ROTEL

Model RX-150A

AM/FM Stereo

Solid State Receiver

Technical Manual

ROTEL

ROTEL®

Model RX-150A

AM/FM Stereo

Solid State Receiver

Techical Manual

—Supplement—

Applicable from the unit

of Serial No. 7221933

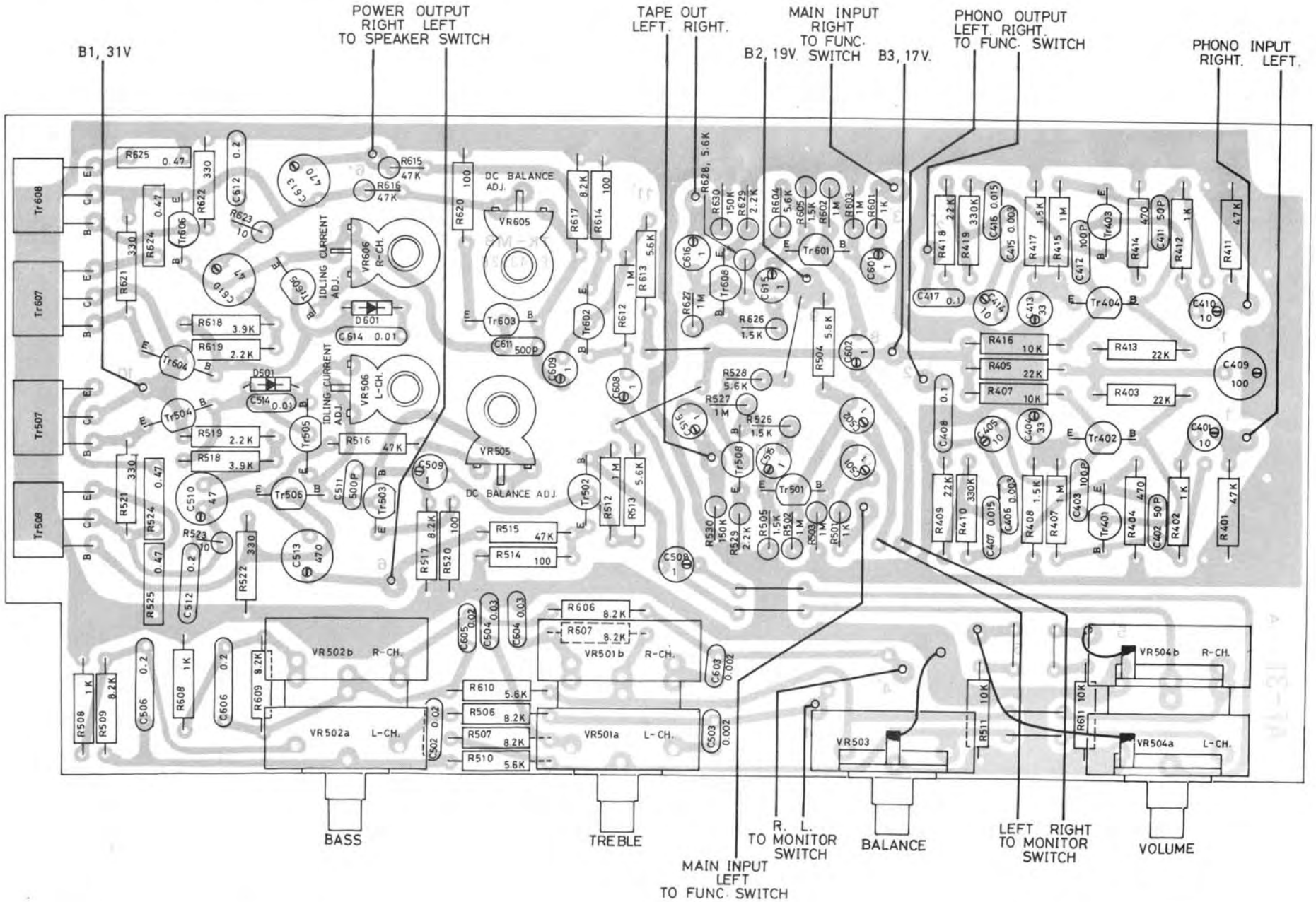
EXPLANATION

The following modifications on model RX-150A were made, from production lot starting with unit Serial No. 7221933 on.

1. Tape Monitor Switch is provided in replacement of Mode Switch.
2. Function Selector positions are changed from (AM-FM AUTO-PHONO-TAPE 1-TAPE 2) to (AM-FM-FM STEREO-PHONO-TAPE/AUX)
3. Main Amp. Circuit Board is changed to provide Tape Monitor facility.
   New part numbers:
   Main Amp. Printed Circuit Board: 140600653
   Main Amp. PCB Assembly: 141610233
4. Circuit for FM output (mono)is added.
5. Volume Control is changed from 50K ohm (Part No. 525121112)to 100K ohm(Part No. 525121114).
6. Balance Control is changed from 100K ohm (Part No. 515121112)to 250K ohm (Part No. 515121114).
7. Transistor Tr 304 for FM Stereo Indicator is changed from 2SC828 (Part No. 30120 1115)to 2SC1383(Part No. 301201138).

