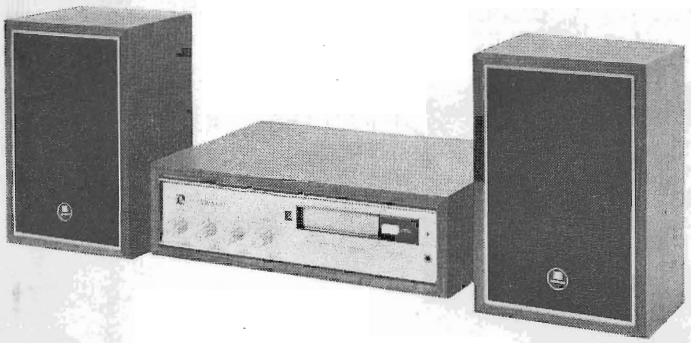
BEI



HITACHI
Hitachi, Ltd. Tokyo Japan

TRANSISTOR STEREO TAPE PLAYER

MODEL TPQ-115

SERVICE MANUAL

No. 224 1969

SPECIFICATIONS

PLAY BACK SYSTEM	8 track, 4 channels
TRANSISTORS	
2SC281	Pre. Amp.
2SC458	Pre. Amp.
2SC281	AF. Amp.
2SC458	Driver
2SB367 × 2	Power Amp.
THERMISTORS	
13D27 × 4	Temperature Compensator
DIODES	
1S310 × 4	Rectifier
CARTRIDGE	Stereo 8 tracks
TAPE SPEED	3¾ ips
TAPE CHANGE SYSTEM	Automatic or Manual Push Button System
FREQUENCY RANGE	40 ~ 13,000Hz
AUDIO OUTPUT	14W (integrate)
SPEAKER	7″ × 5″ P.M. × 2
OUTPUT IMPEDANCE	8 ohms at SP Jack
	8 ohms at Headphone Jack
INPUT IMPEDANCE	10K ohms at Aux. Input Jack
POWER SUPPLY	AC 120V 60Hz or 230V 50Hz
POWER CONSUMPTION	50W
DIMENSIONS	Player
	4⅝″(H) × 15⅞″(W) × 11⅝″(D)
	Speaker
	11⅝″(H) × 17⅞″(W) × 5⅞″(D)
WEIGHT	Player 11 lbs
	Speaker Box 4 lbs. 8oz. × 2
ACCESSORIES	Patch cord ····· 1

CONTROLS AND CONNECTIONS

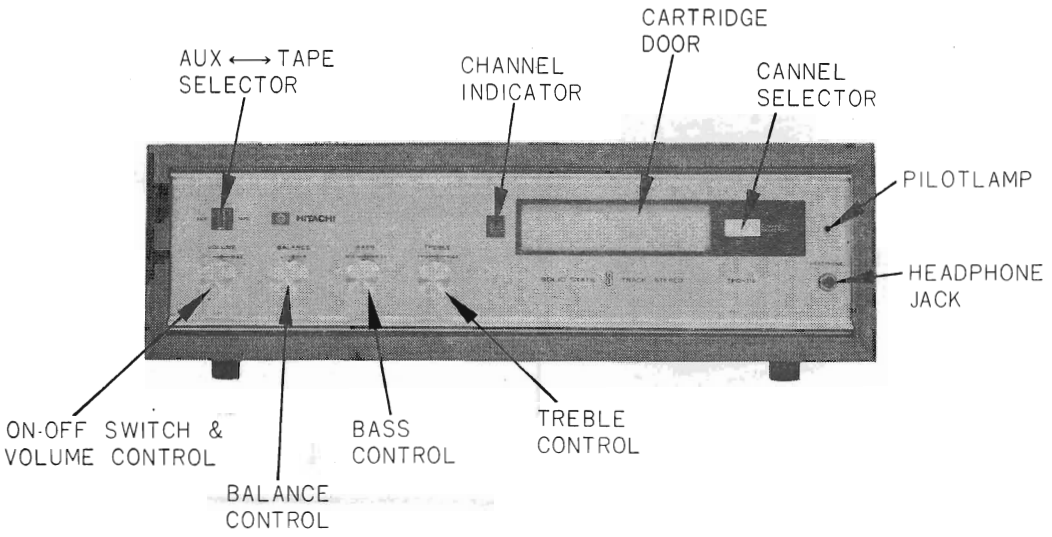


Fig. 1

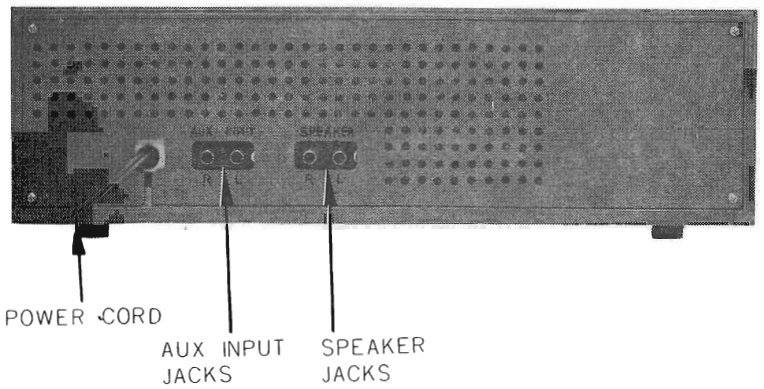


Fig. 2

DISASSEMBLY

1. Removal of Chassis.

Remove nine screws holding chassis as shown in Fig. 3.

The chassis is pulled out from the cabinet, together with the escutcheon panel.

When pulling out the chassis, the cabinet is not damaged provided that the plate such as fibre is inserted in the gap between panel and cabinet so that the side surface of the escutcheon panel and the inside surface of cabinet may not contact.

