

OPTIMUS[®]

Service Manual

31-1991

STA-300

Digital Synthesized


AM/FM Stereo Receiver

Catalog Number: 31-1991

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PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special characteristics. These characteristics often pass unnoticed and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts that have these special safety characteristics are identified in this manual and its supplements. Electrical components having such features are identified by a  in the schematic diagram and the parts list.

Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts that do not have the same safety characteristics as specified in the parts list may create shock, fire, or other hazards.

SPECIFICATIONS

AM SECTION

- All items are measured at tapeout terminals with 47 kohms terminated.
- The generator output shall terminate in an IRE loop.
- Standard Modulation: 400 Hz, 30% modulation.

	Measured at (kHz)	Unit	Nominal	Limit
Frequency Cover Range		kHz	520 – 1720	520 – 1720
Intermediate Frequency		kHz	450	—
20 dB Quieting Sensitivity	600	μV/m	447	891
	1000	μV/m	335	708
	1400	μV/m	335	708
S/N Ratio at 5 mV/m Input	1000	dB	38	30
Selectivity at S/N 20 dB Input, ± 10 kHz	1000	dB	28	20
Band Width at 6 dB down	1000	kHz	6	4.5 – 9
AGC Figure of Merit	1000	dB	45	35
IF Rejection Ratio	600	dB	50	30
Image Rejection Ratio	1400	dB	27	20
THD at 5 mV/m Input, 30% Modulation	1000	%	1.0	3.0
Overload Distortion at 100 mV/m Input, 80% Modulation	1000	%	4.5	8
Electrical Audio Fidelity Frequency Response = 1 kHz, -6 dB down, 5 mV/m Input	1000	Hz	50 – 2.5K	80 – 2.0K

	Measured at (kHz)	Unit	Nominal	Limit
Whistle Modulation				
(2nd) at 1 mV/m	900	%	10	15
at 100 mV/m	900	%	10	15
(3rd) at 1 mV/m	1350	%	5	15
at 100 mV/m	1350	%	5	15
Tapeout Level, 5 mV/m, at 1 kHz	1000	mV	165	165 ± 3.5 dB
Auto Search Stop Level	1000	μV/m	500	250 – 1500

Note: If the PLL synthesized receiver is for Europe and Australia, all of the above measurement points should be replaced to 603 kHz, 999 kHz and 1404 kHz.

AM cover range is 531 kHz to 1710 kHz for Europe and Australia.

FM SECTION

- All items are measured at tapeout terminals with 47 kohms terminated.
- The signal voltage in this specification is the voltage appearing across the 300 ohm input terminals.
- Standard Modulation : 1000 Hz, 75 kHz deviation.

	Measured at (MHz)	Unit	Nominal	Limit
Frequency Cover Range		MHz	87.5 – 107.9	87.5 – 107.9
Intermediate Frequency		MHz	10.7	—
IHF (Usable) Sensitivity	89.9	μV	2.5	8.0
	89.9	dBf	13.2	23.3
	98.1	μV	2.5	8.0
	98.1	dBf	13.2	23.3
	105.9	μV	2.5	8.0
	105.9	dBf	13.2	23.3
Limiting Sensitivity (-3 dB)	98.1	μV	1.7	5
S/N Ratio at 1 mV Input, IHF A Filter	98.1	dB	65	55
S/Hum Ratio	98.1	dB	62	52
Spurious at 206.9 MHz	98.1	dB	70	60

	Measured at (MHz)	Unit	Nominal	Limit
Electrical Audio Fidelity				
400 Hz = 0 dB, at 1 mV Input	98.1	dB	0	0 ± 3
100 Hz				
10 kHz (US/CA)	98.1	dB	-13.65	-13.65 ± 3
10 kHz (EU/AU)	98.1	dB	-10.36	-10.36 ± 3
Distortion at 1 mV Input at 1000 Hz	98.1	%	0.35	1.5
Capture Ratio at Input 100 μV	98.1	dB	2.0	4.0
Alternate Channel Selectivity at Input 100 μV	98.1	dB	50	40
Image Response	105.9	dB	35	24
IF Rejection	89.9	dB	66	50
AM Suppression at 1 mV Input (FM 75 kHz DEV., AM 30% MOD.)	98.1	dB	58	40
Tapeout Level, at RCA, 75 kHz deviation 1 mV Input	98.1	mV	500	500 ± 3.0 dB
Maximum Signal Handling at 10% THD	98.1	μV	200K	100K
Auto Stop Sensitivity	98.1	μV	14.1	14.1 ± 6 dB

Note: If the PLL synthesized receiver is for Europe and Australia, all of the above measurement points should be replaced to 90.0, 98.0, and 106.0 MHz.

FM cover range is 87.5 MHz to 108 MHz for Europe and Australia.

FM MPX SECTION

- All items are measured at tapeout terminals with 47 kohms terminated.
- The signal voltage in this specification is the voltage appearing across the tuner input terminals. (IHF)
- Standard Modulation: Main Carrier (L + R) 33.75 kHz (45%) deviation
 Sub Carrier (L - R) 33.75 kHz (45%) deviation
 Pilot 6 kHz (8%) deviation
 Modulation Frequency 1000 Hz

	Measured at (MHz)	Unit	Nominal	Limit
Stereo Switch/Beacon Threshold	98.1	μV	14.1	14.1 ± 6 dB
	98.1	dBf	28.2	28.2 ± 6 dB
S/N Ratio at 1 mV with 19K input 38 kHz filter and IHF A Filter	98.1	dB	60	50
Stereo Distortion at 1 mV with 19K input 38 kHz filter	98.1	%	0.4	2.0
Stereo Separation (at 1 mV with 19K input 38 kHz Filter)	at 100 Hz 98.1	dB	34	20
	at 1 kHz 98.1	dB	38	25
	at 1 kHz 98.1	dB	34	20
Sub Carrier Product Rejection	98.1	dB	37	30

AUDIO SECTION

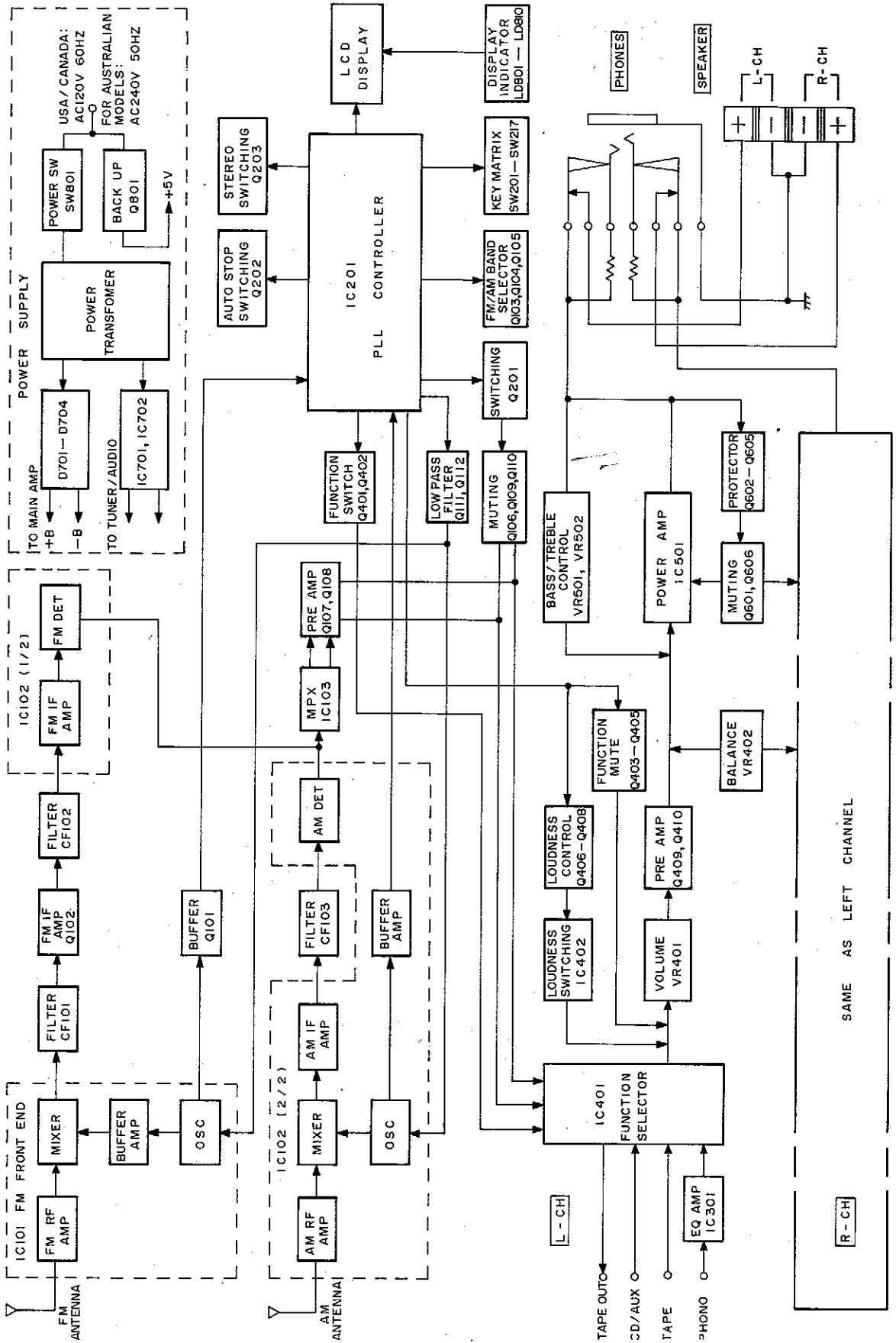
- All items are measured at speaker terminals with non-reactive rated load (8 ohms) unless otherwise indicated.
- Rated Power 13 W.
- Rated THD 0.5%.

		Unit	Nominal	Limit
Power Output from 40 Hz to 20 kHz under Rated THD both channels driven 8 ohms load.		W	15	13
Input Impedance at 1 kHz	PHONO	kohm	47	—
	TAPE	kohm	47	—
	CD/AUX	kohm	47	—
Sensitivity for Rated Power	PHONO	mV	2.5	2.5 ± 3.0 dB
	TAPE	mV	150	150 ± 3.0 dB
	CD/AUX	mV	150	150 ± 3.0 dB

		Unit	Nominal	Limit
Total Harmonic Distortion at 1 kHz, Rated Power		%	0.08	0.5
Maximum Input Signal at 1% THD (measured at Tapeout)	PHONO	mV	80	60
Frequency Response at 0.5W power from 40 Hz to 20 kHz	CD/AUX	dB	0	± 3
S/N Ratio at IHF a Filter, Rated Power Reference				
PHONO (10 mV Input and Shorted)		dB	70	63
TAPE (Input Shorted)		dB	72	65
CD/AUX (Input Shorted)		dB	72	65
Loudness Control	100 Hz	dB	+6	+6 ± 3.0
at -30 dB volume position	10 kHz	dB	+4.5	+4.5 ± 3.0
Tone Control Response				
Bass Control Action	100 Hz	dB	± 10	± 10 ± 3.0
Treble Control Action	10 kHz	dB	± 10	± 10 ± 3.0
Crosstalk at TAPE	1 kHz	dB	52	45
Channel Balance at VR maximum		dB	0	3.0
Hum and Noise at VR min		mV	1.0	3.0
Phone Equalizer (RIAA) channel	100 Hz	dB	+12.9	+12.9 ± 3
(measured at Tapeout)	10 kHz	dB	-13.75	-13.75 ± 3
Radio Memory Backup Time		Hour	72	—

Note: Nominal specs represent the design specs. All units should be able to approximate these - some will exceed and some may drop slightly below these specs. Limit specs represent the absolute worst condition that still might be considered acceptable; in no case should a unit fail to meet limit specs.

BLOCK DIAGRAM



CIRCUIT DESCRIPTION

DIGITAL TUNING SYSTEM DESCRIPTION

The STA-300 digital tuning system provides full electronic control of a vari-cap tuned FM/AM receiver. The block diagram of the system is shown in the figure. This is a phase-locked loop digital tuning system which consists of integrated circuit; controller plus PLL in a single chip, and built-in two-modulus prescaler. The controller chip (IC201) provides phase-locked loop capability with on-chip frequency divider, a reference oscillator whose frequency is controlled by an external crystal of 4.5 MHz, and phase comparator circuitry. It accepts directly an AM local oscillator signal and an FM signal from FM buffer (Q101) and outputs control signals for closed loop operation of these oscillators. The controller also provides the signals to drive the display. The frequency of the tuned station is displayed on a four digit multiplexed display. Six favorite stations on AM band and twelve favorite stations on FM band can be stored as well as "last station tuned" information.

Example of FM operation

When receiving 98.1 MHz, the VCO generates 108.8 MHz ($98.1 + 10.7(\text{IF})$ MHz). The signal passes through buffer amp Q101, then is applied to pin 8 of PLL IC, IC201. This frequency is divided by N ($N = (98.1 \text{ MHz} + 10.7 \text{ MHz}) \div (2 \times 25 \text{ kHz}) = 2176$); the resulting output is 25 kHz.

The reference oscillator 4.5 MHz is divided by 180 in IC201, resulting in another 25 kHz frequency.

These two 25 kHz signals are fed to the phase detector in IC201. An error voltage is generated by the phase detector, which is proportional to the phase difference between these two 25 kHz signals. This error voltage appears at pin 11 of IC201 and passes through the LPF where the error voltage is integrated, and harmonics and noise are filtered out. The resulting DC voltage is applied to the varicap diode D102 (part of VCO) whose capacity varies with applied DC voltage. Thus the output frequency of VCO is corrected. With proper circuit design and precise adjustments, the VCO frequency is accurate and precise when the system is "locked", meaning the phase detector senses no phase differences between the two 25 kHz signals and the frequency VCO generates which is as accurate and stable as the reference crystal oscillator.

Example of AM operation (The basic PLL circuitry system is same as in FM mode.)

When receiving 1000 kHz, VCO generates a 1450 kHz signal ($1000 + 450 (\text{IF})$ kHz). The AM VCO output signal, 1450 kHz is applied to pin 9 of PLL, IC201. This frequency is divided by N ($N = 145$). The resulting output will be 10 kHz.

The reference oscillator 4.5 MHz, is divided by 450, resulting in another 10 kHz frequency.

These two 10 kHz signals are fed to the phase detector. An error voltage is generated by the phase detector, which is in proportion to the phase difference between these two 10 kHz signals. This error voltage appears at pin 11 of IC201 and passes through the LPF where the error voltage is integrated, and harmonics and noise are filtered out.

The resulting DC voltage is applied to the varicap diode D104 (part of VCO) whose capacity varies with applied DC voltage. Thus the output frequency of VCO is corrected. With proper circuit design and precise adjustments, the VCO frequency is accurate and precise.

When the system is "locked", the phase detector senses no phase differences and generates a frequency which is as accurate and stable as the reference crystal oscillator.

Notes:

- The values of divider N can be calculated as follows:

FM band: $VCO \text{ frequency} = f(\text{reference}) \times 2N$

$N = VCO \text{ frequency} (= \text{receiving frequency} + 10.7 \text{ MHz}) \div f(\text{reference } 25 \text{ kHz}) \times 2$

Receiving frequency (MHz)	87.5 – 107.9
VCO frequency (MHz)	98.2 – 118.6
N	1964 – 2372

AM band: $N = VCO \text{ frequency} (= \text{receiving frequency} + 450 \text{ kHz}) \div f(\text{reference})$

Tuning range (kHz)	520 – 1720
f (Reference) (kHz)	10
N	97 – 217

- Reference oscillator 4.5 MHz is divided by divider of IC201.

FM band: $180 = 4.5 \text{ MHz} \div 25 \text{ kHz}$

AM band: $450 = 4.5 \text{ MHz} \div 10 \text{ kHz}$

- LPF circuitry applies the DC voltage to VCO circuitry which is converted from the output signal (25 kHz for FM, 10 kHz for AM) of phase detector (internally IC201).

Digital Tuning System (PLL Circuit) Block Diagram

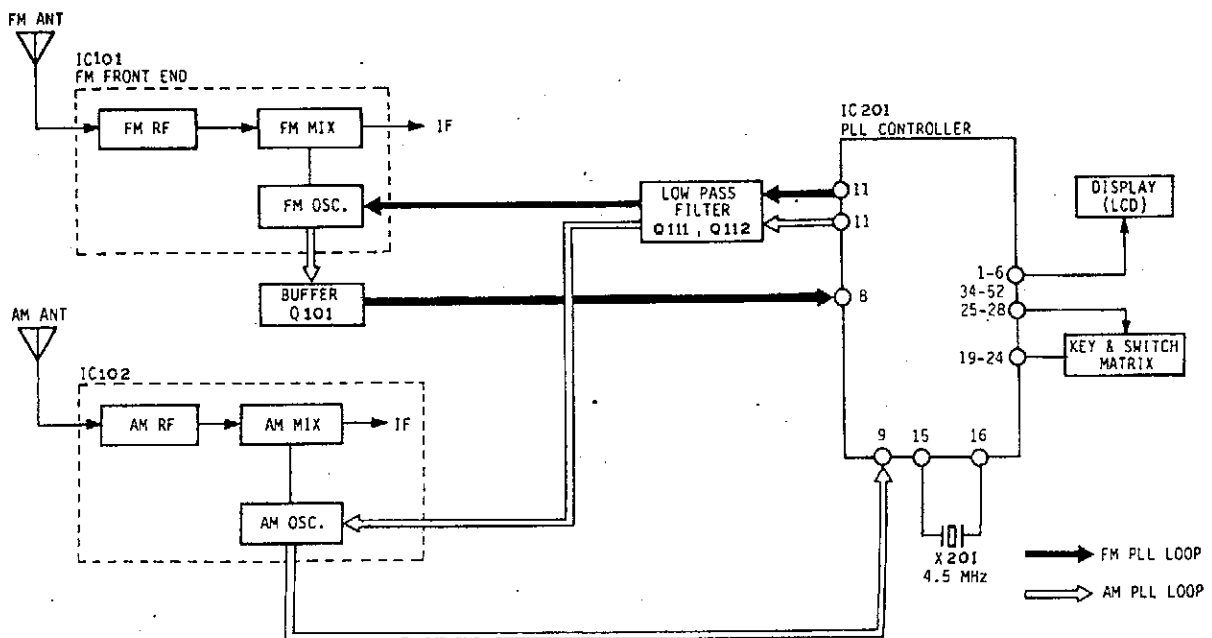


Figure 1

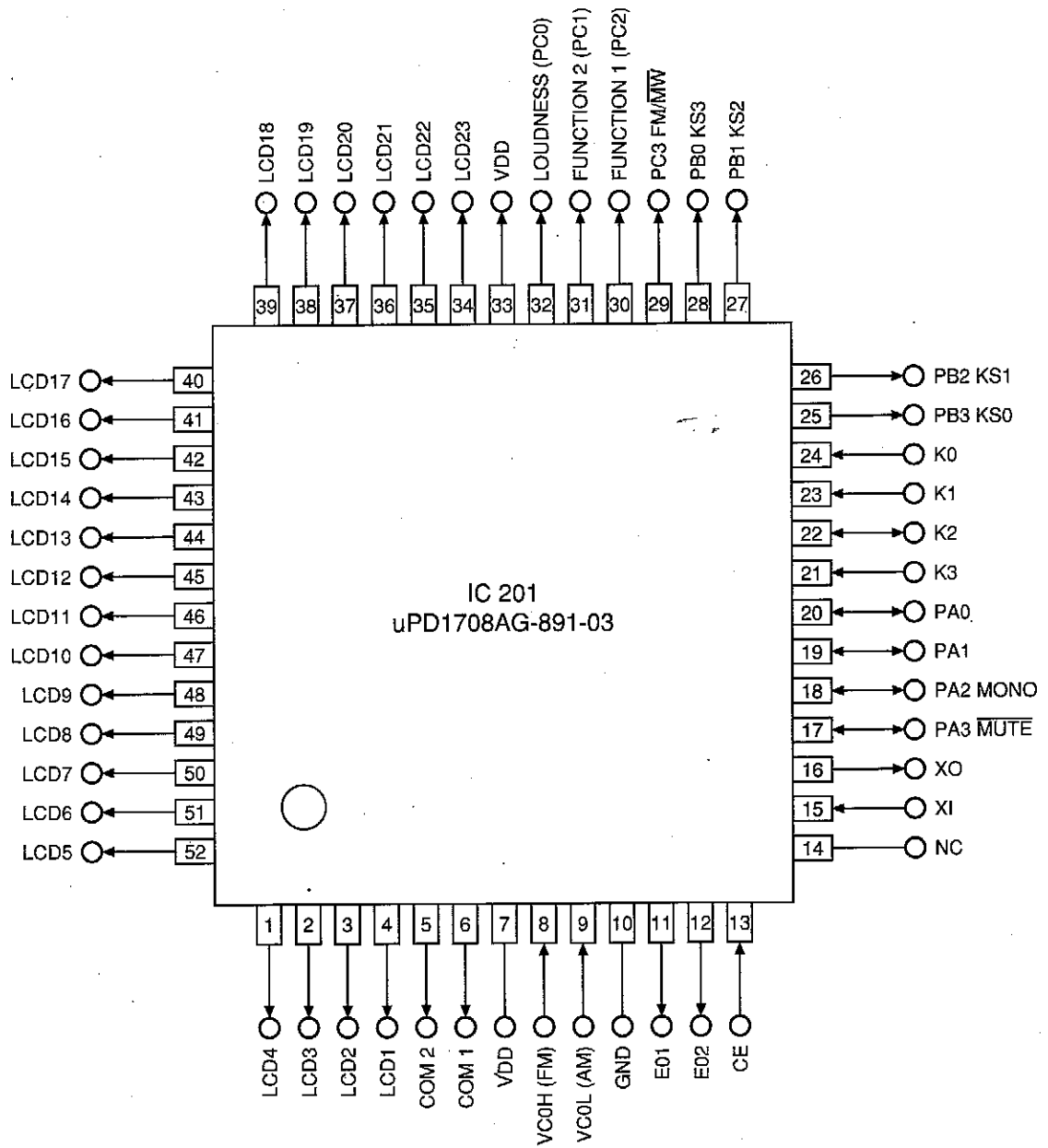


Figure 2 (IC201 Pin Configuration)

