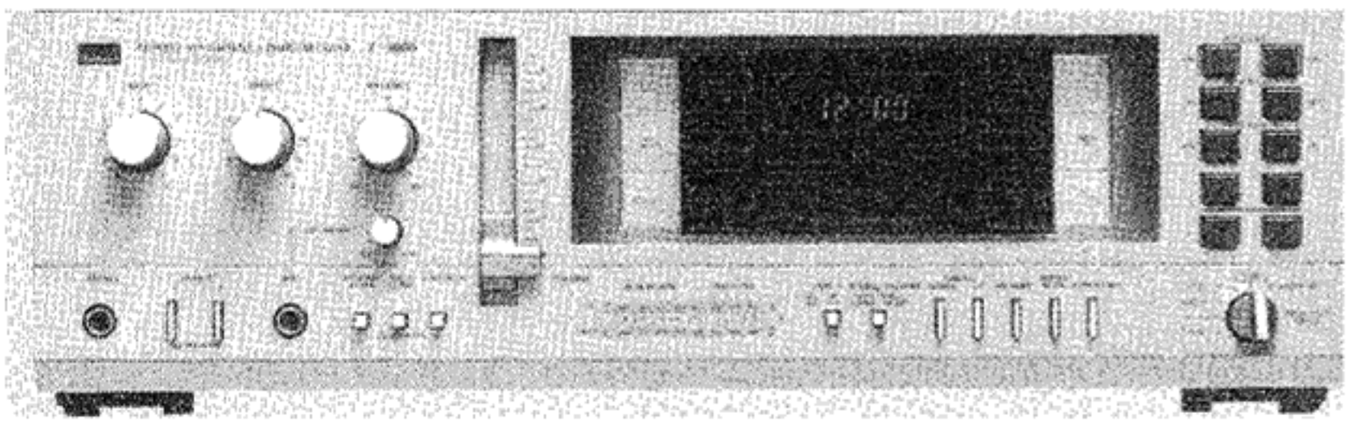
SERVICE MANUAL

QUARTZ SYNTHESIZER COMPU-RECEIVER

SANSUI Z-5000/3000



SANSUI ELECTRIC CO., LTD.

• SPECIFICATIONS

• Z-5000

Audio section

Power output

Min. RMS, both channels driven, from 20 to 20,000 Hz, with no more than 0.007 % total harmonic distortion.

70 watts per channel into 8 ohms

Load impedance . . . . 4 and 8 ohms

Total harmonic distortion

from AUX . . . . . less than 0.007 % at or below rated min. RMS power output

Frequency response (at 1 watt)

from AUX . . . . . 10 to 100,000 Hz, +1.0 dB, –3.0 dB

RIAA curve deviation (PHONO, 20 Hz, 20 kHz)

. . . . . +0.5 dB, –0.5 dB

Input sensitivity and impedance (at 1 kHz)

PHONO . . . . . 2.5 mV/47 kilohms

TAPE PLAY, AUX . 150 mV/47 kilohms

MIC . . . . . 0.5 mV/20 kilohms

Output level (at 1 kHz)

TAPE REC . . . . . 150 mV

Signal to noise ratio (short-circuit, A-network)

PHONO . . . . . 82 dB

TAPE PLAY, AUX . 95 dB

FM section

Tuning range . . . . . 88 to 107.9 MHz

Usable sensitivity

Mono . . . . . 10.8 dBf

Stereo . . . . . 20 dBf

50 dB quieting sensitivity

Mono . . . . . 16.5 dBf

Stereo . . . . . 37.0 dBf

Signal to noise ratio (at 65 dBf)

Mono . . . . . 76 dB

Stereo . . . . . 70 dB

Distortion (at 65 dBf)

Mono . . . . . less than 0.15 % at 1,000 Hz

Stereo . . . . . less than 0.2 % at 1,000 Hz

Alternate channel selectivity (at 400 kHz)

. . . . . 55 dB

Capture ratio . . . . . 1.0 dB

Spurious response ratio 80 dB

IF response ratio . . . 90 dB

Stereo separation . . . . 40 dB at 1,000 Hz

Frequency response . . 30 to 15,000 Hz +1.0 dB, –1.5 dB

Antenna input impedance

. . . . . 300 ohms balanced

75 ohms unbalanced

AM section

Tuning range . . . . . 530 to 1,600 kHz

Usable sensitivity . . . . 50 dB/m

Selectivity . . . . . 30 dB

Signal to noise ratio . . 45 dB

Distortion (at 30 % Modulation, 80 dB/m)

. . . . . less than 0.5 %

Others

Power requirements

Power voltage . . . . 120, 220, 240 V (50/60 Hz)

For U.S.A. and Canada

. . . . . 120 V (60 Hz)

Power consumption

Rated consumption

. . . . . 260 watts 325 VA

Dimensions . . . . . 430 mm (16-15/16") W
133 mm (5-1/4") H
360 mm (14-3/16") D

Weight . . . . . 8.6 kg (19 lbs.) net
9.9 kg (21.8 lbs.) packed

• Z-3000

Audio section

Power output

Min. RMS, both channels driven, from 20 to 20,000 Hz, with no more than 0.008 % total harmonic distortion.

55 watts per channel into 8 ohms

Load impedance . . . . 8 ohms

Total harmonic distortion

from AUX . . . . . less than 0.008 % at or below rated min. RMS power output

Frequency response (at 1 watt)

from AUX . . . . . 10 to 100,000 Hz, +1.0 dB, –3.0 dB

RIAA curve deviation (PHONO, 20 Hz, 20 kHz)

. . . . . +0.5 dB, – 0.5 dB

Input sensitivity and impedance (at 1 kHz)

PHONO . . . . . 2.5 mV/47 kilohms

TAPE PLAY, AUX . 150 mV/47 kilohms

Output level (at 1 kHz)

TAPE REC . . . . . 150 mV

Signal to noise ratio (short circuit, A-network)

PHONO . . . . . 82 dB

TAPE PLAY, AUX . 95 dB

to be continued ▶

FM section

Tuning range . . . . . 88 to 107.9 MHz
Usable sensitivity
  Mono . . . . . 10.8 dBf
  Stereo . . . . . 20 dBf
50 dB quieting sensitivity
  Mono . . . . . 16.5 dBf
  Stereo . . . . . 37.0 dBf
Signal to noise ratio (at 65 dBf)
  Mono . . . . . 76 dB
  Stereo . . . . . 70 dB
Distortion (at 65 dBf)
  Mono . . . . . less than 0.15 % at 1,000 Hz
  Stereo . . . . . less than 0.2 % at 1,000 Hz
Alternate channel selectivity (at 400 kHz)
  . . . . . 55 dB
Capture ratio . . . . . 1.0 dB
Spurious response ratio 80 dB
IF response ratio . . . . 90 dB
Stereo separation . . . . 40 dB at 1,000 Hz
Frequency response . . 30 to 15,000 Hz
  +1.0 dB, −1.5 dB
Antenna input impedance
  . . . . . 300 ohms balanced
  75 ohms unbalanced

AM section

Tuning range . . . . . 530 to 1,600 kHz
Usable sensitivity . . . . 50 dB/m
Selectivity . . . . . 30 dB
Signal to noise ratio . . 45 dB
Distortion (at 30 % Modulation, 80 dB/m)
  . . . . . less than 0.5 %

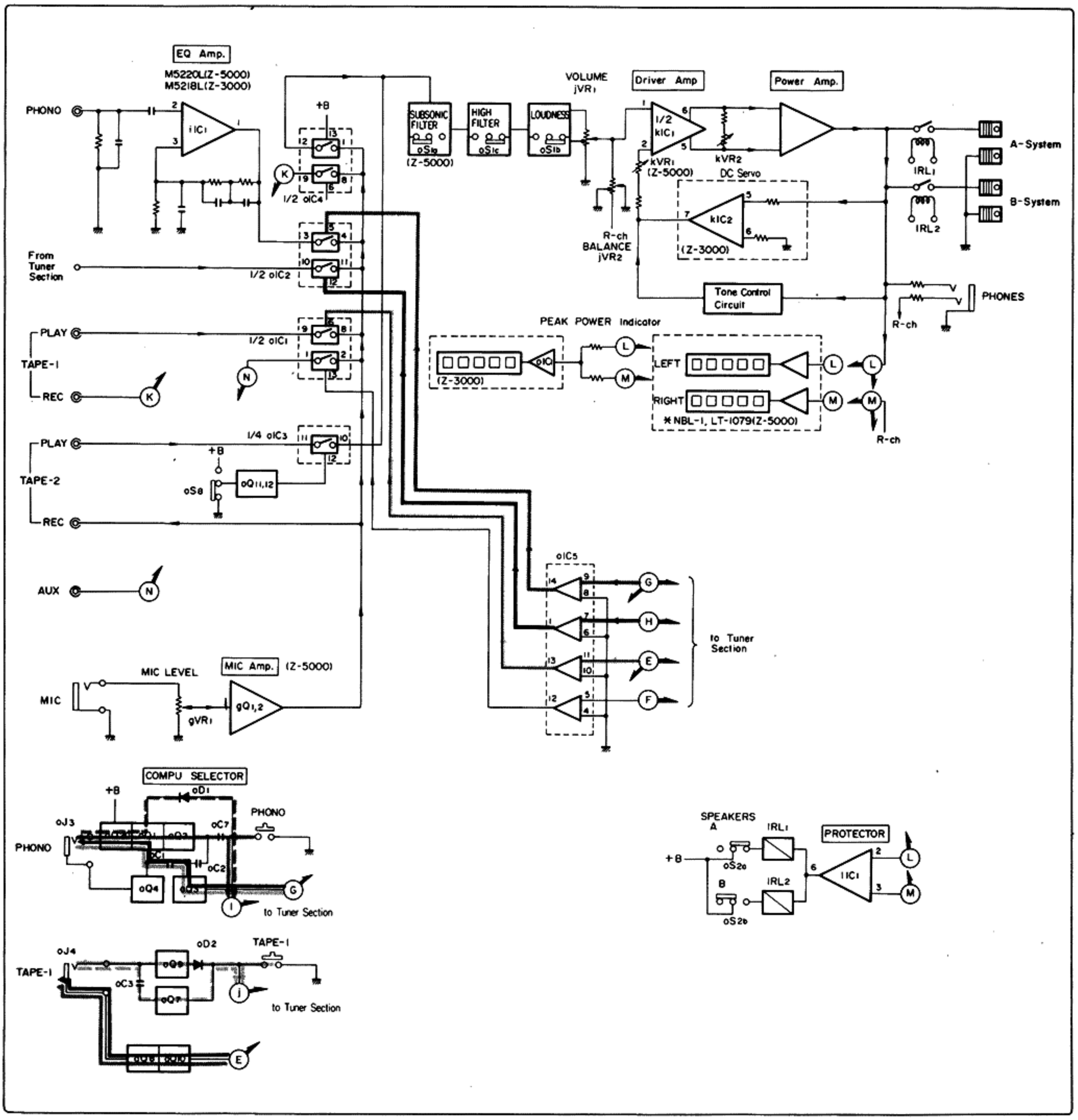
Others

Power requirements
  Power voltage . . . . 120, 220, 240 V (50/60 Hz)
  For U.S.A. and Canada
  . . . . . 120 V (60 Hz)
  Power consumption
  Rated consumption
  . . . . . 260 watts 325 VA
Dimensions . . . . . 430 mm (16-15/16") W
  133 mm (5-1/4") H
  360 mm (14-3/16") D
Weight . . . . . 7.7 kg (17 lbs.) net
  9.0 kg (19.8 lbs.) packed

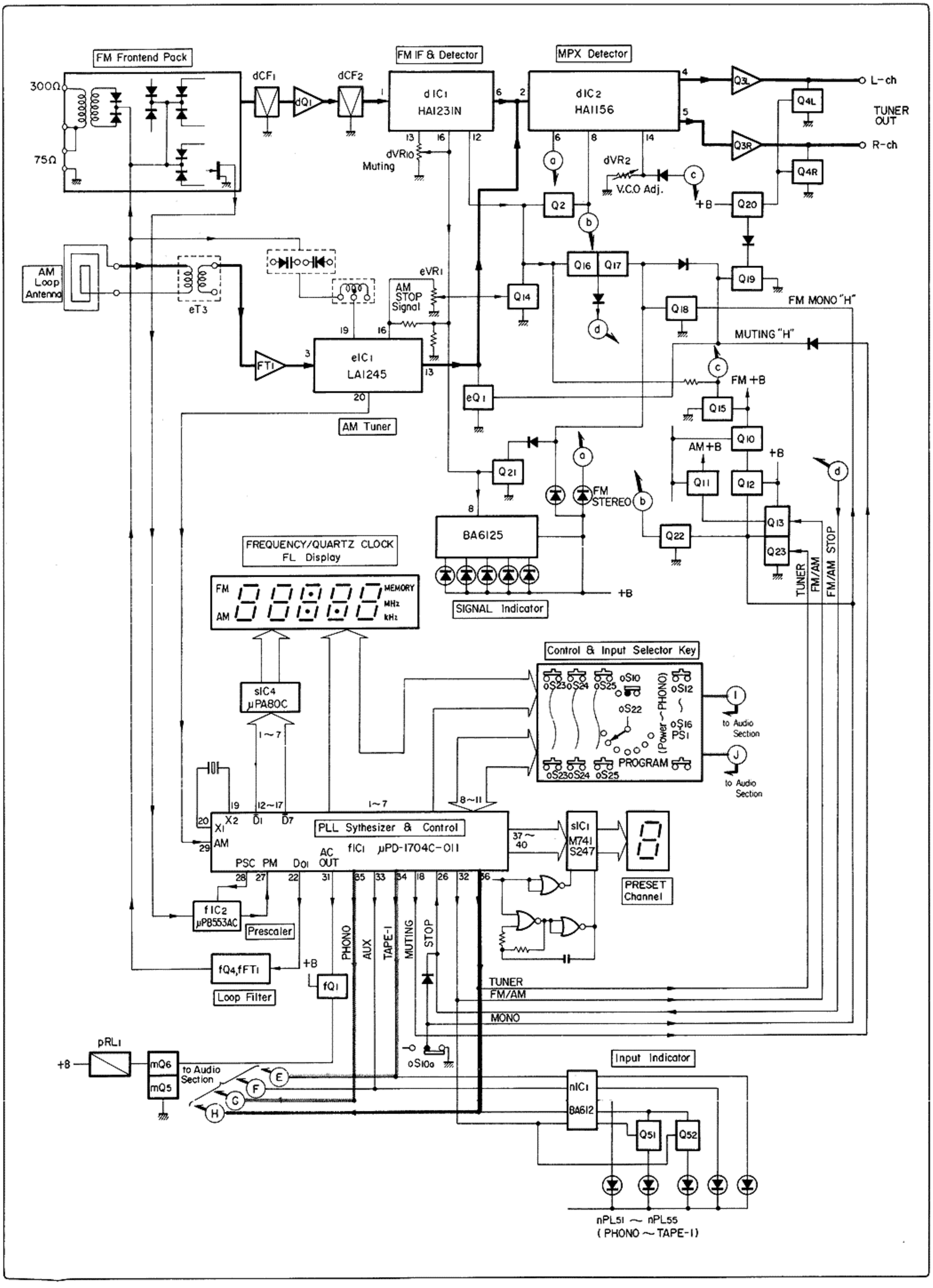
* Design and specifications subject to changes without notice for improvements.

