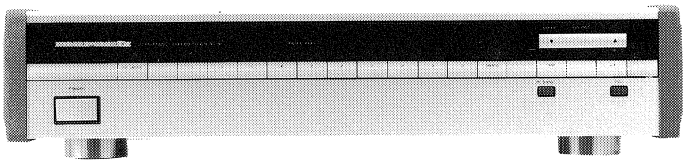
Service Manual

ST-50U

Stereo tuner



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marantz®

model ST-50

First issue : 1991

A.O

066J855040

Printed in Japan

MARANTZ DESIGN AND SERVICE

Using superior design and selected high grade components, MARANTZ company has created the ultimate in stereo sound.
Only **original MARANTZ parts** can insure that your MARANTZ product will continue to perform to the specifications for which it is famous.

Parts for your MARANTZ equipment are generally available to our National Marantz Subsidiary or Agent.

ORDERING PARTS:

Parts can be ordered either by mail or by telex. In both cases, correct part number has to be specified.
The following information must be supplied to eliminate delays in processing your order:

1. Complete address
2. Complete part numbers and quantities required
3. Description of parts
4. Model number for which part is required
5. Way of shipment
6. Signature: any order form or telex must be signed otherwise such part order will be considered as null and void.

MARANTZ INTERNATIONAL
Vestdijk 9
5600 MD Eindhoven
The Netherlands
Phone: +31/40.758290
Telefax: +31/40.75.82.99
Telex: 35000 PHTC NL routing IND NLMTFAT

MARANTZ USA
1150 FEEHANVILLE DR.
MOUNT PROSPECT, ILLNOIS 60056
U.S.A.
PHONE: 800-654-6633
FAX: 708-299-4005

SHOCK, FIRE HAZARD SERVICE TEST:

CAUTION: After servicing this appliance and prior to returning to customer, measure the resistance between either primary AC cord connector pins (with unit NOT connected to AC mains and its Power switch ON), and the face or Front Panel of product and controls and chassis bottom.

Any resistance measurement less than 1 Megohms should cause unit to be reparied or corrected before AC power is applied, and verified before return to user/customer.
Ref. UL Standard NO. 1270. Para 74. 3. D (Mandatory Test after servicing Electrical Appliances, effective 7-1-83).

In case of difficulties, do not hesitate to contact the Technical Department at abovementioned address.

1. TECHNICAL SPECIFICATIONS

FM TUNER SECTION

Mono Usable Sensitivity	10.8 dBf
Sensitivity at 50 dB Quieting	
Mono	16.2 dBf
Stereo	37.0 dBf
Alternate Channel Selectivity	
Wide	35 dB
Narrow	75 dB
Capture Ratio	1.0 dB
Total Harmonic Distortion at 1 kHz	
Wide/Narrow Mono	0.05/0.2%
Stereo	0.08/0.4%
Signal-to-Noise Ratio at 1 kHz	
Mono	90 dB
Stereo	82 dB
Stereo Channel Separation at 1 kHz	55 dB
Frequency Response 20 Hz – 15 kHz	±0.5 dB
Image Rejection	80 dB
IF Rejection	100 dB
Output Level	940 mV
Output Impedance	1.5 kohms

AM TUNER SECTION

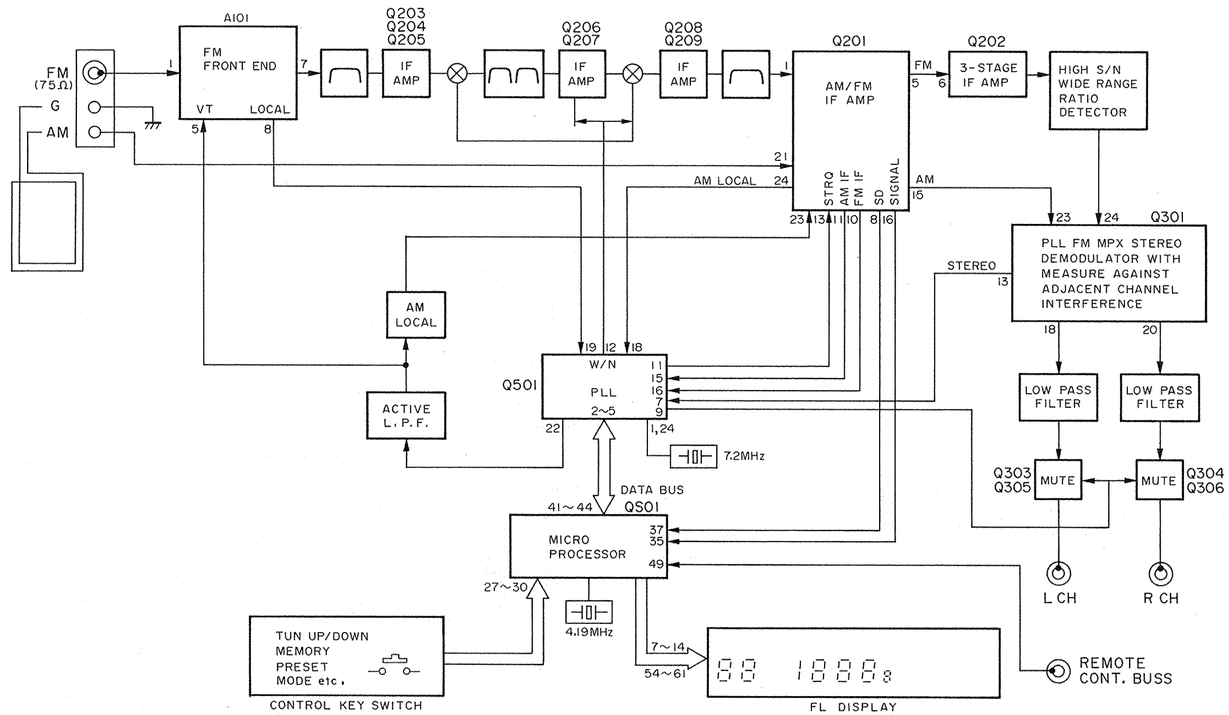
Usable Sensitivity	48 dB/m
Selectivity	30 dB
S/N Ratio at 500 Hz	54 dB
THD at 400 Hz	0.3%
Output Level	280 mV

GENERAL

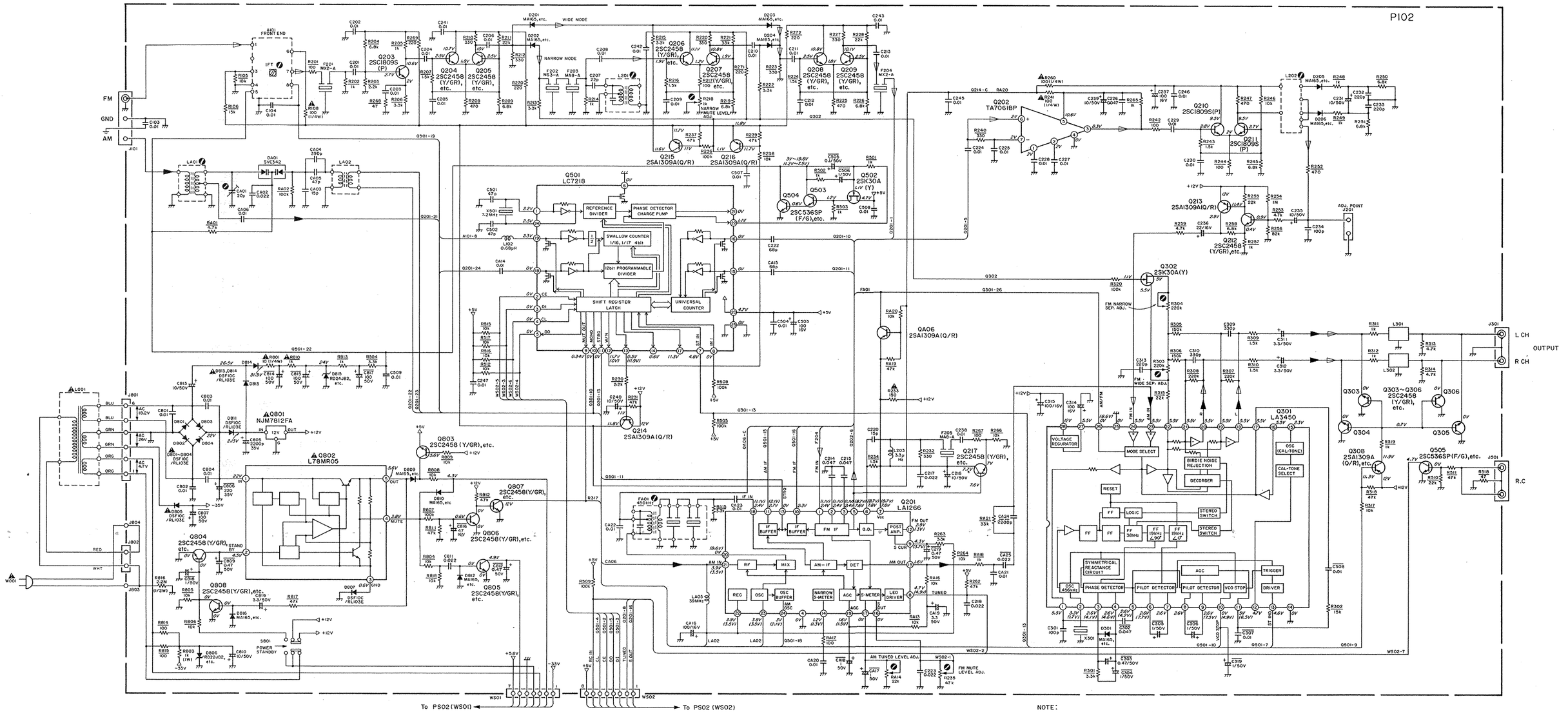
Power Requirements	120V AC, 60 Hz
Power Consumption	10W
Dimensions	
Width	17-7/8 inches (454 mm)
Height	3-3/8 inches (86 mm)
Depth	13-1/8 inches (334 mm)
Weight	14.5 lbs (6.6 kg)

