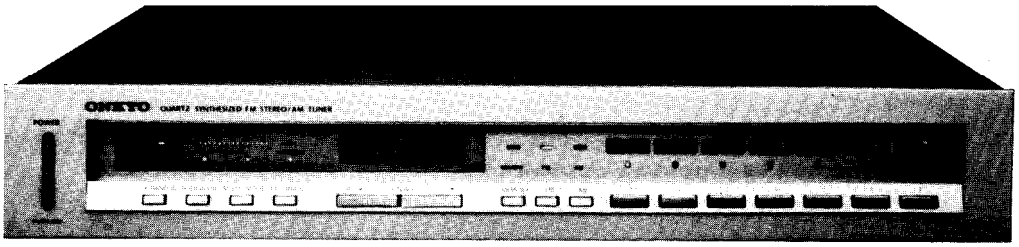
SERIAL NO. 3110

ONKYO® SERVICE MANUAL

QUARTZ SYNTHESIZED FM STEREO/AM TUNER MODEL T-35



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ONKYO®
AUDIO COMPONENTS

SPECIFICATIONS

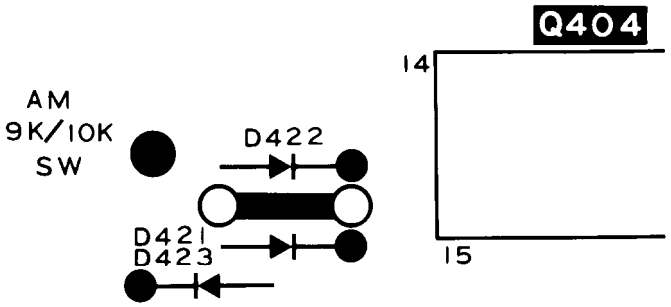
FM:	
Tuning Range:	87.9 – 107.9 MHz (200 kHz steps)
Usable Sensitivity:	Mono: 9.8 dBf. 1.7μV Stereo: 17.2 dBf, 4.0μV
50 dB Quieting Sensitivity:	Mono: 14.7 dBf, 3.0μV Stereo: 36.1 dBf, 35μV
Capture Ratio:	1.0 dB
Image Rejection Ratio:	85 dB
IF Rejection Ratio:	100 dB
Signal-to-Noise Ratio:	Mono: 80 dB (IHF) Stereo: 72 dB (IHF)
Alternate Channel Att.:	80 dB (±400 kHz, IF: Normal)
AM Suppression Ratio:	55 dB
Total Harmonic Distortion:	Mono: 0.08% (IF: width) Stereo: 0.15% (IF: width)
Frequency Response:	30 – 15,000 Hz +0.5 dB, –1.5 dB
Stereo Separation:	40 dB at 1 kHz (IF: width) 33 dB at 70 – 10,000 Hz
Output Voltage:	0 – 1.5 V
Muting Level:	17.2 dBf, 4.0μV

AM:	
Tuning Range:	530 – 1620 kHz (10 kHz steps)
Usable Sensitivity:	20μV
Image Rejection Ratio:	45 dB
IF Rejection Ratio:	30 dB
Signal-to-Noise Ratio:	40 dB
Total Harmonic Distortion:	0.7%
Output Voltage:	0 – 0.5 V
General	
Power supply:	AC 120 V, 60 Hz
Antennas:	FM: 300 ohms balanced and 75 ohms unbalanced AM: built-in loop antenna and external terminal
Semiconductors:	3 FETs, 54 transistors, 16 ICs, 60 diodes, 22 LEDs
Dimensions (W x H x D):	418 x 72 x 275 mm (16-1/2″ x 2-7/8″ x 10-13/16″)
Weight:	3.8 kg, 8.4 lbs.

Specifications and features are subject to change without notice.

PRECAUTIONS

1. **Change of AM band**
   When change the scan step of the AM band from 10 kHz to 9 kHz, add the silicon diode of D422 (1S1555) and jumper wire between pin nos. 16 and 25 of Q404 micro computer.



2. **Handling precautions of CMOS IC**
   1. All MOS devices should be stored or transported in materials that are somewhat conductive. MOS devices must not be inserted into conventional plastic "snow" or plastic trays.
   2. All MOS devices should be placed on a grounded bench surface and operators should ground themselves prior to handling devices, since a worker can be statically charged with respect to the bench surface.
   3. Nylon clothing should not be worn while handling MOS circuits.
   4. When lead straightening or hand soldering is necessary, provide ground straps for the apparatus used.
   5. Double check test equipment setup for proper polarity of voltage before conducting parametric or functional testing.
   6. All unused device inputs should be connected to V_{DD} or V_{SS}.

ALIGNMENT PROCEDURES

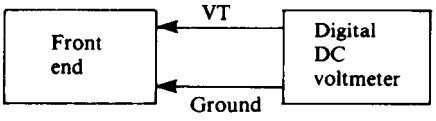
INSTRUMENTS REQUIRED

1. Stereo Modulator
2. FM Signal Generator with Frequency Counter
3. Frequency Counter
4. Digital DC Voltmeter
5. DC Voltmeter
6. Distortion Analyzer
7. AC Voltmeter
8. Oscilloscope

GENERAL ALILGNMENT CONDITION

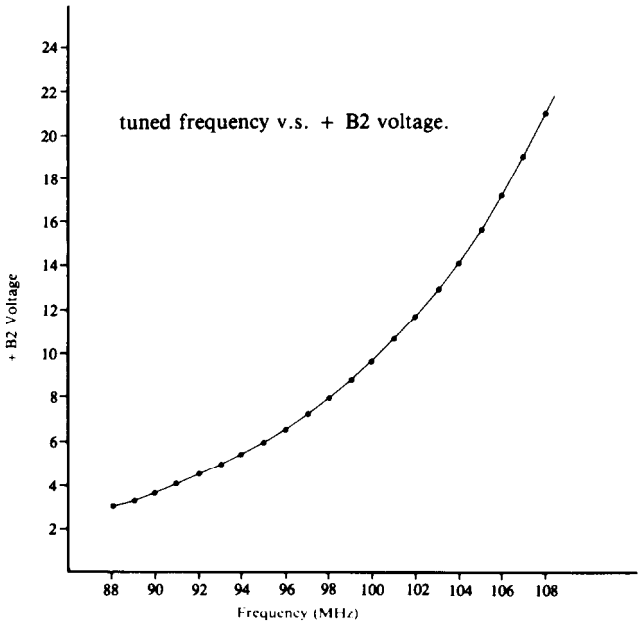
1. Standard modulation is 1 kHz 100% (FM MONO), pilot 9% sub and main 91%. (FM STEREO)
2. The switches and control should be set as follows unless otherwise specified.
   IF band . . . . . Wide
   Auto Hi-blend . . . . . Off
   FM muting/Mode . . . . . On/Stereo
   De-emphasis . . . . . Normal
   Output level . . . . . Maximum

