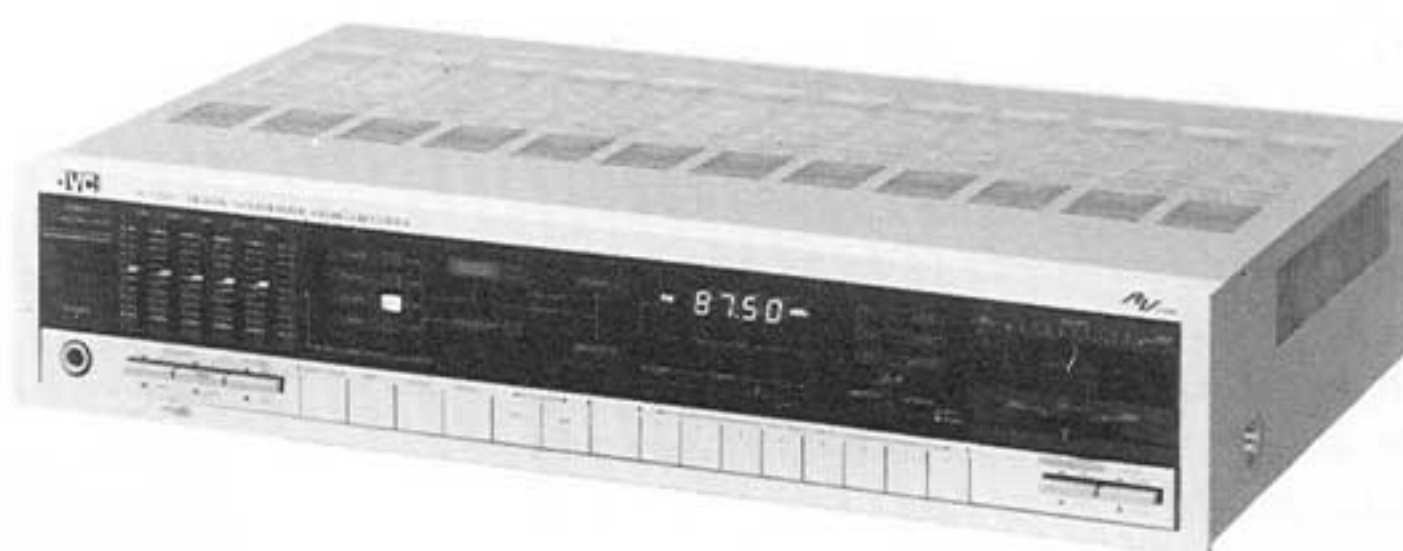


JVC

SERVICE MANUAL

STEREO RECEIVER

MODEL **R-X220/R-X220B**
R-X220L/R-X220LB



R-X220



R-X220L

Model	Version	
	Feature	Color
R-X220	—	Silver
R-X220L	with LW	Silver
R-X220B	—	Black
R-X220LB	with LW	Black

Contents

Safety Precautions	1-1	5. Block Diagram	1-9
1. Specifications	1-2	Parts List	Separate-volume Insertion
2. Names of Controls and Their Functions	1-3	6. R-X220/R-X220L Schematic Diagram	
3. Removal Procedures	1-5	6-(1) R-X220 Tuner Section	1-10
3-(1) Metal cover section	1-6	6-(2) R-X220L Tuner Section	1-11
3-(2) Front panel section	1-6	6-(3) R-X220/R-X220L Amplifier Section	1-12
3-(3) Chassis base section	1-6	6-(4) Internal Block Diagram of	
4. FM/AM(MW/LW) Tuner Alignment Procedures . . .	1-7	Major LSI ICs	1-13

Safety Precautions

1. The design of this product contains special hardware, many circuits and components specially for safety purposes.

For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.

2. Alterations of the design or circuitry of the product should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.

3. Many electrical and mechanical parts in the product have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. Electrical components having such features are identified by shading on the schematics and by (Δ) on the parts list in Service manual. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list in Service manual may create shock, fire, or other hazards.

4. The leads in the products are routed and dressed with ties, clamps, tubings, barriers and/or the like to be separated from live parts, high temperature parts, moving parts and/or sharp edges for the prevention of electric shock and fire hazard.

When service is required, the original lead routing and dress should be observed, and they should be confirmed to be returned to normal, after re-assembling.

5. To confirm the polarity of the power cord and AC outlet (Canada only).

When replacing the power cord or the AC outlet, make sure that the power switch or the protection device (the primary fuse etc.) is NOT connected to the ground power side of the plug and AC outlet (wider blade of plug or wider hole of the AC outlet).

6. Leakage current check
(Safety for electrical shock hazard)

After re-assembling the product, always perform an isolation check on the exposed metal parts of the Products (antenna terminals, knobs, metal cabinet, screw heads, headphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.

Do not use a line isolation transformer during this check.

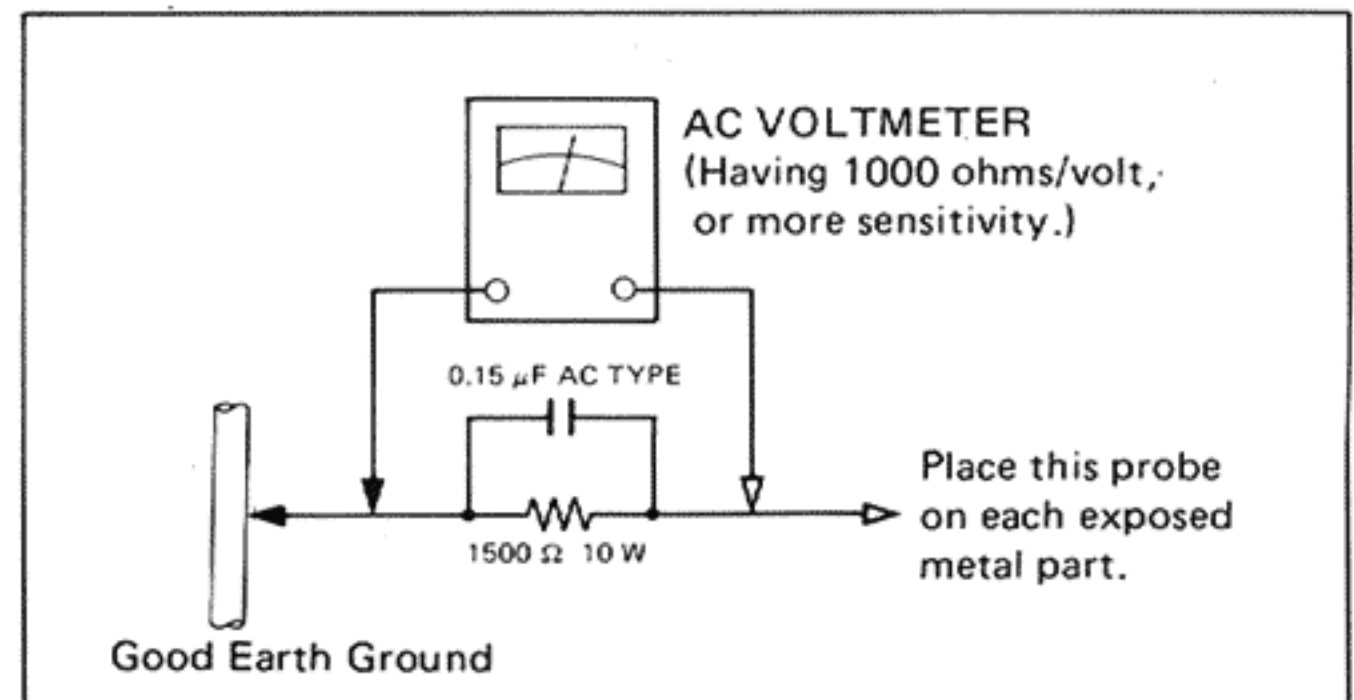
- Plug the AC line cord directly into the AC outlet. Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground. Any leakage current must not exceed 0.5 mA AC (r.m.s.).

- Alternate check method.

Plug the AC line cord directly into the AC outlet. Use an AC voltmeter having 1,000 ohms per volt or more sensitivity in the following manner. Connect a 1500 Ω 10 W resistor paralleled by a 0.15 μ F AC-type capacitor between an exposed metal part and a known good earth ground.

Measure the AC voltage across the resistor with the AC voltmeter.

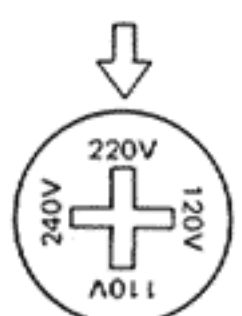
Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.75 V AC (r.m.s.). This corresponds to 0.5 mA AC (r.m.s.).



CHECKING YOUR LINE VOLTAGE (Except for U.S.A., Canada, Australia, U.K. and Continental Europe.)

Before inserting the power plug, please check this setting to see that it corresponds with the line voltage in your area. If it doesn't, be sure to adjust the voltage selector switch to the proper setting before operating this equipment. The voltage selector switch is located on the rear panel.

CAUTION Before selecting the "Voltage selector switch" to proper voltage disconnect the power plug.



1. Specifications

AMPLIFIER SECTION

'78 IHF

RMS Power : 40 watts per channel, min. RMS, both channels driven, into 8 ohms from 40 Hz 40 Hz to 20 kHz, with no more than 0.5 % total harmonic distortion.

45 watts per channel, min. RMS, both channels driven into 8 ohms at 1 kHz with no more than 0.7 % total harmonic distortion.

