

# ELECTRONICS SERVICE MANUAL

## X-06 Receiver

### TABLE OF CONTENTS

Specifications.....	1
FM IF, RF Alignment and FM MPX Alignment...	2
AM IF and RF Alignment.....	2
Bias Adjustment.....	2
Disassembly Diagram.....	3
Schematic Diagram.....	4
Wiring Diagram.....	6
Repair Parts List.....	8

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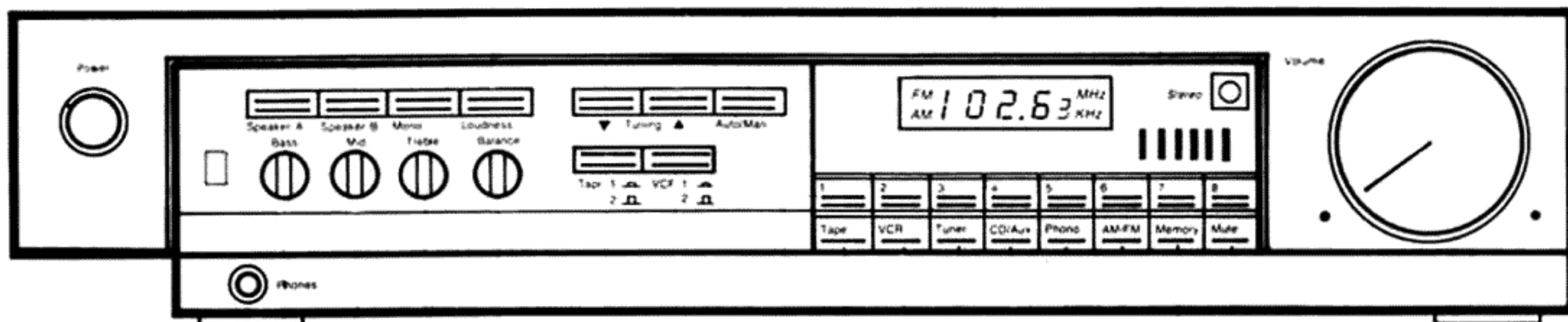
# RePair Parts List

