

CASSETTE RADIO RECORDER

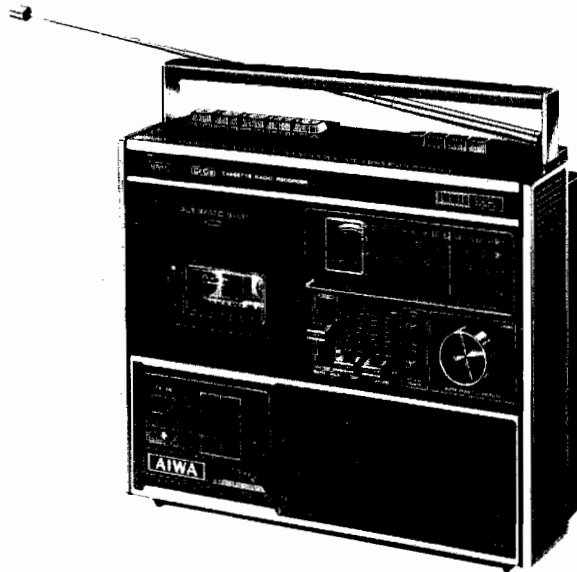
MODEL **TPR-220**EE

AIWA®

[SERVICE MANUAL]



Set using ISO screws



DATE OF ISSUE 10/11/1973

SPECIFICATIONS

Type:	Cassette recorder with 4-band radio, Capstan drive and half-size recording system.	Recording time:	90 min. with C-90, back and forth.
Circuit:	22 transistors, 17 diodes, 1 thermistor.	S/N ratio:	50 dB.
Power source:	Dry cell, UM-1 or Size "D" (1.5V) x 5, DC 7.5V; Car battery, DC 7.5V (through car battery adaptor). House current, AC 110-120V/220-240V switchable.	«Radio Section»	Frequency range:
Output:	3,800mW, Max.	Antenna:	FM, 87.5-108 MHz; MW, 525-1,605 kHz; SW, 5.9-16 MHz; LW, 150-340 kHz.
Frequency response characteristic:	50 ~ 12,000 Hz.	Dimensions:	Rod antenna for FM and SW; Ferrite bar antenna for MW and LW. 301 x 246 x 98 mm (11-13/16" x 9-11/16" x 3-13/16")
Speaker:	Tweeter 42 mm, Woofer 100 x 150 mm	Weight:	3.6 kg (7.9 lbs.)
«Tape Recorder Section»		Accessories:	AC power cord x 1 Tape cassette x 1 Battery (UM-1 or Size "D") x 5 Carrying case x 1
Built-in Microphone:	Condenser microphone.		
Tape speed:	4.75 cm/sec. (1-7/8 ips).		
Recording system:	AC bias.		
Erasing system:	AC erase.		

The specifications and outside design are subject to change without prior notice.

DISASSEMBLY INSTRUCTIONS

1. How to remove Back Cover

- 1) Remove the battery room lid.
- 2) Remove five screws, (1) through (5).
(Refer to Fig. 1.)

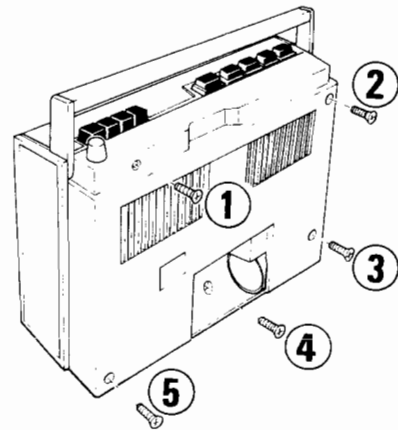


Fig. 1

2. How to remove Radio Chassis

- 1) Pull off control knobs, (a) and (b).
- 2) Remove four screws, (1) through (4).
(Refer to Fig. 2.)

3. How to remove Tape Recorder Chassis

- 1) Remove five screws, (5) through (9).
(Refer to Fig. 2.)

4. How to remove IF/Switch Circuit Board

- 1) Remove three screws, (A) through (C).
(Refer to Fig. 2.)

5. How to remove Audio Circuit Board

- 1) Remove three screws, (D) through (F).
(Refer to Fig. 2.)

6. How to remove Tuner Circuit Board

- 1) Remove two screws, (G) and (H).
(Refer to Fig. 2.)

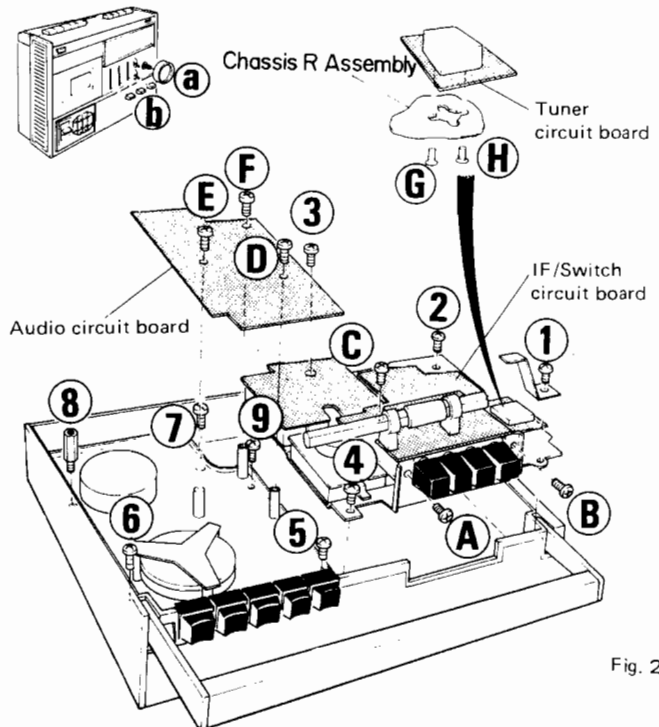


Fig. 2

DIAL CORD STRING

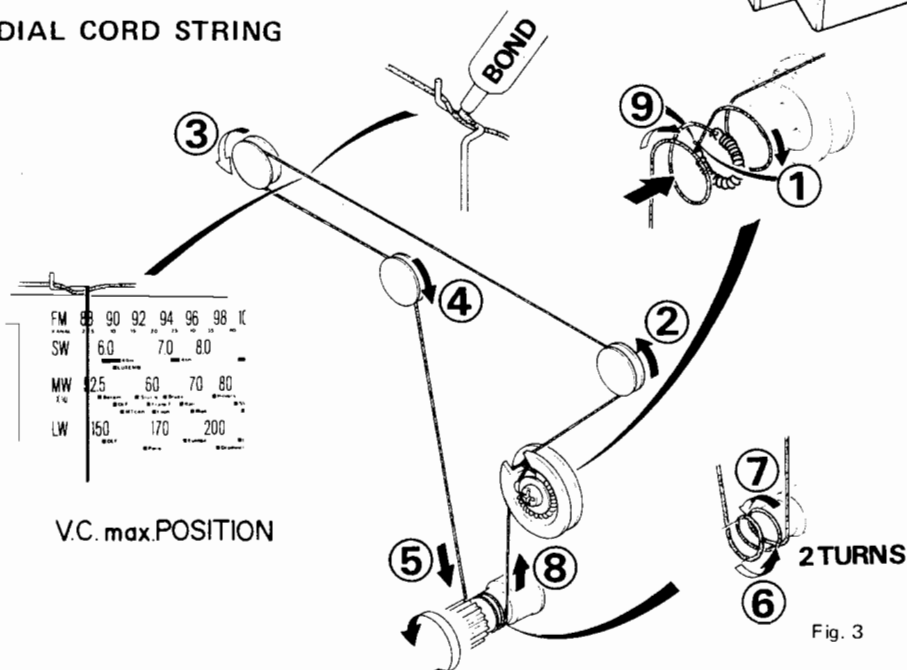


Fig. 3

BLOCK DIAGRAM

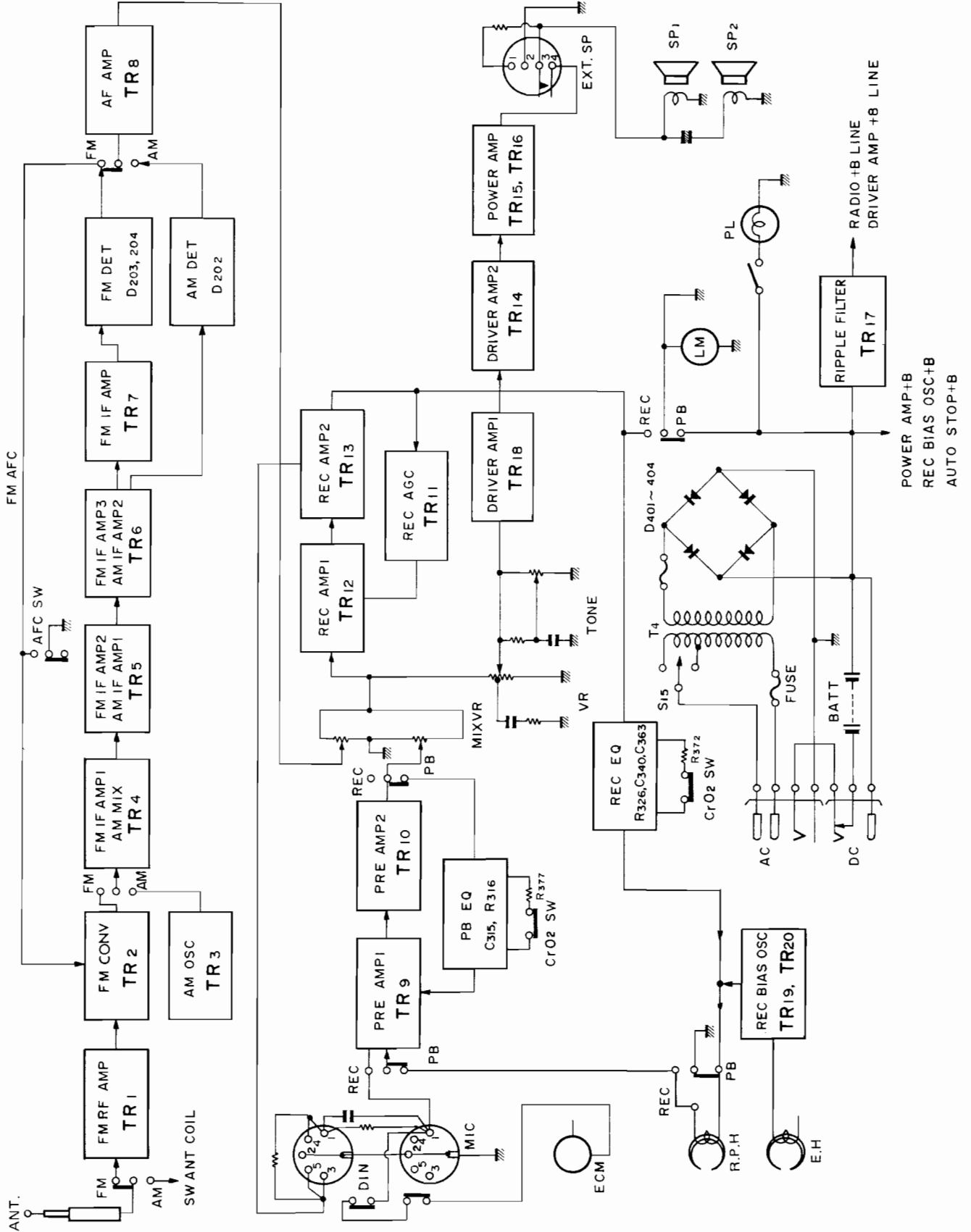
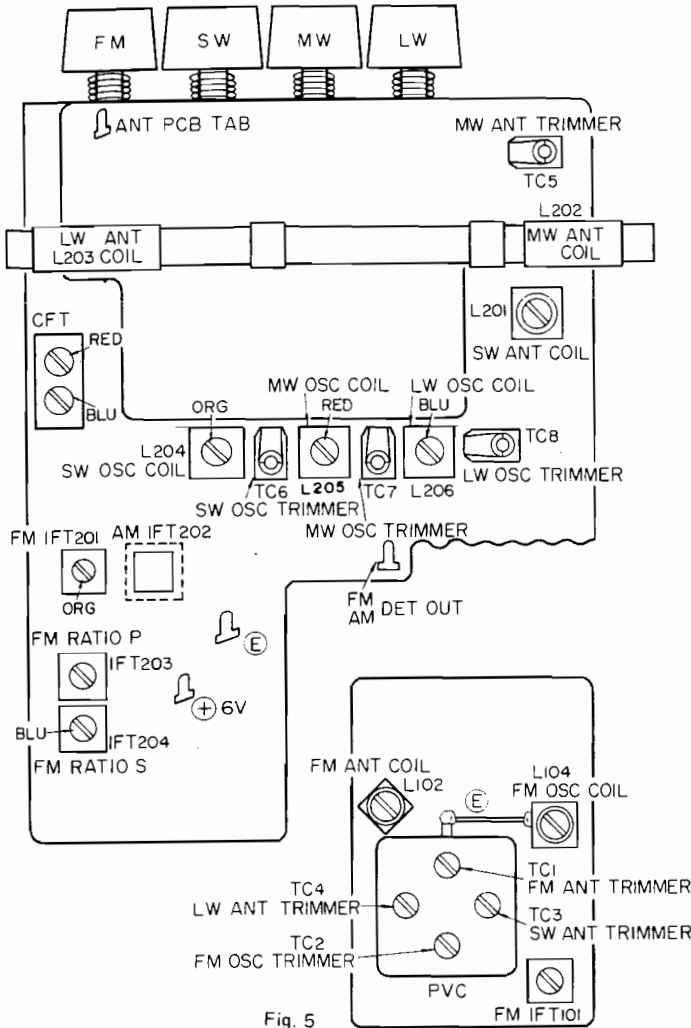


