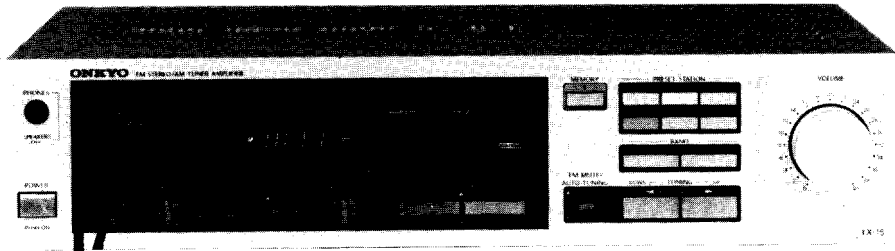


# ONKYO SERVICE MANUAL

## QUARTZ SYNTHESIZED TUNER AMPLIFIER MODEL TX-15/TX-100



### Silver and black models

UD, UDN, BUD, BUDN	120V AC, 60Hz
UG, TX-100, BUG, TX-100B	220V AC, 50Hz
UW, BUW	120 or 220V AC, 50/60Hz
UQA	240V AC, 50Hz

### SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK  $\Delta$  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: 23 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 40 watts at 4 ohms, 1kHz (DIN)  
2 x 35 watts at 8 ohms, 1kHz (DIN)

Continuous Power Output: 2 x 30 watts at 4 ohms, 1kHz (DIN)  
2 x 25 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:  $\pm$ 8dB at 100Hz  
Treble:  $\pm$ 8dB at 10kHz

Loudness (  $\pm$ 30dB): +7dB at 70Hz, +5dB at 10kHz

**ONKYO**  
**AUDIO COMPONENTS**

## TUNER SECTION

<b>FM:</b>	<b>120V model</b>	<b>220/240V model</b>
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 $\mu$ V	Mono: 12.4 dBf, 2.3 $\mu$ V (IHF) 1.2 $\mu$ V, 75 $\Omega$ (DIN)
50 dB Quieting Sensitivity:	Stereo: 19.2 dBf, 5.0 $\mu$ V Mono: 18.2 dBf, 4.5 $\mu$ V Stereo: 38.2 dBf, 4.5 $\mu$ V	Stereo: 2.5 $\mu$ V, 75 $\Omega$ Mono: 2.2 $\mu$ V, 75 $\Omega$ Stereo: 22 $\mu$ V, 75 $\Omega$
Capture Ratio:	1.5 dB	1.5 dB
Image Rejection Ratio:	40 dB	85 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
Tuning Level	17.2 dBf, 4 $\mu$ V	17.2 dBf, 2 $\mu$ V
Stereo Threshold:	17.2 dBf, 4 $\mu$ V	17.2 dBf, 2 $\mu$ V

### AM:

Tuning Range:	520 – 1,710 kHz (10 kHz steps)	522 – 1,611 kHz (9 kHz steps)
Usable Sensitivity:	30 $\mu$ V	30 $\mu$ 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: 4 TR: 24 ICs: 9 Diodes: 49	EETs: 4 TR: 28 ICs: 9 Diodes: 51
Dimensions (WxHxD):	418 x 99 x 319 mm (16 1/2" x 3 15/16" x 12 1/2")	418 x 99 x 319 mm (16 1/2" x 3 15/16" x 12 1/2")
Weight:	5.7 kg., 12.6 lbs.	5.7 kg., 12.6 lbs.

Specifications and features are subject to change without notice.

## TABLE OF CONTENTS

Specifications . . . . .	1	PC board parts list/view . . . . .	14
Service procedures . . . . .	3	Indication circuit . . . . .	14
Exploded view . . . . .	4	Switch circuit . . . . .	14
Parts list . . . . .	5	FM/AM tuner . . . . .	17
Circuit description . . . . .	6	Tone control . . . . .	21
Synthesizer and controller operation . . . . .	6	Fuse terminal . . . . .	21
Auto-search tuning circuit . . . . .	7	Equalizer ampli. . . . .	22
PLL tuned circuit . . . . .	8	Volume/Headphone . . . . .	22
Frequency indicator circuit . . . . .	8	Power ampli. and rectifier . . . . .	25
Adjustment procedures . . . . .	10	Schematic diagrams . . . . .	
Block diagram of ICs . . . . .	13	Tuner (G/Q/W models) . . . . .	15
		Tuner (D model) . . . . .	19
		Amplifier (G/Q models) . . . . .	23
		Amplifier (D/W models) . . . . .	27
		Block diagram . . . . .	29
		Packing view . . . . .	30

3-4-85

**TX-15**

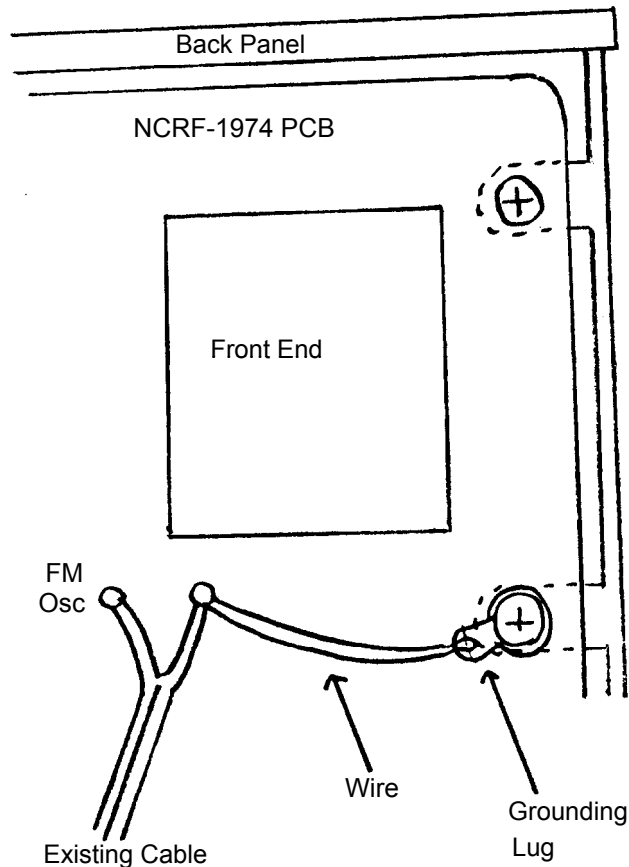
## TX-15 Service Bulletin

(Please enclose this bulletin in your TX-15 Receiver service manual.)

Problem: A loud hum or buzzing noise when listening to AM or FM.

Cause: Loose grounding screws on main printed circuit board NCRF-1974.

Solution: Add an additional grounding wire with lug from the ground post for the FM OSC cable to the chassis ground screw nearest it. Please see the below sketch.



# SERVICE PROCEDURES

# TX-15

## 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) and Q (240V) models

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, F906	252070	1A-SE-EAK, Secondary
F907	252088	250mA-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 (D 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.

Specifications:  $3.3M\Omega \pm 0.3M\Omega$

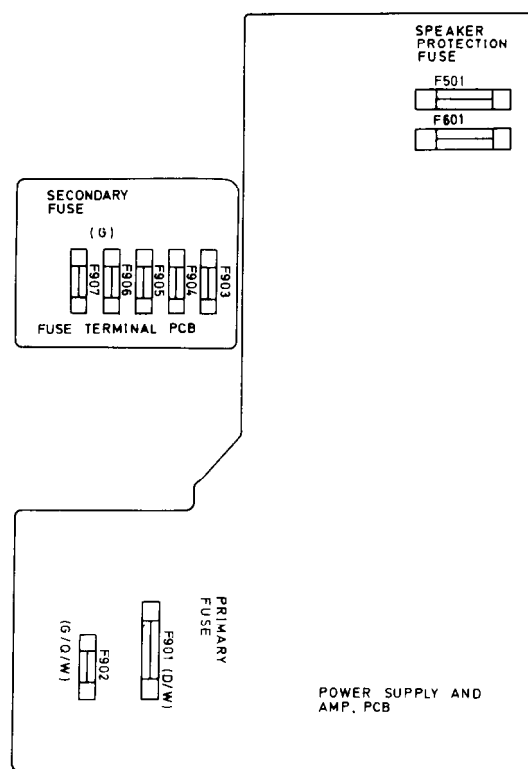
## 3. Check of pc boards

To allow the pc board to be checked from the underside of the chassis, the bottom board has two doors.

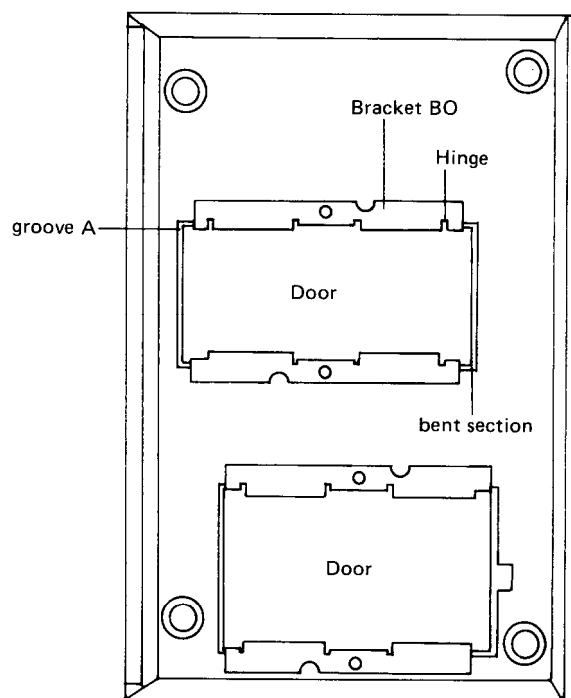
At each one, groove A and the bent section are held in place by bracket BO. Bracket BO serves as a backup part to attach the door to the chassis if the bent section hinge is broken off. When checking the pc board, remove the two BO brackets and bend them about  $90^\circ$ . Be careful because if they are bent too far, attach the door to the chassis using bracket BO.

## 4. Change of AM scan step (W model)

W models are equipped with a switch to change the AM scan step frequency from 9kHz to 10kHz. The switch is located on the back panel. This switch is set to 9kHz at the factory; change to 10kHz if gives better results in your locality.

