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# Service Manual

ORDER NO.
CRT1106

COMPONENT CAR STEREO GRAPHIC EQUALIZER

# EQ-400 EW

## CONTENTS



## SPECIFICATIONS

| | |
|---|---|
| Power source | DC 14.4 V (10.8—15.6 V allowable) |
| Grounding system | Negative type |
| Dimensions | 180(W) x 50(H) x 150(D) mm |
| Weight | 0.9 kg |
| Equalization frequency | 60 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, 16 kHz |
| Gain | −2 dB |
| Equalization range | ±12 dB |
| Frequency response | 20—30,000 Hz (±3 dB) |
| Distortion | 0.06% (1 kHz, 70 mV) |
| Signal-to-noise ratio | 85 dB (IEC-A network) |
| Input impedance | 22 kΩ |
| Output impedance | 1 kΩ |
| Max. output level | 200 mV/1 kHz, 1% THD |

**Note:**
Specifications and the design are subject to possible modification without notice due to improvements.


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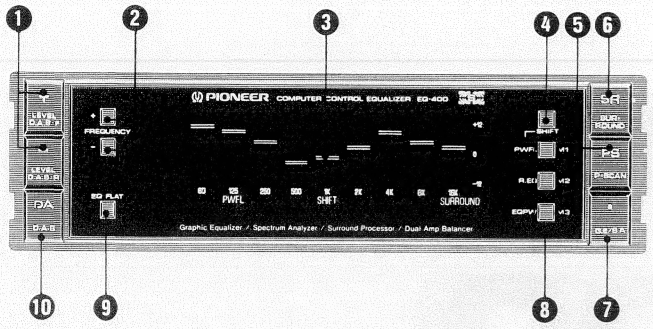
# 1. NOMENCLATURE AND USE




### ❶ Level Up (+), Down (−)/Dual-amp Balance Adjust Button

**Level Up (+), Down (−) Buttons**

Used to adjust graphic equalizer levels. Pressing the (+) button raises the level, while pressing the (−) button lowers the level. Adjustments are made after pressing the frequency select button to cause the selected frequency to flash. Only the frequency that is flashing can be adjusted.

**Dual-amp Balance Adjust Button**

Adjusts the front and rear speaker volume for a 2-amp, 4-speaker system. Pressing the dual-amp balance button causes a dual-amp balance adjust display to appear. Pressing the (+) button while this display is shown reduces output from the rear speaker until output is being produced by the front speaker only. Pressing the (−) button while this display is shown reduces output from the front speaker until output is being produced by the rear speaker only.

### ❷ Frequency Select Button

Used to select the frequency when adjusting the graphic equalizer level. Pressing the (+) button makes the frequency higher, while (−) button makes the frequency lower.

### ❸ Display

### ❹ Shift Button

Switches between the factory preset curves and user preset curves. Pressing this button causes "SHIFT" to appear on the display, allowing selection of factory preset curves.

### ❺ Preset Scan Button

Sequentially recalls 6 types of preset curves (at approximately 4-second intervals). Pressing again while any preset curve is recalled selects that preset curve.

### ❻ Surround Button

Activates the surround function

- The surround effect can only be obtained with a 2-amp, 4-speaker system and not with a 2-speaker system.

### ❼ Display Select Button

Each press of this button switches the display in the following sequence: GRAPHIC EQUALIZER → SPECTRUM ANALYZER (PEAK HOLD) → SPECTRUM ANALYZER (SYMMETRIC)

### ❽ Equalizer Preset Button

Up to 3 equalizer curves (user preset curve) can be assigned to this button making it possible to later select a curve by simply pressing the button. This button is also pressed after the shift button ("SHIFT" appears on display) to select one of 3 factory preset curves.

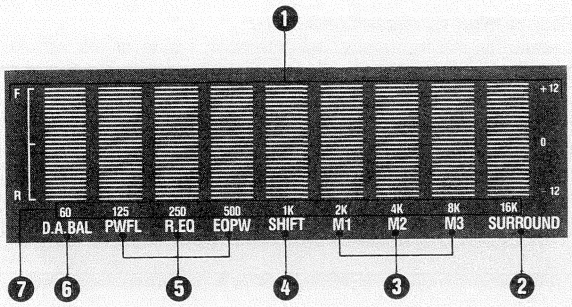
### ❾ Flat Curve Button

Pressing this button produces an uncompensated equalizer curve.

### ❿ Dual-amp Balance Button

Switches to dual-amp balance adjust display. The dual-amp balance adjust button can be used to adjust the volume of the front and rear speakers. Pressing again or leaving for approximately 10 secondes after adjustment returns the display to its original status.

## • Reading the Displays

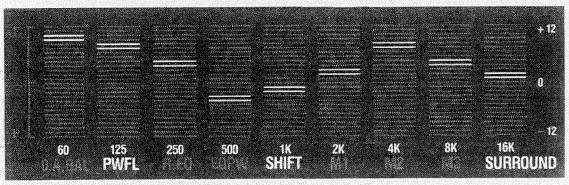



### ❶ Graphic Equalizer/Spectrum Analyzer/Dual-amp Balance Adjust Display

Each press of the display select button causes the display contents to change as illustrated A, B, and C below. Display D is produced by pressing the dual-amp balance button.

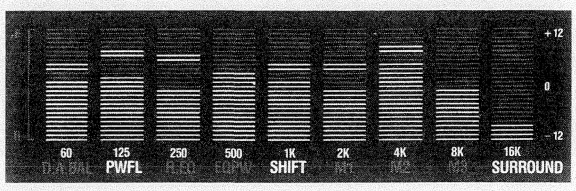
**A: Graphic Equalizer Display**

Levels are shown divided among 9 frequencies. The level indicated by the green lines on the display are the uncompensated levels, while red indicates high level and blue indicates low level.



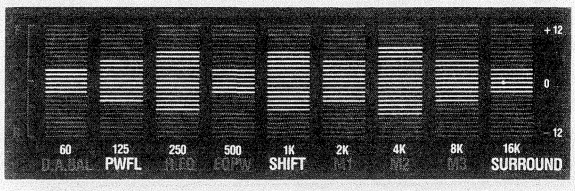

**B: Spectrum Analyzer (Peak Hold) Display**

The power levels of the 9 frequency divisions are momentarily held and displayed.



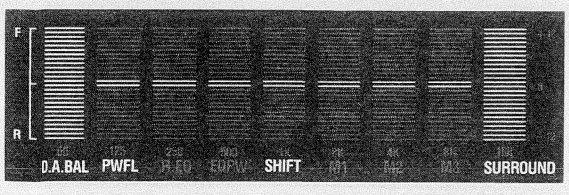

**C: Spectrum Analyzer (Symmetric) Display**

The power levels of the 9 frequency divisions are divided into upper and lower along the center on the display.




**D: Dual-amp Balance Adjust Display**

Pressing the dual-amp balance button changes to the dual-amp balance adjust display, and pressing again returns to the original display. The display indicates that the front and rear speaker volume levels are equal when the bar is at the center position. The front speaker output gets higher when the bar is moved toward F, while the rear speaker output gets higher when the bar is moved toward R.




### ❷ Surround Display

Appears on and disappears from the display when the surround button is pressed.

### ❸ User Preset Display

Displays the button pressed when a user preset curve is selectd after pressing the equalizer preset button.

### ❹ Shift Display

Appears on and disappears from the display when the shift button is pressed.

### ❺ Factory Preset Curve Display

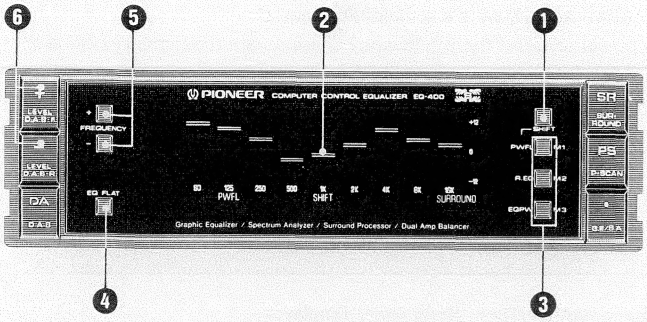
Displays the button pressed when a factory preset curve is selected after pressing the equalizer preset button.

### ❻ Dual-amp Balance Display

Appears on and disappears from the display when the dual-amp balance button is pressed.

### ❼ Frequency Display

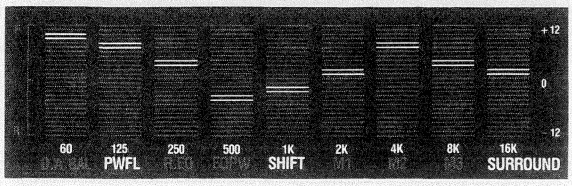
## • Using the Graphic Equalizer




### Factory Preset Curves

1. Press the shift button ❶ and "SHIFT" appears on the display ❷.
2. Press the PWFL, R.EQ, EQPW equalizer preset buttons ❸ or flat curve button ❹ to select one of the following equalizer curves.

**PWFL: Powerful Curve**
Enhances the low and high ranges to produces a powerful curve.




### Forming Equalizer Curves

1. Press the frequency select button ❺ and adjust to the desired frequency (level indicator blinks on display ❷). Pressing the (+) button increases the frequency, while the (−) button decreases the frequency.
2. Use the level up (+)/down (−) buttons ❻ to set the frequency to the desired level.

- Repeat steps 1 and 2 to adjust the other frequencies.
- User preset curves based on a factory preset curve by first calling the desired factory preset curve.

### Recording to Memory

Once an equalizer curve is created, the following operation is used to assign the curve to preset buttons M1 through M3

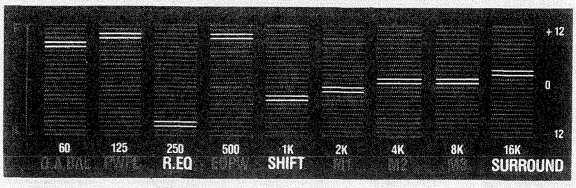
3. Press the shift button ❶ and "SHIFT" disappears on the display ❷.
4. Press and hold down one of the equalizer curve preset buttons (M1 — M3) until a beep is heard (approximately 2 seconds). This signals that the curve has been stored in memory under the preset button pressed.

- The procedure outlined above can be used to create and store up to 3 equalizer curves.

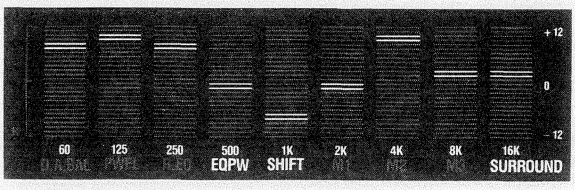
**Note:**

- Changes in low pitched sounds may not be discernible even when the 60 Hz frequency level is adjusted if the program source does not include components in the 60 Hz vicinity or if the small diameter speakers are used.
- Changes in high pitched sounds may not be discernible even when the 16 kHz frequency level is adjusted if the program source does not include components in the 16 kHz vicinity.

**R.EQ: Rear speaker Equalizer Curve**
Compensates for the frequency characteristics inside of the vehicle to produce the equivalent of a flat curve (in most vehicles).

