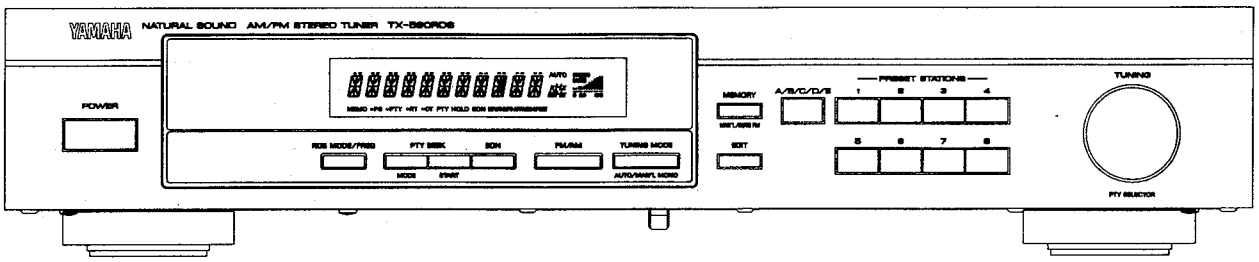
AM/FM STEREO TUNER

TX-590RDS

SERVICE MANUAL

■ FRONT PANEL



IMPORTANT NOTICE

This manual has been provided for the use of authorized YAMAHA Retailers and their service personnel.
It has been assumed that basic service procedures inherent to the industry, and more specifically YAMAHA Products, are already known and understood by the users, and have therefore not been restated.

WARNING: Failure to follow appropriate service and safety procedures when servicing this product may result in personal injury, destruction of expensive components, and failure of the product to perform as specified. For these reasons, we advise all YAMAHA product owners that any service required should be performed by an authorized YAMAHA Retailer or the appointed service representative.

IMPORTANT: The presentation or sale of this manual to any individual or firm does not constitute authorization, certification or recognition of any applicable technical capabilities, or establish a principle-agent relationship of any form.

The data provided is believed to be accurate and applicable to the unit(s) indicated on the cover. The research, engineering, and service departments of YAMAHA are continually striving to improve YAMAHA products. Modifications are, therefore, inevitable and specifications are subject to change without notice or obligation to retrofit. Should any discrepancy appear to exist, please contact the distributor's Service Division.

WARNING: Static discharges can destroy expensive components. Discharge any static electricity your body may have accumulated by grounding yourself to the ground buss in the unit (heavy gauge black wires connect to this buss).

IMPORTANT: Turn the unit OFF during disassembly and part replacement. Recheck all work before you apply power to the unit.

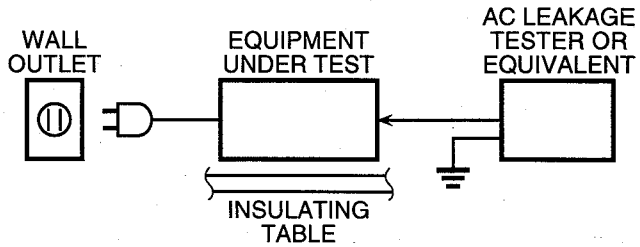
■ CONTENTS

100552

YAMAHA
YAMAHA CORPORATION
P.O.Box 1, Hamamatsu, Japan
1.25K-173 Printed in Japan '96.4

■ TO SERVICE PERSONNEL

Critical Components Information.
Components having special characteristics are marked and must be replaced with parts having specifications equal to those originally installed.



WARNING: CHEMICAL CONTENT NOTICE!

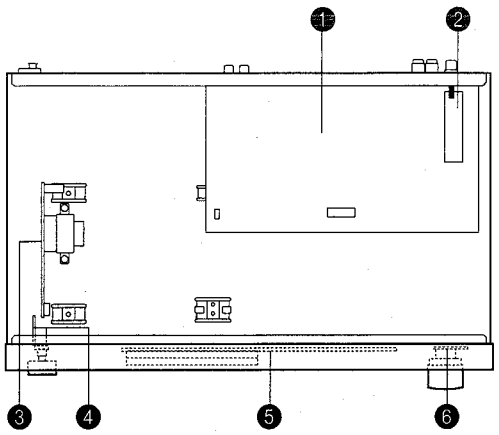
The solder used in the production of this product contains LEAD. In addition, other electrical/electronic and /or plastic (where applicable) components may also contain traces of chemicals found by the California Health and Welfare Agency (and possibly other entities) to cause cancer and/or birth defects or other reproductive harm.

DO NOT PLACE SOLDER, ELECTRICAL/ELECTRONIC OR PLASTIC COMPONENTS IN YOUR MOUTH FOR ANY REASON WHATSOEVER!

Avoid prolonged, unprotected contact between solder and your skin! When soldering, do not inhale solder fumes or expose eyes to solder/flux vapor!

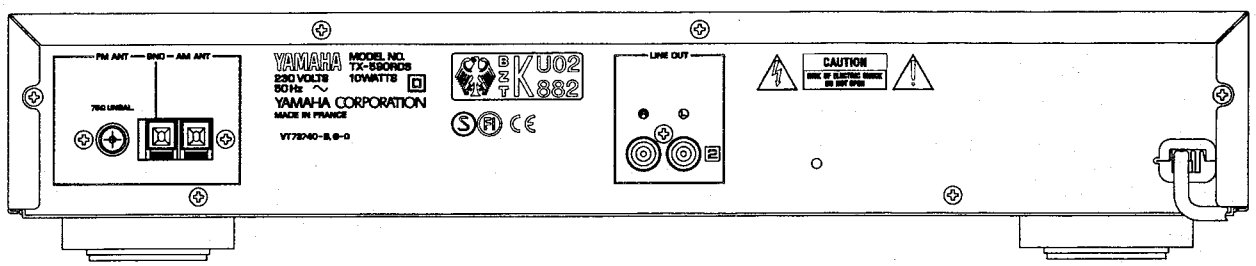
If you come in contact with solder or components located inside the enclosure of this product, wash your hands before handling food.

■ INTERNAL VIEW



1. Tuner P. C. B (1)
2. Front-end pack
3. Tuner P. C. B. (3)
4. Tuner P. C. B. (4)
5. Tuner P. C. B. (2)
6. Tuner P. C. B. (5)

■ REAR PANELS

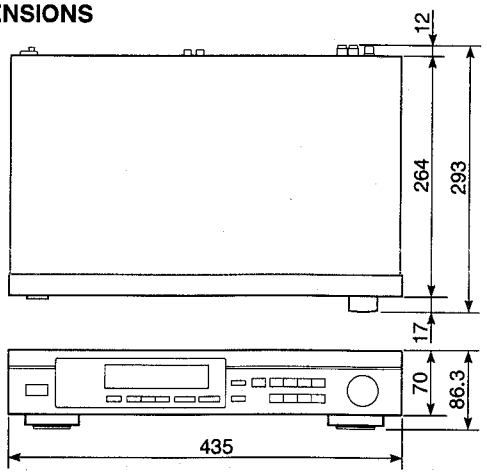


■ SPECIFICATIONS

■ FM SECTION	
Tuning Range	87.50 to 108.00 MHz
Usable Sensitivity (30dB S/N Quieting)	
Mono (S/N 26 dB)	0.9 µV
Stereo (S/N 46 dB)	24 µV
Image Response Ratio	80 dB
IF Response Ratio	80 dB
Spurions Response Ratio	70 dB
AM Suppression Ratio	55 dB
Capture Ratio	1.5 dB
Alternate Channel Selectivity	
Selectivity (two signals) 40 kHz Dev. ±300 kHz	70 dB
Signal to Noise Ratio (DIN-Weighted 40 kHz)	
Mono	75 dB
Stereo	70 dB
Harmonic Distortion 1 kHz	
Mono	0.1 %
Stereo	0.2 %
Stereo Separetion 1kHz (40 kHz Dev.)	45 dB
Frequency Response	
30 Hz to 13 kHz	0±0.5 dB
■ AM SECTION	
Tuning Range	531 to 1611 kHz
Usable Sensitivity	100 µV/m
Selectivity	32 dB
Signal to Noise Ratio	50 dB
Image Response Ratio	40 dB
Spurions Response Ratio	50 dB
Harmonic Distortion 1 kHz	0.3 %
■ AUDIO SECTION	
Output Level/Impedance (Fixed)	
FM 100 % MOD 1 kHz	500 mV/2.2 kΩ
AM 30 % MOD 1 kHz	200 mV/2.2 kΩ
■ GENERAL	
Power Supply	AC230V, 50 Hz
Power Consumption	10 W
Dimensions (W x H x D)	435 x 86 x 293mm
Weight	3.2 kg

* Specifications subject to change without notice.

• DIMENSIONS



■ DISASSEMBLY PROCEDURES

(Remove parts in the order as numbered.)

1. Removal of Top Cover

Remove 4 screws (①) and 2 screws (②) in Fig. 1.

2. Removal of Front Panel

a. Remove 3 plastic rivets (③) in Fig. 1.
b. Remove 3 screws (④) in Fig. 1.
c. Remove tuning knob (⑥) in Fig. 1.
d. Unhook at 9 place (⑤) in Fig. 1 and remove the front panel.

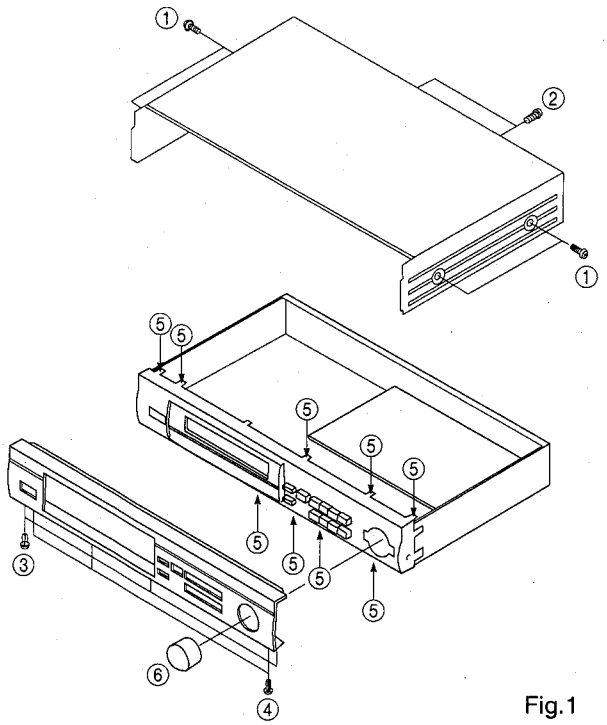


Fig.1

■ ADJUSTMENTS

1. Before Adjustment

1) After the power switch is pushed on, wait 5 minutes before starting the adjustment to be sure of the most stable operations.
2) Adjust the OSC coil and IFT with insulated screw driver.
3) Set the switches to the following position.
   TUNING MODE : AUTO
4) Decibel abbreviations
   dBμ : Decibels above or below 1μV

Example :
   0dBμ = 1 μv, 60dBμ = 1 mV
   X dBμ = (X + 11.2) dBf
   When substituting 60 for X,
   60 dBμ = 72.2 dBf

2. Measuring instrument abbreviations

FM SG	: FM signal generator
SSG	: Stereo signel generator
AM SG	: AM signal generator
DIST. M	: Distortion meter
FC	: Frequency counter
ACVM	: AC voltage meter
DCVM	: DC voltage meter
RDS SG	: RDS signal generator

<POWER SUPPLY CHECK>

Check that the following voltage are obtained respectively across each test point and ground on the tuner cirsuit.

Test points	Rating or Standard
+10 V terminal	+10.0 ±0.5V
+5 V terminal	+5.6 ±0.5 V
+VP terminal	+24.0 ±1.0 V

CAUTION :

Before setting to the TEST mode, write down the existing preset memory content of the Tuner in a table as shown below. (This is because setting to the TEST mode will cause the memory content to be as factory set, i.e. all the preset memory by the user will be erased.)