Total Harmonic Distortion : 0.1 % at 40 watts (1 kHz, 8 ohms)

Input Sensitivity/Impedance

PHONO : 2.5 mV/47 kohms
TAPE PLAY/CD/VIDEO SOUND : 170 mV/40 kohms

Recording Output Level : 170 mV

Frequency Response : 20 Hz – 20 kHz, +1 dB, -1 dB (8 ohms)

SEA Graphic Equalizer

Center Frequencies : 63 Hz, 250 Hz, 1 kHz, 4 kHz, 16 kHz

Control Range : +10 dB ± 1 dB, -10 dB ± 1 dB

Signal to Noise Ratio

PHONO : 70 dB ('66 IHF) 59 dB (DIN)
78 dB ('78 IHF, Rec out)

TAPE PLAY/CD/AUX/VIDEO SOUND PLAY : 91 dB ('66 IHF) 64 dB (DIN)
74 dB ('78 IHF)

FM TUNER SECTION

'78 IHF

DIN (for Europe)

Tuning Range : 87.5 MHz–108.0 MHz 87.5 MHz–108.0 MHz
Usable Sensitivity : Mono 10.8 dBf (S/N 26 dB)
0.95 μV/75 ohms 1.5 μV/75 ohms
1.9 μV/300 ohms —

50 dB Quieting Sensitivity : Mono 16.3 dBf (1.8 μV/75 ohms)
(3.6 μV/300 ohms)
Stereo 38.3 dBf (22.5 μV/75 ohms)
(45 μV/300 ohms)

S/N 46 dB Stereo Sensitivity : — Stereo 23 μV/75 ohms

Signal to Noise Ratio : Mono 80 dB Mono 72 dB
Stereo 73 dB (A-net.) Stereo 64 dB (weighted)
(at 98 MHz, 80 dBf)

Total Harmonic Distortion : Mono 0.15 % Mono 0.15 %

1 kHz Stereo 0.3 % Stereo 0.3 %

Frequency Response : 30 Hz – 15 kHz, +0.5 dB, -5 dB

Capture Ratio : 1.5 dB 1.0 dB

Alternate Channel Selectivity : 60 dB, ±400 kHz 55 dB, ±300 kHz

Image Response Ratio : 55 dB at 98 MHz

IF Response Ratio : 85 dB at 98 MHz

Stereo Separation : 40 dB at 1 kHz

AM TUNER SECTION

'78 IHF

DIN (for Europe)

MW

Tuning Range : 522 kHz–1611 kHz 522 kHz–1611 kHz
Channel space : 9 kHz

Channel space : 520 kHz–1710 kHz
10 kHz

Sensitivity : 350 μV/m at 1000 kHz 350 μV/m at 999 kHz
30 μV at 1000 kHz 30 μV at 999 kHz

Signal to Noise Ratio (100mV/m) : 50 dB at 1000 kHz 50 dB at 999 kHz

Selectivity : 38 dB, ±10 kHz at 1000 kHz 35 dB, ±9 kHz at 999 kHz

LW (R-X220L/R-X220LB only)

Tuning Range : 153 Hz – 360 kHz

Sensitivity : 600 μV/m at 245 kHz
100 μV at 245 kHz

Signal to Noise Ratio (100 mV/m) : 45 dB at 245 kHz

Selectivity : 40 dB ±9 kHz at 245 kHz

Design and specifications subject to change without notice.

Power Specifications

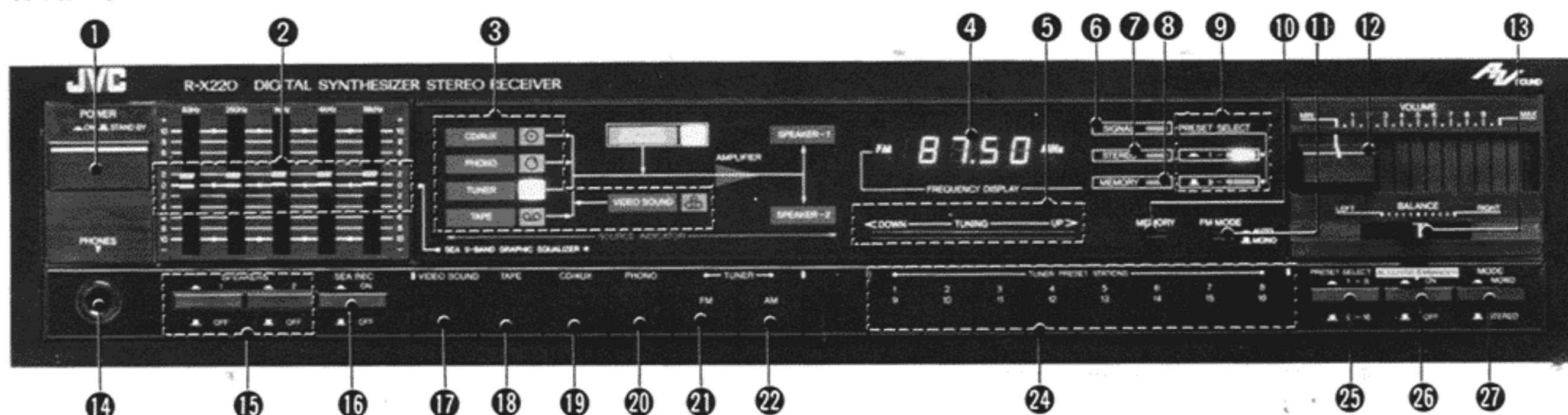
Areas	Line Voltage & Frequency	Power Consumption
U.S.A., Canada	AC 120 V, 60 Hz	160 W, 200 VA
Europe	AC 220 V [~] , 50 Hz	120 watts
U.K., Australia	AC 240 V [~] , 50 Hz	120 watts
Other Areas	AC 110/120/220/240 V [~] , Selectable, 50/60 Hz	120 watts

Dimensions and Weight


Dimensions			Weight
Height	Width	Depth	Net
92 mm (3-5/8")	435 mm (17-3/16")	266 mm (10-1/2")	4.3 kg (9.5 lbs)


2. Names of Controls and Their Functions

R-X220B



1 POWER

ON (): Press to set to this position to turn the power on.

STAND BY (): When the power cord is plugged into an AC outlet, the memory circuit operates and the preset stations and the source selectors are not subject to cancellation or accidental alteration. The preset data and the source select data are maintained even in the case of a power failure or when the power cord is disconnected; if the period power is not applied does not exceed a couple of days.

Note:

- Even when the POWER button is set to STAND BY, this receiver consumes a small amount of electricity (5 watts). To shut the power completely off, disconnect the power cord.
- An electronic source selector is used in this unit. When the POWER switch is first switched on, two or more sources or no source may be selected. Make sure to input the source select data by pressing one of the source selectors.

2 S.E.A. graphic equalizer system

These five controls allow you to boost or lower response separately in five portions of the frequency spectrum by 10 dB. For operation of these controls, which give far more flexible control over tone than the conventional bass/treble controls, see page 19.

3 Source indicators

The indicator corresponding to the source select button and Acoustic Expander Switch pressed lights.

4 Frequency display

The tuned-in frequency is displayed digitally as follows:

For AM reception: Four digits (kHz) are displayed.

For LW reception: Three digits (kHz) are displayed.

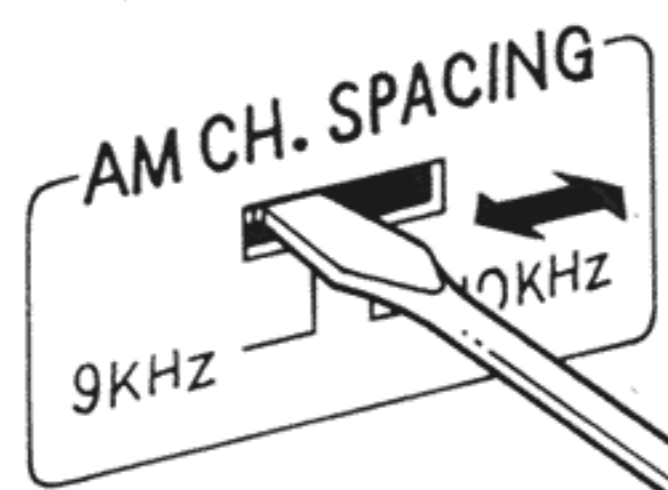
(R-X220L/R-X220LB only)

For FM reception: Five digits (MHz) are displayed.

(for continental Europe, the U.K., Australia and other areas.)

Four digits (MHz) are displayed.

(for the U.S.A. and Canada)



Switch over using the tip of a screwdriver as shown in Fig.

5 TUNING UP/DOWN

When the UP/DOWN-scanning button is pressed, the frequency changes in predetermined steps (see table below). Tapping this button changes the tuner step by step; pressing continuously (more than 0.5 sec.) changes tuning by high speed scanning which stops when the button is released.

After choosing the frequency you want to listen to, hold the button pressed to scan rapidly until the display approaches the desired frequency, then tap the button lightly to tune precisely.

Channel spacing

AM channel spacing knob (R-X220/R-X220B only) is provided on the rear panel for selecting 9 kHz or 10 kHz steps according to your area. (Fig. 11)

Band Area	FM	AM (MW)	AM (LW)
U.S.A., Canada	100 kHz	10 kHz	—
Europe, UK	50 kHz	9 kHz	1 kHz
Europe, Australia	50 kHz	9 kHz	—
Other areas	*50 kHz	*9 kHz	—
	100 kHz	10 kHz	—

Note: *Preset at the factory.

6 SIGNAL indicator

This LED lights when the signal is input. Tune to the required frequency while watching the frequency display 4

7 FM STEREO indicator

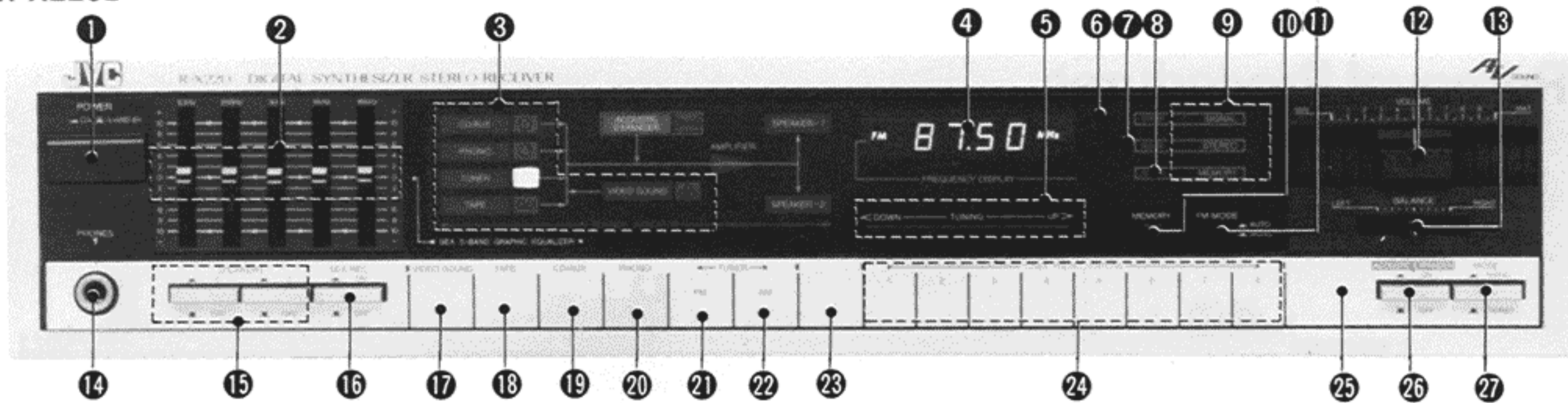
This LED lights when tuned to an FM stereo broadcasts.

