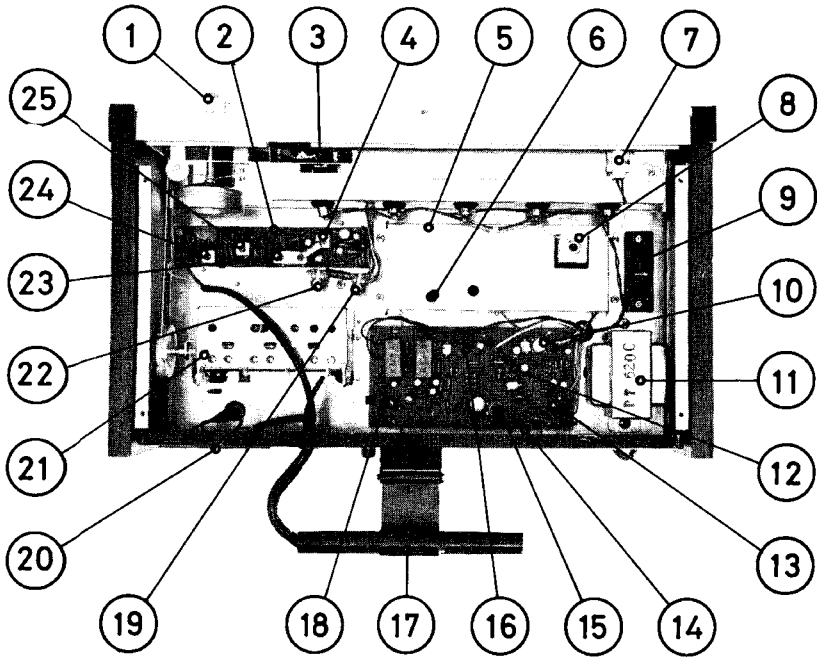
ROTEL

MODEL RT-620

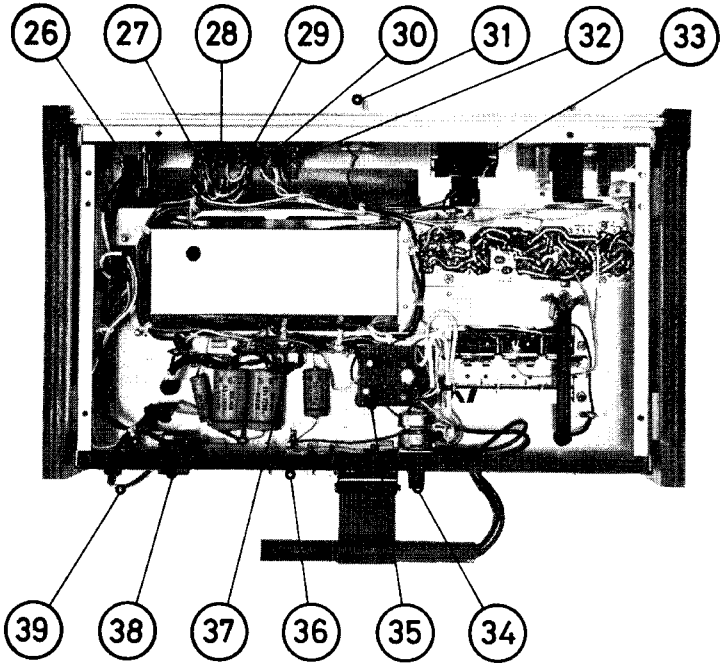
AM/FM Stereo
Solid State Tuner
TECHNICAL MANUAL

