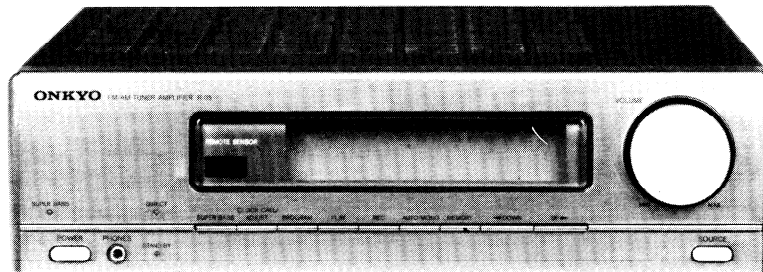


ONKYO SERVICE MANUAL

QUARTZ SYNTHESIZED TUNER AMPLIFIER MODEL R-05



UD, UDN, BHUD	120V AC, 60Hz
UP, UPV, UPF, BHUP, BHUPV	230V AC, 50Hz
UW, BHUW	120 or 220V AC, 50/60Hz
UQA, BHUQA	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 PART 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.

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ONKYO
AUDIO COMPONENTS

SPECIFICATIONS

Tuner Amplifier R-05

Amplifier section

Power Output:	30 watts per channel, min. RMS, at 6 ohms, both channels driven, from 40 Hz to 20 kHz, with no more than 0.5 % THD.
Musical Power Output:	2 x 45 watts at 6 ohms, 1 kHz (DIN)
Continuous Power Output:	2 x 32 watts at 6 ohms, 1 kHz (DIN)
Total Harmonic Distortion:	0.5 % at rated power
IM Distortion:	0.5 % at rated power
Damping Factor:	25 at 6 ohms
Frequency Response:	40 – 20,000 Hz \pm 3 dB (DIRECT)
Sensitivity and Impedance:	
CD/Tape Play:	150mV/50 kohms
Tape Rec:	150 mV/3.5 kohms
Signal-to-Noise Ratio:	
CD/Tape:	100dB (IHF-A)
Tone Controls:	
Super Bass:	+18dB at 55Hz
Bass:	\pm 10dB at 100Hz
Treble:	\pm 10dB at 10kHz
Muting:	-45dB

Tuner section

FM:

Tuning Range:	
European models:	87.5 – 108.0MHz (50kHz steps)
U.S.A. and Canadian models:	87.9 – 107.9MHz (200kHz steps)
Usable Sensitivity:	
Mono:	11.2 dBf, 1.0 μ V, 75 ohms 0.9 μ V (S/N 26dB, 40kHz Devi.) 75 ohms DIN
Stereo:	18.0dBf, 2.2 μ V, 75 ohms 23 μ V (S/N 46dB, 40kHz Devi.) 75ohms DIN
50dB Quieting Sensitivity:	
Mono:	18.2dBf, 2.2 μ V, 75 ohms
Stereo:	37.2dBf, 20 μ V, 75 ohms
Capture Ratio:	1.5dB
Image Rejection Ratio:	85dB
IF Rejection Ratio:	90dB
Signal-to-Noise Ratio:	
Mono:	73dB
Stereo:	66dB
Selectivity:	50dB DIN (\pm 300kHz, 40kHz dev.)
AM Suppression Ratio:	50dB
Harmonic Distortion:	
Mono:	0.15%
Stereo:	0.30%
Frequency Response:	30 – 15,000Hz \pm 1.5dB
Stereo Separation:	40dB at 1kHz

AM:

Tuning Range:	
European models:	522 – 1611kHz (9kHz steps)
U.S.A. and Canadian models:	530 – 1710kHz (10kHz steps)
Saudi Arabia and Worldwide models:	531 – 1602kHz (9kHz steps)
Usable Sensitivity:	30 μ V
Image Rejection Ratio:	40dB
IF Rejection Ratio:	40dB
Signal-to-Noise Ratio:	40dB
Harmonic Distortion:	0.8%

General

Power Supply:	
European models:	AC230V, 50Hz
U.S.A. and Canadian models:	AC120V, 60Hz
U.K. and Australian models:	AC 240V, 50Hz
Worldwide models:	120 and 220V switchable, 50/60Hz
Dimensions (W x H x D):	275 x 80.5 x 317 mm 10-13/16" x 3-3/16" x 12-1/2"
Weight:	4.5kg., 9.9lbs.

Remote control transmitter RC-212S

Transmitter:	Infrared
Signal range:	Approx. 5 meters (16ft. 4")
Power supply:	Two "AA" batteries (1.5V x 2)

Speaker system PS-05U

Type:	2-Way, Bass Reflex
Speakers	
Woofer:	15cm Mica Composite PP Cone type
Tweeter:	2.5cm Soft Dome type
Impedance:	6 Ω
Max. Input Power:	80W*
Frequency Range:	45Hz – 30kHz
Output sound pressure level	89dB
Dimensions:	175(W) X 353(H) X 291(D)mm (6-7/8" x 13-7/8" x 11-7/16")
Weight:	6kg (13.2lbs.)

Design and specifications are subject to change without prior notice.

SERVICE PROCEDURES

1. Replacing the fuses

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

Circuit No.	Part No.	Description
F901	252048	△ 3A ST-6, Primary fuse<D/W>
F903	252070	△ 1A-SE-EAK, Primary fuse <P/Q>
F902	252071	△ 1.25A-SE-EAK, AC outlet fuse<P>
F902	252071	△ 1.25A-SE-EAK, Primary fuse<W>

NOTE:<D>:Only 120V model
<P>:Only 230V model
<W>:Only Worldwide model
<Q>:Only 240V model

2. Change of FM/AM band step.

With the exception of the Worldwide model, a BAND STEP selector switch is not provided.

(FM)

BAND STEP	J193	J194
200kHz→50kHz	Short	Open
50kHz→200kHz	Open	Open

(AM)

BAND STEP	J195
10kHz→9kHz	Short
9kHz→10kHz	Open

— Worldwide model —

Worldwide models are equipped with a step band selector switch. This switch is located on the back panel. This switch is set to 50kHz(FM) and 9kHz(AM) at the factory, but may have to be reset to 100kHz and 10kHz depending on the area where the unit is used.

	De-emphasis	FM step	AM step
Europe:	50 μsec	50kHz	9kHz
U.S.A.:	75 μsec	200kHz	10kHz

3. Memory preservation

This unit does not require memory preservation batteries. A built-in memory power back-up system preserves 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 operative. The period of time during which memory contents are preserved after power has last been turned off varies depending on climate 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.

4. Safety-check out

(Only U.S.A. model)

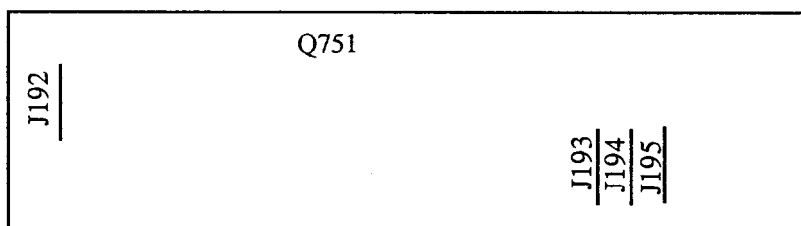
After correcting the original service problem perform the following safety check before releasing the set to the customer.

Connect the insulating-resistance tester between the plug of power supply cord and terminal GND on the back panel. Specifications: 3.3 Mohm ±10% at 500V.

5. Change of voltage

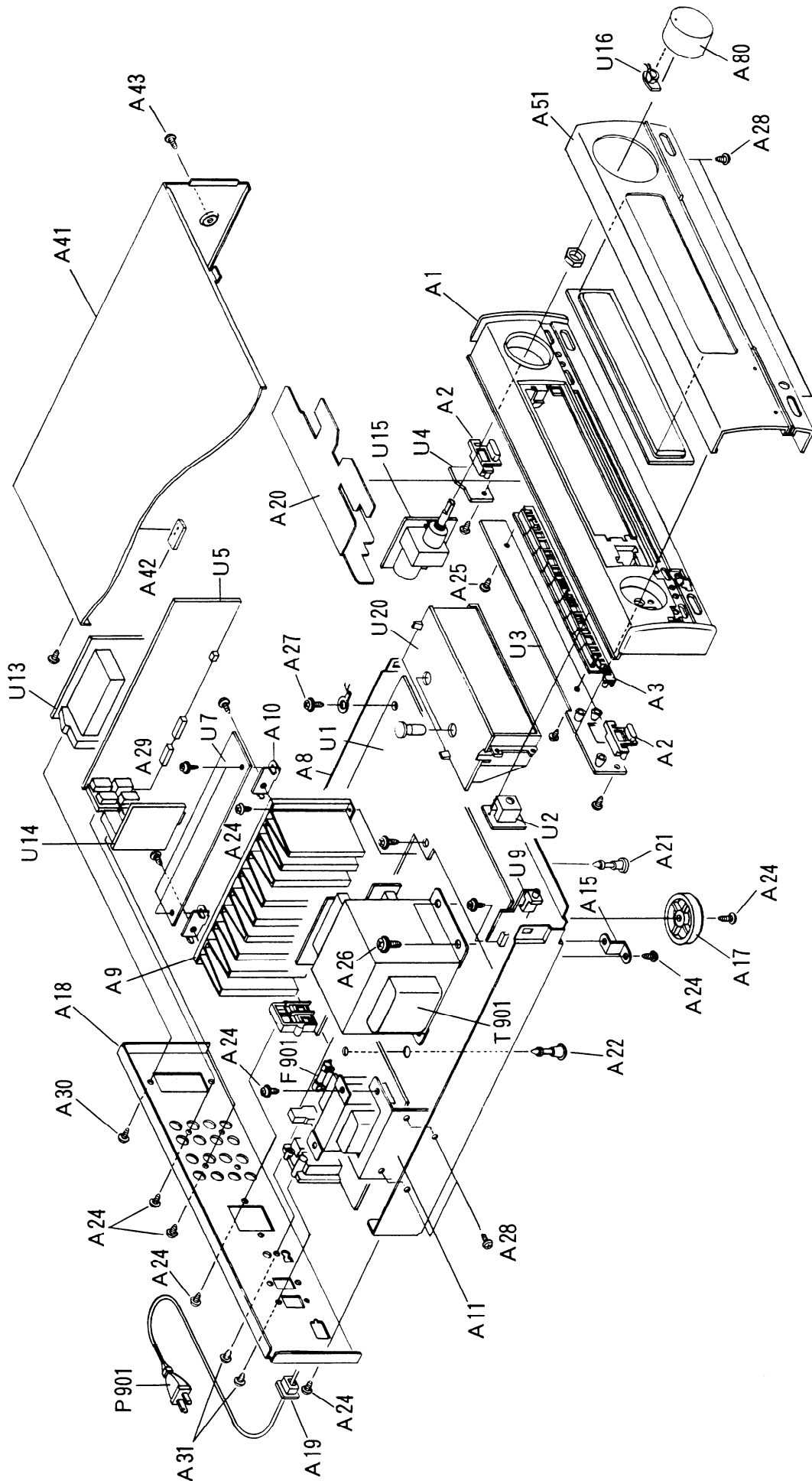
Worldwide models are equipped with a voltage selector to conform with local power supplies. This switch is located on the back panel. Be sure to set this switch to match the voltage of the power supply in your area before turning the power switch on.

This switch is set to 220V at the factory. Voltage is changed by sliding the groove in the switch with the 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.



