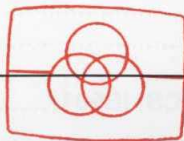


# GE-470

# SERVICE MANUAL

Digitized by WWW.FREESERVICEMANUALS.INFO



Free service manual  
Gratis schema's

Digitized by

www.freeservicemanuals.info

©1993-8 PRINTED IN JAPAN  
B61-4793-00 (J) 2318

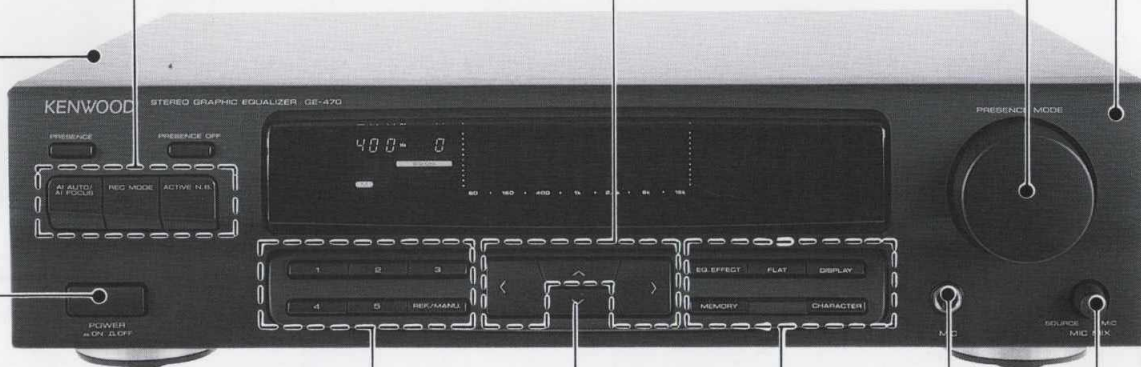
Metallic cabinet  
(A01-3125-08)

Knob (AI AUTO)  
(K29-5905-08)

Knob (Up)  
(K29-5909-08)

Knob (PRESENCE MODE)  
(K29-5898-08)

Panel ass'y\*  
(A60-)



Knob (POWER)  
(K27-2120-08)

Knob (Preset)  
(K29-5906-08)

Knob (Down)  
(K29-5910-08)

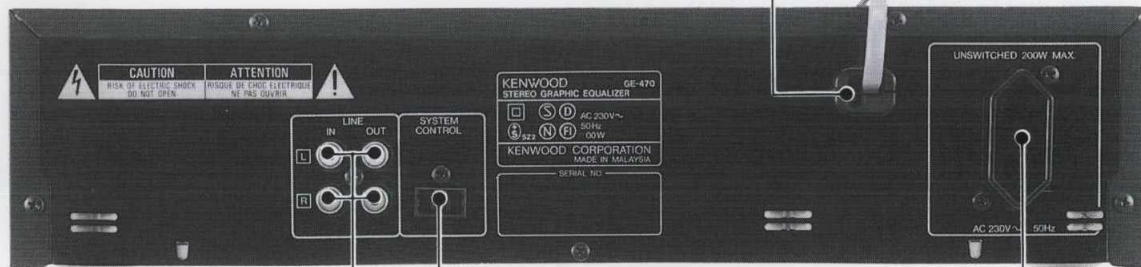
Knob (MEMORY)\*  
(K29-)

Phone jack (MIC)  
(E11-0259-08)

Knob (MIC MIX)  
(K29-5899-08)

AC power cord\*  
(E30-)

Power cord bushing  
(J42-0192-08)



Foot (REAR)  
(SH1101230060)

Phono jack (LINE IN/OUT)  
(E63-0113-08)

Rectangular receptacle (S.CONT)  
(E08-0311-05)

AC outlet\*  
(E03-)

\*Refer to parts list on page 18.

# GE-470

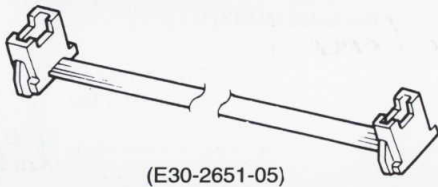
## CONTENTS/ACCESSORIES

### CONTENTS

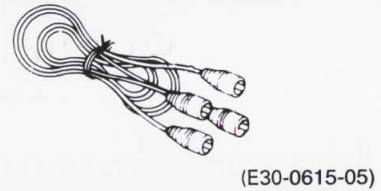
|  |           |
|--|-----------|
| <b>ACCESSORIES</b> .....   | <b>2</b>  |
| <b>CONTROL</b> .....   | <b>3</b>  |
| <b>BLOCK DIAGRAM</b> .....   | <b>4</b>  |
| <b>CIRCUIT DESCRIPTION</b>   |           |
| 1. GE Microprocessor : M38173M6-140FP (FL PCB: IC501) .....            | 5         |
| 2. Initialize and Test mode .....                                      | 7         |
| 3. Graphic Equalizer Display Filter : XR-1091ECP (FL PCB: IC503) ..... | 7         |
| <b>PC BOARD (COMPONENT SIDE VIEW)</b> .....                            | <b>9</b>  |
| <b>SCHEMATIC DIAGRAM</b> .....   | <b>13</b> |
| <b>EXPLODED VIEW (UNIT)</b> .....                                      | <b>19</b> |
| <b>PARTS LIST</b> .....  | <b>20</b> |
| <b>SPECIFICATIONS</b> .....  | <b>21</b> |