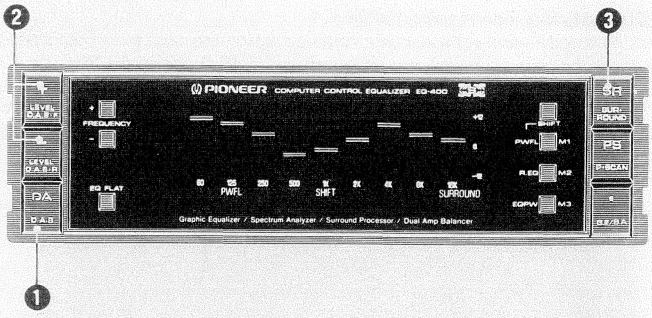



**EQPW: Equalizer Powerful Curve**
Compensates for the frequency characteristics inside of the vehicle while enhancing the low and high ranges to produce a powerful sound.




**EQ FLAT: Flat Curve**
An uncompensated flat curve that can be used as a reference to determine the effects of the other curves. The flat curve can be recalled regardless of the ON/OFF status of the shift button.

## • Surround Function




The surround function provides powerful concert hall ambience, giving the feeling of sitting in the center of a concert hall or sound studio.

**The following procedure allows the most effective use of the surround system:**

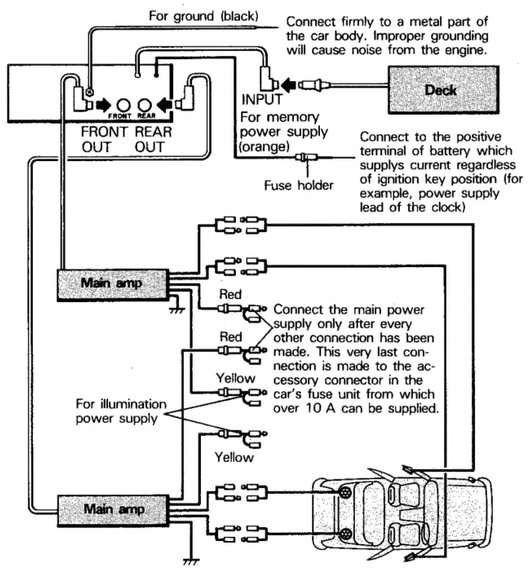
1. Adjust the front and rear speaker volume to the same levels using the dual-amp balance button ❶ and dual-amp balance adjust button ❷.
2. Press the surround button ❸.
3. The rear speaker volume level may increase with certain sources. At this time, reduce the rear speaker volume level using the dual-amp balance button ❶ and dual-amp balance adjust button ❷.

- The surround effect can only be obtained with a 2-amp, 4-speaker system and not with a 2-speaker system.
- The surround effect cannot obtained with a monaural source
- Left/right volume balance of the rear speakers cannot be adjusted while the surround function is being used.
- The effectiveness of the surround function depends upon the source.

# 2. CONNECTIONS

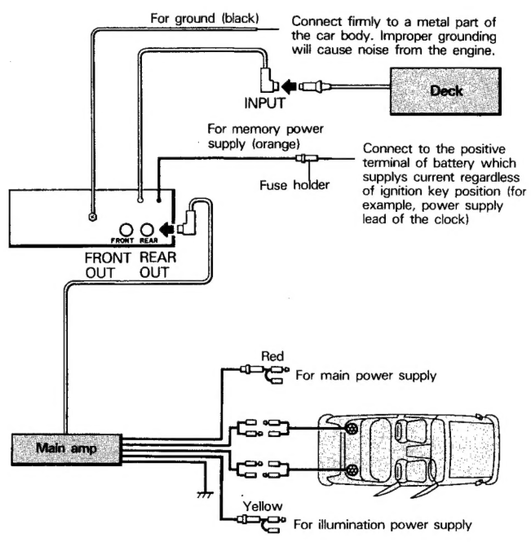
## 4-Speaker System

- Grounding of both main amps is required when two main amps are used.




## 2-Speaker System

- In a 2-speaker system, wire the rear output terminal to the main amp.






# 3. DISASSEMBLY

### • Removing the Case

1. Remove the three fastening screws and then remove the case.

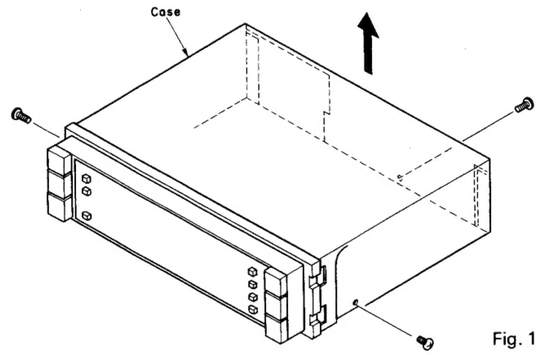



Fig. 1

### • Removing the Grille Unit

1. Remove the grille unit tab and pull the grille straight out.

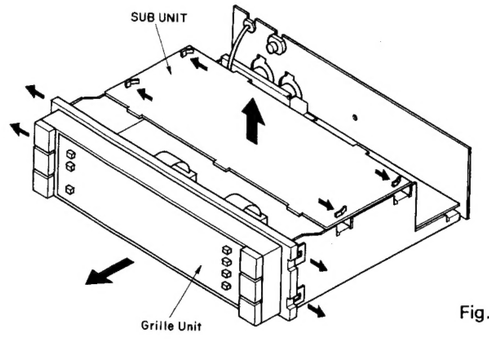



Fig. 2

### • Removing the Sub Unit (Fig. 2)

1. Unbend the four tabs and lift up the sub unit.

### • Removing the Key Board Unit

1. Remove the four fastening screws and lift up the key board unit.

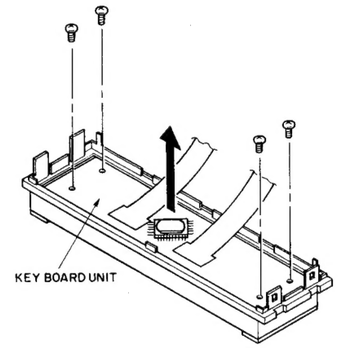



Fig. 3

### • Removing Main Unit

1. Remove the two fastening screws.
2. Unbend the three tabs and lift up the main unit.

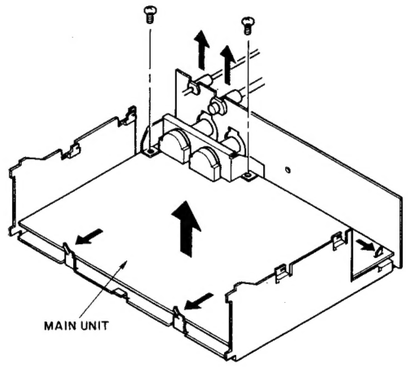



Fig. 4

# 4. BLOCK DIAGRAM

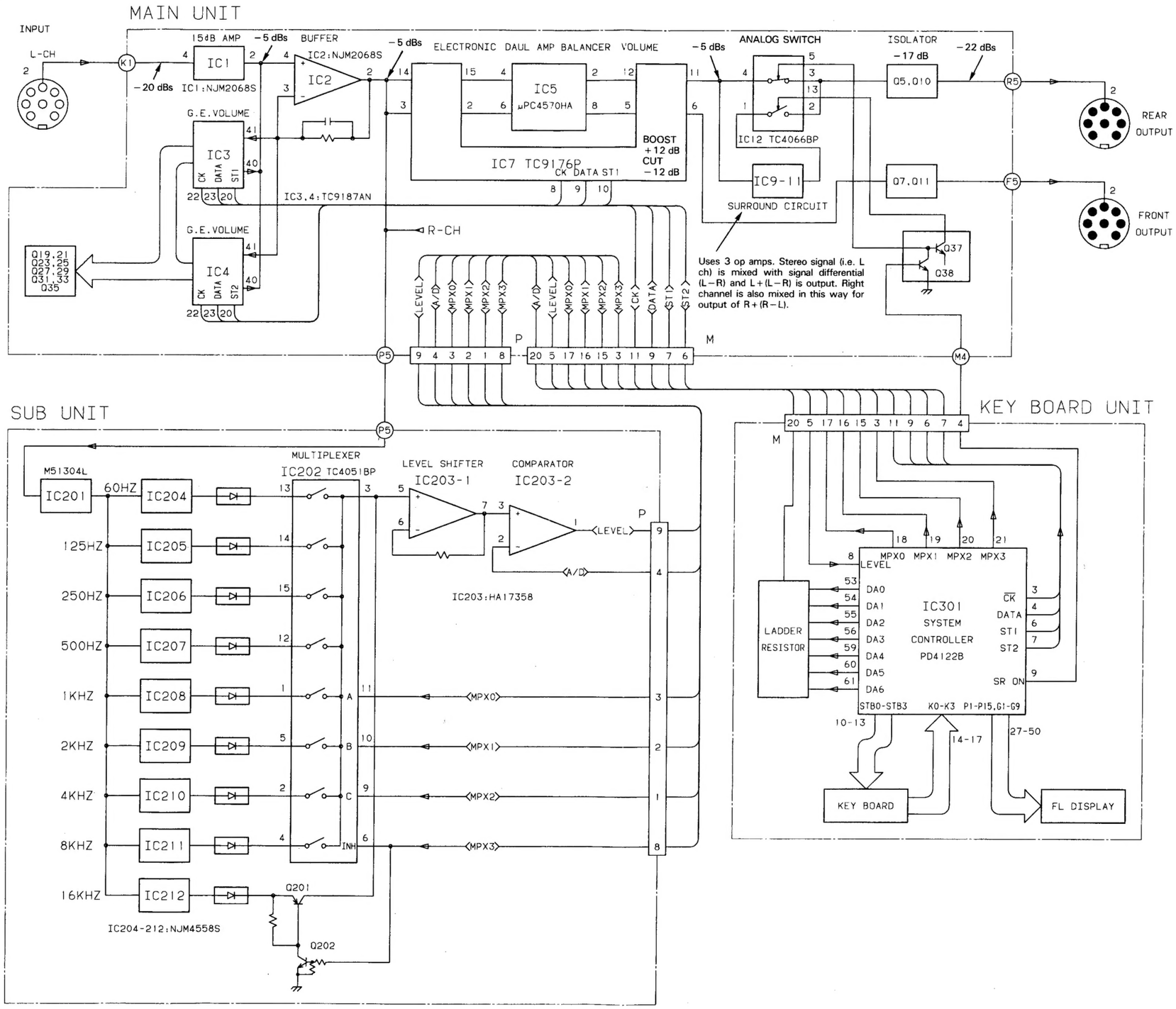
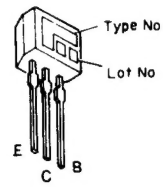


