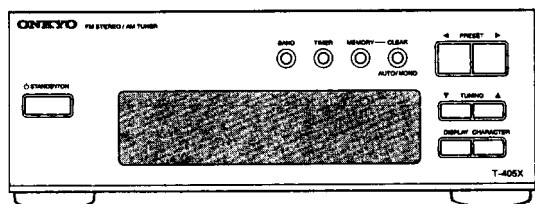
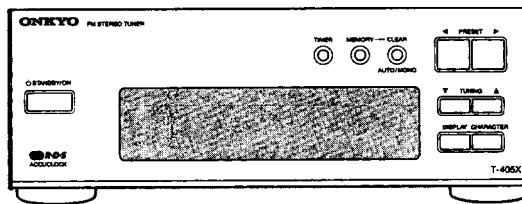


# ONKYO® SERVICE MANUAL

## STEREO TUNER MODEL T-405X



UD model



Other model

### Silver model

SUP, SUPT	230V AC, 50Hz
SUD, SUDT	120V AC, 60Hz

### SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK  $\Delta$  ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE 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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# SPECIFICATIONS

## FM

Tuning Range:  
 87.90 – 107.90 MHz, 200 kHz steps  
 (U.S. & Canadian models)  
 87.50 – 108.00 MHz, 50 kHz steps  
 (Other area models)

Usable Sensitivity:  
 Mono : 12.8 dBf 1.2  $\mu$ V, 75 Ohms IHF  
 Stereo: 19.2 dBf 2.5  $\mu$ V, 75 Ohms IHF

50dB Quieting Sensitivity:  
 Mono : 18.0 dBf 2.2  $\mu$ V, 75 Ohms  
 Stereo: 38.0 dBf 22  $\mu$ V, 75 Ohms

Capture Ratio : 1.5 dB  
 Image Rejection Ratio : 85 dB  
 IF Rejection Ratio : 90 dB  
 Signal-to-Noise Ratio : Mono: 73 dB IHF  
 Stereo: 66 dB IHF

Selectivity : 50 dB DIN ( $\pm$ 300 kHz, 40 kHz dev.)  
 AM Suppression Ratio : 50 dB  
 Total Harmonic Distortion : Mono: 0.5%  
 Stereo: 0.8%

Frequency Response : 30 – 15,000 Hz ( $\pm$ 1.5 dB)  
 Stereo Separation : 40 dB at 1 kHz  
 30 dB at 70 – 10,000 Hz

Output Level : 0.5 V (U.S. & Canadian models)  
 0.75 V (Other area models)

Muting Level : 17.2 dBf 2.0  $\mu$ V, 75 Ohms

## AM

Tuning Range :  
 530 – 1,710 kHz, 10 kHz steps

Usable Sensitivity : 30  $\mu$ V  
 Image Rejection Ratio : 30 dB  
 IF Rejection Ratio : 40 dB  
 Signal-to-Noise Ratio : 40 dB  
 Total Harmonic Distortion : 0.8%  
 Output Level: 0.15 V

## General

Power Supply :  
 AC 120 V, 60 Hz  
 AC 230 V, 50 Hz

Power Consumption : 9 W  
 Dimensions (W x H x D) :  
 205 x 76 x 279 mm  
 8-1/16" x 3" x 11"


Weight : 1.7 kg, 3.7 lbs.


AM reception is available only on the U.S. and Canadian models.

Specifications and external appearance are subject to change without notice as a result of product improvement.

# SERVICE PROCEDURES

## 1. Replacing the fuses

 This symbol located near the fuses indicates that the fuse used is fast operating type. For continued protection against fire hazard, replace with same type fuse. For fuse rating refer to the marking adjacent to the symbol.

 Ce symbole indique que le fusible utilise est a rapide. Pour une protection permanente, n'utiliser que fusibles de meme type. Ce dernier est la qu le present symbol est appse.

CIRCUIT NO.	PART NO.	DESCRIPTION
F901	252075	2.5A-SE-EAK
		230V model only

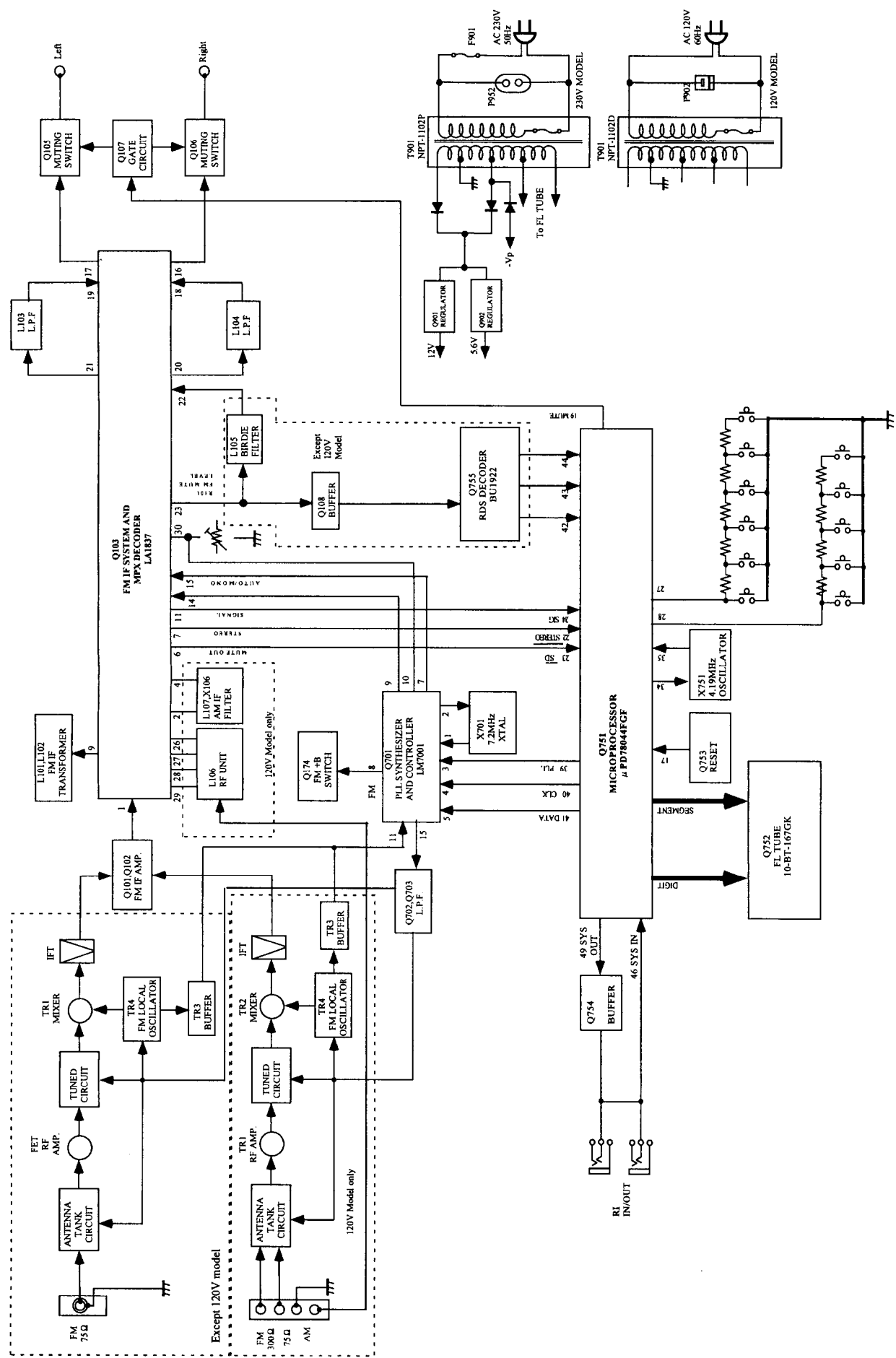
## 2. To initialize the unit

This device employs a microprocessor to perform various functions and operations. If interference generated by an external power supply, radio wave, or other electrical source results in accident which causes the specified operations and functions to operate abnormally.

