

ONKYO SERVICE MANUAL

QUARTZ SYNTHESIZED

TUNER AMPLIFIER

MODEL TX-17



Silver and black models

UD, UDN, BUD, BUDN	120V AC, 60Hz
UG, BUG	220V AC, 50Hz
UW, BUW	120 or 220V AC, 50/60Hz
UQA, UQB	240V AC, 50Hz

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK Δ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PARTS NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

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.

SPECIFICATIONS

AMPLIFIER SECTION

Power Output: 25 watts per channel, min. RMS, at 8 ohms, both channels driven, from 40Hz to 20kHz, with no more than 0.3% THD.

Music Power Output: 2 x 45 watts at 4 ohms, 1kHz (DIN)
2 x 38 watts at 8 ohms, 1kHz (DIN)

Continuous Power Output: 2 x 35 watts at 4 ohms, 1kHz (DIN)
2 x 27 watts at 8 ohms, 1kHz (DIN)

Total Harmonic Distortion: 0.1% at 20W
0.1% at 1 watt output

IM Distortion: 0.1% at 20W
0.1% at 1 watt output

Damping Factor: 35 at 8 ohms

Frequency Response: 20 – 30,000 Hz \pm 1dB

RIAA Deviation: 20 – 20,000 Hz \pm 0.8dB

Sensitivity and Impedance: Phono: 2.5mV/50 kohms
Tape Play: 150mV/50 kohms
Tape Rec: 150mV/3.5 kohms (phono)

Phono Overload: 150mV RMS at 1 kHz, 0.3% THD

Signal-to-Noise Ratio: Phono: 85dB (at 10mV input, A weighted)
75dB (IHF A-202)
Tape: 95dB (A weighted)
80dB (IHF A-202)

Tone Controls: Bass: \pm 10 dB at 100Hz
Treble: \pm 10 dB at 10kHz

Loudness (–30dB): +7dB at 70Hz, +5dB at 10kHz



TUNER SECTION

	120V model	Other models
FM:		
Tuning Range:	87.5 – 108.0 MHz (100 kHz steps)	87.5 – 108.0 MHz (50 kHz steps)
Usable sensitivity:	Mono: 12.4 dBf, 2.3 μ V	Mono: 12.4 dBf, 2.3 μ V (IHF) 1.2 μ V, 75 Ω (DIN)
50 dB Quieting Sensitivity:	Stereo: 19.2 dBf, 5.0 μ V Mono: 18.2 dBf, 4.5 μ V Stereo: 38.2 dBf, 45 μ V	Stereo: 2.5 μ V, 75 Ω Mono: 2.2 μ V, 75 Ω Stereo: 22 μ V, 75 Ω
Capture Ratio:	1.5 dB	1.5 dB
Image Rejection Ratio:	40 dB	80 dB
IF Rejection Ratio:	90 dB	90 dB
Signal-to-Noise Ratio:	Mono: 70 dB Stereo: 65 dB	Mono: 70 dB Stereo: 65 dB
Alternate channel Attenuation:	55 dB	50 dB DIN (\pm 300 kHz, 40 kHz dev.)
AM Suppression Ratio:	50 dB	50 dB
Harmonic Distortion:	Mono: 0.15% Stereo: 0.3%	Mono: 0.15% Stereo: 0.3%
Frequency Response:	30 – 15,000 Hz \pm 1.5 dB	30 – 15,000 Hz \pm 1.5 dB
Stereo Separation:	40 dB at 1 kHz 30 dB at 100 – 10,000 Hz	40 dB at 1 kHz 30 dB at 100 – 10,000 Hz
Muting Level	17.2 dBf, 4 μ V	2 μ V
Stereo Threshold:	17.2 dBf, 4 μ V	2 μ V

AM:

Tuning Range:	520 – 1,710 kHz (10 kHz steps)	522 – 1,611 kHz (9 kHz steps)
Usable Sensitivity:	30 μ V	30 μ V
Image Rejection Ratio:	40 dB	40 dB
IF Rejection Ratio:	30 dB	30 dB
Signal-to-Noise Ratio:	40 dB	40 dB
Harmonic Distortion:	0.8%	0.8%

GENERAL:

Semiconductors:	EETs: 5 TR: 23 ICs: 9 Diodes: 50	EETs: 5 TR: 27 ICs: 9 Diodes: 52
Dimensions (WxHxD):	435 x 98 x 317 mm (17-1/8" x 3-15/16" x 12-1/2")	435 x 98 x 317 mm (17-1/8" x 3-15/16" x 12-1/2")
Weight:	5.8 kg., 12.8 lbs.	5.8 kg., 12.8 lbs.

Specifications and features are subject to change without notice.

TABLE OF CONTENTS

Specifications	1	Printed circuit board view/Parts list	16
Service procedures	3	Tone control, headphone, speaker switch & volume control pc board	16
Exploded view	4	Display and function switch pc board	17
Parts list	5	Equalizer amplifier pc board	18
Block diagram-120V model-	6	Tuner pc board	19
Block diagram-220V model-	7	Main amplifier, switch and power supply circuit pc board	23
Circuit description	8	Schematic diagram -220V model-	21
Adjustment procedures	12	Schematic diagram -D/W model-	25
Block diagram of IC	15		
Packing view	27		

SERVICE PROCEDURES

1. Replacing the fuses

For continued protection against fire hazard, replace only with same type and same rating fuse.

D (120V) model

Circuit no.	Part no.	Description
F501, F601	252006	3A (SS-2), Speaker
F901	252048	3A (ST-6), Primary

G (220V) model

Circuit no.	Part no.	Description
F501, F601	252075	2.5A-SE-EAK, Speaker
F902	252073	1.6A-SE-EAK, Primary
F903, F904	252077	4A-SE-EAK, Secondary
F905	252070	1A-SE-EAK, Secondary

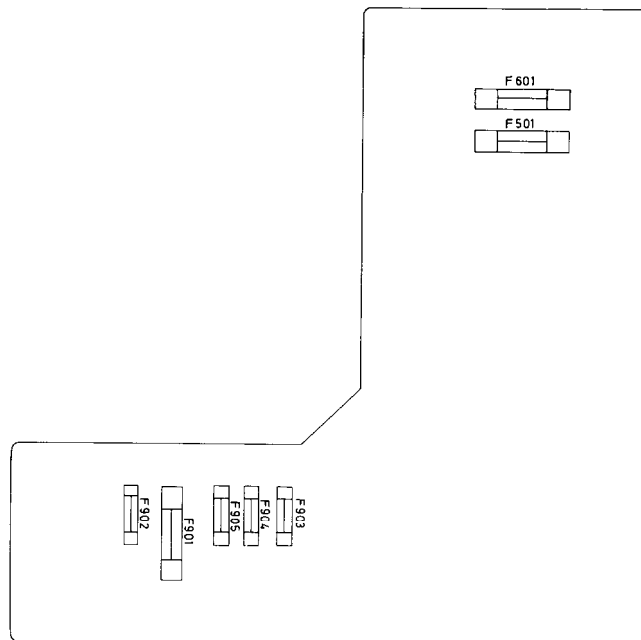
W (120 or 220V) model

Circuit no.	Part no.	Description
F501, F601	252006	3A (SS-2), Speaker
F901	252048	3A (ST-6), Primary
F902	252073	1.6A-SE-EAK, Primary

2. Safety-check out (Only U.S.A. model)

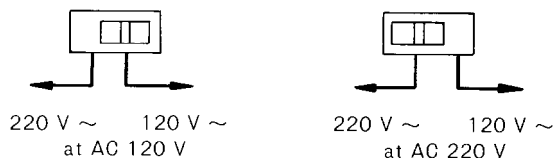
After correcting the original service problem, perform the following safety check before releasing the set to the customer:

Connect the insulating-resistance tester between the plug of power supply cable and nickel screw on the back panel.
Specifications: $3.3M\Omega \pm 0.3M\Omega$



3. Voltage Selector (Back Panel)

Universal models are equipped with a voltage selector to conform with local power supplies. Be sure to set this switch to match the voltage of the power supply in your area before turning the power switch on. This switch is set to 220V at the factory. Voltage is changed by sliding the groove in the switch with a screwdriver to the right or left. Confirm that the switch has been moved all the way to the right or left before turning the power switch on. Models without a voltage selector can only be used in areas where the power supply is the same as that of the unit.



4. Tuning Step Frequency Switch: Band Selector (Back Panel)

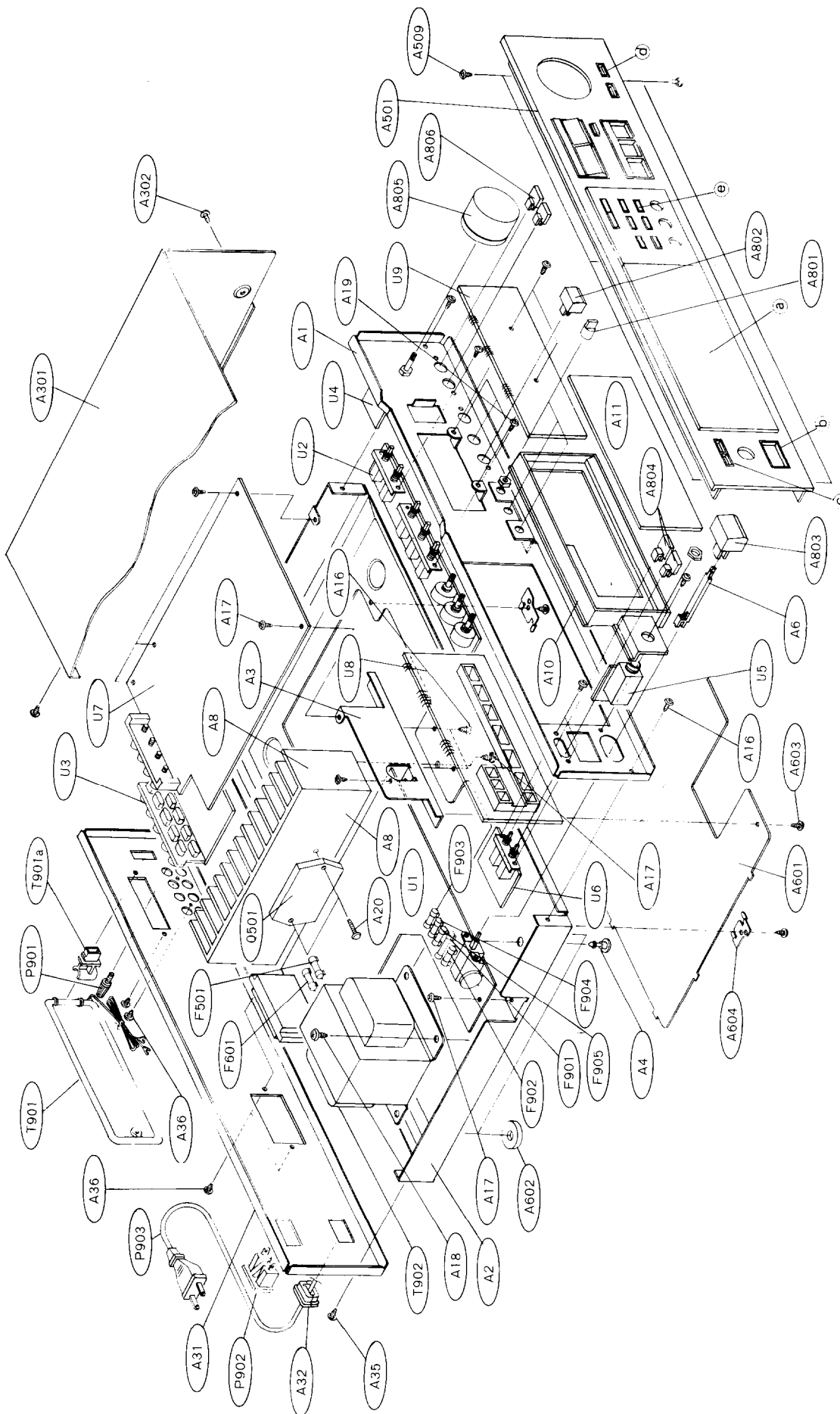
Universal models are equipped with a switch that controls the AM (9kHz/10kHz) and FM (50kHz/100kHz) band tuning steps. The switch is set to the 9kHz/50kHz position at the factory but may have to be reset to the 10kHz/100kHz position depending on the area where the unit is used:

5. Memory Preservation

This unit does not require memory preservation batteries.