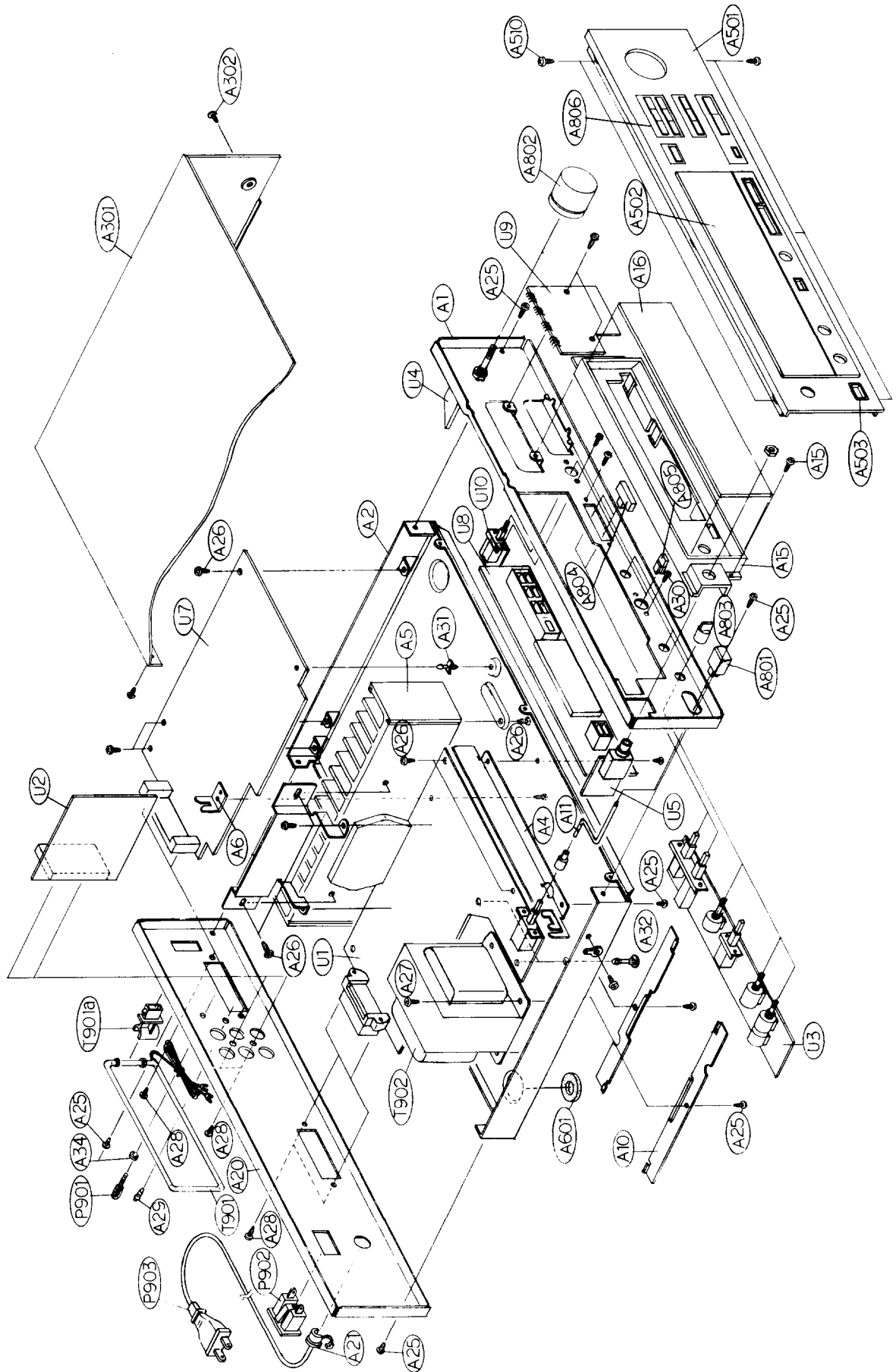


(fig. 1)



(fig. 2)

**EXPLODED VIEW**



# PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
A1	27110217A	Front bracket	Front panel ass'y (TX-100B)	A501	18112121	Front panel ass'y (TX-100B)	U1	18088568	NAAF-1968, Power amplifier and rectifier circuit pc board ass'y (D)
A2	27100052	Chassis	Clear plate		28191244	Clear plate			
A4	27130350	Bracket, pc board	Guide, power		27267215	Guide, power			
A5	27160142	Radiator	Knob ass'y	A510	28321480	Knob ass'y	U1	18094568A	NAAF-1968a, Power amplifier and rectifier circuit pc board ass'y (G/Q/TX-100)
A6	27140893	Bracket, pc board	3TTS+6B (BC), Tapping screw	A601	834430068	3TTS+6B (BC), Tapping screw	U1	18090568B	NAAF-1968b, Power amplifier and rectifier circuit pc board ass'y (W)
A8	27140908	Bracket BO	Leg	A801	27175011C	Leg			
A10	28320135	Connector	Knob, power (S)	A802	28320852	Knob, power (S)	U2	18088569	NAEQ-1969, Equalizer amplifier pc board ass'y (D/W)
A11	27260144	Shaft	Knob, volume (B)	A803	28321160	Knob, volume (B)			
A15	27190265	Holder	Knob, volume (S)	A804	28320543-1	Knob, volume (S)	U2	18094569A	NAEQ-1969a, Equalizer amplifier pc board ass'y (G/Q/TX-100)
A16	28133096	Back plate	Knob, tone (B)	A805	28321473	Knob, tone (B)			
A20	27120573A	Back panel (D)	Knob, tone (S)		28321474	Knob, tone (S)			
	27120574	Back panel (G)	Knob, selector (S)		28321475	Knob, selector (S)			
	27120580	Back panel (TX-100)	Knob, push (B)		28321476	Knob, push (B)			
	27120575	Back panel (W)	Knob, push (S)		28321477	Knob, push (S)			
	27120635	Back panel (Q)	3A (SS-2), Speaker protection fuse (D/W)		28321478	Knob, push (B)			
A21	270280	SR-4K-4, Strainrelief	3A (SS-2), Speaker protection fuse (D/W)		252006	3A (SS-2), Speaker protection fuse (D/W)	U3	18088570	NATC-1970, Tone control pc board ass'y
A25	834430068	3TTS+6B (BC), Tapping screw	2. 5A-SE-EAK, Speaker protection fuse (G/Q/TX-100)		F501, F601	2. 5A-SE-EAK, Speaker protection fuse (G/Q/TX-100)	U4	18088571	NAVR-1971, Volume control pc board ass'y
A26	831430088	3TTW+8B (BC), Tapping screw	3A (ST-6), Primary fuse (D/W)		252075	3A (ST-6), Primary fuse (D/W)	U5	18088572	NAHP-1972, Headphone terminal pc board ass'y
A27	838440089	4TTB+8C (BC), Tapping screw	1. 6A-SE-EAK, Primary fuse (G/Q/TX-100/W)		252048	1. 6A-SE-EAK, Primary fuse (G/Q/TX-100/W)	U6	18094573	NAFU-1973, Fuse terminal pc board ass'y (G/Q/TX-100)
A28	834430108	3TTS+10B (BC), Tapping screw	4A-SE-EAK, Secondary fuse (G/Q/TX-100)		252073	4A-SE-EAK, Secondary fuse (G/Q/TX-100)	U7	18088574	NARF-1974, FM/AM tuner pc board ass'y (D)
A29	834230108	3TTS+10B (Ni), Nickel screw	1A-SE-EAK, Secondary fuse (G/Q/TX-100)		F901	1A-SE-EAK, Secondary fuse (G/Q/TX-100)	U7	18094574A	NARF-1974a, FM/AM tuner pc board ass'y (G/Q/TX-100)
A30	82143006	3P+6FN (BC), Pan head screw	250mA-SE-EAWK, Secondary fuse (G/Q/TX-100)		F902	250mA-SE-EAWK, Secondary fuse (G/Q/TX-100)	U7	18090574B	NARF-1974b, FM/AM tuner pc board ass'y (W)
A31	27190062	Holder	Ground terminal		F903, F904	Ground terminal	U8	18088575	NADIS-1975, Indication pc board ass'y (D)
A32	27190266	Holder	NSCT-2P15, AC outlet (D)		F905, F906	NSCT-2P15, AC outlet (D)	U8	18094575A	NADIS-1975a, Indication pc board ass'y (G/Q/TX-100/W)
A33	27140889	Bracket, fuse (G/TX-100)	AS-UC-4#18, Power supply cable (D)		F907	AS-UC-4#18, Power supply cable (D)	U9	18088576	NASW-1976, Switch pc board ass'y
A34	87613010	W3x10F, Washer	AS-CEE, Power supply cord (G/TX-100/W)		252088	AS-CEE, Power supply cord (G/TX-100/W)	U10	18088577	NASW-1977, Muting switch pc board ass'y
A35	838430068	3TTB+6B (BC), Tapping screw	AS-SAA, Power supply cord (Q)		25060044	AS-SAA, Power supply cord (Q)	U11	18090578	NASW-1978, Band selector switch pc board ass'y (W)
A301	28184144	Top cover (S)	NPS-1258P, Voltage selector switch (W)		25050046	NPS-1258P, Voltage selector switch (W)			
A302	28184228	Top cover (B)	NMA-3052, AM loop antenna		253112	NMA-3052, AM loop antenna			
A302	834430068	3TTS+6B (BC), Tapping screw	Antenna holder		253083-1	Antenna holder			
A501	18088121	Front panel ass'y (S)	NPT-836D, Power transformer (D) <i>120V AC</i>		230785A	NPT-836D, Power transformer (D)			
	28191243	Clear plate	NPT-836G, Power transformer (G/TX-100)		230786	NPT-836G, Power transformer (G/TX-100)			
	27267215	Guide, power	NPT-836DG, Power transformer (W)		230784	NPT-836DG, Power transformer (W)			
	28321479	Knob ass'y	NPT-836Q, Power transformer (Q)		230838	NPT-836Q, Power transformer (Q)			
A501	18108121	Front panel ass'y (B)							
	28191244	Clear plate							
	27267215	Guide, power							
	28321480	Knob ass'y							
A501	18092121	Front panel ass'y (TX-100)							
	28191243	Clear plate							
	27267215	Guide, power							
	28321479	Knob ass'y							

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  ARE CRITICAL FOR FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PARTS NUMBER SPECIFIED.