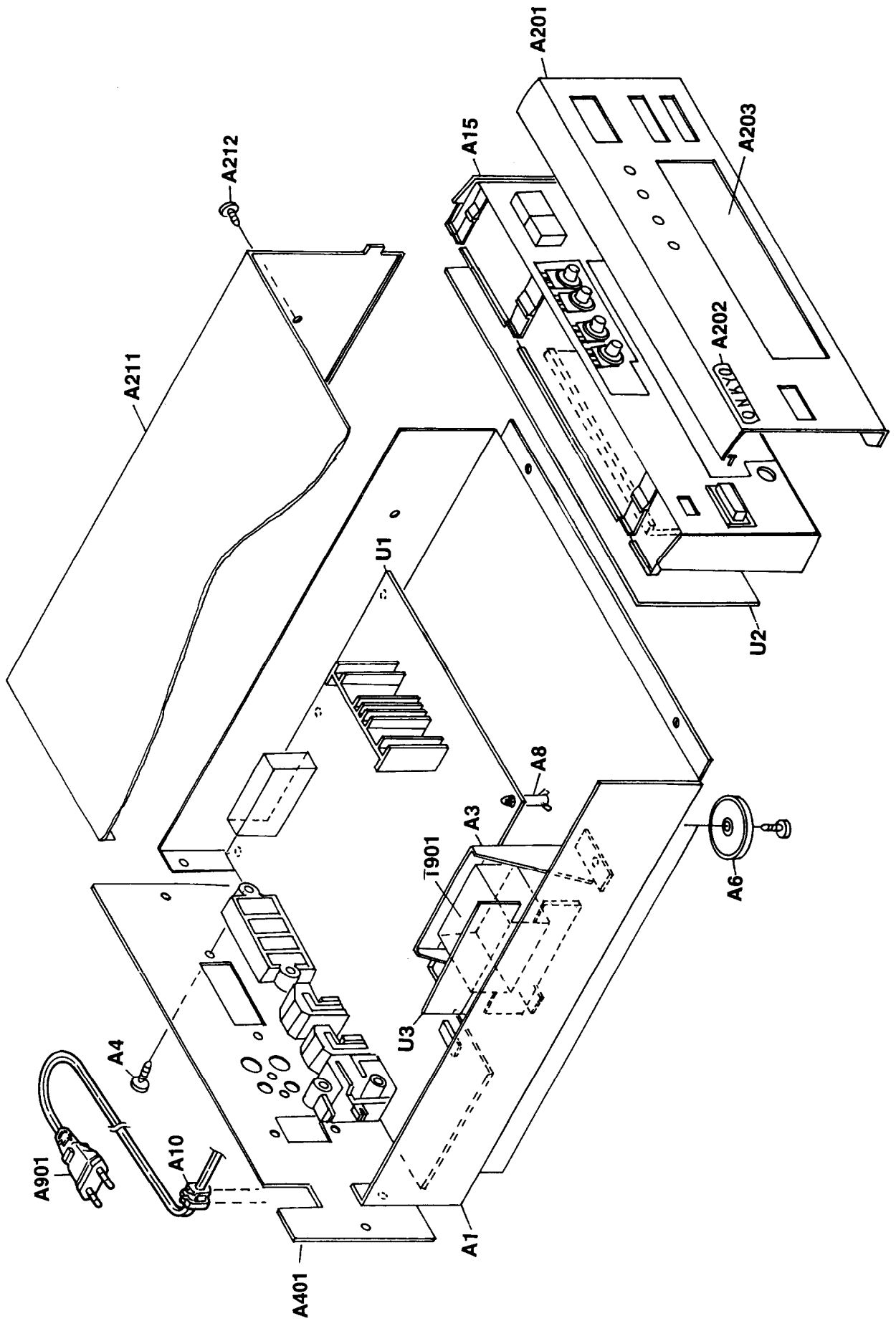
To perform a result, please follow the procedure below.

1. Press and hold down the **MEMORY** button, then press the **DISPLAY** button.
2. After "clear" is displayed, the preset memory and each mode stored in the memory, such as surround, are initialized and will return to the factory setting.

# BLOCK DIAGRAM



EXPLODED VIEW



## PARTS LIST

REF.NO.	PART NO.	DESCRIPTION
A1	27100337	Chassis
A3	27141695A	Retainer
A4	838130088	3TTB+8B,Self-tapping screw
A6	27175323	Leg
A8	27190524	KGLS-14RF,Holder
A10	27300750	▲ Bushing, cord
A15	27111039B	Front bracket
A201	27212112	Front panel <D>
	27212113	Front panel <P/T/DT>
A202	28135247	Badge
A203	28191800C	Clear plate
A211	28184705	Top cover
A212	838930088	3TTB+8B(UN),Self-tapping screw
A401	27122607	Rear panel <D>
	27122608	Rear panel <P/T>
	27122609	Rear panel <DT>
F901	252075	▲ 2.5A-SE-EAK,Fuse <P/T>
P901	253277MIL	▲ AS-UC-2#18, Power supply cord <D>
	253193HIT	▲ AS-CEE,Power supply cord <P/T>
	253277MIL	▲ AS-UC-2#18, Power supply cord <DT>
T901	2300636	▲ NPT-1102D,Power transformer <D/DT>
	2300637	▲ NPT-1102P,Power transformer <P/T>
U1	1A849530-3B	NARF-6130-3B,Main circuit PC board assy <D>
	1A849530-3C	NARF-6130-3C,Main circuit PC board assy <P/T>
	1A849530-3D	NARF-6130-3D,Main circuit PC board assy <DT>
U2	1A849531-3B	NADIS-6131-3B,Display circuit PC board assy <D>
	1A849531-3C	NADIS-6131-3C,Display circuit PC board assy <P/T>
	1A849531-3D	NADIS-6131-3D,Display circuit PC board assy <DT>
U3	1A849532-3B	NAETC-6132-3B,Power transformer PC board assy <D>
	1A849532-3C	NAETC-6132-3C,Power transformer PC board assy <P/T>
	1A849532-3D	NAETC-6132-3D,Power transformer PC board assy <DT>

