Clarion

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# Service Manual

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"Clarion Service Manual"

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## MAZDA Automobile Genuine Electronic Radio

## Model RT-9031D,F

## ■SPECIFICATIONS:

Tuning system: Electronic tuning (PLL synthesizer)
Receive range: AM (9031F) 531kHz to 1,602kHz (9031D) 530kHz to 1,620kHz
FM 87.5MHz to 107.9MHz
Intermediate frequency:
AM 450kHz
FM 10.7MHz
Quieting sensitivity: AM Less than 33dB (at 20dB S/N)
FM Less than 15dB (at 30dB S/N)
Separation: FM More than 20dB
Auto tuning stop sensitivity:
AM 35±6dB
FM 33±6dB

Load impedance: 4Ω×2
Power output: 10W×2 (at 3% distortion)
Power supply voltage: DC 13.2V, Negative ground
Current consumption: Less than 5A
Dimensions: Width 180mm
Height 35mm
Depth 160mm
Weight: 0.9kg

## ■COMPONENT:

- **RT-9031D-A (Use only SOUTH AMERICA)**
  Main unit 1
- **RT-9031F-A**
  Main unit 1

# ■EXPLANATION OF IC's:

MPX-NC-D 051-0632-00
■MPX-NC-H 051-0632-01 MPX with Noise Canceller for FM
MPX-NC-V 051-0633-00

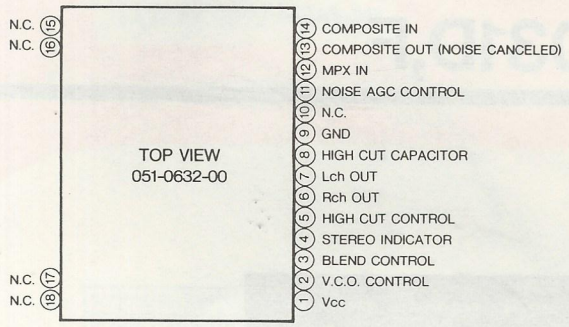
**Function:**

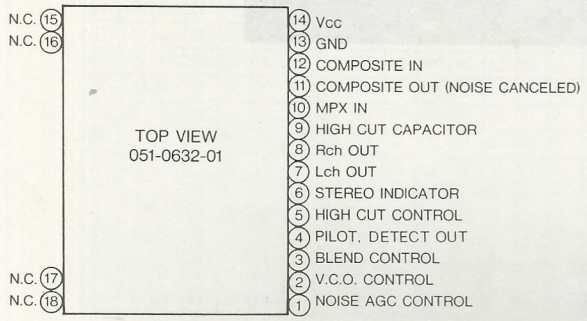
- o MPX
- o Pulse noise cancellation
- o Pilot signal cancellation
- o Stereo noise control (automatic mixing)
- o Automatic high-cut
- o Automatic stereo/monaural switching
- o VCO oscillation shutdown

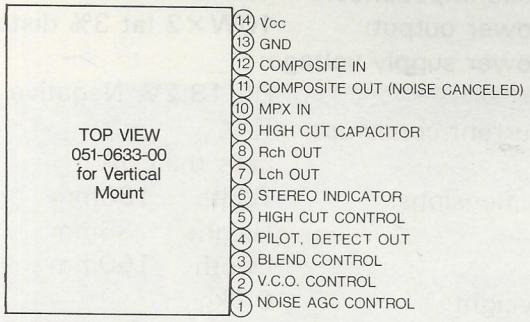
**Absolute Maximum Ratings** (Ta=25±15°C)

| | | | |
|---|---|---|---|
| Supply Voltage | $V_{CC}$ | max | 16V |
| Power Dissipation | $P_D$ | max | 920mW |