A built-in memory power back-up system preserves the contents of the memory during power failures and even when the unit is unplugged. The unit must be plugged in and the power switch turned on and off once in order to charge the back-up system. Note that since this is not a permanent memory, the power switch must be turned on and off a few times each month to keep the back-up system operable. The period of time during which memory contents are preserved after power has last been turned off varies depending on climate and the location and placement of the unit. On the average, memory contents are protected over a period of 3 to 4 weeks (a minimum of 2 weeks) after the last time power has been turned off. This period is shorter when the unit is exposed to very high humidity or used in an area with an extremely humid climate.

EXPLODED VIEW



PARTS LIST

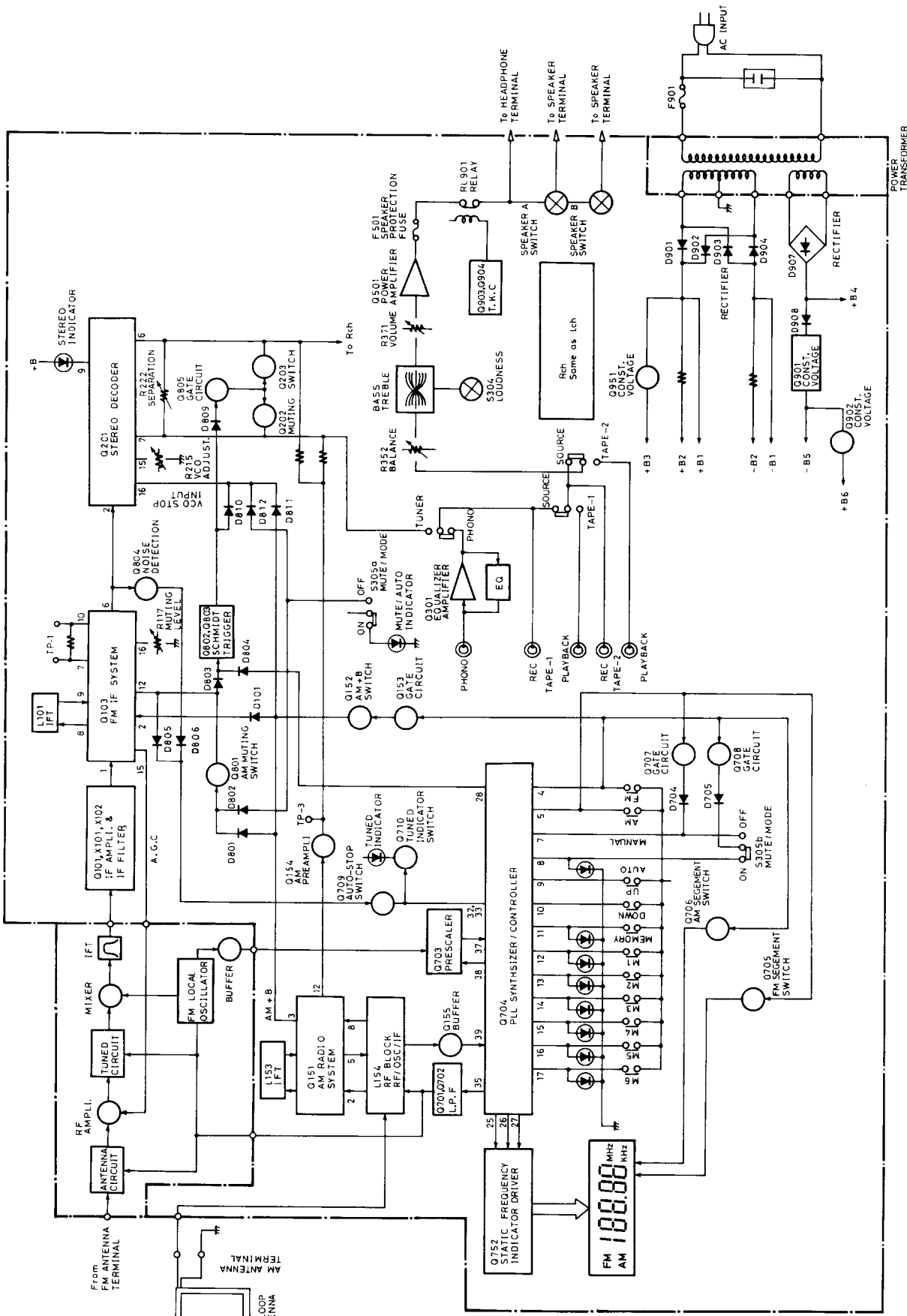
REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
A1	27110240B	Front bracket	A802	28321885A	Knob, push (S)	U2	18328574	NATC-2274, Tone control pc board ass'y
A2	27100070A	Chassis	A803	28321893A	Knob, push (B)	U3	18328575	NAEQ-2275, Equalizer amplifier pc board ass'y (D/W)
A3	27140988	Bracket, pc board	A804	28321905B	Knob, power (S)			NAEQ-2275A, Equalizer amplifier pc board ass'y (G)
A4	27190266	Holder	A805	28321886	Knob, speaker (S)			NAVR-2276, Volume pc board ass'y
A5	28175117A	Insulator plate		28321894	Knob, speaker (B)			NAHP-2277, Headphone terminal pc board ass'y
A6	27260170A	Shaft, switch		28321887A	Knob, volume (S)			NASP-2278, Speaker switch pc board ass'y
A8	27210161	Radiator	A806	28321895	Knob, volume (B)	U4	18328576	NARF-2269, Tuner pc board ass'y (D)
A10	27190345	Holder	F501, F601	252006	3A (SS-2), Speaker fuse (D/W)			NARF-2269A, Tuner pc board ass'y (G)
A11	28133130	Back plate		252075	2.5A-SE-EAK, Speaker fuse (G)			board ass'y (G)
A16	834430068	3TTS - 6B (BC), Tapping screw	F901	252048	3A (ST-6), Primary fuse (D/W)			NARF-2269B, Tuner pc board ass'y (W)
A17	831430088	3TTW - 8B (BC), Tapping screw	F902	252073	1.6A-SE-EAK, Primary fuse (G/W)			NADIS-2270, Display pc board ass'y (D)
A18	838440089	4TTB - 8C (BC), Tapping screw	F903, F904	252077	4A-SE-EAK, Secondary fuse (G)	U7	18328569	NADIS-2270A, Display pc board ass'y (G/W)
A19	82143006	3P - 6FN (BC), Pan head screw						NASW-2271, Function switch pc board ass'y
A20	834430168	3TTS + 16B (BC), Tapping screw						NASW-2272, De-emphasis/band switch pc board ass'y
A31	27120663A	Back panel (D)	F905	252070	1A-SE-EAK, Secondary fuse (G)			
	27120669A	Back panel (G)	P901	25060044	Terminal GND			
	27120670A	Back panel (W)	P902	25050046	NSCT-2P-15, AC outlet (D)	U8	18328570	
A32	27300750	Strainrelief	P903	253112	AS-UC-4 #18, Power supply cord (D)			
A35	834430068	3TTS - 6B (BC), Tapping screw	Q501, Q601	222045	AS-CFE, Power supply cord (G/W)	U9	18328571	
A36	834430108	3TTS - 10B (BC), Tapping screw	S902	25065123	NPS-1258P, Voltage selector switch (W)			
A37	834230108	3TTS + 10B (NI), Nickel screw	T901	232119	NMA-3052, AM loop antenna			
A301	28184267	Top cover (S)	T901a	27190105	Holder, antenna			
	28184268	Top cover (B)	T902	230862	NPT-872D, Power transformer (D)			
A302	834430068	3TTS + 6B (BC), Tapping screw		230863	NPT-872G, Power transformer (G)	U10	18330572	
A501	18328121	Front panel ass'y (S)	U1	18328573	NAAF-2273, Main amplifier, switch and power supply circuit pc board ass'y (D)			
A501a	28191288B	Guide, power						
A501b	27267386B	Guide, speaker						
A501c	27267387	Guide, loudness						
A501d	27267388	Guide, loudness						
A501e	28321880B	Knob ass'y						
A501	18348121	Front panel ass'y (B)						
A501a	28191288B	Clear plate						
A501b	27267389B	Guide, power						
A501c	27267390	Guide, speaker						
A501d	27267391	Guide, loudness						
A501e	28321888B	Knob ass'y						
A509	838430068	3TTB + 6B (BC), Tapping screw						
A601	27170197A	Bottom board						
A602	27175030	Leg						
A603	834430068	3TTS - 6B (BC), Tapping screw						
A604	27141001	Bracket BO						
A801	28320797	Knob, selector (S)						
	28321735	Knob, selector (B)						

Note: (D): Only 120V model
 (G): Only 220V model
 (Q): Only 240V model
 (W): Only 120/220V model
 (S): Only silver model
 (B): Only black model

