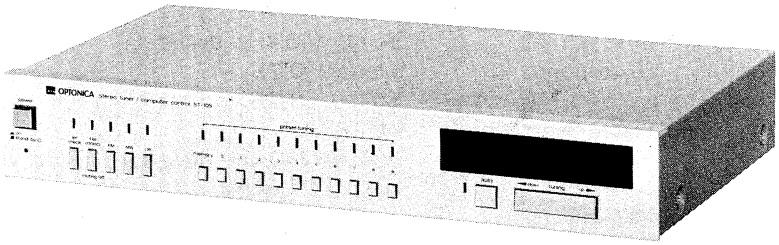
SHARP OPTONICA

SERVICE MANUAL

ST-105H

ATSM481034TUN



MODEL ST-105H

In the interests of user-safety the set should be restored to its original condition and only parts identical to those specified be used.

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FEATURES

- QUARTZ PLL SYNTHESIZER TUNER
- AUTO TUNING SYSTEM
- PRE-SET TUNING SYSTEM
- ADVANCED FM FRONT-END DESING
- PLL MULTIPLEX DECODER
- LINER PHASE CERAMIC FILTER
- FM SIMULATED OUTPUT (AIR CHECK)
- DIGTAL DISPLAY
- FM MUTING
- ADVANCED AM STAGE DESIGN
- FM QUADRATURE DETECTOR
- REMOTE CONTROL OPERATION

Note: The model ST-105H is the same in circiutry construction as the former ST-5200H/HB except that it has a remote control function newly employed and disuses the high blend switch, and that it uses instead of the battery an electronic capacitor to produce a back-up power for the memory safety (the charged electronic capacitor, if a power fails, will be discharged to maintain the memory function).
This is why this ST-105H Service Manual omits the following descriptions given in the already issued "ST-5200H/HB Service Manual (Technical Guide)".

- CIRCUIT DESCRIPTION — Page 9 ~ 25
- EQUIVALENT CIRCUIT OF IC — Page 33 ~ 37

SHARP CORPORATION OSAKA, JAPAN

SPECIFICATIONS

GENERAL DESCRIPTION

Power Source:	AC 110/220/240 V, 50/60 Hz
Circuit:	Superheterodyne and PLL synthesizer tuning system, FM/MW/LW 3-band tuner, multiplex FM stereo decorder, FM muting, air-check calibrator
Power Consumption:	15 W
Semiconductors:	1-Microcomputer 1-LSI (Large Scale Integrated Circuit) 9-ICs (Integrated Circuit) 1-FET (Dual Gate, MOS type) 2-FETs (Junction type) 60-Transistors 65-Diodes 4 Variable capacitance diodes (for FM) 3 Variable capacitance diodes (for MW/LW) 18 LEDs and 1-LED Array unit (for signal indicator)
Dimensions:	Width; 430 mm Height; 71 mm Depth; 298 mm Weight; 3.4 kg

FM

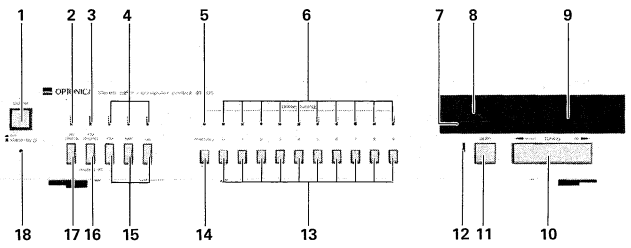
Tuning Range:	87,6 to 108 MHz
IF:	10.7 MHz
Scan Frequency:	50 kHz
Sensitivity:	1.3 μV (at S/N 26 dB, 40 kHz deviation, 75 ohms) 1.6 μV (at S/N 26 dB, 40 kHz deviation, 300 ohms)
Frequency Response:	30 to 15000 Hz ± 3 dB
Image Rejection:	75 dB (at 98 MHz)
IF Rejection:	75 dB (at 98 MHz)
Selectivity: (22.5 kHz deviation, ±300 kHz)	45 dB
Capture Ratio:	2.5 dB
AM Suppression:	50 dB
S/N:	66 dB (40 kHz deviation)
Distortion:	Mono; 0.2% Stereo; 0.3%
Stereo Separation:	40 dB (at 1 kHz)
FM Output Voltage:	350 mV (40 kHz deviation)

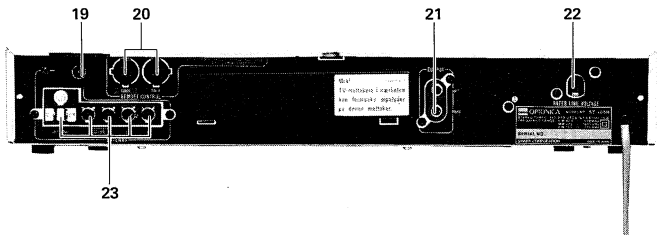
MW/LW

Tuning range:	MW; 522 ~ 1611 kHz LW; 150 ~ 372 kHz
IF:	450 kHz
Scan Frequency:	1 kHz (Manual Tuning) 9 kHz (Automatic Tuning)
Quieting Sensitivity:	MW; 350 μV/m LW; 350 μV/m
Image Rejection:	MW; 40 dB (at 999 kHz) LW; 30 dB (at 218 kHz)
IF Rejection:	MW; 40 dB (at 999 kHz) LW; 40 dB (at 218 kHz)
Distortion:	1.5%
Output Voltage:	200 mV (400 Hz, 30% Modulation)

Specifications are subject to change without prior notice.

PARTS LAYOUT





1. Power switch
2. Air check indicator
3. FM mono/muting off indicator
4. Band indicator
5. Preset station memory indicator
6. Frequency input presetting indicator
7. Signal strength indicator
8. FM stereo indicator
9. Tuning frequency and band display
10. Frequency count up/down button
11. Automatic tuning button
12. Automatic tuning indicator
13. Frequency input presetting button
14. Preset station memory button
15. Band selector button
16. FM mono/muting off button
17. Air check button
18. Power indicator
19. FM Coaxial antenna socket (DIN 45 325 type)
20. Remote control sockets
21. Output sockets
22. Voltage selector
23. Antenna terminals

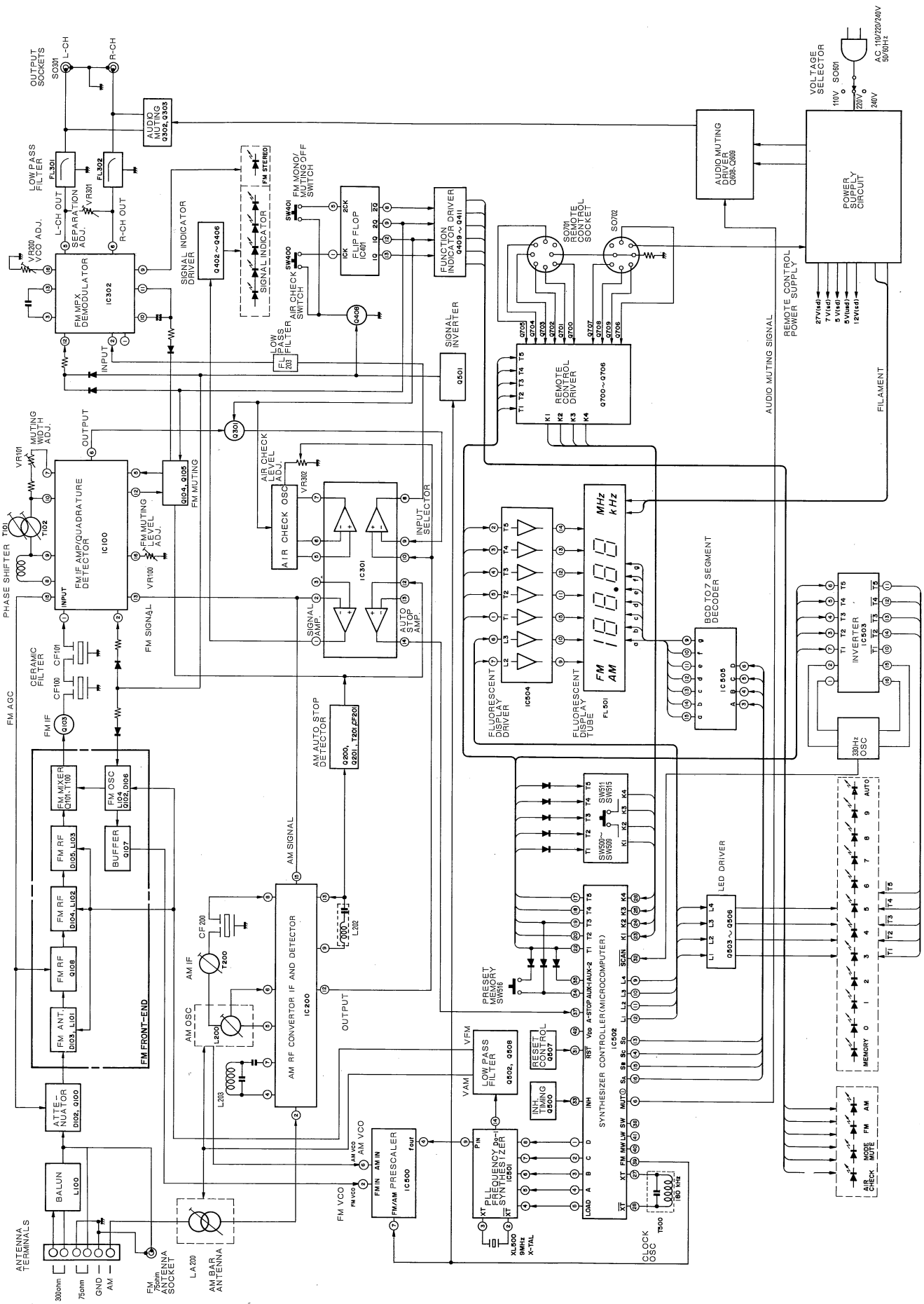


Figure 3 BLOCK DIAGRAM

AM INTERVAL

The International Telecommunication Union (ITU) has established that in its member countries there should be either a 10 kHz or 9 kHz interval between the frequencies of any two AM broadcasting stations. The following map shows the 9 kHz interval area (regions 1 and 3) and the 10 kHz interval area (region 2).
Circuits of Model ST-105H are different according to the 9 kHz or 10 kHz interval area where the model is placed. In the 10 kHz interval area, see the frequencies shown in bracket [ ] for adjutment.

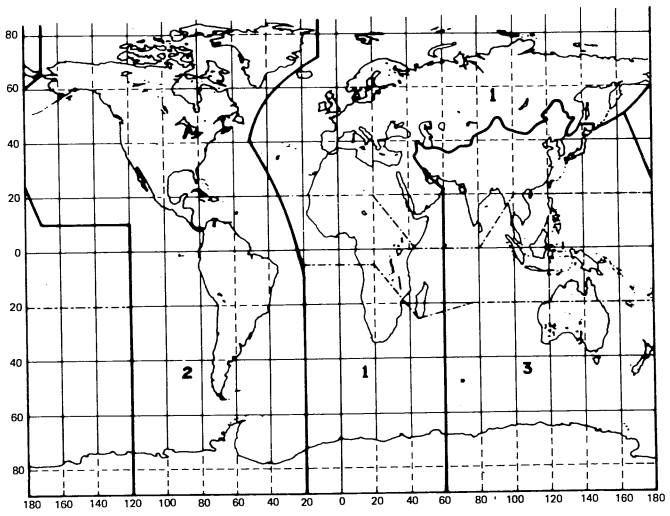


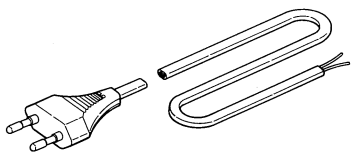
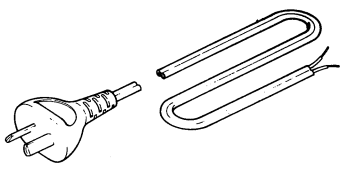
Figure 8–1

RESETTING OF MICROCOMPUTER

If control buttons do not function correctly when they are pushed because of external noise, etc. coming from the power supply, or if the tuner itself does not operate normally when the Power switch is turned on for the first time, again set the Power switch to the "on" position (Do not disconnect the power source.) and press the Reset button which is on the bottom of the tuner.
Then all the previous settings of memories will be cancelled and the frequency display will be "FM 87.50 MHz".
Now, adjust the each control button once again.

AC SUPPLY VOLTAGE SELECTION

The unit operates on 110 V, 220 V, or 240 V, AC supply of either 50 Hz or 60 Hz. Although the unit has been adjusted to a local supply voltage level, check the voltage selector setting.
Turn the voltage selector with a screwdriver until the correct voltage reading appears adjacent to adjusting screw.

AC supply cord	Bushing	Connection		
		Ⓐ	Ⓑ	
QACCV0001AGZZ	LBSHC0004AGZZ	Brown	Light blue	
QACCL0052AFZZ	LBSHC0007AFZZ	White stripe	Black	

AC POWER SUPPLY CORD WIRING CONNECTIONS

AM IF ALIGNMENT (MW, LW)

PROCEDURE NUMBER	SWEEP GENERATOR		TUNING FREQUENCY DISPLAY	SELECTOR SETTING	METER CONNECTION	ADJUSTMENT	REMARKS
	CONNECTION	FREQUENCY					
1	Entwine signal generator output in loop from around antenna coil LA200 (MW)	450 kHz (Central frequency of ceramic filter)	High end of Frequency	Band selector switch (MW)	Oscilloscope is connected between the test point TP200 and the TP201 (earth)	T200 and T202	Maximum response at 450 kHz Repeat 2 or 3 times (Figure 7–2)

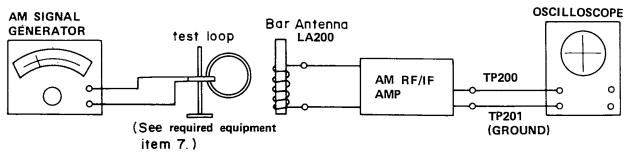


Figure 7–1 AM IF ALIGNMENT EQUIPMENT CONNECTIONS

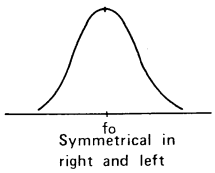


Figure 7–2 IF CURVE

LW RF ALIGNMENT

PROCEDURE NUMBER	TEST STAGE	SIGNAL GENERATOR		TUNING FREQUENCY DISPLAY	METER CONNECTION	ADJUSTMENT	REMARKS
		CONNECTION	FREQUENCY				
1	V.C.O.			Low end of frequency (150 kHz)	Connect the VTVM (vacuum tube voltmeter) between the test point TP106 and the ground (earth).	Local oscillation coil L200.	Adjust the L200 so that the said voltmeter reads 2.3 ± 0.1V.
2				High end of frequency (372 kHz).	Same as above	Oscillation trimmer TC203	Adjust the TC203 so that the voltmeter reading reaches 19.0 ± 0.2V.
3	Press the number input keys "7" and "8" – Whose corresponding memories have been individually loaded with "LW" 150 kHz" and "LW 372 kHz" by the operations so far made – alternately to check the voltages measured when the voltage setting is at LW 150 kHz and LW 372 kHz. If those voltages deviate from specified values, readjustment is needed.						
4	Tracking	Connect AM signal generator to the loop antenna and place this assembly at near the bar antenna coil (LA200) Fix the AM signal generator output at some 55 dB (560μV/m).	173 kHz (400 Hz, 30%, AM modulated)	frequency (173 kHz)	Connect the VTVM (vacuum tube voltmeter) to the output socket	AM bar antenna coil LA200 (LW)	Make the output be the maximum.
5		Same as above	344 kHz (400 Hz, 30%, AM modulated)	frequency (344 kHz)	Same as above	Antenna trimmer TC201.	Same as above
6	Repeat the steps 4 to 5 until no further improvement can be made.						
7	Auto-Stop Signal (ASS)	Connect AM signal generator to the loop antenna and place this assembly at near the bar antenna coil (LA200). Set the AM signal generator output at about 50 dB.	Same as step 5.		Connect a DC voltmeter between the test point TP301 and the ground (earth).	T201	Adjust both the T201 so that the reading of the said DC voltmeter (TP301) reaches its maximum. (If the reading is then more than 10 V, reduce the AM signal generator output level to maintain the reading less than 10 V.)
8		Adjust the frequency and output settings of AM signal generator respectively to 344 kHz and about 57 dB (710μV/m). In such a machine state, check to see if the ST-105H automatically stops the scanning – both upward and downward scannings – at the 344 kHz position and receives a signal of that frequency when it is compelled to scan the both ways, up and down, in the automatic tuning mode. If the unit fails to automatically stop scanning, repeat step 7 above.					