NOTE: &lt;D&gt;: 120V model only

&lt;P&gt;: European model only

&lt;T&gt;: Asian model only

&lt;DT&gt;: Taiwanese model only

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

# PRINTED CIRCUIT BOARD – PARTS LIST

## MAIN CIRCUIT PC BOARD(NARF-6130-3B/3C/3D)

CIRCUIT NO.	PART NO.	DESCRIPTION
TU001	240102	FE417-G02 <P/T/DT>
	240107	TFFJ2U552A <D>
<b>Front end</b>		
<b>ICs</b>		
Q103	22241151	LA1837
Q701	22241076	LM7001J
Q901	222780125	78M12HF
Q902	222780565JRC	NJM78M56FA
<b>Transistors</b>		
Q101	2210746	2SC945A-P <D>
	2211723	2SC1923-O <P/T/DT>
Q102	2211723	2SC1923-O
Q105,Q106	2212794 or	2SD1468-R or
	2215024	2SD1468S-R
Q107,Q704	2213510 or	DTA114ES or
	2215770	NP KRA102M
Q108	2213284	2SC1740S-R <P/T/DT>
Q702	2212445	2SK365-GR
Q703	2213284	2SC1740S-R
Q903,Q904	2213284	2SC1740S-R
<b>Diodes</b>		
D101-D103	223163 or	1SS133 or
D701	223205	1SS270A
D104	224470913	MTZJ9.1C
D901-D905	22380035 or	GP104003E or
	22380046	AM01Z
D906	224472704	MTZJ27D
D907	224470623	MTZJ6.2C
D908-D910	223163 or	1SS133 or
	223205	1SS270A
D911	224471203	MTZJ12C
<b>Coils and transformers</b>		
L101	233457	NFIF-4081
L102	233458	NFIF-4082
L103,L104	233528	NMC-4110
L105	233471	NMC-6084 <P/T/DT>
L106	232174	NMRF-5077 <D>
L107	232139	NMIF-4062 <D>
<b>Ceramic filters</b>		
X101,X102	3010071	SFE-10.7MA5 RED
X103	3010071	SFE-10.7MA5 RED <D>
	3010130	SFE10.7MZ2K <P/T/DT>
X105	3010076	BFU-450C T890 <D>
X106	3010123	SFZ450JL <D>
<b>Crystal</b>		
X701	3010141	XTL-7.2M
<b>Capacitors</b>		
C001	354741019	100 $\mu$ F,16V,Elect.
C002	354741009	10 $\mu$ F,16V,Elect.
C104,C917	354744709	47 $\mu$ F,16V,Elect.
C105,C117	354780229	2.2 $\mu$ F,50V,Elect.
C106,C108	354741019	100 $\mu$ F,16V,Elect.
C109,C111	354780109	1 $\mu$ F,50V,Elect.
C110,C121	354784799	0.47 $\mu$ F,50V,Elect.
C113,C114	374722224	2200pF $\pm$ 5%,50V,Plastic <P/T/DT>
C113,C114	374724724	4700pF $\pm$ 5%,50V,Plastic <D>
C115,C116	354742209	22 $\mu$ F,16V,Elect.
C123,C124	354742209	22 $\mu$ F,16V,Elect.
C125,C126	374722724	2700pF $\pm$ 5%,50V,Plastic
C130	354742209	22 $\mu$ F,16V,Elect.

NP: No spare parts

CIRCUIT NO.	PART NO.	DESCRIPTION
<b>Capacitors</b>		
C131	374724734	0.047 $\mu$ F $\pm$ 5%,50V,Plastic <D>
C134	354742209	22 $\mu$ F,16V,Elect. <D>
C136	354741009	10 $\mu$ F,16V,Elect. <P/T/DT>
C136,C706	354721019	100 $\mu$ F,6.3V,Elect.
C147	354780109	1 $\mu$ F,50V,Elect.
C152	354780109	1 $\mu$ F,50V,Elect. <D>
C709	374723334	0.033 $\mu$ F $\pm$ 5%,50V,Plastic
C710	354780229	2.2 $\mu$ F,50V,Elect.
C711	354782299	0.22 $\mu$ F,50V,Elect.
C712,C918	354741009	10 $\mu$ F,16V,Elect.
C902,C914	354764709	47 $\mu$ F,35V,Elect.
C903	354751029	1000 $\mu$ F,25V,Elect.
C904,C908	354762219	220 $\mu$ F,35V,Elect.
C911	354722219	220 $\mu$ F,6.3V,Elect.
C912	354791019	100 $\mu$ F,100V,Elect.
C913	354794709	47 $\mu$ F,100V,Elect.
C915	354781009	10 $\mu$ F,50V,Elect.
C916	354761009	10 $\mu$ F,35V,Elect.
C919	354744719	470 $\mu$ F,16V,Elect.
<b>Resistors</b>		
R111	5210262	N06HR10KBC,Trimming
R901	431533355	$\Delta$ RC1/2GFKUL-3.3M,Solid <D/DT>
R902,R903	453530104	1 $\Omega$ $\pm$ 5%,1/2W,Metal
R904	453530474	4.7 $\Omega$ $\pm$ 5%,1/2W,Metal
R905	443524704	47 $\Omega$ $\pm$ 5%,1/2W,Metal oxide
R906	443621024	1k $\Omega$ $\pm$ 5%,1W,Metal oxide
<b>Terminals</b>		
P101	25060195 or	NTM-4PDML117 or
	25060239	NTM-4PDML161,Antenna <D>
P102	25060231	NTM-1PD153,Antenna <P/T/DT>
P103	25045333	NPJ-2PDBL185,Output
P701	25045330	NPJ-2PDBL184,R1
<b>Plugs</b>		
TP101	25055038	NPLG-2P29
P901A	25055675	$\Delta$ NPLG-2P631
<b>Sockets</b>		
JL701B	25051094	NSCT-10P881
JL702B	25051089	NSCT-5P876
JL901B	25050269	NSCT-5P97
P902	25051637	$\Delta$ NSCT-2P1424 <P/T>
	25051990	$\Delta$ NSCT-2P1777 <D/DT>
<b>Fuse holders</b>		
F901A	25050065	$\Delta$ YSH403T
<b>Heat sink</b>		
Q901A	27160209	RAD-67
<b>Screws</b>		
Q901B	838430107	3TTB+10S(BC),Self-tapping

NOTE: &lt;D&gt;:120V model only

&lt;P&gt;: European model only

&lt;T&gt;: Asian model only

&lt;DT&gt;: Taiwanese model only

**NOTE: THE COMPONENTS IDENTIFIED BY MARK  $\Delta$  ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.**

# ADJUSTMENT PROCEDURES

## Preparation

### Input

FM mono: 1kHz, 75kHz devi., 60dB/μV

FM stereo: 1kHz, 67.5kHz devi., 60dB/μV

Pilot signal 9kHz, 7.5kHz devi.

AM: 400Hz, 30% mod.

### 1. Clock adjustment

Connect the frequency counter to the test point TP701.

Set the unit to standby.

Press and hold down MEMORY button, then press DISPLAY button. (The all segments on the fluorescent tube light on)

Adjust the trimming capacitor C755 so that the indication of frequency counter becomes 524.288kHz ± 1Hz.

After adjustment, turn POWER switch to OFF.

### 2. FM Adjustment

Item	Step	Connection of instrument	FM SG output	Stereo modulator output	Tuning frequency	Output indicator	Adjustment point	Adjust for	Remarks
FM IF/RF	1	Fig.1	98.1MHz 1kHz 75kHz devi. 65dBf ( 60dB)	—	98.1MHz	DC voltmeter	L101	0 ± 20mV	FM MUTE/MODE switch: ON/STEREO Repeat the steps 1 and 3 until no further adjustment is necessary.
	2					AC voltmeter	IFT on the front end	Maximum	
	3					Distortion analyzer	L102	Minimum	
Stereo Distortion		Fig.2	98.1MHz Ext. mod.	Channel L or R 1kHz	98.1MHz	Distortion analyzer	IFT on the front end	Minimum	Don't turn more than ± 180°
Muting Level		Fig.1	98.1MHz 19.2dBf ( 14dB )	—	98.1MHz	Oscilloscope or TUNED indicator	R111	Signal output or light on	

