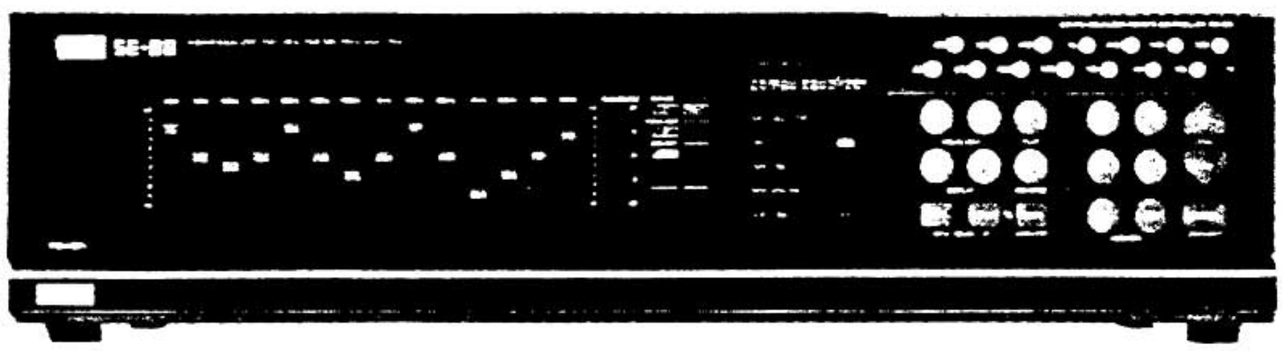
# SERVICE MANUAL

## FULL REMOTE CONTROL SYSTEM COMPU-EQUALIZER

# SANSUI SE-88



## CAUTION

1. Parts identified by the ⚠ symbol on the schematic diagram and the parts list are critical for safety. Use only replacement parts that have critical characteristics recommended by the manufacturer.
2. Make leakage-current or resistance measurements to determine that exposed parts are acceptably insulated from the supply circuit before returning the appliance to the customer.

Sansui

SANSUI ELECTRIC CO., LTD.

**SE-88**

## •SPECIFICATIONS

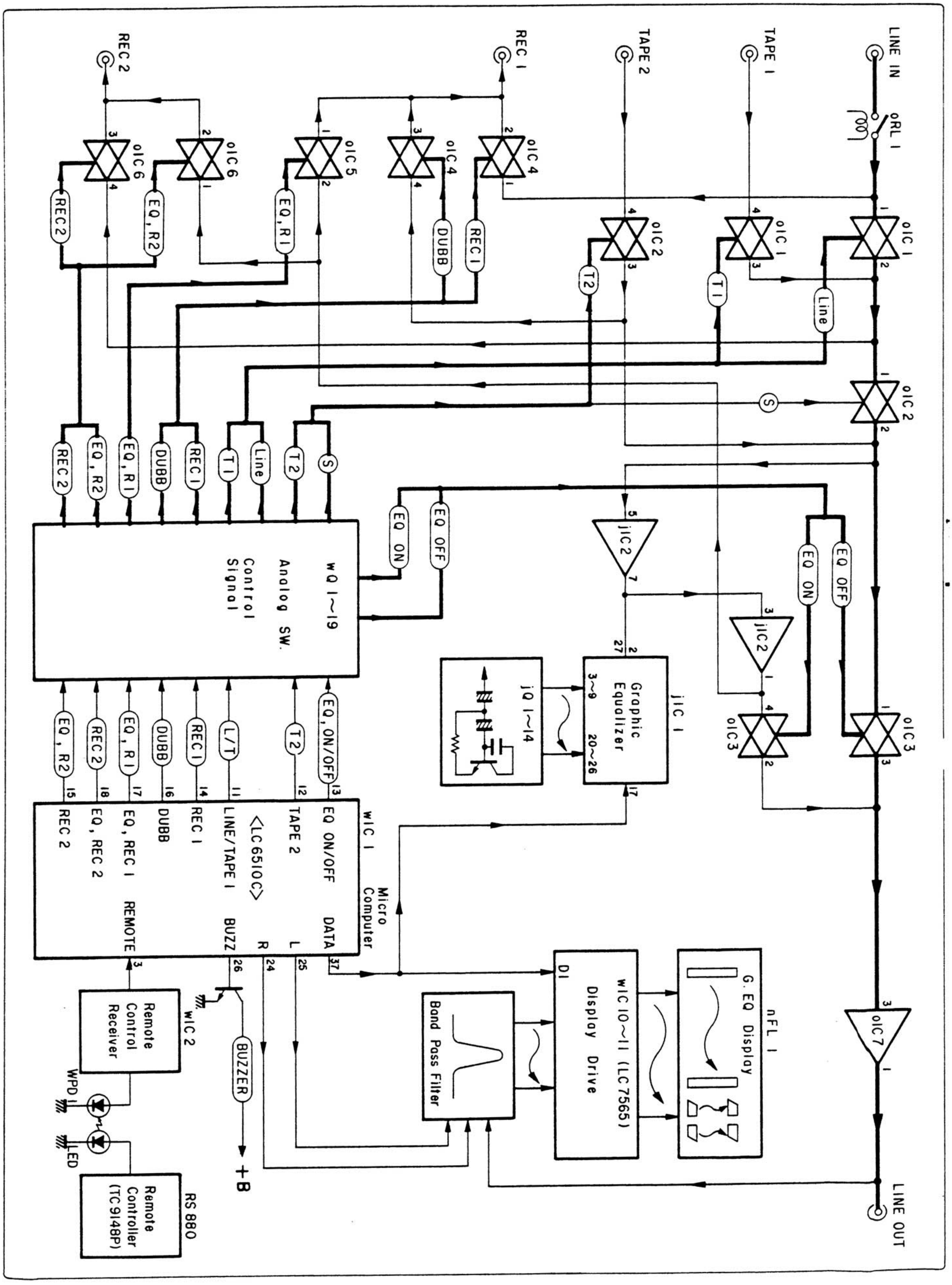
**Input sensitivity and impedance** (1 kHz)
INPUT, TAPE PLAY-1,2
..... 150mV/47 kohms
**Output level and impedance** (1 kHz)
TAPE REC-1,2 ..... 150mV/1.5 kohms
OUTPUT ..... 150mV/1.5 kohms
(Maximum output level: 5V into 47 kohms at 0.5% total harmonic distortion)
**Total harmonic distortion** (2V, 20 Hz to 20 kHz)
INPUT, TAPE PLAY-1,2
..... 0.008%
**Frequency response** (at 0.5V, Equalizer controls: "0" position)
INPUT, TAPE PLAY-1,2
..... 10 Hz to 100 kHz, +1.0 dB, —3.0 dB
**Signal to noise ratio** (Short-circuit, A-network)
INPUT, TAPE PLAY-1,2
..... 110 dB
**Equalizer frequency** ..... 25 Hz, 50 Hz, 100 Hz, 160 Hz, 250 Hz, 400 Hz, 630 Hz, 1 kHz, 1.6 kHz, 2.5 kHz, 4 kHz, 6.3 kHz, 10 kHz, 20 kHz
**Level variation range** ..... ±10 dB

### Others

**Power voltage** ..... 120, 220, 240 V (50/60 Hz)
For U.S.A. and Canada
..... 120 V (60 Hz)
**Power consumption** ..... 20 watts
**Dimensions** ..... 430 mm (16-15/16") (W)
111 mm (4-3/8")(H)
303 mm (11-15/16") (D)
**Weight** ..... 4.1 kg (9.0 lbs) net
5.5 kg (12.0 lbs) packed

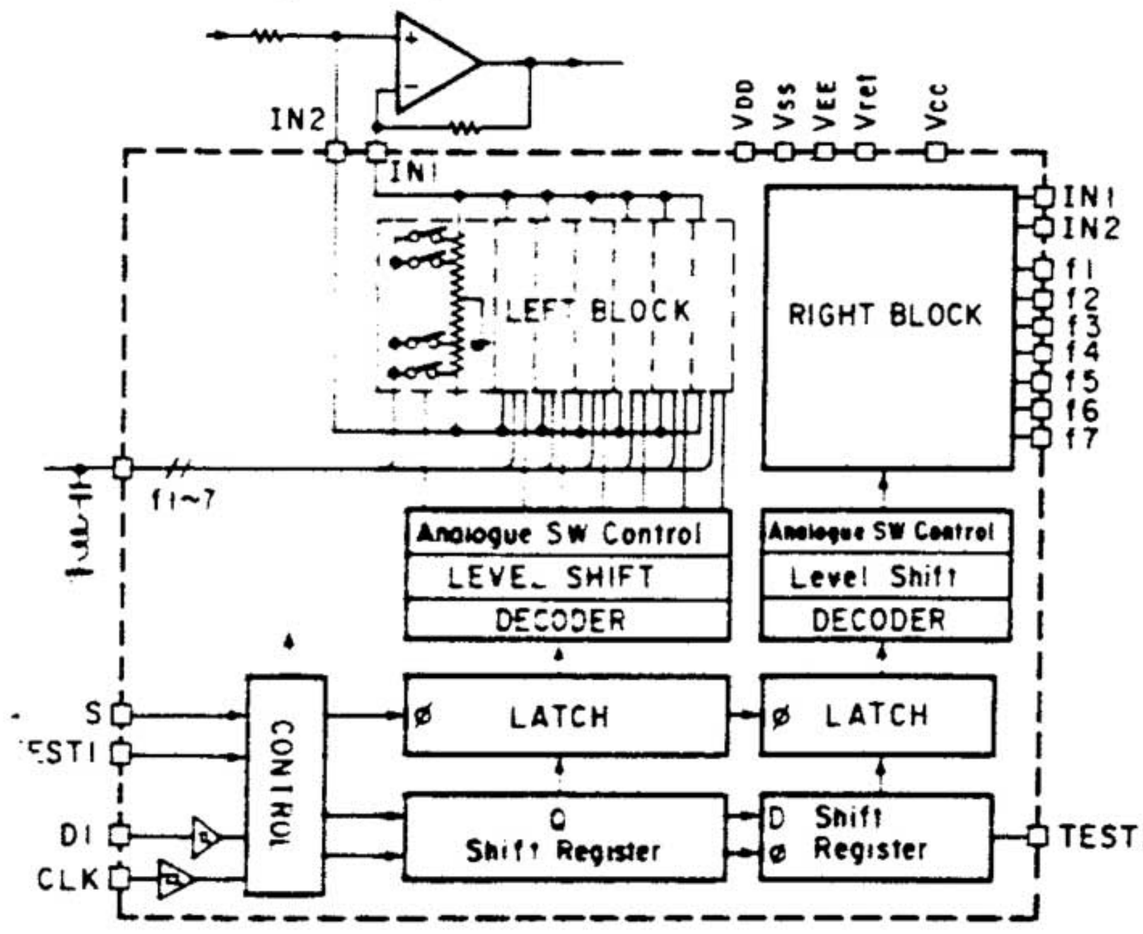
- Design and specifications subject to change without notice for improvements.
- Due to local laws and regulations, this unit sold in some areas are not equipped with variable voltage selectors.

