

# PIONEER®



## SERVICE MANUAL



AM/FM MULTIPLEX RECEIVER

# SX-82

PIONEER ELECTRONIC CORPORATION

TOKYO JAPAN

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1. SCHEMATIC DIAGRAM
2. LAYOUT
3. BLOCK DIAGRAM
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# SX-82

**RESISTORS**  
 20% TOLERANCE, 1/2 WATT, UNLESS OTHERWISE NOTED  
 K = KILOHM, M = MEGOHM, W = WATT  
 A ----- 5% TOLERANCE  
 Δ ----- 10% TOLERANCE  
 ⊙ ----- WIRE WOUND, LN ----- A TYPE CARBON  
 C ----- C TYPE CARBON, (A) ----- A TYPE CARBON  
 NON MARK ----- COMPOSITION

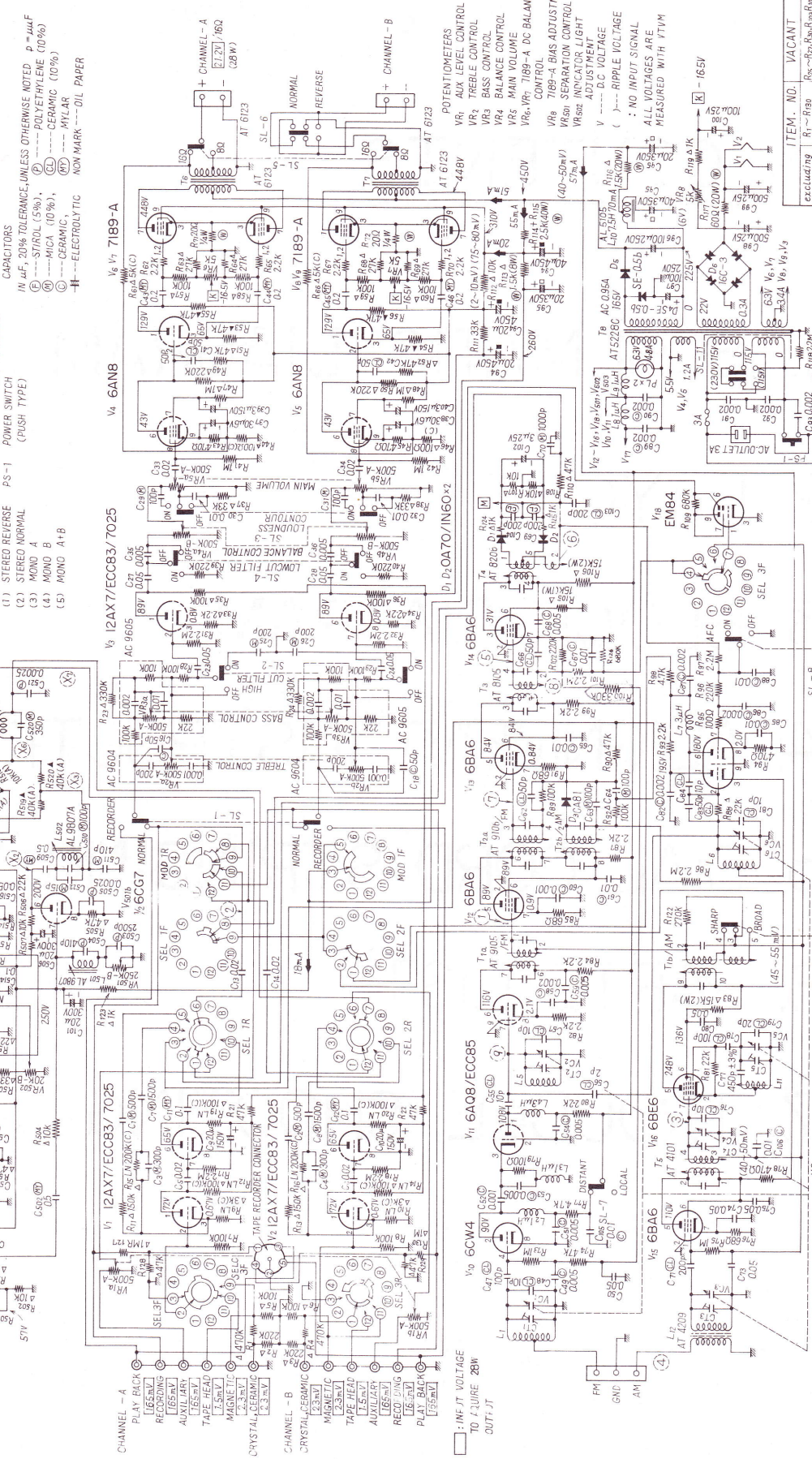
**SELECTOR SWITCH**  
 (1) FM MPX (2) AM (3) PHONO (4) TAPE (5) AUX (6) SENSITIVITY SELECTOR (7) STEREO REVERSE (8) MONO A (9) MONO B (10) MONO A+B

