PIONEER

# Service Manual

**CIRCUIT DESCRIPTIONS**
**REPAIR & ADJUSTMENTS**

ORDER NO.
ARP1010 - 0

## STEREO RECEIVER

# SX-1500(BK)

**MODEL SX-1500(BK) COMES IN SEVEN VERSIONS DISTINGUISHED AS FOLLOWS:**

| Type | Power requirement | Destination |
|---|---|---|
| KU | AC120V only | U.S.A. |
| KC | AC120V only | Canada |
| S | AC110V, 120V, 220V, 240V (switchable) | General market |
| HEZ | AC220V, 240V (switchable) | West Germany |
| HE | AC220V, 240V (switchable) | European continent |
| HB | AC240V, 220V (switchable) | United Kingdom |
| YP | AC240V | Australia |

- **This service manual is applicable to the KU type.**
- **As to the KC type please refer to the additional service manual (ARP1011).**
- **As to the SX-1500(BK) HE and HB types please refer to the additional service manual (ARP 1103).**
- **As to the S and HEZ types please refer to the additional service manual (ARP1104).**
- **As to the SX-1500(BK) YP type please refer to the additional service manual (ARP1105).**

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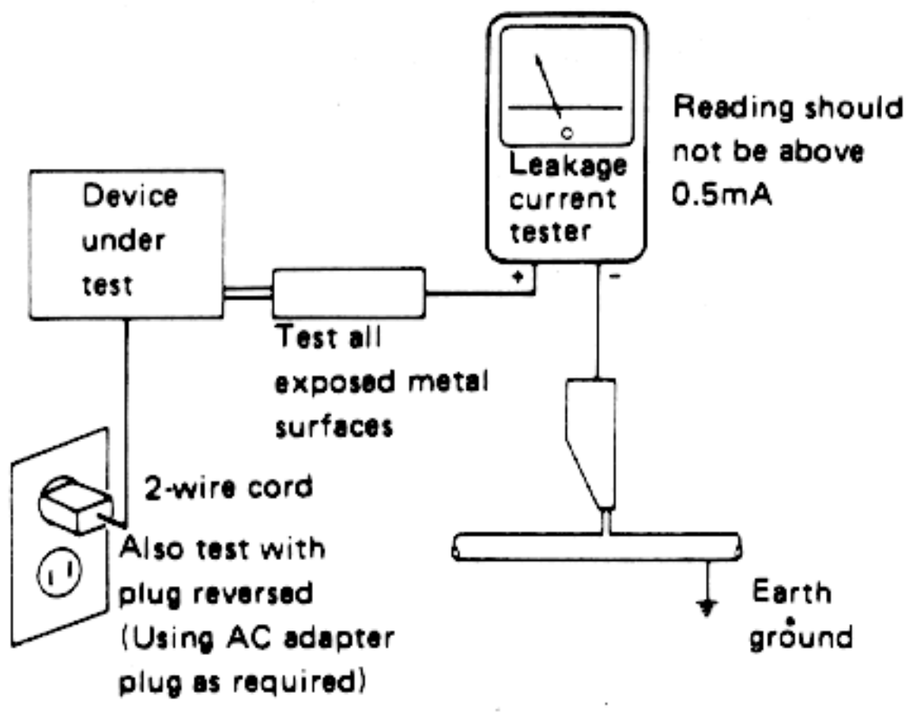
# 1. SAFETY INFORMATION

## 1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

**LEAKAGE CURRENT CHECK**

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.




AC Leakage Test

**ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.**

## 2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which dose not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

# 2. SPECIFICATIONS

**Amplifier Section**

Continuous Average Power Output is 45 watts* per channel, min., at 8 ohms from 40 Hertz to 20,000 Hertz with no more than 0.3% total harmonic distortion.

Continuous Power Output (both channel driven)
- 1 kHz, T.H.D. 0.3%, 8 Ω ..... 48 W + 48 W
- 40 Hz — 20 kHz, T.H.D. 0.3%, 8 Ω ..... 45 W + 45 W

Total Harmonic Distortion
- 1 kHz, 22.5 W, 8 Ω ..... 0.05%

Input (Sensitivity/Impedance)
- PHONO ..... 2.5 mV/47 kΩ
- CD, TAPE PLAY, AUX, VCR ..... 150 mV/22 kΩ

Phono Overload Level (T.H.D. 0.01%, 1,000 Hz)
- PHONO ..... 130 mV

Output Level
- TAPE REC ..... 150 mV

Frequency Response
- PHONO (RIAA Equalization) ..... 30 Hz to 20,000 Hz ±0.5 dB
- CD, AUX, VCR ..... 10 Hz to 70,000 Hz $\pm^{0.5}_{3.0}$ dB

Hum and Noise (IHF, short circuited, A network)
- PHONO ..... 72 dB
- CD, TAPE PLAY, AUX, VCR ..... 94 dB

Graphic Equalizer frequency band ..... 100 Hz, 330 Hz, 1 kHz, 3.3 kHz, 10 kHz, ±8 dB

**FM Tuner Section**

- Frequency range ..... 87.5 MHz to 108 MHz
- Usable Sensitivity ..... 11.2 dBf (1.0 μV/75 Ω)
- 50 dB Quieting Sensitivity
  - MONO ..... 15.3 dBf (1.6 μV/75 Ω)
  - STEREO ..... 38.3 dBf (22.5 μV/75 Ω)
- Signal-to-Noise Ratio
  - MONO ..... 78 dB (at 85 dBf)
  - STEREO ..... 75 dB (at 85 dBf)
- Distortion
  - STEREO ..... 0.5% (1 kHz)
- Alternate Channel Selectivity ..... 55 dB (400 kHz)
- Stereo Separation ..... 35 dB (1 kHz)
- Frequency Response ..... 30 Hz to 15 kHz, ($\pm\frac{1}{2}$) dB
- Antenna Input ..... 300 Ω balanced, 75 Ω unbalanced

## AM Tuner Section

Frequency range
- When 10 kHz step ..... 530 kHz to 1,600 kHz
- When 9 kHz step ..... 531 kHz to 1,602 kHz

Sensitivity
- IHF, Loop antenna ..... 300 μV/m

Selectivity ..... 20 dB
Signal-to-Noise Ratio ..... 50 dB
Antenna ..... AM Loop Antenna

## Miscellaneous

Power Requirements .....
- U.S., Canadian model ..... AC 120 Volts, 60 Hz

Power Consumption ..... 175 Watts
Dimensions ..... 420 (W) x 98 (H) x 220 (D) mm
16-9/16 (W) x 3-7/8 (H) x 8-11/16 (D) in
Weight (without package) ..... 4.3 kg (9 lb 8 oz)

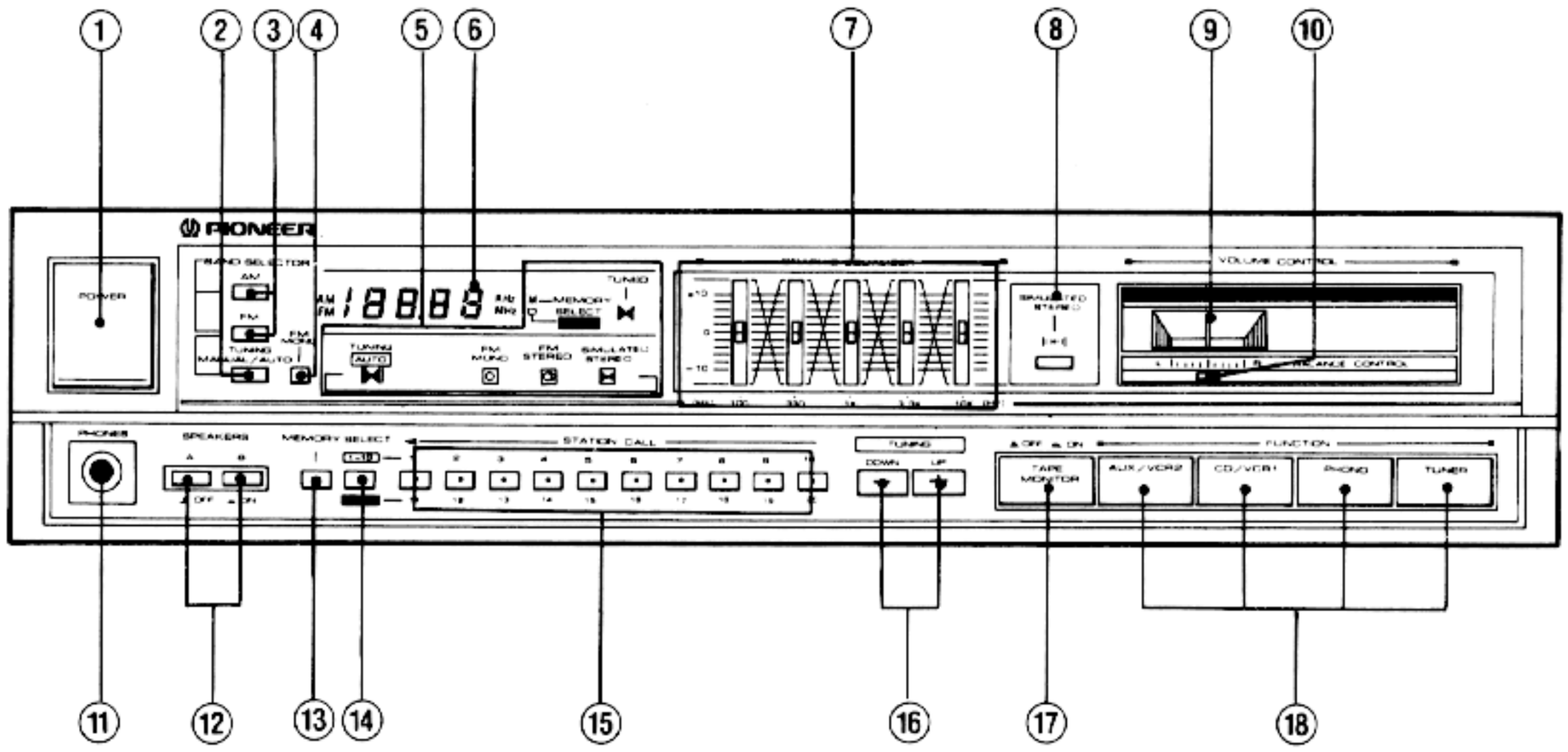
## Furnished Parts

FM T-type Antenna ..... 1
AM Loop Antenna ..... 1
Operating Instructions ..... 1

** Measured pursuant to the Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifier.*

*NOTE:*
*Specifications and design subject to possible modification without notice due to improvements.*

# 3. FRONT PANEL FACILITIES




The illustration shows model SX-1500.

### ① POWER button

When this button is pressed, power is supplied to the unit. To turn power off, press the button again to the released position.

### ② TUNING MANUAL/AUTO button

Works during FM reception. Use to select either the AUTO mode or MANUAL mode for FM reception.
Indicators on the display panel show whether the mode selected is MANUAL or AUTO.

### ③ BAND SELECTOR buttons

**[Model SX-1500]**
These buttons are used to select either AM or FM reception.
**AM**: Push this button for AM reception.
**FM**: Push this button for FM reception.

**[Model SX-1500L]**
These buttons are used to select MW, LW or FM reception.
**MW/LW**: Every time the MW/LW button is pressed, MW or LW reception is selected alternately. The band selected, MW or LW, is indicated alternately on the frequency display for easy confirmation.
**FM**: Push this button for FM reception.

### ④ FM MONO button

Normally, the MONO indicator remains off. However, it may not be possible to tune in a desired FM station because it is too far away or because its signals are too weak. In cases like these, press the button to set the reception to the monaural mode (MONO indicator lights) and tune in the station. The program of an FM stereo broadcast will be heard in mono. The setting of the FM MONO button (ON or OFF) is memorized along with the station's frequency in the STATION CALL buttons.
When using the preset tuning feature, reception will be in the mode selected when the station was memorized.
This button will not function for AM (MW or LW) reception.

### ⑤ Indicators

**[MEMORY] (M)**
This lights when the MEMORY button is pressed. Stations can be preset into the STATION CALL buttons while this indicator is on.
**[SELECT (11 – 20)] (■)**
This lights when the SELECT button is pressed and mode 2 (11 – 20) is established.
**[TUNED] ( ⋈ )**
This lights to indicate that a station has been optimally tuned in.

**[TUNING AUTO] ( ⋈ )**
Lights when the auto tuning mode is selected during FM reception.
**[FM MONO] ( ⊙ )**
Lights when the FM MONO button is pressed to select monaural FM reception.
**[FM STEREO] ( ◎ )**
This lights during FM stereo reception.
**[SIMULATED STEREO] ( ▮▮ )**
This lights when the simulated stereo button is pressed and the simulated stereo mode is established.

## ⑥ Frequency display

This display normally shows the frequency of the station selected. When a STATION CALL button is pressed, the channel number for that station (the number of the STATION CALL button) is displayed for a few seconds. The display will show --CH during other than preset tuning.