1. BLOCK DIAGRAM

1-1. Audio Section



1-2. Tuner & Control Section



2. OPERATION OF COMPU SELECTOR

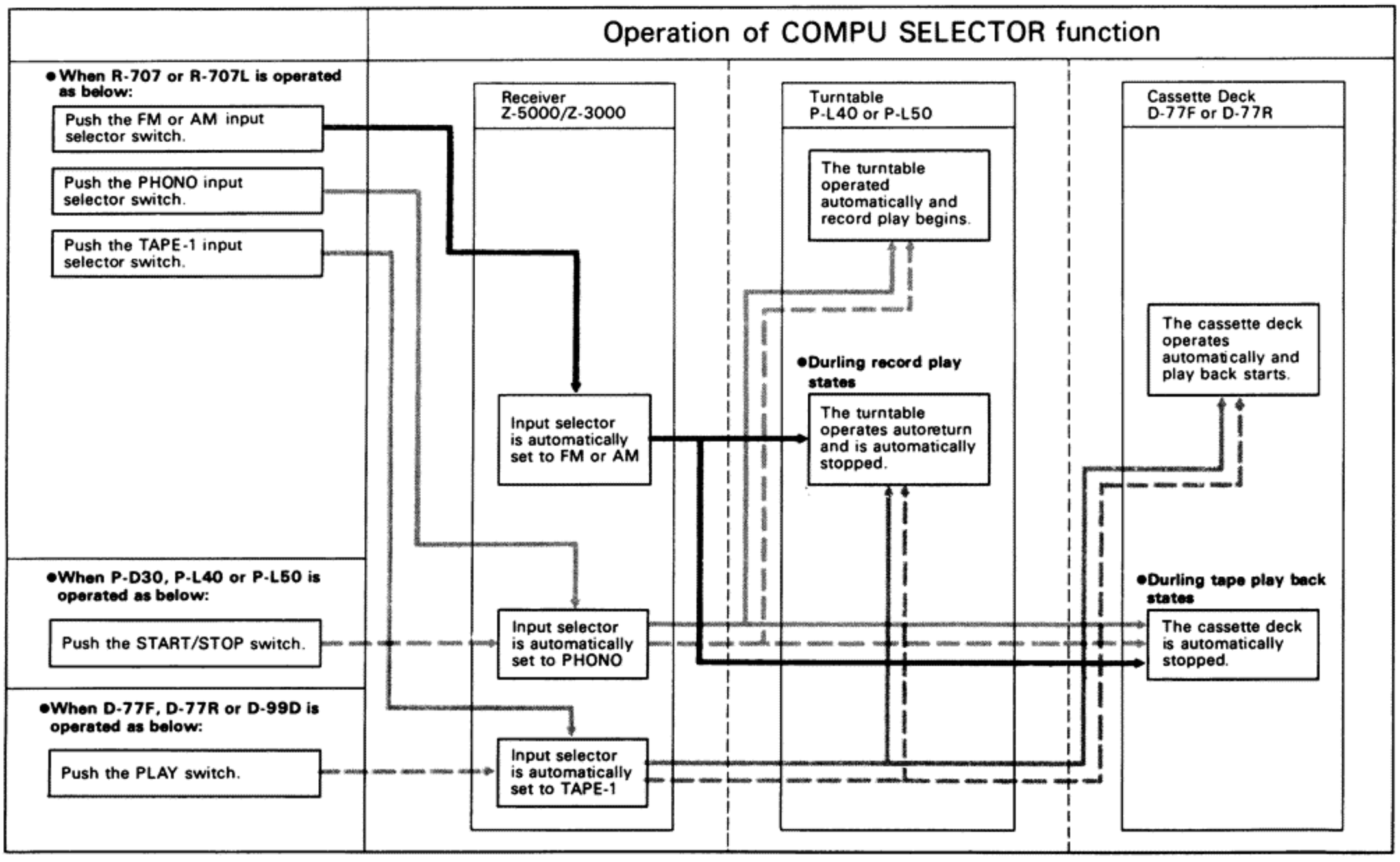
* This receiver has COMPU SELECTOR function which works with a turntable (P-D30, P-L40 or P-L50), a tape deck (D-77F, D-77R or D-99D).

A. Operation when one of the input selector switches of the receiver is pushed

1) • When the PHONO switch is pushed, input selector is automatically set to PHONO, the platter of the turntable (P-L40 or P-L50) starts rotating and the tonearm automatically moves to play record.
   • When the FM, the AM or TAPE-1 switch is pushed during record play, the tonearm returns to the arm rest and the platter stops, rotating automatically.
2) • When the TAPE-1 switch is pushed, input selector is automatically set to TAPE-1, the cassette deck (D-77F or D-77R) starts automatically to playback a tape.
   • When the PHONO, the FM or the AM switch is pushed during tape playback, cassette deck stops automatically.

B. Operation when one of the function switches of combined unit is controlled

1) When the START/STOP switch of the turntable (P-D30, P-L40 or P-L50) is pushed, the input selector of the receiver is automatically set to the PHONO mode.
2) When the PLAY switch of the cassette deck is pushed, the input selector of the receiver is automatically set to the TAPE-1 mode.



3. DESCRIPTION OF μPD1704C-011/PLL SYNTHESIZER & THE CONTROL IC

3-1. Function Outline

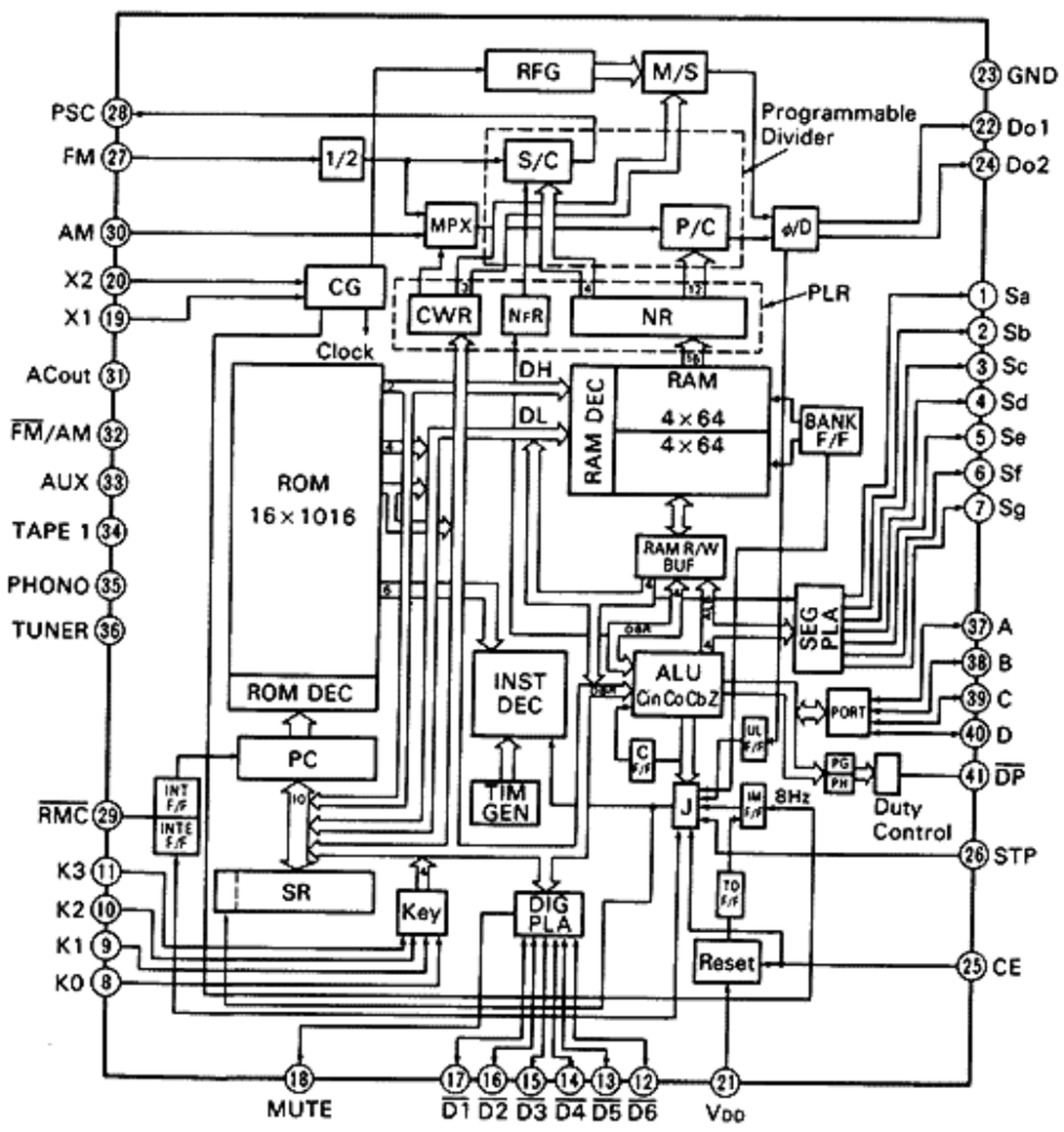
A. Functions of automatic station selection

1) Automatic tuning
2) Manual tuning
3) Preset scanning: Scanning operation is repeated from 1st channel to 8th channel with holding each channel for about five seconds.
4) Preset memory access: Accessible to eight stations for AM/FM each, independently, by depressing eight buttons.

B. Functions of programmable timers

1) PROGRAMS 1 and 2: Once ON/OFF times are preset, the designated source is turned on and the entire system is turned off repeatedly at the preset times every day.
2) PROGRAM 3: Once ON/OFF times are preset, the designated source is turned on and the entire system is turned off only once at the preset times.

3-2. Description of terminal function of μPD1704C-011



• Terminal Function of μPD1704C-011

Terminal Nos.	Terminal Symbols	Terminal Name	Function
1~7	Sa~Sg	Segment Output	Terminals for outputting indicator digit segment signals and a key return signal source. High level when active.
8~11	K_0~K_3	Key Return Signal	Terminals for inputting a key return signal from externally connected key matrix. The key return signal source is an ANDed signal of segment terminals Sa to Sg and tuner and phono terminals.
12~17	D_1~D_6	Digit Outputs	Terminals for outputting indicator digit signals. Low level when active.
18	MUTE	Mute	Terminal for outputting a muting signal to eliminate shock noise generated when PLL is unlocked. High level when active. This muting signal is kept outputted for 55 ms before and after PLL data (contents in the programmable counter) change. The muting signal is outputted in the following modes: * In AM/FM and selector switching * In MANUAL UP/DOWN * In AUTO UP/DOWN * In preset memory access (including preset scanning) * In switching from CLOCK set to OFF mode
19, 20	X_1, X_2	X'tal	Terminals for connecting a 4.5 MHz quartz oscillator.
21	VDD	VDD	Terminal for a power supply for a device.
22 24	DO_1 DO_2	Error Out	Terminals for outputting signals from a phase detector which configures PLL. High level when the divided oscillator frequency is higher than the reference frequency. Low level when the divided one is lower than the reference one.
23	GND	Ground	Terminal connected to ground.
25	CE	Chip Enable	Terminal for inputting a device is used for the ordinary operations. Low level when no device is used. (1) When NONCLOCK is preset by an initializing diode matrix: CE = High . Ordinary operations CE = Low . Indicator is off. PLL is inoperative. Internal clock generator is inoperative. (2) When NONCLOCK is not preset by an initializing diode matrix: CE = High . Ordinary operations CE = Low . Indicator is off. PLL is inoperative.

Terminal Nos.	Terminal Symbols	Terminal Name	Function
26	SD	Station Detector	Terminal for inputting a signal to detect whether or not a station is received in automatic tuning (AUTO UP/DOWN). Automatic tuning stops when at high-level. However, it is necessary to input a High level signal within 50 ms after PLL has been locked.
27	FM	FM Local Oscillator Signal Inputs	Terminal for input a signal from FM programmable counter. The inputted signal is obtained by dividing an output signal from FM local oscillator (VCO) into 1/16 or 1/17 through prescaler μPB553AC.
28	PSC	Prescaler Control	Terminal for outputting a signal to change the division ratio of prescaler in FM. This terminal is connected to PSC terminal of prescaler μPB553AC. Selectable division ratios are 1/16 and 1/17 in μPB553AC.
29	$\overline{RMC}$	Remote Control Inputs	Terminal for inputting a remote control signal. Not now in use.
30	AM	AM Local Oscillator Signal Inputs	Terminal for inputting a signal from AM programmable counter. The inputted signal is one outputted from AM local oscillator (VCO).
31	AC OUT	AC Outlet Control	Terminal for AC outlet. The AC outlet is used for energizing a relay to break the main power supply for the set. High level when any of selection terminals (TUNER, PHONO, TAPE-1, and AUX) is on. Low level when STD-BY key is depressed.
32	$\overline{FM}$/AM	FM/AM Power Supply Control	Terminal for switching the power supply for FM section to that for AM section or vice versa in tuner. Low level in FM. High level in AM.
33 34 35 36	AUX TAPE-1 PHONO TUNER	AUX TAPE-1 PHONO TUNER	Terminals for selecting TUNER, PHONO, TAPE-1 and AUX. TUNER terminal is at a High level when FM/AM key or preset key is depressed; PHONO, TAPE-1, AUX terminals are at a High level when PHONO key, TAPE-1 key or AUX key is depressed respectively. Further, all terminals change to a Low level when STD-BY key is depressed.
37~40	A~D	Preset Station Indicator Outputs	Terminals for outputting preset station indicator BCD signals. The output BCD signals corresponding to the preset stations are listed below:
41	$\overline{DP}$	DECIMAL POINT	Terminal for outputting a decimal point indication signal in FM frequency indication. Low level when active.
42	$\overline{COLON}$	COLON	Terminal for outputting a COLON indication signal in CLOCK indication. Low level when active.

PRESET STATION	D	C	B	A
No channel designation	0	0	0	0
P1	0	0	0	1
P2	0	0	1	0
P3	0	0	1	1
P4	0	1	0	0
P5	0	1	0	1
P6	0	1	1	0
P7	0	1	1	1
P8	1	0	0	0

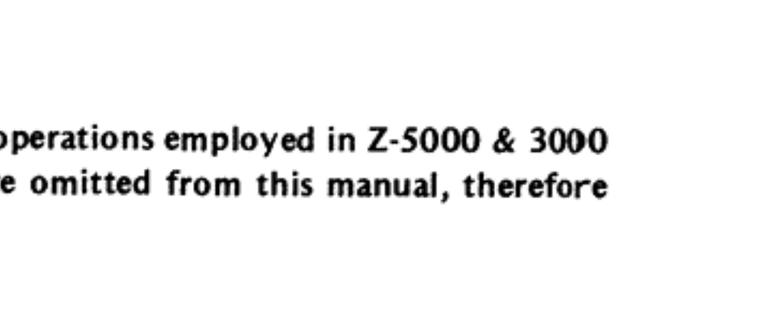
- Since the description key matrix and the description of programmable timer operations employed in Z-5000 & 3000 are similar to those of Z-9000 & 7000, the explanation of those circuits are omitted from this manual, therefore please refer to the service manual of Z-9000/7000.

4. ADJUSTMENTS

4-1. Reference Frequency Adjustment of Synthesizer Control Circuit

Note: 1. Input Selector . . . . . AM
2. TUNING/FM MODE . . . . . MANUAL/MONO
3. The frequency with "*" mark is for the unit that the AM 9/10 kHz channel step switch (oS18, See Fig. 4-1) is set to 9 kHz and "**" is for the 10 kHz.
4. The unit without the AM 9/10 kHz channel step switch is "**" mark frequency.

Fig. 4-1



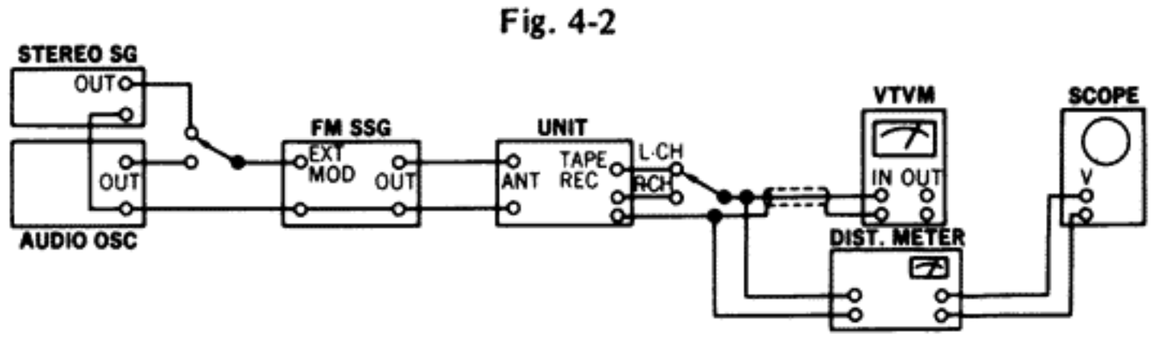
SUBJECT	SETTING	MEASURE OUTPUT	ADJUST	ADJUST FOR	REMARKS
X'tal Frequency Adj.	Set frequency display to *999kHz <**1000kHz>	Between Point Ⓐ and Earth, F-3900, Frequency Counter • See Parts Location F-3900 on page 9.	fTC1 (F-3901) (See Top View on page 11 & Parts Location F-3901 on page 10)	* 1449kHz ±10Hz <**1450kHz ±10Hz>	

4-2. FM Adjustments

(See Fig. 4-2 and Top View on Page 11)

Note: 1. Input Selector . . . . . FM
2. The frequency with "*" mark is for the unit that the AM 9/10 kHz channel step switch (oS18, See Fig. 4-1) is set to 9 kHz and "**" is for the 10 kHz.
3. The unit without the AM 9/10 kHz channel step switch is "**" mark frequency.

Fig. 4-2



(1) FM IF, RF

Note: TUNING/FM MODE . . . . . MANUAL/MONO

STEP	SUBJECT	FEED SIGNAL			MEASURE OUTPUT	ADJUST	ADJUST FOR	REMARKS
		FROM		TO				
1.	FM IF Coil Adj.	*98MHz <**98.1MHz> ANT Input 20dBf (14.8dB), 1kHz (100% MOD.), FM SSG		ANT terminal, 300Ω	Between Point Ⓑ (dVR10) and Earth, DC Volt Meter • See Parts Location F-3900 on page 9.	T1 (Front-end) (See Top View on page 11)	MAX. DC Volt	
2.	Discriminator Coil Adj.	1	*98MHz <**98.1MHz> ANT Input 65dBf (59.8dB), 1kHz (100% MOD.), FM SSG	Same as above	Between Ⓒ and Ⓓ, (Across dR41), DC Volt Meter • See Parts Location F-3767 on page 10.	dT2 (F-3767)	0 ±30mV	• Repeat procedures as stated in subject 1 & 2.
		2	Same as above	Same as above	REC OUT L-CH or R-CH, VTVM & SCOPE	dT3 (F-3767)	Min. THD	

(2) FM STEREO

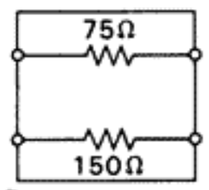
Note: TUNING/FM MODE . . . . . AUTO/STEREO

STEP	SUBJECT	FEED SIGNAL		MEASURE OUTPUT	ADJUST	ADJUST FOR	REMARKS
		FROM	TO				
1.	PLL V.C.O. Adj.	*98MHz <**98.1MHz> ANT Input 65dBf (59.8dB), FM SSG Pilot 19kHz (9% MOD.), R or L MODE 1kHz + Pilot (100% MOD.), STEREO SG.	ANT terminal 300Ω	STEREO Indicator	dVR2 (F-3767)	Light Indicator	Adjust the dVR2 within center of lighting level.
	PLL V.C.O. Adj; In case of using Frequency Counter	*98MHz <**98.1MHz> ANT Input 65dBf (59.8dB), FM SSG, No. MOD.	Same as above	Between Point Ⓔ (Pin 10 of fdIC2) and Earth, Frequency Counter • See Parts Location F-3767 on page 10.	dVR2 (F-3767)	19kHz ±50Hz	
2.	Muting Level Adj.	*98MHz <**98.1MHz> 20dBf (14.8dB), FM SSG, Pilot 19kHz (9% MOD.), L or R MODE 1kHz + Pilot (100% MOD.), STEREO SG.	Same as above	STEREO Indicator or REC OUT L-CH or R-CH VTVM & SCOPE	dVR10 (F-3900)	STEREO Indicator turns ON or Output Signal comes out.	

