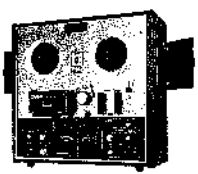
PARTS LIST A

MODEL GX-225D



MODEL GX-221

STEREO TAPE DECK

MODEL GX-225D

ALSO APPLICABLE TO MODEL GX-221 STEREO TAPE RECORDER AND GX-221D STEREO TAPE DECK

SECTION 1

SERVICE MANUAL

TABLE OF CONTENTS

I. SPECIFICATIONS

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

TRACK SYSTEM	4 track 2 channel stereo/monaural system
REEL CAPACITY	Up to 7" reel
TAPE SPEED	7-1/2 ips(19 cm/sec.) ±0.7%(*±0.8%)
	3-3/4 ips(9.5 cm/sec.) ±0.7%(*±0.8%)
	1-7/8 ips(4.75 cm/sec.) ±0.7%(*±0.8%)
WOW AND FLUTTER	Less than 0.08%(*0.12%) R.M.S. at 7-1/2 ips
	Less than 0.12%(*0.25%) R.M.S. at 3-3/4 ips
	Less than 0.20%(*0.4%) R.M.S. at 1-7/8 ips
FREQUENCY RESPONSE	
AKAI S.R.T. Tape	30 to 25,000 Hz ±3 dB at 7-1/2 ips
	30 to 20,000 Hz ±3 dB at 3-3/4 ips
	30 to 10,000 Hz ±3 dB at 1-7/8 ips
Regular Tape	30 to 23,000 Hz(*30 to 22,000 Hz) ±3 dB at 7-1/2 ips
	30 to 19,000 Hz(*30 to 18,000 Hz) ±3 dB at 3-3/4 ips
	30 to 9,000 Hz(*40 to 9,000 Hz) ±3 dB at 1-7/8 ips
SIGNAL TO NOISE RATIO	Better than 50 dB(53 dB with N.R. process)
	* Better than 48 dB at 7-1/2 ips
	* Better than 47 dB at 3-3/4 ips
	* Better than 45 dB at 1-7/8 ips
	* Better than 44 dB at Rewrite Mode
HUM AND NOISE	5 mV Tone Control and Main Volume Min.
	(Model GX-221 only)
DISTORTION FACTOR	Less than 1.5%(*3%) at 1,000 Hz "0" VU Recording
TONE CONTROLS Treble	12 ±2 dB(Max.) and −14 ±2 dB(Min.) at 10 kHz
Bass	12 ±2 dB(Max.) and −10 ±2 dB(Min.) at 100 Hz
	(Model GX-221 only)
CROSS TALK	Better than 65 dB(*58 dB) monaural
	Better than 50 dB(*43 dB) stereo
ERASE RATIO	Better than 70 dB
BIAS FREQUENCY	100 kHz ± 5%
BIAS LEAK	Less than −20 VU
HIGH FREQUENCY DEVIATION	
Between Channels	Within 2 dB, using an 8,000 Hz 3-3/4 ips recorded tape at 7-1/2 ips
Between FWD/REV	Within 3 dB, using an 8,000 Hz 3-3/4 ips recorded tape at 7-1/2 ips
REC./P.B. LEVEL	4 ± 1.5 dB
INPUTS Mic Input	0.2 mV(*0.4 mV) Impedance: 10 kΩ
Line Input	50 mV(*60 mV) Impedance 150 kΩ
Din Input	2 mV(low) and 50 mV(*60 mV) (High)
OUTPUTS Line Output	1.228V (4 ± 1 dB) Impedance: 20 kΩ
Din Output	0.4V
Speaker Output	30 W total music power at 8Ω (GX-221 only)
	20 W continuous power at 8Ω (GX-221 only)
HEAD PHONE OUTPUT	30 to 40 mV at 8Ω
REVERSING TIME	2 to 6 sec.
FAST FORWARD AND REWIND TIME	85/65 sec., using a 1,200 ft. tape at 50/60 Hz
MOTORS Main Motor	3 speed hysteresis synchronous motor
	Type: HC-16X
	Revolutions 3,000/1,500/750 r.p.m.(50 Hz)
	3,600/1,800/900 r.p.m.(60 Hz)
*Reel Motor	Two 6-pole eddy current outer rotor motors
	Type: 24XQ-MR
	Revolutions: 930 r.p.m. (50 Hz)
	1,120 r.p.m. (60 Hz)
HEADS Erase Head	Type: E4-250
	Gap: 0.6 mm
	Impedance: 195Ω ± 10% at 100 kHz
	D.C. Resistance: 3.5Ω

Recording Head	Type: R4-200 Gap: 4μ ± 15% Impedance: 1,870Ω at 100 kHz D.C. Resistance: 8Ω	
Playback Head	Type: P4-200 Gap: 1.75μ ± 15% Impedance: 3 ± 1 kΩ at 1 kHz D.C. Resistance: 500Ω	
I.C	LD5141 . . . 2	STK015 . . . 2(GX-221 only)
TRANSISTORS	2SC372(Y) . . . 1	2SC971(2H3) RED . . . 2
	2SC871(F) . . . 12	2SC121 8C)(D) . . . 8
	2SC945(Q)(R) . . . 6	2SD223(G)(Y) . . . 1
	2SC968(3)(4) . . . 3	
	2SC458LG(C) . . . 6	2SC511(E) . . . 4
	(N.R. Amp.)	(N.R. Amp.)
DIODES	1N34A . . . 7	SB2 . . . 1(GX-221 only)
	10D1 . . . 3	WZ-240 . . . 1
	10D4 . . . 1	
	WG-599 . . . 4(N.R. Amp.)	
POWER SUPPLY	100 to 240 V A.C, 50/60 Hz	
POWER CONSUMPTION	90W Models GX-225D, GX-221D 135W Model GX-221	
INSULATION RESISTANCE	More than 50 MΩ	
INSULATION DURABILITY	500V D.C. for more than 1 min. duration.	
DIMENSIONS	430(W) × 425(H) × 230(D) mm (17.2" × 17" × 9.2")	
WEIGHT	20.5 kg(45.1 lbs.) Models GX-225D, GX-221D 22.5 kg(49.5 lbs.) Model GX-221	

NOTE: Specifications subject to change without notice.

II. MEASURING METHOD

1. TAPE SPEED DEVIATION

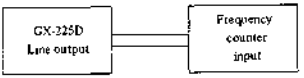


Fig. 1

As shown in Fig. 1, connect a Frequency Counter to the Line output. 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

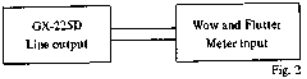


Fig. 2

Method A

As shown in Fig. 2, connect the Line output 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

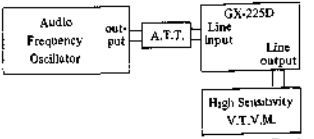


Fig. 3

For measuring frequency response, connect instruments as shown in Fig. 3 and proceed as follows:

1) Supply a 1,000 Hz sine wave to the Line input 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, re-adjust attenuator so that the Line Output is −16 dB, and record 30 to 22,000 Hz at 7-1/2 ips spot frequencies.
4) Rewind the 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

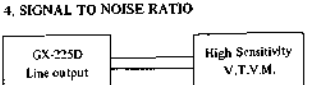


Fig. 4

As shown in Fig. 4, connect a High Sensitivity V.T.V.M. to the Line output. 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 FACTOR

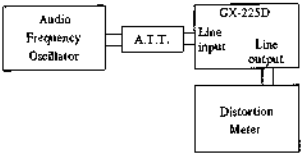


Fig. 5

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
(Cross talk between the channels)

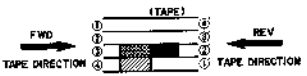


Fig. 6

As shown in Fig. 6, first record a 1,000 Hz sine wave signal on Track No. 3 at +3 VU level. Next, record under a non-input condition. Then, playback the tape on Tracks No. 3 and 4 (reversed condition of tape) through the 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 level
E_1 = Non-input signal recorded level

Fig. 7

7. ERASE RATIO

As shown in Fig. 4, connect a High Sensitivity V.T.V.M. to the Line ouput. Playback a virgin tape and take a V.T.V.M. reading of the output level. Next, record a 1,000 Hz sine wave signal at +3 VU, then playback this recorded signal and take a V.T.V.M. reading of the output level. Next, using this pre-recorded tape, record under a non-input condition and take a reading of the noise level output of the erased signal and obtain a ratio between the two from the following formula:

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

where, E_r = Desired erase ratio (dB)
E_0 = 1,000 Hz signal output level
E_2 = Non-input signal recorded level
E_1 = Virgin tape noise output level

8. POWER OUTPUT (GX-221 only)

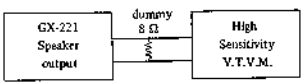


Fig. 8

As shown in Fig. 7, connect an 8Ω dummy load resistor to the speaker output and connect this terminal to a High Sensitivity V.T.V.M. Playback a 250 Hz "0" VU pre-recorded test tape and take a V.T.V.M. reading of the output level. The resultant output can be obtained from the above measurement by using the following formula:

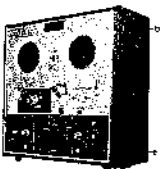
$$P = \frac{E^2}{R} \text{ (W)}$$

where, P = Desired power output (watts)
E = Measured voltage (R.M.S.)
R = 8Ω

III. DISMANTLING OF UNIT

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

4



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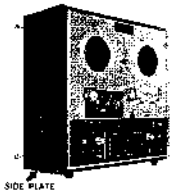

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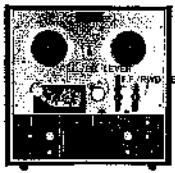

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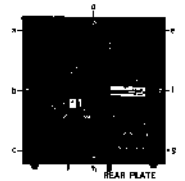

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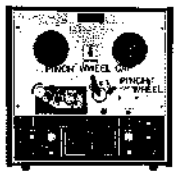

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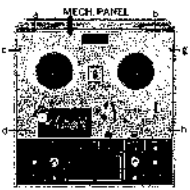

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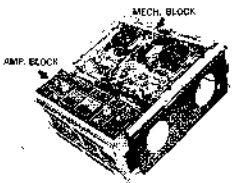

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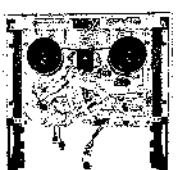

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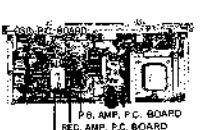


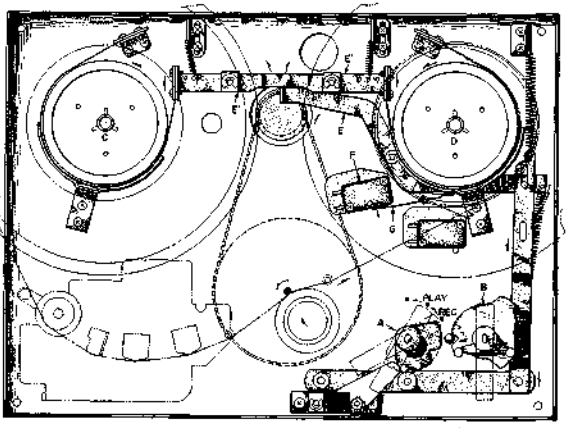


Fig. 9 FWD P.B./RECORDING REVERSE MODE

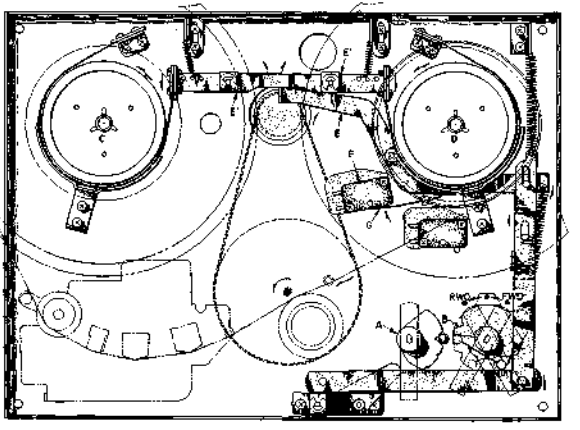


Fig. 10 F.FWD/REW MODE

1. FORWARD PLAYBACK RECORDING MODE (Refer to Fig. 9)

Setting Recording/Playback lever (A) to playback position causes brake lever (E') to move in the direction of the arrow and release the brake of both torque motors, and at the same time, operation micro switch (SW-006) is turned ON by lever (G), and the torque motors begin to rotate in the direction of the arrows. Also the capstan contacts the pinch roller and the tape is transported at constant speed.

2. FAST FORWARD/REWIND MODE (Refer to Fig. 10)

1) Setting Fast Forward/Rewind lever (B) to Fast Forward or Rewind position causes brake lever (E') to move in the direction of the arrow, and release the brake of both torque motors, and at the same time, operation micro switch (SW-006) is turned ON by lever (G) and the torque motors begin to rotate in the direction of the arrows.
2) For fast forward or rewind, the mechanical operation is the same, but the voltage supply is different at each mode. (Refer to Chart 2)

3. BLOCK DIAGRAM OF VOLTAGE SUPPLY CIRCUIT TO MOTOR AT EACH MODE

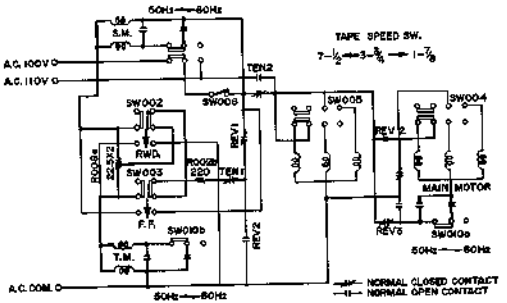


Fig. 11 NORMAL PLAYBACK MODE

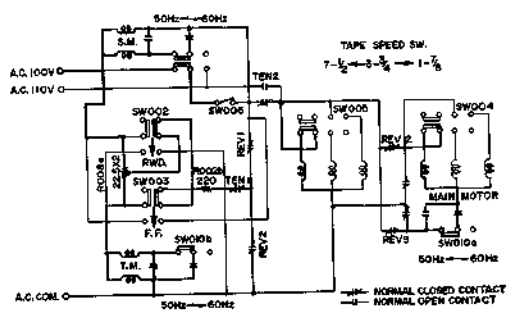


Fig. 12 REVERSE PLAYBACK MODE

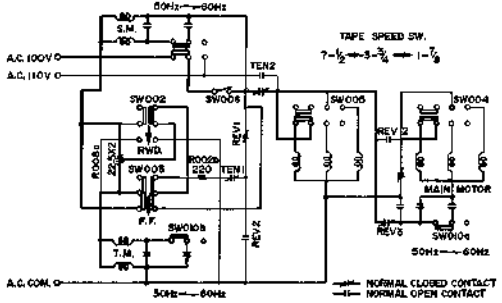


Fig. 13 F.FWD MODE

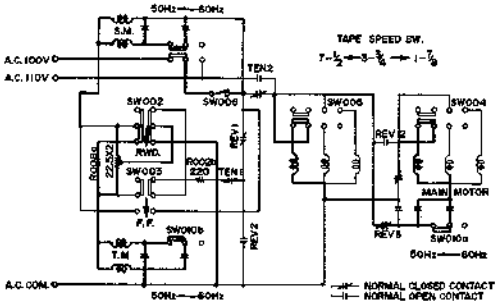
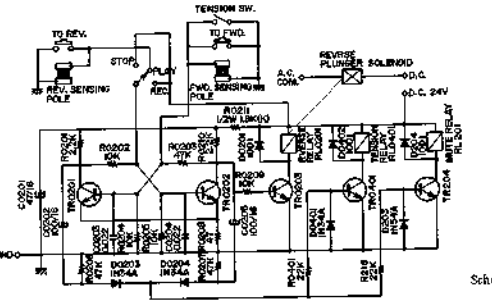


