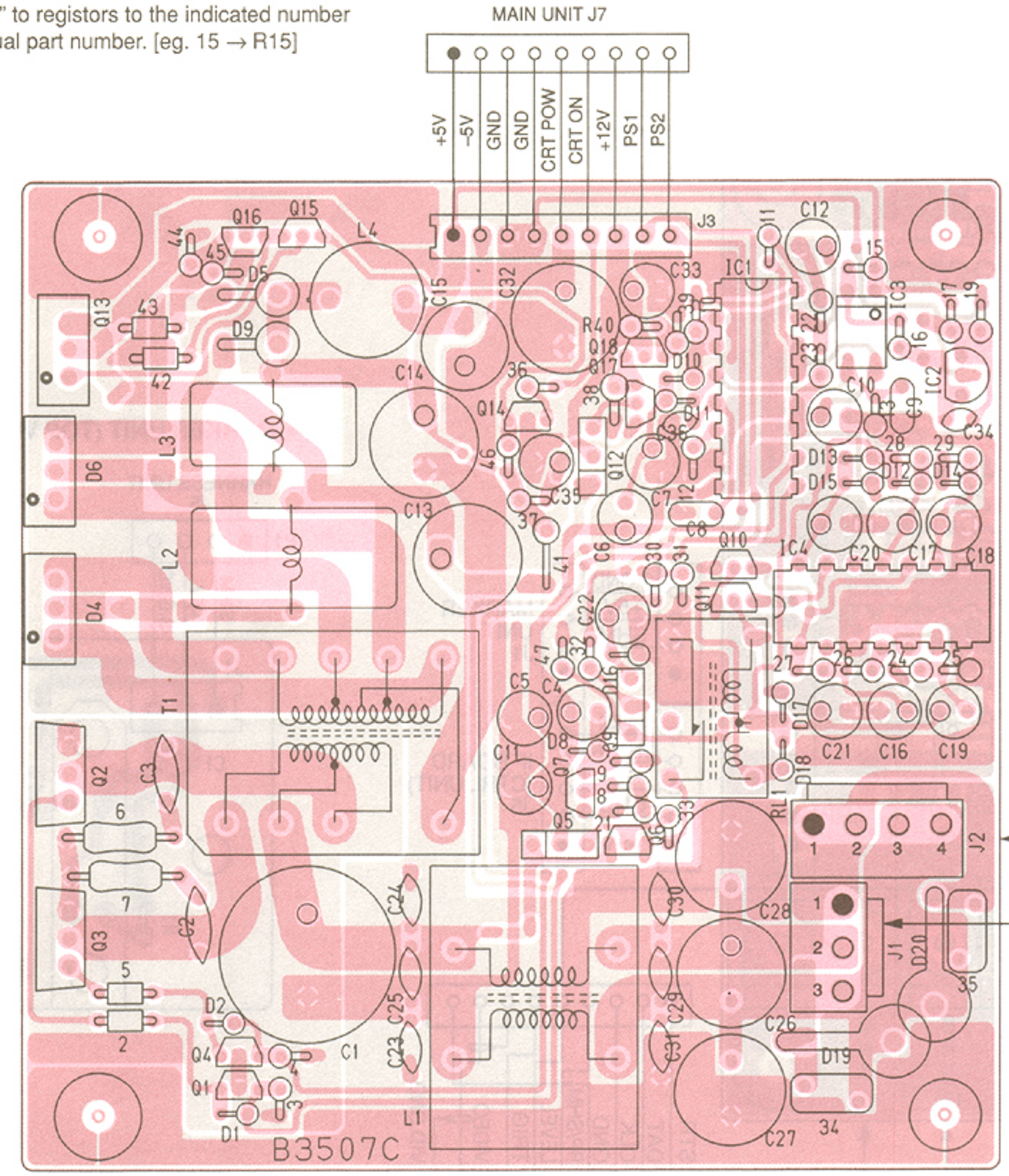
Symbol: G3


J5
J1
J2
J3
B32KD

8-3 REAR UNIT (REG BOARD AND FIL BOARD)

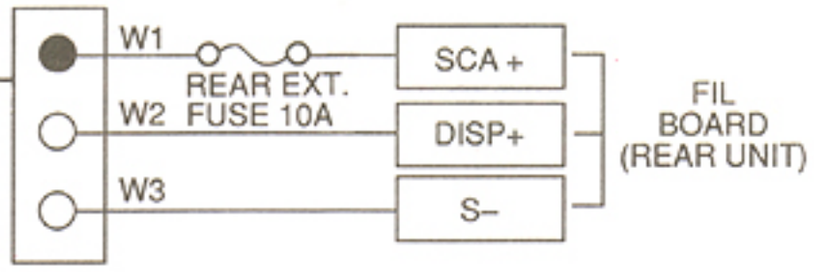
• REG BOARD (TOP VIEW)

NOTE: Add "R" to registors to the indicated number for actual part number. [eg. 15 → R15]

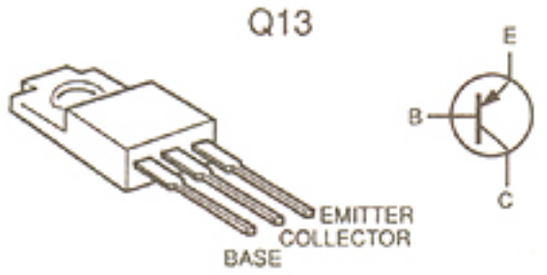


• FIL BOARD (TOP VIEW)

REAR UNIT
EP1

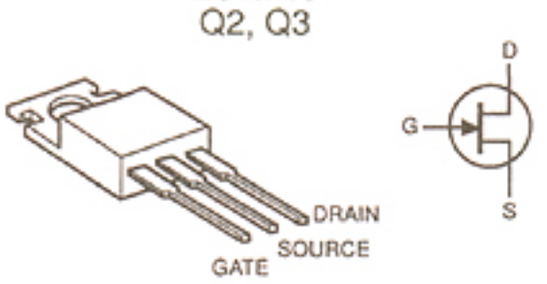


2SB1015
Q13



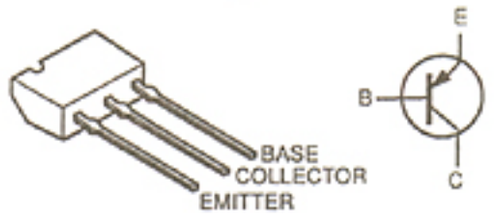
2SB909M Q
Q12

2SK740
Q2, Q3

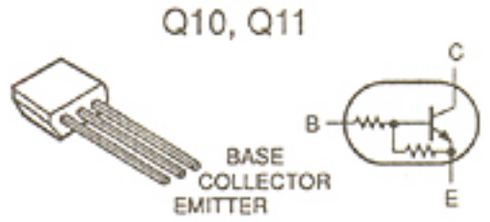


2SC2458-Y
Q7, Q15 ~ Q18

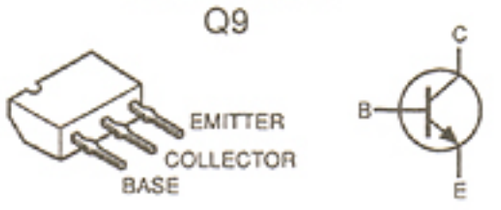
2SA1428-Y
Q5



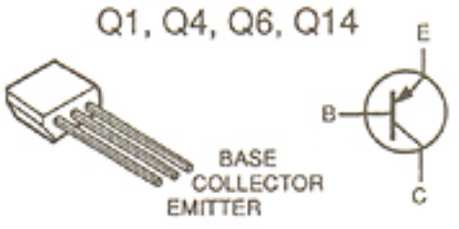
RN1204
Q10, Q11

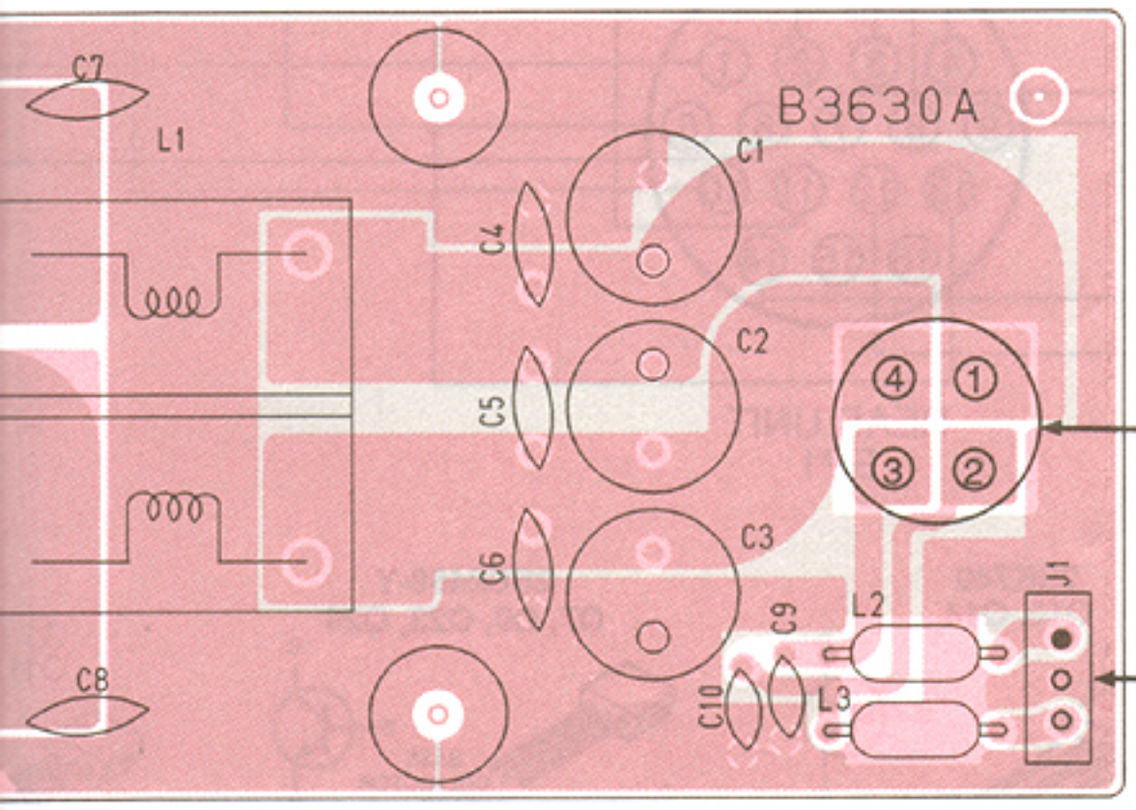


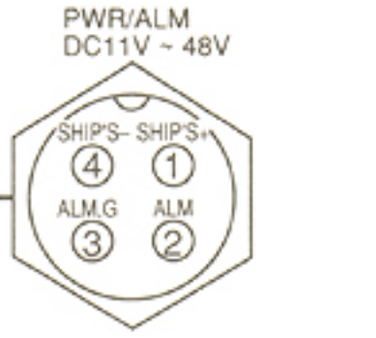
2SD1225M R
Q9

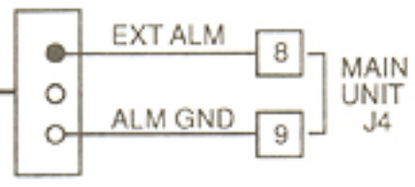


2SA1048-Y
Q1, Q4, Q6, Q14



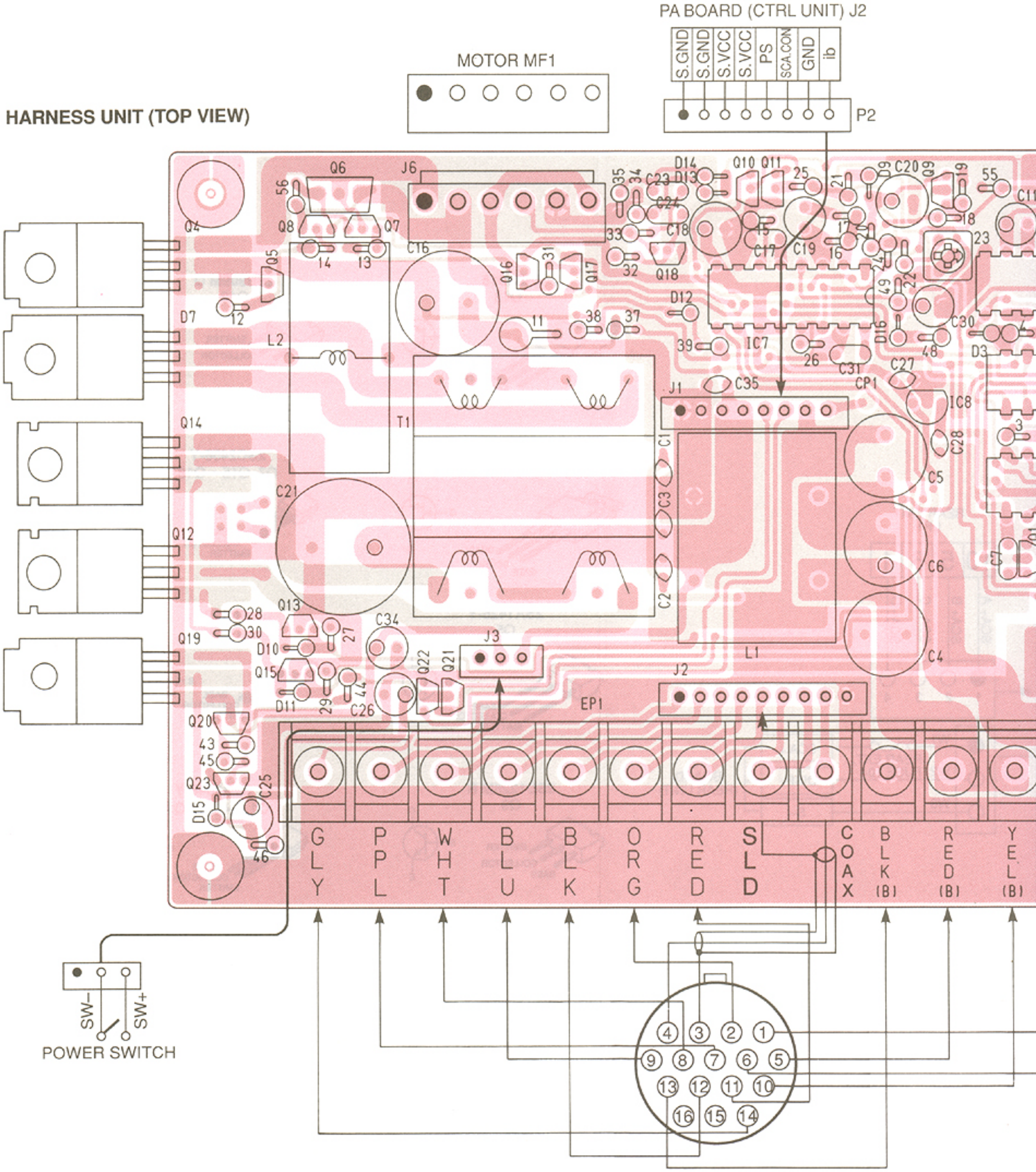




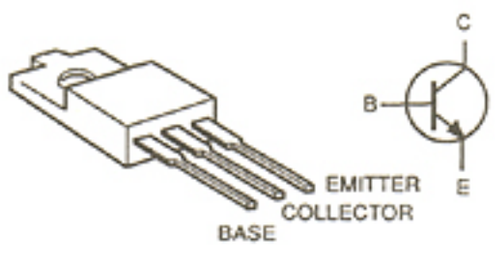


8-4 HARNESS UNIT AND MARKER UNIT

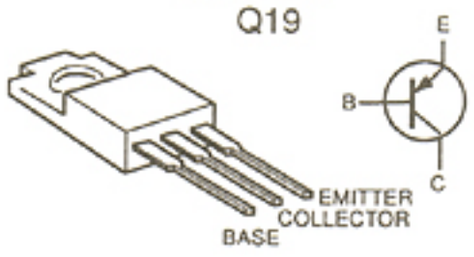
• HARNESS UNIT (TOP VIEW)



