

PRELIMINARY SERVICE MANUALMODEL GX-215DDATE January 1977

Technical Data

Track System	4 track 2 channel stereo/monaural system
Reel Capacity	Up to 7" reel
Tape Speed	7-1/2 and 3-3/4 ips
Wow & Flutter	Less than 0.09% RMS, 0.17% (DIN 45 500) at 7-1/2 ips Less than 0.18% RMS at 3-3/4 ips
Frequency Response	30 to 25,000 Hz ± 3 dB at 7-1/2 ips 30 to 19,000 Hz ± 3 dB at 3-3/4 ips
Distortion	Less than 1% (1,000 Hz "0" VU)
Signal-to-Noise Ratio	Better than 56 dB (measured via tape with peak recording level of +6 VU)
Erase Ratio	Better than 70 dB
Bias Frequency	100 kHz
Heads	(3): One GX playback, one GX recording and one erase head
Motors	(3): One 4/8 pole self lubricating hysteresis synchronous capstan drive motor and two eddy current outer-rotor reel drive motors
FF and Rewind Time	90 sec using 1,200 ft tape
Output Jacks	Line(2): 0.775V(0 VU). Required load impedance: more than 100 k ohms Phone(1): 50 mV/8 ohms
Input Jacks	Microphone(2): 0.3 mV/2.2 k ohms. Required microphone impedance: 600 ohms Line(2): 70 mV/100 k ohms
DIN Jack	Input 0.3 mV/Output 0.5V
Semi-conductors	Transistors 27, Diodes 17
Power Requirements	CSA, UL and LA Models: 120V, 60 Hz only CEE Models : 220V, 50 Hz only Other Models: 110/120/220/240V, 50/60 Hz switchable
Dimensions	380(W) x 390 (H) x 295(D) mm, (15.0" x 15.4" x 11.6")
Weight	15.7 kg (34.6 lbs)

NOTE: For improvement purposes, specifications and design are subject to change without notice.

AKAI ELECTRIC CO., LTD.(P.O.BOX 21, Tokyo International Airport, Japan)
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Printed in Japan