Fig. 14 RWD MODE


TENSION SW.
TO REV.
TO FWD.
STOP
PLAY
REC
REV. SENSING POLE
FWD. SENSING POLE
REVERSE PLUNGER SOLENOID
A.C. COM.
D.C.
D.C. 24V
R0218 1/2W 1.8K Ω
R0202 10K
R0205 47K
R0204 10K
R0206 47K
R0208 10K
R0209 10K
R0210 47K
R0211 47K
R0212 47K
R0213 47K
R0214 47K
R0215 47K
R0216 47K
R0217 47K
R0218 47K
C0201 47μ 16
C0202 100μ 16
C0203 0.01μ
C0204 0.01μ
C0205 0.01μ
C0206 0.01μ
C0207 0.01μ
C0208 0.01μ
C0209 0.01μ
C0210 0.01μ
C0211 0.01μ
C0212 0.01μ
C0213 0.01μ
C0214 0.01μ
C0215 0.01μ
C0216 0.01μ
C0217 0.01μ
C0218 0.01μ
C0219 0.01μ
C0220 0.01μ
C0221 0.01μ
C0222 0.01μ

V. MECHANISM ADJUSTMENTS

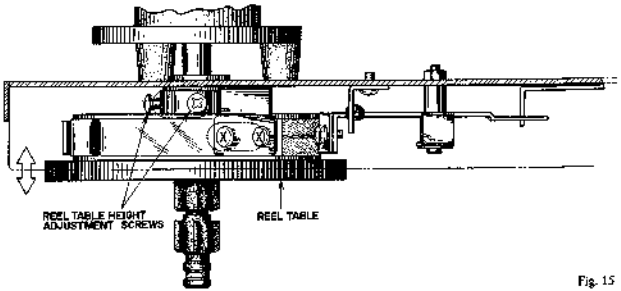


Fig. 15

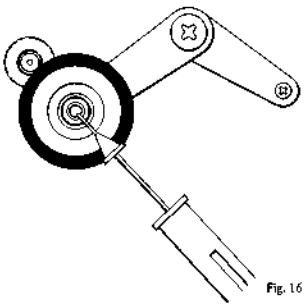


Fig. 16

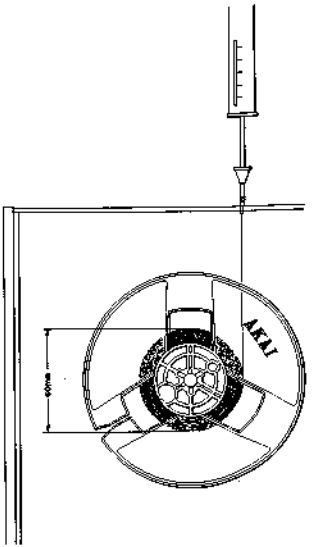


Fig. 17

1. REEL TABLE HEIGHT ADJUSTMENT

As shown in Fig. 15, loosen reel table height adjustment screws, and adjust reel table height by moving table in direction of arrow and positioning so that the tape winds in the center of the reel.

2. PINCH WHEEL PRESSURE MEASURING METHOD

Measure pinch wheel pressure with a tension gauge as shown in Fig. 16. Read the value on the tension gauge as soon as the pinch wheel separates from the tape and tape travel stops. Ideal pinch wheel pressure is 1.8 kg.

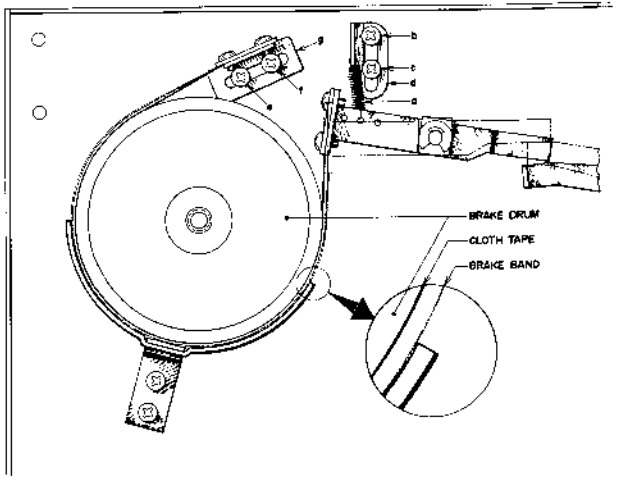


Fig. 18

3. BRAKE TENSION ADJUSTMENT

1) As shown in Fig. 17, use a 60 mm diameter tape wound on a 5" reel and measure the brake tension with a tension gauge. Ideal brake tension is from 300 to 370 grams.
2) Brake tension adjustment can be made as follows: (Refer to Fig. 18)
   a) Change position of suspended spring (a).
   b) Loosen screws (b) and (c) and adjust the vertical position of spring suspension metal (d).
   c) Loosen screws (e) and (f) and adjust the horizontal position of brake band suspension metal (g).
   d) Only the left side is shown in Fig. 18, but the right side must be adjusted in the same way.

NOTE: In making brake tension adjustment, at all modes except stop mode, confirm that the brake band completely separates from the cloth tape on the brake drum. (Refer to Fig. 18)

4. SUPPLY VOLTAGE AND TENSION AT VARIOUS OPERATING MODES

Torque Motor / Mode	Left Side	Right Side
Normal P.B.	30 V (34 V) 60 g	60 V (68 V) 200 g
Reverse P.B.	60 V (68 V) 200 g	30 V (34 V) 60 g
F.FWD	5.8 V (6 V) 15 g	94.2 V (103 V) 460 to 480 g
RWD	94.2 V (103 V) 460 to 480 g	5.8 V (6 V) 15 g
Tension Relay at Operating Time	45 V (51 V) 100 g	45 V (51 V) 100 g

The voltage shown in parentheses are at 60 Hz.

Chart 2

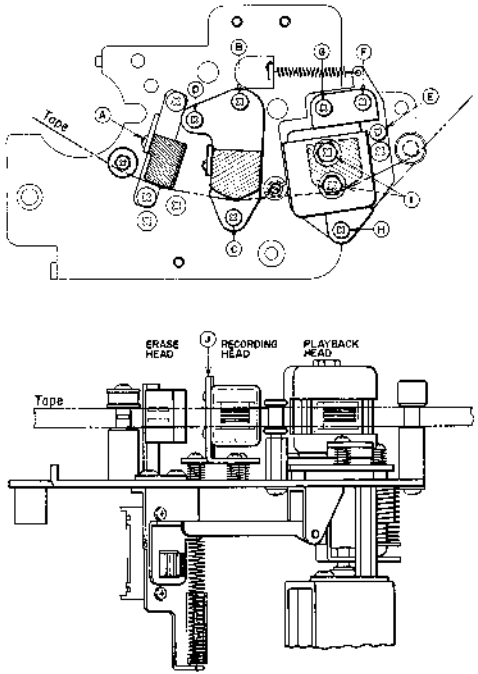


Fig. 19

I. HEAD HEIGHT ADJUSTMENT

1) Erase Head
At Playback mode, loosen screws (A) shown in Fig. 19 and adjust head height so that the upper edge of the tape is about 0.1 mm lower than the upper edge of the left channel erase head core.

2) Recording Head
At Playback mode adjust recording head height by turning screws (B) (C) and (D) shown in Fig. 19 to left and right until the upper edge of the tape is the same height as the upper edge of the left channel recording head core.

3) Playback Head
a) At Forward Playback mode, adjust playback head height by turning screws (F) (G) and (H) shown in Fig. 19 to left and right until the upper edge of the tape is the same height as the upper edge of the left channel playback head core.

b) At Reverse Playback mode, adjust playback head height by turning screw (F) shown in Fig. 19 to left and right until the lower edge of the tape is the same height as the lower edge of the right channel playback head core.

2. HEAD AZIMUTH ALIGNMENT ADJUSTMENT

1) Playback Head
   a) Connect a high sensitivity V.T.V.M. to the line output terminals.
   b) Set both the Tape Speed Switch and Equalizer Switch to 7-1/2 ips (19 cm/sec), depress STEREO Track Selector, and set the Monitor Switch to TAPE position.
   c) In case of model GX-225D, set Noise Reduction Switch to OFF position.
   d) Playback an 8,000 Hz 3-3/4 ips recorded Ampex Alignment test tape.
   e) At Forward Playback mode, turn Azimuth Alignment Screw (F) shown in Fig. 19 to obtain maximum line output level on both channels.
   f) After the adjustment in Item e) above has been completed, loosen screws (I) shown in Fig. 19 and move the head gap side of the playback head to left and right. When tension is applied to the supply reel side and the line output level of both channels do not fluctuate, (maximum allowable fluctuation within +0.5/ -0 dB) fix screws (I) to maintain this condition.
   g) At reverse playback mode, make the same adjustment as outlined above until the line output level of both channels do not fluctuate.
2) Recording Head
   a) Connect an audio frequency oscillator to the line input terminals, and connect a high sensitivity V.T.V.M. to the line output terminals and load a blank tape.
   b) Set both the Tape Speed Switch and Equalizer switch to 7-1/2 ips (19 cm/sec.), depress STEREO Track Selector, and set the monitor switch to TAPE position.
   c) Record a 16,000 Hz audio frequency at - 10 dB recording level.
   d) At recording mode, turn Azimuth Alignment Adjustment Screw (D) shown in Fig. 19 to left and right until the line output level of both channels is maximum and does not fluctuate.
   e) After completing adjustment in Item d) above, adjust gap side of recording head by bending installation angle (J) shown in Fig. 19 to left and right until the line output level of both channels do not fluctuate (maximum allowable fluctuation within +0.5/−0 dB) when tension is applied to the supply reel side.

3. To obtain best results, repeat adjustments outlined in paragraphs 1 and 2 above 2 or 3 times.
New blank tape should be used when making these adjustments.

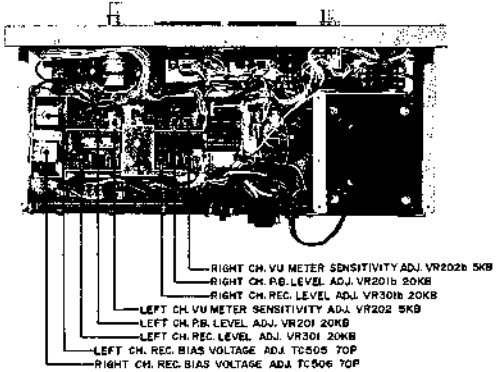


Fig. 20

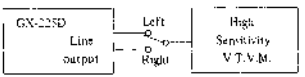


Fig. 21

1. PLAYBACK OUTPUT LEVEL ADJUSTMENT

1) Connect a high sensitivity V.T.V.M. to the line output terminals.
2) Set both the Tape Speed Switch and Equalizer Switch to 7-1/2 ips (19 cm/sec.), depress STEREO Track Selector and set the Monitor Switch to TAPE position.
3) In case of model GX-225D, set Noise Reduction Switch to OFF position.
4) Playback a 250 Hz "0" VU prerecorded test tape.
5) Adjust P.B. Amp. P.C. Board playback level adjustment semi-fixed resistors VR201 20 kB (Left Channel) and VR201b 20 kB (Right Channel) shown in Fig 20 to obtain a High Sensitivity V.T.V.M. indication of 4 dB (1.228 V).

2. VU METER SENSITIVITY ADJUSTMENT

After the playback output level adjustment has been completed, adjust P.B. Amp P.C. Board VU meter sensitivity adjustment semi-fixed resistors VR202 5 kB (Left Channel) and VR202b 5 kB (Right Channel) shown in Fig. 20 to obtain a VU meter indication of "0" VU on both channels.

3. HIGH FREQUENCY DEVIATION CHECK

1) Between Channels
When an 8,000 Hz 3-3/4 ips Ampex Alignment test tape is played back, check to confirm that the difference in high range output level between the left and right channel is within 2 dB.
2) Between FWD and REV Playback
Playback and Alignment test tape and check to confirm that the difference in high range level output between FWD and Reverse playback mode is within 3 dB
3) If Items 1) and 2) above are not within specifications, repeat Head Azimuth Alignment adjustment.

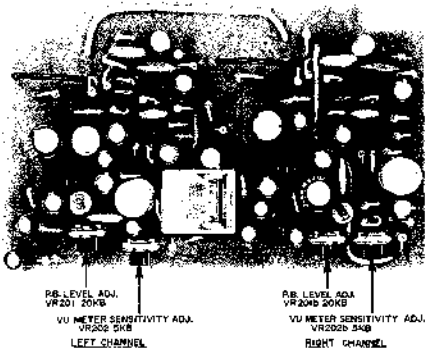
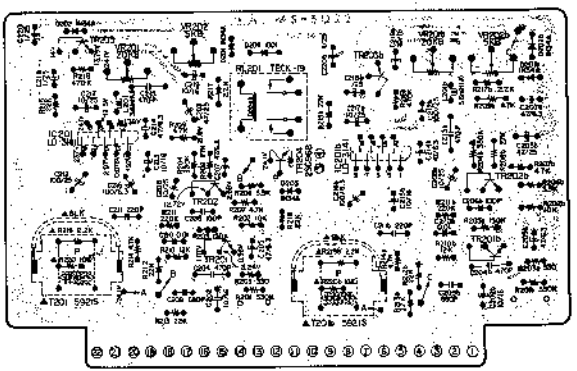


Fig. 22 P.B. AMP. P.C. BOARD (Face Side)



Model	AT201	R219	R220	LEAD W. RE (BLK)
GX-221	X	O	X	O
GX-221D	O	X	X	X
GX-225D	X	O	O	X

TR201, 202 2SC87I (E)
TR203 2SC945 (G) (B)

Fig. 23 P.B. AMP. P.C. BOARD MS-5022 (Reverse Side)

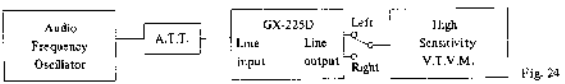


Fig. 24

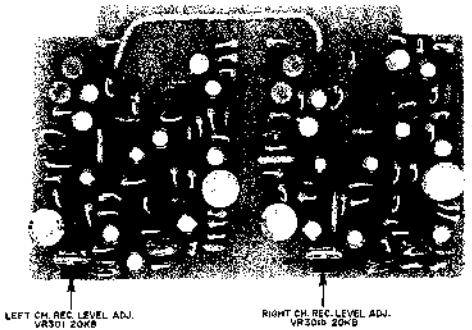


Fig. 25 REC. AMP. P.C. BOARD (Face Side)

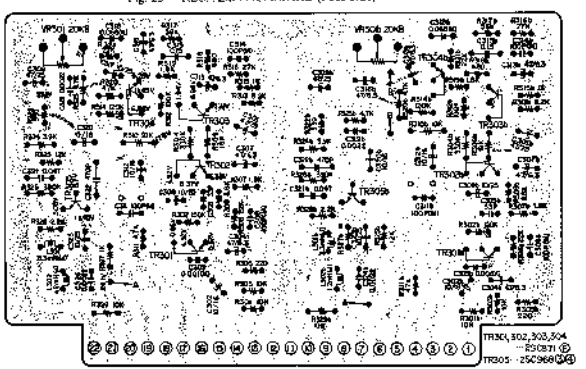


Fig. 26 REC. AMP. P.C. BOARD MS-5023 (Reverse Side)

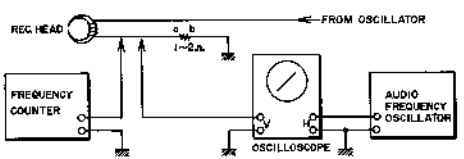


Fig. 27

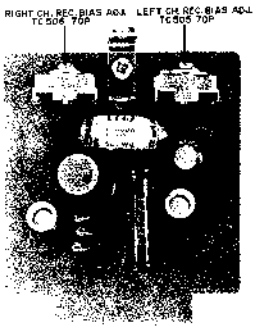


Fig. 28 OSC. P.C. BOARD (Face Side)

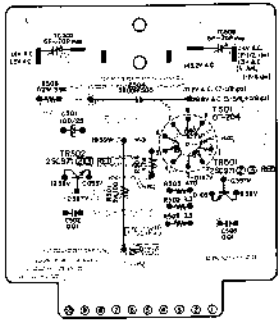


Fig. 29 OSC. P.C. BOARD MS-5025 (Reverse Side)

4. 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) Set both the Tape Speed Switch and the Equalizer Switch to 7-1/2 ips (19 cm/sec), depress the STEREO Track Selector, and set the Monitor Switch to TAPE position.
3) In case of model GX-225D, set Noise Reduction Switch to OFF position.
4) Set Recording Level Controls to maximum and load a blank tape (AKAI 1001 Tape).
5) Set recorder to recording mode, and supply a 1,000 Hz signal from the Audio Frequency Oscillator. Adjust attenuator to obtain a V.T.V.M. indication of 4 dB.
6) Set Monitor Switch to SOURCE position, and adjust Rec. Amp P.C. Board recording level adjustment semi-fixed resistors VR301 20 kΩ (Left Channel), and VR301b 20 kΩ (Right Channel) shown in Fig. 20 to obtain a V.T.V.M. indication of 4 dB on both channels.