ROTEL

CHASSIS LAYOUT



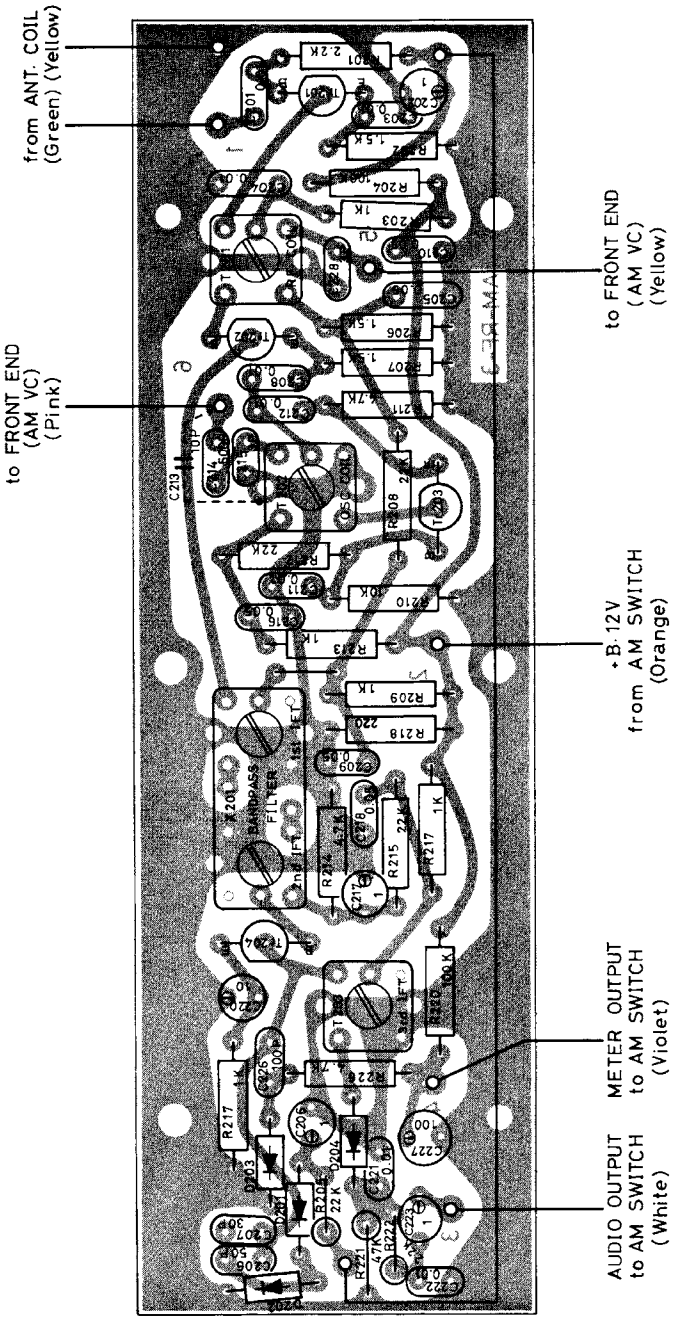
TOP VIEW



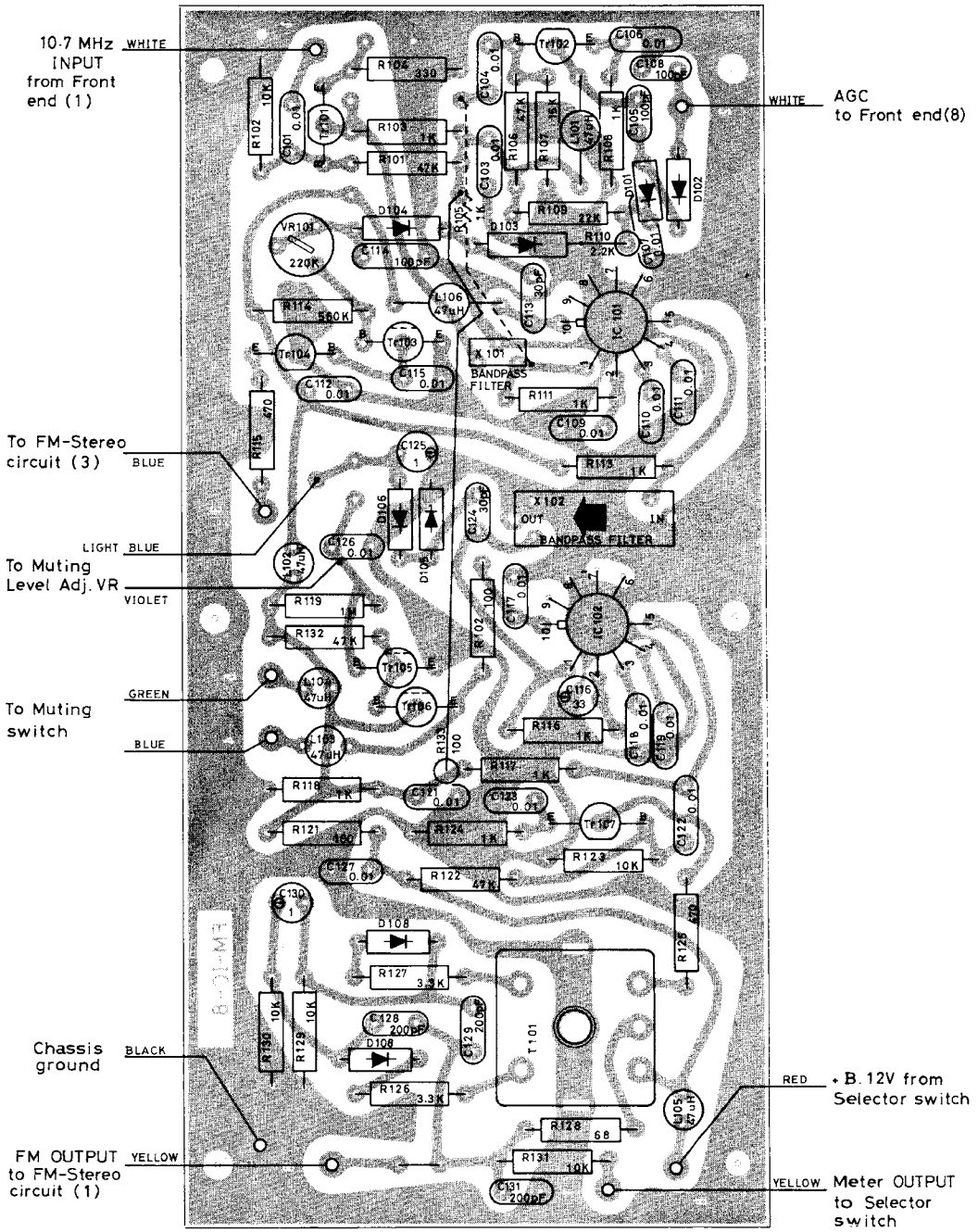
BOTTOM VIEW

1. Tuning
2. AM Circuit Board
3. Stereo Beacon Lamp
4. AM IFT, T203
5. FM IF Circuit
6. FM Auto-switching Level Adj. VR101
7. Dial Pointer
8. FM IFT (Ratio), T101
9. Votage Selector
10. FM-Stereo 19KHz Coil, L301
11. Power Transformer, T902
12. FM-Stereo 19KHz Trans., T301
13. FM-Stereo SCA 72KHz Trap Coil, L303
14. FM-Stereo Circuit Board
15. FM-Stereo SCA 67KHz Trap Coil, L302
16. FM-Stereo 38KHz Trans., T302
17. AM ANT Coil, L901
18. FM-Stereo Separation Adj., VR301
19. Muting Level Adj., VR902
20. ANT Terminal Strip
21. AM FM Front end
22. Muting Level Adj., VR903
23. AM 455KHz Bandpass Filter
24. AM RF Coil, T201
25. AM OSC Coil, T202
26. Power Switch
27. AM Switch
28. FM Switch
29. FM-Stereo Switch
30. Noise Filter Switch
31. Muting Level Cont., VR901
32. Muting Switch
33. Tuning Meter
34. Output Level Cont., VR904
35. Audio Amp Circuit Board
36. Output Jacks
37. Rectifier, D902
38. AC Outlet
39. AC Power Supply Cord

AM CIRCUIT BOARD DIAGRAM



FM IF CIRCUIT BOARD DIAGRAM



NOTES: 1. Resistance is shown in ohms. K=1,000 M=1,000,000

2. Capacitance is shown in mfd, unless otherwise noted.

PRECAUTION

1. Always disconnect the chassis from power line when soldering.
   Turning the power switch OFF is not enough. Power line leakage paths through the heating element may destory transistors.
2. Never attempt to do any work on the transistor amplifiers without first disconnecting the AC line cord and waiting until the power supply filter capacitors have discharged.

AM ALIGNMENT PROCEDURE

Instruments: AM Signal Generator and AC VTVM.

Set Selector switch to AM position.

NOTE: Input signal must be kept as low as possible to avoid AVC action.

Step	Generator		Tuning Dial	Output Indicator Connected to	Adjust	Adjust for
	Coupling	Frequency	Setting			
1	Tr202 Base (on AM IF board) Through a 0.01 mfd capacitor.	455 KHz (400 Hz 30%Mod.)	Non interfering at low end of scale.	AC VTVM to TAPE OUT jack	T203 and X201 (on AM IF board)	Maximum reading on VTVM
2	Connect to short loop of wire. Radiate signal into ferrite loopstick antenna.	600 KHz (400 Hz 30%Mod.)	600 KHz		T202(OSC) T201(RF) (on AM IF board) and L901(ANT) Ring.	
3		1400 KH (400 Hz 30%Mod.)	1400 KHz		CT7(OSC) CT6(RF) and CT5 (ANT) (on Front end)	
4	Repeat steps 2 and 3 until no further improvement is noticed.					

FM ALIGNMENT PROCEDURE

Instruments: FM Signal Generator, Oscilloscope and Distortion Meter.

