

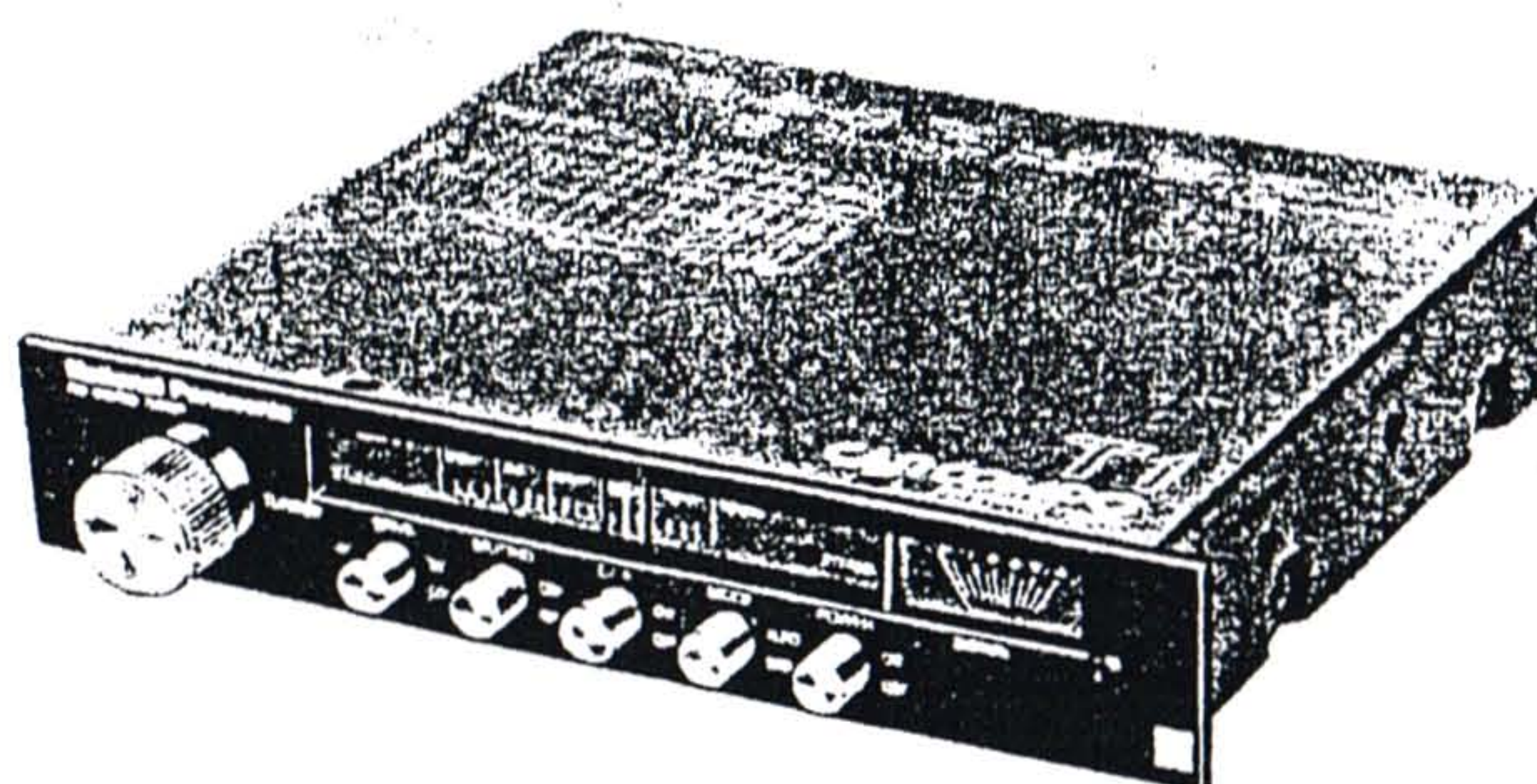
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ORDER NO. APD-7803-505 ^{90%}

Service Manual

CAR RADIO CX-T1EN

FM/FM MPX
SOLID STATE CAR RADIO TUNER



SPECIFICATIONS*

Frequency Range:	FM	87.5 ~ 108 MHz
Intermediate Frequency:	FM	10.7 MHz
Sensitivity:	FM	6 dB/ μ V for S/N 10 dB quieting 15 dB/ μ V for S/N 30 dB quieting
Output:	FM	0.3 V (at 1 k Ω load)
Stereo Separation:		25 dB (at 400 Hz)
Power Supply Voltage:		DC 12 V (11 ~ 16 V), Negative ground
Transistors:		14
IC's:		4
Diodes:		9
Dimensions**:	Width:	198 mm
	Height:	35 mm
	Depth:	150 mm
Weight**:		1 kg

FEATURES

- FM/FM MPX manual tuning car radio tuner.
- DC 12 V, Negative ground.
- Built-in signal meter.
- A. F. C. (Automatic Frequency Control)
- Sensitive superheterodyne system with 1 RF stage and 2 I-F stages (IC & CFs) on FM amplifier.
- Sensitivity (DX/LOCAL) selector switch.
- Built-in DIN Connector.
- P. L. L. (Phase Locked Loop) MPX circuit.
- E. I. A. (Electronic Interference Absorption)
- Muting circuit.
- Component system with a car stereo, a pre-amplifier and a main amplifier.
 - CX-D1EN; Automatic reversing cassette car stereo
 - CX-P1EN; Stereo pre amplifier
 - CX-M1EN; Stereo main amplifier

*Specifications subject to change without notice.

** Weight and Dimensions shown are approximate.

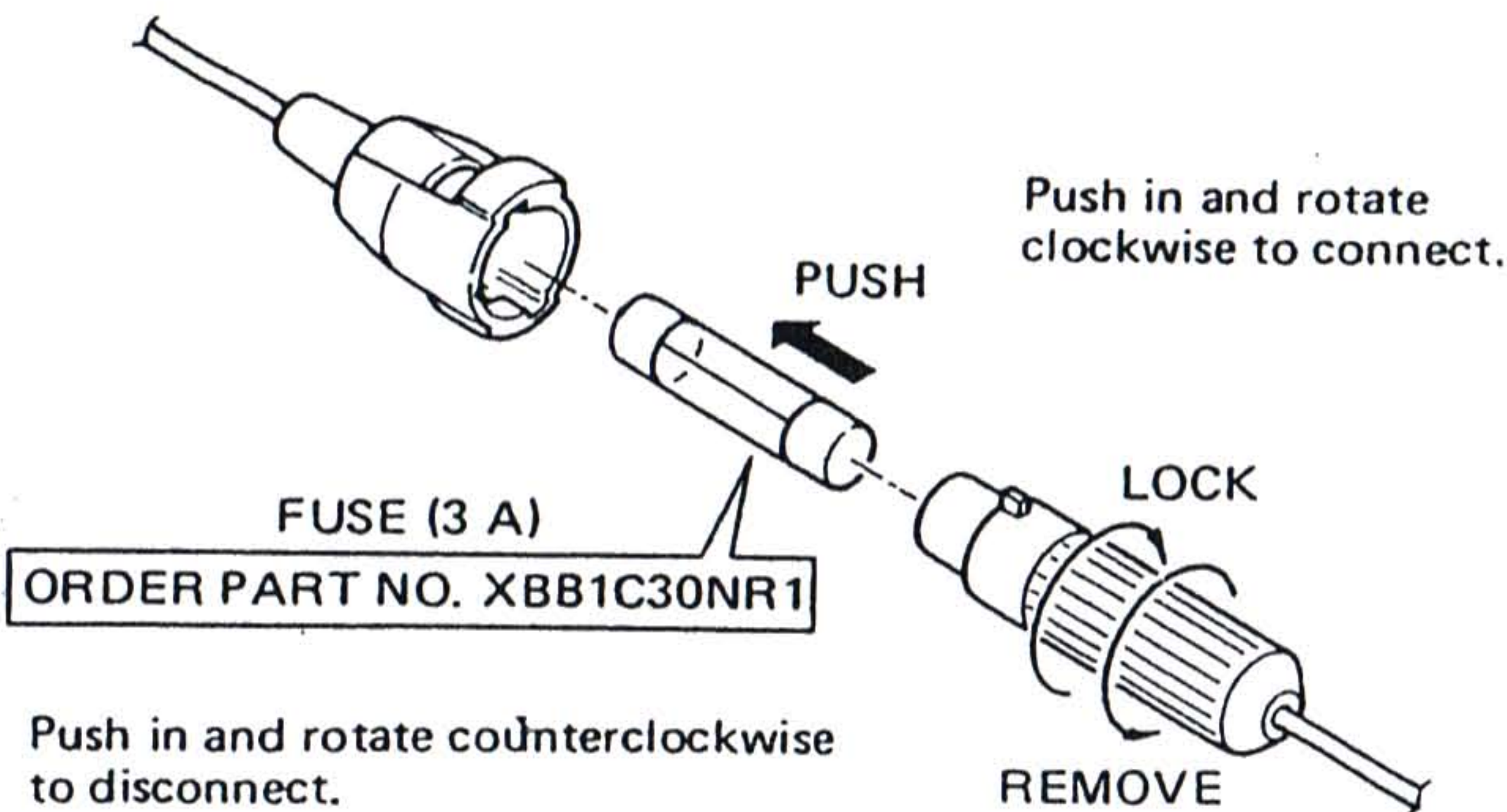
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SM-CXT1EN 1 ST
SERVICE MANUAL

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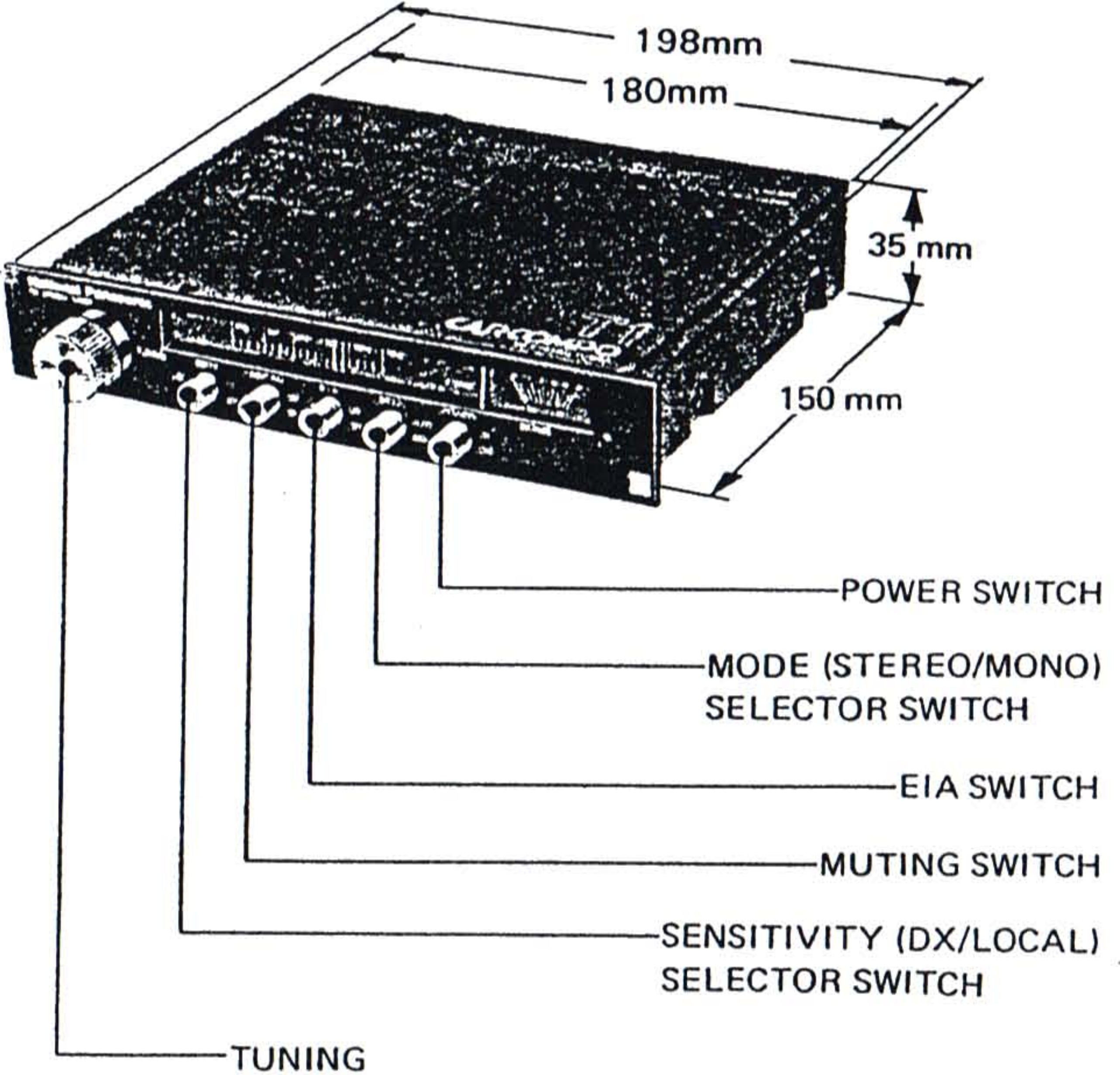
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FUSE REPLACEMENT

Be sure to use a 3 A fuse for replacement. Use of a larger fuse may not protect the unit excessive current drain.