♦ Technical Hint for FM Adjustment

- There are two kind in indication of FM SG output attenuator
  1. Attenuator with marking of 75Ω open . . . open indication type.
  2. Attenuator with marking of 75Ω load or close . . . . . load or close indication type.
- FM SG output level in this FM adjustment are described as open indication type.
- To feed FM signal, a dummy antenna circuit as Fig. 4-3 must be connected between FM SG output and ANT terminal (300Ω) of the unit.

Fig. 4-3



Dummy antenna

- The following table shows relations among FM SG attenuator indication (dB), available power ratio (dBf) and antenna terminal voltage (dB/μV) in each indication type.

	FM SG Attenuator Indication	Available Power Ratio	Antenna Terminal Voltage
Open indication type	0 dB 66 dB	−0.8 dBf 65.2 dBf	-6 dB/μV 60 dB/μV
Load or close indication type	0 dB 60 dB	5.2 dBf 65.2 dBf	0 dB/μV 60 dB/μV

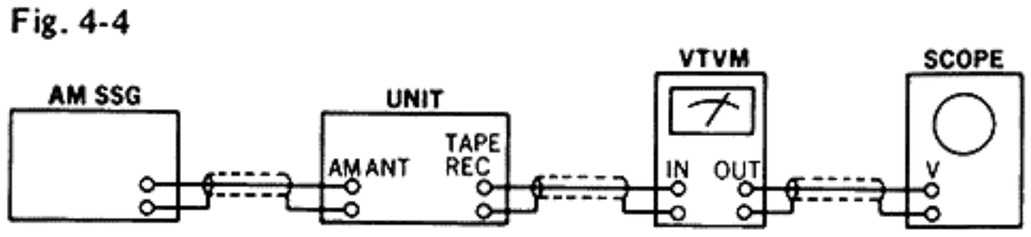
4-3. AM Adjustment

(See Figs. 4-4, 4-5, Parts Location F-3900 on page 9 and Top View on Page 11)

Note: 1. Input Selector . . . . . AM
2. TUNING/FM MODE . . . . . MANUAL/MONO
3. The frequency with "*" mark is for the unit that the AM 9/10 kHz channel step switch (oS18, Fig. 4-1) is set to 9 kHz and "**" mark is for the 10 kHz.
4. AM channel step frequency of the unit without the AM channel step switch (oS18) is fixed to 10 kHz, and it is applicable to the USA (UL) and Canada (CSA) under industrial standards.
5. Preset the listed frequencies to the memories.

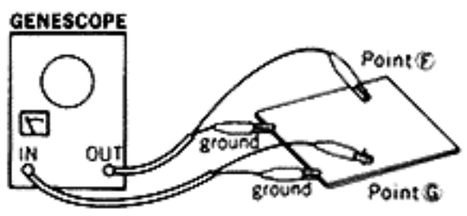
PRESET KEY	AM	
	*9 kHz STEP	**10kHz STEP
1	522kHz	530kHz
2	1611kHz	1620kHz
3	603kHz	600kHz
4	1404kHz	1400kHz

Fig. 4-4



(1) AM IF

Fig. 4-5



STEP	SUBJECT	FEED SIGNAL		MEASURE OUTPUT	ADJUST	ADJUST FOR	REMARKS
		FROM	TO				
1.	IF Coil Adj.	Genescope Output 50dB	Point Ⓕ (eR1), F-3900	Between Point Ⓖ (eR11) and Earth F-3900	eCF1, (F-3900)	MAX. Waveform	450kHz

(2) AM Tuning Voltage

STEP	SUBJECT	SETTING	MEASURE OUTPUT	ADJUST	ADJUST FOR	REMARKS
1.	522kHz <**530kHz> Tuning Voltage	Depress PRESET Key 1 to readout 522kHz <**530kHz>	Between Ⓗ and Earth, F-3900, DC Volt Meter	eT2 (F-3900)	1V ±0.1V	• Repeat procedures as state in STEP 1 & 2.
2.	1611kHz <**1620kHz> Tuning Voltage	Depress PRESET Key 2 to readout 1611kHz <**1620kHz>	Same as above	eTC2 (F-3900)	9V ±0.1V	

(3) AM RF and Muting Level

Note: 1. Connect AM loop antenna to the AM antenna terminal and GND terminal.
2. Repeat procedures as stated in STEP 1 and 2.

STEP	SUBJECT	FEED SIGNAL		MEASURE OUTPUT	ADJUST	ADJUST FOR	REMARKS
		FROM	TO				
1.	*603kHz <**600kHz> RF Adj.	603kHz <**600kHz> ANT Input 50dB, 400Hz (30% MOD.), AM SSG	ANT terminal	REC OUT L-CH or R-CH, VTVM & SCOPE	eT3 (F-3900)	MAX. Output	• Depress PRESET Key 3 to readout *603kHz <**600kHz>
2.	*1404kHz <**1400kHz> RF Adj.	1404kHz <**1400kHz> ANT Input 50dB, 400Hz (30% MOD.), AM SSG	Same as above	Same as above	eTC1 (F-3900)	MAX. Output	• Depress PRESET Key 4 to readout *1404kHz <**1400kHz>
3.	Muting Level Adj.	999kHz <**1000kHz> ANT Input 55dB, 400Hz <30% MOD.), AM SSG	Same as above	Same as above	eVR1 (F-3900)	Output signal comes out.	• TUNING/FM MODE switch . . . AUTO

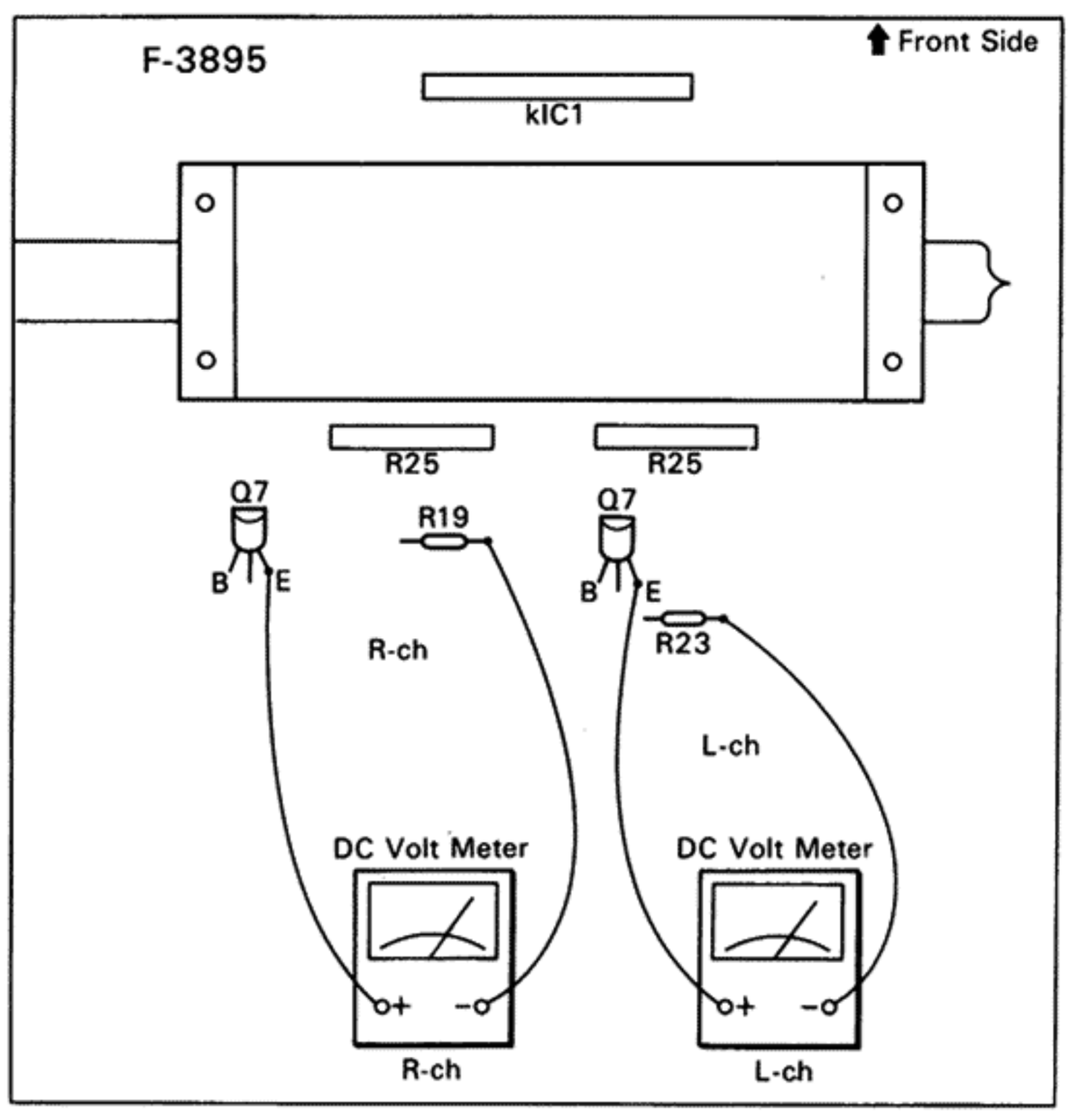
4-4. Driver Circuit Adjustment

(See Top View on Page 11)

Note: 1. Room Temperature . . . . . 18°C ~ 28°C
2. VOLUME . . . . . Minimum
3. Input Selector . . . . . AUX.
4. For adjustment, run the unit for more than 3 minutes after the power is switched on.

STEP	SUBJECT	MEASURE OUTPUT	ADJUST	ADJUST FOR	REMARKS
1.	DC 0V Voltage Adj. L-CH	SPEAKERS Terminal L-ch, DC Volt Meter	kVR1L (F-3895)	DC 0V ±5 mV	• Z-5000 Only
2.	DC 0V Voltage Adj. R-CH	SPEAKERS Terminal, R-ch, DC Volt Meter	kVR1R (F-3895)	DC 0V ±5mV	• Z-5000 Only
3.	Bias Current Adj. L-CH	Between emitter terminals of kQ7L and R23L, F-3895, DC Volt Meter (See Fig. 4-6)	kVR2L (F-3895)	DC 3mV ±1mV	• Before turning ON power switch, turn kVR2L, R fully counter-clockwise. • This bias current value into voltage by ohms law.
4.	Bias Current Adj. R-CH	Between emitter terminals of kQ7R and R19R, F-3895, DC Volt Meter (See Fig. 4-6)	kVR2R (F-3895)		

Fig. 4-6



•Abbreviations

Equipment		Others	
AM FM Generator Oscilloscope	Genescope	Antenna	ANT.
AM Standard Signal Generator	AM SSG	Modulation	MOD.
FM Standard Signal Generator	FM SSG	Total Harmonic Distortion	T.H.D.
FM Stereo Generator	Stereo SG		
Oscilloscope	Scope		
Audio Oscillator	Audio Osc.		
Distortion Meter	Dist. Meter		

5. PARTS LOCATION & PARTS LIST

•Since some of capacitors and resistors are omitted from parts lists in this Service Manual, refer to the Common Parts List for capacitors & resistors, which was appended previously to Sansui Manual.

5-1. F-3895 Power Amp. & Power Supply Circuit Board (Stock No. 00718501 = Z-5000/00717401 = Z-3000)

Component Side

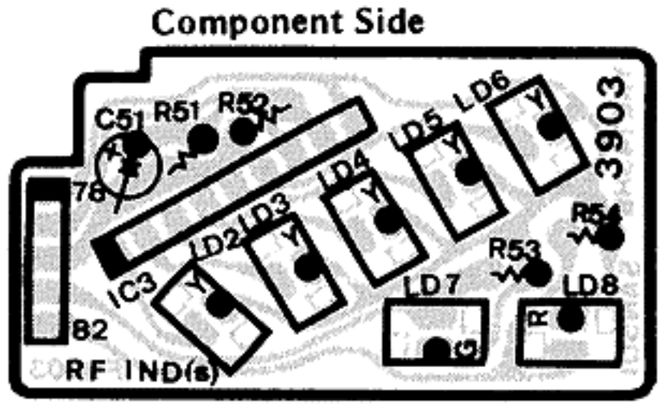
Parts List <F-3895>

Parts No.	Stock No.	Description
●Transistor		
kQ1	03067401	2SC1845
kQ2	03066801	2SC2071
kQ3	03010301	2SA939
kQ6	46127701	2SC2909
kQ7	46127601	2SA1207
kQ8	03069301	2SC2238
kQ9	03012401	2SA968
kQ10	03068101	2SC2581 } <Z-5000>
kQ11	03011401	2SA1106 } <Z-5000>
kQ10	07259101	2SC2579LB } <Z-3000>
kQ11	07258901	2SA1104LB } <Z-3000>
●IC		
kIC1	46435600	STK3062-2
kIC2	03607700	NJM4558D <Z-3000>
●Diode		
kD1, 2	03117600	1S2473D <Z-5000>
●Resistor		
kR10, 32	46228600	47Ω 1/2W N.I.R.
kR14, 15	46228400	33Ω 1/2W N.I.R. <Z-5000>
kR20	46229100	120Ω 1/2W N.I.R.
kR21, 24	46227400	4.7Ω 1/2W N.I.R.
kR25	00091700	0.33Ω x 2 5W Ce.R.
kR28	46227400	4.7Ω 1/2W N.I.R.
kC16, 17	46445800	10μF 16V E.B.
kBL1	46426800	Composition Parts } <Z-3000>
kL1	42903700	Inductor
	46027200	Inductor <Z-5000>
kVR1	07241400	20kΩ B S.V.R., DC 0V <Z-5000>
kVR2	07241000	1kΩ S.V.R., Bias
●Transistor		
lQ1	03066801	2SC2071
lQ2	03010901	2SA992
●IC		
lIC1	46207600	TA7317P
●Diode		
lD1	03117600	1S2473D
●Zener Diode		
lDZ1, 2	03180200	RD24E
lR19, 20	46229300	180Ω 1/2W N.I.R.
lRL1, 2	46254900	Relay, protector
●Transistor		
mQ2	03085201	2SD438
mQ3	03033101	2SB528
mQ4, 5	07194701	2SA1015
	or 07197001	2SA733A
	or 03012701	2SA999
mQ6	46188601	2SA1015
●IC		
mIC1	46361400	L78N10
●Diode		
mD1 ~ 4	03115300	30D-2
mD5 ~ 17	03117700	10E-2
●Zener Diode		
mDZ1	03178600	RD11E-B
mDZ2	03171900	RD27F B
●Resistor		
mR1	00195400	27Ω 3W N.I.R.
mR3	46229200	150Ω 1/2W N.I.R.
mR6, 14	46249500	150Ω 1/2W N.I.R.
mR11	46228600	47Ω 1/2W N.I.R.
mR13	46230200	1kΩ 1/2W N.I.R.
mR19, 20	46227900	12Ω 1/2W N.I.R.

Parts No.	Stock No.	Description
●Capacitor		
mC1, 2	08680400	10000pF 500V C.C.
mC3, 4	08301800	6800μF 63V E.L. <Z-5000>
	08300300	6800μF 55V E.L. <Z-3000>
mC5, 6	08680400	10000pF 500V C.C.
mT2	15008511	Power Transformer
	46364100	8P Push Terminal, SPEAKERS
pC1	46425800	10000pF 400V C.C.
pF1	07188800	Fuse 3A (220 V) <Z-5000>
	07189200	Fuse 6A (120 V) <Z-5000>
	07188700	Fuse 2.5A (220 V) <Z-3000>
	07189100	Fuse 5.0A (120 V) <Z-3000>
pRL1	46275300	Relay

5-2. F-3903 Signal Indicator Circuit Board

Component Side



● Note:
This circuit board is not supplied as the assembled. However, individual parts on the circuit board are provided by order.

