



**KENWOOD**  
HI/FI STEREO COMPONENTS

# SERVICE MANUAL

**KR-9400**



**STEREO RECEIVER**

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**Note:**

The products are subject to modification in components and circuits in different countries and regions. This manual provides information of modification based on the standard in the U.S., for the convenience of ordering associated components and parts.

We employ the following abbreviations of respective countries.

U.S.A. ....	K
Canada ....	P
PX .....	U
Australia .....	X
Europe .....	W
England .....	T
Scandinavia .....	L
South Africa .....	S
Other area .....	M

# Service Bulletin

KENWOOD ELECTRONICS, INC  NATIONAL SERVICE DEPT.

DATE: August 15, 1977

Bulletin SB 2023

TO: ALL KENWOOD AUTHORIZED SERVICE CENTERS

SUBJECT: REPLACEMENT OF OUTPUT TRANSISTORS IN THE KR9400

The following procedure should be observed when servicing a KR9400 with blown output transistors:

- 1) Replace the power transistors 2SB539 and 2SD287.
- 2) On the main amp board X07-1390-10, remove the jumper wire J2 which connects the collector of Qe3 to ground pins 5 and 6. In its place install a 15K ohm,  $\frac{1}{4}$ W resistor.
- 3) Install a 0.47uf, 100V Mylar capacitor in parallel with capacitor Ce4 (47uf, 100V).
- 4) Replace the 1pf capacitor Ce8 with a 3pf capacitor. Alternatively, a 2pf capacitor can be added in parallel to the 1pf Ce8.
- 5) Sever the connection between pin 3 and Re7 on the main amp board by cutting the printed foil pattern between pin 3 and Re7. Make the cut as close to Re7 as possible.
- 6) Short pin 3 to pin 2 via a jumper wire.

The above service should be performed on both KR9400 main amp boards. Refer to figure 1 for further details.

Once the main amp boards have been serviced, proceed as follows:

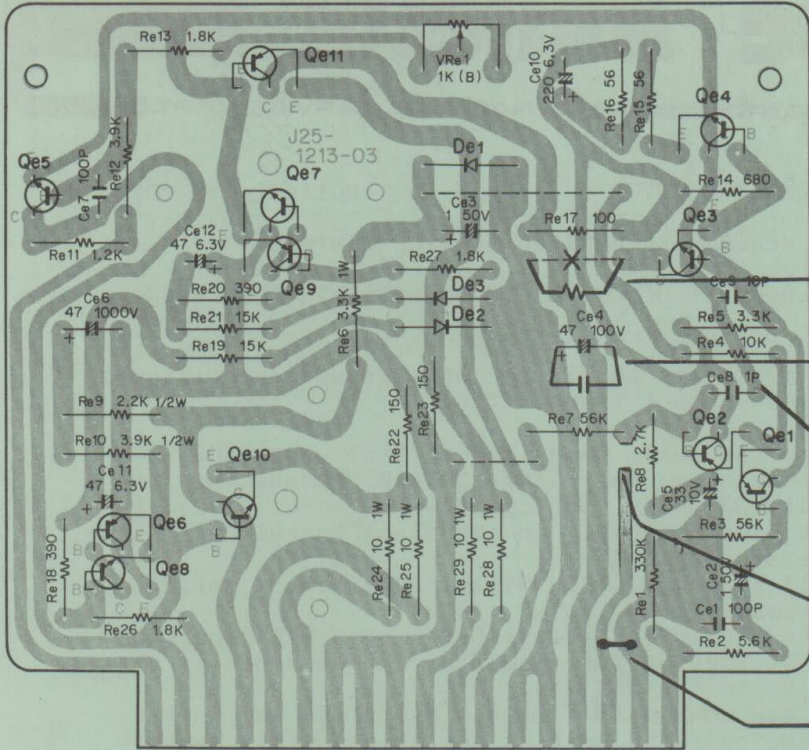
- 1) Check all eight output transistors and all eight 0.47 ohm resistors on the heat sink.
- 2) Check power supply.

If the above items are in proper working condition, install the main amp boards.

Once the boards are installed adjust the bias conditions. Refer to the service manual and figure 2 below. Note that bias adjustments made when the receiver is cold will differ from the adjustment made after warm-up. Therefore, to avoid over currents, allow about 10 minutes warm-up prior to adjustment.

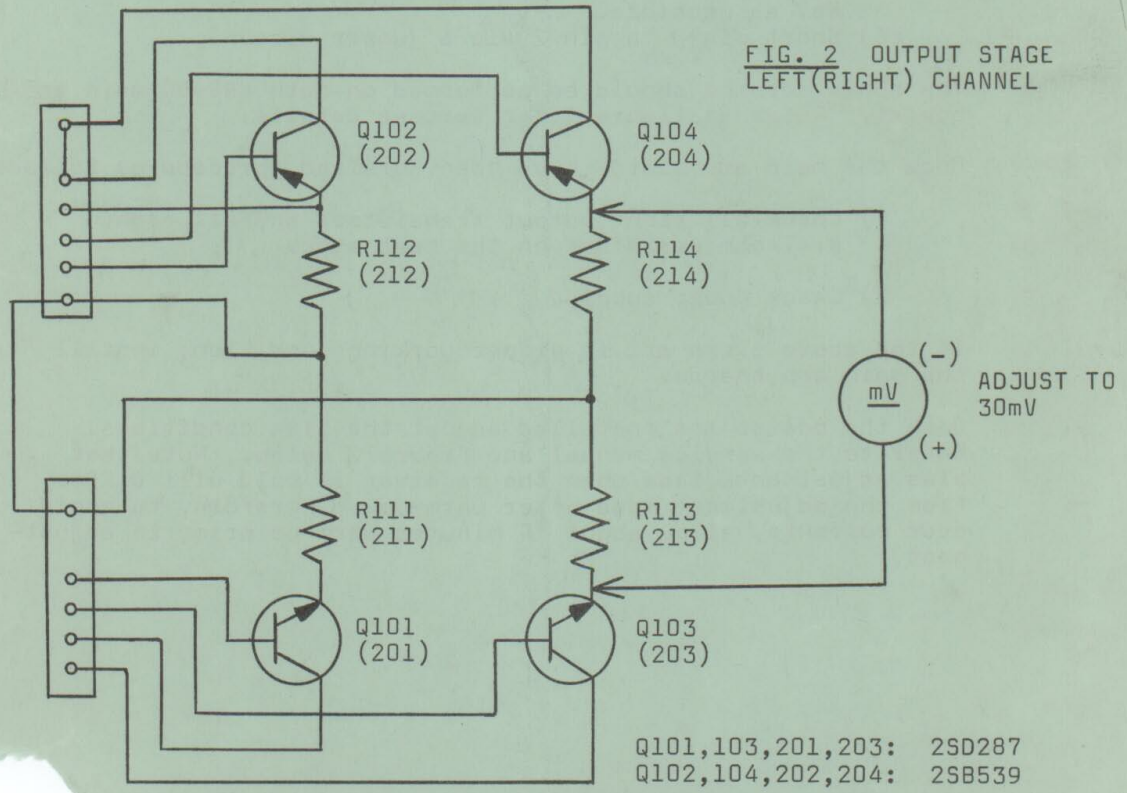


FIG. 1  
MAIN AMP  
X07-1390-10



- 1) CHANGE OUTPUT TRANSISTORS
- 2) REMOVE JUMPER. ADD 15K, 1/4W
- 3) ADD 0.47uf, 100V
- 4) CHANGE TO 3pf
- 5) CUT OPEN
- 6) SHORT PINS 2 AND 3

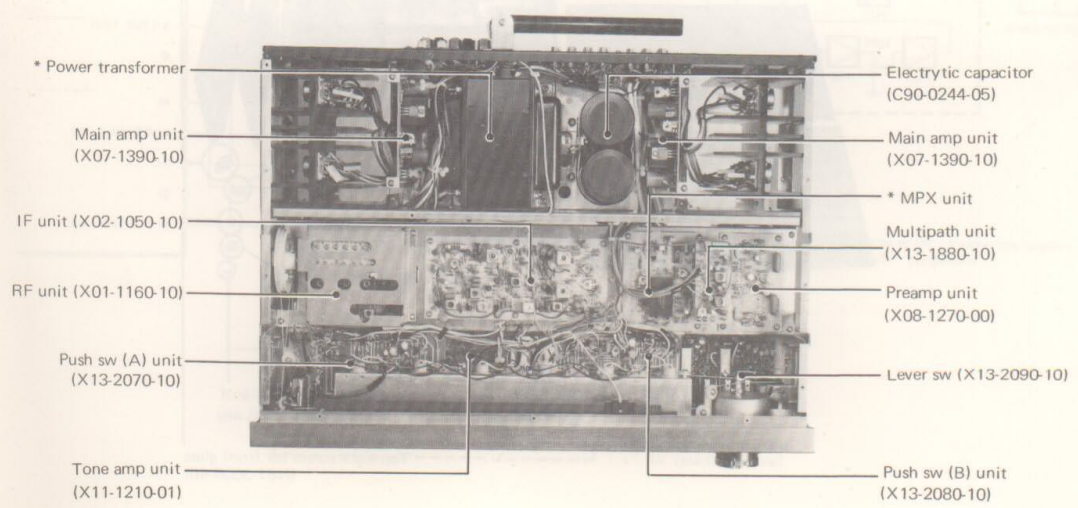
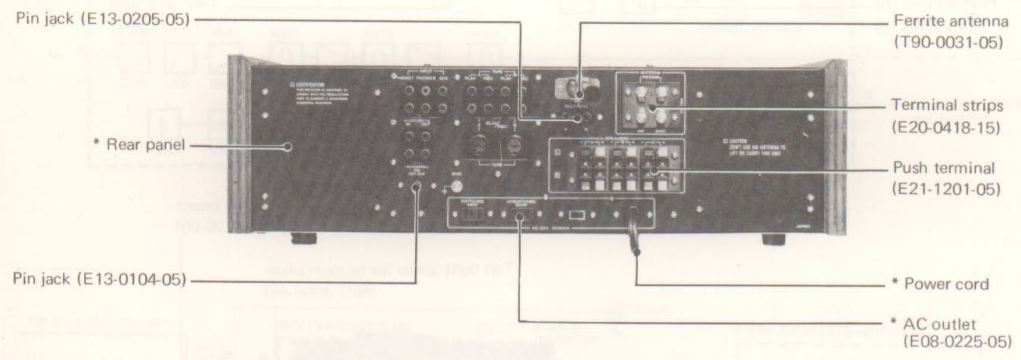
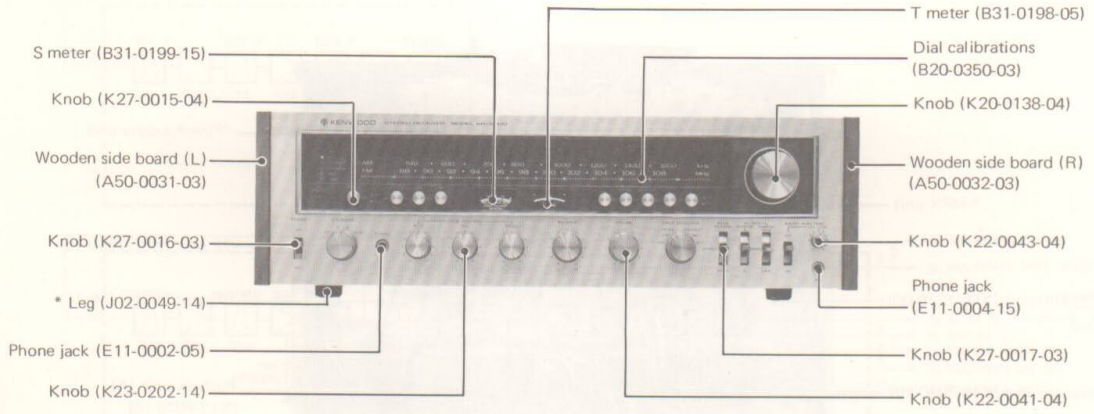
FIG. 2 OUTPUT STAGE  
LEFT(RIGHT) CHANNEL