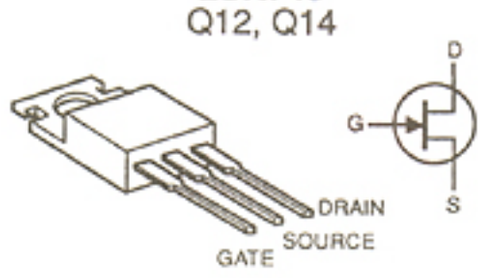
2SD1406Y
Q4, Q6



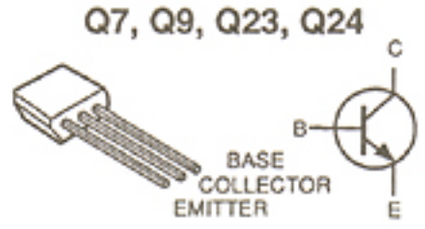
2SB1015
Q19

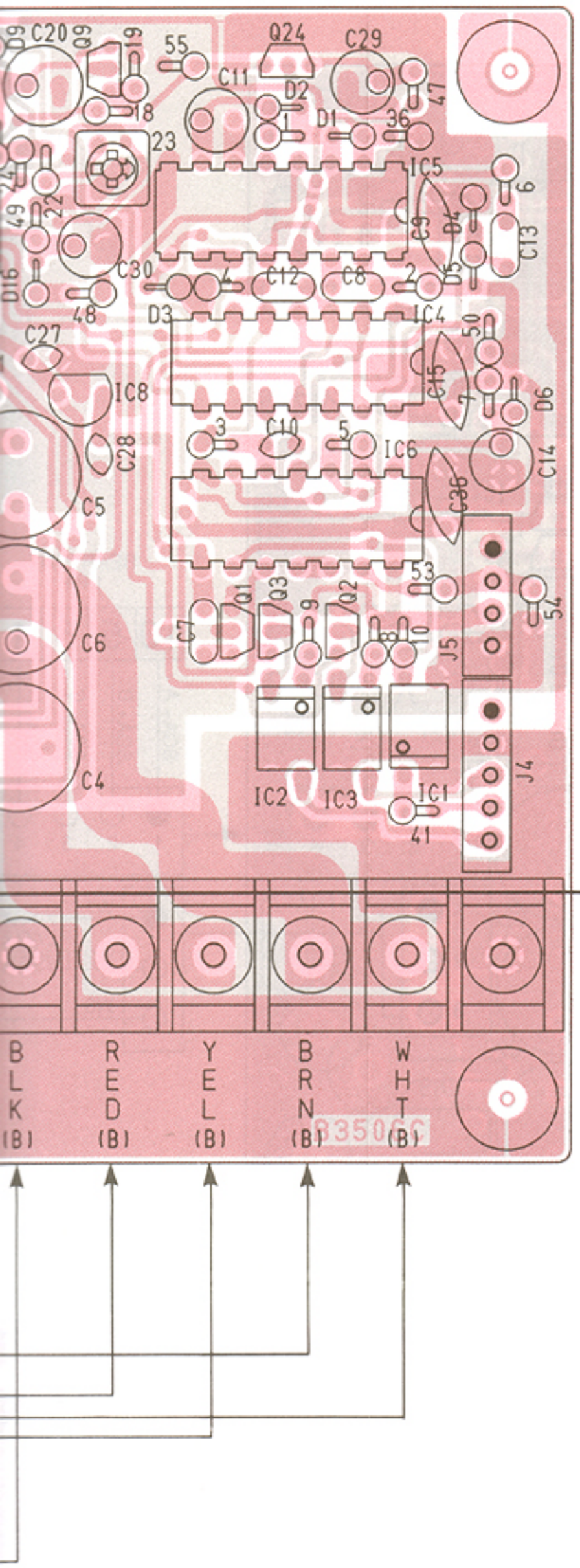


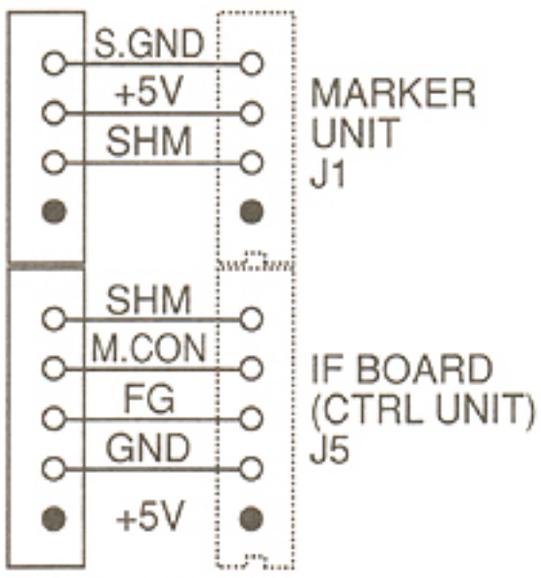
2SK740
Q12, Q14

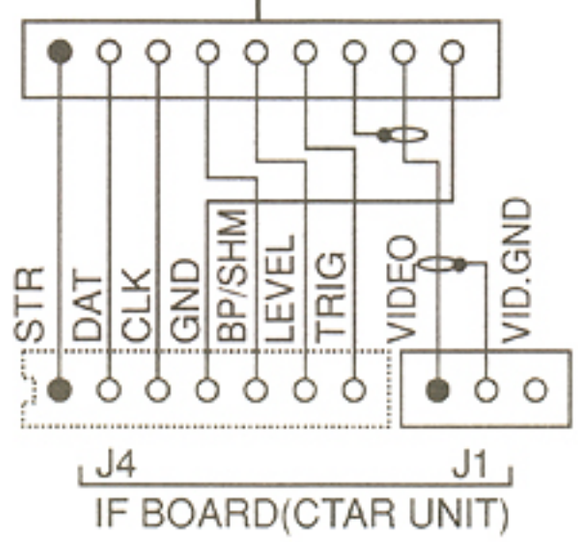


2SC2458-Y
Q7, Q9, Q23, Q24

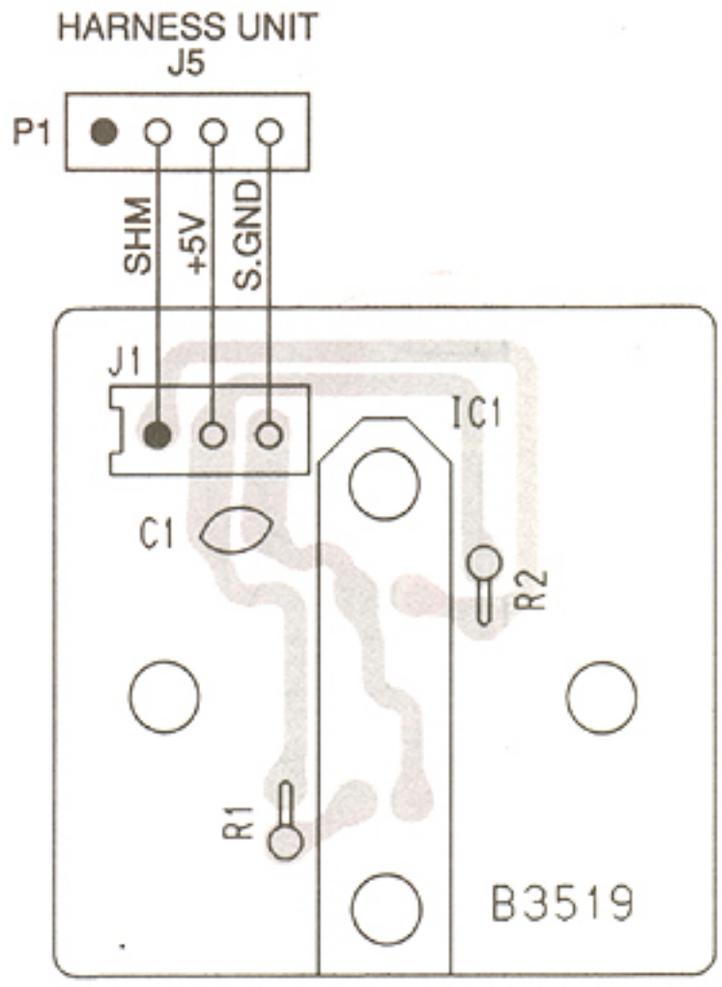




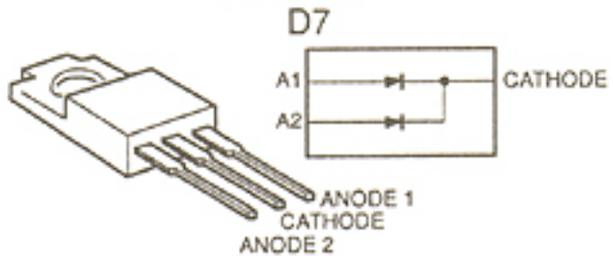




• **MARKER UNIT (TOP VIEW)**

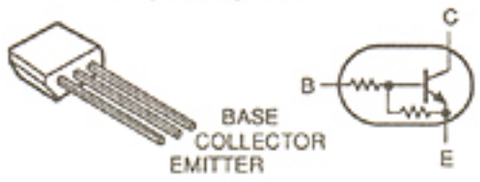


MA693
D7



458-Y
Q23, Q24

RN1202
Q1 ~ Q3, Q8, Q10,
Q11, Q17, Q22

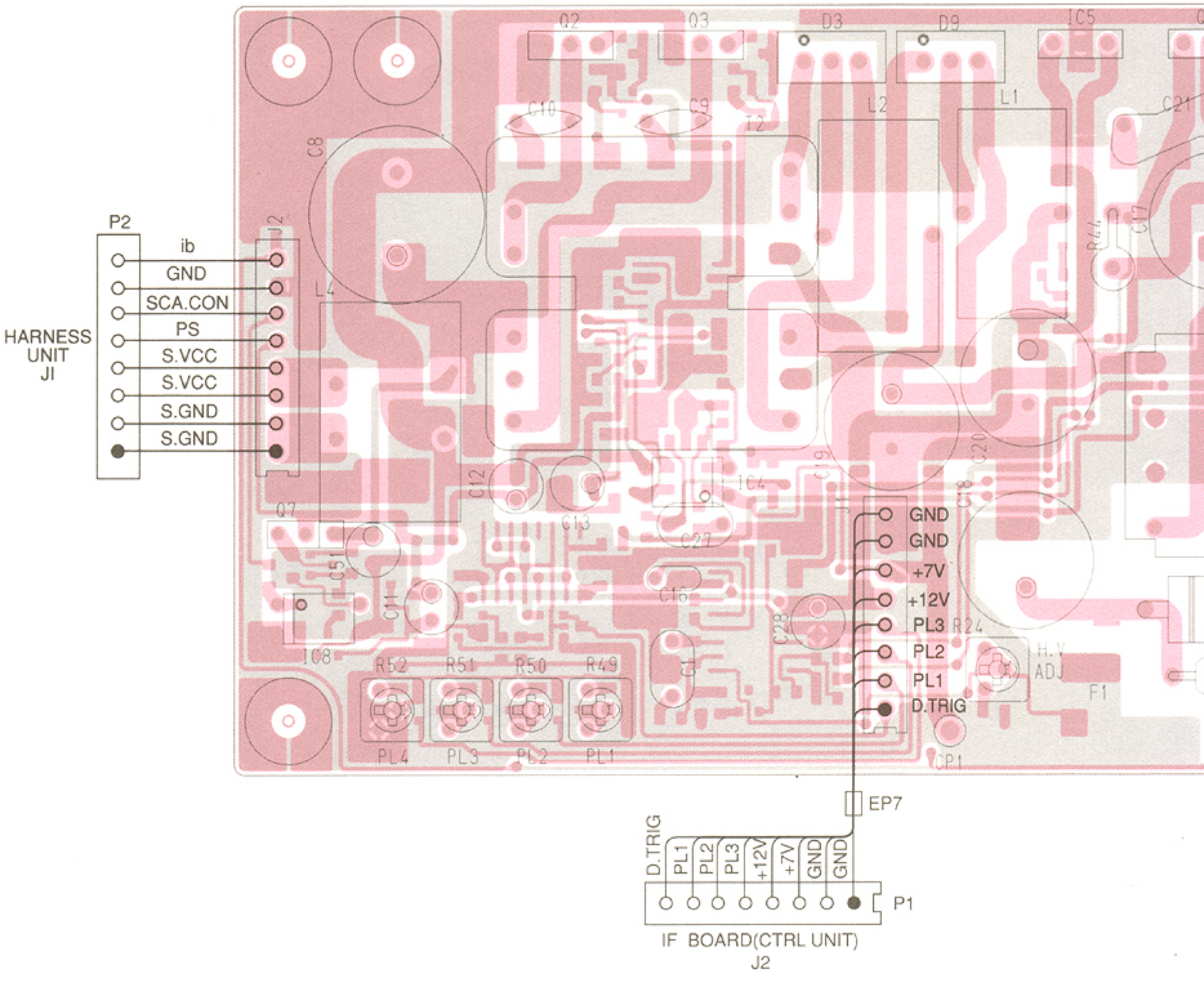


RN1204
Q18, Q21

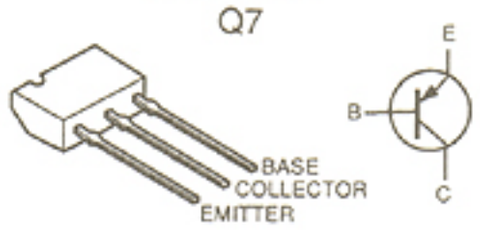
2SA1048-Y
Q5, Q13, Q15,
Q16, Q20

8-5 CTRL UNIT (PA BOARD AND IF BOARD)

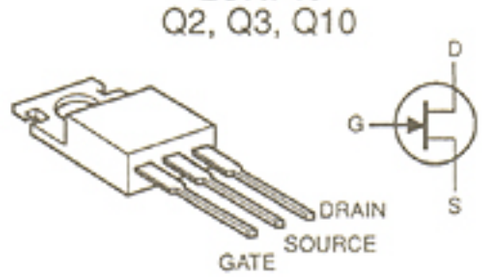
- **PA BOARD (TOP VIEW)**



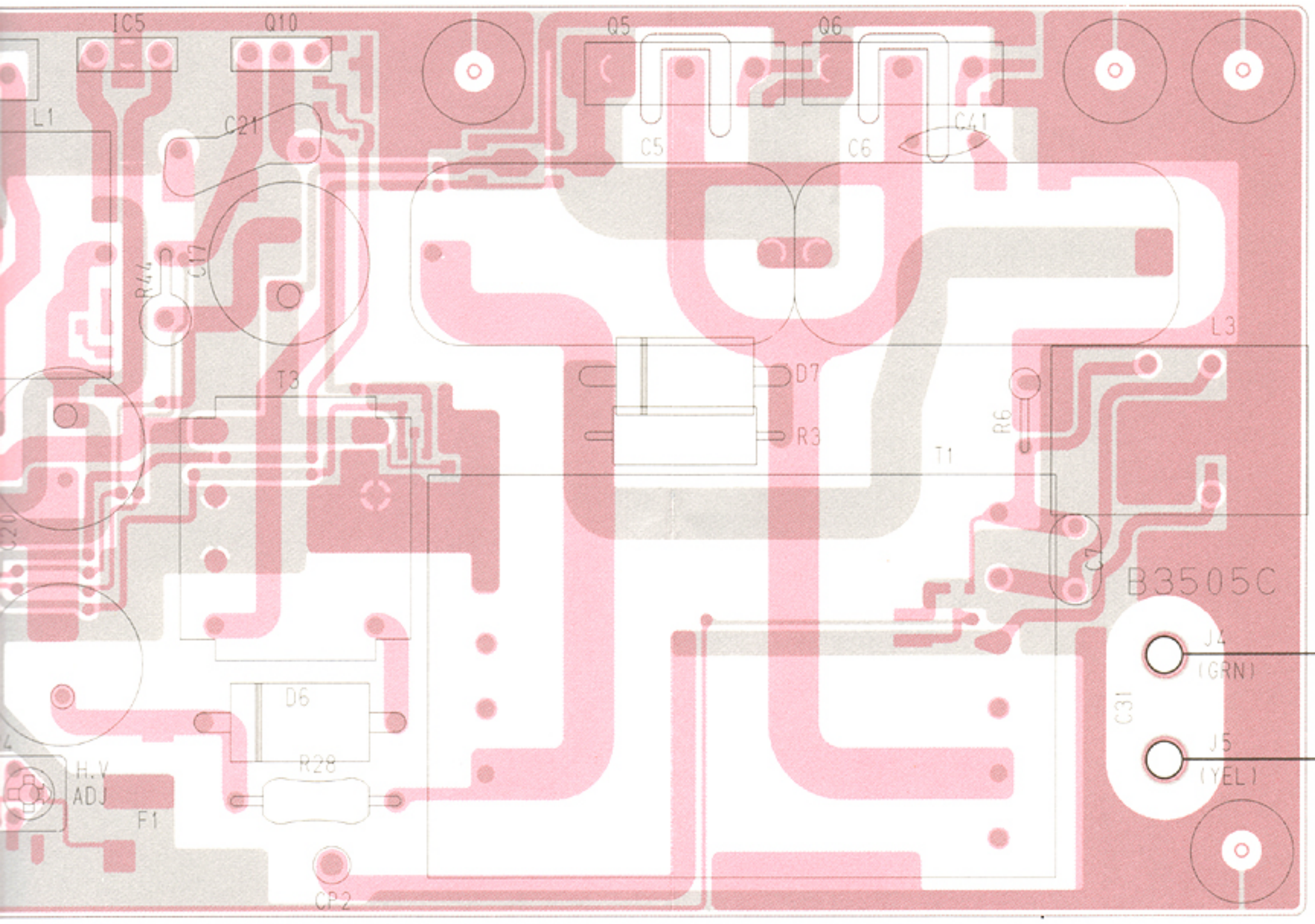
2SA1428-Y
Q7



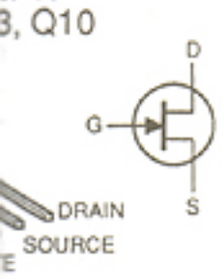
2SK740
Q2, Q3, Q10



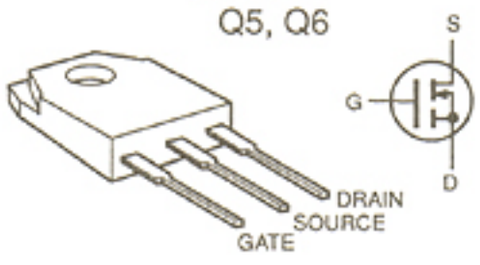
The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.



