



## SURROUND STEREO TAPE DECK

### MODEL GX-280D-SS

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SECTION 1

**SERVICE MANUAL**

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# I. SPECIFICATIONS

An asterisk next to a figure indicates the minimum guaranteed performance.

TRACK SYSTEM	4-track 4-channel/2-channel compatible stereo system	
REEL CAPACITY	Up to 7" reel	
TAPE SPEED	7-1/2 ips (19 cm/sec.) $\pm 0.5\%$ (* $\pm 1.0\%$ -0.5%)	
WOW AND FLUTTER	3-3/4 ips (9.5 cm/sec.) $\pm 0.5\%$ (* $\pm 1.0\%$ ) Less than 0.10% (*0.12%) R.M.S. at 7-1/2 ips Less than 0.15% (*0.18%) R.M.S. at 3-3/4 ips	
FREQUENCY RESPONSE	Low Noise Tape	20 to 25,000 Hz (*30 to 24,000 Hz) $\pm 3$ dB at 7-1/2 ips 30 to 20,000 Hz (*30 to 15,000 Hz) $\pm 3$ dB at 3-3/4 ips
	Regular Tape	30 to 23,000 Hz (*30 to 22,000 Hz) $\pm 3$ dB at 7-1/2 ips 30 to 19,000 Hz (*30 to 13,000 Hz) $\pm 3$ dB at 3-3/4 ips
SIGNAL TO NOISE RATIO	Better than 55 dB *Better than 48 dB at 7-1/2 ips *Better than 46 dB at 3-3/4 ips	
DISTORTION FACTOR	0.8% at 1,000 Hz "0" VU recording *Less than 2% at 7-1/2 ips, 1,000 Hz "0" VU recording *Less than 3% at 3-3/4 ips, 1,000 Hz "0" VU recording	
CROSS TALK	Better than 45 dB 2-channel stereo Better than 40 dB 4-channel stereo	
ERASE RATIO	Better than 70 dB	
BIAS FREQUENCY	100 to 110 kHz	
BIAS LEAK	Less than -20 VU	
HIGH FREQUENCY DEVIATION	Between channels	Within 3 dB, using a 8,000 Hz at 3-3/4 ips recorded tape
	Between FWD & REV	Within 4 dB, using a 8,000 Hz at 3-3/4 ips recorded tape
INPUTS	Mic Input	0.5 mV Impedance: 10 k $\Omega$
	Line Input	100 mV Impedance: 150 k $\Omega$
	Din Input	10 mV (Low) and 60 mV (High)
OUTPUTS	Line Output	1.228V (4 $\pm 1.5$ dB) Impedance: 25 k $\Omega$
	Din Output	0.4V
RECORDING CAPACITY	30/60 min., 4-channel/2-channel stereo recording, using a 1,200 ft. tape at 7-1/2 ips	
FAST FORWARD AND REWIND TIME	68/83 sec., using a 1,200 ft. tape at 60/50 Hz	
MOTORS	Capstan Motor	2-speed servo control outer rotor motor Type: SCM2-24 Revolutions: 520 r.p.m. at 7-1/2 ips 260 r.p.m. at 3-3/4 ips
	Reel Motor	Two 6-pole eddy current outer rotor motors Type: 24XO-MR Revolutions: 930 r.p.m. at 50 Hz 1,120 r.p.m. at 60 Hz
HEADS	Full Track Erase Head	Type: EF-200 Gap: 0.4 mm Impedance: 350 $\Omega$ $\pm 10\%$ at 100 kHz D.C. Resistance: 3 $\Omega$
	4-track Erase Head	Type: E4-250 Gap: 0.6 mm Impedance: 195 $\Omega$ $\pm 10\%$ at 100 kHz D.C. Resistance: 3.5 $\Omega$
	Recording Head	Type: R4-280 Gap: 4 micron $\pm 15\%$ Impedance: 16 $\Omega$ $\pm 15\%$ at 1 kHz D.C. Resistance: 13 $\Omega$
	Playback Head	Type: P4-280 Gap: 1.7 micron $\pm 15\%$ Impedance: 1,346 $\Omega$ at 1 kHz D.C. Resistance: 350 $\Omega$

TRANSISTORS	2SA564(R) ... 2 2SC458LG(C) ... 20 2SC711(D) (E) (F) (G) ... 13 2SC971(2) (3) (red) ... 2	2SC968(2) (3) (4) ... 8 2SC1014(D) (E) ... 1 2SD234(Y) ... 2 2SC945(Q) (R) (S) ... 18
I.C.	LD-3141 ... 4	
DIODES	1N34A ... 32 10D1 ... 14 10D4 ... 3	10DC-1 (black) ... 1 10DC-1 (red) ... 1 RD9A ... 1
THERMISTER	41D26 ... 1	
POWER SUPPLY	100 to 240V A.C. 50/60 Hz	
POWER CONSUMPTION	140W	
INSULATION RESISTANCE	More than 50 M $\Omega$	
INSULATION DURABILITY	500V D.C. for more than 1 min. duration	
DIMENSIONS	435(W) x 505(H) x 250(D) mm (17.4" x 20.2" x 10")	
WEIGHT	22.4 kg (49.5 lbs.)	

NOTE: Specifications subject to change without notice.

## II. MEASURING METHOD

### 1. TAPE SPEED DEVIATION

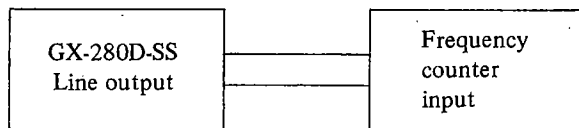


Fig. 1

As shown in Fig. 1, connect a Frequency Counter to the Line Output of Model GX-280D-SS. Playback a 1,000 Hz pre-recorded test tape. Take a Frequency Counter reading at the beginning, middle, and end of tape winding during playback. The maximum value of these respective readings will represent tape speed deviation.

### 2. WOW AND FLUTTER

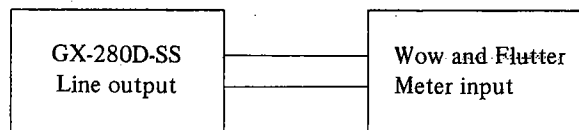


Fig. 2

#### Method A

As shown in Fig. 2, connect the Line Output of Model GX-280D-SS to the Input of a Wow and Flutter Meter. Playback a 3,000 Hz pre-recorded test tape and take a Wow and Flutter Meter reading at the beginning, middle, and end of tape winding. The maximum value of these respective readings will represent the Wow and Flutter.

#### Method B

Supply a 3,000 Hz sine wave signal from an Audio Frequency Oscillator and make a recording on a blank tape at the beginning, middle, and end of tape winding. Rewind and playback the resultant signal. Measure Wow and Flutter with a Wow and Flutter Meter. (The Wow and Flutter value of Method B will be close to twice that of Method A.)

### 3. FREQUENCY RESPONSE

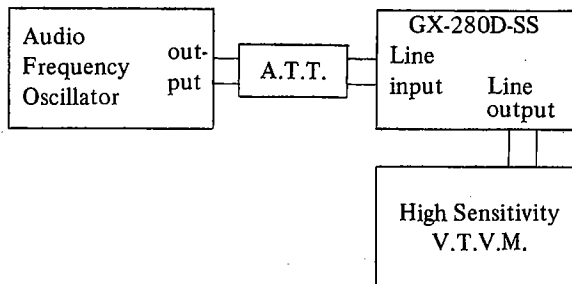


Fig. 3

For measuring Frequency Response, connect instruments as shown in Fig. 3 and proceed as follows:

- 1) Supply a 1,000 Hz sine wave signal to the Line Input of Model GX-280D-SS from an Audio Frequency Oscillator through an Attenuator.
- 2) Set recorder to recording mode and turn recording level control volume and line output level control volume to maximum. Adjust attenuator to obtain a +4 dB V.T.V.M. reading.
- 3) Under conditions described in 2) above, readjust attenuator so that the Line Output is -16 dB, and record 30 to 24,000 Hz spot frequencies.
- 4) Rewind tape and playback from the beginning. Take V.T.V.M. spot frequency readings and plot values on a graph.

NOTE: When measuring Frequency Response, new tape should be used.

### 4. SIGNAL TO NOISE RATIO

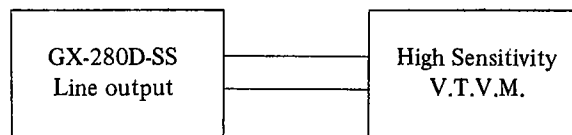


Fig. 4

As shown in Fig. 4, connect a High Sensitivity V.T.V.M. to the Line output of Model GX-280D-SS. Playback a 250 Hz "0" VU pre-recorded test tape and measure the output. Then remove the tape and measure the noise level under the same condition. Convert each of the measured values into decibels.

## 5. TOTAL HARMONIC DISTORTION

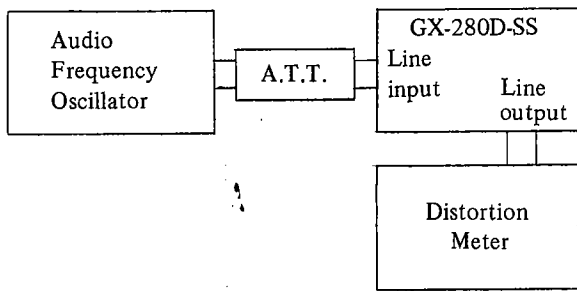


Fig. 5

Connect the measuring instruments as shown in Fig. 5 and record a 1,000 Hz sine wave signal at "0" VU. Playback the resultant signal and measure the overall distortion factor. Measure the noise level of the tape recorder without the tape. Connect the Audio Frequency Oscillator directly to the distortion meter for measurement of the distortion factor of the oscillator. The required distortion factor can be obtained from the results of the above measurement by the following formula:

$$d_0 = d - d_1 - d_2$$

where,  $d_0$  = Required distortion factor  
 $d$  = Overall distortion factor  
 $d_1$  = Noise level  
 $d_2$  = Distortion factor of the oscillator

NOTE: When measuring the distortion factor, new tape should be used.

## 6. CROSS TALK

1) Between the tracks (2-Channel)

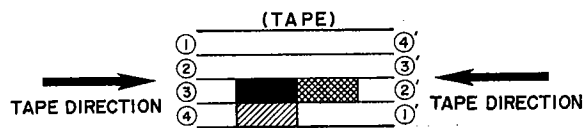


Fig. 6

As shown in the figure, first record a 1,000 Hz sine wave on track No. 3 at +3 VU level. Next, remove the 1,000 Hz input signal and record under a non-input condition. Then, playback the tape on tracks 3 and 1 (reversed condition of tape) through the 1,000 Hz B.P.F. (Band Pass Filter, Sensitivity . . . 1 : 1) and obtain the ratio between the two by using the following formula.

$$C = 20 \log \frac{E_0}{E_2 - E_1} \text{ (dB)}$$

where,

$C$  = Desired cross talk ratio (dB)

$E_0$  = 1,000 Hz signal output level

$E_2$  = 1,000 Hz cross talk output level

$E_1$  = Non-input signal record level

2) Between the channels (4-Channels)

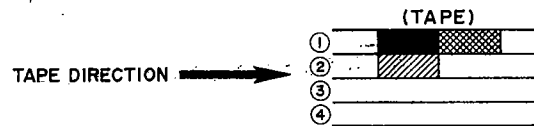


Fig. 7

As shown in the figure, first record a 1,000 Hz sine wave on track No. 1 at +3 VU level. Next, remove the 1,000 Hz input signal and record under a non-input condition.

Then, playback the tape on track No. 1 and No. 2 through the 1,000 Hz B.P.F. (Band Pass Filter, Sensitivity . . . 1 : 1) and obtain a ratio between the two from the following formula.

$$C = 20 \log \frac{E_0}{E_2 - E_1} \text{ (dB)}$$

where,

$C$  = Desired cross talk ratio (dB)

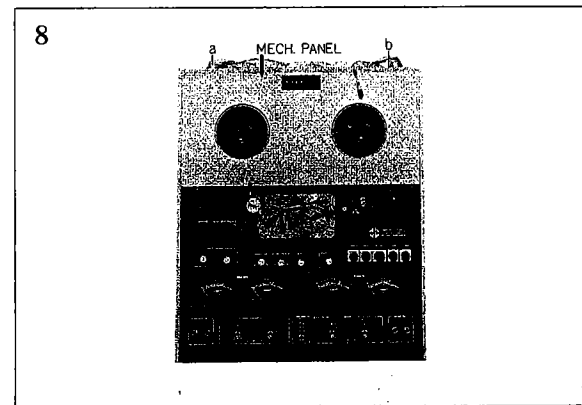
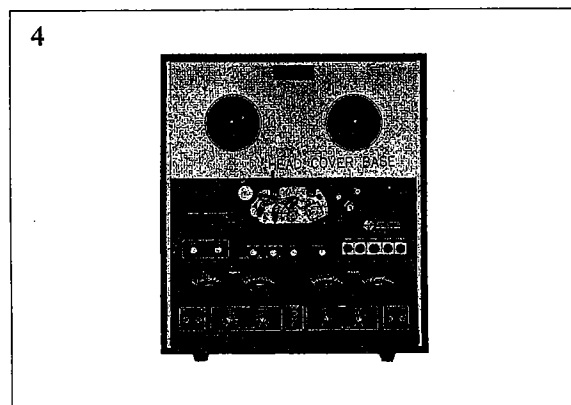
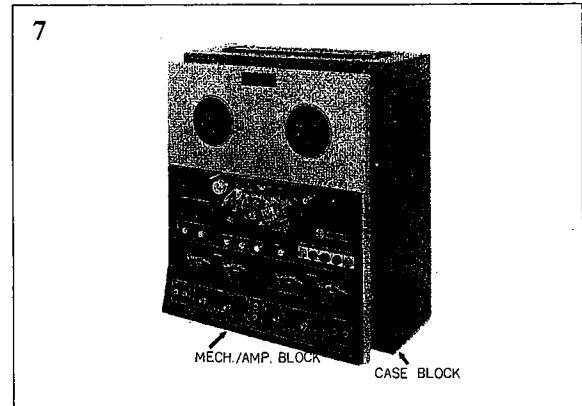
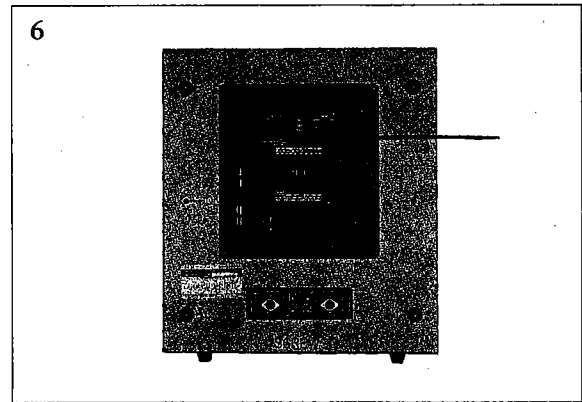
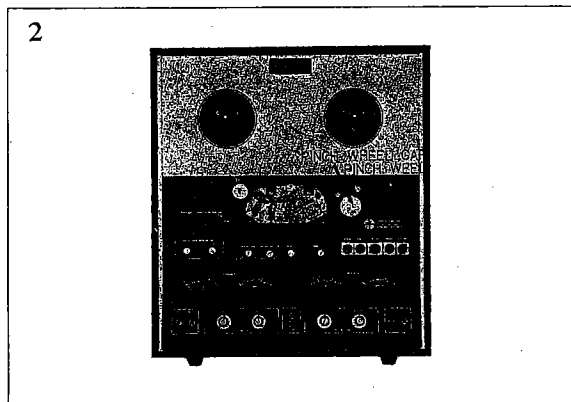
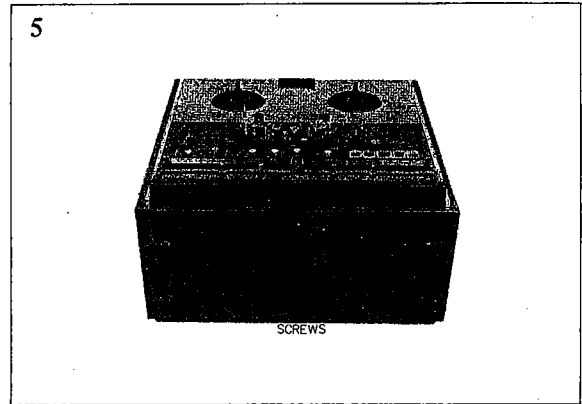
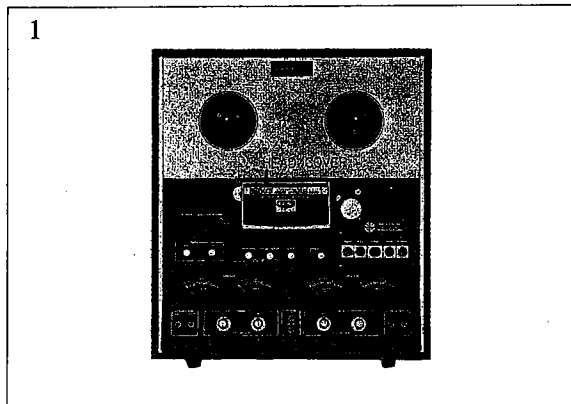
$E_0$  = 1,000 Hz signal output level

$E_2$  = 1,000 Hz cross talk output level

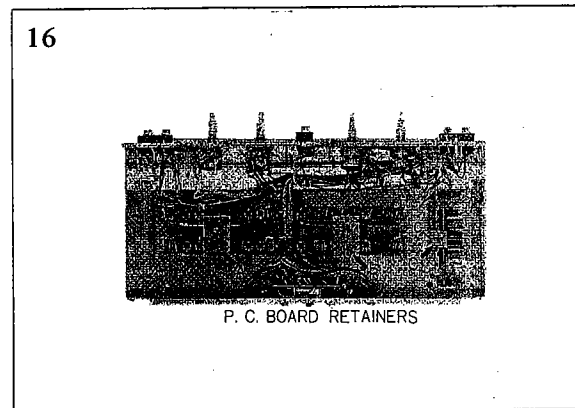
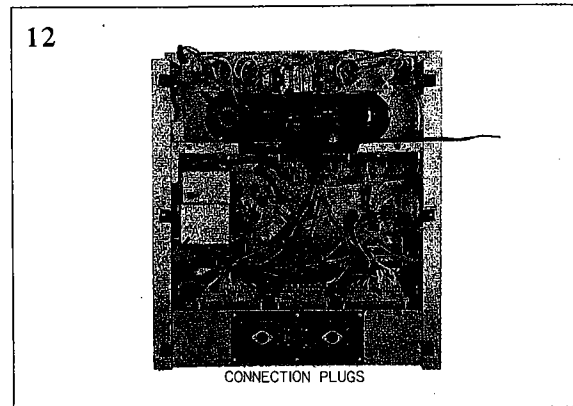
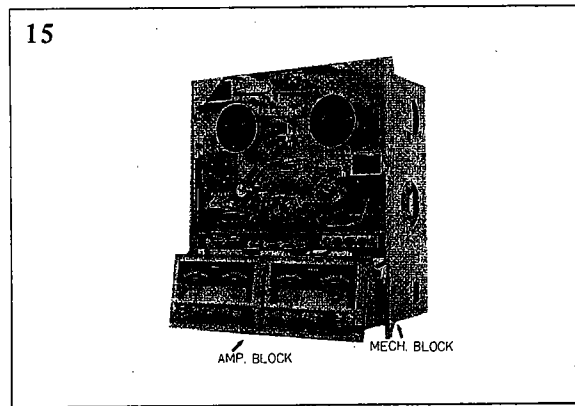
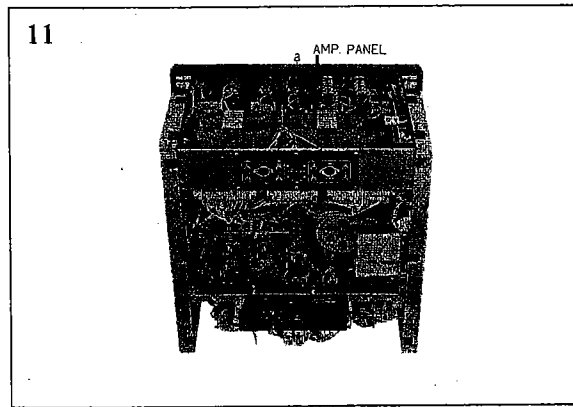
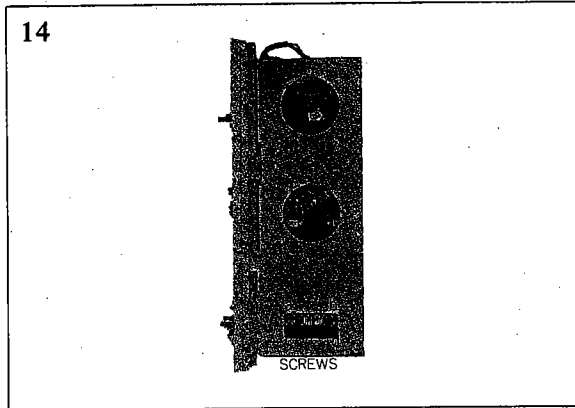
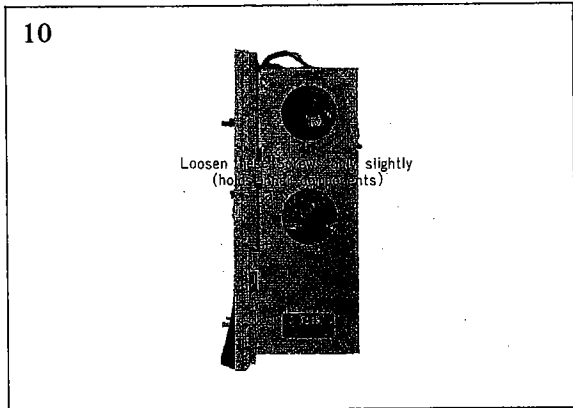
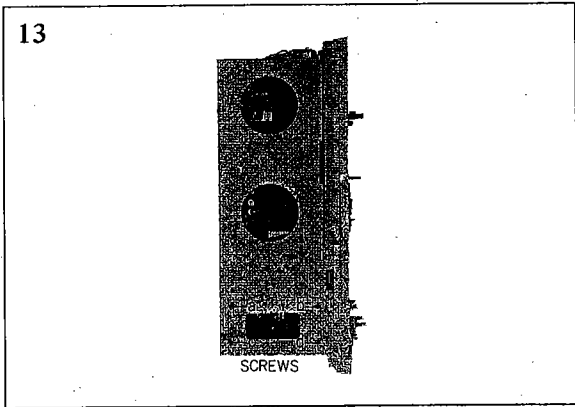
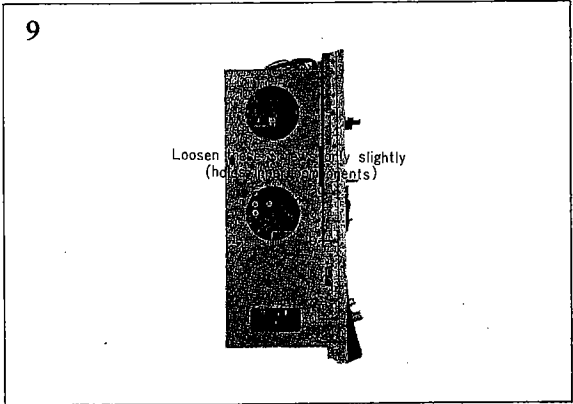
$E_1$  = Non-input signal record level

### III. DISMANTLING OF UNIT

In case of trouble, etc. necessitating disassembly, please disassemble in the order shown in photographs. Reassemble in reverse order.







## IV. MECHANISM ADJUSTMENTS

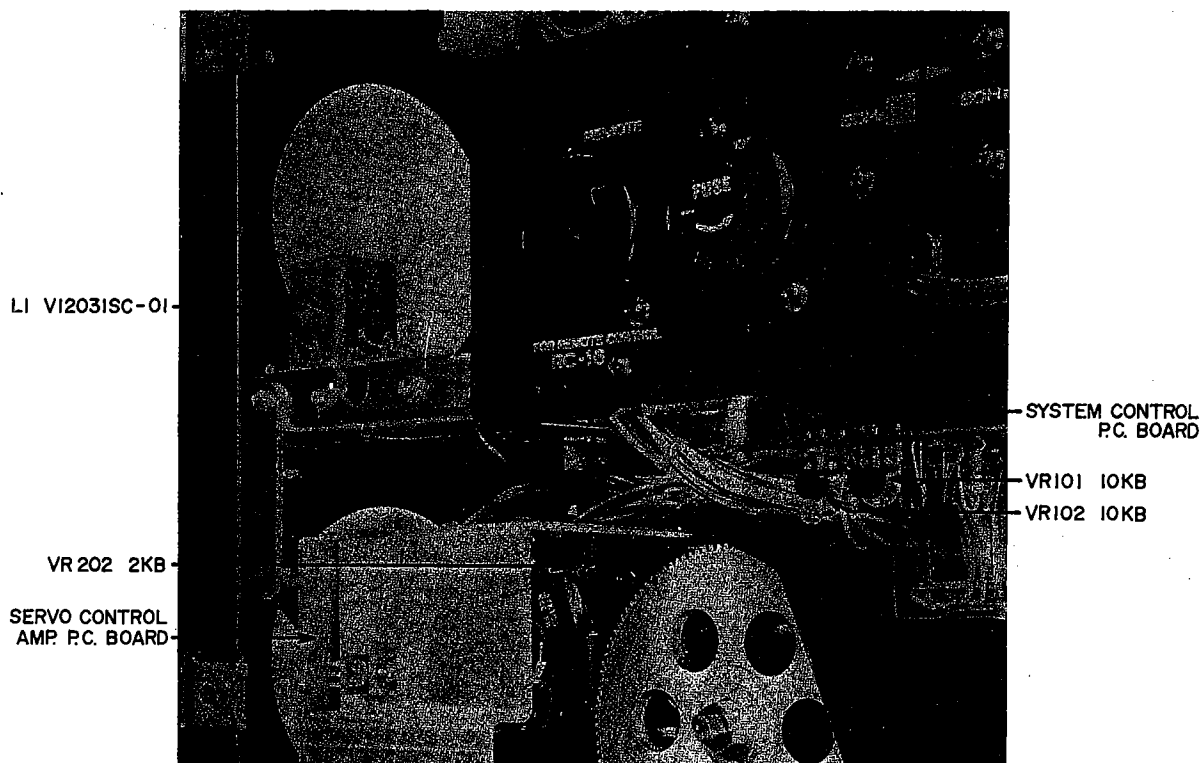


Fig. 8

### 1. TAPE SPEED ADJUSTMENT

#### (Servo Control Amp. Adjustment)

- 1) Connect a frequency counter to the Line Outputs as shown in Fig. 1.
- 2) Depress 3-3/4 ips (9.5 cm/sec.) Tape Speed Selector Switch and playback a 1,000 Hz pre-recorded test tape.
- 3) Adjust the core of coil L1 (VI023SC-01) shown in Fig. 8 to obtain a frequency counter indication of 500 Hz  $\pm 1\%$ .
- 4) After the 3-3/4 ips (9.5 cm/sec.) tape speed adjustment has been completed, depress the 7-1/2 ips (19 cm/sec.) Tape Speed Selector Switch and adjust Servo Control P.C. Board semi-fixed resistor VR202 (2 kB) shown in Fig. 8 to obtain a frequency counter indication of 1,000 Hz  $+1/-0.5\%$ .

NOTE: When making tape speed adjustment, it is necessary to make the low speed (3-3/4 ips) adjustment first.

### 2. DIRECT FUNCTION TIME CONSTANT

#### ADJUSTMENT

#### 1) FWD $\leftrightarrow$ REV Time Constant

Adjust System Control P.C. Board semi-fixed resistor VR101 (30 kB) shown in Fig. 8 so that when the machine is switched from FWD to REV mode or from REV to FWD mode, the pinch wheel separates from the capstan in about 3 seconds.

- 2) Adjust System Control P.C. Board semi-fixed resistor VR102 (10 kB) shown in Fig. 8 so that when the machine is switched from F.FWD or RWD to FWD or REV mode, the time constant is about 1.5 seconds.

NOTE: When making adjustments outlined in Items 2. 1) and 2. 2) above, when the machine is switched from the various modes to FWD or REV, confirm that correct capstan motor (servo motor) revolutions are reached by the time the pinch wheel contacts the capstan.

### 3. BRAKE TENSION ADJUSTMENT

- 1) Use a 60 mm diameter tape wound on a 5" reel and measure the brake tension with a tension gauge as shown in Fig. 9. Ideal tape tension is 350 grams.
- 2) Brake tension adjustment methods are as follows: (Refer to Fig. 10)
  - a. Change position of suspended springs (d) (d').
  - b. Loosen screws (a), (b) as well as (a') (b') and adjust the vertical (up and down) position of spring suspension metal (c) (c').
  - c. Loosen screws (e) (f) as well as (e') (f') and adjust the horizontal (left/right) position of brake band suspension metal (g) (g').

NOTE: In making brake tension adjustment, confirm that when the machine is set to each of the various modes (except stop mode) the brake band completely separates from the cloth tape on the brake drum (Refer to Fig. 11).