Preset keys	P1	P2	P3	P4	P5	P6	P7	P8
A								
B								
C								
D								
E								

<TEST mode>

- Turn the POWER switch on while pressing the PRESET 1 and FM/AM keys simultaneously, and the unit enters the TEST mode for the display check. After this, repeat 1) to 4).

1) The DISPLAY light on all segments.
2) The DISPLAY light on "TX-590RDS" as it scroll to the left.
3) The DISPLAY light on "G RDS" as it scroll to the left.
4) The DISPLAY light on UCOM-VERSION as it scroll to the left.

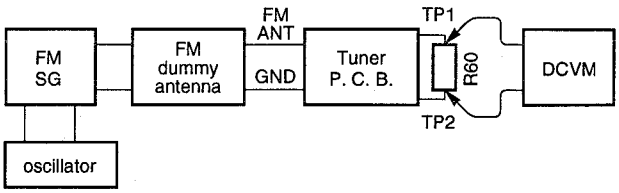
When push the P1 key, it starts from 1).
When push the other keys, mode switches the NORMAL mode.

<Factory preset memory content>

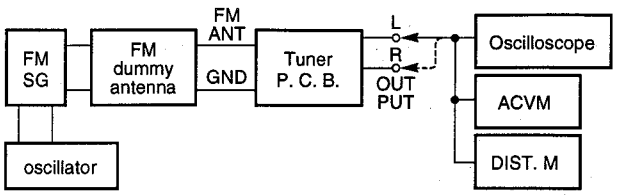
Preset	P1	P2	P3	P4	P5	P6	P7	P8
A, C, E	87.50	90.10	95.10	98.10	108.00	88.10	106.10	108.00
B, D	630	1080	1440	531	1611	900	1350	1404

<Connection Diagram (Measuring Instruments)>

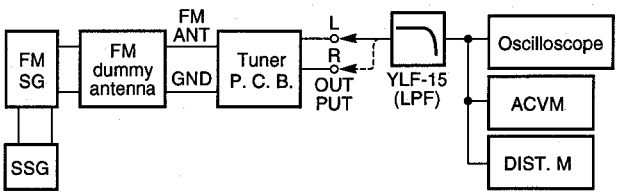
1) Discriminator balance adjustment



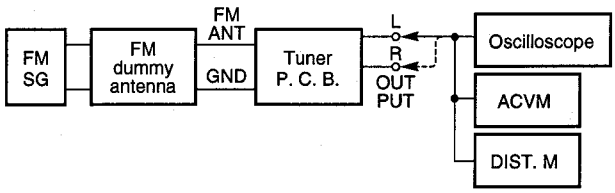
2) Monaural distortion adjustment



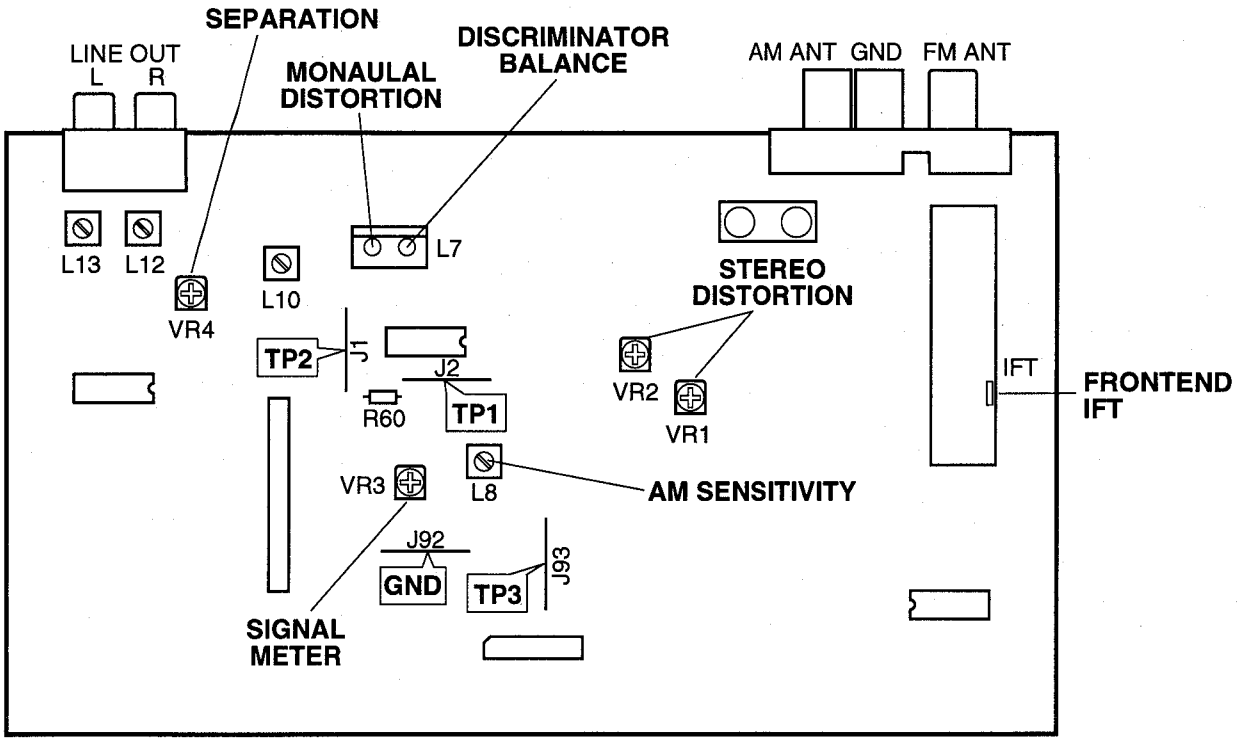
3) Stereo distortion adjustment



4) Sensitivity verification



● **TEST POINTS**



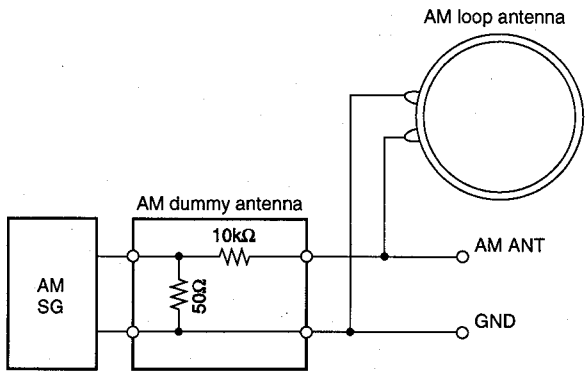
<FM TUNER SECTION>

Step	Adjustment item	Signal (ANT IN)	Reception frequency	Adjusted point	Test point	Rating
1	Rough adjustment of discriminator balance.	SG: 98.1 MHz 70 dBμ Modulation : 100 % Monaural : 100 Hz	Preset A-4: 98.1 MHz	L7 (right side)	TP1, TP2 (both end of R60)	DC 0 V ±100mV at turning point.
2	Rough adjustment of monaural distortion.	Same as Step 1.	Same as Step 1.	L7 (left side)	OUTPUT	Minimize distortion.
3	Fine adjustment of discriminator balance.	Same as Step 1.	Same as Step 1.	L7 (right side)	TP1, TP2	DC 0 V ±50mV
4	Fine adjustment of monaural distortion.	Same as Step 1.	Same as Step 1.	L7 (left side)	OUTPUT	Minimize distortion. (to less than -43dB)
5	Verification of discriminator balance.	Same as Step 1.	Same as Step 1.		TP1, TP2	DC 0 V ±50mV
6	Adjustment of Frontend IFT.	SG: 98.1 MHz 30 dBμ Modulation : 100 % Monaural : 1 kHz	Same as Step 1.	Frontend IFT	TP3, GND	Adjust so that the DC voltage is maximum. **CAUTION:** Over-adjusting of the IFT core will reduce the sensitivity. (Maximum ±90°)
7	Adjustment of stereo distortion.	SG: 98.1 MHz 70 dBμ Modulation : 100 % Stereo L or R : 1 kHz	Same as Step 1.	VR1, VR2	OUTPUT	Minimize distortion. Tuning mode is AUTO.

Step	Adjustment item	Signal (ANT IN)	Reception frequency	Adjusted point	Test point	Rating
8	Verification of monaural distortion.	SG: 98.1 MHz 70 dBμ Modulation : 100 % Monaural : 1 kHz	Preset A-4: 98.1 MHz		OUTPUT	Minimize distortion. (to less than -43dB)
9	Verification of stereo distortion.	SG: 98.1 MHz 70 dBμ Modulation : 100 % Stereo L or R : 1 kHz	Same as Step 8.		OUTPUT	Minimize distortion. (to less than -37dB) Tuning mode is AUTO.
10	Verification of sensitivity.	SG: 88.1/98.1/106.1 MHz Modulation : 100 % Monaural : 1 kHz	A-6: 88.1 MHz A-4: 98.1 MHz A-7: 106.1 MHz			S/N should be 30 dB at each frequency of 88.1 MHz, 98.1 MHz and 106.1 MHz. Check to ensure that the voltage at the ANT terminal is 6 dBμ or less.
11	Adjustment of separation.	SG: 98.1 MHz 70 dBμ Modulation : 100 % Stereo L or R : 1 kHz	Preset A-4: 98.1 MHz	VR4	OUTPUT	To more than 35 dB.
12	Adjustment of signal meter.	SG: 98.1 MHz 45 dBμ Modulation : 30 % Monaural : 1 kHz	Preset A-4: 98.1 MHz	VR3	Signal meter	Adjust so that signal meter is maximum at rating level.
13	Verification of all signal meter segments light off.	ANT input minimum.				Check to ensure that signal meter turn off.
14	Verification of AUTO TUNING.	SG: 98.1 MHz 23 dBμ Modulation : 30 % Stereo L or R : 1 kHz	Preset A-4: 98.1 MHz	Tuning knob		Automatic reception should be available when the tuning knob is UP and DOWN. Stereo indicator should be light. Audio muting should be applied during tuning.
15	Verification of AUTO PS (program service name)	SSG: Modulation: 1.6 % (1.2 kHz) SG: 98.1 MHz 40 dBμ Modulation : 100 % Monaural : 1 kHz	Preset A-4: 98.1 MHz			Confirm that the display automatically turn into the PS and PS indicator light on when tuned again.

<AM TUNER SECTION>

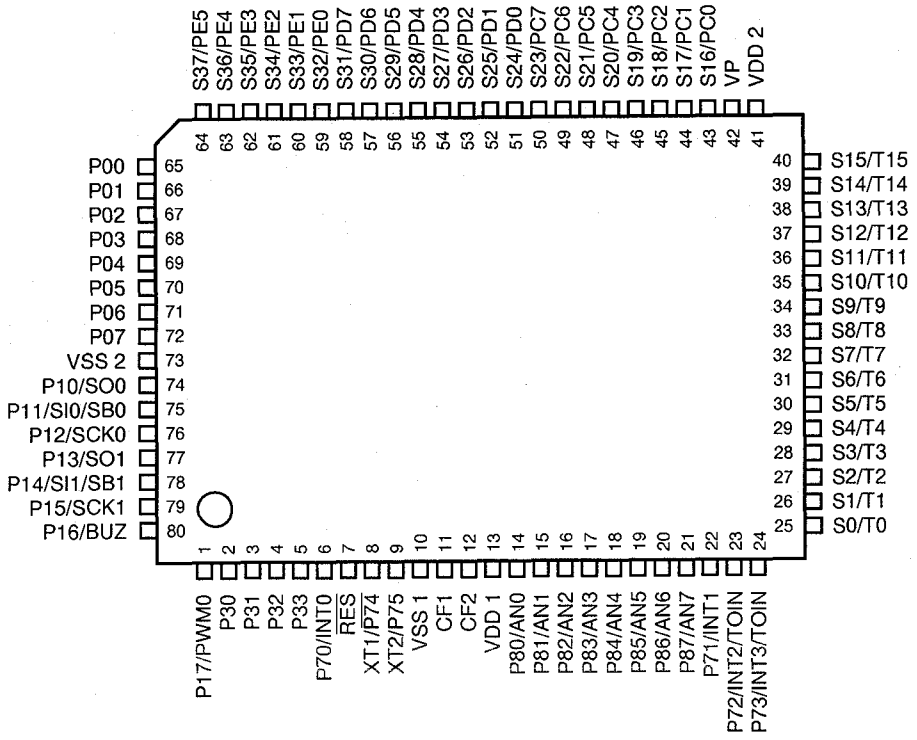
- To be adjusted after FM section adjustment.
- Use the specified dummy anetenna for loop antenna.