# CIRCUIT DESCRIPTIONS

## 1. Synthesizer and controller operation

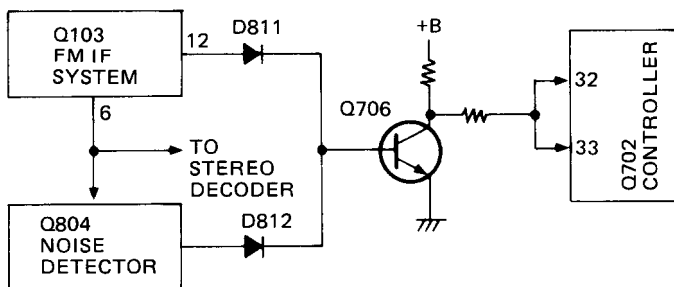
Pin No.	Symbol	Terminal	Description
1	GND	Ground	
2	XT	X'tal	Connected to the 7.2MHz crystal oscillator for the reference frequency.
3	XT		
4	FM	FM band specification input	Mutual reset type, performs switching of each band, FM/MW/LW.
5	MW	MW band specification input	
6	LW	LW band specification input	
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.
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.
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 Q703 and Q704. The output from both terminals is the same, but only DO1 is used.
35	DO2		
36	TEST	Test terminal	Test mode at the high level.
37	FM IN	FM programmable counter input	Connect to the prescaler output (Pin3 of Q701)
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 (C715) for memory preservation.

table 1.

E1 (Pin 30)	E2 (Pin 29)	Regin	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 ~ 1 710 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

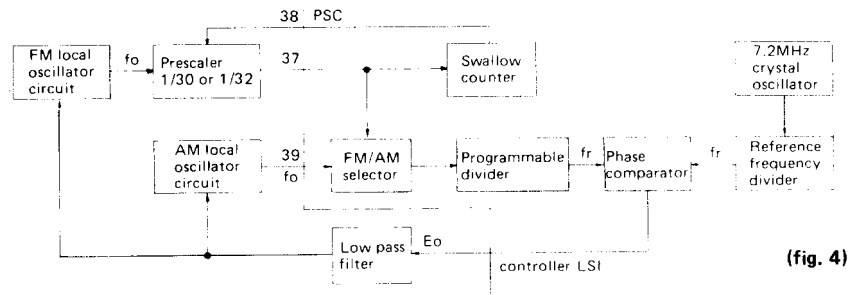
## 2. Auto-search tuning circuit



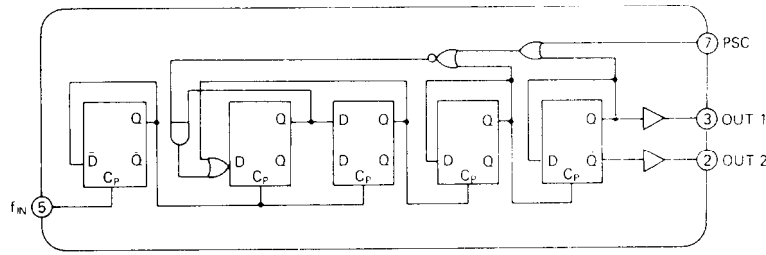
During FM reception, this is operated by the IF level detection and zero point detection circuits included in the FM IF system IC of Q103 and by the noise component detection circuit of Q804. When a station is tuned, the output of all outputs go to the low level so Q706 goes from on to off, causing pins 32 and 33 of the controller IC to go to the high level to complete auto search tuning.



### 3. PLL tuned circuit



(fig. 4)



TD6104P (P rescaler)

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

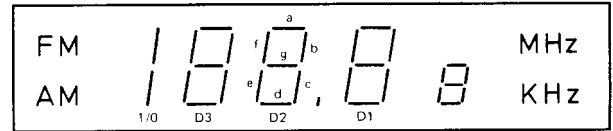
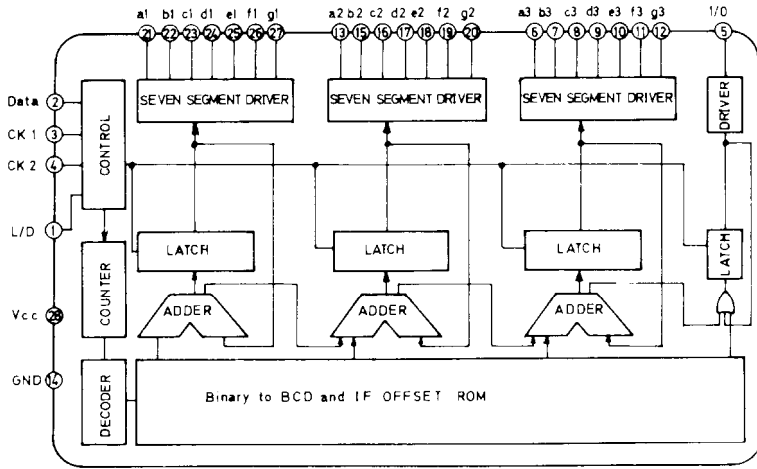
The pulse swallow method is used in the prescaler of this unit. In this type of prescaler, a supplementary number

(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



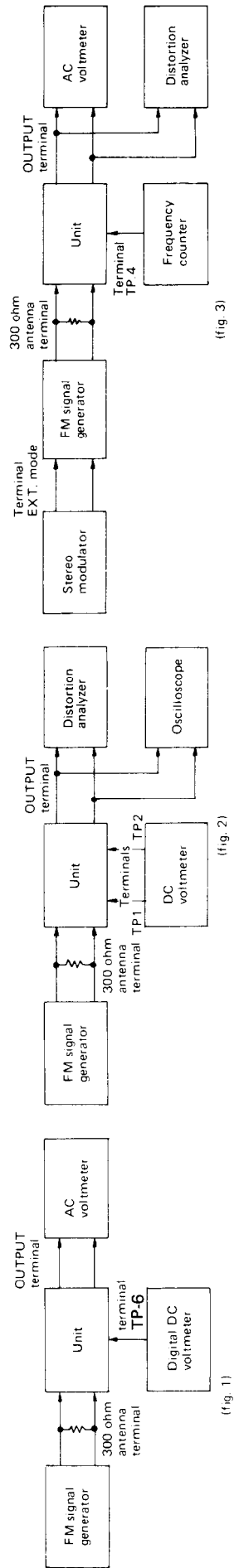
**TD6301AP block diagram**

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	1/0	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

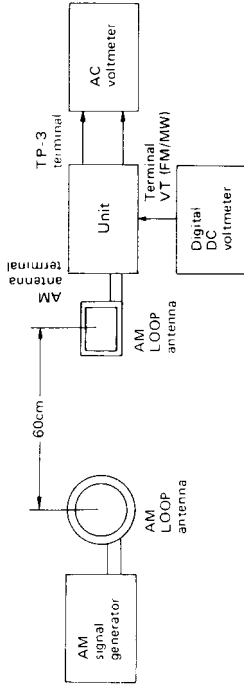
Item	Step	Connection of instrument	FM SG output	Stereo modulator output	Turning dial setting	Output indicator	Adjustment	Adjust for	Remarks
FM RF	1	Fig. 1	-	-	87.50 MHz	Digital DC voltmeter	LO	1.5V ± 0.3V	(G/Q models)
	2	Fig. 1	107.9 MHz 1 kHz, 75 kHz devi.	-	107.90 MHz	AC voltmeter	TC1, TC2	Maximum output	
FM RF	1	Fig. 1	-	-	87.5 MHz	Digital DC voltmeter	LO	1.5V ± 0.3V	(D/W models)
	2	Fig. 1	107.9 MHz 1 kHz, 75 kHz devi.	-	107.9 MHz	AC voltmeter	TC1	Maximum output	
FM IF	1	Fig. 2	98.1 MHz 1 kHz, 75 kHz devi. 65 dBf (60 dB)	-	98.1 MHz	DC voltmeter	L101 1st coil	0V	Repeat the steps 1 and 2 until no further adjustment is necessary
	2	Fig. 2	98.1 MHz 1 kHz, 75 kHz devi. 65 dBf (60 dB)	-	98.1 MHz	Frequency counter	L101 2nd coil	Minimum	
VCO		Fig. 3	98.1 MHz 1 kHz, 75 kHz devi. 65 dBf (60 dB)	-	98.1 MHz	Distortion analyzer	R213	19 kHz ± 19 Hz	Remove the frequency counter after adjustment
Distortion		Fig. 3	98.1 MHz 65 dBf (60 dB) Ext. modulation	L+R 1 kHz	98.1 MHz	Distortion analyzer	T2	Minimum	
Muting level	1	Fig. 2	98.1 MHz 17.2 dBf (12 dB) 1 kHz, 75 kHz devi.	-	98.1 MHz	Oscilloscope	R120	Signal output	Muting switch to on.
	2		98.1 MHz 16.2 dBf (11 dB) 1 kHz, 75 kHz devi.	-				No output	