5. RECORDING BIAS FREQUENCY MEASURING METHOD

Method 1

1) As shown in Fig. 27, install a 1 to 2 Ω resistor in series with the recording head and connect the vertical input of an oscilloscope to these terminals (a and b).
2) Supply a sine wave signal from an Audio Frequency Oscillator to the horizontal input of the oscilloscope.
3) Set the recorder to recording mode, and vary the oscillation frequency of the Audio Frequency Oscillator until the waveform of the oscilloscope displays a circular or linear pattern.
4) At the time of a circular or linear pattern display, if the audio frequency oscillator indication is within a range of 100 kHz ±5%, the recording bias frequency is correct.

Method 2

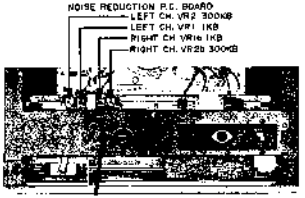
As shown in Fig. 27, connect a frequency counter to terminals a and b, set recorder to recording mode, and take a frequency counter reading.

6. RECORDING BIAS VOLTAGE ADJUSTMENT (Frequency Response Adjustment)

1) Employ the same measuring instruments used in Recording Level Adjustment procedure and connect them in the same way.
2) Feollow Recording Level Adjustment procedure through Item 5), and then set the attenuator to −20 dB.
3) Under these conditions, adjust OSC P.C. Board recording bias voltage adjustment trimmer condensers TC505 70P (Left Channel) and TC506 70P (Right Channel) shown in Fig. 20 to obtain an equally flat response at 1,000 Hz and 10,000 Hz.
4) Recording bias voltage, following frequency response adjustment, is from 1.3 to 1.4 V A.C.
5) Ideal erase voltage is 70 V A.C.

NOTE: The frequency response will vary depending upon the tape being used. As a rule, AKAI 1000F Tape (Fuji F tape) is used for this adjustment.

VIII. AUTOMATIC NOISE REDUCTION AMPLIFIER ADJUSTMENTS (Model GX-225D only)



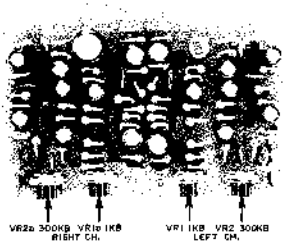


Fig. 31 AUTOMATIC NOISE REDUCTION AMP. P.C. BOARD (Face Side)

1. A.N.R. AMP. ADJUSTMENT

1) Connect the various measuring instruments as shown in Fig. 24.
2) Set recording level adjustment volumes VR1a 50 kA (Left Channel) and VR1b 50 kA (Right Channel) to maximum.
3) Set the Noise Reduction Switch and the S.O.S. Switch to OFF position, and set Monitor Switch to SOURCE.
4) Set tape deck to recording mode, and supply a 100 Hz signal to the line input terminals from the Audio Frequency Oscillator. Adjust attenuator to obtain a high sensitivity V.T.V.M. indication of 4 dB (VU meter indication "0" VU).
5) Adjust Noise Reduction P.C. Board semi-fixed resistors VR2 300 kB (Left Channel) and VR2b 30 kB (Right Channel) shown in Fig. 30 so that when the Noise Reduction Switch is set to ON position, a line output level of 4 dB is maintained.
6) Return Noise Reduction Switch to OFF position and set the oscillation frequency of the Audio Frequency Oscillator to 10 kHz. Then adjust the attenuator to obtain the same results as outlined in Item 4) above.
7) Set Noise Reduction Switch to ON position, and, at this time, adjust Noise Reduction P.C. Board semi-fixed resistors VR1 1 kB (Left Channel) and VR1b 1 kB (Right Channel) shown in Fig. 30 to obtain a line output level decrease of 2.5 dB.
8) After the adjustments in Items 1) through 7) have been completed, decrease the 10 kHz signal by 30 dB and supply this signal to the line input. Confirm that the line output level is 6 ± 0.5 dB lower when the Noise Reduction Switch is at ON position than when at OFF position.

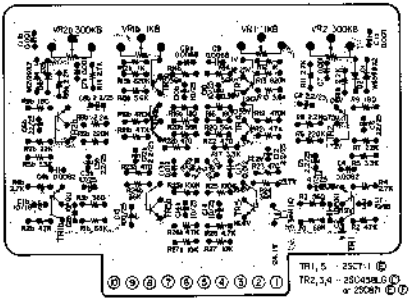


Fig. 32 AUTOMATIC NOISE REDUCTION AMP. P.C. BOARD MS-5215 (Reverse Side)

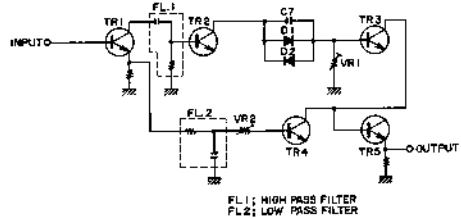


Fig. 33 A.N.R. AMP. BLOCK DIAGRAM

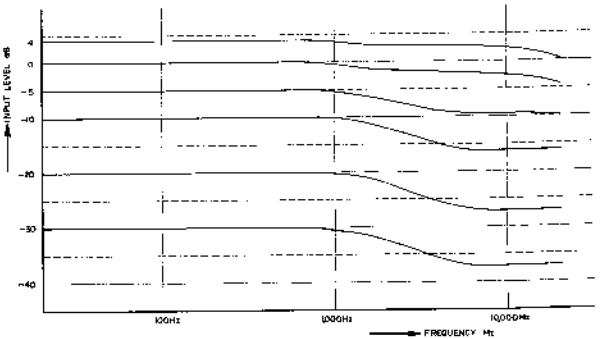


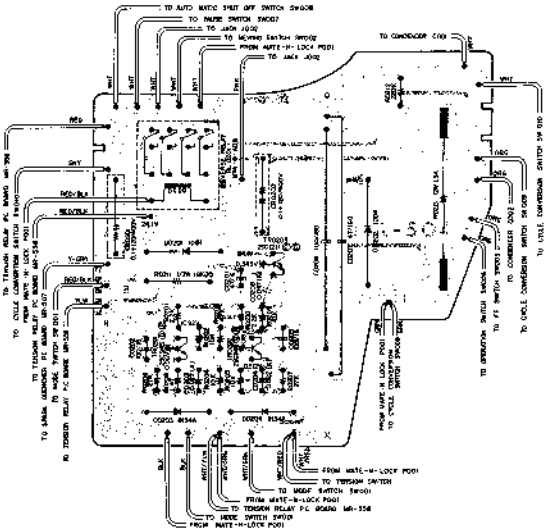
Fig. 34 AUTOMATIC NOISE REDUCTION AMP. CHARACTERISTICS

2. A.N.R. OPERATION AND CHARACTERISTICS (Refer to Fig. 33 & 34)

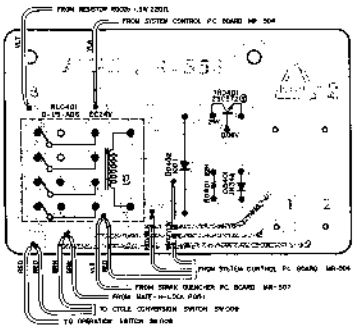
1) The TR1 output signal passes the high pass filter and the low pass filter and is supplied to TR2 and TR4 respectively.
2) The TR2 output passes diodes D1 and D2 as well as condenser C7 and is supplied to TR3. In case the input signal is high, D1 and D2 decreases the impedance and the signal supplied to TR3 is unchanged. Also the signal which passed FL2 is amplified at TR4 and the TR3 and TR4 signals merge at the input side of TR5 and become a composite signal.
3) In case the level of the signal which passed High Pass Filter FL1 is small, diodes D1 and D2 increases the impedance relative to this signal level and the signal supplied to TR3 is even smaller. The signal which passes Low Pass Filter FL2, because there are no variable impedance components such as D1 and D2, is supplied to TR4 unchanged. Consequently, both signals merge, becoming a composite signal and the output becomes a high frequency reduced signal in relation to a low level input.
4) The characteristics of diodes D1 and D2 increases the impedance of low level signals (the lower the level, the more the impedance is increased) so that the signal supplied to TR3 is close to zero. Consequently, the purpose of condenser C7 is to prevent decrease below a certain level.

IX. COMPOSITE VIEWS OF COMPONENTS

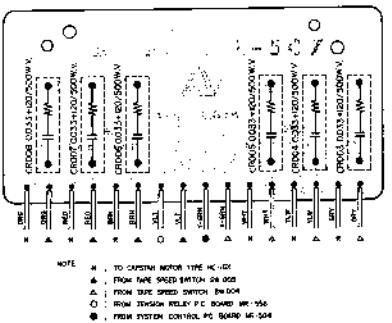
1. SYSTEM CONTROL P.C. BOARD MR-504



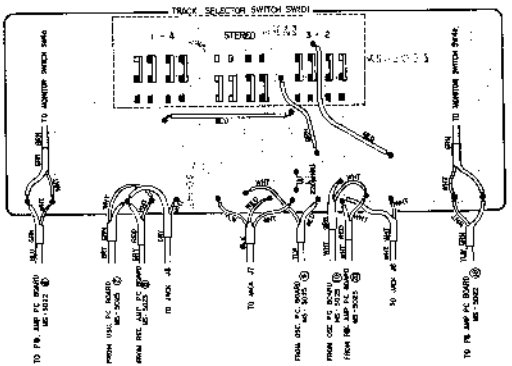
2. TENSION RELAY P.C. BOARD MR-558



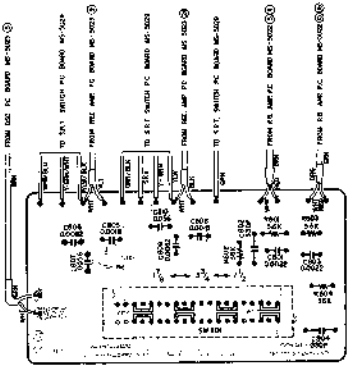
3. SPARK QUENCHER P.C. BOARD MR-507



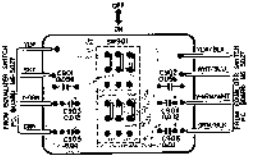
4. TRACK SELECTOR P.C. BOARD MS-5055



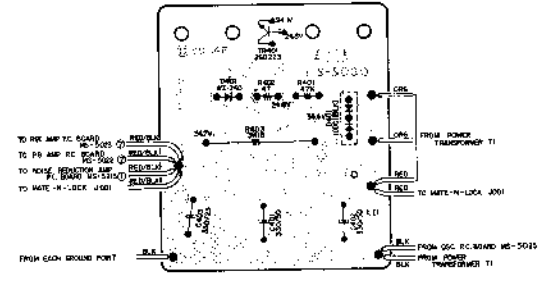
5. EQUALIZER SWITCH P.C. BOARD MS-5027



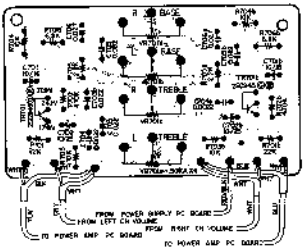
6. S.R.T. SWITCH P.C. BOARD MS-5029



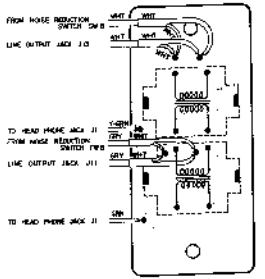
7. POWER SUPPLY P.C. BOARD MS-5030



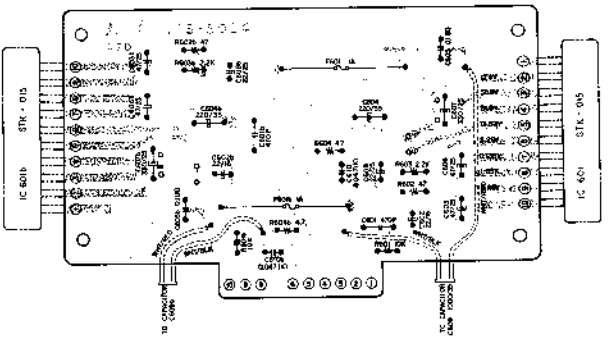
8. TONE CONTROL P.C. BOARD MS-5028



9. HEAD PHONE TRANS. P.C. BOARD MS-5216



10. POWER AMP. P.C. BOARD MS-5024



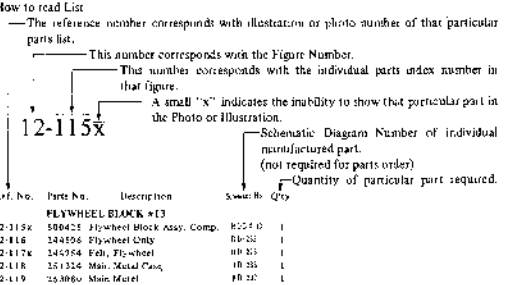
SECTION 2

PARTS LIST

TABLE OF CONTENTS

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



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 prices. The most simple method of finding parts Price is to utilize the reference number.

ELECTRICAL PARTS TABLE

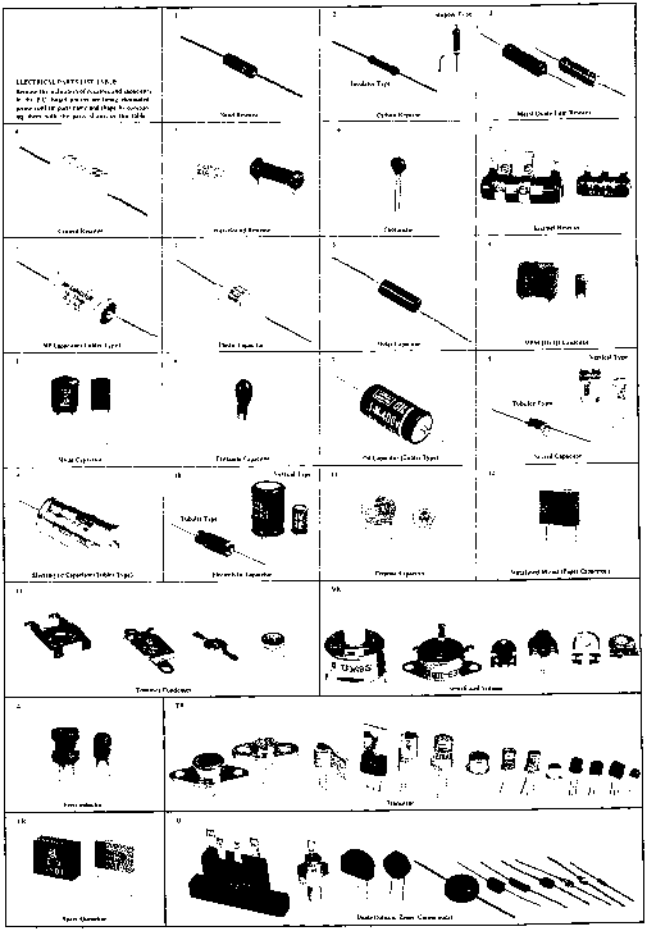
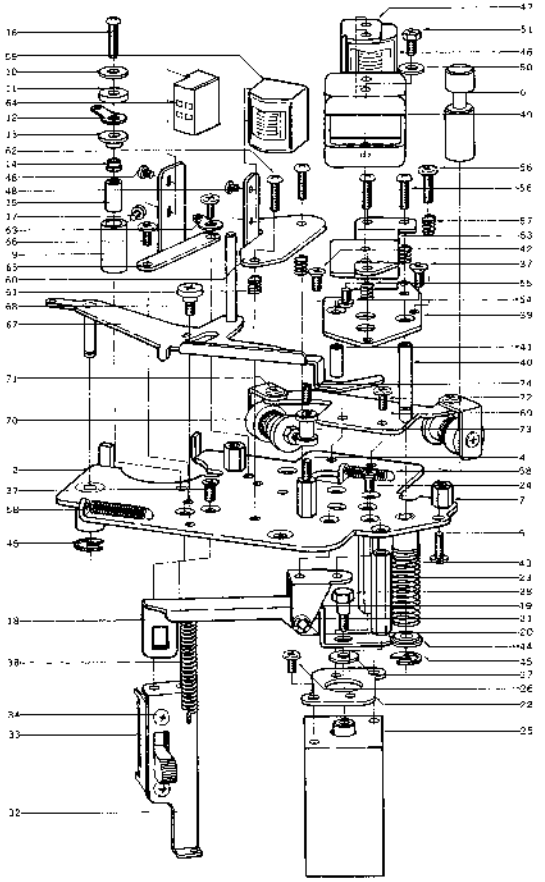