1. Principal Parts Location

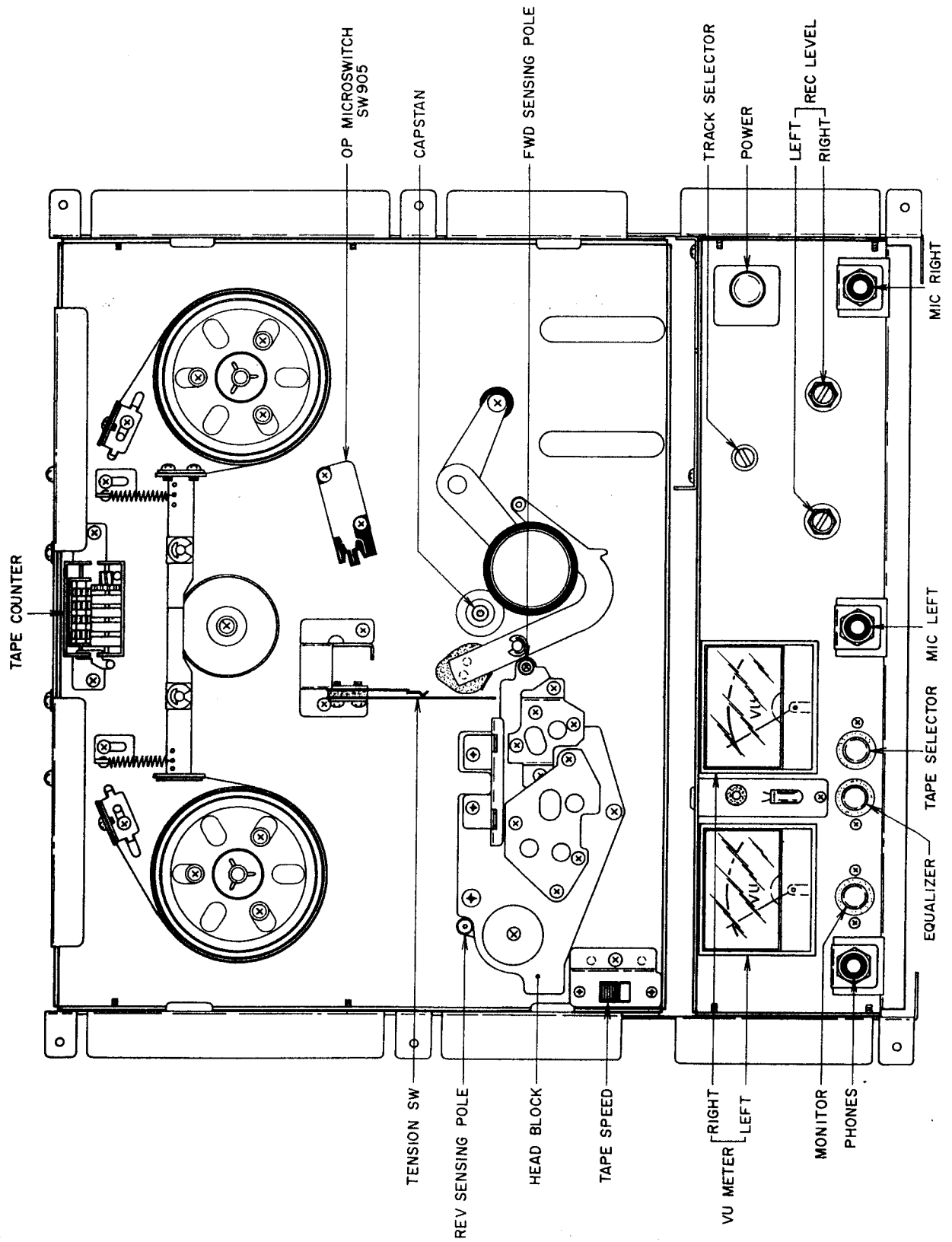


Fig. 1 Front View

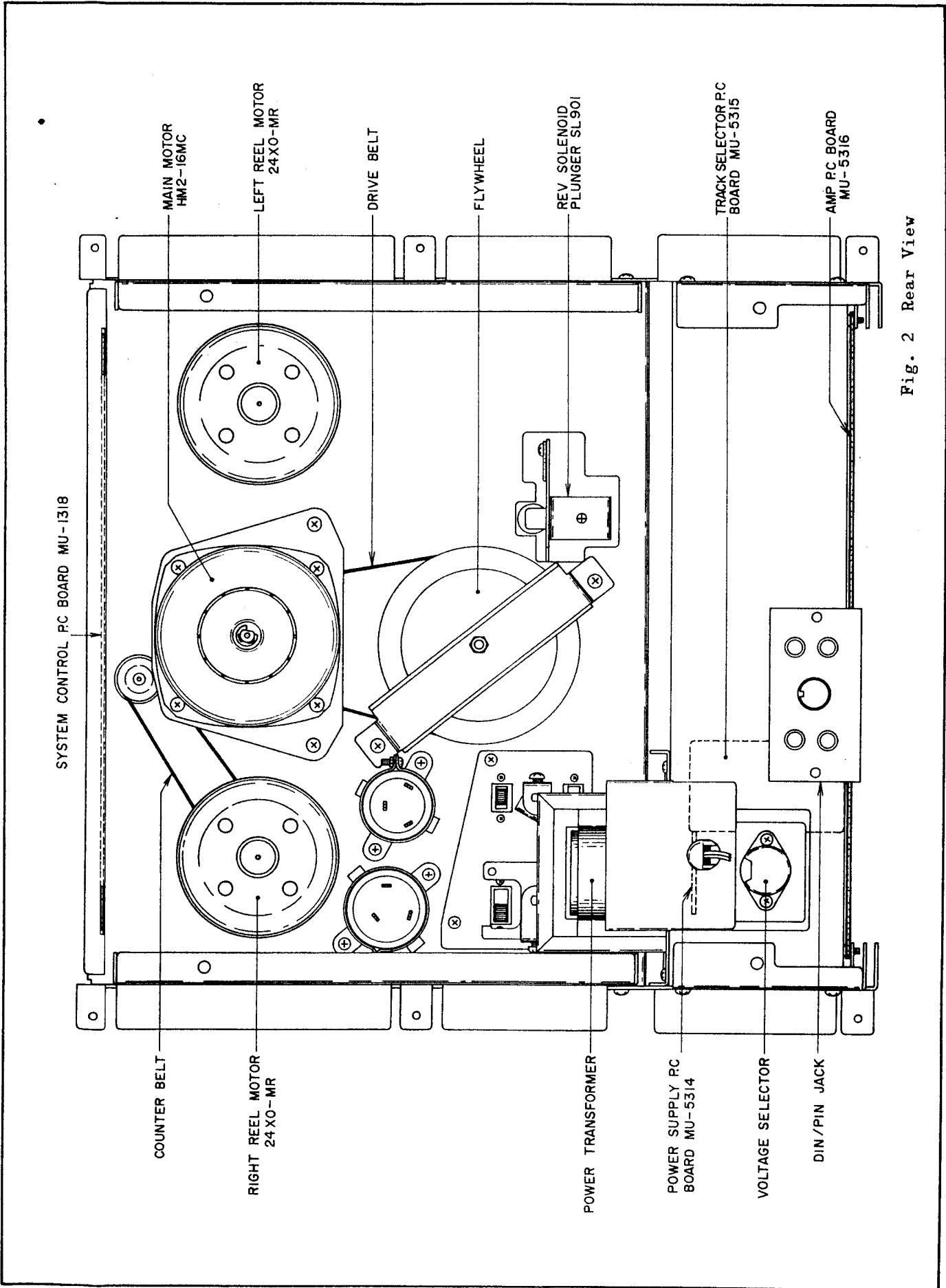


Fig. 2 Rear View

2. Mechanism Adjustment

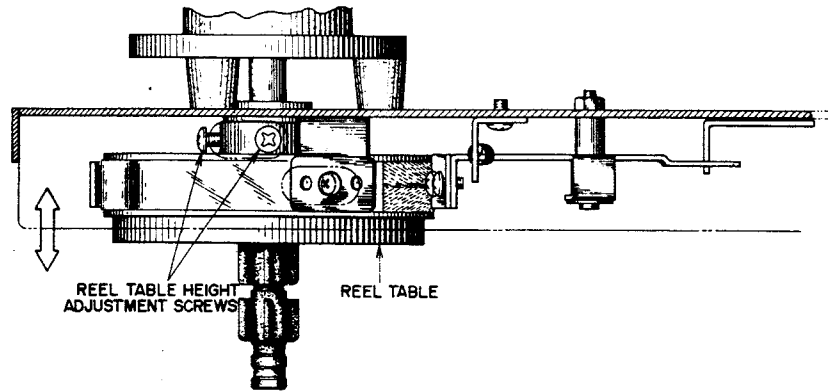


Fig. 3

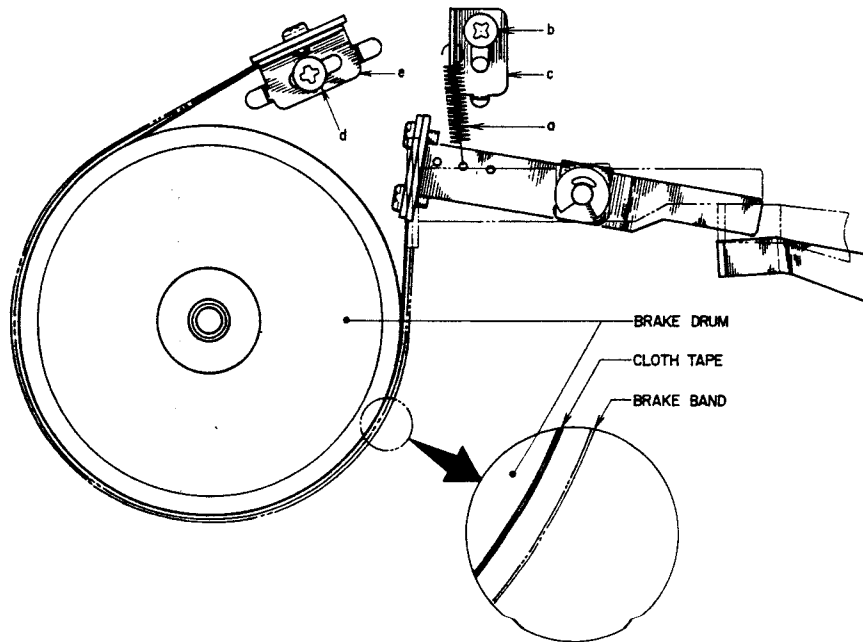


Fig. 4

1) Reel Table Height Adjustment

As shown in Fig. 3, 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) Brake Tension Adjustment

Brake tension adjustment can be made as follows: (Refer to Fig. 4)

- a) Change position of suspended spring (a).
- b) Loosen screw (b) and adjust the vertical position of spring suspension metal (c).
- c) Loosen screw (d) and adjust the horizontal position of brake band suspension metal (e).
- d) Only the left side is shown in Fig. 14, but the right side must be adjusted in the same way.

NOTE: In making brake tension adjustments, at all modes except stop mode, confirm that the brake band completely separates from the cloth tape on the brake drum. (Refer to Fig. 4)

3) Left and Right Reel Motor Tension at Various Operating Modes

Reel Motor Mode	Left Reel Motor	Right Reel Motor
FWD PB	60g	180g
REV PB	180g	60g
F.FWD	10g	400g
RWD	400g	10g

Chart 1

4) Flywheel Loose Play Adjustment

Turn the adjustment screw to obtain a 0.3 mm gap between the steel ball and bearing when the flywheel is moved in the direction of the arrow as shown in Fig. 5.

5) Flywheel Belt Position Adjustment

- 1) With capstan motor revolutions operating at Rev. mode, loosen setting screw and turn flywheel belt position adjustment screw until the flywheel belt comes to the center of the motor pulley. (Refer to Fig. 6)
- 2) Tighten setting screw to maintain center positioning of flywheel belt at Rev. mode.
- 3) Confirm that the flywheel belt runs on the center of the motor pulley at Fwd. mode also.