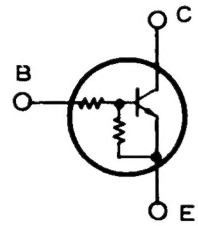

Fig. 5

## • ICs and Transistors

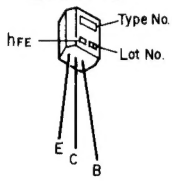
DTC143ES



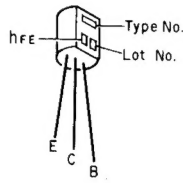

DTC143ES



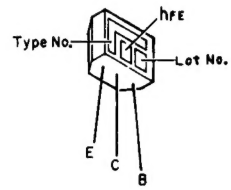

2SA1048
2SC1740S
2SC2458
2SC2458L
2SC3113



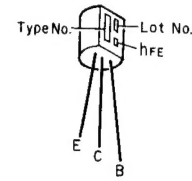

2SA934




2SA933S

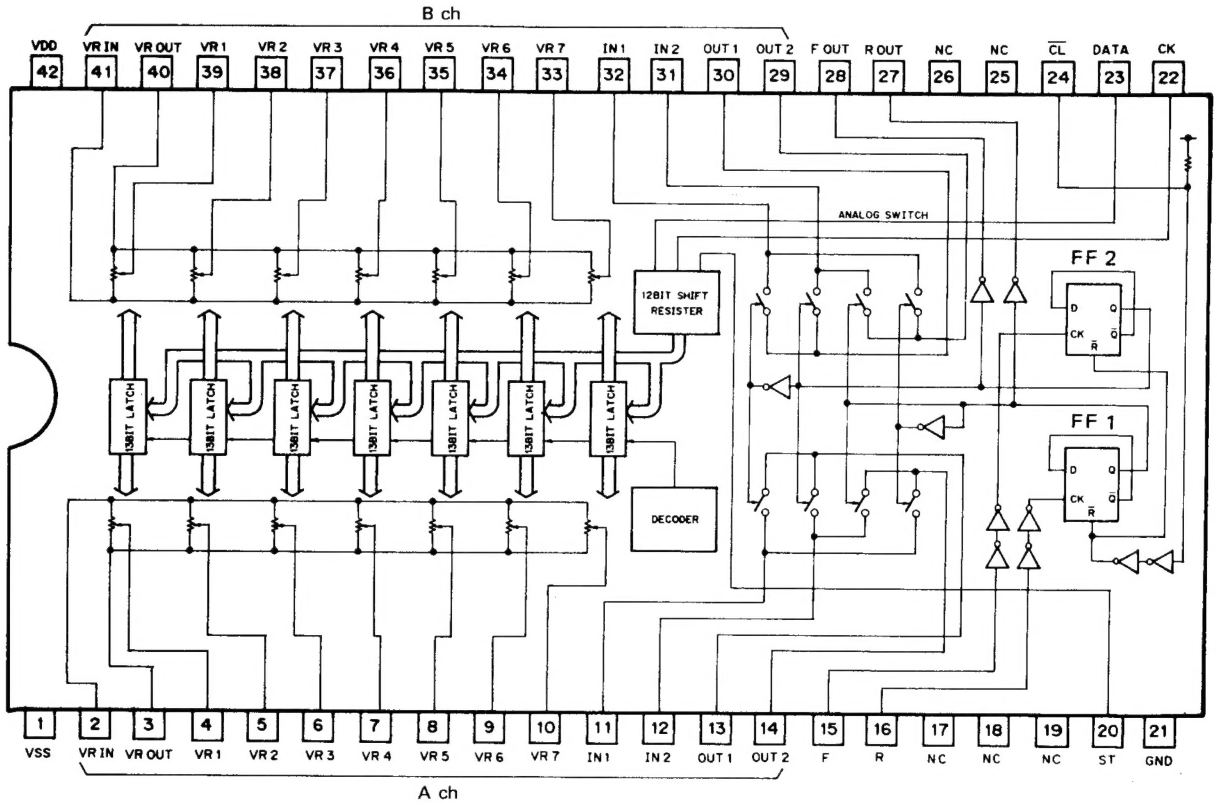



2SA1015




## • Main Unit

IC3, 4: TC9187AN

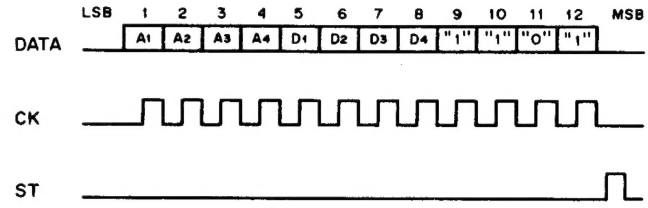


## • Pin Functions: (TC9187AN)

| Pin | Pin Name | Function and Operation |
|---|---|---|
| 2<br>41 | (A)<br>(B) $V_{RIN}$ | Common input pin for each volume control |
| 3<br>40 | (A)<br>(B) $V_{ROUT}$ | Common output pin for each volume control |
| 4<br>39 | (A)<br>(B) $VR_1$ | Common pin for volume control 1<br>60 Hz |
| 5<br>38 | (A)<br>(B) $VR_2$ | Common pin for volume control 2<br>125 Hz |
| 6<br>37 | (A)<br>(B) $VR_3$ | Common pin for volume control 3<br>250 Hz |
| 7<br>36 | (A)<br>(B) $VR_4$ | Common pin for volume control 4<br>500 Hz |
| 8<br>35 | (A)<br>(B) $VR_5$ | Common pin for volume control 5<br>1 kHz |
| 9<br>34 | (A)<br>(B) $VR_6$ | Common pin for volume control 6<br>3.5 kHz |
| 10<br>33 | (A)<br>(B) $VR_7$ | Common pin for volume control 7<br>10 kHz |
| 11<br>32 | (A) $IN_1$<br>(B) | Input pin for the analog switch matrix<br>(Input pin for signals that by-pass the EQ circuit.) |
| 12<br>31 | (A) $IN_2$<br>(B) | Input pin for the analog switch matrix<br>(Input pin for signals that pass through the EQ circuit.) |
| 13<br>30 | (A) $OUT_1$<br>(B) | Front output pin<br>Front output pin |
| 14<br>29 | (A) $OUT_2$<br>(B) | Rear output pin<br>Rear output pin |
| 15 | F | Input pin for analog switch control<br>(Turns the front equalizer circuit on and off) |
| 16 | R | Input pin for analog switch control<br>(Turns the rear equalizer circuit on and off) |
| 17—19<br>25—28 | | Not in use |
| 20 | ST | Strobe input pin. Control data at the CK pin and DATA pin is latched when this pin goes HIGH. |
| 22 | CK | Clock input pin.<br>Fetches control data |
| 23 | DATA | Control data input pin. Control data is made up of 12 bits. |
| 24 | $\overline{CL}$ | Clear input pin for the analog switch matrix. Turns the equalizer circuit off at a LOW level input. |
| 1<br>21<br>42 | $V_{DD}$<br>GND<br>$V_{SS}$ | Power supply pin |

*Pins 15 and 16 are active HIGH. The states of FF1 and FF2 are reversed at the leading edge of these pins and turns the circuit on and off.

## • Control Data Format




### a) A1-A4 (bits 1-4)

Data bits 1-4 select one of the seven volume control circuits denoted VR1-VR7.

| $A_1$ | $A_2$ | $A_3$ | $A_4$ | Volume |
|---|---|---|---|---|
| H | L | L | H | $VR_1$ |
| L | H | L | H | $VR_2$ |
| H | H | L | H | $VR_3$ |
| L | L | H | H | $VR_4$ |
| H | L | H | H | $VR_5$ |
| L | H | H | H | $VR_6$ |
| H | H | H | H | $VR_7$ |

### b) D1-D4 (bits 5-8)

Data bits 5-8 set each volume step. Data bits 5-8 control the volume selected by A1-A4 in 13 steps.

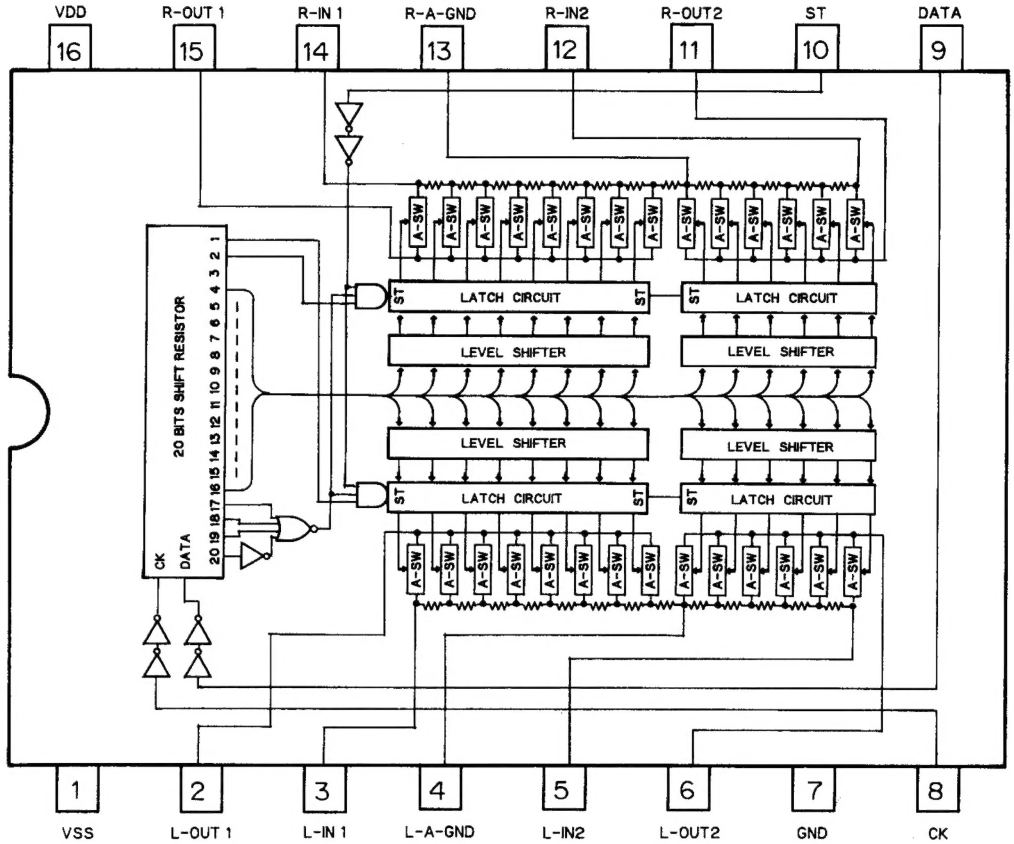
| $D_1$ | $D_2$ | $D_3$ | $D_4$ | Step |
|---|---|---|---|---|
| L | H | H | L | +6 (+12 dB) |
| H | L | H | L | +5 (+10 dB) |
| L | L | H | L | +4 (+8 dB) |
| H | H | L | L | +3 (+6 dB) |
| L | H | L | L | +2 (+4 dB) |
| H | L | L | L | +1 (+2 dB) |
| L | L | L | L | 0 (0 dB) |
| H | H | H | H | −1 (−2 dB) |
| L | H | H | H | −2 (−4 dB) |
| H | L | H | H | −3 (−6 dB) |
| L | L | H | H | −4 (−8 dB) |
| H | H | L | H | −5 (−10 dB) |
| L | H | L | H | −6 (−12 dB) |

### c) Codes Bits (bits 9-12)

Data bits 9-12 must match the cods for TC9187AN. Data is received only when these bits are as shown below.

| 9 | 10 | 11 | 12 |
|---|---|---|---|
| H | H | L | H |

IC7, 8: TC9176P

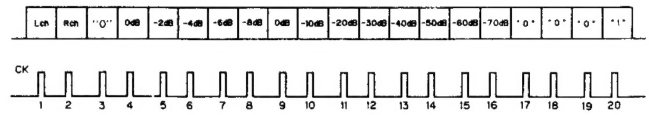


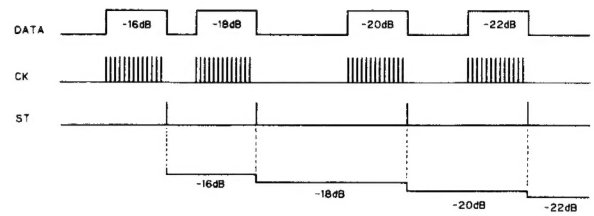

## • Pin Functions: (TC9176P)

| Terminal | Name | I/O | Function and operation |
|---|---|---|---|
| 2<br>15 | L-OUT1<br>R-OUT1 | Output | 10 dB step attenuator output<br>Signal with IN is attenuated from 0 to 70 dB in B steps at the 10 dB step. |
| 3<br>14 | L-IN1<br>R-IN1 | Input | 10 dB attenuator input |
| 4, 13 | A-GND | | AC ground terminal. |
| 5<br>12 | L-IN2<br>R-IN2 | Input | 2 dB attenuator input |
| 6<br>11 | L-OUT2<br>R-OUT2 | Output | 2 dB attenuator output<br>Signal with IN is attenuated from 0 to 8 dB in 5 steps at the 2 dB step. |
| 9 | DATA | Input | Data input of attenuation amount and channel selection<br>Consisting of 20 bits, it is input by the CK signal. |
| 8 | CK | Input | Clock input<br>Clock input to fetch dats of the DATA terminal. |
| 10 | ST | Input | Strobe input<br>Attenuation amount and channel selection data fetched from the DATA and CK terminal can be latched by having this terminal set to "H" level. If "H" level is not applied to this terminal, the previous data will be in effect. |
| 16 | VDD | | (+) power applied terminal |
| 7 | GND | | Ground terminal |
| 1 | VSS | | (−) power applied terminal |

The TC9176P is a built-in electronic volume IC for loudness ON/OFF. The attenuation volume data output by the system controller (IC301), is input to the DATA, CK, and ST terminals. The data consists of 20 bits. It consists of the following.