**SL-SWITCH**  
 SL-1 TAPE MONITOR (2) HIGH CUT FILTER (3) AM (4) LOUDNESS CONTOUR (5) LOW CUT FILTER (6) B3 - 16Ω (7) SPEAKER PHASE (8) SENSITIVITY SELECTOR (9) BROAD - SHARP, AFC SWITCH (10) POWER SWITCH (PUSH TYPE)

**MODE SWITCH**  
 (1) STEREO NORMAL (2) STEREO REVERSE (3) MONO A (4) MONO B (5) MONO A+B

**CAPACITORS**  
 IN μF, 20% TOLERANCE, UNLESS OTHERWISE NOTED, p = pF  
 ⊙ ----- STYROL (5%), ⊕ ----- POLYETHYLENE (10%)  
 ⊙ ----- MICA (10%), ⊕ ----- CERAMIC (10%)  
 ⊙ ----- CERAMIC, ⊕ ----- MLCAR  
 ⊕ ----- ELECTROLYTIC  
 NON-MARK ----- OIL PAPER

**ITEM. NO.**  
 R1 - R80 excluding MPX section  
 C1 - C80 excluding MPX section  
 R81 - R89  
 C81 - C89  
 VACANT



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 R1 - R80 excluding MPX section  
 C1 - C80 excluding MPX section  
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 C81 - C89  
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 R1 - R80 excluding MPX section  
 C1 - C80 excluding MPX section  
 R81 - R89  
 C81 - C89  
 VACANT







ALIGNMENT INSTRUCTION

Please read these Instructions with extreme care before attempting alignment.

+ Test Equipment

- 1) Standard Signal Generator      2) VTVM. DC, AC      3) Audio Oscillator  
4) Oscilloscope                      5) FM Multiplex Generator

+ Attention on Alignment

- 1) Signal Generator Input: in every case, use the minimum generator input that will obtain a satisfactory output indication.  
2) When connecting the test equipment to the input, use the shielded wire as short as possible.

+ VTVM and Oscilloscope should be connected in parallel at the output.

+ Alignment of AM Section

+ Note: Position of Switch; SELECTOR - AM  
MODE - STEREO NORMAL  
Position of Volume Control; MINIMUM

STEPS	Signal Generator Input			Dial setting	Connect VTVM	Alignment	
	Coupling	Freq.	Modu.			Adjust	Remarks
1	Pin 1 of V <sub>12</sub> (6BA6)  (1)	455kc	1kc 30%	Point of no interference as near as 535 kc	Audio output  (2)	T <sub>2-b</sub> top and bottom	Adjust to get MAX. deflection
2	On Step 3, at first set the band width selector switch (SL-8) to SHARP, then adjust to get a curve similar to fig.1-A, after that set the (SL-8) to BROAD, adjust to fig.1-B. From step 4, (SL-8) should be set at SHARP position.						
3	Pin 7 of V <sub>16</sub> (6BE6)  (3)	455 kc	1kc 30%	"	"	T <sub>1-b</sub> top and bottom	"
4	Antenna terminal through dummy (0.1 uF)  (4)	600 kc	"	600 kc	"	L <sub>11</sub> , L <sub>12</sub> and T <sub>5</sub>	"
5	"	1400 kc	"	1400 kc	"	CT <sub>3</sub> , CT <sub>4</sub> and CT <sub>5</sub>	
6	Repeat STEPS 4 & 5 until no further improvement is possible						

+ Alignment of FM Section

- Note: 1) Position of Switch: SELECTOR - FM  
 " AFC - OFF  
 2) Position of Volume Control: MINIMUM  
 3) Connect VTVM and Oscilloscope in parallel at STEPS 9, 10.