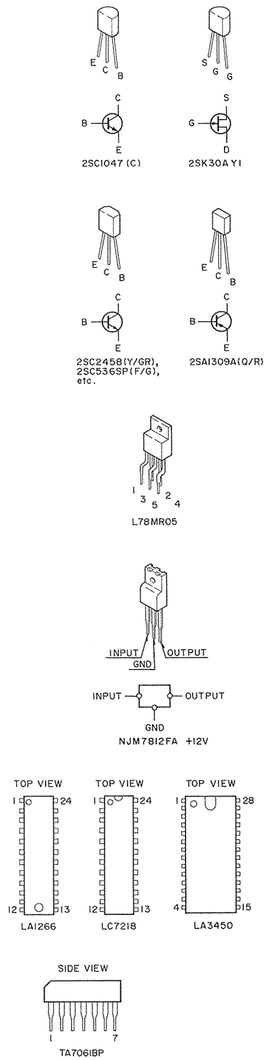
Specifications subject to change without prior notice.

2. BLOCK DIAGRAM



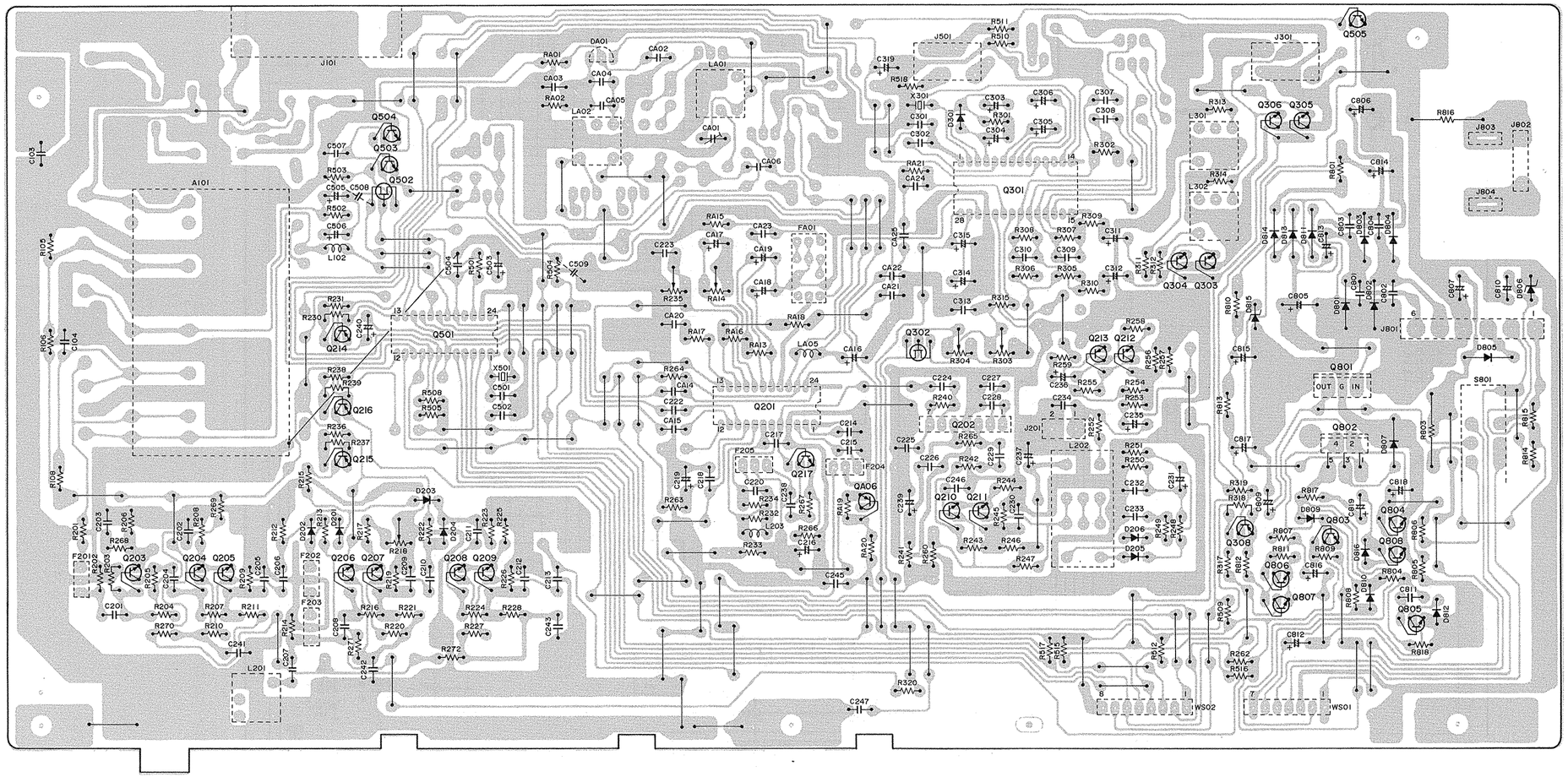
3. SCHEMATIC DIAGRAM AND PARTS LOCATIONS (PATTERN SIDE)