Fig. 4

ADJUSTMENTS OF RADIO SECTION

■ Locations of Main Parts



ALIGNMENT PROCEDURES

1. Instruments Required

Signal Source

1. RF Signal generator (AM, FM).
2. IF sweep generator (Centered 455 kHz. for AM and 10.7 MHz for FM).

Output Indicator

1. V.T.V.M.
2. Oscilloscope

Regulator Adjusting Steps

For band	For stages on each band
1. AM (MW)	1st: IF 2nd: RF frequency range 3rd: RF tracking
2. SW	1st: RF frequency range 2nd: RF tracking
3. LW	1st: RF frequency range 2nd: RF tracking
4. FM	1st: IF 2nd: RF frequency range 3rd: RF tracking

AM-IF Alignment

Step	Signal source	Set signal to	Alignment indicator	Set radio dial to	Adjust	Adjust for
	Connect to		Connect to			
1	AM IF sweep gen.	Sweep centered 455 kHz	Oscilloscope	Min. Freq.	CFT (AM)	Maximum
	Antenna tab		AM det. output tab			

AM-RF Alignment

Step	Signal source	Set signal to	Alignment indicator	Set radio dial to	Adjust	Adjust for
	Connect to		Connect to			
1	AM signal gen.	MW 515 kHz (Modulated)	V.T.V.M.	515 kHz (Low end)	L205 (OSC coil)	Maximum
	Antenna tab		AM det. output tab			
2	Antenna tab	1650 kHz (Modulated)	AM det. output tab	1650 kHz (High end)	TC-7 (OSC trim.)	Maximum
3	(Repeat steps 1 and 2 to obtain frequency range.)					
4	Antenna tab	600 kHz (Modulated)	AM det. output tab	600 kHz	L207 (ANT coil)	Maximum
5	Antenna tab	1400 kHz (Modulated)	AM det. output tab	1400 kHz	TC-5 (ANT trim.)	Maximum
6	(Repeat steps 4 and 5 to minimize tracking error, and also step 3 if necessary.)					

SW-RF Alignment

Step	Signal source	Set signal to	Alignment indicator	Set radio dial to	Adjust	Adjust for
	Connect to		Connect to			
1	AM signal gen.	SW 5.7 MHz (Modulated)	V.T.V.M.	5.7 MHz (Low end)	L204 (OSC coil)	Maximum
	Antenna tab		AM det. output tab			
2	Antenna tab	16.7 MHz (Modulated)	AM det. output tab	16.7 MHz (High end)	TC-6 (OSC trim.)	Maximum
3	(Repeat steps 1 and 2 to obtain frequency range.)					
4	Antenna tab	6 MHz (Modulated)	AM det. output tab	6 MHz	L201 (ANT coil)	Maximum
5	Antenna tab	16 MHz (Modulated)	AM det. output tab	6 MHz	TC-3 (ANT trim.)	Maximum
6	(Repeat steps 4 and 5 to minimize tracking error, and also step 3 if necessary.)					

LW-RF Alignment

Step	Signal source	Set signal to	Alignment indicator	Set radio dial to	Adjust	Adjust for
	Connect to		Connect to			
1	AM signal gen.	LW 145 kHz (Modulated)	V.T.V.M.	145 kHz (Low end)	L206 (OSC coil)	Maximum
	Antenna tab		AM det. output tab			
2	Antenna tab	320 kHz (Modulated)	AM det. output tab	320 kHz (High end)	TC-8 (OSC trim.)	Maximum
3	(Repeat steps 1 and 2 to obtain frequency range.)					
4	Antenna tab	145 kHz (Modulated)	AM det. output tab	145 kHz	L203 (ANT coil)	Maximum
5	Antenna tab	320 kHz (Modulated)	AM det. output tab	320 kHz	TC-4 (ANT trim.)	Maximum
6	(Repeat steps 4 and 5 to minimize tracking error, and also step 3 if necessary.)					

FM-RF Alignment

Step	Signal source	Set signal to	Alignment indicator	Set radio dial to	Adjust	Adjust for
	Connect to		Connect to			
1	FM signal gen.	88 MHz (Modulated)	V.T.V.M.	88 MHz	L104 (OSC coil)	Maximum
	Antenna tab		FM det. output tab			
2	Antenna tab	107 MHz (Modulated)	FM det. output tab	107 MHz	TC-2 (OSC trim.)	Maximum
3	(Repeat steps 1 and 2 to obtain frequency range.)					
4	Antenna tab	88 MHz (Modulated)	FM det. output tab	88 MHz	L102 (ANT coil)	Maximum
5	Antenna tab	107 MHz (Modulated)	FM det. output tab	107 MHz	TC-1 (ANT trim.)	Maximum
6	(Repeat steps 4 and 5 to minimize tracking error, and step 3 if necessary.)					

FM-IF Alignment

Step	Signal source	Set signal to	Alignment indicator	Set radio dial to	Adjust	Adjust for
	Connect to		Connect to			
1	FM IF sweep gen.	Sweep centered 10.7 MHz	Oscilloscope	Max. Freq.	IFT 101 IFT 201 IFT 203	Max. Symmetrical response, equal heights
	Antenna tab		FM det. output tab			
2	Antenna tab	Sweep centered 10.7 MHz	FM det. output tab	Max. Freq.	IFT 204	Symmetrical response, centered 10.7 MHz
3	(Repeat 1 and 2 to obtain a balanced "S" curve linearity.)					

How to change the upper limit of FM frequency range from 107MHz to 103MHz.

Symbol No.	Description	107MHz	103MHz
C109	Ceramic capacitor	5pF : 88-213-050-01	7pF : 88-213-070-01
C114	Ceramic capacitor	3pF : 88-213-030-01	10pF : 88-213-100-01
C119	Ceramic capacitor	3pF : 88-213-030-01	7pF : 88-213-070-01

ADJUSTMENTS OF TAPE RECORDER SECTION

1. Mechanical Adjustments

1) Tape Speed Variation

± 3%

Using the standard test tape TTA-111 (3kHz.), measure the tape speed at the starting and finishing stages of tape winding.

2) Wow and Flutter

Less than 0.4%

Using the standard test tape TTA-111 (3kHz.), measure the wow and flutter at the starting and finishing stages of tape winding.

3) Pinch Roller Pressure

220~270g

4) Take-up Torque

35~45g/cm.

5) Fast Forward Torque

More than 70g/cm

6) Rewind Torque:

55~75g/cm.

7) Fast Forward Time

180 seconds with C-60 cassette

8) Rewind Time

120 seconds with C-60 cassette

9) Current Consumption

Less than 175mA in FWD, less than 190mA in F.F., and less than 210mA in REW.

10) Flywheel Thrust Gap Adjustment

Using a hexagonal wrench, adjust the adjuster screw until the thrust gap is adjusted to 0.2~0.3mm.

11) Flywheel Thrust Adjustment

Depress F.F./REW button and see how far the flywheel drops by itself. Then adjust the thrust accordingly.

2. Electrical Adjustments

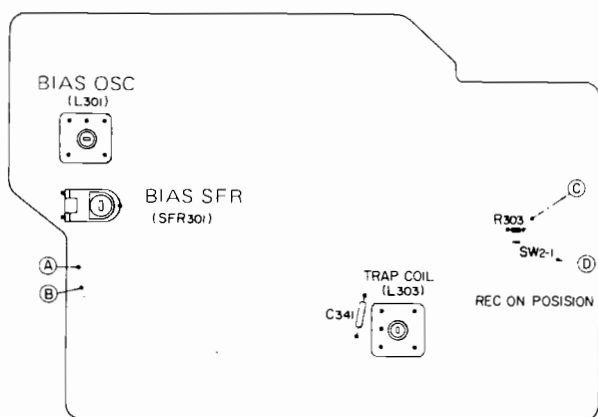


Fig. 6

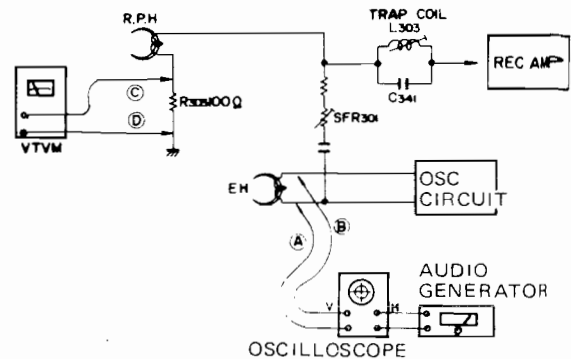


Fig. 7

1) Bias Oscillating Frequency Adjustment

- (1) Connect oscilloscope and audio generator between (A) and (B).
- (2) Set the Beat Suppressor Switch (OSC) to the center position.



Fig. 8

- (3) Turn the bias oscillating coil (L301) to adjust the oscillating frequency to 50kHz±0.3kHz.
(Adjust so as to have the oscilloscope draw a circular Lissajous' figure and then read the value indicated by the audio generator at that time.)
- (4) Confirm that the bias oscillating frequency changes a little (by 1~2kHz.) when the Beat Suppressor Switch (OSC) is changed to another position.