**Terminal Connection**



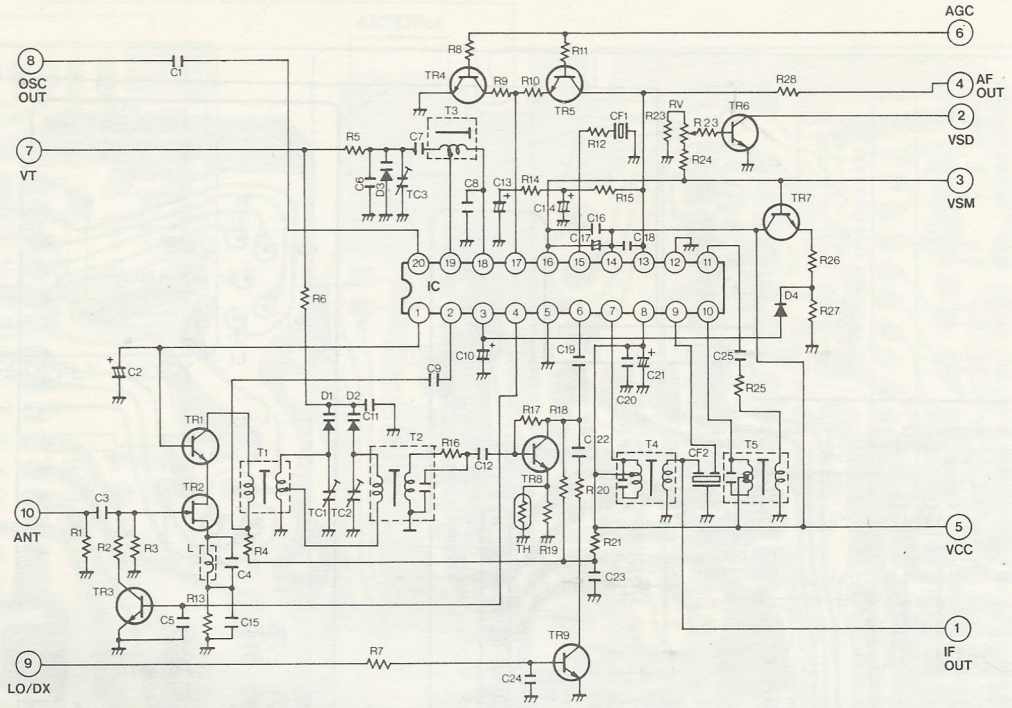



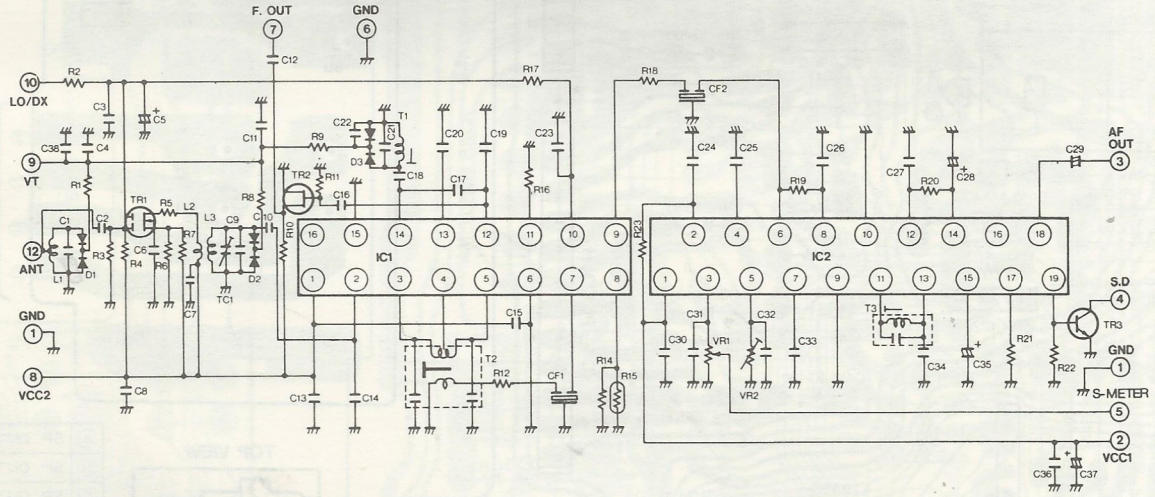

| No. | Terminal Name | Function |
|---|---|---|
| 18(18)<br>17(17)<br>16(16)<br>15(15) | N.C. | Unused |
| 14(1) | Vcc | Power pin; recommended power +12V. |
| 13(9) | GND | |
| 12(14) | COMPOSITE IN | The composite signal demodulated by the FM modem is input here. |
| 11(13) | COMPOSITE OUT | The composite signal out of which the pulse noises are eliminated by the noise canceller is output here. |
| 10(12) | MPX IN | The input pin of MPX circuit. |
| 9(8) | HIGH CUT CAPACITOR | The high-cut capacitor is connected here for the composite signal. |
| 8(6) | Rch OUT | The right channel output of Audio signal. |
| 7(7) | Lch OUT | The left channel output of Audio signal. |
| 6(4) | STEREO INDICATOR | The stereo-indicator LED is connected here. |
| 5(5) | HIGH CUT CONTROL | The high-band component of the composite signal can be attenuated if the voltage under 1.2V is applied to this pin. |
| 4 | PILOT SIGNAL DETECTOR OUT | By shorting this terminal with GND, the AF signal output changes to the monaural output. Open this terminal to effect the stereo output. |
| 3(3) | BLEND CONTROL | By turning this pin 0V, the L and R signals can be blended into the monaural output or into the stereo output of the maximum separation if it exceeds 1.8V. |
| 2(2) | V.C.O. CONTROL | The VCO oscillation of PLL MPX can be stopped by raising the voltage of this pin over 7V. |
| 1(11) | NOISE A.G.C. CONTROL | By setting this pin to "H", the sensitivity of noise A.G.C. can be raised so much as to eliminate even microscopic pulse noise. But it is more likely to cause false operations by the continuous noises. |