Step	Adjustment item	Signal (ANT IN)	Reception frequency	Adjusted point	Test point	Rating
1	Adjustment of sensitivity.	SG: 630 kHz 50 dBμ, 1 kHz, 30% modelation	Preset B-1: 630 kHz	L8	OUTPUT	Maximize detected signal output.
2	Verification of sensitivity.	SG: 630 kHz/1080 kHz/ 1440 kHz 50 dBμ, 1 kHz, 30% modelation	Preset B-1: 630 kHz B-2: 1080 kHz B-3: 1440 kHz			To be less than 54 dBμ.
3	Verification of signal meter.	SG: 1080 kHz 90 dBμ, 1 kHz, 30% modelation	Preset B-2: 1080 kHz			Check to ensure that all signal meters turn on.
		ANT input -10 dBμ or less				Check to ensure that all signal meters turn off.
4	Verification of auto tuning.	SG: 1080 kHz 60 dBμ, 1 kHz, 30% modelation	Preset B-2: 1080 kHz	Tuning knob		Automatic reception should be available when the tuning knob is UP and DOWN. Audio muting should be applied during tuning.

■ µ-COM DATA

IC4 : LC866420A
8 bit µ-COM

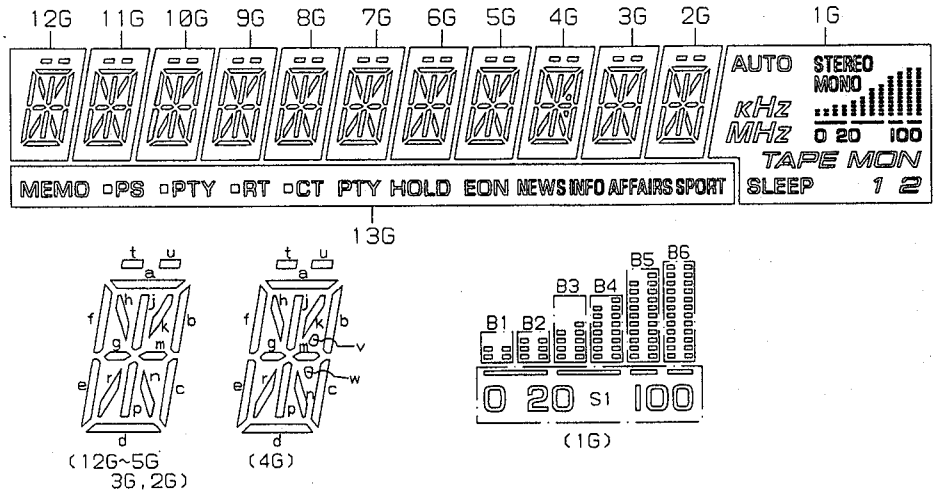


No.	Port	I/O	Name	Function	No.	Port	I/O	Name	Function
1	P17/PWMO	O	/TMUTE	Tuner mute	41	VDD2		VDD	+5V
2	P30	I	POWIN	Power state	42	VP		VDDVPP	–24V
3	P31	I	/PRTIN	Protection	43	S16/PC0	O	P1	FL segment 1
4	P32	I	MODEL 1	Model detect 1	44	S17/PC1	O	P2	FL segment 2
5	P33	I	MODEL 2	Model detect 2	45	S18/PC2	O	P3	FL segment 3
6	P70/INTO	I	/ST	STEREO (TUNER)	46	S19/PC3	O	P4	FL segment 4
7	/RES	I	/RESET	RESET	47	S20/PC4	O	P5	FL segment 5
8	/P74/XT1			N. C.	48	S21/PC5	O	P6	FL segment 6
9	P75/XT2			N. C.	49	S22/PC6	O	P7	FL segment 7
10	VSS1		VSS	GND	50	S23/PC7	O	P8	FL segment 8
11	CF1		CF1	6MHz	51	S24/PD0	O	P9	FL segment 9
12	CF2		CF2	6MHz	52	S25/PD1	O	P10	FL segment 10
13	VDD1		VDD	+5V	53	S26/PD2	O	P11	FL segment 11
14	P80/AN0	I	TUKIN1	Tuner key in 1 (A/D)	54	S27/PD3	O	P12	FL segment 12
15	P81/AN1	I	TUKIN2	Tuner key in 2 (A/D)	55	S28/PD4	O	P13	FL segment 13
16	P82/AN2	I	TUKIN3	Tuner key in 3 (A/D)	56	S29/PD5	O	P14	FL segment 14
17	P83/AN3	I	METER	Signal level in (A/D)	57	S30/PD6	O	P15	FL segment 15
18	P84/AN4	I	AMPKIN	Amp key in (A/D)	58	P31/PD7	O	P16	FL segment 16

• A/D KEY INPUT

No.	Name	KEY						
		1	2	3	4	5	6	7
14	KEYIN 1	P3	P4	P5	P6	P7	P8	—
15	KEYIN 2	TUNING MODE	EDIT	MEMORY	A/B/C/D/E	P1	P2	—
16	KEYIN 3	RDS MODE	PTY	START	EON	FM/AM	TUNING DOWN	TUNING UP
18	AMPIN	PHONO	CD	TUNER	AUX	TAPE 1	—	—

■ DISPLAY DATA (13-BT-140GK)



PIN CONNECTION

PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
CONNECTION	F1	F1	NP	NP	P16	P15	P14	P13	P12	P11	P10	P9	P8	P7	P6	P5	P4	P3	P2	P1	NX

PIN NO.	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
CONNECTION	NX	NX	NX	1G	2G	3G	4G	5G	6G	7G	8G	9G	10G	11G	12G	13G	NP	NP	F2	F2

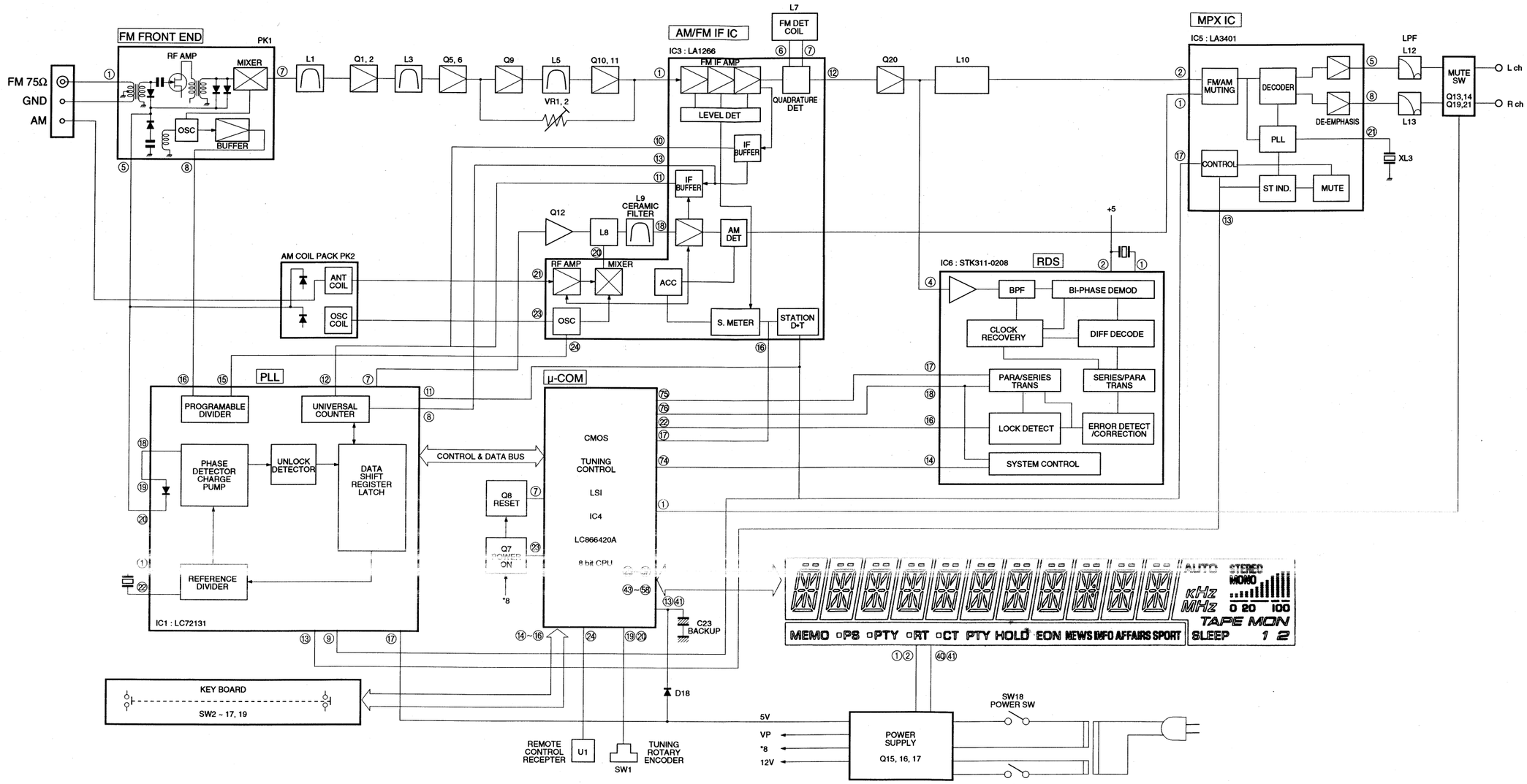
NOTE:
1) F1, F2 ..... Filament
2) NP ..... Np pin
3) NX ..... No extend pin
4) NC ..... No connection
5) DL ..... Datum line
6) 1G~13G ..... Grid

