T–9090

SERIAL No. 3190

ONKYO SERVICE MANUAL

SYNTHESIZED
FM STEREO TUNER

MODEL T-9090

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ 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.

TABLE OF CONTENTS

ONKYO
AUDIO COMPONENTS

SPECIFICATIONS

(120V model)

Tuning Range:	87.9 – 107.9 MHz (200kHz steps)
Usable Sensitivity:	Mono: 12.8dBf, 1.2μV (75 ohms) Stereo: 17.2dBf, 2.0μV
50dB Quieting Sensitivity:	Mono: 15.8dBf, 1.7μV Stereo: 37.2dBf, 20μV
Capture Ratio:	1.0dB
Intermodulation:	110dB
Image Rejection Ratio:	100dB
IF Rejection Ratio:	100dB
Signal-to-Noise Ratio:	Mono: 95dB (IHF) Stereo: 85dB (IHF)
Alternate Channel Att:	80dB IHF (±400kHz, IF: super narrow)
AM Suppression Ratio:	60dB
Total Harmonic Distortion:	Mono: 0.009% (IF : wide) Stereo: 0.02% (IF : wide)
Frequency Response:	30 – 15,000Hz+0.5dB, –1.0dB
Stereo Separation:	55dB at 1kHz (IF : wide) 33dB at 70 – 10,000Hz (IF : wide)
Output Voltage:	0 – 1.5V

General

Power Supply:	AC120V, 60Hz
Antennas:	75 ohms unbalanced
Semiconductors:	FETs: 18 Transistors: 38 ICs: 22 Diodes: 86 LEDs: 41
Dimensions (W x H x D):	450 x 99 x 388mm (17 3/4" x 4" x 15 3/8")
Weight:	6.6 kg., 14.5 lbs.

(other models)

Tuning Range:	87.5 – 108.0 MHz (50kHz steps)
Usable Sensitivity:	Mono: 0.8μV (S/N 26dB, 40kHz Dev.) DIN Stereo: 20.0μV (S/N 46dB, 40kHz Dev.) DIN
50dB Quieting Sensitivity:	Mono: 15.8dBf, 1.7μV Stereo: 37.2dBf, 20μV
Capture Ratio:	1.0dB
Intermodulation:	110dB
Image Rejection Ratio:	100dB
IF Rejection Ratio:	100dB
Signal-to-Noise Ratio:	Mono: 95dB (IHF) Stereo: 85dB (IHF)
Selectivity:	80dB (±300kHz, IF : super narrow)
AM Suppression Ratio:	60dB
Total Harmonic Distortion:	Mono: 0.009% (IF : wide) Stereo: 0.02% (IF : wide)
Frequency Response:	30 – 15,000Hz+0.5dB, –1.0dB
Stereo Separation:	55dB at 1kHz (IF : wide) 33dB at 70 – 10,000Hz (IF : wide)
Output Voltage:	0–1.5V

General

Power Supply:	AC220V, 50Hz AC120/220V, 50/60Hz
Antennas:	75 ohms unbalanced (DIN socket)
Semiconductors:	FETs: 18 Transistors: 38 ICs: 22 Diodes: 86 LEDs: 41
Dimensions (W x H x D):	450 x 99 x 388mm (17 3/4" x 4" x 15 3/8")
Weight:	6.6 kg., 14.5 lbs.

- Specifications and features are subject to change without notice.

SERVICE PROCEDURES

1. Replacing the lamp

This unit uses the lamp listed below.

Circuit no.	Parts no.	Desciption
PL921	210064A	PL 6.3V, 250mA, Dial plate illumination

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 on the back panel.

Specification: 3.3MΩ ±10% at 500V

3. Change of De-emphasis

W models are equipped with a 50μsec-75μsec selector switch. This switch is located on the back panel. This switch is set to 50μsec at the factory, but may have to be reset to 75μsec depending on the area where the unit is used.

Europe: 50μsec

U.S.A.: 75μsec

4. Change of voltage

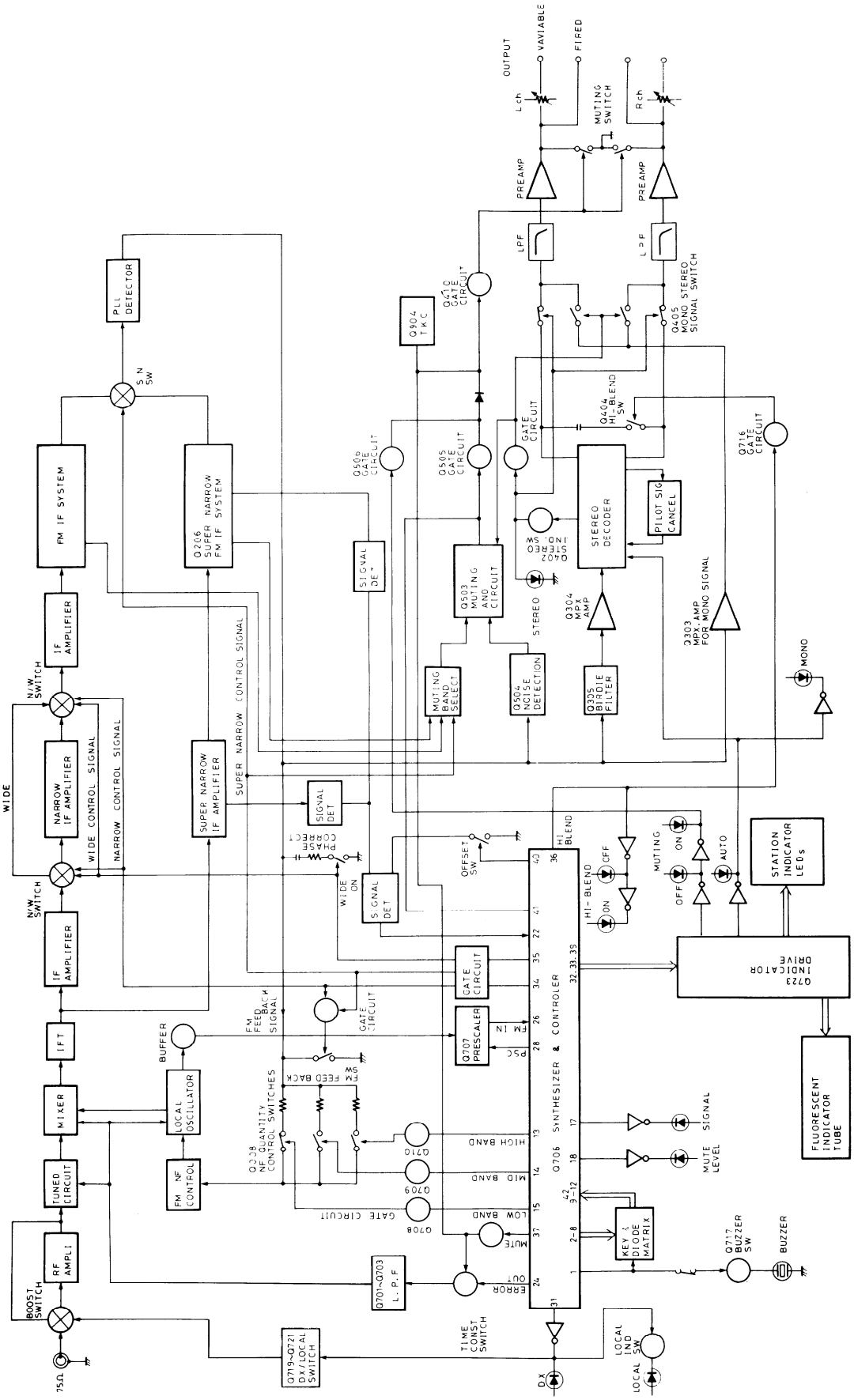
W models are equipped with a voltage selector to conform with local power supplies. This switch is located on the back panel. Be sure to set this switch to match the voltage of the power supply in your area before turning the power switch on.

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.

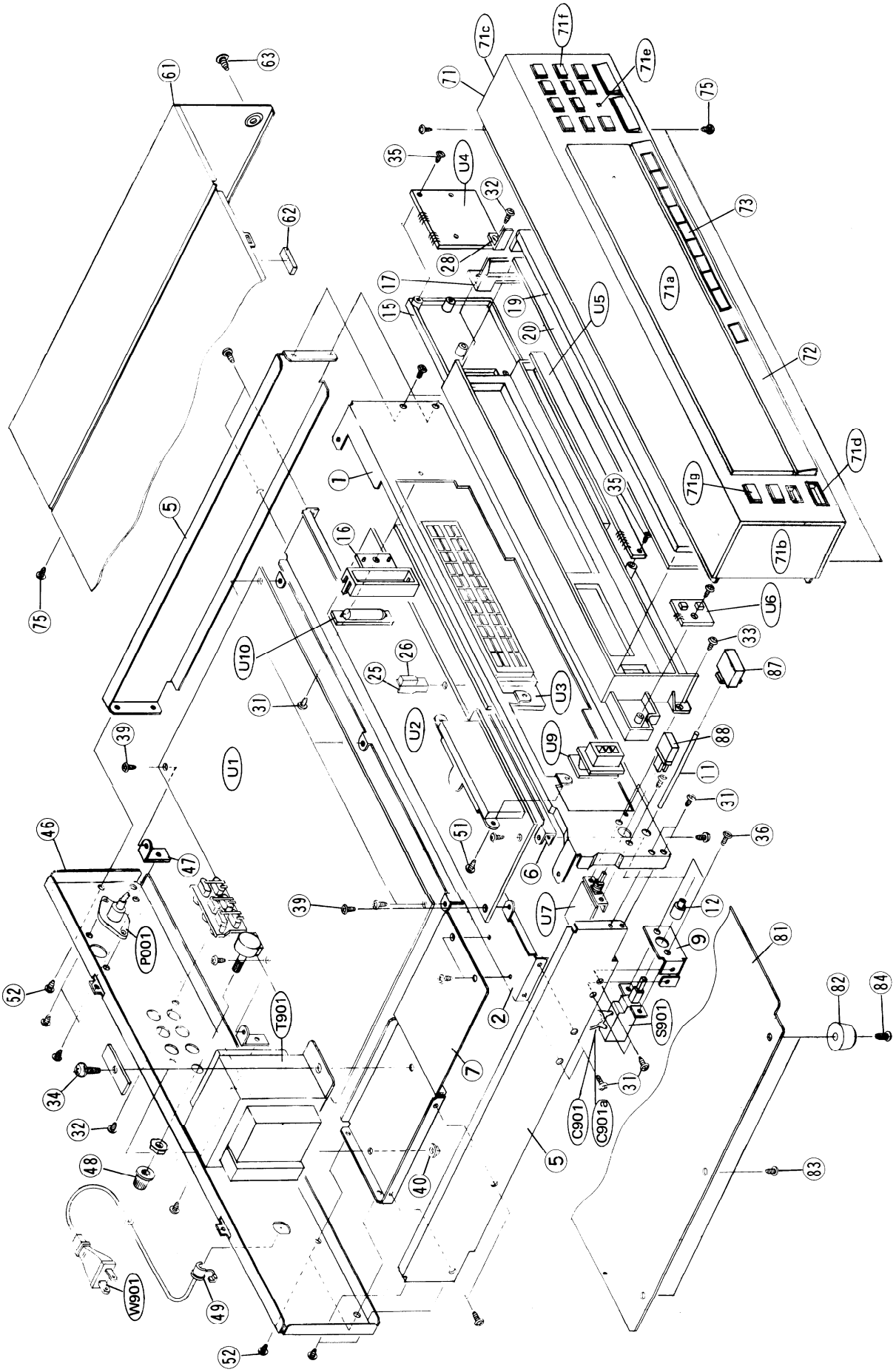
5. Memory Preservation

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 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.