( )·····051-0632-00

## ■AM TUNER PACK: 941-0141-01




## ■FM TUNER PACK: 941-0143-01




## ■PARTS LIST:

◎Electrical section

| REF.NO. | PART NO. (ORDER NO.) | DESCRIPTION | Q'TY |
|---|---|---|---|
| $D_{101,102,103,201,202,203,606,611,801\sim809,811,812}$ | 001-0330-00 | Diode (1SS119) | 19 |
| $D_{601,602,604,605,607}$ | 001-0360-00 | Diode (S5566B) | 5 |
| $D_2$ | 001-0377-47 | Diode (MA4091M) | 1 |
| $D_{612}$ | 001-0379-00 | Diode (S5566G) | 1 |
| $D_{608,609}$ | 001-0423-18 | Diode (MA4051) | 2 |
| $D_{1,603,610,810}$ | 001-0423-24 | Diode (MA4091) | 4 |
| $CHOKE_{602}$ | 009-0470-04 | Choke | 1 |
| $CHOKE_{601}$ | 009-0643-00 | Choke | 1 |
| $L_{101}$ | 010-2047-86 | Coil (220μH) | 1 |
| $L_{201}$ | 010-2053-00 | Coil | 1 |
| $RY_{601}$ | 014-0509-00 | Relay | 1 |
| $PL_{101}$ | 017-0321-01 | Neon lamp | 1 |
| $CCT_{801}$ | 050-0093-03 | Component circuit | 1 |

| REF.NO. | PART NO. (ORDER NO.) | DESCRIPTION | Q'TY |
|---|---|---|---|
| $IC_3$ | 051-0301-02 | IC (M51522AL) | 1 |
| $IC_{4,5}$ | 051-0364-01 | IC (μPC1230H2) | 2 |
| $IC_2$ | 051-0606-00 | IC (BT3S501) | 1 |
| $IC_1$ | 051-0633-00 | IC (NC+MPX) | 1 |
| $IC_6$ | 051-0713-00 | IC (μPD1708G-017) | 1 |
| $X_{801}$ | 061-1037-00 | Crystal | 1 |
| $Q_{804}$ | 102-1545-02 | Transistor (2SC1545B) | 1 |
| $Q_{101,102,301,302,401,501,602,801,802,803}$ | 102-2458-00 | Transistor (2SC2458) | 10 |
| $Q_{4,5,604}$ | 102-3402-00 | Transistor (2SC3402) | 3 |
| $Q_{1,2,3,601,603}$ | 103-1255-18 | Transistor (2SD1225M) | 5 |
| $Q_{805,806}$ | 103-1504-00 | Transistor (2SD1504) | 2 |
| $Q_{605,606}$ | 125-0003-02 | Transistor (RN2202) | 2 |
| $R_{701}$ | 114-1201-11 | Film resistor (1W12Ω) OM | 1 |
| $R_{702}$ | 114-1501-21 | Film resistor (2W15Ω) OM | 1 |

