

ONKYO® SERVICE MANUAL

QUARTZ SYNTHESIZED TUNER AMPLIFIER MODEL TX-6000

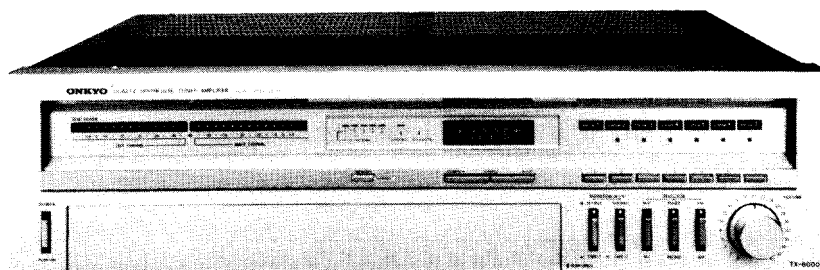


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SPECIFICATIONS

AMPLIFIER SECTION

Output Power	70 watts per channel, min. RMS, at 8 ohms, both channels driven, from 20 Hz to 20,000 Hz with no more than 0.03% total harmonic distortion
Total Harmonic Distortion	0.03% at rated output 0.028% at 1 watt output
IM Distortion	0.03% at rated output 0.028% at 1 watt output
Damping Factor	50 at 8 ohms
Frequency Response	15 Hz – 30,000 Hz (± 1 dB)
RIAA Deviation	20 Hz – 20,000 Hz (± 0.5 dB)
Sensitivity and Impedance	Phono MM : 2.5mV, 50 kohms Phono MC : 350 μ V, 330 ohms Tape Play : 150mV, 50 kohms Tape Rec : 150mV, 3.2 kohms
Phono Overload	200mV RMS at 1 kHz, 0.03% THD (MM)
Signal-to-Noise Ratio	Phono MM : 76 dB (IHF "A" weighted, 1 watt output, 5mV input) 86 dB (IHF "A" weighted, 10mV input) Tape : 80 dB (IHF "A" weighted, 1 watt output, 0.5V input) 95 dB (IHF "A" weighted)
Tone Controls	Bass : ± 12 dB at 100Hz Treble : ± 10 dB at 10 kHz
Filters	High : 6 kHz, 6 dB/oct. Subsonic : 10 Hz, 6 dB/oct.
Loudness	+8 dB at 40 Hz, +5 dB at 20 kHz

TUNER SECTION FM

Tuning Range	87.9 – 107.9 MHz (200 kHz steps)
Usable Sensitivity	Mono : 10.3 dBf, 1.8 μ V Stereo : 17.2 dBf, 4.0 μ V
50 dB Quieting Sensitivity	Mono : 14.7 dBf, 3 μ V Stereo : 37.2 dBf, 40 μ V
Capture Ratio	1.4 dB
Image Rejection	80 dB

IF Rejection	90 dB
Spurious Rejection	1/2 IF 90 dB
Signal to Noise Ratio	Mono 73 dB Stereo 68 dB
Alternate Channel Att	70 dB
AM Suppression Ratio	55 dB
Harmonic Distortion	Mono 0.12% Stereo 0.25%
Frequency Response	30 – 15,000 Hz (± 1.5 dB)
Stereo Separation	40 dB at 1 kHz 33 dB at 100 – 10,000 Hz
Subcarrier Suppression	60 dB
Muting Level	17.2 dBf, 4 μ V
Stereo Threshold	17.2 dBf, 4 μ V

AM

Tuning Range	530 – 1620 kHz (10 kHz steps)
Usable Sensitivity	25 μ V
Image Rejection	45 dB
IF Rejection	35 dB
Signal-to-Noise Ratio	40 dB

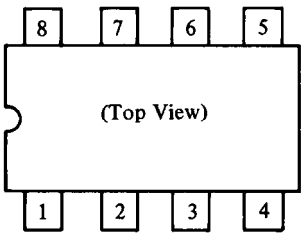
GENERAL

Power Supply Outputs	AC 120 volts, 60Hz Speakers A & B, Headphones, Tape Rec Out 1 & 2, EPS OUT (PRE OUT), AC Outlet (SWITCHED $\times 1$, UNSWITCHED $\times 1$)
Inputs	Phono, Tape Play 1 & 2, EPS IN (MAIN IN), FM and AM antennas
Antennas	FM : 300 ohms balanced and 75 ohms unbalanced AM : built-in ferrite core antenna and external terminal
Semiconductors	3 FETs, 21 ICs, 51 transistors, 70 diodes, 39 LEDs, 1 fluorescent digital display tube
Dimensions (W $\times$ H $\times$ D)	540 $\times$ 142 $\times$ 392 mm 21-1/4" $\times$ 5-5/8" $\times$ 15-7/16"
Weight	15 kg, 33 lbs

Specifications and features are subject to change without notice.

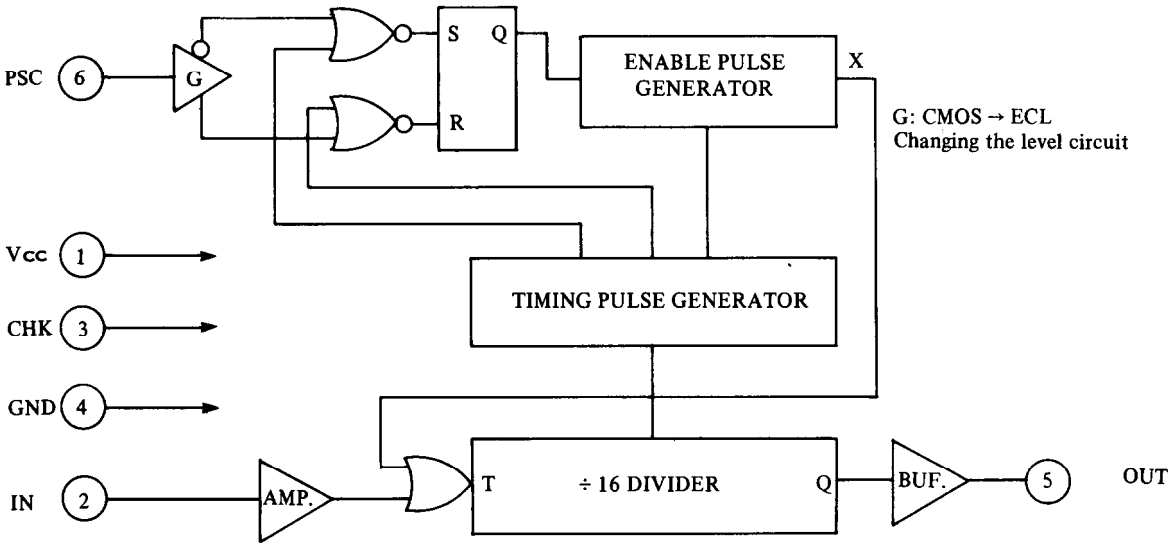
μPB553AC (Prescaler)

Pin Connection

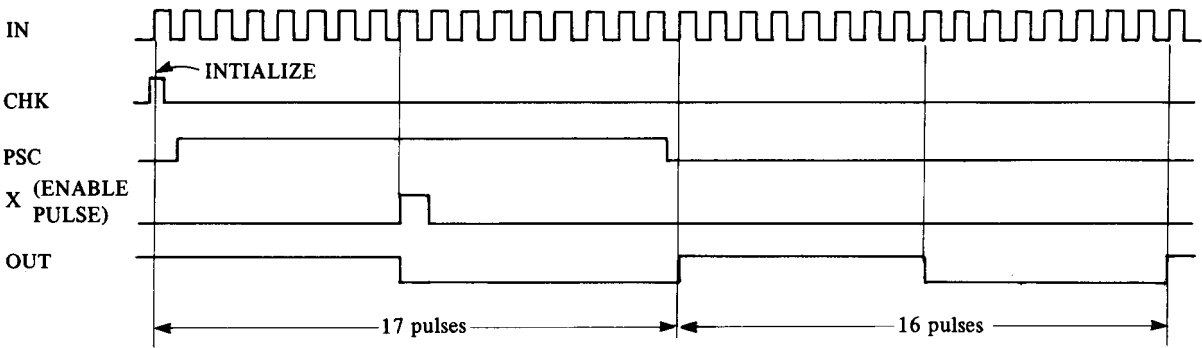


Pin No.	Symbol	Description
1	V _{CC}	+5V supply
2	IN	Input terminal
3	CHK	Check terminal. To Ground
4	GND	Ground
5	OUT	Output
6	PSC	Prescaler Control
7	NC	Not connected
8	NC	Not connected