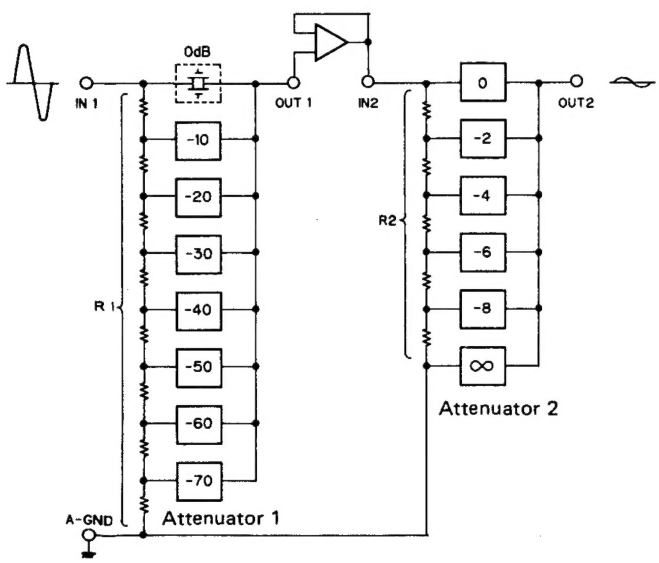
| Bit | Description |
|---|---|
| 1, 2 | Selection of L channel, R channel |
| 3 | Always "0" |
| 4 – 8 | Setting of 2 dB step attenuator |
| 9 – 16 | Setting of 10 dB step attenuator |
| 17 – 20 | Chip select bit<br>"0001" is select mode, for values other than this, there is no operation. |



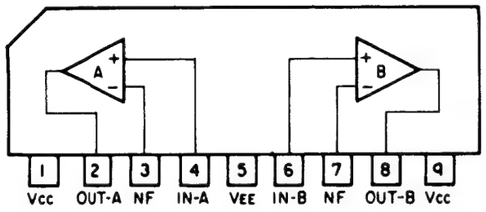




There will be infinite attenuation volume for –78 dB data. Therefore, step up from infinity to 1 will be –76 dB. Changes of the fetched data will all be synchronized with ST signal transition.

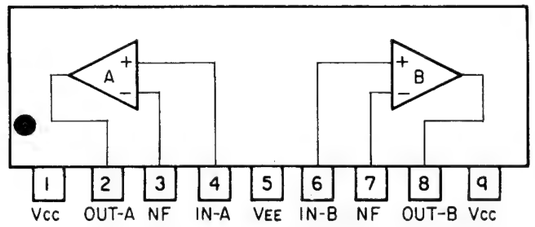
The attenuator section consists of a diffused resistor array and an analog switch. Attenuator 1 can attenuate 0 to 70 dB at 10 dB step, and attenuator 2 can attenuate 0 to 8 dB at 2 dB step, for a total attenuation of 0 to 76 dB at 2 dB step.



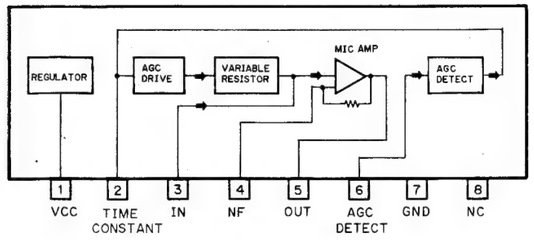
IC1, 2: NJM2068S



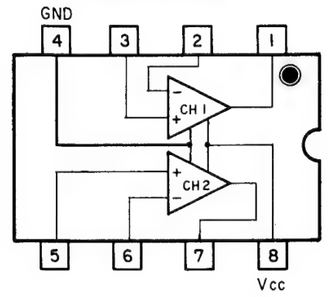

IC5, 6, 9-11: µPC4570HA



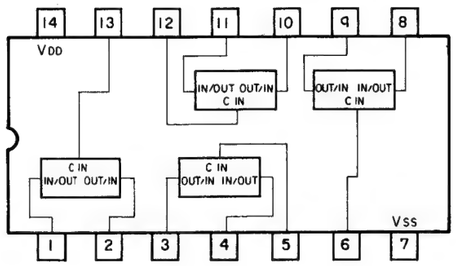

IC201: M51304L



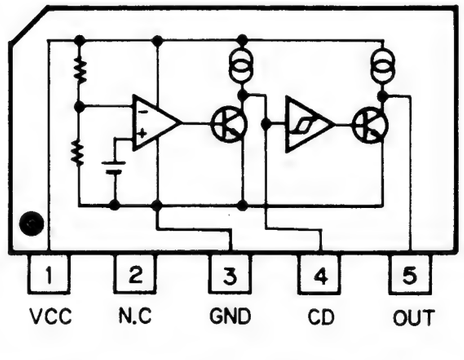

IC203: HA17358



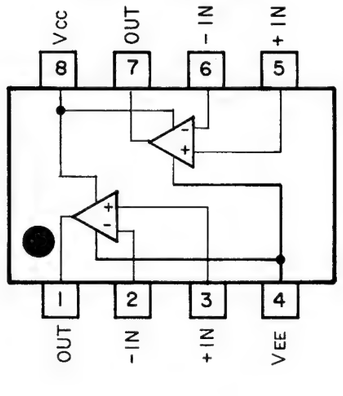

IC12: TC4066BP




IC13: M51954AL

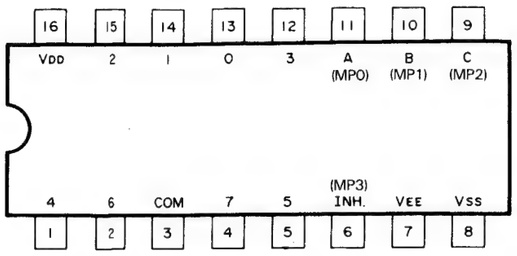


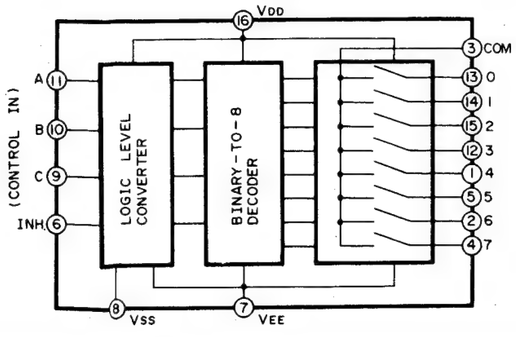

IC204-212: NJM4558S




## • Sub Unit

IC202: TC4051BP




The TC4051BP is an 8 channel multiplexer capable of both selecting between the analog signal and digital signal and combining them. The switch corresponding to each of the 8 channels is turned on by the digital signal in the control pin.

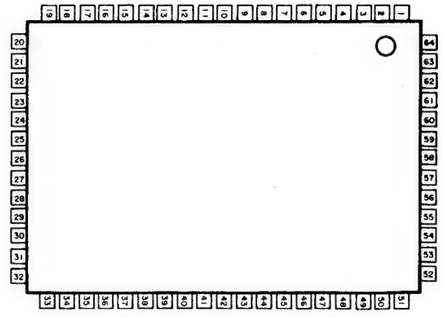
| Control input signals | | | | "ON" channel |
|---|---|---|---|---|
| INH | C | B | A | |
| L | L | L | L | 0 |
| L | L | L | H | 1 |
| L | L | H | L | 2 |
| L | L | H | H | 3 |
| L | H | L | L | 4 |
| L | H | L | H | 5 |
| L | H | H | L | 6 |
| L | H | H | H | 7 |

When a HIGH level is input to INH, no channel turns on regardless of the state of the other inputs.

## • Key Board Unit

*IC's marked by *are MOS type.*
*Be careful in handling them because they are very liable to be damaged by electrostatic induction.*

IC301: PD4122B



## • Pin Functi

| Terminal | |
|---|---|
| 1 | N |
| 2 | D |
| 3 | C |
| 4 | D |
| 5 | B |
| 6 | S |
| 7 | S |
| 8 | L |
| 9 | S |
| 10 | S |
| \| | \| |
| 13 | S |
| 14 | K |
| \| | \| |
| 17 | K |
| 18 | M |
| \| | \| |
| 21 | M |
| 22 | E |
| 23 | X |
| 24 | X |
| 25 | V |
| 26 | V |
| 27 | P |
| \| | \| |
| 33 | P |
| 34 | P |
| \| | \| |
| 41 | P |
| 42 | G |
| \| | \| |
| 50 | G |
| 51 | V |
| 52 | V |
| 53 | D |
| \| | \| |
| 56 | D |
| 57 | B |
| 58 | V |

## • Pin Functions: (PD4122B)

| Terminal | Terminal Name | Input/Output | Function and Operation |
|---|---|---|---|
| 1 | NC | | Not used |
| 2 | DIM | Input | Dimmer control input terminal. Dimmer ON when H level input. |
| 3 | $\overline{CK}$ | CMOS Output | Control data clock terminal. Output of electronic GEQ volume control data of synchronization clock. |
| 4 | DATA | CMOS Output | Control data terminal. Output of electronic GEQ volume control data. |
| 5 | BTB 1 | Input | BT + B input terminal. Input of system power supply control. System switches ON with input of H level. Power is switched OFF and unit enters stand-by mode with change iron H level to L level. |
| 6<br>7 | ST1<br>ST2 | CMOS Output<br>CMOS Output | Electronic GEQ volume control data latch output terminals |
| 8 | LEVEL | Input | Spectrum analyzer level input terminal. Input of spectrum analyzer display level comparator output. |
| 9 | SR | CMOS Output | Surround control output terminal. H when active. |
| 10<br>I<br>13 | STB0<br>I<br>STB3 | CMOS Output | Strobe output terminal for key matrix. H when active. |
| 14<br>I<br>17 | K0<br>I<br>K3 | Input | Input terminal for key matrix. |
| 18<br>I<br>21 | MPX0<br>I<br>MPX3 | CMOS Output | B.P.F. switch data output terminal for spectrum analyzer |