## AM section

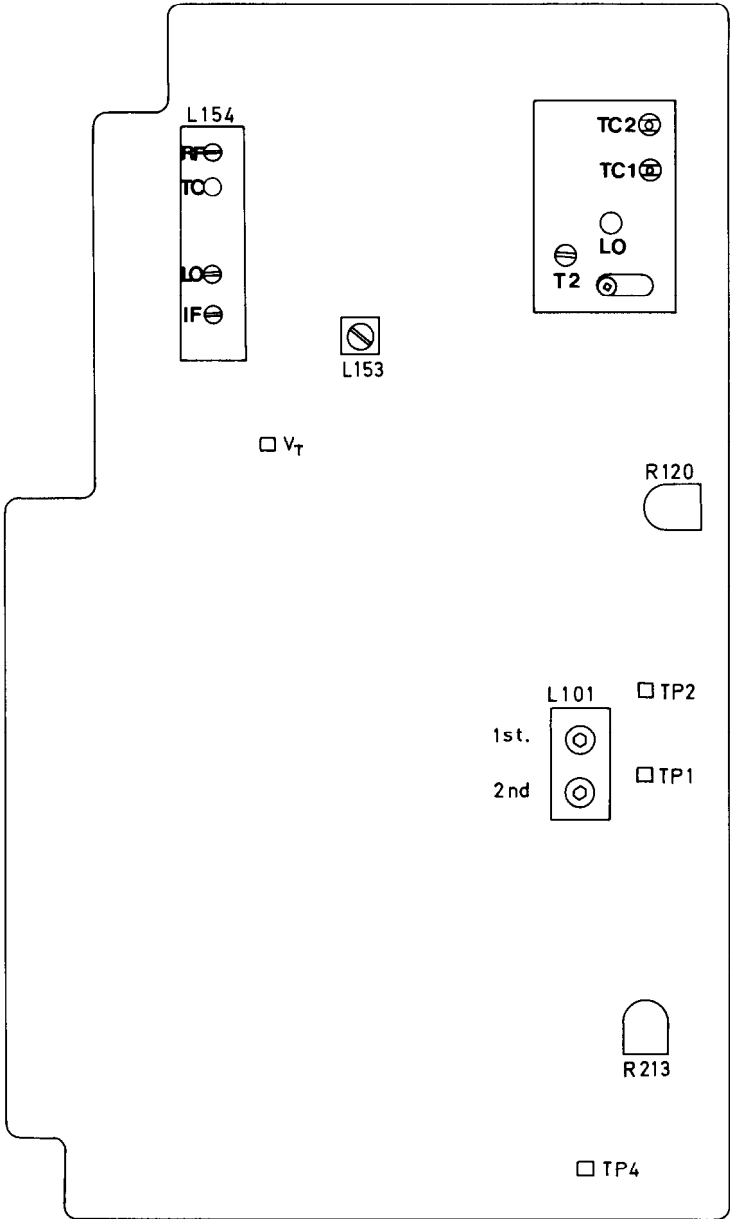
### 120V model

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	



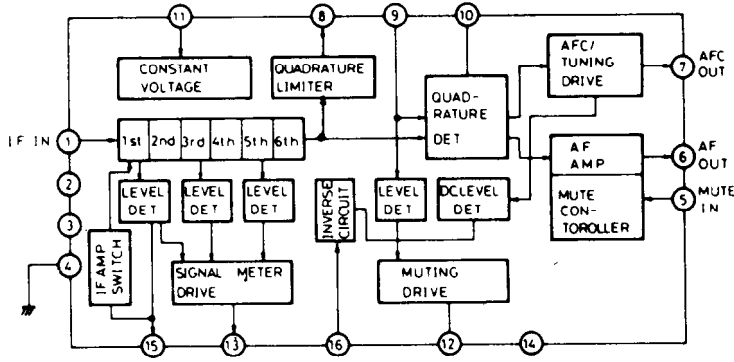
### Other models

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	



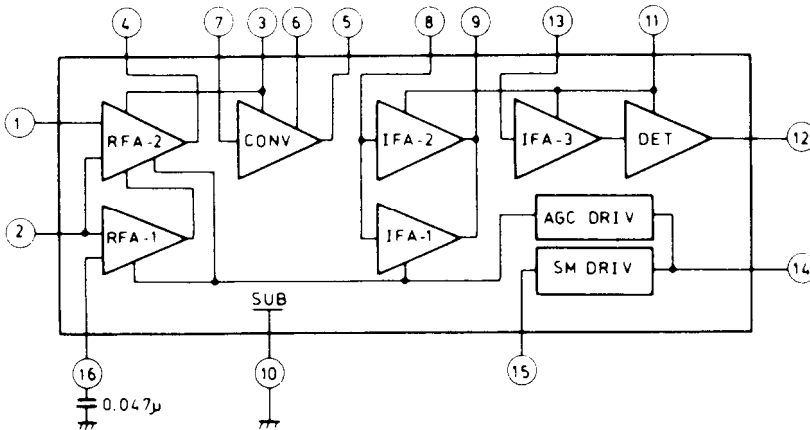
# BLOCK DIAGRAM OF ICS

**μPC1267C (FM IF system)**

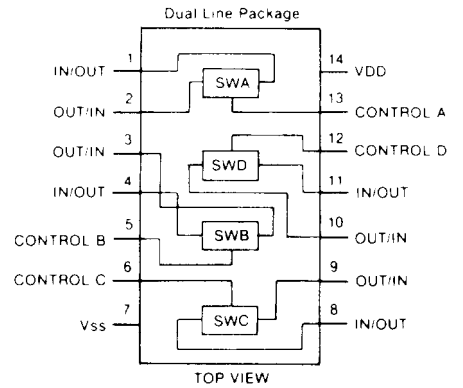


1. IF signal input
2. IF amplifier switch input  
H level: Off
3. Muting switch input
4. Composite signal output
5. AFC output
6. IF amplifier output
7. 10.7MHz input
8. Reference voltage
9. Power supply
10. Muting output  
Tuned: L level
11. Signal strength output
12. AGC output
13. Muting level

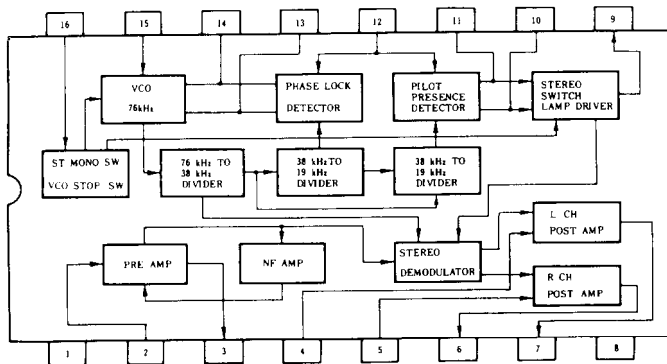
**μPC1243C (AM radio system)**



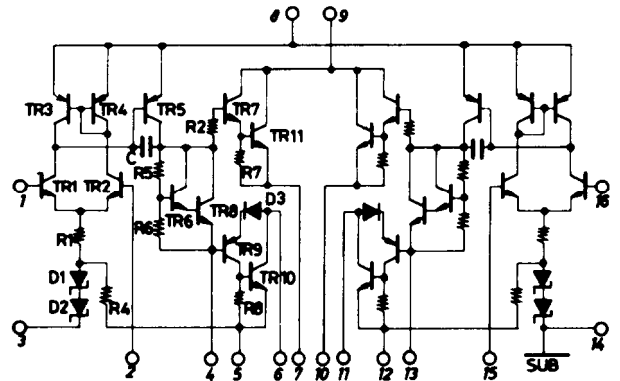
**TC4066BP (Analogue switch)**



**μPC1161C3 (Stereo decoder)**



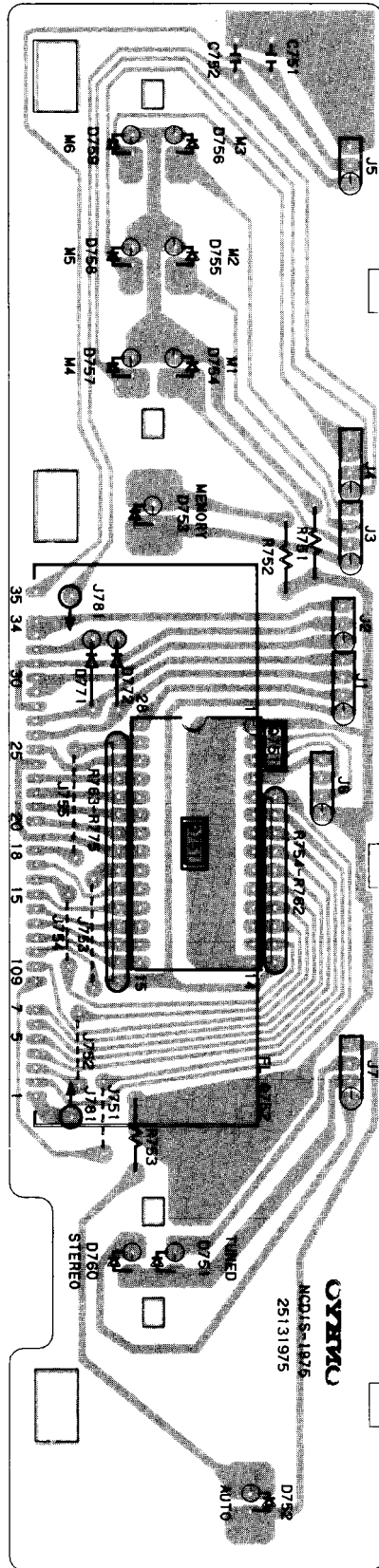
**STK-459 (Power amplifier)**



# PRINTED CIRCUIT BOARD-PARTS LIST

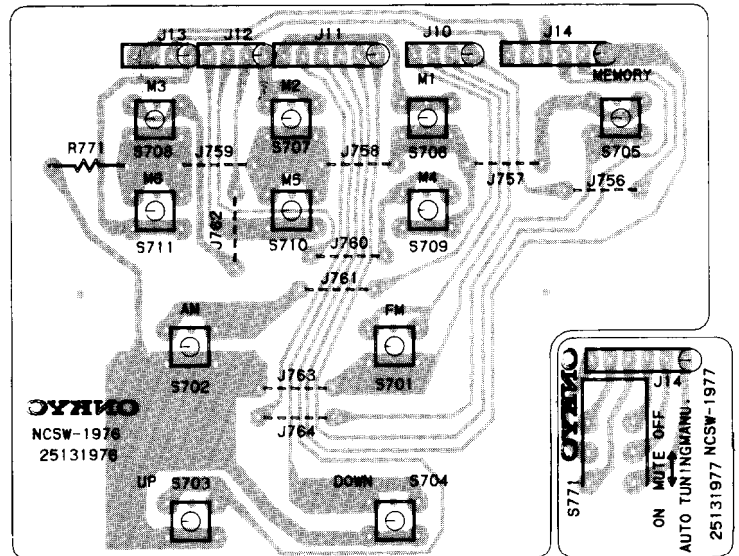
# TX-15

## INDICATION CIRCUIT (NADIS-1975/a)



(D): Only 120V model  
 (G): Only 220V or 240V models  
 (W): Only 120/220V model