### 2. AM Adjustment

U.S.A. model only

Step	AM SG output	Tuning Frequency	Output Indicator	Adjustment point	Adjust for
1		530kHz	Digital DC voltmeter	OSC coil on RF block L106	1.4 ± 0.2V
2	600kHz 400Hz 30% mod. 60dBm	600kHz	AC voltmeter	RF coil on RF block L106	Maximum
3	990kHz 400Hz 30% mod. 60dBm	990kHz	AC voltmeter	L107	Maximum

Reference Specification (U.S.A. model only)

FM tuned voltage: 87.9MHz ~ 107.9MHz  
1.8 ± 0.5V ~ 7.0 ± 0.5V

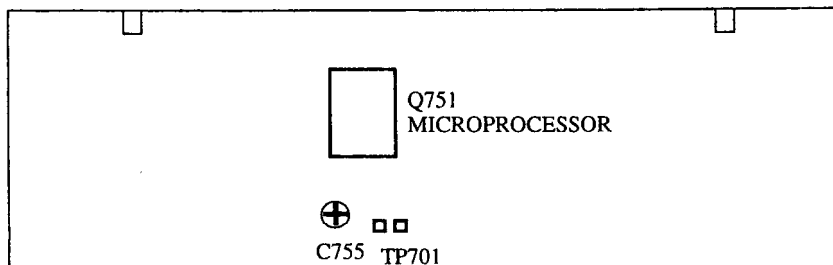
AM tuned voltage: 530kHz ~ 1710kHz

1.4 ± 0.4V ~ 7.3 ± 0.4V

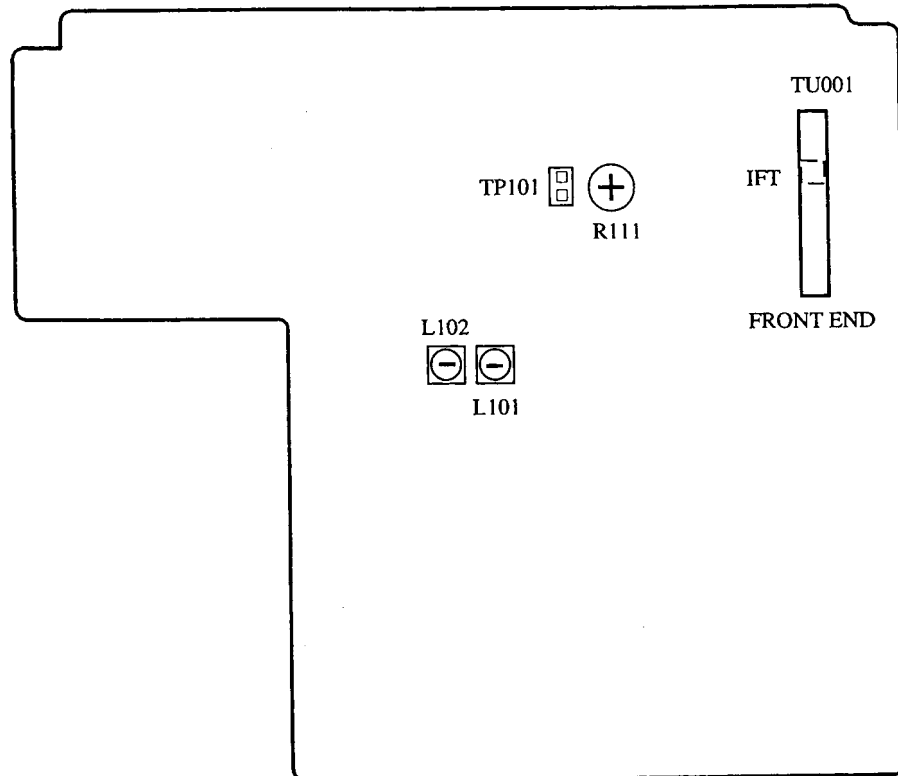
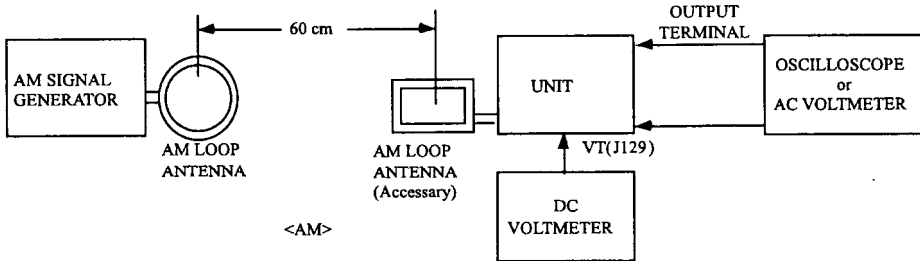
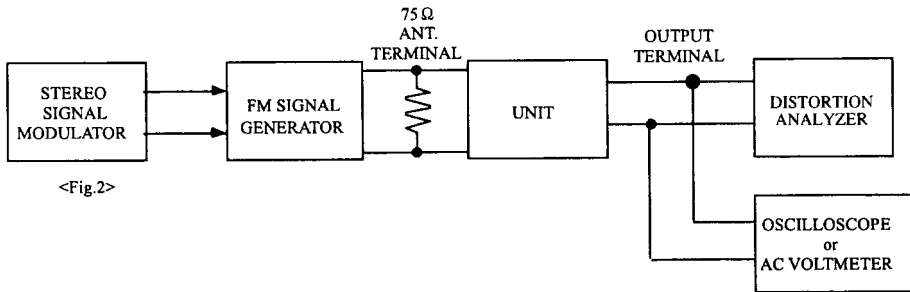
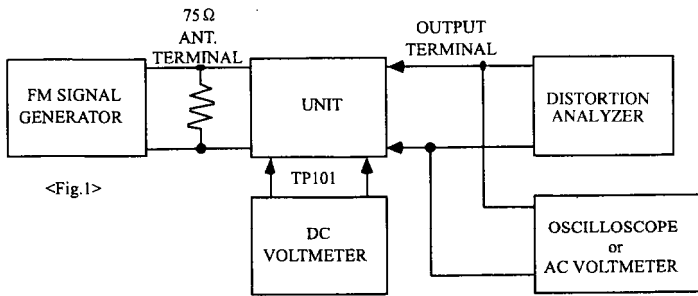
Reference Specification (Other models)

FM tuned voltage: 87.5MHz ~ 108.0MHz

1.8 ± 0.5V ~ 7.8 ± 0.5V



DISPLAY CIRCUIT PC BOARD FROM SOLDERING SIDE



MAIN CIRCUIT PC BOARD



**DISPLAY CIRCUIT PC BOARD (NADIS-6131-3B/3C/3D)**

<b>CIRCUIT NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>
<b>FL tube</b>		
Q752	212141	10BT-167GK
<b>ICs</b>		
Q751	22241374	MPD78044FGF-158-3B9
Q755	22241124	BU1922 <P/T/DT>
<b>Transistors</b>		
Q753	221282 or 2215820	DTC144ES or NP KRC104M
Q754	2212600 or 2215780	DTA124ES or NP KRA103M
<b>Diodes</b>		
D751-D754	223163 or 223205	1SS133 or 1SS270A
D756,D759	223163 or 223205	1SS133 or 1SS270A
D757	224470562	MTZJ5.6B
D758	223163 or 223205	1SS133 or 1SS270A <P/T/DT>
<b>Crystals</b>		
X751	3010224	XTL-4.19M
X752	3010203	AF6146CG <P/T/DT>
<b>Capacitors</b>		
C751	3000078	DX-5R5L104,Super
C752	375524744	0.47 $\mu$ F $\pm$ 5%,50V,Plastic
C753	355780226	2.2 $\mu$ F,50V,Elect.
C754	355741009	10 $\mu$ F,16V,Elect.
C755	3060031	NTC-45P27,Trimming
C758	355780226	2.2 $\mu$ F,50V,Elect. <P/T/DT>
C760	374725614	560pF $\pm$ 5%,50V,Plastic <P/T/DT>
C763	355721019	100 $\mu$ F,6.3V,Elect. <P/T/DT>
<b>Switches</b>		
S751-S758	25035652	NPS-111-S604
S759	25035652	NPS-111-S604 <D>
S760,S761	25035652	NPS-111-S604
<b>Sockets</b>		
JL702A	25051089	NSCT-5P876
JL701A	25051094	NSCT-10P881
<b>Plug</b>		
TP701	25055038	NPLG-2P29
<b>Holder</b>		
Q752A	27190943	(FL)

