

Radio Shack® Service Manual

26-1209

CCR-82 COMPUTER CASSETTE TAPE RECORDER Catalog Number : 26-1209



CUSTOM MANUFACTURED FOR RADIO SHACK, A DIVISION OF TANDY CORPORATION



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SPECIFICATIONS

STANDARD TEST CONDITIONS

- 1) Speaker impedance: 8 ohm
- 2) Output readings are taken across a non-reactive load
- 3) Output reference level: 50 mW total power
- 4) Reference frequency: 1 kHz 0 dB = 0.775V
- 5) Power Supply Voltage
DC 6V
- 6) Ambient conditions
Temperature 17° to 23°C
Humidity 40 to 70%

		UNIT	NOMINAL	LIMIT
Recording sensitivity	Mic input	dB	-76	-76 ± 4
	Aux input	dB	-20	-20 ± 4
Audio output max power	input - 50 dB	mW	500	400
	playback	mW	500	400
Audio output at 10% THD	input - 50 dB	mW	350	270
	playback	mW	350	270
Distortion	input - 50 dB			
	overall	%	4	6
Track crosstalk	input - 76 dB	dB	50	45
	playback	dB	50	45
Frequency response	input - 76 dB			
	150 Hz	dB	-4	-4 ± 6
	6,000 Hz	dB	3	-3 ± 6
	at playback			
Erasing ratio	125 Hz	dB	-2	-2 ± 6
	6,300 Hz	dB	-1	-1 ± 6
S/N ratio	input - 50 dB	dB	46	40
	at playback	dB	49	39
ALC effect	input - 40 dB			
	to -70 dB	dB	60	50
ALC distortion	input - 50 dB	dB	2	8
		%	8	12
Hum and noise level	at volume Min	mV	0.5	1
	at volume Max	mV	3	6

Battery indicator turn on voltage		V	4.2	4.2 ± 0.6
AGC delay time	at recording	sec	0.4	0.5
Turn on time	at play	sec	0.4	0.5
Current consumption	Record no signal	mA	130	200
	Play no signal	mA	100	180
	Fast-Forward	mA	100	220
	Rewind	mA	130	220
ALC on level	at Mic input	dB	70	(70 ± 4)
Tape speed		%	+1	+3 -2
Wow and flutter	WRMS	%	0.18	0.28
	RMS	%	(0.28)	(0.40)
Winding time at C-60 tape	Fast-Forward	sec	170	190
	Rewind	sec	170	190
Torque	Play	g.cm	40	35
	Fast-Forward	g.cm	50	40
	Rewind	g.cm	50	40
Record monitor output level input	-50 dB (DC)	mW	300	220
Output power at preset position of volume control		μW	(400)	

NOTE: Nominal specs represent the design specs; all units should be able to approximate these -- some will exceed and some may drop slightly below these specs. Limit specs represent the absolute worst conditions that are considered to be acceptable; in no case should a unit perform to less than within any limit spec.

DISASSEMBLY INSTRUCTIONS

1. Removal of the Cabinet

Remove five Screws from the Bottom Cabinet as shown in Figure A.

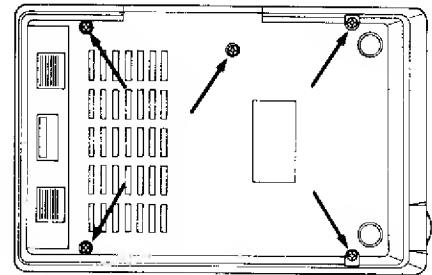


Figure A

2. Removal of the P.C. Board

Remove three screws from the Main P.C. Board and one screw from the Volume Control Knob. (Figure B-1). Remove two screws from the Volume Control Knob (Figure B-2). Remove two screws from the Small P.C. Board (Figure B-3).

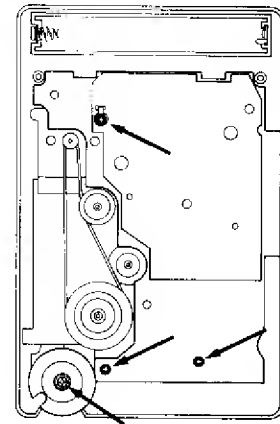


Figure B-1

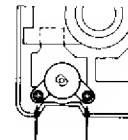


Figure B-2

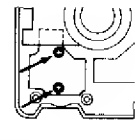


Figure B-3

3. Removal of the Tape Mechanism Assembly

Remove three screws from Tape Mechanism Ass'y (Figure C-1).

Open the Cassette Door. Remove the two screws shown in Figure C-2.

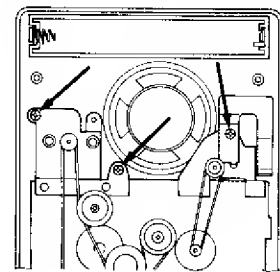


Figure C-1

Note: Rotate the supply reel so that the claws on the supply reel shaft are not caught by the Top Cabinet.

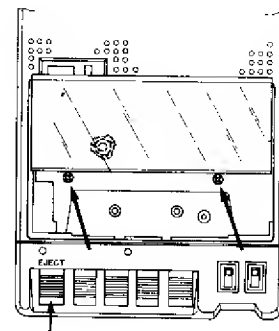
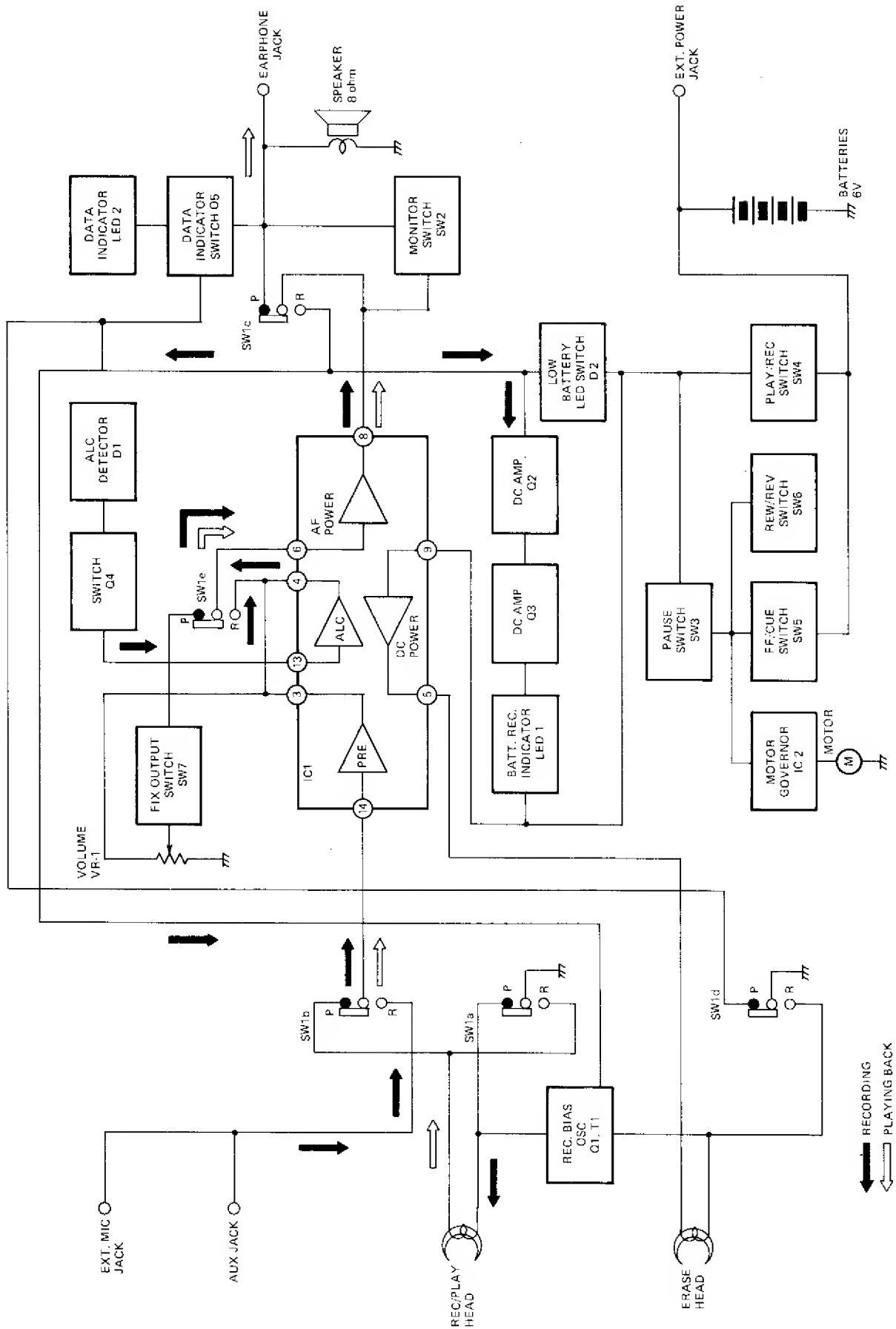


Figure C-2

BLOCK DIAGRAM



CIRCUIT DESCRIPTION

General

The CCR-82 is a computer cassette tape recorder which consists of an ALC (Automatic Level Control) circuit, electronic governor circuit, recording circuit and playback circuit. Almost all of these circuits are contained in one IC (IC1). Power is supplied by four C size batteries (or a power adapter for 6V DC). Refer to the **BLOCK DIAGRAM** and **SCHEMATIC DIAGRAM** as you read the following descriptions.