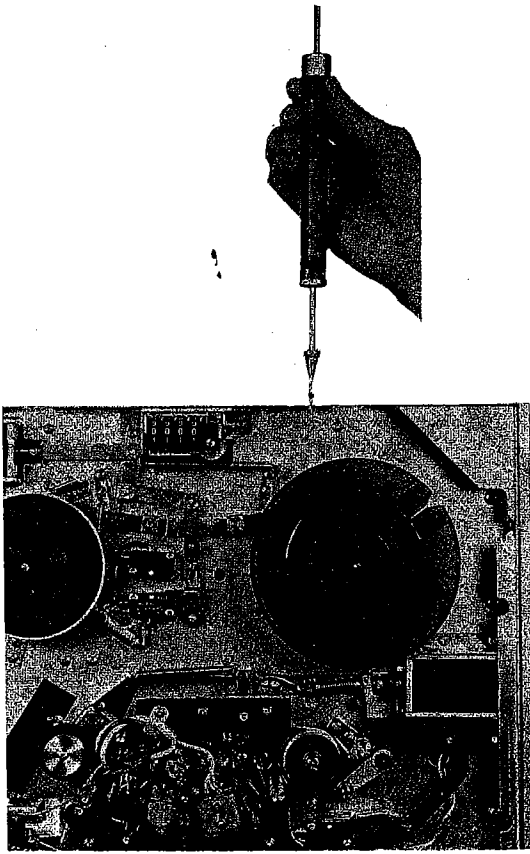


Fig. 9

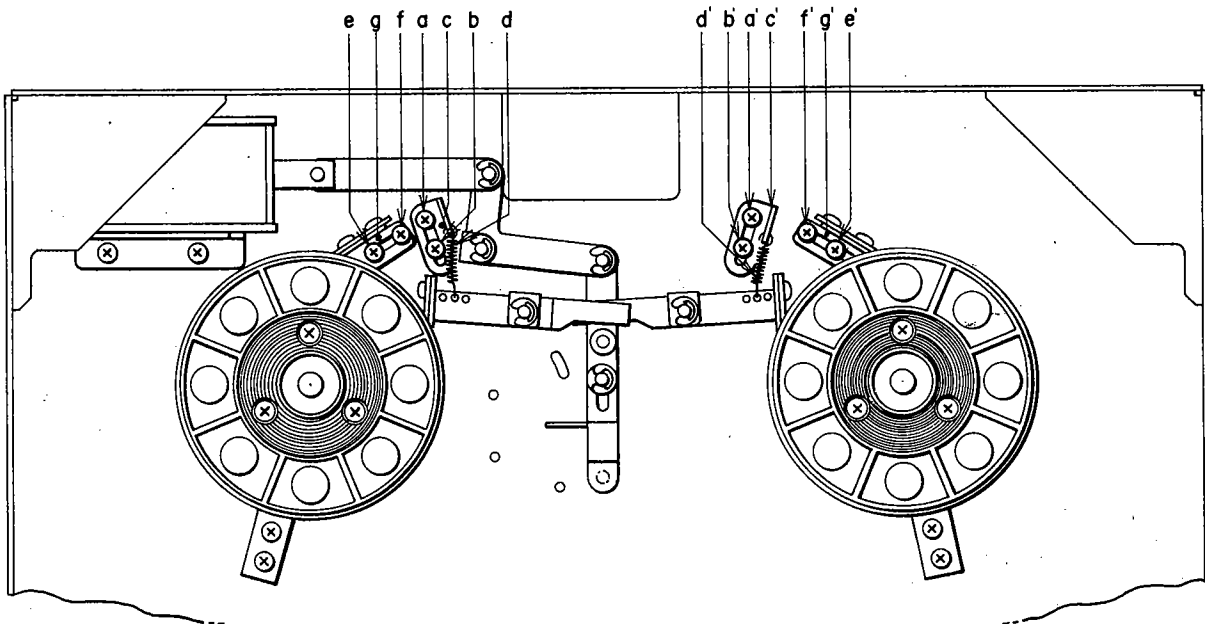


Fig. 10

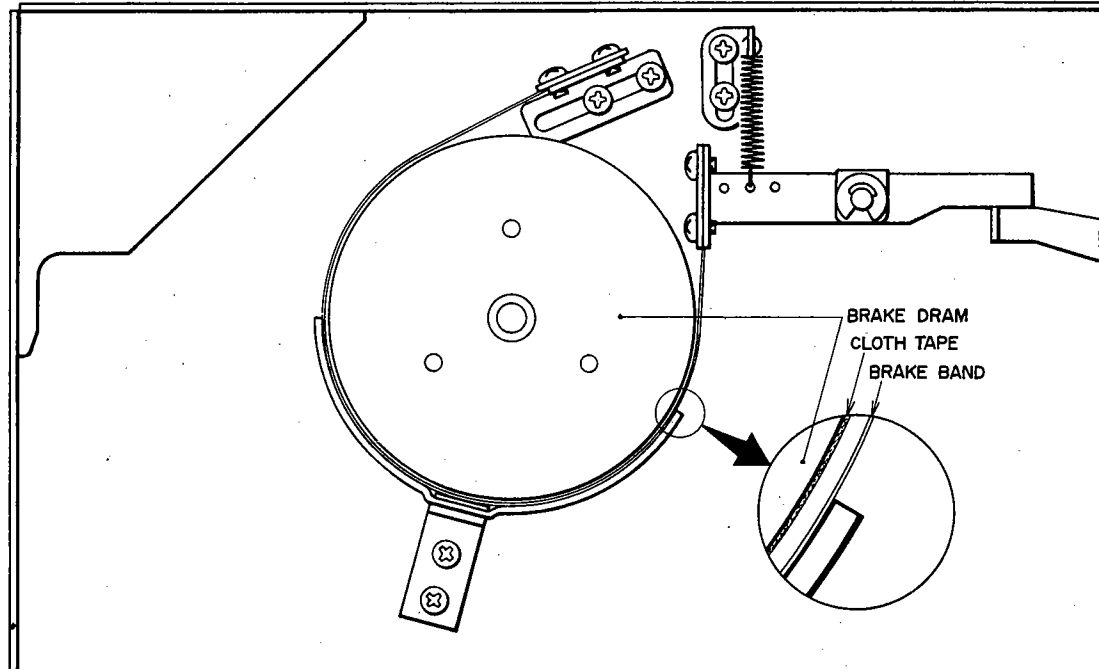


Fig. 11

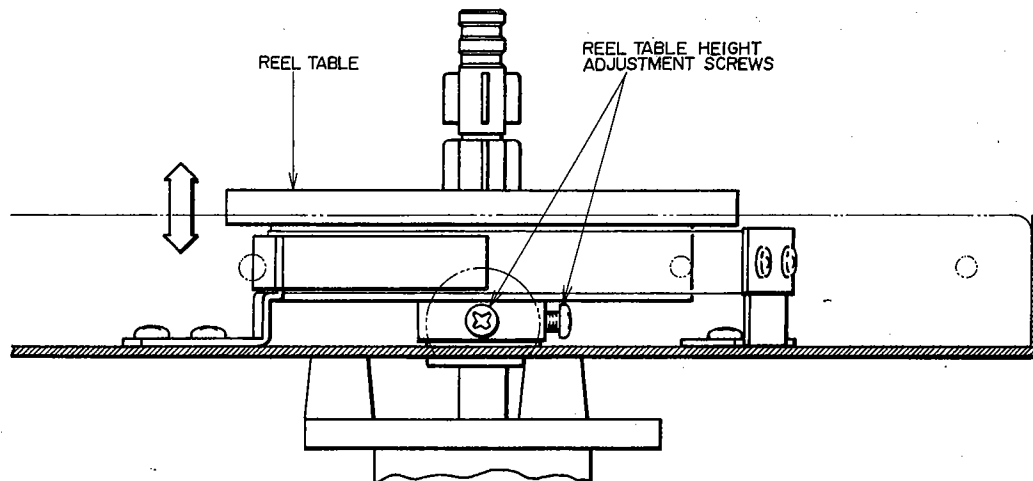


Fig. 12

**4. SUPPLY VOLTAGE TO BOTH TORQUE MOTORS AS WELL AS TENSION AT VARIOUS OPERATING MODES**

Torque Motor Mode	Left Side	Right Side
FWD	30V (35V) 55g	55V (60V) 180g
REV	55V (60V) 180g	30V (35V) 55g
RWD	100V (100V) 500g	11V (13V) 15g
F. FWD	11V (13V) 15g	100V (100V) 500g

**5. REEL TABLE HEIGHT ADJUSTMENT**

Loosen the reel table height adjustment screws shown in Fig. 12 and adjust by moving the reel table as indicated by the arrow and positioning so that the tape winds in the center of the reel.

Figures in parentheses indicate voltage at 60 Hz.

Chart 1

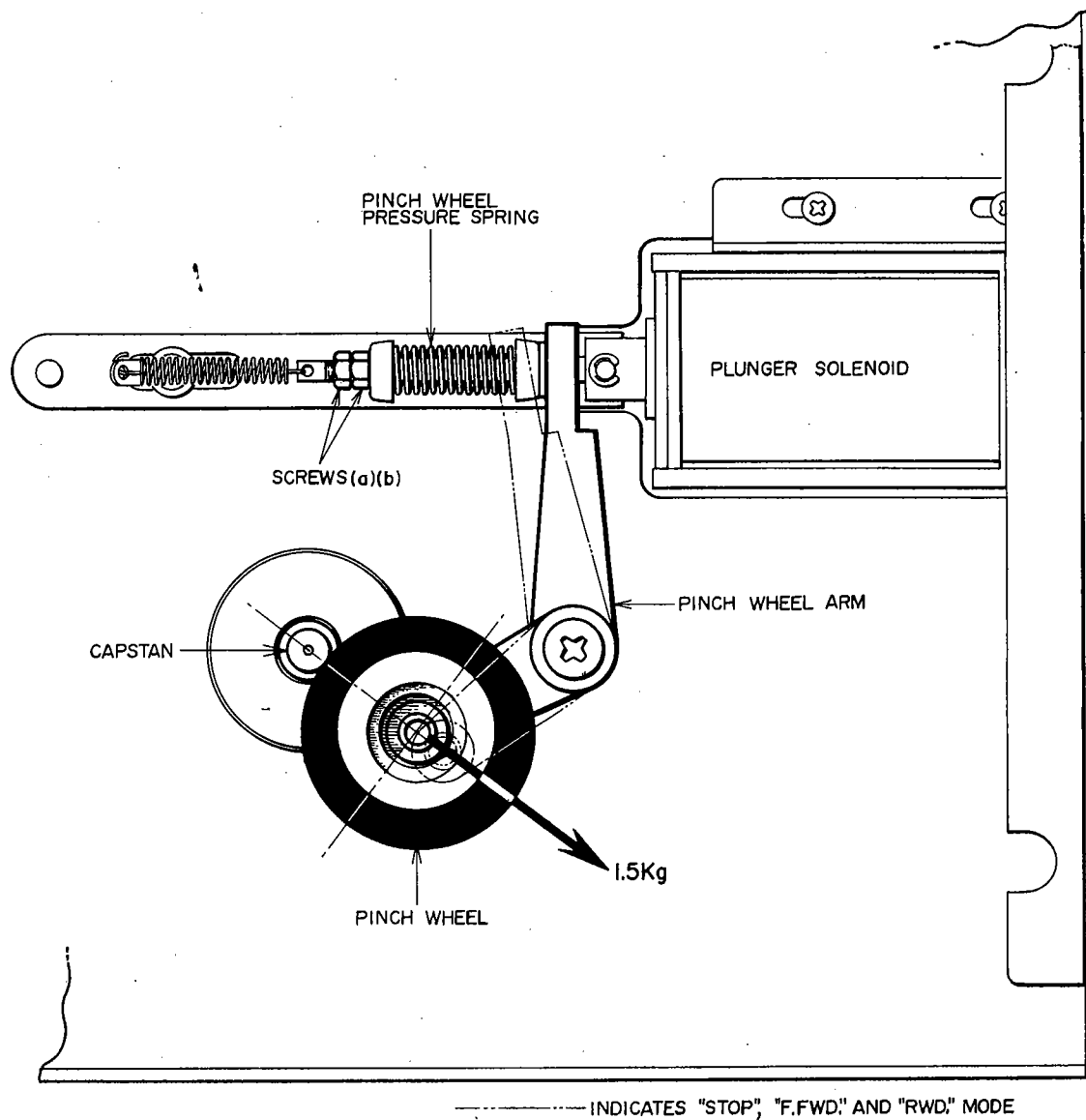


Fig. 13

## 6. PINCH WHEEL PRESSURE MEASUREMENT AND ADJUSTMENT

Use a tension gauge and measure the pinch wheel pressure as shown in Fig. 13. Read the value on the gauge as soon as the pinch wheel separates from the tape and tape travel stops. Ideal pinch wheel pressure is 1.5 kg. To regulate pinch wheel pressure, adjust nuts (a), (b) shown in Fig. 13.

# V. HEAD ADJUSTMENTS

## 1. HEAD CONSTRUCTION

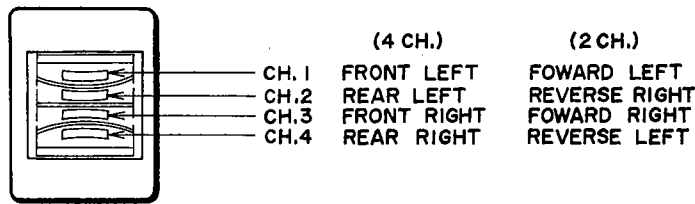


Fig. 14 4 Track 4 Channel/2 Channel Head

## 2. ORDER OF HEADS

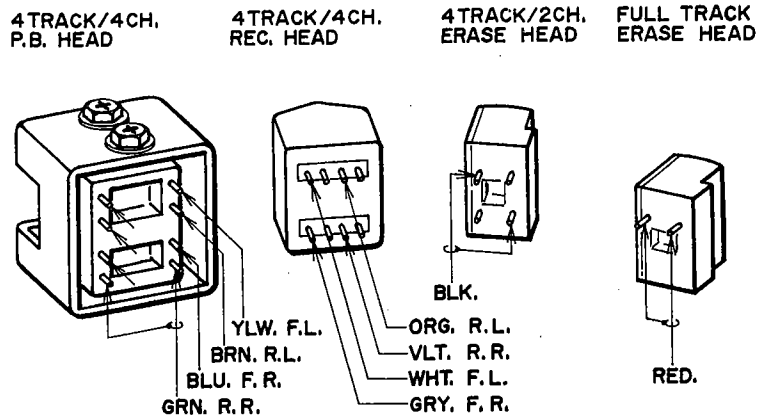


Fig. 15

## 3. HEAD HEIGHT ADJUSTMENT

### 1) Full Track Erase Head

At playback mode, loosen head height control screws (a) (a'), and adjust so that the tape is equi-distant in relation to the protruding top and bottom edges of the full track erase head core (width between top edge of tape and top edge of head core is the same as the distance between the bottom edge of the tape and the bottom edge of the head core).

### 2) 4-track Erase Head

At playback mode, loosen head height control screws (b) (b') shown in Fig. 16, and adjust so that the upper edge of the tape is about 0.1 mm lower than the upper edge of the left channel head core of the 4-track erase head.

### 3) Recording Head

At playback mode, adjust recording head height by turning head height control screws (c), (d), (e) shown in Fig. 16 to left and right until the upper edge of the tape is the same height as the upper edge of track-1 head core of the recording head. At this time confirm that the lower edge of the tape is also the same height as the lower edge of track-4 head core of the recording head.

### 4) Playback Head

With head height control screws (f) (g) (h) shown in Fig. 16, adjust the playback head height in the same way as outlined above for recording head.

### 5) After the various head height adjustments have been made, confirm that the core side of the heads are at right angles with the chassis during tape travel.

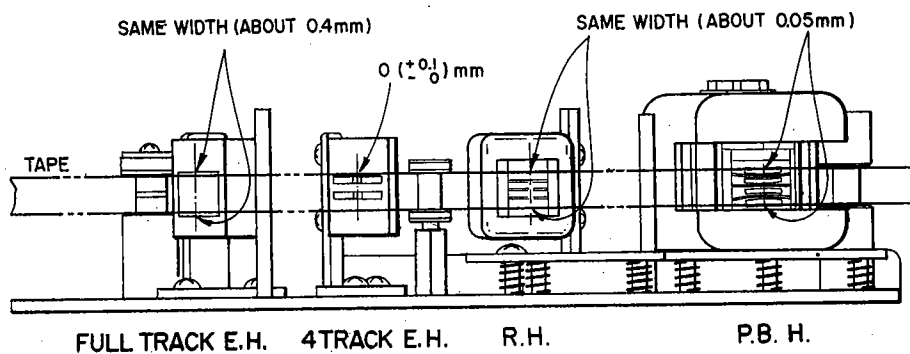
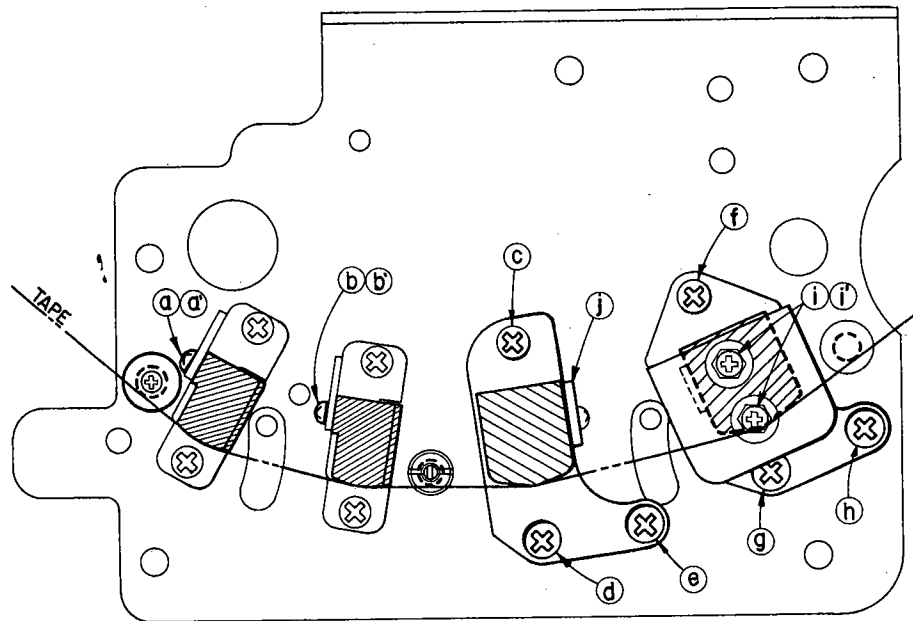


Fig. 16

#### 4. HEAD AZIMUTH ALIGNMENT

##### 1) Playback Head

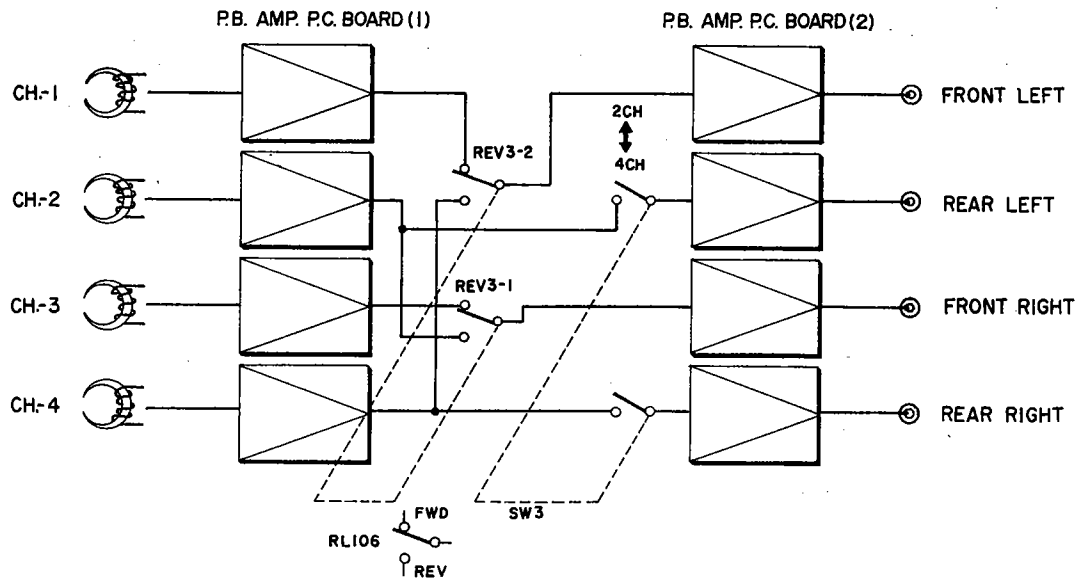
- a. Connect a high sensitivity V.T.V.M. to the line output terminals.
- b. Depress the "7-1/2 ips" Tape Speed Selector Switch, set Monitor Switch to TAPE, and set Stereo Selector to "2 CH" position.
- c. Playback an Alignment Test Tape (8,000 Hz ampex alignment test tape recorded at 3-3/4 ips).
- d. At playback mode, adjust alignment adjustment screw (h) shown in Fig. 16 by turning to left and right until the line output level of both channels is maximum.
- e. After the adjustments outlined in (d) above, loosen screws (i), (i') and move the head gap side of the playback head to left and right until there is no fluctuation in output level (both channels) when tension is applied to the supply reel. Then tighten screws (i) (i') to maintain this position.

##### 2) Recording Head

- a. Connect an Audio Frequency Oscillator to the line input terminals and a high sensitivity V.T.V.M. to the line output terminals and load a blank tape.
- b. Set the Monitor Switch to TAPE position and record a 16,000 Hz signal at -10 dB.
- c. When the above adjustment has been completed, adjust the gap side of the recording head by bending recording head installation angle (i) shown in Fig. 16 to left and right until the line output level (both channels) does not fluctuate when tension is applied to the supply reel.

5. For optimum adjustment, repeat Items 1 and 2 above 2 or 3 times. Blank testing tape should be new tape.

# VI. AMPLIFIER ADJUSTMENTS



NOTE; P.B. AMP. P.C. BOARD (1) AND (2) ARE SAME P.C. BOARD MS-5022

Fig. 17-

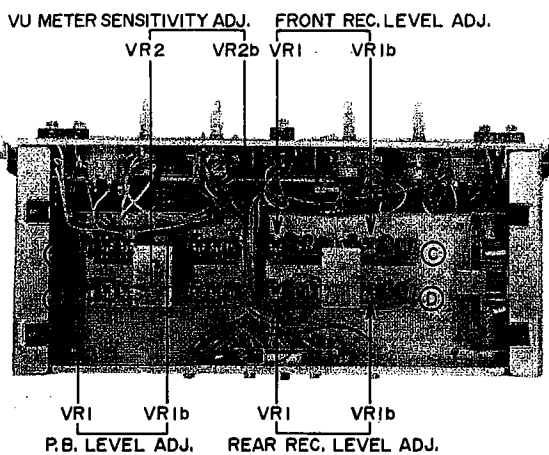


Fig. 18

- (A): FRONT P.B. AMP. P.C. BOARD MS-5022
- (B): REAR P.B. AMP. P.C. BOARD MS-5022
- (C): FRONT REC. AMP. P.C. BOARD MS-5023
- (D): REAR P.B. AMP. P.C. BOARD MS-5023
- (E): OSC. P.C. BOARD KF-5010

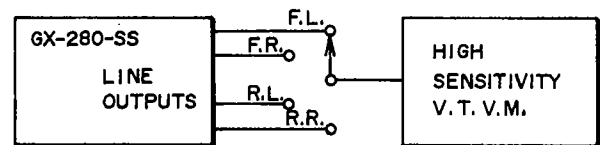


Fig. 19

## 1. PLAYBACK OUTPUT LEVEL ADJUSTMENT

- 1) Connect a high sensitivity V.T.V.M. to the line output terminals.
- 2) Depress "7-1/2 ips" Tape Speed Selector Switch, set Monitor Switch to TAPE, and set Stereo Selector to "4 CH" position.
- 3) Playback a 250 Hz "0" VU recorded test tape.
- 4) Adjust P.B. Amp. P.C. Board playback level adjustment semi-fixed resistors VR1 (50 kΩ) and VR1b (50 kΩ) shown in Fig. 18 (VR1 front/rear left channel; VR1b front/rear right channel) to obtain a V.T.V.M. indication of 4 dB (1.228V) on each channel.

## 2. VU METER SENSITIVITY ADJUSTMENT

After every channel adjustment has been completed, adjust P.B. Amp. P.C. Board VU meter sensitivity adjustment semi-fixed resistors VR2 (5 kΩ) and VR2b (5 kΩ) shown in Fig. 18 (VR2 front/rear left channel; VR2b front/rear right channel) to obtain a VU meter indication of "0" VU (0 position).





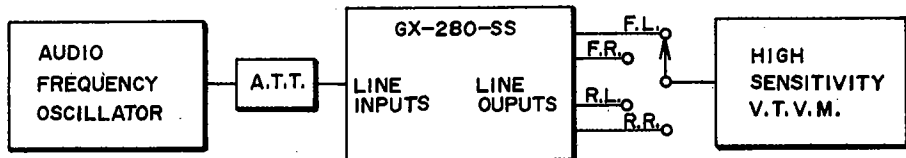


Fig. 22

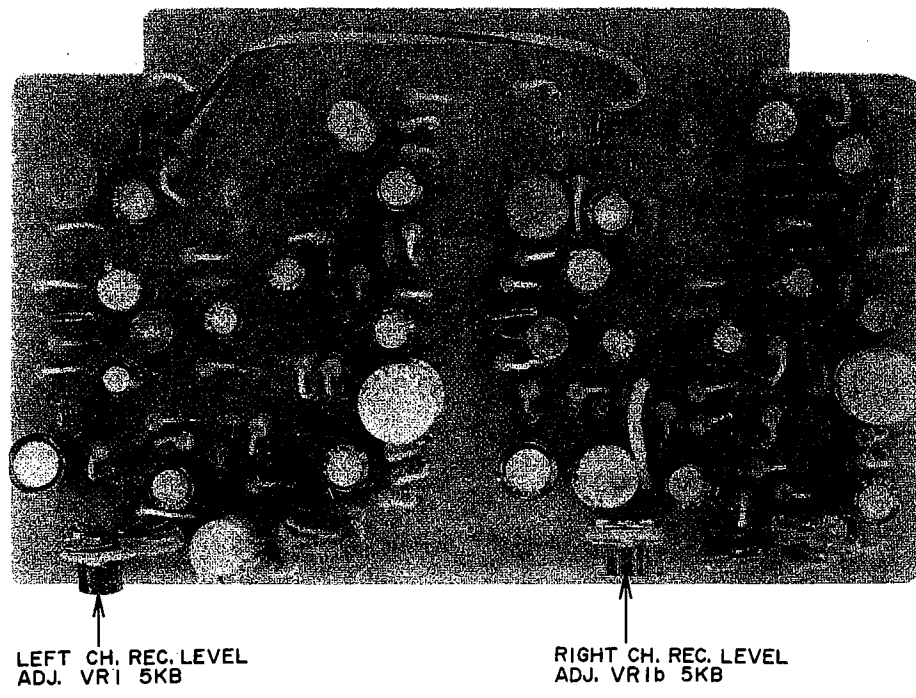


Fig. 23 REC. AMP. P.C. BOARD (FACE SIDE)

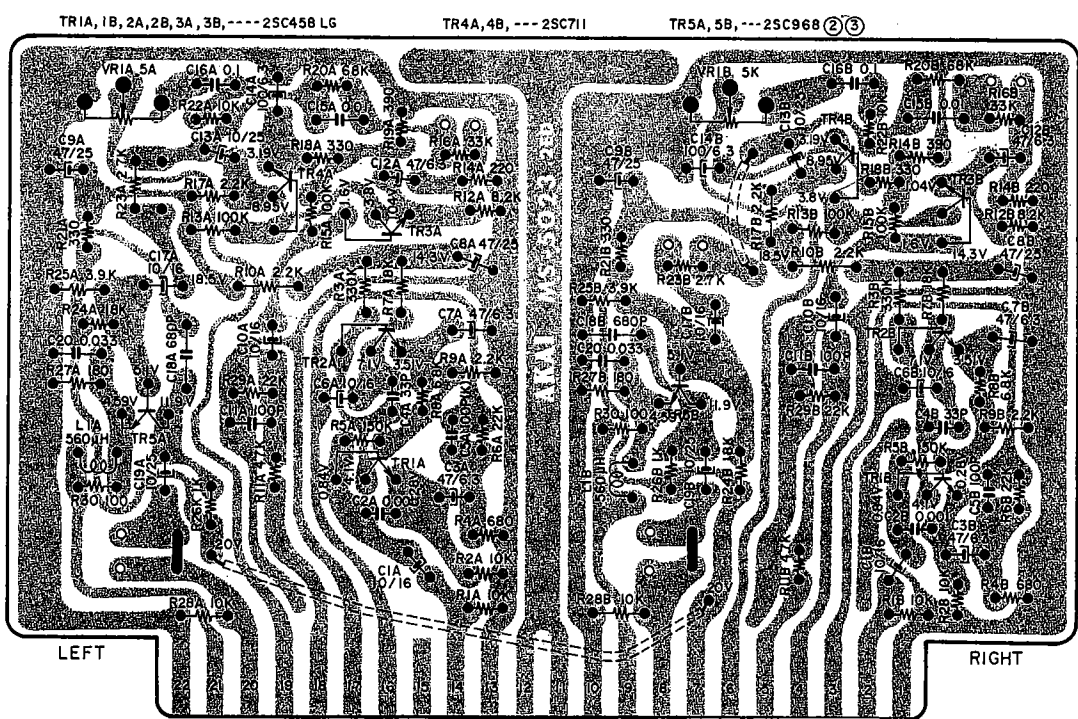


Fig. 24 REC. AMP. P.C. BOARD MS-5023 (REVERSE SIDE)

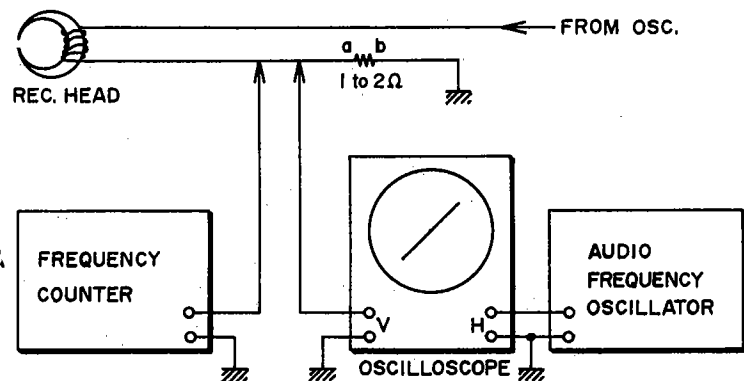


Fig. 25

### 3. RECORDING LEVEL ADJUSTMENT

- 1) Connect an Audio Frequency Oscillator to the line input terminals through an attenuator and connect a high sensitivity V.T.V.M. to the line output terminals.
- 2) Depress the "7-1/2 ips" Tape Speed Selector Switch and set the Stereo Selector to "4-CH" position.
- 3) Set line recording level controls to maximum and load a Scotch #111 blank tape.
- 4) Set the Monitor Switch to TAPE position and set the tape deck to recording mode. Supply a 1,000 Hz signal from the Audio Frequency Oscillator, and adjust the attenuator to obtain a V.T.V.M. indication of 4 dB (1.228V).
- 5) Set the Monitor Switch to SOURCE position, and adjust REC. Amp. P.C. Board recording level adjustment semi-fixed resistor VR1 (5 kΩ) and VR1b (5 kΩ) shown in Fig. 18 (VR1 front/rear left channel; VR1b front/rear right channel) to obtain a line output level of 4 dB on each channel.