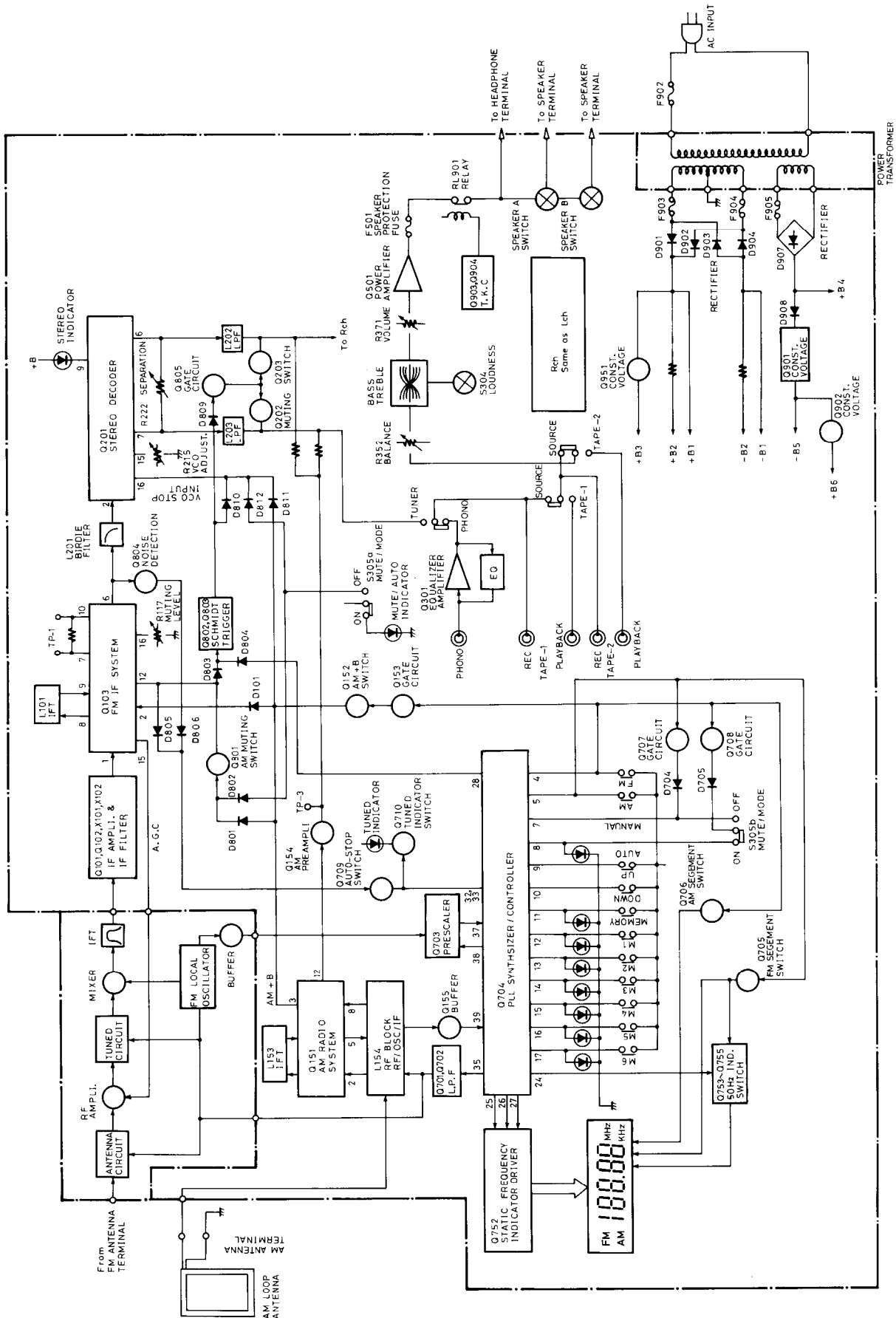
NOTE: THE COMPONENTS IDENTIFIED BY MARK Δ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PARTS NUMBER SPECIFIED.

BLOCK DIAGRAM

-120V model-



-220V model-



CIRCUIT DESCRIPTIONS

1. Synthesizer and controller operation

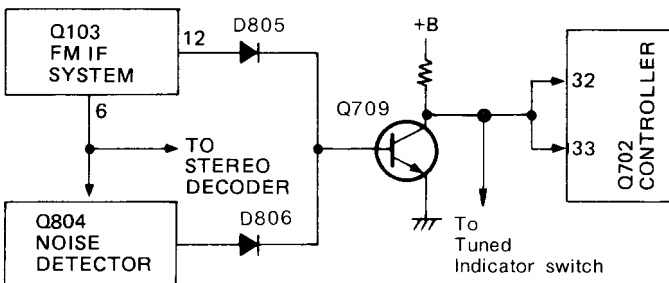
Pin No.	Symbol	Terminal	Description
1	GND	Ground	
2	XT	X'tal	Connected to the 7.2MHz crystal oscillator for the reference frequency.
3	XT		
4	FM	FM band specification input	Mutual reset type, performs switching of each band, FM/MW/LW.
5	MW	MW band specification input	
6	LW	LW band specification input	
7	MANUAL	Manual tuning mode specification input	Mutual reset type, performs auto search and manual operation mode switching during UP/DOWN tuning.
8	AUTO	Auto search tuning mode specification input	
9	UP	UP tuning key input	Connect the push key and perform UP/DOWN tuning.
10	DOWN	DOWN tuning key input	
11	STO	Memory store command input	The preset memory is set to the write mode when the key is pressed.
12-19	M1-M8	Preset memory channel specification input	Controls the write and read out of the internal 16-station preset memory along with the MC1 and MC2 input. (M7 and M8 are not used)
20	MC-1	Memory control input	Set the 16-station preset memory to the 8 FM/8 AM station mode or the FM/MW/LW 3-band 16-station random mode. The 8 FM/8 AM mode is used in this unit. (M7 and M8 are not used)
21	MC-2		
22	OSC2	AM oscillator terminal	CR connection terminal for the oscillator that determines the scan speed during the AM search mode.
23	OSC1	FM oscillator terminal	CR connection terminal for the oscillator that determines the scan speed during the FM search mode.
24	0/5	FM 50 kHz output	Output that represents the 50kHz FM band tuning step for European models. Goes to the high level for the 50 kHz setting.
25	CK2	Tuned frequency data output	Outputs the serial data and timing clock to the tuned frequency display driver.
26	CK1		
27	DATA		
28	MUTE	Muting signal output	Goes to the high level during muting output.
29	E2	Regin specification input	See table 1.
30	E1		
31	STOP 3	AM IF signal input	During AM reception, this counts the IF signal and stops auto search.
32	STOP 2	Auto search stop signal input	When the stop 1 input (pin 33) is at the high level and this terminal goes to the high level, auto search is stopped.
33	STOP 1	Scan speed slow input	When the high level is input at this terminal, the auto search speed is cut in half.

Pin No.	Symbol	Terminal	Description
34	DO1	Error output	Charge pump output of the phase detector which constitutes the PLL. High level is output when the divided oscillation frequency is high than the reference frequency. In the opposite case, low level is output. Floating occurs when the frequencies match. The output is applied to the variable capacitor diode in the front end through low pass filter Q701 and Q702. The output from both terminals is the same, but only D02 is used.
35	D02		
36	TEST	Test terminal	Test mode at the high level.
37	FM IN	FM programmable counter input	Connect to the prescaler output (Pin3 of Q703)
38	PSC	Pulse swallow control output	Output to the control the division ratio of the prescaler.
39	AM IN	AM local oscillator signal input	Terminal for input of AM broadcast signal.
40	$\overline{\text{INH}}$	Inhibit input	Operates normally at the high level. Inhibit status at the low level.
41	$\overline{\text{INT}}$	Initialize input	Operates normally at the high level. At the low level, the internal status is initialized.
42	V _{DD}	Power supply	Device power terminal; supplies 5V during the normal operation and 2.5V from the super capacitor (C714) for memory preservation.

table 1.

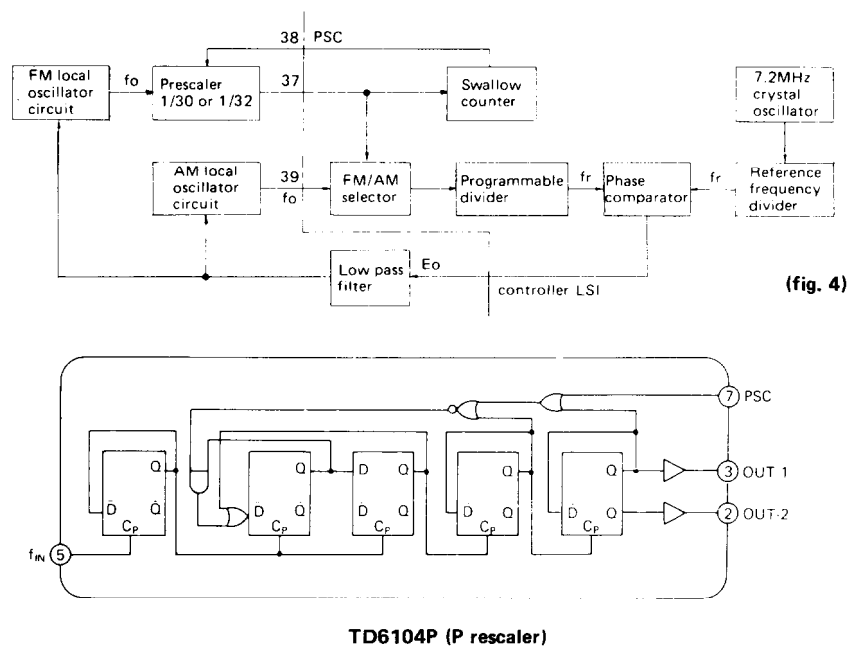
E1 (Pin 30)	E2 (Pin 29)	Region	Band	Frequency range	Intermediate frequency	Scan step	Reference frequency
0	1	U.S.A	FM	87.5 ~ 108.0 MHz	+10.7 MHz	100 kHz	25 kHz
			AM1	520 ~ 1710 kHz	+450 kHz	10kHz	10 kHz
1	1	Europe	AM2	522 ~ 1710 kHz	+450 kHz	9kHz	9kHz
1	0		FM	87.50 ~ 108.00 MHz	+10.7 MHz	50 kHz	25 kHz
			MW	522 ~ 1611 kHz	+450 kHz	9 kHz	9 kHz
0	0	Japan	LM	153 ~ 360 kHz	+450 kHz	1 kHz	1 kHz
			FM	76.0 ~ 90.0 MHz	-10.7 MHz	100 kHz	25 kHz
			AM	522 ~ 1611 kHz	+450 kHz	9 kHz	9 kHz

2. Auto-search tuning circuit



During FM reception, this is operated by the IF level detection and zero point detection circuits included in the FM IF system IC of Q103 and by the noise component detection circuit of Q804. When a station is tuned, the output of all outputs go to the low level so Q709 goes from on to off, causing pins 32 and 33 of the controller IC to go to the high level to complete auto search tuning.

3. PLL tuned circuit



A block diagram of the tuned circuit of the PLL is shown in figer 4.