Microprocessor

EXPLODED VIEW



PARTS LIST

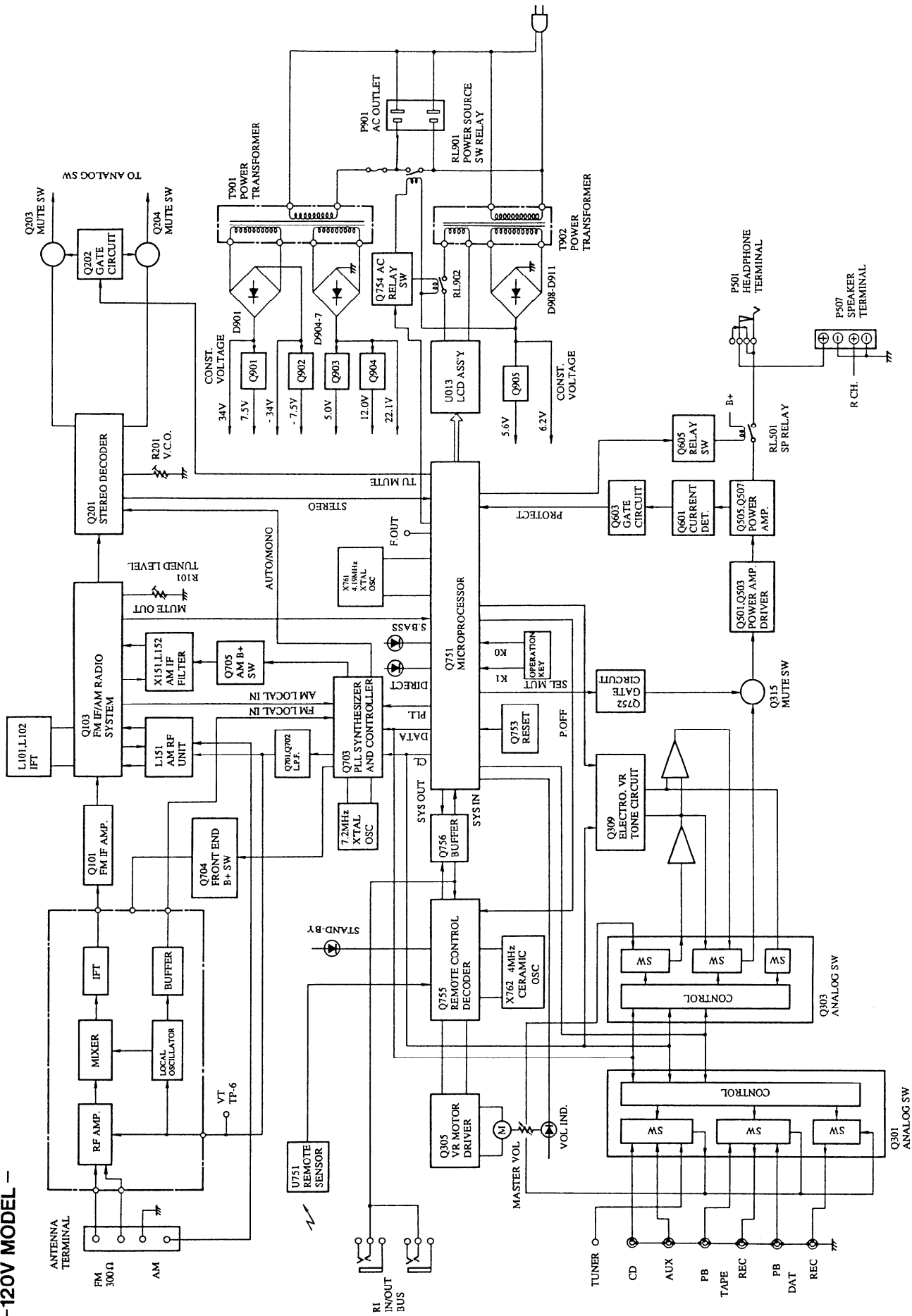
REF. NO.	PART NO.	DESCRIPTION	PART NAME	NOTE	REF. NO.	PART NO.	DESCRIPTION	PART NAME	NOTE
A1	27110590-1		Front bracket ass'y	T	P901	253142A	AS-UC-7 #18	Power supply cord	D
A2	27110590		Front bracket ass'y	B		253148	AS-CEE	Power supply cord	P/W
A2	28324090-1		Knob source	T		253118	AS-SAA	Power supply cord	Q
A3	28324090		Knob source	B	P902	25050337	NSCT-2P164	AC outlet	P/W
A3	28324091-1		Knob	T		25050346	NSCT-2P173	AC outlet	Q
A3	28324091		Knob	B	Q505,Q506	2202303,	25C4512-O,	Power transistors	
A8	27100222A		Chassis			2202304 or	25C4512-Y or	Power transistors	
A9	27160268-1		Radiator			2202305	25C4512-P	Power transistors	
A10	27141359-1		Bracket H		Q507,Q508	2202313,	25A1726-O,	Power transistors	
A11	27141424B		Bracket PT			2202314 or	25A1726-Y or	Power transistors	
A12	28141102		Cushion			2202315	25A1726-P	Power transistors	
A13	27301425		Insulator plate	P/W/Q	S901	25065287	NSS-22113P	Voltage selector switch	W
A15	27141432		Bracket S		T901	2300686A	NPT-1115D	Power transformer	D
A17	27175252-1A		Leg			2300687	NPT-1115P	Power transformer	P
A18	27121467		Back panel	D		2300688	NPT-1115DG	Power transformer	W
A18	27121468		Back panel	P		2300689A	NPT-1115Q	Power transformer	Q
A18	27121469		Back panel	W		2300689A	NPT-1115Q	Power transformer	W
A18	27121470		Back panel	Q	U1	1A288526-1	NAAR-4226-1A	Power transformer	Q
A19	27300750	#2271	Bushing		U2	1A288526-1B	NAAR-4226-1B	Main circuit pc board ass'y	D
A20	28175180A		Insulator plate		U3	1A288527-1	NAAR-4226-1A	Main circuit pc board ass'y	P/Q
A21	27190428	KGLS-10RT	Holder		U4	1A288528-1	NAAR-4226-1A	Main circuit pc board ass'y	W
A22	27190524	KGLS-14RT	Holder		U5	1A288529-1	NAAR-4226-1A	Main circuit pc board ass'y	W
A24	834430088	3TTSh-8B(BC)	Self-tapping screw		U7	1A288530-1A	NAAF-4230-1A	Remote control sensor pc board ass'y	D
A25	838426088	2.6TTB+8B(BC)	Self-tapping screw		U8	1A288531-1	NAAF-4231-1	Operation switch pc board ass'y (1)	P/Q/W
A26	830440089	4TTC+8C(BC)	Self-tapping screw		U9	1A288532-1	NAEFC-4232-1	Operation switch pc board ass'y (2)	D
A27	831130088	3TTW+8B	Self-tapping screw		U10	1A288533-1	NAEFC-4233-1	Tone amplifier pc board ass'y	P/Q/W
A28	838430088	3TTW+8B(BC)	Self-tapping screw		U11	1A288534-1	NAEFC-4234-1	Tone amplifier pc board ass'y	P/Q/W
A29	801433	3SMSBSWSW+14B(BC)	Sems self-tapping screw		U12	1A288535-1	NAPS-4235-1	Main amplifier circuit pc board ass'y	W
A30	834230108	3TTS+10B(Ni)	Self-tapping screw		U13	1A288535-1B	NAPS-4235-1B	Headphone amplifier pc board ass'y	D
A31	833430080	3TTP+8P(BC)	Self-tapping screw	T	U15	1A288535-1	NAPS-4235-1	Band selector switch pc board ass'y	P
A41	28184465-1A		Top cover	B	U16	1A288535-1	NAPS-4235-1A	Power supply circuit pc board ass'y	W
A42	28184465A		Top cover		U17	1A288535-1	NAPS-4235-1A	Power supply circuit pc board ass'y	Q
A42	28140555-1		Self-tapping screw		U18	1A288535-1	NAPS-4235-1	Power supply circuit pc board ass'y	D
A43	838430088	3TTB+8B(BC)	Self-tapping screw		U19	1A288535-1	NAPS-4235-1	Power supply circuit pc board ass'y	Q
A51	1A288121		Front panel ass'y		U20	24190027	LTTAE-6151A	Tuner circuit pc board ass'y	D
A51	1A288121		Front panel ass'y			24190026	LTTAE-6131A	Tuner circuit pc board ass'y	P/Q/W
A53	28191570-1B		Cushion	T		1A288536-1	NARF-4236-1	Volume circuit pc board ass'y	D
A53	28191570-1B		Clear plate	B		1A288536-1	NARF-4236-1	Volume circuit pc board ass'y	D
A80	28324092-1		Front panel ass'y	B	U15	1A288525-3	NAEFC-4025-3	Volume indicator pc board ass'y	P/Q/W
A80	28324092-1		Front panel ass'y		U16	1A288537-1	NAEFC-4237-1	Volume indicator pc board ass'y	D
F901	252048	3A (ST-6)	Cushion	T	U16	1A288526-3	NAEFC-4026-3	Volume indicator pc board ass'y	P/Q/W
F901	252048	1A-SE-EAK	Clear plate	B	U17	1A288538-1	NAEFC-4238-1	Power transformer terminal pc board ass'y	D
F902	252070	1.25A-SE-EAK	Knob VOLUME	T	U17	1A288527-3	NAEFC-4027-3	Power transformer terminal pc board ass'y	P/Q
F902	252071	1.25A-SE-EAK	Knob VOLUME	B	U17	1A288539-1	NAEFC-4239-1	Power transformer terminal pc board ass'y	W
F902	252071	1.25A-SE-EAK	Fuse	D/W	U20	24190027	LTTAE-6151A	LCD ass'y	T
F902	252071	1.25A-SE-EAK	Fuse	P/Q		24190026	LTTAE-6131A	LCD ass'y	B
F902	252071	1.25A-SE-EAK	Fuse	P/W		24190026	LTTAE-6131A	LCD ass'y	B

NOTE T : Titanium model
 B : Black model
 D : 120V model
 P : 230V model
 W : Worldwide model
 Q : 240V model

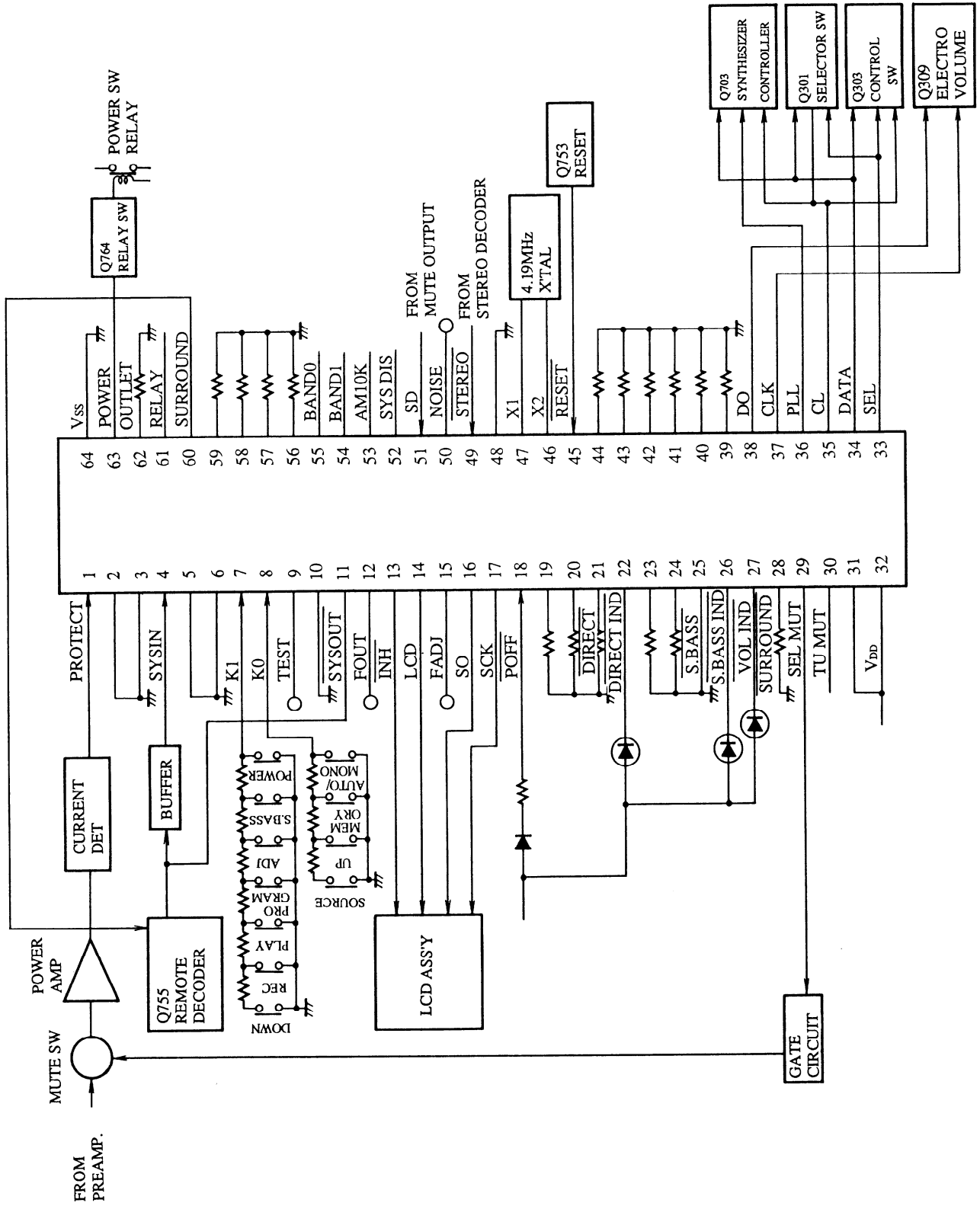
NOTE: THE COMPONENTS IDENTIFIED BY MARK **△** ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PARTS NUMBER SPECIFIED.