### 4. RECORDING BIAS FREQUENCY MEASURING METHOD AND ADJUSTMENT

#### MEASURING METHOD:

##### Method 1

- 1) As shown in Fig. 25, install a 1 to 2Ω resistor in series with the recording head and connect both of these terminals (a) and (b) to the vertical input of the oscilloscope and set deck to recording mode.
- 2) Supply a sine wave to the horizontal input of the oscilloscope from the Audio Frequency Oscillator.
- 3) Vary the oscillation frequency of the audio frequency oscillator until the oscilloscope waveform displays a circular or linear pattern.
- 4) If the oscillation frequency indication is within 100 to 110 kHz when a circular or linear pattern is displayed, the recording bias frequency is correct.

##### Method 2

- 1) Connect a Frequency Counter to both terminals (a) and (b) as shown in Fig. 25. Set deck to recording mode and take a frequency counter reading.
- 2) If the frequency counter indication at this time is within 100 to 110 kHz, the recording bias frequency is correct.

#### ADJUSTMENT

The recording bias frequency can be adjusted by changing the value of OSC. P.C. Board condenser C4 (4500P/500 WV) shown in Fig. 26.

### 5. RECORDING BIAS VOLTAGE ADJUSTMENT (Frequency Response Adjustment)

- 1) Connect the various measuring instruments in the same way as outlined in "Recording Level Adjustment" procedure.
- 2) Follow Recording Level Adjustment procedure through Item 4 and set the attenuator to -20 dB.
- 3) Under these conditions, adjust OSC. P.C. Board recording bias voltage adjustment trimmer condensers TC1 (front left), TC2 (front right), TC3 (rear right), and TC4 (rear left) 70P shown in Fig. 26 to obtain an equally flat frequency response at 1,000 Hz and 10,000 Hz.
- 4) After frequency response adjustment is completed, the recording bias voltage is within 2 to 5V A.C.
- 5) Proper erase voltage is within 65 to 70V A.C.

NOTE: Frequency response will vary depending upon the tape being used. (As a general rule, AKAI 100F (Fuji F) tape is used.)

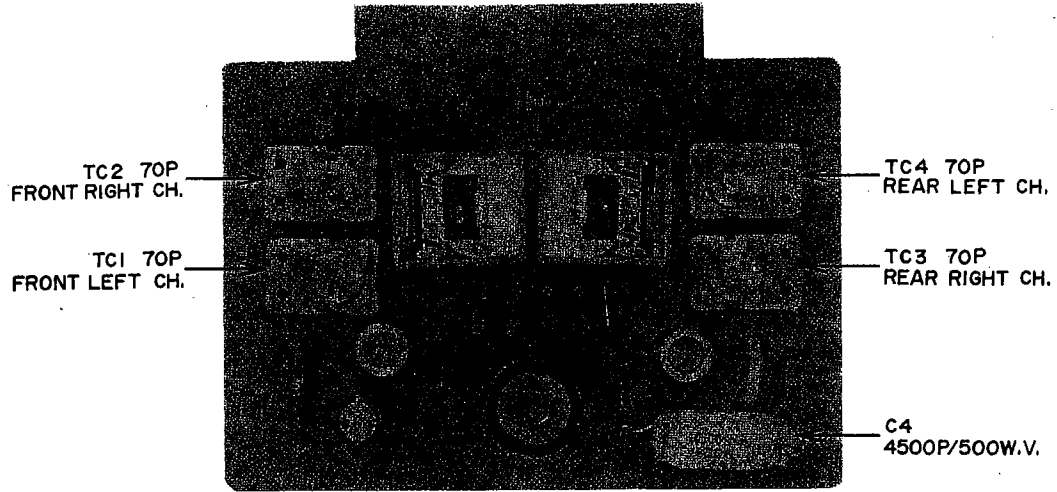


Fig. 26 OSC. P.C. BOARD (FACE SIDE)

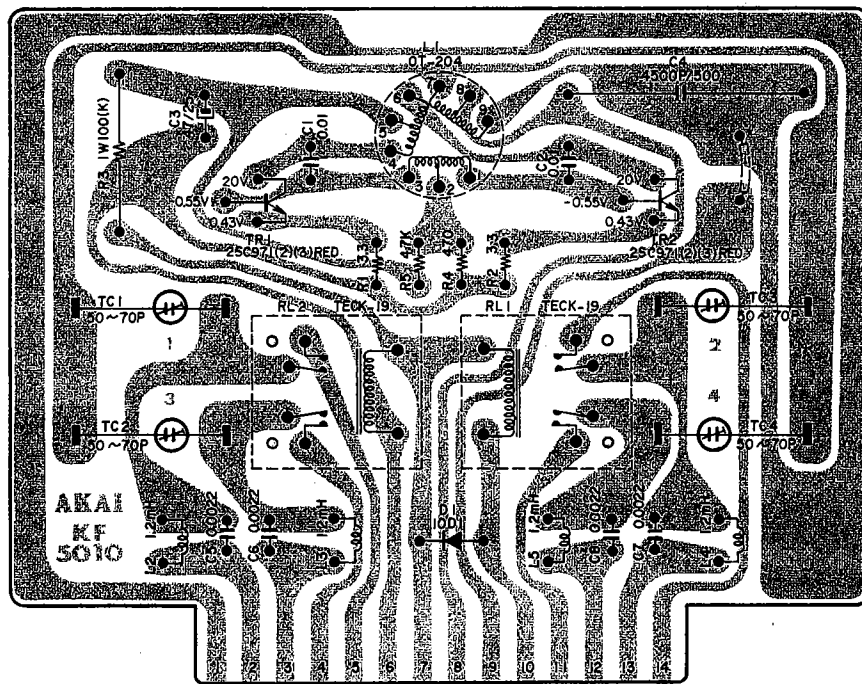


Fig. 27 OSC. P.C. BOARD KF-5010 (REVERSE SIDE)

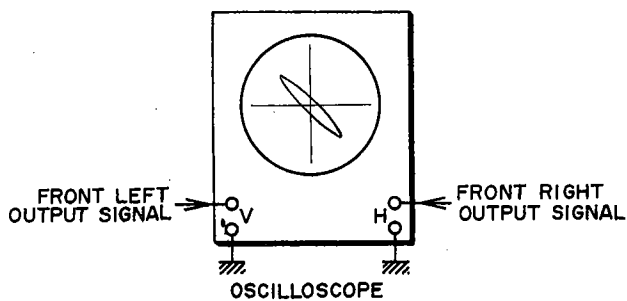
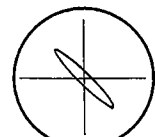
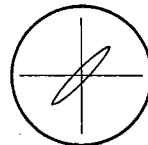


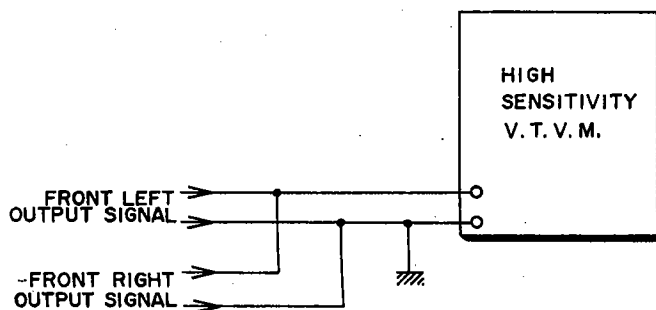
Fig. 28



IN PHASE Fig. 29



OUT-OF PHASE Fig. 30



IN PHASE +4dB  
OUT-OF PHASE -5dB Fig. 31

## 6. 4-CHANNEL PHASE CHECK

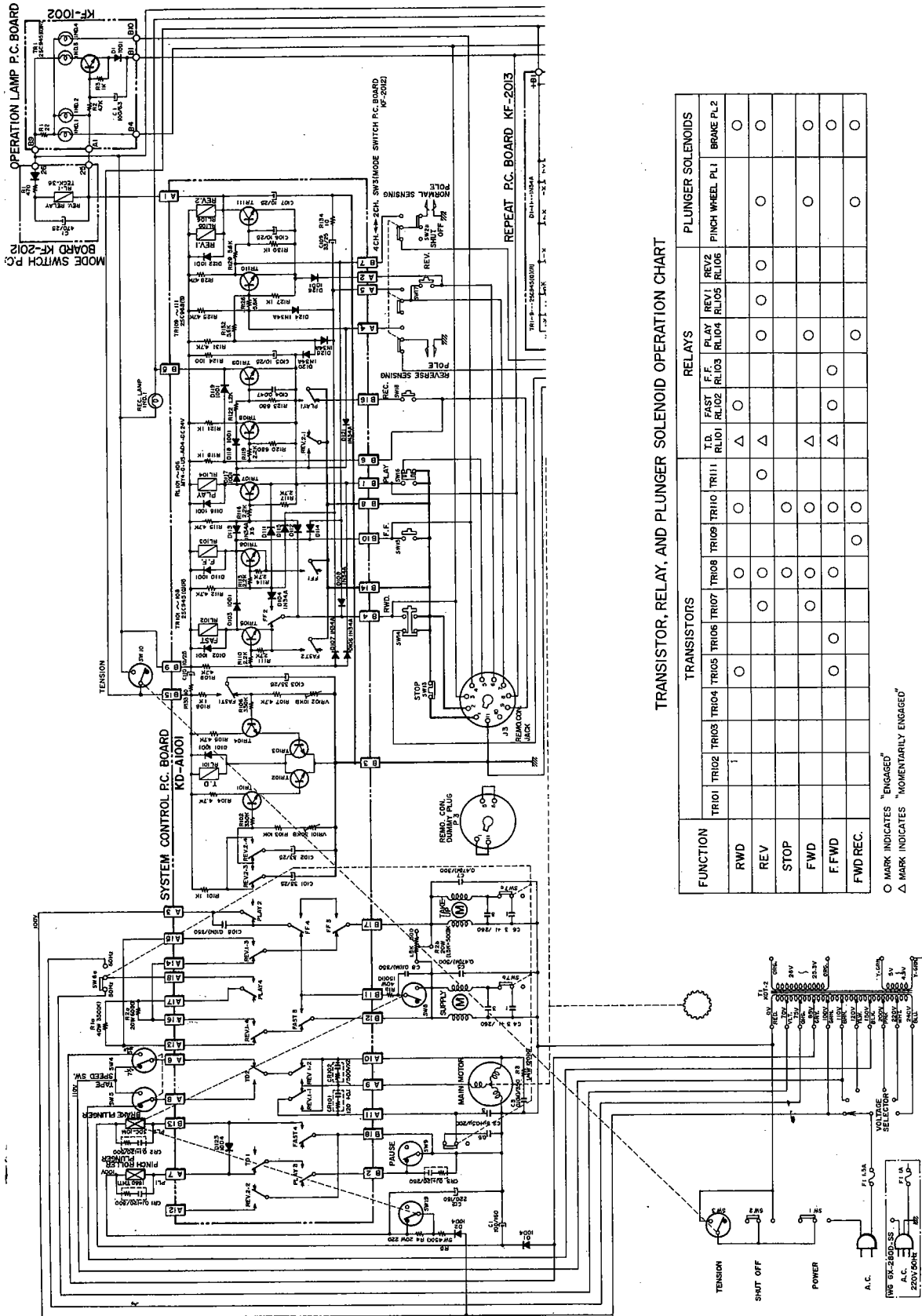
### Method A

- 1) Connect front left signal and front right signal from the line output terminal to vertical and horizontal input terminal of Oscilloscope. (See Fig. 28)
- 2) Playback a 250 HZ "0" VU pre-recorded test tape at 7-1/2 ips.
- 3) If front left and front right are In-Phase, the waveform as shown in Fig. 29 will appear on the oscilloscope screen.
- 4) If phase is 180° out of phase, a waveform as shown in Fig. 30 will appear on the oscilloscope screen.
- 5) Make the same check on front left/rear left and rear left/rear right.
- 6) The line outputs should be In-Phase, if not, Recording/Playback Head needs adjusting.

### Method B (See Fig. 31)

- 1) Playback a 250 Hz "0" VU pre-recorded test tape at 7-1/2 ips.
- 2) Connect front left signal and front right signal of line output terminals in parallel and connect this to a high sensitivity V.T.V.M. (Model 161A).
- 3) If In-Phase, the line output will be about +4 dB.
- 4) At 180° out of phase, the line output will be about -5 dB.
- 5) Make the same check on front left/rear left and rear left/rear right.

# VII. TRANSPORT MECHANISM



TRANSISTOR, RELAY, AND PLUNGER SOLENOID OPERATION CHART

FUNCTION	TRANSISTORS										RELAYS				PLUNGER SOLENOIDS				
	TR101	TR102	TR103	TR104	TR105	TR106	TR107	TR108	TR109	TR110	TR111	F.F. RL101	F.F. RL102	F.F. RL103	REV1 RL104	REV1 RL105	REV2 RL106	PINCH WHEEL PL1	BRAKE PL2
RWD																			
REV																			
STOP																			
FWD																			
F.FWD																			
FWD REC.																			

○ MARK INDICATES "ENGAGED"  
 △ MARK INDICATES "MOMENTARILY ENGAGED"

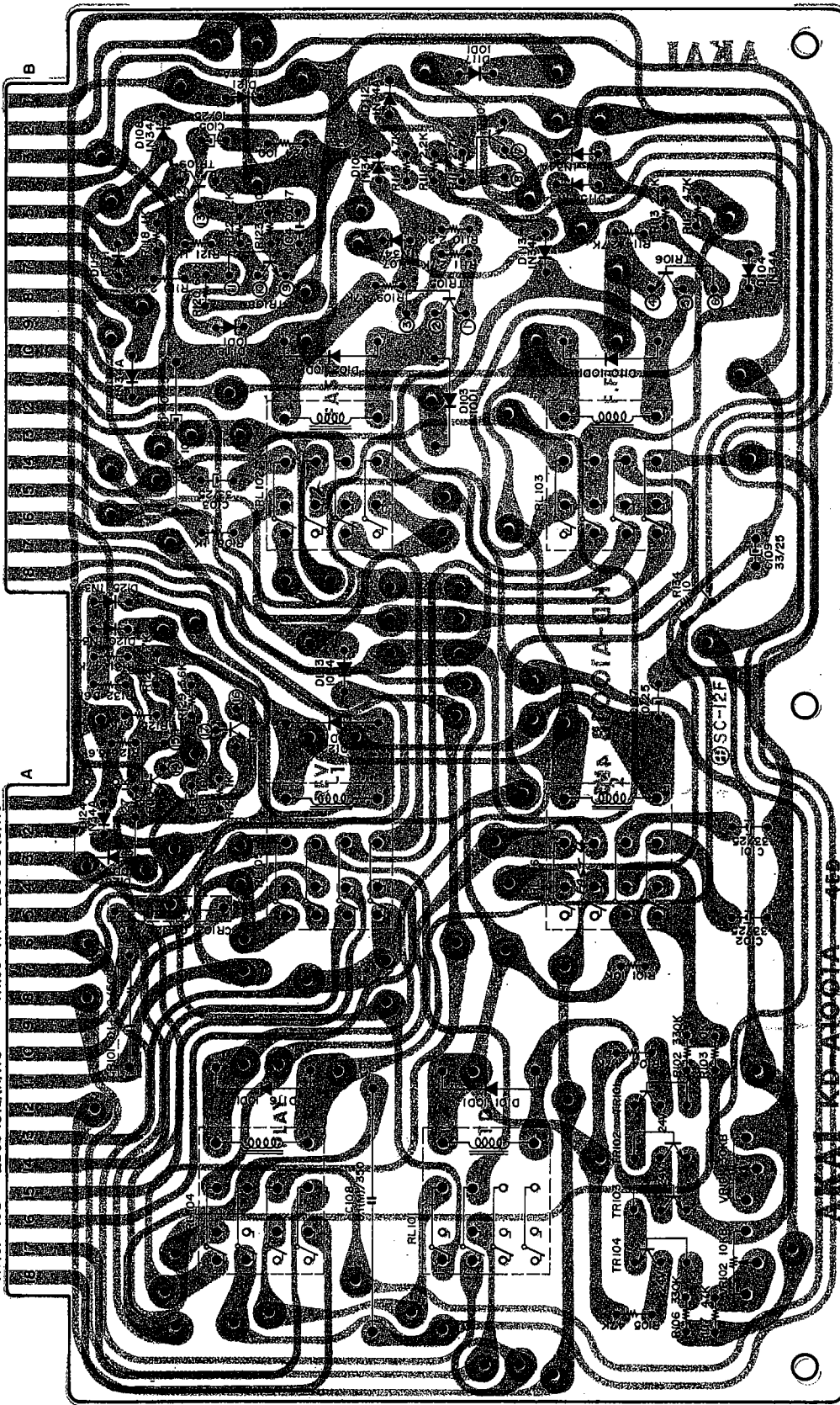
SYSTEM CONTROL SCHEMATIC DIAGRAM

SCHEMATIC-1

RL 101~106 MY-0-US-AD4

TR 109~111 2SC968(3)X3

TR 101~108 2SC945(Q)(R)X8



- ① 0 (FF RWD) 24V (STOP) 6.3V (FWD, REC) 9V (REV)
- ② 0 (FF RWD) 24V (STOP) 6.3V (FWD, REC) 9V (REV)
- ③ 4V (FF RWD) 24V (STOP) 0.77V (OTHERS)
- ④ 0 (FF) 24V (STOP) 0.65V (OTHERS)
- ⑤ 0 (FF) 24V (OTHERS)
- ⑥ 0.8V (FF) 24V (STOP) 0.68V (OTHERS)
- ⑦ 0.13V (FWD, REV, REC) 24V (OTHERS)
- ⑧ 0.8V (FWD, REV, REC) 24V (STOP) 11.5V (OTHERS)
- ⑨ 0.17V (REV) 24V (OTHERS)
- ⑩ 0.1V (FWD, REV) 13.3V (REC) 0.21V (REC) 24V (OTHERS)
- ⑪ 0.8V (FWD, REV) 0.8V (FWD, REV) 0.21V (REC) 24V (OTHERS)
- ⑫ 0.1V (REC) 24V (OTHERS)
- ⑬ 0.05V (FWD, REV) 0.81V (REC) 24V (OTHERS)
- ⑭ 0.94V (REV) 0 (OTHERS) 0.7V (OTHERS)
- ⑮ 0.2V (REV) 0.7V (OTHERS)
- ⑯ 0.75V (REV) 0 (OTHERS)

Fig. 32 SYSTEM CONTROL P.C. BOARD KA-1001 (REVERSE SIDE)

## 1. FROM STOP TO FORWARD PLAYBACK

When the FWD Button is depressed, TR107 emitter is grounded, and TR107 passes RL104 and is turned on. TR107 is maintained at "on" by RL104 contact point Play-1.

The Pinch Roller Plunger and Brake Plunger current passes Play-3 and is turned on. The voltage passes Play-4 and is divided by means of R1a (350Ω) and R2a (60Ω). About 55V (60V 60Hz) is supplied to the Take-up Motor and about 30V (35V 60Hz) to the Supply Motor. At 7-1/2 ips, 110V is applied to the Main Motor and at 3-3/4 ips, 85V is applied to the Main Motor.

At Forward Playback, TR110 is turned on, and TR111 is turned off. C101 of T.D. Circuit passes R101 and is charged.

## 2. 2-CHANNEL AUTOMATIC REVERSE PLAYBACK

### 1) From Forward to Reverse Playback

When the Reverse Button is depressed or when the sensing tape passes the sensing pole, TR110 is turned off and TR111 is turned on. Consequently, RL105, RL106, and RL1 of Switch P.C. Board is turned on. When RL106 is momentarily turned on, C101 passes R103 and VR101 and discharge begins. C101 discharge current flows to the base of TR101 and TR102 and they are turned on. When this occurs, RL101 is turned on, and Brake Plunger as well as Pinch Roller Plunger is turned off. At this time, the capstan motor begins reverse revolutions. (While RL101 is "on", because increased torque is applied to the capstan motor, high voltage is applied.)

When discharge of C101 is completed, TR101 and TR102 are turned off. RL101 is also turned off and voltage is supplied to the Pinch Roller Plunger as well as to the Brake Plunger and playback is effected.

### 2) From Reverse to Forward Play

When the FWD Button is depressed or the sensing tape passes the sensing pole, TR111 is turned off, and TR110 is turned on. Because TR111 is turned off, RL105 and RL106 as well as RL1 are turned off. When RL106 is momentarily turned off, C102 passes R103 and VR101 and discharge commences. C102 discharge current flows to the base of TR101 and TR102 and they are turned on. When this occurs, RL101 is turned on and the Brake Plunger as well as the Pinch Roller Plunger are turned off. At this time, the capstan motor begins forward revolutions. (While RL101 is "on", because increased torque is applied to the capstan motor, high voltage is applied.)

When discharge of C102 is completed, TR101 and TR102 is also turned off and voltage is supplied to the Pinch Roller Plunger as well as to the Brake Plunger and Forward Playback is effected. Charge of C101 is begun. (If Shut-off Switch is at "on" position, this operation will not take place.)

## 3. FAST FORWARD

When the Fast Forward Button is depressed, current flows to RL102 and RL103. At the same time, TR105 and TR106 is maintained at "on", and Fast Forward operates. 100V is applied to the Take-up Motor and about 12V to the Supply Motor.

When Fast Forward is effected from Forward Playback, DR113 is activated and cuts off TR107.

When Fast Forward is effected from Reverse Playback, D114 is activated and cuts off TR111.

When Fast Forward is effected from Rewind, TR105 remains "on", TR106 operates and RL103 is turned on.

## 4. REWIND

When the Rewind Button is depressed, TR105 is turned on. TR105 is maintained at "on" by means of RL102. 100V is applied to the Supply Motor and about 11V to the Take-up Motor.

When Rewind is effected from Forward Playback, D112 is activated and cuts off TR107.

When Rewind is effected from Reverse Playback, D108 is activated and cuts off TR111.

When Rewind is effected from Fast Forward, D104 is activated and cuts off TR106.



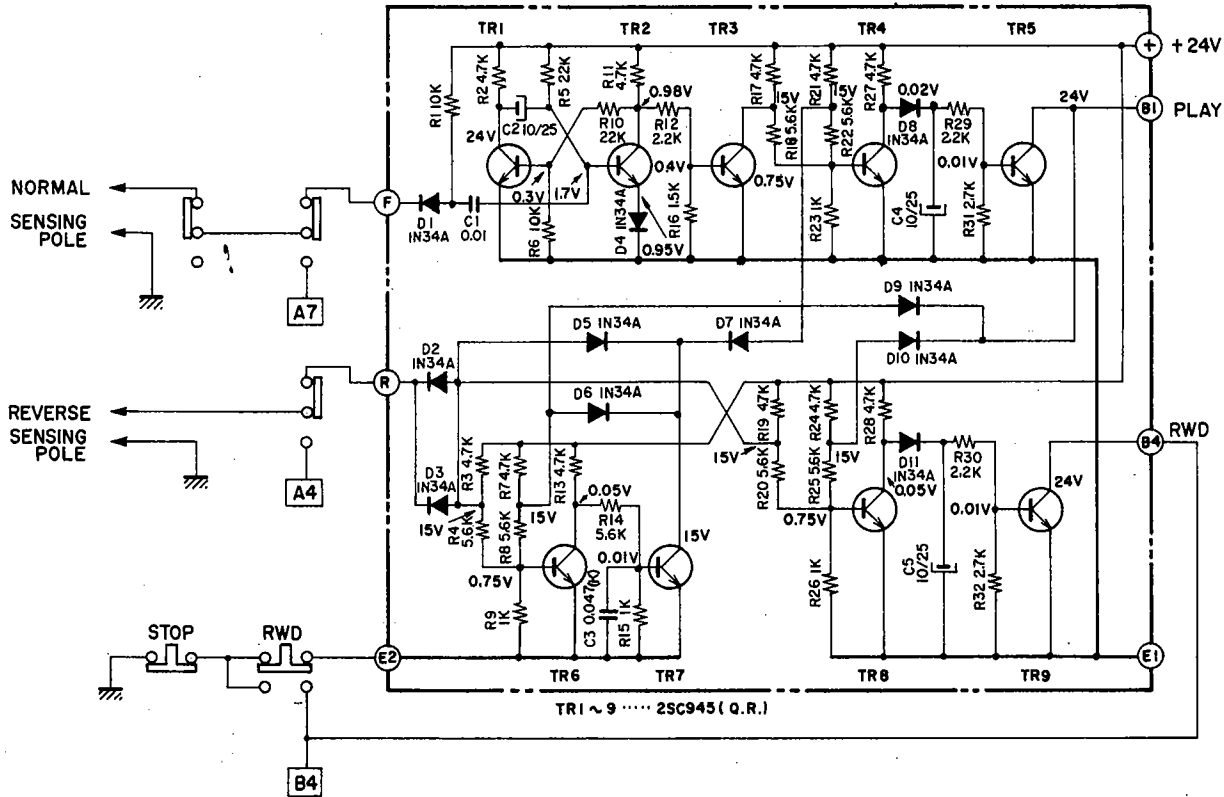


Fig. 33 4-CHANNEL REPEAT CIRCUIT

	TR105	TR107	TR1	TR2	TR3	TR4	TR5	TR6	TR7	TR8	TR9
Forward Play	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
Repeat (sensing tape passed reverse sensing pole)	ON	OFF	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	ON
Stop the Forward Play	OFF	ON	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
(sensing tape passed forward sensing pole)	OFF	ON	OFF	ON	OFF	ON	OFF	OFF	ON	ON	OFF

Chart 2

## 5. 4-CHANNEL REPEAT CIRCUIT

(See Figs. 33 and Chart 2)

When the Stereo Selector is set to 4-channel position, Syscon Board [A7] and [A4] are opened. When during Forward Playback, the sensing tape passes the reverse sensing pole, TR6 is turned off and TR7 is turned on. At this time, TR4 is "on" and TR5 is turned off. Further, because TR8 is "off" and TR9 "on", [B4] is grounded and at the same time, TR107 is turned off. TR105 is turned on and because it passes RL102 is held at "on". Consequently, Rewind mode is attained and the tape begins to rewind.

When the sensing tape passes the Forward sensing pole, D1 is grounded, TR1 is turned on, TR2 is

turned off, and TR3 is turned on. Thus, TR4 which has been on up to now is turned off and TR5 is turned from off to on. Because TR5 is on, the unit operates in the same as if the Forward Button had been depressed (TR107 is turned on, and TR105 is turned off. Consequently, Forward Play commences.). Because sensing tape is affixed at both ends, repeat mode is continuous (Play-Rewind-Play). Rewind and Stop can be effected by depressing the Rewind Button during Repeat Mode. When the Rewind Button is depressed, TR6 is turned on and TR7 is turned off. For this reason, TR4 is maintained at "on". Although Pin D1 is grounded, and TR1 is turned on, TR2 off, and TR3 on, because TR4 is held at "on", and TR5 is turned off, the machine will not enter Forward Play.

# VIII. SERVO MOTOR OPERATING PRINCIPLES

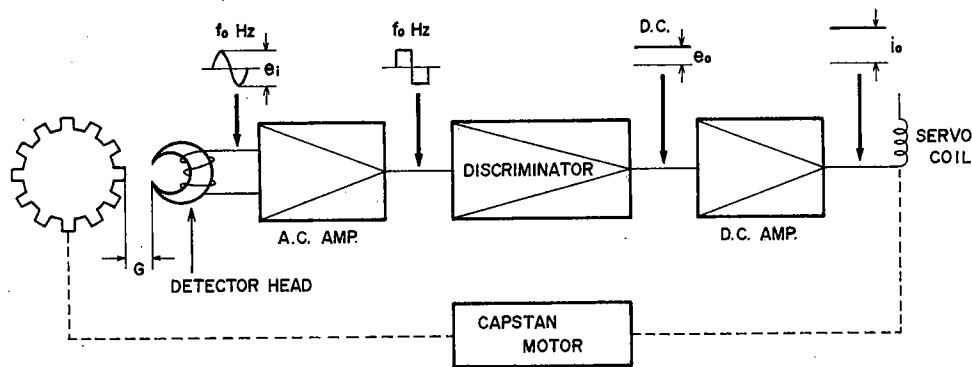


Fig. 34

G (Gap): Adjust to obtain a detector head terminal voltage of  $3 \pm 0.5$  mV at 7-1/2 ips.

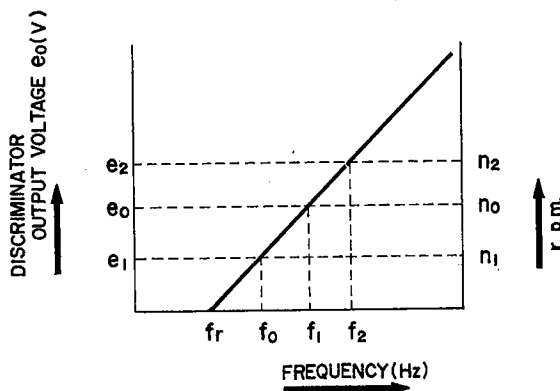


Fig. 35

1. The detector head core is comprised of a permanent magnet, and the gear installed on the motor, by magnet, and the gear installed on the motor, by the magnetic flux of the detector head core. Accordingly, the detector head coil works in the same way and generates A.C. Voltage (becomes the detector signal described below). When this detector signal voltage ( $e_i$ ) becomes detector signal frequency ( $f_o$ ), this adjusts the capstan motor revolutions proportionately. (See Figs. 34 & 35)
2. When the detector signal voltage generated from the detector head is about 3 mV (at 7-1/2 ips), because the level is low, the perpendicular (up and down) waveform is amplified by the A.C. Amplifier until the waveform is clipped. (See Fig. 34)

3. Discriminator Coil L1 (VI2031SC-01) and C210 (0.051/50) at 7-1/2 ips and C211 (0.27/100) at 3-3/4 ips constitute the resonance circuit, and this resonance frequency becomes  $f_r$ . Because the detector signal frequency generated at the detector coil differs according to capstan motor revolutions, the capacity of the discriminator resonance condenser changes and the resonance frequency changes at the different tape speeds of 7-1/2 and 3-3/4 ips.

4. When the discriminator input frequency and the resonance frequency  $f_r$  are simultaneous, the D.C. signal to be supplied to the next stage D.C. Amplifier is not generated. Consequently, when the capstan motor rotates at normal speed, a higher than resonance frequency  $f_r$ , detector signal. Signal frequency  $f_o$  is established.

5. As shown in Chart 3, when electric current is not flowing to the capstan motor servo coil, the capstan motor revolutions are far faster than normal revolutions. Consequently, in order to maintain normal revolutions, an electro-magnetic field is generated at the servo coil by means of collector current flowing to TR-209 (2SD234), and this serves as an electro-magnetic brake. This electro-magnetic brake and the load torque balances the capstan motor torque and normal revolutions are maintained.