Operation during AM reception

The reception frequency is applied to the programmable divider where it is divided to $1/N$ and output as f_v . This is applied to the phase comparator where it is compared with frequency reference f_r (9kHz for G/W model and 10kHz for D model). If f_r and f_v differ, E_o equal to the difference in frequency is output. Since error output E_o is a pulse waveform, it is passed through the low pass filter to change it into DC voltage V_D , which is applied to the variable capacitor diode in the front end to change the reception frequency. This continues until f_v and f_r are the same and $E_o=0$.

Operation during FM reception

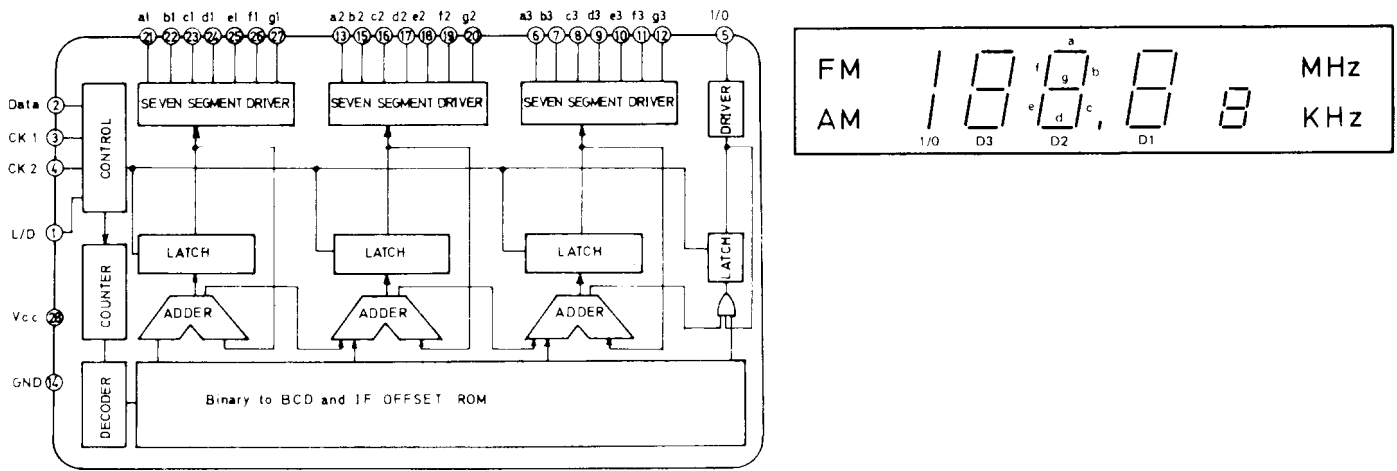
The pulse swallow method is used in the prescaler of this unit. In this type of prescaler, a supplementary number

(changed according to the program code input) and the divided reception frequency from the prescaler are combined in the control counter and the prescaler's division factor is switched 1/30 or 1/32 according to external control (1/32 when the PSC terminal is "H" and 1/30 when it is "L").

The station oscillator frequency is applied to the programmable divider, but the programmable divider has an upper frequency limit of only 30MHz, so the pulse swallow-type prescaler, which can be used up to 150 MHz, is inserted for division to $1/N_p$;

The signal is applied to the programmable divider and divided to $1/N$. The result is compared with a 25kHz frequency reference in the phase detector and the error is output as E_o until a match is obtained as in AM operation.

4. Frequency indicator circuit



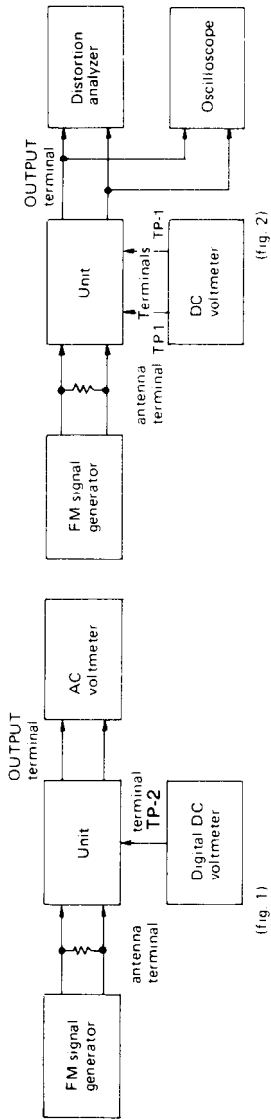
TD6301AP block diagram

Pin No.	Terminal	Description
1	L/D	Output indication switching input terminal: Fluorescent display at the low level, and LED display at the high level.
2	Data	Tuned frequency data input terminal: Input from the system controller LSI to the serial.
3,4	CK1, CK2	Tuned frequency data input control timing input terminal: Transferred simultaneously with data from the system controller LSI.
5	I/O	Segment drive output terminal: Sets the number of display digit for FM (100MHz) and AM (1,000kHz) reception.
6-12	a3-g3	Seven segment drive output terminals: Sets the number of display digit for FM(10MHz) and AM (100kHz) reception.
13, 15-20	a2-g2	Seven segment drive output terminals: Sets the number of display digit for FM (1MHz) and AM (10kHz) reception
21-27	a1-g1	Seven segment drive output terminals; set the number of display digit for FM (100kHz) and AM (1kHz) reception
14	Vcc	Power source terminal
28	Gnd	Ground

ADJUSTMENT PROCEDURES

FM section

Item	Step	Connection of instrument	FM SG output	Stereo modulator output	Turning dial setting	Output indicator	Adjustment	Adjust for	Remarks
FM RF	1	Fig. 1	—	—	87.50 MHz	Digital DC voltmeter	LO	1.5V \pm 0.3V	(220V model)
	2	Fig. 1	108.0MHz 1 kHz, 75 kHz devi.	—	108.00 MHz	AC voltmeter	RF1, RF2	Maximum output	
FM RF	1	Fig. 1	—	—	87.5 MHz	Digital DC voltmeter	LO	1.5V \pm 0.3V	(D/W models)
	2	Fig. 1	108.0 MHz 1 kHz, 75 kHz devi.	—	108.0 MHz	AC voltmeter	RF	Maximum output	
FM IF	1	Fig. 2	99.0 MHz 1 kHz, 75 kHz devi. 65 dBf (60 dB)	—	99.0 MHz	DC voltmeter	L101 Pri	0V to -30mV	Muting switch: off Repeat the steps 1 and 2 until no further adjustment is necessary
	2	Fig. 2	—	—	99.0 MHz	Distortion analyzer	L101 second	Minimum	
VCO		Fig. 3	99.0 MHz 1 kHz, 75 kHz devi. 65 dBf (60 dB)	—	99.0 MHz	Frequency counter	R 215	19 kHz \pm 19-Hz	Muting switch: on Remove the frequency counter after adjustment
Distortion		Fig. 3	99.0 MHz 65 dBf (60 dB) Ext. modulation	L + R 1 kHz 67.5 kHz devi. Pilot signal 67.5 kHz devi.	99.0 MHz	Distortion analyzer	IF	Minimum	
Stereo Separation		Fig. 3	99.0 MHz 65 dBf (60 dB) Ext. modulation	L ch, 1 kHz	99.0 MHz	R ch, AC voltmeter	R 222	Minimum	Maximum and same separation
				R ch, 1 kHz		L ch, AC voltmeter			
Muting level	1	Fig. 2	99.0 MHz 17.2 dBf (12 dB) 1 kHz, 75 kHz devi.	—	99.0 MHz	Oscilloscope	R 117	Signal output	Muting switch to on.
	2		99.0 MHz 16.2 dBf (11 dB) 1 kHz, 75 kHz devi.					No output	



(fig. 1)

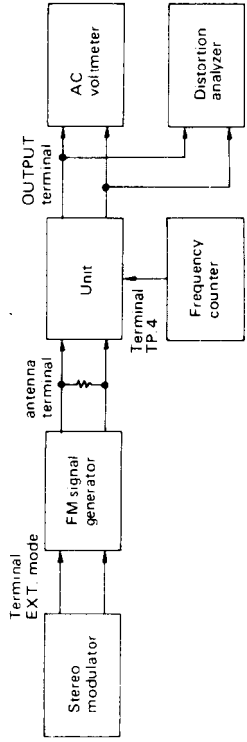
AM section

120V model

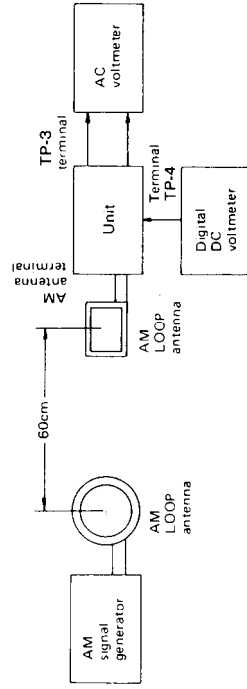
Step	AM SG output	Tuned frequency	Output indicator	Adjustment point	Adjust for	Remarks
1	1000kHz 400Hz 30% mod.	1000kHz	AC voltmeter	IF L153	Maximum	
2		520kHz	Digital DC voltmeter	LO	1.2V ± 0.2V	
3	600kHz 400Hz 30% mod.	600kHz	AC voltmeter	RF	Maximum	Repeat the steps 3 and 4 until no further adjustment is necessary.
4	1400kHz 400Hz 30% mod.	1400kHz	AC voltmeter	TC	Maximum	