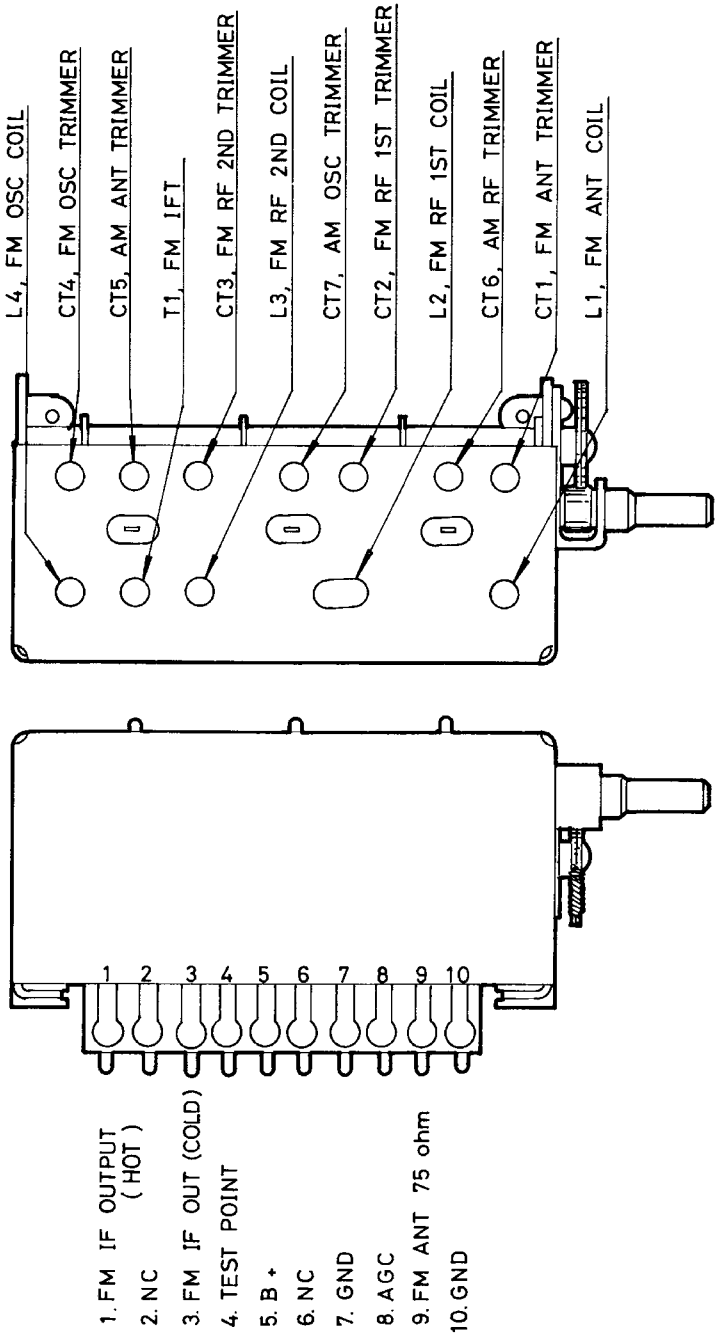
Set Selector switch to FM MONO, Muting switch to OFF and Noise Filter switch to OFF position.

Connect FM Signal Generator to FM antenna terminals.

Connect Oscilloscope and Distortion Meter to OUTPUT jack.

Step	Generator		Tuning Dial Setting	Adjust	Adjust for
	Sig.Strength	Freq.			
1	No signal input.		Quiet point on band.	T101(on FM IF board) Top	Center of Tuning Meter (zero reading on Tuning Meter)
2	1mV	98MHz (400 Hz 100% Mod.)	Tune for Center of Tuning Meter	T101 Bottom	Minimum reading on Distortion Meter (minimum distortion).
3	1mV→0			T1(on Front end) Top and Bottom.	Maximum I.H.F. sencitivity.
4	Repeat steps 2 and 3 until no further improvement is noticed.				
5	3 uV	90 MHz (400 Hz 100%Mod.)	90 MHz	LO(FM OSC), LR2 LR1(FM RF), and LA(FM ANT) coil (on Front end)	Maximum output and maximum I.H.F. sencitivity.
6		106 MHz 400 Hz) 100%Mod)	106 MHz	TCO(FM OSC), TCR2, TCR1(FM RF)and TCA(FM ANT) trimmer (on Front end)	
7	Repeat steps 5 and 6 until no further improvement is noticed.				

FRONT END LAYOUT



MUTING ALIGNMENT PROCEDURE

Instruments: FM Signal Generator, Oscilloscope and AC VTVM.
Set Selector switch to FM MONO position and Noise Filter switch to OFF position.
Set Frequencies of the FM Signal Generator to 98MHz (400Hz 100% Mod.)

Step	Generator		Tuning Dial Setting	Output Indicator connected to	Muting switch Set to	Muting Level Cont. to	Adjust	Adjust for
	Connected to	Signal Strength						
1	FM antenna terminals.	1 mV	98MHz	Oscilloscope and VTVM to OUTPUT terminal (Left or Right channel).	OFF	Minimum position (CCW)	Tuning Dial	Maximum reading on VTVM
2	Disconnect FM signal Generator.	No signal input.			ON		VR903 on chassis near Front end Right side	Just disappear the noise on scope.
3	Same as in step 1.	1 mV				Maximum postiion (CW)	VR902 on chassis near Front end Left side red mark	Just appear the signal on scope.
4	Repeat Steps 2 and 3 until no further improvement is noticed.							
5	Same as in step 1.	30 uV ↓ 100 uV	Same as in step 1	Same as in step 1.	Same as in step 2.	Same as in step 3.	ATT. on FM SG	Confirm no signal on scope

Fig1 Location of Muting Level Adj. VR

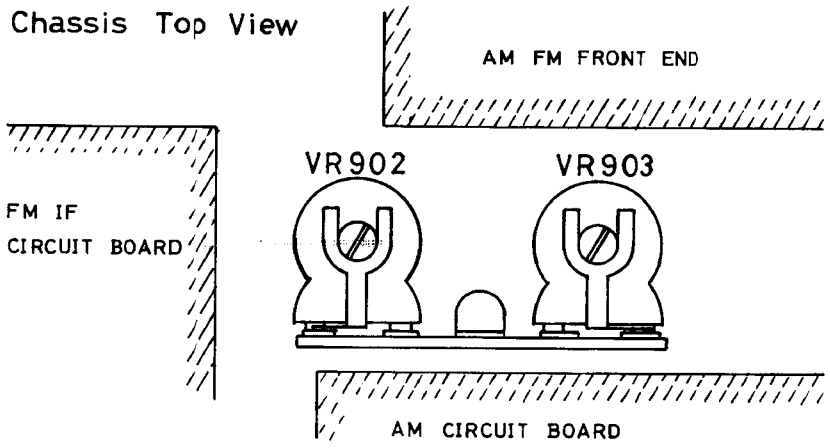
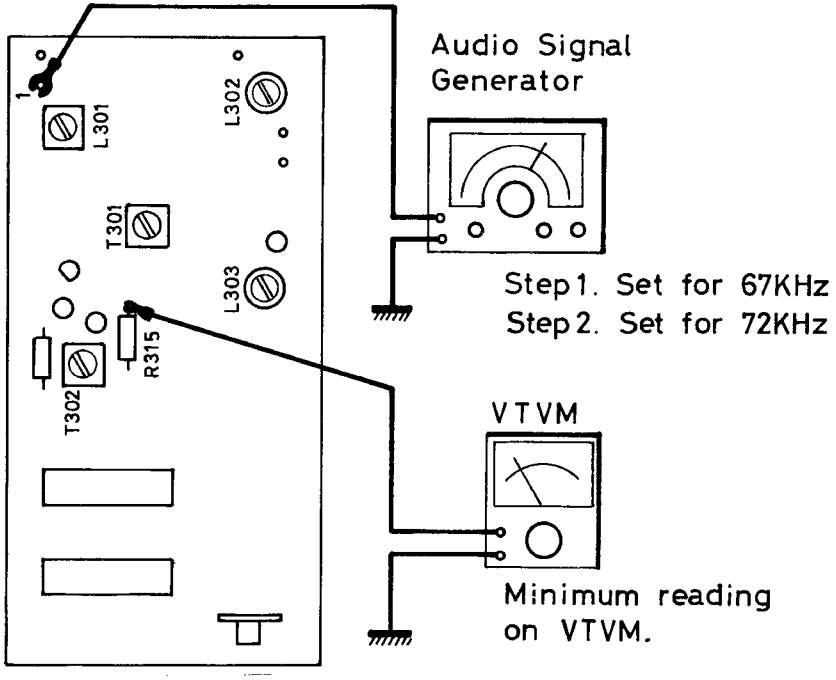