Schematic Location	Parts No.	Description
<b>TRANSISTORS, DIODES AND IC'S</b>		
Q101	TR50000140	3SK107-F. FM RF Amp.
Q102, 103	TR30000133	2SC1674, FM MIX. OSC
Q104	TR50000139	2SK168-F. Buffer Amp.
Q141	TR30000108	2SC1571 (E. F) Buffer Amp
Q160 - 167	TR30000248	2SC945 For Switch
Q201	TR50000097	2SK49 (F. H) AM RF Amp.
Q251	TR30000327	2SC536G For Switch
Q301	TR10000126	2SA608K (F. G) For Switch
Q302	TR30000248	2SC945 For Switch
Q303, 304	TR10000126	2SA608K (F. G) For Switch
Q305, Q306	TR10000140	2SA984K (E. F) For Switch
Q307, Q308	TR30000248	2SC945 For Switch
Q309	TR50000127	2SK246-Y. FET
Q310 - 312	TR30000431	2SC1570 (E. F) Tuning Voltage Control Circuit
Q401, 402	TR30000248	2SC945 For Switching
Q441 - 448	TR30000248	2SC945 For Switching
Q449 - 456	TR10000126	2SA608K (F. G) For Switching
Q457	TR30000248	2SC945 For Switching
Q458	TR10000126	2SA608K (F. G) For Switching
Q501 - 504	TR30000467	2SC2602 (G) Differential Amp.
Q505	TR30000248	2SC945 Stabilizer
Q506	TR10000126	2SA608K (F. G) Stabilizer
Q551	TR30000248	2SC945 Stabilizer
Q552	TR10000126	2SA608K (F. G) For Switching
Q553, 554	TR30000248	2SC945 For Switching
Q555	TR10000126	2SA608K (F. G) For Switching
Q556, 557	TR50000127	2SK246-Y For Switching
Q651 - 654	TR10000102	2SA929 (G. F. H), Flat Tone Amp.
Q655, 656	TR30000327	2SC536G For Switch
Q701 - 706	TR10000023	2SA1016 (G. H) Differential Amp. Constant Current
Q707 - 710	TR30000212	2SC2362 (G. H) Pre.Driver
Q711 - 714	TR10000047	2SB631K (E. F) Driver
Q715 - 718	TR40000069	2SD600K (E. F) Bias Compensator. Driver
Q719, 720	TR10000047	2SB631K (E. F) Driver
Q721, 722	TR40000045	2SD1047 (D. E) Power Amp.
Q723, 724	TR20000040	2SB817 (D. E) Power Amp.
Q725, 726	TR40000045	2SD1047 (D. E) Power Amp.
Q727, 728	TR20000040	2SB817 (D. E) Power Amp.
Q801 - 811	TR30000248	2SC945 For Switch
Q812 - 815	TR30000121	2SC2274 (E. F) For Switch
Q851	TR10000126	2SA608K (F. G) Buffer Amp
Q901	TR30000029	2SD313 Regulator
Q902	TR10000047	2SB631K (E. F) Regulator
Q903	TR30000029	2SD313 Regulator
Q904	TR40000069	2SD600K (E. F) Regulator
Q951	TR30000121	2SC2274 (E. F) For Switch
D101 - 104	DD50000055	SVC211, Vari-Cap FM Tuning
D141 - 144	DD10000100	1N4148 Diode
D161 - 167	DD10000100	1N4148 Diode
D231, 232	DD10000100	1N4148 Diode
D251, 252	DD10000100	1N4148 Diode
D201, 202	DD50000092	SVC333 (B2), Vari-Cap AM Tuning
D301 - 316	DD10000100	IN4148 Diode
D317	DD20000090	UZ-15B(L) Zener Regulator
D318	DD10000100	IN4148 Diode
D401	DD10000100	IN4148 Diode
D441 - 453	DD10000100	IN4148 Diode
D551, 552	DD20000041	UZ-18B (M, H), Zener Regulator
D553 - 559	DD10000100	IN4148 Diode
D701 - 708	DD10000100	IN4148 Diode
D803 - 818	DD10000100	IN4148 Diode
D831	DD10000100	IN4148 Diode
D851 - 865	DD40000812	SE65224T-D, L.E.D
D866 - 873	DD40000824	SE6521DK, L.E.D
D901, 902	DD10000020	KBL-02/PBL403, Rectifier
D903, 904	DD20000028	UZ-20 (M, H), Zener Regulator
D905 - 908	DD10000068	IN4003/DS135C, Diode
D909	DD20000090	UZ-15B (L), Zener Regulator
D910	DD20000065	UZ-6.8B (M, H), Zener Regulator
IC131, 132	IC00001656	UPP-1163H FM IF Amp.
IC141	IC00001103	LA1235 FM IF Amp.
IC142	IC00001620	LB1450 Tuning LED Driver