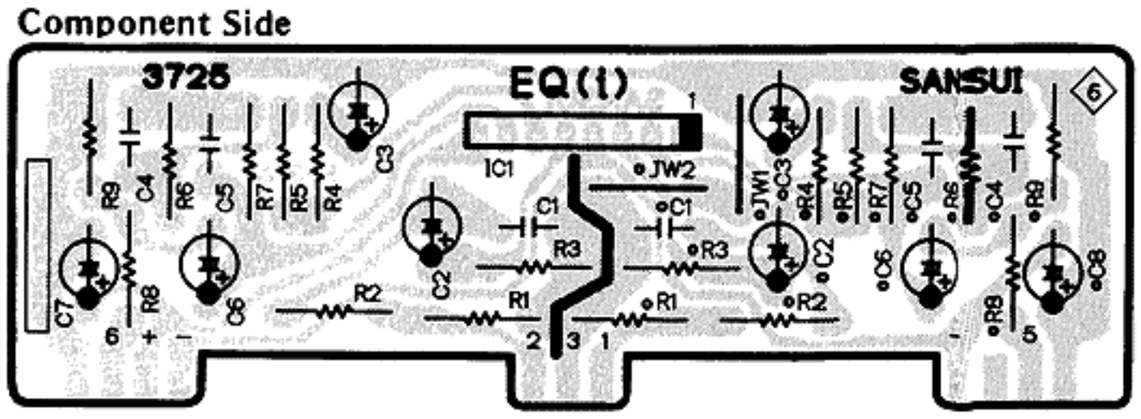
Parts List

Parts No.	Stock No.	Description
●IC		
sIC3	46392500	BA6125
●LED		
sLD2 ~ 6	07251000	TLY123, Signal
	or 46470400	SEL2910A
sLD7	07250900	TLG123, LOCKED
	or 46470300	SEL2410E
sLD8	46176900	TLS-123, STEREO
	or 46470200	SEL2210S
●Resistor		
sR51, 52, sR54	46330200	10kΩ 1/6W C.R.
●Capacitor		
sC51	46275600	10μF 16V E.C.

5-3. F-3725 EQ. Amp. Circuit Board

(Stock No. 00719901 = Z-5000/00695501 = Z-3000)

Component Side

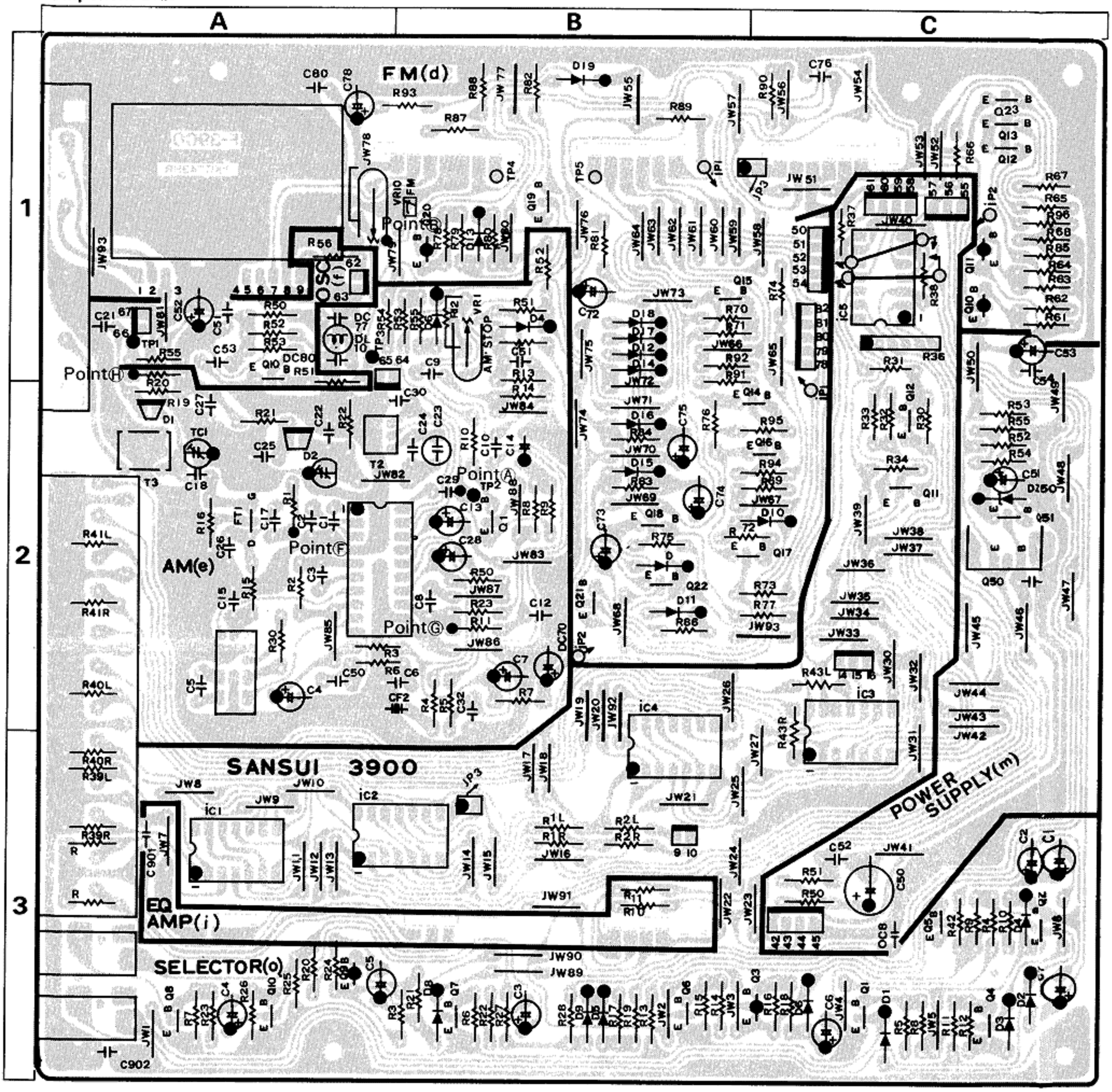


Parts List

Parts No.	Stock No.	Description
●IC		
iIC1	46288800	M5220L <Z-5000>
	46078900	M5218L <Z-3000>
●Capacitor		
iC1	46137200	220pF 50V C.C.

5-4. F-3900 FM, AM RF & COMPU Selector Circuit Board (Stock No. 00719001 = Z-5000/00717801 = Z-3000)

Component Side



Parts List

Parts No.	Stock No.	Description
	46392600	FM Frontend Pack
●Transistor		
dQ10, 11	46367001	2SA1115
dQ12~19	46367101	2SC2603
dQ20	46367001	2SA1115
dQ21~23	46367101	2SC2603
●Diode		
dD10, 11	03117600	1S2473D
	or 46086000	1S1588
dD12	46501600	Composition Parts
dD13, 15	03117600	1S2473D
	or 46086000	1S1588
dD16, 19	03117600	1S2473D
	or 46086000	1S1588
dL10	46204100	2.2μH Inductor
dVR10	07241300	10kΩ (B) S.V.R., Muting Adj.
●Transistor		
eQ1	46367101	2SC2603

Parts No.	Stock No.	Description
●FET		
eFT1	46393000, 1	2SK192A-Y, GR
●IC		
eIC1	07237200	LA1245
●Diode		
eD1, 2	46254600	Varactor Diode 1SV100
dD3~5	03117600	1S2473D
	or 46086000	1S1588
	or 46092700	US1035
eTC1, 2	46095600	20pF Trimmer Capacitor
eCF1	07254000	Ceramic Filter
eCF2	07265100	Ceramic Filter
eT2	46394700	AM RF Coil
eT3	46394600	AM ANT Coil
eVR1	07241500	50kΩ (B) S.V.R., AM stop level Adj.

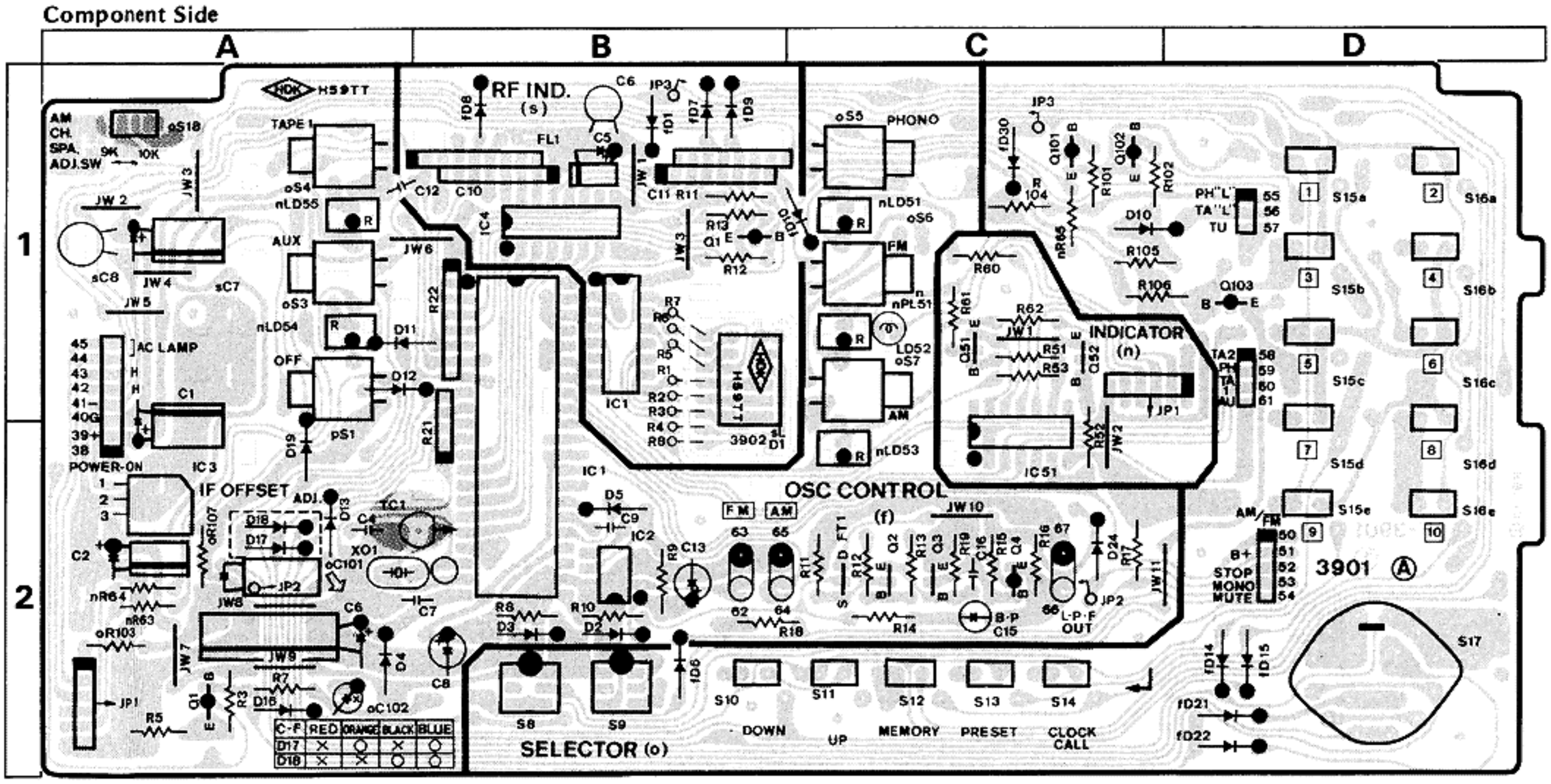
Parts List <F-3900>

Parts No.	Stock No.	Description
●Transistor		
fQ10	46367101	2SC2603
mQ50	07287101	2SD1147
mQ51	46367101	2SC2603
●Zener Diode		
mDZ50	03177600	RD6.8E
mR50	46230800	3.3kΩ 1/2W N.I.R.
●Transistor		
oQ1, 2	46367101	2SC2603
oQ3	46367001	2SA1115
oQ4~8	46367101	2SC2603
oQ9, 11	46367001	2SA1115
oQ12	46367101	2SC2603
oQ19, 20	03068301	2SC2320
	or 07194801	2SC1815

Parts No.	Stock No.	Description
●IC		
oIC1~4	46255000	LC4066BH
oIC5	07246300	MB4204M
●Diode		
oD1~6	03117600	1S2473D
	or 46086000	1S1588
	or 46092700	US1035
oD8, 9	03117600	1S2473D
	or 46086000	1S1588
	or 46092700	US1035
oR48	46503400	Composition Parts
oJ3, 4	46411800	Jack, COMPU SELECTOR
	46363800	4P Input Terminal, TAPE-1, TAPE-2, AUX, PHONO

5-5. F-3901 Control & Indicator Circuit Board (Stock No. 00719101 = Z-5000/00717901 = Z-3000)

Component Side



Parts List

Parts No.	Stock No.	Description
●Transistor		
fQ1	46086601	2SA937
fQ2, 3	07194801	2SC1815
	or 03059501	2SC945
	or 03068301	2SC2320
fQ4	07197001	2SA733
	or 03012701	2SA999
●FET		
fFT1	03703401, 2	2SK163-K2, L1
●IC		
fIC1	46253300	μPD1704C-011
fIC2	46253400	μPB553AC
fIC3	46361200	L78N06
fXO1	46443900	Quartz Element (4.5MHz)
●Diode		
fD1~19	03111600	1S2473D
fD21, 22	03111600	1S2473D
fD24, 30	03111600	1S2473D

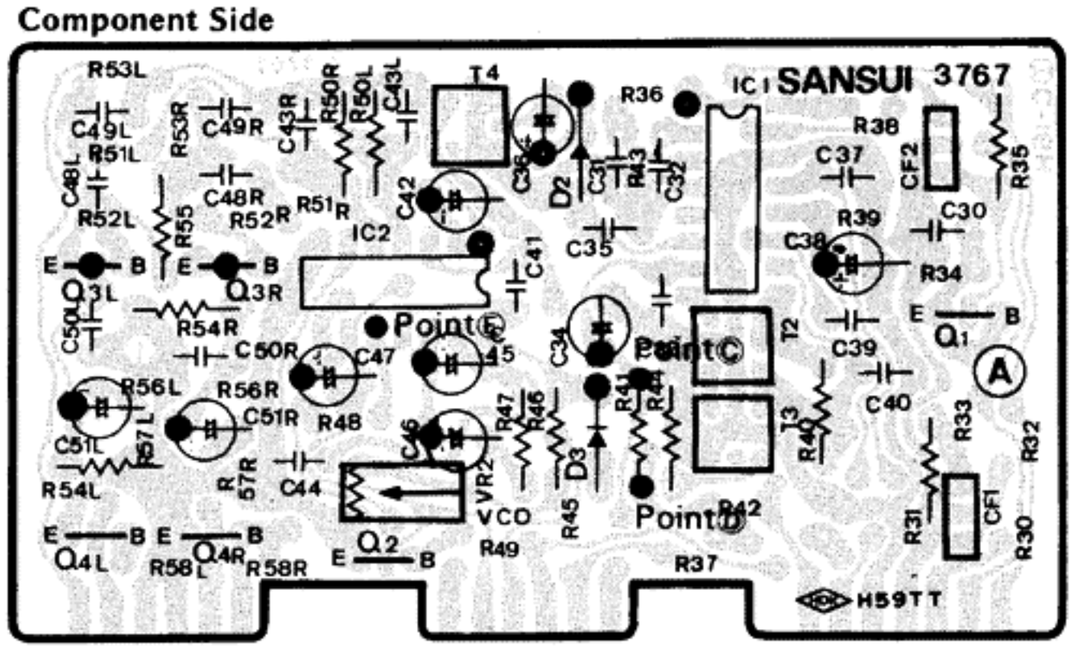
Parts No.	Stock No.	Description
●Array Resistor		
fR21	46343100	Array Resistor, 100k-4P
fR22	46392900	Array Resistor, 100k-7P
●Capacitor		
fC1	46316400	100μF 16V E.L.
fC2	46275900	47μF 16V E.L.
fC8	46276800	4.7μF 50V E.L.
fC13	46275700	22μF 16V E.L.
fC15	00305800	2.2μF 25V E.B.
fTC1	46444600	30pF
●Transistor		
nQ51, 52	03069401	2SC2021
●IC		
nIC51	46397500	BA612
●LED		
nLD51 ~ 55	46176900	TLS-123
	or 46470200	SEL2210S
nPL51	46315900	Pilot Lamp 12V 0.15A

Parts List <F-3901>

Parts No.	Stock No.	Description
●Transistor		
oQ101~Q103	46086601	2SA937
●Diode		
oD101	03111600	1S2473D
oC101	00305800	2.2μF 25V E.B.
oS3~7	46395900	Push SW., TAPE-1, AUX, PHONO, FM, AM
oS8, 9	46360000	Push SW., TAPE-2, FM MODE
oS10~16	46396700	Push SW., TUNING, MEMORY, SCAN, CLOCK CALL, PROGRAM
oS17	46396300	Rotary SW., PROGRAM TIMER
oS18	46394000	Slide SW., AM STEP
pS1	46395900	Push SW., POWER STD-BY

5-6. F-3767 FM IF Circuit Board (Stock No. 00722001)

Component Side



Parts List

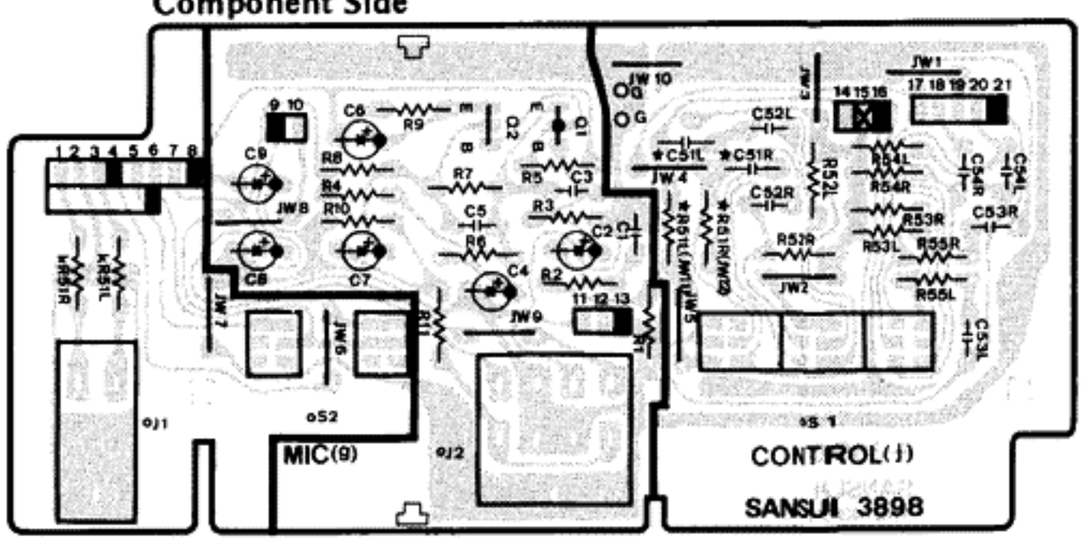
Parts No.	Stock No.	Description
●Transistor		
dQ1	46393201	2SC2786
dQ2	46391901	2SC2785
dQ3	46392001	2SA1175
dQ4	46367101	2SC2603
or	46391901	2SC2785
●IC		
dIC1	07191200	LA1231N
dIC2	03603000	HA1156W
●Diode		
dD2, 3	03117600	1S2473D
●Capacitor		
dC36	08451400	4.7μF 25V E.B.
dC42	08451200	2.2μF 25V E.B.
●Ceramic Filter		
dCF1, 2	07248700	SFE10.7MS1G
●Coil		
dT2	46369100	FM IF Coil
dT3	46369200	FM IF Coil
dT4	46202400	Filter
dVR2	07218000	6.8kΩ S.V.R., VCO Adj.