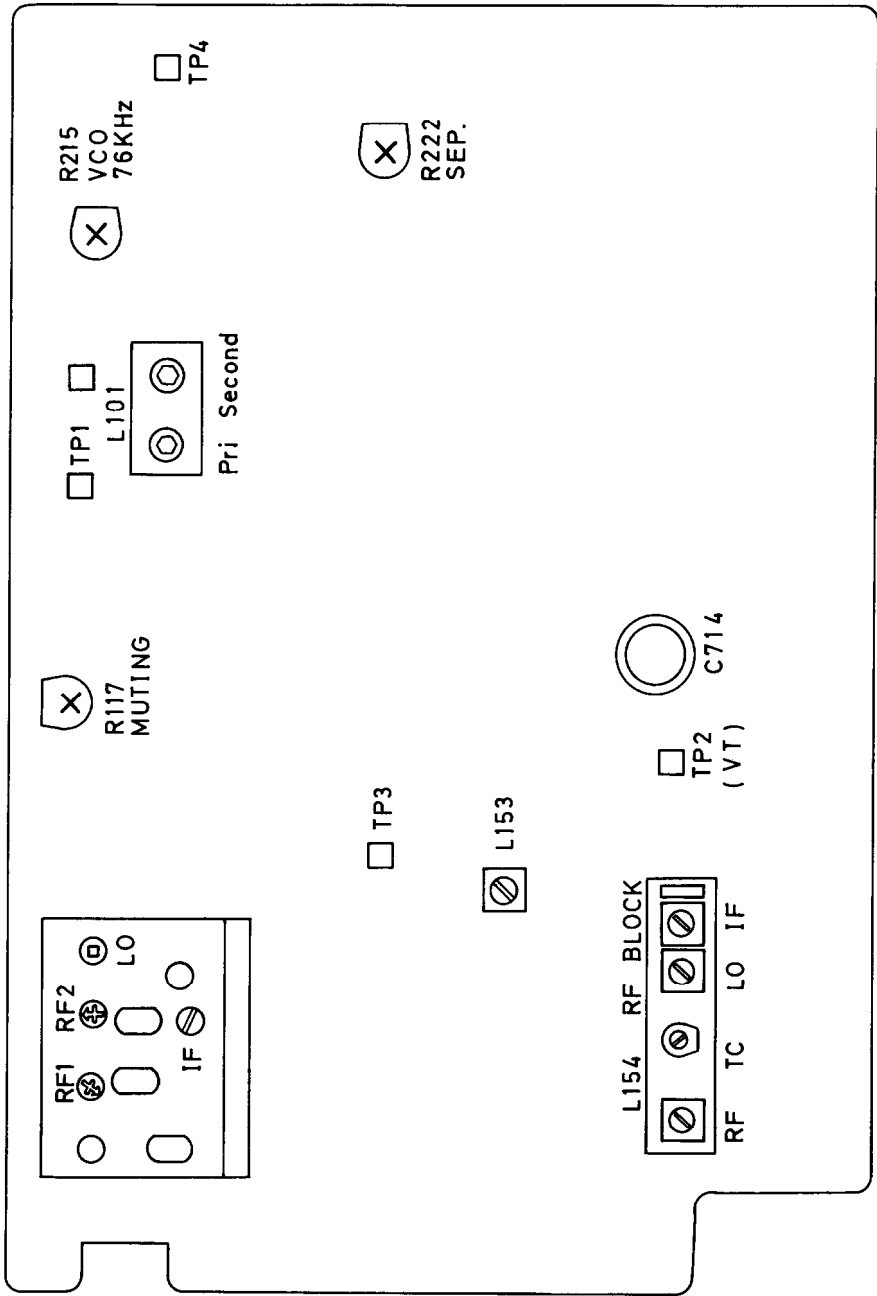
Other models

Step	AM SG output	Tuned frequency	Output indicator	Adjustment point	Adjust for	Remarks
1	999kHz 400Hz 30% mod.	999kHz	AC voltmeter	IF L153	Maximum	
2		522kHz	Digital DC voltmeter	LO	1.2V ± 0.2V	
3	603kHz 400Hz 30% mod.	603kHz	AC voltmeter	RF	Maximum	Repeat the steps 3 and 4 until no further adjustment is necessary.
4	1404kHz 400Hz 30% mod.	1404kHz	AC voltmeter	TC	Maximum	



(fig. 3)

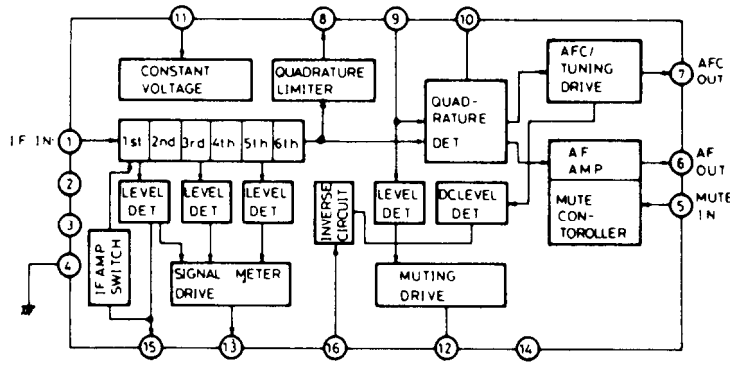




Adjustment point

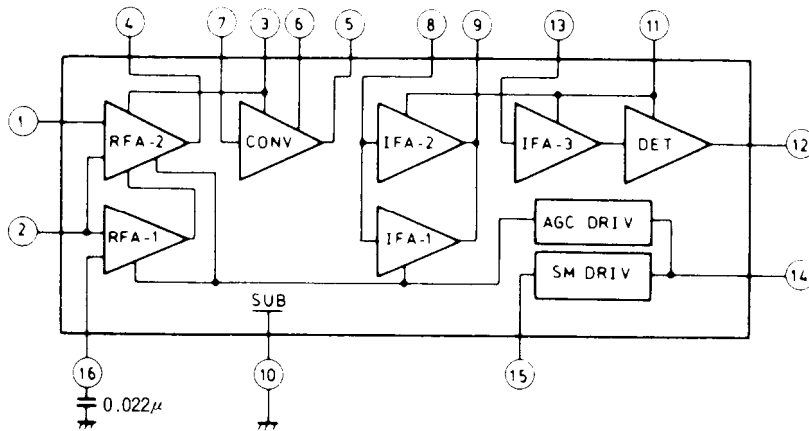
BLOCK DIAGRAM OF IC

μ PC1167C2(FM IF system)

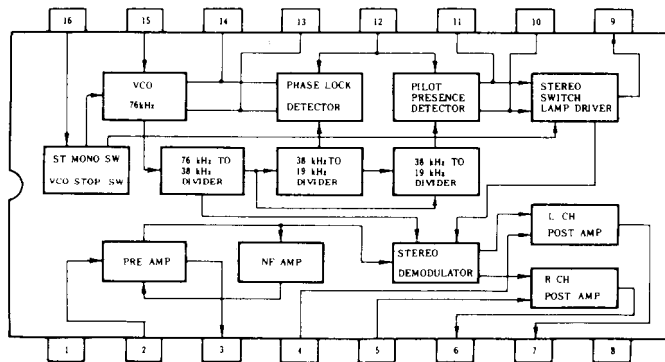


1. IF signal input
2. IF amplifier switch input
H level: Off
5. Muting switch input
6. Composite signal output
7. AFC output
8. IF amplifier output
9. 10.7MHz input
10. Reference voltage
11. Power supply
12. Muting output
Tuned: L level
13. Signal strength output
15. AGC output
16. Muting level

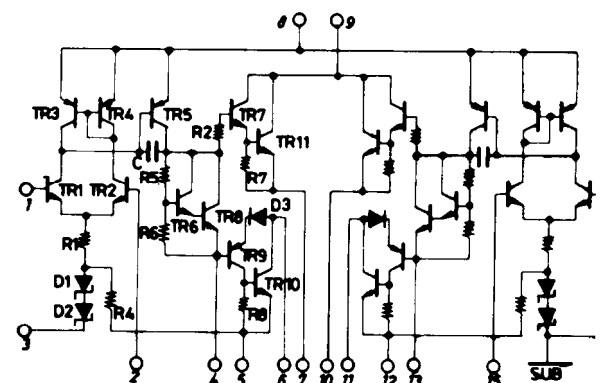
μ PC1243C(AM radio system)

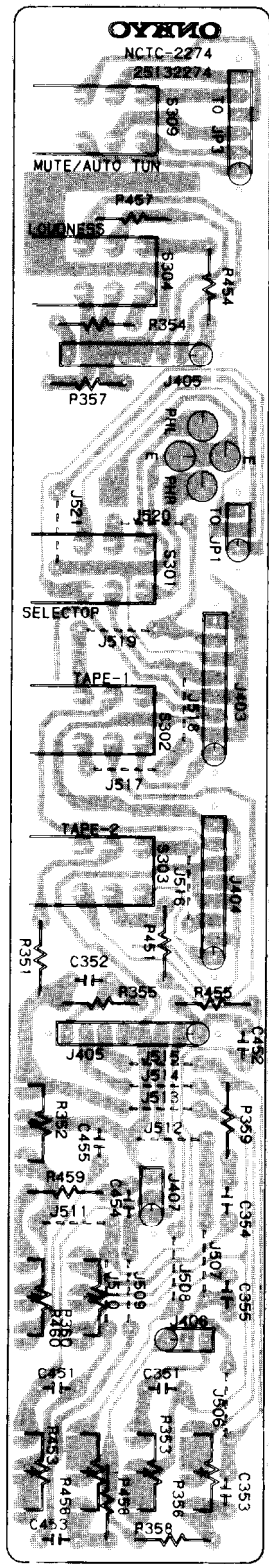


μ PC1161C3(Stereo decoder)



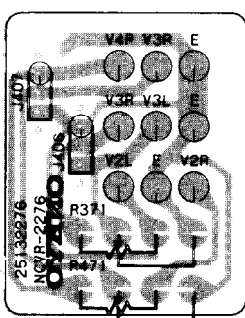
STK4141V(Main amplifier)



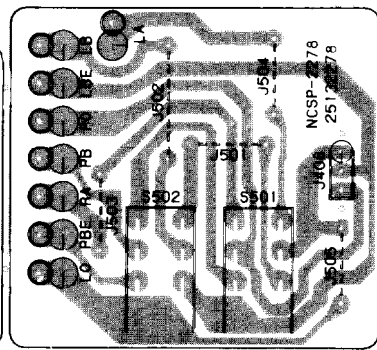


TONE CONTROL

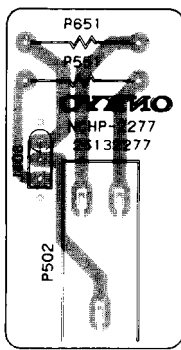
HEADPHONE TERMINAL



SPEAKER SWITCH



VOLUME CONTROL



PRINTED CIRCUIT BOARD PARTS LIST

PC BOARD(NATC-2274)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Variable resistors	
R352, R452	5146048	N16RLC250K W20, Balance
R353, R453	5104170	N16RQM110K 180K 20, Bass
R360, R460	5148100	N16RGM219K 20, Treble
	Switches	
S301-S303	25035472	NPS-322-L434, Selector
S304, S305	25035460	NPS-222-L422, Muting/Loudness

VOLUME PC BOARD(NAVR-2276)

CIRCUIT NO.	PART NO.	DESCRIPTION
R371, R471	5148101	N16RGM100KBTP30, Variable resistor

HEADPHONE TERMINAL PC BOARD(NAHP-2277)

CIRCUIT NO.	PART NO.	DESCRIPTION
R551, R651	441522714	270Ω, 1/2W, Metal oxide film resistor
P502	25045138	HLJ0520-01-010, Headphone terminal

SPEAKER SWITCH PC BOARD(NASP-2278)

CIRCUIT NO.	PART NO.	DESCRIPTION
S501, S601	25035467	NPS-222-L429, Speaker switch