ROTEL

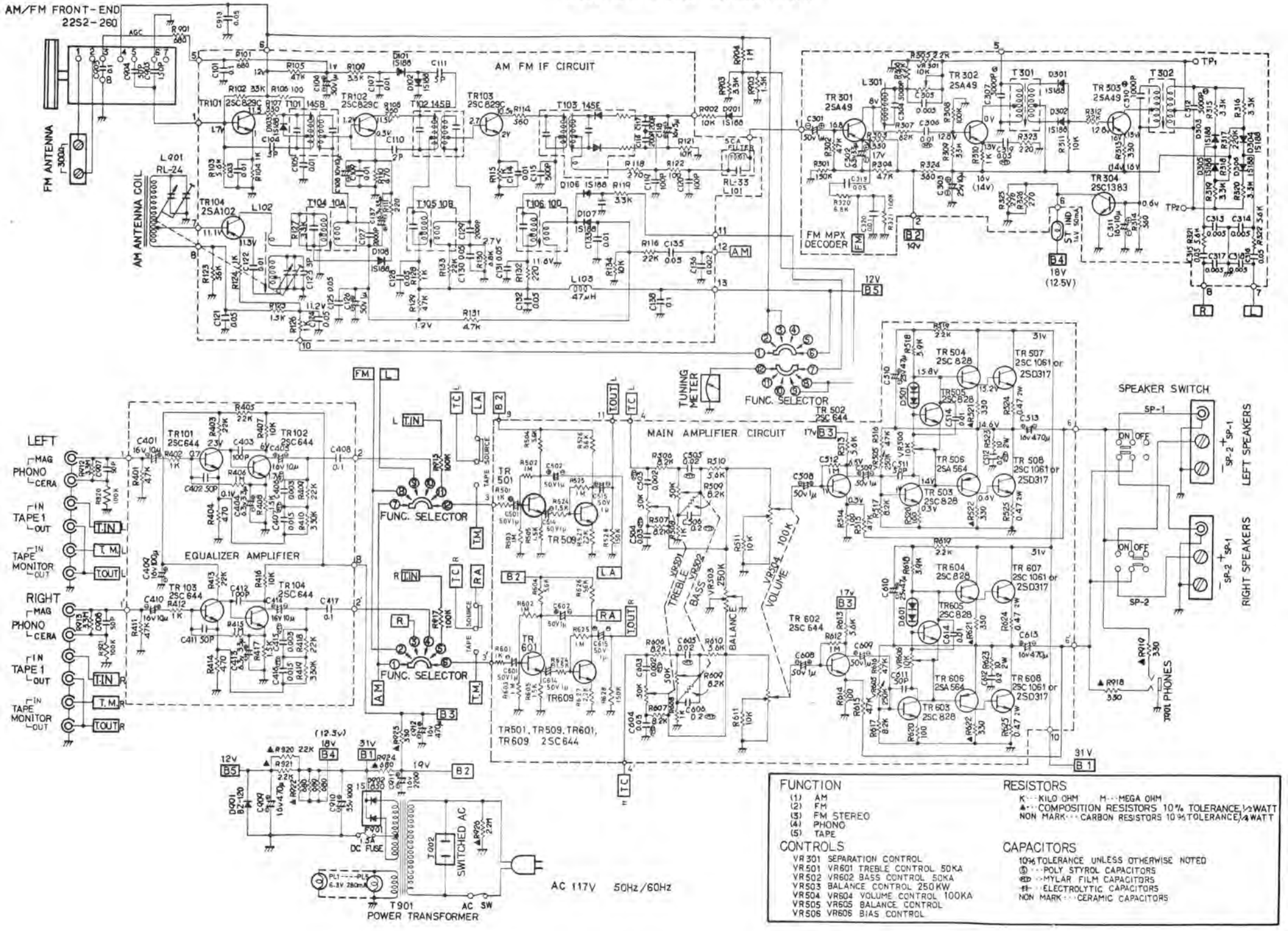
MAIN AMP. CIRCUIT BOARD DIAGRAM



Notes:

1. Unless otherwise noted in the diagram, all capacitor values are expressed in MFD.
2. Resistance is shown in ohms.
   K = 1,000 M = 1,000,000

SCHEMATIC DIAGRAM



FUNCTION

(1) AM
(2) FM
(3) FM STEREO
(4) PHONO
(5) TAPE

CONTROLS

VR301 SEPARATION CONTROL
VR501 VR601 TREBLE CONTROL 50KA
VR502 VR602 BASS CONTROL 50KA
VR503 BALANCE CONTROL 250KW
VR504 VR604 VOLUME CONTROL 100KA
VR505 VR605 BALANCE CONTROL
VR506 VR606 BIAS CONTROL

RESISTORS

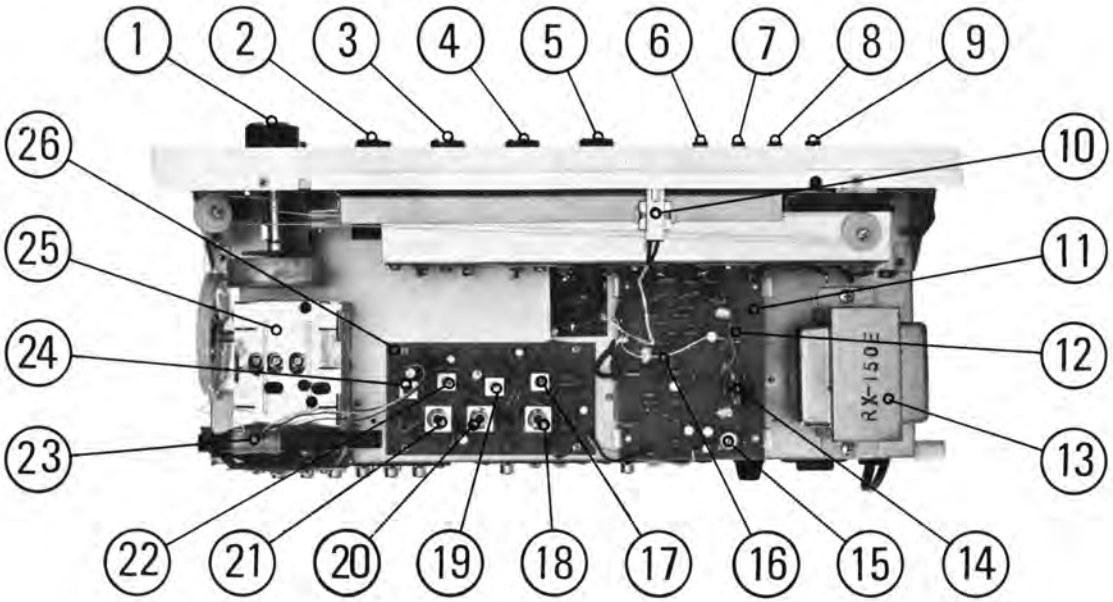
K···KILO OHM M···MEGA OHM
▲···COMPOSITION RESISTORS 10% TOLERANCE 1/2WATT
NON MARK···CARBON RESISTORS 10% TOLERANCE 1/4WATT

CAPACITORS

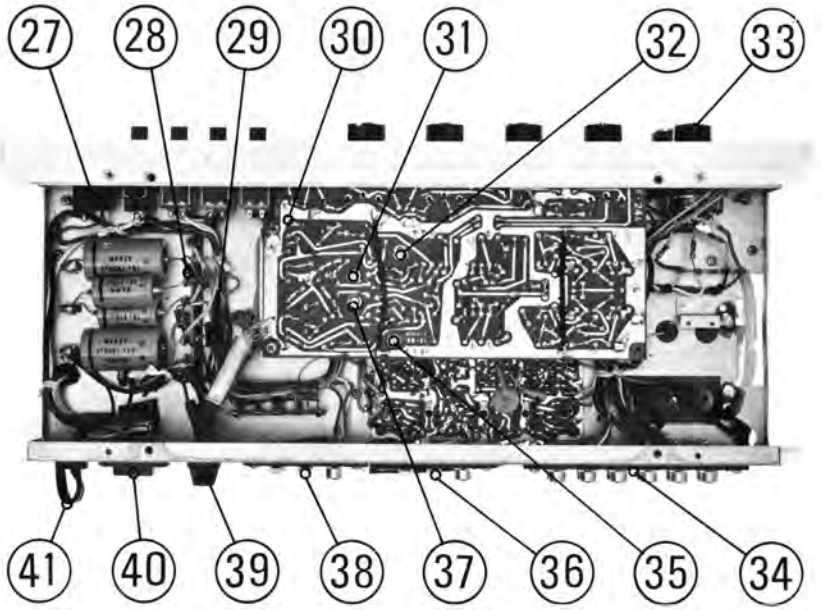
10% TOLERANCE UNLESS OTHERWISE NOTED
Ⓢ···POLY STYROL CAPACITORS
Ⓜ···MYLAR FILM CAPACITORS
ⓔ···ELECTROLYTIC CAPACITORS
NON MARK···CERAMIC CAPACITORS