Recording Circuit

In the recording mode, the audio signal input from the EXT. MIC Jack, JK5 (or AUX Jack, JK3), is coupled through SW1b and C2 to pin 14 of IC1. This then starts the motor. The audio signal is amplified by pre amp (inside IC1). The output is fed through C8, R8, R9, SW1e and C10 to pin 6 of IC1. The signal is amplified by the REC amp (inside IC1). The REC amp signal is output from pin 8 of IC1. The recording signal goes through C19, SW1f, C15/R15 and is fed to the R/P head via an AC bias circuit (consisting of T1 and Q1).

The input signal of the REC amp (pin 6 of IC1) is controlled by the ALC circuit. The output from pin 8 of IC1 goes through C19, SW1f and is fed to D1 (ALC Detector). The ALC circuit consists of D1, R14, C14 and IC1. When the recording signal increases, D1 rectifies the signal. At this time, C14 is charged and, thus, ALC (inside IC1) is enabled. As a result, pin 4 of IC1 is shorted to GND. Hence, ALC adjusts the recording signal to the pertinent level. The output signal of the REC amp (pin 8 of IC1) goes through C19, SW1f, R33, C29 and is fed to the RECORD/LOW BATTERY indicator control circuit. This circuit consists of D2, Q2, Q3 and LED1. The REC signal is amplified by Q2, and Q3 is switched on and off, in accordance with the magnitude of signals amplified by Q2. When Q3 is on, LED1 lights up. As a result, the RECORD/LOW BATTERY indicator (LED1) blinks. When battery voltage is down, D2 turns on and Q3 is kept on. Hence, LED1 lights up. In the recording mode, Q4 circuits eliminate remnant sound during motor start and stop.

Playback Circuit

In the playback mode, a signal from the R/P head is fed through SW1b and C2 to pin 14 of IC1. Pin 14 is the input of an equalizer amp (inside IC1). Pin 3 of IC1 is the output of an equalizer amp (inside IC1). The output signal is coupled through C8, R8, R36/VR1, SW1e, C10 to the audio power amp circuit input. (pin 6 of IC1). Pin 8 of IC1 is the output of the amp. Hence, the audio power amp drives an 8-ohm load. Output from pin 8 of IC1 goes through C19, SW1f, R37, C33 and is fed to the DATA indicator control (Q5 and LED2). When a computer loads data, LED2 blinks (Q5 switches on/off).

Electronic Governor Circuit

The electronic governor circuit consists of IC2, R23-25, VR3 and the motor. The governor circuit utilizes the counter-EMF voltage of the motor to control its revolution speed, detecting the revolutions with a bridge circuit. The equivalent circuit of a DC motor consists of internal resistance (of the motor) and counter-EMF voltage of the motor.

Figure A is the equivalent circuit of DC motors. In Figure B, when the bridge circuit, having the motor as one of its elements reaches a balance condition ($r_m \times r_2 = R_{24}/R_{25} \times r_4$), the voltage at the detection terminal (between pin 2 and pin 4) is proportional to the revolution of the motor. Therefore, when the servo is applied as illustrated to keep the value of the voltage constant (between pin 2 and pin 4), the revolution is maintained constant by applying the principle of electronic control (IC2) of the motor.

- rm: Internal resistance of motor
- em: Counter-EMF voltage of motor
- R24/R25: Parallel resistor
- r2, r4: Internal resistance of IC2
- Vd: Voltage at bridge detection terminal

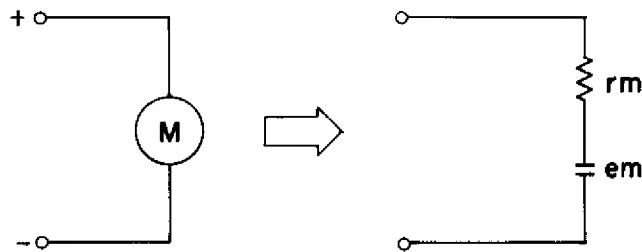


Figure A

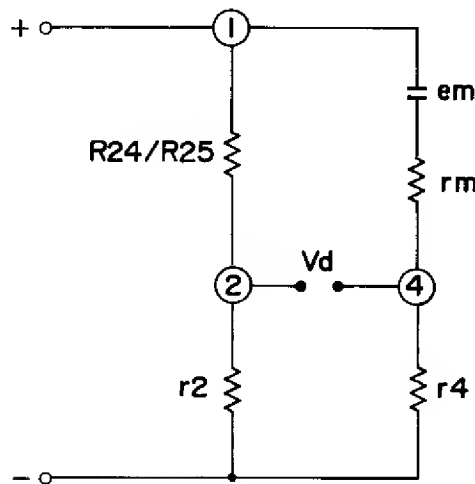


Figure B

STANDARD MAINTENANCE

Whenever a unit is brought in for service or repair, it should be cleaned and lubricated and the head should be demagnetized.

1. **Cleaning:** Clean the heads and all tape handling surfaces using alcohol and cotton swabs. Wipe dry.
2. **Demagnetization:** Do not use magnetized tools near the head, since they can magnetize the head. With normal use, the head will retain small amounts of residual magnetism (this results in increased noise and loss of high-frequency response). Use a standard tape head demagnetizer to demagnetize the head.
3. **Lubrication:** Use a high grade of specially formulated grease (do not use oil) on the sliding surfaces indicated with (P) or (M) in the figures below. Lubrication is normally required only when parts tend to bind, or after long periods of use. Use all lubricants very sparingly and avoid contact with other parts.

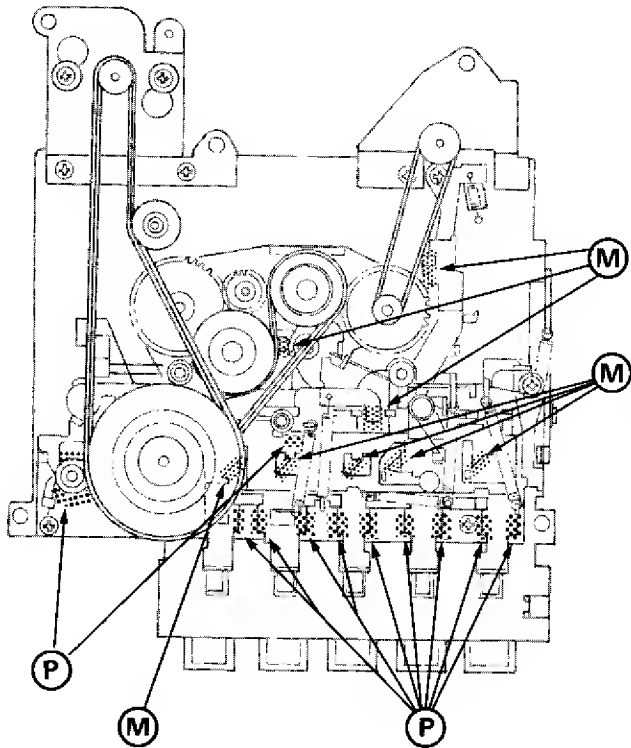


Figure 1-A

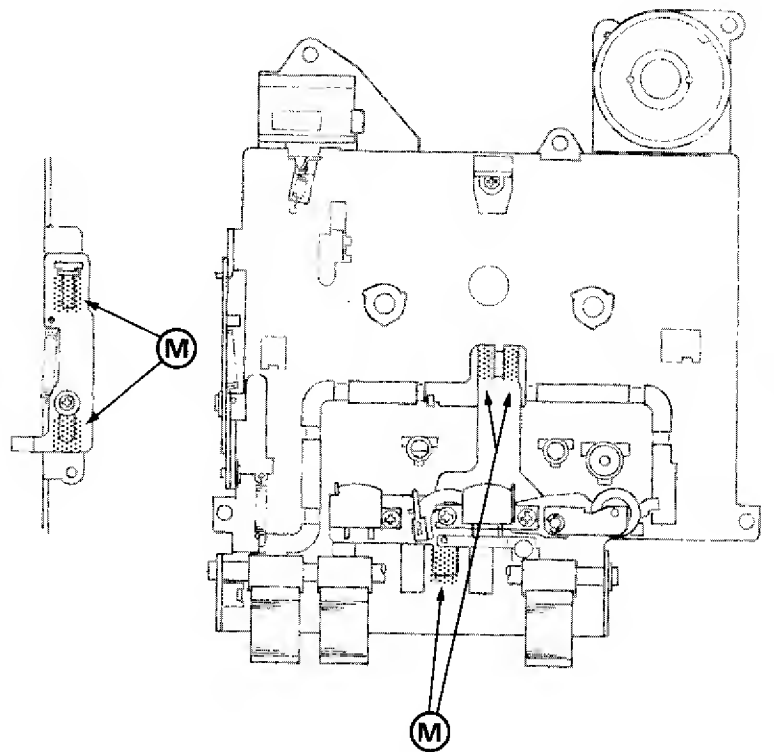



Figure 1-B

P:  Grease for Plastic

M:  Grease for Metal

CIRCUIT ADJUSTMENT

Adjustment of the Tape Speed

Load the unit with a 3 kHz test cassette tape, tape such as MTT-111. Use a Frequency Counter connected to the audio output across an 8-ohm speaker. Adjust the 200 Ω (VR3) Variable Resistor so the Frequency Counter reading is 3,000Hz +0.33 — +0.67%.