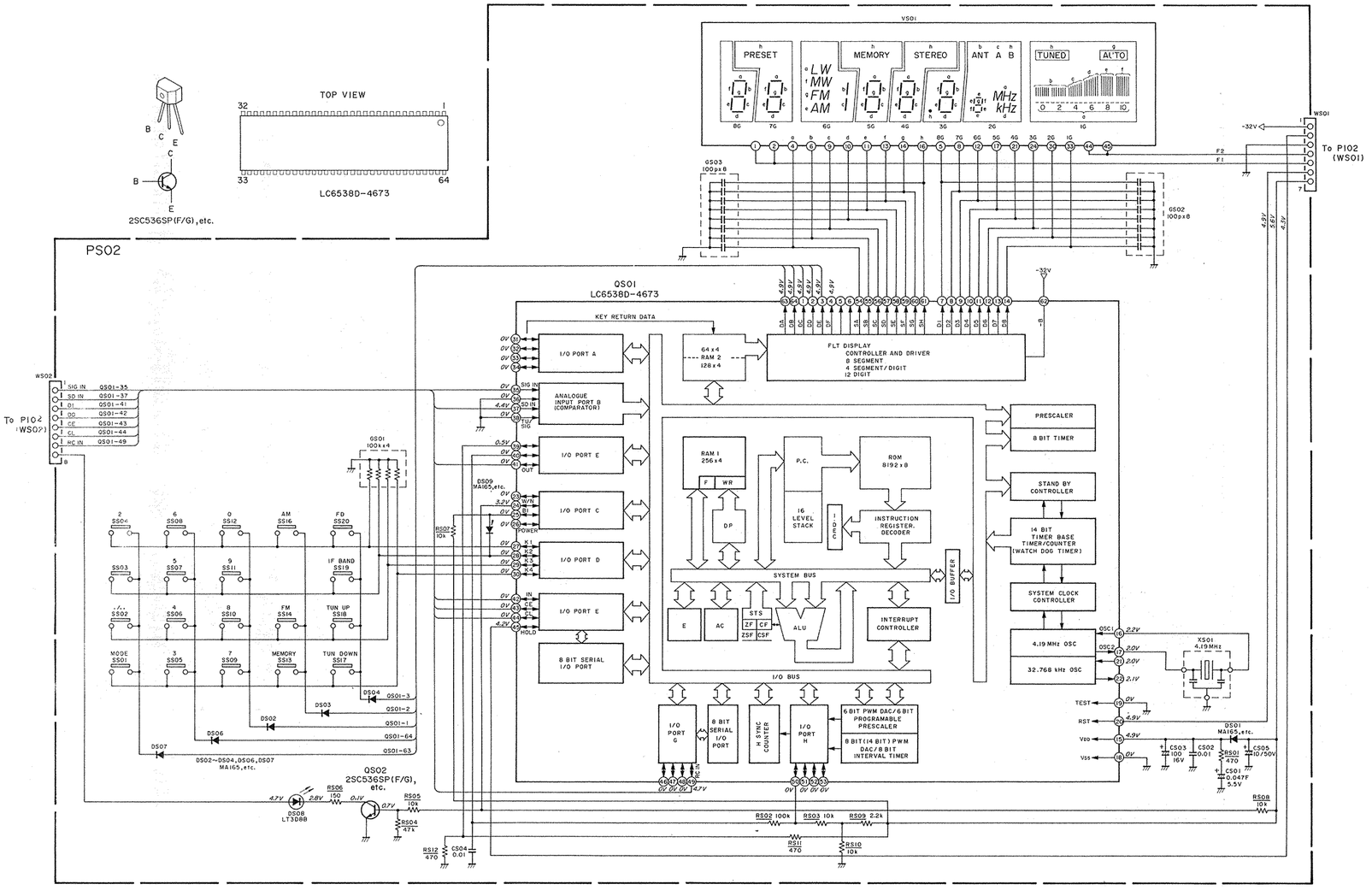




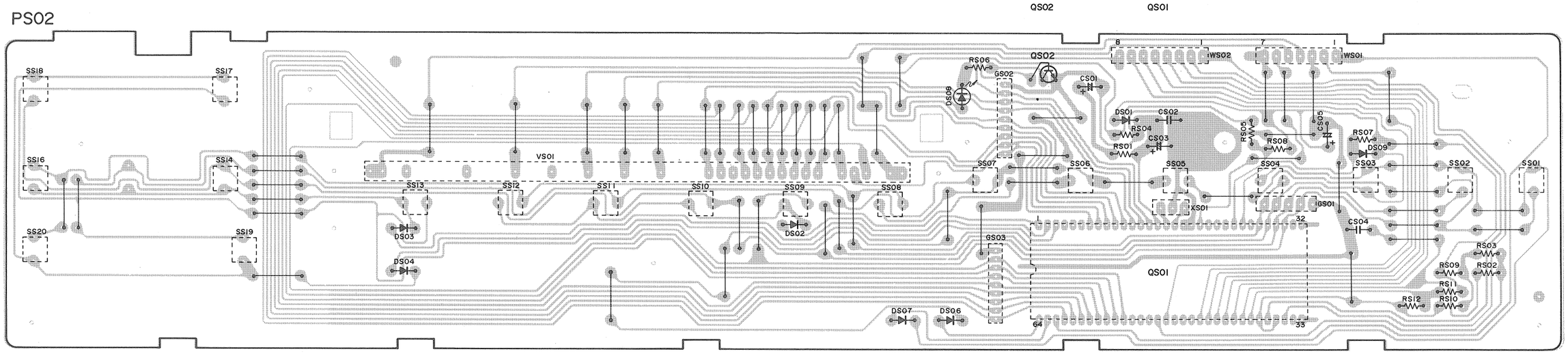
Q203～Q205 Q214～Q216 Q502～Q504 Q206～Q209 Q501 QA03 Q201 Q217 QA06 Q302 Q202 Q301 Q210 Q211 Q213 Q212 Q304 Q303 Q306 Q305 Q505 Q308 Q801～Q807

P102

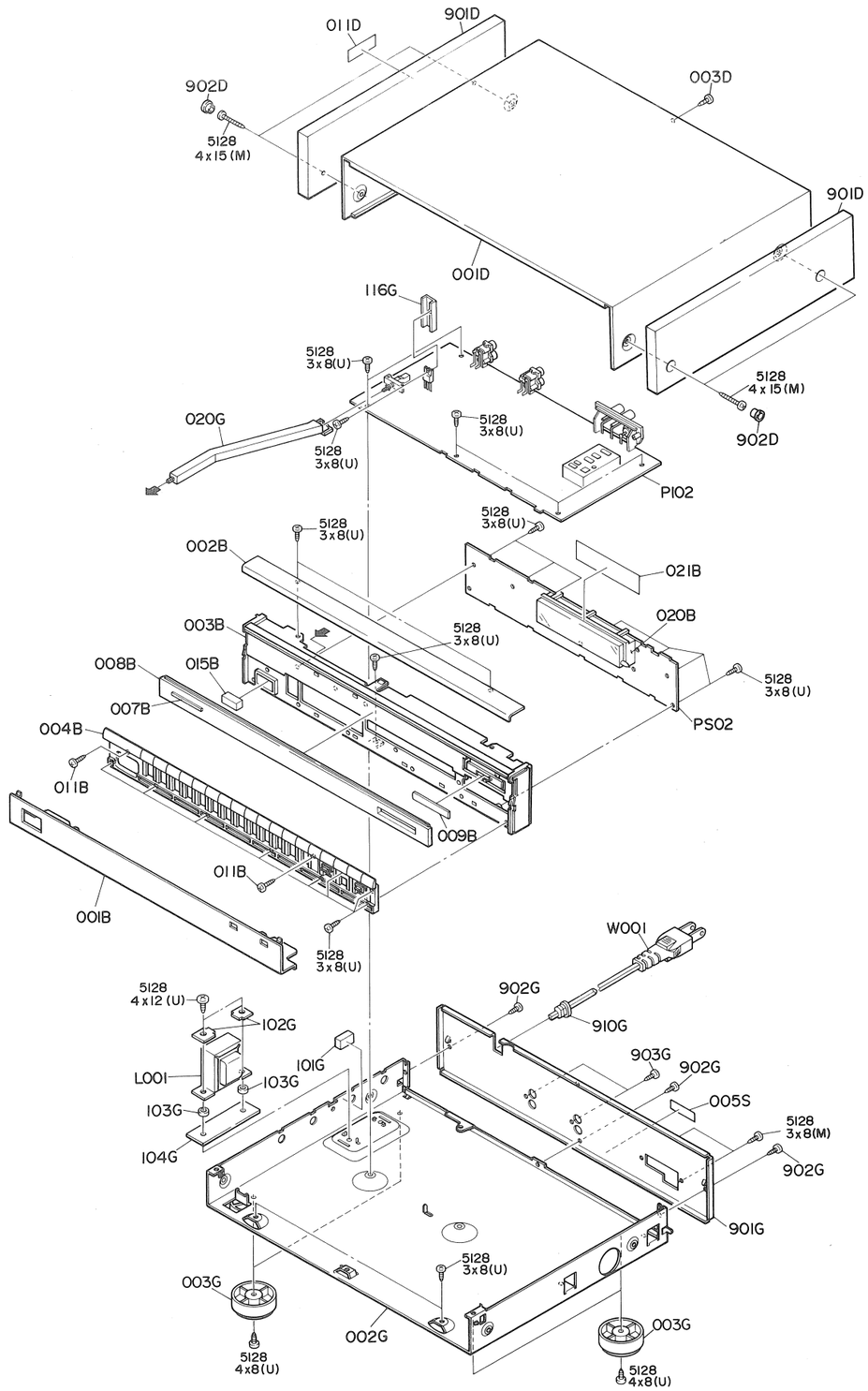



TOP VIEW
LC6538D-4673
2SC536SP(F/G),etc.
PS02
QS01
LC6538D-4673
VS01
PRESET
MEMORY
STEREO
ANT A B
TUNED
AUTO
LW
MW
FM
AM
MHz
kHz
GS03 100p×8
GS02 100p×8
WS01
To P102 (WS01)
-32V
F2
F1
KEY RETURN DATA
I/O PORT A
64×4 RAM 2 128×4
FLT DISPLAY CONTROLLER AND DRIVER 8 SEGMENT 4 SEGMENT/DIGIT 12 DIGIT
ANALOGUE INPUT PORT B (COMPARATOR)
I/O PORT E
I/O PORT C
I/O PORT D
I/O PORT E
8 BIT SERIAL I/O PORT
RAM 1 256×4
F
WR
DP
P.C.
ROM 8192×8
16 LEVEL STACK
INSTRUCTION REGISTER, DECODER
SYSTEM BUS
E
AC
STS
ZF
CF
ZSF
CSF
ALU
INTERRUPT CONTROLLER
I/O BUFFER
I/O BUS
I/O PORT G
8 BIT SERIAL I/O PORT
16 STAGE COUNTER
I/O PORT H
6 BIT PWM DAC/6 BIT PROGRAMABLE PRESCALER
8 BIT(14 BIT) PWM DAC/8 BIT INTERVAL TIMER
PRESCALER
8 BIT TIMER
STAND BY CONTROLLER
14 BIT TIMER BASE TIMER/COUNTER (WATCH DOG TIMER)
SYSTEM CLOCK CONTROLLER
4.19 MHz OSC
32.768 kHz OSC
XS01 4.19MHz
TEST
RST
VDD
VSS
WS02
SIG IN
SD IN
DI
DO
CE
CL
AC IN
To P102 (WS02)
GS01 100×4
DS09 MA165,etc.
POWER
DS04
DS03
DS02
DS06
DS07
DS02~DS04,DS06,DS07 MA165,etc.
QS02 2SC536SP(F/G), etc.
DS08 LT3088
RS01 470
RS02 100k
RS03 10k
RS04 47k
RS05 10k
RS06 150
RS07 10k
RS08 10k
RS09 2.2k
RS10 10k
RS11 470
RS12 470
CS01 0.047F 5.5V
CS02 0.01
CS03 100 16V
CS04 0.01
CS05 10/50V

