SHARP Service Manual

ST-1122H

FM/MW/LW
Stereo tuner

MODEL ST-1122H

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

SPECIFICATIONS

GENERAL DESCRIPTION

Power source:	a.c. 110/220/240V, 50/60Hz
Power consumption:	7W
Circuit:	Superheterodyne system, FM/LW/LW 3-band tuner, with PLL stereo demodulator, FM muting circuit, air check calibrator circuit.
Semiconductors:	3-IC (integrated circuit) 1-FET 7-transistor 8-diode (1-zener diode) 2-LED
Dimentions:	Width: 390mm Height: 142mm Depth: 257mm
Weight:	4kg

FM

Tuning range:	87.6 ~ 108MHz
IF:	10.7MHz
Sensitivity:	2.0μV (at S/N 26dB, 40kHz deviation)
Image rejection:	46dB (at 98MHz)
I.F. rejection:	85dB (at 98MHz)
Selectivity:	55dB
Capture ratio:	2.0dB
AM suppression:	45dB
S/N:	60dB (40kHz deviation)
Destortion:	mono: 0.5% stereo: 0.5%
Stereo separation:	40dB (1kHz)
Output voltage:	350mV (400Hz, 40kHz deviation)

MW

Tuning range:	520 ~ 1620kHz
IF:	455kHz
Quieting sensitivity:	450μV/m (with bar antenna)
Image rejection:	40dB (at 1400kHz)
I.F. rejection:	30dB (at 600kHz)
Distortion:	1.5%
Output voltage:	200mV (400Hz, 30% modulation)

LW

Tuning range:	150 ~ 370kHz
Quieting sensitivity:	350μV/m (with bar antenna)
Image rejection:	40dB (at 340kHz)
I.F. rejection:	25dB (at 340kHz)
Output voltage:	200mV (400Hz, 30% modulation)

SHARP CORPORATION OSAKA, JAPAN

DISASSEMBLY

Prior to removing the chassis, be sure to disconnect the power cord plug from wall outlet. Then proceed with the following steps after removing all of the connection cords located at the rear of the set.

(1) How to remove the cabinet
Remove the 4 screws (1) located at both sides of the cabinet, then the cabinet can be taken out of the set.

(2) How to remove the bottom plate
Turn the set over and remove the 4 screws (2) retaining the bottom cabinet, then the bottom cabinet can be taken out if withdrawed frontward.
Then, it becomes able to repair the PWB.
However, in order to further remove the front panel, take the following procedures.

(3) How to remove the front panel
1. Draw the Tuning knobs (3) out of the front panel.
2. Remove the 5 screws (4) retaining the front panel, then the front panel can be taken out.

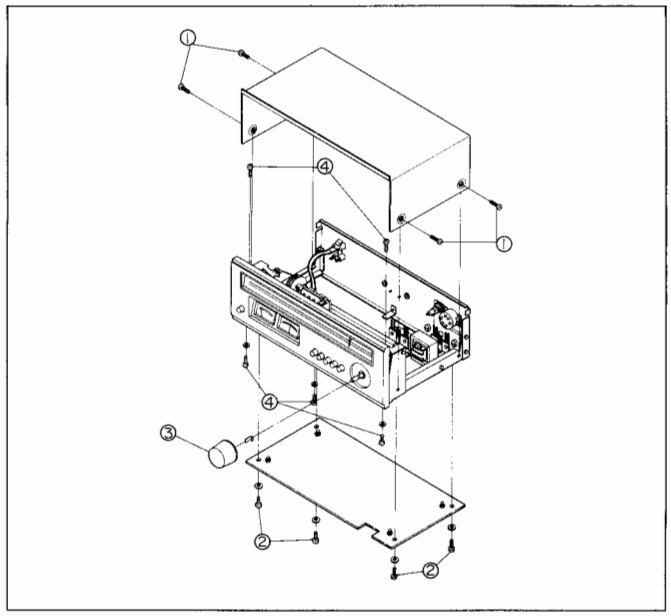
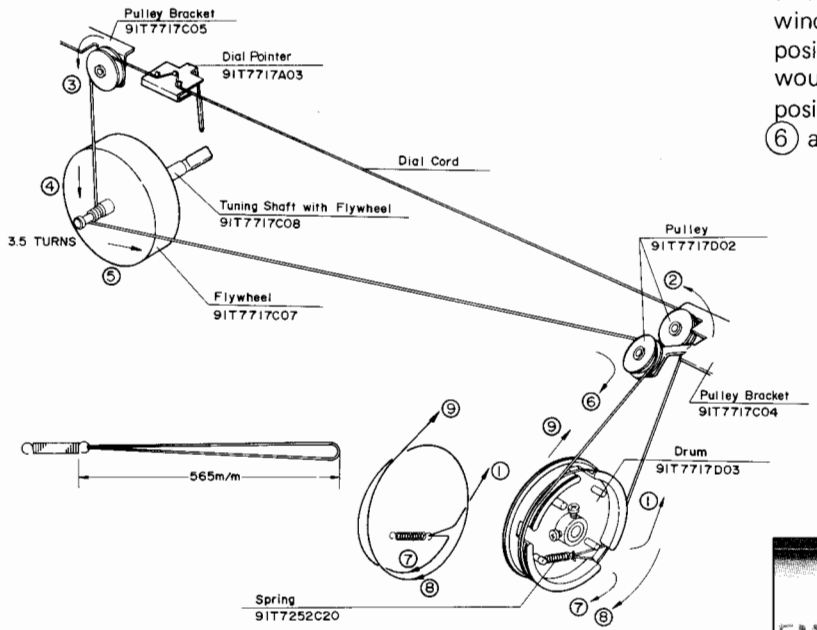


Figure 1 DISASSEMBLY



(1) Setting of the dial cord
1. Turn the drum fully counnter clockwise (at the highest frequency position).
2. Put a hook of the spring on the central hole of the drum.
3. Then proceed with stringing in the numerical order from (1) to (8) At this work, while holding a hand at the position (6) to temporarity fix a dial string. wind the string on the drum by 1-1/2 turns at the position (7) (which is an extention of the string, wound at the position (6)) and bring it through the position (8). Then release a hand from the position (6) and thus the stringing is completed.

(2) Setting of the pointer
1. Turn the tuning shaft fully counter-clockwise (at the lowest frequency position).
2. Align the pointer to the center of LED (stereo indicator) of the dial scale plate. (Fig. 2-A)

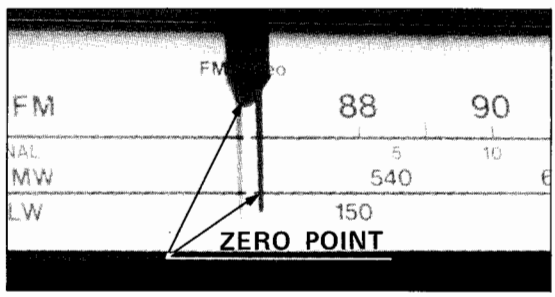


Figure 2–A

Figure 2 DIAL CORD STRINGING

FRONT PARTS LAYOUT

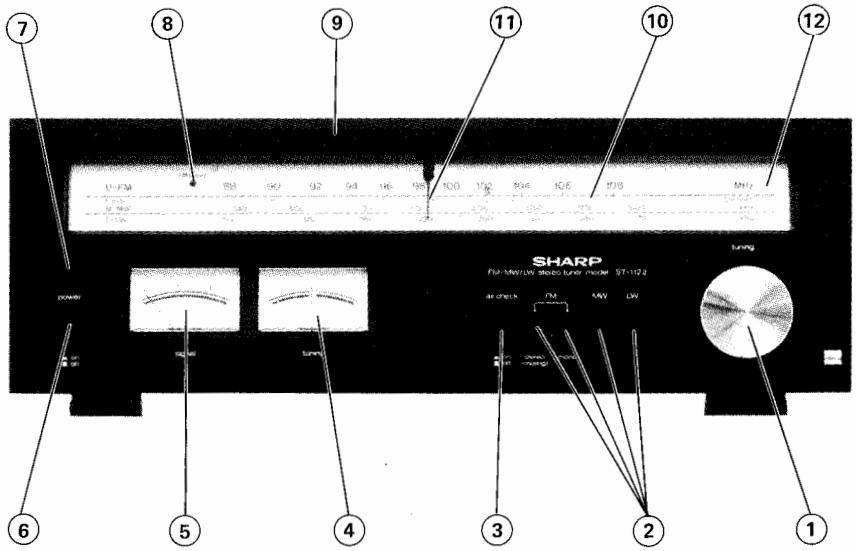


Figure 3 FRONT PARTS LAYOUT

① Tuning Knob (JKNBK0166AFSA)
② Band Selector Knob, FM stereo (muting)/FM mono/MW/LW (91T7717B06)
③ Air Check Knob (91T7717B06)
④ Tuning Meter (91TMM-040)
⑤ Signal Meter (91TMM-041)
⑥ Power Knob (91T7717B06)
⑦ Power Indicator (91TGL-3AR1)
⑧ Stereo Indicator (91TGL-3AR1)
⑨ Front Panel (91T7717B10)
⑩ Dial Scale (91T7717A05)
⑪ Dial Pointer (91T7717A03)
⑫ Window Transparent (91T7717B02)

REAR PARTS LAYOUT

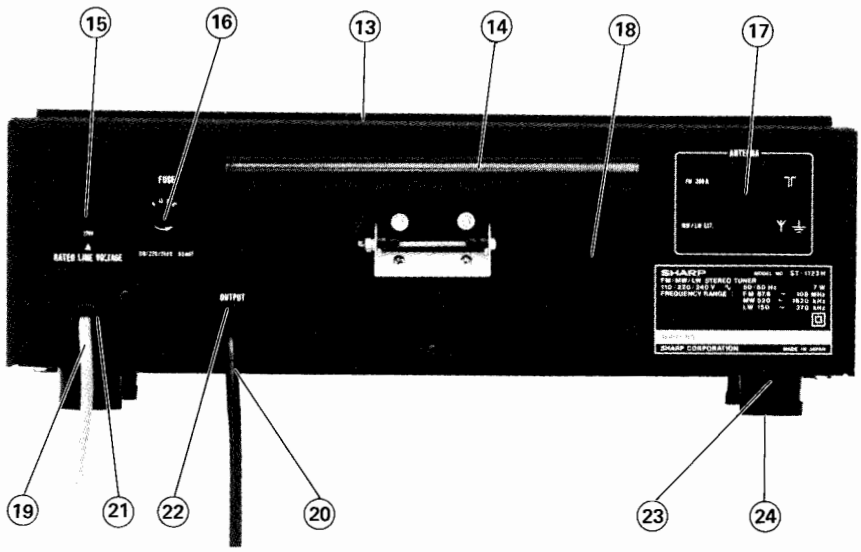
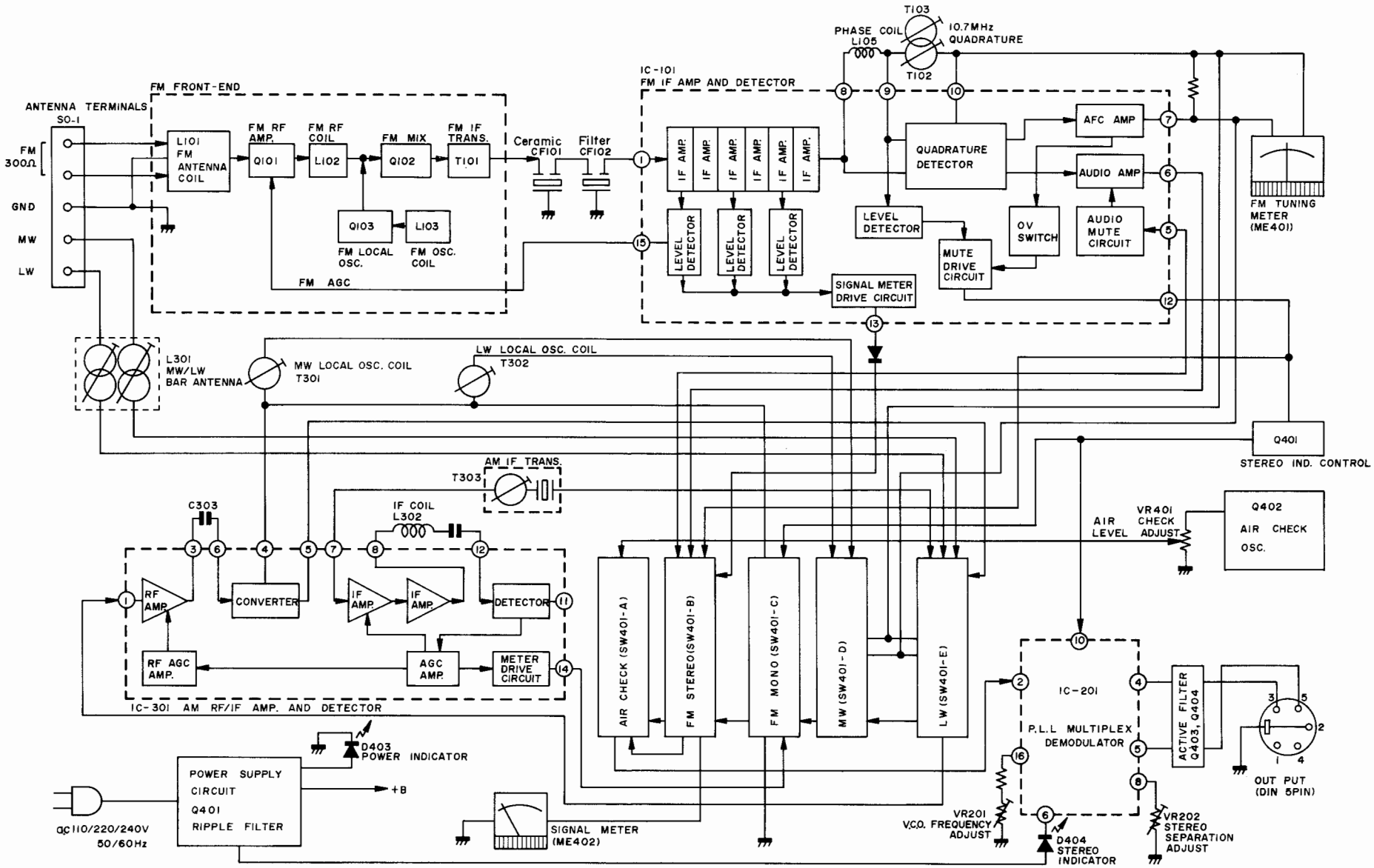


Figure 4 REAR PARTS LAYOUT

⑬ Cabinet (91T7717A01)
⑭ MW/LW Bar Antenna (91TAD-135)
⑮ Voltage Selector (QSOCE-0410AGZZ)
⑯ Fuse Holder (QFSHP1001AGZZ)
⑰ Jack, FM/MW/LW Antenna (91TJ1-008)
⑱ Rear Panel (91T7717B06)
⑲ Power Supply Cord (QACCB0052AF09)
⑳ Output Cord (91TZ1-001)
㉑ Stopper, Power Supply Cord (91T3361D04)
㉒ Stopper, Output Cord (91T7405D01)
㉓ Leg (91T7717D01)
㉔ Sheet, Leg (91T7717D07)