Adjustment of the Recording Bias

Adjust VR2 so that the Audio Voltmeter indicates 80 mV RMS (voltage across R3) with a 50-52 kHz test frequency at T1.

Head Adjustment

Pre-adjustment Procedures

1. Be sure to demagnetize and clean the head before proceeding with the Head Adjustment.
2. For the Head Adjustment, never use a magnetized screwdriver.

1. Connect a VTVM to the Earphone Jack.
2. Use 8-ohm dummy load when the VTVM is plugged into the Earphone Jack.
3. Load a 6.3 kHz test tape MTT-113 into the unit. Turn Azimuth Adjusting Screw for a gauge. A take-up torque of 30-65 gcm is required (Figure 3).
4. After adjustment, secure the Azimuth Adjusting Screw with glyptol or "screw lock".

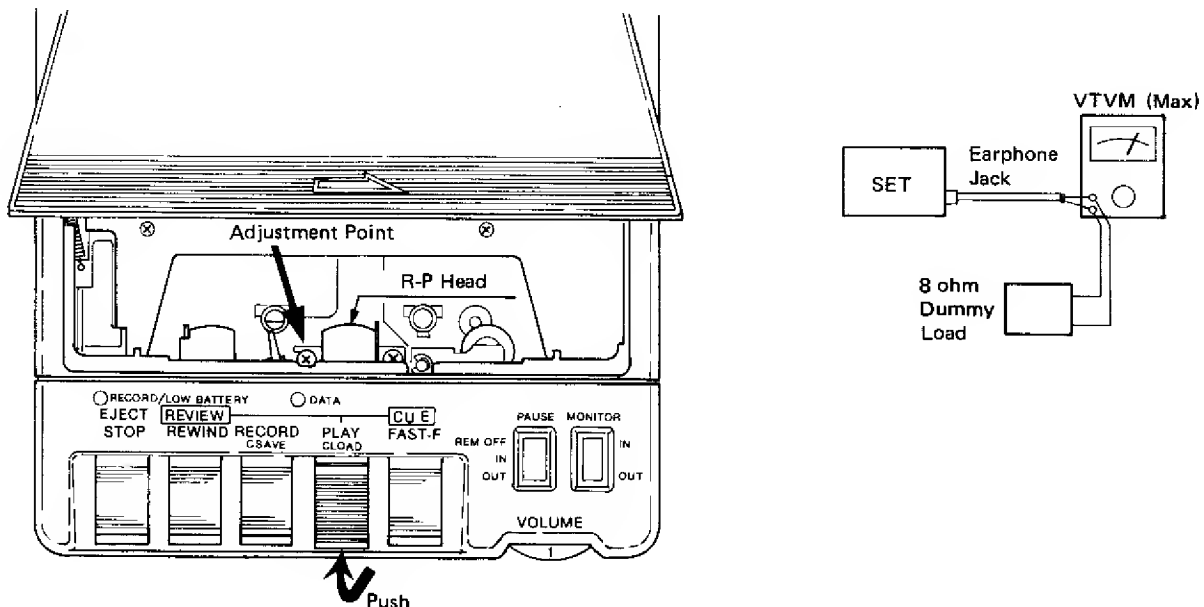


Figure 2

MECHANICAL ADJUSTMENT

General Remarks

Before attempting to adjust the mechanism of this unit, use a piece of soft cloth soaked in alcohol to wipe clean the tape contacting surfaces (i.e., the tension pick-up, pinch roller, playback head and capstan), as well as the contact surfaces of the driving parts (i.e., the motor pulley, flywheel, take-up reel, supply reel, rewind pulley and FF Gear). Grease stains may cause trouble.

Take-Up Torque Adjustment

1. Set the unit in the playback mode and measure the torque of the take-up reel with a torque gauge. A take-up torque of 30-65 gcm is required (Figure 3).
2. If a torque of 30-65 gcm cannot be obtained, replace either the take-up reel or forward clutch assembly.

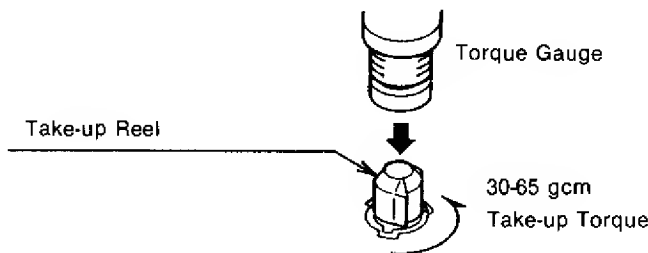


Figure 3

Fast-Forward and Rewinding Torque Adjustment

With a cloth soaked in alcohol, wipe clean the contact surfaces of the take-up reel, supply reel, FF pulley and center pulley.

Dirty surfaces will cause slippage.

1. Measure the F-FWD torque value. Torque of more than 45 gcm is necessary for fast-forward operation (Figure 4).
2. If the fast-forward torque is not adequate (required fast-forward torque: over 45 gcm), replace either the take-up reel center pulley or the FF pulley.
3. Measure the rewinding torque value. Torque of more than 45 gcm is necessary for rewinding operation (Figure 5).
4. If the rewinding torque is not adequate (over 45 gcm), replace the supply reel and/or the center pulley.

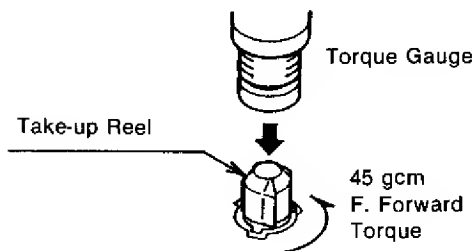


Figure 4

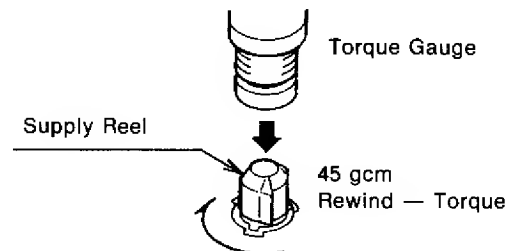


Figure 5

Auto Shut-Off Adjustment

The auto shut-off mechanism automatically switches off the unit at the end of a tape during playback or recording operation.

1. Set the unit in the playback mode.

Apply a tension gauge to the tension pick-up as illustrated (Figure 6).

Push the gauge in the indicated direction and measure the force required for shut-off to occur.

2. The tension pick-up sensitivity should be set properly so that the auto shut-off works and switches off the unit when the tension gauge reads 40 to 80g (reference: 60g).

If the auto shut-off works and switches off the unit at a tension pick-up force of less than 40g, either bend the spring hook to increase its force or replace the spring.

If a tension pick-up force of more than 80g is required to shut-off the unit, check the auto shut-off mechanism as outlined below.

- 1) Check to see if the sensing lever, auto-kick lever and spring are too loose or too secure (Figure 7).
- 2) If you don't locate the difficulty by checking the parts listed above, replace the spring.

