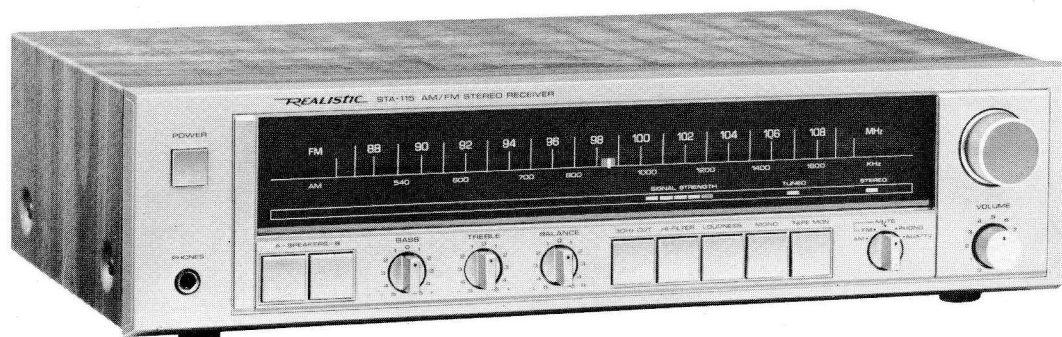


REALISTIC[®]

Service Manual

31-2098

**STA-115
SOLID STATE
AM/FM STEREO RECEIVER
Catalog Number : 31-2098**




CUSTOM MANUFACTURED FOR RADIO SHACK, A DIVISION OF TANDY CORPORATION

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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.

ELECTRICAL PERFORMANCE SPECIFICATIONS

Whole Specs are measured under the following conditions:

1. The supply voltage is 120 volts (U.S.A., Canada), (240 volts AC, 50 Hz for Australian models) from a regulated power supply.
2. All measurements shall be taken under IHF measurement method unless otherwise specified.
3. The power source must be insulated from other equipment, connected to antenna or output.
4. The room temperature is 25° C (77° F).

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 perform to less than within any limit spec.

AM Section

- Notes:**
1. Output readings are taken across a non-reactive 47 k ohm load termination.
 2. Output is measured at TAPE OUT terminals.
 3. The generator output shall terminate in an IRE loop antenna.
 4. Standard modulation: 400 Hz, 30% modulation.

ITEM	Measured at (kHz)	UNIT	NOMINAL	LIMIT	
Frequency coverage		kHz	510 – 1650	520 – 1620	
Intermediate Frequency		kHz	455		
20 dB Quieting sensitivity	600	μV/m	250	500	
	1000	μV/m	250	500	
	1400	μV/m	250	500	
Sensitivity at antenna terminal	1000	μV	20	–	
S/N Ratio at 5 mV/m input	1000	dB	43	37	
Selectivity at S/N 20 dB input, ± 10 kHz	1000	dB	27	22	
Band width at 6 dB down	1000	kHz	6	4.5 – 9	
A.G.C. Figure of merit	1000	dB	50	42	
IF rejection ratio	600	dB	32	27	
Image Rejection ratio	1400	dB	45	38	
T.H.D. at 5mV/m input, 30% mod.	1000	%	0.8	2.0	
Overload Distortion at 100mV/m input 80% mod.	1000	%	3	5	
Overload capacity	at 80% mod.	1000	mV/m	200	100
	at 30% mod.	1000	mV/m	200	100
Electrical audio fidelity Ref. freq. = 1 kHz, –6 dB down, 5mV/m input	1000	Hz	50 – 3k	80 – 2.5k	
Whistle modulation (2nd)	at 5mV/m	910	%	5.0	10.0
	at 100mV/m	910	%	10.0	15.0
	(3rd) at 1mV/m	1365	%		10.0
	at 5mV/m	1365	%	5.0	10.0
	at 100mV/m	1365	%	10.0	15.0
Frequency calibration	600	kHz	0	±25	
	1000	kHz		±40	
	1400	kHz	0	±50	

ITEM	Measured at (kHz)	UNIT	NOMINAL	LIMIT
Spurious response from 1650 – 30000 Hz	1000	dB	50	44
Tape out level, at 1 kHz 5mV/m, RCA Jack	1000	mV	200	200 ±2.5 dB
**5mV/m, DIN Jack (3.3kΩ terminated)	1000	mV	3.3	3.3 ±2.5 dB
The oscillator shall not drift more than 10 kHz starting at 25°C (77°F) and through range up to 50°C (122°F), at 1000 kHz.				
Meter Sensitivity at 1st LED	1000	mV/m	0.4	
at 3rd LED	1000	mV/m	1.0	
at 5th LED	1000	mV/m	5.0	

** For Australian models only.

FM Section

- Notes:**
1. Output readings are taken across a non-reactive 47 k ohm load termination.
 2. Output is measured at TAPE OUT terminals.
 3. The signal voltage in this specification is the voltage appearing across the tuner input terminals (IHF).
 4. Standard modulation: 1000 Hz, 75 kHz deviation.

ITEM	Measured at (MHz)	UNIT	NOMINAL	LIMIT
Frequency coverage (U.S.A., Canada, Australia)		MHz	87.4 – 108.3	87.4 ±0.5 – 108 + 0.9 –0
Intermediate frequency		MHz	10.7	---
IHF (Useable) sensitivity	90/98/106	μV	1.9	3.8
	90/98/106	dBf	10.8	16.8
50 dB Quieting sensitivity	90/98/106	μV	3.54	4.5
	90/98/106	dBf	16.21	18.29
Limiting sensitivity (–3 dB)	98	μV	1.8	3.5
S/N Ratio at 1mV input	98	dB	74	66
S/Hum noise ratio at 1mV	98	dB	70	64
Muting threshold	98	dB	7.0	4 – 10
Frequency response ±2.5 dB range, at 1mV input	98	Hz	30 – 12k	40 – 10k
Distortion at quieting sens. at 100 Hz	98	%	0.4	
at 1000 Hz	98	%	0.4	
at 6000 Hz	98	%	0.8	
Distortion at 1mV input at 100 Hz	98	%	0.25	
at 1000 Hz	98	%	0.065	0.5
at 6000 Hz	98	%	0.3	
Capture ratio	98	dB	1.2	3.0
Alternate channel selectivity at input 100μV	98	dB	60	45
Spurious response ratio	98	dB	72	65
Image response ratio	106	dB	65	48
IF response ratio	90	dB	90	70

ITEM	Measured at (MHz)	UNIT	NOMINAL	LIMIT
AM suppression at 1mV input	98	dB	65	52
AFC holding range at 100 μ V input	98	kHz	\pm 250	\pm 330
Calibration accuracy	90/98/106	kHz		\pm 250
Tape out level, 1 mV input at RCA, 75 k dev.	98	mV	660	660 \pm 2.5 dB
**at DIN, 22.5 k dev.	98	mV	3.3	3.3 \pm 2.5 dB
Meter sensitivity at 1st LED	98	μ V	4.5	---
at 3rd LED	98	μ V	25.0	---
at 5th LED	98	μ V	150	---
Temperature range for satisfactory operation		$^{\circ}$ C	0 – 45	
		$^{\circ}$ F	32 – 113	
Max. signal handling capacity	98	μ V	200k	
Auto-M Range at 1mV input	98	MHz	\pm 800	\pm 600

** For Australian models only.

FM Stereo Section

- Notes:**
- Output readings are taken across a non-reactive 47 k ohm load termination.
 - Output is measured at TAPE OUT terminals.
 - 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%) dev.
Sub carrier (L – R) – 33.75 kHz (45%) dev.
Pilot (19 kHz) – 6.75 kHz (9%) dev.
Modulation frequency – 1000 Hz

ITEM	Measured at (MHz)	UNIT	NOMINAL	LIMIT
Stereo beacon switching and muting threshold	98	μ V	7	5 – 15
	98	dBf	22.13	19.21 – 28.75
Stereo 50 dB quieting sensitivity	90/98/106	μ V	39.8	
	90/98/106	dBf	37.2	
S/N Ratio at 1mV input (W/Low pass filter)	98	dB	71	55
Freq. response at 1mV input (50 – 10000 Hz)	98	dB	\pm 0	\pm 2.5
Stereo distortion at 100 Hz	98	%	0.8	---
at 1mV input at 1 kHz	98	%	0.2	1.5
(W/Low pass filter) at 6 kHz	98	%	0.8	---
Stereo separation at 1mV input at 100 Hz	98	dB	38	28
	98	dB	45	33
	98	dB	32	25
Sub-carrier product rejection	98	dB	39	32
SCA rejection	98	dB	50	45
Tape out level at 1 kHz, RCA Jack 1mV input	98	mV	600	600 \pm 2.5 dB

Audio Section

Notes: All units are measured at SPEAKER terminals with non-reactive rated load (8 ohms) unless otherwise indicated.

Rated Power: 22W (RMS)

Rated THD: 0.08%

ITEM	UNIT	NOMINAL	LIMIT	
Power output from 20 Hz to 20 kHz under rated THD. Both channels driven 8Ω load (RMS).	W	24	22	
Input impedance at 1 kHz	PHONO AUX/TV TAPE IN	kΩ kΩ kΩ	50 50 50	
Sensitivity for rated power	PHONO AUX/TV TAPE IN	mV mV mV	2.2 160 160	2.2 ±2.5 dB 160 ±2.5 dB 160 ±2.5 dB
Total harmonic distortion from 20 Hz to 20 kHz at rated power	at 20 Hz at 1 kHz at 20 kHz	% % %	0.03 0.03 0.03	0.08 0.08 0.08
Max. input signal at rated THD (0.08%) (measured at Tape out)	PHONO AUX/TV TAPE	mV mV mV	120 Infinite Infinite	90
Frequency response from 20 Hz to 20 kHz		dB	0	±2
S/N Ratio	PHONO	dB	72	
A-weighted 1W reference (IHF)	AUX/TV TAPE	dB dB	75 75	
A-weighted rated power reference				
PHONO (10mV input & shorted)		dB	85	74
AUX/TV (input shorted)		dB	88	80
TAPE (input shorted)		dB	88	80
Dynamic headroom		dB	1.1	
Clipping headroom		dB	1.0	
Damping factor			70	
Loudness contour ch.	at 100 Hz at 10 kHz	dB dB	+ 6 + 4.5	+ 6 ±2.5 +4.5 ±2.5
Tone control response				
Bass control action	at 100 Hz	dB	± 10	±10 ±2.5
Treble control action	at 10 kHz	dB	± 10	±10 ±2.5
Filter cutoff freq. (-3 dB point)	30 Hz Cut Filter High Filter	Hz	See Filter curve on page 20. 7K	
Filter slope	30 Hz Cut Filter High Filter	dB/oct dB/oct	18.0 6.0	
Crosstalk at AUX/TV	at 100 Hz at 1 kHz at 10 kHz	dB dB dB	70 60 43	45 45 35
A-weighted crosstalk at AUX/TV	at 100 Hz at 1 kHz at 10 kHz	dB dB dB	85 60 45	

ITEM	UNIT	NOMINAL	LIMIT
IM Distortion (SMPTE)	%	0.08	0.2
Transient overload recovery time	μ sec	15	
Slew factor		3.5	
Channel balance at VR max	dB	0	± 1.5
DC Balance at no signal and output	mV	0	± 50
Tape out Level at RCA PHONO (input = 2.5mV)	mV	140	140 ± 3 dB
Jacks (47k Ω terminated) AUX/TV (Input = 160mV)	mV	140	140 ± 3 dB
**at DIN Jacks PHONO (Input = 3.0mV)	mV	3.3	3.3 ± 2.5 dB
(3.3k Ω terminated) AUX/TV (Input = 220mV)	mV	3.3	3.3 ± 2.5 dB
Hum and noise at VR min.	mV	0.8	2.0
Phono Eq. RIAA ch. from 20 Hz to 20 kHz (measured at Tape out)	dB	± 0.5	± 2.0

** Australian models only.

DISASSEMBLY INSTRUCTIONS

1) To remove the cabinet

- (A) Remove two screws from each side of cabinet (Figure A).
Be careful not to lose the screw inserts when the screws are removed.

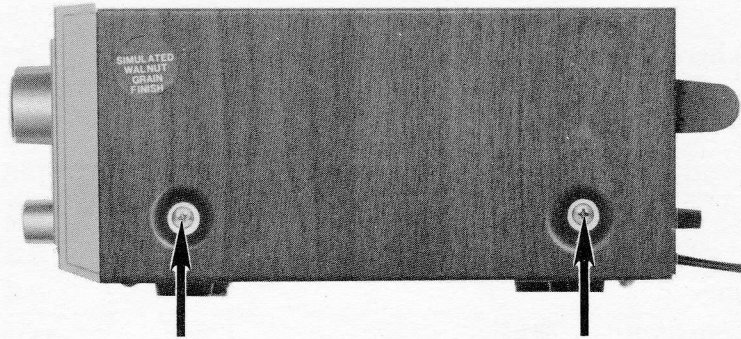


Figure A

- (B) Remove three screws from upper back panel (Figure B).

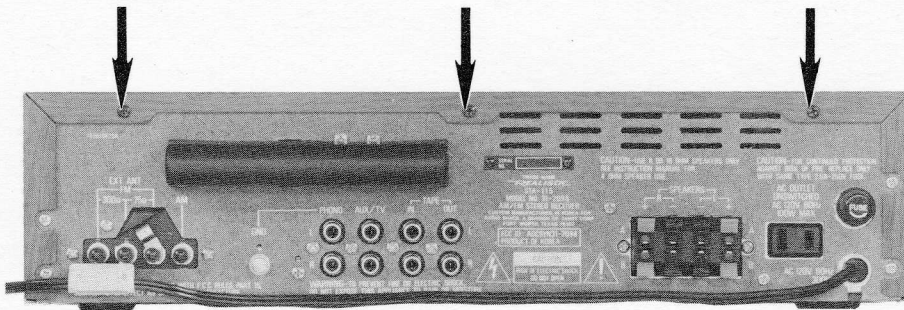


Figure B

2) To remove the bottom cover

- (A) Turn the receiver upside down and remove twelve screws from the bottom (Figure C).
- (B) Lift the bottom cover off.

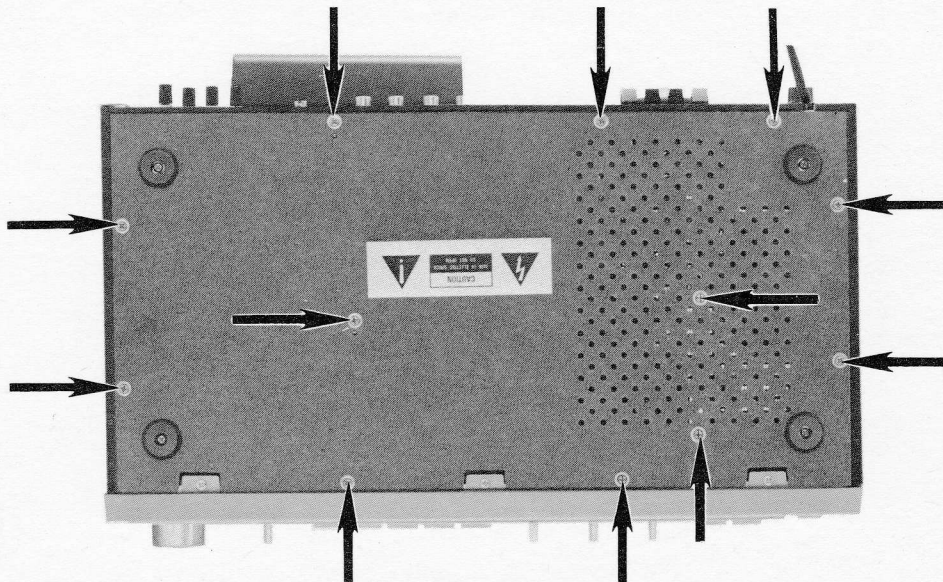


Figure C

3) To remove the front panel (aluminum panel)

- (A) Remove the cabinet and bottom cover as described in 1. and 2.
- (B) Remove three screws from top of front panel (Figure D).

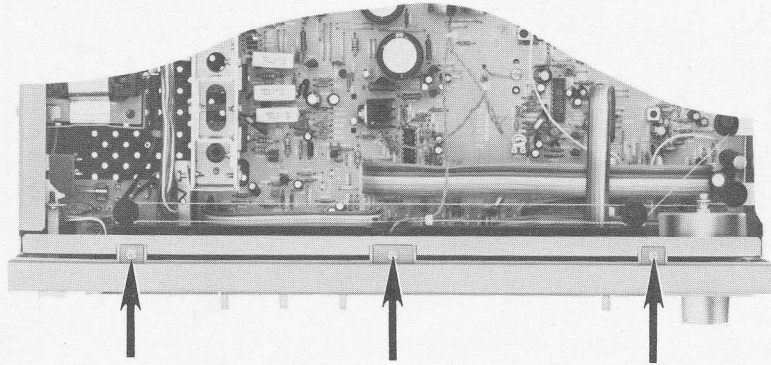


Figure D

- (C) Remove three screws from bottom of front panel (Figure E).

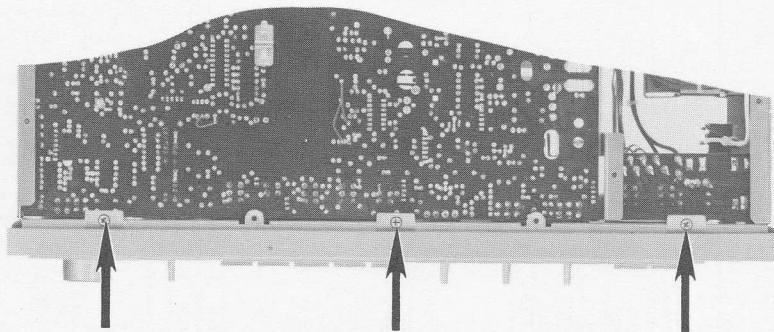


Figure E

- (D) Remove seven knobs from the front panel which is: Power (a), bass, treble, balance (b), selector (c), tuning (d) and volume (e) (Figure F).

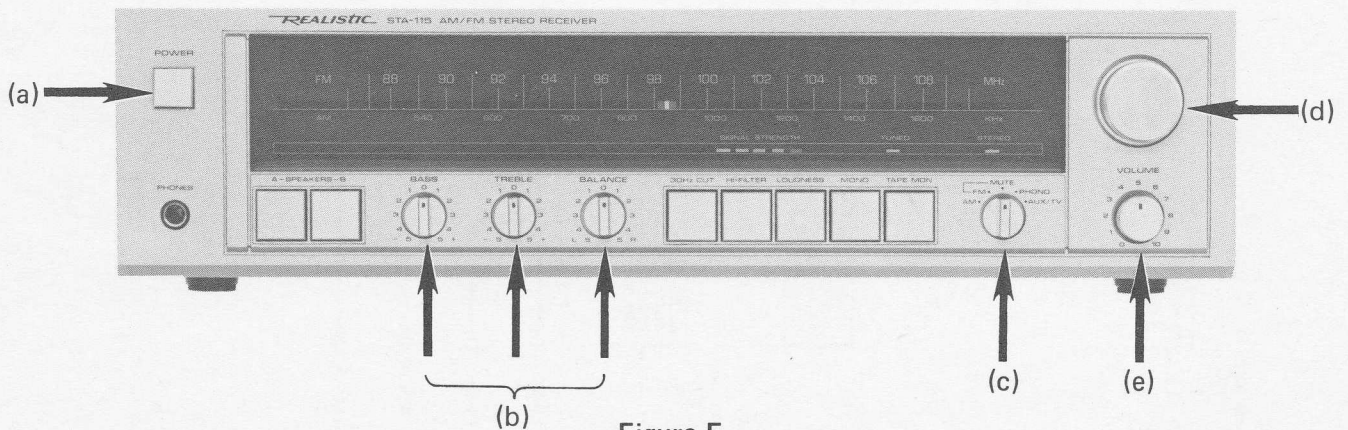
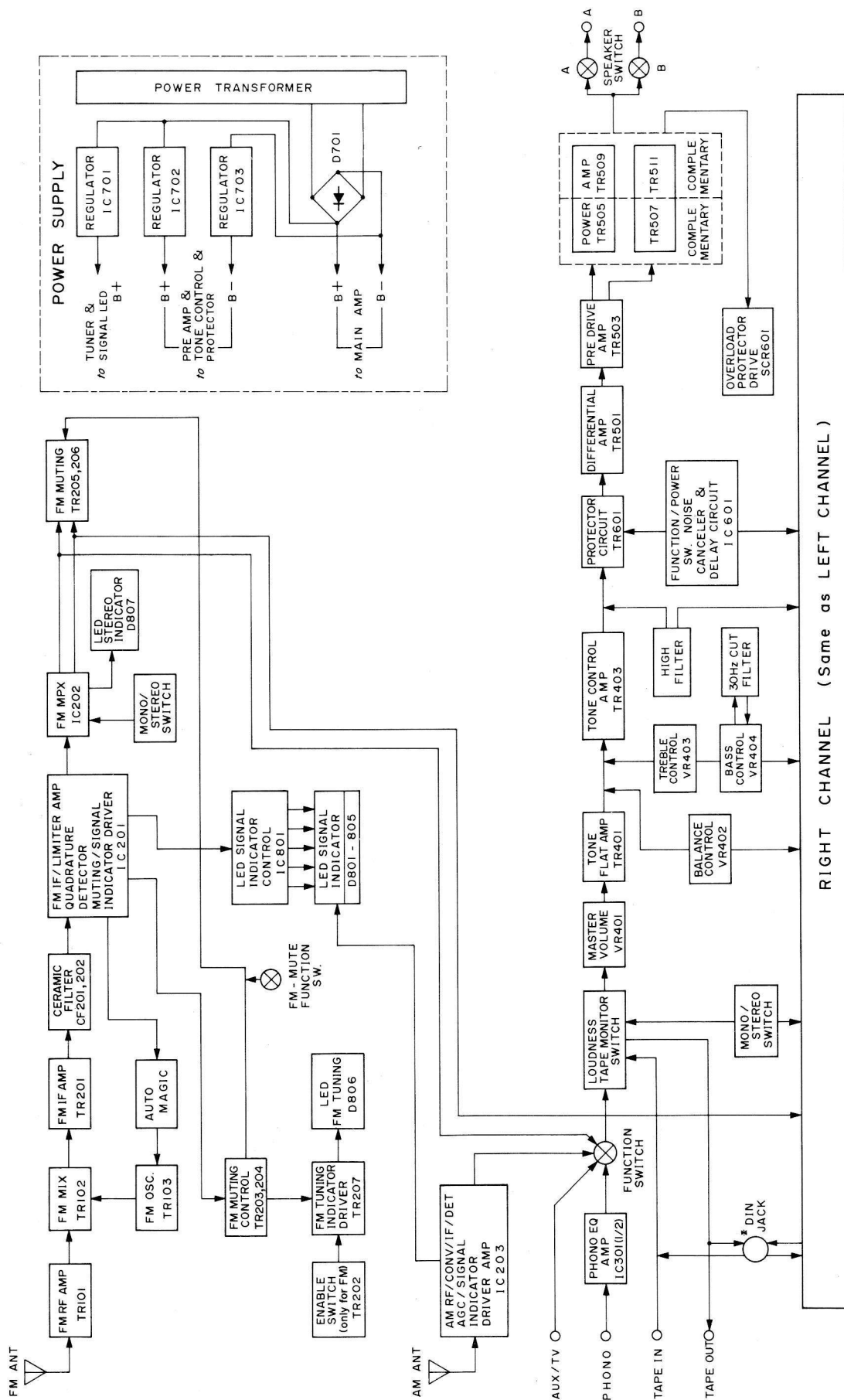