**MPX Control Data**

| B.P.F. | 60 Hz | 125 Hz | 250 Hz | 500 Hz | 1 kHz | 2 kHz | 4 kHz | 8 kHz | 16 kHz |
|---|---|---|---|---|---|---|---|---|---|
| MPX0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| MPX1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |
| MPX2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| MPX3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

| | | | |
|---|---|---|---|
| 22 | EVENT | | Not used. |
| 23<br>24 | X2<br>X1 | Output<br>Input | Oscillation circuit output terminal<br>Oscillation circuit input terminal |
| 25 | VSS | | GND terminal |
| 26 | VDD | | Power supply terminal |
| 27<br>I<br>33 | P1<br>I<br>P7 | Output<br>Pch<br>Open Drain | FL display tube segment output terminal |
| 34<br>I<br>41 | P15<br>I<br>P8 | Output<br>Pch<br>Open Drain | FL display tube segment output terminal |
| 42<br>I<br>50 | G1<br>I<br>G9 | Output<br>Pch<br>Open Drain | FL display tube timing output terminal |
| 51 | VLOAD | Input | Display driver power supply terminal. |
| 52 | VPRE | Input | Pre-driver power supply terminal. |
| 53<br>I<br>56 | DA0<br>I<br>DA3 | CMOS Output | A/D converter control output for spectrum analyzer |
| 57 | BTB2 | Input | Stand-by cnacel interrupt input terminal. Stand-by mode cancelled with change iron L level to H level. |
| 58 | VDD | | Power supply terminal |

*y are very*
*uction.*



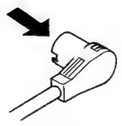


| Terminal | Terminal Name | Input/Output | Function and Operation |
|---|---|---|---|
| 59<br>I<br>61 | DA4<br>I<br>DA6 | CMOS Output | A/D converter control output for spectrum analyzer |
| 62 | $\overline{SR}$ | CMOS Output | Surround control output terminal. L when active. |
| 63 | RESET | Input | Reset input terminal. |
| 64 | BFEP | CMOS Output | Key touch tone output terminal (4 kHz, 30 ms) |

## SPECTRUM ANALYZER A/D CONVERSION THRESHOLD VALUE

| THRESHOLD VALUE | | | | | | | (HEX) | LEVEL | D/A Output (V) |
|---|---|---|---|---|---|---|---|---|---|
| DA6 | DA5 | DA4 | DA3 | DA2 | DA1 | DA0 | | | |
| 1 | 1 | 1 | 0 | 0 | 0 | 1 | 71 | 12 | 2.2 |
| 1 | 0 | 1 | 1 | 0 | 1 | 0 | 5A | 11 | 1.76 |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 | 48 | 10 | 1.41 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 39 | 9 | 1.11 |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 2D | 8 | 0.880 |
| 0 | 1 | 0 | 0 | 1 | 0 | 0 | 24 | 7 | 0.703 |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1D | 6 | 0.566 |
| 0 | 0 | 1 | 0 | 1 | 1 | 1 | 17 | 5 | 0.449 |
| 0 | 0 | 1 | 0 | 0 | 1 | 0 | 12 | 4 | 0.352 |
| 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0E | 3 | 0.273 |
| 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0B | 2 | 0.215 |
| 0 | 0 | 0 | 1 | 0 | 0 | 1 | 09 | 1 | 0.176 |

# 5. SCHEMATIC CIRCUIT DIAGRAM



The view of the connector is one seen from the mating connector.

MAIN UNIT

Surround Circuit

IC9 µPC4570HA

IC10 µPC4570HA

IC11 µPC4570HA

IC1 15dB AMP NJM2068S

Input Connector

Buffer

IC2 : NJM2068S

Electronic Graphic Equalizer

IC3 TC9187AN

IC4 : TC9187AN

Analog Switch

IC12 : TC4066BP

IC5,6 µPC4570HA

Electronic D.A.B. Volume

IC6

Q19 ~ 36 : 2SC2458L

Q18 2SC1740S or 2SC2458

D4 : HZS6R2JB3 or RD6R2JSB3

SUB UNIT

IC201 : M51304L ALC

Q203 2SC1740S or 2SC2458

IC204

IC205

IC206

IC207

IC208

IC209

IC210

IC211

IC212

IC202 TC4051BP Multiplexer

IC203 HA17358 Level Shifter and Comparator

Q201 2SA1048 or 2SA933S

Q202 DTC143ES

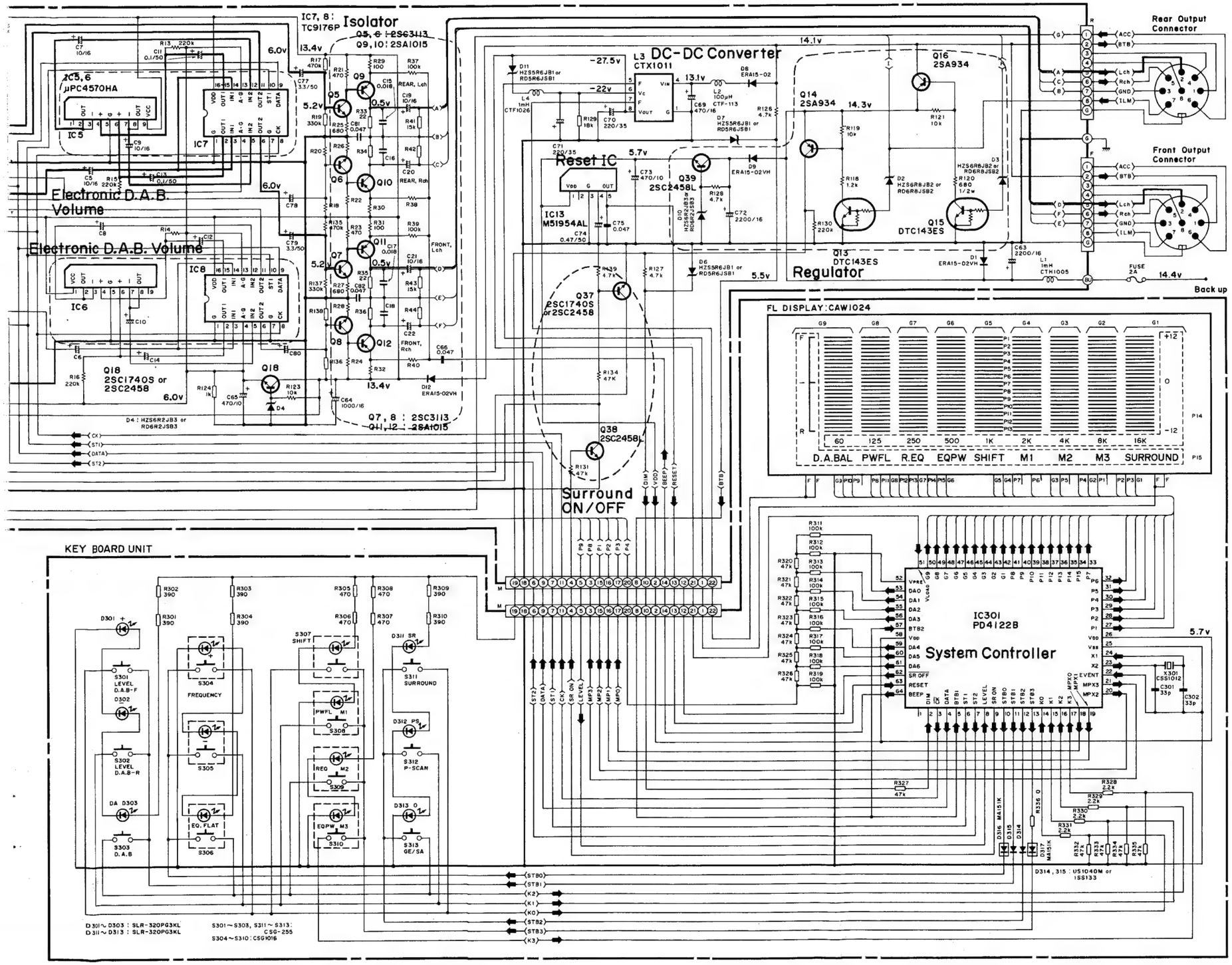
D201 ~ D218 : 1S1040M or 1SS133

IC204 ~ 212 NJM4558S Active Filter and Rectifiers

KEY BOARD UNIT

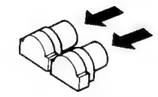
D301 ~ D303 : SLR-320P03KL

D311 ~ D313 : SLR-320P03KL




NOTE:

- Indicates a chip resistor
- Indicates a chip capacitor
- Indicates a chip diode

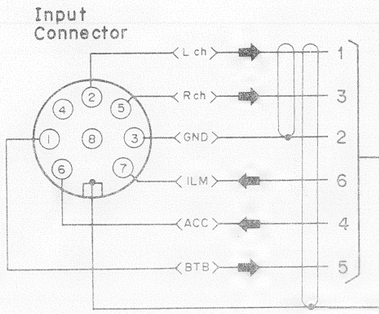


The view of the connector is one seen from the mating connector.

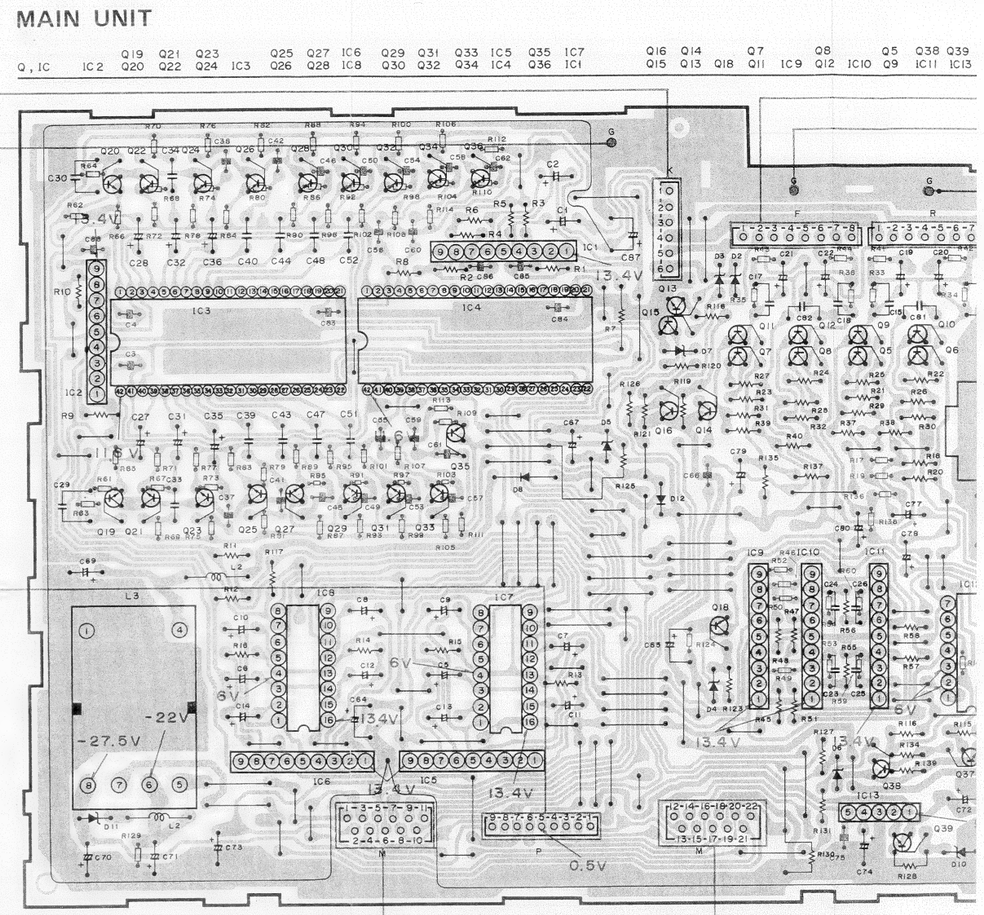
| Graphic Equalizer Assy |
|---|
| Consists of<br>• Main Unit<br>• Sub Unit<br>• Key Board Unit |