STEPS	Signal Generator Input			Dial Setting	Connect VTVM	Alignment	
	Coupling	Frequency	Modu.			Adjust	Remarks
1	Pin 1 of V <sub>14</sub> (6BA6) (5)	10.7 mc 100 db	None	Point of no interference as near as 88 mc	DC VTVM to Pin 5 of T <sub>4</sub> (6)	Top of T <sub>4</sub>	Adjust to get zero volts (between pos. and neg. reading)
2	"	10.4 mc 100 db	"	"	"	Bottom of T <sub>4</sub>	Adjust to get Maximum deflection
3	"	11 mc 100 db	"	"	"	"	Adjust to get Maximum deflection (Neg. reading)
4	Repeat STEPS 1, 2 and 3 several times to get a similar curve as Fig.2						
5	Pin 1 of V <sub>13</sub> (6BA6) (7)	10.7 mc 100 mc	"	"	DC VTVM to Pin 2 of T <sub>3</sub> (8)	Top and bottom of T <sub>3</sub>	Adjust to get Maximum deflection (Neg. reading)
6	Pin 1 of V <sub>12</sub> (6BA6) (1)	10.7 mc 70 db	"	"	"	Top and bottom of T <sub>2-a</sub>	"
7	Pin 7 of V <sub>11</sub> (6AQ8) (9)	10.7 mc 60 db	"	"	"	Top and bottom of T <sub>1-a</sub>	"
8	Repeat STEPS 5, 6 and 7 several times to get a similar curve as fig.3						
9	FM antenna terminal	90 mc 20 db	1 kc 30%	90 mc	AC VTVM to audio output (2)	L <sub>1</sub> , L <sub>5</sub> & L <sub>6</sub>	Adjust to get Maximum deflection
10	"	105 mc 20 db	"	105 mc	"	CT <sub>1</sub> , CT <sub>2</sub> & CT <sub>6</sub>	"
11	Repeat STEPS 9 and 10 until no further improvement is possible						



Alignment of MPX Section

- Note: 1) Position of Switch: SELECTOR - FM MPX  
 2) - " - AFC - OFF  
 3) Position of Volume Control: MINIMUM  
 (main volume control)  
 4) Couple VTVM and Oscilloscope in parallel so as to observe ripples simultaneously.  
 5) At Step 5, 1 megohm is indispensable in coupling VTVM to pin 4 of T<sub>503</sub> in series.  
 6) At Steps 6 and 7, apply the Composite signal to FM antenna terminal and measurement must be made on each right and left channel separately.

STEPS	Circuit to be adjusted	Signal Generator Input			Connect VTVM	Alignment	
		Coupling	Input Signal	Modu.		Adjust	Remarks
1	38 kc Separation Coil	Audio Oscillator to (X <sub>1</sub> )	38 kc 200 mv (rms)	None	to junction C <sub>509</sub> & L <sub>502</sub> (X <sub>2</sub> )	Bottom of L <sub>501</sub>	Adjust to get Max. deflection Position of VR <sub>501</sub> : Minimum
2	67 kc Trap Coil	" (X <sub>1</sub> )	67 kc 300 mv (rms)	"	C <sub>511</sub> (X <sub>3</sub> )	Bottom of L <sub>502</sub>	Adjust to get Min. deflection Position of VR <sub>501</sub> : Maximum
3	38 kc Trap Coil	" (X <sub>4</sub> )	38 kc 10 v	"	C <sub>519</sub>	Bottom of L <sub>503</sub>	Adjust to get Minimum deflection
4	"	" (X <sub>6</sub> )	"	"	C <sub>521</sub> (X <sub>7</sub> )	Bottom of L <sub>504</sub>	"
5	Sub Carrier Circuit	Multiplex Generator to FM Antenna terminal	60 db of 19 kc Pilot signal	10%	Pin 4 of T <sub>503</sub> (X <sub>8</sub> )	T <sub>501</sub> T <sub>502</sub> T <sub>503</sub>	Adjust to get Max. deflection from T <sub>503</sub> to 502 and 501 reversely, repeating several times
6	Pilot phase	"	60 db Composite Signal each channel	19 kc Pilot 10% & Sub & Main 1kc 30%	C <sub>521</sub> (X <sub>5</sub> ) or (X <sub>7</sub> )	T <sub>501</sub>	Adjust to get Max. output and Min. distortion, Confirm each channel
7	Separation Control	"	"	"	"	VR <sub>501</sub>	Adjust to get Min. output of reverse channel, Confirm each channel
8	Repeat STEPS 6 and 7 several times						
9	Stereo indicator light	"	30 db 19 kc pilot signal	19 kc 10%	-	VR <sub>502</sub>	Adjust to glow NL <sub>501</sub> when 19 kc Pilot signal is applied

