

SANYO

Solide-state Cartridge

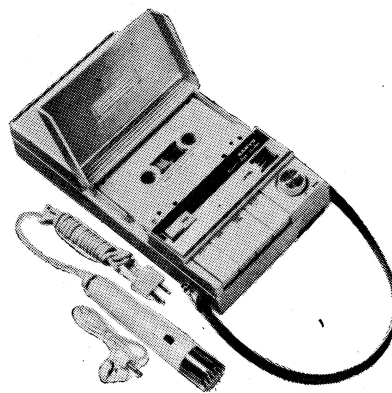
Tape Recorder

MODEL M - 8

SERVICE MANUAL

SANYO ELECTRIC CO., LTD.

INTERNATIONAL DIVISION: SANYO ELECTRIC TRADING CO., LTD.
OSAKA, JAPAN



SPECIFICATIONS

Performance Specifications

Recording Capability	Monophonic 2-track
Mechanism	Push-button switch method
Volume control	Variable resistor
Tape speed	4.75cm/sec.
Transistors	(1) 2SB303 \times 1 (2) 2SB186 \times 3 (3) 2SB22 \times 2 (4) 2SC536 \times 2
Diodes	DT-09 \times 2
Recording bias operation	AC bias
Erasure operation	DC erase operation
Level indication	Level meter
(on the recording)	Recording voltage-level)
(on the playing)	Battery voltage)
Microphone	Dynamic microphone with remote switch.
Power source	Dry batteries (UM-2) \times 5, 7.5 V
Speaker	7 cm (Diameter) P.D.S. imp. 8 Ω
Dimensions	8-4/5" deep \times 4-4/5" wide \times 2-1/5" high (224 \times 123 \times 57mm)
Weight	3.3 lbs. (1.5kg)

2. Technical specifications

AC bias	45 kc 600 μ A 800 μ A
DC erase current	6mA at 7.5V
Tape speed	4.75cm/sec. \pm 3%
Recording time	60 min. maximum (double tracks)
Rewind time	2 min. maximum
Fast forward time	2 min. maximum
Maximum output power	350 mW maximum 200 mW undistorted
Distortion	7% maximum (input 0.1mV)
Wow & flutter	0.6% R.M.S. maximum
Gain & frequency response	120 c/s to 6k c/s within -3db
Noise	30 mV max. at maximum voltage 2mV max. at minimum voltage
Erase factor	40 db minimum

3. Inclusive accessories

Microphone, Microphone case, Microphone stand, Hanger strap, Cartridge with tape (86m), Earphone

4. Optional accessories

Leather carrying case, AC adaptor, DC adaptor

MECHANICAL DESCRIPTION

1. "PLAYBACK" position.

Press "PLAY+REC" push button (2) to move power switch slide arm (44) which will turn on power switch (52), making the motor and the amplifier operate. The motor actuates drive belt (64) which drives flywheel (41). The rotation of the flywheel is then transmitted to each mechanism.

Slide base (3) and slide arm base actuator (43) are connected with each other through screw (26). This permits the simultaneous operation of slide base (3) and slide arm base actuator (43) by pressing the "PLAY+REC" push button. The recorder is locked in its PLAYBACK position by means of the push button switch mechanism. Steel ball (15) facilitates the motion of slide base (3).

Pinch roller (6) is held against capstan and flywheel (41) with a pressure of approximately 250g by means of pinch roller arm spring (21).

Slide base (3) is provided with some holes for fixing the spring so that the pressure can be adjusted by changing the spring position.

Record head (7) and erase head (8) are designed to come into close contact with the tape. The tape is wound as take-up pulley (45) rotates by coming into contact with reel base (5) by some 100g side pressure from take-up spring (58). If this pressure is too low, take-up pulley (45) will slip. If it is too high, defective tape winding will result. The optimum torque for the take-up pulley ranges from 30 to 60g-cm. In PLAYBACK position, brake (4) must be away from reel base (5) because of power switch slide arm (44).

Idler and arm (46) must be apart from flywheel (41) because of the interlocking motion of slide arm actuator (43) so the idler will not rotate.