BLOCK DIAGRAM



EXPLODED VIEW



PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
1	27110223A	Front bracket
2	27130359B	Bracket F
5	27115163	Side bracket
6	27130360	Bracket M
7	27130361A	Bracket, power transformer
9	27140913	Bracket, power switch
11	27160149B	Shaft
12	28320135	Connector
15	27190289A	Holder
16	27190290A	Holder, lamp
17	27190291	Holder, dial plate
19	28130218B	Dial plate
20	28133105A	Back plate
25	27140957	Bracket, holder
26	28140563	20×10×6mm, Cushion
27	28140564	25×5×1.5mm, Cushion
28	27140958	Bracket, pulley
31	834430068	3TTS+6B(BC), Tapping screw
32	834430108	3TTS+10B(BC), Tapping screw
33	831430088	3TTW+8B(BC), Tapping screw
34	830440109	4TTC+10C(BC), Tapping screw
35	834430080	3TTP+8P(BC), Tapping screw
36	82143006	3P+6FN(BC), Pan head screw
38	870065	Special washer
39	831130088	3TTW+8B, Tapping screw
40	86414010	FWN4×10FN, Flange nut
46	27120620A	Back panel [D]
	27120621A	Back panel [G]
	27120622A	Back panel [W]
47	27140914	Bracket, back
48	28320540	Knob L
49	270280	⚠ SR–4K–4, Strainrelief
51	834430068	3TTS+6B(BC), Tapping screw
52	801230	3TTS+8BQ(BC), Tapping screw
53	834230108	3TTS+10B(Ni), Nickel screw
54	82143006	3P+6FN(BC), Pan head screw
61	28184124-1A	Top cover
62	28140020	10×40×4, Cushion
63	838440089	4TTB+8C(BC), Tapping screw
71	18308121	Front panel ass'y
71a	28191262	Clear plate
71b	28125103	End cap L
71c	28125104	End cap R
71d	27267279	Guide, power
71e	28198592	Facet
71f	28321655B	Knob, tuning
71g	28321669A	Knob, timer

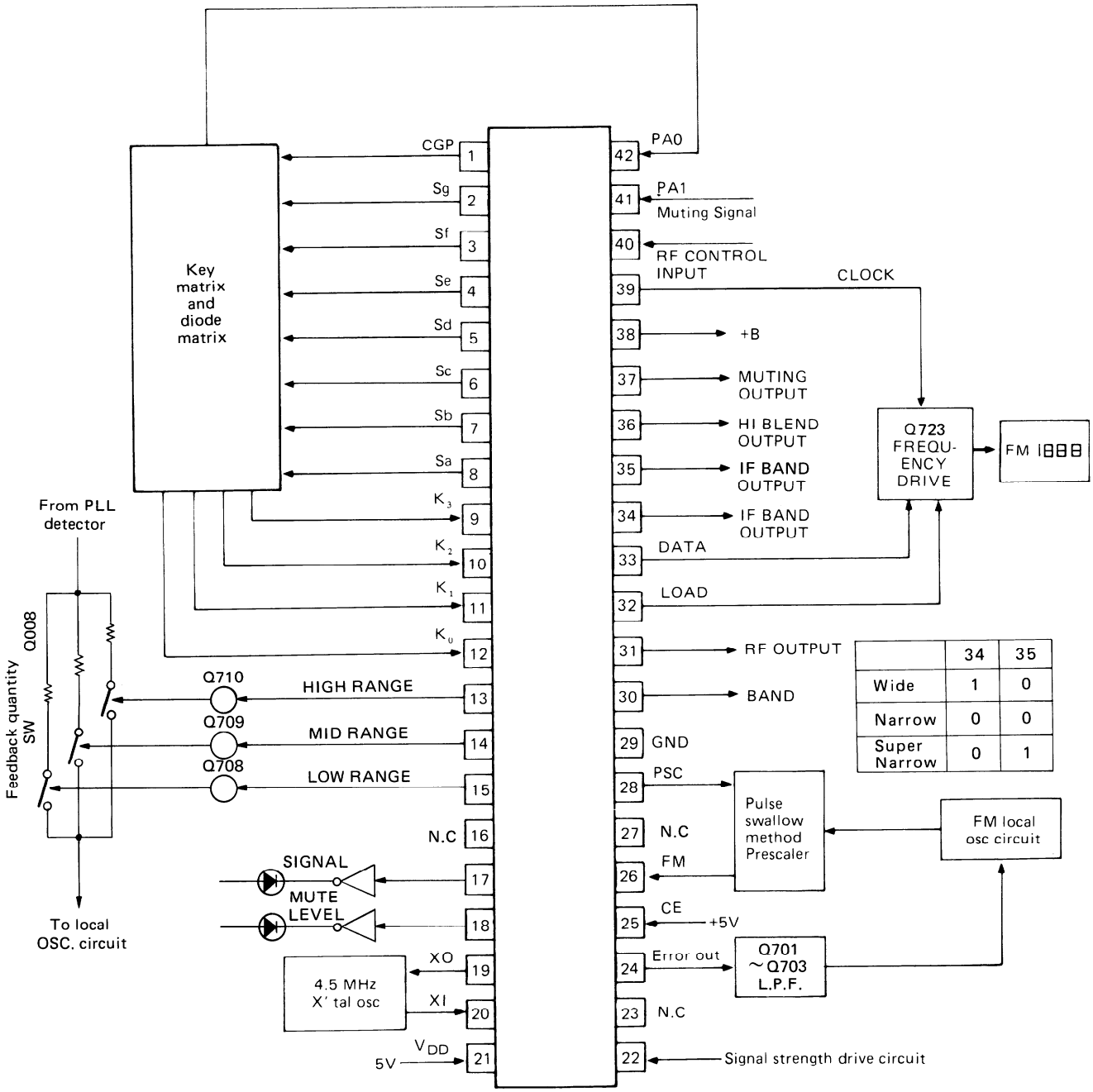
REF. NO.	PART NO.	DESCRIPTION
72	27262302A	Plate P
73	28321642A	Knob, preset
75	834430068	3TTS+6B(BC), Tapping screw
81	27170179	Bottom board
82	27175009A	T–C, Leg
83	831430088	3TTW+8B(BC), Tapping screw
84	834430108	3TTS+10B(BC), Tapping screw
87	28321394	Knob, power
88	28321672A	Knob, tone
C901	3500065A	⚠ 0.01μF, 125V/400V, AC, Capacitor IS
C901a	27300601	⚠ Cover for C901
P1	223004–1	B–5–1, Terminal
P001	25045156	Socket, antenna
R920	431523355	⚠ 3.3MΩ, 1/2W, Solid resistor [D]
S901	25035295	⚠ NPS–111–L261P, Power switch
S902	25065123	⚠ NSS–1258P, Voltage selector switch [W]
T901	230814	⚠ NPT–843D, Power transformer [D]
	230816	⚠ NPT–843G, Power transformer [G]
	230815	⚠ NPT–843DG, Power transformer [W]
U1	18308588	NARF–2088, FM RF/IF/MPX and power supply circuit pc board ass'y [D]
	18314588B	NARF–2088b, FM RF/IF/MPX and power supply circuit pc board ass'y [G]
	18310588A	NARF–2088a, FM RF/IF/MPX and power supply circuit pc board ass'y [W]
U2	18308589	NADG–2089, Digital circuit pc board ass'y [D]
	18314589B	NADG–2089b, Digital circuit pc board ass'y [G]
	18310589A	NADG–2089a, Digital circuit pc board ass'y [W]
U3	18308590	NALED–2090, Indicator pc board ass'y
U4	18308591	NASW–2091, Operation switch pc board ass'y
U5	18308592	NASW–2092, Station switch pc board ass'y
U6	18308593	NASW–2093, Program/Display switch pc board ass'y
U7	18308594	NASW–2094, Touch tone switch pc board ass'y
U8	18310595	NASW–2095, De-emphasis switch pc board ass'y [W]
U9	18308596	NALED–2096, Indicator pc board ass'y
U10	18308597	NAPL–2097, Dial illumination lamp pc board ass'y
W901	253112	⚠ AS–UC–4#18, Power supply cord [D]
	253083–1	⚠ AS–CFF, Power supply cord [G/W]

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 Universal model

BLOCK DIAGRAM OF IC

μPD1712CU-712-513 (Synthesizer and controller)



	34	35
Wide	1	0
Narrow	0	0
Super Narrow	0	1

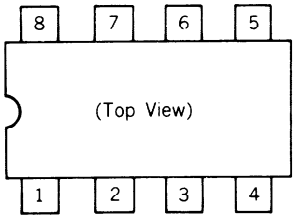
Matrix circuit

	PAD (42)	K3 (9)	K2 (10)	K1 (11)	K0 (12)
Sg (2)	MEMORY	UP	DOWN	AUTO/MANUAL	
Sf (3)	DISPLAY	PROGRAM	AUTO MEMORY	PRESET SCAN	PRESET REVERSE
Se (4)	M5/M15	M4/M14	M3/M13	M2/M12	M1/M11
Sd (5)	M10/M20	M9/M19	M8/M18	M7/M17	M6/M16
Sc (6)		HI-BLEND	IF	RF	MUTE LEVEL
Sb (7)			SIGNAL/FREQ	MUTING	MONO/STEREO
Sa (8)	TEST		APR DEFEAT		
CGP (1)	BAND 2	BAND 1	BAND 0	PRESET	APR