Block Diagram

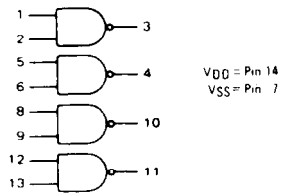


Timing Chart

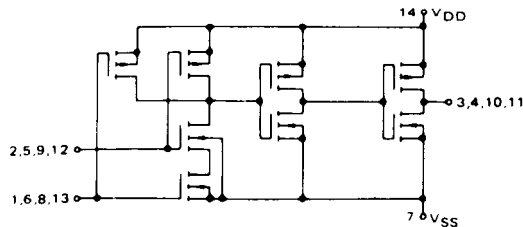


4011B (Quad 2-input "NAND" gate)

LOGIC DIAGRAM

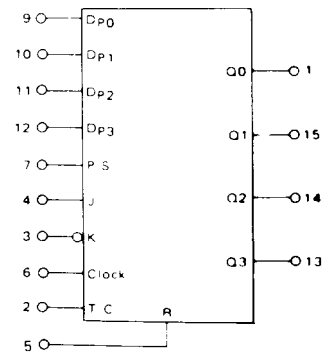


CIRCUIT SCHEMATICS
(1/4 of Device Shown)



4035B (4-bit parallel-in/out shift register)

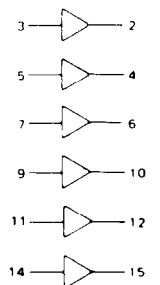
BLOCK DIAGRAM



VDD = Pin 16
VSS = Pin 8

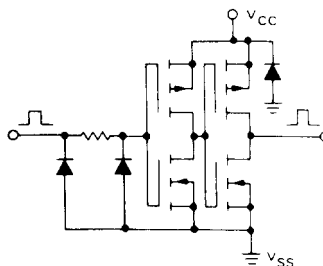
4050B (Hex buffers)

LOGIC DIAGRAMS



NC = Pin 13, 16
VSS = Pin 8
VCC = Pin 1

CIRCUIT SCHEMATIC
(1/6 OF CIRCUIT SHOWN)

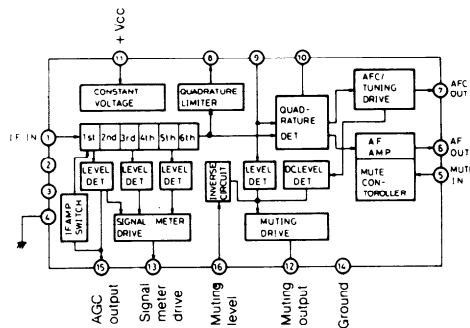


INPUTS				t _n OUTPUT
C	J	K	R	Q0
0	0	0	0	0
0	0	1	0	Q0 (n-1)
0	1	0	0	Q0 (n-1)
1	1	1	0	1
x	x	x	0	Q0 (n-1)
x	x	x	1	0

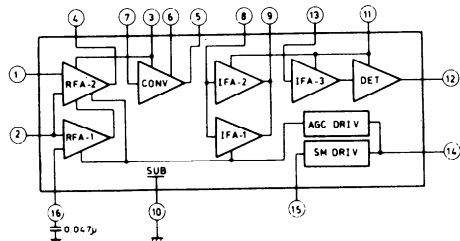
x = Don't Care
P/S = 0 = Serial Mode
T/C = 1 = True Outputs

PRECAUTIONS

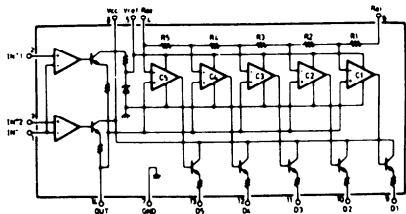
- For continued protection against fire hazard, replace only with same type and same rating fuse.
AC fuse 5A (ST-6) PARTS NO. 252050
- Replacement for power, complementary and driver transistors, if necessary, must be made from the same beta (HFE) group as the original type.
- All CMOS devices have diode input protection against adverse electrical environments such as static discharge. Unfortunately, there can be severe electrical environments during the process of handling. For example, static voltages generated by a person walking across a common waxed floor have been measured in the 4 to 15 kV range (depending on humidity, surface conditions, etc.). These static voltages are potentially disastrous when discharged into a CMOS input considering the energy stored in the capacity (≈ 300 pF) of the human body at these voltage levels. Present CMOS gate protection structures can generally protect against overvoltages. This is usually sufficient except in the severe cases. Following are some suggested handling procedures for CMOS devices, many of which apply to most semiconductor devices.
 - 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.
 - 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.
 - Nylon clothing should not be worn while handling MOS circuits.
 - When lead straightening or hand soldering is necessary, provide ground straps for the apparatus used.
 - Double check test equipment setup for proper polarity of voltage before conducting parametric or functional testing.
 - All unused device inputs should be connected to VDD or VSS.

μ PC1167C2 (FM IF system)

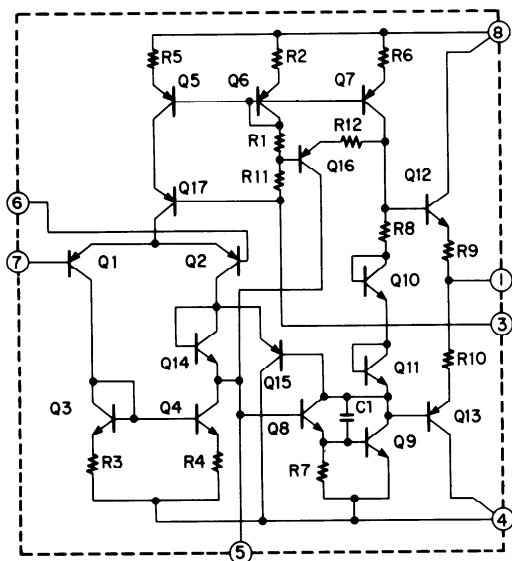
LA-1240 (AM radio system)



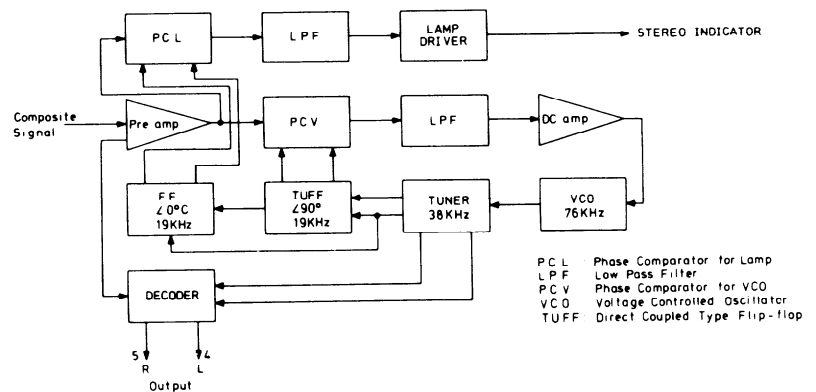
LB-1426 (Single indicator drive)



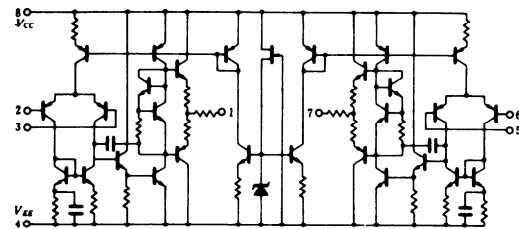
HA12017 (Equalizer Amplifier)



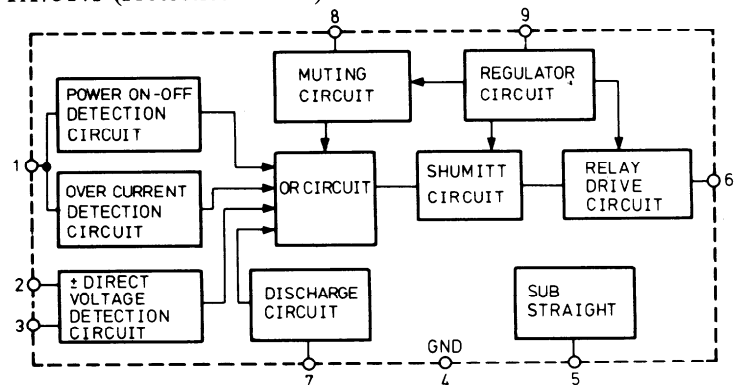
HA1156W (MPX Decoder)