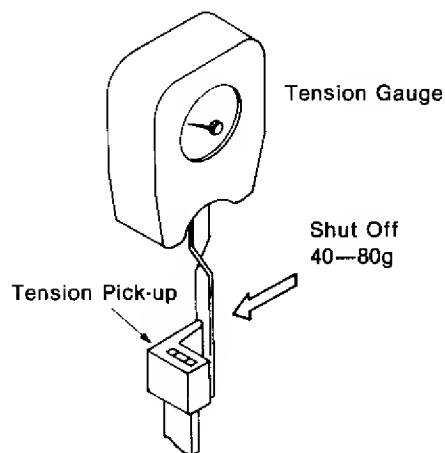


Figure 6

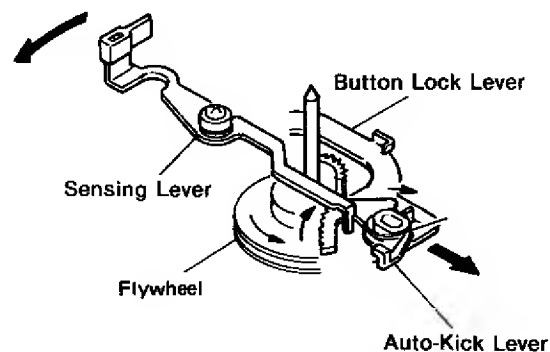


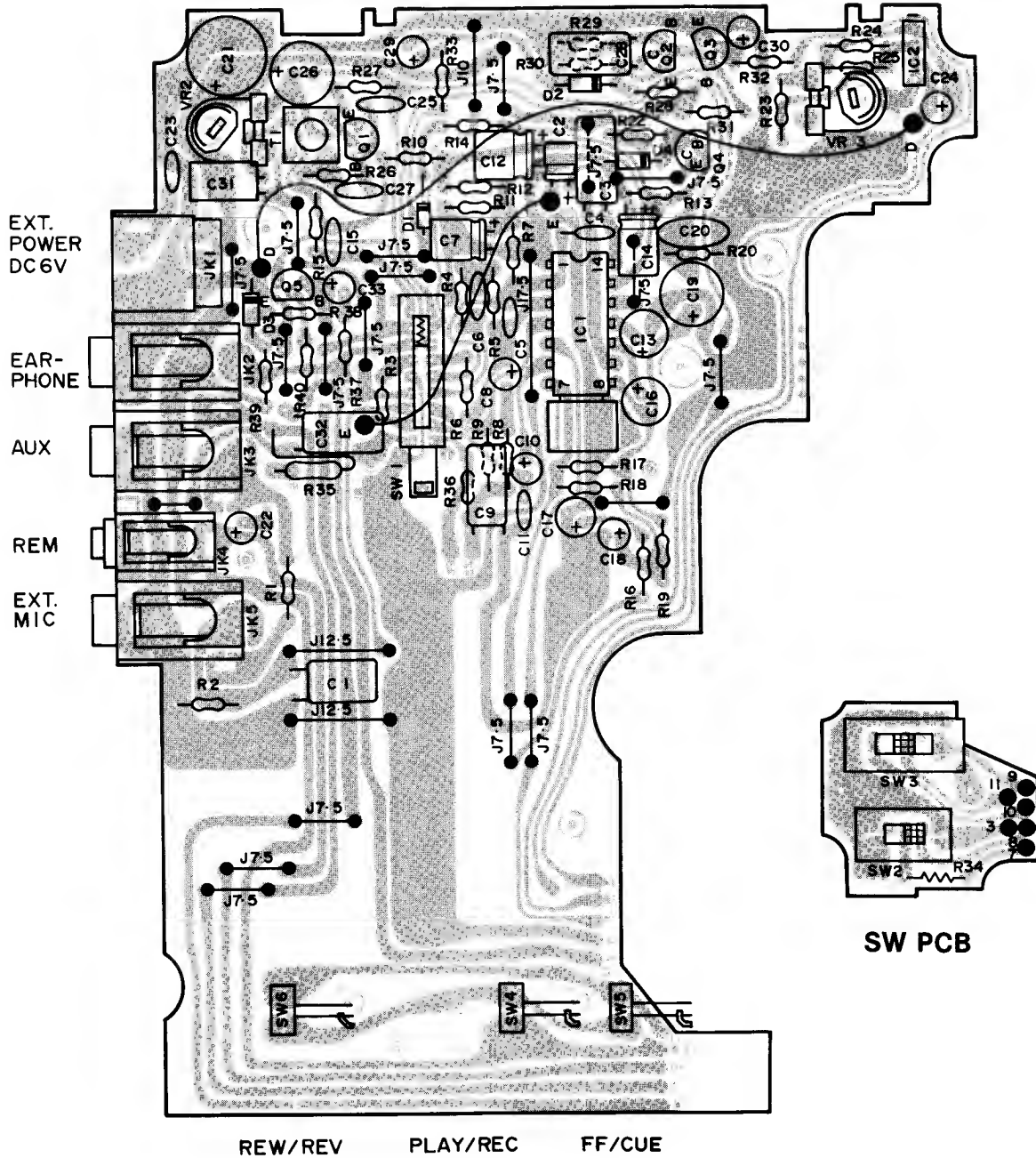
Figure 7

TROUBLESHOOTING CHART

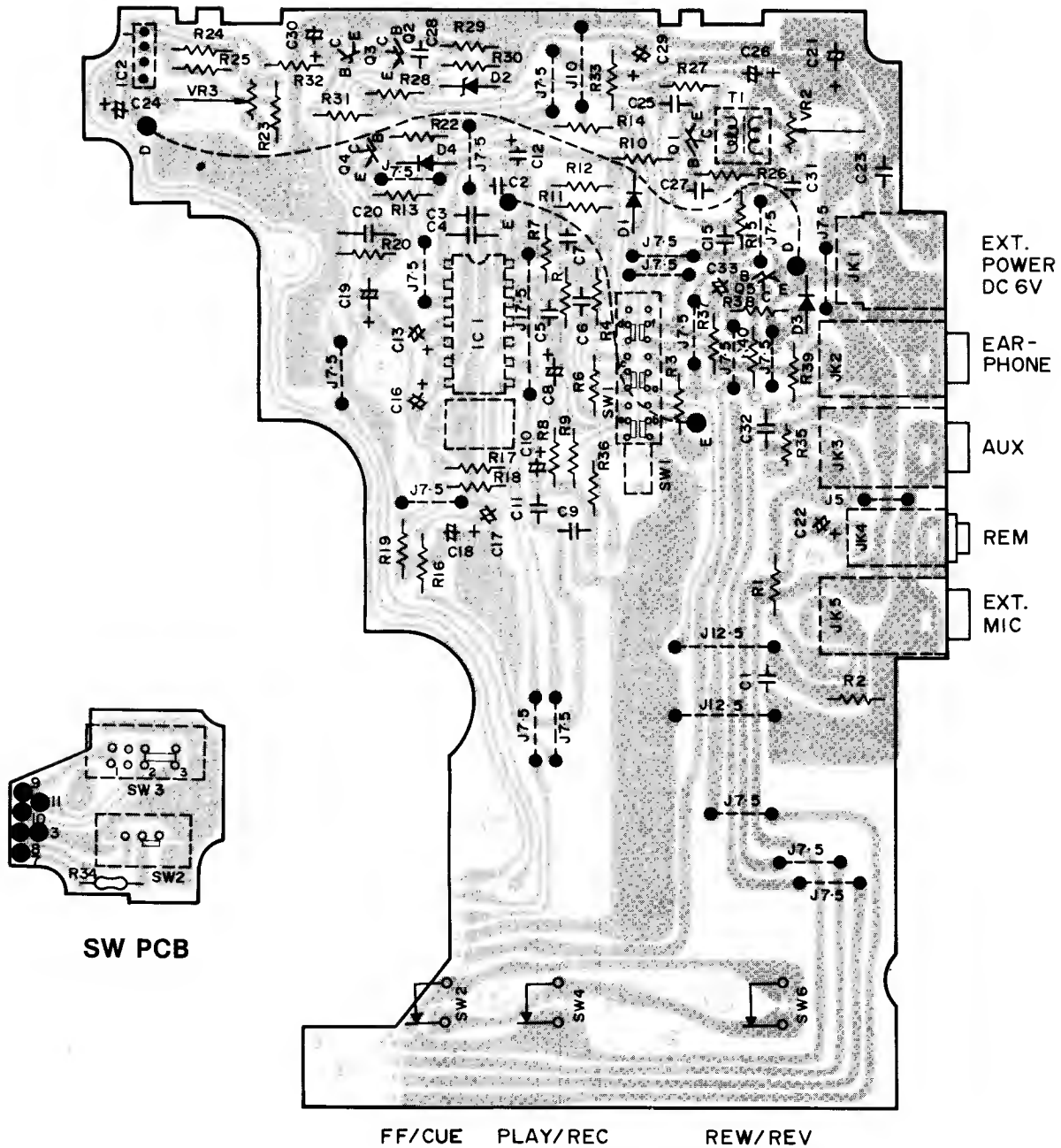
SYMPTOM	CAUSE AND REMEDY
Unit Does Not Function.	<ol style="list-style-type: none"> 1) Motor does not function: Replace. 2) Main belt slipping: Replace. 3) SW4 poor contact: Adjust or replace. 4) Defective EXT. Power Jack (JK1): Repair or replace.
No Take-up of Tape	<ol style="list-style-type: none"> 1) Take-up reel ass'y and center gear slipping. Wipe off take-up reel ass'y and center gear. 2) Pin roller ass'y slipping: Wipe off pinch roller ass'y. Change the spring location or replace pinch roller spring.
Will Not Fast-Forward or Rewind	<ol style="list-style-type: none"> 1) RF clutch arm ass'y, center gear or supply reel ass'y slipping: Wipe off RF clutch arm ass'y, center gear or supply reel ass'y. 2) Defective SW5 or SW6: Repair or replace. 3) IC2 defective: Replace.
Excessive Wow	<ol style="list-style-type: none"> 1) Motor defective: Replace. 2) Pinch roller ass'y defective: Replace.
Varying Speed	<ol style="list-style-type: none"> 1) Main belt slipping: Wipe off flywheel capstan and motor pulley or replace main belt. 2) Motor defective: Replace. 3) IC2 defective: Replace. 4) Improper adjustment of VR3: Make readjustment.
No Playback	<ol style="list-style-type: none"> 1) R/P head defective or open: Replace. 2) R/P head dirty: Wipe off R/P head with a cloth moistened with alcohol. 3) Lead wire to R/P head open: Replace lead wire. 4) No power to Amplifier (IC-1): Replace SW4. 5) Defective components in Amplifier (IC-1): Check and replace the defective components.