| REF.NO. | PART NO. (ORDER NO.) | DESCRIPTION | Q'TY |
|---|---|---|---|
| $R_{3,4}$ | 114-4711-11 | Film resistor (1W470Ω) OM | 2 |
| $C_{407,507}$ | 043-0165-00 | Ceramic capacitor (16V0.1μF) | 2 |
| $C_{801}$ | 043-0197-00 | Ceramic capacitor (0.01μF) | 1 |
| $C_{103}$ | 160-3322-05 | Ceramic capacitor (3300pF B) HD | 1 |
| $C_{411,511}$ | 160-5612-05 | Ceramic capacitor (560pF B) HD | 2 |
| $C_{114,115,204}$ | 171-1033-06 | Ceramic capacitor (0.01μF SR) SC | 3 |
| $C_{104}$ | 171-1533-06 | Ceramic capacitor (0.015μF SR) SC | 1 |
| $C_{805}$ | 173-1032-10 | Polyester capacitor (0.01μF) S | 1 |
| $C^{417,418,517,518}_{601,602,610,701}$ | 173-1042-10 | Polyester capacitor (0.1μF) S | 8 |
| $C_{111,112,202}$ | 173-2732-10 | Polyester capacitor (0.027μF) S | 3 |
| $C_{408,508}$ | 173-3332-10 | Polyester capacitor (0.033μF) S | 2 |
| $C_{203,804}$ | 173-5632-10 | Polyester capacitor (0.056μF) S | 2 |
| $C_{102}$ | 173-6811-10 | Polyester capacitor (680pF) S | 1 |
| $C_{101}$ | 174-1800-13 | Ceramic capacitor (18pF CH) TC | 1 |
| $C_{201,802,803}$ | 174-2200-13 | Ceramic capacitor (22pF CH) TC | 3 |
| $C_{412,512}$ | 042-0334-25 | Electrolytic capacitor (16V47μF) | 2 |
| $C^{411,413,414,415}_{513,515,516,517}$ | 042-0342-00 | Electrolytic capacitor (10V100μF) | 8 |
| $C_{402,502,806}$ | 179-1053-62 | Electrolytic capacitor (50V1μF) S | 3 |
| $C^{303,304,401,406}_{501,506,614,808}$ | 179-1063-32 | Electrolytic capacitor (16V10μF) S | 8 |

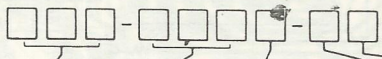
| REF.NO. | PART NO. (ORDER NO.) | DESCRIPTION | Q'TY |
|---|---|---|---|
| $C_{613}$ | 179-1073-22 | Electrolytic capacitor (10V100μF) S | 1 |
| $C_{1,305}$ | 179-1073-32 | Electrolytic capacitor (16V100μF) S | 2 |
| $C_{604}$ | 179-1073-33 | Electrolytic capacitor (16V100μF) S | 1 |
| $C^{109,110,301,302}_{409,509}$ | 179-2253-62 | Electrolytic capacitor (50V2.2μF) S | 6 |
| $C_{113}$ | 179-2273-22 | Electrolytic capacitor (10V220μF) S | 1 |
| $C_{606}$ | 179-2273-23 | Electrolytic capacitor (10V220μF) S | 1 |
| $C_{609}$ | 179-2283-31 | Electrolytic capacitor (16V2200μF) S | 1 |
| $C_{807}$ | 179-3363-22 | Electrolytic capacitor (10V33μF) S | 1 |
| $C_{612}$ | 179-3373-22 | Electrolytic capacitor (10V330μF) S | 1 |
| $C_{608}$ | 179-3373-33 | Electrolytic capacitor (16V330μF) S | 1 |
| $C_{403,405,503,505}$ | 179-4743-62 | Electrolytic capacitor (50V0.47μF) S | 4 |
| $C^{404,410,504,510}_{605}$ | 179-4753-62 | Electrolytic capacitor (50V4.7μF) S | 5 |
| $C_{2,3,607,611}$ | 179-4763-22 | Electrolytic capacitor (10V47μF) S | 4 |
| $C_{702,703}$ | 179-4763-32 | Electrolytic capacitor (16V47μF) S | 2 |
| $C_{603}$ | 179-4773-33 | Electrolytic capacitor (16V470μF) S | 1 |
| $C_{107,108}$ | 182-1056-62 | Electrolytic capacitor (50V1μF NP) SS | 2 |
| $C_{450,550}$ | 182-1063-33 | Electrolytic capacitor (16V10μF) SS | 2 |
| $C_{106}$ | 182-2246-62 | Electrolytic capacitor (50V0.22μF NP) SS | 1 |
| $C_{105}$ | 182-4756-32 | Electrolytic capacitor (16V4.7μF NP) SS | 1 |

Note : OM (Oxidized Metal)
S (Small)
HD (Higher Dielectric)
SC (Semi-Conductor)
SS (Super Small)
TC (Temperature-Compensating)
LL (Low Leak)
USS (Ultra Super Small)

## ● How to read resistor

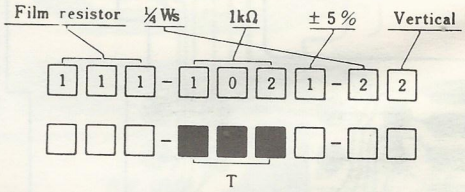
Resistors are deleted from the table of electric components, (except metal film resistors and special resistors). They can be converted to product Nos. as follows.

