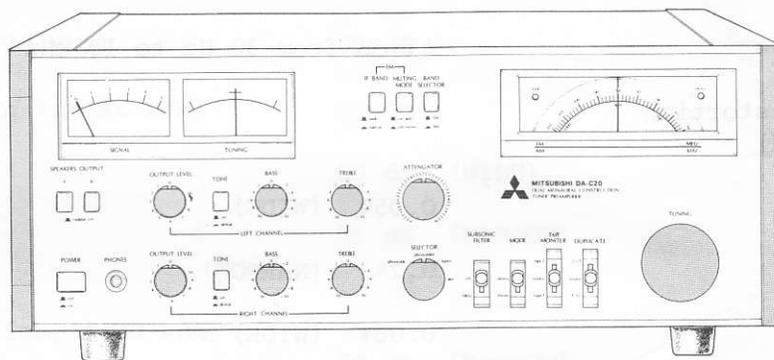


MITSUBISHI

AM/FM STEREO TUNER-PREAMPLIFIER DA-C20

SERVICE MANUAL



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MELCO SALES, INC.

SPECIFICATIONS

1-(1) FM TUNER SECTION (IHF)

Usable sensitivity

MONO 11.2 dBf (2.0 μ V)

STEREO 22.7 dBf (7.5 μ V)

50 dB quieting sensitivity

MONO 19.2 dBf (5.0 μ V)

STEREO 39.2 dBf (50 μ V)

Signal to noise ratio

MONO 80 dB

STEREO 75 dB

Frequency response ± 1 dB from 30 Hz to 15 kHz

Total harmonic distortion (at 1 kHz, 65 dBf)

MONO 0.05% (WIDE)

0.2% (NARROW)

STEREO 0.08% (WIDE)

0.5% (NARROW)

Capture ratio 0.8 dB (WIDE)

1.5 dB (NARROW)

Alternate channel selectivity 45 dB (WIDE)

75 dB (NARROW)

Spurious response ratio 90 dB

Image response ratio 80 dB

IF response ratio 80 dB

AM suppression ratio 55 dB (WIDE)

50 dB (NARROW)

Stereo separation

WIDE 45 dB at 1 kHz, 35dB at 10 kHz

NARROW	40 dB at 1 kHz, 30 dB at 10 kHz
Subcarrier product ratio	70 dB
SCA rejection ratio	70 dB
Tuning range	88 MHz to 108 MHz
1-(2) FM TUNER SECTION (DIN)	
Sensitivity (at 40 kHz deviation)	
MONO (S/N 26 dB)	1.2 μ V
STEREO (S/N 46 dB)	32 μ V
Image frequency rejection (at 98 MHz)	78 dB
IF rejection (at 98 MHz)	85 dB
Spurious rejection (at 98 MHz)	90 dB
AM suppression	60 dB (WIDE)
	55 dB (NARROW)
Selectivity	40 dB (WIDE)
(at 40 kHz deviation, \pm 300 kHz)	70 dB (NARROW)
Signal to noise ratio	
(at 40 kHz deviation)	
MONO	75 dB
STEREO	72 dB
Total harmonic distortion	
(at 1 kHz, 40 kHz deviation)	
MONO	0.06% (WIDE)
	0.15% (NARROW)
STEREO	0.08% (WIDE)
	0.3% (NARROW)
Stereo separation	45 dB (WIDE)
(at 1 kHz, 40 kHz deviation)	35 dB (NARROW)
Frequency response	\pm 1 dB from 30 Hz to 15 kHz

2-(1) AM TUNER SECTION (IHF)

Usable sensitivity (bar antenna)	45 dB
Selectivity	30 dB
Total harmonic distortion	0.8%
Image response ratio	40 dB
IF response ratio	70 dB
Hum and noise	50 dB
Tuning range	525 kHz to 1605 kHz

2-(2) AM TUNER SECTION (DIN)

Selectivity (bar antenna, at 30% modulation, S/N 26 dB)	300 μ V/m
Signal to noise ratio (at 5 mV/m, 30% modulation)	50 dB
Selectivity (at ± 9 kHz)	30 dB
Image frequency rejection (at 1 MHz)	40 dB
IF rejection (at 1 MHz)	70 dB
Total harmonic distortion (at 30% modulation)	0.8%

3 PREAMPLIFIER SECTION

Input sensitivity/impedance

PHONO MC	0.1 mV/10 ohms
PHONO MM	2.3 mV/50k ohms/100 pF
AUX, PLAY 1, PLAY 2	150 mV/50k ohms

Output level/impedance

OUTPUT	1V (rated output)/600 ohms
	18V (maximum output)
REC 1, REC 2	150 mV/600 ohms
PHONES (8 ohms)	600 mV (at output 1V)/15 ohms
	650 mV (maximum output) (headphone impedance from 8 ohms to 16 ohms)

Equivalent input noise level
(IHF, A network)

PHONO MC	-157 dB(V) (47 ohms terminated)
PHONO MM	-136 dB(V) (closed circuit)
AUX, PLAY 1, PLAY 2	-126 dB(V) (closed circuit)

Signal to noise ratio
(IHF, A network at rated output)

PHONO MC	77 dB (47 ohms terminated)
PHONO MM	84 dB (closed circuit)
AUX, PLAY 1, PLAY 2	110 dB (closed circuit)

Signal to noise ratio (DIN)

PHONO MC	72 dB (47 ohms terminated)
PHONO MM	73 dB (2.2k ohms terminated)
AUX, PLAY 1, PLAY 2	106 dB (closed circuit)
	92 dB (47k ohms/250 pF terminated)

Total harmonic distortion
(at rated output attenuator -20 dB
from 20 Hz to 20 kHz)

PHONO MC	0.005%
PHONO MM	0.003%
AUX, PLAY 1, PLAY 2	0.003%

Channel separation

PHONO MC, PHONO MM	Crosstalk is less than noise level at 1 kHz, 80 dB at 20 kHz
PLAY 1, PLAY 2	Crosstalk is less than noise level at 1 kHz, 100 dB at 20 kHz

Frequency response

PHONO MC, PHONO MM	±0.2 dB from 20 Hz to 20 kHz (RIAA STD)
PLAY 1, PLAY 2	+0 -0.5 dB from 10 Hz to 100 kHz

Tone control

BASS	±10 dB at 100 Hz
TREBLE	±10 dB at 10 kHz

Subsonic filter	18 Hz (-6 dB/oct)
Phono overload level (at 1 kHz with 0.1% THD)	
PHONO MC	12 mV
PHONO MM	290 mV
Power consumption	30W
Dimensions (W × H × D)	425 × 170 × 292 mm (16-3/4 × 6-3/4 × 11/1/2")
Weight	7.5 kg (16-1/2 lbs)
Supplied with: T shaped antenna	

Design and specifications are subject to change without notice for improvements.

SERVICING NOTES

1. Before connection, turn off the power supply at all times

Otherwise, the speakers are liable to be damaged by click noise caused when the cord is plugged in or out.

2. Avoid improper connection

When turntable, tuner, and R and L of output terminals of this machine are incorrectly connected or short-circuited, stable sound production cannot be achieved.

3. Correctly make input terminal connection

When pin plug or earth wire of record player output cord is loosely connected or disconnected, hum occurs. Note that the speaker is liable to be damaged when such incorrect connection is not remedied.

4. Use shielded wire for input terminal connection

Use a shielded wire of not more than 2 m long for connections to record player and tuner. In this case, avoid the use of longer shielded wire which causes deterioration of high band characteristics and easy catching of hum and noise.

5. Use the machine with a pin plug for short-circuiting use in PHONO terminal unused

This is intended to prevent open noise, and click noise caused when the input selector is switched without connecting a turntable. When you use Mitsubishi DA-A10DC or DA-A15DC in combination with this machine, power of the power amplifier must be supplied from SWITCHED plug sockets of this machine. The speaker control cord is used for only Mitsubishi power amplifiers.

DESCRIPTION AND FUNCTION OF EACH PART

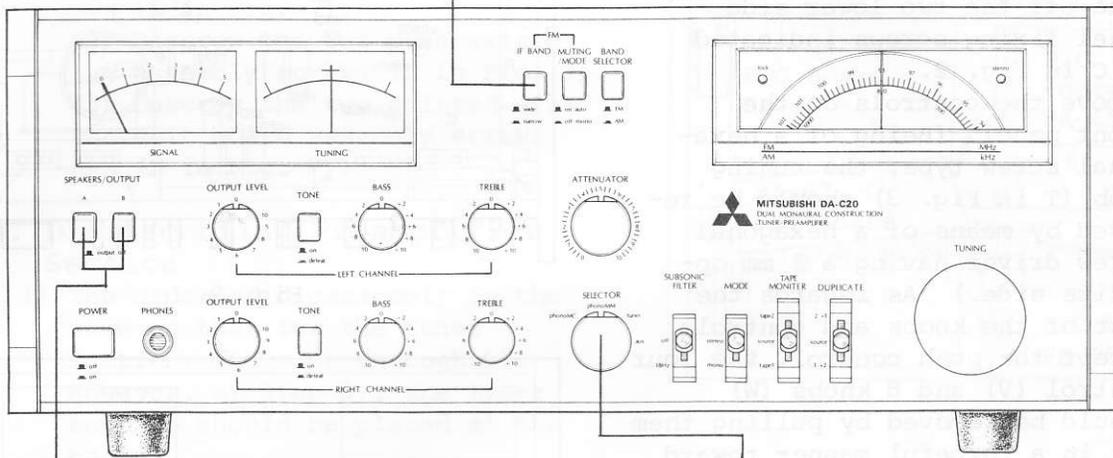
FRONT PANEL

IF BAND (Selectivity Switch)

This selectivity switch is for choosing the IF band-width and may be switched between the WIDE (with 45 dB selectivity) and the NARROW (with 75 dB selectivity) for reception.