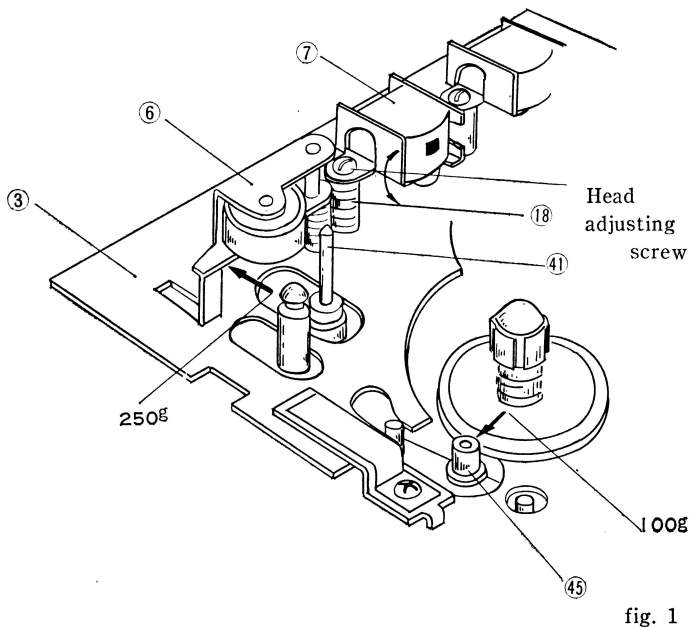
Power switch slide arm (44) is pulled by slide arm spring (53) and slide arm base actuator (43) by slide base actuator spring (54), respectively, so they will return to normal in STOP position.
(See figs. 1&2.)

2. "RECORDING position."

With RECORD push button (9) pressed, press "PLAY+REC" push button (2), and slide base (3) will move record switch arm (51) which will switch the position of slide switch (SW-1) on printed circuit board from PLAY to RECORD, and lock the recorder in RECORDING position.

One reason why the switch position can not be changed is that record switch (SW-1) is too tight to move. Therefore the change-over force of SW-1 is reduced below 300g.

For other operations, please follow the instructions described in the foregoing paragraph "PLAYBACK position." (See fig. 2)



3. "FAST FORWARD" position.

Press "FAST FOR" push button (2) and power switch slide arm (44) operates, and turns on power switch (52), aparting brake (4) from reel base.

As idler base (47) moves, the idler further goes into flywheel (41) by means of idler spring (55) and the idler roller (41) comes into contact with take-up reel base (5) to set the recorder in FAST FORWARD position. Roller idler base (57) facilitates the motion of idler base (47).

In FAST FORWARD position, slide base (3) does not move and the pinch roller, record head and erase head are at standstill.

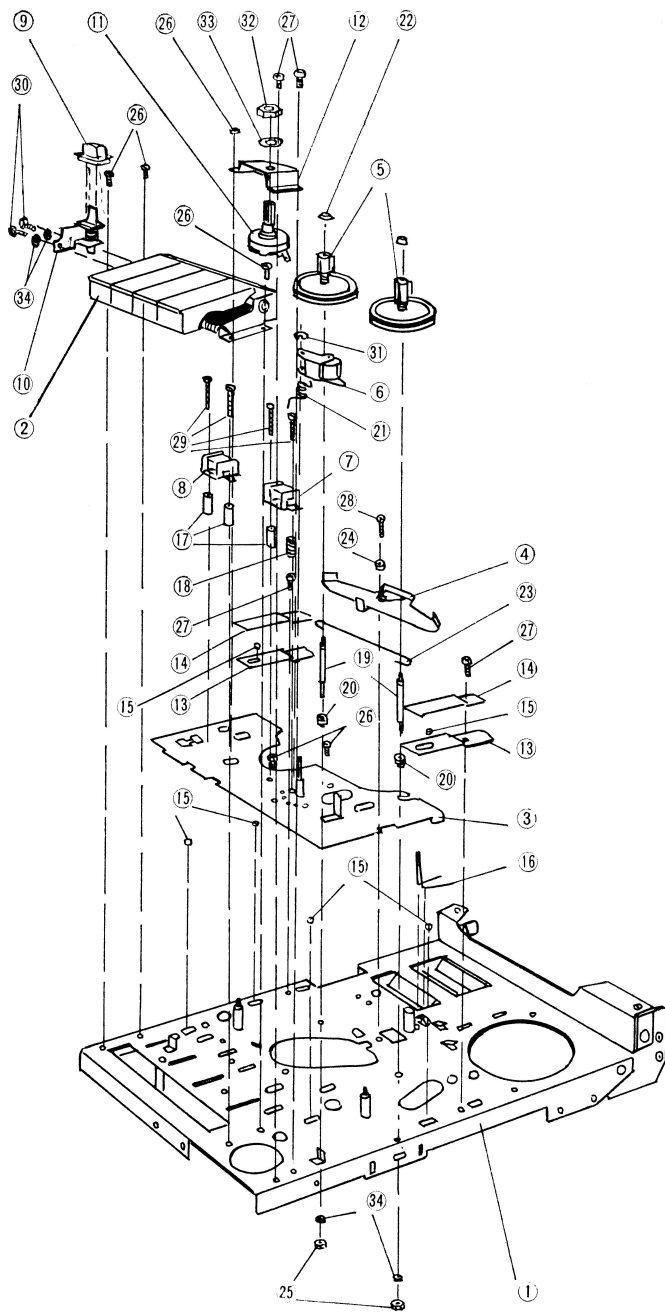
Since this push button is not locked, the recorder is kept in FAST FORWARD position only while the push button is being pressed. (See fig. 2)

4. "REWINDING" position.