1	CGP	Buzzer drive output and Key return signal source of diode matrix . Active high.
2 3 4 5 6 7 8	Sg Sf Se Sd Sc Sb Sa	Key return signal source output terminals. Active high.
9 10 11 12	K3 K2 K1 K0	Terminals for input of the key return matrix and diode matrix.
13 14 15	D6 D5 D4	These terminals output signal that switches the frequency range of FM to 3 divided. Active high.
16	D3	N.C
17	D2	Signal indicator output. Active high.
18	D1	Muting level indicator output. Active high.
19 20	X0 X1	Connect to the 4.5MHz crystal oscillator.
21	V_{DD}	Device power terminal; supplies 5V during normal operation and 3V from the super capacitor C804 for memory preservation.
22	AD	A/D converter input terminal.
23 24	E02 E01	Charge pump output of the phase detector which constitutes the PLL. High level is output when the divided oscillation frequency is higher 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 local oscillation circuit of FM through low pass filter Q701, Q702 and Q703. The output from both terminals is the same, but only E01 is used.
25	CE	Chip enable input. Device selection signal terminal. High level . . . Normal operation Low level . . . Memory preservation.
26	FM	FM local oscillator input.
27	AM	AM local oscillator input. Not used.
28	PSC	Output to control the division ratio of the prescaler.
29	GND	Ground terminal
30	PB3	FM/AM band selector output. FM at the high level.
31	PB2	DX/LOCAL selector output. DX at the high level.
32	PB1	LOAD output.
33	PB0	DATA output
34	PC3	IF band selector output. Wide position at the high level.
35	PC2	IF band selector output. Super narrow position at the high level.
36	PC1	Output to switch the hi-blend filter. Active low.
37	PC0	Muitng output. Active high.
38	INT	Remote control input. Not used.
39	PA3	CLOCK output.
40	PA2	RF control input.
41	PA1	Sensor input.
42	PA0	Key return signal input.

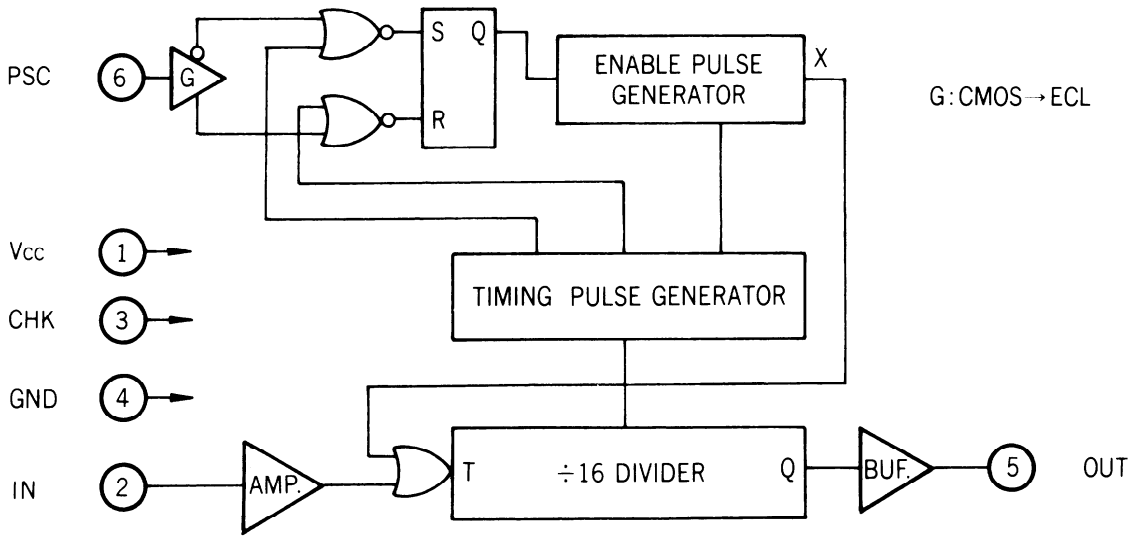
μPB553AC (Prescaler)

Pin Connection

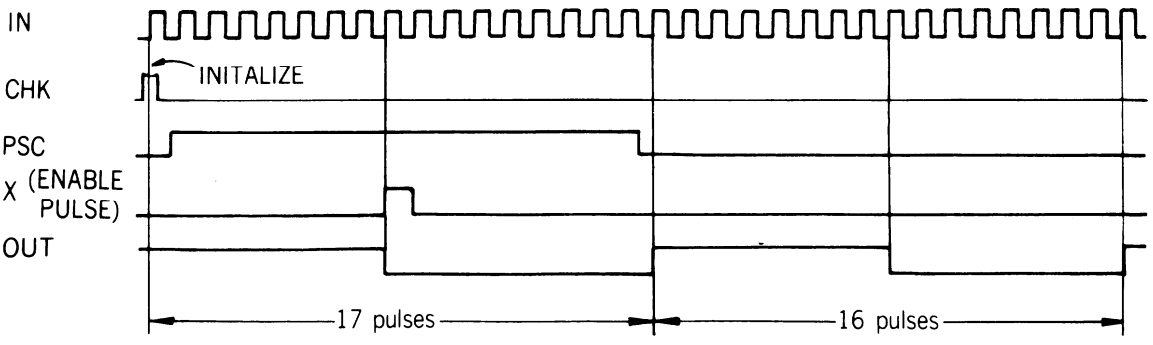


1 Pin 1 (Vcc).....+5 volts Supply
2. Pin 2 (IN).....FM local oscillator signal input
3. Pin 3 (CHK).....Check terminal
4. Pin 4 (GND).....Ground terminal
5. Pin 5 (OUT).....Prescaler terminal
6, Pin 6 (PSC).....Prescaler control terminal
7. Pin 7.8.....Not connected

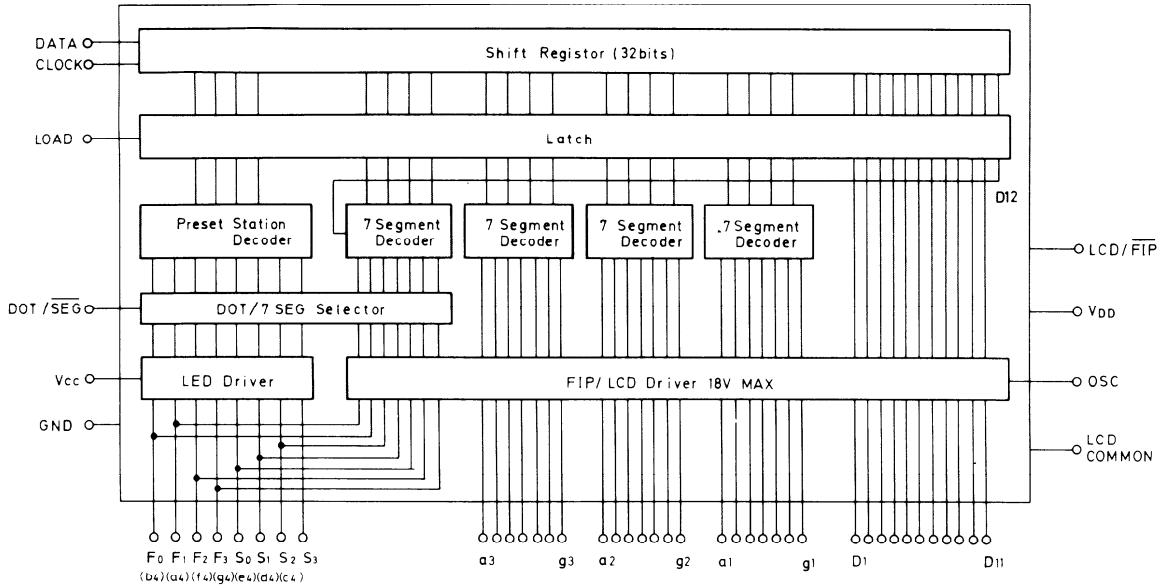
Block Diagram



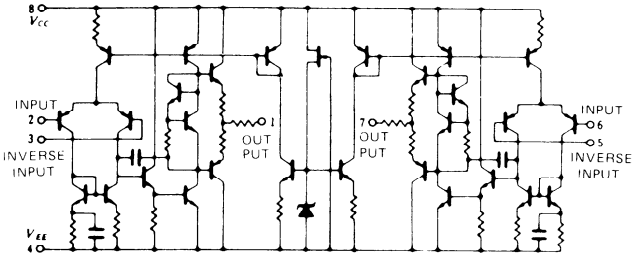
Timing Chart

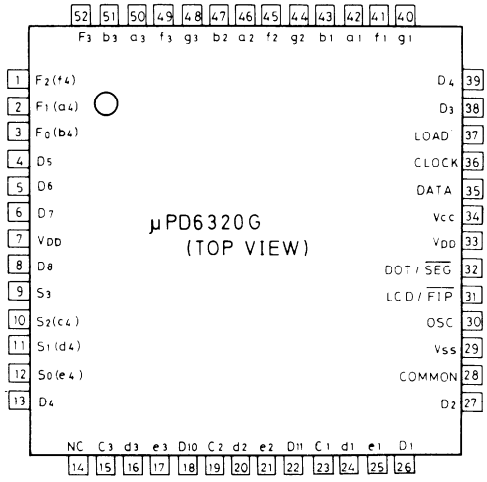


μPD6320G (Indicator drive)

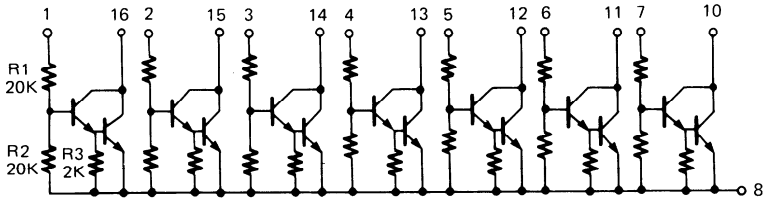


NJM4560 (Operation amplifier)

