

The Harman Kardon Model hk200xm

Stereo Cassette Deck

Technical Manual

harman/kardon

PRECAUTIONS

1. Always disconnect the chassis from power line when soldering. Turning the power switch OFF is not enough. Power line leakage passing through the heating element may destroy the transistors.
2. Never attempt to do any work on the transistor amplifiers without first disconnecting the AC line cord and waiting until the power supply filter capacitors have discharged.
3. Replacement for output and driver transistors, if necessary, must be made from the same beta group as the original type.
4. If one output transistor burns out (open or short) always remove all the output transistors in that channel and check the bias adjustment, the control and other parts in the network with an ohmmeter before inserting a new transistor. All transistors in one channel will be destroyed if the base biasing circuit is open on the emitter end.
5. When mounting a replacement power transistor, be sure that the bottom of the flange, the mica insulators and the surface of the heat sink are free of foreign matter, for they may cause transistor failure.
6. Silicon grease must be applied between the transistor and the mica insulator, and between the mica insulator and the heat sink for better heat conduction.
7. Fuses must be replaced with size and type indicated. Use of other types can expose components to destructive current levels.

ALIGNMENT PROCEDURES

General Conditions (unless otherwise noted)

1. Tape Select Switch is LN position.
2. Dolby NR Switch is OFF position.
3. Dolby HX Switch is OFF position.
4. MPX Filter Switch is OFF position.
5. Input Selector Switch is LINE position.
6. Input Level Controls at maximum.
7. Output Level Control at maximum.
8. Bias Fine Trim Control at center.
9. Connect 10 k ohm (1/4W) carbon resistors across both left and right line output jacks.

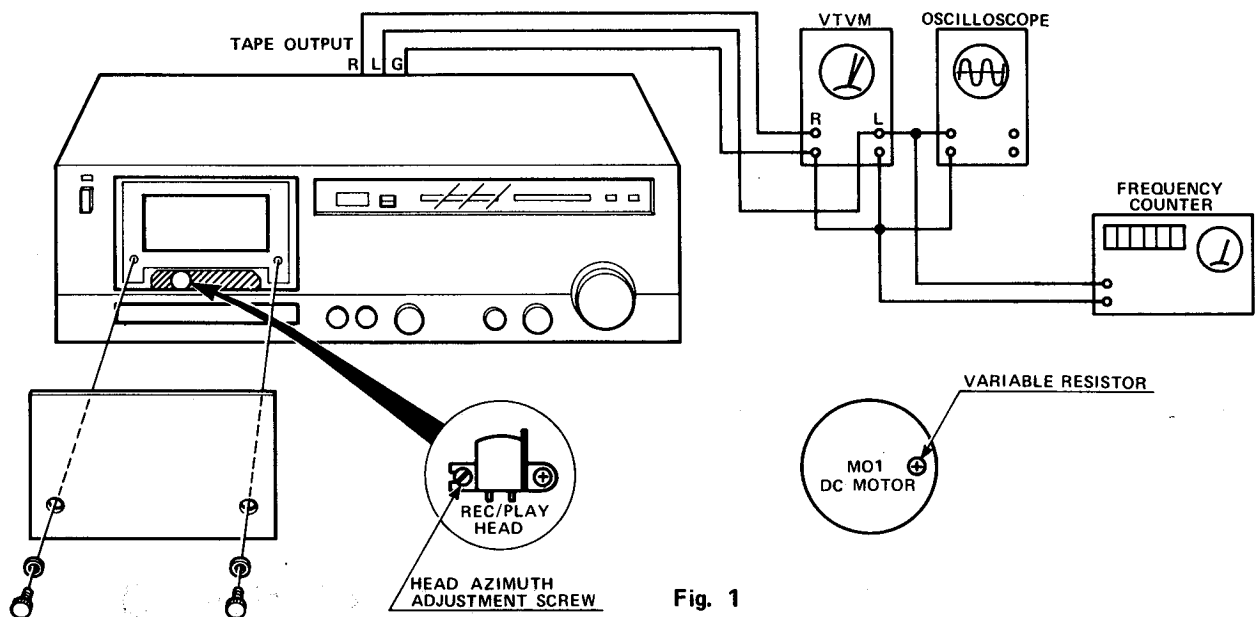


Fig. 1

Noise Reduction System and Headroom Extension System manufactured under license from Dolby Laboratories Licensing Corporation. Dolby and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.

ALIGNMENT PROCEDURES

HEAD AZIMUTH ADJUSTMENT

Equipment Required: Dual Channel AC V.T.V.M. and 10 kHz Test Tape (TEAC MTT-114)

1. Connect dual channel AC V.T.V.M. to TP3 (left), TP2 (right) and TP1 (ground).
2. Play back the "A" side of the test tape and adjust Head Azimuth Adjustment Screw so that the output indicated by the V.T.V.M. will be maximum and the difference of output between left and right becomes less than 1 dB.
3. Play back the "B" side of the test tape and adjust Head Azimuth Adjustment Screw for maximum output.
4. Repeat steps 2 and 3, and adjust Head Azimuth Adjustment Screw until the difference of outputs from side "A" and side "B" becomes less than 1 dB.