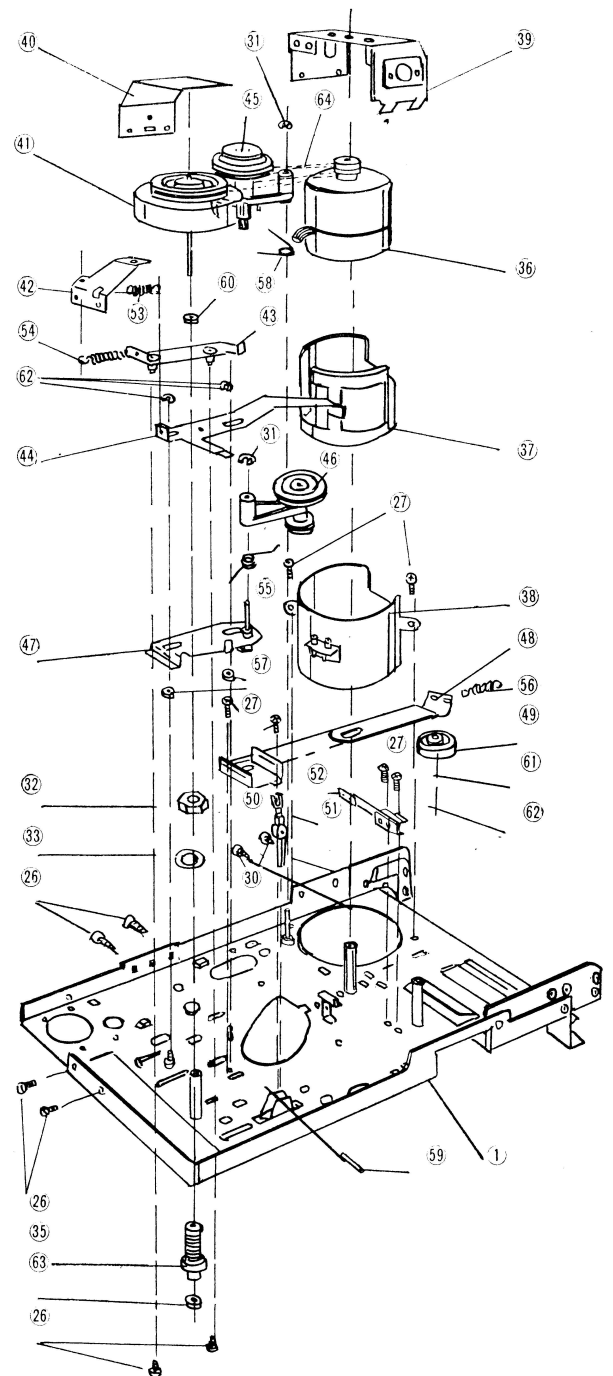
Press "REW" push button (2), and power switch slide arm (44) will move, turning on power switch (52).

Rewind roller (49) is contained in arm and rewind roller assembly (48), always pulled in its moving direction by means of roller spring (56) and kept from moving by the push button switch lever. Pressing of the "REW" push button brings rewind roller (49) into parallel contact with reel plate (5) and idler roller by means of rewind roller arm spring (50), making the recorder in REWINDING position.

Then the recorder is locked in the position by means of the push button switch mechanism. In this case, either, slide base (3) will not move. (See fig. 2)