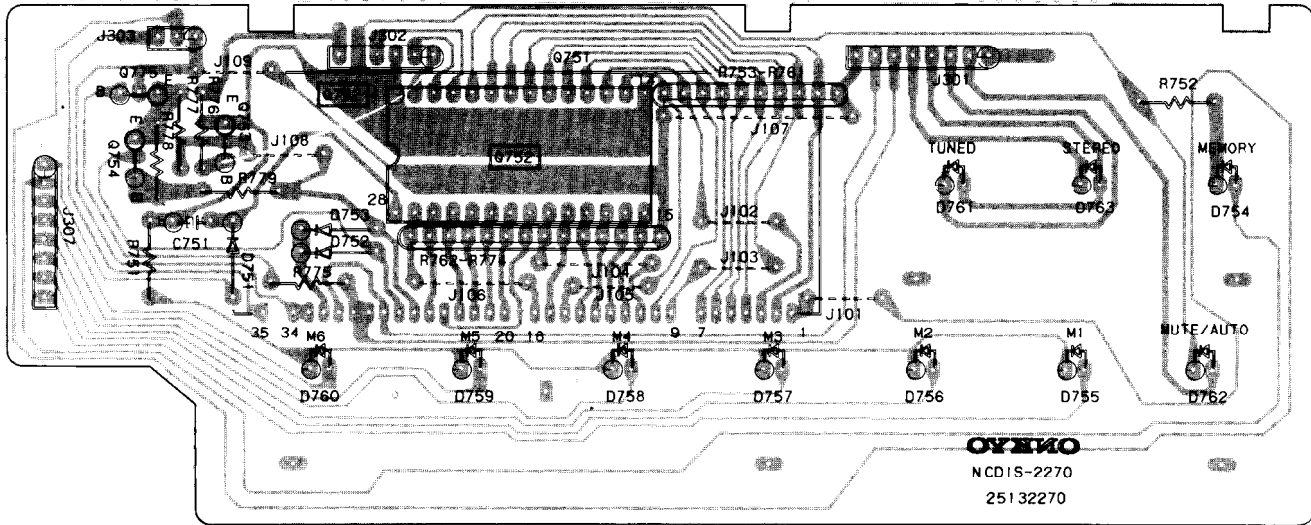
DE-EMPHASIS SWITCH PC BOARD(NASW-2272)

CIRCUIT NO.	PART NO.	DESCRIPTION
S721	25065126	NSS-2259, Slide switch (W)

(D): Only 120V model
 (G): Only 220V model
 (W): Only 120/220V model

PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE

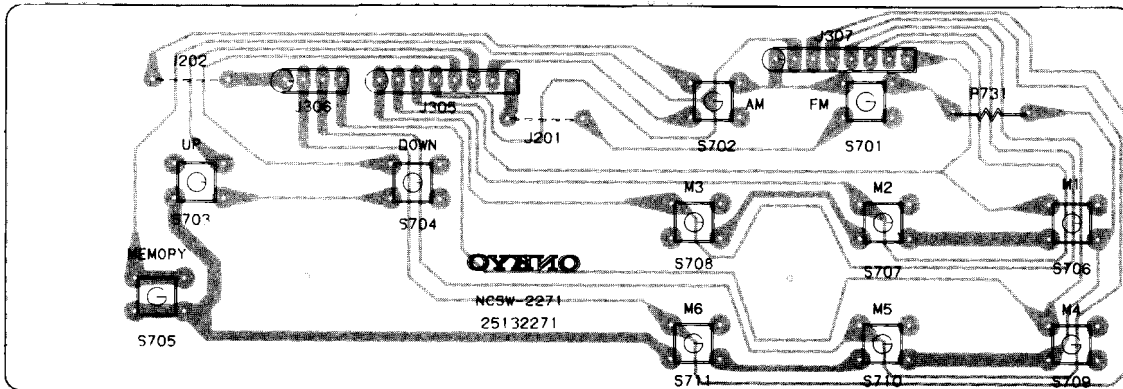
DISPLAY PC BOARD



DISPLAY PC BOARD (NADIS-2270/A)

CIRCUIT NO.	PART NO.	DESCRIPTION	CIRCUIT NO.	PART NO.	DESCRIPTION
Q752	222673	IC TD6301AP	D754, D763	225141	L. E. Ds SEL2213C
Q753, Q755	2211255, 2210746 or 2212485	Transistors 2SC1815(GR), 2SC945A (P) or JC501 (Q) <G/W>	D755-D761 D762	225137 225142	SEL2413E SEL2913K
Q754	2211455	2SA1015 (GR) <G/W>	C751	352741009	Capacitor 10μF, 16V, Elect.
Q751	212016	Fluorescent tube FIP7B8CS	R753-R761 R762-R774	49121333509 49121333513	Resistors 33k×9, /8W, Network 33k×13, 1/8W, Network
D751-D753	223150, 223145 or 223124	Diodes US1040, 1S2076 TD or 1S2473 <G/W>		27190346	Holder L. E. D
D751	223150, 223145 or 223124	Diodes US1040, 1S2076 TD or 1S2473 <D>		28140593	Cushion 3.5×10×40
				27270071	Spacer

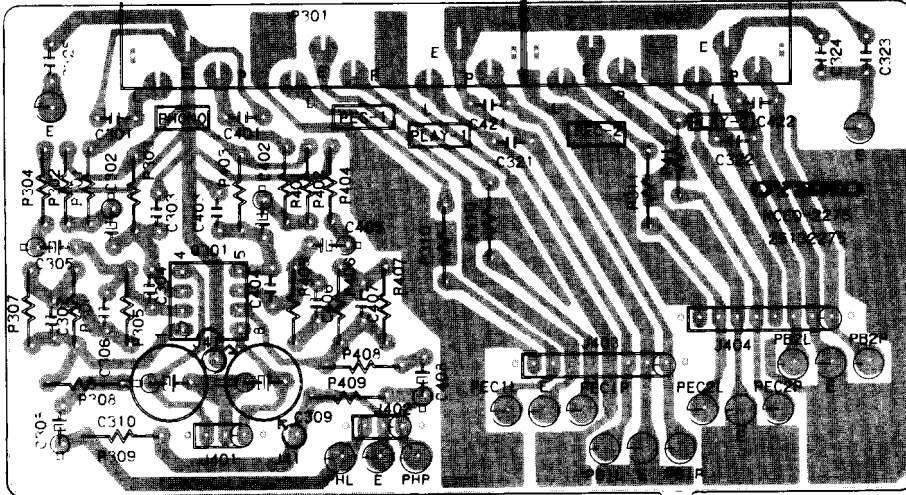
FUNCTION SWITCH PC BOARD



FUNCTION SWITCH PC BOARD (NASW-2271)

CIRCUIT NO.	PART NO.	DESCRIPTION
S701-S711	25035389	NPS-111-S353, Push switch

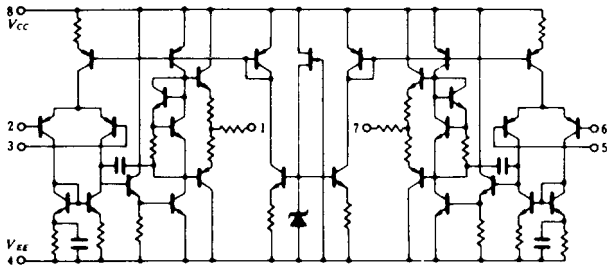
EQUALIZER AMPLIFIER PC BOARD



EQUALIZER AMPLIFIER PC BOARD (NAEQ-2275/A)

CIRCUIT NO.	PART NO.	DESCRIPTION
	IC	
Q301, Q401	222502 or 222534	NJM4558DX or NJM4559DX
	Capacitors	
C302, C402	352780229	2.2 μ F, 50V, Elect.
C305, C405	352721019	100 μ F, 6.3V, Elect.
C308, C408	352780229	2.2 μ F, 50V, Elect.
C309, C310	352742219	220 μ F, 16V, Elect.
	Terminals	
P301	25045143	NPJ-6PDBL56, Phono / Tape
P302	25045142	NPJ-4PDBL55, Tape

NJM4558DX/NJM4559DX(Operation amplifier)



PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE

TUNER PC BOARD

PRINTED CIRCUIT BOARD PARTS LIST

TUNER PC BOARD(NARF-2269/A/B)

CIRCUIT NO.	PART NO.	DESCRIPTION	CIRCUIT NO.	PART NO.	DESCRIPTION
	Front End			Transistors	
TU001	240059	FE416U33 <G>	Q154, Q701	2211255	2SC1815 (GR)
	240061	FE349U14 <D/W>	Q155	2211945 or	2SK246 (GR) or
	ICs		Q202, Q203	2212304	2SK381 (D)
Q103	222608	μ PC1167C2		2211706 or	2SD655 (F) or
Q151	222629	μ PC1243C		2211705	2SD655 (E)
Q201	222678	μ PC1161C3	Q702	2212294 or	2SK108 (D) or
Q703	222675	TD6104P		2211293	2SK68 (M)
Q704	222674	TC9147AP	Q804, Q951	2211255	2SC1815 (GR)
	Transistors		Q805	2212495 or	JA101 (Q) or
Q101	2211722 or	2SC1923 (R) or		2211455	2SA1015 (GR)
	2211723	2SC1923 (O)		Diodes	
Q102	2211722 or	2SC1923 (R) or	D001	2243192,	MTZ8. 2A,
	2211723	2SC1923 (O) <G>		2241031 or	GZA8. 2X or
Q152, Q153	2211255,	2SC1815 (GR),		2239552	RD8. 2EB2 <G>
Q705-Q710	2210746 or	2SC945A (P) or	D101	223150,	US1040,
Q801-Q803	2212485	JC501 (Q)	D701-D705	223145 or	1S2076TD or
			D801-D812	223124	1S2473
			D151	4000068	VD1222

CIRCUIT NO.	PART NO.	DESCRIPTION
X701	3010073	XTL7. 2M
	Capacitors	
C001	352780229	2.2 μ F, 50V, Elect.
C106, C108	352780109	1 μ F, 50V, Elect.
C110	352741009	10 μ F, 16V, Elect.
C116	352784799	0.47 μ F, 50V, Elect.
C156	352741019	100 μ F, 16V, Elect.
C160	352742209	22 μ F, 16V, Elect.
C161	352750479	4.7 μ F, 25V, Elect.
C165	352782299	0.22 μ F, 50V, Elect.
C166	352780109	1 μ F, 50V, Elect.
C167	352721019	100 μ F, 6.3V, Elect.
C170	352741009	10 μ F, 16V, Elect.
C201	352744719	470 μ F, 16V, Elect.
C202	352750479	4.7 μ F, 25V, Elect.
C207, C208	352741009	10 μ F, 16V, Elect.
C209	352782299	0.22 μ F, 50V, Elect.
C210	352780339	3.3 μ F, 50V, Elect.
C211	352780109	1 μ F, 50V, Elect.
C212	370134714	470pF, 100V, APS
C213, C214	352780109	1 μ F, 50V, Elect.
C703	395160107	1 μ F, 35V, Tantalum
C705	352741009	10 μ F, 16V, Elect.
C709	352744709	47 μ F, 16V, Elect.
C710	352780109	1 μ F, 50V, Elect.
C711	352780229	2.2 μ F, 50V, Elect.
C712	352784799	0.47 μ F, 50V, Elect.
C714	3020017	0.022 μ F, 5V, Super
C717	352780339	3.3 μ F, 50V, Elect.
C801	352782299	0.22 μ F, 50V, Elect.
C803	352784799	0.47 μ F, 50V, Elect.
C806	352784799	0.47 μ F, 50V, Elect.
C951	352780109	1 μ F, 50V, Elect.
	Resistors	
R117	5215046	N08HR50KBC, Semi-fixed
R215	5215044	N08HR5KBC, Semi-fixed
R222	5215047	N08HR100KBC, Semi-fixed
R951	441523904	39 Ω , 1/2W, Metal oxide film
	Terminal	
P901	25060087	NTM2PDMN31, Antenna <G>
	25060085	NTM4PDMN29, Antenna <D/W>