WIDE For receiving an FM broadcast when there is no interference from nearby stations. In this position, the lowest distortion reception is obtained.

NARROW For receiving an FM broadcast in a crowded broadcast area to eliminate interference from nearby stations.



SPEAKERS/OUTPUT

(Speaker Selection Switches)

When using the companion power amplifier (DA-A10DC, DA-A15DC), the speakers connected to the power amplifier may be controlled with these switches. The "speaker control cable" supplied with the power amplifier must be connected, to utilize these switches.

A B

- ■ For listening with headphones. Preamplifier outputs are off and no sound will be produced from the speakers.
- ■ For listening to the speakers connected to the A terminals on the power amplifier.
- ■ For listening to the speakers connected to the B terminals on the power amplifier.
- ■ For listening to the speakers connected to both A and B terminals on the power amplifier.

SELECTOR (Input Selection Switch)

This switch selects the desired program source.

PHONO MC This position is used for playing a disc on the turntable equipped with a MC (moving coil) cartridge and connected to the PHONO MC inputs.

PHONO MM This position is used for playing a disc on the turntable equipped with a MM (moving magnet) cartridge and connected to the PHONO MM inputs.

TUNER For listening to programs on the AM/FM tuner.

AUX For playing a second tuner, turntable with a high output ceramic cartridge, tape deck for playback use, television audio, or any suitable high output sources connected to the AUX inputs.

■ DISASSEMBLING TUNER SECTION AND PREAMPLIFIER SECTION

1. Removal of the Top Plate and the Bottom Cover

- 1) After removing the two screws indicated as A in Fig. 1, take off the top plate, pulling it toward the back.
- 2) The cabinet is removed by taking off the four screws indicated as B in Fig. 1 as well as the two screws located at the bottom.

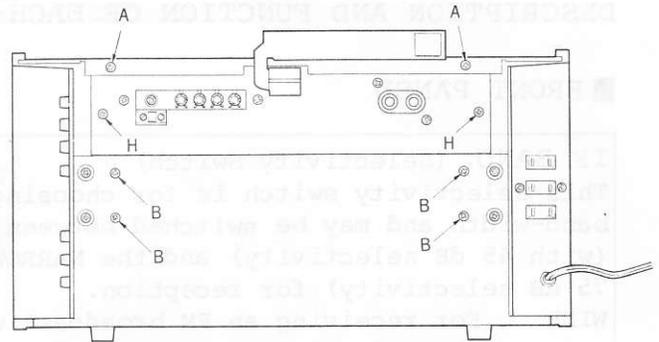


Fig. 1

2. Removal of Front Panel

- 1) Take off the two upper panel fixing screws indicated as D in Fig. 4.
- 2) Take off the two lower side panel fixing screws indicated as C in Fig. 2.
- 3) Remove the controls on the front panel. (Being of a hexagonal screw type, the tuning knob (T in Fig. 3) should be removed by means of a hexagonal screw driver having a 2 mm opposite side.) As regards the rest of the knobs and controls except the push control, the four control (V) and 8 knobs (W) should be removed by pulling them out in a forceful manner toward this side.
- 4) In this condition, the front panel can be taken off toward this side.

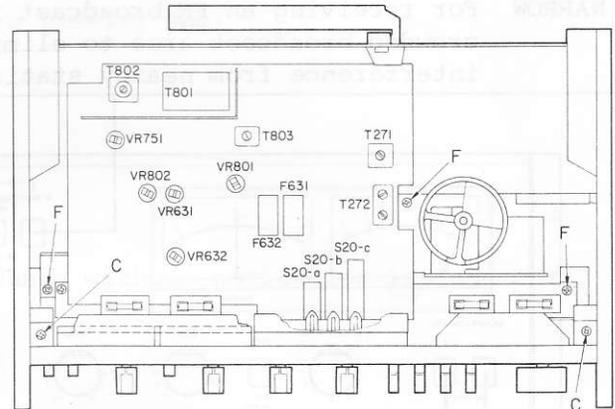


Fig. 2

3. Removal of Tuner Section

- 1) Disassemble the aluminum inlay of the tuner section by removing the four screws indicated as E in Fig. 5.
- 2) Take off the three chassis-fixing screws (F in Fig. 2) of the tuner section.
- 3) Remove the two front-chassis-fixing screws (G of Fig. 5) of the tuner section.
- 4) Remove the rear-chassis-fixing screws (H of Fig. 1) of the tuner section.
- 5) Take off the side panel and holder assembly screw (J in Fig. 4).

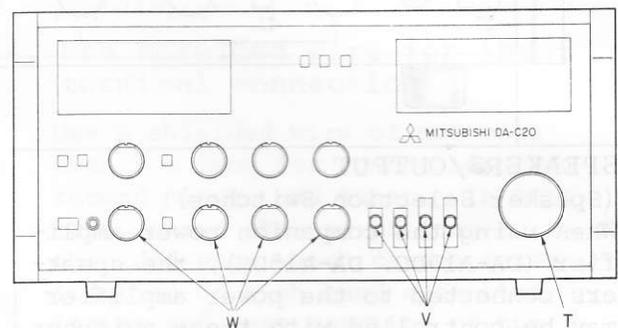


Fig. 3

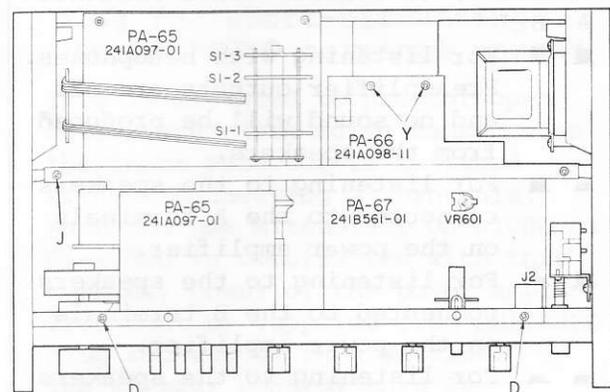


Fig. 4

- 6) With the right side panel spread outward from its normal position, lift up the tuner section and arrange it as shown in Fig. 6. To prevent short-circuiting between the tuner section's chassis and the preamplifier's printed circuit board, insert a cloth or the like in between.
- 7) With the set in this condition, the front end can be adjusted.
- 8) To remove the printed circuit board from the chassis when replacing the parts on it, the following screws are to be removed.

- (1) Take off the two holder set-screws for meter mounting (K in Fig. 7).
- (2) Unscrew the two push switch assembly screws (L in Fig. 7).
- (3) Unscrew the two printed circuit board assembly screws (M in Fig. 7).

4. Disassembling Preamplifier Section

- 1) The order of disassembly is the same as that for the tuner section, Steps 1) through 6). However, at Step 6), the tuner section should be placed at the back.
- 2) Remove the two front chassis fixing screws (N in Fig. 5) of the preamplifier section.
- 3) Remove the three volume fixing nuts (P of Fig. 5) of the front chassis section.
- 4) Take off the switch assembly screw (Q of Fig. 5) of the front chassis section.
- 5) Remove the two printed circuit board (PA-66) assembly screws (Y in Fig. 4).
- 6) Remove the coupling section (in the direction of R shown in Fig. 6) of the selector switch and extension shaft.
- 7) Lift up the front chassis and turn the printed circuit board PA-67 toward this side. (The condition shown in Fig. 6)