ANTENNA TERMINALS
SO-1
FM 300Ω
GND
MW
LW
FM FRONT-END
L101 FM ANTENNA COIL
FM RF AMP.
Q101
FM RF COIL
L102
FM MIX
Q102
FM IF TRANS.
T101
Q103
FM LOCAL OSC.
L103
FM OSC. COIL
FM AGC
Ceramic CF101
Filter CF102
IC-101
FM IF AMP AND DETECTOR
IF AMP.
LEVEL DETECTOR
QUADRATURE DETECTOR
PHASE COIL L105
T103
10.7MHz QUADRATURE
T102
AFC AMP
AUDIO AMP
AUDIO MUTE CIRCUIT
OV SWITCH
MUTE DRIVE CIRCUIT
SIGNAL METER DRIVE CIRCUIT
FM TUNING METER (ME401)
L301 MW/LW BAR ANTENNA
MW LOCAL OSC. COIL T301
LW LOCAL OSC. COIL T302
AM IF TRANS. T303
C303
IF COIL L302
RF AMP.
CONVERTER
IF AMP.
DETECTOR
RF AGC AMP.
AGC AMP.
METER DRIVE CIRCUIT
IC-301 AM RF/IF AMP. AND DETECTOR
AIR CHECK (SW401-A)
FM STEREO (SW401-B)
FM MONO (SW401-C)
MW (SW401-D)
LW (SW401-E)
Q401
STEREO IND. CONTROL
VR401 AIR CHECK LEVEL ADJUST
Q402 AIR CHECK OSC.
IC-201
P.L.L MULTIPLEX DEMODULATOR
ACTIVE FILTER Q403, Q404
OUT PUT (DIN 5PIN)
VR201 V.C.O. FREQUENCY ADJUST
D404 STEREO INDICATOR
VR202 STEREO SEPARATION ADJUST
D403 POWER INDICATOR
POWER SUPPLY CIRCUIT Q401 RIPPLE FILTER
+B
AC 110/220/240V 50/60Hz
SIGNAL METER (ME402)

CIRCUIT DESCRIPTION

AM SECTION

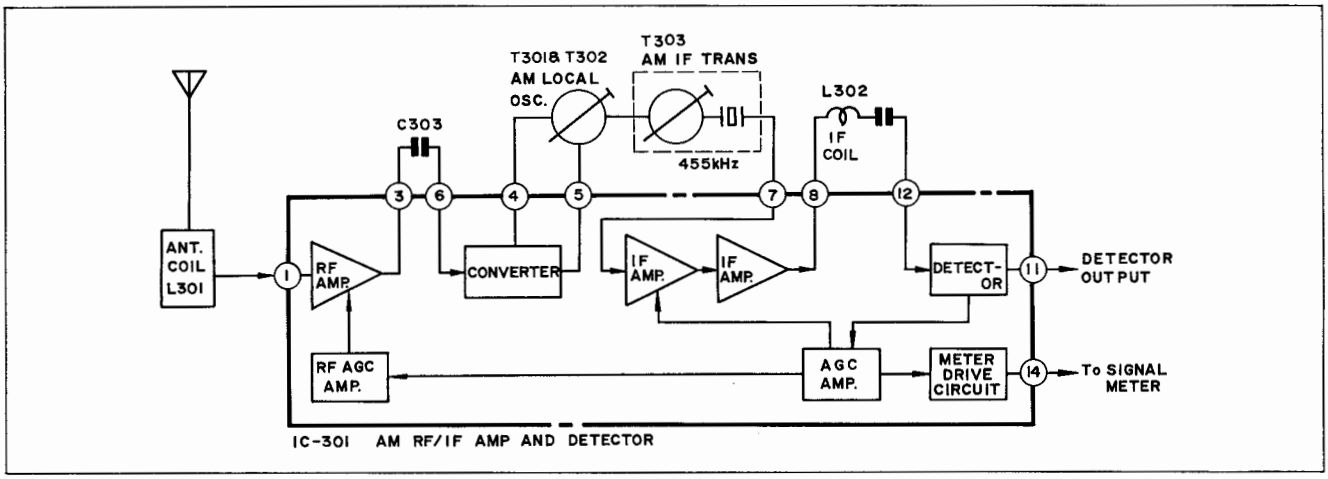


Figure 6 BLOCK DIAGRAM OF IC301

Fig. 6 is a block diagram of IC301. The coil L301 is AM ferrite bar antenna and it serves as antenna tuning circuit. Being received by the coil L301, AM broadcast signal is applied to the terminal (1) of the integrated circuit IC301 to be amplified by RF amplifier and then be supplied to the converter via the capacitor C303. T301 and T302 is an oscillation coil for AM local oscillation circuit. AM broadcast signal is thus converted to 455kHz IF signal by the converter to be applied to the transformer T303 which works as intermediate frequency selection element including ceramic filter and the signal will further be amplified by 1st and 2nd IF amplifiers to be applied to the IF Coil L302. Then the signal is finally detected by the detector circuit and it will be output at the terminal (11).
This IC301 also includes signal meter drive circuit which enables easier tuning and the output at the terminal (14) is connected to the signal meter (ME402).

FM RF SECTION

FM antenna input circuit has a 300 ohm input terminal, which will be connected a FM antenna by using balanced type feeder. between the set and the FM antenna.
Fig. 7 shows FM front-end circuit. The front-end section is composed of one FET and two transistors. Q101 refers to the FET and it has the almost same characteristic as a vacuum tube. As a result of employment of this FET, crossmodulation characteristic and spurious characteristic are remarkably improved compared to conventional transistor-type products (Sharp-made ones). It is so designed that to the gate of Q101 is applied AGC voltage and this results in the amplification of the FET Q101 will be reduced if over-gain input signal is applied to the antenna so that the reception be made always stabilized. The

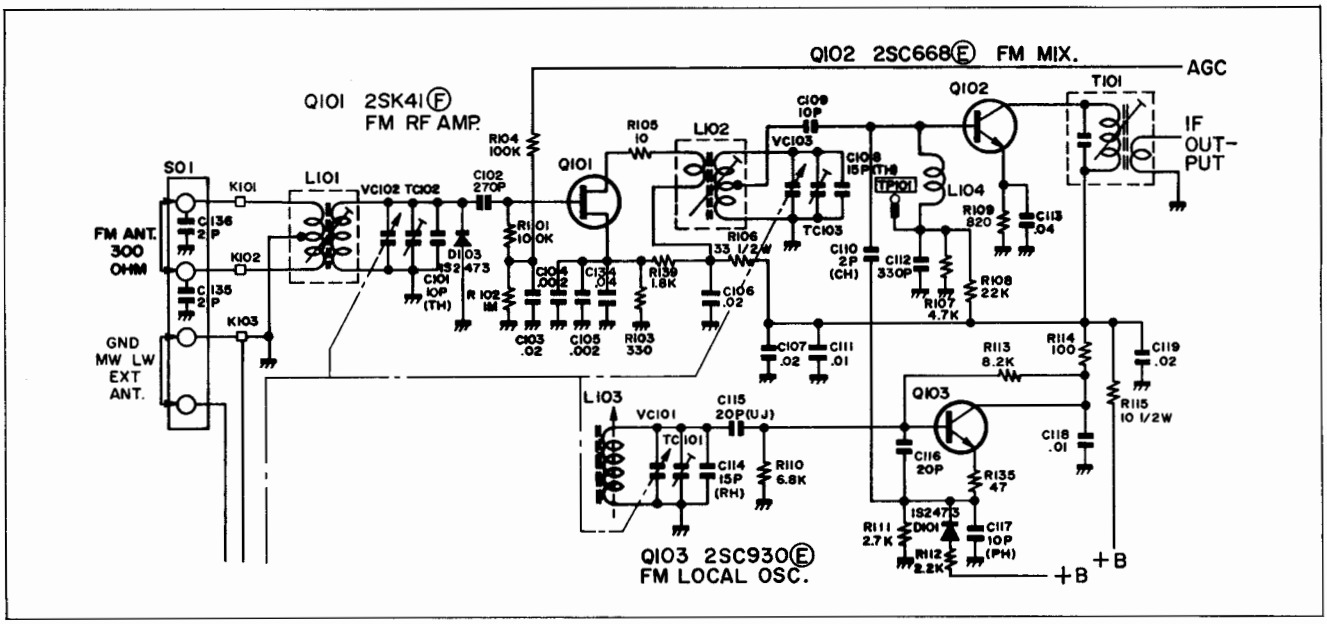


Figure 7 FM FRONT-END CIRCUIT

FET Q101 is for FM RF amplification. The transistor Q102 serves as frequency mixer and it receives high-frequency signal (from, the FET Q101) and local oscillation signal (from the transistor Q103) to produce 10.7MHz intermediate frequency (IF) to apply it to IF tuning transformer T101. The transistor Q103 works for FM local oscillation and it will apply oscillation voltage to the base of transistor Q102 via the capacitor C110(2pF). The coil L101 is provided for FM antenna tuning and the coils L102, for FM RF amplification and tuning while the coil L103, for local oscillation.
Meanwhile, during AM broadcast reception, it is so designed that +B voltage is applied to the emitter of the transistor Q103 via the diode D101 and resistor R112 to stop the oscillation.

FM IF AMPLIFIER SECTION

IF signal, having been converted to 10.7MHz signal at the FM front-end section, is ceramic filters CF101 and CF102 so that there will be higher selectivity (this is required in order to amplify IF signal without distorsion and to obtain higher selectivity.) This IF signal is further applied to the terminal (1) of IC101 where the signal gain will be amplified by about 66 dB by the 6-stage differential amplifier, this being subjected to appropriate limiter operation.

FM DETECTION SECTIONS (Quadrature Detector Circuit)

(1) FM Detector Circuit
This unit employs "Quadrature Detector" based on newly developed IC (Integrated Circuit), which is substituted for ratio detector and Foster-Seeley's detector that have been so far used. The basic structure of quadrature detector circuit is as shown in Fig. 8.

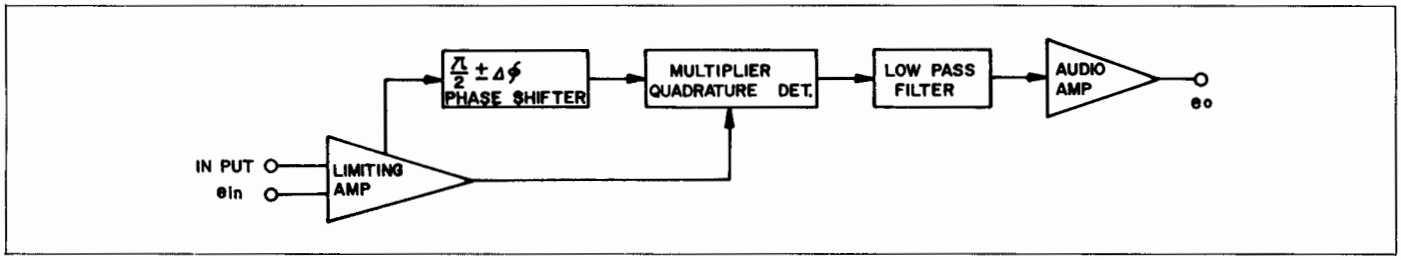


Figure 8 BASIC STRUCTURE OF QUADRATURE DETECTOR CIRCUIT

With this detection system, the multiplier (quadrature detector) circuit receives two types of input signals, one is the signal which has been amplified by the limiting amplifier and another which has passed through the phase shift circuit. (aboutπ/2). Thus, the quadrature detector circuit produces demodulation signal.
The term "quadrature" is resulted from that the phase difference between these two signal is π/2. The multiplier consists of doubly balance circuit as shown in the following circuit drawing. Phase characteristic of the phase shift circuit is as shown in Fig. 10.
This circuit is featured by:
(1) Good linearity and low distortion.
(2) Operates on small signal and less higher harmonics.
(3) Wide-band detection of as much as 1.0MHz.
Therefore, this circuit assures low distortion even with the overmodulation of more than 100% thereby reproducing high quality sound.
Actually saying, the detecting circuit ST-1122H uses L105 as phase-shift coil T102 and T103 are 10.7MHz tuning quadrature coil.
Detection output appears at the terminal (6) of IC101 and it is supplied to the terminal (2) of P.L.L. multiplex integrated circuit IC201.

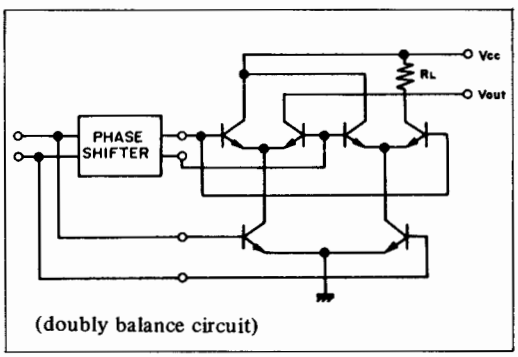


Figure 9

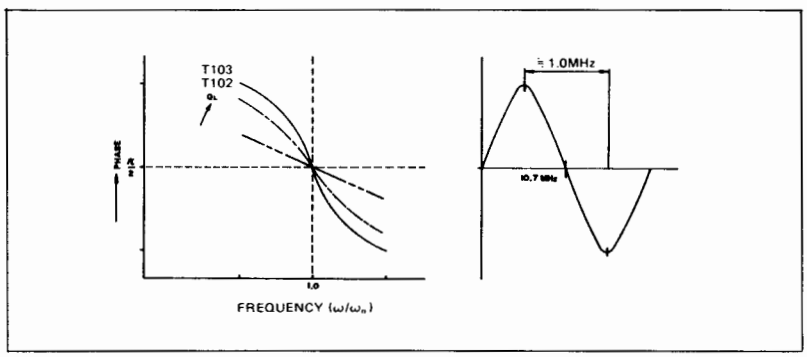


Figure 10

FM AGC

FM AGC voltage is developed at terminal (15) of IC101, and is supplied to the gate of FET Q101 through resistor R104 and R101.

The AGC voltage is developed in IC101 as delayed AGC voltage, and the AGC starts to operate when antenna input reaches approx. 60dB and thus a voltage at terminal (15) of IC101 starts to drop.

FM STEREO DEMODULATOR SECTION

(1) Features of P.L.L. stereo demodulator circuit

This set incorporates a stereo demodulator circuit that comprises IC's with the PLL (Phase Locked Loop) system applied. The PLL (Phase Locked Loop) FM demodulator circuit is provided with such characteristics as mentioned below.

In order to demodulate stereo composite signals, it is necessary to take a 19kHz pilot signal out of the stereo composite signals and to make it a 38kHz signal.

Most of the conventional methods to obtain such a 38kHz signal are frequency doubling ones which utilize a non-linearity of the elements. Compared with the conventional type, the recently developed IC-ed demodulator provides more sufficient separation effects. However, since it also requires 2 or 3 coils like the conventional one, if even one of them is deslocated from the initially adjusted point due to a secular change the separation effects will be deteriorated. Moreover there is such a contradiction that the more the efficiencied of the coils are increased enough to withstand the outer pulse signals like automobil ignition noises, the more the coils suffer secular changes.