CHASSIS LAYOUT

TOP VIEW

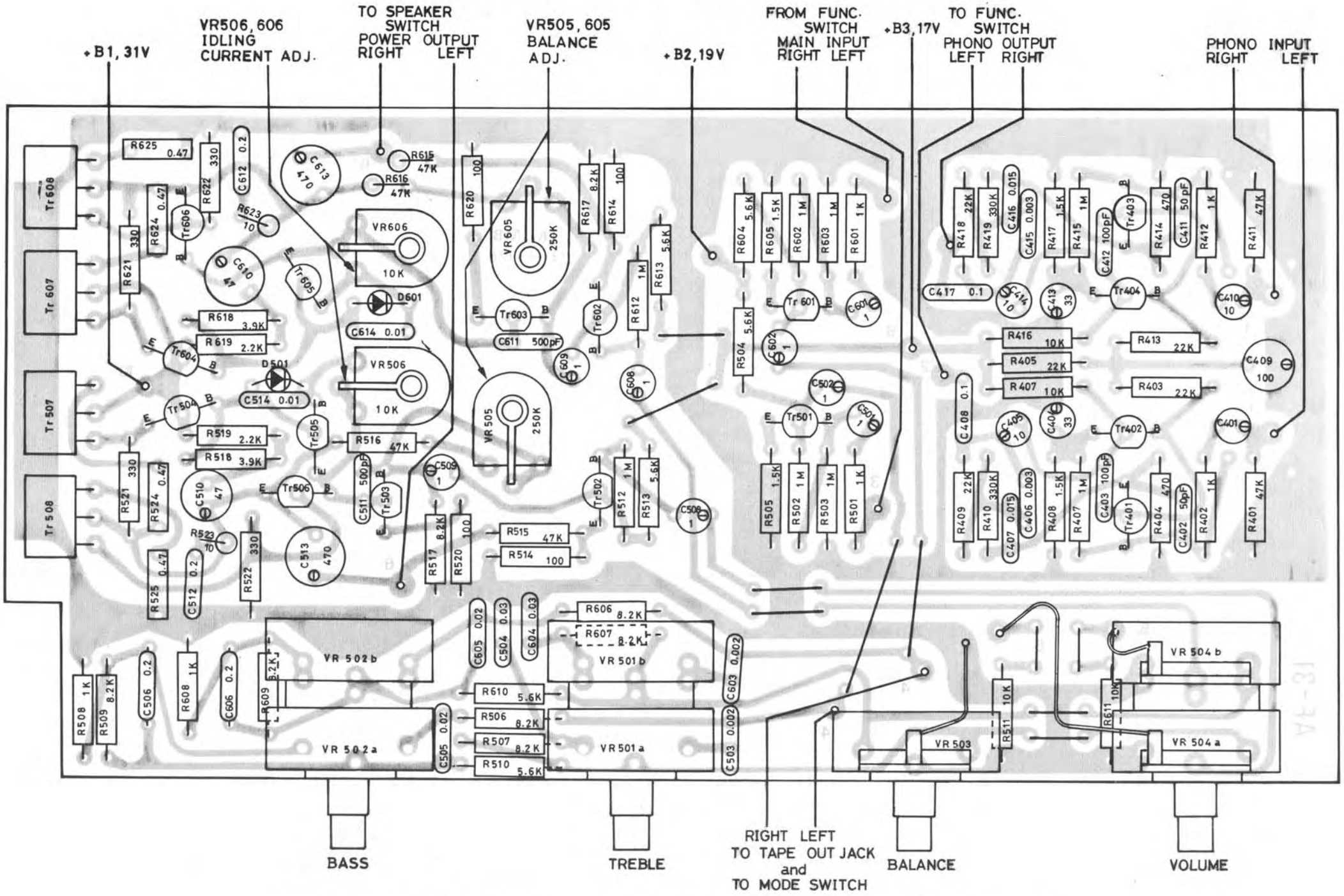


BOTTOM VIEW



1. Tuning Knob
2. Volume Control
3. Balance Control
4. Treble Control
5. Bass Control
6. Mode Switch
7. Speaker Switch (SP-2)
8. Speaker Switch (SP-1)
9. Power Switch
10. Dial Pointer w/Stereo Lamp
11. MPX Circuit Board
12. T302, MPX Trans. 38KHz
13. Power Transformer
14. VR301, Separation Adj.
15. L301, MPX Coil 19KHz
16. T301, MPX Trans. 19KHz
17. T106, AM IFT
18. T103, FM IFT
19. T105, AM IFT
20. T102, FM IFT
21. T101, FM IFT
22. T104, AM IFT
23. AM Antenna Coil
24. L102, AM OSC Coil
25. AM FM Front end
26. AM FM IF Circuit Board
27. Headphone Jack
28. D901, Zener Diode
29. D902, Rectifier
30. Audio Amp. Circuit Board
31. VR506, Idling Current Adj. (L ch)
32. VR505, DC Balance Adj. (L ch.)
33. Function Selector
34. Input Terminal
35. VR605, DC Balance Adj. (R ch.)
36. Output Terminal (R ch.)
37. VR606, Idling Currnte Adj. (R ch)
38. Output Terminal (L ch.)
39. Fuse 1.5A
40. AC Outlet
41. AC Supply Cord

AUDIO AMP CIRCUIT BOARD DIAGRAM



NOTES: 1. Unless otherwise noted in the diagram, all capacitor values are expressed in MFD.

2. Resistance is shown in OHMS. K=1,000 M=1,000,000

ALIGNMENT PROCEDURE

PRECAUTIONS

1. Always disconnect the chassis from power line when soldering. Turning the power switch OFF is not enough. Power line leakage passing through the heating element may destroy the 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.
3. Replacement for output and driver transistors, if necessary, must be made from the same beta group as the original type.
4. If one output transistor burns out (open or short) always remove all output transistors in that channel and check the bias adjustment, the control and other parts in the network with an ohm-meter before inserting a new transistor. All transistors in one channel will be destroyed if the base biasing circuit is open on the emitter end.
5. When mounting a replacement power transistor, be sure the bottom of the flange, the mica insulators and the surface of the heat sink are free of foreign matter, ... for they may cause transistor failure.
6. Silicon grease must be applied between the transistor and the mica insulator, and between the mica insulator and the heat sink for better heat conduction.

PRE-DRIVER/DRIVER ADJUSTMENT

1. Set BALANCE, BASS and TREBLE controls to mid-position.
2. Set MODE switch to "STEREO", SPEAKER switch to "ON" and SELECTOR switch to TAPE-1 position.
3. Connect 8 ohm, 20 watts resistor across Left speaker terminals. Then, in parallel with load resistor, connect a VTVM and the vertical input leads of an oscilloscope.
4. Connect an audio signal generator to Left channel, TAPE-1 input and apply 1,000Hz (sine wave) signals.
5. Connect AC power cord and rotate Volume Control clockwise..... full volume. Increase generator output until sine wave on scope just starts clipping. Adjust DC Balance VR505 (on Driver Circuit Board) for equal clipping on the positive and negative half cycles of the signal (see Figure 1).
6. Rotate Volume Control counterclockwise to get 0.9 volts RMS across 8 ohm (0.1 W) on VTVM. Adjust Idling Control VR506 (on Driver Circuit Board) until ideal response appears on scope (see Figure 2-1). Or adjust idling current using a DC milli-volt meter across R525 resistor (on Driver Circuit Board), rotate Idling Adjust Control VR506 to obtain a 10mV reading on DC milli-volt meter (no signal input). See Figure 2-2.
7. Repeat the steps 3 through 6 as above for Right channel. (Use VR605, 606 and R625).