### ACCESSORIES

System control cord .... 1

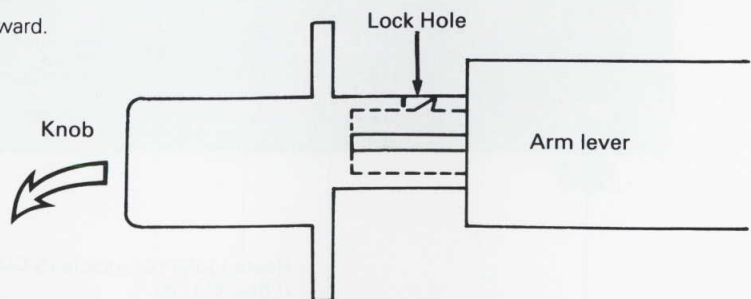


Audio cord ..... 2



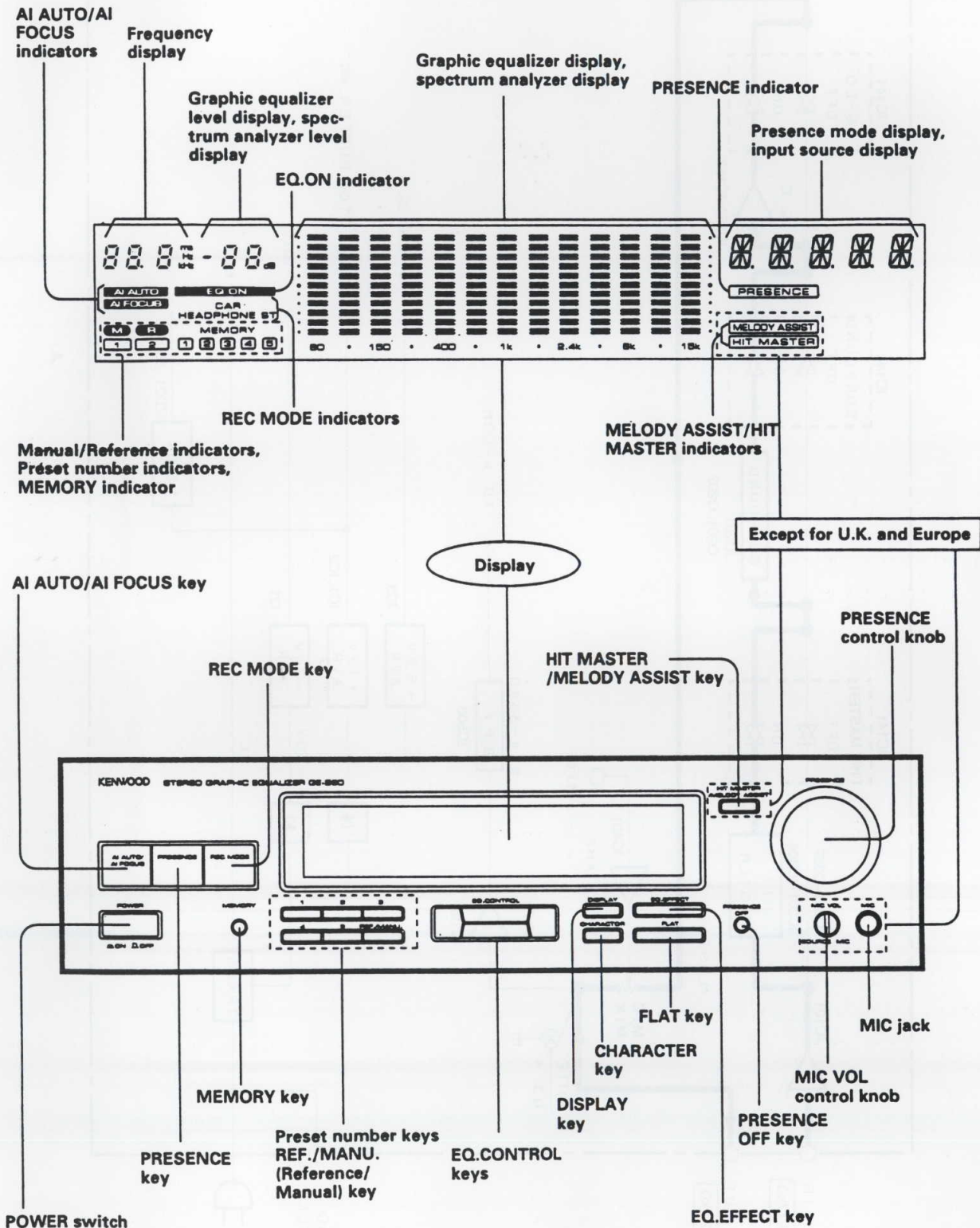
### Removing the power knob

Remove the knob by pulling it diagonally downward.