Fig. 9

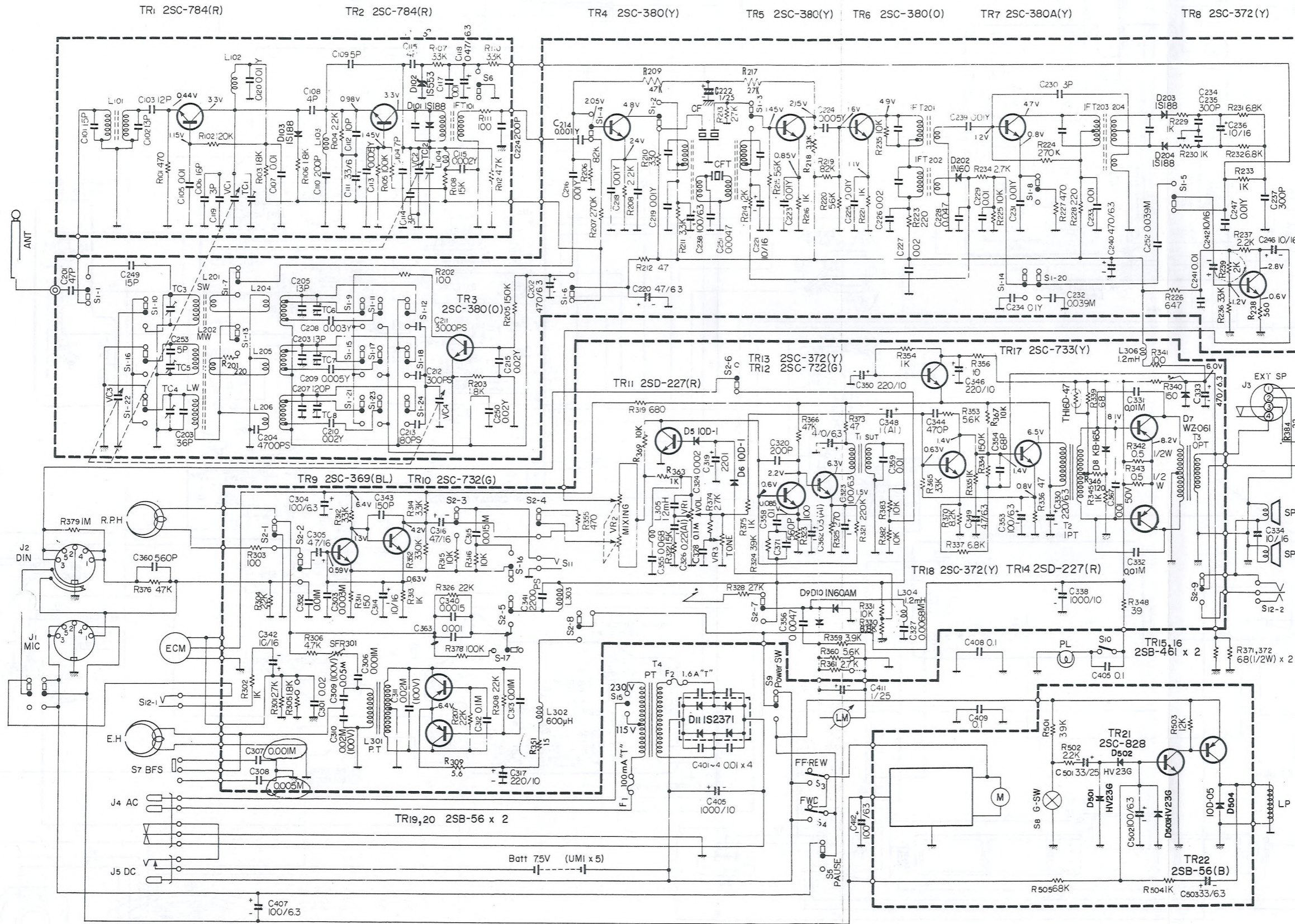
2) Bias Current Adjustment

- (1) Connect a high-frequency V.T.V.M. between (C) and (D).
- (2) Set the Beat Suppressor Switch (OSC) to the center position.
- (3) Turn the trap coil (L303) until the maximum voltage is indicated by the V.T.V.M.
- (4) Turn the bias SFR (SFR301) until the voltage reading on the V.T.V.M. becomes 60mV.

3) Azimuth Adjustment

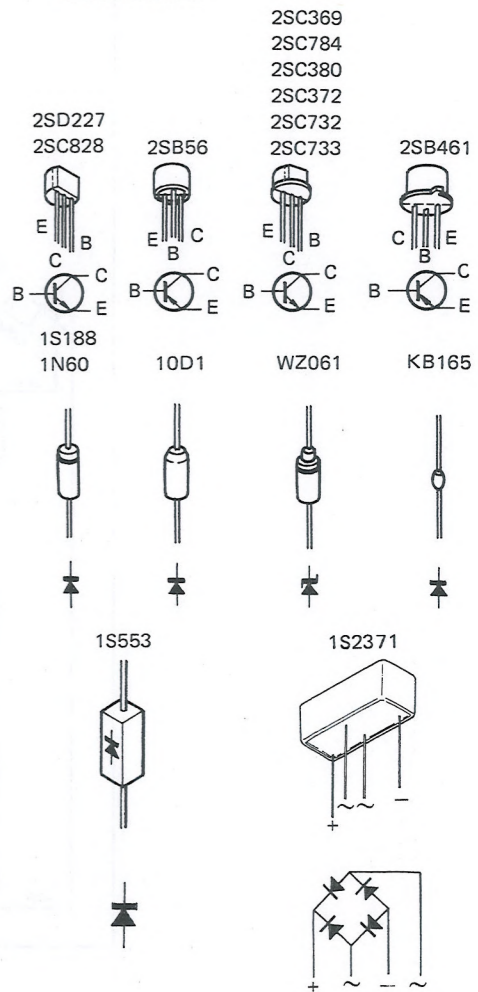
- (1) Play back the standard test tape TTA-113B (8kHz.)
- (2) Change the record/playback head azimuth to obtain the maximum output in playback.
- (3) While observing the oscilloscope, lower volume level to such an extent that the waveform may not become clipped.
- (4) Readjust the head azimuth until the maximum output is obtained.

SCHEMATIC DIAGRAM

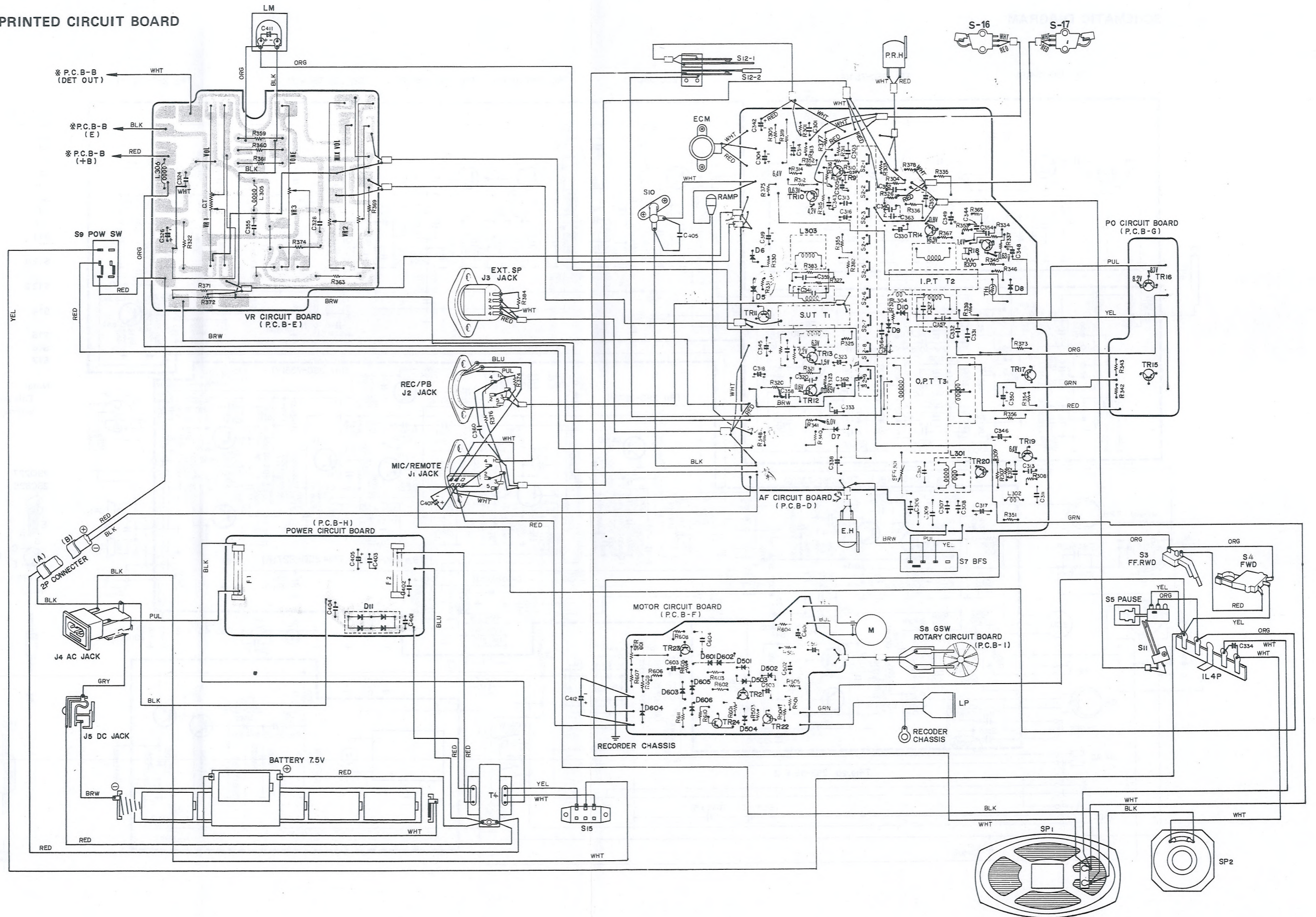


- S1-1 ~ 22 Band switch (FM position)
- S2-1 ~ 9 Rec./Pb. switch (pb position)
- S3 Ff. rew switch (off position)
- S4 Fwd switch (off position)
- S5 Pause switch (on position)
- S6 AFC switch (on position)
- S7 Beat switch
- S8 Tape end detector
- S9 Power switch (on position)
- S10 Lamp switch (off position)
- S11 Interlocked with S5 to turn off pre-amp. when pause is turned on.
- S12-1 Interlocked with mix. vol. to turn on or off ECM.
- S12-2 Interlocked with mix. vol. to turn on or off speaker.
- S14 Interlocked with S4 to turn on or off the ⊕ B of ECM.
- S15 Voltage selector switch
- S16 CrO₂ switch (normal position)
- S17 CrO₂ switch (normal position)