Input and Output Terminal Functions of IC201

Pin No.	Mark	Function	Remarks															
1-4 34-52	LCD1-4 LCD5-23	LCD1-4 LCD5-23	These outputs are used as segment drivers for the display.															
5 6	COM2 COM1	COM2 COM1	These outputs are used as common signal outputs for the display.															
7, 33	VDD	VDD	This is a power supply for the chip.															
8	VCOH (FM)	VCOH (FM)	This is the FM band local oscillator input.															
9	VCOL (AM)	VCOL (AM)	This is the AM band local oscillator input.															
10	GND	GND	System ground.															
11 12	EO1 EO2	EO1 EO2	These outputs are used by the tuner vari-cap for controlling the local oscillators.															
13	CE	Chip Enable	This input is used to designate the stand-by mode to the chip.															
14	NC	NC	No connection.															
15 16	XI XO	X'tal In. X'tal Out.	These input and output are for connection to a 4.5 MHz crystal.															
17	PA3	Mute	This output line is low to mute the radio in case of station change, band change, and so on.															
18	PA2	Mono	This is the mono control signal input.															
19 20	PA1 PA0	A1 A0	These are control key and switch matrix return signal inputs.															
21-24	K3-K0	K3-K0	These are control key and switch matrix return signal inputs.															
25-28	PB3-PB0	KS3-KS0	These are control key and switch matrix return signal outputs.															
29	PC3	FM/MW	These outputs are used to select radio band. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Band</th> <th>FM/MW</th> </tr> </thead> <tbody> <tr> <td>FM</td> <td>1</td> </tr> <tr> <td>MW</td> <td>0</td> </tr> </tbody> </table>	Band	FM/MW	FM	1	MW	0									
Band	FM/MW																	
FM	1																	
MW	0																	
30 31	PC2 PC1	Function 1 Function 2	These outputs are used to select a function. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Mode \ Out</th> <th>Function 1</th> <th>Function 2</th> </tr> </thead> <tbody> <tr> <td>RADIO</td> <td>0</td> <td>0</td> </tr> <tr> <td>PHONO</td> <td>0</td> <td>1</td> </tr> <tr> <td>TAPE</td> <td>1</td> <td>0</td> </tr> <tr> <td>CD/AUX</td> <td>1</td> <td>1</td> </tr> </tbody> </table>	Mode \ Out	Function 1	Function 2	RADIO	0	0	PHONO	0	1	TAPE	1	0	CD/AUX	1	1
Mode \ Out	Function 1	Function 2																
RADIO	0	0																
PHONO	0	1																
TAPE	1	0																
CD/AUX	1	1																
32	PC0	Loudness	This output line is high to activate the loudness circuit.															

CONTROL KEY AND SWITCH MATRIX

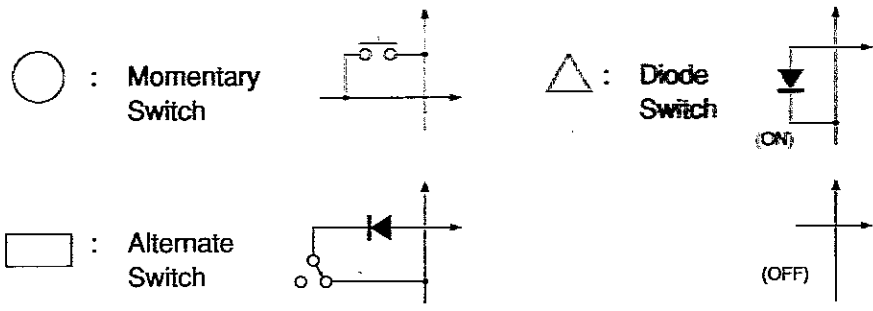
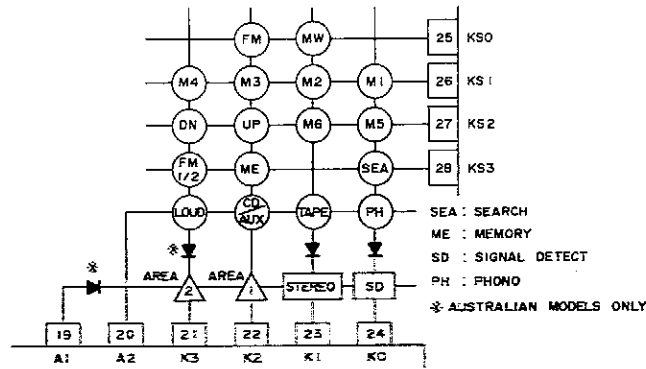


Figure 3

Searching for Stations

SEARCH Switch; ON (SEEK)

When the "SEARCH" indicator is indicated on the LCD, pressing the UP or DOWN key for a moment causes automatic up or down. Searching at the speed at 30-50 ms/ch until SD terminal activates (active low) or UP or DOWN key is pressed.

SEARCH Switch; OFF (Manual Searching)

Pressing the UP or DOWN key starts tuning to the next channel, and pressing the key continuously for more than 0.5 second allows traversing up or down at the speed of 100 ms until the key is released.

Memory Tuning

MEMORY

The tuning information is stored into an internal RAM by pressing the MEMORY key and then the desired memory tuning key within 5 seconds. If no key is pressed during this 5 seconds, the MEMORY function is cancelled.

M1 to M6

Six AM, twelve FM favorite stations can be recalled from internal RAM for each band. When it is switched from one band to the other band, it tunes to the "last-tuned-to station" on that band. Each time a station is changed, the controller provides a signal to mute the tuner.

AUTO STOP CIRCUIT FOR AUTO SEARCH

The automatic stop circuit consists of IC102 and IC201. When receiving input signal of more than 15 μ V in FM or more than 500 μ V in AM, pin 8 of IC102 goes low and Q202 turns on. Then pin 24 and pin 19 of IC201 are connected to each other. So the auto search stops on the station of the signal.

Adjust the auto-stop level by VR101(FM).

FUNCTION MUTE CIRCUIT

To eliminate the clicking noise when the function selector is changed from one function to another, the function mute circuit is activated.

When the function selector is pressed, a high signal is applied to pin 17 of IC201. Then pin 17 goes low and Q201 turns on, and Q403, Q404 and Q405 turn on. This mutes an input into the main amp circuit to eliminate the clicking noise.

THERMAL PROTECTION CIRCUIT

The STA-300 uses a transistor as thermal protector. If the temperature of the power transformer rises to 105°F, Q605 turns on. This causes Q602, Q603, Q604 to turn on and Q601 to turn off so that the signals are shut down.

ALIGNMENT

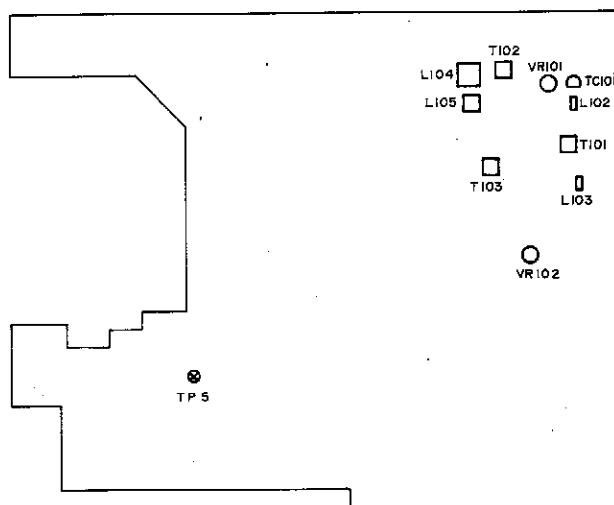


Figure 4. Alignment Locations

AM Section

List of Test Equipment

- AM standard signal generator (AM SG)
- AC voltmeter (SSVM)
- Oscilloscope
- DC voltmeter
- Distortion meter

General Preparation

- Connect standard loop antenna to AM standard signal generator (400 Hz, 30% modulation) and radiate signal into AM loop antenna.
- Connect oscilloscope, distortion meter and SSVM to TAPE OUT jack.
- Press in AM selector switch.
- Rotate VOLUME to minimum.
- Set TONE and BALANCE controls to center position.

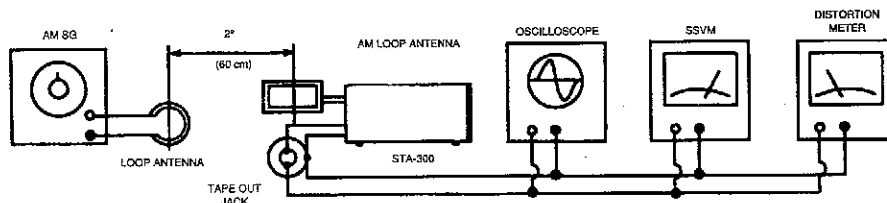


Figure 5

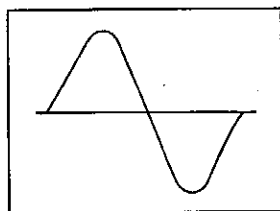


Figure 6

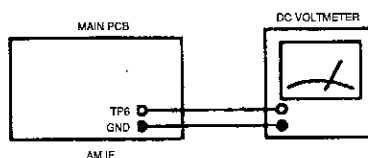


Figure 7

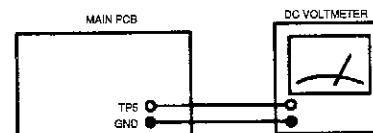


Figure 8

No.	Alignment	Connection	Step	Gen. Freq.	Indicator	Adjustment	For
1	IF	Fig. 5	--	450 kHz (400 Hz, 30% modulation)	Oscilloscope	T102	Maximum symmetrical waveform in Fig. 2.
2	Coverage	Fig. 5	--	Check the coverage from 520 - 1720 kHz. (from 531 - 1710 kHz for Australia.)			
3	Tracking	Figs. 5 and 7	a	600 kHz (603 kHz)	DC volt-meter	L105	2.05 V \pm 0.2 V
					AC volt-meter	L104	Maximum reading
			b	1400 kHz (1404 kHz)	DC volt-meter	TC102	6.5 V \pm 0.5 V
					AC volt-meter		Maximum reading
4	Tracking Error	Fig. 5	a	1000 kHz (999 kHz)	AC volt-meter	Check for tracking error at 1000 kHz. It should be within 2 dB.	
			b	If tracking error does not fall within 2 dB, change 3-b voltage (6.5 V) by 4.6 V, and repeat 3-a and 3-b. Then check the voltage of 3-b -- should be within 9.0 V.			
5	Auto-Stop	Figs. 5 and 8	a	1000 kHz (999 kHz) 500 μ V input	DC volt-meter	Check TP5.	0 V reading
			b	With 500 μ V +9.5 -6.0 dB input, check if auto-stop activates.			

* Frequencies inside of the parentheses are for Australian models.

FM Section

List of Test Equipment

- FM standard signal generator
- AC voltmeter (SSVM)
- Oscilloscope
- DC voltmeter
- Distortion meter
- Dummy antenna 300 ohm

General Preparation

- Connect FM standard SG (1000 Hz, 75 kHz deviation) to FM 300 ohm antenna terminal. Connect oscilloscope, distortion meter and SSVM to TAPE OUT jack.
- Press in FM selector switch.
- Rotate VOLUME to minimum.

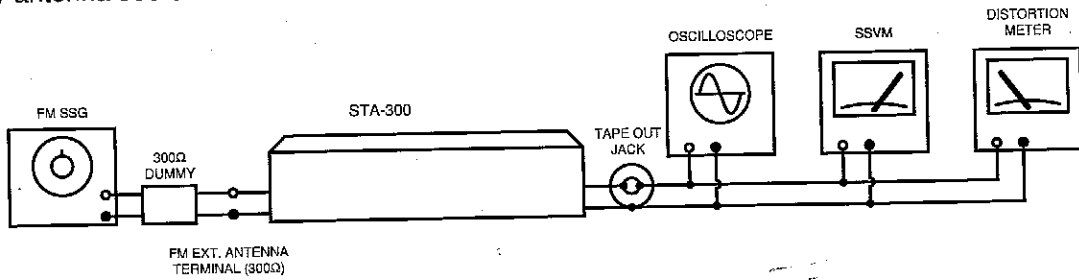


Figure 9

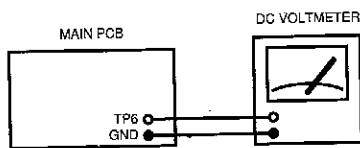


Figure 10

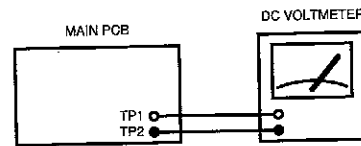


Figure 11

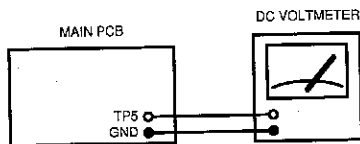


Figure 12

No.	Alignment	Connection	Step	Gen. Freq.	Indicator	Adjustment	For
1	Coverage	Fig. 10	a	87.5 MHz	DC volt-meter	L103	2.4 V \pm 0.3 V
			b	107.9 MHz (108 MHz)	DC volt-meter	Check	7.5 V \pm 1 V
2	IF	Figs. 9 and 11	a	98.1 MHz No input	DC volt-meter	T103	0 V \pm 30 mV
			b	98.1 MHz 1 mV input	AC volt-meter	T101	Maximum reading
3	Tracking	Fig. 9	a	89.9 MHz	AC volt-meter	L102	Maximum reading
			b	105.9 MHz	AC volt-meter	TC101	Maximum reading
			c	Repeat Steps a and b until no further improvement can be made.			
4	Auto-Stop	Figs. 9 and 12	a	98.1 MHz 1 mV input	DC volt-meter	VR101	0 V reading at 98.1 MHz (\pm 27 kHz – \pm 50 kHz)
			b	Check if auto stop activates with 14.1 μ V \pm 6 dB input.			

* Frequencies inside the parentheses are for Australian models.

FM MPX Section

List of Test Equipment

- FM stereo SG
Modulation level of 19 kHz
Pilot signal 8%
- FM Signal generator
Output level .. 1 mV
Frequency Approximately 98.1 MHz
Deviation 67.5 kHz, 90%
- AC voltmeter (SSVM)
- Oscilloscope
- Distortion meter
- Frequency counter

General Preparation

- Connect FM stereo SG (1000 Hz, 67.5 kHz deviation, 7% Pilot) through FM standard SG to 300 ohm antenna terminal.
- Connect oscilloscope, distortion meter and SSVM to TAPE OUT jack.
- Press in FM selection switch.
- Press out MONO switch (stereo position).
- Rotate VOLUME to minimum.

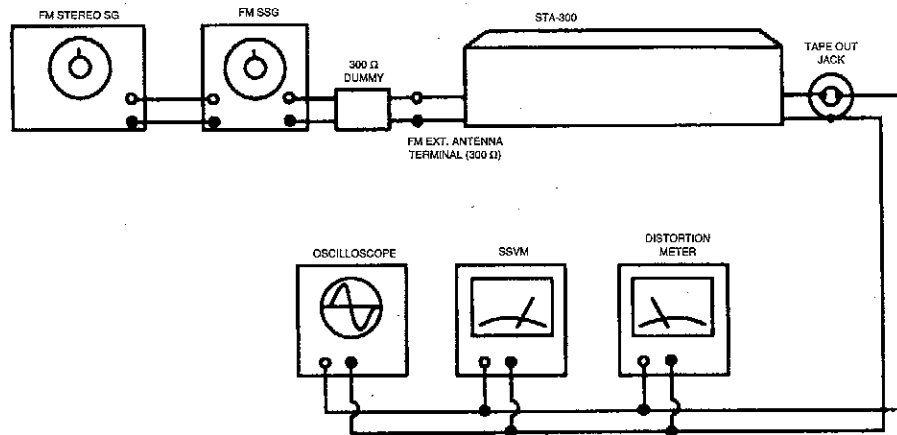


Figure 13



Figure 14

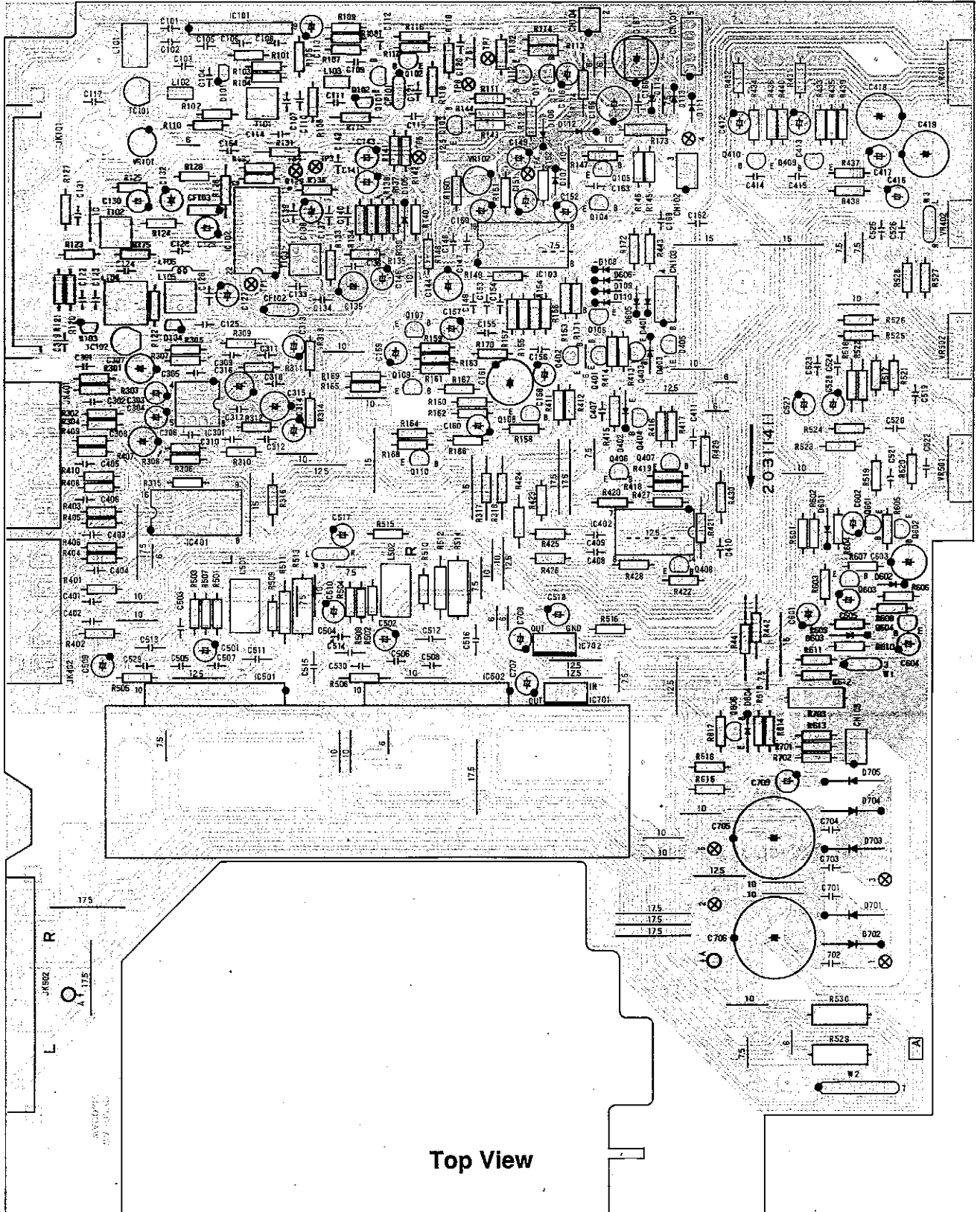
No.	Alignment	Connection	Step	Stereo Mod.	Indicator	Adjustment	For
1	MPX	Fig. 13	a	Set FM SG to MONO mode. Input 1 mV at 98.1 MHz, then cut the deviation.			
		Fig. 13 and 14	b	MONO 1 kHz (1000 Hz, No Mod) 1 mV input	Frequency counter	VR102.	19 kHz \pm 50 Hz
2	Stereo LCD	Fig. 13	--	Composite MPX signal 1 kHz.	STEREO indicator		With 14.1 μ V \pm 6 dB, STEREO LCD should light.
3	Separation	Fig. 13	a	Composite MPX signal 1 kHz on LEFT channel only.	AC volt- meter	Check	Minimum reading at RIGHT channel output.
			b	Composite MPX signal 1 kHz on RIGHT channel only.	AC volt- meter	Check	Minimum reading at LEFT channel output.
			c	Repeat Steps a and b until AC voltmeter reading is at least - 25 dB (i.e. 25 dB separation).			
4	Distortion	Fig. 13	--	Composite MPX signal 1 kHz.	Distortion meter	With 1 mV antenna input, stereo distortion should be less than 2%.	