SYMPTOM	CAUSE AND REMEDY
Low Playback or Distorted Playback	1) Amplifier (IC-1) defective: Check and replace the defective components. 2) R/P head dirty: Wipe off R/P head with a cloth moistened with alcohol. 3) R/P head worn out: Replace.
No Record	1) R/P head defective or open: Replace. 2) Components in Amplifier (IC-1) defective: Check and replace the defective components. 3) EXT. MIC Jack (JK5) defective: Repair or replace. 4) R/P head dirty: Wipe off R/P head with a cloth moistened with alcohol. 5) Poor contact in AUXiliary Jack (JK3): Repair or replace. 6) SW4 defective: Repair or replace.
No Erase	1) Erase head defective: Replace. 2) Lead wire to erase head poorly soldered: Re-solder lead wire.
No Load	1) REM Jack (JK4) defective: Repair or replace. 2) Defective PAUSE Switch (SW3): Repair or replace. 3) Improper adjustment of VOLUME (VR1): Make readjustment. 4) Defective PRESET Switch (SW7): Repair or replace. 5) Poor contact in EARPHONE Jack (JK2): Repair or replace.
No Save	1) Poor contact in AUXiliary Jack (JK3) or MIC Jack (JK5): Repair or replace. 2) Defective SW1: Replace.