## ⑦ GRAPHIC EQUALIZER controls

The equalizer is divided into five frequency ranges (100 Hz, 330 Hz, 1 kHz, 3.3 kHz, 10 kHz) to tailor music to the individual taste of the listener.

## ⑧ SIMULATED STEREO button

This turns monaural signals into simulated stereo sound. Use this when you wish to experience the sense of stereo presence with AM broadcasts, VCR or other monaural signal sources.

*NOTE:*
*This function can also be used with stereo sources, but it will result in a different sound from the normal stereo sound.*

## ⑨ VOLUME control

## ⑩ BALANCE control

## ⑪ PHONES jack

This is a standard "plug-type jack" for headphones.

## ⑫ SPEAKERS buttons ( ■ OFF, ▬ ON)

These are used to select the speaker through which you wish to listen.
**A**: When the speakers connected to A terminals are in use.
**B**: When the speakers connected to B terminals are in use.
• Turn both A and B speakers to OFF position when only the HEADPHONES are in use.

*NOTE:*
*No sound will be heard through the speakers when both A and B buttons are depressed if only one set of speakers has been connected to either A or B SPEAKERS terminals.*

## ⑬ MEMORY button

This is used to memorize stations. When the button is pressed, the MEMORY indicator will light. To memorize the frequency of any station, press the STATION CALL button while the MEMORY indicator is lit.

## ⑭ SELECT button

This button is used to set the STATION CALL buttons to Mode 1 (1—10) or MODE 2 (11—20). Mode 2 (11—20) is obtained when the button is pressed and select indicator is lit.

*NOTE:*
*Changing the position of this button has no effect on receiver performance itself.*

## ⑮ STATION CALL buttons

These are used to recall preset broadcasting stations and to preset the station.

## ⑯ TUNING buttons (−, +)

The function of these buttons differs according to whether AUTO tuning or MANUAL tuning is selected during FM reception. The MANUAL tuning mode is automatically selected for AM reception.
**[AUTO tuning mode]**
When the "+" button is pressed, the frequencies are scanned in ascending order; when the "−" button is pressed, they are scanned in descending order. Scanning stops as soon as a station has automatically been tuned in.
**[MANUAL tuning mode]**
When the "+" button is pressed, the frequency increases and when the "−" button is pressed, it decreases. Every time either button is pressed, the frequency changes one step at a time and when the button is kept pressed, the frequency changes continuously.

## ⑰ TAPE MONITOR button ( ■ OFF, ▬ ON)

[TAPE MONITOR]
Press when playing the tape deck connected to the TAPE jacks.

## ⑱ FUNCTION buttons

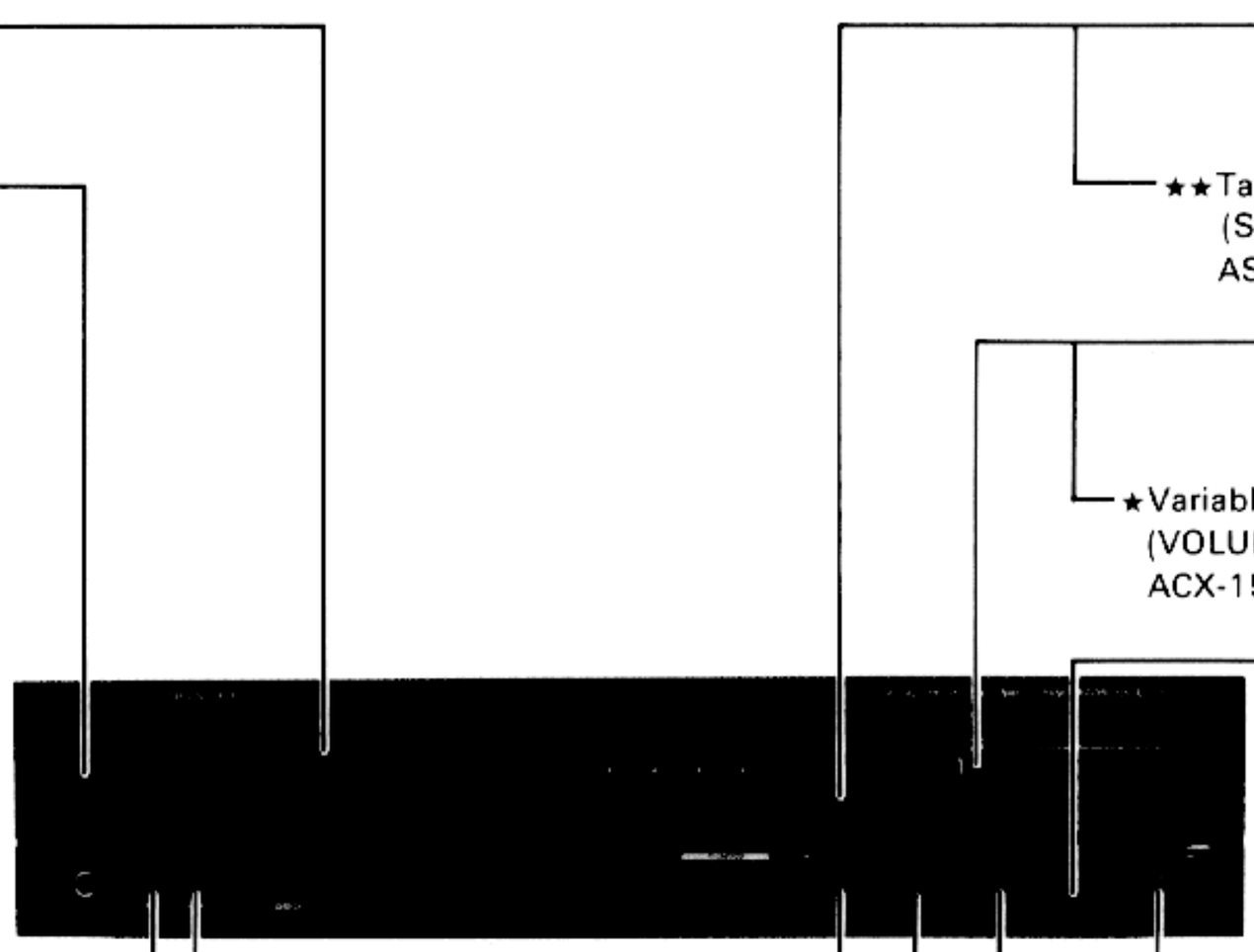
**[AUX/VCR 2]**
Press when listening to a stereo component connected to the AUX/VCR 2 jacks.
**[CD/VCR 1]**
Press when listening to a stereo component connected to the CD/VCR 1 jacks.
**[PHONO]**
Press when playing records on a turntable connected to the PHONO jacks.
**[TUNER]**
Press when listening to a radio broadcast.

# 4. PARTS LOCATION

*NOTES:*

- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *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 marked by " ⊙ " are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

## Front Panel View



★Fluorescent tube (V401)
AAV-039

Knob (POWER)
AYY-404

★★Push switch
(S1, POWER)
ASG-551

Push knob
(SIMULATED STEREO)
AAY-306

★★Tact switch
(S407, SIMULATOR STEREO)
ASG-711

Slide knob
(VOLUME CONTROL)
AAY-385

★Variable resistor (VR402, 100 kΩ)
(VOLUME CONTROL)
ACX-154

Knob
(PHONO)
AAY-387

★★Push switch
(S302 PHONO)
SUJ5L2B2B2B2L

Push knob
(SPEAKERS, A, B)
AAY-306

★★Push switch
(S901, SPEAKERS A, B)
SUJ6LYXS

Knob
(TUNER)
AAY-386

★★Push switch
(S302, TUNER)
SUJ5L2B2B2B2L

Knob
(TAPE MONITOR)
AAY-389

★★Push switch
(S301, TAPE MONITOR)
ASG-424

Knob
(CD/VCR1)
AAY-388

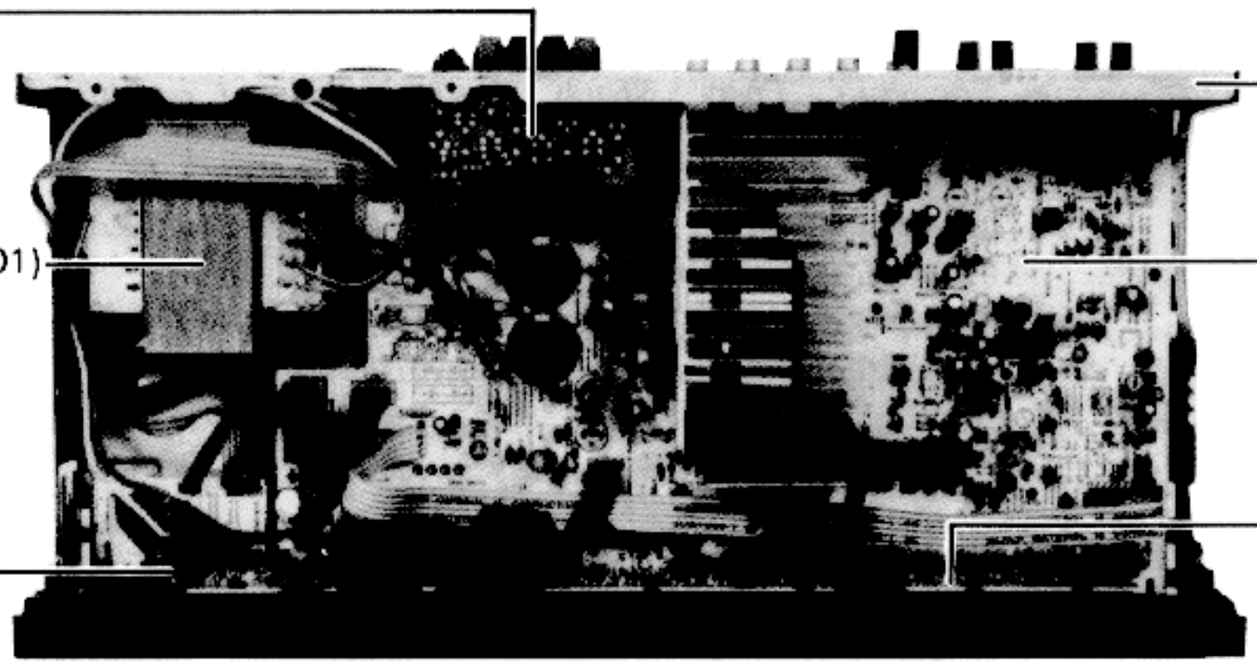
★★Push switch
(S302, CD/VCR1)
SUJ5L2B2B2B2L

Knob
(AUX/VCR2)
AAY-391

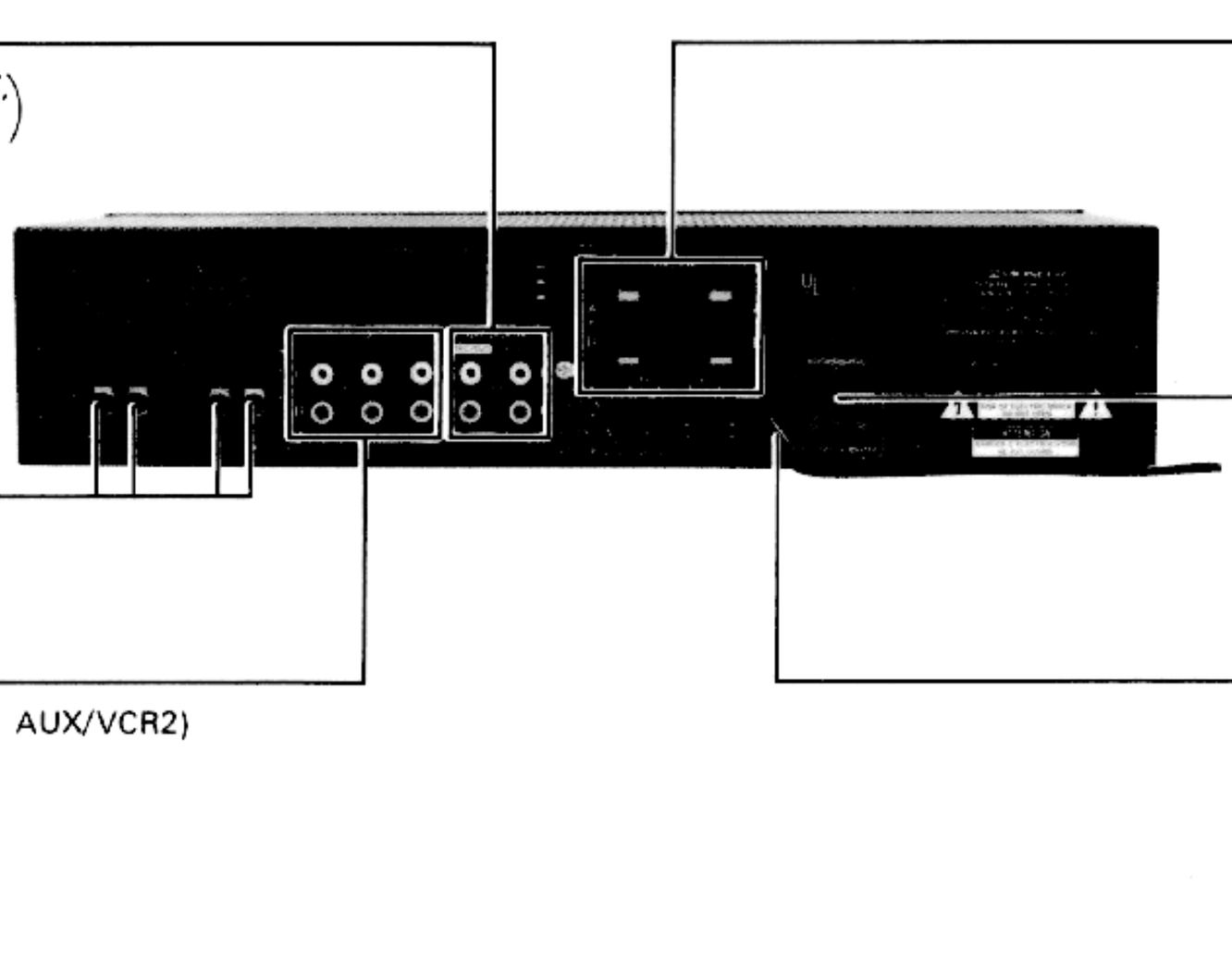
★★Push switch
(S302, AUX/VCR2)
SUJ5L2B2B2B2L

Note: The parts described above the drawn out lines show those which are attached to the front side of the front panel. The parts described below show those attached to the rear side of the front panel.