FIG. 1 ILLUSTRATION OF MS HEAD BLOCK



MS HEAD BLOCK

Ref. No.	Parts No.	Description	Schematic No.	Q'ty
1-1*	BH426047	MS Head Block Comp.		1
1-2	HZ425437	Head Base Plate, w/metal	MS-0001	1
1-3*	MZ303298	T Arm Cushion (Rubber)	EE-201	2
1-4	HZ425542	Tape Guide Prop B	MS-0005	1
1-5	ZW419025	Screw, binding head 2x8, w/washer		2
1-6	HZ425597	Tape Guide Prop C	MS-0011	1
1-7	HZ425586	Head Cover Post	MS-0009	1
1-8*	ZW413188	Nut, M4		2
1-9	HZ426430	Tape Guide Prop A	MS-0002	1
1-10	ZW396786	Tape Guide Washer	EE-0035	1
1-11	HZ396595	Insulator Collar	EE-0037	1
1-12	ZW213178	Earth Lug, M3		1
1-13	HZ396595	Sensing Guide D	MS-0006	1
1-14	HZ426632	Insulator Collar A	EE-38	1
1-15	HZ396707	Sensing Guide	MS-0008	1
1-16	ZW202252	Screw, round head 2.3x12		1
1-17	ZW427674	Screw, pan head 2x3		1
1-18	HL317676	Plunger Lever	MS-10	1
1-19	HL317687	Lever Support	MS-10	1
1-20	ZW257477	Connecting Pin	EE-211	1
1-21	ZW270088	"E" Ring 1.5M	EE-19	1
1-22	HZ317686	Plunger Base	MS-20	1
1-23	HZ317900	Plunger Retaining Prop	MS-6	2
1-24	ZW432655	Screw, countersunk head 3x6		2
1-25	EP318115	Plunger Solenoid RSA10143	MS-30	1
1-26	ZW413223	Screw, binding head 3x5, w/washer		2
1-27	ZW450053	Washer (Nylon) D4.1x9x1		3
1-28	ZW317731	Plunger Bell	MS-15	1
1-29*	EJ299358	SP Plug	EJ-171	1
1-30*	EJ425432	4P Plug, Consent S 15908	EJ-170	1
1-31*	MZ314403	Nylon Clip HP-2N		3
1-32	HZ317735	Slide Switch Base	MS-35	1
1-33	ES317744	Slide Switch SL-2423B4V	MS-35a	1
1-34	ZW412496	Screw, round head 2.6x5		2
1-35*	ZW317801	Toothed Lock Washer, M2.6		2
1-36*	EJ308981	Mold 4P Plug	EJ-172	1
1-37	ZW200417	Screw, countersunk head 3x6		3
1-38	ZG317766	Plunger Lever Spring	MS-19	1
1-39	HZ425807	P.B. Head Holddown Table	MS-2005	1
1-40	MS317581	PH Shaft	MS-16	1
1-41	HZ298012	A.T.F. Holddown Base Guide	MS-09	1
1-42	ZW413263	Screw, countersunk head 2.3x6		1
1-43	ZG317582	PH Spring	MS-18	1
1-44	ZW317934	Spring Holder	MS-17	1
1-45	ZW290383	"U" Ring 2.85M	EE-1	2
1-46	HP354524	P.B. HEAD PP-200		1
1-47	HZ425387	Head Angle	MS-3001	1
1-48	ZW201475	Screw, pan head 2x3		6
1-49	HZ382662	Thigh-shield	MS-43	1
1-50	ZW426262	Washer (SPC) D3.4x7.8x0.31		2
1-51	ZW403312	Hexagon Bolt 3x4		2
1-52*	LA461206	P.C. Board, Terminal A	MS-2006	4
1-53	HZ425520	P.B. Head Adjust Table	MS-2004	1
1-54	ZW202691	Screw, round head 2x4		2
1-55	ZG425531	P.B. Head Spring	MS-3002	1
1-56	ZW345914	Screw, round head 3x10		4
1-57	ZG303300	Angle Adjust Spring B	EE-18	1
1-58	ZG315811	Brake Lever Spring	MS-25	2
1-59	HB354513	RH HEAD R4-280		1
1-60	HZ425568	RH Angle	MS-3009	1
1-61	ZG201644	Angle Adjust Spring	EE-18	3
1-62	ZW336808	Screw, round head 2x12		3
1-63	ZW273851	Earth Lug, M4		1
1-64	HE412187	ERASE HEAD E4-260		1
1-65	HZ425575	Erase Head Base	MS-0014	1
1-66	ZW323928	Screw, binding head 3x5		2
1-67	HL426606	Shifter Lever B, w/shaft	MS-0018	1
1-68	ZW340677	XB Idler Lever Screw	MS-100	1
1-69	HZ425643	Cartel Coil Table	MS-3010	1
1-70	HS539208	Hum Backing Coil 151	EE-32	2
1-71	ZW413223	Screw, binding head 3x5, w/washer		2
1-72	ZW323728	Screw binding head 3x5		2
1-73	HZ231864	Tape Guide D	MS-3	1
1-74	ZW308640	Set Screw 3x5 (cup)		1

REEL MOTOR & REEL TABLE BLOCK

Ref. No.	Parts No.	Description	Schematic No.	Q'ty
2-1	BM214741	Reel Motor Block Comp. 24x12	MS-3C AE-30	1
2-2*	BR426038	Reel Table Block Comp. (Take-up)	MS	1
2-3*	BR426025	Reel Table Block Comp. (Supply)	MS	1
2-4	MT425970	MS Reel Table Disc	MS-3001	1
2-5	MT255420	Reel Retainer	MS-102	3
2-6	MS342010	Reel Shaft	MS-104	1
2-7	ZG255033	Reel Spring	MS-105	2
2-8	MT299063	"E" Ring 2.9x1.65 M	MS-105	1
2-9	ZW270088	"E" Ring 1.5M	EE-19	2
2-10	MT397225	Reel Table Rubber	MS-2002	1
2-11*	MT476606	Brake Drum (R) A (Take-up)	MS-204	1
2-12*	MT476614	Brake Drum (L) A (Supply)	MS-206	1
2-13*	ZW270378	Earth Lug, M3		2
2-14*	ZW423451	Screw, binding head 3x3		2
2-15	MT476860	Brake Cloth Comp.	MS-208	1
2-16	ZG317996	Felt Tension Spring	MS-209	1
2-17	ZW424056	Screw, pan head 4x3.11		2
2-18	ZW425492	Screw, countersunk head 3x8		3
2-19	MP426858	Counter Pulley (Take-up)	MS-207	1
2-20	ZW516656	Screw, countersunk head 2.3x8		2
2-21	XZ517373	Brake Lever Prop	MS-22	2
2-22*	ZW413168	Nut, M4		2
2-23	ML314976	Brake Lever A (Take-up)	MS-210	1
2-24*	ML394810	Brake Lever B (Supply)	MS-1020	1
2-25	MP314987	Brake Band	MS-213	2
2-26	ML314998	Brake Band Retaining Plate	MS-214	4
2-27*	ZW417337	Screw, binding head 3x4		8
2-28	MZ315000	Brake Band Support	MS-216	2
2-29	ZG315011	Brake Lever Spring	MS-38	2
2-30	ZW200163	"C" Ring 2.5AM	EJ-1	2
2-31*	ZW323728	Screw, binding head 3x5		4
2-32	MZ317900	Brake Band Guide, w/base	MS-102	2
2-33	HB426535	Counter Bell D43x1.6	EA-501	1

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

FIG. 2 ILLUSTRATION OF REEL MOTOR & REEL TABLE BLOCK

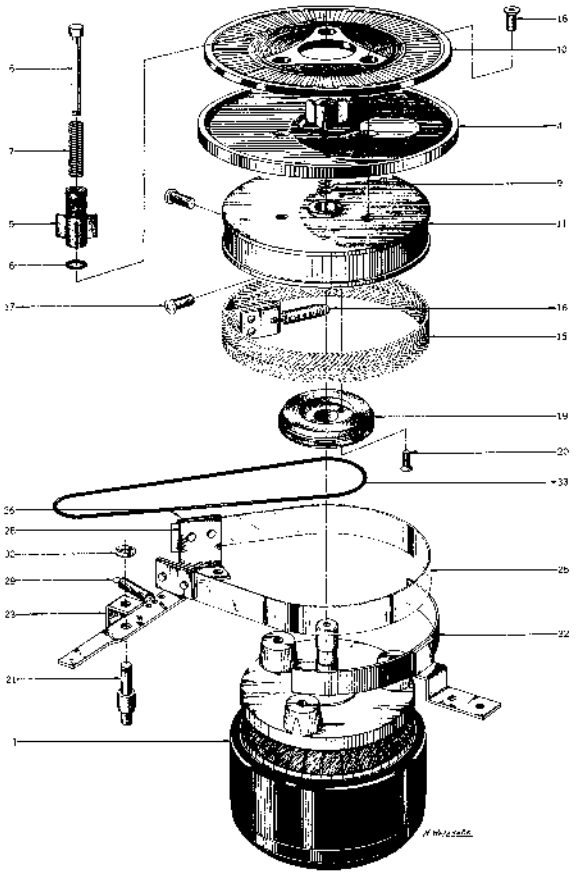
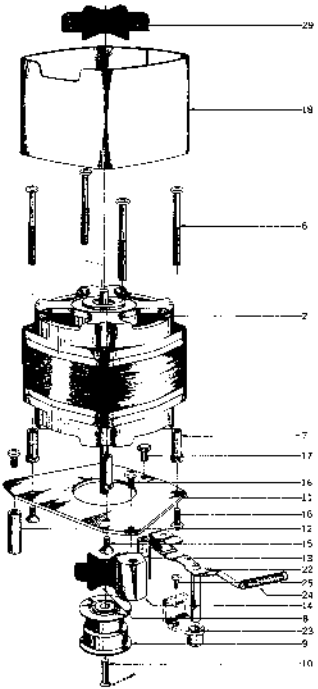


FIG. 3 ILLUSTRATION OF MAIN MOTOR BLOCK



MAIN MOTOR BLOCK

Ref. No.	Parts No.	Description	Reference No.	Q'ty
1-1x	BM437096	Main Motor Block Comp.	MB [illegible]	1
1-2	MZ448222	24 Motor Cover, w/metal	[illegible]	2
1-3x	ZW226023	Thrust Adjust Washer A 0.11	[illegible]	8
1-4x	ZW226036	Thrust Adjust Washer B 0.25	[illegible]	8
1-5x	ZW228L94	Thrust Washer (Nylon) 0.51	[illegible]	2
1-6	ZW201745	Screw, pan head 4x50, w/washer		4
1-7	MZ234527	Motor Mt. Prop	[illegible]	4
1-8	MZ316247	M/R Motor Fan	MB-[illegible]	1
1-9	MR437602	M/C Motor Pulley	MC-[illegible]	1
1-10	ZW203016	Screw, oval countersunk head 3x16		4
1-11	MZ316294	M/R Motor Mt. Plate	MB-[illegible]	1
1-12	MZ234160	Motor Prop A	[illegible]	1
1-13	MZ234182	Motor Prop B	[illegible]	1
1-14	M7316304	S/R Motor Prop	MB-[illegible]	1
1-15	ZW427026	Screw, countersunk head 4x10		2
1-16	ZW424054	Screw, pan head 4x10		6
1-17	ZW272395	M/C Motor Prop Retaining Screw	[illegible]	1
1-18	MZ316326	Motor Out-side Shield (Large) A	[illegible]	1
1-19x	MZ237724	Motor Out-side Shield (Large) B	[illegible]	1
1-20x	MZ292364	X/R Motor Shield Plate B	[illegible]	1
1-21x	BL437035	Belt Change Lever Block Comp. D		1
1-22	BL437591	Belt Change Lever D (small), w/roller	[illegible]	1
1-23	MZ348364	Belt Guide Stop, w/metal	[illegible]	1
1-24	ZG417337	Belt Return Spring	[illegible]	1
1-25	ZW417150	Screw, pan head 4x6		1
1-26x	ZG417394	Belt Change Spring B	[illegible]	1
1-27x	ZW260054	Washer (SUS) D6.1xt1.6x0.25t		1
1-28x	ZW290283	'U' Ring 2.5SM	[illegible]	1
1-29	MZ364448	Motor Fan (large)	[illegible]	1
1-30x	MZ404820	Dust Cover Plate (Nylon)	[illegible]	1

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

FIG. 4A ILLUSTRATION OF FLYWHEEL BLOCK

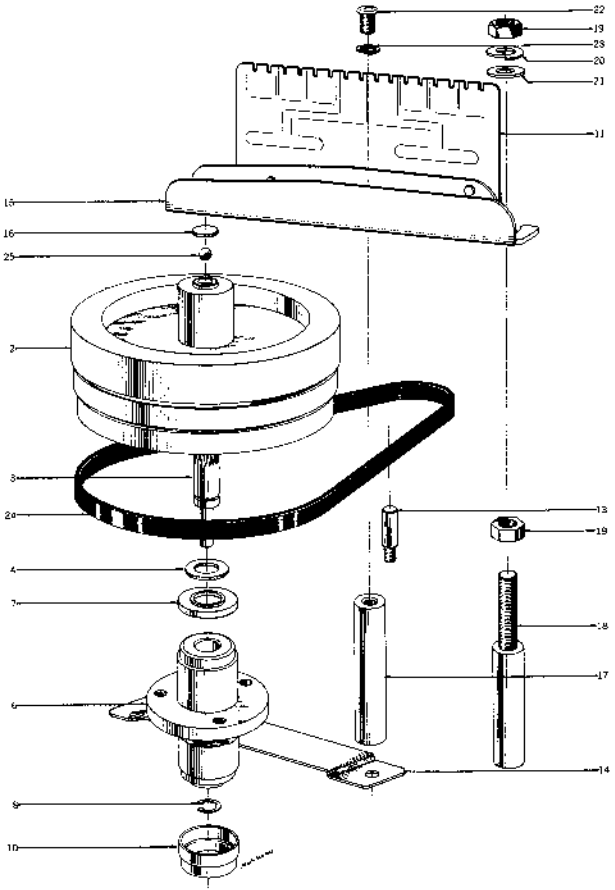
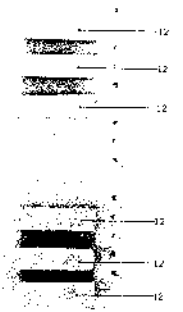