2. Removal of circuit board.

Remove four screws holding circuit board as shown in Fig. 4.

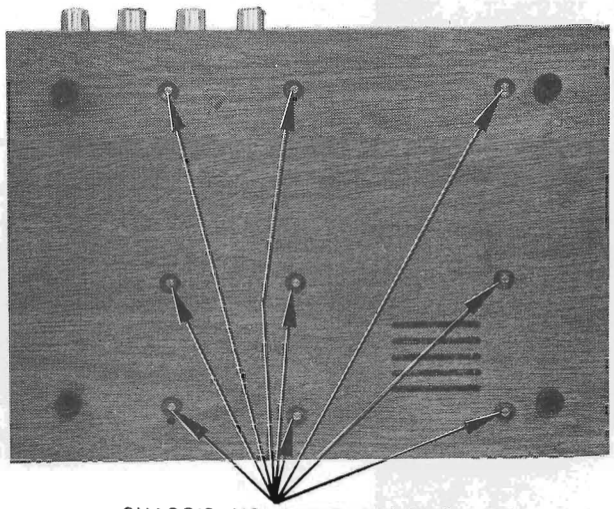

CHASSIS HOLDINNG SCREWS

Fig. 3

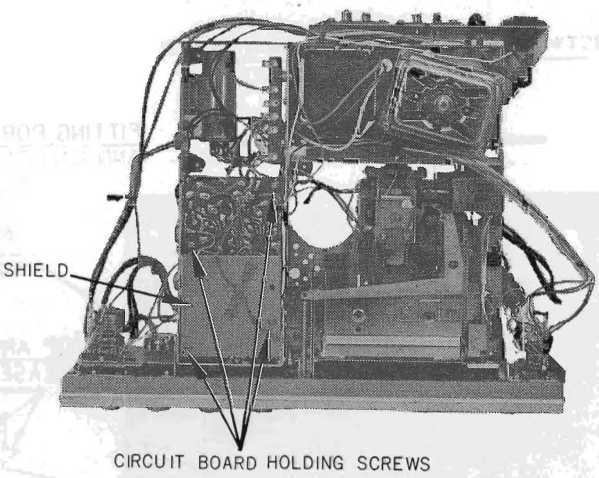

SHIELD
CIRCUIT BOARD HOLDING SCREWS

Fig. 4

3. To take off the output transistor.

The side surface of the chassis is utilized as the radiation plate of the output transistor. Referring to Figs. 5 and 6, take off the output transistor.

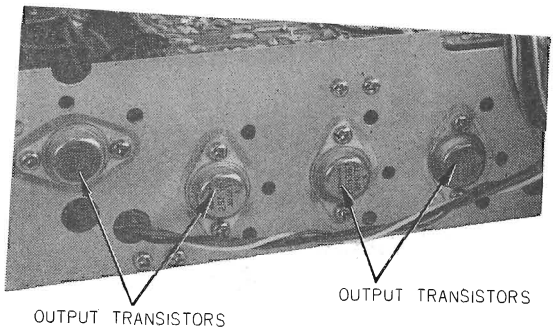


Fig. 5

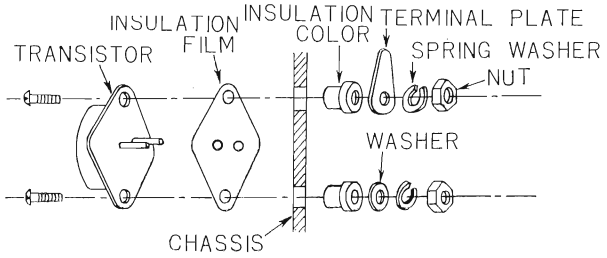


Fig. 6

LUBRICATION

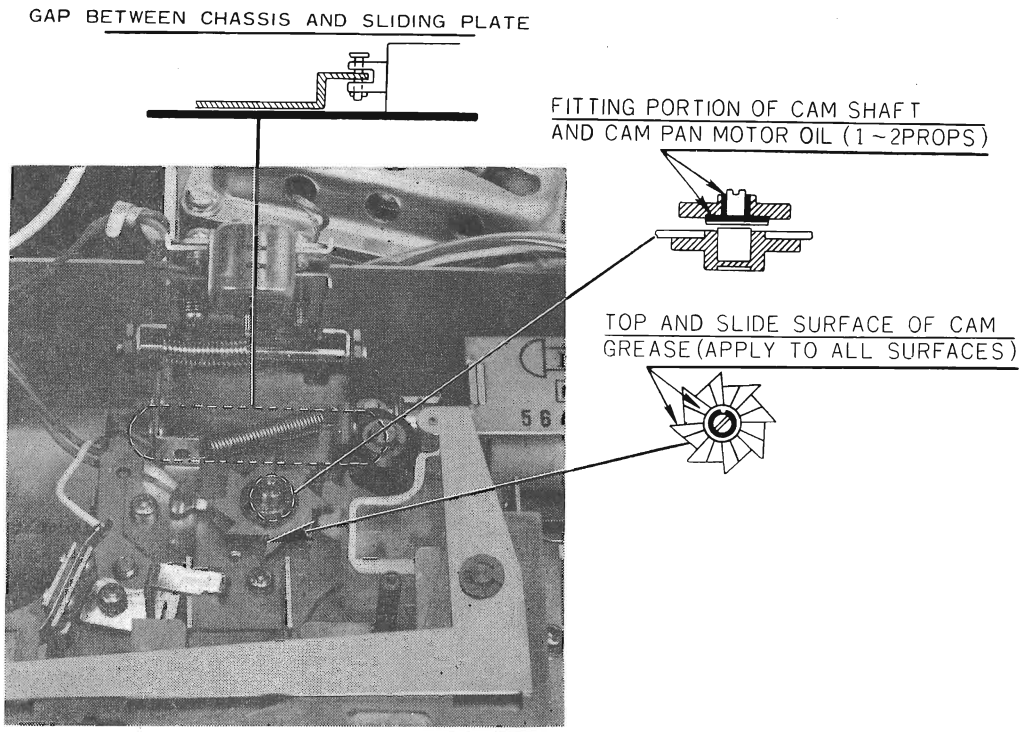


Fig. 7

ADJUSTMENT

Adjusting the Head Height

Height of the reproduction head must coincide exactly with the height of the recorded track (1-8) on the tape. The head height is adjusted by rotating the adjustment screw (shown in Fig. 8) which adjusts height of the cam.

