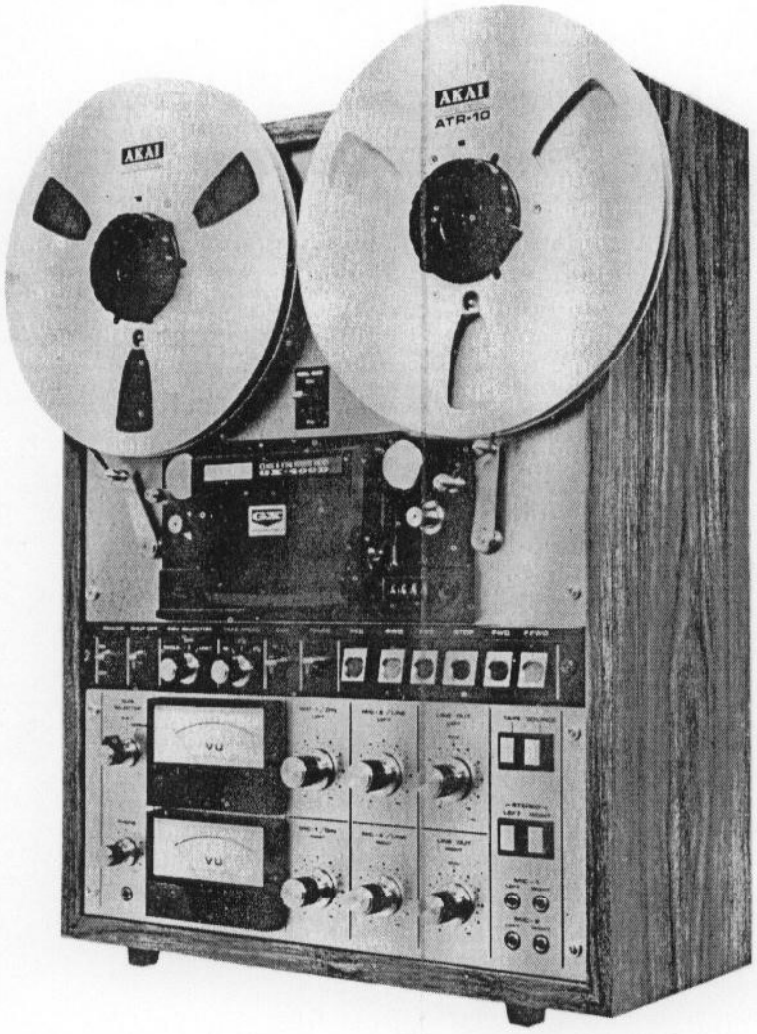


STEREO TAPE DECK

MODEL GX-400D

ALSO APPLICABLE TO MODEL GX-400D·PRO
STEREO TAPE DECK

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SECTION 1

SERVICE MANUAL

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I. SPECIFICATIONS

1. MODEL: GX-400D

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

TRACK SYSTEM		4 track 2 channel stereo, monaural Recording/Playback
TAPE SPEED		15, 7-1/2 and 3-3/4 ips.±0.5%(*1.5%)
WOW AND FLUTTER		Less than 0.035%(*0.06%) R.M.S. at 15 ips. Less than 0.05%(*0.09%) R.M.S. at 7-1/2 ips. Less than 0.08%(*0.15%) R.M.S. at 7-1/2 ips.
FREQUENCY RESPONSE	S.R.T. Tape	20 to 30,000 Hz(*30 to 27,000 Hz±3 dB) at 15 ips. 20 to 28,000 Hz(*30 to 24,000 Hz±3 dB) at 7-1/2 ips. 30 to 20,000 Hz(*30 to 17,000 Hz±3 dB) at 3-3/4 ips.
	Normal Tape	20 to 28,000 Hz(*30 to 24,000 Hz±3 dB) at 15 ips. 20 to 26,000 Hz(*30 to 22,000 Hz±3 dB) at 7-1/2 ips. 30 to 19,000 Hz(*30 to 15,000 Hz±3 dB) at 3-3/4 ips.
DISTORTION		*Less than 2% at 15 ips. 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
OUTPUTS	Line Output	0±1 dB(O VU), 6±1.5 dB(VR Max.)
	Din Output	390 mV
	Head Phone Output	50±10 mV 8Ω load 1,000 Hz O VU Head Phone Volume maximum
INPUTS	Mic Input	0.7 mV
	Line Input	70 mV
	Din Input	15 mV(low), 300 mV(high)
RECORDING/PLAYBACK LEVEL		0±1.5 dB
SIGNAL TO NOISE RATIO		Better than 54 dB(*48 dB)
CROSS TALK	Stereo	*Better than 45 dB at 1,000 Hz 3 VU recording
	Monaural	Better than 70 dB *Better than 60 dB at 1,000 Hz 3 VU recording
ERASE RATIO		Better than 70 dB
RECORDING BIAS FREQUENCY		100±5 kHz
BIAS LEAK	Stereo	Less than -30 VU
	Monaural	Less than -20 VU
HIGH FREQUENCY DEVIATION		0±1.5 dB, using a 15,000 Hz test tape at 15 ips.
REVERSING TIME		Within 4 sec. at 15 ips. Within 3 sec. at 7-1/2, 3-3/4 ips.
RECORDING CAPACITY		90 min. stereo recording, using a 3,600 ft. tape at 15 ips.
F.FWD AND RWD TIME		120/100 sec., using a 2,400 ft. tape at 50/60 Hz
MOTORS	Capstan Motor	4 pole eddy current A.C. servo motor Type: SCM3-16TW Revolutions: 800 r.p.m. at 15 ips. 400 r.p.m. at 7-1/2 ips. 200 r.p.m. at 3-3/4 ips.
	Reel Motor	Two 6 pole eddy current inner rotor motors Type: IM1-24TW Revolutions: 1,000/1,200 r.p.m. at 50/60 Hz
HEADS	Combo Recording/ Erase Head	Type: RE4-6 Gap: 3.5 to 5.5 microns(Rec.) 0.2 mm x2 W Gap(Erase) Impedance: 1,400Ω±25% at 100 kHz(Rec.) 130Ω±7% at 100 kHz(Erase) D.C. Resistance: 5.5Ω Rec.(approx.) 2.3Ω Erase(approx.)
	Playback Head	Type: P4-220 Gap: 0.5 to 2 microns Impedance: 1.2 kΩ±25% at 1 kHz D.C. Resistance: 160Ω(approx.)

TRANSISTORS	2SA564(Q)(R) . . . 3 2SA628(D)(F) . . . 3 2SA640(L) . . . 10 2SA733(R) . . . 2 2SC458LG(C) . . . 2 2SC711(D)(E) . . . 32 2SC792 . . . 1 2SC945(Q)(R) . . . 8	2SC971 . . . 1 2SC1014(C)(D) . . . 1 2SC1098(L)(M) . . . 2 2SC1211(C)(D) . . . 1 2SC1222(E)(F) . . . 12 2SC1247A(B)(V) . . . 12 2SD234(O)(R) . . . 1
F.E.T.	2SK30(O) . . . 2	
DIODES	1N34A . . . 4 WG713 . . . 5 1S1588 . . . 52 10D05 . . . 9 10D1 . . . 7	10D4 . . . 7 10DC-2(Blk) . . . 1 10DC-2(Red) . . . 1 5B2 . . . 1
ZENER DIODES	RD7A(L)(N) . . . 3 RD9A . . . 2	WZ085 . . . 2
THERMISTER	31D26 . . . 1	
POWER SUPPLY	100 to 240VA.C. 50/60Hz	
POWER CONSUMPTION	160W maximum	
INSULATION RESISTANCE	More than 50 MΩ	
DIMENSIONS	457(W)x590(H)x240(D) mm (18"x23.2"x9.5")	
WEIGHT	31.2 kg(68.7 lbs.)	

NOTE: Specifications subject to change without notice.

2. MODEL: GX-400D·PRO

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

TRACK SYSTEM		2 track 2 channel stereo Recording/Playback 4 track 2 channel stereo Playback
TAPE SPEED		15, 7-1/2 and 3-3/4 ips.±1.5%
WOW AND FLUTTER		Less than 0.035%(*0.06%) R.M.S. at 15 ips. Less than 0.09% R.M.S. at 7-1/2 ips. Less than 0.15% R.M.S. at 3-3/4 ips.
FREQUENCY RESPONSE	S.R.T. Tape	30 to 27,000 Hz±3 dB at 15 ips. 30 to 24,000 Hz±3 dB at 7-1/2 ips. 30 to 18,000 Hz±3 dB at 3-3/4 ips.
	Normal Tape	30 to 24,000 Hz±3 dB at 15 ips. 30 to 22,000 Hz±3 dB at 7-1/2 ips. 30 to 16,000 Hz±3 dB at 3-3/4 ips.
DISTORTION		*Less than 2% at 15 ips. 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
OUTPUTS	Line Output	0±1 dB(0 VU), 6±1.5 dB(VR Max.)
	Din Output	390 mV
	Head Phone Output	50±10 mV 8Ω load 1,000 Hz 0 VU Head Phone Volume maximum
INPUTS	Mic Input	0.5 mV
	Line Input	50 mV
	Din Input	10 mV(low), 250 mV(high)
RECORDING PLAYBACK LEVEL		0±1.5 dB
SIGNAL TO NOISE RATIO		Better than 58 dB
	2 Track	*Better than 53 dB
	4 Track	*Better than 48 dB
CROSS TALK		Better than 45 dB(*43 dB) at 1,000 Hz 3VU recording
ERASE RATIO		Better than 70 dB
RECORDING BIAS FREQUENCY		160±10 kHz
BIAS LEAK		Less than -30 VU
HIGH FREQUENCY DEVIATION	2 Track	0±1.5 dB, using, a 15,000 Hz test tape at 15 ips.
	4 Track	0±3 dB, using a 15,000 Hz test tape at 15 ips.
RECORDING CAPACITY		45 min. stereo recording, using a 3,600 ft. tape at 15 ips.
F. FWD AND RWD TIME		120/100 sec., using a 2,400 ft. tape at 50/60 Hz
MOTORS	Capstan Motor	4 pole eddy current A.C. servo motor Type: SCM3-16TW Revolutions: 800 r.p.m. at 15 ips. 400 r.p.m. at 7-1/2 ips. 200 r.p.m. at 3-3/4 ips.
	Reel Motor	Two 6 pole eddy current inner rotor motors Type: IM1-24TW Revolutions: 1,000/1,200 r.p.m. at 50/60 Hz
HEADS	Erase Head	Type EF-210 Gap: 0.2mm x2 W Gap Impedance: 360Ω±10% at 100 kHz D.C. Resistance: 2.8Ω(approx.)
	2 Track Recording Head	Type: R2-100 Gap: 4.5±1 microns Impedance: 3 kΩ±20% at 100 kHz D.C. Resistance: 8Ω(approx.)
	2 Track Playback Head	Type: P2-100 Gap: 0.5 to 1 microns Impedance: 1.9 kΩ±20% at 1 kHz D.C. Resistance: 250Ω(approx.)
	4 Track Playback Head	Type: P4-220 Gap: 0.5 to 2 microns Impedance: 1.2 kΩ±25% at 1 kHz D.C. Resistance: 160Ω(approx.)

TRANSISTORS	2SA564(Q)(R) . . . 3	2SC971 . . . 1
	2SA628(D)(F) . . . 2	2SC1014(C)(D) . . . 1
	2SA640(L) . . . 10	2SC1098(L)(M) . . . 2
	2SA733(R) . . . 2	2SC1211(C)(D) . . . 1
	2SC458LG(C) . . . 2	2SC1222(E)(F) . . . 12
	2SC711(D)(E) . . . 30	2SC1247A(B)(V) . . . 10
	2SC792 . . . 1	2SD234(O)(R) . . . 1
	2SC945(Q)(R) . . . 8	
F.E.T.	2SK30(O) . . . 2	
DIODES	1N34A . . . 4	10D4 . . . 7
	WG713 . . . 5	10DC-2(Blk) . . . 1
	1S1588 . . . 36	10DC-2(Red) . . . 1
	10D05 . . . 7	5B2 . . . 1
	10D1 . . . 7	
ZENER DIODES	RD7A(L)(N) . . . 3	WZ085 . . . 3
	RD9A . . . 2	
THERMISTER	31D26 . . . 1	
POWER SUPPLY	100 to 240VA.C. 50/60 Hz	
POWER CONSUMPTION	160W maximum	
INSULATION RESISTANCE	More than 50 MΩ	
DIMENSIONS	457(W)x590(H)x258(D) mm (18"x23.2"x10.2")	
WEIGHT	30.5 kg(67.2 lbs.)	

NOTE: Specifications subject to change without notice.

II. MEASURING METHOD

1. TAPE SPEED DEVIATION

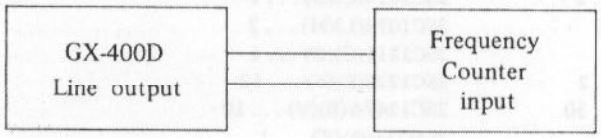


Fig. 1

As shown in Fig. 1, connect a Frequency Counter to the Line output of Model GX-400D. 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

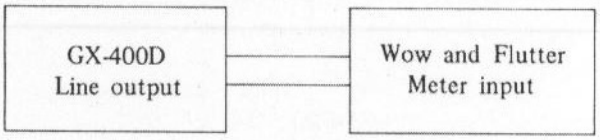


Fig. 2

Method A

As shown in Fig. 2, connect the Line output of Model GX-400D 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 $\sqrt{2}$ times of value of Method A.)

3. FREQUENCY RESPONSE

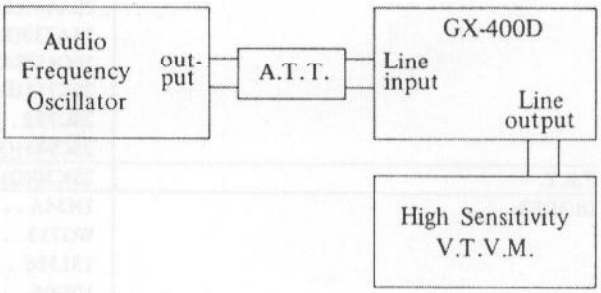


Fig. 3

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-400D from an Audio Frequency Oscillator through an Attenuator.
2) Set recorder to recording mode and turn recording level control volume to maximum. Adjust Attenuator to obtain a 0 dB V.T.V.M. reading.
3) Under conditions described in 2) above, readjust Attenuator so that the Line output is -20 dB, and record 30 to 27,000 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

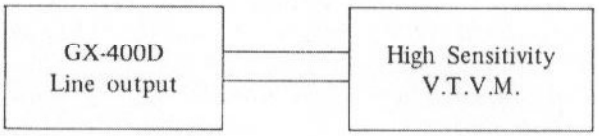


Fig. 4

As shown in Fig. 4, connect a High Sensitivity V.T.V.M. to the Line output of Model GX-400D. Playback a 700 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

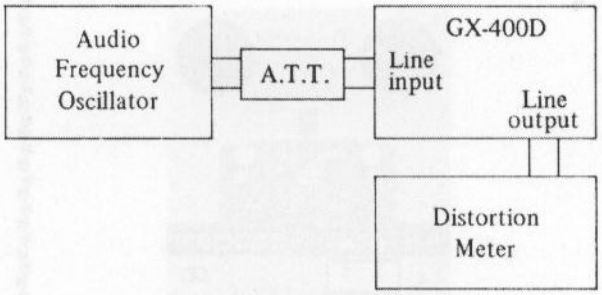


Fig. 5

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.

NOTE: 1) At this time, Distortion of the Audio Frequency Oscillator must be sufficiently small.
2) When measuring the distortion factor, new tape should be used.

6. CROSS TALK (Cross talk between the tracks)

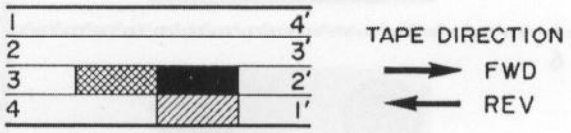


Fig. 6

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 track No. 3 and 1' (reversed condition of tape) through the B.P.F. (1,000 Hz Band Pass Filter, sensitivity 1,000 Hz, ratio 1:1) and obtain the ratio from the following formula.

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

where, C = Desired cross talk ratio (dB)
E_0 = 1,000 Hz signal output level (V)
E_2 = 1,000 Hz cross talk level (V)
E_1 = Non-input cross talk level (V)

7. ERASE RATIO

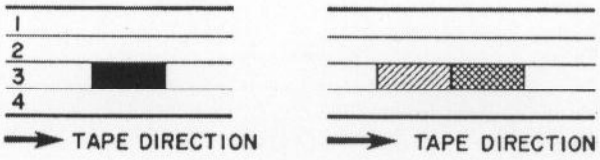


Fig. 7

As shown in Fig. 7 using a virgin tape first record a 1,000 Hz sine wave signal on track No. 3 at +3 VU level, then playback this recorded signal and take a V.T.V.M. reading at the output level. Next, erase this recorded portion and playback the erased part through the B.P.F. (1,000 Hz sensitivity 1:1) and take readings of the erased signal. Obtain a ratio between the two from the following formula:

$$E_r = 20 \log \frac{E_0}{E_2 - E_1} \quad (dB)$$

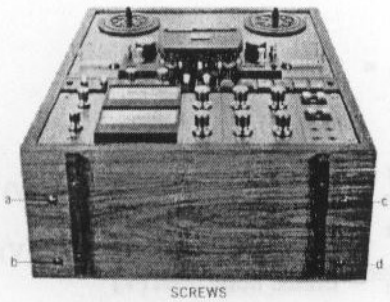
where, E_r = Desired erase ratio
E_0 = 1,000 Hz signal output level (V)
E_2 = Erased 1,000 Hz signal and noise level (V)
E_1 = Erased noise level (V)

NOTE: When measuring cross talk and erase ratio virgin tape should be used.

III. DISMANTLING OF UNIT

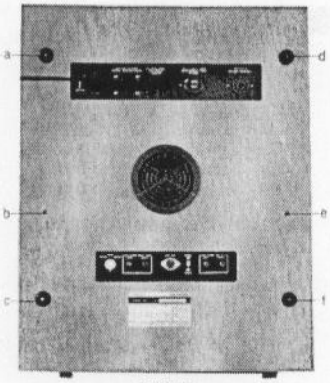
In case of trouble, etc. necessitating disassembly, please disassemble in the order shown in photographs. Reassemble in reverse order.

1



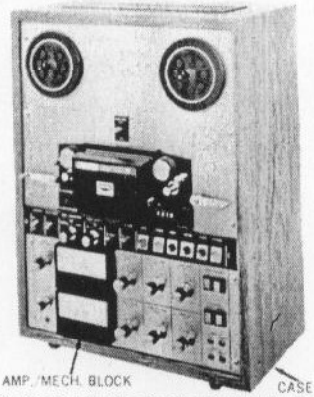
SCREWS

2



SCREWS

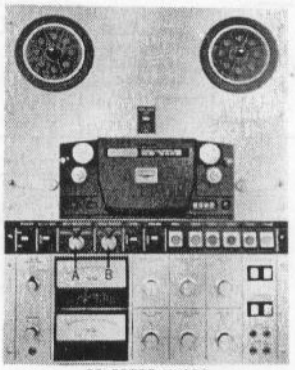
3



AMP./MECH. BLOCK

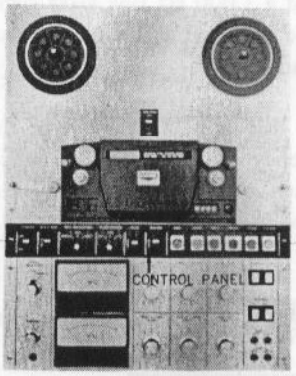
CASE BLOCK

4

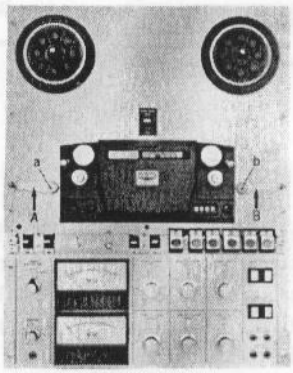


SELECTOR KNOBS

5

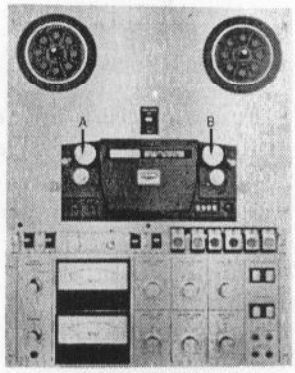


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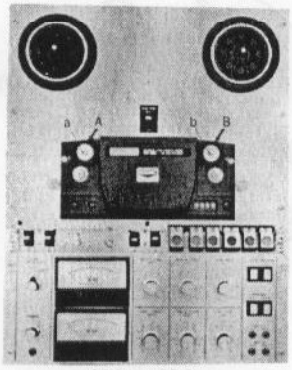
TENSION ARMS