DISASSEMBLY

Prior to removing the chassis, be sure to draw the AC power supply plug from a wall outlet. Then, proceed with the removal work in the following order after disconnecting all of the connection cords at the rear of the set.

1) To remove the cabinet: (Refer to Figure 5–1)
1. Remove 4 screws ① retaining the cabinet (2 screws each for the right and left sides).
2. Shift the cabinet backward about 10 mm.
3. Giving a force to the bottom of cabinet, hold it up and remove.

2) To remove the bottom board: (Refer to Figure 5–2)
Turn over the set and remove 4 screws ② retaining the bottom board, then the bottom board can be detached.

3) To remove the front panel: (Refer to Figure 5–3)
Remove 4 screws ③ retaining the front panel (2 screws each for the top and bottom sides), that the front panel can be detached.

4) To remove the front P.W. Board: (Refer to Figure 5–4)
Remove 3 push rivets ④ retaining the front P.W. Board, that the front P.W. Board can be detached.

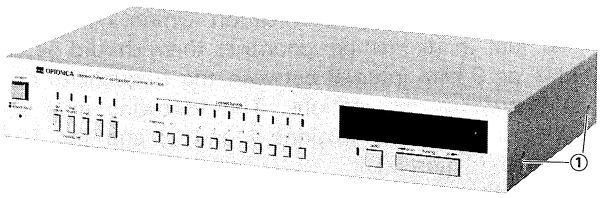


Figure 5–1

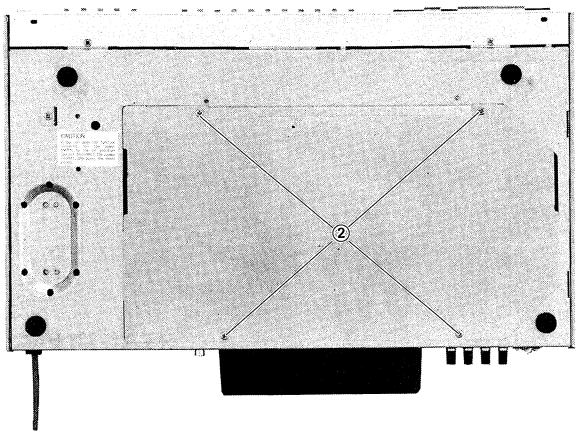


Figure 5–2

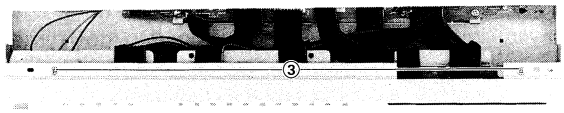


Figure 5–3

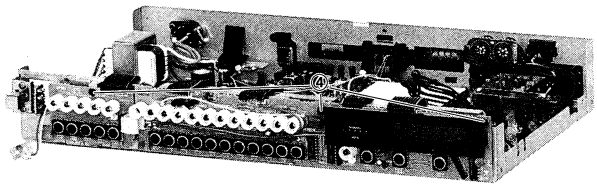


Figure 5–4

CIRCUIT DESCRIPTION

■ REMOTE CONTROL CIRCUIT

If connected with the remote control system (AD-105H), the ST-105H will offer the following two remote controlled functions.

1. Power On/Off Operation
   When the power switch of the remote control side is set at "on" position, the resultant signal goes out of pin ⑤ of the remote control socket (SO702) and is applied via R609 into the base of Q603 to make it be at "high" level. Thus the Q603 turns on, and Q602 also turns on to cause the power circuit of the ST-105H to start operation.
   When the switch is set at off position, the signal from pin ⑤ of the remote control socket (SO702) is cut off so that the base of Q603 becomes "low" level. Thus the Q603 turns off, and Q602 also turns off making dead the power circuit of the ST-105H.
2. Calling of the Preset Stations
   When one of the preset station buttons 0 to 9 of the remote control side is pushed, one of the preset switches (SW500 to SW509) turns on, and one of the transistors (Q700 to Q709) connected in parallel with it also turns on, so that the corresponding preset station of the ST-105H is called out without pushing the preset switch on the ST-105H.
   Suppose that the preset station button 3 of the remote control side is pushed. Then the preset switch (SW503) turns on, and the transistor (Q706) connected in parallel with it also turns on: at the time, the base of Q706 is at "low" level. And a current flows from the emitter (T_5) to the collector (K_1) to do the same as with the preset switch 3 of the ST-105H pushed, resulting in a call-out of the preset station 3.

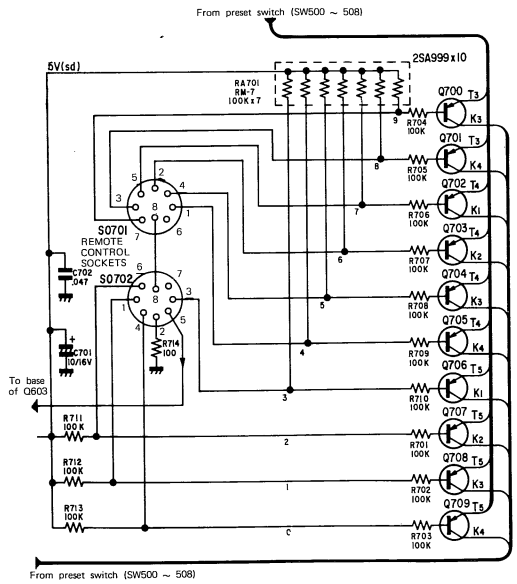


Figure 5–5

ALIGNMENT INSTRUCTIONS

Alignment is an exacting procedure and should be undertaken only when necessary. If alignment of (LW, MW) and FM is required, either section may be done first.

The FM stereo section, however, should be done only if the FM monaural section is properly adjusted.

REQUIRED EQUIPMENT

1. Signal generator with a frequency range of 150kHz to 1611kHz; (LW, MW)
2. Signal generator with a frequency range of 87.5MHz to 108.0MHz; FM
3. Vacuum tube voltmeter (AC-VTVM)
4. Sweep signal generator with a sweep range of at least 500kHz and center frequency of 10.7MHz with at least a 10.7MHz marker may be used. (For FM)
5. Sweep signal generator with a sweep range of at least 50kHz and center frequency of 450kHz with at least a 450kHz marker may be used. (For AM)
6. Oscilloscope with a wide range amplifier of approximately 100kHz.
7. Test loops, a coil of any size wire, one turn or more; (LW, MW)
8. Vacuum tube voltmeter (DC-VTVM)
9. FM stereo signal generator.
10. Audio signal generator with a frequency range of 20Hz to 100kHz.
11. Frequency counter with a frequency range of approximately 200 MHz

Notes:

Allow the set at least five minutes to warm up before attempting alignment. During alignment keep the signal generator output at the lowest level that will maintain a usable output from the set.

For the adjustment of stereo separation, the FM stereo generator output is usually 1,000μV. Incorrect grounding to the metal chassis may pick up an unwanted 10.7MHz signal from the final IF stage, which will cause a regenerative sweep response on the sweep curve and result in misalignment.

Therefore always connect a ground to point.

Ground connection of signal generator:	Chassis ground
Generator modulation (AM):	30%, 400Hz
Generator modulation (FM):	40kHz, 1000Hz
Generator modulation (FM stereo):	Ch. L. or Ch. R. 40kHz, 1,000Hz Mod.

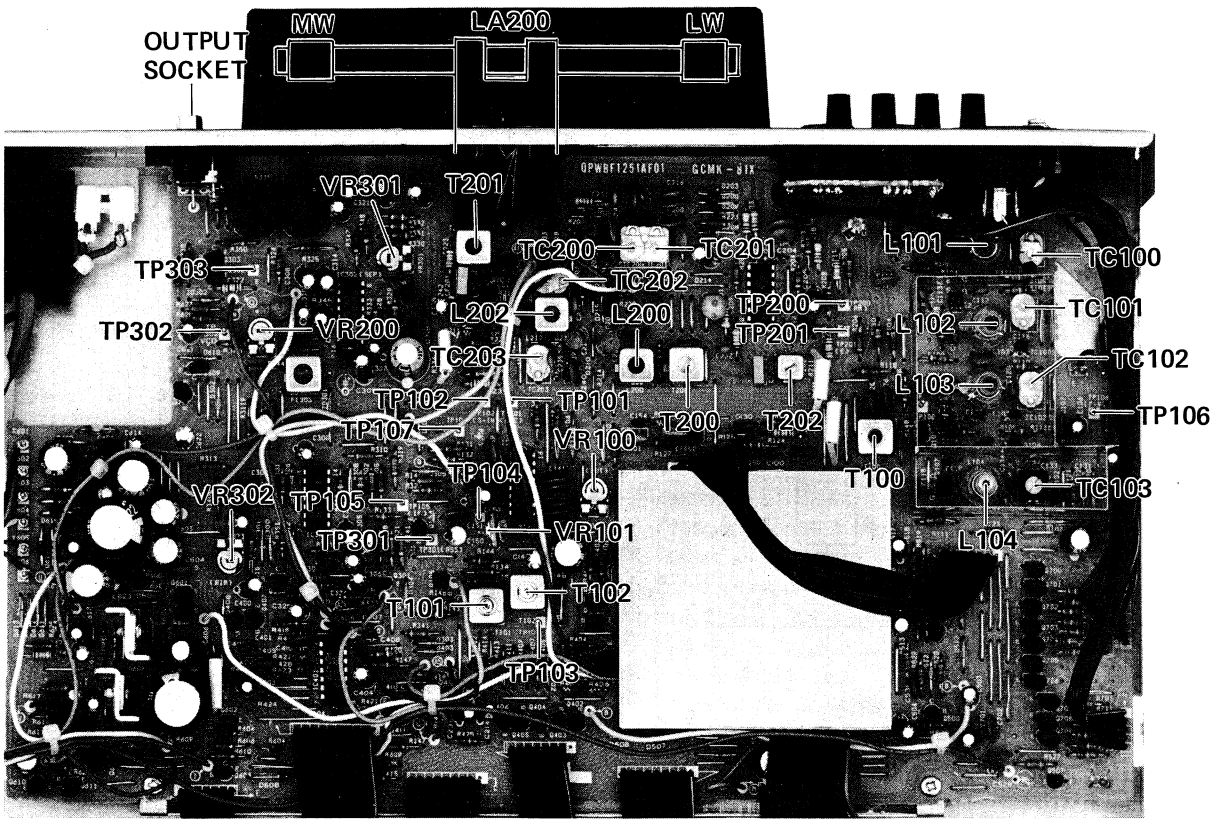


Figure 6

AM IF ALIGNMENT (MW, LW)

PROCEDURE NUMBER	SWEEP GENERATOR		TUNING FREQUENCY DISPLAY	SELECTOR SETTING	METER CONNECTION	ADJUSTMENT	REMARKS
	CONNECTION	FREQUENCY					
1	Entwine signal generator output in loop from around antenna coil LA200 (MW)	450 kHz (Central frequency of ceramic filter)	High end of Frequency	Band selector switch (MW)	Oscilloscope is connected between the test point TP200 and the TP201 (earth)	T200 and T202	Maximum response at 450 kHz Repeat 2 or 3 times (Figure 7–2)

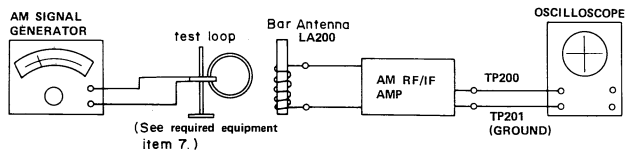


Figure 7–1 AM IF ALIGNMENT EQUIPMENT CONNECTIONS

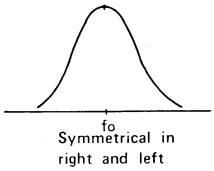


Figure 7–2 IF CURVE

LW RF ALIGNMENT

PROCEDURE NUMBER	TEST STAGE	SIGNAL GENERATOR		TUNING FREQUENCY DISPLAY	METER CONNECTION	ADJUSTMENT	REMARKS
		CONNECTION	FREQUENCY				
1	V.C.O.			Low end of frequency (150 kHz)	Connect the VTVM (vacuum tube voltmeter) between the test point TP106 and the ground (earth).	Local oscillation coil L200.	Adjust the L200 so that the said voltmeter reads 2.3 ± 0.1V.
2				High end of frequency (372 kHz).	Same as above	Oscillation trimmer TC203	Adjust the TC203 so that the voltmeter reading reaches 19.0 ± 0.2V.
3	Press the number input keys "7" and "8" — Whose corresponding memories have been individually loaded with "LW" 150 kHz" and "LW 372 kHz" by the operations so far made — alternately to check the voltages measured when the voltage setting is at LW 150 kHz and LW 372 kHz. If those voltages deviate from specified values, readjustment is needed.						
4	Tracking	Connect AM signal generator to the loop antenna and place this assembly at near the bar antenna coil (LA200) Fix the AM signal generator output at some 55 dB (560μV/m).	173 kHz (400 Hz, 30%, AM modulated)	frequency (173 kHz)	Connect the VTVM (vacuum tube voltmeter) to the output socket	AM bar antenna coil LA200 (LW)	Make the output be the maximum.
5		Same as above	344 kHz (400 Hz, 30%, AM modulated)	frequency (344 kHz)	Same as above	Antenna trimmer TC201.	Same as above
6	Repeat the steps 4 to 5 until no further improvement can be made.						
7	Auto-Stop Signal (ASS)	Connect AM signal generator to the loop antenna and place this assembly at near the bar antenna coil (LA200). Set the AM signal generator output at about 50 dB.	Same as step 5.		Connect a DC voltmeter between the test point TP301 and the ground (earth).	T201	Adjust both the T201 so that the reading of the said DC voltmeter (TP301) reaches its maximum. (If the reading is then more than 10 V, reduce the AM signal generator output level to maintain the reading less than 10 V.)
8		Adjust the frequency and output settings of AM signal generator respectively to 344 kHz and about 57 dB (710μV/m). In such a machine state, check to see if the ST-105H automatically stops the scanning — both upward and downward scannings — at the 344 kHz position and receives a signal of that frequency when it is compelled to scan the both ways, up and down, in the automatic tuning mode. If the unit fails to automatically stop scanning, repeat step 7 above.					