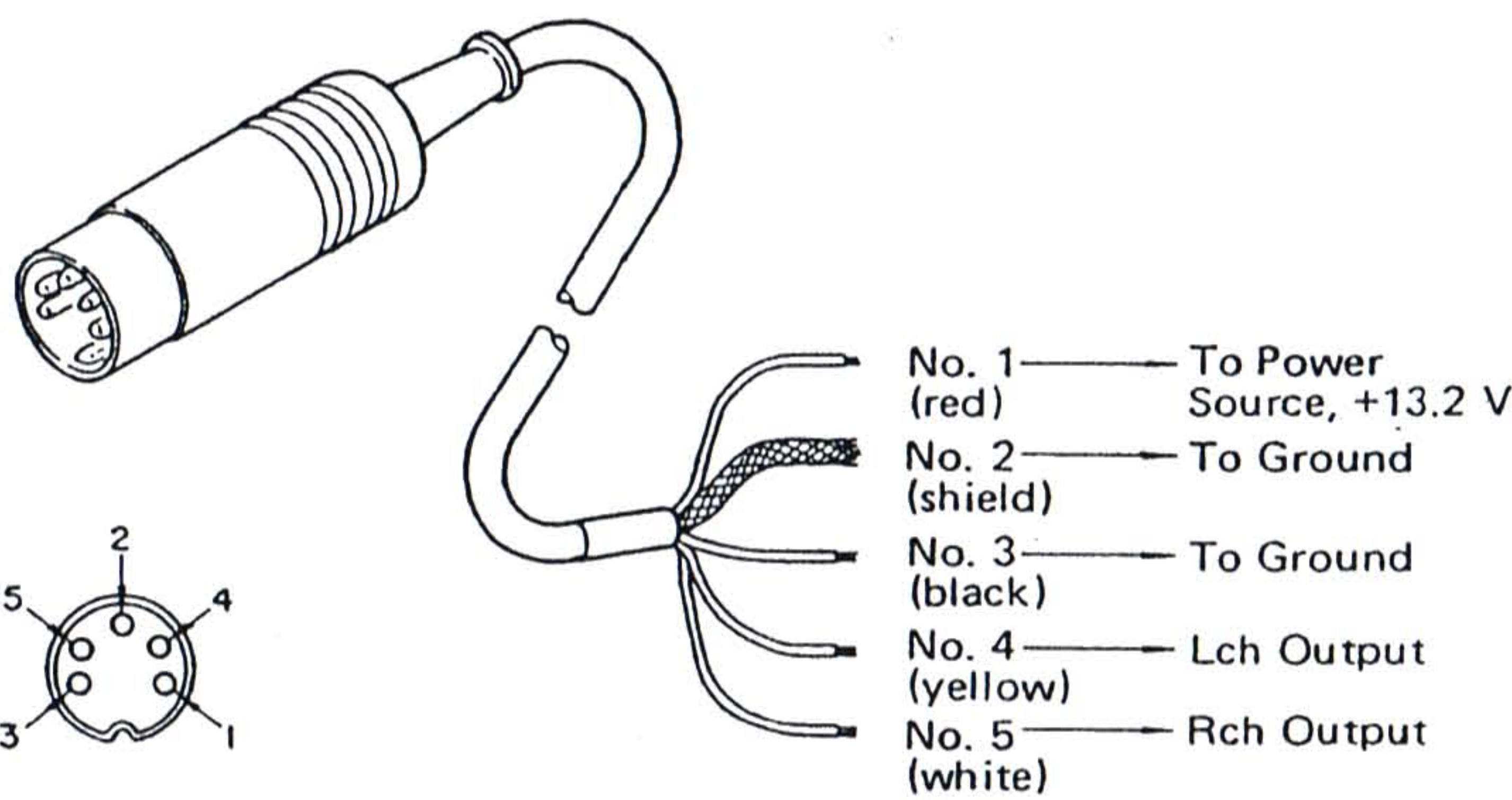


DIMENSIONS AND LOCATION OF CONTROLS

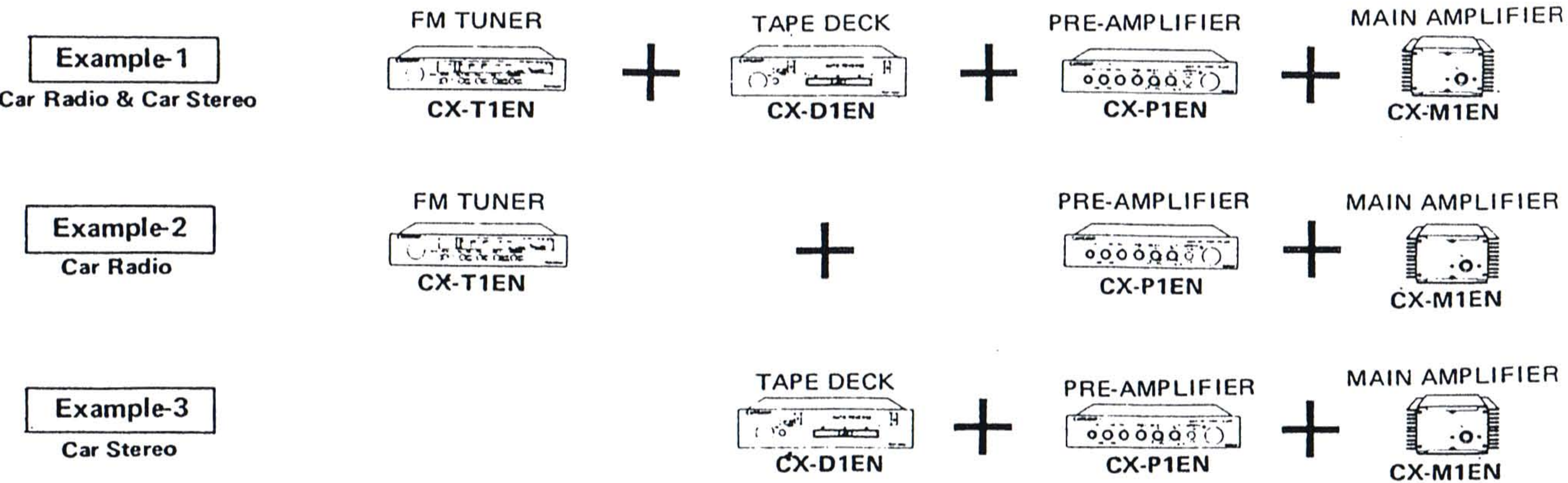


SERVICE PLUG

To service this unit without the need to connect it to a pre-amplifier or car stereo, use a DIN connector cord, Part No. YEAE01134, and hook it up as shown.

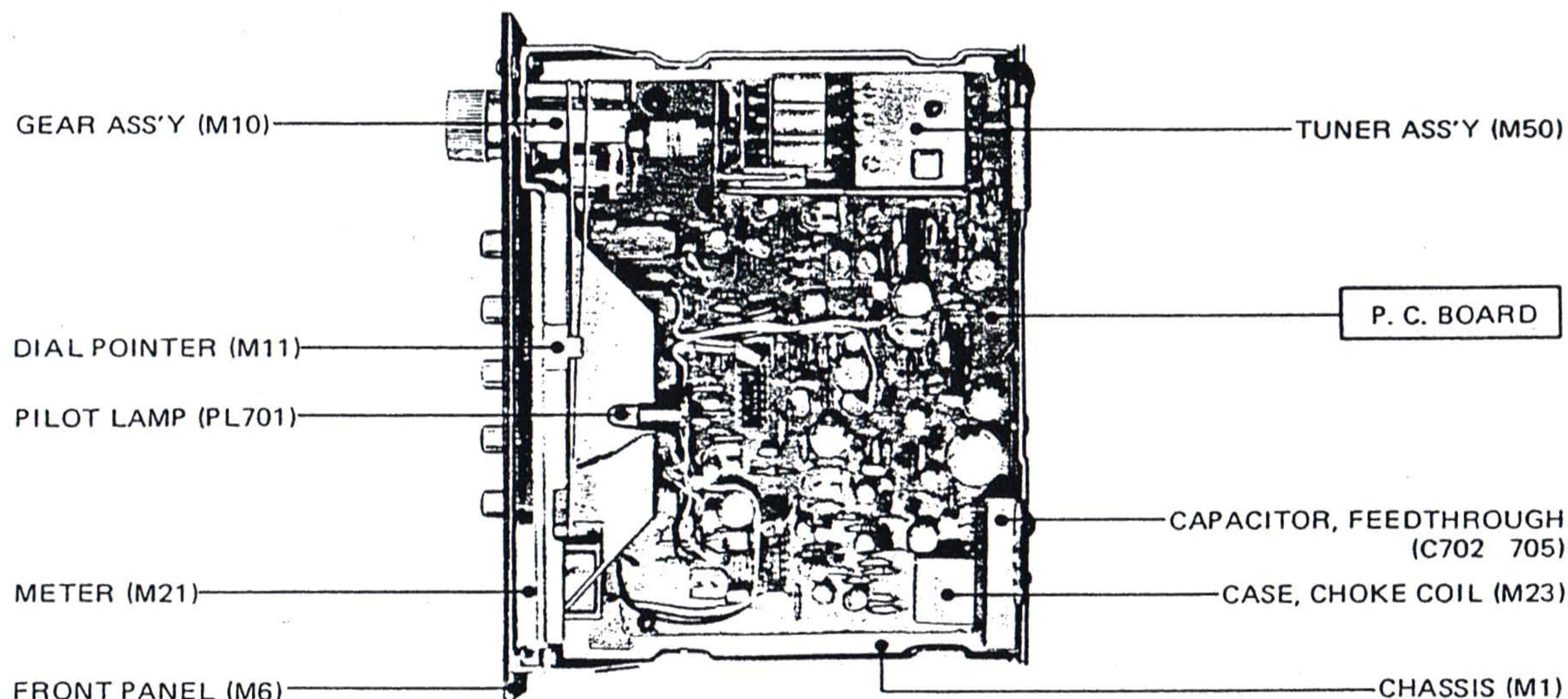


CAR COMPO COMBINATIONS



PARTS LOCATION

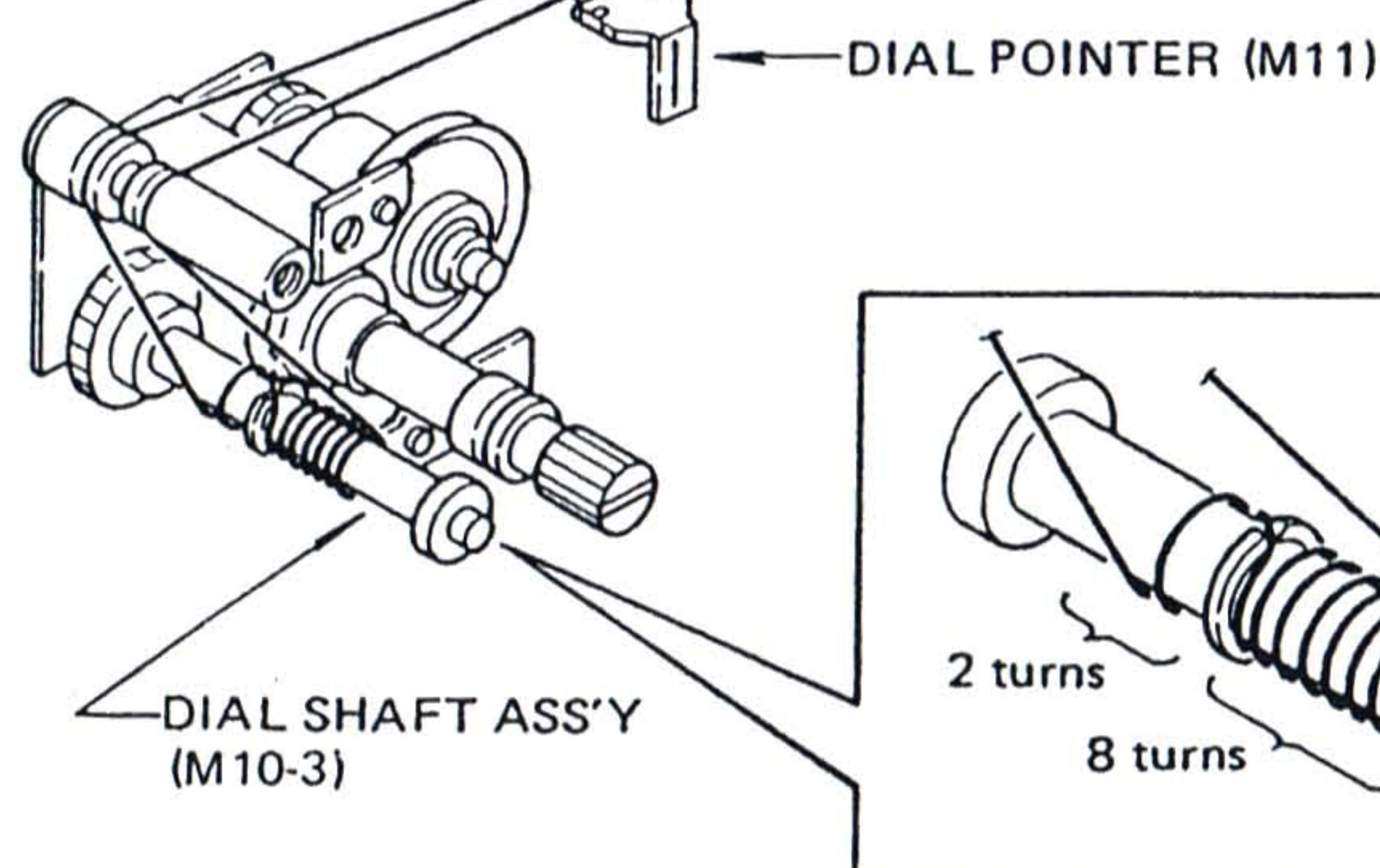
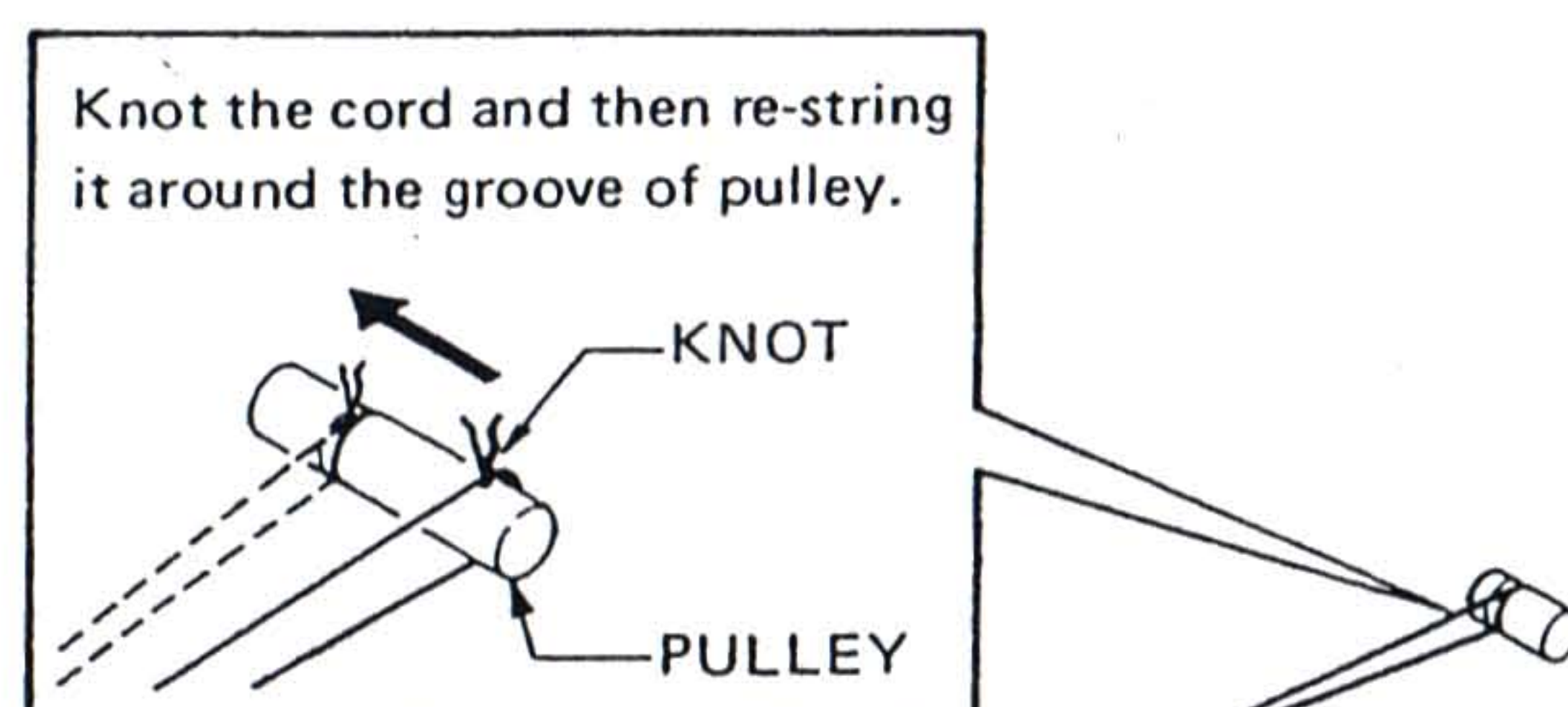
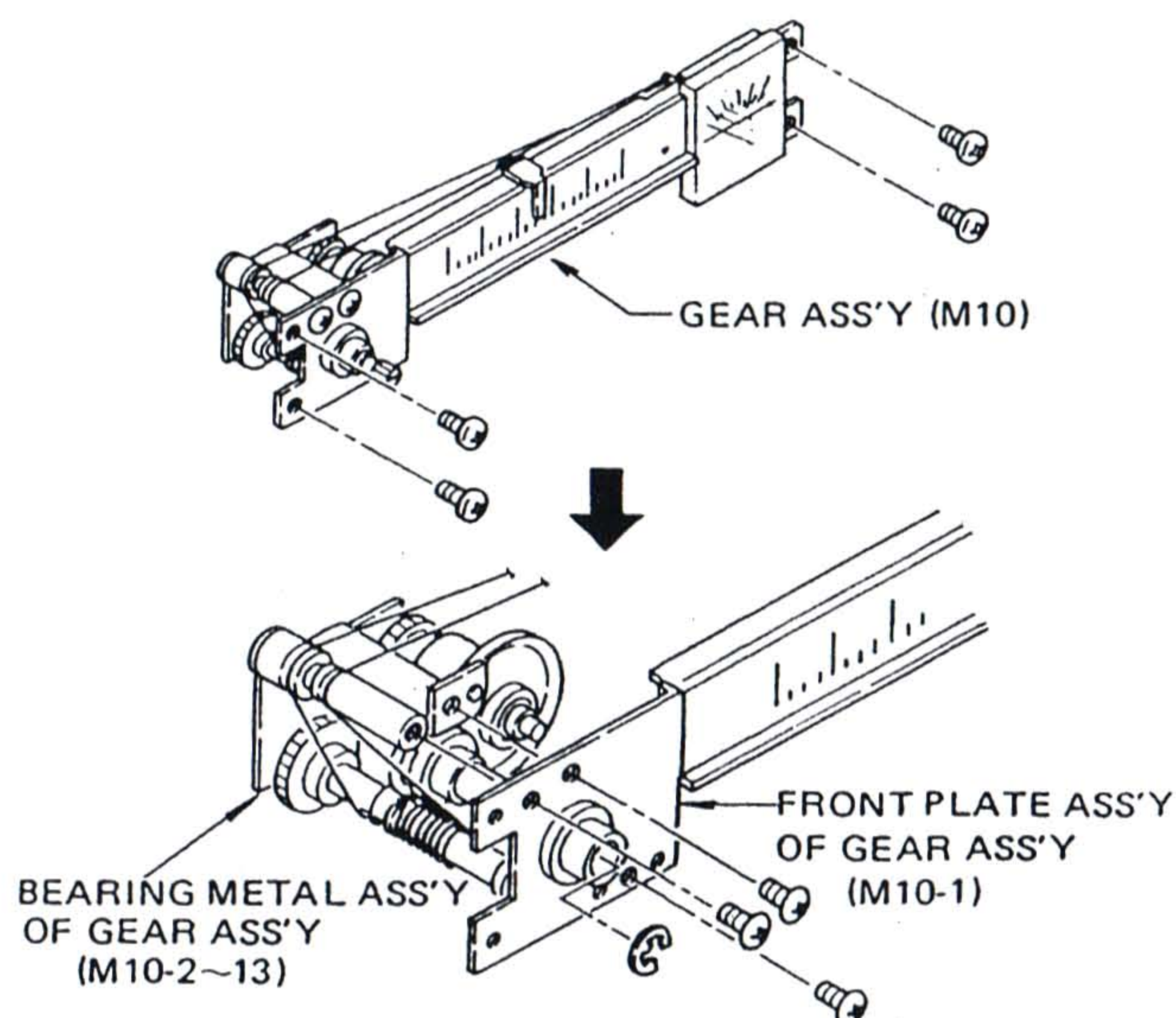
- Reference numbers, in (), are listed in the Replacement Parts List, starting on page 11.
- For other parts location, see the EXPLODED VIEW, page 12.