To eliminate such disadvantages as above, PLL (Phase Locked Loop) system is employed in the method to make a 38kHz signal using a 19kHz pilot signal.

The PLL system stereo demodulator gives such three merits as:

1. Since the phases of a pilot signal and a 38kHz signal are automatically made the same with each other, the deterioration of separation effect is strongly minimized.
2. Since only one of variable resistor, being newly employed, plays the role of 2 to 3 pieces of conventional coils, troubles of the parts due to secular changes are decreased. In addition, even if this variable resistor is slightly dislocated, the separation effect wil never be deteriorated because of the merit as mentioned in 1 by which the automatic phase adjustment is assured.
3. Compared with the conventinal one, the PLL system demodulator shows a more noise withstanding characteristic since it has such performances as the selection of frequencies and the continuity of oscillation frequencies (short time memory), thus assuring a stable stereo demodulation.

(2) FM stereo demodulator circuit of ST-1122H

IC201 is an integrated circuit for P.L.L. stereo demodulation and its block diagram is as shown in Fig. 11.

V.C.O. free-running frequency is to be adjusted to 19kHz by adjusting semi-fixed risistor VR201 (5K ohm). TP201 is the test point for frequency observation. (See the paragraph "Adjustment" described later.)

During AM reception, +B voltage is supplied to the terminal (16) of IC201 through diode D201 and resistor R205 so that oscillation frequency of V.C.O. will be stopped. Semi-fixed resistor VR202 (1K ohm) aims at the adjustment of stereo separation and with this resistor it is possible to minimize crosstalk to the opposite channel. +B voltage is supplied to the terminal (10) to force stereo signals to become monaural ones.

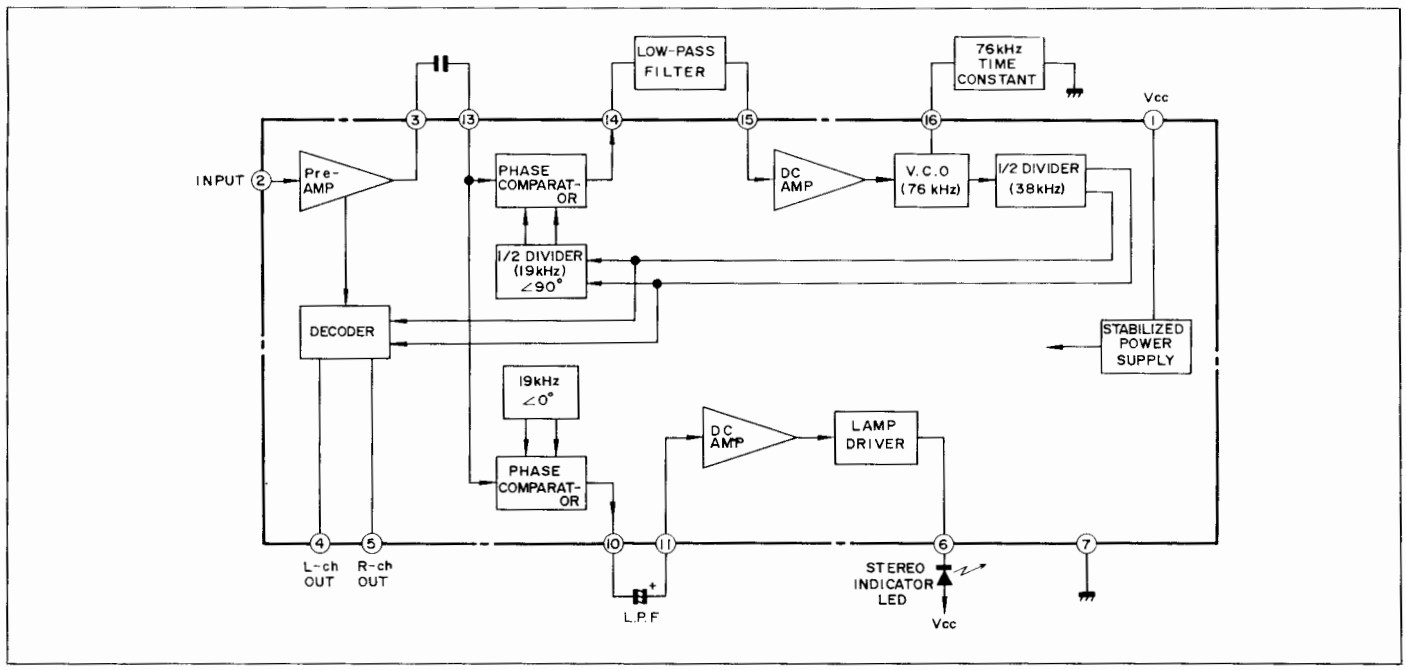


Figure 11 BLOCK DIAGRAM OF IC201

AIR CHECK CALIBRATION CIRCUIT

This circuit is to make appropriate the recording level in advance when recording FM broadcast into the tape recorder. The circuit shown in Fig. 12 hereof is CR type oscillator circuit to be used for the air check calibration (about 400Hz). When the air check switch (SW401-A) located at the front panel is set to the position "air check on", the air check calibrator circuit begins to operate and oscillation voltage thus produced by the air check calibrator circuit will appear as air check signal at the output socket (DIN, 5pin) located at the rear of the set. The air check signal level is set to 40% (–8.0dB) of the output voltage obtained when the tuner receives FM broadcast signal (modulation, 75kHz deviation) and this level voltage appears at the output terminal of the rear panel through the air check oscillator circuit. VR401 is semi-fixed resistor to be used from adjusting the air check signal level. How to record FM broadcast using the air check calibration system is described below.

Set the air check switch to "air check on" position, put the tape recorder in record mode, apply air check signal to the tape recorder and adjust the record level so that the record level meter of the tape recorder indicates "0VU" (Fig. 13). After that, set the air check switch to "air check off" position and proceed with recording FM broadcast.

[Note]

In the case of AM reception, in other words, when the band selector switch is kept to the position MW and LW, air check level signal does not appear at the output terminal located at the rear of the set since the air check calibrator is not functioning at the time.

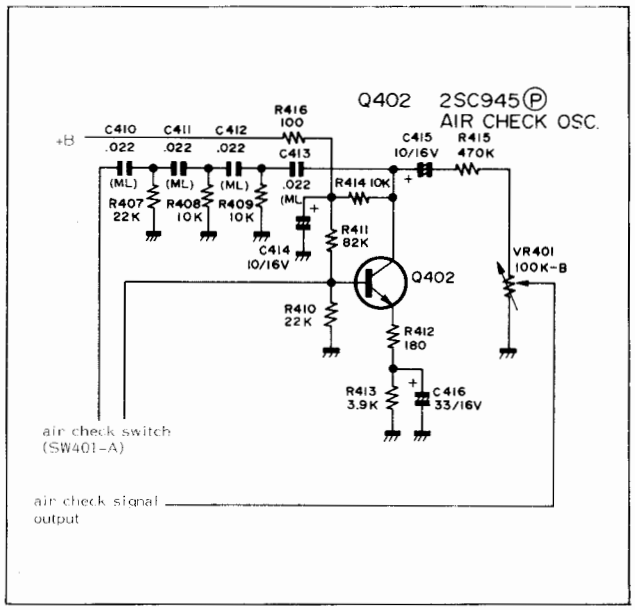


Figure 12 AIR CHECK CAL. CIRCUIT

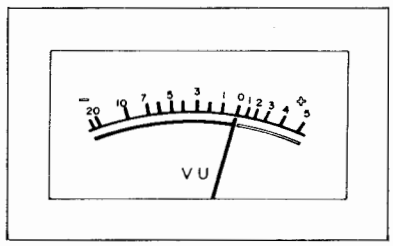


Figure 13 "0 VU"

FM MUTING CIRCUIT

In ST-1122H, IC101 incorporates muting circuit and this circuit is so designed that if FM input signal to the antenna terminal becomes about 10dB when the FM mono/FM stereo (muting) switch (SW401-B) is kept at "muting on", the muting is released and the signal appears at the output without undergoing muting.

The muting release signal is produced by the pin (12) of IC101 and this signal is applied to the Pin (5) of IC101 via the FM mono/FM stereo (muting) switch (SW401-C). The signal to release the muting will be applied to the terminal (10) of the P.L.L. stereo multiplex demodulator IC201 to be forced to mono-operation.

Fig. 14 shows the output voltage of two outputs, one is at the terminal (10) of IC101 and another, at the collector of transistor Q401, to be added to each other.

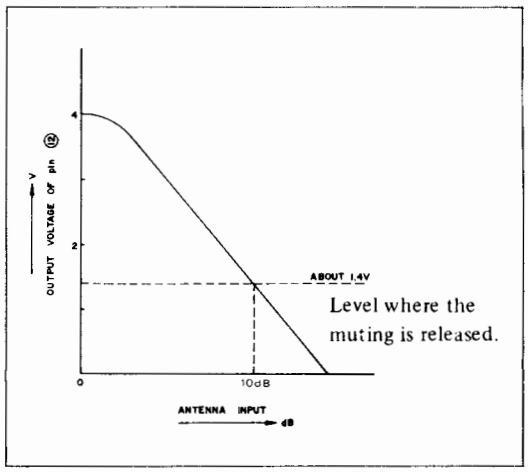


Figure 14

POWER SUPPLY CIRCUIT

In dealing with +B power supply, the power voltage is full-wave rectified by diodes D401 and D402 to be supplied to each section. Diode D405 is zener diode to be used for voltage regulation and the zener voltage is about 13.0V. Transistor Q405 is to remove ripples from the rectification current.

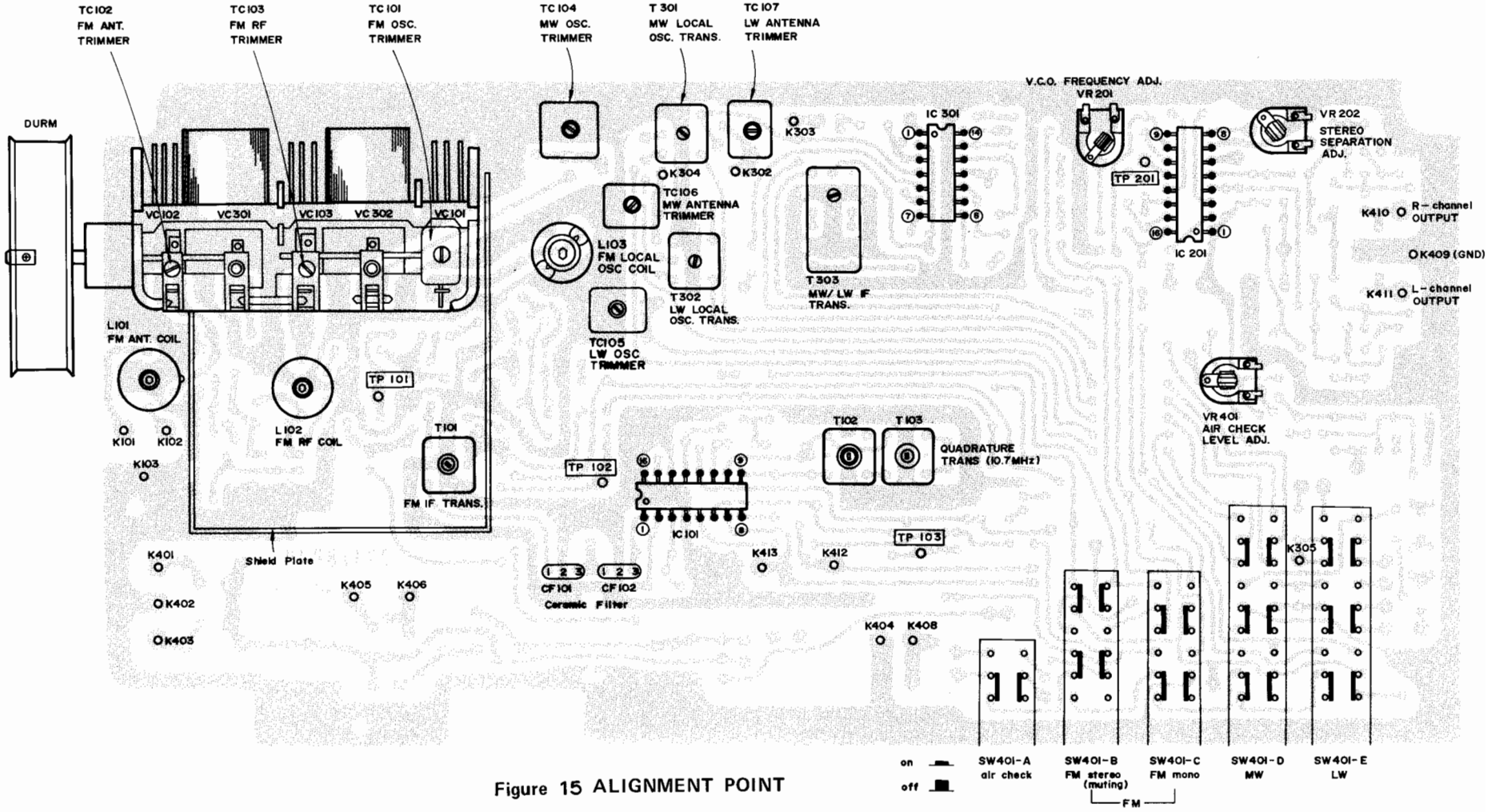


Figure 15 ALIGNMENT POINT

ALIGNMENT INSTRUCTIONS

Alignment is an exacting procedure and should be undertaken only when necessary. If alignment of MW/LW 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 140kHz to 1650kHz; AM
2. Signal generator with a frequency range of 86.1MHz to 109.2MHz; FM
3. Signal generator with a frequency output of 10.7MHz ± 0.5MHz; FM
4. Vacuum tube voltmeter (AC-VTVM)
5. 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.
6. Oscilloscope with a wide range amplifier of approximately 100kHz.
7. Test loops, a coil of any size wire, one turn or more; AM
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 100kHz.

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 useble 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, 400Hz
Generator modulation (FM stereo)	Ch. L. or Ch. R. 40kHz, 1,000Hz Mod.

THE INSTRUCTION OF FREQUENCY ADJUSTMENT

In order to comply with Pfg. Nr. 358/1970, please fix the low end of dial frequency (87.5MHz) and the high end of dial frequency (107.9MHz) on FM band, by adjusting oscillation coil (L103) and oscillation trimmer (TC101), respectively, as illustrated in Figure 16.