ANODE CONNECTION

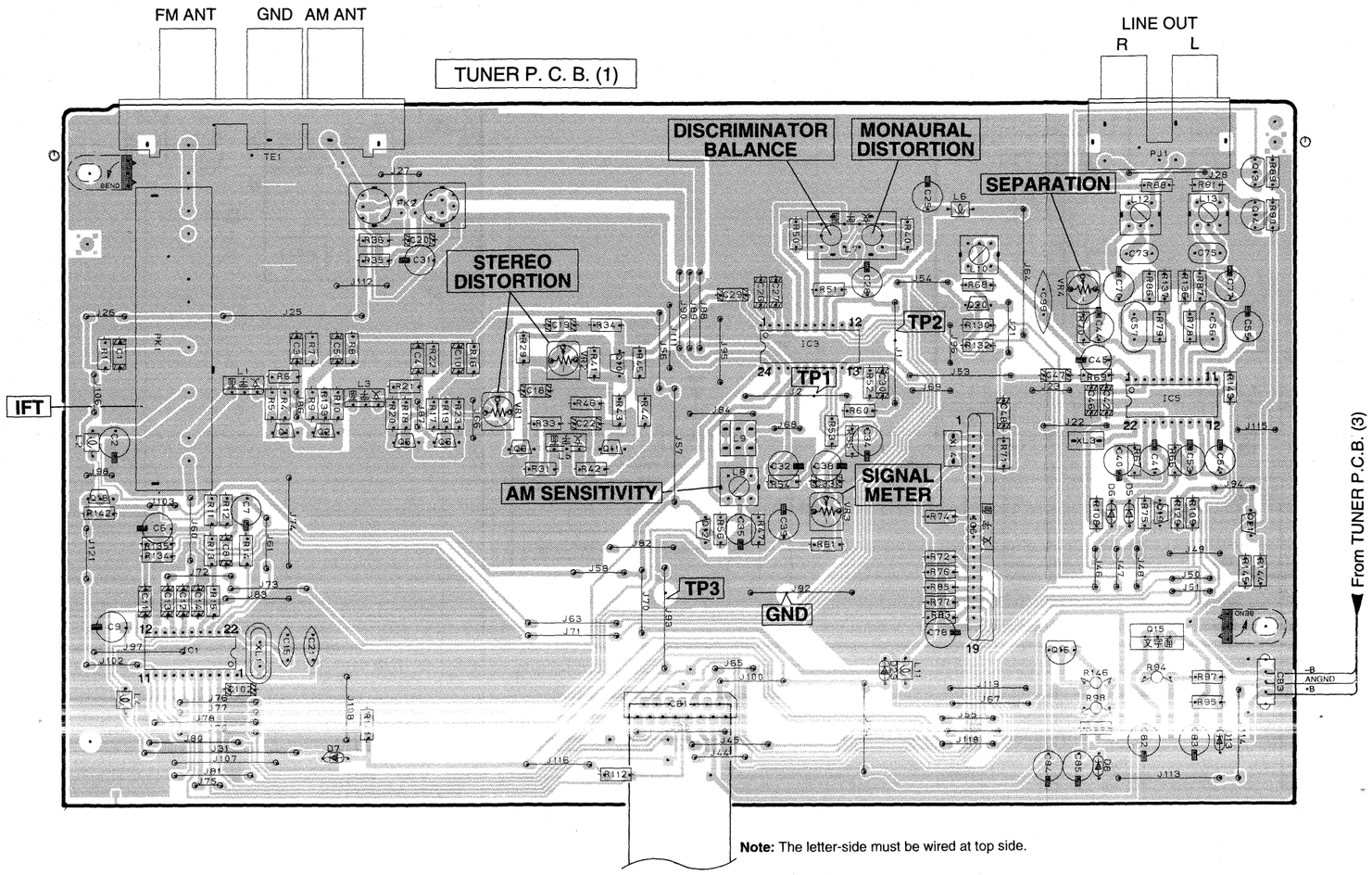
	13G	12G	11G	10G	9G	8G	7G	6G	5G	4G	3G	2G	1G
P1	**SPORT**	a	a	a	a	a	a	a	a	a	a	a	**AUTO**
P2	**AFFAIRS**	b	b	b	b	b	b	b	b	b	b	b	**kHz**
P3	**INFO**	c	c	c	c	c	c	c	c	c	c	c	**MHz**
P4	**NEWS**	d	d	d	d	d	d	d	d	d	d	d	**STEREO**
P5	**EON**	e	e	e	e	e	e	e	e	e	e	e	**MONO**
P6	**PTY HOLD**	f	f	f	f	f	f	f	f	f	f	f	B1
P7	**CT**	g	g	g	g	g	g	g	g	g	g	g	B2
P8	□ (CT)	h	h	h	h	h	h	h	h	h	h	h	B3
P9	**RT**	j	j	j	j	j	j	j	j	j	j	j	B4
P10	□ (RT)	k	k	k	k	k	k	k	k	k	k	k	B5
P11	**PTY**	m	m	m	m	m	m	m	m	m	m	m	B6
P12	□ (PTY)	n	n	n	n	n	n	n	n	n	n	n	S1
P13	**PS**	p	p	p	p	p	p	p	p	p	p	p	**TAPE MON**
P14	□ (PS)	r	r	r	r	r	r	r	r	r	r	r	**1**
P15	**MEMO**	t, u	t, u	t, u	t, u	t, u	t, u	t, u	t, u	v, w	t, u	t, u	**2**
P16	–	–	–	–	–	–	–	–	–	–	–	–	**SLEEP**

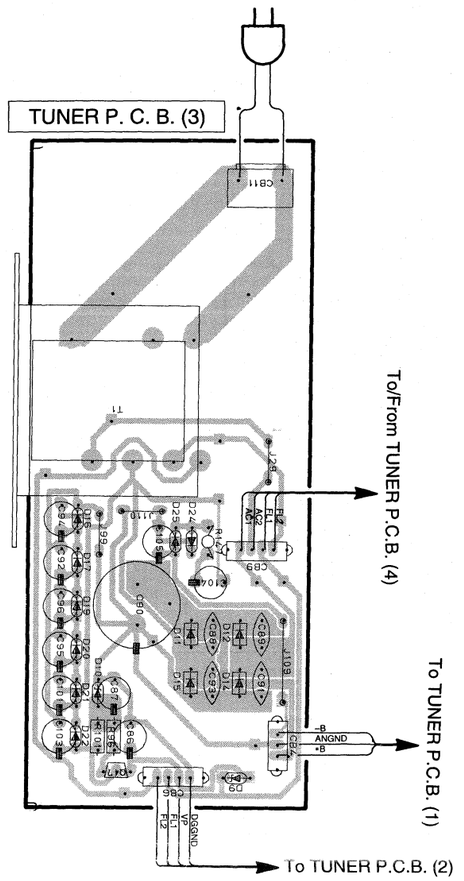
MEMO

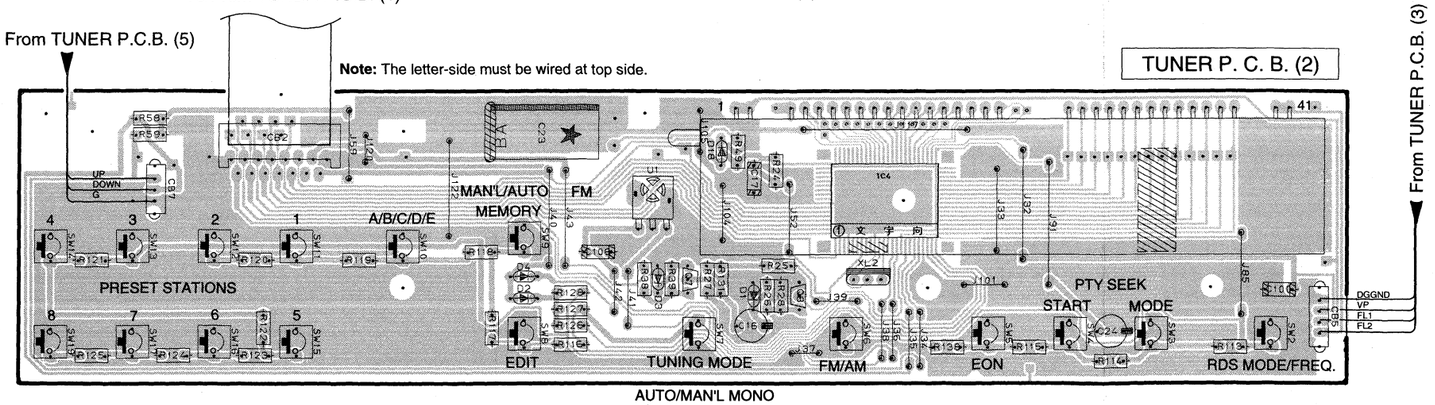
■ BLOCK DIAGRAM

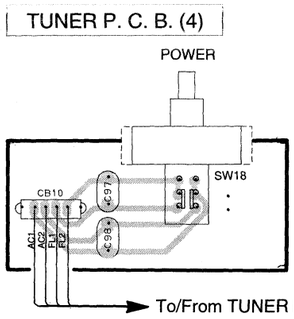


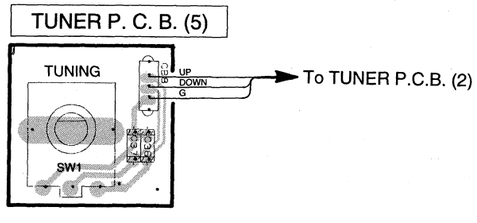
■ PRINTED CIRCUIT BOARD (Foil side)











• **Semiconductor Location**

Ref. No.	Location
IC1	A4
IC3	D2
IC4	D5
IC5	E3
IC6	D3

Ref. No.	Location
Q1	B3
Q2	B3
Q5	B3
Q6	B3
Q7	C5
Q8	C5
Q9	C3
Q10	C3
Q11	C3
Q12	C3
Q13	E2
Q14	E2
Q15	E4
Q16	E4
Q17	F3
Q18	A3
Q19	E3
Q20	D2
Q21	E3

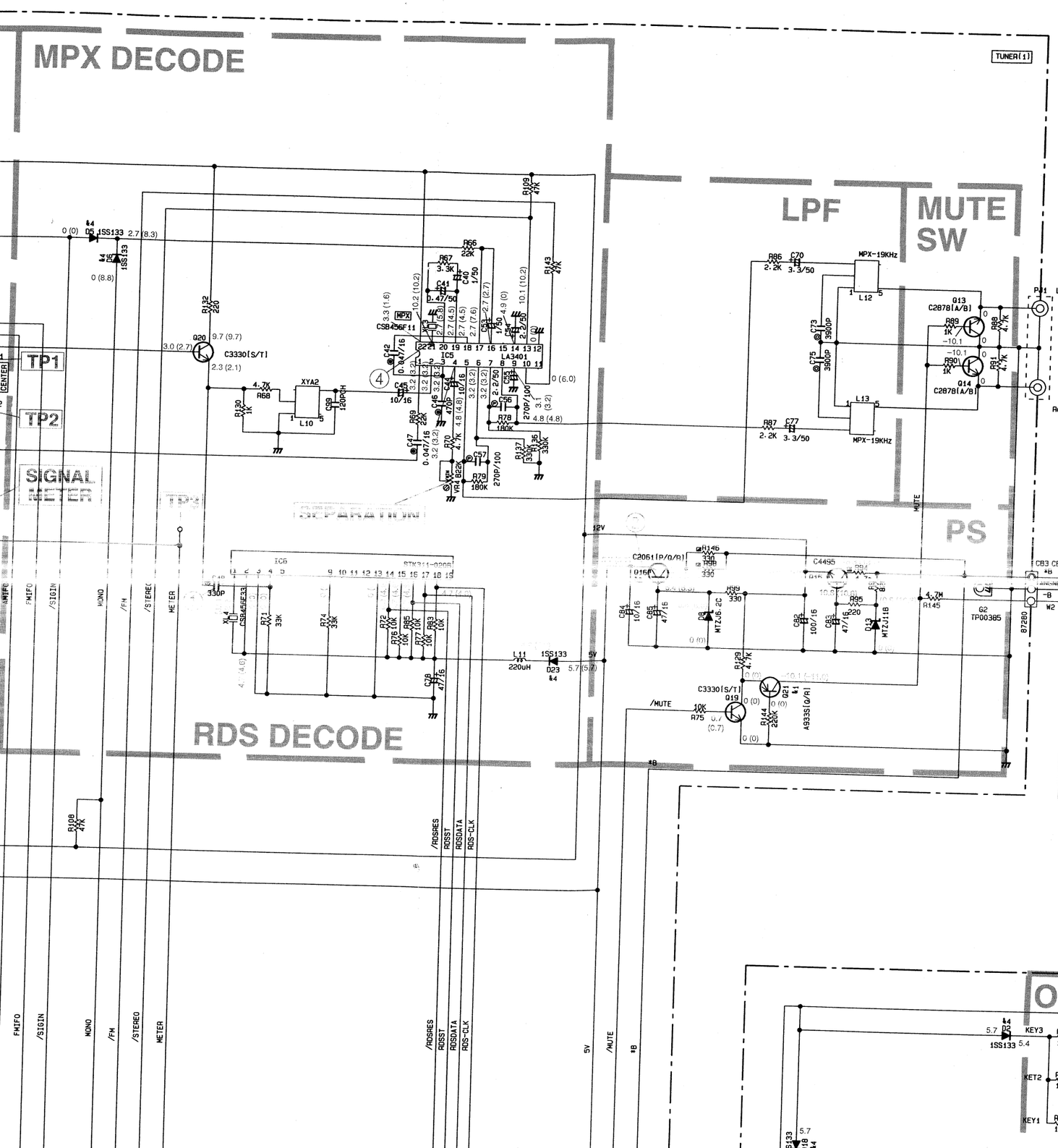
Ref. No.	Location
D1	C5
D2	B5
D3	C5
D4	B5
D5	E3
D6	E3
D7	B4
D8	E4
D9	G3
D10	F3
D11	F3
D12	G3
D13	E4
D14	G3
D15	F3
D16	F2
D17	F3
D18	C5
D19	F3
D20	F3
D21	F3
D22	F3
D23	D4
D24	F3
D25	F3

■ SCHEMATIC DIAGRAM

Each voltage given here represents that in the FM (98.1MHz, STEREO) reception mode but the one in the parentheses ( ) is that in the AM (1080kHz, MAN'L) reception mode.