PS02


QS02
QS01
SSI8
SSI7
SSI6
SSI4
SSI5
SS20
SSI9
VS01
SSI3
SSI2
SSI1
SSI0
SS09
SS08
DS03
DS04
DS02
RS06
GS02
DS06
QS02
CS01
WS02
WS01
DS01
CS02
RS04
CS03
RS01
RS05
RS08
CS05
RS07
DS09
SS07
SS06
SS05
SS04
SS03
SS02
SS01
XS01
GS01
32
CS04
RS03
RS09
RS02
RS11
RS12
RS10
GS03
QS01
DS07
DS06
64
33

4. EXPLODED VIEW AND PARTS LIST



REF. DESIG.	PART NO.	DESCRIPTION
001B	066J248110	FRONT PANEL
002B	066J248230	FRONT PANEL
003B	066J105130	CHASSIS, FRONT MOLD
004B	066J270510	BUTTON
007B	274H251130	BADGE, MARANTZ
008B	066J158010	WINDOW
009B	415T270340	BUTTON, TUNING
011B	51260308U0	B.T.SCREW(W/W), 003B+004B
015B	415T270120	BUTTON, POWER
020B	066J271010	HOLDER, FL
021B	056J122020	STICKER, FL ADHESIVE
001D	066J257020	LID, TOP COVER
003D	237K010010	SCREW, TOP COVER REAR
011D	117H861020	LABEL, TOP COVER SIDE
901D	066J249010	SIDE PANEL
902D	198K067110	CAP, SIDE
002G	066J105020	CHASSIS, MAIN
003G	176H057570	LEG
020G	066J121010	LINK, POWER SWITCH
101G	066J056030	BUFFER
102G	066J160010	BRACKET
103G	066J055010	COLLAR
104G	066J056010	BUFFER
116G	001J267030	HEAT-SINK
901G	066J250110	REAR PANEL
902G	237K010010	SCREW, REAR PANEL + CHASSIS
903G	237K010010	SCREW
910G	450H259010	BUSHING, AC CORD
⚠ L001	TS14808520	POWER TRANSFORMER
⚠ W001	YC01800330	A.C.POWER CORD
001T	066J851250	USER MANUAL
Z001	LA00045020	AM LOOP ANT
Z002	ZA02000070	EXT.ANTENNA, FM
Z003	YP90000310	PLUG, ANT ADAPTOR
Z004	ZD01000330	CONNECTIVE CORD, OUTPUT

NOTE ON SAFETY :
Symbol ⚠ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol ⚠ . Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.

5. SERVICE PROGRAM

1. T.R POINT ME (tracking point memory) mode.
   From power OFF (backup mode), when the power switch is pressed ON while pressing the FM and AM band keys simultaneously, the T.R POINT ME mode is called.

		P1	P2	P3	P4	P5	P6	P7	P8	P9
FM	USA	90MHz	98MHz	106MHz						
AM	10kHz				600kHz	1000kHz	1400kHz	—	—	—

		P10	P11	P12 ~ P30
FM	USA			—
AM	10kHz	—	—	

—: Low end frequency of the FM and AM band.

2. Segment check mode
   1) In the above situation, further press the FM and AM band keys simultaneously.
   2) The muting signal is output and the service program is started. During the execution of the service program, muting remains ON.
   3) The fluorescent display all goes out once, lighting is performed from segments 8G-a to 1G-h sequentially one after another at a rate of 0.3 second/segment. (A segment once lit does not go out as it stands.)
   4) When all the segments light, the segment check mode is terminated with their lighting for 3 seconds as they are. (The band and frequency engaged right before the segment check mode are restored.)
      During the lighting for 3 seconds, when the MEMORY key is pressed, all the segments continue lighting as they are.
      When the MEMORY key is pressed once again, all the segments flicker for 3 seconds (at 1 Hz), with which the segment check mode is then terminated.
   5) During the execution of the segment check mode, any other key than the MEMORY key is not accepted.
   6) In the state of 3), when the MEMORY key is pressed, the state that all the segments light is entered. Namely, by the pressure of the MEMORY key, it is possible to skip over the process that all segments light one after another in sequence.

   * During the execution of the service program, when the power is turned once OFF and then ON, the service program is canceled.

6. TUNER ALIGNMENT PROCEDURES

Set to T.R point ME mode of the service program.
(P2) to (P6) in the Digital Readout Frequency Setting column shows preset numbers for the above mode.
Before alignment, connect a dummy resistor of 47 kohms to the tuner output terminal.

6-1. FM Alignment Procedures

(Function switch at "FM" position and MODE switch at "MONAURAL" position)

- **FM RF Alignment** (IF BAND switch at "WIDE" position)

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Digital Readout Frequency Setting	Adjust
1	FM signal generator to FM antenna terminal. Adjust the RF signal output so that slight noise occurs at the upper and lower sides of the output waveform.	98.0 MHz	AC VTVM to L- or R-channel output (J301)	98.0 MHz (P2)	Front end IFT for maximum output and minimum distortion.
2	FM signal generator 500 μV output to FM antenna terminal (75-ohm).	98.0 MHz	"0" center meter or DC ammeter (100 μA range) to J201.	98.0 MHz (P2)	L202 (primary winding) core so that the meter points to its center or reads "0".
3			Distortion meter to L- or R-channel output (J301)		L202 (secondary winding) core for minimum distortion.
4	Repeat steps 2 and 3 until distortion is minimized.				

- **FM IF Alignment**

(Function switch at "FM" position and MODE switch at "AUTO STEREO" position)

1) IF BAND switch at "WIDE" position

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Digital Readout Frequency Setting	Adjust
1	FM signal generator 500 μV output modulated by MPX signal generator to FM antenna terminal (75-ohm). Modulation level: IHF 67.5 kHz +9 % pilot dev.	Stereo L-channel (1.000 Hz)	VTVM to L-channel output (J301 L-channel)	98.0 MHz (P2)	Front end IFT for minimum distortion.
2		Stereo R-channel (1,000 Hz)	VTVM to R-channel output (J301 R-channel)		

2) IF BAND switch at "NARROW" position

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Digital Readout Frequency Setting	Adjust
1	FM signal generator 500 μV output modulated by MPX signal generator to FM antenna terminal (75-ohm). Modulation level: IHF 67.5 kHz +9 % pilot dev.	Stereo L-channel (1,000 Hz)	VTVM to R-channel output (J301 R-channel)	98.0 MHz (P2)	L201 for minimum distortion.
2		Stereo R-channel (1,000 Hz)	VTVM to L-channel output (J301 L-channel)		

• Muting Level Alignment

(Function switch at "FM" position and MODE switch at "AUTO STEREO" position)

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Digital Readout Frequency Setting	Adjust
1	FM signal generator 6.3 μV output to FM antenna terminal (75-ohm)	98.0 MHz	AC VTVM to L- or R-channel output (J301)	98.0 MHz (P2)	IF BAND WIDE R235/NARROW R218 to a point at which output appears.

• Multiplex Alignment

(Function switch at "FM" position and MODE switch at "AUTO STEREO" position)

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Digital Readout Frequency Setting	Adjust
1	FM signal generator 500 μV output modulated by MPX signal generator to FM antenna terminal (75-ohm) Modulation level: IHF 67.5 kHz +9 % pilot dev.	Stereo L-channel (1,000 Hz)	VTVM to R-channel output (J301 R-channel)	98.0 MHz (P2)	IF BAND WIDE R303/NARROW R304 so that channel separation is identical between both channels.
2		Stereo R-channel (1,000 Hz)	VTVM to L-channel output (J301 L-channel)		
3	Repeat steps 1 and 2.				

6-2. AM Alignment Procedures

(Function switch at "AM" position)

• AM IF Alignment

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Digital Readout Frequency Setting	Adjust
1	Sweep generator to AM antenna terminal	450 kHz	AC VTVM to L- or R-channel output (J301)	—	FA01 for maximum and symmetrical waveform.