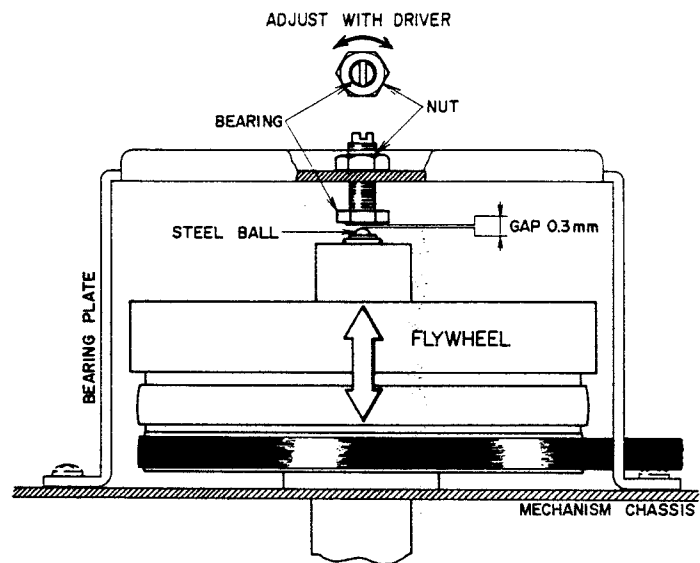


Fig. 5

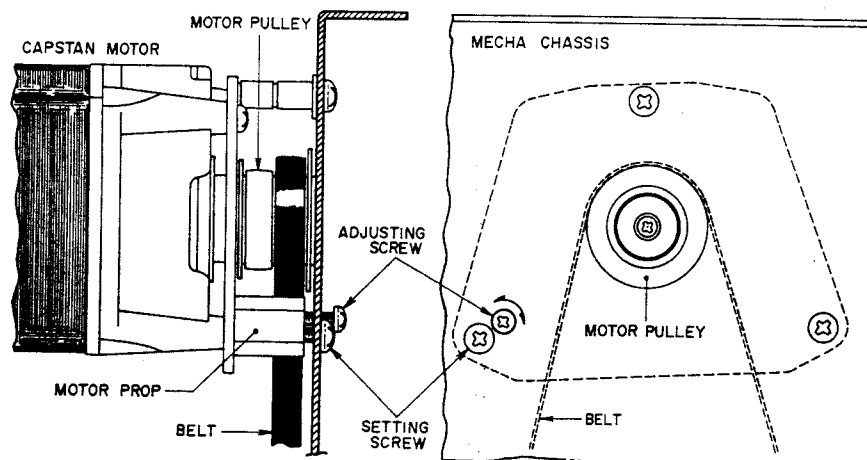


Fig. 6

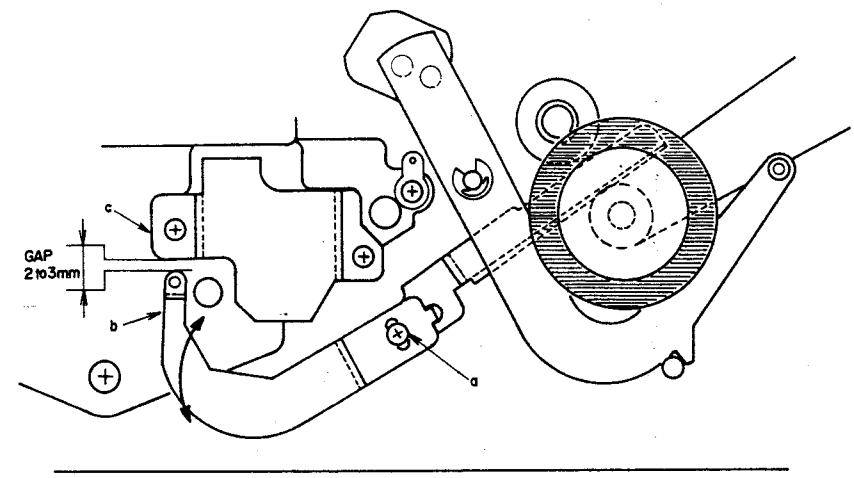
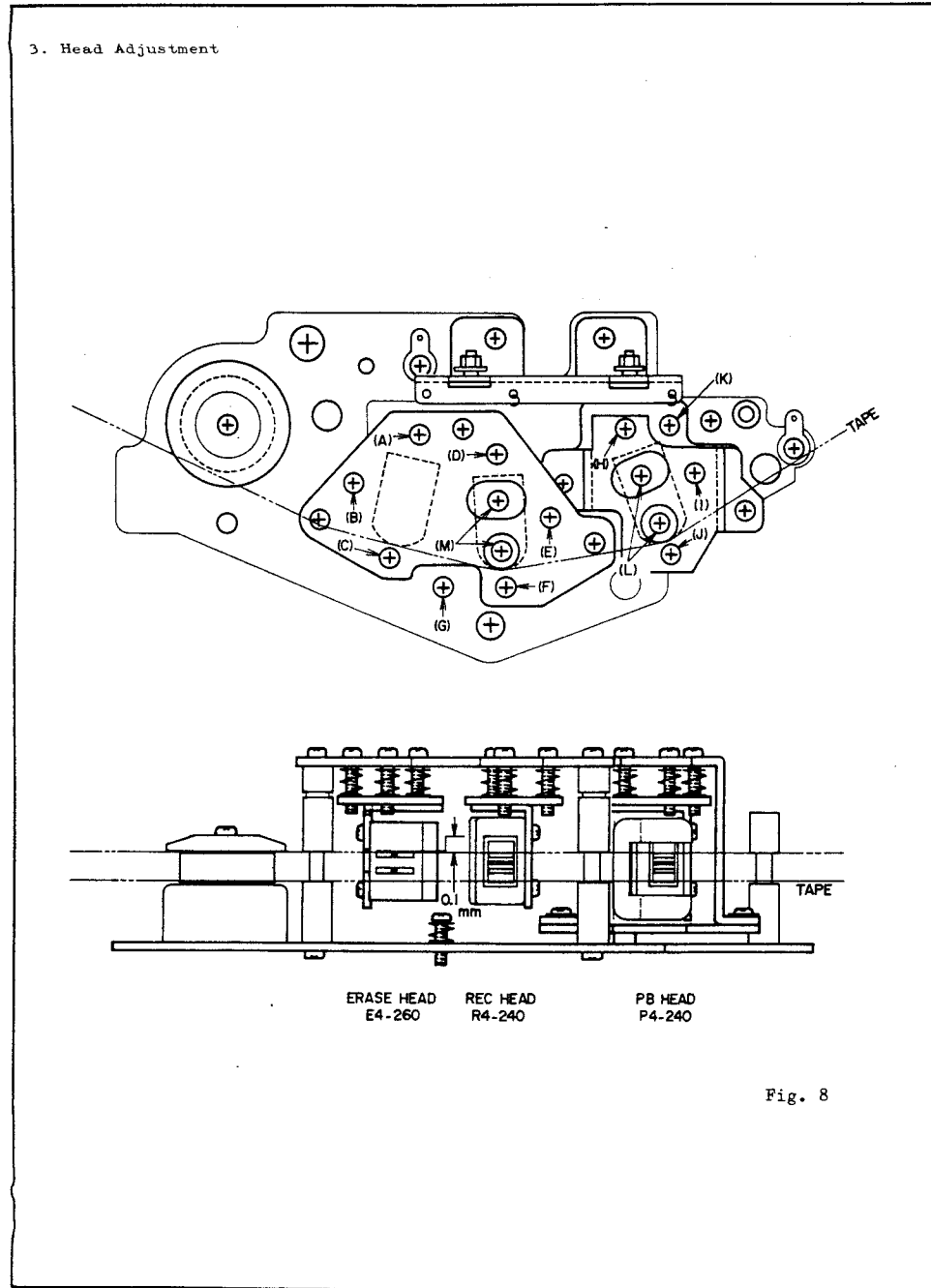


Fig. 7

6) Shifter Lever Adjustment

Loosen screw (a) and adjust by moving shifter lever (b) so that at play mode the gap between shifter lever (b) and angle plate (c) is 2 ~ 3 mm.



Step	Adjustment Item	Test Tape Supply Signal	Mode	Adjustment Point	Remarks
1	Erase Head Height Adjustment	Optional	Play	(A)(B)(C)	Upper edge of Ch1 head core is 0.1 mm higher than upper edge of the tape.
2	Recording Head Height Adjustment	Optional	Play	(D)(E)(F)	Upper edge of Ch1 head core is the same height as the upper edge of the tape.
3	Playback Head Height Adjustment (FWD)	Optional	Fwd Play	(G)	Same as Step 2.
4	Playback Head Height Adjustment (REV)	Optional	Rev Play	(K)	Lower edge of Ch2 head core is the same height as the lower edge of the tape.
5	Playback Head Azimuth Alignment	8,000 Hz 9.5 cm/sec test tape	Fwd Play	(H)(I)(J)	Maximum output, both channels.
6	Playback Head Gap Alignment	8,000 Hz 9.5 cm/sec test tape	Fwd Play	(L)	Adjust head gap surface so that there is no change in output level when tension is applied to the supply reel side.
7	Recording Head Azimuth Alignment	Scotch #211 tape, 15,000 Hz -20 VU recording	Rec	(E)	Same as Step 5.
8	Recording Head Gap Alignment	Scotch #211 tape, 15,000 Hz -20 VU recording	Rec	(M)	Same as Step 6.

Chart 2

- * 1. Set Tape Speed to 7-1/2 ips (19 cm/sec).
- 2. Regarding Step 3, when replacing a head or for slight head adjustment, do not move screw (G). Adjust with screws (D)(E) and (F) and then make the next Step 4 adjustment.

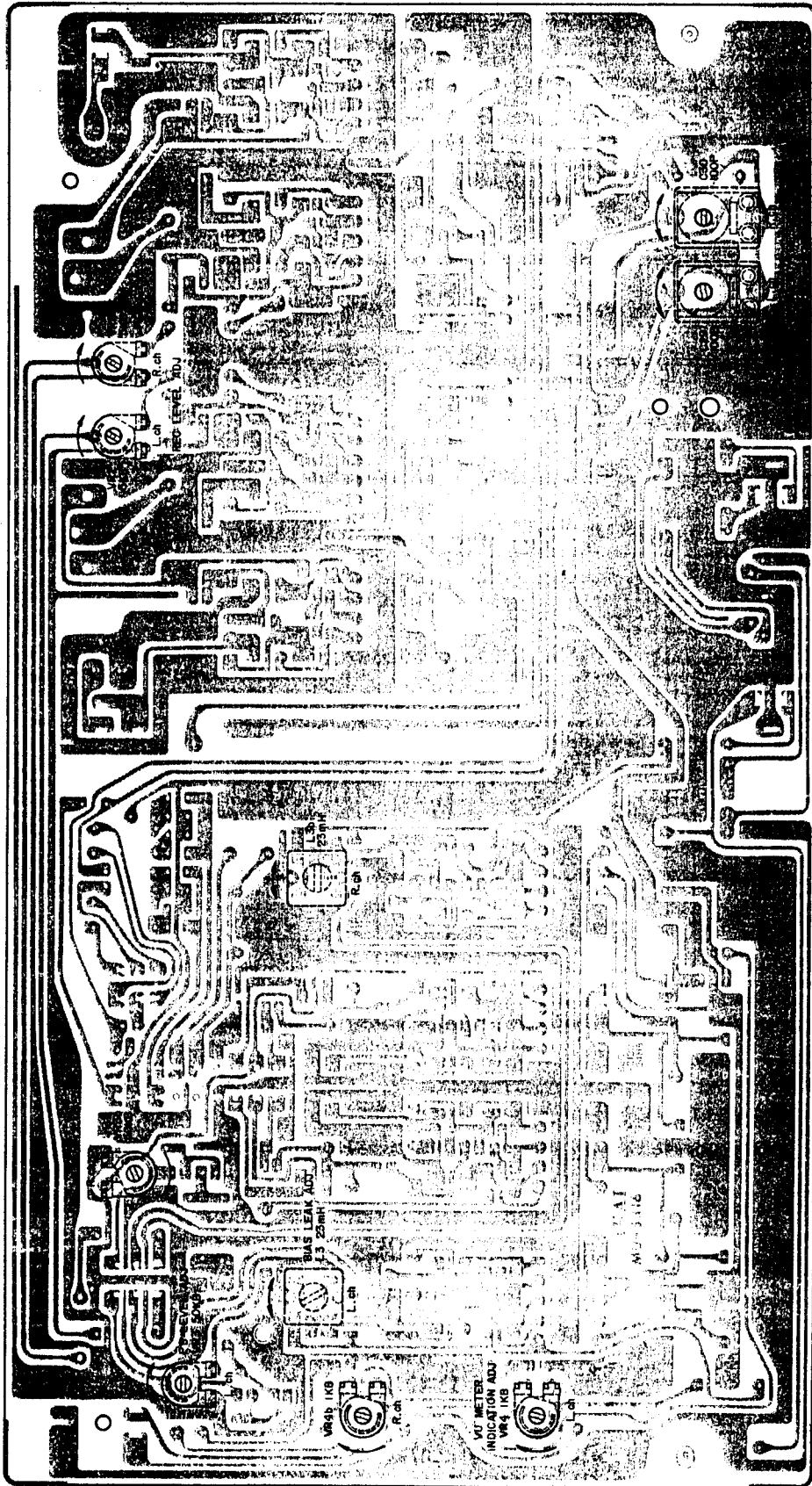


Fig. 9 Amp P.C Board MU-5316

4. Recording and Playback Amplifier Adjustment						
Step	Adjustment Item	Test Tape Supply Signal	Mode	Adjustment Point	Result	Remarks
1	Playback Level	700 Hz 7-1/2 ips Test Tape	FWD PLAY	VR3 50 kB (MU-5316)	0 dBm ±0.5 dB	+1.0 dB in relation to 0 dBm at RVS mode.
2	VU Meter Sensitivity	700 Hz 7-1/2 ips Test Tape	FWD PLAY	VR4 1 kB (MU-5316)	"0" VU indication	
3	Recording Level	SCOTCH #176 tape 1,000 Hz "0"VU recording	REC and PLAY	REC Volume VR1 50 kB	0 dBm ±0.5 dB	Monitor Switch to TAPE position and Tape Selector to LOW NOISE position.
		SCOTCH #176 tape 1,000 Hz "0"VU recording	REC and PLAY	VR2 5 kB (MU-5316)	0 dBm ±0.5 dB	Monitor Switch to SOURCE position and Tape Selector to LOW NOISE position.
4	Frequency Response	SCOTCH #176 tape 1,000 Hz, 10,000Hz -20 dBm recording	REC and PLAY	C29(Left) C30(Right) (MU-5316)	Adjust to +1 dB at 10,000 Hz in relation to 1,000 Hz	Tape Selector to LOW NOISE position and Tape Speed to 3-3/4 ips.
5	Bias Leak		REC	L3 23 mH (MU-5316)	Less than -30 dB	With Monitor Switch to TAPE and SOURCE positions.