VT : FM 87.5MHz 1.7V
98.1MHz 4.1V
108.0MHz 8.5V
AM 531kHz 1.4V
1080kHz 5.0V
1611kHz 7.6V

FM IF
FM/AM DETECT
MPX DECODE
DISCRIMINATOR BALANCE
MONAURAL DISTORTION
STEREO DISTORTION
FRONTEND
AM IFT
PLL
RDS DECODE
TP1
TP2
SIGNAL METER
TUNING METER



CAPACITOR

REMARKS	PARTS NAME	
NO MARK	ELECTROLYTIC CAPACITOR	#
⊗	TANTALUM CAPACITOR	#
NO MARK	CERAMIC CAPACITOR	##
◉	CERAMIC TUBULAR CAPACITOR	##
◎	POLYESTER FILM CAPACITOR	##
○	POLYSTYRENE FILM CAPACITOR	##
Ⓘ	MICA CAPACITOR	##
Ⓟ	POLYPROPYLENE FILM CAPACITOR	##
●	SEMICONDUCTIVE CERAMIC CAPACITOR	##

RESISTOR

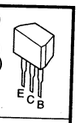
REMARKS	PARTS NAME
NO MARK	CARBON FILM RESISTOR (P=5)
☑	CARBON FILM RESISTOR (P=10)
△	METAL OXIDE FILM RESISTOR
▲	METAL FILM RESISTOR
⊠	METAL PLATE RESISTOR
◪	FIRE PROOF CARBON FILM RESISTOR
□	CEMENT MOLDED RESISTOR
⊘	SEMI VARIABLE RESISTOR
■	CHIP RESISTOR

Interchangeable Parts at Manufacture-Stage

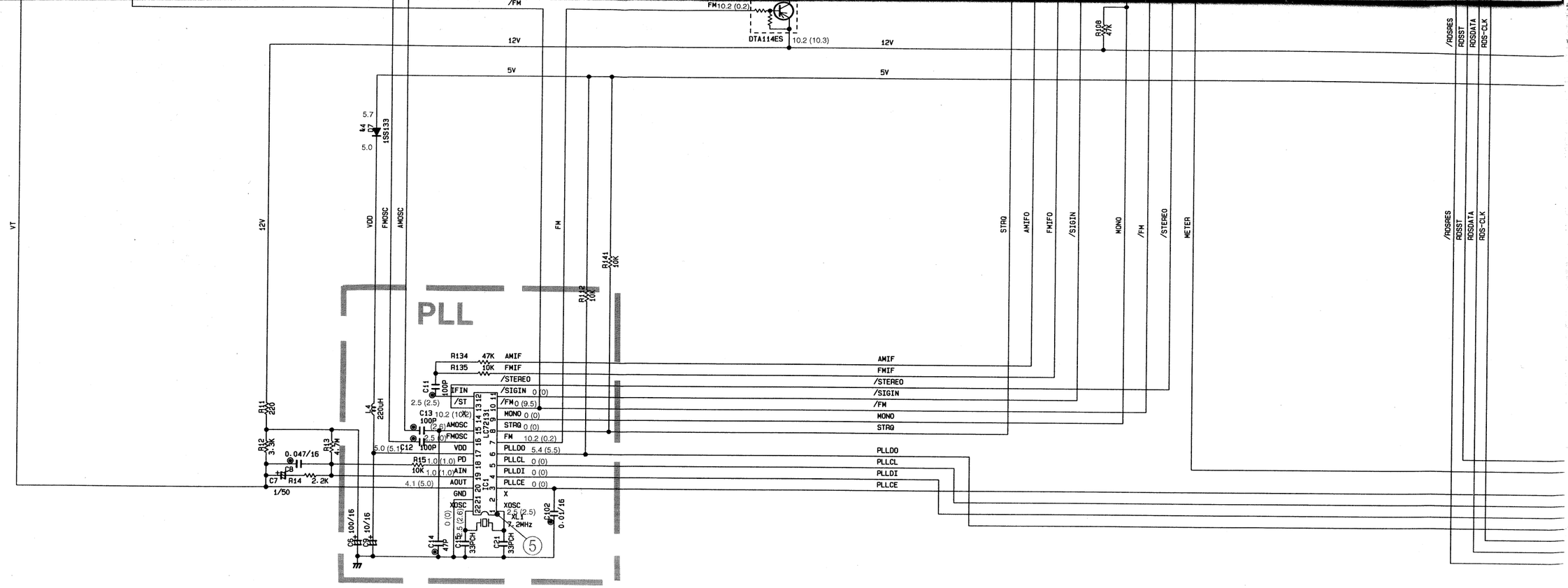
Mark	Reference Parts Number	Parts Name
&1	Q7.17.21	2SA933S[Q/R] 2SA1115[E/F] 2SA1309A[Q/R/S]
&2	Q8	2SC1740S[R/S] 2SC2603[E/F] 2SC3311A[Q/R/S]
&3	Q16	2SC2061[P/Q/R] 2SD438[E/F]
&4	D1.2.4-7.16-25	1SS133 HSS104TD

PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICS.

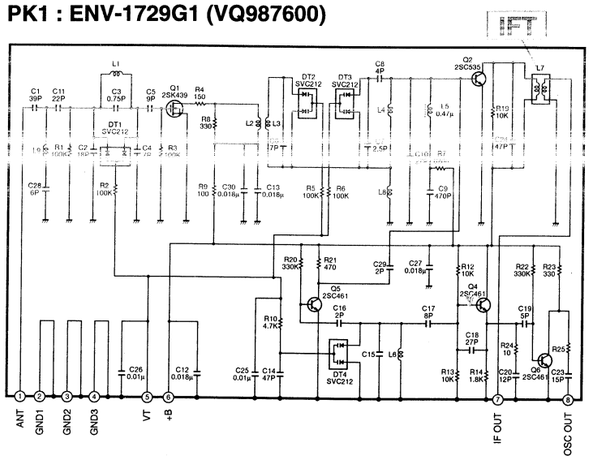
2SC1809S(N,P)
2SA933S(Q,R)
2SC1740S(R,S)
2SC3330(R,S,T)
DTA114ES



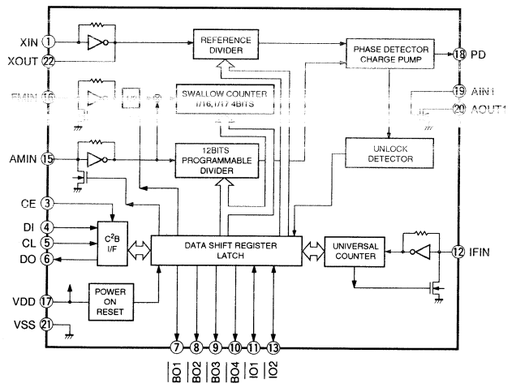
2SC2878(A,B)
2SC2061(P,Q,R)



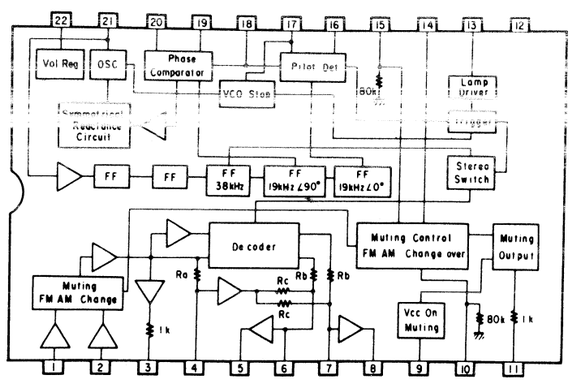
PK1 : ENV-1729G1 (VQ987600)



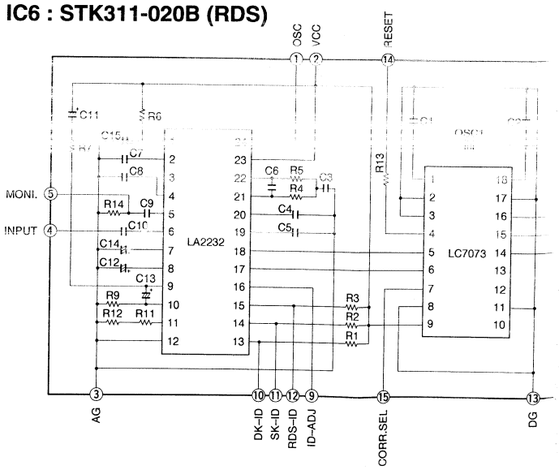
IC1 : LC72131 (PLL)



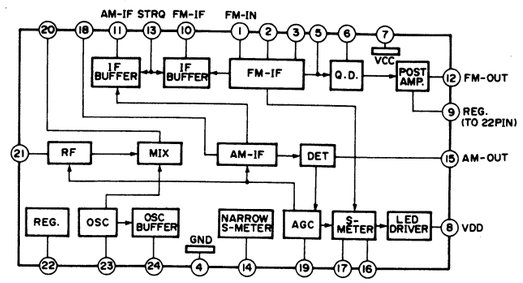
IC5 : LA3401 (MPX)



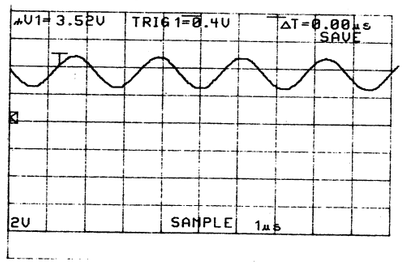
IC6 : STK311-020B (RDS)



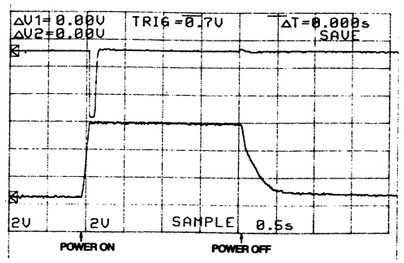
IC3 : LA1266 (AM/FM IF)



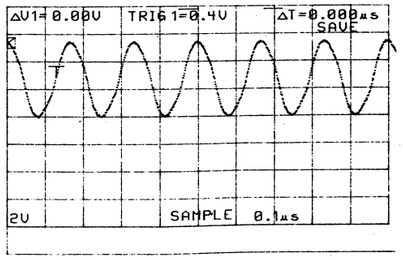
Point ①
(pin 1 of IC6)



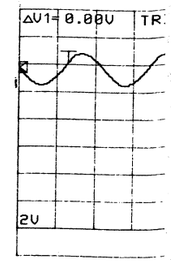
Point ②
(pin 7 of IC4 and Emitter of Q16)