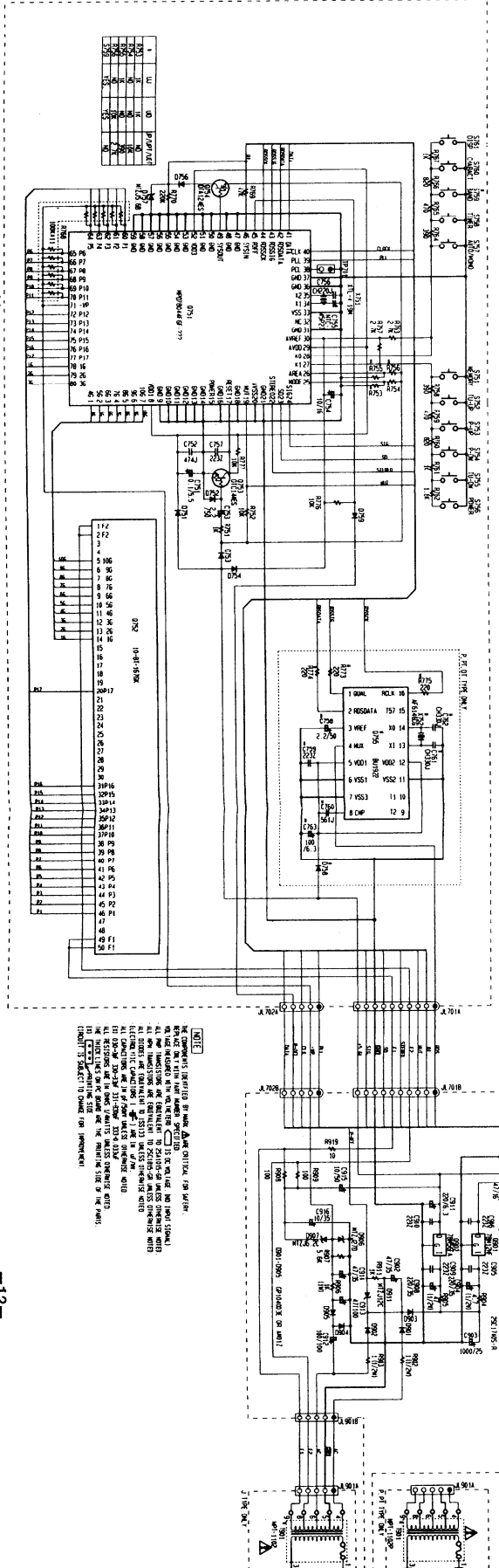
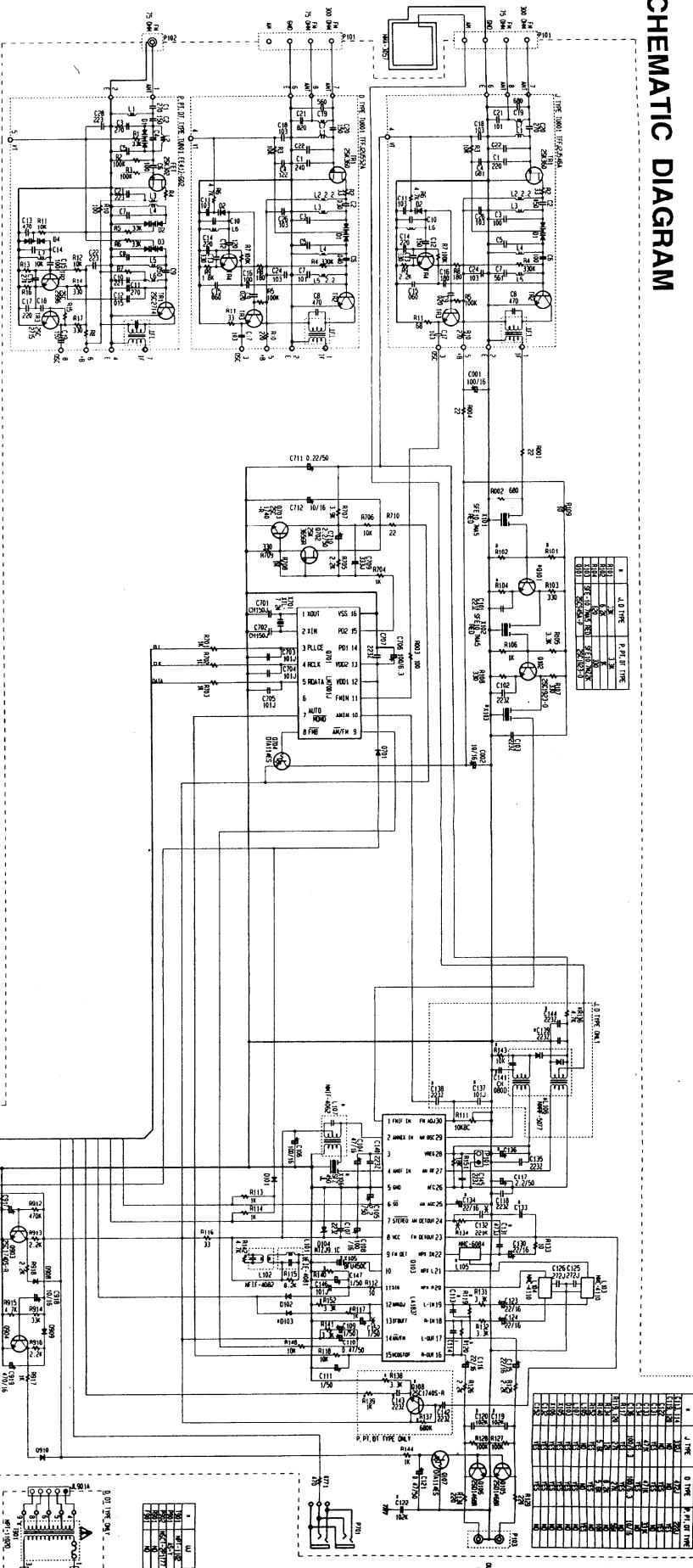
NOTE: <D>: 120V model only  
 <P>: European model only  
 <T>: Asian model only  
 <DT>: Taiwanese model only

**POWER TRANSFORMER PC BOARD (NAPS-6133-3B/3C/3D)**

<b>CIRCUIT NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>
JL901A	25051109	NSCT-5P896