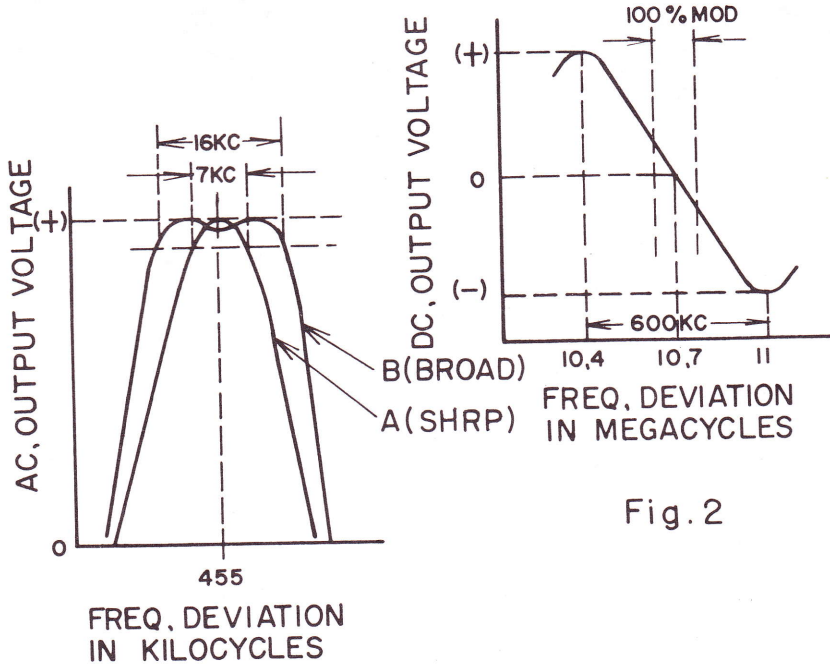


Fig. 1

Fig. 2

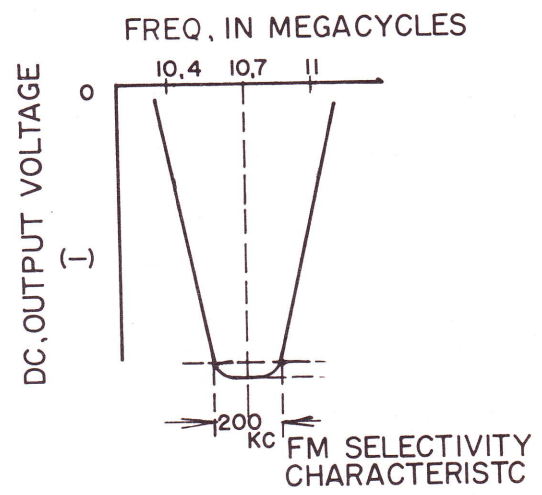
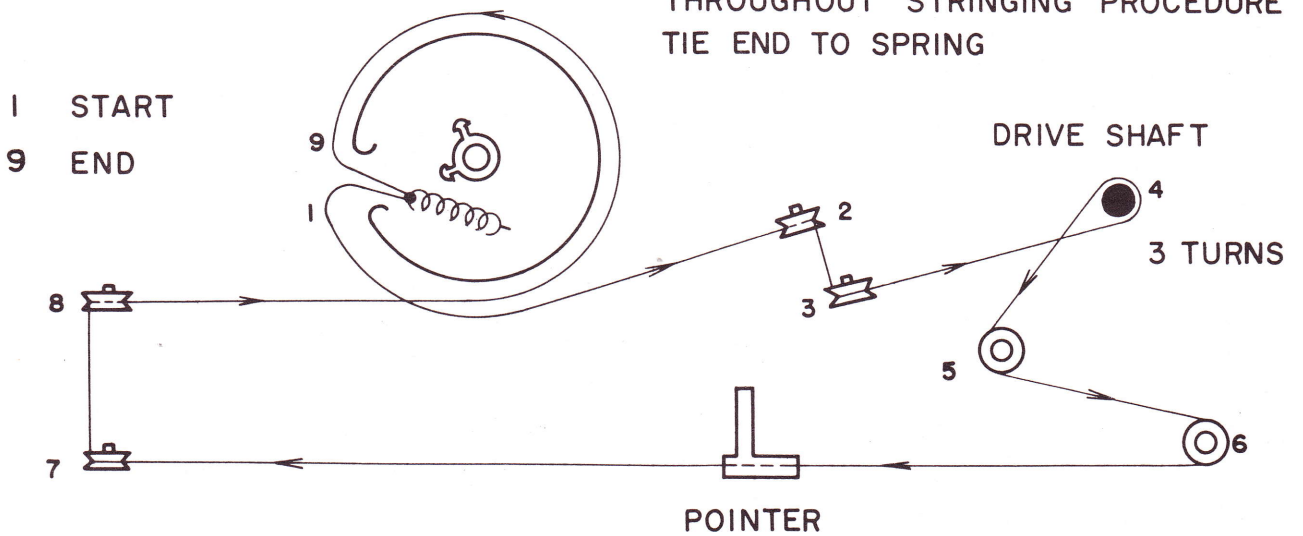


Fig. 3

## DIAL CORD STRINGING

CONNECT ONE END OF DIAL CORD TO SPRING AS SHOWN  
 BELOW STRING AS INDICATED  
 BY ARROW KEEP A MODERATE  
 AMOUNT OF TENSION ON CORD  
 THROUGHOUT STRINGING PROCEDURE  
 TIE END TO SPRING