● Note: The F-3906 circuit board is not supplied as the assembled. However, individual parts on the circuit board are provided by order.

Parts No.	Stock No.	Description
●Transistor		
sQ1	46086601	2SA937
●IC		
sIC1	46257100	M74LS247
or	46257200	MB74LS247
sIC4	46253500	μPA80C
sFL1	46254000	Display Tube, FG78G1GR
●Resistor		
sR1~7	46328600	2.2kΩ 1/6W C.R.
sR8	46322300	4.7Ω 1/6W C.R.
●Capacitor		
sC5	46275900	47μF 16V E.L.
sC7	46422700	47μF 35V E.C.
sC10, 11	46263000	Array Capacitor, 330pF 50V

5-7. F-3898 Mic Amp. & Control Switch Circuit Board (Stock No. 00718801 = Z-5000/ 00717701 = Z-3000)

Component Side

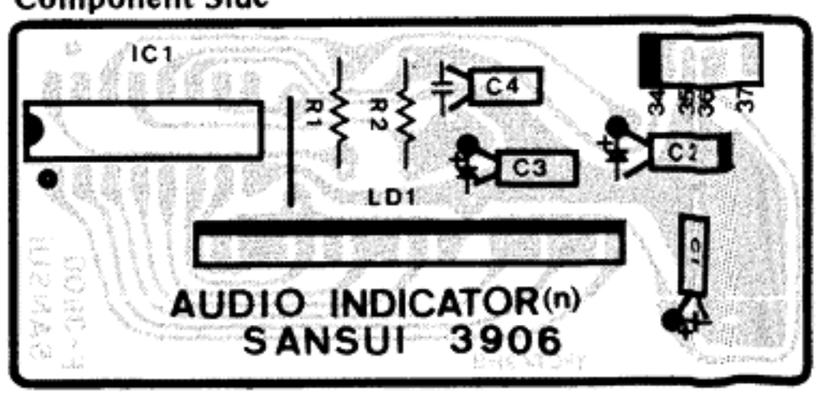


Parts List

Parts No.	Stock No.	Description
●Transistor		
gQ1	03010901	2SA992
gQ2	07225401	2SC2320L
kR51	46249700	220Ω 1W N.I.R.
oS1	46430500	Push SW., SUBSONIC FILTER, HIGH FILTER, LOUDNESS <Z-5000>
	46430700	Push SW., HIGH FILTER, LOUDNESS <Z-3000>
oS2	46430600	Push SW., SPEAKERS,
oJ1	46289200	Jack, PHONES
oJ2	46133900	Jack with SW., MIC <Z-5000>

5-8. F-3906 Peak Power Indicator Circuit Board <Z-3000>

Component Side



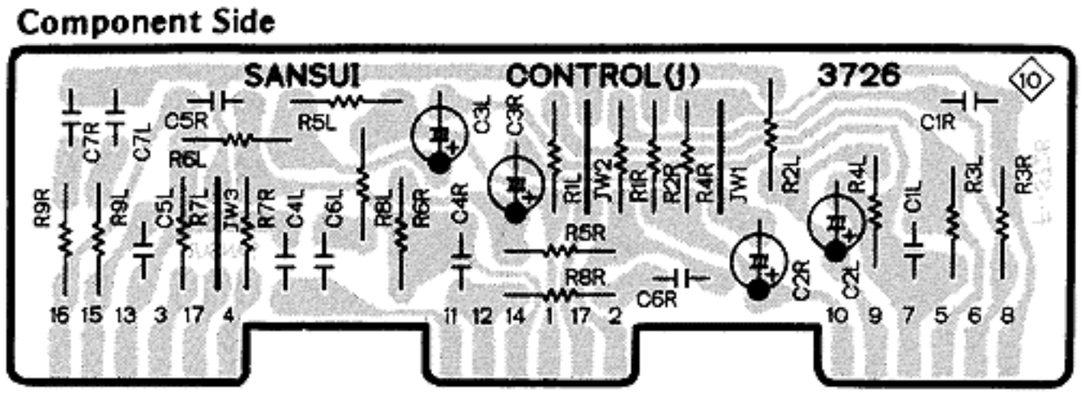
Parts List

Parts No.	Stock No.	Description
●IC		
nIC1	46398400	IR2E29
nLD1	46398500	LED (GL107R), PEAK POWER Ind.

- The following circuit boards are not supplied as the assembled. However, the individual parts on the circuit boards are provided for orders.

5-9. F-3726 Tone Control Circuit Board

Component Side

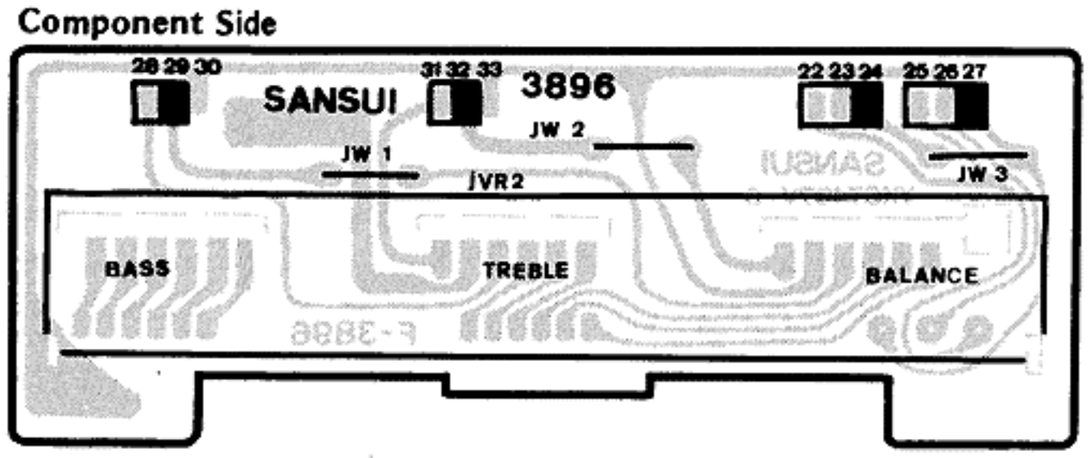


Parts List

Parts No.	Stock No.	Description
jC7	07216800	0.068μF 25V C.C.

5-10. F-3896 Tone & Balance VR Circuit Board

Component Side

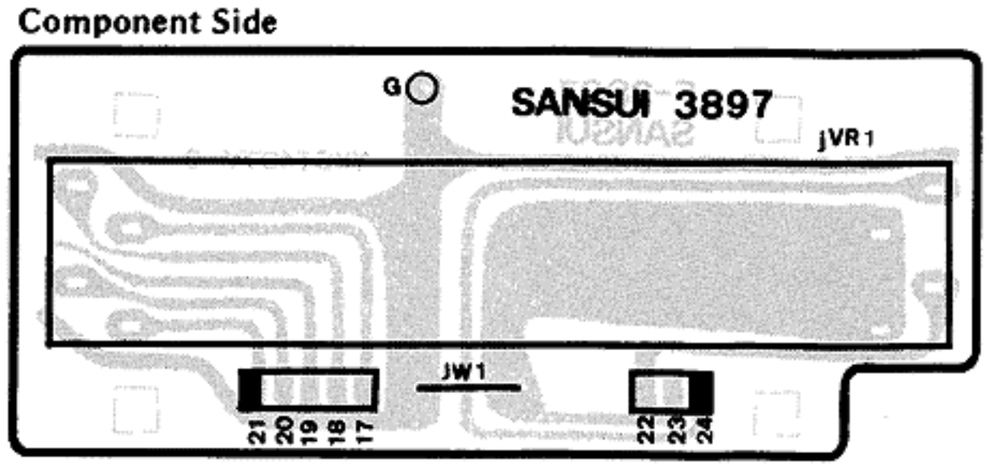


Parts List

Parts No.	Stock No.	Description
jVR2	46423900	50kΩ x 2 & 250kΩ VR.

5-11. F-3897 Volume Circuit Board

Component Side

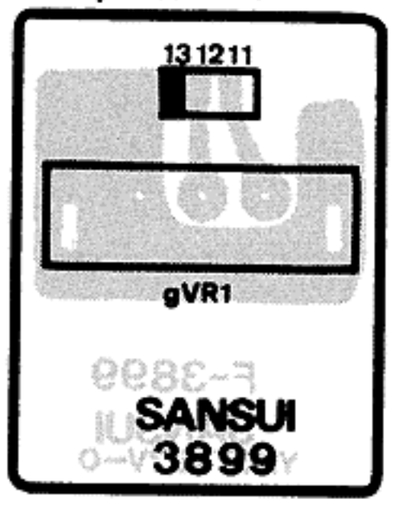


Parts List

Parts No.	Stock No.	Description
jVR1	46423800	150kΩ (B) x 2 Slide VR, VOLUME

5-12. F-3899 Mic VR Circuit Board

Component Side



Parts List

Parts No.	Stock No.	Description
gVR1	46424000	20kΩ VR

5-13. F-3902 Preset Station Circuit Board

Parts List

Parts No.	Stock No.	Description
sLD1	46427300	LED, PRESET STATION

* Concerning Printed Resistor and Printed Silver Pattern

In this model, printed circuit board is used on which carbon resine resistance and silver foil pattern are coated. And it is impossible to replace those parts. Therefore, please keep following procedures when repairing or ordering the parts.

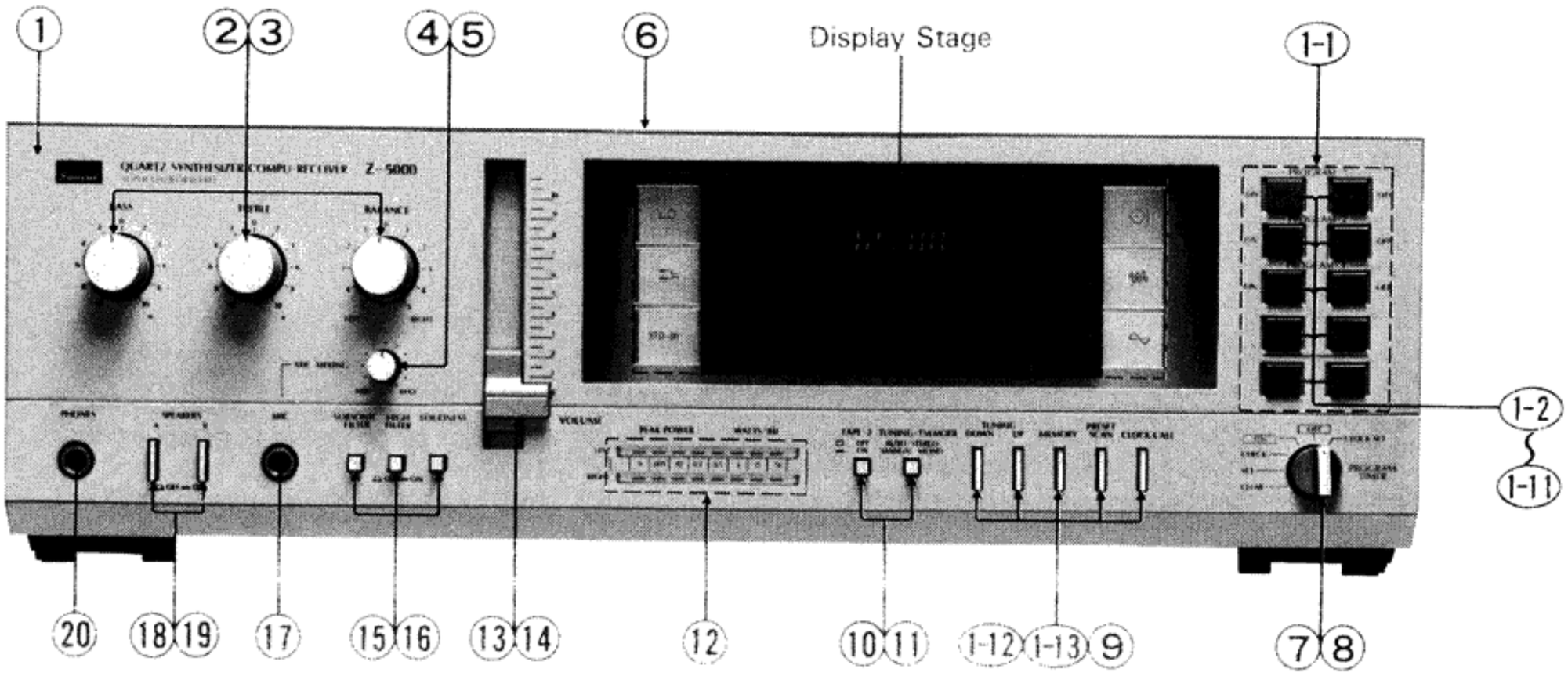
1. When repairing the printed resistor, cut off center portion of the resistor to make complete open circuit. Then solder 1/3 W type carbon resistor to conductor side of the PCB.
2. When repairing the printed silver pattern, solder lead wire to conductor side of the PCB.
3. When ordering the 1/3 W type carbon resistor, read the resistance value from the schematic diagram, and refer to "Common Parts List for Resistors and Capacitors".