Q101,103,201,203: 2SD287  
Q102,104,202,204: 2SB539

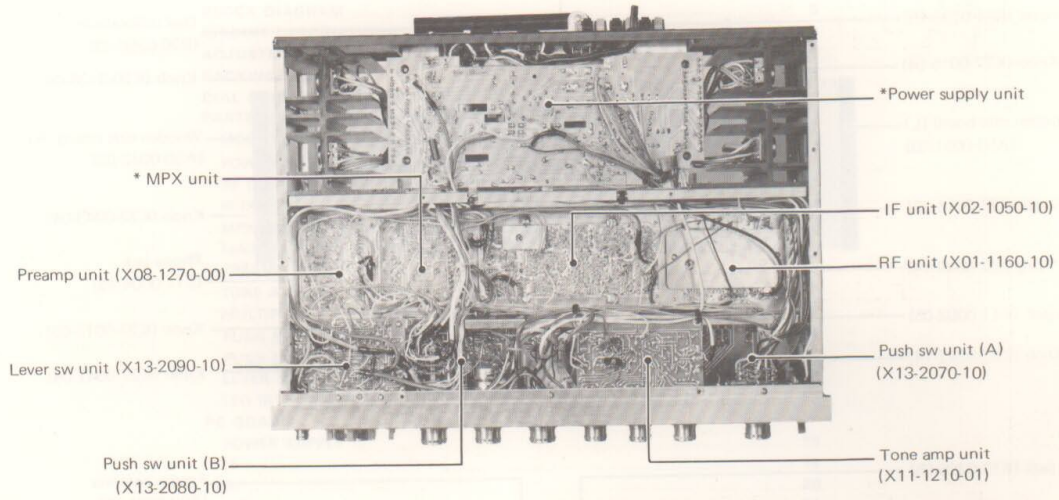


# EXTERNAL & TOP VIEW

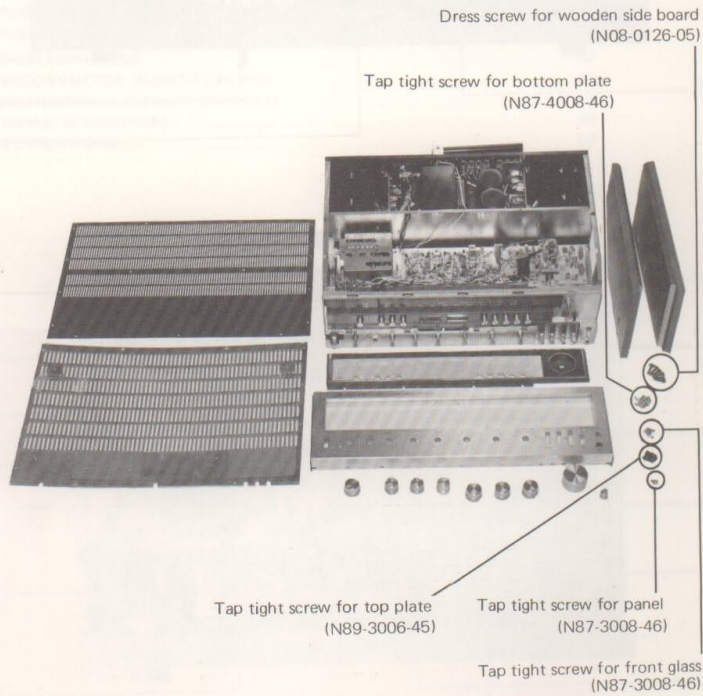


\* Refer to parts list

# BOTTOM VIEW/DISASSEMBLY

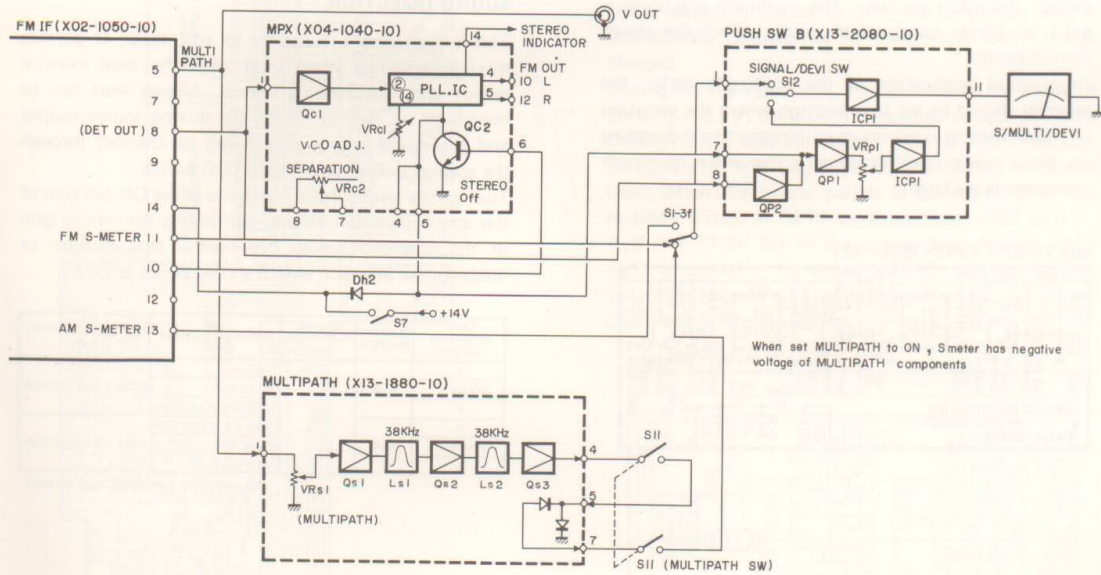
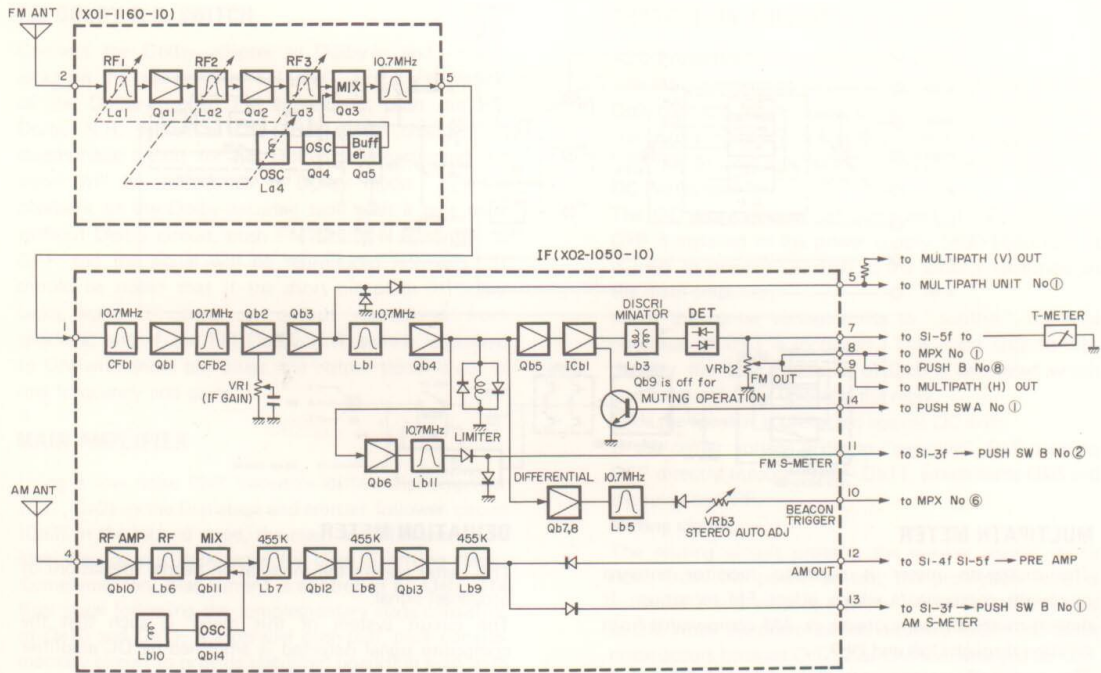


\* Refer to parts list

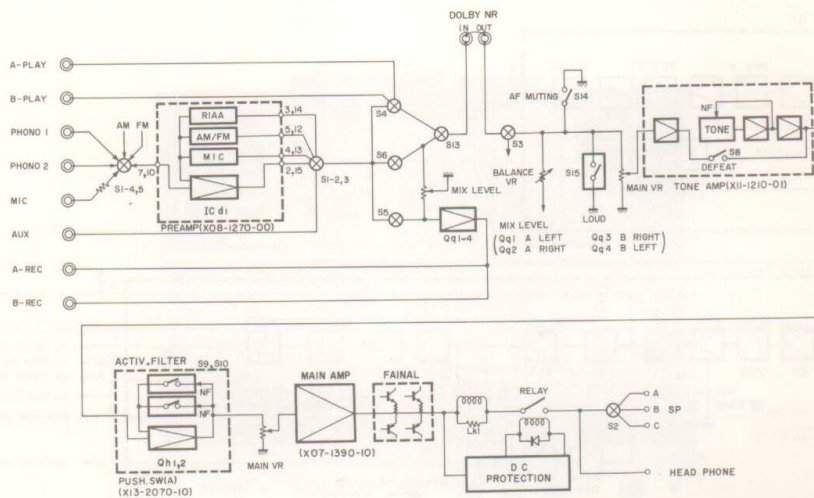




# BLOCK DIAGRAM (1)



## BLOCK DIAGRAM/CIRCUIT DESCRIPTIONS



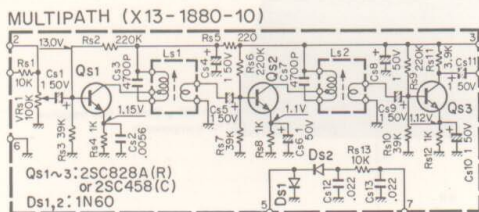
### MULTIPATH METER

The multipath meter is used to monitor antenna multipath components which affect FM reception. It detects multipath components or AM components from IF stage through Db6 and Db7.

The multipath components thus detected are fed to X13-1880-10 consisting of Qs1, Ls1, Qs2, Ls2 and Qs3 and then rectified by negative voltage doubler rectifier composed of Ds1 and Ds2.

This voltage is mixed with the signal meter input to deflect the meter pointer. The multipath components exist in 38kHz band, which vitally affect the stereo demodulation.

In practical application of the multipath meter, the antenna should be set to a position where the variation of meter reading is minimum with respect to the reading on the S meter (meter reading is low when multipath components are large).



### DEVIATION METER

This meter checks the modulation degree (deviation) of broadcast signal.

The circuit system of this meter is such that the composite signal detected is amplified by DC amplifier (IC used) to provide excellent transient response.

The meter pointer indicates full scale (100%) at 67.5kHz deviation, 100% modulation for FM stereo or at 75kHz deviation, 100% modulation for FM mono.

### SOUND INJECTION

This circuit has a function to edit tape. It permits mixing recording when used with the tape monitor switch and the dubbing switch. Mixing level can be controlled as desired. Both the mixing source output and the mixed source output can be checked through the speaker output with MONITOR switch.

The mixing level control functions at the ON position of the sound injection switch, controlling the mixing gain of the selector source. For normal tape monitor or dubbing, the injection switch should be set to OFF.

TAPE MONITOR SWITCH	DUBBING SWITCH	SOUND INJECTION SWITCH	SPEAKER OUTPUT	REC JACK OUTPUT (A, B)
A	A-B	ON	TAPE-A	TAPE-A & SELECTOR
SOURCE			SELECTOR	
B	TAPE-A & SELECTOR			
A	TAPE-B & SELECTOR			
SOURCE	B-A	SELECTOR	TAPE-B & SELECTOR	
B		TAPE-B		

RELATION OF SWITCHES AND OUTPUT



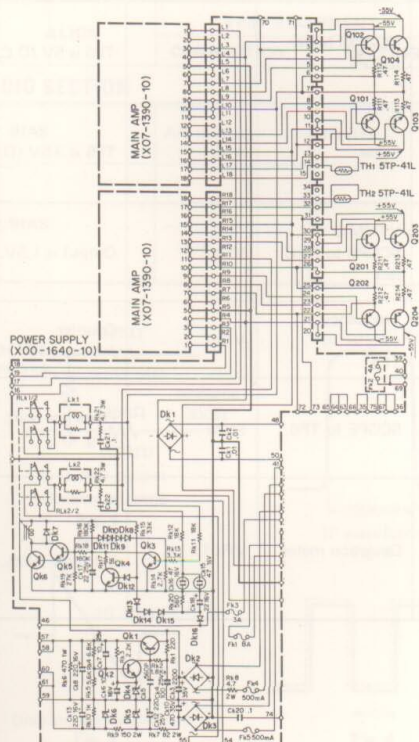
## CIRCUIT DESCRIPTIONS

### FM DOLBY N.R. SWITCH

Connect the Dolby adapter to Dolby-in and -output jacks on the rear panel of KR-9400. For the reception of the Dolby-encoded FM broadcasts, push the FM Dolby N.R. switch to ON. This switch changes FM de-emphasis circuit for FM Dolby broadcasts, and the signal will be reproduced in Dolby mode. For the playback of the Dolby-encoded tape with a tape deck without Dolby circuit, push FM Dolby N.R. switch to OFF and the signal will be reproduced normally. It should be noted that if the short pin plugs in Dolby jacks leave it open, no output reproduces from speakers, and if the FM Dolby N.R. switch is pushed to ON with short pin plugs, the output signal is cut in low frequency and gains.

### MAIN AMPLIFIER

Using a low noise PNP transistor differential amplifier (Qe1, Qe2) in the first stage and emitter follower circuit (Qe3) in the second stage, the main amplifier assures an ideal low output impedance for class A driving stage. Complementary bias current is controlled by Qe5. The final stage following the complementary stage consisting of Qe10 and Qe11, is a parallel push-pull, pure complementary circuit to provide stabilized operation even with large output signals.



### PROTECTION CIRCUIT

#### ASO Protection:

The ASO protection circuit composed of Qe6 through Qe9 controls input signal exceeding ASO of the final transistors, thus protecting the transistors against overload due to large inputs or shorting of speaker terminals.

#### DC Protection:

The DC protection circuit composed of Qk3, Qk5, and Qk6 is installed in the power supply (X00-1640-10). It is used to prevent DC drift at the speaker terminals on the main amplifier.

When the center voltage drifts to "positive", the base potential of Qk3 is increased. This turns Qk3 to ON, thereby the base potential of Qk5 is decreased which also turns off Qk5, Qk6 and the relay.

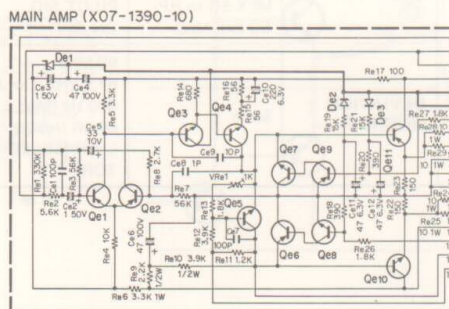
Thus the speaker is protected against DC drift.

If the center voltage drifts to "negative", Qk5 is set to OFF directly through Dk8 ~ Dk11, which turns Qk6 and the relay to OFF.

#### Muting circuit:

The muting circuit protects the speaker against shock noise from the power switch; the protection relay is activated 2 ~ 3 seconds after the power switch is turned to ON. When the power switch is turned to OFF, no shock noise occurs because Ck17 (22μ 15V) is discharged by Qk4. In normal operation, Qk5 is in ON state with the voltage shunted by Rk16, Rk18 and Rk19. However, at the time the power switch is turned to ON, the base potential of Qk5 is low until Ck17 is charged, and therefore Qk5 and the relay are set to OFF. When the power switch is turned to OFF, the protection relay is immediately deenergized by Qk4 while Ck17 is discharged.

During normal operation, the potential at the anode of Dk12 is -8.2V, summed the rectified voltage of -10V through Dk16 and the voltage drop of +1.8V through Dk13, Dk14, and Dk15, so Qk4 is cut off in reverse bias. When the power switch is turned to OFF, the rectified voltage at Dk16 increases from -10V to 0V. And then +1.8V due to the voltage drop through Dk13 ~ 15 is applied to the anode of Dk12, thus turning Qk4 to ON and thereby Ck17 is discharged which, in turn, set Qk5 and the relay to OFF.



## ADJUSTMENT

- \* Tuning dial is set to the proper point corresponding to no radio stations.
- \* The sweep and the r.f. generator are set to the lowest response possible on oscilloscope.
- \* When connecting the r.f. generator, to the antenna terminal use the dummy antenna . . . refer to Fig. 1.
- \* Use the insulated screwdriver adjusting the i.f.t.
- \* FM MUTING is OFF position unless it is required.
- \* Test point shown in the schematic diagram and PC board.
- \* INPUT means antenna input level.

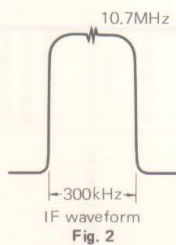
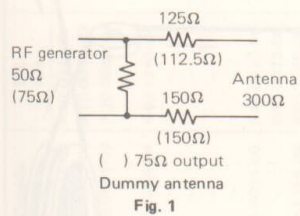
No.	ALIGN	TEST EQUIPMENTS		RECEIVER SETTING	OUTPUT INDICATOR	ADJUSTMENT POINTS	REMARKS
		CONNECTION	SETTING				
<b>FM SECTION</b>							
1	IFT	SWEEP to TP1 via. 5pF cap.	10.7 MHz	Non-station	SCOPE to TP2 via 100 kΩ resist.	Lb1 La8	Maximum deflection (Fig. 2)
2	IFT	Same	Same	Same	SCOPE to TP3, TP4	Lb11 Lb5	Same
3	DIS-CRIMINATOR	Same	Same	Same	VTVM & SCOPE to DET OUT jack	Lb3	S-response and its symmetry on each side of 10.7 MHz center frequency (Fig. 3)
4	TRACKING	RF-SG to ANT via. dummy ant.	90 MHz 75 kHz (Dev.) 400 Hz (Mod.)	90 MHz	Same	La1 ~ 4	Maximum deflection
5	TRACKING	Same	105 MHz 75 kHz (Dev.) 400 Hz (Mod.)	105 MHz	Same	CTa1 ~ 4	Same
6	BEACON	Same	95 MHz 75 kHz (Dev.) 400 Hz (Mod.) 60 dB (Input)	95 MHz	DC Volt Meter to TP5	VRb3	TP5 is 5V (D.C.)
7	IF GAIN	Same	95 MHz 75 kHz (Dev.) 400 Hz (Mod.) 22~23dB (Input)	Same	Same	VRb1	TP5 is 3.5V (D.C.)
8	AF OUTPUT	Same	95 MHz 75 kHz (Dev.) 400 Hz (Mod.) 60 dB (Input)	Same	VTVM & SCOPE to REC jack	VRb2	Output is 1.5V.
9a	VCO	—	—	Non-station	Frequency-counter to TP6.	VRc1	Counter indicates 19 kHz.
9b	VCO	RF-SG to ANT via. dummy ant. MPX-SG to RF-SG ext. Mod.	95 MHz 60 dB (Input) PILOT SIG. ON-OFF	95 MHz	SCOPE to TP6.	Same	Phase not drift. (Fig. 4)
10	DEVIATION METER	Same	95 MHz 67.5 kHz (Dev.) 400 Hz (Mod.) 60 dB (Input) L + R (SELECTOR)	95 MHz Deviation Meter SW on	Deviation meter	VRp1.	Meter indicates 100%.