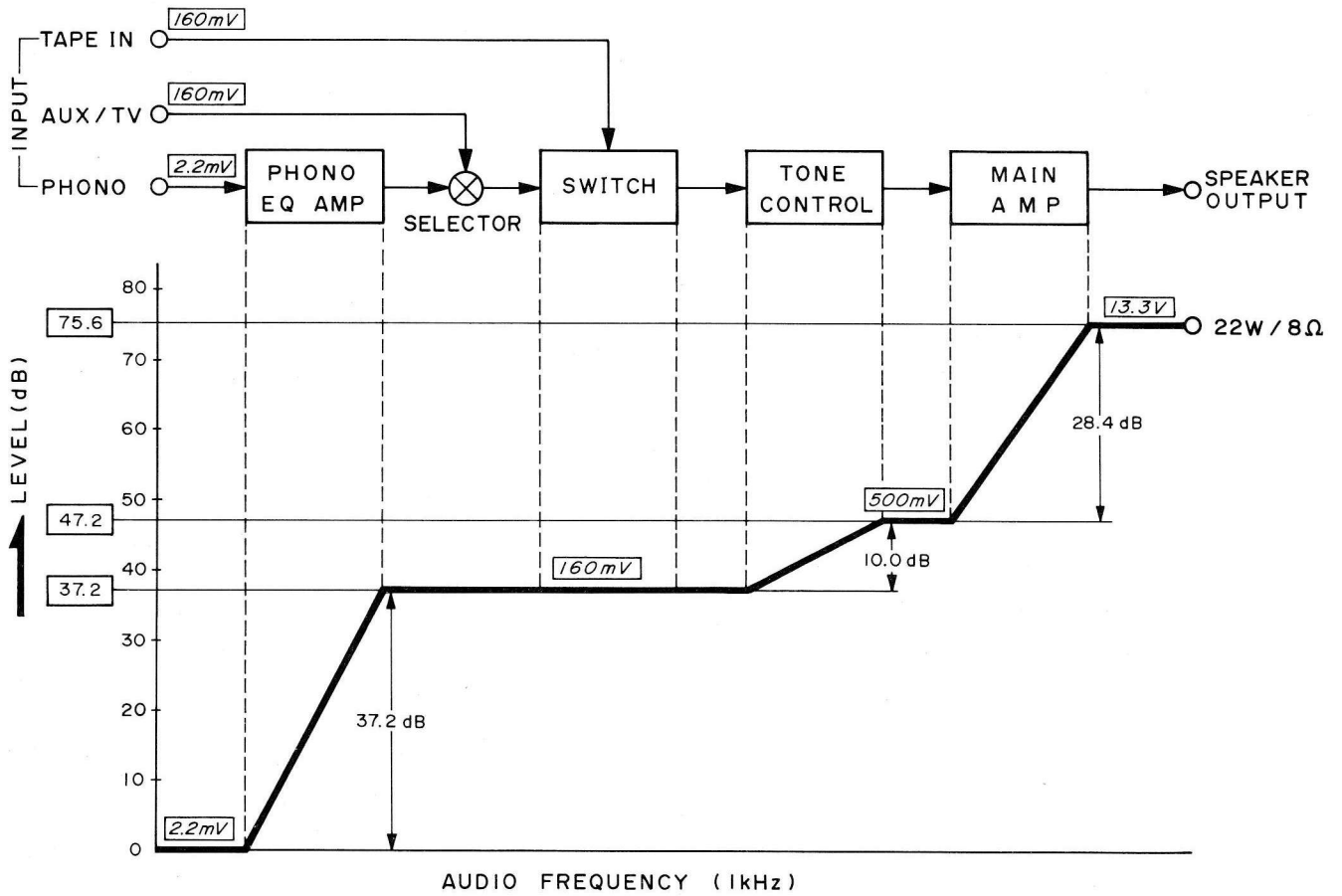
Figure F

BLOCK DIAGRAM

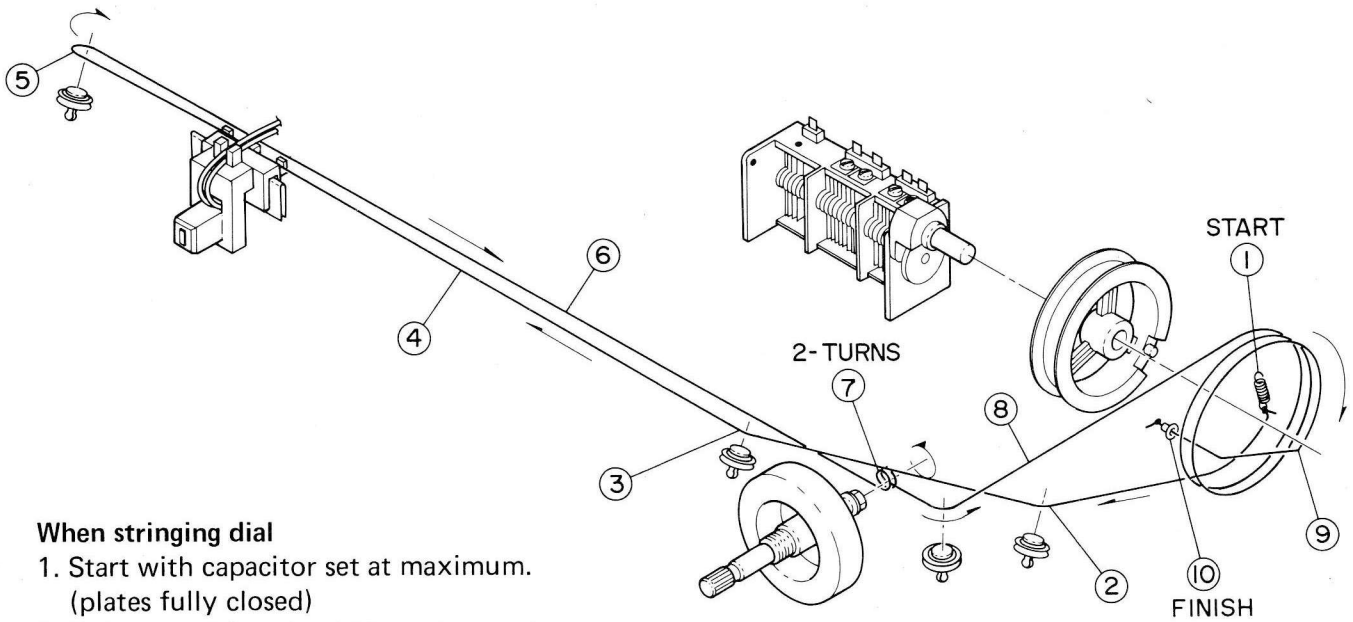


* AVAILABLE ON AUSTRALIAN MODELS ONLY.

LEVEL DIAGRAM



DIAL STRINGING DIAGRAM



When stringing dial

1. Start with capacitor set at maximum. (plates fully closed)
2. Pointer position should be at low end.
3. Start at tension spring.
4. Finish at eyelet.

CIRCUIT DESCRIPTION

PROTECTION CIRCUITS

The output from tone amp circuit to main amp circuit is switched on/off with two FETs TR601 and TR602. When pin 10 of IC601 is high, the FETs are on; when low, FETs are off.

The switching will take place in the following three instances.

1. Turning the receiver on and off (Figure 1)

When the power is switched on, both pins 1 and 2 of IC601 are high, so pin 3 also becomes high and hence pin 4 goes high. After the delay time set by the time constant R607 and C608, pin 10 of IC601 becomes high and signals from the tone amp are fed to main amp. This time constant R607 and C608 is required to keep the speakers off to protect them from the switching transients.

At power off, DC voltage will not turn off immediately, so the AC portion is taken from the secondary of the power transformer via D606 to pin 1 and 2. When this goes low, pin 3 goes low, C608 is discharged by D602, and pin 10 goes low.

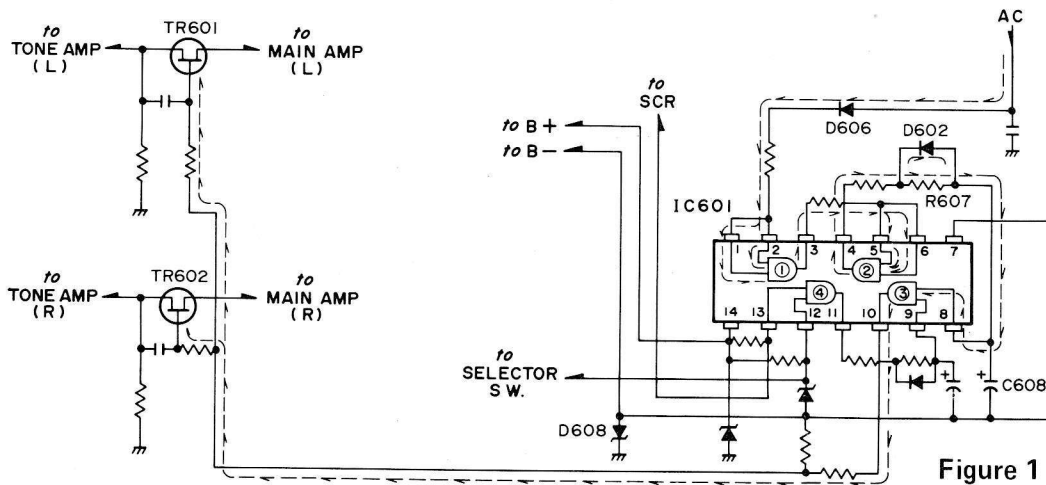


Figure 1

2. Changing the selector switch position (Figure 2)

This prevents the switching noise from going to the speakers. The selector switch is a shorting type; when it is turned from one position to another, the switch contact will make a momentary short circuit to ground. This low level is applied to pin 12 of IC601. Pin 11 goes low, pin 10 goes low through the time constant circuit C607, D603 and R608. The time constant is required so the cut-off condition lasts for about 0.3 to 0.6 seconds.

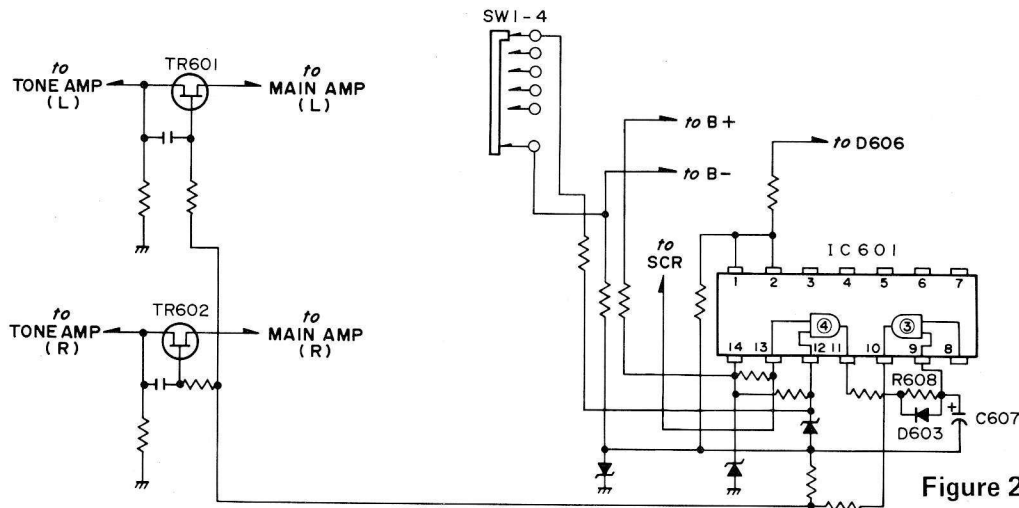


Figure 2

3. Speaker terminal is shorted/low impedance speakers are used (Figure 3)

If either of the above takes place, an excessively high current flows from emitter to collector of TR511/TR512, and a voltage appears across R533/R534. This voltage is applied to gate of the SCR601 via D505/D506. When this voltage exceeds 0.7V, SCR conducts and pin 13 of IC601 goes low, C607 is discharged by D603, and pin 10 goes low.

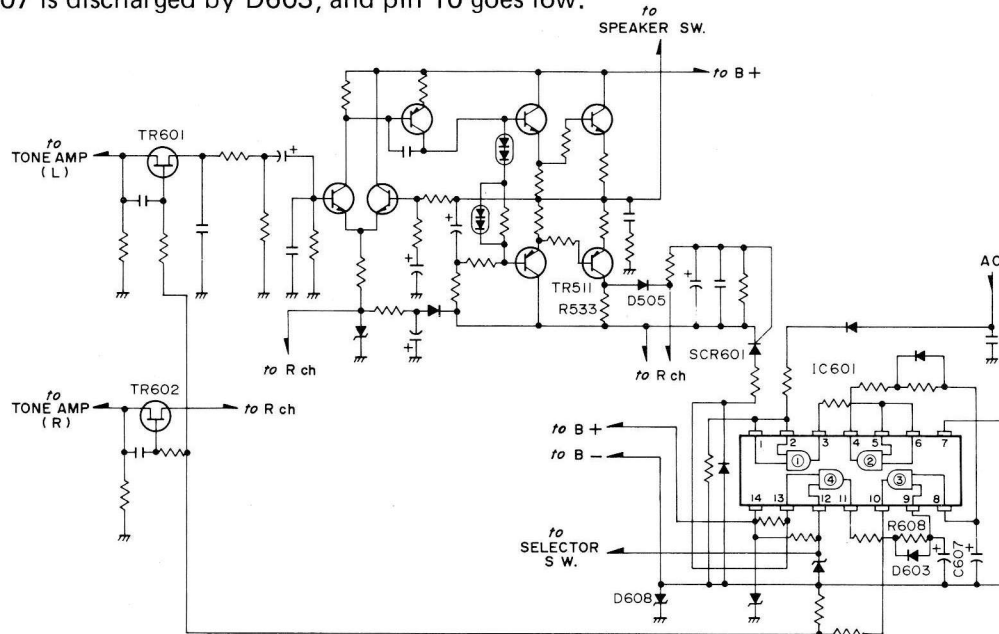


Figure 3

Abnormal Temperature Rise Protection (Figure 4)

The STA-115 has two thermal protectors

If the temperature of the main amp heat sink rises to 105°C/221°F (or power transformer temperature rises to 95°C/203°F) the thermal protector switch makes an open circuit and the power supply will be cut off. This protects the main amp and power transformer. In this case, the amplifier automatically shuts down and output will drop to 0V. If this should occur, turn the receiver off. When the temperature of the main amp heat sink falls to within the operating limits of the receiver, the thermal protector switch will reset itself. When the problem is corrected, turn the receiver on again.

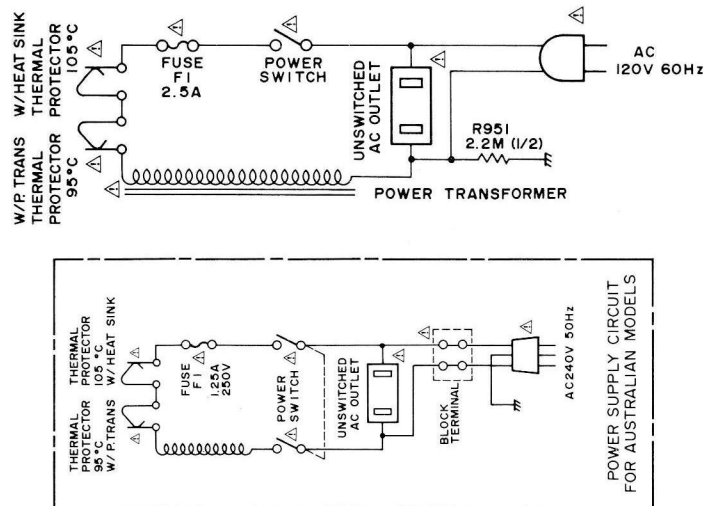
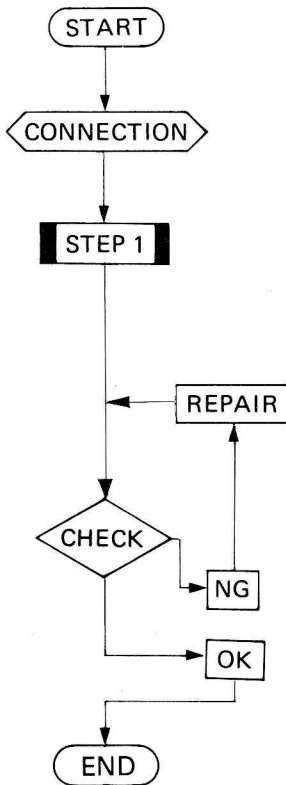


Figure 4

OPERATIONAL CHECK FOR CIRCUITS

Power Supply Operation Check



- Connect AC cord to standard AC power source.
- Power switch ON and dial lamp should light.

Check the power supply voltages.

** Figure 5 **

- (1) Check power supply circuit on TUNER AUDIO P.C.B., fuses, and power transformer.
- (2) See TROUBLESHOOTING on Page 33.

DC voltages are not correct.

DC voltages are correct.

Proceed to next section

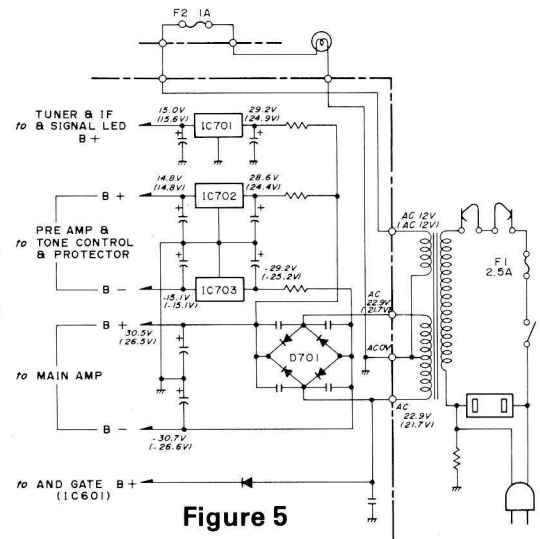
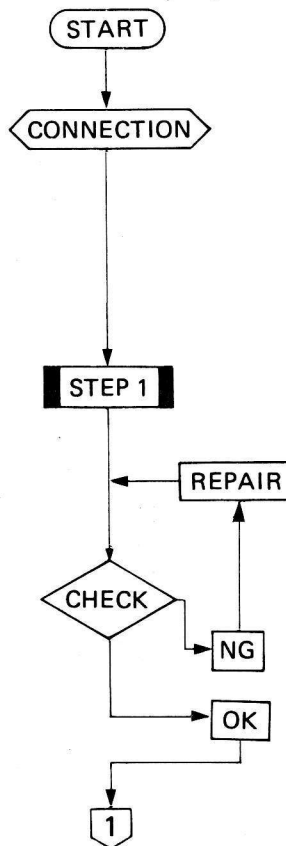


Figure 5

Audio Section Operation Check

Main Amp Operation Check



- Connect 8Ω load to speaker output.
- Connect DC voltmeters to C701 (minus [-] to ground) and C702 (plus [+] to ground) of main amp circuits on TUNER AUDIO P.C.B.

Check power supply voltage with no input.

** Must be $\pm 30.5V \pm 0.5V$. **

- (1) Check D701, C701, C702.
- (2) Check for short-circuits.
- (3) See TROUBLESHOOTING on page 33.

DC voltage is not $\pm 31V \pm 0.5V$

DC voltage is $\pm 31V \pm 0.5V$

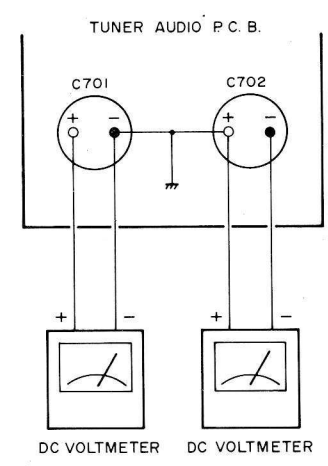
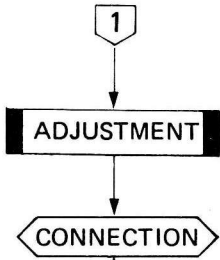


Figure 6



Adjust DC balance and idling current.
See ALIGNMENT INSTRUCTIONS on page 28.

- Connect DC voltmeter to pin 11 (L) or pin 12 (R) and GROUND of TUNER AUDIO P. C. B.

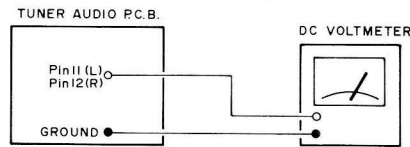
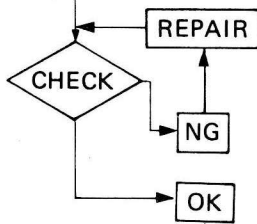


Figure 7

STEP 2

Check for balance of DC voltage at L and R channel output terminals.

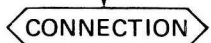
** within $\pm 50\text{mV}$. **



- Check TR501 (L) or TR502 (R).

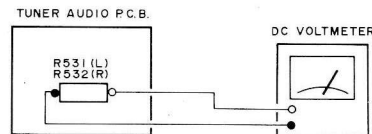
DC voltage over $\pm 50\text{mV}$

DC voltage within $\pm 50\text{mV}$



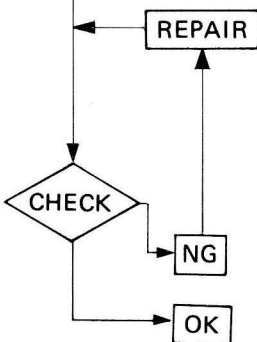
- Connect DC voltmeter to R531 (L ch) or R532 (R ch).

Figure 8



Check the idling current of main amp with no input.
Check the DC voltage across emitter resistor R529 (R531) (L ch) and R530 (R532) (R ch).

** should be $2.35\text{mV} + 4.7/-1.88\text{mV}$. **

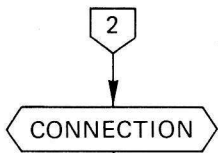


- Check the value of R519 (L ch) and R520 (R ch).
[For Australian models, adjust VR 501 (L ch) and VR 502 (R ch).]
- Check the bias circuit of D501, D503 (L ch) and/or D502, D504 (R ch).
- Check TR503 (L ch) and TR504 (R ch).
- Check TR501, (L ch) and TR502 (R ch).
- Check for short-circuits on TUNER AUDIO P.C.B.

DC voltage is above 7.05mV or below 0.47mV .

DC voltage is $2.35\text{mV} + 4.7/-1.88\text{mV}$.

5



- Connect oscilloscope and V.T.V.M. to speaker terminal.
- Connect 8Ω load to speaker output.
- Connect audio osc. to input of main amp circuit: C501s plus (+) side (L), and/or C502s plus (+) side (R).
- Input should be 500mV and output should be 13.3V (at 1 kHz).

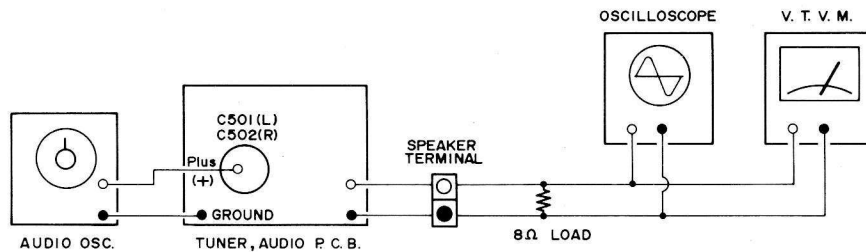
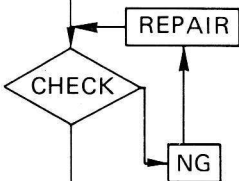


Figure 9

STEP 4

Check for symmetrical clipping of output signal wave shape.

** Input level should be about 600mV to 1.0V. **



- (1) Check TR501, 503, 505, 509 (L) and TR502, 504, 506, 510 (R).
- (2) Check STEP 2 and STEP 3.
- (3) Check main amp. circuits.

Output signal wave is not clipping symmetrically.

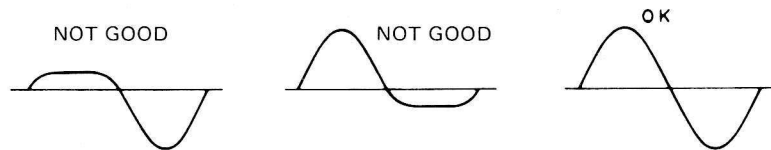


Figure 10

SYMMETRICAL
(just beginning to clip)

Symmetrical clipping (balanced) of output signal wave.

ADJUSTMENT

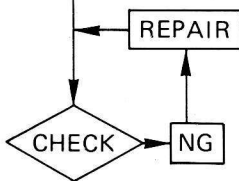
Adjust output from audio osc. (1 kHz) to produce 22 watts rated output power.

STEP 5

Check the main amp gain.

** should be about 28.4 dB. **

$$\text{dB} = 20 \log \frac{\text{OUTPUT voltage}}{\text{INPUT voltage}}$$



- (1) Check main amp circuits.
- (2) Check STEPs 1, 2, 3 and 4.

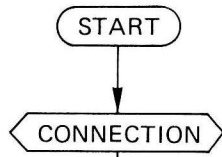
Input level is not 500mV ± 2 dB.

Input level is at least 500mV ± 2 dB for rated output power.

END

Proceed to next section.

Preamp Operation Check



- Connect audio osc. to PHONO input.
- Connect oscilloscope and V.T.V.M. with decibel scale to TAPE OUT jack.
- Set SELECTOR switch to PHONO.

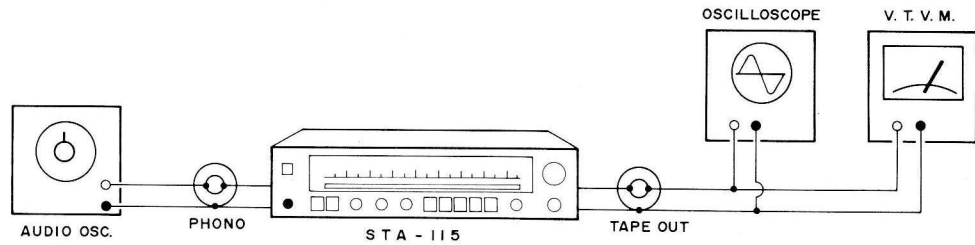


Figure 11

STEP 1

Check the PHONO equalization response.

** RIAA Curve **
 (100 Hz — + 12.9 dB)
 (1 kHz — 0 dB)
 (10 kHz — -13.7 dB)

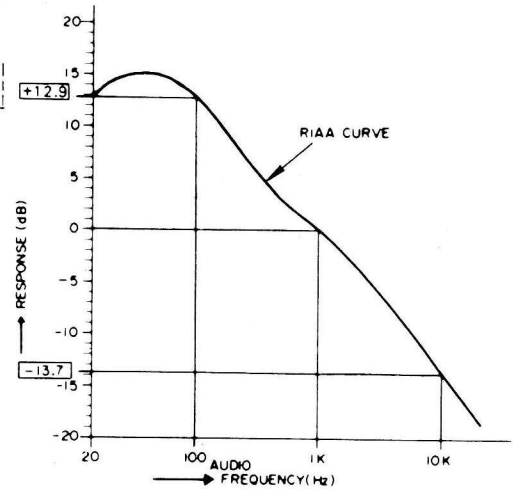
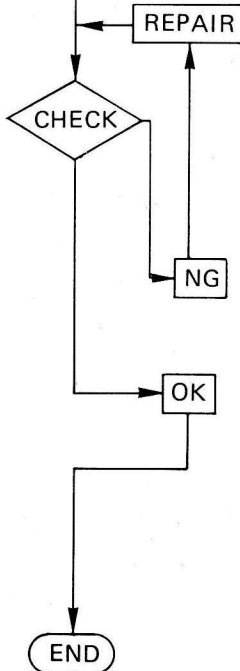


Figure 12



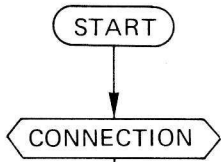
- (1) Check IC301.
 (2) Check C309, C311, R309, R311 (L ch) and C310, C312, R310, R312 (R ch).
 (3) Check PRE amp circuits.

Equalization response at 100 Hz does not fall within + 12.9 (RIAA) ± 2 dB and 10 kHz does not fall within -13.7 (RIAA) ± 2 dB.