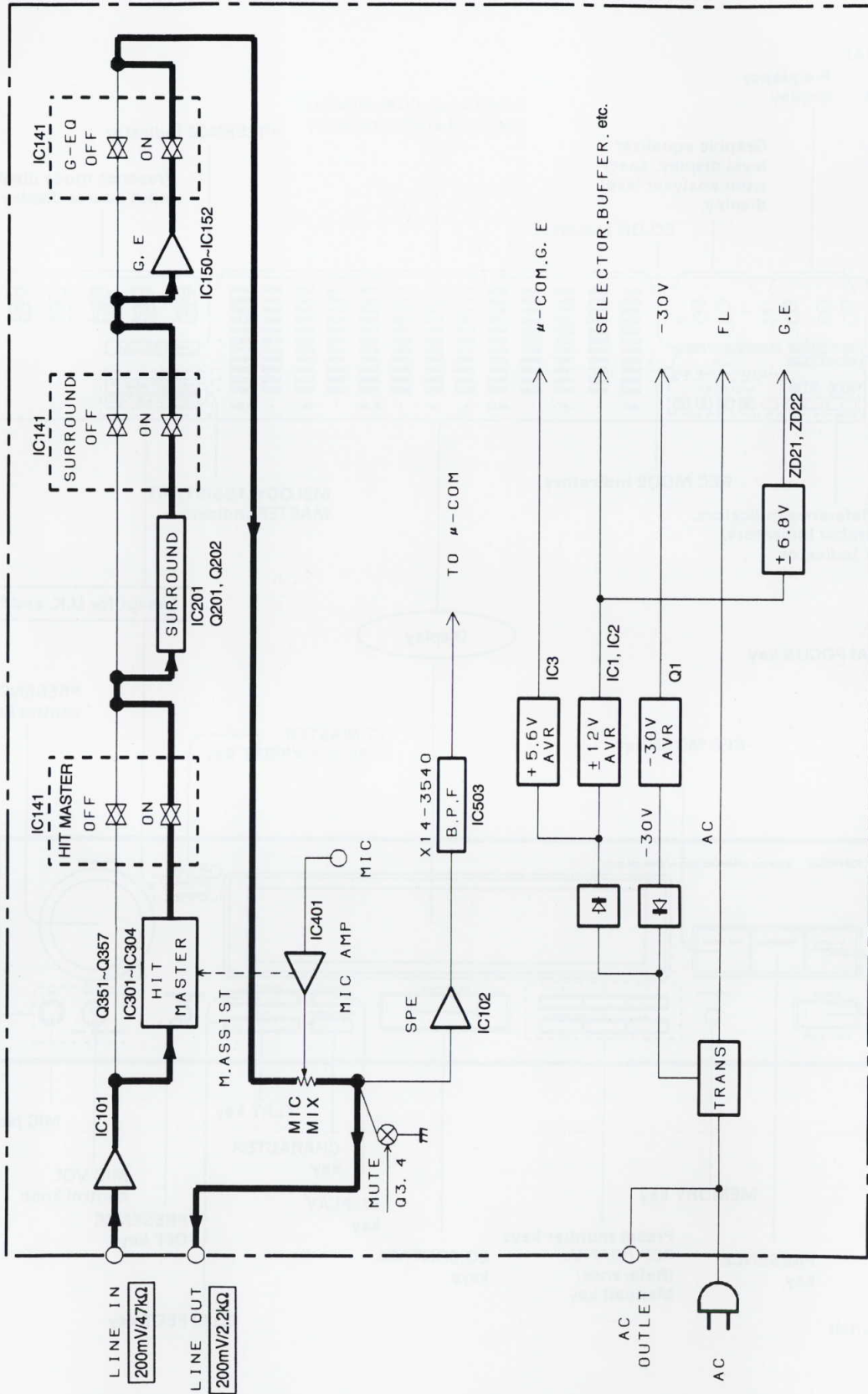
# CONTROL

Digitized by WWW.FREESERVICEMANUALS.INFO



# GE-470

## BLOCK DIAGRAM

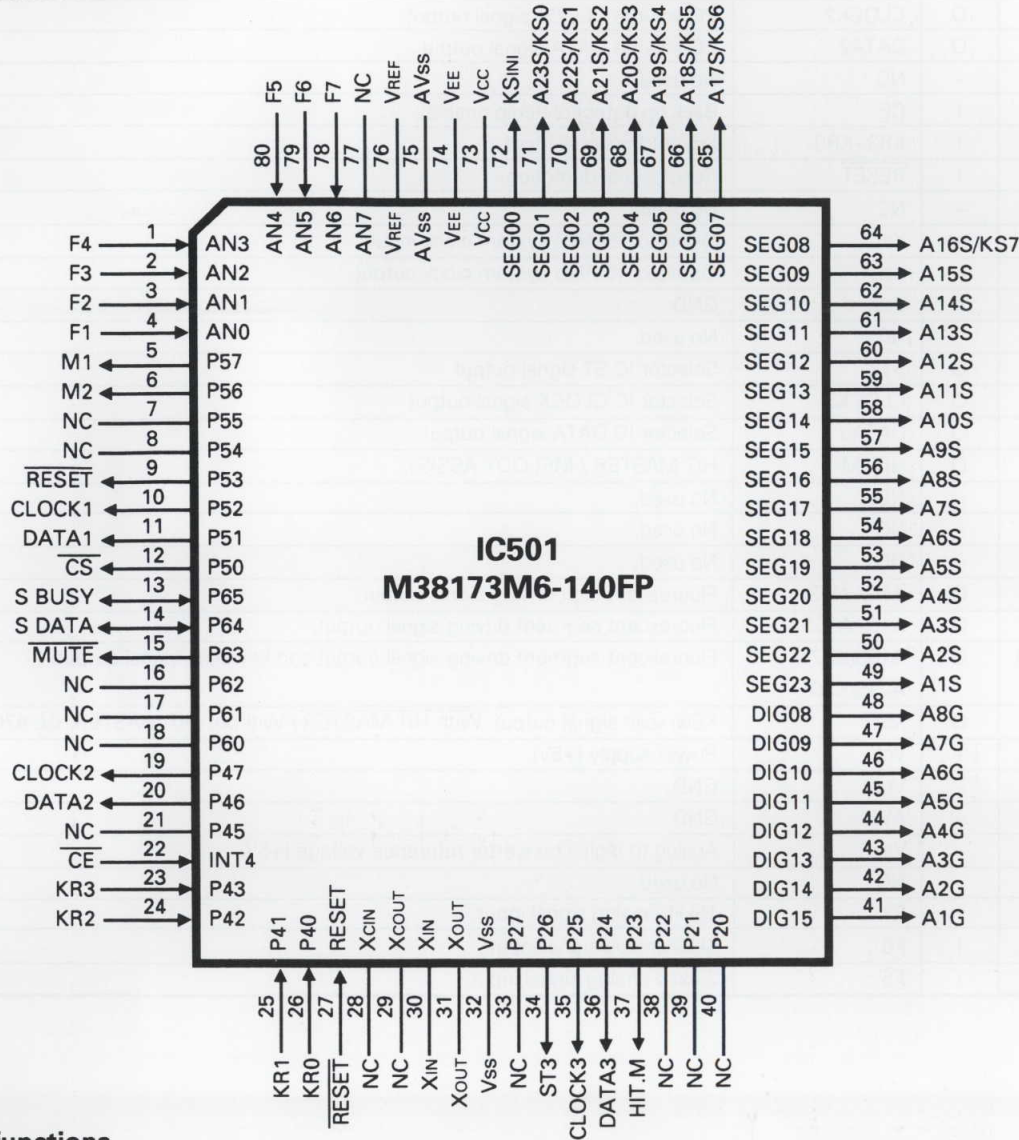


# CIRCUIT DESCRIPTION

Digitized by WWW.FREESERVICEMANUALS.INFO

## 1. GE Microprocessor : M38173M6-140FP (FL PCB : IC501)

### 1-1. Pin connection



### 1-2. Pin functions

| Pin no. | Pin name | I/O | Name   | Function                           |
|---------|----------|-----|--------|------------------------------------|
| 1       | AN3      | I   | F4     | 1kHz analog signal input.          |
| 2       | AN2      | I   | F3     | 400Hz analog signal input.         |
| 3       | AN1      | I   | F2     | 150Hz analog signal input.         |
| 4       | AN0      | I   | F1     | 60Hz analog signal input.          |
| 5       | P57      | O   | M1     | DSP mode select.                   |
| 6       | P56      | O   | M2     | DSP mode select.                   |
| 7       | P55      | -   | NC     | No used.                           |
| 8       | P54      | -   | NC     | No used.                           |
| 9       | P53      | O   | RESET  | CXP2201 RESET signal output.       |
| 10      | P52      | O   | CLOCK1 | CXP2201 CLOCK signal output.       |
| 11      | P51      | O   | DATA1  | CXP2201 DATA signal output.        |
| 12      | P50      | O   | CS     | CXP2201 CHIP SELECT signal output. |
| 13      | P65      | I/O | S BUSY | System serial BUSY signal.         |
| 14      | P64      | I/O | S DATA | System serial DATA signal.         |
| 15      | P63      | O   | MUTE   | Signal mute.                       |
| 16      | P62      | -   | NC     | No used.                           |
| 17      | P61      | -   | NC     | No used.                           |