Fig. 1 DC BALANCE ADJUSTMENT

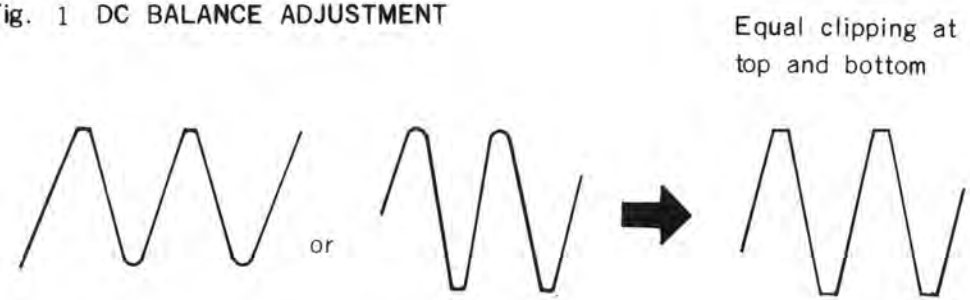
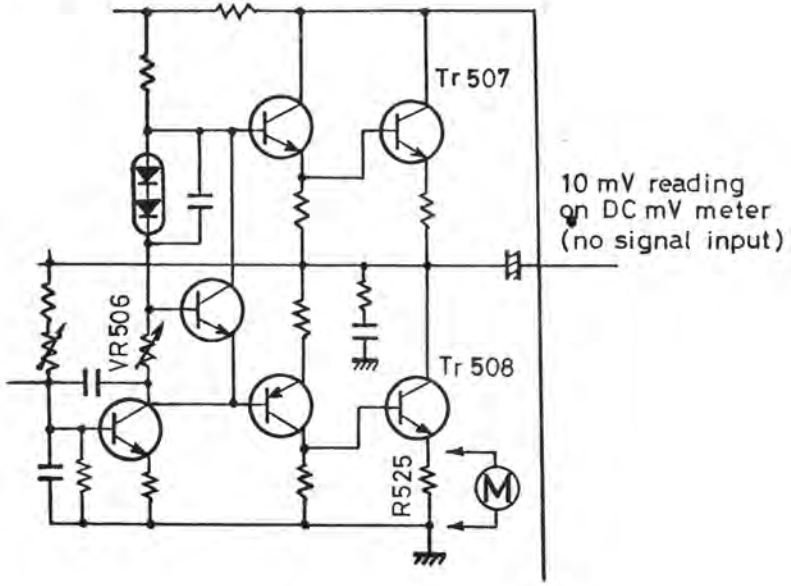


Fig. 2-1 CROSSOVER DISTORTION ADJUSTMENT

Fig. 2-2 IDLING CURRENT ADJUSTMENT



AM ALIGNMENT

Instruments: AM Signal Generator, AC VTVM and Oscilloscope.

NOTE: Set Selector switch to "AM" position.

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

Step	Signal Generator		Tuning Dial Setting	Output Indicator	Adjust	Adjust for
	Coupling	Frequency		Connected to		
1	Tr104 Base through a 0.01uF capacitor	455KHz (400 Hz 30%)	Any Non-interfering setting at Low end of Scale.	VTVM and Oscilloscope L or R chan. TAPE OUT terminal	T106, 105 and 104	Maximum reading on VTVM
2	Connect to short loop of wire. Radiate signal into ferrite loopstick antenna.	600KHz (400 Hz 30%)	600KHz		L102 (OSC Coil) & L901 (ANT Coil)	
3		1400KHz (400 Hz 30%)	1400KHz		CT2 (OSC) CT1 (ANT) (AM FM Front end)	
4	Repeat steps 2 and 3 until no further improvement is possible.					

FM ALIGNMENT

Instruments: FM Signal Generator, VTVM, Oscilloscope and Distortion meter.
Set Selector switch to "FM AUTO"

Step	Signal Generator		Tuning Dial Setting	Output Indicator	Adjust	Adjust for
	Connect to	Frequency		Connected to		
1	Junction of C904 & C905	10.7MHz (unmodulated)	Quiet point on band	VTVM junction of R130, 133, and C129	T102 & 101 Top & Bottom	Maximum reading on VTVM
2				Oscilloscope & VTVM (must be aligned to null point in mid-range) junction of R122, C120	T103 Top & Bottom	ZERO voltage on VTVM
3	Repeat steps 1 and 2 as necessarily till obtain a balanced "S" curve.					
4	FM antenna terminals	98MHz (400Hz 100% modulation)	Tuning for maxmum output point	Oscilloscope to TAPE OUT	T102 T101 & T2 (FM Front end) Top & Bottom	Maximum Amplitude on scope
5				Distortion meter to TAPE OUT	T103 Top & Bottom fine Adjust	Minimum Distortion on Meter
5		90MHz	90MHz	VTVM to TAPE OUT	L3 & L1 (FM Front end)	Maximum reading on VTVM
7		106MHz	106MHz		CT4 & CT3 (FM Front end)	
8	Repeat steps 6 and 7 until no further improvement is possible.					

MPX ALIGNMENT

Instruments: FM Stereo Generator, VTVM and Oscilloscope.
Set Selector switch to FM AUTO.
NOTE: The FM IF Amplifier Alignment must be completed before attempting this MPX Alignment. Poor IF alignment would result in poor Multiplex Adjustment.
Set MPX Separation VR301 (located on MPX board) to mid-position before starting this procedure. Connect Stereo Generator to FM antenna terminals.
Keep Stereo Generator output level at 1-2mV during this adjustment.

Step	Stereo Generator		Output Indicator	Adjust	Adjust for
	Modulation	RF. Deviation	Connected to		
1	19KHz Pilot only	1 — 2%	VTVM & Oscilloscope — Test Point TP2	L301 T301 T302	Maximum reading on VTVM
2	Composite 1KHz signal to L channel only	Pilot 10% Signal 70%	VTVM & Oscilloscope — L chan. TAPE OUT	T301	Maximum Clean sine wave on scope.
3	Composite 1KHz signal to R channel only			VR301	Minimum reading on VTVM.
4	Same as in step 2		VTVM & Oscilloscope — R chan. TAPE OUT		
5	Repeat steps 3 and 4 until no further improvement is possible.				