5. DC Resistance of Various Coils

Part	Designation	DC Resistance
Main Motor	HM2-16MC	Between PNK-RED 130 ohms
		Between PNK-BRN 180 ohms
		Between GRN-GRY 360 ohms
		Between GRN-YLW 370 ohms
Reel Motor	24X0-MR	Between BLU-RED 47 ohms Between YLW-GRN 166 ohms
Reverse Solenoid Plunger	840FHT1 48V 220 ohms	220 ohms $\pm 15\%$
Relay	MY4-02-US DC24	660 ohms
Reed Relay	L-24	1,600 ohms
Headphone Output Transformer	N19-349S	Primary: 160 ohms $\pm 15\%$ Secondary: 0.64 ohms $\pm 15\%$
Oscillator Coil	OT-204	Between 1-3 0.3 ohms
		Between 4-6 0.7 ohms
		Between 7-9 8.2 ohms
Erase Head	E4-260	3.5 ohms
Recording Head	R4-240	6.2 ohms
Playback Head	P4-240	220 ohms

* Resistance values shown in this chart are average values.

6. Classification of Various P.C Boards

- 1) Amp P.C Board MU-5316
- 2) Track Selector P.C Board MU-5315
- 3) Power Supply P.C Board MU-5314
- 4) System Control P.C Board MU-1318

7. Basic Parts List

Parts No.	Designation	Note
BA272002	Syscon P.C Board Comp. MU-1318	U/T
BA272013	Syscon P.C Board Comp. MU-1318	CEE
BA272024	Syscon P.C Board Comp. MU-1318	CSA
BA272081	Amp P.C Board Comp. MU-5316	U/T
BA272698	Amp P.C Board Comp. MU-5316	CEE
BA272711	Amp P.C Board Comp. MU-5316	CSA
BA272092	Track Selector P.C Board Comp. MU-5315	
BA272182	Power Supply P.C Board Comp. MU-5314	
BC249164	Wood Frame MU-6308	
BF271934	Flywheel Block Comp.	
BM271912	Motor (HM2-16MC) Block Comp.	
BS271923	SW. Block Comp.	
BT249388	Power Trans. MUT-5	U/T
BT249401	Power Trans. MUT-7	CEE
BT249390	Power Trans. MUT-6	CSA
BR271945	Reel Table (L) Block Comp.	
BR271956	Reel Table (R) Block Comp.	
EC207898	Trimmer/C. TM-110 100PF	C29,C30(MU-5314)
ED249581	Diode SIQB20 0.8A 200V (Red)	D2 (MU-5314)
EL619064	Lamp(L/T) 24V 35 mA	1ND901
EM666450	VU Meter D18A68R	M901,M902
E0383365	OSC Coil OT-204	T1 (MU-5316)
EP249344	Reed Relay L24	RL1 (MU-5316)
EP249647	Plunger Solenoid SDC0840FHT1	SL901
EP638763	Relay MY4-0-US DC24V	L1 (MU-1318)
ES562465	Micro SW. K-1	SW905
ES479485	Slide SW. S-1	SW903
ES258467	Slide SW. SSB-022	SW904
ES258232	Slide SW. S-2930	SW1 (MU-1318)
ES249254	Push SW. SUE-12	SW1 (MU-5316)
ES249276	Push SW. SUE-24	SW2 (MU-5316)
ES224436	Push SW. JP01	U/T, CSA
ES242346	Push SW. JP17	CEE

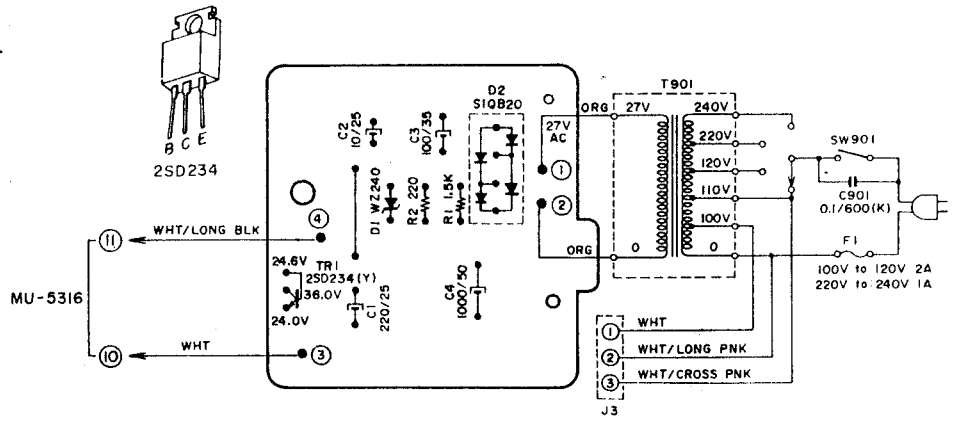
Parts No.	Designation	Note
EV249243	Vol. V24L52PHN6OR 15A 50k	VR1 (MU-5316)
HE563220	ERASE HEAD E4-260	
HP271978	PB HEAD P4-240	
HR271980	REC HEAD R4-240	
MB541012	Drive Belt (Flat) MC-1209	
MB247904	Counter Belt MU-1302	
MC259312	Counter MU-3	
MP271170	Pinch Roller LC-321	
SK249096	Mecha Knob MU-6303	
SK259345	Pause Knob (C) MR-612	
SK631056	Single Knob MY-6208	
SK264892	Selector Knob B CI-6020	
SK634410	Push Button Knob J 91-5051	
SR694888	Knob 3 CP-5019	
SP247408	Front Panel MU-6307	

8. List of Interchangeable Semiconductors

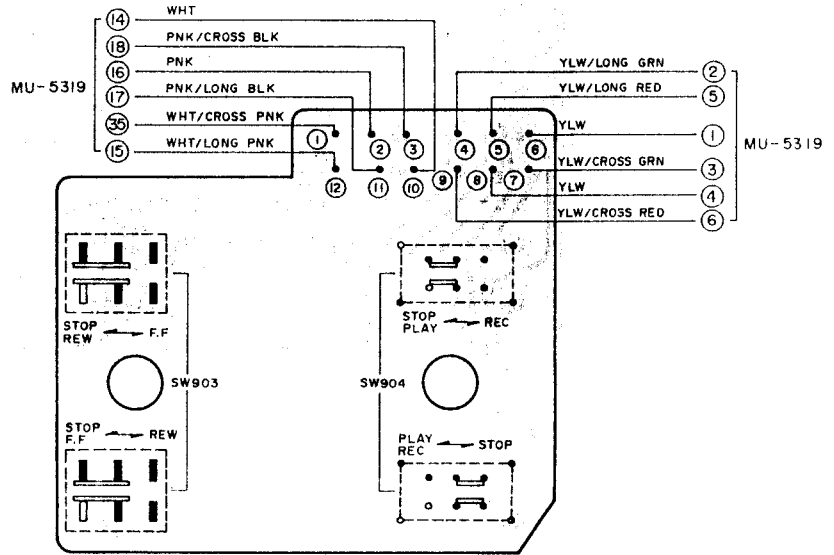
As for as service in concerned, in case the original parts cannot be obtained, the interchangeable parts listed below can be substituted.