● **AM RF Alignment**

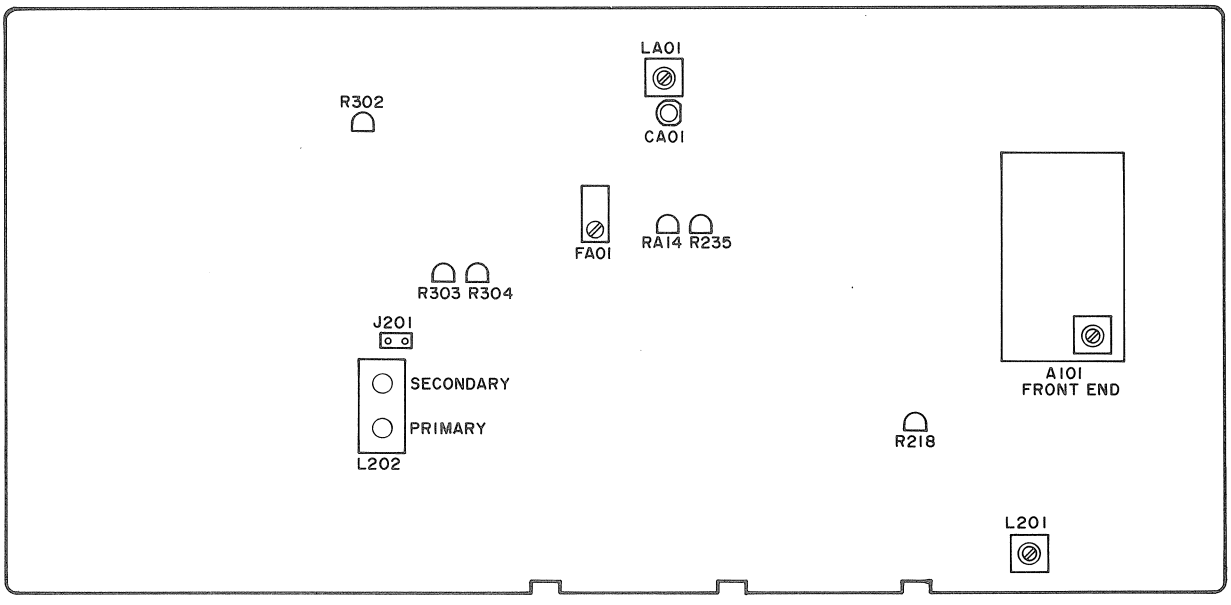
Step	Signal Source Connection	Signal Frequency	Indicator Connection	Digital Readout Frequency Setting	Adjust
1	AM signal generator to AM loop antenna in a test loop	600kHz	VTVM to L- or R-channel output (J301)	600kHz (P4)	LA01 for maximum output.
2		1400kHz		1400kHz (P6)	CA01 for maximum output.
3	Repeat steps 1 and 2 until sensitivity is maximized.				

● **AM Auto Stop Alignment** (Function switch at "AM" position)

Step	Signal Source Connection	Signal Frequency	Indicator Connection	Digital Readout Frequency Setting	Adjust
1	RF generator to AM loop antenna in a test loop (500 μV/m)	1000kHz	—	1000kHz (P5)	RA14 so that the first unit of the signal indicator on the display tube lights.

7. ALIGNMENT POINTS AND TEST POINTS

PI02



8. TUNER MICROPROCESSOR SPECIFICATIONS

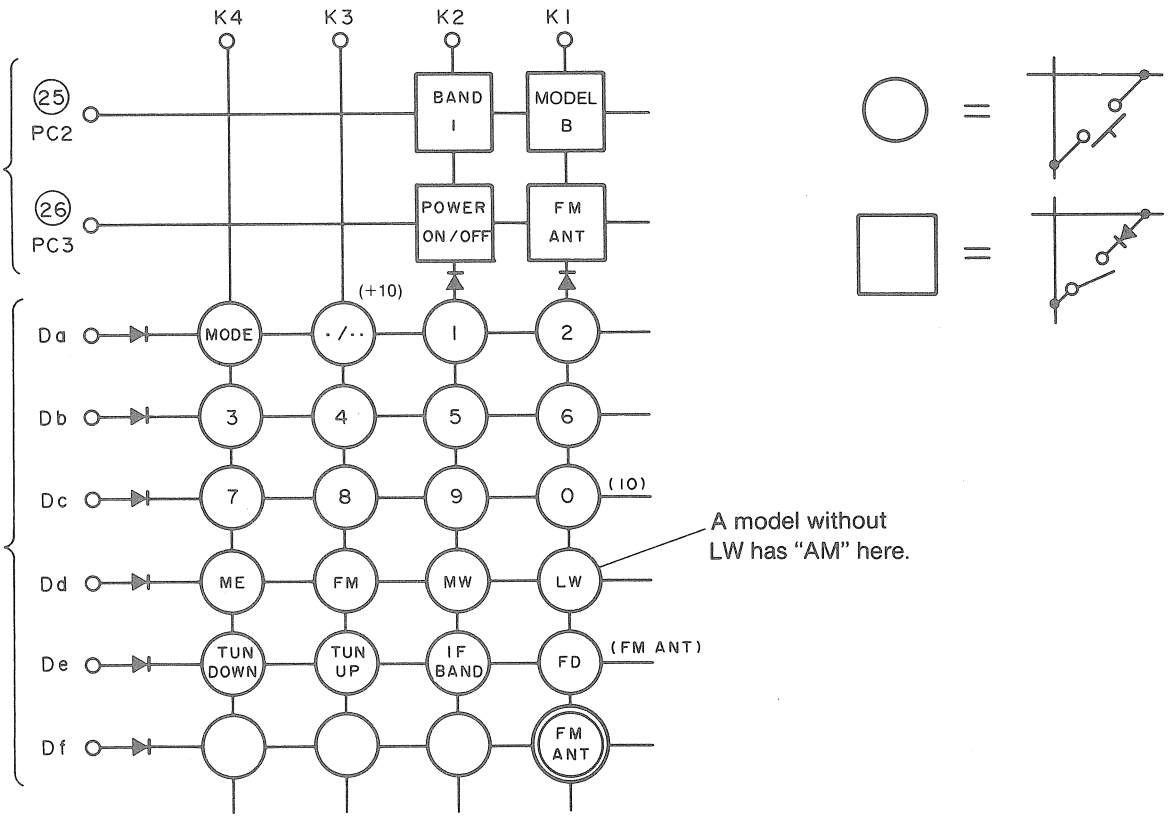
8-1. Receiving Frequency Range, Channel Space, Reference Frequency and Intermediate Frequency

		Receiving Frequency	Channel Space	Reference Frequency	Intermediate Frequency
Japan	FM	76.0~90 MHz	100 kHz	25 kHz	−10.7 MHz
	AM	531~1602 kHz	9 kHz	9kHz	+450 kHz
U.S.A.	FM	87.5~108.0 MHz	100 kHz	25 kHz	+10.7 MHz
	AM	520~1710 kHz	10 kHz	10 kHz	+450 kHz
Europe	FM	87.50~108.00 MHz	50 kHz	25 kHz	+10.7 MHz
	MW	531~1602 kHz	9 kHz	9 kHz	+450 kHz
	LW	152~282 kHz	1 kHz	1 kHz	+450 kHz

8-2. Tuning Function

1) Automatic Up/Down Tuning (sawtooth wave mode)
2) Manual Up/Down Tuning
   The tuning frequency varies steppedly when the momentary switch is pressed or rapidly at a rate of approximately 70 msec/step when the same switch is pressed continuously for more than 0.5 sec. In this situation, if the said switch is released from hand pressure, automatic tuning is performed.
3) Preset Memory Call
   a. Random access to 24 FM and AM (MW+LW) stations (Except for model A for Japan)
      Call by a numeral key + the single/double (./..) digit key + a numeral key where necessary
   b. Random access to 20 FM and AM stations (only for models for Japan)
      Call by a numeral key + (+10 key where necessary).

Key Matrix



( ) : Japan version only

8-3. Description of Keys

(0)~(9): Numeral keys

Preset memory writing, call and direct access call

(FM) (MW) (LW): Band selection keys

With a model without LW, the "LW" key falls invalid.

(MODE): Mono/stereo output selection key

At FM, when this key is pressed, OUT1 of PLL IC LC7218 varies between "LOW" and "HIGH" cyclically. In synchronization with this variation, "AUTO" in the FL display flickers.

(TUN UP) (TUN DOWN): Tuning up/down keys

The tuning frequency increases or decreases by 1 step at each pressure (for less than 0.5 second), and varies rapidly at a rate of approximately 70 msec/step when either is pressed continuously for 0.5 second or more. In this situation, when that key is released from hand pressure, auto tuning is performed.

(ME): Memory writing key

When the key is pressed, "MEMORY" flickers (at 1 Hz) for approximately 5 seconds, thus indicating that the memory is capable of writing. The wanted number is input by means of a numeral key, the single/double (./..) digit key and a numeral key where necessary, in which way at the point of time when a digit of units order is input, the frequency then being received is memorized.

(IF BAND): FM IF WIDE/NARROW selection key

At FM, when this key is pressed, the OUT3 signal of PLL IC LC7218 varies between "LOW" and "HIGH" in a cyclic manner.

(·/··): Single/double digit key (except for models for Japan)

This key is used in calling one of preset station numbers P10 to P30. When the key is pressed, " PRESET " is displayed, the LED segment g of units order digits lights and that of tens order digit flickers.