Memory Back Up Check

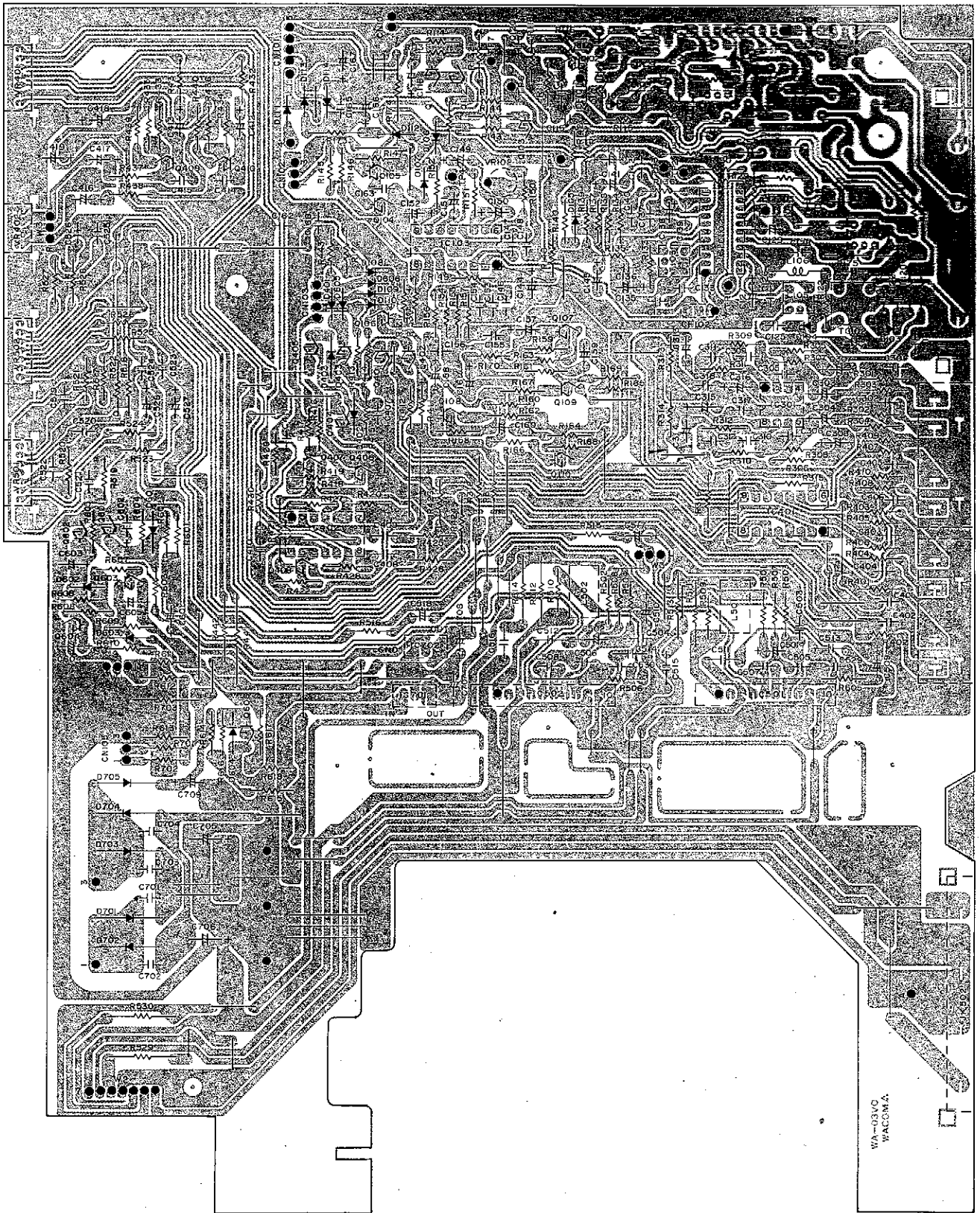
Unplug AC Cord and replug it after 10 minutes. Check that memorized frequencies are held.

PRINTED CIRCUIT BOARD

Main PCB



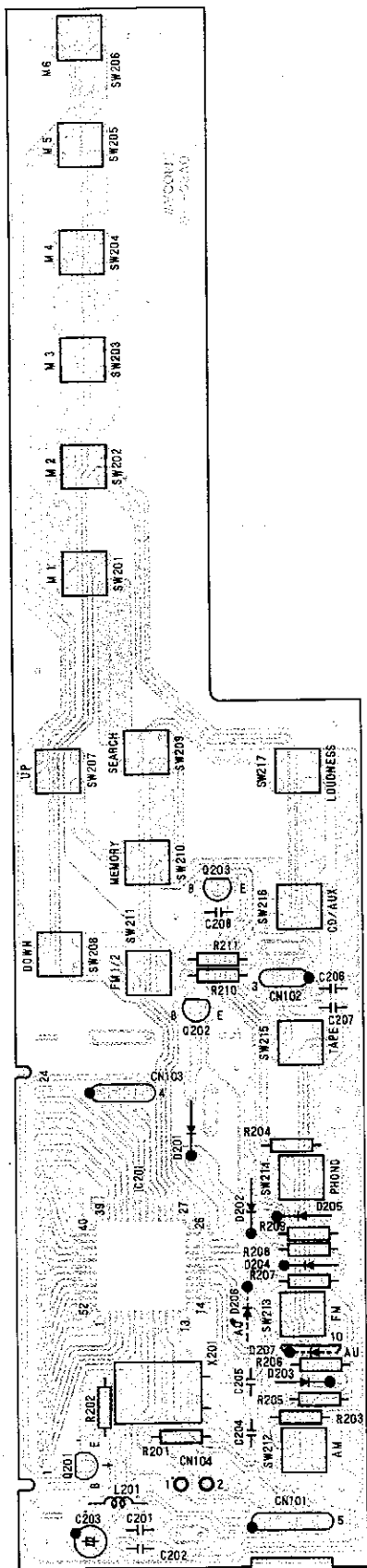
Top View



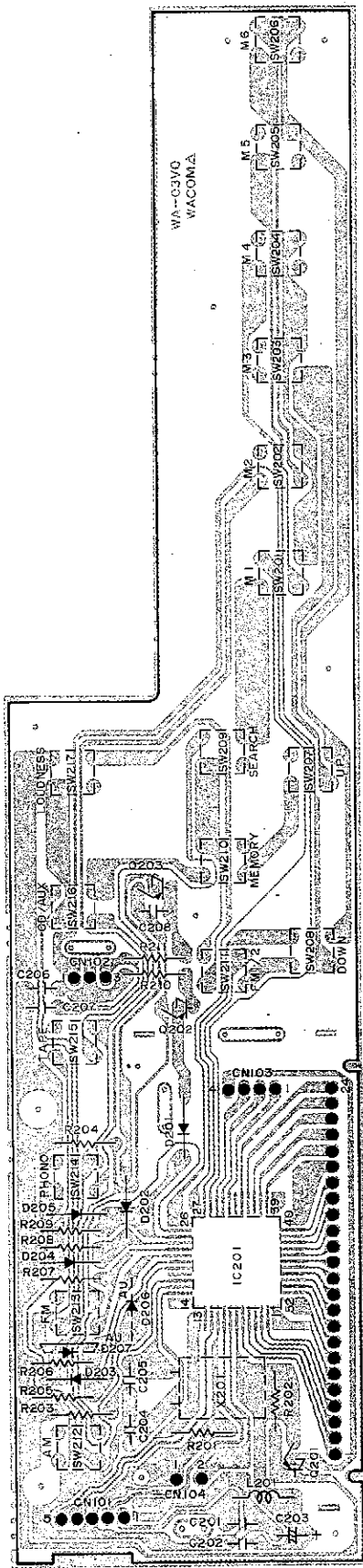
Bottom View

Display PCB

Top View

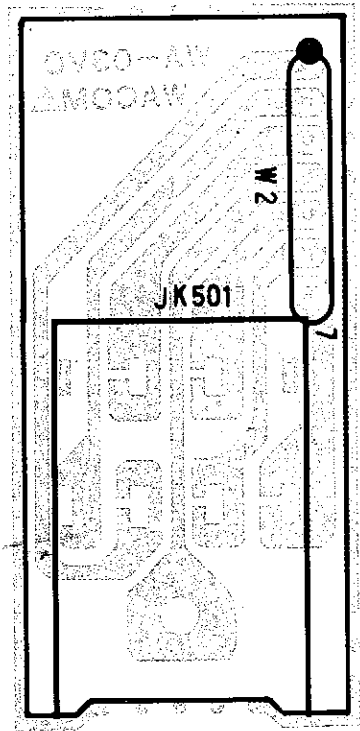


Bottom View

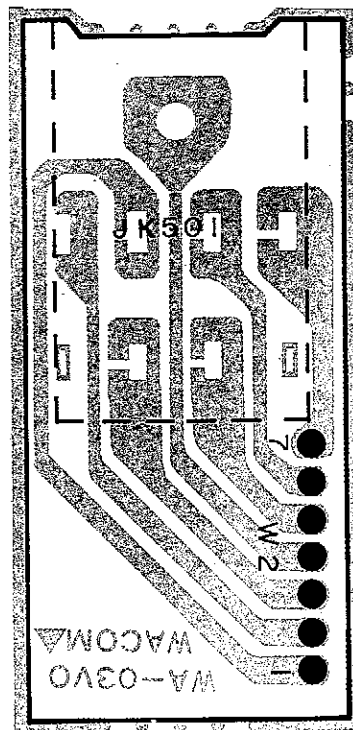


Headphone PCB

Top View

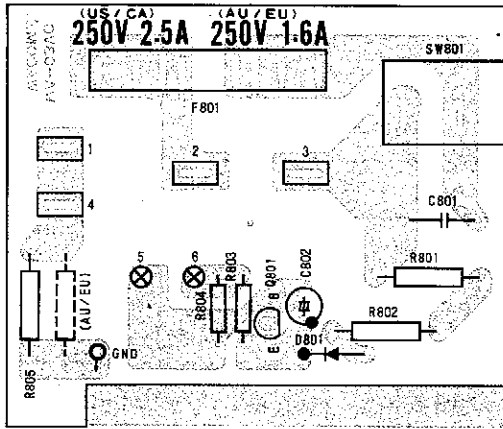


Bottom View

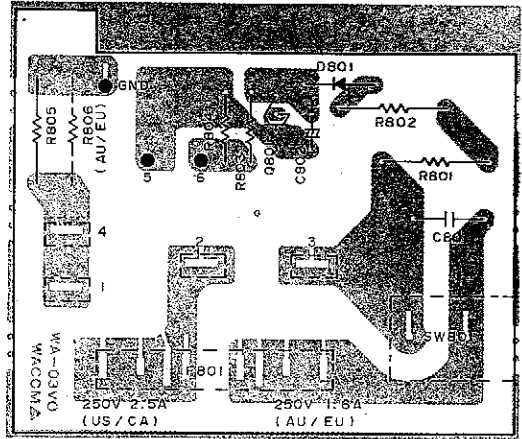


Power Switch PCB

Top View

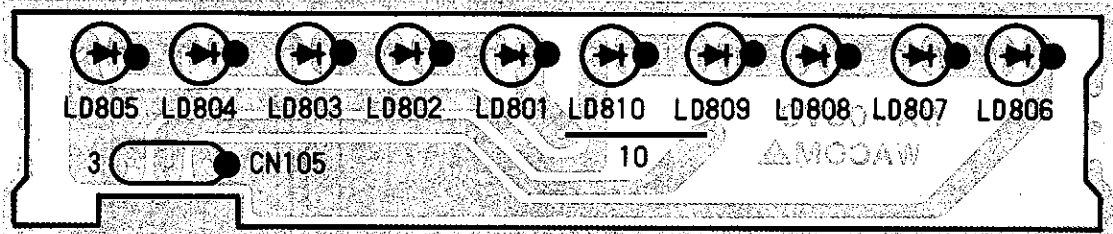


Bottom View

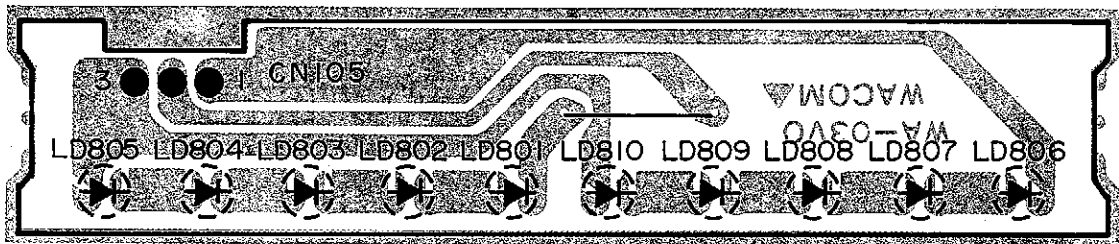


LED PCB

Top View

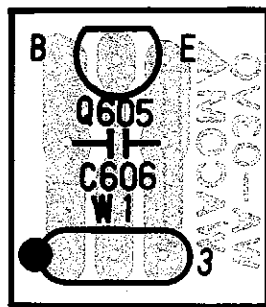


Bottom View

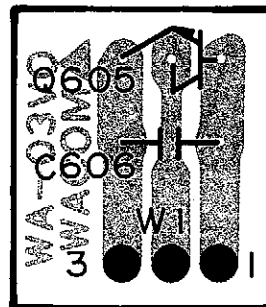


Transistor PCB

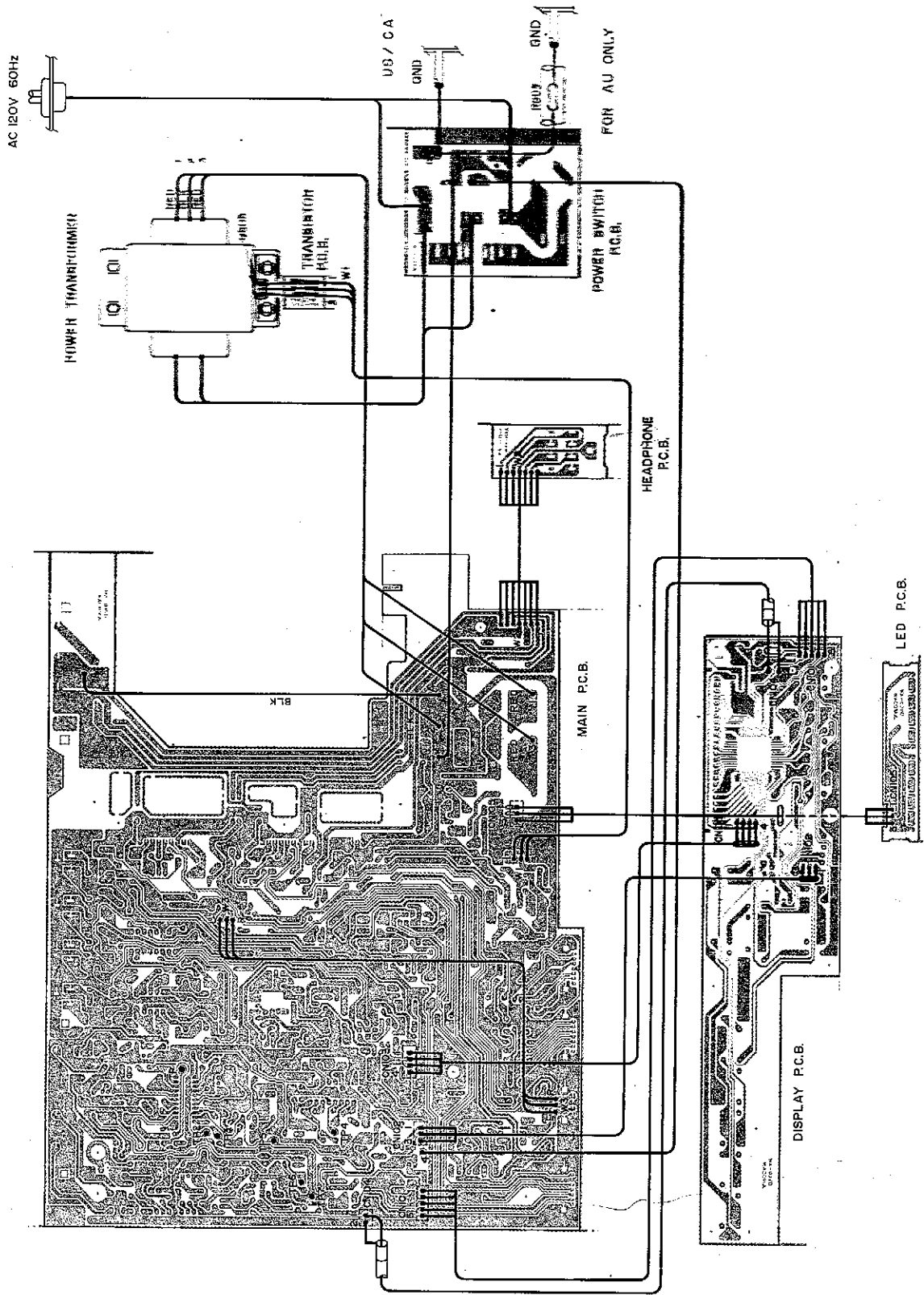
Top View



Bottom View



WIRING DIAGRAM



TROUBLESHOOTING

Symptom	Cause	Remedy
Unit inoperative at all; display light does not turn on.	<ul style="list-style-type: none"> • Faulty AC power cord. • Defective power switch (SW801). • Broken fuse (F801). • Broken power transformer (T801). 	<ul style="list-style-type: none"> • Replace. • Replace. • Replace. • Replace.
Unit operative, but display light does not turn on when power is ON.	<ul style="list-style-type: none"> • Short in primary or secondary of transformer circuitry. • Damaged rectifiers D701 - D704. • Defective IC702, R701 or R702. 	<ul style="list-style-type: none"> • Replace. • Replace defective rectifier(s). • Replace defective component(s).
Display light turns on, but no sound from both channels.	<ul style="list-style-type: none"> • Defective headphone jack (JK501). • Defective IC501, IC502, Q409 or Q410 in main amp circuit. • Defective transistors: Q403, Q404, Q405, Q601 or Q606. 	<ul style="list-style-type: none"> • Replace. • Replace defective component(s). • Replace defective transistor(s).
One channel does not work with volume (VR401) at maximum with a test signal applied to the center terminal of the volume of the dead channel.	<ul style="list-style-type: none"> • Defective IC501, IC502, Q409 or Q410 in main amp circuit. • Short in speaker output terminal. • Defective capacitors: C412, C413, C416, C417, C501 or C502. • Defective IC201, IC401, Q401 or Q402. 	<ul style="list-style-type: none"> • Replace defective component(s). • Repair. • Replace defective capacitor(s). • Replace defective component(s).
Speaker works normally but headphones inoperative.	<ul style="list-style-type: none"> • Headphone plug does not mate with jack. • Defective R529 or R530. • Poor contact in TAPE, CD/AUX input jack. • Defective IC201, IC401, Q401, Q402, SW215 or SW216. 	<ul style="list-style-type: none"> • Replace the plug. • Replace. • Repair or replace the jack. • Replace defective component(s).
PHONO input inoperative.	<ul style="list-style-type: none"> • Poor contact in PHONO input jack. • Defective IC201, IC401, IC301, Q401, Q402 or SW214. 	<ul style="list-style-type: none"> • Repair or replace the jack. • Replace defective component(s).
TAPE OUT has no effect.	<ul style="list-style-type: none"> • Defective contact in TAPE OUT jack. • Defective R401 or R402. 	<ul style="list-style-type: none"> • Repair or replace the jack. • Replace.