DIAL CORD STRINGING GUIDE

- 1) Remove the upper cover by removing the five screws.
- 2) Remove the gear ass'y from the chassis by removing the four screws as below.
- 3) Remove the bearing metal ass'y from the front plate ass'y by removing the E-ring and three screws.
- 4) Wind the dial cord around the dial shaft ass'y as below: 2 turns then through the sprit boss, and then 8 more turns.

- 5) Re-install the bearing metal ass'y, if it was removed.
- 6) Knot the both ends of dial cord, and then mount it on the chassis.
- 7) Set the dial pointer to the lowest frequency, before re-assembling the FM tuner ass'y.



ALIGNMENT INSTRUCTIONS

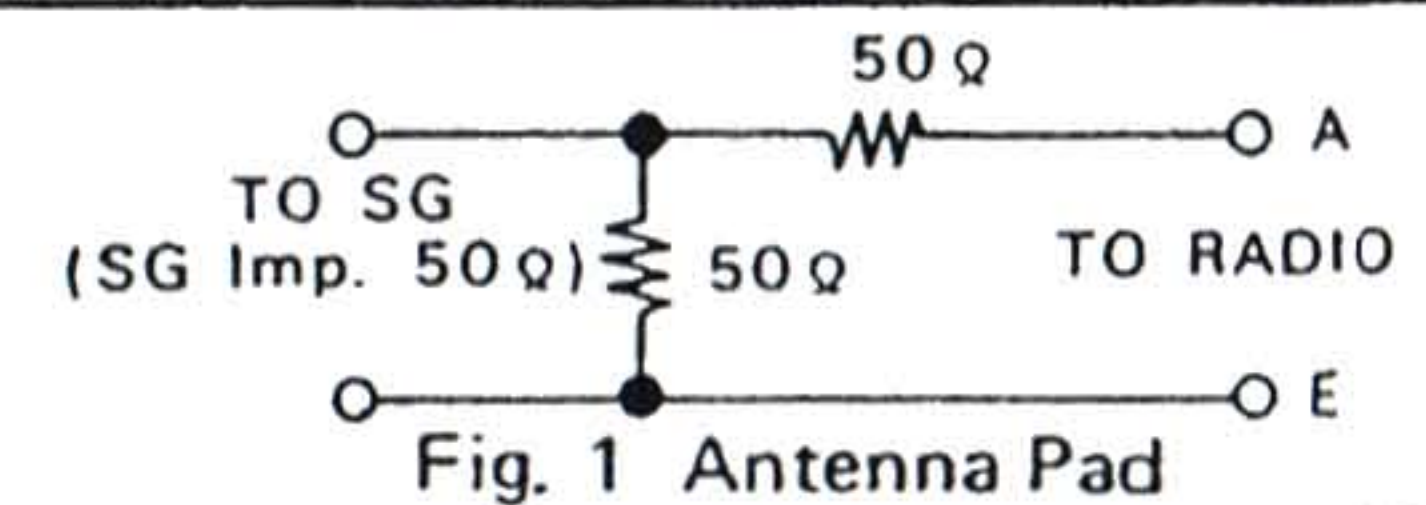
■ EQUIPMENT REQUIRED

- Signal Generator: FM 10.7 MHz, 86 ~ 110 MHz, 400 Hz Mod. @30% and Stereo Signal Generator
- Sweep Generator: 10.7 MHz
- Antenna Pad: Refer to Fig. 1 and Two-signal Antenna Pad
- Indicator: Output Meter (AC Voltmeter or VTVM)
Oscilloscope
Frequency Counter
Signal Meter of CX-T1EN
- Power Source Voltage: DC 13.2 V (standard voltage for measurement)
- Service Plug: See Page 1. (If the absence of service plug, connect the tuner to a Pre Amplifier Model CX-P1EN and a Main Amplifier Model CX-M1EN.)

FM I-F, RF ALIGNMENT

• FM I-F ALIGNMENT USING FM SIGNAL GENERATOR AND SWEEP GENERATOR

- Volume, Tone and Balance Controls may be left in any position. (Pre Amplifier)*
- Connect the signal generator to the antenna receptacle through the antenna pad. (Fig. 1)
- Keep the signal generator output low enough to prevent overloading the circuits.



	STEP	GENERATOR FREQUENCY	RADIO-DIAL SETTING	SIGNAL FEED POINT	INDICATOR CONNECTION	ADJUST	REMARKS
F M	①	10.7 MHz	Point of non-interference	Through pad (Fig. 1) to antenna receptacle or Test Point ③.	Vert. amp of scope to Test Point ③, low side to ground.	IFT (FM Tuner Ass'y)	Adjust for maximum amplitude and proper linearity between ± 100 kHz markers. (Ref. to Fig. 2)
	②	"	"	"	"	IFT101 IFT102	
M E T E R	③	"	"	"	—	IFT151	Adjust for maximum deflection of signal meter.
	④	"	"	"	—	VR151	"

• FM RF ALIGNMENT

- Set Volume Control at maximum, and Tone Control in the treble position. (Pre Amplifier)*
- Set Balance Control in center. (Pre Amplifier)*
- Keep the signal generator output low enough to prevent overloading the circuits.
- Connect the signal generator to the antenna receptacle through the antenna pad. (Fig. 1)

	STEP	GENERATOR FREQUENCY	RADIO-DIAL SETTING	SIGNAL FEED POINT	INDICATOR CONNECTION	ADJUST (FM Tuner Ass'y)	REMARKS
F M R F	⑤	87.35 MHz [400 Hz Mod.]	Low freq. end stop.	Through pad (Fig. 1) to antenna receptacle.	VTVM between Test Point ③ and ground.	OSC Trimmer	• Adjust for maximum. • Repeat steps two or three times.
	⑥	98 MHz [400 Hz Mod.]	Tune to signal.	"	"	RF Trimmer	
	⑦	98 MHz [400 Hz Mod.]	Tune to signal.	"	"	ANT Trimmer	

DETECTOR ALIGNMENT USING SIGNAL GENERATOR

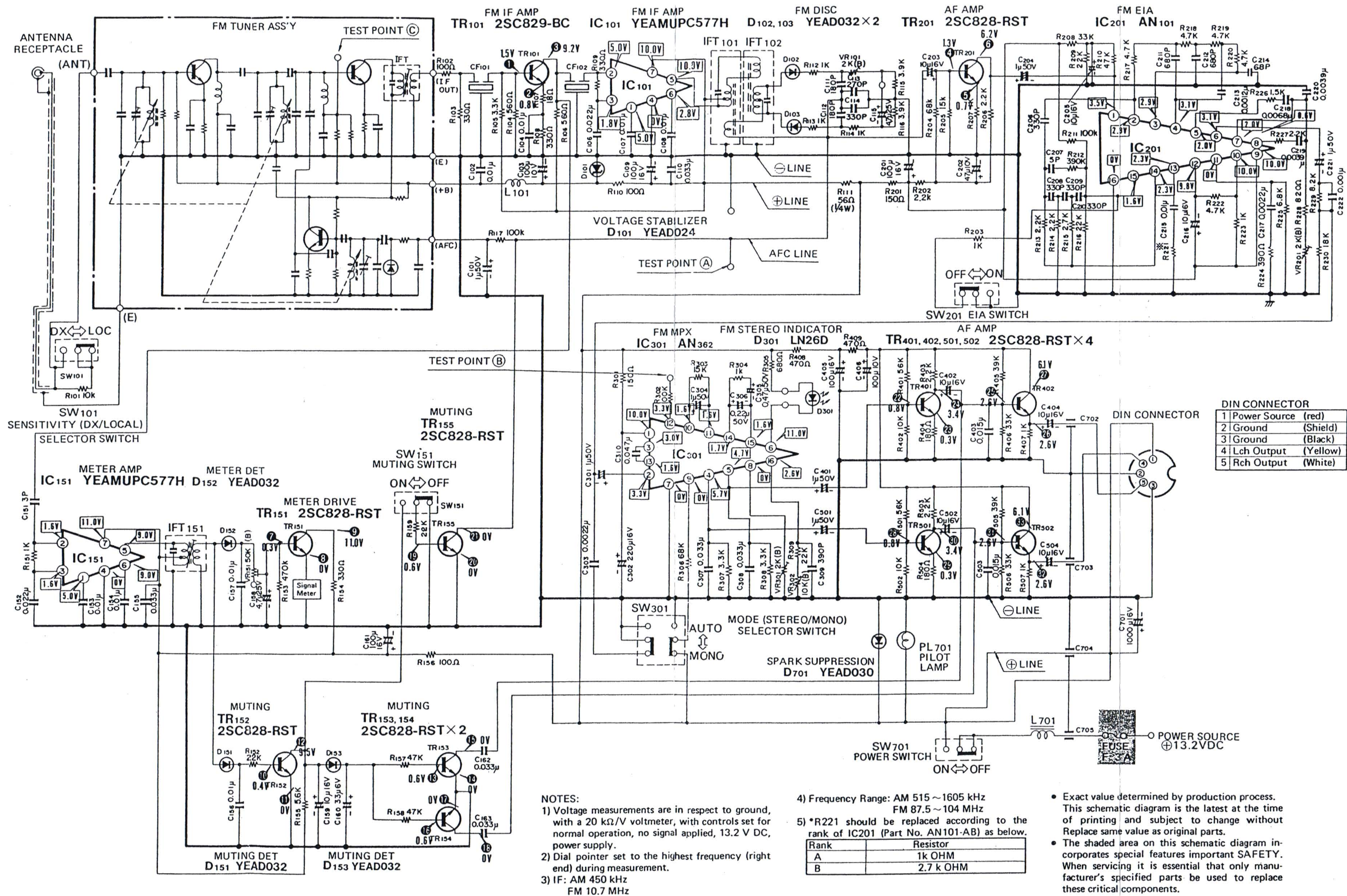
- Connect the signal generator to the antenna receptacle through the antenna pad. (Fig. 1)
AM/FM Signal Generator: Modulation Level FM 400 Hz, 30%, 22.5 kHz
Signal Generator Output Level 20 dB/ μ V
Signal Generator Frequency 98 MHz
- Firstly apply the FM Signal, tune the radio to the signal, and set the volume control to obtain 0.5 W. (Pre Amplifier)*

	STEP	GENERATOR FREQUENCY	INDICATOR	ADJUST	REMARKS
D E T	⑧	98 MHz [AM Mod.] [1000 Hz, 30% Mod.]	VTVM between Test Point ③ and ground, or across speaker terminals.	VR101	Adjust VR101 for minimum amplitude.