# CIRCUIT DESCRIPTION

Digitized by WWW.FREESERVICE-MANUALS.INFO

| Pin no. | Pin name    | I/O | Name                  | Function   |
|---------|-------------|-----|-----------------------|--|
| 18      | P60         | -   | NC                    | No used.   |
| 19      | P47         | O   | CLOCK2                | EQ volume CLOCK signal output.   |
| 20      | P46         | O   | DATA2                 | EQ volume DATA signal output.  |
| 21      | P45         | -   | NC                    | No used.   |
| 22      | INT4        | I   | CE                    | Back up detection (chip enable).                                       |
| 23~26   | P43~40      | I   | KR3~KR0               | Key return signal input.   |
| 27      | RESET       | I   | RESET                 | Reset signal detection.  |
| 28, 29  | Xcin, Xcout | -   | NC                    | No used.   |
| 30      | Xin         | -   | Xin                   | Oscillator (6MHz) system clock input.                                  |
| 31      | Xout        | -   | Xout                  | Oscillator (6MHz) system clock output.                                 |
| 32      | Vss         | -   | Vss                   | GND.   |
| 33      | P27         | -   | NC                    | No used.   |
| 34      | P26         | O   | ST3                   | Selector IC ST signal output.  |
| 35      | P25         | O   | CLOCK3                | Selector IC CLOCK signal output.                                       |
| 36      | P24         | O   | DATA3                 | Selector IC DATA signal output.  |
| 37      | P23         | O   | HIT. M                | HIT MASTER / MELODY ASSIST   |
| 38      | P22         | -   | NC                    | No used.   |
| 39      | P21         | -   | NC                    | No used.   |
| 40      | P20         | -   | NC                    | No used.   |
| 41~48   | DIG15~DIG08 | O   | A1G~A8G               | Fluorescent digit driving signal output.                               |
| 49~63   | SEG23~09    | O   | A1S~A15S              | Fluorescent segment driving signal output.                             |
| 64~71   | SEG08~SEG01 | O   | A16S/KS7~<br>A23S/KS0 | Fluorescent segment driving signal output and key scan signal output.  |
| 72      | SEG00       | O   | KSINI                 | KSINI scan signal output. With HIT-MASTER / Without HIT-MASTER, GE-470 |
| 73      | Vcc         | -   | Vcc                   | Power supply (+5V).  |
| 74      | VEE         | -   | VEE                   | GND.   |
| 75      | AVss        | -   | AVss                  | GND.   |
| 76      | VREF        | -   | VREF                  | Analog to digital converter reference voltage (+5V).                   |
| 77      | AN7         | -   | NC                    | No used.   |
| 78      | AN6         | I   | F7                    | 15kHz analog signal input.   |
| 79      | AN5         | I   | F6                    | 6kHz analog signal input.  |
| 80      | AN4         | I   | F5                    | 2.4kHz analog signal input.  |

### 1-3. Key matrix

|            | KR0 (26)                                | KR1 (25)           | KR2 (24)          | KR3 (23) |
|------------|---|--------------------|-------------------|----------|
| KSINI (72) | With HIT-MASTER /<br>Without HIT-MASTER | -                  | GE-470            | -        |
| KS0 (71)   | MR2                                     | MR3                | ▽ f-              | MR1      |
| KS1 (70)   | DISPLAY                                 | △ f+               | △ L+              | -        |
| KS2 (69)   | HIT-MASTER /<br>MELODY ASSIST           | EQ EFFECT          | FLAT              | -        |
| KS3 (68)   | -                                       | ▽ L-               | CHARACTER         | -        |
| KS4 (67)   | PRESENCE MODE UP                        | PRESENCE MODE DOWN | PRESENCE MODE OFF | M/R      |
| KS5 (66)   | MR5                                     | MR4                | REC MODE          | MEMORY   |
| KS6 (65)   | -                                       | AI AUTO / AI FOCUS | PRESENCE MODE ON  | -        |
| KS7 (64)   | -                                       | -                  | -                 | -        |

## CIRCUIT DESCRIPTION

Digitized by www.freeservicemanuals.info

### 2. Initialize and Test mode

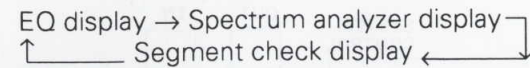
#### 2-1. Setting of initial conditions

While pressing the MEMORY key, turn the AC ON.

#### 2-2. Test mode

Setting : While pressing the FLAT key, turn the AC ON.

Contents : If the system is set to the test mode, all the indicator elements lights up. If any key is pressed, the system returns to normal indicating condition.



In the normal mode of the spectrum analyzer display, the indicator elements are turned on and off inversely (They all light up when no signals are input).

c) In the surround mode, each time the REAR LEVEL UP/DOWN key is pressed, the rear level is changed as follows.  
 0dB ↔ -10dB ↔ -40dB

d) In the Dolby surround mode, each time the DELAY TIME UP/DOWN key is pressed, the delay time is changed as follows.  
 16ms ↔ 23ms ↔ 30ms

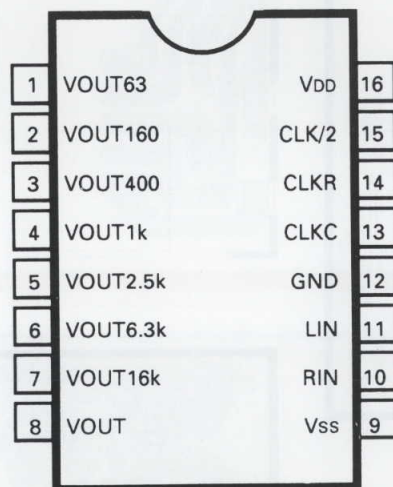
b) Set the contents of MANUAL PRESET MEMORY key as follows.

- M1 key → FLAT curve
- M2 key → MAX curve
- M3 key → MIN curve

b) Each time the DISPLAY key is pressed, the display is changed.