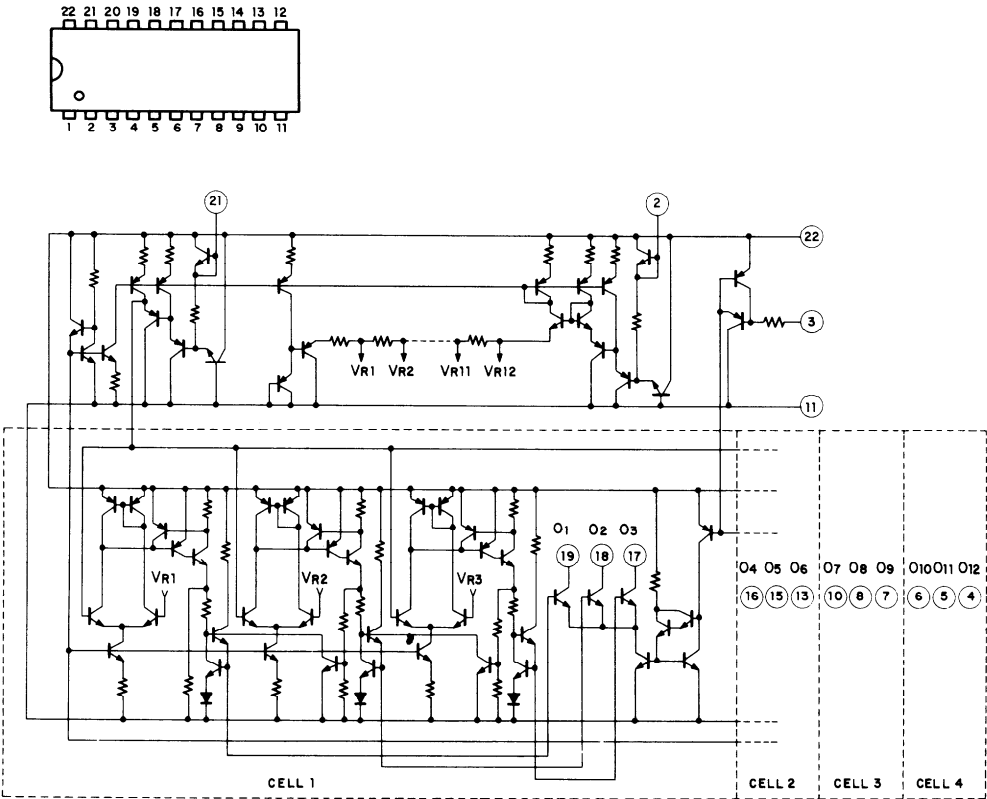
NJM4558/4559 (Operation amplifier)



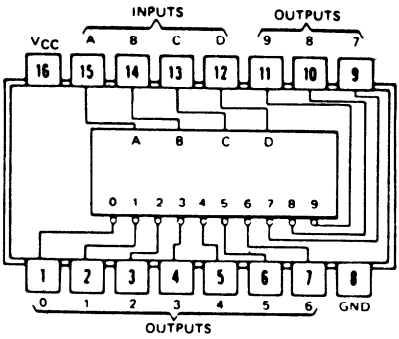
TA7317P (Protection Circuit)



IR2431 (Output Power Indicator Drive)



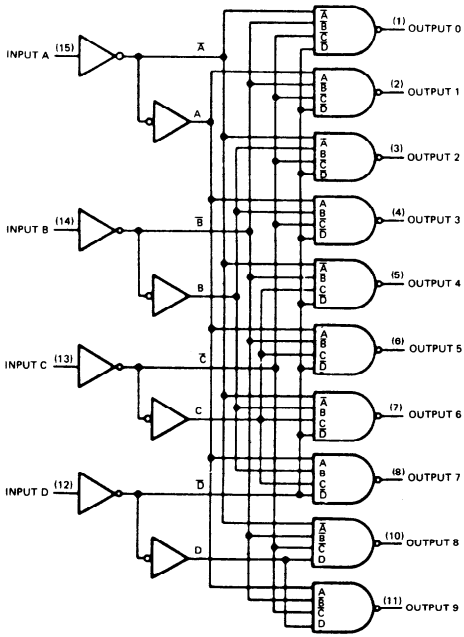
7442 (BCD-to-Decimal Decoder)



Pin Connection Diagram

NO.	INPUTS				OUTPUTS									
	D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	L	H	H	H	H	H	H	H	H	H
2	L	L	H	L	L	H	H	H	H	H	H	H	H	H
3	L	L	H	H	L	H	H	H	H	H	H	H	H	H
4	L	H	L	L	L	H	H	H	L	H	H	H	H	H
5	L	H	L	H	L	H	H	H	H	L	H	H	H	H
6	L	H	H	L	L	H	H	H	H	H	L	H	H	H
7	L	H	H	H	L	H	H	H	H	H	H	L	H	H
8	H	L	L	L	L	H	H	H	H	H	H	H	L	H
9	H	L	L	H	L	H	H	H	H	H	H	H	H	L
INVALID	H	L	H	L	L	H	H	H	H	H	H	H	H	H
	H	L	H	H	L	H	H	H	H	H	H	H	H	H
	H	L	L	L	H	H	H	H	H	H	H	H	H	H
	H	L	L	H	L	H	H	H	H	H	H	H	H	H
	H	H	L	L	L	H	H	H	H	H	H	H	H	H