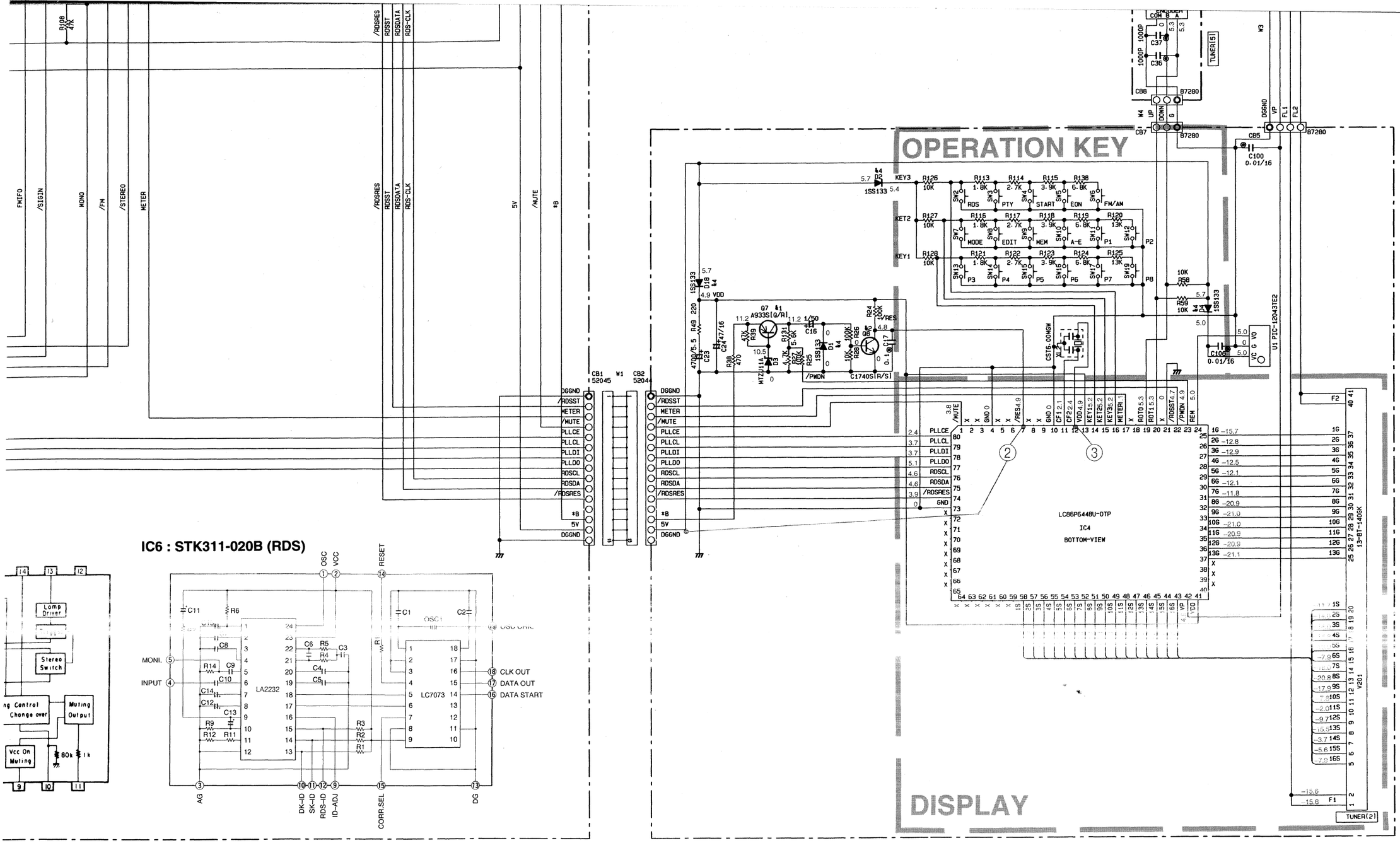


Point ③
(pin 12 of IC4)



Point ④
(pin 21 of IC5 a

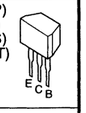




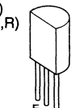
IC6 : STK311-020B (RDS)

PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODES AND ICS.

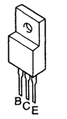
2SC1809S(N,P)
2SA933S(Q,R)
2SC1740S(R,S)
2SC3330(R,S,T)
DTA114ES



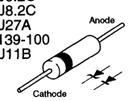
2SC2878(A,B)
2SC2061(P,Q,R)



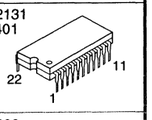
2SC4495



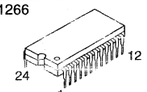
1SS133
MTZJ11A
MTZJ6.2C
MTZJ8.2C
MTZJ27A
1SR139-100
MTZJ11B



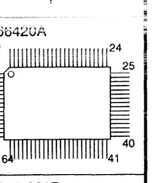
LC72131
LA3401



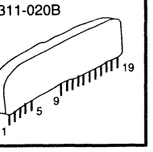
LA1266



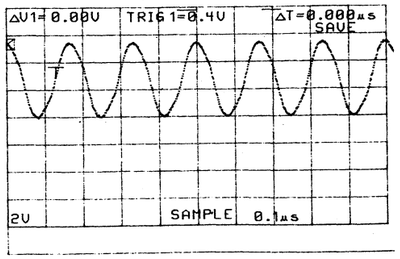
LC8664420A



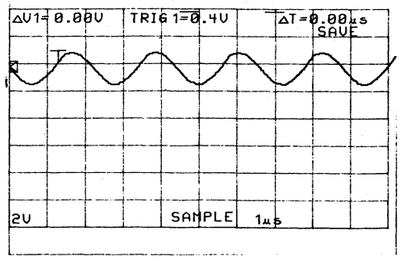
STK311-020B



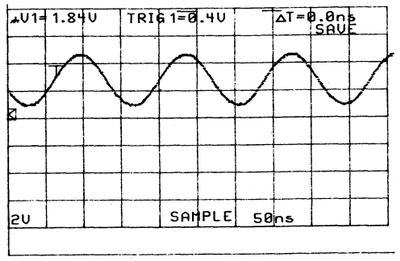
Point ③
(pin 12 of IC4)



Point ④
(pin 21 of IC5 at FM receiving)



Point ⑤
(pin 1 of IC1)



** All voltage are measured with a 10MΩ/DC electric volt meter.*
** Components having special characteristics are marked ⚠ and must be replaced with parts having specifications equal to those originally installed.*
** Schematic diagram is subject to change without notice.*

PARTS LIST

■ ELECTRICAL PARTS

■ **WARNING**

Components having special characteristics are marked ⚠ and must be replaced with parts having specifications equal to those originally installed.

- Carbon resistors (1/6W or 1/4W) are not included in the ELECTRICAL PARTS List. For the parts No. of the carbon resistors, refer to last page.

ABBREVIATIONS IN THIS LIST ARE AS FOLLOWS:

C.A.EL.CHP	: CHIP ALUMI.ELECTROLYTIC CAP
C.CE	: CERAMIC CAP
C.CE.ARRAY	: CERAMIC CAP ARRAY
C.CE.CHP	: CHIP CERAMIC CAP
C.CE.ML	: MULTILAYER CERAMIC CAP
C.CE.M.CHP	: CHIP MULTILAYER CERAMIC CAP
C.CE.SAFTY	: RECOGNIZED CERAMIC CAP
C.CE.TUBLR	: CERAMIC TUBULAR CAP
C.CE.SMI	: SEMI CONDUCTIVE CERAMIC CAP
C.EL	: ELECTROLYTIC CAP
C.MICA	: MICA CAP
C.ML.FLM	: MULTILAYER FILM CAP
C.MP	: METALLIZED PAPER CAP
C.MYLAR	: MYLAR FILM CAP
C.MYLAR.ML	: MULTILAYER MYLAR FILM CAP
C.PAPER	: PAPER CAPACITOR
C.PLS	: POLYSTYRENE FILM CAP
C.POL	: POLYESTER FILM CAP
C.POLY	: POLYETHYLENE FILM CAP
C.PP	: POLYPROPYLENE FILM CAP
C.TNTL	: TANTALUM CAP
C.TNTL.CHP	: CHIP TANTALUM CAP
C.TRIM	: TRIMMER CAP
CN	: CONNECTOR
CN.BS.PIN	: CONNECTOR,BASE PIN
CN.CANNON	: CONNECTOR,CANNON
CN.DIN	: CONNECTOR,DIN
CN.FLAT	: CONNECTOR,FLAT CABLE
CN.POST	: CONNECTOR,BASE POST
COIL.MX.AM	: COIL,AM MIX
COIL.AT.FM	: COIL,FM ANTENNA
COIL.DT.FM	: COIL,FM DETECT
COIL.MX.FM	: COIL,FM MIX
COIL,OUTPT	: OUTPUT COIL
DIOD.ARRAY	: DIODE ARRAY
DIODE.BRG	: DIODE BRIDGE
DIODE.CHP	: CHIP DIODE
DIODE.VAR	: VARACTOR DIODE
DIOD.Z.CHP	: CHIP ZENER DIODE
DIODE.ZENR	: ZENER DIODE
DSCR.CE	: CERAMIC DISCRIMINATOR
FER.BEAD	: FERRITE BEADS
FER.CORE	: FERRITE CORE
FET.CHP	: CHIP FET
FL.DSPLY	: FLUORESCENT DISPLAY
FLTR.CE	: CERAMIC FILTER
FLTR.COMB	: COMB FILTER MODULE
FLTR.LC.RF	: LC FILTER,EMI
GND.MTL	: GROUND PLATE
GND.TERM	: GROUND TERMINAL
HOLDER.FUS	: FUSE HOLDER
IC.PRTCT	: IC PROTECTOR
JUMPER.CN	: JUMPER CONNECTOR
JUMPER.TST	: JUMPER,TEST POINT
L.DTCT	: LIGHT DETECTING MODULE
L.EMIT	: LIGHT EMITTING MODULE
LED.DSPLY	: LED DISPLAY
LED.INFRD	: LED,INFRARED
MODUL.RF	: MODULATOR,RF
PHOT.CPL	: PHOTO COUPLER
PHOT.INTR	: PHOTO INTERRUPTER
PHOT.RFLCT	: PHOTO REFLECTOR
PIN.TEST	: PIN,TEST POINT
PLST.RIVET	: PLASTIC RIVET
R.ARRAY	: RESISTOR ARRAY
R.CAR.	: CARBON RESISTOR
R.CAR.CHP	: CHIPRESISTOR
R.CAR.FP	: FLAME PROOF CARBON RESISTOR
R.FUS	: FUSABLE RESISTOR
R.MTL.CHP	: CHIP METAL FILM RESISTOR
R.MTL.FLM	: METAL FILM RESISTOR
R.MTL.OXD	: METAL OXIDE FILM RESISTOR
R.MTL.PLAT	: METAL PLATE RESISTOR
RSNR.CE	: CERAMIC RESONATOR
RSNR.CRYS	: CRYSTAL RESONATOR
R.TW.CEM	: TWIN CEMENT FIXED RESISTOR
R.WW	: WIRE WOUND RESISTOR
SCR.BND.HD	: BIND HEAD B-TITE SCREW
SCR.BW.HD	: BW HEAD TAPPING SCREW
SCR.CUP	: CUP TITE SCREW
SCR.TERM	: SCREW TERMINAL
SCR.TR	: SCREW,TRANSISTOR
SUPRT.PCB	: SUPPORT,P.C.B.
SURG.PRTCT	: SURGE PROTECTOR
SW.TACT	: TACT SWITCH
SW.LEAF	: LEAF SWITCH
SW.LEVER	: LEVER SWITCH
SW.MICRO	: MICRO SWITCH
SW.PUSH	: PUSH SWITCH
SW.RT.ENC	: ROTARY ENCODER
SW.RT.MTR	: ROTARY SWITCH WITH MOTOR
SW.RT	: ROTARY SWITCH
SW.SLIDE	: SLIDE SWITCH
TERM.SP	: SPEAKERTERMINAL
TERM.WRAP	: WRAPPING TERMINAL
THRMST.CHP	: CHIP THERMISTOR
TR.CHP	: CHIP TRANSISTOR
TR.DGT	: DIGITAL TRANSISTOR
TR.DGT.CHP	: CHIP DIGITAL TRANSISTOR
TRANS	: TRANSFORMER
TRANS.PULS	: PULSE TRANSFORMER
TRANS.PWR	: POWERTRANSFORMER ASS'Y
TUNER.AM	: TUNER PACK,AM
TUNER.FM	: TUNER PACK,FM
TUNER.PK	: FRONT-ENDTUNER PACK
VR	: ROTARY POTENTIOMETER
VR.MTR	: POTENTIOMETER WITH MOTOR
VR.SW	: POTENTIOMETER WITH ROTARY SW
VR.SLIDE	: SLIDEPOTENTIOMETER
VR.TRIM	: TRIMMER POTENTIOMETER

Note) Those parts marked with "#" are not included in the P.C.B. ass'y.

