

Ref. No.	Part No.	Part Name & Descriptions
D501 ~515	2760049011	1S2076A DIODE
D516	2760338007	SAVB20F DIODE
D517	2760239009	STRBA20F DIODE
D518	2760263014	HZ-15-1 ZENER
D519	2760053007	HZ-12A ZENER
D520,	2760256008	HZ-16-2 ZENER
521		
D522	2760049011	1S2076A DIODE
~525		
D801,	2760216019	KB-265 DIODE
802		

RESISTORS (not included Carbon Film ±5% ¼W Type)		
--	--	--

R111	2440032029	330 ohm ±5% 2W METAL OXIDE FILM (NB)
R553	2412314081	560 ohm ±5% ¼W CARBON FILM (NB)
~656		
R557	2412314007	100 ohm ±5% ¼W CARBON FILM (NB)
558		
R561	2412314067	100 ohm ±5% ¼W CARBON FILM (NB)
562		
R573	2412314023	470 ohm ±5% ¼W CARBON FILM (NB)
574		
R575	2442013080	0.22 ohm ±5% 1W METAL OXIDE FILM (NB)
~578		
R679	2412321032	4.7 ohm ±5% ¼W CARBON FILM (NB)
H684	2440033017	220 ohm ±5% 1W METAL OXIDE FILM (NB)
~587		
R903	2440017017	10 ohm ±5% 1W METAL OXIDE FILM (NB)
904		

VR001	2116000099	2 kohm SEMI FIXED RESISTOR
VR002	2116000086	200 kohm SEMI FIXED RESISTOR
VR003	2116000073	20 kohm SEMI FIXED RESISTOR
VR051	2110432003	VARIABLE RESISTOR 100 kohm MAIN
VR052	2110433002	VARIABLE RESISTOR 100 kohm LOUDNESS
VR053	2110434001	VARIABLE RESISTOR 250 kohm BALANCE
VR054	2110435000	VARIABLE RESISTOR 50 kohm TREBLE
VR055	2110435013	VARIABLE RESISTOR 250 kohm BASS
VR501,	2116000015	10 kohm SEMI FIXED RESISTOR 502

CAPACITORS (not included Ceramic 50V ±5%, ±10% Type)		
--	--	--

C002,	2531024003	0.01µF +80,-20% 50V CERAMIC 003
C004	2544132005	10µF 16V ELECTROLYTIC
C005	2531024003	0.01µF +80,-20% 50V CERAMIC ~009
C010	2544145005	0.47µF 50V ELECTROLYTIC
C011	2531024003	0.01µF +80,-20% 50V CERAMIC
C012	2544145005	0.47µF 50V ELECTROLYTIC
C013	2531024003	0.01µF +80,-20% 50V CERAMIC
C015	2544145005	0.47µF 50V ELECTROLYTIC
C016	2544136001	100µF 16V ELECTROLYTIC
C017	2544132005	10µF 16V ELECTROLYTIC
C018	2531025002	0.022µF +80,-20% 50V CERAMIC
C019,	2531024003	0.01µF +80,-20% 50V CERAMIC 020
C021	2531025002	0.022µF +80,-20% 50V CERAMIC
C022	2531024003	0.01µF +80,-20% 50V CERAMIC

Ref. No.	Part No.	Part Name & Descriptions
C023	2533600001	70F ±0.5pF 50V CERAMIC
C024	2531024003	0.01µF +80,-20% 50V CERAMIC ~027
C028	2544132005	10µF 16V ELECTROLYTIC
C029	2531024003	0.01µF +80,-20% 50V CERAMIC
C030	2533603008	10pF ±0.5pF 50V CERAMIC
C031	2560609007	390pF ±5% 50V PLASTIC FILM
C032	2531024003	0.01µF +80,-20% 50V CERAMIC
C033	2551064001	0.0022µF ±10% 50V PLASTIC FILM
C034	2544136001	100µF 16V ELECTROLYTIC
C035	2531024003	0.01µF +80,-20% 50V CERAMIC
C036	2544132005	10µF 16V ELECTROLYTIC
C037	2544146004	1µF 50V ELECTROLYTIC
C038	2531024003	0.01µF +80,-20% 50V CERAMIC
C039	2544149001	4.7µF 50V ELECTROLYTIC
C040,	2531024003	0.01µF +80,-20% 50V CERAMIC 041
C042	2531025002	0.022µF +80,-20% 50V CERAMIC
C043	2544136001	100µF 16V ELECTROLYTIC ~045
C046	2541016001	4.7µF ±20% 16V TANTALUM
C047	2544145005	0.47µF 50V ELECTROLYTIC
C048	2544017007	47µF 16V ELECTROLYTIC
C049	2544148002	3.3µF 50V ELECTROLYTIC ~051
C052	2544163029	470µF ±20% 16V ELECTROLYTIC
C053	2544148002	3.3µF 50V ELECTROLYTIC
C054	2544146004	1µF 50V ELECTROLYTIC
C055	2551080001	0.047µF ±10% 50V PLASTIC FILM
C056	2544149001	4.7µF 50V ELECTROLYTIC
C057	2566090000	1000pF ±5% 50V PLASTIC FILM
C058	2544148002	3.3µF 50V ELECTROLYTIC
C059,	2544133004	22µF 16V ELECTROLYTIC 060
C061	2551120039	0.0018µF ±5% 50V PLASTIC FILM
C062		
C063,	2544148002	3.3µF 50V ELECTROLYTIC 064
C065	2544132005	10µF 16V ELECTROLYTIC
C066,	2531024003	0.01µF +80,-20% 50V CERAMIC 067
C101	2531024003	0.01µF +80,-20% 50V CERAMIC
C102	2544019005	220µF 16V ELECTROLYTIC
C103,	2531025002	0.022µF +80,-20% 50V CERAMIC 104
C105	2544127007	220µF 6.3V ELECTROLYTIC
C108	-	-
C109	2544006005	470µF 6.3V ELECTROLYTIC
C110	2531024003	0.01µF +80,-20% 50V CERAMIC ~113
C114,	2544147003	2.2µF 50V ELECTROLYTIC 115
C116,	2531024003	0.01µF +80,-20% 50V CERAMIC
C117		
C118	2544129005	47µF 10V ELECTROLYTIC
C119	2531024003	0.01µF +80,-20% 50V CERAMIC ~121
C501,	2544146004	1µF 50V ELECTROLYTIC
C502		
C515,	2544132005	10µF 16V ELECTROLYTIC
C516		
C517,	2544161050	1000µF ±20% 6.3V ELECTROLYTIC
C518		
C519,	2551122024	0.068µF ±5% 50V PLASTIC FILM
C520		
C521,	2551121054	0.018µF ±5% 50V PLASTIC FILM
C522		
C523,	2551120000	0.001µF ±5% 50V PLASTIC FILM 524

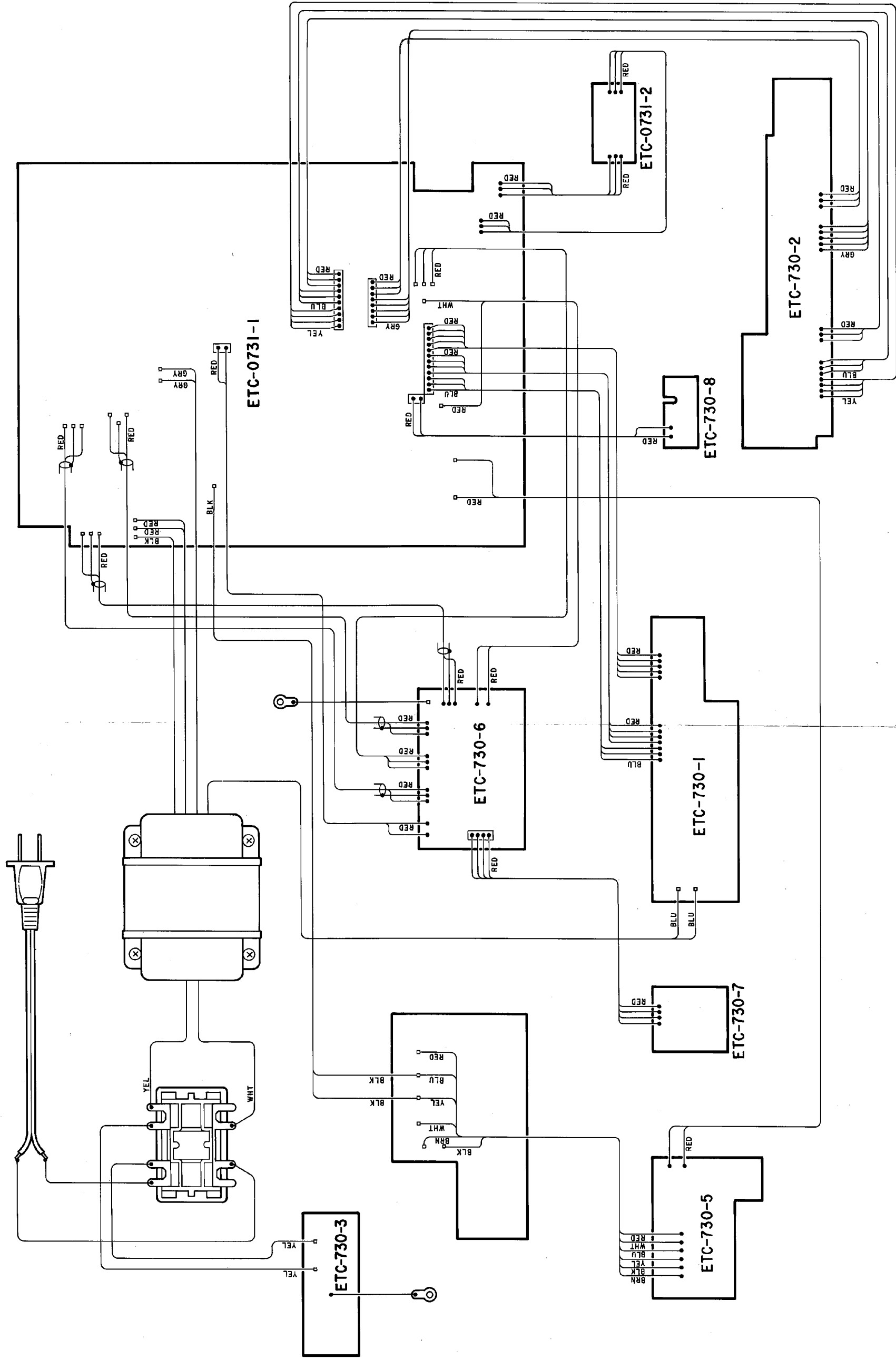
Ref. No.	Part No.	Part Name & Descriptions
C525,	2531024003	0.01µF +80,-20% 50V CERAMIC
526		
C527,	2549014018	0.22µF ±20% 50V ELECTROLYTIC
528		
C531,	2551076002	0.022µF ±10% 50V PLASTIC FILM
532		
C533	2544146004	1µF 50V ELECTROLYTIC
C536		
C539,	2533603008	10pF ±0.5pF 50V CERAMIC
C540		
C541,	2544132005	10µF 16V ELECTROLYTIC
C542		
C543	2531025002	0.022µF +80,-20% 50V CERAMIC
C544	2544146004	1µF 50V ELECTROLYTIC
C545	2531025002	0.022µF +80,-20% 50V CERAMIC ~548
C553,	2531027000	0.1µF +80,-20% 50V CERAMIC
554		
C557,	2531025002	0.022µF +80,-20% 50V CERAMIC
558		
C561,	2531025002	0.022µF +80,-20% 50V CERAMIC
562		
C571,	2531024003	0.01µF +80,-20% 50V CERAMIC
572		
C575	2544146004	1µF 50V ELECTROLYTIC ~580
C581	2544080005	1000µF ±20% 25V ELECTROLYTIC
C583,	2531024003	0.01µF +80,-20% 50V CERAMIC
584		
C586	2544146004	1µF 50V ELECTROLYTIC
C587	2531052004	4700pF +100,-0 500V CERAMIC
~590		
C591	2546089004	8200µF ±20% 56V ELECTROLYTIC
C592	2546030024	5600µF ±20% 50V ELECTROLYTIC
C593,	2531024003	0.01µF +80,-20% 50V CERAMIC
594		
C595,	2544138009	47µF 25V ELECTROLYTIC
596		
C597	2544136001	100µF 16V ELECTROLYTIC
C599,	2551074004	0.015µF ±10% 50V PLASTIC FILM
600		
C601	2551070008	0.0068µF ±10% 50V PLASTIC FILM
602		
C605,	2551081000	0.056µF ±10% 50V PLASTIC FILM
606		
C607,	2551085006	0.12µF ±10% 50V PLASTIC FILM
608		
C609,	2551061004	0.0012µF ±10% 50V PLASTIC FILM
610		
C621,	2531024003	0.01µF +80,-20% 50V CERAMIC
622		
C710,	2544132005	10µF 16V ELECTROLYTIC
723,		
724		
C795	2531024003	0.01µF +80,-20% 50V CERAMIC
C800	2531024003	0.01µF +80,-20% 50V CERAMIC ~805
C901,	2551084607	0.1µF ±10% 50V PLASTIC FILM
902		
TC001,	2130022008	TRIMMER CONDENSER 002