1. Front end adjustment



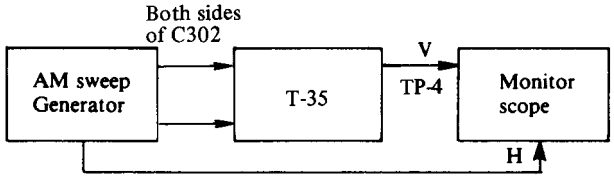
Step	Set to dial	Adjust	Output indicator	Adjust for
	FM adjustment			
1	88.1 MHz	L008 (LO)	Digital DC voltmeter	3.03V
2	107.9MHz	TC004 (TCO)		20.8V
3	Repeat steps 1 and 2 as necessary			
	AM adjustment			
1	600 kHz	L302	Digital DC voltmeter	2.5V
2	1400 kHz	C306		15.5V
3	Repeat steps 1 and 2 as necessary			

Remark : Usually not necessary to adjust.



2. AM IF adjustment

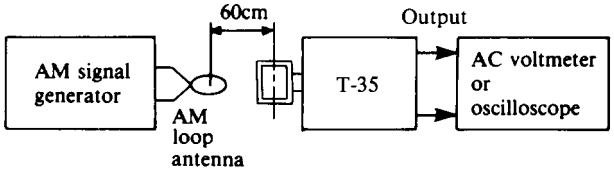
1. Set the dial to quiet point.



Set signal	Adjust	Adjust for
450.kHz	L303	The output of monitor scope becomes maximum symmetrical response

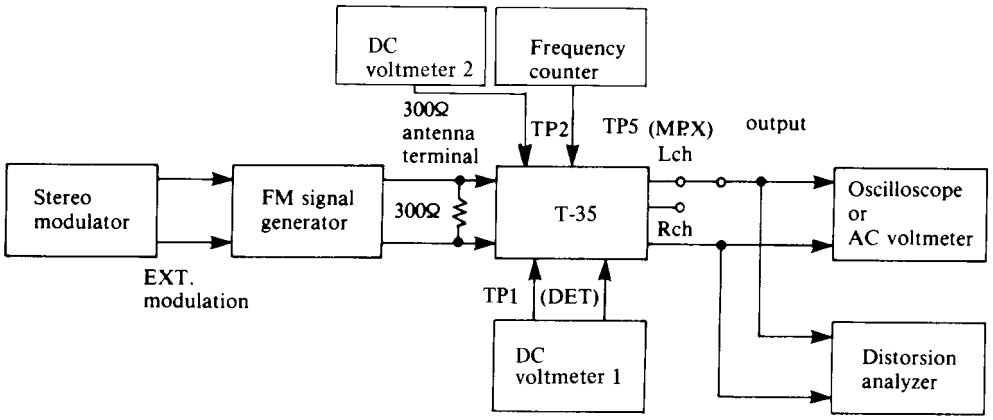
Remark : Usually not necessary to adjust.

3. AM RF adjustment

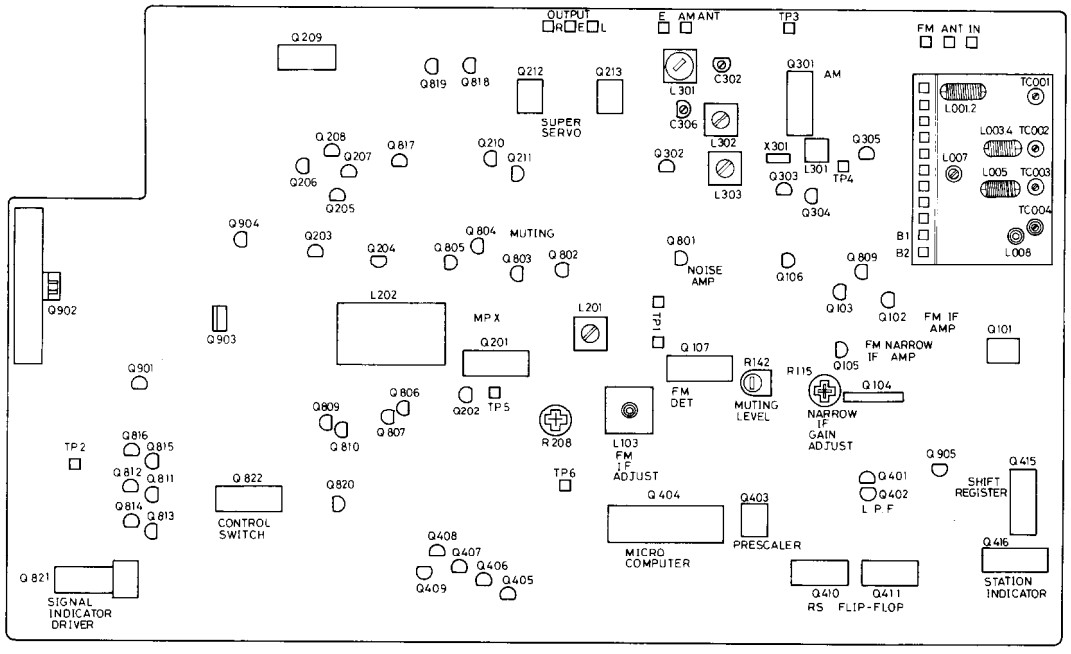


	AM Signal generator	Dial to set	Adjust	Adjust for
1	600kHz 400Hz, 30% mod.	600kHz	L301	Maximum
2	1400kHz 400Hz, 30% mod.	1400kHz	C302	Maximum
3.	Repeat steps 1 and 2 as necessary			