7



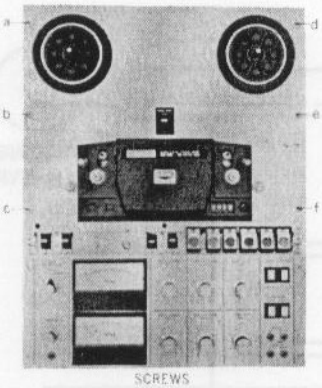
PINCH WHEEL CAPS

8



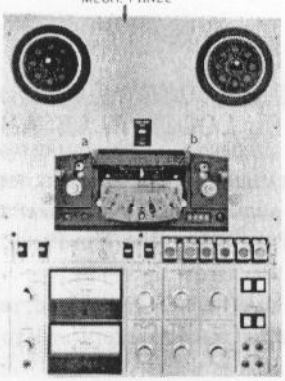
PINCH WHEELS

9

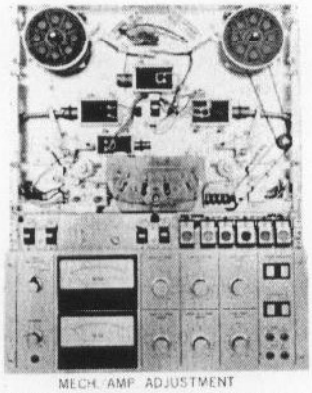


SCREWS

10

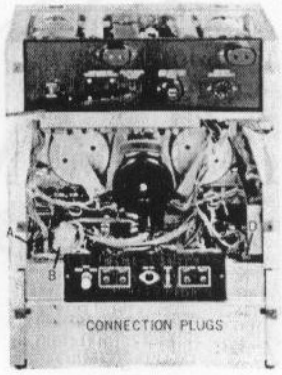


11



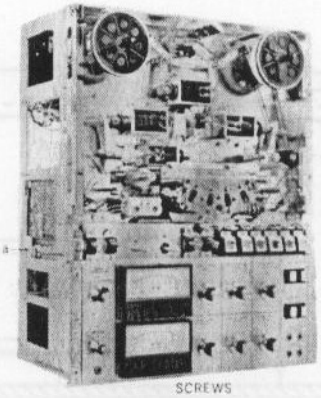
MECH. AMP. ADJUSTMENT

12



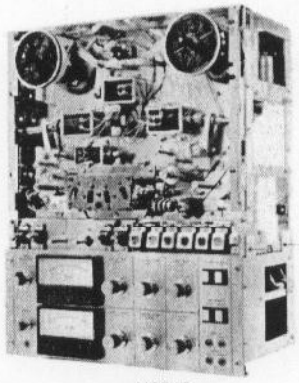
CONNECTION PLUGS

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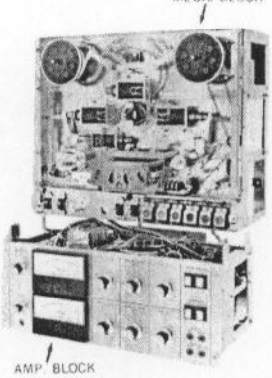
SCREWS

14



SCREWS

15



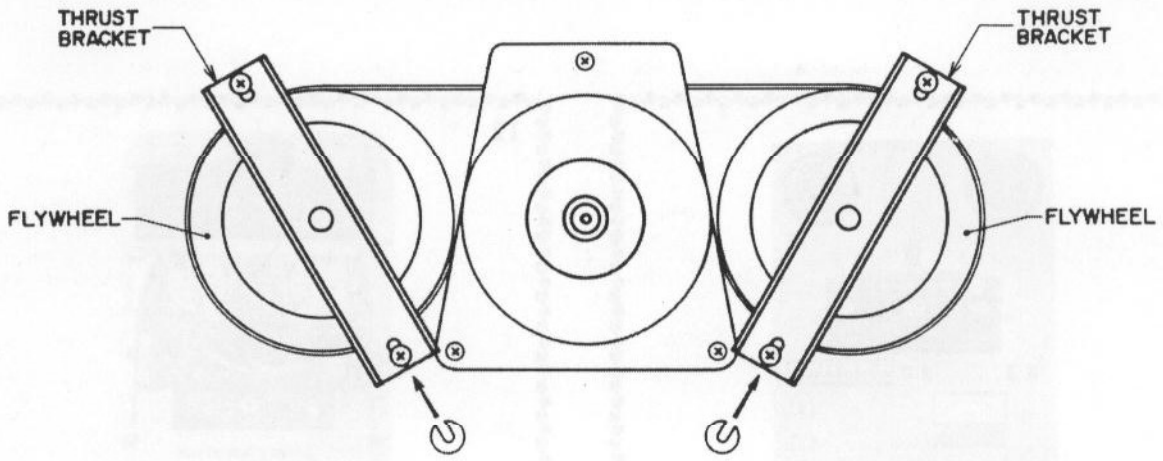


Fig. 8

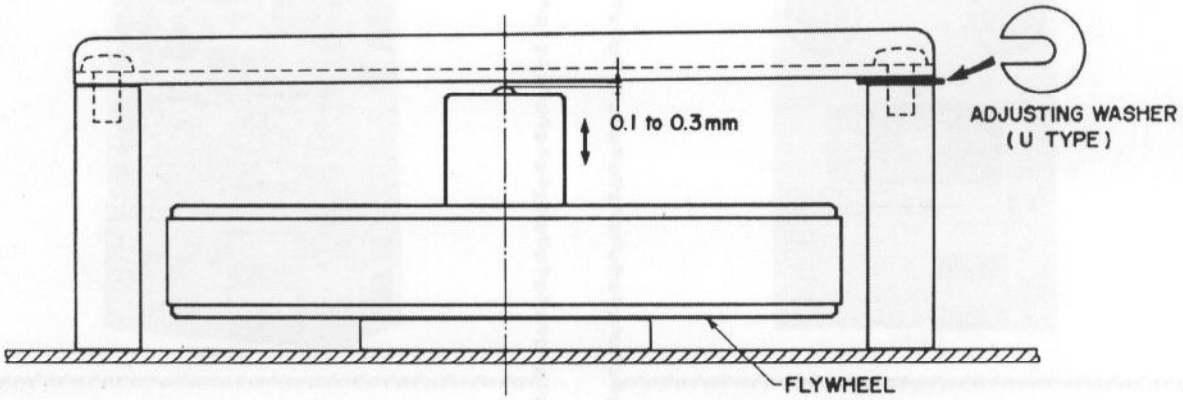


Fig. 9

1. FLYWHEEL LOOSE PLAY ADJUSTMENT

Adjust by inserting an Adjusting washer (U type) at the places indicated in Fig. 8 to obtain a 0.1 to 0.3 mm loose play when the flywheel is moved in the direction of the arrow shown in Fig. 9.

NOTE: When the flywheel is replaced, replace only with one of the same rank.

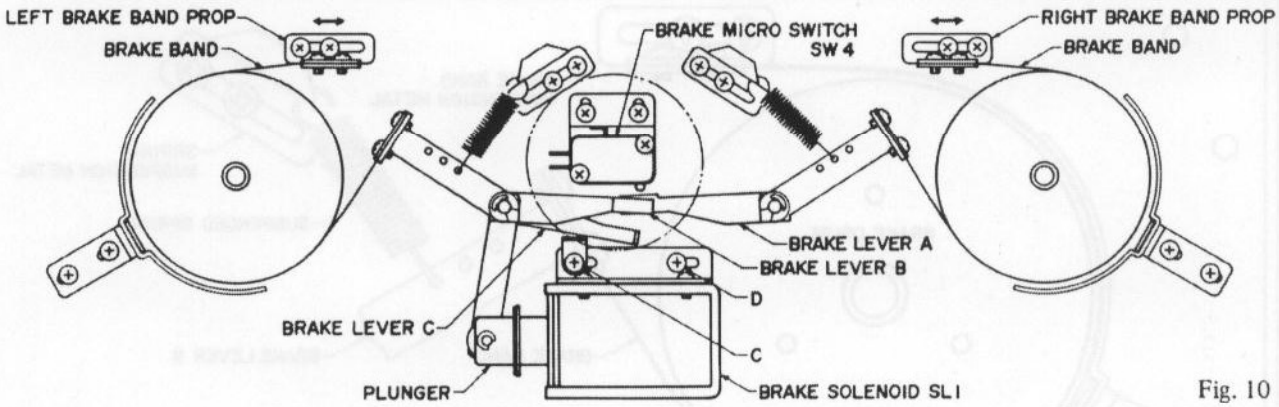


Fig. 10

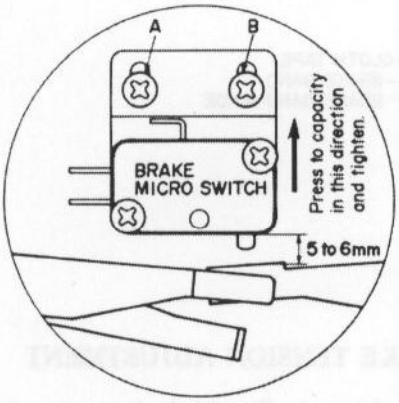


Fig. 11

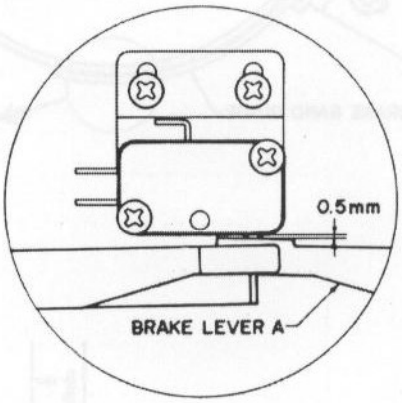


Fig. 12

2. BRAKE SOLENOID POSITION ADJUSTMENT

1) As shown in Fig. 11, press brake micro switch as far as it will go toward the top of the mechanical frame, and tighten screws A and B.
2) Move the Right Brake Band Prop shown in Fig. 10 so that the gap between Brake Lever A and the body of Brake Micro Switch is 5 to 6 mm (See Fig. 11).
3) Move the Left Brake Band Prop shown in Fig. 10 so that Brake Lever B and Brake Lever A are simultaneously operated by Brake Lever C.
4) As shown in Fig. 12, when the plunger is pulled, tighten Brake Solenoid Screws C and D at position at which the gap between Brake Lever A and the body of Brake Micro Switch is 0.5 mm at the narrowest place.

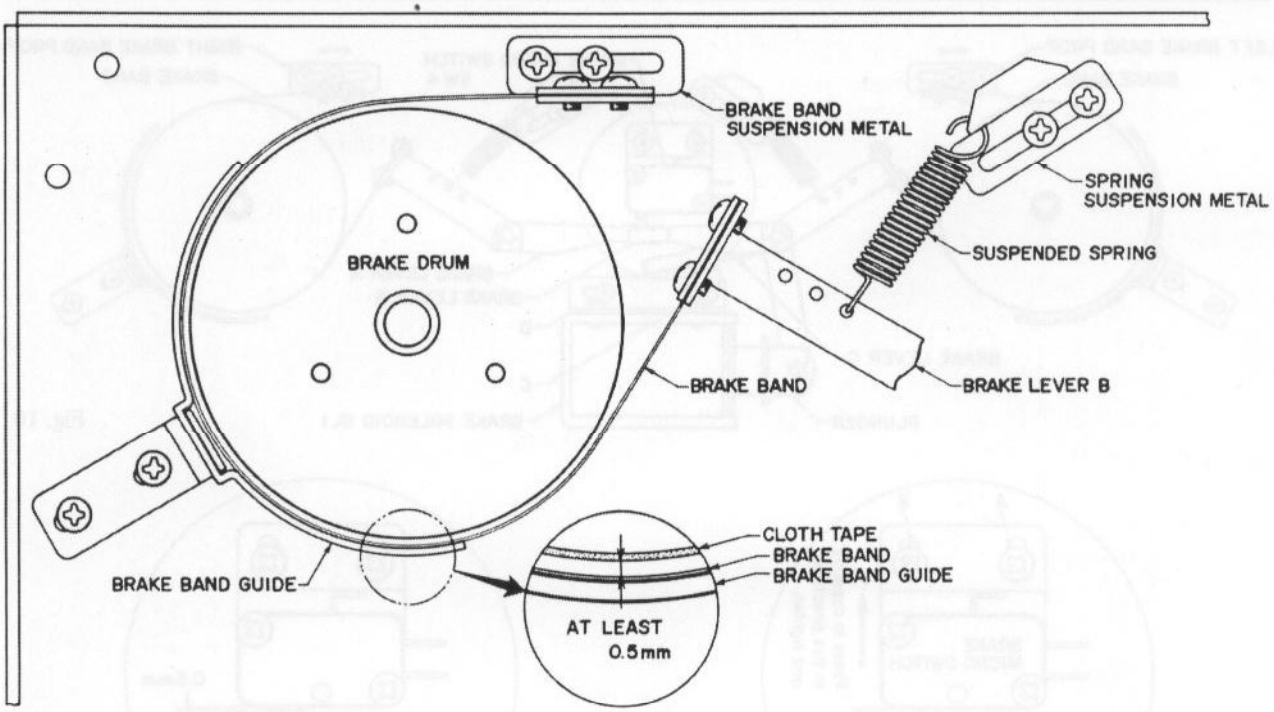


Fig. 13

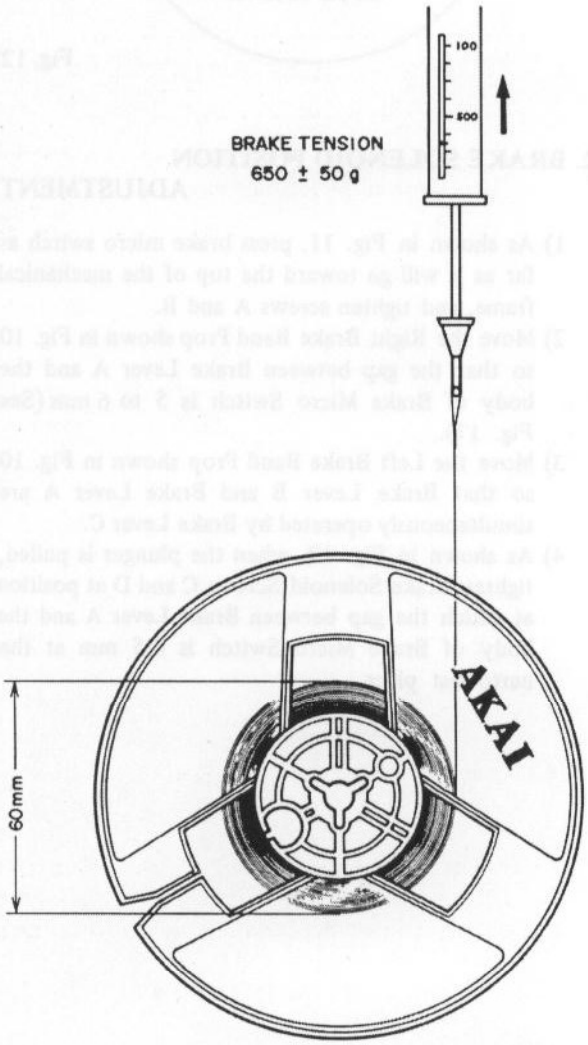


Fig. 14

3. BRAKE TENSION ADJUSTMENT

1) As shown in Fig. 14, brake tension is measured with a spring gauge using a 60 mm diameter tape wound on a 5" reel. Ideal brake tension is 650±50 gr, and left/right deviation allowance should be within 50 gr.
2) Methods for brake tension adjustment are as follows: (See Fig. 13)
   Method A: Change position of suspended spring.
   Method B: Adjust position of spring suspension metal.

NOTE: Following Brake Tension Adjustment, confirm that when the machine is set to each of the various modes (except stop mode), the brake band separates from the cloth tape on the brake drum by at least 0.5 mm. (See Fig. 13)

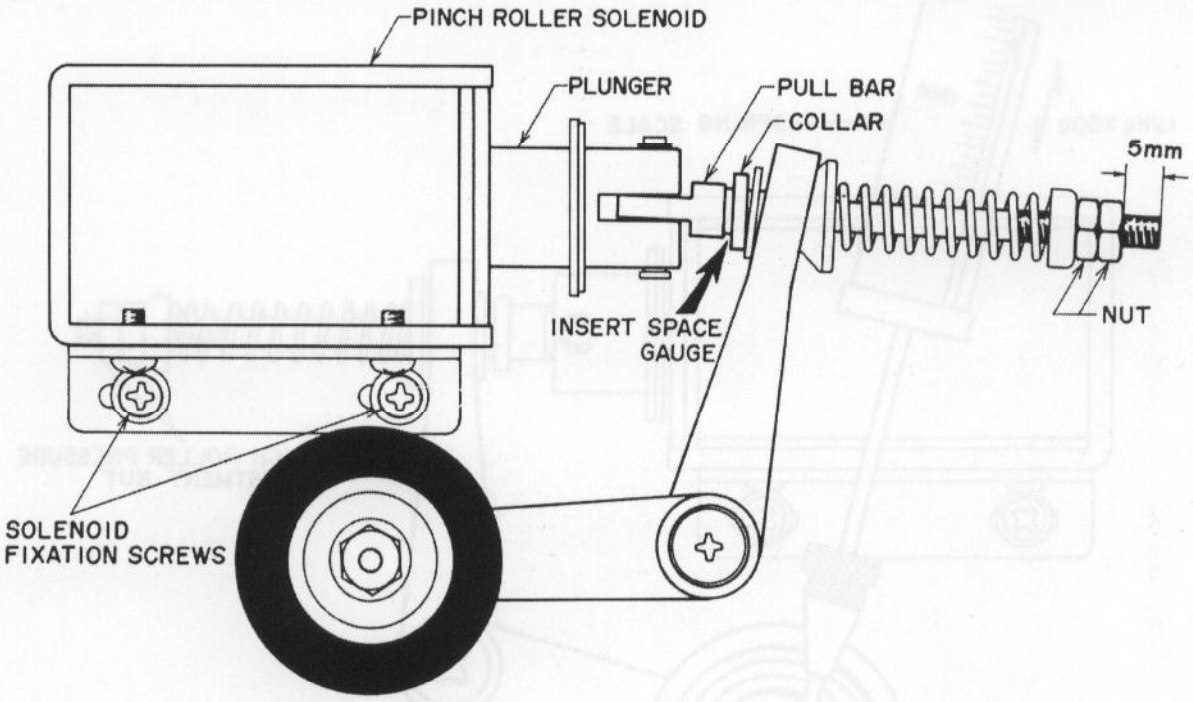


Fig. 15

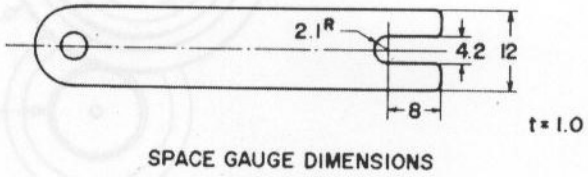


Fig. 16

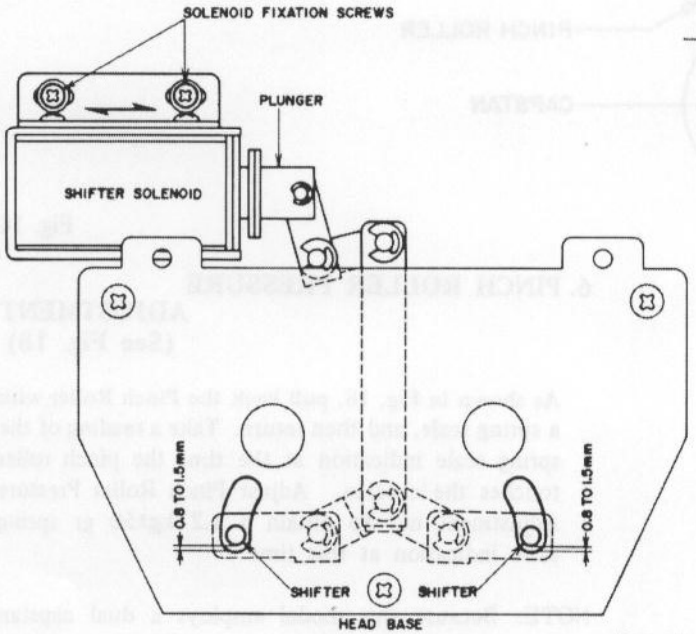


Fig. 17

4. PINCH ROLLER SOLENOID POSITION ADJUSTMENT

Set nut so that the screw part of the pull bar extends 5 mm further than the nut, and insert a space gauge of which the dimensions are the same as shown in Fig. 16 between the collar and pull bar shown in Fig. 15, and fix at position at which the pinch roller rests against the capstan. Set left and right to same degree.

5. SHIFTER SOLENOID POSITION ADJUSTMENT (See Fig. 17)

Adjust the position of the Shifter Solenoid so that when the plunger is pulled, the gap of the shifter and oblong hole of the head base is 0.8 to 1.5 mm.

NOTE: The tape must definitely not touch the head.

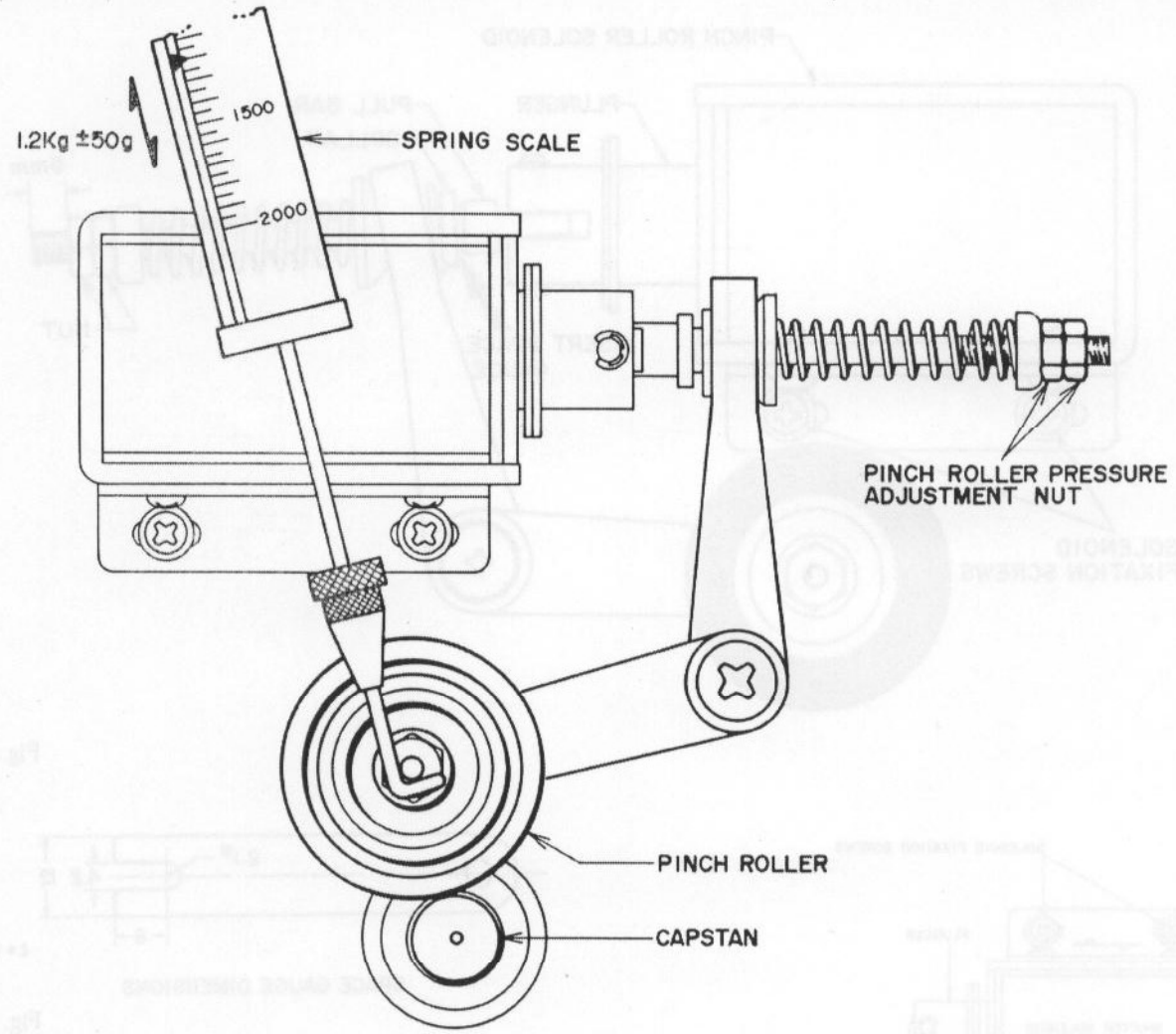


Fig. 18

6. PINCH ROLLER PRESSURE ADJUSTMENT (See Fig. 18)

As shown in Fig. 18, pull back the Pinch Roller with a spring scale, and then return. Take a reading of the spring scale indication at the time the pinch roller touches the capstan. Adjust Pinch Roller Pressure Adjustment nut to obtain a 1.2 kg±50 gr spring scale indication at this time.