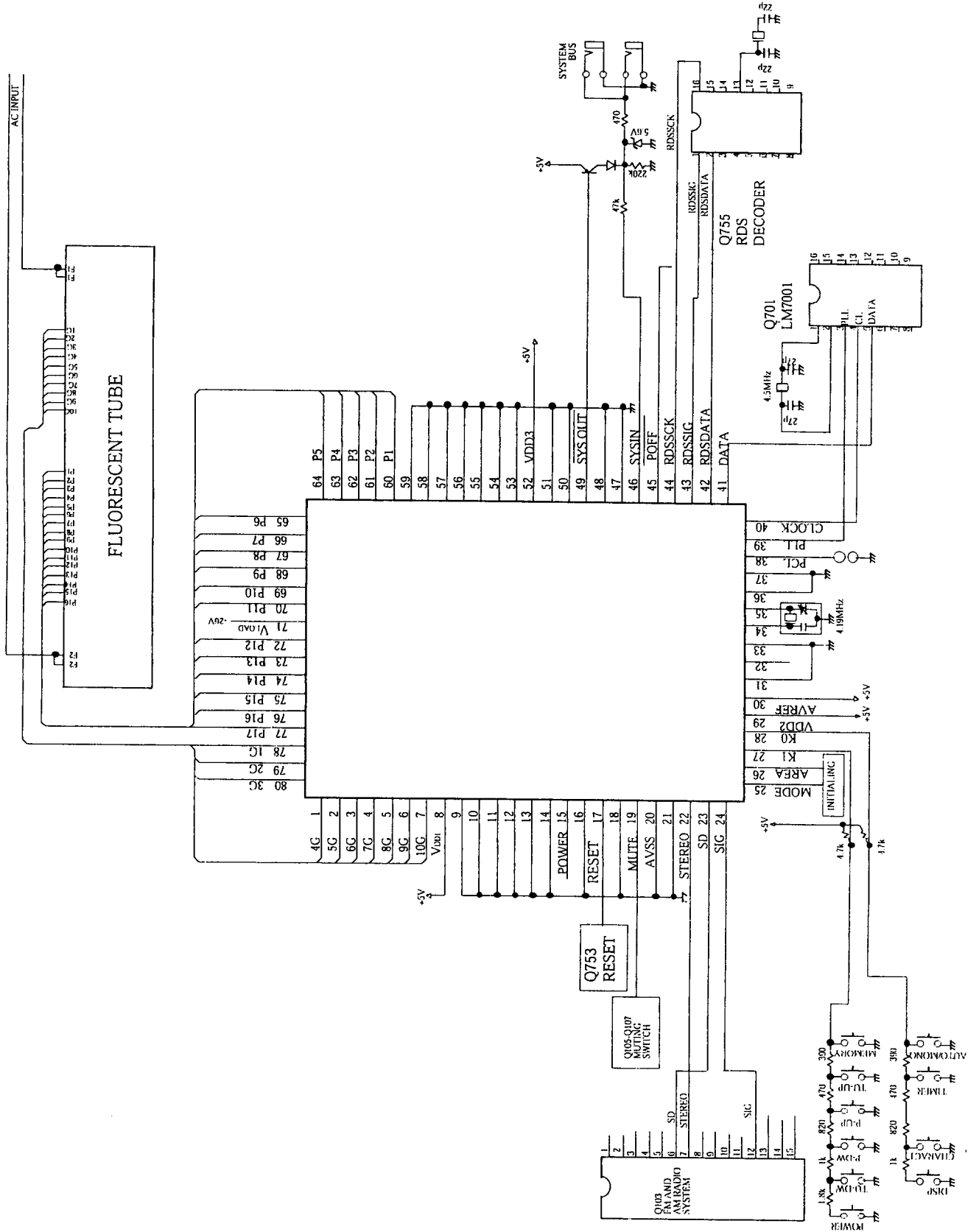
# SCHEMATIC DIAGRAM

A B C D E F G



**NOTE:**  
 1. ALL COMPONENTS SHOULD BE OF THE QUALITY SPECIFIED.  
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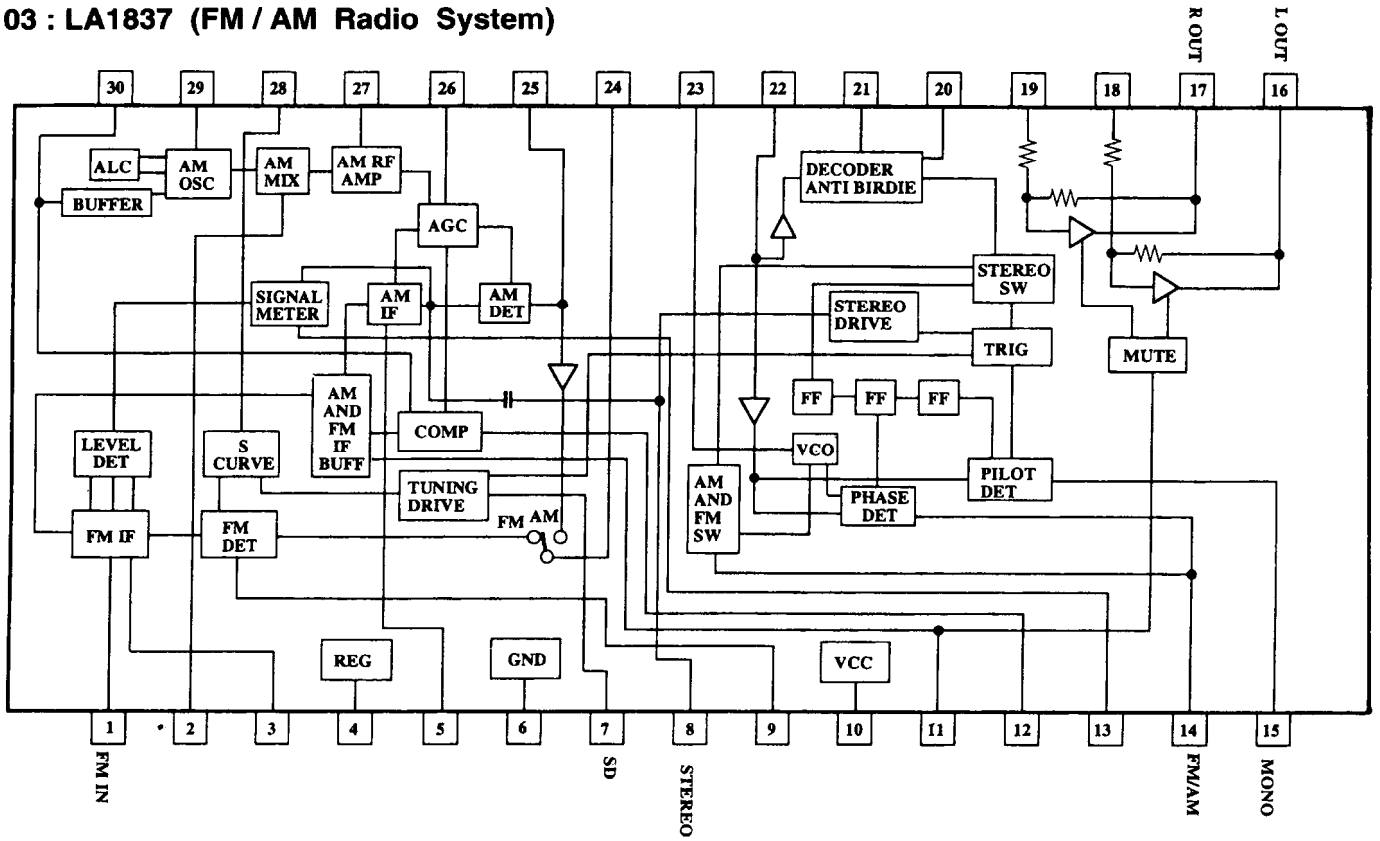
# MICROPROCESSOR-CONNECTION DIAGRAM