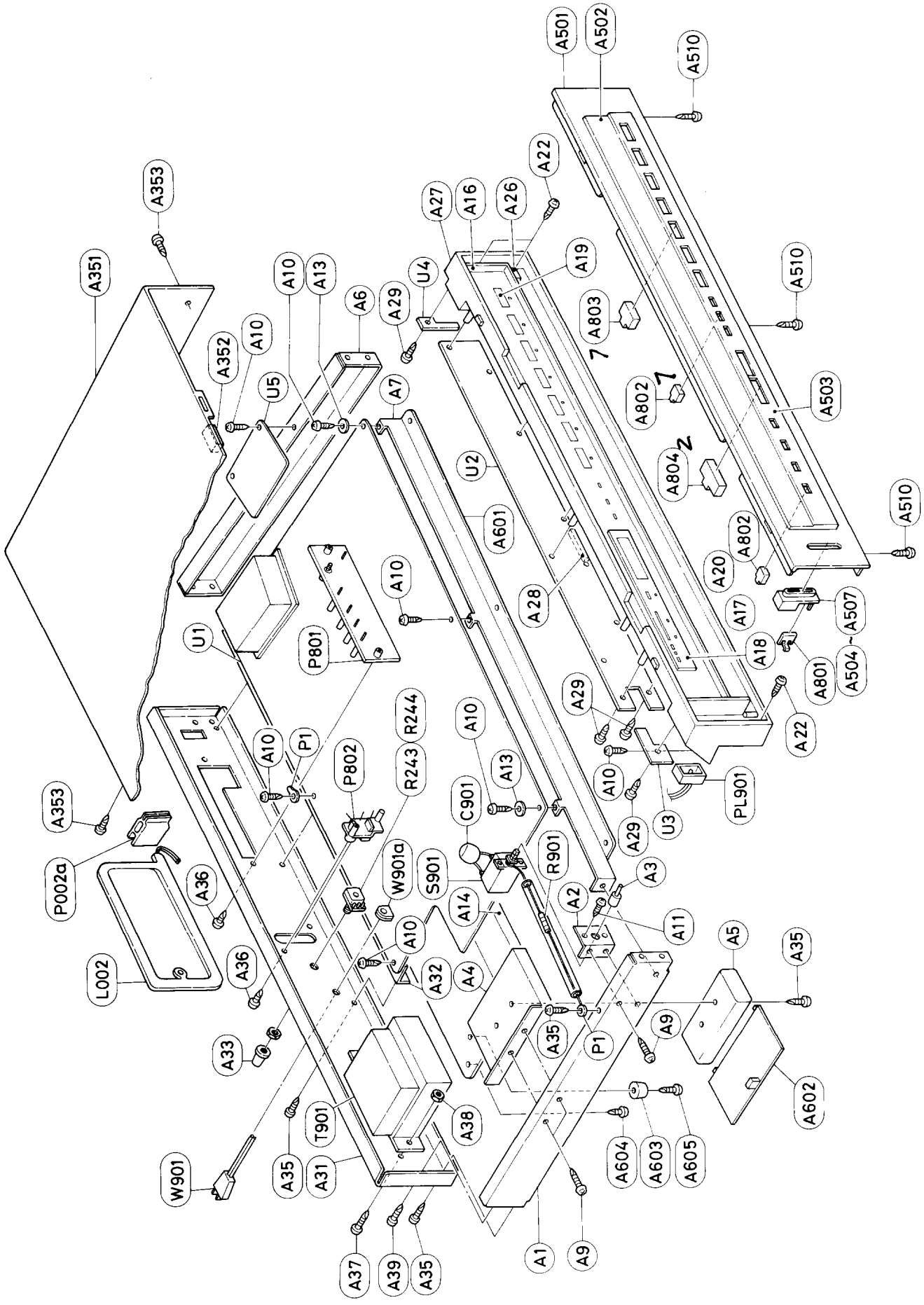
4. FM adjustment



Item		FM signal generator	Stereo modulator	Dial to set	Adjust	Output indicator	Adjust for	Remarks
IF	1		———	No input signal	L103 Bottom	DC voltmeter	0V	Repeat steps 1 and 2 as necessary
FM	2	98.1MHz, 65dBf, 1kHz, 75kHz devi.	———	98.1MHz	L103 upper L007	Distorsion analyzer	Minimum	
V.C.O		98.1MHz 65dBf	———	98.1MHz	R208	Frequency counter	19kHz	Turn off the modulation
Stereo Separation		98.1MHz 65dBf Ext. modulation	Rch	98.1MHz	R256	AC voltmeter (Lch)	Minimum	Maximum and same separation
			Lch			AC voltmeter (Rch)	Minimum	
Muting level		98.1MHz, 17dBf 1kHz, 75kHz devi.	———	98.1MHz	R142	Oscilloscope	Signal	
		98.1MHz, 16dBf 1kHz,75kHz devi.	———				No signal	
IF Narrow level		98.1 MHz, 35 dBf 1 kHz, 75 kHz devi.	———	98.1MHz	R115	DC Voltmeter 2	The levels of narrow and wide positions become same.	

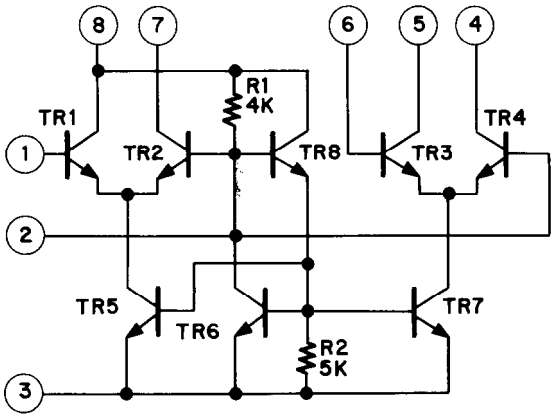


EXPLODED VIEW

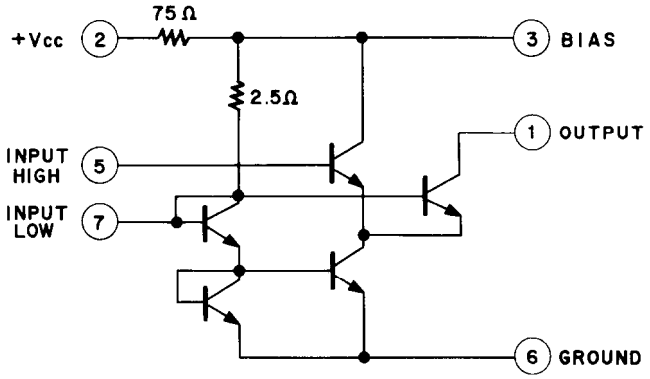


BLOCK DIAGRAM OF IC

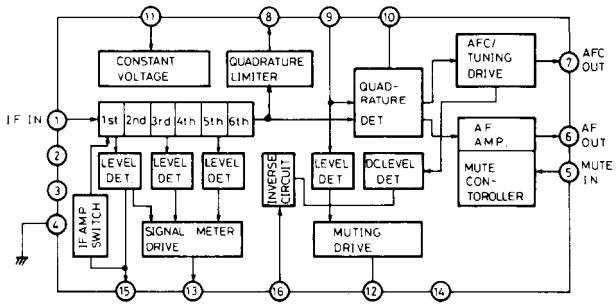
LA1222 (IF ampli.)