BLOCK DIAGRAM

-120V MODEL-



MICROPROCESSOR CONNECTION DIAGRAM



TERMINAL DESCRIPTIONS

Pin No.	Function	Description
1	PROTECT	Protection circuit operation detection input terminal. On when high.
4	SYS IN	System code input terminal. Active high.
7	K1	Key input terminal.
8	K0	Key input terminal.
9	TEST	Test mode input terminal. Test mode at high level.
11	SYS OUT	System code output terminal. Active low.
12	FOUT	Output terminal for crystal oscillator circuit. Adjustment mode when FADJ input is high.
13	INH	Connect to the terminal INH of LCD driver LC7582.
14	LCD	Connect to the terminal CE of LCD driver LC7582.
15	FADJ	Crystal oscillator frequency adjustment output. Adjustment mode when this terminal is the high level.
16	SO	Connect to the terminal DATA of LCD driver LC7582.
17	SCK	Connect to the terminal CLK of LCD driver LC7582.
18	POFF	This is the input terminal for detection of the stoppage of electric current. "L" when the stoppage of electric current.
21	DIRECT	DIRECT indicator output terminal.
22	DIRECT	DIRECT control output terminal.
25	S.BASS	SUPER BASS indicator output terminal.
26	S.BASS	SUPER BASS control output terminal.
27	VOLIND	VOLUME indicator output terminal.
29	SEL MUT	Muting output when the selector switch is operated.
30	TU MUT	Muting output for tuner section.
32	VDD	Power supply terminal.
33	SEL	Connect to the terminal CE of analogue switches LC7822N and LC7823N.
34	DATA	Connect to the terminal DI of analogue switches and the terminal DATA of PLL IC LM7001.
35	CL	Connect to the terminal CL of analogue switches and the terminal CL of PLL IC.
36	PLL	Connect to the terminal PLL of PLL IC.
37	CLK	Connect to the terminal CLK of electro volume LC7522.
38	DO	Connect to the terminal DI of electro volume.
45	RESET	Reset input terminal. Active low.
46	X2	Connect to the 4.19MHz crystal oscillator.
47	X1	Connect to the 4.19MHz crystal oscillator.
49	STEREO	Stereo broadcast detection input terminal. Active L. Control the STEREO indicator.
50	NOISE	Noise detection input. Not used.
51	SD	Broadcast detection input terminal. Active L. Control the stop of auto tuning and muting output.
52	SYS DIS	Initializing input terminal for system code operation changeover.
53	AM10K	Initializing input terminal for the region of AM band setting.
54	BAND1	Initializing input terminal for the region of FM band setting.
55	BAND0	Initializing input terminal for the region of FM band setting.
61	RELAY	Speaker relay control output terminal. On when the high level.
62	OUTLET	Outlet control output terminal. On when the high level.
63	POWER	Power source control output terminal. High level when the power turns on.
64	VSS	Ground terminal.

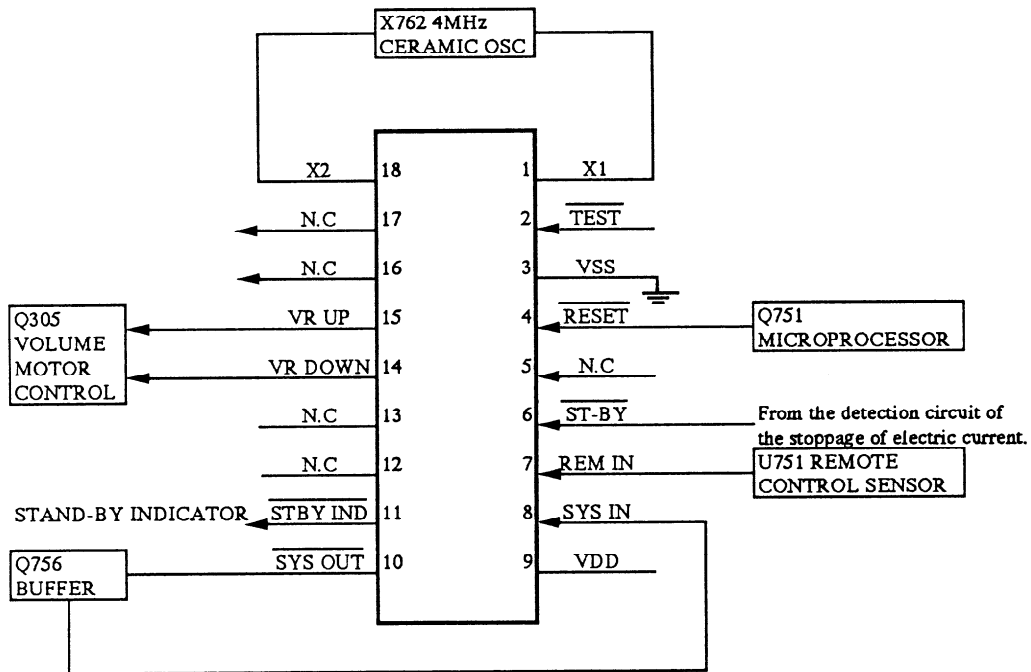
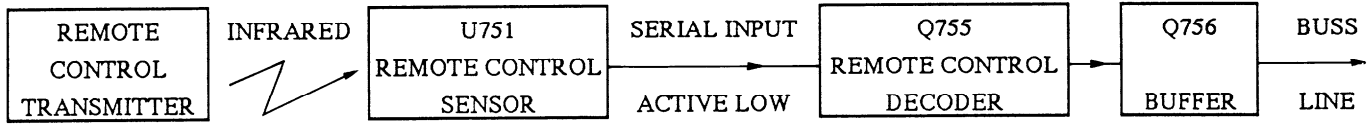
FM band setting

BAND	BAND	Region	Frequency Range	Channel space
1	0	U.S.A.	87.9-107.9MHz	200kHz
0	1	Europe	87.50-108.00MHz	50kHz
1	0	Saudi Arabia	87.50-108.00MHz	50kHz
0	0	Japan	76.0-90.0MHz	100kHz

AM band setting

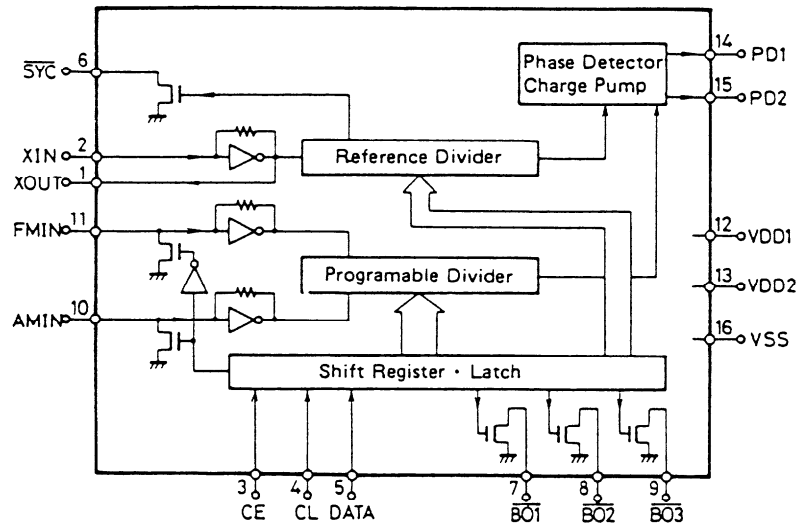
BAND	BAND	AM	Region	Frequency Range	Channel space
1	0	10K	U.S.A.	530-1710kHz	10kHz
0	1	0	Europe	522-1611kHz	9kHz
1	0	0	Saudi Arabia	531-1602kHz	9kHz
		1	U.S.A.	530-1710kHz	10kHz

IC BLOCK DIAGRAMS AND DESCRIPTIONS



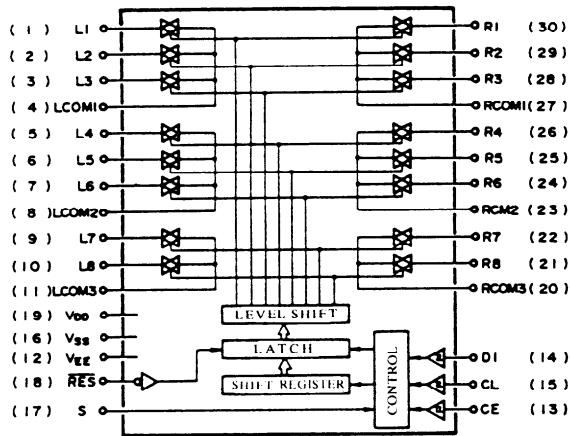
No.	SYMBOL	DESCRIPTION
1	X1	Connect to the 4.0MHz ceramic oscillator.
18	X2	
2	TSET	Test terminal.
3	VSS	Ground terminal.
4	RESET	System reset terminal.
5	SURROUND	Surround processor control input. Not used.
6	ST-BY	Stand-by detection input terminal. Decode the power code only when this terminal is low.
7	REM IN	Input terminal from the remote control sensor.
8	SYS IN	System code input terminal.
9	VDD	Power supply terminal.(+5V)
10	SYS OUT	System code output terminal.
11	STBY IND	STAND-BY indicator output.
14	MASTER VR DOWN	Volume control output terminal.(Down direction)
15	MASTER VR UP	Volume control output terminal.(Up direction)
16	SURROUND VR DOWN	Not used.
17	SURROUND VR UP	Not used.

LM7001 (PLL Synthesizer and Controller)

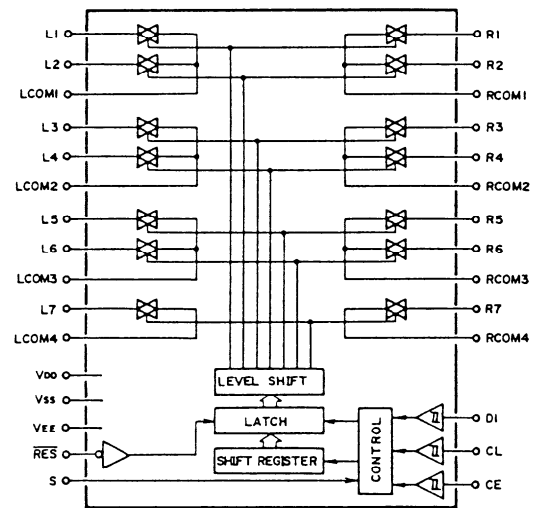


Pin No.	Terminal	Description
1	XOUT	Connect to the 7.2 MHz crystal oscillator.
2	XIN	
3	CE	Chip enable terminal. Connect to the PLL terminal of microprocessor.
4	CL	Serial clock input terminal. Connect to the CLOCK terminal of microprocessor.
5	DATA	Serial data input terminal. Connect to the DATA terminal of microprocessor.
6	$\overline{\text{SYN}}$	Not used.
7	$\overline{\text{AUTO/MONO}}$	AUTO/MONO selection output terminal. "L" when AUTO.
8	$\overline{\text{FM}}$	FM band control output terminal. "L" when FM.
9	$\overline{\text{AM}}$	AM band control output terminal. "L" when AM.
10	AMIN	AM local oscillator input terminal.
11	FMIN	FM local oscillator terminal.
12	VDD 1	Power supply terminal for back-up.
13	VDD 2	Power supply terminal.
14	PD1	Charge pump output of the phase detector which constitutes the PLL. High level is output when the divided local oscillator frequency is high than the reference frequency. In the opposite case, low level is output. Floating occurs when the frequencies matched. The output is applied to the variable capacitor diode in the local oscillator through the low pass filters.
15	PD2	
16	Vss	Ground terminal.

LC7822N (Analog Switch)



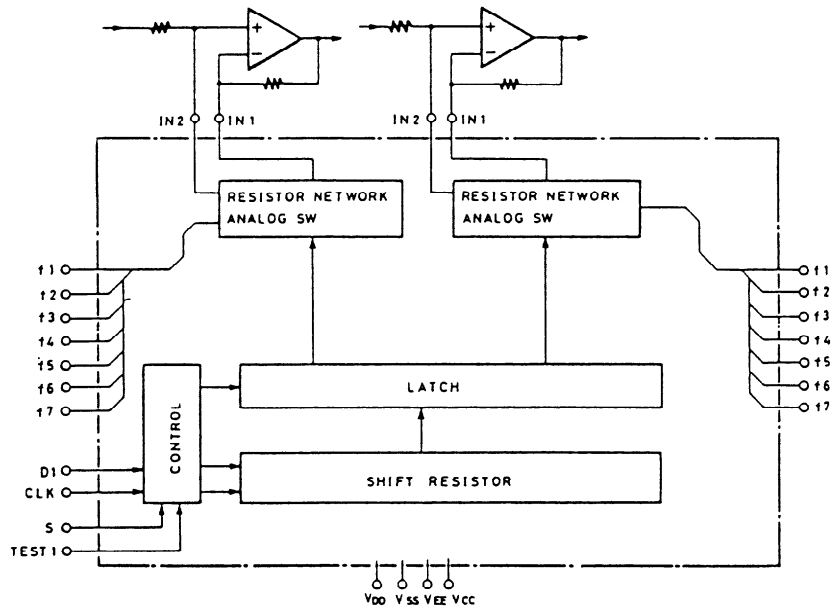
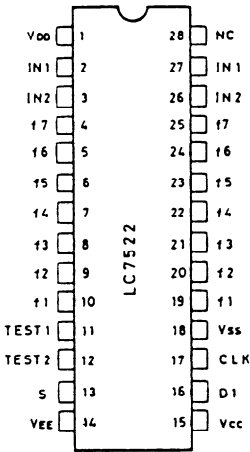
LC7823N (Analog Switch)