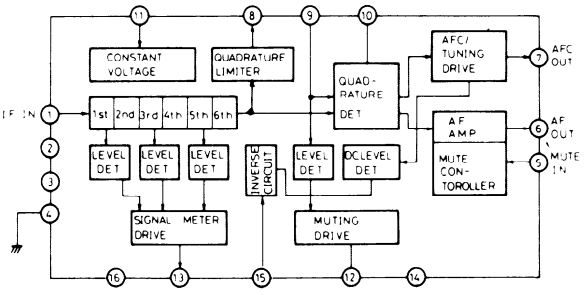




μPA81C (Indicator drive)

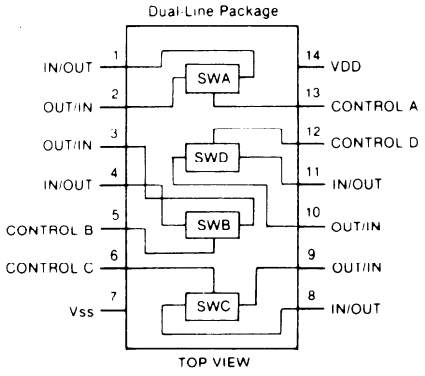


LA1235 (FM IF system)

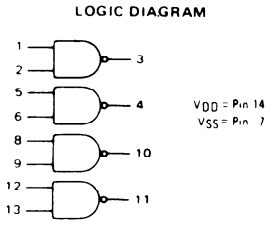


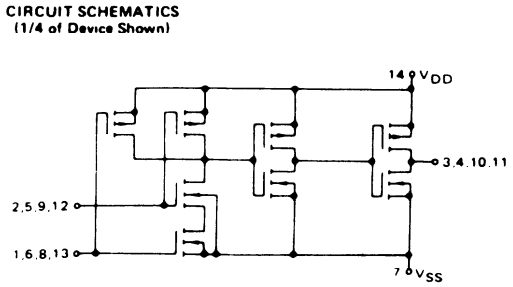
1. IF signal input
2. IF amplifier switch input
   H level: Off
5. Muting switch input
6. Composite signal output
7. AFC output
8. IF amplifier output
9. 10.7MHz input
10. Reference voltage
11. Power supply
12. Muting output
    Tuned: L level
13. Signal strength output
15. Muting level

4066 (Analogue switch)

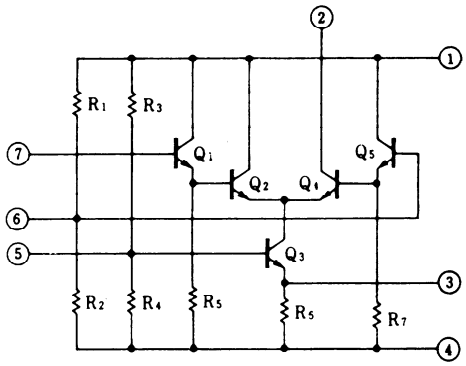


4011B (Naud gate)





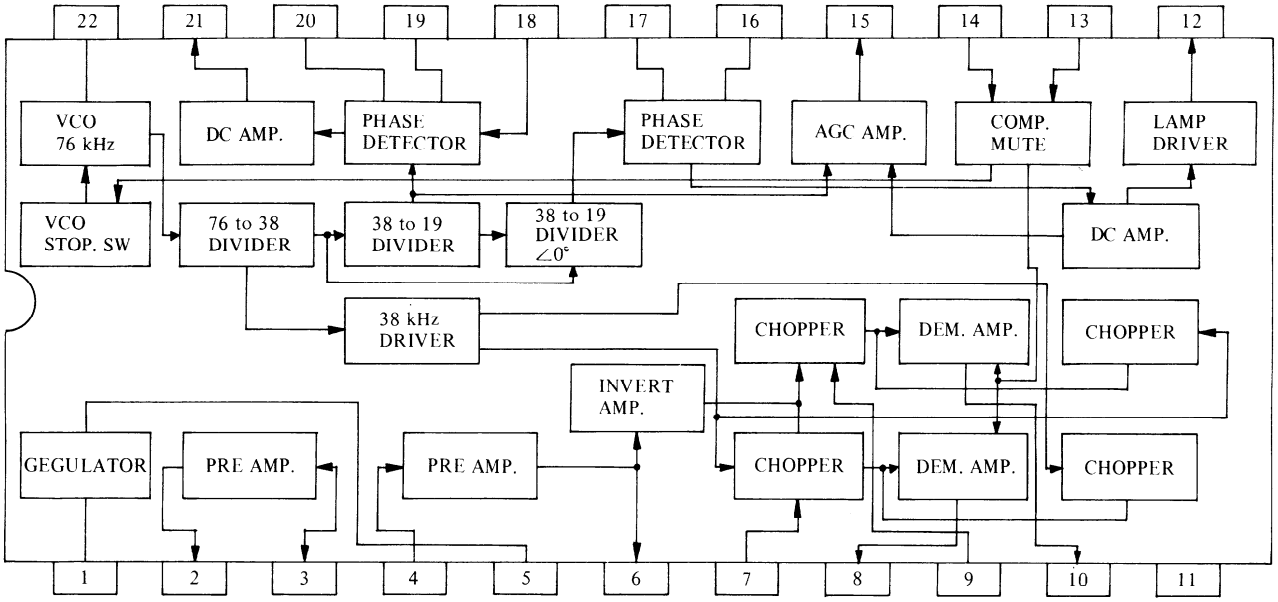
μPC1163H (FM IF amp.)



Terminal No.	Operation
1	Vcc
2	OUTPUT
3	BYPASS
4	GND
5	BYPASS
6	INPUT BIAS
7	INPUT

μPC1223C (Stereo decoder)

Block diagram



Terminal No.	Connection	Terminal No.	Connection
1	Vcc	12	ST. LAMP INDICATOR
2	PRE AMP. OUTPUT 1	13	ST–MONO SW & VCO STOP
3	PRE AMP. INPUT 1	14	MUTING SWS
4	PRE AMP. INPUT 2	15	19kHz CANCEL
5	BYPASS	16	LPF
6	PRE AMP. OUTPUT 2	17	LPF
7	POST AMP. INPUT	18	FILTER INPUT
8	L–ch OUTPUT	19	LPF
9	POST AMP. INPUT	20	LPF
10	R–ch OUTPUT	21	LPF
11	GND	22	OSC RC NETWORK