## Top View with Bonnet Case Removed




## Rear Panel View



# 5. ELECTRICAL PARTS LIST

*NOTES:*

- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

  *Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).*

  | | | | |
  |---|---|---|---|
  | *560Ω* | *56 × 10¹* | *561 . . . . .* | *RD¼PS 5 6 1 J* |
  | *47kΩ* | *47 × 10³* | *473 . . . . .* | *RD¼PS 4 7 3 J* |
  | *0.5Ω* | *0R5* | *. . . . . .* | *RN2H 0 R 5 K* |
  | *1Ω* | *010* | *. . . . . .* | *RS1P 0 1 0 K* |

  *Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).*

  | | | | |
  |---|---|---|---|
  | *5.62kΩ* | *562 × 10¹* | *5621 . . . .* | *RN¼SR 5 6 2 1 F* |

- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *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 marked by " ⊙ " are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

## Miscellaneous Parts

### P.C.BOARD ASSEMBLIES

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | Complex assembly | GWM-496 |
| | Control assembly | GWY-379 |
| | HEAD PHONE assembly | Non supply |
| | SP TERMINAL assembly | Non supply |
| | S.S assembly | Non supply |

### OTHERS

| Mark | | Symbol & Description | Part No. |
|---|---|---|---|
| ⚠ | | C901 Capacitor (0.01/125V) | ACG-001 |
| ⚠ | ★ | T901 Power transformer (120V) | ATS-285 |
| ⚠ | | AC Socket (AC OUTLET) | AKP-507 |
| ⚠ | ★★ | S1 Push switch (POWER) | ASG-551 |
| ⚠ | ★★ | FU601 Fuse (2.5A) | AEK-123 |
| ⚠ | | Power cord | ADG-088 |

## Complex Assembly (GWM-496)

### SEMICONDUCTORS

| Mark | | Symbol & Description | Part No. |
|---|---|---|---|
| | ★★ | IC101 AM/FM IC | LA1265S |
| | ★★ | IC301 OP-AMP IC | NJM4558DXC |
| | ★★ | IC701 U-COM IC | PD2017 |
| ⚠ | ★★ | IC501 AUDIO-IC | STK4171-2S |
| | ★★ | IC201 FM MAX IC | TA7343AP |
| | ★★ | IC702 PLL IC | TC9172P |
| | ★★ | IC601 REGURATOR IC | μPC78M12H |
| | ★★ | Q704, Q706—Q708 | DTA124ES (RN2203) |
| | ★★ | Q709, Q714 | DTA143ES (RN2201) |
| | ★★ | Q701, Q705, Q710, Q713 | DTC124ES (RN1203) |
| | ★★ | Q702 | DTC143ES (RN1201) |
| | ★★ | Q603 | 2SC1845 |
| | ★★ | Q201—Q203, Q601, Q602, Q703, Q711, Q712, Q715, Q716 | 2SC2458ES (2SC2603) |
| | ★★ | Q3, Q4 | 2SC2668 |
| | ★★ | Q2 | 2SC2786 |
| | ★★ | Q5 N-FET | 2SK161 (2SK168) |
| | ★★ | Q1 MOS-FET | 2SK241 |
| ⚠ | ★ | D603 | RBV402 |
| | ★ | D609, D612 | RD12EB (HZ12EB) |
| | ★ | D608 | RD20EB (HZ20EB) |
| | ★ | D604, D607 | RD5.6EB (HZ5.6EB) |
| | ★ | D103, D104, D605, D606, D610, D611, D702—D709 | 1SS131 |
| ⚠ | ★ | D201, D202, D601, D602 | 11E2 (S5566) |
| | ★ | D1, D2 | 1TT301 |
| | ★ | D101, D102 | SVC321C2 |

### SWITCHES AND RELAY

| Mark | | Symbol & Description | Part No. |
|---|---|---|---|
| | ★★ | S301 Push switch (TAPE MONITOR) | ASG-424 |
| | ★★ | S701—S712 Tact switch (STATION CALL 1-10 11-20) | ASG-712 |
| | ★★ | S302 Push switch (AUX/VCR2, CD/VCR1, PHONO, TUNER) | SUJ5L2B2B2B2L |
| | ★ | RY501 Relay | ASR-111 |

## COILS, TRANSFORMERS AND FILTERS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | T101 AM ANT transformer | ATB-099 |
| | L101 AM OSC coil | ATB-114 |
| | T1 FM RF transformer | ATC-194 |
| | L2 FM OSC coil | ATC-269 |
| | T2 FM coupling transformer | ATE-063 |
| | L102 FM Detection coil | ATE-079 |
| | F2, F3 FM Ceramic filter | ATF-126 |
| | F1 FM Band pass filter | ATF-155 |
| | F101 AM Ceramic filter | ATF-208 |
| | L103 Inductor | ATH-108 |
| | L501, L502 AF Choke coil | ATH-133 |
| | L1 Inductor | LAU2R2M |

## CAPACITORS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ⚠ | C611 Ceramic capacitor | ACG-502 |
| | C606, C607 Electrolytic | ACH-252 |
| | C715 | ACH-902 |
| | TC101, TC106 Ceramic trimmer | ACM-026 |
| | C102 | CCCCH150J50 |
| | C703, C704 | CCCCH330J50 |
| | C16 | CCCSL010C50 |
| | C505, C506 | CCCSL101J50 |
| | C17 | CCCSL150J50 |
| | C112, C303, C304 | CCCSL221J50 |
| | C1 | CCDCH040C50 |
| | C13 | CCDCH080D50 |
| | C11 | CCDCH150J50 |
| | C12 | CCDCH330J50 |
| | C3 | CCDRH180J50 |
| | C5 | CCDSL020C50 |
| | C7 | CCDSL101J50 |
| | C14 | CCDTH150J50 |
| | C201, C501, C502 | CCDTH150J50 |
| | C114, C204, C207, C210—C212, C705 | CEAS010M50 |
| | C708 | CEAS1R5M50 |
| | C511, C512, C609, C612 | CEAS100M50 |
| | C10, C202, C604 | CEAS101M16 |
| | C507, C508 | CEAS101M25 |
| | C513 | CEAS101M50 |
| | C605 | CEAS2R2M100 |
| | C118, C301, C302, C313, C314, C317, C318 | CEAS2R2M50 |
| | C206 | CEAS221M16 |
| | C701 | CEAS222M6 |
| | C120, C203, C711 | CEAS3R3M50 |
| | C111, C123, C710 | CEAS330M16 |
| | C121 | CEAS4R7M50 |
| | C119, C305, C306, C610, C706 | CEAS470M10 |
| | C601, C602 | CEAS470M25 |
| | C509, C510 | CEAS470M50 |
| | C608 | CEAS471M35 |
| | C603 | CEAS471M6 |
| | C117, C702, C707 | CKCYB102K50 |
| | C503, C504 | CKCYB122K50 |
| | C107, C113, C115, C125, C213, C307, C308, C709, C712, C713, C714 | CKCYF103Z50 |
| | C104, C105, C116, C124 | CKCYF223Z50 |
| | C122 | CKCYF473Z50 |
| | C315, C316 | CKDYB391K50 |
| | C2, C4, C8, C9, C15, C18 | CKDYF103Z50 |
| | C108, C109 | CKDYF223Z50 |
| | C110 | CKDYF473Z50 |
| | C208, C209 | CQMA183K50 |
| | C309, C310 | CQMA242J50 |
| | C514, C515 | CQMA473K50 |
| | C311, C312 | CQMA822J50 |
| | C205 | CQSA102J50 |
| | C103 | CQSA431J50 |

## RESISTORS

*NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ⚠ | R611 Carbon composition | ACN-209 |
| ⚠ | R509—R512, R507, R508 | RD1/2PM□□□J |
| ⚠ | R515—R519, R522 | RD1/4PM□□□J |
| | R7 | RD1/4PM151J |
| ⚠ | R603 | RS1PMF181J |
| ⚠ | R607 | PS1PMF272J |
| ⚠ | R608 | RS1PMF821J |
| ⚠ | R601, R602 | RS2LM122J |
| ★ | VR101 Semi-fixed | VRTB6VS473 |
| ★ | VR201 Semi-fixed | VRTB6VS472 |
| | Other resistors | RD1/8PM□□□J |

## OTHERS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | ANT terminal | AKA-017 |
| | Terminal (4P) (TAPE/ADAPTOR • REC/OUT, PLAY/IN) | AKB-115 |
| | Terminal (6P) (INPUT • PHONO, CD/VCR1, AUX/VCR2) | AKB-117 |
| ★ | X701 Crystal resonator | ASS-025 |
| | Rivet | AEP-230 |

## Control Assembly (GWY-379)

### SEMICONDUCTORS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ★★ | IC401, IC402 AUDIO IC | BA3812L |
| ★★ | IC403 OP-AMP IC | M5218PF |
| ★★ | Q401 | DTA124ES (RN2203) |
| ★★ | Q402 | DTC124ES (RN1203) |
| ★ | D402 LED assembly | AEL-460 |
| ★ | D404—D406 LED assembly | AEL-461 |
| ★ | D403 LED assembly | AEL-463 |
| ★ | D407, D409 | 1SS131 |
| ★ | D401 | 11E2 |

### SWITCHES

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ★★ | S401—S407 Tact swich (FM/MONO, FM, AM, AUTO/MANUAL, MEMORY, SELECT, SIMULATED STEREO) | ASG-711 |

### CAPACITORS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | C431, C432 | CEASR68M50 |
| | C405, C406 | CEAS101M10 |
| | C409—C412 | CEJA4R7M35 |
| | C427, C428 | CEJAR22M50 |
| | C401, C402, C433, C434 | CEJA4R7M35 |
| | C403, C404 | CEAS470M25 |
| | C415, C416 | CKCYB122K50 |
| | C407, C408 | CKCYB331K50 |
| | C413, C414 | CKCYB391K50 |
| | C435, C436 | CKCYF103Z50 |
| | C425, C426 | CQMA123K50 |
| | C421, C422 | CQMA223K50 |
| | C417, C418 | CQMA392K50 |
| | C429, C430 | CQMA393K50 |
| | C423, C424 | CQMA682K50 |
| | C419, C420 | CQMA683K50 |

### RESISTORS

*NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ★ | VR403—VR407 Variable resistor (Slide type, 30K), (GRAPHIC EQUALIZER) | ACX-152 |
| ★ | VR401 Variable resistor (BALANCE CONTROL, 250K) | ACX-153 |
| ★ | VR402 Variable resistor (VOLUME CONTROL, 100K) | ACX-154 |
| | R419 | RD1/2PM561J |
| | Other resistors | RD1/8PM□□□J |

### OTHERS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ★ | V401 Fluorescent tube | AAV-039 |

## HEADPHONE Assembly

### SWITCH

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ★★ | S901 Push switch (SPEAKERS A, B) | SUJ6LYXS |

### RESISTORS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ⚠ | R901, R902 | RS1PMF331J |

### OTHERS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | Jack (PHONES) | AKN-045 |

## SP TERMINAL Assembly

### OTHER

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | Terminal (SPEAKERS) | AKE-110 |

## S.S Assembly

### SEMICONDUCTORS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| ★★ | IC802 OP-AMP IC | M5201P |
| ★★ | IC801 OP-AMP IC | M5218PF |

### CAPACITORS

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | C801 | CEAS2R2M50 |
| | C804 | CEAS4R7M50 |
| | C803 | CKCYB331K50 |
| | C805, C806 | CKCYF103Z50 |
| | C802 | CQMA332K50 |

### RESISTORS

*NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

| Mark | Symbol & Description | Part No. |
|---|---|---|
| | All resistors | RD1/8PM□□□J |