Pin No.	Terminal	Terminal	Description
	Q301	Q303	
1,30	CD	VOL	Input/output terminals of analogue switches. Change over the analogue switch at the serial data of microprocessor.
2,29	AUX	NC	
3,28	TUNER	COM1	
4,27	COM1	DIRECT	
5,26	TAPE PB	TONE	
6,25	TAPE REC.	COM2	
7,24	DAT PB	NC	
8,23	COM2	S.BASS	
9,22	DAT REC	COM3	
10,21	NC	NC	
11,20	COM3	COM4	
12	VEE		Negative power supply terminal.(-15V)
13	CE		Chip enable terminal.Connect to the terminal FUNC of the microprocessor.
14	DI		Serial data input terminal.Connect to the terminal DATA of the microprocessor.
15	CL		Serial clock terminal.Connect to the terminal CL of the microprocessor.
16	VSS		Ground terminal.
17	S		Select terminal.
18	RES		Reset terminal.
19	VDD		Power supply terminal.(+5V)

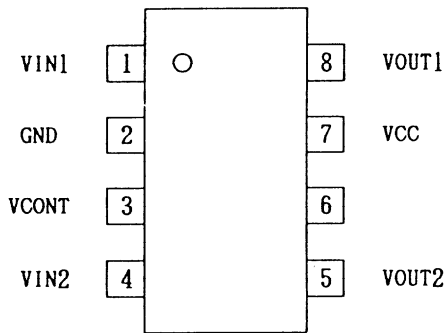
NO.	ADDRESS				SWITCH CHANGEOVER							
	A0	A1	A2	A3	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
Q301	0	0	1	1	CD	AUX	TUNER	TAPE PB	TAPE REC	DAT PB	DAT REC	
Q302	0	1	1	1			DIRECT	DIRECT	SUPER BASS	SUPER BASS	SUPER BASS	

LC7522 (Electro Volume)



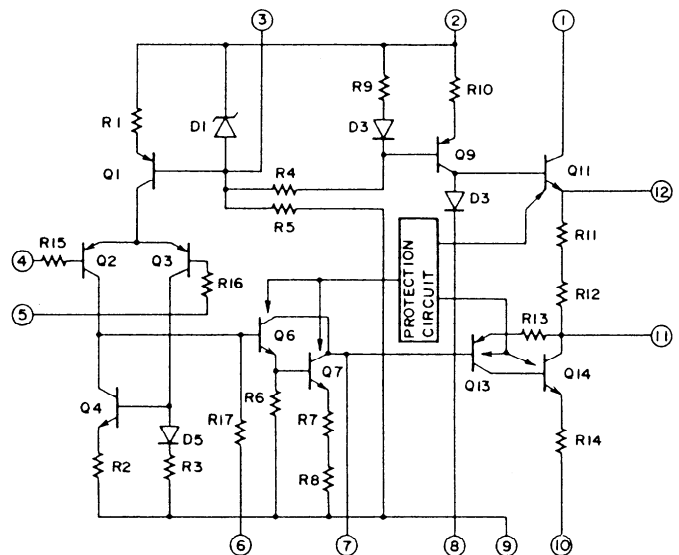
Pin No.	Symbol	Description
1	VDD	Positive power supply for audio signal.
2,27	IN1	Audio signal input terminal.
3,26	IN2	Audio signal input terminal.
4~10 19~25	f1~f7	Band pass filter connection terminal.
11	TEST1	Test terminal.
12	TEST2	
13	S	Selector terminal.
14	VEE	Negative power supply for audio signal.
15	VCC	Power supply terminal.
16	DI	Data input terminal from the microprocessor.
17	CLK	Clock input terminal from the microprocessor.
18	VSS	Ground terminal.

LB1639 (Volume Motor Drive)

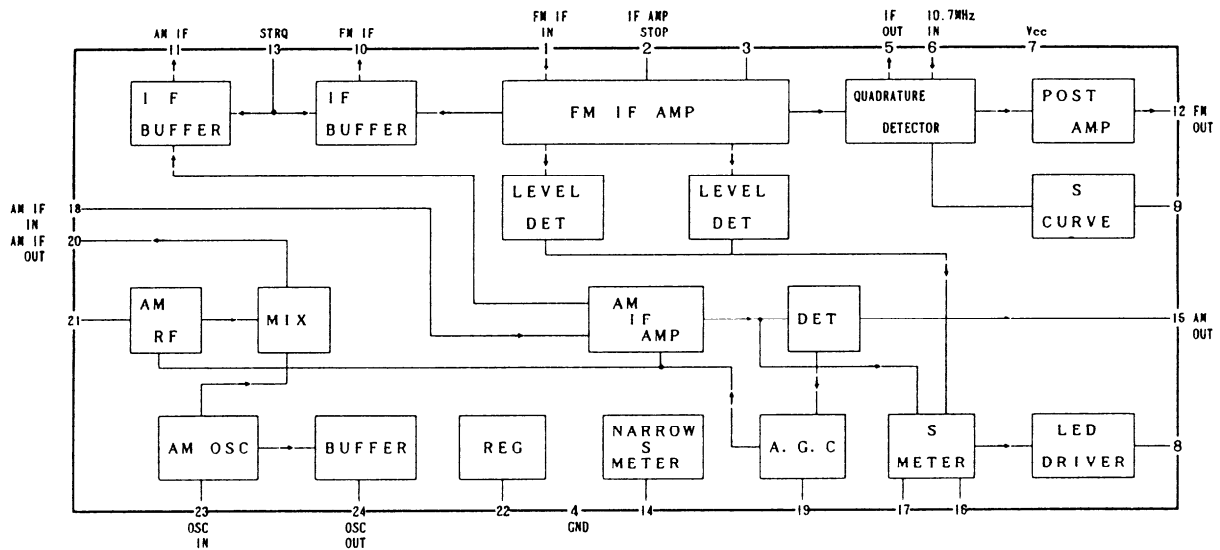


VIN1	VIN2	VOUT1	VOUT2	
H	L	H	L	CD
L	H	L	H	CCD
H	H	OFF	OFF	STOP
L	L	OFF	OFF	STOP

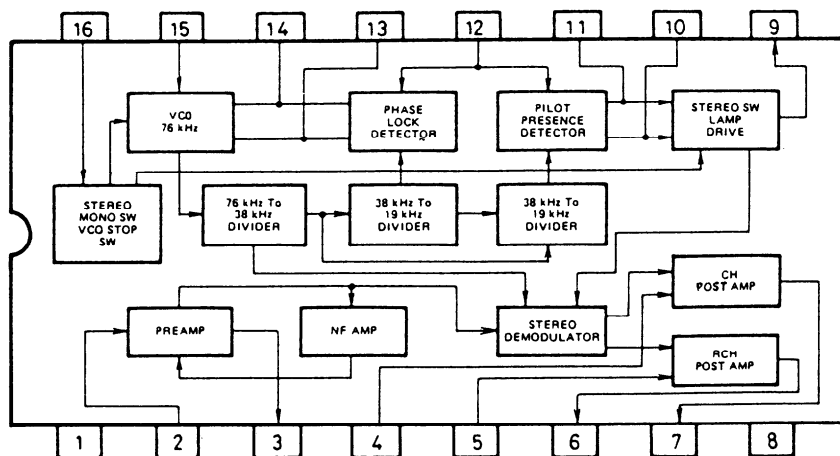
μPC1225H (Power Amplifier Driver)



LA1266 (FM IF and AM Radio System)



AN7470 (FM Stereo Decoder)



ADJUSTMENT PROCEDURES

Preparation

• Input

FM mono: 1kHz, 75kHz devi., 60dB/ μ V

FM stereo: 1kHz, L+R 67.5kHz devi.: Pilot signal
19kHz 7.5kHz devi.

AM: 400Hz, 30% mod.,

• Output

Connect the non-inductive type resistor of 8 ohms to the speaker terminal A of left and right channels unless otherwise noted.

• Standard knob position

Input selector CD
MUTING/LOUDNESS OFF
VOLUME/BALANCE Maximum
BASS/TREBLE CENTER
TAPE MONITOR OFF

Clock Frequency adjustment

Set the input selector switch to FM.

Set the tuning to 99.1 MHz.

Short between terminals +B and FADJ with the short clip, and connect the frequency counter to terminal F-OUT.

Adjust C751 so that the counter reading becomes $1,048,576 \pm 3$ Hz.

After adjustment, disconnect the short clip and frequency counter.

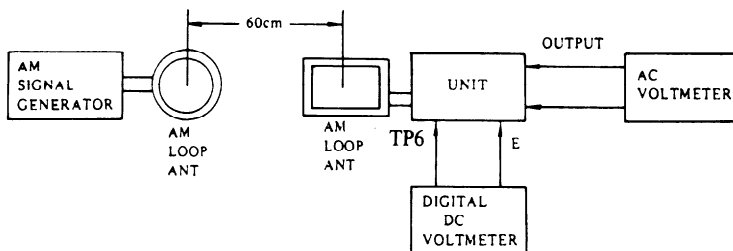
FM section

Item	Step	Connection of instrument	FM SG output	Stereo modulator output	Turning dial setting	Output indicator	Adjustment	Adjust for
FM IF	1	Fig. 1	99.1 MHz 1kHz, 75kHz devi. 65dBf (60dB)	-	99.1 MHz	DC voltmeter	L101	0V ± 30mV
	2							Distortion analyzer
TUNED indicator level	1	Fig. 3	99.1MHz 19.2dBf (14dB) (120V model) 21.2dBf (16dB) (Other models)	-	99.1 MHz	Oscilloscope	R101	Output
	2		99.1MHz 18.2dBf (13dB) (120V model) 20.2dBf (15dB) (Other models)					No output
VCO		Fig. 2	98.00MHz 1kHz, 75kHz devi. 65dBf (60dB)	-	98.00MHz	Frequency counter	R201	19kHz ± 10Hz
Stereo Distortion		Fig. 3	98.00MHz 65dB (60dB) Ext. modulation	L or Rch. 1kHz	98.00MHz	Distortion analyzer	IF on the front end	Minimum

AM section

Step	AM SG output	Tuned frequency	Output indicator	Adjustment point	Adjust for
1		522kHz (530kHz)	Digital DC voltmeter	OSC on RF block (L151)	1.3V ± 0.1V
2	603kHz (600kHz) 400Hz 30% mod. 60dB/m	603kHz (603kHz)	AC voltmeter	RF on RF block (L151)	Maximum
3	999kHz (990kHz) 400Hz 30% mod. 60dB/m	999kHz (999kHz)	AC voltmeter	L152	Maximum

() : 120V model



Reference specifications

FM Tuned voltages	87.50MHz 1.6 ± 0.5V	} 50k	
	108.00MHz 8.0 ± 0.5V		
	87.9MHz		} 10k
	107.9MHz		
Auto stop level	AM: Less than 68dB/m		
	FM: Less than 18 dBμ		
AM Tuned voltage	522kHz 1.3 ± 0.5V	} 9k	
	1611kHz 7.2 ± 0.5V		
	530kHz 1.3 ± 0.5V		} 10k
	1710kHz 7.6 ± 0.5V		

Adjustment	Adjust for	Remarks
	$0V \pm 30mV$	Mode switch: MONO Repeat the steps 1 and 2 until no further adjustment is necessary
	Minimum	
	Output	Mode switch: AUTO Remove R102 when this adjustment can not.
	No output	
	$19kHz \pm 10Hz$	Mode switch STEREO
Phase	Minimum	Don't turn more than $\pm 180^\circ$

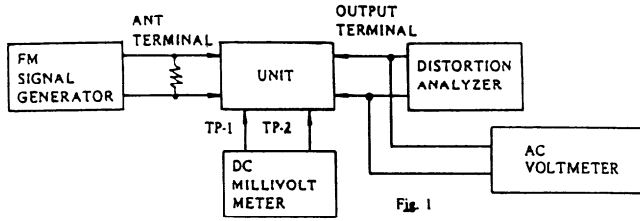
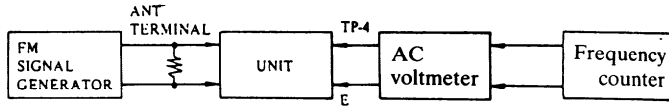


Fig. 1



Use the high impedance probe. (10:1)