TOP VIEW



BOTTOM VIEW

MECHANICAL PARTS LIST

SYMBOL No.	STOCK No.	DESCRIPTION
Mechanism Chassis		
1.	KR1-11143-12	Assembly, Chassis
2.	KR3-11142-5	Assembly, Push Button switch
3.	KR3-11140-2	Assembly, Slide Base
4.	KR4-11129	Brake
5.	KR4-31167-5	Assembly, Reel Plate
6.	KR4-24030-3	Assembly, Pinch Roller and Arm
7.	KR-H1012-2	Record Head with Bracket
8.	KR-H2005-2	Erase Head with Bracket
9.	KR4-31157	Push Button, Record
10.	KR4-11131-3	Assembly, Record Interlock
11.	KR-G1014	Control, Volume
12.	KR4-11127	Bracket, Volume Control Mounting
13.	KR4-11137	Holder, Steel Ball
14.	KR-11144	Spring, Steel Ball
15.	KR-11159	Steel Ball
16.	KR4-14037	Spring, Cartridge
17.	KR4-31146	Spacer, Heads
18.	KR4-16020	Spring, Record/Play Head
19.	KR4-15030	Spindle
20.	KR4-25076	Washer, Spindle
21.	KR4-16027	Spring, Pinch Roller Arm
22.	KR4-31171	Cap, Spindle
23.	KR4-16024	Spring, Brake
24.	KR4-25075	Spacer, Brake
25.	KR-24020	Nut, Hexagonal 2 mm
26.	KR-11161	Screw (2.6×5mm Pan Hd.)
27.	KR-11164	Screw, Self Tapping (2.6×5mm Phil.)
28.	KR-24039	Screw, (2.6×4mm Truss Hd. Phil.)
29.	KR-24037	Screw, (2×12mm Pan Hd.)
30.	KR-11162	Screw (2×4mm Pan Hd.)
31.	KR-11168	C Clamp, Pinch Roller Arm
32.	KR-24041	Nut, Hex., Fly Wheel Bearing
33.	KR-11165	Washer, Fly Wheel Bearing
34.	KR-11167	Washer, Record Interlock
35.	KR4-23022-3	Bearing Fly Wheel
36.	KR-M1005-2	Motor with Pulley
37.	KR4-36047	Cushion, Motor
38.	KR3-11158	Case, Motor
39.	KR3-11157-8	Cover, Motor Pulley
40.	KR3-11141-2	Support, Fly Wheel
41.	KR3-14033	Assembly, Capstan Shaft and Fly Wheel
42.	KR4-11126	Bracket, Chassis Mounting
43.	KR4-11135-3	Assembly, Slide Arm Base Actuator
44.	KR4-11130	Slide Arm. Power Switch
45.	KR4-31144-13	Assembly, Take-up Pulley and Arm

SYMBOL No.	STOCK No.	DESCRIPTION
46.	KR4-31138-7	Assembly, Idler and Arm
47.	KR4-11125-2	Assembly, Idler Base
48.	KR4-11139-2	Assembly, Arm and Rewind Roller
49.	KR4-31143-2	Roller, Rewind
50.	KR4-11132	Spring, Rewind Roller Arm
51.	KR4-31141	Arm, Record Switch
52.	KR-E1026	Switch, Power
53.	KR4-16037	Spring, Slide Arm
54.	KR4-16035	Spring, Slide Base Actuator
55.	KR4-16029	Spring, Idler
56.	KR4-16034	Spring, Roller
57.	KR4-25074	Roller Idler Base
58.	KR4-16025	Spring, Take-up Pulley
59.	KR-11166	Pin, Record Switch Arm
60.	KR-33020	Washer, Phenolic, Fly Wheel
61.	KR-33019	Washer, Phenolic, Rewind Roller
62.	KR-11169	C Clamp, Rewind Roller
63.	KR4-31180	Washer, Nylon, Fly Wheel
64.	KR4-36045	Drive Belt
Cabinet		
1.	KR1-31165-12	Assembly, Cabinet Front
2.	KR1-31164-2	Assembly, Cabinet Back
3.	KR1-31163-4	Assembly, Lid, Battery Compartment
4.	KR1-31166	Lid, Cartridge Compartment
5.	KR4-31175-2	Knob, Volume Control
6.	KR4-25083	Screw, Hand Strap
7.	KR4-25082	Screw, Cabinet Back
8.	KR4-11156	Clamp, Speaker
9.	KR-V1008	Speaker
10.	KR-U1004	Indicator
11.	KR-E3003	Assembly, Jack
12.	KR-E3006	Assembly, External Power Socket
13.	KR-Y1018	Microphone, Dynamic, with Remote Switch
14.	KR-V2003	Earphone
15.	KR-39029	Hand Strap
16.	KR-39028	Case, Microphone
17.	KR-E2010	Battery, C Cell
18.	KR-34110	Service Data Sheet
19.	KR-34111	Owner's Manual
20.	KR1-31161	Tape Cartridge
21.	KR-11163	Screw (3×6mm Pan Hd.)
22.	KR-24044	Screw (2×6mm Flt. Hd.)
23.	KR3-31185	Stand, Microphone
24.	KR4-34108	Label, External Power Connection
25.	KR-34104-3	Carton & Filler

ELECTRICAL DESCRIPTIONS

1. "RECORDING" position.