Symptom	Cause	Remedy
FM inoperative	<ul style="list-style-type: none"> • Defective L101. • Defective IC201, IC401, Q401, Q402 or SW213. • Defective Q101, Q102, Q103, Q104, Q105, Q111, Q112, IC101, IC102 or IC103. • Defective coil(s): L102, L103, T101 or T103. • Defective ceramic filter(s): CF101, CF102. • Defective IC201, IC401, Q401 or Q402. 	<ul style="list-style-type: none"> • Replace. • Replace defective component(s). • Replace defective component(s). • Replace defective coil(s). • Replace defective ceramic filter(s). • Replace defective component(s).
Poor multiplex separation.	<ul style="list-style-type: none"> • Defective R153. 	<ul style="list-style-type: none"> • Replace.
STEREO indicator does not light.	<ul style="list-style-type: none"> • Improper adjustment of VR102. • Defective LCD. • Defective IC201. 	<ul style="list-style-type: none"> • Re-adjust VR102. • Replace. • Replace.
AM inoperative.	<ul style="list-style-type: none"> • Damaged IC102, IC103. • Defective L104, L105 or T102. • Defective R122, R129 or R140. • Defective C143. • Defective SW212. • Defective varicap diode(s): D103, D104. • Damaged AM loop antenna. • Defective IC201, IC401, Q401 or Q402. 	<ul style="list-style-type: none"> • Replace. • Replace defective component(s). • Replace defective component(s). • Replace. • Replace. • Replace. • Repair or replace. • Replace defective component(s).
LOUDNESS has no effect.	<ul style="list-style-type: none"> • Defective IC201, IC402 or SW217. • Defective Q406, Q407 or Q408. • Defective C408-C411, R425-R430. 	<ul style="list-style-type: none"> • Replace defective component(s). • Replace defective transistor(s). • Replace defective component(s).
BASS control has no effect.	<ul style="list-style-type: none"> • Defective VR501. • Defective C519-C522, R517-R522. 	<ul style="list-style-type: none"> • Replace. • Replace defective component(s).
TREBLE control has no effect.	<ul style="list-style-type: none"> • Defective VR502. • Defective C523-C526, R525-R528. 	<ul style="list-style-type: none"> • Replace. • Replace defective component(s).

Symptom	Cause	Remedy
Excessive noise of PHONO input.	<ul style="list-style-type: none"> • Defective IC301. • Defective R307, R308, C307 or C308. 	<ul style="list-style-type: none"> • Replace. • Replace.
Noisy VOLUME control.	<ul style="list-style-type: none"> • Defective VR401. • Defective C412, C413, C501 or C502. 	<ul style="list-style-type: none"> • Replace. • Replace defective capacitor(s).
SEARCH tune inoperative (UP/DOWN, AM or FM).	<ul style="list-style-type: none"> • Poor contact in UP/DOWN key. • Defective SW209. • Defective IC201. • Defective D205. • Defective IC101, IC102 or IC201. • In case of FM only, improper adjustment of T101, T103. 	<ul style="list-style-type: none"> • Repair or replace. • Replace. • Replace. • Replace • Replace defective IC(s). • Re-adjust.
MANUAL tune inoperative (UP/DOWN, AM or FM).	<ul style="list-style-type: none"> • Poor contact in UP/DOWN key. • Defective IC201. 	<ul style="list-style-type: none"> • Repair or replace. • Replace.
MEMORY setting (Keys M1-M6) inoperative.	<ul style="list-style-type: none"> • Poor contact in memory keys M1-M6. • Poor contact in MEMORY set key. • Defective IC201. • Defective D204, D205. 	<ul style="list-style-type: none"> • Replace the key(s). • Replace the key. • Replace. • Replace.
LCD inoperative.	<ul style="list-style-type: none"> • Defective LCD. • Defective IC201. 	<ul style="list-style-type: none"> • Replace. • Replace.

ELECTRICAL PARTS LIST

PRODUCT SAFETY NOTE: Products marked with a have special characteristics important to safety. Before replacing any of these components, read carefully the products safety notice of this service manual. Don't degrade the safety of the product through improper servicing.

Ref. No.	Description	RS Part No.	Mfr's Part No.
	PCB Assembly, Main consists of the following:	US CA AU	MH00658 MH00719 MH00838
CAPACITORS			
C101	Ceramic SL 27 pF 50 V ± 5%		CCJVK270J*
C102	Ceramic 0.01 µF 50 V +80%–20%		CKJPK103Z*
C103	Ceramic 0.01 µF 50 V +80%–20%		CKJPK103Z*
C104	Ceramic 0.01 µF 50 V +80%–20%		CKJPK103Z*
C105	Ceramic NPO 3 pF 50 V ± 0.25 pF		CCJBK3R0C*
C106	Ceramic NPO 10 pF 50 V ± 5%		CCJBK100J*
C107	Ceramic 0.022 µF 50 V +80%–20%		CKJPK223Z*
C108	Ceramic NPO 20 pF 50 V ± 5%		CCJBK200J*
C109	Ceramic NPO 2 pF 50 V ± 0.25 pF		CCJBK2R0C*
C110	Ceramic NPO 4 pF 50 V ± 0.5 pF		CCJBK4R0D*
C111	Ceramic 0.01 µF 50 V +80%–20%		CKJPK103Z*
C112	Ceramic 1000 pF 50 V ± 10%		CKJEK102K*
C113	Electrolytic 22 µF 16 V ± 20%		CEACG226M*
C114	Ceramic 0.01 µF 50 V +80%–20%		CKJPK103Z*
C115	Ceramic 0.022 µF 50 V +80%–20%		CKJPK223Z*
C116	Electrolytic 3.3 µF 50 V ± 20%		CEACK335M*
C117	Ceramic 0.022 µF 50 V +80%–20%		CKJPK223Z*
C118	Not used		
C119	Not used		
C120	Ceramic 0.022 µF 50 V +80%–20%		CKJPK223Z*
C121	Ceramic 0.022 µF 50 V +80%–20%		CKJPK223Z*
C122	Ceramic 0.047 µF 50 V +80%–20%		CKJPK473Z*
C123	Ceramic NPO 9 pF 50 V ± 0.5 pF		CCJBK9R0D*
C124	Ceramic 0.047 µF 50 V +80%–20%		CKJPK473Z*
C125	Styrene 390 pF 50 V ± 5%		CNEHK391J*
C126	Ceramic 0.022 µF 50 V +80%–20%		CKJPK223Z*
C127	Electrolytic 10 µF 16 V ± 20%		CEACG106M*
C128	Ceramic SL 33 pF 50 V ± 5%		CCJVK330J*
C129	Electrolytic 4.7 µF 25 V ± 20%		CEACI475M*
C130	Electrolytic 22 µF 16 V ± 20%		CEACG226M*
C131	Ceramic 0.022 µF 50 V +80%–20%		CKJPK223Z*
C132	Electrolytic 4.7 µF 25 V ± 20%		CEACI475M*
C133	Ceramic 0.022 µF 50 V +80%–20%		CKJPK223Z*
C134	Ceramic 0.022 µF 50 V +80%–20%		CKJPK223Z*
C135	Electrolytic 47 µF 25 V ± 20%		CEACI476M*

Ref. No.	Description	RS Part No.	Mfr's Part No.
C136	Ceramic 0.022 μ F 50 V +80%–20%		CKJPK223Z*
C137	Ceramic 0.047 μ F 50 V +80%–20%		CKJPK473Z*
C138	Electrolytic 0.47 μ F 50 V \pm 20%		CEACK474M*
C139	Ceramic 100 pF 50 V \pm 10%		CKJEK101K*
C140	Ceramic 0.01 μ F 50 V +80%–20%		CKJPK103Z*
C141	Electrolytic 10 μ F 16 V \pm 20%		CEACG106M*
C142	Mylar# 0.01 μ F 50 V \pm 5%		CQQMK103J*
C143	Electrolytic 0.22 μ F 50 V \pm 20%		CEACK224M*
C144	Electrolytic 47 μ F 16 V \pm 20%		CEACG476M*
C145	Electrolytic 4.7 μ F 25 V \pm 20%		CEACI475M*
C146	Ceramic 1000 pF 50 V \pm 10%		CKJEK102K*
C147	Mylar 0.047 μ F 50 V \pm 5%		CQQMK473J*
C148	Styrene 1000 pF 50 V \pm 5%		CNEHK102J*
C149	Electrolytic 0.47 μ F 50 V \pm 20%		CEACK474M*
C150	Electrolytic 0.47 μ F 50 V \pm 20%		CEACK474M*
C151	Electrolytic 1 μ F 50 V \pm 20%		CEACK105M*
C152	Electrolytic 1 μ F 50 V \pm 20%		CEACK105M*
C153	Mylar 0.01 μ F 50 V \pm 5% US/CA		CQQMK103J*
	Mylar 5600 pF 50 V \pm 5% AU		CQQMK562J*
C154	Mylar 0.01 μ F 50 V \pm 5% US/CA		CQQMK103J*
	Mylar 5600 pF 50 V \pm 5% AU		CQQMK562J*
C155	Mylar 2200 pF 50 V \pm 5%		CQQMK222J*
C156	Mylar 2200 pF 50 V \pm 5%		CQQMK222J*
C157	Electrolytic 1 μ F 50 V \pm 20%		CEACK105M*
C158	Electrolytic 1 μ F 50 V \pm 20%		CEACK105M*
C159	Electrolytic 1 μ F 50 V \pm 20%		CEACK105M*
C160	Electrolytic 1 μ F 50 V \pm 20%		CEACK105M*
C161	Electrolytic 220 μ F 16 V \pm 20%		CEACG227M*
C162	Ceramic 0.022 μ F 50 V +80%–20%		CKJPK223Z*
C163	Ceramic 0.022 μ F 50 V +80%–20%		CKJPK223Z*
C164	Ceramic 0.01 μ F 50 V +80%–20%		CKJPK103Z*
C165	Ceramic 0.01 μ F 50 V +80%–20%		CKJPK103Z*
C166	Electrolytic 220 μ F 6.3 V \pm 20%		CEACD227M*
C167	Electrolytic 0.047 μ F 5.5 V +80%–20%		CEZCCA06ZF or CEZCCA11ZF
C168	Ceramic 0.022 μ F 50 V +80%–20%		CKJPK223Z*
C301	Ceramic 100 pF 50 V \pm 10%		CKJEK101K*
C302	Ceramic 100 pF 50 V \pm 10%		CKJEK101K*
C303	Electrolytic 4.7 μ F 50 V \pm 20%		CEACK475M*
C304	Electrolytic 4.7 μ F 50 V \pm 20%		CEACK475M*
C305	Ceramic 1000 pF 50 V \pm 10%		CKJEK102K*
C306	Ceramic 1000 pF 50 V \pm 10%		CKJEK102K*
C307	Electrolytic 47 μ F 10 V \pm 20%		CEACE476M*
C308	Electrolytic 47 μ F 10 V \pm 20%		CEACE476M*
C309	Mylar 0.018 μ F 50 V \pm 50%		CQQMK183J*
C310	Mylar 0.018 μ F 50 V \pm 50%		CQQMK183J*
C311	Mylar 4700 pF 50 V \pm 5%		CQQMK472J*
C312	Mylar 4700 pF 50 V \pm 5%		CQQMK472J*
C313	Electrolytic 1 μ F 50 V \pm 20%		CEACK105M*

Note: # Mylar is a registered trademark of E.I. Du Pont de Nemours and Company, Inc.

Ref. No.	Description	RS Part No.	Mfr's Part No.
C314	Electrolytic 1 μ F 50 V \pm 20%		CEACK105M*
C315	Electrolytic 47 μ F 10 V \pm 20%		CEACE476M*
C316	Electrolytic 47 μ F 10 V \pm 20%		CEACE476M*
C317	Ceramic 0.022 μ F 50 V +80%-20%		CKJPK223Z*
C318	Ceramic 0.022 μ F 50 V +80%-20%		CKJPK223Z*
C319	Ceramic 0.022 μ F 50 V +80%-20%		CKJPK223Z*
C401	Ceramic 470 pF 50 V \pm 10%		CKJEK471K*
C402	Ceramic 470 pF 50 V \pm 10%		CKJEK471K*
C403	Ceramic 470 pF 50 V \pm 10%		CKJEK471K*
C404	Ceramic 470 pF 50 V \pm 10%		CKJEK471K*
C405	Ceramic 470 pF 50 V \pm 10%		CKJEK471K*
C406	Ceramic 470 pF 50 V \pm 10%		CKJEK471K*
C407	Ceramic 0.01 μ F 50 V +80%-20%		CKJPK103Z*
C408	Styrene 220 pF 50 V \pm 5%		CNEHK221J*
C409	Styrene 220 pF 50 V \pm 5%		CNEHK221J*
C410	Mylar 0.027 μ F 50 V \pm 5%		CQQMK273J*
C411	Mylar 0.027 μ F 50 V \pm 5%		CQQMK273J*
C412	Electrolytic Low Noise 0.47 μ F 50 V \pm 20%		CEKCK474ME
C413	Electrolytic Low Noise 0.47 μ F 50 V \pm 20%		CEKCK474ME
C414	Ceramic SL 10 pF 50 V \pm 5%		CCJVK100J*
C415	Ceramic SL 10 pF 50 V \pm 5%		CCJVK100J*
C416	Electrolytic 4.7 μ F 50 V \pm 20%		CEACK475M*
C417	Electrolytic 4.7 μ F 50 V \pm 20%		CEACK475M*
C418	Electrolytic 470 μ F 16 V \pm 20%		CEACG477M*
C419	Electrolytic 470 μ F 16 V \pm 20%		CEACG477M*
C501	Electrolytic 0.22 μ F 50 V \pm 20%		CEACK224M*
C502	Electrolytic 0.22 μ F 50 V \pm 20%		CEACK224M*
C503	Ceramic SL 680 pF 50 V \pm 5%		CCJVK681J*
C504	Ceramic SL 680 pF 50 V \pm 5%		CCJVK681J*
C505	Ceramic SL 7 pF 50 V \pm 0.5 pF		CCJVK7R0D*
C506	Ceramic SL 7 pF 50 V \pm 0.5 pF		CCJVK7R0D*
C507	Ceramic SL 24 pF 50 V \pm 5%		CCJVK240J*
C508	Ceramic SL 24 pF 50 V \pm 5%		CCJVK240J*
C509	Electrolytic 22 μ F 16 V \pm 20%		CEACG226M*
C510	Electrolytic 22 μ F 16 V \pm 20%		CEACG226M*
C511	Mylar 0.1 μ F 50 V \pm 10%		CQQMK104K*
C512	Mylar 0.1 μ F 50 V \pm 10%		CQQMK104K*
C513	Mylar 0.1 μ F 50 V \pm 10%		CQQMK104K*
C514	Mylar 0.1 μ F 50 V \pm 10%		CQQMK104K*
C515	Mylar 0.1 μ F 50 V \pm 10%		CQQMK104K*
C516	Mylar 0.1 μ F 50 V \pm 10%		CQQMK104K*
C517	Electrolytic 4.7 μ F 50 V \pm 20%		CEACK475M*
C518	Electrolytic 4.7 μ F 50 V \pm 20%		CEACK475M*
C519	Mylar 0.082 μ F 50 V \pm 5%		CQQMK823J*
C520	Mylar 0.082 μ F 50 V \pm 5%		CQQMK823J*
C521	Mylar 0.012 μ F 50 V \pm 5%		CQQMK123J*
C522	Mylar 0.012 μ F 50 V \pm 5%		CQQMK123J*
C523	Mylar 3300 pF 50 V \pm 5%		CQQMK332J*
C524	Mylar 3300 pF 50 V \pm 5%		CQQMK332J*

Ref. No.	Description				RS Part No.	Mfr's Part No.
C525	Mylar	0.018 μ F	50 V	$\pm 5\%$		CQQMK183J*
C526	Mylar	0.018 μ F	50 V	$\pm 5\%$		CQQMK183J*
C527	Electrolytic	4.7 μ F	50 V	$\pm 20\%$		CEACK475M*
C528	Electrolytic	4.7 μ F	50 V	$\pm 20\%$		CEACK475M*
C529	Ceramic SL	47 pF	50 V	$\pm 5\%$		CCJVK470J*
C530	Ceramic SL	47 pF	50 V	$\pm 5\%$		CCJVK470J*
C601	Electrolytic	33 μ F	35 V	$\pm 20\%$		CEACJ336M*
C602	Electrolytic	10 μ F	16 V	$\pm 20\%$		CEACG106M*
C603	Electrolytic	100 μ F	16 V	$\pm 20\%$		CEACG107M*
C604	Electrolytic	0.1 μ F	50 V	$\pm 20\%$		CEACK104M*
C605	Electrolytic	0.1 μ F	50 V	$\pm 20\%$		CEACK104M*
C701 #	Ceramic	0.022 μ F	50 V	+80%–20%		CKJPK223Z*
C702 #	Ceramic	0.022 μ F	50 V	+80%–20%		CKJPK223Z*
C703 #	Ceramic	0.022 μ F	50 V	+80%–20%		CKJPK223Z*
C704 #	Ceramic	0.022 μ F	50 V	+80%–20%		CKJPK223Z*
C705	Electrolytic	4700 μ F	35 V	$\pm 20\%$		CEACJ478M*
C706	Electrolytic	4700 μ F	35 V	$\pm 20\%$		CEACJ478M*
C707	Electrolytic	0.33 μ F	50 V	$\pm 20\%$		CEACK334M*
C708	Electrolytic	0.33 μ F	50 V	$\pm 20\%$		CEACK334M*
C709	Electrolytic	2.2 μ F	50 V	$\pm 20\%$		CEACK225M*
FILTERS						
CF101	Ceramic	SFE10.7MA5-A				392310150A
CF102	Ceramic	SFE10.7MA5-A				392310150A
CF103	Ceramic	PFB450JR3				391910100A
CONNECTORS						
CN101 *	Pin	5267-05A				194113280A
CN102 *	Pin	5267-03A				194113260A
CN103 *	Pin	5267-04A				194113270A
CN104	Eyelet	1.3 \times 2.5				HAE21325BA
CN105 *	Pin	5267-03A				194113260A
DIODES						
D101	Varicap	SVC-201SPA				SDVC00027-
D102	Varicap	SVC-201SPA				SDVC00027-
D103	Varicap	SVC-321SP-A2		or		SDVC00024A or
		SVC-321SP-B2				SDVC00024B
D104	Varicap	SVC-321SP-A2		or		SDVC00024A or
		SVC-321SP-B2				SDVC00024B
D105/106	Silicon	1N4148				SDSI00009- or
						SDSI00149- or
						SDSI00064- or
						SDSI00062-

Notes: # C701-C704 (Part No. CKJPK223Z*) rating changed from 50 V to 100 V for units with serial No. 010251 and after. New Part No. CKJPN223Z*.

* Pin connectors marked with * are direct PCB header type.