Equalization response falls within + 12.9 (RIAA) ± 2 dB at 100 Hz and -13.7 (RIAA) ± 2 dB at 10 kHz.

Proceed to next section.

Tone Control Operation Check



- Connect audio osc. to AUX/TV input jack.
- Connect oscilloscope and V.T.V.M. to speaker terminal.
- Connect 8Ω load to speaker output.
- Set SELECTOR switch to AUX/TV position.
- TAPE MONITOR: OFF
- MONO switch: STEREO
- LOUDNESS: OFF

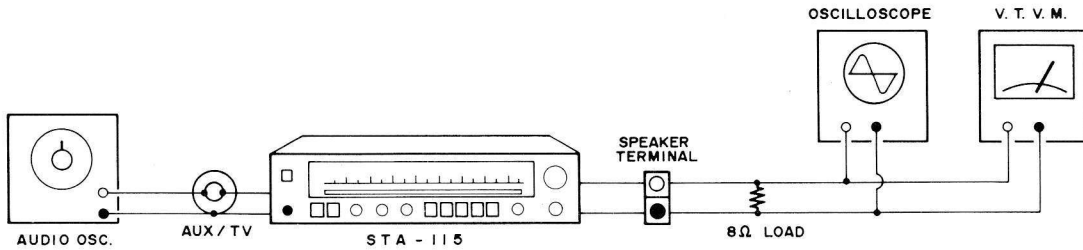


Figure 13

STEP 1

Check BASS action at 100 Hz.

** TONE CONTROL Curve**

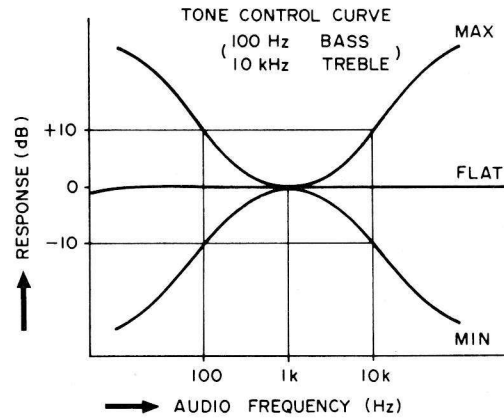
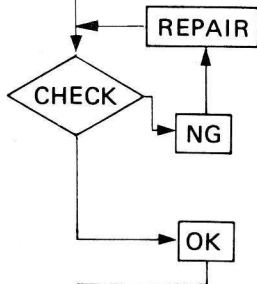


Figure 14



- (1) Check bass control circuit on TUNER AUDIO P.C.B.
 (2) See TROUBLESHOOTING on page 35.

Frequency response does not fall within $\pm 10 \pm 2.5$ dB.

Frequency response falls within $\pm 10 \pm 2.5$ dB.

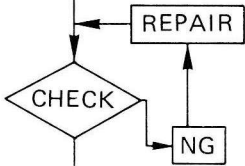
3

3

STEP 2

Check TREBLE action at 10 kHz

** TONE CONTROL Curve (Figure 14)**



- (1) Check treble control circuit on TUNER AUDIO P.C.B.
- (2) See TROUBLESHOOTING on page 35.

Frequency response does not fall within $\pm 10 \pm 2.5$ dB.

Frequency response falls within $\pm 10 \pm 2.5$ dB.

STEP 3

Check LOUDNESS compensation at 48mV RMS output level.
(-30 dB volume position)

LOUDNESS Curve

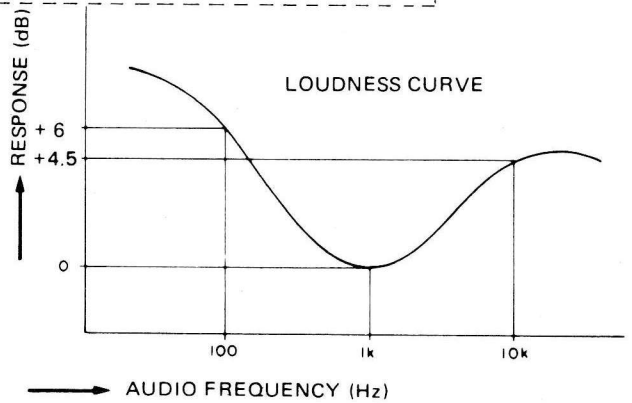
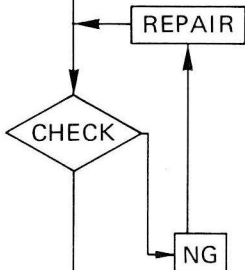


Figure 15



- (1) Check loudness circuit on TUNER AUDIO P.C.B.
- (2) See TROUBLESHOOTING on page 35.

Loudness compensation does not fall within $+ 6 \pm 2.5$ dB at 100 Hz and $+ 4.5 \pm 2.5$ dB at 10 kHz.

Loudness compensation falls within $+ 6 \pm 2.5$ dB at 100 Hz and $+ 4.5 \pm 2.5$ dB at 10 kHz.

END

Proceed to the next section.

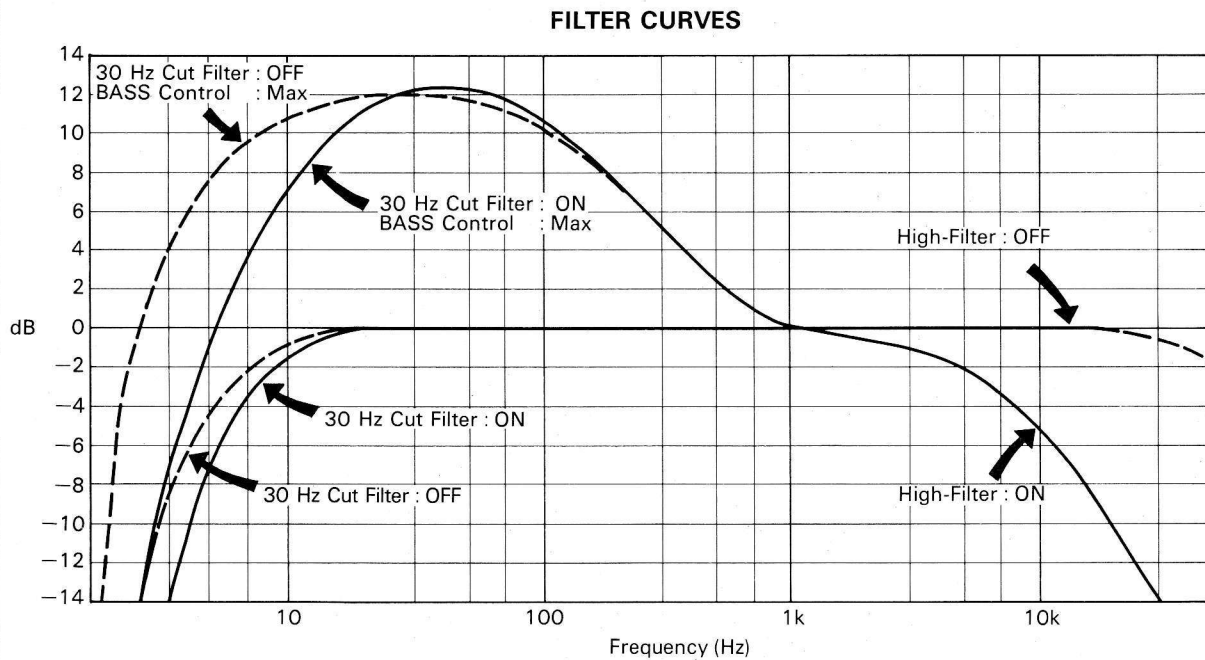
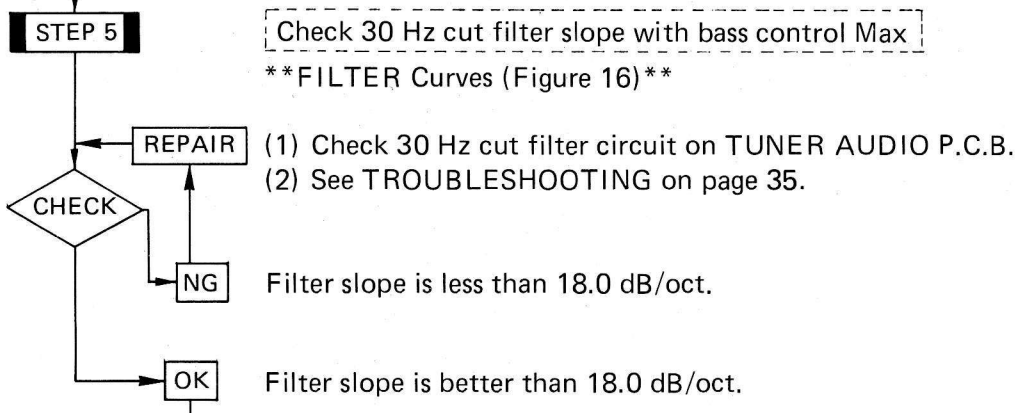
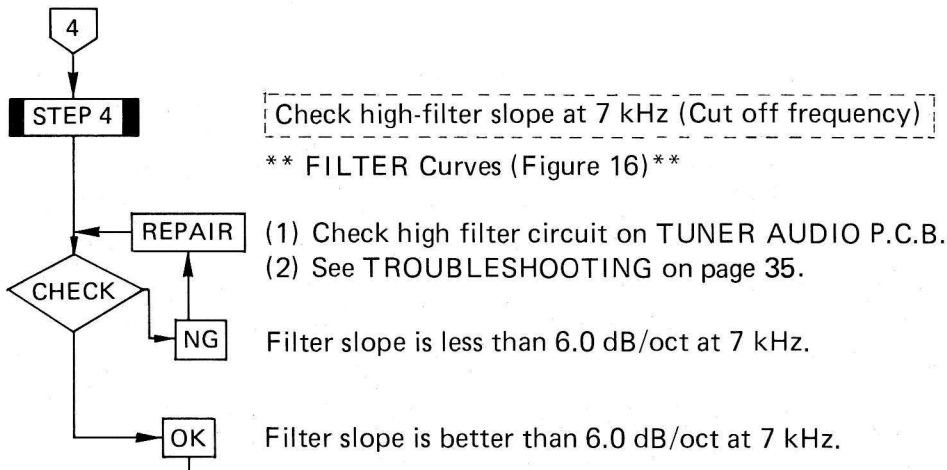
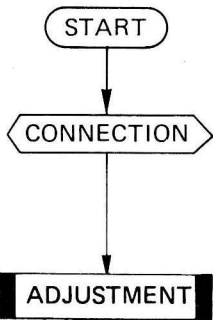


Figure 16

END

Protector Circuit Operation Check



- Connect audio osc. (1 kHz) to AUX/TV input jack.
- Connect audio oscilloscope and V.T.V.M. to speaker terminals.
- Connect 2, 4 or 8Ω load to speaker output terminal.

Adjust output from Audio Osc. to get 2V at 8Ω load.

Check the reset circuits

** Figure 17 **

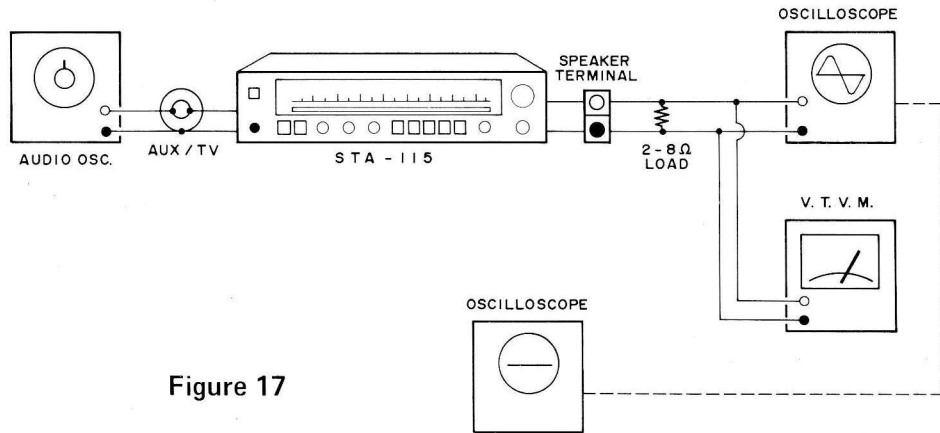
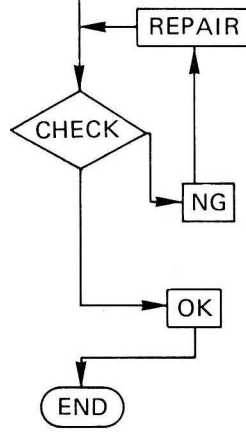


Figure 17

(When protector circuit is activated.)

- (1) Connect 2Ω load to speaker output terminal.
Check for no output after output signal is driven past clipping.
- (2) Connect 8Ω load to speaker output terminal.
Check for no output after output is shorted.
- (3) Connect 4Ω load to speaker output terminal.
Check for normal output after output signal is driven into clipping.



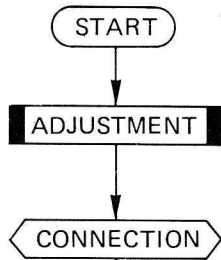
REPAIR Check reset circuit (See TROUBLESHOOTING on page 35.)

NG Reset circuit does not work.

OK Reset circuit works

END Proceed to next section.

AM RF and IF Operation Check



Adjust per AM IF & RF alignment, if required.
See AM IF & RF ALIGNMENT section on page 29.

- Connect standard loop antenna to AM standard signal generator (400 Hz, 30% mod.) and radiate signal into AM ferrite antenna L203.
- Connect oscilloscope, distortion meter and V.T.V.M. to TAPE OUT jack.
- Set SELECTOR switch to AM position.

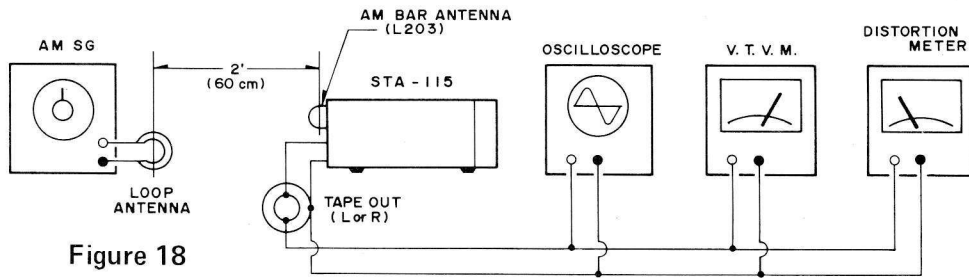
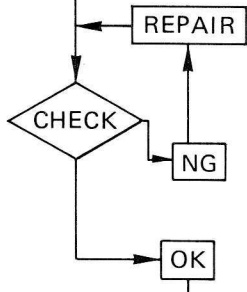


Figure 18

STEP 1

Check AM coverage.

** The lowest dial pointer setting should be under 520 kHz and highest position should be over 1620 kHz.**



(1) Readjust AM coverage. (See page 29 for AM IF & RF ALIGNMENT.)

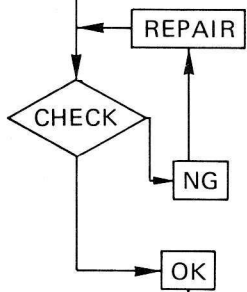
Coverage is less than 520 kHz – 1620 kHz.

Coverage is at least 520 kHz – 1620 kHz.

STEP 2

Check the antenna sensitivity for S/N 20 dB point at 600/1000/1400 kHz.

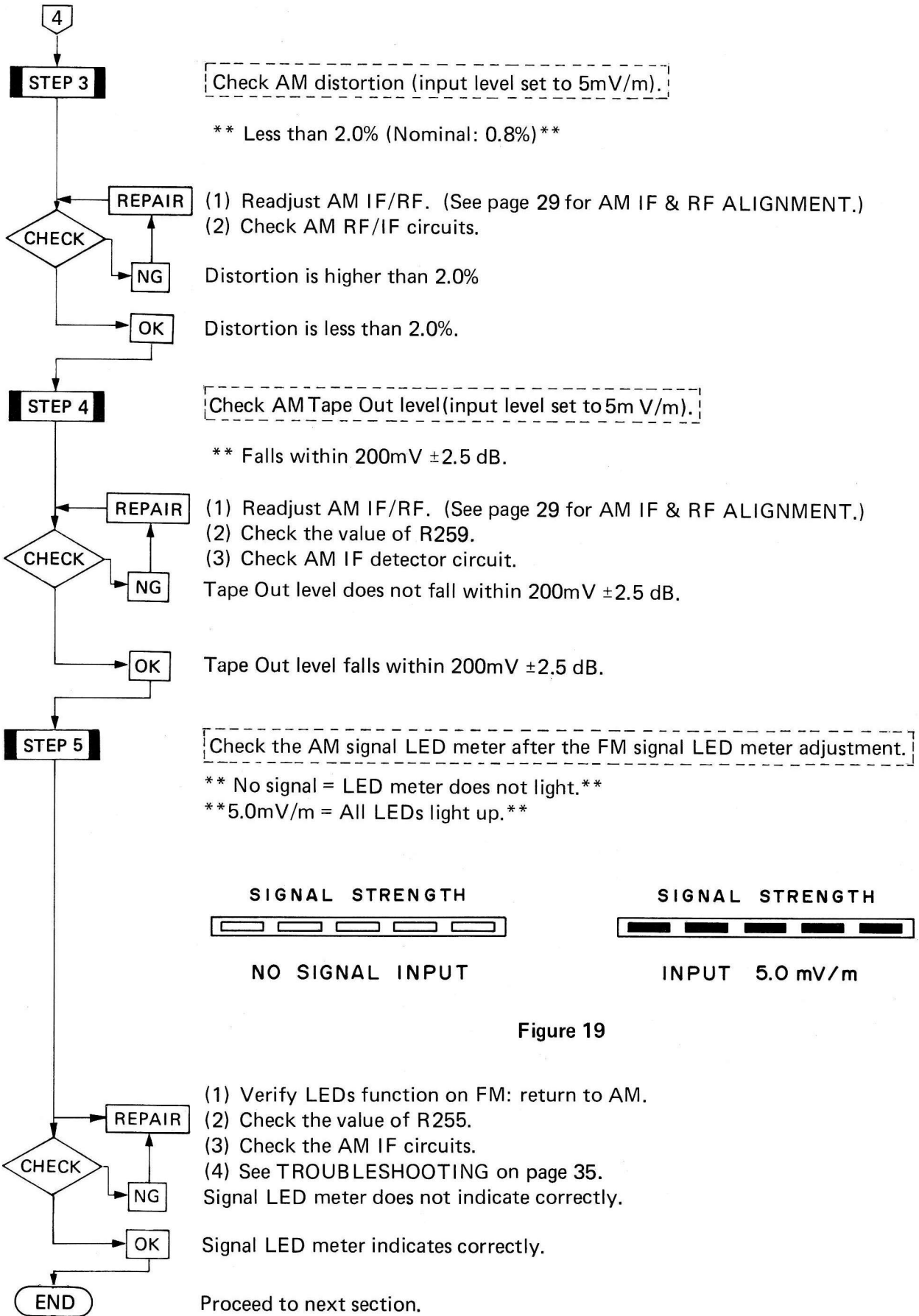
Better than 500 μ V/m



(1) Readjust AM tracking. (See page 29 for AM IF & RF ALIGNMENT.)
(2) Check AM circuit.

AM sensitivity is less than 500 μ V/m.

AM sensitivity is better than 500 μ V/m.



FM RF/IF Operation Check

START

ADJUSTMENT

Adjust per FM alignment, if required.
See page 30 for FM RF & IF ALIGNMENT.

CONNECTION

- Connect FM standard SG (1000 Hz, 75 kHz dev.) to FM 300Ω antenna terminal.
- Connect oscilloscope, distortion meter and V.T.V.M. to TAPE OUT jack.
- Set SELECTOR switch to FM position.

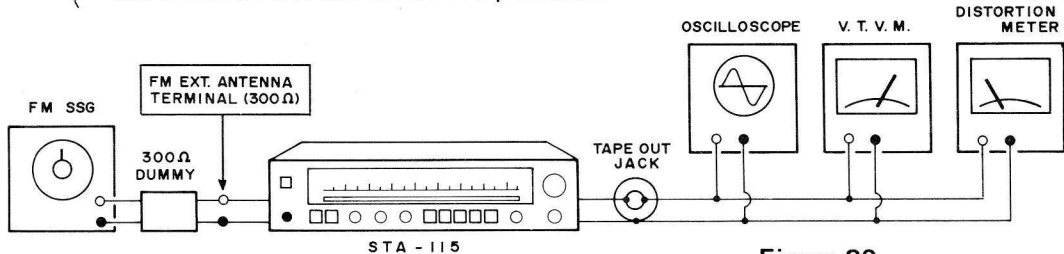
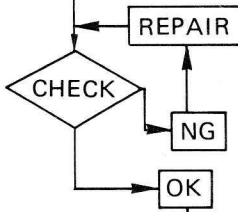


Figure 20

STEP 1

Check FM coverage.

** The lowest dial pointer setting unit is 87.9 MHz and highest pointer position should be over 108 MHz.**



- (1) Readjust FM coverage. (See page 30 for FM RF & IF ALIGNMENT.)
- (2) Check FM RF circuits.

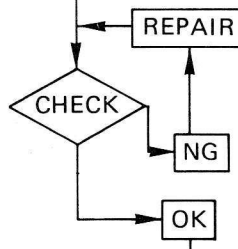
Coverage is less than 87.9 MHz – 108 MHz.

Coverage is at least 87.9 MHz – 108 MHz.

STEP 2

Check IHF sensitivity at 90, 98 and 106 MHz.

** should be less than $3.8\mu\text{V}$ **



- (1) Readjust FM tracking. (See page 30 for FM RF & IF ALIGNMENT.)
- (2) Check FM RF circuits.

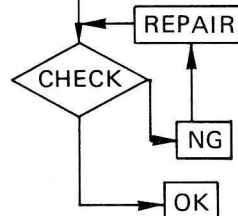
FM IHF sensitivity is higher than $3.8\mu\text{V}$.

FM IHF sensitivity is lower than $3.8\mu\text{V}$.

STEP 3

Check T.H. distortion for MONO signal.
(Input: 1mV, FM standard SG: 98 MHz)

** Lower than 0.5%.**

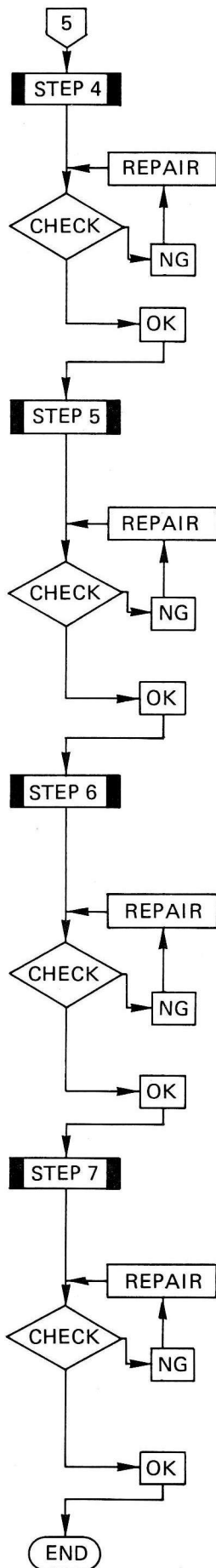


- (1) Readjust RF/IF. (See page 30 for FM RF & IF ALIGNMENT.)
- (2) Check FM RF/IF circuits.

T.H. distortion is higher than 0.5%.

T.H. distortion is lower than 0.5%.

5



Check Signal-to-Noise ratio. (Input signal: 1mV, FM standard SG: 98 MHz)

should be higher than 66 dB.

- (1) Readjust RF/IF. (See page 30 for FM RF & IF ALIGNMENT.)
- (2) Check FM RF/IF circuits.

Signal-to-Noise ratio is lower than 66 dB.

Signal-to-Noise ratio is higher than 66 dB.

Check the signal LED meter.

** No signal = LED meter does not light.**

** 200 μ V/m Input = All LEDs light up.**

- (1) Verify LEDs function on AM; return to FM.
- (2) Readjust VR202 for all LEDs lit at 200 μ V/m input.
- (3) Check FM IF circuit.

Signal LED meters do not light correctly.

Signal LED meters light correctly.

Check FM 75 μ sec de-emphasis response curve.

See Figure 22

- (1) Check and/or change value of C229 (Lch), C230 (Rch). (Pin 8, 10 of IC202)

FM 75 μ sec response at 10 kHz modulation does not fall within -13.65 ± 1.5 dB.

FM 75 μ sec response at 10 kHz modulation falls within -13.65 ± 1.5 dB.

Check muting threshold. (Input: 98 MHz)

** Input 4.0 – 10.0 μ V (Nominal 7.0 μ V) **

Readjust VR201 (Pin 13, IC201).

Muting level is not 4.0 – 10.0 μ V.

Muting level is 4.0 – 10.0 μ V.

Proceed to next section.

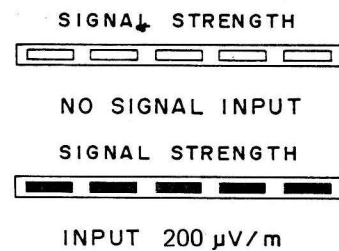


Figure 21

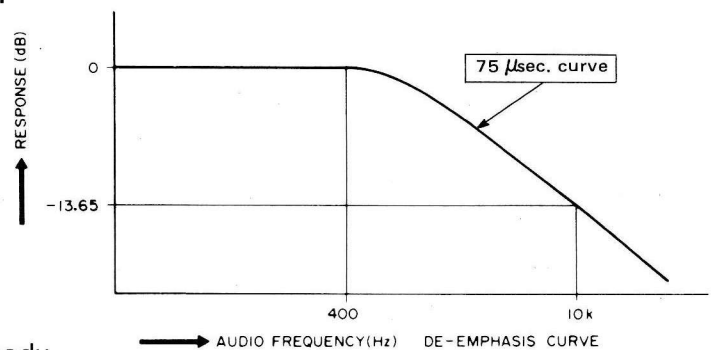
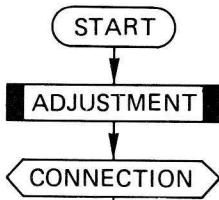


Figure 22

FM MPX Operation Check



Adjust per FM MPX alignment.