OTHER PARTS		
-------------	--	--

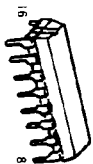
L001	2221082106	P.W. BOARD
	2090008120	JUMPER W/RE P=10mm USED 121
	EP-5667H1	TERMINAL PIN USED 44
	2350015947	INDUCTOR (2.2mH) USED 1

Ref. No.	Part No.	Part Name & Descriptions
T001	2312026000	FM, IF, DET (A) USED 1
T002	2312027009	FM, IF, DET (B) USED 1
T003	2311061008	MM ANT TRANS USED 1
T004	2311076103	MM OSC COIL USED 1
T005	2310056001	AM IFT USED 1
LP001	2320056004	ANTI BIRDIE FILTER USED 1
LP002,	2320041006	LOW PASS FILTER USED 2
003		
CF001	2610029000	FM CERAMIC FILTER USED 2
~003		
CF004	2610034008	AM CERAMIC FILTER (SEP450H) USED 1
CF005	2610031001	AM CERAMIC FILTER (BFU450C4) USED 1
	39900008038	X-TAL (7.2MHz) USED 1
	2124254002	SLIDE SW (REMOTE) USED 1
	2124501001	4P PUSH SWITCH USED 1
	4170233004	RADIATOR BLOCK USED 1
	4140240001	EARTH PLATE USED 2
	2020022008	FUSE HOLDER USED 4
	2061035070	FUSE (4.0A) USED 2
F902,		
903		
	2160052006	FRONT END USED 1
	2050185038	3P WIRE HOLDER USED 8
	2050133022	2P NH CONNECTOR BASE USED 2
	2050133080	8P NH CONNECTOR BASE USED 1
	2050167001	10P CONNECTOR BASE USED 1
	2050167027	12P NH CONNECTOR BASE USED 1
	2050152003	6P CONNECTOR BASE USED 2
	2050208009	3P NJ ANT TERMINAL USED 1
	4700012022	PAN SCREW WITH W. SW 3x12
		USED 4
	4737002018	TAPPING SCREW (S) 3x8 USED 2
	4159001008	F.S WASHER USED 2
	3940006007	LITHIUM BATTERY

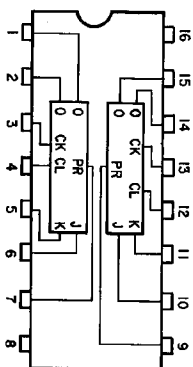
CONNECTION DIAGRAM



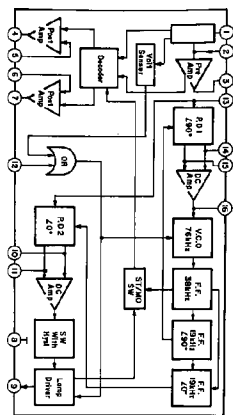
HD14027B
HA11225
HA12016
(Hitachi)



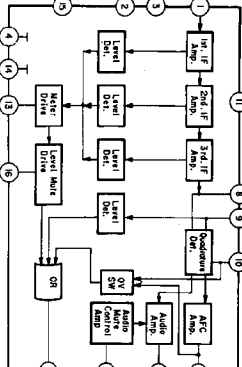
HD14027B



HA12016



HA11225



TRANSISTORS

2SC461(C)
2SC1815(BL)
2SA1015(GR),(Y)
2SC1685(R)
2SA1564A(R)
2SC1683(O/R)
2SA988(E/F)
2SC1841(E/F)
2SC535(C)

2SB647A(C)
2SD667A(C)
2SD468A(C)

DIODES (including LED)

1S2076A
HZ-6-B2 HZ-12A
HZ-15-1 HZ-16-2
HZ-9B-2

Varactor
SVC321SP-D2

Blue *

Black *

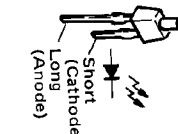
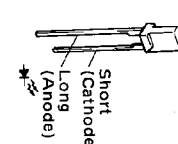
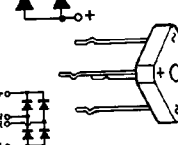
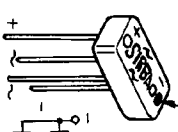
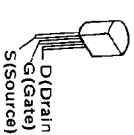
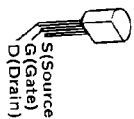
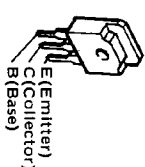
Red *

Orange
Red
Brown

2SA1104(Y/O)
2SC2579(Y/O)

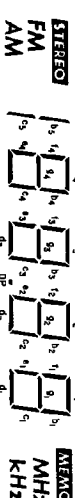
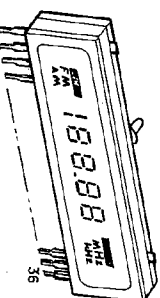
FET 2SK163M

FET 2SK373Y



ELECTRON RAY INDICATOR TUBE

F1P7F8S



ETC0730B CONTROL UNIT PARTS LIST

Ref. No.	Part No.	Part Name & Descriptions
SEMICONDUCTORS		
IC401	2620453006	TD6301 AP (TOSHIBA) IC
TR401	2730294016	2SC1686(R) TRANSISTOR
~404		
TR405	2730294016	2SC1686(R) TRANSISTOR
TR406	2710178039	2SA564A(R) TRANSISTOR
407		
DO12	3939261014	SEL1321G(GREEN) LED
DA02	3939261001	SEL1121R(RED) LED
~409		
DA10	3939260002	SEL1112R(RED) LED
411		
D902	3939261014	SEL1321G(GREEN) LED
~904		
RESISTORS		
R080	2412092002	1 kohm ±5% 1/4W CARBON FILM
R401	2412130003	39 kohm ±5% 1/4W CARBON FILM
402		

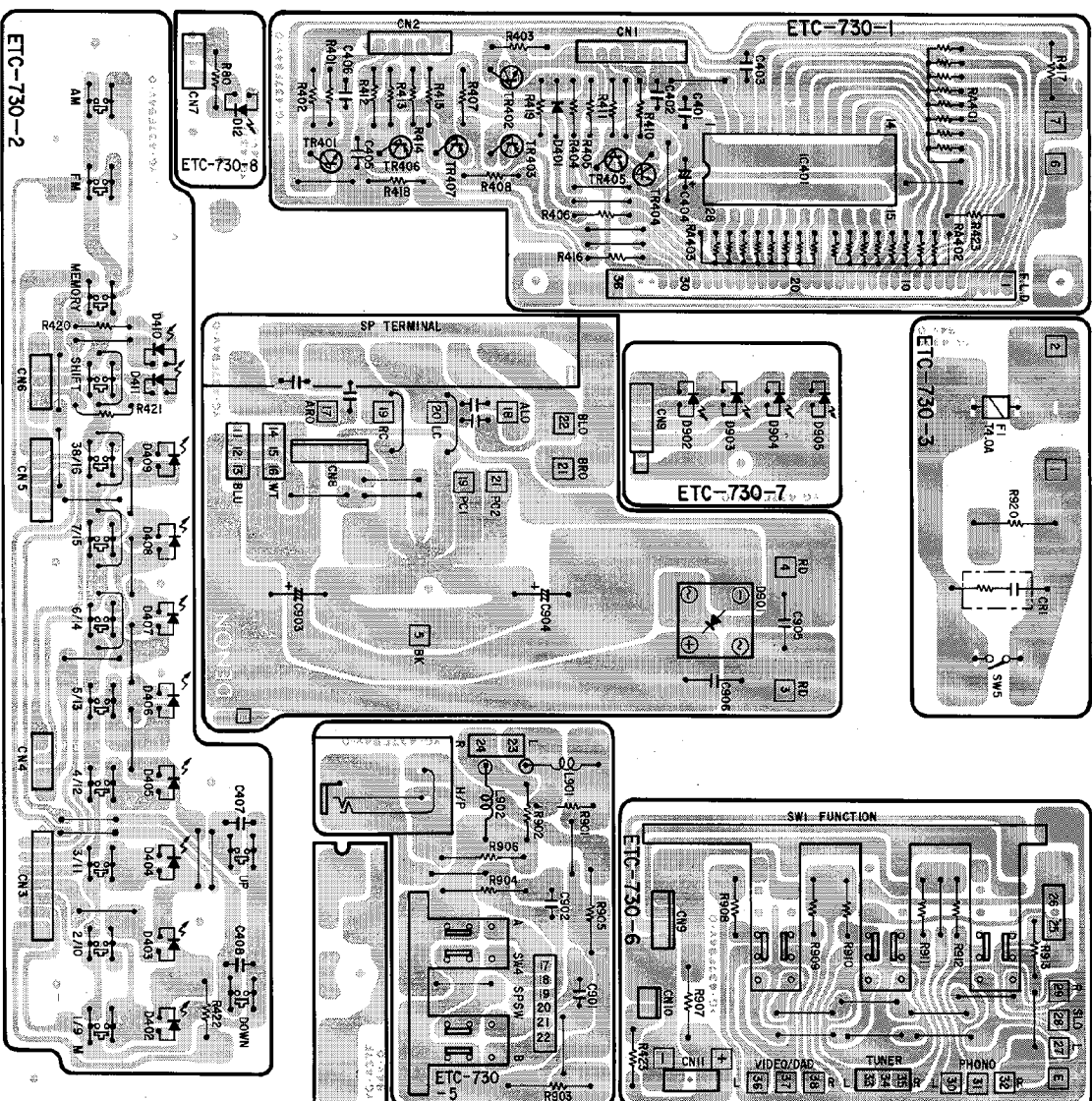
Ref. No.	Part No.	Part Name & Descriptions
~405	2412116001	10 kohm ±5% 1/4W CARBON FILM
R408		
R410	2412130003	39 kohm ±5% 1/4W CARBON FILM
~415		
R416	2412116001	10 kohm ±5% 1/4W CARBON FILM
R417	2412076002	220 ohm ±5% 1/4W CARBON FILM
418		
R420	2412087004	620 ohm ±5% 1/4W CARBON FILM
R421	2412108006	4.7 kohm ±5% 1/4W CARBON FILM
R422	2412087004	620 ohm ±5% 1/4W CARBON FILM
R423	2412110007	5.6 kohm ±5% 1/4W CARBON FILM
R901	2410282005	47 ohm ±5% 1/4W CARBON FILM
902		
R905	2440033020	220 ohm ±5% 1W METAL OXIDE FILM (NB)
906		
R907	2410181009	680 ohm ±5% 1/4W CARBON FILM
R908	2412068007	100 ohm ±5% 1/4W CARBON FILM
~911		
R920	2420073000	2.2 Mohm ±10% 1/4W CARBON COMPOSIT
RA401	2462012003	10 kohm ±20% 1/8W RESISTOR ALLY
~403		

Ref. No.	Part No.	Part Name & Descriptions
CAPACITORS		
CA01	2531006005	2200pF ±10% 50V CERAMIC
403		
CA07	2533633007	180pF ±5% 50V CERAMIC
C903	2531024003	0.01µF ±80% -20% 50V CERAMIC
904		
2610035007		C R BLOCK
OTHER PARTS		
2221081204		P.W. BOARD USED 1
2090008120		TERMINAL PIN USED 10
3934009019		JUMPER WIRE P-10mm USED 31
2124407008		EIP7F8S FLD USED 1
2124409006		TACT SWITCH USED 14
2124499003		POWER SWITCH USED 1
2124504008		2P PUSH SWITCH USED 1
L001	2350007007	INPUT SELECTOR SWITCH USED 1
002		INDUCTOR USED 2