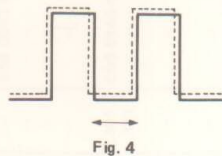
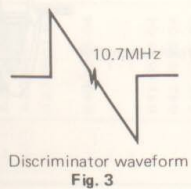
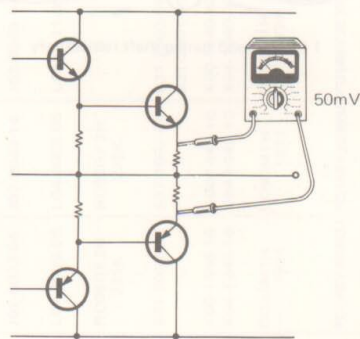
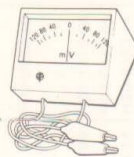
## ADJUSTMENTS

No.	ALIGN	TEST EQUIPMENTS		RECEIVER SETTING	OUTPUT INDICATOR	ADJUSTMENT POINTS	REMARKS
		CONNECTION	SETTING				
11	SEPARATION	Same	95 MHz 67.5 kHz (Dev.) 400 Hz (Mod.) 60 dB (Input) L or R (SELECTOR)	95 MHz	VTVM & SCOPE to REC jack	VRc2	Minimum deflection
12	MULTIPATH	AG to TP7.	38 kHz	Non-station	VTVM & SCOPE to TP8.	Ls1, Ls2	Maximum deflection
13	MULTIPATH	Same	38 kHz 1 mV (Input)	Same	Same	VRs1	TP8 is 1V.
<b>AM SECTION</b>							
1	IFT	SWEEP to TP9.	455 kHz	Non-station	VTVM & SCOPE to TP10.	Lb7 ~ 9	Maximum deflection
2	TRACKING	RF-SG to ANT	600 kHz 400 Hz (30% Mod.)	600 kHz	VTVM & SCOPE to REC jack	Lb6, Lb10 Ferrite ANT	Same
3	TRACKING	Same	1,400 kHz 400 Hz (30% Mod.)	1,400 kHz	Same	CTa5 ~ 7	Same
4	S METER	Same	1,000 kHz 400 Hz (30% Mod.)	1,000 kHz	S meter	—	Confirm the meter deflection at 4.5

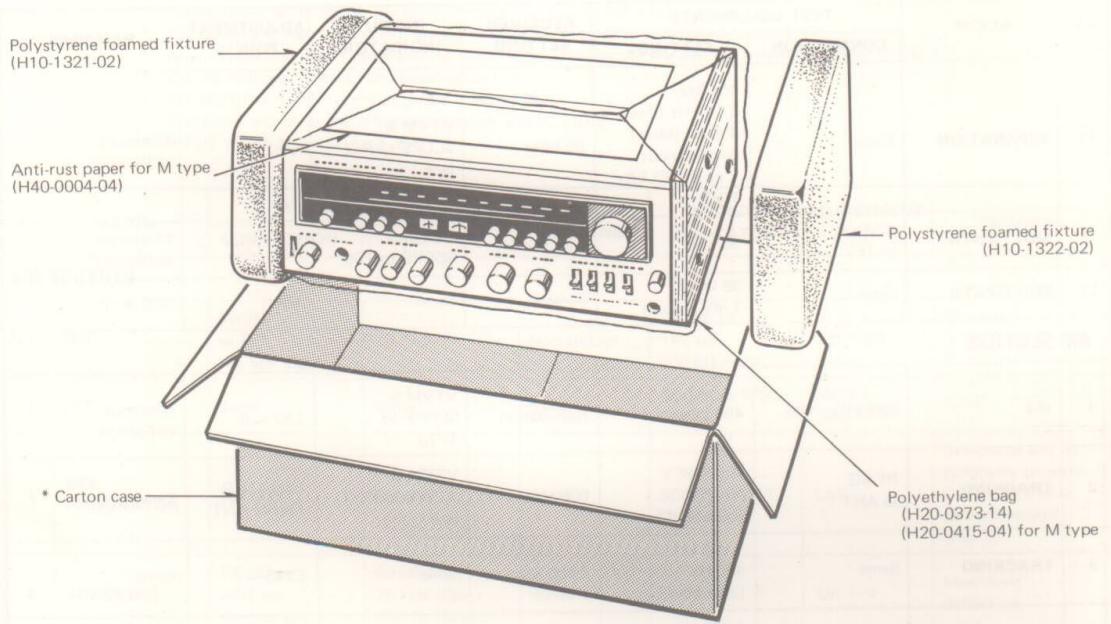
No.	ALIGN	TEST EQUIPMENT		OUTPUT INDICATOR	ADJUSTMENT POINTS	REMARKS
		CONNECTION	SETTING			
<b>AUDIO SECTION</b>						
1	BIAS	AG to Aux.	10 kHz	SCOPE across dummy load	VRe1	Waveform has not crossover distortion.
2	BIAS	—	—	IDLING METER (Fig. 5) across the emitter resistor of the power transistor	VRe1	Meter indicates around 50mV.



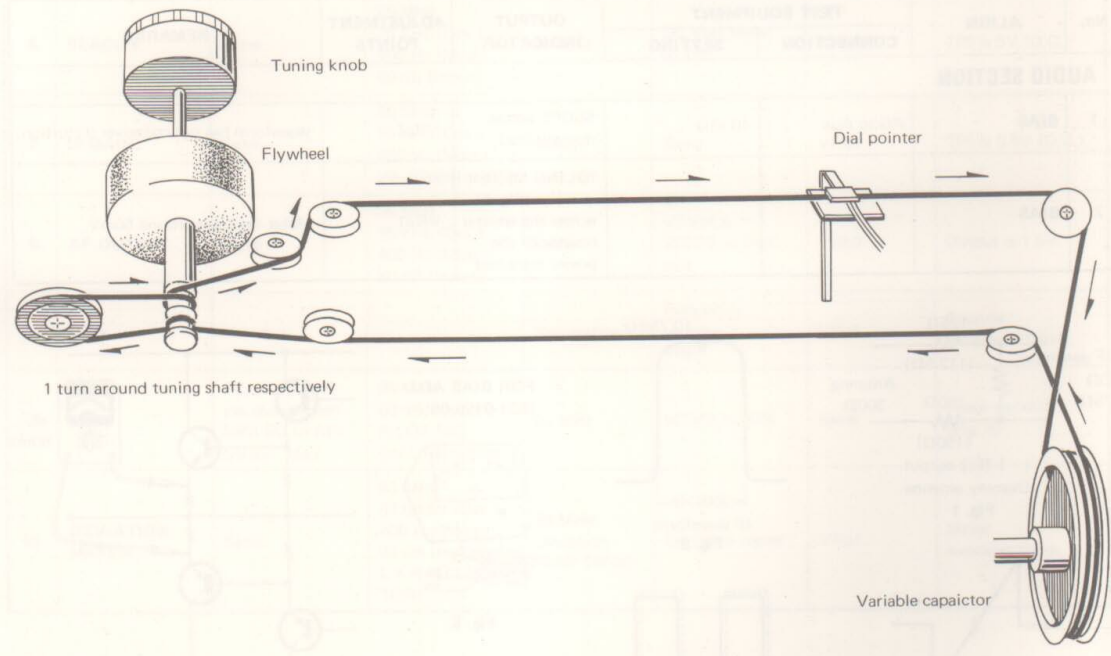
FOR BIAS ADJ.  
(B31-0125-05)



# PACKING/DIAL CORD STRINGING



\* Refer to parts list





# MODIFICATIONS' PARTS LIST

Ref. No.	U.S.A. (K)	Canada (P)	PX (U)	Australia (X)	Europe (W)	Scandinavia (L)	England (T)	South Africa (S)	Other areas (M)	Description
	A20-0946-01	A20-0946-01	A20-0946-01		A20-0946-01	A20-0946-01	A20-0948-01		A20-0946-01	Panel
	A20-0947-03	A20-0947-03	A20-0947-03		A20-0947-03	A20-0947-03	A20-0949-01		A20-0947-03	Panel ass'y
	A23-0581-02	A23-0581-02	A20-0582-02		A20-0583-02	A23-0584-02	A23-0586-02		A20-0949-03	Rear panel
	B40-1246-04	B40-1246-04	B40-1248-04		B40-1250-04	B40-1252-04	B40-1251-04		B40-1249-04	Model name plate
					B42-0024-04					SEV sticker
					B42-0574-04					FTZ sticker
	B42-0571-04									Caution sticker for top plate
	B42-0572-04									Caution sticker x 3
	B46-0002-00									Warranty card
	B50-1365-00	B46-0021-00	B46-0022-00		B50-1365-00	B50-1365-00	B50-1366-00		B50-1365-00	Instruction manual
	B58-0043-00	B58-0043-00	B46-0023-00							Carton case caution card
			B58-0139-00		B58-0156-00				B58-0003-00	Power supply caution card
			B58-0144-00		B58-0157-00				B58-0101-00	Power voltage selector caution card
			B59-0018-00							KENWOOD service stations' list
C301, 311	C90-0145-05	C90-0145-05	CK45E3D103 PMU		CK45E3D103 PMU x 3	CK45E3D103 PMU x 3	CK45E3D103 PMU		CK45E3D103 PMU	Capacitor 0.01µF
			D32-0075-04		D32-0075-04		D32-0075-04		D32-0075-04	Switch stopper (power voltage selector)
					E05-0203-05					Power plug
	E08-0225-05	E08-0225-05	E08-0225-05		E08-0225-05		E08-0225-05		E08-0225-05	AC outlet x 2
	E30-0181-05	E30-0181-05	E30-0034-25		032-0202-05	E30-0292-05	040-0304-05		E30-0034-25	Power cord
			F09-0033-05		F09-0033-05 x 3	F09-0033-05 x 3				Capacitor cap x 2
			H01-1415-04		H01-1415-04	H01-1415-04	H01-1416-04		H01-1414-04	Carton case
			H03-0442-04		H03-0442-04	H03-0442-04	H03-0443-04			Carton case
	H20-0373-14	H20-0373-14	H20-0373-14		H20-0373-14	H20-0373-14	H20-0373-14		H20-0415-04	Polyethylene cover
									H40-0004-04	Anti-rust paper
	J02-0073-04	J02-0049-14	J02-0049-14		J02-0049-14	J02-0049-14	J02-0049-14		J02-0049-14	Leg x 4
	L04-0089-05	L04-0089-05	L03-0111-05		L09-0155-05	L09-0155-05	L03-0111-05		L03-0111-05	Power transformer
R301	RC05GF2H 225K	RC05GF2H 225K								Resistor 2.2MΩ ±10% 1/2W
S16	S37-2002-05	S37-2002-05	S37-2003-05		S37-2003-05	S37-2003-05	S37-2003-05		S37-2003-05	Lever switch (power)
			S31-2001-05		S31-2001-05		S31-2001-05		S31-2001-05	Slide switch (power voltage selector)
	X00-1640-10	X00-1640-10	X00-1640-82		X00-1640-61	X00-1640-61	X00-1640-82		X00-1640-82	Power supply unit
	X04-1040-10	X04-1040-10	X04-1040-10		X04-1040-61	X04-1040-61	X04-1040-01		X04-1040-10	MPX unit
Cx1,2	CO93M1H 182J	CO93M1H 182J	CO93M1H 182J		CO93M1H 272J	CO93M1H 272J	CO93M1H 272J		CO93M1H 182J	Mylar 0.0018µF ±5%
Cx1,2					CO93M1H 272J	CO93M1H 272J	CO93M1H 272J			Mylar 0.0027µF ±5%
Rx1,2	PD14BY2E393J	PD14BY2E393J	PD14BY2E393J		PD14BY2E183J	PD14BY2E183J	PD14BY2E183J		PD14BY2E393J	Carbon 39kΩ ±5% 1/4W
Rx1,2										Carbon 18kΩ ±5% 1/4W

# PARTS LIST

KR-9400

Ref. No.	Parts No.	Description	Re- marks
<b>CAPACITOR</b>			
C112 ~ 117	CK45F403Z	Ceramic 0.04μF +80%, -20%	
C118 ~ 123	CK45D1H561M	Ceramic 560pF ±20%	
C302,303	C90-0244-05	Electrolytic 15000μF 80WV (a pair)	
C304	CQ93M1H224K	Mylar 0.22μF ±10%	
C305	CE04W1H010	Electrolytic 1μF 50WV	
<b>RESISTOR</b>			
R101,201	PD14BY2E103J	Carbon 10kΩ ±5% 1/4W	
R102,202	PD14BY2E102J	Carbon 1kΩ ±5% 1/4W	
R103,203	PD14BY2E154J	Carbon 150kΩ ±5% 1/4W	
R104,204	PD14BY2E184J	Carbon 180kΩ ±5% 1/4W	
R105,205	PD14BY2E154J	Carbon 150kΩ ±5% 1/4W	
R106,206	PD14BY2E184J	Carbon 180kΩ ±5% 1/4W	
R107,207	RN14AB3D681K	Metal film 680Ω ±10% 2W	
R111 ~ 114	R92-0115-05	Metal film 0.47Ω ±10% 3W	
R211 ~ 214			
R302	PD14BY2E104J	Carbon 100kΩ ±5% 1/4W	
<b>SEMICONDUCTOR</b>			
Q101,201	V04-0045-05	Transistor 2SD287(1) (Q) or (R)	
Q102,202	V02-0042-05	Transistor 2SB539(1) (Q) or (R)	
Q103,203	V04-0045-05	Transistor 2SD287(1) (Q) or (R)	
Q104,204	V02-0042-05	Transistor 2SB539(1) (Q) or (R)	
D301	V11-0273-05	Diode 1S2076A	
TH1, 2	V22-0027-05	Thermistor 5TP-41L	
<b>POTENTIOMETER</b>			
VR1	R06-3010-05	Potentiometer 10kΩ(B) MIX	
VR2	R08-5028-05	Potentiometer 100kΩ(B) BALANCE	
VR3	R11-9009-05	Potentiometer 100kΩ(B) x 2 10kΩ(B) x 2 VOLUME	
<b>SWITCH</b>			
S1	S10-5015-05	Rotary (INPUT SELECTOR)	
S2	S10-3076-05	Rotary (SPEAKERS)	
<b>MISCELLANEOUS</b>			
-	A10-0453-02	Front chassis	
-	A11-0067-02	Sub chassis	
-	A13-0118-03	Frame A (L)	
-	A13-0119-03	Frame A (R)	
-	A13-0120-03	Frame B	
-	A22-0176-01	Sub panel	
-	A33-0038-03	Reflector	
-	A40-0138-13	Bottom plate	
-	A50-0031-03	Wooden side board (L)	
-	A50-0032-03	Wooden side board (R)	
-	A52-0012-03	Top plate	
-	A70-0088-05	Pilot lamp ass'y	
-	B01-0097-04	Side plate (L)	
-	B01-0098-04	Side plate (R)	
-	B03-0089-02	Dress plate	
-	B07-0154-02	Escutcheon	
-	B07-0155-04	Pushbutton switch ring x 9	
-	B10-0187-13	Front glass	
-	B19-0177-03	Color board	
-	B20-0350-03	Dial calibrations	