-SCHEMATIC DIAGRAM

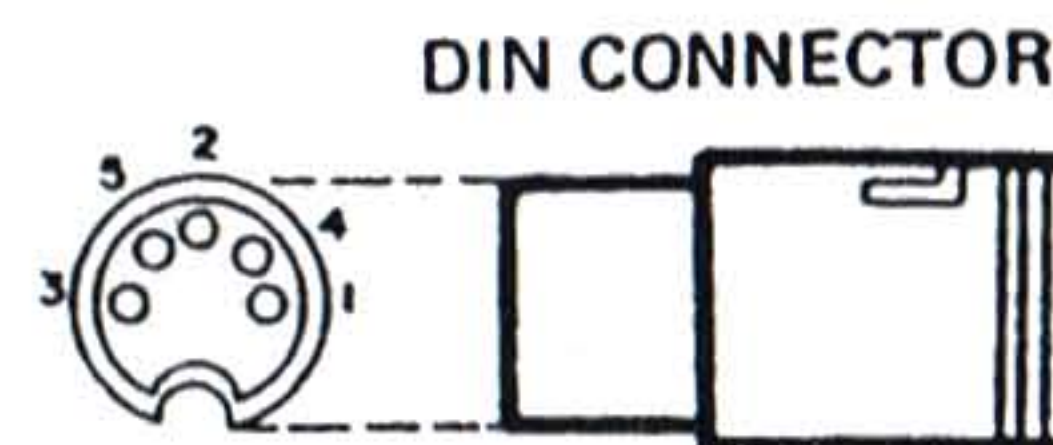
MODEL

CX-T1EN

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WIRING DIAGRAM MODEL CX-T1EN

DIN CONNECTOR	
1	Power Source (Red)
2	Ground (Shield)
3	Ground (Black)
4	Lch Output (Yellow)
5	Rch Output (White)



POWER SOURCE
⊕13.2VDC

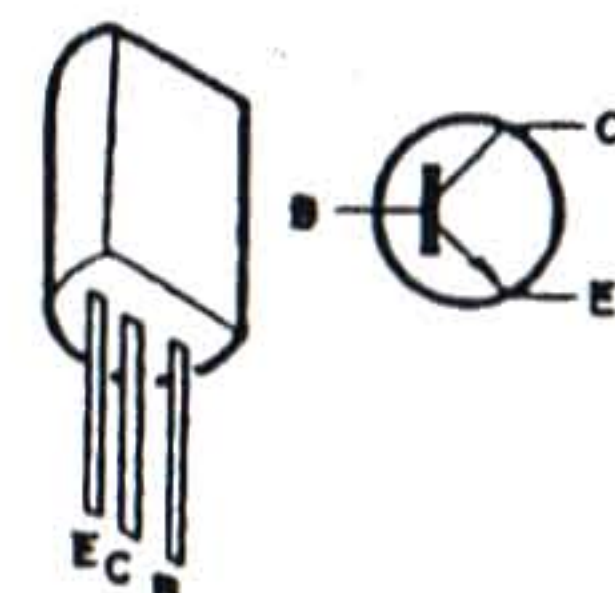
FUSE: 3 A

■ Negative side is shown in blue.

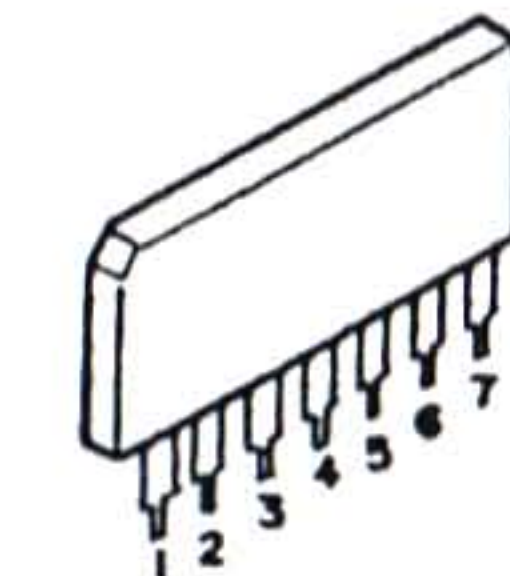
No.	Voltage	No.	Voltage
TRANSISTORS			
1	1.5V	1	5.0V
2	0.8V	2	1.6V
3	9.2V	3	1.6V
4	1.3V	4	0V
5	0.7V	5	0V
6	6.2V	6	9.0V
7	0.3V	7	11.0V
8	0V	IC 201	
9	11.0V	1	3.5V
10	0.4V	2	2.9V
11	0V	3	2.9V
12	9.5V	4	3.1V
13	0.6V	5	3.1V
14	0V	6	2.0V
15	0V	7	2.0V
16	0.6V	8	0.6V
17	0V	9	10.0V
18	0V	10	10.0V
19	0.6V	11	0V
20	0V	12	9.8V
21	0V	13	2.3V
22	0.8V	14	2.3V
23	0.2V	15	1.6V
24	3.4V	16	0V
25	2.6V	IC 301	
26	2.0V	1	10.0V
27	6.1V	2	3.3V
28	0.8V	3	3.0V
29	0.2V	4	5.7V
30	2.9V	5	4.7V
31	2.6V	6	11.0V
32	2.0V	7	0V
33	6.1V	8	0V
34	0V	9	0V
IC 101			
1	5.0V	10	1.6V
2	1.7V	11	1.6V
3	1.8V	12	1.4V
4	0V	13	1.6V
5	10.0V	14	1.7V
6	2.8V	15	1.6V
7	10.0V	16	2.6V

WIRE COLOR ABBREVIATION	
BLK	Black
BLU	Blue
RED	Red
GRN	Green
YEL	Yellow
WHT	White

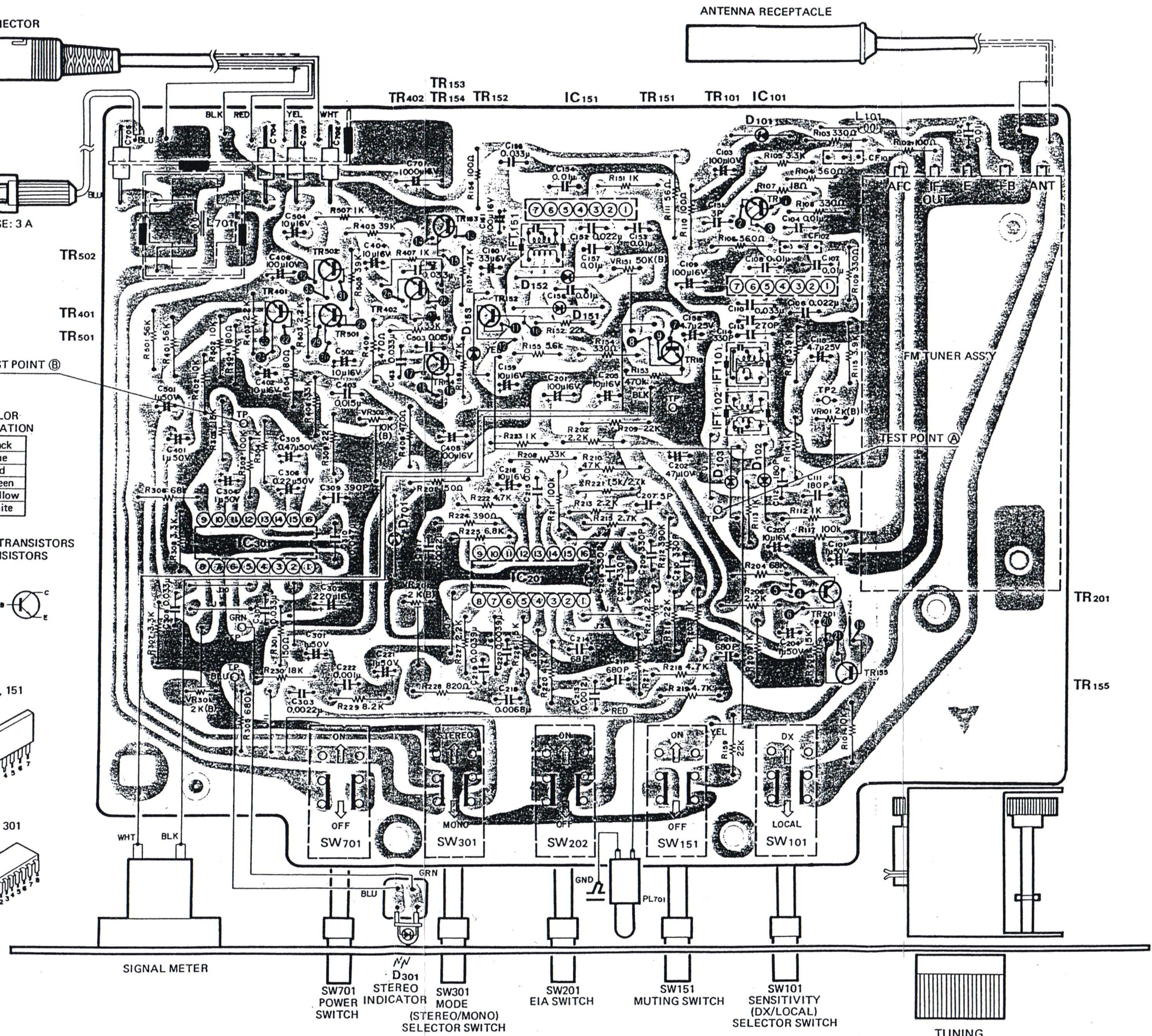
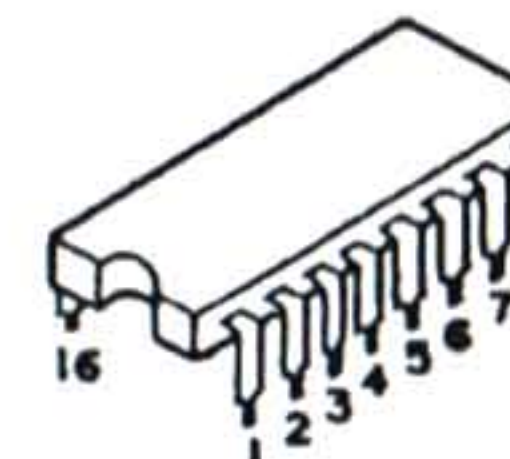
■ IC's AND TRANSISTORS
• TRANSISTORS



• IC 101, 151



• IC 201, 301



FM/FM MPX RADIO TUNER

MULTIPLEX ALIGNMENT USING FM SIGNAL GENERATOR AND STEREO SIGNAL GENERATOR

- Set Volume Control at maximum, and Tone Control in the treble position. (Pre Amplifier)*
- Set Balance Control in center. (Pre Amplifier)*
- Connect the signal generator to the antenna receptacle through the antenna pad. (Fig. 1)
- Keep the signal generator output low enough to prevent overloading the circuits.
- FM Signal Generator should be modulated by Stereo Signal Generator.
 Modulation Level: 19 kHz, 10%
 400 Hz, 30%
 FM Signal Generator Output Level 1 mV
 FM Signal Generator Frequency 98 MHz

	STEP	MODULATION FREQUENCY	INDICATOR	ADJUST	REMARKS
F M P X	⑨	No signal input.	Frequency counter to Test Point ③, low side to ground.	VR302	Adjust to 19 kHz $\pm$ 50 Hz.
	⑩	19 kHz, 400 Hz (Right Channel)	VTVM to DIN terminal No. 5 & 3 or right speaker terminals.	VR301	Adjust for minimum.
		19 kHz, 400 Hz (Left Channel)	VTVM to DIN terminal No. 4 & 3 or left speaker terminals.		Adjust for minimum.

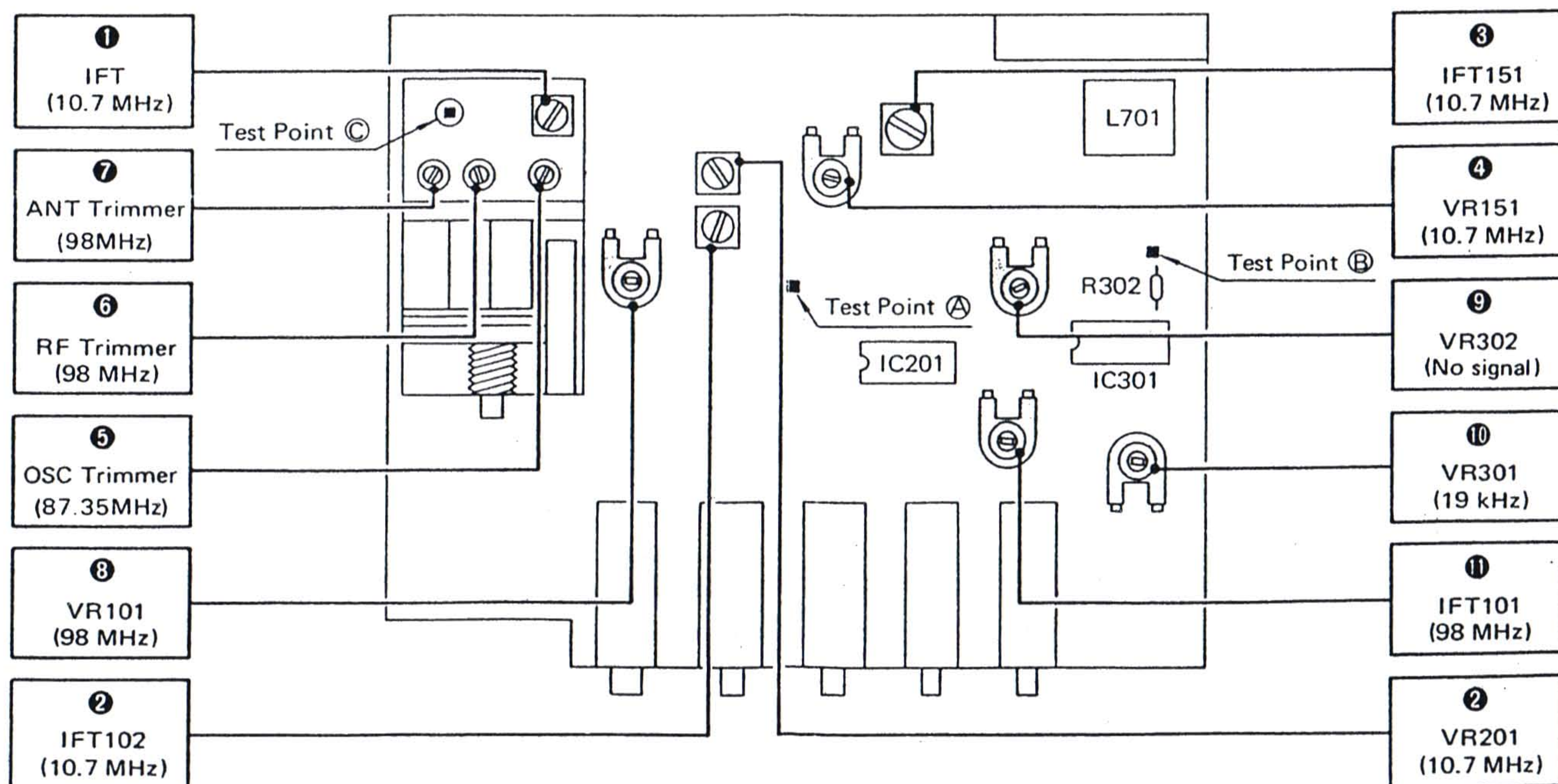
- Repeat steps two or three times.