## SWITCH (NASW-1976) MUTING SWITCH (NASW-1977)



## INDICATION PC BOARD (NADIS-1975)

CIRCUIT NO.	PART NO.	DESCRIPTION
	IC	
Q751	222673	TD6301AP
	Fluorescent indicator tube	
Q752	212016	FIP7B8CS
	Diodes	
D771, D772	223145	1S2076TD (G/W)
	LEDs	
D751	225137	SEL2413E
D752	225060	SEL1310E
D753	225126	GL3PR1
D754-D759	225137	SEL2413E
D760	225142	SEL2913K
	Resistors	
R754-R762	49121333509	33kΩx9, 1/8W, Network
R763-R775	49121333513	33kΩx13, 1/8W, Network
	Holders	
	27190268	LED-2
	27190267	LED-7
	Spacer	
	27270071	
	Cushion	
	28140538	t3.5x10x40

## SWITCH PC BOARDS (NASW-1976/77)

CIRCUIT NO.	PART NO.	DESCRIPTION
S701-S711	25035275 or 25035389	NPS-111-S239 or NPS-111-S353, Push switch
S771	25035372	NPS-122-L336, Push switch

## BAND SELECTOR SWITCH PC BOARD (NASW-1978) (Only W model)

CIRCUIT NO.	PART NO.	DESCRIPTION
S751	25065147	NSS-4266

# TX-15

## PRINTED CIRCUIT BOARD PARTS LIST/VIEW FROM BOTTOM SIDE

FM/AM TUNER (NARF-1974/a/b)

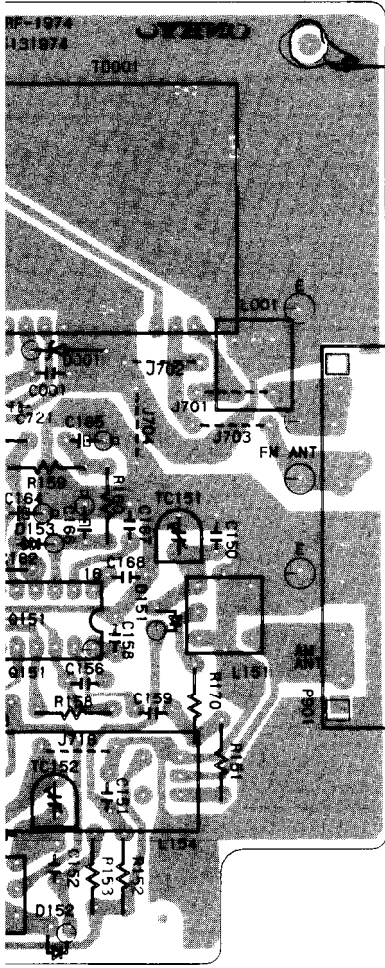
### FM/AM TUNER PC BOARD (NARF-1974/a/b)

CIRCUIT NO.	PART NO.	DESCRIPTION
	<b>Front end</b>	
TU001	240061	FE349U14 (D/W)
	240059	FE416U33 (G)
	<b>ICs</b>	
Q103	222803	$\mu$ PC1267C
Q151	222804 or	$\mu$ PC1168C or
	222629	$\mu$ PC1243C
Q201	222678	$\mu$ PC1161C3
Q701	222675	TD6104P
Q702	222674	TC9147P
	<b>Transistors</b>	
Q101	2211723	2SC1923 (O)
Q102	2211723	2SC1923 (O) (G)
Q152	2211945 or	2SK246 (GR) or
	2212304	2SK381 (D)
Q153	2211255 or	2SC1815 (GR) or
	2210746	2SC945A (P)

CIRCUIT NO.	PART NO.	DESCRIPTION
Q154, Q155	2212485, 2211255 or 2210746	JC501Q, 2SC1815 (GR) or 2SC945A (P)
Q202, Q203	2211706 or 2211705	2SD655 (F) or 2SD655 (E)
Q703	2211293 or 2212294	2SK68 (M) or 2SK108 (D)
Q704	2211255	2SC1815 (GR)
Q705-Q710	2212485,	JC501Q,
Q801-Q803	2211255 or 2210746	2SC1815 (GR) or 2SC945A (P)
Q711	2212495 or 2211455	JA101Q or 2SA1015 (GR)
Q712, Q713	2212485, 2211255 or 2210746	JC501Q, 2SC1815 (GR) or 2SC945A (P) (G/W)
Q714	2212495 or 2211455	JA101Q or 2SA1015 (GR) (G/W)
Q804	2211255	2SC1815 (GR)
Q951, Q952	2211255	2SC1815 (GR)



(D): Only 120V model  
 (G): Only 220V or 240V models  
 (W): Only 120/220V model



CIRCUIT NO.	PART NO.	DESCRIPTION
	<b>Diodes</b>	
D001	2243192, 2242865 or 2239552	MTZ8.2B, EQA02-08B or RD8.2EB2 (G/W)
D101	223150, 223133 or 223145	US1040, DS442X or 1S2076TD
D153	4000068	VD1222
D701-D706	233150,	US1040,
D708	233133 or 223145	DS442X or 1S2076TD
D707	2243292, 2242991 or 2239752	MTZ22B, EQA02-22A or RD22EB2
D709, D953	2243133, 2242834 or 2239433	MTZ4.7C EQA02-05A or RD4.7EB3
D801-D805 D808-D812	233150, 233133 or 223145	US1040, DS442X or 1S2076TD

CIRCUIT NO.	PART NO.	DESCRIPTION
D806, D807	223133 or 223145	DS442X or 1S2076TD
D951	2243021 or 2239792	EQA02-28A or RD27E-B3
D952	2243163, 2242848 or 2239493	MTZ6.2C, EQA02-06E or RD6.2EB3
	<b>Transformers</b>	
L101	233270	NFIF-6040
L153	232095	NMIF-6025
	<b>Coils</b>	
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
	<b>RF. block</b>	
L154	233311	NMRF-7036
	<b>Filters</b>	
X101, X102	3010071	SFE10.7MA5 (D/W)
X101	3010043	SFE10.7MM (G)
X102	3010070	SFE10.7MS3GY-A (G)
	<b>X'tal</b>	
X701	3010073	XTL-7.2M
	<b>Capacitors</b>	
C107, C109	352780109	1 $\mu$ F, 50V, Elect.
C110	352741009	10 $\mu$ F, 16V, Elect.
C116	352784799	0.47 $\mu$ F, 50V, Elect.
C157	352741019	100 $\mu$ F, 16V, Elect.
C164	352741009	10 $\mu$ F, 16V, Elect.
C165	352750479	4.7 $\mu$ F, 25V, Elect.
C166	352741009	10 $\mu$ F, 16V, Elect.
C170	352782299	0.22 $\mu$ F, 50V, Elect.
C171	352780109	1 $\mu$ F, 50V, Elect.
C172	352721019	100 $\mu$ F, 6.3V, Elect.
C202	352744719	470 $\mu$ F, 16V, Elect.
C203	352750479	4.7 $\mu$ F, 25V, Elect.
C207, C208	352741009	10 $\mu$ F, 16V, Elect.
C210	352782299	0.22 $\mu$ F, 50V, Elect.
C211	352780339	3.3 $\mu$ F, 50V, Elect.
C212	352780109	1 $\mu$ F, 50V, Elect.
C213	370134714	470pF $\pm$ 5%, 100V, APS
C215, C216	352780229	2.2 $\mu$ F, 50V, Elect.
C705	352734709	47 $\mu$ F, 10V, Elect.
C707	395160107	1 $\mu$ F, 35V, Tantalum
C710	352780109	1 $\mu$ F, 50V, Elect.
C711	352780229	2.2 $\mu$ F, 50V, Elect.
C713	3020018	0.047F, 5V, Super
C714	352784799	0.47 $\mu$ F, 50V, Elect.
C715	352780339	3.3 $\mu$ F, 50V, Elect.
C719	352741009	10 $\mu$ F, 16V, Elect.
C804, C806	352784799	0.47 $\mu$ F, 50V, Elect.
C807	352782299	0.22 $\mu$ F, 50V, Elect.
C951, C952	352780109	1 $\mu$ F, 50V, Elect.
C954	352724719	470 $\mu$ F, 6.3V, Elect.
	<b>Resistors</b>	
R120	5215003	N08HR20KBC, Semi-fixed
R213	5215044	N08HR5KBC, Semifixed
R953	441523904F	39 $\Omega$ , 1/2W, Metal oxide film
	<b>Terminal</b>	
P901	25060085	NTM-4PDMN29, Antenna (D/W)
	25060087	NTM-2PDMN31 (G)