- Connect FM stereo SG (1000 Hz, 67.5 kHz dev., 9% Pilot) through FM standard SG to 300Ω antenna terminal.
- Connect oscilloscope, distortion meter and V.T.V.M. to TAPE OUT jack.
- Set SELECTOR switch to FM position.
- Set MONO switch to OUT (stereo) position.

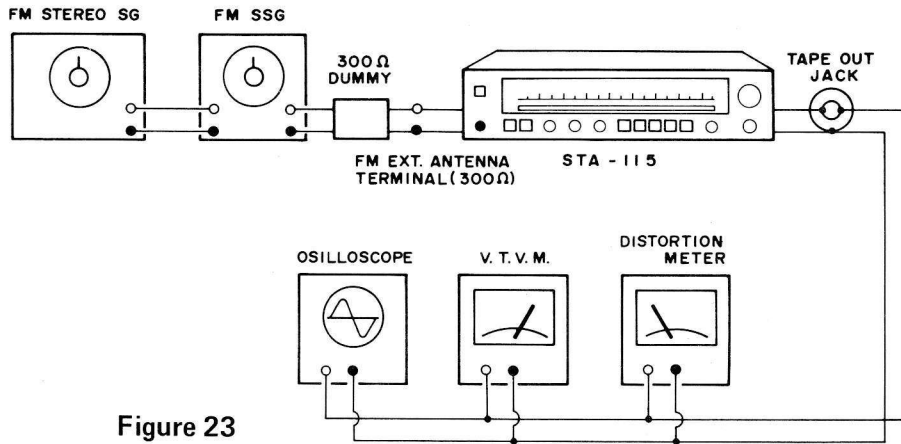
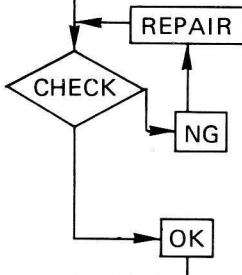


Figure 23

STEP 1

Check the stereo indicator sensitivity.

** Lower than 5.0 – 15.0μV (Nominal: 7.0μV)**



- (1) Readjust FM MPX. (See page 32 for FM MPX ALIGNMENT.)
- (2) See TROUBLESHOOTING on page 34.

Stereo indicator sensitivity is higher than 5.0 – 15.0μV.

Stereo indicator sensitivity is lower than 5.0 – 15.0μV.

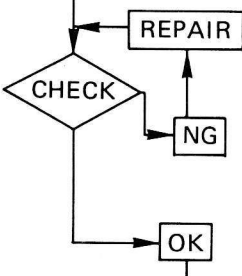
STEP 2

Check stereo separation at 100 Hz, 1 kHz and 10 kHz (input = 1mV).

** More than 28 dB at 100 Hz**

33 dB at 1 kHz

25 dB at 10 kHz



- (1) Readjust FM MPX. (See page 32 for FM MPX ALIGNMENT.)
- (2) See TROUBLESHOOTING on page 34.

Separation is less than 28 dB at 100 Hz, 33 dB at 1 kHz, and 25 dB at 10 kHz.

Separation is more than 28 dB at 100 Hz, 33 dB at 1 kHz, and 25 dB at 10 kHz.

END

Proceed to ALIGNMENT section.

ALIGNMENT INSTRUCTIONS

FM Coil & Trimmer Location (Tuner, Audio P.C.B.)

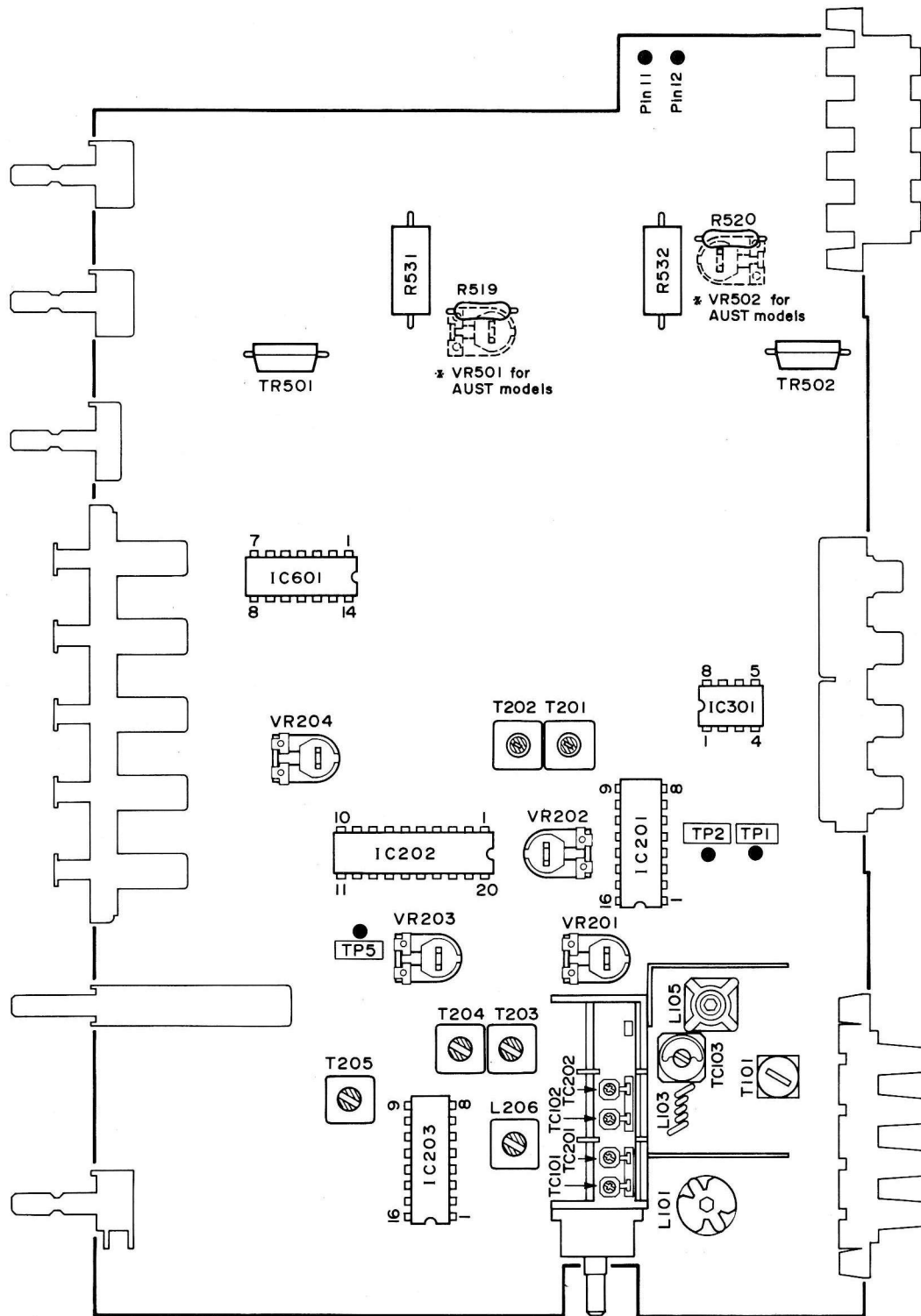


Figure 24

Note: Refer to P.C.B. illustration for alignment and adjustment points.

Audio Circuit Adjustment

Equipment Required

1. AC Voltmeter

Notes:

- Maintain voltage at 120 volts AC, 60 Hz (U.S.A., Canada) (240 volt AC, 50 Hz for Australian models.)
- Set SELECTOR switch to AUX/TV.
- Set MONO switch to IN position.
- Set volume to minimum.

Set-Up

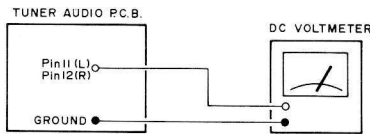


Figure 25

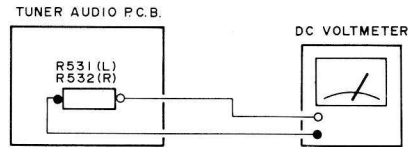


Figure 26

- Connect DC voltmeter to pin 11 (L) or pin 12 (R) and GROUND of TUNER AUDIO P.C.B.
- Connect DC voltmeter to R531 (L ch) or R532 (R ch).

Adjustment Check

STEP	ADJUSTMENT	EQUIPMENT	LEVEL	ADJUSTMENT/CHECK
1	Check balance by measuring DC voltage across OUTPUT terminal of L and R channel.	DC voltmeter (Figure 25)	DC voltage should be less than $\pm 50\text{mV}$.	Check: TR501(L) TR502(R)
2	Idling current adjustment (for U.S.A. and Canadian models)	DC voltmeter (Figure 26)	Adjust voltage across emitter resistors R531 and R532 to 2.35mV $+4.7/-1.88\text{mV}$ (8Ω Load)	Check the value of R519(L), R520(R).
3	Idling current adjustment (for Australian models)	same as above	same as above	Adjust VR501 (L), VR502(R).

AM IF & RF Alignment

Equipment Required

1. AM standard signal generator
2. Standard loop antenna
3. Oscilloscope
4. AC voltmeter
5. Distortion meter

- Notes:**
- Signal generator output should be no higher than necessary to obtain an output reading.
 - Maintain voltage at 120 volts AC, 60 Hz (U.S.A., Canada). (Use 240 volts AC, 50 Hz for Australian models.)

- Set SELECTOR switch to AM.
- Set BASS, TREBLE and BALANCE to center;
- Volume to minimum.

Set-Up

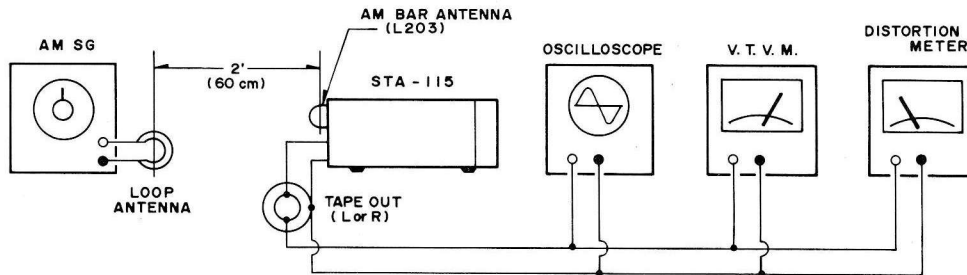


Figure 27

- Connect standard loop antenna to signal standard generator and radiate signal into the AM antenna.
- Connect oscilloscope, AC voltmeter and distortion meter to TAPE OUT jack.

Adjustment Check

STEP	SIGNAL GENERATOR FREQUENCY	DIAL SETTING	INDICATOR	ADJUSTMENT	REMARKS
1	455 kHz (400 Hz, 30% mod.)	Point of non-interference (near 600 kHz)	<ul style="list-style-type: none"> • AC voltmeter • Oscilloscope • Distortion meter 	T203, 204, 205 (AM IFT)	Adjust for maximum reading on meter.
2	520 kHz (400 Hz, 30% mod.)	Tuning gang fully closed.	same as above	L206 (AM OSC Coil)	same as above
3	1620 kHz (400 Hz, 30% mod.)	Tuning gang fully opened.	same as above	TC202 (AM OSC Trimmer)	same as above
4	600 kHz (400 Hz, 30% mod.)	600 kHz	same as above	L203 (AM ANT. Coil)	same as above
5	1400 kHz (400 Hz, 30% mod.)	1400 kHz	same as above	TC201 (AM ANT. Trimmer)	same as above
6	Repeat steps 4 and 5 until no further change is noticed.				

FM RF & IF Alignment

Equipment Required

1. Standard signal generator
2. FM dummy antenna
3. Oscilloscope
4. AC voltmeter
5. Distortion meter
6. Center tuning meter
($1.2k\Omega$, $200\mu A$)

- Notes:
- Signal generator output should be no higher than necessary to obtain an output reading.
 - Maintain voltage at 120 volts AC, 60 Hz (U.S.A., Canada). (Use 240 volts AC, 50 Hz for Australian models.)

- Set SELECTOR switch to FM.
- Set MONO switch to OUT (stereo) position.

Set-Up

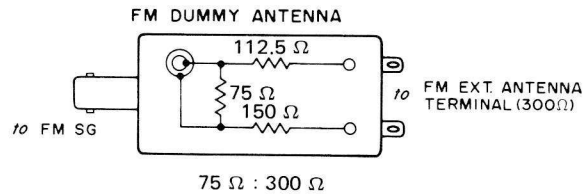


Figure 28

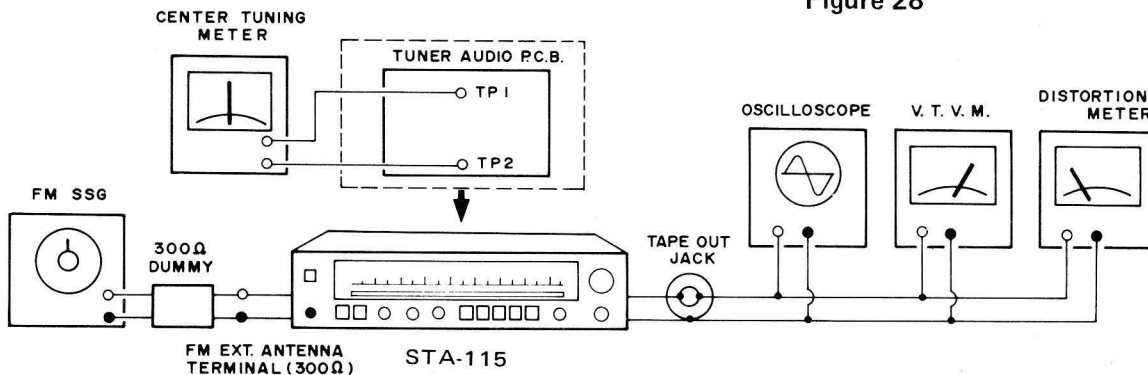


Figure 29

- Connect standard signal generator to FM antenna terminal (300Ω) through FM dummy antenna (300Ω).
- Connect oscilloscope, AC voltmeter and distortion meter to TAPE OUT jack.
- Connect center tuning meter ($1.2k\Omega$, $200\mu A$) to TP1 and TP2 on TUNER/AUDIO P.C.B.

Adjustment Check

STEP	GENERATOR FREQUENCY	DIAL SETTING	INDICATOR	ADJUSTMENT	REMARKS
1	98 MHz (1000 Hz, 75 kHz dev.) Input: about $2 - 4\mu V$	98 MHz	<ul style="list-style-type: none"> • AC voltmeter • Oscilloscope • Distortion meter 	T101 FM IF	Adjust for maximum reading on meter.
2	98 MHz (1000 Hz, 75 kHz dev.) Input: no input (unit off)	98 MHz	<ul style="list-style-type: none"> • Center tuning meter 	T201 (Primary)	Adjust for center point on center tuning meter.
3	98 MHz (1000 Hz, 75 kHz dev.) Input: 1mV	98 MHz	<ul style="list-style-type: none"> • AC voltmeter • Oscilloscope • Distortion meter 	T202 (Secondary)	Adjust for minimum Distortion (better than 0.5%).
4	Repeat steps 1, 2 and 3 until no further improvement is noticed.				See Figure 30 and Figure 31.

STEP	GENERATOR FREQUENCY	DIAL SETTING	INDICATOR	ADJUSTMENT	REMARKS
5	87.9 MHz (1000 Hz, 75 kHz dev.) Input 1mV	87.9 MHz	<ul style="list-style-type: none"> ● AC voltmeter ● Oscilloscope ● Distortion meter 	L105 (FM OSC. Coil)	Adjust for maximum reading on meter.
6	108 MHz (1000 Hz, 75 kHz dev.)	108 MHz	<ul style="list-style-type: none"> ● AC voltmeter ● Oscilloscope ● Distortion meter 	TC103 (FM OSC. Trimmer)	Adjust for maximum reading on meter.
7	Repeat steps 5 and 6 until no further improvement is noticed.				
8	90 MHz (1000 Hz, 75 kHz dev.) Input: about 2 – 4 μ V	90 MHz	<ul style="list-style-type: none"> ● AC voltmeter ● Oscilloscope ● Distortion meter 	L101 (FM antenna coil) L103 (FM RF coil – stretch or squeeze)	Adjust for maximum reading on meter.
9	106 MHz (1000 Hz, 75 kHz dev.) Input: about 2 – 4 μ V	106 MHz	<ul style="list-style-type: none"> ● AC voltmeter ● Oscilloscope ● Distortion meter 	TC101 (FM antenna trimmer) TC102 (FM RF trimmer)	Adjust for maximum reading on meter.
10	Repeat steps 8 and 9 until no further improvement is noticed.				
11	98 MHz (1000 Hz, 75 kHz dev.) Input: 4 – 10 μ V	98 MHz	<ul style="list-style-type: none"> ● AC voltmeter ● Oscilloscope ● Distortion meter 	VR201 (Mute threshold adj.)	Set selector to FM mute and adjust VR201 for no signal output.
12	98 MHz (1000 Hz, 75 kHz dev.) Input: 200 μ V	98 MHz	<ul style="list-style-type: none"> ● Signal meter (LEDs) on set. 	VR202 (FM signal meter adj.)	Adjust until all the signal LEDs light.

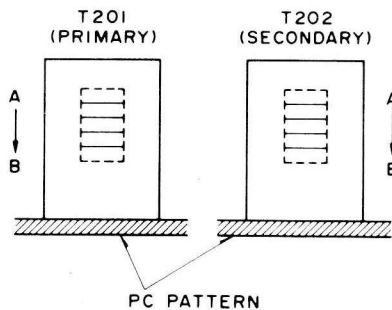


Figure 30

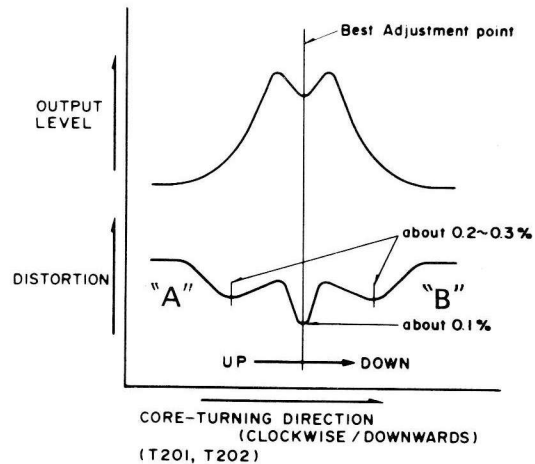


Figure 31

FM Stereo (Multiplex & Separation) Alignment

Equipment Required

1. Stereo modulator
Modulation level of 19 kHz
Pilot signal 8 – 10%
2. FM signal generator
Output level – 1mV
Frequency – Approximately 98 MHz
Deviation – 75 kHz, 100% deviation
3. Audio generator of composite signal
4. AC voltmeter
5. Oscilloscope
6. Distortion meter
7. Frequency counter

Notes:

- Signal Generator output should be no higher than necessary to obtain an output reading.
- Maintain voltage at 120 volts AC, 60 Hz (U.S.A., Canada) (240 volt AC, 50 Hz for Australian models.)

- Set SELECTOR switch to FM.
- Set MONO switch to OFF (stereo) position.

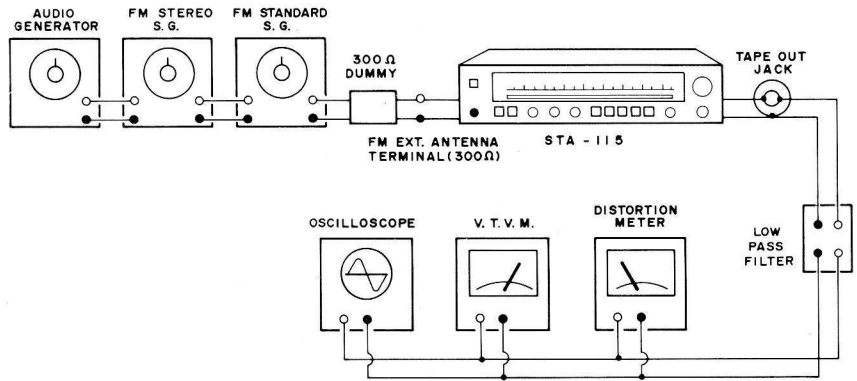


Figure 33

Set-Up

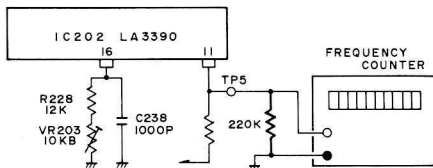


Figure 32

- Connect stereo modulator to EXT. Mod. terminal of FM signal generator.
- Connect to FM Antenna terminal through FM dummy antenna (300Ω). (See Figure 28 Dummy Ant.)
- Connect oscilloscope, AC voltmeter, distortion meter, and Low Pass filter (10 Hz – 15 kHz ±0.5 dB, 19 kHz – over 45 dB, 38 kHz – over 50 dB) to TAPE OUT jack.
- Connect counter to TP5 (near IC202) and GROUND, and terminate a 220K resistor to counter input in parallel (Figure 32).

Adjustment Check

Step	Stereo Modulation	Indicator	Adjustment	Remarks
1	Mono 1 kHz (1000 Hz, No Mod.) Input 1mV	• Counter	VR203 (19 kHz Adj.)	Adjust for 19 kHz ±50 Hz on Counter
2	Composite MPX signal 1 kHz on left channel ONLY	• AC voltmeter (TAPE OUT jack of right channel)	VR204 (Separation)	Adjust for minimum reading on meter.
3	Composite MPX signal 1 kHz on right channel ONLY	• AC voltmeter (TAPE OUT jack of left channel)	VR204 (Separation)	Adjust for minimum reading on meter.
4	Repeat steps 2 and 3 until AC voltmeter reading is at least –33 dB. (i.e. 33 dB separation) Nominal: 45 dB			
5	Composite MPX signal 1 kHz	• AC voltmeter	–	With 5 – 15μV antenna input signal, Stereo indicator LED (D807) should come on.
6	Composite MPX signal 1 kHz	• Distortion meter	–	With 1mV antenna input signal, Stereo distortion should be less than 1.5%.

TROUBLESHOOTING

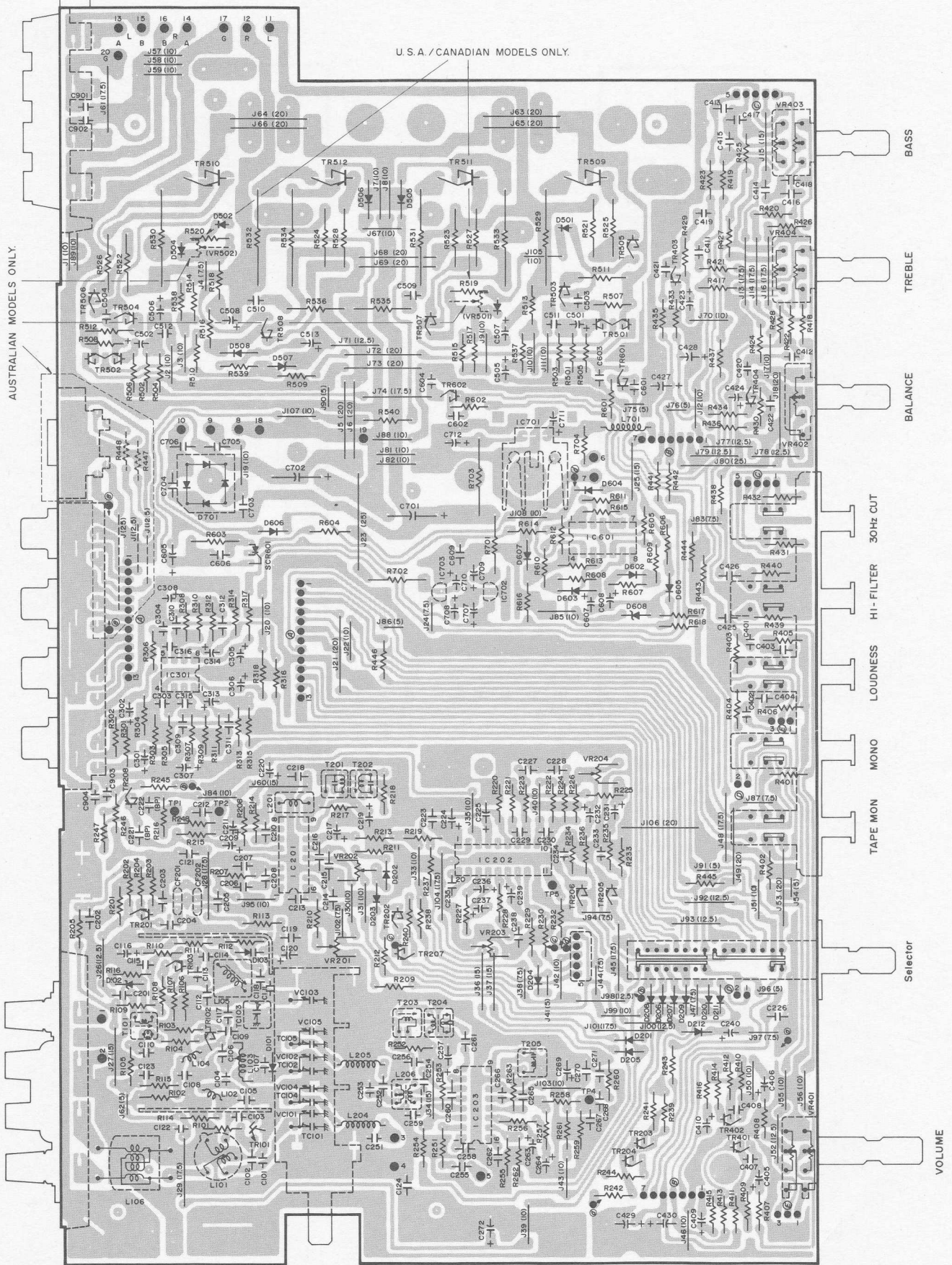
SYMPTOM	CAUSE AND REMEDY
1) No output	(1) Faulty AC power cord: Replace. (2) Defective POWER switch: Replace. (3) Broken wire in the power transformer: Replace. (4) Blown primary fuse: Replace. (5) Defective D701 or diodes, transistor(s) in power supply circuit on TUNER AUDIO P.C.B.: Replace the defective part(s). (6) Main amp or temperature protector circuit activated or defective: Deactivate or repair.
2) Fuse blows	(1) Defective rectifier D701: Replace. (2) Short-circuit in the rectifier circuit: Remove the short. (3) Short-circuit in power transistor circuitry TR505 – 512: Repair circuit and/or replace the defective transistor(s). (4) Defective power transformer: Replace.
3) A Speakers do not work.	(1) Speaker selector switch defective: Replace. (2) Poor contact in speaker output terminals: Repair or replace. (3) Poor contact in speaker selector switch: Repair or replace.
4) B Speakers do not work.	(1) Speaker selector switch defective: Replace. (2) Poor contact in speaker selector switch: Repair or replace. (3) Poor contact in speaker output terminals: Repair or replace.
5) No output on one channel with VOLUME at maximum and BALANCE at center, when a test signal is applied to the BALANCE control (VR402) terminal of the non-operating channel.	(1) Defective TR401, TR403, TR601, TR501 left channel (equiv. Rt. ch.). Also SCR601 and IC601: Replace the defective part(s). (2) Defective resistor or capacitor of TONE and MAIN AMP circuit: Replace the defective part(s).
6) No output when a test signal is applied to the input terminals.	(1) Defective MONO switch or TAPE MONitor switch: Repair or replace. (2) Defective SELECTOR switch: Replace.
7) No output when a test signal is applied to the PHONO input terminals	(1) Defective transistor, resistor or capacitor of PREAMP circuit: Replace the part(s). (2) Defective MONO-Stereo or TAPE Monitor switch: Repair or replace. (3) Defective SELECTOR switch: Replace. (4) Defective IC301: Replace.
8) DC not balanced within $\pm 50\text{mV}$ at output of L/R channel	(1) Defective TR501, TR503, TR505(L) or TR502, TR504, TR506 (R): Replace the defective transistor(s). (2) Improper value for R503, R511 (L) or R504, R512 (R): Select suitable value resistor.