FIG. 4B PHOTO OF FLYWHEEL BLOCK

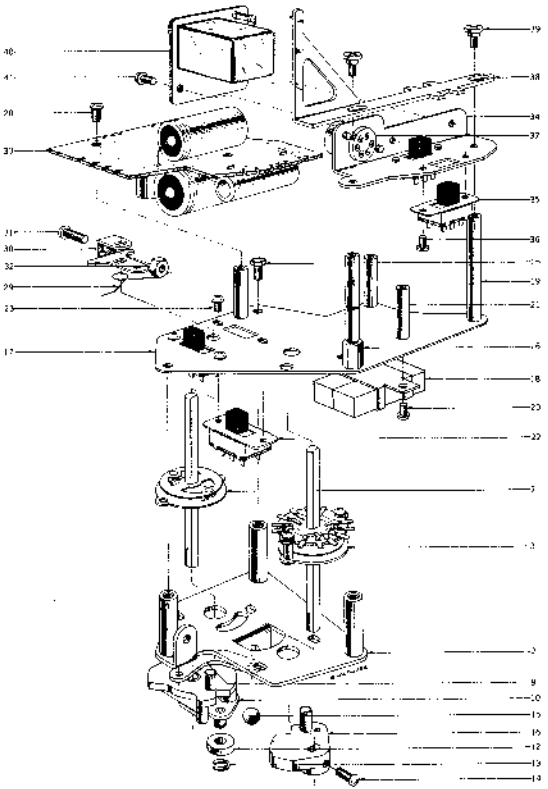


FLYWHEEL BLOCK

Ref. No.	Parts No.	Description	Schematic No.	Q'ty
4-1	DF476550	Flywheel Block Comp.	HB-2	1
4-2	MZ296245	Flywheel 2.3	HB-1	1
4-3	MS476572	DC Main Shaft	HB-3	1
4-4	ZW947208	Flywheel Thrust B		
		(7.9x13x0.5)	HB-5	1
4-5	ZW303577	Set Screw, hexagon socket		
		5x6 (flat)		2
4-6	MZ296256	Main Case A 2.3, w/metal	HB-8	1
4-7	MZ446635	Thrust Cap, Main Metal B2	HB-9	1
4-8	ZW208710	Flywheel Fixing Pin	HB-10	1
4-9	MZ244113	Felt (D12.5x1mx21)		1
4-10	MZ253113	Main Metal Cap B	HB-11	1
4-11	BA514541	Spark Quencher P.C. Board		
		Comp. (MR-507)		1
4-12	BR450787	Spark Quencher U/L		
		0.033μF+120Ω 400WV	HB-14	6
4-13	MZ298353	Belt Guide 2Sa	HB-15	1
4-14	MB439515	Flywheel Belt Holding Plate B	HB-16	1
4-15	MZ314893	Flywheel Supporting Plate M.R.	HB-17	1
4-16	ZW392681	Washer, without hole		
		(Nylon) U8x18		1
4-17	MZ273026	M9 Flywheel Prop A	HB-20	1
4-18	MZ273047	M9 Flywheel Prop B	HB-21	1
4-19	ZW415280	Inch Nut, 1/4" (P20)		2
4-20	ZW393232	Spring Washer, 1/4"		1
4-21	ZW413906	Washer (SUS) Z16.8x12.7x1t		1
4-22	ZW415201	Screw, pan head 4x8		1
4-23	ZW273914	Spring Washer, M4		1
4-24	MB437703	MC Flywheel Belt	HB-18	1
4-25	MV269985	Steel Ball D4		1
4-26X	ZW323738	Screw, binding head 3x5		2

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

FIG. 5 ILLUSTRATION OF SWITCH BLOCK



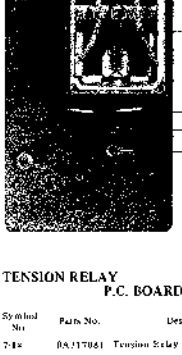
SWITCH BLOCK

Ref. No.	Parts No.	Description	Schematic No.	Qty
4-1x	BS433783	Switch Block Comp.	MS	1
4-2	H7401390	Switch Table A-2 (MB), w/prop	MB-381	1
4-3	FS425924	Play Shaft (Y Type) Y-2632	MB-276	1
4-4x	ZW460157	Washer (SPC) D3.1X8X0.8T		2
4-5x	ZW548107	ISO Nut, M3		2
4-6x	ER305756	Carbon/R, RM1/4 65k (J) (Insu. type)	MB-305	1
4-7	ES416934	Y type Rod Shaft	MB-275	1
4-8	MZ416945	Nut Plate	MB-285	1
4-9x	ZW413728	Screw, binding head 3x6, w/washer		2
4-10	MZ416956	Cam A-3, w/plate	MB-282	1
4-11x	ZW259942	Washer(Fiber) D5.1x10.3x0.5t		1
4-12	MR264730	Cam Roller D12	MB-310	1
4-13	ZW290283	'U' Ring 2.8S4		1
4-14	ZW413291	Screw, pan head 4x8		2
4-15	MV270006x	Steel Ball D8		1
4-16	MZ217271	Cam B, without tap	MB-307	1
4-17	MZJ16967	Control Chassis	MB-362	1
4-18	ER427663	Cement/R, H (154-151) H.A (22.5+22.5) K220F	MB-337	1
4-19	MZJ16978	Cycle Switch Prop	MB-287	1
4-20	ZW413229	Screw, binding head 3x5, w/washer		7
4-21	MZJ16981	Sys. Con. P.C. Board Prop	MB-361	3
4-22	ES375476	Slide Switch ESD-279DU	MS-288	2
4-23	ZW371556	ISO Screw, binding head 3x5		3
4-24x	ER376413	Spark Quenucher C/R, 0.033μ+120 500WV	MB-337	1
4-25	MZ465915	Hexagon Bolt 4x8, w/washer		2
4-26	MZJ17046	Rec. Lever Prop	MB-296	1
4-27x	MZ273318	Nylon Clip HP-3N		3
4-28x	ZW321298	ISO Screw, binding head 3x5		3
4-29	ZC228516	Switch Spring	MB-298	1
4-30	MZJ17024	Switch Cam	MB-290	1
4-31	ZW424056	Screw, pan head 4x10		3
4-32	ZW413488	Nut, M4		1
4-33	BA324088	Sys. Con. P.C. Board Comp. (MR-504)		1
4-34	BZ425946	Frequency Switch Table	MB-3002	1
4-35	ES375531	Slide Switch ESD-374DU	MB-274	2
4-36	ZW384131	Screw, round head 3x4		4
4-37	EJ365703	6P Socket	MB-367	1
4-38	MLM17542	Cycle Change Lever M.R	MB-298	1
4-39	ZW207384	Armp. Lever Set Screw	MB-301	2
4-40	BA317081	Tension Relay P.C. Board Comp. (MR-655)		1
4-41	ZW413223	Screw, binding head 3x5, w/washer		2
4-42x	EJ393062	32P Male-N-Lock Cap Housing 3-480278-0	MB-361	1
4-43x	EJ373623	Pin Contact 60116-1	MB-361	32
4-44x	EJ317125	5P TV-Connector Plug	MB-361	1

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

Ref. No.	Parts No.	Description	Symbol No.	Q'ty
6-84x	ZW330434	Adjust Washer(H) D4x13x0.5t		1
6-85x	ZW330445	Adjust Washer(L) D4x13x0.8t		1
6-86	MEJ14763	MR Lever B, w/lever D	MR-113	1
6-87	MR314785	Cam Roller D9	MR-251	1
6-88	ZW290283	"C" Ring 2.95M	C-1	6
6-89	ZG314818	D Lever Spring	MR-114	1
6-90	ME334580	MR Lever A, w/metal	MR-156	1
6-91	MEJ14642	MR Lever C	MR-108	1
6-92x	ZW410826	Washer (Fiber) D6.2x10x1t		2
6-95	ML314964	IR Lever	MR-111	1
6-96	MZ260662	AS Lever Prop Base, w/prop	AT3-128	1
6-97x	ZW201110	Screw, binding head 3x5, w/lug		1
6-98	MZ216125	Gear Stopper	AT3-120	1
6-99	ZG226647	Stopper Spring	AT3-121	1
6-98	ML228868	Auto Mech. Control Lever	AT3-125	1
6-99	ZW260887	Washer (Fiber) D11x10x0.5t		1
6-100	ME314932	MR Pinch Roller Lever	MR-109	1
6-101	MS143404	Pinch Roller Shaft C	AT3-106	1
6-102x	ZW259974	Washer (ESP) D5.1x10.3x0.4t		1
6-103	ZW413156	Nut, M4		4
6-104	MR269763	Cam Roller D13	MR-256	1
6-105	MS217192	Cam Roller Shaft A	MR-126	1
6-106	ZG456692	Punch Roller Spring (MS)	MR-105	1
6-107	ML426790	Shifter Lever A	MR-1001	1
6-108x	ZW413223	Screw, binding head 3x5, w/washer		2
6-109	MZ425001	Shifter Stopl, w/pin	MR-1005	2
6-110	ZW323525	Screw, binding head 3x5		8
6-111x	ZW314943	IR Washer	MR-112	1
6-112	ML314955	Brake Lever A (Take-up)	MR-116	1
6-113	MB314987	Brake Band	MR-102	2
6-114x	MZ314958	Brake Band Retaining Plate	MR-212	4
6-115	ZW417137	Screw, binding head 3x8		5
6-116	MZ315000	Brake Band Support	MR-204	2
6-117	ZG315011	Brake Lever Spring	MR-118	2
6-118x	ML315010	Brake Lever B (Supply)	MR-1004	1
6-119	HZJ15977	Reverse Guide Base w/prop	MR-128	1
6-120	HZJ15998	Reverse Guide	MR-205	1
6-121x	ZW344463	Set Screw, hexagon socket 4x6 [equi]		1
6-122	E5438535	Tension Switch Comp. MS-2	MS-1051	1
6-123	MZ261703	Switch Angle Base	MR-202	1
6-124x	ZW273775	Earth Leg, V3		1
6-125x	ZW027038	Screw, round head 3x3		2
6-126	MZ210071	Auto. Switch Plate	MR-110	1
6-127	ES35478	Slide Switch ESD-299DU	ES-1 28	1
6-128	ZW344291	ISO Screw, countersunk head 3.5x6		2
6-129	E5438535	Micro Switch V-1-A442 U/L	ES-1 .5	2
6-130x	ER3564.35	Spark Quencher U/L 0.1μ+120 250WV at 1 25		1
6-131x	ZW486558	Screw, round head 3x15		3
6-132x	ZW339514	Screw, binding head 3x18		1
6-133	ML336994	Operation Switch Lever	MR-122	1
6-134x	ZW270068	"E" Ring 1.9M	E-1.9	1
6-135	ZW425768	Screw, round head 3x4		3
6-136	ML316523	MR Pause Lever, w/lever B	MR-210	1
6-137	ZW217879	Pause Lever Retaining Screw	MR-127	1
6-138	MZ316951	MR Pause Stopper	MR-125	1
6-139	ZG301062	Paute Spring 980A	AT3-124	1
6-140	ML316440	Switch/E Switch Lever	MR-124	1
6-141	ZW323528	Screw, binding head 3x5		6
6-142	ZW107314	Amp. Lever Set Screw	AM-132	1
6-143	MC299528	Commtr M-42DD	MC-1 1	1
6-144	MB303535	Counter Dek D91x1.6	AM-132	1
6-145	MZ317486	Brake Band Guide, w/base	MR-127	2
6-146	RL316484	AS Lever Comp.	AS-302 MC	1
6-147	ZG260706	AS Lever Spring	AT3-112	1
6-148	ZW290294	"U" Ring 2.85M	U-2.8	1
6-149x	MF271170	LC Pinch Roller	LC-321	1
6-150x	EJ304975	Cramp Terminal 1-SD	SD-2	2
6-151	ZG217394	Belt Change Spring B	AM-125	1

FIG. 7 PHOTO OF TENSION RELAY P.C. BOARD (MR-558)

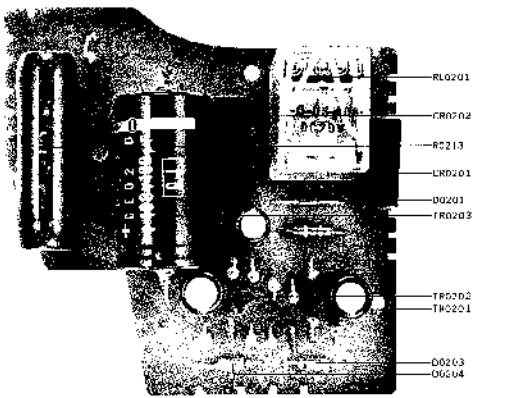


TENSION RELAY P.C. BOARD (MR-558) BLOCK

Symbol No.	Parts No.	Description	Q'ty
7-1x	RA117051	Tension Relay P.C. Board Comp. (MR-558)	1
7-TR0401	EB130808	Transistor 2SC372(Y)	1
7-D0401	ED914364	Germanium Diode 1N34A	5
7-D1402	ED224526	Silicon Diode 10D1	2
7-RL0403	EJ325585	Relay MY2-0-115-AD-24V	1
7-R0401	ER212264	Carbon Resistor B1/4 220kΩ (Stop type)	1

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

FIG. 8 PHOTO OF SYS. CON. P.C. BOARD (MR-504)



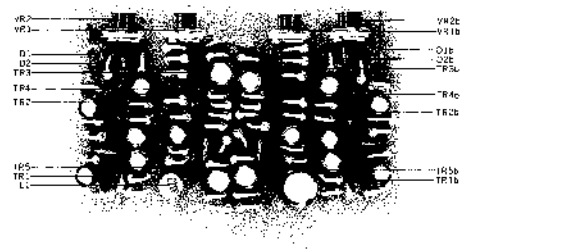
SYS. CON. P.C. BOARD (MR-504) BLOCK

Symbol No.	Parts No.	Description	Q'ty
S-Unit	RA324038	Sys. Con. P.C. Board Comp. (MR-504)	1
S-TR0201,2	EF390711	Transistor 2SC945(Q)(BK)	2
S-TR0203	EF430907	Transistor 2SC3211(LKD)	1
S-D0201	ED224526	Silicon Diode 1B4B	1
S-D0202	ED224550	Silicon Diode 1B4	1
S-D0203,4	ED219366	Germanium Diode 1N34A	2
S-CR0201	ER376414	Spark Quencher U/L 0.1μF120 500WV	1
S-CR0202	ER450786	Spark Quencher U/L 0.1μF120 400WV	1
S-RL0201	EF315001	Relay MY4 Q-US AUS 20V	1
		Capacitor, Vertical Type	
S-C0201	EC320040	Elect. 47mF 16WV	1
S-C0202	EC250127	Elect. 100μF 16WV	1
S-C0203,4	EC251057	Mylar 0.022μF(K) 50WV	2
S-C0205	EC250127	Elect. 100μF 16WV	1
S-C0206	EC316091	Elect. 100mF 160WV (Tub. type)	1
S-C0207	EC316113	Elect. 47μF 160WV (Tub. type)	1
S-C0208	EC305711	Mylar 0.047μF(K) 50WV	1

Symbol No.	Parts No.	Description	Q'ty
		Resistor, Stopper Type	
S-R0201	ER359456	Carbon RDL/4 2.2k(J)	1
S-R0202	ER336442	Carbon RDL/4 100k(J)	1
S-R0203	ER346601	Carbon RDL/4 47k(J)	1
S-R0204,5	ER336442	Carbon RDL/4 100k(J)	2
S-R0206,7	ER342933	Carbon RDL/4 27k(J)	2
S-R0208	ER361642	Carbon RDL/4 47(J)	2
S-R0209	ER336442	Carbon RDL/4 100k(J)	1
S-R0210	ER357456	Carbon RDL/4 2.2k(J)	1
S-R0211	ER314078	Solid RCR/2W 1.8k(K)	1
S-R0212	ER380711	Carbon RDL/4 220k(J)	1
S-R0213	ER316080	Enamel RWH15G 1.5k(J) (Temp. type)	1

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

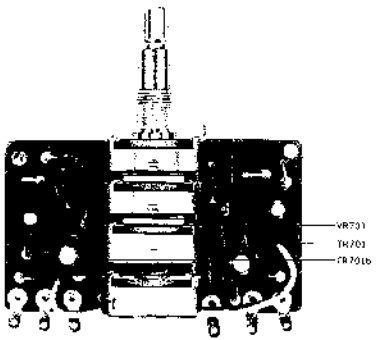
FIG. 11 PHOTO OF NOISE REDUCTION P.C. BOARD (MS-5215)