The signal coming in from the microphone is applied through C2 to the base of transistor TR 1 by means of the a-b connection on SW-1.

The base of TR1 is set at a DC bias by means of R2 and R8 and the amplified signal lies across R1. TR2 is directly connected with the collector of TR1 and adjusted with R12 and R10.

Part of the signal amplified by collector load resistor R10 of TR2 is returned to the emitter of TR1 through C7-C6-R9-R5-R6-R4. In this case, the recorder offers selective response that increase the amplification of both high and low frequencies. The signal is variable by VR1 and applied through C9 to the base of TR3. R13 and R14 determine the electric potential of the base. The impedance of C12-L1 connected, in parallel, with emitter resistor R17 become very low at high frequencies of about 7KC where the amplification degree of TR3 increases.

The signal lying across the collector of TR3 is applied through C13, g & h on SW-1 (record/play switch)-L2-C15-R19 to the record head. L-2 and C15 in parallel connection are intended to efficiently apply to the record head with the bias current resonated to around 45KC by the AC bias trap and oscillated by the bias oscillator.

TR7 and TR8 serving as AC bias oscillators with T3 are push-pull operated. VR2 and C27 are power-decoupling circuits. VR2 can also change bias current. R38 controls the DC current (approx. 6mA) flowing through the erase head.

The signal from the collector of TR3 is damped by R22 and R23 and applied to the base of TR4.

Since o and n on SW-1 are open, the bias on TR5 and TR6

become zero but a faint current flows, according to the microphone signal, through the emitter and collector of TR6 to the level meter.

2. "PLAYBACK" position.

The signal coming from the tape to the record/playback head is applied to the base of TR1 through j-c-b on SW-1. TR1 and TR2 act in about the same manner as for recording. R18 and C10 are connected, in parallel, to emitter resistor R17 of TR3 to increase the amplification of medium and low frequencies.

In PLAYBACK position, h and i on SW-1 are connected, and R22 and R23 become unconcerned.

The signal amplified by TR4 is applied through the secondary coil of T1 to final transistors TR5 and TR6.

Bias on the bases is determined by R28, R29, TH1, R30, R31 and TH2 (TH1 and TH2 serve as temperature compensators at high and low temperatures).

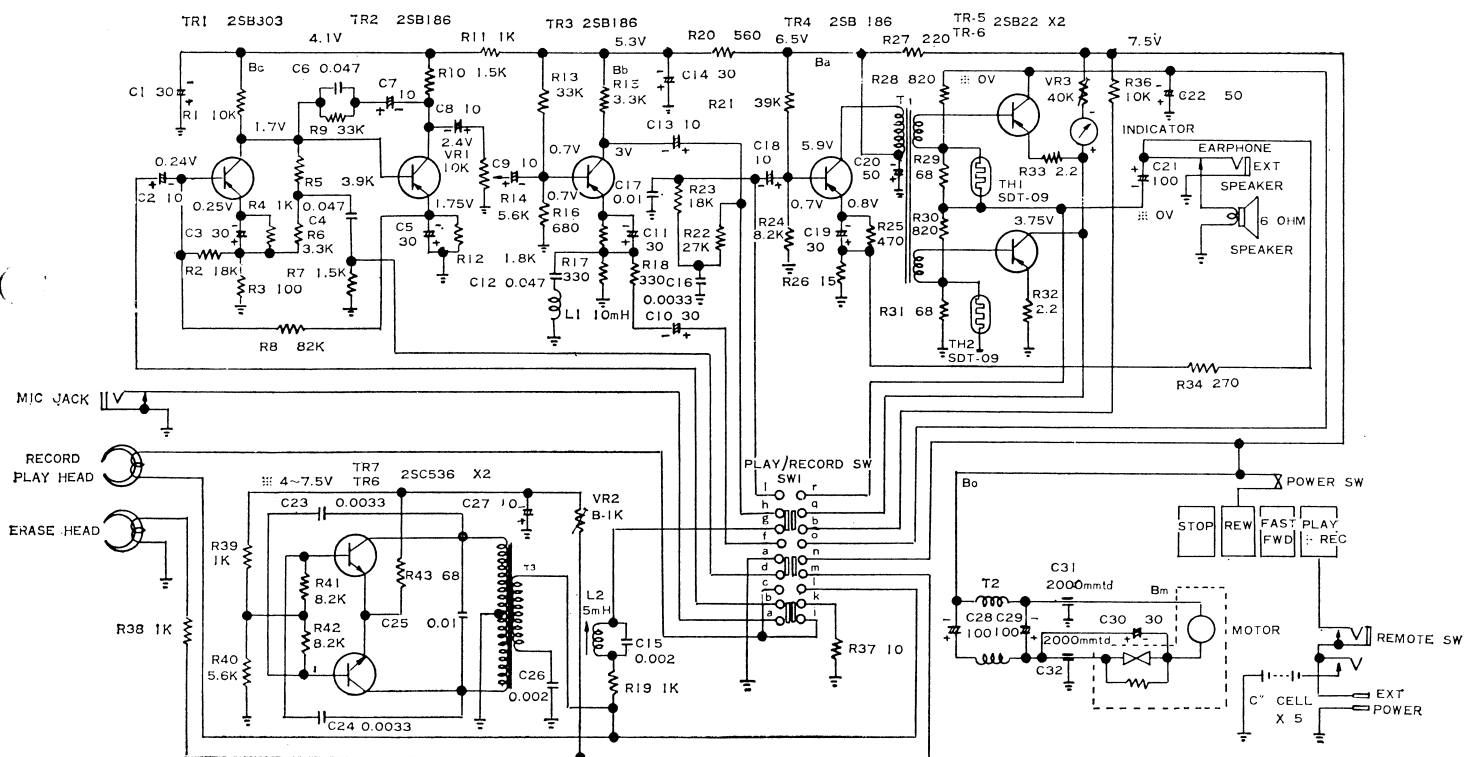
C21 connects the signal amplified by TR5 and TR6 with the speaker. R34 is a feedback resistor that corrects the distortion of output stages and improves frequency characteristics.