Schematic Location	Parts No.	Description
IC201	IC00001322	LA1245 AM IF Amp.
IC251	IC00001450	LA3400 FM MPX Decoder
IC301	IC00001346	TC9157AP PLL Synthesizer
IC302	IC00000482	TD6104P Prescaler
IC303	IC00001528	LC4013 D. Type Flip Flop
IC401	IC00000573	TD6301AP Driver For Frequency Display
IC441	IC00001632	HD74HC541 Inverting Octal 3 State Buffer
IC442	IC00001644	M54832P 8 Channel Selector
IC501	IC00001279	NE5532N Pre. Amp.
IC551	IC00001541	LC7818 For Func. Switch
IC601	IC00001292	NJM2041DD F/AT Amp
IC801	IC00001498	TC9150P Switch For Remote Control Receiver
IC802	IC00001528	LC4013 D. Type Flip-Flop
IC851	IC00000925	LB1403 Signal LED Driver
IC852	IC00001589	CX20106A Remote Control Receiver Amp
IC951	IC00000512	μPC78L05 Regulator
<b>COILS VARIABLE RESISTORS, SWITCHES AND OTHERS</b>		
L101	LC02370009	RL237T, FM ANT Coil
L102	LC22200006	TRL-220, FM RF Coil
L103	LC22210000	TRL-221, FM RF Coil
L104	LC02330000	RL-233T, FM IF Coil
L105	LM00000073	TRL-239, Micro Inductor
L106	LC31120000	RLV112T, FM OSC Coil
L141	LC31090007	RLV109T, IF Coil
L201	LC31050009	RLV105T, AM OSC Coil
L202	LC31070008	RLV107A00, AM ANT Coil
L203	LC23230006	TRL-323, AM IF Coil
L251, 252	LC21940006	TRL-194, FM MPX Filter
L701, 702	LC23320007	TRL-332, Anti-Parasitic Coil
CT101 - 103	CF00000238	CVSSA1001 10PF Film Trimmer Cap.
CT104	CF00000240	CVSSA0701 7PF Film Trimmer Cap.
CT201	CF00000238	CVSSA1001 10PF Film Trimmer Cap.
CT202	CF00000238	CVSSA1001 10PF Film Trimmer Cap.
VR141	RV20000235	08-301 50KB, FM Meter Adj.
VR142	RV20000193	08-301 10KB, FM Muting Adj.
VR231, 232	RV20000235	08-301 50KB, AM Meter AM Auto Adj.
VR251	RV20000235	08-301 50KB, Separation Adj.
VR601	RV10001073	C-4170A08 50KBX2, Volume Control
VR651 - 653	RV10000433	4TR-1742 20KBX2, Bass, Mid, Treble Control
VR654	RV10000378	4TR-1572 20KW, Balance Control
RY951	LY00000137	VS-24MB-NR, Relay
	SH14000184	4TR-2312, 4 Key Push Switch for Speaker A. B. Mon. Loudness
	SH13000310	4TR-2311, 3 Key Push Switch for Auto/Man Up, Down
	SH12000326	4TR-2276, 2 Key Push Switch for Tape 1/2, VCR 1/2
	SH11000227	4TR-2306, 1 Key Push Switch for Power
	SH60000239	4TR-2301, Key board Switch for Tape, VCR, Tuner, CD/AUX, Phono, AM/FM, Memory, Mute.
T001	PT21006044	Power Transformer, TT-241-AF (for A Version)
	PT21006299	Power Transformer, TT-241-GF (for B/C Version)
T002	PT21006340	Power Transformer, TT-230-AF-1 (for A Version)
	PT21006491	Power Transformer, TT-230-GF-1 (for B/C Version)
F701, 702	FU12000136	Fuse, 125V Long 6A UL
	FU23000086	Fuse, 250V 6.3A S
F901 - 904	FU12000045	Fuse, 250V 4A UL
	FU23000049	Fuse, 250V 4A S
F905	FU12000070	Fuse, 250V 1A UL
	FU23000025	Fuse, 250V 1A S

# Specification

Continuous Power Output.....	60 watts per channel, min RMS both channels into 8 ohms from 20 to 10,000 Hz with no more than 0.03% total harmonic distortion
DIN Power Output.....	100watts per channel(1 kHz, 4 ohms, 1% THD)
Music Power.....	200 watts total (50 w/ch)
Total Harmonic Distortion (20 to 20,000 Hz).....	No more than 0.03%
Intermodulation Distortion (60 Hz; 7 kHz = 4:1).....	0.03%
<b>Output</b>	
Speaker .....	8 ohms nominal
Headphone.....	8 ohms nominal
Damping Factor.....	120 (1 kHz, 8 ohms)
<b>Input Sensitivity/Impedance</b>	
Phono (MM) .....	2.5 mV/47 kohms
(MC) .....	200 $\mu$ V/100 ohms
CD, Video Tape .....	150 mV/20 kohms
<b>Overload Level (THD 0.5%, 1 kHz)</b>	
Phono.....	180 mV
Tape, CD Video.....	5V
<b>Frequency Response</b>	
Phono.....	20 to 20 kHz $\pm$ 0.3 dB (RIAA Std)
Tape, CD Video.....	20 to 20 kHz $\pm$ 0.5 dB
<b>Tone Control</b>	
Bass .....	$\pm$ 8 dB (100 Hz)
Mid .....	$\pm$ 8 dB (1 kHz)
Treble.....	$\pm$ 8 dB (10 KHz)
<b>Loudness Control (Volume Control Set at 30 dB Position)</b>	
	+ 5 dB (100 Hz), + 3 dB (10 kHz)
<b>Signal to Noise Ratio (IHF, A-Network)</b>	
Phono (MM).....	80 dB
(MC) .....	70 dB
Tape, CD, Video.....	90 dB
<b>FM Tuner Section</b>	
Usable Sensitivity.....	11.2 dBf/2.0 $\mu$ V (mono)
DIN Sensitivity.....	1.2 $\mu$ V (26 dB S/N 75 ohms)
<b>50 dB Quieting Sensitivity</b>	
Mono.....	17.2 dBf/4.0 $\mu$ V
Stereo.....	37.2 dBf/4.0 $\mu$ V
<b>Signal to Noise Ratio (at 65 dBf) IHF A Weighted</b>	
Mono.....	72 dB
Stereo.....	70 dB
<b>Harmonic Distortion (at 65 dBf) 30 Hz ~ 7.5 kHz</b>	
Mono.....	0.2%
Stereo.....	0.3%
Frequency Response.....	$\pm$ 0.5dB (50Hz ~ 10KHz)
Capture Ratio.....	1.5dB
Alternate Channel Selectivity.....	70 dB ( $\pm$ 400 kHz)
Spurious Response Ratio.....	85 dB
Image Response Ratio.....	70 dB
IF Response Ratio.....	90 dB
AM Suppression Ratio.....	60 dB
Stereo Separation.....	40 dB (100 Hz ~ 10 kHz)
<b>AM Tuner Section</b>	
Selectivity .....	40 dB
Sensitivity (Loop Antenna).....	300 $\mu$ V
Signal to Noise Ratio.....	50 dB
Image Response Ratio.....	40 dB
IF Response Ratio.....	40 dB
Power Consumption.....	300 Watts
Dimension (Overall).....	430(W) $\times$ 88(H) $\times$ 422(D) 16 <sup>15/16</sup> " $\times$ 3 <sup>15/32</sup> " $\times$ 16 <sup>5/8</sup> "
Weight (net).....	11.1 kgs/24.42 lbs