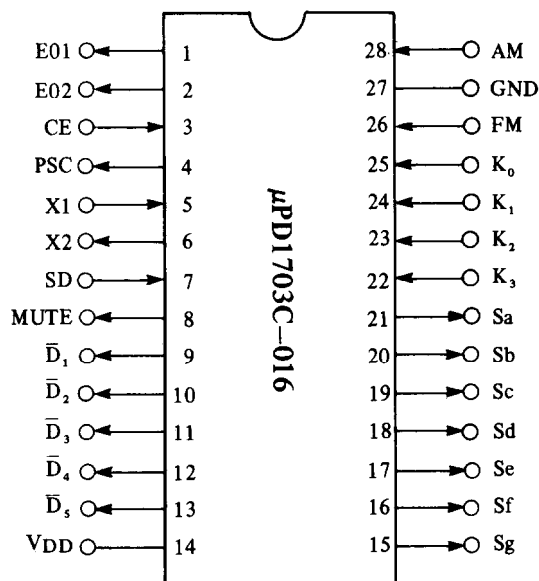
Function Table



Logic Diagram

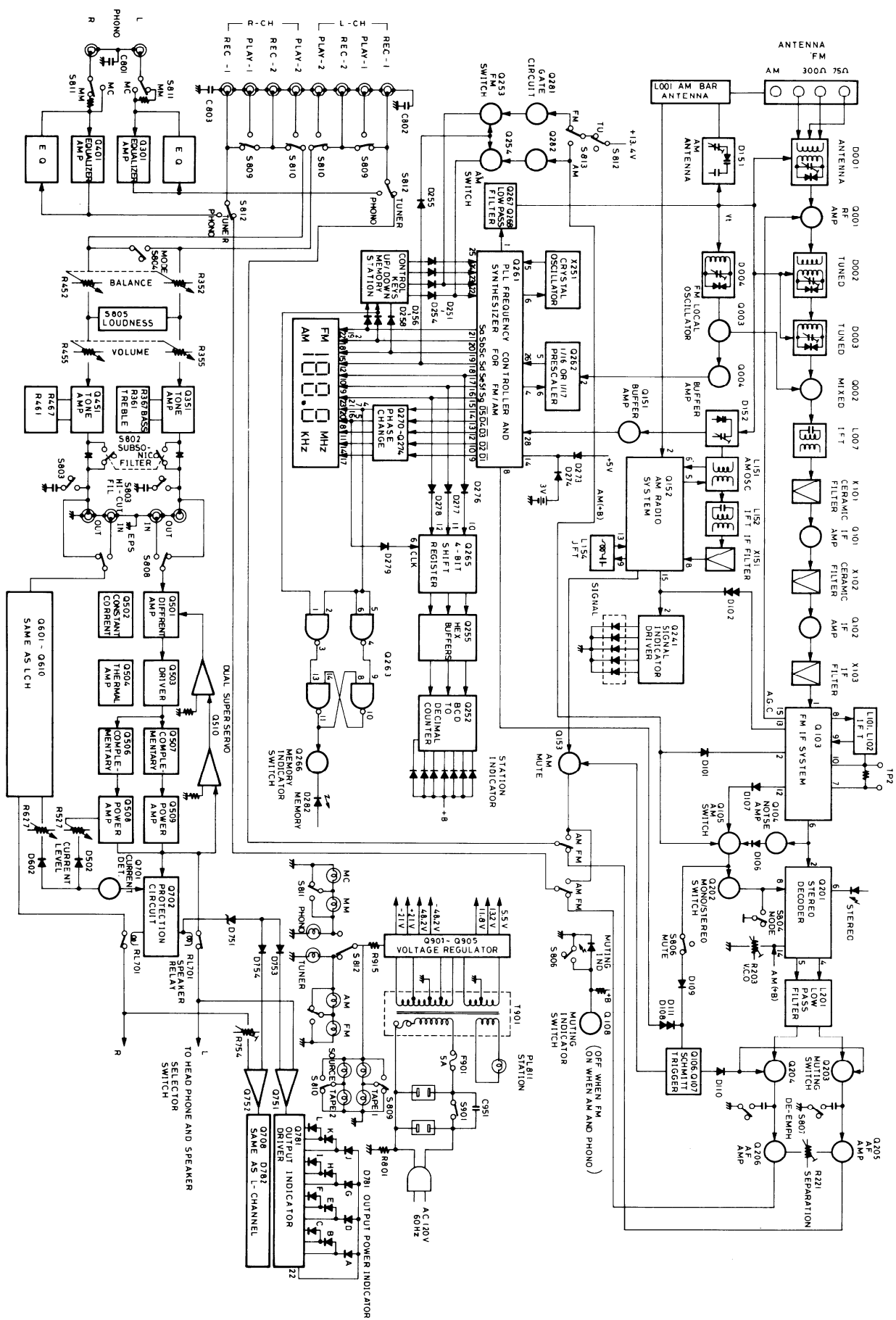
BLOCK DIAGRAM FOR IC

μ PD1703C-016 (Micro computer)

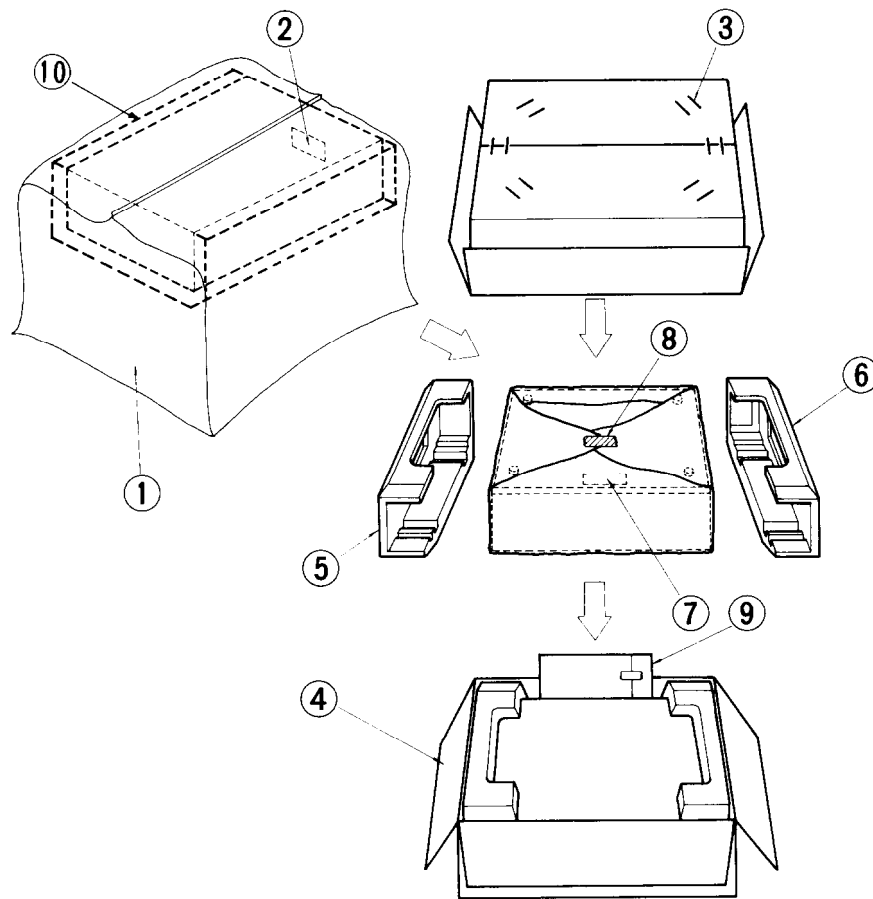


Terminal No.	Symbol	Terminal	Description
1 2	EO ₁ EO ₂	Error Out	Charge pump output of the phase detector which constitutes the PLL. High level is output when the divided oscillation frequency is higher than the reference frequency. In the opposite case, LOW level is output. Floating occurs when the frequencies match. The output is applied to the variable capacitor in the front end through low pass filter Q267 and Q268. The output from both terminal is the same, but only EO1 is used.
3	CE	Chip Enable	Device selection signal input terminal. HIGH level . . . normal operation; LOW level . . . memory preservation.
4	PSC	Prescaler Control	This terminal outputs a signal that switches the prescaler division ratio to 1/16 or 1/17 when the pulse swallow method is used for division (FM only).
5 6	X1 X2	X'tal	Connected to the 4.5 MHz crystal oscillator.
7	SD	Station Detector	Input terminal for detecting whether or not a broadcast signal is being received during auto-tuning. Stopped by the HIGH level. Not used.
8	MUTE	MUTE	Output terminal which mutes the shock noise occurring when the PLL is released; active HIGH.
9 ~ 13	$\bar{D}_1 \sim \bar{D}_5$	Digit Outputs	Display digit output signal terminals; active LOW.
14	VDD	VDD	Device power terminal; supplies 5V during normal operation and 3V from the external power source (two batteries) for memory preservation.
15 ~ 21	Sa ~ Sg	Segment Outputs	Display tube segment signal output, key return signal source and station display signal terminals; active HIGH. Since these terminals can handle 30V, they are connected directly to the segment terminals of the fluorescent display tubes.
22 ~ 25	K ₀ ~ K ₃	Key Return Signal Inputs	Terminals for input of the key return signals from the external key matrix.
26	FM	FM Local Oscillator Signal Input	FM signals received are divided by 1/16 or 1/17 by prescaler μ PB553AC for input to this terminal.
27	GND	GND	Ground
28	AM	AM Local Oscillator Signal Input	Terminal for input of AM broadcast signal.