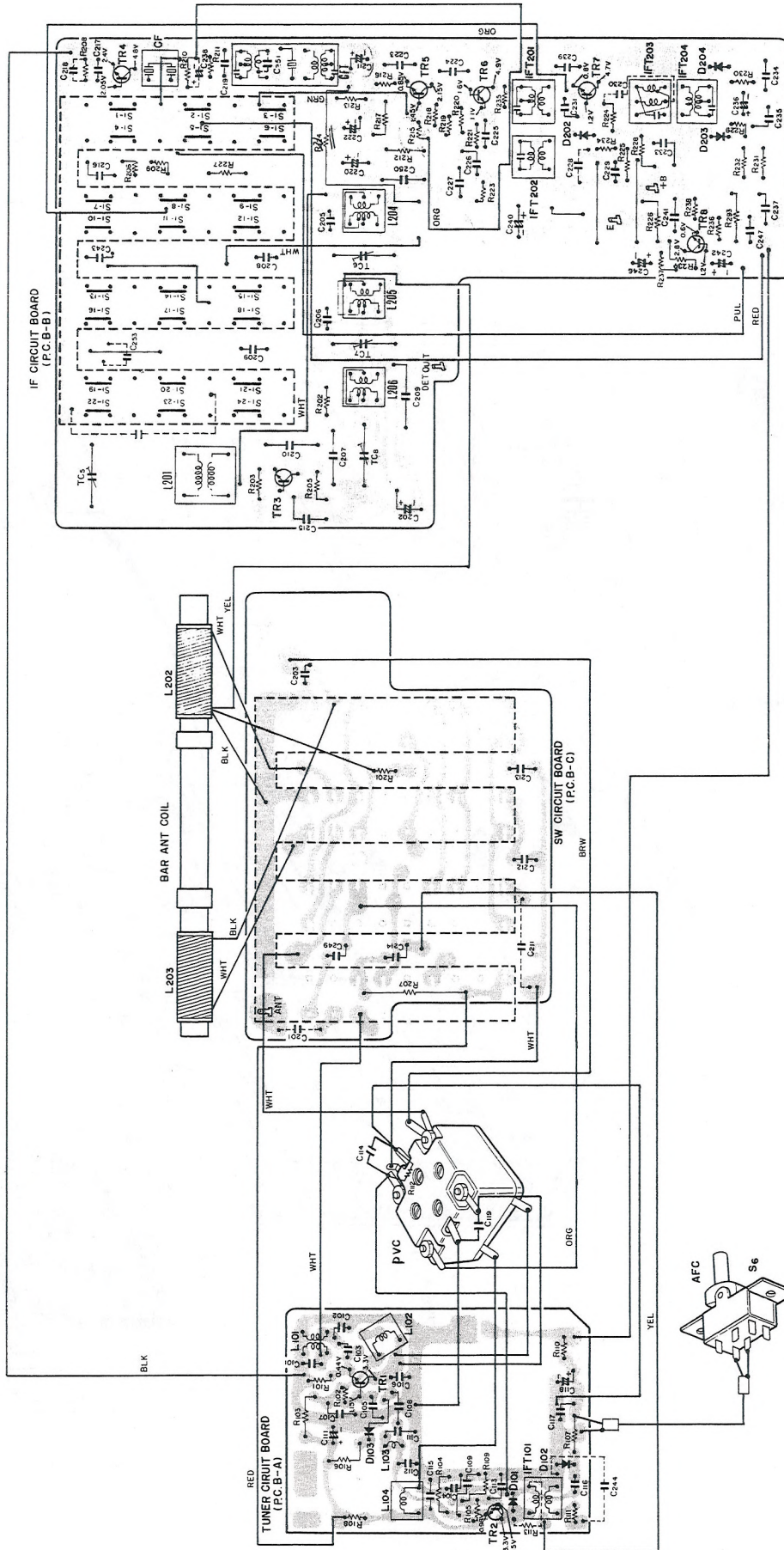
Note: This schematic diagram is subject to change without notice.



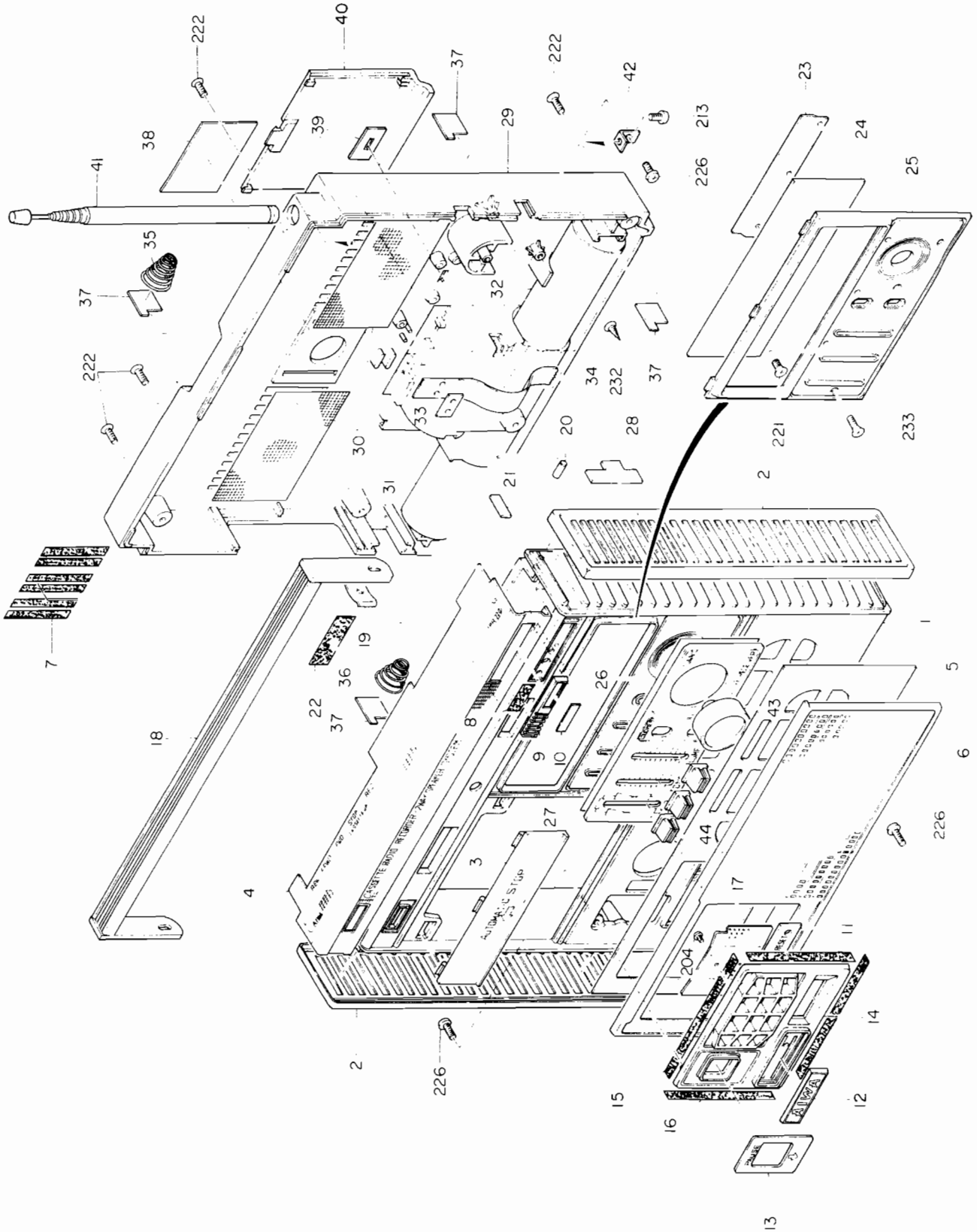
PRINTED CIRCUIT BOARD



PRINTED CIRCUIT BOARD



EXPLODED VIEW-1



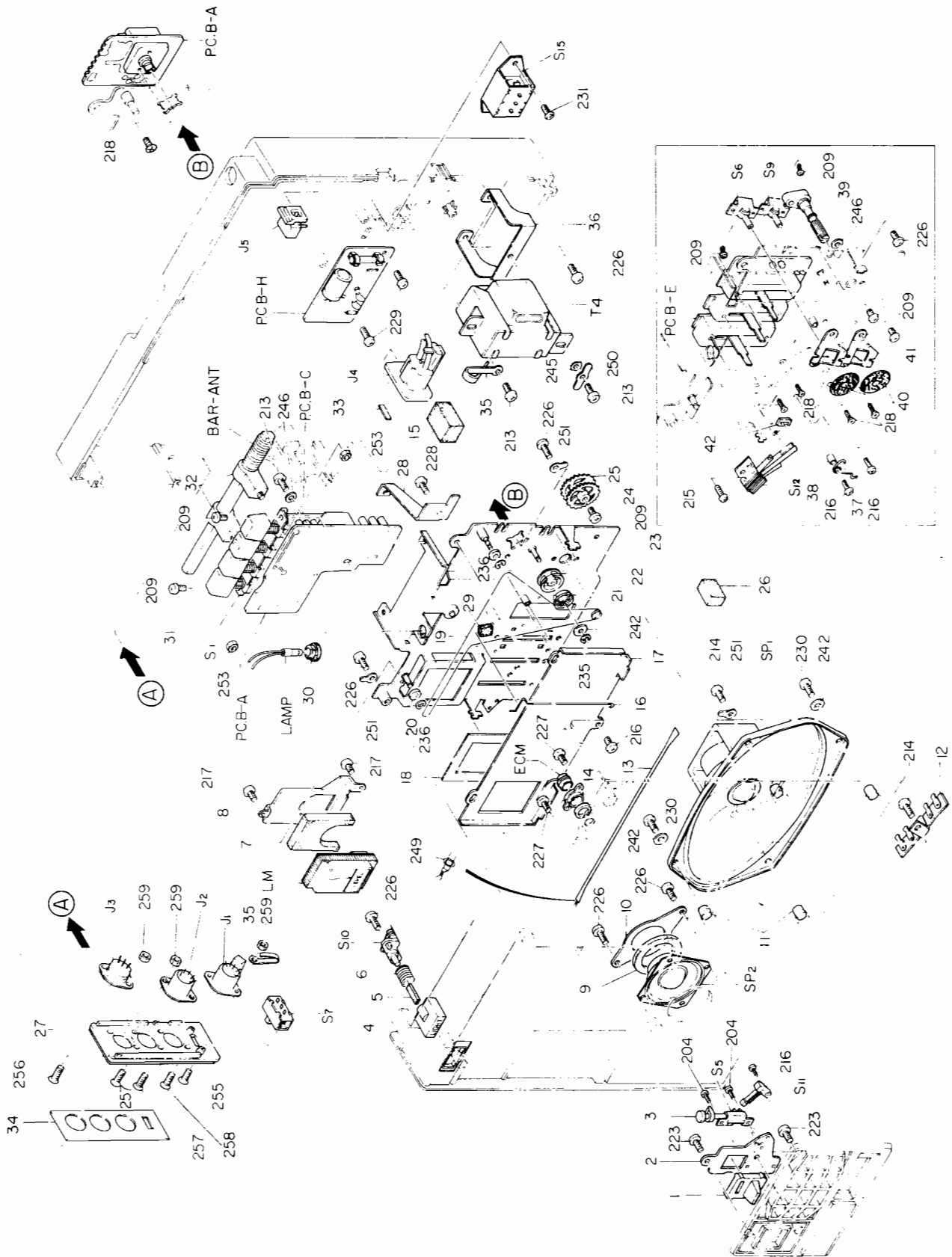
PARTS LIST

MECHANICAL PARTS

■ * mark in this parts list shows exclusive part (which is used) for only Model TPR-220.