AM FM FRONT-END LAYOUT & SCHEMATIC DIAGRAM

Fig. 3－1 TOP VIEW

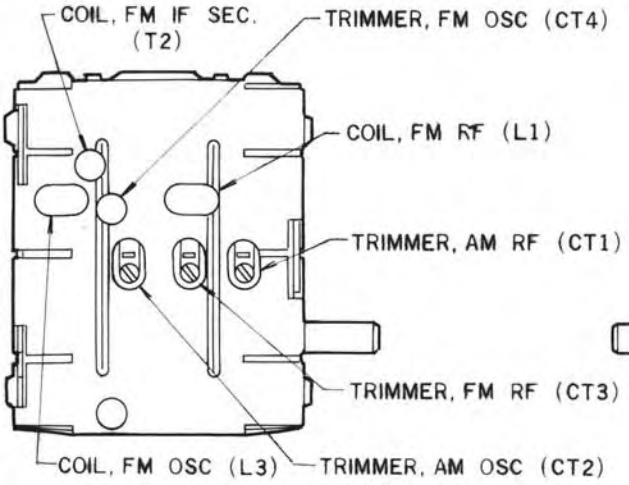
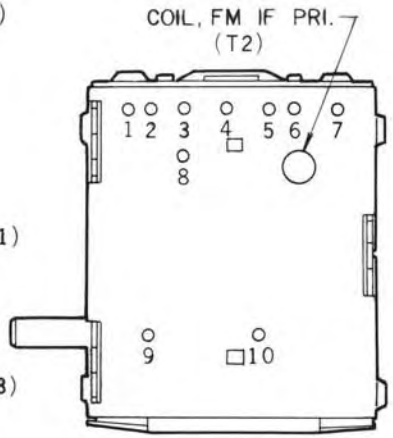


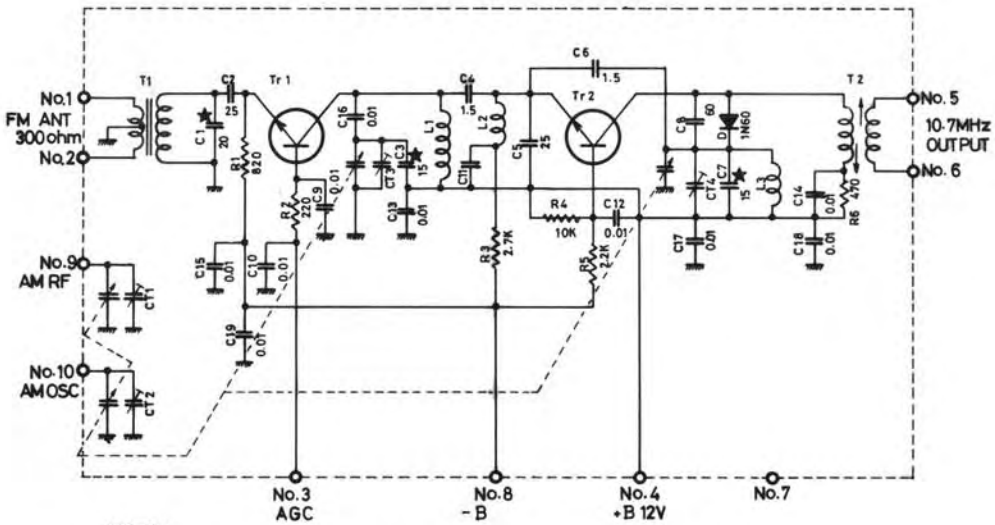
Fig. 3－2 BOTTOM VIEW



DESCRIPTION OF TERMINAL PINS

No.1: No.2: ANTENNA, 300ohm BALANCED.
No.3: A.G.C
No.4: +B, 12V
No.5: IF, HOT
No.6: IF, COLD
No.7: N.C.
No.8: －B, GND
No.9: AM RF
No.10: AM OSC

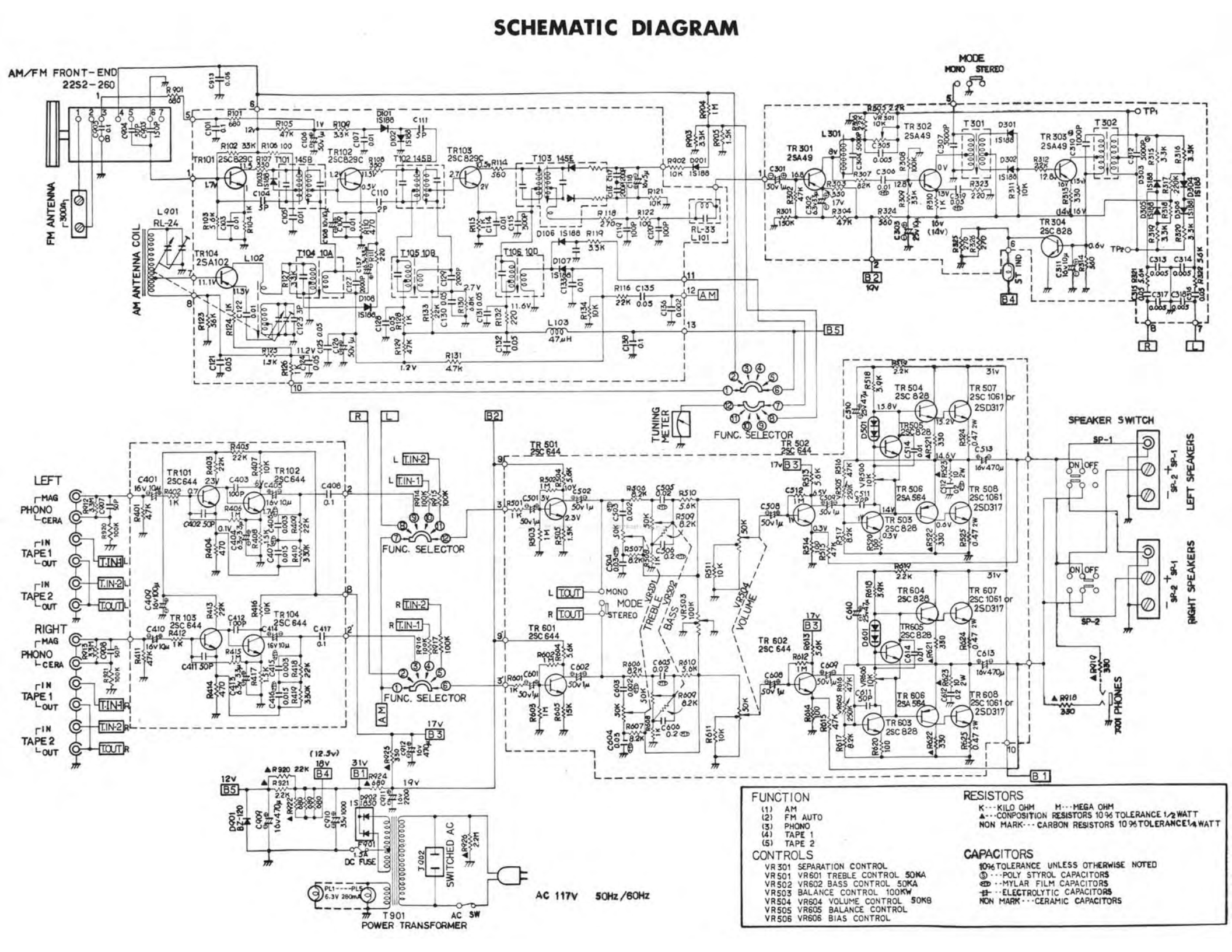
AM /FM FRONT-END "22S2-260" CIRCUIT DIAGRAM