SYMPTOM	CAUSE AND REMEDY
9) Speaker works normally but head- phone does not work.	(1) Defective R901 (Left) or R902 (Right): Change defective resistor(s). (2) Headphone plug does not mate with jack: Replace the plug.
10) All the inputs work normally except AUX/TV input.	(1) Poor contact in AUX/TV input jack: Repair or replace. (2) Poor contact in SELECTOR switch: Repair or replace the switch.
11) PHONO input inoperative	(1) Poor contact in PHONO input jack: Repair or replace. (2) Faulty SELECTOR switch: Repair or replace.
12) TAPE OUT inoperative	(1) Poor contact in TAPE OUT output jack: Repair or replace.
13) TAPE IN inoperative	(1) Poor contact in TAPE IN input jack: Repair or replace.
14) No AM or FM (tuner B+ voltage is 13 – 14V.)	(1) Broken secondary winding in the power transformer: Replace. (2) Faulty capacitor C711 or C712: Replace the defective capacitor(s). (3) Faulty resistor R703: Replace. (4) Defective IC701: Replace. (5) Short-circuit in tuner B+ circuit: Repair the short. (6) Poor contact in SELECTOR switch: Repair or replace the switch.
15) No FM	(1) Poor contact in SELECTOR switch: Repair or replace. (2) IC, transistor, diode, resistor, capacitor, inductor or IFT of FM IF circuit defective: Replace the defective part(s). (3) FM front end defective: Replace the defective part(s). (4) Faulty FM antenna lead-in/circuitry: Repair or replace the antenna lead-in/circuitry.
16) No AM	(1) Poor contact in SELECTOR switch: Repair or replace. (2) IC, transistor, diode, resistor, capacitor or IFT of AM IF circuit defective: Replace the defective part(s). (3) Bar-antenna coil defective: Repair or replace.
17) No FM MPX separation	(1) Improper adjustment: Readjust VR203 and VR204. (2) IC202 in MPX circuit defective: Replace. (3) VR203, VR204 defective: Replace the trimmer resistor(s).
18) No STEREO light or FM stereo does not work.	(1) Broken STEREO indicator LED D807: Replace. (2) Defective IC202 of FM MPX circuit: Replace the defective IC. (3) VR204 defective or misadjusted: Replace the defective trimmer resistor or adjust.

SYMPTOM	CAUSE AND REMEDY
19) LOUDNESS has no effect.	(1) Defective LOUDNESS switch: Replace. (2) Defective C401, C403, R403, R405 (L) or C402, C404, R404, R406 (R): Replace the defective part(s).
20) MONO-Stereo not effective	(1) Defective MONO-Stereo switch: Repair or replace.
21) MUTING not effective	(1) Defective SELECTOR switch: Repair or replace. (2) Defective transistor TR203, TR204, TR205, TR206: Replace the defective transistor(s). (3) Defective trimmer resistor VR201: Replace. (4) Defective diode D212: Replace. (5) Defective IC201: Replace.
22) TAPE MONitor does not operate.	(1) Defective TAPE MONitor switch: Replace or repair.
23) BASS has no effect.	(1) VR404 (100k ohm control) defective: Replace. (2) Defective C413, 415, 417, R419, 425 (L) or C414, 416, 418, R420, 426 (R): Replace the defective part(s).
24) TREBLE has no effect.	(1) VR403 (100k ohm control) defective: Replace. (2) Defective C411, R417, 421, 427 (L) or C412, R418, 422, 428 (R): Replace the defective part(s).
25) 30 Hz CUT FILTER has no effect.	(1) Defective 30 Hz CUT FILTER switch: Replace the switch. (2) Defective TR403, 404 capacitor(s), resistor(s) in 30 Hz cut Filter circuit: Replace the defective parts.
26) HIGH FILTER has no effect.	(1) Defective HIGH FILTER switch: Replace. (2) Defective C425 (L) or C426 (R): Replace the defective capacitor(s).
27) AM/FM SIGNAL METER not functioning	(1) Defective AM/FM Signal Meter D801 – 805, IC801: Replace the defective part(s). (2) In case of FM reception, IC201, D202, D203, VR202 defective: Replace the defective part(s). (3) In case of AM reception, IC203, R255, R262 defective: Replace the defective part(s).
28) TUNED LED not functioning	(1) Defective D806: Replace. (2) Improper adjustment: Readjust T201, T202.
29) Protector circuit does not work.	(1) Defective SCR601, IC601, TR601 or TR602. Replace the defective part(s). (2) Defective resistor(s), capacitor(s), diode(s) in protector circuit: Replace the defective component(s).

Bottom View

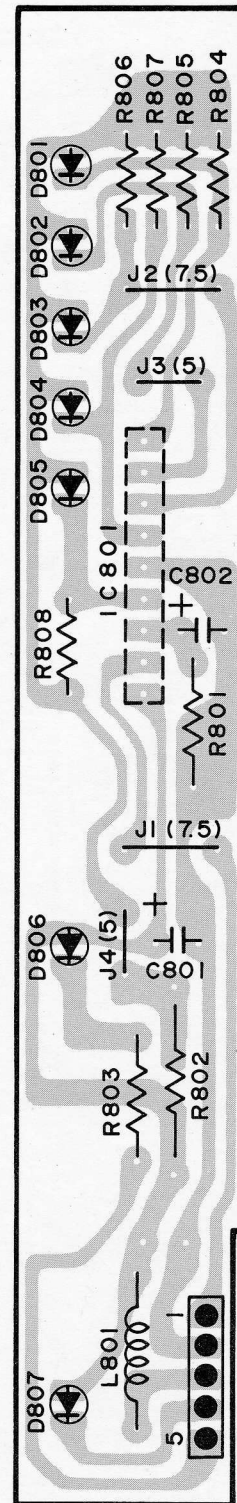
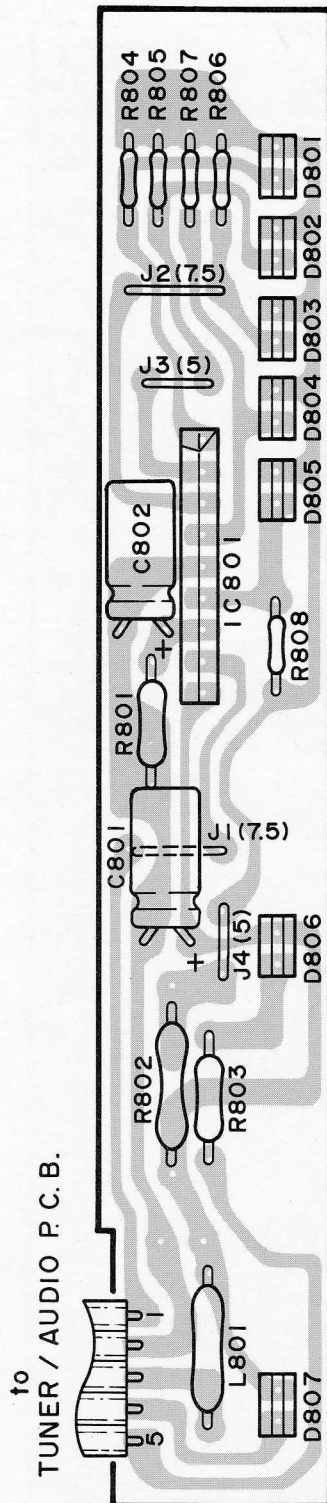
U.S.A. / CANADIAN MODELS ONLY.



LED P.C.B. (TOP & BOTTOM VIEWS)

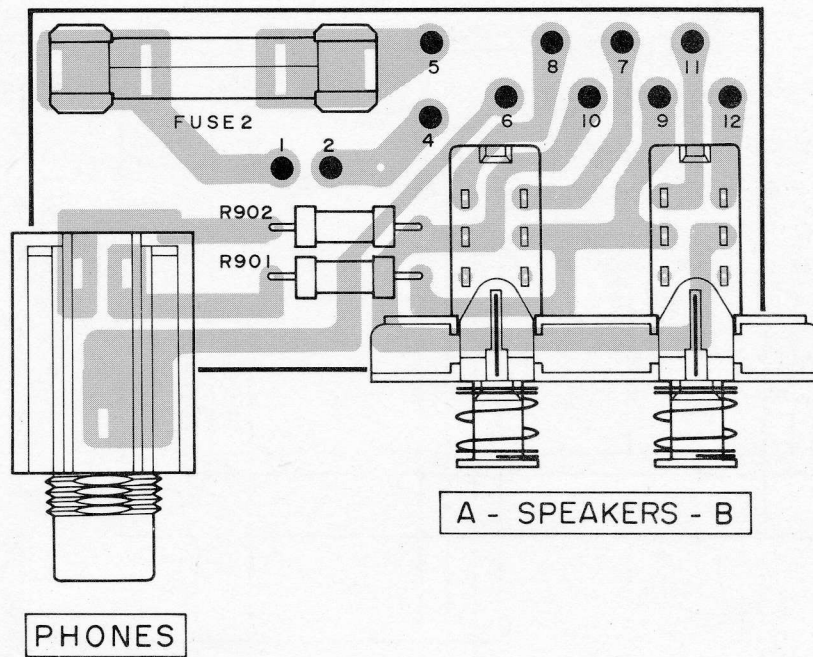
Top View

Bottom View

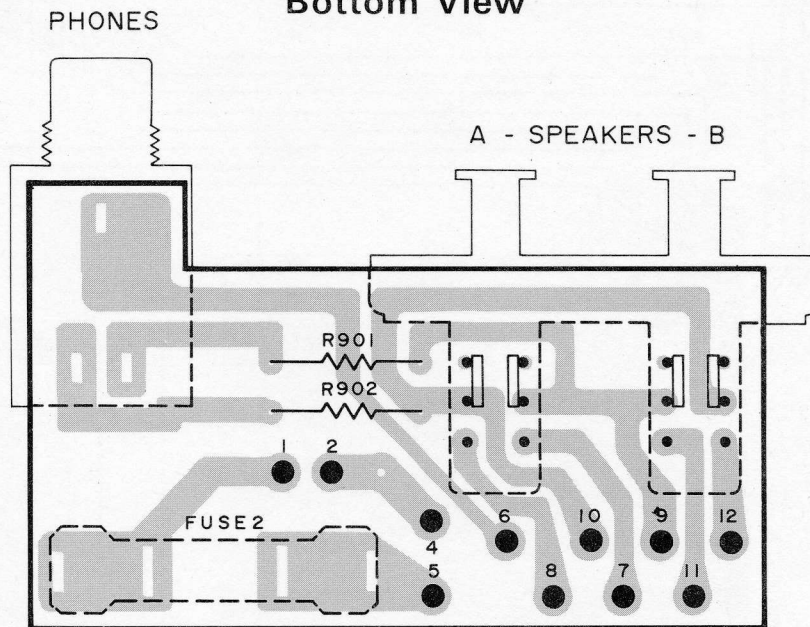


SPEAKER SWITCH P.C.B. (TOP & BOTTOM VIEWS)

Top View

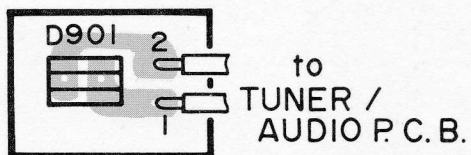


Bottom View

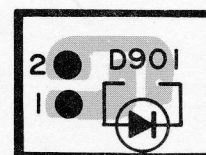


DIAL POINTER P.C.B. (TOP & BOTTOM VIEWS)

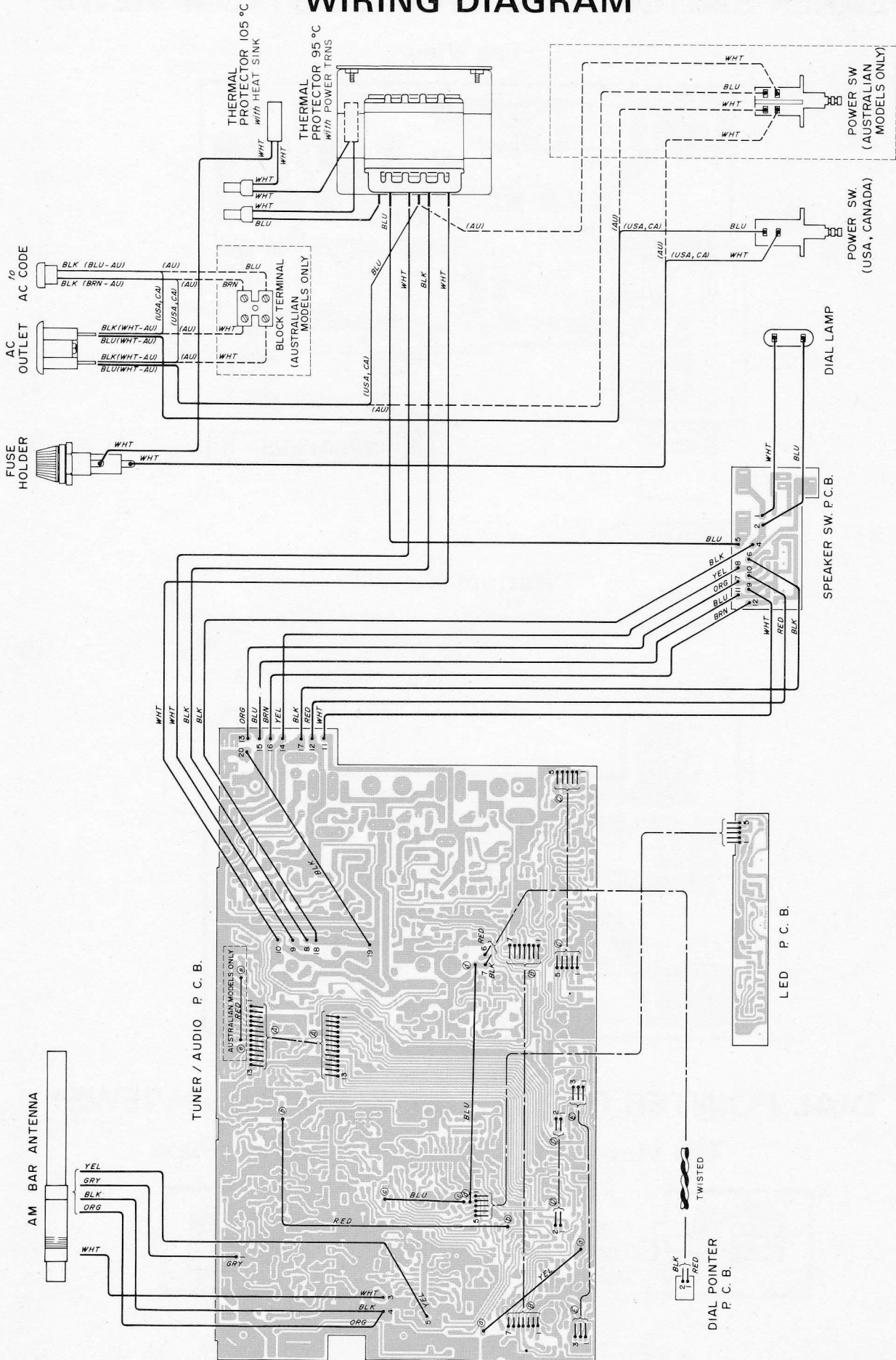
Top View



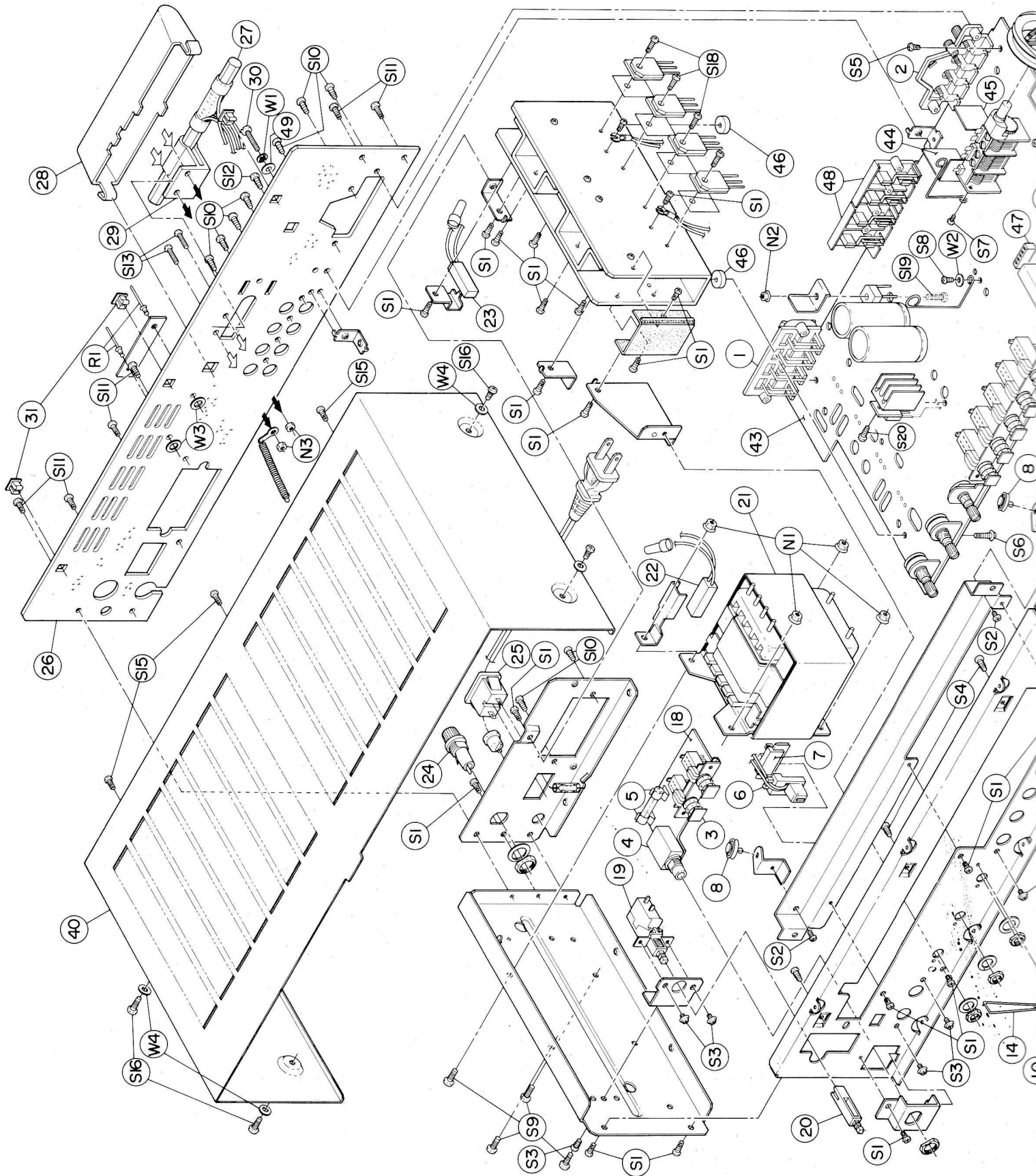
Bottom View



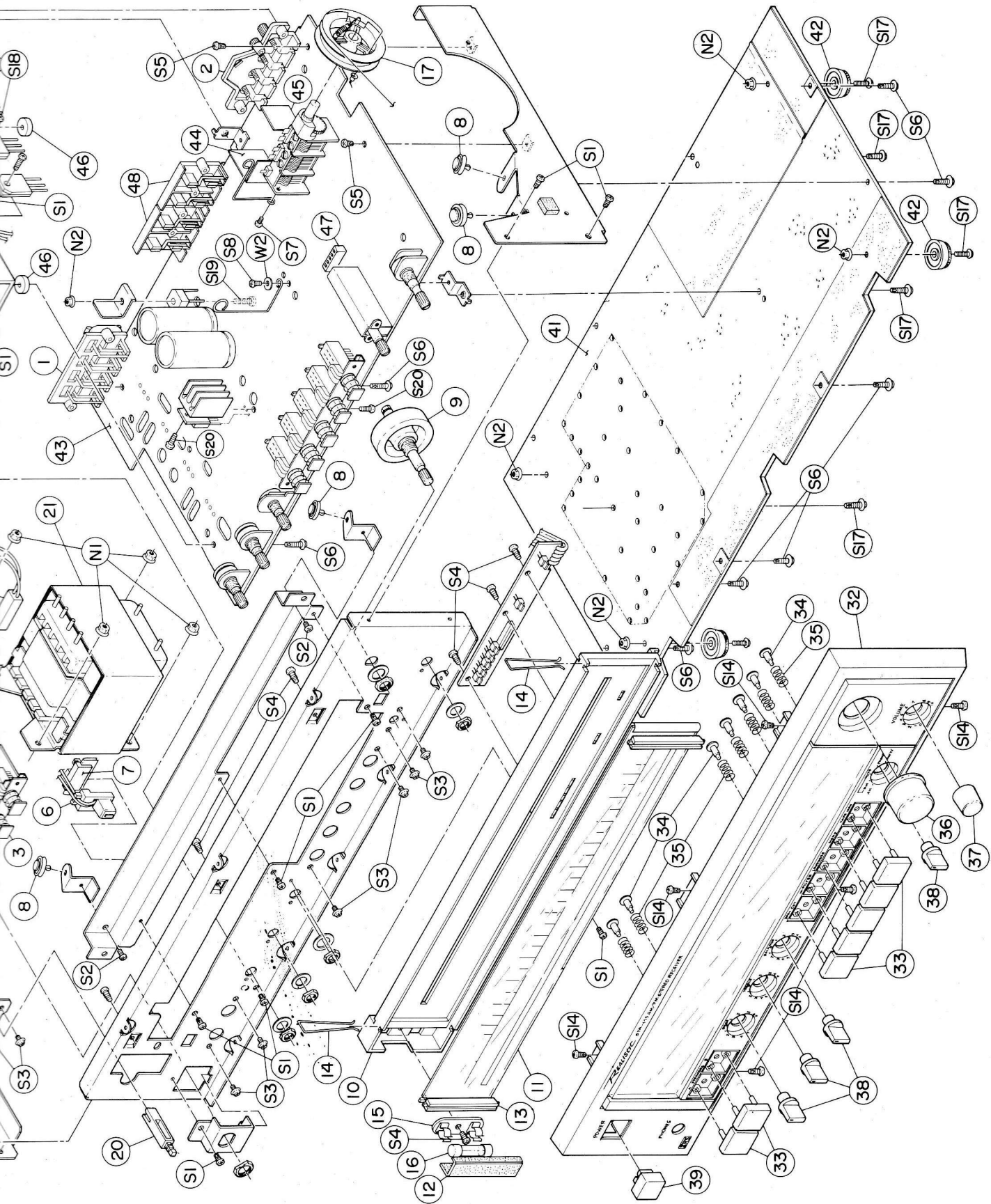
WIRING DIAGRAM



EXPLODED VIEW



EXPLODED VIEW



ELECTRICAL PARTS LIST

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

CAPACITORS					
Ref. No.	Material	Value (μ F)	Voltage (V)	Tolerance (%)	R/S Part No.
C101	Ceramic	18 p (NPO)	50	± 5	CF-1853
C102	Ceramic	30 p	50	± 5	CF-1970
C103	Ceramic	1 p (NPO)	50	± 0.25 pF	CF-1010
C104	Ceramic	30 p	50	± 5	CF-1970
C105	Ceramic	0.01	50	+80/-20	CC103JJCP
C106	Ceramic	10 p	50	± 0.5 pF	CF-1815
C107	Ceramic	18 p (NPO)	50	± 5	CF-1853
C108	Ceramic	120 p	50	± 5	CF-1973
C109	Ceramic	0.022	50	+80/-20	CC223KJCP
C110	Ceramic	0.01	50	+80/-20	CC103JJCP
C111	Ceramic	12 p (N750)	50	± 5	CF-7353
C112	Ceramic	10 p (NPO)	50	± 0.5 pF	CF-1141
C113	Ceramic	15 p (NPO)	50	± 5	CF-1188
C114	Ceramic	15 p (NPO)	50	± 5	CF-1188
C115	Ceramic	0.0047	50	± 10	CC472KJCP
C116	Electrolytic	1	50	± 20	CC105KJAP
C117	Ceramic	1 p (NPO)	50	± 0.25 pF	CF-1010
C118	Ceramic	13 p (NPO)	50	± 5	CF-2067
C119	Ceramic	0.047	50	+80/-20	CC473JJCP
C120	Electrolytic	0.47	50	± 20	CC474MJAP
C121	Ceramic	0.047	50	+80/-20	CC473JJCP
C122	Ceramic	0.01	50	+80/-20	CC103JJCP
C123	Ceramic	0.022	50	+80/-20	CC223KJCP
C124	Ceramic	120 p	50	± 5	CF-1973
C201	Ceramic	0.01	50	+80/-20	CC103JJCP
C202	Ceramic	0.047	50	+80/-20	CC473JJCP
C203	Ceramic	0.022	50	+80/-20	CC223KJCP
C204	Ceramic	0.01	50	+80/-20	CC103JJCP
C205	Ceramic	0.01	50	+80/-20	CC103JJCP
C206	Ceramic	0.047	50	+80/-20	CC473JJCP
C207	Ceramic	0.047	50	+80/-20	CC473JJCP
C208	Ceramic	0.047	50	+80/-20	CC473JJCP
C209	Electrolytic	4.7	50	± 20	CC475MJAP
C210	Ceramic	220 p	50	± 5	CC221JJCP
C211	Electrolytic	0.47	50	± 20	CC474MJAP
C212	Ceramic	0.047	50	+80/-20	CC473JJCP
C213	Ceramic	0.022	50	+80/-20	CC223KJCP
C214	Ceramic	0.022	50	+80/-20	CC223KJCP
C215	Ceramic	0.022	50	+80/-20	CC223KJCP
C216	Ceramic	0.022	50	+80/-20	CC223KJCP
C217	Electrolytic	10	16	± 20	CC106MDAP
C218	Ceramic	0.047	50	+80/-20	CC473JJCP
C219	Electrolytic	47	16	± 20	CC476KDAP
C220	Electrolytic	10	16	± 20	CC106MDAP
C221	Electrolytic	33 (BP)	16	± 20	CC336MDAP
C222	Electrolytic	0.47 (BP)	50	± 20	CC474MJAP
C223	Ceramic	0.022	50	+80/-20	CC223KJCP
C224	Electrolytic	100	16	± 20	CC107MDAP
C225	Electrolytic	4.7	50	± 20	CC475MJAP