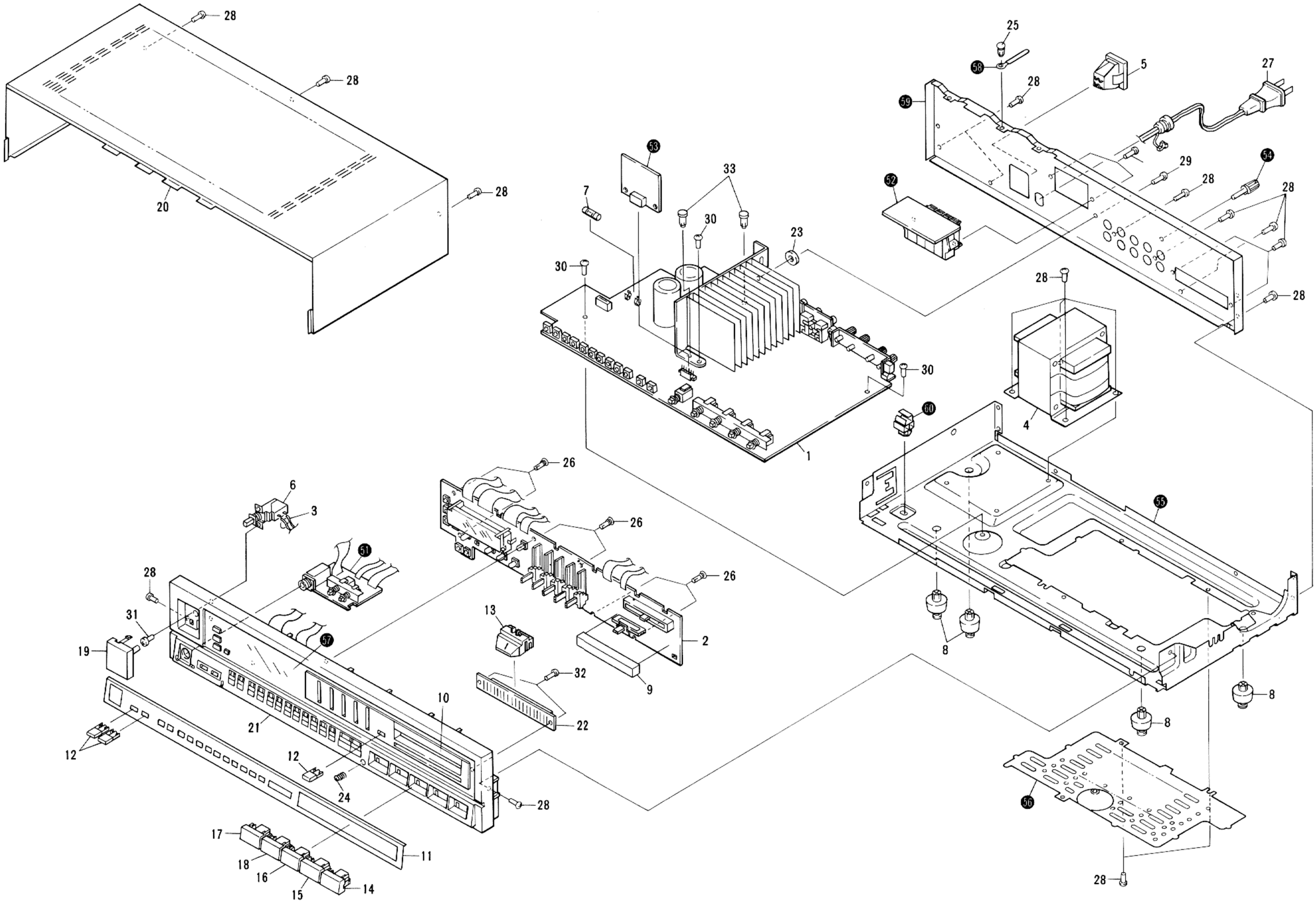
# 6. EXPLODED VIEW

*NOTES:*

- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *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 marked by " ⊙ " are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

## Parts List

| Mark | No. | Part No. | Description |
|---|---|---|---|
| | 1 | GWM-496 | Complex assembly |
| | 2 | GWY-379 | Control assembly |
| ⚠ | 3 | ACG-001 | Capacitor (C901, 0.01/125V) |
| ⚠ ★ | 4 | ATS-285 | T901 Power transformer (120V) |
| ⚠ | 5 | AKP-507 | AC socket (AC OUTLET) |
| ⚠ ★★ | 6 | ASG-551 | S1 Push switch (POWER) |
| ⚠ ★★ | 7 | AEK-123 | FU601 Fuse (2.5A) |
| | 8 | AEC-784 | Leg assembly |
| | 9 | AEB1005 | Cushion |
| | 10 | AAH-123 | Volume panel |
| | 11 | AAH-125 | Aluminum sash |
| | 12 | AAY-306 | Push knob A (SPEAKER A, B, SIMULATED STEREO) |
| | 13 | AAY-385 | Slide knob (VOLUME CONTROL) |
| | 14 | AAY-386 | Function knob (TUNER) |
| | 15 | AAY-387 | Function knob (PHONO) |
| | 16 | AAY-388 | Function knob (CD/VCR1) |
| | 17 | AAY-389 | Function knob (TAPE MONITOR) |
| | 18 | AAY-391 | Function knob (AUX/VCR2) |
| | 19 | AAY-404 | Knob (POWER) |
| | 20 | ANE-623 | Bonnet case |
| | 21 | ANY-189 | Front panel |
| | 22 | ANZ-323 | Blinder |
| | 23 | ABE-061 | Washer |
| | 24 | ABH1003 | Coil spring |
| | 25 | AEC-471 | Nylon rivet |
| | 26 | AEC-558 | Nylon rivet |
| ⚠ | 27 | ADG-088 | Power cord |
| | 28 | BBZ30P080FZK | Screw |
| | 29 | PBZ25P100FMC | Screw |
| | 30 | VBT30P100FMC | Screw |
| | 31 | VMZ30P060FMC | Screw |
| | 32 | VPZ23P060FMC | Screw |
| | 33 | AEP-230 | Nylon rivet |
| | 51 | | HEAD PHONE assembly |
| | 52 | | TERMINAL assembly |
| | 53 | | S.S assembly |
| | 54 | | Terminal (GND) |
| | 55 | | Chassis |
| | 56 | | Bottom plate |
| | 57 | | Sheet panel |
| | 58 | | Binder |
| | 59 | | Rear panel |
| | 60 | | P.C. Board holder |


28
28
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8
8
56
28

3 | 4 | 5 | 6 | 7 | 8 | 9

Q1 Q4 Q3 Q712 Q711 Q713 Q714 IC702 Q5 Q710 Q709 Q2 IC101 Q203 Q202 IC201 Q201 IC301 Q708 Q707 Q706 Q715 Q716 IC501 Q705 Q704 IC601 Q703 Q601 Q602 Q603 Q701 Q702 IC701 TC101 VR101 VR201 TC106

COMPLEX ASSEMBLY (GWM-496)

SP TERMINAL ASSEMBLY

SPEAKER TERMINAL

HEADPHONE ASSEMBLY

SPEAKERS

HEADPHONE

S.S ASSEMBLY

IC 801 : M5218PF
IC 802 : M5201P

Q401, Q704, Q706 - Q709, Q714

Q402, Q701, Q702, Q705, Q710, Q713

PHONO CD/VCR1 AUX/VCR2 REC/OUT PLAY/IN

TUNER PHONO CD/VCR1 AUX/VCR2 TAPE MONITOR

UP DOWN 10 9 8 7 6 5 4 3 2 1 STATION

SWITCH(POWER) ASG-551

AC SOCKET (AC OUTLET) AKP-507

POWER CORD ADG-088

AC 120V 60Hz

C901 0.01/125V ACG-001

FUSE 2.5A/125V

T901 POWER TRANSFORMER ATS-285

CONTROL ASSEMBLY (GWY-379)

TUNED

SIMULATED STEREO

STEREO MONO AUTO

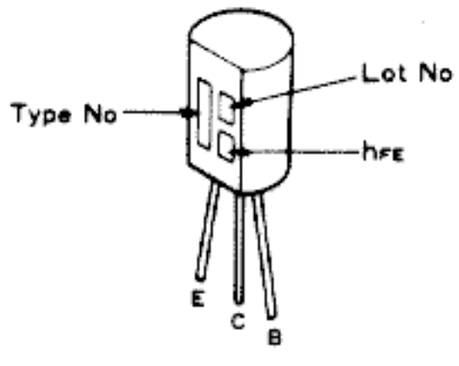
| | |
|---|---|
| IC702 | : TC9172P |
| IC101 | : LA1265S |
| IC201 | : TA7343AP |
| IC301 | : NJM4558DXC |
| IC501 | : STK4171-2S |
| IC601 | : μPC78M12H |
| IC701 | : PD2017 |
| Q1 | : 2SK241 |
| Q2 | : 2SC2786 |
| Q3,Q4 | : 2SC2668 |
| Q5 | : 2SK161(2SK168) |
| Q201-Q203, Q601,Q602, Q703,Q711, Q712,Q715, Q716 | : 2SC2458 (2SC2603) |
| Q603 | : 2SC1845 |
| Q701,Q705, Q710,Q713, Q702 | : DTC124ES (RN2201) |
| Q704,Q706, Q707,Q708, Q709,Q714, | : DTA124ES (RN2203) |
| D1,D2 | : DTA143ES(RN2201) |
| D101,D102 | : 1T310 |
| D103,D104, D703-D709, D605,D606, D610,D611, D702, | : SVC321C2/D2 : ISS131 |
| D201,D202, D601,D602 | : 1IE2(S5566) |
| D603 | : RBV402 |
| D604,D607 | : RD5.6EB(HZ5.6EB) |
| D608 | : RD20EB (HZ20EB) |
| D609,D612 | : RD12EB (HZ12EB) |

| | |
|---|---|
| IC401,IC402 | : BA3812L |
| IC403 | : M5218PF |
| Q401 | : DTA124ES(RN2203) |
| Q402 | : DTC124ES(RN1203) |
| D407 | : ISS131 |
| D409 | |
| D402 | : AEL-460 |
| D403 | : AEL-463 |
| D404-D406 | : AEL-461 |
| D401 | : 1IE2(S5566) |