Fig. 2

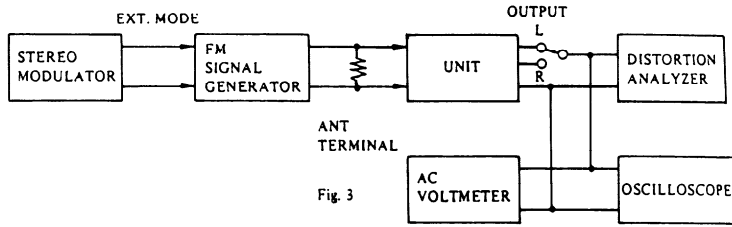
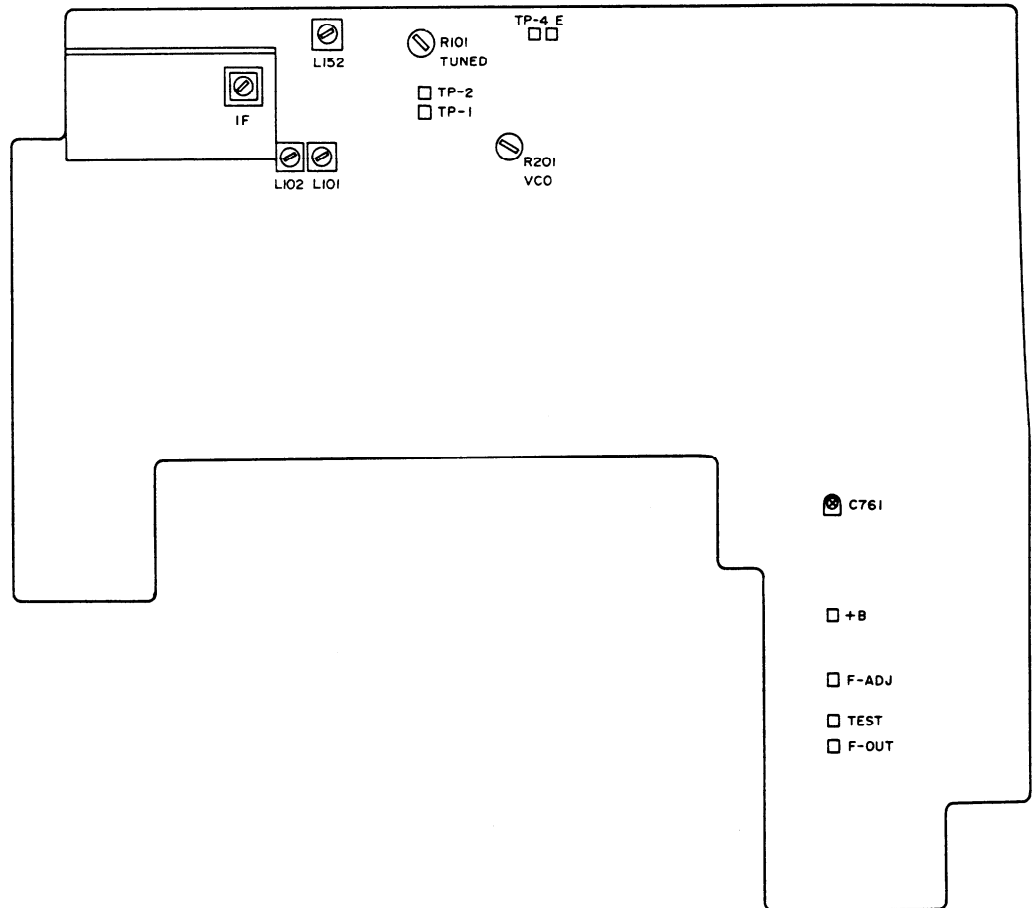


Fig. 3

- ns
- 87.50MHz $1.6 \pm 0.5V$ } 50kHz step models
- 108.00MHz $8.0 \pm 0.5V$ }
- 87.9MHz } 100kHz step models
- 107.9MHz }
- AM: Less than 68dB/m
- FM: Less than 18 dB μ
- 522kHz $1.3 \pm 0.5V$ } 9kHz step models
- 1611kHz $7.2 \pm 0.5V$ }
- 530kHz $1.3 \pm 0.5V$ } 10kHz step models
- 1710kHz $7.6 \pm 0.5V$ }



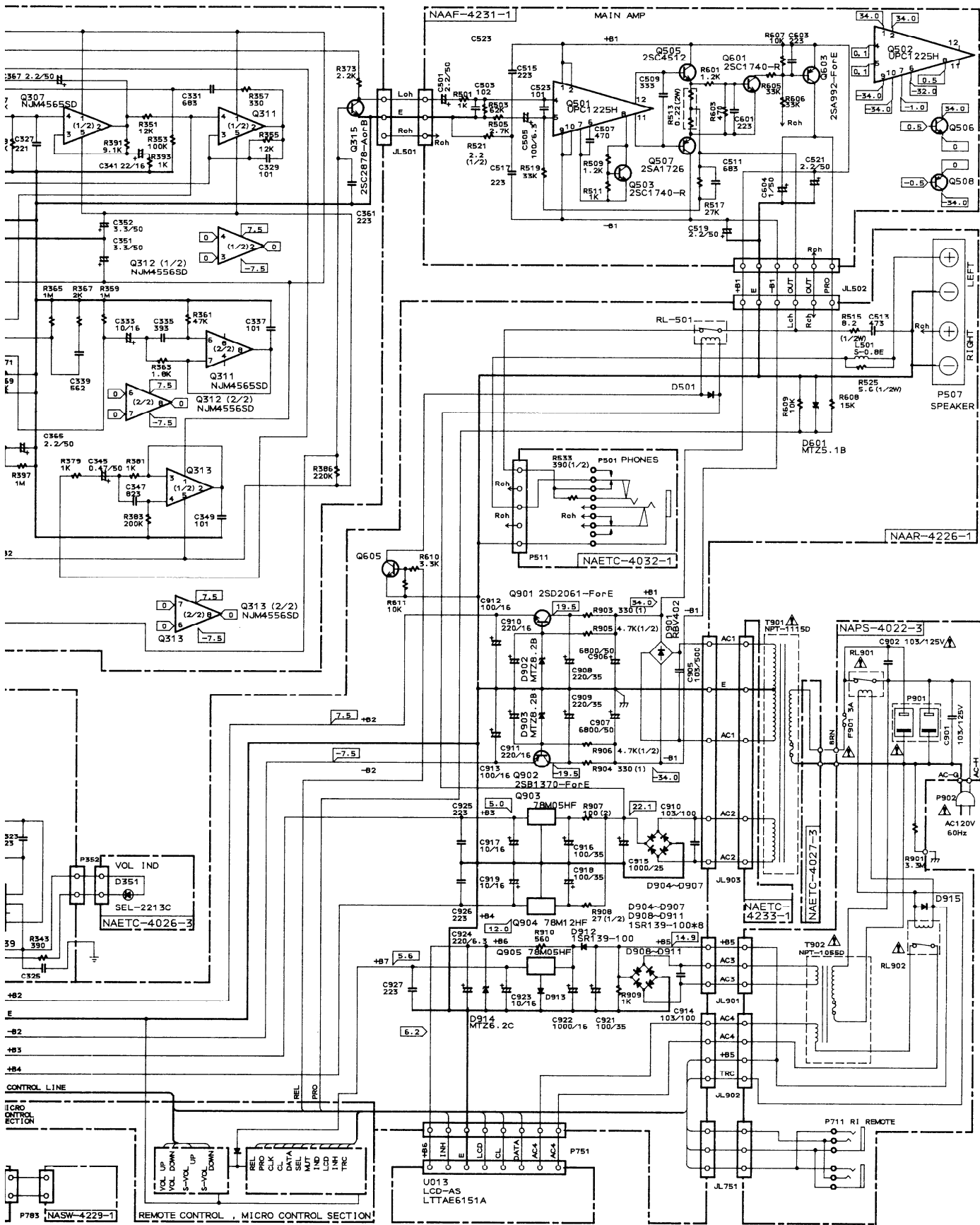
D

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G

H



A

B

C

D

SCHEMATIC DIAGRAM

-120V MODEL -

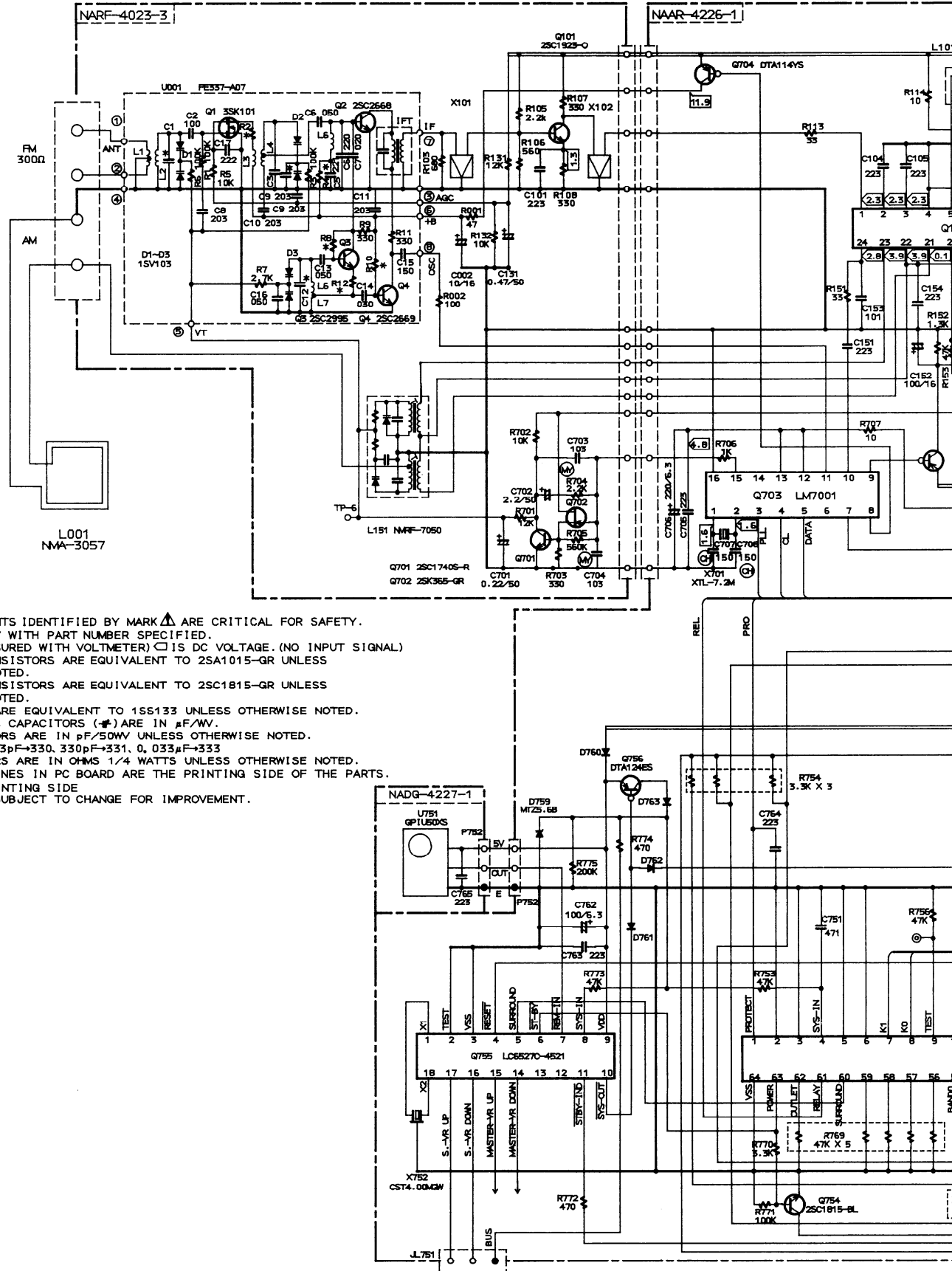
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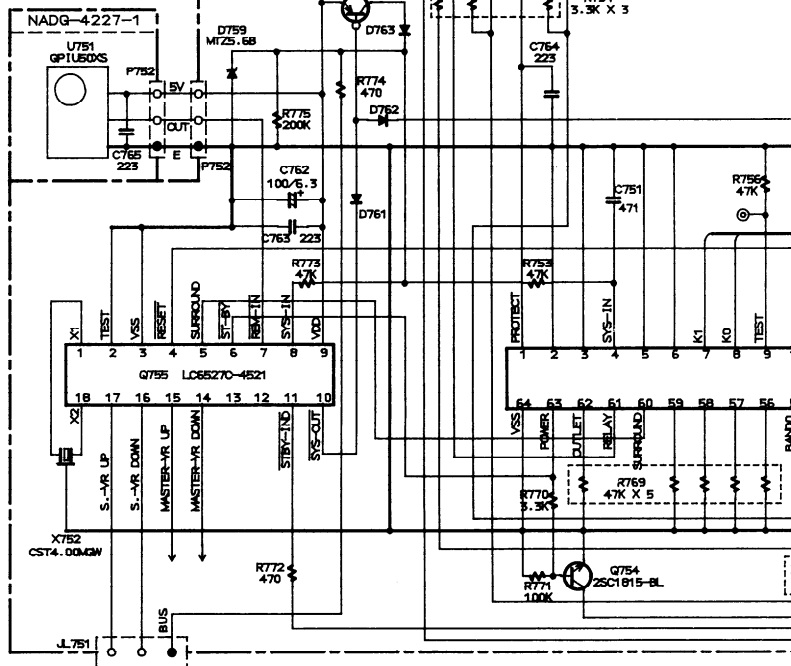
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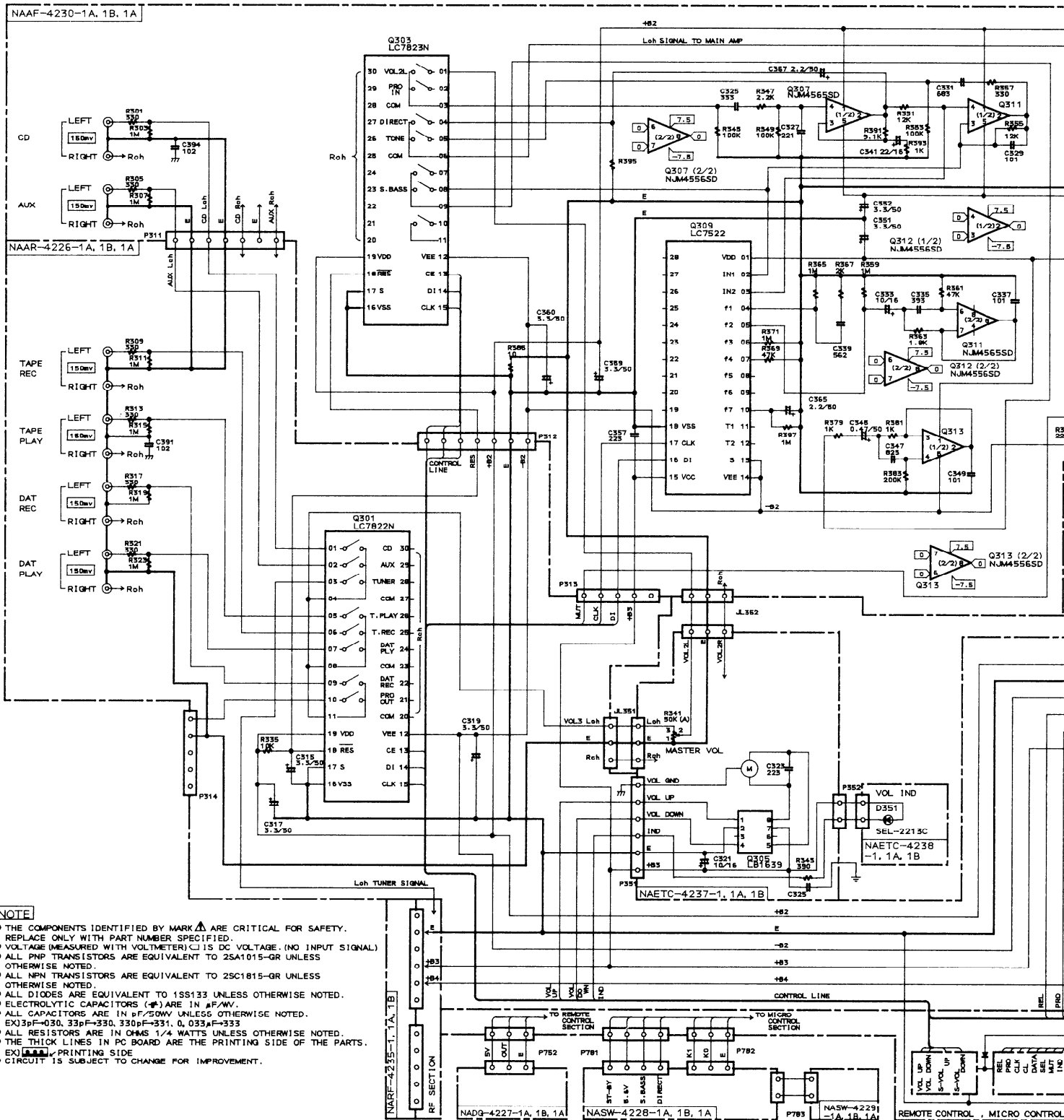
NOTE