MW RF ALIGNMENT

PROCEDURE NUMBER	TEST STAGE	SIGNAL GENERATOR		TUNING FREQUENCY DISPLAY	METER CONNECTION	ADJUSTMENT	REMARKS
		CONNECTION	FREQUENCY				
1	V.C.O.			Low end of frequency (522 kHz) [520 kHz]	Connect the VTVM (vacuum tube voltmeter) between the test pont [TP106] and the ground (earth).	Local oscillation coil L202.	Adjust the L202 so that the said voltmeter reads 1.8 ± 0.1V.
2				High end of frequency (1611 kHz). [1610 kHz]	Same as above	Oscillation trimmer TC202	Adjust the TC202 so that the voltmeter reading reaches 21.0 ± 0.2V.
3	Press the number input keys "4" and "5" — Whose corresponding memories have been individually loaded with "MW" 522 [520] kHz" and "MW 1611 [1610] kHz" by the operations so far made — alternately to check the voltages measured when the voltage setting is at MW 522 [520] kHz and MW 1611 [1610] kHz. If those voltages deviate from specified values, readjustment is needed.						
4	Tracking	Connect AM signal generator to the loop antenna and place this assembly at near the bar antenna coil (LA200) Fix the AM signal generator output at some 55 dB (560μV/m).	612 [600] kHz (400 Hz, 30%, AM modulated)	frequency (612 kHz) [600 kHz]	Connect a VTVM (vacuum tube voltmeter) to the output socket	AM bar antenna coil LA200 (MW)	Make the output be the maximum.
5		Same as above	1404 [1400] kHz (400 Hz, 30%, AM modulated)	frequency (1404 kHz) [1400 kHz]	Same as above	Antenna trimmer TC200.	Same as above
6	Repeat the steps 4 to 5 until no further improvement can be made.						
7	Auto-Stop Signal (ASS)	Connect AM signal generator to the loop antenna and place this assembly at near the bar antenna coil (LA200). Set the AM signal generator output at about 56 dB.	Same as step 5.		Connect a VTVM (vacuum tube voltmeter) between the test point [TP301] and the ground (earth).	T201	Adjust both the T201 so that the reading of the said DC voltmeter ([TP301]) reaches its maximum. (If the reading is then more than 10 V, reduce the AM signal generator output level to maintain the reading less than 10 V.)
8		Adjust the frequency and output settings of AM signal generator respectively to 1404 [1400] kHz and about 57 dB (710μV/m). In such a machine state, check to see if the ST-105H automatically stops the scanning — both upward and downward scannings — at the 1404 [1400] kHz position and receives a signal of that frequency when it is compelled to scan the both ways, up and down, in the automatic tuning mode. If the unit fails to automatically stop scanning, repeat step 7 above.					

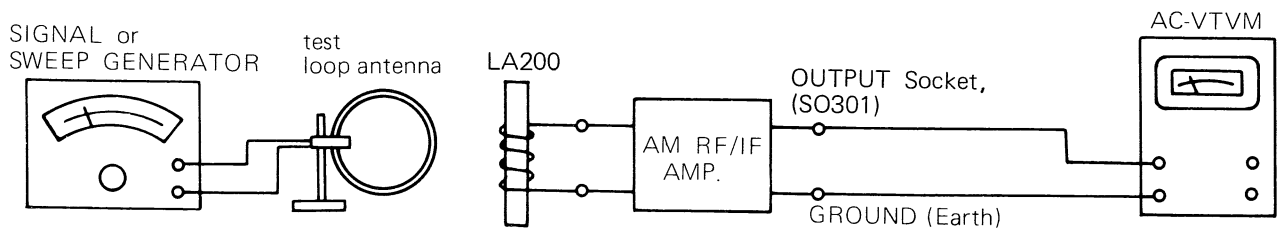


Figure 8 LW, MW, RF ALIGNMENT EQUIPMENT CONNECTIONS

FM IF/RF ALIGNMENT

Push the FM mono/muting off switch to off position.
(Check then that the FM mono/muting off indicator is light up.)

PROCEDURE NUMBER	TEST STAGE	SIGNAL GENERATOR		TUNING FREQUENCY DISPLAY	METER CONNECTION	ADJUSTMENT	REMARKS
		CONNECTION	FREQUENCY				
1	IF	Connect FM sweep generator to test point TP100 through 5pF capacitor. The earth is to be connected with the shield plate (Keep the output be closed as much as possible)	Central frequency of ceramic filter (10.700 MHz)	High end of frequency (108.00 MHz)	Connect oscilloscope to the test points TP101 and TP107 (ground)	T100	Rotate the cores of T100 so that the waveform becomes symmetrical and highest as shown in Fig. 10–2.
2	V.C.O.			Low end of frequency (87.50MHz)	Connect the VTVM (vacuum tube voltmeter) between the test point TP106 and the ground (earth).	Local oscillation coil L104.	Adjust the L104 so that the said voltmeter reads 3.0 ± 0.1V.
3				High end of frequency. (108.00MHz)	Same as above	Oscillation trimmer TC103	Adjust the TC103 so that the voltmeter reading reaches 21.0 ± 0.2V
4	Press the number input keys "3" and "4" — Whose corresponding memories have been individually loaded with "FM" 87.50MHz" and "FM 108.00MHz" by the operations so far made — alternately to check the voltages measured when the voltage setting is at FM 87.50MHz and FM 108.00MHz. It those voltages deviate from specified values readjustment is needed.						
5	Distortion	Connect the FM signal generator to the test point TP100 with a 5pF capacitor connected between them. The ground is to be connected to the shield plate. Fix the FM signal generator output so that the generator delivers a monaural signal of about 80 dB.	10.700 MHz (1 kHz, 40 kHz dev., FM modulated)	Same as step 1 above	Connect a distortion factormeter to the output terminal	T101	Adjust T101 so that the meter reads minimum.
6		Connect the FM signal generator to the test point TP100 with a 5pF capacitor connected between then. Connect the ground to the shield plate.	10.700 MHz (40 kHz dev., 1kHz).	Same as step 1 above	Connect the VTVM (vacuum tube voltmeter) between the tuner test points TP104 and TP103 .	T102	Adjust the T102 so that the VTVM-(vacuum tube voltmeter) reads less than 0,01 V and that the then distortion factor reaches its minimum.
7	Repeat the steps 1 to 4 until no further improvement can be made.						
8	Tracking (* A)	Connect FM signal generator to the antenna terminal. (Keep the input be closed as much as possible.)	91MHz (1kHz, 40 kHz Dev., FM modulated.)	Tunig in 91 MHz	Connect VTVM to the output socket	L101, L102, L103	Make the output be the maximum.
9		Same as above	106 MHz (1kHz, 40kHz Dev., FM modulated.)	Tuning in 106 MHz	Same as above	TC100, TC101, TC102	Same as above
10	Repeat the steps 8 to 9 until no further improvement can be made.						

(* A) As for FM high-frequency range (front-end section), since it has been already adjusted, do not rotate the coils and trimmers unless the adjustment becomes necessary — readjust the FM-high frequency only when it suffers a considerable disalignment.

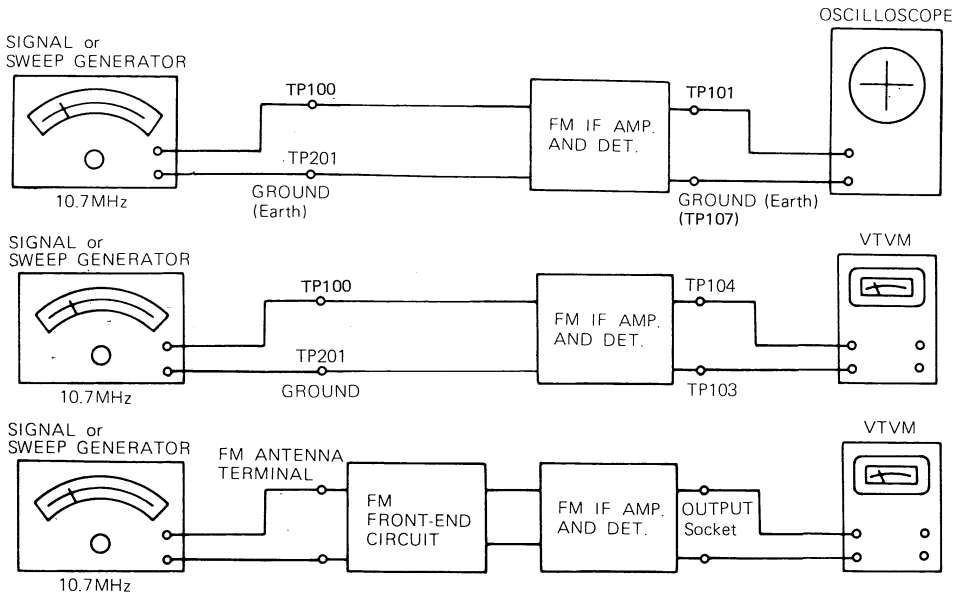


Figure 10–1 FM ALIGNMENT EQUIPMENT CONNECTIONS

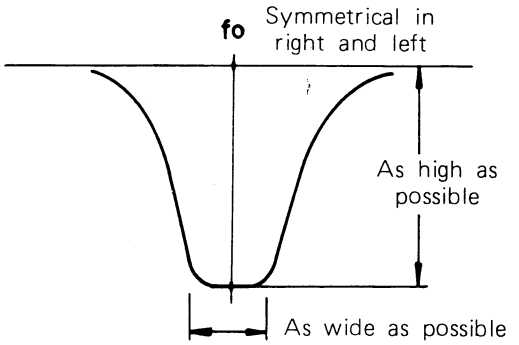


Figure 10–2

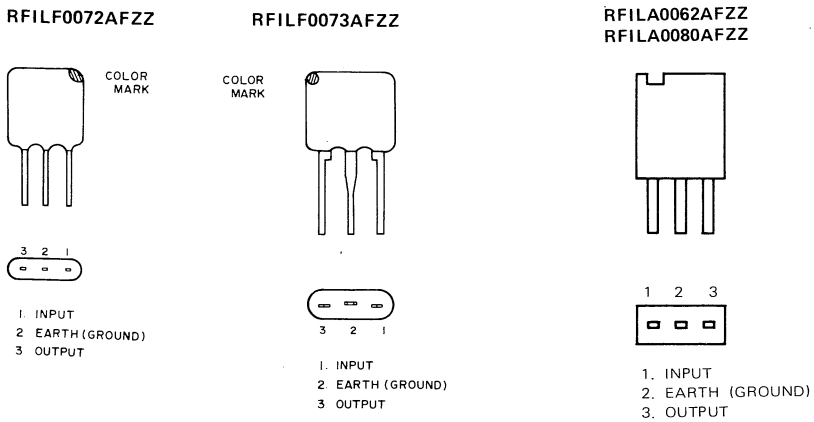


Figure 10–3 CERAMIC FILTER TYPES

FM IF READJUSTMENT AND DISTORTION FACTOR ADJUSTMENT

1. Push the FM mono/muting off switch to on position.
2. Set the frequency of FM signal generator to 98 MHz (40kHz deviation, 1KHz), fully close the output and connect such signal to the FM antenna terminal of the set through a dummy resistor of 300 ohms.
3. Set the switches of the set to the respective positions shown below and turn on the power switch.
   (Air Check – off)
4. Keeping the output of FM signal generator be fully closed (that is, with no signal given), rotate the core of T102, so that voltage between the test points TP103 and TP 104 be just 0(zero)V, too.
   (around "98 MHz" position).
5. Adjust the output of FM signal generator to 60 dB, adjust the core of T101 so that the distortion will be minimized.
6. Fully close the output of FM signal generator and make so that voltage between the test points TP103 and TP104 be just 0(zero)V, too.
7. Repeat the steps 1 to 6 until the best point will be found.
8. Connect FM stereo modulator to FM signal generator. At the time, the following should be set: modulation frequency; 1kHz, [modulation degree L+R 20kHz deviation, L – R; 20kHz deviation pilot (19kHz) 6kHz deviation.] FM signal generator is being set so that the outpu will be 60 dB with the frequency 98 MHz.
9. Arrange the FM stereo modulator to cause modulation for only the signal at the left channel and finely adjust the T100 so as to provide a minimum distortion. (The same operation is to be made also for the right channel signal.)
10. Fully close the output of FM signal generator (the same as with no signal given) and check additionally adjust T102, so that voltage between the test points TP103 and TP104 be just 0(zero)V, too.
11. Repeat the steps 1 to 10 above until you will achieve the best tuning.

ADJUSTMENT OF AIR CHECK CAL.

Produce 98 MHz, 60 dB FM mono signal (75kHz deviation, 400 Hz) by a signal generator to apply it to the antenna of the unit and read the tuner output voltage.
Next, set Air Check switch to air check on position, then the output voltage will vary. Adjust semi-fixed resistor VR302 so that the output voltage with Air check/Muting switch set to air check on becomes about 40% (−8 dB), of that with Air Check switch kept at air check off.

ADJUSTMENT OF FM MUTING LEVEL

(Check the signal generator output frequency by the aid of frequency counter.)

1. Push the FM mono muting off switch to off position.
2. Connect a 300 ohm dummy resistor and FM signal generator to the FM antenna terminal (300 ohm). Keep the output of FM signal generator as small as possible (to produce no signal).
3. Manipulate the FM signal generator so that it outputs a monaural signal of 98 MHz (23 dB, 400 Hz, 40 kHz dev.), and set the receiving frequency of the tuner at 98.00 MHz.
4. And manipulate the semi-variable resistor VR200 so that the muting function is activated with an FM signal generator output of 23 dB (14 μV). (antenna open voltage)

ADJUSTMENT OF FM STEREO V.C.O. FREE-RUNNING FREQUENCY, STEREO SEPARATION

(Check the signal generator output frequency by the use of frequency counter.)

1. Push the FM mono muting off switch to off position.
2. Adjust the FM signal generator so as to output monaural signal of 98.000 MHz (400 Hz, 40 kHz deviation), 60 dB (1 mV) and connect it to the FM antenna terminal. Then tune in the unit with a tuner receiving frequency set at 98.00 MHz.
3. Connect the VTVM across a 3.3 Megohm resistor, to the test point TP302 and a frequency counter to the output terminal of VTVM.
4. Adjust the semi-variable resistor VR200 so that V.C.O. free-running frequency will be 76 kHz ± 76 Hz.
5. Connect the FM stereo modulator to the FM signal generator. At the time, the following setting should be made: modulation frequency; 1 kHz [L + R; 20 kHz dev., L − R; 20 kHz dev., and pilot signal (19 kHz); 6 kHz (8%) deviation].
6. Fix the FM signal generator output frequency at 98.000 MHz, 60 dB (1 mV). Connect the VTVM to the output socket of this unit.
7. Then manipulate the stereo modulator so that the left channel alone is subjected to modulation and set the then left-channel output of the ST-105H at 0 dB (output socket).
8. Connect the VTVM to the fixed output socket (R-channel) of the unit and to the ground (earth) and adjust the semi-variable resistor VR301 so that the separation becomes maximum (the output leak to the opposite channel is minimized).
   Repeat the above procedures until the outputs of both channels will be equal to each other.