	Capstan Motor Supply Voltage	Capstan Motor Supply Voltage at FWD or REV Starting Time	Voltage and Frequency Generated at the Detector Coil	Controlled Capstan Motor Speed	Uncontrolled Capstan Motor Speed
7-1/2 ips	110V	150V	$3\text{mV} \pm 0.5\text{mV}$ / 1040Hz r.m.s.	520 r.p.m.	1,420 r.p.m.
3-3/4 ips	85V	110V	$1.5\text{mV} \pm 0.25\text{mV}$ / 520Hz r.m.s.	260 r.p.m.	1,380 r.p.m.

Chart 3

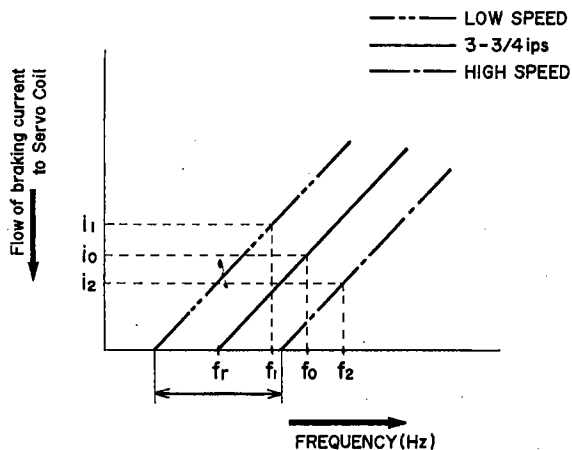


Fig. 36

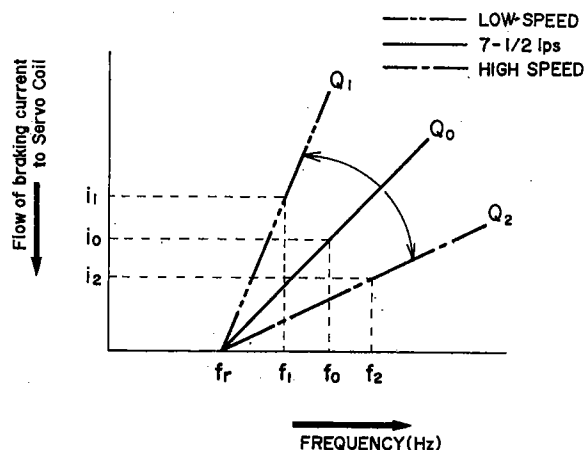


Fig. 37

6. In case of the capstan motor revolutions having reached the speed of  $n_2$ , the detector signal produced at the detector coil surpasses  $f_0$  and advances toward the higher  $f_2$  frequency. (See Figs. 36 & 37) Accordingly, the flow of current to the servo coil increases, and because the electro-magnetic braking supplied to the capstan motor is increased, the capstan motor revolutions become slower, and normal revolutions are regained.

7. In case of the capstan motor revolutions having slowed to  $n_1$ , the detector signal produced at the detector coil drops to lower than  $f_0$  and descends toward the low  $f_1$  frequency (See Figs. 36 & 37). Accordingly, the flow of current to the servo coil decreases, and because the electro-magnetic braking supplied to the capstan motor is decreased, the capstan motor revolutions speed up and normal revolutions are regained.

8. To obtain the proper number of revolutions, adjustment of the flow of brake current to the servo coil is necessary.

1) At 3-3/4 ips tape speed

As shown in Fig. 36, resonance frequency  $f_r$  (between the arrow mark) is changed by adjusting the dust core of discriminator coil L1 (VI2031SC-01). Accordingly,  $f_0$  is also changed between  $f_1$  and  $f_2$ , and the flow of braking current ( $i_0$ ) to the servo coil is also changed between  $i_1$  and  $i_2$ . Consequently, correct tape speed can be attained by using a tape speed measuring tape and a Frequency Counter and adjusting the dust core of coil L1.

2) At 7-1/2 ips tape speed.

As shown in Fig. 37,  $Q_0$  of the resonance circuit (within the arrow mark with  $f_r$  as center frequency) is changed by adjusting discriminator semi-fixed resistor VR202 (5 k $\Omega$ ). Therefore,  $f_0$  is also changed between  $f_1$  and  $f_2$  and, the flow of current ( $i_0$ ) to the servo coil is also changed between  $i_1$  and  $i_2$ . Consequently, correct tape speed can be attained by using a tape speed measuring tape and a Frequency Counter and adjusting semi-fixed resistor VR202.

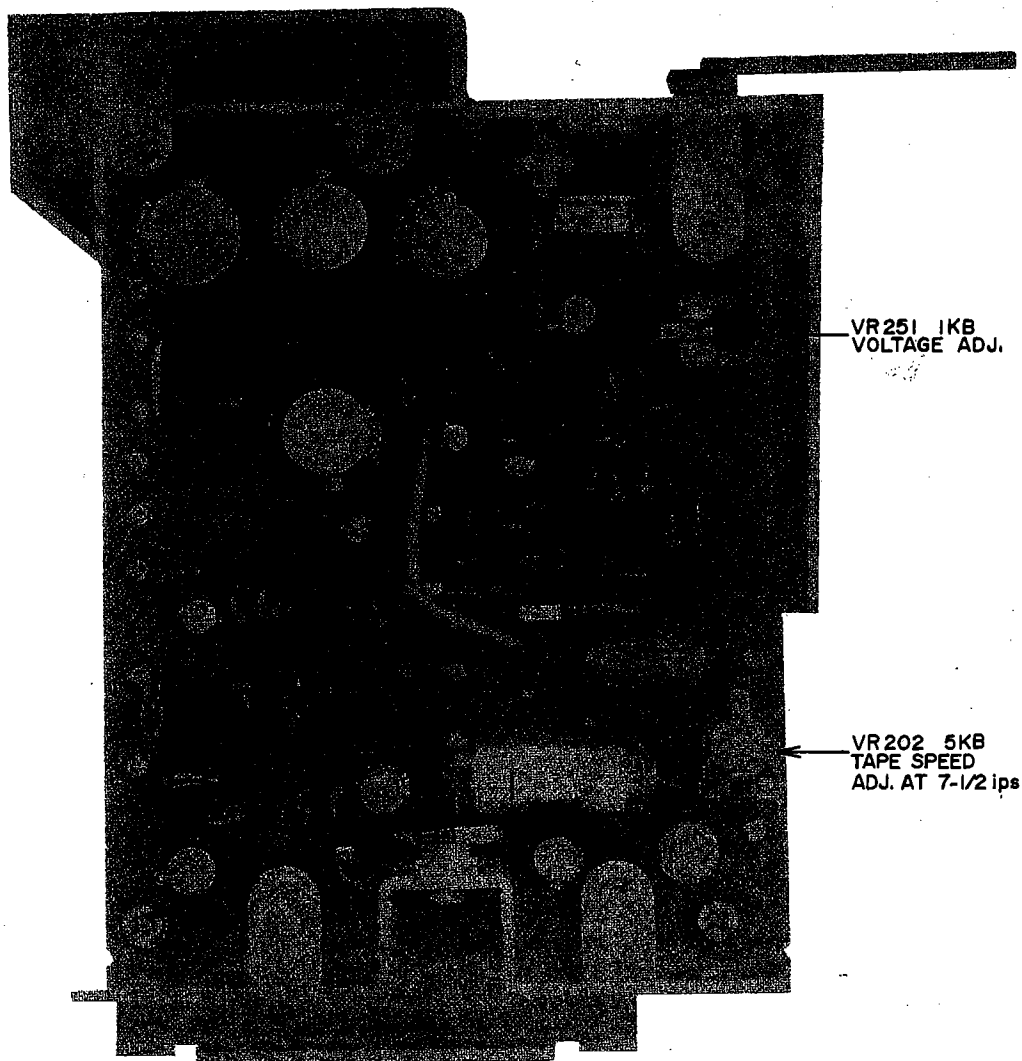


Fig. 38 SERVO CONTROL AMP. & POWER SUPPLY P.C. BOARD (FACE SIDE)

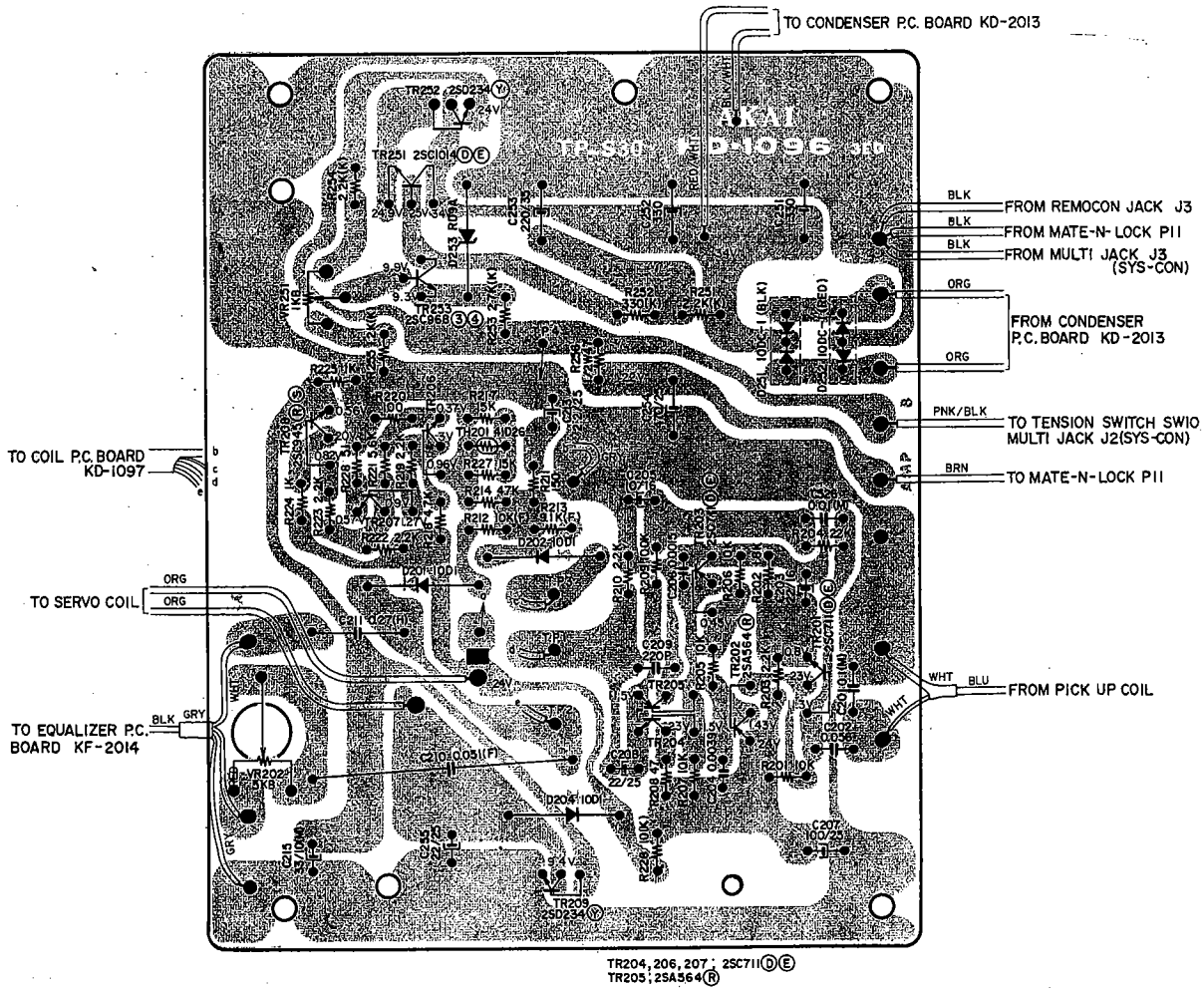


Fig. 39 SERVO CONTROL AMP. & POWER SUPPLY P.C. BOARD KD-1096 (REVERSE SIDE)

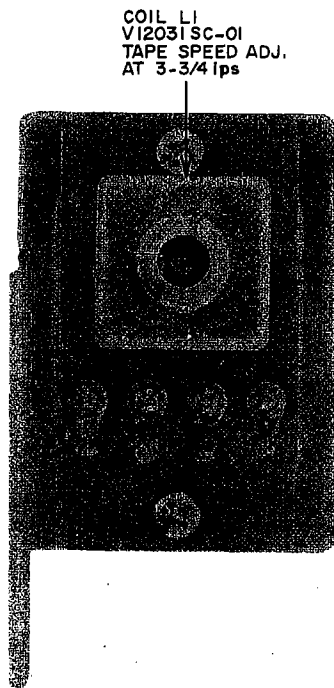


Fig. 40 COIL P.C. BOARD (FACE SIDE)

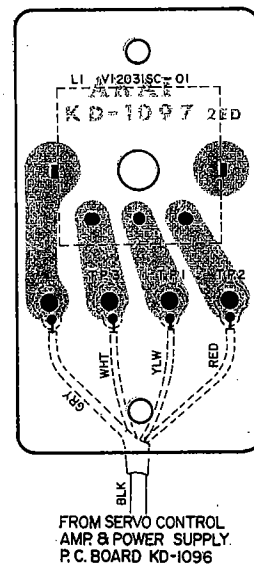
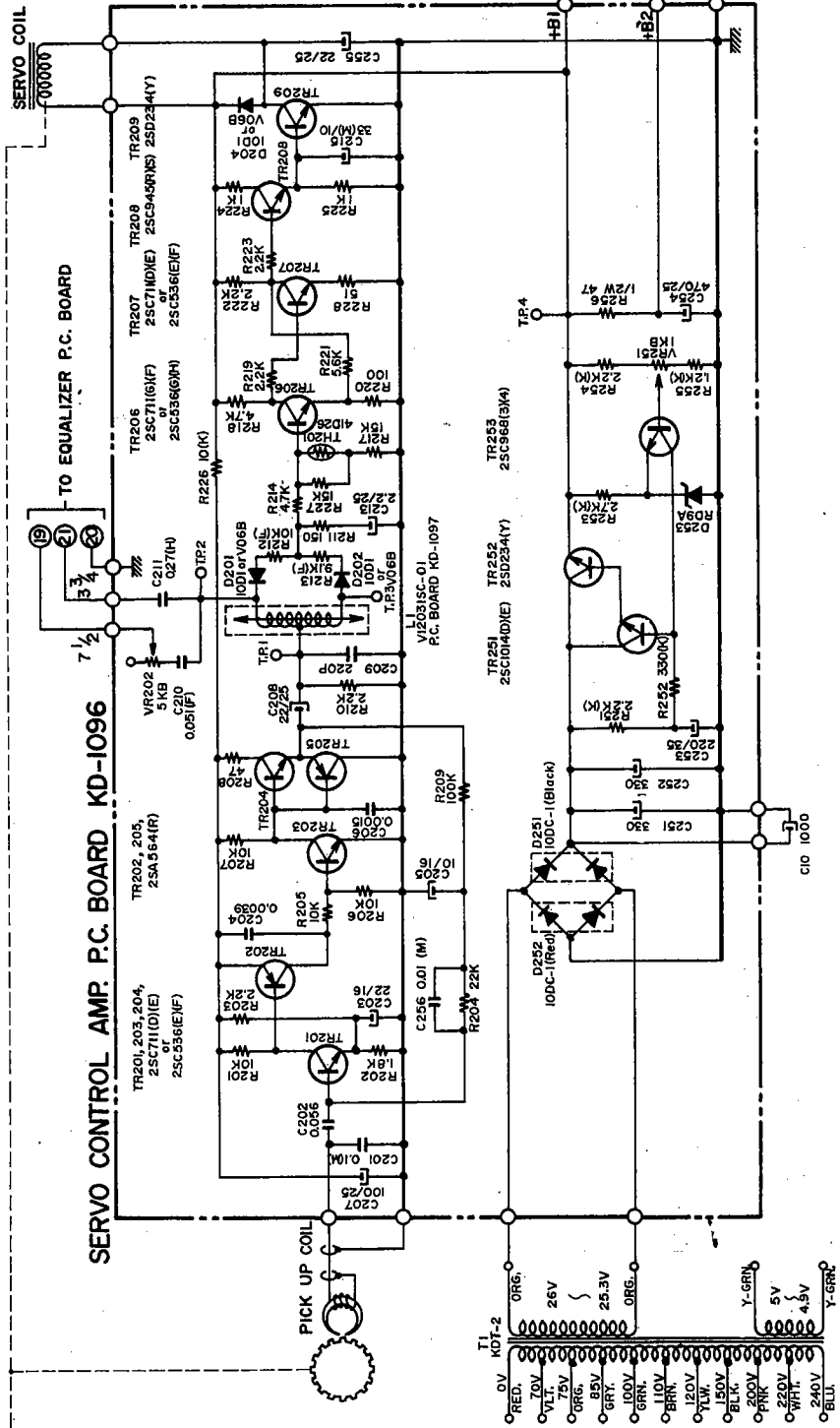
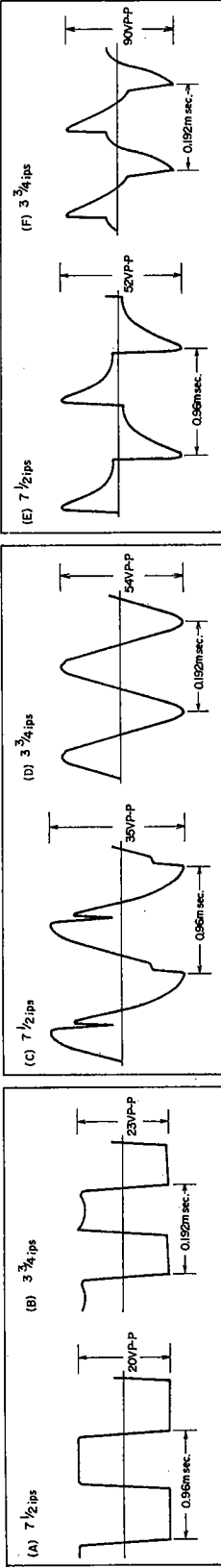
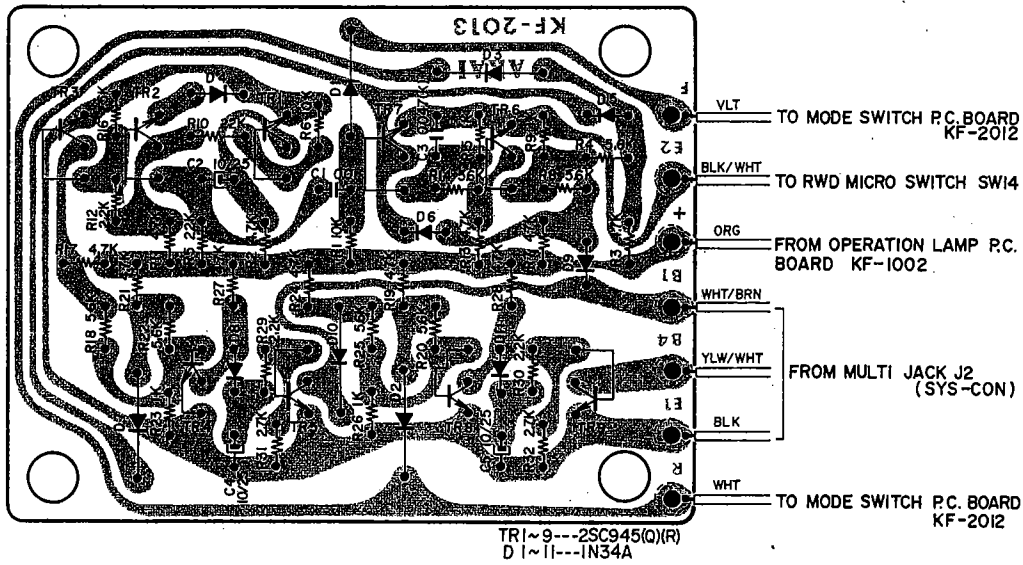


Fig. 41 COIL P.C. BOARD KD-1097 (REVERSE SIDE)

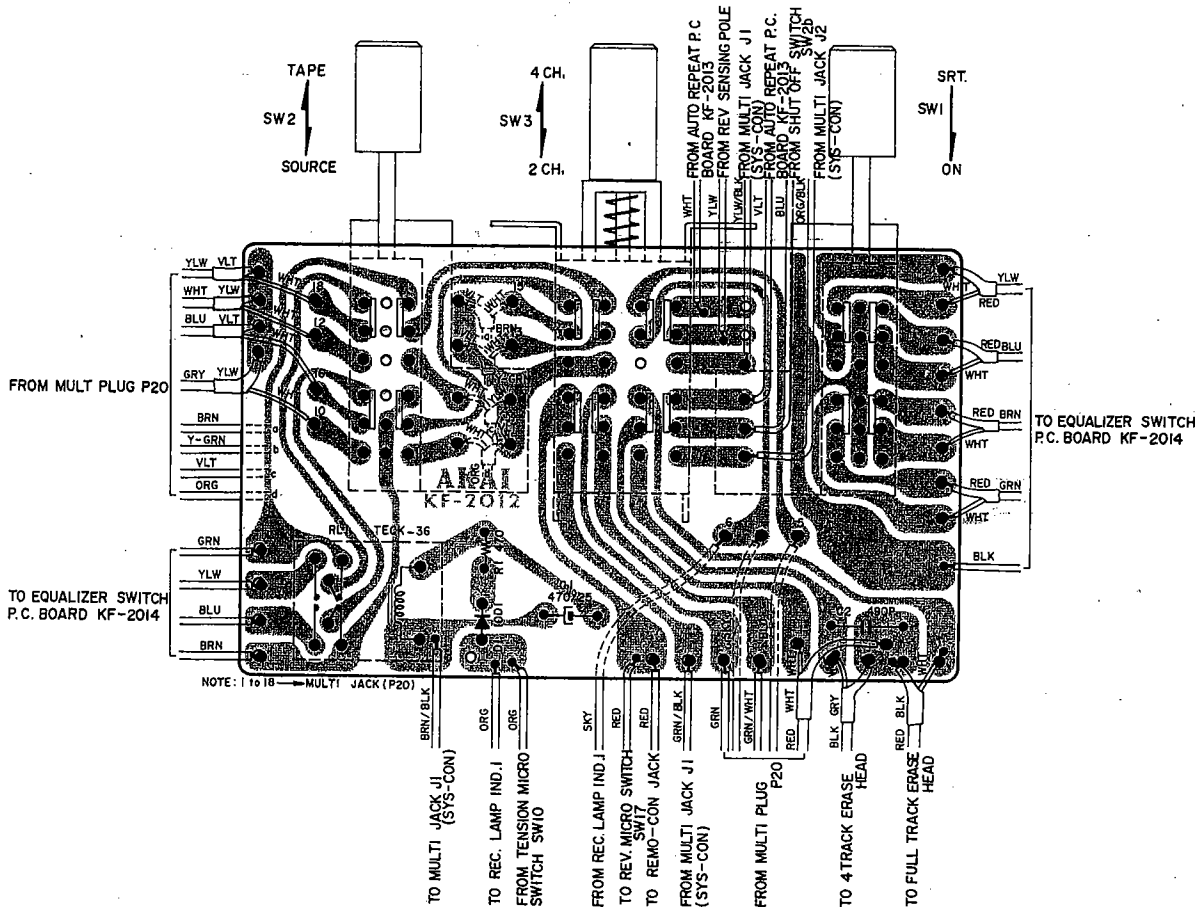


# IX. COMPOSITE VIEWS OF COMPONENTS

## 1. AUTO REPEAT P.C. BOARD KF-2013



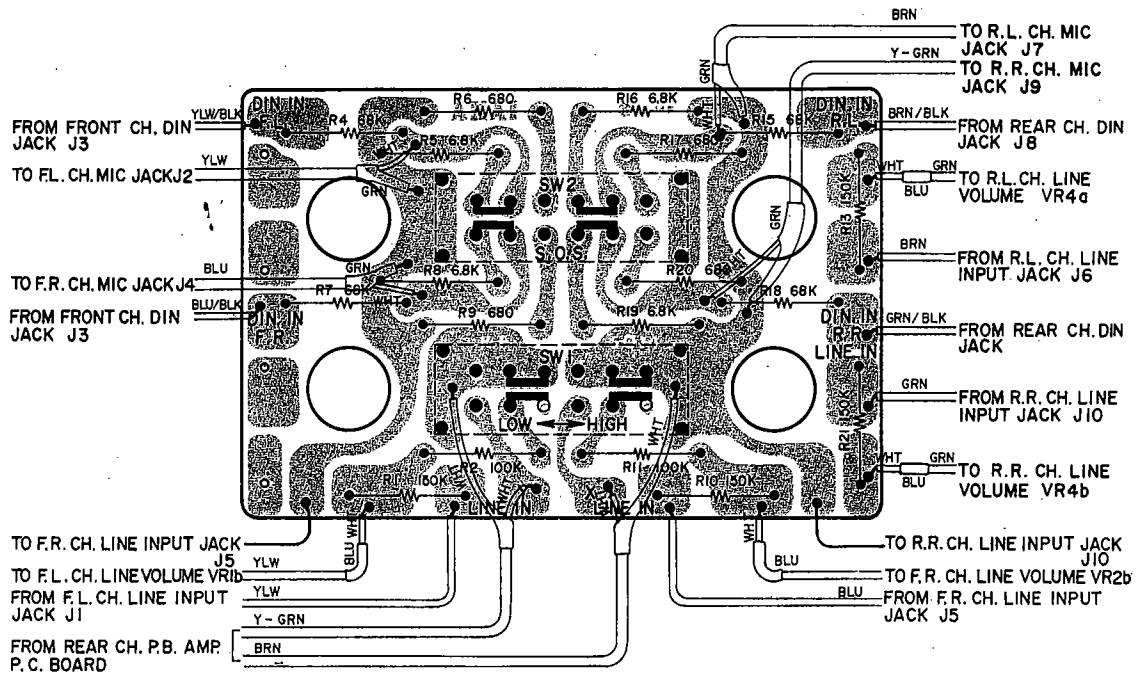
## 2. SWITCH P.C. BOARD KF-2012



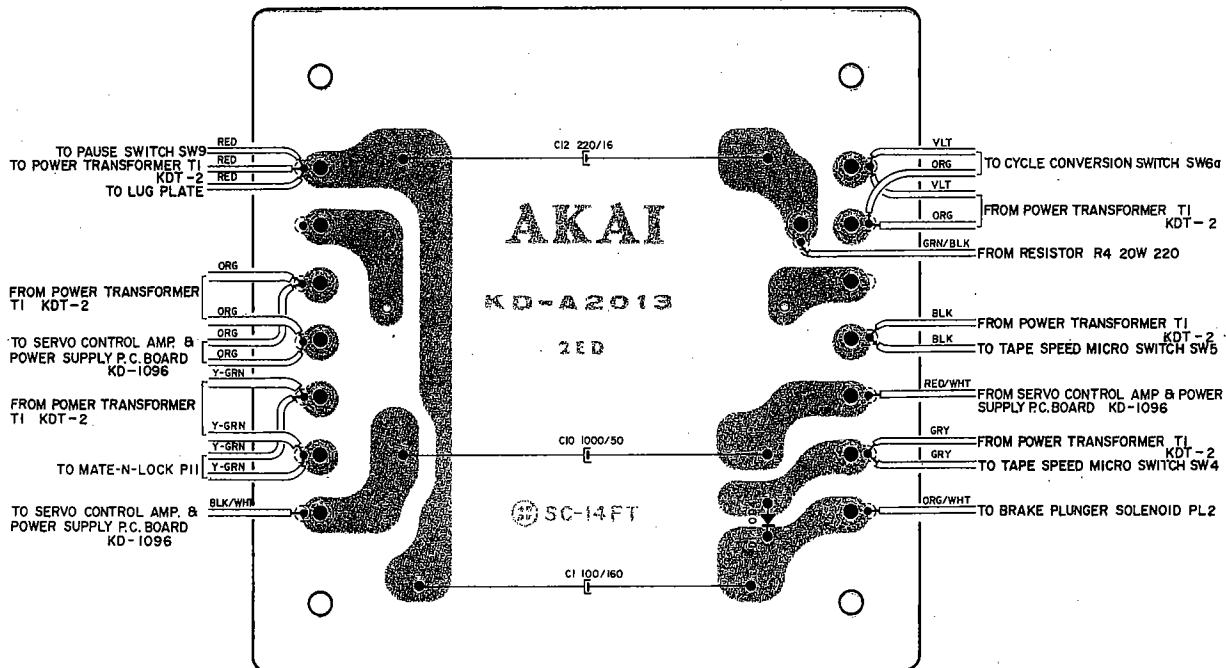




## 5. JACK P.C. BOARD KF-5014



## 6. CONDENSER P.C. BOARD KD-A2013



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SECTION 2

**PARTS LIST**

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## HOW TO USE THIS PARTS LIST

1. This parts list is compiled by various individual blocks based on assembly process.
2. When ordering parts, please describe parts number, serial number, and model number in detail.
3. How to read List

The reference number corresponds with illustration or photo number of that particular parts list.

This number corresponds with the Figure Number.  
 This number corresponds with the individual parts index number in that figure.

A small "x" indicates the inability to show that particular part in the Photo or Illustration.

**12-115x**

Schematic Diagram Number of individual manufactured part.  
 (not required for parts order)

Quantity of particular part required.