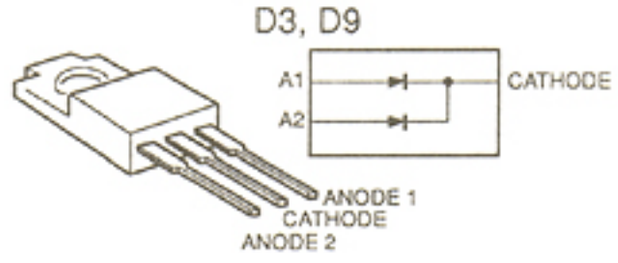
K740
Q3, Q10



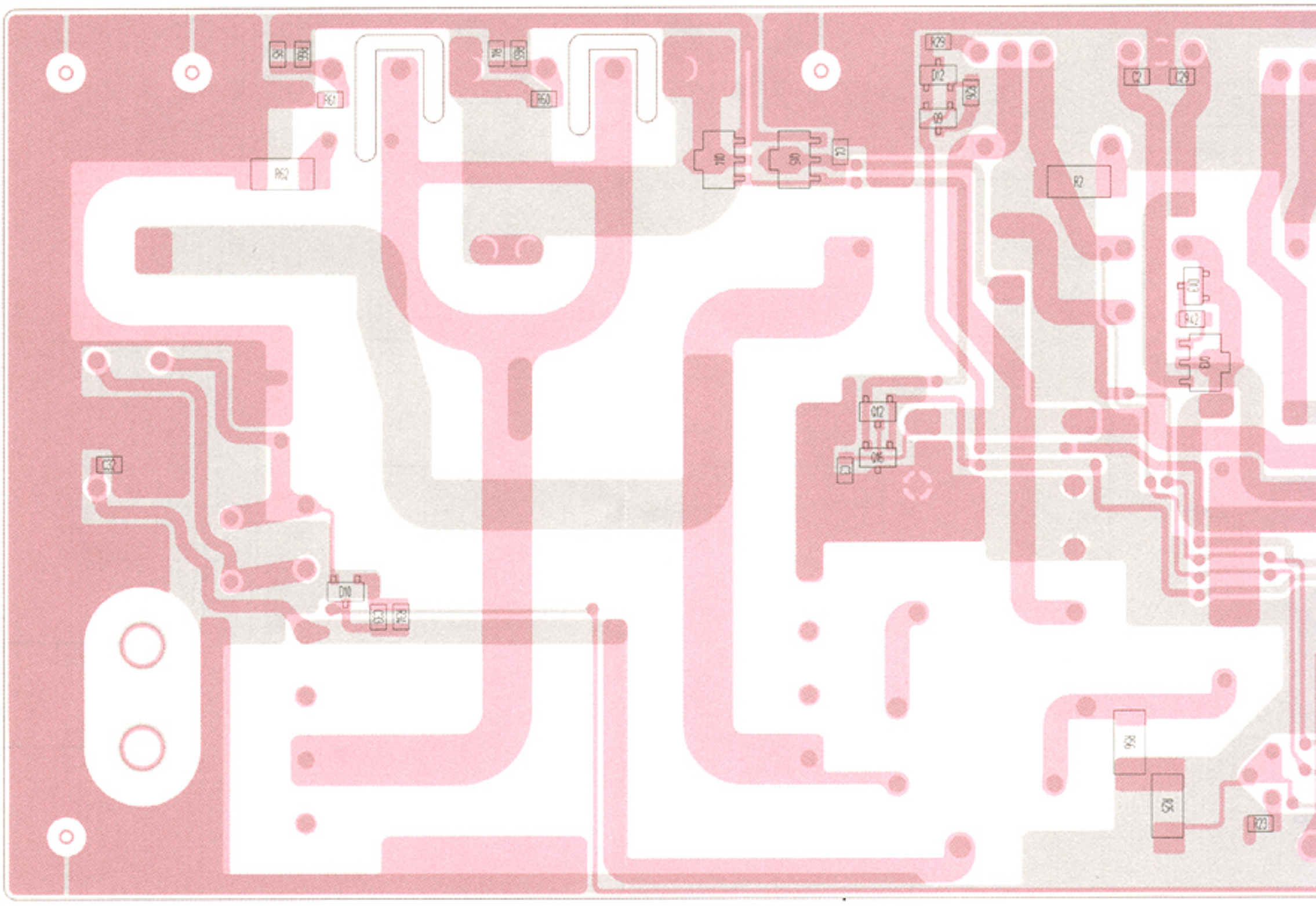
2SK1449
Q5, Q6



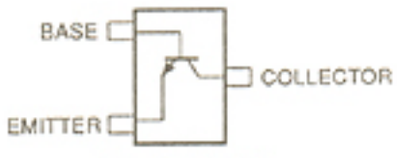
MA693
D3, D9



• **PA BOARD (BOTTOM VIEW)**

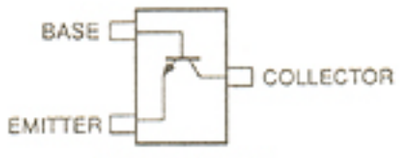


2SC2712-Y
Q8



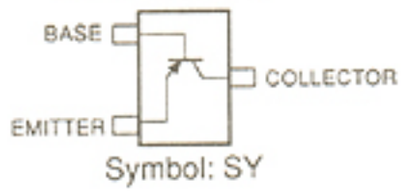
Symbol: LY

2SC2859-Y
Q12



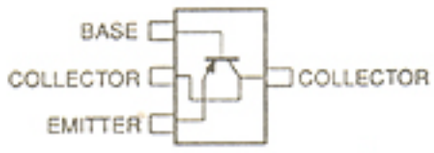
Symbol: WY

2SA1162-Y
Q1, Q4, Q9, Q11



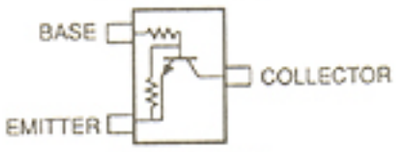
Symbol: SY

2SB798-T2
Q13, Q14



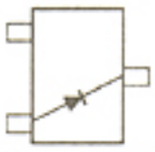
Symbol: DK

RN1402
Q17 ~ Q19



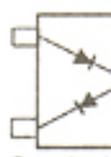
Symbol: XB

1SS196
D1, D2, D10, D12



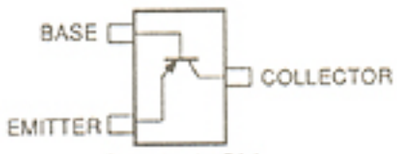
Symbol: G3

1SS2
D8, D



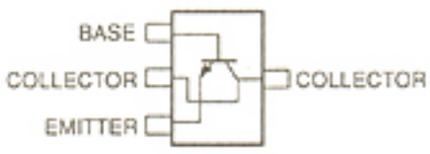
Symbol

2SA1162-Y
Q1, Q4, Q9, Q11



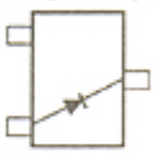
Symbol: SY

2SD999-T2
Q15

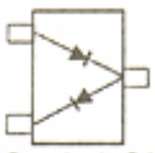


Symbol: CK

1SS196
D1, D2, D10, D12


Symbol: G3

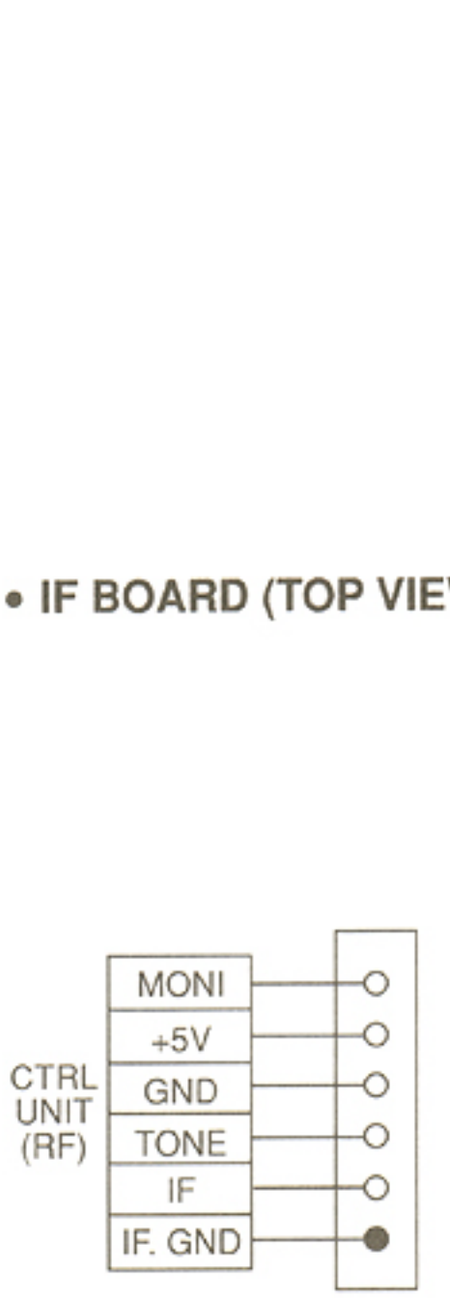
1SS226
D8, D11

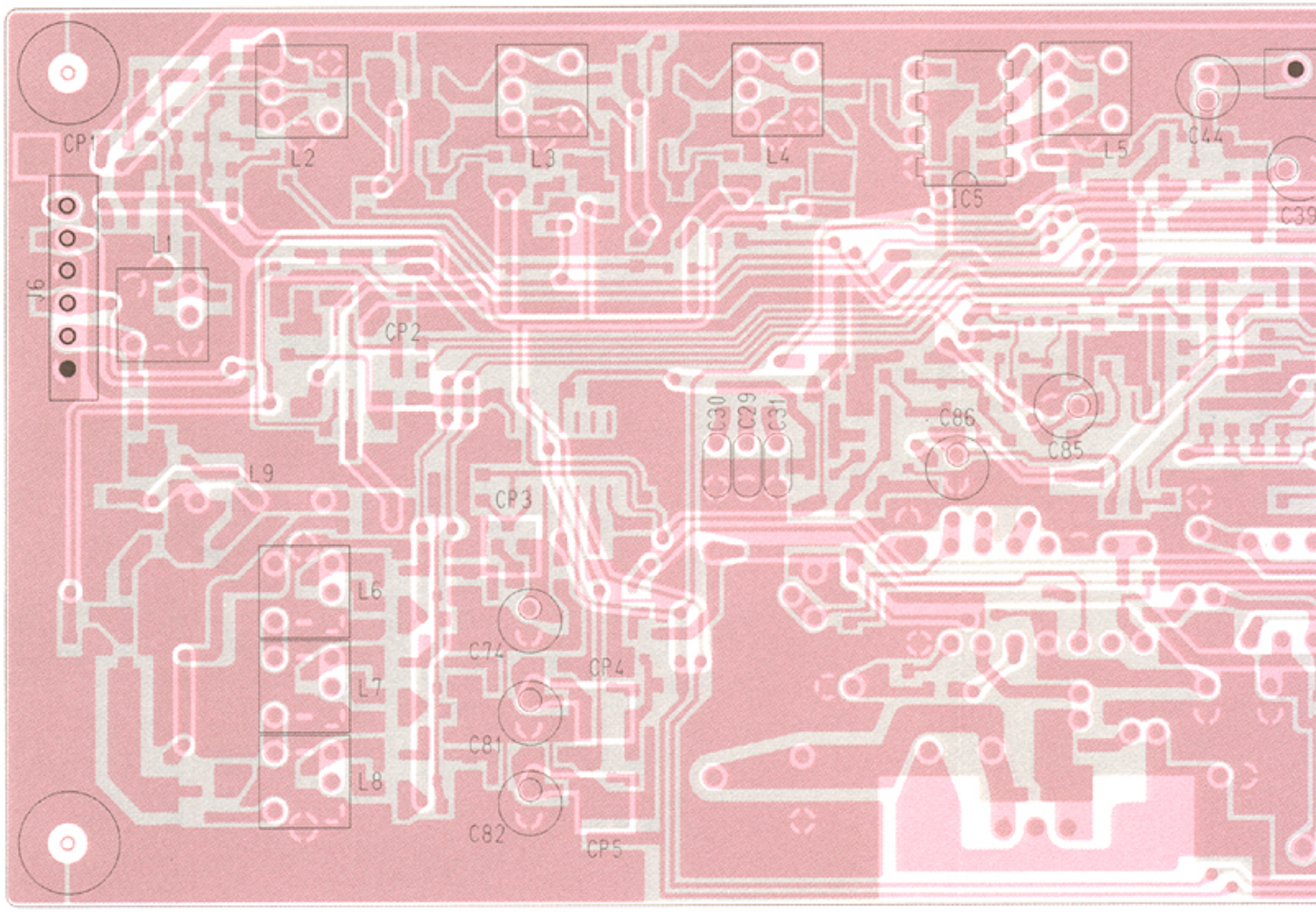

Symbol: C3

RD16M
D4, D13

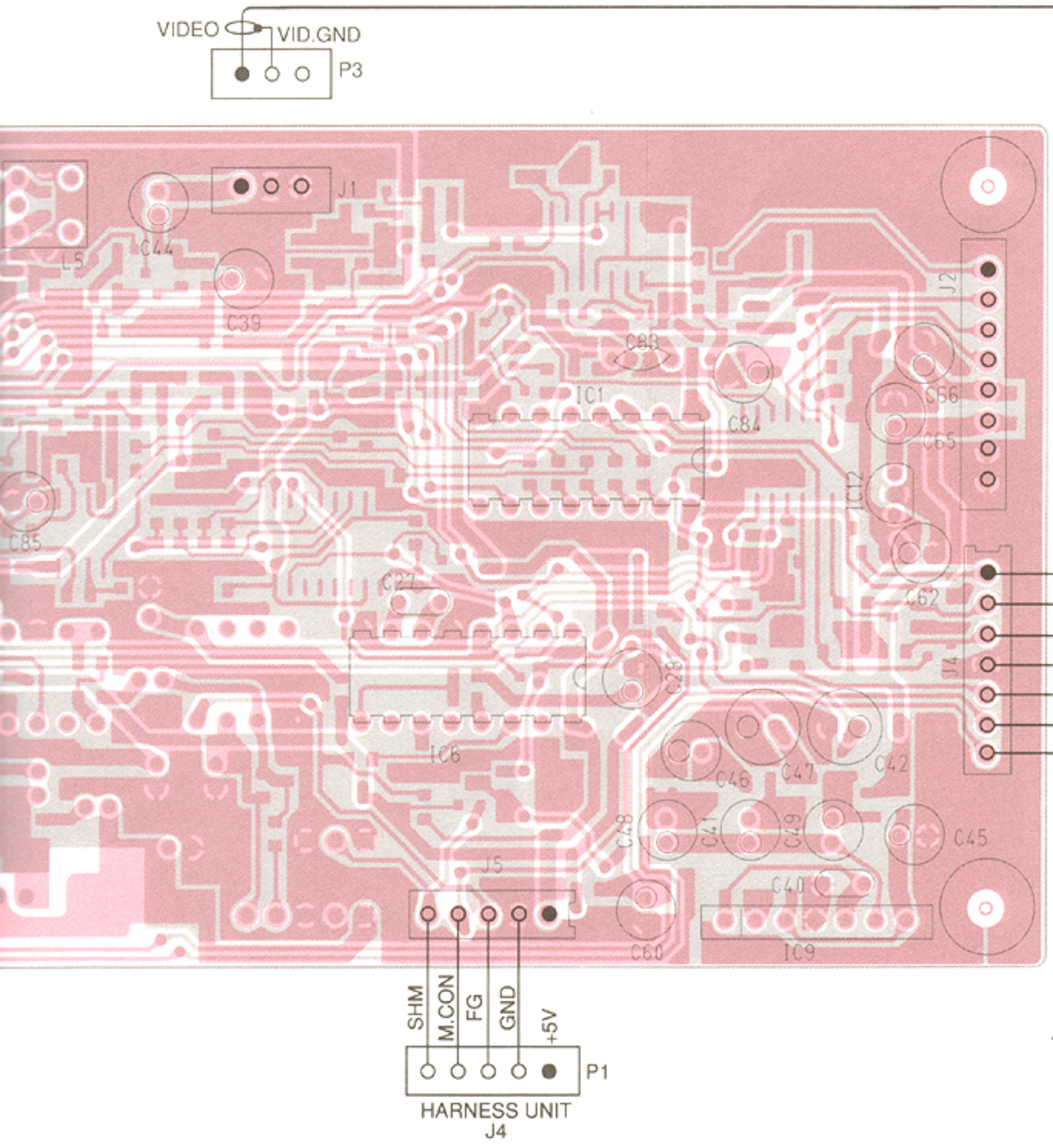

Symbol:162

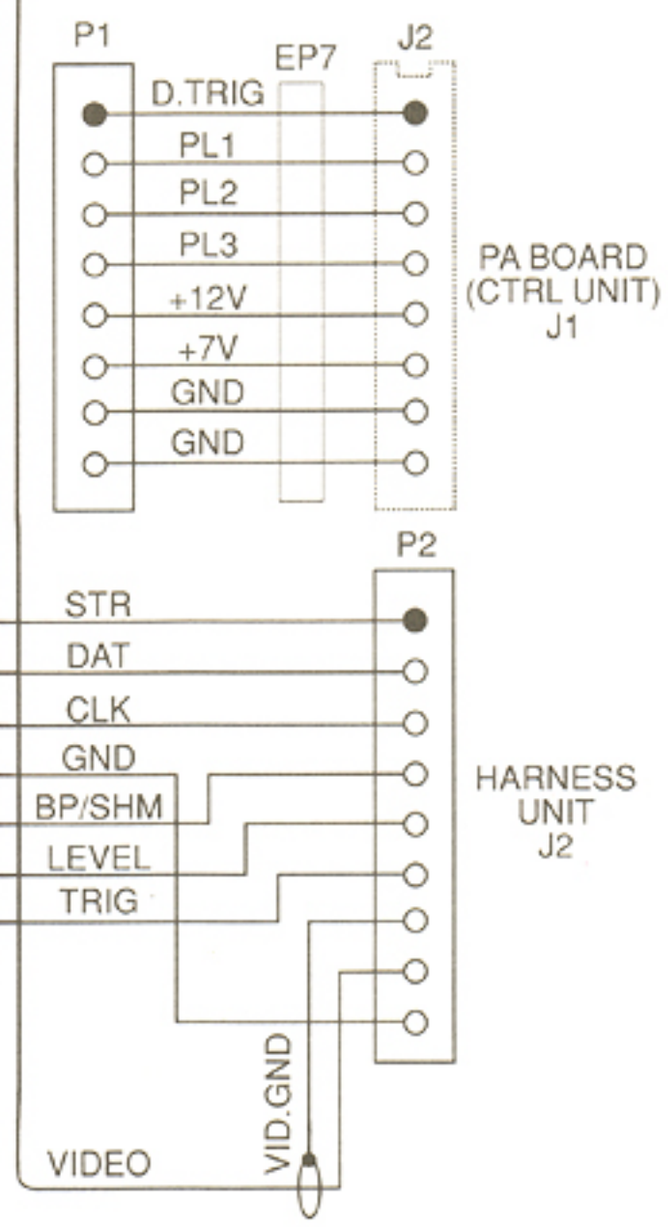
• IF BOARD (TOP VIEW)