Ref. No.	Description	RS Part No.	Mfr's Part No.
D107	Silicon 1N4148		SDSI00009- or SDSI00149- or SDSI00064- or SDSI00062-
D108	Silicon 1N4148		SDSI00009- or SDSI00149- or SDSI00064- or SDSI00062-
D109	Silicon 1N4148		SDSI00009- or SDSI00149- or SDSI00064- or SDSI00062-
D110	Silicon 1N4148		SDSI00009- or SDSI00149- or SDSI00064- or SDSI00062-
D111	Silicon 1N4148		SDSI00009- or SDSI00149- or SDSI00064- or SDSI00062-
D112	Silicon 1N4148		SDSI00009- or SDSI00149- or SDSI00064- or SDSI00062-
D113	Silicon 1N4148		SDSI00009- or SDSI00149- or SDSI00064- or SDSI00062-
D114	Zener RD5.6E RANK: B2 UZ-5.6BC RANK: B	or	SZRD5.6EB2 or SZUZ5.6BCB
D401	Silicon 1N4148		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
D402	Silicon 1N4148		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
D403	Silicon 1N4148		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
D601	Silicon 1N4148		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
D602	Silicon 1N4148		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-

Ref. No.	Description	RS Part No.	Mfr's Part No.
D603	Silicon 1N4148		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
D604	Silicon 1N4148		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
D605	Silicon 1N4148		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
D606	Silicon 1N4148		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
⚠ D701	Silicon 1N5402		SDSI00192- or SDSI09014-
⚠ D702	Silicon 1N5402		SDSI00192- or SDSI09014-
⚠ D703	Silicon 1N5402		SDSI00192- or SDSI09014-
⚠ D704	Silicon 1N5402		SDSI00192- or SDSI09014-
D705	Silicon 1N4002		SDSI00007- or SDSI00036-
ICs			
IC101	KIA7358AP or TA7358AP or KIA6058AS		SIKA7358A- or SITA7358A- or SIKA6058AS
IC102	LA1265		SILA1265--
IC103	KA2261 or LA3361		SIKA2261-- or SILA3361--
IC301	NJM4558D(D)		SINM4558DD
IC401	MC14052BCP or NJU4052BD		SIMD4052B- or SINU4052B-
IC402	MC14066BCP or NJU4066BD		SIMD4066B- or SINU4066B-
IC501	μPC1188H		SIPC1188H-
IC502	μPC1188H		SIPC1188H-
⚠ IC701	NJM7812FA or MC7812CT		SINM7812FA or SIMC#0006-
⚠ IC702	NJM7912FA or MC7912CT		SINM7912FA or SIMCN12CT-

Ref. No.	Description	RS Part No.	Mfr's Part No.
JACKS			
JK101	Screw Terminal AK4-1055		192230040A
JK401	RCA AP4-0032A		192010260A
JK402	RCA AP4-0032A		192010260A
JK501	See Assembly, Headphone PCB		
JK502	Nip Terminal AU4-2045 HSP-114V-01		192330010A or 192399010A
COILS			
L101	Balun 300:75		145010120A
L102	Air HL5.0-3.5T		141110660A
L103	Air HL5.0-3.5T		141110660A
L104	Coil S10		143310520A
L105	Coil S7		143112510A
L106	Inductor 47 μ H K LAL03NA		142011470A
L501	Air HL6-18.5T		141100310A or
	HL6 \times 18.5 \times 0.6		141190210A
L502	Coil HL6-18.5T		141100310A or
	HL6 \times 18.5 \times 0.6		141190210A
TRANSISTORS			
Q101	2SC1674 (L) or		ST2C1674-L or
	2SC1674 (K) or		ST2C1674-K or
	2SC2786 (L) or		ST2C2786-L or
	S2C2786 (K) or		ST2C2786-K or
	2SC2999 (D) or		ST2C2999-D or
	2SC2999 (E)		ST2C2999-E
Q102	2SC930 (E) or		ST2C930--E or
	2SC1675 (K)		ST2C1675-K
Q103	2SC536 (G) or		ST2C536--G or
	KTC1815 (GR) or		STKC1815-G or
	2SC945 (P)		ST2C945--P
Q104	2SC536 (G) or		ST2C536--G or
	KTC1815 (GR) or		STKC1815-G or
	2SC945 (P)		ST2C945--P
Q105	2SA733 (P) or		ST2A733--P or
	KTA1015-G		STKA1015-G
Q106	2SA733 (P) or		ST2A733--P or
	KTA1015-G		STKA1015-G
Q107	2SC536 (G) or		ST2C536--G or
	2SC945 (P) or		ST2C945--P or
	KTC1815 (GR)		STKC1815-G
Q108	2SC536 (G) or		ST2C536--G or
	2SC945 (P) or		ST2C945--P or
	KTC1815 (GR)		STKC1815-G
Q109	2SC536 (G) or		ST2C536--G or
	2SC945 (P) or		ST2C945--P or
	KTC1815 (GR)		STKC1815-G

Ref. No.	Description	RS Part No.	Mfr's Part No.
Q110	2SC536 (G)	or	ST2C536--G or
	2SC945 (P)	or	ST2C945--P or
	KTC1815 (GR)		STKC1815-G
Q111	2SC536 (E)		ST2C536-E
Q112	2SC536 (E)		ST2C536-E
Q401	2SC945 (P)	or	ST2C945--P or
	2SC945 (K)	or	ST2C945--K or
	KTC1815 (GR)	or	STKC1815-G or
	KTC1815 (BL)		STKC1815-B
Q402	2SC945 (P)	or	ST2C945--P or
	2SC945 (K)	or	ST2C945--K or
	KTC1815 (GR)	or	STKC1815-G or
Q403	2SA733 (P)	or	ST2A733--P or
	2SA733 (K)	or	ST2A733--K or
	KTA1015-G		STKA1015-G
Q404	2SD1012 (G)	or	ST2D1012-G or
	2SD1012 (H)		ST2D1012-H
Q405	2SD1012 (G)	or	ST2D1012-G or
	2SD1012 (H)		ST2D1012-H
Q406	2SC945 (P)	or	ST2C945--P or
	2SC945 (K)	or	ST2C945--K or
	KTC1815 (GR)	or	STKC1815-G or
	KTC1815 (BL)		STKC1815-B
Q407	2SA733 (P)	or	ST2A733--P or
	2SA733 (K)	or	ST2A733--K or
	KTA1015-G		STKA1015-G
Q408	2SC945 (P)	or	ST2C945--P or
	2SC945 (K)	or	ST2C945--K or
	KTC1815 (GR)	or	STKC1815-G or
Q409	KTC1815 (BL)		STKC1815-B
	KTC2240 (BL)	or	STKC2240-B or
Q410	2SC1845 (E)		ST2C1845-E
	KTC2240 (BL)	or	STKC2240-B or
Q601	2SC1845 (E)		ST2C1845-E
	2SC945 (P)	or	ST2C945--P or
Q602	KTC1815 (GR)		STKC1815-G
	2SC945 (P)	or	ST2C945--P or
Q603	KTC1815 (GR)		STKC1815-G
	2SA733 (P)	or	ST2A733--P or
Q604	KTA1015-G		STKA1015-G
	2SC945 (P)	or	ST2C945--P or
Q605	KTC1815 (GR)		STKC1815-G
Q605	Sée Assembly, Transistor PCB		
Q606	2SC945 (P)	or	ST2C945--P or
	KTC1815 (GR)		STKC1815-G

Ref. No.	Description				RS Part No.	Mfr's Part No.
RESISTORS						
R101	Carbon	100 ohm	1/4W	± 5%		RCSQP101J*
R102	Carbon	100 kohm	1/4W	± 5%		RCSQP104J*
R103	Carbon	220 ohm	1/4W	± 5%		RCSQP221J*
R104	Carbon	33 kohm	1/4W	± 5%		RCSQP333J*
R105	Carbon	5.6 ohm	1/4W	± 5%		RCSQP5R6J*
R106	Carbon	10 kohm	1/4W	± 5%		RCSQP103J*
R107	Carbon	120 kohm	1/4W	± 5%		RCSQP124J*
R108	Carbon	100 ohm	1/4W	± 5%		RCSQP101J*
R109	Carbon	470 ohm	1/4W	± 5%		RCSQP471J*
R110	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R111	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R112	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R113	Carbon	820 ohm	1/4W	± 5%		RCSQP821J*
R114	Carbon	2.2 kohm	1/4W	± 5%		RCSQP222J*
R115	Carbon	330 ohm	1/4W	± 5%		RCSQP331J*
R116	Carbon	1.8 kohm	1/4W	± 5%		RCSQP182J*
R117	Carbon	330 ohm	1/4W	± 5%		RCSQP331J*
R118	Carbon	470 ohm	1/4W	± 5%		RCSQP471J*
R119	Carbon	390 ohm	1/4W	± 5%		RCSQP391J*
R120	Carbon	100 kohm	1/4W	± 5%		RCSQP104J*
R121	Carbon	10 kohm	1/4W	± 5%		RCSQP103J*
R122	Carbon	470 ohm	1/4W	± 5%		RCSQP471J*
R123	Carbon	68 kohm	1/4W	± 5%		RCSQP683J*
R124	Carbon	1.5 kohm	1/4W	± 5%		RCSQP152J*
R125	Carbon	3 kohm	1/4W	± 5%		RCSQP302J*
R126	Carbon	10 kohm	1/4W	± 5%		RCSQP103J*
R127	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R128	Carbon	10 kohm	1/4W	± 5%		RCSQP103J*
R129	Carbon	3.9 kohm	1/4W	± 5%		RCSQP392J*
R130	Carbon	22 kohm	1/4W	± 5%		RCSQP223J*
R131	Carbon	100 ohm	1/4W	± 5%		RCSQP101J*
R132	Carbon	470 ohm	1/4W	± 5%		RCSQP471J*
R133	Carbon	4.3 kohm	1/4W	± 5%		RCSQP432J*
R134	Carbon	10 kohm	1/4W	± 5%		RCSQP103J*
R135	Carbon	56 ohm	1/4W	± 5%		RCSQP560J*
R136	Carbon	91 ohm	1/4W	± 5%		RCSQP910J*
R137	Carbon	12 kohm	1/4W	± 5%		RCSQP123J*
R138	Carbon	47 kohm	1/4W	± 5%		RCSQP473J*
R139	Carbon	220 kohm	1/4W	± 5%		RCSQP224J*
R140	Carbon	1.5 kohm	1/4W	± 5%		RCSQP152J*
R141	Carbon	22 kohm	1/4W	± 5%		RCSQP223J*
R142	Carbon	1.5 kohm	1/4W	± 5%		RCSQP152J*
R143	Carbon	2.2 kohm	1/4W	± 5%		RCSQP222J*
R144	Carbon	47 kohm	1/4W	± 5%		RCSQP473J*
R145	Carbon	22 kohm	1/4W	± 5%		RCSQP223J*
R146	Carbon	22 kohm	1/4W	± 5%		RCSQP223J*
R147	Carbon	10 kohm	1/4W	± 5%		RCSQP103J*
R148	Carbon	820 ohm	1/4W	± 5%		RCSQP821J*

Ref. No.	Description				RS Part No.	Mfr's Part No.
R149	Carbon	10 kohm	1/4W	± 5%		RCSQP103J*
R150	Carbon	6.8 kohm	1/4W	± 5%		RCSQP682J*
R151	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R152	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R153	Carbon	430 ohm	1/4W	± 5%		RCSQP431J*
		470 ohm	1/4W	± 5%		RCSQP471J*
		510 ohm	1/4W	± 5%		RCSQP511J*
R154	Carbon	5.6 kohm	1/4W	± 5%		RCSQP562J*
R155	Carbon	5.6 kohm	1/4W	± 5%		RCSQP562J*
R156	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R157	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R158	Carbon	1.2 Mohm	1/4W	± 5%		RCSQP125J*
R159	Carbon	1.2 Mohm	1/4W	± 5%		RCSQP125J*
R160	Carbon	3.3 kohm	1/4W	± 5%		RCSQP332J*
R161	Carbon	3.3 kohm	1/4W	± 5%		RCSQP332J*
R162	Carbon	820 ohm	1/4W	± 5%		RCSQP821J*
R163	Carbon	820 ohm	1/4W	± 5%		RCSQP821J*
R164	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R165	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R166	Carbon	2.2 kohm	1/4W	± 5%		RCSQP222J*
R167	Carbon	2.2 kohm	1/4W	± 5%		RCSQP222J*
R168	Carbon	100 kohm	1/4W	± 5%		RCSQP104J*
R169	Carbon	100 kohm	1/4W	± 5%		RCSQP104J*
R170	Carbon	330 ohm	1/4W	± 5%		RCSQP331J*
R171	Carbon	22 kohm	1/4W	± 5%		RCSQP223J*
R172	Carbon	47 kohm	1/4W	± 5%		RCSQP473J*
R173	Carbon	390 ohm	1/2W	± 5%		RCSHP391J*
R174	Carbon	2.2 kohm	1/4W	± 5%		RCSQP222J*
R175	Carbon	220 kohm	1/4W	± 5%		RCSQP224J*
R301	Carbon	2.2 kohm	1/4W	± 5%		RCSQP222J*
R302	Carbon	2.2 kohm	1/4W	± 5%		RCSQP222J*
R303	Carbon	100 kohm	1/4W	± 5%		RCSQP104J*
R304	Carbon	100 kohm	1/4W	± 5%		RCSQP104J*
R305	Carbon	100 kohm	1/4W	± 5%		RCSQP104J*
R306	Carbon	100 kohm	1/4W	± 5%		RCSQP104J*
R307	Carbon	330 ohm	1/4W	± 5%		RCSQP331J*
R308	Carbon	330 ohm	1/4W	± 5%		RCSQP331J*
R309	Carbon	150 kohm	1/4W	± 5%		RCSQP154J*
R310	Carbon	150 kohm	1/4W	± 5%		RCSQP154J*
R311	Carbon	15 kohm	1/4W	± 5%		RCSQP153J*
R312	Carbon	15 kohm	1/4W	± 5%		RCSQP153J*
R313	Carbon	120 kohm	1/4W	± 5%		RCSQP124J*
R314	Carbon	120 kohm	1/4W	± 5%		RCSQP124J*
R315	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R316	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R317	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R318	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R401	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R402	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R403	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*

Ref. No.	Description				RS Part No.	Mfr's Part No.
R404	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R405	Carbon	120 kohm	1/4W	± 5%		RCSQP124J*
R406	Carbon	120 kohm	1/4W	± 5%		RCSQP124J*
R407	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R408	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R409	Carbon	120 kohm	1/4W	± 5%		RCSQP124J*
R410	Carbon	120 kohm	1/4W	± 5%		RCSQP124J*
R411	Carbon	56 kohm	1/4W	± 5%		RCSQP563J*
R412	Carbon	56 kohm	1/4W	± 5%		RCSQP563J*
R413	Carbon	330 kohm	1/4W	± 5%		RCSQP334J*
R414	Carbon	330 kohm	1/4W	± 5%		RCSQP334J*
R415	Carbon	22 kohm	1/4W	± 5%		RCSQP223J*
R416	Carbon	10 kohm	1/4W	± 5%		RCSQP103J*
R417	Carbon	22 kohm	1/4W	± 5%		RCSQP223J*
R418	Carbon	22 kohm	1/4W	± 5%		RCSQP223J*
R419	Carbon	10 kohm	1/4W	± 5%		RCSQP103J*
R420	Carbon	22 kohm	1/4W	± 5%		RCSQP223J*
R421	Carbon	10 kohm	1/4W	± 5%		RCSQP103J*
R422	Carbon	22 kohm	1/4W	± 5%		RCSQP223J*
R423	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R424	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R425	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R426	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R427	Carbon	1 Mohm	1/4W	± 5%		RCSQP105J*
R428	Carbon	1 Mohm	1/4W	± 5%		RCSQP105J*
R429	Carbon	27 kohm	1/4W	± 5%		RCSQP273J*
R430	Carbon	27 kohm	1/4W	± 5%		RCSQP273J*
R431	Carbon	470 ohm	1/4W	± 5%		RCSQP471J*
R432	Carbon	470 ohm	1/4W	± 5%		RCSQP471J*
R433	Carbon	1.8 Mohm	1/4W	± 5%		RCSQP185J*
R434	Carbon	1.8 Mohm	1/4W	± 5%		RCSQP185J*
R435	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R436	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R437	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R438	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R439	Carbon	2.2 kohm	1/4W	± 5%		RCSQP222J*
R440	Carbon	2.2 kohm	1/4W	± 5%		RCSQP222J*
R441	Carbon	560 ohm	1/4W	± 5%		RCSQP561J*
R442	Carbon	560 ohm	1/4W	± 5%		RCSQP561J*
R443	Carbon	2.2 kohm	1/4W	± 5%		RCSQP222J*
R501	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R502	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R503	Carbon	68 kohm	1/4W	± 5%		RCSQP683J*
R504	Carbon	68 kohm	1/4W	± 5%		RCSQP683J*
R505	Carbon	3.9 kohm	1/4W	± 5%		RCSQP392J*
R506	Carbon	3.9 kohm	1/4W	± 5%		RCSQP392J*
R507	Carbon	100 kohm	1/4W	± 5%		RCSQP104J*
R508	Carbon	100 kohm	1/4W	± 5%		RCSQP104J*
R509	Carbon	100 kohm	1/4W	± 5%		RCSQP104J*
R510	Carbon	100 kohm	1/4W	± 5%		RCSQP104J*

Ref. No.	Description				RS Part No.	Mfr's Part No.
R511	Carbon	10 ohm	1/2W	± 5%		RCSHP100J*
R512	Carbon	10 ohm	1/2W	± 5%		RCSHP100J*
R513	M-Oxide	10 ohm	1W	± 5%		RX01H100J*
R514	M-Oxide	10 ohm	1W	± 5%		RX01H100J*
R515	Carbon	15 kohm	1/4W	± 5%		RCSQP153J*
R516	Carbon	15 kohm	1/4W	± 5%		RCSQP153J*
R517	Carbon	2.7 kohm	1/4W	± 5%		RCSQP272J*
R518	Carbon	2.7 kohm	1/4W	± 5%		RCSQP272J*
R519	Carbon	150 kohm	1/4W	± 5%		RCSQP154J*
R520	Carbon	150 kohm	1/4W	± 5%		RCSQP154J*
R521	Carbon	2.4 kohm	1/4W	± 5%		RCSQP242J*
R522	Carbon	2.4 kohm	1/4W	± 5%		RCSQP242J*
R523	Carbon	15 kohm	1/4W	± 5%		RCSQP153J*
R524	Carbon	15 kohm	1/4W	± 5%		RCSQP153J*
R525	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R526	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R527	Carbon	910 ohm	1/4W	± 5%		RCSQP911J*
R528	Carbon	910 ohm	1/4W	± 5%		RCSQP911J*
R529	M-Oxide	220 ohm	1W	± 5%		RX01H221J*
R530	M-Oxide	220 ohm	1W	± 5%		RX01H221J*
R601	Carbon	33 kohm	1/4W	± 5%		RCSQP333J*
R602	Carbon	39 kohm	1/4W	± 5%		RCSQP393J*
R603	Carbon	330 kohm	1/4W	± 5%		RCSQP334J*
R604	Carbon	47 kohm	1/4W	± 5%		RCSQP473J*
R605	Carbon	470 kohm	1/4W	± 5%		RCSQP474J*
R606	Carbon	1 kohm	1/4W	± 5%		RCSQP102J*
R607	Carbon	4.7 kohm	1/4W	± 5%		RCSQP472J*
R608	Carbon	15 kohm	1/4W	± 5%		RCSQP153J*
R609	Carbon	22 kohm	1/4W	± 5%		RCSQP223J*
R610	Carbon	100 kohm	1/4W	± 5%		RCSQP104J*
R611	Carbon	12 kohm	1/4W	± 5%		RCSQP123J*
R612	Carbon	300 ohm	1/4W	± 5%		RCSQP301J*
R613	Carbon	110 ohm	1/4W	± 5%		RCSQP111J*
R614	Carbon	15 kohm	1/4W	± 5%		RCSQP153J*
R615	Carbon	47 kohm	1/4W	± 5%		RCSQP473J*
R616	Carbon	15 kohm	1/4W	± 5%		RCSQP153J*
R617	Carbon	10 kohm	1/4W	± 5%		RCSQP103J*
R618	Carbon	47 kohm	1/4W	± 5%		RCSQP473J*
R701	Carbon	130 ohm	1/4W	± 5%		RCSQP131J*
R702	Carbon	130 ohm	1/4W	± 5%		RCSQP131J*
R703	M-Oxide	390 ohm	1W	± 5%		RX01H391J*
COILS						
T101	IFT	10.7 MHz S7				133010430A
T102	IFT	450 kHz S7				131510060A
T103	IFT	10.7 MHz S7				133010440A







Ref. No.	Description	RS Part No.	Mfr's Part No.
TRIMMERS			
TC101 TC102	TZ03R200FR169 TZ03R200FR169		154099010A 154099010A
POTENTIOMETERS			
VR101	Semi-Fixed 10KB RVF6P01A KVSF637A 10KB	or	177310080A 177390100A
VR102	Semi-Fixed 10KB RVF6P01A KVSF637A 10KB	or	177310080A 177390100A
VR401	Rotary 250KB × 2 RK14K L17.5		171610700A
VR402	Rotary 250KW RK11K L17.5		171211250A
VR501	Rotary 100KC × 2 RK14K L17.5		171610680A
VR502	Rotary 100KC × 2 RK14K L17.5		171610680A
MISCELLANEOUS			
CN101 ★	Terminal Cord 5264-05 360 mm		316090211A
CN102 ★	Terminal Cord 5264-03 230 mm		316090231A
CN103 ★	Terminal Cord 5264-04 210 mm		316090221A
CN104	See P.31		
CN105 ★	Terminal Cord 5264-03 90 mm		316090241A
	Pin Terminal S1.08 × 15 C7701P DEGR	or	194403142A 194403140A
	PCB Assembly, Display consists of the following:	US CA AU	MH00663 MH00720 MH00840
CAPACITORS			
C201	Ceramic 0.01 μF 50V +80%–20%		CKJPK103Z*
C202	Ceramic 0.01 μF 50V +80%–20%		CKJPK103Z*
C203	Electrolytic 100 μF 6.3V ± 20%		CEDCD107M*
C204	Ceramic NPO 27 pF 50 V ± 5%		CCJBK270J*
C205	Ceramic NPO 56 pF 50 V ± 5%		CCJBK560J*
C206	Ceramic 1000 pF 50 V ± 10%		CKJEK102K*
C207	Ceramic 1000 pF 50 V ± 10%		CKJEK102K*
C208	Ceramic 1000 pF 50 V ± 10%		CKJEK102K*
DIODES			
D201	Silicon 1N4148		SDSI00009- SDSI00062- SDSI00064- SDSI00149- or or or

Note: ★ Terminal cords marked with ★ are flexible cords male housing type.