Perform this adjustment when volume from both left and right channels seems somewhat insufficient, sounds of two channels are unbalanced, or reproduced sound is somewhat distorted. Set the adjustment screw at an optimum point (maximum volume and best tone).

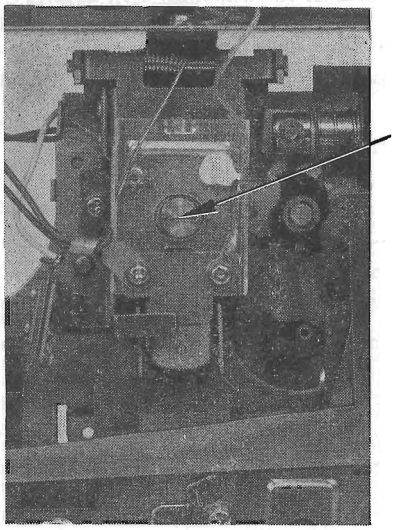


Fig. 8

CHECK AND REPAIR

1. Principal parts which require servicing or replacement during check and repair are as follows:

Table 1

	Nomenclature	Cause
1	Tape head	Abrasions
2	Motor	Deterioration of governor contacts and carbon brushes
3	Flywheel	Slip due to abraded capstan
4	Bearing	Abrasions, or oil expended
5	Belt	Abrasions or breaks
6	Escutcheon and other exterior parts	Stained or broken
7	Zener diode and other electrical parts	Irregular voltage or malconnection in power supply

NOTE: Life of the tape head exceeds 500 hours (average life 700~800 hours; that of the motor is over 1,000 hours. Estimated life of other parts exceeds 2,000 hours.

2. Troubles of tapes or irregular conditions due to users' careless operation are classified as listed in the following table.

Table 2

	Trouble	Cause	Checking method
1	Crosstalk	Recorded sound track width of tape exceeds the rated maximum value (0.05*mm*); or relative position of tracks (1—8) is not accurate.	Replace the cartridge with two or three other cartridges, and check for crosstalk. If normal performance is obtained with other cartridges, the initial cartridge is faulty.
2	Tape jamming	Tape manually pulled out jams in the cartridge. Tape is fed by capstan, but is not taken up in reel, jamming around the capstan.	If the tape is wound slack, tape slack can be absorbed in the reel. If the tape is manually pulled out 5*cm* or more from the reel, the reel cannot take up the jammed tape.
3	Flutter due to deformed pinch roller	Cartridge has been inserted in the set and left for a long time. Car was left with power source cut by engine key, but without removing the cartridge from player. Pinch roller deformation is apt to occur when ambient temperature is high.	Deformation of pinch roller is caused naturally; with continuous use of approximately 100 hours. However, the period depends on the cartridege manufacturer.

3. Defects in bearing

The following troubles require replacement of the flywheel bearings.

Table 3

Item	Symptoms	Possible causes	Remedy
1	Excessive rumbling sound	1) Dust or other foreign matter is mixed between the bearing balls.	Replace bearing
		2) Abraded inner or outer ring or ball bearing causes rumbling.	Replace bearing
		3) Excessive shock applied to the bearing causes rumbling.	Replace bearing
2	Excessive wow and flutter	1) Bearing rotation is not smooth, due to infiltrated foreign matter.	Replace bearing
		2) Bearing rotation is not smooth, grease in inner or outer ring or ball expended due to use exceeding the guaranteed period.	Replace bearing
		3) Excessive load applied to the bearing is causing wear in bearing portion; rotation of bearing balls is not smooth.	Replace bearing

When excessive wow and flutter remain, even after the bearing is replaced based on items 1 and 2, above, check the belt, motor, and flywheel.

3	Tape speed is retarded.	1) Grease in the bearing congealed, due to use exceeding guaranteed bearing life Retards ball rotation and increases loss-torque, thereby so wing down flywheel rotation.	Replace bearing.

When tape speed is still slow, even after the bearing is replaced based on items 1,2 and 3, above, check the belt and motor.

4. Replacing the bearing

1) Remove three 4㎜⌀ Pan head screws (1) and take off the flywheel holder (2).
2) Remove the 2㎜⌀ belt (6), and remove three 2.6㎜⌀ flat-head screws (4). Slowly remove the flywheel (3), paying attention not to bend the flywheel shaft.
3) Remove three 2.6㎜⌀ flat-head screws (4), and remove the bearing (5). Since the bearing is fitted to the shaft, remove the bearing by pulling it slowly straight upward.

Clean that portion of the shaft with alcohol which contacts with the bearing inner ring, assembling it with a new bearing.

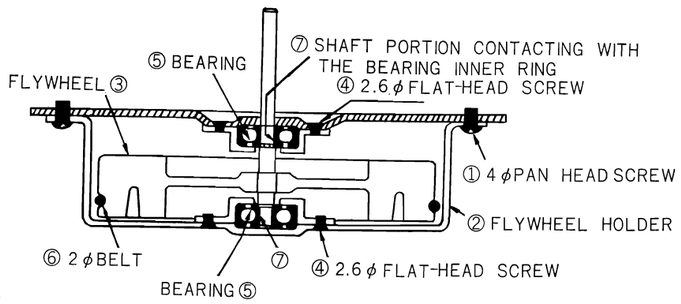


Fig. 9

5. Defect in belt

When the following troubles occur, clean or replace the belt.