## FM IF, RF Alignment and FM MPX Alignment

**Instruments:** FM Signal Generator, (400Hz, 100% Modulated) T.H.D. analyzer, Oscilloscope, AC VTVM, DC Voltmeter, Tuning Meter

FM Stereo Generator, AC VTVM, Oscilloscope, Frequency Counter and THD Analyzer

**Terminated :** DC Voltmeter...Between 4 and E5 On TH-IF-153 P.C.B. (Step 1.2)

Tuning Meter...Between TP1 and TP2 On TH-IF-153 P.C.B. (Step 8)

Step	Generator		Tuning Dial Setting	Adjust	Adjust for
	Coupling	Frequency			
1	No use.		87.5 MHz	L106	3V reading on DC Voltmeter
2			108 MHz	CT104	23V reading on DC Voltmeter
3	Repeat steps 1 and 2 unit no further improvement is noticed.				
4	Antenna terminal	90 MHz	90 MHz	L101, L102 L103	Maximum reading on AC VTVM.
5				L104	Adjust balance of wave form
6		105 MHz	105 MHz	CT101, CT102 CT103	Maximum reading on AC VTVM.
7	Repeat steps 4.5 and 6 unit on further improvement is noticed				
8	Antenna terminal	90 MHz	90 MHz	L141(A)	Adjusting center on Tuning Meter
9	1mV input			L141(B)	Minimum reading on T.H.D. Analyzer
10	Repeat steps 8 and 9 unit no further improvement is noticed				
11	Antenna terminal 15 $\mu$ V input 10 $\mu$ V input (Europe)	90 MHz	90 MHz	VR142	Muting Level (Auto Position)
12	Antenna terminal 1mV input	90 MHz	90 MHz	VR141	Signal Indicator Level 5th LED light on
13	Antenna terminal 1mV input	98 MHz Pilot...10% 1 KHz...90% Mod.	98 MHz	VR251	Best separation No need to Adjust VCO

# AM IF and RF Alignment

**Instruments:** AM signal Generator (400Hz 30% Modulated), AC VTVM, Oscilloscope, DC Voltmeter

**Terminated :** DC Voltmeter "Between 4 and E5 ON TH-IF-153 and TX-474 P.C.B.

Step	Generator		Tuning Dial Setting	Adjust	Adjust for
	Coupling	Frequency			
1	No use.		530 KHz (531 KHz) Europe	L201	3V reading on DC Volt meter
2			1600 KHz (1602 KHz) Europe	CT201	25V reading on DC Volt meter
3	Repeat steps 1 and 2 unit no further improvement is noticed.				
4	Test Loop Radiate signal into loop antenna	450 KHz	530 KHz	L203	Maximum reading on AC VTVM.
5		600 KHz	600 KHz	L202	
6		1400 KHz	1400 KHz	CT202	
7	Repeat steps 5 and 6 unit no further improvement is noticed.				
8	Test Loop Radiate signal into loop ANT. 10mV input	1000 KHz	1000 KHz	VR231	Signal Indicator Lever 5th LED light on
9	Test Loop Radiate signal into loop ANT. 1mV input	1000 KHz	Auto Scanning	VR232	Stop Position