AM ALIGNMENT CHART (Refer to Figure 16)

STEP	BAND	TEST STAGE	SIGNAL GENERATOR		DIAL SETTING	METER CONNECTION	ADJUSTMENT	REMARKS
			CONNECTION	INPUT SIGNAL FREQUENCY				
1	MW	IF	Connect a loop antenna to AM signal socill-ator to place it near the bar antenna coil (L301). (For the adjus-tment, keep the output of the oscillator as small as possible.)	Exactly 455 kHz. (400Hz, 30%, AM modulated).	Low end of dial. (Maximum capacity).	Connect os-cilloscope between poi-ts K410 or K411 and K409 (ground)	Adjust the AM IF tran-sformer (T303)	Adjust for maximum response at 455kHz. Repeat 2 or 3 times.
2	MW	Band Cove-rage	Same as above.	Exactly 515 kHz. (400Hz, 30%, AM modulated).	Low end of dial. (Maximum capacity).	Connect VTVM between points K410 or K411 and K409 (ground)	Adjust the MW oscill-ation coil (T301).	Adjust for maximum output.
3	MW		Same as step 2.	Exactly 1650 kHz. (400Hz, 30%, AM modulated).	High end of dial. (Minimum capacity).	Same as above	Adjust the MW oscill-ation tri-mmer (TC104)	Adjust for maximum output. Repeat steps 3 and 4, 2 or 3 times.
4	MW	Trac-king	Same as step 2.	Exactly 600 kHz. (400Hz, 30%, AM modulated).	600kHz.	Same as step 2	Adjust the MW/LW ante-nna coil (L301)	Same as step 3.
5	MW		Same as step 2.	Exactly 1400 kHz. (400Hz, 30%, AM modulated).	1400kHz.	Same as step 2	Adjust the MW antenna trimmer (TC106).	Same as step 3. Repeat steps 4 and 5, 2 or 3 times.
6	LW	Band Cove-rage	Same as step 2.	Exactly 145 kHz. (400Hz, 30%, AM modulated).	Low end of dial. (Maximum capacity).	Same as step 2	Adjust the LW oscill-ation coil (T302)	Same as step 2.
7	LW		Same as step 2.	Exactly 385 kHz. (400Hz, 30%, AM modulated).	High end of dial. (Minimum capacity).	Same as step 2	Adjust the LW oscill-ation tri-mmer (TC105)	Adjust for maximum output. Repeat steps 6 and 7, 2 or 3 times.
8	LW	Trac-king	Same as step 2.	Exactly 170 kHz. (400Hz, 30%, AM modulated).	170kHz.	Same as step 2	Adjust the MW/LW ante-nna coil (L301)	Same as step 2.
9	LW		Same as step 2.	Exactly 340 kHz. (400Hz, 30%, AM modulated).	340kHz.	Same as step 2	Adjust the LW antenna trimmer (TC107).	Same as step 2.

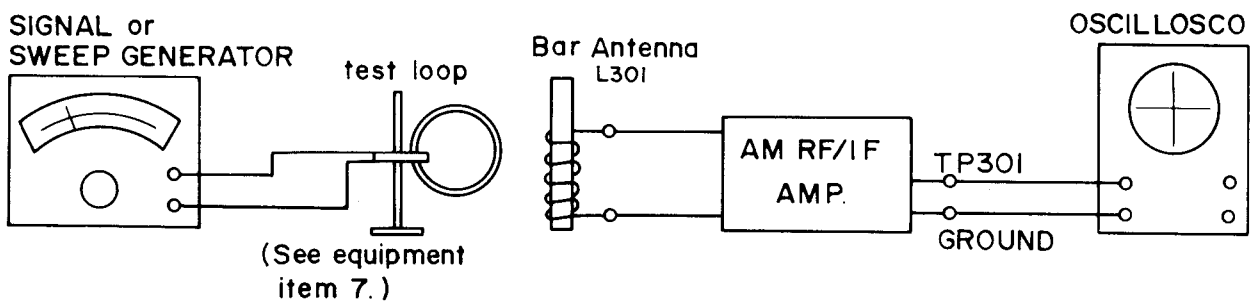


Figure 16 AM RF/IF ALIGNMENT EQUIPMENT CONNECTIONS

FM ALIGNMENT (Refer to Figure 17)

PROCEDURE NUMBER	TEST STAGE	SIGNAL GENERATOR		DIAL POINTER SETTING	SELECTOR SETTING	METER CONNECTION	ADJUSTMENT	REMARKS
		CONNECTION	FREQUENCY					
1	IF (NOTE A)	Connect FM sweep generator, through 6pF capacitor, to the test point TP101 Connect the ground to the variable capacitor case.	10.7MHz ±500kHz as small as possible. (Modulated)	High end of dial	FM-mono	Connect an oscilloscope to the test point TP102 (ground)	T101	Rotate the core of T101 to adjust so that the waveform becomes symmetrical in right and left and attains the maximum in height and width. (Fig. 18)
2	Detector	Same as above	No-signal	Same as above	Same as above	Connect an oscilloscope to the test point TP103 and (ground)	T102	Adjust T102 so that the pointer of tuning meter indicates its center.
3		Same as above	Same as step 1	Step as above	FM-mono	Same as above	T103	Rotate the core to adjust so that the waveform (Fig. 19) becomes symmetrical in the upper and lower with the best linearity.
4	Repeat steps 1 and 3 until no further improvement can be made.							
5	Band Coverage	Connect FM signal generator to the FM antenna terminals	87.0MHz as small as possible (Modulated)	Low end of dial	FM-mono	Connect VTVM to the test point TP103 and ground	Oscillator coil L103	Adjust for maximum output
6		Same as above	109MHz (Modulated) as small as possible	High end of dial	FM-mono	Same as above	Oscillator trimmer TC101	Same as above. Repeat steps 5 and 6 until no further improvement can be made.
7	Tracking	Same as step 5	90MHz (Modulated) as small as possible	90MHz	FM-mono	Same as step 5	Antenna coil L101 and RF coil L102	Same as step 5.
8		Same as step 5	106MHz (Modulated) as small as possible	106MHz	FM-mono	Same as step 5	Antenna trimmer TC102 and RF trimmet TC103	Same as above. Repeat steps 7 and 8 until no further improment can made.
9	After the adjustment, make sure that the tuning meter (ME 401) indicates its center for non-signal reception. (This is adjustable by using T102.)							

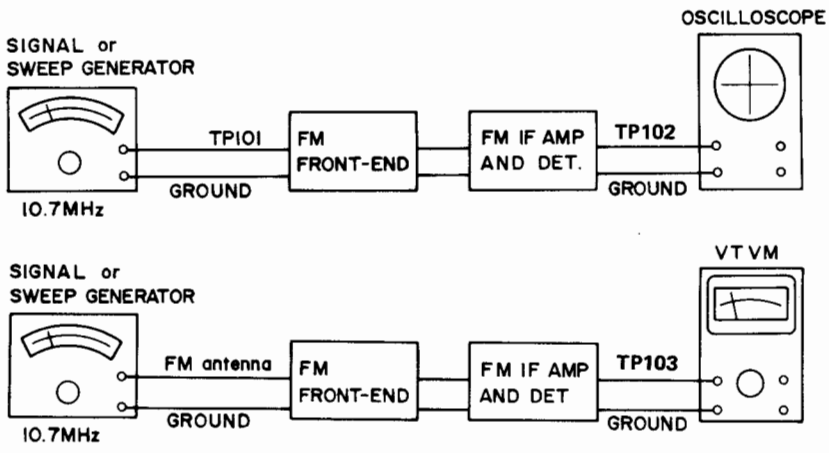


Figure 17 FM ALIGNMENT EQUIPMENT CONNECTIONS

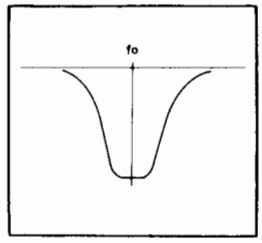


Figure 18

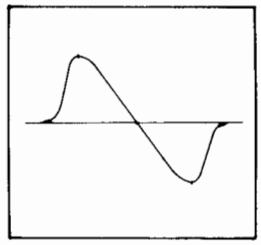


Figure 19

NOTE A

The ceramic filter used for this set is available in 5 types and each of them is given a color indication to differentiate the central frequency from that of the others, as described below.
In the actual use, be sure to make 2 ceramic filters of the same type (the same color) as a pair to put them in the set.
When other ceramic filters than that given a red color indication (with the central frequency of 10.7MHz) are used, note that with such filters the marker (10.7MHz) of FM sweep generator will be deviated; therefore be sure to cut off the marker at the time of the adjustment.

Central Frequency (fo)	D	Black	10.64MHz ±30kHz
	B	Blue	10.67MHz ±30kHz
	A	Red	10.70MHz ±30kHz
	C	Orange	10.73MHz ±30kHz
	E	White	10.76MHz ±30kHz

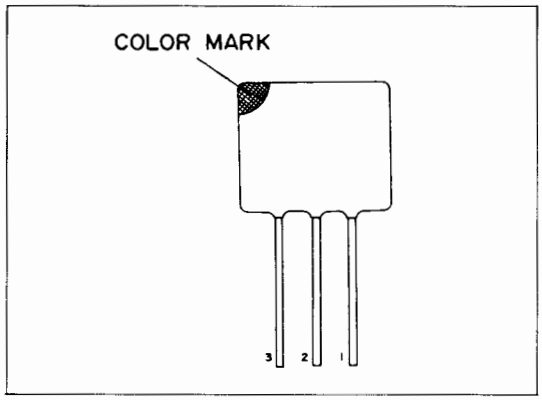


Figure 20

ADJUSTMENT OF AIR CHECK CAL.

Produce 98MHz, 60dB FM mono signal (75kHz deviation, 400Hz) by a signal generator to apply it to the antenna of the unit and read the turner output voltage.
Next, set air check switch to "air check on" position, then the output voltage will vary. Adjust semi-fixed resistor VR401 so that the output voltage with air check switch set to "air check on" becomes about 40% (–8.0dB) of that with air check switch kept at "off".

FM STEREO V.C.O. AND SEPARATION ADJUSTMENT

1. Place the band selector switch (SW401) of the set to the position "FM stereo (muting)" the air check switch (SW401-A) to "off".
2. Connect FM signal generator to FM antenna terminal of the set and regulate the oscillation frequency to 98MHz (40kHz deviation, 400Hz) and the output to 60dB (mono signal). Then tune the set exactly in such signal.
3. Connect VTVM to the test point TP201 and connect frequency counter to the output terminal of VTVM.
4. Have the test point TP103 of the set and the earth be connected (shorted) and adjust the semi-fixed resistor VR201 so that V.C.O. frequency becomes 19.00kHz ±50Hz. (After adjustment of V.C.O. frequency, disconnect the TP103 and the earth from each other.)
5. Connect FM stereo modulator to FM signal generator. Regulate FM stereo modulator to 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 output will be 60dB with the frequency 98MHz.)
6. Regulate FM signal generator to set the frequency to 98MHz and the output to 60dB, tune in the set so that the tuning meter will indicate its center and make only L-channel of the stereo modulator be subjected to modulation. And consider L-channel output thus produced from the set to be 0dB.
7. Connect VTVM to R-channel output terminal of the set and adjust the semi-fixed resistor VR202 so that there will be the maximum separation (in order to limit the output leaking to the opposite channel to the minimum.) Also adjust the separation available with only R-channel undergoing the modulation so that the outputs of both right and left channels be equal to each other.