- THE COMPONENTS IDENTIFIED BY MARK \blacktriangle ARE CRITICAL FOR SAFETY. REPLACE ONLY WITH PART NUMBER SPECIFIED.
- VOLTAGE (MEASURED WITH VOLTMETER) \square IS DC VOLTAGE. (NO INPUT SIGNAL)
- ALL PNP TRANSISTORS ARE EQUIVALENT TO 2SA1015-GR UNLESS OTHERWISE NOTED.
- ALL NPN TRANSISTORS ARE EQUIVALENT TO 2SC1815-GR UNLESS OTHERWISE NOTED.
- ALL DIODES ARE EQUIVALENT TO 1SS133 UNLESS OTHERWISE NOTED.
- ELECTROLYTIC CAPACITORS (+) ARE IN $\mu\text{F/WV}$.
- ALL CAPACITORS ARE IN pF/50WV UNLESS OTHERWISE NOTED.
- EX) 3pF→030, 33pF→330, 330pF→331, 0.033 μF →333
- ALL RESISTORS ARE IN OHMS 1/4 WATTS UNLESS OTHERWISE NOTED.
- THE THICK LINES IN PC BOARD ARE THE PRINTING SIDE OF THE PARTS.
- EX) --- PRINTING SIDE
- CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.



SCHEMATIC DIAGRAM

— OTHER MODEL —



NOTE

- THE COMPONENTS IDENTIFIED BY MARK Δ ARE CRITICAL FOR SAFETY. REPLACE ONLY WITH PART NUMBER SPECIFIED.
- VOLTAGE (MEASURED WITH VOLTMETER) \square IS DC VOLTAGE. (NO INPUT SIGNAL)
- ALL PNP TRANSISTORS ARE EQUIVALENT TO 2SA1015-GR UNLESS OTHERWISE NOTED.
- ALL NPN TRANSISTORS ARE EQUIVALENT TO 2SC1815-GR UNLESS OTHERWISE NOTED.
- ALL DIODES ARE EQUIVALENT TO 1S5133 UNLESS OTHERWISE NOTED.
- ELECTROLYTIC CAPACITORS (Φ) ARE IN μ F/WV.
- ALL CAPACITORS ARE IN pF/50WV UNLESS OTHERWISE NOTED.
- ALL RESISTORS ARE IN OHMS 1/4 WATTS UNLESS OTHERWISE NOTED.
- THE THICK LINES IN PC BOARD ARE THE PRINTING SIDE OF THE PARTS.
- EX) \square PRINTING SIDE
- CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.

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2
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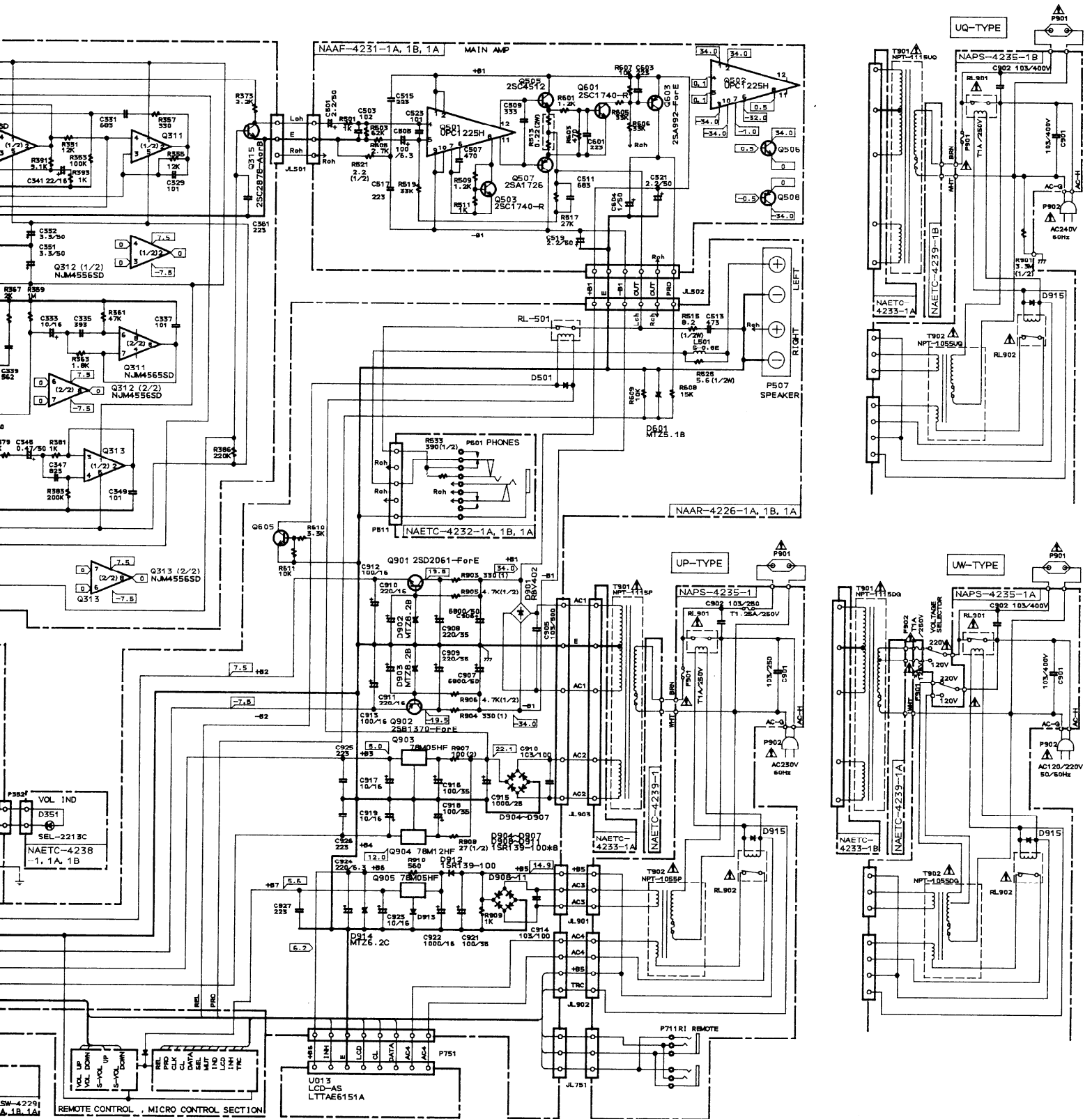
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SCHEMATIC DIAGRAM