Ref. No.	Description	RS Part No.	Mfr's Part No.
D202	Silicon 1N4148		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
D203	Silicon 1N4148		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
D204	Silicon 1N4148		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
D205	Silicon 1N4148		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
D206	Silicon 1N4148 AU		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
D207	Silicon 1N4148 AU		SDSI00009- or SDSI00062- or SDSI00064- or SDSI00149-
IC			
IC201	μPD1708-AG-891-03		SICV1009--
COIL			
L201	Inductor 220 μH K LAL03 NA		142011550A
TRANSISTORS			
Q201	2SA733 (P) or KTA1015-G		ST2A733--P or STKA1015-G
Q202	2SA733 (P) or KTA1015-G		ST2A733--P or STKA1015-G
Q203	2SA733 (P) or KTA1015-G		ST2A733--P or STKA1015-G
RESISTORS			
R201	Carbon 1.3 kohm 1/4W ± 5%		RCSQP132J*
R202	Carbon 22 kohm 1/4W ± 5%		RCSQP223J*
R203	Carbon 22 kohm 1/4W ± 5%		RCSQP223J*
R204	Carbon 47 kohm 1/4W ± 5%		RCSQP473J*
R205	Carbon 47 kohm 1/4W ± 5%		RCSQP473J*
R206	Carbon 47 kohm 1/4W ± 5%		RCSQP473J*
R207	Carbon 47 kohm 1/4W ± 5%		RCSQP473J*

Ref. No.	Description	RS Part No.	Mfr's Part No.
R208	Carbon 47 kohm 1/4W ± 5%		RCSQP473J*
R209	Carbon 47 kohm 1/4W ± 5%		RCSQP473J*
R210	Carbon 10 kohm 1/4W ± 5%		RCSQP103J*
R211	Carbon 10 kohm 1/4W ± 5%		RCSQP103J*
SWITCHES			
SW201	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW202	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW203	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW204	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW205	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW206	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW207	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW208	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW209	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW210	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW211	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW212	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW213	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW214	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW215	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW216	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
SW217	Key SKHHAK0002 KSM0612A	or	187010620A 187090120A
CRYSTAL			
X201	4.500 MHz HC-18/U		391012100A or 391000800A
	PCB Assembly, Headphone consists of the following:		MH00662
JK501	Jack 6.3 mm HTJ-064-04A		191010350A

Ref. No.	Description	RS Part No.	Mfr's Part No.
	PCB Assembly, Transistor consists of the following:		MH00659
C606 Q605	Capacitor, Ceramic, 0.022 μ F 50 V +80%–20% Transistor 2SC1815 (GR) or KTC1815 (GR)		CKJPK223Z* ST2C1815-G or STKC1815-G

	PCB Assembly, Power SW consists of the following:	US/CA AU	MH00660 MH00839
CAPACITORS			
 C801 C802	Line Pass Electrolytic	10 μ F 400 V +100–0% 1 μ F 50 V \pm 20%	CLUCE10090 CEACK105M*
DIODE			
D801	Silicon	IN4002	SDSI00007- or SDSI00036-
FUSE			
 F801	250V 2.5A 250V 1.6A	US/CA AU	251010090A or 251000080A or 251010630A 251210360A or 251210760A
TRANSISTOR			
Q801	2SC1815 (Y) or 2SC1815 (GR) or KTC1815 (Y) or KTC1815 (GR)		ST2C1815-Y or ST2C1815-G or STKC1815-Y or STKC1815-G
RESISTORS			
 R801  R802  R803 R804 R805	Carbon Carbon Carbon Carbon Carbon	1.8 Mohm 1/2W \pm 5% 1.8 Mohm 1/2W \pm 5% 330 kohm 1/4W \pm 5% 1 Mohm 1/4W \pm 5% 2.2 Mohm 1/2W \pm 5% 5.6 Mohm 2W \pm 5%	US/CA AU RCSHP185J* RCSHP185J* RCSQP334J* RCSQP105J* RCSHP225J* or RX02P565J*
SWITCH			
 SW801	Push SDDL B1 TV-3 PCB-TYPE		182111200A

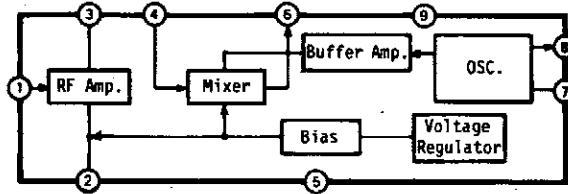
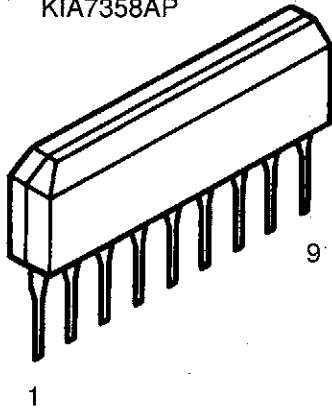
Ref. No.	Description	RS Part No.	Mfr's Part No.
MISCELLANEOUS			
	Clip, Fuse	US/CA AU	197303080A 197303320C
	Terminal, Pin C7701P DEGR S1.08 x 15 IPS-5007	or or	194403140A or 194403142A or 194410110A

	PCB Assembly, LED consists of the following:		MH00661
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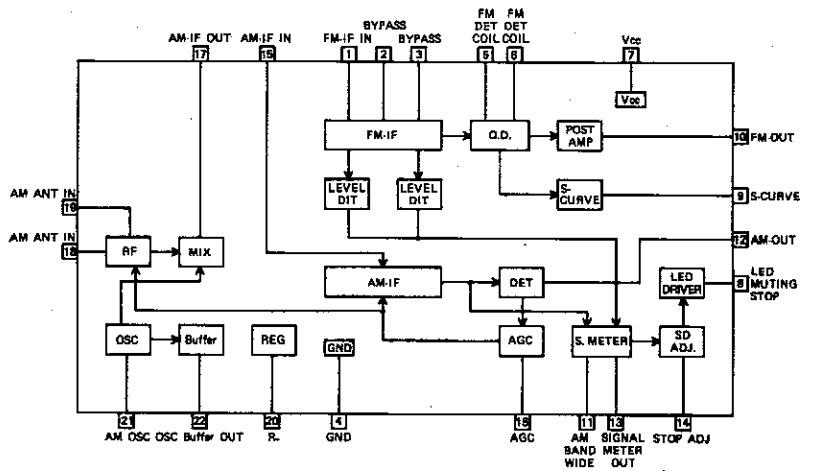
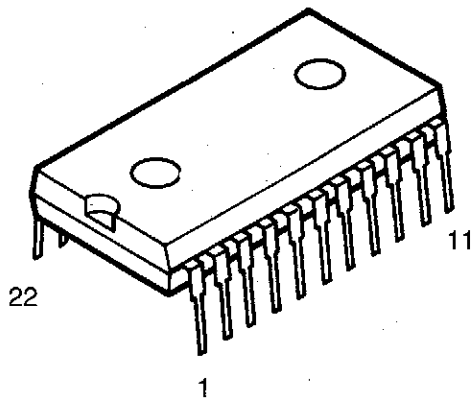
LEDS			
LD801	SEL4725K		SL-Y00015-
LD802	SEL4725K		SL-Y00015-
LD803	SEL4725K		SL-Y00015-
LD804	SEL4725K		SL-Y00015-
LD805	SEL4725K		SL-Y00015-
LD806	SEL4725K		SL-Y00015-
LD807	SEL4725K		SL-Y00015-
LD808	SEL4725K		SL-Y00015-
LD809	SEL4725K		SL-Y00015-
LD810	SEL4725K		SL-Y00015-

IC AND TRANSISTOR LEAD IDENTIFICATION AND IC INTERNAL DIAGRAM

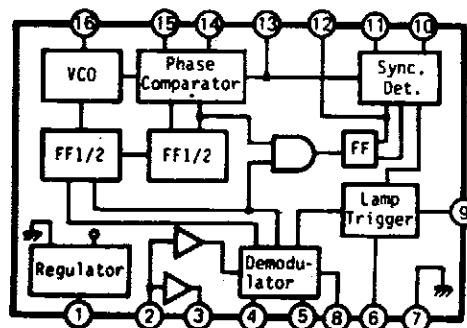
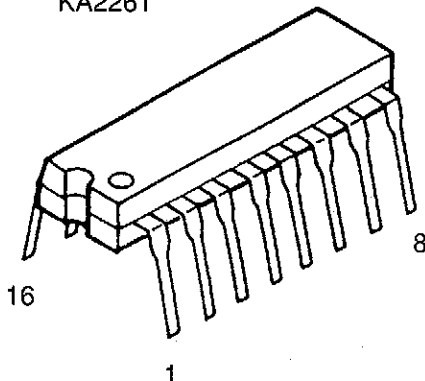
IC101: TA7358AP
KIA7358AP



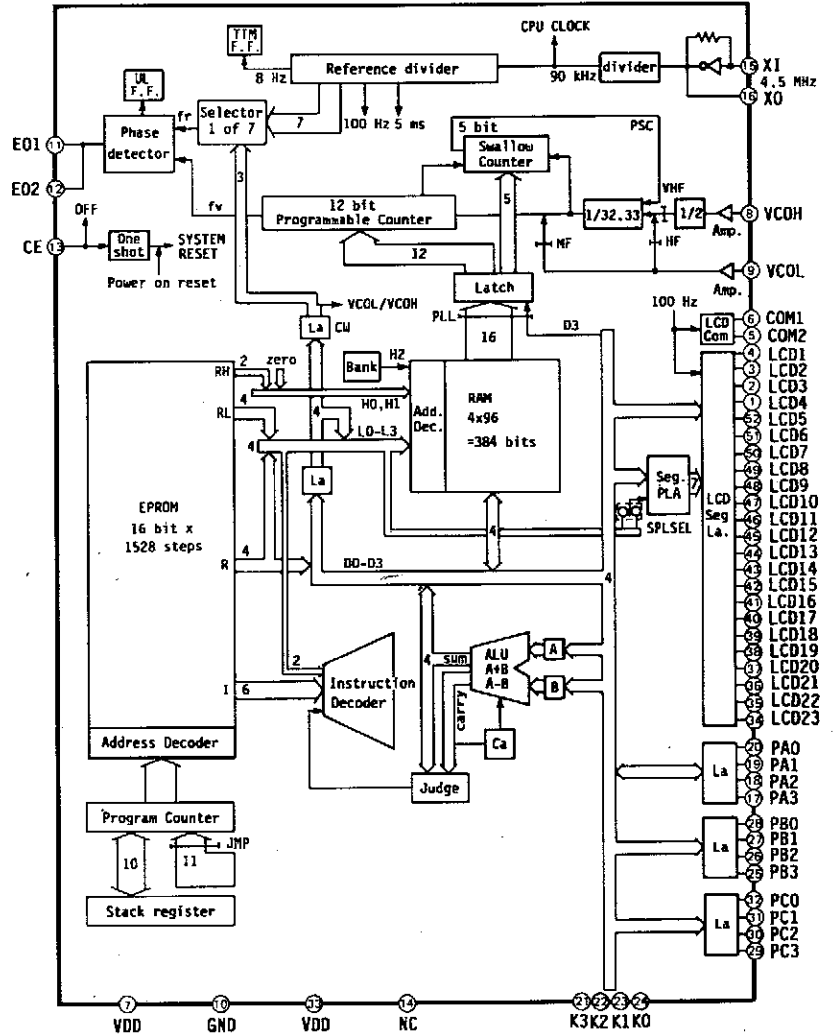
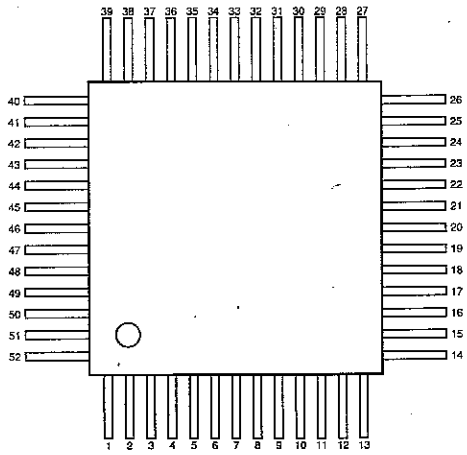
IC102: LA1265



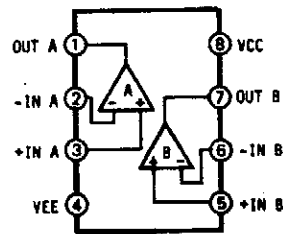
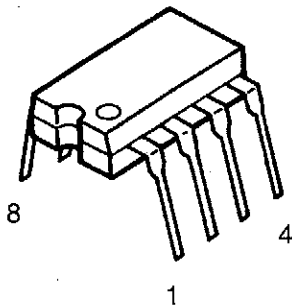
IC103: LA3361
KA2261



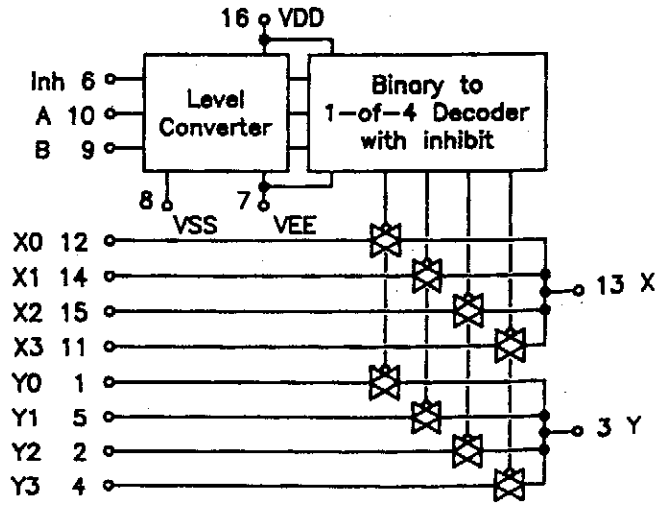
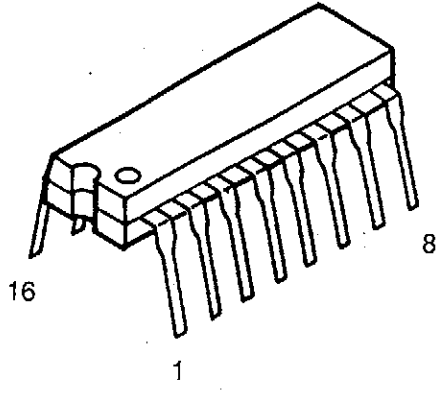
IC201: μ PD1708-AG-891-03



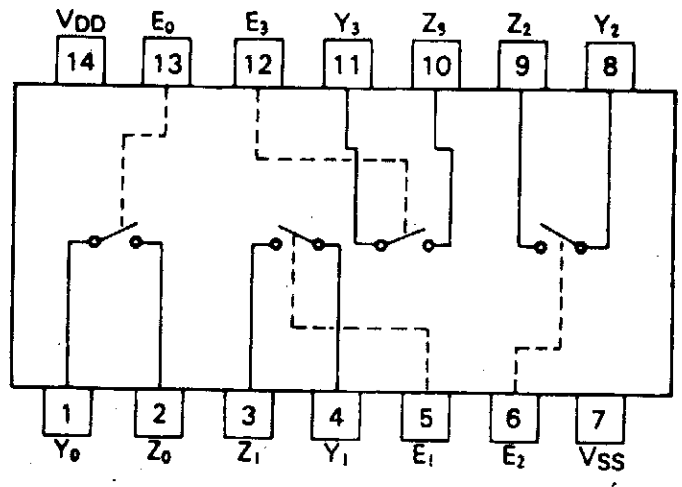
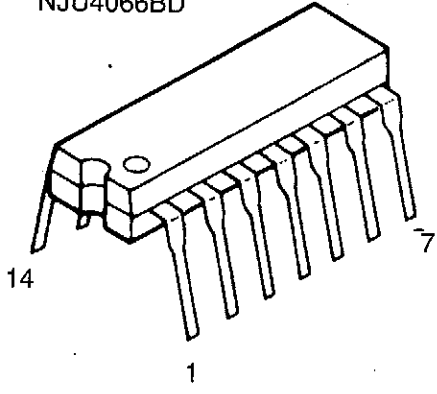
IC301: NJM4558D



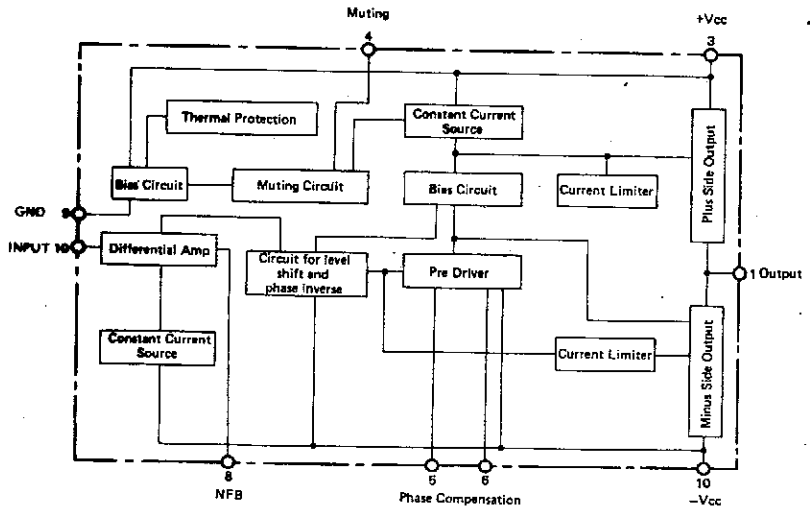
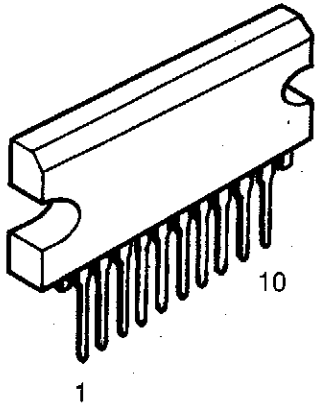
IC401: MC14052BCP
NJU4052BD



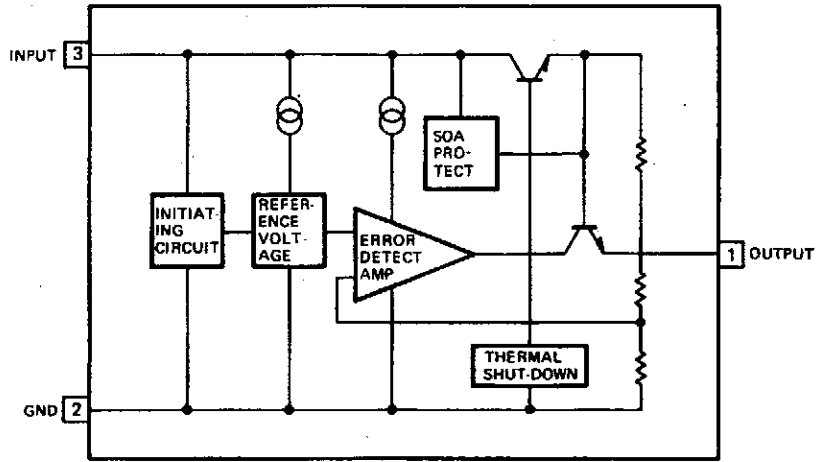
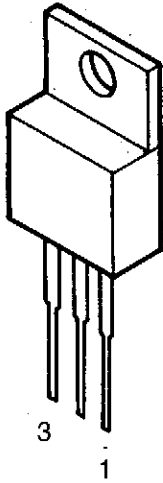
IC402: MC14066BCP
NJU4066BD