Ref. No.	Parts No.	Description	Re- marks
-	B21-2023-05	Dial pointer	
-	B31-0198-05	Tuning meter	
-	B31-0199-15	Signal meter	
-	B42-0009-04	Passed sticker	
-	B52-0186-00	Schematic diagram	
-	D01-0021-05	Flywheel	
-	D15-0133-03	Dial pulley	
-	D15-0146-04	Small pulley x 6	
-	D20-0114-03	Dial shaft ass'y	
-	E02-0209-05	Transistor socket x 8	
-	E11-0002-05	Phone jack (HEAD PHONE)	
-	E11-0004-15	Phone jack (MIC)	
-	E13-0104-05	Pin jack (1P)	
-	E13-0205-05	Pin jack (2P)	
-	E20-0418-15	Terminal strips	
-	E21-0138-05	GND terminal	
-	E21-1201-05	Push terminal (SPEAKERS)	
-	E29-0072-05	Pin jack ass'y	
-	F01-0213-02	Heat sink x 2	
-	F07-0336-23	Front end cover	
-	F10-0340-04	Shield plate	
-	F10-0369-04	Shield plate	
-	F20-0066-05	Mica plate x 8	
-	F20-0105-04	Insulator x 2	
-	G01-0045-24	Dial spring	
-	H10-1321-02	Polystyrene foamed fixture	
-	H10-1322-02	Polystyrene foamed fixture	
-	H25-0078-00	Polyethylene bag	
-	J19-0257-04	Antenna holder	
-	J21-0116-04	Pc board mounting hardware	
-	J21-0806-14	Loopstick antenna mounting hardware	
-	J21-0979-04	L shaped hardware	
-	J21-1364-04	Pc board mounting hardware (L) x 2	
-	J21-1365-04	Pc board mounting hardware (R) x 2	
-	J90-0069-04	Dial pointer rail	
-	K20-0138-04	Knob (TUNING)	
-	K22-0041-04	Knob (VOLUME, BALANCE, SPEAKERS, SELECTOR)	
-	K22-0043-04	Knob (MIX)	
-	K23-0202-14	Knob (TONE) x 3	
-	K27-0015-04	Knob (PUSHBUTTON) x 9	
-	K27-0016-03	Knob (POWER)	
-	K27-0017-03	Knob (MODE, MONITOR, DUBBING, SOUND INJECTION)	
-	L19-0009-05	Balun transformer	
-	T90-0002-05	FM indoor antenna	
-	T90-0031-05	Loopstick antenna	
-	X01-1160-10	RF unit	
-	X02-1050-10	IF unit	
-	X07-1390-10	Main amp unit	



## PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
-	X08-1270-00	Preamp unit	
-	X11-1210-01	Tone amp unit	
-	X13-1880-10	Multipath unit	
-	X13-2070-10	Push sw (A) unit	
-	X13-2080-10	Push sw (B) unit	
-	X13-2090-10	Lever switch unit	
-	X13-2100-10	LED unit	

### POWER SUPPLY (X00-1640-10)

Ref. No.	Parts No.	Description	Re- marks
<b>CAPACITOR</b>			
Ck1, 2	CK45E2H103P	Ceramic 0.01 $\mu$ F +100%, -0%	
Ck3	CE02W1V222	Electrolytic 2200 $\mu$ F 35WV	
Ck4	CE04W1E101	Electrolytic 100 $\mu$ F 25WV	
Ck5	CK45D1H561M	Ceramic 560pF $\pm$ 20%	
Ck6	CE02W1C100	Electrolytic 10 $\mu$ F 16WV	
Ck7	CS15E1E100M	Tantulum 10 $\mu$ F 25WV	
Ck8	CE04W1C221	Electrolytic 220 $\mu$ F 16WV	
Ck10	CE04W1V471	Electrolytic 470 $\mu$ F 35WV	
Ck12	CE04W1E221	Electrolytic 220 $\mu$ F 25WV	
Ck13	CE04W1C221	Electrolytic 220 $\mu$ F 16WV	
Ck15, 16	C90-0297-05	Electrolytic 47 $\mu$ F 16WV	
Ck17	CE04W1E220	Electrolytic 22 $\mu$ F 25WV	
Ck18	CE04W1C220	Electrolytic 22 $\mu$ F 16WV	
Ck20~ 22	CQ93M1H104K	Mylar 0.1 $\mu$ F $\pm$ 10%	
<b>RESISTOR</b>			
Rk1	PD14BY2E221J	Carbon 220 $\Omega$ $\pm$ 5% 1/4W	
Rk2	PD14BY2E182J	Carbon 1.8k $\Omega$ $\pm$ 5% 1/4W	
Rk3	PD14BY2E222J	Carbon 2.2k $\Omega$ $\pm$ 5% 1/4W	
Rk4	PD14BY2E682J	Carbon 6.8k $\Omega$ $\pm$ 5% 1/4W	
Rk5	PD14BY2E562J	Carbon 5.6k $\Omega$ $\pm$ 5% 1/4W	
Rk6	RN14AB3A471J	Metal film 470 $\Omega$ $\pm$ 5% 1W	
Rk7	RN14AB3D820J	Metal film 82 $\Omega$ $\pm$ 5% 2W	
Rk8	RN14AB3D4R7J	Metal film 4.7 $\Omega$ $\pm$ 5% 2W	
Rk9	RN14AB3D151J	Metal film 150 $\Omega$ $\pm$ 5% 2W	
Rk10	PD14BY2E102BJ	Carbon 1k $\Omega$ $\pm$ 5% 1/4W	
Rk11, 12	PD14BY2E183J	Carbon 18k $\Omega$ $\pm$ 5% 1/4W	
Rk13	PD14BY2E332J	Carbon 3.3k $\Omega$ $\pm$ 5% 1/4W	
Rk14	PD14BY2E272J	Carbon 2.7k $\Omega$ $\pm$ 5% 1/4W	
Rk15	PD14BY2E333J	Carbon 33k $\Omega$ $\pm$ 5% 1/4W	
Rk16	PD14BY2E184J	Carbon 180k $\Omega$ $\pm$ 5% 1/4W	
Rk17	PD14BY2E560J	Carbon 56 $\Omega$ $\pm$ 5% 1/4W	
Rk18	PD14BY2E184J	Carbon 180k $\Omega$ $\pm$ 5% 1/4W	
Rk19	PD14BY2E273J	Carbon 27k $\Omega$ $\pm$ 5% 1/4W	
Rk20	PD14BY2E561JB	Carbon 560 $\Omega$ $\pm$ 5% 1/4W	
Rk21, 22	RN14AB3F4R7J	Metal film 4.7 $\Omega$ $\pm$ 5% 3W	
Lk1, 2	RN14AB3H100K	Metal film 10 $\Omega$ $\pm$ 10% 5W	
<b>SEMICONDUCTOR</b>			
Qk1	V03-0343-05	Transistor 2SC1419	
Qk2, 3	V03-0303-05	Transistor 2SC1416A	
Qk4	V03-0235-05	Transistor 2SC1212A	
Qk5	V03-0303-05	Transistor 2SC1416A	
Qk6	V04-0025-05	Transistor 2SD220	
Dk1	V11-0385-05	Diode S5188	
Dk2, 3	V11-0320-05	Diode W04M	
Dk4	V11-0339-05	Zener diode EQA01-06R	
Dk5	V11-0286-05	Zener diode CZ-245	

Ref. No.	Parts No.	Description	Re- marks
Dk6	V21-0006-05	Zener diode DZ-140	
Dk7	V11-0219-05	Diode V06B	
Dk8~15	V11-0273-05	Diode 1S2076A	
Dk16	V11-0219-05	Diode V06B	

### MISCELLANEOUS

-	B41-0210-04	Fuse sticker (X00-1640-10)	
-	F01-0197-04	Heat sink	
-	F01-0212-04	Heat sink (for Dk1)	
F1	F05-8022-05	Fuse (8A) (X00-1640-10)	
F1, 2	F05-4022-05	Fuse (4A) (X00-1640-82)	
F1, 2	F05-4024-05	Fuse (4A) (X00-1640-61)	
F3	F05-3021-05	Fuse (3A) (X00-1640-10)	
F3	F05-3022-05	Fuse (3A) (X00-1640-82)	
F3	F05-3122-05	Fuse (3.15A) (X00-1640-61)	
F4, 5	F05-5011-05	Fuse (0.5A) (X00-1640-10)	
F4, 5	F05-5013-05	Fuse (0.5A) (X00-1640-82)	
F4, 5	F05-5015-05	Fuse (0.5A) (X00-1640-61)	
-	J13-0020-05	Fuse holder x 8 (X00-1640-10)	
-	J13-0020-05	Fuse holder x 10 (X00-1640-82)	
-	J13-0039-05	Fuse holder x 10 (X00-1640-61)	
Lk1, 2	L39-0055-15	Coil	
RL	S51-4029-05	Relay	

### RF (X01-1160-10)

Ref. No.	Parts No.	Description	Re- marks
<b>CAPACITOR</b>			
Ca1	CC45SH1H100J	Ceramic 10pF $\pm$ 5%	
Ca2, 3	CK45F1H103Z	Ceramic 0.01 $\mu$ F +80%, -20%	
Ca4	CC45SL1H101J	Ceramic 100pF $\pm$ 5%	
Ca5	CC45SH1H100J	Ceramic 10pF $\pm$ 5%	
Ca7, 8	CK45F1H103Z	Ceramic 0.01 $\mu$ F +80%, -20%	
Ca9	CC45SL1H101J	Ceramic 100pF $\pm$ 5%	
Ca10	CC45SH1H120J	Ceramic 12pF $\pm$ 5%	
Ca11	CC45SG1H180J	Ceramic 18pF $\pm$ 5%	
Ca12, 13	CK45F1H103Z	Ceramic 0.01 $\mu$ F +80%, -20%	
Ca14	CC45RG1H220J	Ceramic 22pF $\pm$ 5%	
Ca15	CC45TH1H100J	Ceramic 10pF $\pm$ 5%	
Ca16	CK45F1H103Z	Ceramic 0.01 $\mu$ F +80%, -20%	
Ca17	CC45TH1H390J	Ceramic 39pF $\pm$ 5%	
Ca18, 19	CC45TH1H100J	Ceramic 10pF $\pm$ 5%	
Ca20	CQ93M1H103K	Mylar 0.01 $\mu$ F $\pm$ 10%	
Ca21, 22	CK45F1H103Z	Ceramic 0.01 $\mu$ F +80%, -20%	
<b>RESISTOR</b>			
Ra1	PD14BY2B103J	Carbon 10k $\Omega$ $\pm$ 5% 1/8W	
Ra2	PD14BY2B562J	Carbon 5.6k $\Omega$ $\pm$ 5% 1/8W	
Ra3	PD14BY2B221J	Carbon 220 $\Omega$ $\pm$ 5% 1/8W	
Ra7	PD14BY2B102J	Carbon 1k $\Omega$ $\pm$ 5% 1/8W	
Ra8	PD14BY2B221J	Carbon 220 $\Omega$ $\pm$ 5% 1/8W	
Ra9	PD14BY2B104J	Carbon 100k $\Omega$ $\pm$ 5% 1/8W	
Ra10	PD14BY2B471J	Carbon 470 $\Omega$ $\pm$ 5% 1/8W	
Ra11	PD14BY2B103J	Carbon 10k $\Omega$ $\pm$ 5% 1/8W	
Ra12	PD14BY2B271J	Carbon 270 $\Omega$ $\pm$ 5% 1/8W	
Ra13	PD14BY2B123J	Carbon 12k $\Omega$ $\pm$ 5% 1/8W	
Ra14	PD14BY2B103J	Carbon 10k $\Omega$ $\pm$ 5% 1/8W	

## PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
Ra15 ~ 17	PD14BY2B102J	Carbon 1kΩ ±5% 1/8W	
<b>SEMICONDUCTOR</b>			

Ref. No.	Parts No.	Description	Re- marks
Cb53	CK45F1H473Z	Ceramic 0.047μF +80%, -20%	
Cb54	CE04W1E3R3	Electrolytic 3.3μF 25WV	
Cb55, 56	CO93M1H103K	Mylar 0.01μF ±10%	

## PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
Rb61	PD14BY2B562J	Carbon 5.6kΩ ±5% 1/8W	
Rb62	PD14BY2B331J	Carbon 330Ω ±5% 1/8W	
Rb63	PD14BY2B102J	Carbon 1kΩ ±5% 1/8W	
Rb64	PD14BY2B560J	Carbon 56Ω ±5% 1/8W	
Rb65	PD14BY2B104J	Carbon 100kΩ ±5% 1/8W	
Rb66	PD14BY2B101J	Carbon 100Ω ±5% 1/8W	
Rb67	PD14BY2B273J	Carbon 27kΩ ±5% 1/8W	
Rb68	PD14BY2B184J	Carbon 180kΩ ±5% 1/8W	
Rb69	PD14BY2B102J	Carbon 1kΩ ±5% 1/8W	
Rb70	PD14BY2B221J	Carbon 220Ω ±5% 1/8W	
Rb71	PD14BY2B104J	Carbon 100kΩ ±5% 1/8W	
Rb72	PD14BY2B101J	Carbon 100Ω ±5% 1/8W	
Rb73	PD14BY2B472J	Carbon 4.7kΩ ±5% 1/8W	
Rb74	PD14BY2B223J	Carbon 22kΩ ±5% 1/8W	
Rb75	PD14BY2B331J	Carbon 330Ω ±5% 1/8W	
Rb76	PD14BY2B103J	Carbon 10kΩ ±5% 1/8W	
Rb77	PD14BY2B562J	Carbon 5.6kΩ ±5% 1/8W	
Rb78	PD14BY2B102J	Carbon 1kΩ ±5% 1/8W	
Rb79	PD14BY2B152J	Carbon 1.5kΩ ±5% 1/8W	
Rb80	PD14BY2B153J	Carbon 15kΩ ±5% 1/8W	
Rb81	PD14BY2B563J	Carbon 56kΩ ±5% 1/8W	
Rb82	PD14BY2B331J	Carbon 330Ω ±5% 1/8W	
Rb83	PD14BY2B102J	Carbon 1kΩ ±5% 1/8W	
Rb85	PD14BY2B101J	Carbon 100Ω ±5% 1/8W	
Rb86	PD14BY2B472J	Carbon 4.7kΩ ±5% 1/8W	