Fig2. FM-Stereo SCA Trap Adjustment Hook-up



FM-STEREO ALIGNMENT PROCEDURE

NOTE: The FM IF Alignment must be completed before attempting this FM-Stereo Alignment. Poor IF alignment will result in poor FM-Stereo Alignment.

Set Selector switch to FM STEREO, and Noise Filter switch to OFF position.

1. Alignment of SCA Trap

Step	Audio Generator		Output Indicator	Adjust	Adjust for
	Connected to	Frequency	Connected to		
1	To MPX Input (pin No.1 on MPX board)	67KHz	VTVM to junction of L302, 303 and R315.	L302	Minimum reading on VTVM
2		72KHz		L303	

2. Alignment of FM-Stereo

Connect FM Stereo Generator to FM antenna terminals.

Set Separation Adj. VR301 (on MPX board) to mid-position before starting this procedure.

Step	Stereo Generator		Output Indicator	Adjust	Adjust for
	Modulation	RF Deviation	Connected to		
1	19 KHz Pilot only	1-2%	VTVM & Oscilloscope to junction of C312 R317 and 318	L301 T301 T302	Maximum reading on VTVM.
2	Composite 1 KHz signal to Left channel only	Pilot 10% Signal 70%	VTVM & Oscilloscope to Left channel OUTPUT jack.	T301	Maximum and undistorted sine wave on scope.
3	Composite 1 KHz signal to Right channel only.			VR301	Minimum reading on VTVM.
4	Same as in Step 2		VTVM & Oscilloscope to Right channel OUTPUT jack.		
5	Repeat steps 3 and 4 until no further improvement is noticed.				

FM MONO-STEREO AUTOMATIC SWITCHING LEVEL

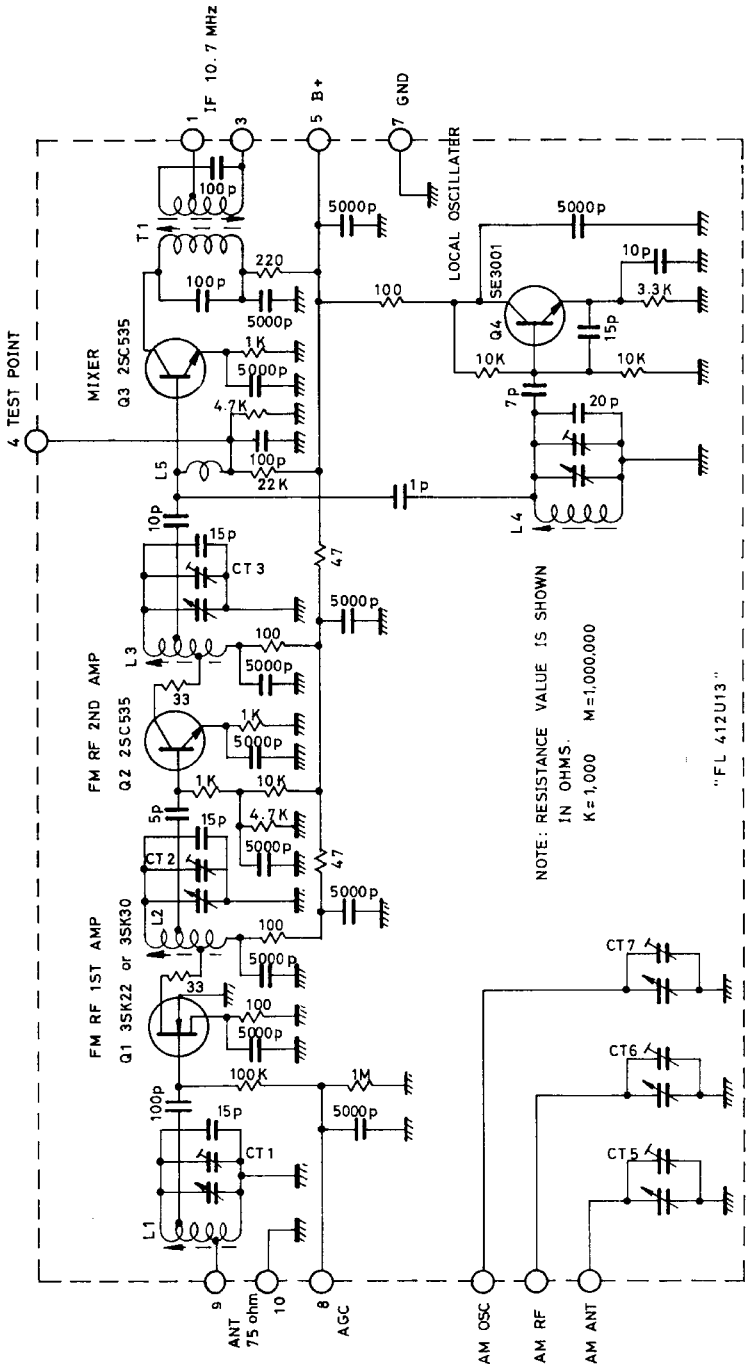
ADJUSTMENT PROCEDURE

1. Connect a VTVM and Oscilloscope to the OUTPUT jack (Left or Right channel).
2. Feed the FM signal whose MPX has been varied into the antenna terminals.