3. Power Circuit.

The recorder can operate on 5 "C" size (UM-2) batteries or 7.5V DC current.

Power switch (52) is turned on by pressing any of the push buttons except for STOP push button. T2 in the motor circuit reduces motor current noises while C31, C32 and C30 eliminate motor noises made by the opening and closing of the governor.

SCHEMATIC DIAGRAM



- NOTES: 1. All resistors are $\frac{1}{8}$ watt, unless otherwise noted.
 2. All capacitors are MFD, unless otherwise noted.
 3. Voltages measured from point indicated to chassis ground with V. T. V. M. record-play (SW1) in play position.
 4. These voltages are measured with RECORD- PLAY Switch (SW1) in RECORD position.
 5. Voltage tolerance $\pm 10\%$.
 6. SW1 shown in RECORD position.

4. Adjusting the Meter.

VR-3 (B-40K) is intended to adjust the meter if its point is not stable. To adjust the meter, set the power voltage to 5.5 volts and press PLAY+REC push button on switch (2). Rotate VR-3 observing the pointer and set the pointer on the end of BATT. (See fig. 3)

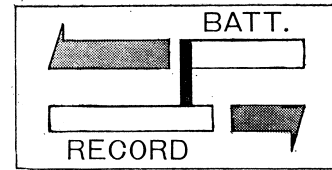


fig. 3

This adjustment is made when VR-3 (B-40K) and the meter are replaced. Before turning on the switch, place the movable piece of VR-3 at the center to prevent the pointer from moving to the full.

5. Adjusting AC Bias.

The following adjustment should be made whenever circuit components are replaced or repaired in the amplifier. The adjustments should be checked periodically.

1. Connect VTVM across the resistor R37 10 ohm. or between "E" and "K" contacts of record-play switch SW1. See fig. 4
2. Set VR-2 (Oscillator Bias Adj.) to its mid-position and VTVM to 0.01 volts range.
3. Set recorder in record position.
4. Adjust L-2 (Bias Trap) with non-metallic aligner for the maximum reading on the VTVM. (See fig. 5)
5. Adjust VR-2 so that the meter reads 0.006 volts.

NOTE: 1) Meter used in this test must be a VTVM capable of measuring 45 KC such as a Hickok Model 209

- 2) While adjusting L-2 do not press it too hard. Damage to the core may result.