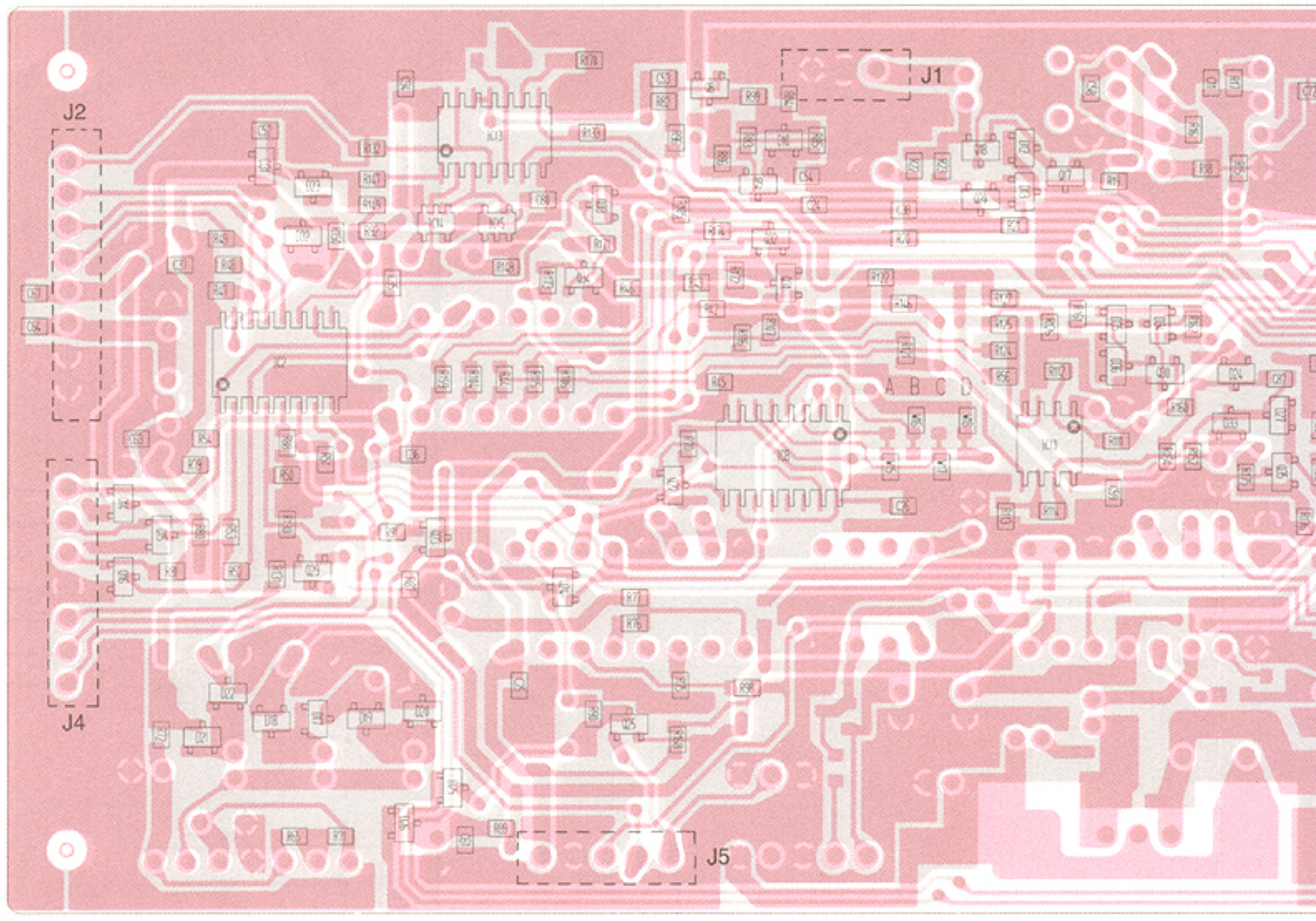


The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

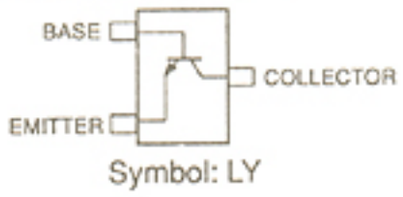




• IF BOARD (BOTTOM VIEW)