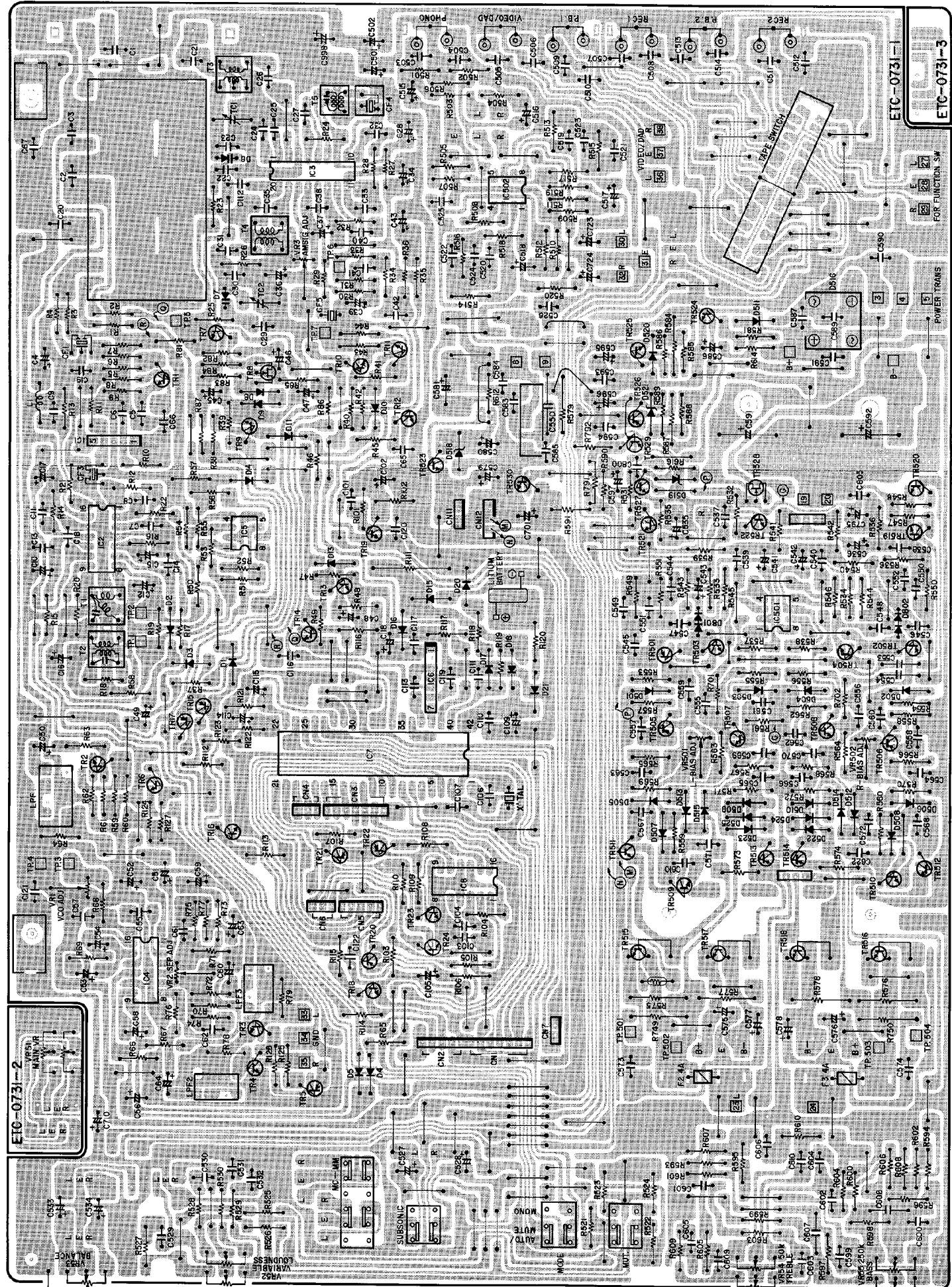
Ref. No.	Part No.	Part Name & Descriptions
F001		
2020022008		FUSE HOLDER USED 2
2061039092		FUSE (4.0A) USED 1
2050151004		8P PUSH TERMINAL USED 1
2030241028		1P CONTACT ASS'Y USED 1
2050241057		1P CONTACT ASS'Y USED 1
2048100009		HEADPHONE JACK USED 1
2050185038		3P WIRE HOLDER USED 6
2050185041		4P WIRE HOLDER USED 1
2050185054		5P WIRE HOLDER USED 1
2050185067		6P WIRE HOLDER USED 1
2050185070		7P WIRE HOLDER USED 1
2050133048		4P NH CONNECTOR BASE USED 1
1460703108		LED GUIDE USED 1
4770210016		PUSH RIVET USED 3
2032154003		2P CONNECTOR CORD USED 2
2036116050		2P CONNECTOR CORD USED 1
2042096009		8P CONNECTOR CORD USED 1
2042090005		10P CONNECTOR CORD USED 1
2046040006		12P CONNECTOR CORD USED 1

PRINTED WIRING BOARD PATTERNS AND PARTS LIST

ETC0730B CONTROL UNIT



ETC0731 AMP TUNER UNIT



ETC0731 AMP TUNER UNIT PARTS LIST

Ref. No.	Part No.	Part Name & Descriptions
SEMICONDUCTORS		
IC001	2630099007	TA-7060AP (TOSHIBA)
IC002	2630083000	HA11225 (HITACHI)
IC003	2630145003	LA1245 (SANYO)
IC004	2630123009	HA-12016 (HITACHI)
IC006	2630232000	TD6104P (TOSHIBA)
IC007	2620452104	TC9147BP (TOSHIBA)
IC008	2620343006	HD14027B (HITACHI)
IC501	2650030004	NJM4558D-D (JRC)
IC502	2650037007	NJM-2043 (JRC)
TR001	2730025023	2SC461(C)
TR002	2730198015	2SC1815(BL)
~004		
TR005	2710102021	2SA1015(GR)
TR006	2730198015	2SC1815(BL)
007		
TR008	2750020008	2SK163(M)
TR009	2730198015	2SC1815(BL)
TR010	2730294016	2SC1685(R)
~014		
TR015	2710102021	2SA1015(GR)
TR016	2730294016	2SC1685(R)
TR017	2710102021	2SA1015(GR)
TR018	2730294016	2SC1685(R)
TR019	2740046005	2SD468A(C)
TR020	2710178039	2SA564A(R)
~022		
TR023	2730294016	2SC1685(R)
TR024	2730269012	2SC1685(O/P)
TR501	2710102005	2SA1015(Y)
502		
TR503	2730198002	2SC1815(Y)
504		
TR505	2710131021	2SA988(E/F)
506		
TR507	2730235020	2SC1841(E/F)
508		
TR509	2730294016	2SC1685(R)
510		
TR511	2740060007	2SD667A(C)
512		
TR513	2720053005	2SB647A(C)
514		
TR515	2730232023	2SC2579(O/Y)
516		
TR517	2710130022	2SA1104(O/Y)
518		
TR519	2730198015	2SC1815(BL)
520		
TR521	2730043021	2SC535(C)
522		
TR523	2740065044	2SD880(Y/GR)
TR524	2730294016	2SC1685(R)
TR525	2730198002	2SC1815(Y)
TR526	2710102005	2SA1015(Y)
TR527	2730294016	2SC1685(R)
TR528	2750042002	2SK373(Y)
D001	2760049011	1S2076A
~005		
D006	2760302004	SVC321SP-D2
007		
D008	2760049011	1S2076A
~011		
D013	2760049011	1S2076A
D015	2760173039	HZ6-B2
D016	2760049011	1S2076A
~018		
D020	2760218033	HZ9B2
021		
D020		ZENER

CONNECTION DIAGRAM OF MEASURING INSTRUMENTS

- **FM**

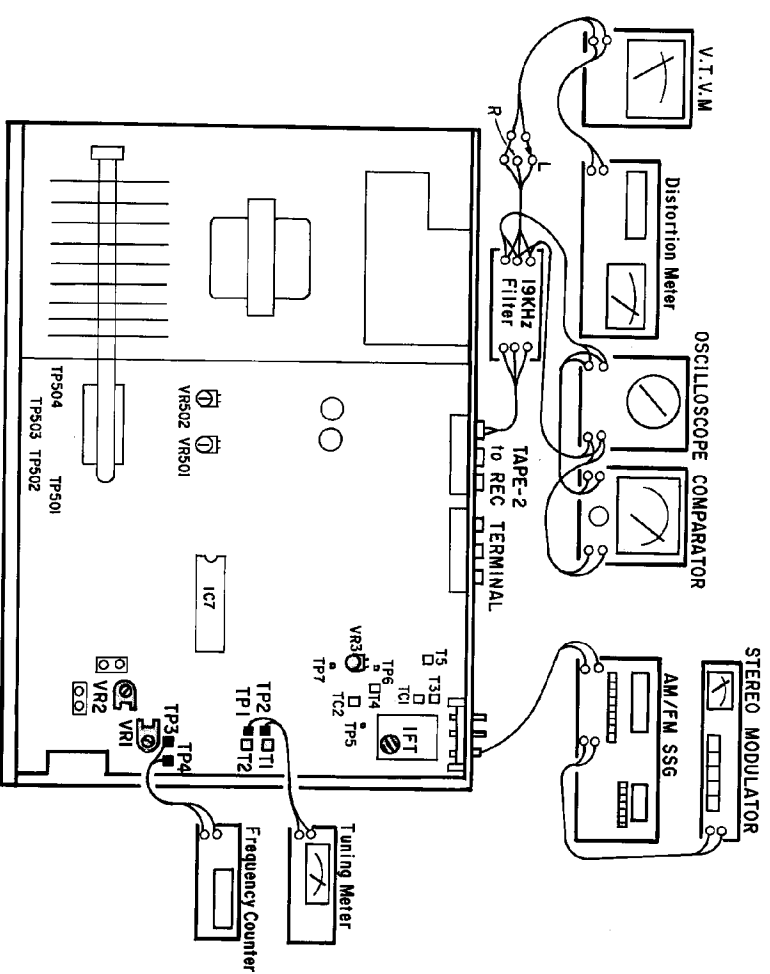


Fig. 8

ROUGH DIAGRAM OF ADJUSTMENT POINTS ETC0731 AMP TUNER UNIT (Component Side)