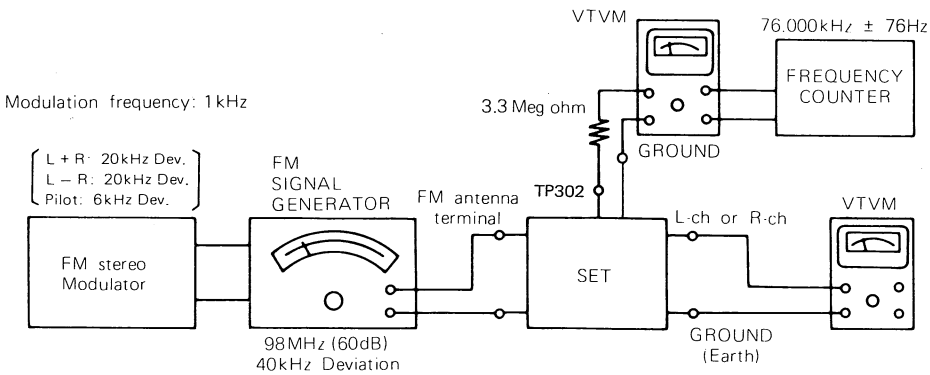


Figure 11 FM STEREO ALIGNMENT EQUIPMENT CONNECTIONS

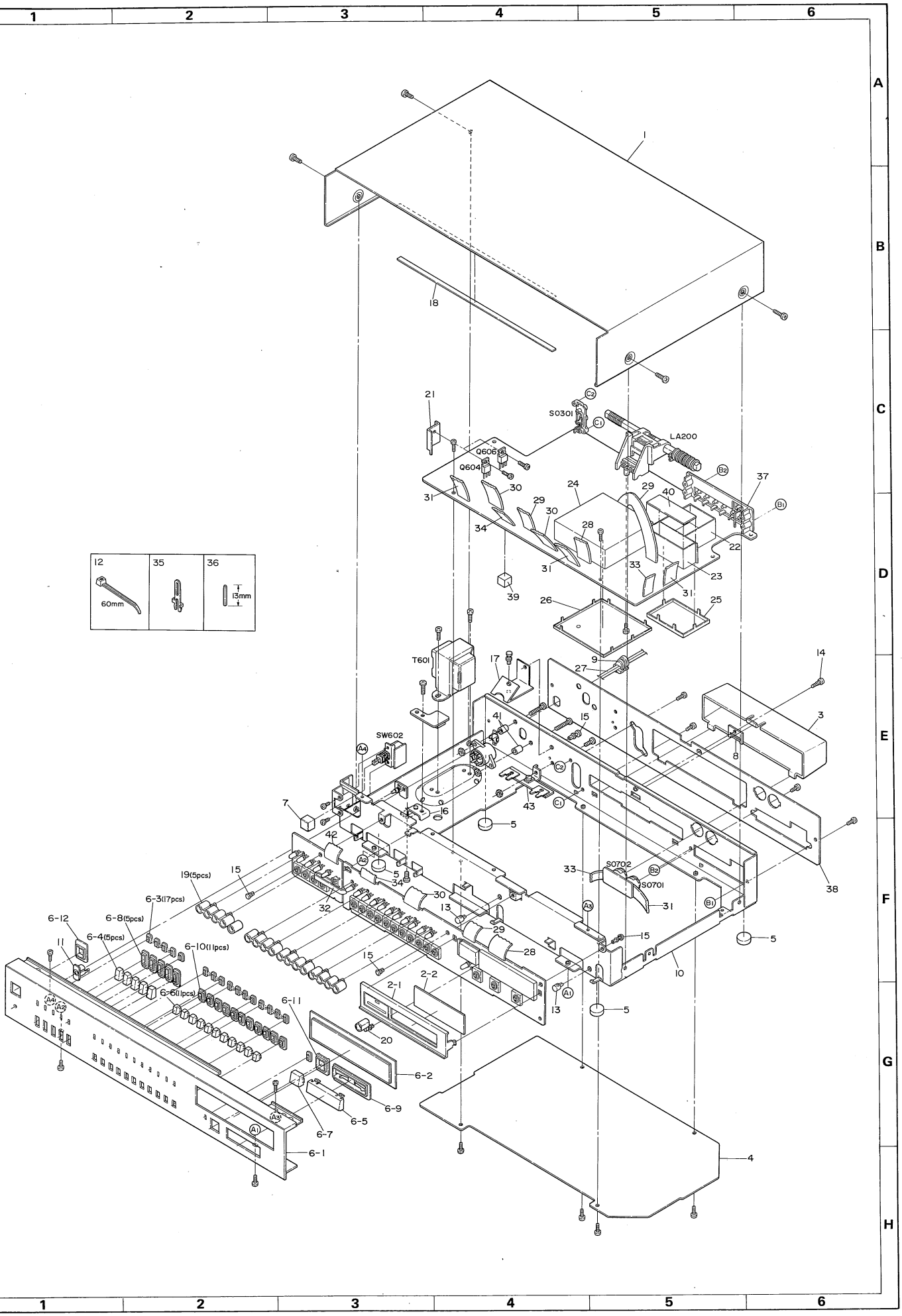


Figure 12 CABINET EXPLODED VIEW

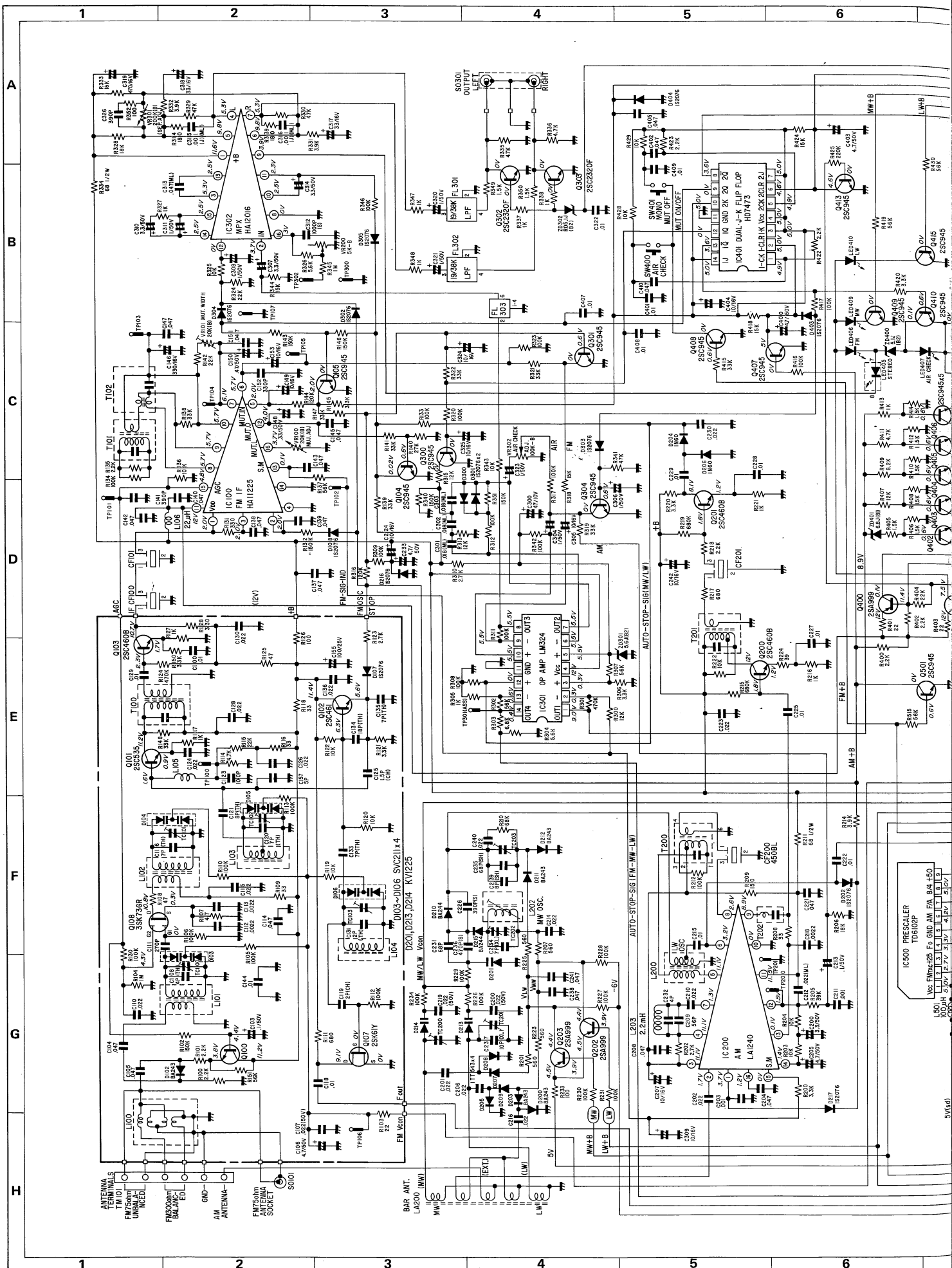
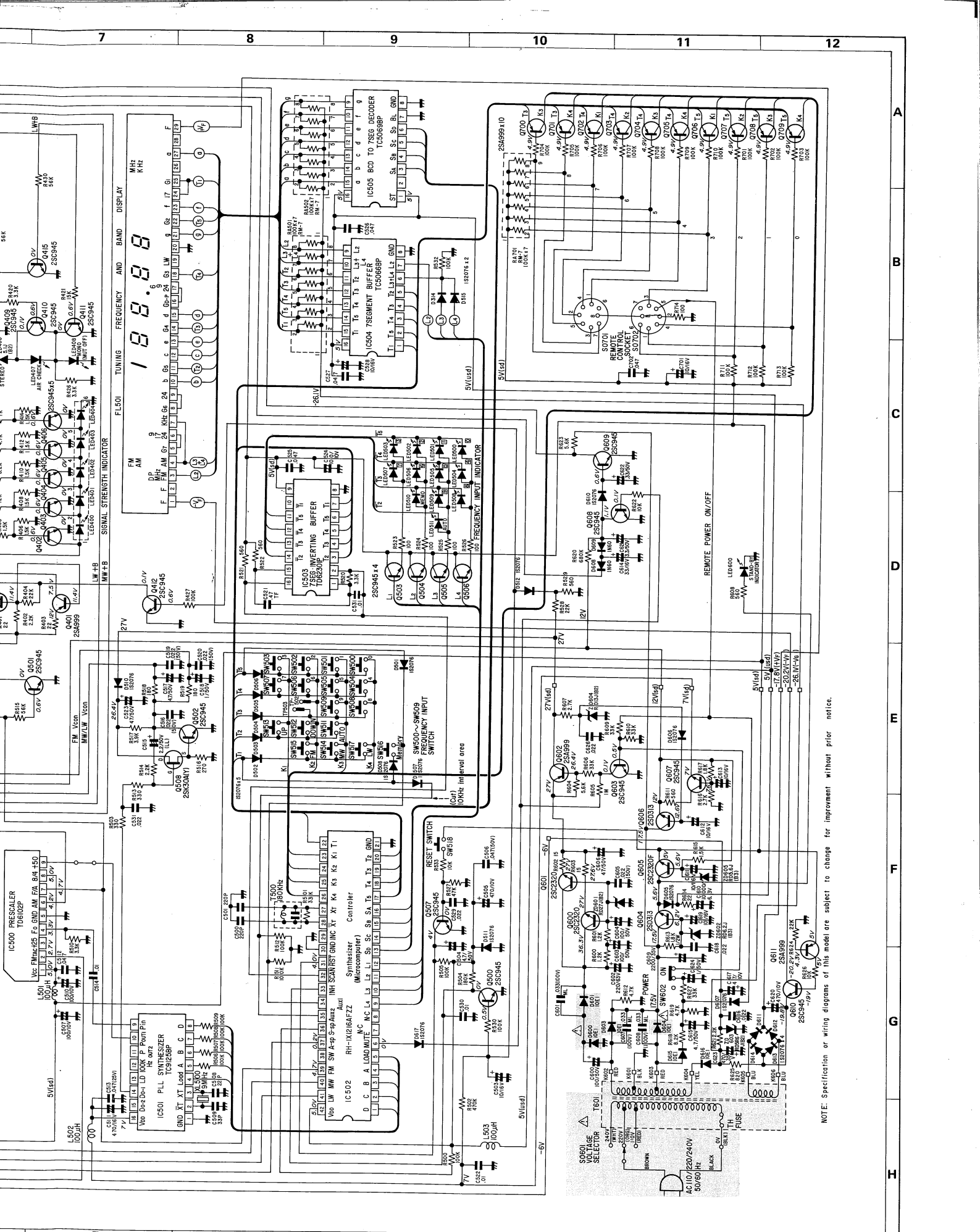