**Film resistor (Carbon film resistor)**



| Classification | Resistance * | Tolerance of the value of resistance | | Rated power | | | Shape | |
|---|---|---|---|---|---|---|---|---|
| | | 0 | | 0 | | | 0 | |
| | Example | 1 | ± 5 % | 1 | ⅛W | Approx. 3.7mm | 1 | Horizontal |
| | 33Ω=330 | 2 | | 2 | ¼Ws | Approx. 6.5mm | 2 | Vertical |
| 1 1 1 | 33kΩ=333 | 3 | | 3 | | | 3 | |
| | | 4 | | 4 | ½W | Approx. 9mm | 4 | |
| | | | | 7 | ⅙W | Approx. 3.5mm | | |
| | | | | 8 | ½Ws | Approx. 6.6mm | | |
| | | | | 9 | ¼Wss | Approx. 3.2mm | | |

**(Example)**



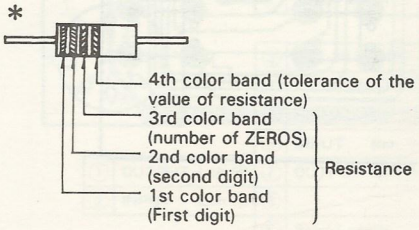

Note 1. The first two of three digits representing resistance are effective digits and the last one represents number of "0" following this.
Unit is given in ohm (Ω).

**Example of conversion of resistance** ■■■□ (T)

Note) R : Resistance, T : Converted value

| R | T | R | T | R | T | R | T | R | T | R | T | R | T | R | T | R | T | R | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ω 0.1 | 108 | Ω 1.0 | 109 | Ω 10 | 100 | Ω 100 | 101 | kΩ 1.0 | 102 | kΩ 10 | 103 | kΩ 100 | 104 | MΩ 1.0 | 105 | MΩ 10 | 106 | MΩ 100 | 107 |
| 0.15 | 158 | 1.5 | 159 | 15 | 150 | 150 | 151 | 1.5 | 152 | 15 | 153 | 150 | 154 | 1.5 | 155 | 15 | 156 | 150 | 157 |

| COLOR | BLK | BRN | RED | ORG | YEL | GRN | BLU | PUR | GRY | WHT | GOLD | SILVER | NO COLOR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1st color band | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | |
| 2nd color band | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | |
| 3rd color band | $10^0$ | $10^1$ | $10^2$ | $10^3$ | $10^4$ | $10^5$ | $10^6$ | | | | $10^{-1}$ | $10^{-2}$ | |
| 4th color band | | | | | | | | | | | ± 5 % (J) | ± 10% (K) | ± 20% (M) |