NOTE: Because this model employs a dual capstan system, adjust so that the difference in pinch roller pressure between left and right is within 50 gr.

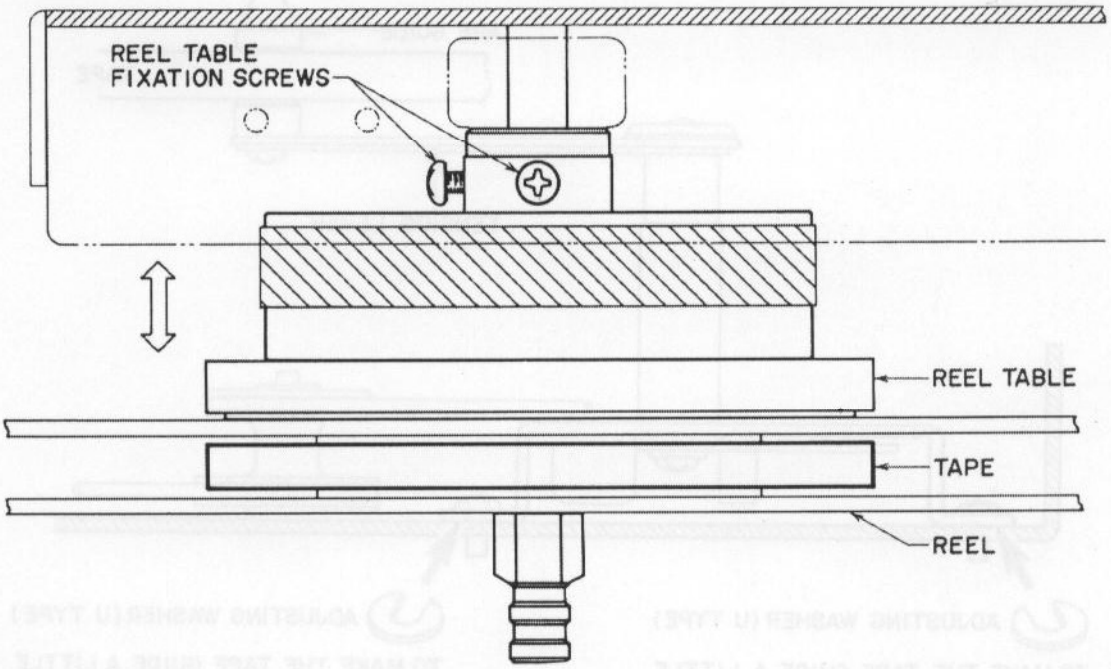


Fig. 19

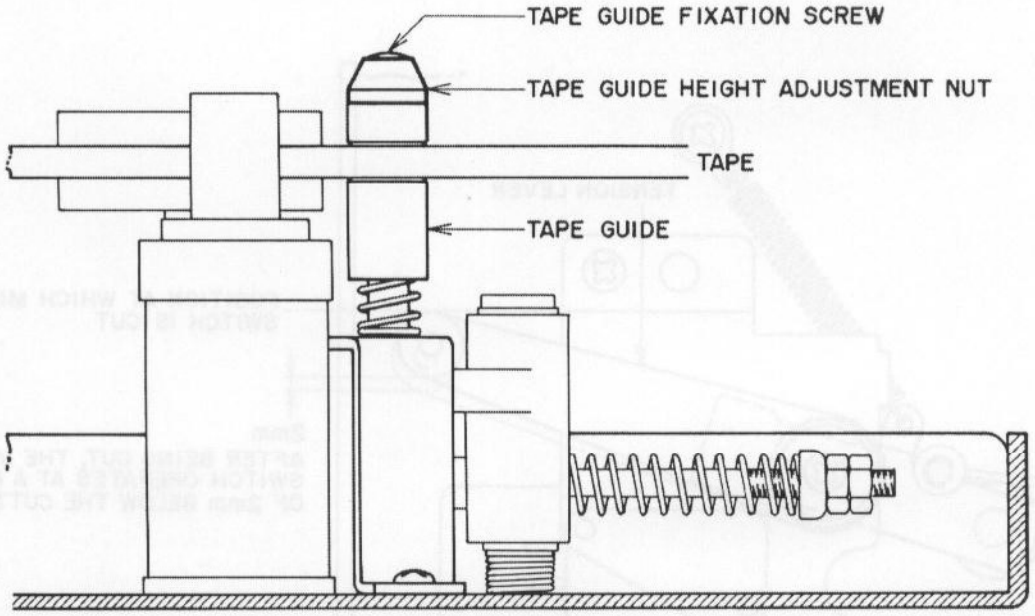


Fig. 20

7. REEL TABLE HEIGHT ADJUSTMENT (See Fig. 19)

Load a tape (left and right reel tables), but do not thread tape through left/right tape guides and tension levers. Set to F.Fwd, and Rwd mode and adjust the position of reel tables in direction of arrow mark so that the tape winds in the center of the reels. Tighten reel table fixation screws at most ideal position.

NOTE: Tape should wind in center of reel regardless of type of reel used.

8. TAPE GUIDE HEIGHT ADJUSTMENT (See Fig. 20)

Thread tape over left and right tape guides, but do not thread over left and right tension levers. Loosen tape guide fixation screws and adjust left and right tape guide height adjustment nuts so that at Fwd and Rev modes, the tape runs on the center of the tape guides. Tighten tape guide fixation screws to maintain this condition.

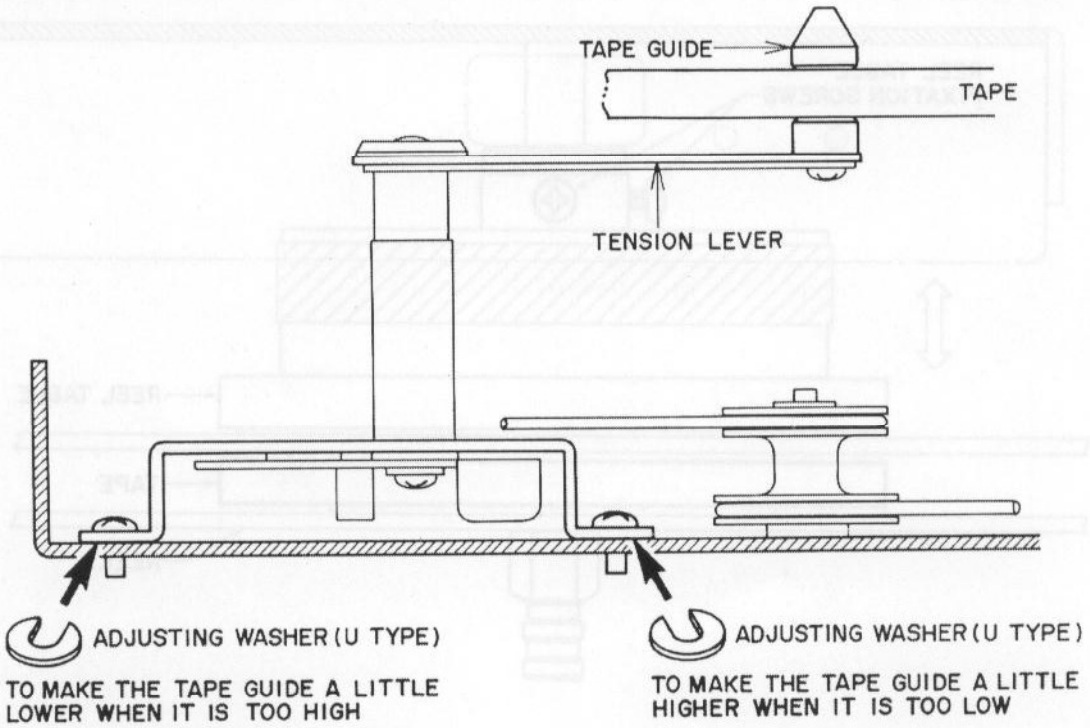

TAPE GUIDE
TAPE
TENSION LEVER
ADJUSTING WASHER (U TYPE)
TO MAKE THE TAPE GUIDE A LITTLE LOWER WHEN IT IS TOO HIGH
ADJUSTING WASHER (U TYPE)
TO MAKE THE TAPE GUIDE A LITTLE HIGHER WHEN IT IS TOO LOW

Fig. 21

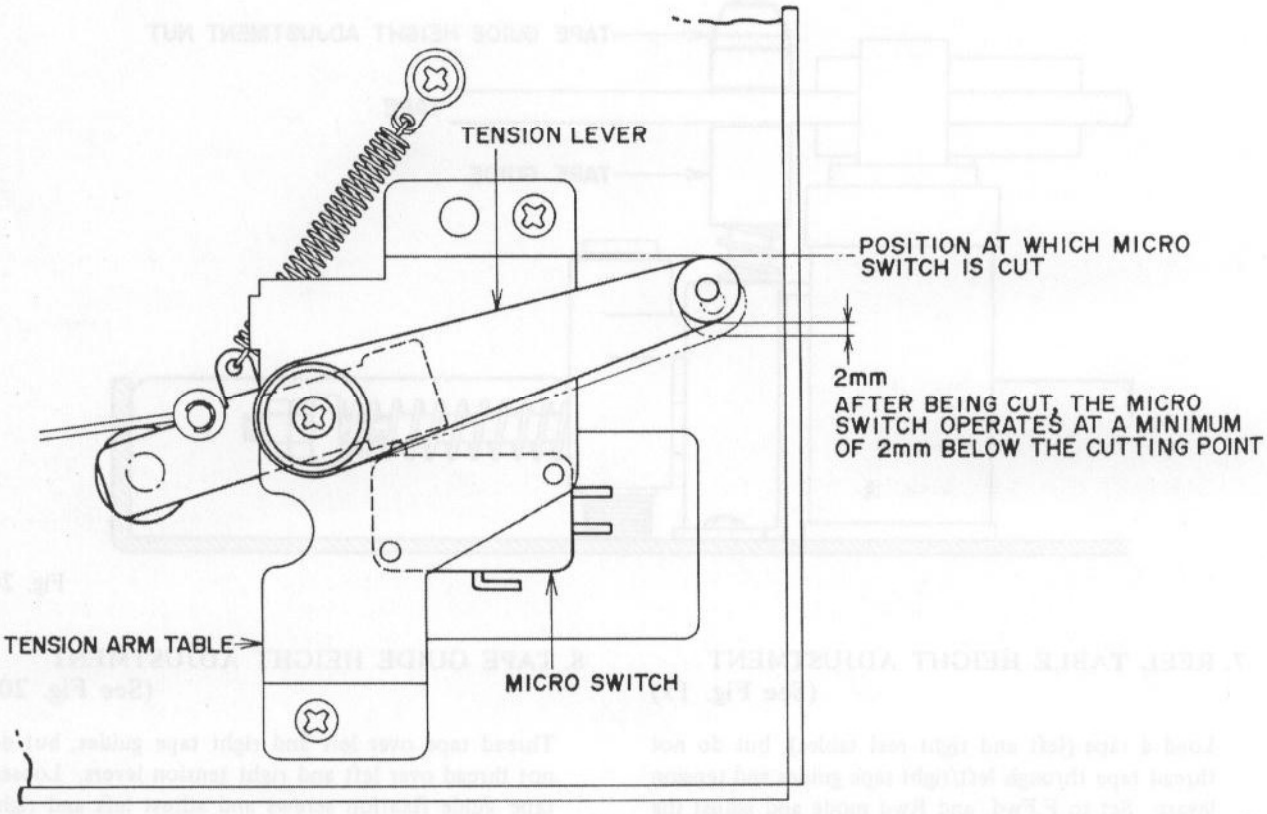

TENSION LEVER
POSITION AT WHICH MICRO SWITCH IS CUT
2mm
AFTER BEING CUT, THE MICRO SWITCH OPERATES AT A MINIMUM OF 2mm BELOW THE CUTTING POINT
TENSION ARM TABLE
MICRO SWITCH

Fig. 22

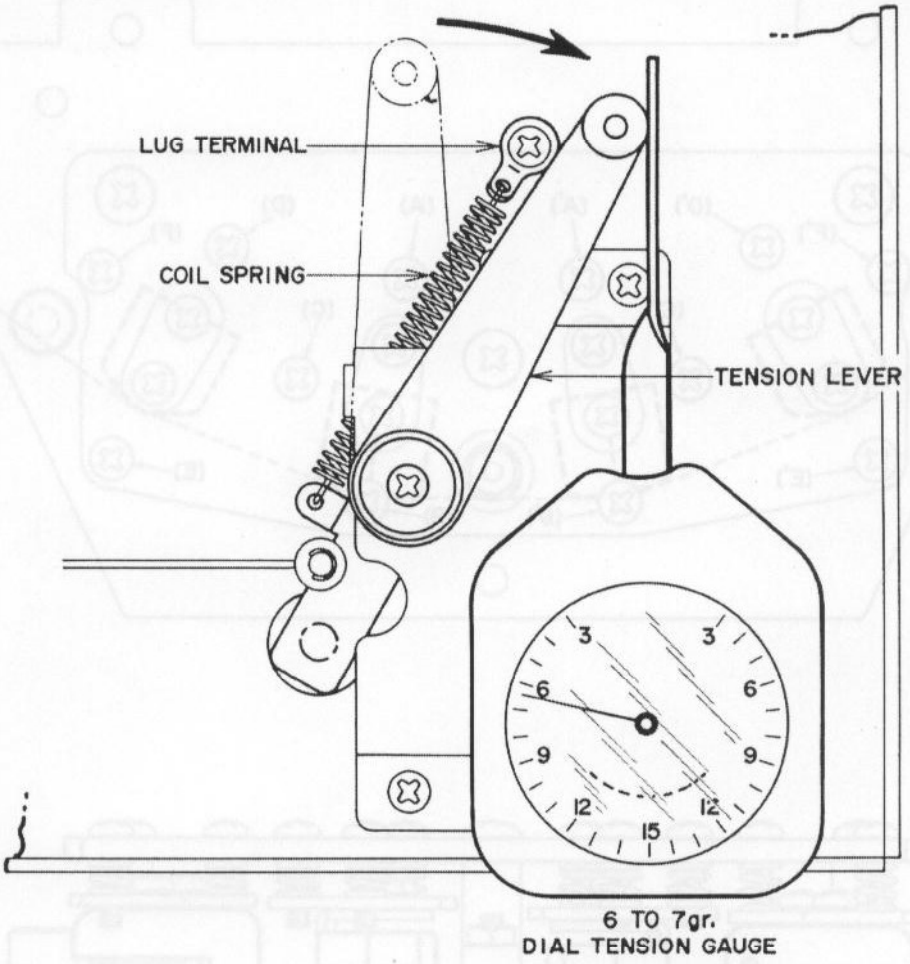


Fig. 23

9. TENSION LEVER HEIGHT ADJUSTMENT (See Fig. 21)

Thread tape over left and right tension levers and over the left and right tape guides properly. Adjust tension lever height by inserting an Adjusting washer (U type) as shown in Fig. 21 so that at Fwd and Rev modes, the tape travels on the center of the tape guide.

NOTE: The right hand side tape guide is shown in Fig. 21, but when making the left hand side tension lever height adjustment, the screw on the left is used to make the tape guide higher, and the screw on the right is used to make the tape guide lower.

10. CONFIRMATION OF POINT AT WHICH LEFT AND RIGHT TENSION ARMS OPERATE

Confirm that the left and right micro switches operate at the positions indicated in Fig. 22.

11. TENSION ARM RETURN TENSION ADJUSTMENT

Bend the oval shaped lug terminal and adjust the strength of coil spring so that as shown in Fig. 23, when the tension arm returns in the direction of the arrow the tension registered with a tension gauge is 6 to 7 gr.

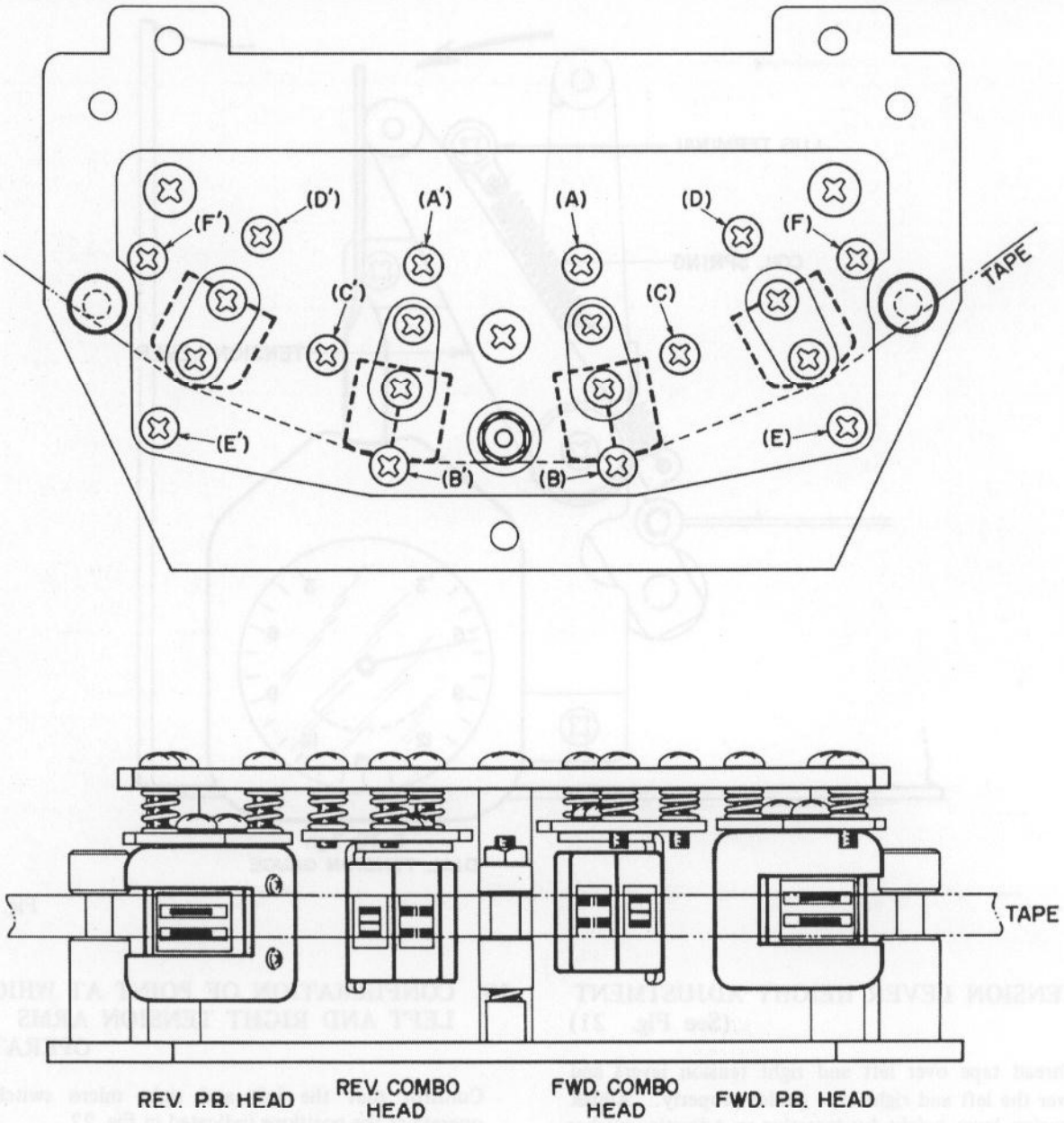

(F')
(D')
(A')
(A)
(D)
(F)
TAPE
(C')
(C)
(E')
(E)
(B')
(B)
TAPE
REV. P.B. HEAD
REV. COMBO HEAD
FWD. COMBO HEAD
FWD. P.B. HEAD