- OTHER MODEL -

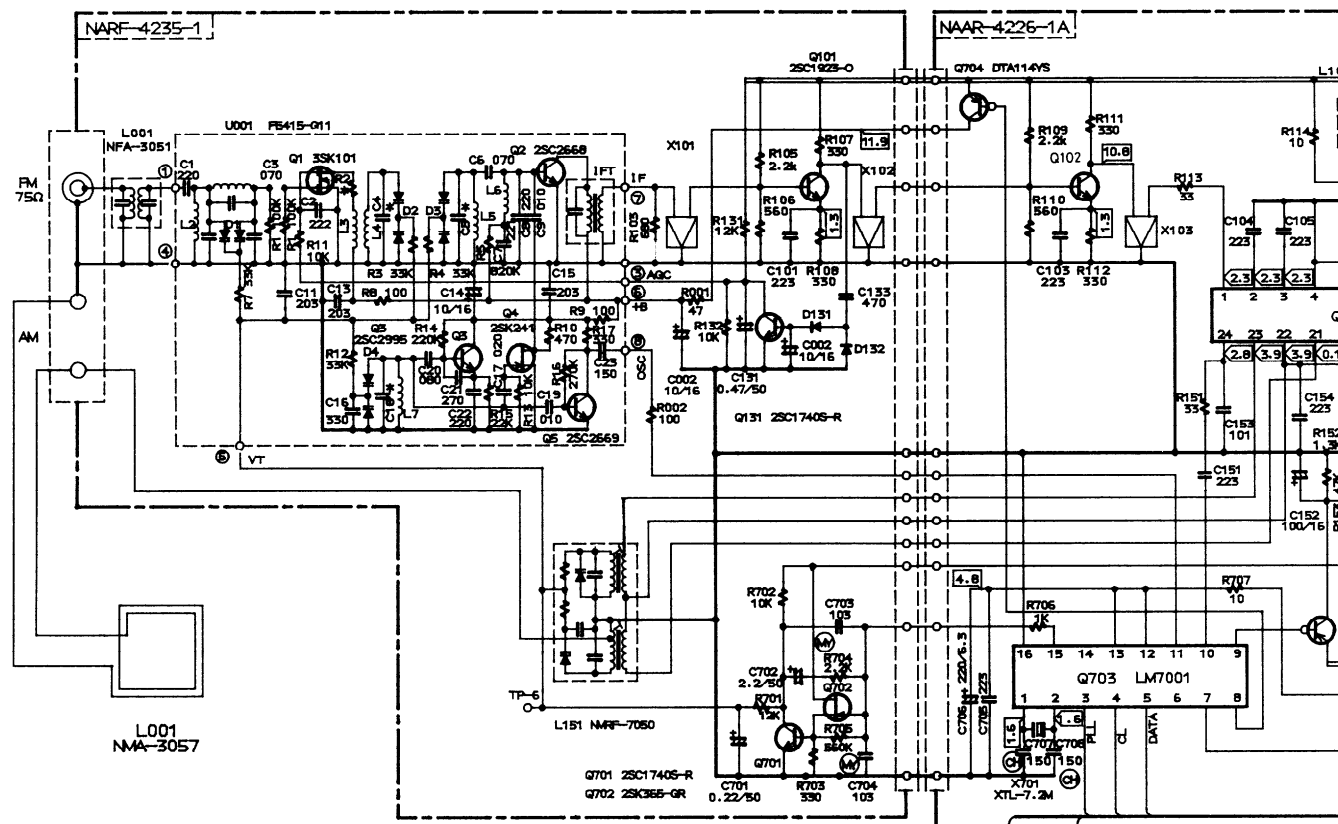
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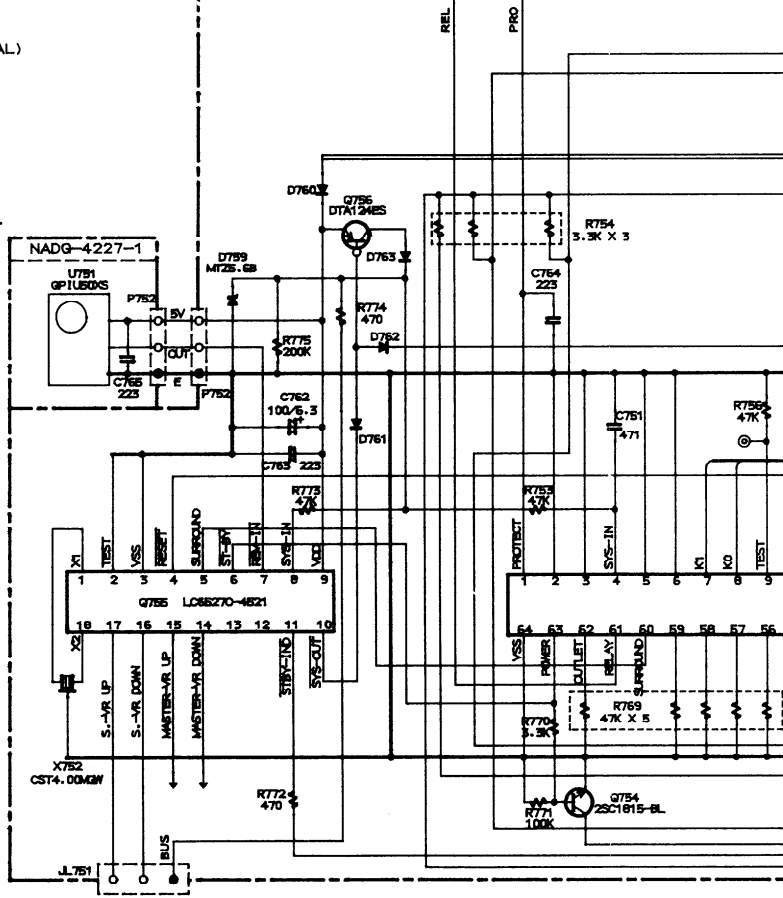
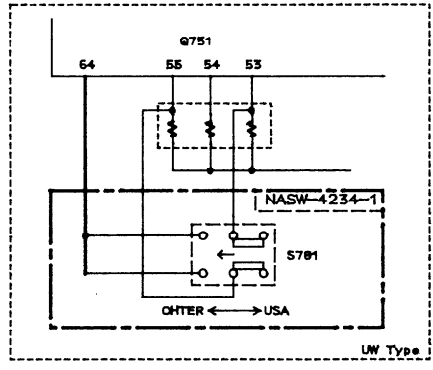
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- NOTE**
- THE COMPONENTS IDENTIFIED BY MARK Δ ARE CRITICAL FOR SAFETY. REPLACE ONLY WITH PART NUMBER SPECIFIED.
 - VOLTAGE (MEASURED WITH VOLTMETER) \square IS DC VOLTAGE. (NO INPUT SIGNAL)
 - ALL PNP TRANSISTORS ARE EQUIVALENT TO 2SA1015-GR UNLESS OTHERWISE NOTED.
 - ALL NPN TRANSISTORS ARE EQUIVALENT TO 2SC1815-GR UNLESS OTHERWISE NOTED.
 - ALL DIODES ARE EQUIVALENT TO 1SS133 UNLESS OTHERWISE NOTED.
 - ELECTROLYTIC CAPACITORS (⊕) ARE IN $\mu\text{F/WV}$.
 - ALL CAPACITORS ARE IN pF/50WV UNLESS OTHERWISE NOTED. EX) 3pF→030, 33pF→330, 330pF→331, 0.033 μF →333
 - ALL RESISTORS ARE IN OHMS 1/4 WATTS UNLESS OTHERWISE NOTED.
 - THE THICK LINES IN PC BOARD ARE THE PRINTING SIDE OF THE PARTS. EX) \square PRINTING SIDE
 - CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.

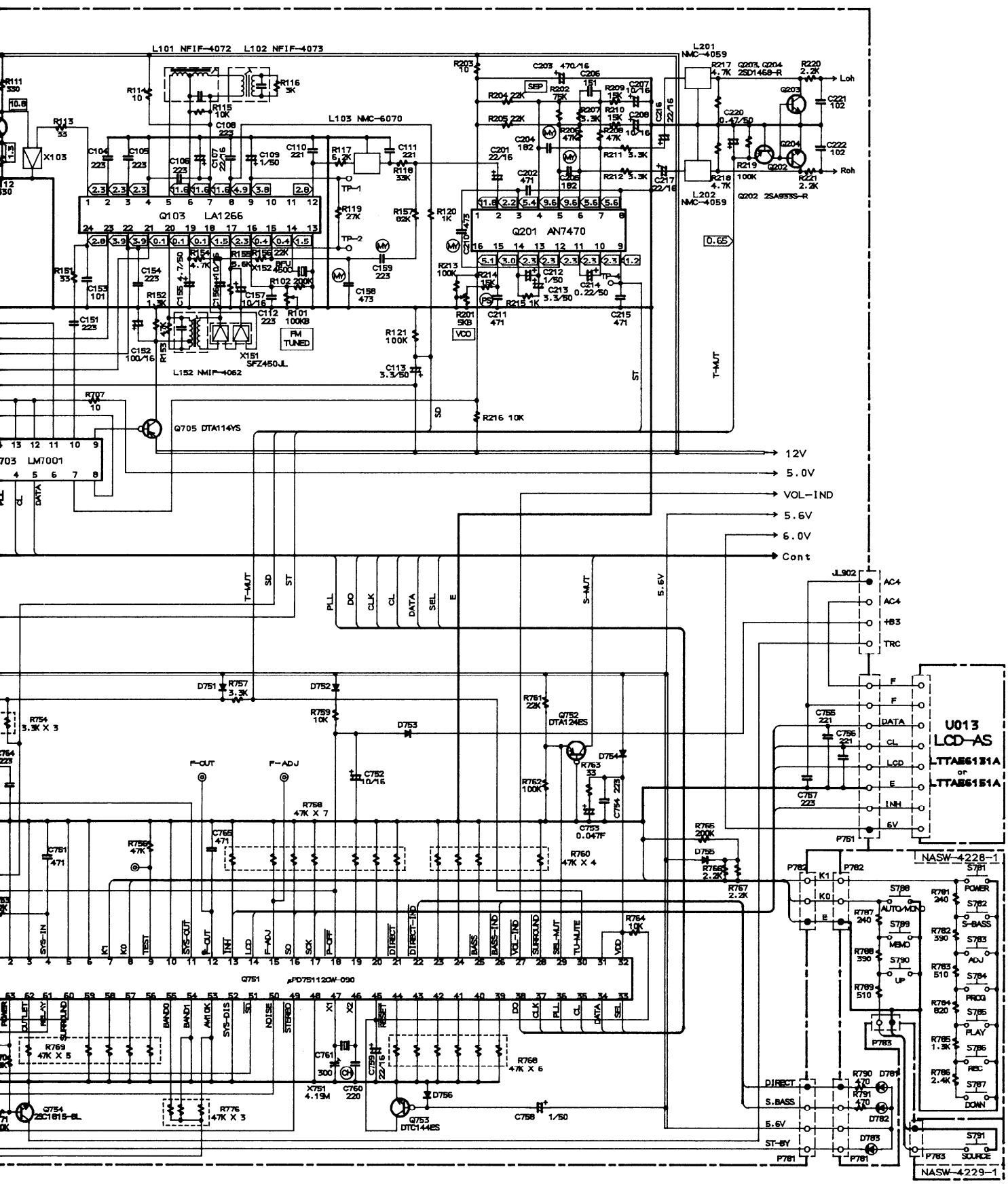


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PRINTED CIRCUIT BOARD PARTS LIST

POWER SUPPLY CIRCUIT PC BOARD(NAPS-4022-3/ NAPS-4235-1/1A/1B)

CIRCUIT NO.	PART NO.	DESCRIPTION
D915	223163	1SS133,Diode
T902	2300691	▲ NPT-1055D, Power transformer <D>
	2300692	▲ NPT-1055P, Power transformer <P>
	2300693	▲ NPT-1055DG, Power transformer <W>
	2300694	▲ NPT-1055Q, Power transformer <Q>
C901,C902	3500065A	▲ DE7150FZ103PAC400V/ 125V,Capacitor IS
R901	431523355	▲ 3.3M Ω ,1/2W,Solid resistor <D>
RL901	25065269	▲ NRL-1P5A-DC12-36,Relay <D>
RL901	25065248	▲ NRL-1P5A-DC12-29,Relay <P/W/Q>
RL902	25065269	▲ NRL-1P5A-DC12-36,Relay
F901	252048	▲ 3A(ST-6),Primary fuse <D/W>
	252070	▲ 1A-SE-EAK,Primary fuse <P/Q>
F902	252071	▲ 1.25A-SE-EAK <P/W>
F901a	250113	▲ SN5051,Fuseholders <D/W>
	25050065	▲ YSH403T,Fuseholders <P/Q>
F902a	25050065	▲ YSH403T,Fuseholders <P/W>
P901	25050409	▲ NSCT-4P234,AC outlet <D>
JL711a,JL901a	25050267	NSCT-3P95,Sockets
JL902a	25050268	NSCT-4P96,Socket
P711	25045172	HSJ1003-01-02,Terminal RI
C901a	27301216	▲ SB1925A,Cover
C902a	27301216	▲ SB1925A,Cover <P/W/Q>
	29360398	▲ Fuse rating label <P/W/Q>
F901b	29361341	▲ Fuse rating label <W>
	28175137	Insulator plate

TUNER CIRCUIT PC BOARD(NARF-4023-3/ NARF-4236-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Front end	
U001	240088	FE337-A07
	240089	FE415-G11
	Transistors	
Q101	2211723	2SC1923-O
Q131	2213284	2SC1740S-R <P/W/Q>
Q701	2213284	2SC1740S-R
Q702	2212445	2SK365-GR
	Diodes	
D131,D132	223132	1K60 <P/W/Q>
	Coil	
L001	233312	NFA-3051 <P/W/Q>
	RF block	
L151	232148	NMRF-7050,AM
	Ceramic filters	
X101,X102	3010071	SFE10.7MA5 <D>
	3010137	SFE10.7MMK <P/W/Q>
	Capacitors	
C002	354741009	10 μ F,16V,Elect.
C131	354784799	0.47 μ F,50V,Elect.
C132	354742209	22 μ F,16V,Elect. <P/W/Q>
C701	354782299	0.22 μ F,50V,Elect.