• Abbreviations

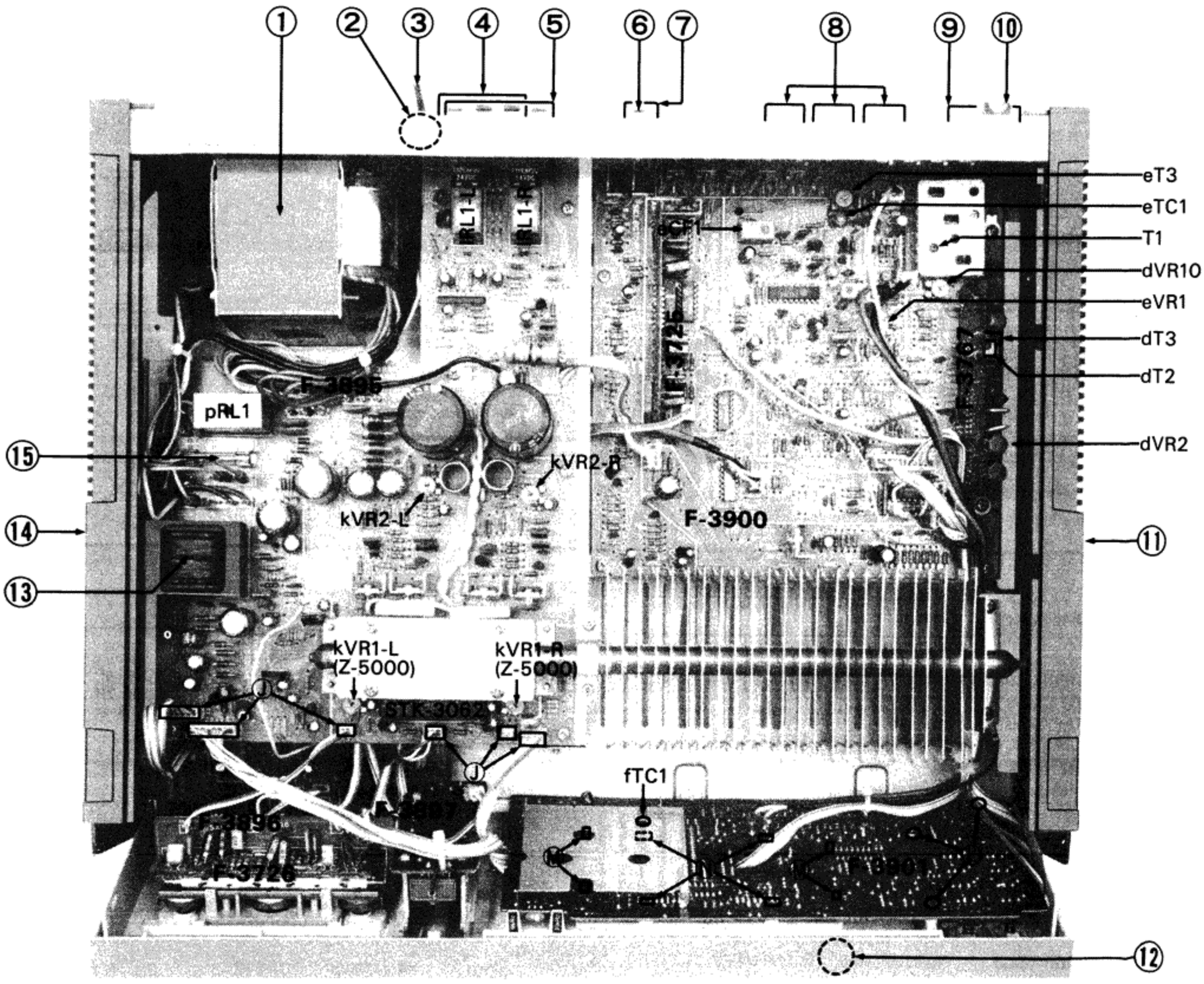
C.R.	: Carbon Resistor	E.B.	: Bi-Polar Electrolytic Capacitor
S.R.	: Solid Resistor	E.BL.	: Low Leak Bi-Polar Electrolytic Capacitor
Ce.R.	: Cement Resistor		
M.R.	: Metal Film Resistor	Ta.C.	: Tantalum Capacitor
F.R.	: Fusing Resistor	F.C.	: Film Capacitor
N.I.R.	: Non-Inflammable Resistor	M.P.	: Metalized Paper Capacitor
C.C.	: Ceramic Capacitor	P.C.	: Polystyrene Capacitor
C.T.	: Ceramic Capacitor, Temperature Compensation	G.C.	: Gimmic Capacitor
		V.R.	: Variable Resistor
E.C.	: Electrolytic Capacitor	S.V.R.	: Semi Variable Resistor
E.L.	: Low Leak Electrolytic Capacitor	SW.	: Switch

6. OTHER PARTS

6-1. Front View



6-2. Top View



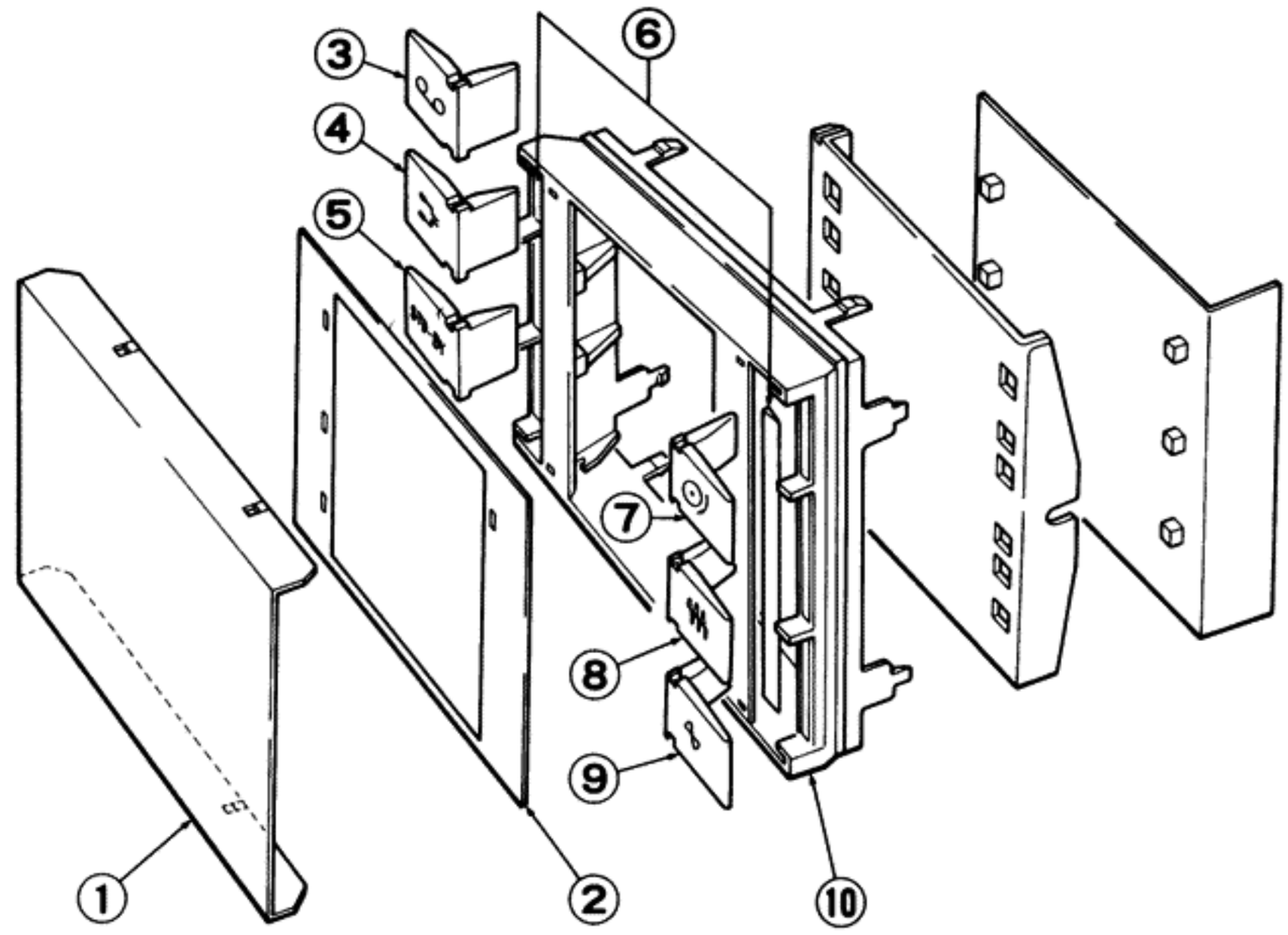
Parts List <Front View>

Parts No.	Stock No.	Description
1	47036500	Front Panel Ass'y (Z-5000)
	47036600	Front Panel Ass'y (Z-3000)
1-1	07988500	10 Key-Guide
1-2	07987300	Push Knob (1), PROGRAM
1-3	07987400	Push Knob (2), PROGRAM
1-4	07987500	Push Knob (3), PROGRAM
1-5	07987600	Push Knob (4), PROGRAM
1-6	07987700	Push Knob (5), PROGRAM
1-7	07987800	Push Knob (6), PROGRAM
1-8	07987900	Push Knob (7), PROGRAM
1-9	07988000	Push Knob (8), PROGRAM
1-10	07988100	Push Knob (9), PROGRAM
1-11	07988200	Push Knob (0), PROGRAM
1-12	47010800	Push Knob, TUNING, MEMORY, SCAN, CLOCK CALL
1-13	47021400	Push Knob Guide, TUNING, MEMORY, SCAN, CLOCK CALL
2	07932400	Knob, BASS, TREBLE, BALANCE
3	46423900	50kΩ x 2 & 250kΩ VR, BASS, TREBLE, BALANCE
4	47035700	Knob, MIC MIXING (Z-5000)
5	46424000	20kΩ VR, MIC MIXING (Z-5000)
6	47036700	Bonnet
7	47035600	Knob, PROGRAM TIMER
8	46396300	Rotary SW., PROGRAM TIMER
9	46396700	Push SW., TUNING, MEMORY, SCAN, CLOCK CALL
10	47010600	Push Knob, TAPE-2 TUNING/ FM MODE
11	46360000	Push SW., TAPE-2 TUNING/ FM MODE
12	46398600	LT1079, PEAK POWER Indicator (Z-5000)
13	47011100	Knob, VOLUME
14	46423800	150kΩ (B) x 2 Slide VR., VOLUME
15	47035500	Push Knob, HIGH FILTER, LOUDNESS, SUBSONIC FILTER
16	46430500	Push SW., HIGH FILTER, LOUDNESS, SUBSONIC FILTER (Z-5000)
	46430700	Push SW., HIGH FILTER, LOUDNESS, (Z-3000)
17	46133900	Jack, MIC (Z-5000)
18	47010700	Knob, SPEAKERS
19	46430600	Push SW., SPEAKERS
20	46289200	Jack, PHONES

Parts List <Top View>

Parts No.	Stock No.	Description
1	15009801	Power Transformer (Z-5000)
	15009901	Power Transformer (Z-3000)
2	39106000	Strain Relief
3	38005700	Power Supply Cord
4	46368600	AC OUTLET
5	46364100	8P Push Terminal, SPEAKERS
6	22301500	Gnd Terminal
7	46411800	Jack, COMPU-SELECTOR
8	46363800	4P Terminal, TAPE-1, TAPE-2, AUX, PHONO
9	46364200	4P Antenna Terminal
10	07193200	Lod Holder
11	47036400	Side Panel (R)
12	46315900	Pilot Lamp, 12V 0.15A
13	15008511	Power Transformer
14	47036300	Side Panel (L)
15	07188800	Fuse 3A (220 V) <Z-5000>
	07189200	Fuse 6A (120 V) <Z-5000>
	07188700	Fuse 2.5A (220 V) <Z-3000>
	07189100	Fuse 5A (120 V) <Z-3000>

6-3. Display Stage



Parts List <Display Stage>

Parts No.	Stock No.	Description
1	47034800	Display Cover
2	47034700	Display Panel
3	07925000	Knob, TAPE-1
4	07969900	Knob, AUX
5	07970000	Knob, POWER STD-BY
6	47071300	Cushion Rubber
7	07924400	Knob, PHONO
8	07924300	Knob, FM
9	07924200	Knob, AM
10	47011720	Display Holder
	46395900	Push SW., TAPE-1, AUX, POWER, PHONO, FM, AM

7. MAIN PARTS REPLACEMENT

A. Side Panel L (R)

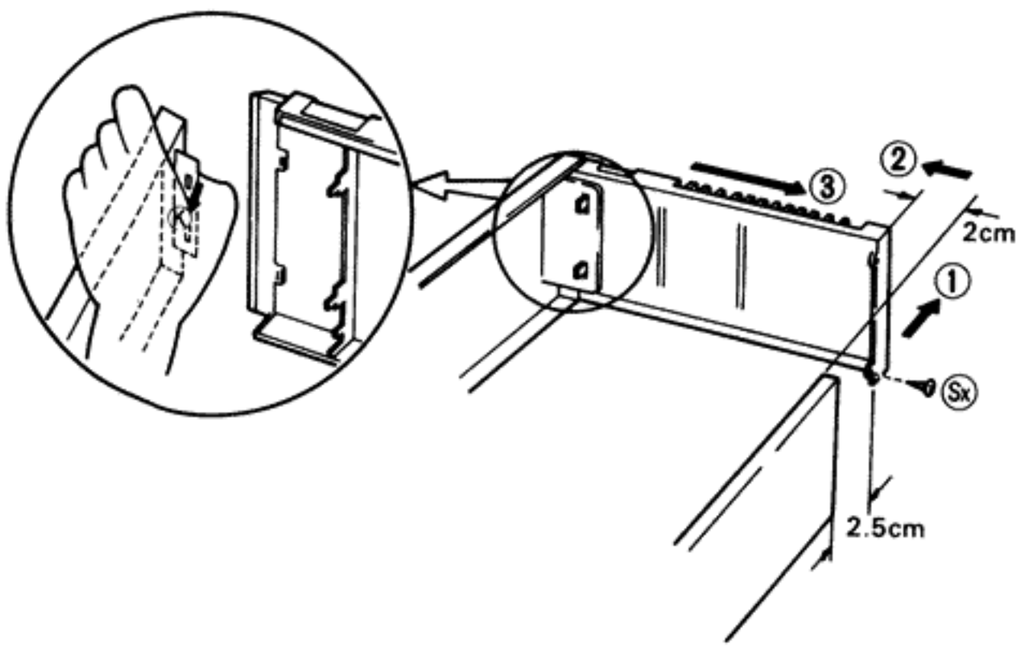
(See Fig. 7-1 and Top View on page 11)

1) Remove the bonnet.
2) Loosen two (Sx) screws fixing side panel L and R from rear panel side.
3) Pull out six (J) connectors on F-3895 circuit board.
4) Position the unit with left side upward.

Note: Do not spoil the side panel.

5) Shift the position of the side panel L 2.5 cm in the arrow direction (1) and shift it 2 cm in the arrow direction (2).
6) Grasp the front panel by left hand and pull (K) portion by left thumb, then pull it the arrow direction (3) to remove side panel L.
7) Remove the side panel R in the same knack.

Fig. 7-1



B. Display Stage

(See Top View on page 11)

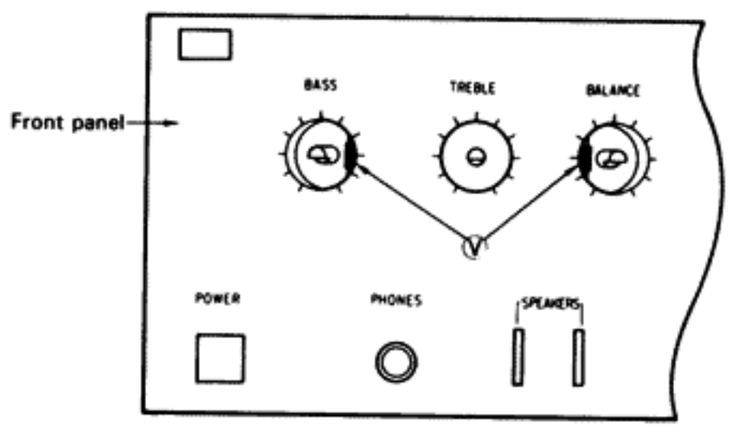
1) Remove the side panel L and side panel R.
2) Loosen the (L) screws fixing, F-3901 circuit board.
3) Unhook four (M) nails to remove F-3901 circuit board.
4) Unhook four (N) nails to remove display stage.

C. Front Panel Ass'y

(See Figs. 7-2, 7-3 and Top View on page 11)

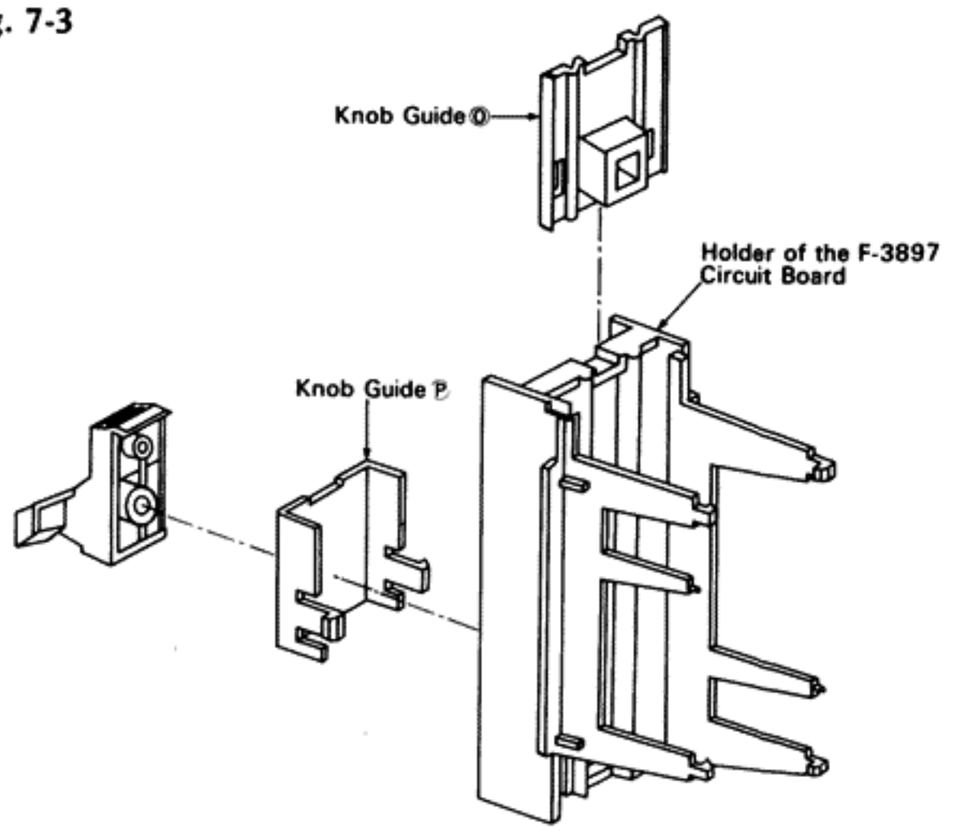
1) Remove the display stage.
2) Unhook four nails to remove the F-3897 circuit board with variable resistor.
3) Remove the F-3898 circuit board with phones jack and speaker switches.
4) Pluck out knobs (BASS, TREBLE, BALANCE)

Fig. 7-2



5) Unhook two (V) nails from front panel to remove the F-3896 circuit board.
6) Pluck out the mic level knob.
7) Remove the F-3899 circuit board with mic volume.