Ref. No.	Material	Value (μ F)	Voltage (V)	Tolerance (%)	R/S Part No.
C226	Mylar	0.047	50	± 10	CC473JJMP
C227	Mylar	0.01	50	± 5	CC103JJMP
C228	Mylar	0.01	50	± 5	CC103JJMP
C229	Styrene	750 p	50	± 5	CC751JJEP
C230	Styrene	750 p	50	± 5	CC751JJEP
C231	Electrolytic	0.47	50	± 20	CC474MJAP
C232	Electrolytic	0.47	50	± 20	CC474MJAP
C233	Styrene	820 p	50	± 5	CC821JJEP
C234	Styrene	820 p	50	± 5	CC821JJEP
C235	Mylar	0.047	50	± 10	CC473JJMP
C236	Electrolytic	2.2	50	± 20	CC225KJAP
C237	Electrolytic	3.3	50	± 20	CC335KJAP
C238	Styrene	0.001	50	± 5	CC102JJEP
C239	Electrolytic	1	50	± 20	CC105KJAP
C240	Electrolytic	10	16	± 20	CC106MDAP
C251	Ceramic	18 p (NPO)	50	± 5	CC180JJCP
C252	Styrene	360 p	50	± 2	CC361GJEP
C253	Ceramic	24 p (NPO)	50	± 5	CC240JJCP
C254	Ceramic	0.022	50	+80/-20	CC223KJCP
C255	Ceramic	0.022	50	+80/-20	CC223KJCP
C256	Ceramic	0.022	50	+80/-20	CC223KJCP
C257	Electrolytic	100	16	± 20	CC107MDAP
C258	Mylar	0.001	50	± 10	CC102KJMP
C259	Ceramic	27 p	50	± 5	CC270JJCP
C260	Ceramic	0.022	50	+80/-20	CC223KJCP
C261	Ceramic	0.022	50	+80/-20	CC223KJCP
C262	Ceramic	0.047	50	+80/-20	CC473JJCP
C263	Electrolytic	4.7	50	± 20	CC475MJAP
C264	Electrolytic	4.7	50	± 20	CC475MJAP
C265	Ceramic	0.001	50	± 10	CC102JJCP
C266	Ceramic	0.01	50	+80/-20	CC103JJCP
C267	Mylar	0.01	50	± 5	CC103JJMP
C268	Mylar	0.033	50	± 5	CC333JJMP
C269	Electrolytic	100	16	± 20	CC107MDAP
C270	Ceramic	0.022	50	+80/-20	CC223KJCP
C271	Styrene	0.0047	50	± 2	CC472GJEP
C272	Electrolytic	220	16	± 20	
C301	Electrolytic	0.47	50	± 20	CC474MJAP
C302	Electrolytic	0.47	50	± 20	CC474MJAP
C303	Ceramic	82 p	50	± 5	CC820JJCP
C304	Ceramic	82 p	50	± 5	CC820JJCP
C305	Electrolytic	47	16	± 20	CC476KDAP
C306	Electrolytic	47	16	± 20	CC476KDAP
C307	Electrolytic	33	16	± 20	CC336MDAP
C308	Electrolytic	33	16	± 20	CC336MDAP
C309	Mylar	0.0047	50	± 5	CC472JJMP
C310	Mylar	0.0047	50	± 5	CC472JJMP
C311	Mylar	0.018	50	± 5	CC183JJMP
C312	Mylar	0.018	50	± 5	CC183JJMP
C313	Electrolytic	0.47	50	± 20	CC474MJAP
C314	Electrolytic	0.47	50	± 20	CC474MJAP
C315	Ceramic	0.001	50	± 10	CC102JJCP
C316	Ceramic	0.001	50	± 10	CC102JJCP

Ref. No.	Material	Value (μ F)	Voltage (V)	Tolerance (%)	R/S Part No.
C401	Styrene	330 p	50	± 5	CC331JJEP
C402	Styrene	330 p	50	± 5	CC331JJEP
C403	Mylar	0.082	50	± 5	CC823JJMP
C404	Mylar	0.082	50	± 5	CC823JJMP
C405	Electrolytic	3.3	50	± 20	CC335KJAP
C406	Electrolytic	3.3	50	± 20	CC335KJAP
C407	Ceramic	68 p	50	± 5	CC680JJCP
C408	Ceramic	68 p	50	± 5	CC680JJCP
C409	Electrolytic	3.3	50	± 20	CC335KJAP
C410	Electrolytic	3.3	50	± 20	CC335KJAP
C411	Mylar	0.001	50	± 5	CC102JJMP
C412	Mylar	0.001	50	± 5	CC102JJMP
C413	Mylar	0.027	50	± 5	CC273JJMP
C414	Mylar	0.027	50	± 5	CC273JJMP
C415	Mylar	0.018	50	± 5	CC183JJMP
C416	Mylar	0.018	50	± 5	CC183JJMP
C417	Mylar	0.018	50	± 5	CC183JJMP
C418	Mylar	0.018	50	± 5	CC183JJMP
C419	M-Plastic	0.47	50	± 5	
C420	M-Plastic	0.47	50	± 5	
C421	Ceramic	39 p	50	± 5	CC390JJCP
C422	Ceramic	39 p	50	± 5	CC390JJCP
C423	Electrolytic	0.47	50	± 20	CC474MJAP
C424	Electrolytic	0.47	50	± 20	CC474MJAP
C425	Mylar	0.022	50	± 5	CC223JJMP
C426	Mylar	0.022	50	± 5	CC223JJMP
C427	Electrolytic	470	16	± 20	CC477MDAP
C428	Electrolytic	470	16	± 20	CC477MDAP
C429	Electrolytic	220	16	± 20	CC227JDAP
C430	Electrolytic	220	16	± 20	CC227JDAP
C501	Electrolytic	2.2	50	± 20	CC225KJAP
C502	Electrolytic	2.2	50	± 20	CC225KJAP
C503	Ceramic	20 p	50	± 5	CC200DJCP
C504	Ceramic	20 p	50	± 5	CC200DJCP
C505	Electrolytic	47	16	± 20	CC476KDAP
C506	Electrolytic	47	16	± 20	CC476KDAP
C507	Electrolytic	100	25	± 20	CC107MFAP
C508	Electrolytic	100	25	± 20	CC107MFAP
C509	Mylar	0.022	50	± 5	CC223JJMP
C510	Mylar	0.022	50	± 5	CC223JJMP
C511	Ceramic	470 p	50	± 5	CC471JJCP
C512	Ceramic	470 p	50	± 5	CC471JJCP
C513	Electrolytic	220	35	± 20	CC227MGAP
C601	Ceramic	68 p	50	± 5	CC680JJCP
C602	Ceramic	68 p	50	± 5	CC680JJCP
C603	Mylar	0.001	50	± 10	CC102KJMP
C604	Mylar	0.001	50	± 10	CC102KJMP
C605	Electrolytic	47	35	± 20	CC476MGAP
C606	Ceramic	0.047	50	+80/-20	CC473JJCP
C607	Electrolytic	0.1	50	± 20	CC104KJAP
C608	Electrolytic	10	25	± 20	CC106MFAP
C609	Ceramic	0.0047	50	± 10	CC472KJCP

Ref. No.	Material	Value (μ F)	Voltage (V)	Tolerance (%)	R/S Part No.
Δ C701	Electrolytic	5800	35	± 20	CC588MGAP
Δ C702	Electrolytic	5800	35	± 20	CC588MGAP
C703	Ceramic	0.047	50	+80/-20	CC473JJCP
C704	Ceramic	0.047	50	+80/-20	CC473JJCP
C705	Ceramic	0.047	50	+80/-20	CC473JJCP
C706	Ceramic	0.047	50	+80/-20	CC473JJCP
C707	Electrolytic	0.33	50	± 20	CC334KJAP
C708	Electrolytic	2.2	50	± 20	CC225KJAP
C709	Electrolytic	0.1	50	± 20	CC104KJAP
C710	Electrolytic	1	50	± 20	CC105KJAP
C711	Electrolytic	0.33	50	± 20	CC334KJAP
C712	Electrolytic	0.1	50	± 20	CC104KJAP
C801	Electrolytic	10	16	± 20	CC106MDAP
C802	Electrolytic	10	16	± 20	CC106MDAP
C901	Mylar	0.0047	50	± 10	CC472JJMP
C902	Mylar	0.0047	50	± 10	CC472JJMP
C903	Mylar	0.0047	50	± 10	CC472JJMP
C904	Mylar	0.0047	50	± 10	CC472JJMP

CERAMIC FILTERS

Ref. No.	Description	R/S Part No.	Manufacturer	Mfr's Part No.
CF201/202	Ceramic Filter 10.7 MHz	C-1214	MURATA	392300300A

COILS

Ref. No.	Description	R/S Part No.	Manufacturer	Mfr's Part No.
L101	Coil, FM Antenna	CA-5610	TOKO MITSUMI	143301180A or 143301420A
L102	Coil, Trap (Air)	CA-5819		141100031A
L103	Coil, RF (Air)	CA-5818		141200330A
L104	Coil, Trap (Air)	CA-5819		141100031A
L105	Coil, VHF Osc	CA-5816	TOKO MITSUMI	121300860A or 121301140A
L106	Coil, Balun $300\Omega : 75\Omega$	CA-2999		145001070A
L201	Coil, Inductor $18\mu\text{H} \pm 5\%$	CA-7872	TOKO MITSUMI	142000290A or 142000430A
L202	(Not Used)			
L203	AM Antenna Coil	CA-0758	SUMIDA	111010080A
L204/205	Inductor $2.2\mu\text{H} \pm 10\%$	CA-9003	TAIYO YUDEN	142000340A
L206	Coil $137\mu\text{H}$	CA-5813	MITSUMI	143110470A
L701	Inductor $47\mu\text{H} \pm 10\%$	CA-9007	TAIYO YUDEN	142000760A
L801	Coil, Inductor $470\mu\text{H} \pm 10\%$	CA-5747	TAIYO YUDEN	142000880A

TRANSFORMERS				
Ref. No.	Description	Destination	R/S Part No.	Mfr's Part No.
△ P.T (21)	Transformer, Power 120V AC 50 Hz Transformer, Power 120V AC 50 Hz Transformer, Power 240V AC 50 Hz	U.S.A. Canada Australia	TA-1106	10101114SA 10101115SA 10101116SA
T101	IFT 10.7		CA-8839	133000070A or 133000650A
T201	IFT 10.7 Quad Det 1		CA-9001	133010120A
T202	IFT 10.7 Quad Det 2		CA-9002	133010130A
T203	IFT 455, 1st		CA-9004	131010170A
T204	IFT 455, 2nd		CA-9005	131010180A
T205	IFT 455, 3rd		CA-9006	131010190A
DIODES				
Ref. No.	Description		R/S Part No.	Manufacturer
D101	Silicon, Limiter	ITT-73N or DS442X	DX-1008	ITT SANYO
D102	Zener, Regulator	GZA11-Z or RD12E-B1 or XZ-112	DX-1790	SANYO NEC JRC
D103	Varicap, AFC	ITT-410	DX-0307	ITT
D201-D211	Silicon, Switching	ITT-73N or DS442X	DX-1008	ITT SANYO
D212	Zener, Regulator	GZA5.6 (X) or RD5.6E (B2)	DX-1840	SANYO NEC
D501/502	Varistor	KFV-11Y or MV-11Y	DX-2083	K-FUJI OHIZUMI
D503/504	Varistor	VD-1221	DX-0517	NEC
D505/506	Germanium, Detector	1S188 (FM)	DX-0161	SANYO or UNIZON
D507	Zener, Regulator	GZA13-X or RD13E (B2) or XZ-127	DX-1835	SANYO NEC JRC
D508	Silicon, Rectifier	DS-135D	DX-1286	SANYO
D601	(Not Used)			
D602	Silicon, Switching	ITT-73N or DS442X	DX-1008	ITT SANYO
D603	Germanium, Switching	1S188 (FM)	DX-0161	SANYO or UNIZON
D604-606	Silicon, Switching	ITT-73N or DS442X	DX-1008	ITT SANYO
D607	Zener, Regulator	GZA5.1-Y or RD5.1E (B2) or XZ-051	DX-1356	SANYO NEC JRC
D608	Zener, Regulator	GZA11-Y or RD11E (B2) or XZ-107	DX-1606	SANYO NEC JRC
△ D701	Rectifier	DBA-40C	DX-2182	SANYO

FUSES					
Ref. No.	Description	Destination	R/S Part No.	Manufacturer	Mfr's Part No.
△ F1	250V 2.5A 250V 1.25A	U.S.A., Canada Australia	HF-1261	NAGASAWA WICKMANN	251000080A 251200900A
△ F2	250V 1A		HF-1178	TRIAD or NAGASAWA	251010070A 251000130A
INTEGRATED CIRCUITS					
Ref. No.	Description		R/S Part No.	Manufacturer	
IC201	LA1231N	FM IF Amp, Linear	MX-4368	SANYO	
IC202	LA3390	MPX, Linear	MX-5667	SANYO	
IC203	LA1240	AM, Linear	MX-4367	SANYO	
IC301	LA6458DX or NJM4558DX	Pre Amp, Linear	MX-5520	SANYO JRC	
IC601	LC4081B or μPD4081BC	C-MOS, Protector	MX-5082	SANYO NEC	
△ IC701	L78M15 or NJM78M15A	Regulator, Linear	MX-5668	SANYO JRC	
△ IC702	NJM78L15A	Reg., Linear	MX-5669	JRC	
△ IC703	NJM79L15A	Reg., Linear	MX-5670	JRC	
IC801	LB1443	LED Driver, Linear	MX-5673	SANYO	
LAMP					
Ref. No.	Description		R/S Part No.	Mfr's Part No.	
(16)	Lamp, Tubular, Fuse Type 12.5V/0.15A (USA) Lamp, Tubular, Fuse Type 12V/0.15A (Canada/Australia) (for Dial Scale)			243010020A 243001320A	
LIGHT EMITTING DIODES (LED)					
Ref. No.	Description		R/S Part No.	Manufacturer	
D801-805	SLP-151B (Red, Signal LED)		L-1146	SANYO	
D806	SLP-251B (Green, Tuned LED)		L-1268	SANYO	
D807	SLP-151B (Red, Stereo LED)		L-1146	SANYO	
D901	SLP-151B (Red, Pointer LED)		L-1146		

RESISTORS						
Ref. No.	Material	Value (Ω)	Wattage (W)	Tolerance (%)	Destination	R/S Part No.
R101	Carbon	100 K	1/4	± 5		N0371EEC
R102	Carbon	5.6 K	1/4	± 5		N0257EEC
R103	Carbon	1.5 K	1/4	± 5		N0206EEC
R104	Carbon	100	1/4	± 5		N0132EEC
R105	Carbon	330	1/4	± 5		N0159EEC
R106	Carbon	10 K	1/4	± 5		N0281EEC
R107	Carbon	3.3 K	1/4	± 5		N0230EEC
R108	Carbon	22 K	1/4	± 5		N0311EEC
R109	Carbon	330	1/4	± 5		N0159EEC
R110	Carbon	10 K	1/4	± 5		N0281EEC
R111	Carbon	240 K	1/4	± 5		N0398EEC
R112	Carbon	220 K	1/4	± 5		N0396EEC
R113	Carbon	270 K	1/4	± 5		N0402EEC
R114	Carbon	330	1/4	± 5		N0159EEC
R115	Carbon	33 K	1/4	± 5		N0324EEC
R116	Carbon	10	1/4	± 5		N0063EEC
R201	Carbon	470	1/4	± 5		N0169EEC
R202	Carbon	3.9 K	1/4	± 5		N0237EEC
R203	Carbon	470	1/4	± 5		N0169EEC
R204	Carbon	330	1/4	± 5		N0159EEC
R205	Carbon	100	1/4	± 5		N0132EEC
R206	(Not Used)					
R207	Carbon	330	1/4	± 5		N0159EEC
R208	Carbon	27 K	1/4	± 5		N0316EEC
R209	Carbon	10 K	1/4	± 5		N0281EEC
R210	Carbon	10 K	1/4	± 5		N0281EEC
R211	Carbon	68 K	1/4	± 5		N0354EEC
R212	Carbon	56 K	1/4	± 5		N0345EEC
R213	Carbon	100	1/4	± 5		N0132EEC
R214	Carbon	100	1/4	± 5		N0132EEC
R215	Carbon	180 K	1/4	± 5		N0387EEC
R216	Carbon	5.6 K	1/4	± 5		N0257EEC
R217	Carbon	12 K	1/4	± 5		N0288EEC
R218	Carbon	3 K	1/4	± 5		N0226EEC
R219	Carbon	100	1/4	± 5		N0132EEC
R220	Carbon	10 K	1/4	± 5		N0281EEC
R221	Carbon	110 K	1/4	± 5		N0373EEC
R222	Carbon	110 K	1/4	± 5		N0373EEC
R223	Carbon	10	1/4	± 5		N0063EEC
R224	Carbon	10	1/4	± 5		N0063EEC
R225	Carbon	1.1 K	1/4	± 5		N0198EEC
R226	Carbon	1.1 K	1/4	± 5		N0198EEC
R227	Carbon	1 K	1/4	± 5		N0196EEC
R228	Carbon	12 K	1/4	± 5		N0288EEC
R229	Carbon	9.1 K	1/4	± 5		N0276EEC
R230	Carbon	2.2 K	1/4	± 5		N0216EEC
R231	(Not Used)					
R232	Carbon	2.7 K	1/4	± 5		N0224EEC
R233	Carbon	20 K	1/4	± 5		
R234	Carbon	20 K	1/4	± 5		
R235	Carbon	6.8 K	1/4	± 5		N0262EEC

Ref. No.	Material	Value (Ω)	Wattage (W)	Tolerance (%)	Destination	R/S Part No.
R236	Carbon	6.8 K	¼	± 5		N0262EEC
R237	Carbon	100 K	¼	± 5		N0371EEC
R238	Carbon	10 K	¼	± 5		N0281EEC
R239	Carbon	10 K	¼	± 5		N0281EEC
R240	Carbon	10 K	¼	± 5		N0281EEC
R241	Carbon	1.2 K	¼	± 5		N0199EEC
R242	Carbon	33	¼	± 5		N0087EEC
R243	Carbon	1 K	¼	± 5		N0196EEC
R244	Carbon	56 K	¼	± 5		N0345EEC
R245	Carbon	56 K	¼	± 5		N0345EEC
R246	Carbon	220 K	¼	± 5		N0396EEC
R247	Carbon	3 K	¼	± 5		N0226EEC
R248	Carbon	1 K	¼	± 5		N0196EEC
R249-R250	(Not Used)					
R251	Carbon	22	¼	± 5		N0078EEC
R252	Carbon	220 K	¼	± 5		N0396EEC
R253	Carbon	2 K	¼	± 5		N0213EEC
R254	Carbon	390	¼	± 5		N0162EEC
R255	Carbon	560	¼	± 5		N0176EEC
R256	Carbon	10 K	¼	± 5		N0281EEC
R257	Carbon	10 K	¼	± 5		N0281EEC
R258	Carbon	4.7 K	¼	± 5		N0247EEC
R259	Carbon	8.2 K	¼	± 5		N0271EEC
R260	Carbon	39 K	¼	± 5		
R261	Carbon	220	¼	± 5		N0149EEC
R262	Carbon	10 K	¼	± 5		N0281EEC
R263	Carbon	220	¼	± 5		N0149EEC
R301	Carbon	100 K	¼	± 5		N0371EEC
R302	Carbon	100 K	¼	± 5		N0371EEC
R303	Carbon	100 K	¼	± 5		N0371EEC
R304	Carbon	100 K	¼	± 5		N0371EEC
R305	Carbon	2.2 K	¼	± 5		N0216EEC
R306	Carbon	2.2 K	¼	± 5		N0216EEC
R307	Carbon	270	¼	± 5		N0082EEC
R308	Carbon	270	¼	± 5		N0082EEC
R309	Carbon	15 K	¼	± 5		N0297EEC
R310	Carbon	15 K	¼	± 5		N0297EEC
R311	Carbon	220 K	¼	± 5		N0396EEC
R312	Carbon	220 K	¼	± 5		N0396EEC
R313	Carbon	100 K	¼	± 5		N0371EEC
R314	Carbon	100 K	¼	± 5		N0371EEC
R315	Carbon	1 K	¼	± 5		N0196EEC
R316	Carbon	1 K	¼	± 5		N0196EEC
R317	Carbon	470	½	± 5		N0169EEC
R318	Carbon	470	½	± 5		N0169EEC
R401	Carbon	100	¼	± 5		N0132EEC
R402	Carbon	100	¼	± 5		N0132EEC
R403	Carbon	4.7 K	¼	± 5		N0247EEC
R404	Carbon	4.7 K	¼	± 5		N0247EEC
R405	Carbon	9.1 K	¼	± 5		N0276EEC
R406	Carbon	9.1 K	¼	± 5		N0276EEC
R407	Carbon	470	¼	± 5		N0169EEC
R408	Carbon	470	¼	± 5		N0169EEC

Ref. No.	Material	Value (Ω)	Wattage (W)	Tolerance (%)	Destination	R/S Part No.
R409	Carbon	2.7 M	¼	±5		N0034EEC
R410	Carbon	2.7 M	¼	±5		N0034EEC
R411	Carbon	5.1 K	¼	±5		N0252EEC
R412	Carbon	5.1 K	¼	±5		N0252EEC
R413	Carbon	1 K	¼	±5		N0196EEC
R414	Carbon	1 K	¼	±5		N0196EEC
R415	Carbon	1 K	¼	±5		N0196EEC
R416	Carbon	1 K	¼	±5		N0196EEC
R417	Carbon	470	¼	±5		N0169EEC
R418	Carbon	470	¼	±5		N0169EEC
R419	Carbon	27 K	¼	±5		N0316EEC
R420	Carbon	27 K	¼	±5		N0316EEC
R421	Carbon	470	¼	±5		N0169EEC
R422	Carbon	470	¼	±5		N0169EEC
R423	Carbon	22 K	¼	±5		N0311EEC
R424	Carbon	22 K	¼	±5		N0311EEC
R425	Carbon	27 K	¼	±5		N0316EEC
R426	Carbon	27 K	¼	±5		N0316EEC
R427	Carbon	12 K	¼	±5		N0288EEC
R428	Carbon	12 K	¼	±5		N0288EEC
R429	Carbon	3.3 M	¼	±5		N0458EEC
R430	Carbon	3.3 M	¼	±5		N0458EEC
R431	Carbon	1 M	¼	±5		N0455EEC
R432	Carbon	1 M	¼	±5		N0455EEC
R433	Carbon	47	¼	±5		N0099EEC
R434	Carbon	47	¼	±5		N0099EEC
R435	Carbon	4.7 K	¼	±5		N0247EEC
R436	Carbon	4.7 K	¼	±5		N0247EEC
R437	Carbon	1 K	¼	±5		N0196EEC
R438	Carbon	1 K	¼	±5		N0196EEC
R439	Carbon	1 M	¼	±5		N0455EEC
R440	Carbon	1 M	¼	±5		N0455EEC
R441	Carbon	680	¼	±5		N0183EEC
R442	Carbon	680	¼	±5		N0183EEC
R443	Carbon	100 K	¼	±5		N0371EEC
R444	Carbon	100 K	¼	±5		N0371EEC
R445	Carbon	4.7 K	¼	±5		N0247EEC
R446	Carbon	4.7 K	¼	±5		N0247EEC
R447	Carbon	180 K	¼	±5	Australia	
R448	Carbon	180 K	¼	±5	Australia	
R501	Carbon	100 K	¼	±5		N0371EEC
R502	Carbon	100 K	¼	±5		N0371EEC
R503	Carbon	1 K	¼	±5		N0196EEC
R504	Carbon	1 K	¼	±5		N0196EEC
R505	Carbon	33 K	¼	±5		N0324EEC
R506	Carbon	33 K	¼	±5		N0324EEC
R507	Carbon	2.2 K	¼	±5		N0216EEC
R508	Carbon	2.2 K	¼	±5		N0216EEC
R509	Carbon	15 K	¼	±5		N0297EEC
R510	Carbon	15 K	¼	±5		N0297EEC
R511	Carbon	27	½	±5		N0082EFC
R512	Carbon	27	½	±5		N0082EFC
R513	Carbon	30 K	¼	±5		N0321EEC