Fig. 24

1. MODEL: GX-400D

Adjustment Item	Test Tape. Supply Signal	Measuring Instrument Connection	Mode	Tape Speed	Adjustment Screw	Ref. Diagram	Remarks
FWD P.B. Head Height Adjustment	Optional		FWD	Optional	(D)(E)(F)	Fig. 24	Even Upper Edge of Ch. 1 Head Core and Upper Edge of Tape
FWD Combo Head Height Adjustment	Optional		FWD	Optional	(A)(B)(C)	Fig. 24	Even Upper Edge of Ch. 1 Rec. Head Core and Upper Edge of Tape
REV P.B. Head Height Adjustment	Optional		REV	Optional	(D')(E')(F')	Fig. 24	Even Lower Edge of Ch. 1 P.B. Head Core and Lower Edge of Tape
REV Combo Head Height Adjustment	Optional		REV	Optional	(A')(B')(C')	Fig. 24	Even Lower Edge of Ch. 1 Rec. Head Core and Lower Edge of Tape
FWD P.B. Head Azimuth Alignment Adjustment	15,000 Hz (15 ips) Test Tape	High Sensitivity V.T.V.M. to Line Output	FWD	15 ips	(F)	Fig. 24	Maximum Line Output, Both Channels
REV P.B. Head Azimuth Alignment Adjustment	15,000 Hz (15 ips) Test Tape	High Sensitivity V.T.V.M. to Line Output	REV	15 ips	(F')	Fig. 24	Maximum Line Output, Both Channels
FWD Combo Head Azimuth Alignment Adjustment	15,000 Hz -20 dB Signal to Line Input	High Sensitivity V.T.V.M. to Line Output	FWD REC	15 ips	(C)	Fig. 24	Maximum Line Output, Both Channels
REV Combo Head Azimuth Alignment Adjustment	15,000 Hz -20 dB Signal to Line Input	High Sensitivity V.T.V.M. to Line Output	REV REC	15 ips	(C')	Fig. 24	Maximum Line Output, Both Channels

Chart 1

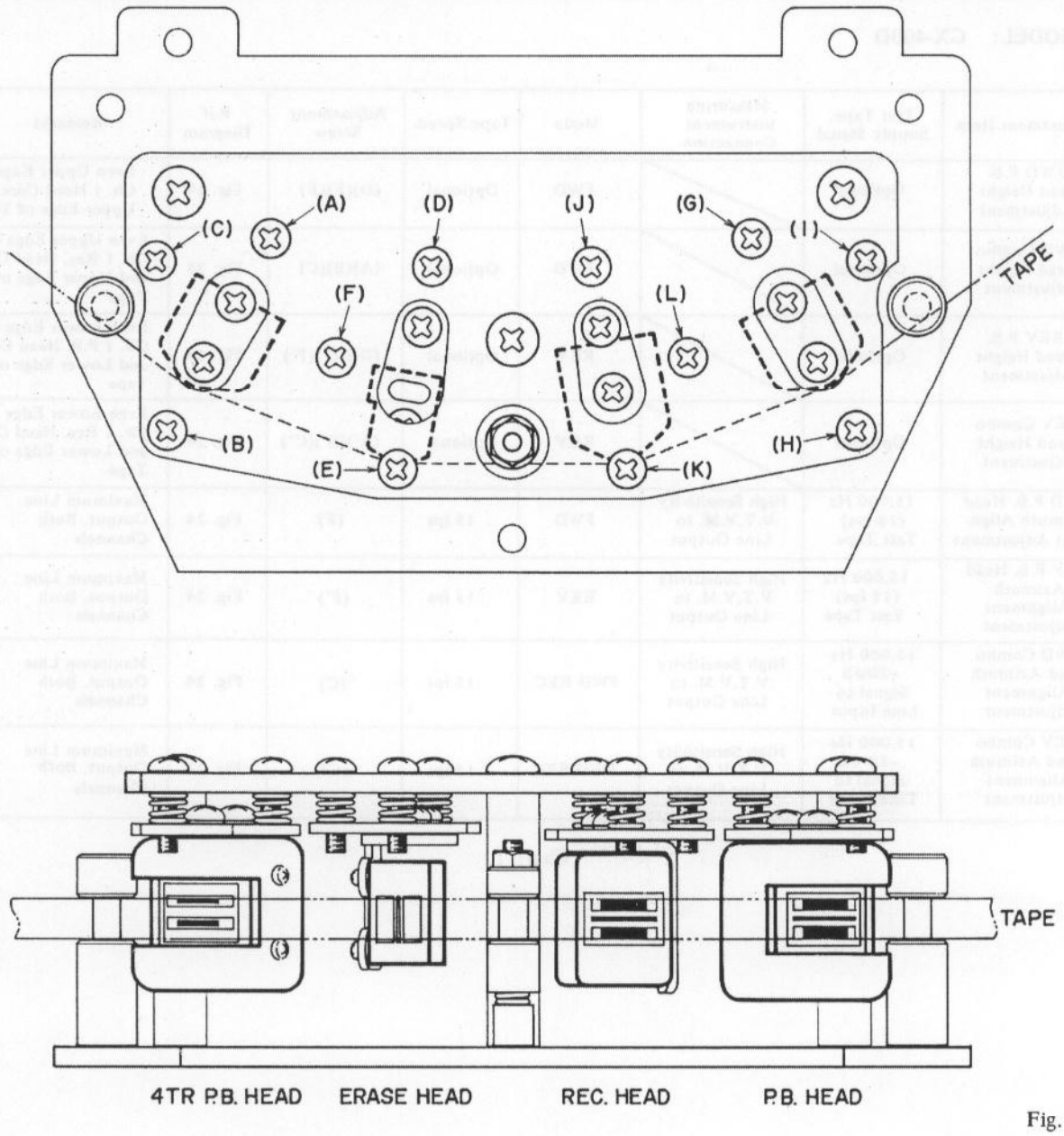
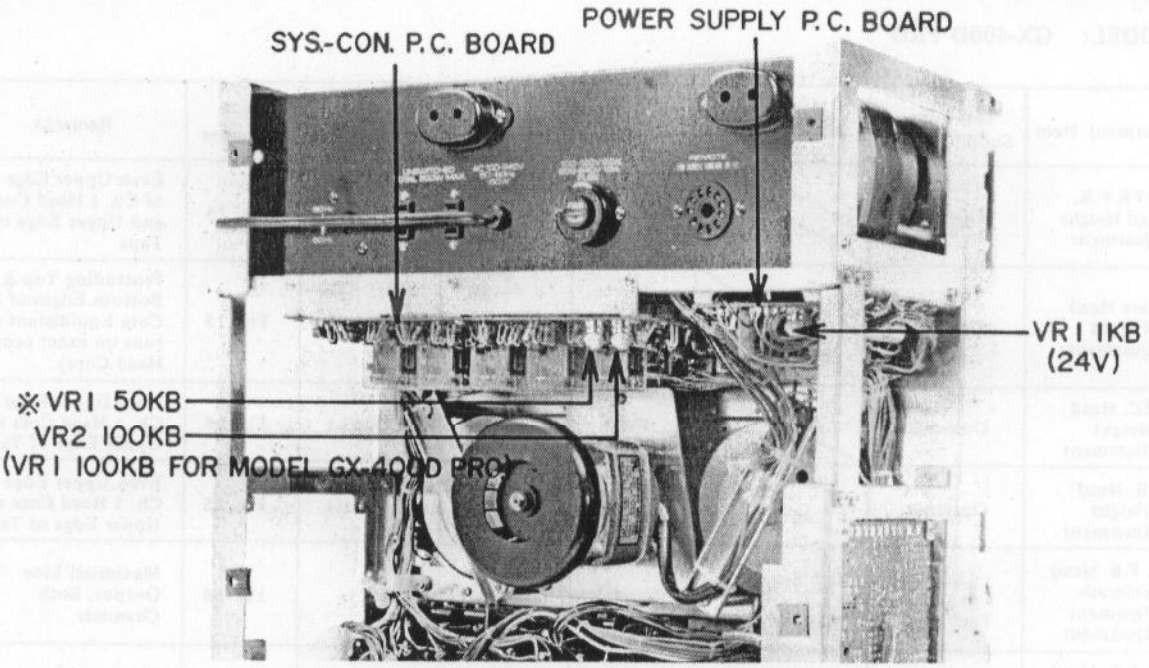

(A)
(C)
(D)
(J)
(G)
(I)
TAPE
(F)
(L)
(B)
(E)
(K)
(H)
TAPE
4TR P.B. HEAD
ERASE HEAD
REC. HEAD
P.B. HEAD

Fig. 25

2. MODEL: GX-400D PRO

Adjustment Item	Test Tape, Supply Signal	Measuring Instrument Connection	Mode	Tape Speed	Adjustment Screw	Ref. Diagram	Remarks
4TR P.B. Head Height Adjustment	Optional		FWD	Optional	(A)(B)(C)	Fig. 25	Even Upper Edge of Ch. 1 Head Core and Upper Edge of Tape
Erase Head Height Adjustment	Optional		FWD	Optional	(D)(E)(F)	Fig. 25	Protruding Top & Bottom Edges of Head Core Equidistant (Tape runs on exact center of Head Core)
REC. Head Height Adjustment	Optional		FWD	Optional	(J)(K)(L)	Fig. 25	Even Upper Edge of Ch. 1 Head Core and Upper Edge of Tape
P.B. Head Height Adjustment	Optional		FWD	Optional	(G)(H)(I)	Fig. 25	Even Upper Edge of Ch. 1 Head Core and Upper Edge of Tape
4TR P.B. Head Azimuth Alignment Adjustment	15,000 Hz (15 ips) Test Tape	High Sensitivity V.T.V.M. to Line Output	FWD/4TR	15 ips	(C)	Fig. 25	Maximum Line Output, Both Channels
2TR P.B. Head Azimuth Alignment Adjustment	15,000 Hz (15 ips) Test Tape	High Sensitivity V.T.V.M. to Line Output	FWD/4TR	15 ips	(T)	Fig. 25	Maximum Line Output, Both Channels
REC. Head Azimuth Alignment Adjustment	15,000 Hz -20 dB Signal to Line Input	High Sensitivity V.T.V.M. to Line Output	FWD REC/2TR	15 ips	(L)	Fig. 25	Maximum Line Output, Both Channels

Chart 2



NOTE: THE SEMI-FIXED RESISTOR MARKED WITH ※ IS NOT USED IN MODEL GX-400D PRO.

Fig. 26

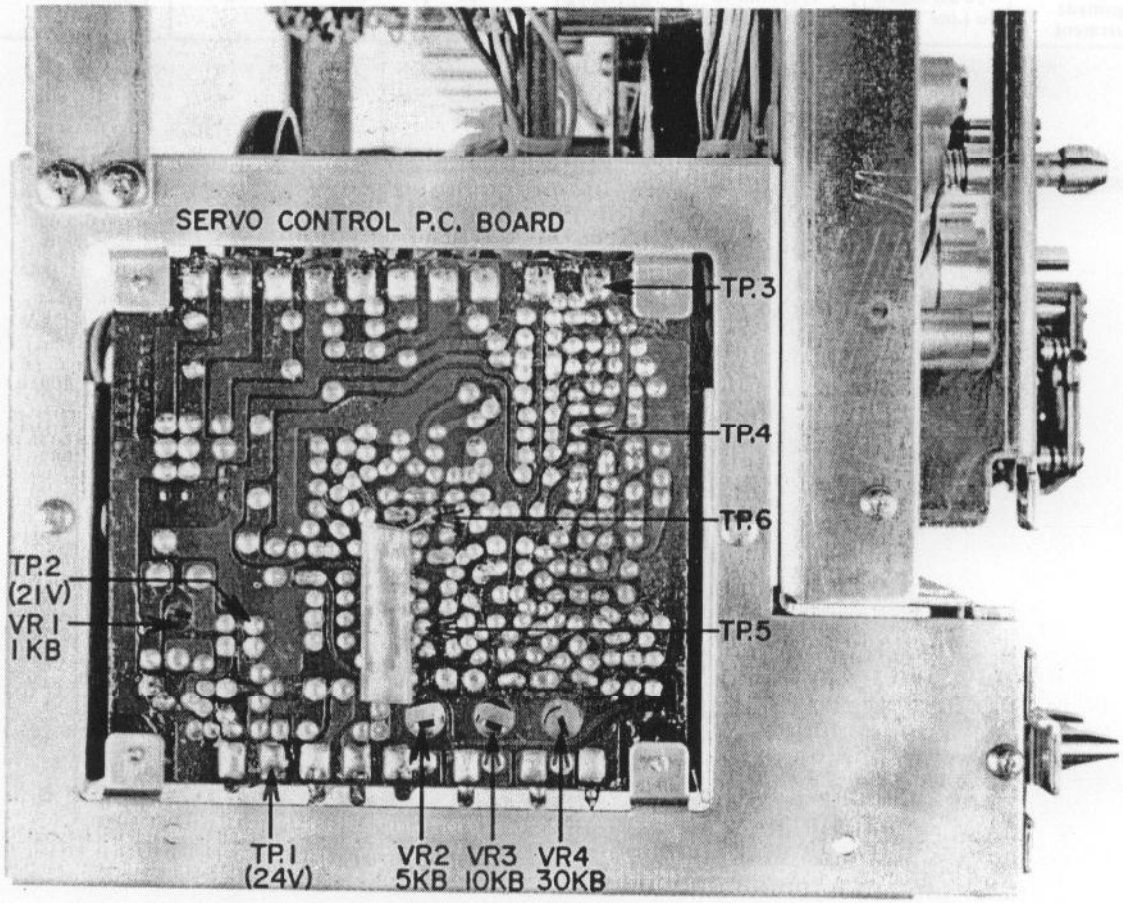


Fig. 27

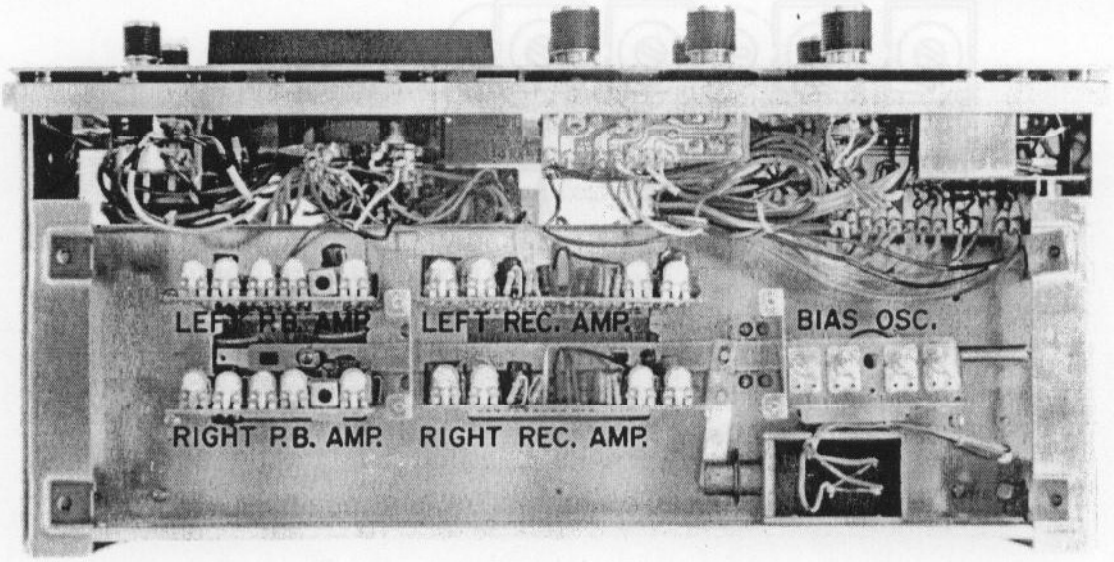
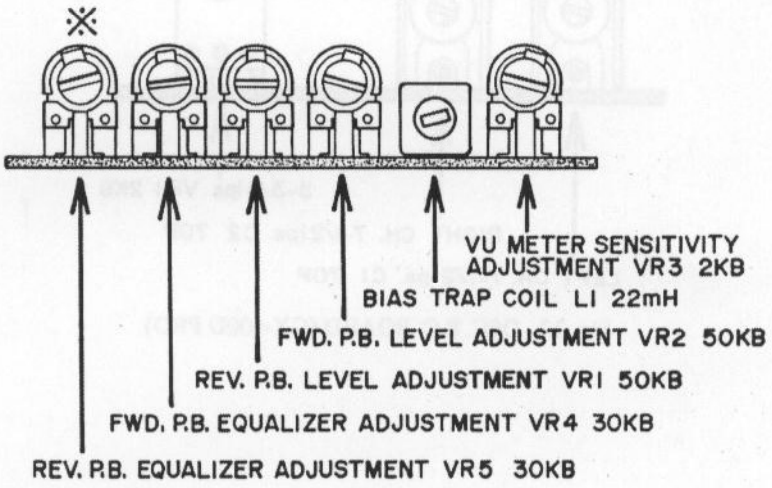
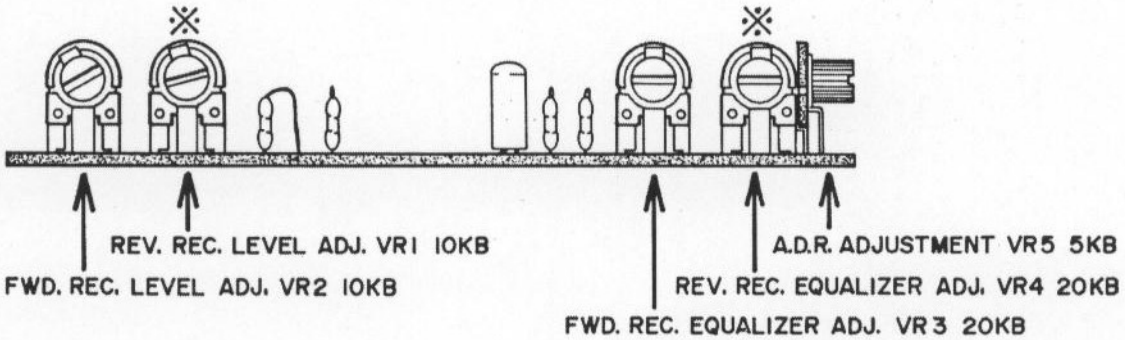


Fig. 28 Arrangement of Each Amp. System P.C. Board



NOTE: THE SEMI-FIXED RESISTOR MARKED WITH ※ ARE NOT USED IN MODEL GX-400D PRO.

Fig. 29 PLAYBACK AMP. P.C. BOARD



NOTE: THE SEMI-FIXED RESISTORS MARKED WITH ※ ARE NOT USED IN MODEL GX-400D PRO.

Fig. 30 RECORDING AMP. P.C. BOARD

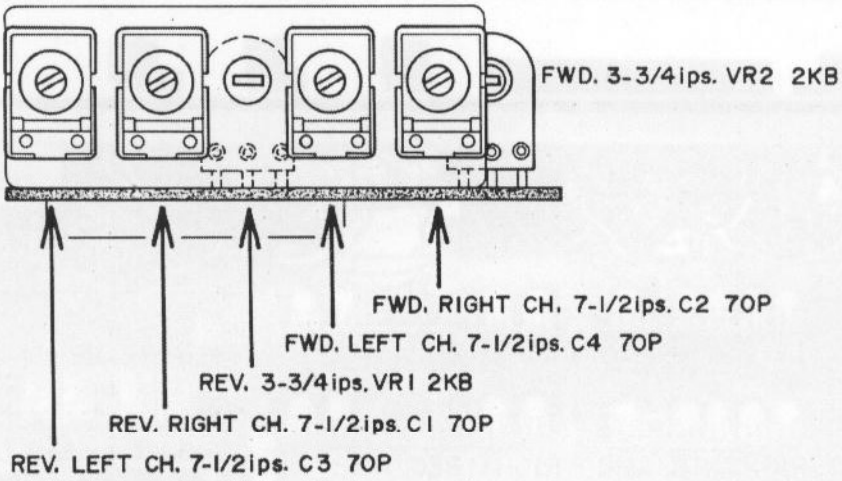


Fig. 31 OSC. P.C. BOARD (GX-400D)

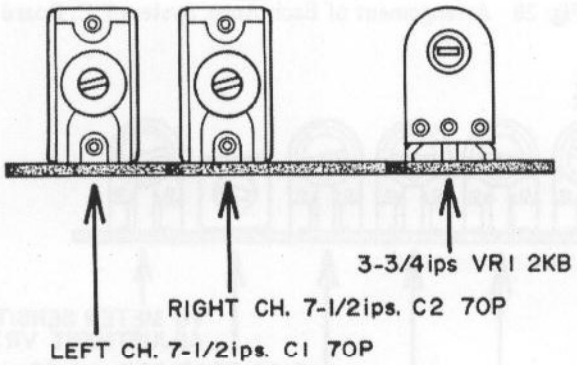


Fig. 32 OSC. P.C. BOARD (GX-400D PRO)

1. MODEL: GX-400D

Adjustment Item	Test Tape, Supply Signal	Measuring Instrument Connection	Mode	Tape Speed	Adjustment	Result	Ref. Diagram	Remarks
Power Source Circuit Voltage Adjustment		V.T.V.M. or Tester between Test Point TP-1 and Ground	STOP		VR1 1kB	24.0V	Fig. 26	TP-1 (See Fig. 27)
Servo Control Circuit Voltage Adjustment		V.T.V.M. or Tester between Test Point TP-2 and Ground	STOP		VR1 1kB	21.0V	Fig. 27	Must first be adjusted to 24V
15 ips (38cm/sec.) Tape Speed Adjustment	1,000 Hz 7-1/2 ips Test Tape	Frequency Counter to Line Output	FWD	15 ips	VR2 5kB	2,000Hz ±1.5%	Fig. 27	
7-1/2 ips (19cm/sec.) Tape Speed Adjustment	1,000 Hz 7-1/2 ips Test Tape	Frequency Counter to Line Output	FWD	7-1/2 ips	VR3 10kB	1,000 Hz ±1.5 %	Fig. 27	
3-3/4 ips (9.5cm/sec.) Tape Speed Adjustment	1,000 Hz 7-1/2 ips Test Tape	Frequency Counter to Line Output	FWD	3-3/4 ips	VR3 30kB	500Hz ±1.5%	Fig. 27	
FWD Playback Level Adjustment	700Hz 15 ips Test Tape	High Sensitivity V.T.V.M. to Line Output	FWD	15 ips	VR2 50kB	0(0.775V) ±1dB	Fig. 29	
REV Playback Level Adjustment	700Hz 15 ips Test Tape	High Sensitivity V.T.V.M. to Line Output	REV	15 ips	VR1 50kB	0(0.775V) ±1dB	Fig. 29	
VU Meter Sensitivity Adjustment	700Hz 15 ips Test Tape	High Sensitivity V.T.V.M. to Line Output	FWD	15 ips	VR3 2kB	OVU	Fig. 29	
FWD Playback Equalizer Adjustment	15,000Hz 15 ips Test Tape	High Sensitivity V.T.V.M. to Line Output	FWD	15 ips	VR4 30kB	+1dB	Fig. 29	
REV Playback Equalizer Adjustment	15,000Hz 15 ips Test Tape	High Sensitivity V.T.V.M. to Line Output	REV	15 ips	VR5 30kB	+1dB	Fig. 29	
FWD 7-1/2 ips (19cm/sec.) Recording Bias Adjustment	1,000Hz -46dB(4mV) to Mic Input	Audio Frequency Oscillator to Line Input, High Sensitivity V.T.V.M. to Line Output	FWD REC	7-1/2 ips	C4 70P(left) C2 70P(right)	Maxi-mum	Fig. 31	1,000Hz-20dB Recording
REV 7-1/2 ips (19cm/sec.) Recording Bias Adjustment	1,000Hz -46dB(4mV) to Mic Input	Audio Frequency Oscillator to Line Input, High Sensitivity V.T.V.M. to Line Output	REV REC	7-1/2 ips	C3 70P(left) C1 70P(right)	Maxi-mum	Fig. 31	1,000Hz-20dB Recording
FWD 7-1/2 ips (19cm/sec.) Recording Equalizer Adjustment	1,000Hz, 15,000Hz -46dB(4mV) to Mic Input	Audio Frequency Oscillator to Line Input, High Sensitivity V.T.V.M. to Line Output	FWD REC	7-1/2 ips	VR3 20kB	OdB/ 1,000Hz +1dB/ 15,000Hz	Fig. 30	1,000Hz-20dB Recording If A.D.R. Adjust-ment is necessary, refer to Section VII.