ADJUSTMENT PROCEDURES

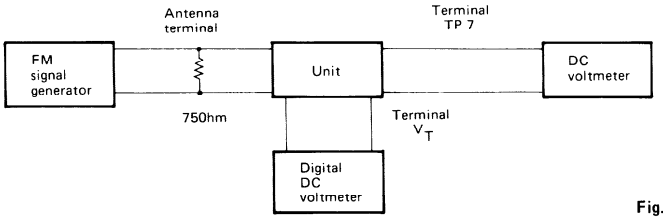


Fig. 1

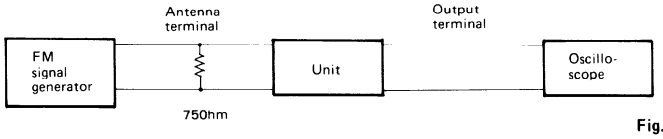


Fig. 2

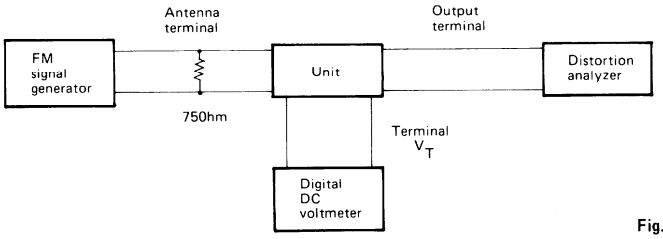


Fig. 3

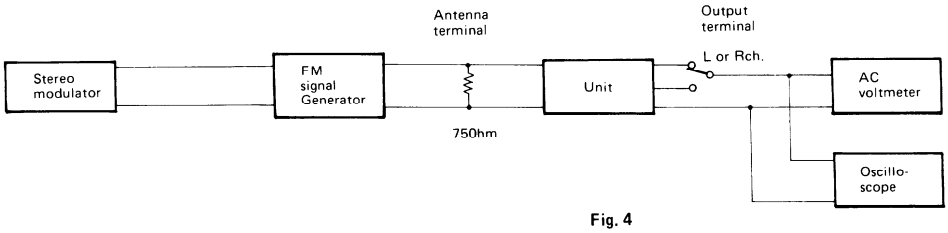
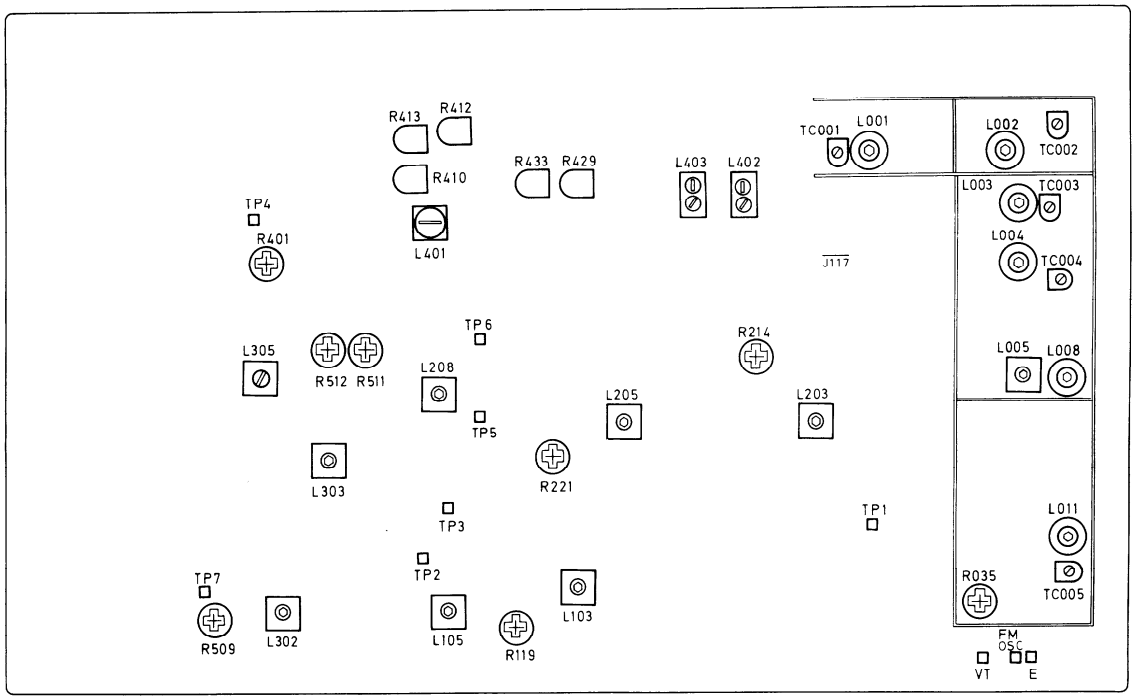
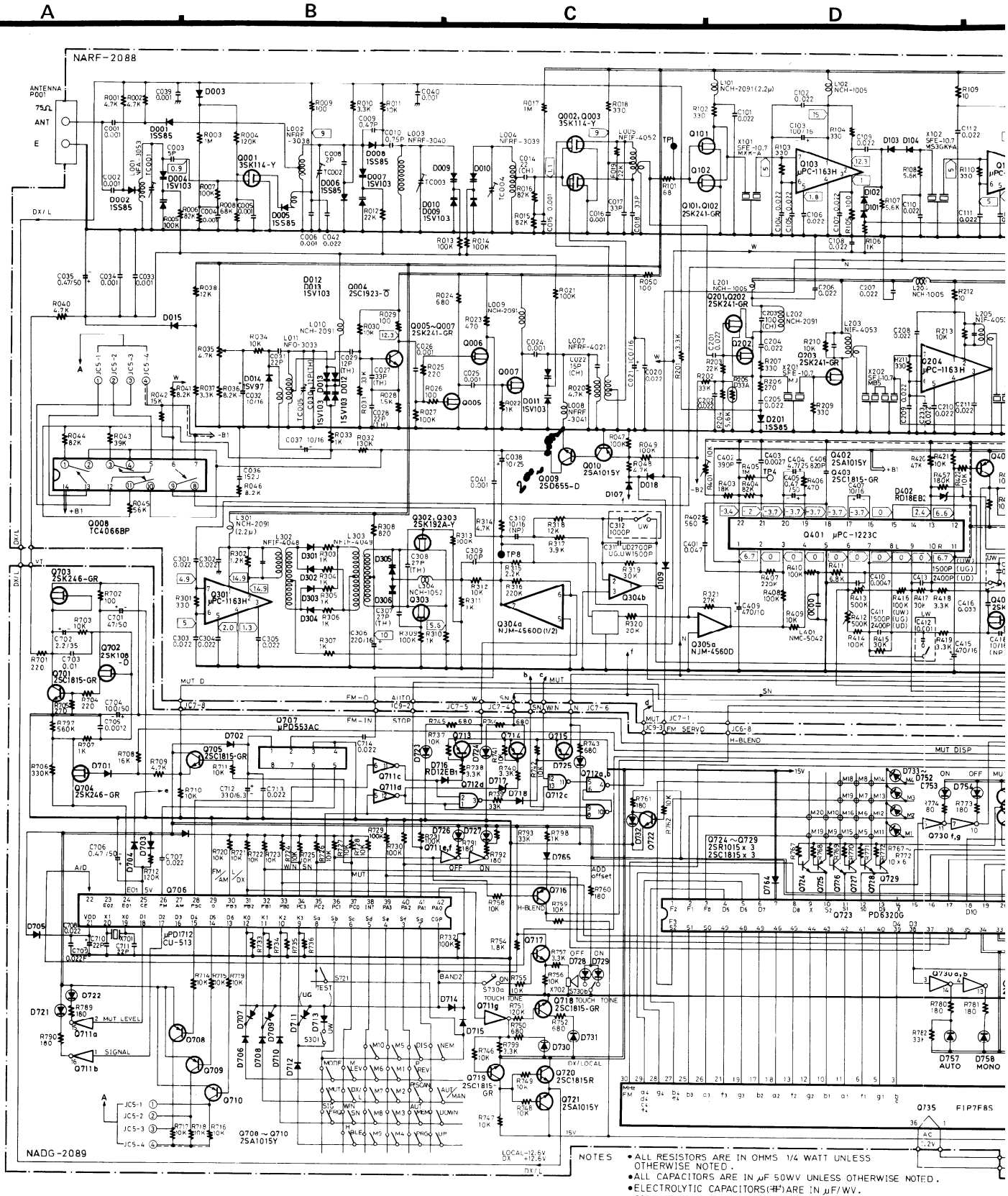


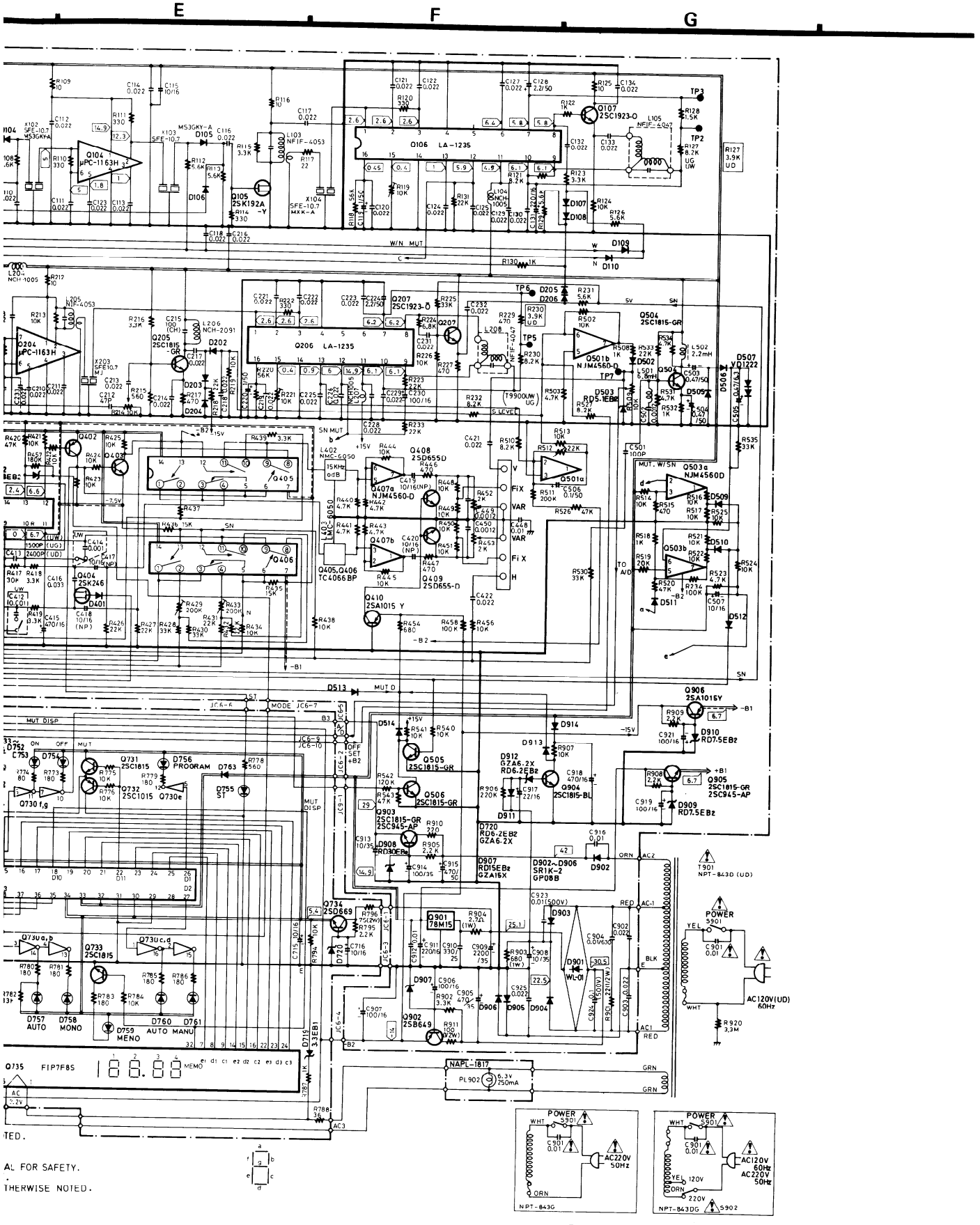
Fig. 4



Item	Step	Connection of instrument	FM SG output	Stereo modulator output	Tuned frequency	Output indicator	Adjustment point	Adjust for	Remarks
Front End	1	Fig. 1		———	107.9MHz	Digital DC voltmeter	TC005	24.0 ± 0.2V	Before adjustment, turn the semi-fixed resistors R509 and R512 fully clockwise. Repeat the steps 1 and 2 until no further adjustment is necessary.
	2			———	87.9MHz		L011	4.0 ± 0.1V	
	3		107.9MHz 1kHz, 75kHz devi. 10dB/ μV (15.2dBf)	———	107.9MHz	DC voltmeter	TC001, TC002, TC003, TC004, L008	Maximum	Repeat the steps 3 and 4 until no further adjustment is necessary.
	4		87.9MHz 1kHz, 75kHz devi. 10dB/ μV (15.2dBf)	———	87.9MHz		L001, L002, L003, L004,	Maximum	
	5						L203, L205	Maximum	
IF level of wide & narrow		Connect the DC voltmeter to pin 13 of Q106	99.1MHz 1kHz, 75kHz devi. 10dB/ μV (15.2dBf)	———	99.1MHz	DC voltmeter	L005, L103	Maximum	
IF level of super narrow		Fig.1	99.1MHz 1kHz, 75kHz devi. 10dB/ μV (15.2dBf)	———	99.1MHz	DC voltmeter	L203, L205	Maximum	
Muting level of wide and narrow	1	Fig.2 Connect the DC voltmeter to terminals TP–2 and TP–3	99.1MHz 1kHz, 75kHz devi. 60dB/ μV (65dBf)	———	99.1MHz	DC voltmeter	L105	0V	
	2		99.1MHz 12dB/ μV (17.5dBf)		99.1MHz	Oscilloscope	R119	Muting circuit opens.	
Muting level of super narrow	1	Fig. 2 Connect the DC voltmeter to terminals TP–4 and TP–5	99.1MHz 1kHz, 75kHz devi. 60dB/ μV (65dBf)		99.1MHz	DC voltmeter	L208	0V	
	2		99.1MHz 12dB/ μV (17.5dBf)		99.1MHz	Oscilloscope	R221	Muting circuit opens.	
PLL detector		Connect the DC voltmeter to Jumper lead J117	99.1MHz 1kHz, 75kHz devi. 80dB/ μV (85dBf)		99.1MHz	DC voltmeter	L303	0V	1F band:Wide RF:DX
FM feedback		Fig. 3	99.1MHz 400Hz, 75kHz devi. 80dB/ μV (85dBf)		99.1MHz	Distortion analyzer	R035	Minimum	Before adjustment, set the semi-fixed resistor R035 to the center position.
						Digital DC voltmeter	TC005	Same value before adjustment	
VCO		Connect the frequency counter to TP4	99.1MHz 1kHz, 75kHz devi. 80dB/ μV (85dBf)		99.1MHz	Frequency counter	R401	76kHz ± 76Hz	
Carrier leakage		Fig. 4	99.1MHz, 80dB Ext. modulation	Only pilot signal	99.1MHz	AC voltmeter or oscilloscope	L401, R401	Minimum	
Separation	1		99.1MHz Ext. modulation 80dB/ μV (85dBf)	L cahnnel	99.1MHz	AC voltmeter or Oscilloscope	R413	Output of right channel becomes minimum	
				R channel			R412	Output of left channel becomes minimum	
	2		99.1MHz Ext. modulation 80dB/ μV (85dBf)	L channel	99.1MHz	AC voltmeter or oscilloscope	R433	Separation of L and R are same and maximum.	1F band:Narrow
				R channel					
	3		99.1MHz Ext. modulation 80dB/ μV (85dBf)	L channel	99.1MHz	AC voltmeter or oscilloscope	R429	Separation of L and R are same and maximum.	1F band:Super narrow
				R channel					
Signal meter	1		99.1MHz, 5dB/ μV		99.1MHz	Signal indicator	R511	10dBf	Before adjustment, turn the semi-fixed resistors R509 and R512 fully clockwise. Proceed to adjustment during press the signal button.1.
	2		60dB/ μV				R512	65dBf	
	3		90dB/ μV				R214	95dBf	