NOISE REDUCTION P.C. BOARD (MS-5215) BLOCK

Symbol No.	Parts No.	Description	Q'ty
11-EX	DA487405	Noise Reduction P.C. Board Comp. (MS-5215)	1
11-TR1	ET380836	Transistor 2SC511(E)	2
11-TR2,3,4	ET384364	Transistor 2SC4681(GC)	6
11-TR5	ET380836	Transistor 2SC511(E)	2
11-D1,2	RD514721	Silicon Diode WG-5v9	4
11-L1	EQ241468	Parts Inductor 51.2±3.4MH(U)	1
11-VR1	EV492071	Semi-Fixed Volume V10KB-15 10kΩ (4US)	2
11-VR2	EV490353	Semi-Fixed Volume V10KB-15 200kΩ	2
		Capacitor, Vertical Type	
11-C1	EC220051	Elect. 10μF 16WV	2
11-C2	EC474671	VFM 10PF(K) 50WV	2
11-C3	EC465025	Elect. 4.7μF 25WV	2
11-C4	EC431927	Mylar 0.0082μF(J) 50WV	2
11-C5	EC220032	Elect. 2.2μF 25WV	2
11-C6	EC478845	Elect. 2.2μF 25WV(Nonpolar)	2
11-C7	EC250875	Mylar 0.001μF(J) 50WV	2
11-C8	EC220042	Elect. 3.3μF 25WV	2
11-C9	EC280671	Mylar 0.006.8μF(J) 50WV	2
11-C10	EC220094	Elect. 10μF 25WV	2
11-C11	EC250875	Mylar 0.001μF(J) 50WV	2
11-C12	EC220432	Elect. 2.2μF 25WV	2
11-C13	EC311794	Mylar 0.012μF(J) 50WV	2
11-C14	EC220094	Elect. 10μF 25WV	2
11-C15	EC220151	Elect. 100μF 25WV	1
11-R1	ER350108	Carbon RD1/4 6.8kΩ(J)	2
11-R2	ER346601	Carbon RD1/4 47kΩ(J)	5
11-R3	ER363648	Carbon RD1/4 560Ω(J)	2
11-R4	ER343015	Carbon RD1/4 2.7kΩ(J)	2
11-R5	ER212477	Carbon RD1/4 3.3kΩ(J)	2
11-R6	ER350721	Carbon RD1/4 220Ω(J)	2
11-R7	ER212264	Carbon RD1/4 22kΩ(J)	2
11-R8	ER357456	Carbon RD1/4 2.2kΩ(J)	2
11-R9	ER361563	Carbon RD1/4 150Ω(J)	2
11-R11	ER343076	Carbon RD1/4 2.7kΩ(J)	2
11-R12	ER211465	Carbon RD1/4 1kΩ(J)	2
11-R13	ER362024	Carbon RD1/4 820Ω(J)	2
11-R14	ER361528	Carbon RD1/4 560Ω(J)	2
11-R15	ER213038	Carbon RD1/4 4.7kΩ(J)	2
11-R16	ER361563	Carbon RD1/4 150Ω(J)	2
11-R17	ER212477	Carbon RD1/4 3.3kΩ(J)	2
11-R18	ER357456	Carbon RD1/4 2.2kΩ(J)	2
11-R19	ER259996	Carbon RD1/4 470kΩ(J)	2
11-R20	ER361528	Carbon RD1/4 560Ω(J)	2
11-R21	ER212852	Carbon RD1/4 6.8kΩ(J)	2
11-R22,23	ER364402	Carbon RD1/4 470Ω(J)	4
11-R24	ER420922	Carbon RD1/4 36kΩ(J)	2
11-R25	ER211757	Carbon RD1/4 100kΩ(J)	2
11-R26	ER212883	Carbon RD1/4 47kΩ(J)	2
11-R27	ER336442	Carbon RD1/4 10kΩ(J)	2
11-R28	ER357456	Carbon RD1/4 2.2kΩ(J)	1

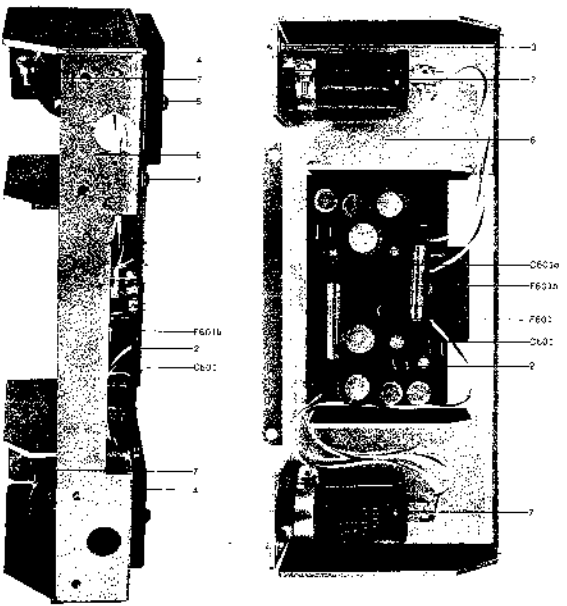
FIG. 12 PHOTO OF TONE CONTROL P.C. BOARD (MS-5028)



TONE CONTROL P.C. BOARD (MS-5028) BLOCK

Symbol No.	Parts No.	Description	Q'ty
12-1x	DA426120	Tone Control P.C. Board Comp. (MS-5028)	1
12-TR701	ET398711	Transistor 2SC945(O)(R)	2
12-VR701	EV42-7945	Dual-axial 4-throw Volume RJ-60R 50KAx4	1
		Capacitor, Vertical Type	
12-C701	EC320051	Elect. 10uF 16WV	2
12-C702	EC220094	Elect. 10uF 25WV	2
12-C703	EC368335	Mylar 0.022uF(J) 50WV	2
12-C704	EC250682	Mylar 0.0022μF(J) 50WV	2
12-C705	EC435041	Mylar 0.082uF(J) 50WV	2
12-C706	EC329661	Mylar 0.015μF(J) 50WV	2
		Resistor, Stopper Type	
12-R701	ER212264	Carbon RD1/4 22kΩ(J)	2
12-R702	ER429996	Carbon RD1/4 470kΩ(J)	2
12-R703,4	ER336042	Carbon RD1/4 10kΩ(J)	4
12-R705	ER357656	Carbon RD1/4 2.2kΩ(J)	2
12-R706	ER306360	Carbon RD1/4 6.8kΩ(J)	2

FIG. 13 PHOTO OF MAIN AMP. BLOCK



MAIN AMP. BLOCK

Symbol No.	Parts No.	Description	Q'ty
13-1x	BA352742	Main Amp. Block Comp.	1
13-2	BA426103	Main Amp. P.C. Board Comp. (MS-5024)	1
13-3	ZW208687	Tapping Screw #2 2x6 (round)	8
13-4	ED25103	Power Amp. I.C. STK-015	2
13-5	ZW326056	Tapping Screw #2 3x12 (round)	4
13-6	EZ425204	Main Amp. Heat-sink	1
13-7	ED23J100	Elect. 1000uF 35WV (Low type)	2
		MAIN AMP. P.C. BOARD (MS-5024) BLOCK	
13-1	BA426183	Main Amp. P.C. Board Comp. (MS-5024)	1
13-F601	EF460653	Fuse ST-1 1A	2

Symbol No.	Parts No.	Description	Q'ty
		Capacitor, Vertical Type	
13-C601	EC337457	Hi-Q 470PF(J) 50WV	2
13-C602	EC333705	Elect. 22uF 16WV	2
13-C603	EC220678	Elect. 47uF 25WV	2
13-C604	EC372148	Elect. 220uF 35WV	2
13-C605	EC253294	Mylar 0.1uF(K) 50WV	2
13-C606	EC220678	Elect. 47uF 25WV	2
13-C607	EC339386	Elect. 330uF 25WV	2
13-C608	EC326684	Elect. 22uF 35WV	2
13-C610	EC306717	Mylar 0.047uF(K) 50WV	2
		Resistor, Stopper Type	
13-R601	ER336192	Carbon RD1/4 10K(J)	2
13-R602	ER361642	Carbon RD1/4 47(J)	2
13-R603	ER357456	Carbon RD1/4 2.2K(J)	2
13-R604	ER399123	Carbon RD1/4 4.7(J)	2

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

FIG. 14 PHOTO OF
OSC. P.C. BOARD (MS-5025)

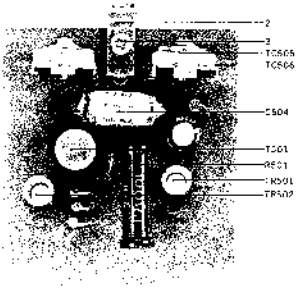
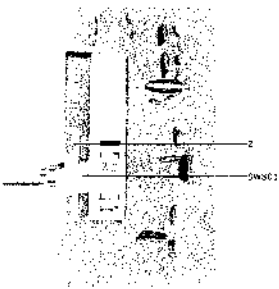


FIG. 15 PHOTO OF
EQUALIZER P.C. BOARD (MS-5027)



OSC. P.C. BOARD (MS-5025) BLOCK

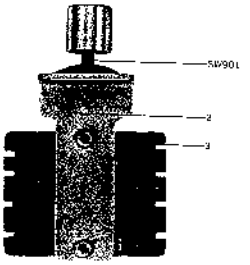
Symbol No.	Parts No.	Description	Q'ty
14-1x	UA426194	OSC. P.C. Board Comp. (MS-5025)	1
14-TR501,2	EE304255	Transistor 2SC945(Q)(3) (Red)	2
14-T501	EQ4C3365	OSC. Coil OT-204	1
14-TC505,6	EC425250	Trimmer Condenser (CD-3) 70PF	2
14-2	EA425226	P.C. Board Retaining Metal	1
14-3	ZW313365	Screw, binding head 3x6	1
14-4x	ZW253856	Nut, M3	1
14-5x	ZW280401	Nut, M1	1
		Capacitor, Vertical Type	
14-C501	EU220151	Elect. 100μF 25WV	1
14-C502,3	EC250843	Mylar 0.01μF(J) 50WV	2
14-C504	EE204952	Styrol 560PF(J) 50WV (Tub. type)	1
		Resistor, Stopper Type	
14-R501	ER425237	Wire-wound 5WL 100Ω (J) (L type)	1
14-R502,3	ER315944	Carbon RD1/4 2.2Ω(J)	2
14-R504	ER212883	Carbon RD1/4 4.7kΩ(J)	1
14-R505	ER204902	Carbon RD1/4 470Ω(J)	1
14-R506	ER538536	Carbon RD1/2 2.0kΩ(J) (Insu. type)	1

EQUALIZER P.C. BOARD (MS-5027) BLOCK

Symbol No.	Parts No.	Description	Q'ty
15-1x	RA426115	Equalizer P.C. Board Comp. (MS-5027)	1
15-SWS01	ES424719	Rotary Switch 3RG-3083	1
15-2	EZ424721	Equalizer Switch Base	1
		Capacitor, Vertical Type	
15-C501	EC250683	Mylar 0.0022μF(J) 50WV	1
15-C502	EC236216	Mylar 330PF(J) 50WV	1
15-C503	EC250680	Mylar 0.0022μF(J) 50WV	1
15-C504	EC236216	Mylar 330PF(J) 50WV	1
15-C505	EC424708	Mylar 0.0018μF(J) 50WV	1
15-C506	EC411827	Mylar 0.0082μF(J) 50WV	1
15-C507	EC368382	Mylar 0.056μF(J) 50WV	1
15-C508	EC424708	Mylar 0.0018μF(J) 50WV	1
15-C509	EC411827	Mylar 0.0082μF(J) 50WV	1
15-C510	EC368382	Mylar 0.056μF(J) 50WV	1
		Resistor, Stopper Type	
15-R501	ER213939	Carbon RD1/4 5.6kΩ(J)	1
15-R502	ER520322	Carbon RD1/4 36kΩ(J)	1
15-R503	ER213939	Carbon RD1/4 5.6kΩ(J)	1
15-R504	ER520322	Carbon RD1/4 36kΩ(J)	1

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

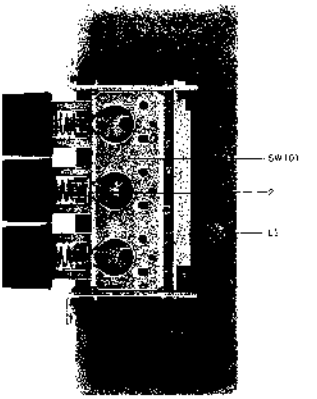
FIG. 16. PHOTO OF
SRT P.C. BOARD (MS-5029)



SRT P.C. BOARD (MS-5029) BLOCK

Symbol No.	Parts No.	Description	Q'ty
16-1x	BA426093	SRT P.C. Board Comp. (MS-5029)	1
16-SW901	ES426071	Push Switch UEG-62L without Knob	1
16-2	LZ424653	SRT Holder	1
16-3	ZW505107	Screw, pan head 2.6×8	2
		Capacitor, Vertical Type	
16-C901,2	EC368557	Mylar 0.056μF(J) 50WV	2
16-C903,4	EC311793	Mylar 0.012μF(J) 50WV	2
16-C905,6	EC250541	Mylar 0.01μF(J) 50WV	2

FIG. 17. PHOTO OF
TRACK SELECTOR P.C. BOARD (MS-5055)

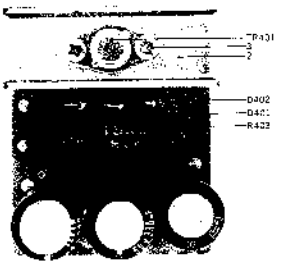


TRACK SELECTOR P.C. BOARD (MS-5055) BLOCK

Symbol No.	Parts No.	Description	Q'ty
17-1x	BA426104	Track Selector P.C. Board Comp. (MS-5055)	1
17-SW101	ES448051	Push Switch SPT-634A13	1
17-L1	LQ374681	Fern Inductor FL7H 220μH(K)	1
17-2	SK383095	TUM Knob	3

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

FIG. 18 PHOTO OF
POWER SUPPLY P.C. BOARD (MS-5030)

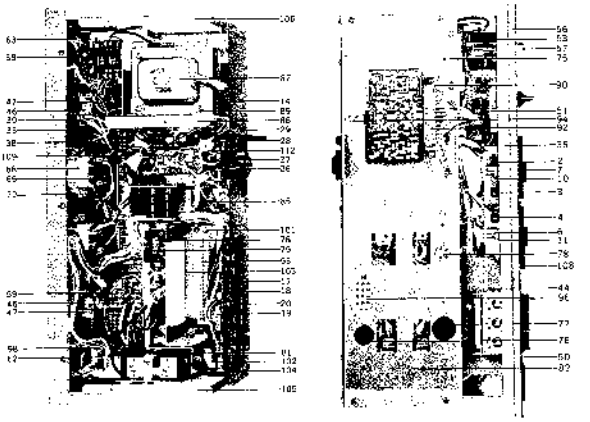


POWER SUPPLY
P.C. BOARD (MS-5030) BLOCK

Symbol No.	Parts No.	Description	Q'ty
18-1#	BA426150	Power Supply P.C. Board Comp. (MS-5030)	1
18-TR401	ET424035	Transistor 2SD223(Y,HG)	1
18-D401	ED154130	Silicon Diode 1S1DC-34(black)	1
18-D402	ED511988	Zener Diode WZ-240	1
18-1	EZ3L5426	Heat-sink Plate	1
18-2	ZW413741	Screw, binding head 3×8	4
18-3#	ZW123956	Nut, M3	2
		Capacitor, Vertical Type	
18-C401,2	EC403463	Elect. 330μF 50WV	2
18-C403	EC324536	Elect. 330μF 25WV	1
		Resistor, Stopper Type	
18-R401	ER452483	Carbon RSD(4.4.5k(J)	1
18-R402	ER361642	Carbon RD(4.47(J)	1
18-R403	ER413717	Wire-wound 3WL 15(J) (L type)	1