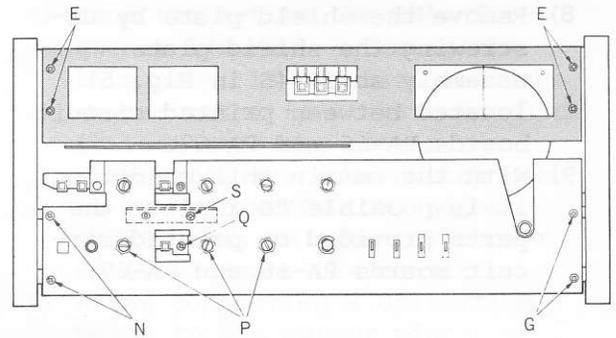


Fig. 5

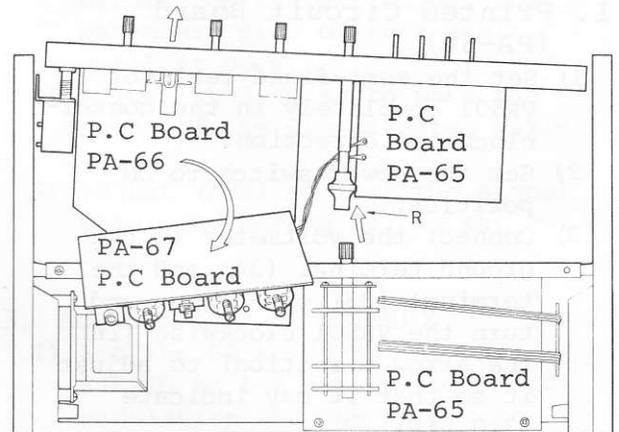


Fig. 6

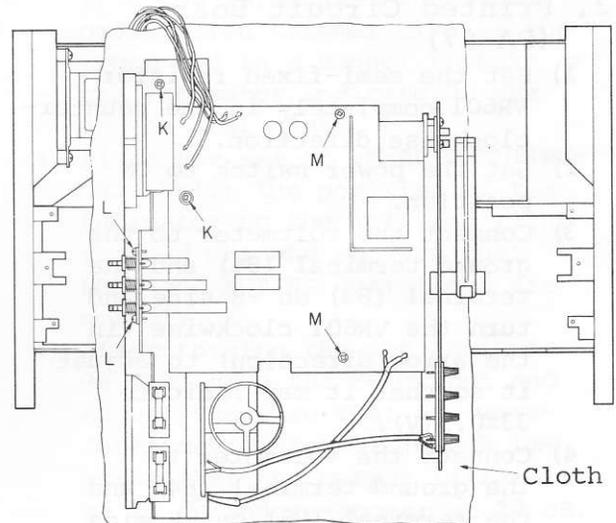


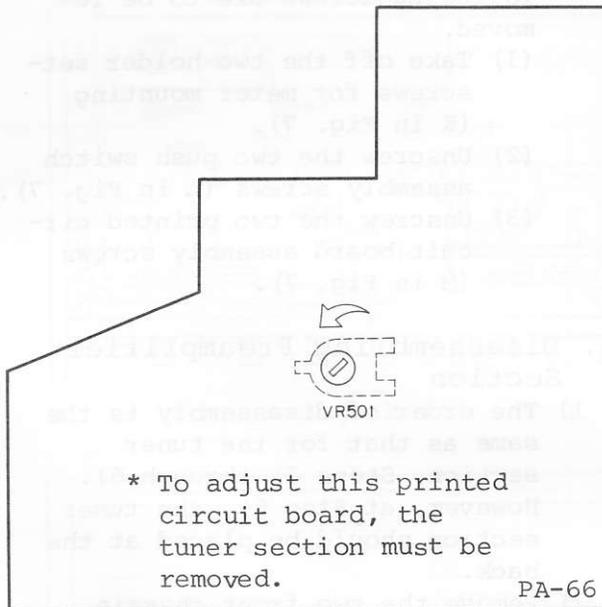
Fig. 7

- 8) Remove the shield plate by unscrewing the shield plate assembly screw (S in Fig. 5) located between printed circuit boards PA-66 and PA-67.
- 9) With the set in this condition, it is possible to replace the parts provided on printed circuit boards PA-66 and PA-67.

ADJUSTMENT

1. Printed Circuit Board (PA-66)

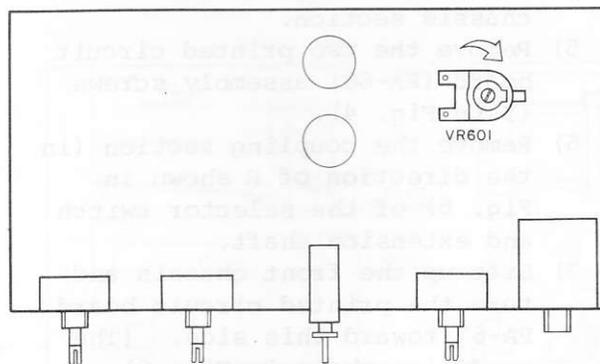
- 1) Set the semi-fixed resistor VR501 completely in the counter-clockwise direction.
- 2) Set the power switch to ON position.
- 3) Connect the voltmeter to the ground terminal (34) and the terminal (33) on +B side and turn the VR501 clockwise (in the arrow direction) to adjust it so that it may indicate $33 \pm 0.5(V)$.
- 4) Connect the voltmeter to the ground terminal (34) and the terminal (35) on -B side and confirm that it indicates $-33 \pm 1.5(V)$.



View seen at copper foil side

2. Printed Circuit Board (PA-67)

- 1) Set the semi-fixed resistor VR601 completely in the counter-clockwise direction.
- 2) Set the power switch to ON position.
- 3) Connect the voltmeter to the ground terminal (84) and the terminal (83) on +B side and turn the VR601 clockwise (in the arrow direction) to adjust it so that it may indicate $33 \pm 0.5(V)$.
- 4) Connect the voltmeter to the ground terminal (84) and the terminal (85) on -B side and confirm that it indicates $-33 \pm 1.5(V)$.



The side where the parts of the printed circuit board (PA-67) are inserted.

■ FM SECTION ■

1. Front End Adjustment

- 1) With the signals of the signal generator (SG) connected to the FM-ANT terminal, take out the set's output from test point T.P. (119).
- 2) With the SG's frequency set to 87 MHz, turn the dial fully counterclockwise so that the tuner may indicate the lowest frequency. Adjust the local oscillation coil so as to make the signals generated by the SG maximum.
- 3) With the SG's frequency set to 109 MHz, turn the dial fully clockwise so that the tuner indicator may show the maximum frequency. Adjust the local oscillation trimmer C191 in a manner to make the SG's signal maximum.
- 4) Repeat Steps 2) and 3) several times.
- 5) With the SG's frequency set to 88 MHz, set the tuner to indicate 88 MHz with the dial. Adjust coils L171, L172 and L173 so as to make the output maximum.
- 6) With the SG's frequency set to 108 MHz, set the tuner to indicate to 108 MHz with the dial. Adjust trimmers TC171, TC172 and TC173 so as to make the output maximum.

2. Adjustment of FM-MONO

- 1) Set the SG to 98 MHz, 400 Hz to MONO 100% modulation and the output to 80 dB.
- 2) Set the selector switch of the set to the FM position and the mode to FM-MONO/MUTING OFF and SELECTIVITY-WIDE.
- 3) Adjust the secondary side core (upper side) of T802 so that the center meter may indicate the center during detuning (approximately 100 MHz).

- 4) Tune the set to the SG's frequency (98 MHz). Tuning, in this case, is attained when the center meter is a state in which it indicates the center. Next, with the mode switch set to FM-AUTO/MUTING-ON, adjust VR751 so as to make the center meter indicate the center.
- 5) After connecting a distortion meter to the output pin terminal, adjust the primary side core (lower side) of T802 so as to make the distortion factor minimum. In this case, if the center meter does not indicate the center, adjust the secondary side of T802 again until it does.
- 6) Adjust T803 so as to make the swing of the signal meter maximum.
- 7) Adjust VR801 so that the signal meter may become 4.7 on the scale.

3. Adjustment of FM-MPX

- 1) Set the SG to 98 MHz, 1 kHz STEREO to L+R 90%, pilot to 10% modulation and the output to 80 dB.
- 2) Set the selector switch of the set to the FM position and mode to FM-MONO/MUTING-OFF and to SELECTIVITY-WIDE. While receiving 98 MHz signals from the SG, adjust the local oscillation trimmer C191 of the front end in a manner to make the indicator indicate 98 MHz on the dial plate.
- 3) Place the set to FM-AUTO/MUTING-ON. Shift the position of the indicator to the left and right from 98 MHz and confirm that LOCK and MUTING operations are normal.
- 4) After turning the set again to 98 MHz, drop the SG output and adjust VR802 so that the waveforms may disappear (which implies that the output is zero) at 26 dB and re-appear at 27 dB.