SCHEMATIC DIAGRAM





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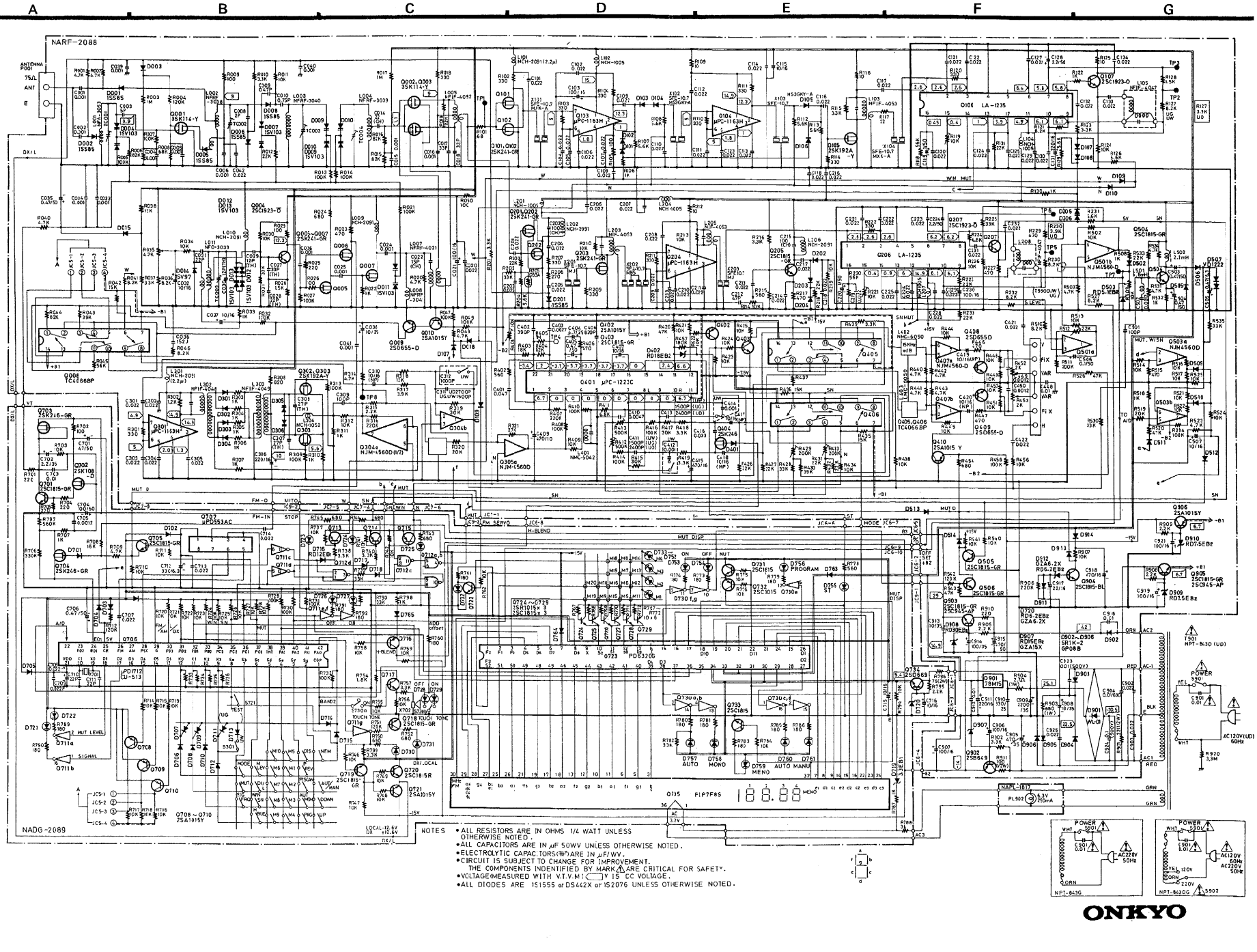
SCHEMATIC DIAGRAM



PRINTED CIRCUIT BOARD-PARTS LIST

FM RF/IF/MPX and power supply circuit pc board (NARF-2088)

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q008	222575 or	TC4066BP or
	222840661	4066
Q103, Q104	222474	μPC-1163H
Q106	222680	LA-1235
Q204	222474	μPC-1163H
Q206	222680	LA-1235
Q301	222474	μPC-1163H
Q304, Q305	222579	NJM4560D
Q401	222732	μPC1223C
Q405, Q406	222575 or	TC4066BP or
	222840661	4066B
Q407, Q501	222579	NJM4560D
Q503	222579	NJM4560D
Q901	222780151	78M15
	Transistors	
Q001-Q003	2212514	3SK114(Y)
Q004	2211723	2SC1923(O)
Q005-Q007	2212195	2SK241(GR)
Q009	2211704 or	2SD655(D) or
	2211705	2SD655(E)
Q010	2211454	2SA1015(Y)
Q101, Q102	2212195	2SK241(GR)
Q105	2212274	2SK192A(Y)
Q107	2211723	2SC1923(O)
Q201-Q203	2212195	2SK241(GR)
Q205	2211255	2SC1815(GR)
Q207	2211723	2SC1923(O)
Q302, Q303	2212274	2SK192A(Y)
Q402	2211454	2SA1015(Y)
Q403	2211255 or	2SC1815(GR) or
	2210746	2SC945A(P)
Q404	2211945 or	2SK246(GR) or
	2211944	2SK246(Y)
Q408, Q409	2211704 or	2SD655(D) or
	2211705	2SD655(E)
Q410, Q906	2211454	2SA1015(Y)
Q504-Q506	2211255 or	2SC1815(GR) or
Q903, Q905	2210746	2SC945A(P)
Q902	2200792 or	2SB649(B) or
	2200793	2SB649(C)
Q904	2211256	2SC1815(BL)
	Diodes	
D001, D002	223149	1SS85
D103	223133 or	DS442X or
	223145	1S2076TD
D004, D007	223154	1SV103
D005, D006	223149	1SS85
D008	223149	1SS85
D009-D013	223154	1SV103
D014	223148	1SV97
D015	223133 or	DS442X or
D017-D019	223145	1S2076TD
D101-D110	223133 or	DS442X or
D202-D206	223145	1S2076TD
D201	223149	1SS85
D301-D304	223133 or	DS442X or
D401	223145	1S2076TD
D305, D306	223136	KV1226
D402	2241191 or	GZA-18X or
	2239712	RD18EB2
D502	223132 or	1K60 or
	223156	0A99A
D503	2240931 or	GZA5. 1X or
	2239452	RD5. 1EB2
D505, D506	223133 or	DS442X or
D509-D514	223145	1S2076TD
D507	4000068	VD1222
D901	223862	WL-01
D902-D906	223804	SR1K-2
D907	2241151 or	GZA15X or
	2239672	RD15FB2
D908	2239812	RD30EB2
D909, D910	2241011 or	GZA-7. 5X or
	2239532	RD7. 5EB2

CIRCUIT NO.	PART NO.	DESCRIPTION
D911, D913	223133 or	DS442X or
D914	223145	1S2076TD
D912	2240971 or	GZA-6. 2X or
	2239492	RD6. 2EB2
	Coils	
L001	233321	NFA-3053
L002	233322	NFRF-3038
L003	233324	NFRF-3040
L004	233323	NFRF-3039
L007	233212	NFRF-4021
L008	233326	NFRF-3041
L009, L010	233304	NCH-2091
L011	233325	NF0-3033
L012, L101	233304	NCH-2091
L102	233105	NCH-1005
L104	233304	NCH-2091
L201	233105	NCH-1005
L202	233304	NCH-2091
L204	233105	NCH-1005
L206	233304	NCH-2091
L207	233105	NCH-1005
L301	233304	NCH-2091
L304	233241	NCH-1052
L305	333319	NMC-6049
L401	233303	NMC-5042
L402, L403	233320	NMC-6050
L501	231042 or	NCH-2082 or
	233122	NCH-3013
L502	233031	NMC-9-1
	Transformers	
L005	233317	NFIF-4052
L103	233318	NFIF-4053
L105, L208	233295	NFIF 4047
L203, L205	233318	NFIF-4053
L302	233296	NFIF-4048
L303	233297	NFIF-4049
	Ceramic filters	
X101, X104	3010085	SFE10. 7MXK-A
X102, X103	3010086	SFE10.7MS3GKY-A
X201, X203	3010087	SFE10. 7MJ-A
X202	3010088	SFJ10.7MB5-A
	Capacitors	
TC001-TC005	3060017	NTC-10P15, Trimmer
C009	3020006	0.47pF ± 5%, 500V
C010	3020007	0.75pF ± 5%, 500V
C021	352741019	100μF, 16V, Elect.
C032, C037	352741009	10μF, 16V, Elect.
C035	352784799	0.47μF, 50V, Elect.
C038	352751009	10μF, 25V, Elect.
C103	352741019	100μF, 16V, Elect.
C115	352741009	10μF, 16V, Elect.
C119	352780109	1μF, 50V, Elect.
C128	352780229	2.2μF, 50V, Elect.
C131	352742219	220μF, 16V, Elect.
C220	352780109	1μF, 50V, Elect.
C224	352780229	2.2μF, 50V, Elect.
C230	352741019	100μF, 16V, Elect.
C306	352742219	220μF, 16V, Elect.
C310	352941006	10μF, 16V, Non-polar elect.
C402	370133914	390pF ± 5%, 100V, APS
C404	352750479	4.7μF, 25V, Elect.
C405	352784799	0.47μF, 50V, Elect.
C406	370138214	820pF ± 5%, 100V, APS
C407, C507	352741009	10μF, 16V, Elect.
C409, C415	352744719	470μF, 16V, Elect.
C417-C420	352941006	10μF, 16V, Non-polar elect.
C504, C505	352784799	0.47μF, 50V, Elect.
C506	352781099	0.1μF, 50V, Elect.
C904	384171037	0.01μF, 630V, DT
C905	352764719	470μF, 35V, Elect.
C906, C907	352741019	100μF, 16V, Elect.
C908	352761009	10μF, 35V, Elect.
C909	352762229	2,200μF, 35V, Elect.
C910	352753319	330μF, 25V, Elect.
C911	352742219	220μF, 16V, Elect.