Fig. 6

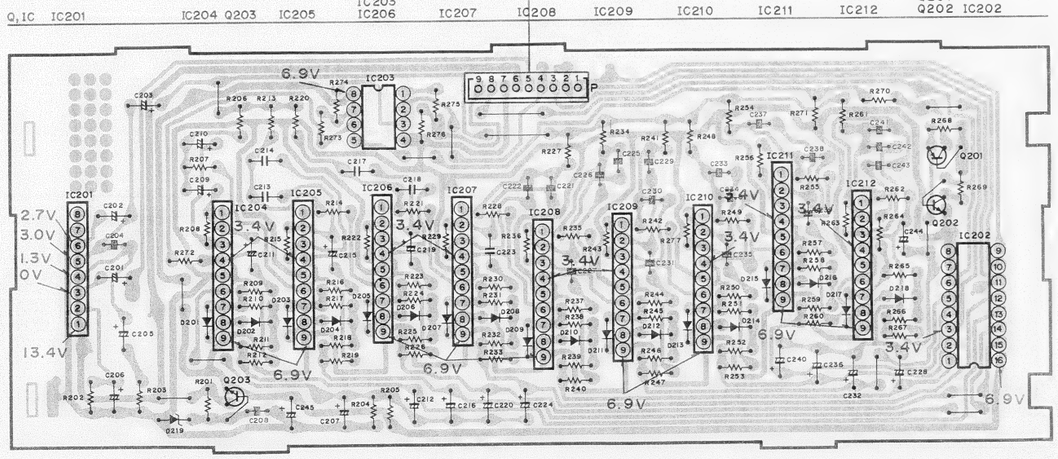
# 6. CONNECTION DIAGRAM



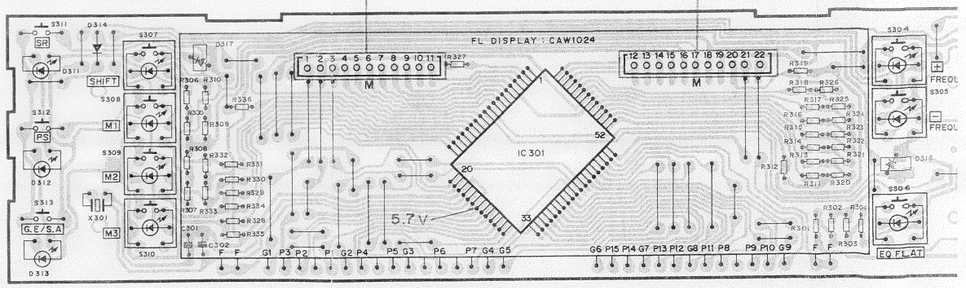

MAIN UNIT



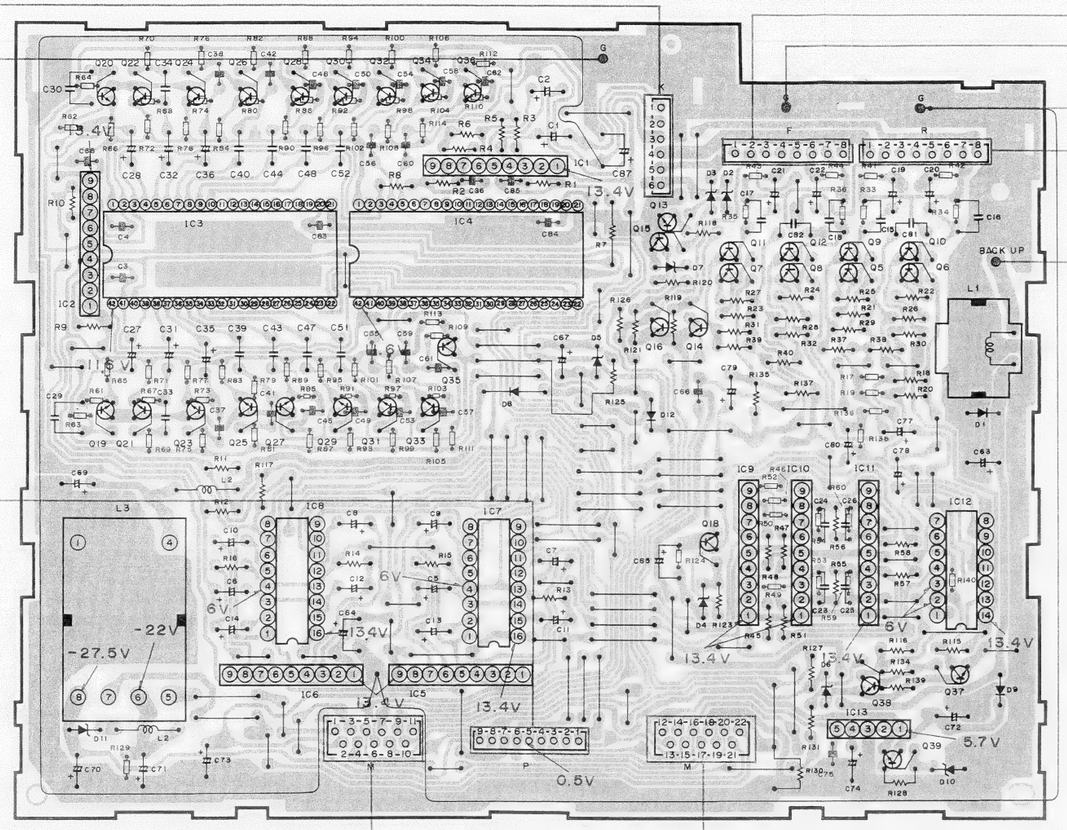

SUB UNIT

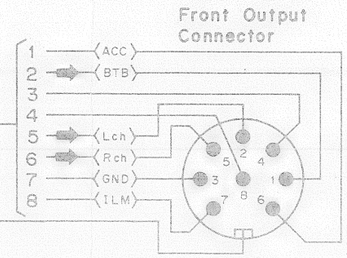


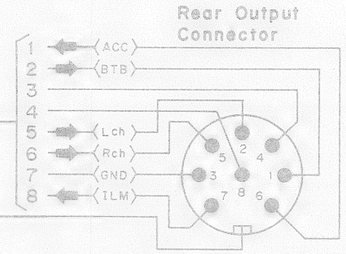

KEY BOARD UNIT



## MAIN UNIT





## KEY BOARD UNIT

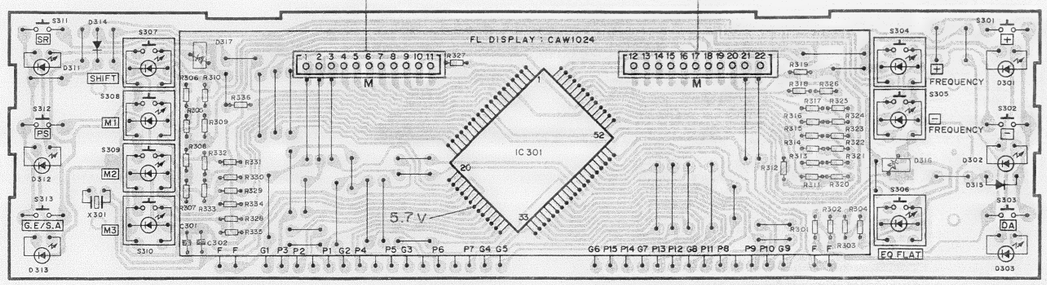



Fig. 7

# 7. EXPLODED VIEW

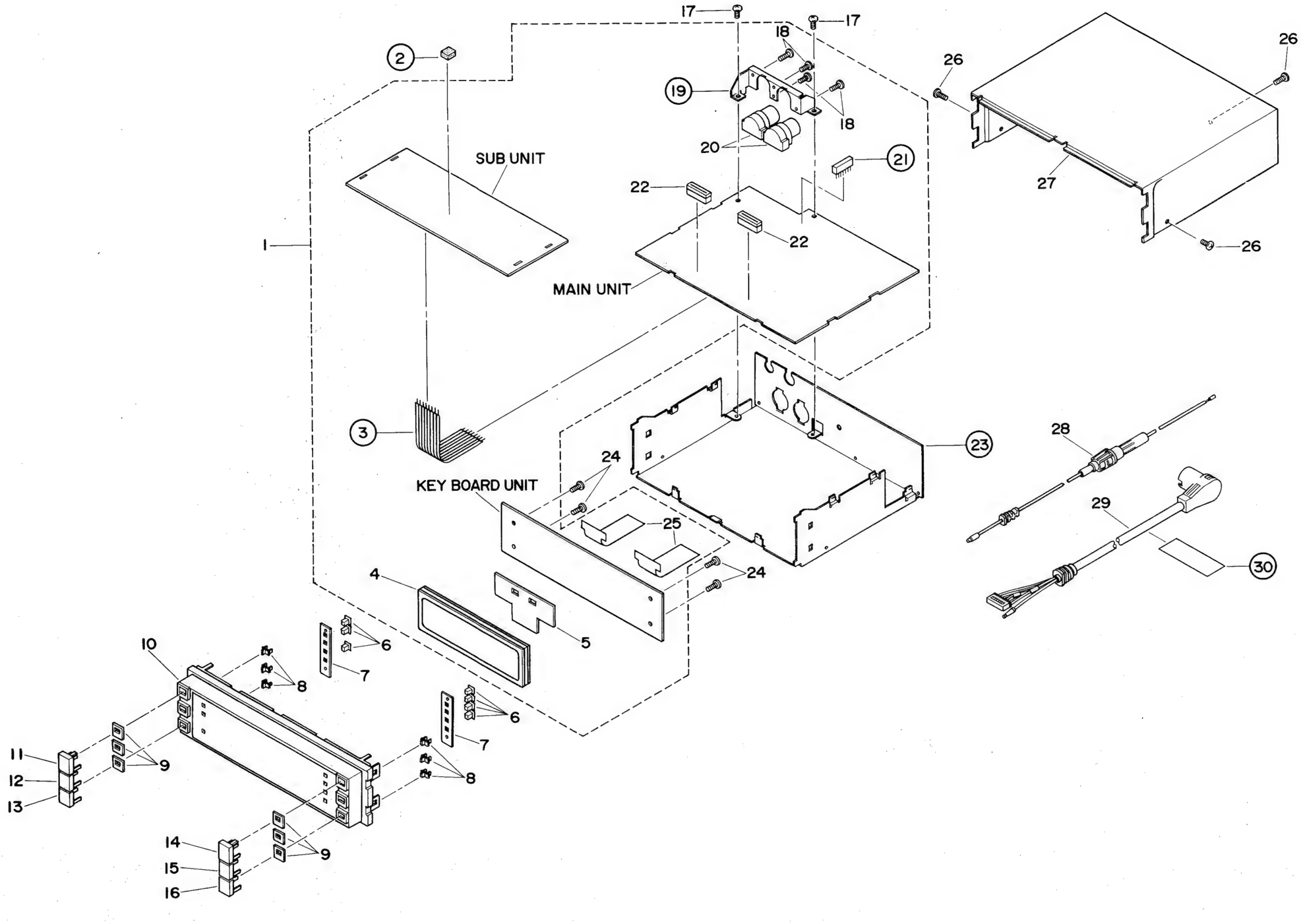



Fig. 8

## • Parts List

*NOTE:*

- *For your Parts*
  *★ ★ and ★.*
  *★ ★: GENER*
  *This classificat*
  *number, temp*
- *Parts whose pa*
- *Parts marked l*
  *longer than us*

| Mark | No. | Part No. |
|---|---|---|
| ◉ | 1 | CWX1068 |
| | 2 | |
| | 3 | |
| | 4 | CAW1024 |
| | 5 | CNM1553 |
| ★ | 6 | CAC1148 |
| | 7 | CNM1552 |
| | 8 | CNV1307 |
| | 9 | CNM1100 |
| | 10 | CXA1753 |
| ★ | 11 | CAC1460 |
| ★ | 12 | CAC1462 |
| ★ | 13 | CAC1464 |
| ★ | 14 | CAC1459 |
| ★ | 15 | CAC1461 |