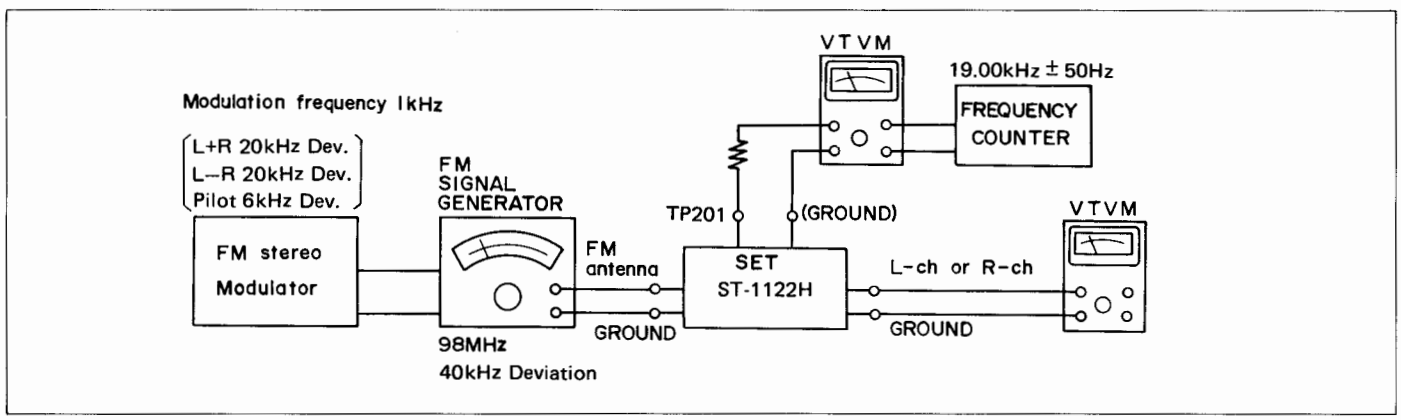


Figure 21 FM STEREO ALIGNMENT EQUIPMENT CONNECTIONS

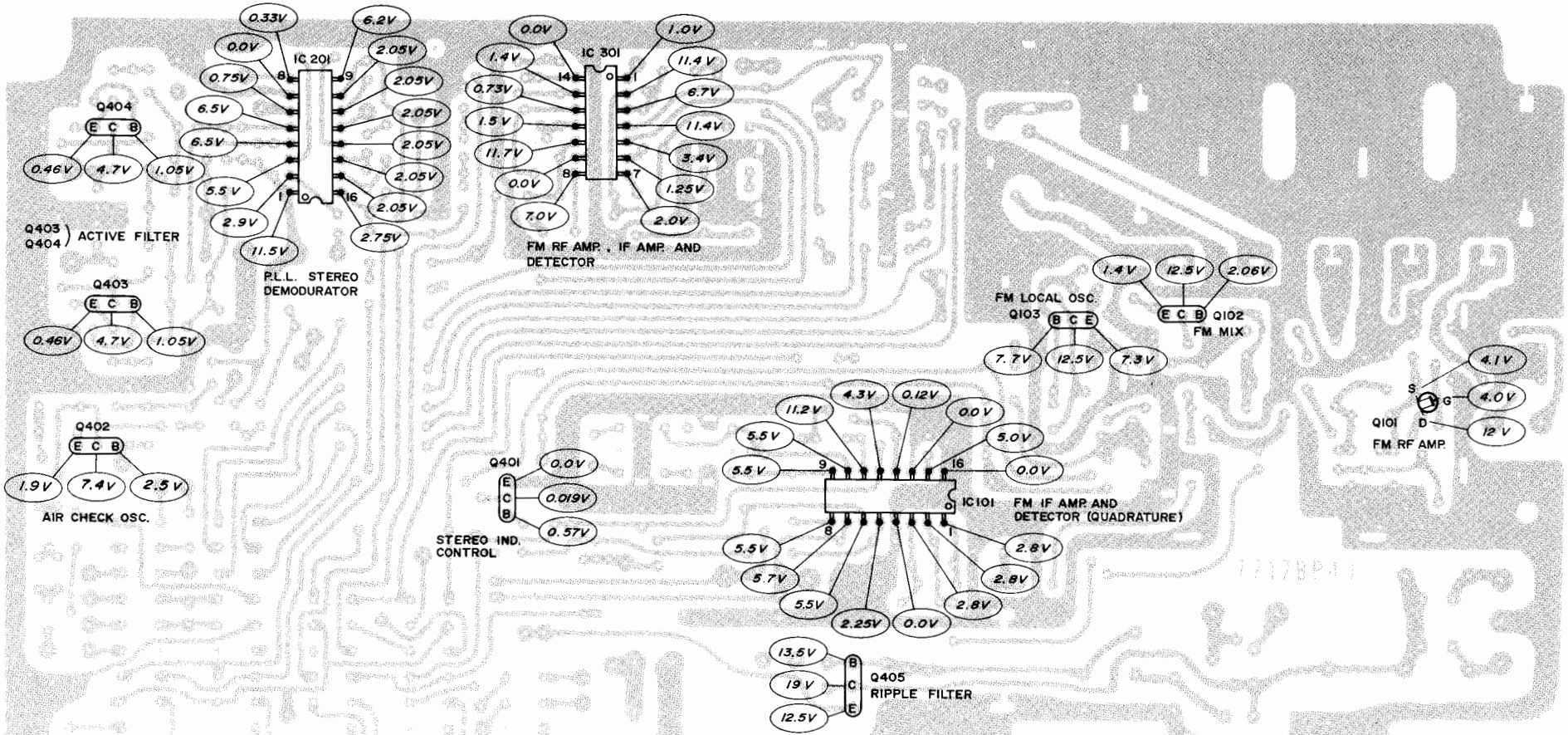
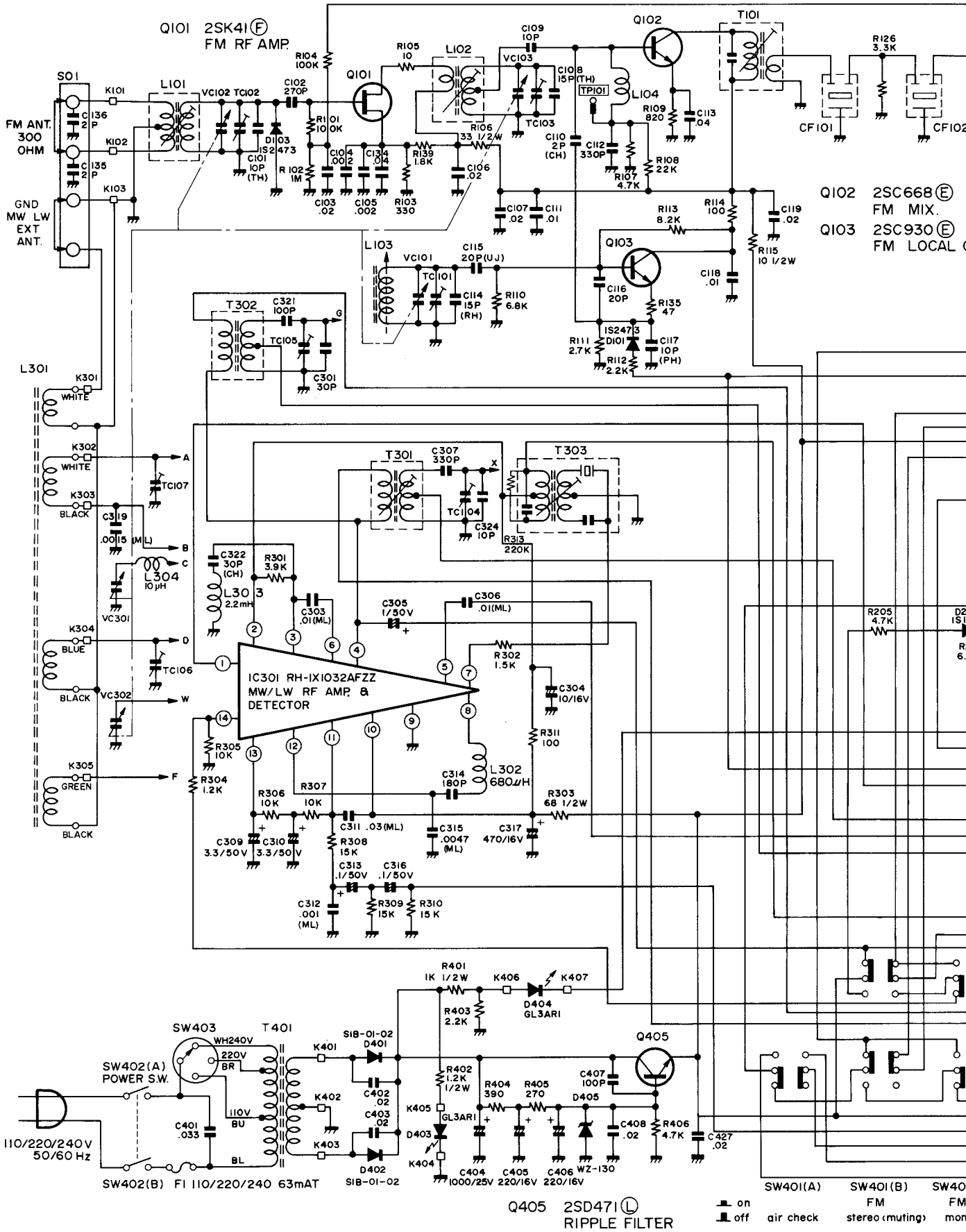
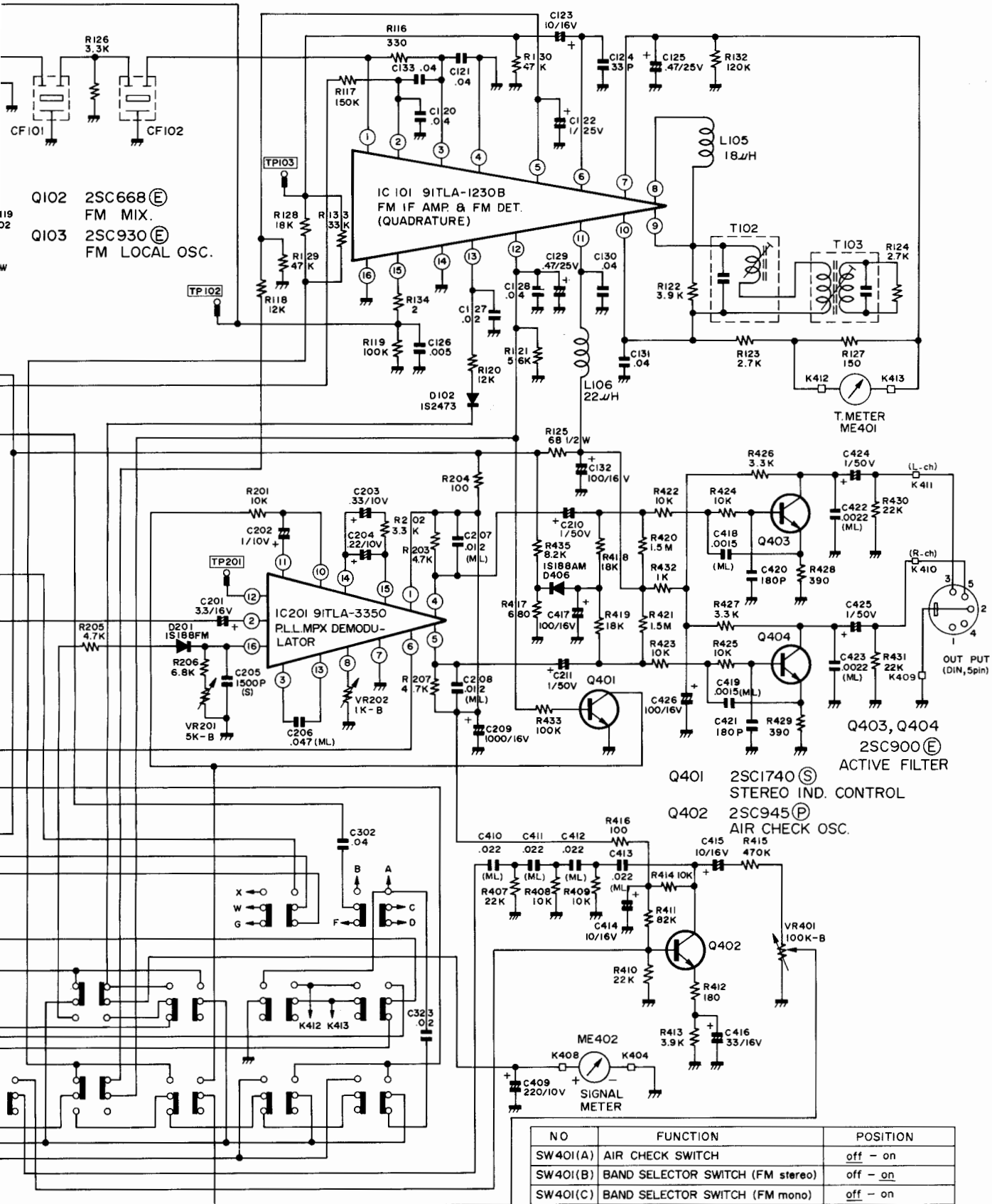

IC 201
0.33V
0.0V
0.75V
6.5V
6.5V
5.5V
2.9V
11.5V
6.2V
2.05V
2.05V
2.05V
2.05V
2.05V
2.05V
2.75V
P.L.L. STEREO DEMODURATOR
Q404
E C B
0.46V
4.7V
1.05V
Q403
Q404
ACTIVE FILTER
Q403
E C B
0.46V
4.7V
1.05V
IC 301
0.0V
1.4V
0.73V
1.5V
11.7V
0.0V
7.0V
1.0V
11.4V
6.7V
11.4V
3.4V
1.25V
2.0V
FM RF AMP., IF AMP. AND DETECTOR
FM LOCAL OSC.
Q103
B C E
7.7V
12.5V
7.3V
1.4V
12.5V
2.06V
E C B
Q102
FM MIX
Q101
S
D
G
4.1V
4.0V
12V
FM RF AMP.
Q402
E C B
1.9V
7.4V
2.5V
AIR CHECK OSC.
Q401
E
C
B
0.0V
0.019V
0.57V
STEREO IND. CONTROL
11.2V
4.3V
0.12V
0.0V
5.5V
5.0V
5.5V
0.0V
5.5V
5.7V
5.5V
2.25V
0.0V
2.8V
2.8V
2.8V
IC101
FM IF AMP AND DETECTOR (QUADRATURE)
13.5V
19V
12.5V
B
C
E
Q405
RIPPLE FILTER

Figure 22



(Specifications or wiring diagrams of this model are subject to change for the improvement without prior notice)

Figure 23 SCHEMATIC DIAGRAM



NO	FUNCTION	POSITION
SW401(A)	AIR CHECK SWITCH	off – on
SW401(B)	BAND SELECTOR SWITCH (FM stereo)	off – on
SW401(C)	BAND SELECTOR SWITCH (FM mono)	off – on
SW401(D)	BAND SELECTOR SWITCH (MW)	off – on
SW401(E)	BAND SELECTOR SWITCH (LW)	off – on
SW402	POWER SWITCH	on off
SW403	VOLTAGE SELECTOR SWITCH	SHOWN IN 240V