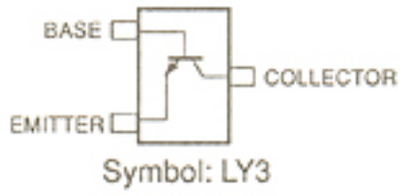


2SC2712-Y
Q2 ~ Q6, Q8, Q9, Q20, Q23, Q26, Q29, Q30



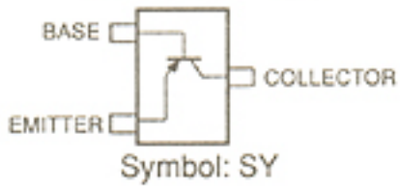
Symbol: LY

2SC3772-3-TA
Q1, Q7



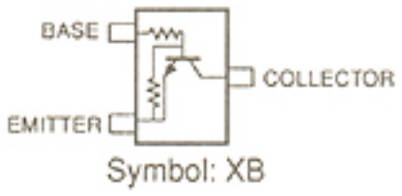
Symbol: LY3

2SA1162-Y
Q17, Q18, Q35



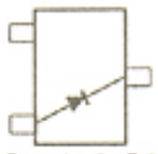
Symbol: SY

RN1402
Q12 ~ Q16, Q22, Q24, Q27, Q28, Q31 ~ Q34



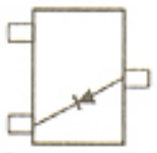
Symbol: XB

1SS196
D4~D13, D15 ~ D20, D22 ~ D25, D27, D31 ~ D33, D36



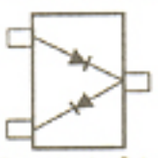
Symbol: G3

1SS190
D21

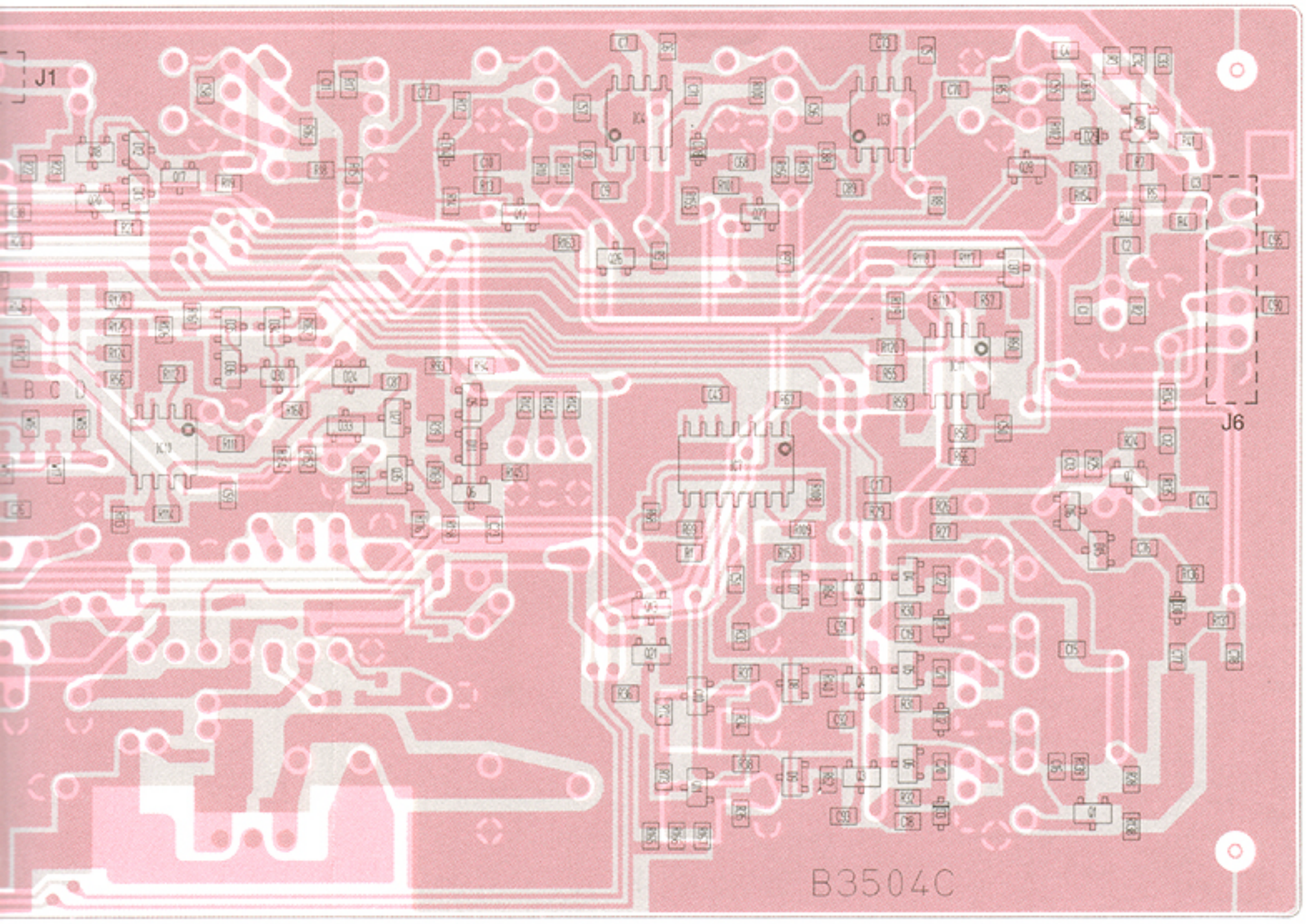


Symbol: E3

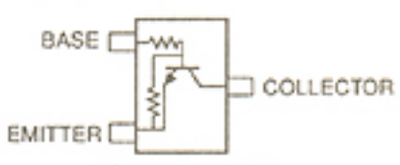
1SS226
D34, D35, D37



Symbol: C3

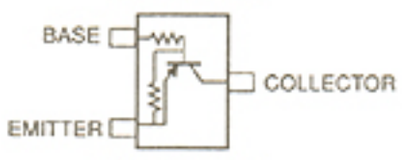


RN1402
Q12 ~ Q16, Q22, Q24, Q27, Q28, Q31 ~ Q34



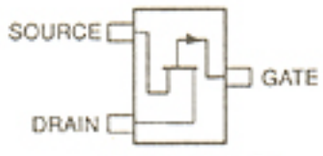
Symbol: XB

RN2402
Q21, Q25



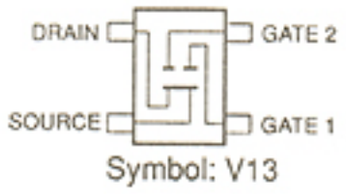
Symbol: YB

2SJ106-GR
Q10, Q11



Symbol: VG

3SK131K-T1
Q19

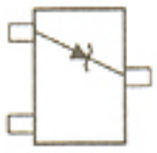


Symbol: V13

1SS226
D34, D35, D37

Symbol: C3

RD6.2M-T2B2
D26

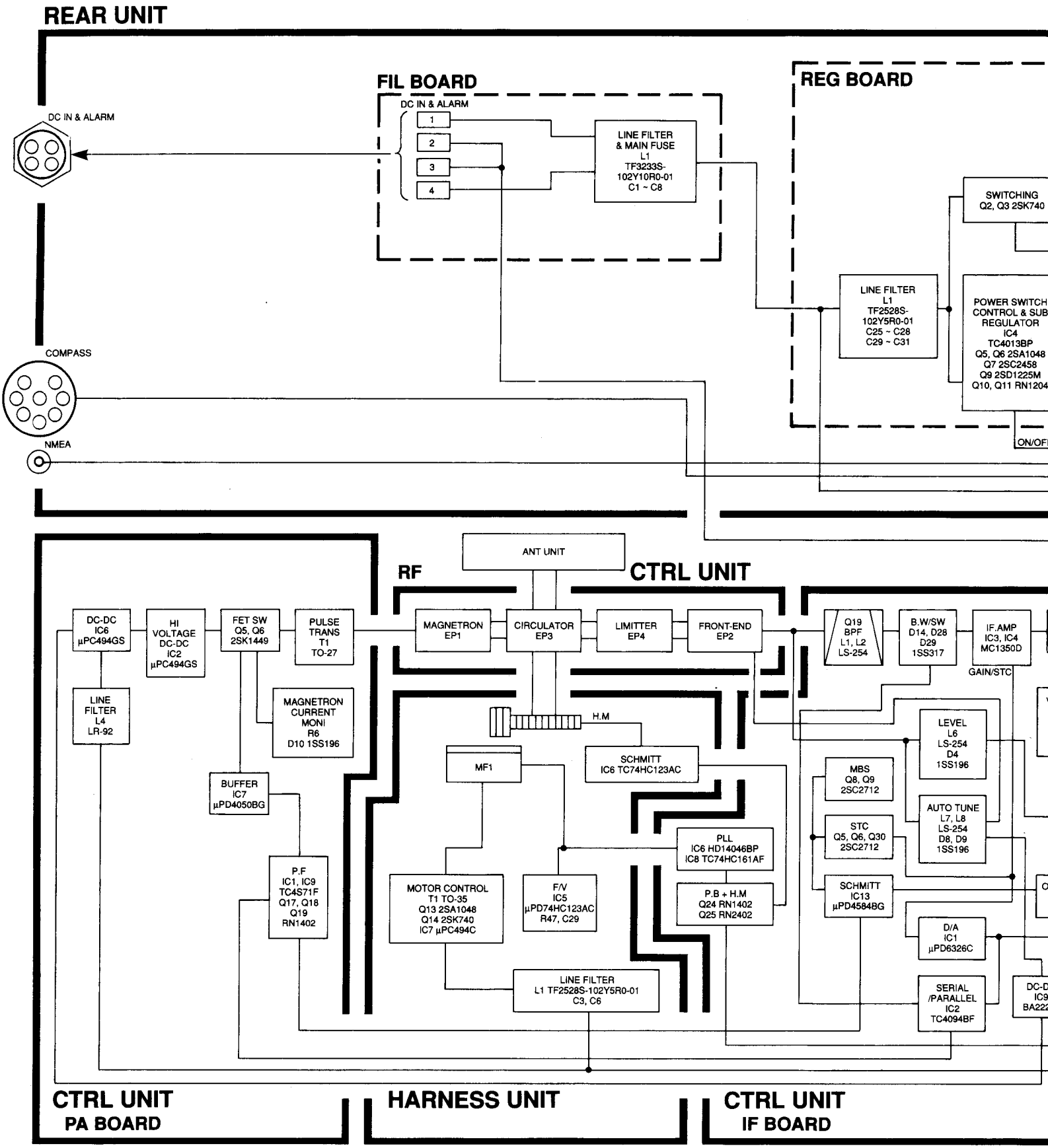


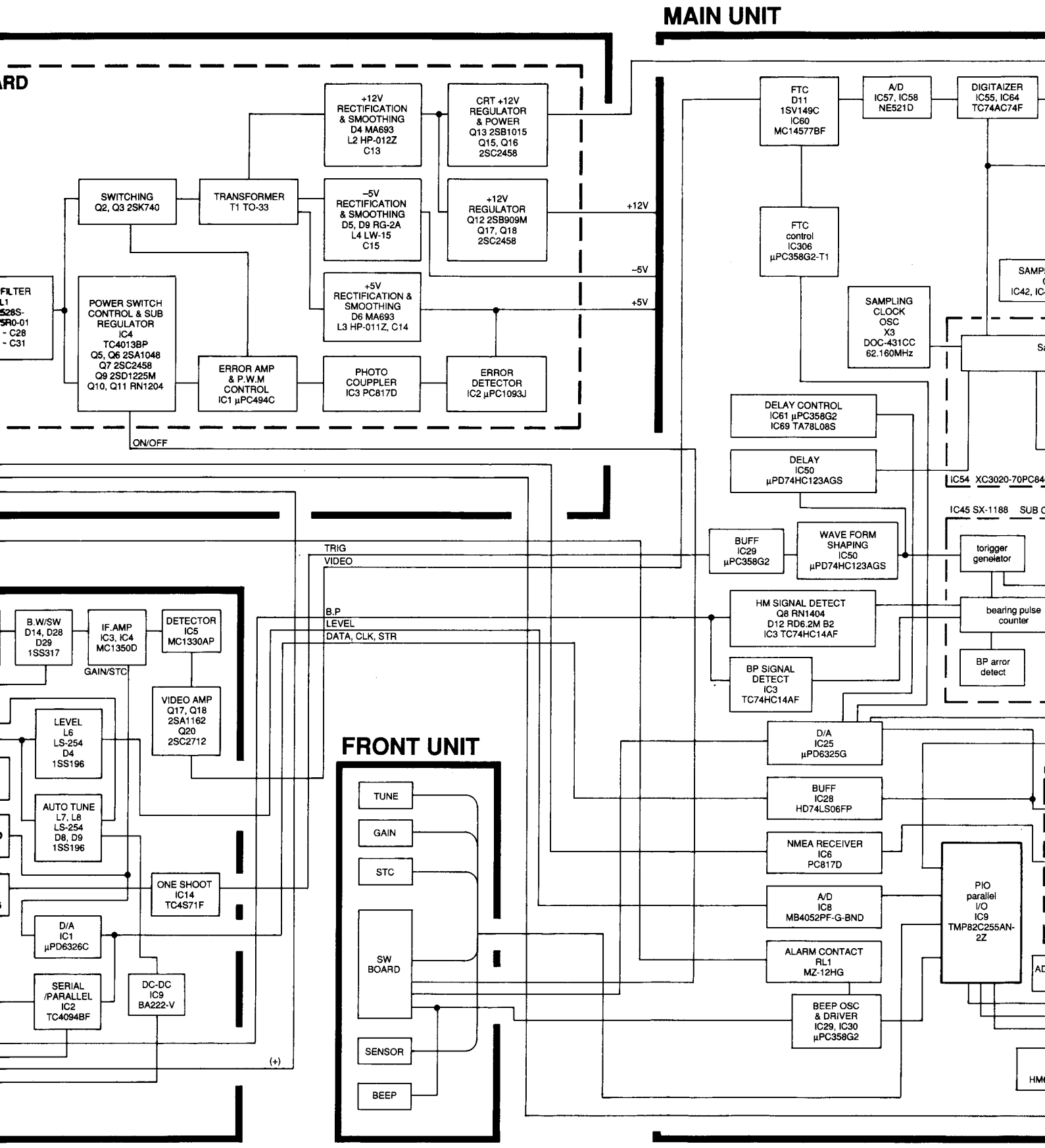
Symbol: 622

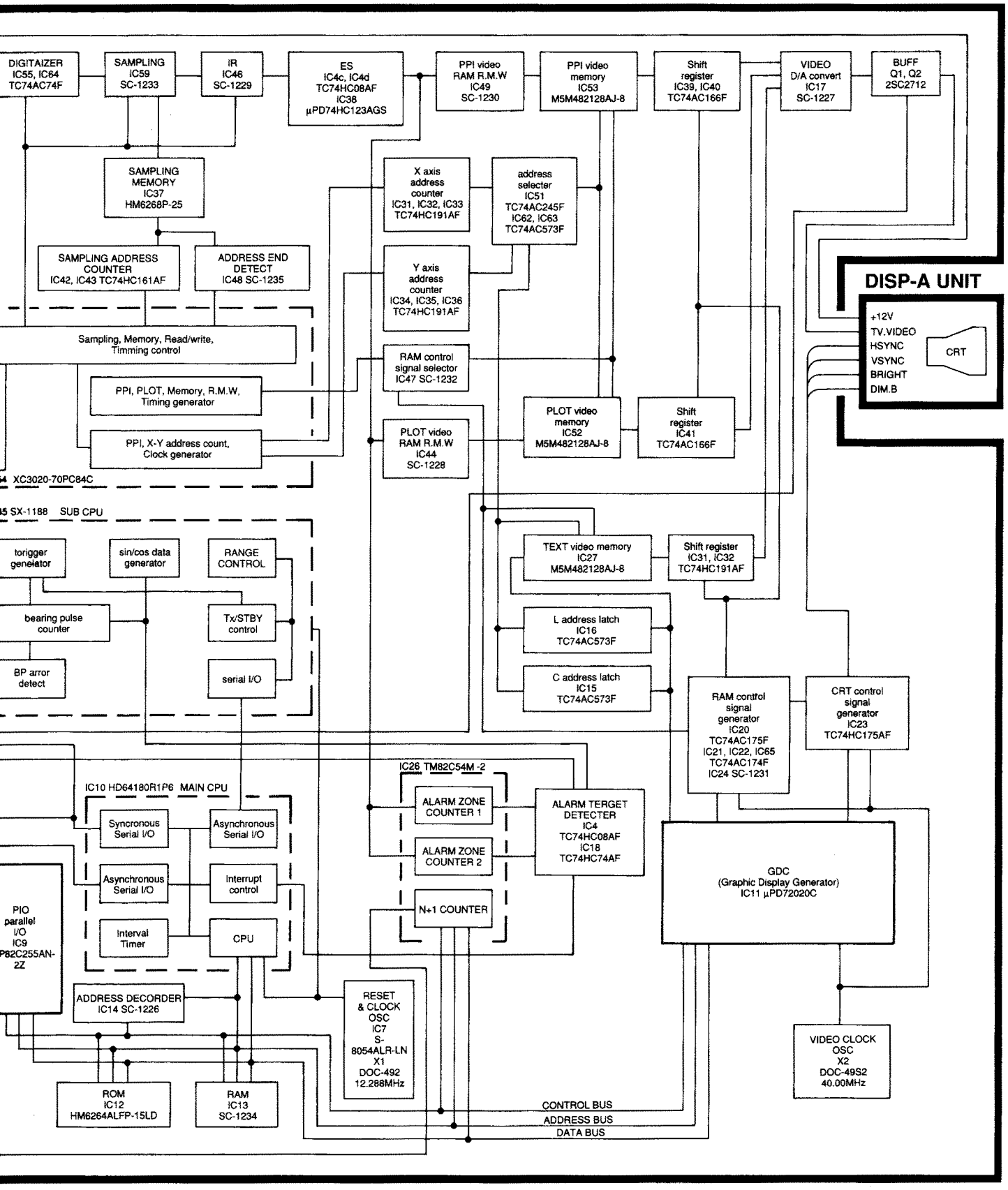
1SV166-T2B
D1 ~ D3

NO symbol,
yellow mark

SECTION 9 BLOCK DIAGRAM

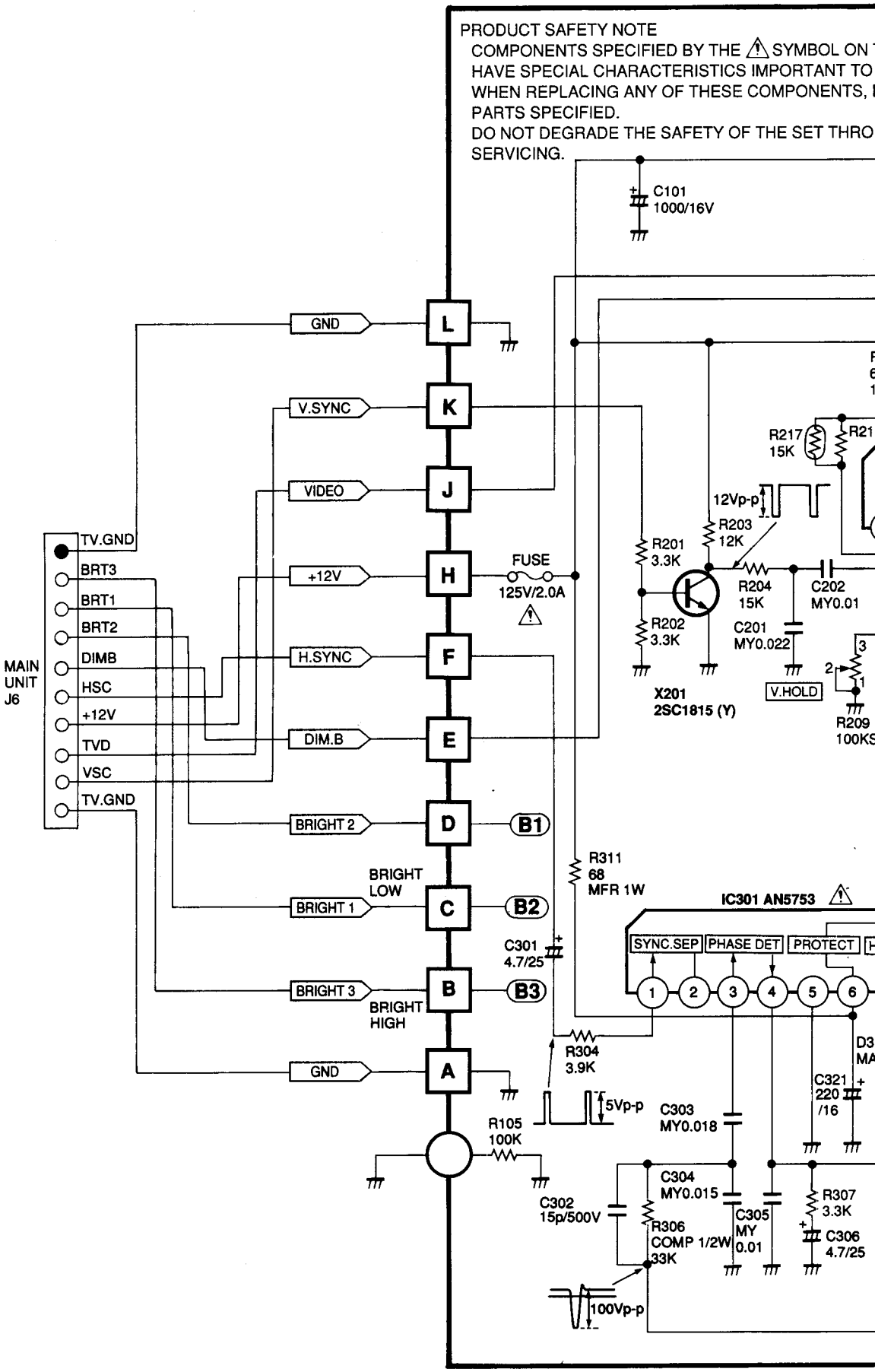


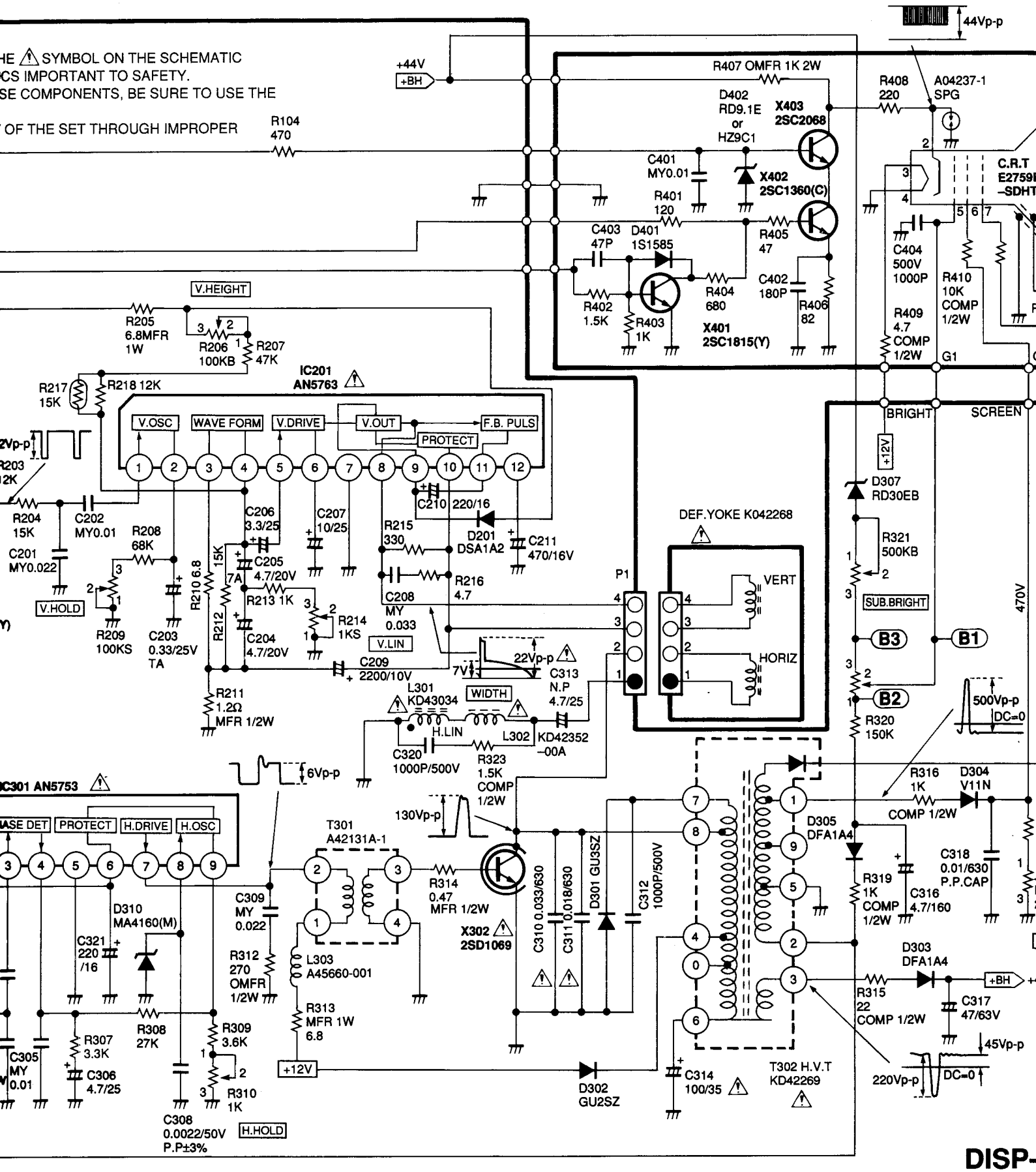

MAIN UNIT
+12V RECTIFICATION & SMOOTHING D4 MA693 L2 HP-012Z C13
CRT +12V REGULATOR & POWER Q13 2SB1015 Q15, Q16 2SC2458
SWITCHING Q2, Q3 2SK740
TRANSFORMER T1 TO-33
-5V RECTIFICATION & SMOOTHING D5, D9 RG-2A L4 LW-15 C15
+12V REGULATOR Q12 2SB909M Q17, Q18 2SC2458
+12V
-5V
+5V RECTIFICATION & SMOOTHING D6 MA693 L3 HP-011Z, C14
+5V
POWER SWITCH CONTROL & SUB REGULATOR IC4 TC4013BP Q5, Q6 2SA1048 Q7 2SC2458 Q9 2SD1225M Q10, Q11 RN1204
ERROR AMP & P.W.M CONTROL IC1 µPC494C
PHOTO COUPPLER IC3 PC817D
ERROR DETECTOR IC2 µPC1093J
ON/OFF
FTC D11 1SV149C IC60 MC14577BF
A/D IC57, IC58 NE521D
DIGITAIZER IC55, IC64 TC74AC74F
FTC control IC306 µPC358G2-T1
SAMPLING CLOCK OSC X3 DOC-431CC 62.160MHz
DELAY CONTROL IC61 µPC358G2 IC69 TA78L08S
DELAY IC50 µPD74HC123AGS
BUFF IC29 µPC358G2
WAVE FORM SHAPING IC50 µPD74HC123AGS
torigger genelator
bearing pulse counter
BP arror detect
HM SIGNAL DETECT Q8 RN1404 D12 RD6.2M B2 IC3 TC74HC14AF
BP SIGNAL DETECT IC3 TC74HC14AF
D/A IC25 µPD6325G
BUFF IC28 HD74LS06FP
NMEA RECEIVER IC6 PC817D
A/D IC8 MB4052PF-G-BND
ALARM CONTACT RL1 MZ-12HG
BEEP OSC & DRIVER IC29, IC30 µPC358G2
PIO parallel I/O IC9 TMP82C255AN-2Z
TRIG
VIDEO
B.P
LEVEL
DATA, CLK, STR
B.W/SW D14, D28 D29 1SS317
IF.AMP IC3, IC4 MC1350D
DETECTOR IC5 MC1330AP
GAIN/STC
VIDEO AMP Q17, Q18 2SA1162 Q20 2SC2712
LEVEL L6 LS-254 D4 1SS196
AUTO TUNE L7, L8 LS-254 D8, D9 1SS196
ONE SHOOT IC14 TC4S71F
D/A IC1 µPD6326C
SERIAL /PARALLEL IC2 TC4094BF
DC-DC IC9 BA222-V
(+)
FRONT UNIT
TUNE
GAIN
STC
SW BOARD
SENSOR
BEEP

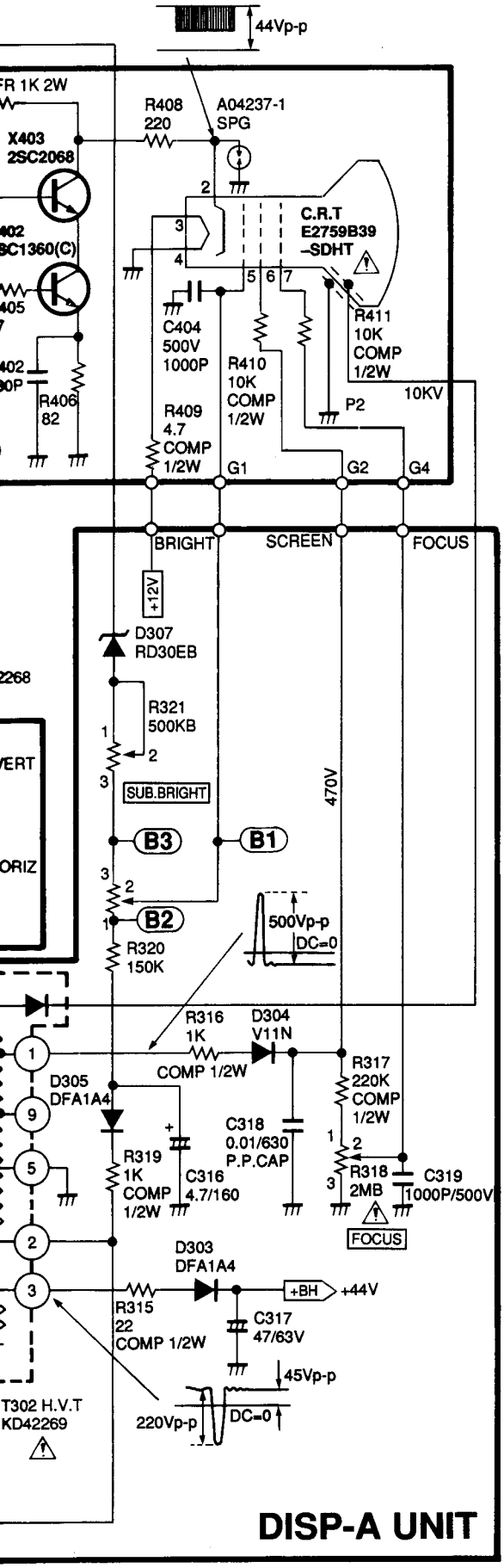

DIGITAIZER IC55, IC64 TC74AC74F
SAMPLING IC59 SC-1233
IR IC46 SC-1229
ES IC4c, IC4d TC74HC08AF IC38 µPD74HC123AGS
PPI video RAM R.M.W IC49 SC-1230
PPI video memory IC53 M5M482128AJ-8
Shift register IC39, IC40 TC74AC166F
VIDEO D/A convert IC17 SC-1227
BUFF Q1, Q2 2SC2712
SAMPLING MEMORY IC37 HM6268P-25
X axis address counter IC31, IC32, IC33 TC74HC191AF
address selecter IC51 TC74AC245F IC62, IC63 TC74AC573F
SAMPLING ADDRESS COUNTER IC42, IC43 TC74HC161AF
ADDRESS END DETECT IC48 SC-1235
Y axis address counter IC34, IC35, IC36 TC74HC191AF
DISP-A UNIT
+12V
TV.VIDEO
HSYNC
VSYNC
BRIGHT
DIM.B
CRT
Sampling, Memory, Read/write, Timming control
RAM control signal selector IC47 SC-1232
PPI, PLOT, Memory, R.M.W. Timing generator
PPI, X-Y address count, Clock generator
PLOT video RAM R.M.W IC44 SC-1228
PLOT video memory IC52 M5M482128AJ-8
Shift register IC41 TC74AC166F
XC3020-70PC84C
SX-1188 SUB CPU
torigger genelator
sin/cos data generator
RANGE CONTROL
TEXT video memory IC27 M5M482128AJ-8
Shift register IC31, IC32 TC74HC191AF
bearing pulse counter
Tx/STBY control
L address latch IC16 TC74AC573F
BP arror detect
serial I/O
C address latch IC15 TC74AC573F
RAM control signal generator IC20 TC74AC175F IC21, IC22, IC65 TC74AC174F IC24 SC-1231
CRT control signal generator IC23 TC74HC175AF
IC26 TM82C54M -2
IC10 HD64180R1P6 MAIN CPU
Syncronous Serial I/O
Asynchronous Serial I/O
ALARM ZONE COUNTER 1
ALARM TERGET DETECTER IC4 TC74HC08AF IC18 TC74HC74AF
Asynchronous Serial I/O
Interrupt control
ALARM ZONE COUNTER 2
GDC (Graphic Display Generator) IC11 µPD72020C
PIO parallel I/O IC9 P82C255AN-2Z
Interval Timer
CPU
N+1 COUNTER
ADDRESS DECORDER IC14 SC-1226
RESET & CLOCK OSC IC7 S-8054ALR-LN X1 DOC-492 12.288MHz
VIDEO CLOCK OSC X2 DOC-49S2 40.00MHz
ROM IC12 HM6264ALFP-15LD
RAM IC13 SC-1234
CONTROL BUS
ADDRESS BUS
DATA BUS