### 3. Graphic Equalizer Display Filter : XR-1091ECP (FL PCB : IC503)

#### 3-1. Pin connection

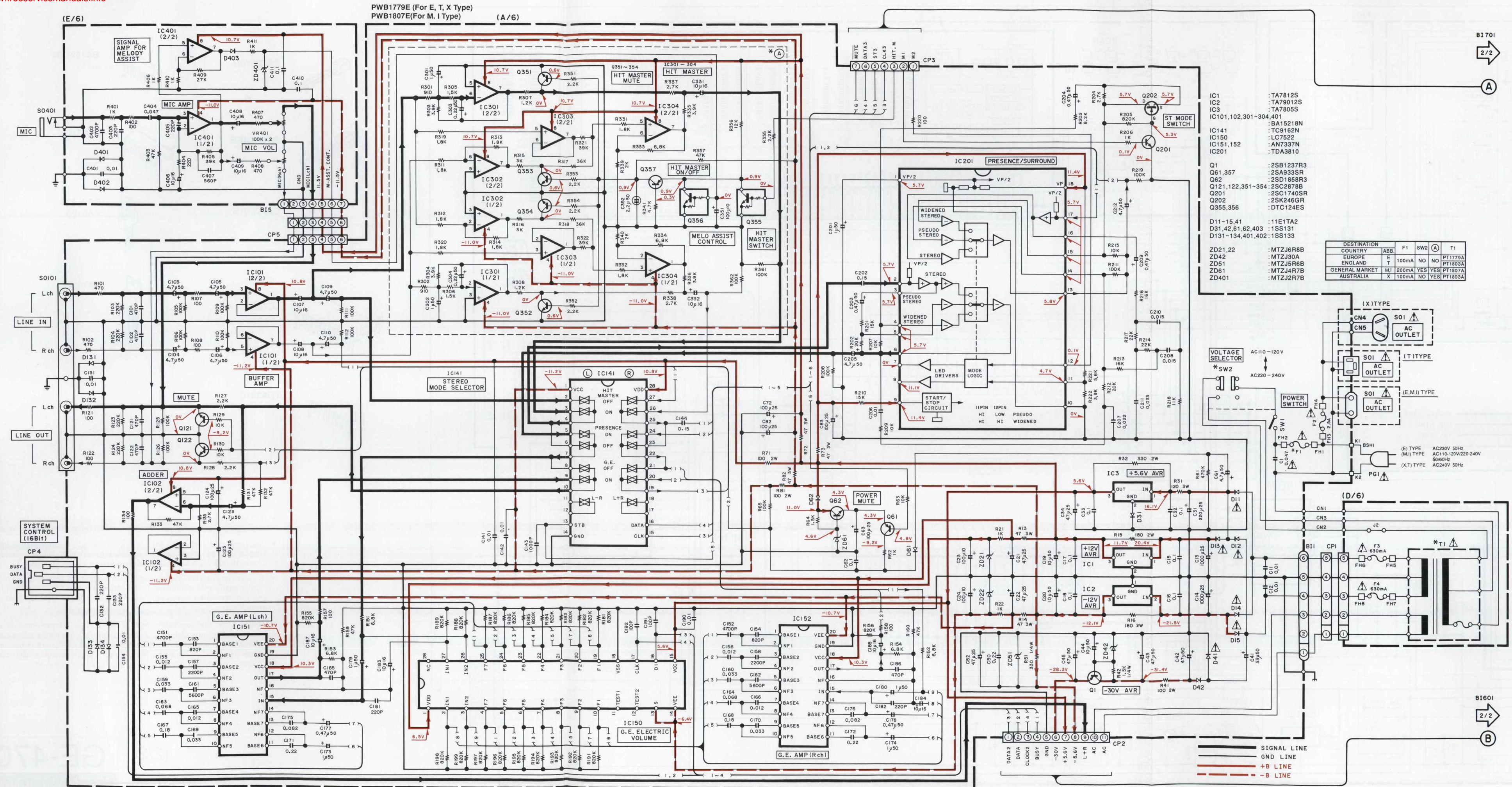


### 3-2. Pin functions

| Pin no. | Name    | Functions   |
|---------|---------|---|
| 1       | OUT63   | Peak hold output terminal of 63Hz bandpass filter. Can be driven up to a 10kΩ load. |
| 2       | OUT160  | Peak hold output terminal of 160Hz bandpass filter.                                 |
| 3       | OUT400  | Peak hold output terminal of 400Hz bandpass filter.                                 |
| 4       | OUT1k   | Peak hold output terminal of 1kHz bandpass filter.                                  |
| 5       | OUT2.5k | Peak hold output terminal of 2.5kHz bandpass filter.                                |
| 6       | OUT6.3k | Peak hold output terminal of 6.3kHz bandpass filter.                                |
| 7       | OUT16k  | Peak hold output terminal of 16kHz bandpass filter.                                 |
| 8       | OUTPEAK | OR peak hold output terminal.   |
| 9       | Vss     | Vss input (-4.5V ~ -6.5V). A capacitor is connected to ground.                      |
| 10      | RIN     | Right-channel input, input impedance is more than 1 x 10 <sup>12</sup> Ω.           |
| 11      | LIN     | Left-channel input, input impedance is more than 1 x 10 <sup>12</sup> Ω.            |
| 12      | GND     | Digital and analog ground.  |
| 13      | CLKC    | A clock capacitor is connected to ground.   |
| 14      | CLKR    | Connected to pin 13 of the clock resistor.  |
| 15      | CLK/2   | A 1/2 original oscillation clock is output.   |
| 16      | VDD     | VDD input (4.5V ~ 6.5V). A capacitor is connected to ground.                        |







IC1 : TA7812S  
 IC2 : TA79012S  
 IC3 : TA7805S  
 IC101,102,301-304,401 : BA15218N  
 IC141 : TC9162N  
 IC150 : LC7522  
 IC151,152 : AN7337N  
 IC201 : TDA3810

Q1 : 2SB1237R3  
 Q61,357 : 2SA933SR  
 Q62 : 2SD1858R3  
 Q121,122,351-354 : 2SC2878B  
 Q201 : 2SC1740SR  
 Q202 : 2SK246GR  
 Q355,356 : DTC124ES