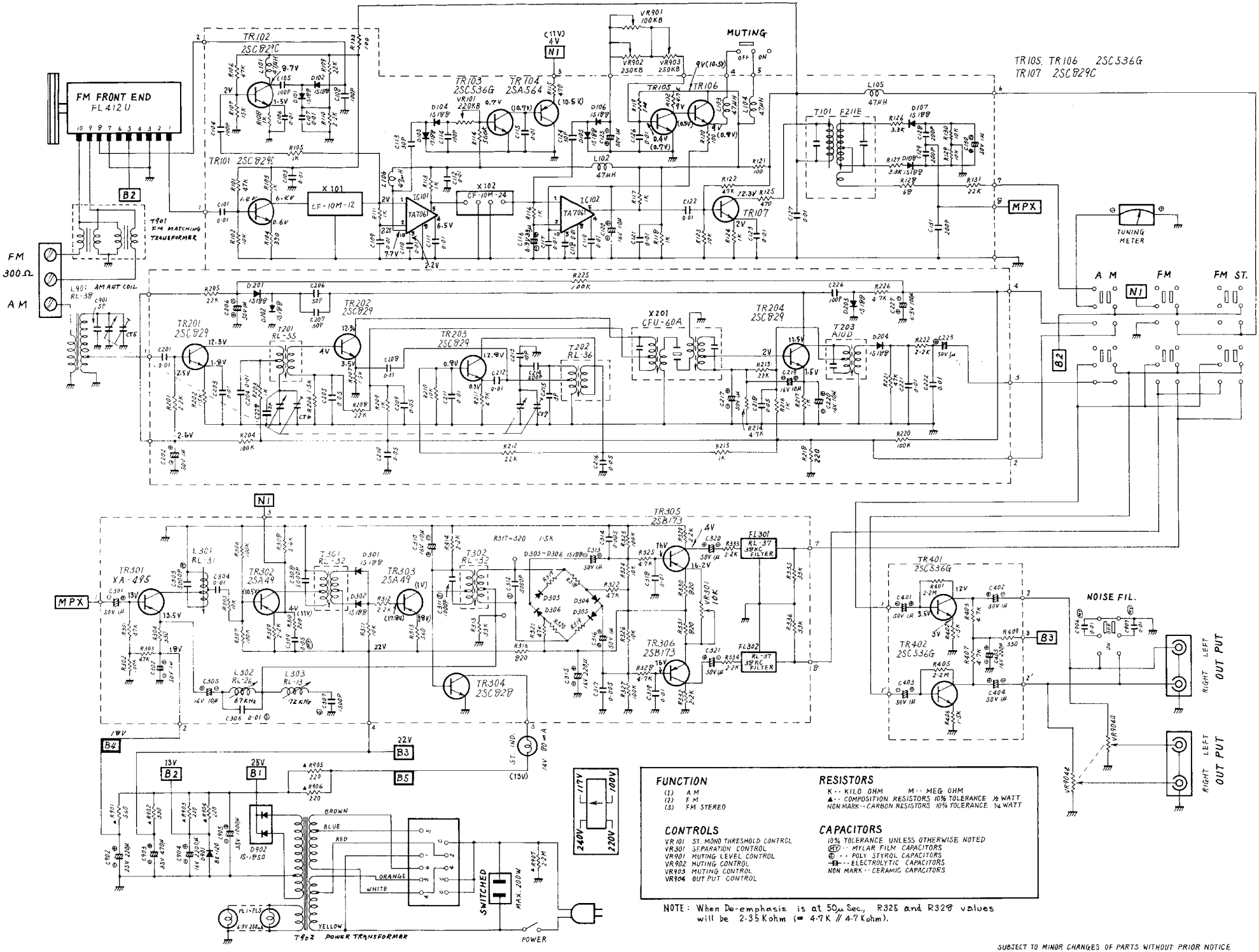
MPX variation	Pilot	10%
	Modulation Frequency	1 KHz(Left or Right channel).
	RF deviation	±45 KHz

3. Set the frequency at 98 MHz (when there are disrupting signal, choose another setting).
4. Set the Function switch to FM STEREO.
5. Turn CCW the MONO-STEREO Auto-switching Level Control VR101 (on FM IF circuit board): This is a condition in which Auto-switching dose not function.
6. Adjust the FM-Stereo so that the distortion and separation will be best.
7. Adjust the VR101 so that when the antenna input level is 30uV or more, Stereo will switch in and when the input is below the 30uV level, Mono will switch in.
8. After adjustment, check to make sure that, indeed, when the antenna input level exceeds 30uV, Stereo will switch in.

FRONT END SCHEMATIC



MODEL RT-620 SCHEMATIC DIAGRAM



FUNCTION
(1) A M
(2) F M
(3) FM STEREO

CONTROLS
VR101 ST. MONO THRESHOLD CONTROL
VR301 SEPARATION CONTROL
VR901 MUTING LEVEL CONTROL
VR902 MUTING CONTROL
VR903 MUTING CONTROL
VR904 OUT PUT CONTROL

RESISTORS
K·· KILO OHM M··· MEG OHM
▲·· COMPOSITION RESISTORS 10% TOLERANCE ½ WATT
NON MARK·· CARBON RESISTORS 10% TOLERANCE ¼ WATT

CAPACITORS
10% TOLERANCE UNLESS OTHERWISE NOTED
(MY)·· MYLAR FILM CAPACITORS
(Ⓢ) ·· POLY STYROL CAPACITORS
⊣⊢··ELECTROLYTIC CAPACITORS
NON MARK··CERAMIC CAPACITORS

NOTE: When De-emphasis is at 50μ Sec., R325 and R328 values will be 2·35 Kohm (= 4·7K // 4·7 Kohm).

ENTIRE UNIT INOPERATIVE

I. If the pilot lamp dose not light,
  A. Check to see if the AC Power Supply Cord is properly connected to the power source.
  B. Check to see if there is adequate voltage from the power source,
  C. If A and B are OK,
    1. AC Power Supply Cord is cut, or
    2. Primary winding in the Power Transformer is cut, or
    3. Power switch connection is faulty.

II. If the pilot lamp dose light,
  A. And if the B voltage is not OK,
    1. Rectifier D902 is open, or
    2. Secondary winding in the Power Transformer (center tap, black lead) is cut, or
    3. Faulty grounding of Black Lead.
  B. And if the B voltage is OK,
    1. And if there is no signal output at OUTPUT jacks,
      a. Transistors Tr401 or 402 is shorted out or open, or
      b. Capacitor C401,402,403 or 404 are open, or
      c. Wires from the Function switch are cut.