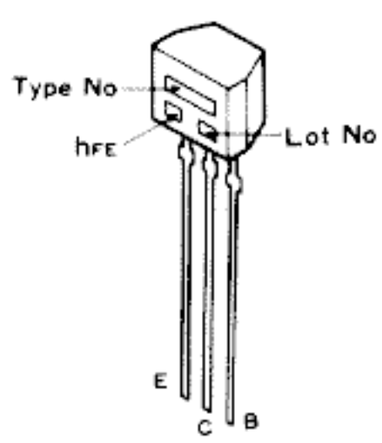
3 | 4 | 5 | 6 | 7 | 8 | 9

## External Appearance of Transistors and ICs

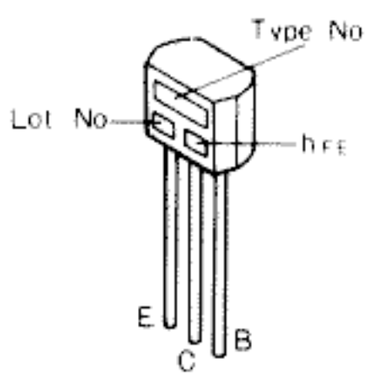
**2SC1845**



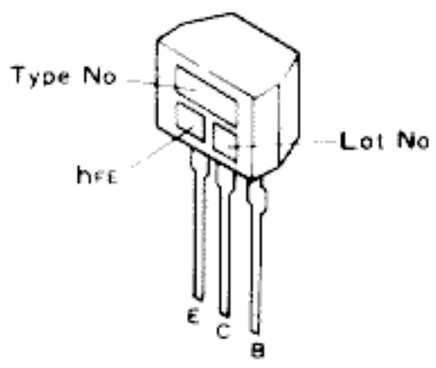

**2SC2458**



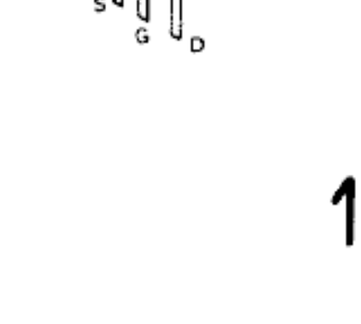

**2SC2603**




**2SC2668**



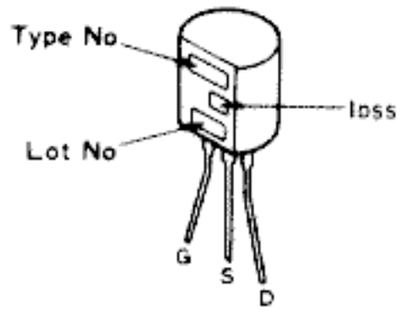

**2SC2786**



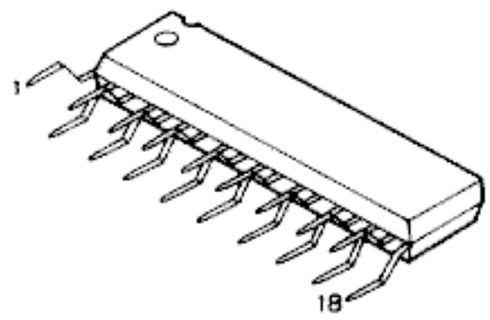

**2SK161**
**2SK241**



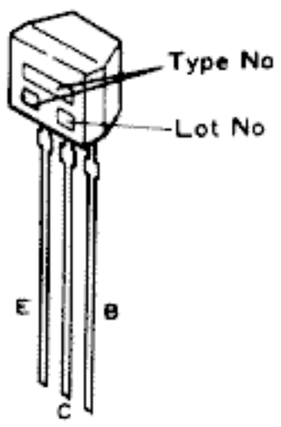

**2SK168**



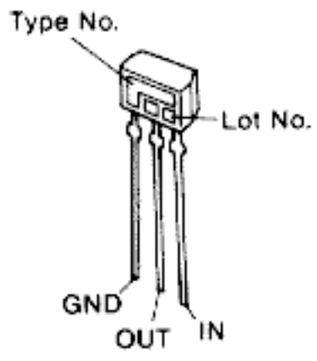

**BA3812L**




**DTA124ES**
**DTA143ES**
**DTC124ES**




**DTC143**

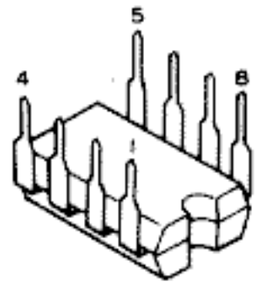



**LA1265**

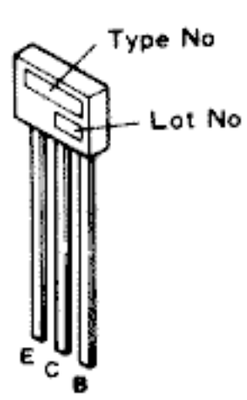

**M5201P**



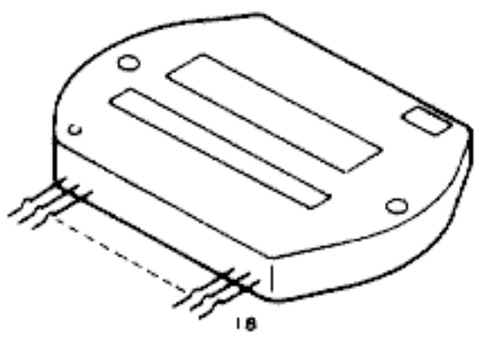

**M5218PF**
**NJM4558DXC**



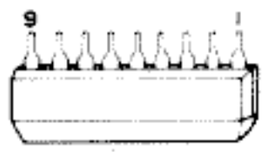

**RN1201**
**RN1203**
**RN2201**
**RN2203**



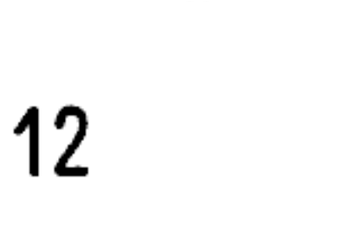

**STK4171-2S**




**TA7343AP**

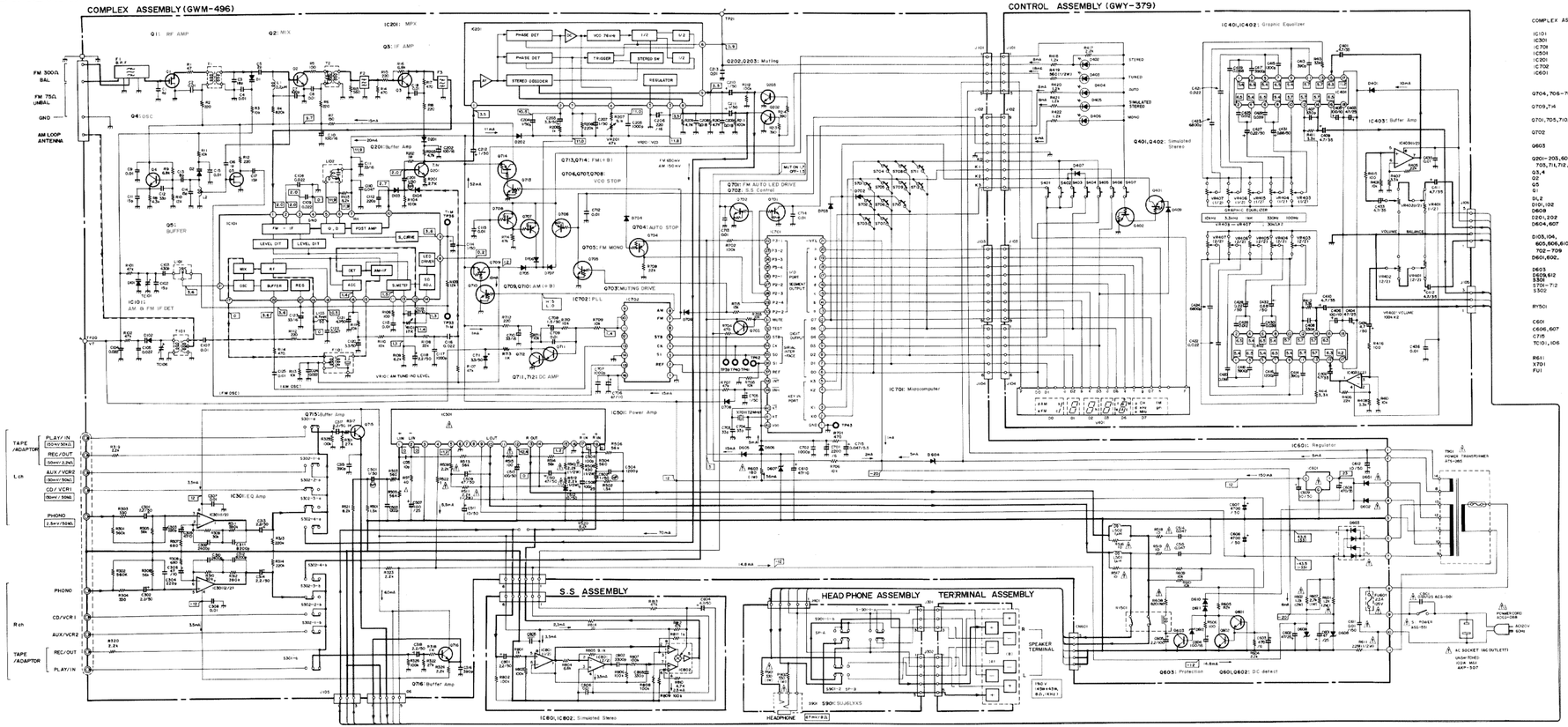



**TC9172P**




**μPC78M12H**

# 8. SCHEMATIC DIAGRAM




*NOTE:*
*The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.*

| COMPLEX ASSEMBLY | | CONTROL ASSEMBLY | |
|---|---|---|---|
| IC101 | LA1265 | IC401,402 | BA3812L |
| IC301 | NJM4558DXC | IC403 | M52189FP |
| IC701 | PQ20I7 | | |
| IC501 | STK4171-25 | Q401 | DTA124ES (RN2203) |
| IC201 | TA7343AP | Q402 | DTC124ES (RN1203) |
| IC702 | TC9172P | | |
| IC601 | μPC78M12H | D402 | AEL-460 |
| Q704, 706-708 | DTA124ES (RN2203) | D404-406 | AEL-461 |
| Q709,714 | DTA143ES (RN2201) | D403 | AEL-463 |
| Q701, 705, 710, 713 | DTC124ES (RN1203) | D407, 409 | 1SS133 |
| Q702 | DTC143 (RN1201) | D401 | 1(E)155666) |
| Q603 | 2SC1845 | VR403-407 | ACX-152 |
| Q201-203, 601, 602, 703, 711, 712, 715, 716 | 2SC2458 (2SC2603) | VR401 | ACX-153 |
| Q3, 4 | 2SC2668 | VR402 | ACX-154 |
| Q2 | 2SC2786 | VR601 | ACA-502 |
| Q5 | 2SK161(2SK168) | | |
| Q1 | 2SK241 | S, S ASSEMBLY | |
| DL2 | 1T130 | IC801 | M52189FP |
| D101, 102 | SVC321(2)D2 | IC802 | M5209P |
| D608 | RD20EB(HZ20E3) | | |
| D201, 202 | 1(E)155666) | | |
| D604, 607 | RD5.6EB (HZ5.6EB) | | |
| D103, 104, 605, 606, 610, 611, 702-709 | 1SS133 | | |
| D601, 602, D603 | 1(E) (S0666) RBV402 | | |
| D609, 612 | RD12EB(HZ12EB) | | |
| S301 | ASG-424 | | |
| S701-712 | ASG-025 | | |
| S302 | SUJ1L282B2BZL | | |
| RY501 | ASR-111 | | |
| C601 | ACG-502 | | |
| C606, 607 | ACH-252 | | |
| C715 | ACH-902 | | |
| TC101, 106 | ACM-026 | | |
| R611 | ACN-209 | | |
| X701 | ASS-025 | | |
| FU1 | AEK-123 | | |

1. RESISTORS:
   Indicated in Ω, 1/4W, 1/8W and 1/8W, ±5% tolerance unless otherwise noted k: kΩ, M: MΩ, (F): ±1%, (G): ±2%, (K): ±10%, (M): ±20% tolerance
2. CAPACITORS:
   Indicated in capacity (μF)/voltage (V) unless otherwise noted p: pF. Indication without voltage is 50V except electrolytic capacitor.
3. VOLTAGE, CURRENT:
   Signal voltage at 45W + 45 W, 8Ω output (1 kHz)
   DC voltage (V) at no input signal Value in ( ) is DC voltage at rated power.
   Unit: mA, DC current at no input signal
4. OTHERS:
   Signal route
   Adjusting point
   The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
   Ⓧ marked capacitors and resistors have parts numbers.
   The underlined indicates the switch position.

   This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.
5. SWITCHES:

   THE UNDERLINED INDICATES THE SWITCH POSITION

| S1 | POWER ON-OFF | S701 | STATION 1 |
|---|---|---|---|
| S301 | TAPE MONITER | S702 | STATION 2 |
| S302-1 | AUX / VCR 2 | S703 | STATION 3 |
| S302-2 | CD / VCR 1 | S704 | STATION 4 |
| S302-3 | PHONO | S705 | STATION 5 |
| S302-4 | TUNER | S706 | STATION 6 |
| S401 | AUTO/MONO | S707 | STATION 7 |
| S402 | FM | S708 | STATION 8 |
| S403 | AM | S709 | STATION 9 |
| S404 | AUTO/MANUAL | S710 | STATION 10 |
| S405 | MEMORY | S711 | UP |
| S406 | SELECT | S712 | DOWN |
| S407 | SIMULATED STEREO | | |

S901: SPEAKERS
S901-6 SP-A ON-OFF
S901-8 SP-B ON-OFF

# 9. ADJUSTMENTS

## FM TUNER SECTION

- Connect the FM signal generator (FM SG) to the FM ANTENNA 300Ω terminal through a 300Ω dummy antenna.
- Set the SX-1500(BK) to the FM band.

(*1) Tune the FM SG to the SX-1500(BK)

(*2) Connect the FM multiplex stereo signal generator to the FM SG external modulator terminal. Set the modulation to Main 1 kHz/L+R/±68.25 kHz deviation, Pilot 19 kHz/±6.75 kHz deviation.

| Step | FM SG (1kHz, ±75kHz deviation) | | SX-1500(BK) Frequency display | Adjustment point | Adjustment procedure |
|---|---|---|---|---|---|
| | Frequency | Level | | | |
| 1 | 98.0MHz | 30 to 40dB | 98.0MHz | T1, T2 | Adjustment until DC voltage between IC101 (13) pin and ground is maximum. |
| 2 | 98.0MHz | 60dB | 98.0MHz | L102 | Adjust DC voltage between terminal TP(T-M) and TP(T-M) to 0±50mV. |
| 3 | 98.0MHz(*1) | 60dB | 98.0MHz | VR201 | Adjust signal between terminal TP(no.21) (VCO) and ground to 38kHz (within ±500Hz). |
| | not modulation | | | | |

Note: Adjust the VCO by inserting a resistance of 4.7 kΩ between TP21 (VCO) and GND. (VCO will not appear at the TP pin if a resistance of 4.7 kΩ is not inserted.)

## AM TUNER SECTION

### MW Tuner Section

- Connect the furnished AM loop antenna between terminals AM ANTENNA and GND.
- Connect the AM signal generator (AM SG) to the AM ANTENNA terminal through a 10 kΩ resistor.
- Set the SX-1500(BK) to the AM (MW) band.

(*3) There are 2 kinds of models in the SX-1500[BK] system. The one is the channel step frequency of 10 kHz and the other is 9 kHz. Accordingly, in case of model 10 kHz step, the adjustment should be performed by using the frequency of Item "10 kHz step" and in case of model 9 kHz step, the adjustment should be performed by using the frequency of Item "9 kHz step".