BLOCK DIAGRAM



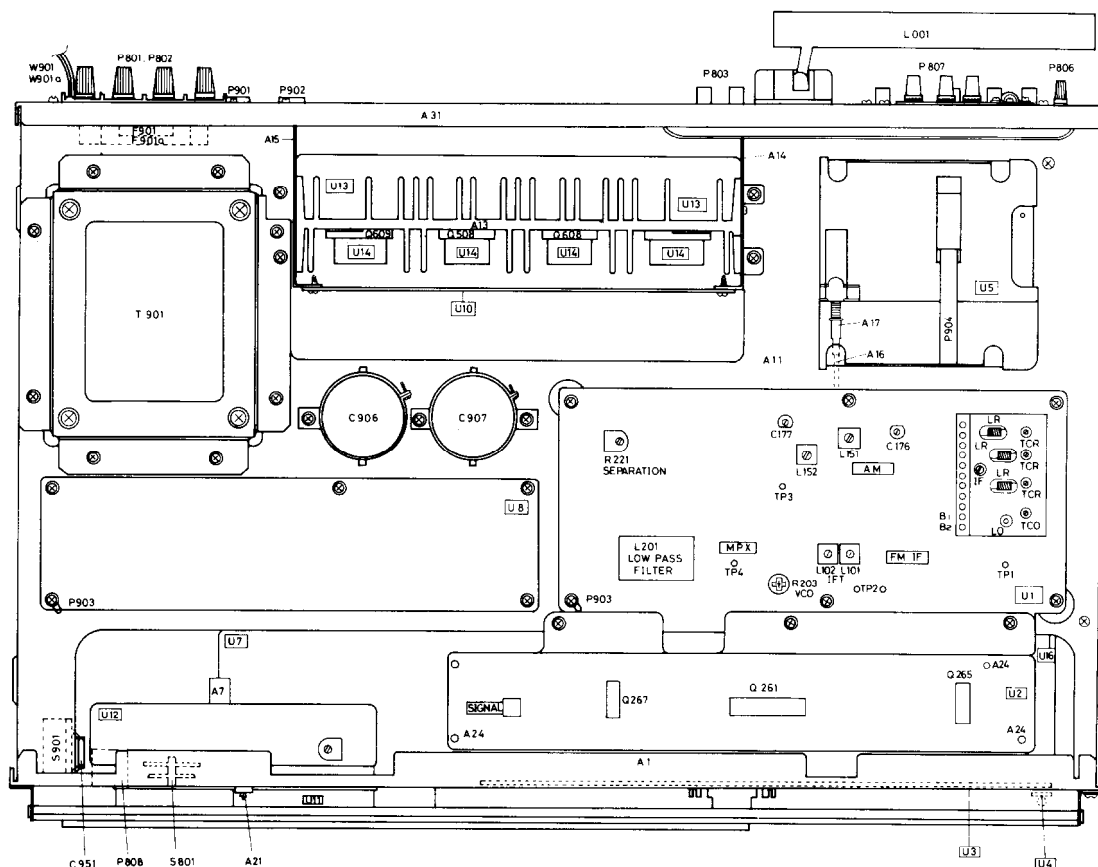
PACKING PROCEDURES



Parts list

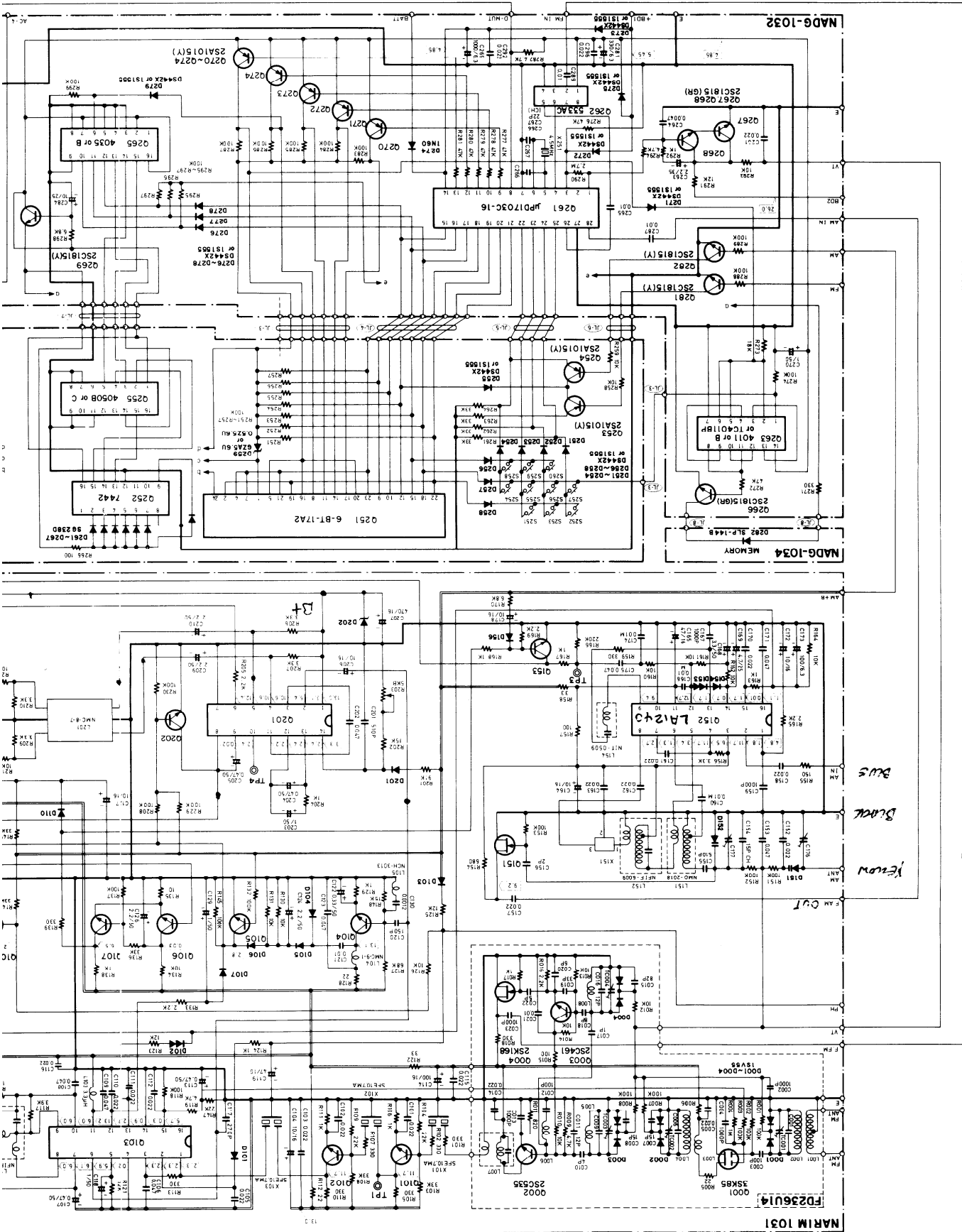
REF.NO.	PARTS NO.	DESCRIPTION
1	29100038	950×720mm, Poly bag
2	29360378	Label
3	282301	Sealing hook
4	29050428	Master carton box
5	29090482	Pad (R)
6	29090483B	Pad (L)
7	29360363	Label
8	29110032	Tape
9		Accessory bag ass'y
	29340487	Instruction manual
	29365006	Warranty card
	292064A	FM antenna
	29358002	Service station list
	3010054	Battery
	29100006	250×350mm, Poly bag
10	290008-1	500×1000mm, Protection sheet

COMPONENT LOCATION



SYMBOL NO.	PARTS NO.	DESCRIPTION	SYMBOL NO.	PARTS NO.	DESCRIPTION
A1	27110129	Front bracket	A42	28140020	4x10x40mm, Cushion
A2	27130243	Bracket, shielded	A43	838440089	4TTB+8C(BC), Tap screw
A3	13439901	Holder ass'y	A44	834130102	3STS+10BQ, Tapping screw
A4	13439902	Back plate ass'y	A51	13439121	Front panel ass'y
A5	27215049	Frame, left	A52	28125077-1	End cap
A6	27215050	Frame, right	A53	27210216	Panel, down
A7	27225047	Shielded plate	A54	28191075	Clear plate
A8	28140261	8x15x30mm, Cushion	A55	28185127A	Plate, right
A9	2814044	2x12x12mm, Cushion	A56	28185128A	Plate, left
A11	27100041B	Chassis	A57	27267093	Guide, selector
A12	27130077B	Bracket, power transformer	A58	27267090	Guide, tuning
A13	27160063	Radiator	A59	27267091	Guide, memory
A14	27130199	Bracket, right	A60	27267063A	Guide, power
A15	27130200	Bracket, left	A61	27267065	Guide, push
A16	27260034	Shaft	A62	27180049	Spring
A17	28320135	Connector	A63	13439903	Front panel (S) ass'y
A19	27140461	Bracket, battery	A64	27300315A	Bearing, right
A20	27300360	Case, battery	A65	27300316A	Bearing, left
A21	880004	Rivert	A66	28198528	Facet
A23	82113006	3P+6FN, Pan head screw	A67	261002	Tape, red
A24	27190009	Holder	A68	29110031	Tape, green
A25	834130062	3STS+6BQ, Tapping screw	A70	834130062	3STS+6BQ, Tapping screw
A26	831130062	3STW+6BQ, Tapping screw	A71	28140126	53mm, Cushion
A27	834130102	3STS+10BQ, Tapping screw	A81	27170100	Bottom board
A28	831130082	3STW+8BQ, Tapping screw	A82	27175021	T-C, Leg
A29	82113010	3P+10FN, Pan head screw	A83	831130162	3STW+16BQ, Tapping screw
A30	86414010	FWN4x10FN, Nut	A84	831130062	3STW+6BQ, Tapping screw
A31	27120281	Back panel	A85	27300359	Lid
A32	834130062	3STS+6BQ, Tapping screw	A91	28320495	Knob, volume
A33	834130102	3STS+10BQ, Tapping screw	A92	28320494	Knob, tone
A34	27190095A	Holder, SEL	A93	28320493	Knob, speaker
A35	27190094	Holder, LED	A94	28320398	Knob, power
A36	27250052	Case, lamp	A95	28320492	Knob, push
A41	28184075	Top cover	A96	28320497	Knob, selector

SCHEMATIC DIAGRAM FOR TUNER SECTION



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PRINTED CIRCUIT BOARD-PARTS LIST