CIRCUIT NO.	PART NO.	DESCRIPTION
C913	352761009	10μF, 35V, Elect.
C914	352761019	100μF, 35V, Elect.
C915	352784719	470μF, 50V, Elect.
C917	352742209	22μF, 16V, Elect.
C918	352744719	470μF, 16V, Elect.
C919, C921	352741019	100μF, 16V, Elect.
	Resistors	
R035	5225019	N10HR4.7KBD, Semi-fixed
R119	5225015	N10HR10KBD, Semi-fixed
R205	4000028	D33A, Thermistor
R214, R221	5225015	N10HR10KBD, Semi-fixed
R401	5225015	N10HR10KBD, Semi-fixed
R410	5215047	N08HR100KBC, Semi-fixed
R412, R413	5215049	N08HR500KBC, Semi-fixed
R429, R433	5215048	N08HR200KBC, Semi-fixed
R452, R453	5146046	N16RGL2KB15, Variable
R509	5225015	N10HR10KBD, Semi-fixed
R511	5225037	N10HR220KBD, Semi-fixed
R512	5225032	N10HR22KBD, Semi-fixed
R903	441626814	680Ω, 1W, Metal oxide film
R904	441620274	2.7Ω, 1W, Metal oxide film
	Terminal	
	2010102	Antenna cable
	25045137	NPJ-6PDBL52, Output
	Radiator	
	27160146	RAD-52
	Socket	
	25050140	NJPS-3P-S
	Shielded plates	
	27150180	Front end
	27150181	Front end
	27150182	Front end
	27150191	Front end

Digital circuit pc board (NADG-2089)

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q706	222769	μPC1712CU-712-513
Q707	222619	μPB553AC
Q711	222807	μPA81C
Q712	222513 or	μPD4011B or
	222840111	4011B
Q723	222770	μPD6320G
Q730	222807	μPA81C
	Fluorescent indicator tube	
Q735	212023	FIP7F8S
	Transistors	
Q701, Q705	2211255 or	2SC1815(GR) or
Q717, Q718	2210746	2SC945A(P)
Q702	2212294	2SK108(D)
Q703, Q704	2211945	2SK246(GR)
Q708-Q710	2211454	2SA1015(Y)
Q713-Q716	2211454	2SA1015(Y)
Q719, Q721	2211454	2SA1015(Y)
Q720, Q722	2211255 or	2SC1815(GR) or
Q731, Q733	2210746	2SC945A(P)
Q732	2211454	2SA1015(Y)
Q734	2200782	2SD669(B)
	Diodes	
D701, D702 D704-D710	223133 or	DS442X or
D712	223145	1S2076TD
D714, D715	223133 or	DS442X or
D762-D764	223145	1S2076TD
D703, D765	223133 or	DS442X or
	223105	1S1555
D716-D718	2241111 or	GZA-12X or
	2239632	RD12EB1
D719	2241291	RD3.3EB1
D720	2240971 or	GZA-6.2X or
	2239493	RD6.2EB2
	X'tal	
X701	3010052	XTL-4.5M
	Buzzer	
X702	241048	RKM24-4A0
	Capacitors	
C701	352784709	47μF, 50V, Elect.
C702	395160227	2.2μF, 35V, Tantalum
C704	352781019	100μF, 50V, Elect.
C706	352784799	0.47μF, 50V, Elect.
C709	3020017	0.022F, 5V, Super
C712	352723319	330μF, 6.3V, Elect.
C715, C716	352741009	10μF, 16V, Elect.
	Resistors	
R720-R728	49121103509	10kΩ×9, 1/8W, Network
R729-R732	49121104504	100kΩ×4, 1/8W, Network
R733-R736	49121104504	100kΩ×4, 1/8W, Network
R796	441727504	75Ω, 2W, Metal oxide film
	Radiator	
	27160145	RAD-51
	Sockets	
	25050141	NJPS-4P-S
	25050145	NJPS-8P-S
	25050147	NJPS-10P-S
	Switch	
S721	25035408	NPS-111-S372
	Bracket	
	27130352	Fluorescent tube

Indicator pc board (NALED-2090)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Transistors	
Q724, Q726	2211255 or	2SC1815(GR) or
Q728	2210746	2SC945A(P)
Q725, Q727	2211454	2SA1015(Y)
Q729		
	LEDs	
D723, D726	225137	SEL2413E
D728, D731	225137	SEL2413E
D754, D757	225137	SEL2413E
D760	225137	SEL2413K
D724, D725	225142	SEL2913K
D727, D729	225142	SEL2913K
D730, D756	225142	SEL2913K
D732-D753	225142	SEL2913K
D758, D761	225142	SEL2913K
	Holder	
	27190288A	LED
	Screws	
	833426060	2.6TTP+6P(BC), Tapping

Operation switch pc board (NASW-2091)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Switches	
S701-S707 S720, S721 S723-S726	25035389	NPS-111-S353
	LED	GL3PR1
	225126	

Station switch pc board (NASW-2092)

CIRCUIT NO.	PART NO.	DESCRIPTION
S708-S717 S719	25035408	NPS-111-S372, Push switch

Program/display switch (NASW-2093)

CIRCUIT NO.	PART NO.	DESCRIPTION
S718, S722	25035389	NPS-111-S353, Push switch

Touch tone switch pc board (NASW-2094)

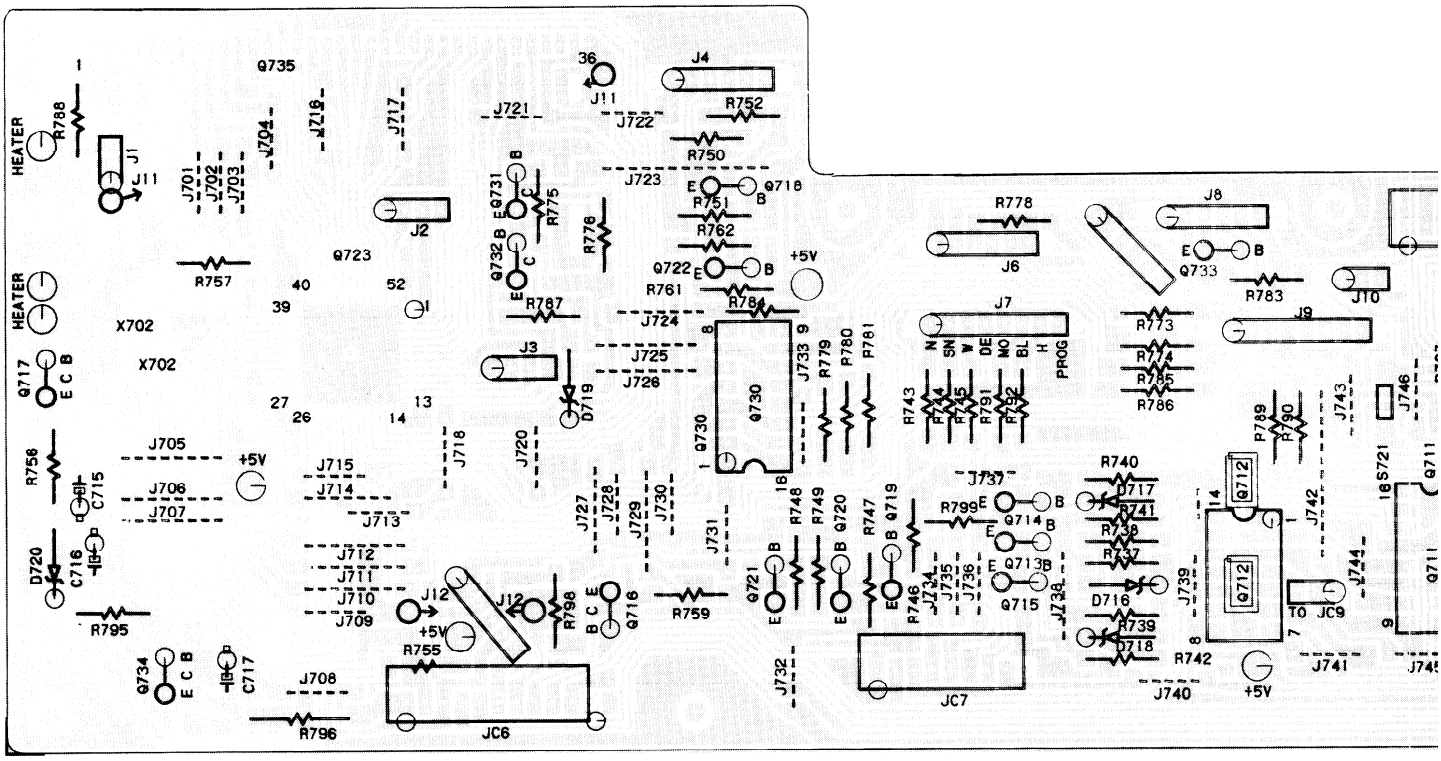
CIRCUIT NO.	PART NO.	DESCRIPTION
S730	25035372	NPS-122-L336, Push switch