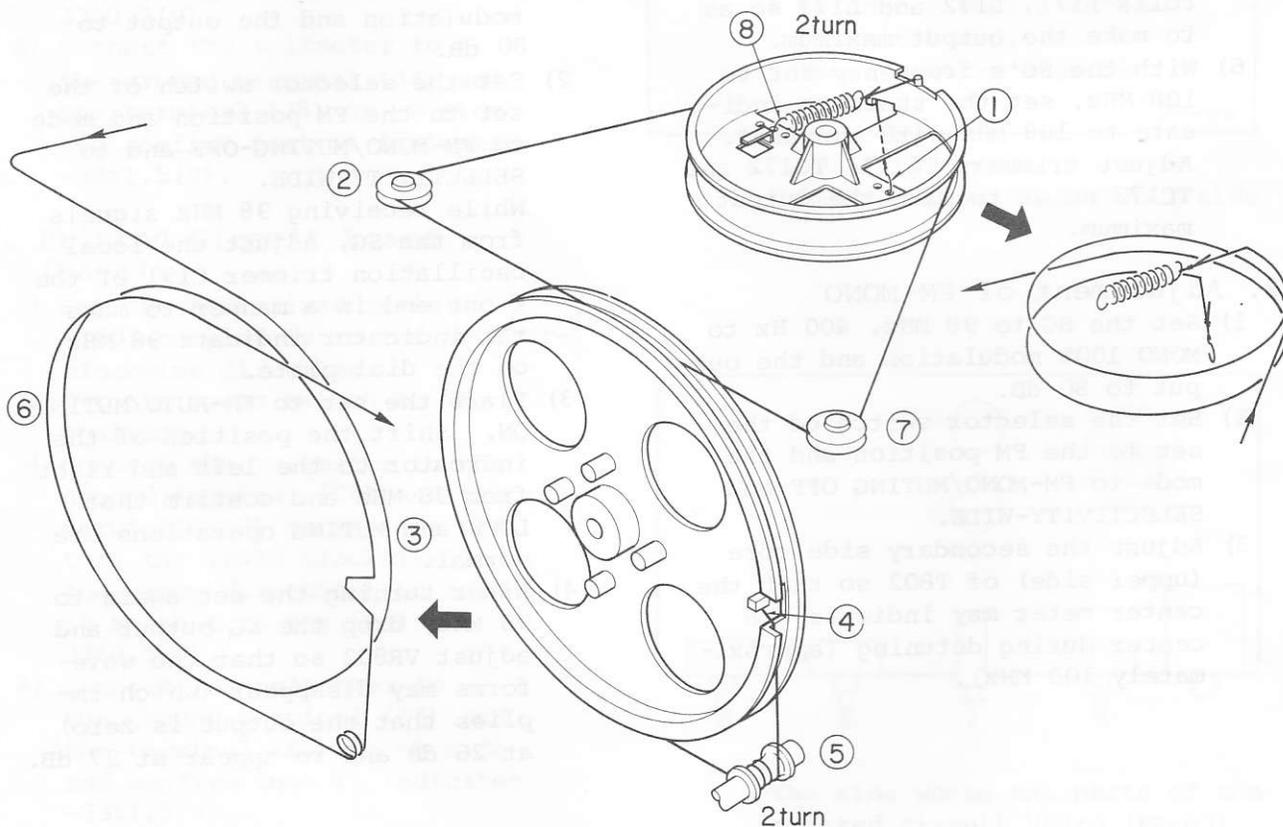
- 5) Turn off the pilot signal and modulation signal of the stereo modulator. With a frequency counter connected to Pin (120), adjust the VR so that the frequency may be within the range of 76 ± 0.2 kHz.
- 6) Turn the pilot signal ON and confirm that the stereo indicator lights up.
- 7) With the modulation of the stereo modulator set to either "R" or "L", adjust VR632 so as to make separation maximum.

■ ADJUSTMENT OF AM SECTION

1. Tracking Adjustment

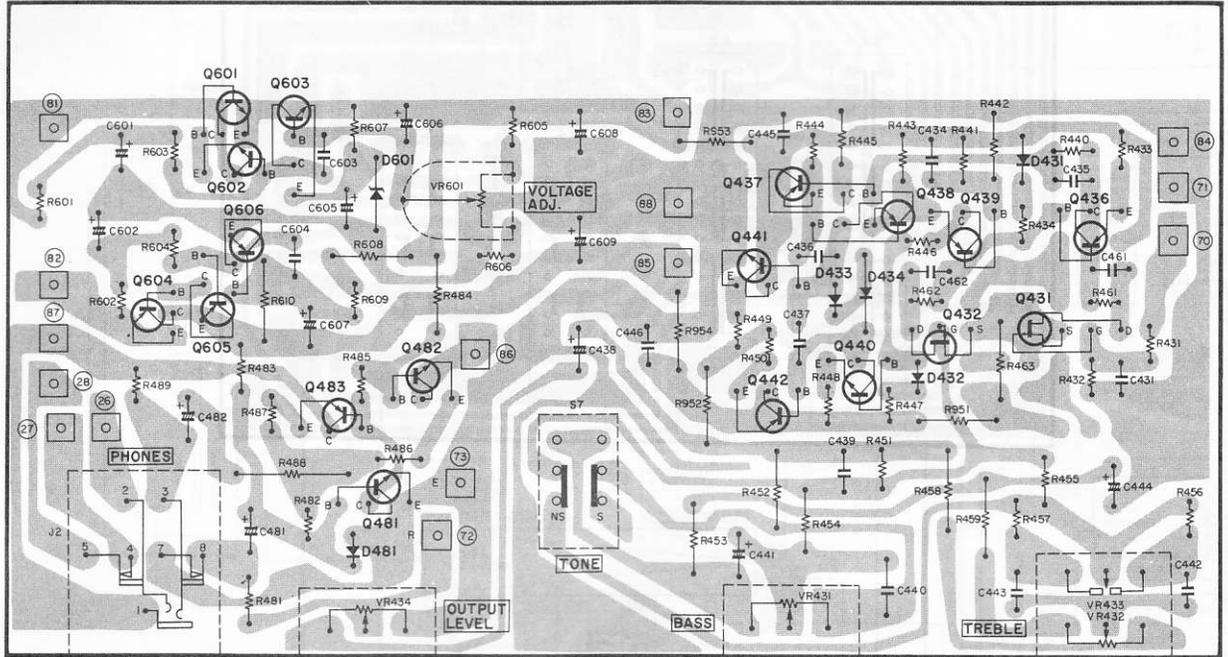
- 1) With the SG's signal set to 600 kHz and 400 Hz to 30% modulation, and the indicator of the set tuned to 600 kHz, adjust the COIL-ANT (L271) and COIL-OSC (T271) so that the output will may become maximum.
- 2) With the SG's signal set to 1,400 kHz and the indicator of the set tuned to 1,400 kHz, adjust the antenna trimmer TC271 and local oscillation trimmer TC272 in a way to make the output maximum.
- 3) Repeat 1) and 2) several times.