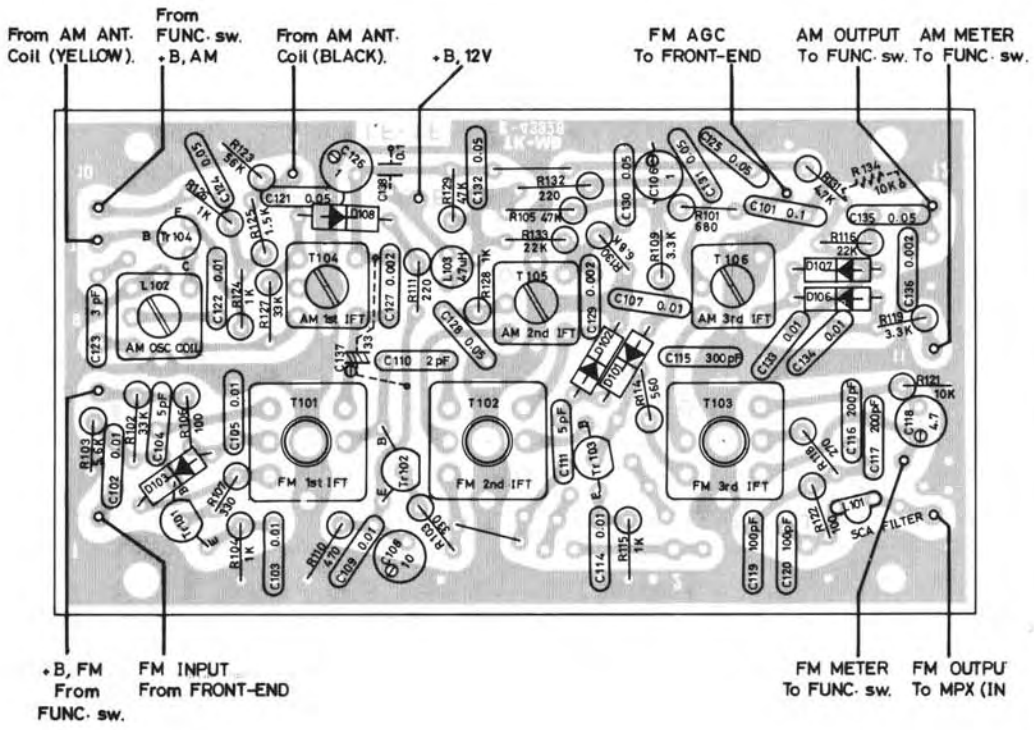
NOTES:

1. ALL CAPACITY VALUES IN uuF EXCEPT DECIMAL VALUES IN uF.
2. ALL RESISTANCE VALUES IN OHMS.
3. AGC VOLTAGE IS 1.4V UPPER FOR －B WHEN INPUT ZERO LEVEL.
4. ★ MARKS INDICATE ADJUSTABLE IN PRODUCTION.

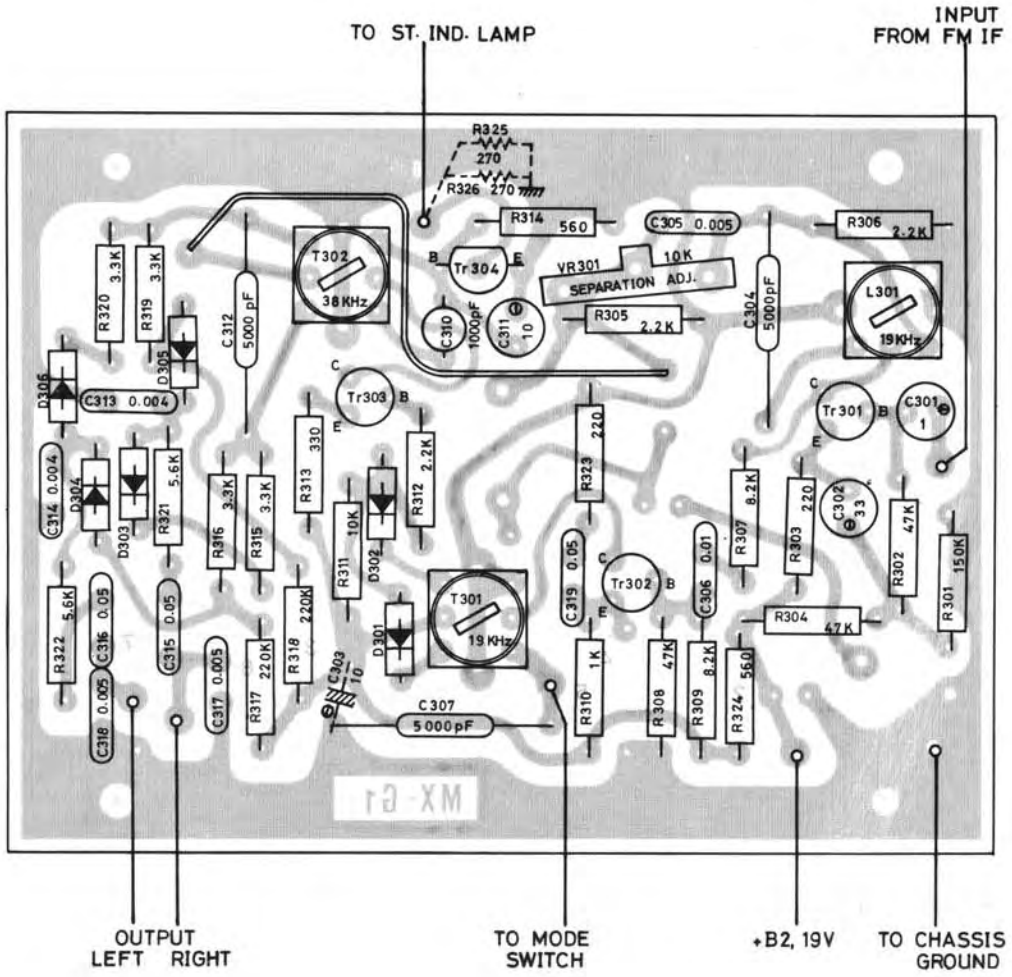
SCHEMATIC DIAGRAM



AM/FM IF CIRCUIT BOARD DIAGRAM



FM MPX CIRCUIT BOARD DIAGRAM



NOTES: 1. Unless otherwise noted in the diagram, all capacitor values are expressed in MFD.