# 1. BLOCK DIAGRAM



# 2. INTERIOR BLOCK DIAGRAM & TERMINAL FUNCTION OF IC

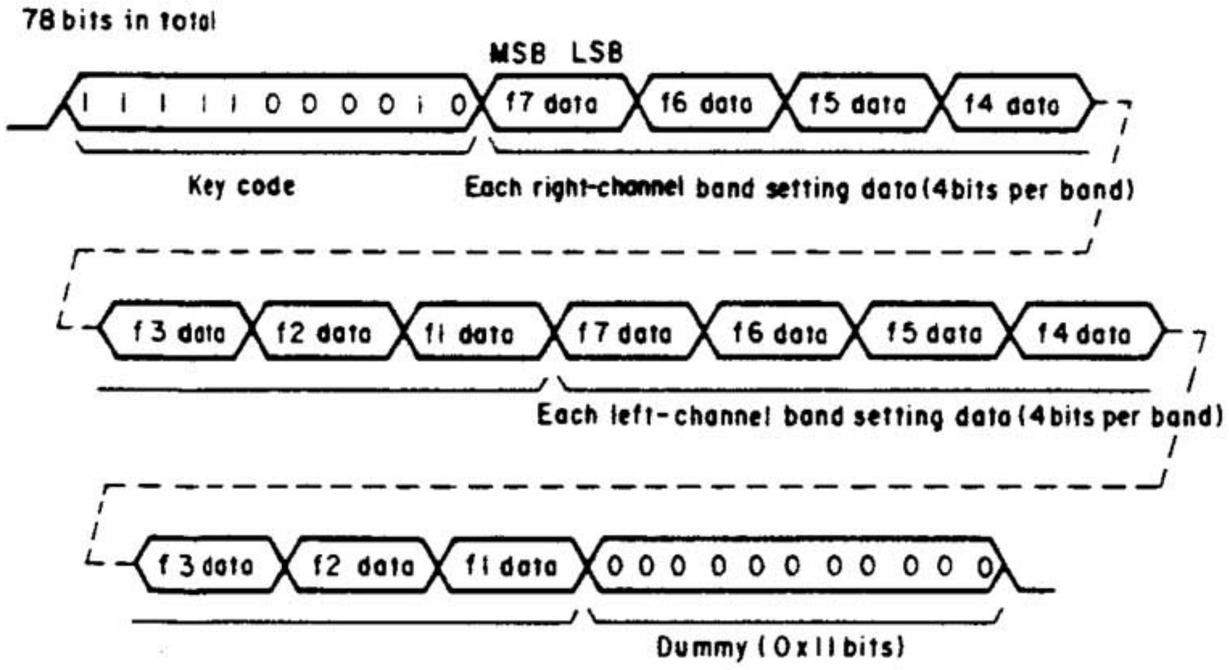
## •LC7520 (Graphic Equalizer IC)



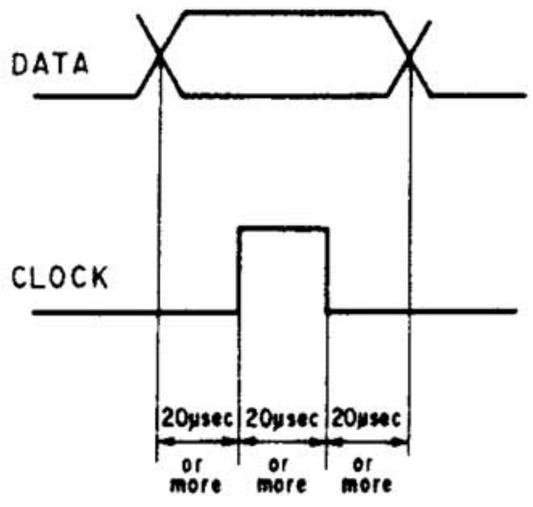

**<Functions>**

1. Seven frequency band circuits are incorporated for each right and left side.
2. Frequency is variable at 2 dB per step within a range of ±10 dB (11 positions per band) by the use of UP/DOWN keys.
3. A microcomputer is used for control. Two control lines are provided.

**<Data bits>**




**<Output timing chart between clock and data from microcomputer>**




**<Description of Terminals>**

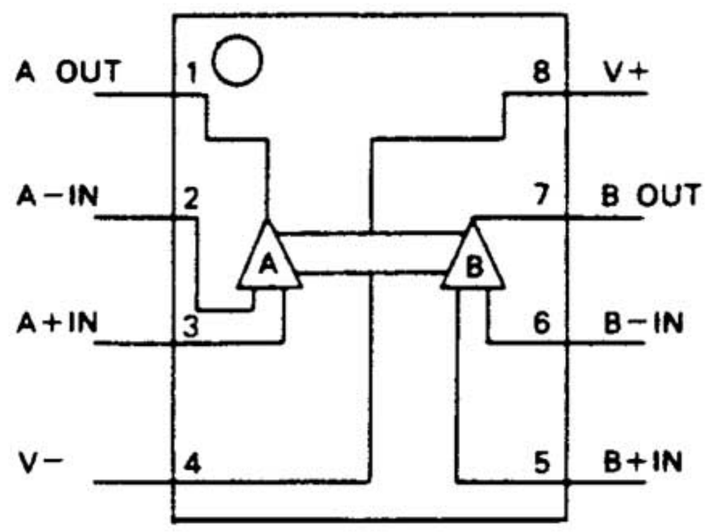
| Pin No. | Terminal Name | Description |
|---|---|---|
| 10 | $V_{DD}$ | Power terminal for audio signal +18V TYP |
| 12 | $V_{ref}$ | Power terminal for logic driving $V_{DD}$ −5V TYP |
| 18 | $V_{SS}$ | Power terminal for ground 0V |
| 19 | $V_{EE}$ | Power terminal for audio signals −18V TYP |
| 13 | $V_{CC}$ | Power terminal −5V |
| 17 | D | *CPU data input terminal<br>*Schmitt inverter type |
| 16 | CLK | *CPU CLK input terminal<br>*Schmitt inverter type |
| 1,28<br>2,27 | IN1<br>IN2 | *Audio signal input terminals<br>*IN1 is usually connected to an inversion input of an operational amplifier.<br>*IN2 is usually connected to a non-inversion input of an operational amplifier.<br>*Provided for each right and left. |
| 9~3<br>26~20 | f1~f7 | *Band pass filter connecting terminals<br>*14 terminals in total (f1 to f7 for each side) |
| 11 | S | *Selector terminal (when two chips are used)<br>*In response to "1", key code 7C3 is connected to $V_{DD}$<br>*In response to "0", key code 7C2 is connected to $V_{ss}$ |
| 14<br>15 | TEST1<br>TEST2 | *IC internal-function test terminal<br>*Open in usual |

**<Band setting data codes>**

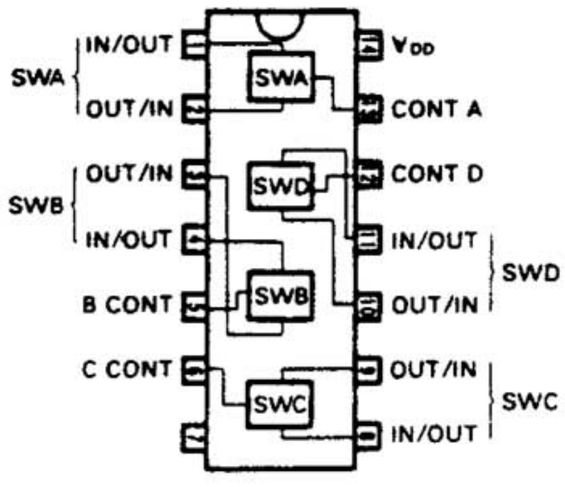
| | MSB | | | LSB |
|---|---|---|---|---|
| +10 dB | 0 | 1 | 0 | 1 |
| +8 | 0 | 1 | 0 | 0 |
| +6 | 0 | 0 | 1 | 1 |
| +4 | 0 | 0 | 1 | 0 |
| +2 | 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 1 | 0 |

| | MSB | | | LSB |
|---|---|---|---|---|
| −2 dB | 1 | 0 | 0 | 1 |
| −4 | 1 | 0 | 1 | 0 |
| −6 | 1 | 0 | 1 | 1 |
| −8 | 1 | 1 | 0 | 0 |
| −10 | 1 | 1 | 0 | 1 |