D11-15,41 : 11E1TA2  
 D31,42,61,62,403 : 1SS131  
 D131-134,401,402 : 1SS133

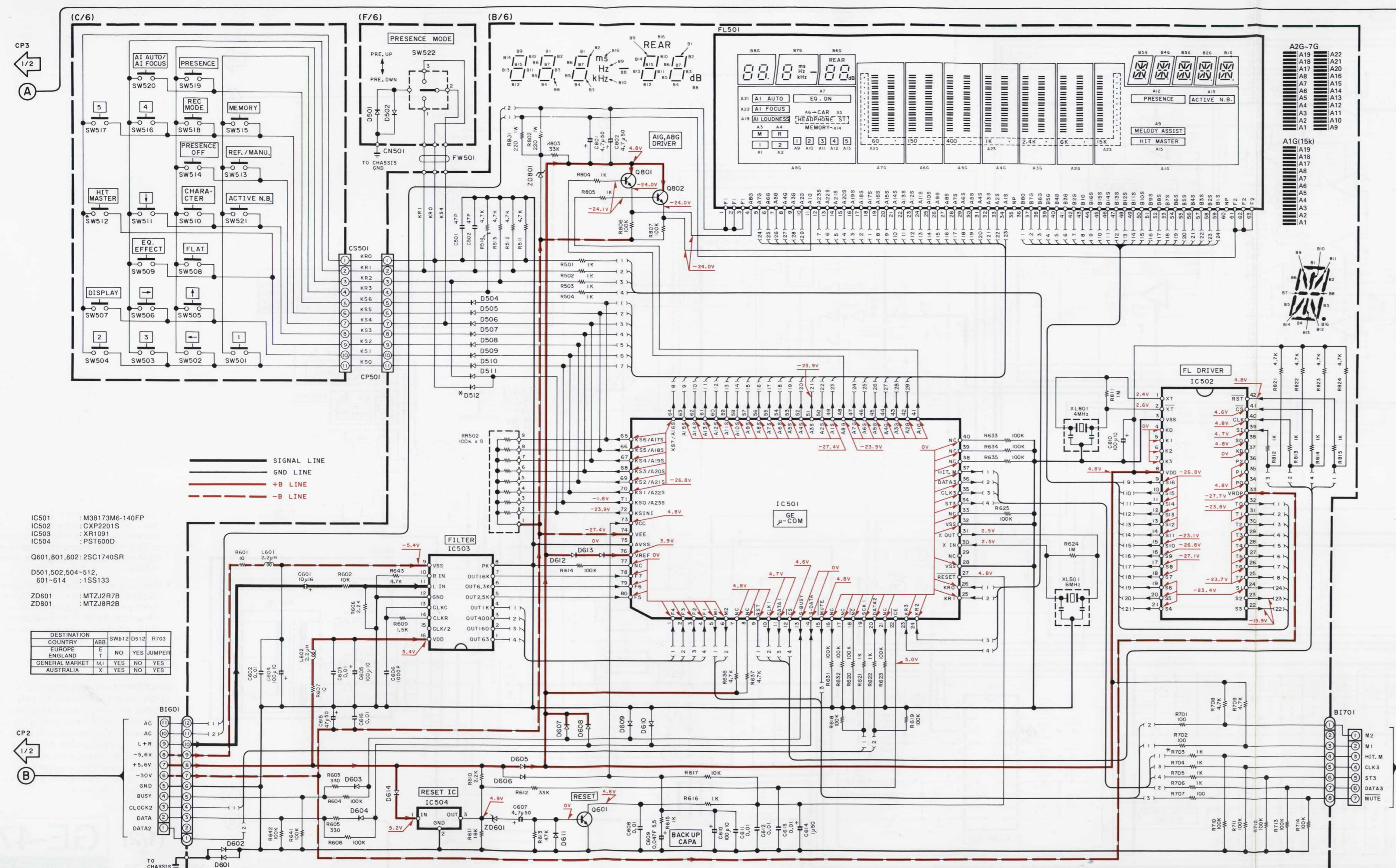
| DESTINATION    | COUNTRY | ABB. | F1    | SW2 | (A) | T1      |
|----------------|---------|------|-------|-----|-----|---------|
| EUROPE         | E       | T    | 100mA | NO  | NO  | PT1779A |
| ENGLAND        | E       | T    | 100mA | NO  | NO  | PT1803A |
| GENERAL MARKET | MJ      |      | 200mA | YES | YES | PT1807A |
| AUSTRALIA      | X       |      | 100mA | NO  | YES | PT1803A |

ZD21,22 : MTZJ6R8B  
 ZD42 : MTZJ30A  
 ZD51 : MTZJ5R6B  
 ZD61 : MTZJ4R7B  
 ZD401 : MTZJ2R7B

(E) TYPE AC230V 50Hz  
 (M.) TYPE AC110-120V/220-240V 50/60Hz  
 (X.T) TYPE AC240V 50Hz

- DC voltages are as measured with a high impedance voltmeter. Values may vary slightly due to variations between individual instruments or/and units.
- Les tension c.c.doivent être mesurées avec un voltmètre à haute impédance. Les valeurs peuvent différer légèrement du fait des variations inhérentes aux appareils et aux instruments de mesure individuels.
- Die angegebenen Gleichspannungswerte wurden mit einem hochohmigen Spannungsmesser gemessen. Dabei schwanken die Meßwerte aufgrund von Unterschieden zwischen einzelnen Instrumenten oder Geräten u.U. geringfügig.

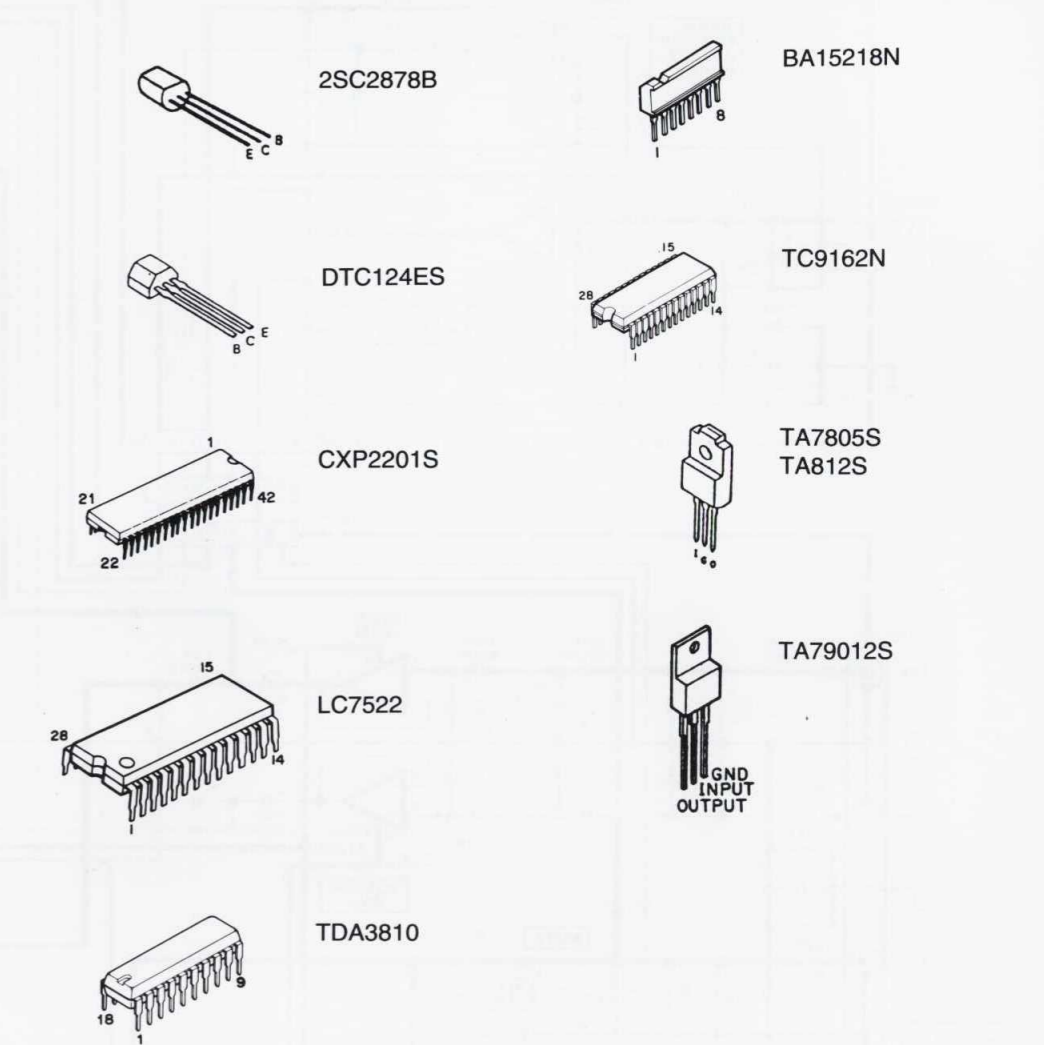
**CAUTION :** For continued safety, replace safety critical components only with manufacturer's recommended parts (refer to parts list). Δ Indicates safety critical components. To reduce the risk of electric shock, leakage-current or resistance measurements shall be carried out (exposed parts are acceptably insulated from the supply circuit) before the appliance is returned to the customer.