8 MEMORY indicator

When the MEMORY button is pressed, this MEMORY indicator lights to show that the unit is ready to store a preset frequency in memory. This indicator will go out automatically in about 10 sec. or when the station select button is pressed.

9 PRESET STATIONS indicator

This LED lights to show that channel 1 through 8 or channel 9 through 16 has been selected by the PRESET SELECT button. (Continental Europe, U.K. and Australia only)

**10 MEMORY**

Press this button and the MEMORY indicator will light to show that memory is ready to receive a frequency. (This button is non-locking type.)

Pressing the station select button while the MEMORY indicator is lit (for about 10 sec.) stores the frequency being received in memory.

When the MEMORY indicator is not lit, the memory function does not operate.

11 FM MODE/MUTE

This button is used to select FM AUTO/ON or MONO/OFF mode.

When stereo reception is possible, set this button to AUTO/ON (—). This also eliminates inter-station noise during FM tuning.

When signals are too weak to be received or a stereo broadcast is unsatisfactory, set to MONO/OFF (■). Stereo will be changed to mono, but sound quality will be improved. This is convenient to bring in distant FM stations without muting.

12 VOLUME

This knob has an auto loudness effect. When the volume is lowered, the sound with compensated high and low frequencies can be obtained.

13 BALANCE

Use to adjust the balance between the left and right speakers.

14 Headphone jack (PHONES)

Plug stereo headphones into this jack for private listening and to monitor recording. For private listening, set the SPEAKERS buttons to OFF.

15 SPEAKERS-1/SPEAKERS-2

Press to switch the speakers connected to the SPEAKERS 1 and/or 2 terminals on and off.

Note:

- When speakers are connected to only one system of the SPEAKERS terminals, press only the SPEAKERS button of the system connected; if both buttons are pressed, sound will not be heard from either speaker system. When two pairs of speakers are connected and either or both SPEAKERS buttons is/are pressed, sound will be heard from either or both speaker system(s).

16 SEA REC

Press to ON (—) to record tapes with the added effect of the S.E.A. Graphic Equalizer. (See page 19.)

17 VIDEO SOUND

Press to listen to any video equipment that has been connected to the VIDEO SOUND terminals on the rear panel.

18 TAPE

Press to listen to the tape deck connected to the TAPE terminals on the rear panel.

19 CD/AUX

Press to hear or record sound from compact disc other equipment connected to the CD/AUX terminals on the rear panel.

20 PHONO

Press to hear or record sound from the turntable connected to the PHONO terminals on the rear panel.

21 FM

Press to switch on the FM tuner section.

22 AM (for R-X220/R-X220B): MW (for R-X220L/R-X220LB)

Press to switch on the AM (MW) tuner section.

23 LW (R-X220L/R-X220LB only)

Press to switch on the LW tuner section.

24 TUNER PRESET STATIONS

These buttons are used to select one of the preset stations or to store the station frequency in memory. If one of these buttons is pressed when the MEMORY button is pressed in, the frequency being received will be stored in memory.

Up to 16 FM and AM stations can be stored in memory, 8 for each position of the PRESET SELECT button (Continental Europe, U.K. and Australia).

8 FM and AM stations can be preset in memory (U.S.A., Canada and other countries).

When you switch from radio reception to any other mode or set the power button to STAND BY, then switch back to the radio or switch the power on again, you will hear the station previously selected.

25 PRESET SELECT

Press to set to channels 1 – 8 (—) or channels 9 – 16 (■). (only for Continental Europe, U.K. and Australia.)

26 ACOUSTIC EXPANDER

This button can be used to select the ACOUSTIC EXPANDER function. This function can transform mono sound into believable stereo, and it can greatly enrich the quality of normal stereo sound.

Note:

- Before pressing the ACOUSTIC EXPANDER switch, set the MODE switch according to the instructions in (27) "MODE" to enable the output of sound from both speakers.
- Sound output with the ACOUSTIC EXPANDER cannot be recorded on either tape or VTR.

27 MODE

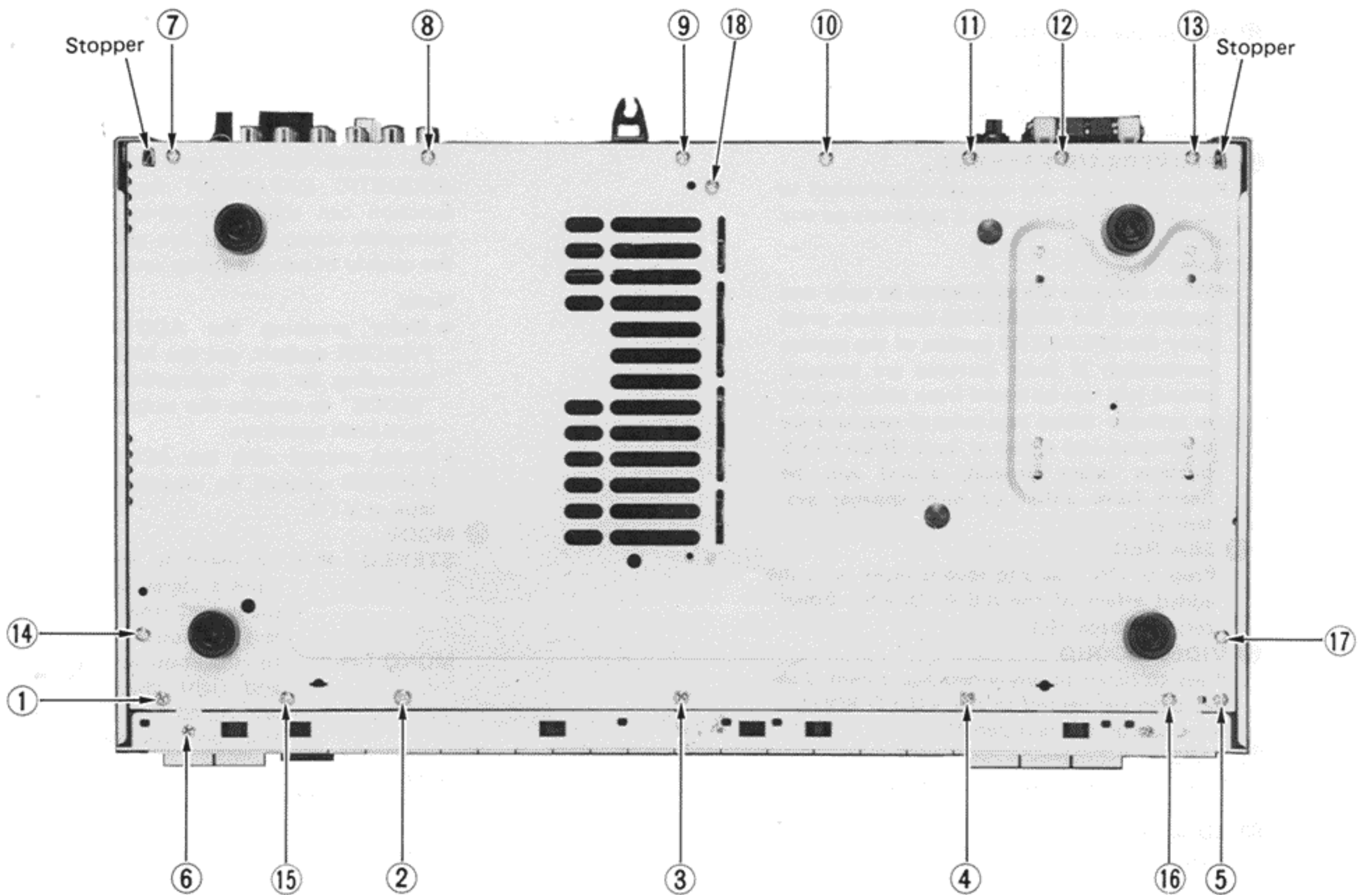
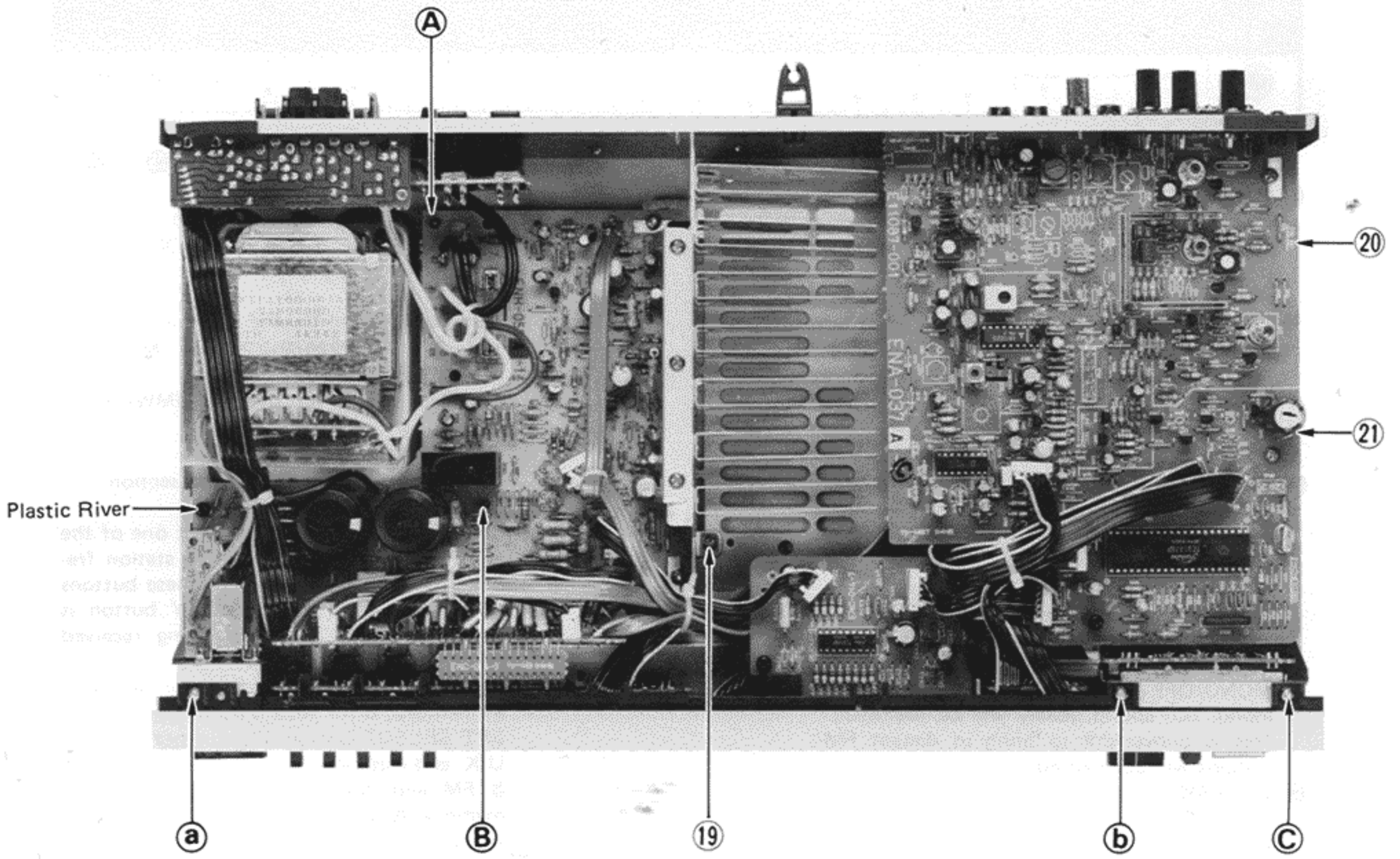
STEREO (■): To listen to stereo sound from a stereo source. Normally set this switch to this position.