Ref. No.	Material	Value (Ω)	Wattage (W)	Tolerance (%)	Destination	R/S Part No.
R514	Carbon	30 K	¼	± 5		N0321EEC
R515	Carbon	2.2 K	¼	± 5		N0216EEC
R516	Carbon	2.2 K	¼	± 5		N0216EEC
R517	Carbon	3.3 K	¼	± 5		N0230EEC
R518	Carbon	3.3 K	¼	± 5		N0230EEC
R519	Carbon	180 (150 ~ 220)	¼	± 5	U.S.A., Canada	N0144EEC
R520	Carbon	180 (150 ~ 220)	¼	± 5	U.S.A., Canada	N0144EEC
R521	Carbon	100	½	± 5	U.S.A., Australia	N0132EFC
R521	Metal Oxide	100	1	± 5	Canada	
R522	Carbon	100	½	± 5	U.S.A., Australia	N0132EFC
R522	Metal Oxide	100	1	± 5	Canada	
R523	Carbon	100	½	± 5	U.S.A., Australia	N0132EFC
R523	Metal Oxide	100	1	± 5	Canada	
R524	Carbon	100	½	± 5	U.S.A., Australia	N0132EFC
R524	Metal Oxide	100	1	± 5	Canada	
R525	Carbon	4.7	½	± 5	U.S.A., Australia	N0047EFC
R525	Metal Oxide	4.7	1	± 5	Canada	
R526	Carbon	4.7	½	± 5	U.S.A., Australia	N0047EFC
R526	Metal Oxide	4.7	1	± 5	Canada	
R527	Carbon	4.7	½	± 5	U.S.A., Australia	N0047EFC
R527	Metal Oxide	4.7	1	± 5	Canada	
R528	Carbon	4.7	½	± 5	U.S.A., Australia	N0047EFC
R528	Metal Oxide	4.7	1	± 5	Canada	
△R529	Cement	0.47	3	± 10		N0008FJF
△R530	Cement	0.47	3	± 10		N0008FJF
△R531	Cement	0.47	3	± 10		N0008FJF
△R532	Cement	0.47	3	± 10		N0008FJF
△R533	Cement	0.33	3	± 10		N0522FJF
△R534	Cement	0.33	3	± 10		N0522FJF
R535	Metal Oxide	12	1	± 5		N0067EGD
R536	Metal Oxide	12	1	± 5		N0067EGD
R537	Carbon	1.1 K	¼	± 5		N0198EEC
R538	Carbon	1.1 K	¼	± 5		N0198EEC
R539	Carbon	5.6 K	¼	± 5		N0257EEC
R540	Carbon	1 K	½	± 5		N0196EFC
R601	Carbon	1 M	¼	± 5		N0445EEC
R602	Carbon	1 M	¼	± 5		N0445EEC
R603	Carbon	820	½	± 5		N0187EFC
R604	Carbon	1 K	¼	± 5		N0196EEC
R605	Carbon	560 K	¼	± 5		N0429EEC
R606	Carbon	3.3 M	¼	± 5		N0458EEC
R607	Carbon	560 K	¼	± 5		N0429EEC
R608	Carbon	4.7 M	¼	± 5		N0463EEC
R609	Carbon	2.7 K	¼	± 5		N0224EEC
R610	Carbon	2.7 K	¼	± 5		N0224EEC
R611	Carbon	150 K	¼	± 5		N0384EEC
R612	Carbon	12 K	¼	± 5		N0288EEC
R613	Carbon	150 K	¼	± 5		N0384EEC
R614	Carbon	4.7 M	¼	± 5		N0463EEC
R615	Carbon	3.3 M	¼	± 5		N0458EEC
R616	Carbon	1.8 K	¼	± 5		N0210EEC
R617	Carbon	1.8 K	¼	± 5		N0210EEC
R618	Carbon	100 K	¼	± 5		N0371EEC

Ref. No.	Material	Value (Ω)	Wattage (W)	Tolerance (%)	Destination	R/S Part No.
Δ R701	Metal Oxide	100	1	± 5		N0132EGD
Δ R702	Metal Oxide	100	1	± 5		N0132EGD
Δ R703	Metal Oxide	22	2	± 5		N0078EHD
R704	Carbon	2.2 K	$\frac{1}{4}$	± 5		N0216EEC
R801	Carbon	33 K	$\frac{1}{4}$	± 5		N0324EEC
R802	Metal Oxide	39	1	± 5		N0092EGD
R803	Carbon	820	$\frac{1}{4}$	± 5		N0187EEC
R804	Metal Oxide	390	$\frac{1}{6}$	± 5		
R805	Metal Oxide	390	$\frac{1}{6}$	± 5		
R806	Metal Oxide	390	$\frac{1}{6}$	± 5		
R807	Metal Oxide	390	$\frac{1}{6}$	± 5		
R808	Metal Oxide	390	$\frac{1}{6}$	± 5		
R901	Metal Oxide	220	1	± 5		N0149EGD
R902	Metal Oxide	220	1	± 5		N0149EGD
R903-R950	(Not Used)					
R951	Carbon	2.2 M	$\frac{1}{2}$	± 5	U.S.A., Canada	N0454EFC

SCR

Ref. No.	Description	R/S Part No.	Manufacturer
SCR601	03P1M	DX-1839	NEC

SWITCHES

Ref. No.	Description	R/S Part No.	Manufacturer	Mrf's Part No.
SW1-1 ~ SW1-4	Push, for mode Rotary Slide for function	S-7687 S-1695	ALPS ALPS	182310090A 181210130A
(3) Δ (19)	Push, for speaker Push, for power (US/CA) Push, for power (AU)	S-7690 S-7691	ALPS ALPS MATSUSHITA	182310080A 182110100A 182105800A

THERMAL PROTECTORS

Ref. No.	Description	R/S Part No.	Mfr's Part No.
Δ	Thermal Protector UI-2 95°C	HC-3369	253000180A
Δ	Thermal Protector UI-2 105°C	HC-3370	253000300A

TRANSISTORS

Ref. No.	Description	R/S Part No.	Manufacturer
TR101 TR102	2SK41 (F) FET RF Amp. 2SC2999 (D,E) or NPN FM Mixer 2SC1674 (L,K)	2SK41 (F) 2SC2999 (D,E) or 2SC1674 (L,K)	SANYO SANYO NEC

Ref. No.	Description	R/S Part No.	Manufacturer
TR103	2SC930 (D, E) or NPN FM Local Osc. 2SC1675 (L, K)	2SC930 (D, E) or 2SC1675 (L, K)	SANYO NEC
TR201	2SC1675 (L, K) or NPN FM IF Amp. 2SC930 (D, E)	2SC1675 (L, K) or 2SC930 (D, E)	NEC SANYO
TR202-TR204	2SC945 (P, K) or NPN FM Mute 2SC536K (G, H)	2SC945 (P, K) or 2SC536K (G, H)	NEC SANYO
TR205/206	2SC1845 (E, U) NPN FM Mute	2SC1845 (E, U)	NEC
TR207	2SC945 (P, K) or NPN FM Mute 2SC536K (G, H)	2SC945 (P, K) or 2SC536K (G, H)	NEC SANYO
TR208	2SC1845 (E, U) NPN FM Mute	2SC1845 (E, U)	NEC
TR401-TR404	2SC1845 (E, U) or NPN Tone Amp 2SC2362 (H)	2SC1845 (E, U) or 2SC2362 (H)	NEC SANYO
TR501/502	2SC2259 (G, F) NPN Differential Amp	2SC2259 (G, F)	MITSUBISHI
TR503/504	2SA1207 (S, T) PNP Pre Driver	2SA1207 (S, T)	SANYO
TR505/506	2SD438 (E) NPN Driver	2SD438 (E)	SANYO
TR507/508	2SB560 (E) PNP Driver	2SB560 (E)	SANYO
△*TR509/510	2SD895 (D, E) NPN Power	2SD895 (D, E)	SANYO
△*TR511/512	2SB775 (D, E) PNP Power	2SB775 (D, E)	SANYO
TR601/602	2SK246 (GR) or FET Muting 2SK304 (E)	2SK246 (GR) or 2SK304 (E)	TOSHIBA NEC

* See "SPECIAL PAIRED PARTS" on next page.

VARIABLE CAPACITORS

Ref. No.	Description	R/S Part No.	Mfr's Part No.	Manufacturer
VC101-103 w/TC101-103	AVC FM: 3 Gang AM: 2 Gang	C-4817	ALPS	151010020A
VC201/202 w/TC201/202	AVC FM: 3 Gang AM: 2 Gang	C4817	ALPS	151010020A
TC103	Trimmer	C1213	SKY-SEIKO	154000200A

VARIABLE RESISTORS

Ref. No.	Description	Destination	R/S Part No.	Manufacturer	Mfr's Part No.
VR201	Semi-Fixed 50KB		P-6786	ALPS	175206210A
VR202	Semi-Fixed 100KB		P-6788	ALPS	175206220A
VR203	Semi-Fixed 10KB		P-6784	ALPS	175206190A
VR204	Semi-Fixed 20KB		P-6704	ALPS	175206200A
VR401	Rotary 100K2BL x 2 for Master		P-7600	NOBLE	171610360A
VR402	Rotary 100K5B-2 for Balance		P-3322	NOBLE	171610350A
VR403/404	Rotary 200KB x 2 for BASS/TREBLE		P-7601	NOBLE	171610340A
VR501/502	Semi-Fixed 500ΩB	Australia		ALPS	175206150A

SPECIAL PAIRED PARTS

(Reference No. with asterisk should be replaced in pair per each lot. Do not replace one part only.)

Ref. No.	Description	R/S Part No.	Manufacturers
TR509/510 TR511/512	2SD895 (D) 2SB775 (D)	2SD895 (D) 2SB775 (D)	SANYO SANYO
TR509/510 TR511/512	2SD895 (E) 2SB775 (E)	2SD895 (E) 2SB775 (E)	SANYO SANYO

EXPLODED VIEW PARTS LIST

Ref. No.	Description	R/S Part No.	Mfr's Part No.
1	Terminal Nip, Speaker	J-5108	192310040A
2	Terminal Screw, Antenna		192210070A
3	Switch, Push, Speaker	S-7690	182310080A
4	Jack, 6.3, Headphone	J-1423	191010090A
5	Clip, Fuse	F-1208	197303080A
6	Pointer		435210050A
7	Pointer Base with Sheet		435110020A
8	Pulley, Guide	D-0489	433100420A
9	Shaft Ass'y, Tuning	D-3318	431010010A
10	Back Board, Dial	D-5600	416510100A
11	Scale, Dial	D-5601	717010180A
12	Blind, Lamp Dial	HC-3366	851210970A
13	Side, Dial	D-5602	713410060A
14	Spring Bar, Side Dial	HC-3367	434510150A
15	Holder, Lamp	F-1209	197100120A
16	Lamp, Tubular, Fuse Type 12.5V/0.15A (U.S.A.)		243010020A
	Lamp, Tubular, Fuse Type 12V/0.15A (Canada/Australia)		243001320A
17	Pulley, Dial	D-0574	433002390A
18	P.C.B. Ass'y, Speaker Switch	X-9985	U-23265
△19	Switch, Push, Power (U.S.A./Canada)	S-7691	182110100A
	Switch, Push, Power (Australia)		182105800A
20	Shaft, Joint, Switch Power	HC-3368	432008680A
△21	Transformer, Power (U.S.A.)	TA-1106	10101114SA
	Transformer, Power (Canada)		10101115SA
	Transformer, Power (Australia)		10101116SA
△22	Protector, Thermal	HC-3369	253000180A
△23	Protector, Thermal	HC-3370	253000300A
24	Holder, Fuse (U.S.A.)	F-1206	197000110A or 197000200A
	Holder, Fuse (Canada)		197000130A
	Holder, Fuse (Australia)		197000150A
△25	AC Outlet (U.S.A./Australia)	W-3026	196010020A
	AC Outlet (Canada)		196010040A
26	Panel, Back (U.S.A.)	Z-7623	707010420A
	Panel, Back (Canada)		707010430A
	Panel, Back (Australia)		707010440A
27	Antenna, Bar	CA-0758	111010080A
28	Cover, Antenna Bar	HC-3372	602310030B
29	Holder, Antenna Bar	A-4484	413003900A
30	Screw, Ground		HMWOA002SN
31	Holder, Cabinet/Board, Back	HC-1574	413008710A
32	Panel Ass'y, Front, Non-repairable	Z-7622	M-00375
	Panel, Front,		701010130A
	Window, Dial		713610080A
	Blind, Aluminum		851210980A
	Spacer		852002780A
33	Knob, Push, Square		659510430A
34	Shaft, Joint, Knob Push		432010070A
35	Spring, Coil, Knob Push		434110190A
36	Knob, Tuning	K-5859	652510320A
37	Knob, Volume	K-5860	652510330A
38	Knob, Selector/Tone	K-5861	652510310A
39	Knob, Power	K-5862	655010080A

Ref. No.	Description	R/S Parts No.	Mfr's Part No.
40	Cabinet Ass'y, Top Cabinet, Top Net Spacer Spacer	Z-7624	M-00391 601210570A 851310250A 852002481A 852002780A
41	Cabinet Bottom with Shield Sheet	Z-7625	601310450A
42	Foot	F-0413	608010090A
43	Main P.C.B. Ass'y, TUNER/AUDIO	X-9983	U-22059
44	Plate, Shield	HC-3371	473210350A
45	Plate, Shield	HC-2600	473210310A
46	Sheet, Insulation, Heat Sink/P.C.B.		483004000A
47	Connector Wire, 5P	J-4971	193903400A
48	Jack, RCA, 4P		192003820A
49	Washer, Screw GROUND, 3.2 x 10 x 0.5	J-1470	HAWP3050SN

Hardwares

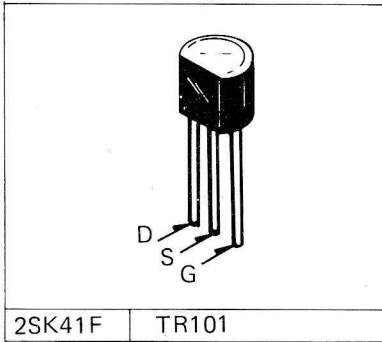
Ref. No.	Description	Ref. No.	Description
S1	Screw, Tapping 2 x 8 BT-2	N1	Nut, Flange 4FN
S2	Screw, Del Tite 3 x 8 BT-3 (Black)	N2	Nut, Flange 3FN
S3	Screw, F-Lock 3 x 6 FL	N3	Nut, Flange 2.6FN
S4	Screw, Tap Tite 3 x 8 BT-B		
S5	Screw, Tapping 3 x 6 BT-2	R1	Rivet, Blind 2.4 x 8.9 (Black)
S6	Screw, Triple Tap 3 x 10 TRT-2		
S7	Screw 2.3 x 4 B	W1	Washer, Toothed 3TW-A
S8	Screw 3 x 6 B	W2	Washer 3W
S9	Screw, Del Tite 4 x 10 BT-3	W3	Washer 2.6W
S10	Screw, Tap Tite 3 x 10 BT-B	W4	Washer 4W (Black)
S11	Screw, Tapping 3 x 10 BT-2		
S12	Screw 3 x 10 B		
S13	Screw, Triple 2.6 x 12TR		
S14	Screw, Triple Tap 3 x 8 TRT-2		
S15	Screw, Tap Tite 3 x 10BT-B (Black)		
S16	Screw, Del Tite 4 x 8 BT-3 (Black)		
S17	Screw, Triple 3 x 10 TR		
S18	Screw, Triple 3 x 12 TR		
S19	Screw, Del Tite 3 x 14 BT-3		
S20	Screw 3 x 8 B		

Miscellaneous Parts List

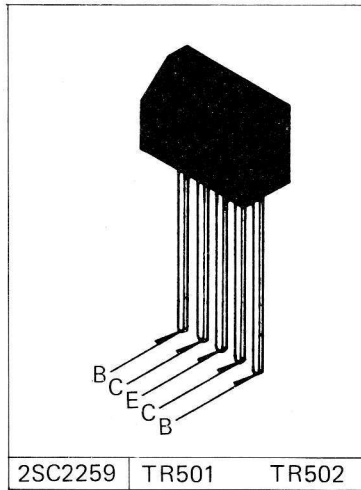
Ref. No.	Description	R/S Part No.	Mfr's Part No.
	Jack, DIN (Australia) Hardware Kit		193404220A HW3102098
	Screw, Tapping 3 x 10 BT-2 (Binding)		3X10BT-2
	Screw, Del Tite 4 x 8 BT-3 (Binding)		4X8BT-3
	Washer 4W		

TRANSISTOR LEAD IDENTIFICATION

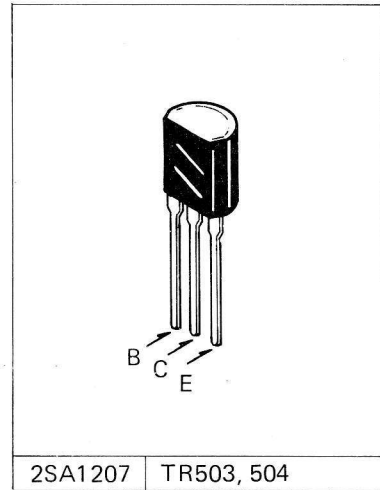
NOTE: The reference numbers without parentheses are used principally. Those with parentheses are used supplementary.



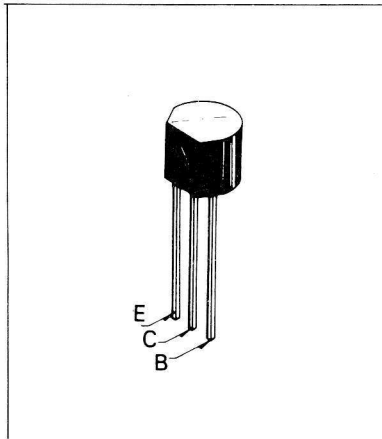
2SK41F	TR101
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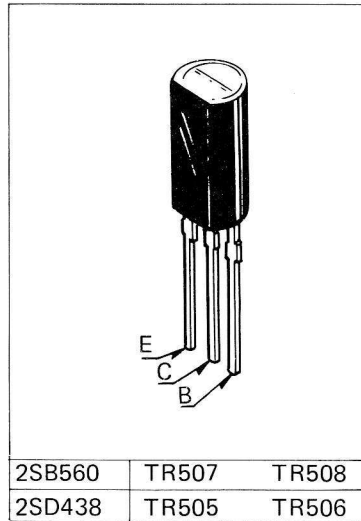
2SC2259	TR501	TR502
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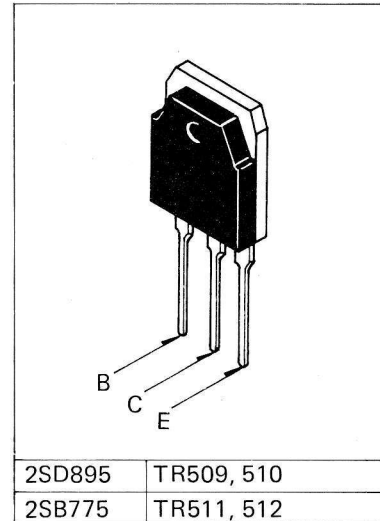
2SA1207	TR503, 504
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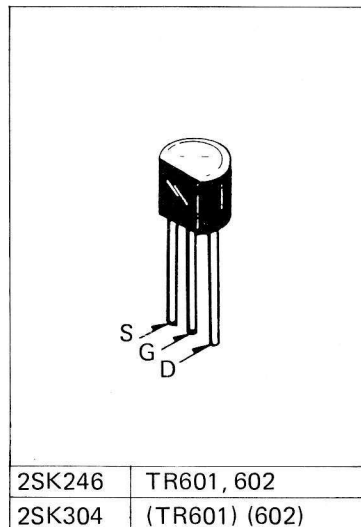
2SC536	(TR202) (203) (204) (207)
2SC930	TR103 (201) (207)
2SC945	TR202, 203, 204, 207
2SC1674	(TR102)
2SC1675	(TR103), 201
2SC1845	TR205, 206, 208, 401, 402, 403, 404
2SC2362	(TR401) (402) (403) (404)



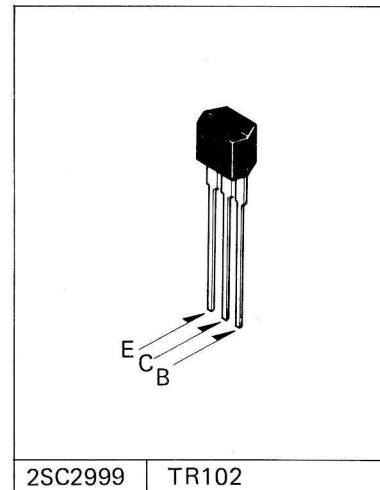
2SB560	TR507	TR508
2SD438	TR505	TR506



2SD895	TR509, 510
2SB775	TR511, 512



2SK246	TR601, 602
2SK304	(TR601) (602)

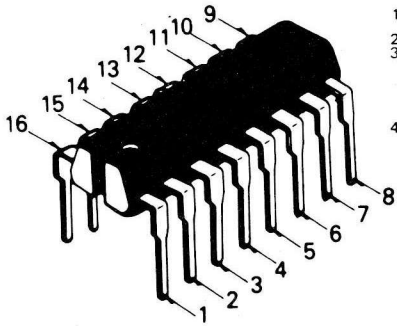
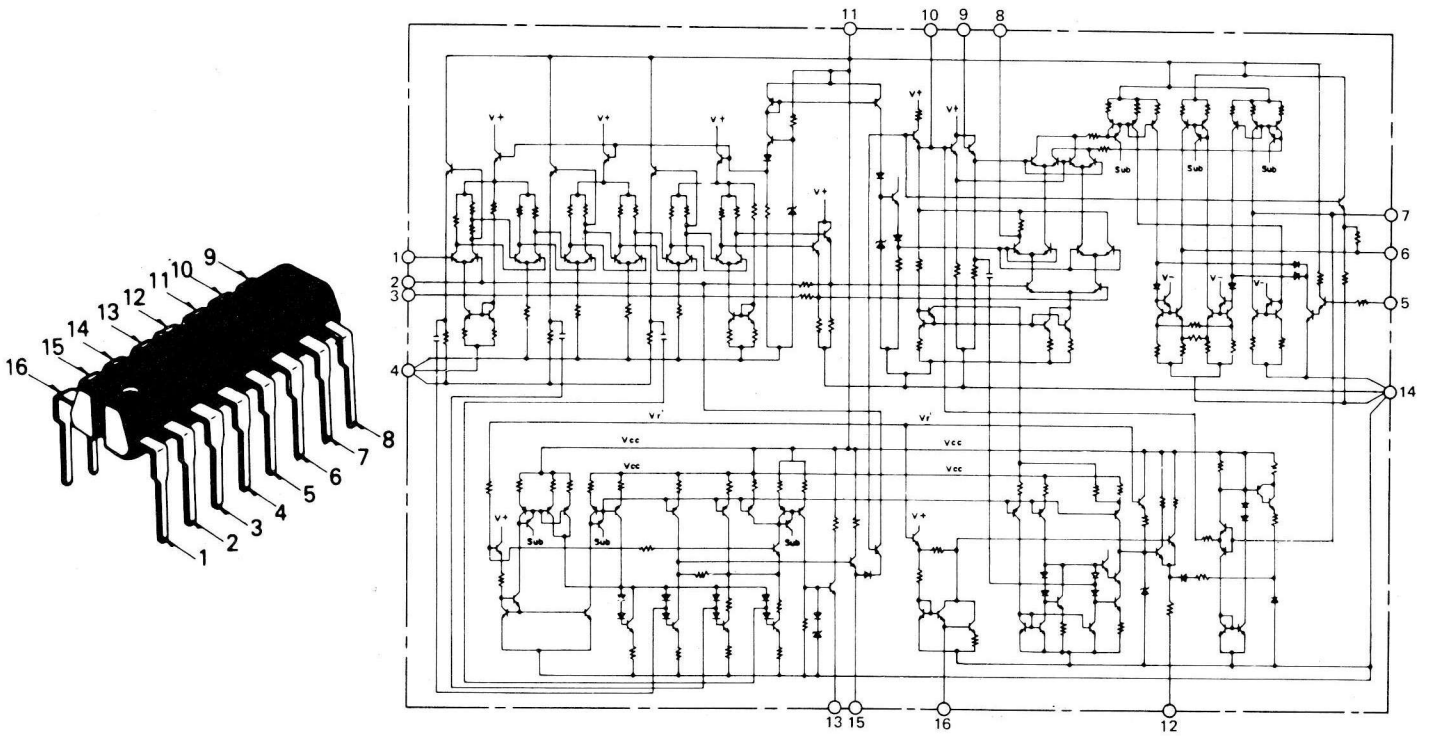