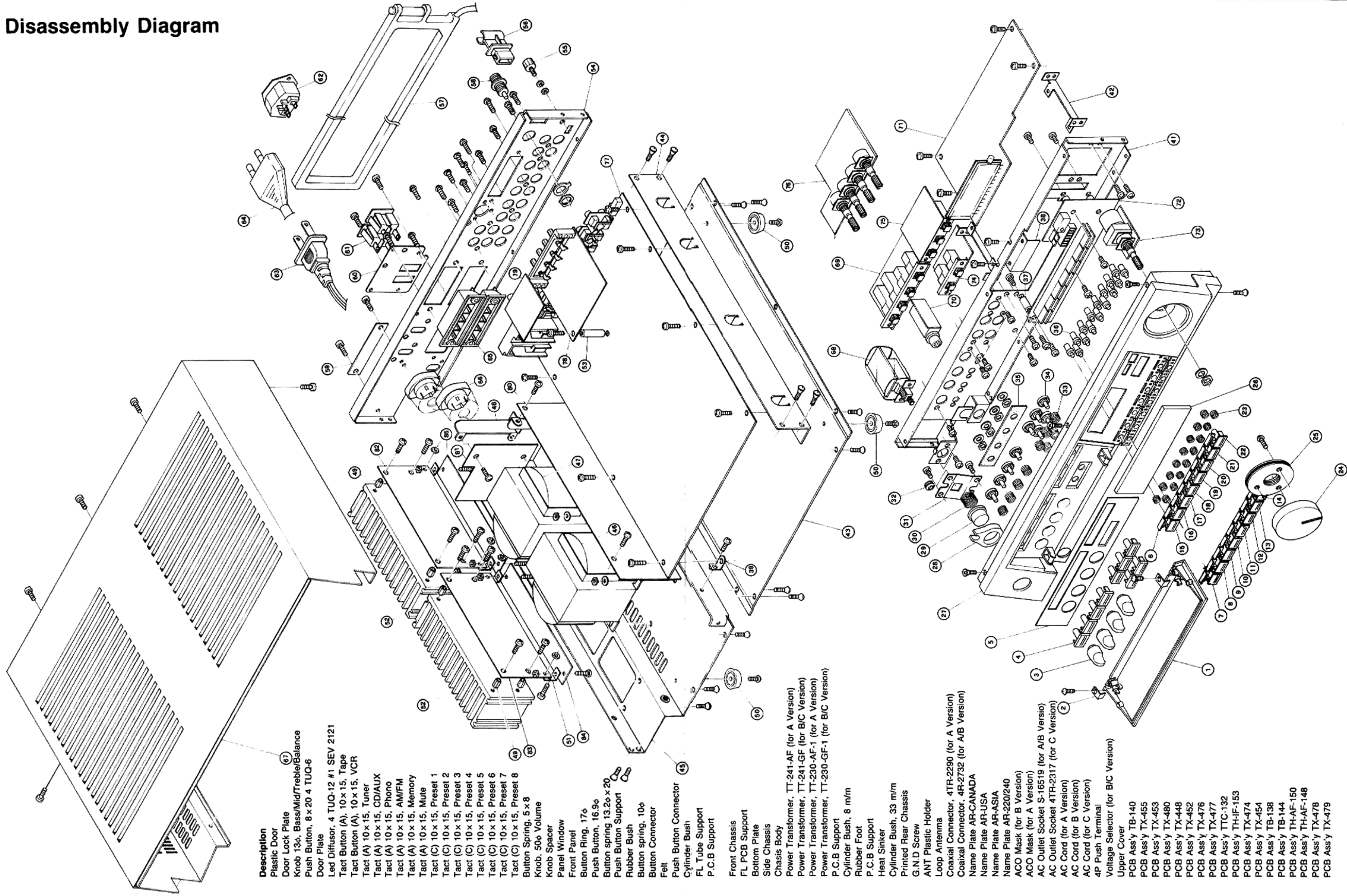
# Bias Adjustment

**Instruments:** DC milli-voltmeter

**Notes:** Prior to Bias Adjustment, run about 5 minutes with rated output (8 ohm) and warm up Power Transistor and Heat Sink.  
Set Volume Control to Minimum.