FM ELECTRONIC INTERFERENCE ABSORPTION CIRCUIT ALIGNMENT USING SIGNAL GENERATOR AND PULSE GENERATOR

- Connect the signal generator and the pulse generator to the antenna receptacle through the two signal generator pad.
 Signal Generator: Frequency 98 MHz (400 Hz Mod.)
 Dev. 19 kHz Pilot Signal 7.5 kHz
 Main Signal 22.25 kHz
 Output Level 30~40 dB/ μ V
 Pulse Generator Rising Time 5 ~ 10 nsec
 Width 40 μ sec
 Interval 1 kHz
 Level +5 Vp-p
- Firstly set Radio Dial to the signal, and the output level of signal generator to 30 dB/ μ V.
- Next cut the modulation level and set Volume Control to maximum. (Pre Amplifier)*

	STEP	MODULATION FREQUENCY	INDICATOR	ADJUST	REMARKS
E I A	⑪	98 MHz [Unmodulated]	Speaker to the speaker terminals.	VR201	Adjust VR201 for minimum noise level.

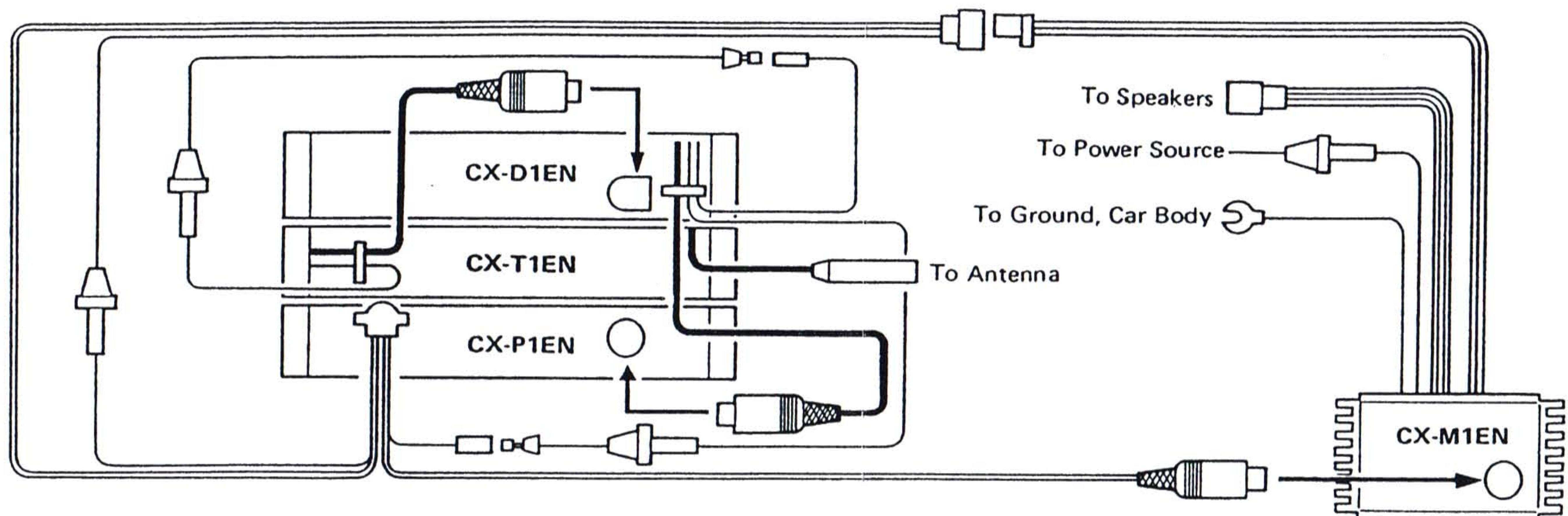
NOTE: *If the service plug is not used, and the tuner is connected to the component pre amplifier.



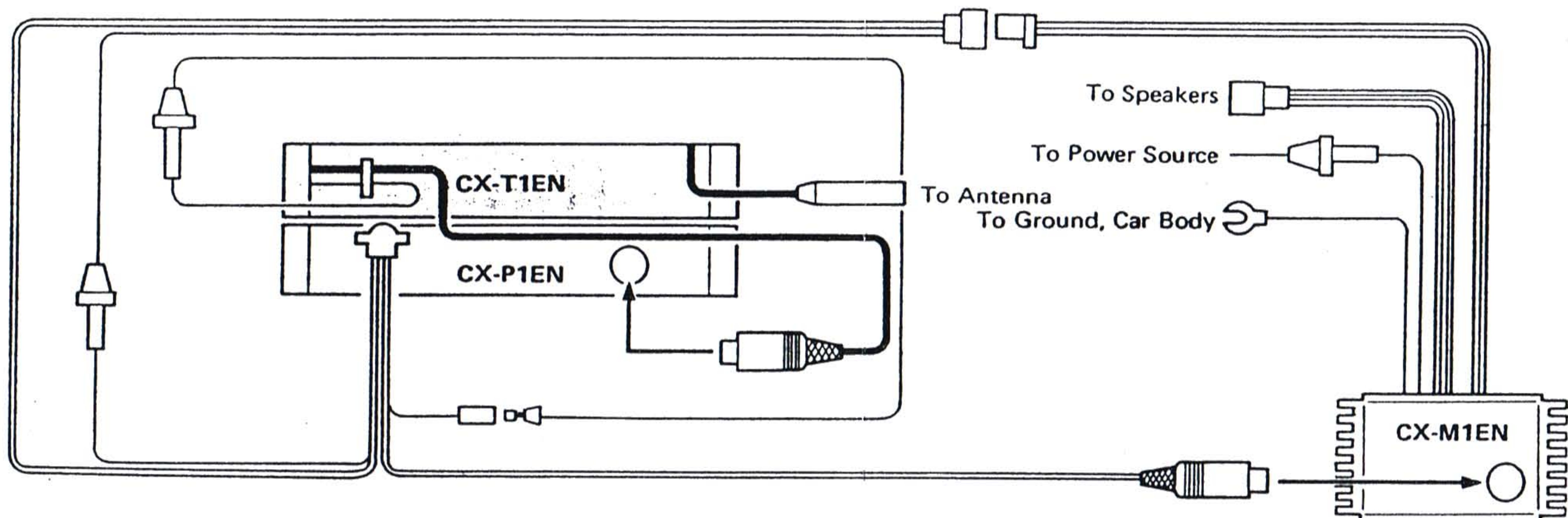
■ Numbers in ● are indicated ALIGNMENT STEPS.

INSTALLATION INSTRUCTIONS

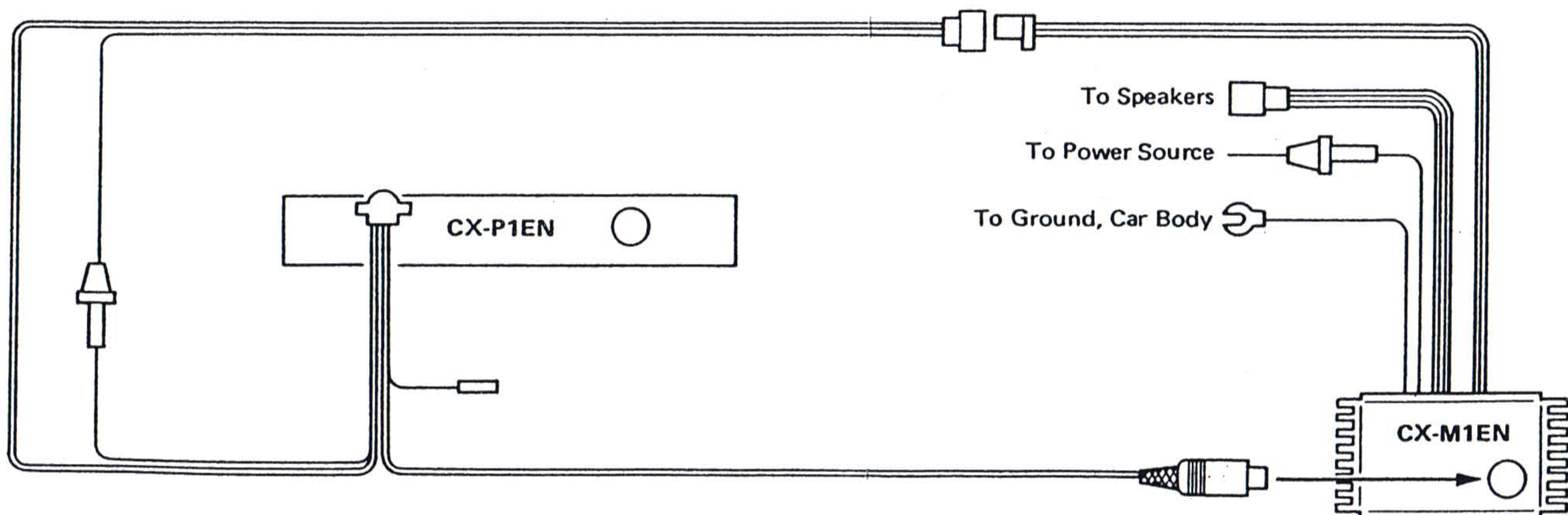
TUNER + TAPE DECK + PRE-AMPLIFIER + MAIN AMPLIFIER



TUNER/TAPE DECK + PRE-AMPLIFIER + MAIN AMPLIFIER



PRE-AMPLIFIER + MAIN AMPLIFIER



EXPLANATION OF EIA

General

The E. I. A. (Electronic Interference Absorption) Circuit is designed to absorb the pulse noise as an ignition noise in FM reception.

The E. I. A. circuit is composed with a monolithic integrated circuit (IC201, part No. AN101) and CR filters.

When the input signal with the noise is applied to the Buffer it is divided to a low frequency signal (audio signal) and high frequency signal (noise) by the delay circuit (Low Pass Filter) or the High Pass Filter.

The audio signal is applied to the Gate. Also, the noise is detected, then they are applied to the Gate as a gate pulse through the Monostable Multivibrator.

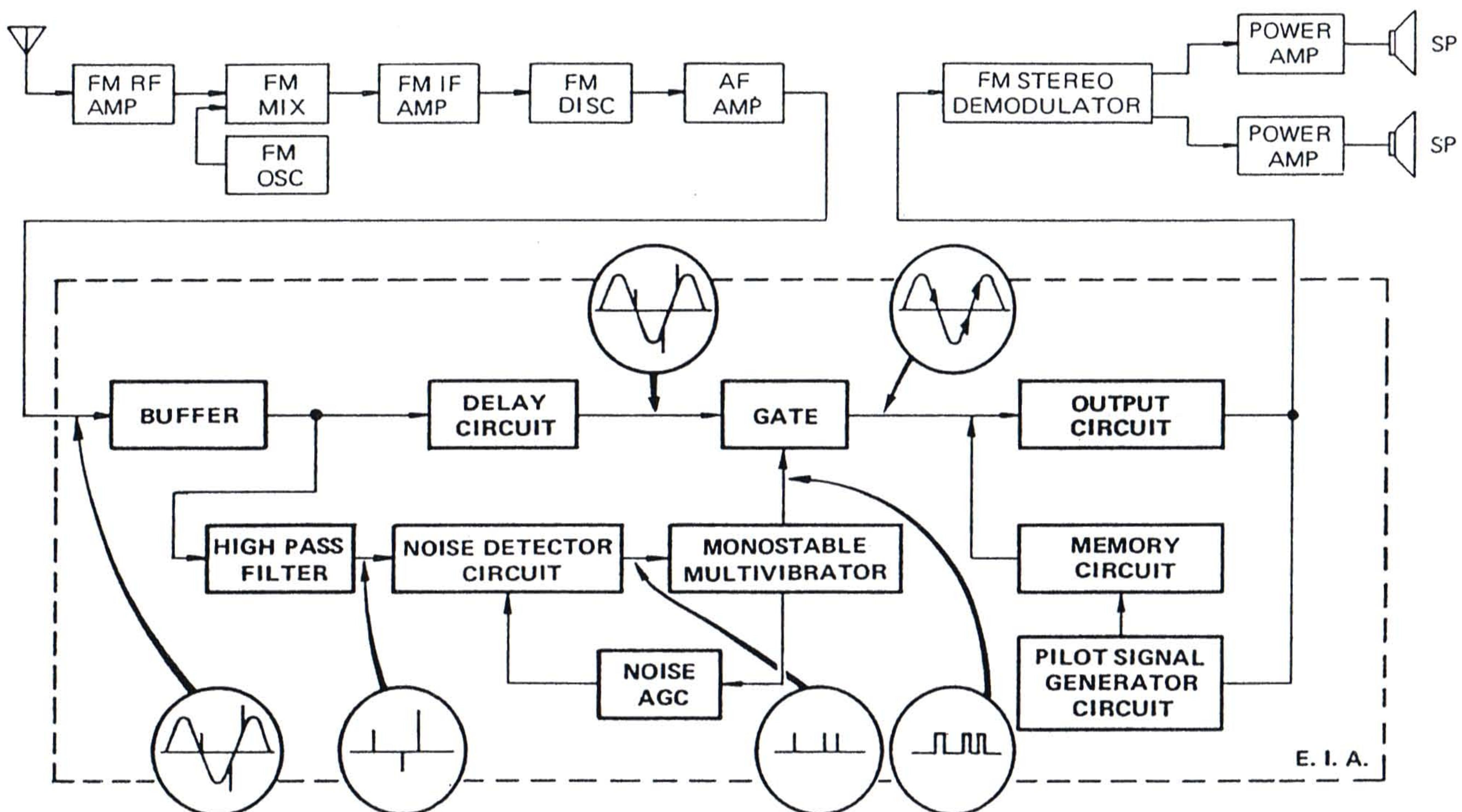
The Gate cuts off the audio signal a moment when the gate

pulse is applied. The audio signal is delayed about 2~3 μsec to meet the timing of gate pulse, by the Delay Circuit (low pass filter).

The gated audio signal is amplified and it is sent to the FM Stereo Demodulator or the AF Amplifier as an output signal.