1. Resistance is shown in OHMS. K=1,000 M=1,000,000

ENTIRE UNIT INOPERATIVE

I. If the pilot lamp does 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 does light,
  A. Check to see if the DC fuse is not blown.
    1. If the DC fuse is blown,
      a. Output Circuits (including the speakers) are shorted out, or
      b. +B Circuits are shorted out, due to faulty C910 or faulty Transistors Tr507, 508, 607, 608, 504, 506, 604 or 606, or
      c. Faulty C513 or 613,
    2. If the DC fuse is OK,
      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 Wire, or
        (4). Faulty DC fuse connection.
      b. And if the B voltage is OK,
        (1). And if there is signal output at the TAPE OUT jack,
          (a). Transistors Tr502, 503, 504, 506, 602, 603, 604, or 606 are faulty, or
          (b). C508, 509, 608 or 609 are faulty.
        (2). And if there is no signal output at TAPE OUT jack,
          (a). Transistors Tr501 or 601 are shorted out or open, or
          (b). C501, 502, 601, or 602 are open, or
          (c). Wires from the Function Switch are cut.

ONLY PHONO SECTION INOPERATIVE

I. If there is no fault in the wires to the Pre-amplifier circuit board,
  A. Transistors Tr401, 402, 403 or 404 are shorted out or open, or
  B. C401, 405, 408, 409, 414 or 417 are faulty, or
  C. Function Switch connection is faulty.

TONE CONTROLS INEFFECTIVE

I. C503, 504, 505, 506, 603, 604, 605 or 606 are faulty.

RADIO SECTION INOPERATIVE

I. If both AM and FM are inoperative,
  A. Measure voltage at B5 (refer to circuit diagram),
    1. If there is no voltage at B5,
      (a). Capacitor C909 is faulty, or
      (b). Zener Diode D901 is shorted out.
    2. If there is proper voltage at B5,
      (a). Function Switch connection is faulty, or
      (b). Wire to the Function Switch cut, or
      (c). Transistors Tr102 or 103 are shorted out or open, or
      (d). C108, 109, 114, 115, 128, 130, 131, 132 or 138 are faulty.

II. If only AM is inoperative,
  A. Measure voltage of IF Circuit Board (10).
    1. If there is no voltage,
      (a). Function Switch connection is faulty, or
      (b). C124 is faulty, or
      (c). Wire from Function Switch is cut.
    2. If there is proper voltage,
      (a). Transistors Tr104 is faulty, or
      (b). Coils L102 or 901 is faulty, or
      (c). AM IFT T104, 105 or 106 are faulty.

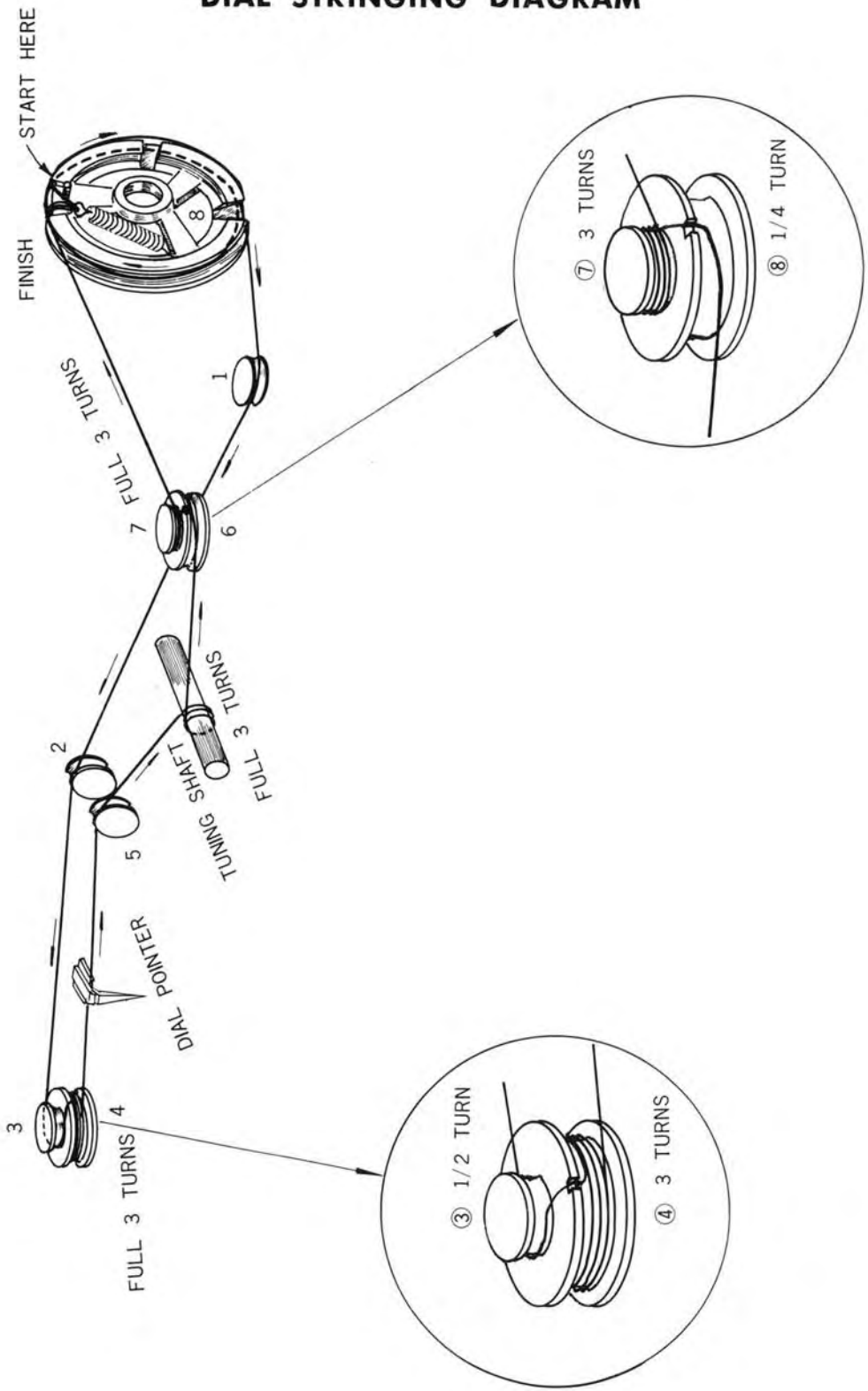
III. If only FM is inoperative, check to see if MPX is working properly.
  A. If MPX is faulty, measure voltage at B2.
    1. If there is no voltage at B2,
      (a). C911 is faulty, or
      (b). R924 is faulty.
    2. If there is proper voltage,
      a. C301 is faulty, or

b. Transistors Tr301, 302, or 303 are faulty.

3. If there is proper voltage at B4 but Stereo Lamp does not light.
   a. Check for audibility of stereo signal.
      (1). If no stereo signal is heard from speakers, then, check the above mentioned transistors on item 2b.
      (2). If stereo signal is heard, then, stereo lamp or Transistor Tr304 is faulty.
4. If Stereo Lamp stays on when signal changes from stereo to mono.
   a. Transistor Tr304 is faulty.