Step	Coupling		Adjust	Adjust for
	Plus Lead	Minus Lead		
1	TP1	TP3	VR701	DC milli-voltmeter reads 4 mV
2	TP2	TP4	VR702	

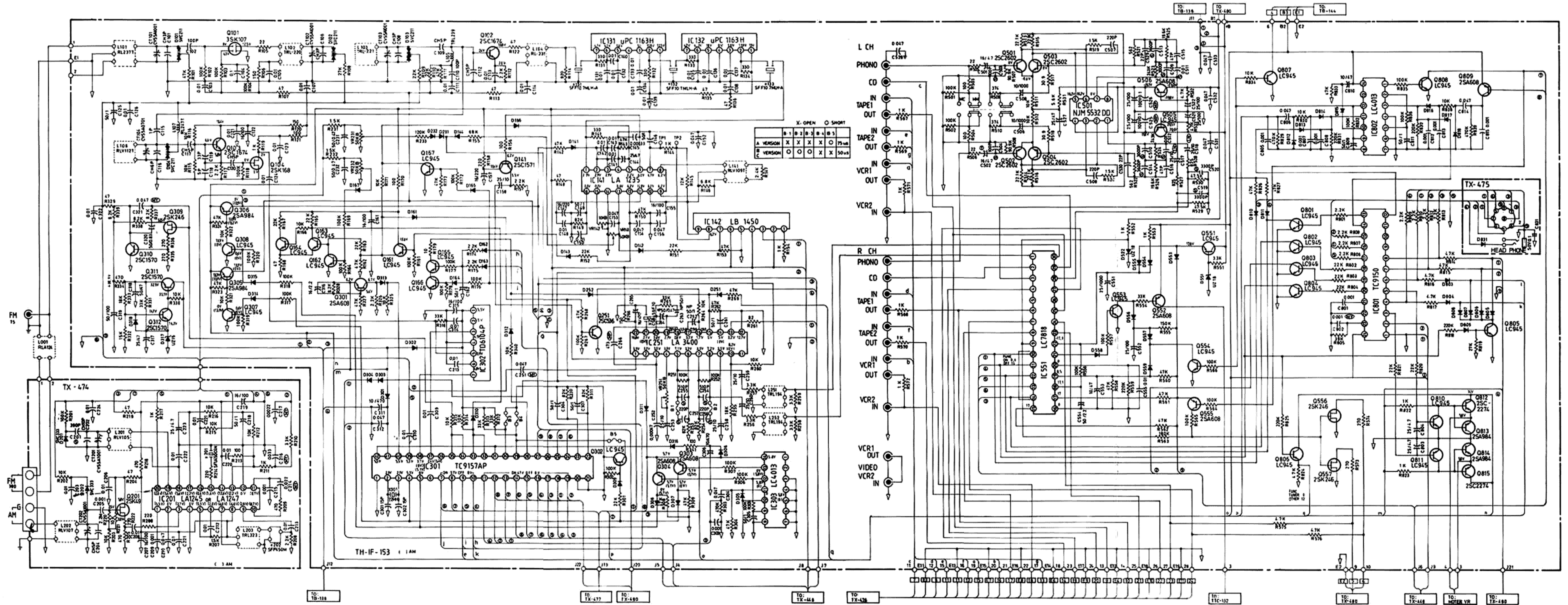
# Disassembly Diagram



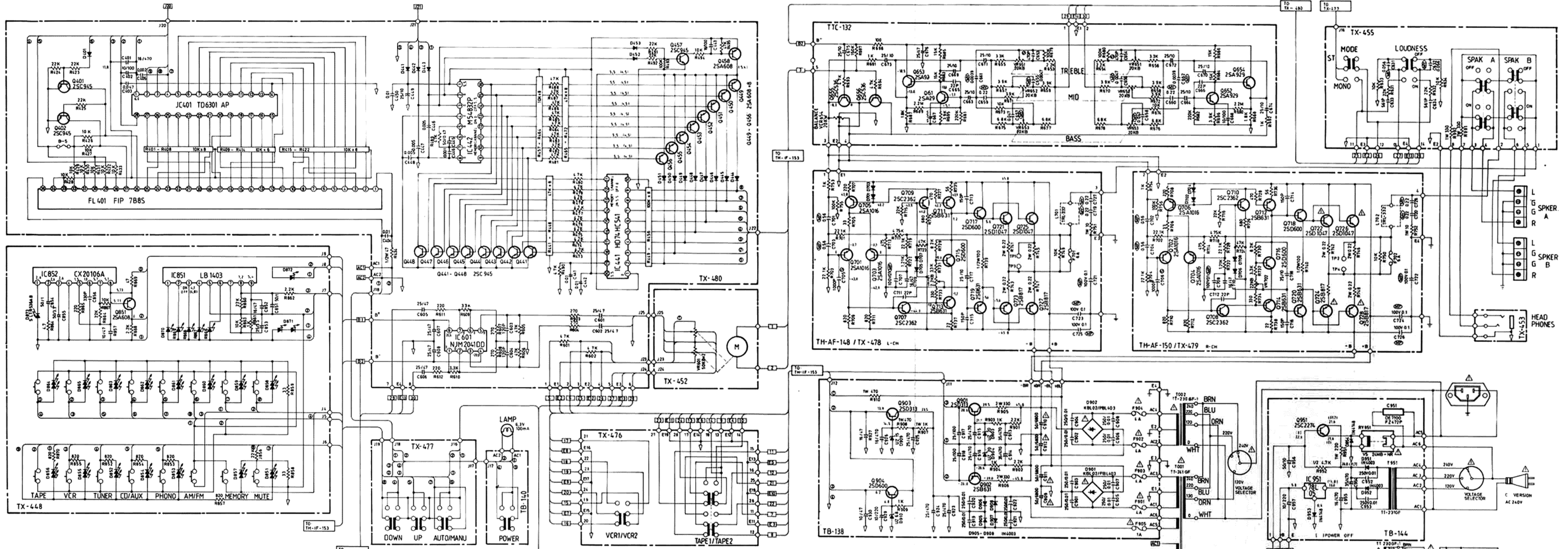
Key No.	Pats No.	Description
1	OM00002029	Plastic Door
2	SP10004860	Door Lock Plate
3	KB10001333	Knob 13 $\phi$ , Bass/Mid/Treble/Balance
4	KB20001664	Push Button, 8 x 20 4 TUQ-6
5	OM00002170	Door Plate
6	OM00002080	Led Diffuser, 4 TUQ-12 #1 SEV 2121
7	KB20001676	Tact Button (A), 10 x 15, Tape
8	KB20001688	Tact Button (A), 10 x 15, VCR
9	KB20001690	Tact (A) 10 x 15, Tuner
10	KB20001706	Tact (A) 10 x 15, CD/AUX
11	KB20001718	Tact (A) 10 x 15, Phono
12	KB20001720	Tact (A) 10 x 15, AM/FM
13	KB20001731	Tact (A) 10 x 15, Memory
14	KB20001743	Tact (A) 10 x 15, Mute
15	KB20001809	Tact (C) 10 x 15, Preset 1
16	KB20001810	Tact (C) 10 x 15, Preset 2
17	KB20001822	Tact (C) 10 x 15, Preset 3
18	KB20001834	Tact (C) 10 x 15, Preset 4
19	KB20001846	Tact (C) 10 x 15, Preset 5
20	KB20001858	Tact (C) 10 x 15, Preset 6
21	KB20001860	Tact (C) 10 x 15, Preset 7
22	KB20001871	Tact (C) 10 x 15, Preset 8
23	SN00000192	Button Spring, 5 x 8
24	KB10001357	Knob, 50 $\phi$ Volume
25	SR00000780	Knob Spacer
26	AW00000356	Panel Window
27	AA80000821	Front Panel
28	BU00000724	Button Ring, 17 $\phi$
29	KB20001652	Push Button, 16.9 $\phi$
30	SN00000180	Button spring 13.2 $\phi$ x 20
31	SP10004901	Push Button Support
32	BU00000037	Rubber Bush
33	SN00000179	Button spring, 10 $\phi$
34	OM00001943	Button Connector
35	FE00000407	Felt
36	OM00002091	Push Button Connector