CIRCUIT NO.	PART NO.	DESCRIPTION
	Capacitors	
C702	354780229	2.2 μ F,50V,Elect.
C703,C704	371121034	0.01 μ F \pm 5%,50V,Mylar
	Sockets	
P111	25050301	NSCT-5P128
P112	25050302	NSCT-6P129
	Terminal	
	25060157	NTM-4PDML083,Antenna <D>
	25060117	NTM-2PDML051, Antenna <P/W/Q>

VOLUME CIRCUIT PC BOARD(NAETC-4025-3/ NAETC-4237-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
Q305	22240322	LB1639,IC
C321	354741009	10 μ F,16V,Elect. capacitor
R341,R342	5104261	N16RGM50KA25F, Variable resistor
JL352A	25050267	NSCT-3P95,Socket
P351	25050444	NSCT-6P268,Socket
P352	2000635A	NASA-4P591,Socket

VOLUME INDICATOR PC BOARD(NAETC-4026-3/ NAETC-4238-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
D351	225141	SEL2213C,L.E.D
	27190545	Holder L.E.D

MAIN CIRCUIT PC BOARD(NAAR-4226-1/1A/1B)

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q103	22240039	LA1266
Q201	22240242	AN7470
Q301	22240270	LC7822N
Q703	22240090	LM7001
Q751	22240482	μ PD75112CW-115
Q755	22240384	LC6527C-4521
Q903,Q905	222780055NEC	78M05HF
Q904	222780125NEC	78M12HF
	Transistors	
Q102	2210746	2SC945A-P <P/W/Q>
Q202	2213354	2SA933S-R
Q203,Q204	2212794	2SD1468-R
Q605,Q754	2211256	2SC1815-BL
Q704,Q705	2213090	DTA114YS
Q752	2212600	DTA124ES
Q753	221282	DTC144ES
Q756	2212600	DTA124ES
Q901	2202115 or 2202116	2SD2061-E or 2SD2061-F
Q902	2202176 or 2202175	2SB1370-F or 2SB1370-E
	Diodes	
D501,D913	223163	1SS133
D601	224450512	MTZ5.1B
D751-D756	223163	1SS133
D759	224450562	MTZ5.6B
D760-D763	223163	1SS133
D901	22380022	RBV402
D902,D903	224450822	MTZ8.2B
D904-D912	22380032	1SR139-100
D914	224450623	MTZ6.2C

CIRCUIT NO.	PART NO.	DESCRIPTION	CIRCUIT NO.	PART NO.	DESCRIPTION
	Transformers			Resistors	
L101	233401	NFIF-4072	R101	5210070 or	N06HR100KBD,Semi-fixed
L102	233402	NFIF-4073		5210221	N06HR100KBD,Semi-fixed
L152	232139	NMIF-4062	R201	5210062 or	N06HR4.7KBD,Semi-fixed
	Coils			5210216	N06HR5KBD,Semi-fixed
L103	233383	NMC-6070 <P/W/Q>	R515,R516	442520824	8.2 Ω ,1/2W,Metal oxide film
L201,L202	233355A	NMC-4059 <P/W/Q>	R525,R526	442520564	5.6 Ω ,1/2W,Metal oxide film
L501,L502	231001	S1.3B	R754	49163332403	3.3k Ω \times 3,1/10W,Network
	Ceramic filters		R758	49163473407	47k Ω \times 7,1/10W,Network
X103	3010137	SFE10.7MMK <P/W/Q>	R760	49163473404	47k Ω \times 4,1/10W,Network
X151	3010123	SFZ450JL	R768	49163473406	47k Ω \times 6,1/10W,Network
X152	3010076	BFU450C	R769	49163473405	47k Ω \times 5,1/10W,Network
	X'tals		R776	49163473403	47k Ω \times 3,1/10W,Network
X701	3010141	XTL-7.2M	R903,R904	441623314	330 Ω ,1W,Metal oxide film
X751	3010121A	XTL-4.19M	R905,R906	442524724	4.7k Ω ,1/2W,Metal oxide film
	Ceramic oscillator		R907	441721014	100 Ω ,2W,Metal oxide film
X752	3010150	CST4.00MGW	R908	442522704	27 Ω ,1/2W,Metal oxide film
	Capacitors			Relay	
C107	354742209	22 μ F,16V,Elect.	RL501	25065339	NRL-2P5ADC24-046
C109	354780109	1 μ F,50V,Elect.		Plugs	
C113	354780339	3.3 μ F,50V,Elect.	P111a	25055257	NPLG-5P240
C152	354741019	100 μ F,16V,Elect.	P112a	25055258	NPLG-7P241
C155	354780479	4.7 μ F,50V,Elect.	P311a,P312a	25055259	NPLG-7P242
C156,C157	354741009	10 μ F,16V,Elect.	P313a	25055257	NPLG-5P240
C158	371124734	0.047 μ F \pm 5%,50V,Mylar	P351a	25055497	NPLG-6P472
C159	371122234	0.022 μ F \pm 5%,50V,Mylar		Sockets	
C201	354742209	22 μ F,16V,Elect.	JL351a	25050267	NSCT-3P95
C203	354744719	470 μ F,16V,Elect.	P751	2009990169	NSAS-16P0239
C204,C205	371121824	1800pF \pm 5%,50V,Mylar <D>		Terminals	
	371121224	1200pF \pm 5%,50V,Mylar <P/Q>	P301,P302	25045340	NPJ-4PDBL191
	371121524	1500pF \pm 5%,50V,Mylar <W>	P501	25060144	NTM-4PDMLO72
C207,C208	354741009	10 μ F,16V,Elect.		REMOTE CONTROL SENSOR PC BOARD(NADG-4227-1)	
C210	371124734	0.047 μ F \pm 5%,50V,Mylar	CIRCUIT NO.	PART NO.	DESCRIPTION
C211	370134714	470pF \pm 5%,100V,Plastic	U751	24130003	GPU50XS,Remote control sensor
C212	354780109	1 μ F,50V,Elect.			NSAS-6P0200,Socket
C213	354780339	3.3 μ F,50V,Elect.	P752	2006340610	
C214	354782299	0.22 μ F,50V,Elect.		OPERATION SWITCH PC BOARD(NASW-4228-1)	
C216,C217	354742209	22 μ F,16V,Elect.	CIRCUIT NO.	PART NO.	DESCRIPTION
C220	354784799	0.47 μ F,50V,Elect.	D781-D783	225141	SEL2213C,L.E.Ds
C315,C317	354780339	3.3 μ F,50V,Elect.	P781	2006390815	NSAS-8P0201,Socket
C319	354780339	3.3 μ F,50V,Elect.	P782	2006320615	NSAS-6P0202,Socket
C513,C514	371124734	0.047 μ F \pm 5%,50V,Mylar	P783	2006390415A	NSAS-4P0203,Socket
C525,C526	374721024	1000pF \pm 5%,50V,Plastic <P/W/Q>	S781-S790	25035548	NPS-111-S510,Switches
	220 μ F,6.3V,Elect.			27190740	Holder
C706	354722219	10 μ F,16V,Elect.		OPERATION SWITCH PC BOARD(NASW-4229-1)	
C752	354741009	0.047F,5.5V,Super	CIRCUIT NO.	PART NO.	DESCRIPTION
C753,C923	3000051	1 μ F,50V,Elect.	S791	25035548	NPS-111-S510,Switch
C758	354780109	22 μ F,16V,Elect.		TONE AMPLIFIER PC BOARD(NAAF-4230-1/1A)	
C759	354742209	NTC-30P14,Trimmer	CIRCUIT NO.	PART NO.	DESCRIPTION
C761	3060016	100 μ F,6.3V,Elect.	Q303	22240339	LC7823N
C762	354721019	68000 μ F,50V,Elect.	Q307	22240273	NJM4565S-D
C906,C907	3504207	220 μ F,35V,Elect.	Q309	22240219	LC7522
C908,C909	354762219	220 μ F,16V,Elect.	Q311-Q313	22240273	NJM4565S-D
C910,C911	354742219	220 μ F,16V,Elect.		Transistors	
C912,C913	354741019	100 μ F,16V,Elect.	Q315,Q316	2212285 or	2SC2878-A or
C914,C920	379131035	0.01 μ F \pm 10%,100V,Plastic		2212286	2SC2878-B
C915	354751029	1000 μ F,25V,Elect.			
C916,C918	354761019	100 μ F,35V,Elect.			
C917,C919	354741009	10 μ F,16V,Elect.			
C921	354761019	100 μ F,35V,Elect.			
C922	354741029	1000 μ F,16V,Elect.			
C924	354722219	220 μ F,6.3V,Elect.			

CIRCUIT NO.	PART NO.	DESCRIPTION
	Capacitors	
C325,C326	374723334	0.033 μ F \pm 5%,50V,Plastic
C331,C332	374726834	0.068 μ F \pm 5%,50V,Plastic
C333,C334	354741009	10 μ F,16V,Elect.
C335,C336	374723934	0.039 μ F \pm 5%,50V,Plastic
C339,C340	374725624	5600pF \pm 5%,50V,Plastic
C341,C342	354742209	22 μ F,16V,Elect.
C345,C346	354784799	0.47 μ F,50V,Elect.
C347,C348	374728234	0.082 μ F \pm 5%,50V,Plastic
C351,C353	354780339	3.3 μ F,50V,Elect.
C359,C360	354780339	3.3 μ F,50V,Elect.
C365-C368	391780229	2.2 μ F,50V,Elect.
	Terminal	
P303	25045340	NPJ-4PDBL191
	Sockets	
P311,P312	25050303	NSCT-7P130
P313	25050301	NSCT-5P128

MAIN AMPLIFIER CIRCUIT PC BOARD(NAAF-4231-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q501,Q502	22240108	μ PC1225H
	Transistors	
Q503,Q504	2213284	2SC1740S-R
Q505,Q506	2202303,	* 2SC4512-O,
	2202304 or	* 2SC4512-Y or
	2202305	* 2SC4512-P
Q507,Q508	2202313,	* 2SA1726-O,
	2202314 or	* 2SA1726-Y or
	2202315	* 2SA1726-P
Q601,Q602	2213284	2SC1740S-R
Q603	2211792 or	2SA992-F or
	2212793	2SA992-E
	Capacitors	
C501,C502	391780229	2.2 μ F,50V,Elect.
C503,C504	374721024	1000pF \pm 5%,50V,Plastic
C505,C506	354721019	100 μ F,6.3V,Elect.
C509,C510	371123334	0.033 μ F \pm 5%,50V,Mylar
C511,C512	371126834	0.068 μ F \pm 5%,50V,Mylar
C515,C517	374722234	0.022 μ F \pm 5%,50V,Plastic
	Capacitors	
C519,C521	354780229	2.2 μ F,50V,Elect.
C604	354780109	1 μ F,50V,Elect.
	Resistors	
R513,R514	4500027	0.22 Ω ,2W,Metal plate
R521	442520224	2.2 Ω ,1/2W,Metal oxide film

HEADPHONE AMPLIFIER PC BOARD(NAETC-4232-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
P501	25045310	LGS6517-0202,Headphone terminal
P511	25055319	NPLG-5P302,Plug
R533,R534	442523914	390 Ω ,1/2W,Metal oxide film resistors

NOTE: <D>: Only 120V model
 <P>: Only 230V model
 <W>: Only Worldwide model
 <Q>: Only 240V model

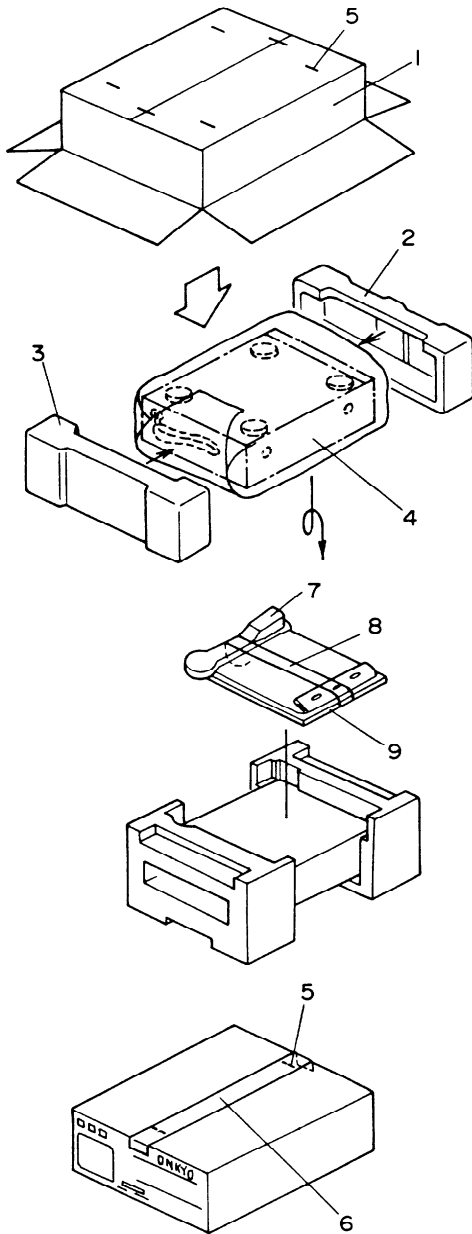
BAND SELECTOR SWITCH PC BOARD(NASW-4234-1)

(Only Worldwide model)

CIRCUIT NO.	PART NO.	DESCRIPTION
S781	25065267	NSS-22109,Slide switch

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

PACKING VIEW



REF.NO.	PART NO.	DESCRIPTION
1	29052220	Master carton box <T>
	29052221	Master carton box
2	29091508	Pad F
3	29091509	Pad B
4	29100123	430×550mm, Styrene bag
5	282301	Sealing hook
6	29110071	Damplon tape
7	24140212	RC-212S, Remote control transmitter
8	261504	Adhesive tape
9	Accessory ass'y	
	2010098A	Connection cord
	2010221	Connection cord RI
	292064B	FM antenna <D>
	292092	FM antenna <P/Q/W>
	232140	NMA-3057, AM loop antenna
	3010054	UM-3, Two batteries
	29341641	Instruction manual
	29341642	Instruction manual <PV/W>
	29341643	Instruction manual <PV/W>
	25060123	FM antenna adaptor <F/W/Q>
	25055018	CV-K-1, Conversion plug
	29100097	Styrene bag

MP-05 PACKING MATERIALS

PART NO.	DESCRIPTION
29052224	Master carton box <T>
29052225	Master carton box
29112020	Band

NOTE: <D>: Only 120V model
 <PV>: Only 230V model except Germany and French models
 <P>: Only 230V model
 <Q>: Only 240V model
 <W>: Only Worldwide model
 <F>: Only French model
 <T>: Only Titanium model
 : Only Black model

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