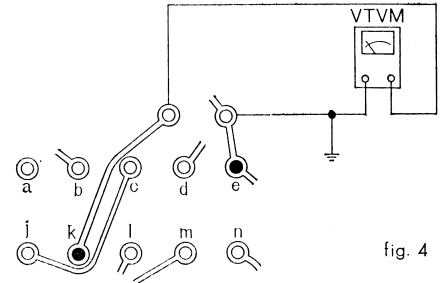


fig. 4

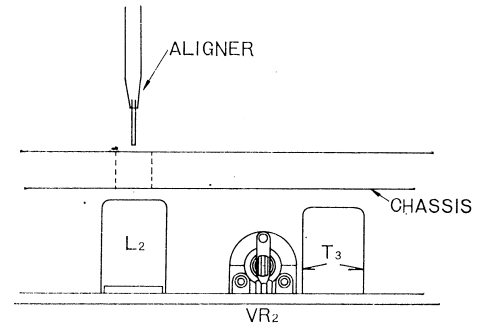
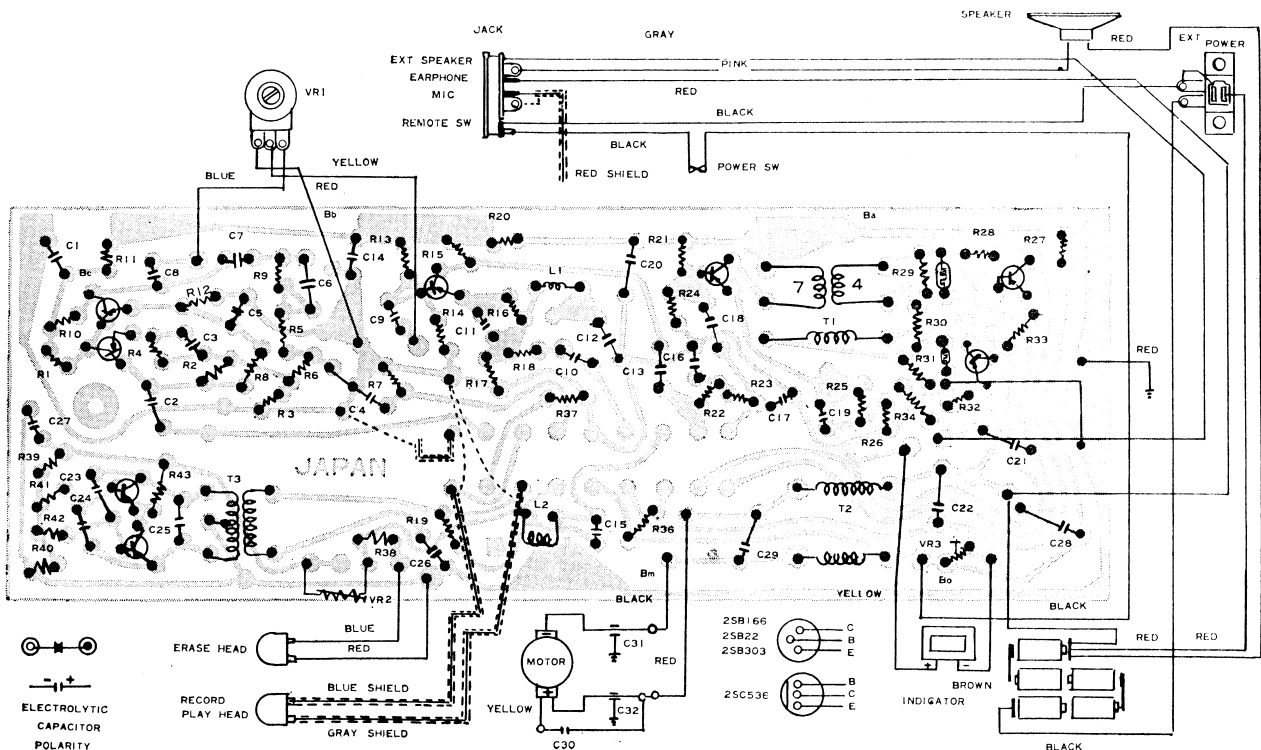
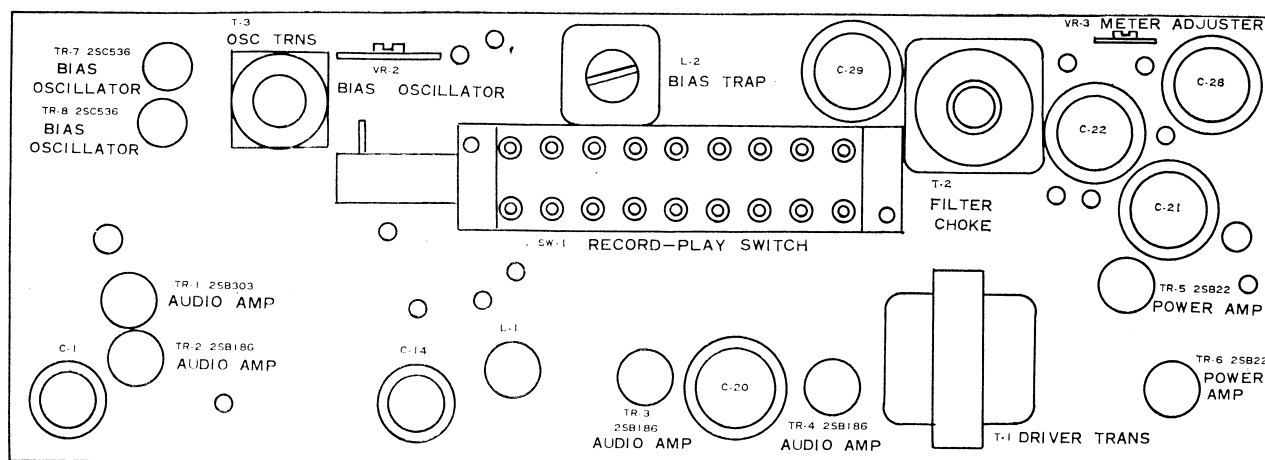