REV 7-1/2 ips (19cm/sec.) Recording Equalizer Adjustment	1,000Hz, 15,000Hz -46dB(4mV) to Mic Input	Audio Frequency Oscillator to Line Input, High Sensitivity V.T.V.M. to Line Output	REV REC	7-1/2 ips	VR4 20kB	OdB/ 1,000Hz +1dB/ 15,000Hz	Fig. 30	1,000Hz -20dB Recording If A.D.R. Adjustment is necessary, refer to Section VII.
FWD 3-3/4 ips (19cm/sec.) Recording Equalizer Adjustment	1,000Hz, 10,000Hz -46dB(4mV) to Mic Input	Audio Frequency Oscillator to Line Input, High Sensitivity V.T.V.M. to Line Output	FWD REC	3-3/4 ips	VR2 2kB	OdB/ 1,000Hz 1±0.5dB/ 10,000Hz	Fig. 31	1,000Hz -20dB Recording
REV 3-3/4 ips (9.5cm/sec.) Recording Bias Adjustment	1,000Hz, 10,000Hz -46dB(4mV) to Mic Input	Audio Frequency Oscillator to Line Input, High Sensitivity V.T.V.M. to Line Output	REV REC	3-3/4 ips	VR1 2kB	OdB/ 1,000Hz 1±0.5dB/ 10,000Hz	Fig. 31	1,000Hz -20dB Recording
FWD REC Level Adjustment	1,000Hz -46dB(4mV) to Mic Input	Audio Frequency Oscillator to Line Input, High Sensitivity V.T.V.M.to Line Output	REV REC	15 ips	VR2 10kB	0±1.5dB	Fig. 30	1,000Hz 0dB Recording
REV REC Level Adjustment	1,000Hz -46dB(4mV) to Mic Input	Audio Frequency Oscillator to Line Input, High Sensitivity V.T.V.M. to Line Output	REV REC	15 ips	VR1 10kB	0±1.5dB	Fig. 30	1,000Hz 0dB Recording
Bias Leak Adjustment		High Sensitivity V.T.V.M. to Line Output	FWD REC	7-1/2 ips	L1 22mH	Less than -30dB (Stereo) Less than -20dB (Monaural)	Fig. 29	
Direct Function Time Constant Adjustment	1,000Hz -46dB(4mV) to Mic Input		FWD → REV REV → FWD	15 ips	VR1 50kB	Within 4 sec.	Fig. 29	
	1,000Hz -46dB(4mV) to Mic Input		F.FWD or RWD → FWD or REV	15 ips	VR2 100kB	Within 4 sec.	Fig. 26	

Chart 3

2. MODEL: GX-400D PRO

Adjustment Item	Test Tape, Supply Signal	Measuring Instrument Connection	Mode	Tape Speed	Adjustment	Result	Ref. Diagram	Remarks
Power Source Circuit Voltage Adjustment		V.T.V.M. or Tester between Test Point TP-1 and Ground	STOP		VR1 1kB	24.0V	Fig. 26	TP-1 (See Fig. 27)

Servo Control Circuit Voltage Adjustment		V.T.V.M. or Tester between Test Point TP-2 and Ground	STOP		VR1 1kB	21.0V	Fig. 27	Must first be adjusted to 24V
15 ips (38cm/sec.) Tape Speed Adjustment	1,000Hz 7-1/2 ips Test Tape	Frequency Counter to Line Output	FWD	15 ips	VR2 5 kB	2,000Hz ±1.5%	Fig. 27	
7-1/2 ips (19cm/sec.) Tape Speed Adjustment	1,000Hz 7-1/2 ips Test Tape	Frequency Counter to Line Output	FWD	7-1/2 ips	VR3 10kB	1,000Hz ±1.5%	Fig. 27	
3-3/4 ips (9.5cm/sec.) Tape Speed Adjustment	1,000Hz 7-1/2 ips Test Tape	Frequency Counter to Line Output	FWD	3-3/4 ips	VR4 30kB	500Hz ±1.5%	Fig. 27	
2TR Playback Level Adjustment	700Hz 15 ips Test Tape	High Sensitivity V.T.V.M. to Line Output	FWD	15 ips	VR1 50kB	0(0.775V) ±1dB	Fig. 29	
4TR Playback Level Adjustment	700Hz 15 ips Test Tape	High Sensitivity V.T.V.M. to Line Output	FWD	15 ips	VR2 50kB	0(0.775V) ±1dB	Fig. 29	
VU Meter Sensitivity Adjustment	700Hz 15 ips Test Tape	High Sensitivity V.T.V.M. to Line Output	FWD	15 ips	VR3 2kB	OVU	Fig. 29	
Playback Equalizer Adjustment	15,000Hz 15 ips Test Tape	High Sensitivity V.T.V.M. to Line Output	FWD	15 ips	VR4 30kB	+1dB	Fig. 29	
Recording Bias Adjustment 7-1/2 ips (19cm/sec.)	1,000Hz -46dB (4mV) to Mic Input	Audio Frequency Oscillator to Mic Input, High Sensitivity V.T.V.M. to Line Output	REC	7-1/2 ips	C1 70P(left) C2 70P(right)	Maximum	Fig. 32	1,000Hz-20dB Recording
Recording Equalizer Adjustment 7-1/2 ips (19cm/sec.)	1,000Hz, 10,000Hz -46dB(4mV) to Mic Input	Audio Frequency Oscillator to Mic Input. High Sensitivity V.T.V.M. to Line Output	REC	7-1/2 ips	VR3 20kB	0dB/ 1,000Hz +1dB/ 15,000Hz	Fig. 30	1,000Hz-20dB Recording If ADR Adjustment is necessary, refer to Section VII.
Recording Bias Adjustment 3-3/4 ips (9.5cm/sec.)	1,000Hz, 10,000Hz -46dB(4mV) to Mic Input	Audio Frequency Oscillator to Mic Input, High Sensitivity V.T.V.M. to Line Output	REC	3-3/4 ips	VR1 2kB	0dB/ 1,000Hz 1±0.5dB/ 10,000Hz	Fig. 32	1,000Hz -20dB Recording
Recording Level Adjustment	1,000Hz -46dB(4mV) to Mic Input	Audio Frequency Oscillator to Mic Input, High Sensitivity V.T.V.M. to Line Output	REC	15 ips	VR2 10kB	0±1.5dB	Fig. 30	1,000Hz 0dB Recording
Bias Leak Adjustment		High Sensitivity V.T.V.M. to Line Output	REC		L1 22mH	Less than -30VU	Fig. 29	
Direct Function Time Constant Adjustment			F.Fwd or Rwd to Fwd	15 ips	VR1 100kB	Within 4 sec.	Fig. 26	

Chart 4

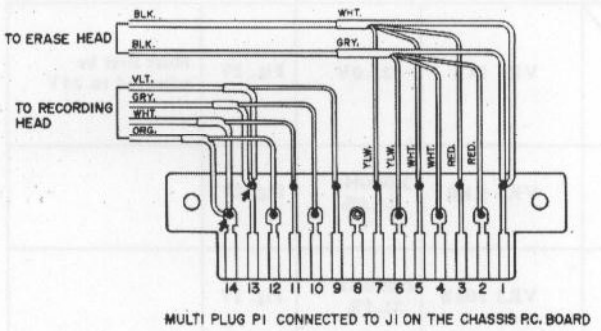


Fig. 33

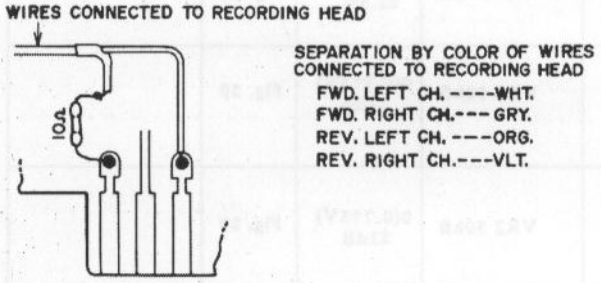


Fig. 34

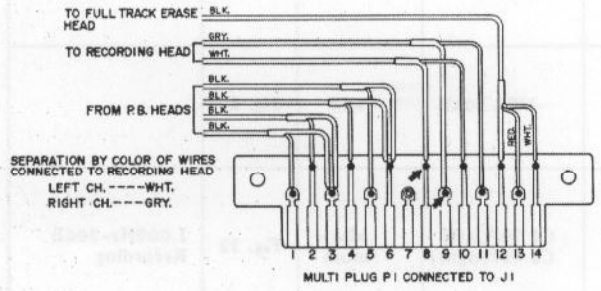


Fig. 35

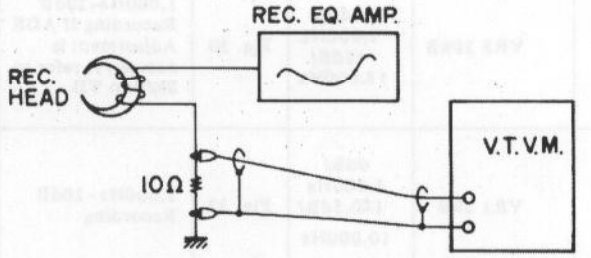


Fig. 36

1. As shown in Figs. 33 and 35, disconnect the ground side wires connected to multi plug recording head, and connect a 10Ω fixed resistor in series between the ground wires as shown in Fig. 34.
2. As shown in Fig. 36, connect a High Sensitivity V.T.V.M. to both terminals of the 10Ω fixed resistor.
3. Temporarily remove the emitter resistor of Oscillator P.C. Board Transistors TR2, 3 (GX-400D) or TR1, 2 (GX-400D PRO), and set deck to recording mode (Bias Voltage is not supplied to Recording Head).
4. Turn ADR Adjustment semi-fixed resistor of Rec. Amp. P.C. Board fully clockwise as shown in Fig. 30. Set Rec. Equalizer Adjustment semi-fixed resistor to 12 o'clock position, and depress SOURCE Button. (ADR does not function)
5. Set tape speed to 3-3/4 ips, and Tape Selector to NORMAL.
6. Supply a 1,000 Hz signal to the Line Input from an audio frequency oscillator, and adjust Recording Level Adjustment volume to obtain a -50 dB V.T.V.M. indication. (This voltage furnishes the 1,000 Hz OVU recording signal current.)
7. Switch to 10,000 Hz frequency, and with Equalizer Adjustment volume, set the 10,000 Hz voltage to -41 dB. (Set 10,000 Hz to +9 dB in relation to 1,000 Hz)
8. In case of Model GX-400D, set machine to FWD and REV modes in Steps 6 and 7.
9. Next, set frequency to 15,000 Hz(GX-400D) or 20,000 Hz(GX-400D PRO), turn ADR Adjustment volume counter-clockwise until the 15,000 Hz voltage is -43dB (or the 20,000 Hz voltage is -45 dB).

NOTE: When making adjustment in Item 9, in case of model GX-400D, the machine can be set to either FWD or REV mode.

10. It is advisable to paint lock Equalizer and ADR Adjustment semi-fixed resistors following adjustment.

Frequency Level Setting According to Model Number

Frequency / Model	1,000 Hz	10,000 Hz	15,000 Hz	20,000 Hz
GX-400D	-50 dB	-41 dB		-45 dB
GX-400D PRO	-50 dB	-41 dB	-43 dB	

Chart 5

VIII. EXPLANATION OF A.C SERVO CONTROL OPERATION

1. CIRCUIT OPERATION (Refer to Schematic Diagram)

1) The A.C. signal which is generated at the detector coil by capstan motor revolutions passes the high pass filter (H.P.F.) and is supplied to the base of TR3.

*It is necessary for the signal generated at the detection coil to pass the H.P.F. because of a hum element included in the signal caused by the 50/60 Hz power source frequency and pulsive noise.

2) At 15 ips motor revolutions, because the A.C. signal generated at the detector coil is a limited level signal of about 800 mVp-p, 1,500 Hz frequency, it is amplified at TR3, 4 until the waveform of the signal is clipped.

3) One of the TR4 output signal enters the differential circuit unchanged and the minus signal is cut at D2. The other output signal is amplified and phase inverted at TR5 and then enters the differential circuit and the minus signal is cut at D3. These two signals are composited at D2, D3 cathodes and becomes twice the frequency generated at the detector coil.

4) The signal composited at Diodes D2, D3 is supplied to the base of TR6 as the TR6, TR7 one-shot multi vibrator trigger signal.

5) While the one-shot multi vibrator is stabilized, TR6 is turned off, TR7 is turned on, and no signal is emitted at TR7 collector.

6) When the positive trigger enters the base of TR6, and TR6 is turned on, TR7 "OFF", the one-shot multi vibrator reverses. TR7 collector voltage increases, and at the same time the charge current which has passed VR2, R59 (at 15 ips) flows to C10. When C10 electrical potential increases and TR7 is turned on, the collector voltage decreases. This operation is repeated by means of the trigger signal to TR6, and accordingly, a pulse output waveform is emitted at TR7 collector.

7) TR7 output is pulse regulated at TR8, TR9 and supplied to the integrated circuit and the output from the integrated circuit is supplied to the base of TR10.

8) Because the level of the signal which passed the integrated circuit is small, it is amplified at TR10, TR12, TR13.

9) Because the ripple part of the collector output signal from TR13 is considerable, it is further passed through the integrated circuit and supplied to the base of TR17.

10) TR17 and Power Transistor TR2 is conversion darlington connected, and TR2 is driven by TR17 emitter current and the impedance of TR2 between C-E is changed.

11) The supply voltage to the capstan motor is changed by the change in impedance between C-E of TR2 and the motor torque is also changed. At this time, a certain load is applied to the capstan motor. However, the voltage applied to the motor is changed according to this load. Therefore, the load is balanced with the torque and stabilized revolutions are maintained.

2. SPEED ADJUSTMENT SYSTEM (Refer to Schematic Diagram)

1) In case the capstan motor revolutions become fast, the output signal frequency of the one-shot multi becomes high, the first integrated circuit output rises, TR10 is turned on further and the collector voltage decreases. When TR10 collector voltage is lowered, TR12 base bias decreases, and TR12 collector voltage rises. When TR12 collector voltage increases, TR13 collector output decreases and the second integrated circuit output voltage decreases. Consequently, TR17 base drive also decreases and the resistance between C-E of Power Transistor TR2 increases, the supply voltage to the motor decreases and the motor torque declines and capstan motor revolutions are reduced.

2) On the other hand, if the capstan revolutions become slow, the output signal frequency of the one-shot multi becomes low, the first integrated circuit output is lowered, TR10 is turned almost off, and the collector voltage increases. When TR10 collector voltage is increased, TR12 base bias increases, and TR12 collector voltage declines. When TR12 collector voltage decreases, TR13 collector output increases and the 2nd integrated circuit output voltage increases. Consequently, TR17 base drive also increases and the resistance between C-E of Power Transistor TR2 decreases, the supply voltage to the motor increases and the motor torque rises and capstan motor revolutions are increased.

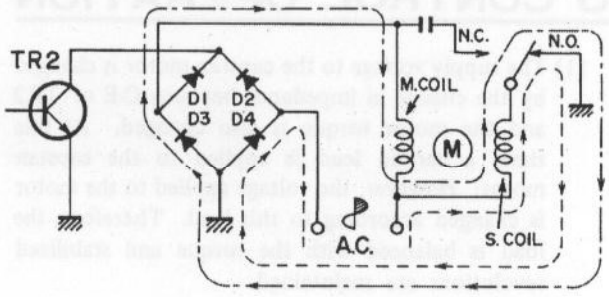


Fig. 37

3. RETARDER CIRCUIT OPERATION

When the Tape Speed Switch is switched from 15 ips to 7-1/2 ips, or from 7-1/2 ips to 3-3/4 ips, capstan motor revolutions are quickly decreased, and in a short time, established motor revolutions are attained.

1) When tape speed is switched from to 15 ips to 7-1/2 ips while switching is taking place, 15 ips revolutions are momentarily retained. The one-shot multi time constant becomes longer and the output pulse width wider. Consequently, the first integrated circuit output increases and in case the revolutions slightly increase over the aforementioned established revolutions, the D.C. amp. operates in the same way as explained above.
2) Accordingly, TR13 collector output decreases, and passes the 2nd stage integrated circuit. TR14 is turned off, TR15 "ON" and TR16 "ON". The collector current flow to relay at TR15 collector load, and the relay operates.
3) When the relay functions, the capstan motor sub coil is grounded, and an A.C. half wave flows as shown in the Fig. 37. The current within the negative half wave does not flow to Diode D4. The power generated at the sub coil passes the D3→ main coil→sub coil closed circuit as shown in the Fig. 37. Consequently, a D.C. magnetic field is formed and braking is applied to the rotor of the motor.
4) When capstan motor revolutions decrease, the voltage necessary for normal revolutions appears at TR13 collector and TR14 is turned on. Also proper bias is applied to the base of TR17 and current flows to the motor through D2→TR2→ D3→motor coil; motor coil→D1→TR2→D4, and normalized motor revolutions are attained.