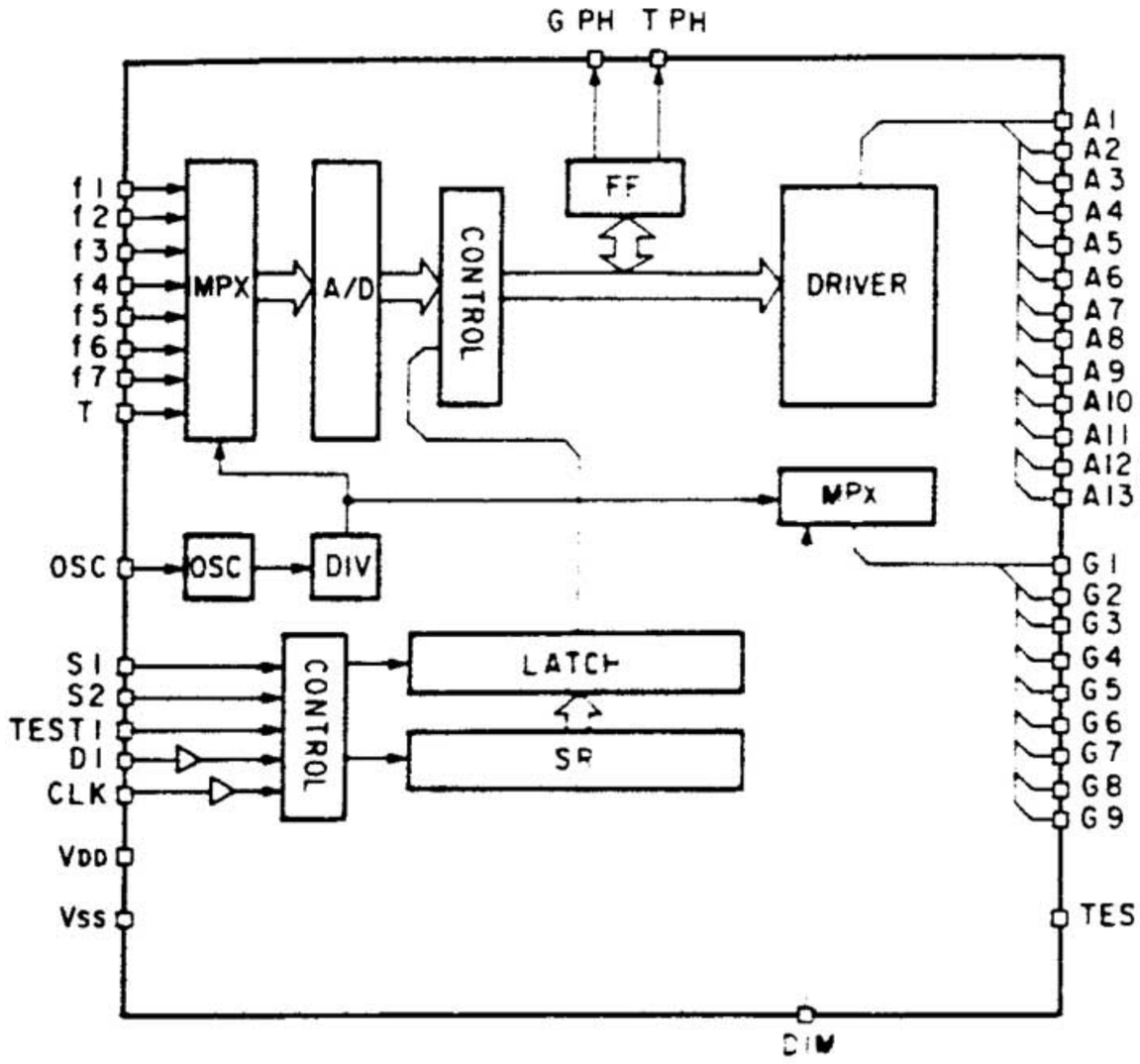
## •M5218P (Operation AMP. IC)



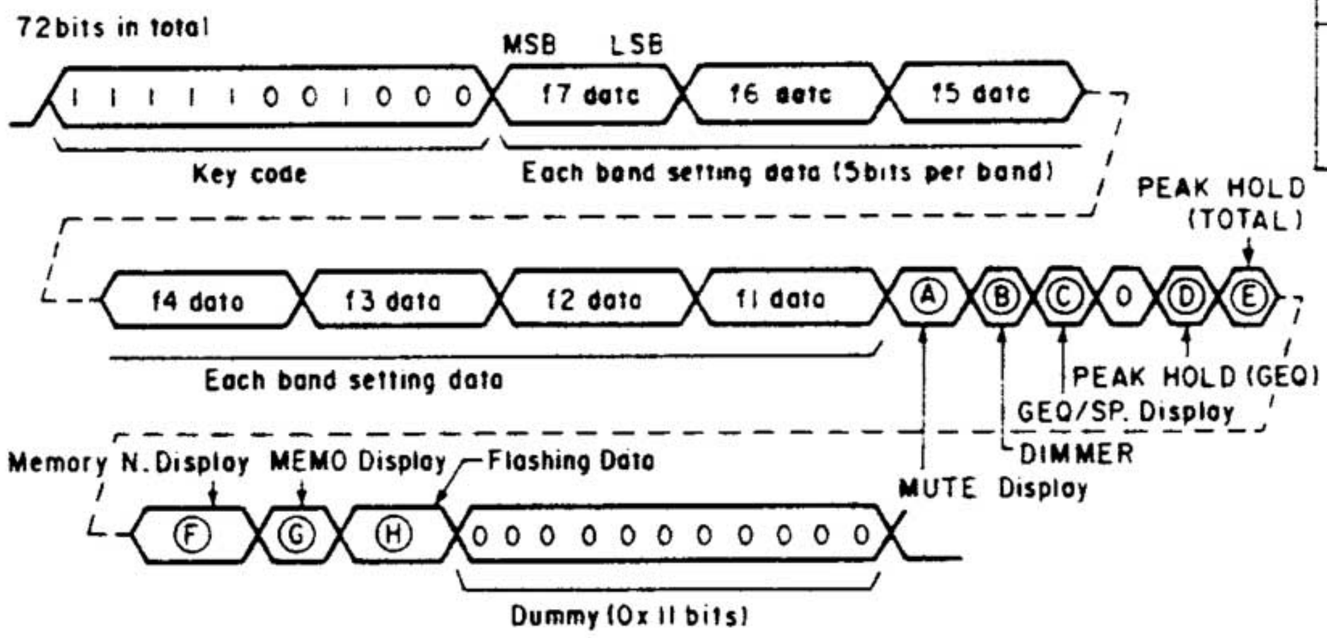

## •LC4066BH (Analog Switch IC)



## •LC7565 (G•EQ Display Driver IC)




### <Data Code>




### <Band Setting Data Code>

| | MSB | | | | LSB |
|---|---|---|---|---|---|
| +12dB | 1 | 1 | 1 | 0 | 0 |
| +10 | 1 | 1 | 0 | 1 | 0 |
| +8 | 1 | 1 | 0 | 0 | 0 |
| +6 | 1 | 0 | 1 | 1 | 0 |
| +4 | 1 | 0 | 1 | 0 | 0 |
| +2 | 1 | 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 |
| −2 | 0 | 1 | 1 | 1 | 0 |
| −4 | 0 | 1 | 1 | 0 | 0 |
| −6 | 0 | 1 | 0 | 1 | 0 |
| −8 | 0 | 1 | 0 | 0 | 0 |
| −10 | 0 | 0 | 1 | 1 | 0 |
| −12 | 0 | 0 | 1 | 0 | 0 |

Ⓐ MUTE Display

| | |
|---|---|
| OFF | 0 0 |
| ON | 0 1 |

Ⓑ DIMMER

| | |
|---|---|
| OFF | 0 |
| ON | 1 |

Ⓒ GEQ/Display

| | |
|---|---|
| GEQ | 0 |
| SPEANA | 1 |

Ⓓ PEAK HOLD (GEQ)

| | |
|---|---|
| OFF | 0 |
| ON | 1 |

Ⓔ PEAK HOLD (TOTAL)

| | |
|---|---|
| OFF | 0 |
| ON | 1 |

Ⓕ Memory No. Display

| | |
|---|---|
| OFF | 0 0 0 |
| M1 | 0 0 1 |
| M2 | 0 1 0 |
| M3 | 0 1 1 |
| M4 | 1 0 0 |
| M5 | 1 0 1 |
| FLAT | 1 1 1 |

Ⓖ MEMO Display

| | |
|---|---|
| OFF | 0 0 |
| ON | 0 1 |

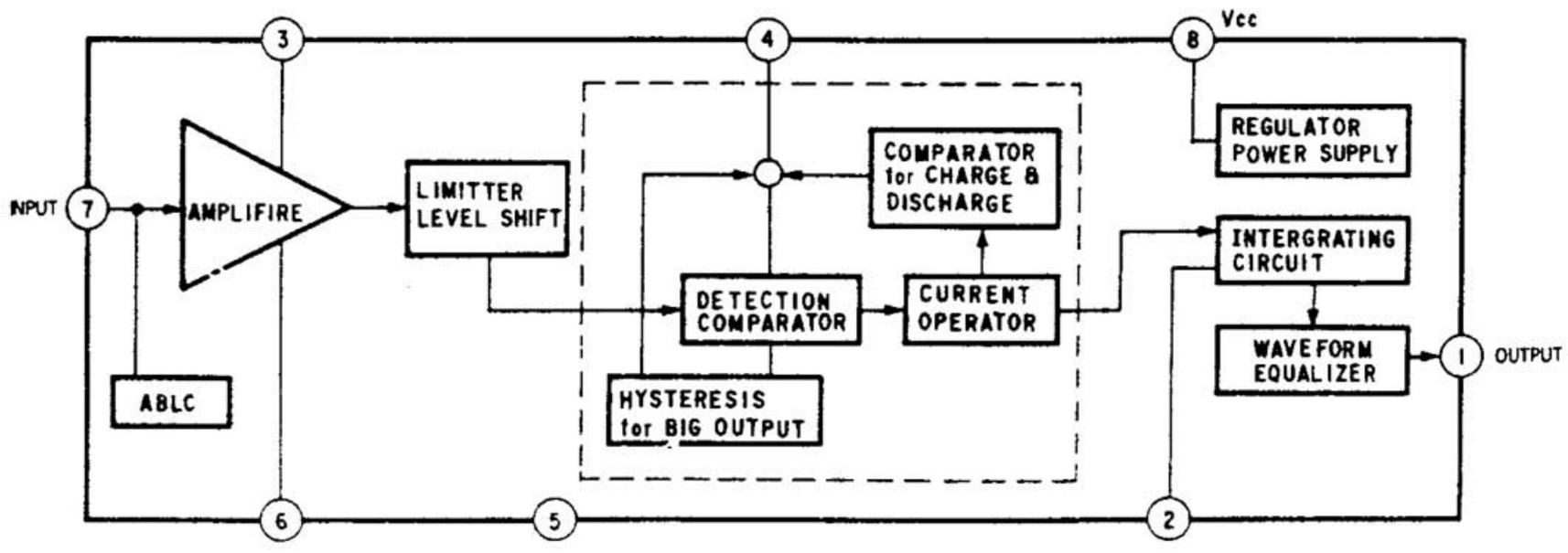
Ⓗ Flashing Data

| | |
|---|---|
| OFF | 0 0 0 |
| $f_1$ | 0 0 1 |
| $f_2$ | 0 1 0 |
| $f_3$ | 0 1 1 |
| $f_4$ | 1 0 0 |
| $f_5$ | 1 0 1 |
| $f_6$ | 1 1 0 |
| $f_7$ | 1 1 1 |