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

FIG. 19 PHOTO OF AMPLIFIER ASSEMBLY BLOCK

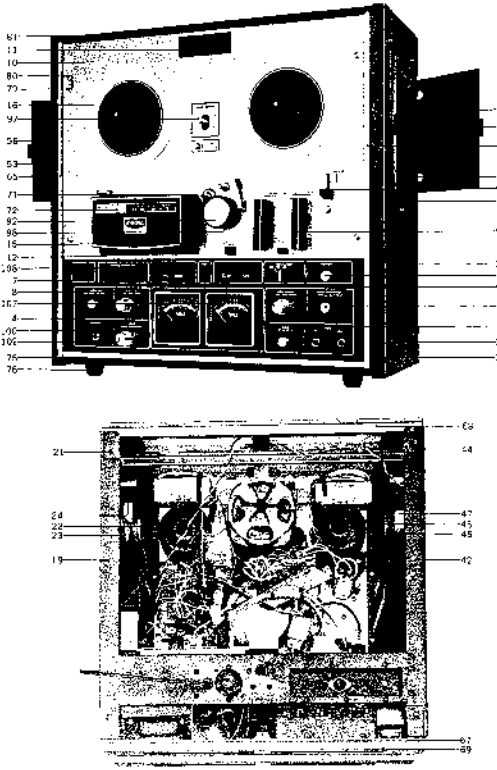


AMPLIFIER ASSEMBLY BLOCK

Ref. No.	Parts No.	Description	Remarks	Q'ty
		DS SWITCH BLOCK		
19-01x	B2426082	DS Switch Block Comp.	MS	1
19-02	E2425474	DS Switch Table	MS-007	1
19-03	ES404555	Leaf Switch A LSA-1127A (Right)	MS-007	1
19-04	ES424596	Leaf Switch B LSA-1127B (Left)	MS-007	1
19-05x	ZW3516001	Screw, binding head 2x5		2
19-06	E2424607	Direction Change Plate	MS-5005	2
19-07	SB424615	Direction Change Button	MS-5005	2
19-08x	ZW4246201	Screw, pan head 2x4B		2
19-09x	ZW3386618	Spring Washer	MS-5004	2
19-10	EG3396007	Function Spring B	MS-5003	2
19-11	ZW3912006	Spring Washer B	MS-5004B	2
		REAR PANEL BLOCK		
19-12x	SP4326006	Rear Panel Block Comp. (Black)	MsD	1
19-13x	BZ4256127	Rear Panel Block Comp. (GX-221)	MSA	1
19-14	EZ4247036	Rear Chassis B	MS-5021	1
19-15x	EZ4247065	Rear Chassis A (GX-221)	MS-5001	1
19-16x	BZ4256146	Jack Plate Block Comp.	MS	1
19-17	EZ4235531	DPS Terminal Plate	MS-5031	1
19-18	EZ4248787	Jack Plate Holder	MS-5009	1
19-19	EJ5314435	Lug Hook VB2L	SP-006	1
19-20	ZW3854951	Screw, truss head 3x5(Black)		5
19-21x	ZW2737756	Nut, M3		5
19-22x	EI3789966	Mic Jack 2PM12 (GX-221)	MS-005	2
19-23x	ZW2243976	Jack Pan Washer	MS-5003	2
19-24x	ZW3451513	E Jack Nut		2
19-25x	ES0754476	Slide Switch ESD-2701M1 (GX-221)	MS-022	1
19-26	EI2135370	Power Plug Socket SP-1001	WP-23	1
19-27	ZW3910025	ISO Screw, truss head 3x6		2
19-28	EZ4252263	Strain Relief SR-2K-4	MS-018	1
19-29	EZ4254894	U/L AC Cord 3M	MS-5018	1
19-30x	EF1383865	Fuse ST-2 1.5A	MS-058	1
19-31x	EF4274811	Fuse ST-2 2.5A (GX-221)	MS-058	1
		SUB PANEL BLOCK		
19-32x	BZ4252269	Sub Panel Block Comp. (GX-226D)		1
19-33x	BZ4252236	Sub Panel Block Comp. (GX-221D)		1
19-34x	BZ4252245	Sub Panel Block Comp. (GX-221)		1
19-35	SP4476958	Sub Panel C (GX-225D)	MS-5021	1
19-36x	SP4244965	Sub Panel B(GX-221D)	MS-5020	1
19-37x	SP4244951	Sub Panel A (GX-221)	MS-5019	1
19-38	LJ3314435	Lug Plate VB2L	SP-006	1
19-39	EJ2551135	Lug Plate VB2LL	SP-006	1
19-40x	ER329308	Carbon(R 1R01J 47k(J) (Jpn. Type)	RD-2	2
19-41x	ER348512	Carbon(R 1R01J 22k(J) (Jpn. Type)	RD-2	2
19-42x	EA2865574	Lamp P.C. Board (Rec.)	GS-1129	1
19-43x	EL2951312	No. 2 Lamp 6V 0.2A(Rec.)	SP-2 P	1
19-44	BA4261044	Track Selector P.C. Board Comp. (MS-5055)		1
19-45x	BZ4246083	DS Switch Comp. MS		1
19-46	ES3749051	Push Switch UEG-22CP	MS-018	2
19-47	EZ4245157	Switch Holder	MS-5005	2
19-48x	ZW4325843	Screw, pan head 2.6x4		2
19-49x	ZW3237725	Screw, binding head 3x5		4
19-50	SK4654675	Knob C	GG-1063	4
19-51	BA4261115	Equalizer P.C. Board Comp. (MS-5023)		1
19-52x	ZW3237328	Screw, binding head 3x6		2
19-53	LS4659541	Push Switch JB-52	MS-048	1
19-54x	ML2347194	Power Switch Table	MS-5017	1
19-55x	ZW3731856	ISO Screw, binding head 3x5		2
19-56	ER3784113	Spark Quencher 0.01μF, 0.033Ω+120Ω 500WV	MS-5037	1
19-57	SK4870697	Knob D	GG-5047	1
19-58	BA4260093	SRT P.C. Board Comp. (MS-5026)		1
19-59	EA4257574	Volume V25N 50 KA	MS-5028	2
19-60x	EV2985755	Double Vol. (ER-1 UP20 X 50Kx2 (GX-221)	MS-5015	1
19-61x	BA4261126	Tone Control P.C. Board Comp. (MS-5016)		1
19-62	EJ3911043	Mic Jack 3PM11P	MS-5035	1
19-63	EJ3911054	Mic Jack 2PM11P	MS-5035	2
19-64x	EZ2251150	Nylon Collar, Jack	LG-5030	3
19-65x	ZW4382946	Washer (Humidur) Dp.2x1.8x0.25t		3
19-66x	ZW3751563	E Jack Nut		3
19-67x	ZW2603386	Washer (Fiber) D9.2x12x0.5t	MS-5004	1
19-68	LM4877110	VU Meter KL-2511A-T (GX-225D)	MS-5038	2
19-69	FA4877106	VU P.C. Board	MS-5039	2
19-70x	LM5291864	VU Meter KPM-5E (GX-221D)	MS-5038	2
19-71x	ZW3124695	Washer (SPCC) D3.2x8x1t		4
19-72	ZG2908778	VU Meter Spring	MX-5004	4
19-73x	ZW3441607	ISO Nut, M3		4
19-74x	EL2955312	No. 2 Lamp 6V 0.2A	SP-2 P	2
19-75	EZ4247235	Amp. Chassis	MS-5006	1
19-76	ES4266332	4P Socket S-16J03	SP-1156	1
19-77	EJ2711108	5P TV-Connect-Socket	SP-1155	1
19-78	EJ2956407	4P Jack	SP-1138	1
19-79	EZ4245476	Connector Shield	MS-5018	1
19-80x	ZW2000887	Tapping Screw #2 3x6(round)		1
19-81	EZ4111276	P.C. Board Resistrix (Metal Prop	LF-5011	2
19-82	ZW4179025	Screw, binding head 3x8, w/washer		2
19-83x	LD1274522	Silicon Diode 1B2 (GX-221)	SP-2155	1
19-84x	EC9015801	Elect. AC 2200μF 50WV (Lug type) (GX-221)	SP-1014	1
19-85	EJ1356682	Lug Plate VB1L	SP-006	1
19-86	EZ4242460	Trans. Hanger	MS-5015	1
19-87	BT4242282	Power Trans. MST-1 (Black)	SP-1155	1
19-88x	BT4242271	Power Trans. MST-3 (GX-221)	SP-1122	1
19-89	ZW2000700	Tapping Screw #2 8x8 (round)		4
19-90	EZ4257080	Multi Holder (MS-23)	MS-5011	1
19-91x	EZ4243464	Multi Holder (GX-221)	MS-5019	1
19-92	EJ2939911	10P Multi-Jack 50R-01M-003	SP-1142	2
19-93x	ZW4870991	Screw, pan head 2.2x8		2
19-94	EZ4873315	NRF Holder	MS-5020	1
19-95	EJ2576070	22P Multi Jack-J (2450-022-001S	SP-1132	2
19-96	EJ2930073	12P Multi-N Lock Plug Housing 3-480275-0	SP-1151	1
19-97x	EJ3730639	Socket Contact 611 15-1	SP-1151	12
19-98	ES3749051	Push Switch UEG-22CP	MS-5038	1
19-99x	EZ4254317	Switch Holder	MS-5035	1
19-100x	ZW4382845	Screw, pan head 2.6x4		4
19-101	ZW2000665	Tapping Screw #2 3x10 (round)		4
19-102	EZ4872202	Multi Hanger	MS-5017	1
19-103	EZ4242236	Preamp. Shield	MS-5014	1
19-104	EZ4242258	OSC Shield	MS-5016	1
19-105	EZ4242326	Side Chassis A (Right)	MS-5018	1
19-106	EZ4242357	Side Chassis B (Left)	MS-5018	1
19-107x	EZ4112267	P.C. Board Retaining Metal	LF-5037	1
19-108	EZ4872581	VU Meter Escutcheon A	MS-5032	2
19-109	EA4871350	HT P.C. Board	MS-5036	1
19-110x	BT1247146	Head Phone Trans N-19-2268	SP-2110	2
19-111x	ZW4324928	Screw, binding head 3x5		4
19-112	MH2251108	Prop	MS-5026	2

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

FIG. 20 PHOTO OF FINAL ASSEMBLY BLOCK



FINAL ASSEMBLY BLOCK

Ref. No.	Parts No.	Description	Symbol No.	Qty
		AMP. PANEL BLOCK		
20-1*	B2A27271	Amp. Panel Block Comp. (GX-221)		1
20-1*	B2A27282	Amp. Panel Block Comp. (GX-221D)		1
20-5x	B2A27260	Amp. Panel Block Comp. (GX-225D)		1
20-4	SP4B3732	Amp. Panel B GX-221	MS-5018	1
20-5x	SP4B3743	Amp. Panel E GX-221D	MS-5018	1
20-6x	SP4B3751	Amp. Panel F GX-225D	MS-5018	1
20-7	SM4B3754	Amp. Panel Name Plate	MS-5182	1
20-8	S2A01320	Illumination Escutcheon	C-5003	1
		MECH. PANEL BLOCK		
20-9*	W2A87461	Mech. Panel Block Comp.	MS-5013	1
20-10	SP4B1273	Mech. Panel C	MS-5011	1
20-11	SZ3B1618	Counter Escutcheon	MS-5004	1
20-12	SZ4B3048	Head Cover Table A	MS-5025	1
20-13x	SZ4B2870	Head Cover Pin	MS-5018	2
20-14x	ZW2003084	Screw, countersunk head 3x6		2
20-15	ZW4B3125	Screw, oval countersunk head 3x6		2
20-16	S7A3B062	Panel Ring	CP-4033	2
		SIDE PLATE (RIGHT) BLOCK		
20-17x	07A31461	Side Plate (Right) Block Comp. (GX-221)		1
20-18x	B2A32527	Side Plate (Right) Block Comp. (Deck)		1
20-19	SZ4A2901	Side Wall D (GX-221)	MS-6001	2
20-20x	SZ4A0281	Side Wall B2 (Deck)	MS-6001	1
20-21	ZW2903260	U type Speed Nut, M4 #1 (large)	CP-3	2
20-22	ZW2903248	U type Speed Nut, M4 #1 (small)	CP-3	2
20-23	SS3B1342	Speaker SK-2107F (GX-221)	P-53	1
20-24	DPM4471.5	Cement, R. SW 27(K)		1
20-25x	ZW2554457	Screw, binding head 3x10		4
20-26x	ZW4B5202	Washer (SPC) D3.5x8x0.5t		4
20-27x	ZW4B3256	Nut, M3		8
20-28x	MZ4B3591	L. Metal Fitting D	MS-6004	1
20-29x	ZW4B7840	Tapping Screw #2 3x8(BR)		2
20-30	SZ4A2823	Side Plate A (GX-221)	MS-6001	1
20-31x	SZ4A2824	Side Plate B (Deck)	MS-6001	1
20-32	SZ4A2945	Speaker Grill (GX-221)	MS-6004	1
20-33	SZ4A2967	Reflection Plate (GX-221)	MS-6005	1
20-34	SZ4A7408	Reflection Plate Retaining Metal	MS-6015	2
20-35x	ZW2B2183	Screw, truss head 3x6(black)		2
20-36	ZW2S2046	Screw 3x25 (truss), without groove		4
20-37x	ZW2S2593	Washer (BSP) D3.4x7.2x0.5t		4
20-38	ZW4S7444	Screw, oval countersunk head 4x25		6
20-39	ZW4G7150	Decorative Washer, M4		6
		SIDE PLATE (LEFT) BLOCK		
20-40x	07A32516	Side Plate (Left) Block Comp. (GX-221)		1
20-41x	B2A32538	Side Plate (Left) Block Comp. (Deck)		1
20-42	SZ4A2890	Side Wall A (GX-221)	MS-6001	1
20-43x	SZ3A0279	Side Wall C (Deck)	MS-6001	1
20-44	ZW2902250	U type Speed Nut, M4 #1 (large)	CP-3	2
20-45	ZW2902248	U type Speed Nut, M4 #1 (small)	CP-3	2
20-46	SS3A1342	Speaker SK-2107F (GX-221)	P-53	1
20-47	DPM4471.5	Cement, R. SW 27(K)		1
20-48x	ZW3554871	Screw, binding head 3x10		4

Ref. No.	Parts No.	Description	Symbol No.	Qty
20-49x	ZW4S2902	Washer (SPC) D3.5x8x0.5t		4
20-50x	ZW2S2856	Nut, M3		4
20-51x	MZ4A7490	L. Metal Fitting A	MS-6009	1
20-52x	ZW4B7840	Tapping Screw #2 3x8(BR)		4
20-53	SZ3A2923	Side Plate A (GX-221)	MS-6006	1
20-54x	SZ4A2834	Side Plate B (Deck)	MS-6006	1
20-55x	SZ4A2945	Speaker Grill (GX-221)	MS-6004	1
20-56	SZ4A2967	Reflection Plate (GX-221)	MS-6005	1
20-57x	SZ4A7508	Reflection Plate Retaining Metal	MS-6015	2
20-58x	ZW2B2183	Screw, truss head 3x8 (black)		2
20-59x	ZW4S2046	Screw, 3x25(truss), without groove		4
20-60x	ZW2S2593	Washer (BSP) D3.4x7.2x0.5t		4
20-61x	ZW4A2444	Screw, oval countersunk head 4x25		5
20-62x	ZW4G2150	Decorative Washer, M4		5
		ASSEMBLY BLOCK		
20-63x	SZ4A2024	Panel Support	MS-6008	2
20-64	SP4B2506	Knob (Right), w/pin	MS-6005	1
20-65	SP4B2528	Knob (Left), w/pin	MS-6015	1
20-66x	ZW3B2728	Screw, binding head 3x6		6
20-67	ZW3A2772	Tapping Screw #2 3x6(BR)		20
20-68	SZ4A2583	Channel A	MS-6008	1
20-69	SZ4A2908	Channel B	MS-6007	1
20-70x	S7A3395x	Head Cover Shield	MS-6014	1
20-71	SP4B2541	Head Cover A	MS-6014	1
20-72	SM4B2563	Head Cover Name Plate GX-221	MS-6006	1
20-73x	SM4B2574	Head Cover Name Plate GX-221D	MS-6006	1
20-74x	SM4B2552	Head Cover Name Plate GX-225D	MS-6005	1
20-75	SZ4A2160	Bottom Plate	MS-6020	1
20-76	SZ3A1991	LM Rubber Foot	CP-5020	8
20-77x	ZW0B9646	Washer (SPC) D4.5x8.6x0.8t		8
20-78x	ZW4B7776	Screw, tris. head 4x18		8
20-79	ZW4G5418	Panel Washer	MS-6024	4
20-80	ZW4T1660	Screw, oval countersunk head 3x6		4
20-81	SZ4A2178	Upper Plate (Ceiling)	MS-6002	1
20-82x	ZW4G1037	Washer, M3 (Mountain type)		4
20-83x	ZW4A2125	Screw, oval countersunk head 3x8 (Black)		4
20-84x	SZ4A5316	Change Name Plate	MS-6004	1
20-85x	ZW4J2044	Push Nut 5x10x0.8t		1
20-86x	ZW3A2005	Lock Screw	MS-5015	1
20-87x	ZW2S9514	Washer (Nylon) D3.1x8x1t		1
20-88x	SZ4A8801	Back Cover A 1 (GX-221)	MS-6023	1
20-89x	SZ4A8812	Back Cover D 1 (Deck)	MS-6023	1
20-90x	ZW4B2194	Tapping Screw #2 3x8(pan), w/washer		4
20-91x	ZW2B0643	Tapping Screw #1 4x25(truss)		6
20-92	SK4B2518	Push Roller Cap	MS-5020	1
20-93	SK4B7585	Mech. R. ob A	MS-5020	2
20-94x	ZW2S2405	Mech. Knob Screw	MS-5012	2
20-95	SK47A752	Power Knob	MS-5012	1
20-96x	ZW2A3001	Set Screw, hexagon socket 3x5 (cup)		1
20-97	SK4B0498	Lever Switch Knob A, B	MS-5027,8	1
20-98	MP3T1450	LC Pitch Roller	MS-5025	1
20-99	SK4B7293	Equalizer Knob	MS-5012	3
20-100	SK4B7326	Volume Knob A (GX-221)	MS-5013	1
20-101x	ZW2G8766	Set Screw 3x3 (cup)		3
20-102	SK4B0337	Volume Knob B (GX-221)	MS-5026	1
20-103x	ZW2B0335	Set Screw 3x3 (cup)		3
20-104x	SK47611.1	Amp. Knob (Deck)	MS-5028	1
20-105	SK4B7697	Knob B	CC-2007	1
20-106	SK4B7675	Knob C	CC-2007	1
20-107	SB4J6615	Direction Change Button	MS-5001	2
20-108	SK3B3095	TUM Knob	MS-5029	3
20-109	E7A2438J	Collar, Jack	MS-5032	3
20-110x	EP4J4511	Fuse ST-2 2.5A	MS-5128	1
20-111x	EP3J4573	Fuse 2A 250V	MS-5126	1
20-112x	EP3B2837	Fuse ST-2 1.5A	MS-5125	1
20-113x	EJ3B0626	Fuse ST-2 1A	MS-5124	1