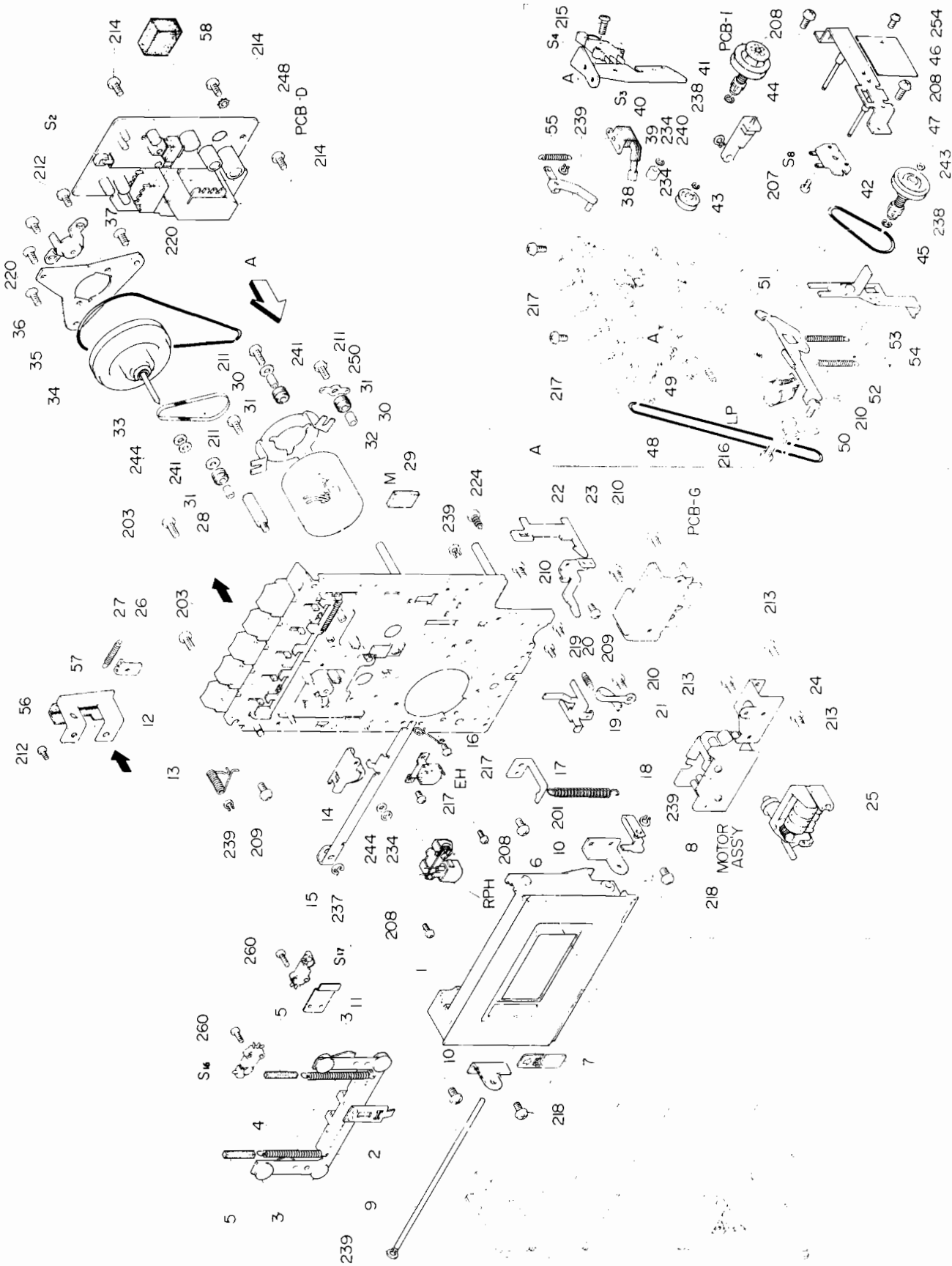
Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty
1 ~ 40	80-004-210-41		Cabinet Assembly (Main case ass'y + Back cover ass'y + Battery room lid)		
1 ~ 28	800-004-211-41		Main case assembly		
1- 1	82-415-001-01		Case proper	TPR-210	1
1- 2	82-421-003-01		Side panel	*	2
1- 3	82-421-015-01		Head cover	*	1
1- 4	82-421-036-01		Panel	*	1
1- 5	82-421-039-01		Punching adhesive paper	*	1
1- 6	82-421-001-01		Punching	*	1
1- 7	82-415-245-01		Cloth, Volume	TPR-210	6
1- 8	82-415-027-01		Cloth, Microphone	TPR-210	1
1- 9	82-421-002-01		Microphone badge	*	1
1-10	82-415-011-01		Microphone badge plate	TPR-210	1
1-11	82-409-039-01		Tape counter cover	TPR-201	1
1-12	87-054-042-01		Name plate, AIWA badge	TPR-202	1
1-13	82-421-006-01		Name plate, Pause	*	1
1-14	82-421-005-01		Panel, Tweeter	*	1
1-15	82-413-231-01		Himeron cloth A	TPR-110	2
1-16	82-421-246-01		Cloth, Tweeter	*	2
1-17	82-421-010-01		Speaker plate	*	1
1-18	82-409-061-01		Carrying handle assembly	TPR-201	1
1-19	82-409-247-01		Spring, Carrying handle	TPR-201	2
1-20	82-409-205-01		Stopper, Carrying handle	TPR-201	2
1-21	82-409-206-01		Stopper B, Carrying handle	TPR-201	2
1-22	82-421-239-01		Cloth, Case proper	*	1
1-23	82-421-212-01		Holder, Dial tuning plate	*	1
1-24	82-421-040-01		Tuning dial plate	*	1
1-25	82-421-017-01		Tuning dial plate B	*	1
1-26	82-421-233-01		Adhesive paper, Tuning dial plate B	*	1
1-27	82-421-018-01		Name plate, Dial tuning & Volume	*	1
1-28	82-421-013-01		Hinder plate, Monitor switch	*	1
(204)	87-261-031-01		Screw, V + 2 - 2		2
(221)	87-233-032-01		Screw, Q + 2 - 3		3
(226)	87-341-095-01		Screw, UT1 + 3 - 8		2
(233)	87-323-074-01		Screw, QT2 +2.6 - 8		3
29 ~ 39	80-004-212-41		Back cover assembly		
1-29	82-421-014-01		Back cover	*	1
1-30	82-409-027-01		Dust screen cloth	TPR-201	2
1-31	82-415-215-01		Battery case A	TPR-210	1
1-32	82-415-216-01		Battery case B	TPR-210	1
1-33	82-415-243-01		Battery ribbon holder	TPR-210	1
1-34	82-415-034-01		Battery ribbon	TPR-210	1
1-35	81-480-050-01		Battery contact spring		1
1-36	82-222-036-01		Battery terminal spring		1
1-37	87-380-018-01		Battery terminal plate		4
1-38	82-421-035-01		Name plate, Rear	*	1
1-39	82-415-022-01		Name plate, Voltage selector	TPR-210	1
1-40	82-415-003-01		Battery room lid	TPR-210	1
1-41	82-409-038-11		Rod antenna	TPR-201	1
1-42	81-493-213-01		Antenna holder	AR-158	1
1-43	82-415-014-01		Knob assembly, Tuning	TPR-210	1
1-44	82-415-026-01		Knob assembly, Volume control	TPR-210	3

EXPLODED VIEW-2



Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty
2- 1	82-421-009-01		Knob, Pause	*	1
2- 2	82-421-208-01		Pause switch bracket	*	1
2- 3	82-421-214-01		Pause button A	*	1
2- 4	82-421-016-01		Knob Dial lamp	*	1
2- 5	82-413-231-01		Himeron cloth A		1
2- 6	82-415-247-01		Spring, Dial lamp	TPR-210	1
2- 7	82-415-246-01		Cushion, Level meter	TPR-210	1
2- 8	82-421-204-01		Holder, Level meter	*	1
2- 9	82-421-211-01		Cushion, Speaker holder	*	1
2-10	82-421-207-01		Holder, Speaker	*	1
2-11	82-421-247-01		Speaker collar	*	4
2-12	87-033-008-01		Lug terminal plate 1L-4P		1
2-13	87-096-073-01		String, Dial pointer guide (35 cm)		1
2-14	82-415-256-01		Microphone sheet	TPR-210	1
2-15	84-301-040-01		Cushion, Printed circuit board	*	1
2-16	82-415-011-01		Dial tuning pointer	TPR-210	1
2-17	82-421-034-01		Back plate	*	1
2-18	82-415-248-01		Cloth, Back plate	*	1
2-19	87-096-046-01		String, Tuning drive (25 cm)	*	1
2-20	81-385-014-01		Roller	AR-612	1
2-21	81-261-138-01		Spring, Drum		1
2-22	82-415-213-01		Drum gear	TPR-210	1
2-23	82-421-263-01		Chassis R assembly	*	1
2-24	81-606-203-01		Gear A		1
2-25	82-415-214-01		Gear B	TPR-210	1
2-26	87-063-095-01		S-cushion 7		1
2-27	82-409-028-01		Jack holder	TPR-201	1
2-28	82-415-252-01		Bracket, Back cover	TPR-210	1
2-29	82-415-268-01		Rubber, Back plate	TPR-210	1
2-30	87-085-006-01		Rubber bushing		1
2-31	82-415-025-01		Knob, Band selector	TPR-210	4
2-32	87-064-045-01		Antenna holder		2
2-33	87-054-048-01		AC indicator name plate		1
2-34	82-409-088-01		Jack cover	TPR-201	1
2-35	87-038-007-01		Metal binder, Lead wire		2
2-36	82-421-260-01		Metal fitting, Transformer	*	1
2-37	82-421-243-01		Spring, Click	*	1
2-38	82-421-244-01		Spring collar	*	1
2-39	82-415-239-01		Tuning shaft assembly	TPR-210	1
2-40	82-421-213-01		Cloth, Switch	*	2
2-41	82-421-206-01		Switch bracket	*	2
2-42	82-421-232-01		Volume guide	*	1
S1	87-031-274-01		Band selector switch, 4 key		1
S5	87-031-286-01		Push switch (Pause)		1
S6	87-031-270-01		Lever switch (Black)		1
S9	87-031-285-01		Lever switch (Red)		1
S10	82-409-615-01		Push switch (Dial light)	TPR-201	1
S11	82-416-640-01		Leaf switch (Pre amp. On-Off)	TPR-601	1
S12	87-031-305-01		Leaf switch (ECM On-off, Speaker On-Off)		1
S15	87-031-246-01		Voltage selector switch		1