### SEMICONDUCTOR

Qb1, 2	V03-0098-05	Transistor 2SC381(O) or 2SC535(B)	
Qb3 ~ 5	V03-0092-05	Transistor 2SC381(O)	
Qb6	V03-0091-05	Transistor 2SC381(R)	
Qb7, 8	V03-0098-05	Transistor 2SC381(O),(R) or 2SC535(B)	
Qb9	V03-0270-05	Transistor 2SC945(O) or (R)	
Qb10	V03-0261-05	Transistor 2SC941(O)	
Qb11	V03-0261-05	Transistor 2SC941(R)	
Qb12	V03-0261-05	Transistor 2SC941(O)	
Qb13	V03-0091-05	Transistor 2SC381(R)	
Qb14	V03-0261-05	Transistor 2SC941(R)	
ICb1	V30-0087-05	IC TA7060P	
Db1 ~ 3	V11-0076-05	Diode 1S1555 or 1S2076	
Db4 ~ 9	V11-0051-05	Diode 1N60	
Db10	V11-0076-05	Diode 1S1555 or 1S2076	
Db11 ~ 15	V11-0051-05	Diode 1N60	

### COIL/FILTER/IFT

Lb1	L30-0243-05	FM-IFT	
Lb2	L40-1511-03	Ferri-inductor	
Lb3	L30-0207-15	Discriminator coil	
Lb4	L40-1511-03	Ferri-inductor	
Lb5	L30-0244-05	Trigger coil	
Lb6	L31-0111-05	AM-RF coil	
Lb7	L30-0272-05	AM-IFT	
Lb8	L30-0273-05	AM-IFT	
Lb9	L30-0052-05	AM-IFT	
Lb10	L30-0082-05	AM-OSC coil	
Lb11	L30-0255-05	Meter coil	
CFb1	L72-0010-05	Ceramic filter	
CFb2	L72-0019-05	Ceramic filter	

### POTENTIOMETER

VRb1	R12-1021-05	PC trimmer 1kΩ (B)	
VRb2	R12-3028-05	PC trimmer 20kΩ (B)	
VRb3	R12-5019-05	PC trimmer 100kΩ (B)	

### MISCELLANEOUS

-	F07-0198-04	Shield cover	
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## MPX (X04-1040-10)

Ref. No.	Parts No.	Description	Re- marks
<b>CAPACITOR</b>			
Cc1, 2	CE04W1E100	Electrolytic 10μF 25WV	
Cc3	CQ08S1H471J	Polystyrene 470pF ±5%	
Cc4	CS15E1VR33M	Tantalum 0.33μF 35WV	
Cc5	CS15E1VR47M	Tantalum 0.47μF 35WV	
Cc6	CS15E1V0R1M	Tantalum 0.1μF 35WV	
Cc7, 8	CS15E1E010M	Tantalum 1μF 25WV	
Cc9	CE04W1H010	Electrolytic 1μF 50WV	
Cc10, 11	CO93M1H822J	Mylar 0.0082μF ±5% (X04-1040-10)	
	CO93M1H562J	Mylar 0.0056μF ±5% (X04-1040-01,61)	
Cc12	CE04W1E100	Electrolytic 10μF 25WV	
Cc13	CO93M1H473K	Mylar 0.047μF ±10%	
Cc15, 16	CS15E1V0R1M	Tantalum 0.1μF 35WV	
Cc17, 18	CO93M1H332J	Mylar 0.0033μF ±5% (X04-1040-61)	

### RESISTOR

Rc1	PD14BY2E224J	Carbon 220kΩ ±5% 1/4W	
Rc2	PD14BY2E563J	Carbon 56kΩ ±5% 1/4W	
Rc3	PD14BY2E682J	Carbon 6.8kΩ ±5% 1/4W	
Rc4	PD14BY2E222J	Carbon 2.2kΩ ±5% 1/4W	
Rc5	PD14BY2E183J	Carbon 18kΩ ±5% 1/4W(SN76115N)	
	PD14BY2E153J	Carbon 15kΩ ±5% 1/4W(HA1156)	
Rc6, 7	PD14BY2E332J	Carbon 3.3kΩ ±5% 1/4W	
Rc8	PD14BY2E102J	Carbon 1kΩ ±5% 1/4W	
Rc10	PD14BY2E103J	Carbon 10kΩ ±5% 1/4W	
Rc11	PD14BY2E101J	Carbon 100Ω ±5% 1/4W	
R12	PD14BY2E154J	Carbon 150kΩ ±5% 1/4W	
Rc13, 14	PD14BY2E392J	Carbon 3.9kΩ ±5% 1/4W	
Rc15, 16	PD14BY2E912J	Carbon 9.1kΩ ±5% 1/4W (X04-1040-10)	
	PD14BY2E822J	Carbon 8.2kΩ ±5% 1/4W(X04-1040-01,61)	
Rc17	PD14BY2E101J	Carbon 100Ω ±5% 1/4W	

### SEMICONDUCTOR

Qc1, 2	V03-0270-05	Transistor 2SC945(O) or (R) or 2SC458(B),(C) or (C) or (D)	
Dc1, 2	V11-0076-05	Diode 1S1555 or 1S2076	
ICc1	V30-0089-05	IC SN76115N or HA1156	

### FILTER

Lc1	L79-0014-15	Low-pass filter	
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### POTENTIOMETER

VRc1	R12-2020-05	PC trimmer 6.8kΩ (B)	
VRc2	R12-3029-05	PC trimmer 30kΩ (B)	

## MAIN AMP (X07-1390-10)

Ref. No.	Parts No.	Description	Re- marks
<b>CAPACITOR</b>			
Ce1	CC45SL1H101K	Ceramic 100pF ±10%	
Ce2, 3	CE04W1H010	Electrolytic 1μF 50WV	
Ce4	CE04W2A470	Electrolytic 47μF 100WV	
Ce5	CE04W1A330	Electrolytic 33μF 10WV	
Ce6	CE04W2A470	Electrolytic 47μF 100WV	
Ce7	CC45SL1H101K	Ceramic 100pF ±10%	
Ce8	CC45SL1H010D	Ceramic 1pF ±0.5pF	
Ce9	CC45SL1H100D	Ceramic 10pF ±0.5pF	
Ce10	CE04W0J221	Electrolytic 220μF 6.3WV	
Ce11, 12	CE04W0J470	Electrolytic 47μF 6.3WV	



## PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
<b>RESISTOR</b>			
Re1	PD14BY2E334J	Carbon 330kΩ ±5% 1/4W	
Re2	PD14BY2E562J	Carbon 5.6kΩ ±5% 1/4W	
Re3	PD14BY2E563J	Carbon 56kΩ ±5% 1/4W	
Re4	PD14BY2E103J	Carbon 10kΩ ±5% 1/4W	
Re5	PD14BY2E332J	Carbon 3.3kΩ ±5% 1/4W	
Re6	RN14AB3A332JB	Metal film 3.3kΩ ±5% 1W	
Re7	PD14BY2E563J	Carbon 56kΩ ±5% 1/4W	
Re8	PD14BY2E272J	Carbon 2.7kΩ ±5% 1/4W	
Re9	RC05GF2H222K	Carbon 2.2kΩ ±10% 1/2W	
Re10	RC05GF2H392K	Carbon 3.9kΩ ±10% 1/2W	
Re11	PD14BY2E122J	Carbon 1.2kΩ ±5% 1/4W	
Re12	PD14BY2E392J	Carbon 3.9kΩ ±5% 1/4W	
Re13	PD14BY2E182J	Carbon 1.8kΩ ±5% 1/4W	
Re14	PD14BY2E681J	Carbon 680Ω ±5% 1/4W	
Re15, 16	PD14BY2E560J	Carbon 56Ω ±5% 1/4W	
Re17	PD14BY2E101JB	Carbon 100Ω ±5% 1/4W	
Re18	PD14BY2E391J	Carbon 390Ω ±5% 1/4W	
Re19	PD14BY2E153J	Carbon 15kΩ ±5% 1/4W	
Re20	PD14BY2E391J	Carbon 390Ω ±5% 1/4W	
Re21	PD14BY2E153J	Carbon 15kΩ ±5% 1/4W	
Re22, 23	PD14BY2E151JB	Carbon 150Ω ±5% 1/4W	
Re24, 25	RN14AB3A100JB	Metal film 10Ω ±5% 1W	
Re26, 27	PD14BY2E182J	Carbon 1.8kΩ ±5% 1/4W	
Re28, 29	RN14AB3A100JB	Metal film 10Ω ±5% 1W	
<b>SEMICONDUCTOR</b>			
Qe1, 2	V01-0133-05	Transistor 2SA620 WLH5	
Qe3	V03-0360-05	Transistor 2SC1451(G) or (B)	
Qe4	V04-0055-05	Transistor 2SD381(1)(L) or (M)	
Qe5	V03-0358-05	Transistor 2SC1416 (GR)	
Qe6	V01-0073-05	Transistor 2SA673A	
Qe7, 8	V03-0215-05	Transistor 2SC1213A	
Qe9	V01-0073-05	Transistor 2SA673A	
Qe10	V04-0055-05	Transistor 2SD381 (1)(L) or (M)	
Qe11	V02-0041-05	Transistor 2SB536 (1)(L) or (M)	
De1	V11-0254-05	Zener diode YZ-140	
De2, 3	V11-0273-05	Diode 1S2076A	
<b>MISCELLANEOUS</b>			
-	F01-0210-04	Heat sink x 2	
-	J21-0435-04	L shaped hardware x 2	
VRe1	R12-1007-05	PC trimmer potentiometer 1kΩ(B)	

### PREAMP (X08-1270-00)

Ref. No.	Parts No.	Description	Re- marks
<b>CAPACITOR</b>			
Cd1, 2	CS15E1A3R3M	Tantalum 3.3μF 10WV	
Cd3, 4	CE04W0J330	Electrolytic 33μF 6.3WV	
Cd5, 6	CQ93M1H224M	Mylar 0.22μF ±20%	
Cd7, 8	CE04W1C470	Electrolytic 47μF 16WV	
Cd9, 10	CQ93M1H272J	Mylar 0.0027μF ±5%	
Cd11, 12	CQ93M1H822J	Mylar 0.0082μF ±5%	
Cd13, 14	CC45SL1H331K	Ceramic 330pF ±10%	
Cd15, 16	CC45SL1H221K	Ceramic 220pF ±10%	
<b>RESISTOR</b>			
Rd1, 2	PD14BY2E222J	Carbon 2.2kΩ ±5% 1/4W	
Rd3 ~6	PD14BY2E104J	Carbon 100kΩ ±5% 1/4W	

Ref. No.	Parts No.	Description	Re- marks
Rd7, 8	PD14BY2E561J	Carbon 560Ω ±5% 1/4W	
Rd9, 10	PD14BY2E824J	Carbon 820kΩ ±5% 1/4W	
Rd11, 12	PD14BY2E563J	Carbon 56kΩ ±5% 1/4W	
Rd13, 14	PD14BY2E221JB	Carbon 220Ω ±5% 1/4W	
Rd15, 16	PD14BY2E303J	Carbon 30kΩ ±5% 1/4W	
Rd17, 18	PD14BY2E474J	Carbon 470kΩ ±5% 1/4W	
Rd19, 20	PD14BY2E393J	Carbon 39kΩ ±5% 1/4W	
Rd21, 22	PD14BY2E682J	Carbon 6.8kΩ ±5% 1/4W	
<b>SEMICONDUCTOR</b>			
ICd1	V30-0091-05	IC RC4558TA	

### TONE AMP (X11-1210-01)

Ref. No.	Parts No.	Description	Re- marks
<b>CAPACITOR</b>			
Ci1, 2	CS15E1VR47M	Tantalum 0.47μF 35WV	
Ci3, 4	CE04W1A6R8NP	Non-pole electrolytic 6.8μF 10WV	
Ci5, 6	CQ93M1H682K	Mylar 0.0068μF ±10%	
Ci7, 8	CQ93M1H103K	Mylar 0.01μF ±10%	
Ci9~12	CQ93M1H183K	Mylar 0.018μF ±10%	
Ci13, 14	CQ93M1H272K	Mylar 0.0027μF ±10%	
Ci15, 16	CC45SL1H331K	Ceramic 330pF ±10%	
Ci17~22	CE04W1A6R8NP	Non-pole electrolytic 6.8μF 10WV	
Ci23, 24	CE04W1A470	Electrolytic 47μF 10WV	
Ci25, 26	CC45SL1H100D	Ceramic 10pF ±0.5pF	
Ci27, 28	CE04W1A6R8NP	Non-pole electrolytic 6.8μF 10WV	
Ci29, 30	CC45SL1H300D	Ceramic 30pF ±0.5pF	
Ci31, 32	CC45SL1H330K	Ceramic 33pF ±10%	
<b>RESISTOR</b>			
Ri1, 2	PD14BY2E222J	Carbon 2.2kΩ ±5% 1/4W	
Ri3, 4	PD14BY2E124J	Carbon 120kΩ ±5% 1/4W	
Ri5, 6	PD14BY2E102J	Carbon 1kΩ ±5% 1/4W	
Ri7, 8	PD14BY2E183J	Carbon 18kΩ ±5% 1/4W	
Ri9, 10	PD14BY2E562J	Carbon 5.6kΩ ±5% 1/4W	
Ri11, 12	PD14BY2E153J	Carbon 15kΩ ±5% 1/4W	
Ri13, 14	PD14BY2E822J	Carbon 8.2kΩ ±5% 1/4W	
Ri15, 16	PD14BY2E562J	Carbon 5.6kΩ ±5% 1/4W	
Ri17, 18	PD14BY2E273J	Carbon 27kΩ ±5% 1/4W	
Ri19, 20	PD14BY2E562J	Carbon 5.6kΩ ±5% 1/4W	
Ri21, 22	PD14BY2E822J	Carbon 8.2kΩ ±5% 1/4W	
Ri23, 24	PD14BY2E153J	Carbon 15kΩ ±5% 1/4W	
Ri25, 26	PD14BY2E103J	Carbon 10kΩ ±5% 1/4W	
Ri27, 28	RC05GF2H225K	Carbon 2.2MΩ ±10% 1/2W	
Ri29, 30	PD14BY2E563J	Carbon 56kΩ ±5% 1/4W	
Ri31, 32	PD14BY2E103J	Carbon 10kΩ ±5% 1/4W	
Ri33, 34	PD14BY2E563J	Carbon 56kΩ ±5% 1/4W	
Ri35, 36	PD14BY2E222J	Carbon 2.2kΩ ±5% 1/4W	
Ri37 ~40	PD14BY2E563J	Carbon 56kΩ ±5% 1/4W	
Ri41, 42	PD14BY2E104J	Carbon 100kΩ ±5% 1/4W	
<b>SEMICONDUCTOR</b>			
ICi1	V30-0122-05	IC TA7136P	
ICi2, 3	V30-0091-05	IC RC4558T (A) or (B)	
ICi4	V30-0122-05	IC TA7136P	
<b>POTENTIOMETER</b>			
VRi1 ~3	R08-5030-05	Potentiometer 100kΩ (B) dual	