THREADING ON DIAL

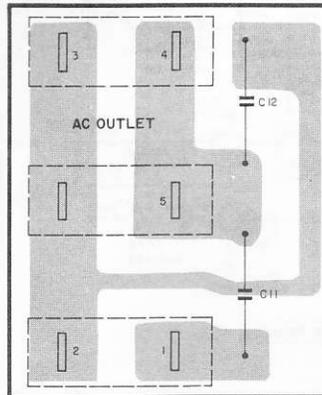


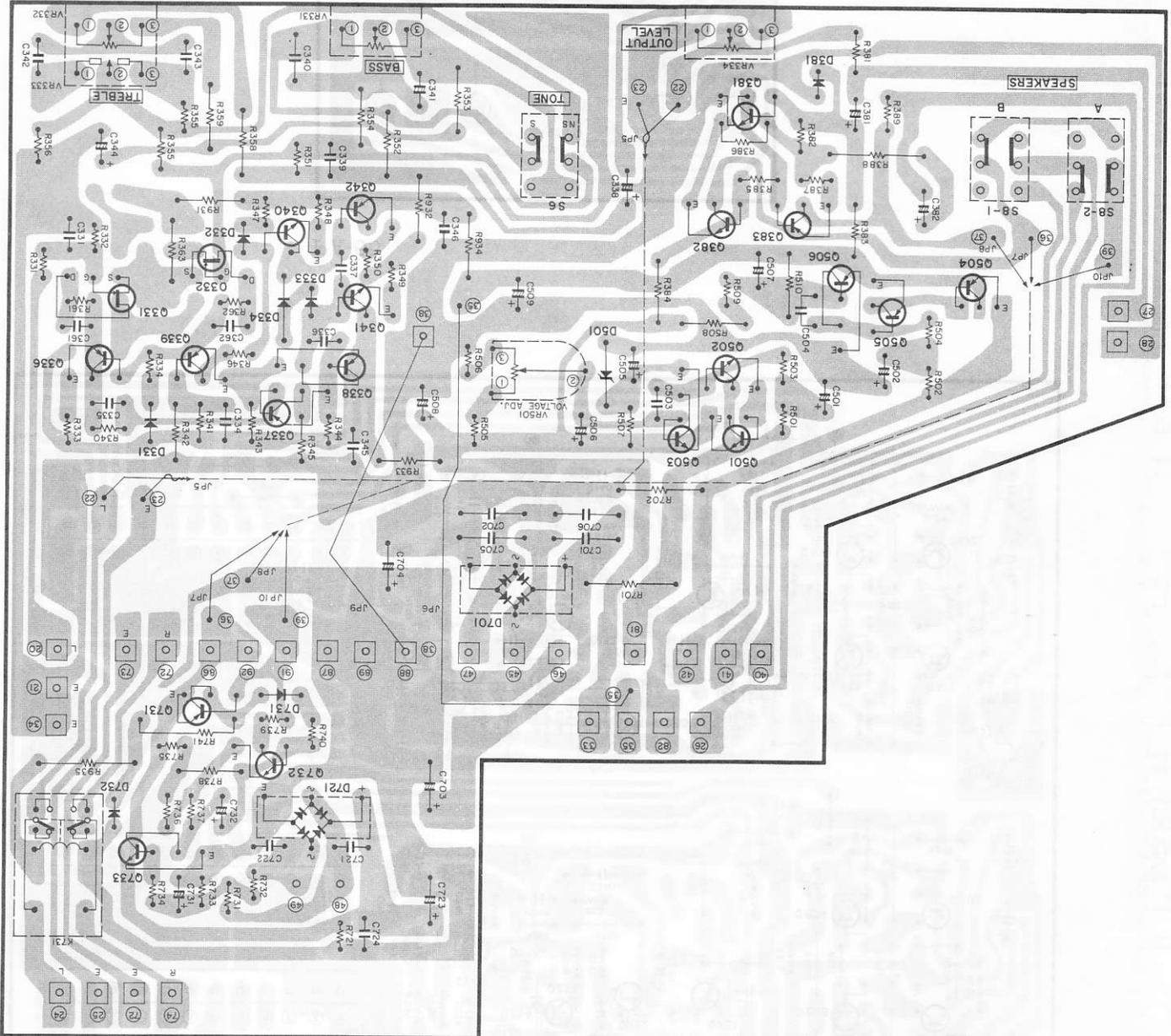
PRINTED CIRCUIT BOARD

PA-67



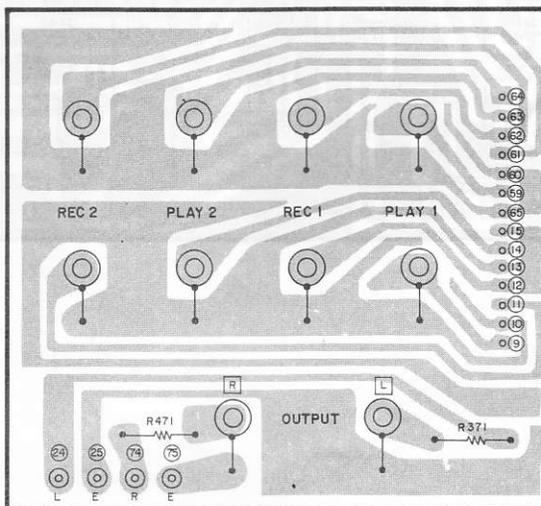
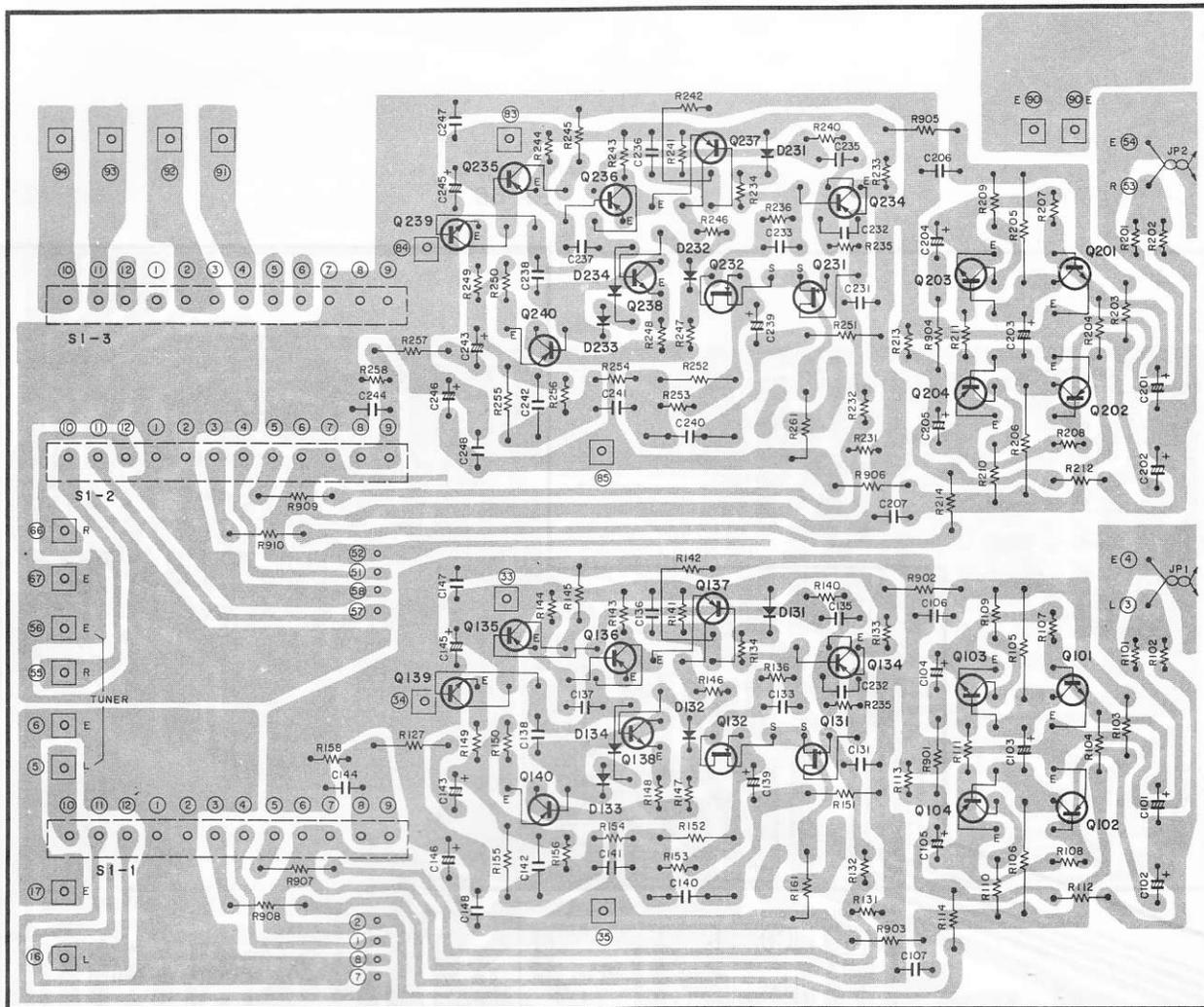
PA-66