2SC2999	TR102
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IC LEAD IDENTIFICATION & INTERNAL DIAGRAM

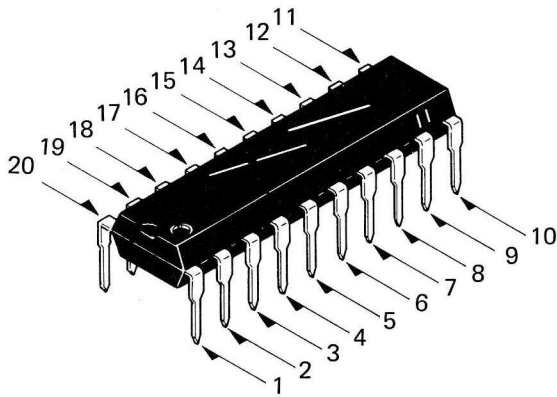
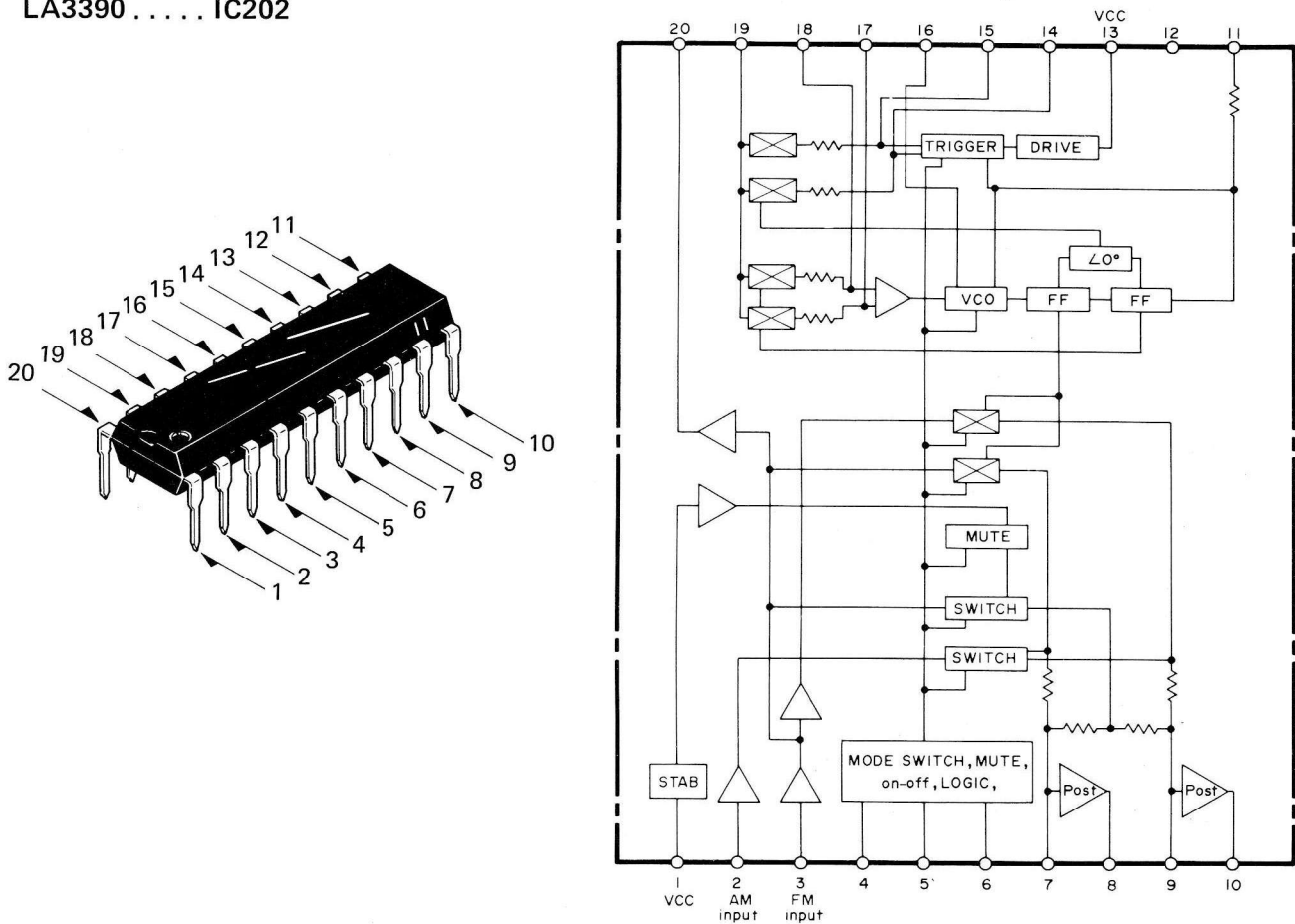
LA1231N IC201

Equivalent Circuit Diagram



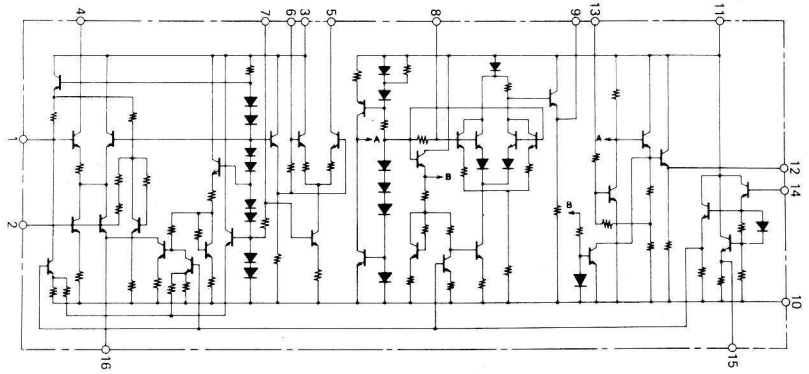
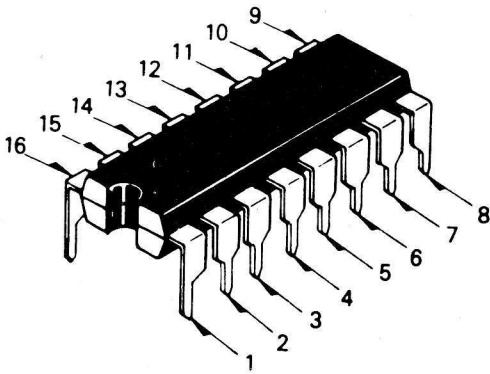
LA3390 IC202

Block Diagram

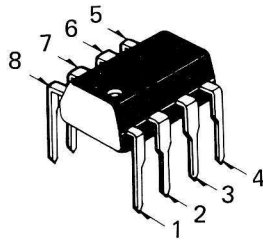


LA1240 IC203

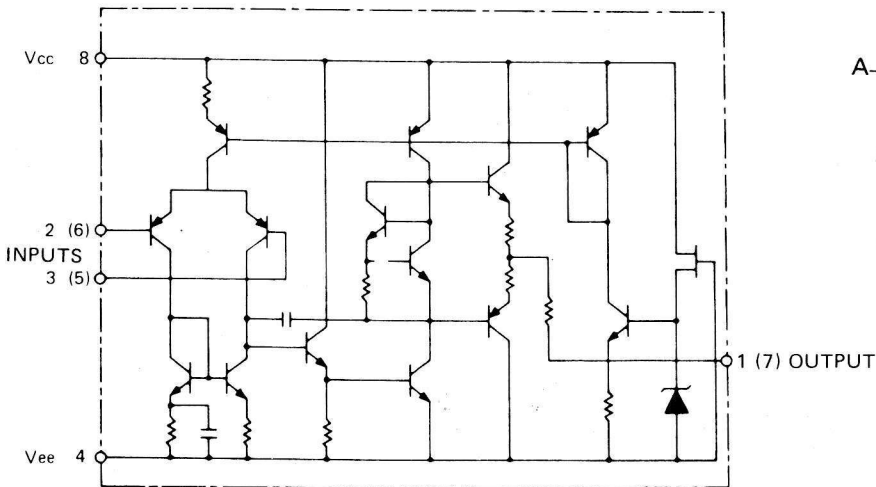
Equivalent Circuit Diagram



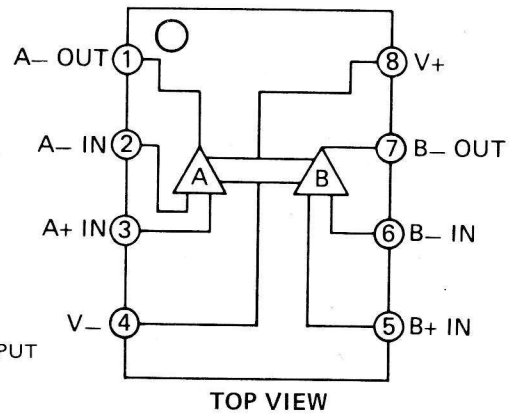
LA6458DX, NJM4558DX IC301



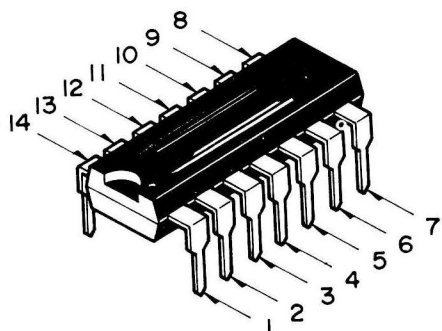
Equivalent Circuit Diagram



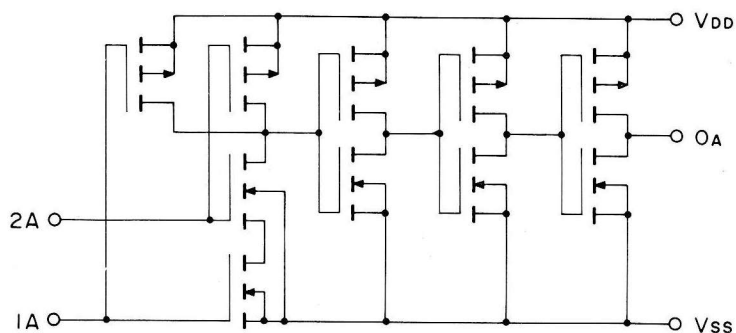
Pin Configuration



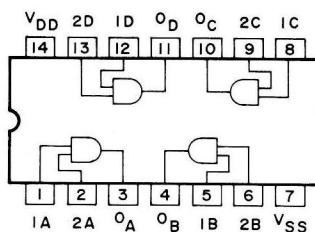
LC4081B, μ PD4081BC IC601



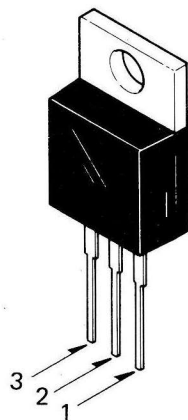
Equivalent Circuit Diagram



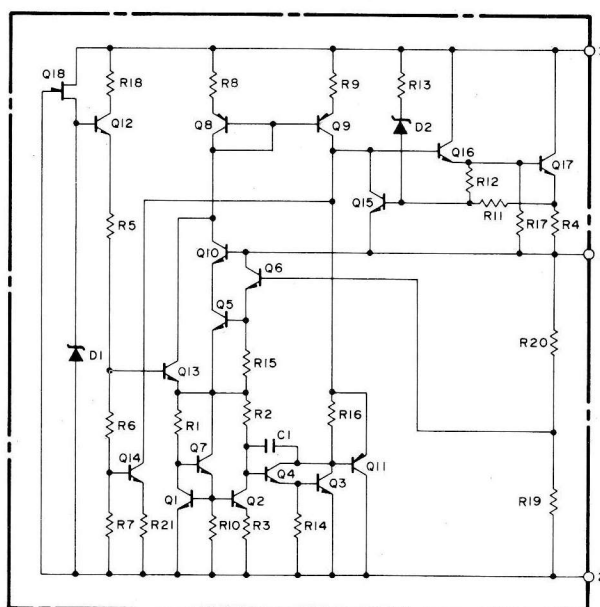
Pin Configuration



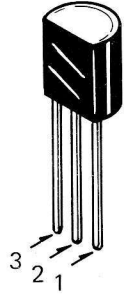
L78M15, NJM78M15A IC701



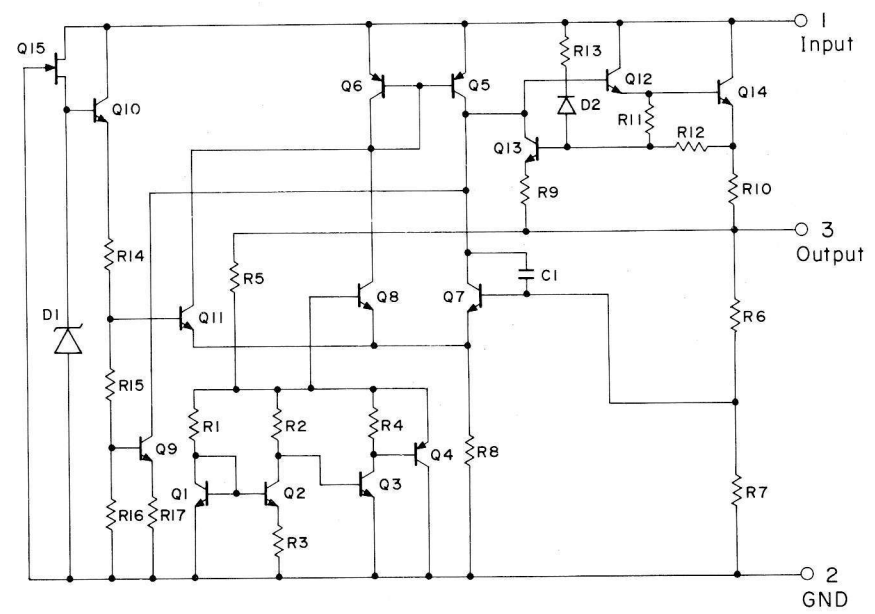
Equivalent Circuit Diagram



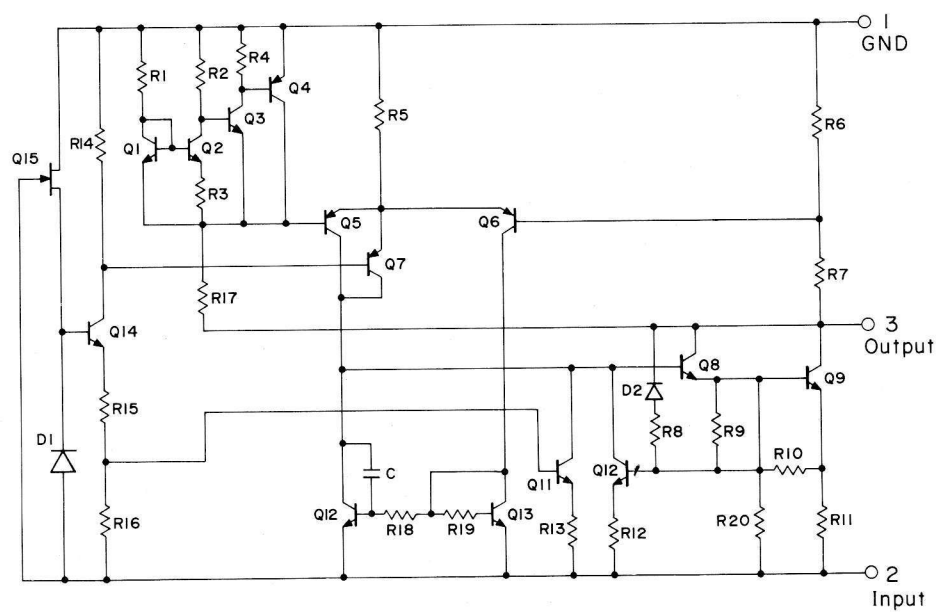
NJM78L15A IC702



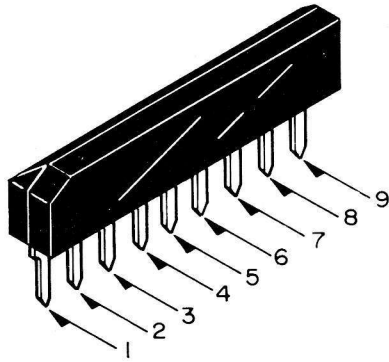
Equivalent Circuit Diagram



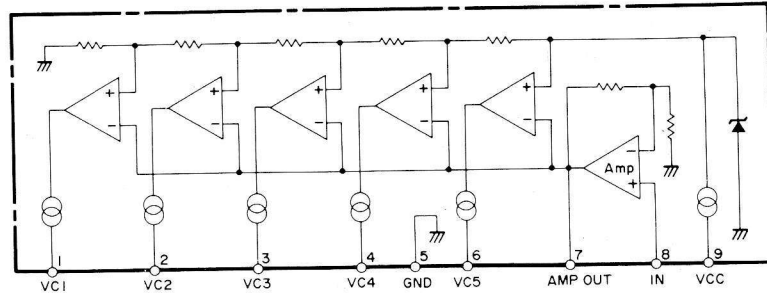
NJM79L15A IC703



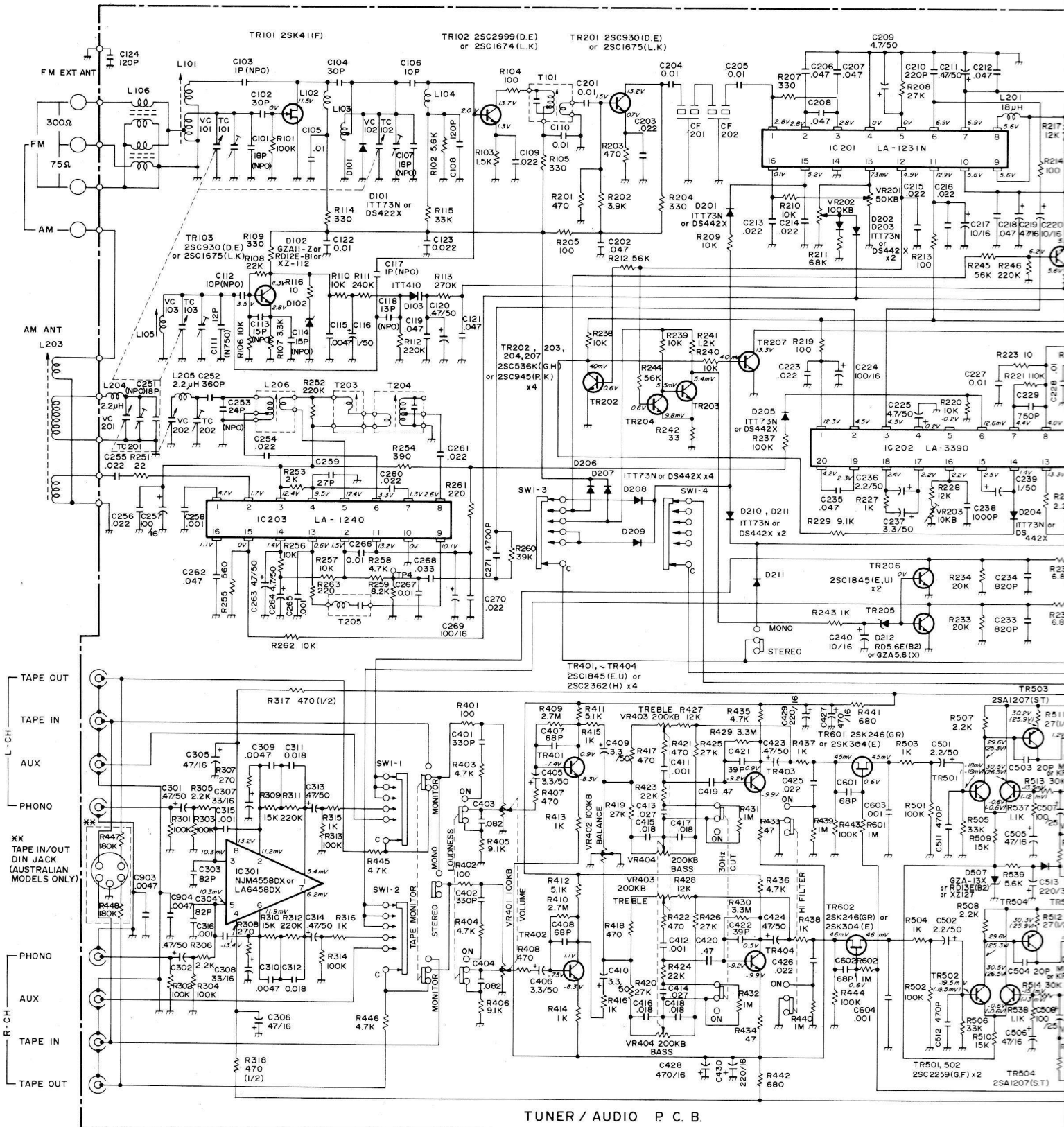
LB1443 IC801



Equivalent Circuit Diagram



SCHEMATIC DIAGR

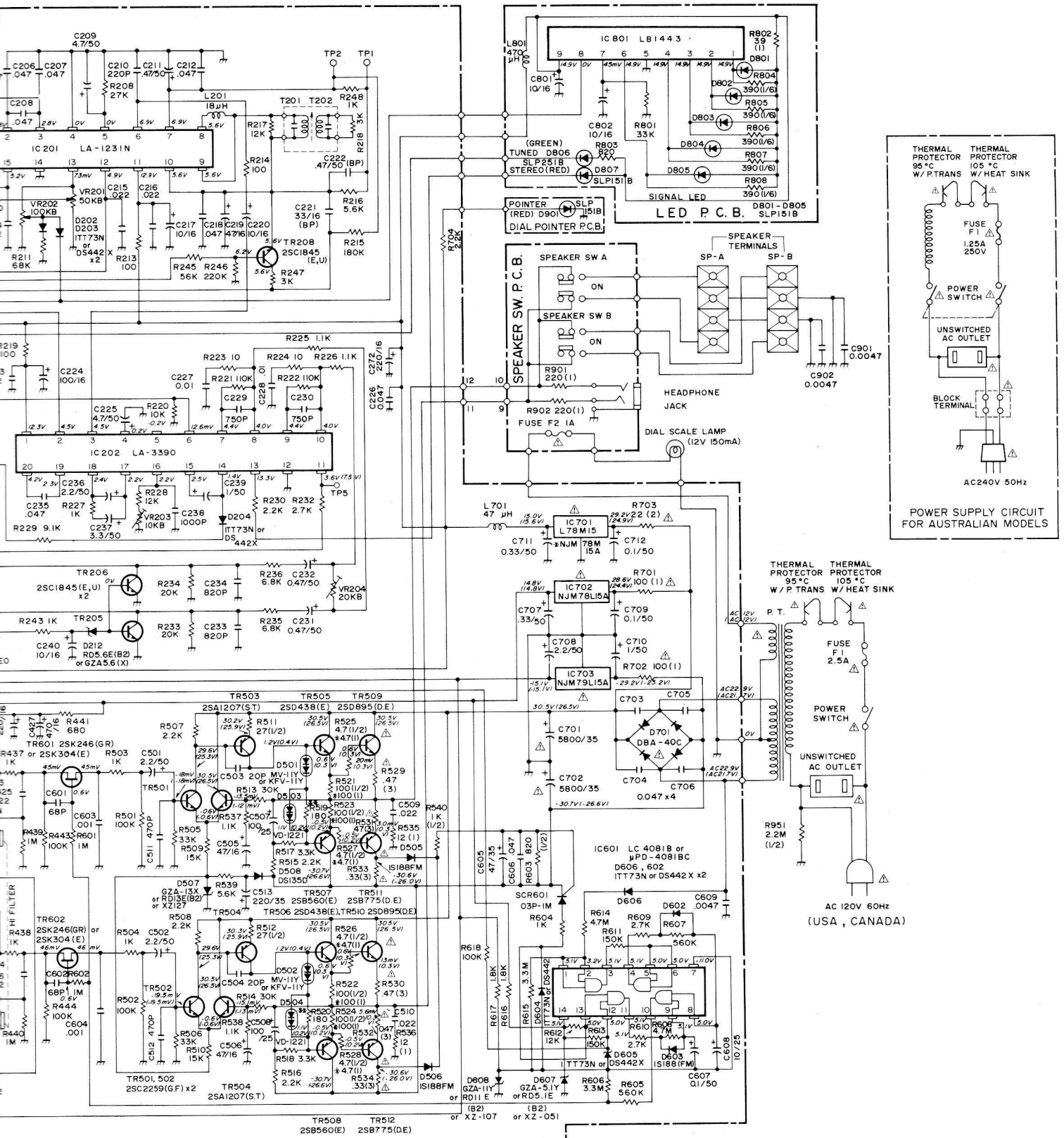


TUNER / AUDIO P. C. B.

- NOTES: (1) SW1-1 ~ SW1-4 INDICATE FUNCTION SELECTOR SW (AM, FM, FM-MUTE, PHONO, AUX-TY)
 (2) ALL RESISTANCE VALUES ARE INDICATED IN "OHM" (K = 10³ OHM, M = 10⁶ OHM)
 (3) ALL CAPACITANCE VALUES ARE INDICATED IN "μF" (P = 10⁻⁶ μF)
 (4) * VALUES ARE USED FOR CANADIAN MODELS ONLY.
 (5) ** VALUES MAY VARY FROM UNIT TO UNIT FOR BEST PERFORMANCE.
 (6) FOR AUSTRALIAN MODELS VR501 and VR502 (500ΩB) ARE USED IN PLACE OF R519 and R520.

CAUTION
 Before
 measure
 circuit.

SCHEMATIC DIAGRAM



0, AUX-TY)
OHM)

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

Before returning the set to the customer, make appropriate leakage current or resistance measurements to determine that exposed parts are properly insulated from the supply circuit.

OF R519 and R520.

RADIO SHACK, A DIVISION OF TANDY CORPORATION

**U.S.A.: FORT WORTH, TEXAS 76102
CANADA: BARRIE, ONTARIO L4M 4W5**

TANDY CORPORATION

AUSTRALIA

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BELGIUM

PARC INDUSTRIEL DE NANINNE
5140 NANINNE

U.K.

BILSTON ROAD WEDNESBURY
WEST MIDLANDS WS10 7JN