IC501 : M38173M6-140FP  
 IC502 : CXP2201S  
 IC503 : XR1091  
 IC504 : PST600D

Q601,801,802: 2SC1740SR  
 D501,502,504-512, 601-614 : 1SS133  
 ZD601 : MTZJ2R7B  
 ZD801 : MTZJ8R2B

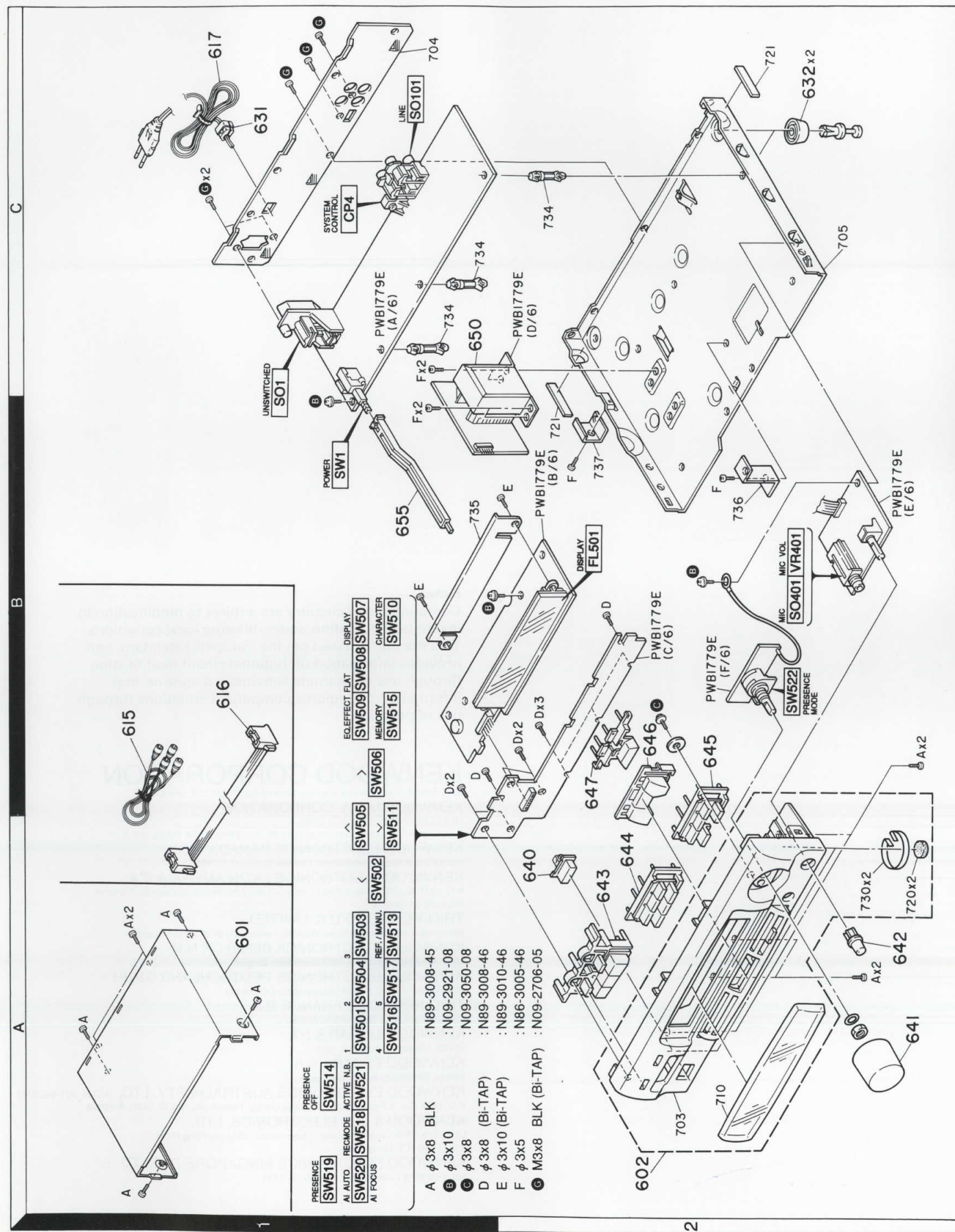
| DESTINATION    | SW512 | D512 | R703 |
|----------------|-------|------|------|
| COUNTRY        | ABB   | T    | NO   |
| EUROPE         | E     | NO   | YES  |
| ENGLAND        | T     | NO   | YES  |
| GENERAL MARKET | M1    | YES  | NO   |
| AUSTRALIA      | X     | YES  | NO   |



- DC voltages are as measured with a high impedance voltmeter. Values may vary slightly due to variations between individual instruments or/and units.
- Les tension c.c.doivent être mesurées avec un voltmètre à haute impédance. Les valeurs peuvent différer légèrement du fait des variations inhérentes aux appareils et aux instruments de mesure individuels.
- Die angegebenen Gleichspannungswerte wurden mit einem hochohmigen Spannungsmesser gemessen Dabei schwanken die Meßwerte aufgrund von Unterschieden zwischen einzelnen Instrumenten oder Geräten u.U. geringfügig.