### <Description of Terminals>

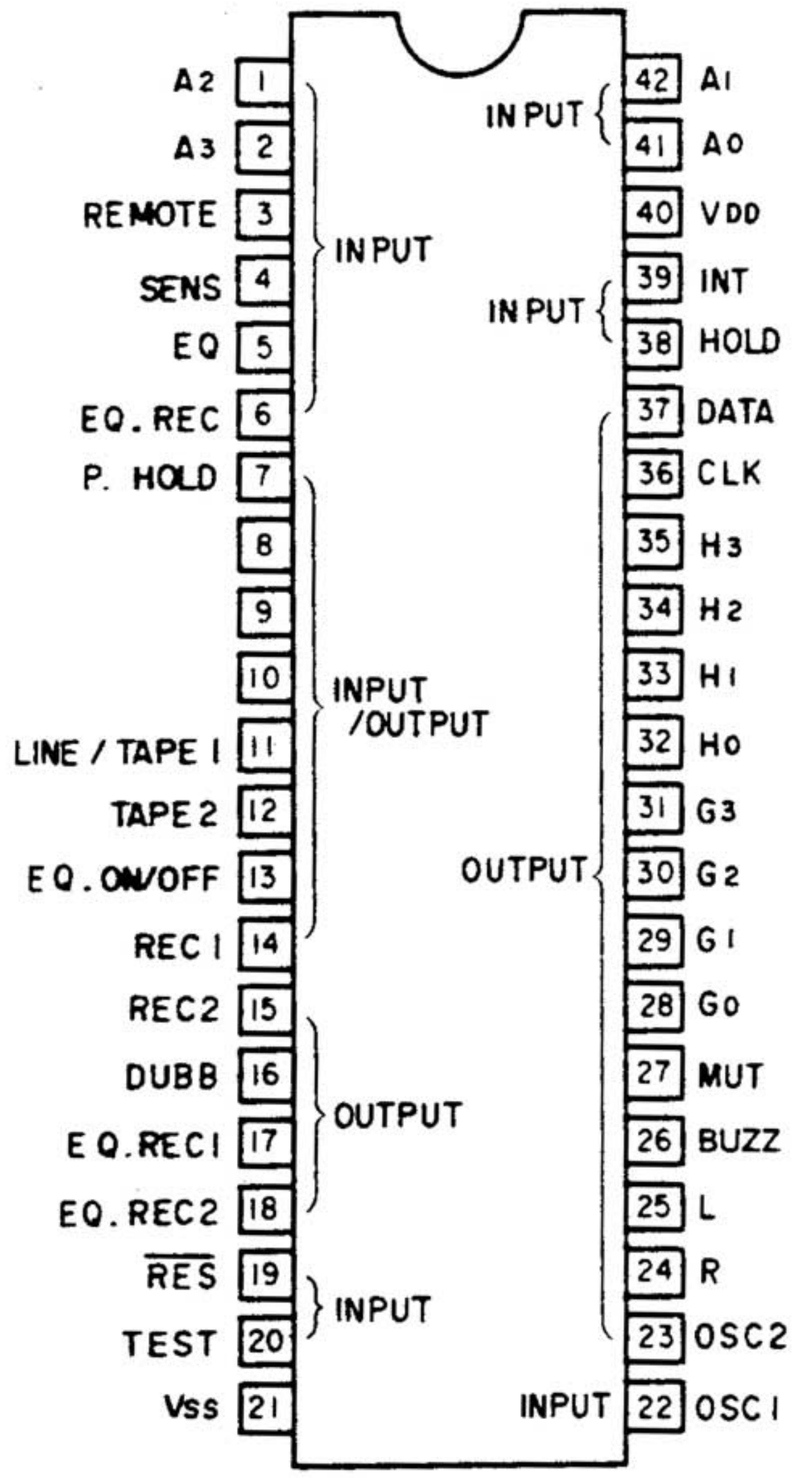
| Pin No. | Terminal Name | Description |
|---|---|---|
| 42<br>19 | $V_{DD}$<br>$V_{SS}$ | Power terminal +5V Typ<br>Power terminal GND |
| 17<br>18 | DI<br>CLK | CPU data input terminal<br>CPU CLK input terminal |
| 15<br>16 | S1<br>S2 | Selection Terminal (When plural chips are used. 4 pieces in maximum). |
| 21 | G•PH | C, R connecting terminal. The CR determines a peak hold reset time to display graphic equalizer in spectrum analyzer fashion. |
| 22 | T•PH | C, R connecting terminal. The CR determines a peak hold reset time in TOTAL dispaly. |
| 32 | DIM | Terminal for controlling dimmer by directly driving the IC (when not controller by CPU). Dimmer is on at "1" but off at "0". |
| 31~25, 24 | f1~f7, T | Rectified audio signal voltage input termina! |
| 20 | OSC | Open-drain type output buffer<br>Temrinal for externally connecting C and R for oscillator |
| 2~14<br>41~33 | A1~A13<br>G1~G9 | Open-drain driver. Anode driven type<br>Open-drain driver. Grid driven type |

## •LA7224 (Remote Control Receiver IC)



# 3. FUNCTION OF MICRO COMPUTER IC & REMOTE CONTROLLER

## •Terminal Name of Micro Computer IC LC6510C



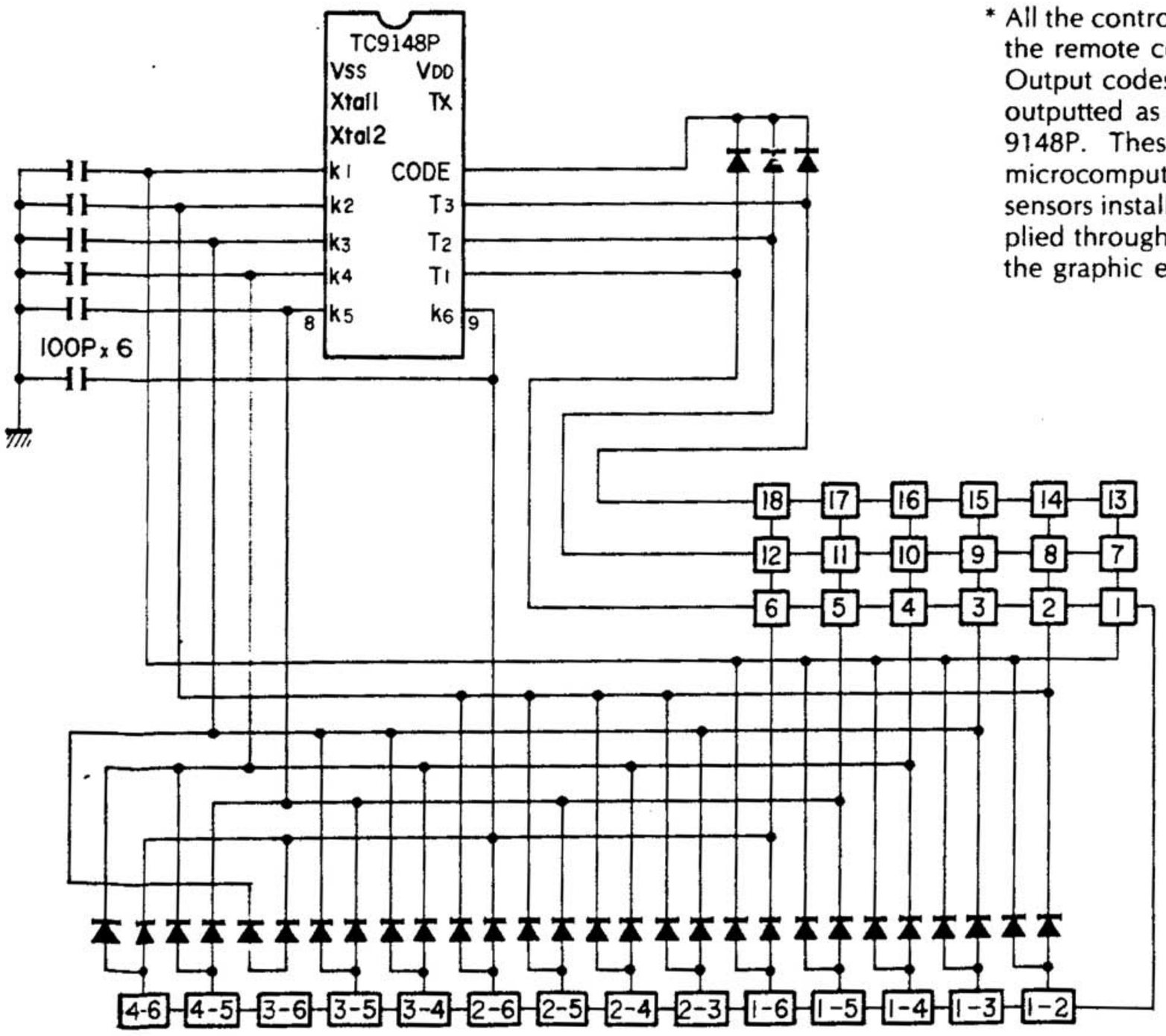

## •Data Code of Remote Controller

| Key No. | KEY NAME | H | $S_1$ | $S_2$ | $D_1$ | $D_2$ | $D_3$ | $D_4$ | $D_5$ | $D_6$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | G. EQ UP | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2 | G. EQ DOWN | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 3 | G. EQ | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 4 | SPEANA | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 5 | REVERSE | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 6 | CANNEL MODE | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 7 | FLAT | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 8 | TAPE 2 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 9 | TAPE 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 10 | LINE | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 11 | G. EQ ON/OFF | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 12 | G. EQ REC | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 13 | MEMORY | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 14 | M1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 15 | M2 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 16 | M3 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 17 | M4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 18 | M5 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1-2 | 25Hz | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 1-3 | 50Hz | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 1-4 | 100Hz | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| 1-5 | 160Hz | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 1-6 | 250Hz | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 2-3 | 400Hz | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 2-4 | 630Hz | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| 2-5 | 1kHz | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| 2-6 | 1.6kHz | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 3-4 | 2.5kHz | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 3-5 | 4kHz | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 3-6 | 6.3kHz | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 4-5 | 10kHz | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 4-6 | 20kHz | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |

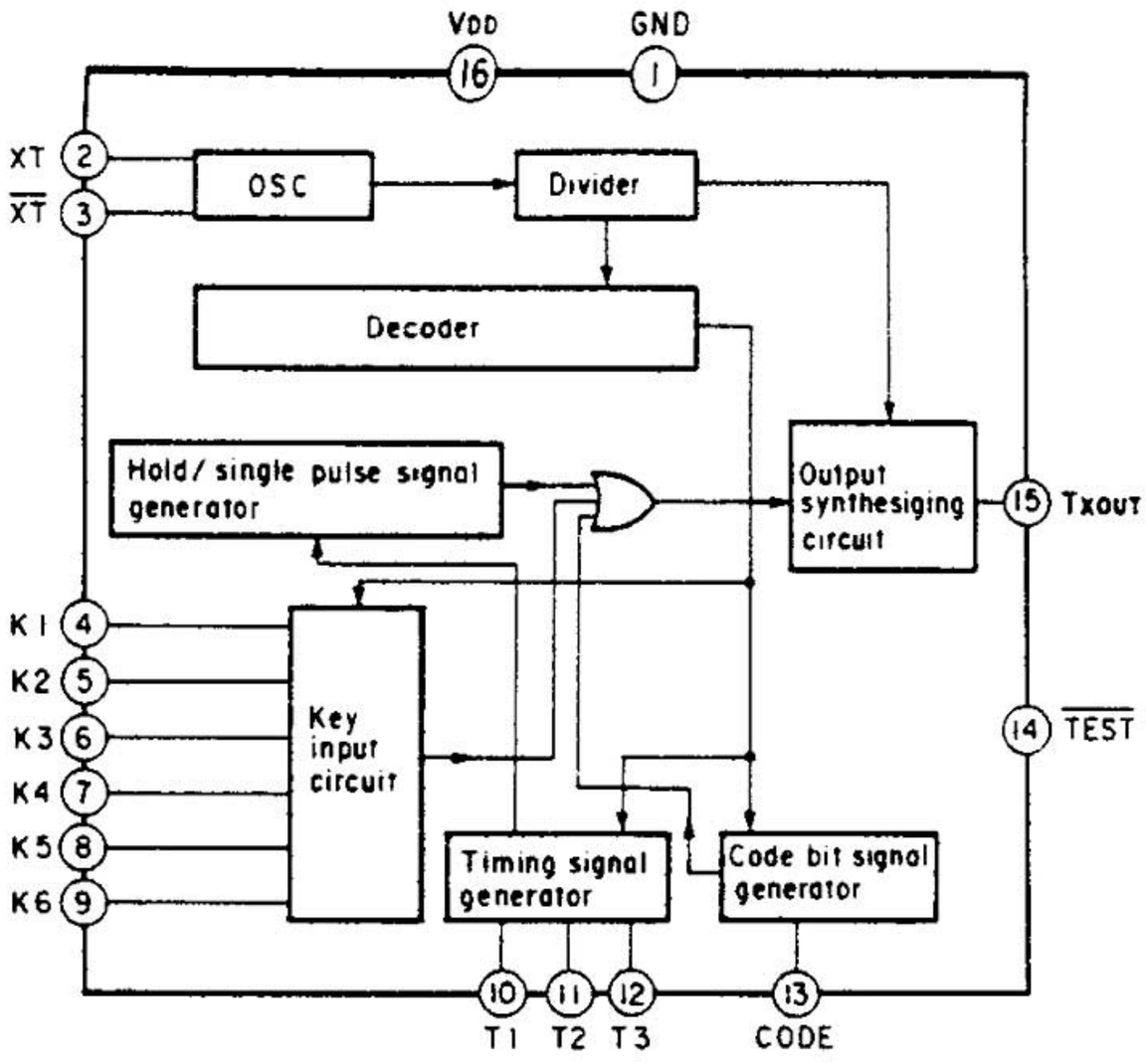
*** Remote Inputs are Active "L".**

* All the control switches except the hold-peak switch are installed in the remote controller.
Output codes selected and entered through the input keys are all outputted as serial data through TX OUT terminal (Pin 15) of TC 9148P. These data are inputted to REMOTE terminal (Pin 3) of microcomputer IC LC6510C after having passed through the photo-sensors installed in the set body. On the basis of the input data applied through REMOTE terminal, the microcomputer controls both the graphic equalizer IC and the analog switch IC.

## •Input Key Matrix of Remote Controller



## •TC9148P (Infrared Remote-Control Transmitter IC)




## 3-1. Key Functions of Remote Controller

**(1) 25 Hz ~ 20 kHz Frequency Selection Keys (Key No. 1-2 ~ 4-6)**

* When GEQ setting is required to change, a required frequency band can be selected by use of these keys.
* The selected band begins flashing.
* Whenever these keys are depressed, GEQ is displayed automatically.
* If no other keys are depressed for 10 sec after one of these keys is depressed, SPEANA is displayed automatically.

**(2) GEQ UP/DOWN Shifting Keys (Key No. 1, 2)**

* After a frequency band has been selected by use of 25 Hz ~ 20 kHz keys, the selected band can be shifted up and down by use of these keys (±2 dB step).
* If these keys are kept depressed, the band is shifted up and down at a speed of 0.5 sec per step.
* When there exists no flashing band, the band is not shifted.
* When the band reaches the upper or lower limit, the band is not shifted.
* When no other keys are depressed for 10 sec after these keys have been released, SPEANA is displayed automatically.

**(3) MEMORY Key (Key No. 13)**

* When the present GEQ set point is required to store, this key enables memory to store the set point.
* While memory is being enabled, MEMORY indication flashes (ON for 0.5 sec and OFF for 0.5 sec).
* When this key is depressed, GEQ is displayed automatically.
* When no other keys are depressed for 10 sec after this key has been depressed, SPEANA is displayed automatically and MEMORY indication goes off.
* When another key (except this key) is depressed within 10 sec after this key has been depressed, the memory "enable" is released and MEMORY indication goes off.
* When SW5 is at "H", MEMORY indication does not flash but stays on.
* Even when the channel mode is in either L status or R status, both L and R mode signals are stored in the memory unit (L+R is stored all the time).

**(4) M1 to M5 Preset Memory Keys (Key No. 7 ~ 11)**

* These keys are used for access to preset memory. When these keys are depressed, an indicator corresponding to depressed preset memory number comes on.
* When this key is depressed with MEMORY kept on, the set points are written into a designated memory.
* When this key is depressed with MEMORY kept off, the contents of designated memory can be read out.
* When this key is depressed, GEQ is displayed automatically.
* When sec has elapsed after this key was depressed, SPEANA is displayed automatically.

**(5) Flat Key (Key No. 7)**

* This key allows GEQ presetting to be flat (25 Hz ~ 20 kHz is 0 dB).
* When this key is depressed, GEQ is displayed automatically.
* When 10 sec has elapsed after this key was depressed, SPEANA is displayed automatically.

**(6) DISPLAY EQ (Key No. 3)**

* When this key is depressed, the display is switched to GEQ, being held until the SPEANA input key is depressed. The display mode never returns to the SPEANA display in response to key inputs other than SPEANA. The contents of display conform to the selected channel mode.

**(7) DISPLAY RTA (Key No. 4)**

* When this key is depressed, the display is switched to the SPEANA display.

**(8) REVERSE (Key No. 5)**

* The setting of graphic equalizer can be reversed from plus to minus or vice versa (reversed upside down with 0 dB as its center).
* When this key is depressed, the display is switched to the GEQ display automatically.
* The display is switched to the SPEANA display automatically, 10 secs after this key has been depressed.

**(9)CHANNEL LR, L, R (Key No. 6)**

* In response to the CHANNEL MODE key inputs, the following outputs can be obtained through L terminal (Pin 25) and R terminal (Pin 24) of the microcomputer IC.

| | Remote Channel Modes | | |
|---|---|---|---|
| Output port | L+R | L | R |
| R (Pin 24) | H | L | H |
| L (Pin 25) | H | H | L |

* In the case of L+R mode, the equalizer display is automatically alternated for each 2 secs being switched from L channel to R channel or vice versa. However, when 10 seconds has elapsed, the spectrum analyzer is displayed by addig both the right and left channel levels.

**(10) TAPE-2 OUT (Key No. 8)**

* Whenever this key is depressed, TAPE-2 terminal (Pin 12) of the microcomputer is alternately switched in level from "H" to "L" or vice versa.

**(11) LINE/TAPE-1 (Key No. 10/9)**

* As listed below, in response to the remote control input keys, the following signals are outputted to the LINE OUT terminal (Pin 11) of the microcomputer.

| Remote Control Input Keys | | Computer Output Port LINE OUT |
|---|---|---|
| LINE | TAPE-1 | |
| )N | OFF | H |
| OFF | ON | L |
| ON | ON | * |

**(12) EQUALIZER ON (Key No. 11)**

* By the use of this key, the equalizer circuit is turned on or off. Whenever this key is depressed, the EQ ON/OFF terminal (Pin 13) of the microcomputer is alternately switched in level from "H" to "L" or vice versa.