fig. 5

CIRCUIT BOARD DIAGRAM



TRANSISTOR LAYOUT



ELECTRICAL PARTS LIST

SYMBOL No.	STOCK No.	DESCRIPTION
Transistors & Thermistors		
TR-1	KR-Q1010	2SB303, 1st Audio Amplifier
TR-2,3,4	KR-Q1011	2SB186, 2nd, 3rd, 4th, Audio Amp.
TR-5,6	KR-Q1012	2SB22, Audio Power Amplifier
TR-7,8	KR-Q1013	2SC536, Bias Oscillator
TH-1,2	KR-Q4005	SDT-09
Transformers & Coils		
L1	KR-L15MHJ	Peaking Coil, 15 mh $\pm 5\%$
L2	KR-L5MHV	Trap, Bias Frequency, 5mh, Variable
T1	KR-N1006	Input Transformer
T2	KR-N1007	Filter Choke Coil
T3	KR-A1001	Oscillator Coil
Capacitors		
C-1	KR-C9001	Electrolytic, 30mfd. 10WV
C-2,7,8,9,13,18,27	KR-C9002	Electrolytic, 10mfd. 10WV
C-3,5,10,11,19	KR-C9003	Electrolytic, 30mfd. 6WV
C-4,6,12	KR-CM047M	Mylar, 0.047mfd
C-14,30	KR-C9004	Electrolytic, 30mfd. 12WV
C-16,23,24	KR-CM0033M	Mylar, 0.0033mfd
C-20,22	KR-C9005	Electrolytic, 50mfd. 12WV
C-21,28,29	KR-C9006	Electrolytic, 100mfd. 12WV
C-25,17	KR-CM01M	Mylar, 0.01mfd
C-26,15	KR-CM002M	Mylar, 0.002mfd
C-27	KR-C9007	Electrolytic, 10mfd. 12WV
C-31,32	KR-CC2000p	Ceramic, 2000 mmfd (Feed Through Type)
Slide Switch		
SW1	KR-E1027	Slide Switch
Variable Resistors		
VR1	KR-G1014	A-10 K ohm
VR2	KR-G1015	B-1 K ohm
VR3	KR-G1016	B-40 K ohm

SYMBOL No.	STOCK No.	DESCRIPTION
Resistors		
R1,R36	KR-R10KK	10K ohm
R2,R23	KR-R18KK	18K ohm
R3	KR-R100K	100 ohm
R4, R11, R19		
R38,R39	KR-R1KK	1K ohm
R5	KR-R3900K	3.9Kohm
R6,R15	KR-R3300K	3.3Kohm
R7,R10	KR-R1500K	1.5Kohm
R8	KR-R82KK	82K ohm
R9,R13	KR-R33KK	33K ohm
R12	KR-R1800K	1.8Kohm
R14,R40	KR-R5600K	5.6Kohm
R16	KR-R680K	680 ohm
R17,R18	KR-R330K	330 ohm
R20	KR-R560K	560 ohm
R21	KR-R39KK	39K ohm
R22	KR-R27KK	27K ohm
R24,41		
R42	KR-R8200K	8.2Kohm
R25	KR-R470K	470 ohm
R26	KR-R15K	15 ohm
R27	KR-R220K	220 ohm
R28,R30	KR-R820K	820 ohm
R29,R31		
R43	KR-R68K	68 ohm
R32,R33	KR-R2.2K	2.2 ohm
R34	KR-R270K	270 ohm
R37	KR-R10K	10 ohm 5%
Miscellaneous		
PCB	KR-33018	Printed Circuit Board without Components
PCB-A	KRA-33018	Printed Circuit Board with Components