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

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BA3170B1	5-40	EC250083	9-C319	EC520492	14-C504	ER2126B1	10-R303
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BA42e200	17-1A	EC250841	14-C903,6	ED223626	8-D0202	ER2128B5	11-R21
BA42e206	19-44	EC251291	13-C406	ED223626	10-D203	ER2128B5	11-R26
BA43a115	15-1A	EC251291	13-C406	EH3203B0	16-D401	ER2128B5	14-R504
BA43a115	19-51	EC308711	9-C0208	EL5311916	19-D402	ER2128B5	15-R401
BA4268B6	12-1K	EC308711	14-C510	ED5197Z1	11-D112	ER2128B5	15-R501
BA4268B6	19-61K	EC311193	11-C31	EE3408B6	20-D13A	ER2128B5	15-R503
BA4268B6	19-1K	EC311193	14-C903,4	EE3408B7	19-D3A	ER2128B5	15-R601
BA4361B1	9-1K	EC313323	9-C318	EE3408B7	20-D12A	ER2128B5	15-R603
BA4361B2	10-2K	EC314402	9-71	EE3907Z3	20-D11A	ER2128B5	15-R604
BA4391B1	15-2	EC316091	8-C0206	EF4218A1	19-51K	ER2128B5	15-R605
BA4261B1	14-1K	EC316113	8-C0207	EF4218A1	20-110K	ER2128B5	15-R606
BA4332A2	13-1K	EC320049	8-C0201	EH3406B3	19-T601	ER2128B5	15-R607
BA4332A0	10-3K	EC320051	9-C312	EH4124T3	19-JC201	ER2128B5	15-R608
BA4347Z7	10-1K	EC320053	9-C320	EH4251B3	13-4	ER2128B5	15-R609
BA4347B5	11-1K	EC320053	10-C213	EJ2059T5	9-110A	ER2128B5	15-R610
BA4361B0	4-1K	EC320053	10-C218	EJ2135Z0	19-26	ER2128B5	15-R611
BH1420B4	1-1A	EC320053	11-C51	EJ2135Z0	19-B5	ER2128B5	15-R612
BL5104B4	6-146	EC320053	13-C701	EJ2551T5	19-39	ER2128B5	15-R613
BL4137B3	3-22A	EC320053	14-C603	EJ2551T5	19-77	ER2128B5	15-R614
BM3147A1	2-1	EC320053	14-C703	EJ2V29B1	19-B2	ER2128B5	15-R615
BM4370A0	3-1A	EC320053	9-C301	EJ2V30A2	19-B2K	ER2128B5	15-R616
BR32e035	2-3A	EC320053	9-C307	EJ2V30T3	19-9A	ER2128B5	15-R617
BR4260B6	2-2A	EC320053	9-C313	EJ2V35B7	19-T8	ER2128B5	15-R618
BS4381B1	5-1A	EC320053	9-C314	EJ2V35B7	19-T9	ER2128B5	15-R619
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DT2417A6	19-110A	EC320053	10-C207	EJ3089B1	5-44K	ER2128B5	15-R621
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UZ3192B0	6-1K	EC320053	10-C217	EJ3291Q7	19-95	ER2128B5	15-R625
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UZ4324B1	19-17K	EC320053	10-C226	EJ3756Z4	19-B5K	ER2128B5	15-R633
UZ4324B2	19-B7K	EC320053	10-C227	EJ3756Z4	19-B6K	ER2128B5	15-R634
UZ4324B2	19-B8K	EC320053	10-C228	EJ3756Z4	19-B7K	ER2128B5	15-R635
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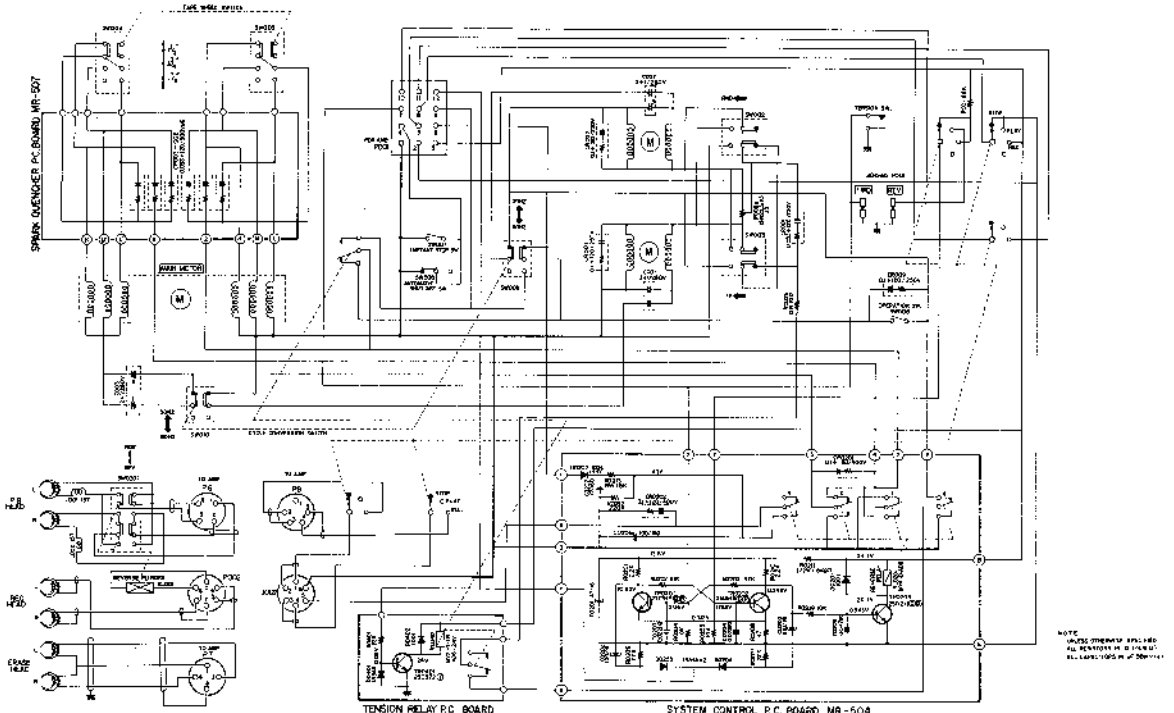
ZW270085	1-21	ZW396786	3-10	ZW863130	6-32		
ZW270085	2-9	ZW403812	1-51				
ZW270088	6-42	ZW406418	20-79				
ZW270088	6-134	ZW411660	20-50				
ZW273395	3-17	ZW413155	14-3				
ZW273668	6-58	ZW413168	1-8				
ZW273756	14-4	ZW413188	5-22				
ZW273756	15-44	ZW413188	5-32				
ZW273756	19-31	ZW413188	6-100				
ZW273756	20-95	ZW415201	6-22				
ZW273756	20-59	ZW413201	5-14				
ZW273778	1-12	ZW413201	6-99				
ZW273778	2-34	ZW413223	1-26				
ZW273775	6-124	ZW413223	1-71				
ZW277881	1-63	ZW413223	5-20				

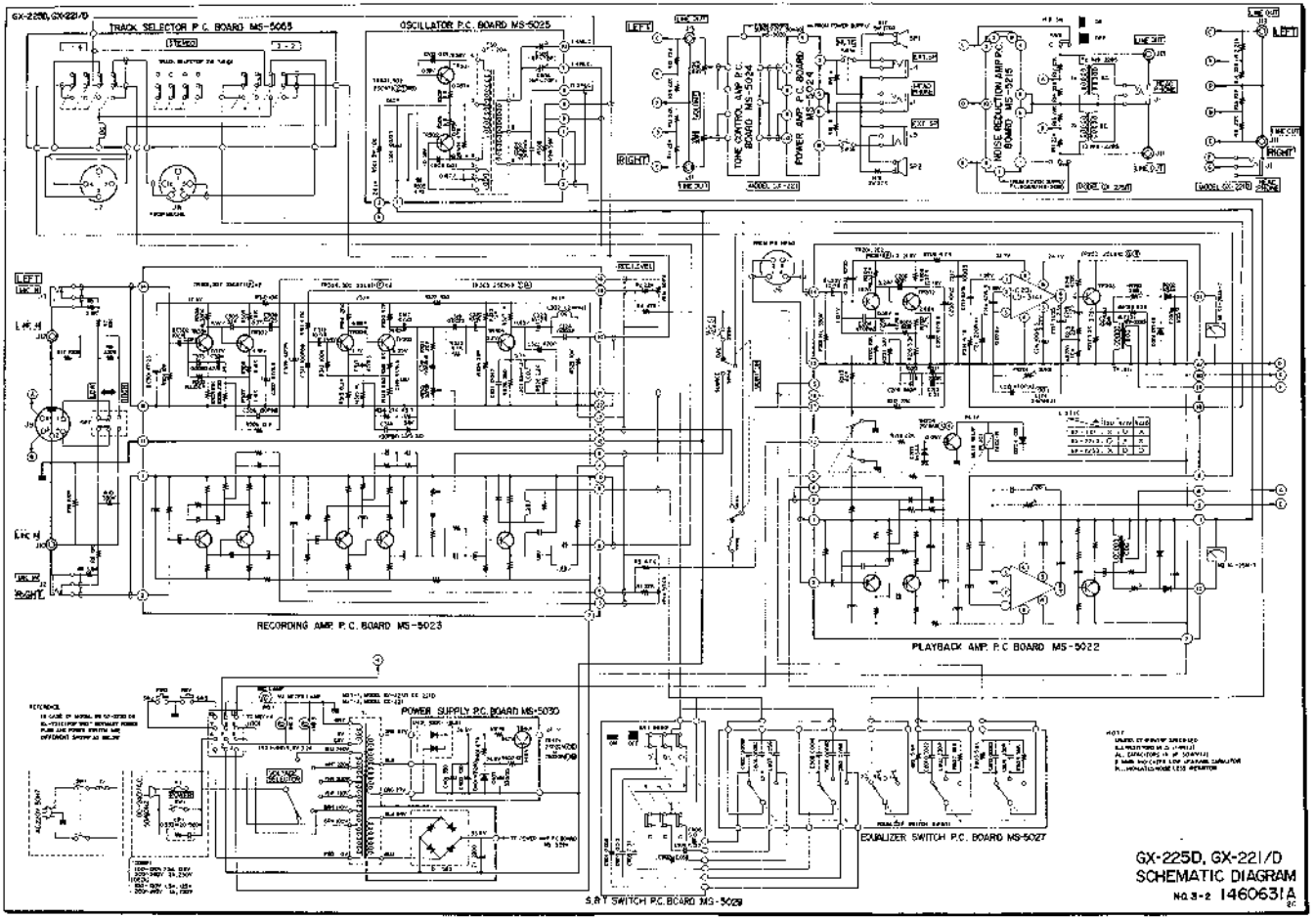
SECTION 3

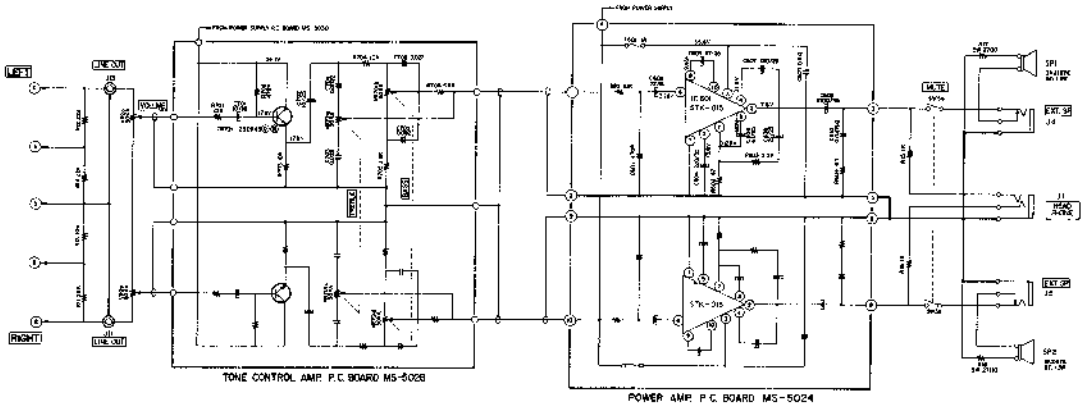
SCHEMATIC DIAGRAM

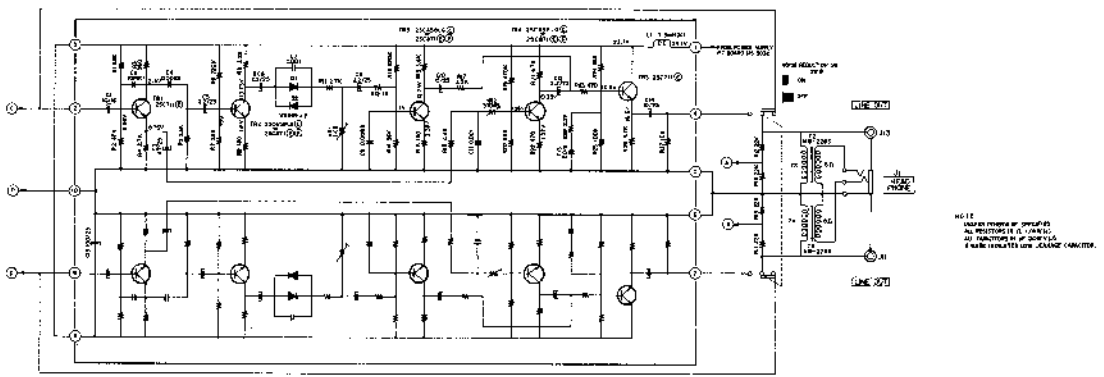
1. GX-225D SCHEMATIC DIAGRAM
2. GX-221 SCHEMATIC DIAGRAM
3. GX-221D SCHEMATIC DIAGRAM



GX-225D, GX-221/D
SCHEMATIC DIAGRAM
NO.3-1 [460630A


GX-225D, GX-221/D
TRACK SELECTOR P.C. BOARD MS-5065
OSCILLATOR P.C. BOARD MS-5025
TONE CONTROL AMP P.C. BOARD MS-5026
POWER AMP. P.C. BOARD MS-5024
NOISE REDUCTION AMP P.C. BOARD MS-5215
RECORDING AMP. P.C. BOARD MS-5023
PLAYBACK AMP. P.C. BOARD MS-5022
POWER SUPPLY P.C. BOARD MS-5030
EQUALIZER SWITCH P.C. BOARD MS-5027
S.B.Y SWITCH P.C. BOARD MS-5029
GX-225D, GX-221/D
SCHEMATIC DIAGRAM
NO.3-2 1460631A





GX-225D, GX-221/D
SCHEMATIC DIAGRAM
NO.3-3 1460632A