Original Parts			Interchangeable Parts	
Description	Parts No.	Utilizing P.C Board	Description	Parts No.
2SC458LG(C)(D)	ET391768	MU-5316	2SC693U(F)(G)	ET429647
			2SC1000(BL)(GR)	ET622181
			2SC1312(F)(G)	ET539987
2SC945L(Q)(R)	ET635837	MU-5316	2SC536(E)(F)(G)(H)	ET246846
2SC945L(P)(Q)	ET639437	MU-1318	2SC711(E)(F)(G)(H)	ET619727
			2SC1641(Q)(R)(S)(E)	ET603843
2SC1312S(G)(H)	ET603257	MU-5316	2SC458LG(C)(D)	ET391768
2SD234(Y)	ET242390	MU-5314	2SD313(D)(E)(F)	ET522911
			2SC1060(B)(C)	ET393614
1N34A	ED219464	MU-5316	1S188AM	ED562386
			1N60	ED428204
1S2473	ED624903	MU-5316	1S1588	ED557447
1S2473VE	ED560913	MU-1318	WG599	ED514721
1OD4	ED224550	MU-1318	1N4004	ED570273
1OD2	ED224548		1N4003	ED570295
0.8A 200V	ED249581	MU-5314		
WZ240	ED511918	MU-5314	RD24A	ED229072
			RD24A(MN)	ED315415
GL-3AR1	ED249377	MU-5318		

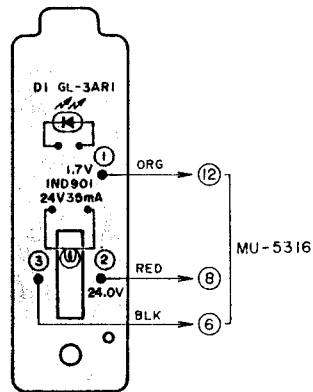
**POWER SUPPLY
P.C BOARD MU-5314**



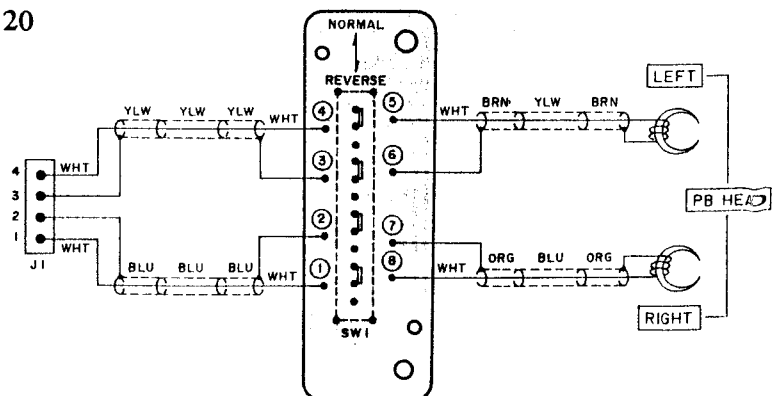
SWITCH P.C BOARD MU-1319



LAMP P.C BOARD MU-5313



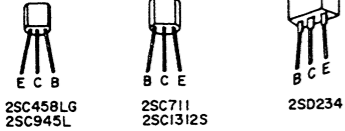
HEAD SWITCH P.C BOARD MU-1320



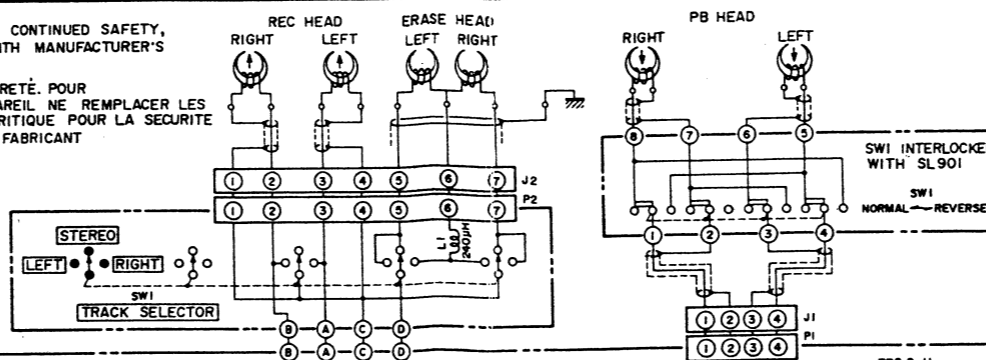
WARNING: Δ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSEMENT: Δ IL INDIQUE LES COMPOSANTS CRITIQUES DE SÛRETÉ. POUR MAINTENIR LE DEGRÉ DE SÛRETÉ DE L'APPAREIL, NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SÛRETÉ QUE PAR DES PIÈCES RECOMMANDÉES PAR LE FABRICANT

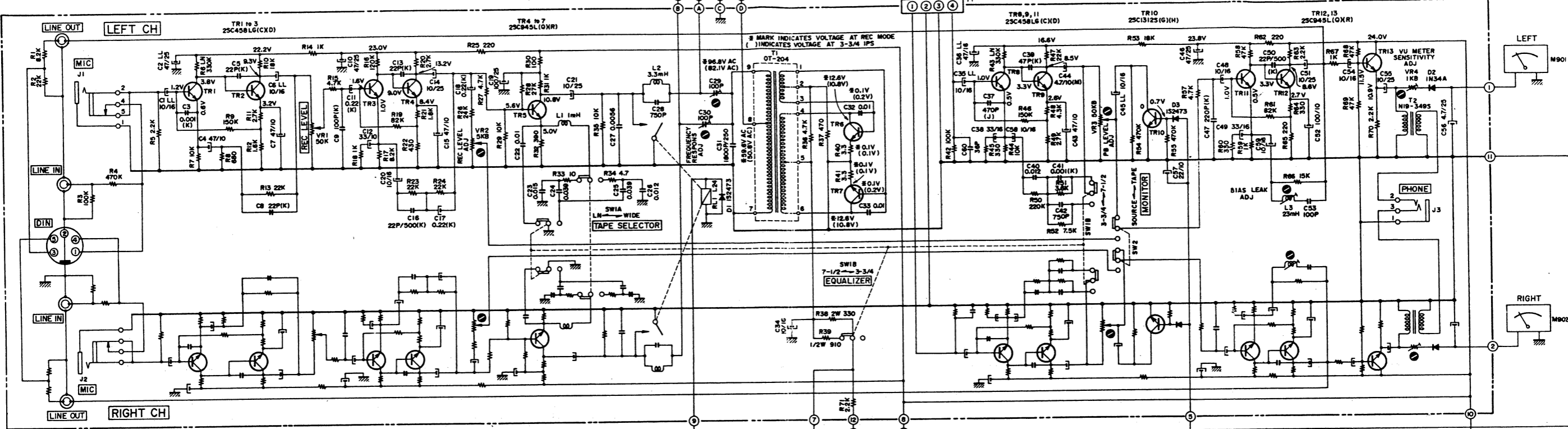
NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN μ F 50WV(J)
P = μ F
LN INDICATES LOW NOISE RESISTOR
LL INDICATES LOW LEAKAGE CAPACITORS
POWER TRANSFORMER IS DIFFERENT ACCORDING TO AREA