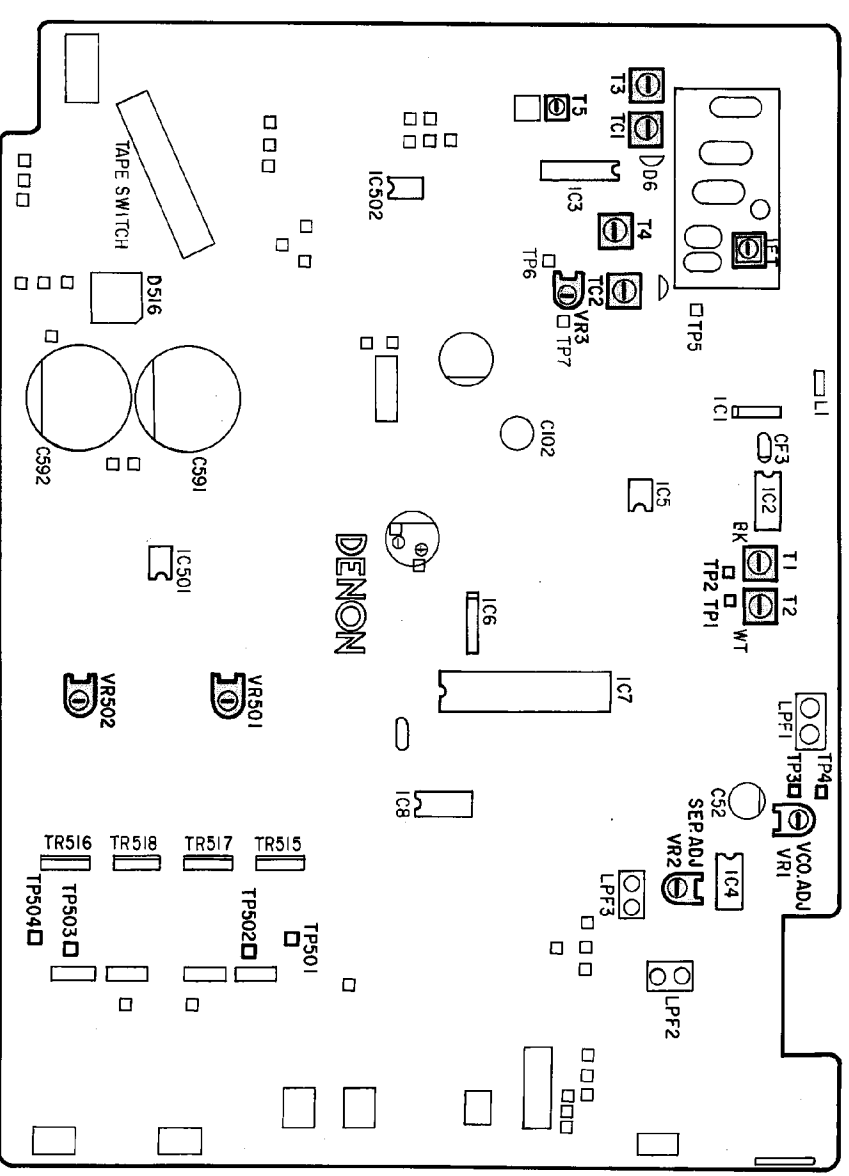


Fig. 10

TUNING METER JIG

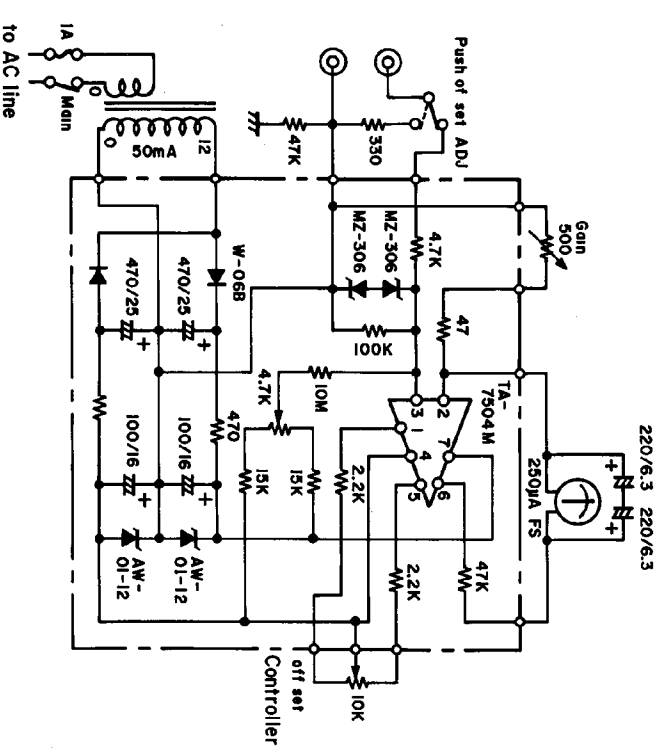


Fig. 11

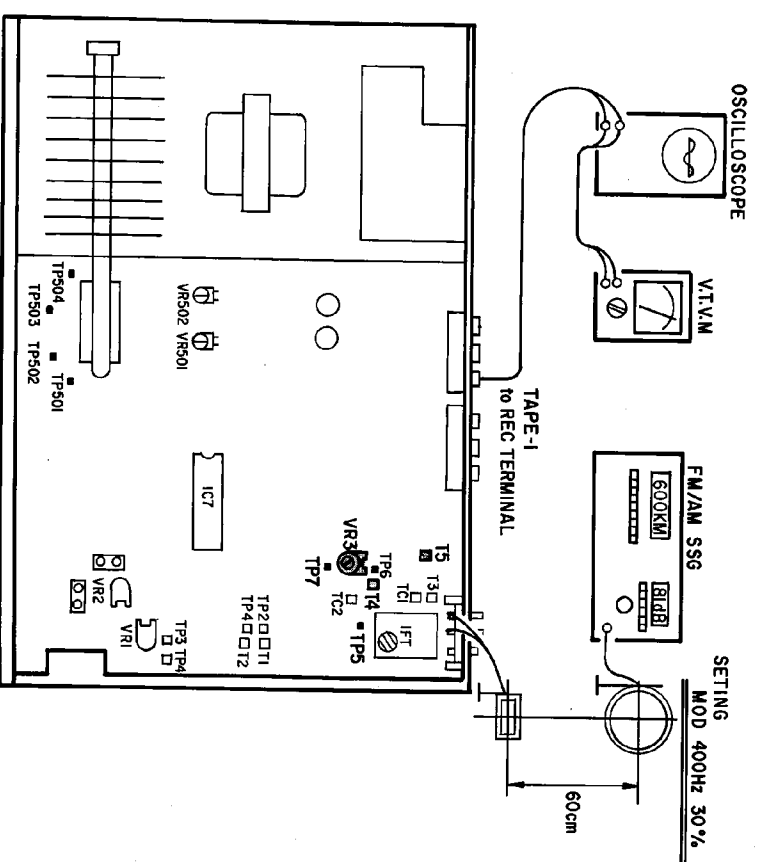
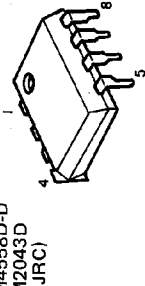


Fig. 9

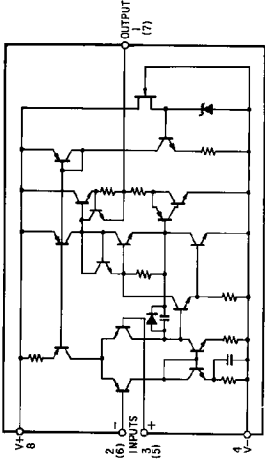
SEMICONDUCTORS

• IC's

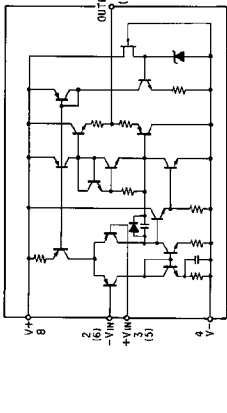
NJM4558D-D
NJM2043D
(JRC)



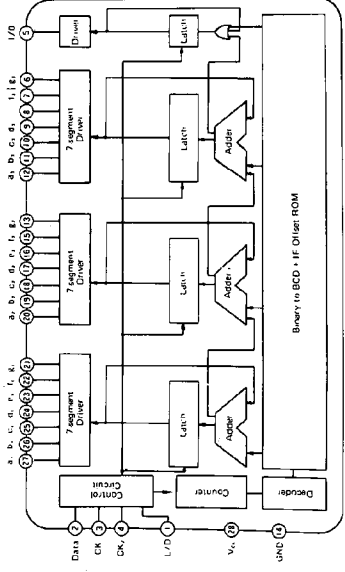
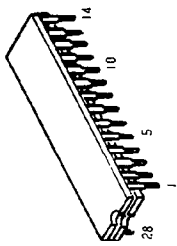
NJM4558D-D



NJM2043D



TD6301AP
(Toshiba)

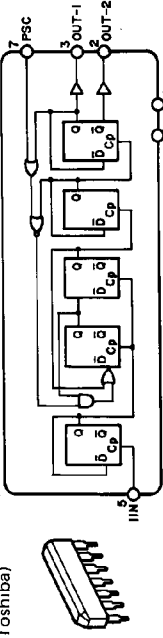


FUNCTIONS OF TERMINALS

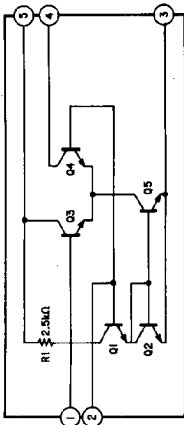
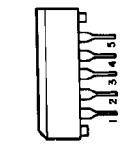
Pin No.	Name	Function
1	L/D	Output status select input terminal. Input terminal for selecting output status by the indicator (LED, F.L, LCD).
2	Data	Receiving frequency data input terminal. Input serially by the system controller LSI.
3, 4	CK1 CK2	Received frequency data input control timing input terminal. Transferred simultaneously with data by the system controller LSI.
5	I/O	Segment drive output terminal. 100 MHz-unit display at FM time. Only 1 pin is used for output because of 1 to 0 in both FM/AM.

Pin No.	Name	Function
6~12	a ³ ~g ³	7-segment drive output terminal. 10 MHz-unit display at FM time. 100 kHz-unit display at AM time.
13, 15~20	a ² ~g ²	7-segment drive output terminal. 1 MHz-unit display at FM time. 10 kHz-unit display at AM time.
21~27	a ¹ ~g ¹	7-segment drive output terminal. 100 kHz-unit display at FM time. 1 kHz-unit display at AM time.
14, 28	Vcc GND	Supply voltage applying terminal.

TD6104P
(Toshiba)



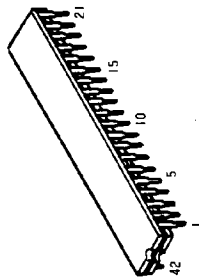
TA7060AP (Toshiba)



FUNCTIONS OF TERMINALS (TD6104P)

Pin No.	Name	Functions
5	f _{IN}	FM station signal input terminal Frequency range 60 – 140 MHz Input level 75 – 300 mVrms
3	OUT-1	Dividing an input signal into 1/30 or 1/32 through dividing output terminal f _{IN} . Output level 0.5(V)/MIN
2	OUT-2	OUT-1 inverted signal output. Because of open emitter system, if it is to be used, external resistor is necessary. Open in general.
7	PSC	Dividing value select control terminal 1/32 when V _{ppc} ≥ 2(V), 1/30 when V _{ppc} ≤ 1(V)
6	C	for bias circuit. Connect C = 2200 pF (approx.) between the unit and the GND.
1 4	Vcc GND	Power terminal Vcc = 5V Icc = 5 mA (standard), 10 mA (max.)

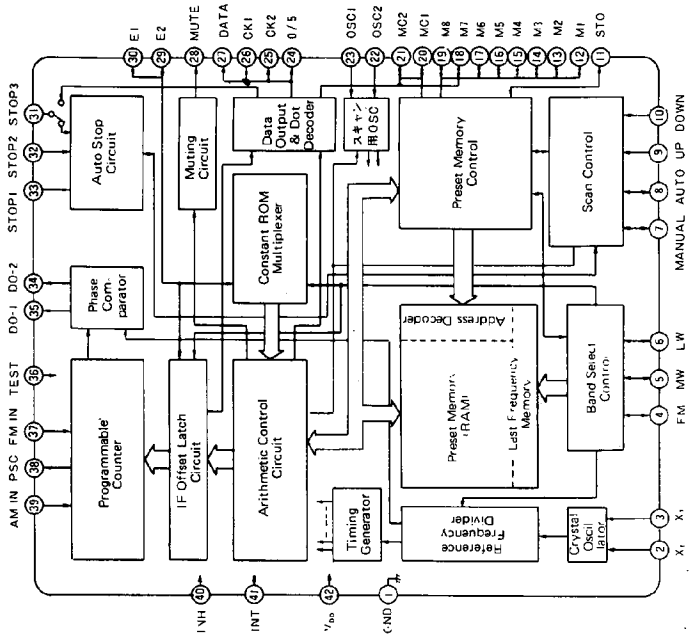
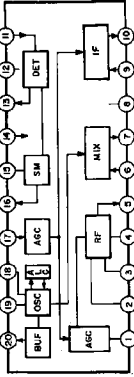
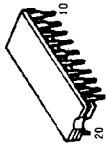
TC9147BP
(Toshiba)