Ref. No.	Parts No.	Description	Schematic No.	Q'ty
	<b>FLYWHEEL BLOCK #13</b>			
12-115x	800425	Flywheel Block Assy. Comp.	RDG #13	1
12-116	244506	Flywheel Only	RD-233	1
12-117x	244754	Felt, Flywheel	RD-275	1
12-118	251324	Main Metal Case	RD-236	1
12-119	253080	Main Metal	RD-237	1

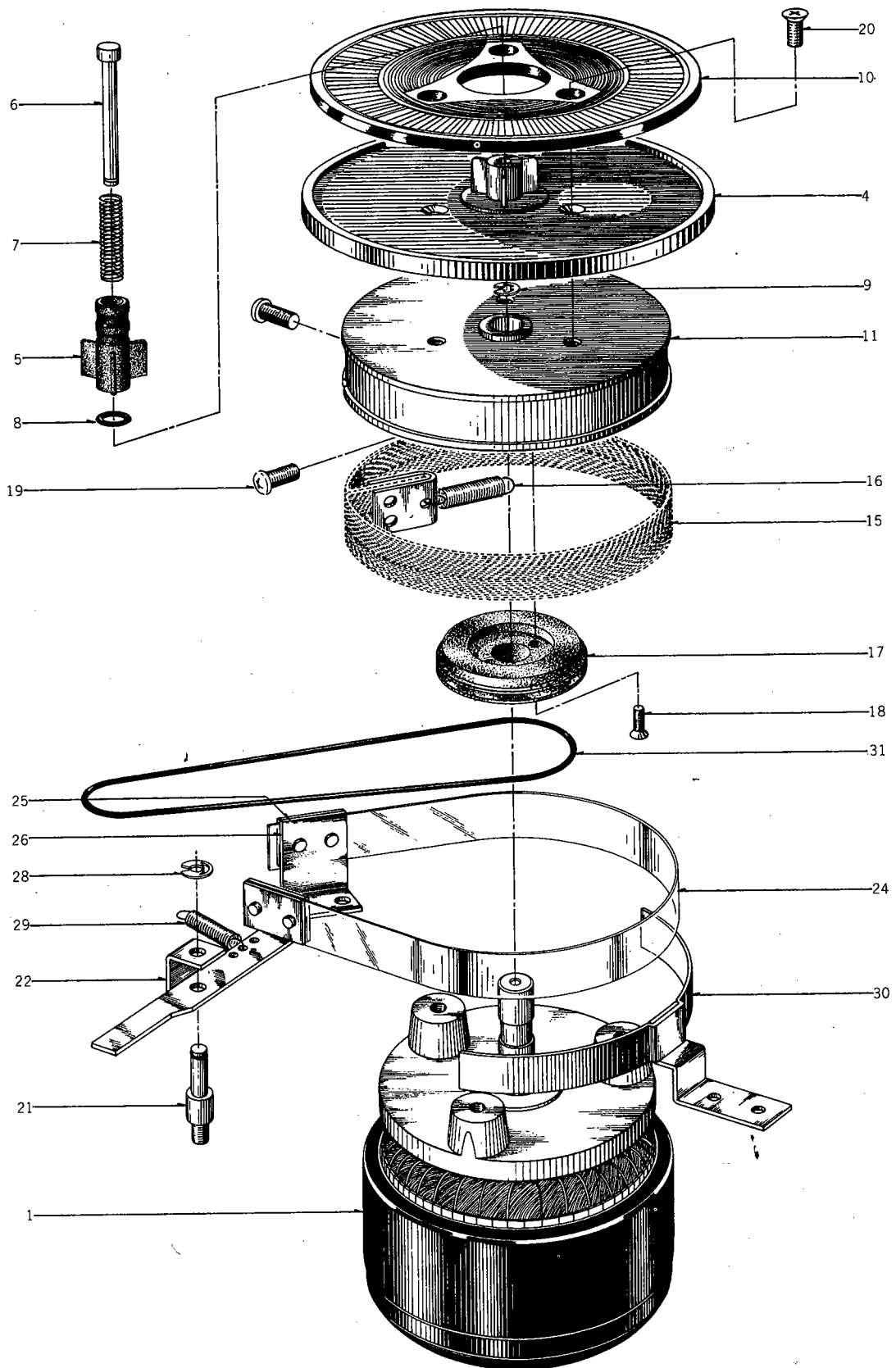
4. The symbol numbers shown on the P.C. Board list can be matched with the Composite Views of components of the Schematic Diagram or Service Manual.
5. The indications of Resistors and Capacitors in the photos of P.C. Board are being eliminated.
6. The shape of the parts and parts name, etc. can be confirmed by comparing them with the parts shown on the Electrical Parts Table of P.C. Board.
7. Both the kind of part and installation position can be determined by the Parts Number. To determine where a parts number is listed, utilize Parts Index at end of Parts List.  
 It is necessary first of all to find the Parts Number. This can be accomplished by using the Reference Number listed at right of parts number in the Parts Index. (meaning of ref. no. outlined in Item 3 above).
8. Utilize separate "Price List for Parts" to determine unit price. The most simple method of finding parts Price is to utilize the reference number.

## HEAD BLOCK

Ref. No.	Parts No.	Description	Schematic No.	Q'ty
1-1x	BH513270	Head Block Comp.	KF-2	1
1-2	HZ396448	Head Chassis, w/shaft	KD-0001	1
1-3x	BZ435003	Sensing Guide (B) Comp.	KF.KD	1
1-4	HZ396584	Sensing Guide C	KD-0015	1
1-5	HZ396797	Sensing Guide	KD-0036	1
1-6	ZW439402	Screw, round head 3x3.2		1
1-7	HZ317632	Insulator Collar A	MR-36	1
1-8	HZ396595	Sensing Guide D	KD-0016	1
1-9	ZW273778	Earth Lug, M3		1
1-10	HZ396505	Insulator Collar	KD-0007	1
1-11	ZW396786	Tape Guide Washer	KD-0035	1
1-12	ZW202252	Screw, round head 2.3x12		1
1-13x	ZW434250	Screw, pan head 4x8, w/washer		1
1-14	MZ402546	Stopper Collar	KD-1070	1
1-15	MZ428343	KD Stopper Rubber	KD-1088	1
1-16	ZW413785	Screw, binding head 3x12		1
1-17	HZ803597	Tape Guide A	RD-3	1
1-18	ZW434250	Screw, pan head 4x8, w/washer		1
1-19	HZ412637	Tape Guide Post	RD-A30	1
1-20x	ZW273802	Toothed Lock Washer, M3		1
1-21	ZW273756	Nut, M3		1
1-22	HF412187	ERASE HEAD E4-250		1
1-23	HZ382680	Erase Head Base	RD-A5	2
1-24	ZW201475	Screw, pan head 2x3		4
1-25	ZW202061	Screw, binding head 3x5		4
1-26x	ZW273778	Earth Lug, M3.		1
1-27	HE412198	ERASE HEAD EF-200		1
1-28	HR513292	REC. HEAD R4-280		1
1-29	HZ441911	Rec. Angle	KF-0005	1
1-30x	ZW201508	Screw, pan head 2x4		2
1-31	ZG364656	Angle Adjust Spring C	RD-57	3
1-32	ZW336868	Screw, round head 3x12		1
1-33	ZW455231	Screw, countersunk head 3x10		2
1-34x	BC411085	4QP Shield Case	LF-0014	2
1-35x	HZ411074	4QP Back-shield	LF-0013	2
1-36x	EA437736	Head Terminal Plate (LF)	LF-0028	2
1-37	HP513281	P.B. HEAD P4-280		1
1-38	HZ441922	Head Shield	KF-0027	1
1-39	HZ512111	P.B. Head Angle	KF-0223	1
1-40x	ZW201508	Screw, pan head 2x4		2
1-41	ZW338635	Screw, round head 3x3		2
1-42	HZ441933	Triple-shield B	RD-A3	1
1-43	ZW426622	Washer (SPC) D3.4x7.8x0.5t		2
1-44	ZW403312	Hexagon Bolt 3x4		2
1-45	HZ405178	P.B. Head Adjust Base A	KD-0030	1
1-46	ZW200305	Screw, countersunk head 3x5		2
1-47	ZG396538	Conic Spring	KD-0010	3
1-48	ZW336857	Screw, round head 3x8		1
1-49	ZW329016	Screw, countersunk head 3x8		2
1-50x	EA222096	Connector P.C. Board	RD-140	1
1-51	HZ231884	Tape Guide B	RD-5	1
1-52	ZW384840	Set Screw 3x5 (cup)		1
1-53	HL396630	Shifter Lever 1, w/pin	KD-0020	1
1-54	HZ396696	Shifter Joint	KD-0026	2
1-55	ZW290283	'U' Ring 2.85M	6-1-1	6
1-56	HL396685	Shifter Lever 2, w/pin	KD-0025	1
1-57	HL408508	Shifter Stopper	KD-0039	1
1-58	ZW345442	Washer (Nylon) D4.2x9x1t		1
1-59	HL396718	Shifter Lever, w/pin	KD-0028	1
1-60	ZG433383	Shifter Spring B	KD-A1008	1
1-61	ZG407575	Shifter Lever Spring	KD-1078	1

When ordering parts, please describe Parts Number, Serial Number, and Model Number in detail.

FIG. 2 ILLUSTRATION OF REEL MOTOR & REEL TABLE BLOCK

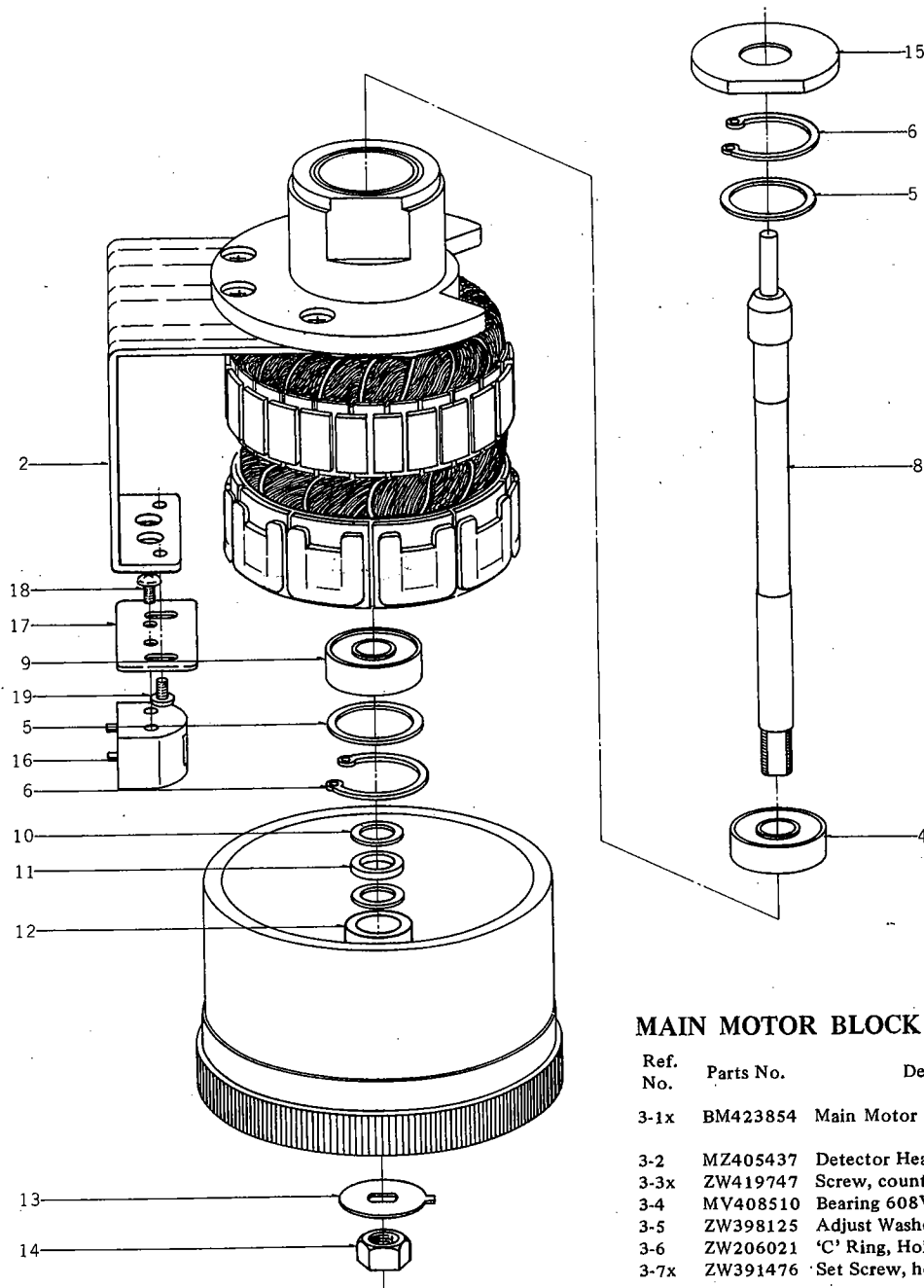


## REEL MOTOR & REEL TABLE BLOCK

Ref. No.	Parts No.	Description	Schematic Q'ty No.	Q'ty
2-1	BM314741	Reel Motor Block Comp. (24XO-2)	KF, KD, MS. MC	1
2-2x	BR398430	Supply Reel Table Block Comp.	KF, KD	1
2-3x	BR398441	Take-up Reel Table Block Comp.	KF, KD	1
2-4	MT488158	RD Reel Table Disk A	RD-272	1
2-5	MT255420	Reel Retainer	3R-102	1
2-6	MS342000	Reel Shaft	3R-108	1
2-7	ZG255633	Reel Spring	3R-109	1
2-8	MT297663	3R 'O' Ring 2.9x1.65M	3R-139	1
2-9	ZW270088	'E' Ring 1.9M	6-1-9	1
2-10	MT397225	Reel Table Rubber	KD-2017	1
2-11	MT495606	Brake Drum (R) A (Take-up)	MR-216	1
2-12x	MT495617	Brake Drum (L) A (Supply)	MR-216	1
2-13x	ZW273778	Earth Lug, M3		2
2-14x	ZW425981	Screw, binding head 3x3		2
2-15	MT436860	Brake Cloth Comp.	MR-269	1
2-16	ZG317496	Felt Tension Spring	MR-260	1
2-17	MR317507	Counter Pulley (Take-up)	MR-217	1
2-18	ZW516644	Screw, countersunk head 2.3x10		2
2-19	ZW424056	Screw, pan head 4x10		2
2-20	ZW403222	Screw, countersunk head 3x10		3
2-21	MZ317373	Brake Lever Prop	MR-102	2
2-22	ML314976	Brake Lever A (Take-up)	MR-210	1
2-23x	ML396810	Brake Lever B (Supply)	KD-1038	1
2-24	MB314987	Brake Band	MR-213	2
2-25	MZ314998	Brake Band Retaining Plate	MR-212	4
2-26	MZ315000	Brake Band Support	MR-214	2
2-27x	ZW323728	Screw, binding head 3x5		8
2-28	ZW290283	'U' Ring 2.85M	6-1-1	1
2-29	ZG315011	Brake Lever Spring	MR-116	2
2-30	MZ317406	Brake Band Guide, w/base	MR-120	2
2-31	MB303535	Counter Belt D91x1.6	3A-617	1

When ordering parts, please describe Parts Number, Serial Number, and Model Number in detail.

FIG. 3 ILLUSTRATION OF MAIN MOTOR BLOCK



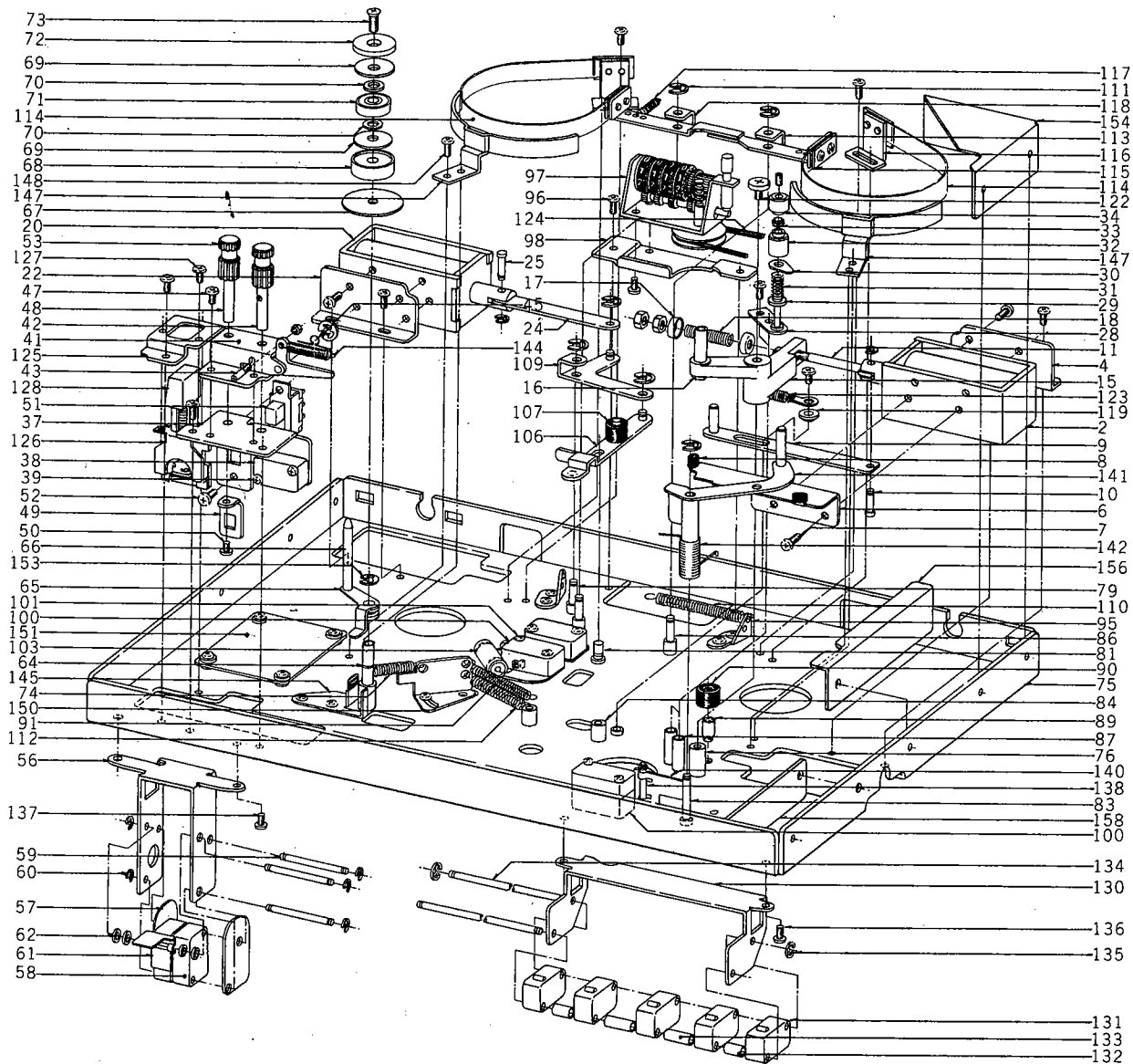
**MAIN MOTOR BLOCK**

Ref. No.	Parts No.	Description	Schematic No.	Q'ty
3-1x	BM423854	Main Motor Block Comp. (SCM-24)	KF, KD	1
3-2	MZ405437	Detector Head Mt. Base	KD-7029	1
3-3x	ZW419747	Screw, countersunk head 4x6		4
3-4	MV408510	Bearing 608VVC2E-AV2-L		1
3-5	ZW398125	Adjust Washer A	KD-7019	2
3-6	ZW206021	'C' Ring, Hollow D22	6-1-2	2
3-7x	ZW391476	Set Screw, hexagon socket 4x4 (cup)		1
3-8	MS424192	Shaft (Capstan)	KD-7056	1
3-9	MV248130	Bearing 608VVC2E-B32		1
3-10	ZW321592	Washer (SUS) D8.1x13x0.3t		2
3-11	ZW356883	Washer (Hycar) D8.3x11.8x 0.5t		3
3-12	ZW424203	Spacer	KD-7057	1
3-13	ZW398158	Anti Loosening Washer	KD-7022	1
3-14	ZW403536	Nut, M7 P=0.5		1
3-15	MZ398182	Cap	KD-7026	1
3-16	HK398452	DETECTOR HEAD	KF, KD, KH	1
3-17	MZ400421	Detector Head Plate	KD-3008	1
3-18	ZW201475	Screw, pan head 2x3		2
3-19	ZW413155	Screw, binding head 3x6		2

When ordering parts, please describe Parts Number, Serial Number, and Model Number in detail.



FIG. 4 ILLUSTRATION OF MECHANISM ASSEMBLY BLOCK (1)



MECHANISM ASSEMBLY BLOCK (1)

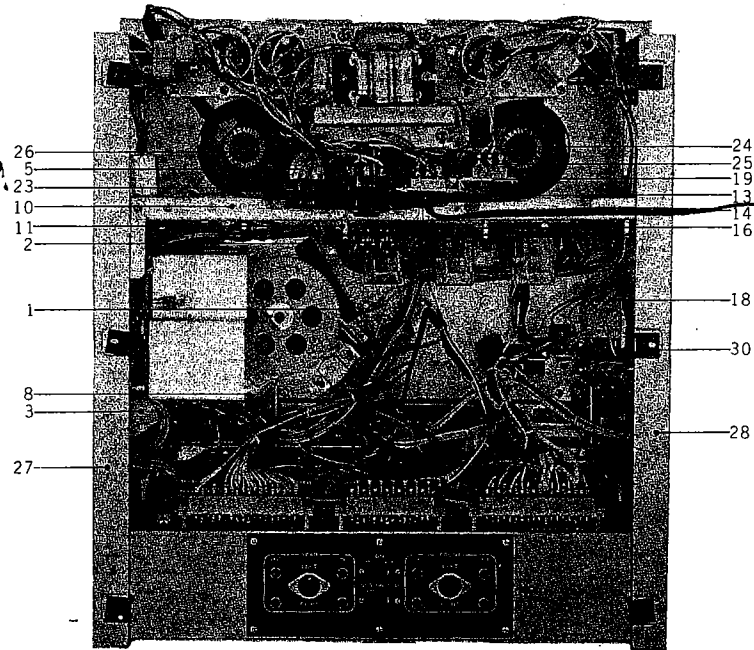
Ref. No.	Parts No.	Description	Schematic No.	Q'ty	Ref. No.	Parts No.	Description	Schematic No.	Q'ty
<b>PINCH ROLLER PLUNGER BLOCK</b>					<b>BRAKE PLUNGER BLOCK</b>				
4-1x	BZ428940	Pinch Roller Plunger Block		1	4-19x	BZ398338	Brake Plunger Block Comp.	KF,KD,KH	1
		Comp. KF,KG,KA	44-1-45	1	4-20	EP398610	Plunger Solenoid		
4-2	EP441990	Plunger 1660THTI Solenoid		1			SDC-10-M-C-100V	44-1-36	1
4-3x	ER376424	Spark Quencher U/L		1	4-21x	ER376424	Spark Quencher U/L		1
		0.1μ+120 500WV	41-1-36	1			0.1μ+120 500WV	41-1-36	1
4-4	MZ396911	Plunger Bracket	KD-1028	1	4-22	MZ396911	Plunger Bracket	KD-1028	1
4-5x	ZW323728	Screw, binding head 3x5		3	4-23x	ZW201835	Screw, binding head 3x5		4
4-6	MZ396922	Black Mask 2	KD-1029	1	4-24	MZ396977	Brake Plunger Joint	KD-1039	1
4-7	ZW417137	Screw, binding head 3x4		2	4-25	ZW257477	Connecting Pin	RD-211	1
4-8	MZ428343	KD Stopper Rubber	KD-1088	2	4-26x	ZW270088	'E' Ring 1.9M	6-1-9	1
4-9	MZ396966	Plunger Joint, w/pin	KD-1033	1					
4-10	ZW257477	Connecting Pin	RD-211	1	<b>SENSING GUIDE BLOCK</b>				
4-11	MZ396944	Pinch Roller Arm Joint	KD-1031	1	4-27x	BZ398362	Sensing Guide Block Comp.	KF,KD	1
4-12x	ZW270088	'E' Ring 1.9M	6-1-9	1	4-28	MZ396551	Sensing Table, w/prop	KD-2021	1
4-13x	ZW345442	Washer (Nylon) D4.2x9x1t		1	4-29	MZ396573	Insulator Collar B	KD-2023	1
4-14x	ZW270101	'E' Ring 3M	6-1-9	1	4-30	MZ397203	Sensing Pole Terminal Plate	KD-2032	1
4-15	MZ396933	Pinch Roller Arm, w/shaft	KD-1030	1	4-31	ZG396516	Tape Guide Adjust Spring	KD-2024	1
4-16	ZW273960	Nut, M4		3	4-32	MZ396527	Sensing Guide B	KD-2025	1
4-17	MZ802980	Spring Holder	RD-276	2	4-33	MZ397214	Insulator Liner A	KD-2031	1
4-18	ZG428927	Pinch Roller Spring B	KD-1032	1					

When ordering parts, please describe Parts Number, Serial Number, and Model Number in detail.

Ref. No.	Parts No.	Description	Schematic No.	Q'ty	Ref. No.	Parts No.	Description	Schematic No.	Q'ty
4-34	MZ397192	Sensing Guide A	KD-2026	1	4-90	MZ428343	KD Stopper Rubber	KD-1088	1
4-35x	ZW433001	Set Screw, hexagon socket 3x5 (cup)		1	4-91	ZG433383	Shifter Spring B	KD-A1008	1
<b>PAUSE &amp; SHUT-OFF SWITCH BLOCK</b>									
4-36x	BZ398340	Pause & Shut-off Switch Block Comp. KF, KD		1	4-92x	ZW420682	Washer (Nylon) D4.2x9x0.5t		1
4-37	MZ397405	Pause & Shut-off Switch Table A	KD-2029	1	4-93x	MZ397045	Sys. Con. Connector Prop	KD-1006	4
4-38	ES250075	Micro Switch V-1A10 U/L	25-1-8	1	4-94x	MZ397170	Trans. Table C	KD-1065	2
4-39	ZW422965	Screw, pan head 3x15		2	4-95	MZ397080	Spring Hanger	KD-1010	2
4-40x	ER376435	Spark Quencher U/L 0.1μ+120 250WV	41-1-35	1	4-96	ZW323728	Screw, binding head 3x5		4
4-41	MZ397416	Pause & Shut-off Switch Table B, w/lever	KD-2030	1	4-97	MC399521	Counter M-470D	9-1-14	1
4-42	MS397451	Pause Shaft	KD-2036	1	4-98	MZ397078	Counter Base	KD-1009	1
4-43	MZ397462	Shut-off Switch Pin	KD-2037	1	4-99x	MZ250413	Micro Insulator C	RC-127	2
4-44x	ZW273734	Nut, M2		1	4-100	ES250064	Micro Switch V-1A44 U/L	25-1-7	4
4-45	ZG397440	Pause Lever Spring	KD-2035	1	4-101	ZW439514	Screw, binding head 3x18		2
4-46x	ZW270123	'E' Ring 4M	6-1-9	1	4-102x	ZW397146	Micro Switch Nut	KD-1057	1
4-47	ZW467908	Screw, pan head 3x4, w/washer		2	4-103	EC273464	MP/C. 0.1μF(M) 350WVDC (Tub. type)	24-9-4	1
4-48	MS397473	Shut-off Shaft	KD-2038	1	4-104x	ZW422965	Screw, pan head 3x15		2
4-49	MZ397484	Shut-off Switch Plate	KD-2039	1	4-105x	ZW414066	Screw, binding head 3x25		2
4-50	ZW413155	Screw, binding head 3x6		1	4-106	MZ396832	Brake Slide, w/pin	KD-1044	1
4-51	ES317531	Slide Switch ESD-271DU	25-3-24	1	4-107	MZ397181	Lever Cushion	KD-1069	1
4-52	ZW323728	Screw, binding head 3x5		2	4-108x	ZW270101	'E' Ring 3M	6-1-9	1
4-53	SK397596	Pause & Shut-off Knob	KD-2041	2	4-109	ML396742	Brake Lever, w/pin	KD-1041	1
4-54x	ZW434160	Set Screw, hexagon socket 3x3 (cup)		2	4-110	ZG465478	Brake Lever Spring	KD-1092	1
<b>SPEED CHANGE SWITCH BLOCK</b>									
4-55x	BS442258	Speed Change Switch Block Comp. KF		1	4-111	ZW290283	'U' Ring 2.85M	6-1-1	6
4-56	MZ446995	Speed Change Switch Stand	KF-2022	1	4-112	ZG407575	Shifter Lever Spring	KD-1078	1
4-57	MZ402377	Micro Insulator D	KD-2050	2	4-113	ML314976	Brake Lever A (Take-up)	MR-210	1
4-58	ES250064	Micro Switch V-1A44 U/L	25-1-7	2	4-114	MB314987	Brake Band	MR-213	2
4-59	MS438254	Micro Switch Shaft	KF-2023	3	4-115	MZ314998	Brake Band Retaining Plate	MR-212	4
4-60	ZW270088	'E' Ring 1.9M	6-1-9	6	4-116	MZ315000	Brake Band Support	MR-214	2
4-61	ML397383	Speed Change Switch Lever 2	KD-2016	1	4-117	ZG315011	Brake Lever Spring	MR-116	2
4-62	ZW425733	Washer (ALP) D3.1x3x1t		2	4-118	ML396810	Brake Lever B (Supply)	KD-1038	1
<b>GUIDE ROLLER BLOCK</b>									
4-63x	BZ434992	Guide Roller Block Comp.	KF, KD	1	4-119	ZW397157	Graduated Washer	KD-1036	1
4-64	MS432358	Guide Roller Shaft	KD-A2002	1	4-120x	ZW273778	Earth Lug, M3		1
4-65	MZ432832	Tension Arm, w/pulley	KD-A2003	1	4-121x	ZW413155	Screw, binding head 3x6		1
4-66	MZ432360	Tension Pole	KD-A2004	1	4-122	ZW243516	Screw, Pinch Roller	XR-140	1
4-67	MZ434316	Roller Mask	KD-A2005	1	4-123	ZG208091	Impedance Arm Spring	RD-269	1
4-68	MZ434970	Tape Guide Table A	KD-A2006	1	4-124	MB303535	Counter Belt D91x1.6	3A-617	1
4-69	ZW231805	Tape Guide Washer (large)	3A-356	2	4-125	MZ397394	Power Switch Table	KD-2028	1
4-70	ZW317171	Washer (PBP) D3.1x8x0.1t		2	4-126	ES246025	Push Switch UEH-12BP U/L	25-5-11	1
4-71	MV248117	Bearing 635AHZZ-CIE-B32		1	4-127	ZW371856	ISO Screw, binding head 3x5		2
4-72	MZ434981	Tape Guide Table B	KD-A2007	1	4-128	SK210521	Push Button Switch Knob	RD-506	1
4-73	ZW411660	Screw, oval countersunk head 3x6	MR-39	1	4-129x	ZW417137	Screw, binding head 3x4		2
4-74	ZG317114	Tension Lever Spring		1	4-130	MZ441988	Operation Switch Base	KF-1001	1
<b>ASSEMBLY BLOCK</b>									
4-75	MZ396990	Mech. Frame	KD-1001	1	4-131	ES403727	Micro Switch V-1A106 U/L	25-1-20	5
4-76	MS397001	Pinch Roller Arm Shaft	KD-1002	1	4-132	MZ397337	Switch Spacer A	KD-2005	2
4-77x	ZW274026	Spring Washer, M5		1	4-133	MZ397348	Switch Spacer B	KD-2006	2
4-78x	ZW413278	Nut, M5		1	4-134	MS250165	Micro Switch Shaft B	RD-122B	2
4-79	MS397012	Brake Lever Shaft	KD-1003	1	4-135	ZW270088	'E' Ring 1.9M	6-1-9	4
4-80x	ZW413188	Nut, M4		4	4-136	ZW323728	Screw, binding head 3x5		2
4-81	MS465480	Brake Lever Shaft B	KD-1093	1	4-137	ZW417137	Screw, binding head 3x4		2
4-82x	ZW516611	Nut, M3		1	4-138	MS408497	Switch Lever Shaft	KD-1080	1
4-83	MS397023	Tension Arm Shaft	KD-1004	1	4-139x	ZW273756	Nut, M3		1
4-84	HZ397034	Head Base Prop	KD-1005	4	4-140	ML409083	Micro Switch Lever	KD-1081	2
4-85x	ZW416687	Screw, binding head 4x8		4	4-141	ML396900	Shut-off Lever, w/metal	KD-1052	1
4-86	MZ317373	Brake Lever Prop	MR-102	2	4-142	ZG409015	Tension Arm Spring C	KD-1079	1
4-87	MZ397168	Sensing Table Prop	KD-1062	2	4-143x	ZW273881	Earth Lug, M4		1
4-88x	ZW413741	Screw, binding head 3x8		6	4-144	ZG366761	Slider Spring	RCC-1209	1
4-89	MS217192	Cam Roller Shaft A	900-130	1	4-145	MZ433721	Stopper	KD-A1006	1
					4-146x	MZ428343	KD Stopper Rubber	KD-1088	1
					4-147	MZ317406	Brake Band Guide, w/base	MR-120	2
					4-148	ZW323728	Screw, binding head 3x5		4
					4-149x	MP424023	Pinch Roller (KD)	KD-1084	1
					4-150	MZ434237	KD Spring Hanger	KD-A1007	1
					4-151	BA442214	Auto Repeat P.C. Board Comp. KF	KF-2013	1
					4-152x	ZW413785	Screw, binding head 3x12		4
					4-153	ZW317103	Snap Ring E-40	6-1-12	1
					4-154	SZ397528	Corner Angle B (Right)	KD-6003	1
					4-155x	SZ397517	Corner Angle A (Left)	KD-6003	1
					4-156	SZ441347	Side Angle B (Right)	KF-6002	1
					4-157x	SZ441336	Side Angle A (Left)	KF-6002	1
					4-158	SZ441358	Side Angle C	KF-6003	2
					4-159x	SZ417194	Screw, binding head 3x10		4

When ordering parts, please describe Parts Number, Serial Number, and Model Number in detail.