<D>: Only 120V model
<G>: Only 220V model
<W>: Only 120/220V model

CIRCUIT NO.	PART NO.	DESCRIPTION
	Diode	
D951	2239493, 2243163 or 2240973	RD6. 2EB3, MTZ6. 2C or GZA6. 2Z
	Coils	
L001	233312	NFA-3051 <G>
L102	233105 or 233024	NCH-1005 or NCCH-1501
L201	233236	NMC-6027 <G>
L202, L203	233291	NMC-5039 <G>
L801	233031	NMC-9-1
	Transformers	
L101	233270	NFIF-6040
L153	232095	NMIF-6025
	RF block	
L154	232121	NMRF-7042
	Ceramic filters	
X101, X102	3010071	SFE10. 7MA5 <D/W>
X101	3010043	SFE10. 7MM <G>
X102	3010070	SFE10. 7MS3GYA <G>

PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE

MAIN AMPLIFIER, SWITCH AND POWER SUPPLY PC BOARD

CIR. NO.	PART NO.	DESCRIPTION
C501, C601	352780229	2.2μF, 50V, Elect.
C505, C605	352731019	100μF, 10V, Elect.
C506	352762219	220μF, 35V, Elect.
C507, C607	352764709	47μF, 35V, Elect.
C509	352762219	220μF, 35V, Elect.
C510	352761009	10μF, 50V, Elect.
C513, C613	352761009	10μF, 35V, Elect.
C901, C903	△ 3500065A	0.01μF, AC400/125V, IS
	3504169 or 3504171	6.800μF, 40V, Elect.
C904, C905	352744719	470μF, 16V, Elect.
C906	352761019	100μF, 35V, Elect.
C907	352752229	2,200μF, 25V, Elect.
C908	352751019	100μF, 25V, Elect.
C911	352780109	1μF, 50V, Elect.
C912	352751009	10μF, 25V, Elect.
C913	352753509	33μF, 25V, Elect.
C914	352780339	3.3μF, 50V, Elect.
R506	R306	100Ω, 1/2W, Metal oxide film
R507, R607	441521014	2.2kΩ, 1/2W, Metal oxide film
R508, R608	441522224	4.7Ω, 1/2W, Metal oxide film
R509, R609	441520474	4.7Ω, 1/2W, Metal oxide film
R521, R621	441520474	100Ω, 1/2W, Metal oxide film
R510	441521014	820Ω, 1/2W, Metal oxide film
R901, R902	441528214	1kΩ, 1W, Metal oxide film
R903	441621024	1Ω, 1W, Metal oxide film
R904	441621204	2Ω, 1/2W, Metal oxide film
R911	441522704	3.3MΩ, 1/2W, Solid
R913	△ 431523355	
RL901	Relay	NRL-2P3ADC24-05
S901	Switch	NPS-111-L362P, Power
C901a	Cover	Capacitor
F501	Terminal	NTM-8PDM25, Speaker
	Fuseholders	YSH403T (G/W) SN5051 (D/W)
F501, F601	Fuses	3A(SS-2), Speaker (D/W) 2.5A-SE-EAK, Speaker (G) 3A(ST-6), Primary (D/W) 1.6A-SE-EA, Primary (G/W) 4A-SE-EAK, Secondary (G) 1A-SE-EAK, Secondary (G)
F902	Label	TL5A/250V, Fuse (G)
F903, F904	Resistor	29360405
F905	Radial	27160011A

PRINTED CIRCUIT BOARD PARTS LIST

MAIN AMPLIFIER, SWITCH AND POWER SUPPLY CIRCUIT PC BOARD (NAAF-2273/A/B)

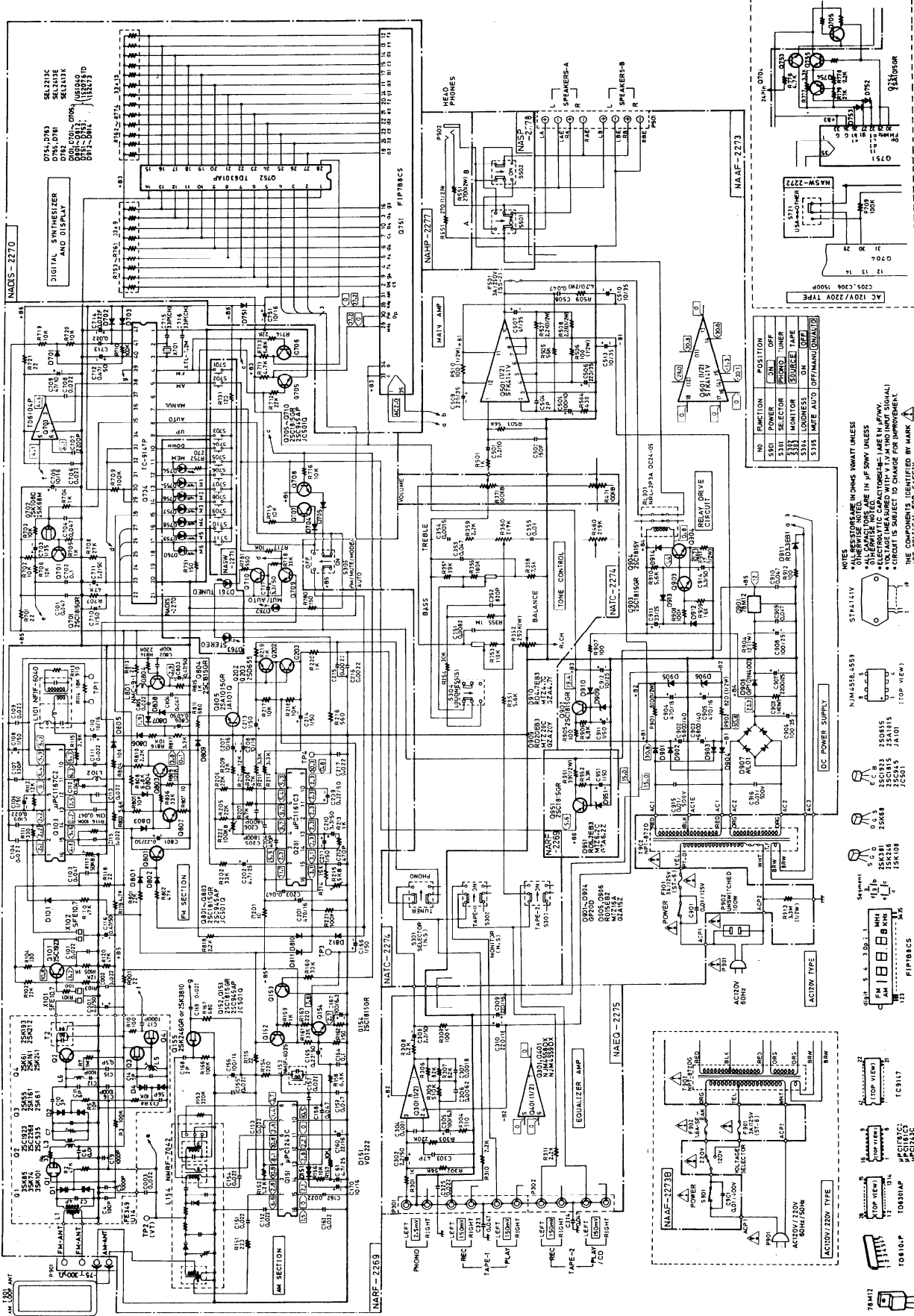
CIRCUIT NO.	PART NO.	DESCRIPTION	CIRCUIT NO.	PART NO.	DESCRIPTION
Q501, Q601	ICs	STK-4141V	D908	Diodes	GP101N4003
Q901	222780T22	78M12	D909	223880	RD20EB3,
Q902, Q903	Transistors	25C1815(GR)		2243283 or	MTZ20C or
Q904	2211255	25C1815(Y)		2241212	GZA20Y
D901-D904	Diodes	GP20DL	D910	22394333,	RD4-7EB3,
D905, D906	223845	RD15EB2,		2243133 or	MTZ4.7C or
	2239672,	MTZ16A or	D911	2242732	GZA4.7Y
	2243261 or	GZA15Z	D912-D914	2241291	RD3-3EB1
D907	2241153	WL01		223150,	US1040,
	223862			223145 or	IS2076TD or
				223124	1S2473
				Coils	
			L501, L601	231001	S-1.3B (G)

NOTE: THE COMPONENTS IDENTIFIED BY MARK ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PARTS NUMBER SPECIFIED.

(D): Only 120V model
(G): Only 220V model
(W): Only 120/220V model

SCHEMATIC DIAGRAM

-D/W models-



NO.	FUNCTION	POSITION
5301	POWER	ON OFF
5311	SELECTOR	PHONO TUNER
5321	MONITOR	SOURCE TAPE
5331	REPEAT	REPEAT
5341	TAPE	TAPE OFF/PAUSE

- NOTES:
 * COMPONENTS IDENTIFIED BY MARK Δ ARE CRITICAL FOR SAFETY.
 * ELECTROLYTIC CAPACITORS—LAKE IN P.P.W.V.
 * CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.