FUNCTIONS OF TERMINALS

Pin No.	Symbol	Name	Function
2	XT	Crystal oscillator terminal	Connects crystal 7.2 MHz for reference frequency.
3	XT	XT	XT
4	FM	FM band specifying input	Selects FM, MW and LW in the mutual reset mode.
5	MW	MW band specifying input	MW
6	LW	LW band specifying input	LW
7	MANUAL	Manual tuning mode specifying input	Selects between manual operation and auto search operation in mutual reset mode at UP/DOWN channel select time.
8	AUTO	Auto search tuning mode specifying input	AUTO
9	UP	UP operation key input	UP/DOWN channel selection by connecting a push-key
10	DOWN	DOWN operation key input	DOWN
11	STO	Memory store instruction input	With this input, preset memory is set to write enable status.
12 ~ 19	M1 ~ M8	Preset memory channel specifying input	Controls read/write of the internal 16-channel preset memory in conjunction with MC1 and MC2 input.
20	MC1	MC1	Sets the 16-channel preset memory to an 8-channel fixed system for FM/AM (MW + LW) or a 16-channel tandem system for FM+MW+LW (3 bands).
21	MC2	MC2	MC2
22	OSC2	Oscillator terminal for AM	C/R connecting terminal for oscillator, which determines scan speed at AM search time.
23	OSC1	Oscillator terminal for FM	C/R connecting terminal for oscillator, which determines scan speed at FM search time.
24	O/5	FM Europe 50 kHz output	Europe area FM band 50 kHz step indicating output. Set "H" at 50 kHz.
25	CK2	CK2	Outputs serial data and timing lock to driver TD6301
26	CK1	CK1	for receiving frequency digital display. CK1 output is used as Pcc output at the same time.
27	DATE	DATE	DATE

LA1245
(Sanyo)



Pin No.	Symbol	Name	Function
28	MUTE	Muting signal output	Set "H" at muting output time.
29	E2	E2	Specifies an area, Japan, U.S.A. or Europe.
30	E1	E1	Counts IF 450 kHz signals at AM time and stops auto search.
31	STOP3	AM-IF signal input	If "H" level is input STOP2 when "H" level is set to STOP1, the auto search is stopped. Used for AR1 or stereo channel receiving status discrimination.
32	STOP2	Auto search stop signal input	When "H" level is input, reduces the auto search scan speed to 1/2.
33	STOP1	Scan speed slow input	Two tristate buffers are output in parallel from a single phase comparator.
34	DO-2	Phase comparator output	Sets test mode with "H" level input.
35	DO-1	Test terminal	Connects the output of precaller TD6104P.
36	TEST	Test terminal	Controls dividing (1/30, 1/32) of the precaller TD6104P.
37	FM/N	FM programmable counter input	Inputs AM channel signal.
38	PSC	Precaller control output	Ordinary operation at "H" level, and inhibit status at "L" level.
39	AM/N	FM programmable counter input	Ordinary operation at "H" level, and initialization of internal status at "L" level.
40	INH	Inhibit input	Applies 5 ± 0.5 V. Up to 2 V is available as backup.
41	INT	Initialize input	INT
42	VDD	Power applying terminal	VDD
1	GND	GND	GND

BLOCK DIAGRAM

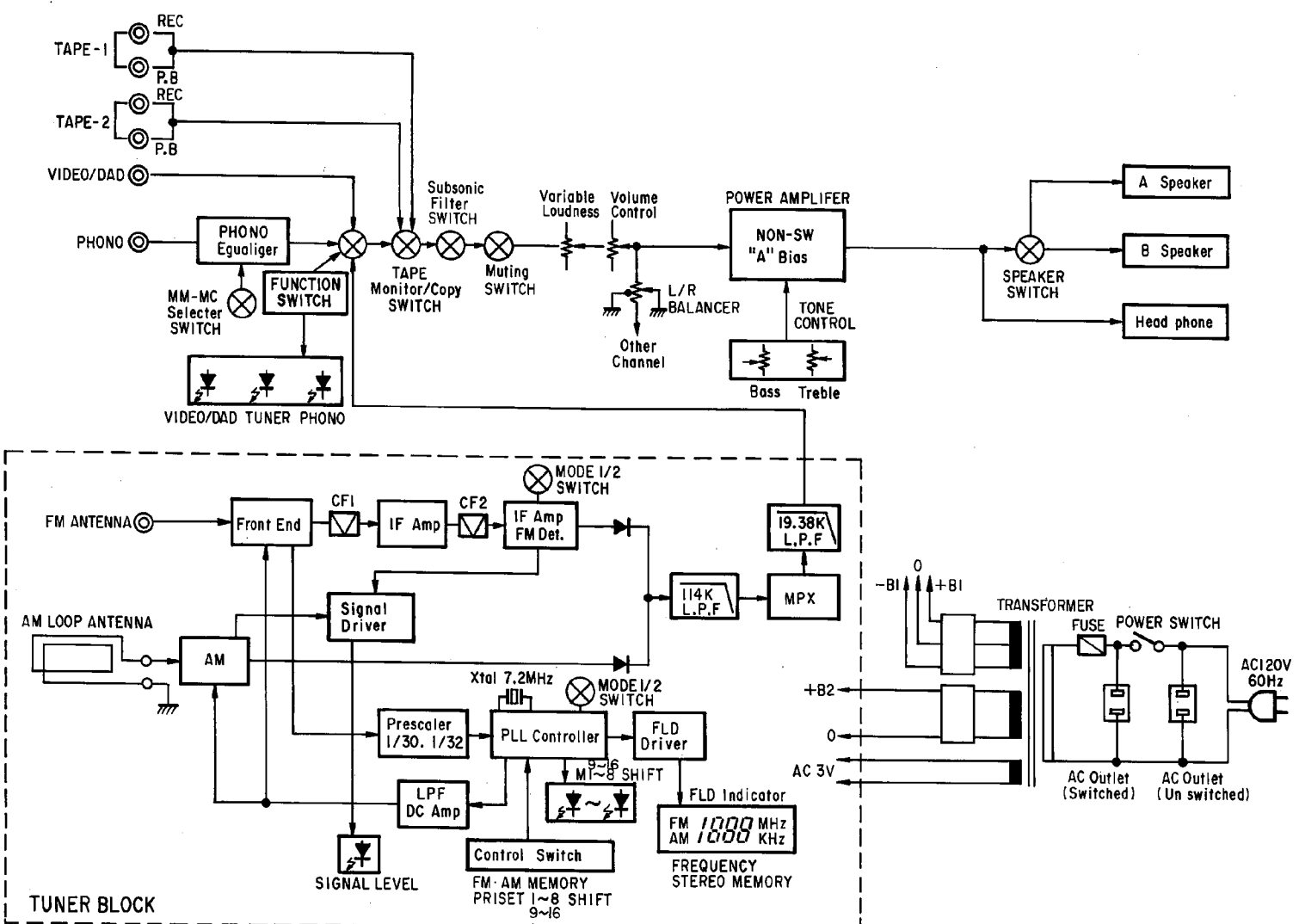


Fig. 6

METHOD OF ADJUSTMENTS

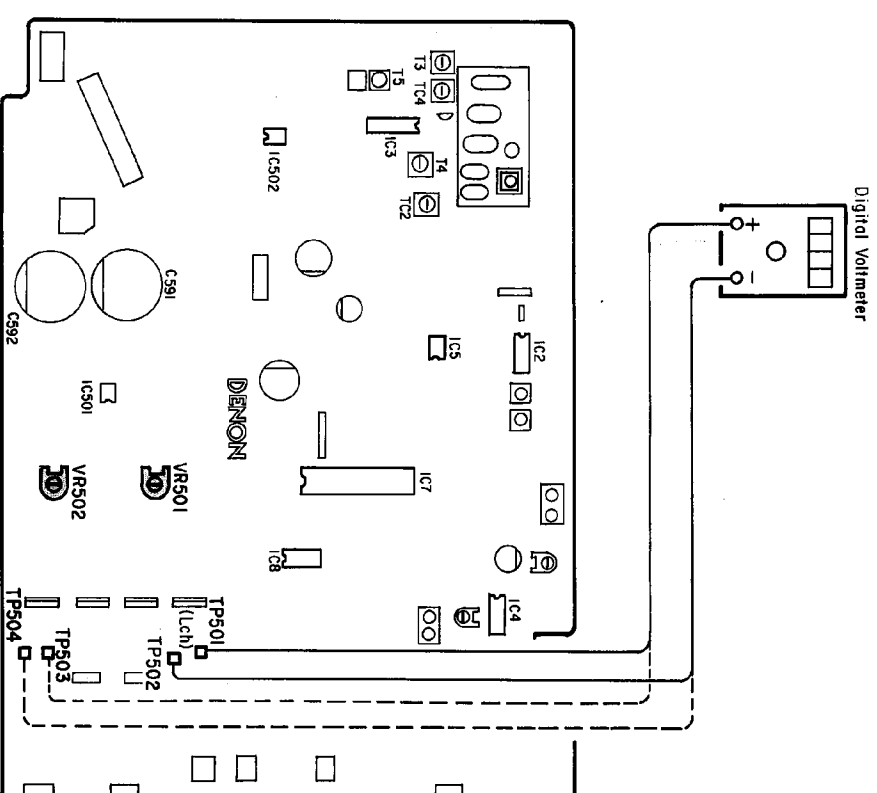
When making adjustments, be sure the power supply is at the rated voltage and the room air is in normal condition with respect to temperature and humidity.

• Amplifier Section

1. IDLING CURRENT (FIG. 7)

- (1) Set controls as follows.

POWER Switch	→ off (■)
VOLUME Control	→ 0 (min.)
SPEAKERS	→ off (■)
Temperature	→ 15°C ~ 30°C
Power supply	→ AC 120 V ± 1 %, 60 Hz.
- (2) Connect Digital Voltmeter to the test points 501 (+), 502 (-) and 503 (+), 504 (-) of the ETC0731B.
- (3) Turn the Power Switch on and rotate VR501 clockwise so that the Digital Voltmeter reads 1mV ± 0.2 mV DC at the test point 501, 502. Follow the same procedure to VR502 for test point 503, 504.
- (4) Warm up three minutes, then readjust VR501 and VR502 as in step (3) so that the Digital Voltmeter reads 4.0 mV ± 0.5 mV DC.



FM/MPX ALIGNMENT (Fig. 8)

Step	Alignment Item	Tuning Frequency Setting	Type	Frequency	Input		Coupling	Type	Output		Remarks
					Modulation	Antenna Terminal			Connect to	Points	
1	76 kHz	98 MHz	FM Standard Signal Generator Mono.	98 MHz	60 dBμ	1 kHz 100%	Antenna Terminal	Frequency Counter	T.P. 3 (GND)	VR1	Function: FM Mode: Auto
2	Tuning Center	98 MHz	FM SSG, Mono.	98 MHz	60 dBμ	None	Antenna Terminal	Center Meter	T.P. 1, 2	T-1	Function: FM Mode: Auto
3	Distortion (Mono)	98 MHz	FM SSG, Mono.	98 MHz	60 dBμ	1 kHz 100%	Antenna Terminal	Distortion Meter	Output TAPE 2 REC (L)	T-2	Function: FM Mode: Auto
4	Distortion (Stereo)	98 MHz	FM SSG Stereo (L)	98 MHz	60 dBμ	Main: 1 kHz L-ch Pilot: 90% 10%	Antenna Terminal	Distortion Meter	Output TAPE 2 REC (L)	IFT on Front End	Function: FM Mode: Auto
5	Noise Center & Distortion	Repeat 2, 3 and 4 to obtain minimum distortion and same time indicating of center meter at center condition.									
6	Separation	98 MHz	FM SSG Stereo (L),(R)	98 MHz	60 dBμ	Main: 1 kHz L-ch Pilot: 90% 10%	Antenna Terminal	Audio V.M.	Output TAPE 2 REC (L),(R)	VR-2	Function: FM Mode: Auto

AM ALIGNMENT (Fig. 9)

1	AM IF	—	AM IF Sweep	—	Input Level is not over to Works A.G.C.	—	AM Antenna Terminal	Oscilloscope	T.P. 6	T-5	Maximum Height and Symmetry Curve 450 kHz	Function: AM
		520 kHz	AM SSG	520 kHz	Input Level is not over to Works A.G.C.	400 Hz 30%	Loop Antenna	Electric DC Voltmeter	T.P. 5, T.P. 7 (GND)	T-4	1.2V ± 20 mV	Function: AM
2	Receiving Band Alignment	1610 kHz	AM SSG	1610 kHz	Input Level is not over to Works A.G.C.	400 Hz 30%	Loop Antenna	Electric DC Voltmeter	T.P. 5, T.P. 7 (GND)	TC-2	8.0V ± 20 mV	Function: AM
		600 kHz	AM SSG	600 kHz	Input Level is not over to Works A.G.C.	400 Hz 30%	Loop Antenna	Audio V.M.	Output TAPE 1 REC (L)	T-3	Maximum Output	Function: AM
3	Tracking Alignment	1400 kHz	AM SSG	1400 kHz	Input Level is not over to Works A.G.C.	400 Hz 30%	Loop Antenna	Audio V.M.	Output TAPE 1 REC (L)	TC-1	Maximum Output	Function: AM
4		1000 kHz	AM SSG	1000 kHz	55 dB/m 400 Hz 30%	Loop Antenna	Loop Antenna	Audio V.M.	—	VR-3	To Light-up Signal LED	Function: AM

ANTENNA INSTALLATION

• T TYPE FM INDOOR ANTENNA

The accessory T type indoor antenna (300 ohm) can be used inside wooden houses when FM stations are local and strong signals can be received. While receiving an FM program, extend the horizontal part of the antenna. Orient the T-shaped part for optimal reception and mount the antenna on the wall or ceiling.