37	BC00000337	Cylinder Bush
38	SP10004780	FL Tube Support
39	OM00002248	P.C.B Support
40		Front Chassis
41	AF80000299	FL PCB Support
42	SP10004779	Bottom Plate
43	AB00000171	Side Chassis
44	AF80000299	Chassis Body
45	AS01000191	Power Transformer, TT-241-AF (for A Version)
46	PT23006044	Power Transformer, TT-241-GF (for B/C Version)
47	PT23006299	Power Transformer, TT-230-AF-1 (for A Version)
48	PT23006491	Power Transformer, TT-230-GF-1 (for B/C Version)
49	SP10004913	P.C.B Support
50	BC00000416	Cylinder Bush, 8 m/m
51	SP10003258	Rubber Foot
52	AH20000394	P.C.B Support
53	BC00000430	Heat Sink
54	AR80000612	Cylinder Bush, 33 m/m
55	SW00000136	Printed Rear Chassis
56	SA00001371	G.N.D Screw
57	LB01130005	ANT Plastic Holder
58	SA00001530	Loop Antenna
59	NP00001342	Coaxial Connector, 4TR-2290 (for A Version)
60	NP00001354	Coaxial Connector, 4R-2732 (for A/B Version)
61	NP00001391	Name Plate AR-USA
62	SP10005048	Name Plate AR-ASIA
63	SA00001450	Name Plate AR-220/240
64	SA00001553	ACO Mask (for B Version)
65	CD00000218	ACO Mask (for A Version)
66	CD00000097	AC Outlet Socket 4TR-2317 (for A/B Versio)
67	TP10000131	AC Outlet Socket 4TR-2317 (for C Version)
68	VC00000048	AC Cord (for A Version)
69	AU00000701	AC Cord (for B Version)
70		4P Push Terminal
71		Voltage Selector (for B/C Version)
72		Upper Cover
73		PCB Ass'y TB-140
74		PCB Ass'y TX-455
75		PCB Ass'y TX-453
76		PCB Ass'y TX-480
77		PCB Ass'y TX-448
78		PCB Ass'y TX-452
79		PCB Ass'y TX-476
80		PCB Ass'y TX-477
81		PCB Ass'y TTC-132
82		PCB Ass'y TH-IF-153
83		PCB Ass'y TX-474
84		PCB Ass'y TX-454
85		PCB Ass'y TB-138