Table 4

Item	Symptoms	Possible causes	Remedy
1	Flywheel does not rotate (with power switch set to ON).	Flywheel does not rotate when a cartridge is properly inserted in the set, and the power switch is turned ON;or transmission power is insufficient to feed the tape.	
		1) Belt is broken, or motor does not rotate	Replace belt.
		2) Belt is out of position, or a flaw in the belt has elongated it,causing a slip between the belt and pulley. (A silicon rubber belt is apt to weaken if a flaw in it occurs.)	Replace belt.

2	Tape speed is retarded.	1) Dust or oil adhered to the belt surface causes slip between the pulley and belt. 2) Elongation of the belt causes slip between the pulley and belt.	Clean the belt with alcohol, not with benzine.
3	Excessive wow and flutter.	1) Fluctuating flywheel rotation due to unstable slip between the pulley and belt on which surface dust or other foreign matter is adhered.	Clean belt with alcohol.

When tape speed is still retarded or flutter exists, even after the belt has been replaced or cleaned, check the bearing, motor and flywheel.

6. Replacing the belt

Remove the 2㎜⌀ belt (6) after removing three 4㎜⌀ pan head screws (1) and the flywheel holder (2). Clean a new belt with alcohol and check it for wear before assembling.

7. Defective flywheel.

When the following trouble occurs, clean or replace the flywheel.

Table 5

Item	Symptom	Possible causes	Remedy
1	Excessive wow and flutter	1) Ferromagnetic powder dropped from the tape has adhered on the flywheel shaft surface, varying pinch roller rotation.	Clean shaft surface with alcohol.
		2) Eccentric shaft rotation. External shock has deformed the shaft.	Replace flywheel.

8. Replacing the flywheel

Remove three 4㎜⌀ pan head screws (1), the flywheel holder (2), and 2㎜⌀ belt (6)in the same manner shown in Fig. 9. Remove and replace the flywheel (3). Be careful not to deform or bend the shaft.

CIRCUIT DIAGRAM

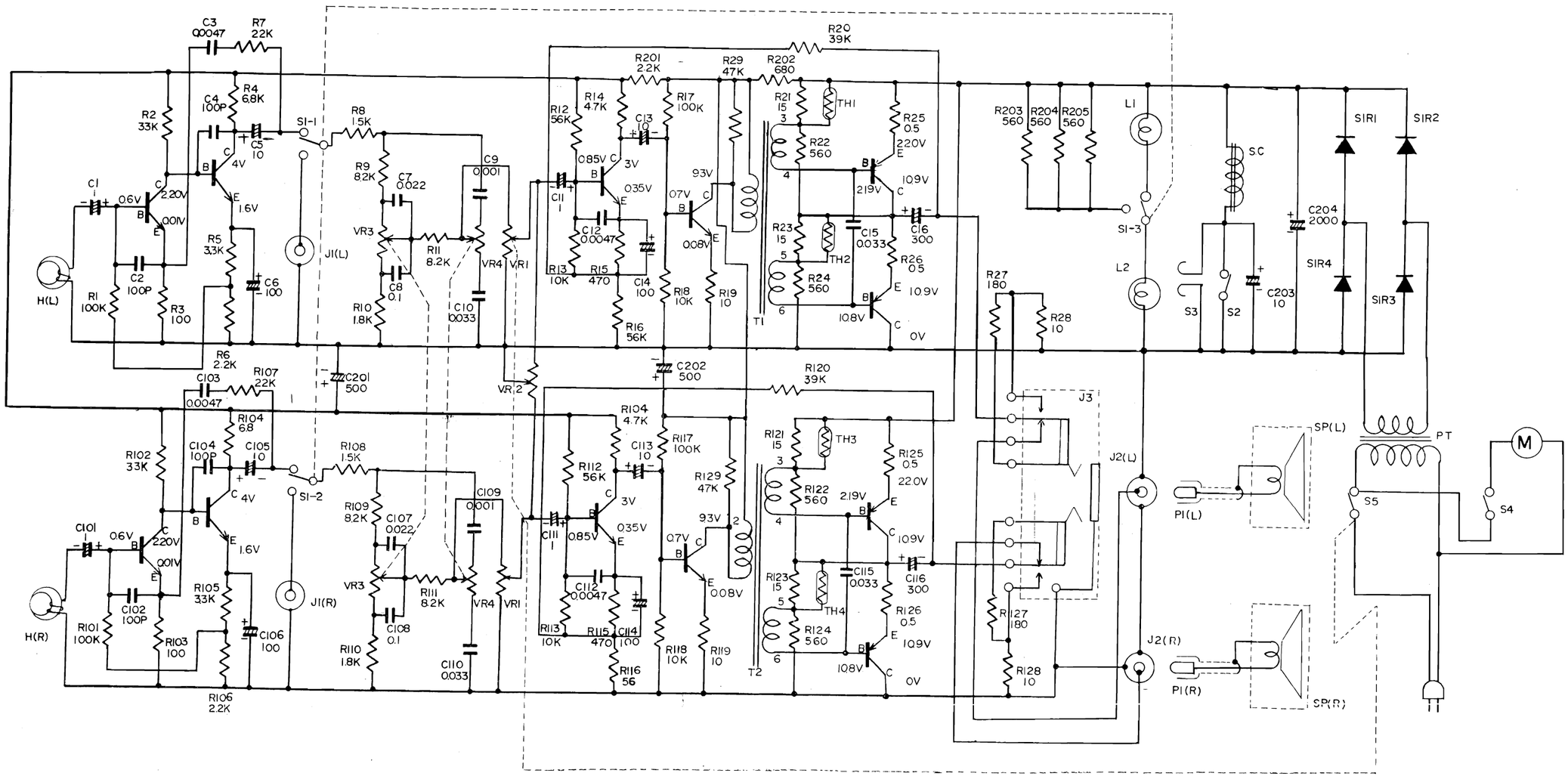
Q1 2SC281(C)(B) PRE. AMP. Q2 2SC458(C) PRE.AMP.