Figure 14 SCHEM



SCHEMATIC DIAGRAM

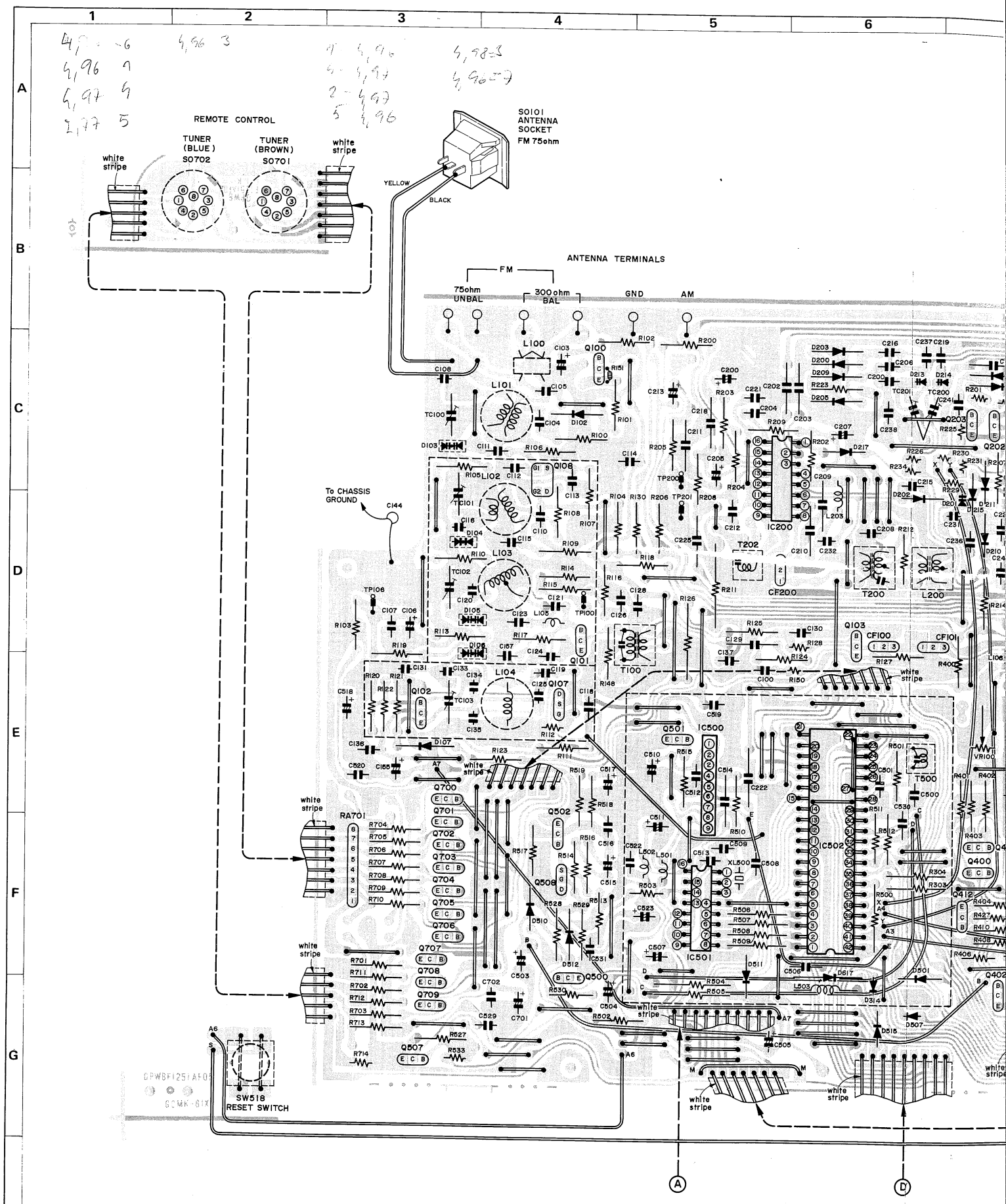
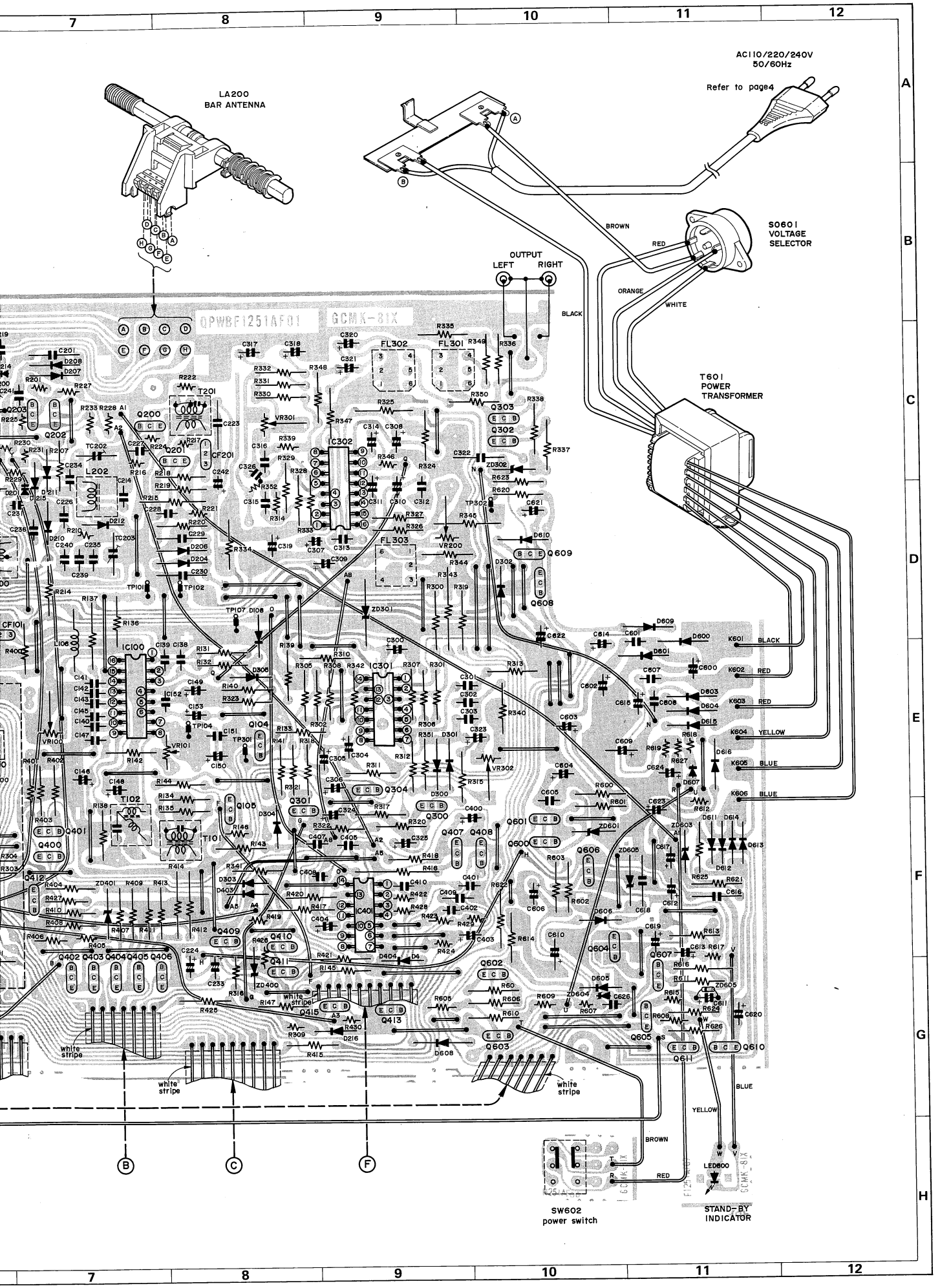


Figure 15 WIRING SIDE OF P.W. BOA



OF P.W. BOARD (1/2)

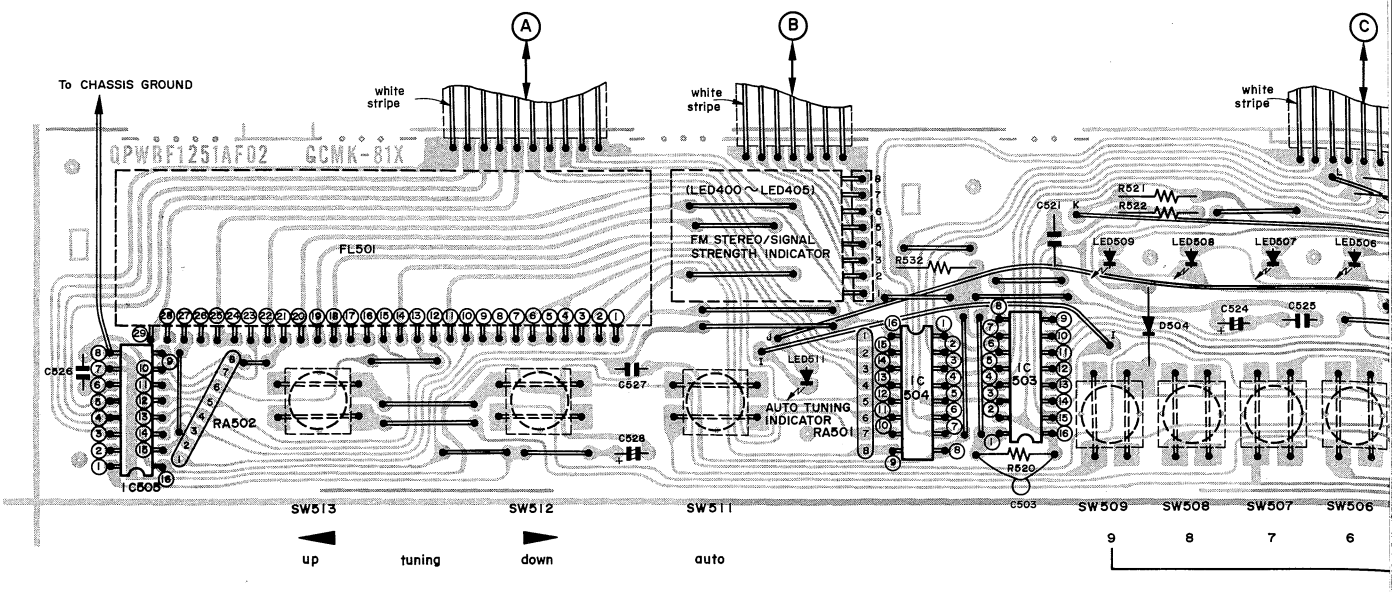


Figure 17 WIRING SIDE OF

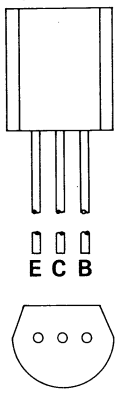
NOTES ON SCHEMATIC DIAGRAM

1. SWITCH POSITION

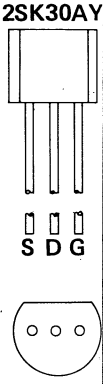
SWITCH NO.	FUNCTION	POSITION
SW400	Air Check	OFF
SW401	FM mono/muting off	
SW500 ~ 509	Frequency Input Presetting (0 ~ 9)	
SW511	Auto Tuning	
SW512	Frequency Count Down	
SW513	Frequency Count Up	
SW514	MW	
SW515	FM	
SW516	Preset Station Memory	
SW517	LW	
SW518	Reset	
SW602	Power	ON

2. Voltage readings are measure with VTVM under no signal input. (FM mono/muting off position)
3. Capacitance value are in MFD. P = MMFD
4. Resistance value are in ohm K = 1000. M = 1000K
5. Specifications of wiring diagram of this model are subject to change for the improvement without prior notice
6. Parts marked with " ⚠ " (▭) are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

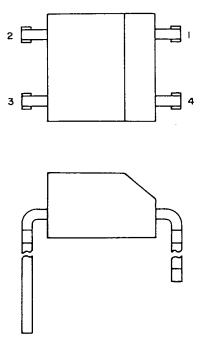
2SA999F
2SC945AP
2SC2320F



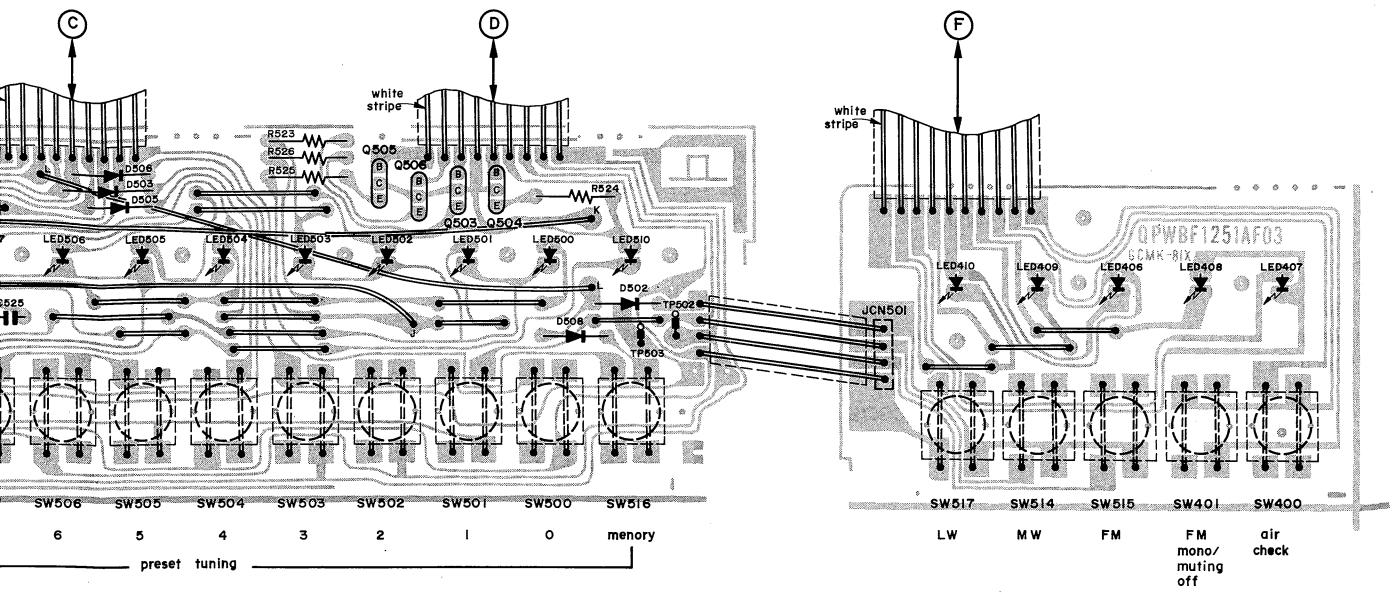
2SK30AY



3SK73G



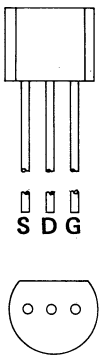
1. SG
2. D
3. G
4. G



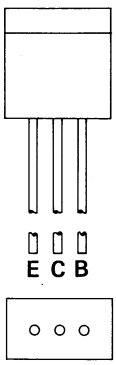
SIDE OF P.W. BOARD (2/2)

TRANSISTOR DIODE AND LED TYPES

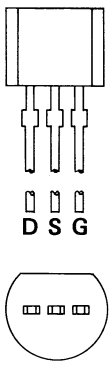
2SK30AY



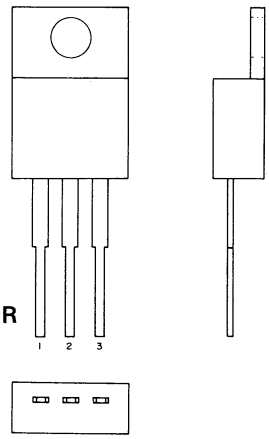
2SC461B
2SC460B
2SC535C



2SK61Y

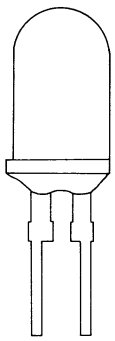


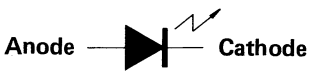
2SD313K

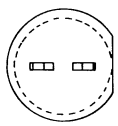


E : EMITTER
C : COLLECTOR
B : BASE
S : SOURCE
D : DRAIN
G : GATE

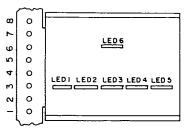
GL-5PR66
GL-5NG66



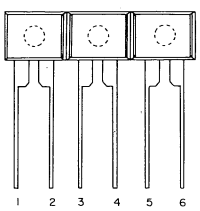




LED ARRAY
SEL8820A



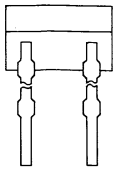
KV1225

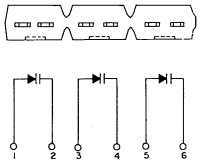


1. 3. 5 : Anode
2. 4. 6 : Cathode

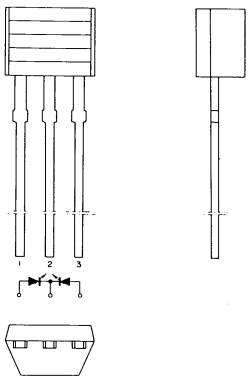
3SK73GR

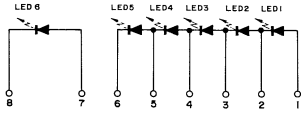
1. SOURCE
2. DRAIN
3. GATE 2
4. GATE 1





SVC211





REPLACEMENT PARTS LIST

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following information.