B. If MPX is OK, check FM IF circuit.
1. If FM IF is not OK,
   a. Measure voltage of IF Circuit Board (6).
      (1). If there is no voltage.
         (a). Function Switch connection is faulty, or
         (b). Wire from Function Switch is cut, or
         (c). C105 is faulty.
      (2). If there is proper voltage,
         (a). Transistor Tr101 is faulty, or
         (b). C103 or 105 is faulty.
2. If FM IF is OK,
   a. And if FM Front-end is faulty,
      (1). Transistors Tr1 or 2 is faulty, or
      (2). C13, 15, 17, 18, or 19 are faulty.
   b. If FM Front-end is OK,
      (1). Input circuit is grounded, or
      (2). FM antenna inproperly connected.

DIAL STRINGING DIAGRAM



REPLACEMENT PARTS LIST

CAPACITORS

Part No.	Description
401100439	Electrolytic, 1000mfd, 35V, (ST)
401220419	Electrolytic, 2200mfd, 16V, (ST)
401470519	Electrolytic, 470mfd, 16V, (ST)
402330609	Electrolytic, 33mfd, 6.3V, (SU)
402470519	Electrolytic, 470mfd, 16V, (SU)
402100519	Electrolytic, 100mfd, 16V, (SU)
402100629	Electrolytic, 10mfd, 25V, (SU)
402470629	Electrolytic, 47mfd, 25V, (SU)
402470729	Electrolytic, 4.7mfd, 25V, (SU)
402100749	Electrolytic, 1mfd, 50V, (SU)
450200833	Mylar Film, 0.2mfd(K), 50V
450100933	Mylay Film, 0.01mfd(K), 50V
450150933	Mylar Film, 0.015mfd(K), 50V
450200933	Mylar Film, 0.02mfd(K), 50V
450300933	Mylar Film, 0.03mfd(K), 50V
450500933	Mylar Film, 0.05mfd(K), 50V
454101073	Polystyren Film, 1000pF(K), 125V
453471033	Polystyren Film, 4700pF(K), 50V
440100835	Ceramic, 0.1mfd, 50V
440100985	Ceramic, 0.01mfd, 250V
440500935	Ceramic, 0.05mfd, 50V
440201085	Ceramic, 0.002mfd, 250V
440301183	Ceramic, 300pF(K), 250V
440201183	Ceramic, 200pF(K), 250V
440151183	Ceramic, 150pF(K), 250V
440101183	Ceramic, 100pF(K), 250V
440501283	Ceramic, 50pF(K), 250V
440501388	Ceramic, 5pF 250V
440201388	Ceramic, 2pF 250V
441301336	Ceramic, 3pF(N5.6), 50V
442501083	Ceramic, 0.005mfd(K), 250V
442401083	Ceramic, 0.004mfd(K), 250V
442201083	Ceramic, 0.002mfd(K), 250V

RESISTORS

Part No.	Description
551010033	Solid, 10 ohm(K), 1/2W
551027133	Solid, 270 ohm(K), 1/2W
551033133	Solid, 330 ohm(K), 1/2W
551047133	Solid, 470 ohm(K), 1/2W
551068133	Solid, 680 ohm(K), 1/2W
551022233	Solid, 2.2Kohm(K), 1/2W
551022533	Solid, 2.2Mohm(K), 1/2W
552010123	Carbon Film, 100 ohm(K), 1/4W
552022123	Carbon Film, 220 ohm(K), 1/4W
552027123	Carbon Film, 270 ohm(K), 1/4W
552033123	Carbon Film, 330 ohm(K), 1/4W
552047123	Carbon Film, 470 ohm(K), 1/4W
552056123	Carbon Film, 560 ohm(K), 1/4W
552068123	Carbon Film, 680 ohm(K), 1/4W
552039123	Carbon Film, 390 ohm(K), 1/4W
552010223	Carbon Film, 1Kohm(K), 1/4W
552015223	Carbon Film, 1.5Kohm(K), 1/4W
552022223	Carbon Film, 2.2Kohm(K), 1/4W
552033223	Carbon Film, 3.3Kohm(K), 1/4W
552047223	Carbon Film, 4.7Kohm(K), 1/4W
552056223	Carbon Film, 5.6Kohm(K), 1/4W
552068223	Carbon Film, 6.8Kohm(K), 1/4W
552039223	Carbon Film, 3.9Kohm(K), 1/4W
552010323	Carbon Film, 10Kohm(K), 1/4W
552022323	Carbon Film, 22Kohm(K), 1/4W
552033323	Carbon Film, 33Kohm(K), 1/4W
552047323	Carbon Film, 47Kohm(K), 1/4W
552056323	Carbon Film, 56Kohm(K), 1/4W
552010423	Carbon Film, 100Kohm(K), 1/4W
552022423	Carbon Film, 220Kohm(K), 1/4W
552033423	Carbon Film, 330Kohm(K), 1/4W
552015423	Carbon Film, 150Kohm(K), 1/4W
552082223	Carbon Film, 8.2Kohm(K), 1/4W
554147953	Bath-tub, 0.47ohm(K), 2W
525121112	VOLUME CONT. 50Kohm
525101111	TREBLE and BASS CONT 50Kohm
515121112	BALANCE CONT 100Kohm
510502114	IDLING CURRENT ADJ. 10Kohm
510502115	DC BALANCE ADJ. 250Kohm
510502102	FM Stereo SEPARATION ADJ. 10Kohm

TRANSFORMERS & COILS

Part No.	Description
201001313	Power Transformer
222301201	Coil, AM Antenna
225601125	Coil, MPX 19KHz(1st)
225601126	Trans, MPX 19KHz(2nd), 38KHz
228641111	Coil, MPX SCA Filter
225501116	IFT, FM (1st, 2nd)
225501117	IFT, FM (Ratio)
225301121	IFT, AM (1st)
225301122	IFT, AM (2nd)
225301124	IFT, AM (3rd)
223301121	Coil, AM Local OSC
220001121	Coil, RF Choke, 47μH

TRANSISTORS & DIODES

Part No.	Description
301201127	2SC1061, Power Amp.
301201115	2SC828, Pre-driver, Driver, Temp. Compensation, ST. Lamp Gate
301201117	2SC829, IF Amp 1st, 2nd, 3rd
301001117	2SA564, Driver
301201114	2SC644, Pre-amp 1st, 2nd, Tone Amp 1st, 2nd
301001111	2SA49, MPX Composite Amp, 19KHz Amp, 38KHz Amp
301001124	2SA102, AM Conv.
300212004	KB-269, Temperature Compensation
300919005	1S1850, Rectifier
300313004	BZ-120, Zener Diode, 12V
300111008	1S188, Diode

MISCELLANEOUS

Part No.	Description
352063028	Dial Lamp, 6.3V 0.28A
351140005	FM Stereo Ind. Lamp 14V 50mA
116310031	Knob, Tuning
116310048	Knob, Func. Selector, Vol., Bal., Treb., Bass
611001623	Switch, MODE, SPEAKERS
611001212	Switch, Power
610112245	Switch, Func. Selector
321304362	AM FM Front-end
231310003	Meter, Tuning
341240015	Fuse, 1.5A
626007702	Jack, Headphone
620101114	AC Outlet
640253334	Holder, Fuse
151691118	Dial Pointer Ass'y w/ST. Ind. Lamp

ROTEL®

RX-150A

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.

835201216

Printed in Japan Jun. '72