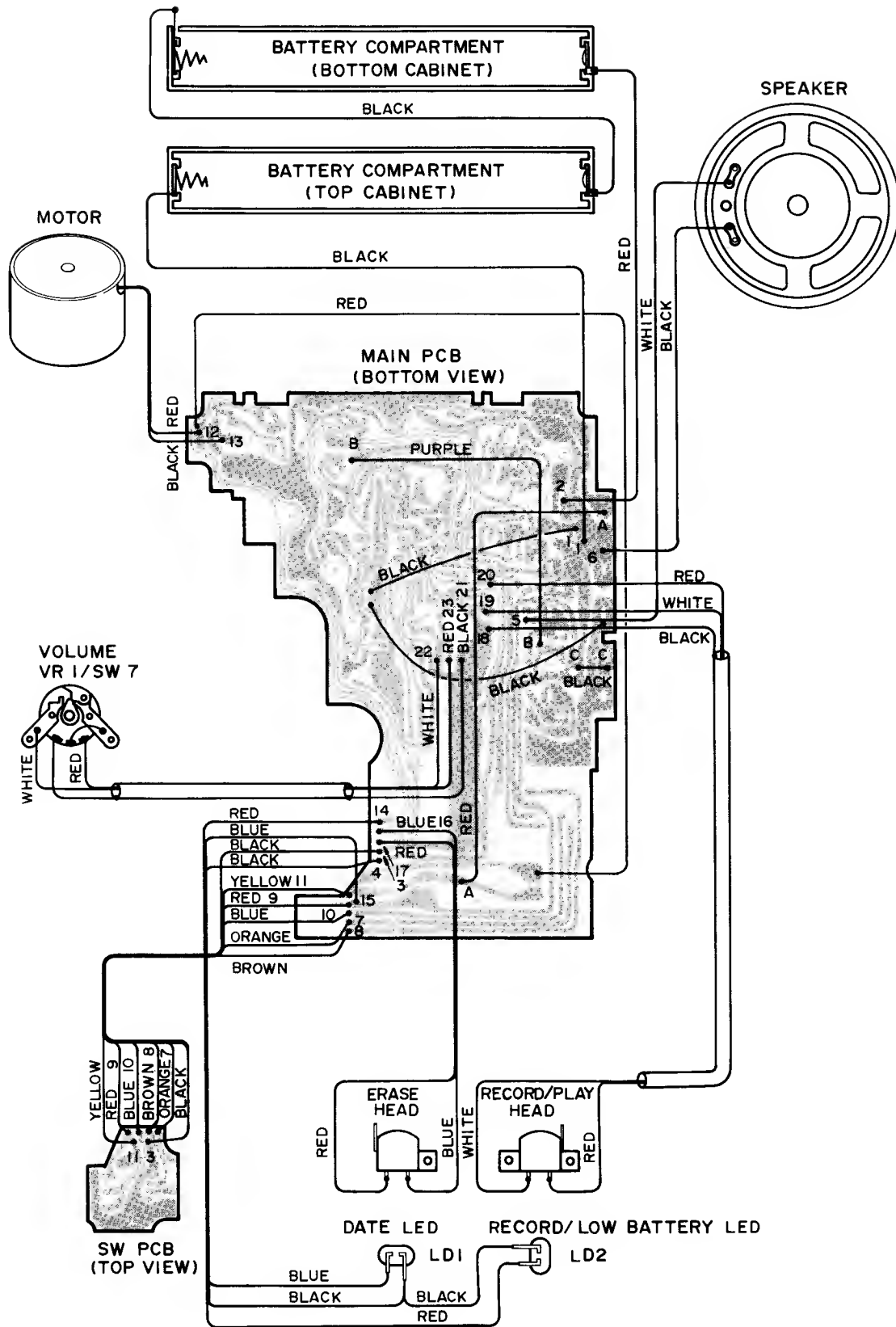
P.C.B. TOP VIEW



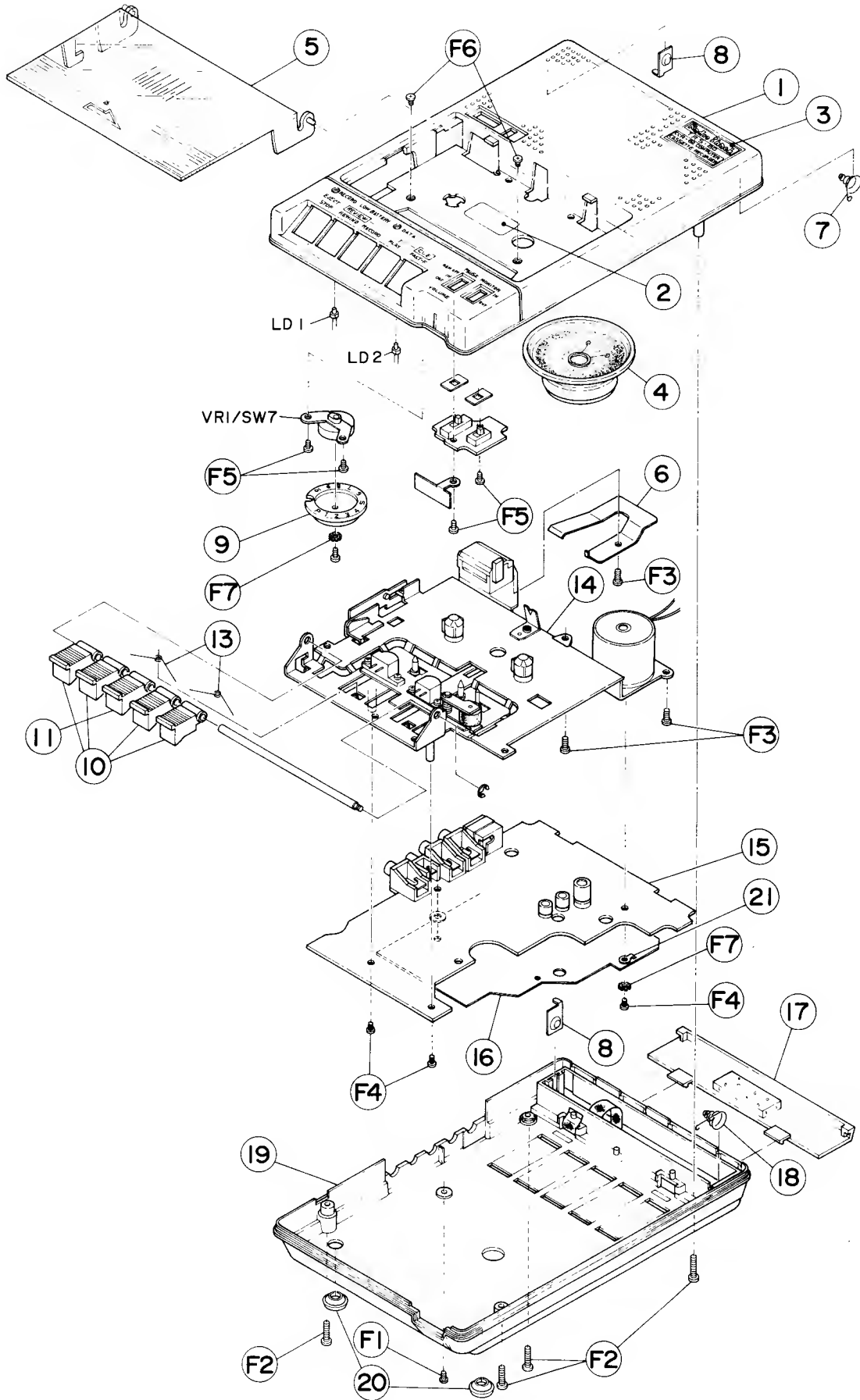
P.C.B. BOTTOM VIEW



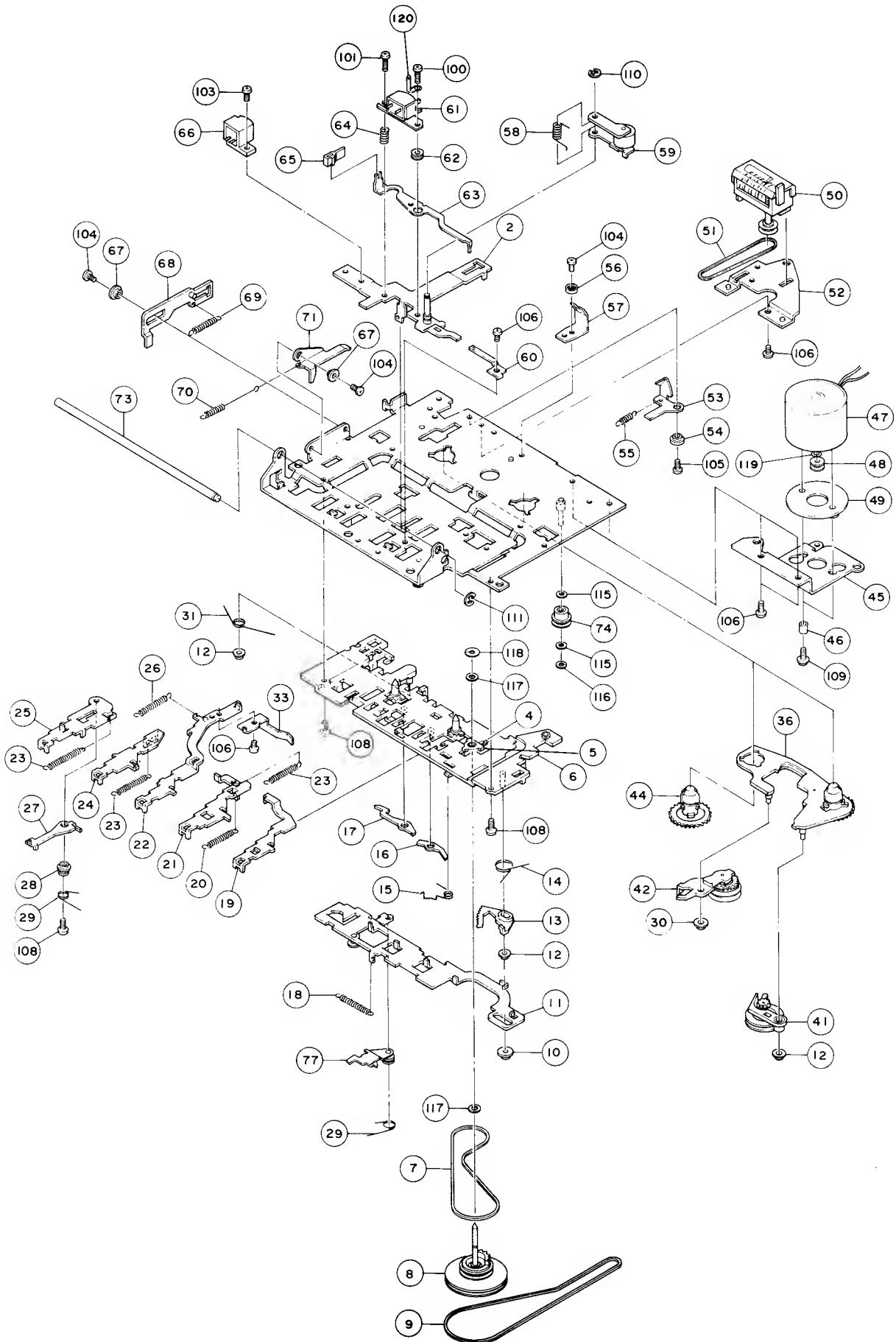
WIRING DIAGRAM



GENERAL EXPLODED VIEW



MECHANISM EXPLODED VIEW



ELECTRICAL PARTS LIST

CAPACITORS						
Ref.No.	Description				RS Part No.	Mfr's Part No.
C1	Mylar	0.015 μ F	50V	\pm 5%		CQQSK153J*
C2	Electrolytic	1 μ F	50V	\pm 20%		CEBCK105M*
C3	Mylar	0.0027 μ F	50V	\pm 5%		CQQSK272J*
C4	Ceramic SL	47 pF	50V	\pm 5%		CCJVK470J*
C5	Ceramic SL	10 pF	50V	\pm 1pF		CCJVK100F*
C6	Mylar	0.022 μ F	50V	\pm 5%		CQQSK223J*
C7	Electrolytic	4.7 μ F	50V	\pm 20%		CEBCK475M*
C8	Electrolytic	1 μ F	50V	\pm 20%		CEBCK105M*
C9	Mylar	0.01 μ F	50V	\pm 5%		CQQSK103J*
C10	Electrolytic	1 μ F	50V	\pm 20%		CEBCK105M*
C11	Ceramic SL	100 pF	50V	\pm 5%		CCJVK101J*
C12	Electrolytic	100 μ F	10V	\pm 20%		CEBCE107M*
C13	Electrolytic	47 μ F	10V	\pm 20%		CEBCE476M*
C14	Electrolytic	22 μ F	10V	\pm 20%		CEBCE226M*
C15	Mylar	0.0047 μ F	50V	\pm 5%		CQQSK472J*
C16	Electrolytic	47 μ F	10V	\pm 20%		CEBCE476M*
C17	Electrolytic	22 μ F	10V	\pm 20%		CEBCE226M*
C18	Electrolytic	1 μ F	50V	\pm 20%		CEBCK105M*
C19	Electrolytic	470 μ F	10V	\pm 20%		CECCE477M*
C20	Mylar	0.1 μ F	50V	\pm 5%		CQQSK104J*
C21	Electrolytic	1000 μ F	10V	\pm 20%		CECCE108M*
C22	Electrolytic	2.2 μ F	50V	\pm 20%		CEBCK225M*
C23	Mylar	0.0047 μ F	50V	\pm 5%		CQQSK472J*
C24	Electrolytic	100 μ F	10V	\pm 20%		CEBCE107M*
C25	Mylar	0.0022 μ F	50V	\pm 5%		CQQSK222J*
C26	Electrolytic	220 μ F	10V	\pm 20%		CECCE227M*
C27	Mylar	0.0033 μ F	50V	\pm 5%		CQQSK332J*
C28	Mylar	0.0022 μ F	50V	\pm 5%		CQQSK222J*
C29	Electrolytic	1 μ F	50V	\pm 20%		CEBCK105M*
C30	Electrolytic	1 μ F	50V	\pm 20%		CEBCK105M*
C31	Polystyrene	4700 pF	50V	\pm 5%		CNEHK472J*
C32	Mylar	0.001 μ F	50V	\pm 5%		CQQSK102J*
C33	Electrolytic	1 μ F	50V	\pm 20%		CEBCK105M*
DIODES						
Ref.No.	Description				RS Part No.	Mfr's Part No.
D1	Silicon	KDS1555	Dectector			SDSI00024-
D2	Zener	RD4.7E-B(2)	Low Battery			SZR4.7EB2
D3	Silicon	KDS155	Detector			SDSI00024-
D4	Silicon	KDS1555	Detector			SDSI00024-
LEDS						
Ref.No.	Description				RS part No.	Mfr's Part No.
LD1	KLR226E	Rec./Data Indicator				SL-R00044-
LD2	KLR226E	Rec./Data Indicator				SL-R00044-

INTEGRATED CIRCUITS

Ref. No.	Description	RS part No.	Mfr's Part No.
IC1	μ PC1350C Linear Amp		SIPC1350C-
IC2	μ PC1470H Linear Governor		SIPC1470H-

JACKS

Ref. No.	Description	RS Part No.	Mfr's Part No.
JK1	DC Power		196204340A
JK2	3.5mm Ear/Aux/Mic		191210060A
JK3	3.5m Ear/Aux/Mic		191210060A
JK4	2.5mm Remote		191410030A
JK5	3.5mm Ear/Aux/Mic		191210060A

TRANSISTORS

Ref. No.	Description	RS Part No.	Mfr's Part No.
Q1	KTC1815(GR) NPN OSC/Low Battery		STKC1815-G
Q2	KTC1815(GR) NPN OSC/Low Battery		STKC1815-G
Q3	KTC1815(Y) NPN Low Battery/ Switching		STKC1815-Y
Q4	KTC1815(Y) NPN Low Battery/ Switching		STKC1815-Y
Q5	KTC1815(Y) NPN Low Battery/ Switching		STKC1815-Y

RESISTORS

Ref. No.	Description	RS Part No.	Mfr's Part No.
R1	Carbon 820K ohm 1/6W \pm 5%		RCOXP824J*
R2	Carbon 1K ohm 1/6W \pm 5%		RCOXP102J*
R3	Carbon 100 ohm 1/6W \pm 5%		RCOXP101J*
R4	Carbon 100K ohm 1/6W \pm 5%		RCOXP104J*
R5	Carbon 4.7K ohm 1/6W \pm 5%		RCOXP472J*
R6	Carbon 15K ohm 1/6W \pm 5%		RCOXP153J*
R7	Carbon 560 ohm 1/6W \pm 5%		RCOXP561J*
R8	Carbon 2.2K ohm 1/6W \pm 5%		RCOXP222J*
R9	Carbon 10K ohm 1/6W \pm 5%		RCOXP103J*
R10	Carbon 56K ohm 1/6W \pm 5%		RCOXP563J*
R11	Carbon 33K ohm 1/6W \pm 5%		RCOXP333J*
R12	Carbon 33K ohm 1/6W \pm 5%		RCOXP333J*
R13	Carbon 470K ohm 1/6W \pm 5%		RCOXP474J*
R14	Carbon 150 ohm 1/6W \pm 5%		RCOXP151J*
R15	Carbon 15K ohm 1/6W \pm 5%		RCOXP153J*
R16	Carbon 180 ohm 1/6W \pm 5%		RCOXP181J*
R17	Carbon 39K ohm 1/6W \pm 5%		RCOXP393J*
R18	Carbon 18K ohm 1/6W \pm 5%		RCOXP183J*
R19	Carbon 18K ohm 1/6W \pm 5%		RCOXP183J*
R20	Carbon 100 ohm 1/6W \pm 5%		RCOXP101J*
R21	Not used		
R22	Carbon 1K ohm 1/6W \pm 5%		RCOXP102J*
R23	Carbon 270 ohm 1/6W \pm 5%		RCOXP271J*
R24	Carbon 270 ohm 1/6W \pm 5%		RCOXP271J*
R25	Carbon 820 ohm 1/6W \pm 5%		RCOXP821J*