Flickers (for 5 seconds at 1 Hz)

(·/··): Single/double digit key (only for models for Japan)

This key is used in calling one of preset station numbers P10-P20. When the key is pressed, " PRESET " is displayed, and the LED segment g of units order digit flickers.

Flickers (for 5 seconds at 1 Hz)

(FM ANT): Antenna A/B selection key (only for models for Japan)

At FM, when this key is pressed, OUT6 of PLL IC LC7218 varies between "LOW" and "HIGH" in a cyclic manner. In synchronization with this variation, "ANT A.B" on the FL display flickers.

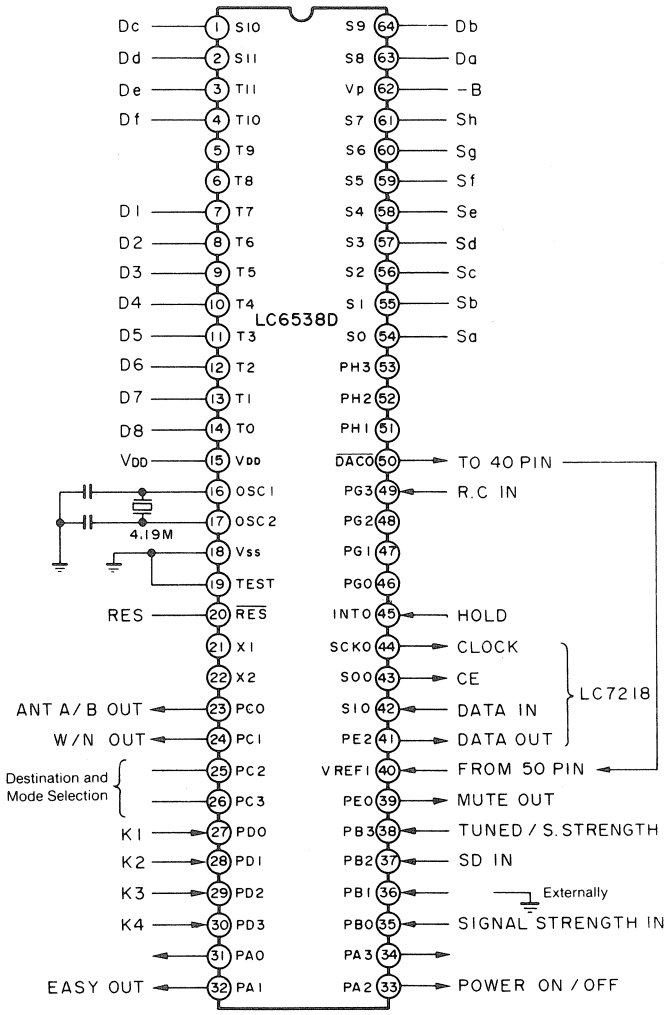
(FD): Frequency direct access tuning key (except for models for Japan)

When this key is pressed, the direct access tuning mode is entered whether in FM or in AM.

(FM ANT): Same operation with (FM ANT) irrespective of any model whatever its destination.

* This key depends on the initial diode setting.

Pin Connections



Pin Functions

PU: Output with pull-up MOS
OD: Open-drain output

Symbol	No. of pin(s)	I/O	Function	Output driver	Option	When resetting
V_{DD}	1	—	Power supply pin	—	—	—
V_{SS}	1	—				
TEST	1	I	LSI test pin, which should necessarily be connected V_{SS} for use.	—	—	—
$\overline{RES}$	1	I	System reset input. Initial reset at $\overline{RES}$="LOW"	—	—	—
OSC1	1	I	Pins to constitute the main system clock oscillation circuit. External clock is input to OSC1 with OSC2 opened. With built-in feedback resistor.	—	—	—
OSC2	1	O				
X1	1	I	Pins to constitute the sub clock oscillation circuit. External clock is input to X1 with X2 opened. With built-in feedback resistor and damping resistor	—	—	—
X2	1	O				
T0~T11	12	O	FL display tube digit exclusive output. Display RAM fixed address output for static mode.	P-ch high withstand voltage and large current type	Pull-down resistor existence/non-existence (bit-wise)	L
S8 ~S11	4	O	FL display tube digit/segment output. Display RAM fixed address output for static mode.	P-ch high withstand voltage and large current type	Pull-down resistor existence/non-existence (bit-wise)	L
S0~S7	8	O	FL display tube segment exclusive output. Display RAM fixed address output for static mode.	P-ch high withstand voltage and large current type	Pull-down resistor existence/non-existence (bit-wise)	L
V_P	1	—	FL display tube output pull-down resistor load power input.	—	—	—
PA_0~PA_3	4	I/O	I/O in units of bit or unit of 4 bits Input of key scan low-threshold type with a function to automatically read the key scan data into RAM.	+15 V withstand voltage and medium current type	PU or OD for each bit	H
PB_0~PB_3	4	I	Built-in comparator of 4 independent channels. Reference voltage selectable between external and internal. Input in units of bit or unit of 4 bits. At low-speed mode (1/32 mode, sub clock mode), input function is stopped.	—	—	Input function stopped
PC_0~PC_3	4	I/O	I/O in units of bit or unit of 4 bits	+15 V withstand voltage and large current type	• PU or OD for each bit • Output when resetting	H/L (option)
PD_0~PD_3	4	I/O	I/O in units of bit or unit of 4 bits	+15 V withstand voltage and large current type	• PU or OD for each bit • Output when resetting	H/L (option)
PE_0~PE_2	4	I/O	I/O in units of bit or unit of 3 bits PE_0/V_{REF0} Used with external reference input of PB1-PB3 PE_1/V_{REF1} Used with external reference input of PB0 PE_2/START Used with HALT control START	+15 V withstand voltage and medium current type only of PE2. Normal withstand voltage and medium current type of others.	PU or OD for each bit	H
PF_0~PF_3	4	I/O	I/O in units of bit or unit of 4 bits PF_0/SI0 Used with serial input S10 PF_1/SO0 Used with serial output SO0 PF_2/SCK0 Used with serial clock I/O SCK0 PF_3/INT0 Used with INT0 interrupt input	+15 V withstand voltage and medium current type	PU or OD for each bit	H
PG_0~PG_3	4	I/O	I/O in units of bit or unit of 4 bits PG_0/SI_1 Used with serial input SI1 $PG_1/\overline{SO1}$ Used with serial output $\overline{SO1}$ $PG_2/\overline{SCK1}$ Used with serial clock I/O $\overline{SCK1}$ $PG_3/\overline{INT1}$ Used with $\overline{INT1}$ interrupt input	+15 V withstand voltage and medium current type	PU or OD for each bit	H
PH_0~PH_3	4	I/O	I/O in units of bit or unit of 4 bits $PH_0/\overline{DAC0}$ Used with 6-bit PWM D/A output $PH_1/\overline{DAC1}$ Used with 8/14-bit PWM D/A output PH_2/SQR Used with square wave pulse output PH_3/HCNT Used with horizontal sync detection input	+15 V withstand voltage and medium current type	PU or OD for each bit	H

8-4. Pin Description

Sa~Sh: Fluorescent display segment signals

D_1~D_8: Fluorescent display digit signals and key return signals

D_a~D_f: Key return signals

K_1~K_4: Key input, diode matrix input

CLOCK, CE, DATA IN, DATA OUT: Signals transferred to PLL IC LC7218

SD IN: Station detector signal input
When the SD IN pin becomes "LOW" as regards a frequency band, the STRQ pin (LC7218 OUT2) becomes "HIGH" so that PLL IC performs IF counting. As a result of this, when FM 10.7 MHz ±10 kHz, MW 450 kHz ±3 kHz or LW 450 kHz ±0.6 kHz is obtained, "TUNED" lights, while when in the auto tuning mode, the station scanning stops.

S.STRENGTH IN: FM/AM signal strength input
The DC voltage from the tuner is input to make the 5-dot segment signal strength indicator light.

MUTE OUT: Audio mute output (active "LOW")
Exactly the same output as OUT0 of PLL IC LC7218

W/N OUT: WIDE/NARROW indicator output
Exactly the same output as OUT3 of PLL IC LC7218

ANT A/B OUT: Antenna A/B indicator output (only for models for Japan)
Exactly the same output as OUT6 of PLL IC LC7218

TUNED/SIGNAL STRENGTH: Determines the fluorescent display ON/OFF.
* When this pin is at "0", "TUNED" (D8-Sh) is not lit independent of the "LOW"/"HIGH" state of SD.
* When this pin is at "1", D8 and Sa-Sf are not lit independent of the "LOW"/"HIGH" state of SD or the DC input of SIGNAL STRENGTH IN.

Due to the "LOW"/"HIGH" operation of this pin, some models have the fluorescent display ON/OFF determined.
"0" (LOW): Signal strength indicator lights.
"1" (HIGH): "TUNED" lights.