* In general, FM indoor antennas might not consistently assure stable reception, due to environmental changes. Use an FM indoor antenna temporarily until and outdoor antenna is installed.

• FM OUTDOOR ANTENNA CONNECTION (Fig. 4)

* 75 ohm coaxial cable (3C-2V, 5C-2V) is preferable to obtain better performance of the tuner.

* Contact your local dealer for details on selection and installation of the FM outdoor antenna.

* When a 300 ohm FM antenna is connected by a 75 ohm coaxial cable, a matching transformer is required.

• AM ANTENNA CONNECTION (Fig. 5)

Since the model is provided with a high performance AM loop antenna on the back panel, this accessory antenna can effectively be used for optimal reception in places where broadcasting stations are located nearby and relatively strong signals are received with low noise.

Orient the loop antenna horizontally to obtain optimal reception.

In places where strong, clear signals are not received due to particular location and/or environmental conditions, connect an insulated wire to the AM antenna terminals and attach it to the wall. In places where broadcasting stations are located too far away and only weak signals are received, or where signals are blocked by obstacles, install an AM outdoor antenna.

* Even if an AM outdoor antenna is installed, do not detach the AM loop antenna.

GROUNDING

If there is much noise during reception, it is recommended that a grounding wire be used.

Connect a thick insulated wire to the "GND" terminal, and wind the unconnected bare end around a metal water pipe, a grounding rod, or a grounded copper plate.

* Never connect grounding the wire to a gas pipe. This could cause fire or explosion.

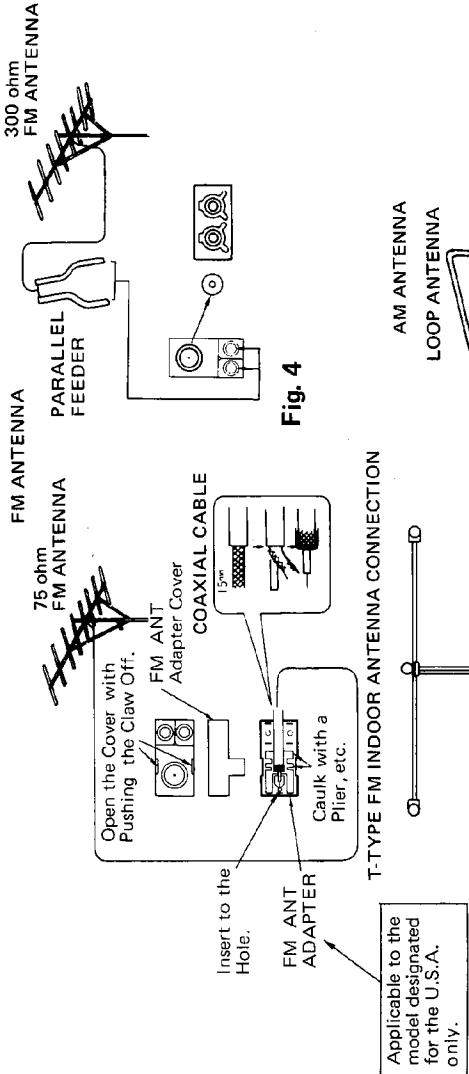


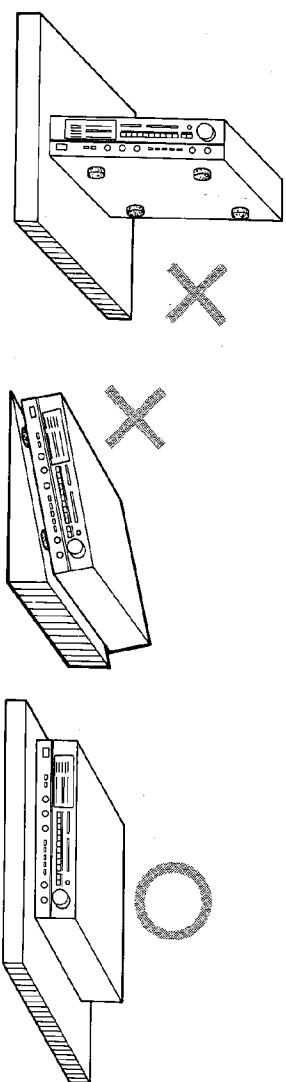
Fig. 5

Note: Two FM antennas should not be connected simultaneously. Even if an external AM antenna is used, the LOOP antenna connect AM loop antenna to the back panel. Be sure the lead terminal does not touch the metal part of back panel.

Table 1

PRECAUTIONS FOR INSTALLATION

DRA-550 uses a newly developed heat emitting unit by employing heat pipes. Since the heat pipes contain a coolant, the DRA-550 must be set level or the desired heat emitting effect cannot be achieved. Always install this unit horizontally.



ADVICE FOR USE

- Do not place the set in direct sunlight, in hot areas such as near heating equipment, with high humidity or dust levels. This may cause damage to the unit.
- Check that all parts are connected correctly before turning on the power source.
- When user is absent for long periods, be sure to remove plug from wall socket.
- Do not use insecticide, benzene or thinner near the unit, or the cabinet color will fade. Avoid using polish: use a soft cloth (e.g. silicon cloth).
- Although the unit is designed to support weight, it is recommended that the user does not place anything too heavy on it. Consider air circulation before placing anything on the unit. If you place any equipment likely to induce hum, make sure there is enough space to between each piece of equipment prevent such hum.

SPECIFICATIONS

AMPLIFIER SECTION

Continuous Power Output: 50 watts per channel minimum RMS, both channels driven at 8 ohm from 20 Hz ~ 20 kHz no more than 0.015% total harmonic distortion
Power Bandwidth (IHF): 5 Hz ~ 40 kHz (T.H.D. 0.05% both ch. driven at 8 ohm)
Total Harmonic Distortion (20 Hz to 20 kHz): -3 dB power into 8 ohm, 0.0095% More than 80 (at 1 kHz, 8 ohm)
Damping Factor: PHONO RIAA Standard Curve
Frequency Response: 20 Hz ~ 20 kHz $\pm$ 0.5 dB MM
50 Hz ~ 20 kHz $\pm$ 0.5 dB MC
TAPE, VIDEO/DAD 20 Hz ~ 50 kHz $\pm$ 1.5 dB

Input Sensitivity and Impedance:

PHONO MM 2.5 mV 47 k ohm
MC 0.25 mV 100 ohm
TAPE, VIDEO/DAD 150 mV More than 33 k ohm

Maximum Input Level (at 1 kHz):

PHONO MM 150 mV
MC 15 mV

Signal to Noise Ratio (IHF-A):

PHONO MM at 5.0 mV input 86 dB
PHONO MC at 0.5 mV input 68 dB
TAPE, VIDEO/DAD 95 dB
BASS $\pm$ 8 dB at 100 Hz
TREBLE $\pm$ 8 dB at 10 kHz

Tone Controls:

Loudness, Control Effect: VARIABLE LOUDNESS "10"
POSITIONS, 50 Hz/10 kHz, +10 dB/
+5 dB
Subsonic Filter Effect: 15 Hz, -6 dB/oct.

TUNER SECTION

[FM]
Receiving Range: 87.5 ~ 108 MHz
Usable Sensitivity: 0.8 μ V (9.3 dBf)
50 dB Quieting Sensitivity: MONO 1.8 μ V (16.4 dBf)
STEREO 23 μ V (38.5 dBf)
Signal to Noise Ratio: MONO 82 dB
STEREO 80 dB
Total Harmonic Distortion: MONO 0.07% at 1 kHz
STEREO 0.12% at 1 kHz
Capture Ratio: 1.2 dB
Image Rejection: 75 dB
AM Suppression: 60 dB
Selectivity: 55 dB
Frequency Response: 30 Hz ~ 15 kHz -1.5 dB
Stereo Separation: 50 dB at 1 kHz

Receiving Range:

520 ~ 1710 kHz (for U.S.A. & Canada)
522 ~ 1611 kHz (for Europe)
Usable Sensitivity: 18 μ V
Signal to Noise Ratio: 55 dB

GENERAL

Power Supply: AC 120 V 60 Hz (for U.S.A. & Canada)
AC 220 V 50 Hz (for Europe)
AC 240 V 50 Hz (for UK & Australia)
130 W (U.S.A.) 210 VA (Canada)
Power Consumption: SWITCHED x 1, 100 W (for U.S.A. & Canada)
UNSWITCHED x 1, 250 W (for U.S.A. & Canada)
Power Outlets: (Not included in systems for European use)
Dimensions: 434 mm (17-3/32")W x 112 mm (4-13/32")H x 400 mm (15-3/4")D
7.9 kg (17 lbs, 6 oz)
Weight:

Design and specifications are subject to change without prior notice.
* Wood side panels are optional.

NOTE: The following codes correspond to the appropriate models:
E3 for U.S.A., EC for Canada, E2 for Europe, EF for France, EG for Germany, E1 for Hongkong.
This Service Manual is prepared base on E3 Gold Version.

NAME AND FUNCTION OF PARTS
FRONT PANEL

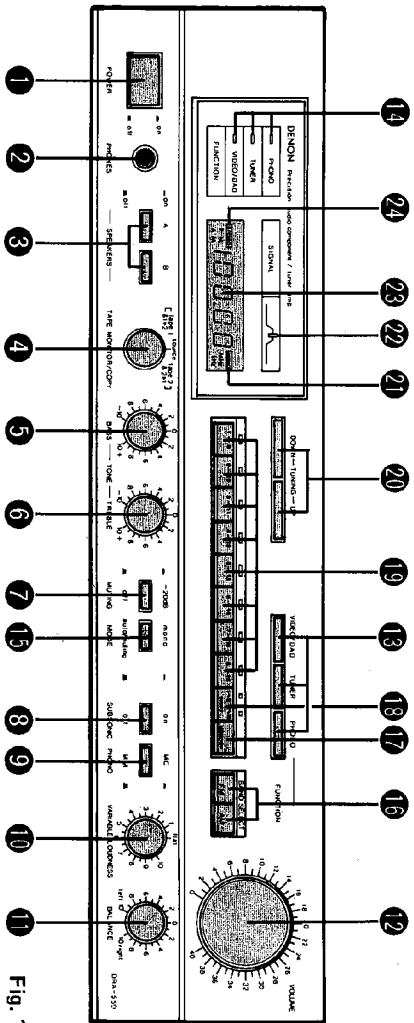


Fig. 1

- 1 POWER (Power Switch)
- 2 PHONES (Headphone Jack)
- 3 SPEAKERS (Speaker Select Switch)
- 4 TAPE MONITOR/COPY (Tape Monitor/Copy Switch)
- 5 BASS (Bass Control)
- 6 TREBLE (Treble Control)
- 7 MUTING (Muting Switch)
- 8 SUBSONIC FILTER (Subsonic Filter Switch)
- 9 PHONO (Cartridge Select Switch)
- 10 VARIABLE LOUDNESS (Loudness Control)
- 11 BALANCE (Balance Control)
- 12 VOLUME (Volume Control)
- 13 FUNCTION (Input Select Switch)
 - PHONO, • TUNER, • VIDEO/DAD
- 14 FUNCTION INDICATOR
- 15 MODE (FM Mode, Tuning Mode and Muting Switch)
 - : auto/muting, ■ : mono
- 16 BAND SELECT (Band Select Buttons)
 - AM, • FM
- 17 MEMORY (Memory Button)
- 18 SHIFT (Shift Button)
- 19 PRESET CHANNEL 1 ~ 16 (Station Presetting Buttons)
- 20 TUNING (Tuning Buttons)
 - UP, DOWN
- 21 MEMORY INDICATOR
- 22 SIGNAL (Signal Strength Indicator)
- 23 FREQUENCY DISPLAY
- 24 STEREO (Stereo Indicator)