FIG. 5 PHOTO OF MECHANISM ASSEMBLY BLOCK (2)



MECHANISM ASSEMBLY BLOCK (2)

Ref. No.	Parts No.	Description	Schematic No.	Q'ty	Ref. No.	Parts No.	Description	Schematic No.	Q'ty
5-1	MZ441966	Motor Shield	KF-1004	1	5-20x	ZW201150	Screw, truss head 3x6 (black)		6
5-2	EJ310871	18P Multi-jack J-2			5-21x	ZW374128	Iso Screw, truss head 3x8		2
		3250-018-001	31-4-11	2	5-22x	ZW447761	Tapping Screw #2 3x6 (BR)		4
5-3	EJ399823	6P Mate-N-Lock Cap Housing			5-23	EJ326430	11P Short Plug A	42-1-25	1
		1-480276-0	52-1-2	1	5-24	EZ397304	Frequency Change Switch		
5-4x	HZ243191	Pin Contact 60511-1	52-1-1	6			Plate A	KD-2043	1
5-5	EJ222748	Sub Magnale Socket #311SG	31-1-39	1	5-25	ES375478	Slide Switch ESD-279DU	25-3-23	2
5-6x	MZ302400	Remote Control Socket Mt.			5-26	EJ233370	Power Plug Socket S-18010		
		Plate RX-515		1			(Volt. Select.)	40-2-3	1
5-7x	ZW413741	Screw, binding head 3x8		4	5-27	SZ441314	Side Frame A (Right)	KF-6001	1
5-8	MZ446951	Servo Shield Plate	KF-1008	1	5-28	SZ441325	Side Frame B (Left)	KF-6001	1
5-9x	ZW323728	Screw, binding head 3x5		9	5-29x	ZW290248	U Type Speed Nut M4 #1		
5-10	EZ397135	Center Frame	KD-1053	1			(small)	6-3-1	6
5-11	EZ397743	P.C. Board Prop	KD-2044	3	5-30	ZW290250	U Type Speed Nut M4 #1		
5-12x	ZW447772	Tapping Screw #2 3x6(BR)		1			(large)	6-3-2	10
5-13	EZ397293	Connector Plate	KD-2042	1	5-31x	SZ441415	Panel Reinforcement Plate A		
5-14	EZ383938	U/L AC Cord 3M	26-3-20	1			(Left)	KF-6014	1
5-15x	EZ315448	Australia Cord (3 core)	26-3-11	1	5-32x	SZ441426	Panel Reinforcement Plate B		
5-16	EZ382263	Strain Relief SR-4K-4	2-7-12	1			(Right)	KF-6014	1
5-17x	EZ246936	Strain Relief SR-6W-1(3 core)	2-7-8	1					
5-18	EJ205986	Cramp Terminal 2-SD	32-1-8	10					
5-19	EZ397124	Cycle Change Switch Plate B	KD-1055	1					

FIG. 6 (A) ILLUSTRATION OF OPERATION BLOCK

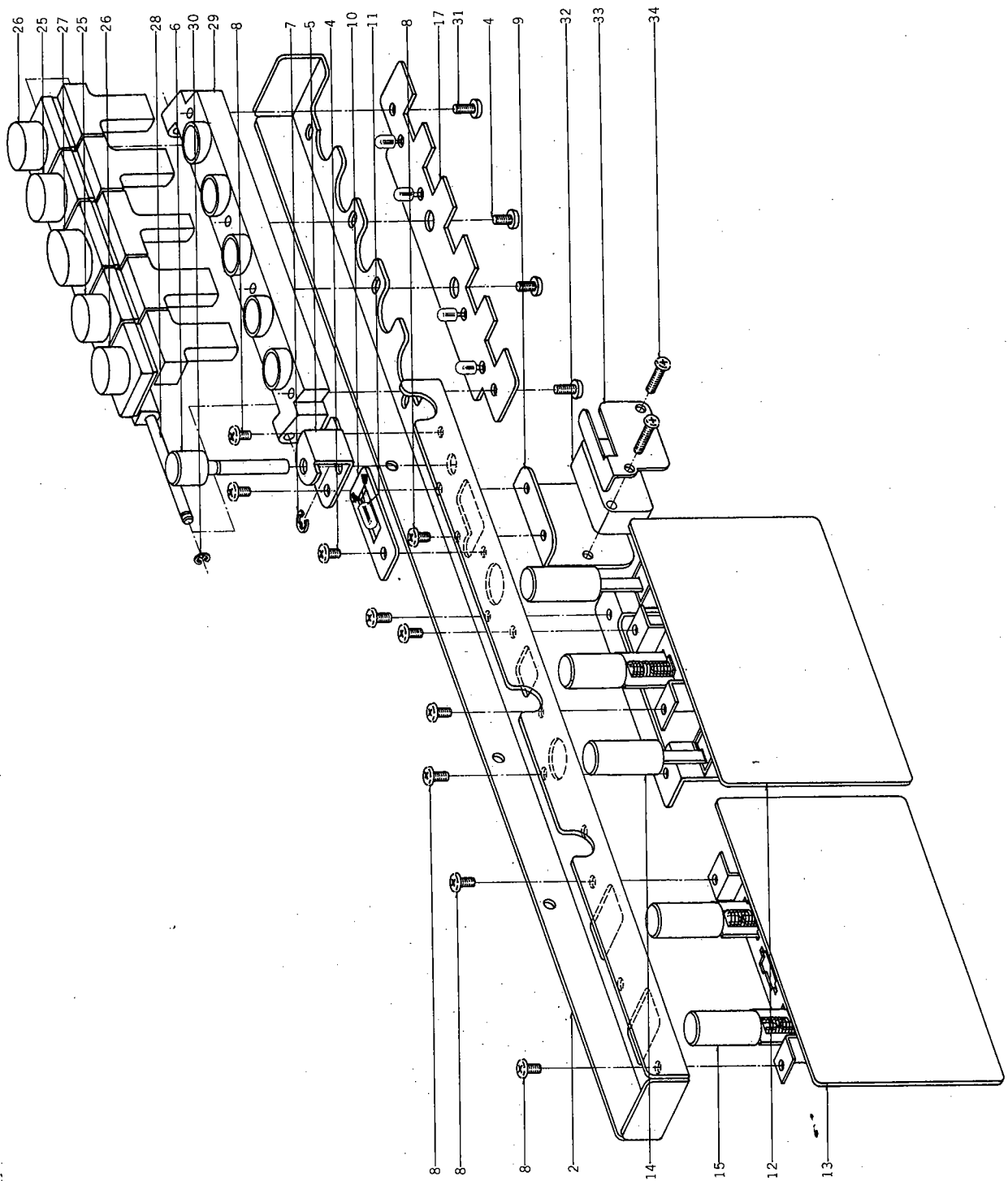
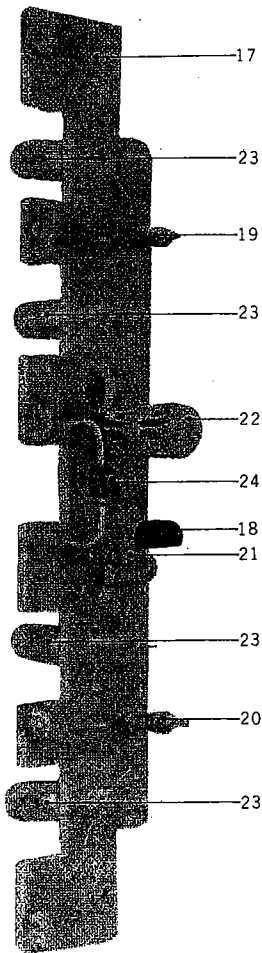


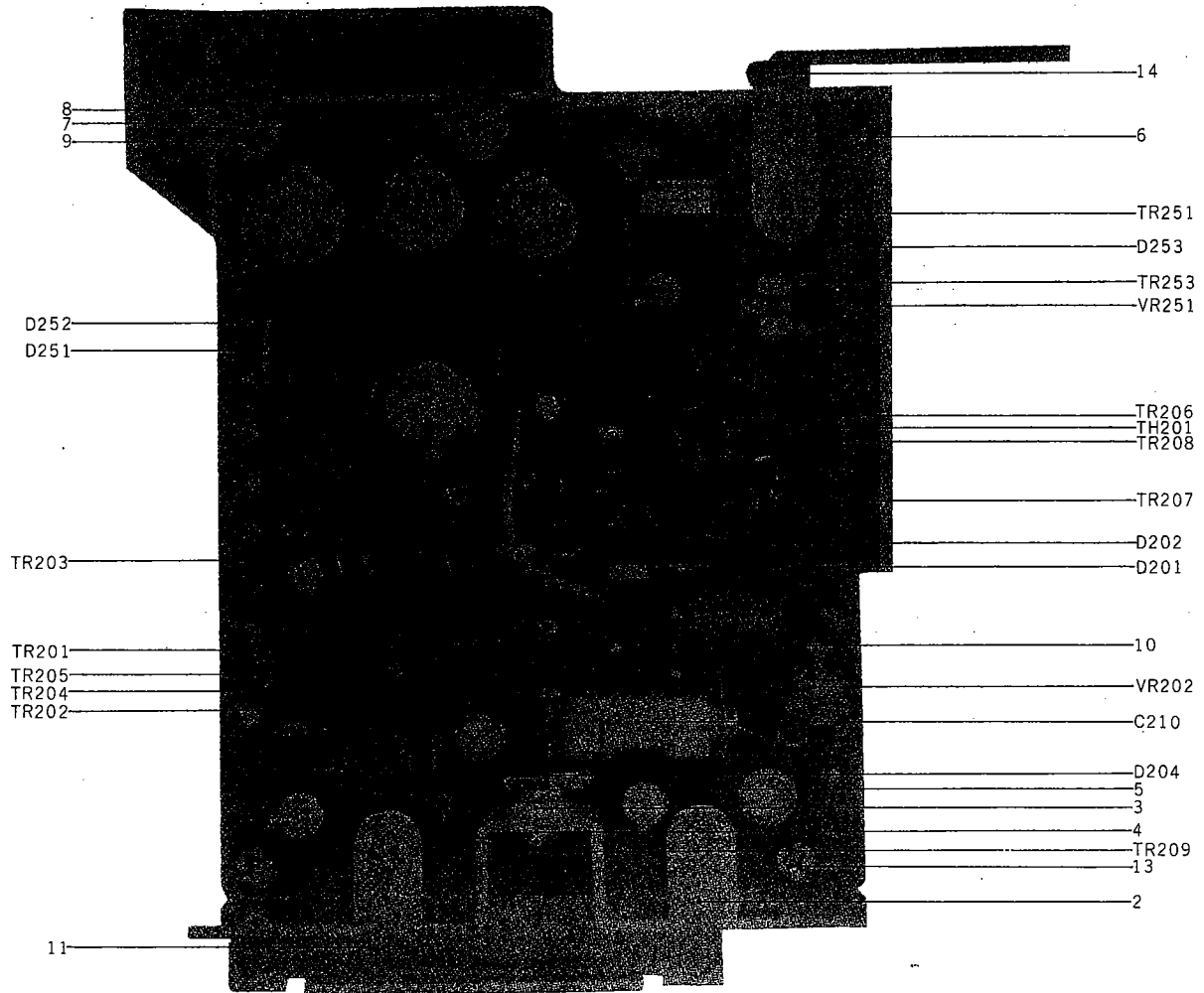
FIG. 6 (B) PHOTO OF OPERATION BLOCK



OPERATION BLOCK

Ref. No.	Parts No.	Description	Schematic No.	Q'ty
6-1x	BZ513257	Operation Block Comp.	KF-2	1
6-2	MZ441595	Operation Button Base	KF-2001	1
6-3x	BA442247	Operation Lamp P.C. Board Comp. (KF-1002)		1
6-4	ZW447772	Tapping Screw #2 3x6(BR)		6
6-5	MZ441573	Rec. Button Holder	KF-2003	1
6-6	SB438265	Rec. Button, w/shaft	KF-2015	1
6-7	ZW270101	'E' Ring 3M	6-1-9	1
6-8	ZW323728	Screw, binding head 3x5		9
6-9	MZ441584	Rec. Switch Base	KF-2002	1
6-10	EA396898	Neon Lamp P.C. Board	KD-1068	1
6-11	EL390576	Pilot Lamp RM6-24V-50MA	28-2-6	1
6-12	BA442225	Switch P.C. Board Comp. (KF-2012)		1
6-13	BA513268	Equalizer Switch P.C. Board Comp. (KF-2014)		1
6-14	SK441628	Knob A	KF-2018	3
6-15	SK436252	Knob B	KF-2019	2
6-16x	BA442247	Operation Lamp P.C. Board Comp. (KF-1002)		1
6-17	EA441720	Operation Lamp P.C. Board	KF-1002	1
6-18	ET398711	Transistor 2SC945(Q) (R)	45-1-85	1
6-19	ER430053	Carbon/R. RD1/4 22(J) (Stop. type)	35-10-1	1
6-20	ER212883	Carbon/R. RD1/4 4.7k (J)	35-10-1	1
6-21	ER211465	Carbon/R. RD1/4 1k (J) (Stop. type)	35-10-1	1
6-22	EC336104	Elect./C. 100μF 6.3WV (Vert. type)	24-12-10	1
6-23	EL390576	Pilot Lamp RM6-24V-50MA	28-2-6	4
6-24	ED224526	Silicon Diode 10D1	45-2-11	1
6-25	SB441538	Button C (green)	KF-2005	2
6-26	SB441516	Button A (orange)	KF-2005	2
6-27	SB441527	Button B (black)	KF-2006	1
6-28	MS438243	Button Shaft	KF-2009	1
6-29	EZ441562	Lamp Cover	KF-2004	1
6-30	ZW270088	'E' Ring 1.9M	6-1-9	2
6-31	ZW413155	Screw, binding head 3x6		2
6-32	ES250075	Micro Switch V-1A10 U/L	25-1-8	1
6-33	ZG466154	Switch Spring	KD-A2012	1
6-34	ZW413785	Screw, binding head 3x12		2

FIG. 7 PHOTO OF SERVO P.C. BOARD (KD-1096)



SERVO P.C. BOARD (KD-1096) BLOCK

Symbol No.	Parts No.	Description	Q'ty	Symbol No.	Parts No.	Description	Q'ty
7-1x	BA423876	Servo P.C. Board Comp. (KD-1096)	1	7-7	ZW200687	Tapping Screw #2 3x6 (round)	2
7-TR201	ET379462	Transistor 2SC711(D) (E)	1	7-8	ZW413741	Screw, binding head 3x8	2
7-TR202	ET356984	Transistor 2SA564(R)	1	7-9	ZW273802	Toothed Lock Washer, M3	1
7-TR203, 4	ET379462	Transistor 2SC711(D) (E)	2	7-10	EZ380428	F3 type Pin	2
7-TR205	ET356984	Transistor 2SA564(R)	1	7-11	EZ397721	Servo P.C. Board Retaining Plate	1
7-TR206	ET398777	Transistor 2SC711(G) (F)	1	7-12x	EZ397743	P.C. Board Prop	4
7-TR207	ET379462	Transistor 2SC711(D) (E)	1	7-13	ZW413155	Screw, binding head 3x6	3
7-TR208	ET399936	Transistor 2SC945(R) (S)	1	7-14	EZ397732	Bracket	1
7-TR209	ET403042	Transistor 2SD234(Y)	1	7-15x	ZW417025	Screw, binding head 3x8, w/washer	1
7-TR251	ET393581	Transistor 2SC1014(D) (E)	1	7-16x	ZW273778	Earth Lug, M3	1
7-TR252	ET403042	Transistor 2SD234(Y)	1	7-17x	ZW413728	Screw, binding head 3x6, w/washer	4
7-TR253	ET391138	Transistor 2SC968(3) (4)	1				
7-D201,2,4	ED224526	Silicon Diode 10D1	3	7-C201	EC398957	Capacitor, Vertical Type Mylar 0.1μF(M) 50WV	1
7-D251	ED329130	Silicon Diode 10DC-1 (black)	1	7-C202	EC251190	Mylar 0.056μF(K) 50WV	1
7-D252	ED329128	Silicon Diode 10DC-1 (red)	1	7-C203	EC331705	Elect. 22μF 16WV	1
7-D253	ED520762	Zener Diode YZ-088A	1	7-C204	EC379787	Mylar 0.0039μF(J) 50WV	1
7-VR202	EV499364	Semi-fixed Volume V10K8-4-2	1	7-C205	EC320051	Elect. 10μF 16WV	1
7-VR251	EV398834	Semi-fixed Volume V10K5-2-4	1	7-C206	EC250661	Mylar 0.0015μF(K) 50WV	1
7-TH201	ED321390	Thermister 41D26	1	7-C207	EC220151	Elect. 100μF 25WV	1
7-2	EZ407586	Heat-sink Plate B	1	7-C208	EC350684	Elect. 22μF 25WV	1
7-3	ZW392940	Insulator Washer 1 G-473025-1	2	7-C209	EC329850	VFM 220PF(J) 50WV	1
7-4	ZW421806	Screw, pan head 3x8	2	7-C210	EC424080	Styrol 0.051μF(F) 50WV (Tub. type)	1
7-5	ZW273756	Nut, M3	4				
7-6	EZ405213	Heat-sink Plate	1				

When ordering parts, please describe Parts Number, Serial Number, and Model Number in detail.

Symbol No.	Parts No.	Description	Q'ty
7-C211	EC438524	Mylar 0.27 $\mu$ F(H) 100WV	1
7-C213	EC220432	Elect. 2.2 $\mu$ F 25WV	1
7-C215	EC517116	Tantalum 33 $\mu$ F(M) 10WV (DTS type)	1
7-C251, 52	EC403468	Elect. 330 $\mu$ F 50WV	2
7-C253	EC372148	Elect. 220 $\mu$ F 35WV	1
7-C254	EC331817	Elect. 470 $\mu$ F 25WV	1
7-C255	EC350684	Elect. 22 $\mu$ F 25WV	1
7-C256	EC250918	Mylar 0.01 $\mu$ F(M) 50WV	1

#### Resistor, Stopper Type

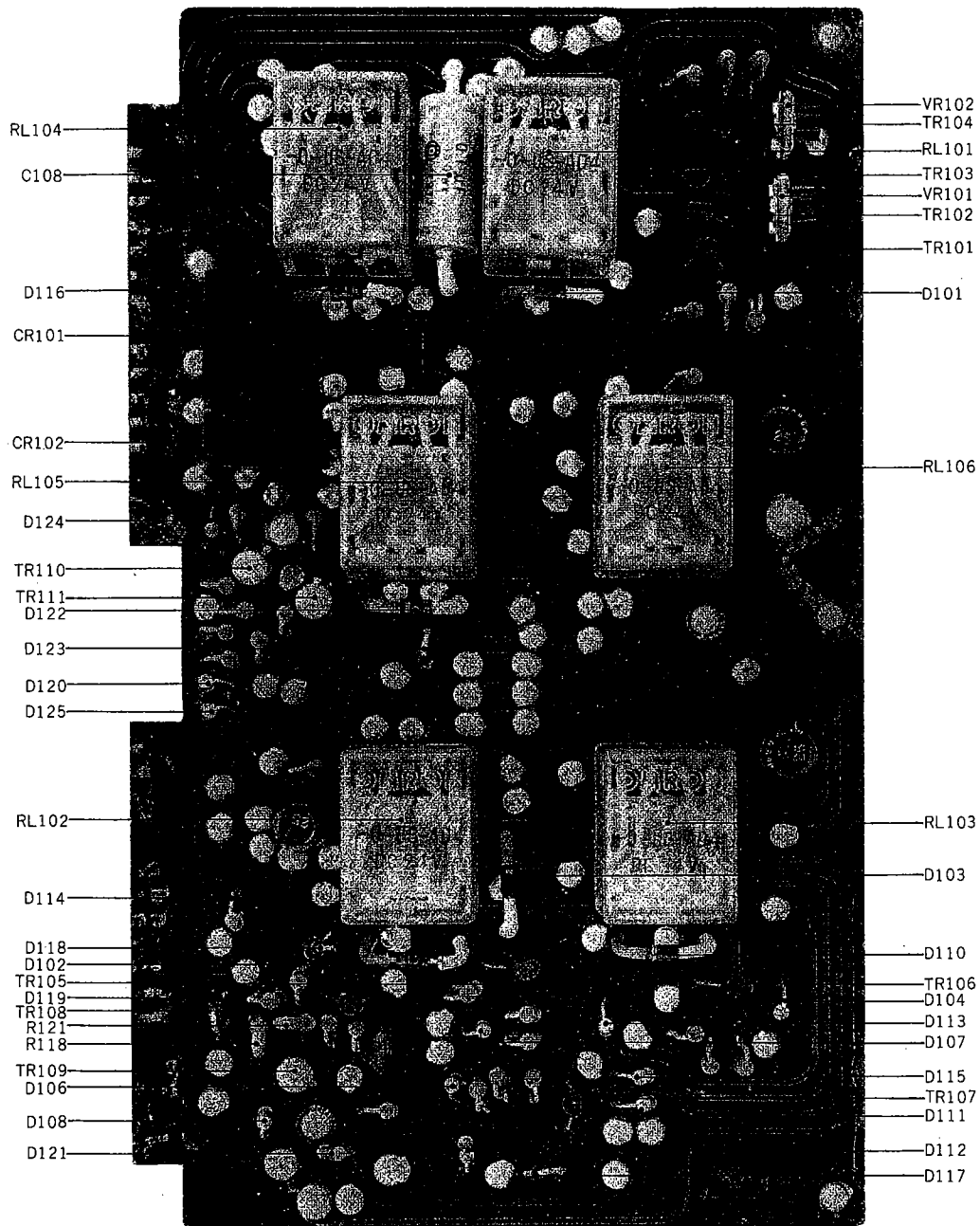
7-R201	ER336442	Carbon RD1/4 10k(J)	1
7-R202	ER362441	Carbon RD1/4 1.8k(J)	1
7-R203	ER357456	Carbon RD1/4 2.2k(J)	1
7-R204	ER212264	Carbon RD1/4 22k(J)	1
7-R205, 6, 7	ER336442	Carbon RD1/4 10k(J)	3
7-R208	ER361642	Carbon RD1/4 47(J)	1
7-R209	ER211757	Carbon RD1/4 100k(J)	1
7-R210	ER357456	Carbon RD1/4 2.2k(J)	1
7-R211	ER212016	Carbon RD1/4 150(J)	1
7-R212	ER403187	Carbon RD1/4 10k(F) (P type)	1
7-R213	ER403097	Carbon RD1/4P 9.1k(F) (P type)	1
7-R214	ER212883	Carbon RD1/4 4.7k(J)	1
7-R217	ER306887	Carbon RD1/4 15k(J)	1
7-R218	ER212883	Carbon RD1/4 4.7k(J)	1
7-R219	ER357456	Carbon RD1/4 2.2k(J)	1
7-R220	ER211667	Carbon RD1/4 100(J)	1
7-R221	ER213030	Carbon RD1/4 5.6k(J)	1
7-R222, 23	ER357456	Carbon RD1/4 2.2k(J)	2
7-R224, 25	ER211465	Carbon RD1/4 1k(J)	2
7-R226	ER304290	Carbon RD1/4 10(J)	1
7-R227	ER306887	Carbon RD1/4 15k(J)	1
7-R228	ER424078	Carbon RD1/4 51(J)	1
7-R251	ER357456	Carbon RD1/4 2.2k(J)	1
7-R252	ER212681	Carbon RD1/4 330(J)	1
7-R253	ER343078	Carbon RD1/4 2.7k(J)	1
7-R254	ER357456	Carbon RD1/4 2.2k(J)	1
7-R255	ER306843	Carbon RD1/4 1.2k(J)	1
7-R256	ER538547	Carbon RD1/2W 47(J)	1

#### SYS. CON.

#### P.C. BOARD (KD-A1001A) BLOCK

Symbol No.	Parts No.	Description	Q'ty
8-1x	BA426284	Sys. Con. P.C. Board Comp. (KD-A1001A)	1
8-TR101 to 8	ET398711	Transistor 2SC945(Q) (R)	8
8-TR109 to 11	ET338894	Transistor 2SC968(3)	3
8-D101 to 3	ED224526	Silicon Diode 10D1	3
8-D104	ED219464	Germanium Diode 1N34A	1
8-D106 to 8	ED219464	Germanium Diode 1N34A	3
8-D110	ED224526	Silicon Diode 10D1	1
8-D111 to 15	ED219464	Germanium Diode 1N34A	5
8-D116 to 19	ED224526	Silicon Diode 10D1	2
8-D120, 21	ED219464	Germanium Diode 1N34A	2
8-D122, 23	ED224526	Silicon Diode 10D1	2
8-D124, 25	ED219464	Germanium Diode 1N34A	2
8-D126	ED224526	Silicon Diode 10D1	1
8-D127	ED224550	Silicon Diode 10D4	1
8-VR101	EV426936	Semi-fixed Volume V10K-5 30 kB	1
8-VR102	EV221826	Semi-fixed Volume V10K-5 10 kB	1
8-RL101 to 6	EP344136	Relay MY4-O-US-AD4-24V	6
8-CR101, 2	ER376424	Spark Quencher U/L 0.1 $\mu$ +120 500WV	2
<b>Capacitor, Vertical Type</b>			
8-C101, 2	EC456041	Elect. 33 $\mu$ F 25WV	2
8-C103	EC220612	Elect. 33 $\mu$ F 25WV	1
8-C104	EC308711	Mylar 0.047 $\mu$ F(K) 50WV	1
8-C105, 6, 7	EC220994	Elect. 10 $\mu$ F 25WV	3
8-C108	EC273464	MP 0.1 $\mu$ F(M) 350WVDC (Tub. type)	1
8-C109	EC220612	Elect. 33 $\mu$ F 25WV	1
8-C110	EC220994	Elect. 10 $\mu$ F 25WV	1
<b>Resistor, Stopper Type</b>			
8-R101	ER211465	Carbon RD1/4 1k(J)	1
8-R102	ER362485	Carbon RD1/4 330k(J)	1

FIG. 8 PHOTO OF SYS. CON. P.C. BOARD (KD-A1001A)

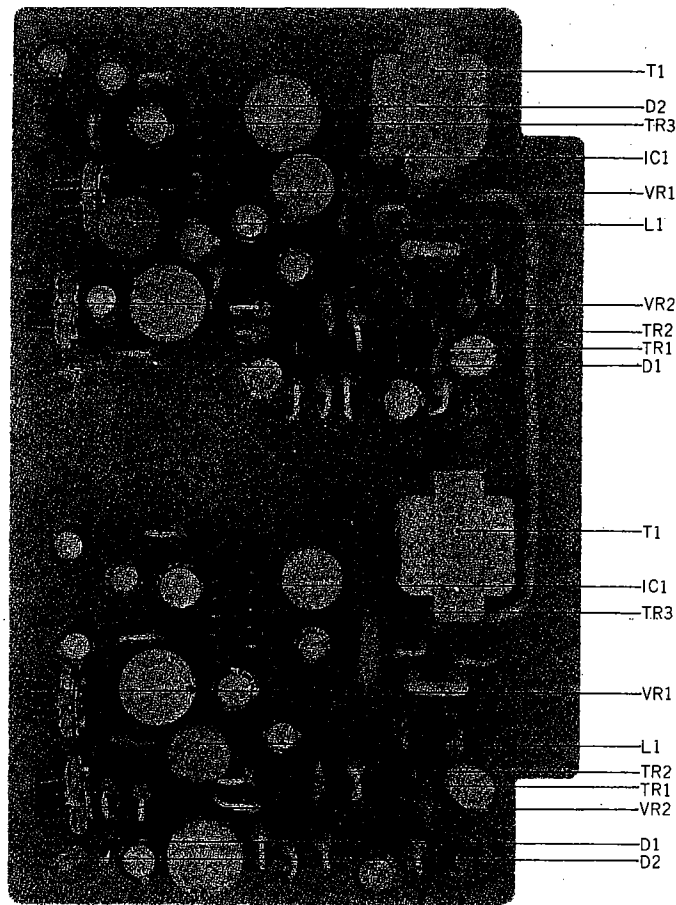


Symbol No.	Parts No.	Description	Q'ty	Symbol No.	Parts No.	Description	Q'ty
8-R103	ER336442	Carbon RD1/4 10k(J)	1	8-R119	ER357456	Carbon RD1/4 2.2k(J)	1
8-R104, 5	ER212883	Carbon RD1/4 4.7k(J)	2	8-R120	ER213300	Carbon RD1/4 680(J)	1
8-R106	ER362485	Carbon RD1/4 330k(J)	1	8-R121	ER391623	Metal Oxide Film 1W 1k(K)	1
8-R107	ER212883	Carbon RD1/4 4.7k(J)	1	8-R122	ER539065	Carbon RD1/4W 1.6k(J)	1
8-R108	ER211465	Carbon RD1/4 1k(J)	1	8-R123	ER213300	Carbon RD1/4 680(J)	1
8-R109	ER212883	Carbon RD1/4 4.7k(J)	1	8-R124	ER211667	Carbon RD1/4 100(J)	1
8-R110	ER357456	Carbon RD1/4 2.2k(J)	1	8-R125	ER336442	Carbon RD1/4 10k(J)	1
8-R111	ER343078	Carbon RD1/4 2.7k(J)	1	8-R126, 27	ER211465	Carbon RD1/4 1k(J)	2
8-R112	ER212883	Carbon RD1/4 4.7k(J)	1	8-R128	ER212883	Carbon RD1/4 4.7k(J)	1
8-R113	ER357456	Carbon RD1/4 2.2k(J)	1	8-R129	ER213030	Carbon RD1/4 5.6k(J)	1
8-R114	ER343078	Carbon RD1/4 2.7k(J)	1	8-R130	ER211465	Carbon RD1/4 1k(J)	1
8-R115	ER212883	Carbon RD1/4 4.7k(J)	1	8-R131	ER336442	Carbon RD1/4 10k(J)	1
8-R116	ER357456	Carbon RD1/4 2.2k(J)	1	8-R132	ER211465	Carbon RD1/4 1k(J)	1
8-R117	ER343078	Carbon RD1/4 2.7k(J)	1	8-R133	ER380147	Carbon RD1/4 10(J)	1
8-R118	ER391623	Metal Oxide Film 1W 1k(K)	1	8-R134	ER304290	Carbon RD1/4 10(J)	1

When ordering parts, please describe Parts Number, Serial Number, and Model Number in detail.