EXPLODED VIEW-3

























Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty
1 ~ 7	80-004-217-71		Cassette box assembly		
3- 1	82-421-023-01		Cassette box assembly	*	1
3- 2	82-272-456-01		Cassette slide plate assembly	TP-742	1
3- 3	82-254-070-01		Cassette slide plate roller		4
3- 4	82-254-090-01		Spring, Cassette slide		2
3- 5	82-601-206-01		Cushion B, Cassette slide spring		2
3- 6	82-254-199-01		Spring, Record blocking		1
3- 7	82-421-026-01		Name plate, Cassette box lid	*	1
3- 8	82-254-060-01		Cassette-up metal B		1
3- 9	82-254-069-01		Cassette box spindle shaft		1
3-10	82-272-309-01		Cassette box shaft bearing	TP-742	1
3-11	82-272-464-01		Switch holder	TP-742	1
3-12	82-421-205-01		Chassis assembly	*	1
3-13	82-601-210-01		Spring, Pinch lever		1
3-14	82-272-375-01		Pinch roller lever assembly	TP-742	1
3-15	82-409-288-01		Cassette-up lever	TPR-201	1
3-16	82-346-339-01		Wire holder	TP-1015	1
3-17	82-421-248-01		Lock-out plate		1
3-18	82-409-289-01		Spring, Cassette-up	TPR-201	1
3-19	82-258-139-01		Record blocking lever A	TP-728	1
3-20	82-254-089-01		Spring, Record blocking lever		1
3-21	87-038-007-01		Metal binder, Lead wire		2
3-22	82-403-230-01		Cassette lock	TPR-103	1
3-23	82-409-318-01		Cassette guide, Left	TPR-201	1
3-24	82-409-207-01		Tape counter bracket	TPR-201	1
3-25	87-040-058-01		Tape counter		1
3-26	82-258-211-01		Adjusting plate	TP-728	1
3-27	82-258-187-01		Spring, Take-up	TP-728	1
3-28	82-401-208-01		Station, Back cover	TPR-101	1
3-29	87-087-028-01		Cushion, Out-put transformer		1
3-30	82-272-397-01		Cushion collar, Motor		6
3-31	87-087-027-01		Rubber cushion, Motor		6
3-32	82-415-250-01		Motor holder	TPR-210	1
3-33	82-258-221-01		Take-up belt	TP-728	1
3-34	82-421-236-01		Flywheel assembly	*	1
3-35	82-258-093-01		Main belt	TP-728	1
3-36	82-421-215-01		Lower shaft bearing plate, Flywheel	*	1
3-37	82-421-219-01		Flywheel platform assembly	*	1
3-38	82-258-159-01		FF lever assembly	TP-728	1
3-39	82-258-188-01		Take-up pulley	TP-728	1
3-40	82-421-235-01		Leaf switch bracket	*	1
3-41	82-409-223-01		Take-up reel platform assembly	TPR-201	1
3-42	82-409-306-01		Supply reel platform assembly	TPR-201	1
3-43	82-403-228-01		Rewind pulley	TPR-103	1
3-44	82-421-225-01		Stopper assembly	*	1
3-45	82-409-296-01		Rewind belt	TPR-201	1
3-46	82-421-255-01		Shield plate, G switch	*	1
3-47	82-409-257-01		Reel platform bearing plate assembly	TPR-201	1
3-48	82-409-217-01		Tape counter belt	TPR-201	1
3-49	82-403-239-01		Spring, Rewind	TPR-103	1
3-50	82-409-239-01		Solenoid bracket	TPR-201	1
3-51	82-409-237-01		Stop lever	TPR-201	1
3-52	82-403-209-01		Spring, Stop lever	TPR-103	1
3-53	82-258-201-01		Spring, Main	TP-728	1
3-54	82-415-240-01		Rec/Pb lever assembly	TPR-210	1
3-55	82-258-186-01		Spring, FF	TP-728	1
3-56	82-415-244-01		Insulation plate, Belt cover	TPR-210	1
3-57	82-409-231-01		Belt cover	TPR-201	1
3-58	84-301-040-01		Cushion printed circuit board	TPR-210	1
S2	87-031-284-01		Slide switch (Rec./Pb.)		1
S3	87-031-273-01		Leaf switch (FF, REW)		1
S4	87-031-288-01		Leaf switch (FWD)		1
S7	87-031-287-01		Slide switch (Beat frequency switch)		1
S8	82-346-614-01		G switch assembly		1
S14	82-416-640-01		Leaf switch	TPR-601	1
S16	82-272-631-01		Leaf switch (CrO ₂ switch A)		
S17	82-272-632-01		Leaf switch (CrO ₂ switch B)		












SCREWS & WASHERS

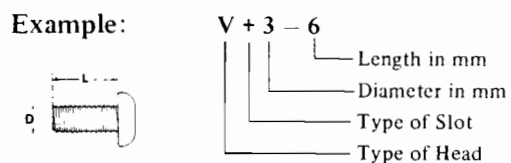
Ref. No.	Part No.	Description	Q'ty
201	87-261-071-01	V + 2.6-4	1
202	87-261-092-11	V + 3-4	2
203	87-261-094-11	V + 3-6	2
204	87-261-031-01	V + 2-2	4
205	87-081-269-01	VS + 2-8	3
206	87-081-236-01	VS + 2-4	6
207	87-081-236-01	V + 2-4	2
208	87-253-070-01	U + 2.6-3	4
209	87-253-071-01	U + 2.6-4	14
210	87-253-072-01	U + 2.6-5	6
211	87-253-074-01	U + 2.6-8	11
212	87-253-092-11	U + 3-4	2
213	87-253-093-11	U + 3-5	7
214	87-253-094-11	U + 3-6	5
215	87-253-036-01	U + 2-8	1
216	87-253-032-01	U + 2-3	8
217	87-253-033-01	U + 2-4	3
218	87-233-071-01	Q + 2.6-4	10
219	87-233-072-01	Q + 2.6-5	2
220	87-233-094-11	Q + 3-6	3
221	87-233-032-01	Q + 2-3	3
222	87-226-096-11	P + 3-10	4
223	87-081-215-01	P + 2-4	2
224	87-353-097-01	VT ₂ + 3-12	1
225	87-351-074-01	VT ₁ + 2.6-8	2
226	87-341-095-01	UT ₁ + 3-8	15
227	87-343-036-01	UT ₂ + 2-8	2
228	87-341-097-01	UT ₁ + 3-12	1
229	87-341-074-01	UT ₁ + 2.6-8	2
230	87-341-096-01	UT ₁ + 3-10	2

Ref. No.	Part No.	Description	Q'ty
231	87-343-072-01	UT ₁ + 3-5	2
232	87-311-097-01	PT ₁ + 3-12	1
233	87-323-074-01	QT ₂ + 2.6-8	3
234	87-441-003-01	STE-1.5	3
235	87-441-005-01	STE-2	1
236	87-441-008-01	STE-2.5	2
237	87-441-009-01	STE-3	1
238	87-441-001-01	STE-1.2	2
239	87-442-003-01	STP-3	5
240	87-442-004-01	STP-4	1
241	87-081-255-01	W-3mmφ diam.	5
242	87-410-031-01	W-3mmφ diam.	3
243	82-215-207-01	TW-1.6mmφ diam.	3
244	87-081-036-01	TW-2mmφ diam.	4
245	87-433-904-01	WTIE-3mmφ diam.	1
246	87-081-015-01	WF-3mmφ diam.	1
247	87-081-163-01	WF-3mmφ diam.	1/5
248	87-422-306-01	WS-3mmφ diam.	1
249	87-400-409-01	H-1.6-4	1
250	87-450-040-01	LA, 4mmφ diam.	2
251	87-450-414-01	LB, 4mmφ diam.	2
252	87-450-413-01	LB, 3mmφ diam.	2
253	87-391-013-01	N-2.6mmφ diam.	2
254	87-253-033-01	U + 2-4	2
255	87-233-035-01	Q + 2-6	2
256	87-233-037-01	Q + 2-10	2
257	87-233-034-01	Q + 2-5	3
258	87-233-036-01	Q + 2-8	1
259	87-391-006-01	N-2mmφ diam.	6
260	87-081-269-01	V + 2-8	4

Hardware Nomenclature

V:	Pan head screw		
U:	Binding head screw		
Q:	Flat countersunk head screw		
P:	Oval countersunk head screw		
VS:	Pan head screw with spring washer		
VT ₁ :	Pan head tapping screw		
VT ₂ :	Pan head tapping screw		
UT ₁ :	Binding head tapping screw		
UT ₂ :	Binding head tapping screw		
QT ₂ :	Flat countersunk head tapping screw		
PT ₁ :	Oval countersunk head tapping screw		

STE:	E ring (washer)	
STP:	Powerful stop ring	
W:	Washer	
TW:	Tefron washer	
WF:	Fibre washer	
WS:	Spring washer	
WTIE:	Crown washer	
N:	Nut	
H:	Eyelet	
LA:	Lug terminal plate	
LB:	Lug terminal plate	



ELECTRICAL PARTS

Symbol No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty
« RADIO SECTION »					
PCB-A,B	82-421-630-01		Tuner/IF circuit board	*	1
PCB-C	82-421-631-01		Switch circuit board	*	1
Tr 1,2	89-307-842-01		Transistor, 2SC784(R)		2
Tr 3,6	89-303-803-01		Transistor, 2SC380(O)		2
Tr 4,5	89-303-804-01		Transistor, 2SC380(Y)		2
Tr 7	87-026-046-01		Transistor, 2SC380A(Y)		1
Tr 8	89-303-724-01		Transistor, 2SC372(Y)		1
D101,103,203,204	88-052-188-11		Diode, 1S188FM		4
D102	88-052-553-01		Vari-cap, 1S553		1
D202	88-051-060-01		Diode, 1N60AM		1
L101	87-006-010-01		FM antenna coil		1
L102,104	87-006-016-01		FM coil (1;3/4t)		2
L103	81-245-319-01		Choke coil 1μH		1
L204	87-007-049-01		SW OSC coil		1
L205	87-007-048-01		MW OSC coil		1
L206	87-007-050-01		LW OSC coil		1
IFT101	81-245-307-01		FM IFT		1
IFT201	87-008-110-01		FM IFT		1
IFT202	87-008-117-01		AM IFT		1
IFT203	87-008-111-01		FM ratio trans. P		1
IFT204	81-245-309-01		FM ratio trans. S		1
CF	87-008-119-01		Ceramic filter 10.7 MHz		1
CFT	87-008-116-01		Ceramic filter trans. 455 Hz		1
TC1,2,3,4	87-011-055-01		PVC 22J-20T1		1
VC1,2,3,4					
TC5,6,7	87-011-024-01		Trimmer ATI-53		3
TC8	87-011-050-01		Trimmer 1T-16M		1
S1	87-031-274-01		Push switch (Band selector)		1
< Resistors >					
R101	88-132-471-01		470Ω 1/4W ±10%		1
R108	88-132-152-01		1.5kΩ 1/4W ±10%		1
R103,106	88-132-182-01		1.8kΩ 1/4W ±10%		2
R104	88-132-222-01		2.2kΩ 1/4W ±10%		1
R112	88-132-472-01		4.7kΩ 1/4W ±10%		1
R214	88-132-123-01		12kΩ 1/4W ±10%		1
R107	88-132-333-01		33kΩ 1/4W ±10%		1
R105	88-132-104-01		100kΩ 1/4W ±10%		1
R102	88-132-124-01		120kΩ 1/4W ±10%		1
R109	88-132-184-01		180kΩ 1/4W ±10%		1
R207	88-132-274-01		270kΩ 1/4W ±10%		1
R202	88-134-101-01		100Ω 1/4W ±10%		1
R201	88-134-221-01		220Ω 1/4W ±10%		1
R227	88-134-471-01		470Ω 1/4W ±10%		1
R209	88-134-473-01		47kΩ 1/4W ±10%		1
R206	88-134-823-01		82kΩ 1/4W ±10%		1
R216,226	88-182-470-01		47Ω 1/4W ±10%	ELR	2
R111	88-182-101-01		100Ω 1/4W ±10%	ELR	1
R223,228	88-182-221-01		220Ω 1/4W ±10%	ELR	2
R210	88-182-331-01		330Ω 1/4W ±10%	ELR	1
R238	88-182-561-01		560Ω 1/4W ±10%	ELR	1
R216,221,229,230,233	88-182-102-01		1kΩ 1/4W ±10%	ELR	5
R203	88-182-182-01		1.8kΩ 1/4W ±10%	ELR	1
R208,237	88-182-222-01		2.2kΩ 1/4W ±10%	ELR	2
R234	88-182-272-01		2.7kΩ 1/4W ±10%	ELR	1
R211,218	88-182-332-01		3.3kΩ 1/4W ±10%	ELR	2
R231,232	88-182-682-01		6.8kΩ 1/4W ±10%	ELR	2
R225,235	88-182-103-01		10kΩ 1/4W ±10%	ELR	2
R213,217	88-182-273-01		27kΩ 1/4W ±10%	ELR	2
R110,236	88-182-333-01		33kΩ 1/4W ±10%	ELR	2
R215,220	88-182-563-01		56kΩ 1/4W ±10%	ELR	2
R219,239	88-182-823-01		82kΩ 1/4W ±10%	ELR	2
R205	88-182-154-01		150kΩ 1/4W ±10%	ELR	1
R224	88-182-274-01		270kΩ 1/4W ±10%	ELP	1