BACK PANEL

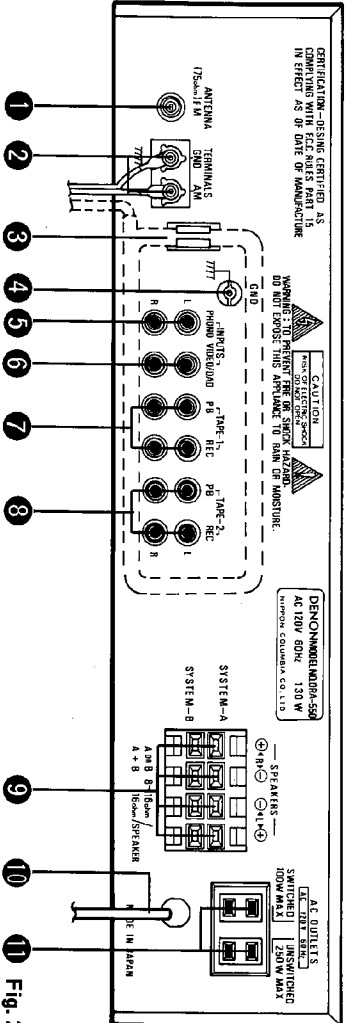


Fig. 2

- 1 FM ANT 75 ohm (FM Antenna Terminal)
- 2 AM ANT (AM Antenna Terminal)
- 3 AM LOOP ANT (AM Loop Antenna)
- 4 GND (Grounding Terminal)
- 5 PHONO (Phono Input Terminals)
- 6 VIDEO/DAD (Input Terminals)
- 7 8 TAPE-1, -2 (Playback and Recording Terminals)
- 9 SPEAKERS (Speaker Terminals)
- 10 AC CORD (Power Cord)
- 11 AC OUTLET (AC Power Outlets)
SWITCHED, UNSWITCHED

CONNECTIONS

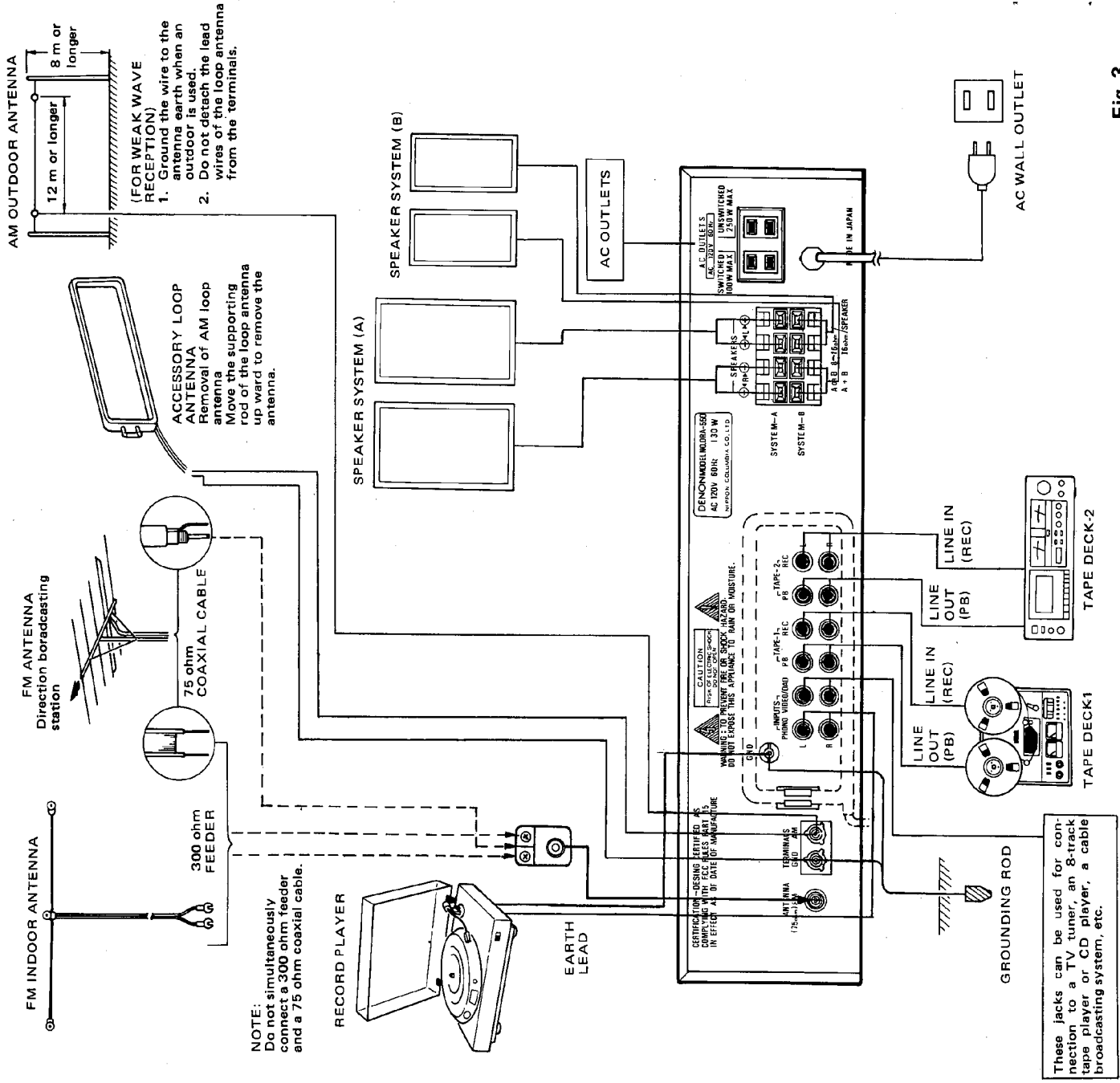


Fig. 3

- Do not plug the power source cord into an AC outlet until all the connections are completed.
- Connect the right (R) channel plug to the right (R) channel jack, and the left channel plug to the left channel jack.
- Insert the plugs firmly into the corresponding jacks. If a connection is incomplete, noise may be generated.
- Plug the power source cord for audio equipment into the AC OUTLET terminal. Do not use this terminal for other electric appliances such as hair dryer. (NOT INCLUDED IN SYSTEM FOR EUROPEAN USE).
- Do not bundle the pin plug cords with the power source cord and do not place the pin plug cords near the power transformer, or humming and other noise may be generated.
- Always connect the pin plug cord to the input terminal "PHONO" because this terminal is highly sensitive. If this terminal is not connected, induction hum may be generated.

111

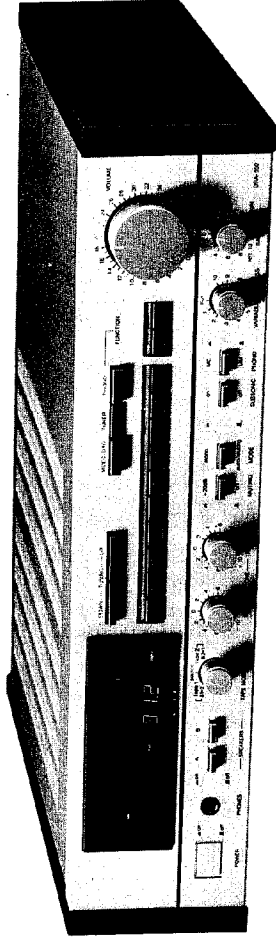
DENON

Hi-Fi Component Tuner Amplifier

For U.S.A. Model

SERVICE MANUAL MODEL DRA-550

SOLID STATE TUNER AMPLIFIER



Wood side panel are optional

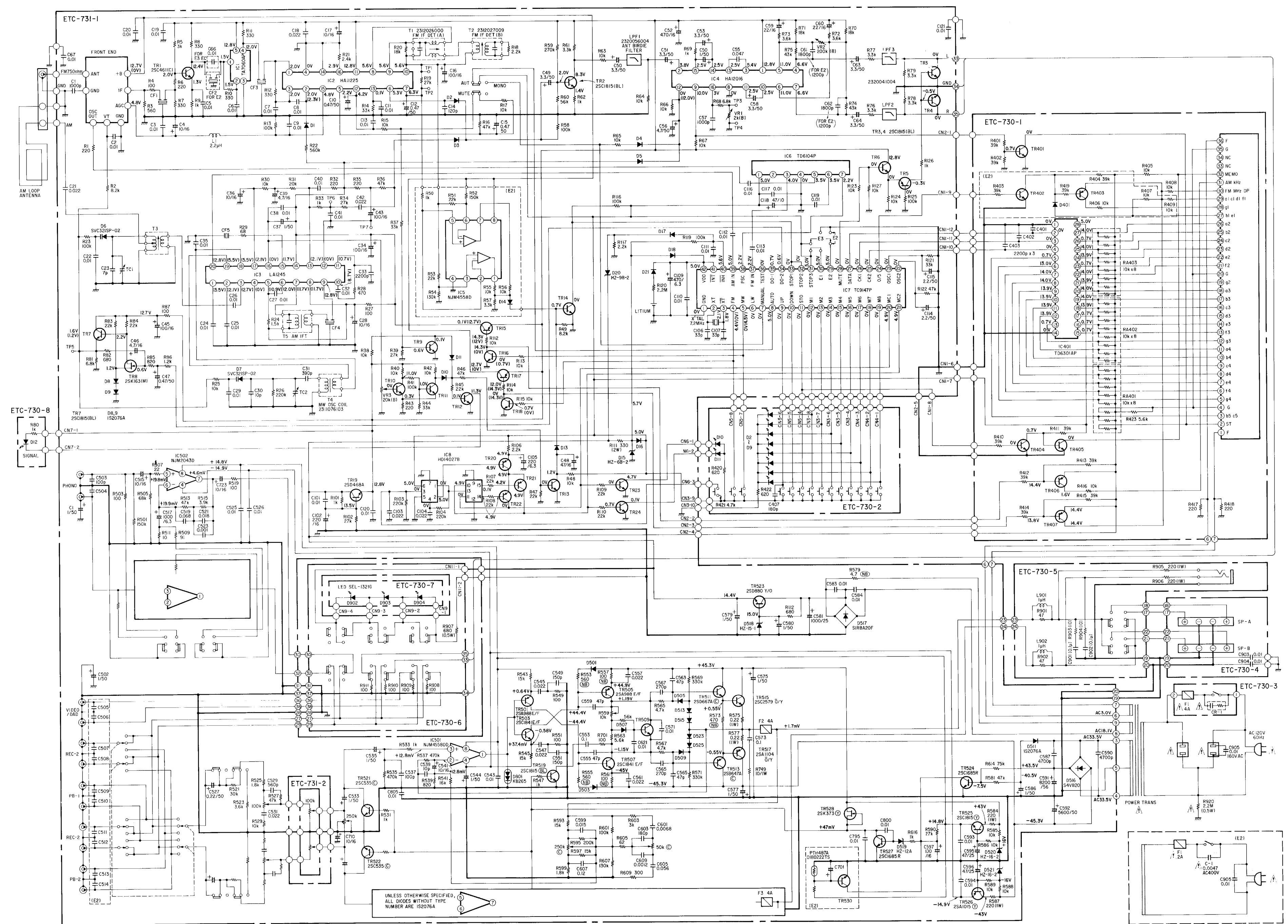
CONTENTS

PRECAUTION FOR INSTALLATION	2
ADVICE FOR USE	2
SPECIFICATIONS	2
NAME AND FUNCTION OF PARTS	3
CONNECTIONS	4
BLOCK DIAGRAM	6
METHOD OF ADJUSTMENT	7
SEMICONDUCTORS	8
PRINTED WIRING BOARD PATTERNS AND PARTS LIST	
ETC0730B CONTROL UNIT	11
ETC0731 AMP TUNER UNIT	12
CONNECTION DIAGRAM	14
WIRING DIAGRAM	15
EXPLODED VIEW OF CHASSIS AND CABINET	16

NIPPON COLUMBIA CO., LTD.