CHEMATIC DIAGRAM

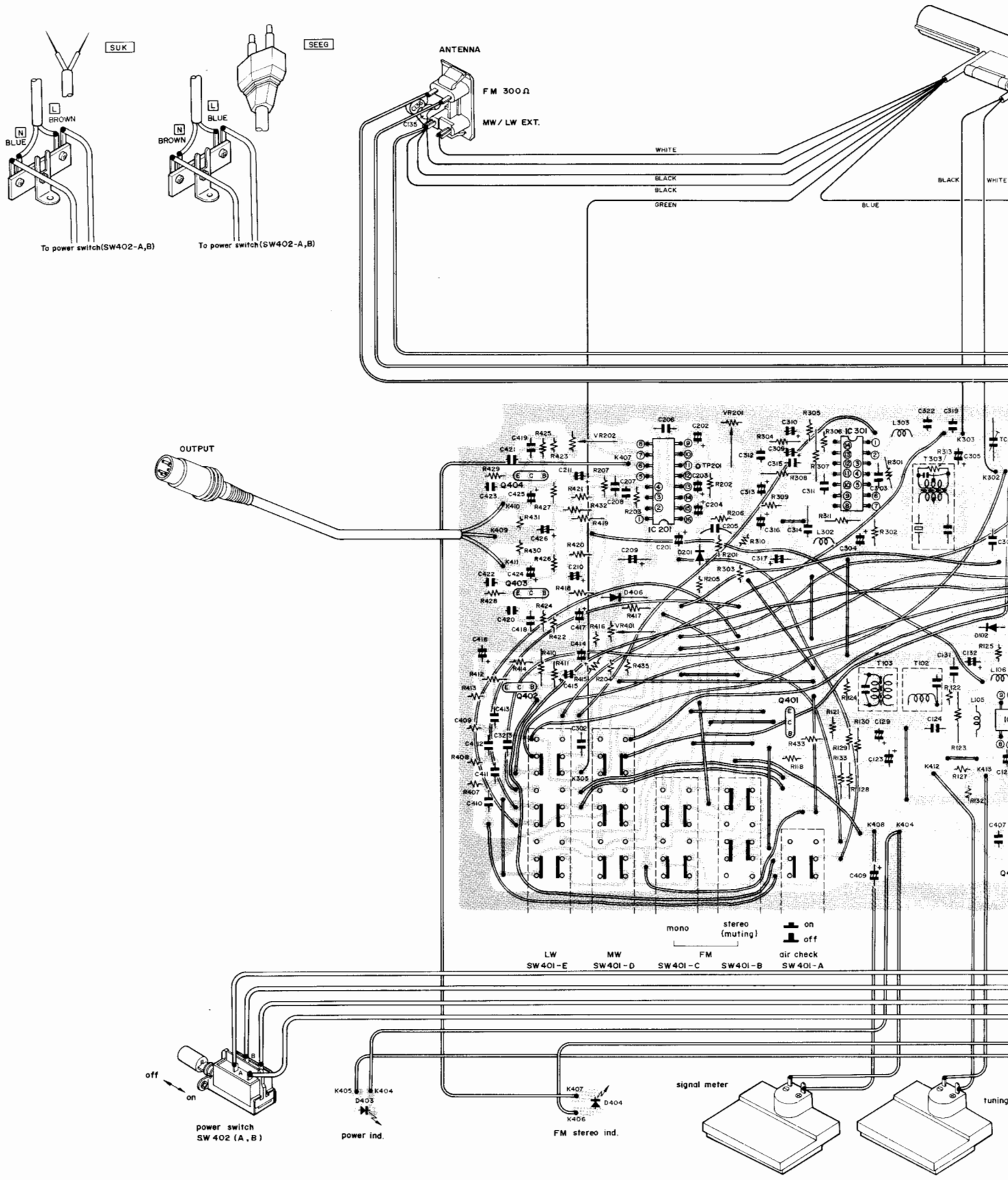
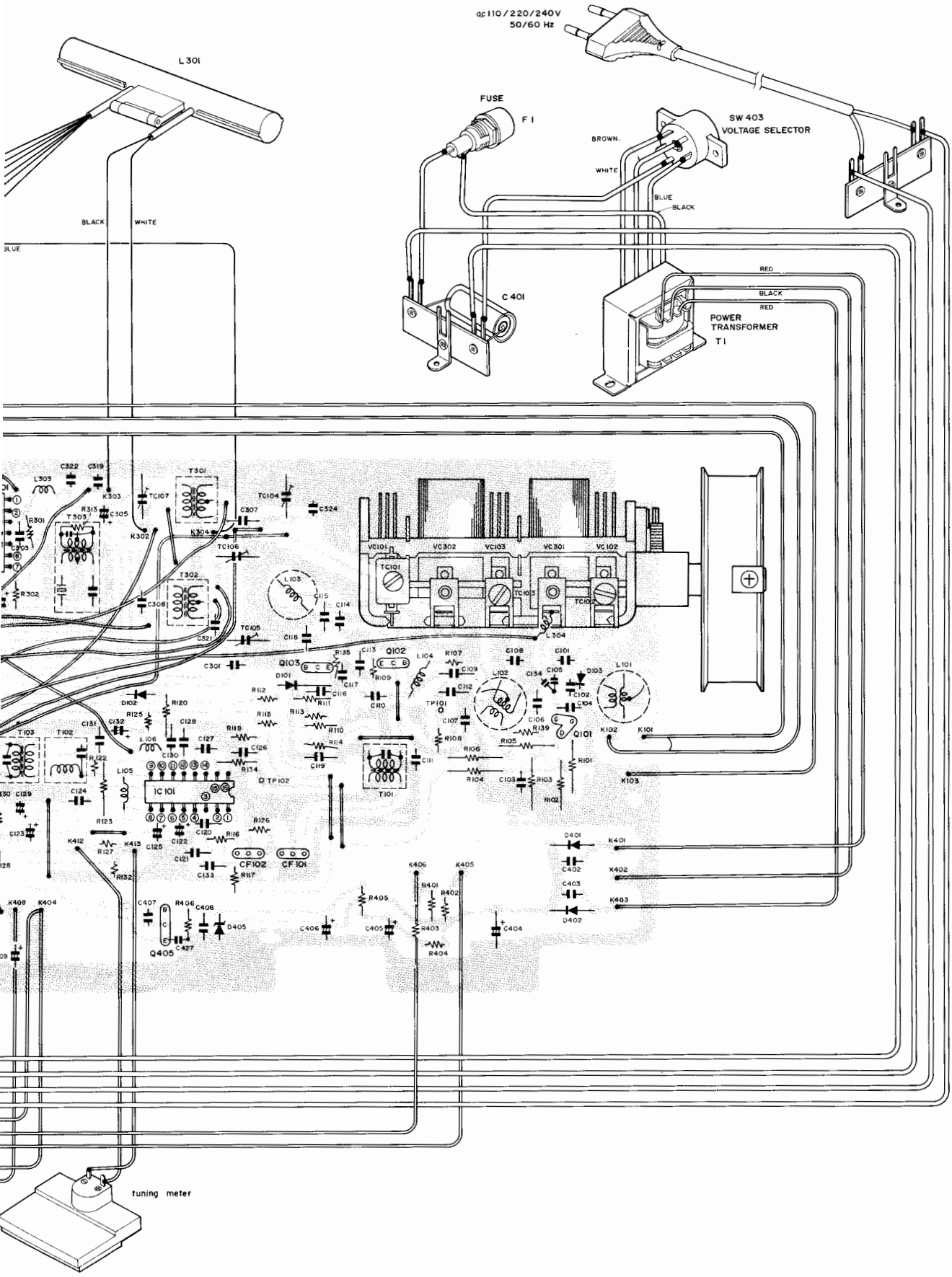
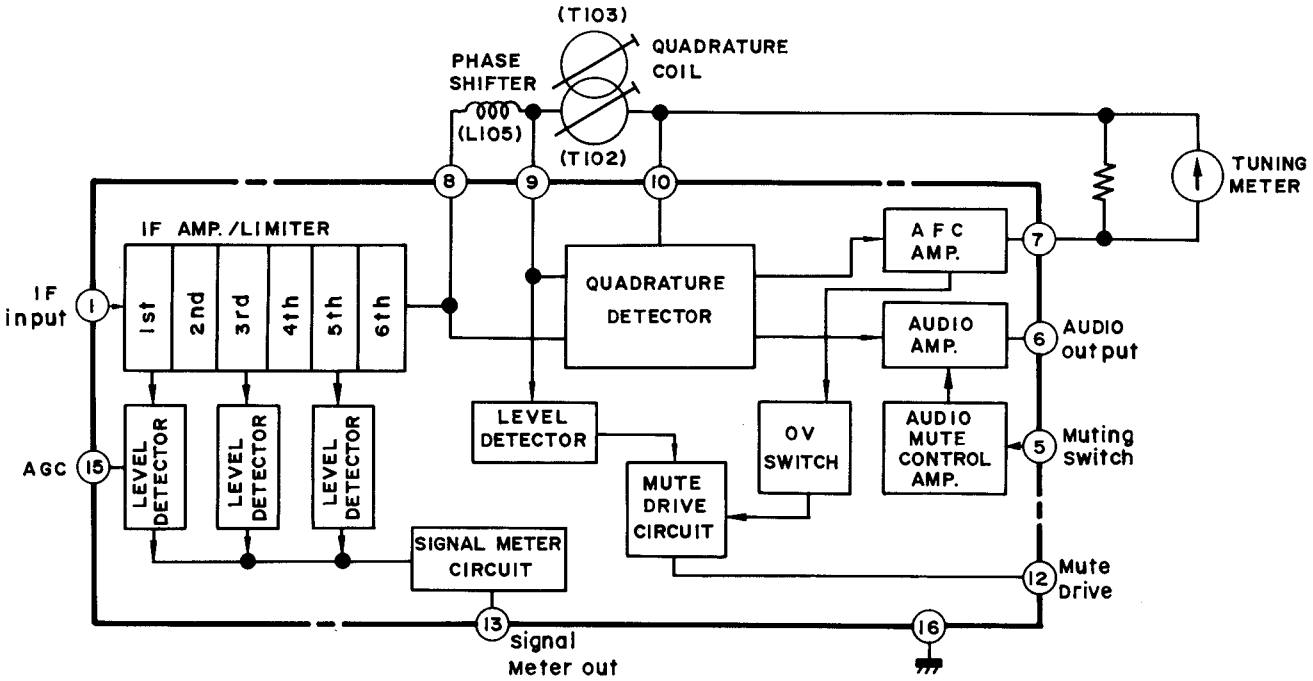


Figure 24 WIRING SIDE (



24 WIRING SIDE OF P.W. BOARD



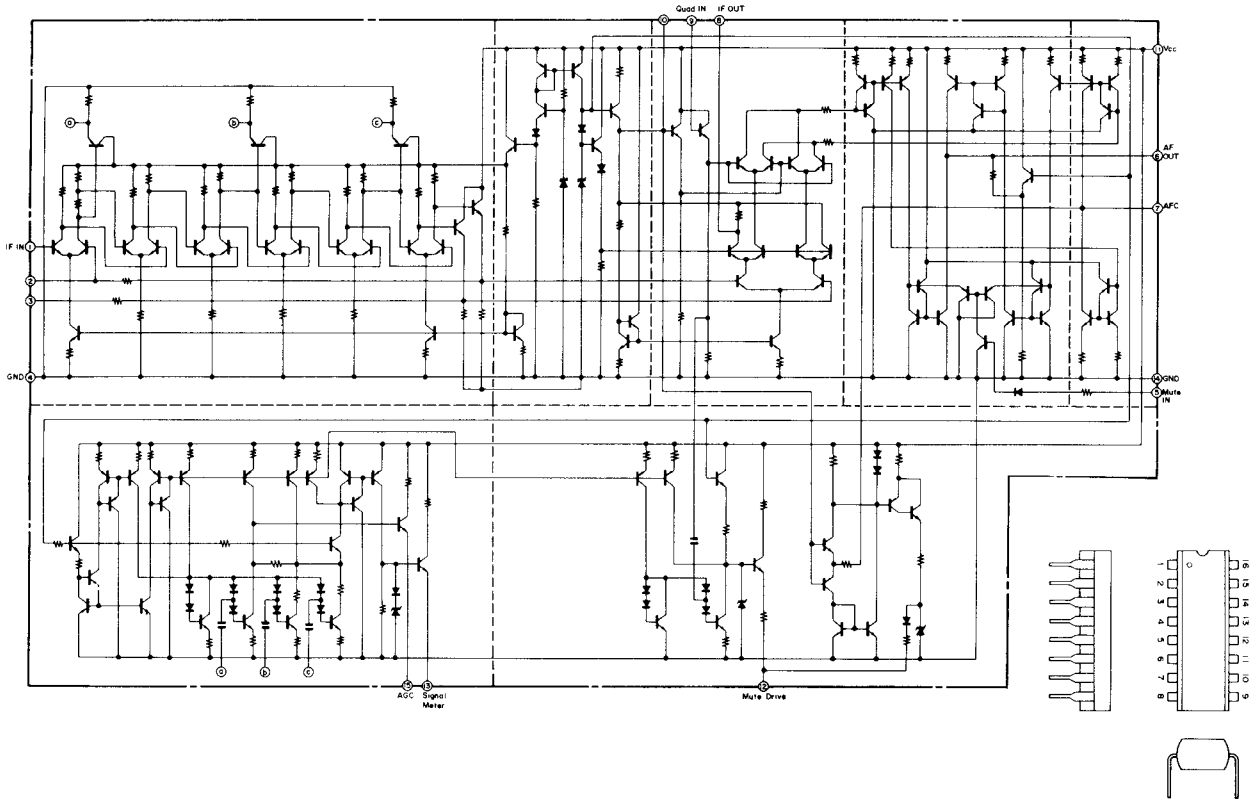
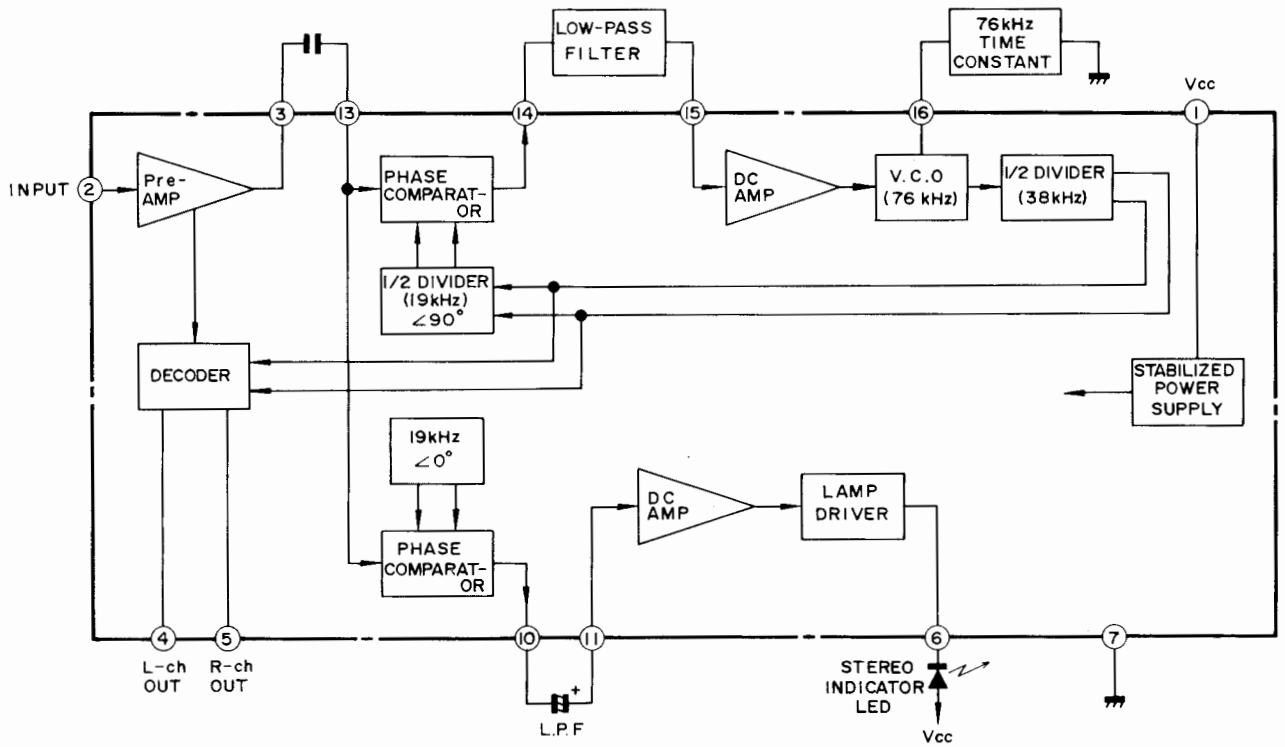


Figure 25 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC101)