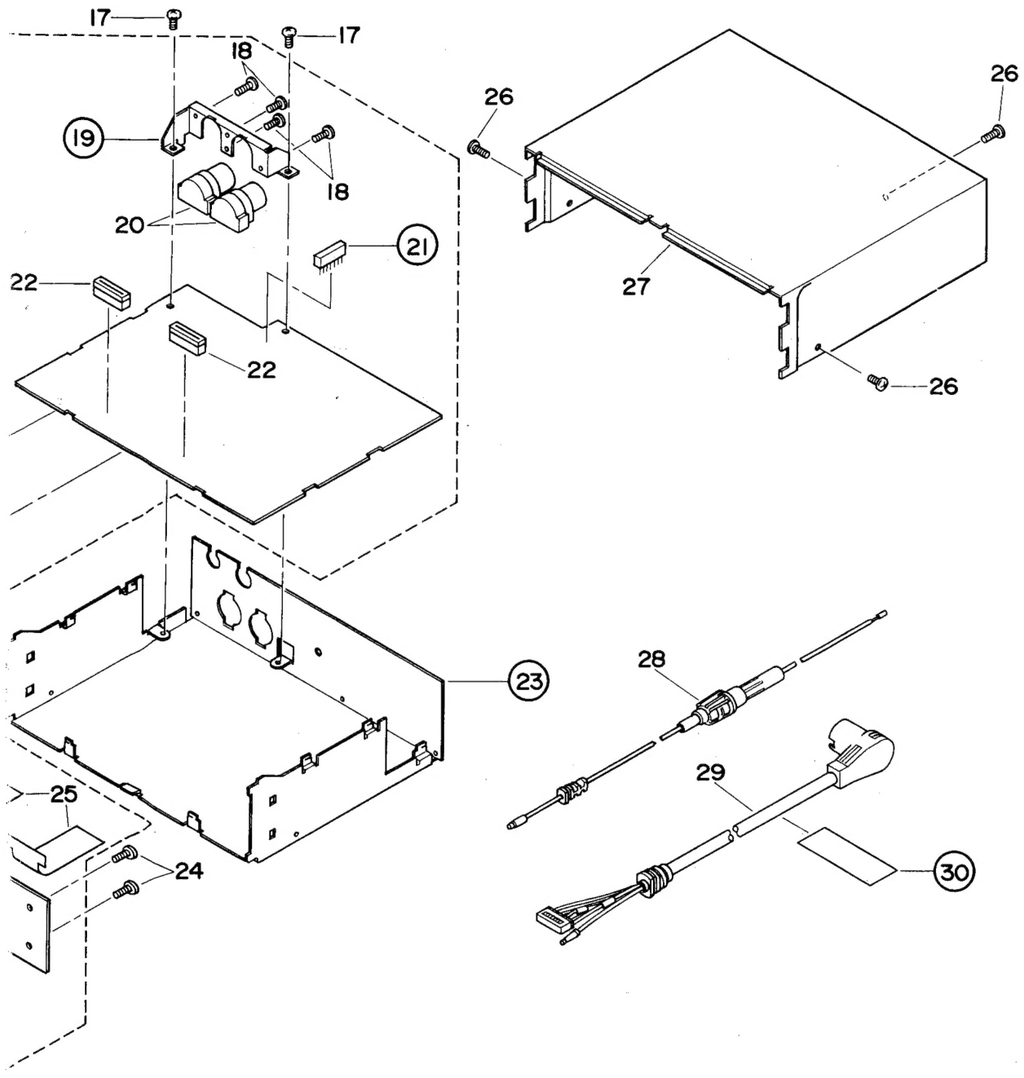



Fig. 8

## • Parts List

*NOTE:*

- *For your Parts Stock Control, the fast moving items are indicated with the marks ★ ★ and ★.*
  *★ ★: GENERALLY MOVES FASTER THAN ★.*
  *This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.*
- *Parts whose parts numbers are omitted are subject to being not supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

| Mark | No. | Part No. | Description |
|---|---|---|---|
| ◉ | 1 | CWX1068 | Graphic Equalier Assy |
| | 2 | | Cushion |
| | 3 | | Connector |
| | 4 | CAW1024 | FL Display |
| | 5 | CNM1553 | Cushion |
| ★ | 6 | CAC1148 | Button |
| | 7 | CNM1552 | Cushion |
| | 8 | CNV1307 | Holder |
| | 9 | CNM1100 | Cushion |
| | 10 | CXA1753 | Grille Unit |
| ★ | 11 | CAC1460 | Button (+) |
| ★ | 12 | CAC1462 | Button (−) |
| ★ | 13 | CAC1464 | Button (DA) |
| ★ | 14 | CAC1459 | Button (SR) |
| ★ | 15 | CAC1461 | Button (PS) |
| ★ | 16 | CAC1463 | Button (G.E/S.A) |
| | 17 | BMZ30P060FMC | Screw |
| | 18 | BMZ20P050FZK | Screw |
| | 19 | | Bracket |
| | 20 | CKS1104 | Connector |
| | 21 | | Plug |
| | 22 | CKS-397 | Connector |
| | 23 | | Chassis |
| | 24 | BPZ20P060FMC | Screw |
| | 25 | CNP1484 | P.C.Board |
| | 26 | BMZ30P050FZK | Screw |
| | 27 | CNB1137 | Case |
| | 28 | CDE1628 | Connector |
| | 29 | CDE1537 | Connector |
| | 30 | | Label |

# 8. ELECTRICAL PARTS LIST

*NOTE:*

- *For your Parts Stock Control, the fast moving items are indicated with the marks ★ ★ and ★.*
  *★ ★: GENERALLY MOVES FASTER THAN ★.*
  *This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.*
- *Parts whose parts numbers are omitted are subject to being not supplied.*
- *The part numbers shown below indicate chip components.*
  *Chip Resistor*
  *RS1/8S□□□J, RS1/10S□□□J*
  *Chip Capacitor (except for CQS. . . . .)*
  *CKS....., CCS....., CSZS.....*

| Graphic Equalizer Assy |
|---|
| Consists of<br>• Main Unit<br>• Sub Unit<br>• Key Board Unit |

Unit Number :
Unit Name : Graphic Equalizer Assy

MISCELLANEOUS

| Mark | Circuit Symbol & No. | Part Name | Part No. |
|---|---|---|---|
| ** | IC 1 2 | | N,JM2068S |
| ** | IC 3 4 | | TC9187AN |
| ** | IC 5 6 9 10 11 | | μPC4570HA |
| ** | IC 7 8 | | TC9176P |
| ** | IC 12 | | TC4066BP |
| ** | IC 13 | | M51954AL |
| ** | IC 201 | | M51304L |
| ** | IC 202 | | TC4051BP |
| ** | IC 203 | | HA17358 |
| ** | IC 204 205 206 207 208 209 210 211 212 | | N,JM4558S |
| ** | IC 301 | | PD4122B |
| ** | Q 5 6 7 8 | | 2SC3113 |
| ** | Q 9 10 11 12 | | 2SA1015 |
| ** | Q 13 15 | | DTC143ES |
| ** | Q 14 16 | | 2SA934 |
| ** | Q 18 37 | | 2SC1740S<br>(2SC2458) |
| ** | Q 19 20 21 22 23 24 25 26 27 28 | | 2SC2458L |
| ** | Q 29 30 31 32 33 34 35 36 38 39 | | 2SC2458L |
| ** | Q 201 | | 2SA1048<br>(2SA933S) |
| ** | Q 202 | | DTC143ES |
| ** | Q 203 | | 2SC1740S<br>(2SC2458) |
| * | D 1 9 12 | | ERA15-02VH |
| * | D 2 3 | | HZS6R8,1B2<br>(RD6R8,1SB2) |
| * | D 4 10 | | HZS6R2,1B3<br>(RD6R2,1SB3) |
| * | D 5 | | RD12,1SB1<br>(HZS12,1B1) |
| * | D 6 7 11 | | HZS5R6,1B1<br>(RD5R6,1SB1) |
| * | D 8 | | ERA15-02 |
| * | D 201 202 203 204 205 206 207 208 209 210 | | US1040M<br>(1SS133) |
| * | D 211 212 213 214 215 216 217 218 | | US1040M<br>(1SS133) |
| * | D 219 | | HZS7R5,1B2<br>(RD7R5,1SB2) |
| * | D 301 302 303 311 312 313 | LED | SLR-320PG3KL |
| * | D 314 315 | | US1040M<br>(1SS133) |
| * | D 316 317 | Chip Diode | MA151K |
| | L 1 | Choke 1mH | CTH1005 |
| | L 2 | Coil 100μH | CTF-113 |
| | L 3 | Converter | CTX1011 |
| | L 4 | Coil 1mH | CTF1026 |
| | X 301 | Xtal | CSS1012 |
| ** | S 301 302 303 311 312 313 | Switch | CSG-255 |
| ** | S 304 305 306 307 308 309 310 | Switch(with LED) | CSG1016 |
| | | FL Display | CAW1024 |