# PARTS LIST

## MULTIPATH (X13-1880-10)

Ref. No.	Parts No.	Description	Re- marks
<b>CAPACITOR</b>			
Cs1	CE04W1H010	Electrolytic 1 $\mu$ F 50WV	
Cs2	CQ93M1H562K	Mylar 0.0056 $\mu$ F $\pm$ 10%	
Cs3	CQ09S1H472J	Polystyrene 4700pF $\pm$ 5%	
Cs4 ~ 6	CE04W1H010	Electrolytic 1 $\mu$ F 50WV	
Cs7	CQ09S1H472J	Polystyrene 4700pF $\pm$ 5%	
Cs8~11	CE04W1H010	Electrolytic 1 $\mu$ F 50WV	
Cs12, 13	CK45F1H223Z	Ceramic 0.022 $\mu$ F +80%, -20%	
<b>RESISTOR</b>			
Rs1	PD14CY2E103J	Carbon 10k $\Omega$ $\pm$ 5% 1/4W	
Rs2	PD14CY2E224J	Carbon 220k $\Omega$ $\pm$ 5% 1/4W	
Rs3	PD14CY2E393J	Carbon 39k $\Omega$ $\pm$ 5% 1/4W	
Rs4	PD14CY2E102J	Carbon 1k $\Omega$ $\pm$ 5% 1/4W	
Rs5	PD14CY2E221J	Carbon 220 $\Omega$ $\pm$ 5% 1/4W	
Rs6	PD14CY2E224J	Carbon 220k $\Omega$ $\pm$ 5% 1/4W	
Rs7	PD14CY2E393J	Carbon 39k $\Omega$ $\pm$ 5% 1/4W	
Rs8	PD14CY2E102J	Carbon 1k $\Omega$ $\pm$ 5% 1/4W	
Rs9	PD14CY2E224J	Carbon 220k $\Omega$ $\pm$ 5% 1/4W	
Rs10	PD14CY2E393J	Carbon 39k $\Omega$ $\pm$ 5% 1/4W	
Rs11	PD14CY2E392J	Carbon 3.9k $\Omega$ $\pm$ 5% 1/4W	
Rs12	PD14CY2E102J	Carbon 1k $\Omega$ $\pm$ 5% 1/4W	
Rs13	PD14CY2E103J	Carbon 10k $\Omega$ $\pm$ 5% 1/4W	
<b>SEMICONDUCTOR</b>			
Qs1 ~ 3	V03-9900-05	Transistor 2SC828A(R) or 2SC458(C)	
Ds1, 2	V11-0051-05	Diode 1N60	
<b>COIL</b>			
Ls1, 2	L31-0285-05	38kHz Tuning coil	
<b>POTENTIOMETER</b>			
VRs1	R12-5019-05	PC trimmer 100k $\Omega$ (B)	

## PUSH SW (A) (X13-2070-10)

Ref. No.	Parts No.	Description	Re- marks
<b>CAPACITOR</b>			
Ch1, 2	CQ93M1H103J	Mylar 0.01 $\mu$ F $\pm$ 5%	
Ch3, 4	CQ93M1H472J	Mylar 0.0047 $\mu$ F $\pm$ 5%	
Ch5 ~ 8	CQ93M1H273J	Mylar 0.027 $\mu$ F $\pm$ 5%	
Ch9, 10	CS15E1E010M	Tantalum 1 $\mu$ F 25WV	
Ch11, 12	CE04W1E2R2	Electrolytic 2.2 $\mu$ F 25WV	
Ch13, 14	CE04W1C470	Electrolytic 47 $\mu$ F 16WV	
Ch15	CK45F1H103Z	Ceramic 0.01 $\mu$ F +80%, -20%	
Ch16	CE04W1C100	Electrolytic 10 $\mu$ F 16WV	
<b>RESISTOR</b>			
Rh1, 2	PD14CY2E102J	Carbon 1k $\Omega$ $\pm$ 5% 1/4W	
Rh3, 4	PD14CY2E332J	Carbon 3.3k $\Omega$ $\pm$ 5% 1/4W	
Rh5 ~ 8	PD14CY2E105J	Carbon 1M $\Omega$ $\pm$ 5% 1/4W	
Rh9, 10	PD14CY2E513J	Carbon 51k $\Omega$ $\pm$ 5% 1/4W	
Rh11, 12	PD14CY2E224J	Carbon 220k $\Omega$ $\pm$ 5% 1/4W	
Rh13, 14	PD14CY2E184J	Carbon 180k $\Omega$ $\pm$ 5% 1/4W	
Rh15, 16	PD14CY2E222J	Carbon 2.2k $\Omega$ $\pm$ 5% 1/4W	
Rh17, 18	PD14CY2E562J	Carbon 5.6k $\Omega$ $\pm$ 5% 1/4W	
Rh19, 20	PD14CY2E222J	Carbon 2.2k $\Omega$ $\pm$ 5% 1/4W	
Rh21, 22	PD14CY2E563J	Carbon 56k $\Omega$ $\pm$ 5% 1/4W	
Rh23, 24	PD14CY2E221J	Carbon 220 $\Omega$ $\pm$ 5% 1/4W	
Rh25	RC05GF2H681K	Carbon 680 $\Omega$ $\pm$ 10% 1/2W	

Ref. No.	Parts No.	Description	Re- marks
<b>SEMICONDUCTOR</b>			
Qh1, 2	V01-0087-05	Transistor 2SA620WL5	
Dh1, 2	V11-0273-05	Diode 1S2076A	
<b>SWITCH</b>			
S7 ~ 10	S41-4011-05	Pushbutton	

## PUSH SW (B) (X13-2080-10)

Ref. No.	Parts No.	Description	Re- marks
<b>CAPACITOR</b>			
Cp1	CE04W1H010NP	Non-pole electrolytic 1 $\mu$ F 50WV	
Cp2	CQ93M1H473K	Mylar 0.047 $\mu$ F $\pm$ 10%	
Cp3	CQ93M1H154K	Mylar 0.15 $\mu$ F $\pm$ 10%	
Cp4	CE04W0F221	Electrolytic 220 $\mu$ F 3.15WV	
Cp5	CE04W1A3R3	Electrolytic 3.3 $\mu$ F 10WV	
Cp7, 8	CQ93M1H102J	Mylar 0.001 $\mu$ F $\pm$ 5%	
Cp9, 10	CQ93M1H563J	Mylar 0.056 $\mu$ F $\pm$ 5%	
Cp11, 12	CE04W1C470	Electrolytic 47 $\mu$ F 16WV	
Cp13	CE04W1H010	Electrolytic 1 $\mu$ F 50WV	
<b>RESISTOR</b>			
Rp1	PD14CY2E564J	Carbon 560k $\Omega$ $\pm$ 5% 1/4W	
Rp2	PD14CY2E274J	Carbon 270k $\Omega$ $\pm$ 5% 1/4W	
Rp3, 4	PD14CY2E392J	Carbon 3.9k $\Omega$ $\pm$ 5% 1/4W	
Rp5	PD14CY2E393J	Carbon 39k $\Omega$ $\pm$ 5% 1/4W	
Rp6	PD14CY2E103J	Carbon 10k $\Omega$ $\pm$ 5% 1/4W	
Rp7	PD14CY2E105J	Carbon 1M $\Omega$ $\pm$ 5% 1/4W	
Rp8	PD14CY2E102J	Carbon 1k $\Omega$ $\pm$ 5% 1/4W	
Rp9	PD14CY2E105J	Carbon 1M $\Omega$ $\pm$ 5% 1/4W	
Rp10	PD14CY2E564J	Carbon 560k $\Omega$ $\pm$ 5% 1/4W	
Rp11	PD14CY2E123J	Carbon 12k $\Omega$ $\pm$ 5% 1/4W	
Rp12	PD14CY2E681J	Carbon 680 $\Omega$ $\pm$ 5% 1/4W	
Rp13	PD14CY2E333J	Carbon 33k $\Omega$ $\pm$ 5% 1/4W	
Rp14	PD14CY2E153J	Carbon 15k $\Omega$ $\pm$ 5% 1/4W	
Rp15	PD14CY2E223J	Carbon 22k $\Omega$ $\pm$ 5% 1/4W	
Rp16	PD14CY2E184J	Carbon 180k $\Omega$ $\pm$ 5% 1/4W	
Rp17, 18	PD14CY2E563J	Carbon 56k $\Omega$ $\pm$ 5% 1/4W	
Rp19, 20	PD14CY2E752J	Carbon 7.5k $\Omega$ $\pm$ 5% 1/4W	
Rp21, 22	PD14CY2E823J	Carbon 82k $\Omega$ $\pm$ 5% 1/4W	
Rp23, 24	PD14CY2E682J	Carbon 6.8k $\Omega$ $\pm$ 5% 1/4W	
Rp25	PD14CY2E102J	Carbon 1k $\Omega$ $\pm$ 5% 1/4W	
Rp26	PD14CY2E684J	Carbon 680k $\Omega$ $\pm$ 5% 1/4W	
Rp27	PD14CY2E824J	Carbon 820k $\Omega$ $\pm$ 5% 1/4W	
Rp28	PD14CY2E103J	Carbon 10k $\Omega$ $\pm$ 5% 1/4W	
Rp29,30	PD14BY2E203J	Carbon 20k $\Omega$ $\pm$ 5% 1/4W	
<b>SEMICONDUCTOR</b>			
Qp1, 2	V03-0270-05	Transistor 2SC945 (P)	
ICp1	V30-0088-05	IC RC4558T	
Dp1	V11-0273-05	Diode 1S2076A	
Dp2	V11-0051-05	Diode 1N60	
Dp3	V11-0273-05	Diode 2S2076A	
<b>POTENTIOMETER</b>			
VRp1	R12-5019-05	PC trimmer 100k $\Omega$ (B)	
<b>SWITCH</b>			
S11~15		Pushbutton	

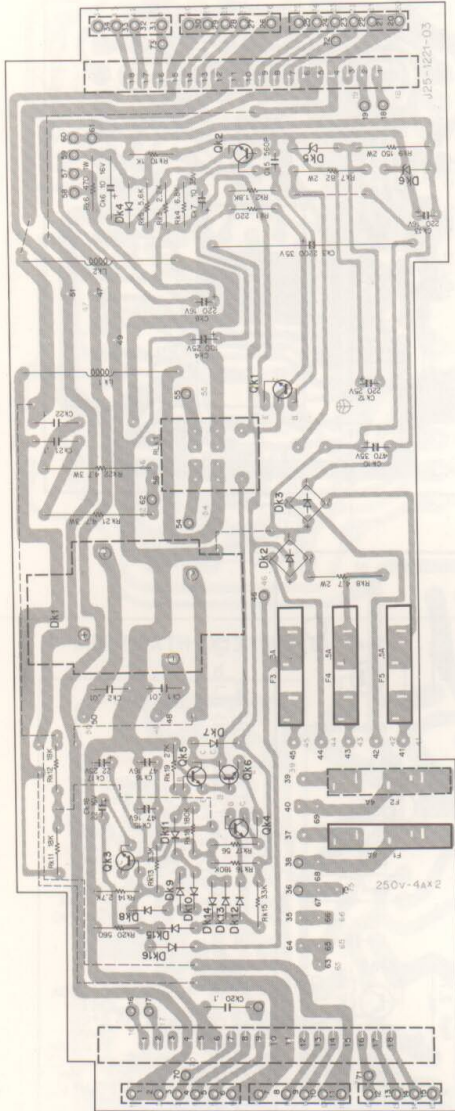




# PC BOARD

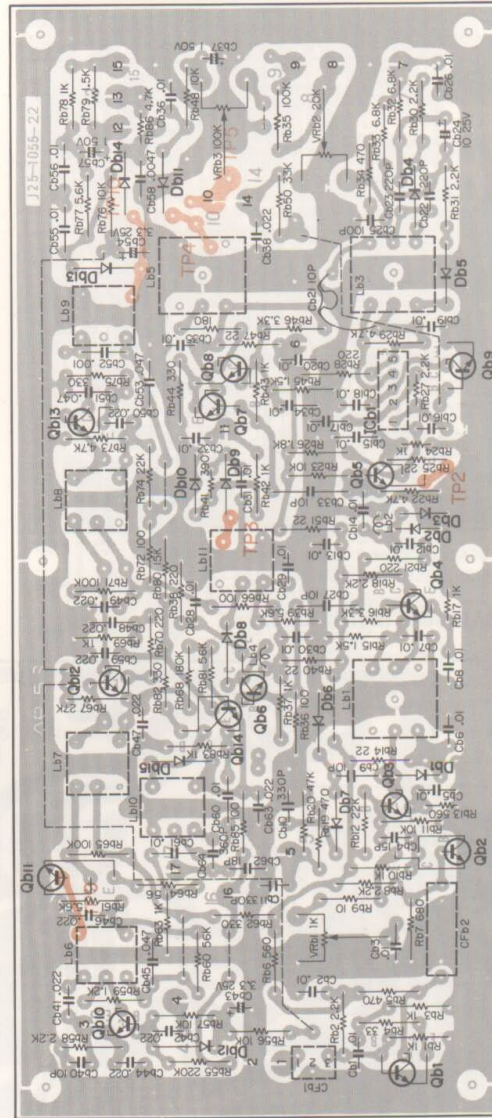
## ▼ POWER SUPPLY (X00-1640-10)

**Caution:** The fuse 4A (schematic number F2) is mounted on the X00-1640-61 and -82, respectively. X00-1640-61 and -82 unit are changed with the value of fuse (S.N. F1). Refer to the parts list of power supply X00-1640-10 on page 13.