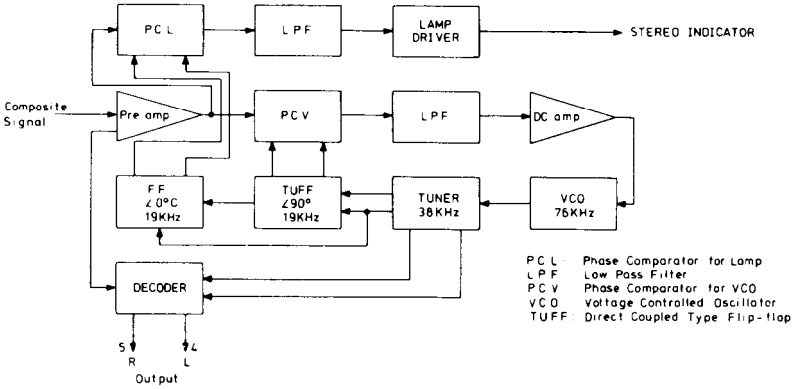
μPC555H (IF ampli.)



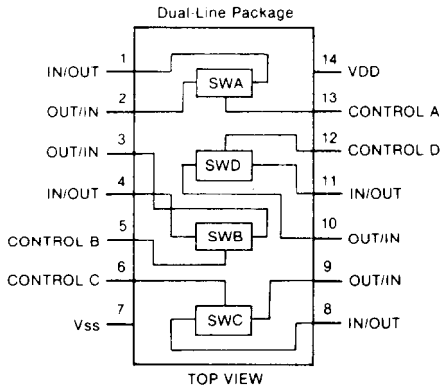
HA11225 (FM IF system)



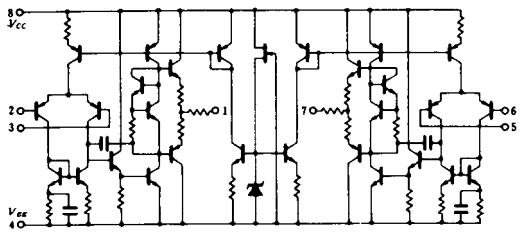
HA1156W (Stereo decoder)



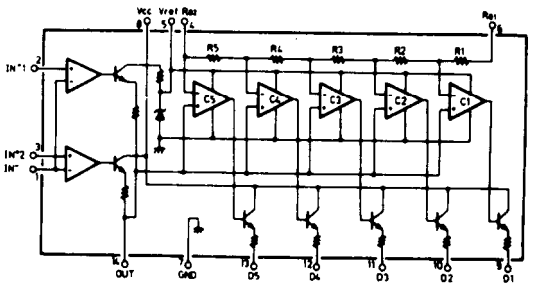
TC4066B (Quad bilateral switch)



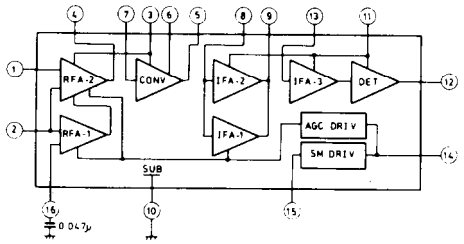
NDM4558DX (Super servo ampli.)



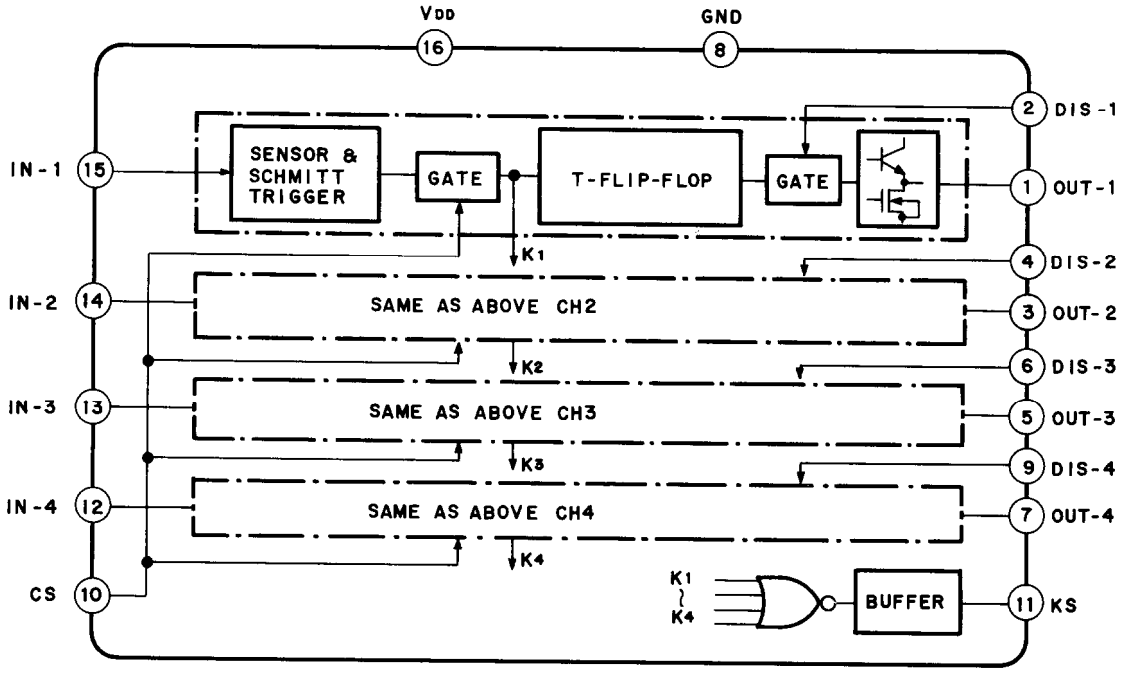
LB1426 (Signal indicator drive)



LA1240 (AM radio system)