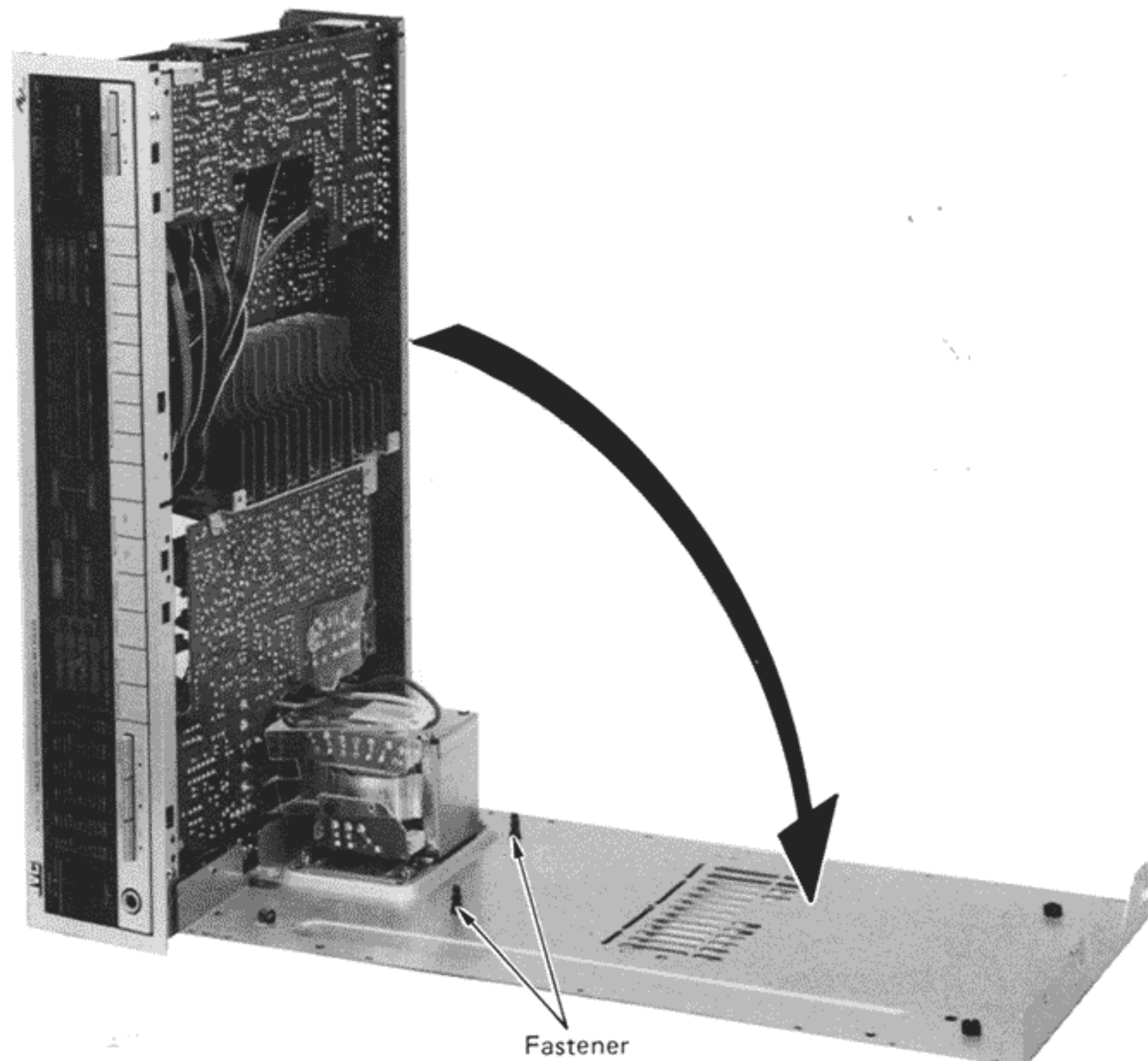
MONO (—): In this position, the left and right channel signals are mixed and reproduced from both speakers.

Note:

- When the VTR connected is not a stereo model, press this switch to set to MONO (—) to output the same sound from both speakers. Otherwise, sound will be output only from one speaker.

3. Removal Procedures





3-(1) Metal Cover Section

1. Remove the screws securing the metal cover – two screws from its two sides and three from its rear side.
2. Extract the metal cover while lifting its rear side.

3-(2) Front Panel Section

1. Demount the metal cover (refer to item 3-(1) above).
2. Remove three screws (a), (b) and (c).
3. Remove five screws (1) through (5) – namely, those screws that jointly secure the front panel and the chassis base through the panel bottom side.
4. Remove screw (6) – the one that secures the front panel through its lower side.

3-(3) Chassis Base Section

1. Demount the metal cover (refer to item 3-(1) above).
2. Remove 16 screws (1) through (5) and (7) through (17) – those screws that secure the chassis base through its bottom side.
3. Remove two screws (18) and (19) securing the heat sink.
4. Remove two screws (20) and (21) securing the tuner PC board.
5. Extract the plastic rivet securing the amplifier PC board.
6. Remove two fasteners (A) and (B) securing the amplifier PC board. (Push in the fasteners while using radio-repair pliers or a similar tool to grip the fastener head.)
7. Open the chassis base while loosening the stopper engaged with the rear panel.

4. FM/AM (MW/LW) Tuner Alignment Procedures

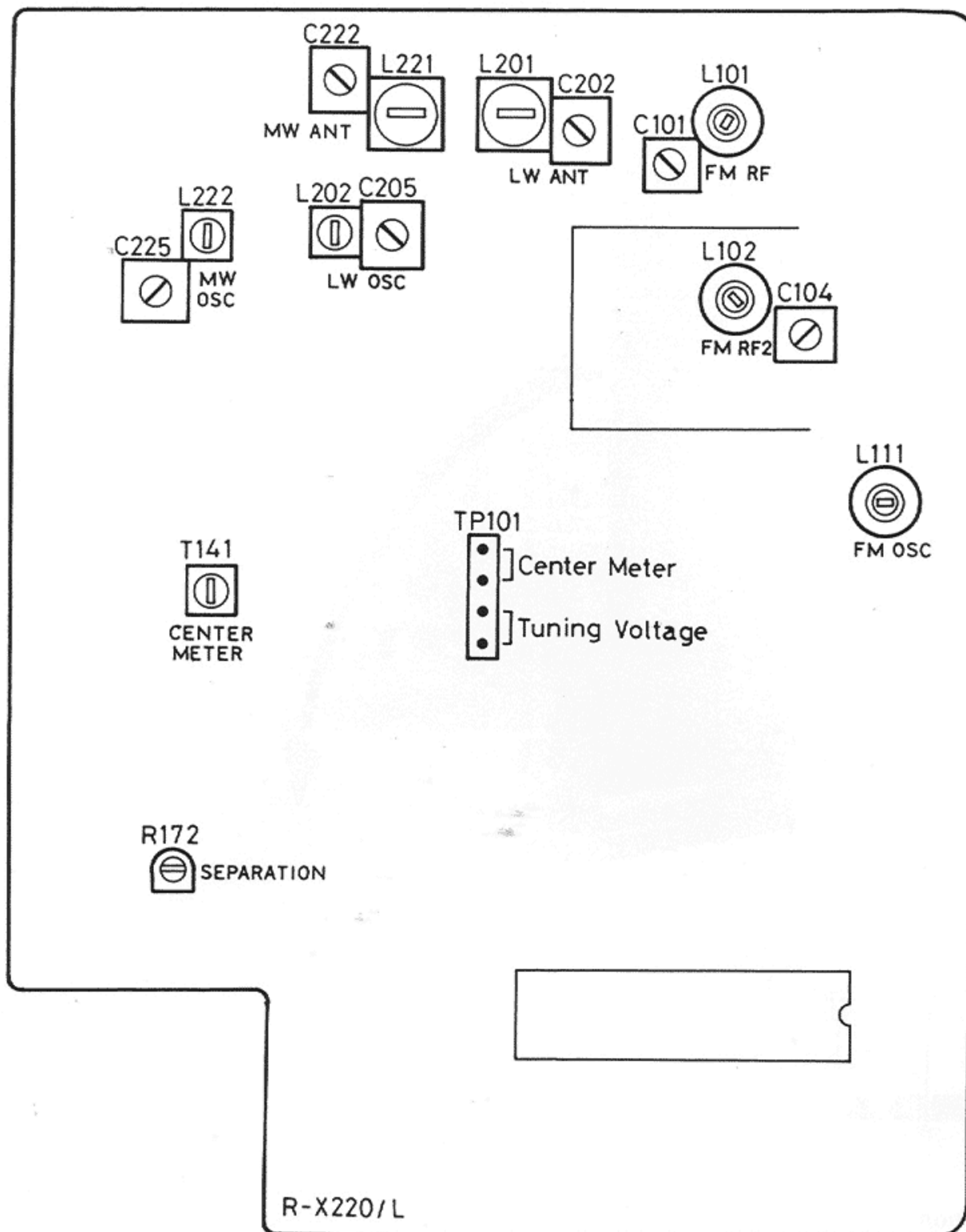


Fig. 6

FM Section

Band Cover

1. Set the frequency display to 108.0 MHz.
2. Connect a DC VTVM to TP101 (Tuning Voltage).
3. Adjust L111 so that the VTVM. shows 9.00 V.
4. And set the frequency display to 87.5 MHz.
5. Check the VTVM. voltage reading $1.60\text{ V} \pm 0.5\text{ V}$.