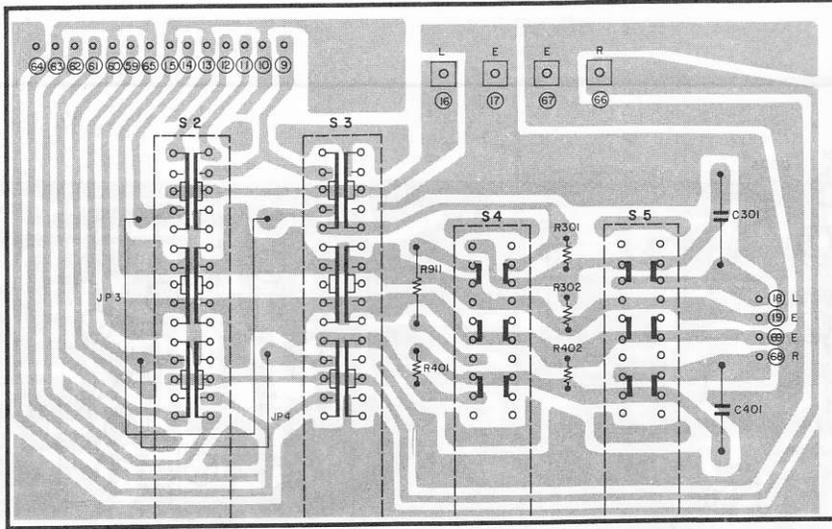


PA-66

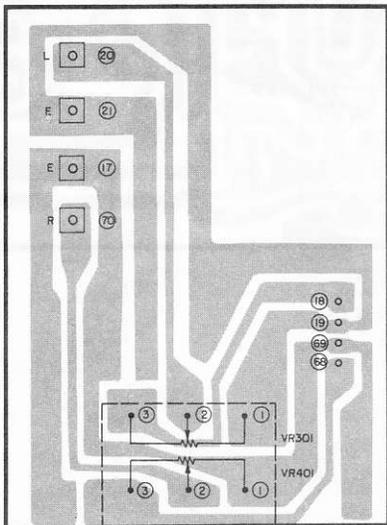




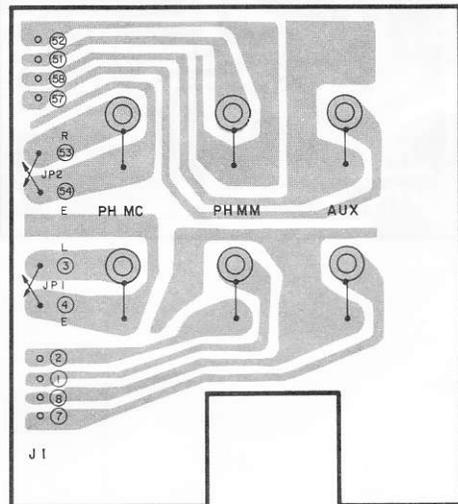
PA-65

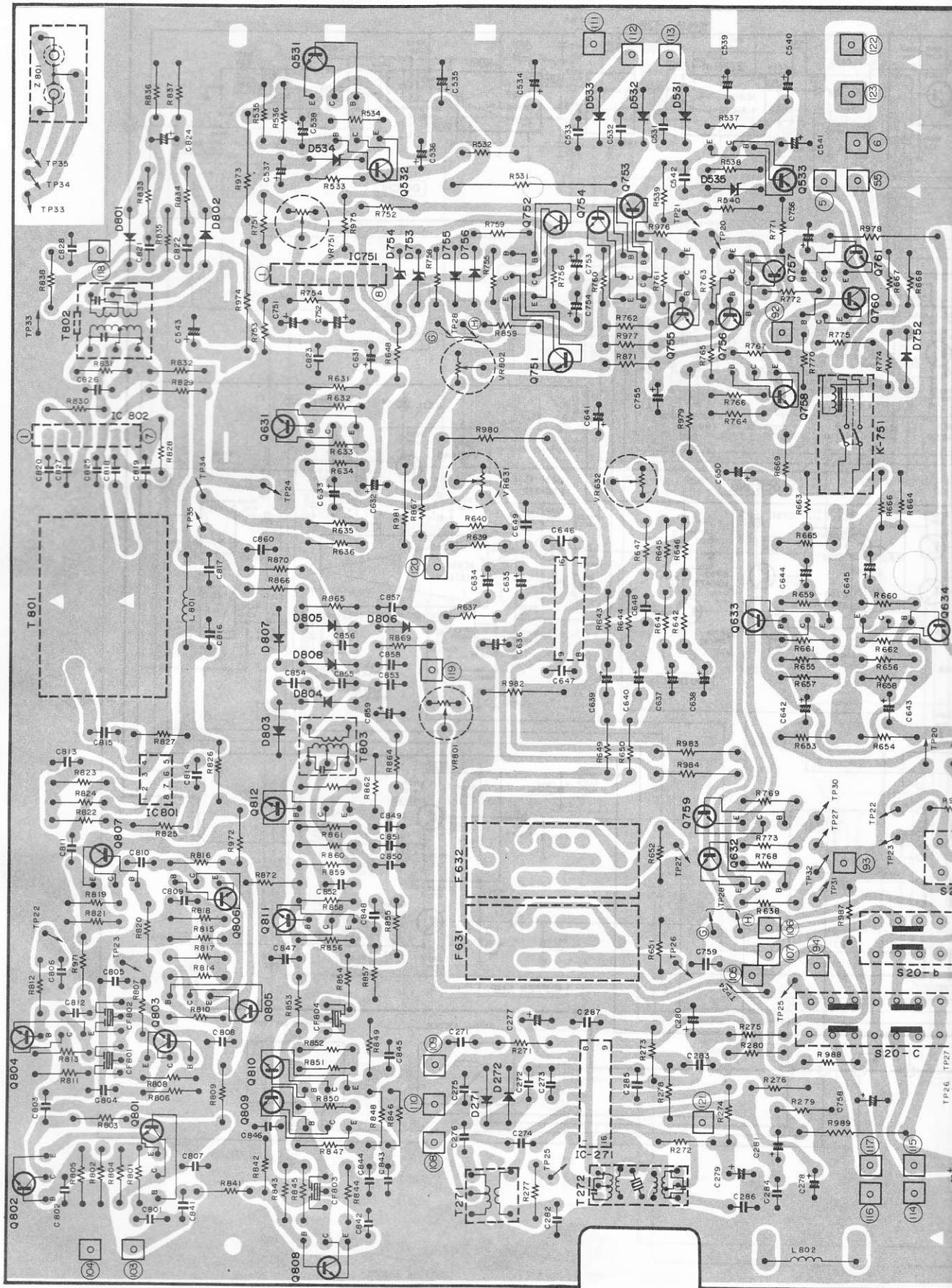