**CAUTION :** For continued safety, replace safety critical components only with manufacturer's recommended parts (refer to parts list). Δ Indicates safety critical components. To reduce the risk of electric shock, leakage-current or resistance measurements shall be carried out (exposed parts are acceptably insulated from the supply circuit) before the appliance is returned to the customer.

EXPLODED VIEW (UNIT)



Parts with the exploded numbers larger than 700 are not supplied.

\* New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnés dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Table No. 2: GE-470 parts list. Columns include Ref. No., Address, Parts No., Description, and Destination. Lists various electronic components like capacitors and resistors.

\* New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnés dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Table No. 1: GE-470 parts list. Columns include Ref. No., Address, Parts No., Description, and Destination. Lists various mechanical and electrical components like cabinets, manuals, and transformers.

PARTS LIST

\* New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnés dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Table No. 3: GE-470 parts list. Columns include Ref. No., Address, Parts No., Description, and Destination. Lists various electronic components like capacitors and resistors.

\* New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnés dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Table No. 4: GE-470 parts list. Columns include Ref. No., Address, Parts No., Description, and Destination. Lists various electronic components like capacitors and resistors.

PARTS LIST

\* New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnés dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

Table No. 5: GE-470 parts list. Columns include Ref. No., Address, Parts No., Description, and Destination. Lists various electronic components like capacitors and resistors.

Digitized by WWW.FREESERVICEMANUALS.INFO

# GE-470

## PARTS LIST

# GE-470

## SPECIFICATIONS

# GE-470

### Performance

|   |                                 |
|---|---------------------------------|
| Equalizer characteristic variable range.....    | ±10 dB                          |
| Center frequencies (Hz) .....                   | 60, 150, 400, 1k, 2.4k, 6k, 15k |
| Total harmonic distortion (at 1 kHz, flat)..... | 0.05 %                          |
| Gain .....                                      | 0 dB                            |
| Signal to noise ratio (IHF'66).....             | 100 dB                          |
| Input impedance .....                           | 47 kΩ                           |
| Output impedance .....                          | 2.2 kΩ                          |

### General

|                        |               |
|------------------------|---------------|
| Power consumption..... | 11W           |
| AC outlets             |               |
| UNSWITCHED.....        | 1 (200W max.) |
| Dimensions .....       | W: 360 mm     |
|                        | H: 94 mm      |
|                        | D: 326 mm     |
| Weight.....            | 4.0 kg        |

**Note:**  
KENWOOD follows a policy of continuous advancements in development. For this reason specifications may be changed without notice.

**Note:**  
Component and circuitry are subject to modification to insure best operation under differing local conditions. This manual is based on, the Europe(E) standard, and provides information on regional circuit modification through use of alternate schematic diagrams, and information on regional component variations through use of parts list

### KENWOOD CORPORATION

Alive Mitake, 2-5, 1-chome Shibuya, Shibuya-ku, Tokyo 150, JAPAN  
**KENWOOD U.S.A. CORPORATION**  
 CONSUMER ELECTRONICS GROUP  
 P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90810, U.S.A.  
**KENWOOD ELECTRONICS CANADA INC.**  
 6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8  
**KENWOOD ELECTRONICS LATIN AMERICA S.A.**  
 P.O. BOX 55-2791, Piso 6 Plaza Chase, Cl. 47 y Aquilino de la Guardia, Panama, Republic de Panama  
**TRIO-KENWOOD U.K. LIMITED**  
 Kenwood House, Dwight Road, Watford, Herts, WD1 8EB, United Kingdom  
**KENWOOD ELECTRONICS BENELUX N.V.**  
 Machelsesteenweg 418 B-1930 Zaventem, Belgium  
**KENWOOD ELECTRONICS DEUTSCHLAND GMBH**  
 Rembrücker Str. 15, 63150 Heusenstamm, Germany  
**TRIO-KENWOOD FRANCE S.A.**  
 13 Boulevard Ney, 75018 Paris, France  
**KENWOOD LINEAR S.p.A.**  
 20125, Milano-Via Arbe, 50, Italy  
**KENWOOD ESPAÑA S.A.**  
 Bolvia, 239-08020 Barcelona, Spain  
**KENWOOD ELECTRONICS AUSTRALIA PTY. LTD. (A.C.N. 001 499 074)**  
 P.O. BOX 504, 8 Figtree Drive, Australia Centre, Hombush, N.S.W. 2140, Australia  
**KENWOOD & LEE ELECTRONICS, LTD.**  
 Unit 3712-3724, Level 37 Tower 1, Metroplaza, 223 Hing Fong Road, Kwai Fong N.T. Hong Kong  
**KENWOOD ELECTRONICS SINGAPORE PTE LTD**  
 No. 1 Genting Lane #07-00, Singapore, 1334

| Ref. No.<br>参照番号                      | Address<br>位置 | New Parts<br>新部品 | Parts No.<br>部品番号   | Description<br>部品名 / 規格   | Re-<br>marks<br>備考 |
|---------------------------------------|---------------|------------------|---|---|--------------------|
| Q957<br>Q801, 802<br>Z021, 22<br>Z042 |               | *                | ZSA933SR<br>ZSC1740SR<br>ZSC1740SR<br>MTZ1648B<br>MTZ130A | TRANSISTOR<br>TRANSISTOR<br>TRANSISTOR<br>ZENER DIODE<br>ZENER DIODE    | MXI                |
| Z051<br>Z0401<br>Z0601<br>Z0801       |               | *                | MTZ1564B<br>MTZ1564B<br>MTZ12R7B<br>MTZ12R7B<br>MTZ16R2B  | ZENER DIODE<br>ZENER DIODE<br>ZENER DIODE<br>ZENER DIODE<br>ZENER DIODE |                    |

\* New Parts  
Parts without Parts No. are not supplied.  
Les articles non mentionnés dans le Parts No. ne sont pas fournis.  
Teile ohne Parts No. werden nicht geliefert.

⚠ indicates safety critical components

L:Scandinavia
K:USA
P:Canada  
Y:FP(Far East, Hawaii)
E:England
M:Europe  
Y:AF(Europe)
X:Australia
M:Other Areas