(*4) Tune the AM SG to the SX-1500(BK).

| Step | AM SG (400Hz, 30% modulation) | | | SX-1500(BK) Frequency display (*3) | | Adjustment point | Adjustment procedure |
|---|---|---|---|---|---|---|---|
| | Frequency (*3) | | Level | | | | |
| | 10kHz step | 9kHz step | | 10kHz step | 9kHz step | | |
| 1 | No signal | | | 530kHz | 531kHz | L101 | $1.2V^{-0.2}_{+0.3}$V DC between terminal TP(no.20) (VT) and ground. |
| 2 | No signal | | | 1600kHz | 1602kHz | TC101 | 10±0.5V DC between terminal TP(no.20) (VT) and ground. |
| 3 | Repeat steps 1 and 2 until both specifications are correct. | | | | | | |
| 4 | 600kHz(*4) | 603kHz(*4) | 76dB | 600kHz | 603kHz | T101 | Adjust until DC voltage between IC101 (13) pin (AMS) and ground is maximum. |
| 5 | 1400kHz(*4) | 1395kHz(*4) | 76dB | 1400kHz | 1395kHz | TC106 | |
| 6 | Repeat steps 4 and 5 until maximum sensitivity is attained | | | | | | |
| 7 | 1000kHz | 999kHz | 76dB | 1000kHz | 999kHz | VR101 | Adjust a VR101 to light up a tuning indicator. |

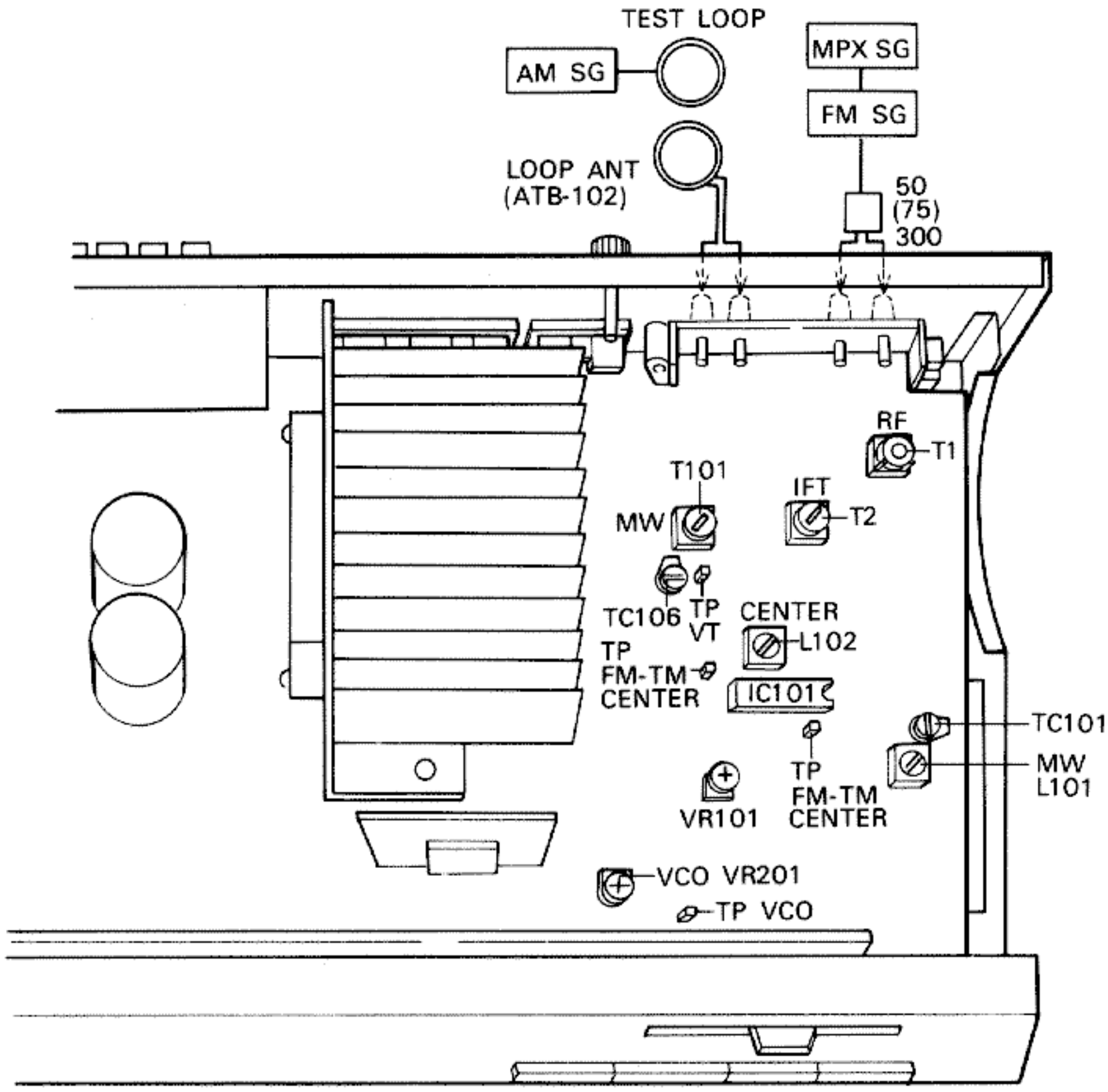
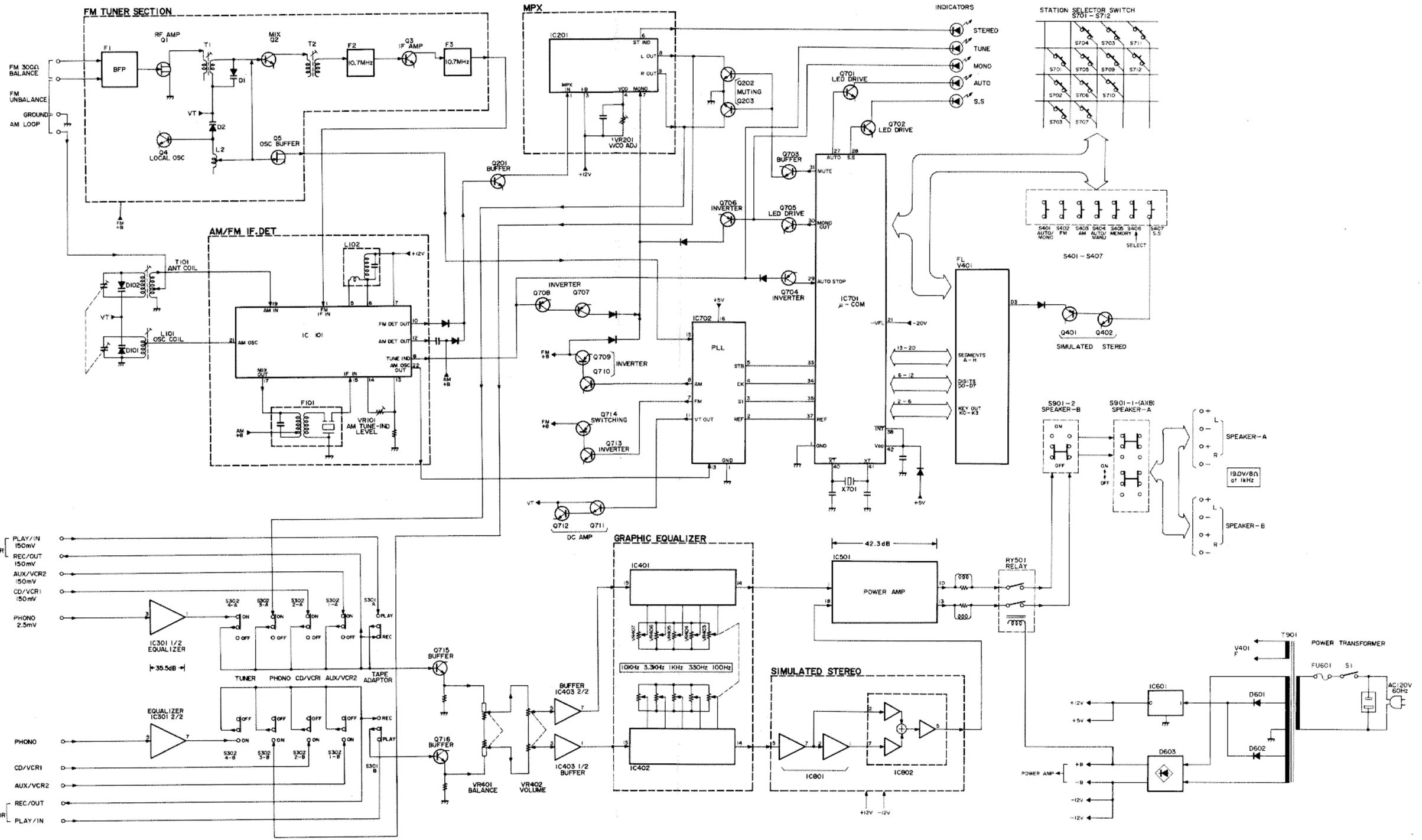



Fig. 9-1 Adjustment point

# 10. BLOCK DIAGRAM



# 11. CIRCUIT DESCRIPTIONS

## 11.1 CIRCUIT DESCRIPTIONS

### ■ Block diagram

The block diagram is as shown on pages 23 and 24.

### ■ Phono eqaulizer section

In the phono equalizer section, the low noise operational amplifier 4558DXC is used and the RIAA equalization is performed.
It uses one dual OP AMP, NJM 4558DXC for Rch and Lch. It can obtain the RIAA characteristics by inserting the RIAA elements, R309, R311, C309 and C311 into the NF side.

### ■ Tuner section

The tuner section is of the synthesizer system which enables to preset at random 20 FM/AM stations.
The circuit is structured by the front end which is comprised of a duplex connection equivalent variable capacitor and a band-pass filter, and an IC (FM/AM IC LA1265S) which integrates the FM IF amplifier and detector, and AM oscillator, mixer, IF amplifier and detector into one chip. The FM MPX demodulation is carried out by the TA7343AP.
Switching of the AM and FM within the IC can be carried out by whether the AM+B is added or not.
Since the FM OUT (pin 10 ) and AM OUT (pin 16 ) are separated respectively, connection to the MPX section can be made by the diode switch of D103 and D104 after being compensated by the AM frequency characteristics.

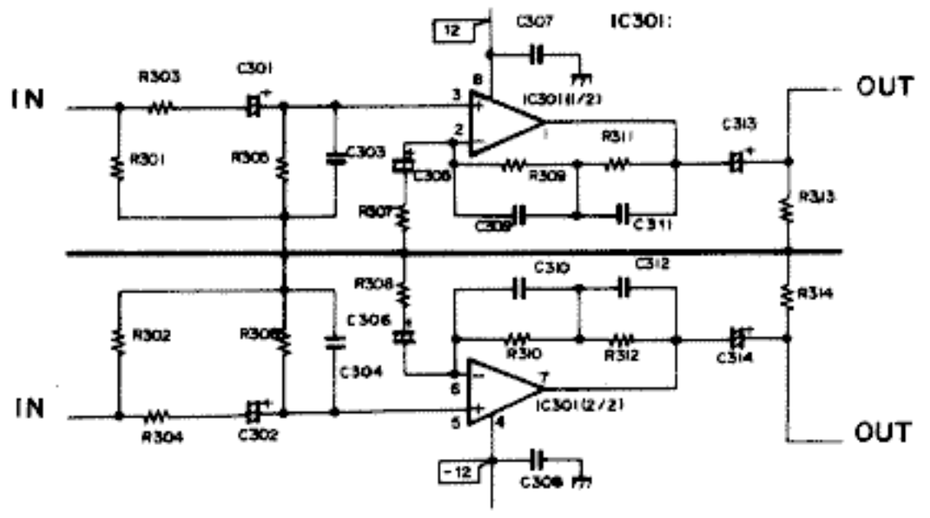



Fig. 11-1 PHONO EQ circuit

### MPX demodulation

The MPX demodulated output can be obtained from pin 8 (Lch) and pin 9 (Rch).
Monitoring of the 38 kHz signal can be carried out by connecting a resistance of approximately 4.7 kΩ to pin 6 of TA7343AP against GND. This output of pin 6 can be used for a monitor pin when adjusting the VCO.