Q3 2SC281(C)(B) AF AMP. Q4 2SC458(C) DRIVER.

Q5,Q6 2SB367(A) X2 POWER. AMP.

TH1~4 13D-27 TEMPERATURE COMPENSATOR

SIR1~4 1S310X4 RECTFIRE



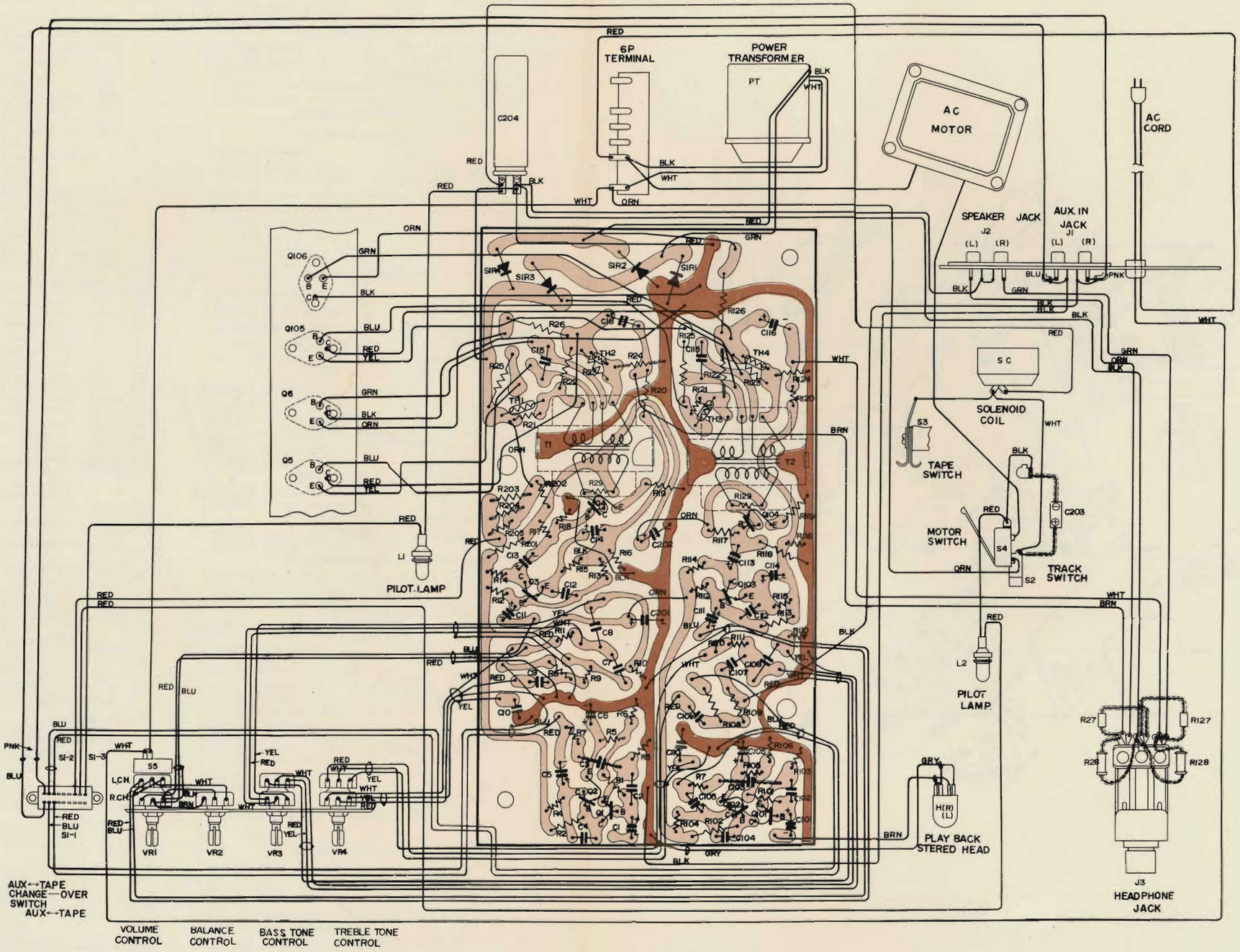
Q101 2SC281(C)(B) PRE. AMP. Q102 2SC458(C) PRE. AMP.

Q103 2SC281(C)(B) AF AMP. Q104 2SC458(C) DRIVER

Q105,Q106 2SB367(A)X2 POWER AMP.