FM/AM TUNER PC BOARD (NARIM-1031)-PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Front end	
	240043	FD236U14
	ICs	
Q103	222608	μ PC1167C2
Q152	222497	LA1240
Q201	222419	HA1156W
	Transistors	
Q101, Q102	2210823	2SC1675 (L-1)
Q104	2210746	2SC945A(P)
Q105-Q108	2210746 or 2211255	2SC945A(P) or 2SC1815(GR)
Q151	2211303	2SK68(M)
Q153	2210746 or	2SC945A(P) or
Q202-Q204	2211255	2SC1815(GR)
Q205, Q206	2211733	2SC1845(E)
	Diodes	
D101, D103	223133 or	DS442X or
D104-D111	223105	1S1555
D102, D153	4000068 or 4000022	VD1222 or VD1212
D151, D152	223136	KV1226
D154, D156	223133 or	DS442X or
D201, D203	223105	1S1555
D202	224060 or 224115	05Z15L or GZA15L
	Transformers	
L101	233229	NFIF-6022P, FM IF
L102	233230	NFIF-6022S, FM IF
L152	232077	NFIF-6009, AM IF
L154	232041	NIT-0509, AM IF
	Coils	
L103	233024 or 233105	NCCH1501 or NCH1005
L104	233031	NMC-9-1
L105	233122	NCH3013
L151	232084	NMO-2018
L201	233032A	NMC-8-7
	Ceramic filters	
X101-X103	3010006	SFE10.7MA(RED)
X151	3010049	CFM2-450BL
	Capacitors	
C104	352741009	10 μ F, 16V, Elect.
C107, C113	352784799	0.47 μ F, 50V, Elect.
C114	352741019	100 μ F, 16V, Elect.
C118	352780109	1 μ F, 50V, Elect.
C119	352734709	47 μ F, 10V, Elect.
C122	352783399	0.33 μ F, 50V, Elect.
C124, C126	352780229	2.2 μ F, 50V, Elect.
C127	352741009	10 μ F, 16V, Elect.
C129	352780109	10 μ F, 50V, Elect.
C155	372525114	510pF $\pm$ 5%, 50V, ST
C164	352741009	1 μ F, 16V, Elect.
C165	352744709	47 μ F, 16V, Elect.
C168	352780339	3.3 μ F, 50V, Elect.
C172	352741009	10 μ F, 16V, Elect.
C173	352721019	100 μ F, 6.3V, Elect.
C176, C177	3060010	NTC-20P09, Trimmer
C178	352741009	10 μ F, 16V, Elect.
C201	372525114	510pF $\pm$ 5%, 50V, ST
C203	352780109	1 μ F, 50V, Elect.
C204, C205	352784799	0.47 μ F, 50V, Elect.
C206	352741009	10 μ F, 16V, Elect.
C207	352744719	470 μ F, 16V, Elect.
C209, C210	352780229	2.2 μ F, 50V, Elect.
C213, C214	352780109	1 μ F, 50V, Elect.
C217, C218	352782299	0.22 μ F, 50V, Elect.
C219	352744719	470 μ F, 16V, Elect.
	Resistors	
R203	5215020 or 5225019	N08HR5KBC or N10HR4, 7KBD, Semi-fixed
R221	5215019	N08HR2KBC, Semi-fixed

DIGITAL CIRCUIT PC BOARD (NADG-1032)—PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
ICs		
Q261	222618	μ PD1703C-016
Q262	222619	μ PB533AC
Q263	222840111	4011B
Q265	222840351	4035B
Q241	222541	LB1426
Transistors		
Q266-Q268	2211255	2SC1815(GR)
Q269	2211254	2SC1815(Y)
Q270-Q274	2211454	2SA1015(Y)
Q281, Q282	2211254	2SC1815(Y)
Diodes		
D271-D273	223133	DS442X
D274	223103	1N60
D275-D279	223133	DS442X
Crystal		
X251	3010052	XTL-4.5M
Capacitors		
C241-C243	352741009	10 μ F, 16V, Elect.
C263	395160227	2.2 μ F, 35V, Tantalum
C268	352751009	10 μ F, 25V, Elect.
C269	352751029	1,000 μ F, 6.3V, Elect.
C270	352780109	1 μ F, 50V, Elect.
C281	352723319	330 μ F, 6.3V, Elect.
C282	352780109	1 μ F, 50V, Elect.
C284	352751009	10 μ F, 25V, Elect.
Resistor		
R918	441524304KF	43 Ω , 1/2W, Metal oxide film
Lead wires		
	79150	JL6-100-5-5-P2.5
	79151	JL4-100-5-5-P2.5
	79152	JL7-120-5-5-P2.5
	79153	JL3-120-5-5-P2.5
	79154	JL7-100-5-5-P2.5

FREQUENCY INDICATOR AND SWITCH CIRCUIT PC BOARD (NADIS-1033)— PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Fluorescent indicator tube		
Q251	212009	6BT17A2
ICs		
Q252	222740420	7442
Q255	222840501	4050B
Transistors		
Q253, Q254	2211454	2SA1015(Y)
L.E.Ds		
D241	225063	SLP-252B
D242	225046	SLP-151B
D243	225047	SLP-251B
D261-D267	225062	SG238D
Diodes		
D251-D258	223133	DS442X
D259	224096	GZA5.6U
Switches		
S251-S260	25035156	NPS-111-S120
Holders		
	27190095A	Selector
	27190094	L.E.D
Cushion		
	28140300	

MEMORY INDICATOR PC BOARD (NADIS-1034)—PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D282	225070	SLP-144B

EQUALIZER AMPLIFIER AND SWITCH CIRCUIT PC BOARD (NAES-1035)—PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
ICs		
Q301, Q401	222594	HA12017

Capacitors		
C301, C401	392851007	10 μ F, 25V, LL
C304, C404	352724719	470 μ F, 6.3V, Elect.
C307, C407	379126824	6.800pF $\pm$ 5%, 50V, DEW
C308, C408	379122034	0.02 μ F $\pm$ 5%, 50V, DEW
C309, C409	392880107	1 μ F, 50V, LL
C311, C312	352780339	3.3 μ F, 50V, Elect.
C801	379122237	0.022 μ F, 50V, DEW
Switches		
S809, S810	25035236	NPS-242-L200
S811c	25065151	NSS-6268
Terimnals		
P804	25045020	NPJ-4PDBL11
P805	25045041	NPJ-6PDBL18

SWITCH AND LAMP CIRCUIT PC BOARD (NASW-1036)—PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Lamps		
PL801-PL810	210082	PL12V0.06AW-2
Capacitor		
C926	352751029	1,000 μ F, 25V, Elect.
Resistors		
R357, R457	5148063	N16RGM41C100KBTP40, Volume control variable
R803-R808	441622014KF	200 Ω , 1W, Metal oxide film
Switches		
S811a, S812	25035235	NPS-242-122-L199
S813		
Lamp case		
	27250052	
Screws		
	82113006	3P+6F-N, Pan head

PREAMPLIFIER CIRCUIT PC BOARD (NAAF-1037)—PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
ICs		
Q351, Q451	222534	NJM-4559DX
Capacitors		
C353, C453	392880227	2.2 μ F, 50V, LL
C356, C456	392880107	1 μ F, 50V, LL
C362, C462	352742209	22 μ F, 16V, Elect.
C363, C463	392880227	2.2 μ F, 50V, LL
C364, C464	392986895	0.68 μ F $\pm$ 10%, 50V, LLN
C367, C368	352750479	4.7 μ F, 25V, Elect.
Resistors		
R352, R452	5148062	N16RGMCS500KMN15, Balance control variable
R361, R461	5148061	N16RGM11C100KCO15, Treble control variable
R367, R467	5148060	N16RGM11C100KCS15, Bass control variable
R373, R473	431421567	15M Ω , 1/4W, Solid
Switches		
S802-S808	25035234	NPS-722-L198

PROTECTOR AND POWER SUPPLY PC BOARD (NAPCS-1038)—PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
IC		
Q702	222584	TA7317P
Transistors		
Q701	2211395 or 2211396	2SA970(GR) or 2SA970(BL)
Q901	2200674 or 2200673	2SA816(Y) or 2SA816(O)
Q902	2200664 or 2200663	2SC1626(Y) or 2SC1626(O)
Q903	2201074 or 2201075	2SD880(Y) or 2SD880(GR)
Q904	2201074 or 2201075	2SD880(Y) or 2SD880(GR)
Q905	2210746, 2211256 or 2211255	2SC945A(P), 2SC1815(BL) or 2SC1815(GR)