Note: After adjustment, confirm that the band cover is as follows: (for West Germany only)
 FM: Low-end 87.5 MHz -300 kHz
 High-end 108.0 MHz +500 kHz

Sensitivity

Low Frequency

1. Connect an RF generator to $75\ \Omega$ antenna terminals on the rear panel through a dummy antenna. (FM $75\ \Omega$: $75\ \Omega$ PAD)

2. Set an RF generator to 90 MHz, a modulation of 1 kHz and a deviation of 75 kHz to provide an input of $1\ \mu\text{V}$.
3. Connect a VTVM and an oscilloscope to the Rec. out jacks on the rear panel.
4. Set the frequency display to 90 MHz.
5. Adjust coils L101, L102 to maximize the output.

High Frequency

6. Set the RF generator to 106 MHz, a modulation of 1 kHz and a deviation of 75 kHz to provide an input of $1\ \mu\text{V}$.
7. Set the Frequency Display to 106 MHz.
8. Adjust the FM trimmers C101, C104 to maximize the output.
9. Repeat these high and low frequencies adjustment alternately until maximum sensitivity is obtained.

Discriminator, Distortion and Signal Gain

1. Press to FM position.
2. Connect an RF generator, 1 kHz modulation and a 75 kHz deviation to the antenna terminals on the rear panel through a dummy antenna.
3. Connect an oscilloscope, Distortion Meter and VTVM to the Rec. out jacks on the rear panel.
4. Set the RF generator to 98 MHz, generator output to minimize.
5. Set the Frequency Display to a 98 MHz.
6. Connect a DC VTVM to TP101 (Center Meter).
7. And set the RF generator output to 0.5 mV.
8. Adjust the core of T141 for DC VTVM reading of 0 (zero) mV.

Stereo Separation (for Europe, U.K. and Australia only)

1. Set the stereo signal generator as follows: 400 Hz modulation frequency, 7.5 kHz deviation pilot, 67.5 kHz main and sub carriers. Connect its output to the RF generator.
2. Connect an RF generator to the antenna terminals through a dummy antenna.
3. Switch the selector of stereo modulator to left channel modulation.
4. Adjust R172 so that the output of right channel is minimized.
5. Switch the selector of the modulator to right channel modulation.
6. Adjust R172 so that the left channel is minimized.
7. Set R172 to an average, if the separation of left and right is different.

AM(MW) Section

Band Cover

1. Press to AM(MW) position.
2. Set the frequency display to 520 kHz (10 kHz channel step), or 522 kHz (9 kHz channel step).
3. Connect a DC VTVM to TP101 (Tuning Voltage).
4. Adjust L222 so that the VTVM. shows 0.95 V.
5. And set the frequency display to 1710 kHz (10 kHz channel step), or 1611 kHz (9 kHz channel step).
6. Adjust C225 so that the DC. VTVM. reads 9.00 V for 1710 kHz, or 7.50 V for 1611 kHz.

Tracking and Sensitivity

Note: Be sure to perform this adjustment posterior to the LW tracking adjustment.

1. Connect the loop antenna. Also connect the RF generator to the antenna terminal on the rear panel.
2. Set the generator to 600 kHz (or 603 kHz) with 30 % modulation at 400 Hz.
3. Set the frequency display to 600 kHz, or 603 kHz.
4. Adjust the core of L221 to maximize the output.
5. Set the generator to 1400 kHz, or 1404 kHz.
6. Set the frequency display of the unit to 1400 kHz, or 1404 kHz.
7. Adjust C222 so that the output signal is maximized.
8. Repeat these adjustments (1 ~ 7) alternately until maximum sensitivity is obtained.

LW Section

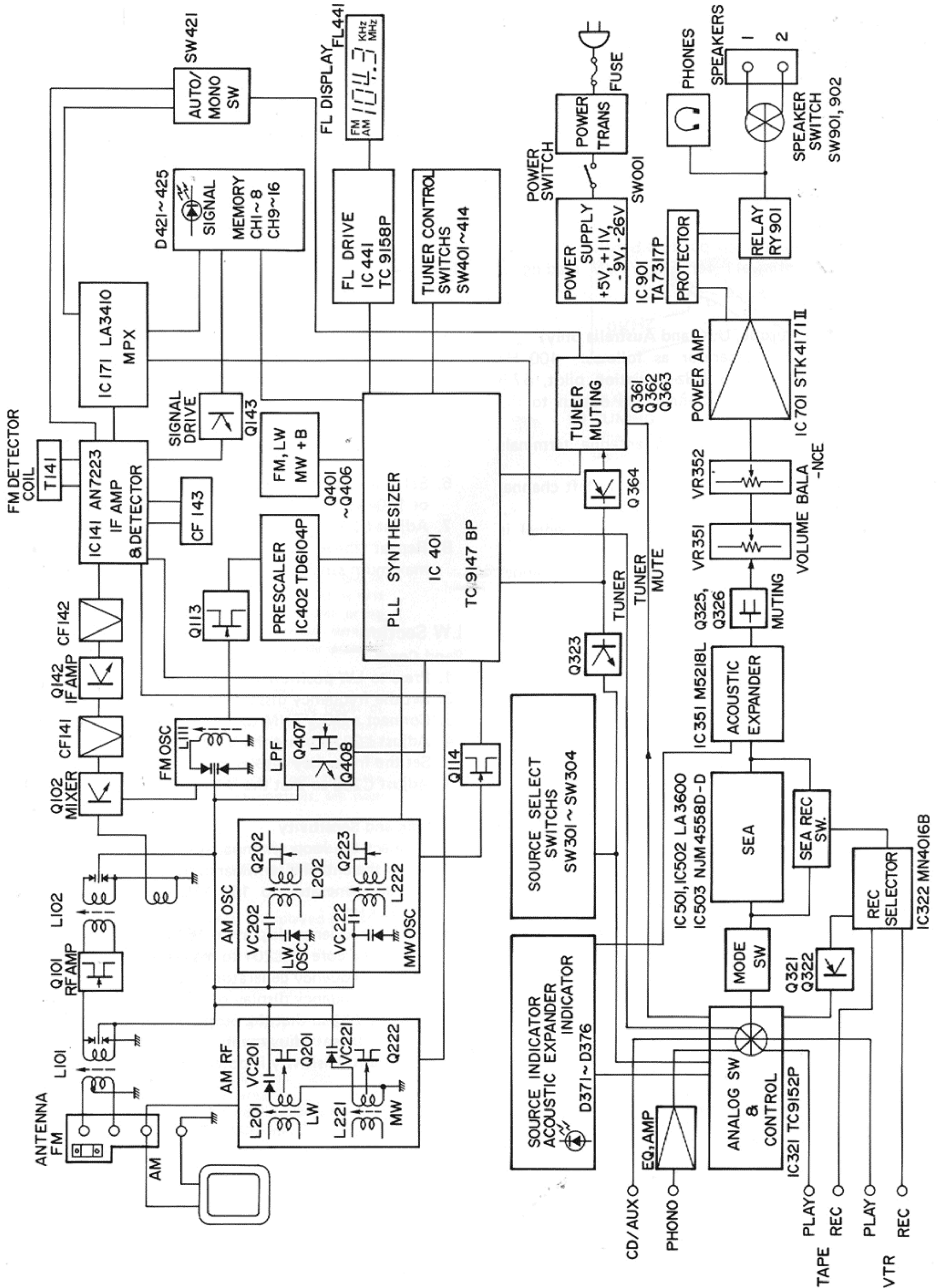
Band Cover

1. Press to LW position.
2. Set the frequency display to 153 kHz.
3. Connect a DC VTVM to TP101 (Tuning Voltage).
4. Adjust L202 so that the VTVM. shows 1.10 V.
5. Set the frequency display to 360 kHz.
6. Adjust C205 so that the VTVM. reads 8.00 V.