A B C D E F G

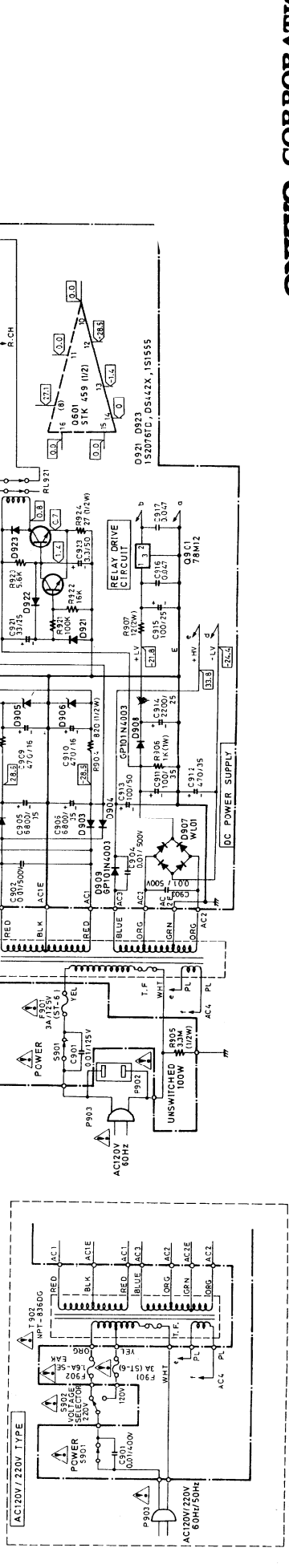
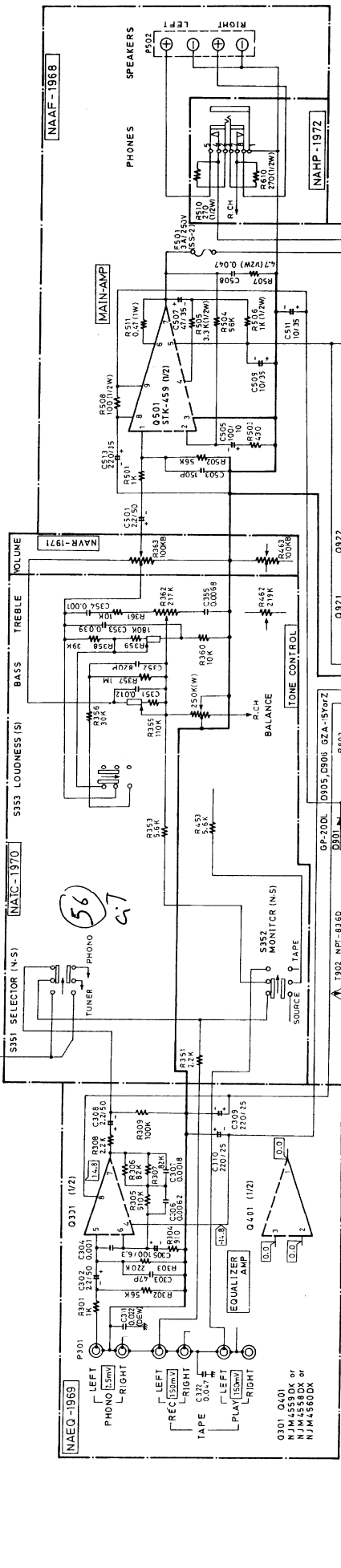
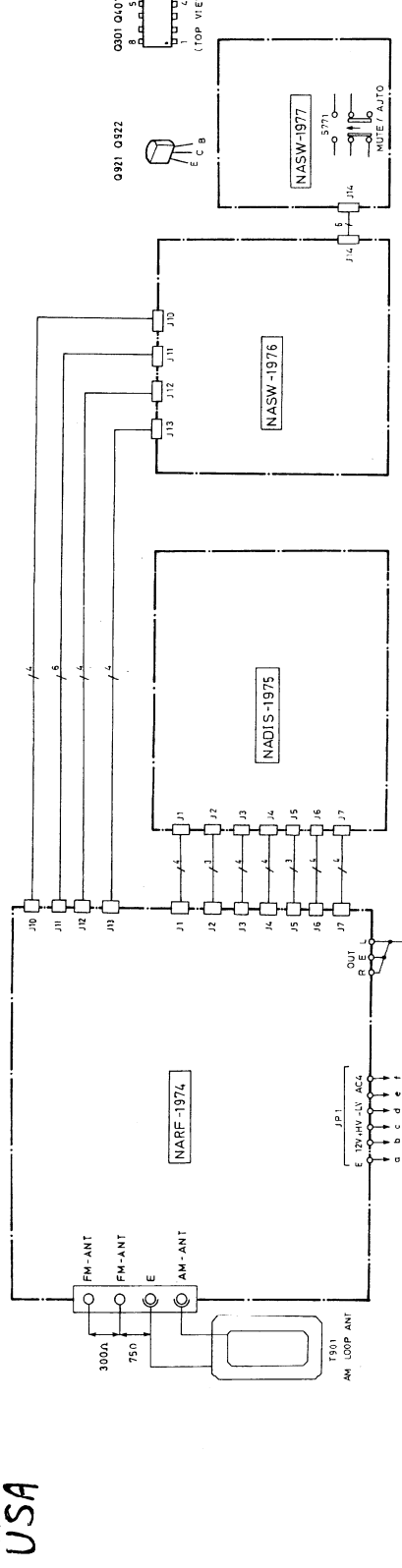
# SCHEMATIC DIAGRAM

## AMPLIFIER SECTION - D/W models -

### USA

NOTES:  
 \* ALL RESISTORS ARE IN OHMS UNLESS OTHERWISE NOTED.  
 \* ALL CAPACITORS ARE IN  $\mu F$  UNLESS OTHERWISE NOTED.  
 \* ELECTROLYTIC CAPACITORS ARE IN  $\mu F$  UNLESS OTHERWISE NOTED.  
 \* VOLTAGE IS MEASURED WITH A 1.5 M $\Omega$  INPUT RESISTANCE.  
 \* CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.  
 \* THE COMPONENTS IDENTIFIED BY MARK  $\Delta$  ARE CRITICAL FOR SAFETY.

NO.	FUNCTION	POSITION
S901	POWER	ON OFF
S351	SELECTOR	PHONO TUNER
S352	MONITOR	SOURCE TAPE
S353	LOUDNESS	ON OFF
S771	MUTE / AUTO	OFF/MANU [ON/AUTO]



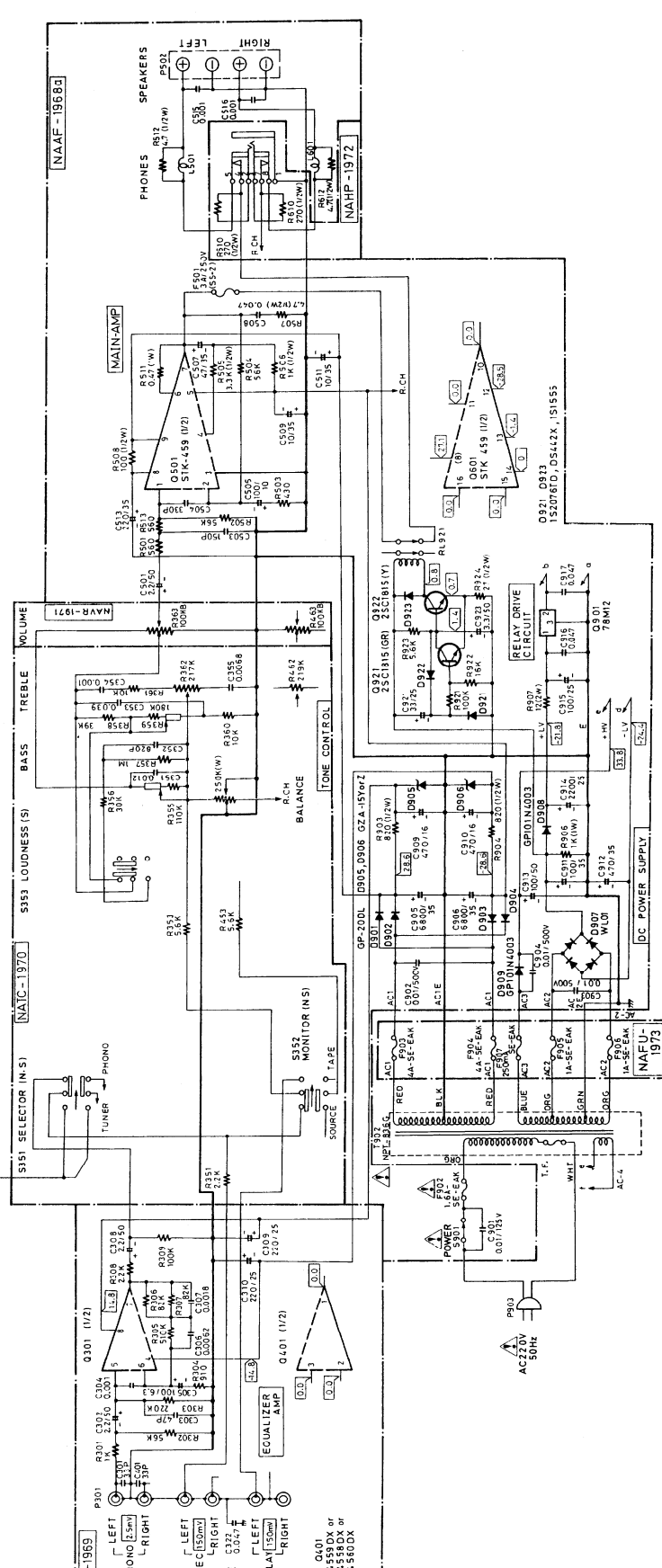
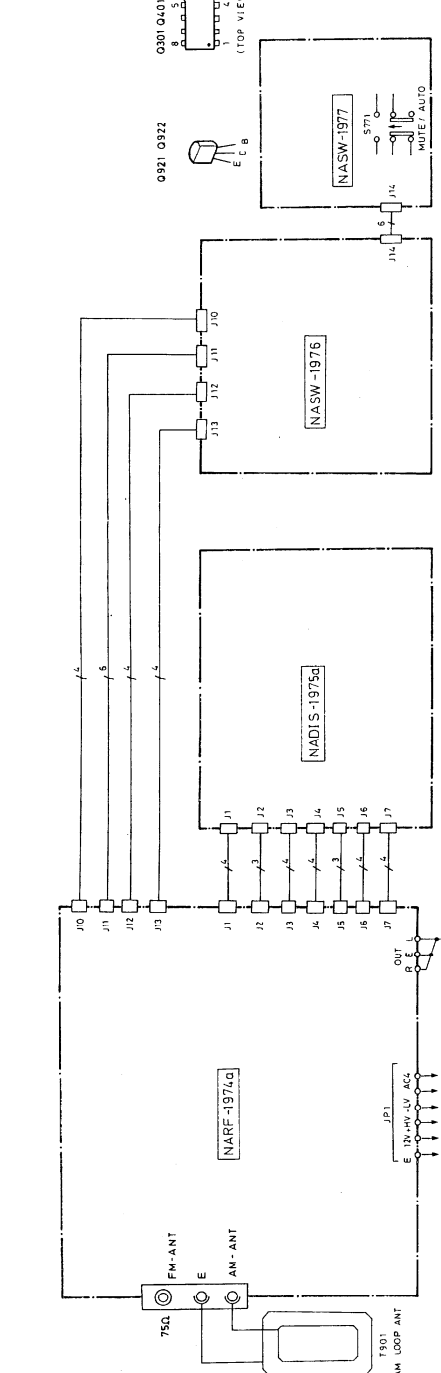
A B C D E F G

# SCHEMATIC DIAGRAM

## AMPLIFIER SECTION - G/Q models -

- NOTES:  
 \* ALL RESISTORS ARE IN OHMS UNLESS OTHERWISE NOTED.  
 \* ALL CAPACITORS ARE IN  $\mu$ F UNLESS OTHERWISE NOTED.  
 \* ELECTROLYTIC CAPACITORS ARE IN  $\mu$ F IN  $\mu$ F/WV.  
 \* VOLTAGE MEASURED WITH V.T.V. (NO INPUT SIGNAL).  
 \* CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.  
 \* THE COMPONENTS IDENTIFIED BY MARK  $\Delta$  ARE CRITICAL FOR SAFETY.