TRACK SELECTOR PC BOARD MU-5315

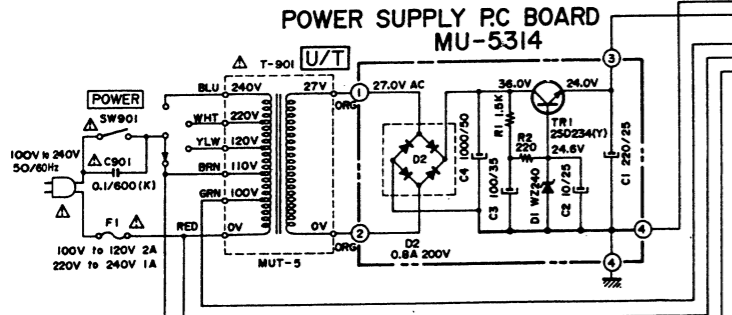


HEAD SWITCH PC BOARD MU-1320



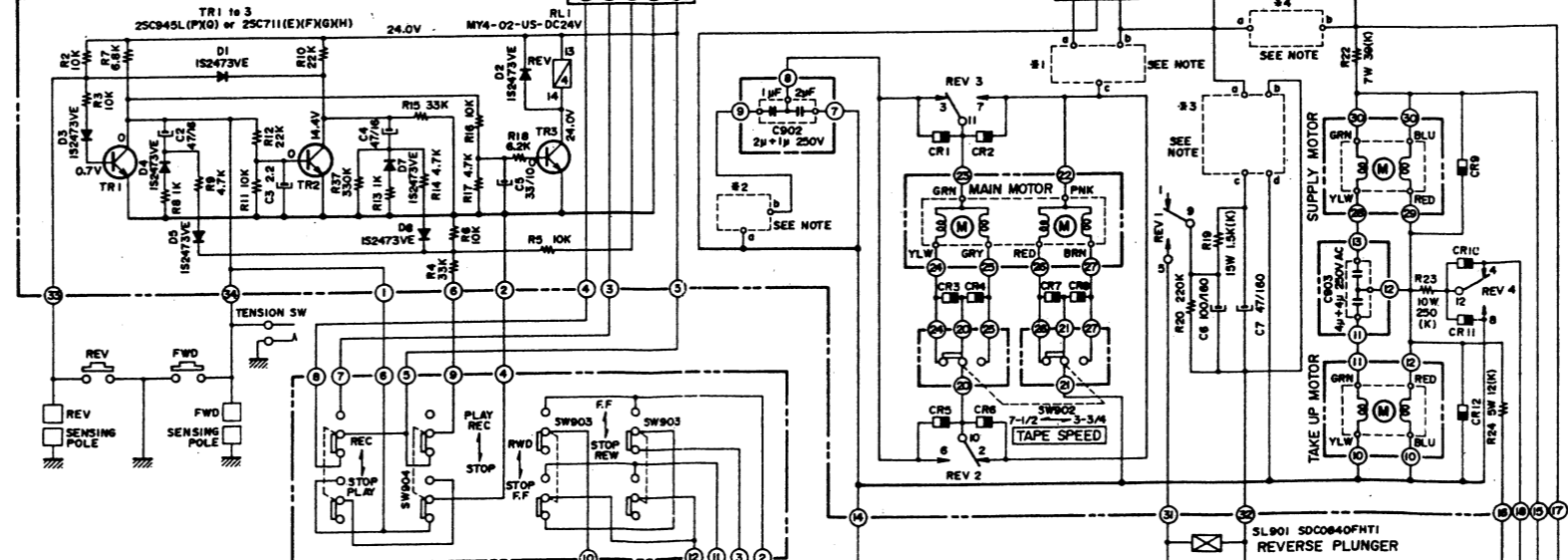
AMP PC BOARD MU-5316

LAMP PC BOARD MU-5313

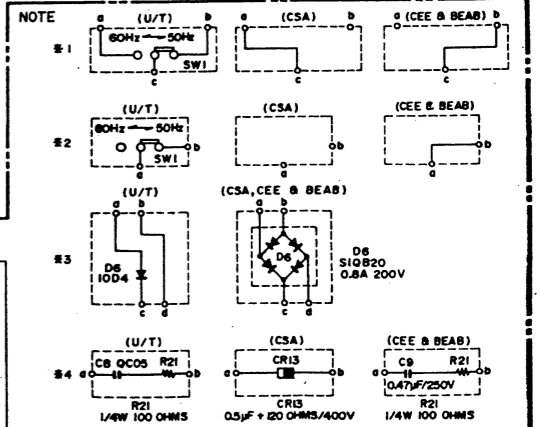
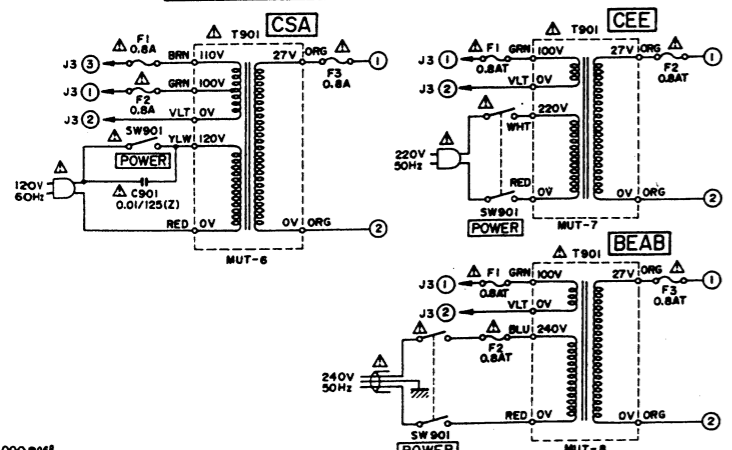