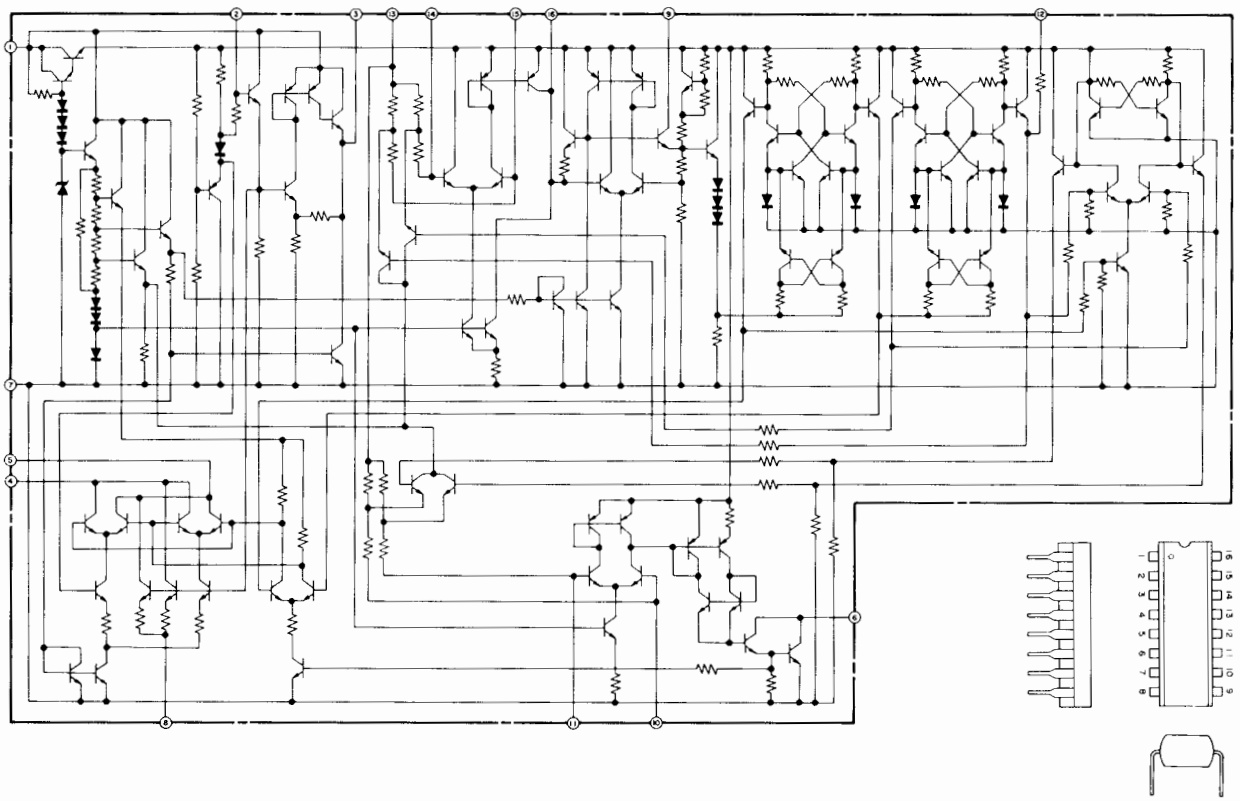
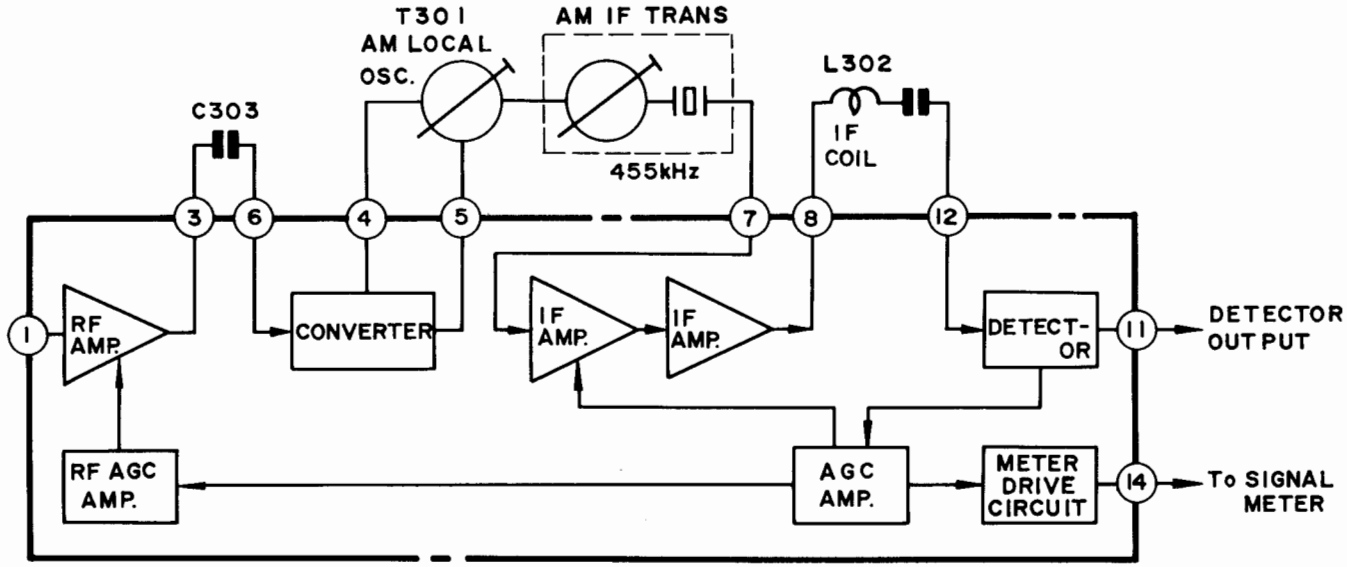
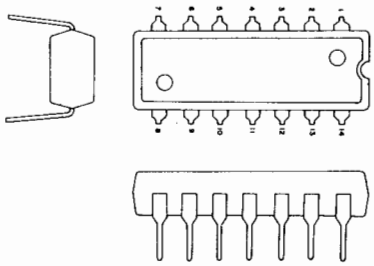


Figure 26 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC201)





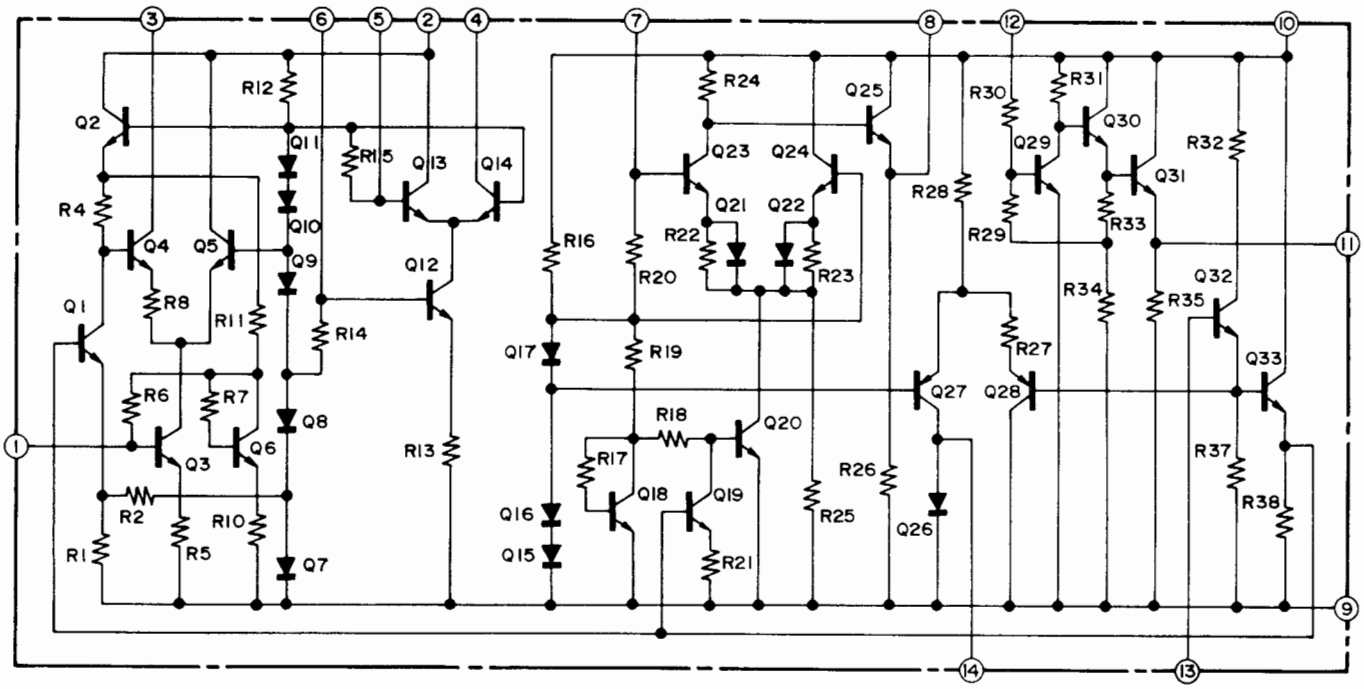


Figure 27 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC301)

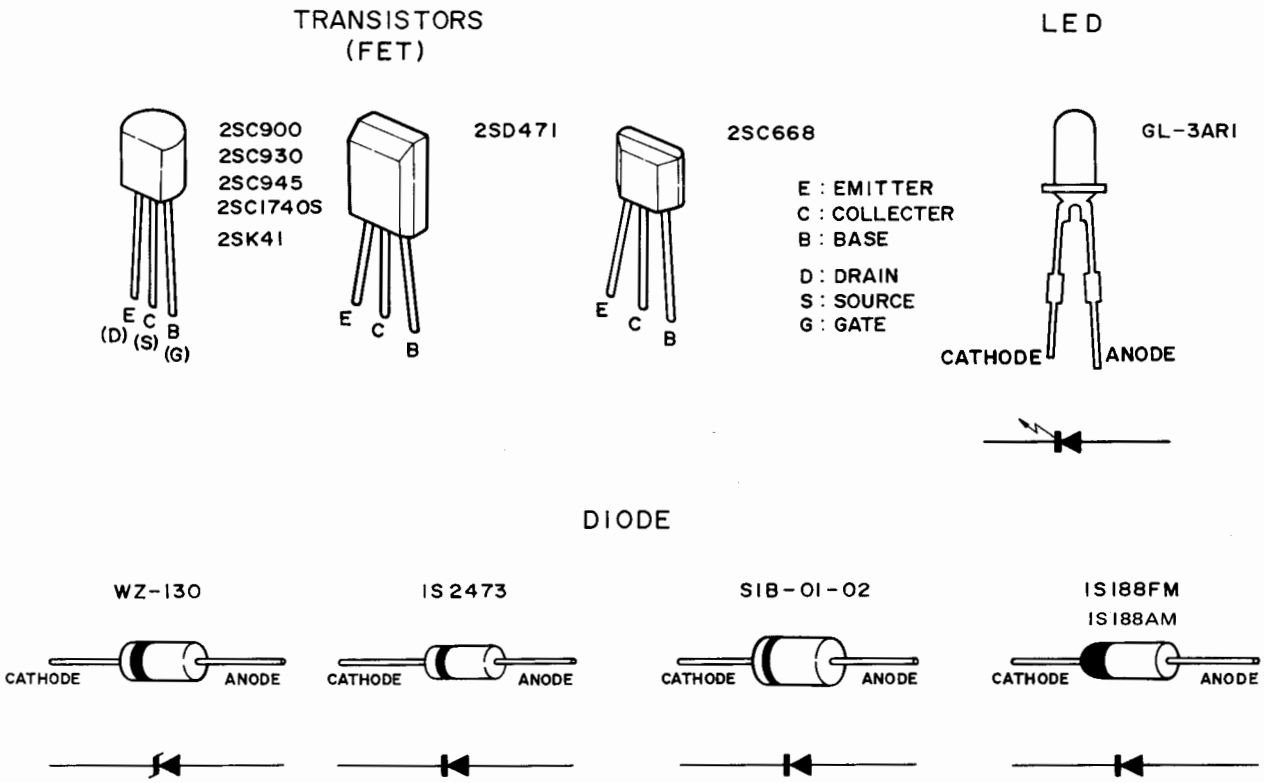


Figure 28 TRANSISTOR AND DIODE TYPE

REPLACEMENT PARTS LIST

"HOW TO ORDER REPLACEMENT PARTS"

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

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

REF. NO.	PART NO.	DESCRIPTION	CODE
		INTEGRATED CIRCUIT	
IC101	91TLA-1230B	FM IF Amplifier and Detector (Quadrature) (LA-1230B)	
IC201	91TLA-3350	P.L.L. MPX Demodulator (LA-3350)	
IC301	RH-1X1032AFZZ	MW/LW RF Amplifier, IF Amplifier and Detector (HA-1151)	
		TRANSISTORS	
Q101	91T2SK41F	FM RF Amplifier (2SK41 Ⓕ)	
Q102	91TS2SC668E	FM Mixer (2SC668 Ⓔ)	
Q103	91T2SC930E	FM Local Oscillator (2SC930 Ⓔ)	
Q401	91T2SC1740S	Stereo IND. Control (2SC1740 Ⓢ)	
Q402	91T2SC945P	Air Check Oscillator (2SC945 Ⓟ)	
Q403	91T2SC900E	Active Filter L-ch (2SC900 Ⓔ)	
Q404	91T2SC900E	Active Filter R-ch (2SC900 Ⓔ)	
Q405	91T2SD471L	Ripple Filter (2SD471 Ⓛ)	
		DIODES	
D101	91T1S2473	Oscillation Stop (1S2473)	
D102	91T1S2473	Signal Meter (1S2473)	
D103	91T1S2473	Static Protector (1S2473)	
D201	91T1S188FM	V.C.O. Frequency Stop (1S188FM)	
D401	91TS1B-01-02	Power Rectifier (S1B-01-02)	
D402	91TS1B-01-02	Power Rectifier (S1B-01-02)	
D403	91TGL-3AR1	Power Indicator (GL-3AR1)	
D404	91TGL-3AR1	Stereo Indicator (GL-3AR1)	
D405	91TWZ-130	Zener Diode, Voltate Regulator (WZ-130)	
D406	91T1S188AM	Audio Muting (1S188AM)	
		COILS	
L101	91THA-019	FM Antenna	
L102	91THB-058	FM RF	
L103	91THC-061	FM Local OSC.	
L104	91THE-008	FM Trap	
L105	91THE-038	18μH, Phase Shifter	
L106	91THE-039	22μH, RF Choke	
L301	91TAD-135	MW/LW Bar Antenna	
L302	91THE-040	680μH, MW/LW IF	
L303	91THE-046	2.2mH, IF Trap	
L304	91THE-022	10μH, RF Choke	

REF. NO.	PART NO.	DESCRIPTION	CODE
		TRANSFORMERS	
T101	91TIK-043	FM IF	
T102	91TIO-023	Quadrature (10.7MHz)	
T103	91TIO-024	Quadrature (10.7MHz)	
T301	91THM-047T	MW Local OSC.	
T302	91THL-010	LW Local OSC.	
T303	91TIG-013	MW/LW IF with Ceramic Filter (455kHz)	
T401	91TTA-136	Power	
		FILTERS	
CF101	91TSFE10.7MA5	FM IF, Ceramic	
CF102	91TSFE10.7MA5	FM IF, Ceramic	
		CONTROLS	
VC101, VC102, VC103, VC301, VC302, TC102, TC103	91TCS-012	Variable Capacitors, Tuning With Trimmers TC102: FM Antenna Trimmer TC103: FM RF Trimmer	
TC101	91TCT-045	Trimmer Capacitor, FM OSC.	
TC104	91TCT-042	Trimmer Capacitor, MW Local OSC.	
TC105	91TCT-038	Trimmer Capacitor, LW Local OSC.	
TC106	91TCT-042	Trimmer Capacitor, MW Antenna	
TC107	91TCT-042	Trimmer Capacitor, LW Antenna	
VR201	91TRT-035	5K ohm (B), V.C.O. Frequency Adjust	
VR202	91TRT-036	1K ohm (B), Stereo Separation Adjust	
VR401	91TRT-031	100K ohm (B), Air Check Level Adjust	
		CAPACITORS	
C101	91TCC-100K	10PF (Blue), 50V, ±10%, Ceramic	
C102	91TCC-271K	270PF, 50V, ±10%, Ceramic	
C103	91TCK-203P	.02MFD, 50V, +100 −0%, Ceramic	
C104	91TCK-202M	.002MFD, 50V, ±20%, Ceramic	
C105	91TCK-202M	.002MFD, 50V, ±20%, Ceramic	
C106	91TCK-203P	.02MFD, 50V, +100 −0%, Ceramic	