De-emphasis switch pc board (NASW-2095) [Only Universal model]

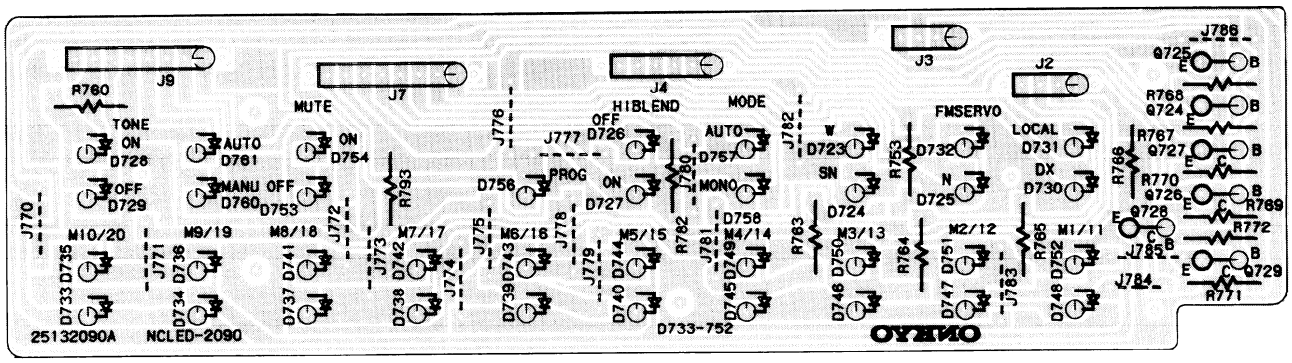
CIRCUIT NO.	PART NO.	DESCRIPTION
S301	25065240	NSS-42102, Slide switch

PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE

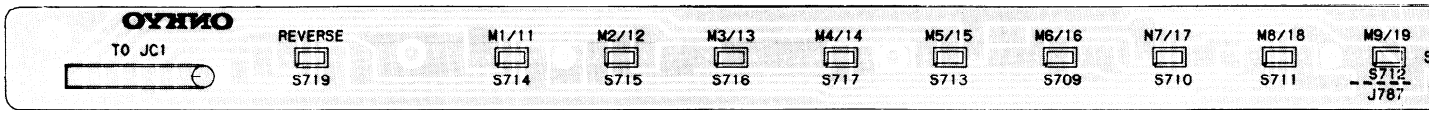
DIGITAL CIRCUIT (NADG–2089)



INDICATOR CIRCUIT (NALED–2090)



STATION SWITCH (NASW–2092)

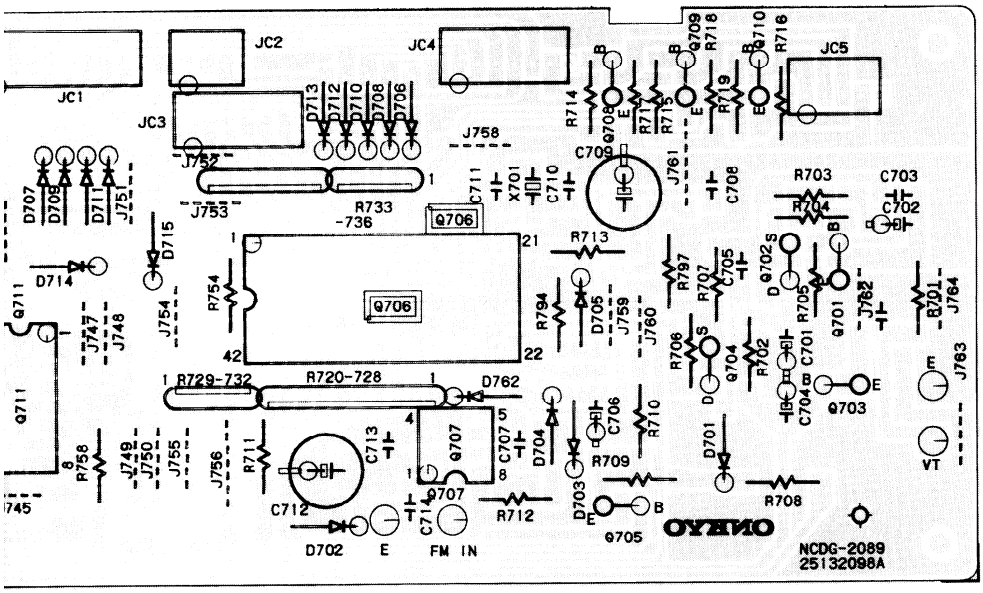


Indicator pc board (NALED–2096)

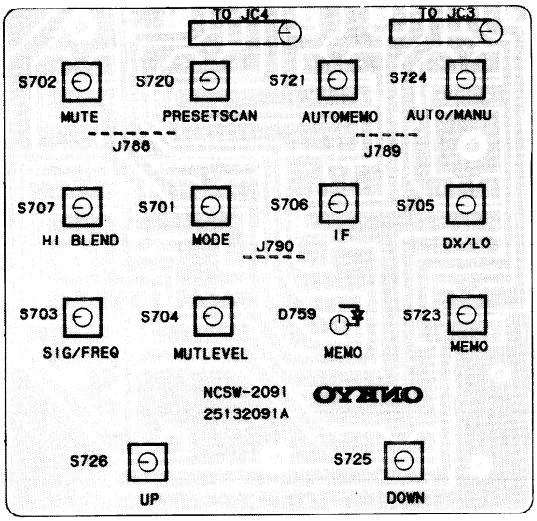
CIRCUIT NO.	PART NO.	DESCRIPTION
D721, D722	225137	SEL2413F, LED
D755	225142	SEL2913K, LED
	27190292A	Holder, LED
	833426060	2.6TTP+6P(BC), Tapping screw

Dial illumination lamp pc board (NAPL–2097)

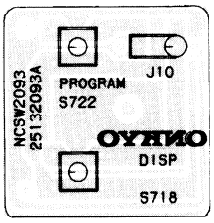
CIRCUIT NO.	PART NO.	DESCRIPTION
PL901	210064A	250mA, 6.3V, Lamp



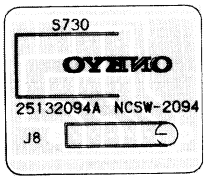
OPERATION SWITCH (NASW–2091)



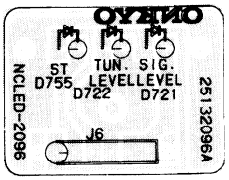
(NASW–2093)

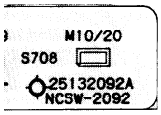


(NASW–2094)

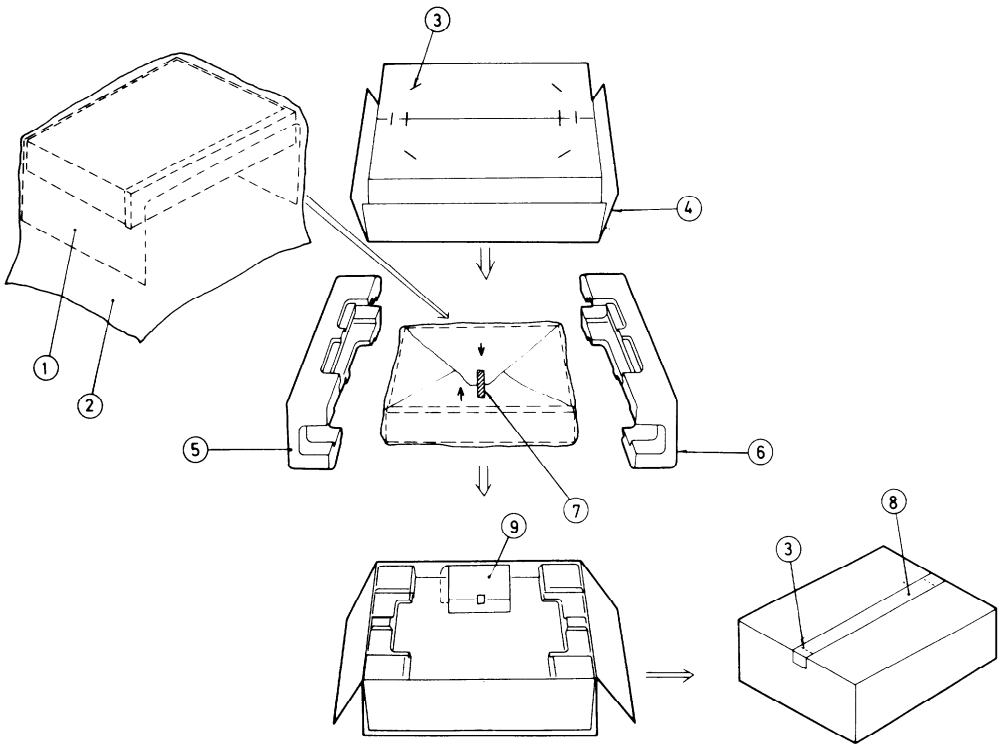


(NALED–2096)





PACKING VIEW



REF. NO.	PARTS NO.	DESCRIPTION
1	29095012–1	500 x 800mm, Protection sheet
2	29100038A	720 x 950mm, Poly=vinyl bag
3	282301	Sealing hook
4	29050981	Master carton box
5	29090921	Pad R
6	29090920	Pad L
7	261504	W=30mm, Adhesive tape
8	260012	50 x 640mm, Damplon tape
9	Accessary bag ass'y	
	U.S.A. model	
	29340799	Instruction manual
	2010069	Connection cable
	25060088	FM adaptor
	292064A	FM antenna
	29365006–6	Warranty card
	29358002A	Service station list
	29100006	350 x 250mm, Poly=vinyl bag
	120V model	
	29340799	Instruction manual
	2010069	Connection cable
	25060088	FM adaptor
	292064A	FM antenna
	29100006	350 x 250mm, Poly=vinyl bag
	220V model	
	29340800	Instruction manual
	2010069	Connection cable
	25060088	FM adaptor
	292064A	FM antenna
	29100006	350 x 250mm, Poly=vinyl bag
	Universal model	
	29340800	Instruction manual
	2010069	Connection cable
	25060088	FM adaptor
	292064A	FM antenna
	25055040	CV–K–2, Conversion plug
	29100006	350 x 250mm, Poly=vinyl bag