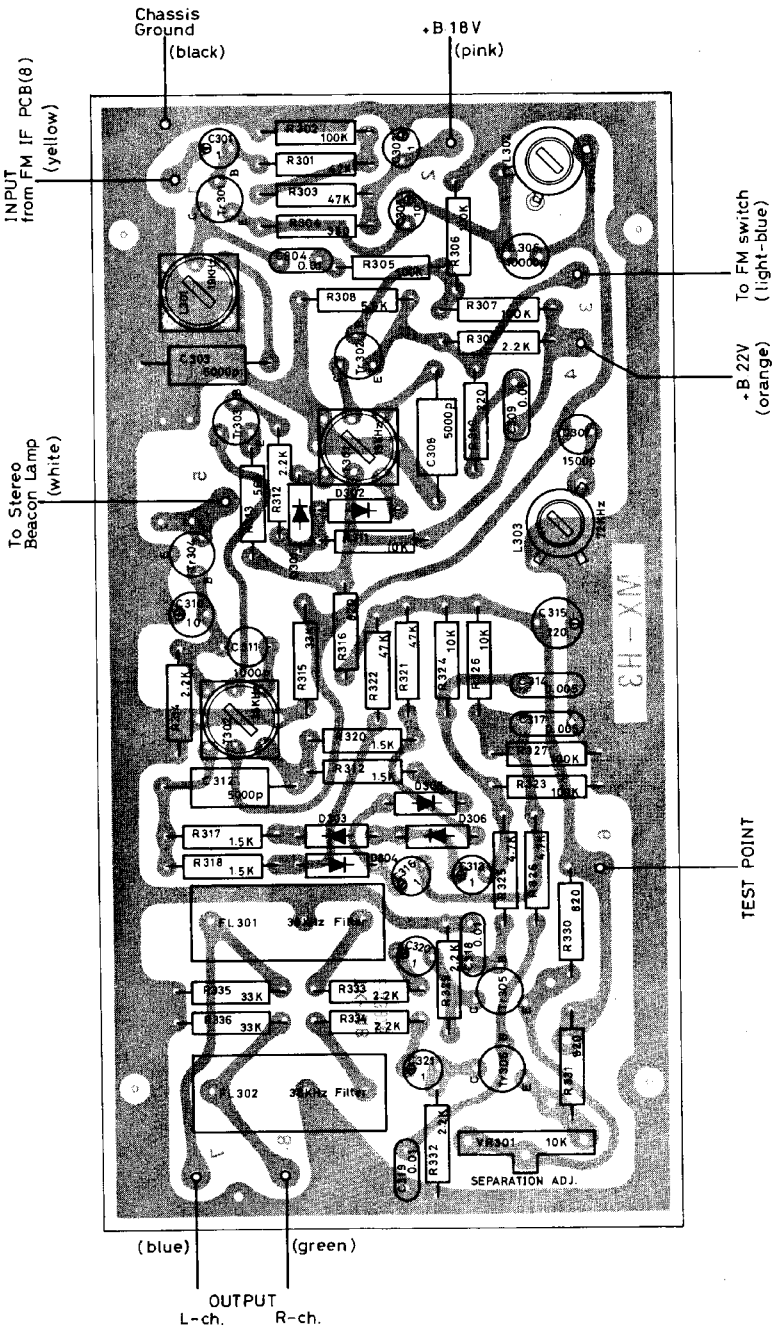
RADIO SECTION INOPERATIVE

I. If both AM and FM are FM inoperative,
  A. Measure voltage at B2 (refer to circuit diagram).
    1. If there is no voltage at B2,
      a. Capacitor C904 is faulty, or
      b. Zener Diode D901 is shorted out.
    2. If there is proper voltage at B2,
      a. Function switch connection is faulty, or
      b. Wire to the Function switch is cut.

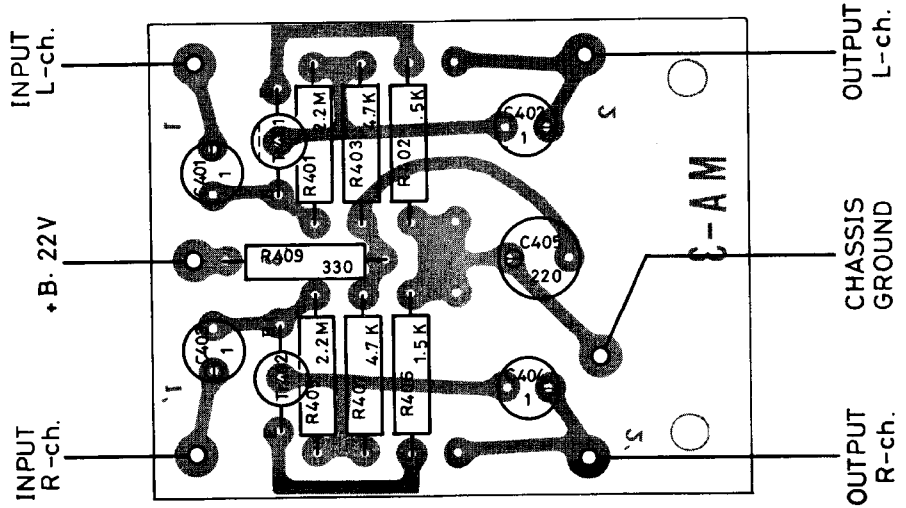
II. If only AM is inoperative,
  A. Measure voltage of AM IF PCB(4).
    1. If there is no voltage,
      a. Function switch connection is faulty, or
      b. Wire from Function switch is cut, or
      c. Capacitor C210 or 227 is faulty.
    2. If thefe is proper voltage,
      a. Capacitors C204,209 or 218 are faulty, or
      b. Transistors Tr201,202,203 or 204 are faulty, or
      c. Coils T201,202 or L901 are faulty, or
      d. AM IFT X201 or T203 is faulty.

III. If only FM is inoperative, check to see if FM-Stereo is working properly.
  A. If FM-Stereo is faulty, measure voltage at B3 and B4.
    1. If there is no voltage at B3.
      a. R902 is faulty, or
      b. C903 is faulty.
    2. If there is no voltage at B4,
      a. C302 or 902 is faulty, or
      b. R901 is faulty.
    3. If there is proper voltage,
      a. Function switch connection is faulty, or
      b. C301 is faulty, or
      c. Transistors Tr301,302 or 303 are faulty.
    4. If there is proper voltage at B5 but Stereo Lamp dose not light,
      a. Check for audibility of stereo signal.
        (1). If there is no signal output, then, check the above mentioned transistors.
        (2). If there is signal output, then, Stereo Lamp or transistor Tr304 is faulty.
    5. If Stereo Lamp stays on when signal changes from Stereo to mono,
      a. Transistor Tr304 is faulty.
  B. If FM-Stereo is OK, check FM IF circuit.
    1. If FM IF is not OK,
      a. Measure voltage of FM IF PCB(6).
        (1). If there is no voltage.
          (a). Function switch connection is faulty, or
          (b). Wire from Function switch is cut, or
          (c). C103,112,121 or 127 are faulty.
        (2). If there is proper voltage,
          (a). Transistors Tr101 or 107 is faulty. or
          (b). IC101 or 102 is faulty, or
          (c). C109,111,116 or 119 are faulty.
    2. If FM IF is OK,
      a. And if FM Front end is faulty,
        (1). Transistors Q1,2,3 or 4 are faulty.
      b. If FM Front end is OK,
        (1). Input circuit is grounded, or
        (2). FM antenna inproperly connected.