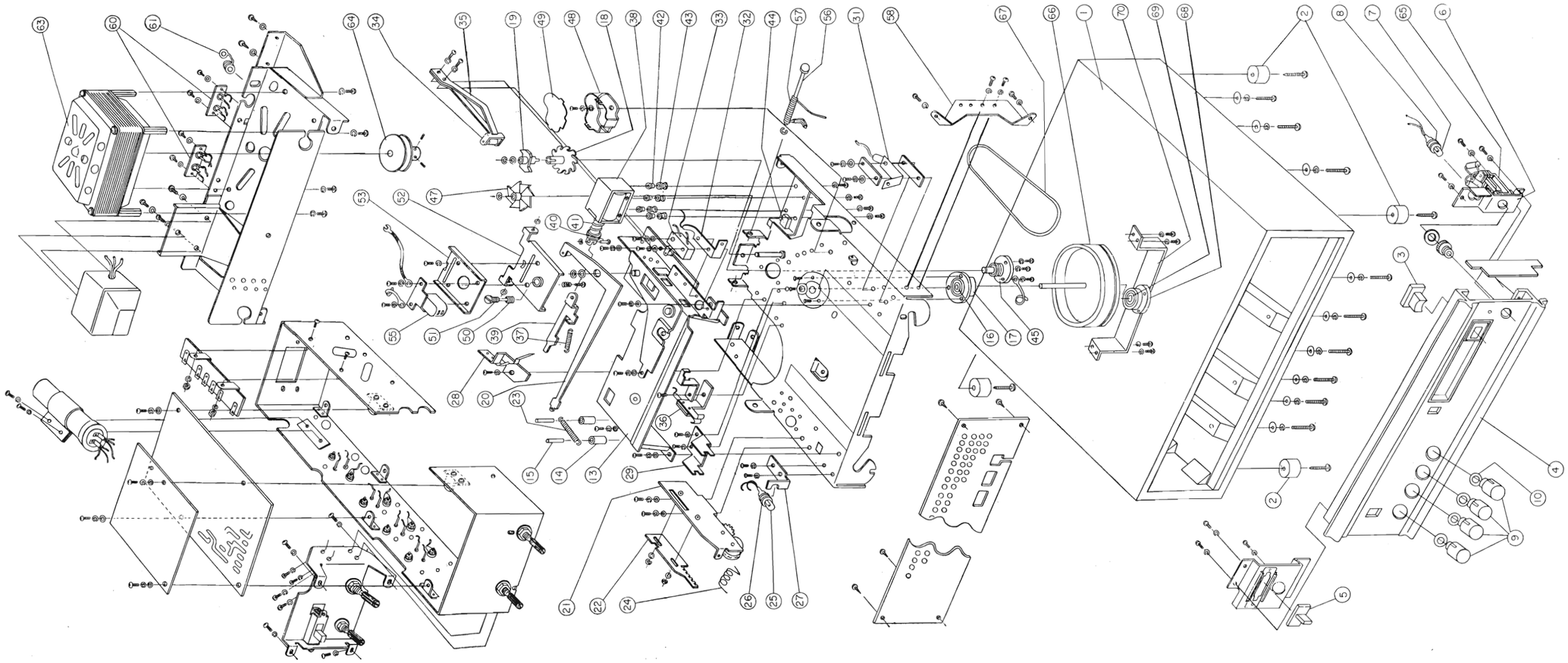
TH3~4 13D-27 TEMPERATURE COMPENSATOR

CIRCUIT BOARD DIAGRAM



MODEL TPQ-115 SERVICE MANUAL

MECHANICAL PARTS VIEW



REPLACEMENT PARTS

Symbol No.	Stock No.	Description		
CAPACITORS:				
C 1,101	0252811	Electrolytic	1μF	50V
C 2,102	0248724	Ceramic	100pF±10%	50V
C 3,103	0274115	Mylar	0.0047μF±20%	50V
C 4,104	0248724	Same as C2	100pF±10%	
C 5,105	0252321	Electrolytic	10μF	10V
C 6,106	0252131	Electrolytic	100μF	3V
C 7,107	0275113	Mylar	0.022μF±20%	50V
C 8,108	0276111	Mylar	0.1μF±20%	50V
C 9,109	0274111	Mylar	0.001μF±20%	50V
C10,110	0275114	Mylar	0.033μF±20%	50V
C11,111	0252811	Same as C1	1μF	
C12,112	0274115	Same as C3	0.0047μF±20%	
C13,113	0252321	Same as C5	10μF	
C14,114	0252131	Same as C6	100μF	
C15,115	0275114	Same as C10	0.033μF±20%	
C16,116	0252633	Electrolytic	300μF	25V
C 201	0252535	Electrolytic	500μF	15V
C 202	0252535	Same as C201	500μF	
C 203	0251821	Electrolytic	10μF	50V
C 204	0259716	Electrolytic	2000μF	25V
RESISTORS:				
R 1,101	0137951	Carbon film	100kΩ±10%	SRD¼SD
R 2,102	0137907	Carbon film	33kΩ±10%	SRD¼SD
R 3,103	0137801	Carbon film	100Ω±10%	SRD¼SD
R 4,104	0137861	Carbon film	6.8kΩ±10%	SRD¼SD
R 5,105	0137857	Carbon film	3.3kΩ±10%	SRD¼SD
R 6,106	0137855	Carbon film	2.2kΩ±10%	SRD¼SD
R 7,107	0137905	Carbon film	22kΩ±10%	SRD¼SD
R 8,108	0137853	Carbon film	1.5kΩ±10%	SRD¼SD
R 9,109	0137862	Carbon film	8.2kΩ±10%	SRD¼SD
R10,110	0137854	Carbon film	1.8kΩ±10%	SRD¼SD
R11,111	0137862	Carbon film	8.2kΩ±10%	SRD¼SD
R12,112	0137910	Carbon film	56kΩ±10%	SRD¼SD
R13,113	0137901	Carbon film	10kΩ±10%	SRD¼SD
R14,114	0137859	Carbon film	4.7kΩ±10%	SRD¼SD
R15,115	0137809	Carbon film	470Ω±10%	SRD¼SD
R16,116	0137768	Carbon film	56Ω±10%	SRD¼SD
R17,117	0137951	Same as R1	100kΩ±10%	
R18,118	0137901	Same as R13	10kΩ±10%	
R19,119	0137759	Carbon film	10Ω±10%	SRD¼SD
R20,120	0137908	Carbon film	39kΩ±10%	SRD¼SD
R21,121	0137761	Carbon film	15Ω±10%	SRD¼SD
R22,122	0134370	Composition	560Ω±10%	RC½GF
R23,123	0137761	Same as R21	15Ω±10%	
R24,124	0134370	Same as R22	560Ω±10%	
R25,125	0149101	Wire wound	0.5Ω±10%	RU½
R26,126	0149101	Same as R25	0.5Ω±10%	
R27,127	0134364	Composition	180Ω±10%	RC½GF
R28,128	0190026	Wire wound	10Ω±10%	RG2P
R 201	0137855	Same as R6	2.2kΩ±10%	
R 202	0137811	Carbon film	680Ω±10%	SRD¼SD
R 203	0134370	Same as R22	560Ω±10%	
R 204	0134370	Same as R22	560Ω±10%	
R 205	0134370	Same as R22	560Ω±10%	
VR 1	0153641	Variable (with switch)	100kΩ(A)	RVD
VR 2	0153635	Variable	50kΩ(B)	RV-24
VR 3	0156090	Variable	50kΩ(B)	RVD
VR 4	0156090	Same as VR3	50kΩ(B)	
VR 5	0156091	Variable	50kΩ(A)	RVD
TRANSISTORS:				
Q 1,101	0573066		2SC281(C)	
Q 2,102	0573481		2SC458(C)	
Q 3,103	0573066	Same as Q1		
Q 4,104	0573481	Same as Q2	2SC458(C)	
Q 5,105	0573030		2SB367(A)P	
Q 6,106	0576031	Same as Q5		
TH 1	0576031	Thermistor	13D27	
TH 2	0576031	Same as TH1	13D27	
TH 3	0576031	Same as TH1	13D27	
TH 4	0552010	Same as TH1	13D27	
Si R1	0552010	Silicon rectifier	IS310	
Si R2	0552010	Same as SiR1	IS310	
Si R3	0552010	Same as SiR1	IS310	
Si R4	0441058	Same as SiR1	IS310	
TRANSFORMERS:				
T 1	0441058	Driver		
T 2	0441058	Same as T1		
	5210273		(100V 50/60%)	
	5210272	Power transformer	(117V 60%)	(TPQ-115A)
	5210274	Power transformer	(220V50%	(TPQ-115E)