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
C107	91TCK-203P	.02MFD, 50V, +100 –0%, Ceramic	
C108	91TCC-150K	15PF (Blue), 50V, ±10%, Ceramic	
C109	91TCMK-100J	10PF, 50V, ±5%, Mica	
C110	91TCC-020K	2PF (Black), 50V, ±10%, Ceramic	
C111	91TCK-103P	.01MFD, 50V, +100 –10%, Ceramic	
C112	91TCMK-331J	330PF, 50V, ±5%, Mica	
C113	91TCK-403P	.04MFD, 50V, +100 –0%, Ceramic	
C114	91TCC-150K	15PF (Yellow), 50V, ±10%, Ceramic	
C115	91TCC-200K	20PF (Violet), 50V, ±10%, Ceramic	
C116	91TCMK-200J	20PF, 50V, ±5%, Mica	
C117	91TCC-100K	10PF (Orange), 50V, ±10%, Ceramic	
C118	91TCK-103P	.01MFD, 50V, +100 –10%, Ceramic	
C119	91TCK-203P	.02MFD, 50V, +100 –0%, Ceramic	
C120	91TCK-403P	.04MFD, 50V, +100 –0%, Ceramic	
C121	91TCK-403P	.04MFD, 50V, +100 –0%, Ceramic	
C124	91TCMK-330J	33PF, 50V, ±5%, Mica	
C126	91TCK-502P	.005MFD, 50V, +100 –0%, Ceramic	
C127	91TCK-203P	.02MFD, 50V, +100 –0%, Ceramic	
C128	91TCK-403P	.04MFD, 50V, +100 –0%, Ceramic	
C130	91TCK-403P	.04MFD, 50V, +100 –0%, Ceramic	
C131	91TCK-403P	.04MFD, 50V, +100 –0%, Ceramic	
C133	91TCK-403P	.04MFD, 50V, +100 –0%, Ceramic	
C134	91TCK-403P	.04MFD, 50V, +100 –0%, Ceramic	
C135	91TCC-020K	2PF, 50V, ±10%, Ceramic	
C136	91TCC-020K	2PF, 50V, ±10%, Ceramic	
C205	91TCS-152J	1500PF, 50V, ±5%, Styrol	
C206	91TCMS-473M	.047MFD, 50V, ±20%, Mylar	
C207	91TCMS-123J	.012MFD, 50V, ±5%, Mylar	
C208	91TCMS-123J	.012MFD, 50V, ±5%, Mylar	
C301	91TCC-300K	30PF, 50V, ±10%, Ceramic	
C302	91TCK-403P	.04MFD, 50V, +100 –0%, Ceramic	
C303	91TCMS-103M	.01MFD, 50V, ±20%, Mylar	
C306	91TCMS-103M	.01MFD, 50V, ±20%, Mylar	
C307	91TCMK-331J	330PF, 50V, ±5%, Mica	
C311	91TCMS-303M	.03MFD, 50V, ±20%, Mylar	
C312	91TCMS-102M	.001MFD, 50V, ±20%, Mylar	
C314	91TCMK-181J	180PF, 50V, ±5%, Mica	
C315	91TCMS-472K	.0047MFD, 50V, ±10%, Mylar	
C319	91TCMS-152J	.0015MFD, 50V, ±5%, Mylar	
C321	91TCMK-101J	100PF, 50V, ±5%, Mica	
C322	91TCC-301K	30PF (Black), 50V, ±10%, Ceramic	
C323	91TCK-203P	.02MFD, 50V, +100 –0%, Ceramic	
C324	91TCK-100K	10PF, 50V, ±10%, Ceramic	
C401	RC-PZ062CAFZZ	.033MFD, 450V, ±20%, Oil Paper (91TCO-333M)	
C402	91TCK-203P	.02MFD, 50V, +100 –0%, Ceramic	
C403	91TCK-203P	.02MFD, 50V, +100 –0%, Ceramic	
C407	91TCC-101K	100PF, 50V, ±10%, Ceramic	
C408	91TCK-203P	.02MFD, 50V, +100 –0%, Ceramic	
C410	91TCMS-223M	.022MFD, 50V, ±20%, Mylar	
C411	91TCMS-223M	.022MFD, 50V, ±20%, Mylar	
C412	91TCMS-223M	.022MFD, 50V, ±20%, Mylar	
C413	91TCMS-223M	.022MFD, 50V, ±20%, Mylar	
C418	91TCMS-152K	.0015MFD, 50V, ±10%, Mylar	
C419	91TCMS-152K	.0015MFD, 50V, ±10%, Mylar	
C420	91TCC-181K	180PF, 50V, ±10%, Ceramic	
C421	91TCC-181K	180PF, 50V, ±10%, Ceramic	
C422	91TCMS-222K	.0022MFD, 50V, ±10%, Mylar	
C423	91TCMS-222K	.0022MFD, 50V, ±10%, Mylar	
C427	91TCK-203P	.02MFD, 50V, +100 –0%, Ceramic	

ELECTROLYTIC CAPACITORS

C122	91TCDV1/25A	1MFD, 25V, +75 –10%
C123	91TCDV10/16Y	10MFD, 16V, +50 –10%
C125	91TCDV0.47/25A	.47MFD, 25V, +75 –10%
C129	91TCDV0.47/25A	.47MFD' 25V, +75 –10%
C132	91TCDV100/16Y	100MFD, 16V +50 –10%
C201	91TCDV3.3/16A	3.3MFD, 16V, +75 –10%
C202	91TCFV1/10K	1MFD, 10V, ±10%, Aluminum
C203	91TCFV0.33/10K	.33MFD, 10V, ±10%, Aluminum
C204	91TCFV0.22/10K	.22MFD, 10V, ±10%, Aluminum
C209	91TCDV1000/16Y	1000MFD, 16V, +50 –10%
C210	91TCDV1/50A	1MFD, 50V, +75 –10%
C211	91TCDV1/50A	1MFD, 50V, +75 –10%
C304	91TCDV10/16Y	10MFD, 16V, +50 –10%
C305	91TCDV1/50A	1MFD, 50V, +75 –10%
C309	91TCDV3.3/50A	3.3MFD, 50V, +75 –10%
C310	91TCDV3.3/50A	3.3MFD, 50V, +75 –10%
C313	91TCDV0.1/50A	.1MFD, 50V, +75 –10%
C316	91TCDV0.1/50A	.1MFD, 50V, +75 –10%
C317	91TCDV470/16Y	470MFD, 16V, +50 –10%
C404	91TCDV1000/25Y	1000MFD, 25V, +50 –10%
C405	91TCDV220/16Y	220MFD, 16V, +50 –10%
C406	91TCDV220/16Y	220MFD, 16V, +50 –10%
C409	91TCDV220/10Y	220MFD, 10V, +50 –10%
C414	91TCDV10/16Y	10MFD, 16V, +50 –10%
C415	91TCDV10/16Y	10MFD, 16V, +50 –10%
C416	91TCDV33/16Y	33MFD, 16V, +50 –10%
C417	91TCDV100/16Y	100MFD, 16V, +50 –10%
C424	91TCDV1/50A	1MFD, 50V, +75 –10%
C425	91TCDV1/50A	1MFD, 50V, +75 –10%
C426	91TCDV100/16Y	100MFD, 16V, +50 –10%

RESISTORS

(Unless otherwise specified resistors are 1/4W, ±10%, Carbon Type.)

R101	91TRD14PY100KK	100K ohm
R102	91TRD14PY1MK	1Meg ohm
R103	91TRD14PY330K	330 ohm
R104	91TRD14PY100KK	100K ohm

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
R105	91TRD14PY10K	10 ohm	
R106	91TRD12PY33K	33 ohm, 1/2W, ±10%, Carbon	
R107	91TRD14PY4.7KK	4.7K ohm	
R108	91TRD14PY22KK	22K ohm	
R109	91TRD14PY820K	820 ohm	
R110	91TRD14PY6.8KK	6.8K ohm	
R111	91TRD14PY2.7KK	2.7K ohm	
R112	91TRD14PY2.2KK	2.2K ohm	
R113	91TRD14PY8.2KK	8.2K ohm	
R114	91TRD14PY100K	100 ohm	
R115	91TRD12PY10K	10 ohm, 1/2W, ±10%, Carbon	
R116	91TRD14PY330K	330 ohm	
R117	91TRD14PY150KK	150K ohm	
R118	91TRD14PY12KK	12K ohm	
R119	91TRD14PY100KK	100K ohm	
R120	91TRD14PY12KK	12K ohm	
R121	91TRD14PY56KK	56K ohm	
R122	91TRD14PY3.9KK	3.9K ohm	
R123	91TRD14PY2.7KK	2.7K ohm	
R124	91TRD14PY2.7KK	2.7K ohm	
R125	91TRD12PY68K	68 ohm, 1/2W, ±10%, Carbon	
R126	91TRD14PY3.3KK	3.3K ohm	
R127	91TRD14PY150K	150 ohm	
R128	91TRD14PY18KK	18K ohm	
R129	91TRD14PY47KK	47K ohm	
R130	91TRD14PY47KK	47K ohm	
R132	91TRD14PY120KK	120K ohm	
R133	91TRD14PY33KK	33K ohm	
R134	91TRD14PY2K	2 ohm	
R135	91TRD14PY47K	47 ohm	
R139	91TRD14PY1.8KK	1.8K ohm	
R201	91TRD14PY10KK	10K ohm	
R202	91TRD14PY3.3KK	3.3K ohm	
R203	91TRD14PY4.7KK	4.7K ohm	
R204	91TRD14PY100K	100 ohm	
R205	91TRD14PY4.7KK	4.7K ohm	
R206	91TRD14PY6.8KK	6.8K ohm	
R207	91TRD14PY4.7KK	4.7K ohm	
R301	91TRD14PY3.9KK	3.9K ohm	
R302	91TRD14PY1.5KK	1.5K ohm	
R303	91TRD12PY68K	68 ohm, 1/2W, ±10%, Carbon	
R304	91TRD14PY1.2KK	1.2K ohm	
R305	91TRD14PY10KK	10K ohm	
R306	91TRD14PY10KK	10K ohm	
R307	91TRD14PY10KK	10K ohm	
R308	91TRD14PY15KK	15K ohm	
R309	91TRD14PY15KK	15K ohm	
R310	91TRD14PY15KK	15K ohm	
R311	91TRD14PY100K	100 ohm	
R313	91TRD14PY220KK	220K ohm	
R401	91TRD12PY1KK	1K ohm, 1/2W, ±10%, Carbon	
R402	91TRD12PY1.2KK	1.2K ohm, 1/2W, ±10%, Carbon	
R403	91TRD14PY2.2KK	2.2K ohm	
R404	91TRD14PY390K	390 ohm	
R405	91TRD14PY270K	270 ohm	
R406	91TRD14PY4.7KK	4.7K ohm	
R407	91TRD14PY22KK	22K ohm	
R408	91TRD14PY10KK	10K ohm	
R409	91TRD14PY10KK	10K ohm	
R410	91TRD14PY22KK	22K ohm	
R411	91TRD14PY82KK	82K ohm	
R412	91TRD14PY180K	180 ohm	
R413	91TRD14PY3.9KK	3.9K ohm	
R414	91TRD14PY10KK	10K ohm	
R415	91TRD14PY470KK	470K ohm	
R416	91TRD14PY100K	100 ohm	
R417	91TRD14PY680K	680 ohm	
R418	91TRD14PY18KK	18K ohm	
R419	91TRD14PY18KK	18K ohm	
R420	91TRD14PY1.5MK	1.5Meg ohm	
R421	91TRD14PY1.5MK	1.5Meg ohm	
R422	91TRD14PY10KK	10K ohm	
R423	91TRD14PY10KK	10K ohm	
R424	91TRD14PY10KK	10K ohm	
R425	91TRD14PY10KK	10K ohm	
R426	91TRD14PY3.3KK	3.3K ohm	
R427	91TRD14PY3.3KK	3.3K ohm	
R428	91TRD14PY390K	390 ohm	
R429	91TRD14PY390K	390 ohm	
R430	91TRD14PY22KK	22K ohm	
R431	91TRD14PY22KK	22K ohm	
R432	91TRD14PY1KK	1K ohm	
R433	91TRD14PY100KK	100K ohm	
R435	91TRD14PY8.2KK	8.2K ohm	

MISCELLANEOUS

91T7717A01	Cabinet
91T7717A03	Pointer, Dial
91T7717A05	Dial Scale
91T7717A06	Panel, Rear
91T7717A07	Bracket, Bar Antenna
91T7717B02	Window Transparent
JKNBK0166AFSA	Knob, Tuning (91T7717B05)
91T7717B06	Knob, Air Check, Band Selector (FM Stereo (muting)/FM mono/MW/LW)
91T7717B09	Cabinet, Bottom
91T7717B10	Panel, Front
91T7717B11	Sleeve, Air Check Knob/FM Stereo (muting) Knob
91T7717B12 91T7717B13	Case, MW/LW Bar Antenna
91T7717C02	Bracket, Side
91T7717C03	Bracket, Center
91T7717C04	Bracket, Pulley
91T7717C05	Bracket, Pulley
91T7717C07	Flywheel
91T7717C08	Tuning Shaft with Flywheel
91T7717C10	Plate Spring, Tuning Knob
91T7717C11	Shield Plate, FM RF Section
91T7717C12	Bracket, P.W. Board
91T7717C13	Bracket, Power Transformer
91T7717C14	Chassis, Front
91T7717D01	Leg
91T7717D02	Pulley, Dial Cord
91T7717D03	Drum, Dial Cord
91T7717D07	Sheet, Leg
91T7717D08	Band, MW/LW Bar Antenna Case
91T7717F02	Packing Add, Cushion
91T7717F03	Polyethylene Bag
91T7717F05	Sheet, 460 x 180 x 1
91T7717F08	Packing Case
91T7717BP400K	Printed Wiring Board
91T7717BP201K	P.W.B., Stereo L.E.D.
91T7717BP301K	P.W.B., Power L.E.D.
91T7718C07	Bracket, Bottom Cabinet

REF. NO.	PART NO.	DESCRIPTION	CODE
	91T3361D04	Stopper, Power Supply Cord	
	91T7205D08	Bushing, Antenna Cord	
	91T7504D04	Cushion, Rubber	
	91T7205D09	Bushing, Bar Antenna Core	
	91T7252C20	Spring, Dial Cord	
	91T7405D01	Stopper, Output Cord	
	91T7608C20	Wire Holder	
SO-1	91TJ1-008	Jack, FM/MW/LW Antenna	
	91TLA-016	Lug Terminal	
ME401	91TMM-040	Meter, Tuning	
ME402	91TMM-041	Meter, Signal	
SW402	91TSP-103	Switch, Power	
SW401	91TSP-104	Switch, Air Check, Band Selector (FM Stereo and mono/MW/LW)	
SW403	QSOCE-0410AGZZ	Switch, Voltage Selector (91TSQ-058)	
	QACCB0052AF09	A.C. Cord with Plug	
	QACCV0001AFZZ	A.C. Cord with Plug	
	91TZE-007	FM Indoor Antenna, T-Shape	
F-1	91TZF-048	Fuse	
	QFSHP1001AGZZ	Holder, Fuse (91TZG-011)	
	91TZI-011	Output Cord with Plug	

A7804-2.7MNK
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