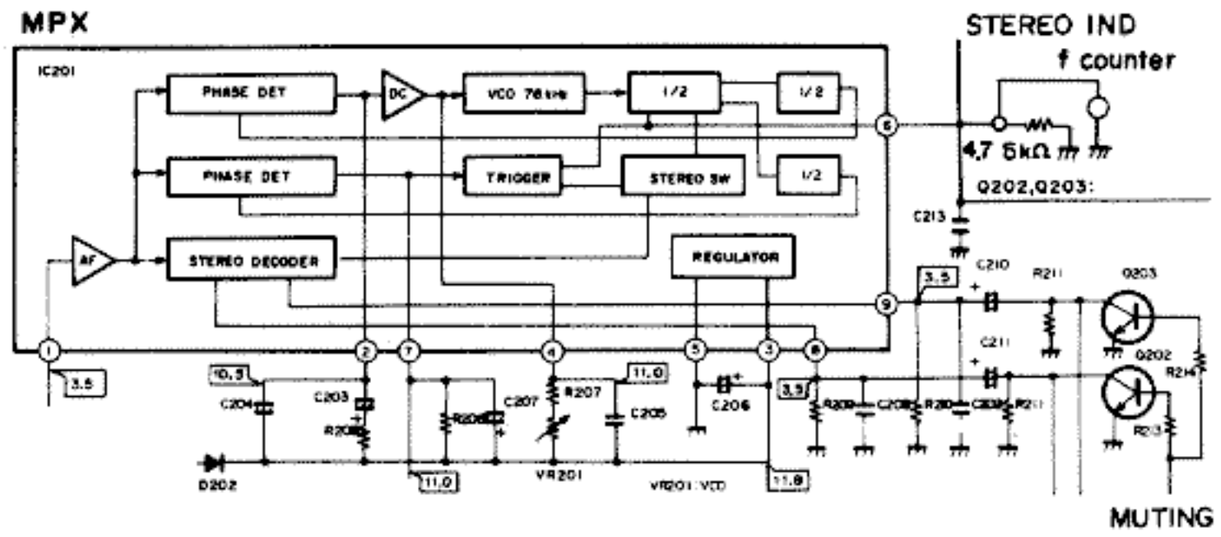



Fig. 11-3 MPX demodulation circuit

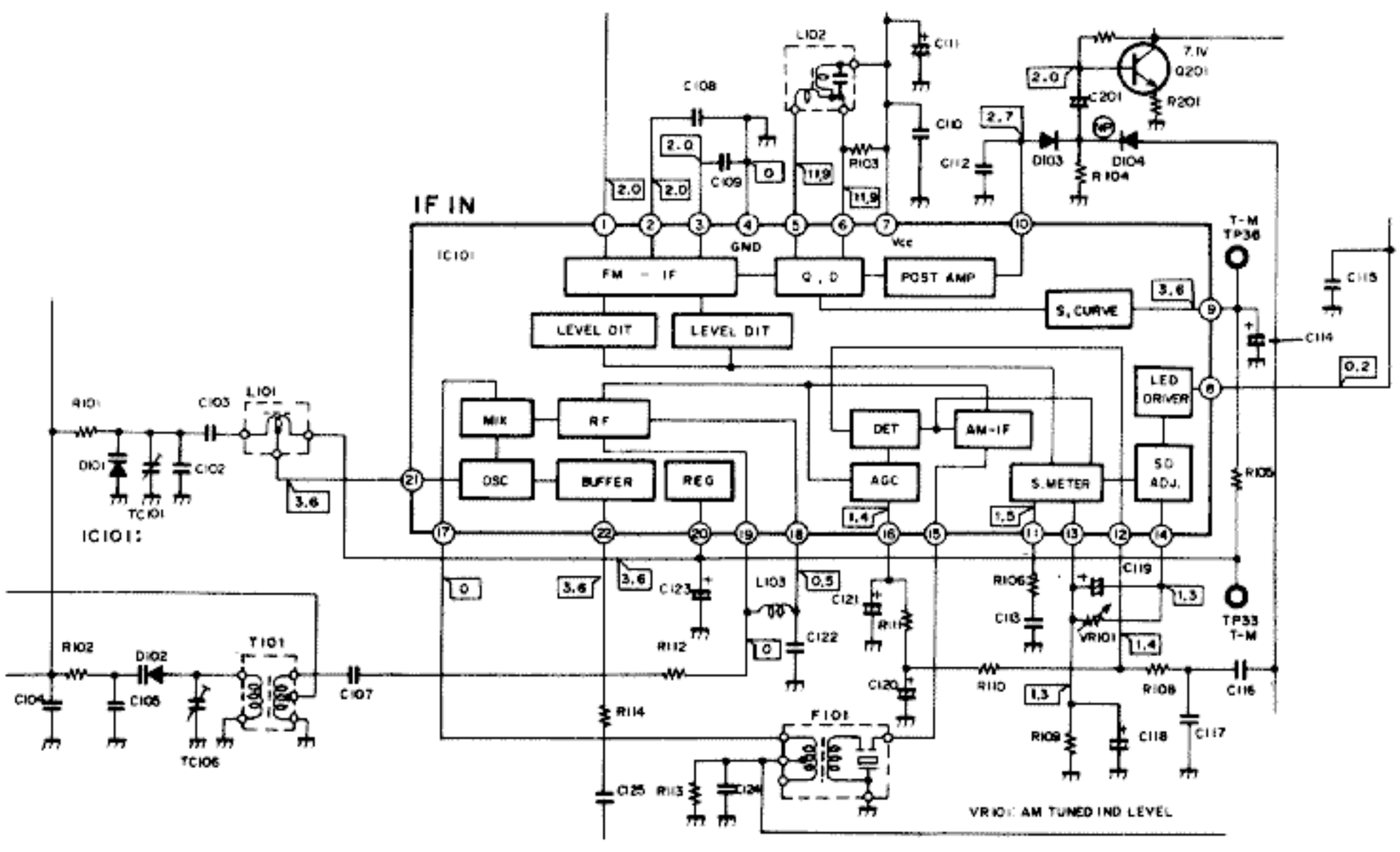



Fig. 11-2 TUNER circuit

## ■ 5-band graphic equalizer section

The circuit is structured by 2 graphic EQ dedicated IC BA3812L (each for L and R) and 5 sliding volumes. It enables to control the individual frequencies with ±8 dB.
The circuit is comprised of a graphic EQ dedicated IC BA3812L, sliding volumes and an externally attached element.
The BA3812L is comprised of the semiconductor inductor equivalent to 5 elements and an OP AMP for adding use.
The center frequency of the graphic EQ is determined by setting the center value and resonance frequency of the semiconductor inductor by the externally attached capacitors (ex. C417 and C419). In this model, they are set at 100 Hz, 330 Hz, 1 kHz, 3.3 kHz and 10 kHz.

## ■ Power amplifier section

In the power amplifier section, 2-circuit 1 package hybrid IC STK-4171IIS is used and an 8Ω corresponding convection heat radiator is employed. The output of 45W+45W is obtained.

## ■ Control section

The control section of this model is mainly used for controlling the tuner section. The custom microcomputer PD2017 manufactured by Pioneer Co., Ltd. is used as the control IC.
Its major functions are PLL controlling, lighting of the FL dynamic, switching of FM and AM, station memory, etc.

## ■ Simulated stereo

It converts monaural sound source into simulated stereo sounds.
In this model, the OP AMP is employed from the conventional discrete structure. As a result, during simulated stereo on, bad effects due to ripple from the power supply and S/N ratio are improved.

## ■ Others

1 Since the super capacitor (47000 μF) is used as the memory back up of the station, the memory is not cancelled for several weeks*note after the power supply is turned off.
However, in the event the memory has been cancelled due to the power supply being off for a long duration of time, perform the renewal of the memory again. [*Note: for approximately over a month]