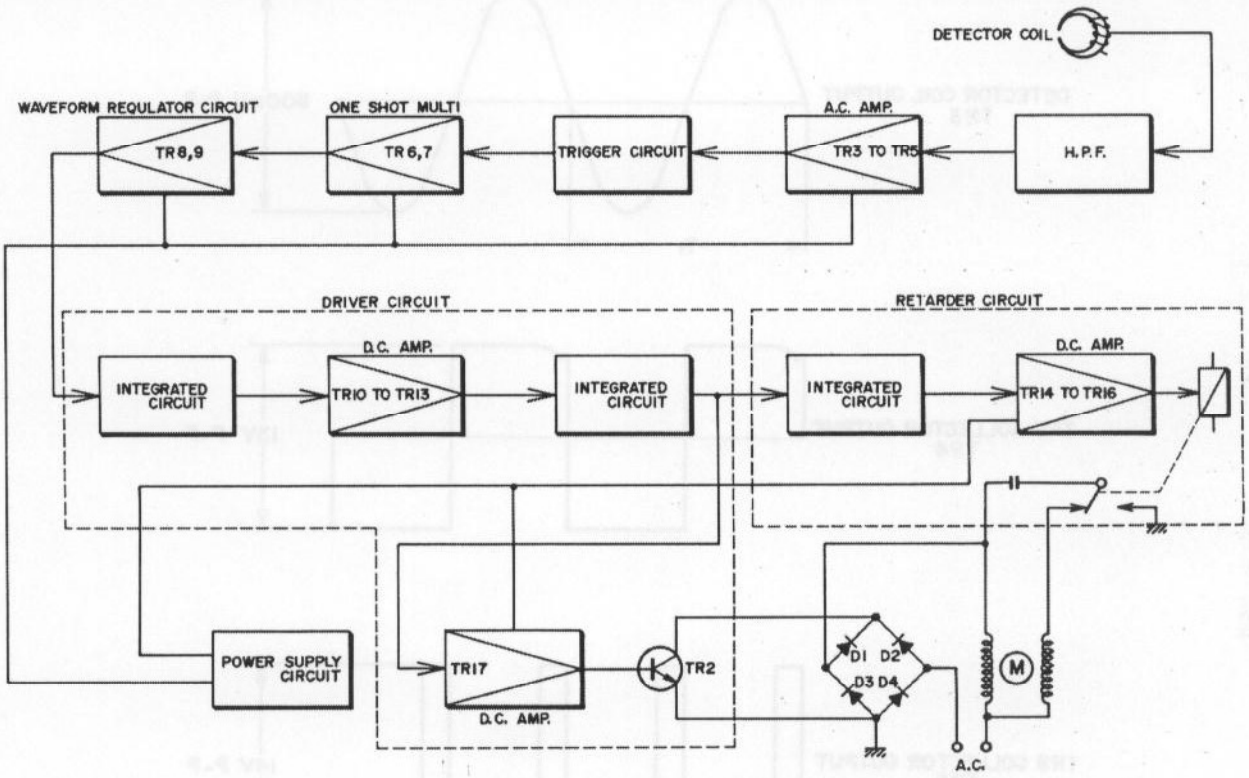


Fig. 38 A.C. SERVO CONTROL SYSTEM BLOCK DIAGRAM

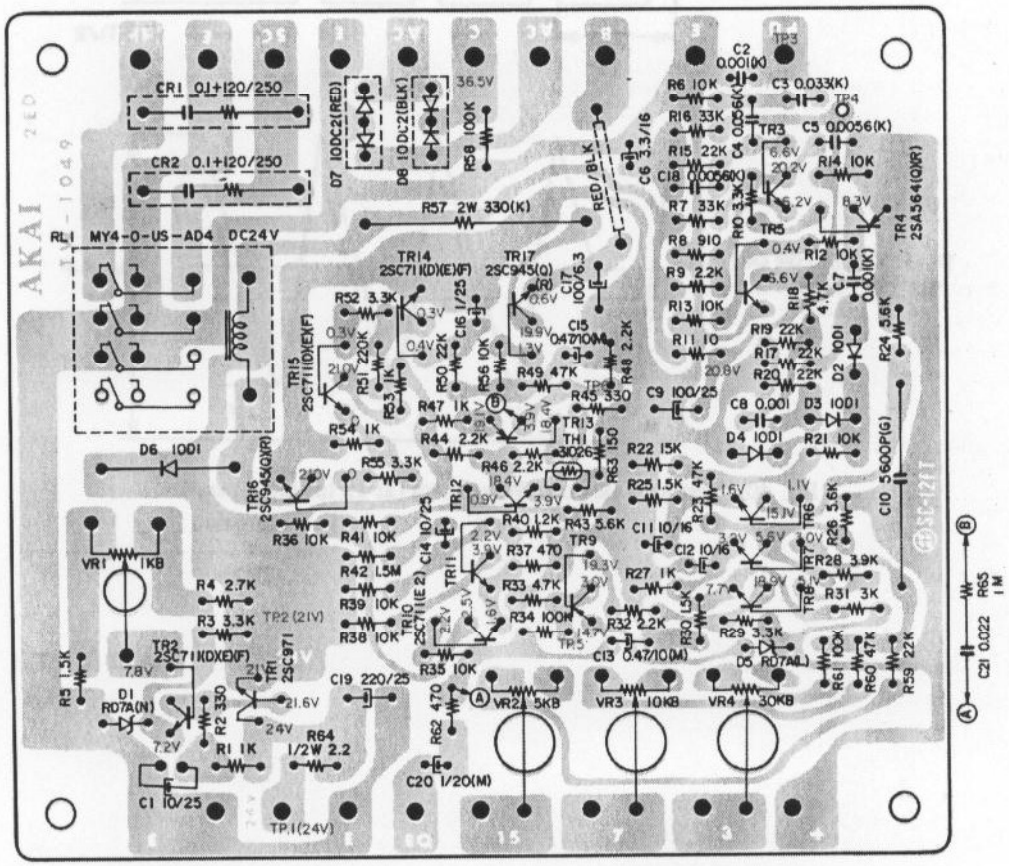


Fig. 39 SERVO CONTROL P.C. BOARD TW-1049
SERVO CIRCUIT TEST POINTS

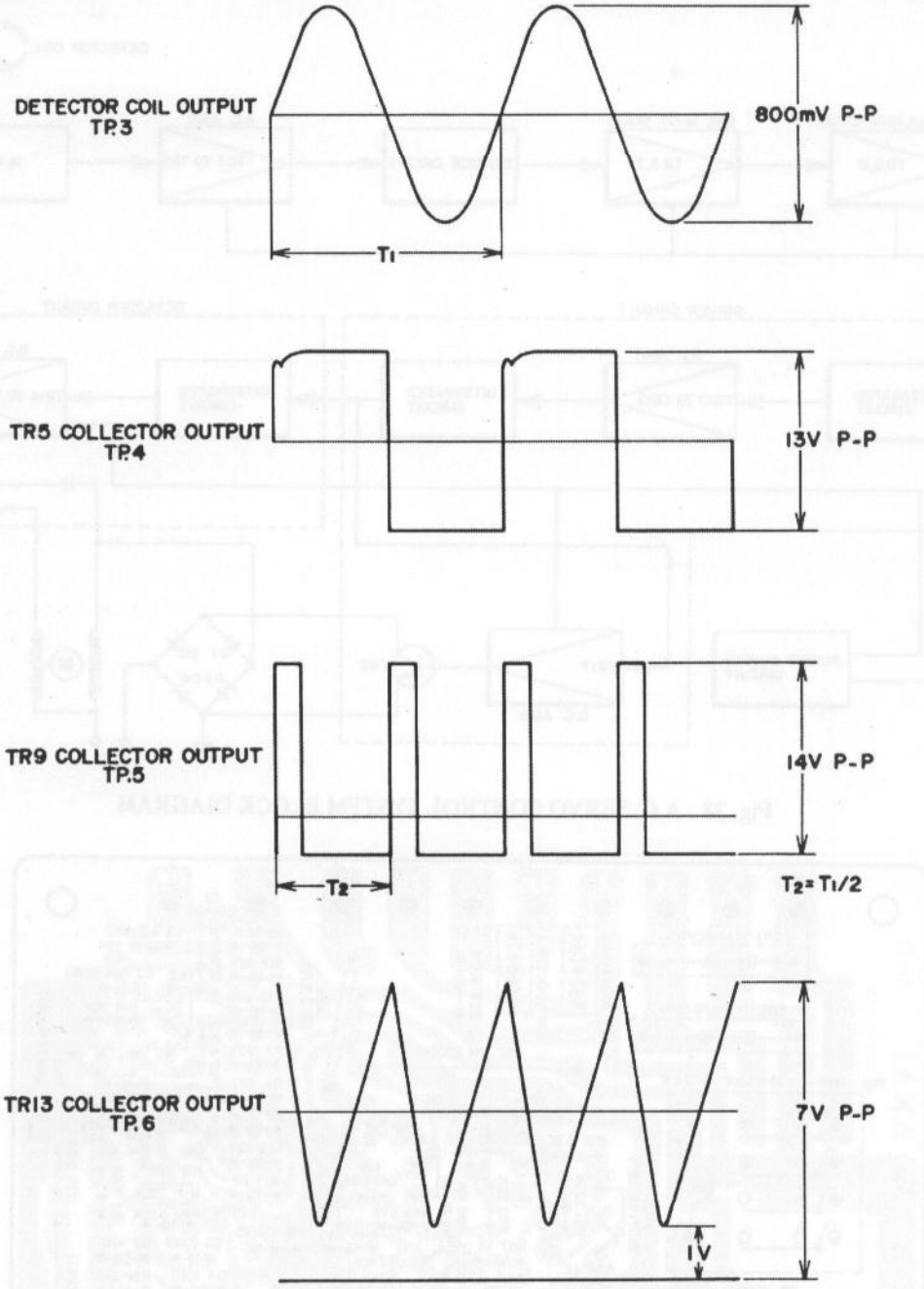


Fig. 40 Various Test Point Waveforms (at 15 ips tape speed)

IX. A.D.R. (AUTOMATIC DISTORTION REDUCTION) OPERATION

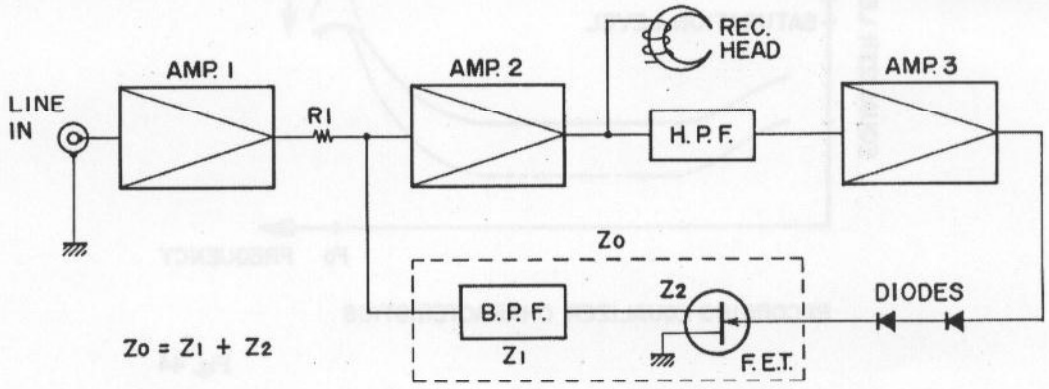
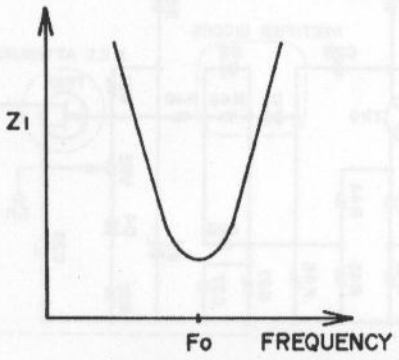


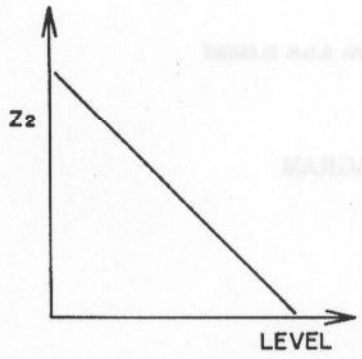
Fig. 41 A.D.R. BLOCK DIAGRAM



Fo: Z1 RESONANCE FREQUENCY

B.P.F. IMPEDANCE CHARACTERISTICS

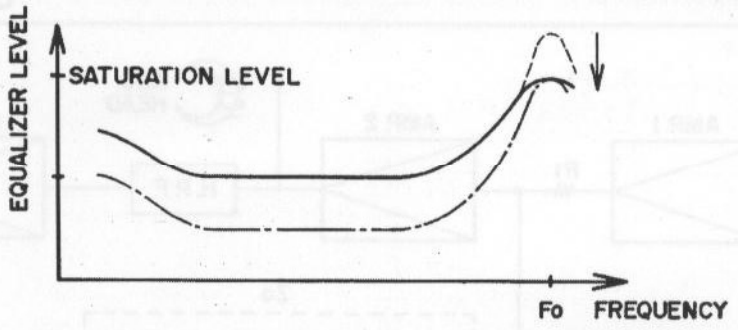
Fig. 42



F.E.T. IMPEDANCE CHARACTERISTICS

Fig. 43

1. The A.D.R. Block Diagram is as shown in Fig. 41, and A.T.T. is comprised of R1 and Z_0.
2. Z_0 impedance is the composite impedance of Z_1 of which the impedance is changed by the frequency and Z_2 which is changed depending upon the signal level. (See Figs. 42, 43)
3. Z_1 impedance resonates at recording equalizer peak point in the vicinity of f_0 (see Fig. 44). At resonance time the impedance of Z_1 is minimum.
4. When a flat and wide frequency band width signal is introduced to the Line Input, it is amplified at Amp. 1 and Amp. 2 and supplied to the recording head.
5. Regarding the flow of signal current to the Rec. Head, as shown in Fig. 44 when comparing the high with the low, the high flow of current is rather large.
6. Accordingly, in attempting to record at a high level, as shown in Fig. 44, there is a relative increase in the recording equalizer level as well, and there are instances in which the saturation level of the magnetic tape is surpassed at the equalizer peak.
7. At this time, as shown in Fig. 41, the Amp. 2 output passes the H.P.F., is amplified at Amp. 3, and this output is rectified at the diodes.
8. The voltage rectified at the diodes is supplied to the F.E.T. drain. Therefore, the impedance between gate & source is lowered and Z_0 impedance is also lowered. However, because at the resonance point vicinity of the recording equalizer Z_1 impedance is minimum, R_1 and Z_0 A.T.T. operates only at high range frequencies.
9. The high range frequency level is decreased at the input stage of Amp. 1 by means of A.T.T. composed of R_1 and Z_0, and after passing Amp. 1 and Amp. 2, the recording current supplied to the recording head, as shown in Fig. 44, becomes below the saturation level of the magnetic tape in the vicinity of f_0 and the signal can be recorded on the magnetic tape without distortion.



RECORDING EQUALIZER CHARACTERISTICS

Fig. 44

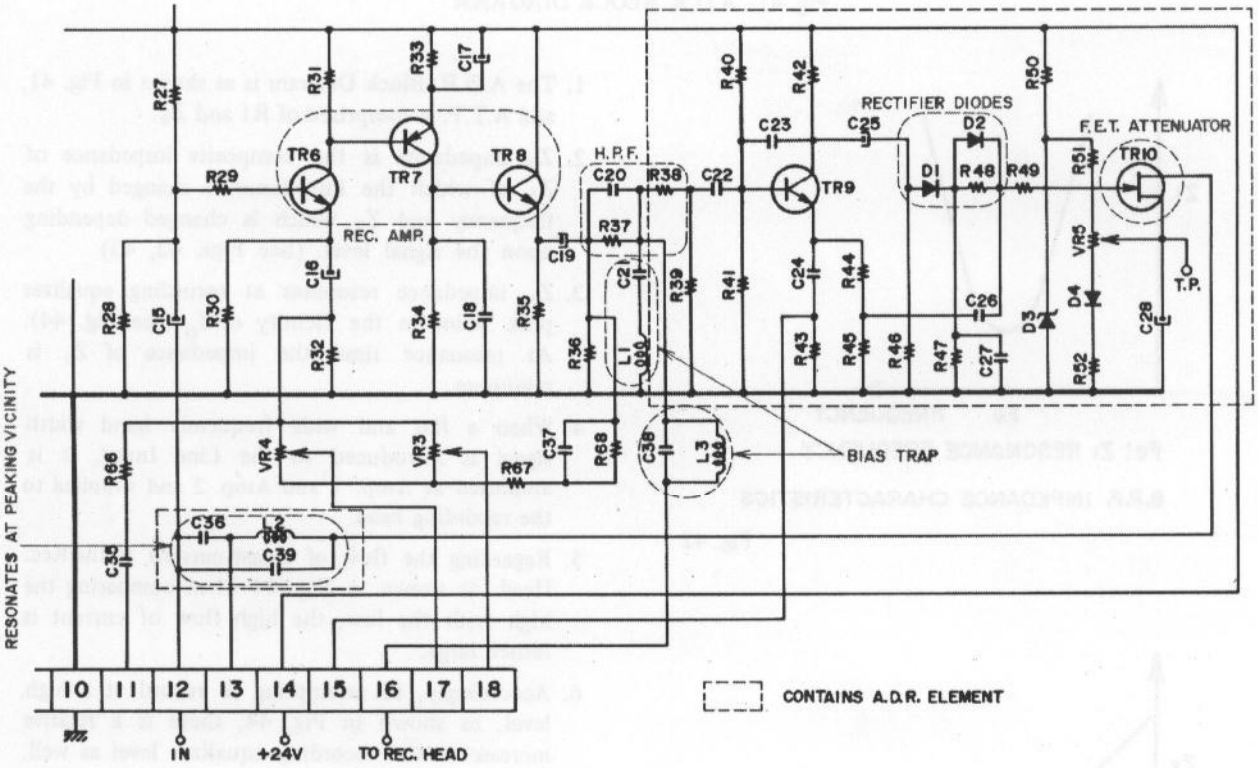


Fig. 45 A.D.R. SECTION SCHEMATIC DIAGRAM

1. MODEL: GX-400D

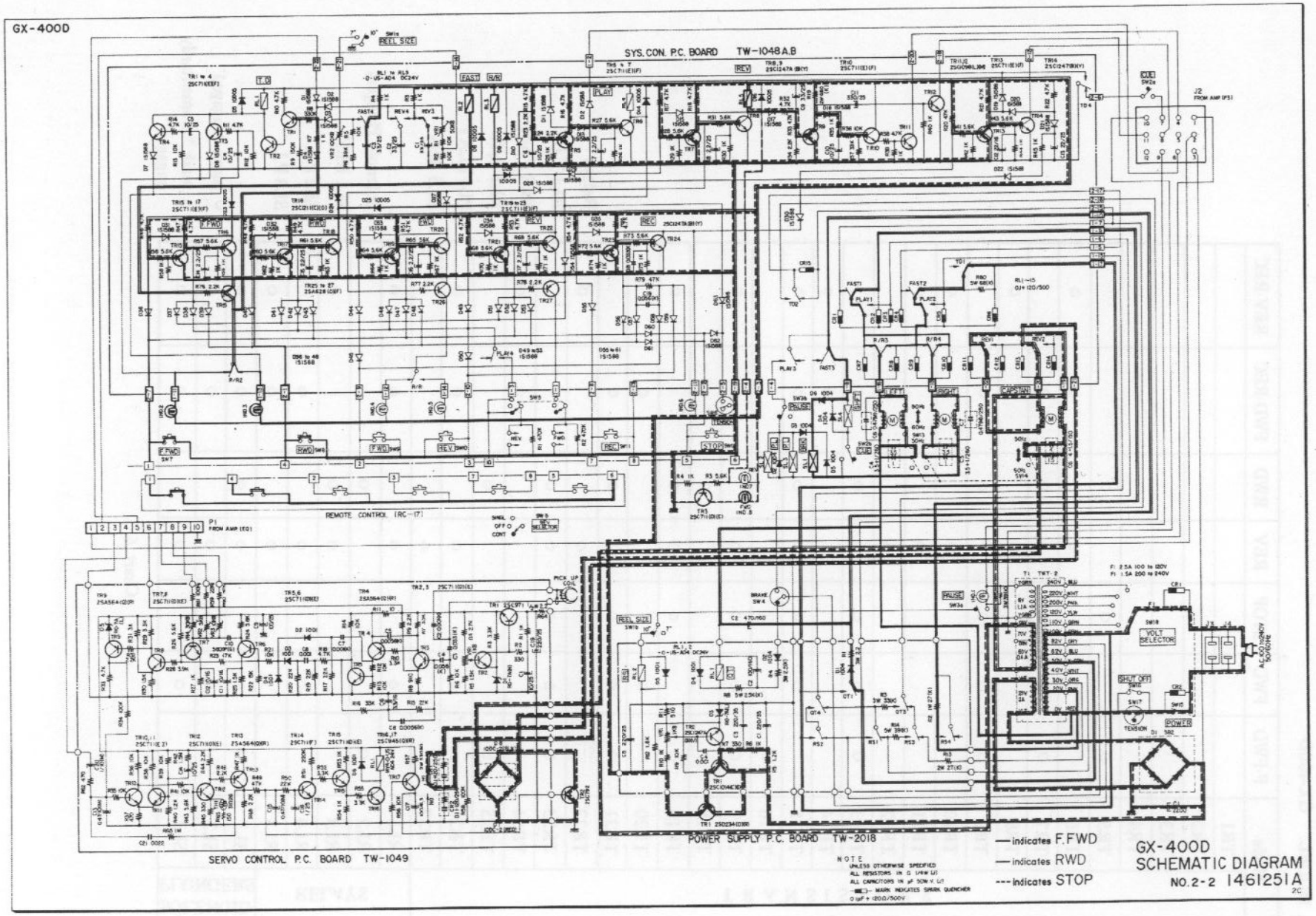
Mode		F·FWD	FWD	STOP	REV	RWD	FWD·REC	REV·REC
TRANSISTORS	TR1							
	TR2							
	TR3							
	TR4							
	TR5	○		○		○		
	TR6		○		○		○	○
	TR7	○	○	○		○	○	
	TR8				○			○
	TR9	○	○	○		○	○	
	TR10				○			○
	TR11				○			○
	TR12				△			
	TR13	○	○	○	○	○		
	TR14						○	○
	TR15		○	○	○	○	○	○
	TR16	○						
	TR17	○	○	○	○		○	○
	TR18					○		
	TR19	○		○	○	○		○
	TR20		○				○	
	TR21	○	○	○		○	○	
	TR22				○			○
	TR23	○	○	○	○	○		
	TR24						○	○
	TR25	○				○		
	TR26		○		○		○	○
	TR27				△			
RELAYS	RL1		△		△		△	△
	RL2	○				○		
	RL3				○	○		○
	RL4		○		○		○	○
	RL5				○		○	○
SOLENOID PLUNGERS	SL1	○	○		○	○	○	○
	SL2		○		○		○	○
	SL3		○		○		○	○

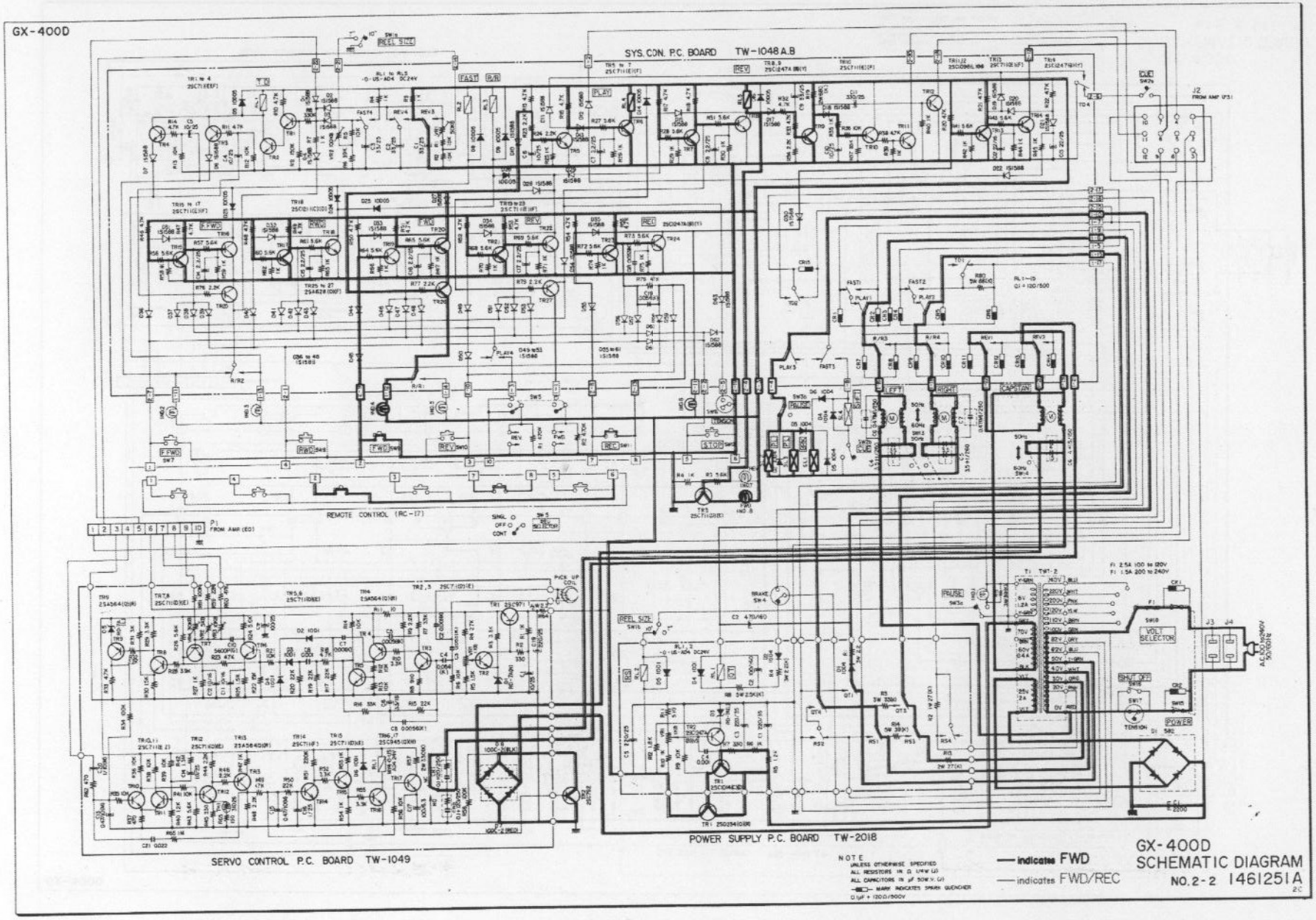
Relays
RL1 T.D
RL2 FAST
RL3 R/R
PL4 PLAY
RL5 REV