NO.	FUNCTION	POSITION
S901	POWER	ON OFF
S351	SELECTOR	PHONC TUNER
S352	MONITOR	SOURCE TAPE
S353	LOUDNESS	ON OFF
S771	MUTE / AUTO	OFF/MANU ON/AUTO



1

2

3

4

5





# PRINTED CIRCUIT BOARD PARTS LIST/VIEW FROM BOTTOM SIDE

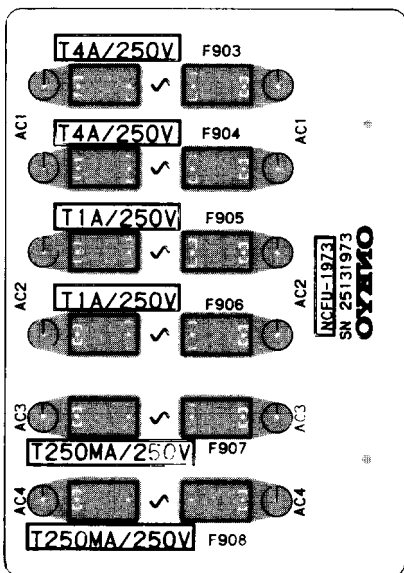
## TONE CONTROL (NATC-1970)

(D): Only 120V model  
 (G): Only 220V or 240V models  
 (W): Only 120/220V model

## TONE CONTROL PC BOARD (NATC-1970)

CIRCUIT NO.	PART NO.	DESCRIPTION
<b>Resistors</b>		
R354	5146026	N16RLC250KW15, Balance control variable
R355, R455	5104114-1	N16RQM110K180K15, Bass control variable
R362, R462	5148059-1	N16RGM219K15, Treble control variable
<b>Switches</b>		
S351, S352	25035314	NPS-222-L278, Selector/Tape
S353	25035421	NPS-122-L385, Loudness

## FUSE TERMINAL PC BOARD (NAFU-1973)



## FUSE TERMINAL PC BOARD (NAFU-1973)

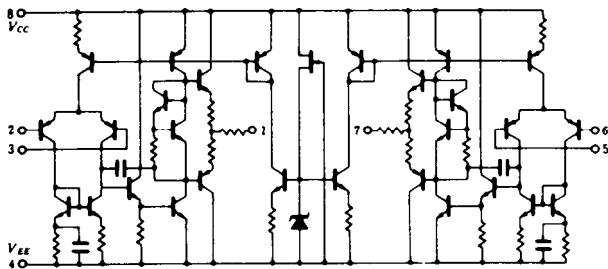
(Only G model)

CIRCUIT NO.	PART NO.	DESCRIPTION
△ F903, F904	252077	4A-SE-EAK, Secondary fuse
△ F905, F906	252070	1A-SE-EAK, Secondary fuse
△ F907	252088	250mA-SE-EAWK, Secondary fuse
△	25050065	YSH403T, Fuseholder

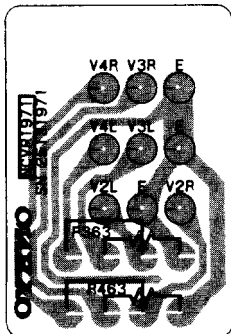
NOTE: THE COMPONENTS IDENTIFIED BY MARK △ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PARTS NUMBER SPECIFIED.

## EQUALIZER AMPLIFIER (NAEQ-1969/a)

### NJM-4559DX (Equalizer amplifier)



### VOLUME CONTROL (NAVR-1971)



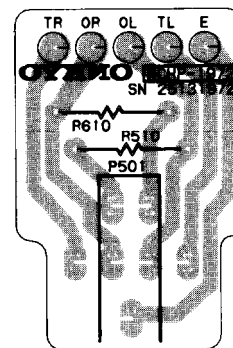
### VOLUME CONTROL PC BOARD (NAVR-1971)

CIRCUIT NO.	PART NO.	DESCRIPTION
R363, R463	5148093	N16RGM100KBTP35 Variable resistor

### EQUALIZER AMPLIFIER PC BOARD (NAEQ-1969/a)

CIRCUIT NO.	PART NO.	DESCRIPTION
Q301, Q401	222534	NJM4559DX
	222502 or	NJM4558DX or
	222570	NJM4560DX
<b>Capacitors</b>		
C302, C402	352780229	2.2 $\mu$ F, 50V, Elect.
C305, C405	352721019	100 $\mu$ F, 6.3V, Elect.
C308, C408	352780229	2.2 $\mu$ F, 50V, Elect.
C309, C310	352742219	220 $\mu$ F, 16V, Elect.
C311	379122237	0.022 $\mu$ F, 50V, DEW (D/W)
<b>Terminal</b>		
P301	25045143	NPJ-6PDBL56, Phono and tape


### HEADPHONE TERMINAL (NAHP-1972)



### HEADPHONE TERMINAL PC BOARD (NAHP-1972)

CIRCUIT NO.	PART NO.	DESCRIPTION
P501	25045109	HLJ4308-01-040, Headphone terminal
R510, R610	441522714	270 $\Omega$ , 1/2W, Metal oxide film

CIRCUIT NO.	PART NO.	DESCRIPTION
	<b>ICs</b>	
Q501, Q601	222016	STK459
Q901	222780122	78M12
	<b>Transistors</b>	
Q921	2211255	2SC1815 (GR)
Q922	2211254	2SC1815 (Y)
	<b>Diodes</b>	
D901-D904	223845	GP20DL
D905, D906	2241152 or 2241153	GZA15Y or GZA15Z
D907	223862	WL01
D908, D909	223880	GP101N4003
D921-D923	223105, 223145 or 223133	1S1555, 1S2076TD or DS442X

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



CIRCUIT NO.	PART NO.	DESCRIPTION	CIRCUIT NO.	PART NO.	DESCRIPTION
	<b>Coils</b>			<b>Resistors</b>	
L501, L601	231001	S-1. 3B (G)	R505, R605	441523324	3.3k $\Omega$ , 1/2W, Metal oxide film
	<b>Capacitors</b>		R506, R606	441521024	1k $\Omega$ , 1/2W, Metal oxide film
C501, C601	352780229	2.2 $\mu$ F, 50V, Elect.	R507, R607	441520474F	4.7 $\Omega$ , 1/2W, Metal oxide film
C505, C605	352731019	100 $\mu$ F, 10V, Elect.	R508	441521014F	100 $\Omega$ , 1/2W, Metal oxide film
C507, C607	352764709	47 $\mu$ F, 35V, Elect.	R511, R611	441624794F	0.47 $\Omega$ , 1W, Metal oxide film
C509, C609	352761009	10 $\mu$ F, 35V, Elect.	R512, R612	441520474F	4.7 $\Omega$ , 1/2W, Metal oxide film (G)
C511	352761009	10 $\mu$ F, 35V, Elect.	R903, R904	441528214F	820 $\Omega$ , 1/2W, Metal oxide film
C513	352762219	220 $\mu$ F, 35V, Elect.	$\Delta$ R905	531523355	3.3M $\Omega$ , 1/2W, Solid (D)
$\Delta$ C901	3500065A	0.01 $\mu$ F, AC400/125V Capacitor IS	R906	441621024	1k $\Omega$ , 1W, Metal oxide film
C905, C906	3504166	6,800 $\mu$ F, 35V, Elect.	R907	441721204F	12 $\Omega$ , 2W, Metal oxide film
C909, C910	352744719	470 $\mu$ F, 16V, Elect.	R924	441522704F	27 $\Omega$ , 1/2W, Metal oxide film
C911	352761019	100 $\mu$ F, 35V, Elect.		<b>Relay</b>	
C912	352764719	470 $\mu$ F, 35V, Elect.	RL921	25065108	NRL-2P3ADC24-05
C913	352781019	100 $\mu$ F, 50V, Elect.		<b>Switch</b>	
C914	352752229	2,200 $\mu$ F, 25V, Elect.	$\Delta$ S901	25035398	NPS-111-L362P
C915	352751019	100 $\mu$ F, 25V, Elect.		<b>Terminal</b>	
C921	352753309	33 $\mu$ F, 25V, Elect.	P502	25060086	NTM-4PDML30, Speaker
C923	352780339	3.3 $\mu$ F, 50V, Elect.		<b>Fuse holders</b>	
			$\Delta$ F501a, F601a,	250113	SN5051 (D/W)
			$\Delta$ F901a		
			$\Delta$ F501a, F601a,	25050065	YSH403T (G)
			$\Delta$ F902a		
			$\Delta$ F902a	25050065	YSH403T (W)
				<b>Fuses</b>	
			$\Delta$ F501, F601	252006	3A (SS-2) (D/W)
			$\Delta$ F501, F601	252075	2.5A-SE-EAK (G)
			$\Delta$ F901	252075	3A (ST-6) (D/W)
			$\Delta$ F902	252073	1.6A-SE-EAK (G/W)
				<b>Bracket</b>	
				27140887	IC
				<b>Cover</b>	
				27300601	Capacitor
				<b>Radiator</b>	
				27160011A	RAD-05
				<b>Screws</b>	
				82143010	3P+10F (BC), Pan head
				834430108	3TTS+10B (BC), Tapping
				834430068	3TTS+6B (BC), Tapping
				<b>Nut</b>	
				863430	N-3F-N (BC)
				<b>Rating label</b>	
				29360405	Fuse (G)
				29360684	Fuse (W)