## PARTS LIST OF SX-82

## CAPACITORS

In uF, 10% tolerance for all fixed capacitors,  
unless otherwise noted. p = uuF

Symbol	Description			Part No.
C1,2	Mica	500p		400v
C3,4	Mica	300p		400v
C5,6	Oil paper	0.02	20%	400v
C7,8	Mica	1500p		400v
C9,10	Electrolytic	20	-	150v
C11,12	Mylar	0.1	20%	400v
C13,14	Oil paper	0.02	20%	400v
C16,18	Ceramic	50p		400v
C15,17,19,20, 21,22	Vacant			
C23,24	Oil paper	0.05	20%	400v
C25,26	Mica	200p		400v
C27,28	Oil paper	0.05	20%	400v
C29	Mica	100p		400v
C30	Oil paper	0.01		400v
C31	Mica	100p		400v
C32	Oil paper	0.01		400v
C33,34	Oil paper	0.02	20%	400v
C35,36	Oil paper	0.005	20%	400v
C37,38	Electrolytic	30	-	6v
C39,40	Electrolytic	3	-	150v
C41,42	Ceramic	30p		400v
C43,44,45,46	Mylar	0.2	20%	400v
C47	Ceramic	100p		400v
C48	Ceramic	10p		400v
C49	Ceramic	0.005		400v
C50	Oil paper	0.05	20%	400v
C51	Ceramic	0.005		400v
C52	Ceramic	0.001		400v
C53,54	Ceramic	0.005		400v
C55	Ceramic	10p		400v
C56	Ceramic	2p		400v
C57	Ceramic	10p		400v
C58,59	Ceramic	0.002		400v
C60	Ceramic	0.01		400v
C61	Ceramic	0.01		400v
C62	Ceramic	50p		400v
C63,64	Mica	100p		400v
C65	Ceramic	0.01		400v
C66	Ceramic	50p		400v
C67	Ceramic	0.01		400v
C68	Ceramic	0.005		400v
C69	Ceramic	200p		400v
C70	Mica	1000p		400v
C71	Ceramic	200p		400v
C72	Vacant			
C73,74,75	Oil paper	0.05	20%	400v
C76	Ceramic	10p		400v
C77	Ceramic	450p	3%	400v
C78	Ceramic	100p		400v
C79	Ceramic	20p		400v
C80	Oil paper	0.05	20%	400v
C81	Ceramic	10p		400v

C82	Ceramic	0.002		400v
C83	Ceramic	50p		400v
C84	Ceramic	10p		400v
C85	Ceramic	0.01		400v
C86,87	Ceramic	0.002		400v
C88	Ceramic	0.01		400v
C89,90	Ceramic	0.002		400v
C91,92,93	Oil paper	0.002	20%	400v
C94	Electrolytic	40-20-20	-	450v
C95	Electrolytic	40-20-20	-	350v
C96,97	Electrolytic	100	-	250v
C98,99	Electrolytic	500	-	25v
C100	Electrolytic	100	-	25v
C101	Electrolytic	20	-	300v
C102	Electrolytic	3	-	3v
C103	Ceramic	200p		400v
C104	Mica	200p		400v
C105,105	Ceramic	0.01		400v

RESISTORS

10% tolerance  $\frac{1}{2}$  watts, unless otherwise marked or noted.  
k = kilohm, m = Megohm.

Symbol	Description			Part No.
R1	Composition	470k		
R2,3	Composition	220k		
R4	Composition	470k		
R5,6	Composition	100k		
R7,8	Composition	100k	20%	
R9,10	Carbon	3k		
R11	Composition	150k		
R12	Carbon	100k		
R13	Composition	150k		
C14	Carbon	100k		
R15,16	Carbon	200k		
R17,18	Composition	2.2m	20%	
R19,20	Carbon	100k		
R21,22	Composition	47k	20%	
R23,24	Composition	330k		
R25,26,27,30	C-R network			
R28,29	Composition	100k		
R31,32	Composition	2.2m	20%	
R33,34	Composition	2.2k		
R35,36	Composition	100k		
R37,38	Composition	33k		
R39,40	Composition	220k		
R41,42	Composition	1m	20%	
R43	Composition	470 ohm		
R44	Carbon	100 ohm		
R45	Composition	470 ohm		
R46	Carbon	100 ohm		
R47,48	Composition	1m		
R49,50	Composition	220k		
R51,52	Composition	47k		
R53,54,55,56	Composition	47k	5%	
R57,58,59,60	Composition	100k		
R61	Carbon	5k		
R62	Composition	2.2k	20%	