D701	Diodes 223133	DS442X		ICs 222502 or 222597	NJM-4559DX or NJM-4558DN
D702	224107 or 224108	GZA10L or GZA10U	Q510, Q610		
D703	223804	SR1K-2		Diodes 4000022	VD1212
D901-D904	223863	GP30DL	D501, D601	223133	DS442X
D905, D906	224123	GZA22L	D502-D504	223133	DS442X
D907-D910	223804	SR1K-2	D602-D604		
D911	223848	GP08B		Coils 231001	S-1, 3B
D912	224097	GZA6. 2L			
D913	224115	GZA15L	L501, L601		
D914	224009	WZ-260		Capacitors 392880227	2.2 μ F, 50V, LL
C701	Capacitors 352721019	100 μ F, 6.3V, Elect.	C501, C601	352780109	1 μ F, 50V, Elect.
C704	352732209	22 μ F, 10V, Elect.	C505, C605	352721019	100 μ F, 6.3V, Elect.
C705	352784799	0.47 μ F, 50V, Elect.	C507, C607	352780339	3.3 μ F, 50V, Elect.
C706	352742219	220 μ F, 16V, Elect.	C509, C609	379124735	0.047 μ F $\pm$ 10%, 50V, DEW
C908, C909	352781019	100 μ F, 50V, Elect.	C512, C612	379124735	0.047 μ F $\pm$ 10%, 50V, DEW
C910, C911	352751019	100 μ F, 25V, Elect.	C514, C614	352752209	22 μ F, 25V, Elect.
C912, C913	352754709	47 μ F, 25V, Elect.	C516, C616	352752209	22 μ F, 25V, Elect.
C916	352751019	100 μ F, 25V, Elect.	C517, C617	352780339	3.3 μ F, 50V, Elect.
C917	352752229	2,200 μ F, 25V, Elect.	C518, C618	352750479	4.7 μ F, 25V, Elect.
C918	352734709	47 μ F, 10V, Elect.	C519, C520	352770229	2.2 μ F, 63V, Elect.
C919	352731019	100 μ F, 10V, Elect.	C521, C621	352770479	4.7 μ F, 63V, Elect.
C920, C921	352744709	47 μ F, 16V, Elect.	C522, C622	352770229	2.2 μ F, 63V, Elect.
C922	352744719	470 μ F, 16V, Elect.	C524, C624	352770479	4.7 μ F, 63V, Elect.
C924	352781019	100 μ F, 50V, Elect.	C525, C625		
C925	352762219	220 μ F, 25V, Elect.		Resistors 5221019	N10HR470BE, Semi-fixed
R551, R651	Resistors 441613314KF	330 Ω , 1W, Metal oxide film	R514, R614	44152514KF	100 Ω , 1/2W, Metal oxide film
R701, R702	431522735	27K Ω , 1/2W, Solid	R517, R617	44152514KF	150 Ω , 1/2W, Metal oxide film
R901, R902	431523925	3.9K Ω , 1/2W, Solid	R518, R618	4000049	0.27 Ω , 5W, Metal plate
R903	441521214KF	120 Ω , 1/2W, Metal oxide film	R519, R619	4000047	0.47 Ω , 5W, Metal plate
R904	441521014KF	100 Ω , 1/2W, Metal oxide film	R520, R620	4000047	0.47 Ω , 5W, Metal plate
R907	441624704KF	47 Ω , 1W, Metal oxide film	R521, R621	4000067	1 Ω , 2W, Metal plate
R909	441621024KF	1K Ω , 1W, Metal oxide film	R523, R623	431520565	5.6 Ω , 1/2W, Solid
R910	441521004KF	10 Ω , 1/2W, Metal oxide film	R524, R624	441620564KF	5.6 Ω , 1/2W, Metal plate
R913	441622724K	2.75 Ω , 1W, Metal oxide film	R525, R625	5221007	R-HK2.2KB, Semi-fixed
R914	431522725	2.7K Ω , 1W, solid	R527, R627		
R915	441621004KF	10 Ω , 1W, Metal oxide film		Rasiators 27160029	RAD-07
R916	441526814K	680 Ω , 1/2W, Metal oxide film		Screws 82113008	3P+8F-N, Pan head
RL701	Relay 25065134	NRL-2P5A-DC24V-07			
	Radiators 27160011	RAD-05			
	27160029	RAD-07			
	Screws 82113008	3P+8F-N, Pan head			
	831130082	3STW+8BQ, Tapping			
	Nut 863130	N-3F-N			

STATION ILLUMINATION PC BOARD (NAPL-1039)-PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	210054B	PL6.3V0.25A, Lamp

POWER AMPLIFIER PC BOARD (NADA-809a)-PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
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Q501, Q601	Transistors 2211371 or 2211372	2SC2259(F) or 2SC2259(G)
Q502, Q602	2211405 or 2211406	2SC2240(G) or 2SC2240(BL)
Q503, Q603	2211742 or 2211743	2SA915(L) or 2SA915(M)
Q505, Q605	2211762 or 2211763	2SC1940(L) or 2SC1940(M)
Q506, Q606	2201174 ro 2201173	2SC1624(Y) or 2SC1624(O)
Q507, Q607	2201184 or 2201183	2SA814(Y) or 2SA814(O)
Q508, Q608	2201103, 2201102, 2201012 or 2201013	2SD845(O), 2SD845(R), 2SD745(R) or 2SD745(Q)
Q509, Q609	2201093, 2201092, 2201022 or 2201023	2SB755(O), 2SB755(R), 2SB705(R) or 2SB705(Q)

OUTPUT POWER INDICATOR DRIVE CIRCUIT PC BOARD (NAME-1030a)-PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
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Q751, Q752	ICs 222502	NJM-4558DX
D751	Diodes 224096	GZA5.6U
D753-D758	223133	DS442X
D759	224096	GZA5.6U
C753	Capacitor 352754709	47 μ F, 25V, Elect.
C755, C756	352780109	1 μ F, 50V, Elect.
C757, C759	352744709	47 μ F, 16V, Elect.
R753	Resistor 5215021	N08HR10KBC, Semi-fixed
	Lead wire 79140	JL7-80-5-5P2.5

OUTPUT POWER INDICATOR PC BOARD (NADIS-1029a)-PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
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Q781, Q782	ICs 222621	IR2431
D781, D782	L.E.Ds 225068	GL-112V13
C781	Capacitor 352780339	3.3 μ F, 50V, Elect.

THERMAL DETECTOR PC BOARD (NACC-810)-PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
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Q04	2211255, 2211256 or 2210746	2SC1815(GR), 2SC1815(BL) or 2SC945A(P)
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ALIGNMENT PROCEDURES

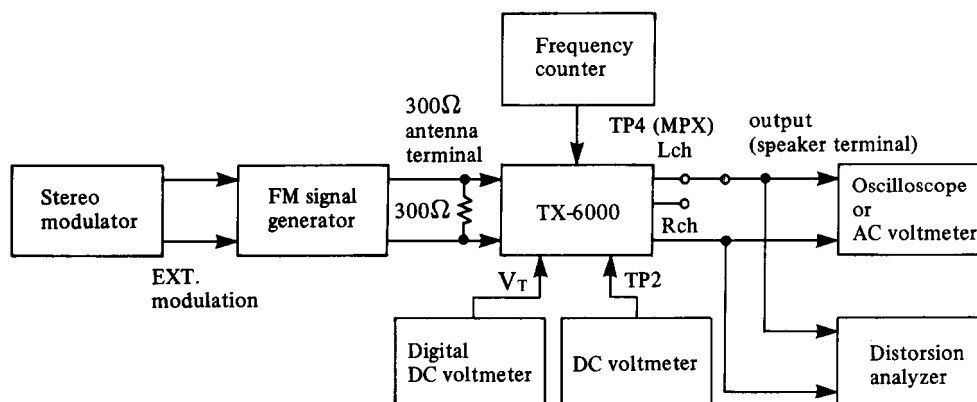
INSTRUMENTS REQUIRED

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
9. CR Oscillator

GENERAL ALIGNMENT CONDITION

1. Standard modulation is 1 kHz 100% (FM MONO), pilot 9% sub and main 91% (FM STEREO)
2. Standard knob position
 MODE STEREO
 MUTING OFF
 TONE, BALANCE CENTER
 LOUDNESS, FILTER OFF