FM-Stereo CIRCUIT BOARD DIAGRAM



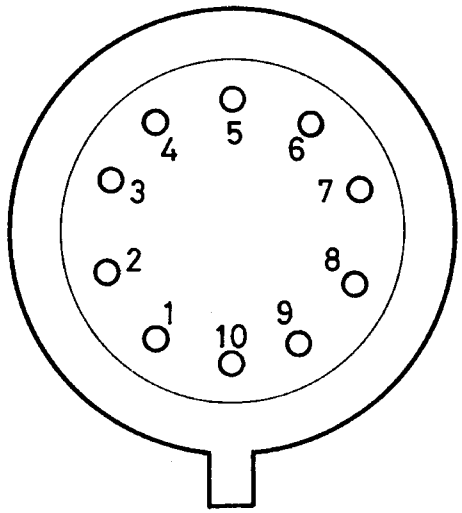
AUDIO AMP CIRCUIT BOARD DIAGRAM



NOTES: 1. Resistance is shown in ohms. K=1,000 M=1,000,000

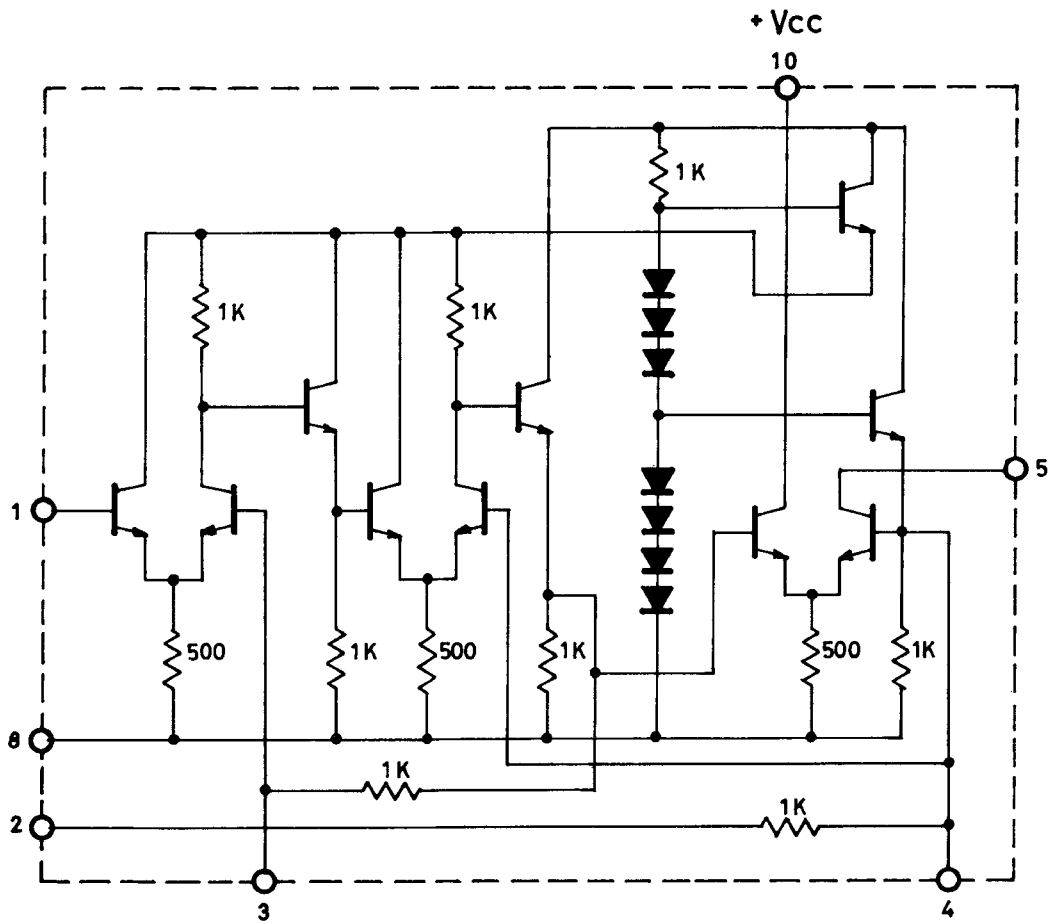
2. Capacitance is shown in mfd, unless otherwise noted.