Qk1:2SC1419, Qk2,3,5:2SC1416A, Qk4:2SC1212A, Qk6:2SD220  
 Dk1:S5188, Dk2,3:W04M, Dk4:EQA01-06R, Dk5:CZ-245  
 Dk6:DZ-140, Dk7:VO6B, Dk8~15:1S2076A, Dk16:VO6B

## ▼ IF (X02-1050-10)

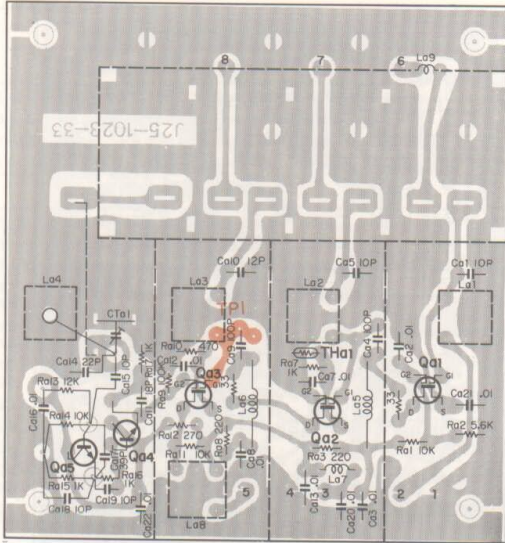


Qb1,2:2SC381(O) or 2SC535(B) Qb3~5:2SC381(O) Qb6,13:2SC381(R)  
 Qb7,8:2SC381(R),(O) or 2SC535(B) Qb9:2SC945(O),(R)  
 Qb10,12:2SC941(O) Qb11,14:2SC941(R) ICb1:TA7060P  
 Db1~3,10:1S1555 or 1S2076 Db4~9,11~15:1N60



# PC BOARD

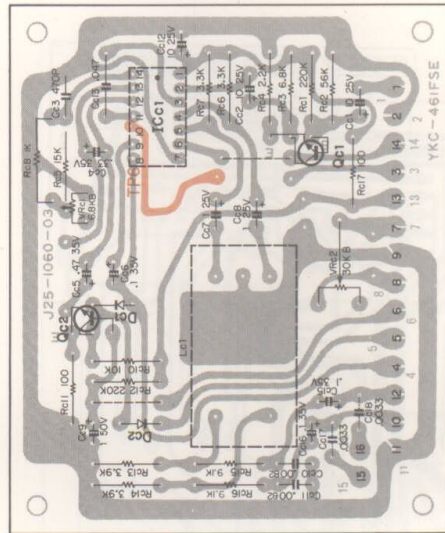
## ▼ RF (X01-1160-10)



Qa1:3SK45B,C, Qa2,3:3SK41 L or M, 3SK45B or C  
 Qa4,5:2SC785R THa1:SDT-65

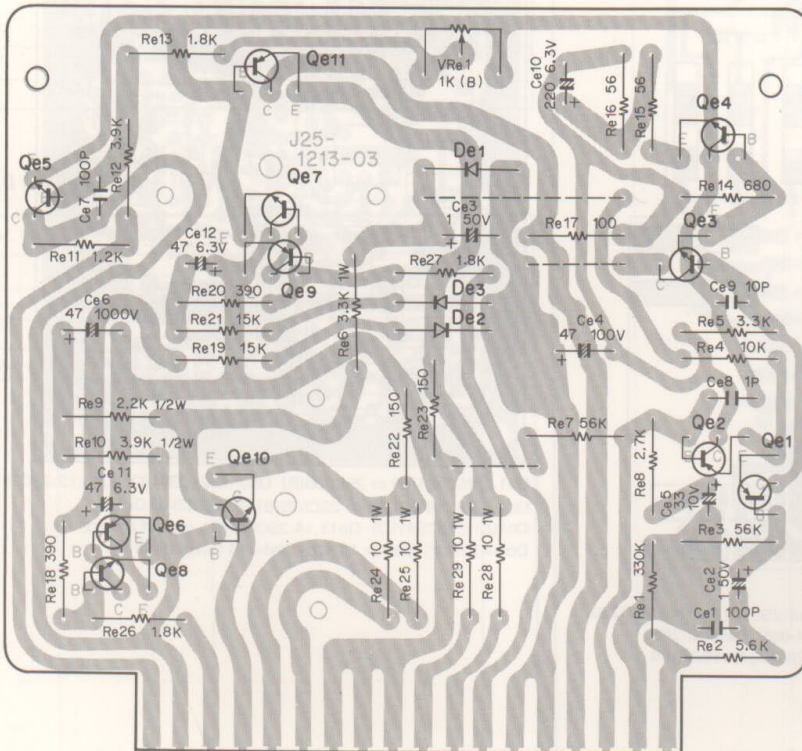
## ▼ MPX (X04-1040-10)

**Caution:** X04-1040-01 and -61 are changed with the value of Cc10, 11 and Rc15, 16.  
 Cc17, 18 are mounted on X04-1040-61 only.



Qc1,2:2SC945(R) (Q) or 2SC458(B) (C), (D)  
 ICc1:HA1156(SNT76115N), Dc1,2:1S1555 or 1S2076

## ▼ MAIN AMP (X07-1390-10)



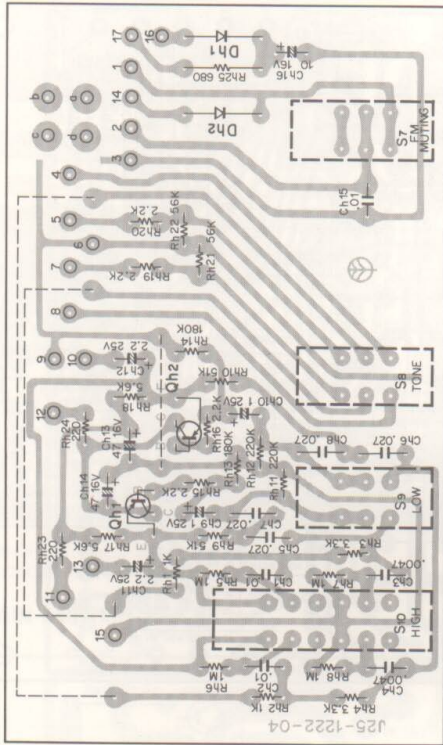
Qe1,2:2SA620 W(L)H5, Qe3:2SC1451 (G) or (B), Qe4,10:2SD381 (1) (L) or (M)  
 Qe5:2SC1416 (GR), Qe6,9:2SA673A, Qe7,8:2SC1213A, Qe11:2SB536 (1) (L) or (M)  
 De1:YZ-140, De2,3:1S2076A





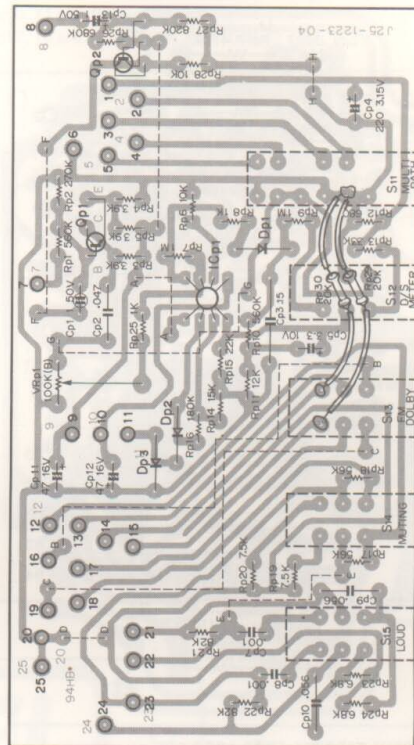
# PC BOARD

## ▼ PUSH SW (A) (X13-2070-10)



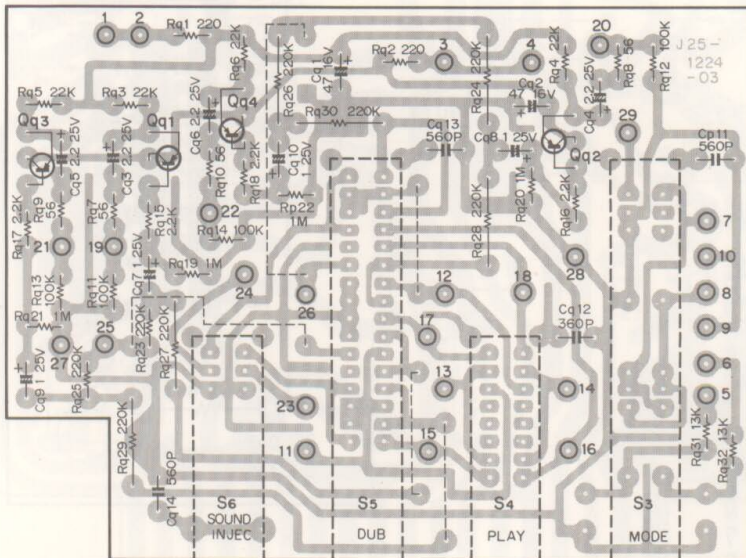
Qh1,2:2SA620WL5, Dh1,2:1S2076A

## ▼ PUSH SW (B) (X13-2080-10)



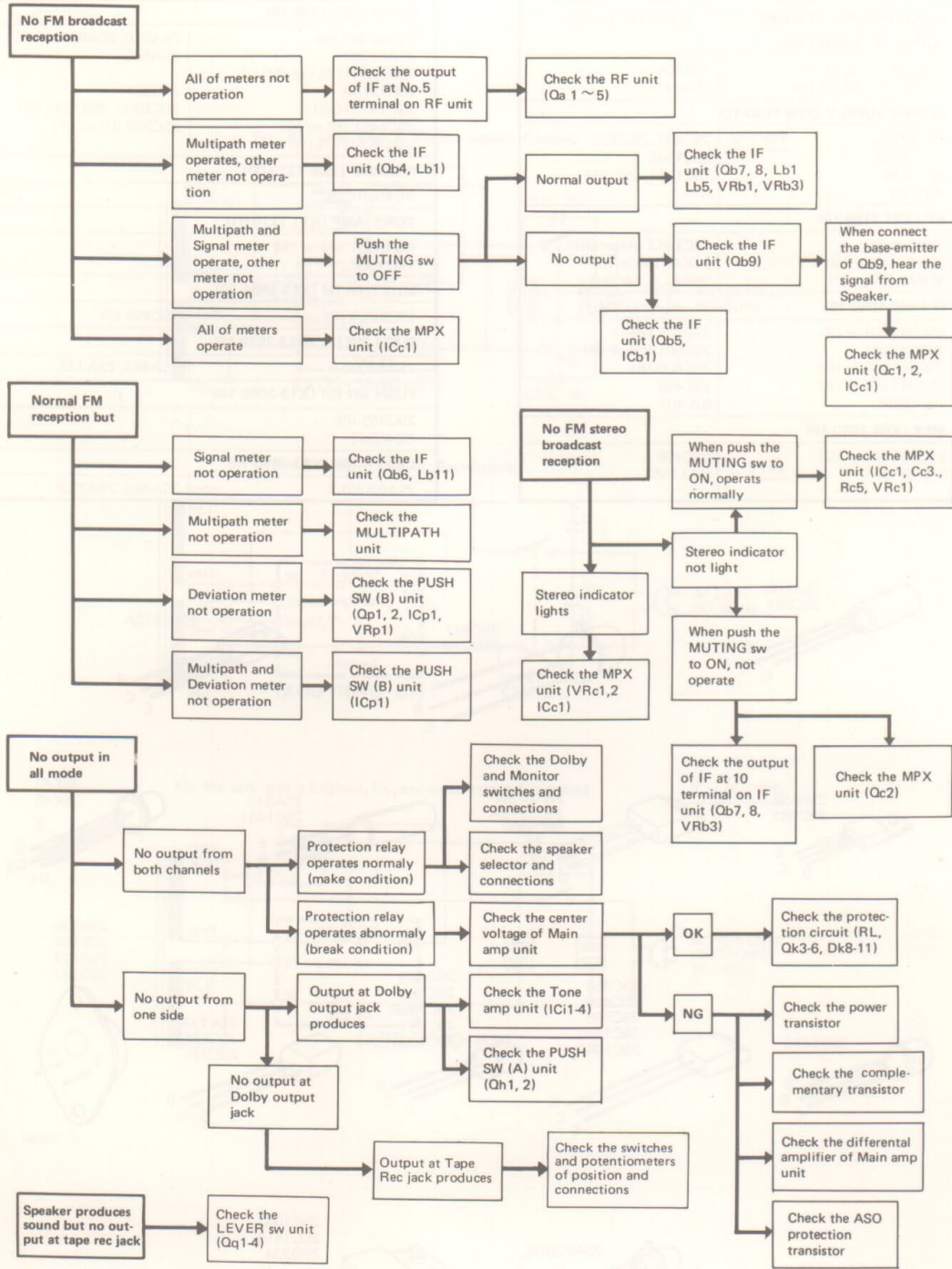
Qp1,2:2SC945 (P) ICp1:RC4558T Dp1,3:1S2076A  
Dp2:1N60

## ▼ LEVER SW (X13-2090-10)



Qq1~4:2SA620WL5

# TROUBLESHOOTING

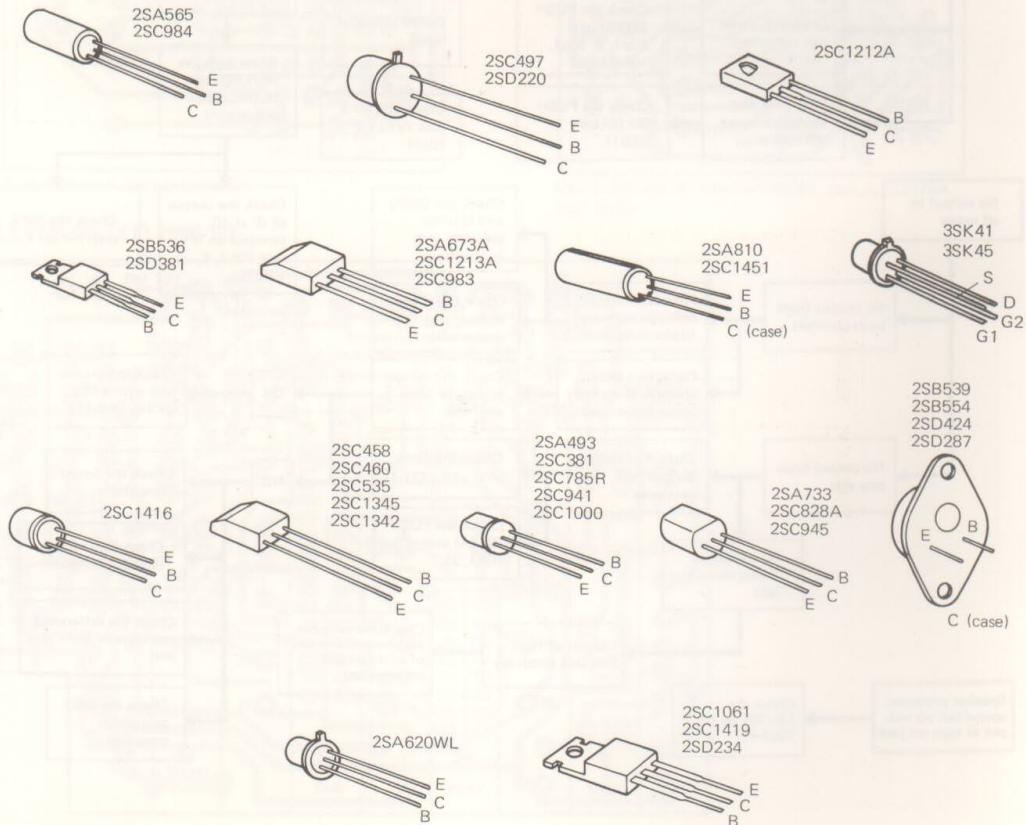




# SEMICONDUCTOR SUBSTITUTIONS

SEMICONDUCTOR NAME	SUBSTITUTIONS
<b>POWER TRANSISTOR</b>	
2SB539 (1) (Q) or (R) 2SD287 (1) (Q) or (R)	2SB554 2D424
<b>POWER SUPPLY (X00-1640-10)</b>	
2SC1212A 2SC1416A 2SC1419 2SD220	2SC497, 2SD220 2SC1345 2SC1061, 2SD234 —
<b>RF (X01-1160-10)</b>	
2SC785 (R) 3SK41 (L) or (M) 3SK45 (B) or (C)	2SC1342 (A) or (B) 3SK45 (B) or (C) 3SK41 (L) or (M)
<b>IF (X02-1050-10)</b>	
2SC381 (O) or (R) 2SC535 (B) 2SC941 (O) or (R) 2SC945 (Q) or (R) TA7060P	2SC535 (B) 2SC381 (O) or (R) 2SC460 (B) 2SC458 BA-401
<b>MPX (X04-1040-10)</b>	
2SC945 (R) or (Q) SN76115N	2SC458 HA1156

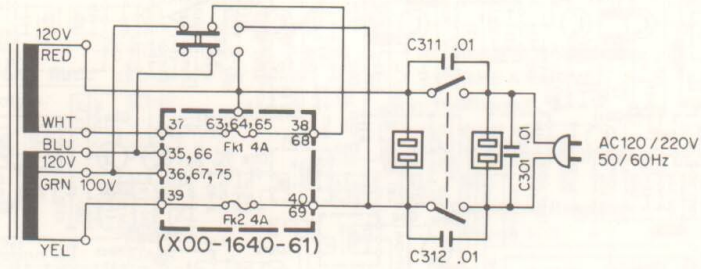
<b>MAIN (X07-1390-10)</b>	
2SA620WLH5 2SA673A 2SB536 (1) (L) or (M) 2SC1213A 2SC1416 (GR) 2SC1451 (B) or (G) 2SD381 (1) (L) or (M)	2SA810, 2SA809 2SA565 — 2SC984 2SC1000, 2SC1345 (D) 2SC983 (O) or (Y) —
<b>PREAMP (X08-1270-00)</b>	
RC4558T (A)	—
<b>TONE AMP (X11-1210-01)</b>	
RC4558T (A) or (B) TA7136P	— —
<b>MULTIPATH (X13-1880-10)</b>	
2SC828A (R)	2SC458 (C)
<b>PUSH SW (A) (X13-2070-10)</b>	
2SA620WL5	2SA493, 2SA733
<b>PUSH SW (B) (X13-2080-10)</b>	
2SC945 (P) RC4558T	— —
<b>LEVER SW (X13-2090-10)</b>	
2SA620WL5	2SA493, 2SA733



# MODIFICATIONS' CIRCUIT DIAGRAM

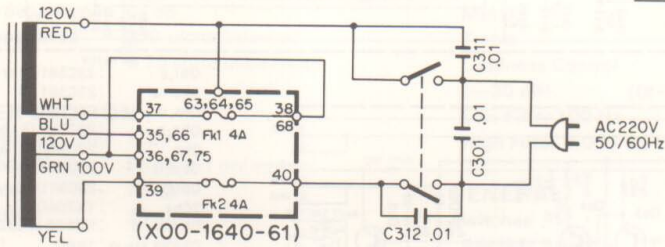
For the sets sold in Europe except England.