POWER SUPPLY PC BOARD MU-5314

SYSTEM CONTROL PC BOARD MU-1318



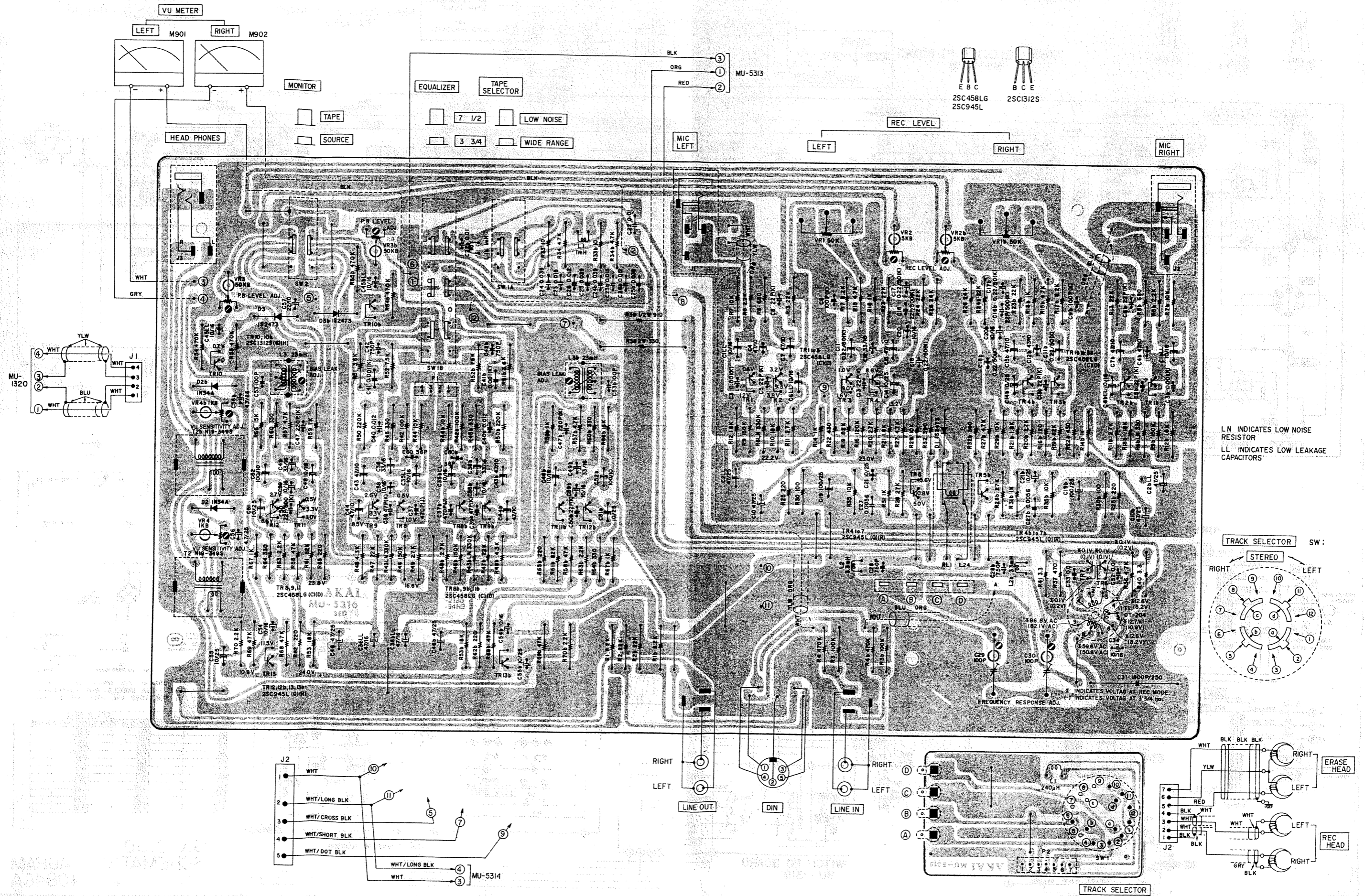
SWITCH PC BOARD MU-1319



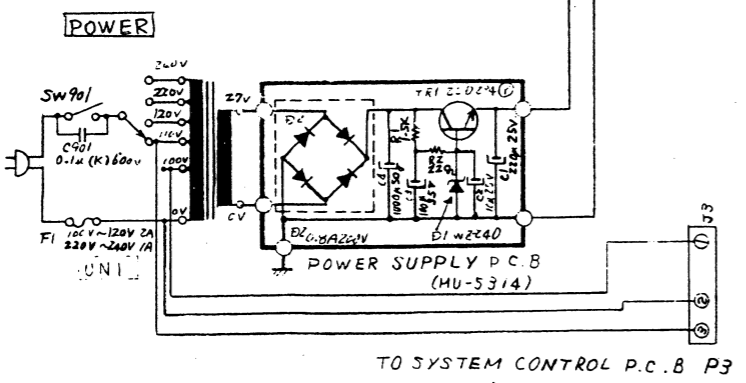
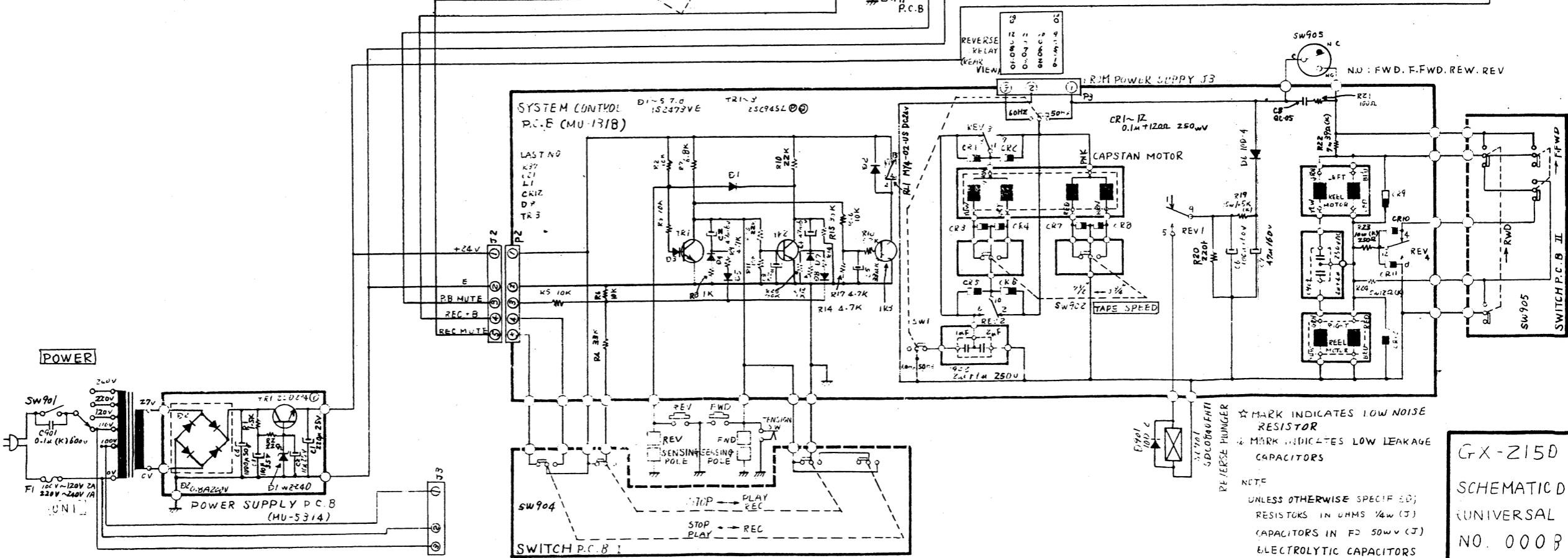
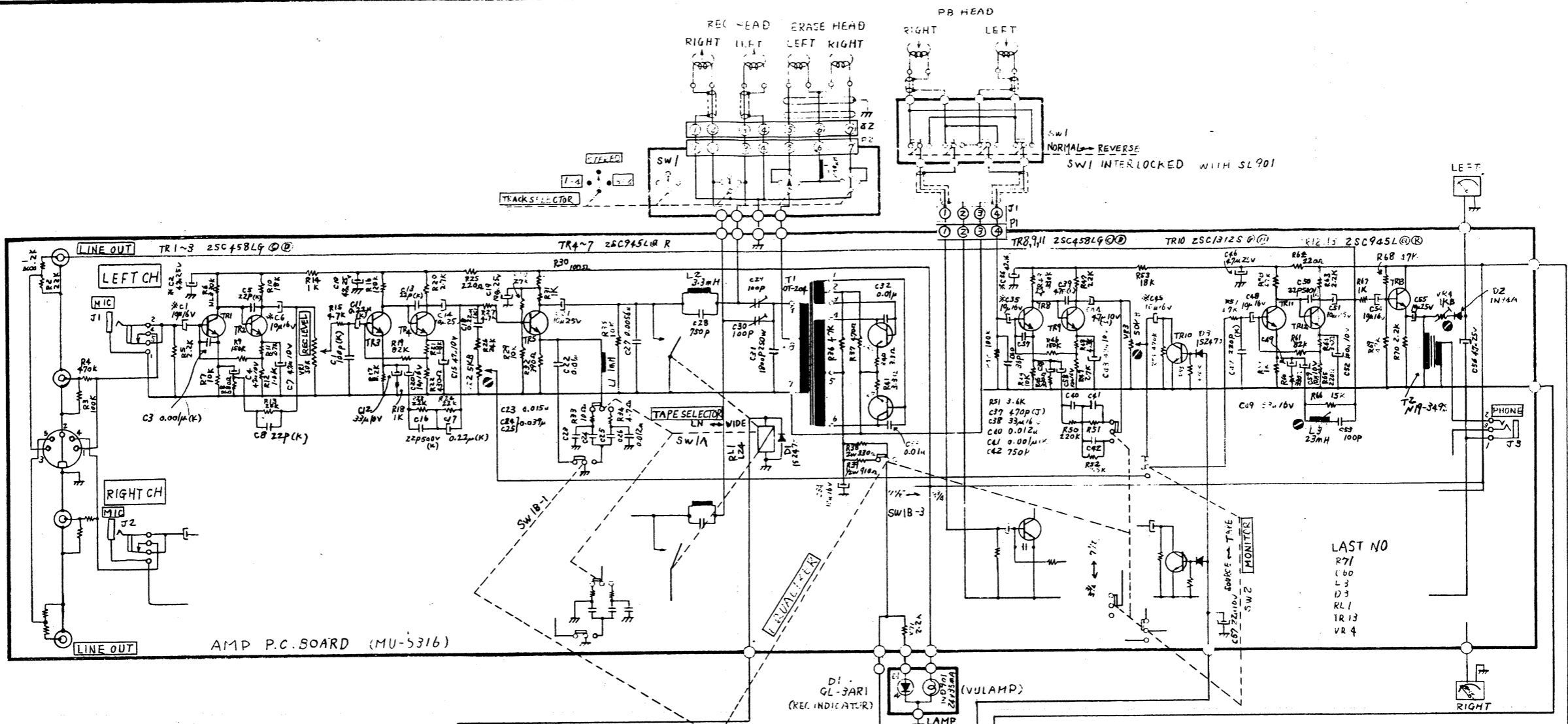
REGARDING CR1 THROUGH CR12, SPARK QUENCHERS ARE USED FOR U/T AND CSA MODELS, AND INDEPENDENT CAPACITORS AND RESISTORS ARE USED FOR CEE AND BEAB MODELS

U/T & CSA		CEE & BEAB	
CR1	C10 0.1 μ F + 120 OHMS 250V	C10 0.1 μ F/250V AC	R25 1/4W 120 OHMS
CR2	C11	R26	
CR3	C12	R27	
CR4	C13	R28	
CR5	C14	R29	
CR6	C15	R30	
CR7	C16	R31	
CR8	C17	R32	
CR9	C18	R33	
CR10	C19	R34	
CR11	C20	R35	
CR12	C21	R36	

COMPOSITION OF VARIOUS P.C BOARDS
 AMP. P.C BOARD MU-5316 & TRACK SELECTOR P.C BOARD MU-5315

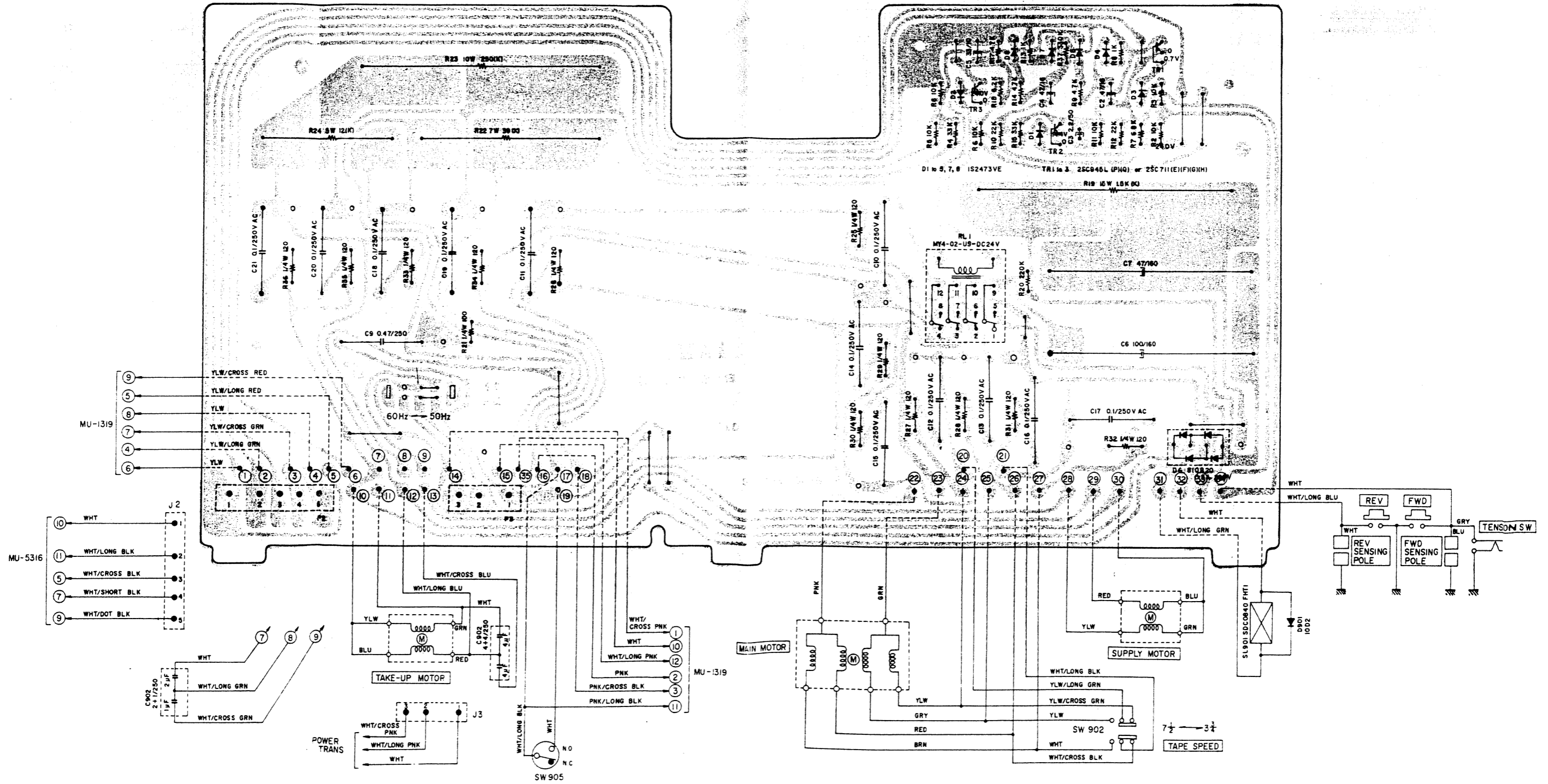
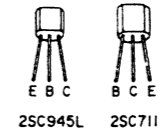