1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION

NOTES:
Parts marked with " ⚠ " (▨) are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

REF. NO.	PART NO.	DESCRIPTION	CODE
		INTEGRATED CIRCUITS	
IC100	VHIHA11225/-1	FM. IF. Amplifier and Detector (HA11225)	AN
IC200	VHILA1240//-1	AM. RF. Amplifier, Converter, IF Amplifier and Detector (LA1240)	AK
IC301	VHILM324///-1	Operational Amplifier (LM324)	
IC302	VHIHA12016/-1	P.L.L. Multiplex Stereo Demodulator (HA12016)	AL
IC401	RH-IX1206AFZZ	TTL, Dual J-K Flip-Flop (HD7473P or SN7473N or M53273P)	AG
IC500	VHITD6102P/-1	ECL (Emitter Coupled Logic) Prescaler (TD6102P)	AT
IC501	VHITC9125BP-1	C-MOS, P.L.L. Synthesizer (TC9125BP)	AV
IC502	RH-IX1216AFZZ	C-MOS, Microcomputer, (TC9129BP)	AZ
IC503	VHITD62301P-1	C-MOS, 7 Segment-Inverting Buffer (TD62301P)	AK
IC504	VHITC5066BP-1	C-MOS, 7-High Voltage Buffer/Non Inverting Type (TC5066BP)	AP
IC505	VHITC5069BP-1	C-MOS, BCD to 7-Segment Latch, Decoder, Driver (TC5069BP)	AT
		TRANSISTORS	
Q100	VS2SC945AP/-1	FM Circuit (2SC945AP)	AB
Q101	VS2SC535-C/-1	FM Mixer Circuit (2SC535C)	AC
Q102	VS2SC461-B/-1	FM Oscillation Circuit (2SC461B)	AB
Q103	VS2SC460-B/-1	FM IF Amplifier Circuit (2SC460B)	AC
Q104, 105	VS2SC945AP/-1	FM Muting Circuit (2SC945AP)	AB
Q107	VS2SK61-Y//-1	FM Oscillation Circuit, FET (2SK61Y)	AD
Q108	VS3SK73GR/-1	FM RF Circuit, FET (3SK73GR)	AF
Q200, 201	VS2SC460-B/-1	AM RF Circuit (2SC460B)	AC
Q202, 203	VS2SA999-F/-1	AM RF Circuit (2SA999F)	AC
Q300, 301	VS2SC945AP/-1	FM Muting Circuit (2SC945AP)	AB
Q302, 303	VS2SC2320-F-1	Audio Muting Circuit (2SC2320F)	
Q304	VS2SC945AP/-1	FM/AM Switching Circuit (2SC945AP)	
Q400, 401	VS2SA999-F/-1	Signal Strength Indicator Driver (2SA999F)	AC
Q402, 403, Q404, 405, Q406	VS2SA945AP/-1	Signal Strength Indicator Driver (2SC945AP)	AB
Q407, 408	VS2SC945AP/-1	Switching, Flip-Flop Circuit (2SC945AP)	
Q409	VS2SC945AP/-1	LED Indicator Circuit (2SC945AP)	
Q410, 411	VS2SC945AP/-1	LED Indicator Circuit (2SC945AP)	
Q412, 413, Q415	VS2SC945AP/-1	Switching, Flip-Flop Circuit (2SC945AP)	
Q500	VS2SC945AP/-1	Synthesizer Controler Circuit (2SC945AP)	
Q501	VS2SC945AP/-1	Signal Inverter (2SC945AP)	
Q502	VS2SC945AP/-1	LowPass Filter (2SC945AP)	
Q503, 504, Q505, 506	VS2SC945AP/-1	LED Indicator Circuit (2SC945AP)	
Q507	VS2SC945AP/-1	Reset Control (2SC945AP)	
Q508	VS2SK30A-Y/-1	LowPass Filter (2SK30AY)	AD
Q600, 601	VS2SC2320-F-1	Power Supply Circuit (2SC2320F)	AB
Q602	VS2SA999-F/-1	Power Supply Circuit (2SA999F)	AC
Q603	VS2SC945AP/-1	Power Supply Circuit (2SC945AP)	AB
Q604	VS2SD313-K/-1	Power Supply Circuit (2SD313K)	AE
Q605	VS2SC2320-F-1	Power Supply Circuit (2SC2320F)	AB
Q606	VS2SD313-K/-1	Power Supply Circuit (2SD313K)	AE
Q607	VS2SC945AP/-1	Power Supply Circuit (2SC945AP)	
Q608, 609	VS2SC945AP/-1	Audio Muting Circuit (2SC945AP)	AB
Q610	VS2SC945AP/-1	Power Supply Circuit (2SC945AP)	
Q611	VS2SA999-F/-1	Power Supply Circuit (2SA999F)	AC
Q700, 701, Q702, 703, Q704, 705, Q706, 707, Q708, 709	VS2SA999-F/-1	Switching, Remote Control Circuit (2SA999F)	AC
		DIODES	
D102	VHDBA243///-1	Switching, FM RF (BA243)	AC
D103	VHCSVC211//3F	Variable Capacity, FM Antenna (SVC211)	AD
D104	VHCSVC211//3F	Variable Capacity, FM RF (SVC211)	AD

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
D105	VHCSVC211//3F	Variable Capacity, FM RF (SVC211)	AD
D106	VHCSVC211//3F	Variable Capacity, FM Oscillation (SVC211)	
D107	VHD1S2076//-1	Switching, FM OSC. Stop (1S2076)	AB
D108	VHD1S2076//-1	Switching, FM Operation Killer (1S2076)	
D200	VHDBA243///-1	Switching, AM Antenna Circuit (BA243)	AC
* D201, 213, D214	VHCKV1225//3F	Variable Capacity, AM (KV1225)	AS
D202	VHD1S2076//-1	Switching, AM Oscillation Stop (1S2076)	AB
D203	VHDBA243///-1	Switching, AM Antenna Circuit (BA243)	AC
D205	VHDITT543//-1	Switching, AM Antenna Circuit (ITT543)	AB
D204, 206	VHD1N60////-1	Rectifier, AM Auto Stop Signal (1N60)	
D207, 208, D209	VHDITT543//-1	Switching, AM Antenna Circuit (ITT543)	
D210	VHDBA244///-1	Switching, AM Antenna Circuit (BA244)	AC
D211	VHDBA243///-1	Switching, AM Antenna Circuit (BA243)	
D212	VHDBA243///-1	Switching, AM Antenna Circuit (BA243)	
D215	VHDBA244///-1	Switching, AM Antenna Circuit (BA244)	AB
D216	VHD1S2076//-1	Switching, Operational Amplifier (1S2076)	
D217	VHD1S2076//-1	Switching, AM Oscillation Stop (1S2076)	
D300, 301	VHD1S2076//-1	Switching, Limiter Air Check Oscillation Circuit (1S2076)	AB
D302	VHD1S2076//-1	Switching, VCO Stop (1S2076)	
D303	VHD1S2076//-1	Switching, Air Check Circuit (1S2076)	
D304	VHD1S2076//-1	Switching, FM Mono (1S2076)	
D305	VHD1S2076//-1	Switching, FM (1S2076)	
D314	VHD1S2076//-1	Switching, Frequency Display (1S2076)	
D403, 404	VHD1S2076//-1	Switching, Flip Flop Circuit (1S2076)	
D501, 502, D503, 504, D505, 506, D507, 508	VHD1S2076//-1	Switching, Key Matrix (1S2076)	
D510	VHD1S2076//-1	Switching, Signal LED Drive Circuit (1S2076)	
D511	VHD1S2076//-1	Siwtching, Synthesizer Control Circuit (1S2076)	
D512	VHD1S2076//-1	Switching, Signal LED Drive Circuit (1S2076)	
D515	VHD1S2076//-1	Switching, Frequency Drive Circuit (1S2076)	
⚠D600, 601	VHD10E1////-1	Rectifier, Power Supply Circuit (10E1)	AC
⚠D603, 604	VHD10E1////-1	Rectifier, Power Supply Circuit (10E1)	AC
D605	VHD1S2076//-1	Rectifier, Power Supply Circuit (1S2076)	AB
D606	VHD1S2076//-1	Rectifier, Power Supply Circuit (1S2076)	
D607	VHD1S2076//-1	Switching, Remote Control Circuit (1S2076)	
D608, 609	VHD1N60////-1	Switching, Audio Muting Circuit (1N60)	
D610	VHD1S2076//-1	Switching, Audio Muting Circuit (1S2076)	
D611, 612, D613, 614	VHD1S2076//-1	Rectifier, Power Supply Circuit (1S2076)	
D615, 616	VHD10E1////-1	Rectifier, Power Supply Circuit (10E1)	AC
D617	VHD1S2076//-1	Siwtching, Muting Signal Control Circuit (1S2076)	AB

ZENER DIODES

ZD301	VHERD5R6JB2-1	Voltage Regulator, 5.6V (RD5.6JB2)	AB
ZD302, 400	VHERD5R1JB2-1	Voltage Regulator, 5.1V (RD5.1JB2)	
ZD401	VHERD6R8JB1-1	Voltage Regulator, 6.8V (RD6.8JB1)	
ZD601	VHERD270JB2-1	Voltage Regulator, 27V (RD27JB2)	
ZD602	VHERD6R2JB3-1	Voltage Regulator, 6.2V (RD6.2JB3)	
ZD603	VHERD5R6JB2-1	Voltage Regulator, 5.6V (RD5.6JB2)	
ZD604	VHERD130JB2-1	Voltage Regulator, 13V (RD13JB2)	
ZD605	VHERD5R6JB3-1	Voltage Regulator, 5.6V (RD5.6JB3)	

LED's

LED400, 401, LED402, 403, LED404, 405	VHPSEL8820A1F	LED Array, Signal Strength Indicator and FM Stereo Broadcast Indicator (SEL8820A)	AP
LED406	RH-PX1023AFZZ	FM Indicator (GL-5NG66)	AD
LED407	RH-PX1023AFZZ	FM Air Check Indicator, Green (GL-5NG66)	
LED408	RH-PX1023AFZZ	FM Mono/Muting off Indicator,Green (GL-5NG66)	
LED409	RH-PX1023AFZZ	MW Indicator, Green (GL-5NG66)	
LED410	RH-PX1023AFZZ	LW Indicator, Green (GL-5NG66)	
LED500, 501, LED502, 503, LED504, 505, LED506, 507, LED508, 509, LED510	RH-PX1022AFZZ	Input/Pre-Setting Indicator, Red (GL-5PR66)	AC
LED511	RH-PX1022AFZZ	Automatic Tuning Indicator, Red (GL-5PR66)	

* Note: D201, D213, D214 For ordering this assembly of three diodes, a separate supply of each diode is not possible: the three are considered a pair.

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
LED601	VHPGL2PR1//-1	Standby Indicator, Red (GL2PR1)	AC
		COILS	
L100	RCILA0475AFZZ	FM Balun, 300 to 75 ohm	AD
L101	RCILA0478AFZZ	FM Antenna	
L102	RCILR0346AFZZ	FM RF	
L103	RCILR0347AFZZ	FM RF	
L104	RCILB0490AFZZ	FM Oscillation	
L105	RCILC0079AFZZ	FM IF Trap	AC
L106	VP-CH220K0000	22μH, Choke +B	AB
L200	RCILB0487AFZZ	LW Oscillation	AD
L202	RCILB0489AFZZ	MW Oscillation	
L203	VP-LK222K0000	2.2 mH, Choke	AC
L501, 502	VP-CF101K0000	100μH, Choke +B	AB
L503	VP-CK101K0000	100μH, Choke +B	
LA200	RCILA0477AFZZ	MW/LW Ferrite Bar Antenna	AM
		FILTERS	
CF100	RFILF0072AFZZ	10.700MHz ±20kHz (Red), FM IF, Ceramic	AG
CF101	RFILF0073AFZZ	10.700MHz ±20kHz (Red), FM IF, Ceramic	
CF200	RFILA0062AFZZ	450kHz, AM IF, Ceramic	
CF201	RFILA0080AFZZ	450kHz, AM Auto Stop Signal	AF
FL301, 302	RFILL0060AFZZ	Low Pass Filter, 19/38kHz	AH
FL303	RFILL0061AFZZ	Low Pass Filter	AE
		TRANSFORMERS	
T100	RCILI0237AFZZ	FM IF	AD
T101	RCILD0072AFZZ	Quadrature (10.7MHz), FM Demodulator	AE
T102	RCILD0071AFZZ	Quadrature (10.7MHz), FM Demodulator	
T200	RCILI0281AFZZ	AM IF (450kHz)	AD
T201	RCILI0280AFZZ	AM IF (ASS, 450kHz)	
T202	RCILI0254AFZZ	MW, OSC	
T500	RCILI0286AFZZ	Clock Pulse OSC	
⚠T601	RTRNP0766AFZZ	Power	AW
		CONTROLS	
VR100	RVR-M0326AFZZ	20K ohm (B), FM Muting Level Adjust	AB
VR101	RVR-M0156AFZZ	20K ohm (B), FM Muting Width Adjust	AC
VR200	RVR-M0324AFZZ	5K ohm (B), VCO Frequency Adjust	AB
VR301	RVR-M0330AFZZ	200K ohm (B), Stereo Separation Adjust	
VR302	RVR-M0329AFZZ	100K ohm (B), Air Check Level Adjust	
TC100	RTO-H1064AFZZ	FM Antenna	
TC101, 102	RTO-H1064AFZZ	FM RF	
TC103	RTO-H1030AGZZ	FM OSC	AC
TC200, 201	RTO-H2033AGZZ	AF RF (Trimmer Assembly)	AD
TC202	RTO-H1009AFZZ	MW OSC	AC
TC203	RTO-H1009AFZZ	LW OSC	