Symbol No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty
< Capacitors >					
C222	88-336-100-01		1 μ F 25V Electrolytic		1
C221,236,242,246	88-335-110-01		10 μ F 16V Electrolytic		4
C111	88-332-310-01		33 μ F 6.3V Electrolytic		1
C220	88-332-510-01		47 μ F 6.3V Electrolytic		1
C238	88-332-120-01		100 μ F 6.3V Electrolytic		1
C202,240	88-332-520-01		470 μ F 6.3V Electrolytic		1
C118	87-015-095-01		0.47 μ F 6.3V Alox		1
C213	88-617-460-01		180pF Styrol		1
C212	88-617-510-01		300pF Styrol		1
C211	88-617-690-01		3000pF Styrol		1
C204	88-617-720-01		4700pF Styrol		1
C232,252	88-727-950-01		0.039 μ F Mylar		2
C114,119,230	88-213-030-01		3pF Ceramic		3
C108,116	88-213-040-01		4pF Ceramic		2
C104,109,253	88-213-050-01		5pF Ceramic		3
C112	88-213-100-01		10pF Ceramic		1
C103	88-212-120-01		12pF Ceramic		1
C102,205,206	88-212-130-01		13pF Ceramic		3
C101,249	88-212-150-01		15pF Ceramic		1
C106	88-212-160-01		16pF Ceramic		1
C203	88-212-260-01		36pF Ceramic		1
C207	88-212-420-01		180pF Ceramic		1
C110,120	88-212-470-01		200pF Ceramic		1
C234,235,237	88-212-510-01		300pF Ceramic		3
C201	88-232-290-01		47pF Ceramic		1
C105,107,117,229 233,241	88-205-810-01		0.01 μ F Ceramic		6
C226,227	88-205-830-01		0.022 μ F Ceramic		2
C228	88-205-850-01		0.047 μ F Ceramic		1
C216,217,218,219 223,225,231,243 247	88-214-810-01		0.01 μ F Ceramic		9
C210,215,250	88-214-830-01		0.02 μ F Ceramic		3
C214,239	88-214-610-01		0.001 μ F Ceramic		2
C115	88-214-650-01		0.002 μ F Ceramic		1
C208	88-214-690-01		0.003 μ F Ceramic		1
C113,209,224,251	88-214-720-01		0.005 μ F Ceramic		4
<< TAPE RECORDER SECTION >>					
AF circuit board assembly					
PCB-D	82-421-607-01		AF circuit board		1
Tr9	89-303-696-01		Transistor, 2SC369(BL)		1
Tr 10,12	89-307-325-01		Transistor, 2SC732(G)		2
Tr 11,14	89-402-274-01		Transistor, 2SD227(R)		2
Tr 13,18	89-303-724-01		Transistor, 2SC372(Y)		2
Tr17	89-307-334-01		Transistor, 2SC733(Y)		1
Tr 19,20	89-200-562-01		Transistor, 2SB56(B)		2
D5,6	87-027-039-01		Diode, 10D 1		2
D7	82-415-637-01		Zener diode, WZ 061	TPR-210	1
D8	87-026-052-01		Varistor, KB165		1
D9,10	88-051-060-01		Diode, 1N60AM		2
Th1	88-063-470-01		Thermistor, 16D47		1
L301	82-418-612-01		OSC (TP)	TPR-202	1
L302	82-401-624-01		Choke coil 600 μ H		1
L303	87-003-034-01		Trap coil		1
L304	87-005-072-01		Micro inductor 1.2mH		1
T1	87-002-090-01		Step-up transformer		1
T2	82-415-644-01		Input transformer	TPR-210	1
T3	82-421-613-01		Output transformer	*	1
S2	87-031-270-01		Slide switch (REC/PB)		1
SFR301	87-021-359-01		Semi-fixed resistor, 30k Ω -B		1
< Resistors >					
R256	88-132-100-01		10 Ω 1/4W \pm 10%		1
R351	88-132-150-01		15 Ω 1/4W \pm 10%		1
R384	88-132-220-01		22 Ω 1/4W \pm 10%		1

Symbol No.	Part No.	Part No. Changed to	Description			Common Model	Q'ty
R348	88-132-390-01		39Ω	1/4W	±10%		1
R336,373	88-132-470-01		47Ω	1/4W	±10%		2
R339	88-132-680-01		68Ω	1/4W	±10%		1
R341	88-132-101-01		100Ω	1/4W	±10%		1
R340	88-132-151-01		150Ω	1/4W	±10%		1
R313,320,335,345	88-132-102-01		1kΩ	1/4W	±10%		4
R304	88-132-152-01		1.5kΩ	1/4W	±10%		1
R305	88-132-182-01		1.8kΩ	1/4W	±10%		1
R301	88-132-272-01		2.7kΩ	1/4W	±10%		1
R314	88-132-332-01		3.3kΩ	1/4W	±10%		1
R327	88-132-392-01		3.9kΩ	1/4W	±10%		1
R353,360	88-132-562-01		5.6kΩ	1/4W	±10%		2
R315,316,330,367 382,383	88-132-103-01		10kΩ	1/4W	±10%		6
R307,308	88-132-223-01		22kΩ	1/4W	±10%		2
R365	88-132-333-01		33kΩ	1/4W	±10%		1
R376,377	88-132-473-01		47kΩ	1/4W	±10%		2
R378	88-132-104-01		100kΩ	1/4W	±10%		1
R321	88-132-224-01		220kΩ	1/4W	±10%		1
R379	88-132-105-01		1MΩ	1/4W	±10%		1
R309	88-182-569-01		5.6Ω	1/4W	±10%	ELR	1
R370	88-182-829-01		8.2Ω	1/4W	±10%	ELR	1
R303,323	88-182-101-01		100Ω	1/4W	±10%	ELR	2
R346	88-182-121-01		120Ω	1/4W	±10%	ELR	1
R311	88-182-151-01		150Ω	1/4W	±10%	ELR	1
R325	88-182-271-01		270Ω	1/4W	±10%	ELR	1
R355	88-182-471-01		470Ω	1/4W	±10%	ELR	1
R319	88-182-681-01		680Ω	1/4W	±10%	ELR	1
R375	88-182-102-01		1kΩ	1/4W	±10%	ELR	1
R306,366	88-182-472-01		4.7kΩ	1/4W	±10%	ELR	2
R337	88-182-682-01		6.8kΩ	1/4W	±10%	ELR	1
R315,331	88-182-103-01		10kΩ	1/4W	±10%	ELR	2
R326	88-182-223-01		22kΩ	1/4W	±10%	ELR	1
R312	88-182-333-01		33kΩ	1/4W	±10%	ELR	1
R324	88-182-393-01		39kΩ	1/4W	±10%	ELR	1
R310	88-182-683-01		68kΩ	1/4W	±10%	ELR	1
R334	88-182-154-01		150kΩ	1/4W	±10%	ELR	1
R352	88-182-334-01		330kΩ	1/4W	±10%	ELR	1
R328	88-181-273-01		2.7kΩ	1/4W	±5%	ELR	1
			<Capacitors>				
C305,316	88-335-500-01		4.7μF	16V	Electrolytic		2
C314,318,342	88-335-110-01		10μF	16V	Electrolytic		3
C317,346,350	88-333-220-01		220μF	10V	Electrolytic		3
C338	88-333-139-01		1000μF	10V	Electrolytic		1
C349	88-332-510-01		47μF	6.3V	Electrolytic		1
C304,323,353	88-332-120-01		100μF	6.3V	Electrolytic		3
C319,330	88-332-220-01		220μF	6.3V	Electrolytic		2
C333,345	88-332-524-01		470μF	6.3V	Electrolytic		2
C348	87-015-097-01		1μF	6.3V	Alox		1
C362	87-015-094-01		0.3μF	6.3V	Alox		1
C341	88-617-660-01		2200pF		Styroil		1
C358	88-727-910-01		0.1μF		Mylar		1
C312,313,331,332 352	88-728-810-01		0.01μF		Mylar		5
C315	88-728-820-01		0.015μF		Mylar		1
C310,311	88-728-830-01		0.022μF		Mylar		2
C309	88-728-850-01		0.047μF		Mylar		1
C306,307,363	88-727-610-01		0.001μF		Mylar		3
C340	88-727-630-01		0.0015μF		Mylar		1
C303	88-727-700-01		0.0033μF		Mylar		1
C308,356	88-727-720-01		0.0047μF		Mylar		2
C327	88-727-740-01		0.0068μF		Mylar		1
C354	88-212-330-01		68pF		Ceramic		1
C343	88-212-450-01		150pF		Ceramic		1
C320	88-212-470-01		200pF		Ceramic		1
C344	88-212-550-01		470pF		Ceramic		1