2 The location of the antenna of this model can be set freely since a large loop antenna is used for AM receiving.

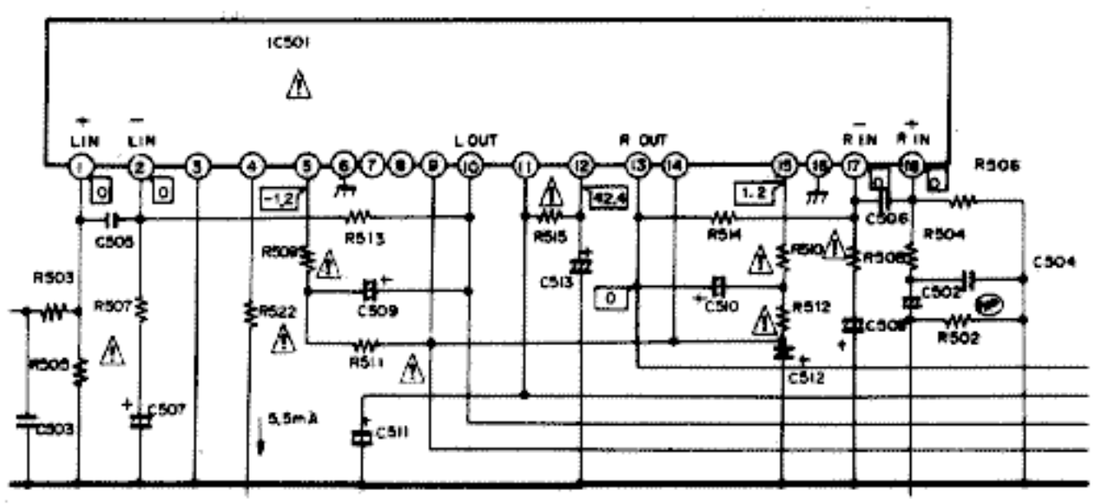



Fig. 11-5 Power AMP circuit

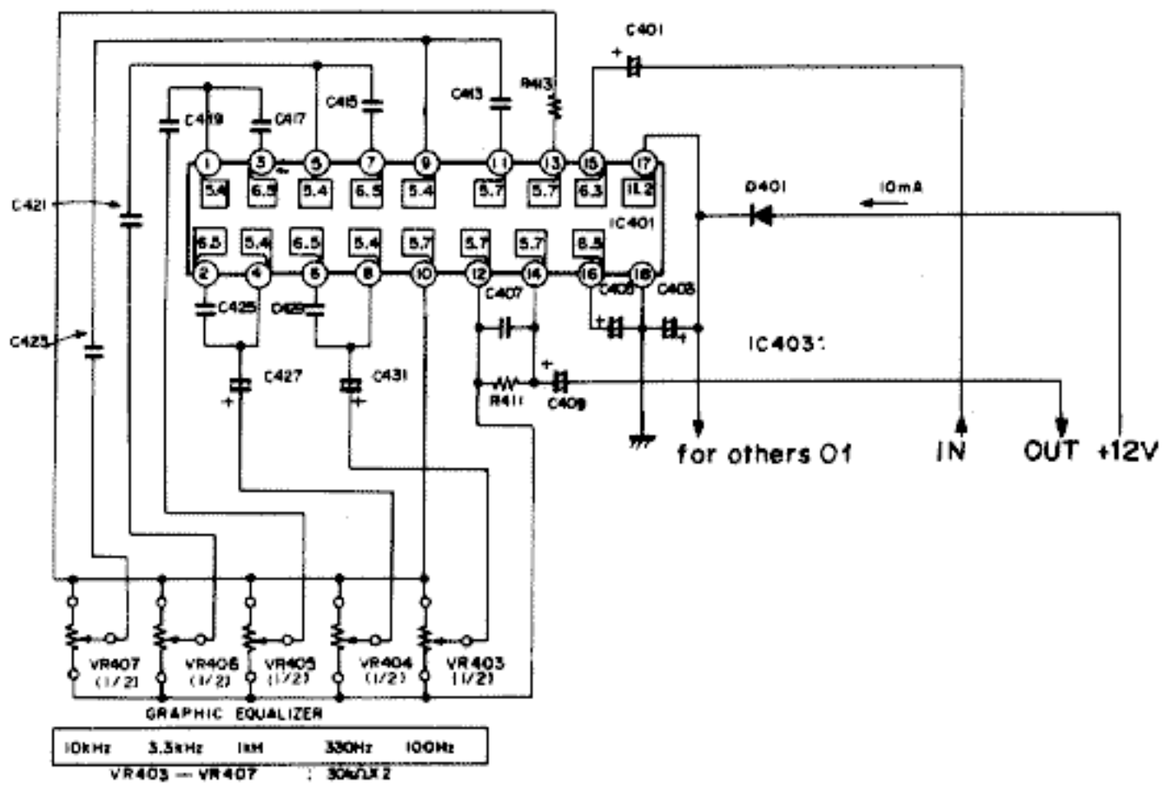



Fig. 11-4 5-band graphic equalizer circuit

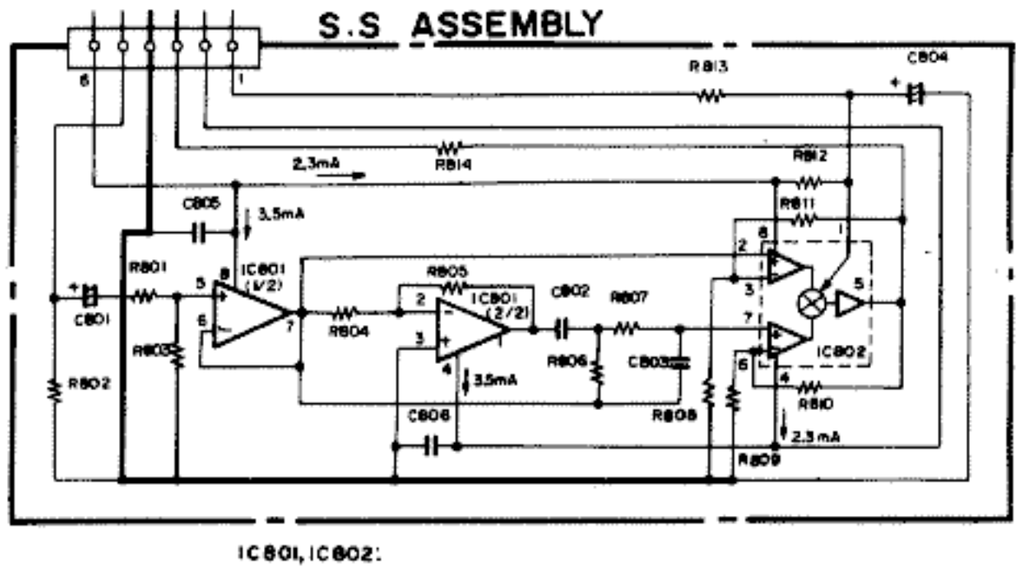



Fig. 11-6 Simulated stereo circuit

## 11.2 IC data

### ■ TA7343AP

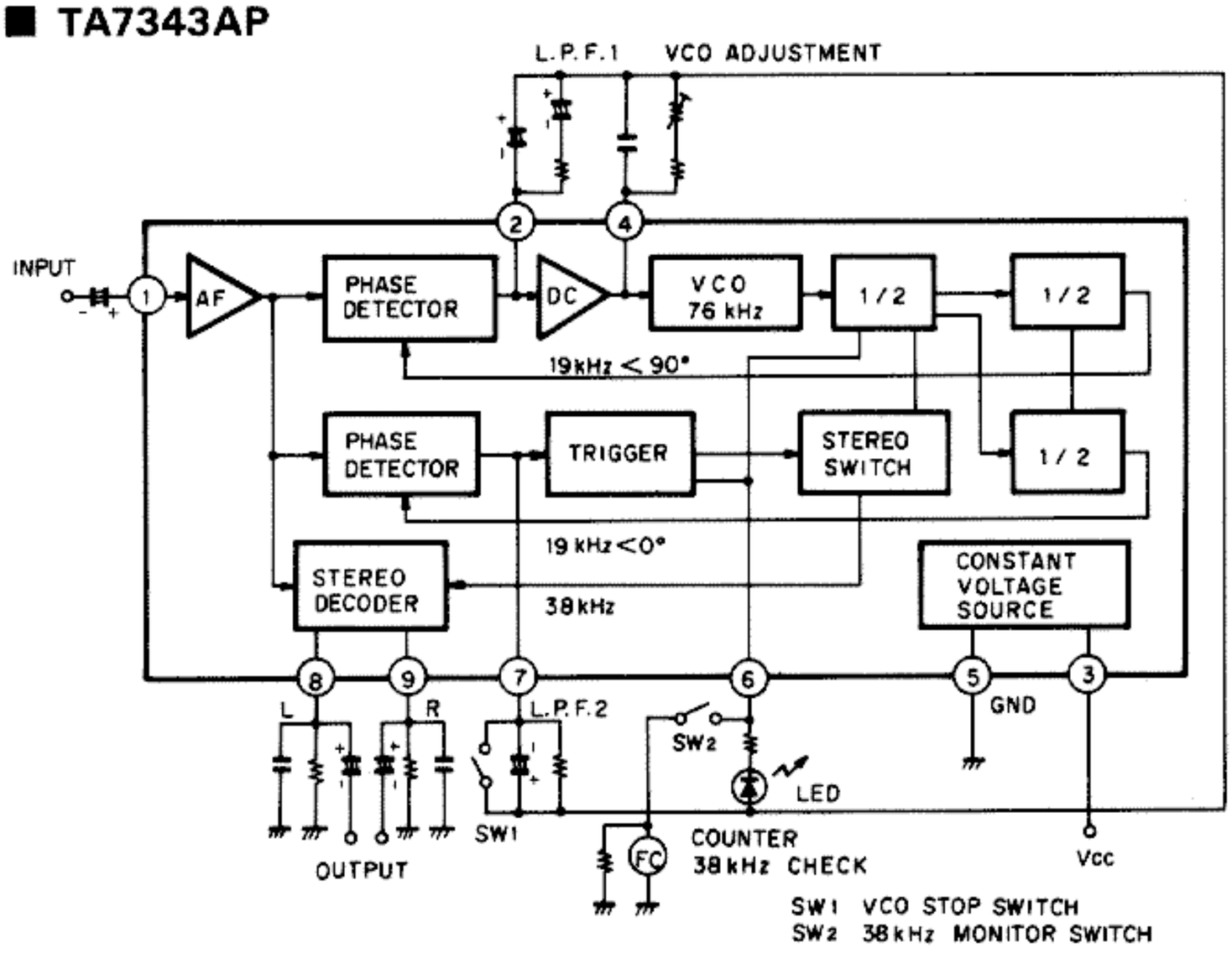



Fig. 11-7 Block diagram of TA7343AP

### ■ PD2017

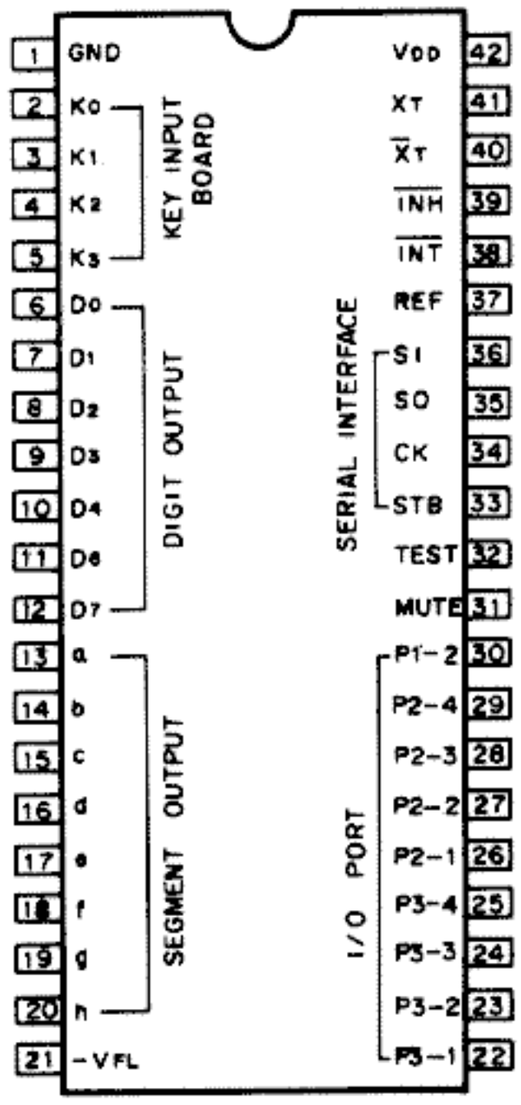



Fig. 11-9 Pin alignment of PD2017

### ■ LA1265S

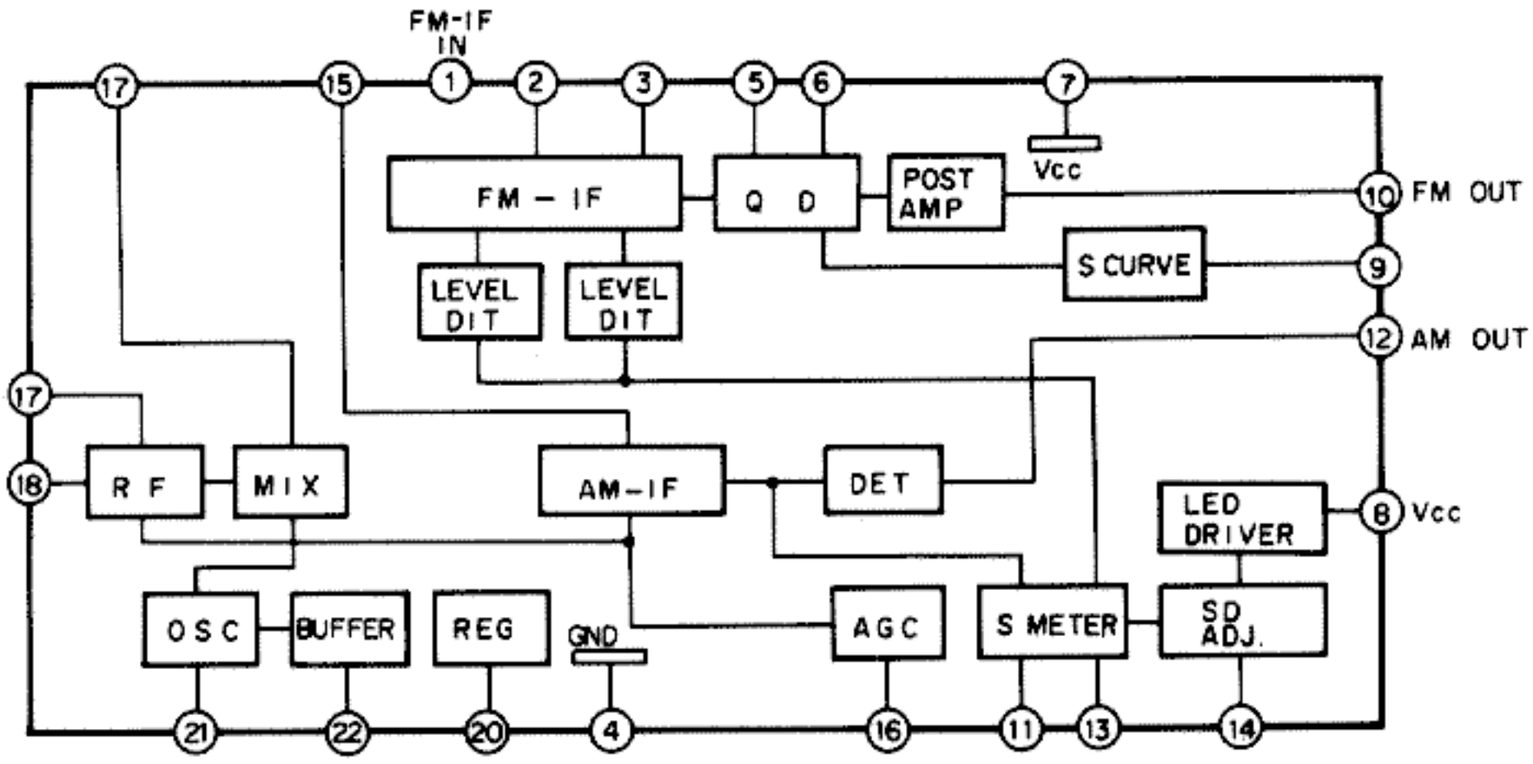



Fig. 11-8 Block diagram of LA1265S

### ■ STK4171IIS

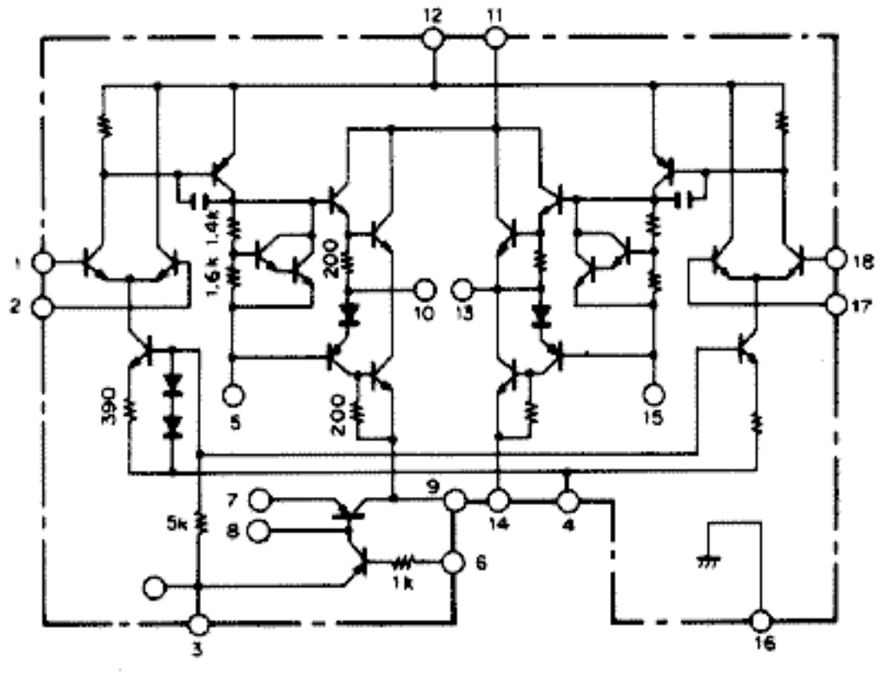



Fig. 11-10 Block diagram of STK4171IIS

# 12. PACKING

## Parts List

| Mark | No. | Part No. | Description |
|---|---|---|---|
| | 1 | ADH-005 | FM Antenna |
| | 2 | ARB-719 | Operating instruction (English) |
| | 3 | ATB-102 | Loop antenna assembly |
| | 4 | AHA-394 | Side pad |
| | 5 | AHE-690 | Packing case |