W TYPE



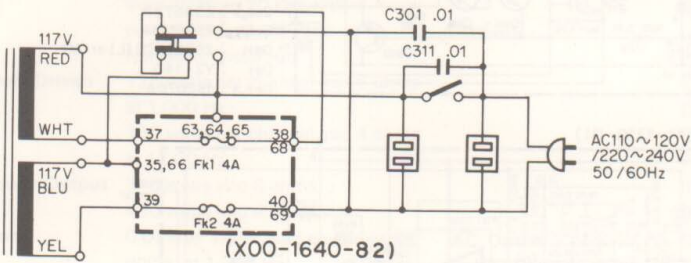
For the sets sold in Scandinavia.

L TYPE



For the sets sold in England, PX, and areas except designated.

T,U,M TYPE

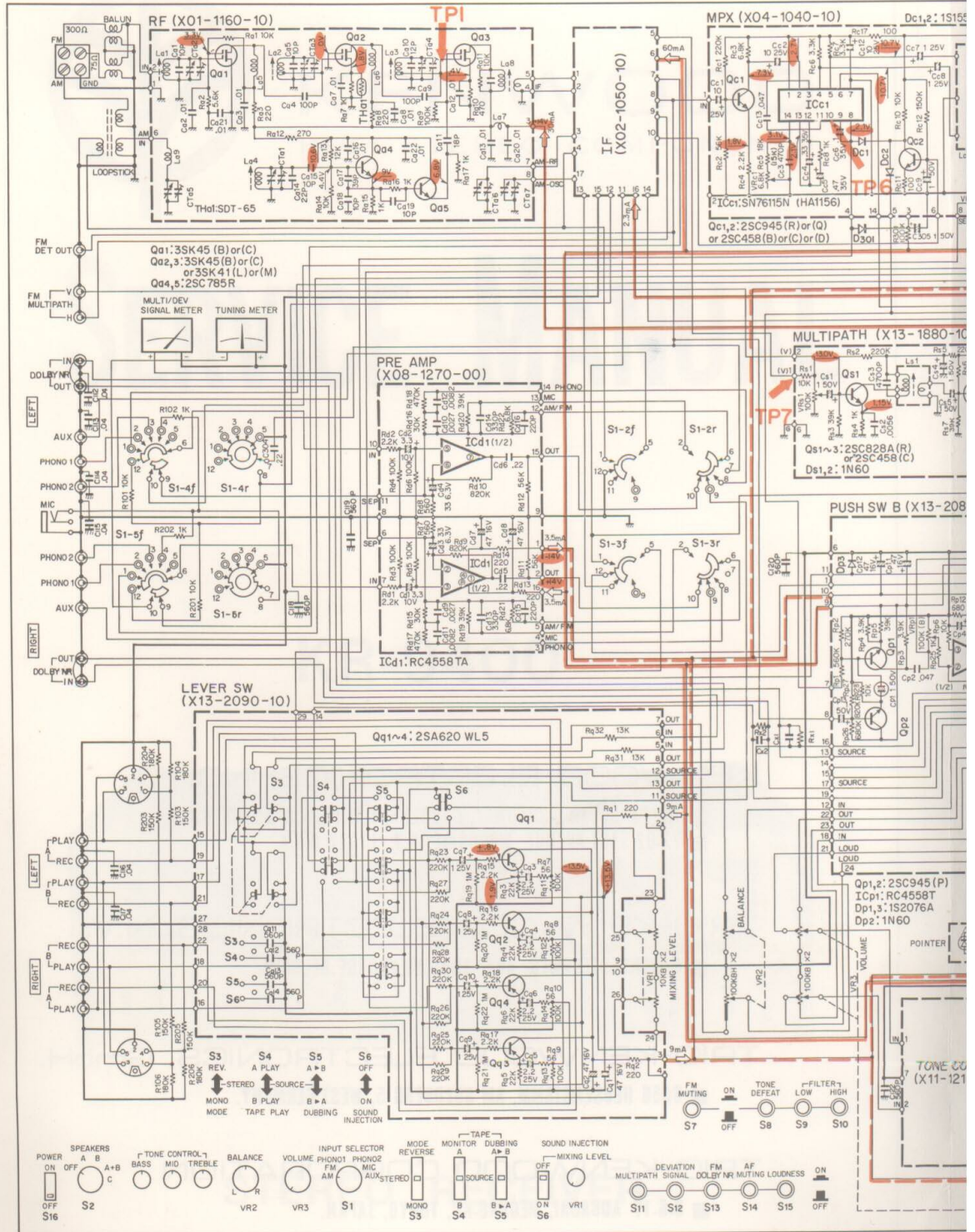






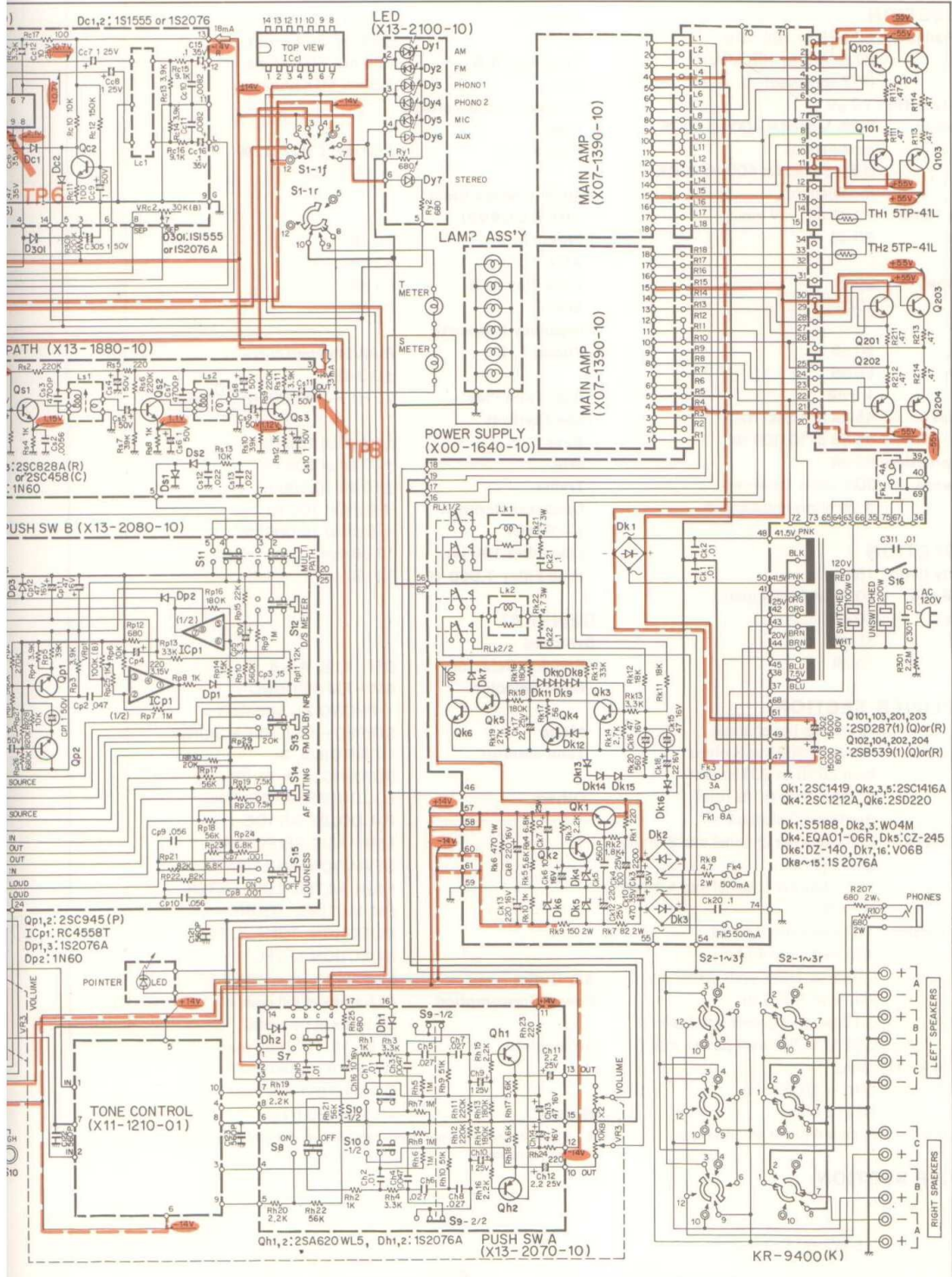


# SCHEMATIC DIAGRAM





# TIC DIAGRAM (2)



## SPECIFICATIONS

### FM TUNER SECTION

<b>FM Frequency Range</b>	88 MHz to 108 MHz 87.5 MHz to 108 MHz (FTZ approved)
<b>Usable Sensitivity (IHF)</b>	1.7 $\mu$ V
<b>Harmonic Distortion</b>	0.3% Mono (at 400 Hz 100% modulation) 0.5% Stereo (at 400 Hz 100% modulation)
<b>Signal to Noise Ratio</b>	72 dB at 1 mV input
<b>Image Rejection</b>	80 dB
<b>Selectivity</b>	
(IHF ALT Channel)	80dB
<b>IF Rejection</b>	100 dB
<b>Spurious Signal Rejection</b>	90 dB
<b>AM Suppression</b>	55 dB
<b>Capture Ratio</b>	1.3 dB
<b>Stereo Separation</b>	45 dB at 1,000 Hz 35 dB at 10,000 Hz
<b>Sub Carrier Suppression</b>	62 dB
<b>Antenna Impedance</b>	300 ohms balanced & 75 ohms unbalanced

### AM TUNER SECTION

<b>Usable Sensitivity (IHF)</b>	15 $\mu$ V
<b>Signal to Noise Ratio</b>	50 dB at 1 mV input
<b>Image Rejection</b>	70 dB
<b>Selectivity (IHF)</b>	35 dB
<b>IF Rejection</b>	70 dB

### POWER-AMPLIFIER SECTION

<b>Power Output</b>	120 watts per channel, minimum RMS at 8 ohms from 20 Hz to 20 kHz with no more than 0.1% Total Harmonic Distortion
<b>Both Channels Driven</b>	125 watts per channel into 8 ohms at 1,000 Hz 150 watts per channel into 4 ohms at 1,000 Hz
<b>Dynamic Power Output</b>	310 watts into 8 ohms 480 watts into 4 ohms
<b>Total Harmonic Distortion</b>	0.02% at 1/2W watt power into 8 ohms at 1,000 Hz
<b>Intermodulation Distortion</b>	0.1% at rated power into 8 ohms
<b>(60 Hz : 7 kHz = 4 : 1)</b>	0.02 % 1/2W watt power into 8 ohms
<b>Power Bandwidth</b>	5Hz — 40,000 Hz
<b>Damping Factor</b>	50 at 8 ohms
<b>Speaker Impedance</b>	Accept 4 ohms to 16 ohms

### PRE-AMPLIFIER SECTION

<b>Input Sensitivity &amp; Impedance</b>	
Phono 1	2.5 mV, 50 K ohms

<b>Phono 2</b>	2.5 mV, 50 K ohms
<b>AUX</b>	150 mV, 50 K ohms
<b>Tape Play A,B</b>	150 mV, 50 K ohms
<b>Mic</b>	2.5 mV 50 K ohms
<b>Maximum Input Voltage (rms)</b>	
Phono 1, 2	150 mV, T.H.D. 0.1% at 1,000 Hz
<b>Signal to Noise Ratio (IHF A CURVE)</b>	
Phono 1, 2	70 dB
AUX	93 dB
Tape Play A, B	93 dB
Mic	65 dB
<b>Frequency Response</b>	
Phono 1, 2	RIAA Standard curve $\pm 0.3$ dB
Aux, Tape Play	20 Hz — 35,000 Hz $\begin{matrix} +0 \\ -1 \end{matrix}$ dB
<b>Tone Controls</b>	
Bass	$\pm 10$ dB at 100 Hz
Mid	$\pm 10$ dB at 800 Hz
Treble	$\pm 10$ dB 10,000 Hz
Loudness Control	+8 dB at 100 Hz, +5 dB at 10,000 Hz
Low Filter 100 Hz	12 dB/oct
High Filter 7,000 Hz	12 dB/oct

### GENERAL

<b>Switches</b>	
<b>Speaker Selector</b>	OFF, A, B, A+B, C
<b>Input Selector</b>	AM — FM — PHONO 1 — PHONO 2 — MIC-AUX
<b>Mode</b>	STEREO — REVERSE — MONO
<b>Tape monitor</b>	MONITOR (A, B); DUBBING (A $\blacktriangleright$ B), (B $\blacktriangleright$ A)
<b>Others</b>	LOUDNESS, AF MUTING, FM DOLBY NR (DE- EMPHASIS SELECTOR), DEVIATION, MULTIPATH, HIGH FILTER, LOW FILTER, FM MUTING, SOUND INJECTION, TONE DEFEAT, INJECTION LEVEL
<b>AC Outlet</b>	Switched 1, unswitched 1
<b>Power Consumption</b>	415 watts at full power 60 watts at no signal
<b>Dimensions</b>	W 21-15/16" (557 mm), H 6-9/16" (166 mm), D 15-9/16" (395 mm)
<b>Weight</b>	45.4 lbs (20.6 kg)

● Any of the specifications given here may be changed or modified without notice.



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