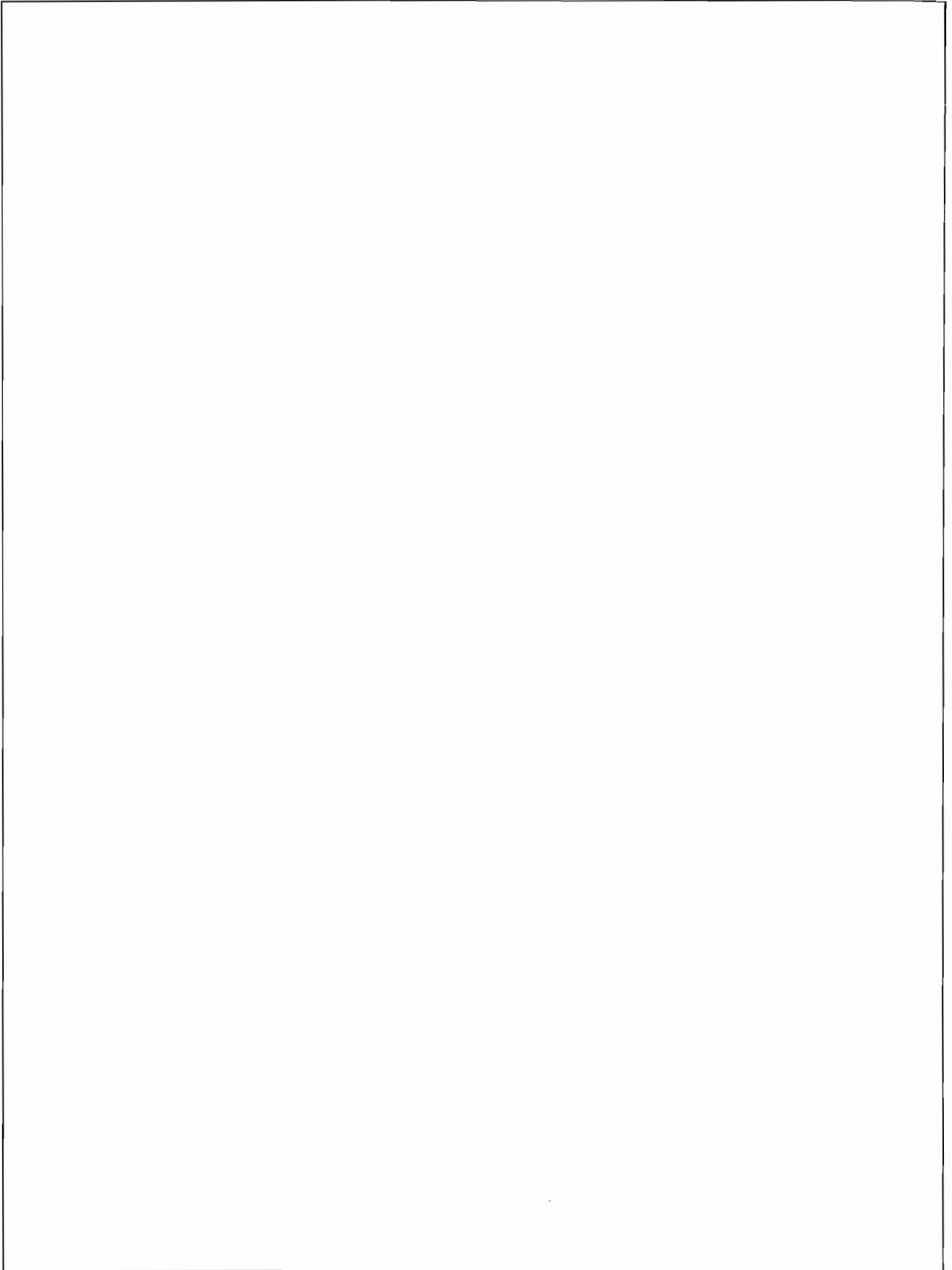
Symbol No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty
C360	88-212-560-01		560pF Ceramic		1
C357	88-213-810-01		0.01μF Ceramic		1
C301	88-205-870-01		0.039μF Ceramic		1
C359	88-205-610-01		0.001μF Ceramic		1
Volume circuit board assembly					
PCB-E	82-421-608-01		Volume circuit board	*	1
L305,306	87-005-072-01		Micro inductor 1.2mH		2
VR1	82-421-606-01		Slide volume (Volume)	*	1
VR2	82-421-605-01		Slide volume (Mixing)	*	1
VR3	82-421-615-01		Slide volume (Tone)	*	1
< Resistors >					
R363,364	88-132-102-01		1kΩ 1/4W ±10%		2
R332	88-132-152-01		1.5kΩ 1/4W ±10%		1
R361,374	88-132-272-01		2.7kΩ 1/4W ±10%		2
R359	88-132-392-01		3.9kΩ 1/4W ±10%		1
R369	88-134-103-01		10kΩ 1/4W ±10%		1
R371,372	88-144-680-01		68Ω 1/2W ±10%		2
< Capacitors >					
C326	87-015-093-01		0.2μF 6.3V Alox		1
C328	88-727-910-01		0.1μF Mylar		1
C324	88-727-660-01		0.0022μF Mylar		1
C355	88-727-740-01		0.0068μF Mylar		1
Po circuit board assembly					
PCB-G	82-415-621-01		Po circuit board	TPR-210	1
TR15,16	89-204-613-51		Transistor, 2SB461-C,D,E		2
R342,343	88-142-508-01		Resistor, 0.5Ω 1/2W ±10%		2
	82-415-622-01		Radiation plate		1
	87-037-077-01		Insulation film		2
	87-064-032-01		Transistor holder		2
« POWER SOURCE SECTION »					
PCB-H	82-421-632-01		Power source circuit board		1
D11	87-027-121-01		Diode, 1S2371		1
F1	87-035-067-01		Fuse, 100mA		1
F2	87-035-068-01		Fuse, 1.6A "T"		1
	87-032-323-01		Fuse clamp		4
< Capacitors >					
C405	88-333-130-01		1000μF 10V Electrolytic		1
C401,402,403,404	88-205-810-01		0.01μF Ceramic		4
« MOTOR SECTION »					
Motor Assembly (Motor proper + Motor governor ass'y)					
	87-045-093-11		Motor assembly		1
	87-045-095-01		Motor proper		1
	87-045-096-01		Motor governor ass'y		1
TR21,24	89-308-280-01		Transistor, 2SC828		2
TR22	89-200-560-01		Transistor, 2SB56		1
TR23			Transistor, 2SB461		1
D501,502,503,601,602,603,605,606	87-027-116-01		Diode, HV-23G		8
D504,604	87-027-078-01		Diode, 10D-05		2
SFR601	87-021-236-01		Semi-fixed resistor, 500Ω		1
Rotary circuit board assembly					
PCB-1	87-033-099-01		Rotary circuit board		1
S8	82-421-629-01		G switch assembly		1
LP	82-421-612-01		Solenoid		1
« MISCELLANEOUS »					
S3	87-031-324-01		Leaf switch (FF/REW)		1
S4	87-031-288-01		Leaf switch (FWD)		1
S5	87-031-286-01		Push switch (Pause)		1
S6	87-031-270-01		Lever switch (AFC On/Off)		1
S7	82-409-630-01		Slide switch (Beat frequency switch)		1

Symbol No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty
S9	87-031-285-01		Lever switch (Power On/Off)		1
S10	82-409-615-01		Push switch (Dial Light)		1
S11	82-283-631-01		Leaf switch (Pause)		1
S12	87-031-305-01		Leaf switch (ECM On/Off, Speaker On/Off)		1
S15	87-031-280-01		Voltage selector switch		1
S16	82-272-631-01		Leaf switch (CrO ₂ switch A)		1
S17	82-272-632-01		Leaf switch (CrO ₂ switch B)		1
T4	82-421-633-01		Power transformer	*	1
SP1	82-421-603-01		Speaker (Woofer)	*	1
SP2	82-421-604-01		Speaker (Tweeter)	*	1
ECM	87-041-001-01		Condenser microphone		1
LM	82-415-608-01		Level meter	TPR-210	1
PL	82-409-650-01		Pilot lamp	TPR-201	1
RPH	87-046-110-01		Rec./Pb. head		1
EH	87-046-105-01		Erase head		1
J1	87-032-413-01		5P DIN socket (MIC./REM.)		1
J2	87-032-276-01		5P DIN socket (REC./PB.)		1
J3	87-032-268-01		2P DIN socket (EXT.SP.)		1
J4	87-032-387-01		AC jack		1
J5	82-266-214-01		DC jack		1
SFR301	87-021-359-01		Semifixed resistor, 30kΩ-B		1
	82-415-620-01		2 pin connector A	TPR-210	1
	82-415-613-01		2 pin connector B	TPR-210	1
	87-033-008-01		Lug terminal plate 1L4P		1
« MISCELLANEOUS »					
	87-038-031-01		AM IFT shield case		1
	82-409-629-01		Shield plate		1
	81-286-225-01		Shield case		1
	87-033-097-01		P.C.B. tab		1
	82-421-617-01		Faston assembly	*	1
	87-005-080-01		RH type core		1
			< Capacitors >		
C411	88-336-100-01		1μF 25V Electrolytic		1
C407,412	88-332-120-01		100μF 6.3V Electrolytic		2
C334	87-015-141-01		10μF 16V No-pole electrolytic		1
C405,408,409	88-205-810-01		0.01μF Cermic		3

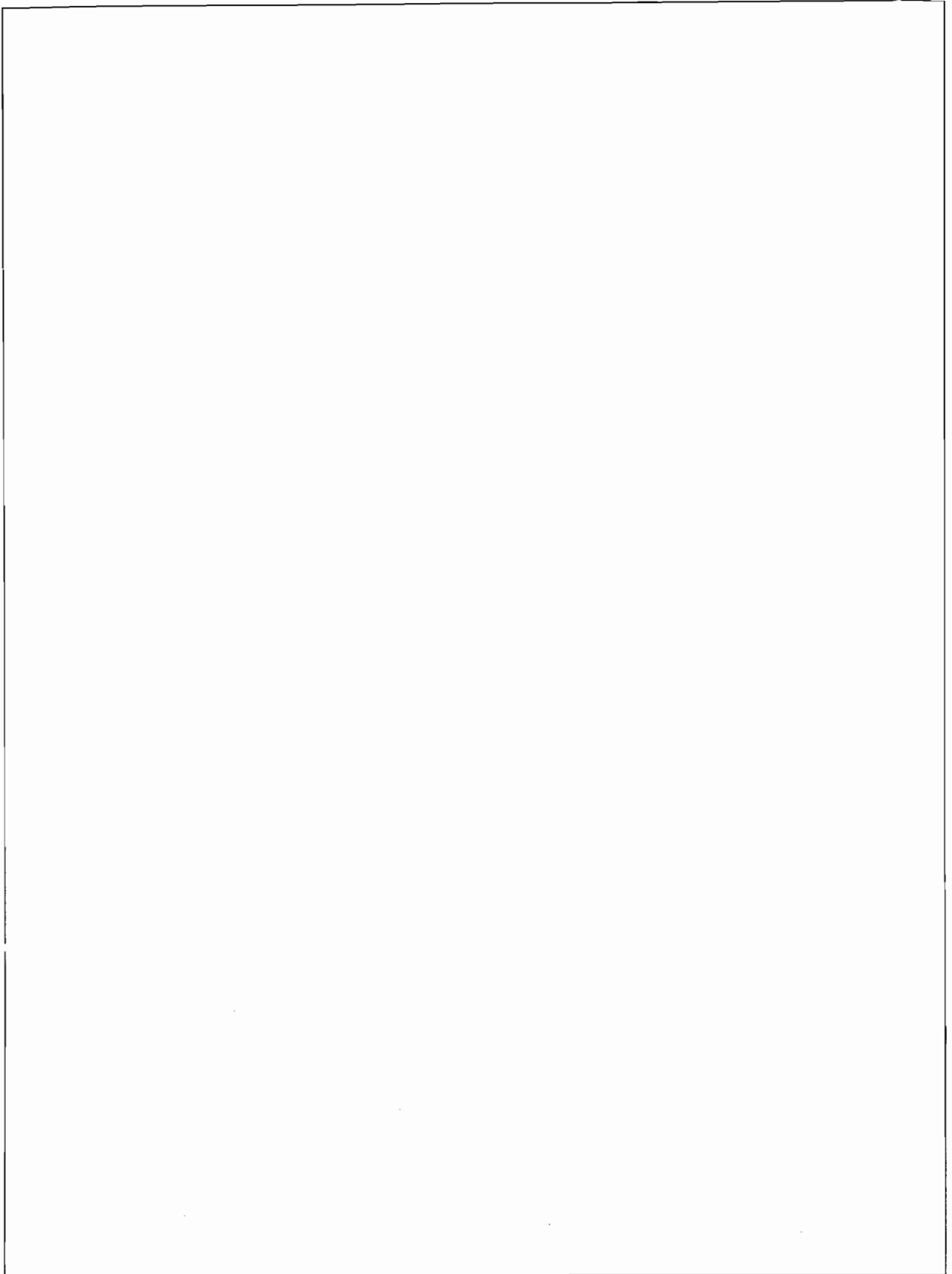
ACCESSORIES/PACKAGE

Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty
	87-048-001-01		Battery, UM-1A		5
	87-034-073-01		AC power cord		1
	80-291-632-01		Cassette tape, DMC-127		1
	82-421-952-01		Carrying case	*	1
	82-421-911-01		Instructions booklet	*	1
	82-421-909-01		Pop label	*	1
	87-057-766-01		Fuse label 100mA "T"		1
	87-057-772-01		Fuse label 1.6A "T"		1
	87-057-133-01		Serial number label		2
	87-051-131-11		Poly-vinyl sack (for AC cord)		1
	87-051-143-11		Poly-vinyl sack (for case)		1
	87-051-150-01		Poly-vinyl sack (for instructions)		1
	82-421-853-01		Printed indiv. packing	*	1
	82-415-853-41		Cushion R, Printed indiv.	TPR-210	1
	82-415-854-41		Cushion L, Printed indiv.	TPR-210	1
	82-409-854-11		Accessory box	TPR-201	1
	82-409-860-01		Cushion, Cassette lid.	TPR-201	1
	82-409-861-01		Cushion, Carrying case	TPR-201	1
	82-415-855-01		External carton box	TPR-210	1/4

SERVICE INFORMATION



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