Stock No.	Description
MISCELLANEOUS:	
	for Final assembly
6115071	Cabinet
0971279	Rubber base
8751513	Screw-3.5mmø×13mm wood (4 req'd)
8711435	Screw-3mmø×35mmpan head ISO } (9 req'd)
0645587	Special washer }
8813124	Washer-3mmø spring }
	for chassis mounting
6161762	Back lid
8755410	Screw-3.1mmø×10mm wood (4 req'd)
0015672	Switch button
6211771	Panel sub ass'y
0015329	Switch button
8711405	Screw-3mmø×5mm pan head ISO (3 req'd) }
8813124	Washer-3mmø spring (3 req'd) }
	for button holder mounting
7174111	Head phone jack holder
0594112	Pilot lamp
0948295	Rubber plate
6704271	Insulating washer (2 req'd) }
0958453	Jack washer }
7661511	Rubber plate }
	for head phone jack mounting
8711405	Screw-3mmø×5mm pan head ISO } (3 req'd)
8813124	Washer-3mmø spring }
	for head phone jack holder mounting
8711405	Screw-3mmø×5mm pan head ISO } (2 req'd)
8813124	Washer-3mmø spring }
	for panel mounting side of panel holder
8711405	Screw-3mmø×5mm pan head ISO }
8813124	Washer-3mmø spring } (4 req'd)
8811234	Washer-3mmø (A) }
	for panel mountig side of volume holder
6260762	Volume control knob sub ass'y
0625898	Volume felt
6114053	Speaker box sub ass'y
0526171	Speaker
0681276	Washer-3mmø special (8 req'd)
8821114	Nut-3mmø ISO (8 req'd
7711131	Back plate
8751410	Screw-3.1mmø×10mm wood (8 req'd)
8751410	Screw-3.1mmø×10mm wood (2 req'd)
7711161	Cord clamper
0598508	Patch cord
7614571	
7617202	Rating label (117V60%) (TPQ-115A)
7617203	Rating label (220V50%) (TPQ-115E)
	for Chassis assembly
7171363	Cartridge guide sub ass'y
0015216	Guide roller
0944751	Guide roller shaft
8711405	Screw-3mmø×5mm pan head ISO } (4 req'd)
8813124	Washer-3mmø spring }
	for cartridge guide mounting