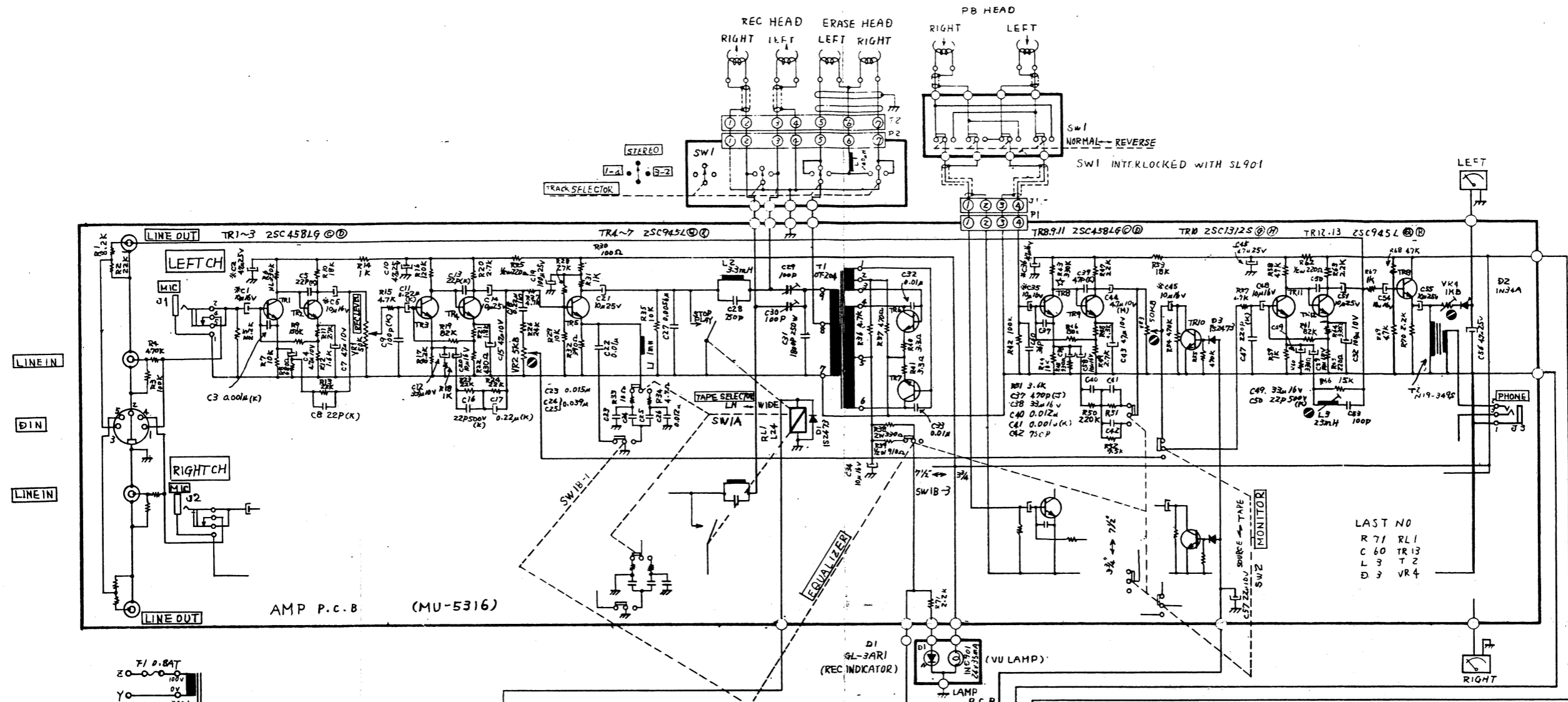
MANUAL TRACKER
 A00-304



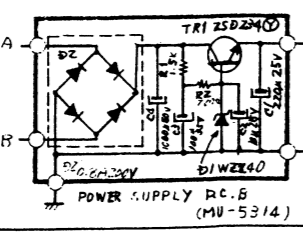
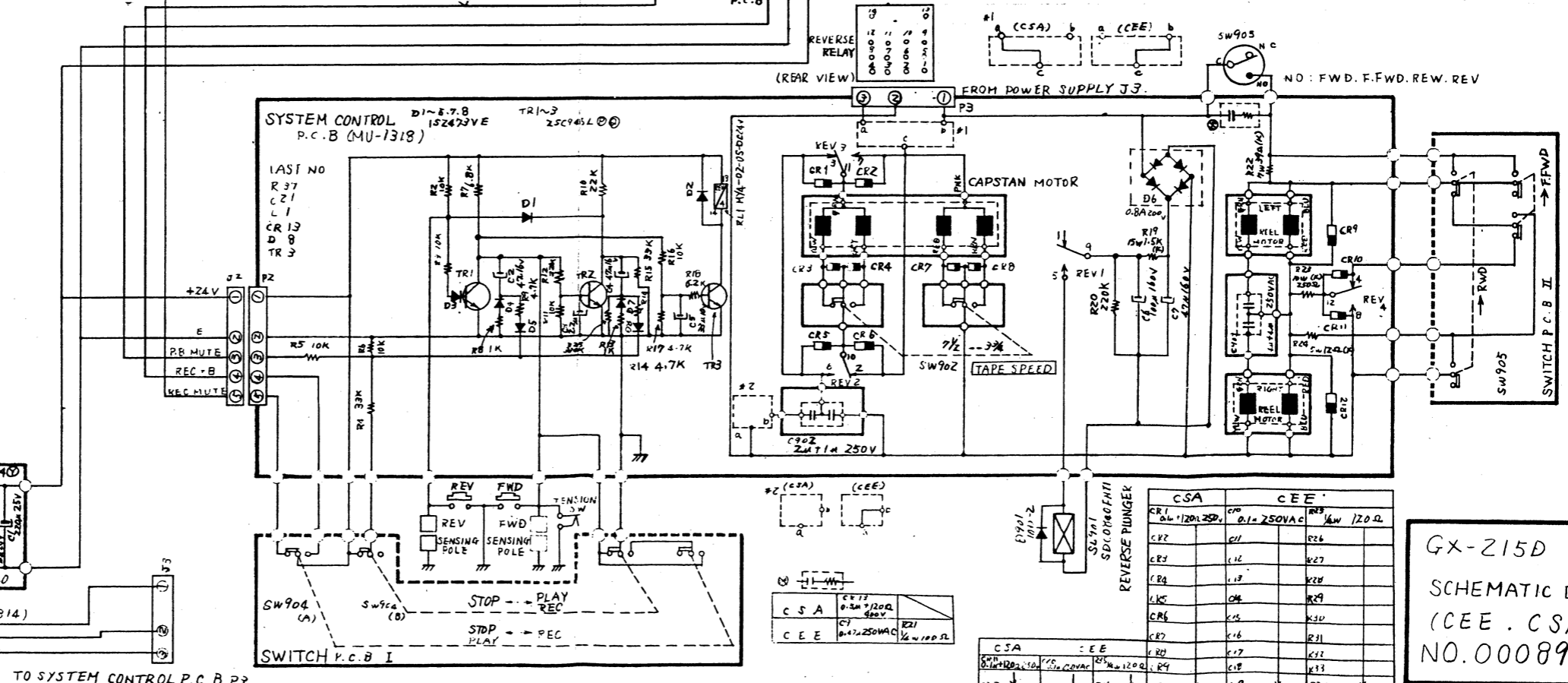
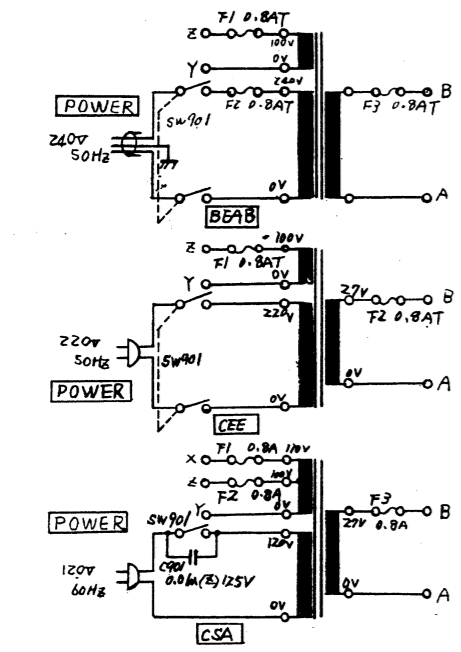
GX-2150
 SCHEMATIC DIAGRAM
 (UNIVERSAL TYPE)
 NO. 000896A

SYSTEM CONTROL P.C BOARD MU-1318 (CEE)





* MARK INDICATES LOW NOISE RESISTOR
 * MARK INDICATES LOW LEAKAGE CAPACITORS
 NOTE
 UNLESS OTHERWISE SPECIFIED:
 RESISTORS IN OHMS 1/4W (T)
 CAPACITORS IN FD 50WV (J)
 ELECTROLYTIC CAPACITORS
 (-E) IN FD 50WV



CSA	CR1	0.5M 120V	CR2	0.5M 120V
CEE	CR3	0.5M 120V	CR4	0.5M 120V
	CR5	0.5M 120V	CR6	0.5M 120V
	CR7	0.5M 120V	CR8	0.5M 120V
	CR9	0.5M 120V	CR10	0.5M 120V

CSA	CEE
CR1	CR1
CR2	CR2
CR3	CR3
CR4	CR4
CR5	CR5
CR6	CR6
CR7	CR7
CR8	CR8
CR9	CR9
CR10	CR10

GX-215D
 SCHEMATIC DIAGRAM
 (CEE, CSA TYPE)
 NO. 000897 A

TO SYSTEM CONTROL P.C.B P3