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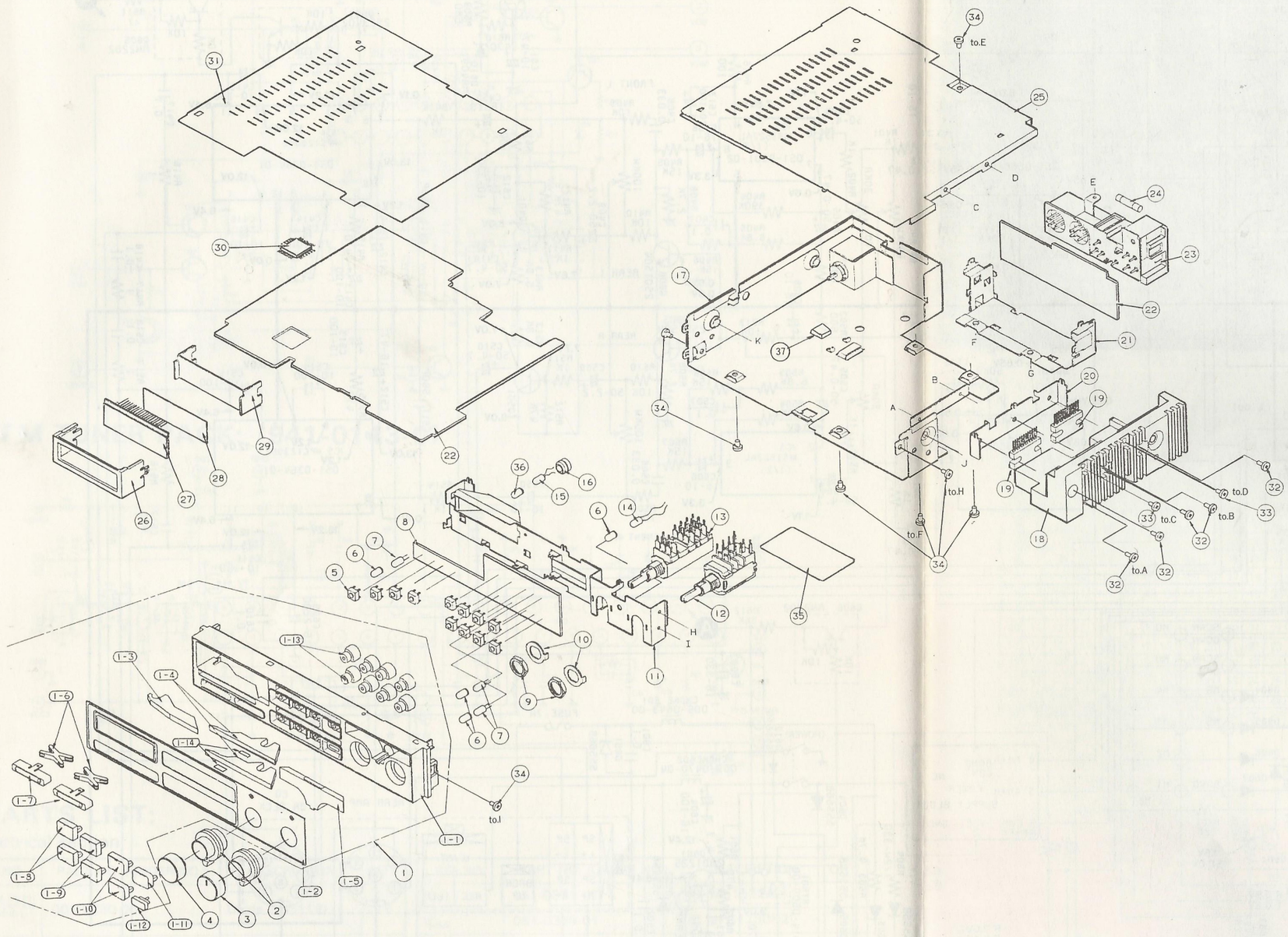
# ■EXPLODED VIEW • PARTS LIST:

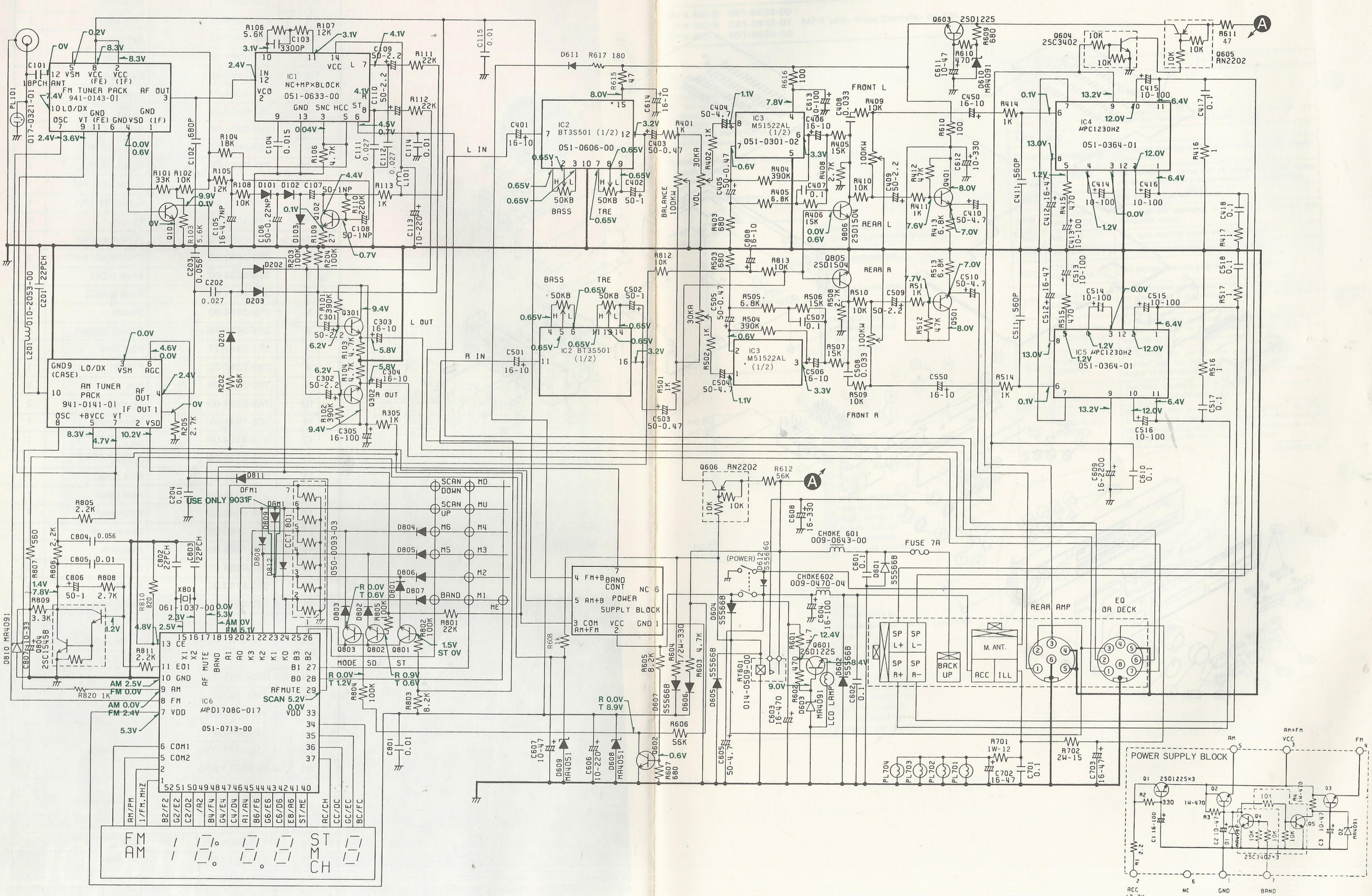
◎Main section



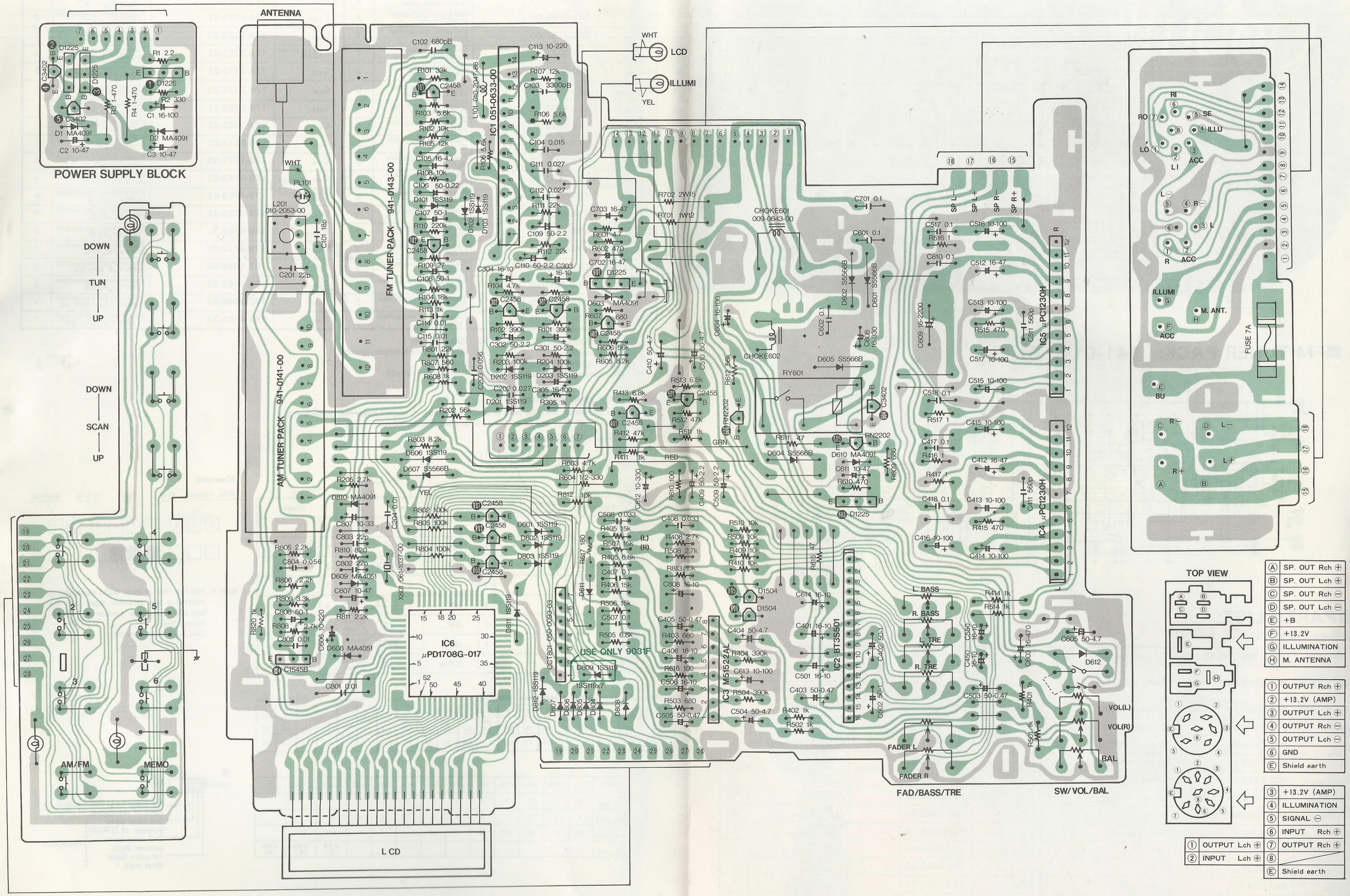

| REF.NO. | PART NO. (ORDER NO.) | DESCRIPTION | Q'TY |
|---|---|---|---|
| 1 | 940-0537A | Escutcheon ass'y | 1 |
| 1-1 | 370-3795-03 | Escutcheon | 1 |
| 1-2 | 371-3236-03 | Trim plate | 1 |
| 1-3 | 335-1960-02 | Reflector | 1 |
| 1-4 | 335-1961-03 | Reflector | 2 |
| 1-5 | 335-1962-02 | Reflector | 1 |
| 1-6 | 345-4038-01 | Spacer | 2 |
| 1-7 | 382-0923-00 | Button (TUNE, SCAN) | 2 |
| 1-8 | 382-0920-00 | Button (1, 4) | 2 |
| 1-9 | 382-0921-00 | Button (2, 5) | 2 |
| 1-10 | 382-0922-00 | Button (3, 6) | 2 |
| 1-11 | 382-0919-01 | Button (AM/FM) | 1 |
| 1-12 | 380-4632-00 | Button (MEMO) | 1 |
| 1-13 | 345-4039-02 | Spacer | 8 |
| 1-14 | 347-1463-00 | Adhesive paper | 2 |
| 2 | 380-4646-00 | Knob (FAD, BAL) | 2 |
| 3 | 380-4634-00 | Knob (VOL) | 1 |
| 4 | 380-4635-00 | Knob (BASS) | 1 |
| 5 | 013-3694-00 | Switch | 12 |
| 6 | 345-3436-15 | Rubber contact | 4 |
| 7 | 017-0345-17 | Pilot lamp | 3 |
| 8 | 099-7397-02 | P.W.B | 1 |
| 9 | 722-0231-00 | Nut | 2 |
| 10 | 745-0668-00 | Washer | 2 |