(D): Only 120V model
(G): Only 220V or 240V models
(W): Only 120/220V model

DAIGAE  
TX-15 UD

日付：85/04/17 ページ： 1

発行日	回路番号	部品名	<i>sub</i> 代替部品	<i>REG</i> 正規部品	<i>between SN</i> 適用台数
590709	Q704,804,951,952	TRANSISTOR	2SC1815LGR	2SC1815GR	14041-15040
590709	Q703	FET	2SK68AM	2SK68M/2SK108D	14041-15040
590523	D907	DIODE	WL04/2W02	WL01	9541-11840
590521	D952	DIODE	RD6.2EB3	GZA6.2Y	9041-11840
591017	Q101	TRANSISTOR	2SC1923R	2SC19230	17441-20540
591106	D751,754-759	LED	SEL2413E	SEL2310G	20541-21040

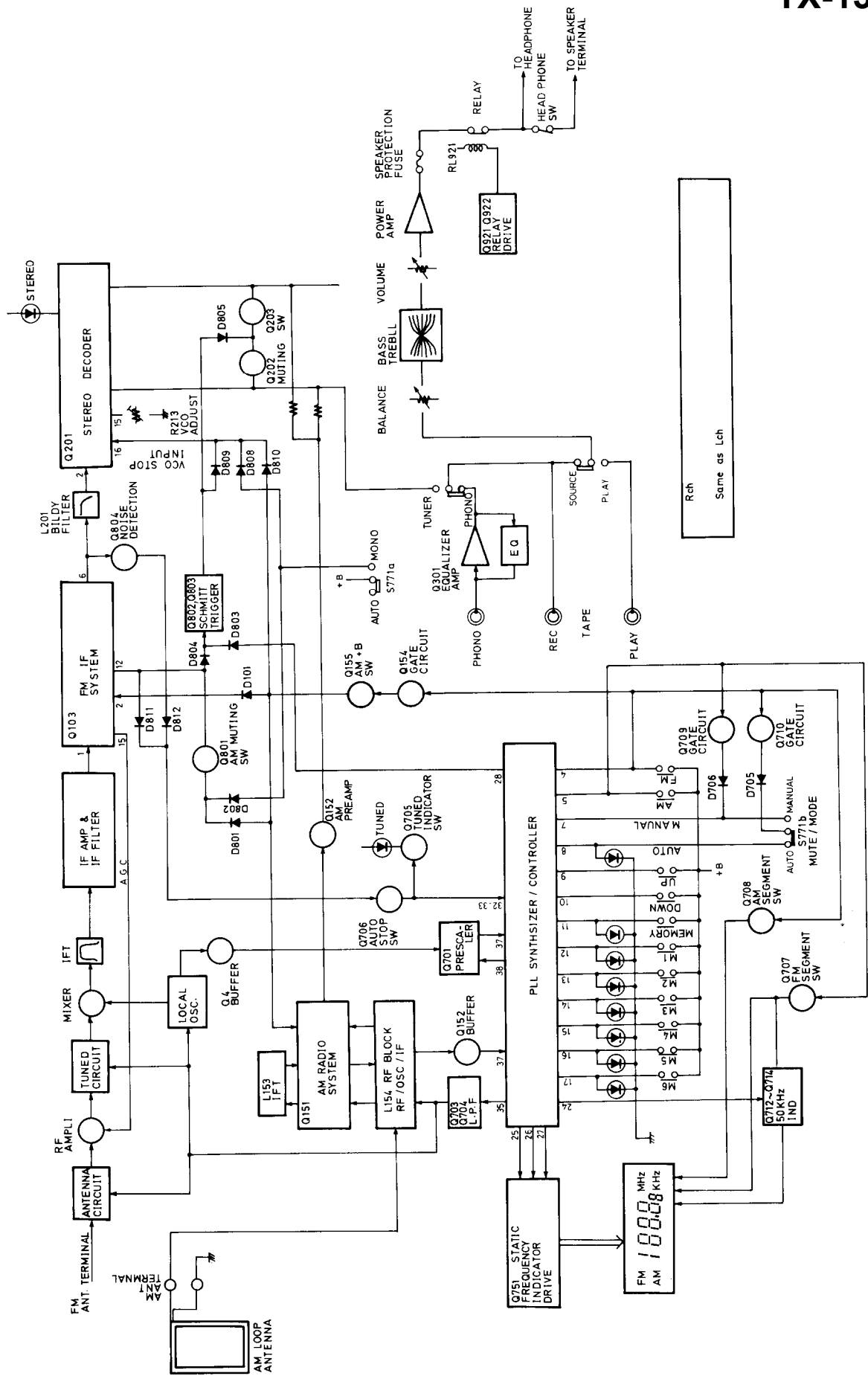
MODEL TX-100

SUBSTITUTIVE PARTS LIST

NOTE:USE THE REGULAR PARTS WHEN REPLACEMENT

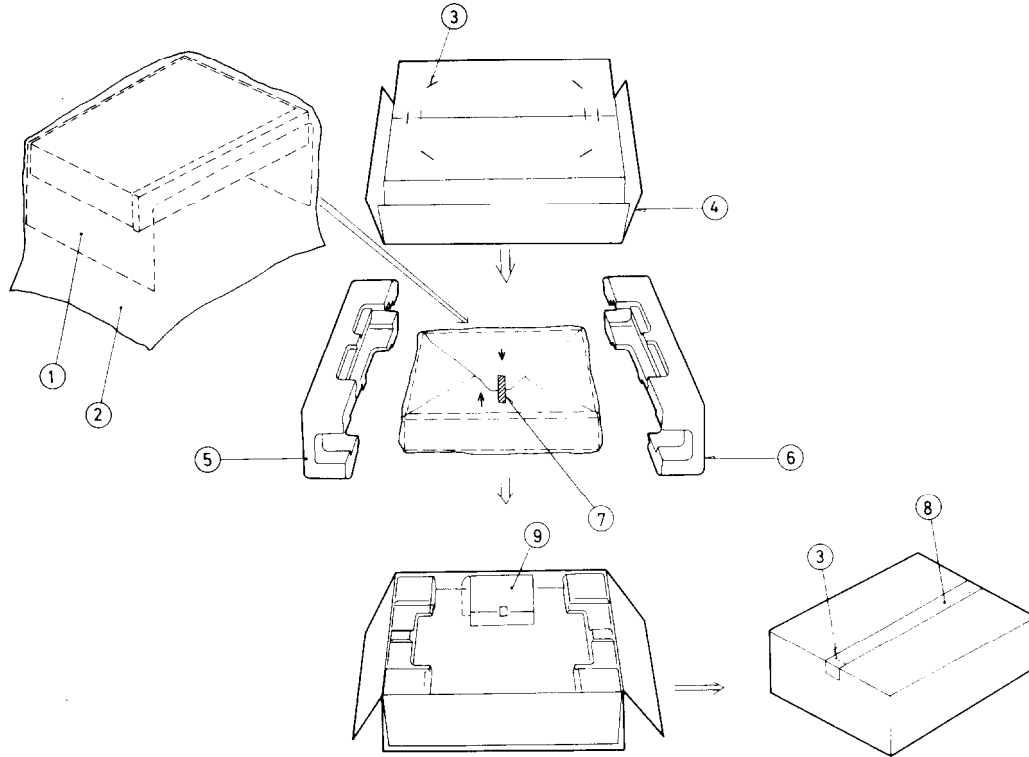
TYPE	CIRCUIT NO.	DESCRIPTION	REGULAR PARTS	SUBSTITUTIVE PARTS	APPLICATION
	D907	DIODE	WL01	WL04	1007-2007

**BLOCK DIAGRAM**



# PACKING VIEW

# TX-15



REF. NO.	PARTS NO.	DESCRIPTION	
1	29095012-1	500×800mm, Protection sheet	<b>220V model</b>
2	29100063	750×500mm, Poly-vinyl bag	292092 FM antenna
3	282301	Sealing hook	29340759 Instruction manual
4	29050911	Master carton box (silver model)	29100006 350×250mm, Poly-vinyl bag
	29050912	Master carton box (black model)	<b>TX-100</b>
	29050924	Master carton box (TX-100)	292092 FM antenna
	29050925	Master carton box (TX-100B)	29340761 Instruction manual
5	29090690A	Pad R	29365016 Warranty card
6	29090691	Pad L	29100006 350×250mm, Poly-vinyl bag
7	29110032	W = 15mm, Adhesive tape	<b>120/220V model</b>
8	260012	W = 50mm, Damplon tape	292064A FM antenna
9	Accessory bag ass'y		29340759 Instruction manual
	<b>U.S.A. model</b>		25055040 Conversion plug
	292064A	FM antenna	29100006 350×250mm, Poly-vinyl bag
	29340758	Instruction manual	<b>240V model</b>
	29365006-5	Warranty card	292092 FM antenna
	29358002A	Service station list	29340759 Instruction manual
	29100006	350×250mm, Poly-vinyl bag	25060088 FM antenna adaptor
	<b>120V model</b>		29100006 350×250mm, Poly-vinyl bag
	292064A	FM antenna	
	29340758	Instruction manual	
	29100006	350×250mm, Poly-vinyl bag	

## ONKYO CORPORATION

International Division: No. 24 Mori Bldg., 23-5, 3-chome, Nishi-Shinbashi, Minato-ku, Tokyo, Japan  
 Telex: 2423551 ONKYO J. Phone: 03-432-6981

## ONKYO U.S.A. CORPORATION

200 Williams Drive, Ramsey, N.J. 07446 Tel. 201-825-7950

## ONKYO DEUTSCHLAND GMBH, ELECTRONICS

8034 München-Germering, Industriestrasse 18, West Germany. Telex: 521 726 Telefon: (089)-84-3071