SECTION 10 VOLTAGE DIAGRAMS

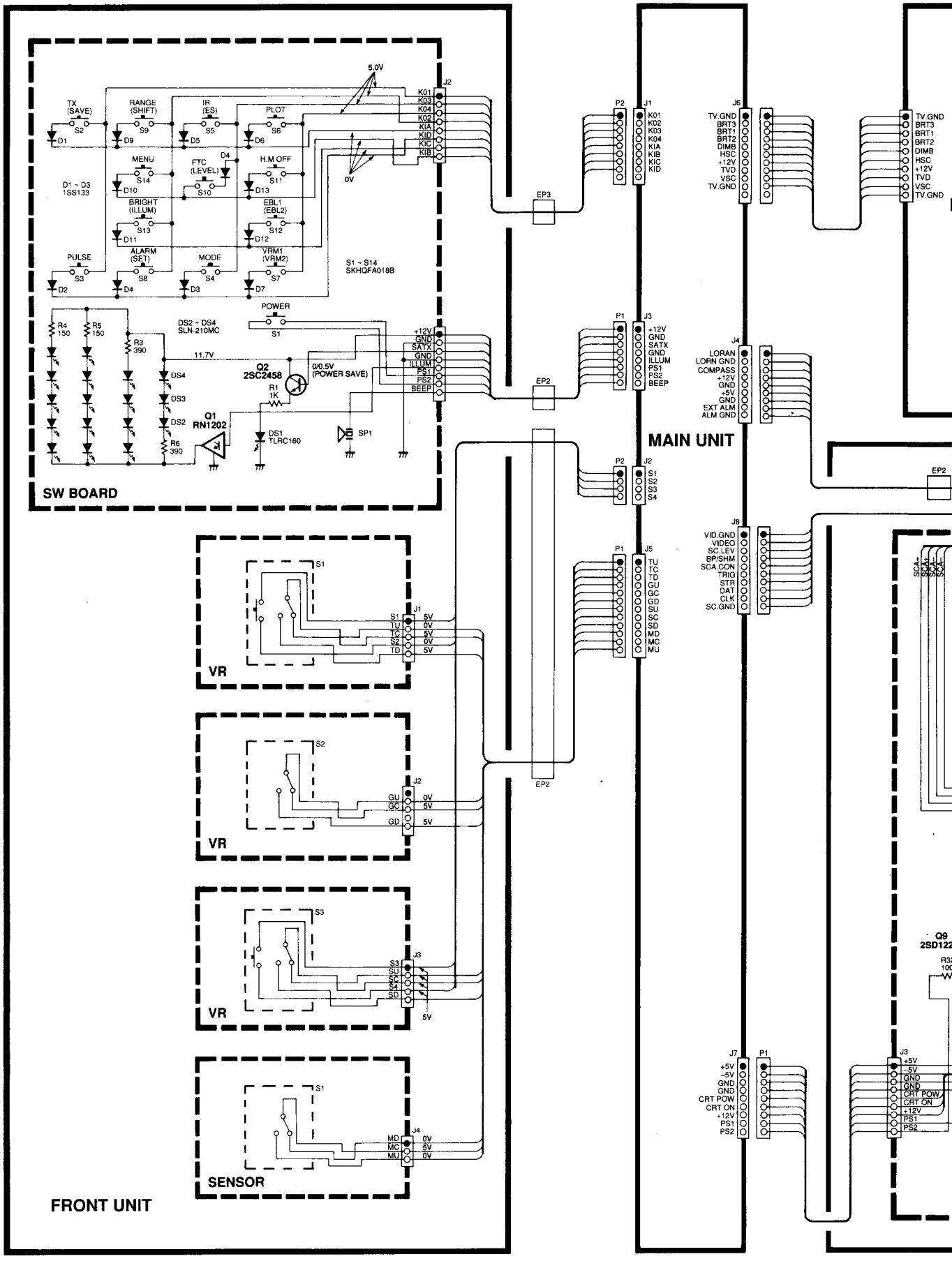
10-1 DISPLAY-A UNIT

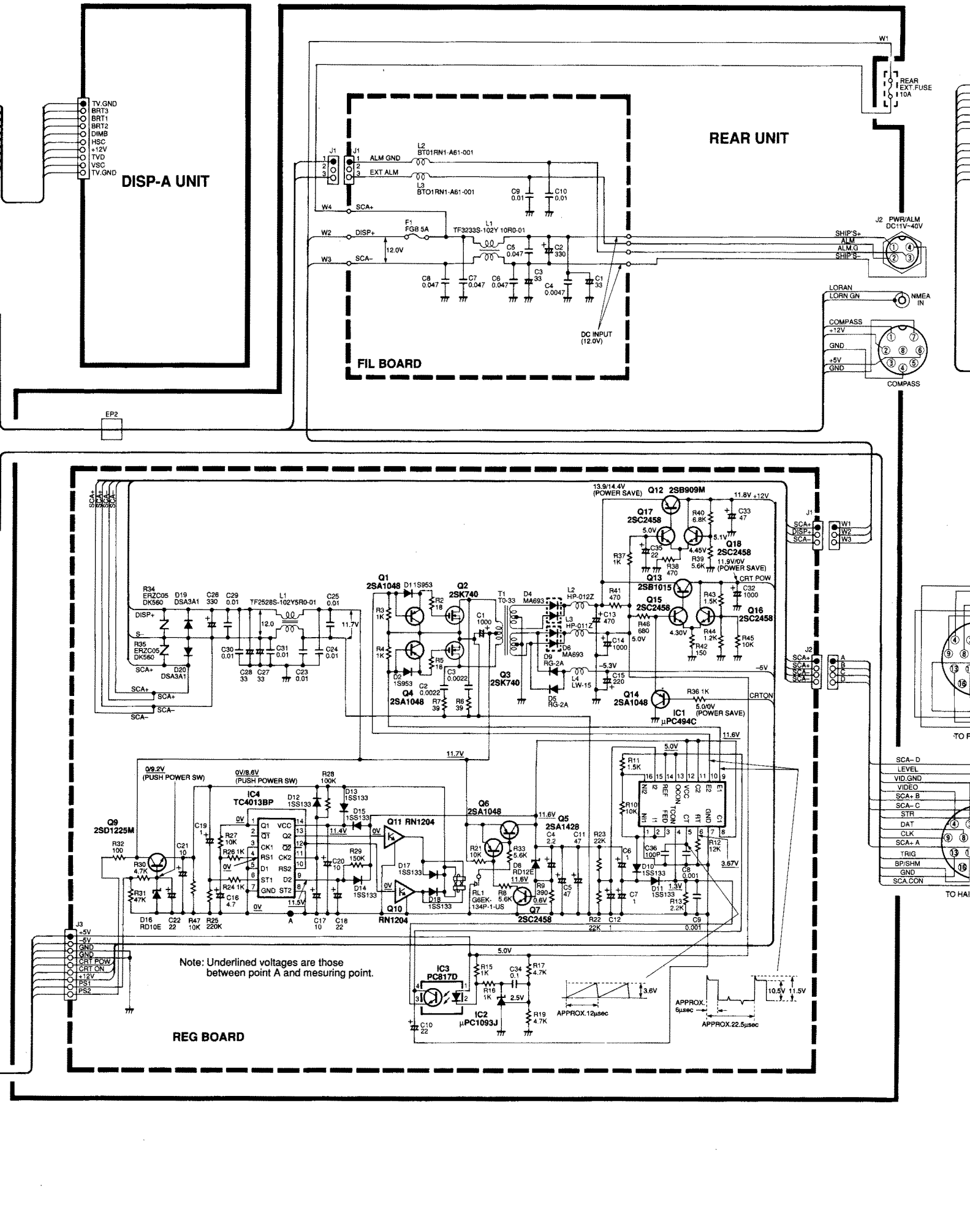


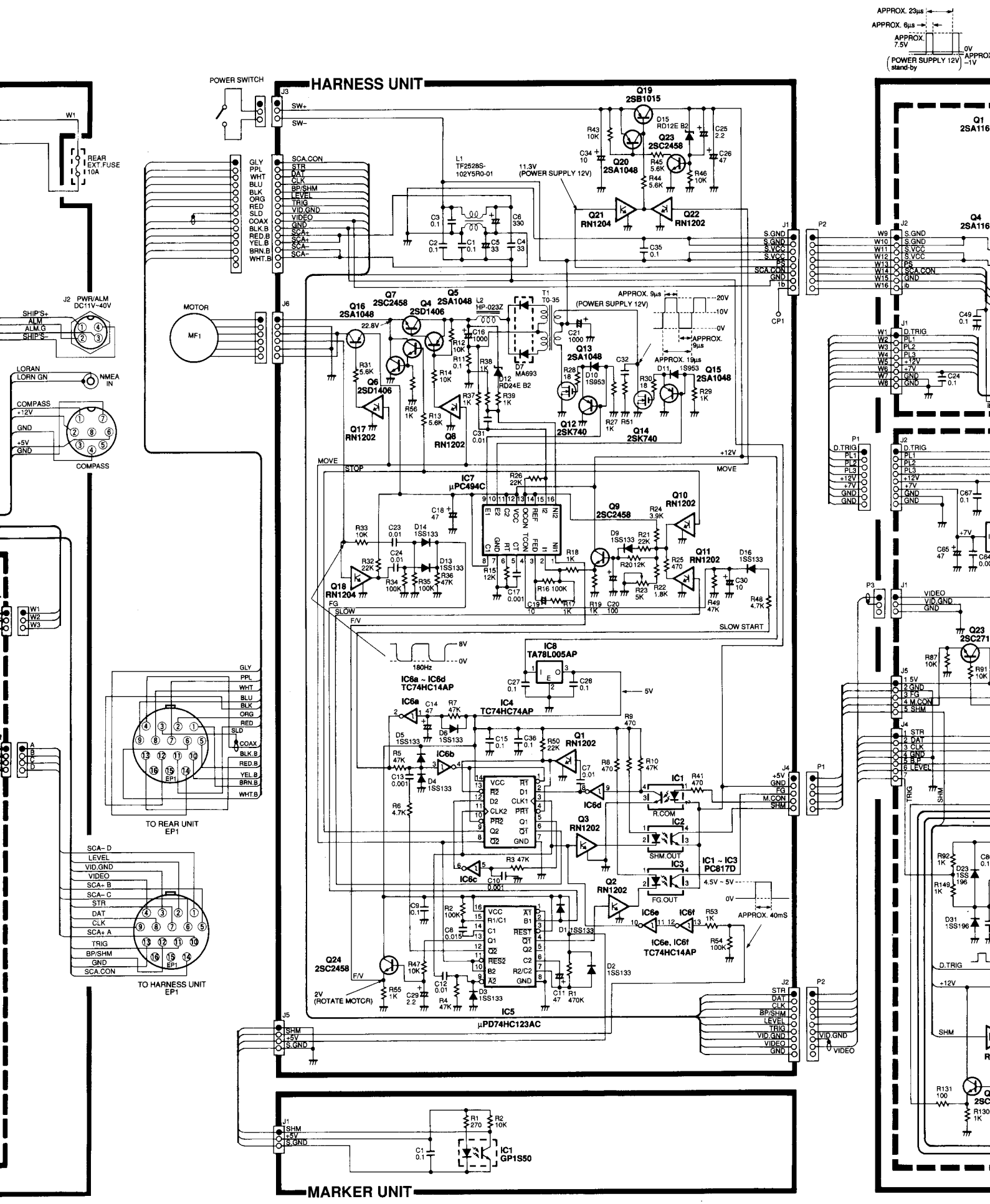

HE ⚠ SYMBOL ON THE SCHEMATIC
CS IMPORTANT TO SAFETY.
SE COMPONENTS, BE SURE TO USE THE
OF THE SET THROUGH IMPROPER
R104 470
+44V
+BH
R407 OMFR 1K 2W
D402 RD9.1E or HZ9C1
X403 2SC2068
X402 2SC1360(C)
X401 2SC1815(Y)
C401 MY0.01
R401 120
C403 47P
D401 1S1585
R402 1.5K
R403 1K
R404 680
R405 47
C402 180P
R406 82
R408 220
A04237-1 SPG
44Vp-p
C.R.T
C404 500V 1000P
R410 10K COMP 1/2W
R409 4.7 COMP 1/2W
G1
BRIGHT
SCREEN
+12V
V.HEIGHT
R205 6.8MFR 1W
R206 100KB
R207 47K
R217 15K
R218 12K
IC201 AN5763 ⚠
V.OSC
WAVE FORM
V.DRIVE
V.OUT
F.B. PULS
PROTECT
R204 15K
C202 MY0.01
C201 MY0.022
V.HOLD
R209 100KS
C203 0.33/25V TA
R208 68K
R210 6.8
15K
C204 4.7/20V
C205 4.7/20V
7A
C206 3.3/25
C207 10/25
R213 1K
R214 1KS
V.LIN
C209 2200/10V
R211 1.2Ω MFR 1/2W
C208 MY 0.033
R215 330
R216 4.7
C210 220/16
D201 DSA1A2
C211 470/16V
DEF.YOKE K042268
P1
VERT
HORIZ
D307 RD30EB
R321 500KB
SUB.BRIGHT
B3
B1
B2
R320 150K
470V
500Vp-p
DC=0
7V
22Vp-p ⚠
C313 N.P 4.7/25
L301 KD43034 ⚠
WIDTH
H.LIN
L302 KD42352 -00A
C320 1000P/500V
R323 1.5K COMP 1/2W
6Vp-p
130Vp-p
C301 AN5753 ⚠
BASE DET
PROTECT
H.DRIVE
H.OSC
T301 A42131A-1
R314 0.47 MFR 1/2W
X302 ⚠ 2SD1069
C309 MY 0.022
D310 MA4160(M)
C321 220 /16
R312 270 OMFR 1/2W
L303 A45660-001
R313 MFR 1W 6.8
C310 0.033/630
C311 0.018/630
D301 GU3SZ
C312 1000P/500V
D305 DFA1A4
R316 1K COMP 1/2W
D304 V11N
C318 0.01/630 P.P.CAP
R319 1K COMP 1/2W
C316 4.7/160
D303 DFA1A4
+BH
R315 22 COMP 1/2W
C317 47/63V
45Vp-p
220Vp-p
DC=0
R307 3.3K
C306 4.7/25
R308 27K
R309 3.6K
R310 1K
C305 MY 0.01
C308 0.0022/50V P.P±3%
H.HOLD
+12V
D302 GU2SZ
C314 100/35 ⚠
T302 H.V.T KD42269 ⚠
DISP-

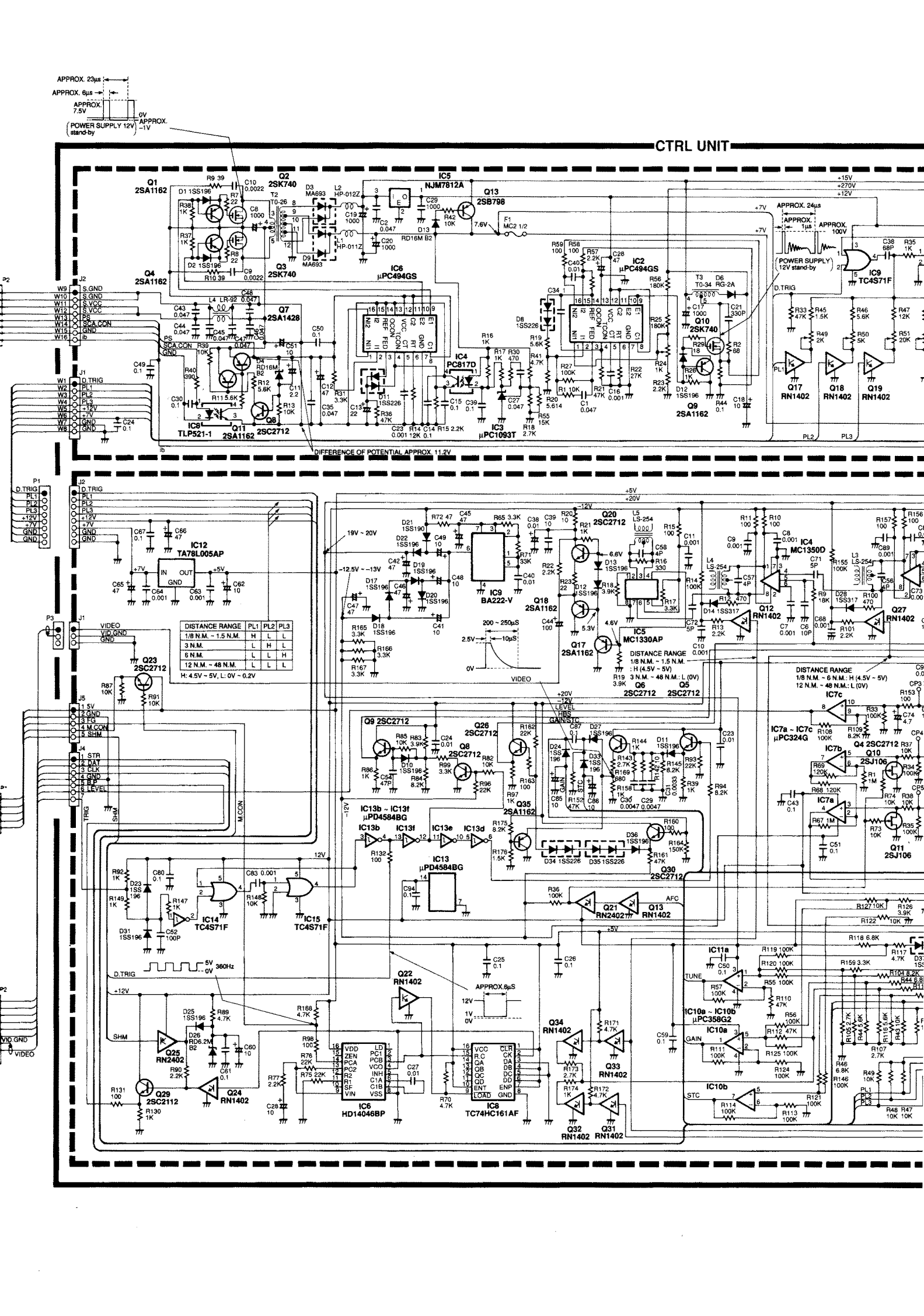

44Vp-p
R408
220
A04237-1
SPG
X403
2SC2068
C.R.T
E2759B39
-SDHT
C404
500V
1000P
R410
10K
COMP
1/2W
R411
10K
COMP
1/2W
10KV
P2
R409
4.7
COMP
1/2W
G1
G2
G4
BRIGHT
SCREEN
FOCUS
+12V
D307
RD30EB
R321
500KB
SUB.BRIGHT
470V
B3
B1
B2
500Vp-p
DC=0
R320
150K
R316
1K
COMP 1/2W
D304
V11N
R317
220K
COMP
1/2W
D305
DFA1A4
C318
0.01/630
P.P.CAP
R319
1K
COMP
1/2W
C316
4.7/160
R318
2MB
C319
1000P/500V
FOCUS
D303
DFA1A4
+BH
+44V
R315
22
COMP 1/2W
C317
47/63V
45Vp-p
220Vp-p
DC=0
T302 H.V.T
KD42269
DISP-A UNIT