Symbol No.	Stock No.	Description
	8711404	Screw-3mmø×4mm pan head ISO
	8813124	Washer-3mmø spring
	8811234	Washer-3mmø (A)
		for adjusting plate mounting
	0944764	Bearing
	7500192	Bearing holder
	0721306	Screw-2.6mmø×6mm flat (3 req'd)
	6340121	Channel gear
	6340132	Channel cam
	0637445	Ring-"E"
	7164291	Cam roller sub ass'y
	0636553	Rewind washer
	0637445	Ring-"E"
	7170931	Rack holder sub ass'y
	8711405	Screw-3mmø×5mm pan head ISO (2 req'd)
	8813124	Washer-3mmø spring
		for rack holder mounting
	7170921	Rack
	0636553	Rewind washer (2 req'd)
	0637445	Ring-"E" (2 req'd)
	6311071	Return spring
	6310841	Dial spring
	0941257	Ring-"E"
	0594112	Pilot lamp
	0948295	Rubber plate
	7171011	Lamp holder
	8711405	Screw-3mmø×5mm pan head ISO (2 req'd)
	8813124	Washer-3mmø spring
		for lamp holder mounting
	7171293	Adjusting spring sub ass'y
	8711405	Screw-3mmø×5mm pan head ISO
	8813124	Washer-3mmø spring
	7165161	Tape guide
	8711405	Screw-3mmø×5mm pan head ISO (2 req'd)
	8813124	Washer-3mmø spring (2 req'd)
	0015223	Insulating plate (1)
	0941897	Switch plate
	0948911	Insulating plate (2)
	7171412	Earth plate
	0711306	Screw-2.6mmø×6mm pan head
	8811113	Washer-2.6mmø (A) (2 req'd)
	8813433	Washer-2.6mmø spring
		for switch plate mounting
	0948821	Insulating sheet
	8715110	Screw-2mmø×10mm pan head
	8811231	Washer-2mmø (A) (2 req'd)
	8813231	Washer-2mmø spring
		for micro switch mounting
	0942154	Pressure roller sub ass'y
	0942156	Sub pressure spring
	8711406	Screw-3mmø×6mm pan head ISO (2 req'd)
	8813124	Washer-3mmø spring (2 req'd)
	7171312	Track switch plate sub ass'y
	6310781	Push plate spring
	5640071	DC solenoid
	0942054	Push plate
	0637443	Ring-"E"
	7501782	Push plate shaft
	6311081	Planger spring
	8711410	Screw-3mmø×10mm pan head ISO (3 req'd)
	8811234	Washer-3mmø
		for DC solenoid mounting
	7505331	Collar
	0948783	Rubber plate-8mmø
	7661774	Spring pad
	0945061	Cam bearing plate
	8711406	Screw-3mmø×6mm pan head ISO
	8711405	Screw-3mmø×5mm pan head ISO (2 req'd)
	8813124	Washer-3mmø spring (3 req'd)
	7502723	Head shifting adjust screw
	6340202	Head shifting cam
	0637445	Ring-"E"
	6702141	Tape holder
	6702151	Tape holder cover
	8711406	Screw-3mmø×6mm pan head ISO
	8813124	Washer-3mmø spring
	8812114	Washer-3mmø (B)
		for tape holder mounting

Symbol No.	Stock No.	Description
	6311641	Adjust spring
	7504741	Adjust screw sub ass'y
	7174881	Head plate sub ass'y
	7174861	Head holder
	8711412	Screw-3mmø×12mm pan head ISO
	0948154	Tape guide spring
	8813124	Washer-3mmø spring
	8711408	Screw-3mmø×8mm pan head ISO
	5440043	Head
	8711405	Screw-3mmø×5mm pan head ISO (2 req'd)
	8813124	Washer-3mmø spring (2 req'd)
	0944752	Shaft-head plate
	0637443	Ring-"E"
	0662191	Spring
	0638551	Fiber washer (2 req'd)
	0942157	Panel holder
	8711405	Screw-3mmø×5mm pan head ISO (2 req'd)
	8813124	Washer-3mmø spring (2 req'd)
		for panel holder mounting
	8711405	Screw-3mmø×5mm pan head ISO (3 req'd)
	8813124	Washer-3mmø spring (3 req'd)
		for power transformer mounting
	5650131	
J 1, 2	5670101	Jack-2P pin jack
	8781436	Screw-3mmø×6mm tapping (4 req'd)
	8811234	Washer-3mmø (A) (4 req'd)
	0043793	Bushing
	5740493	
	0593558	Power cord
	5570195	
	5570342	Motor (TPQ-115A)
	5570341	Motor (TPQ-115E)
	6340513	Motor pully (TPQ-115A)
	0944876	Motor pully (TPQ-115A.E)
	0638564	Lock screw (2 req'd)
	8711606	Screw-4mmø×6mm pan head ISO (4 req'd)
	8813126	Washer-4mmø spring
		for motor mounting
	5670261	Head phone jack
	0930128	Flywheel sub ass'y
	0971235	Belt-2mmø
	0948578	Nylon washer
	7500192	Bearing holder
	0944764	Bearing
	7170991	Flywheel holder
	0721306	Screw-2.6mmø×6mm flat (3 req'd)
		for bearing holder mounting
	8711608	Screw-4mmø×8mmpan head ISO (3 req'd)
	8813126	Washer-4mmø spring (3 req'd)
		for flywheel holder mounting
	0544402	2 pale terminal
	8711405	Screw-3mmø×5mm pan head ISO
	8813124	Washer-3mmø spring
	0711306	Screw-26mmø×5mm pan head (2 req'd)
	8813123	Washer-2.6mmø spring
		for slide switch mounting
	8711405	Screw-3mmø×5mm pan head ISO (2 req'd)
	8813124	Washer-3mmø spring
		for slide switch holder mounting
	8711408	Screw-3mmø×8mmpan head ISO (2 req'd)
	8813124	Washer-3mmø spring
		for electrolytic capacitor mounting
	0544404	6 pale terminal
	8711408	Screw-3mmø×8mm pan head ISO (4 req')
	8813124	Washer-3mmø spring
	8821114	Nut-3mmø (4 req'd)
		for 6PT mounting
	8711412	Screw-3mmø×12mm pan head ISO (8 req'd)
	8811234	Washer-3mmø (A) (4 req'd)
	8813124	Washer-3mmø spring (8 req'd)
	8821114	Nut-3mmø ISO (8 req'd)
		for transistor mounting
S 1	0532180	Switch-slide
S 4	0539121	Switch-micro

HITACHI
Hitachi, Ltd. Tokyo Japan

Head Office : 4,1-chome, Marunouchi, Chiyoda-ku, Tokyo
Tel. Tokyo (212) 1111 (80 lines)
Cable Address: "HITACHY" TOKYO
Codes : All Codes Used

Printed in Japan (K)