■
- Sa~Sh
- D1-D8
- FM MONO, W/N OUT, ANT A/B OUT, POWER On/OFF OUT

Any above pin becomes "HIGH" from "LOW" after holding and starts output 0.5 second after.

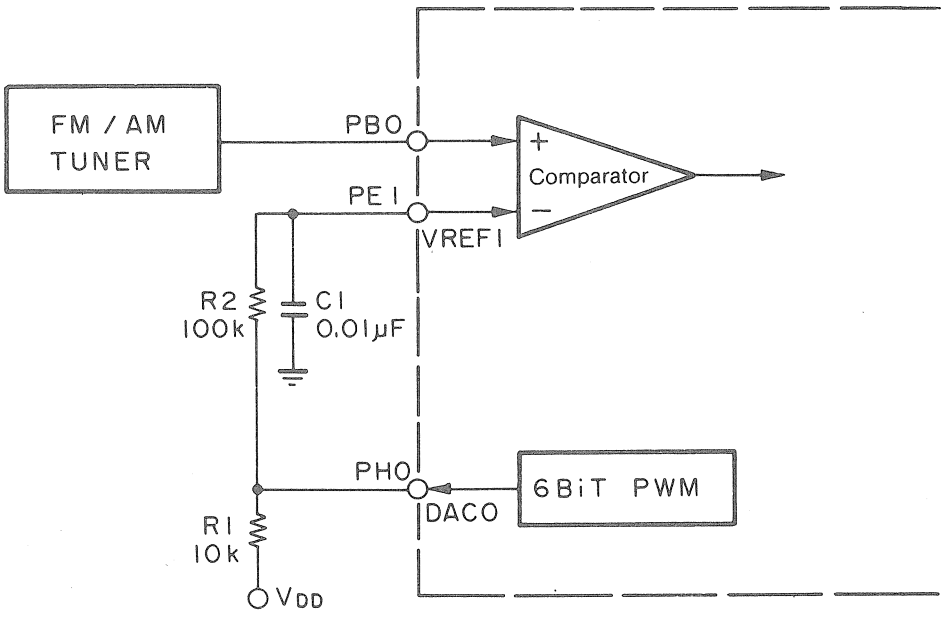
BAND 1: **Destination selection initial setting diode**
[combined with port 8 of PLL IC LC7218 (Q501)]

	USA	JAPAN	EUROPE without LW	EUROPE with LW
BAND 1	1	0	1	0
IN 1 (PLL IC)	1	1	0	0

BAND 1
1: With diode (DS09)
0: Without diode

IN 1
1: "HIGH", 0: "LOW"

8-5. 5-dot Signal Strength Indicator:



		SIGNAL STRENGTH INPUT VOLTAGE V_{BO} (DC.V)				
		DOT 1 (Sb)	DOT 2 (Sc)	DOT 3 (Sd)	DOT 4 (Se)	DOT 5 (Sf)
FM	ON	*	1.3	1.7	2.1	≧2.5
	OFF		1.25	1.65	2.05	≦2.45
AM	ON	*	1.3	1.7	2.1	≧2.5
	OFF		1.25	1.65	2.05	≦2.45

LC7218 Port Assignment:

OUT0: $\overline{MUT}$, mute output
OUT1: FM MONO output
OUT2: STRQ output
OUT3: W/N output, FM WIDE/NARROW
OUT4: $\overline{FM}$, FM band selection
OUT5: $\overline{AM}$, AM (MW) band selection
OUT6: $\overline{LW}$, LW band selection/FM ANT A.B

	OUT 0 PIN ⑨	OUT 1 PIN ⑩	OUT 2 PIN ⑪	OUT 3 PIN ⑫	OUT 4 PIN ⑬	OUT 5 PIN ⑭	OUT 6 PIN ⑰	
	MUT OUT	FM MONO	STRQ	W/N OUT	$\overline{FM}$	$\overline{AM}$	$\overline{LW}$	FM ANT A.B
FM	1/0	1/0	1/0	1/0	0	1	1	1/0
AM (MW)		1		0	1	0	1	1/0 (Note)
LW					1	1	0	

IN 0: STEREO IN (PIN ⑦)
IN 1: Destination selection (PIN ⑧)

Note: The FM mode given just prior stays as it is.

9. ELECTRICAL PARTS LIST

ASSIGNMENT OF COMMON PARTS CODES.

RESISTOR

R***: (1) GD05---140, Carbon film fixed resistor, ±5%, 1/4W
R***: (2) GD05---160, Carbon film fixed resistor, ±5%, 1/6W
① — Resistance value

Examples
① Resistance value

0.1Ω ... 001	10Ω ... 100	1kΩ ... 102	100kΩ ... 104
0.5Ω ... 005	18Ω ... 180	2.7kΩ ... 272	680kΩ ... 684
1Ω ... 010	100Ω ... 101	10kΩ ... 103	1MΩ ... 105
6.8Ω ... 068	390Ω ... 391	22kΩ ... 223	4.7MΩ ... 475

(Note) Please distinguish 1/4W from 1/6W by the shape of parts used actually.

C***: CERAMIC CAP.
(1) DD1 ----370, Ceramic condenser
Disc type
①② Temp. coeff. P350 — N1000, 50V
②: Capacity value
①: Tolerance

Examples
① Tolerance (Capacity deviation)
±0.25pF ... 0
±0.5pF ... 1
±5% ... 5
* Tolerance of COMMON PARTS handled here are as follows.
0.5pF ~ 5pF ... ±0.25pF
6pF ~ 10pF ... ±0.5pF
12pF ~ 560pF ... ±5pF
② Capacity value

0.5pF ... 005	3pF ... 030	100pF ... 101
1pF ... 010	10pF ... 100	220pF ... 221
1.5pF ... 015	47pF ... 470	560pF ... 561

C***: CERAMIC CAP.
(1) DK16---300, High dielectric constant ceramic condenser
Disc type
① Temp. chara. 2B4, 50V
①: Capacity value

Examples
② Capacity value

100pF ... 101	1000pF ... 102	10000pF ... 103
470pF ... 471	2200pF ... 222	

C***: ELECTROLY CAP. (⏚), FILM CAP. (⏦)
(1) EA------10, Electrolytic condenser
One-way lead type, Tolerance ±20%
①②
②: Dielectric strength
①: Capacity value

Examples
① Capacity value

0.1μF ... 104	4.7μF ... 475	100μF ... 107
0.33μF ... 334	10μF ... 106	330μF ... 337
1μF ... 105	22μF ... 226	1100μF ... 108
		2200μF ... 228

② Working voltage

6.3V ... 006	25V ... 025
10V ... 010	35V ... 035
16V ... 016	50V ... 050

(2) DF15--- 350, Plastic film condenser
One-way type, Mylar ±5% 50V
①
①: Capacity value

Examples
① Capacity value

0.001μF (1000pF) . . 102	0.1μF ... 104
0.0018μF 182	0.56μF ... 564
0.01μF 103	1μF ... 105
0.015μF 153	

REF. DESIG.	PART NO.	DESCRIPTION
		PS02-μ-COM, TACT SW CIRCUIT BOARD
		PS02-CAPACITORS
CS01	EX47300530	BIG ELECT 0.047F 5.5V
CS02	DK18103310	CERAMIC 0.01μF +80% -20% 50V
CS03	OA10701620	ELECT 100μF 16V
CS04	DK18103310	CERAMIC 0.01μF +80% -20% 50V
CS05	OA10605020	ELECT 10μF 50V
GS02	BF10100020	CAP. COMPO. 100PF 50V X8
GS03	BF10100020	CAP. COMPO. 100PF 50V X8
		PS02-RESISTOR
GS01	BW05104140	RES.COMPO. 100KΩ 1/16W X4
		PS02-SEMICONDUCTORS
DS01 ~ DS07	HD20002000	DIODE, 1SS133, 1SS176, MA165, ETC.
DS08	HI10062320	L.E.D. LT3D8B
DS09	HD20002000	DIODE, 1SS133, 1SS176, MA165, ETC.
QS01	HU10032032	MICROPROCESSOR, LC6538D-4673
QS02	HT30001000	TRANSISTOR 2SC536SP (F, G) 2SC2458 (Y, GR) ETC.
		PS02-MISCELLANEOUS
SS01 ~ SS14	SP01011280	PUSH SWITCH
SS16 ~ SS20	SP01011280	PUSH SWITCH
VS01	HQ30806060	DISPLAY UNIT, FIP8CAM8
XS01	FQ04194020	SERAMIC VIB, 4.19MHZ
		P102-TUNER CIRCUIT BOARD
		P102-CAPACITORS
CA01	CT12000200	TRIMMING 20PF
CA02	DK18223310	CERAMIC 0.022μF +80% -20% 50V
CA03	DA15150110	CERAMIC 15PF ±5% 50V
CA04	DF55391090	FILM 390PF ±5% 50V
CA05	DA15470110	CERAMIC 47PF ±5% 50V
CA06	DK18103310	CERAMIC 0.01μF +80% -20% 50V
CA14	DK18103310	CERAMIC 0.01μF +80% -20% 50V
CA15	DA15680110	CERAMIC 68PF ±5% 50V
CA16	OA10701620	ELECT 100μF 16V
CA19	OA33505020	ELECT 3.3μF 50V
CA20 ~ CA23	DK18103310	CERAMIC 0.01μF +80% -20% 50V
C102 ~ C104	DK18103310	CERAMIC 0.01μF +80% -20% 50V
C201 ~ C206	DK18103310	CERAMIC 0.01μF +80% -20% 50V
C207	DA15220110	CERAMIC 22PF ±5% 50V
C208 ~ C213	DK18103310	CERAMIC 0.01μF +80% -20% 50V
C214	DK18473310	CERAMIC 0.047μF +80% -20% 50V
C215	DK18473310	CERAMIC 0.047μF +80% -20% 50V
C216	OA10605020	ELECT 10μF 50V
C217	DK18223310	CERAMIC 0.022μF +80% -20% 50V