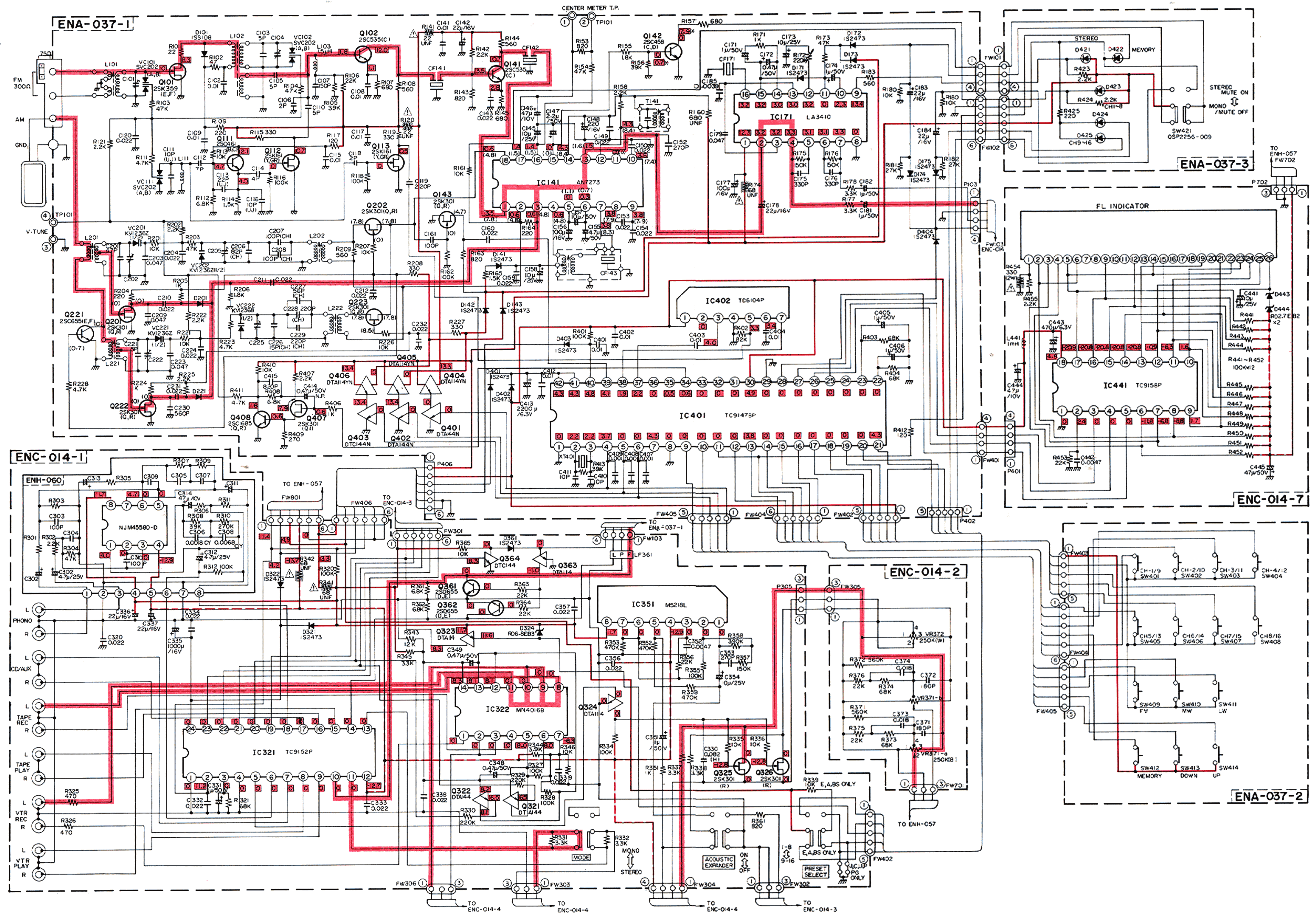
Tracking and Sensitivity

1. Connect the loop antenna. Also connect the RF generator to the antenna terminal on the rear panel.
2. Set the generator to 164 kHz with 30 % modulation at 400 kHz.
3. Set the frequency display to 164 kHz.
4. Adjust the core of L201 to maximize the output.
5. Set the frequency generator to 353 kHz.
6. Set the frequency display of the unit to 353 kHz.
7. Adjust C202 so that the output signal is maximized.
8. Repeat these adjustments (1 ~ 7) alternately until maximum sensitivity is obtained.

5. Block Diagram



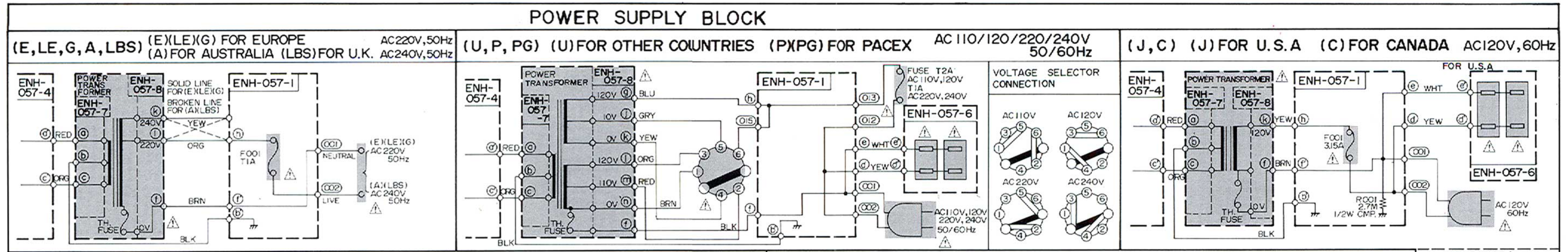
6-(2) R-X220L Tuner Section



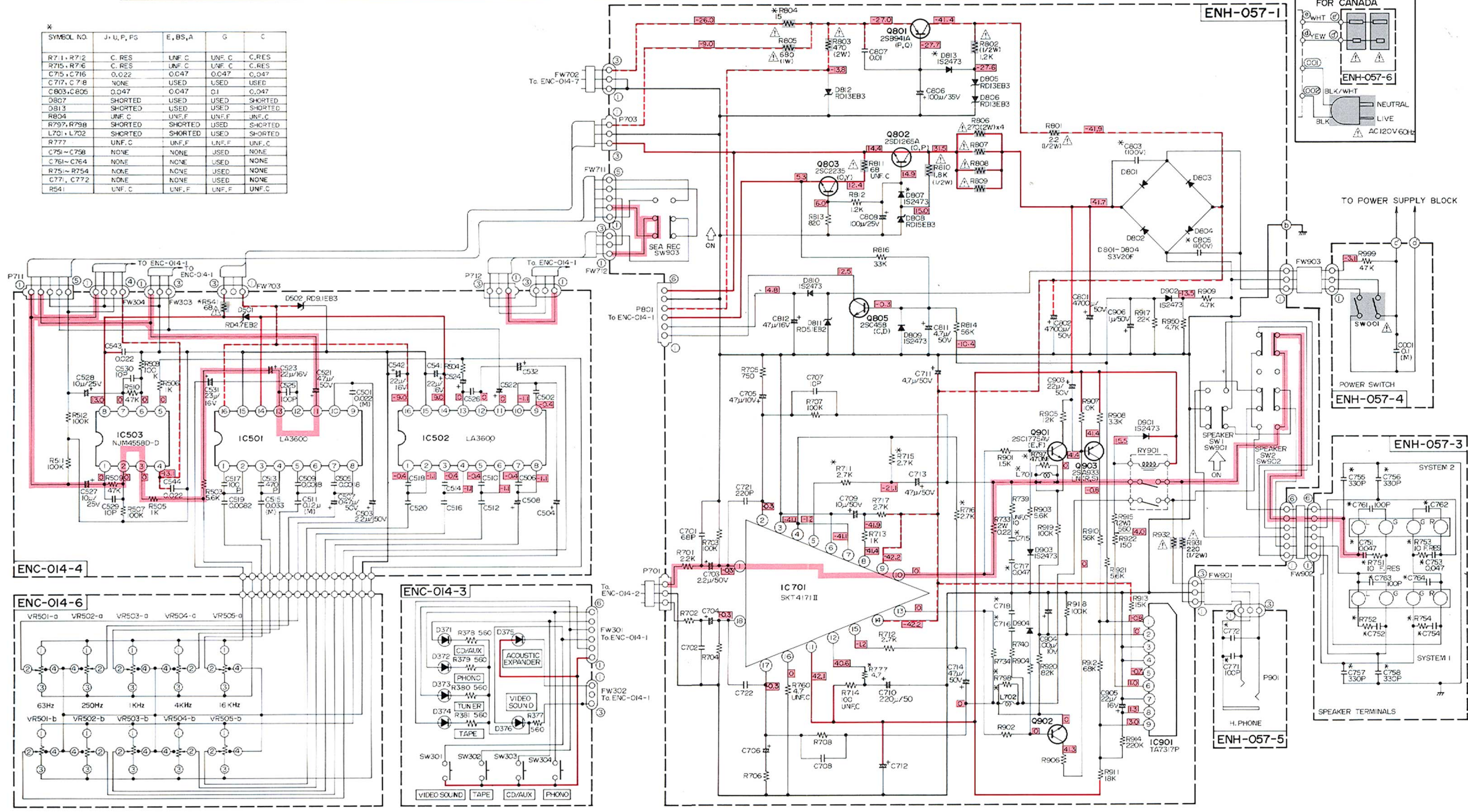
Notes:

1. shows DC voltage to the chassis with no signal input.
2. — indicates positive B power supply.
3. — indicates negative B power supply.
4. — indicates signal path.

5. When replacing the parts in the darkened area () and those marked with Δ , be sure to use the designated parts to ensure safety.
6. This is the standard circuit diagram. The design and contents are subject to change without notice.