Fig. 7-3



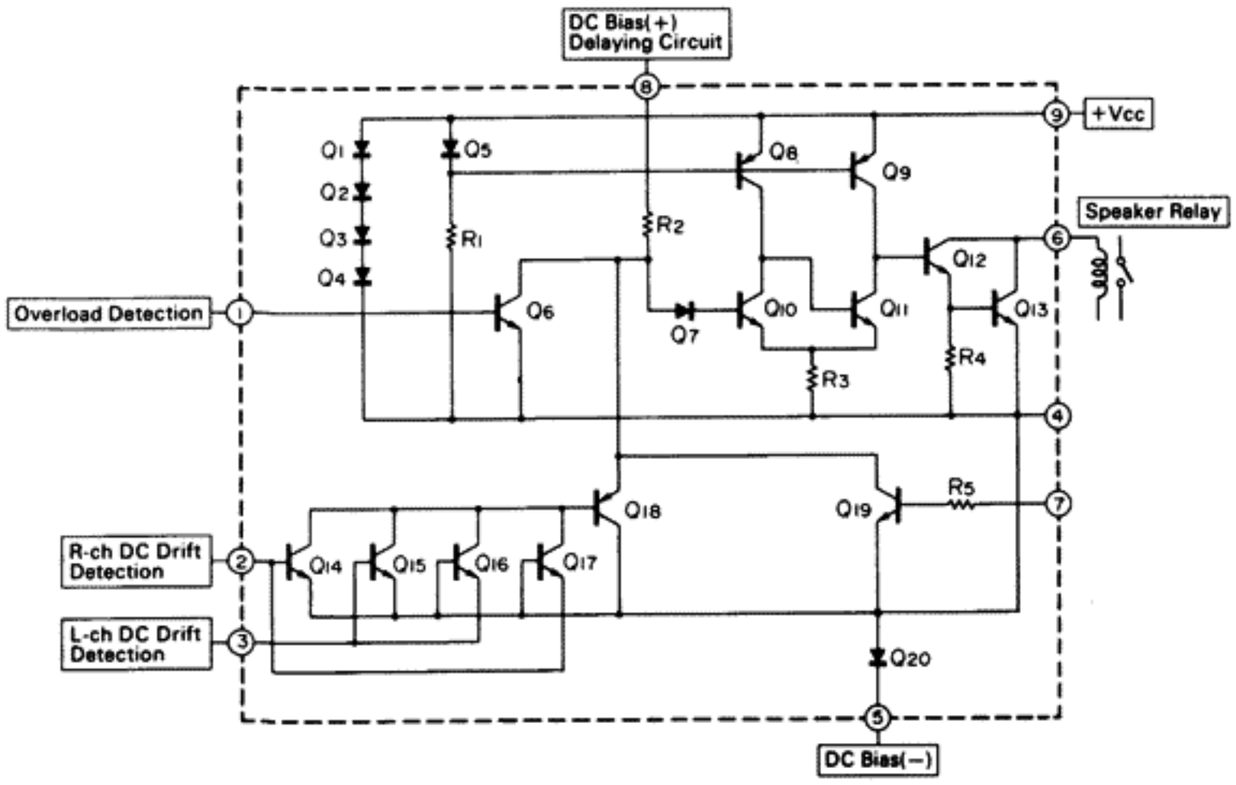
8) Unhook two nails to remove (O) knob guide.
9) Unhook two nails to remove holder of the F-3897 circuit board.
10) Remove (P) knob guide.

D. Program Knob

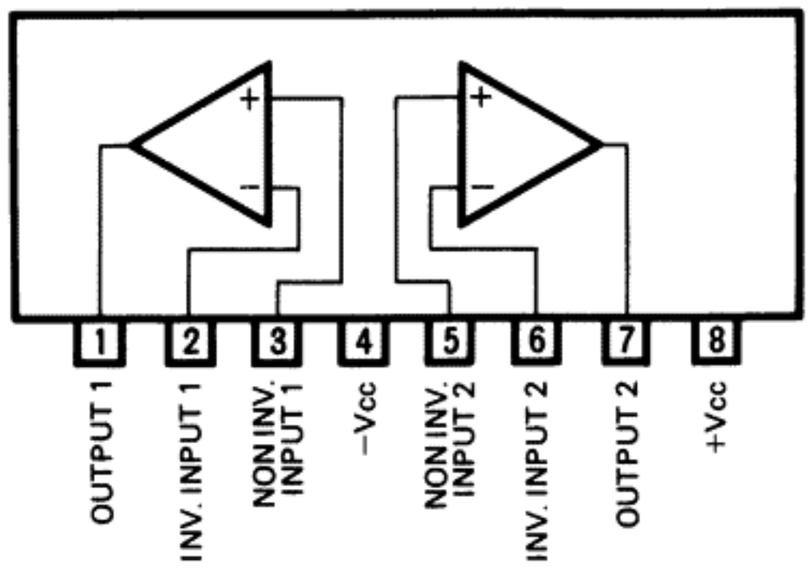
1) Remove front panel Ass'y.
2) Cut off the 10-key guide with program knobs from front panel by wire cutter.
3) Past new program knobs inside a little. (To settle program knobs and 10key guide, fix them by adhesive for plastic).
4) Insert program knobs into pins of new 10-key guide.
5) Settle the 10-key guide with program knobs by adhesive for plastic.

9. INTERIOR BLOCK DIAGRAM OF IC

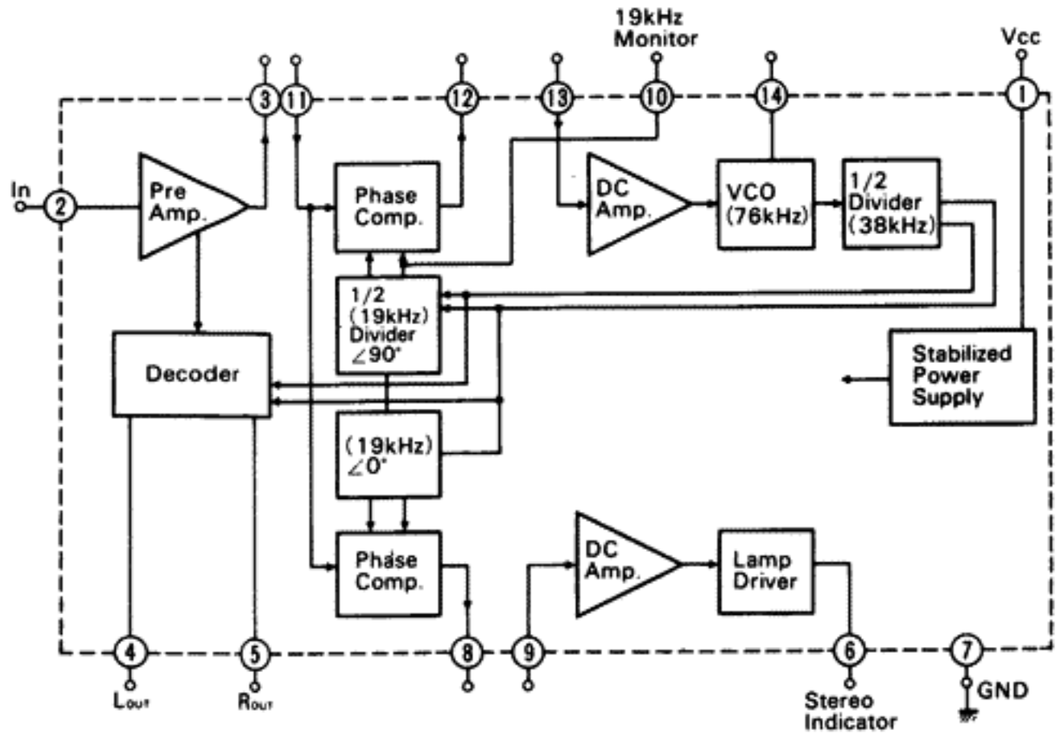
• TA7317P (Speaker Protector IC)



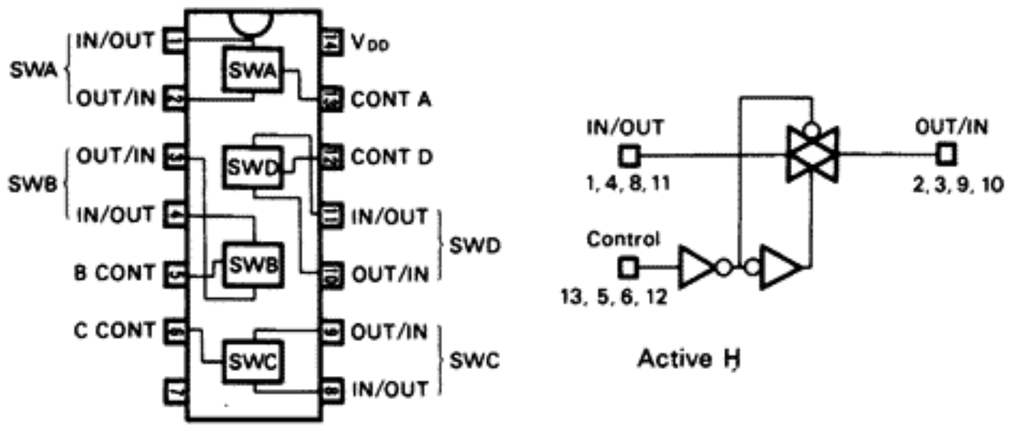
• M5220L, M5218L (Audio Pre Amp. IC)



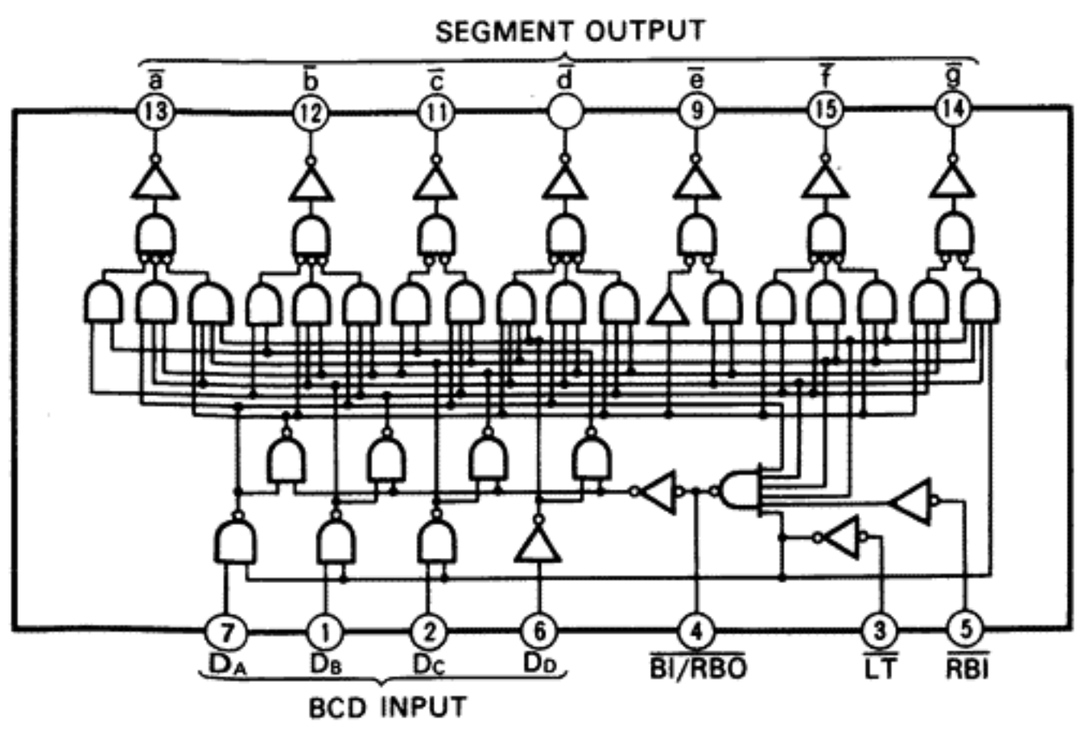
• HA1156 (MPX IC)



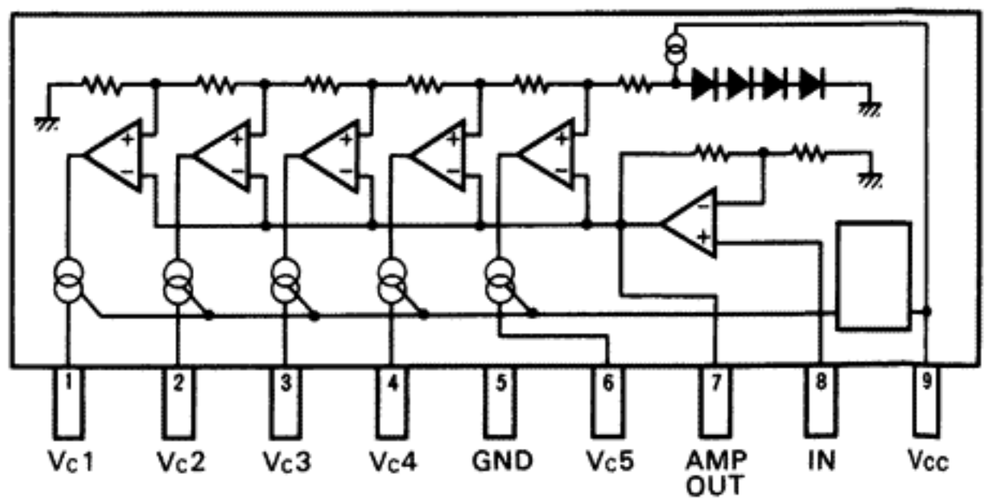
• LC4066BH (Quard Bilateral Switch IC)



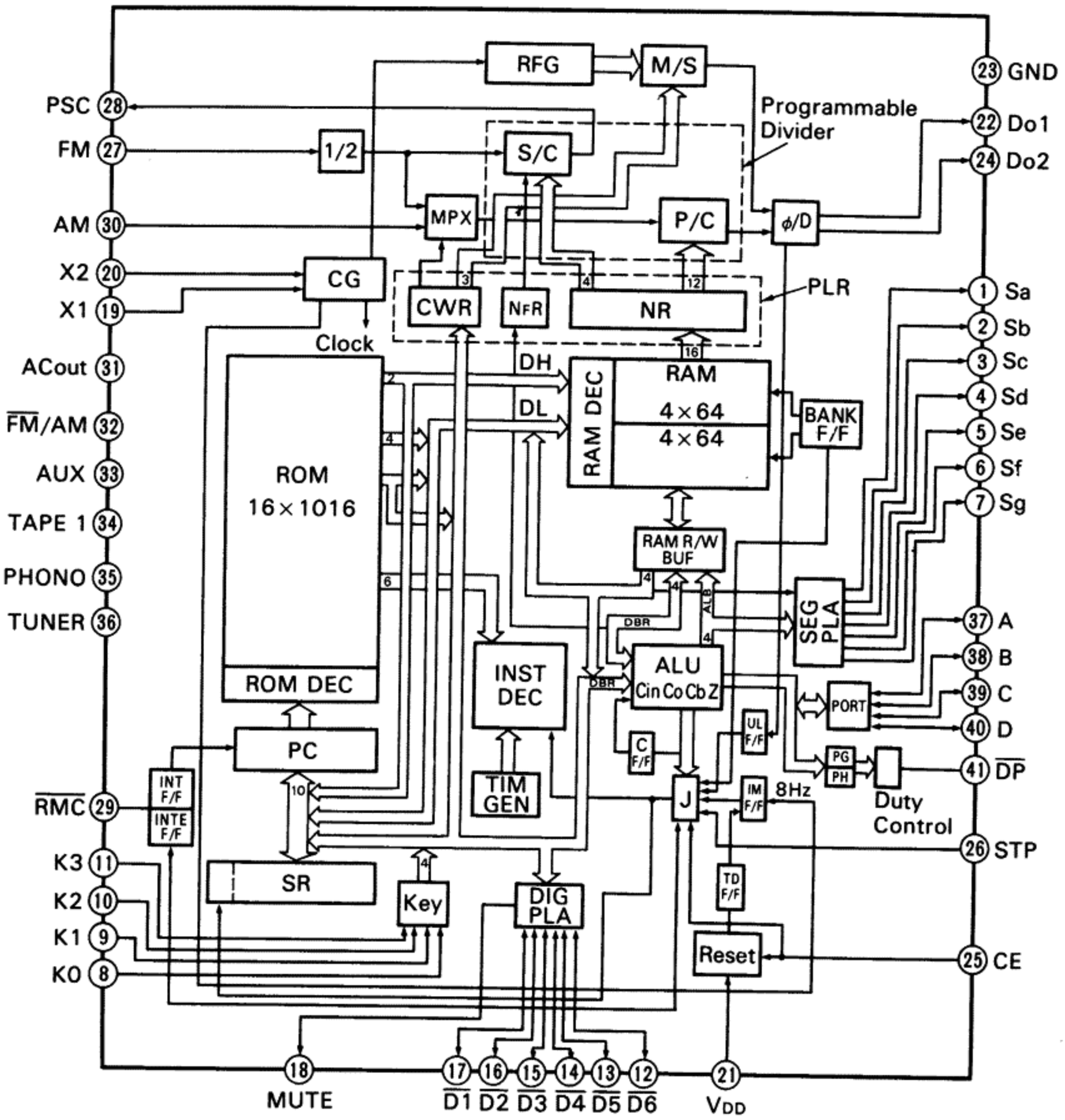
• M74LS247/MB74LS247 (BCD-TO-SEVEN-SEGMENT DECODER DRIVE IC)