TUNER P. C. B.

Schm Ref.	PART NO.	Description		
*	VU228400	P. C. B.	TUNER	
CB1	VM859600	CN. BS. PIN	15P	
CB2	VM929900	CN. BS. PIN	15P	
CB3	VR580900	CN. BS. PIN	3P	
CB4	VR580900	CN. BS. PIN	3P	
CB5	VR581000	CN. BS. PIN	4P	
CB6	VR581000	CN. BS. PIN	4P	
CB7	VR580900	CN. BS. PIN	3P	
CB8	VR580900	CN. BS. PIN	3P	
CB9	VR581000	CN. BS. PIN	4P	
CB10	VR581000	CN. BS. PIN	4P	
CB11	VG879900	CN. BS. PIN	2P	
C1	VF467300	C. CE. TUBLR	0. 01uF	16V
C2	VJ837200	C. EL	47uF	16V
C3	VF467300	C. CE. TUBLR	0. 01uF	16V
C4	VF467300	C. CE. TUBLR	0. 01uF	16V
C5	VF467300	C. CE. TUBLR	0. 01uF	16V
C6	VJ836900	C. EL	10uF	16V
C7	VJ839100	C. EL	1uF	50V
C8	VJ599000	C. CE. TUBLR	0. 047uF	16V
C9	VJ836900	C. EL	10uF	16V
C10	VF467300	C. CE. TUBLR	0. 01uF	16V
C11	VF466800	C. CE. TUBLR	100pF	50V
C12	VF466800	C. CE. TUBLR	100pF	50V
C13	VF466800	C. CE. TUBLR	100pF	50V
C14	VF466700	C. CE. TUBLR	47pF	50V
C15	VA761200	C. CE	33pF	50V
C16	VJ839100	C. EL	1uF	50V
C17	VH053100	C. CE. TUBLR	0. 1uF	50V
C18	VF467300	C. CE. TUBLR	0. 01uF	16V
C19	VF467300	C. CE. TUBLR	0. 01uF	16V
C20	VJ599000	C. CE. TUBLR	0. 047uF	16V
C21	VA761200	C. CE	33pF	50V
C22	VF467300	C. CE. TUBLR	0. 01uF	16V
C23	VS672200	C. EL	4700uF	5. 5V
C24	VJ837200	C. EL	47uF	16V
C25	VJ836900	C. EL	10uF	16V
C26	VF467300	C. CE. TUBLR	0. 01uF	16V
C27	VF467300	C. CE. TUBLR	0. 01uF	16V
C28	VJ839200	C. EL	2. 2uF	50V
C29	VF467300	C. CE. TUBLR	0. 01uF	16V
C30	VF467300	C. CE. TUBLR	0. 01uF	16V
C31	VJ836900	C. EL	10uF	16V
C32	UM416470	C. EL	4. 7uF	50V
C33	VF467300	C. CE. TUBLR	0. 01uF	16V
C34	VJ836900	C. EL	10uF	16V
C35	VJ836900	C. EL	10uF	16V
C36	VF467000	C. CE. TUBLR	1000pF	50V
C37	VF467000	C. CE. TUBLR	1000pF	50V
C38	UM216330	C. EL	3. 3uF	50V
C39	VJ839000	C. EL	0. 47uF	50V
C40	VJ839100	C. EL	1uF	50V
C41	VJ839000	C. EL	0. 47uF	50V

* New Parts

Schm Ref.	PART NO.	Description		
C42	VJ599000	C. CE. TUBLR	0. 047uF	16V
C44	VJ836900	C. EL	10uF	16V
C45	VJ836900	C. EL	10uF	16V
C46	VF466900	C. CE. TUBLR	470pF	50V
C47	VJ599000	C. CE. TUBLR	0. 047uF	16V
C48	VG278600	C. CE. TUBLR	330pF	50V
C53	VJ839100	C. EL	1uF	50V
C54	VJ839200	C. EL	2. 2uF	50V
C55	VJ839200	C. EL	2. 2uF	50V
C56	UT452270	C. PP	270pF	100V
C57	UT452270	C. PP	270pF	100V
C70	UM216330	C. EL	3. 3uF	50V
C73	UA653390	C. MYLAR	3900pF	50V
C75	UA653390	C. MYLAR	3900pF	50V
C77	UM216330	C. EL	3. 3uF	50V
C78	VJ837200	C. EL	47uF	16V
C82	VF964800	C. EL	100uF	16V
C83	VJ837200	C. EL	47uF	16V
C84	VJ836900	C. EL	10uF	16V
C85	VJ837200	C. EL	47uF	16V
C86	UM417100	C. EL	10uF	50V
C87	UM417100	C. EL	10uF	50V
C88	UG444100	C. CE	0. 01uF	50V
C89	UG444100	C. CE	0. 01uF	50V
C90	UJ649220	C. EL	2200uF	25V
C91	UG444100	C. CE	0. 01uF	50V
C92	UJ667470	C. EL	47uF	50V
C93	UG444100	C. CE	0. 01uF	50V
C94	UJ667470	C. EL	47uF	50V
C95	UJ667470	C. EL	47uF	50V
C96	UJ667470	C. EL	47uF	50V
C97	VR168300	C. MYLAR. ML	ECQ-V1H104JL3	
C98	VR168300	C. MYLAR. ML	ECQ-V1H104JL3	
C99	VA777400	C. CE	120pF	50V
C100	VF467300	C. CE. TUBLR	0. 01uF	16V
C101	UJ667470	C. EL	47uF	50V
C102	VF467300	C. CE. TUBLR	0. 01uF	16V
C103	UJ667470	C. EL	47uF	50V
C104	Ui367220	C. EL	22uF	50V
C105	UM417100	C. EL	10uF	50V
C106	VF467300	C. CE. TUBLR	0. 01uF	16V
D1	iF004600	DIODE	1SS133	
D2	iF004600	DIODE	1SS133	
D3	VG439800	DIODE. ZENR	MTZJ11A	11V
D4	iF004600	DIODE	1SS133	
D5	iF004600	DIODE	1SS133	
D6	iF004600	DIODE	1SS133	
D7	iF004600	DIODE	1SS133	
D8	VG438100	DIODE. ZENR	MTZJ6. 2C	6. 2V
D9	VG439000	DIODE. ZENR	MTZJ8. 2C	8. 2V
D10	VG442800	DIODE. ZENR	MTZJ27A	27V
D11	VH770800	DIODE	1SR139-100	
D12	VH770800	DIODE	1SR139-100	

* New Parts

TUNER P. C. B.

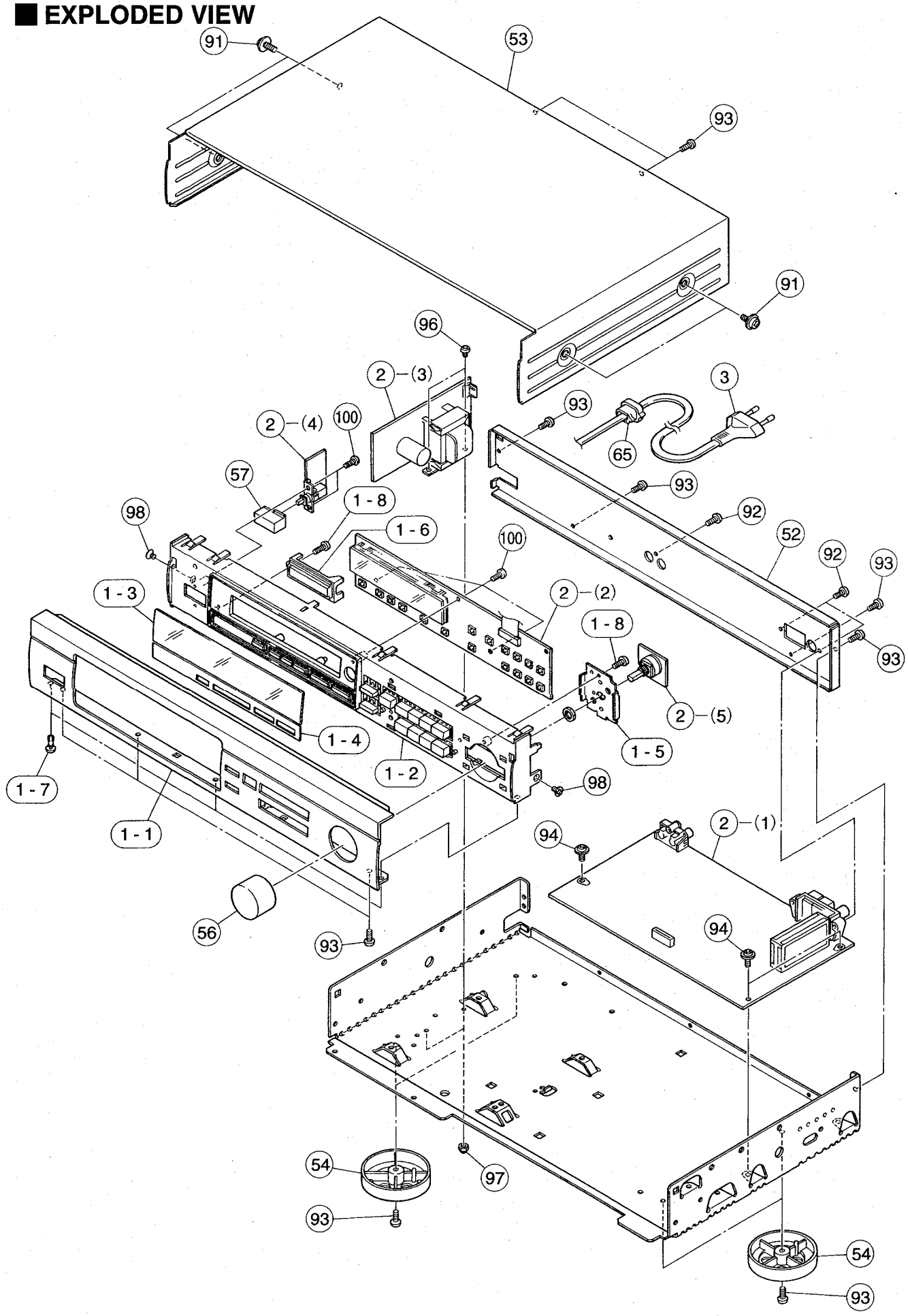
Schm Ref.	PART NO.	Description	
D13	VG439900	DIODE. ZENR	MTZJ11B 11V
D14	VH770800	DIODE	1SR139-100
D15	VH770800	DIODE	1SR139-100
D16	iF004600	DIODE	1SS133
D17	iF004600	DIODE	1SS133
D18	iF004600	DIODE	1SS133
D19	iF004600	DIODE	1SS133
D20	iF004600	DIODE	1SS133
D21	iF004600	DIODE	1SS133
D22	iF004600	DIODE	1SS133
D23	iF004600	DIODE	1SS133
D24	iF004600	DIODE	1SS133
D25	iF004600	DIODE	1SS133
G1	VR463400	TERM. GND	D3.5 TP00385
G2	VR463400	TERM. GND	D3.5 TP00385
* IC1	XQ944A00	IC	LC72131
IC3	XB760A00	IC	LA1266
IC4	XQ942A00	IC	LC866420A-XXXX
IC5	iG158100	IC	LA3401
IC6	XQ359A00	IC	STK311-020B
L1	GG000560	FLTR. CE	SFE10.7MS3GHY-A
L2	Vi546100	COIL	220uH
L3	GG000560	FLTR. CE	SFE10.7MS3GHY-A
L4	Vi546100	COIL	220uH
L5	GG000560	FLTR. CE	SFE10.7MS3GHY-A
L6	Vi546100	COIL	220uH
L7	VC218600	COIL. DT. FM	10.7MHz
L8	GE100470	COIL. IF. AM	450KHz
L9	VC219000	FLTR. CE	SFZ450JL3
L10	VT486800	COIL	XYA2
L11	Vi546100	COIL	220uH
L12	VQ138200	FLTR. LC	19KHz
L13	VQ138200	FLTR. LC	19KHz
PJ1	VM725600	JACK. PIN	2P
PK1	VQ987600	TUNER. PK	EXV-17296G1
PK2	Vi027300	COIL. AM	
Q1	VR497000	TR	2SC1809S N, P
Q2	VR497000	TR	2SC1809S N, P
Q5	VR497000	TR	2SC1809S N, P
Q6	VR497000	TR	2SC1809S N, P
Q7	iA093320	TR	2SA933S Q, R
Q8	iC174020	TR	2SC1740S R, S
Q9	VR497000	TR	2SC1809S N, P
Q10	VR497000	TR	2SC1809S N, P
Q11	VC218900	TR	2SC3330 R, S, T
Q12	VD678500	TR. DGT	DTA114ES
Q13	iC287820	TR	2SC2878 A, B
Q14	iC287820	TR	2SC2878 A, B
Q15	VN996900	TR	2SC4495
Q16	iC206110	TR	2SC2061 P, Q, R
Q17	iA093320	TR	2SA933S Q, R
Q18	VD678500	TR. DGT	DTA114ES
Q19	VC218900	TR	2SC3330 R, S, T