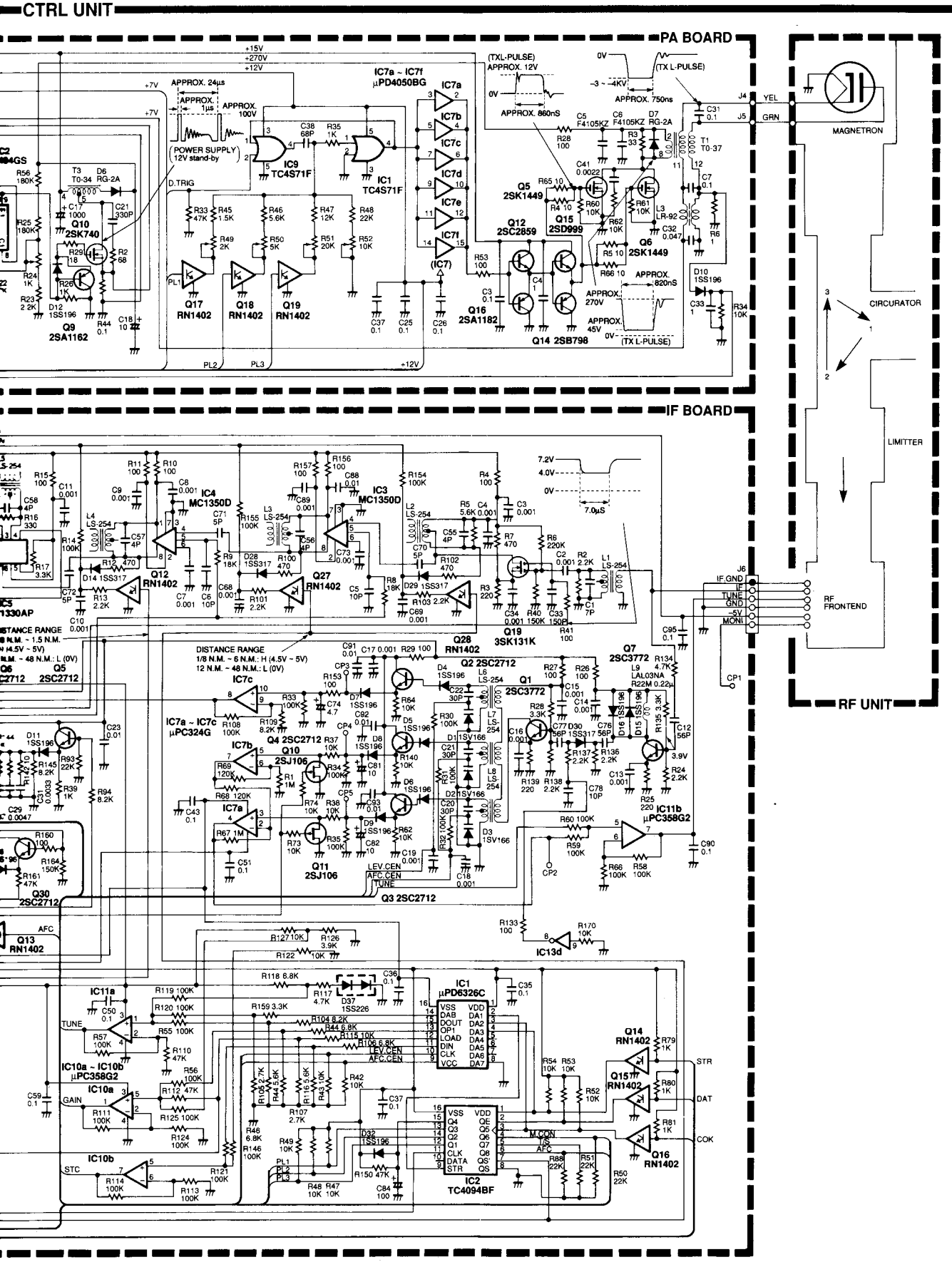
10-2 WHOLE CIRCUIT DIAGRAM



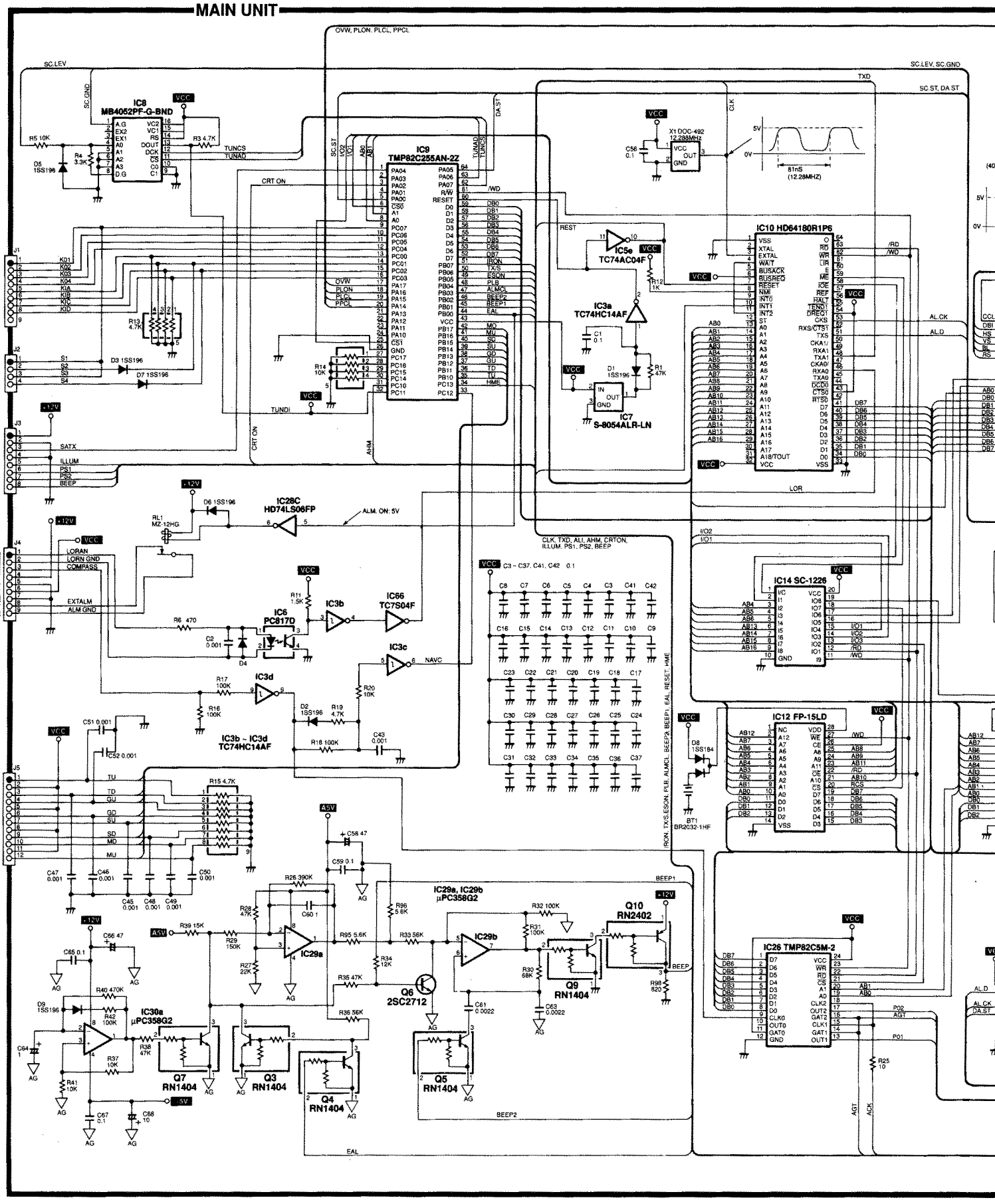

DISP-A UNIT
TV.GND
BRT3
BRT1
BRT2
DIMB
HSC
+12V
TVD
VSC
TV.GND
REAR UNIT
W1
REAR EXT.FUSE 10A
J1
ALM GND
EXT ALM
L2 BT01RN1-A61-001
L3 BTO1RN1-A61-001
C9 0.01
C10 0.01
W4 SCA+
W2 DISP+
W3 SCA–
F1 FGB 5A
L1 TF3233S-102Y 10R0-01
12.0V
C5 0.047
C2 330
C8 0.047
C7 0.047
C6 0.047
C3 33
C4 0.0047
C1 33
DC INPUT (12.0V)
FIL BOARD
J2 PWR/ALM DC11V~40V
SHIP'S+
ALM
ALM.G
SHIP'S–
LORAN
LORN GN
NMEA IN
COMPASS
+12V
GND
+5V
GND
COMPASS
EP2
REG BOARD
Q1 2SA1048
D11S953
Q2 2SK740
T1 TO-33
D4 MA693
L2 HP-012Z
L3 HP-011Z
D6 MA693
D9 RG-2A
D5 RG-2A
Q3 2SK740
Q4 2SA1048
L4 LW-15
C15 220
Q14 2SA1048
IC1 µPC494C
CRTON
13.9/14.4V (POWER SAVE)
Q12 2SB909M
11.8V +12V
Q17 2SC2458
Q18 2SC2458
11.9V/0V (POWER SAVE)
Q13 2SB1015
Q15 2SC2458
Q16 2SC2458
CRT POW
R34 ERZC05 DK560
D19 DSA3A1
D20 DSA3A1
R35 ERZC05 DK560
L1 TF2528S-102Y5R0-01
11.7V
Q9 2SD1225M
IC4 TC4013BP
Q11 RN1204
Q10 RN1204
Q6 2SA1048
Q5 2SA1428
Q7 2SC2458
RL1 G6EK-134P-1-US
IC3 PC817D
IC2 µPC1093J
APPROX.12µsec
APPROX.6µsec
APPROX.22.5µsec
3.6V
10.5V 11.5V
Note: Underlined voltages are those between point A and mesuring point.
J3
–5V
–5V
GND
GND
CRT POW
CRT ON
+12V
PS1
PS2
SCA– D
LEVEL
VID.GND
VIDEO
SCA+ B
SCA– C
STR
DAT
CLK
SCA+ A
TRIG
BP/SHM
GND
SCA.CON
TO HA

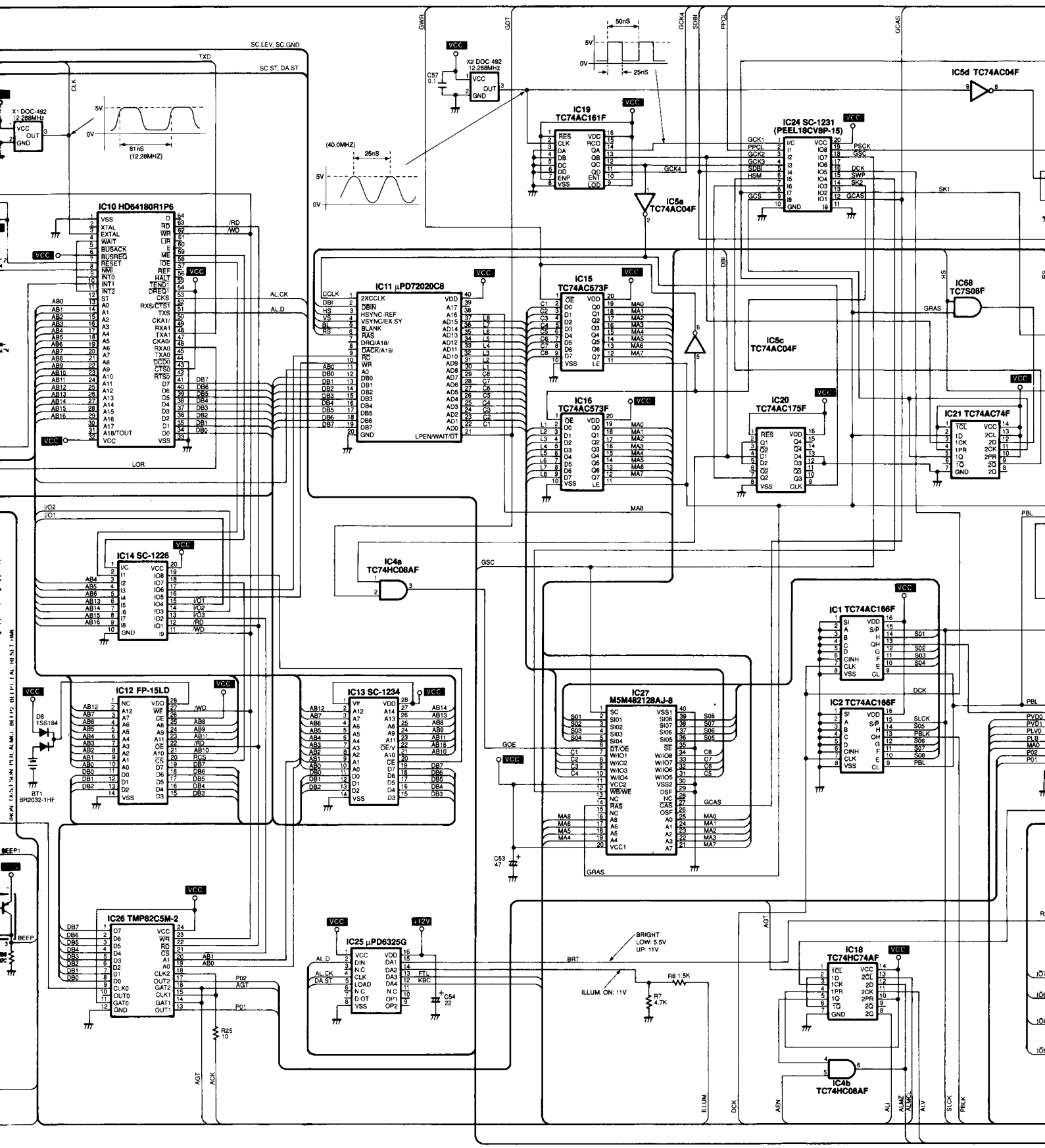

HARNESS UNIT
POWER SWITCH
REAR EXT.FUSE 10A
PWR/ALM DC11V~40V
SHIP'S+
ALM
ALM.G
SHIP'S-
LORAN
LORN GN
NMEA IN
COMPASS
+12V
GND
+5V
GND
MOTOR
MF1
TO REAR UNIT EP1
TO HARNESS UNIT EP1
SW+
SW-
SCA.CON
STR
DAT
CLK
BP/SHM
LEVEL
TRIG
VID.GND
VIDEO
GND
SCA+
SCA-
RED
BLK.B
RED.B
YEL.B
BRN.B
WHT.B
SLD
COAX
ORG
PPL
WHT
BLU
BLK
GLY
Q19 2SB1015
Q23 2SC2458
Q20 2SA1048
Q21 RN1204
Q22 RN1202
Q7 2SC2458
Q4 2SD1406
Q5 2SA1048
Q16 2SA1048
Q6 2SD1406
Q17 RN1202
Q8 RN1202
Q13 2SA1048
Q15 2SA1048
Q12 2SK740
Q14 2SK740
Q9 2SC2458
Q10 RN1202
Q11 RN1202
Q18 RN1204
Q1 RN1202
Q3 RN1202
Q2 RN1202
Q24 2SC2458
IC7 μPC494C
IC8 TA78L005AP
IC6a ~ IC6d TC74HC14AP
IC4 TC74HC74AP
IC6e, IC6f TC74HC14AP
IC1 ~ IC3 PC817D
IC5 μPD74HC123AC
IC1 GP1S50
MOVE
STOP
SLOW
F/V
FG
SLOW START
11.3V (POWER SUPPLY 12V)
APPROX. 9μs
APPROX. 19μs
APPROX. 40mS
2V (ROTATE MOTOR)
R.COM
SHM.OUT
FG.OUT
MARKER UNIT
APPROX. 23μs
APPROX. 6μs
APPROX. 7.5V
POWER SUPPLY 12V stand-by