- STABILITY
 * 1N4001-1N4002
 * 1N4003-1N4004
 * 1N4005-1N4006
 * 1N4007-1N4008
 * 1N4009-1N4010
 * 1N4011-1N4012
 * 1N4013-1N4014
 * 1N4015-1N4016
 * 1N4017-1N4018
 * 1N4019-1N4020
 * 1N4021-1N4022
 * 1N4023-1N4024
 * 1N4025-1N4026
 * 1N4027-1N4028
 * 1N4029-1N4030
 * 1N4031-1N4032
 * 1N4033-1N4034
 * 1N4035-1N4036
 * 1N4037-1N4038
 * 1N4039-1N4040
 * 1N4041-1N4042
 * 1N4043-1N4044
 * 1N4045-1N4046
 * 1N4047-1N4048
 * 1N4049-1N4050

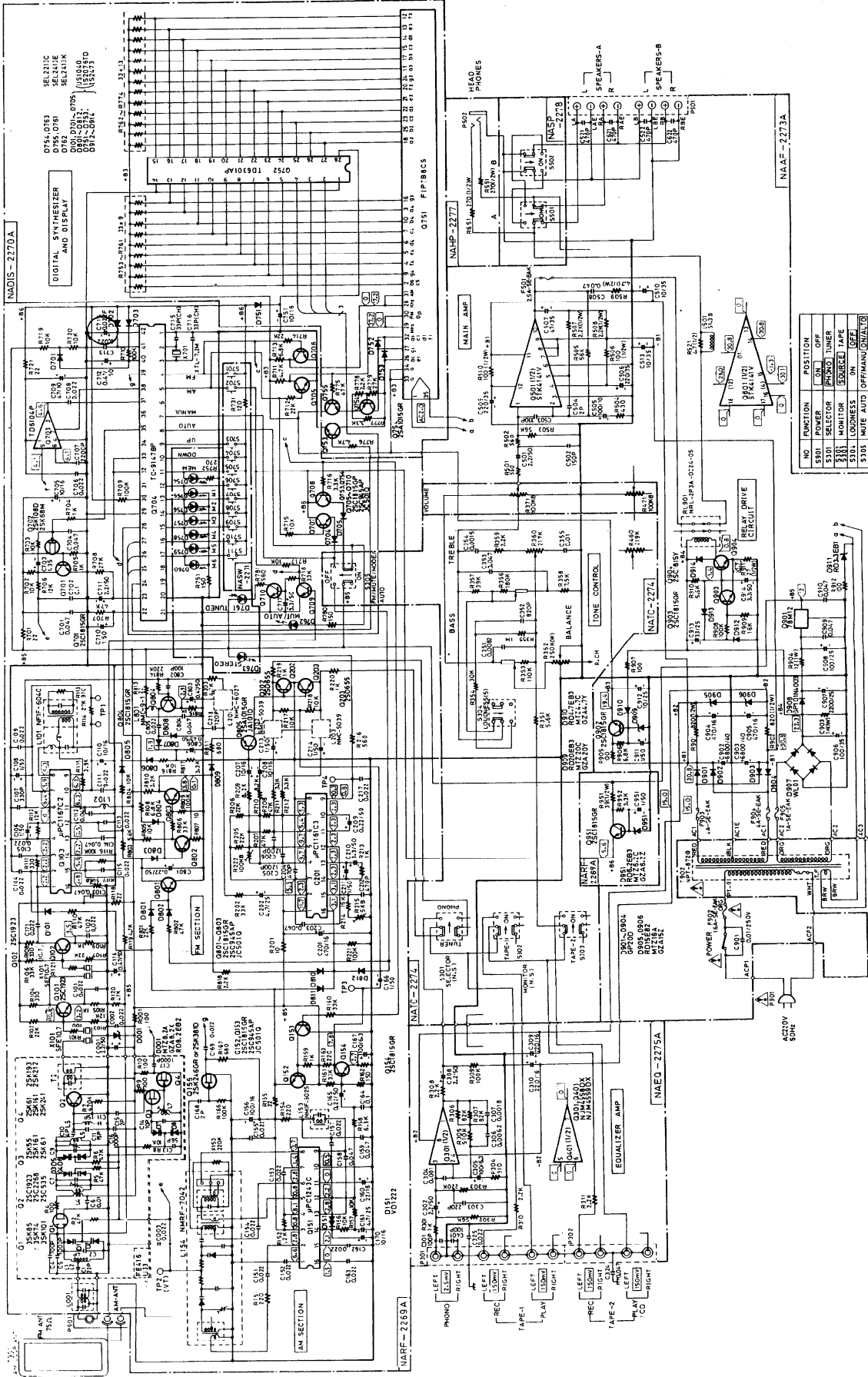
- DC POWER SUPPLY
 * 1N4001-1N4002
 * 1N4003-1N4004
 * 1N4005-1N4006
 * 1N4007-1N4008
 * 1N4009-1N4010
 * 1N4011-1N4012
 * 1N4013-1N4014
 * 1N4015-1N4016
 * 1N4017-1N4018
 * 1N4019-1N4020
 * 1N4021-1N4022
 * 1N4023-1N4024
 * 1N4025-1N4026
 * 1N4027-1N4028
 * 1N4029-1N4030
 * 1N4031-1N4032
 * 1N4033-1N4034
 * 1N4035-1N4036
 * 1N4037-1N4038
 * 1N4039-1N4040
 * 1N4041-1N4042
 * 1N4043-1N4044
 * 1N4045-1N4046
 * 1N4047-1N4048
 * 1N4049-1N4050

- AC120V/220V TYPE
 * 1N4001-1N4002
 * 1N4003-1N4004
 * 1N4005-1N4006
 * 1N4007-1N4008
 * 1N4009-1N4010
 * 1N4011-1N4012
 * 1N4013-1N4014
 * 1N4015-1N4016
 * 1N4017-1N4018
 * 1N4019-1N4020
 * 1N4021-1N4022
 * 1N4023-1N4024
 * 1N4025-1N4026
 * 1N4027-1N4028
 * 1N4029-1N4030
 * 1N4031-1N4032
 * 1N4033-1N4034
 * 1N4035-1N4036
 * 1N4037-1N4038
 * 1N4039-1N4040
 * 1N4041-1N4042
 * 1N4043-1N4044
 * 1N4045-1N4046
 * 1N4047-1N4048
 * 1N4049-1N4050

- AC120V/220V TYPE
 * 1N4001-1N4002
 * 1N4003-1N4004
 * 1N4005-1N4006
 * 1N4007-1N4008
 * 1N4009-1N4010
 * 1N4011-1N4012
 * 1N4013-1N4014
 * 1N4015-1N4016
 * 1N4017-1N4018
 * 1N4019-1N4020
 * 1N4021-1N4022
 * 1N4023-1N4024
 * 1N4025-1N4026
 * 1N4027-1N4028
 * 1N4029-1N4030
 * 1N4031-1N4032
 * 1N4033-1N4034
 * 1N4035-1N4036
 * 1N4037-1N4038
 * 1N4039-1N4040
 * 1N4041-1N4042
 * 1N4043-1N4044
 * 1N4045-1N4046
 * 1N4047-1N4048
 * 1N4049-1N4050

SCHEMATIC DIAGRAM

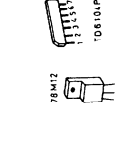
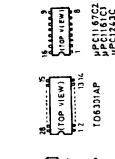
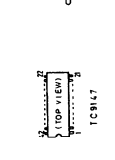
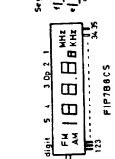
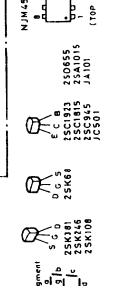
-220V model-



NO	FUNCTION	POSITION
S301	POWER	ON
S302	SELECTOR	AM/FM
S303	MONITOR	ON/OFF
S304	TAPE	ON/OFF
S305	LOUDNESS	ON/OFF
S306	MUTE	AUTO/OFF/MANUAL

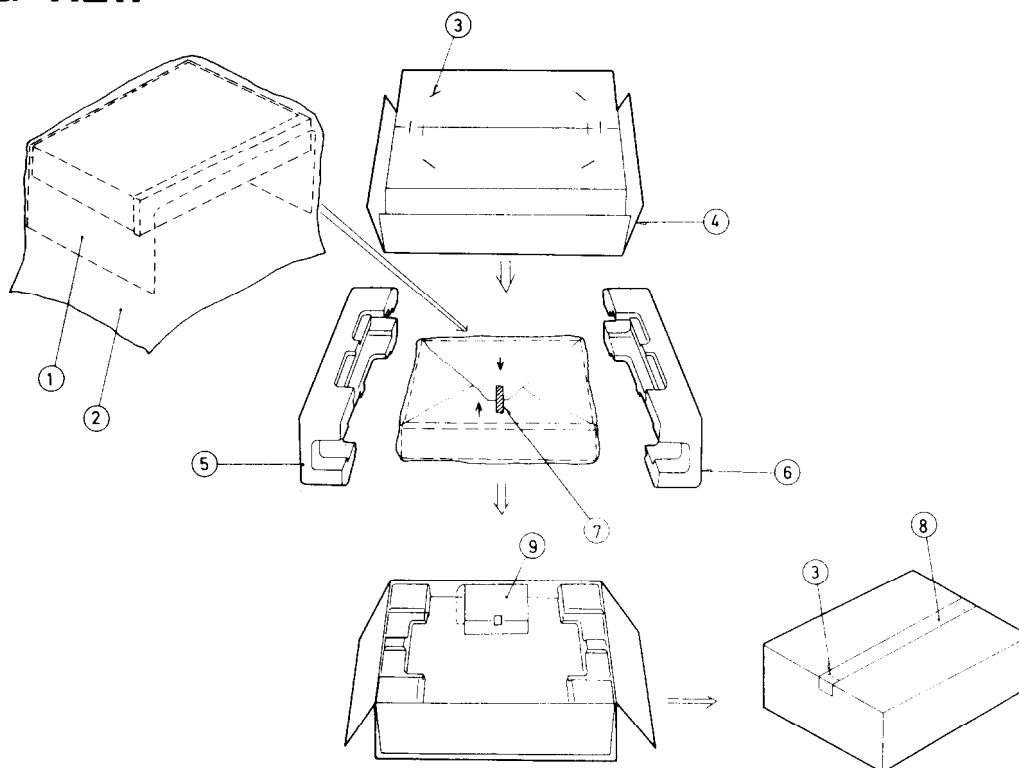
NOTES

- *ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE INDICATED
- *DIMENSIONS IN PARENTHESIS ARE IN INCHES
- *VOLTAGE MEASURED WITH V.F.M. (NO INPUT SIGNAL)
- *CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT
- *THE COMPONENTS IDENTIFIED BY MARK Δ ARE CRITICAL FOR SAFETY.



A B C D E F G

PACKING VIEW



REF. NO.	PART NO.	DESCRIPTION	
1	29095012-1	500×800mm, Protection sheet (B)	120V model
2	29100036A	550×850mm, Poly-vinyl bag	292064A FM antenna
3	282301	Sealing hook	29340851 Instruction manual
4	29051072	Master carton box (S)	29100006A 250×350mm, Poly-vinyl bag
	29051073	Master carton box (B)	220V model
5	29090690B	Pad R	292092 FM antenna
6	29090691B	Pad L	29340859 Instruction manual
7	29110032	W=15MM, Adhesive tape	29100006A 250×350mm, Poly-vinyl bag
8	260012	W=50mm, Damplon tape	Universal model
9	Accessory bag ass'y		292064A FM antenna
	U.S.A. model		29340859 Instruction manual
	292064A	FM antenna	25055040 CV-K-2, Conversion plug
	29340851	Instruction manual	29100006A 250×350mm, Poly-vinyl bag
	29365006-6	Warranty card	
	29358002C	Service station list	
	29100006A	250×350mm, Poly-vinyl bag	

(B):Only black model
(S):Only silver model