| 11 | 308-1031-01 | Front cover | 1 |
| 12 | 012-4319-00 | Variable resistor (VOL) | 1 |
| 13 | 012-4320-00 | Variable resistor (BASS) | 1 |
| 14 | 017-0345-35 | Pilot lamp | 1 |
| 15 | 017-0346-03 | Pilot lamp | 1 |
| 16 | 345-4040-02 | P.L holder | 1 |
| 17 | 311-1180-02 | Lower case | 1 |
| 18 | 313-1222-00 | Heat sink | 1 |
| 19 | 051-0364-01 | IC | 2 |
| 20 | 330-8190-00 | IC holder | 1 |
| 21 | 330-8191-01 | Outlet holder | 1 |
| 22 | 099-7389-02 | P.W.B | 1 |
| 23 | 074-0766-02 | Outlet socket | 1 |
| 24 | 120-0070-02 | Fuse (7A) | 1 |
| 25 | 303-0325-02 | Upper cover | 1 |
| 26 | 335-1963-01 | LCD holder | 1 |
| 27 | 379-0082-00 | Indicator | 1 |
| 28 | 335-1964-01 | Reflector | 1 |
| 29 | 335-1965-00 | Back plate | 1 |
| 30 | 051-0713-00 | IC | 1 |
| 31 | 347-1803-02 | Insulator | 1 |
| 32 | 714-3014-80 | Machine screw (M3x14) | 5 |
| 33 | 714-3008-80 | Machine screw (M3x8) | 2 |
| 34 | 714-3004-80 | Machine screw (M3x4) | 8 |
| 35 | 286-3678-00 | Set plate | 1 |
| 36 | 345-3842-01 | P.L cap | 1 |
| 37 | 345-3933-00 | Spacer | 1 |


RT-9031D,F

## ■CIRCUIT DIAGRAM:



## ■PRINTED WIRING BOARD:





RT-9031D,F