## 3-2. Major Terminal Functions in Microcomputer

**(1) REC OUT(1), REC OUT(2), G.E. REC(1), G.E. REC(2), DUBBING, LINE/TAPE-1, TAPE-2**

* In response to each output the analog switches are controlled, so that the combinations of inputs and outputs in the set are switched. As listed below, 8 output states can be produced in combination of operations obtained through 4 input keys.

| | Remote Control Input Keys | | | | Coimputer Output Ports | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LINE | TAPE 1 | TAPE 2 | G.E REC | REC OUT(1) | G.E REC(1) | DUB-BING | REC OUT(2) | G.E REC(2) | LINE/ TAPE 1 | TAPE 2 |
| 1 | ON | OFF | OFF | OFF | H | L | L | H | L | H | L |
| 2 | OFF | ON | OFF | OFF | L | L | L | H | L | L | L |
| 3 | ON | OFF | ON | OFF | L | L | H | H | L | H | H |
| 4 | OF | ON | ON | OFF | L | L | H | H | L | L | H |
| 5 | ON | OFF | OFF | ON | L | H | L | L | H | H | L |
| 6 | OFF | ON | OFF | ON | L | L | L | L | H | L | L |
| 7 | ON | OFF | ON | ON | L | H | L | L | L | H | H |
| 8 | OFF | ON | ON | ON | L | H | L | L | L | L | H |

**(2) MUTE**

* MUTE OUT is outputted on the basis of the following input key operation.

| Input key | MUTE OUT |
|---|---|
| CHANNEL MODE INPUT<br>Preset M1 ~ M5 INPUT<br>FLAT INPUT<br>REVERSE INPUT | "H" for 0.1 sec, then to "L" |
| GEQ ON/OFF, GEQ REC ON/OFF<br>LINE, TAPE 1, TAPE 2 | "H" for 0.5 sec, then to "L" |

**(3) DATA, CLK Output**

* In response to data inputs obtained through REMOTE terminal data for controlling the analog switches and the electronic variable resistor are outputted. Refer to the LC 7520 and LC 7565 with respect to DATA CODES.

**(4) P. HOLD**

* PEAK HOLD is switched to ON or OFF only during the SPEANA display.

# 4. PARTS LOCATION & PARTS LIST

## 4-1. F-5170 Control Board (Stock No. 00929701)

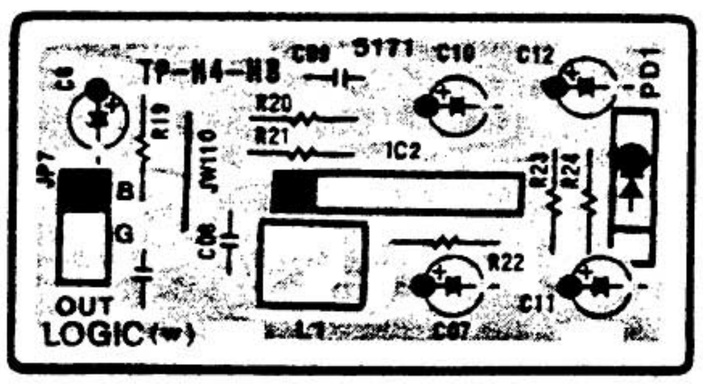
**Component Side**

Parts List <F-5170>

| Parts No. | Stock No. | Description |
|---|---|---|
| •Transistor | | |
| jQ1 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| jQ2 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| jQ3 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| jQ4 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| jQ5 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| jQ6 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| jQ7 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| jQ8 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| jQ9 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| jQ10 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| jQ11 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| jQ12 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| jQ13 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| jQ14 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| •IC | | |
| jIC1 | 48159300 | LC7520 |
| jIC2 | 46580100 | M5218P |
| jC5 | 46532300 | 0.12μF 50V F.C. |
| •Transistor | | |
| oQ1 | 46367001 | 2SA1115 |
| | or 46367201 | 2SA1048 |
| •FET | | |
| oFT1 | 46643500 | 2SK163-K1 |
| | or 46643501 | 2SK163-K2 |
| | or 46643502 | 2SK163-L1 |
| | or 46643503 | 2SK163-L2 |
| | or 46643600 | 2SK117-O |
| | or 46643601 | 2SK117-Y |
| •IC | | |
| oIC1 | 46255000 | LC4066BH |
| oIC2 | 46255000 | LC4066BH |
| oIC3 | 46255000 | LC4066BH |
| oIC4 | 46255000 | LC4066BH |
| oIC5 | 46255000 | LC4066BH |
| oIC6 | 46255000 | LC4066BH |
| oIC7 | 46580100 | M5218P |
| •Diode | | |
| oD2 | 03117700 | 10E-2 |
| oS1 | 48127100 | Slide SW., PEAK HOLD |
| oRL1 | 11504701 | Relay LR2A-12B |
| oZ1 | 46363700 | 2P Terminal, OUTPUT |
| oZ2 | 46363800 | 4P Terminal, TAPE |
| oZ3 | 46363900 | 6P Terminal, TAPE & INPUT |
| •Transistor | | |
| wQ1 | 46719900 | DTC124ES |
| wQ2 | 46719800 | DTA124ES |
| wQ3 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| wQ4 | 46719900 | DTC124ES |
| wQ5 | 46719800 | DTA124ES |
| wQ6 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| wQ7 | 46719900 | DTC124ES |
| wQ8 | 46719800 | DTA124ES |
| wQ9 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| wQ10 | 46719900 | DTC124ES |
| wQ11 | 46719800 | DTA124ES |
| wQ12 | 46719900 | DTC124ES |
| wQ13 | 46719800 | DTA124ES |
| wQ14 | 46719900 | DTC124ES |
| wQ15 | 46719800 | DTA124ES |
| wQ16 | 46719900 | DTC124ES |
| wQ17 | 46719800 | DTA124ES |
| wQ18 | 46719900 | DTC124ES |
| wQ19 | 46719800 | DTA124ES |
| wQ20 | 46719900 | DTC124ES |
| wQ21 | 46719800 | DTA124ES |
| wQ22 | 46719900 | DTC124ES |
| wQ23 | 46719800 | DTA124ES |
| wQ24 | 46719800 | DTA124ES |
| wQ25 | 46719800 | DTA124ES |
| wQ26 | 46719900 | DTC124ES |
| wQ27 | 46719800 | DTA124ES |
| wQ28 | 46719900 | DTC124ES |
| wQ29 | 46719900 | DTC124ES |
| wQ30 | 46719900 | DTC124ES |
| wQ31 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| wQ32 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| •IC | | |
| wIC1 | 48319300 | LC6510C-793 |
| wXO1 | 48319400 | Ceramic Element KBR800H |
| •Diode | | |
| wD1 | 03117600 | 1S2473T77 |
| wD2 | 03117600 | 1S2473T77 |
| wD3 | 03117600 | 1S2473T77 |
| wD4 | 03117600 | 1S2473T77 |
| wD5 | 03117600 | 1S2473T77 |
| wD6 | 03117600 | 1S2473T77 |
| wD7 | 03117600 | 1S2473T77 |
| | or 46086000 | 1S1588TP-3 |
| wD8 | 03117600 | 1S2473T77 |
| | or 46086000 | 1S1588TP-3 |
| wC1 | 46725600 | 3900μF 6.3V E.C. |
| wC4 | 46282900 | 0.01μF 50V F.C. |
| wBT1 | 46255500 | Lithium Battery CR2430 |
| wBZ1 | 48178400 | Buzzer |

## 4-2. F-5171 Remote Control Receiver Board

Component Side




Parts List

| Parts No. | Stock No. | Description |
|---|---|---|
| •IC | | |
| wIC2 | 48159100 | LA7224 |
| wPD1 | 48268800 | Photo Diode PD49PI |
| wL1 | 48179100 | Coil (38kHz) |

# 4-3. F-5173 Band Pass Filter Board (Stock No. 00930001)

Component Side




**Parts List**

| Parts No. | Stock No. | Description |
|---|---|---|
| •Transistor | | |
| nQ1 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ2 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ3 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ4 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ5 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ6 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ7 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ8 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ9 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ10 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ11 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ12 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ13 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ14 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ15 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| nQ16 | 46719800 | DTA124ES |
| nQ17 | 46719800 | DTA124ES |
| nQ18 | 46719800 | DTA124ES |
| nQ19 | 46719800 | DTA124ES |
| nQ20 | 46719900 | DTC124ES |
| nQ21 | 46719900 | DTC124ES |
| nQ22 | 46719900 | DTC124ES |
| nQ23 | 46719900 | DTC124ES |
| nQ200 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| •IC | | |
| nIC1 | 46580100 | M5218P |
| nIC2 | 46580100 | M5218P |
| nIC3 | 46580100 | M5218P |
| nIC4 | 46580100 | M5218P |
| nIC5 | 46580100 | M5218P |
| nIC6 | 46580100 | M5218P |
| nIC7 | 46580100 | M5218P |
| nIC8 | 46580100 | M5218P |
| •Diode | | |
| nD1 | 03117600 | 1S2473T77 |
| | or 46086000 | 1S1588TP-3 |
| nD2 | 03117600 | 1S2473T77 |
| | or 46086000 | 1S1588TP-3 |

# 4-4. F-5174 Display Board (Stock No. 00930101)

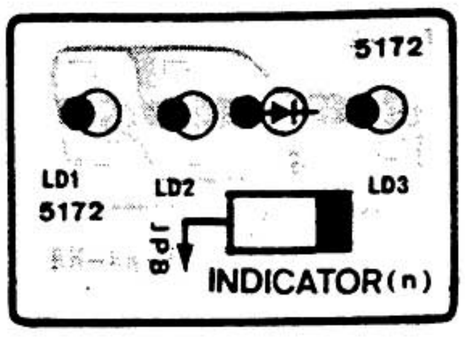
**Component Side**

Parts List <F-5174>

| Parts No. | Stock No. | Description |
|---|---|---|
| nQ106 | 46719900 | DTC124ES |
| nQ107 | 46719900 | DTC124ES |
| •IC | | |
| nIC10 | 48159400 | LC7565 |
| nIC11 | 48159400 | LC7565 |
| nFL1 | 48319500 | FL. Display Tube CP1061GR |
| nC53 | 48152100 | 47μF 6.3V E.C. |
| nC55 | 48152100 | 47μF 6.3V E.C. |