INTEGRATED CIRCUIT TA7027M

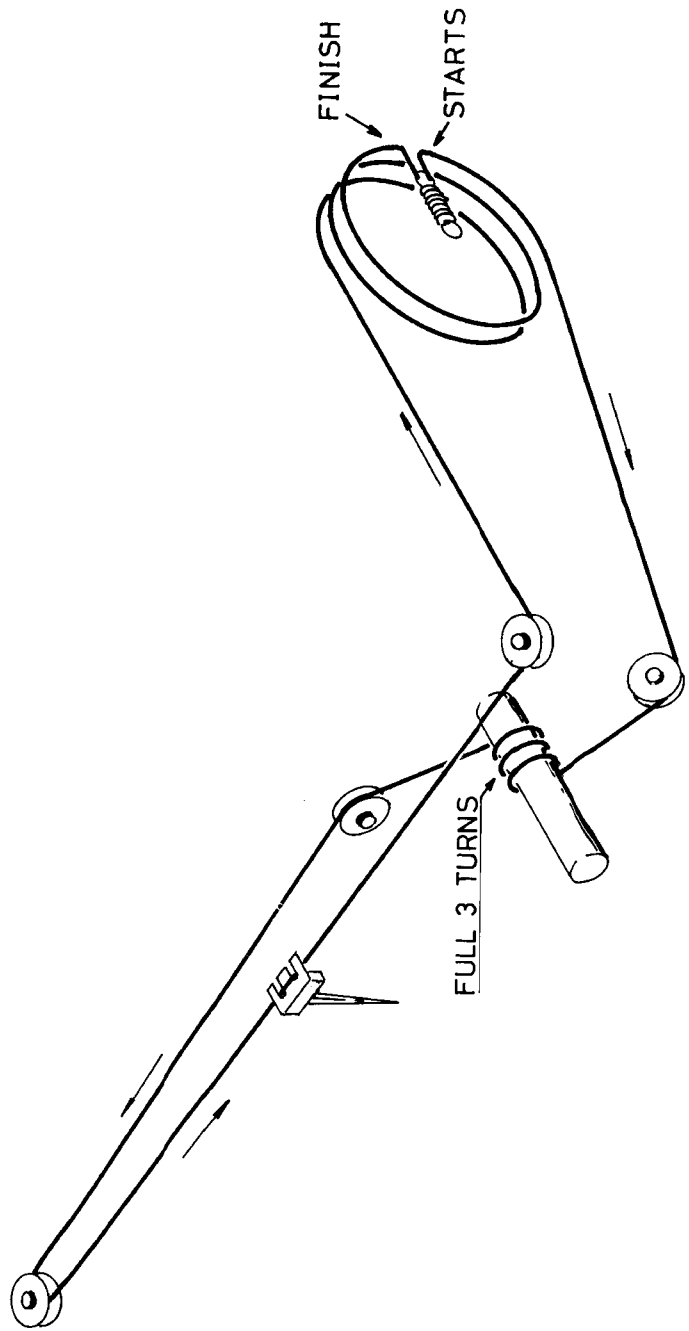


BOTTOM VIEW

INTEGRATED CIRCUIT TA7027M
SCHEMATIC DIAGRAM



DIAL STRINGING DIAGRAM



REPLACEMENT PARTS LIST

Roland Part No.	Symbol No.	Descriptions
TRANSISTORS		
301201117	Tr101,102,107,201,202,203, 204,	2SC829, FM IF amp, AM RF and IF amp, AM OSC, AM MIX, etc.
301001117	Tr104.	2SA564A, FM MODE Auto-switching
301101114	Tr305,306	2SB173, FM-Stereo Matrix amp.
301201115	Tr304	2SC828, FM-Stereo. Beacon Driver.
301001111	Tr302,303	2SA49, FM-Stereo 19KHz, 38KHz amp.
301201112	Tr103,105,106,401,402'	2SC536G, FM Muting, Audio amp. etc.
301901120	Tr301.	XA-495, FM Composite amp.
DIODES		
300313004	D901,	BZ-120, Zener 12V.
300919005	D902,	1S1850, Rectifier
300111008	D101,102,103,104,105,106, 107,108,201,202,203,204. 301,302,393,304,305,306.	FM Det., AM Det., MPX DX Dec., etc.
COILS & TRANSFORMERS		
205001315	T902,	Trans., Power Supply
228211125	T301,302	Trans., FM-Stereo 19KHz , 38KHz tune
228111125	L301,	Coil, FM-Stereo 19KHz tune
228641109	L303.	Coil, SCA Filter, 72KHz tune
228641110	L302.	Coil. SCA Filter, 67KHz tune
225501113	T101.	IFT, FM Ratio
225301124	T203.	IFT, AM 3rd
226501111	T901.	Trans. FM ANT. Matching
223301123	T202.	Coil, AM Local Oscillator
222391117	L901.	Coil, AM ANT.
226501113	T201.	Coil, AM RF.
220001121	L101,102,103,104,105,106.	Coil, RF choke, 47 uH
VARIABLE RESISTORS		
525301211	VR904.	Output Level Control, 50 Kohm
515301111	VR901.	Muting Level Control, 100 Kohm
510502118	VR101.	FM MODE Auto-switching Level Adj.
510502115	VR902,903.	Muting Level Adj.
510502102	VR301.	FM-Stereo Separation Adj.

Roland Part No.	Symbol No.	Descriptions
RESISTORS		
551022133	R903,904,905,906.	Solid, 220 ohm(K), $\frac{1}{2}$w
551033133	R902.	〃 , 330 ohm(K), $\frac{1}{2}$w
551056133	R901.	〃 , 560 ohm (K), $\frac{1}{2}$w
551022533	R401,402,907.	〃 , 2.2 Mohm(K), $\frac{1}{2}$w
552068023	R128.	Carbon Film, 68 ohm(K), $\frac{1}{4}$w
552010123	R120,121,133.	〃 , 100 ohm(K), $\frac{1}{4}$w
552033123	R304,409,104.	〃 , 330 ohm(K), $\frac{1}{4}$w
552047123	R115,125.	〃 , 470 ohm(K), $\frac{1}{4}$w
552056123	R313.	〃 , 560 ohm(K), $\frac{1}{4}$w
552082123	R316,330,331.	〃 , 820 ohm(K), $\frac{1}{4}$w
552010223	R103,105,108,111,113 116,117,118,124,126,127, 203,209,213,216,217.	〃 , 1Kohm(K), $\frac{1}{4}$w
552015223	R202,206,207,317,318,319, 320,402,406.	〃 , 1.5 Kohm (K), $\frac{1}{4}$w
552022223	R110,201,309,312,314,329, 222.	〃 , 2.2 Kohm (K), $\frac{1}{4}$w
552047223	R211,214,226,325,328,403, 407.	〃 , 4.7 Kohm (K), $\frac{1}{4}$w
552056223	R308.	〃 , 5.6 Kohm (K), $\frac{1}{4}$w
552010323	R102,123,129,130,210. 305,311,324,326.	〃 , 10 Kohm (K), $\frac{1}{4}$w
552015323	R107.	〃 , 15 Kohm (K), $\frac{1}{4}$w
552022323	R109,205,208,212,215,131.	〃 , 22 Kohm (K), $\frac{1}{4}$w
552033323	R315,335,336.	〃 , 33 Kohm (K), $\frac{1}{4}$w
552047323	R101,106,122,221,301,303, 132,306,307,321,322.	〃 , 47 Kohm (K), $\frac{1}{4}$w
552010423	R204,220,302,323,327,225,	〃 , 100Kohm (K), $\frac{1}{4}$w
552056423	R114.	〃 , 560Kohm (K), $\frac{1}{4}$w
552010523	R119.	〃 , 1Kohm (K), $\frac{1}{4}$w
552022123	R218,310.	〃 , 220 ohm (K), $\frac{1}{4}$w
CAPCITORS		
401100439	C905.	Electrolytic, 1,000 mfd, 35V(ST)
401470539	C903.	〃 , 470 mfd,35V(ST)
401220419	C904.	〃 , 2,200mfd,16V(ST)
401220529	C902.	〃 , 220mfd, 25V(ST)
402220519	C315,405.	〃 , 220mfd, 16V(SU)
402100509	C227.	〃 , 100mfd, 6.3V(SU)
402100629	C120,219,220,305,310.	〃 , 10mfd, 25V(SU)
402100749	C125,130,202,206,217,223.	〃 , 1mfd, 50V(SU)
402330709	C116.	〃 , 33mfd, 6.3V(SU)

Roland Part No.	Symbol No.	Descriptions
CAPCITORS——Continued		
402100749	C301,302,313,316,320,321, 401,402,403,404	Electrolytic, 1 mfd. 50V(SU)
453501033	C303,308,312.	Polystren Film, 5,000pF(K), 50 V
454101073	C311.	〃 , 1,000pF(K),125 V
454151032	C307.	〃 , 1,500pF(J), 50 V
454100933	C306.	〃 , 10,000pF(K), 50 V
450500933	C309.	Mylar Film, 0.05 mfd(K), 50V
450100933	C304,318,319,906,907.	〃 , 0.01 mfd(K), 50V
450501033	C314,317.	〃 , 0.005mfd(K), 50V
440500935	C205,209,210,216,218.	Ceramic, 0.05 mfd, 50V
440100985	C101,103,106,107,109,110, 111,112,115,117,118,119, 121,122,123,126,127,201, 203,204,208,208,211,212, 221,222.	, 0.01 mfd, 250V
440501183	C214.	〃 , 500 pF(K), 250V
440201183	C128,129,131.	〃 , 200 pF(K). 250V
440101183	C104,105,108,114,226.	〃 , 100 pF(K), 250V
440501283	C206.	〃 , 50pF (K), 250V
440301283	C113,124,207.	〃 , 30pF (K), 250V
440101283	C213.	〃 , 10pF (K), 250V
440501388	C901.	〃 , 5pF ± 0.5pF, 250V
440301388	C228	〃 , 3pF ± 0.5pF, 250V
441301336	C215.	〃 , 3pF(N5.6), 50V
MISCELLANEOUS		
321304366		AM / FM Front end
229101129	X201.	Ceramic Filter, AM IF
229101127	X102.	〃 , FM IF 2nd
229101125	X101.	〃 , FM IF 1st
303452141	IC101,102.	IC, TA7027M, FM IF 2nd, 3rdamp.
231310009		Tuning Meter
351080015		Lamp, Dial Pointer, 8V 0.15A
352063028		Lamp, Dial Illumination, 6.3V 0.28A
351140008		Lamp, FM-Stereo Beacon, 14V 80mA
614051004		Push switch 5 keys
614061204		Power switch,
120311215		AM ANT. Ring

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Roland Electronics Co., Ltd. Main Office: 1-36-8 Ohokayama, Meguro-ku, Tokyo, Japan
Chofu Plant: 3-60-3 Kamiishihara, Chofu-shi, Tokyo, Japan

Rotel Electronics Co., Ltd. Offices & Plants: 310, Sec. 5, Nanking E. Road, Taipei, Taiwan

Rolecor of America Inc. Main Office: 2640 Central Ave., Yonkers, New York 10710, U.S.A.

835201210

Printed in Japan March, '72