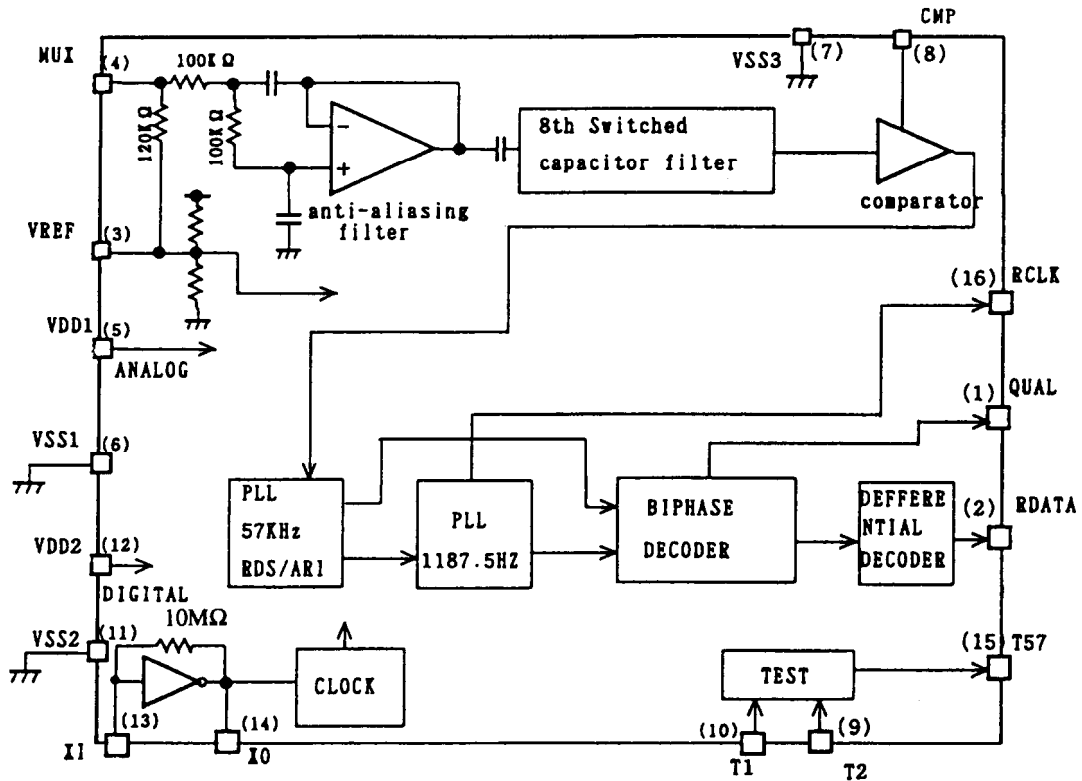
Pin No.	Function	Description	Pin No.	Function	Description
1	4G	Grid output pin	42	RSDSDATA	Data input pin from RDS decoder
2	5G	Grid output pin	43	RDSSIG	Signal input pin from RDS decoder
3	6G	Grid output pin	44	RDSSCK	Clock input pin from RDS decoder
4	7G	Grid output pin	45	POFF	Power failure detector input pin
5	8G	Grid output pin	46	SYSIN	System code input pin
6	9G	Grid output pin	48	IC	Internal connection pin
7	10G	Grid output pin	49	YSOOUT	System code output pin
8	VDD	Positive power supply pin (+5V)	52	VDD	Positive power supply pin (+5V)
15	POWER	Power source control pin	60	P1	Segment output pin
17	RESET	System reset pin	61	P2	Segment output pin
19	TUMUT	Muting control output pin	62	P3	Segment output pin
20	AVSS	Ground voltage pin for A/D converter	63	P4	Segment output pin
22	STEREO	Stereo broadcast detection input pin	64	P5	Segment output pin
23	SD	Broadcast detection input	65	P6	Segment output pin
24	SIGNAL	Signal strength level input pin	66	P7	Segment output pin
25	MODE	Initializing pin for RDS broadcast	67	P8	Segment output pin
26	AREA	Initializing pin for band area	68	P9	Segment output pin
27	K1	Key input pin	69	P10	Segment output pin
28	K0	Key input pin	70	P11	Segment output pin
29	AVDD	Analog power supply pin for A/D converter	71	VLOAD	Pull-down resistor connection pin
30	AVREF	Reference voltage pin for A/D converter	72	P12	Segment output pin
31	XT1	Crystal connection pins for subsystem clock	73	P13	Segment output pin
32	XT2	Not used.	74	P14	Segment output pin
33	VSS	Ground	75	P15	Segment output pin
34	X1	Crystal connection pins for main system clock	76	P16	Segment output pin
35	X2	Connect the ceramic oscillator 4.19MHz.	77	P17	Segment output pin
38	FOUT	Frequency output pin for adjustment	78	IG	Grid output pin
39	PLL CE	Chip enable output pin for PLL IC	79	2G	Grid output pin
40	CLK	Clock output pin for PLL IC	80	3G	Grid output pin
41	DATA	Data output pin for PLL IC			

# IC BLOCK DIAGRAM

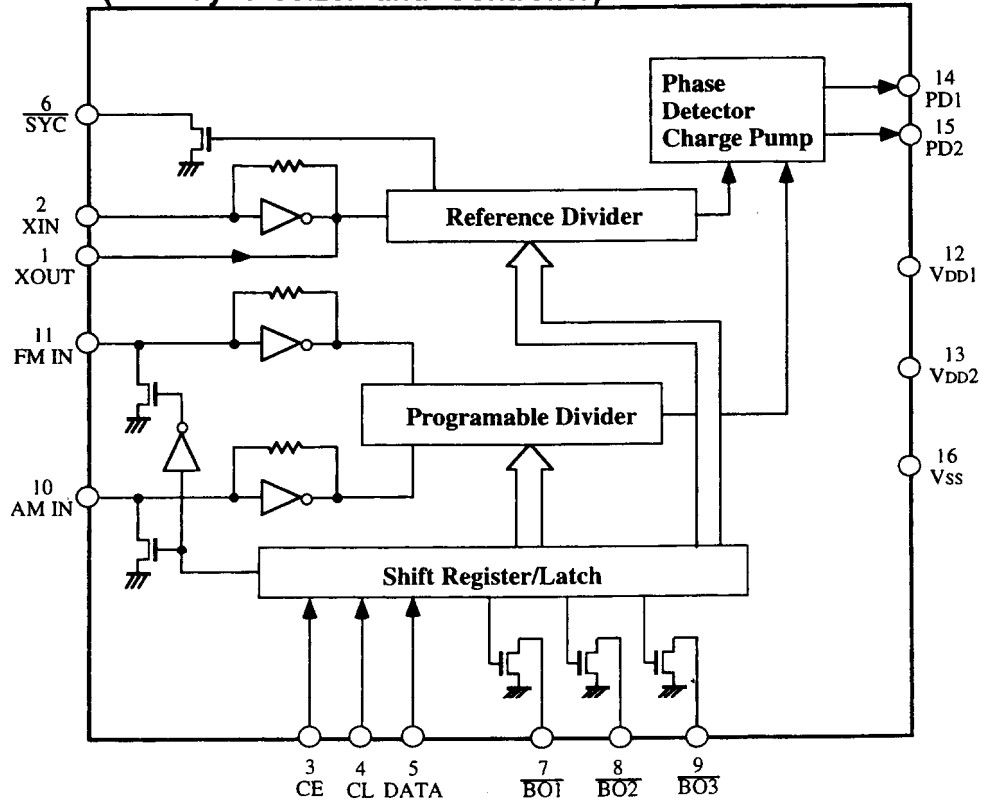
Q103 : LA1837 (FM / AM Radio System)