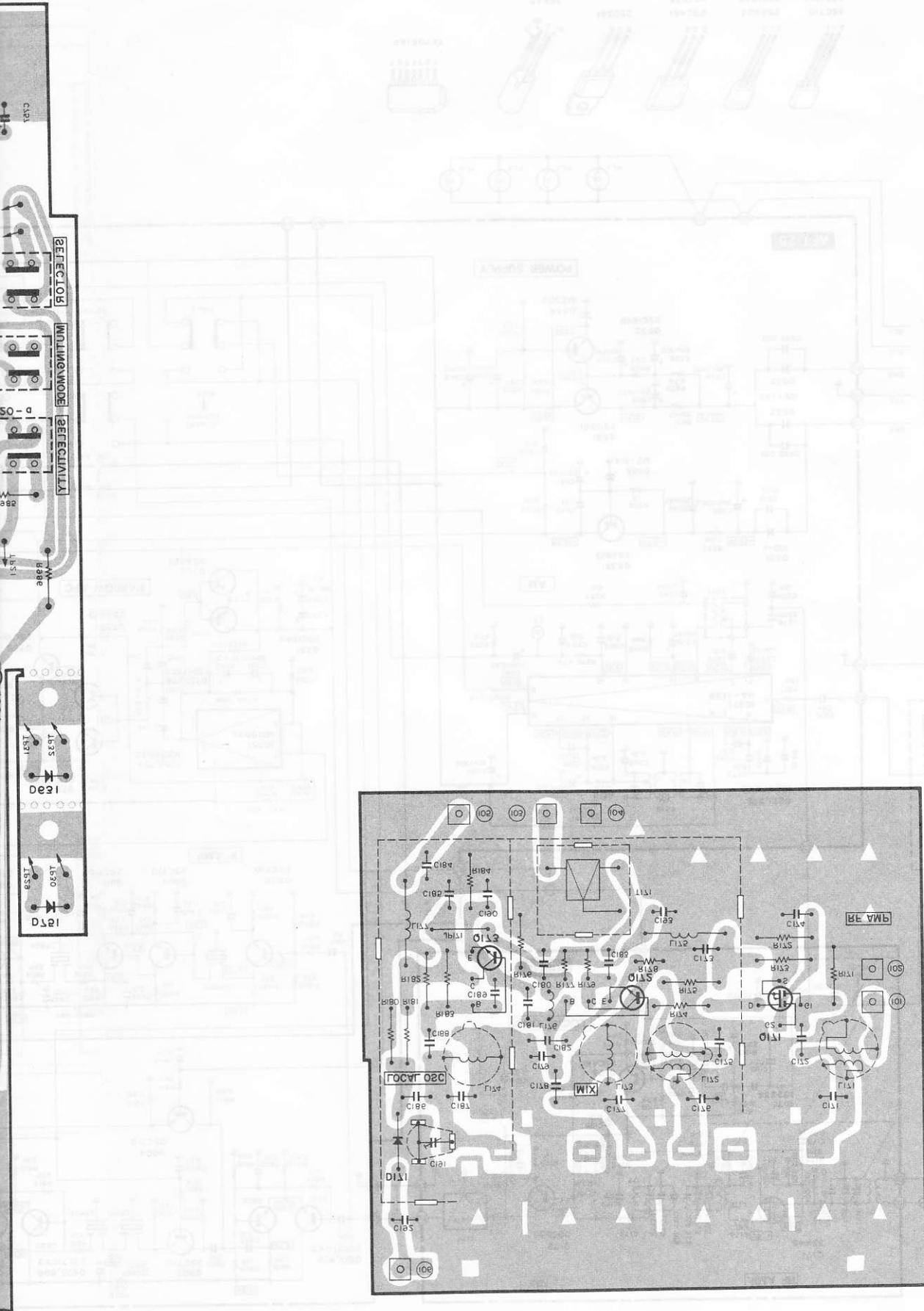
PA-65



PA-65





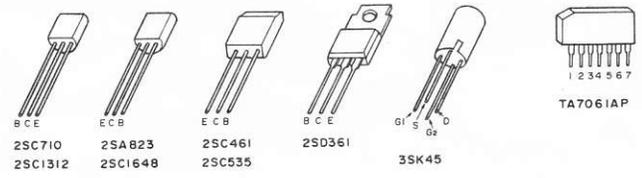
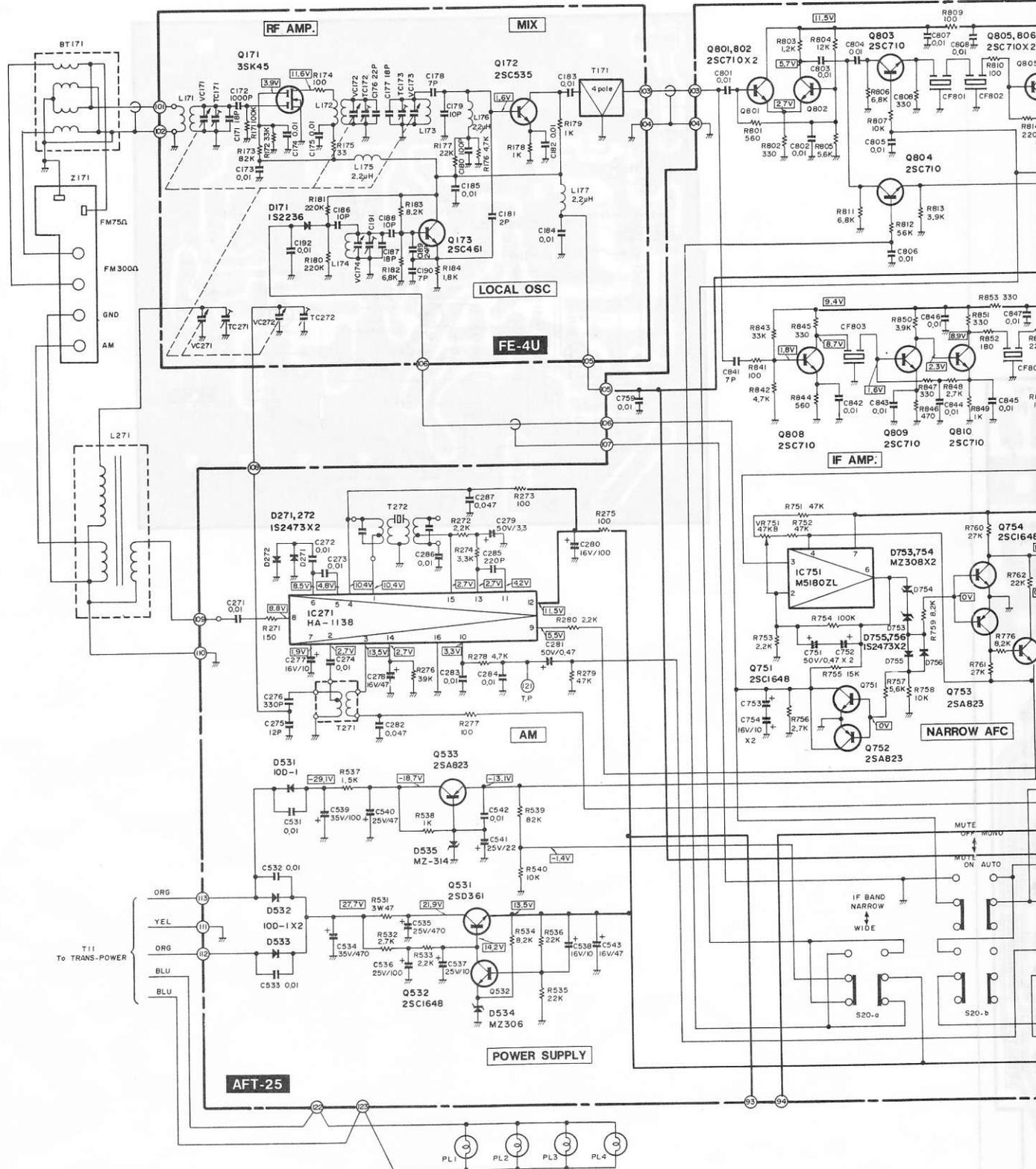