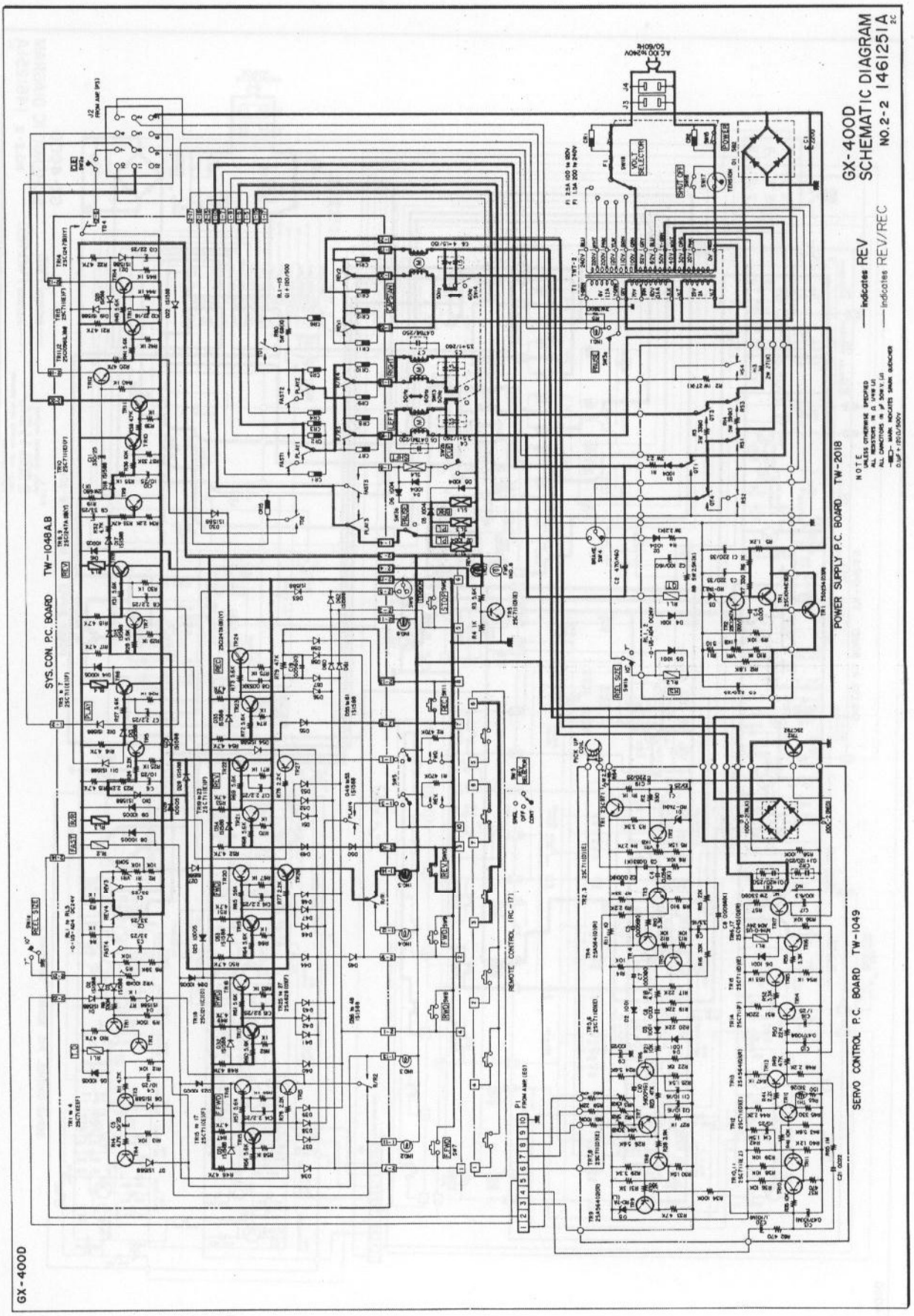
Solenoid Plungers
SL1 BRK
SL2 P.L
SL3 P.L

○ mark "engaged"
△ mark "momentarily engaged"

Chart 6


GX-400D
SYS. CON. P.C. BOARD TW-1048 A,B
REMOTE CONTROL (RC-17)
SERVO CONTROL P.C. BOARD TW-1049
POWER SUPPLY P.C. BOARD TW-2018
— indicates F.FWD
— indicates RWD
--- indicates STOP
NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN Ω 1/4W (J)
ALL CAPACITORS IN μF 50V-Y (J)
-■- MARK INDICATES SIRKA QUENCHER
0 (μF) + (200Ω/500V
GX-400D
SCHEMATIC DIAGRAM
NO.2-2 1461251A


GX-400D
SYS. CON. P.C. BOARD TW-1048 A,B
REMOTE CONTROL (RC-17)
SERVO CONTROL P.C. BOARD TW-1049
POWER SUPPLY P.C. BOARD TW-2018
NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN Ω 1/4W (J)
ALL CAPACITORS IN μF 50W.V. (J)
MARK INDICATES SPARK QUENCHER
0.1μF + 120Ω/500V
indicates FWD
indicates FWD/REC
GX-400D
SCHEMATIC DIAGRAM
NO. 2-2 1461251A


GX-4000D
SCHEMATIC DIAGRAM
NO.2-2 1461251A
2C
SYS.CON. P.C. BOARD TW-1048A,B
POWER SUPPLY P.C. BOARD TW-2018
SERVO CONTROL P.C. BOARD TW-1049
REMOTE CONTROL (RC-17)
indicates REV
indicates REV/REC
NOTE

2. MODEL: GX-400D PRO

Mode		F·FWD	FWD	STOP	RWD	REC
TRANSISTORS	TR1	○		○	○	
	TR2		○			○
	TR3	○	○	○	○	
	TR4					○
	TR5					
	TR6					
	TR7				△	
	TR8					
	TR9					
	TR10		○	○	○	○
	TR11	○				
	TR12	○	○	○		○
	TR13				○	
	TR14	○		○	○	
	TR15		○			○
	TR16	○	○	○	○	
	TR17					○
	TR18					
	TR19	○	○	○	○	○
	TR20				△	
RELAYS	RL1	○			○	
	RL2				○	
	RL3		○			○
	RL4		△			
SOLENOID PLUNGERS	SL1	○	○		○	○
	SL2		○			○
	SL3		○			○

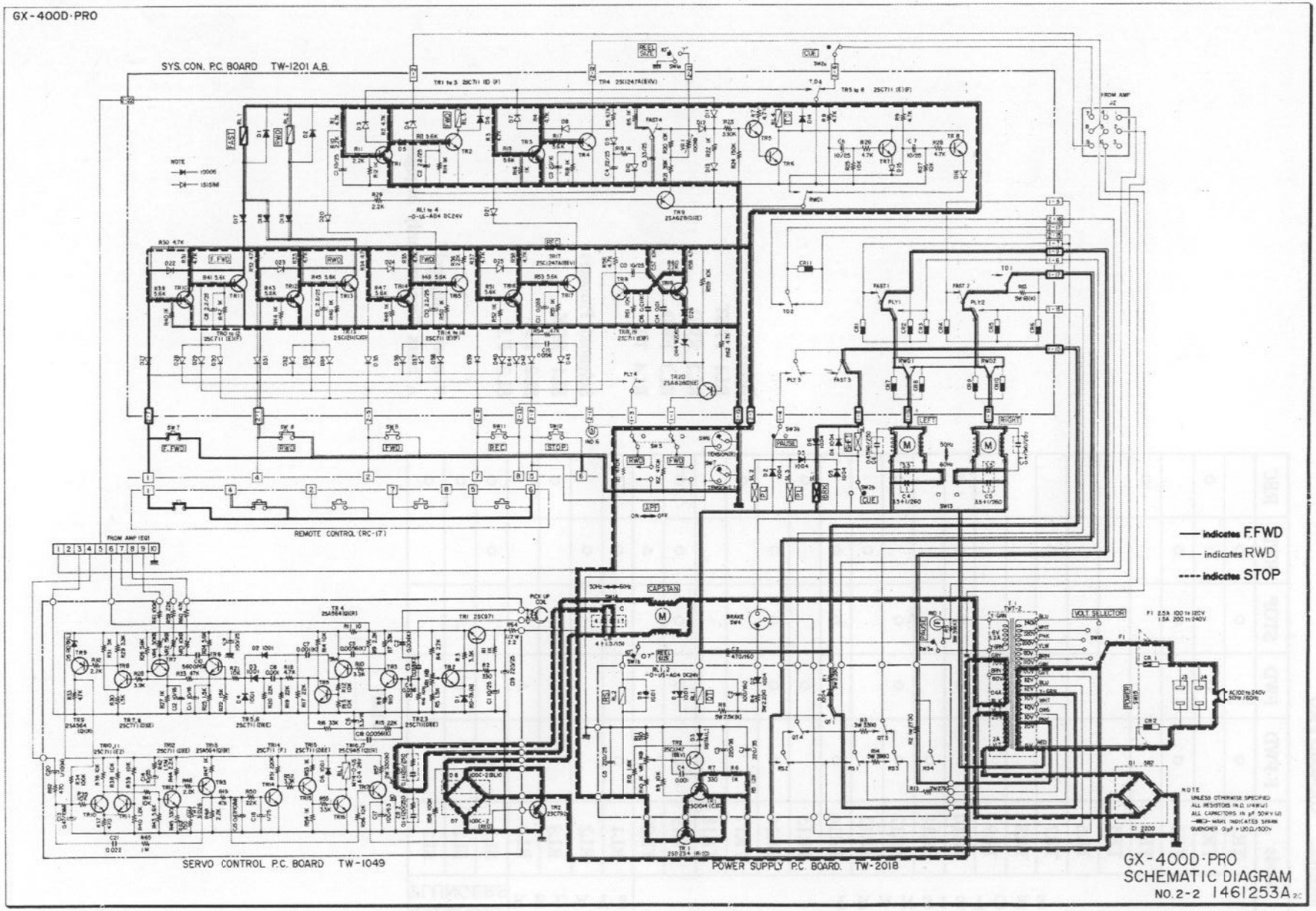
Chart 7

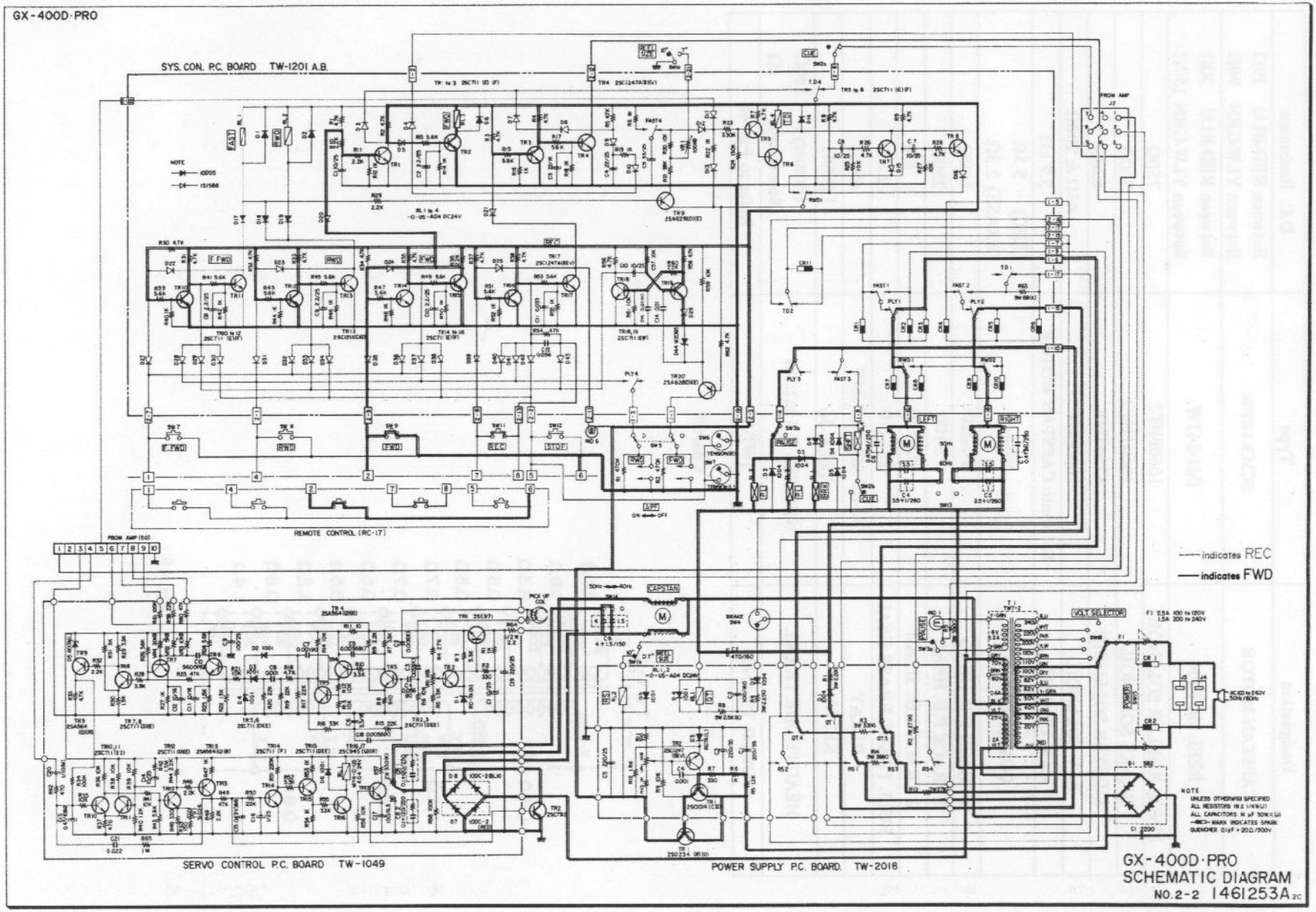
Relays
RL1 FAST
RL2 RWD
RL3 FWD
RL4 T.D

Solenoid Plungers
SL1 BRK
SL2 P.L
SL3 P.L

○ mark "engaged"
△ mark "momentarily engaged"

GX-400D·PRO


SYS. CON. P.C. BOARD TW-1201 A,B.
REMOTE CONTROL (RC-17)
SERVO CONTROL P.C. BOARD TW-1049
POWER SUPPLY P.C. BOARD TW-2018
indicates F.FWD
indicates RWD
indicates STOP
GX-400D·PRO
SCHEMATIC DIAGRAM
NO.2-2 1461253A


GX-400D·PRO
SYS. CON. P.C. BOARD TW-1201 A.B.
REMOTE CONTROL (RC-17)
SERVO CONTROL P.C. BOARD TW-1049
POWER SUPPLY P.C. BOARD TW-2018
indicates REC
indicates FWD
GX-400D·PRO
SCHEMATIC DIAGRAM
NO.2-2 1461253A 2C

XI. D.C. RESISTANCE OF EACH COIL

D.C. resistance value is average value.

Designation	Type	D.C. Resistance
CAPSTAN MOTOR	SCM3-16TW	Between RED-BLU 19Ω Between YLW-GRN 90Ω
REEL MOTOR	IM1-24TW	Between RED-BLU 30Ω Between YLW-GRN 157Ω
PINCH ROLLER SOLENOID	1660PHT2	750Ω
BRAKE SOLENOID	1660THT2	700Ω
SHIFTER SOLENOID	1254THT	620Ω
REV SOLENOID	1660PHT	45Ω & 200Ω
PICK UP COIL	Built into CAPSTAN MOTOR	3.7 kΩ
COMBO HEAD	RE4-6	(REC) 5.5Ω (ERASE) 2.3Ω
4 TRACK P.B. HEAD	P4-220	160Ω
2 TRACK P.B. HEAD	P2-100	250Ω
2 TRACK REC HEAD	R2-100	8Ω
FULL TRACK ERASE HEAD	EF-210	2.8Ω
RELAY	O-US-AD4 D.C.24V	650Ω
RELAY	TECK-36	1,000Ω
HEAD PHONE TRANS.	N19-228S 7.5 kΩ:8Ω	(Primary) 580Ω (Secondary) 1Ω
POWER TRANS.	TWT-2	Refer to Fig. 46

Chart 8

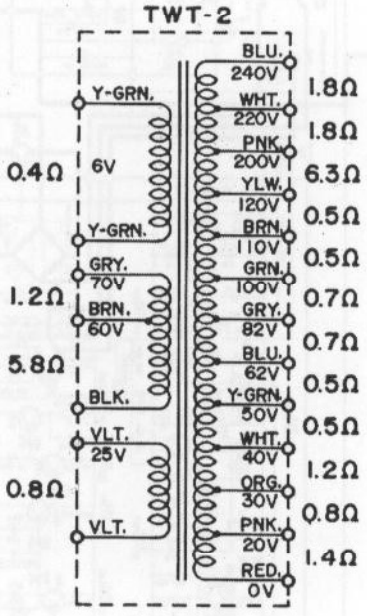
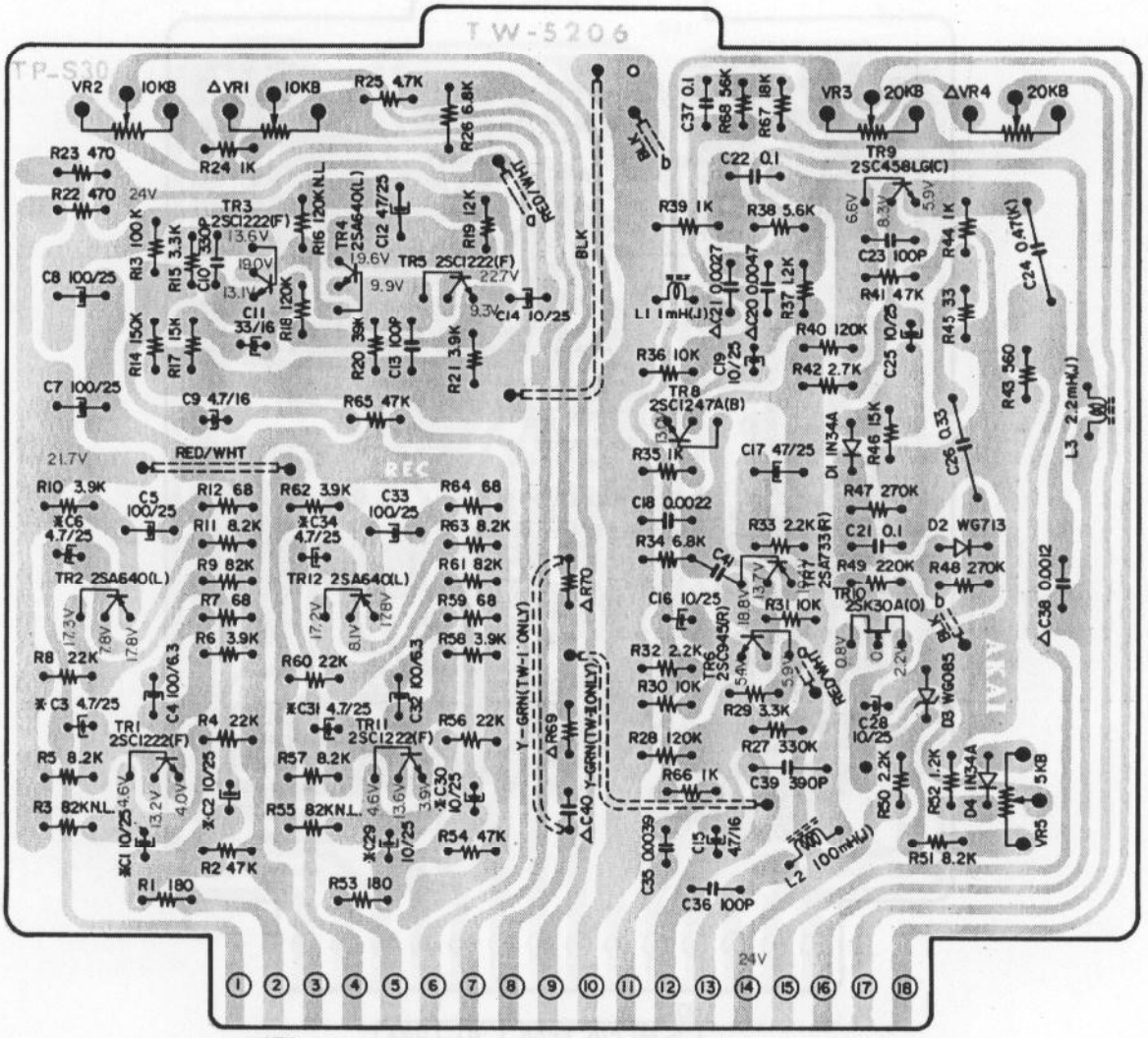