RESISTORS						
Ref. No.	Description			RS Part No.	Mfr's Part No.	
R26	Carbon	15K ohm	1/6W	± 5%		RCOXP153J*
R27	Carbon	10 ohm	1/6W	± 5%		RCOXP100J*
R28	Carbon	39K ohm	1/6W	± 5%		RCOXP393J*
R29	Carbon	22K ohm	1/6W	± 5%		RCOXP223J*
R30	Carbon	560 ohm	1/6W	± 5%		RCOXP561J*
R31	Carbon	39K ohm	1/6W	± 5%		RCOXP393J*
R32	Carbon	3.3K ohm	1/6W	± 5%		RCOXP332J*
R33	Carbon	4.7K ohm	1/6W	± 5%		RCOXP472J*
R34	Carbon	150 ohm	1/6W	± 5%		RCOXP151J*
R35	Carbon	3.9 ohm	1/2W	± 5%		RCOXP393J*
R36	Carbon	16K ohm	1/6W	± 5%		RCOXP163J*
R37	Carbon	1K ohm	1/6W	± 5%		RCOXP102J*
R38	Carbon	68K ohm	1/6W	± 5%		RCOXP683J*
R39	Carbon	5.6K ohm	1/6W	± 5%		RCOXP562J*
R40	Carbon	220 ohm	1/6W	± 5%		RCOXP221J*
R41	Carbon	100K ohm	1/6W	± 5%		RCOXP104J*
POTS						
Ref. No.	Description			RS Part No.	Mfr's Part No.	
VR1	Rotary	10KB	Volume		171110041A or 171110040A	
VR2	Semi-fixed	500B			175206152A	
VR3	Semi-fixed	200B			175206141A	
SWITCHES						
Ref. No.	Description			RS Part No.	Mfr's Part No.	
SW1	Slide	R/P			183110510A	
SW2	Slide	Monitor			183110470A	
SW3	Slide	Pause			183110480A	
SW4	Leaf	Play/FF/Rew.			185010110A	
SW5	Leaf	Play/FF/Rew.			185010110A	
SW6	Leaf	Play/FF/Rew.			185010110A	
COIL						
Ref. No.	Description			RS Part No.	Mfr's Part No.	
T1	Bais OSC				124002300A	

GENERAL EXPLODED VIEW PARTS LIST

Ref.No.	Description	RS Part No.	Mfr's Part No.
1	Cabinet Ass'y Top Cabinet, Top w/Net		M-00410 601210700C
2	Mirror, Cassette		919310030A
3	Plate, Top		711010140A
4	Speaker, D50 8 ohm 0.2W		271010120A
5	Door, Cassette		603610170A
6	Spring, Leaf Door Cassette		434610380A
7	Spring, Conical		434310120A
8	Contact, Battery		198110290A
9	Knob, Volume		651110030A
10	Knob, Play/FF/Rew/Eject		659110170A
11	Knob, Record		659110180A
12	Not used		
13	Spring, Button		53133
14	Mechanism Ass'y, Tape		901500000A
15	RP Amp Unit		U-21028
16	Sheet, Shield		473310580A
17	Cover, Battery w/Cushion		602110170A
18	Spring, Conical		434310110A
19	Cabinet, Bottom		601310600D
20	Foot		608010080A
21	Lug		HAL # 10340A
HARDWARE			
F1	Screw, Pan	2X6P	
F2	Screw, Pan	2.6X14PT	
F3	Screw, Pan	2.6X8PT	
F4	Screw, Zeror Tapping	2X6PIT-S	
F5	Screw, Zeror Tapping	2X6PIT-B	
F6	Screw, Zeror Tapping	2X3PIT-S	
F7	Washer, Tooth	2TW-B	
MISCELLANEOUS PARTS LIST			
	Case, Soft Cord, Patch		855010070A 313510050A

MECHANISM EXPLODED VIEW PARTS LIST

Ref.No.	Description	RS Part No.	Mfr's Part No.
1	Not Used		
2	Base B, Head		53129
3	Not Used		
4	Plate 3, Ground		53007
5	Metal, Flywheel		53142
6	Case D Ass'y Bottom		53111
7	Belt, Sub		53143
8	Flywheel		53153
9	Belt, Main		53146
10	Washer B, Button Lock		53150
11	Lever C, Lock Button		53131
12	Washer, Auto Kick		53016
13	Lever, Auto Kick		53014
14	Spring, Auto Kick		53015
15	Spring B, Lever FF		53152
16	Lever, Cue Function		53034
17	Lever, REW Function		53035
18	Spring, Lock Lever		53038
19	Lever D, FF		53137
20	Spring, Head Function		53005
21	Lever D, Play		53138
22	Lever B, REC		53148
23	Spring, Button Lever		52010
24	Lever E, REW		53139
25	Lever F, Stop		53118
26	Spring, Rec. Lever		53066
27	Hook, Eject		53119
28	Collar, Hook Eject		53120
29	Spring T, 3H		53121
30	Washer, Center Arm		53128
31	Spring, REW Function		53027
32	Not Used		
33	Plate E, Push REC		53140
34	Not Used		
35	Not Used		
36	Metal Ass'y, FWD Reel		53019
37	Not Used		
38	Not Used		
39	Not Used		
40	Not Used		
41	Pulley Comp B, FWD Clutch		53057
42	Arm Comp C, Center Gear		53109
43	Not Used		
44	Metal Comp B, REW Reel		53110
45	Holder D, Motor		53125
46	Collar B, Motor		52041
47	Motor Ass'y Motor DC		E-00072 582110100A
48	Pulley D, Motor		53126

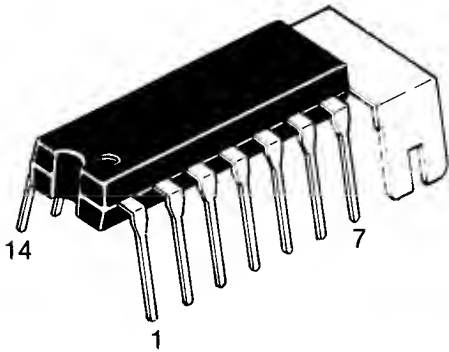
Ref. No.	Description	RS Part No.	Mfr's Part No.
49	Cushion , Motor		53145
50	Counter, Tape		556010070A
51	Belt, Counter		53147
52	Holder, Counter		53149
53	Rec. Safety		50139
54	Collar, Rec. Safety		50137
55	Spring, Rec. Safety		50138
56	Stad, Cassette		53130
57	Spring, Pack		53030
58	Spring, Pinch Roller		53041
59	Roller Comp B, Pinch		53058
60	Holder, Base Head		53136
61	Head, R/P		583010080A
62	Stud, Head		53154
63	Lever, Sensing		53151
64	Spring, Head		50074
65	Sensing,		52014
66	Head, Erase		SE-2
67	Collar, Eject		53116
68	Slide, Eject		53122
69	Spring, Slide Eject		53124
70	Spring, Kick Eject		53117
71	Kick, Eject		53115
72	Not Used		
73	Shaft, Lever Button		53127
74	Pulley D, Ilder		53144
75	Not Used		
76	Not Used		
77	Safety,		53132
100	Screw	2X5	60027
101	Screw	2X6	60003
102	Not used		
103	Screw	2X4	60115
104	Screw, Black	2X3	60084
105	Screw, Black	2X4	60087
106	Screw	2X3TP	60075
107	Not used		
108	Screw	2X5TP	60135
109	Screw, w/Washer	2X4	60082
110	E Ring	1.5	60048
111	E Ring	2.5	60051
112-	Not used		
114			
115	Washer	1.7X3.2X0.25t	60095
116	Washer	1.2X3.0X0.25t	60098
117	Washer	2.1X3.2X0.25t	60061
118	Washer	1.6X6.0X0.25(s)	60056
119	Washer	1.9X3.2X0.25t	60133
120	Lug		HAL # 1350A