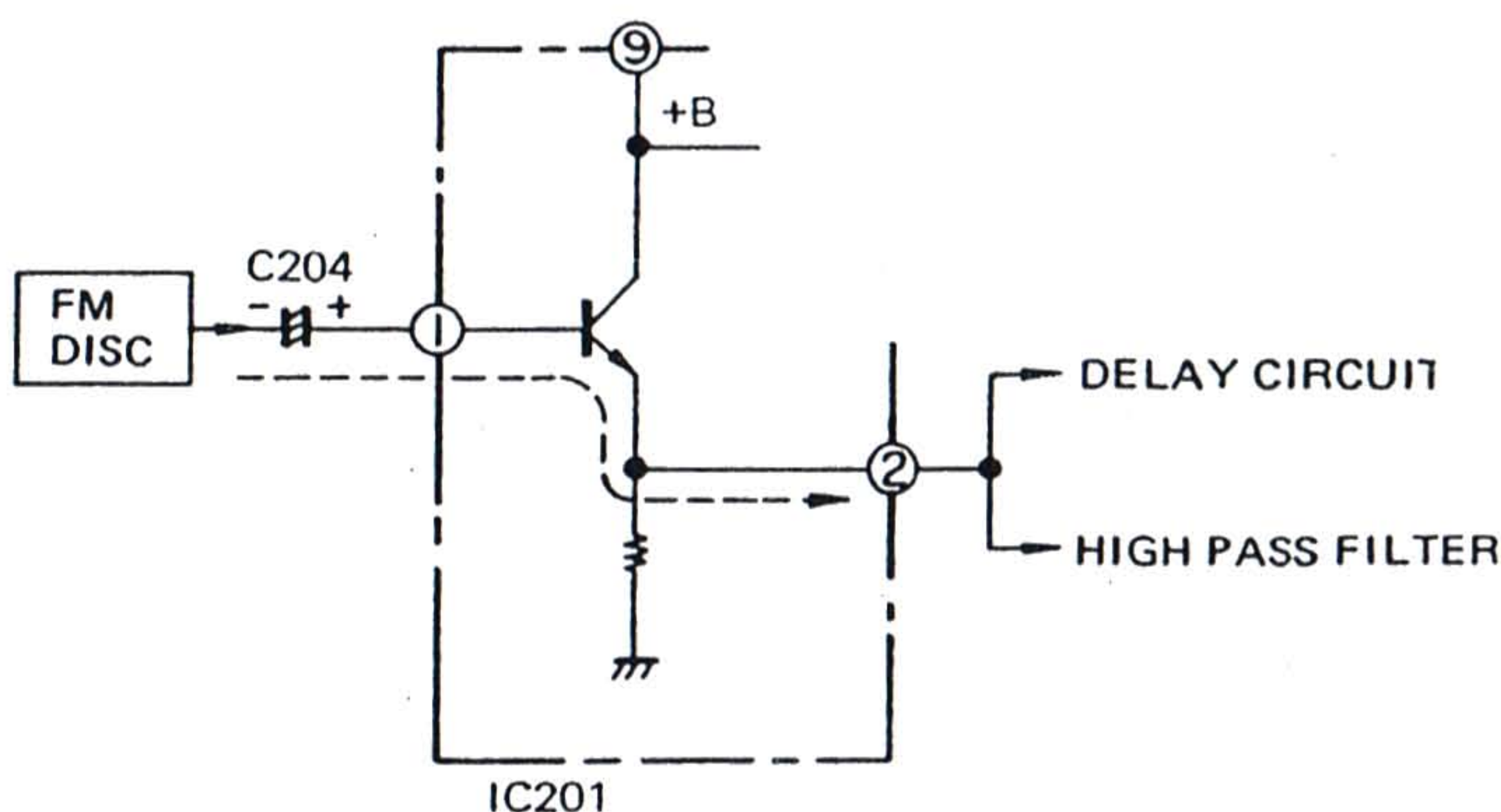
The Pilot Signal Generator Circuit and the Memory Circuit are provided to compensate an FM 19 kHz pilot signal.

For the auxiliary circuit, the trigger pulse of Monostable Multivibrator is detected and is controlled the level and it is fed-back to the Noise Detector Circuit to prevent that the Gate continuous to cut off the audio signal during the beat noise (white noise) input.



Buffer

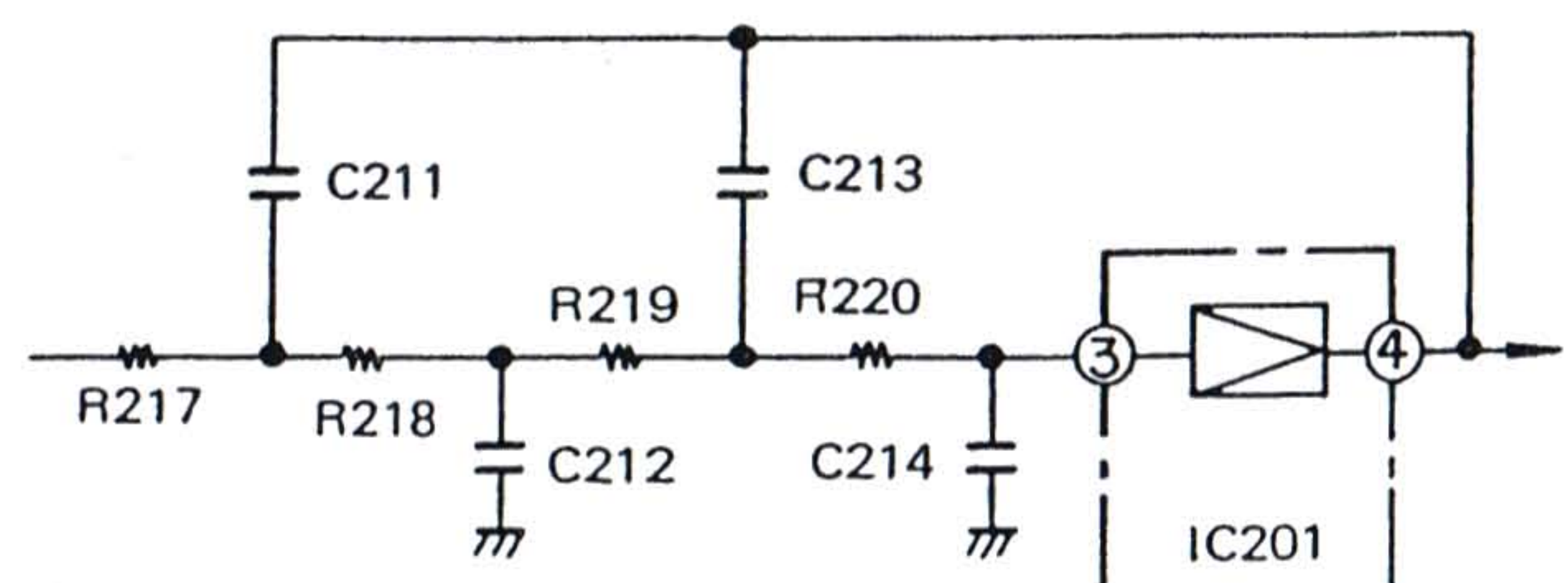
The Buffer is an emitter-follower to invert the impedance.



Delay Circuit (Low Pass Filter)

The Delay Circuit utilized with the low pass filter delays previously the input signal a 2~3 μsec to meet the timing of the Gate, since the pulse noise is delayed through the High Pass Filter and the Noise Detector Circuit.

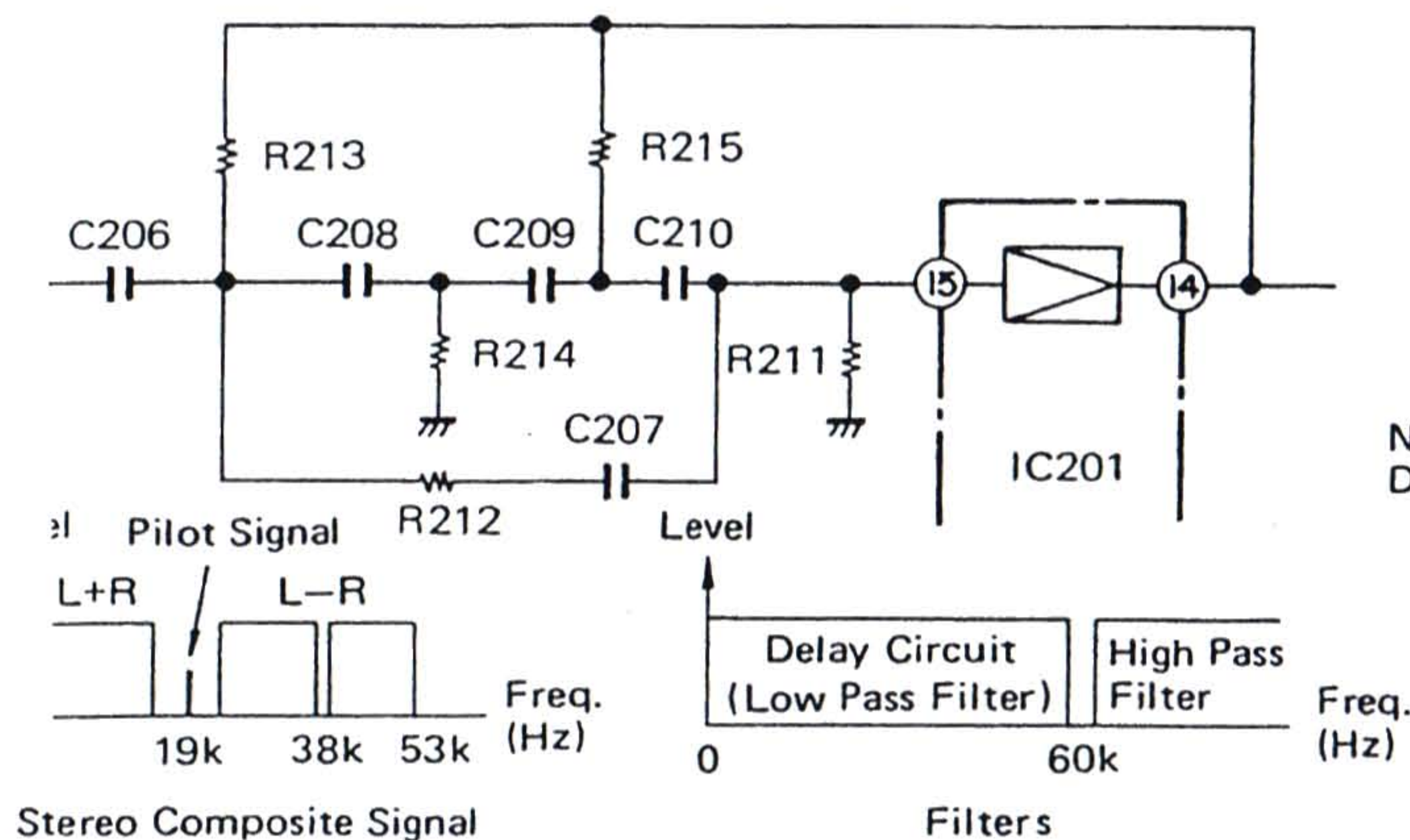
The Low Pass filter is an active Filter designed for flat and linear characteristics.



High Pass Filter

The High Pass Filter is an active filter designed to detect the pulse noise only.

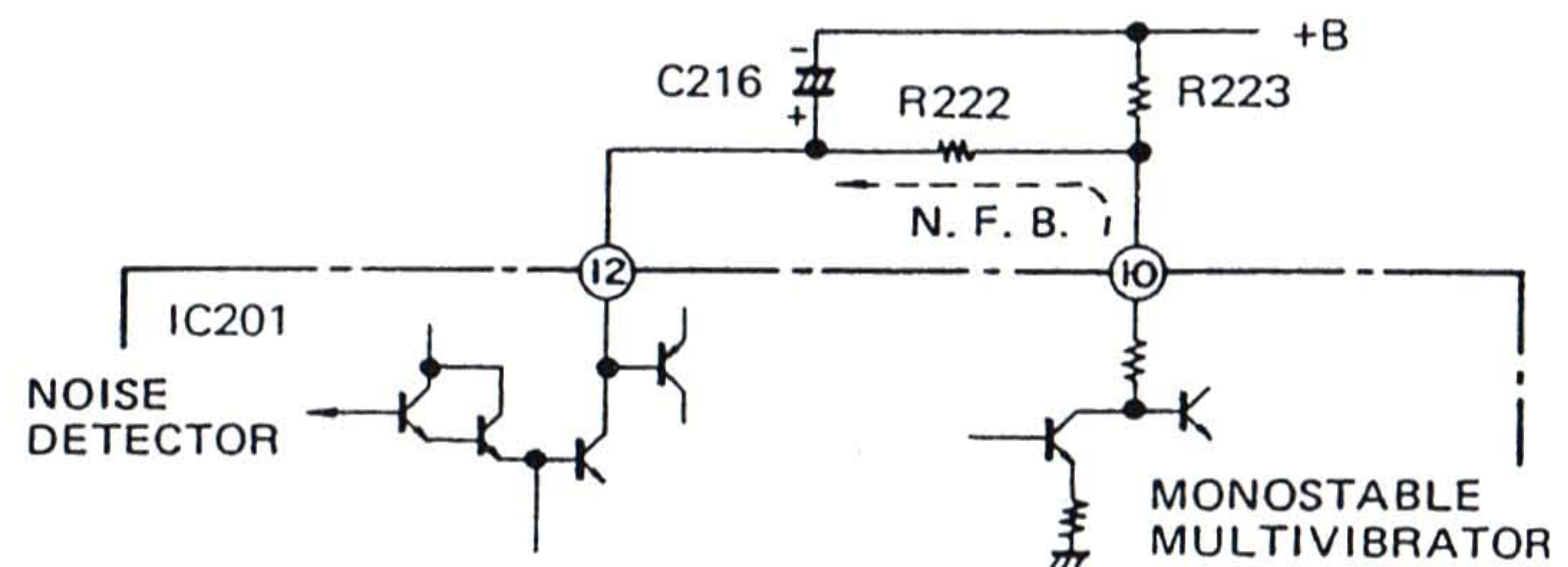
This circuit is provided to prevent misoperating the Noise Detector Circuit by the audio signal.



Noise AGC

The Noise AGC is provided to reduce the noise detecting sensitivity in proportion to the increasing of noise.

The Noise AGC detects only large pulse noise by applying the NFB (Negative feed back) to the Noise Detector when the white noise is increased.

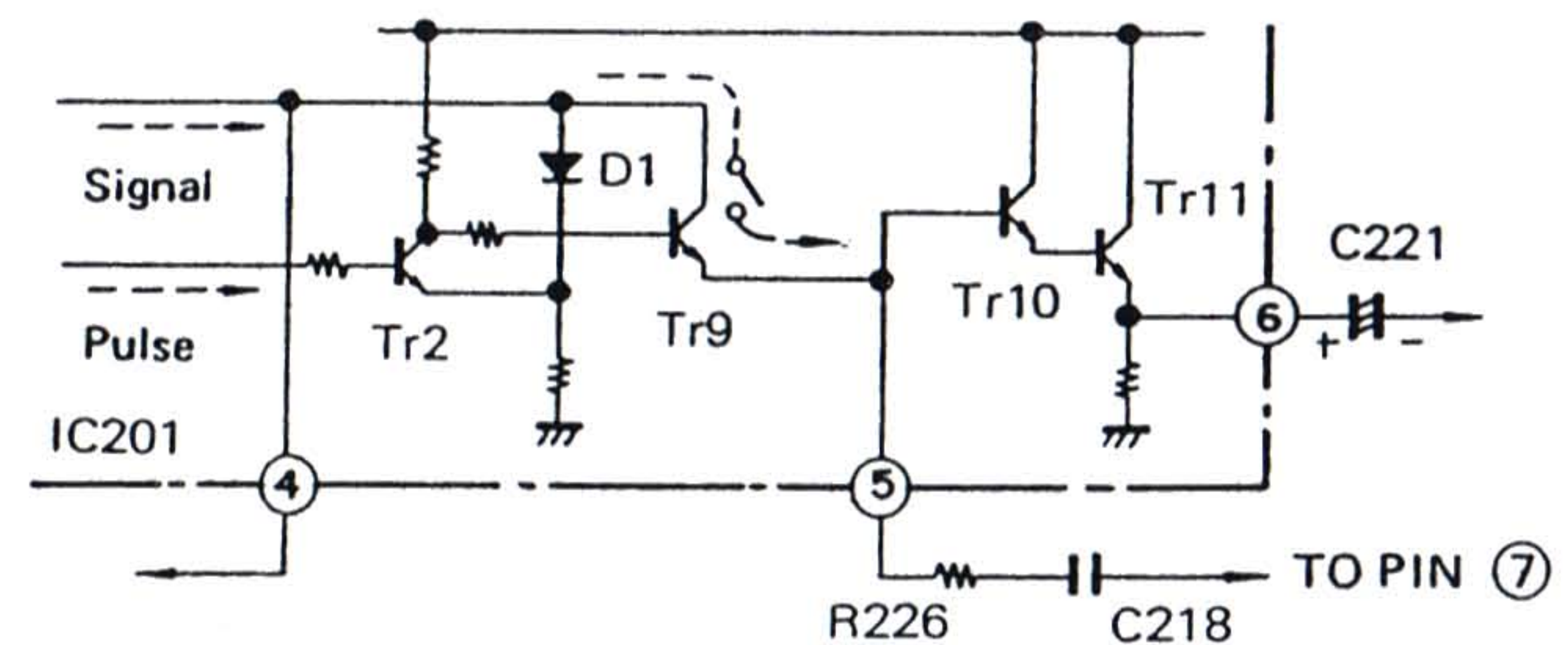


Gate and Output Circuit

The Gate is an analog switch by using TR9, and C218 is a holding capacitor driven with the TR9 as shown in below. Usually, as driving the C218 in low-impedance, the input signal is sent to pin 6 through the Output Circuit undistortedly, since the Gate (TR9) is ON.