Fig. 46

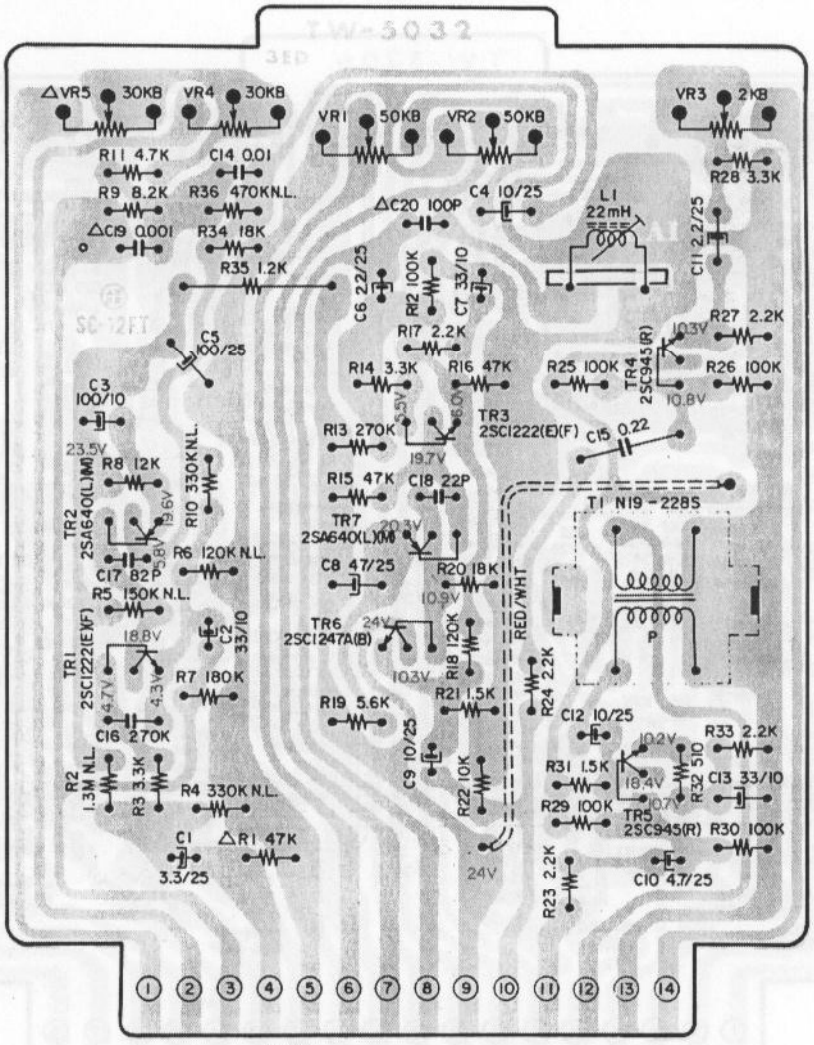
1. REC. AMP. P.C. BOARD TW-5206



NOTE

Δ	C20	C21	C38	C40	C41	R69	R70	VR1	VR4
TW-I	0.0047	0.0027	0.0012					USED	USED
TW-II	0.0056	0.001	430P	0.0027	82P	4.7K	10K		

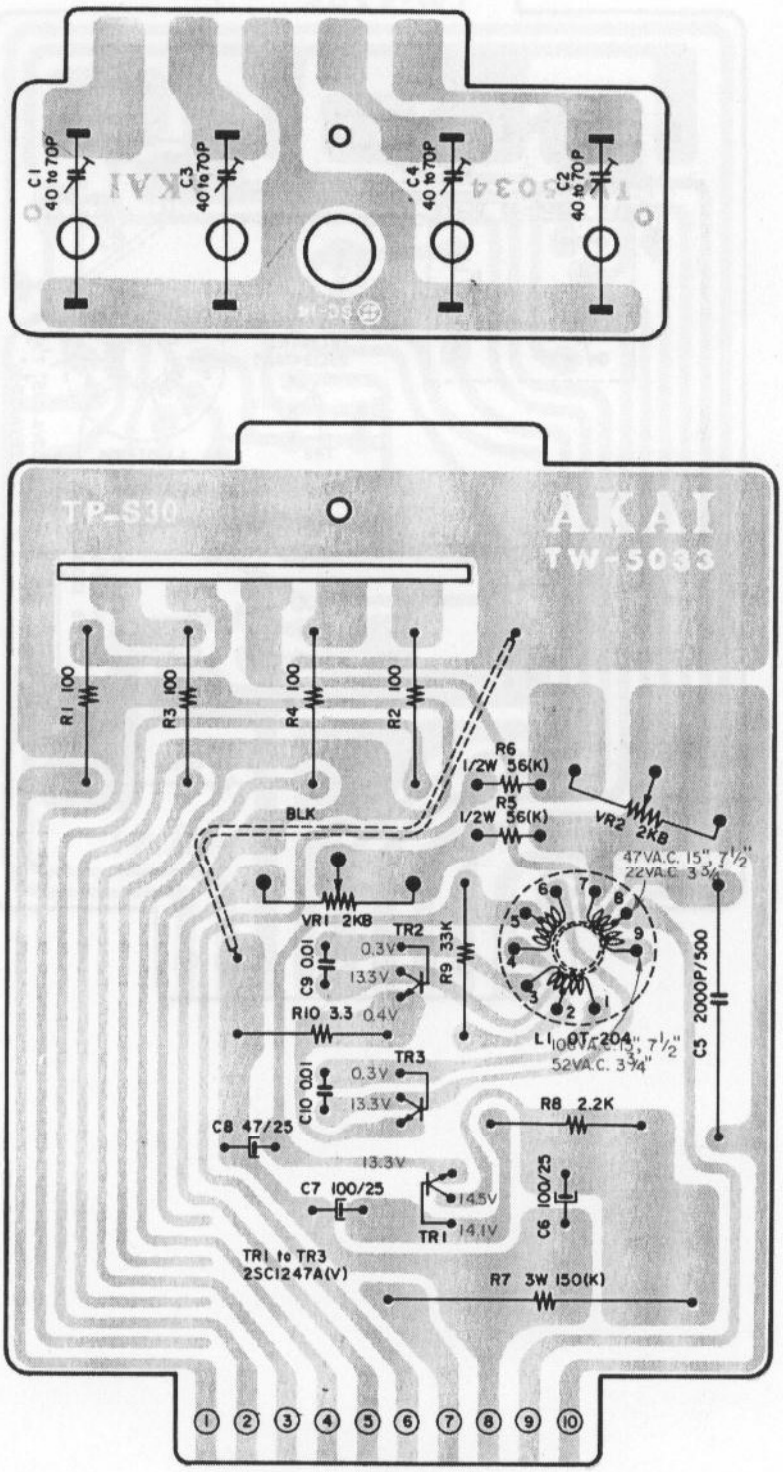
2. P.B. AMP. P.C. BOARD TW-5032



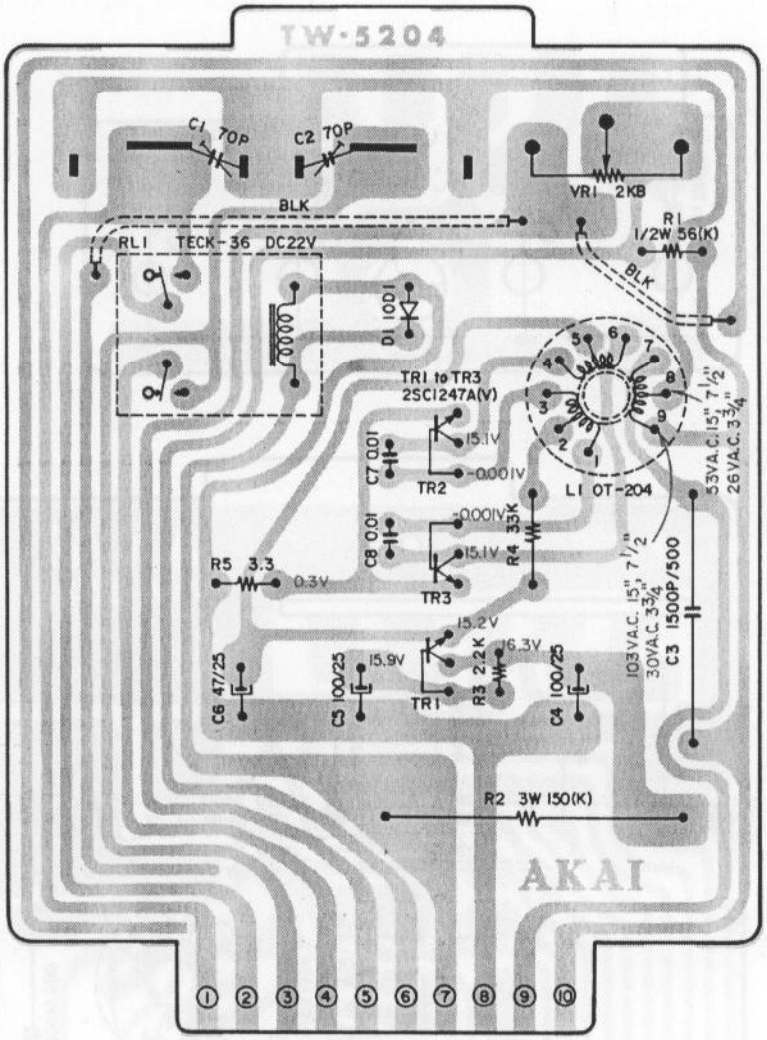
NOTE

△	C19	C20	R1	VR5
TW-I	0.001	100P	47K	USED
TW-II	0.0015	50P	56K	

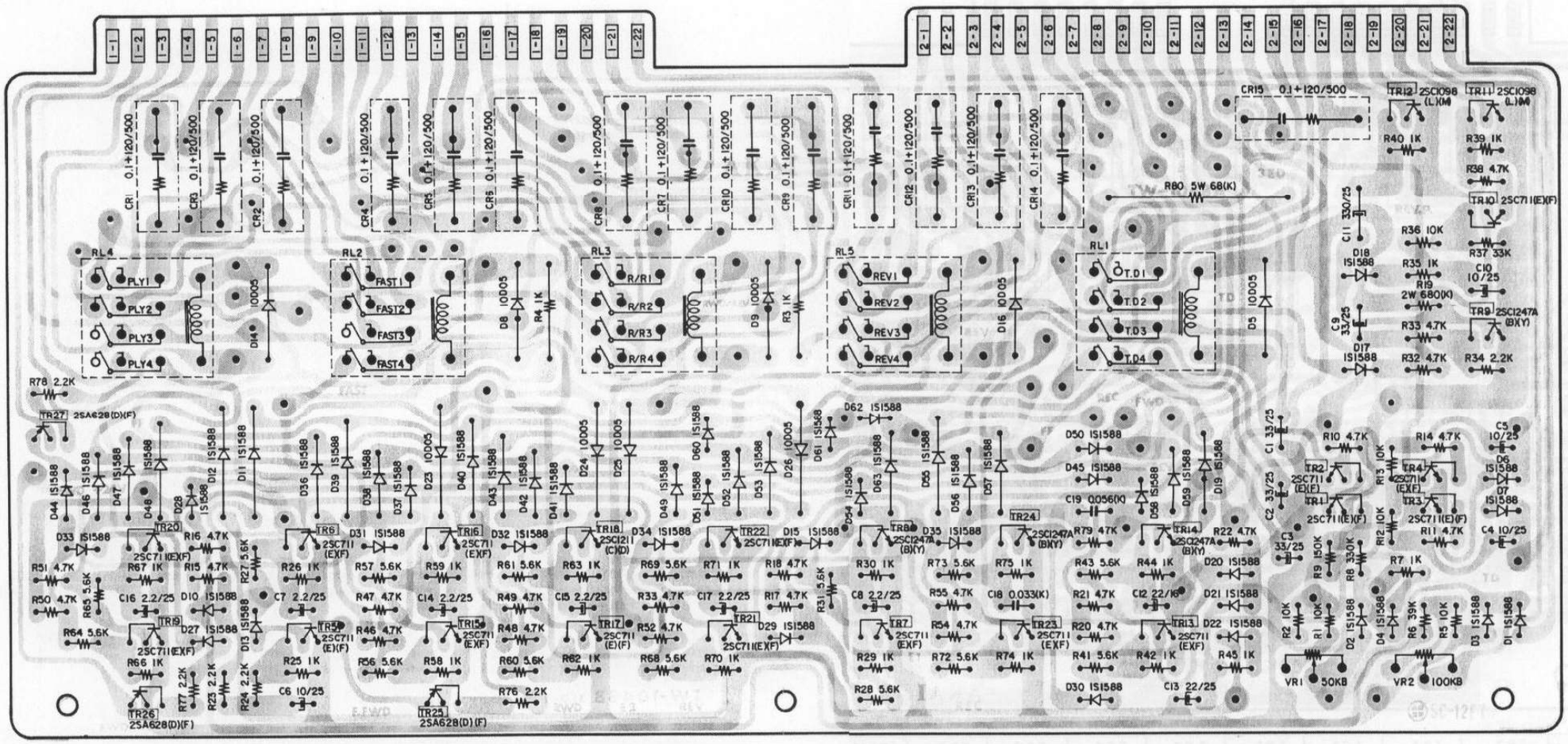
3. OSC. P.C. BOARD TW-5033



4. OSC. P.C. BOARD TW-5204 (PRO)



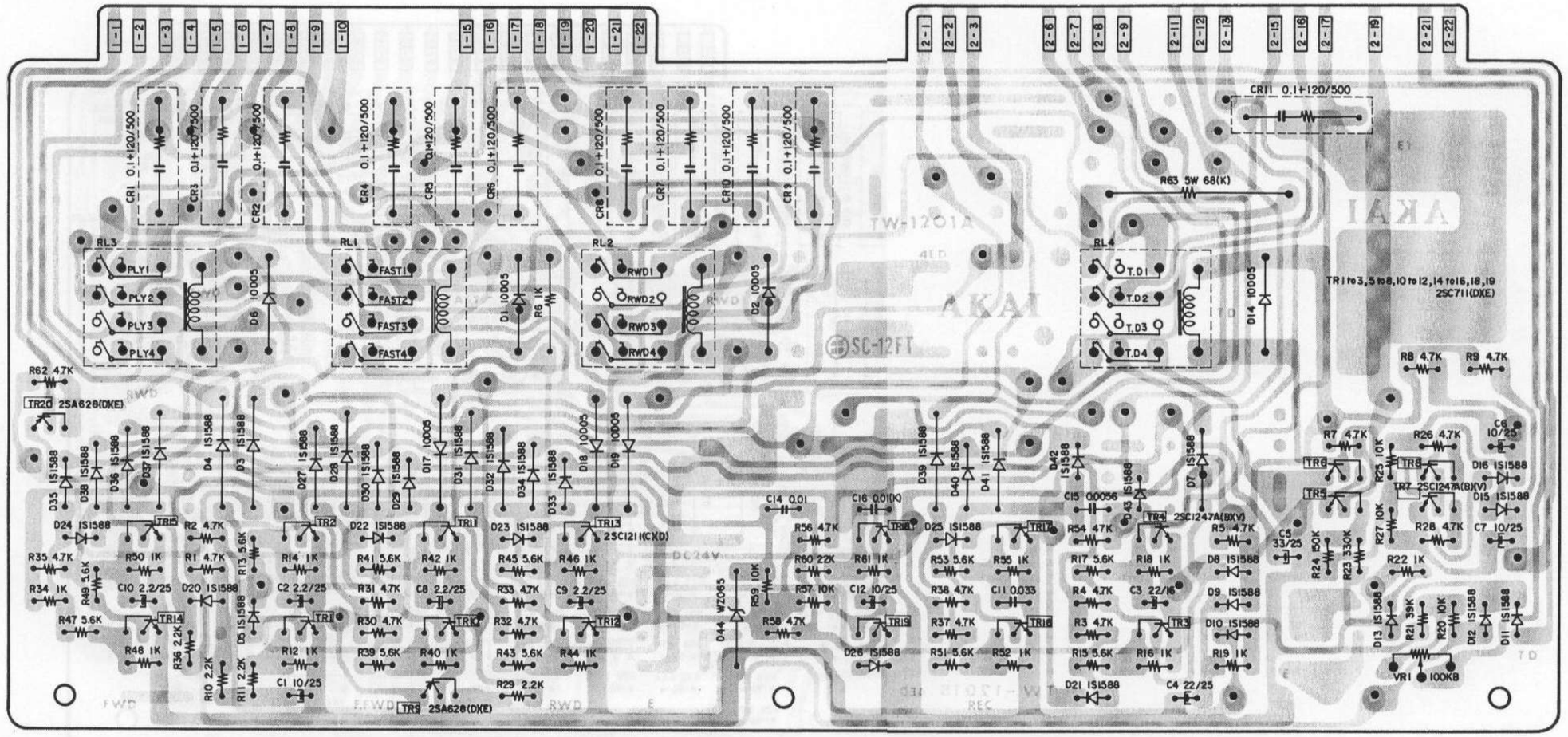
5. SYS. CON. P.C. BOARD TW-1048



	TR1	TR2	TR3	TR4	TR5	TR6	TR7	TR8	TR9	TR10	TR11	TR12	TR13	TR14
E										16.7V(F.F,REV,REC) 0(OTHER)				
C	24V	24V	24V	24V	0.1V(FWD,STOP,RWD) 13V(OTHER)	24V(F.F,STOP,RWD) 0.1V(OTHER)	10V(REV,REC) 0.1V(OTHER)	0.3V(REV,REC) 23.3V(OTHER)	23.6V(REV,REC) 0.1V(OTHER)	24V	0.2V(F.F,REV,REC) 35V(OTHER)	34V(REV,REC) 36V(OTHER)	14.3V(REC) 0.1V(OTHER)	0.2V(REC) 24V(OTHER)
B					0.4V(FWD,STOP,RWD) 0.8V(OTHER)	0.8V(FWD,REV,REC) 0.1V(OTHER)	0.2V(REV,REC) 0.8V(OTHER)	0.8V(REV,REC) 0.1V(OTHER)	0.1V(REV,REC) 0.8V(OTHER)	18V(F.F,REV,REC) 0(OTHER)	0.8V(F.F,REV,REC) 0(OTHER)		0.2V(REC) 0.8V(OTHER)	0.8V(REC) 0(OTHER)

	TR15	TR16	TR17	TR18	TR19	TR20	TR21	TR22	TR23	TR24	TR25	TR26	TR27	
E											2.2V(F.F,RWD) 24V(OTHER)	2.3V(FWD,REV,REC) 24V(OTHER)	10V(REV,REC) 0.1V(OTHER)	
C	13.4V(F.F) 0.1V(OTHER)	0.2V(F.F) 23.6V(OTHER)	13.3V(RWD) 0.1V(OTHER)	0.2V(RWD) 23.6V(OTHER)	13.3V(FWD,REV) 0.1V(OTHER)	0.1V(FWD,REC) 10V(REV,REC) 23V(OTHER)	10V(REV,REC) 0.1V(OTHER)	0.3V(REV,REC) 23.6V(OTHER)	13.4V(REC) 0.1V(OTHER)	0.2V(REC) 24V(OTHER)				
B	0.2V(F.F) 0.8V(OTHER)	0.8V(F.F) 0.1V(OTHER)	0.2V(RWD) 0.8V(OTHER)	0.8V(RWD) 0.1V(OTHER)	0.2V(FWD,REC) 0.8V(OTHER)	1V(F.F,FWD,REC) 0.1V(OTHER)	0.2V(REV,REC) 1V(OTHER)	0.9V(REV,REC) 0.1V(OTHER)	0.2V(REC) 1V(OTHER)	0.8V(REC) 0.1V(OTHER)	1.5V(F.F,RWD) 24V(OTHER)	23V(F.F,RWD,STOP) 2V(OTHER)	24V(F.F,STOP,RWD) 0.1V(OTHER)	

6. SYS. CON. P.C. BOARD TW-1201 (PRO)



	TR1	TR2	TR3	TR4	TR5	TR6	TR7	TR8	TR9	TR10	TR11	TR12	TR13	TR14	TR15	TR16	TR17	TR18	TR19	TR20
E																				6.2V
C	12V(FWD,REC) 0.1V(OTHER)	0.2V(FWD,REC) 24V(OTHER)	14.4V(REC)- 0.1V(OTHER)	0.1V(REC) 24V(OTHER)	24V	24V	24V	24V		13.4V(F.F) 0.1V(OTHER)	0.2V(F.F) 23V(OTHER)	13.5V(RWD) 0.1V(OTHER)	0.1V (RWD) 23.6V(OTHER)	13.3V(FWD,REC) 0.1V(OTHER)	0.1V(FWD,REC) 24V(OTHER)	13.3V(REC) 0.1V(OTHER)	0.1V(REC) 24V(OTHER)	24V	0.8V	6.2V(F.F,RWD) 0.1V(OTHER)
B	0.2V(FWD,REC) 0.8V(OTHER)	0.8V(FWD,REC) 0.1V(OTHER)	0.1V(REC) 0.8V(OTHER)	0.8V(REC) 0.1V(OTHER)						0.2V(F.F) 0.7V(OTHER)	0.8V(F.F) 0.1V(OTHER)	0.2V(RWD) 0.8V(OTHER)	0.8V(RWD) 0.1V(OTHER)	0.2V(FWD,REC) 0.8V(OTHER)	0.8V(FWD,REC) 0.1V(OTHER)	0.2V(REC) 0.8V(OTHER)	0.8V(REC) 0.1V(OTHER)	0.3V	1.5V	5.5V(F.F,RWD) 17.5V(OTHER)