FIG. 9 PHOTO OF P.B. AMP. P.C. BOARD (MS-5022)

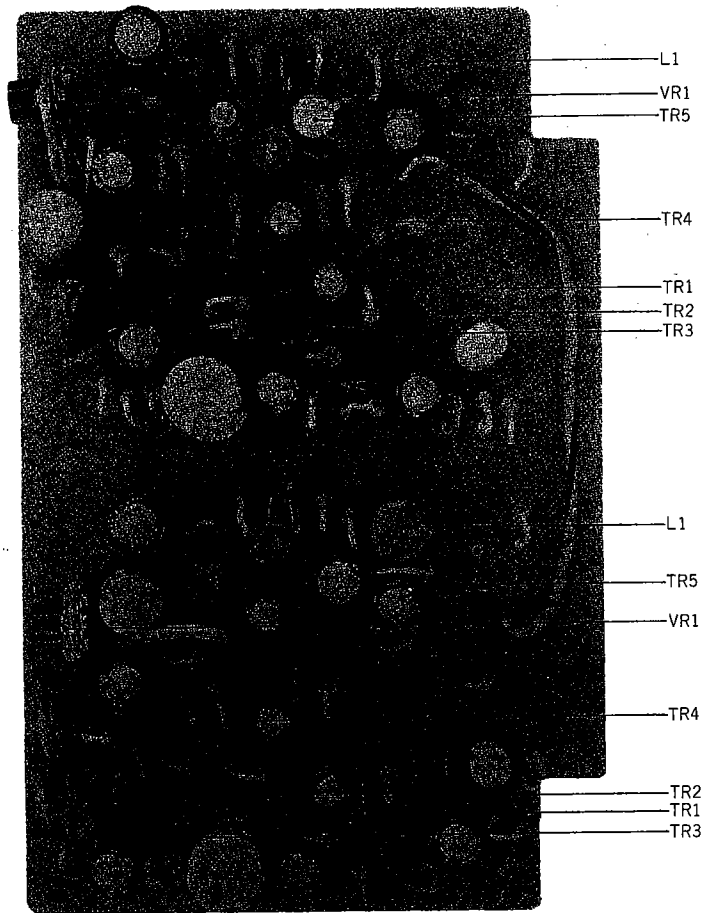


P.B. AMP. P.C. BOARD (MS-5022) BLOCK

Symbol No.	Parts No.	Description	Q'ty	Symbol No.	Parts No.	Description	Q'ty
9-1x	BA513325	P.B. Amp. P.C. Board Comp. (MS-5022)	1	9-C15	EC220994	Elect. 10 $\mu$ F 25WV	2
9-IC1	EI412413	Line Amp. I.C. LD-3141	2	9-C16	EC336104	Elect. 100 $\mu$ F 6.3WV	2
9-TR1, 2	ET234854	Transistor 2SC458LG(C)	4	9-C17	EC450055	Elect. 1 $\mu$ F 25WV	2
9-TR3	ET379462	Transistor 2SC711(D) (E)	2	9-C18	EC220994	Elect. 10 $\mu$ F 25WV	2
9-D1, 2	ED219464	Germanium Diode 1N34A	4	9-C19	EC450055	Elect. 1 $\mu$ F 25WV	2
9-VR1	EV221850	Semi-fixed Volume V10K-5 20 kB	2	9-C20	EC290520	VFM 100PF(J) 50WV	2
9-VR2	EV398812	Semi-fixed Volume V10K-5 5 kB	2			<b>Resistor, Stopper Type</b>	
9-L1	EO244012	Ferri Inductor FL9H 22MH(J)	2	9-R1	ER346601	Carbon RD1/4 47k(J)	2
9-T1	BT247768	Head Phone Trans. N19-5921S	2	9-R2	ER336442	Carbon RD1/4 10k(J)	2
		<b>Capacitor, Vertical Type</b>		9-R3	ER362485	Carbon RD1/4 330k(J)	2
9-C1	EC329850	VFM 220PF(J) 50WV	2	9-R4	ER212681	Carbon RD1/4 330(J)	2
9-C2	EC432810	Elect. 10 $\mu$ F 16WV (noiseless)	2	9-R5	ER426857	Carbon RD1/4 270k(J)	2
9-C3	EC290531	VFM 100PF(K) 50WV	2	9-R6	ER357570	Carbon RD1/4 150k(J)	2
9-C4	EC329771	Elect. 47 $\mu$ F 6.3WV	2	9-R7	ER212264	Carbon RD1/4 22k(J)	2
9-C5	EC250841	Mylar 0.01 $\mu$ F(J) 50WV	2	9-R8	ER212477	Carbon RD1/4 3.3k(J)	2
9-C6	EC290531	VFM 100PF(K) 50WV	2	9-R9	ER212883	Carbon RD1/4 4.7k(J)	2
9-C7	EC450055	Elect. 1 $\mu$ F 25WV	2	9-R10	ER212264	Carbon RD1/4 22k(J)	2
9-C8	EC329771	Elect. 47 $\mu$ F 6.3WV	2	9-R11	ER306887	Carbon RD1/4 15k(J)	2
9-C9	EC476965	Elect. 47 $\mu$ F 25WV (noiseless)	2	9-R12	ER212264	Carbon RD1/4 22k(J)	2
9-C10	EC336126	Elect. 47 $\mu$ F 25WV	2	9-R13	ER429996	Carbon RD1/4 470k(J)	2
9-C11	EC329850	VFM 220PF(J) 50WV	2	9-R14	ER357456	Carbon RD1/4 2.2k(J)	2
9-C12	EC320051	Elect. 10 $\mu$ F 16WV	2	9-R15	ER212264	Carbon RD1/4 22k(J)	2
9-C13	EC329771	Elect. 47 $\mu$ F 6.3WV	2				
9-C14	EC290520	VFM 100PF(J) 50WV	2				

When ordering parts, please describe Parts Number, Serial Number, and Model Number in detail.

FIG. 10 PHOTO OF REC. AMP. P.C. BOARD. (MS-5023)

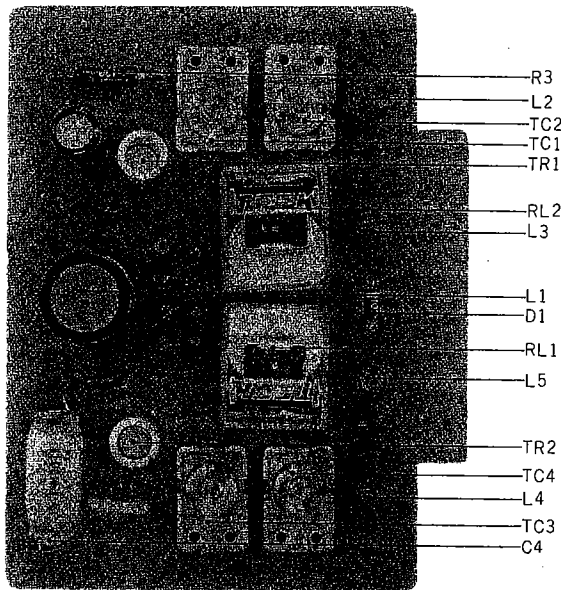


REC. AMP. P.C. BOARD (MS-5023) BLOCK

Symbol No.	Parts No.	Description	Q'ty	Symbol No.	Parts No.	Description	Q'ty
10-1x	BA513336	Rec. Amp. P.C. Board Comp. (MS-5023)	1	10-R1, 2	ER336442	Carbon RD1/4 10k(J)	4
10-TR1,2,3	ET234854	Transistor 2SC458LG(C)	6	10-R3	ER362485	Carbon RD1/4 330k(J)	2
10-TR4	ET379462	Transistor 2SC711(D) (E)	2	10-R4	ER213300	Carbon RD1/4 680(J)	2
10-TR5	ET446736	Transistor 2SC968(2) (3)	2	10-R5	ER357570	Carbon RD1/4 150k(J)	2
10-VR1	EV398812	Semi-fixed Volume V10k-5 5 kΩ	2	10-R6	ER212264	Carbon RD1/4 22k(J)	2
10-L1	EO512954	Ferri Inductor FL9H 560μH(K)	2	10-R7	ER346994	Carbon RD1/4 18k(J)	2
		<b>Capacitor, Vertical Type</b>		10-R8	ER343078	Carbon RD1/4 2.7k(J)	2
10-C1	EC432810	Elect. 10μF 16WV (noiseless)	2	10-R9	ER211320	Carbon RD1/4 1.5k(J)	2
10-C2	EC383501	Mylar 0.001μF(M) 50WV	2	10-R10	ER357456	Carbon RD1/4 2.2k(J)	2
10-C3	EC329771	Elect. 47μF 6.3WV	2	10-R11	ER212883	Carbon RD1/4 4.7k(J)	2
10-C4	EC399690	VFM 33PF(J) 50WV	2	10-R12	ER349942	Carbon RD1/4 8.2k(J)	2
10-C5	EC290531	VFM 100PF(K) 50WV	2	10-R13	ER211757	Carbon RD1/4 100k(J)	2
10-C6	EC320051	Elect. 10μF 16WV	2	10-R14	ER357412	Carbon RD1/4 220(J)	2
10-C7	EC329771	Elect. 47μF 6.3WV	2	10-R15	ER211757	Carbon RD1/4 100k(J)	2
10-C8	EC476965	Elect. 47μF 25WV (noiseless)	2	10-R16	ER349907	Carbon RD1/4 33k(J)	2
10-C9	EC336126	Elect. 47μF 25WV	2	10-R17	ER357456	Carbon RD1/4 2.2k(J)	2
10-C10	EC320051	Elect. 10μF 16WV	2	10-R18	ER212681	Carbon RD1/4 330(J)	2
10-C11	EC290531	VFM 100PF(K) 50WV	2	10-R19	ER349784	Carbon RD1/4 390(J)	2
10-C12	EC329771	Elect. 47μF 6.3WV	2	10-R20	ER350100	Carbon RD1/4 68k(J)	2
10-C13	EC220994	Elect. 10μF 25WV	2	10-R21	ER212681	Carbon RD1/4 330(J)	2
10-C14	EC336104	Elect. 100μF 6.3WV	2	10-R22	ER336442	Carbon RD1/4 10k(J)	2
10-C15	EC368370	Mylar 0.15μF(J) 50WV	2	10-R23	ER343078	Carbon RD1/4 2.7k(J)	2
10-C16	EC379170	Mylar 0.1μF(J) 50WV	2	10-R24	ER346994	Carbon RD1/4 18k(J)	2
10-C17	EC320051	Elect. 10μF 16WV	2	10-R25	ER352045	Carbon RD1/4 3.9k(J)	2
10-C18	EC423033	VFM 680PF(K) 50WV	2	10-R26	ER211465	Carbon RD1/4 1k(J)	2
10-C19	EC220994	Elect. 10μF 25WV	2	10-R27	ER361563	Carbon RD1/4 180(J)	2
10-C20	EC379157	Mylar 0.033μF(J) 50WV	2	10-R28	ER336442	Carbon RD1/4 10k(J)	2
				10-R29	ER212264	Carbon RD1/4 22k(J)	2
				10-R30	ER211667	Carbon RD1/4 100(J)	2

When ordering parts, please describe Parts Number, Serial Number, and Model Number in detail.

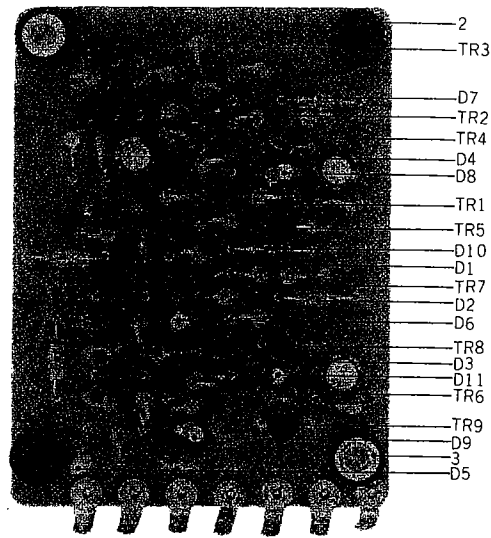
FIG. 11 PHOTO OF  
OSC. P.C. BOARD (KF-5010)



OSC. P.C. BOARD (KF-5010) BLOCK

Symbol No.	Parts No.	Description	Q'ty
11-1x	BA442282	OSC. P.C. Board Comp. (KF-5010)	1
11-TR1, 2	ET304255	Transistor 2SC971(2) (3) (red)	2
11-D1	ED224526	Silicon Diode 10D1	1
11-L1	EO383365	OSC. Coil OT-204	1
11-L2 to 5	EO424866	Ferri Inductor FL7H 1.2MH(J)	4
11-RL1, 2	EP315461	Relay TECK-19 1500	2
11-TC1 to 4	EC398878	Trimmer Condenser C-1P-2 50 to 70PF	4
<b>Capacitor, Vertical Type</b>			
11-C1, 2	EC250841	Mylar 0.01 $\mu$ F(J) 50WV	2
11-C3	EC220678	Elect. 47 $\mu$ F 25WV	1
11-C4	EC442080	Plustic Film 4500PF(J) 500WV	1
11-C5 to 8	EC250683	Mylar 0.0022 $\mu$ F(J) 50WV	4
<b>Resistor, Stopper Type</b>			
11-R1, 2	ER315944	Carbon RD1/4 3.3(J)	2
11-R3	ER398856	Metal Oxide Film 1W 100(K)	1
11-R4	ER304402	Carbon RD1/4 470(J)	1
11-R5	ER212883	Carbon RD1/4 4.7k(J)	1

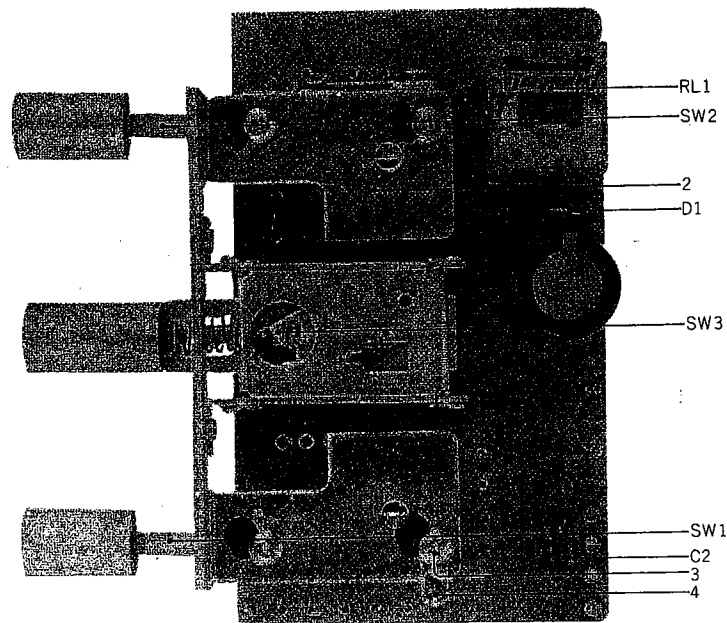
FIG. 12 PHOTO OF AUTO REPEAT  
P.C. BOARD (KF-2013)



AUTO REPEAT  
P.C. BOARD (KF-2013) BLOCK

Symbol No.	Parts No.	Description	Q'ty
12-1x	BA442214	Auto Repeat P.C. Board Comp. (KF-2013)	1
12-TR1 to 9	ET398711	Transistor 2SC945(Q) (R)	9
12-D1 to 11	ED219464	Germanium Diode 1N34A	11
12-2	EZ246611	P.C. Board Cushion	4
12-3	EZ237148	Eyelet D4x7x10	2
<b>Capacitor, Vertical Type</b>			
12-C1	EC250885	Mylar 0.01 $\mu$ F(K) 50WV	1
12-C2	EC220994	Elect. 10 $\mu$ F 25WV	1
12-C3	EC308711	Mylar 0.047 $\mu$ F(K) 50WV	1
12-C4, 5	EC220994	Elect. 10 $\mu$ F 25WV	2
<b>Resistor, Stopper Type</b>			
12-R1	ER336442	Carbon RD1/4 10k(J)	1
12-R2, 3	ER212883	Carbon RD1/4 4.7k(J)	2
12-R4	ER213030	Carbon RD1/4 5.6k(J)	1
12-R5	ER212264	Carbon RD1/4 22k(J)	1
12-R6	ER336442	Carbon RD1/4 10k(J)	1
12-R7	ER212883	Carbon RD1/4 4.7k(J)	1
12-R8	ER213030	Carbon RD1/4 5.6k(J)	1
12-R9	ER211465	Carbon RD1/4 1k(J)	1
12-R10	ER212264	Carbon RD1/4 22k(J)	1
12-R11	ER212883	Carbon RD1/4 4.7k(J)	1
12-R12	ER357456	Carbon RD1/4 2.2k(J)	1
12-R13	ER212883	Carbon RD1/4 4.7k(J)	1
12-R14	ER213030	Carbon RD1/4 5.6k(J)	1
12-R15	ER211465	Carbon RD1/4 1k(J)	1
12-R16	ER211320	Carbon RD1/4 1.5k(J)	1
12-R17	ER212883	Carbon RD1/4 4.7k(J)	1
12-R18	ER213030	Carbon RD1/4 5.6k(J)	1
12-R19	ER212883	Carbon RD1/4 4.7k(J)	1
12-R20	ER213030	Carbon RD1/4 5.6k(J)	1
12-R21	ER212883	Carbon RD1/4 4.7k(J)	1
12-R22	ER213030	Carbon RD1/4 5.6k(J)	1
12-R23	ER211465	Carbon RD1/4 1k(J)	1
12-R24	ER212883	Carbon RD1/4 4.7k(J)	1
12-R25	ER213030	Carbon RD1/4 5.6k(J)	1
12-R26	ER211465	Carbon RD1/4 1k(J)	1
12-R27, 28	ER212883	Carbon RD1/4 4.7k(J)	2
12-R29, 30	ER357456	Carbon RD1/4 2.2k(J)	2
12-R31, 32	ER343078	Carbon RD1/4 2.7k(J)	2

FIG. 13 PHOTO OF SWITCH P.C. BOARD (KF-2012)



**SWITCH P.C. BOARD (KF-2012) BLOCK**

Symbol No.	Parts No.	Description	Q'ty
13-1x	BA442225	Switch P.C. Board Comp. (KF-2012)	1
13-SW1, 2	ES426971	Push Switch UEG-62L (without Knob)	2
13-SW3	ES442045	Push Switch SPM-015	1
13-D1	ED224526	Silicon Diode 10D1	1
13-RL1	EP383321	Relay TECK-36 DC22V1000	1
13-2	EZ441674	Switch Table	1
13-3	ZW442585	Screw, binding head 2.6x4	4
13-4	ZW316800	Earth Lug, M2.6	1
13-5x	EJ441685	18P Terminal P.C. Board	1
		<b>Capacitor, Vertical Type</b>	
13-C1	EC331817	Elect. 470 $\mu$ F 25WV	1
13-C2	EC455894	Hi-Q 490PF(J) 500WV	1
13-R1	ER304402	Carbon Resistor RD1/4 470(J)	1

When ordering parts, please describe Parts Number, Serial Number, and Model Number in detail.

FIG. 14 PHOTO OF EQUALIZER SWITCH  
P.C. BOARD (KF-2014)

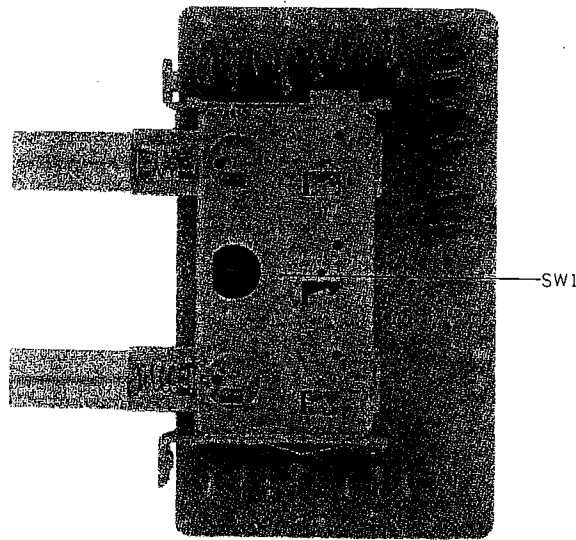
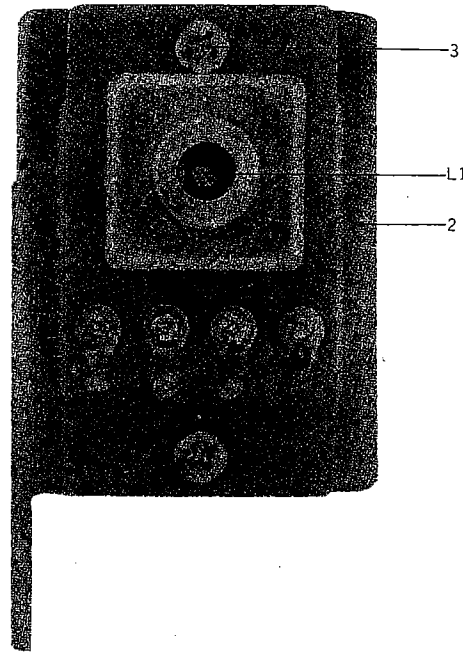


FIG. 15 PHOTO OF  
COIL P.C. BOARD (KD-1097)



**EQUALIZER SWITCH  
P.C. BOARD (KF-2014) BLOCK**

Symbol No.	Parts No.	Description	Q'ty
14-1x	BA513268	Equalizer Switch P.C. Board Comp. (KF-2014)	1
14-SW1	ES447827	Push Switch UM32420	1
14-2x	EJ441685	18P Terminal P.C. Board	1
<b>Capacitor, Vertical Type</b>			
14-C1	EC368368	Mylar 0.056 $\mu$ F(J) 50WV	1
14-C2	EC302321	Mylar 0.01 $\mu$ F(J) 50WV	1
14-C3	EC438052	Mylar 0.082 $\mu$ F(J) 50WV	1
14-C4	EC329861	Mylar 0.027 $\mu$ F(J) 50WV	1
14-C5	EC368368	Mylar 0.056 $\mu$ F(J) 50WV	1
14-C6	EC302321	Mylar 0.01 $\mu$ F(J) 50WV	1
14-C7	EC438052	Mylar 0.082 $\mu$ F(J) 50WV	1
14-C8	EC329861	Mylar 0.027 $\mu$ F(J) 50WV	1
14-C9	EC368368	Mylar 0.056 $\mu$ F(J) 50WV	1
14-C10	EC302321	Mylar 0.01 $\mu$ F(J) 50WV	1
14-C11	EC438052	Mylar 0.082 $\mu$ F(J) 50WV	1
14-C12	EC329861	Mylar 0.027 $\mu$ F(J) 50WV	1
14-C13	EC368368	Mylar 0.056 $\mu$ F(J) 50WV	1
14-C14	EC302321	Mylar 0.01 $\mu$ F(J) 50WV	1
14-C15	EC438052	Mylar 0.082 $\mu$ F(J) 50WV	1
14-C16	EC329861	Mylar 0.027 $\mu$ F(J) 50WV	1
14-C17	EC336216	VFM 330PF(J) 50WV	1
14-C19	EC336216	VFM 330PF(J) 50WV	1
14-C21	EC336216	VFM 330PF(J) 50WV	1
14-C23	EC336216	VFM 330PF(J) 50WV	1
<b>Resistor, Stopper Type</b>			
14-R1	ER212883	Carbon RD1/4 4.7k(J)	1
14-R2	ER212872	Carbon RD1/4 4.3k(J)	1
14-R3	ER212883	Carbon RD1/4 4.7k(J)	1
14-R4	ER212872	Carbon RD1/4 4.3k(J)	1
14-R5	ER212883	Carbon RD1/4 4.7k(J)	1
14-R6	ER212872	Carbon RD1/4 4.3k(J)	1
14-R7	ER212883	Carbon RD1/4 4.7k(J)	1
14-R8	ER212872	Carbon RD1/4 4.3k(J)	1

**COIL P.C. BOARD (KD-1097) BLOCK**

Symbol No.	Parts No.	Description	Q'ty
15-1x	BA497845	Coil P.C. Board Comp. (KD-1097)	1
15-L1	EO403446	Variable Coil VI2031 SC-01	1
15-2	EZ495832	Coil P.C. Board Base	1
15-3	ZW413155	Screw, binding head 3x6	2

FIG. 16 (A) ILLUSTRATION OF POWER SUPPLY BLOCK

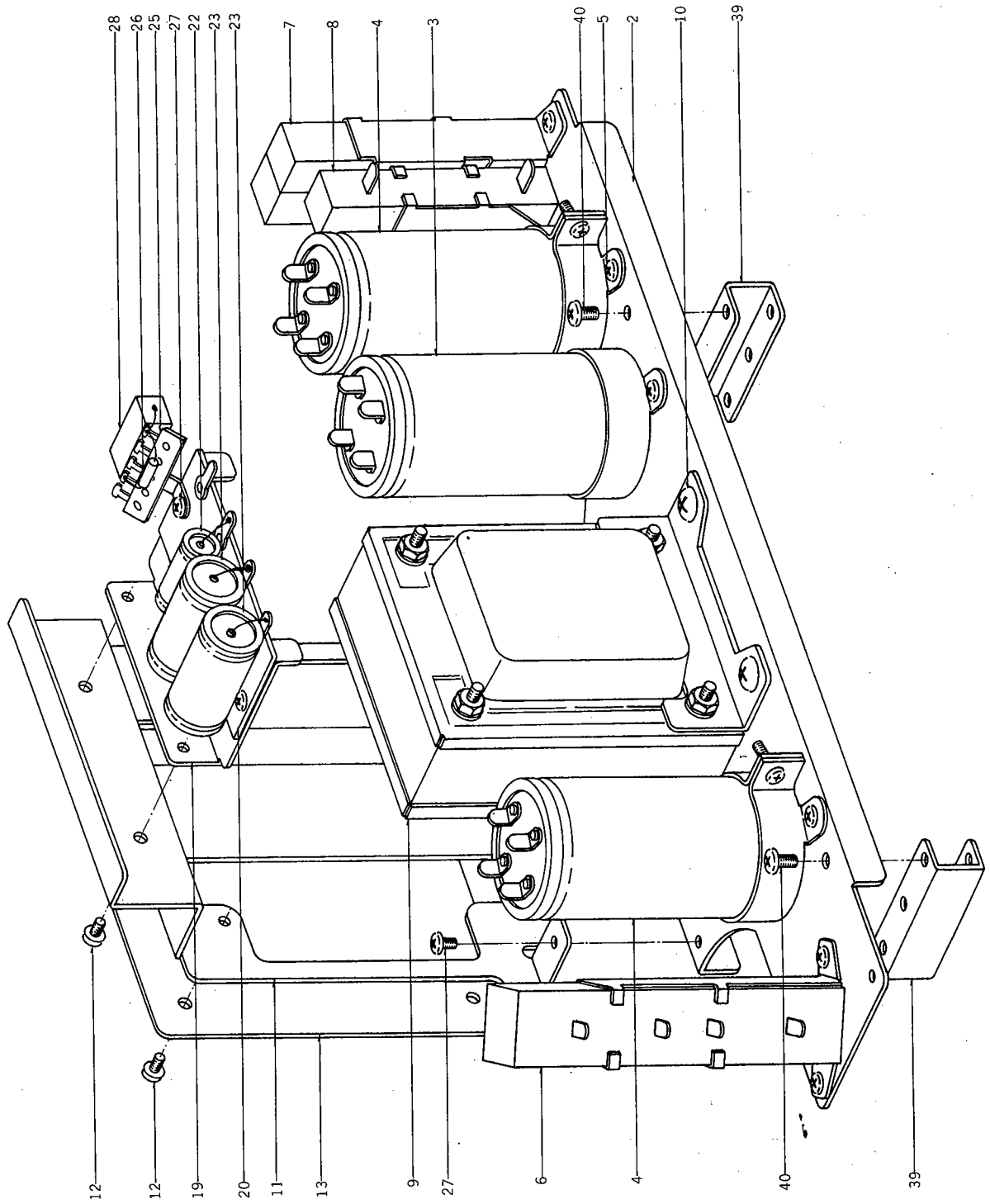
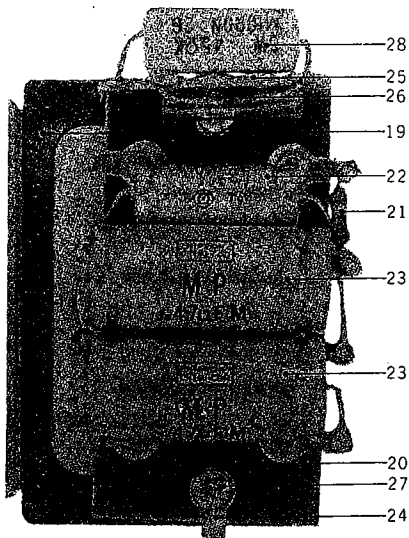
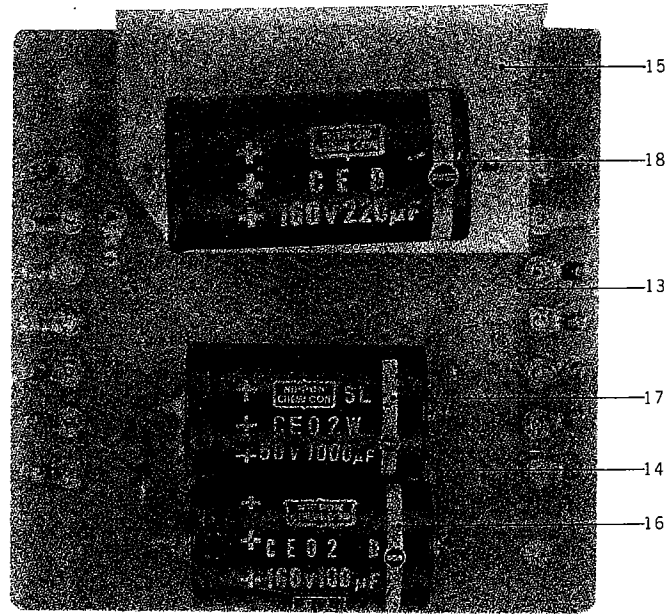