REF. NO.	PART NO.	DESCRIPTION	CODE
		CRYSTAL	
XL500	RCRSB0069AFZZ	9.00MHz, P.L.L.	AK
		ELECTROLYTIC CAPACITORS (Unless otherwise specified capacitors are 50V, ±20%.)	
C103	VCEALA1HW104M	.1MFD	AB
C106	RC-EZA475AF1H	4.7MFD	
C146	RC-EZV337AF1C	330MFD, 16V, ±20%	AC
C148	VCEALA1HW334M	.33MFD	AB
C149	RC-EZA106AF1C	10MFD, 16V, ±20%	
C150	VCEALU1HW474M	.47MFD	
C153	RC-EZA106AF1C	10MFD, 16V, ±20%	
C155	RC-EZV107AF1E	100MFD, 25V, ±20%	AC
C200	RC-EZA335AF1H	3.3MFD	AB
C205	RC-EZA475AF1H	4.7MFD	
C207	RC-EZA106AF1C	10MFD, 16V, ±20%	
C213	VCEALA1HW104M	.1MFD	
C224	RC-EZA106AF1C	10MFD, 16V, ±20%	
C233	RC-EZA475AF1H	4.7MFD	
C242	RC-EZS106AF1C	10MFD, 16V, ±20%	
C300	RC-EZA476AF1A	47MFD, 10V, ±20%	
C304	RC-EZA105AF1H	1MFD	
C305	RC-EZA106AF1C	10MFD, 16V, ±20%	
C306	RC-EZA105AF1H	1MFD	
C307	RC-EZS335AF1H	3.3MFD	
C308	RC-EZA105AF1H	1MFD	
C309	RC-EZA106AF1C	10MFD, 16V, ±20%	
C310	RC-EZA335AF1H	3.3MFD	
C311	RC-EZA105AF1H	1MFD	
C314	RC-EZA335AF1H	3.3MFD	
C317, 318	RC-EZA336AF1C	33MFD, 16V, ±20%	
C319	RC-EZV477AF1C	470MFD, 16V, ±20%	AC
C320, 321, C323	RC-EZA105AF1H	1MFD	AB
C324	RC-EZS106AF1C	10MFD, 16V, ±20%	
C325	RC-EZA106AF1C	10MFD, 16V, ±20%	
C400, 403	RC-EZA475AF1H	4.7MFD	
C404, 503	RC-EZA106AF1C	10MFD, 16V, ±20%	
C504	RC-EZA475AF1H	4.7MFD	
C505	RC-EZV477AF1A	470MFD, 10V, ±20%	AC
C507, 510	RC-EZA107AF1A	100MFD, 10V, ±20%	AB
C511	RC-EZV477AF1C	470MFD, 16V, ±20%	AC
C515	VCEALA1HW225M	2.2MFD	AB
C517	RC-EZA475AF1H	4.7MFD	
C518	RC-EZA105AF1H	1MFD	
C523	RC-EZA476AF1H	47MFD	AC
C524, 528	RC-EZA107AF1A	100MFD, 10V, ±20%	AB
C600	RC-EZV107AF1H	100MFD	
C602	RC-EZV227AF1J	220MFD, 63V, ±20%	AC
C603, 604	RC-EZV107AF1H	100MFD	AB
C606	RC-EZA476AF1H	47MFD	AC
C609	RC-EZW228AF1V	2200MFD, 35V, ±20%	
C610	RC-EZ1145AFZZ	10000MFD, 6.3V, ±20%	AH
C611	RC-EZS106AF1C	10MFD, 16V, ±20%	AB
C617	RC-EZS476AF1A	47MFD, 10V, ±20%	
C612, 613	RC-EZS106AF1C	10MFD, 16V, ±20%	
C614	RC-EZS336AF1C	33MFD, 16V, ±20%	
C615	RC-EZA475AF1H	4.7MFD, 50V, ±20%	
C617	RC-EZS476AF1A	47MFD, 10V, ±20%	
C619	RC-EZA106AF1C	10MFD, 16V, ±20%	
C620	RC-EZA477AF1A	470MFD, 10V, ±20%	
C621	RC-EZA335AF1H	3.3MFD	

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
C622	VCEALA1HW334M	.33MFD	AB
C623	RC-EZV477AF1V	470MFD, 35V, ±20%	AE
C624	RC-EZA105AF1H	1MFD	AB
C701	RC-EZA106AF1C	10MFD, 16V, ±20%	

CAPACITORS

(Unless otherwise specified capacitors are 25V, ±20%, Semiconductor type.)

C100	VCTYPU1EX103M	.01MFD	AA
C104, 105	VCTYPA1EX473M	.047MFD	AB
C107	VCKZPA1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	AA
C108	VCCTPU1HH4R0D	4PF, 50V, ±.5PF, Ceramic	AA
C110	VCKZPU1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	
C111	VCCSPA1HL271J	270PF, 50V, ±5%, Ceramic	
C112, 113	VCTYPA1EX222K	.0022MFD, 25V, ±10%, Semiconductor	
C114	VCTYPA1EX473M	.047MFD	AB
C115	VCKZPA1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	AA
C116	VCCTPU1HH7R0D	7PF, 50V, ±.5PF, Ceramic	AA
C118	VCTYPA1EX103M	.01MFD	
C119	VCCCPU1HH2R0C	2PF, 50V, ±.25PF, Ceramic	
C120	VCCTPU1HH7R0D	7PF, 50V, ±.5PF, Ceramic	
C121	VCCTPU1HH8R0D	8PF, 50V, ±.5PF, Ceramic	
C123	VCCSPA1HL101J	100PF, 50V, ±5%, Ceramic	
C124	VCKZPA1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	
C125	VCCCPU1HH1R5C	1.5PF, 50V, ±.25PF, Ceramic	
C126, 128	VCKZPA1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	
C129	VCTYAT1EX103M	.01MFD	
C130	VCKZPA1HF223Z	.022MFD, 50V, +80 −10%, Ceramic	
C131	VCCTPU1HH2R0D	2PF, 50V, ±.5PF, Ceramic	AB
C133	VCCTPU1HH7R0D	7PF, 50V, ±.5PF, Ceramic	AA
C134	VCCTPU1HH180J	18PF, 50V, ±5%, Ceramic	
C135	VCCTPU1HH7R0D	7RF, 50V, ±.5PF, Ceramic	
C136	VCKZPA1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	
C137	VCTYPA1EX473M	.047MFD	AB
C138, 139	VCTYPU1EX473M	.047MFD	
C140	VCTYPA1EX473M	.047MFD	
C141	VCCSPA1HL391J	390PF, 50V, ±5%, Ceramic	AA
C142	VCTYPU1EX473M	.047MFD	AB
C143	VCTYPA1EX473M	.047MFD	
C144	VCTYPU1EX103M	.01MFD	AA
C145	VCTYPU1EX473M	.047MFD	AB
C147, 151	VCTYPA1EX473M	.047MFD	
C152	VCCSPA1HL331J	330PF, 50V, ±5%, Ceramic	AA
C157	VCCSPU1HL5R0D	5PF, 50V, ±.5PF, Ceramic	
C200	VCKZPA1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	
C201, 202	VCTYAT1CY223N	.022MFD, 16V, ±30%, Semiconductor	AB
C203	VCKYAT1HB102K	.001MFD, 50V, ±10%, Ceramic	AA
C204	VCTYPA1EX473M	.047MFD	AB
C206	VCKZPA1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	AA
C208	VCTYPA1EX473M	.047MFD	AB
C209	VCCSAT1HL560J	56PF, 50V, ±5%, Ceramic	AA
C210	VCTYAT1CY223N	.022MFD, 16V, ±30%, Semiconductor	AA
C211	VCKYAT1HB102K	.001MFD, 50V, ±10%, Ceramic	
C212	VCQYKU1HM223K	.022MFD, 50V, ±10%, Mylar	AB
C214	VCKZPA1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	AA
C215	VCTYAT1EX103M	.01MFD	
C216	VCKZPA1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	
C218	VCTYAT1HV222K	.0022MFD, 50V, ±10%, Semiconductor	
C219	VCKZPA1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	
C221	VCTYPA1EX473M	.047MFD	AB
C222	VCTYAT1EX103M	.01MFD	AA
C223	VCTYAT1CY223N	.022MFD, 16V, ±30%, Semiconductor	
C226	VCQSMU1HS392J	390PF, 50V, ±5%, Styrol	AB
C225, 227, C228, 229	VCTYAT1EX103M	.01MFD	AA
C230	VCTYAT1CY223N	.022MFD, 16V, ±30%, Semiconductor	
C231	VCCSPU1HH680J	68PF, 50V, ±5%, Ceramic	
C232	VCCSPU1HL4R0C	4PF, 50V, ±.25PF, Ceramic	
C234	VCCXPU1HL7R0D	7PF, 50V, ±.5PF, Ceramic	AB
C235	VCCSPU1HH680J	68PF, 50V, ±5%, Ceramic	AA
C236	VCQSMU1HS471J	470PF, 50V, ±5%, Styrol	AB
C237	VCCXPU1HL100J	10PF, 50V, ±5%, Ceramic	AB
C238	VCTYPA1EX473M	.047MFD	AB
C239	VCCSPU1HH8R0C	8PF, 50V, ±.25PF, Ceramic	AA
C240	VCKZPA1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	AA
C241	VCTYPU1EX473M	.047MFD	AB
C301, 302, C303	VCQYKA1HM183J	.018MFD, 50V, ±5%, Mylar	AB
C312	VCQSMU1HS102J	1000PF, 50V, ±5%, Styrol	
C313	VCQYKA1HM473J	.047MFD, 50V, ±5%, Mylar	
C315, 316	VCQYKA1HM102J	.001MFD, 50V, ±5%, Mylar	
C322	VCTYAT1EX103M	.01MFD	AA
C326	VCCSPU1HL391J	390PF, 50V, ±5%, Ceramic	
C401	VCTYPA1EX103M	.01MFD	AA
C402	VCTYPU1EX473M	.047MFD	AB
C405	VCTYPA1EX473M	.047MFD	
C407, 408, C409	VCTYPU1EX103M	.01MFD	AA
C410	VCTYPA1EX473M	.047MFD	AB
C500, 501	VCCSPA1HL221J	220PF, 50V, ±5%, Ceramic	AA
C503	VCKZPU1HF103Z	.01MFD, 50V, +80 −20%, Ceramic	
C506	VCKZPU1HF473Z	.047MFD, 50V, +80 −20%, Ceramic	
C508	VCCSPA1HL220J	22PF, 50V, ±5%, Ceramic	
C509	VCCSPA1HL330J	33PF, 50V, ±5%, Ceramic	
C512, 513	VCTYPU1EX473M	.047MFD	AB
C514	VCTYAT1EX103M	.01MFD	AA
C516, 519, C520	VCKZPA1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	
C521	VCFYKU1HA474J	.47MFD, 50V, ±5%, Metallized Film	AD
C522	VCTYPA1EX103M	.01MFD	AA
C525, 526, C527	VCTYPA1EX473M	.047MFD	AB
C529	VCKZPU1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	AA
C530	VCTYPU1EX103M	.01MFD	
C531	VCTYPU1EX223M	.022MFD	AB

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
C601	VCQYKU2AM333K	.033MFD, 100V, ±10%, Mylar	AB
C605	VCKZPA1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	AA
C607, 608	VCQYKU2AM333K	.033MFD, 100V, ±10%, Mylar	AB
C616, 618	VCTYAT1CY223N	.022MFD, 16V, ±30%, Semiconductor	AA
C626	VCKZPU1HF223Z	.022MFD, 50V, +80 −20%, Ceramic	
C702	VCTYPA1EX473M	.047MFD	AB

RESISTORS

(Unless otherwise specified resistors are 1/4W, ±5%, Carbon Type.)

R100, 101	VRD-ST2EE222J	2.2K ohm	AA
R102	VRD-ST2EE154J	150K ohm	
R103	VRD-ST2EE220J	22 ohm	
R104	VRD-ST2EE105J	1 Meg ohm	
R105, 106	VRD-ST2EE104J	100K ohm	
R107, 108	VRD-ST2EE470J	47 ohm	
R109	VRD-ST2EE330J	33 ohm	
R110	VRD-ST2EE104J	100K ohm	
R111	VRD-ST2EE681J	680 ohm	
R112	VRD-SU2EE104J	100K ohm	
R113	VRD-ST2EE104J	100K ohm	
R114	VRD-ST2EE472J	4.7K ohm	
R115	VRD-ST2EE223J	22K ohm	
R116	VRD-SU2EE330J	33 ohm	
R117	VRD-ST2EE102J	1K ohm	
R118	VRD-ST2EE330J	33 ohm	
R119, 120	VRD-ST2EE103J	10K ohm	
R121	VRD-ST2EE332J	3.3K ohm	
R122	VRD-ST2EE103J	10K ohm	
R123	VRD-ST2EE272J	2.7K ohm	
R124	VRD-ST2EE474J	470K ohm	
R125	VRD-ST2EE470J	47 ohm	
R126	VRD-ST2EE101J	100 ohm	
R127	VRD-ST2EE102J	1K ohm	
R128	VRD-SU2EE331J	330 ohm	
R129	VRD-ST2EE102J	1K ohm	
R130	VRD-ST2EE104J	100K ohm	
R131	VRD-ST2EE331J	330 ohm	
R132	VRD-ST2EE154J	150K ohm	
R133, 134	VRD-ST2EE104J	100K ohm	
R135	VRD-ST2EE222J	2.2K ohm	
R136	VRD-ST2EE103J	10K ohm	
R137	VRD-ST2EE563J	56K ohm	
R138, 139	VRD-ST2EE333J	33K ohm	
R140	VRD-ST2EE273J	27K ohm	
R141	VRD-ST2EE333J	33K ohm	
R142	VRD-ST2EE223J	22K ohm	
R143	VRD-ST2EE154J	150K ohm	
R144	VRD-ST2EE124J	120K ohm	
R145	VRD-ST2EE333J	33K ohm	
R146	VRD-SU2EE154J	150K ohm	
R147, 148	VRD-ST2EE333J	33K ohm	
R150	VRD-SU2EE330J	33 ohm	
R151	VRD-SU2EE563K	56K ohm	
R200	VRD-ST2EE332J	3.3K ohm	
R201	VRD-ST2EE561J	560 ohm	
R202	VRD-ST2EE272J	2.7K ohm	
R203, 204	VRD-ST2EE103J	10K ohm	
R205	VRD-ST2EE393J	39K ohm	
R206	VRD-ST2EE183J	18K ohm	
R207	VRD-ST2EE561J	560 ohm	AA
R208	VRD-ST2EE330J	33 ohm	
R209	VRD-ST2EE151J	150 ohm	
R210	VRD-SU2EE683J	68K ohm	
R211	VRD-ST2HD680J	68 ohm, 1/2W, ±5%, Carbon	
R212	VRD-ST2EE104J	100K ohm	
R214	VRD-ST2EE392J	3.9K ohm	
R215	VRD-ST2EE684J	680K ohm	
R216	VRD-SU2EE102J	1K ohm	
R217	VRD-SU2EE681J	680 ohm	
R218	VRD-ST2EE222J	2.2K ohm	
R219	VRD-ST2EE684J	680K ohm	
R220	VRD-ST2EE332J	3.3K ohm	
R221	VRD-SU2EE102J	1K ohm	
R222	VRD-SU2EE103J	10K ohm	
R223	VRD-ST2EE561J	560 ohm	
R224	VRD-SU2EE390J	39 ohm	
R225	VRD-SU2EE561J	560 ohm	
R226, 227	VRD-SU2EE104J	100K ohm	
R228	VRD-SU2EE101J	100 ohm	
R229, 230, R231	VRD-SU2EE104J	100K ohm	
R233	VRD-SU2EE104J	100K ohm	
R234	VRD-SU2EE104J	100K ohm	
R300	VRD-ST2EE123J	12K ohm	
R301	VRD-ST2EE474J	470K ohm	
R302	VRD-ST2EE563J	56K ohm	
R303	VRD-ST2EE682J	6.8K ohm	
R304	VRD-ST2EE562J	5.6K ohm	
R305	VRD-ST2EE102J	1K ohm	
R306	VRD-ST2EE332J	3.3K ohm	
R307	VRD-ST2EE563J	56K ohm	
R308	VRD-ST2EE104J	100K ohm	
R309	VRD-SU2EE104J	100K ohm	
R310	VRD-ST2EE272J	2.7K ohm	
R311, 312	V RD-ST2EE104J	100K ohm	
R314	VRD-SU2EE181J	180 ohm	
R313, 315	VRD-ST2EE123J	12K ohm	
R316	VRD-SU2EE124J	120K ohm	
R317	VRD-ST2EE104J	100K ohm	
R318	VRD-ST2EE153J	15K ohm	
R319	VRD-ST2EE333J	33K ohm	
R320	VRD-ST2EE104J	100K ohm	
R321, 322	VRD-ST2EE333J	33K ohm	
R323	VRD-ST2EE104J	100K ohm	
R324	VRD-ST2EE223J	22K ohm	
R325	VRD-ST2EE103J	10K ohm	
R326	VRD-ST2EE562J	5.6K ohm	
R327	VRD-ST2EE102J	1K ohm	
R328	VRD-ST2EE183J	18K ohm	
R329, 330	VRD-ST2EE473J	47K ohm	
R331, 332	VRD-ST2EE392J	3.9K ohm	
R333	VRD-ST2EE183J	18K ohm	
R334	VRD-ST2HD680J	68 ohm, 1/2W, ±5%, Carbon	
R335, 336	VRD-ST2EE472J	4.7K ohm	
R337, 338	VRD-ST2EE102J	1K ohm	
R339	VRD-SU2EE181J	180 ohm	
R340	VRD-ST2EE154J	150K ohm	
R341	VRD-ST2EE473J	47K ohm	
R342	VRD-ST2EE104J	100K ohm	
R343	VRD-ST2EE103J	10K ohm	
R344	VRD-ST2EE153J	15K ohm	
R345	VRD-ST2EE105J	1 Meg ohm	
R346	VRD-SU2EE104J	100K ohm	
R347, 348	VRD-ST2EE102J	1K ohm	