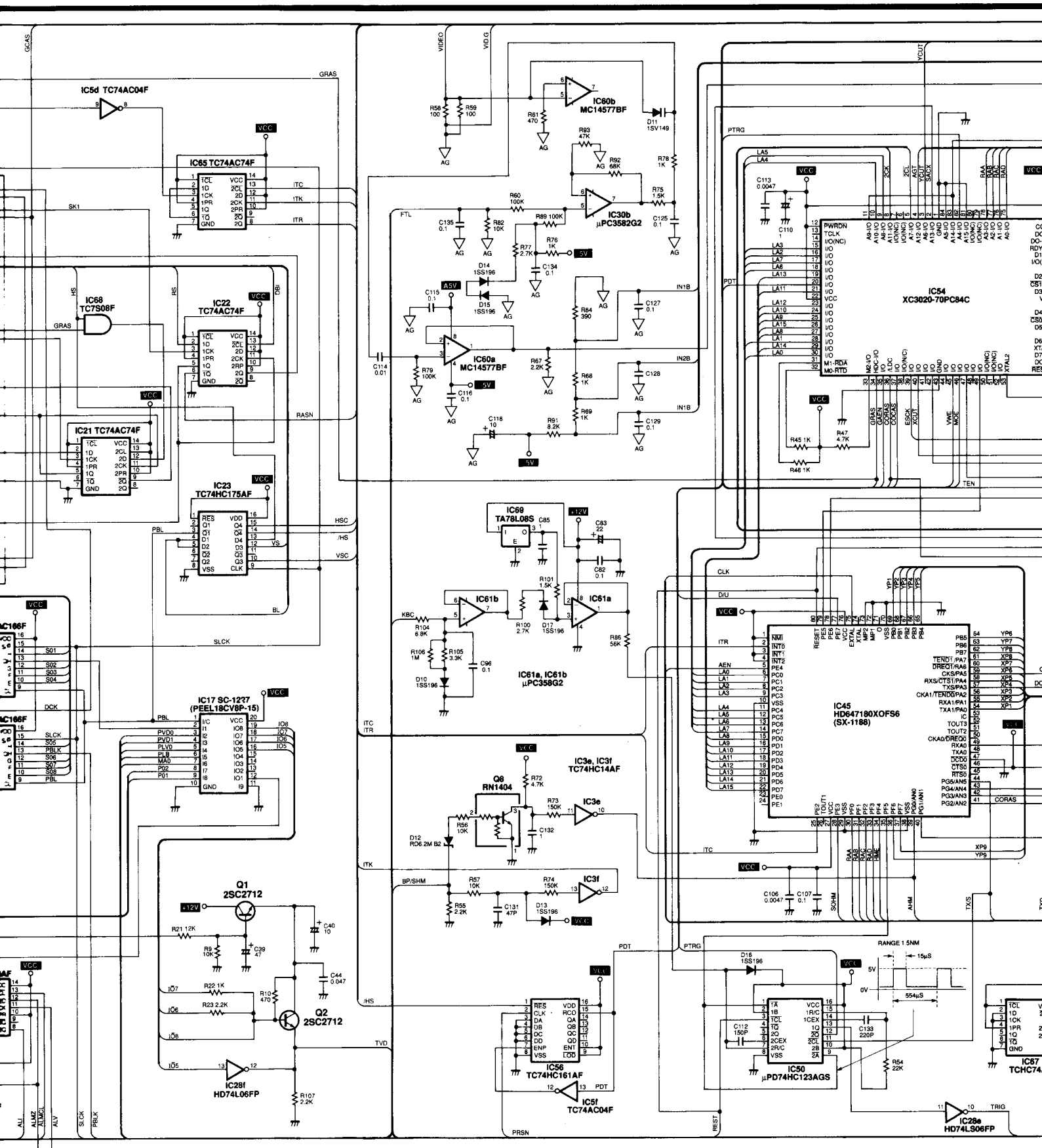

CTRL UNIT
APPROX. 23µs
APPROX. 6µs
APPROX. 7.5V
0V
APPROX. −1V
POWER SUPPLY 12V stand-by
Q1 2SA1162
Q2 2SK740
Q3 2SK740
Q4 2SA1162
IC5 NJM7812A
Q13 2SB798
IC6 µPC494GS
IC2 µPC494GS
IC4 PC817D
IC3 µPC1093T
IC8 TLP521-1
Q11 2SA1162
Q8 2SC2712
Q7 2SA1428
Q10 2SK740
Q9 2SA1162
IC9 TC4S71F
Q17 RN1402
Q18 RN1402
Q19 RN1402
DIFFERENCE OF POTENTIAL APPROX. 11.2V
IC12 TA78L005AP
IC9 BA222-V
IC4 MC1350D
Q20 2SC2712
Q18 2SA1162
IC5 MC1330AP
Q17 2SA1162
Q6 2SC2712
Q5 2SC2712
Q12 RN1402
Q27 RN1402
Q23 2SC2712
DISTANCE RANGE
1/8 N.M. ~ 1.5 N.M. H H L
3 N.M. L H L
6 N.M. L L H
12 N.M. ~ 48 N.M. L L L
H: 4.5V ~ 5V, L: 0V ~ 0.2V
DISTANCE RANGE
1/8 N.M. ~ 6 N.M.: H (4.5V ~ 5V)
12 N.M. ~ 48 N.M.: L (0V)
IC13b ~ IC13f µPD4584BG
IC13 µPD4584BG
Q35 2SA1162
Q30 2SC2712
IC14 TC4S71F
IC15 TC4S71F
Q21 RN2402
Q13 RN1402
Q22 RN1402
IC7c
IC7a ~ IC7c µPC324G
Q4 2SC2712
Q10 2SJ106
Q11 2SJ106
IC11a
IC10a ~ IC10b µPC358G2
IC10a
IC10b
Q25 RN2402
Q29 2SC2112
Q24 RN1402
IC6 HD14046BP
IC8 TC74HC161AF
Q34 RN1402
Q33 RN1402
Q32 RN1402
Q31 RN1402
VIDEO
TRIG
SHM
M.CON
AFC
TUNE
GAIN
STC

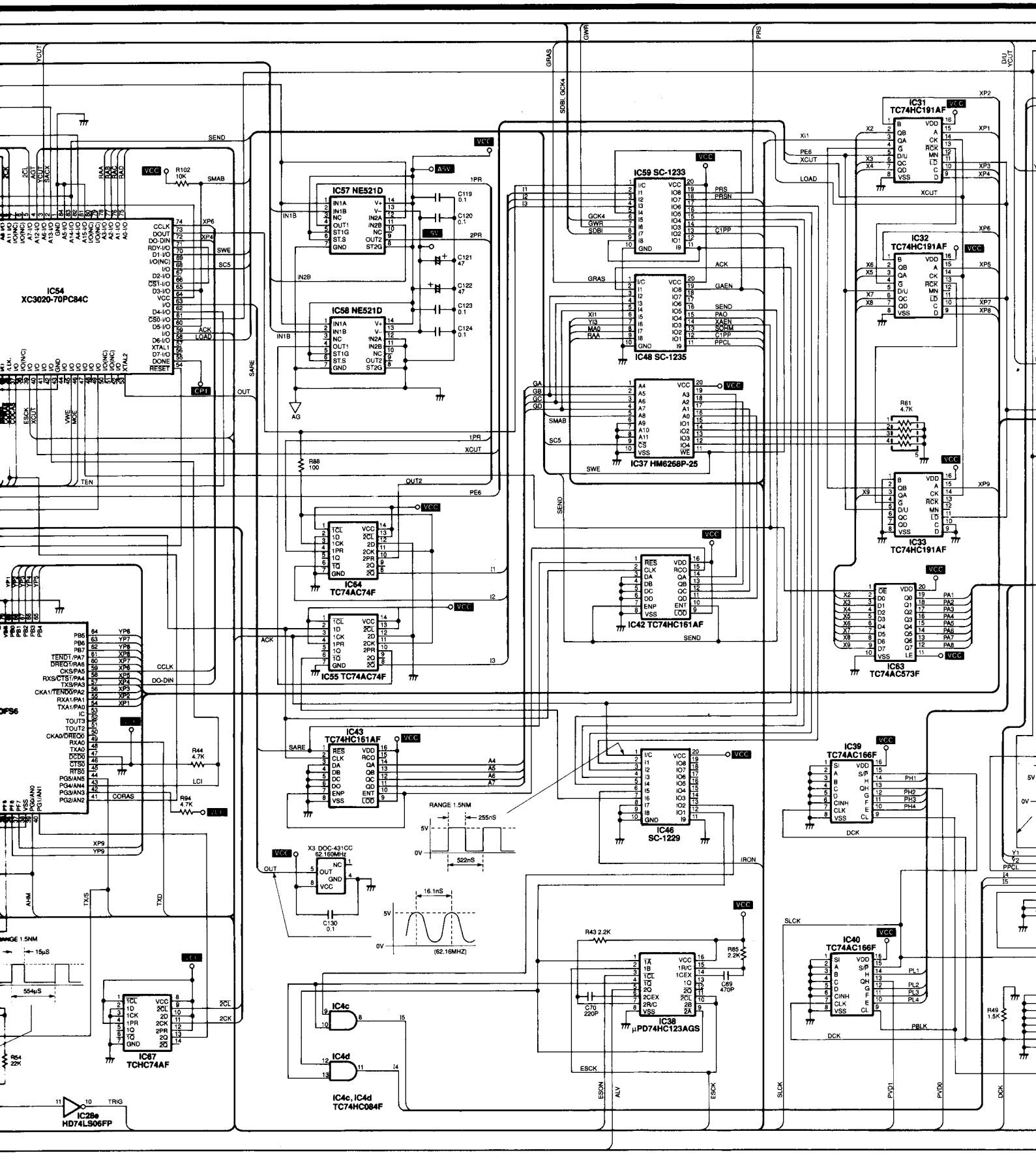

CTRL UNIT
PA BOARD
IF BOARD
RF UNIT
MAGNETRON
CIRCURATOR
LIMITTER
RF FRONTEND
IC7a ~ IC7f
μPD4050BG
IC9
TC4S71F
IC1
TC4S71F
IC4
MC1350D
IC3
MC1350D
IC7a ~ IC7c
μPC324G
IC1
μPD6326C
IC2
TC4094BF
IC11a
IC11b
μPC358G2
IC10a ~ IC10b
μPC358G2
IC13d
Q10
2SK740
Q9
2SA1162
Q17
RN1402
Q18
RN1402
Q19
RN1402
Q5
2SK1449
Q15
2SD999
Q12
2SC2859
Q16
2SA1182
Q14 2SB798
Q6
2SK1449
Q12
RN1402
Q27
RN1402
Q28
RN1402
Q19
3SK131K
Q2 2SC2712
Q1
2SC3772
Q7
2SC3772
Q10
2SJ106
Q11
2SJ106
Q3 2SC2712
Q30
2SC2712
Q13
RN1402
Q14
RN1402
Q15
RN1402
Q16
RN1402
T1
T0-37
T3
T0-34
D6
RG-2A
D7
RG-2A
D10
1SS196
D12
1SS196
D14 1SS317
D28 1SS317
D29 1SS317
D37
1SS226
(TXL-PULSE)
APPROX. 12V
APPROX. 860nS
(TX L-PULSE)
APPROX. 750ns
APPROX. 820nS
APPROX. 270V
APPROX. 45V
POWER SUPPLY
12V stand-by
D.TRIG
DISTANCE RANGE
1/8 N.M. ~ 6 N.M.: H (4.5V ~ 5V)
12 N.M. ~ 48 N.M.: L (0V)
7.2V
4.0V
0V
7.0μS
+15V
+270V
+12V
+7V
APPROX. 24μs
APPROX. 1μs
APPROX. 100V
-3 ~ -4KV
J4
J5
J6
YEL
GRN
IF.GND
IF
TUNE
GND
-5V
MONI
CP1
CP2
CP3
CP4
PL1
PL2
PL3
TUNE
AFC
GAIN
STC
LEV.CEN
AFC.CEN
M.CON
STR
DAT
COK

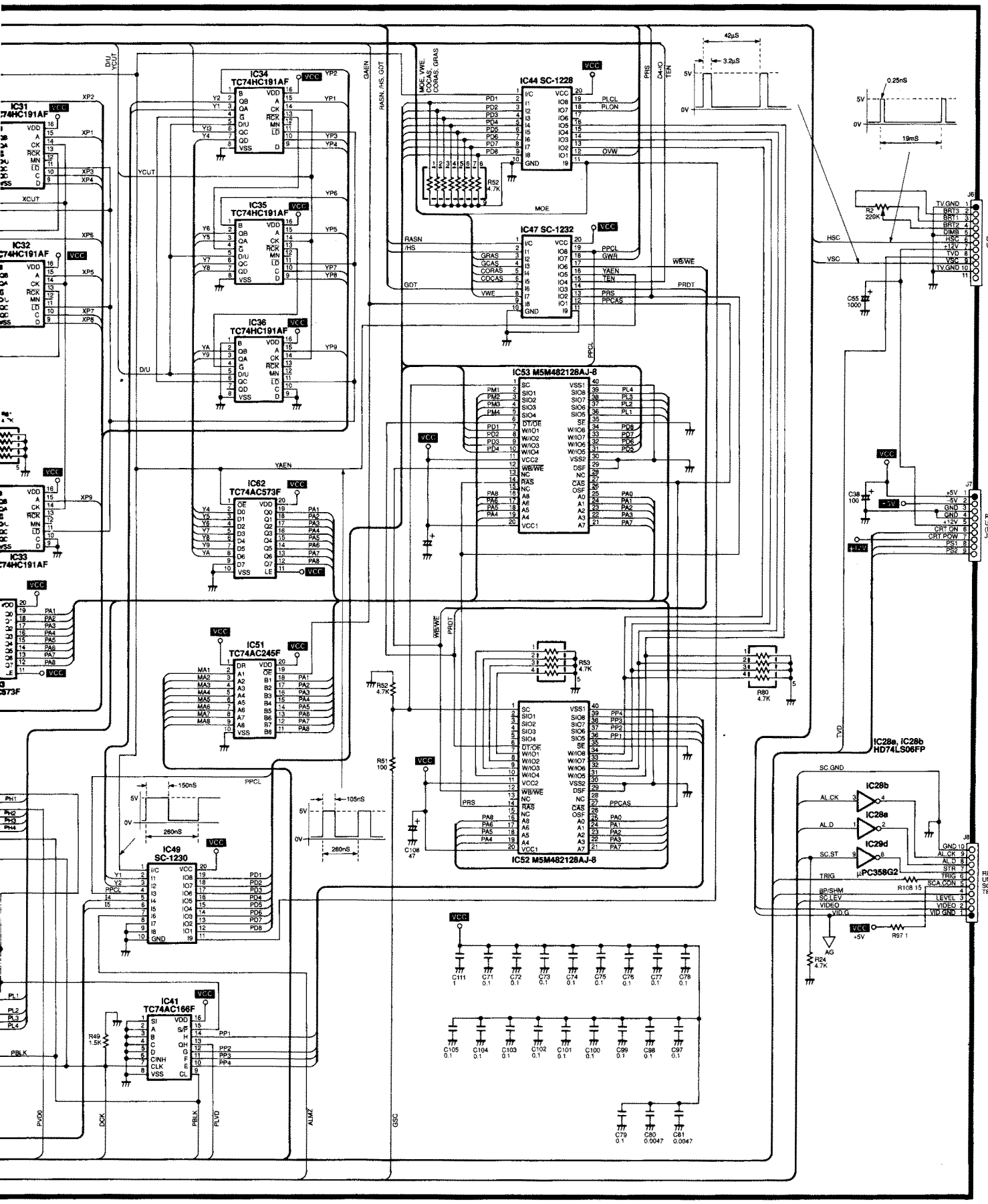
10-3 MAIN UNIT




SC.LEV, SC.GND
TXD
SC.ST, DA.ST
CLK
X1 DOC-492 12.288MHz
81nS (12.28MHZ)
(40.0MHZ)
25nS
50nS
X2 DOC-492 12.288MHz
C57 0.1
IC10 HD64180R1P6
IC11 µPD72020C8
IC12 FP-15LD
IC13 SC-1234
IC14 SC-1226
IC15 TC74AC573F
IC16 TC74AC573F
IC18 TC74HC74AF
IC19 TC74AC161F
IC20 TC74AC175F
IC21 TC74AC74F
IC24 SC-1231 (PEEL18CV8P-15)
IC25 µPD6325G
IC26 TMP82C5M-2
IC27 M5M482128AJ-8
IC1 TC74AC166F
IC2 TC74AC166F
IC4a TC74HC08AF
IC4b TC74HC08AF
IC5a TC74AC04F
IC5c TC74AC04F
IC5d TC74AC04F
IC68 TC7S08F
D8 1SS184
BT1 BR2032-1HF
BEEP
BRIGHT LOW: 5.5V UP: 11V
ILLUM. ON: 11V
R8 1.5K
R7 4.7K
R25 10
C53 47
C54 22
/RD
/WD
AL.CK
AL.D
LOR
GOE
GRAS
GSC
PBL
DCK
SLCK
PBLK
ILLUM
AEN
ALU
ALMZ
ALMCL
ALV
AGT
ACK
+12V
VCC


IC5d TC74AC04F
IC65 TC74AC74F
IC68 TC7S08F
IC22 TC74AC74F
IC21 TC74AC74F
IC23 TC74HC175AF
IC17 SC-1227 (PEEL18CV8P-15)
IC60b MC14577BF
IC30b µPC3582G2
IC60a MC14577BF
IC69 TA78L08S
IC61b
IC61a
IC61a, IC61b µPC358G2
IC3e, IC3f TC74HC14AF
Q8 RN1404
IC3e
IC3f
Q1 2SC2712
Q2 2SC2712
IC28f HD74L06FP
IC56 TC74HC161AF
IC5f TC74AC04F
IC54 XC3020-70PC84C
IC45 HD647180XOFS6 (SX-1188)
IC50 µPD74HC123AGS
IC28e HD74LS06FP
IC67 TCHC74
GCAS
GRAS
SK1
ITC
ITK
ITR
HS
RS
IBD
RASN
PBL
HSC
/HS
VS
VSC
BL
SLCK
DCK
VIDEO
VID.G
FTL
IN1B
IN2B
+12V
-5V
A5V
KBC
BP/SHM
/HS
TVD
PRSN
PDT
PTRG
CLK
D/U
AEN
ITR
ITC
ITK
REST
TRIG
RANGE 1.5NM
15µS
554µS
5V
0V
TEN
CORAS
SCHM
AHM
TX/S


IC54
XC3020-70PC84C
IC57 NE521D
IC58 NE521D
IC59 SC-1233
IC48 SC-1235
IC37 HM6268P-25
IC31
TC74HC191AF
IC32
TC74HC191AF
IC33
TC74HC191AF
IC64
TC74AC74F
IC55 TC74AC74F
IC42 TC74HC161AF
IC63
TC74AC573F
IC43
TC74HC161AF
IC46
SC-1229
IC39
TC74AC166F
IC40
TC74AC166F
IC38
μPD74HC123AGS
IC67
TCHC74AF
IC4c, IC4d
TC74HC084F
IC28e
HD74LS06FP
SEND
VCC
R102
10K
SMAB
XP6
XP4
SWE
SC5
ACK
LOAD
CP1
OUT
SARE
AG
1PR
2PR
XCUT
PE6
OUT2
TEN
R88
100
CCLK
DO-DIN
R44
4.7K
LCI
CORAS
R94
4.7K
RANGE 1.5NM
255nS
522nS
X3 DOC-431CC
62.160MHz
C130
0.1
16.1nS
(62.16MHZ)
R43 2.2K
R85
2.2K
C70
220P
C69
470P
R54
22K
554μS
15μS
R61
4.7K
R49
1.5K
IRON
DCK
SLCK
PBLK
ESCK
ESDN
ALV
PVD1
PVD0


IC34 TC74HC191AF
IC35 TC74HC191AF
IC36 TC74HC191AF
IC31 TC74HC191AF
IC32 TC74HC191AF
IC33 TC74HC191AF
IC44 SC-1228
IC47 SC-1232
IC53 M5M482128AJ-8
IC52 M5M482128AJ-8
IC62 TC74AC573F
IC51 TC74AC245F
IC49 SC-1230
IC41 TC74AC166F
IC28a, IC28b HD74LS06FP
IC28b
IC28a
IC29d
µPC358G2
VCC
D/U
YCUT
XCUT
YAEN
GAEN
RASN, /HS, GDT
MOE, VWE, CGAS, CORAS, GRAS
PRS
D4-IO
TEN
PRDT
WB/WE
PPCL
PPCAS
PBLK
PVDD
DCK
ALM2
GSC
PLVD
TVD
SC.GND
DISP-A UNIT
REAR UNIT (REG BOARD) J3
REAR UNIT SCAN TERMINAL
42µS
3.2µS
0.25nS
19mS
150nS
105nS
280nS
5V
0V
-5V
+5V
+12V
HSC
VSC
AG

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