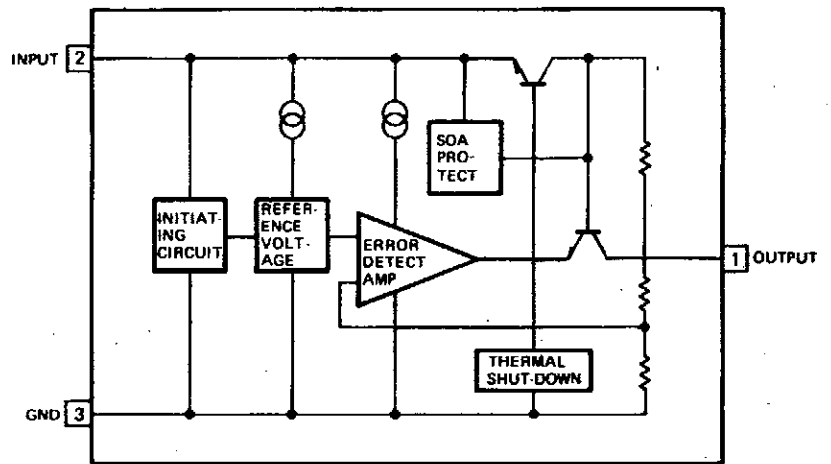
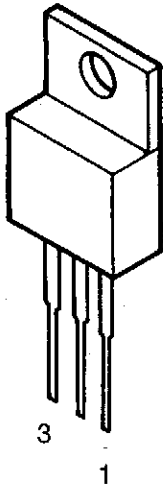
IC501/502: μ PC1188H



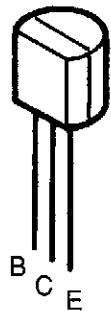
IC701: MC7812CT
NJM7812A



IC702: MC7912CT
NJM7912A



- | | |
|---------|---------|
| 2SA733 | 2SC1815 |
| KTA1015 | KTC1815 |
| 2SC536 | KTC2240 |
| 2SC930 | 2SC1845 |
| 2SC945 | 2SC2786 |
| 2SC1674 | 2SC2999 |
| 2SC1675 | |



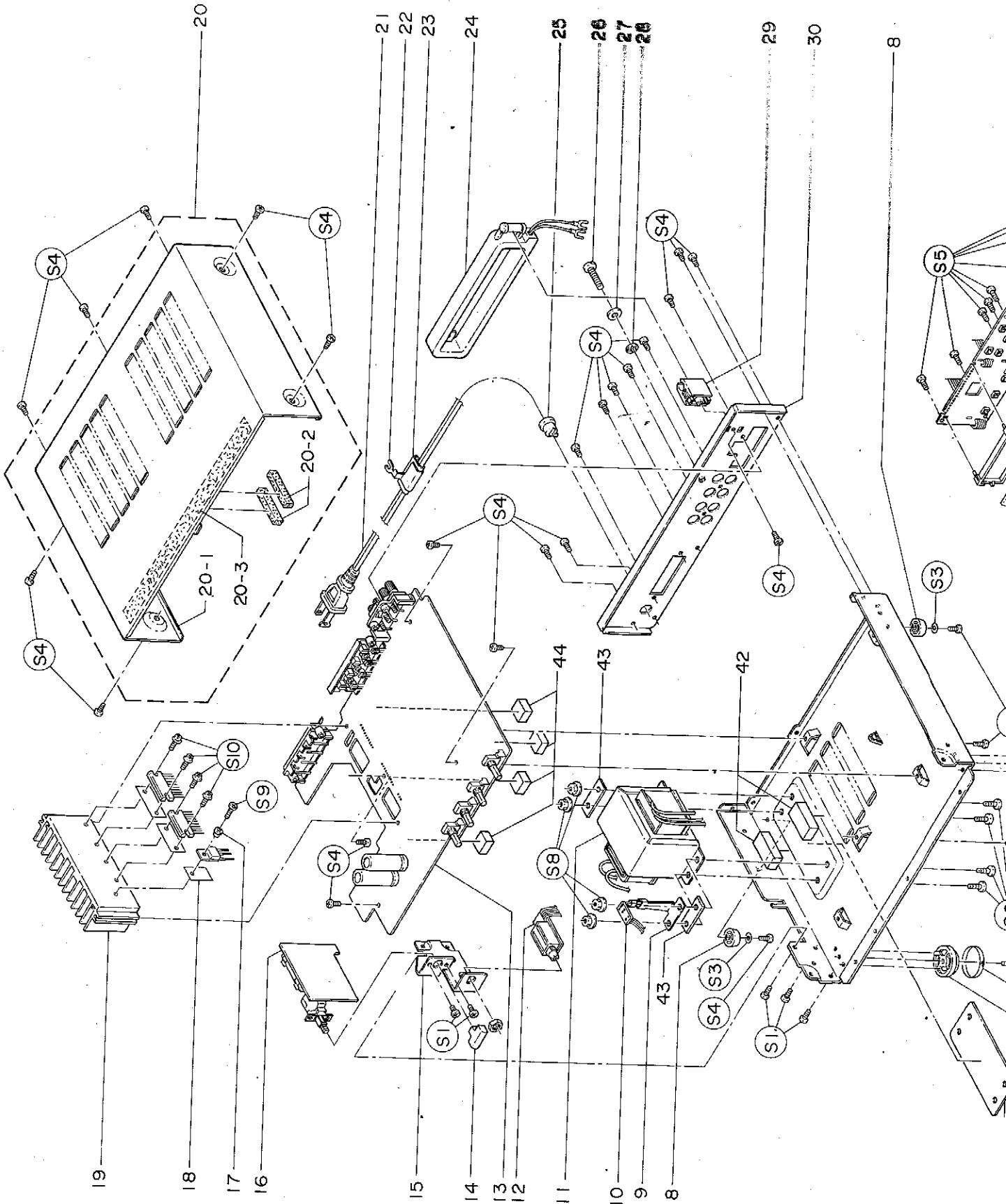
2SD1012



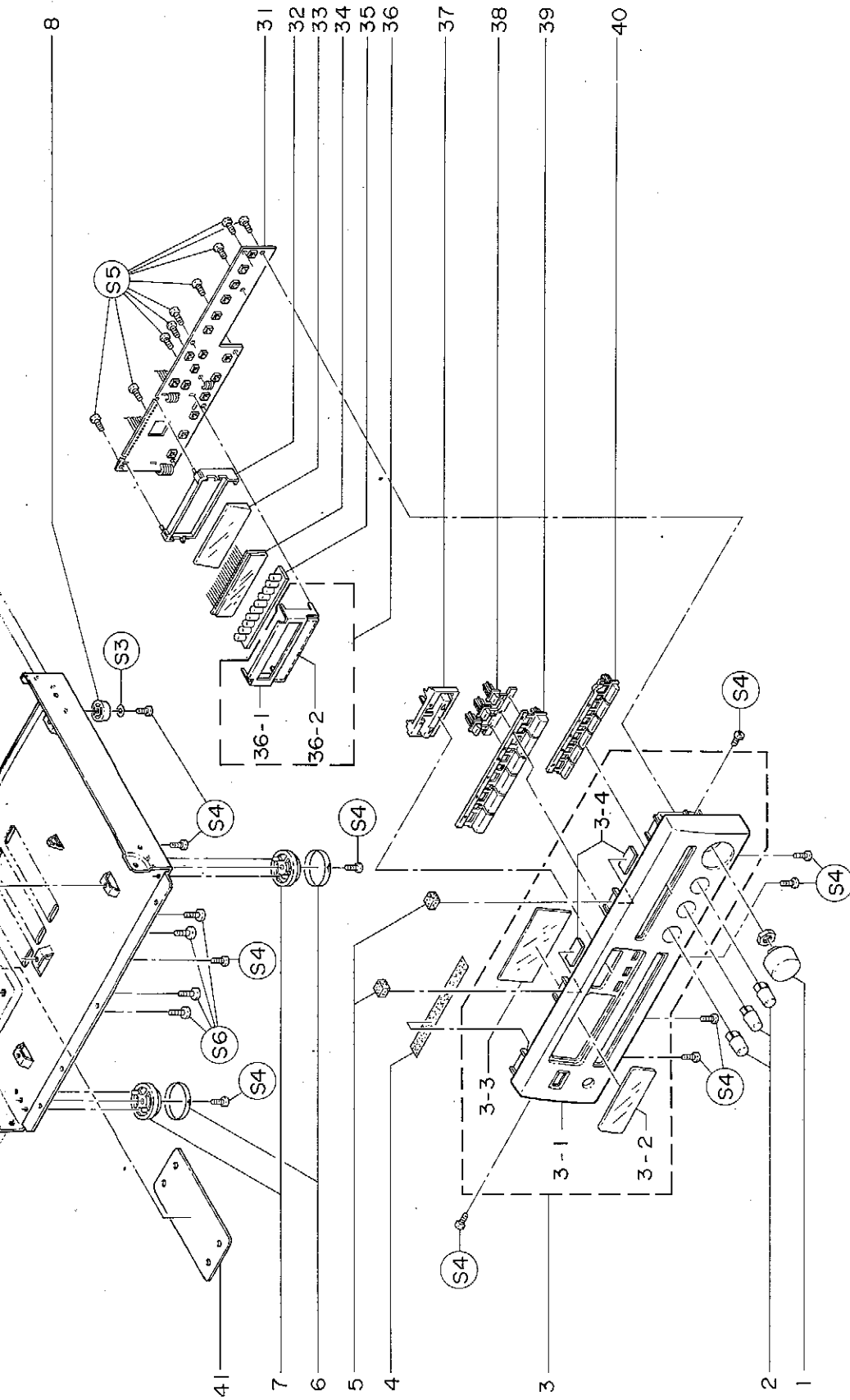
EXPLODED VIEW PARTS LIST

Ref. No.	Description	RS Part No.	Mfr's Part No.
1	Knob 21, Volume		652110380A
2	Knob 21, Rotary		652110370A
3	Assembly, Panel, Front	US CA AU	MH00664 MH00721 MH00841
3-1	Panel, Front	US CA/AU	701010340A 701010350A
3-2	Plate, Front		711210490A
3-3	Blind		851213040A
3-4	Cushion 3m CR		851099060A
4	Blind, Himelon		851213070A
5	Cushion, NEOP Sponge, for Front Panel		851012620A
6	Foot, Poron, HH48		608010720A
7	Foot, Poron, HH48		608010710A
8	Foot, Back, Ultrasen, J65		608004920A
9	Holder, SUS-304		411117000A
10	Assembly, PCB, Transistor		MH00659
11	Transformer, Power, EI-66, 120V (T801) 240V (T801)	US/CA AU	10103661SA 10103671SA
12	Assembly, PCB, Headphone		MH00662
13	Assembly, PCB, Main	US CA	MH00658 MF00719
14	Knob 50, Power		655010800A
15	Holder, Switch, Power		411116800A
16	Assembly, PCB, Switch, Power		MH00660
17	Grommet for IC701		481110120A
18	Sheet, Insulation for IC701		483011470A
19	Heat Sink		471110190A
20	Assembly, Cabinet, Top		MH00665
20-1	Cabinet, Top		601212580A
20-2	Cushion, NEOP Sponge for Top Cabinet		851012610A
20-3	Spacer, Himelon		852099030A
21	Cord, AC, KKP-10W L6.5F BLK APC-7W L6.5F BLK KP-560 7F BLK	or US/CA AU	311030030A 311010810A 311010430A
22	Holder for FM Line Antenna	US/CA AU	411012970A 411101530A
23	Sheet, Insulation, Fiber, for FM Line Antenna	US/CA AU	483013270A 483013280A
24	Assembly, Antenna, Loop, AM (Non-repairable) Loop, Antenna, LA-50 Holder, ABS 94HB Holder, ABS 94HB Wire, UL-1007 D/L #20		115090010A

EXPLODED VIEW / DISASSEMBLY INS



SEMBLY INSTRUCTIONS



Disassembly Instructions:

1. Remove seven screws S4 from the top cabinet assembly 20, then slide off the top cabinet.
2. To remove main PCB assembly 13:
 - 1) Remove a knob 1 and its nut and three knobs 2 from the front panel assembly 3.
 - 2) Remove three screws S1, which secure the power switch holder 15, from the side of the chassis.
 - 3) Remove five screws S4 from the back panel 30.
 - 4) Remove three screws S4 from the main PCB assembly 13.
3. To remove the display PCB 31 from the front panel assembly 3, remove nine screws S5.

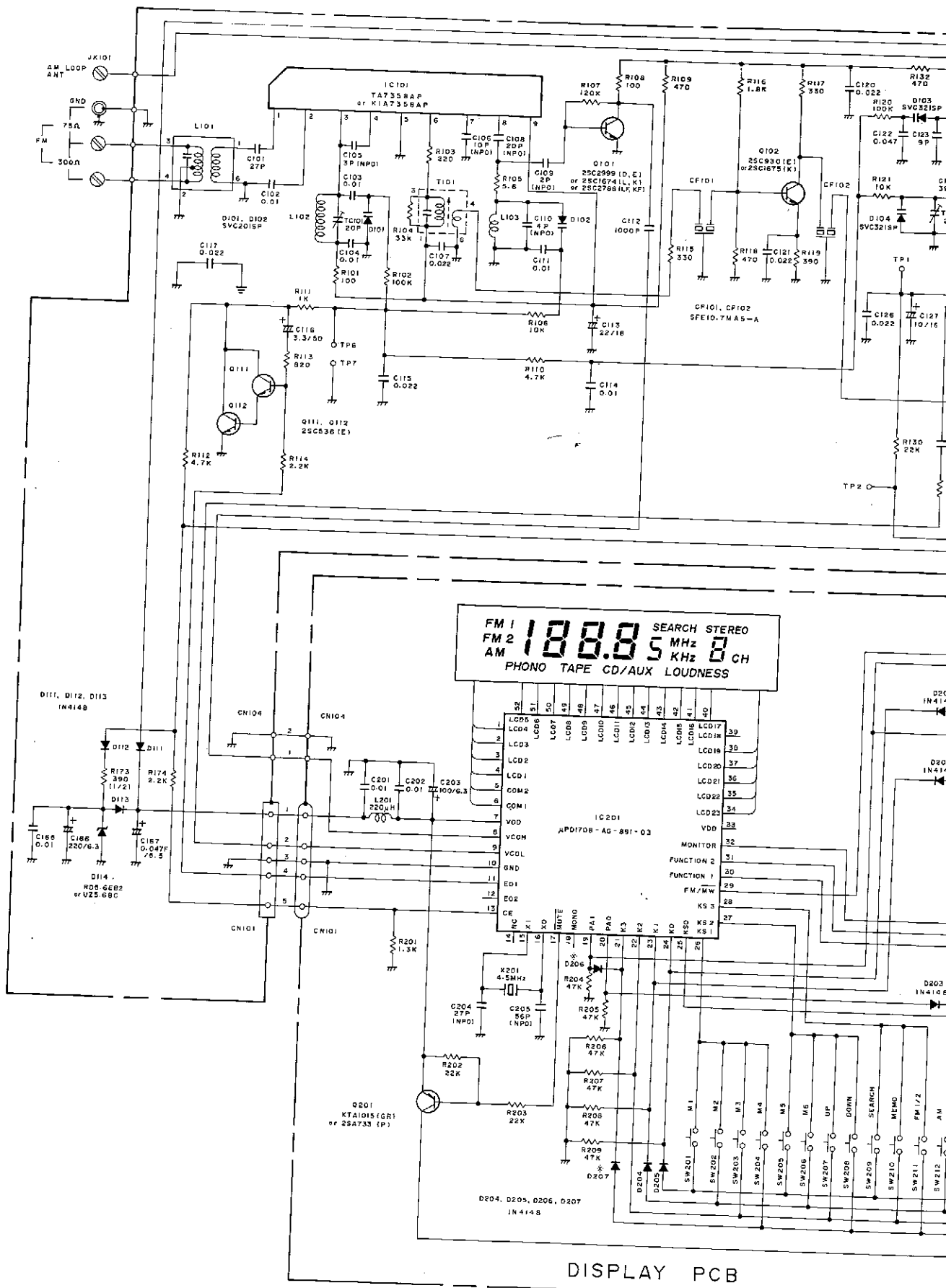
EXPLODED VIEW PARTS LIST

Ref. No.	Description	RS Part No.	Mfr's Part No.
1	Knob 21, Volume		652110380A
2	Knob 21, Rotary		652110370A
3	Assembly, Panel, Front	US CA AU	MH00664 MH00721 MH00841
3-1	Panel, Front	US CA/AU	701010340A 701010350A
3-2	Plate, Front		711210490A
3-3	Blind		851213040A
3-4	Cushion 3m CR		851099060A
4	Blind, Himelon		851213070A
5	Cushion, NEOP Sponge, for Front Panel		851012620A
6	Foot, Poron, HH48		608010720A
7	Foot, Poron, HH48		608010710A
8	Foot, Back, Ultrasen, J65		608004920A
9	Holder, SUS-304		411117000A
10	Assembly, PCB, Transistor		MH00659
11	Transformer, Power, EI-66, 120V (T801) 240V (T801)	US/CA AU	10103661SA 10103671SA
12	Assembly, PCB, Headphone		MH00662
13	Assembly, PCB, Main	US CA	MH00658 MF00719
14	Knob 50, Power		655010800A
15	Holder, Switch, Power		411116800A
16	Assembly, PCB, Switch, Power		MH00660
17	Grommet for IC701		481110120A
18	Sheet, Insulation for IC701		483011470A
19	Heat Sink		471110190A
20	Assembly, Cabinet, Top		MH00665
20-1	Cabinet, Top		601212580A
20-2	Cushion, NEOP Sponge for Top Cabinet		851012610A
20-3	Spacer, Himelon		852099030A
21	Cord, AC, KKP-10W L6.5F BLK APC-7W L6.5F BLK KP-560 7F BLK	or US/CA AU	311030030A 311010810A 311010430A
22	Holder for FM Line Antenna	US/CA AU	411012970A 411101530A
23	Sheet, Insulation, Fiber, for FM Line Antenna	US/CA AU	483013270A 483013280A
24	Assembly, Antenna, Loop, AM (Non-repairable) Loop, Antenna, LA-50 Holder, ABS 94HB Holder, ABS 94HB Wire, UL-1007 D/L #20		115090010A