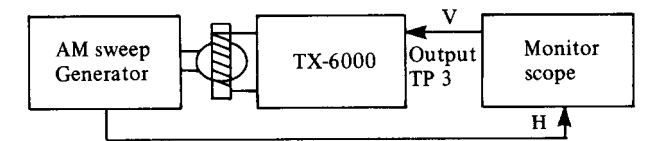
1. FM adjustment



Item	FM signal generator	Stereo modulator	Dial to set	Adjust	Output indicator	Adjust for	Remarks
FM IF	1	_____	No input signal	L101	DC voltmeter	0V	Repeat steps 1 and 2 as necessary
	2	_____	98.1MHz	L102	Distorsion analyzer	Minimum	
FM RF	1	_____	88.1MHz	L008 (LO)	Digital DC voltmeter	3.03V	Repeat steps 1 and 2 as necessary
	2	_____	107.9MHz	TC004 (TCO)		20.8V	
	3	_____	98.1MHz	L007 (IF)	Distorsion analyzer	Minimum	
V.C.O.	98.1MHz 65dBf	_____	98.1MHz	R203	Frequency counter	19kHz	Turn off the modulation
Stereo Separation	98.1MHz 65dBf Ext. modulation	Rch	98.1MHz	R221	AC voltmeter (Lch)	Minimum	Maximum and same separation
		Lch			AC voltmeter (Rch)	Minimum	

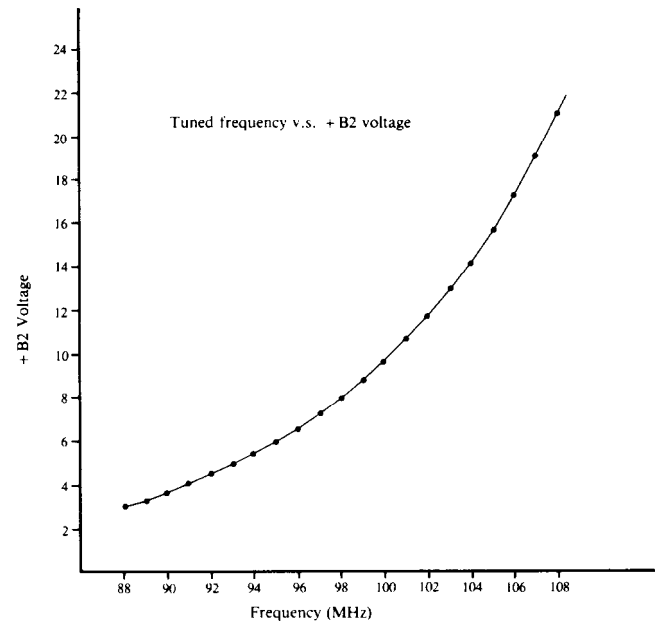
2. AM IF adjustment

1. Set the dial to quiet point.

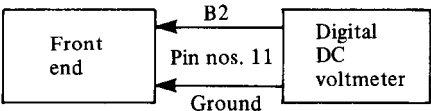


Set signal	Adjust	Adjust for
450 kHz	L152	The output of monitor scope becomes maximum symmetrical response

Remark : Usually not necessary to adjust.

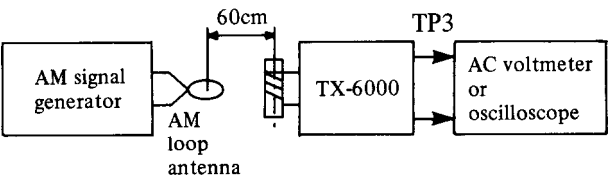


3. Front end adjustment

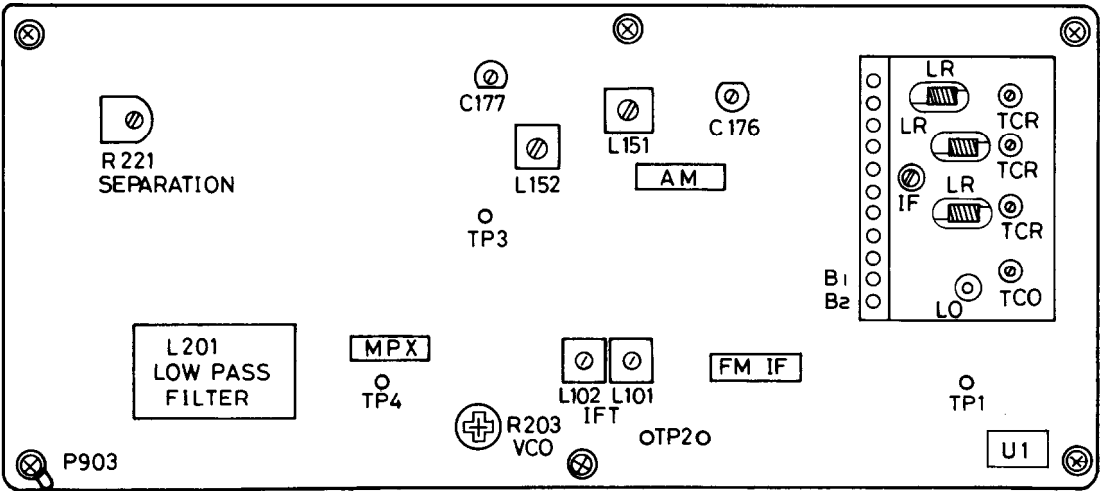


Step	Set to dial	Adjust	Output indicator	Adjust for
1	600 kHz	L151	Digital DC voltmeter	2.5V
2	1400 kHz	C177		15.5V
3	Repeat steps 1 and 2 as necessary			

4. AM RF adjustment



	AM Signal generator	Dial to set	Adjust	Adjust for
1	600 kHz 400Hz, 30% mod.	600 kHz	AM bar antenna	Maximum
2	1400 kHz 400Hz, 30% mod.	1400 kHz	C176	Maximum
3	Repeat steps 1 and 2 as necessary			



5. Idling Current Adjustment

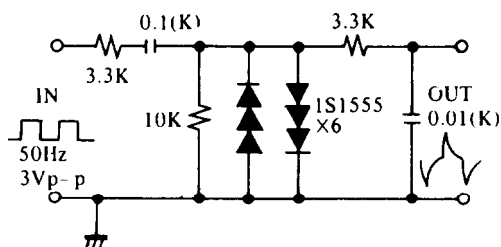
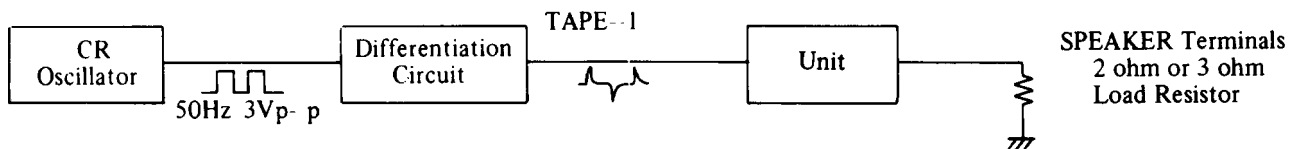
Connect the DC voltmeter between ID and VCT terminals.

Adjust the semi-fixed resistors R514 and R614 so that the reading of voltmeter becomes $19 \pm 2\text{mV}$.

Notes : Adjust after switching on for 5 minutes.

Open load, VOLUME ----- Minimum, TAPE-1 ----- ON

6. Current Detector Circuit Adjustment



Differentiation Circuit

Apply a tone burst signal to the TAPE-1 terminals. Connect a 2Ω hollow resistor to the speaker terminals, and adjust variable resistor R527 (Lch) or R627 (Rch) so that the relay is operated at maximum volume. Connect a 3Ω hollow resistor to the speaker terminals. Confirm the relay is not operated at maximum volume.

NOTES: Adjust after switching on for 5 minutes.

VOLUME – Maximum

7. Center Voltage Check

When the transistor of the differential amp, the power amplifier or the constant current circuit has been replaced, check the center voltage.

Connect a DC VTVM between the VCT and E terminals and check if the reading of the DC VTVM is within $\pm 10\text{mV}$.

Perform this check 5 minutes after the power switch has been set to On.

8. Output Indicator Adjustment

Connect the AF oscillator to the TAPE-1 input terminals, set it to 1kHz.

Connect to 8Ω hollow resistor and AC VTVM to the speaker terminals.

Adjust the VOLUME or AF oscillator so that the reading of AC VTVM becomes 27.5dBV (24V).

Confirm the 11th L.E.D. of left channel lights up.

Adjust the semi-fixed resistor R754 so that the 11th L.E.D. of right channel lights up.