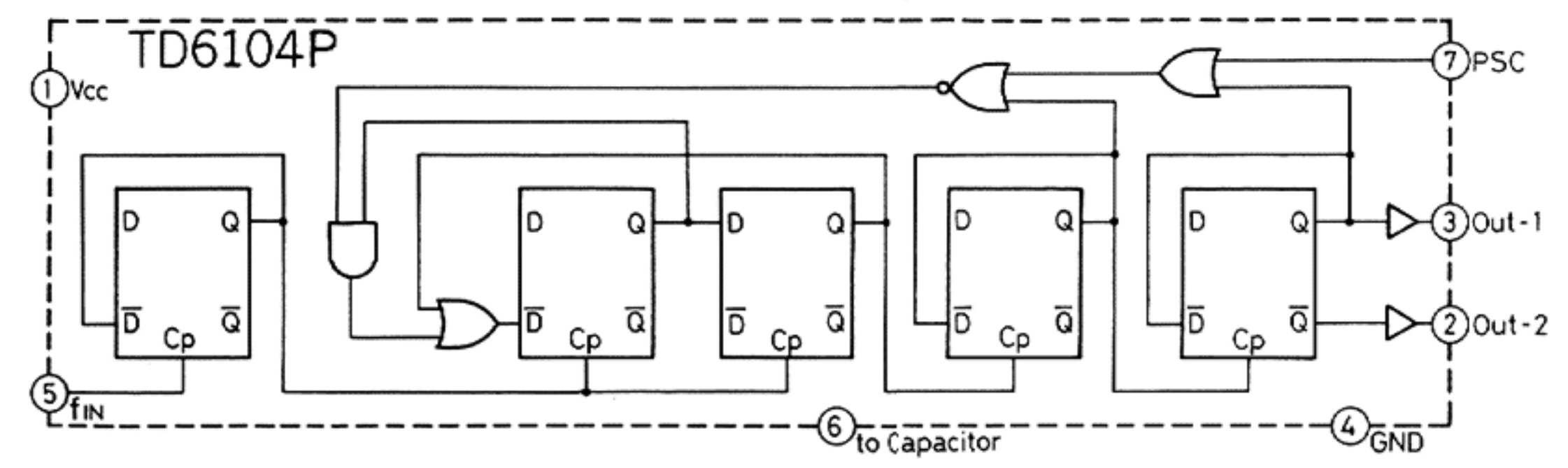
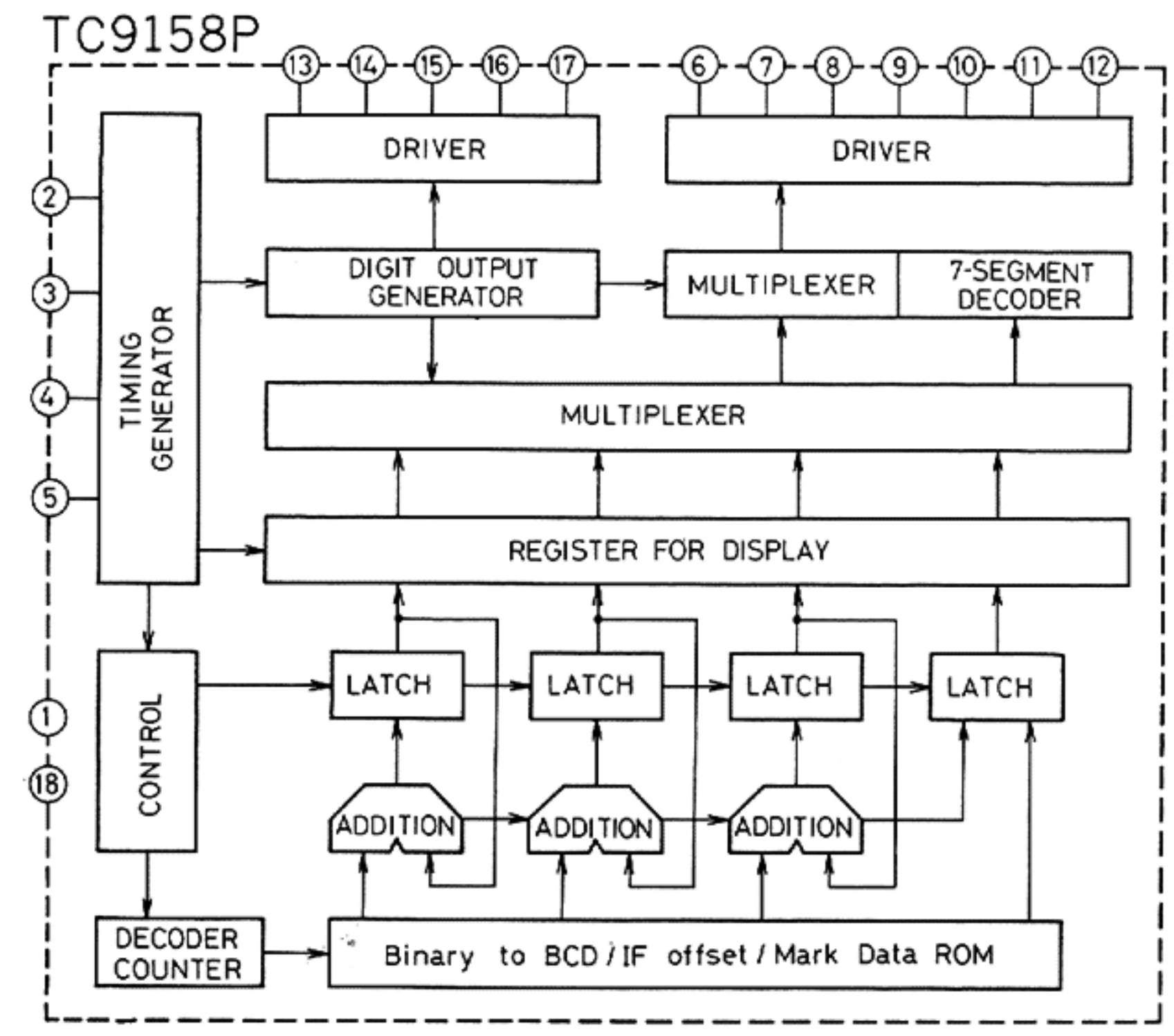
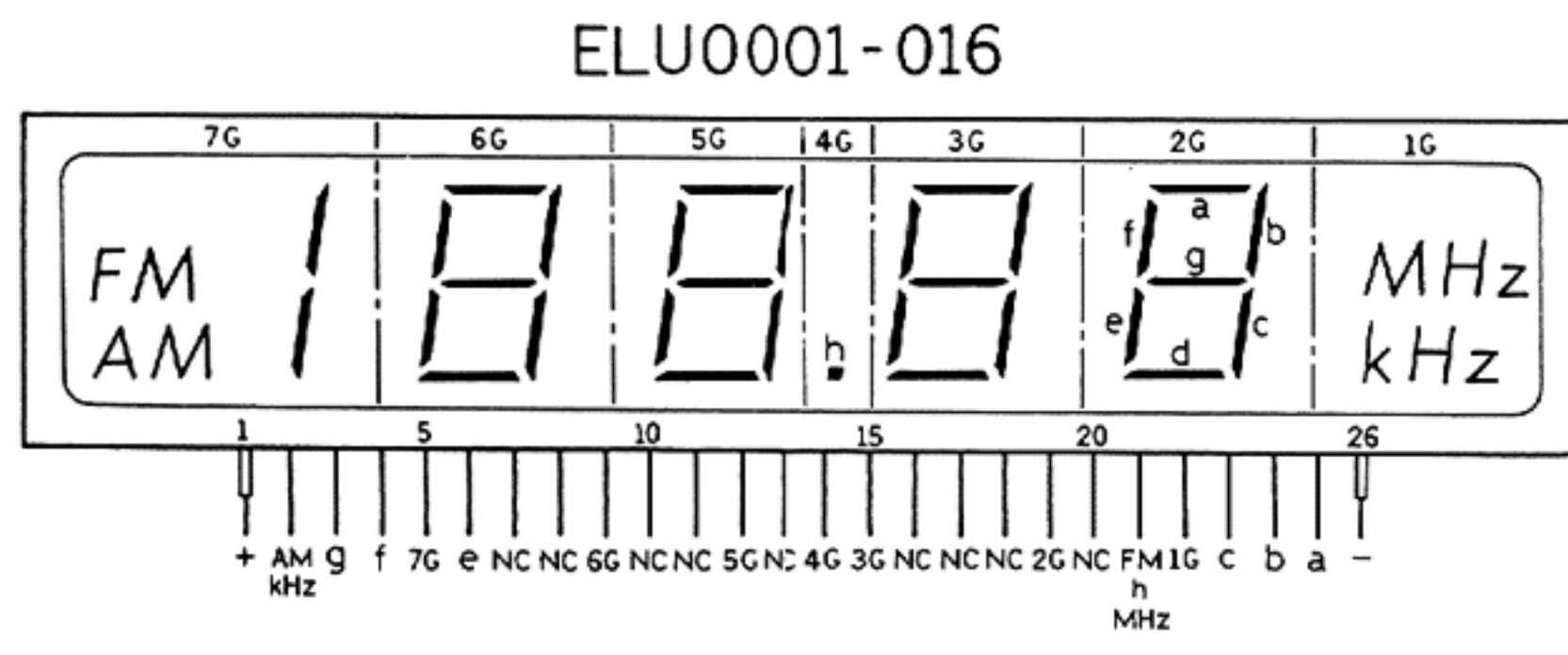
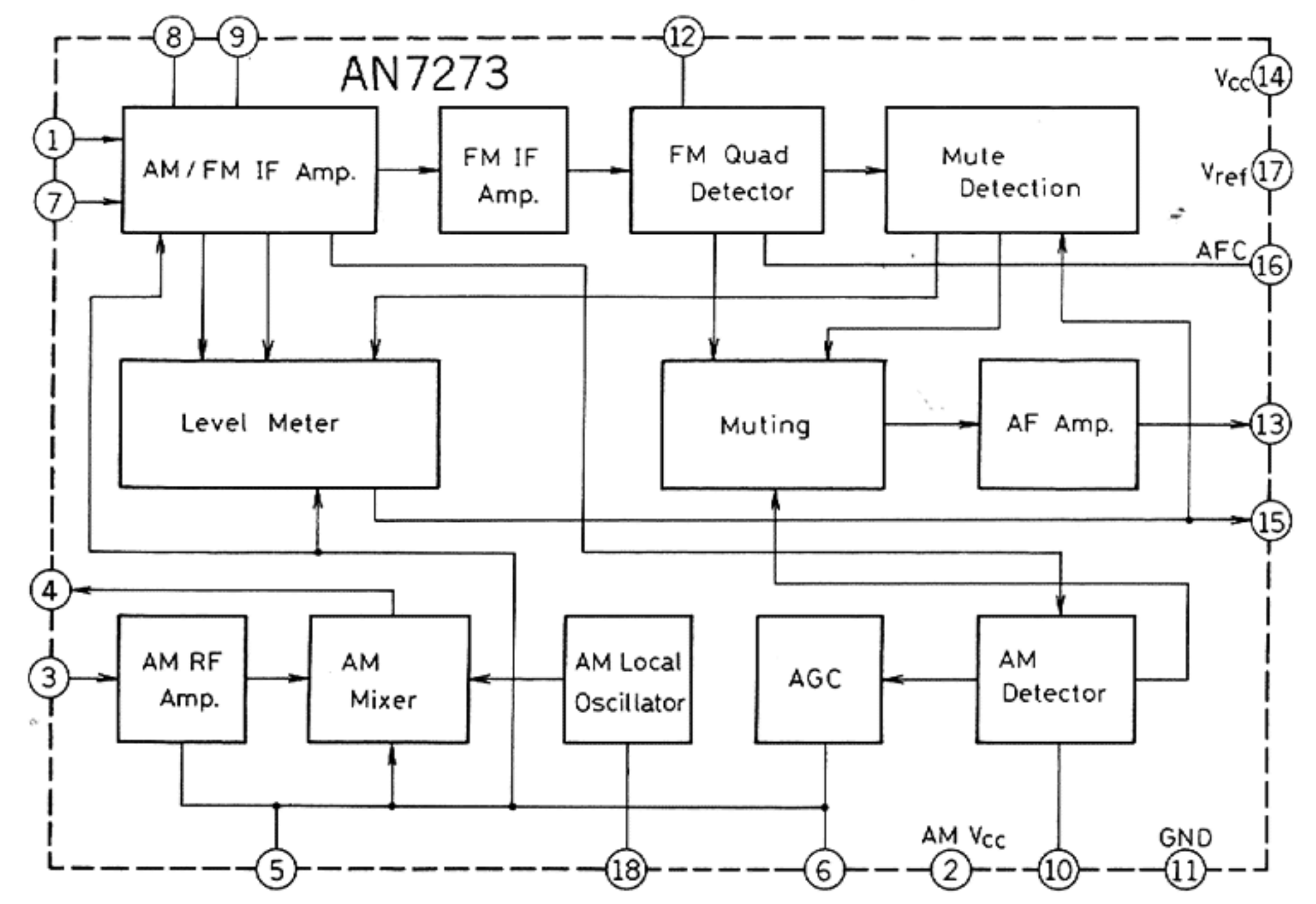
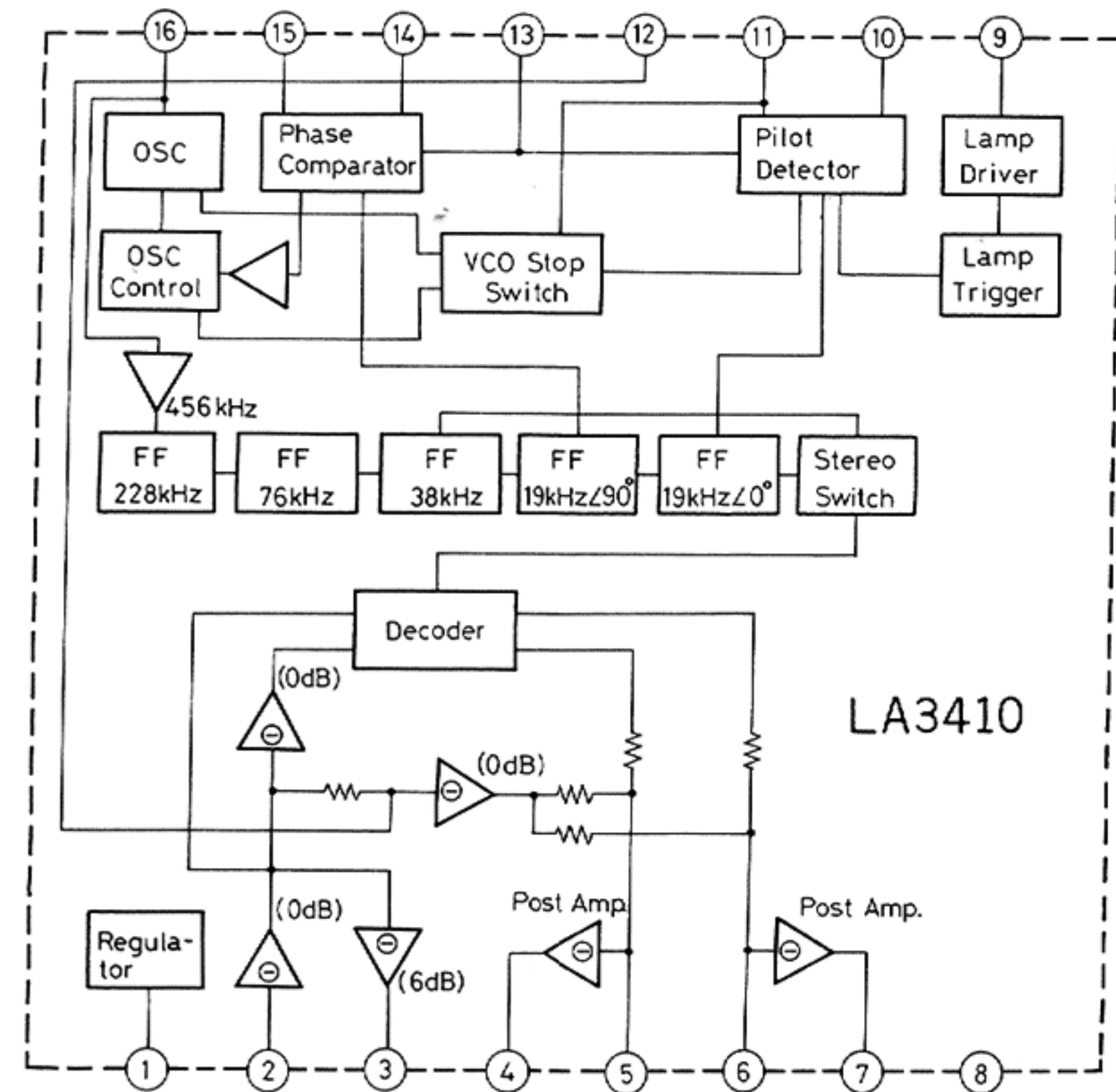
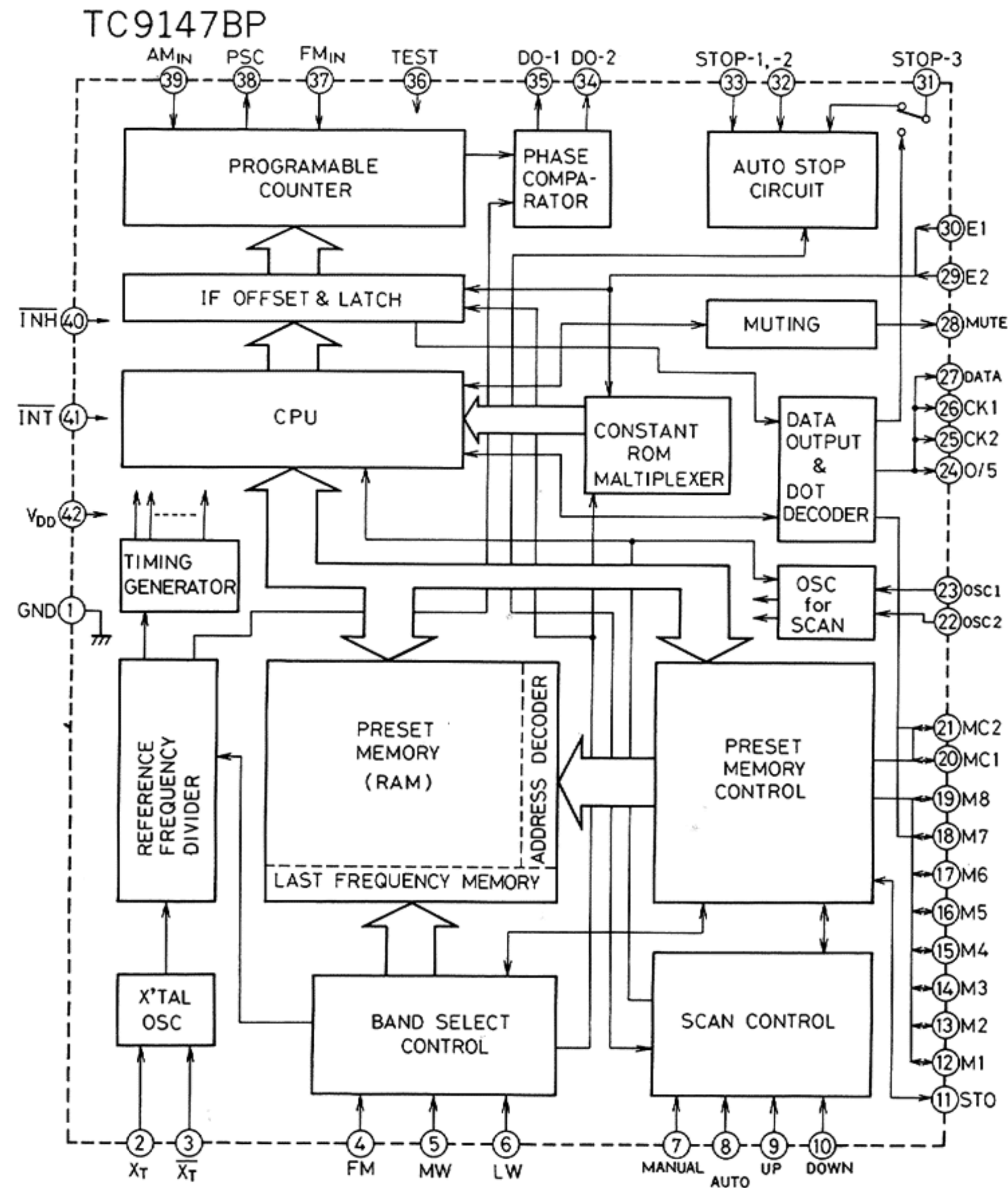
SYMBOL NO.	J, U, P, PG	E, BS, A	G	C
R71, R72	C, RES	UNF, C	UNF, C	C, RES
R75, R76	C, RES	UNF, C	UNF, C	C, RES
C75, C76	0.022	0.047	0.047	0.047
C77, C78	NONE	USED	USED	USED
C803, C805	0.047	0.047	0.1	0.047
D807	SHORTED	USED	USED	SHORTED
D813	SHORTED	USED	USED	SHORTED
R804	UNF, C	UNF, F	UNF, F	UNF, C
R797, R798	SHORTED	SHORTED	USED	SHORTED
L701, L702	SHORTED	SHORTED	USED	SHORTED
R777	UNF, C	UNF, F	UNF, F	UNF, C
C751 ~ C758	NONE	NONE	USED	NONE
C761 ~ C764	NONE	NONE	USED	NONE
R751 ~ R754	NONE	NONE	USED	NONE
C771, C772	NONE	NONE	USED	NONE
R541	UNF, C	UNF, F	UNF, F	UNF, C



- Notes:**
1. shows DC voltage to the chassis with no signal input.
 2. — indicates positive B power supply.
 3. --- indicates negative B power supply.
 4. — indicates signal path.

5. When replacing the parts in the darkened area (■) and those marked with △, be sure to use the designated parts to ensure safety.
6. This is the standard circuit diagram. The design and contents are subject to change without notice.

6-(4) Internal Block Diagram of Major LSI ICs





JVC

VICTOR COMPANT OF JAPAN, LIMITED
STEREO DIVISION, YAMATO PLANT, 1644, SHIMOTSURUMA, YAMATO-SHI, KANAGAWA-KEN, 242, JAPAN

(No. 2814)



Printed in Japan
8502 (N)