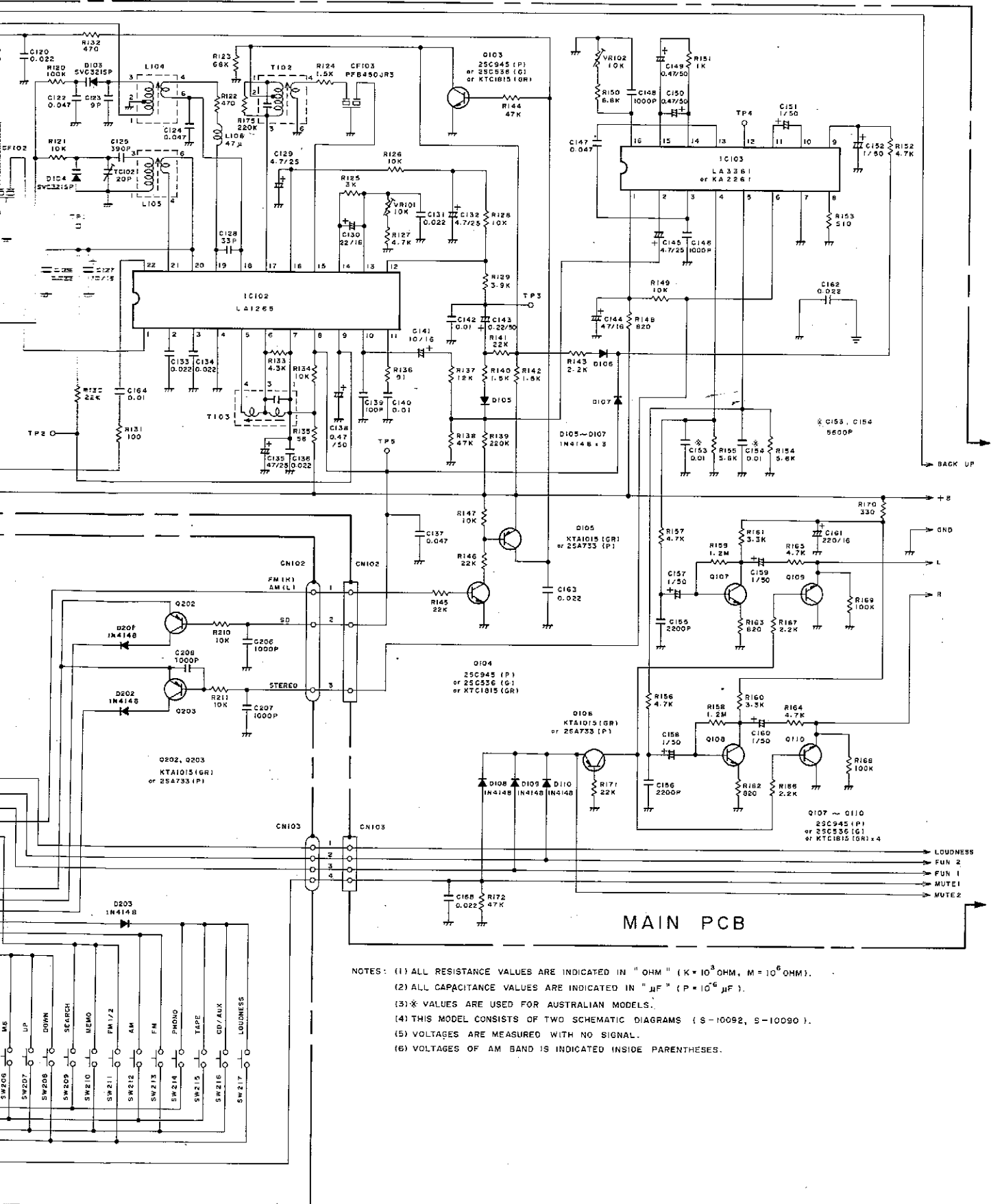
Ref. No.	Description	RS Part No.	Mfr's Part No.
25	Bushing, Cord, 3P-4 94HB SR-4N-4	US/CA AU	481000100A 481000800A
26	Screw, S3 x 16FF/Ni-3, GND		HMW0A002SN
27	Washer, 3W/Ni-3, GND		HAWP30SSSN
28	Washer, Toothed, 3TW-A/Ni-3, GND		HAWA30SSSN
29	Holder, Antenna		412100620A
30 ★	Panel, Back	US CA AU	707010850A 707010860A 707010870A
31	Assembly, PCB, Display	US CA	MH00663 MH00720
32	Holder, Display, ABS 94HB, White		413102440A
33	Reflector, Display, PMMA Paint		417010390A
34	LCD, E-5468		553510200A
35	Assembly, PCB, LED		MH00661
36	Assembly, Holder, Display	US CA	MH10666 MH00666
36-1	Holder, Display, SPCC/ZnB, Black		411116900A
36-2	Reflector, Polyester		417010400A
37	Knob 95, Tuning		659513090A
38	Knob 95, Memory		659513100A
39	Knob 95, Selector		659513060A
40	Knob 95, Channel		659513080A
41	Holder, SECC-C		411199040A
42	Spacer, Silicon Rubber for Power Transformer		852099040A
43	Holder, SECC DEGR for Power Transformer		411199030A
44	Spacer, NEOP Rubber for Main PCB		852013290A
	Hardware Kit		HWK0311991
S1	Screw, Taptite, 3 x 6BT-C/ZnB		HCBC3006SB
S2	Not used		
S3	Washer, 3W/ZnY		HAWP30SSSY
S4	Screw, Taptite, 3 x 8BT-B/ZnB		HCBB3008SB
S5	Screw, 2.6 x 8PT-B/ZnB		HCPB2608SB
S6	Screw, Taptite, 4 x 12BT-C/ZnB		HCBC4012SB
S7	Not used		
S8	Nut, Flange, 4FN/ZnB		HAWP400-SB
S9	Screw, 3 x 10B/Ni-3 for IC701		HMB03010SN
S10	Screw, F-Lock, 3 x 10FL/Ni-3 for IC501, 502		HFP03010SN

Note: ★ The Back Panel 707010850A has been changed to 707010850B from units with serial number 012701 and after.

SCHEMATIC



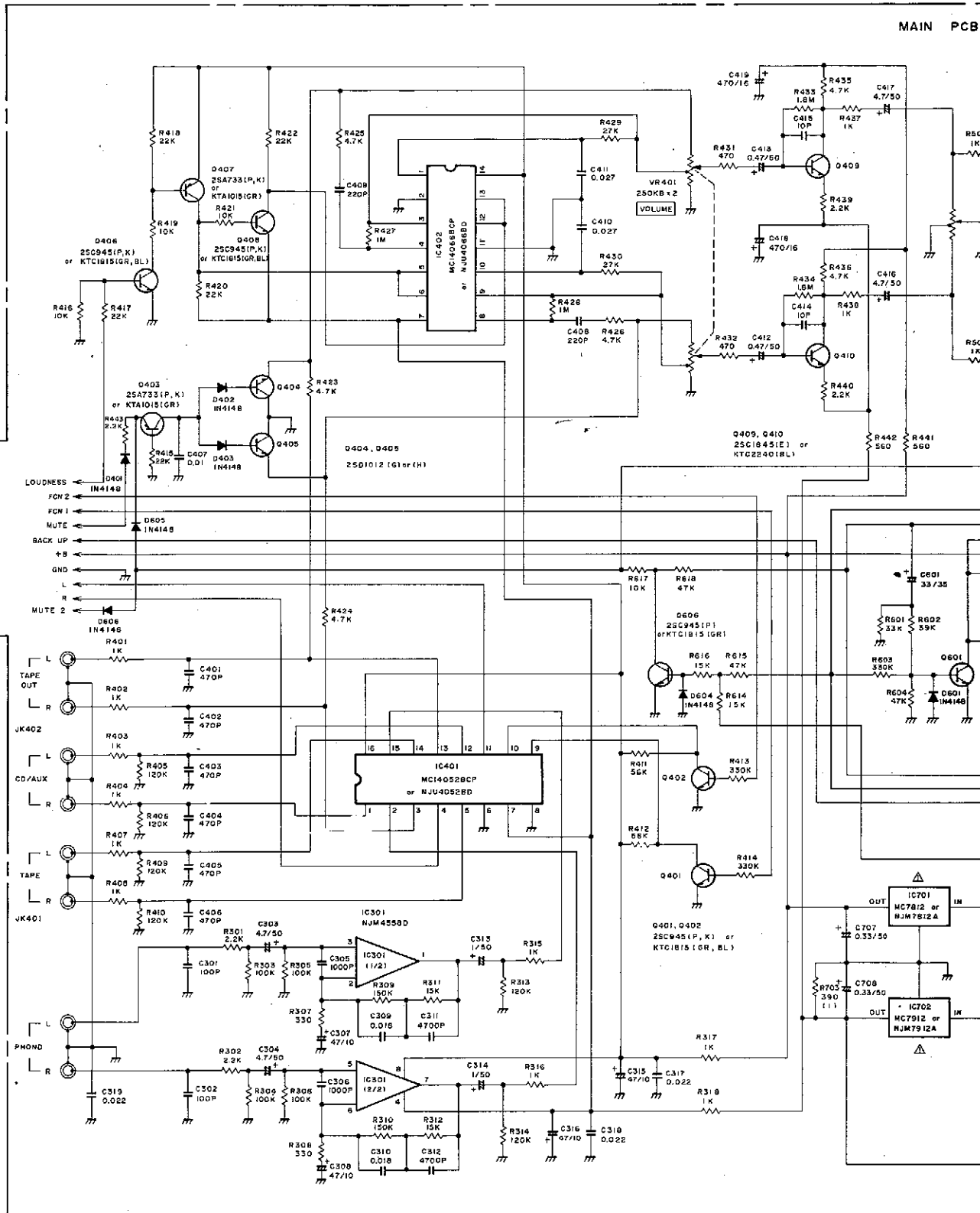
SCHEMATIC DIAGRAM (1/2)



- NOTES: (1) ALL RESISTANCE VALUES ARE INDICATED IN " OHM " (K = 10³ OHM, M = 10⁶ OHM).
 (2) ALL CAPACITANCE VALUES ARE INDICATED IN " μF " (P = 10⁶ μF).
 (3) * VALUES ARE USED FOR AUSTRALIAN MODELS.
 (4) THIS MODEL CONSISTS OF TWO SCHEMATIC DIAGRAMS (S-10092, S-10090).
 (5) VOLTAGES ARE MEASURED WITH NO SIGNAL.
 (6) VOLTAGES OF AM BAND IS INDICATED INSIDE PARENTHESES.

SCHEMATIC DIAGRAM

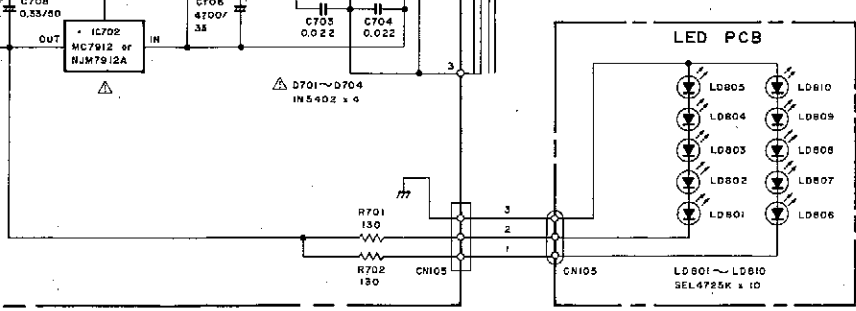
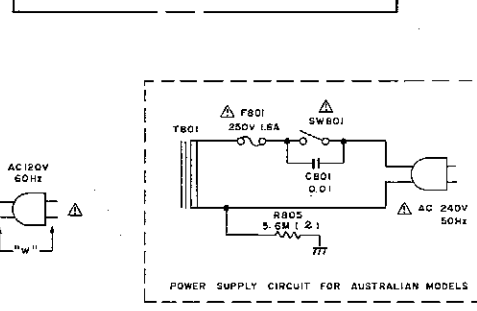
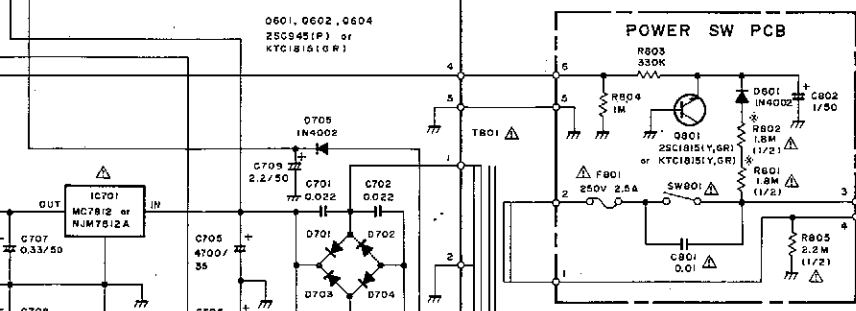
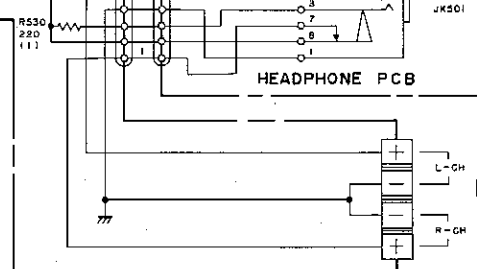
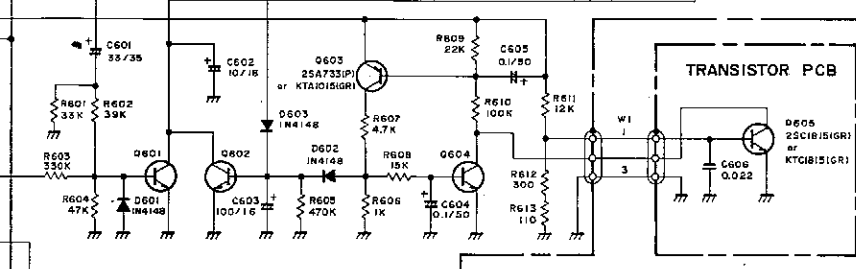
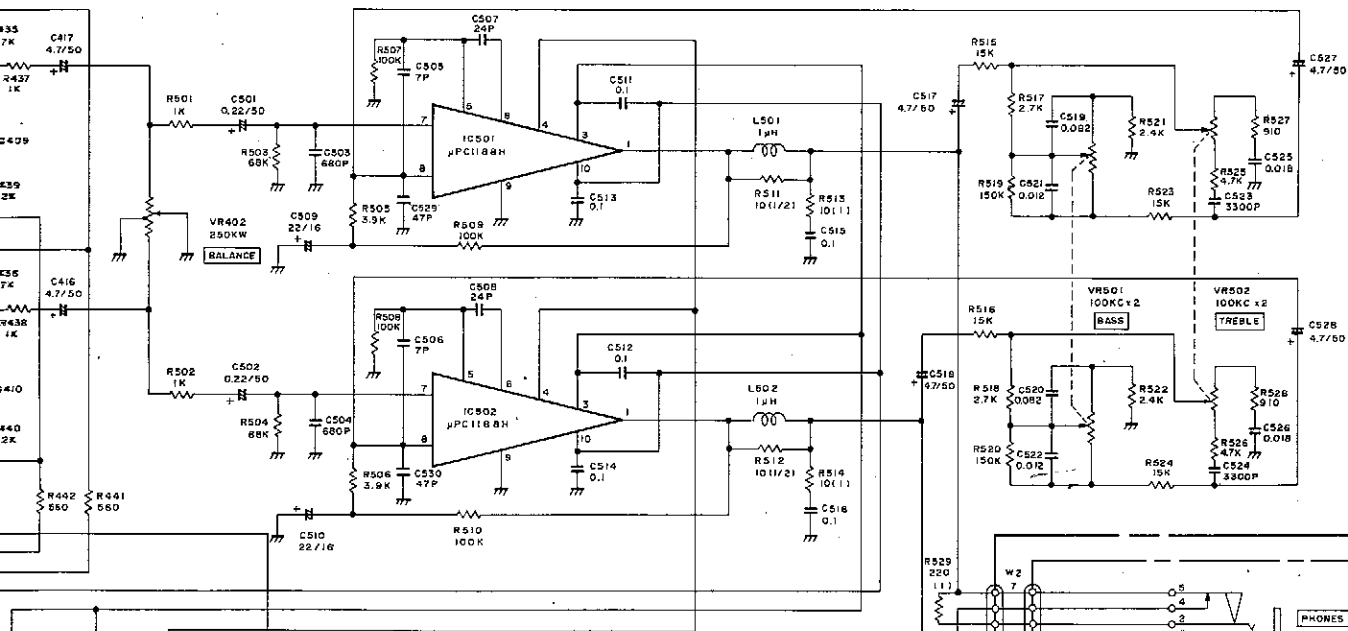
MAIN PCB



CAUTION : SINCE THE CIRCUIT IS A STEREO AMPLIFIER, IT MUST BE USED WITH STEREO SIGNALS.
 USE THOSE COMPONENTS WHICH ARE SPECIFIED IN THE SCHEMATIC.

MATIC DIAGRAM (2/2)

MAIN PCB



CAUTION: SINCE THE COMPONENTS MARKED BY Δ ARE CRITICAL FOR SAFETY, USE THOSE DESCRIBED ON PARTS LIST ONLY.

VOLTAGE CHART

Measuring Conditions:

- No signal input
- Volume at minimum
- Measuring Unit: Volt

IC Pin	IC101	IC102		IC103			IC401			
	Mode FM	AM	FM	AM	FM	STEREO	AM/FM	PHOND	TAPE	CD/AUX
1	0.73	1.1	2.4	5.9	5.9	5.4	0	0	0	0
2	1.46	1.1	2.4	2.35	2.4	2.3	0	0	0	0
3	4.0	1.1	2.4	1.7	1.7	1.7	0	0	0	0
4	1.43	0	0	2.9	2.9	2.8	0	0	0	0
5	0	10.9	10.9	2.7	2.7	2.7	0	0	0	0
6	3.95	10.9	10.9	5.9	5.9	0.62	0	0	0	0
7	3.3	10.9	10.9	0	0	0	-8.6	-8.6	-8.6	-8.6
8	4.0	8.5	5.65	0.4	0.4	0.4	0	0	0	0
9	4.1	3.7	3.67	3.7	2.6	0	8.4	8.3	0	0
10		3.2	3.3	1.35	1.35	1.35	8.4	0	8.3	0
11		1.4	1.43	1.35	1.35	1.35	0	0	0	0
12		1.6	1.46	0	0	1.0	0	0	0	0
13		0.1	0	1.35	1.35	1.35	0	0	0	0
14		0	0	1.35	1.35	1.35	0	0	0	0
15		1.1	2.4	1.35	1.35	1.35	0	0	0	0
16		1.55	1.45	0	0	0.8	8.5	8.3	8.3	8.2
17		10.0	0							
18		2.0	0							
19		2.0	0							
20		3.8	4.0							
21		3.8	4.0							
22		1.7	2.9							

IC	IC402		IC301	IC501	IC502	IC701	IC702
Pin	LOUDNESS		—	—	—	—	—
	OFF	ON					
1	0	0	0	-25.6	-25.6	12	-12
2	0	0	0	0	0	0	-25.6
3	0	0	0	0	0	25.6	0
4	0	0	-8.6	0	0		
5	-8.6	5.6	0	-24	-24		
6	-8.6	5.6	0	-0.48	-0.48		
7	-8.6	-6.5	0	6.2	6.2		
8	0	0	8.3	25.6	25.6		
9	0	0		0	0		
10	0	0		0	0		
11	0	0					
12	8.2	-6.5					
13	8.2	-6.5					
14	8.2	5.6					

TR	Q101		Q102		Q103		Q104	
Pin	AM	FM	AM	FM	AM	FM	AM	FM
Emitter		0		0.5	0	0	0	0
Collector		5.6		5.6	10.0	0	12.0	0
Base		0.76		1.2	0	0.7	0	0.65

TR	Q105		Q106		Q107, 108
Pin	AM	FM	AM/FM	SEARCH	AM/FM
Emitter	12.0	12.0	0.14	4.2	1.16
Collector	0	11.9	-0.14	4.2	6.4
Base	12	11.3	0	3.5	1.75

TR	Q109		Q110		Q111		Q112	
Pin	AM/FM	SEARCH	AM/FM	SEARCH	AM	FM	AM	FM
Emitter	0	0	0	0	0.65	0.65	0	0
Collector	0	0	0	0	4.67	4.3	4.7	4.3
Base	-1.5	0.7	-1.5	0.7	1.15	1.15	0.65	0.65

TR	Q201	Q202		Q203	
Mode	—	SD		STEREO	
Pin	—	OFF	ON	OFF	ON
Emitter	4.8	0	0	0	0
Collector	0	-1.0	-0.8	-1.0	-1.0
Base	4.8	5.65	0	5.6	0.64

TR	Q401				Q402			
Mode	AM/FM	PHONO	TAPE	CD/AUX	AM/FM	PHONO	TAPE	CD/AUX
Pin	—	—	—	—	—	—	—	—
Emitter	0	0	0	0	0	0	0	0
Collector	8.4	8.3	0	0	8.4	0	8.3	0
Base	0	0	0.57	0.57	0	0.57	0	0.57

TR	Q403	Q404, 405		Q406		Q407	
Mode	—	—		LOUDNESS		LOUDNESS	
Pin	—	—		OFF	ON	OFF	ON
Emitter	0.16	0		0	0	8.5	5.8
Collector	-0.3	0		8.5	0	-8.6	5.8
Base	0	-1.3		0	0.63	8.5	5.2

TR	Q408		Q409	Q410	Q601		Q602	
Mode	LOUDNESS		—	—	PROTECTOR		PROTECTOR	
Pin	OFF	ON	—	—	OFF	ON	OFF	ON
Emitter	-8.6	-6.5	-5.6	-5.6	0	0	0	0
Collector	8.5	-6.5	0.5	0.6	6.2	0	6.2	0
Base	-8.6	-5.8	-4.8	-4.8	-0.46	-0.46	0	0.7

TR	Q603		Q604		Q605		Q606	Q801
Mode	PROTECTOR		PROTECTOR		PROTECTOR		—	—
Pin	OFF	ON	OFF	ON	OFF	ON	—	—
Emitter	12	12	0	0	0	0	0	6.6
Collector	0	12	12	0	11.3	0	0	
Base	12	11.4	0	0.59	0.42	0.42	0.65	0

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