# BU1922 (RDS Decoder)



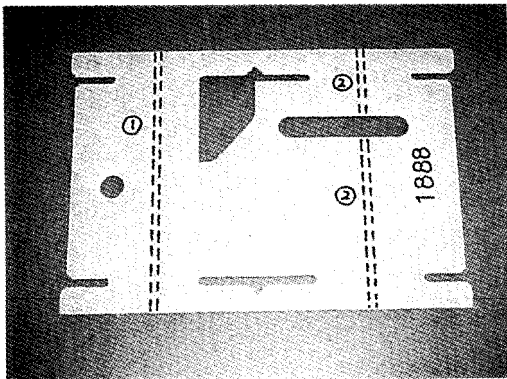
Q701 : LM7001J (PLL Synthesizer and Controller)



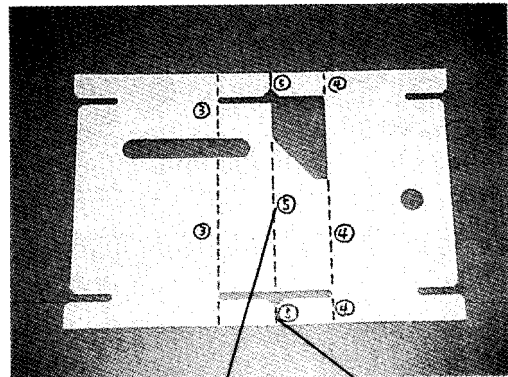
**PACKING PROCEDURES**

1. Assembling of Pad A

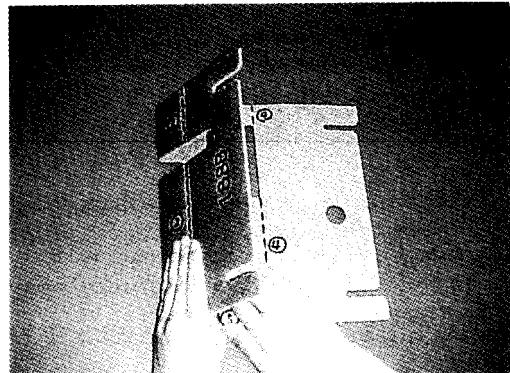
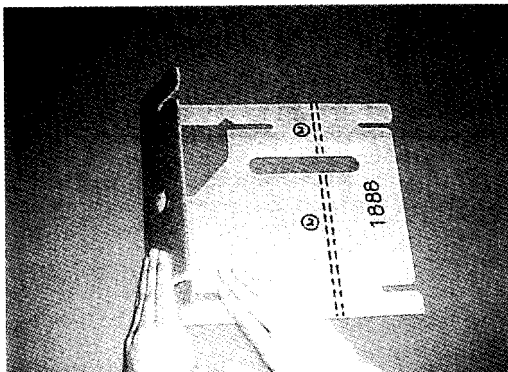
Procedures : ① to ⑤



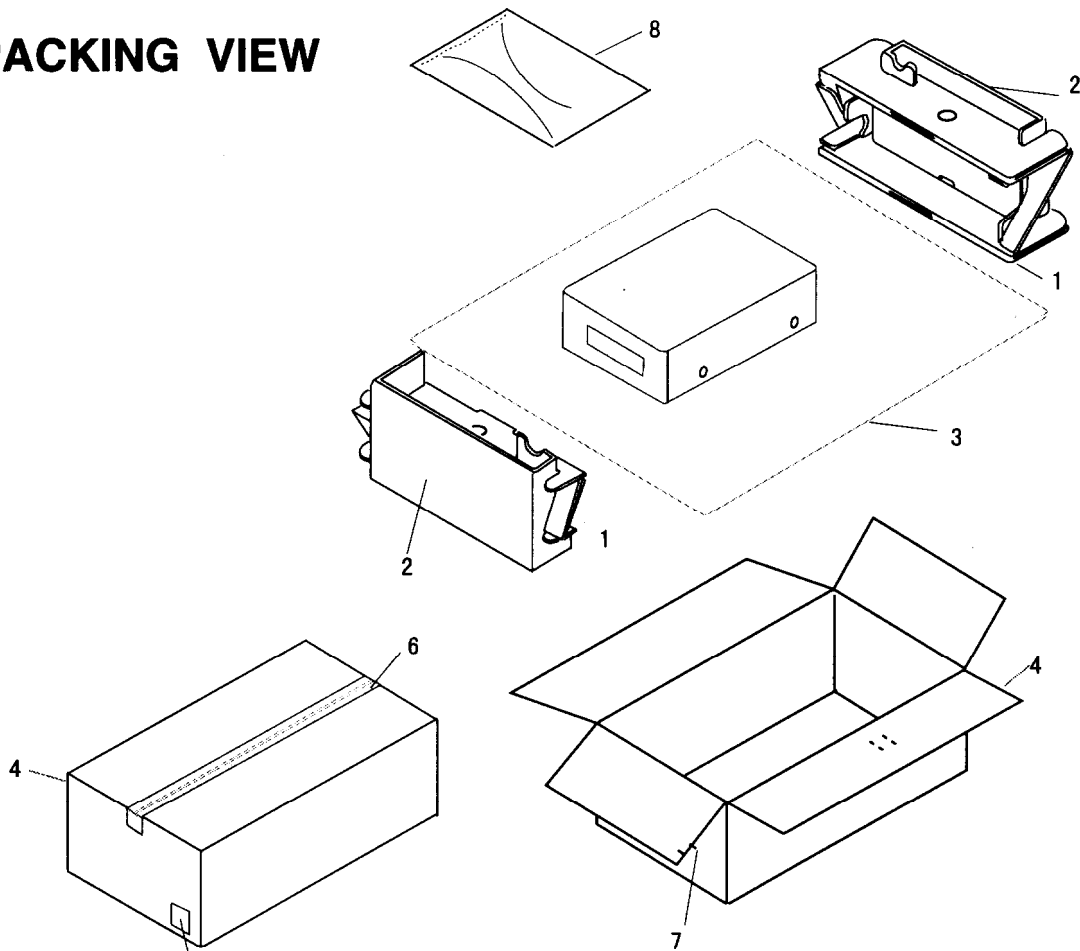
----- : Inside



inside                      Outside



# PACKING VIEW



REF.NO.	PART NO.	DESCRIPTION
1	29091888	Pad A
2	29091889	Pad B
3	29095835	650*550,Protection sheet
4	29053459	Carton box <P/T/DT>
	29053458	Carton box <D>
5	29362473	Label EAN <P/T/DT>
	29362470	Label UPC <D>
6	29110071	PP tape
7	282301	Staple
8	2010375	Cord RI
	2010376	Connection cord
	232140	NMA-3057, AM loop antenna <D>
	25065462	YAE21-0237,Antenna adapter <T/DT>
	29095866	Sheet <D>
	29100180	D240*W250,Polybag
	292111	FM antenna <D>
	292116	FM antenna <P/T/DT>
	29342744	Instruction manual E
	29342745	Instruction manual U3FSI <P>
	29342746	Instruction manual U3GDSW <P>
	29342747	Instruction manual T <T/DT>
	29365083	Warranty card <D>

NOTE: <D>:120V model only  
 <P>: European model only  
 <T>: Asian model only  
 <DT>: Taiwanese model only

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