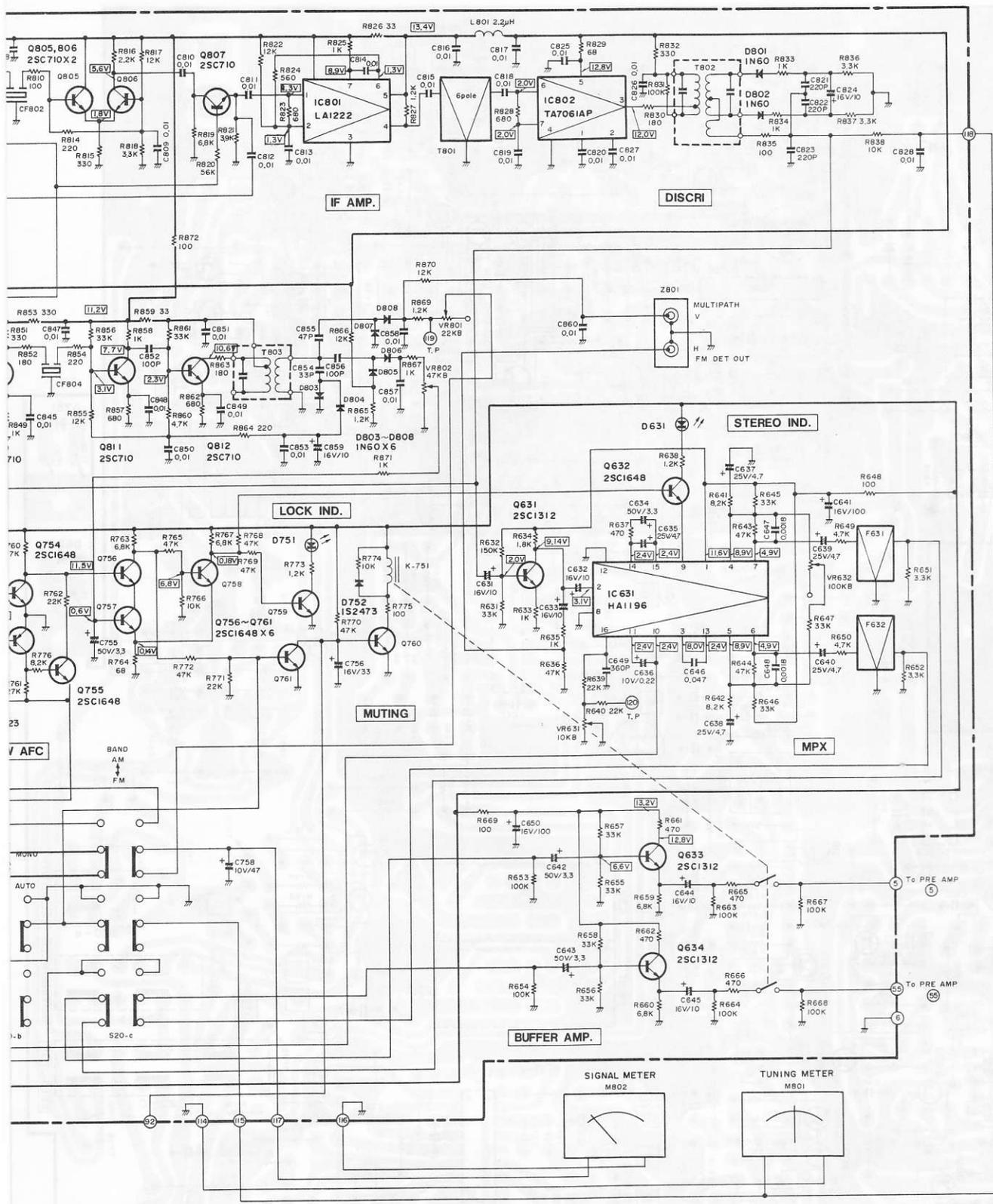
EE-70

SCHWARTZ DIAGRAM TUNER SECTION

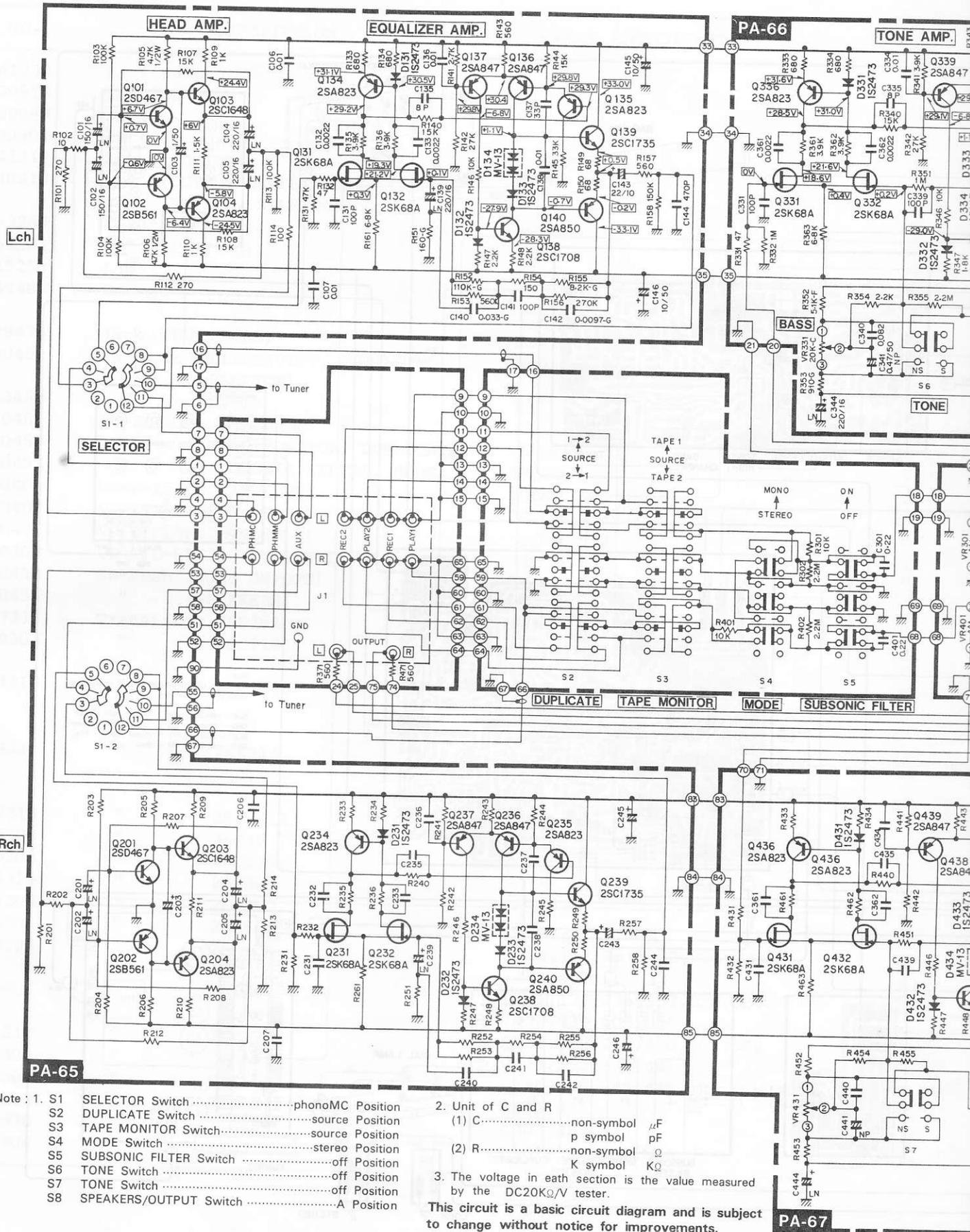
SCHEMATIC DIAGRAM

TUNER SECTION





PREAMPRIFIER SECTION



- Note : 1. S1 SELECTOR SwitchphonoMC Position
 S2 DUPLICATE Switchsource Position
 S3 TAPE MONITOR Switch.....source Position
 S4 MODE Switchstereo Position
 S5 SUBSONIC FILTER Switchoff Position
 S6 TONE Switchoff Position
 S7 TONE Switchoff Position
 S8 SPEAKERS/OUTPUT SwitchA Position

2. Unit of C and R
 (1) C non-symbol μ F
 p symbol pF
 (2) R non-symbol Ω
 K symbol K Ω
3. The voltage in each section is the value measured by the DC20K Ω /V tester.

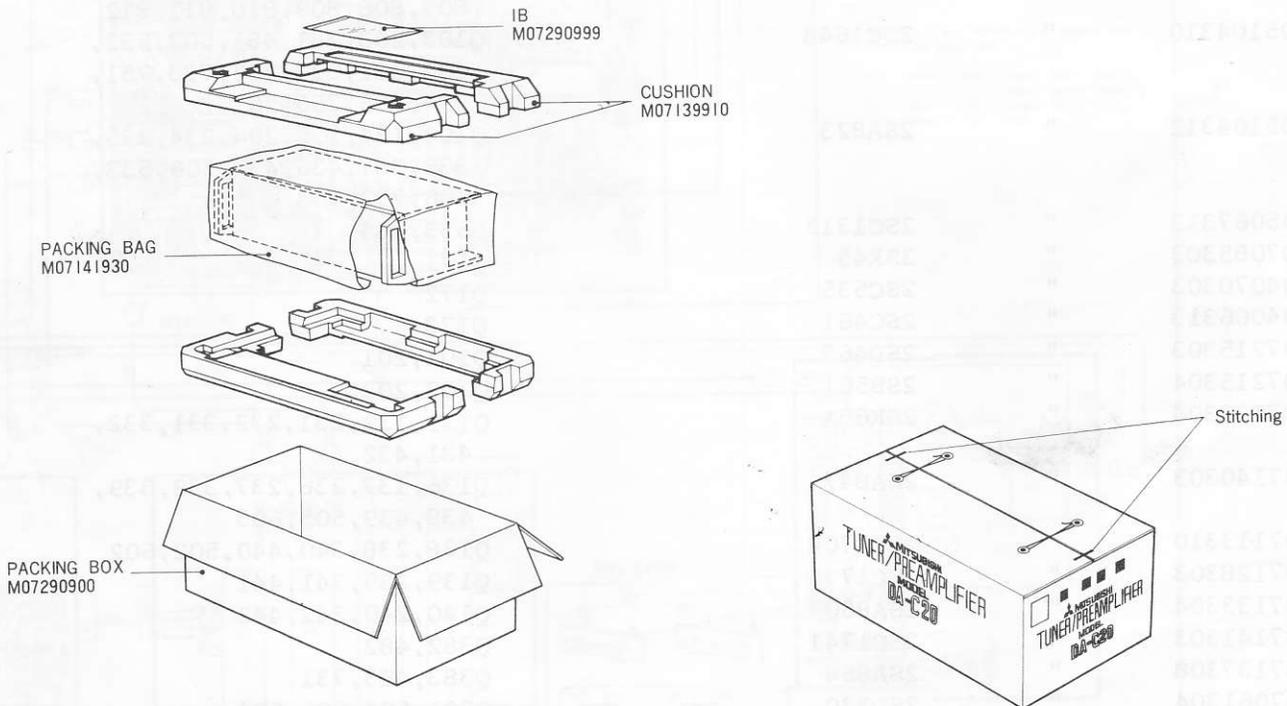
This circuit is a basic circuit diagram and is subject to change without notice for improvements.

PARTS LIST

PART NO.	DESCRIPTION	PART IDENTIFICATION
M07141930	Packing Bag	
M07139910	Cushion	
M07290999	I.B	
M07290900	Packing Box	
M07141210	Knob (TUNING)	
M07290210	" (OUTPUT LEVEL, BASS, TREBLE, VOLUME, SELECTOR)	
M07163260	Meter (SIGNAL)	M802
M07163261	" (TUNING)	M801
M07115250	Lamp	PL1~PL4
M07139480	Socket	
M07229476	Jack (HEADPHONE)	J2
M07290450	SW-Push (SELECTIVITY, MUTING/MODE SELECTOR)	S20
M07213450	" (POWER)	S11
M07290451	SW-Rotary (SELECTOR)	S1
M07290452	SW-Lever (TAPE MONITOR, DUPLICATE)	S2,S3
M07290453	" (SUBSONIC FILTER, MODE)	S4,S5
M07290400	VR-W-A50K25 (VOLUME)	VR301,401
M07290401	VR-STD-C20K25 (BASS)	VR331,431
M07290402	VR-W-C20K25 (TREBLE)	VR332,432
M07290403	VR-STD-E5K25 (OUTPUT LEVEL)	VR334,434
M07290454	SW-Push (TONE ON/OFF)	S6,S7
M07290455	" (SPEAKERS)	S8
M05067315	Transistor 2SD361	Q531
M04070304	" 2SC710	Q801,802,803,804,805,806,807,808,809,810,811,812
M05104310	" 2SC1648	Q103,203,381,481,503,532,603,631,632,732,733,751,754,755,756~761
M05104312	" 2SA823	Q104,134,135,204,234,235,336,337,436,437,506,533,606,752,753
M05067313	" 2SC1312	Q633,634
M07085303	" 3SK45	Q171
M04070303	" 2SC535	Q172
M04066313	" 2SC461	Q173
M07215303	" 2SD467	Q101,201
M07215304	" 2SB561	Q102,202
M07139304	" 2SK68A	Q131,132,231,232,331,332,431,432
M07140303	" 2SA847	Q136,137,236,237,338,339,438,439,505,605
M07113310	" 2SC1708	Q138,238,340,440,502,602
M07128303	" 2SC1735	Q139,239,341,441
M07133304	" 2SA850	Q140,240,342,442
M07141303	" 2SC1741	Q382,482
M07137308	" 2SA854	Q383,483,731
M07061304	" 2SD330	Q501,504,601,604

PART NO.	DESCRIPTION	PART IDENTIFICATION
M04097320	Diode IN60	D801~808
M07133322	" MZ308	D501,601
M07060320	" 1S2473	D131,132,133,231,232,233, 271,272,331,332,333,381, 431,432,433,481,731,732, 752,755,756
M07228320	" SEL105R	
M04079320	" 10D1	D531,532,533
M05129320	" MZ306	D534
M07141322	" MZ314	D535
M07085320	" 1S2236	D171
M07151320	" SIRBA10	D701,721
M04091331	Varistor MV-13	D134,234,334,434
M07133420	R-Fuse 1/W 10-J	D701,702
M07115343	IC LA1222	IC801
M04137343	" TA7061AP	IC802
M07141343	" M51802L	IC751
M07236343	" HA1196	IC631
M07115345	" HA1138	IC271
M07236465	Relay	K751
M07215465	"	K731

PACKAGE INSTRUCTION



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