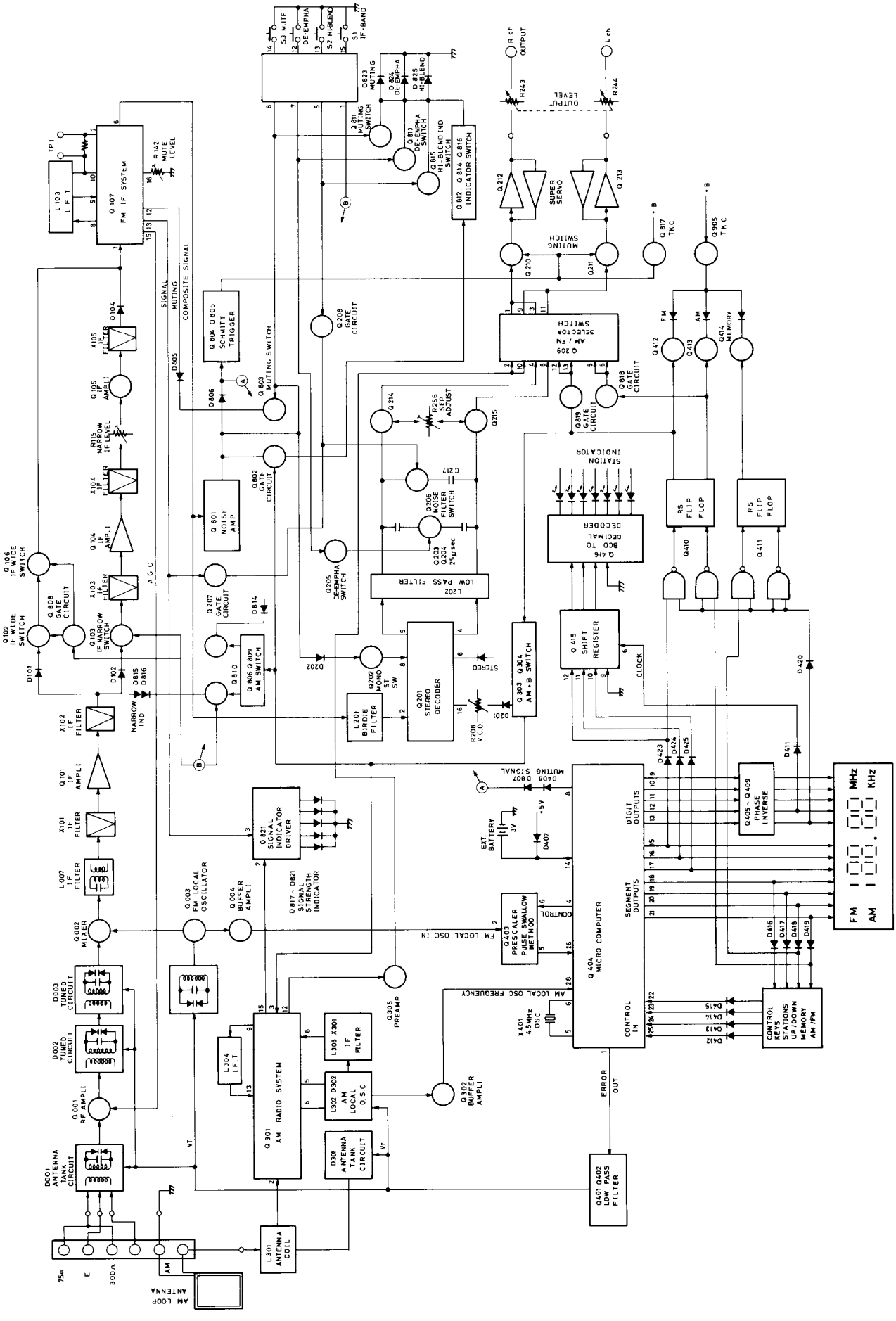


TC9130P

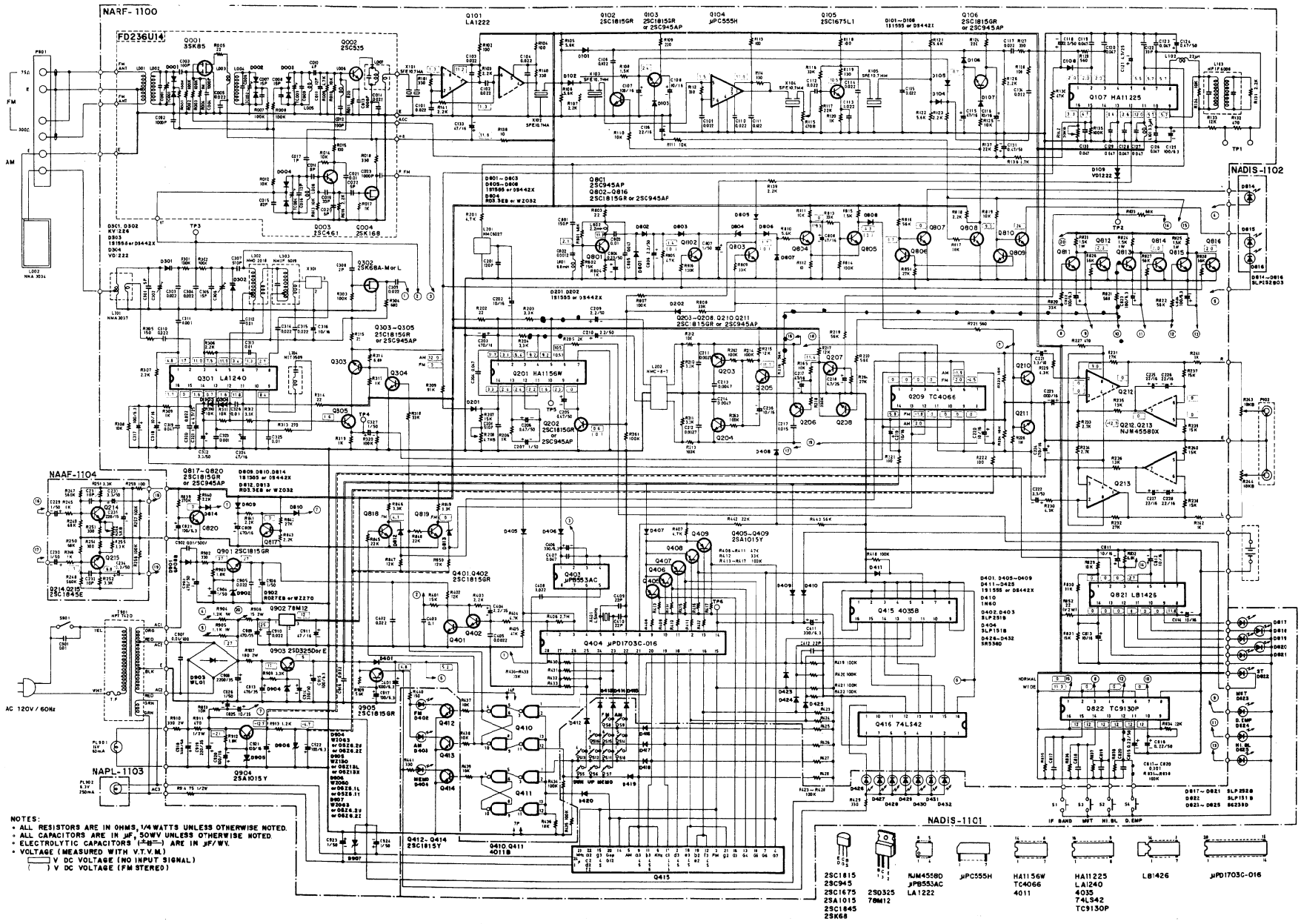


Pin nos.	Mark	Terminal	Descriptions
15 | 12	IN-1 | IN4	Input signal	When the supply voltage of this terminal changes from the high level to low level, the output terminal does the inversion.
1, 3 5, 7	OUT-1 | OUT-4	Output	
2, 4 6, 9	DIS-1 | DIS-4	Outuput forbidden	When this terminal does the low level, the output becomes the low level.
10	CS	Input forbidden	When this terminal does the low level, the acceptions of input terminals are forbidden. And the flip-flop of inner holds the before condition.
11	KS	Input detector	When the input terminal becomes the low level, this terminal becomes the low level.
16	V_{DD}	Power supply	
8	GND	Ground	

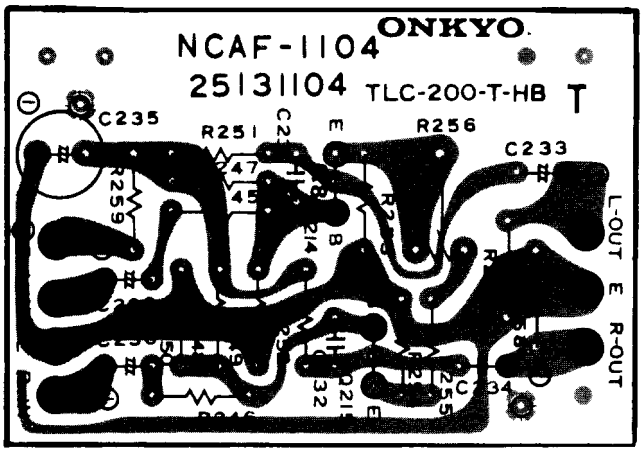
BLOCK DIAGRAM



SCHEMATIC DIAGRAM



ONKYO CORPORATION



PRINTED CIRCUIT BOARD — PARTS LIST

FM/AM TUNER PC BOARD (NARF-1100) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Front end	
	240043	FD236U14
	ICs	
Q101	222577	LA1222, FM IF ampli.
Q104	222591	μPC555H, FM IF ampli.
Q107	222540	HA11225, FM detector
Q201	222419	HA1156W, Stereo decoder
Q209	222575	TC4066BP, Analog switch
Q212, Q213	222502	NJM-4558DX, Super servo ampli.
Q301	222497	LA1240, AM radio system
Q403	222619	μPB553AC, Prescler
Q404	222618	μPD1703C-016, Micro computer
Q410, Q411	222840111 or	4011B or
	222513	TC4011BP, 2 input NAND gate
Q415	222840351	4035B, Shift register
Q416	222740421	74LS42, BCD to decimal decoder
Q821	222541	LB1426, Signal meter driver
Q822	222625	TC9130P, Control switch
Q902	222780122	78M12, Voltage regulator
	Transistors	
Q102	2211255	2SC1815 (GR)
Q103	2211255 or	2SC1815 (GR) or
	2210746	2SC945A (P)
Q105	2210823	2SC1675 (L-1)
Q106	2211255 or	2SC1815 (GR) or
	2210746	2SC945 A (P)
Q202–Q208	2211255 or	2SC1815 (GR) or
Q210, Q211	2210746	2SC945A (P)
Q302	2211302 or	2SK68A (L) or
	2211303	2SK68A (M)
Q303–Q305	2211255 or	2SC1815 (GR) or
	2210746	2SC945A (P)
Q401, Q402	2211255	2SC1815 (GR)
Q405–Q409	2211454	2SA1015 (Y)
Q801	2210746	2SC945A (P)
Q802–Q820	2211255 or	2SC1815 (GR) or
	2210746	2SC945A (P)
Q901	2211255	2SC1815 (GR)
Q903	2201034 or	2SD325 (D) or
	2201035	2SD325 (E)