R63,64	Composition	27k		
R65	Composition	2.2k	20%	
R66	Carbon	5k		
R67	Composition	2.2k	20%	
R68,69	Composition	27k		
R70	Composition	2.2k	20%	
R71,72	Wirewound	20 ohm		1/4 w
R73	Composition	1m	20%	
R74	Composition	47k	20%	
R75	Composition	1m	20%	
R76	Composition	68 ohm	20%	
R77	Composition	4.7k		
R78	Composition	470 ohm	20%	
R79	Composition	100 ohm	20%	
R80	Composition	2.2k	20%	
R81	Composition	22k	20%	
R82	Composition	2.2k	20%	
R83	Composition	15k		2w
R84	Composition	2.2k	20%	
R85	Composition	68 ohm	20%	
R86	Composition	2.2m	20%	
R87	Composition	2.2k	20%	
R88	Composition	22k		
R89	Composition	100k	20%	
R90	Composition	47k		
R91	Composition	68 ohm	20%	
R92	Composition	100k		
R93	Composition	2.2k	20%	
R94	Composition	470 ohm	20%	
R95	Composition	100 ohm	20%	
R96	Composition	220k	20%	
R97	Composition	2.2m	20%	
R98	Composition	4.7k		
R99	Composition	2.2k	20%	
R100	Composition	100k	20%	
R101	Composition	2.2m	20%	
R102	Composition	220k	20%	
R103,104	Vacant			
R105	Carbon	15k		1w
R106	Carbon	15k		2w
R107,108	Carbon	10k		
R109	Carbon	680k		
R110	Carbon	47k		
R111	Carbon	33k	20%	
R112	Carbon	10k		
R113	Wirewound	15k		8w
R114,115	Wirewound	2.5k		40w
R116	Wirewound	1.5k		20w
R117	Wirewound	60 ohm		20w
R118	Composition	2.2m	20%	
R119	Carbon	1k		
R120,121	Vacant			
R122	Composition	270k	20%	
R123	Carbon	1k		
R124,125	Carbon	1k		

#### POTENTIOMETERS

Symbol	Description	Part No.
VR1	AUX. LEVEL 500k dual tandem	AR8543
VR2,3	TREBLE & BASS 500k dual tandem	AR8708
VR4,5	BALANCE & MAIN VOLUME, QUADRUPLE	AR8808
VR6,7	DC BALANCE CONTROL 500k	AR8543
VR8	BIAS ADJUSTMENT	AR8543

COILS, TRANSFORMERS AND CHOKES

Symbol	Description	Part No.
L1	FM ANTENNA COIL	AL0416
L2,3	FM RF CHOKE COIL 1 uH	AL0502
L4,7	FM PLATE CHOKE COIL 3uH	AL0410
L5	FM RF COIL	AL0416
L6	FM OSC COIL	AL0312
L8,9	FM FILAMENT CHOKE COIL 1 uH	AL0502
L10	FILTER CHOKE	AL5105
L11	MW OSC COIL	AT4301
T1	AM/FM IFT	AT9105
T2	AM DET, FM IFT	AT9106
T3	FM IFT	AT8105
T4	FM DET IFT	AT8208
T5	AM RF TRANSFORMER	AT4101
T6,7	OUTPUT TRANSFORMER	AT6123
T8	POWER TRANSFORMER	AT5228c

TUBES AND DIODES

V1,2	12AX7 (audio amp) low noise	
V3	12AX7 (audio amp)	
V4,5	6AN8 (phase inv)	
V6,7,8,9	7189-A (power amp)	
V10	6CW4 (FM RF amp) Nuvistor	
V11,17	6AQ8 (FM RF, OSC, AFC, MIX)	
V12,13,14	6BA6 (IF amp)	
V15	6BA6 (AM RF amp)	
V16	6BE6 (AM OSC, MIX)	
V18	EM-84 (tuning indicator)	
D1,2	OA70 (FM DET)	
D3	OA81 (AM DET)	
D4,5	SE-05b (silicon rect)	AG3101
D6	16C-4 (selenium rect)	AG1310

SWITCHES

SELECTOR	Input selector switch	AS1615
MODE	Mode selector switch	AS1528
SL-1,2,3,4,8	Slide switch	AS6217
SL-5,6,7,9	Slide switch	AS6216
PS-1	Power switch (push button)	AS5105
	Dial Pointer	AA3147
	Front panel	AM2176
	Dial scale	AA3243c
	Dial pully	AM4102
	Dial spring	AE4102
	Fuse holder	AK9603
	AC consent	AK8203
	Foot	AM6103
	Knob, input selector	AA1131
	Knob, mode	AA1131
	Knob, double inside	AA1015
	Knob, double outside	AA1016
	Knob, tuning	AA1011
	Terminal, speaker output 4p	AP3113
	Terminal FM/AM Ant 3p	AP3111

Symbol			
Terminal input		6p	Part No.
Fuse	3 ampere		AP2213
Pilot light			
Screw, to fix metal cover		4 $\phi$	AB1005
Screw, to fix bottom plate		3 $\phi$	

PARTS LIST OF MULTIPLEX SECTION

RESISTERS

10% tolerance 1/2% watt, unless otherwise marked or noted.  
k=kilohm, m=Megohm.