## 4-5. F-5172 Indicator Board

Component Side

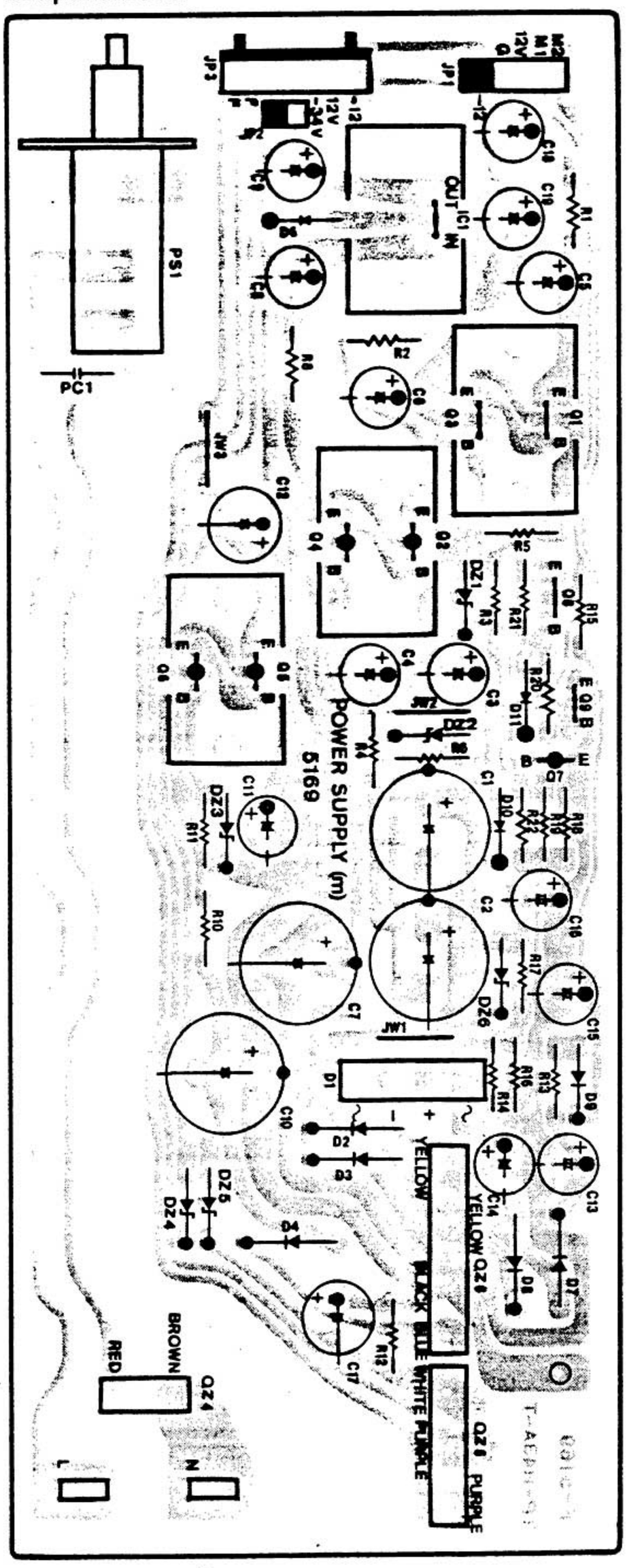



Parts List

| Parts No. | Stock No. | Description |
|---|---|---|
| •LED | | |
| nLD1 | 46176900 | TLS-123, LINE |
| nLD2 | 46176900 | TLS-123, TAPE 1 |
| nLD3 | 46176900 | TLS-123, TAPE 2 |

## 4-6. F-5169 Power Supply Board (Stock No. 00929601 = XX, UL, EU, UK/Stock No. 00929603 = CSA)

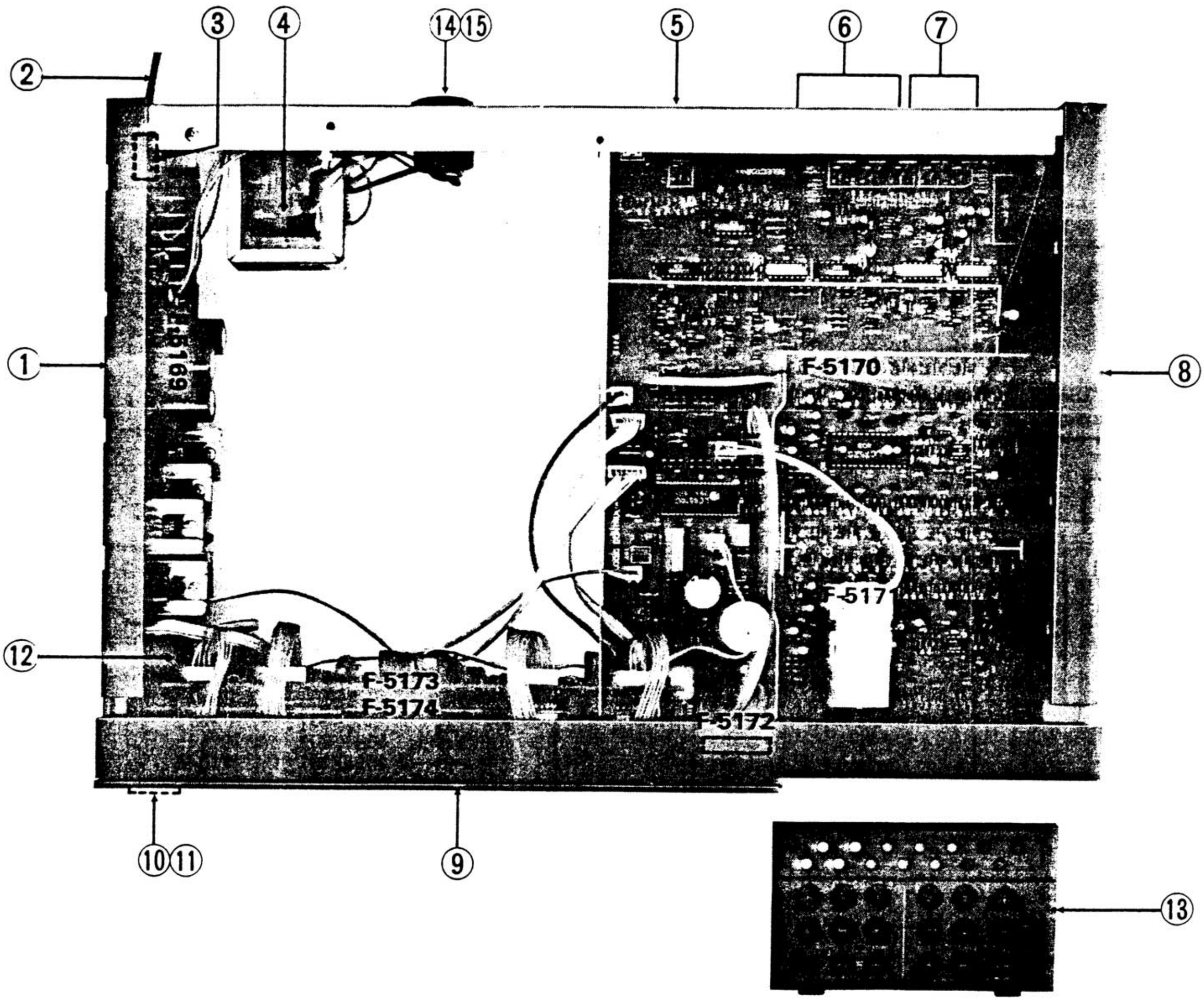
Component Side




Parts List

| Parts No. | Stock No. | Description |
|---|---|---|
| •Transistor | | |
| ⚠mQ1 | 03083901 | 2SD313AL |
| ⚠ | or 46546701 | 2SD880 |
| ⚠ | or 48073601 | 2SD1061 |
| mQ2 | 48063301 | 2SB507 |
| | or 48064601 | 2SB825 |
| mQ3 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| ⚠mQ4 | 46367001 | 2SA1115 |
| ⚠ | or 46367201 | 2SA1048 |
| ⚠mQ5 | 48063301 | 2SB507 |
| ⚠ | or 48064601 | 2SB825 |
| mQ6 | 46367001 | 2SA1115 |
| | or 46367201 | 2SA1048 |
| mQ7 | 46367001 | 2SA1115 |
| | or 46367201 | 2SA1048 |
| mQ8 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| mQ9 | 46367101 | 2SC2603 |
| | or 46367301 | 2SC2458 |
| •IC | | |
| ⚠mIC1 | 46144200 | NJM78M05A |
| •Diode | | |
| ⚠mD1 | 03117000 | RB152-LFF |
| ⚠mD2 | 03117700 | 10E-2 |
| ⚠mD3 | 03117700 | 10E-2 |
| ⚠mD4 | 03117700 | 10E-2 |
| mD6 | 03117600 | 1S2473T77 |
| ⚠mD7 | 03117700 | 10E-2 |
| ⚠mD8 | 03117700 | 10E-2 |
| mD9 | 03117600 | 1S2473T77 |
| | or 46086000 | 1S1588TP-3 |
| mD10 | 03117600 | 1S2473T77 |
| | or 46086000 | 1S1588TP-3 |
| mD11 | 03117600 | 1S2473T77 |
| | or 46086000 | 1S1588TP-3 |
| •Zener Diode | | |
| mDZ1 | 46113900 | 05Z12-Y |
| mDZ2 | 46113900 | 05Z12-Y |
| mDZ3 | 46116900 | 05Z33-Y |
| mDZ4 | 03167500 | RD3.3F-B |
| mDZ5 | 03167500 | RD3.3F-B |
| mDZ6 | 46111800 | 05Z6.2-Y |
| ⚠pC1 | 46425800 | 0.01μF 400V C.C. |
| ⚠ | or 46943200 | 0.01μF 400V C.C. |
| ⚠pS1 | 48065200 | Push SW., Power (CSA) |
| ⚠ | 46413900 | Push SW., Power (XX,UL,EU,BS) |
| ⚠mR3 | 00135800 | 4.7Ω 1/2W N.I.R. |
| ⚠mR4 | 00135800 | 4.7Ω 1/2W N.I.R. |
| ⚠mR8 | 00134100 | 33Ω 1W N.I.R. |
| ⚠mR10 | 00135800 | 4.7Ω 1/2W N.I.R. |
| ⚠mR13 | 00133000 | 220Ω 1/2W N.I.R. |

# 5. OTHER PARTS




**Parts List**

| Parts No. | Stock No. | Description |
|---|---|---|
| 1 | 47608900 | Left Side Panel |
| ⚠ 2 | 38004700 | Power Supply Cord (XX,UL,CSA) |
| ⚠ | 38004500 | Power Supply Cord (EU) |
| ⚠ | 38004300 | Power Supply Cord (BS) |
| 3 | 47157300 | AC Cord Cover |
| ⚠ 4 | 15022409 | Power Transformer with Voltage Selector Socket (XX) |
| ⚠ | 15022402 | Power Transformer (UL,CSA) |
| ⚠ | 15022405 | Power Transformer (EU,BS) |
| 5 | 46363700 | 2P Output Terminal |
| 6 | 46363800 | 4P Tape Terminal |
| 7 | 46363900 | 6P Tape Terminal |
| 8 | 47609000 | Right Side Panel |
| 9 | 27046700 | Front Panel Ass'y |
| 10 | 27040900 | Knob, Power Switch |
| ⚠ 11 | 46413900 | Push SW., POWER (XX,UL,EU,BS) |
| ⚠ | 48065200 | Push SW., POWER (CSA) |
| 12 | 47705700 | Joint Shaft, Power SW. |
| 13 | 48314700 | Remote Controller Unit, RS-880 |
| ⚠ 14 | 48175200 | Voltage Selector Plug (XX) |
| ⚠ 15 | 07204700 | Voltage Selector Switch (EU,BS) |
| | 47301000 | Bonnet |

# 6. SCHEMATIC DIAGRAM

## 6-1. Signal Switching & Graphic Equalizer Section

*Design and specifications subject to change without notice for improvement.
*La présention et les spécifications sont susceptibles d'être modifiées sans préavis par suites d'améliorations éventuelles.
*Änderungen, die dem technischen Fortschritt dienen, bleiben vorbehalten.