FIG. 16 (B, C) PHOTO OF POWER SUPPLY BLOCK



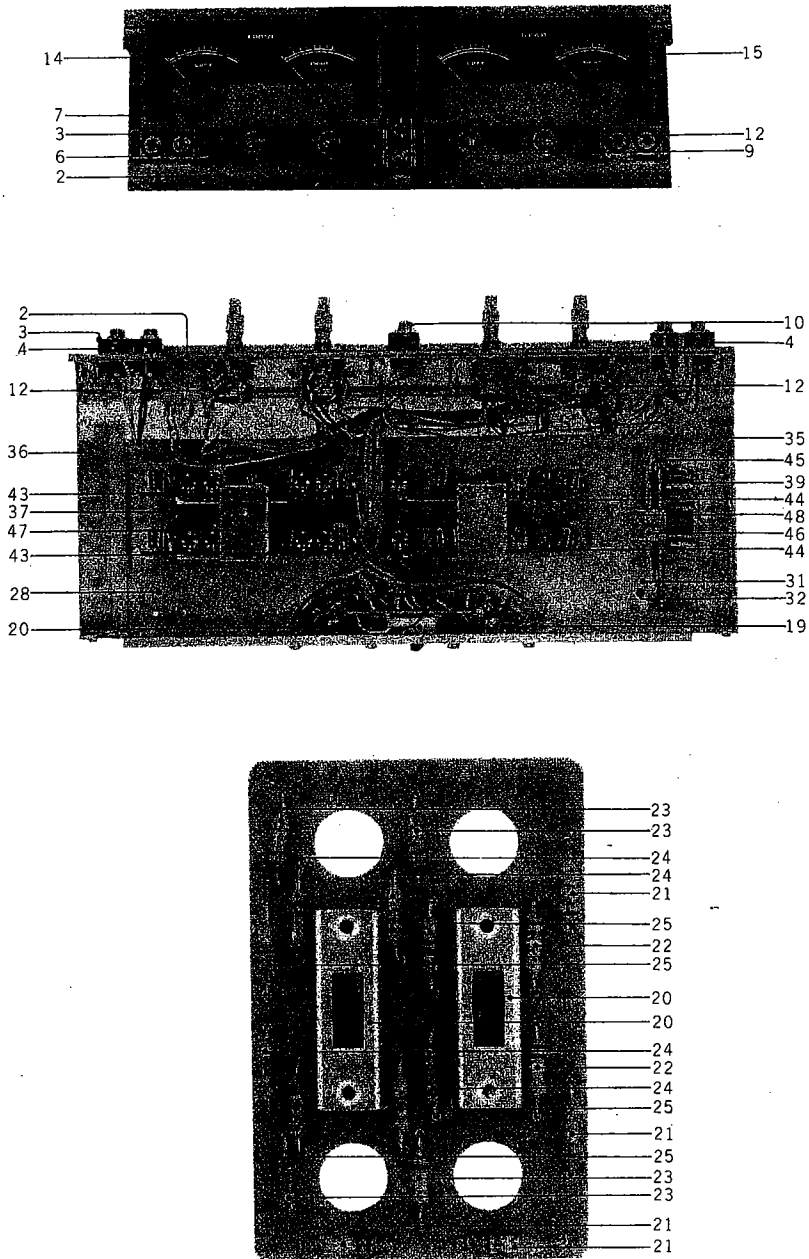
Ref. No.	Parts No.	Description	Schematic No.	Q'ty
16-11	MZ465772	Trans. Table D	KD-A2008	1
16-12	ZW490228	Tapping Screw #2 3x8		6
16-13	EA465851	Capacitor P.C. Board	KD-A2013	1
16-14	ED224550	Silicon Diode 10D4	45-2-16	1
16-15	EZ472206	Capacitor Insulator Plate B	KD-2064	1
16-16	EC316091	Elect./C. 100μF 160WV (Tub. type)	24-14-14	1
16-17	EC365692	Elect./C. 1000μF 50WV (Tub. type)	24-13-15	1
16-18	EC346746	Elect./C. 220μF 160WV (Tub. type)	24-14-8	1
16-19	EZ397282	Capacitor Retaining Base	KD-2027	1
16-20	EZ398946	Terminal Plate SP-0501 4P (B type)	33-2-17	1
16-21	ER430143	Carbon/R. RD1/4 120(J) (Insu. type)	35-9-5	1
16-22	EC273464	MP/C. 0.1μF(M) 350WVDC (Tub. type)	24-9-4	1
16-23	EC341842	MP/C. 0.47μF(M) 300WVAC (Tub. type)	24-9-35	2
16-24	ZW273778	Earth Lug, M3		1
16-25	EJ255115	Lug Plate VB2L2	33-4-3	1
16-26	ED224550	Silicon Diode 10D4	45-2-16	1
16-27	ZW323728	Screw, binding head 3x5		4
16-28	ER466986	Cement/R. S5W 45(K) (Wire-wound type)	35-16-3	1
16-29x	EZ328320	Nylon Clip HP-5N		2
16-30x	ZW462194	Tapping Screw #2 3x8(pan), w/washer		2
16-31x	EZ397304	Frequency Change Switch Plate A	KD-2043	1
16-32x	ES375478	Slide Switch ESD-279DU	25-3-23	2
16-33x	ZW371856	Iso Screw, binding head 3x5		2
16-34x	ZW440291	Iso Screw, countersunk head 3x6		2
16-35x	EJ233370	Power Plug Socket S-18010 (Volt. Select.)	40-2-3	1
16-36x	EF338387	Fuse ST-2 1.5A	39-1-26	1
16-37x	EF277413	Fuse ST-2 2A	39-1-26	1
16-38x	EJ205975	Cramp Terminal 1-SD	32-1-7	1
16-39	MZ397170	Trans. Table C	KD-1065	2
16-40	ZW417150	Screw, pan head 4x6		4

POWER SUPPLY BLOCK

Ref. No.	Parts No.	Description	Schematic No.	Q'ty
16-1x	BP442304	Power Supply Block Comp.	KF	1
16-2	UM488924	Trans. Table	KH-2052	1
16-3	EC434081	MP/C. 3+0.5μF 200WV (Lug type Uni/D.)	24-9-58	1
16-4	EC398632	MP/C. 3+1μF 260WV (Lug type Uni/D.)	24-9-52	2
16-5	ZW472274	Tapping Screw #2 3x6		11
16-6	ER426688	Cement/R. H40H2B H40H2B(150+350)K	35-16-23	1
16-7	ER441955	Cement/R. H1B (60x1.5k+500)K	35-16-24	1
16-8	ER472296	Cement/R. H20B 220(K)	35-16-16	1
16-9	BT466672	Power Trans. KDT-2	38-4-147	1
16-10	ZW468112	Tapping Screw #2 4x8 (truss)		4

When ordering parts, please describe Parts Number, Serial Number, and Model Number in detail.

FIG. 17 PHOTO OF AMPLIFIER ASSEMBLY BLOCK



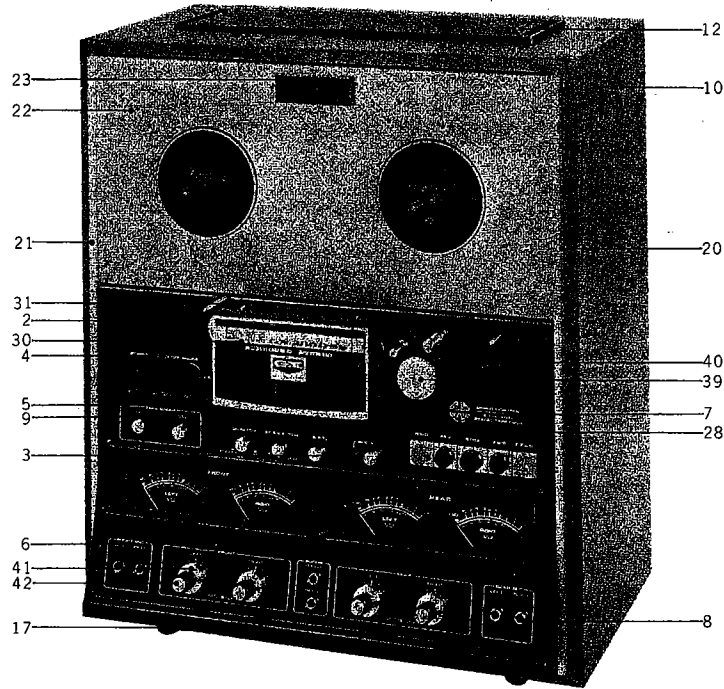


## AMPLIFIER ASSEMBLY BLOCK

Ref. No.	Parts No.	Description	Schematic No.	Q'ty
<b>FRONT FRAME BLOCK</b>				
17-1x	BZ447647	Front Frame Block Comp.	KF	1
17-2	EZ441797	Amp. Frame	KF-5005	2
17-3	EJ441810	Mic. Jack Table	KF-5007	2
17-4	EJ433844	Mic. Jack 2PMJ4	31-2-35	4
17-5x	EZ225180	Nylon Collar, Jack	LD-520	4
17-6	ZW260368	Washer (Fiber)D9.2x18x0.5t		4
17-7	ZW375153	E Jack Nut		6
17-8x	ZW447772	Tapping Screw #2 3x6(BR)		6
17-9	EJ441808	Head Phone Jack Stand	KF-5006	1
17-10	EJ442078	Mic. Jack 3PMJ4	31-2-36	2
17-11x	ZW436026	Washer (SPC)D9.2x15x0.5t		2
17-12	EV442102	Double Volume DJ50A 50		4
		kAx2	36-3-33	
17-13x	ER329308	Carbon/R. RD1/4 47k(J)		4
		(Insu. type)	35-9-5	
17-14	EM442113	VU Meter KL-266A-1(Front)	46-1-45	1
17-15	EM442124	VU Meter KL-266A-2 (Rear)	46-1-46	1
17-16x	SZ223042	Shield Plate Moltplene		2
		5tx30x85	RD-538	
17-17x	ZW273756	Nut, M3		8
<b>JACK PLATE BLOCK</b>				
17-18x	BZ513314	Jack Plate Block Comp.	KF-2	1
17-19	EJ441865	Jack Plate, w/jack	KF-5002	1
17-20	ES446973	Slide Switch SL-242B4D	25-3-51	2
17-21	ER213873	Carbon/R. RD1/4 150k(J)		4
		(Insu. type)	35-9-5	
17-22	ER213715	Carbon/R. RD1/4 100k(J)		2
		(Insu. type)	35-9-5	
17-23	ER345756	Carbon/R. RD1/4 68k(J)		4
		(Insu. type)	35-9-5	
17-24	ER214536	Carbon/R. RD1/4 6.8k(J)		4
		(Insu. type)	35-9-5	
17-25	ER430288	Carbon/R. RD1/4 680(J)		4
		(Insu. type)	35-9-5	
17-26x	ER345712	Carbon/R. RD1/4 22k(J)		4
		(Insu. type)	35-9-5	
17-27x	ER213647	Carbon/R. RD1/4 10k(J)		4
		(Insu. type)	35-9-5	
<b>ASSEMBLY BLOCK</b>				
17-28	EZ441764	Amp. Chassis	KF-5001	1
17-29x	EZ397743	P.C. Board Prop	KD-2044	6
17-30x	ZW413155	Screw, binding head 3x6		6
17-31	EZ441775	OSC. Shield Plate	KF-5003	1
17-32	ZW447772	Tapping Screw #2 3x6(BR)		10
17-33x	EZ441786	P.C. Board Retaining Prop	KF-5004	3
17-34x	ZW417025	Screw, binding head 3x8, w/washer		3
17-35	EZ441821	Amp. Side Plate (Right)	KF-5008	1
17-36	EZ441832	Amp. Side Plate (Left)	KF-5008	1
17-37	EJ347670	22P Multi-jack-3 3250-022- 001S	31-4-13	4
17-38x	EJ310871	18P Multi-jack J-2 3250-018- 001	31-4-11	2
17-39	EJ368785	14P Multi-jack 3250-014-001	31-4-14	2
17-40x	EJ299834	6P Mate-N-Lock Plug Housing 1-480273-0	52-1-2	1
17-41x	EJ229353	Socket Contact 60510-1	52-1-1	6
17-42x	ZW273778	Earth Lug, M3		5
17-43	BA513325	P.B. P.C. Board Comp. (MS-5022)		2
17-44	BA513336	Rec. P.C. Board Comp. (MS-5023)		2
17-45	BA442282	OSC. P.C. Board Comp. (KF-5010)		1
17-46	EZ441854	P.C. Board Retainer	KF-5013	1
17-47	EZ411287	P.C. Board Retaining Metal	LF-5027	2
17-48	ZW413741	Screw, binding head 3x8		3

When ordering parts, please describe Parts Number, Serial Number, and Model Number in detail.

FIG. 18 PHOTO OF FINAL ASSEMBLY BLOCK



**FINAL ASSEMBLY BLOCK**

Ref. No.	Parts No.	Description	Schematic No.	Q'ty	Ref. No.	Parts No.	Description	Schematic No.	Q'ty
<b>AMP. PANEL BLOCK</b>					<b>ASSEMBLY BLOCK</b>				
18-1x	BZ513235	Amp. Panel Block Comp.	KF-2	1	18-20	SP441360	Sash (Right)	KF-6004	1
18-2	SP441437	Amp. Panel	KF-6007	1	18-21	SP491905	Sash (Left)	KF-6004	1
18-3	EZ426780	Illumination Escutcheon (red)	61-5023	1	18-22	SP513347	Mech. Panel B	KF-6005	1
18-4	SM441448	Amp. Panel Name Plate A	KF-6008	1	18-23	SZ397618	Counter Escutcheon	KD-6008	1
18-5	SM441450	Amp. Panel Name Plate B	KF-6009	1	18-24x	ZW323728	Screw, binding head 3x5		4
18-6	SM441461	Amp. Panel Name Plate C	KF-6010	1	18-25x	ZW200384	Screw, countersunk head 3x6		2
18-7	SM512897	Panel Plate	KF-6202	1	18-26x	ZW447805	Tapping Screw #2 3x12(BR)		4
18-8	EZ441483	Jack Collar	KF-6016	6	18-27x	ZW419793	Screw, countersunk head 3x12		2
18-9	SK441472	Button Collar	KF-6017	6	18-28	SZ441404	Head Cover Base	KF-6012	1
<b>CASE BLOCK</b>					18-29x	ZW201060	Screw, truss head 3x12		2
18-10	BC442326	Case Block Comp.	KF	1	18-30	SM512910	Head Cover Name Plate	KF-6201	1
18-11x	ZW447963	Tapping Screw #1 3x10(truss)		25	18-31	SC426407	Head Cover	KD-A6001	1
18-12	SZ382230	Ventilator (Upper)	RD-A404	1	18-32x	ZW201150	Screw, truss head 3x6 (black)		2
18-13x	ZW439672	Screw, truss head 3x14, without groove		4	18-33x	SZ377190	LM Rubber Foot	LM-404	4
18-14x	ZW273756	Nut, M3		4	18-34x	ZW419646	Washer (SPC)D4.5x9.8x0.5t		4
18-15x	SZ382241	Ventilator Retaining Plate	RD-A405	1	18-35x	ZW421503	Tapping Screw #1 4x30(truss)		4
18-16x	ZW 439672	Tapping Screw #1 4x10(truss)		1	18-36x	ZW259806	Washer (SPC-1)D4.5x12.8x1t		6
18-17	SZ382230	LM Rubber Foot	LM-404	4	18-37x	ZW200621	Tapping Screw #1 4x25(truss)		2
18-18x	ZW419646	Washer (SPC)D4.5x9.8x0.5t		4	18-38x	ZW366377	Tapping Screw #1 4x45(truss)		4
18-19x	ZW403571	Wood Screw, round head 4.5x20		4	18-39	SK425158	Pinch Roller Cap	MS-6020	1
					18-40	MP424023	Pinch Roller (KD)	KD-1084	1
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HZ411074	1-35x	MZ397348	4-133	ZG396516	4-31	ZW336857	1-48	ZW447963	18-11x
HZ412637	1-19	MZ397394	4-125	ZG396538	1-47	ZW336868	1-32	ZW455231	1-33
HZ441911	1-29	MZ397405	4-37	ZG397440	4-45	ZW338635	1-41	ZW462194	16-30x
HZ441922	1-38	MZ397416	4-41	ZG407575	1-61	ZW345442	1-58	ZW467908	4-47

# INDEX

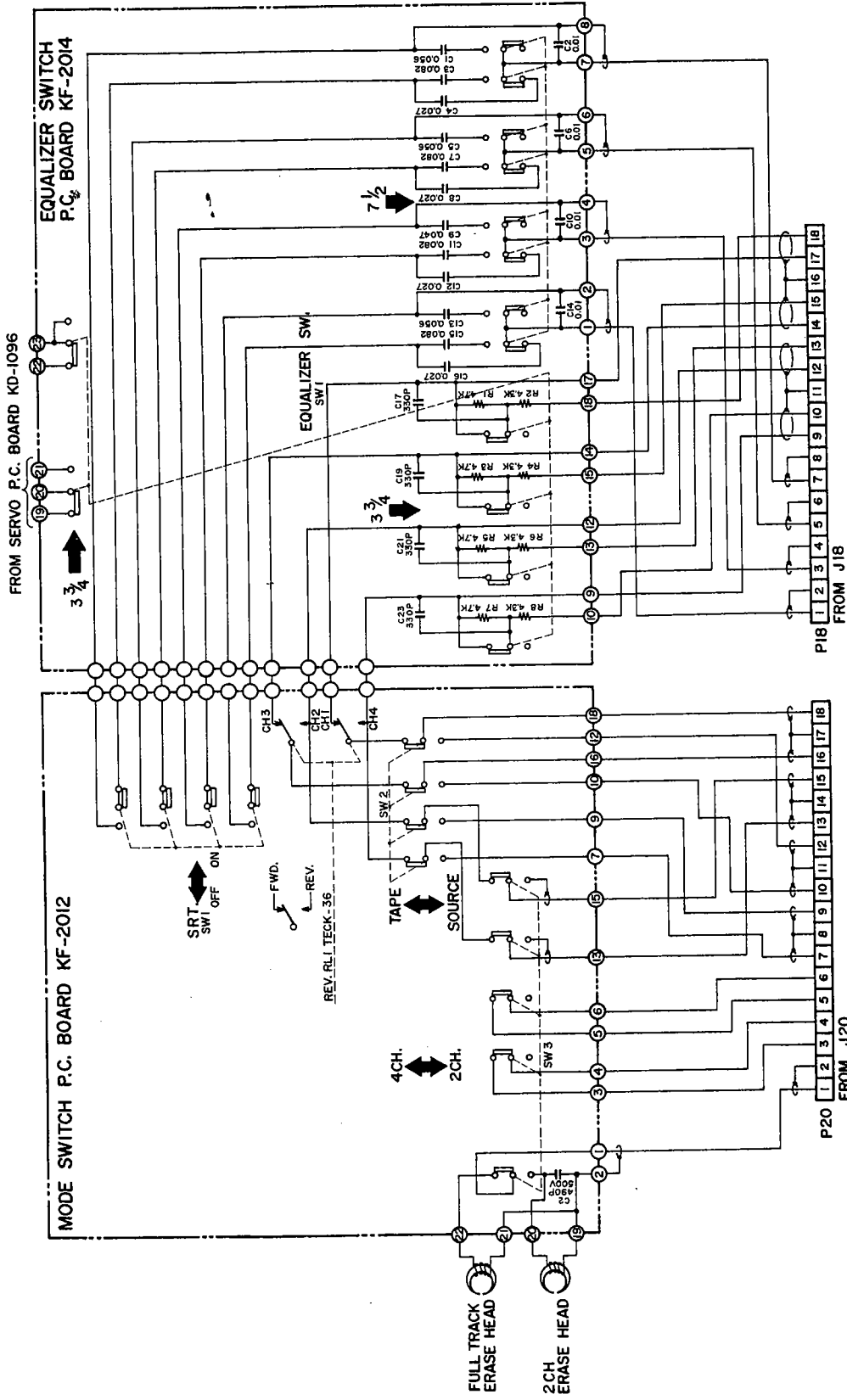
Parts No.	Ref. No. & Symbol No.	Parts No.	Ref. No. & Symbol No.	Parts No.	Ref. No. & Symbol No.	Parts No.	Ref. No. & Symbol No.	Parts No.	Ref. No. & Symbol No.
ZW468112	16-10								
ZW472274	16-5								
ZW490228	16-12								
ZW516611	4-82x								
ZW516644	2-18								

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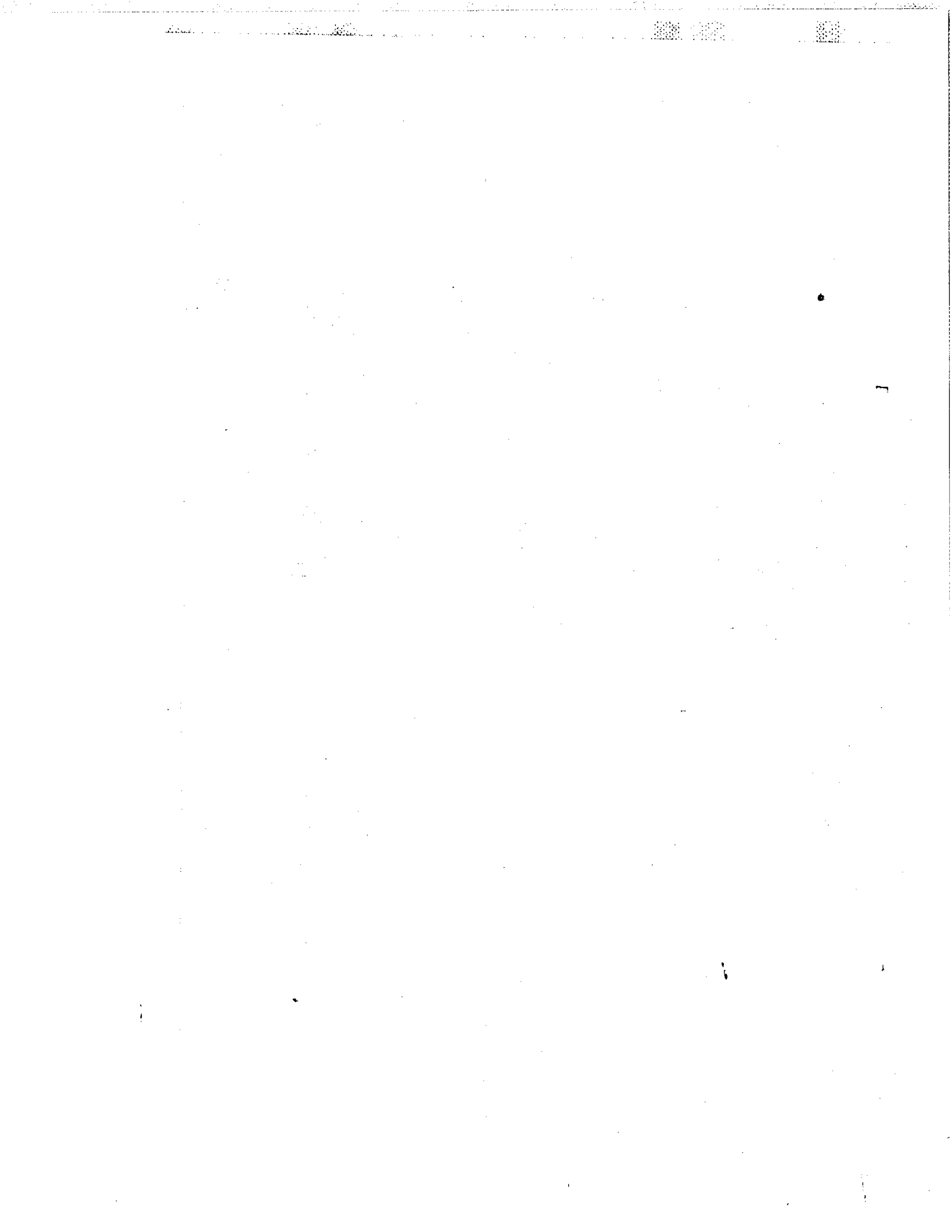
SECTION 3

**SCHEMATIC DIAGRAM**

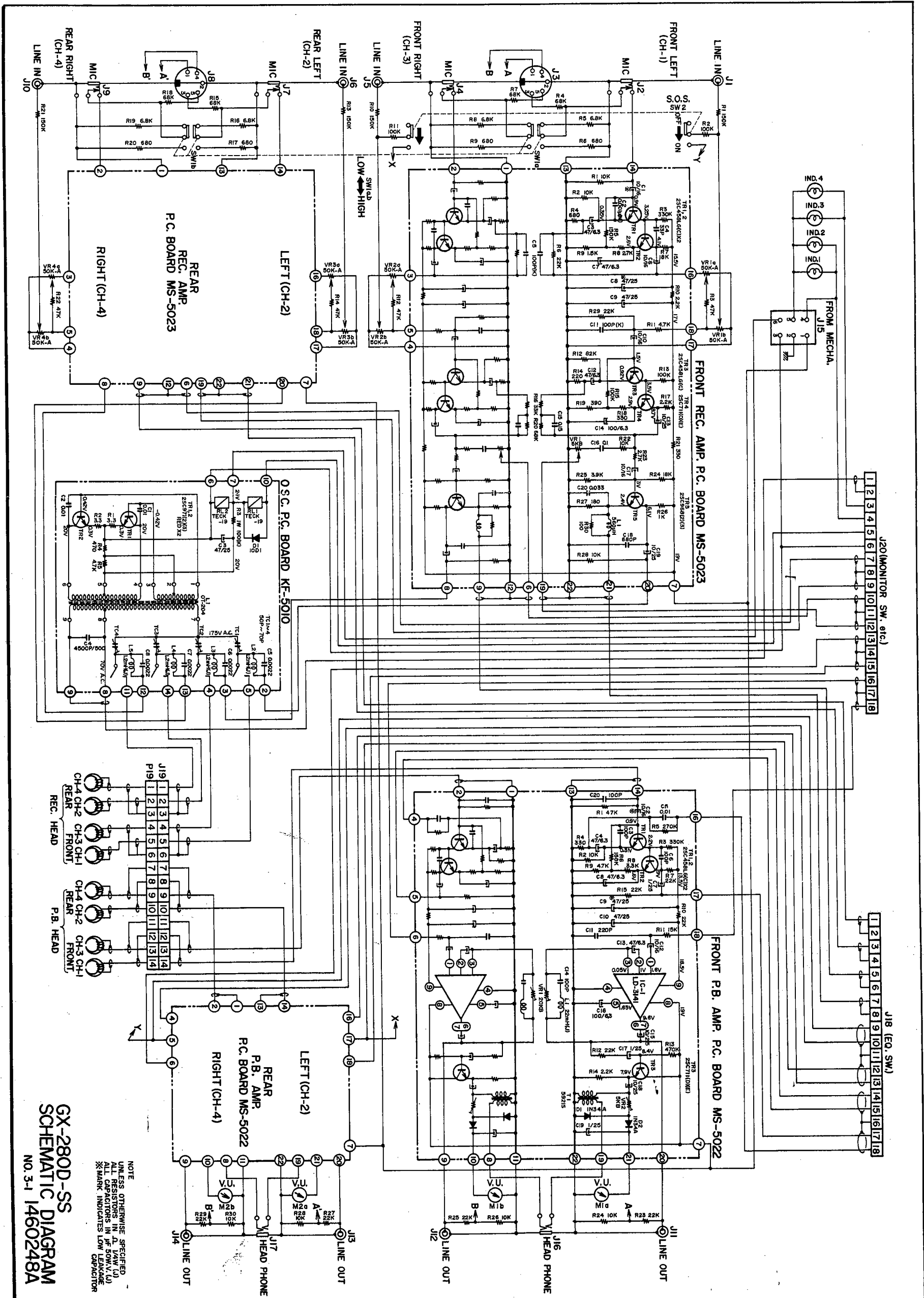
GX-280D-SS SCHEMATIC DIAGRAM



GX-280D-SS  
SCHEMATIC DIAGRAM  
NO.3-3 1460250A







NOTE  
 UNLESS OTHERWISE SPECIFIED  
 ALL RESISTORS IN  $\Omega$ ,  $\text{K}\Omega$ ,  $\text{M}\Omega$ ,  $\text{V}$ ,  $\text{V}$ ,  $\text{V}$ ,  $\text{V}$   
 ALL CAPACITORS IN  $\mu\text{F}$ ,  $\text{N}$ ,  $\text{P}$ ,  $\text{F}$ ,  $\text{F}$ ,  $\text{F}$ ,  $\text{F}$   
 \* MARK INDICATES LOW LEAKAGE CAPACITOR

GX-280D-SS  
 SCHEMATIC DIAGRAM  
 NO. 3-1 1460248A