WIRING DIAGRAM

Means important safety item, which must be replaced, when necessary, by a part specified or meeting the specification by the manufacturer.

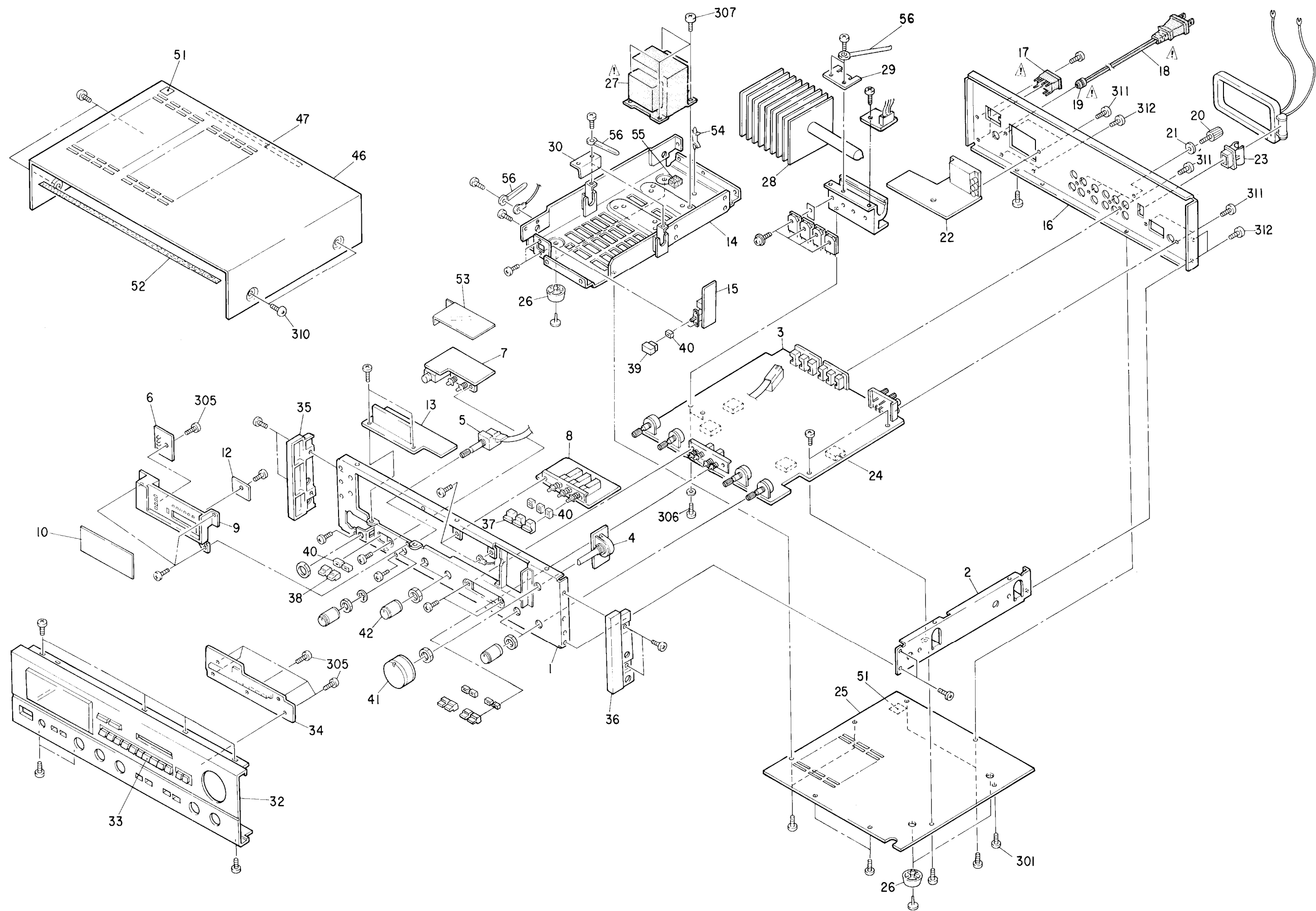


NOTE (FOLLOWING TO OUT PUT POWER TRANSISTOR USED)

PARTS NO.	R515, 516	R517, 518	R565, 566	R567, 570	C903, 904	C901, 902	R903, 904
POWER TR SYSTEM 1	25C2577 (Q/Y)	25A1102 (Q/Y)	470 (J)	270PF (J)	0.01uF (Z)	---	---
POWER TR SYSTEM 2	25C2458 (Q/P)	25A1061 (Q/P)	1K (J)	1000PF (J)	0.0022uF (K)	0.1uF (K)	100 (J)(11W)
POWER TR SYSTEM 3	25C2581 (Q/Y)	25A1106 (Q/Y)	1K (J)	1000PF (J)	0.0022uF (K)	0.1uF (K)	100 (J)(11W)

NOTES:
ALL RESISTANCE VALUES IN OHM, K = 1,000 OHM, M = 1,000,000 OHM.
ALL CAPACITANCE VALUES IN MICROFARAD, P = MICRO-MICRO FARAD.
EVERY VOLTAGES AND CURRENTS IS MEASURED AT NO SIGNAL INPUT CONDITION.
CIRCUIT AND PARTS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

EXPLODED VIEW OF CHASSIS AND CABINET

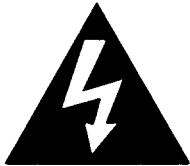


⚠ Means important safety item, which must be replaced, when necessary, by a part specified or meeting the specification by the manufacturer.

DENON

WARNING:

- 1. Component parts**
Parts marked with ⚠ and/or shading in this service manual have special characteristics important to safety. Be sure to use the specified parts for replacement.
- 2. Leakage current**
Before returning the appliance to customer, test the leakage current when the power plug is connected. Use a calibrated (with an error of not more than 5%) leakage current tester and measure the leakage current from any exposed metal to the earth ground. Reverse the power plug polarity and test the above again.
Any current measured MUST NOT EXCEED 0.5 miliamps. Corrective measure must be taken if it exceeds the limit.



CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN



CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVING TO QUALIFIED SERVICE PERSONNEL.



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user of the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

NIPPON COLUMBIA CO., LTD.
No. 14-14, 4-CHOME AKASAKA,
MINATO-KU, TOKYO 107 JAPAN
TEL: 03-584-8111
TLX: JAPANOLA J22591
CABLE: NIPPONCOLUMBIA TOKYO

Printed in Japan

EXPLODED VIEW OF CHASSIS AND CABINET PARTS LIST (GOLD VERSION)

Ref. No.	Part No.	Part Name & Descriptions
1	4110430003	FRONT CHASSIS ASS'Y
2	4110422008	SIDE CHASSIS
3	ETC0731-1	AMP. TUNER UNIT
4	ETC0731-2	MAIN VR UNIT
5	2124505007	ROTARY REMOTE SW
6	ETC0730B-1	CONTROL UNIT
7	ETC0730B-4	SP SW & H.P. UNIT
8	ETC0730B-6	FUNCTION SW UNIT
9	1460695106	LED HOLDER
10	1430370118	INDICATOR SHEET
11	—	—
12	ETC0730B-8	SIGNAL UNIT
13	ETC0730B-7	F. LED UNIT
14	4110424006	TRANS CHASSIS ASS'Y
15	ETC0730B-3	POWER SW UNIT
16	1050606000	BACK PANEL
17	2033921015	AC OUTLET (2P)
18	2062019008	AC CORD
19	4450028007	CORD BUSH
20	2050071016	TERMINAL ASS'Y
21	4770018001	WASHER (P-87)
22	ETC0730B-5	SP TERMINAL UNIT
23	1460494006	ANTENNA HOLDER
24	4610114023	CUSHION
25	1050608011	BOTTOM COVER
26	1040111000	FOOT
27	2335469000	POWER TRANS.
28	4170231103	H.P. RADIATOR
29	4121646006	RADIATOR BRACKET
30	4121648004	BRACKET
31	4450033005	WIRE CLAMP BAND USED 10
32	1441241207	FRONT PANEL ASS'Y
33	1130601103	PUSH KNOB ASS'Y FOR TU. MEMORY
34	ETC0730B-2	KEY LED UNIT
35	1430374305	ESC BAR (L)
36	1430375304	ESC BAR (R)
37	1130604100	PUSH KNOB FOR FUNCTION
38	1130536029	PUSH KNOB FOR SP, AM, MUT.
39	1130515008	PUSH KNOB (A) FOR POWER
40	1140056007	FLEXIBLE RING
41	1120458104	KNOB ASS'Y FOR MAIN VR

Ref. No.	Part No.	Part Name & Descriptions
42	1120459103	KNOB ASS'Y FOR TONE, TAPE
43	5130895025	FUSE LABEL (4A)
44	1460338230	ESC PLATE (L)
45	1460339239	ESC PLATE (R)
46	1020178115	TOP COVER
47	1220095014	SPACER
48	5130883008	SERIAL NO. PLATE
49	5130772009	UL LABEL
50	—	—
51	5138266009	DANGEROUS MARK
52	1220095001	SPACER
53	4150287009	ISOLATION SHEET
54	4150228000	PCB HOLDER
55	4610114007	CUSHION
56	EP-4772	CORD HOLDER
57	1439003004	BLIND SHEET
58	1439003017	BLIND SHEET
59	2558000042	CAPACITOR 0.01μF/160V
60	—	—
61	—	—
62	—	—

Ref. No.	Part No.	Part Name & Descriptions
PACKING & ACCESSORIES (not included EXPLODED VIEW)		
a.	5058092049	LAMINATE ENVELOPE
b.	5030448103	CUSHION
c.	5010999012	CARTON CASE
d.	5050061007	ENVELOPE
e.	5111233004	INST. MANUAL
f.	5111041005	SAFETY INSTRUCTION
g.	5158053108	WARRANTY IN ENVELOPE
h.	2311060009	LOOP ANT. NNA
i.	3950005107	FM ANT. ASS'Y
j.	5290040008	FM ANT. ADAPTOR
k.	—	—

Ref. No.	Part No.	Part Name & Descriptions	Q'ty
SCREWS, NUTS & WASHERS			
301	4737002005	TAPPING SCREW (S) 3x6	48
302	—	NUT M7 (SP)	6
303	—	TOOTHED WASHER φ7 (SP)	1
304	—	NUT M12 (SP)	1
305	4737500015	TAPPING SCREW (P) 3x8	15
306	—	—	—
307	4737004003	TAPPING SCREW (S) 4x8	4
308	—	—	—
309	—	—	—
*310	4734801005	TAPPING SCREW (TRUS) 4x8	4
311	4737500044	TAPPING SCREW (P) 3x8 (BLACK)	8
312	4737002034	TAPPING SCREW (S) 3x6 (BLACK)	6
313	—	—	—
314	—	—	—
315	—	—	—

BLACK VERSION PARTS LIST
(Same as GOLD VERSION except the followings)

Ref. No.	Part No.	Part Name & Descriptions
32	1441241210	FRONT PANEL ASS'Y
33	1130601116	PUSH KNOB ASS'Y FOR TU. MEMORY
35	1430374321	ESC BAR (L)
36	1430375317	ESC BAR (R)
37	1130604126	PUSH KNOB FOR FUNCTION
38	1330536045	PUSH KNOB FOR SP, AM, MUT
39	1130515121	PUSH KNOB (A) FOR POWER
41	1120458120	KNOB ASS'Y FOR MAIN VR
42	1120459129	KNOB ASS'Y FOR TONE, TAPE
44	1460338243	ESC PLATE (L)
45	1460339242	ESC PLATE (R)
46	1020178131	TOP COVER
310	4734454038	TAPPING SCREW (2) 4x8
c.	5010999054	CARTON CASE

Note: *Mark is not included EXPLODED VIEW.