Q904	2211454	2SA1015 (Y)
Q905	2211255	2SC1815 (GR)
	Diodes	
D101–D108	223105 or	1S1555 or
D201, D202	223133	DS442X
D109	4000068	VD1222
D301, D302	223136	KV1226
D303	223105 or	1S1555 or
	223133	DS442X
D304	4000068	VD1222
D401	223105 or	1S1555 or
D405–D409	223133	DS442X
D410	223103	1N60
D411	223105 or	1S1555 or
D423–D425	223133	DS442X
D801–D803	223105 or	1S1555 or
D805–D810	223133	DS442X
D804, D812	224084 or	WZ032 or
D813	224129	RD3.3EB
D814	223105 or	1S1555 or
	223133	DS-442X
D901	223848	GP-08B
D902	223922 or	WZ270 or
	223979	RD27EB
D903	223862	WL01
D904, D907	224020 or	WZ063 or
	224043	05Z6.2U
D905	223924 or	WZ130 or
	224058	05Z13L
D906	224019 or	WZ050 or
	224038	05Z5.1L
	Coils & Transformers	
L101	233105 or	NCH1005 or
	233024	NCCH1501
L102	233144	NCH-1020
L103	233143A	NFIF-6008
L201	233236	NMC-6027
L202	233032A	NMC-8-7
L301	232089	NMA3037
L302	232084	NMO-2018
L303	232077	NMIF-6009
L304	232041	NIT-0509
L801	233122	NCH-3013
L802	233031	NMC-9-1
	Ceramic filters	
X101, X102	3010006	SFE10.7MA
X103–X105	3010043	SFE10.7MM
X301	3010049	CFM2-450BL
	X'tal	
X401	3010052	XTL-4.5M
	Capacitors	
C107	352741019	100μF, 16V, Elect.
C108	352741009	10μF, 16V, Elect.
C115	352744709	47μF, 16V, Elect.
C116	352741009	10μF, 16V, Elect.
C118	352780229	2.2μF, 50V, Elect.
C121	352750479	4.7μF, 25V, Elect.
C124	352784799	0.47μF, 50V, Elect.
C125	352721019	100μF, 6.3V, Elect.
C131	352784799	0.47μF, 50V, Elect.
C133	352744709	47μF, 16V, Elect.
C136	352742209	22μF, 16V, Elect.
C202	352741009	10μF, 16V, Elect.
C203	352744719	470μF, 16V, Elect.
C205, C206	352784799	0.47μF, 50V, Elect.
C207	352780109	1μF, 50V, Elect.
C208	372525114	510pF ± 5%, 50V, ST
C209, C210	352780229	2.2μF, 50V, Elect.
C218	352750479	4.7μF, 25V, Elect.
C219, C220	352741009	10μF, 16V, Elect.
C221, C222	352780339	3.3μF, 50V, Elect.
C223	352741029	1,000μF, 16V, Elect.
C224	352744719	470μF, 16V, Elect.
C225–C228	352742209	22μF, 16V, Elect.
C236	352741009	10μF, 16V, Elect.
C237	352744709	47μF, 16V, Elect.
C302, C306	3060010	NTC-20P-09, Trimmer
C307	372525114	510pF ± 5%, 50V, ST
C316	352741009	10μF, 16V, Elect.
C317	352721019	100μF, 6.3V, Elect.
C318	352741009	10μF, 16V, Elect.
C321	352750479	4.7μF, 25V, Elect.