When the pulse noise is applied, the Gate immediately opens (be OFF) and the C218 maintains the signal level till then.

Disappearing the noise, the Gate closes and the signal is sent again.



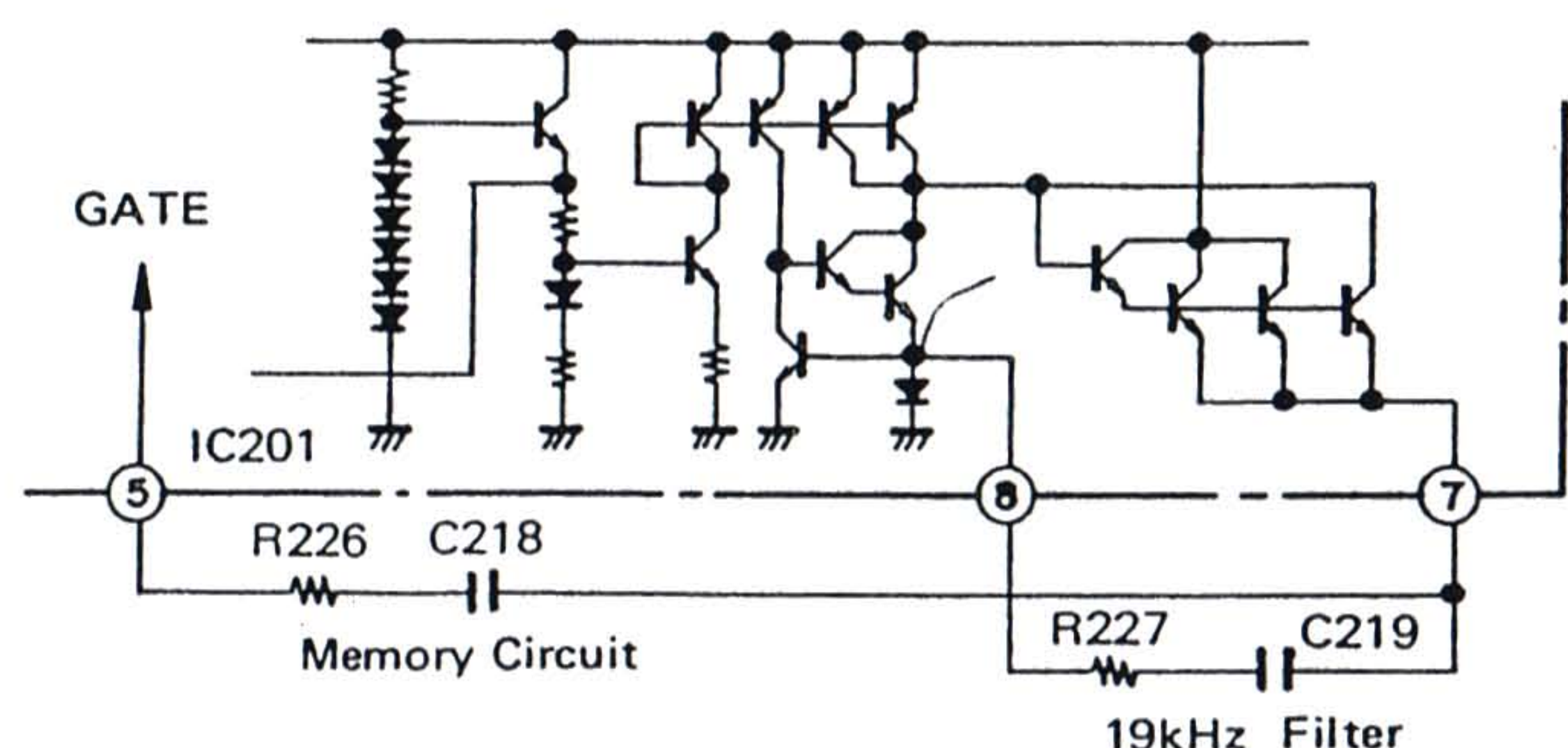
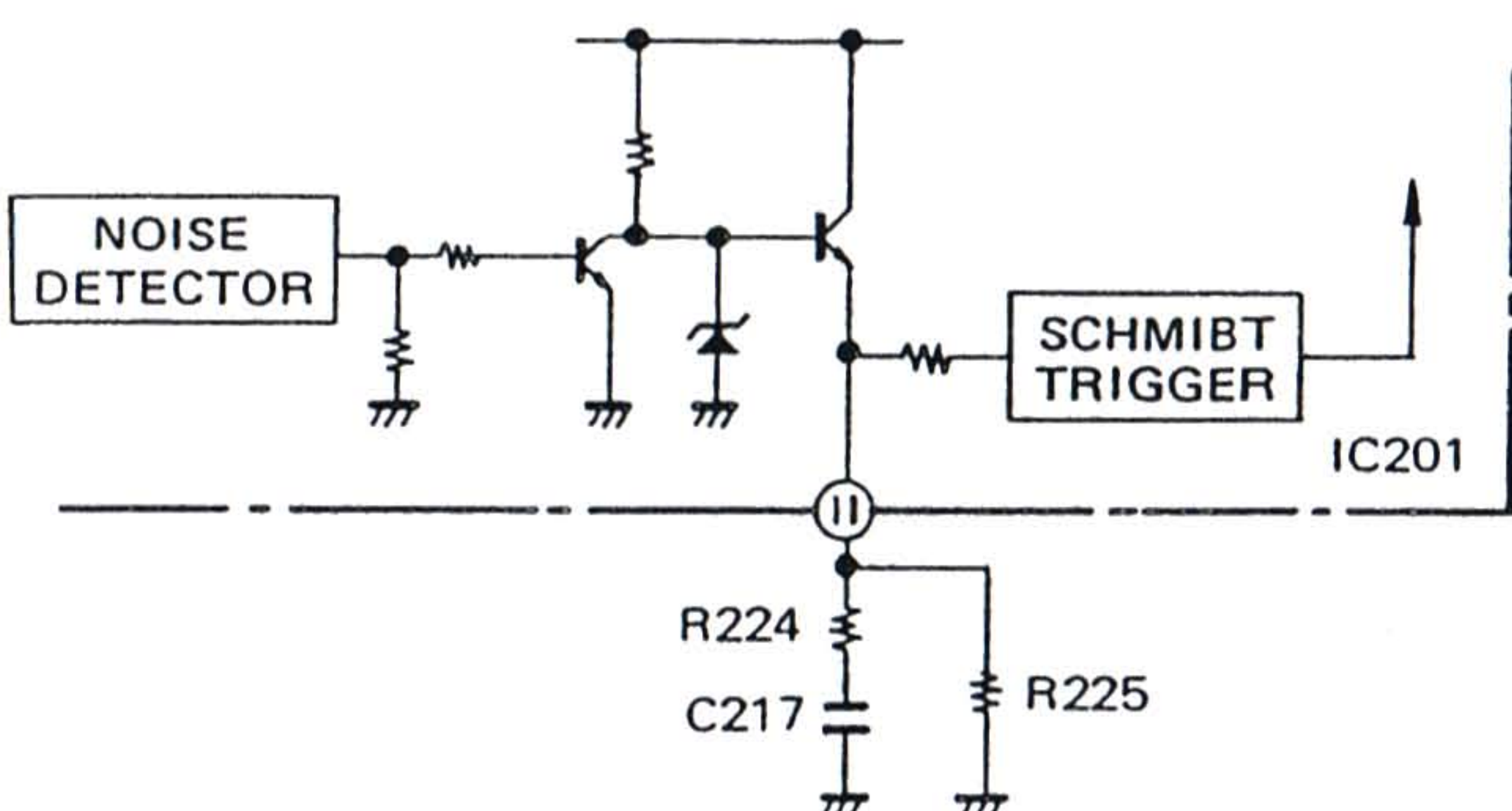
Pilot Signal Generator Circuit

Applying the stereo composite signal to the Gate, a new noise may occur and the pilot signal may disappear during the Gate OFF.

To solve this problem, compensatory apply a 19 kHz sine wave to the holding capacitor, C218 of the Gate from the Pilot Signal Generator Circuit when the Gate is OFF.

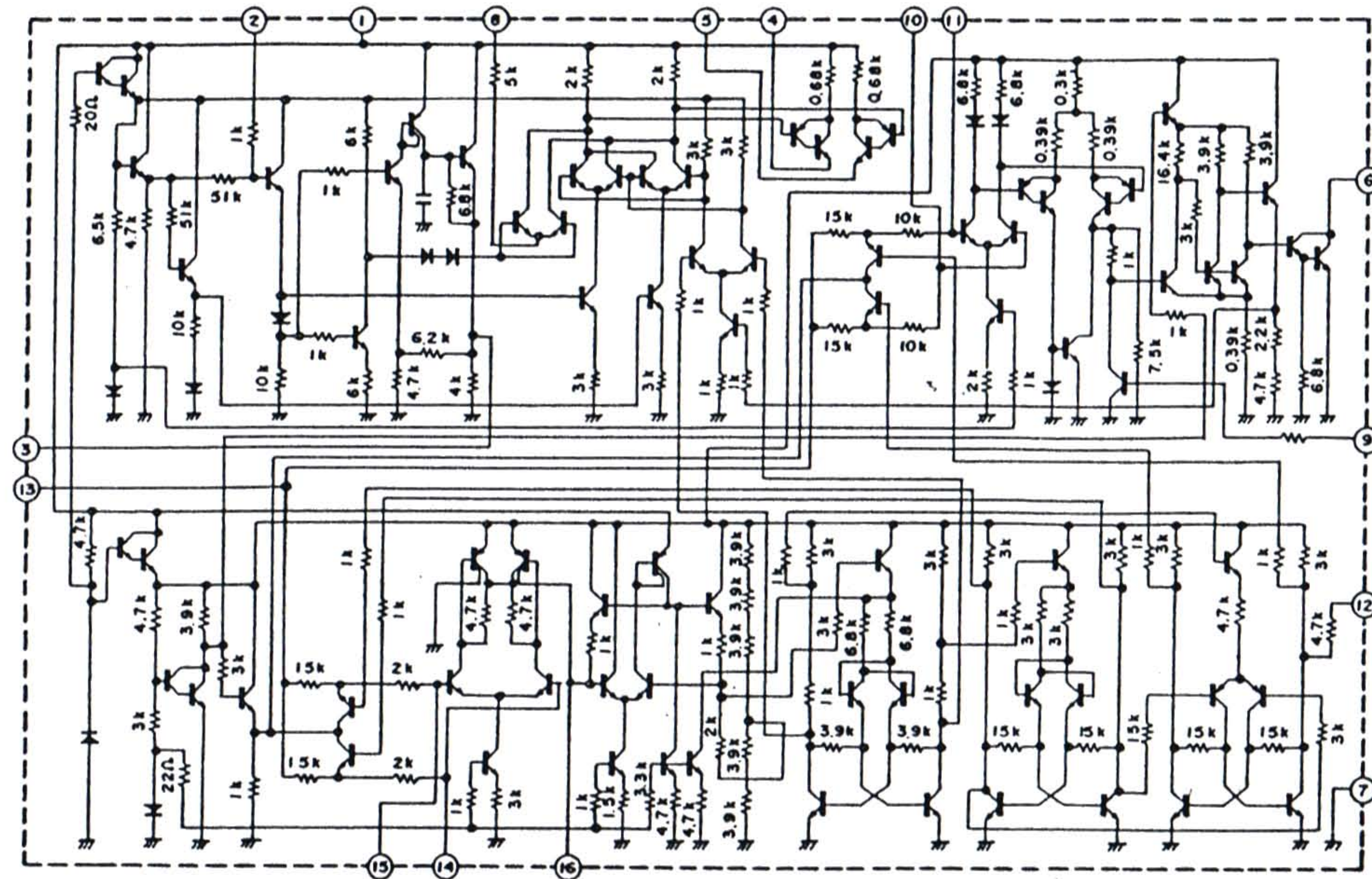
Amplitude and phase of the 19 kHz sine wave should be met to the 19 kHz pilot signal.

In the Pilot Signal Generator Circuit, the Feed Back Circuit is provided to start the oscillation at the Gate OFF and to stop it at the Gate ON.