REF. DESIG.	PART NO.	DESCRIPTION
C218	DK18223310	CERAMIC 0.022μF +80% -20% 50V
C220	DA15150110	CERAMIC 15PF ± 5% 50V
C222	DA15680110	CERAMIC 68PF ± 5% 50V
C223	DK18223310	CERAMIC 0.022μF +80% -20% 50V
C224	DK18103310	CERAMIC 0.01μF +80% -20% 50V
C225	DK18103310	CERAMIC 0.01μF +80% -20% 50V
C226	DK18473310	CERAMIC 0.047μF +80% -20% 50V
C227 ~ C230	DK18103310	CERAMIC 0.01μF +80% -20% 50V
C231	OA10605020	ELECT 10μF 50V
C232	DA16221110	CERAMIC 220PF ±10% 50V
C233	DA16221110	CERAMIC 220PF ±10% 50V
C234	DA16101110	CERAMIC 100PF ±10% 50V
C235	OA10605020	ELECT 10μF 50V
C236	OA22601620	ELECT 22μF 16V
C237	OA10701620	ELECT 100μF 16V
C238	DK18103310	CERAMIC 0.01μF +80% -20% 50V
C239	OA10605020	ELECT 10μF 50V
C240	OA10605020	ELECT 10μF 50V
C241 ~ C243	DK18103310	CERAMIC 0.01μF +80% -20% 50V
C245 ~ C247	DK18103310	CERAMIC 0.01μF +80% -20% 50V
C301	DA16101110	CERAMIC 100PF ±10% 50V
C309	DA16331110	CERAMIC 330PF ±10% 50V
C310	DA16331110	CERAMIC 330PF ±10% 50V
C311	OA33505020	ELECT 3.3μF 50V
C312	OA33505020	ELECT 3.3μF 50V
C313	DA16221110	CERAMIC 220PF ±10% 50V
C314	OA10701620	ELECT 100μF 16V
C315	OA10701620	ELECT 100μF 16V
C501	DA15470110	CERAMIC 47PF ± 5% 50V
C502	DA15470110	CERAMIC 47PF ± 5% 50V
C503	OA10701620	ELECT 100μF 16V
C504	DK18103310	CERAMIC 0.01μF +80% -20% 50V
C507 ~ C509	DK18103310	CERAMIC 0.01μF +80% -20% 50V
C801 ~ C804	DK18103310	CERAMIC 0.01μF +80% -20% 50V
C805	OA22803520	ELECT 2200μF 35V
C810	OA10605020	ELECT 10μF 50V
C811	DK18223310	CERAMIC 0.022μF +80% -20% 50V
C813	OA10605020	ELECT 10μF 50V
C819	OA33505020	ELECT 3.3μF 50V
		P102-RESISTORS
RA14	RA02230780	22K Ω TRIMMING
⚠R108	GG05101140	100 Ω ± 5% 1/4W
R218	RA01020780	1K Ω TRIMMING
⚠R233	GG05151160	150 Ω ± 5% 1/6W
R235	RA04730780	47K Ω TRIMMING
⚠R241	GG05101140	100 Ω ± 5% 1/4W
⚠R260	GG05101140	100 Ω ± 5% 1/4W
R303	RA02240780	220K Ω TRIMMING
R304	RA02240780	220K Ω TRIMMING
⚠R801	NF02100140	10 Ω 1/4W FUSIBLE
R803	GA05102010	1K Ω ± 5% 1W
⚠R816	RC10225920	2.2M Ω 1/2W
		P102-SEMICONDUCTORS
DA01	HD40009030	VARICAP, SVC342
D201 ~ D206	HD20002000	DIODE, 1SS133, 1SS176, MA165, ETC.

REF. DESIG.	PART NO.	DESCRIPTION
D301	HD20002000	DIODE, 1SS133, 1SS176 ,MA165, ETC.
⚠D801 ~ ⚠D805	HD20003000	DIODE, DSF10C, RL103E
D806	HD32201000	ZENER DIODE, 22V
D807	HD20003000	DIODE, DSF10C, RL103E
D809	HD20002000	DIODE, 1SS133, 1SS176, MA165, ETC.
D810	HD20002000	DIODE, 1SS133, 1SS176, MA165, ETC.
⚠D811	HD20003000	DIODE, DSF10C, RL103E
D812	HD20002000	DIODE, 1SS133, 1SS176, MA165, ETC.
⚠D813	HD20003000	DIODE, DSF10C, RL103E
⚠D814	HD20003000	DIODE, DSF10C, RL103E
D815	HD32401000	ZENER DIODE, 24V
D816	HD20002000	DIODE, 1SS133, 1SS176, MA165, ETC.
QA06	HT113092C0	TRANSISTOR 2SA1309A (Q, R)
Q201	HC10222030	IC LA1266
Q202	HC10251050	IC TA7061BP
Q203	HT318091P0	TRANSISTOR 2SC1809S (P)
Q204 ~ Q209	HT30001000	TRANSISTOR 2SC536SP (F, G) 2SC2458 (Y, GR) ETC.
Q210	HT318091P0	TRANSISTOR 2SC1809S (P)
Q211	HT318091P0	TRANSISTOR 2SC1809S (P)
Q212	HT30001000	TRANSISTOR 2SC536SP (F, G) 2SC2458 (Y, GR) ETC.
Q213 ~ Q216	HT113092C0	TRANSISTOR 2SA1309A (Q, R)
Q217	HT30001000	TRANSISTOR 2SC536SP (F, G) 2SC2458 (Y, GR) ETC.
Q301	HC10248030	IC LA3450
Q302	HF200300B0	F.E.T. 2SK30A (Y)
Q303 ~ Q306	HT30001000	TRANSISTOR 2SC536SP (F, G) 2SC2458 (Y, GR) ETC.
Q308	HT113092C0	TRANSISTOR 2SA1309A (Q, R)
Q501	HC10221030	IC LC7218
Q502	HF200300B0	F.E.T. 2SK30A (Y)
Q503 ~ Q505	HT30001000	TRANSISTOR 2SC536SP (F, G) 2SC2458 (Y, GR) ETC.
⚠Q801	HC3891209F	IC NJM7812FA
⚠Q802	HC10205030	IC L78MR05
Q803 ~ Q808	HT30001000	TRANSISTOR 2SC536SP (F, G) 2SC2458 (Y, GR) ETC.
		P102-MISCELLANEOUS
A101	AV01202140	V.H.F.TUNER, FRONT END
FA01	FF10045330	CERAMIC FILTER, AM IF
F201	FF11070660	CERAMIC FILTER SFE10.7MX2-A
F202	FF11070620	CERAMIC FILTER SFE10.7MS3-A
F203	FF11070610	CERAMIC FILTER SFE10.7MA8-A
F204	FF11070660	CERAMIC FILTER SFE10.7MX2-A
F205	FH10750010	DISCRI. SERAMIC CDA10.7MA18-A
J101	BY04030030	TERMINAL, FM/AM ANT
J301	YT02020720	TERMINAL, OUTPUT
J501	YT02020550	TERMINAL, REMOTE CONTROL
LA01	LA10295140	ANT COIL, AM
LA02	LO10013400	OSC COIL, AM
LA05	LC23960710	CHOKE COIL, 39MH
L102	LC16810140	CHOKE COIL, 0.68μH
L201	LI10016010	I.F.T, FM
L202	LI14030030	I.F.T, FM DET
L203	LC13320140	CHOKE COIL, 3.3UH
L301	LS10293010	M.P.X.COIL, 19/38KHZ

REF. DESIG.	PART NO.	DESCRIPTION
L302	LS10293010	M.P.X.COIL, 19/38KHZ
⚠S801	SP02011000	PUSH SWITCH, POWER/STANDAY
X301	FQ04563010	SERAMIC VIB, CSB465F11
X501	JX07001260	X'TAL, 7.2MHZ

NOTE ON SAFETY :
Symbol ⚠ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol ⚠. Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.