RESISTORS

| Mark | Circuit Symbol & No. | Part Name | Part No. |
|---|---|---|---|
| | R 1 2 | | RD1/4PS752,JL |
| | R 3 4 | | RD1/4PS152,JL |
| | R 5 6 13 14 15 16 130 | | RD1/4PS224,JL |
| | R 7 | | RD1/4PM272,J |
| | R 8 9 10 | | RD1/4PS272,JL |
| | R 11 12 | | RD1/4PS223,JL |
| | R 17 136 | | RS1/8S474,J |
| | R 18 135 | | RD1/4PS474,JL |
| | R 19 138 | | RS1/8S334,J |
| | R 20 137 | | RD1/4PS334,JL |
| | R 21 22 23 24 | | RD1/4PS471,JL |
| | R 25 26 27 28 | | RD1/4PS681,JL |
| | R 29 30 31 32 | | RD1/4PS101,JL |
| | R 33 34 35 36 121 | | RS1/8S220,J |
| | R 37 38 39 40 | | RD1/4PS104,JL |

| Mark | Circuit Symbol & No. | Part Name | Part No. |
|---|---|---|---|
| R | 41 42 43 44 | | RS1/8S153J |
| R | 45 55 56 57 58 | | RD1/4PS682JL |
| R | 46 59 60 | | RS1/10S682J |
| R | 47 48 51 | | RD1/4PS222JL |
| R | 49 50 52 53 54 65 66 71 72 77 | | RS1/10S222J |
| R | 61 62 67 68 73 74 | | RS1/10S181J |
| R | 63 64 | | RS1/10S124J |
| R | 69 70 | | RS1/10S823J |
| R | 75 76 | | RS1/10S563J |
| R | 78 83 84 89 90 95 96 101 102 107 | | RS1/10S222J |
| R | 79 80 85 86 91 92 97 98 | | RS1/10S271J |
| R | 81 82 | | RS1/10S333J |
| R | 87 88 | | RS1/10S273J |
| R | 93 94 99 100 | | RS1/10S183J |
| R | 103 104 109 110 | | RS1/10S331J |
| R | 105 106 111 112 | | RS1/10S223J |
| R | 108 113 114 | | RS1/10S222J |
| R | 115 116 117 126 127 128 139 | | RD1/4PS472JL |
| R | 118 | | RD1/4PS122JL |
| R | 119 123 | | RD1/4PS103JL |
| R | 120 | | RD1/2VS681J |
| R | 124 | | RS1/8S102J |
| R | 125 | | RD1/4PS102JL |
| R | 129 | | RS1/8S183J |
| R | 131 134 | | RD1/4PS473JL |
| R | 140 336 | | RS1/8S0R0J |
| R | 201 275 | | RD1/4PS472JL |
| R | 202 | | RD1/4PS103JL |
| R | 203 | | RD1/4PS560JL |
| R | 204 205 | | RD1/4PS102JL |
| R | 206 274 | | RD1/4PS473JL |
| R | 207 | | RD1/4PS182JL |
| R | 208 | | RD1/4PS184JL |
| R | 209 257 | | RD1/4PS823JL |
| R | 210 217 224 231 238 245 251 258 265 271 | | RD1/4PS124JL |
| R | 211 218 225 232 239 246 252 259 266 | | RD1/4PS151JL |
| R | 212 219 226 233 240 247 250 253 260 | | RD1/4PS104JL |
| R | 213 227 | | RD1/4PS393JL |
| R | 214 228 262 | | RD1/4PS152JL |
| R | 215 229 | | RD1/4PS154JL |
| R | 216 223 230 237 243 244 273 277 | | RD1/4PS124JL |
| R | 220 234 254 261 | | RD1/4PS333JL |
| R | 221 235 255 | | RD1/4PS132JL |
| R | 222 236 256 263 | | RD1/4PS134JL |
| R | 241 248 | | RD1/4PS303JL |
| R | 242 249 | | RD1/4PS122JL |
| R | 264 | | RD1/4PS563JL |
| R | 267 268 | | RD1/4PS104JL |
| R | 269 | | RD1/4PS224JL |
| R | 270 272 276 | | RD1/4PS223JL |
| R | 301 302 303 304 309 310 | | RS1/8S391J |
| R | 305 306 307 308 | | RS1/8S471J |
| R | 311 312 313 314 315 316 317 318 319 | | RS1/10S104J |
| R | 320 321 322 323 324 325 326 327 332 333 | | RS1/10S473J |
| R | 328 329 330 331 | | RS1/10S222J |
| R | 334 335 | | RS1/10S473J |

CAPACITORS

| Mark | Circuit Symbol & No. | Part Name | Part No. |
|---|---|---|---|
| C | 1 2 31 32 | | CEA010M50L2 |
| C | 3 4 61 62 | | CKSQYB182K50 |
| C | 5 6 7 8 9 10 | | CEA100M16L2 |
| C | 11 12 13 14 | | CEA0R1M50L2 |
| C | 15 16 17 18 | | CQMA183K50 |
| C | 19 20 21 22 | | CEA100M16L2 |
| C | 23 24 | | CQMA103K50 |
| C | 25 26 | | CKCYB331K50 |
| C | 27 28 77 78 79 80 | | CEA3R3M50L2 |
| C | 29 30 33 34 | | CQFAH104J50L |
| C | 35 36 | | CEAR68M50LL |
| C | 37 38 | | CKSYB563K25 |
| C | 39 40 | | CQFAH334J50L |
| C | 41 42 | | CKSYB333K50 |
| C | 43 44 | | CQFAH184J50L |
| C | 45 46 | | CKSQYB183K25 |
| C | 47 48 | | CQMA823K50 |
| C | 49 50 | | CKSQYB153K25 |
| C | 51 52 | | CQMA393K50 |
| C | 53 54 | | CKSQYB822K50 |
| C | 55 56 | | CKSYB153K50 |
| C | 57 58 | | CKSQYB392K50 |
| C | 59 60 235 | | CKSYB822K50 |
| C | 63 72 | 2200μF/16V | CCH1001 |
| C | 64 | | CEA102M16L2 |
| C | 65 73 | | CEA471M10L2 |
| C | 66 75 | | CKSYB473K25 |
| C | 67 | | CEA330M16L2 |
| C | 68 83 84 | | CKSYB102K50 |
| C | 69 | 470μF/16V | CCH-114 |
| C | 70 71 | | CEA221M35L2 |
| C | 74 | | CEAR47M50L2 |
| C | 81 82 | | CQMA473K50 |
| C | 85 86 | | CKSQYB471K50 |
| C | 87 | | CEA102M6R3L2 |
| C | 201 | | CEA100M16L2 |
| C | 202 211 | | CEAR47M50L2 |
| C | 203 | | CEA010M50L2 |
| C | 204 | | CKSYB102K50 |
| C | 205 207 245 | | CEA101M10L2 |
| C | 206 | | CEA330M16L2 |
| C | 208 | | CKSYF104Z25 |
| C | 209 210 | | CEAR15M50LL |
| C | 212 216 220 224 228 232 236 240 244 | | CEA2R2M50L2 |
| C | 213 214 | | CQMA823K50 |
| C | 215 | | CEAR22M50L2 |
| C | 217 218 | | CQMA473K50 |
| C | 219 | | CEA0R1M50L2 |
| C | 221 222 | | CKSYB223K50 |
| C | 223 | | CQMA683K50 |
| C | 225 226 | | CKSYB123K50 |
| C | 227 | | CKSYB333K50 |
| C | 229 230 | | CKSYB682K50 |
| C | 231 | | CKSYB153K50 |
| C | 233 234 | | CKSYB332K50 |
| C | 237 238 | | CKSYB152K50 |
| C | 239 | | CKSYB472K50 |
| C | 241 242 | | CKSYB821K50 |
| C | 243 | | CKSYB222K50 |
| C | 301 302 | | CCSCH330J50 |

# 9. PACKING METHOD

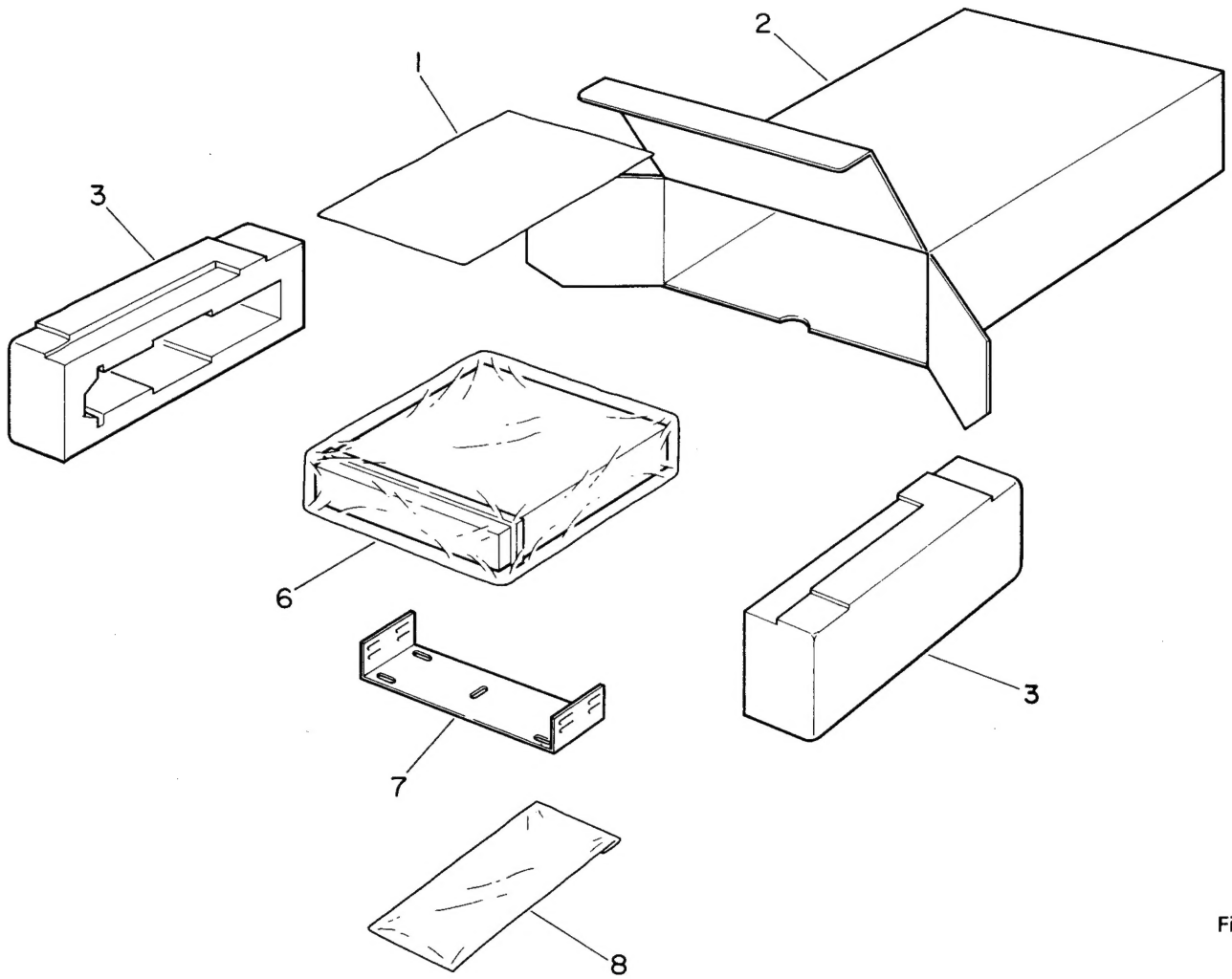



Fig. 9

## • Parts List

| Mark No. | Part No. | Description |
|---|---|---|
| 1 | CRD1135 | Owner's Manual |
| | | Card |
| 2 | CHG1341 | Carton |
| 3 | CHP1021 | Styrofoam |
| 4,5 | ····· | |
| 6 | CEG-114 | Cover |
| 7 | CNB-723 | Mounting Bracket |
| 8 | CEA1119 | Accessory Assy |
| 8-1 | CDE1289 | Cord |
| 8-2 | | Screw Kit |

| Mark No. | Part No. | Description |
|---|---|---|
| 8-2-1 | CBA-102 | Screw |
| 8-2-2 | HMF40P080FUC | Screw |
| 8-2-3 | HMF40P080FZK | Screw |
| 8-2-4 | NF50FMC | Nut |
| 8-3 | | Double-sided Seal |
| 8-4 | CNF-111 | Strap |
| 8-5 | CNN-058 | Spacer |