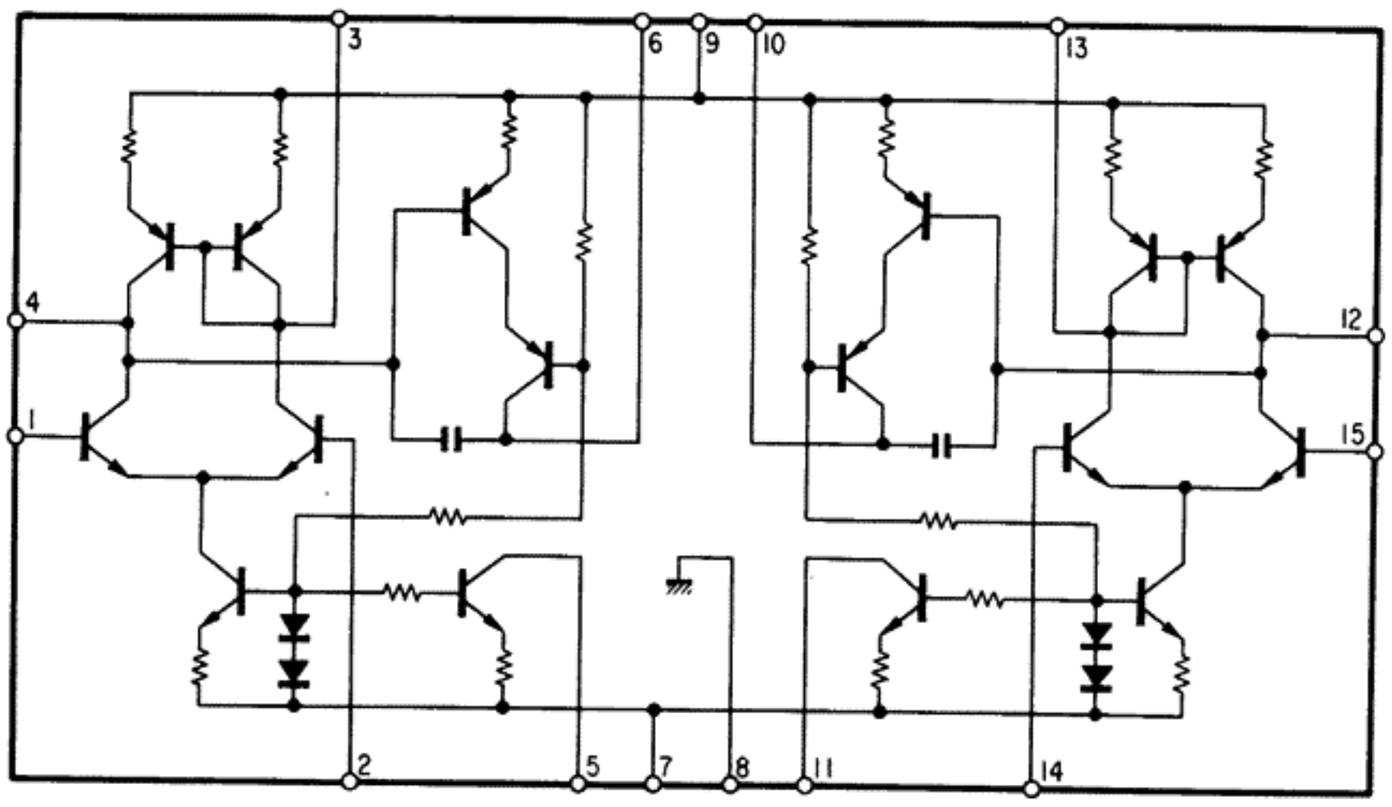
• BA6125 (L.E.D. Drive IC)



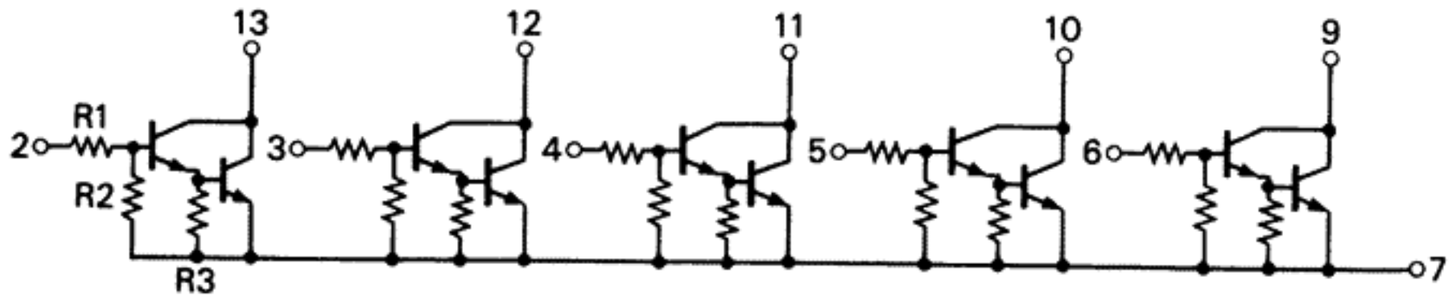
• μPD1704C-011 (FM/AM PLL Synthesizer & Control IC)



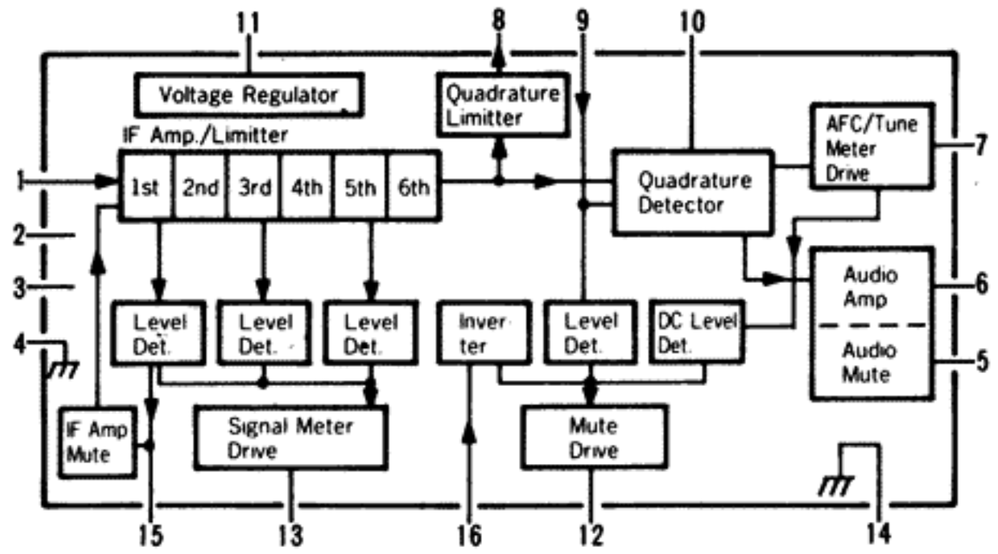
• STK3062 (Differential Amp. IC)



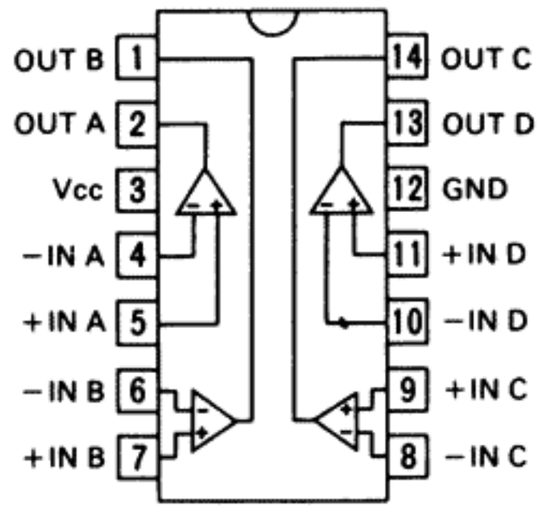
• BA-612 (L.E.D. Drive IC)



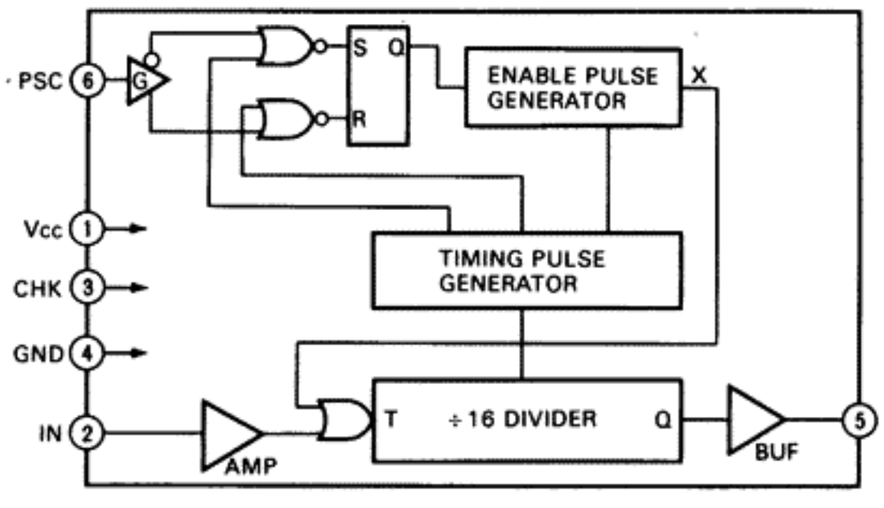
• LA1231N (IF & Quadrature Detector IC)



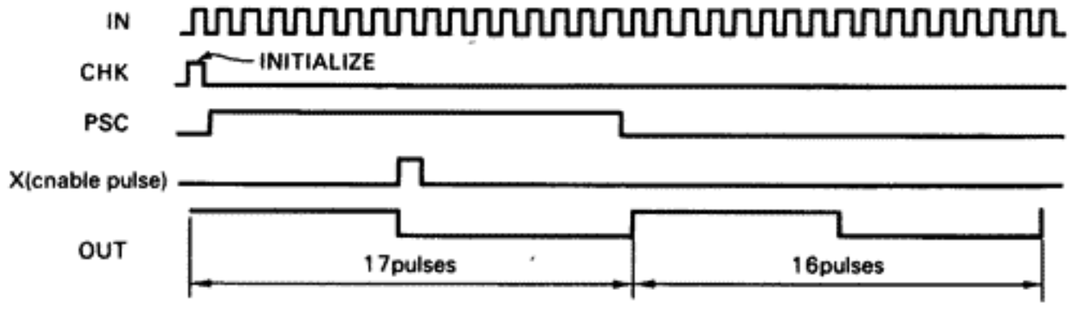
• MB4204M (Operational Amp. IC)



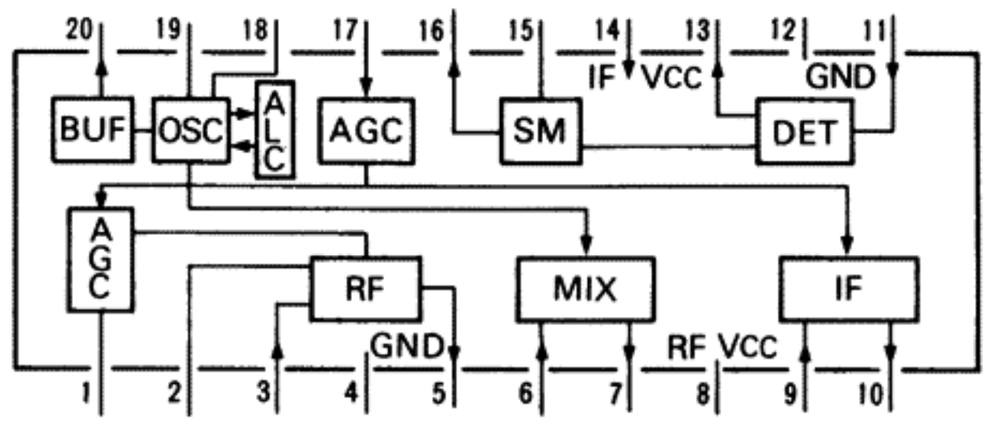
• μPB553AC (Prescaler IC)



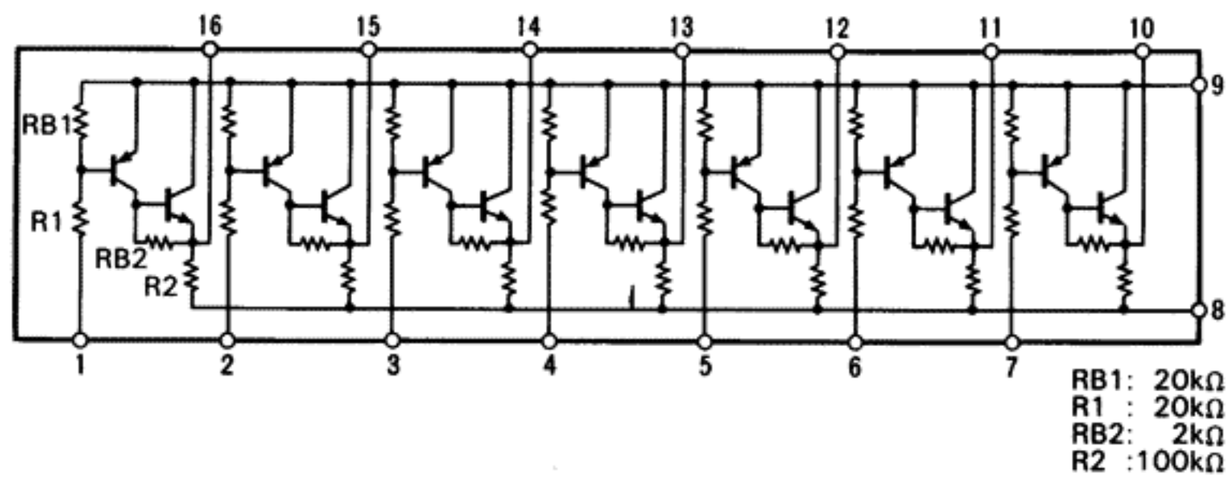
Timing Chart



• LA1245 (AM Tuner IC)



• μPA80C (FL Display Tube Drive IC)



RB1: 20kΩ
R1 : 20kΩ
RB2: 2kΩ
R2 :100kΩ

10. NOTES

10-1. Notice when the user moves from 9 kHz to 10 kHz step area, or vice versa, in AM broadcasting frequency

- AM programs are being broadcast under channel plans which, depending on the broadcasting area in the world, are characterized by different channels (frequency intervals) between broadcasting stations. In North, South, and Central America, this channel is 10 kHz whereas in the rest of these areas, it is 9 kHz.
  This unit is a synthesizer tuner which varies the reception frequency at each 9 kHz or 10 kHz channel (frequency interval) during auto search reception. If the client uses the unit in an area with a different channel plan, he may not be able to receive AM stations. The unit he has purchased has been originally adjusted to the channel in his area. It is therefore necessary to change over the channel setting if he moves to an area with a different channel plan.
  It is impossible to receive AM broadcasting in Automatic Tuning operation. In this case, use the AM 9/10 kHz channel step switch (oS18, see Fig. 4-1 on page 3) installed on the circuit board F-3901.

10-2. Notice when the user moves from 100 kHz to 50 kHz step area, or vice versa, in FM broadcasting frequency.

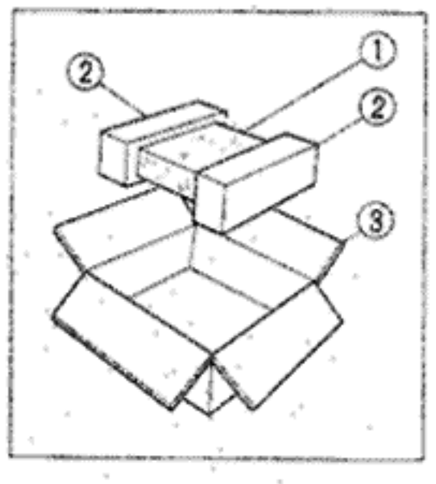
- When the frequency-step of AM broadcasting is set to 10 kHz or 9 kHz (in EUROPE) by sliding the AM 9/10 kHz channel step switch (oS18) installed on the circuit board F-3901, the frequency-step of FM broadcasting is also switched automatically to 200 kHz or 50 kHz (in EUROPE).

Switch (oS18)	AM	FM
Set 10 kHz	10 kHz Frequency Step	200 kHz Frequency Step
Set 9 kHz	9 kHz Frequency Step	50 kHz Frequency Step

- Disconnect the AC power plug from the AC outlet, when AM 9/10 kHz channel step switch (oS18) is set to 9 kHz or 10 kHz.

11. PACKING LIST

Parts No.	Stock No.	Description
1	91167820	Vinyl Bag
2	47036800	Styrofoam Packing
3	47036900	Carton Case (Z-5000)
	47037000	Carton Case (Z-3000)



12. ACCESSORY LIST

Stock No.	Description
07563000	Antenna Holder
46051700	FM Antenna
46145700	AM Loop Antenna
46256900	Operating Instruction (Z-5000)
46257000	Operating Instruction (Z-3000)
46425700	Operating Sheet

Sansui

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