IC & TRANSISTOR LEAD IDENTIFICATION AND IC INTERNAL DIAGRAM

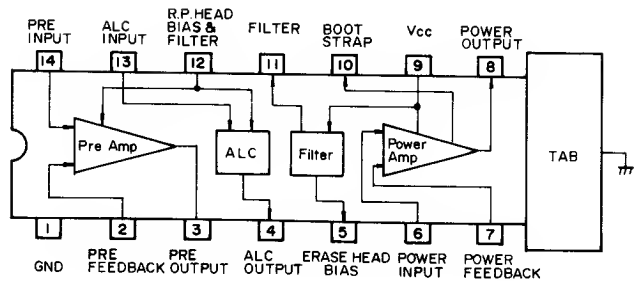
KTC 1815



μ PC 1350C



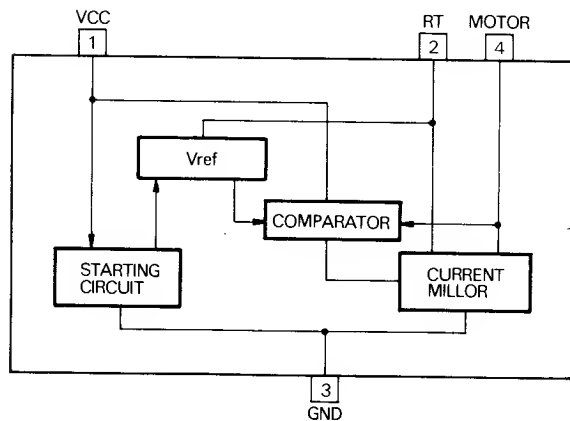
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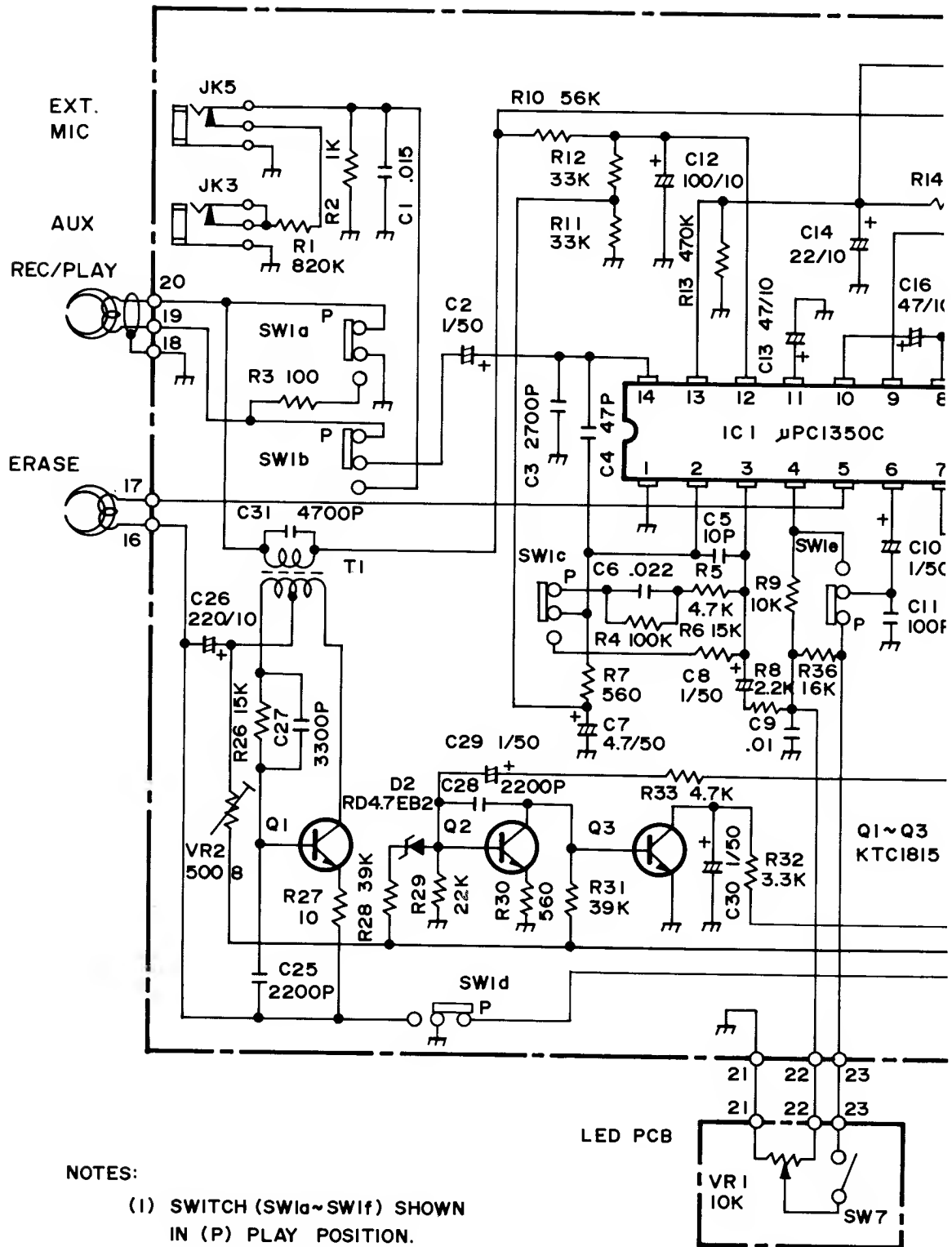
μ PC 1470H



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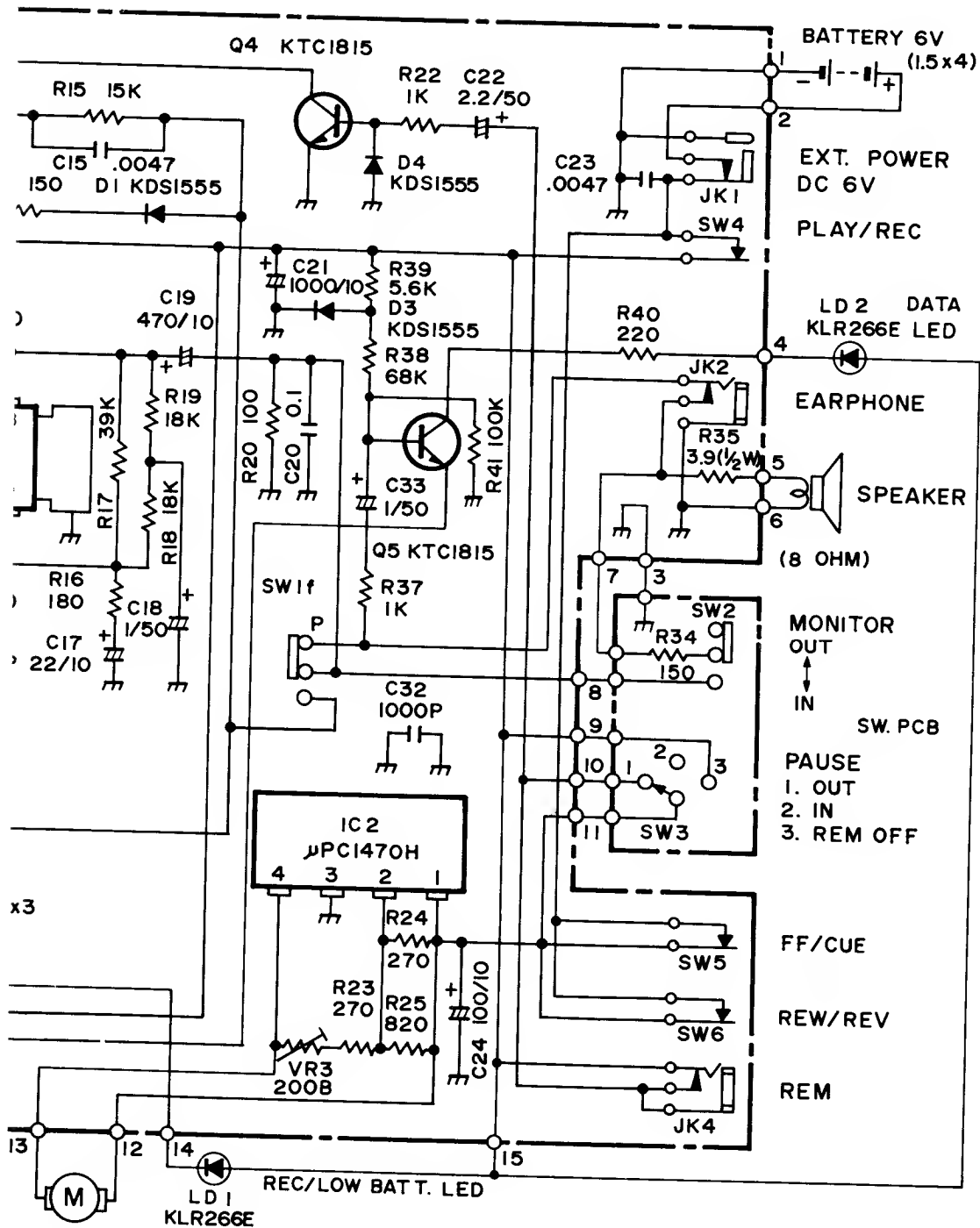
SCHEMAT



NOTES:

- (1) SWITCH (SW1a~SW1f) SHOWN IN (P) PLAY POSITION.
- (2) ALL RESISTANCE VALUES ARE INDICATED IN "OHM" ($K=10^3$ OHM).
- (3) ALL CAPACITANCE VALUES ARE INDICATED IN " μF " ($P=10^{-6}$ μF).

IC DIAGRAM



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