R501	Composition	470k	
R502	Composition	10k	
R503	Composition	1k	
R504	Composition	10k	
R505	Composition	4.7k	
R506	Composition	22k	
R507	Composition	10k	
R508	Composition	470 ohm	
R509	Composition	33k	
R510	Composition	220 ohm	
R511	Composition	100k	
R512	Composition	470k	
R513	Composition	270k	
R514	Composition	1k	
R515,516			
R517,518	Carbon	10k	5%
R519,520	Carbon	40k	5%

CAPACITORS

In uF, p= uuF

C501	Mylar	0.05	20%	150v
C502	Mylar	0.5	20%	150v
C503	Polyethylene	2500p	5%	400v
C504	Polyethylene	410p	5%	400v
C505	Polyethylene	2500p	5%	400v
C506	Electrolytic	20	20%	300v
C507,508	Mica	0.01	10%	400v
C509	Mylar	0.01	20%	300v
C510	Mica	100p	10%	400v
C511	Polyethylene	410p	5%	400v
C512	Mylar	0.1	20%	150v
C513	Stirol	0.02	5%	400v
C514	Mylar	0.05	20%	300v
C515	Polyethylene	1000p	5%	400v
C516	Mylar	0.05	20%	150v
C517	Stirol	0.007	5%	400v
C518	Mica	350p	10%	400v
C519	Polyethylene	2500p	5%	400v
C520	Mica	350p	10%	400v
C521	Polyethylene	2500p	5%	400v
C522	Mica	15p	10%	400v



## TRANSFORMERS

Symbol	Description	Part No.
T501	19kc double tuned	AT9808
T502	19kc single tuned	AT9809
T503	38kc multiplier	AT9810

### COILS

L501,502, 503,504	38kc trap coil	AL9807
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### TUBES

V501	6CG7	
V502	6AQ8	
V503	6AV6	
NL501	Neon light	AV7401

### DIODES

D501,502, 503,504	0A81/IN34	
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### POTENTIOMETERS

VR501	Separation control	ARO011
VR502	Indicator light adjustment	ARO012

## TROUBLE SHOOTING

### POWER CIRCUIT

SYMPTOMS	POSSIBLE CAUSE	TO BE CHECKED
Does not light up or function	1) No power	
	a. Severed power cable	Check where cable enters plug.
	b. Defective power switch	Check contact point.
	c. Fuse blown or no fuse inserted	Replace or insert new fuse.
	2) Fuse blows	
	a. Power transformer heat up	Short between transformer windings layer.
	b. Defective insulation in OPT between primary and secondary.	
	c. Short between electrode in tubes	Mainly in rectifier or in power tubes.
	d. Defective electrolytic capacitor	Mainly filter circuit.
	3) Emits smoke	
	a. Short in heater wiring	Check wiring by removing tubes.
	b. Defective tube socket	Mainly poor insulation of wafer-type socket.

Light up, but does not function

- 1) Insufficient plate voltage
  - a. Rectifier tube or diode burned out.
  - b. Resistor in filter circuit burned out
  - c. No rectifier.
- 2) No voltage at plate circuit.
  - a. Primary windings of output transformer burned out.

## AUDIO CIRCUIT

SYMPTOMS	POSSIBLE CAUSE	TO BE CHECKED
Does not function		
1) Power amplifier section	a. Severed output transformer(s) windings (primary and secondary) b. Power output tubes damaged or heaters burned out c. Plate load resistors between each stages burned out d. Bias resistor in cathode circuit burned out	
2) Preamplifier section	a. Plate load resistors between each stages burned out b. Poor contact(s) in input selector switch or mode switch. c. Defective cathode resistor d. Defective de-coupling resistors between each stages e. Defective tubes.	
Noises		
1) Tubes	a. Defective tubes	
2) Resistors	a. Defective plate resistors, negative feed back resistors, or cathode resistors.	
3) Capacitors	a. Defective capacitor, coupling, phase compensation circuit.	
4) Potentiometers	a. Noise emanating from defective volume control or other variable resistors.	
Hum		
1) Tubes	a. Defective tubes, particularly short between electrodes.	
2) Resistors	a. Defective load resistor in phase inverter circuit on cathode end	
3) Capacitors	a. Defective electrolytic capacitors in filter circuit or in de-coupling circuit.	
Distortion		
1) Transformer	a. Defective output transformer, output tubes or rectifier (tube or diode). b. Short between primary and secondary.	
2) Capacitor	a. Defective capacitor in output tube bias circuit.	
3) Resistor	a. Defective grid leak resistor	
4) Rectifier	a. Defective rectifier in bias circuit when fixed bias circuit employed.	