F-5170

CONTROL (j)

jQ1~14 2SC2603(E,F), 2SC2458(Y,GR)
jIC2 M5218P, NJM4558

jIC1 LC7520

SELECTOR (o)

LINE OUT

LINE IN

TAPE 1

TAPE 2

REC 1

REC 2

LOGIC (w)

wQ1,4,7,10,12,14,16,18,20,22,26,28,29,30 DTC124
wQ2,5,8,11,13,15,17,19,21,23,24,25,27 DTA124
wQ3,6,9,31,32 2SC2603(E,F), 2SC2458(Y,GR)
wD1~8 IS2473, IS1588

wIC1 LC6510C-733

F-5172

INDICATOR (n)

nLD1~3 TLS123

| ANALOG Sw CONTROL | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| INPUT · Key | | | OUTPUT · PORT | | | | | |
| | LINE TAPE 1 | TAPE 2 | EQ REC | REC 1 | EQ REC 1 | DUBB | REC 2 | EQ REC 2 |
| ① | H | L | L | H | L | L | H | L |
| ② | L | L | L | L | L | L | L | L |
| ③ | H | H | L | L | L | H | H | L |
| ④ | L | H | L | L | L | H | L | L |
| ⑤ | H | L | H | L | H | L | L | H |
| ⑥ | L | L | H | L | L | L | L | H |
| ⑦ | H | H | H | L | H | L | L | L |
| ⑧ | L | H | H | L | H | L | L | L |

FTZ only: oR100 ~ oR104, oC100 ~ oC104
oQ1 2SA1115(E,F), 2SA1048(Y,GR)
oIC1~6 LC4066BH
oIC7 M5218P, NJM4558
oFT1 2SK163(K1, K2, L1, L2) 2SK1710(Y)

**RESISTORS**
Are in ohms, 1/4 Watts, ±5% Tolerance
Unless Otherwise Noted. k: kΩ, M: MΩ

**CAPACITORS**
Are in pF, Unless Otherwise Noted. P: pF
Electrolytic Capacitor
Capacitance (μF) / Volt (V)

**TOLERANCE**

Each D.C. Voltage shows the nominal value in volts at no input signal

Each D.C. Voltage measured by the instruments described below shows the nominal value in volts at 33 I/3rpm
Measuring Instruments.
Volt Meter
Oscilloscope

⚠ is Safety part.
Use only replacement parts recommended by the manufacturer.

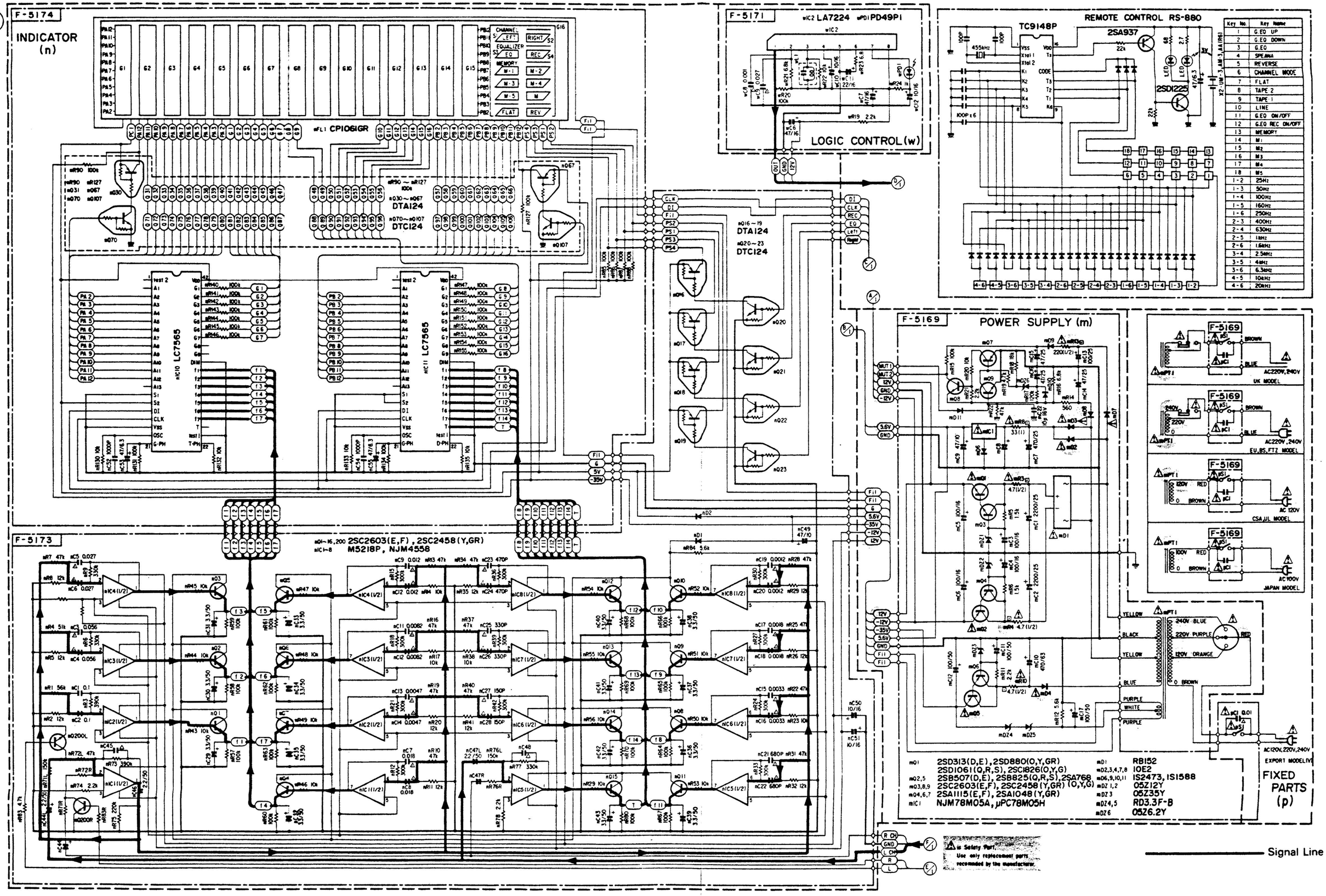
**SYMBOL**
△ Ceramic
▲ Barrier Layer Capacitor
● Film
⊡ Non-Inflammable Resistor

SYMBOL OF FUNCTION
(j) CONTROL
(m) POWER SUPPLY
(n) INDICATOR
(o) SELECTOR
(w) LOGIC

Signal Line
Remote Signal Line

## 6-2. Spectrum Analizer & Power Supply Section

*Design and specifications subject to change without notice for improvement.
*La présention et les spécifications sont susceptibles d'être modifiées sans préavis par suites d'améliorations éventuelles.
*Änderungen, die dem technischen Fortschritt dienen, bleiben vorbehalten.

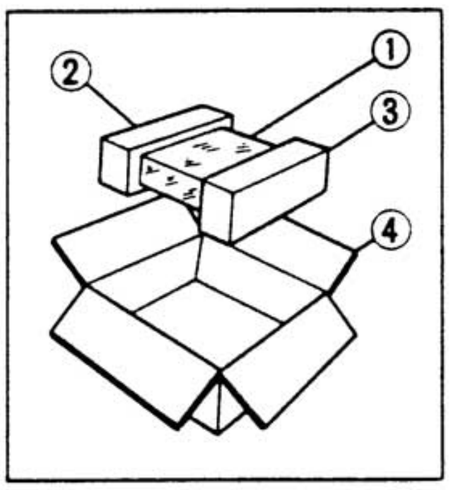



| | | |
|---|---|---|
| wQ1 | 2SD313(D,E),2SD880(O,Y,GR) | wD1 RB152 |
| | 2SD1061(Q,R,S),2SC1826(O,Y,G) | wD2,3,4,7,8 10E2 |
| wQ2,5 | 2SB507(D,E),2SB825(Q,R,S),2SA768 | wD6,9,10,11 IS2473, IS1588 |
| wQ3,8,9 | 2SC2603(E,F),2SC2458(Y,GR) (O,Y,G) | wDZ1,2 05Z12Y |
| wQ4,6,7 | 2SA1115(E,F),2SA1048(Y,GR) | wDZ3 05Z35Y |
| wIC1 | NJM78M05A, μPC78M05H | wDZ4,5 RD3.3F-B |
| | | wDZ6 05Z6.2Y |

⚠ is Safety Part.
Use only replacement parts recommended by the manufacturer.

# 7. PACKING LIST

| Parts No. | Stock No. | Description |
|---|---|---|
| 1 | 47859100 | Vinyl Cover |
| 2 | 27047000 | Styrofoam Packing (Left Side) |
| 3 | 27047100 | Styrofoam Packing (Right Side) |
| 4 | 27046800 | Carton Case |




# 8. ACCESSORY LIST

| Stock No. | Description |
|---|---|
| 07193400 | Pin Plug Cord |
| or 38103300 | Pin Plug Cord |
| 46988700 | Operating Instructions (*E•F•S) |
| 46994300 | Operating Instructions (*G•I•S) |

***Note:**
**E•F•S:** **E**nglish•**F**rench and **S**panish Version
**G•I•S:** **G**erman•**I**talian and **S**wedish Version