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
R349, 350	VRD-ST2EE152J	1.5K ohm	
R351	VRD-ST2EE154J	150K ohm	
R352	VRD-ST2EE101J	100 ohm	
R400	VRD-ST2EE222J	2.2K ohm	
R401	VRD-ST2EE220J	22 ohm	
R402	VRD-ST2EE222J	2.2K ohm	
R403	VRD-ST2EE220J	22 ohm	
R404	VRD-ST2EE223J	22K ohm	
R405, 406	VRD-SU2EE152J	1.5K ohm	
R407	VRD-ST2EE123J	12K ohm	
R408	VRD-ST2EE152J	1.5K ohm	
R409	VRD-ST2EE822J	8.2K ohm	
R410	VRD-ST2EE152J	1.5K ohm	
R411	VRD-ST2EE472J	4.7K ohm	
R412	VRD-ST2EE152J	1.5K ohm	
R413	VRD-ST2EE102J	1K ohm	
R414	VRD-ST2EE152J	1.5K ohm	
R415	VRD-ST2EE333J	33K ohm	
R416, 417	VRD-ST2EE104J	100K ohm	
R418	VRD-ST2EE153J	15K ohm	
R419	VRD-SU2EE563J	56K ohm	
R420	VRD-ST2EE332J	3.3K ohm	
R421	VRD-ST2EE153J	15K ohm	
R422, 423	VRD-SU2EE222J	2.2K ohm	
R424	VRD-SU2EE153J	15K ohm	
R425	VRD-ST2EE224J	220K ohm	
R426	VRD-SU2EE332J	3.3K ohm	
R427	VRD-SU2EE104J	100K ohm	
R428	VRD-SU2EE103J	10K ohm	
R429	VRD-ST2EE103J	10K ohm	
R430	VRD-SU2EE563J	56K ohm	
R500	VRD-ST2EE104J	100K ohm	
R501	VRD-ST2EE333J	33K ohm	AA
R502	VRD-ST2EE474J	470K ohm	
R503	VRD-SU2EE331J	330 ohm	
R504	VRD-ST2EE184J	180K ohm	
R505, 506, R507, 508, R509	VRD-ST2EE104J	100K ohm	
R510	VRD-ST2EE332J	3.3K ohm	
R511, 512	VRD-ST2EE104J	100K ohm	
R513	VRD-ST2EE331J	330 ohm	
R514	VRD-ST2EE222J	2.2K ohm	
R515	VRD-ST2EE563J	56K ohm	
R516	VRD-ST2EE271J	270 ohm	
R517	VRD-ST2EE392J	3.9K ohm	
R518, 519	VRD-ST2EE181J	180 ohm	
R520	VRD-ST2EE332J	3.3K ohm	
R521, 522	VRD-ST2EE561J	560 ohm	
R523, 524, R525, 526	VRD-ST2EE101J	100 ohm	
R527	VRD-ST2EE473J	47K ohm	
R528	VRD-ST2EE223J	22K ohm	
R529	VRD-ST2EE561J	560 ohm	
R530	VRD-SU2EE104J	100K ohm	
R532	VRD-ST2EE104J	100K ohm	
R533	VRD-SU2EE103J	10K ohm	
R600, 601	VRD-ST2EE122J	1.2K ohm	
R602, 603	VRD-ST2EE150J	15 ohm	
R604	VRD-ST2EE562J	5.6K ohm	
R605	VRD-ST2EE105J	1 Meg ohm	
R606	VRD-ST2EE333J	33K ohm	
R607	VRD-SU2EE272J	2.7K ohm	
R608	VRD-SU2EE561J	560 ohm	
R609	VRD-SU2EE333J	33K ohm	
R610	VRD-ST2EE333J	33K ohm	
R611	VRD-ST2EE561J	560 ohm	
R612	VRD-SU2EE472J	4.7K ohm	
R613	VRD-ST2HD182J	1.8K ohm, 1/2W, ±5%, Carbon	
R614	VRD-ST2EE220J	22 ohm	
R615	VRD-SU2EE152J	1.5K ohm	
R616	VRD-ST2EE272J	2.7K ohm	
R617	VRD-SU2EE182J	1.8K ohm	
R618	VRD-SU2EE822J	8.2K ohm	
R619	VRD-SU2EE472J	4.7K ohm	
R620	VRD-ST2EE684J	680K ohm	
R621	VRD-ST2EE222J	2.2K ohm	
R622	VRD-ST2EE103J	10K ohm	AA
R623	VRD-ST2EE562J	5.6K ohm	
R624	VRD-ST2EE223J	22K ohm	
R625	VRD-ST2EE821J	820 ohm	
R626	VRD-ST2EE103J	10K ohm	
R627	VRD-SU2EE333J	33K ohm	
R701, 702, R703, 704, R705, 706, R707, 708, R709, 710, R711, 712, R713	VRD-ST2EE104J	100K ohm	
R714	VRD-SU2EE101J	100 ohm	

RESISTOR ARRAY

RA501, 502, RA701	RMPTC0033AFZZ	100K ohm x 7, 1/8W, ±10%	AD

MISCELLANEOUS

⚠1	GCAB-3100AFSA	Cabinet	AS
2	GCOVA1202AFSA	Cover Assembly, Fluorescent Display Tube	AH
2–1	————	Cover	
•2–2	PFILW0020AFSA	Filter	AE
3	GCOVH1161AFSA	Cover, AM Bar Antenna	AF
4	GFTAU3093AFZZ	Bottom Plate	AD
5	GLEGG0054AF00	Rubber, Leg	AB
6	HPNLC3482AFSA	Front Panel Assembly	BD
6–1	————	Front Panel	
6–2	GCOVA1251AFSA	Window, Display	AF
6–3	GMADZ0064AFSA	Window, LED (Air Check/FM Mono•Muting off/FM/MW/LW/Station Memory/Frequency input/Auto Tuning	AA
6–4	JKNBZ0193AFSA	Button (A); Air Check/FM Mono•Muting off/FM/MW/LW	AD
6–5	JKNBZ0194AFSA	Button (B), Frequency Count Up/Down	AF
6–6	JKNBZ0195AFSA	Button (C), Station Memory/Frequency input	AD
6–7	JKNBZ0196AFSA	Button (D), Auto Tuning	AD
6–8	PSPAS0111AFSA	Spacer, Button (A)	AA
6–9	PSPAS0112AFSA	Spacer, Button (B)	AB
6–10	PSPAS0113AFSA	Spacer, Button (C)	AA
6–11	PSPAS0114AFSA	Spacer, Button (D)	
•6–12	PSPAS0115AFSB	Spacer, Power Switch Button	AB

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
7	JKNBM0355AFSA	Button, Power Switch	AE
8	LANGK0256AFZZ	Bracket, Antenna Cover	AD
⚠9	LBSHC0004AGZZ	Bushing, AC Supply Cord	AB
	LBSHC0007AFZZ	Bushing, AC Supply Cord	
⚠10	LCHSM0382AFZZ	Main Chassis	AS
11	LHLDP9052AF00	Holder, Power Indicator LED	AB
12	LHLDW1075AFZZ	Nylon Band, 60 mm	AA
13	LHLDZ1111AF09	Spacer, P.W. Board Retaining	
14	LX-BZ0211AFFF	Screw, Antenna Cover	
15	LX-LZ0051AF00	Push Rivet	
16	LANGQ0819AFZZ	Bracket, Reset Switch	
⚠17	PCOVW1110AFZZ	Insulator Cover, AC Supply Cord Lug	AB
18	PFLT-0330AF00	Felt, Cabinet	
19	PGIDM0084AFSA	Spacer, LED (four pair)	
20	PGIDM0086AFSA	Spacer, Auto Tuning	AA
21	PRDAR0101AFFW	Heat Sink	AB
22	PSLDM3183AFZZ	Shield Plate	
23	PSLDM3184AFZZ	Shield Plate	
24	PSLDM3185AFZZ	Shield Case	AD
25	PSLDM3192AFZZ	Shield Plate	AB
26	PSLDM3194AFZZ	Shield Plate	
⚠27	QACCL0052AFZZ	AC Supply Cord	AL
	QACCV0001AGZZ	AC Supply Cord	
28	QCNW-0841AFZZ	10 Leads of Jumper (155 mm)	AD
29	QCNW-0842AFZZ	7 Leads of Jumper (170 mm)	AC
30	QCNW-0843AFZZ	9 Leads of Jumper (210 mm)	AD
31	QCNW-0844AFZZ	7 Leads of Jumper (230 mm)	
32	QCNW-1011AFZZ	5 Leads of Jumper	AC
33	QCNW-0896AFZZ	5 Leads of Jumper (300 mm)	AD
34	QCNW-0897AFZZ	9 Leads of Jumper (140 mm)	
35	QLUGP0104AGZZ	Lug	AA
36	QLUGP0111CEFW	Pin, 13 mm	
37	QTANN0462AFZZ	Antenna Terminal Plate	AH
38	TLABH0124AFSA	Label, Specification	AF
39	PGUMS0154AFZZ	Cushion, Rubber	AA
40	PSLDM3212AFZZ	Shield Plate	
41	PSPAB0103AFFW	Spacer, Voltage Selector	
42	QCNW-1149AFZZ	10 Leads of Jumper	AD
⚠43	QLUGL0453AFZZ	Lug Terminal, AC Supply Cord	AD
	PSLDM3198AFZZ	Shield Case, T500 (Synthesizer Circuit)	AC
SO101	QSOCZ2179AFZZ	Socket, FM Antenna	AE
SO301	QSOCJ0770AFZZ	Socket, Output	AD
SO601	QSOCE0558AFZZ	Voltage Selector	AG
SO701, 702	QSOCD0890AFZZ	Socket, Remote Control	
SW400	QSW-K0050AFZZ	Switch, Air Check	AC
SW401	QSW-K0050AFZZ	Switch, FM Mono/Muting off	
JCN501	QCNCW322DAFZZ	Connector, Jumper (5 Pin)	AD
SW500, 501, SW502, 503, SW504, 505, SW506, 507, SW508, 509	QSW-K0050AFZZ	Switch, Frequency input (0～9)	AC
SW511	QSW-K0050AFZZ	Switch, Auto Tuning	AC
SW512	QSW-K0050AFZZ	Switch, Frequency Down	
SW513	QSW-K0050AFZZ	Switch, Frequency Up	
SW514	QSW-K0050AFZZ	Switch, MW	
SW515	QSW-K0050AFZZ	Switch, FM	
SW516	QSW-K0050AFZZ	Switch, Preset Station Memory	
SW517	QSW-K0050AFZZ	Switch, LW	
SW518	QSW-K0050AFZZ	Switch, Reset	
SW602	QSW-P0275AFZZ	Switch, Power	AE
FL501	VVK7-MT-13ZS1	Fluorescent Display Tube	AX
	QANTW0051AFZZ	FM Antenna (T type)	AG
	QCNW-0962AFZZ	Connecting Wires, RCA—Pin type	AF
	QPLGA0250AFZZ	Adapter, AC Plug	
	SPAKA0658AFZZ	Packing Add.	
	SPAKC1719AFZZ	Packing Case	AL
	SSAKA0024AFZZ	Polyethylene Bag, Operation Manual	AA
	SSAKA0039AGZZ	Polyethylene Bag, Set	AB
	TINSZ0281AFZZ	Operation Manual	AK
	TLABH0132AFZZ	Label, Reset	AA
	TMAPC0763AFZZ	Schematic Diagram	

P.W.B. ASSEMBLY
(Not Replacement Item)

DUNTR0168AF03 (Combined Assembly)	Main/Frequency display

CAUTIONS ON HANDLING MOS LSI (IC)

MOS IC is to control the electric conductivity between the source and drain by using the voltage at the gate electrode through insulating oxide film (SiO_2). If over-voltage is applied to the gate electrode, the insulator at the gate electrode undergoes dielectric breakdown. Once such dielectric breakdown occurs, the junction between the gate and other terminals is shortcircuited and MOS IC is so damaged that its quality will not be recovered again.

And, MOS IC is highly sensitive to static charge because its gate oxide film is as thin as 1000 Å to 1500 Å. Input protective circuit is provided to protect MOS IC but this circuit can not always play its role according to the conditions of using MOS IC.

Therefore, pay due attention to the following when handling it.

■ CAUTIONS ON TRANSPORTATION AND PRESERVATION

As for MOS IC, either the input or output terminal has remarkably high impedance in comparison with ordinary semiconductor IC. Therefore, MOS IC is liable to be affected by the induction of neary-by high-tension power source or A.C. power source and it may be given a larger voltage unexpectedly due to body discharged possibly causing dielectric breakdown of the gate. To eliminate this, during transportation and preservation of MOS IC all the terminals shoud be kept at the same potential in the following methods (to shortcircuit all the terminals).

① Wing thin wire around MOS IC.
② Fit metalic ring on it.
③ Pack it with aluminum foil.
④ Hold it by electric conductive jig.
⑤ Put it in a special case for LSI.

Note: Never put MOS IC in a mal-conductive container such as made of polystyrene.

■ CAUTIONS ON SERVICING

① A soldering tool to be used should be the less-leak one (more than 100K ohm of lead resistance—there may be a soldering tool of more than 1 Meg. ohm to be used for semiconductor). Otherwise, ground the soldering tool when using it.
② Ground the earth terminal of a measuring instrument.
③ Ground a bench.
④ Before insertion or removal of LSI to or from P.W.B., be sure to turn off the power switch.
⑤ When inserting LSI to P.W.B., ground the earth terminal of P.W.B.
⑥ Never touch the terminals of LSI by hand.
⑦ Be sure to ground the earth terminal of D.C. power source.
⑧ To prevent LSI from being broken due to human body discharge, it is necessary to ground the human body. But this requires the greatest care as otherwise the body encounters large current (absolutely avoid touching A.C. power source).
⑨ As MOS LSI is actuated with a small current, be sure to remove soldering flux and perform moisture-proof treatment after repairing. (Apply moisture-proof agent for electronic calculator.)

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