## AM TUNER CIRCUIT

SYMPTOMS	POSSIBLE CAUSE	NOTE
Does not function	a. Defective tubes b. Poor contact or defective insulation in input selector or mode switch	

	<ul style="list-style-type: none"> <li>c. Burnt out resistor in power supply</li> <li>d. Severed winding(s) in IF transformer</li> <li>e. Severed oscillator coil winding</li> <li>f. Short of variable capacitor (tuning) inside mechanism</li> <li>g. Germanium diode in detector circuit is defective</li> </ul>
Poor sensitivity	<ul style="list-style-type: none"> <li>a. Severed winding in RF coil</li> <li>b. Out of alignment in IF transformer</li> <li>c. Out of tracking alignment</li> <li>d. Defective tubes</li> <li>e. Poor insulation of trimming capacitors</li> </ul>
Distortion	<ul style="list-style-type: none"> <li>a. Defective germanium diode</li> <li>b. Defective tubes</li> <li>c. Defective tuning indicator tube</li> <li>d. Defect in AVC circuit</li> </ul>
Noise	<ul style="list-style-type: none"> <li>a. Noise emanating from defective tube</li> <li>b. Occasional short between fixed plate and rotor plate of variable capacitor.</li> <li>c. Poor soldering or short between parts.</li> </ul>

#### FM TUNER CIRCUIT

SYMPTOMS	POSSIBLE CAUSE	NOTE
Does not function	<ul style="list-style-type: none"> <li>a. Defective tubes</li> <li>b. Severed winding(s) in IF Transformers</li> <li>c. Poor contact or defective insulation in rotary switch</li> <li>d. Burnt out resistor(s) in power supply</li> <li>e. Loose oscillation coil connection, or poor soldering</li> <li>f. Poor contact between sockets and tube pins</li> <li>g. Defective germanium diode(s)</li> </ul>	
Poor sensitivity	<ul style="list-style-type: none"> <li>a. IF transformers out of alignment</li> <li>b. Tracking out of alignment</li> <li>c. Defective tubes</li> </ul>	
Distortion	<ul style="list-style-type: none"> <li>a. Discriminator IF transformer out of alignment</li> <li>b. Defective tubes</li> <li>c. Defective germanium diode(s)</li> </ul>	
Noises including Microphonic	<ul style="list-style-type: none"> <li>a. In most cases, due to defective tubes in RF amplifier or local oscillator tube(s)</li> <li>b. Poor contact between sockets and tube pins.</li> <li>c. Antenna input is not enough</li> <li>d. Improper mounting variable capacitor</li> <li>e. Poor soldering or short between parts.</li> <li>f. Excessive long leads or resistors in RF or IF circuits</li> </ul>	



MULTIPLEXE TROUBLE SHOOTING AND REPAIRS

SYMPTOMS	PROBABLE CAUSE	REPAIRS NECESSARY
	1. Pilot amplifying circuit (drift in 19 kc transformer, or other faulty components).	1. Readjustment (AT9808-AT9810); replacement of components.
Poor separation	2. Composite circuit (drift in separation control; drift in 38 kc coil; or other faulty components).	2. Readjustment of separation control; readjustment of components.
Excessive distortion in stereo reception	1. Pilot amplifier circuit 2. Composite circuit (6CG7, etc.) 3. Drop in line power voltage.	1. Readjustment or replacement of components. 2. Vicinity of 6CG7 3. Provide supply of proper voltage.
Distortion prevalent at points of high	1. Inadequate pilot level. 2. Drop in line power voltage.	1. Readjustment; replacement of faulty components. 2. Check power supply section.
Extreme drop in volume in stereo reception	1. Composite amplifying circuit (Faulty 6CG7 or components in its vicinity.)	1. Replace 6CG7 or other faulty components in vicinity of 6CG7.
Separation control completely ineffective (No change even when separation control adjusted.)	1. Faulty separation control variable resistor (burntout) 2. Severed 38 kc coil. 3. 6CG7. 2500pf cathode capacitor faulty.	1. Replace component. 2. Replace component. 3. Replace components.
Poor separation on one channel only	1. Faulty 38 kc filter (one channel only). 2. One of secondary windings of 38 kc transformer severed.	1. Replace component. 2. Replace component.
Stereo indicator fails to function	1. Faulty neon tube. 2. Improper working point.	1. Replace component. 2. Readjust indicator sensitivity control.

+Other malfunctions should be dealt with in the same way as for other amplifiers.

As to the technical inquiry, Please refer to :

**PIONEER ELECTRONIC CORPORATION**

Audio Component Division, Ohmori Plant,  
Engineering Department, Quality Assurance Section.  
218, Ohmori 5-Chome, Ohta-ku, Tokyo, Japan.