* New Parts

Schm Ref.	PART NO.	Description	
Q20	VC218900	TR	2SC3330 R, S, T
Q21	iA093320	TR	2SA933S Q, R
R94	HV453470	R. CAR. FP	4.7Ω 1/4W
R98	HV455330	R. CAR. FP	330Ω 1/4W
R146	HV455330	R. CAR. FP	330Ω 1/4W
R147	HV453330	R. CAR. FP	3.3Ω 1/4W
* SW1	VU260800	SW. RT. ENC	EC16B24104
SW2	VG392900	SW. TACT	SKHVAA
SW3	VG392900	SW. TACT	SKHVAA
SW4	VG392900	SW. TACT	SKHVAA
SW5	VG392900	SW. TACT	SKHVAA
SW6	VG392900	SW. TACT	SKHVAA
SW7	VG392900	SW. TACT	SKHVAA
SW8	VG392900	SW. TACT	SKHVAA
SW9	VG392900	SW. TACT	SKHVAA
SW10	VG392900	SW. TACT	SKHVAA
SW11	VG392900	SW. TACT	SKHVAA
SW12	VG392900	SW. TACT	SKHVAA
SW13	VG392900	SW. TACT	SKHVAA
SW14	VG392900	SW. TACT	SKHVAA
SW15	VG392900	SW. TACT	SKHVAA
SW16	VG392900	SW. TACT	SKHVAA
SW17	VG392900	SW. TACT	SKHVAA
SW18	VS262300	SW. PUSH	PSE01-A4KPX
SW19	VG392900	SW. TACT	SKHVAA
T1	XN911A00	TRANS. PWR	
TE1	LA005800	TERM. ANT	YKD31-0215
U1	VU591000	L. DTCT	GP1U271X
* V201	VT668600	FL. DSPLY	13-BT-140GK
VR1	VJ693200	VR. TRIM	B2.2KΩ
VR2	VJ693200	VR. TRIM	B2.2KΩ
VR3	VJ694000	VR. TRIM	B47KΩ
VR4	VJ693800	VR. TRIM	B22KΩ
XL1	QU003800	RSNR. CRYS	7.2MHz
XL2	VH611900	RSNR. CE	CST6.00MGW-TF01
XL3	GG000750	RSNR. CE	18.95MHz
XL4	VS860100	RSNR. CE	19KHz
	VR519500	SHEET	
	VR380100	SPACER	FL-T6

* New Parts

■ EXPLODED VIEW



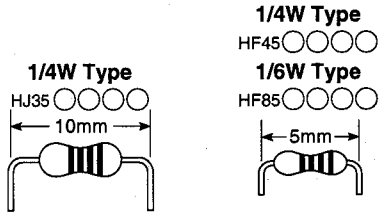
■ MECHANICAL PARTS

	Ref. No.	PART NO.	Description		Remarks	Markets
*	1-1	VT711500	FRONT PANEL		BL	
*	1-1	VT711600	FRONT PANEL		TI	
*	1-2	VT711700	SUB PANEL		BL	
*	1-2	VT711800	SUB PANEL		TI	
*	1-3	VT711900	SHEET	WINDOW		
*	1-4	VT712000	SHEET, BUTTON		BL	
*	1-4	VT712100	SHEET, BUTTON		TI	
*	1-5	VT731100	SUPPORT, VR			
*	1-6	VU455800	SUPPORT/FP			
	1-7	VQ368600	PUSH RIVET	P3555-B		
	1-8	EX600310	BIND HEAD P-TITE SCREW	3x8 FCRM3-BL		
*	2	VU228400	P.C.B. ASS'Y	TUNER		
	3	VS168400	POWER CORD ASS'Y			(G)
	3	VS680700	POWER CORD ASS'Y			(B)
*	25	VT908000	SPACER			
*	52	VT737400	REAR PANEL			
	53	VR216700	TOP COVER		BL	
	53	VR216800	TOP COVER		TI	
	54	VQ780300	LEG	D60xH16		
	56	VR217100	KNOB	D32	BL	
	56	VT274400	KNOB	D32/S	TI	
	57	VQ780000	BUTTON	10x25	BL	
	57	VT990000	BUTTON	10x25	TI	
	65	VN158600	CORD STOPPER	No. 2104		
	91	EK365090	PW HEAD S-TITE SCREW	4x8-10 FCRM3-BL	BL	
	91	EX601150	BW HEAD S-TITE SCREW	4x8-10 FNM3-BL	TI	
	92	EN301010	BIND HEAD BONDING TAP. SCREW	3x8 FCRM3-BL		
	93	Ei330086	BIND HEAD B-TITE SCREW	3x8 FCRM3-BL		
	94	EX600700	BW HEAD TAPPING SCREW	3x8 FCM3-CU		
	96	EP630210	BIND HEAD S-TITE SCREW	3x6 ZMC2-BL		
	97	VQ057700	HEXAGONAL CAP NUT	3mm FNM3-3G		
	98	VD780000	FLAT HEAD S-TITE SCREW	3x6 MFZN2BL		
	100	EX600310	BIND HEAD P-TITE SCREW	3x8 FCRM3-BL		
			ACCESSORIES			
		VQ099100	AM LOOP ANTENNA	1.0m		
		VQ147100	ANTENNA, FM	1P 1.4m		
		VS381600	PIN PLUG CORD	1.0m		
		VE364900	ANTENNA ADAPTER	PAL 75-300Ω		

* New Parts

Parts List for Carbon Resistors

Value	1/4W Type Part No.	1/6W Type Part No.	Value	1/4W Type Part No.	1/6W Type Part No.
1.0 Ω	HJ35 3100	HF85 3100	10 kΩ	HF45 7100	HF45 7100
1.8 Ω	HJ35 3180	✻	11 kΩ	HF45 7110	HF45 7110
2.2 Ω	HJ35 3220	HF85 3220	12 kΩ	HJ35 7120	HF85 7120
3.3 Ω	HJ35 3330	HF85 3330	13 kΩ	HF45 7130	HF45 7130
4.7 Ω	HJ35 3470	HF85 3470	15 kΩ	HF45 7150	HF45 7150
5.6 Ω	HJ35 3560	HF85 3560	18 kΩ	HF45 7180	HF45 7180
10 Ω	HF45 4100	HF45 4100	22 kΩ	HF45 7220	HF45 7220
15 Ω	HJ35 4150	HF85 4150	24 kΩ	HF45 7240	HF45 7240
22 Ω	HF45 4220	HF45 4220	27 kΩ	HJ35 7270	HF85 7270
27 Ω	HJ35 4270	HF85 4270	30 kΩ	HF45 7300	HF45 7300
33 Ω	HF45 4330	HF45 4330	33 kΩ	HF45 7330	HF45 7330
39 Ω	HJ35 4470	HF85 4390	36 kΩ	HF45 7360	HF45 7360
47 Ω	HF45 4470	HF45 4470	39 kΩ	HF45 7390	HF45 7390
56 Ω	HF45 4560	HF45 4560	47 kΩ	HF45 7470	HF45 7470
68 Ω	HF45 4680	HF45 4680	51 kΩ	HF45 7510	HF45 7510
75 Ω	HF45 4750	HF45 4750	56 kΩ	HF45 7560	HF45 7560
82 Ω	HF45 4820	HF45 4820	62 kΩ	HF45 7620	HF45 7620
91 Ω	HF45 4910	HF45 4910	68 kΩ	HF45 7680	HF45 7680
100 Ω	HF45 5100	HF45 5100	82 kΩ	HF45 7820	HF45 7820
110 Ω	HJ35 5110	HF85 5110	91 kΩ	HF45 7910	HF45 7910
120 Ω	HF45 5120	HF45 5120	100 kΩ	HF45 8100	HF45 8100
150 Ω	HF45 5150	HF45 5150	110 kΩ	HF45 8110	HF45 8110
160 Ω	HJ35 5160	✻	120 kΩ	HF45 8120	HF45 8120
180 Ω	HF45 5180	HF45 5180	150 kΩ	HF45 8150	HF45 8150
200 Ω	HF45 5200	HF45 5200	180 kΩ	HF45 8180	HF45 8180
220 Ω	HF45 5220	HF45 5220	220 kΩ	HJ35 8220	HF85 8220
270 Ω	HF45 5270	HF45 5270	270 kΩ	HF45 8270	HF45 8270
330 Ω	HF45 5330	HF45 5330	300 kΩ	HF45 8300	HF45 8300
390 Ω	HF45 5390	HF45 5390	330 kΩ	HF45 8330	HF45 8330
430 Ω	HF45 5430	HF45 5430	390 kΩ	HJ35 8390	HF85 8390
470 Ω	HF45 5470	HF45 5470	470 kΩ	HF45 8470	HF45 8470
510 Ω	HF45 5510	HF45 5510	560 kΩ	HJ35 8560	HF85 8560
560 Ω	HF45 5560	HF45 5560	680 kΩ	HJ35 8680	HF85 8680
680 Ω	HF45 5680	HF45 5680	820 kΩ	HJ35 8820	HF85 8820
820 Ω	HF45 5820	HF45 5820	1.0 MΩ	HF45 9100	HF45 9100
910 Ω	HF45 5910	HF45 5910	1.2 MΩ	HJ35 9120	✻
1.0 kΩ	HF45 6100	HF45 6100	1.5 MΩ	HJ35 9150	HF85 9150
1.2 kΩ	HF45 6120	HF45 6120	1.8 MΩ	HJ35 9180	HF85 9180
1.5 kΩ	HF45 6150	HF45 6150	2.2 MΩ	HJ35 9220	HF85 9220
1.8 kΩ	HF45 6180	HF45 6180	3.3 MΩ	HJ35 9330	HF85 9330
2.0 kΩ	HJ35 6200	HF85 6200	3.9 MΩ	HJ35 9390	✻
2.2 kΩ	HF45 6220	HF45 6220	4.7 MΩ	HJ35 9470	HF85 9470
2.4 kΩ	HJ35 6240	HF85 6240			
2.7 kΩ	HF45 6270	HF45 6270			
3.0 kΩ	HF45 6300	HF45 6300			
3.3 kΩ	HF45 6330	HF45 6330			
3.6 kΩ	HJ35 6360	HF85 6360			
3.9 kΩ	HF45 6390	HF45 6390			
4.7 kΩ	HF45 6470	HF45 6470			
5.1 kΩ	HF45 6510	HF45 6510			
5.6 kΩ	HF45 6560	HF45 6560			
6.8 kΩ	HF45 6680	HF45 6680			
8.2 kΩ	HF45 6820	HF45 6820			
9.1 kΩ	HF45 6910	HF45 6910			



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