CIRCUIT NO.	PARTS NO.	DESCRIPTION
C322	352780339	3.3μF, 50V, Elect.
C324	352744709	47μF, 16V, Elect.
C327	352780109	1μF, 50V, Elect.
C401	352721029	1,000μF, 6.3V, Elect.
C404	395160227	2.2μF, 35V, Tantalum
C406	352723319	330μF, 6.3V, Elect.
C411	352723319	330μF, 6.3V, Elect.
C804	352783399	0.33μF, 50V, Elect.
C806	352780229	2.2μF, 50V, Elect.
C807	352780109	1μF, 50V, Elect.
C808	352744709	47μF, 16V, Elect.
C809	352744719	470μF, 16V, Elect.
C811–C814	352741009	10μF, 16V, Elect.
C815, C816	352782299	0.22μF, 50V, Elect.
C821–C824	352721019	100μF, 6.3V, Elect.
C825	352751009	10μF, 25V, Elect.
C826	352780109	1μF, 50V, Elect.
C903	352784719	470μV, 50V, Elect.
C904, C906	352780109	1μF, 50V, Elect.
C908	352762229	2.200μF, 35V, Elect.
C909	352764719	470μF, 35V, Elect.
C911	352744709	47μF, 16V, Elect.
C913	352764719	470μF, 35V, Elect.
C914	352733319	330μF, 10V, Elect.
C915, C917	352721019	100μF, 6.3V, Elect.
C918	352783319	330μF, 50V, Elect.
C919	352762219	220μF, 35V, Elect.
C920, C921	352741019	100μF, 16V, Elect.
C922	352721019	100μF, 6.3V, Elect.
C923, C924	352780109	1μF, 50V, Elect.
	Resistors	
R115	5225026	N10HR470BD, Semi-fixed, narrow IF level
R142	5215003	N08HR20KBC, Semi-fixed, Muting level
R208	5225019	N10HR4.7KBD, Semi-fixed, V.C.O.
R823–R825	441621524	1.5kΩ, 1W, Metal oxide film
R852	431522205	22Ω, 1/2W, Solid
R904	441621224	1.2kΩ, 1W, Metal oxide film
R905	441621124	1.1kΩ, 1W, Metal oxide film
R906	441721504	15Ω, 2W, Metal oxide film
R907	441721814	180Ω, 2W, Metal oxide film
R910	441723314	330Ω, 2W, Metal oxide film
R911	441524714	470Ω, 1/2W, Metal oxide film
R914	441527504	75Ω, 1/2W, Metal oxide film
	Lamp	
PL901	210083	PL14V0.06AW-3

INDICATOR PC BOARD (NADIS-1101) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Transistors	
Q412–Q414	2211254	2SC1815 (Y)
	Fluorescent tube	
Q415	212010	7-BT-05A2
	Diodes	
D412–D420	223105 or 223133	1S1555 or DS442X
	L.E.Ds	
D402, D403	225047	SLP251B
D404	225046	SLP151B
D426–D432	225057	SR538D
D817–D821	225063	SLP-252B
D822	225046	SLP-151B
D823–D825	225062	SG238D
	Switches	
S1–S16	25035156	NPS-111-S120

IF BAND INDICATOR PC BOARD (NADIS-1102) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D814–D816	225083	SLP-252B-03

LAMP PC BOARD (NAPL-1103) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
PL902	210054B	PL6.3V, 250mA, Lamp

AF AMPLIFIER PC BOARD (NAAF-1104) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Transistors	
Q214, Q215	2211733	2SC1845 (E)
	Capacitors	
C229, C230	352780109	1μF, 50V, Elect.
C233, C234	352780339	3.3μF, 50V, Elect.
C235	352742219	220μF, 16V, Elect.
	Resistor	
R256	5215045	N08HR10KBC, Semi-fixed