# Schematic Diagram (1/2)

NOTE: PARTS AND CIRCUIT SUBJECT TO CHANGE FOR IMPROVEMENTS, WITHOUT NOTICE



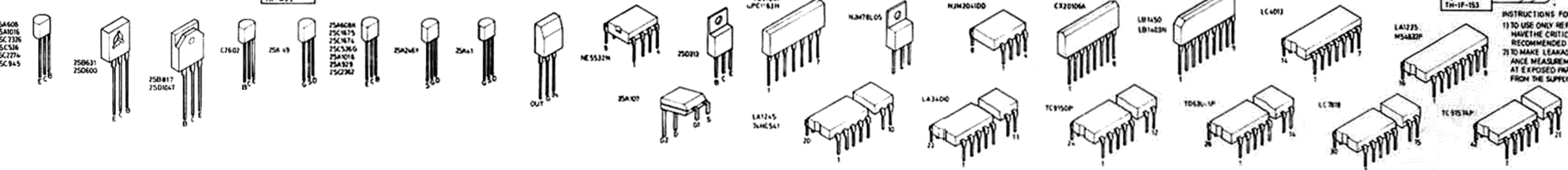
# Schematic Diagram (2/2)



**RESISTORS**  
 5% TOLERANCE UNLESS OTHERWISE NOTED  
 R --- RESISTOR  
 M --- MEGA OHM  
 K --- KILO OHM  
 W --- WATT  
 RSU --- METAL OXIDE FILM RESISTORS  
 NON MARK LOW NOISE TYPE CARBON RESISTORS

**CAPACITORS**  
 □ --- LOW NOISE ELECTROLYTIC CAPACITORS  
 ○ --- FILM CAPACITORS  
 ○ --- POLYSTYRENE FILM CAPACITORS  
 ○ --- TANTALUM CAPACITORS  
 ○ --- ELECTROLYTIC CAPACITORS  
 ○ --- CERAMIC CAPACITORS  
 UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITANCE VALUES ARE EXPRESSED

ITEM	SCHEMATIC LOCATION (E.A.S.I.)	PART NUMBER
FM IF AMP	R179	C161
AM IF AMP	R269	C262
MP3	R311	C332
INDICATOR	R335	C350
PHONO AMP	R576	C555
CD/AUX	R698	C674
MAIN AMP	R752	C726
SWITCH	R869	C857
POWER SUPPLY	R992	C954



**INSTRUCTIONS FOR SERVICE PERSONNEL**  
 1) TO USE ONLY REPLACEMENT PARTS THAT HAVE THE CRITICAL CHARACTERISTICS RECOMMENDED BY MANUFACTURER.  
 2) TO MAKE LEAKAGE CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