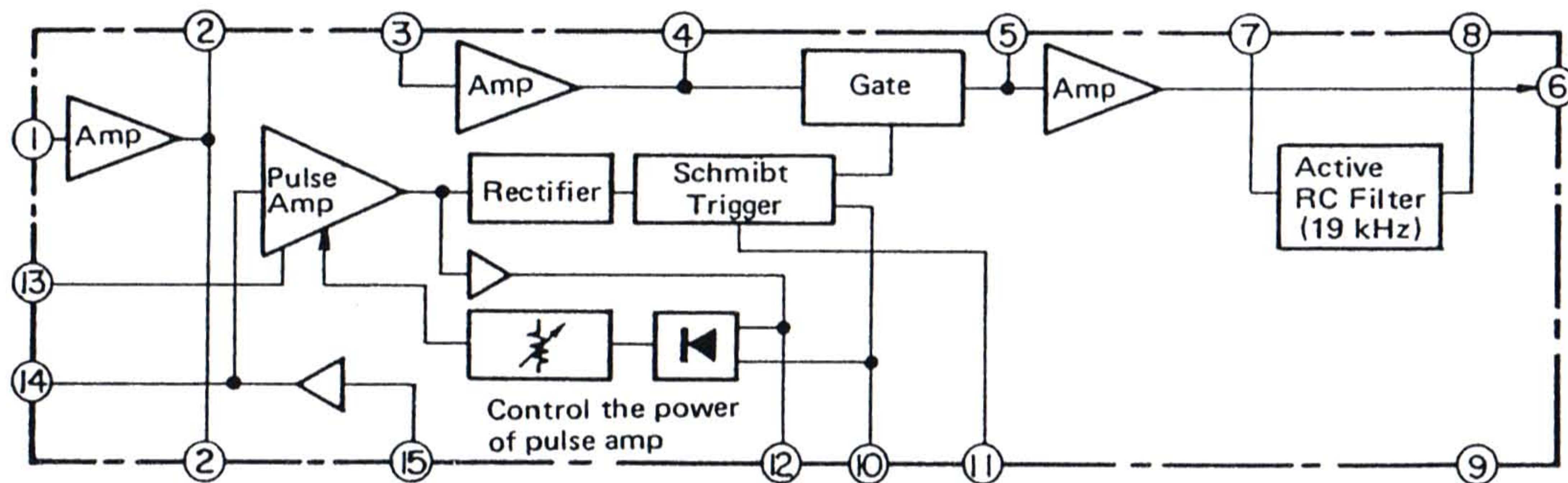


IC EQUIVALENT CIRCUIT

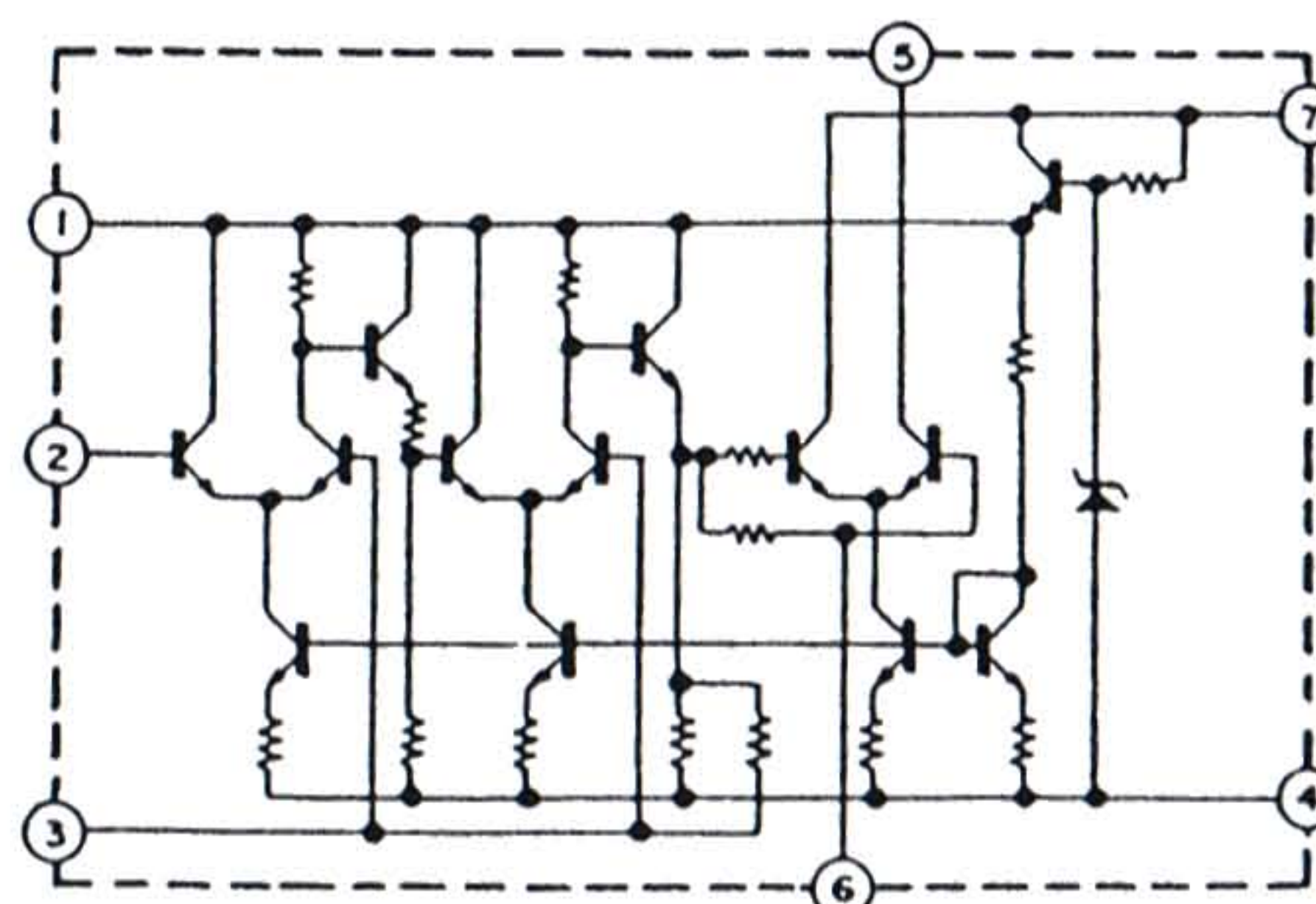
- AN362 (IC301)
FM MPX DETECTOR



- AN101 (IC201)
FM EIA



- YEAMUPC577H (IC101, 151)
FM IF AMP

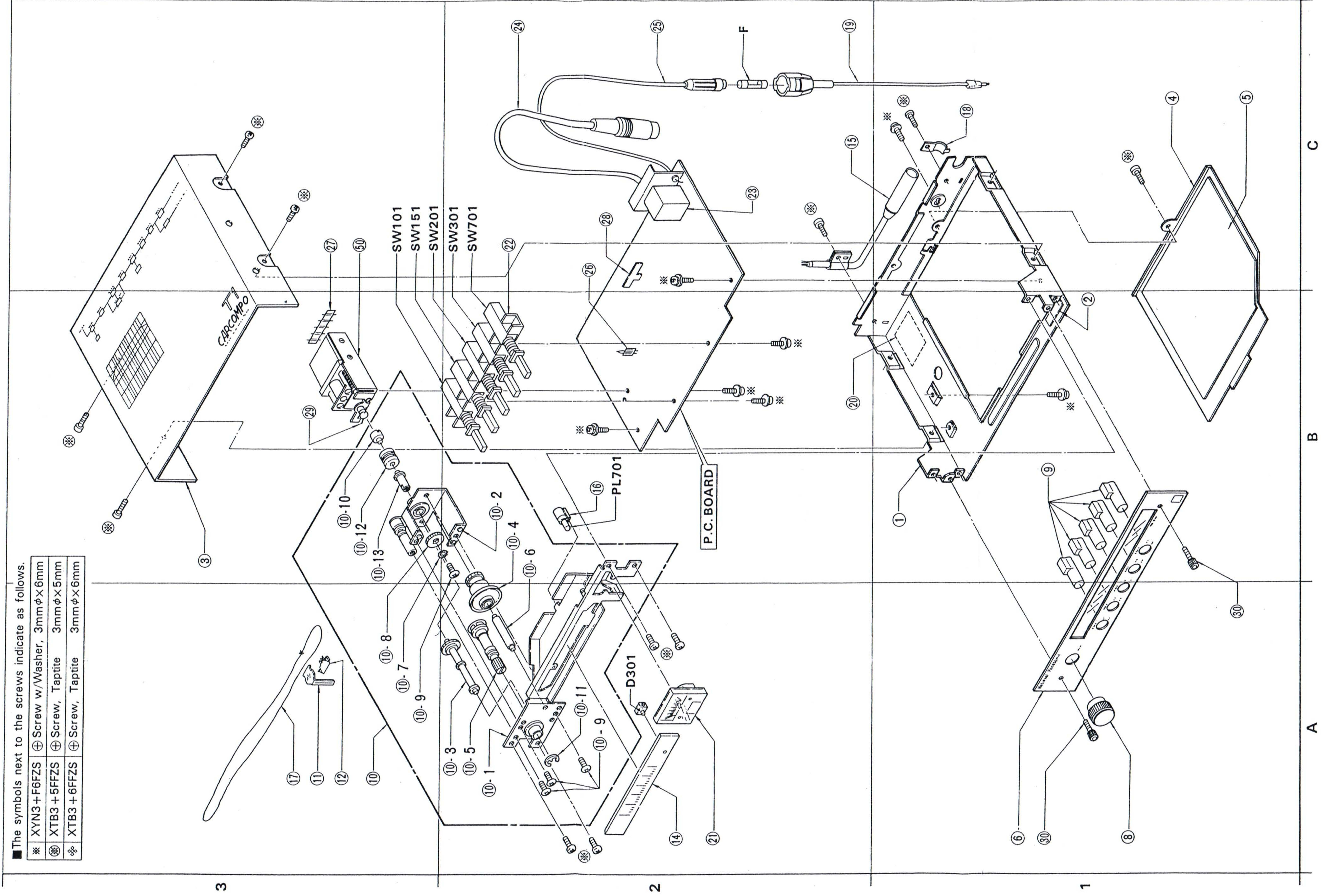


EXPLODED VIEW

Numbers in ○ are indicated REF. NO. in the REPLACEMENT PARTS LIST.

■ The symbols next to the screws indicate as follows.

※	XYN3 + F6FZS	⊕	Screw w/Washer, 3mmφ×6mm
⊗	XTB3 + 5FFZS	⊕	Screw, Taptite 3mmφ×5mm
⊗	XTB3 + 6FFZS	⊕	Screw, Taptite 3mmφ×6mm



[illegible]

[illegible]

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks	
R153	ERD18TJ474	470k OHM 1/8W ±5% Carbon	1		
R154	ERD18TJ331	330 OHM 1/8W ±5% Carbon	1		
R155	ERD18TJ562	5.6k OHM 1/8W ±5% Carbon	1		
R156	ERD18TJ101	100 OHM 1/8W ±5% Carbon	1		
R157	ERD18TJ473	47k OHM 1/8W ±5% Carbon	1		
R158	ERD18TJ473	47k OHM 1/8W ±5% Carbon	1		
R159	ERD18TJ223	22k OHM 1/8W ±5% Carbon	1		
R201	ERD18TJ151	150 OHM 1/8W ±5% Carbon	1		
R202	ERD18TJ222	2.2k OHM 1/8W ±5% Carbon	1		
R203	ERD18TJ102	1k OHM 1/8W ±5% Carbon	1		
R204	ERD18TJ683	68k OHM 1/8W ±5% Carbon	1		
R205	ERD18TJ153	15k OHM 1/8W ±5% Carbon	1		
R206	ERD18TJ222	2.2k OHM 1/8W ±5% Carbon	1		
R207	ERD18TJ102	1k OHM 1/8W ±5% Carbon	1		
R208	ERD18TJ333	33k OHM 1/8W ±5% Carbon	1		
R209	ERD18TJ223	22k OHM 1/8W ±5% Carbon	1		
R210	ERD18TJ473	47k OHM 1/8W ±5% Carbon	1		
R211	ERD18TJ104	100k OHM 1/8W ±5% Carbon	1		
R212	ERD18TJ394	390k OHM 1/8W ±5% Carbon	1		
R213	ERD18TJ222	2.2k OHM 1/8W ±5% Carbon	1		
R214	ERD18TJ222	2.2k OHM 1/8W ±5% Carbon	1		
R215	ERD18TJ272	2.7k OHM 1/8W ±5% Carbon	1		
R216	ERD18TJ223	22k OHM 1/8W ±5% Carbon	1		
R217	ERD18TJ472	4.7k OHM 1/8W ±5% Carbon	1		
R218	ERD18TJ472	4.7k OHM 1/8W ±5% Carbon	1		
R219	ERD18TJ472	4.7k OHM 1/8W ±5% Carbon	1		
R220	ERD18TJ472	4.7k OHM 1/8W ±5% Carbon	1		
R221	ERD18TJ102	1k OHM 1/8W ±5% Carbon	1		
	ERD18TJ272	2.7k OHM 1/8W ±5% Carbon	1		
R222	ERD18TJ472	4.7k OHM 1/8W ±5% Carbon	1		
R223	ERD18TJ102	1k OHM 1/8W ±5% Carbon	1		
R224	ERD18TJ391	390 OHM 1/8W ±5% Carbon	1		
R225	ERD18TJ682	6.8k OHM 1/8W ±5% Carbon	1		
R226	ERD18TJ152	1.5k OHM 1/8W ±5% Carbon	1		

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks	
R227	ERD18TJ222	2.2k OHM 1/8W ±5% Carbon	1		
R228	ERD18TJ821	820 OHM 1/8W ±5% Carbon	1		
R229	ERD18TJ822	8.2k OHM 1/8W ±5% Carbon	1		
R230	ERD18TJ183	18k OHM 1/8W ±5% Carbon	1		
R301	ERD18TJ151	150 OHM 1/8W ±5% Carbon	1		
R302	ERD18TJ104	100k OHM 1/8W ±5% Carbon	1		
R303	ERD18TJ153	15k OHM 1/8W ±5% Carbon	1		
R304	ERD18TJ102	1k OHM 1/8W ±5% Carbon	1		
R305	ERD18TJ681	680 OHM 1/8W ±5% Carbon	1		
R306	ERD18TJ683	68k OHM 1/8W ±5% Carbon	1		
R307	ERD18TJ332	3.3k OHM 1/8W ±5% Carbon	1		
R308	ERD18TJ332	3.3k OHM 1/8W ±5% Carbon	1		
R309	ERD18TJ243	24k OHM 1/8W ±5% Carbon	1		
R401	ERD18TJ563	56k OHM 1/8W ±5% Carbon	1		
R402	ERD18TJ103	10k OHM 1/8W ±5% Carbon	1		
R403	ERD18TJ222	2.2k OHM 1/8W ±5% Carbon	1		
R404	ERD18TJ181	180 OHM 1/8W ±5% Carbon	1		
R405	ERD18TJ393	39k OHM 1/8W ±5% Carbon	1		
R406	ERD18TJ333	33k OHM 1/8W ±5% Carbon	1		
R407	ERD18TJ102	1k OHM 1/8W ±5% Carbon	1		
R408	ERD18TJ471	470 OHM 1/8W ±5% Carbon	1		
R409	ERD18TJ471	470 OHM 1/8W ±5% Carbon	1		
R501	ERD18TJ563	56k OHM 1/8W ±5% Carbon	1		
R502	ERD18TJ103	10k OHM 1/8W ±5% Carbon	1		
R503	ERD18TJ222	2.2k OHM 1/8W ±5% Carbon	1		
R504	ERD18TJ181	180 OHM 1/8W ±5% Carbon	1		
R505	ERD18TJ393	39k OHM 1/8W ±5% Carbon	1		
R506	ERD18TJ333	33k OHM 1/8W ±5% Carbon	1		
R507	ERD18TJ102	1k OHM 1/8W ±5% Carbon	1		

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
VARIABLE RESISTORS				
VR101, 201	EVNK4AA00B23	2k OHM (B)	2	
VR151	EVNK4AA00B54	50k OHM (B)	1	
VR301	EVNK4AA00B23	2k OHM (B)	1	
VR302	EVNK4AA00B14	10k OHM (B)	1	
SWITCHES				
SW101, 151, 201, 301, 701	YEAS09056	Sensitivity Selector Switch, Muting Switch, EIA Switch, Power Switch, Mode Switch	5	
COILS, TRANSFORMERS AND CERAMIC FILTERS				
L101	YELT04C330K	RF Coil	1	
L701	YETQ020F012	Choke Coil	1	
IFT101	YEIF07S7048	FM IFT	1	
IFT102	YEIF07S7047	FM IFT	1	
IFT151	YEIF07S7049	FM IFT	1	
CF101, 102	YEIN09N5004	Ceramic Filter	2	
TUNER				
M50	YEAU01070	FM Tuner Ass'y	1	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
ACCESSORIES				
A1	YEAJ09036	Wire, Bonding	1	
A2	XSN5 + 8FXS	⊕ Screw, Pan 5mmϕ x 8mm	1	
A3	XWG5FX	Washer, Flat 5mmϕ	1	
A4	XWA5BFX	Washer, Spring 5mmϕ	1	
PRINTING				
A5	YEFM06665	Instruction Book'	1	