PARTS LIST

SYMBOL NO.	PARTS NO.	DESCRIPTION
A1	27115087	Side bracket, left side
A2	27140448	Switch bracket
A3	27260046	Shaft
A4	27140461	Bracket, battery
A5	27300360	Case, battery
A6	27115045E	Side bracket, right side
A7	27140499	Bracket, pc board, front side
A8	28140356	Cushion
A9	838130068	3TTP+6B, Tap screw
A10	831130088	3TTW+8B, Tap screw
A11	82113006	3P+6FN, Pan head screw
A13	870072	Washer
A14	28140188	Cushion
A16	28133047	Back plate
A17	27267108	Guide, L.E.D.
A18	28130111	Dial plate
A19	28191083	Clear plate
A20	28191082	Clear plate
A22	834130088	3TTS+8B, Tap screw
A26	28140333	Cushion
A27	27110133	Front bracket
A28	28140300	Cushion
A29	833130080	3TTP+8P, Tap screw
A31	27120299	Back panel
A32	27140500	Bracket, pc board, back side
A33	28320540	Knob, output level control
A35	834130068	3TTS+6B, Tap screw
A36	834130108	3TTS+10B, Tap screw
A37	82114008	4P+8FN, Pan head screw
A38	86414010	FWN4x10FN, Nut
A39	834230108	3TTS+10B (ni), Tap screw
A351	28184104	Top cover
A352	28140020	4x10x40mm, Cushion
A353	834430068	3TTS+6B (BC), Tap screw
A501	13409121	Front panel ass'y
A502	28191084	Clear plate
A503	27262095	Plate
A504	27267087	Guide, power
A505	28198541A	Facet
A506	27300354	Filter
A507	28199019A	Film
A510	833130100	3TTW+10P, Tap screw
A601	27170103	Bottom board
A602	27300359	Lid
A603	27175018	Leg
A604	831130088	3TTW+8B, Tap screw
A605	834130128	3TTS+12B, Tap screw
A801	28320485	Knob, power
A802	28320501	Knob, push
A803	28320502	Knob, station
A804	28320503	Knob, up/down
C901	3500060	0.01μF, 125V, CS capacitor
L002	232085	NMA-3034, AM loop antenna
P1	223004	Terminal
P801	25060045	NTM4PRMN14, Antenna terminal
P002a	27190105	Holder, am loop antenna
P802	25045026	NPJ-2PR-BL04, Output terminal
R901	431523355	3.3MΩ, 1/4W, Solid resistor
R243, R244	5147012	N16RG10KB15, Output control variable resistor
S901	25035135	NPS-111-L100P, Power switch
T901	230493	NPT-742D, Power transformer
U1	13409500	NARF-1100, FM/AM tuner and digital circuit pc board ass'y
U2	13409501	NADIS-1101, Indicator pc board ass'y
U3	13409502	NADIS-1102, Indicator pc board ass'y
U4	13409503	NAPL-1103, Lamp pc board ass'y
U5	13409504	NAAF-1104, AF amplifier pc board ass'y
W901	253099A	AS-UC-3, Power supply cable
W901a	270025	SR-3P-4, Strainrelief

DISASSEMBLING PROCEDURES

1. **Removal of front panel**
   1. Remove the four screws (A353) holding the side bracket and the top cover.
   2. Remove a screw (A353) holding the top cover and back panel.
   3. Remove the three screws (A510) holding the front panel and front bracket from bottom side.
   4. Insert the driver between the front panel and front bracket as shown in the fig. 1, and remove the front panel from the projection of the front bracket.

2. **Removal of the digital pc board**
   1. Remove the top cover and the front panel.
   2. Remove the three screws (A22) holding the front bracket and digital pc board from the front side.
   3. Remove the nine screws (A29) holding the digital pc board and the front bracket.

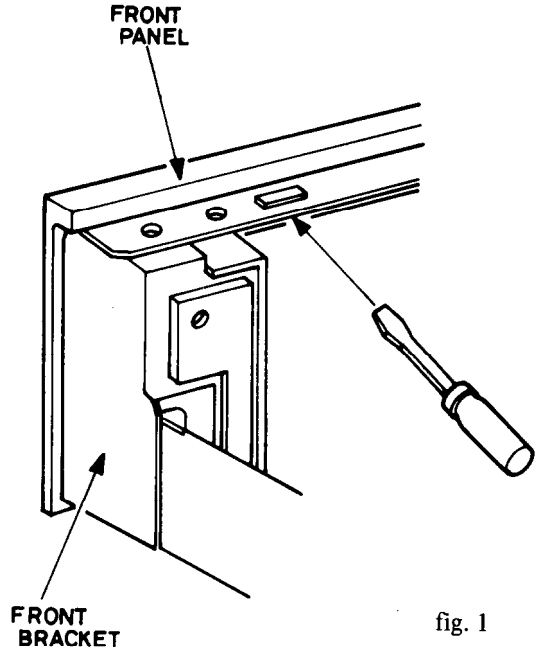
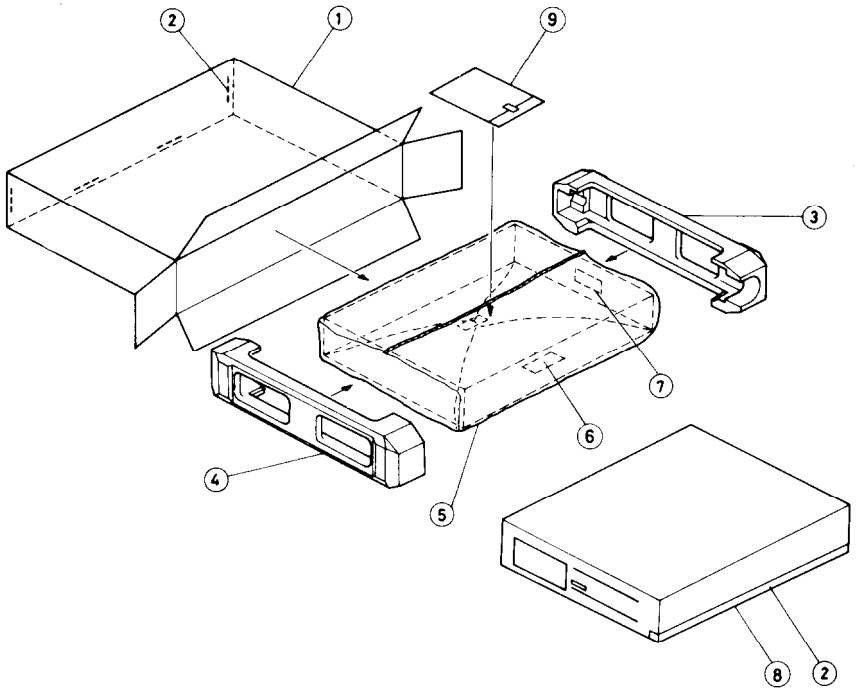


fig. 1

PACKING PROCEDURES



REF. NO.	PARTS NO.	DESCRIPTION
1	29050448	Master carton box
2	282301	Sealing hook
3	29090533B	Pad (R)
4	29090532A	Pad (L)
5	29100051	420x750mm, Poly bag
6	29360363	Caution label (C)*
7	29360378	Label*
8	260012	Damplon tape
9		Accessary bag ass'y
	29340505	Instruction manual
	28365006	Warranty card*
	29358002	Service station list*
	292064A	5059-01, FM antenna
	29100006	250x350mm, Poly bag
	3010054	Battery
	29100002A	80x150mm, Poly bag for battery
	253074	Connection cable

* : Only U.S.A. model.

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