TAPE SPEED ADJUSTMENT

Equipment Required: Frequency Counter and 3 kHz Test Tape (TEAC MTT-111D)

1. Connect frequency counter to TP3 (or TP2) and TP1 (ground).
2. Play back the test tape and adjust the variable resistor built in the DC motor for 3 kHz $\pm 1\%$.

PLAYBACK AMP LEVEL ADJUSTMENT

Equipment Required: Dual Channel AC V.T.V.M. and Test Tape (TEAC MTT-150)

1. Connect dual channel AC V.T.V.M. to TP3 (left), TP2 (right) and TP1 (ground).
2. Play back the test tape and adjust VR103 (left) and VR104 (right) so that the output will be 580 mV +0.5 dB -0 dB.

PLAYBACK EQUALIZER FREQUENCY CHARACTERISTIC ADJUSTMENT

Equipment Required: Dual Channel AC V.T.V.M. and Test Tape (TEAC MTT-316)

1. Set tape select switch to FeCr position.
2. Connect dual channel AC V.T.V.M. to TP3 (left), TP2 (right) and TP1 (ground).
3. Play back the test tape and adjust VR101 (left), VR102 (right) so that the playback frequency response is within the range as shown in Fig. 2.

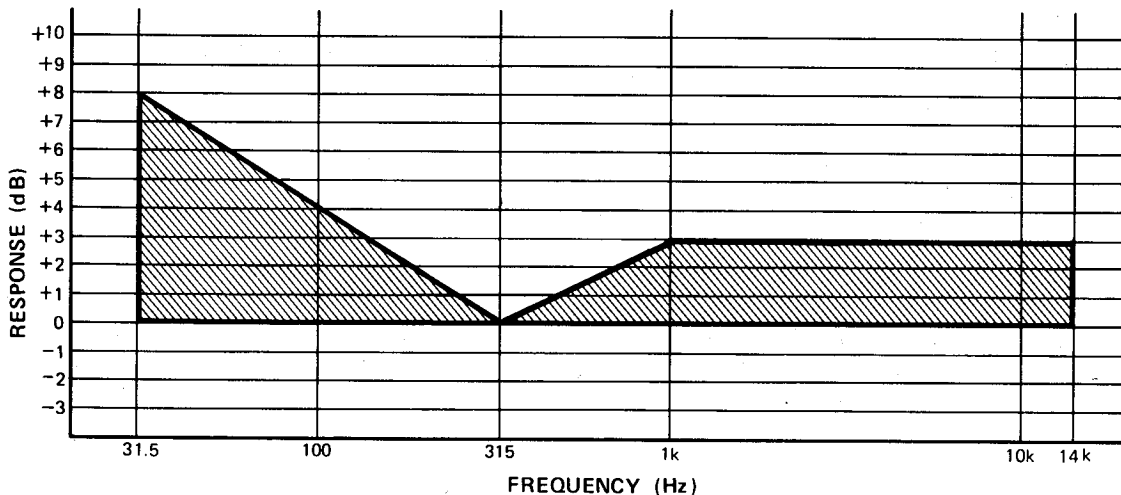


Fig. 2

ALIGNMENT PROCEDURES

RECORD BIAS TRAP ADJUSTMENT

Equipment Required: Frequency Counter and Dual Channel AC V.T.V.M.

1. Set tape select switch to METAL position.
2. Connect frequency counter and AC V.T.V.M. to TP9 and TP8 (ground).
3. Place unit in record mode.
4. Confirm that bias frequency is within the 105 kHz \pm 5 kHz.
5. Connect dual channel AC V.T.V.M. to TP7 (left), TP6 (right) and TP8 (ground).
6. Place unit in record mode.
7. Adjust L303, L305 (left) and L304, L306 (right) so that the output becomes minimum.

RECORD BIAS LEVEL ADJUSTMENT

Equipment Required: Audio Signal Generator, Distortion Meter, Two Dual Channel AC V.T.V.M. (1 and 2) and a Normal Blank Test Tape (TDK AC-222)

1. Connect dual channel AC V.T.V.M. 1 to TP5 (left), TP4 (right) and TP10 (ground), and connect dual channel AC V.T.V.M. 2 and distortion meter to TP3 (left), TP2 (right) and TP1 (ground).
2. Connect audio signal generator to both left and right line input jacks. Set the generator for a 1 kHz signal. Place unit in record mode. Adjust generator input level for an output on the V.T.V.M. 2 of 580 mV.
3. Vary the bias level as read on the V.T.V.M. 1 of 42 mV, with VR601 and record on a blank test tape.
4. Play back the test tape and read the 1.3% on distortion meter.
5. If the above distortion is not obtained, adjust VR601 slightly. Repeat steps 3 and 4 until distortion on the distortion meter is adjusted 1.3%.
6. Keep note of the bias level on V.T.V.M. 1 at the time.
7. Place unit in record mode.
8. Set tape select switch to METAL position.
9. Adjust TC601 (left) and TC602 (right) so that the bias level becomes +8.8 dB of level obtained at step 6 on V.T.V.M. 1.
10. Set tape select switch to LN position.
11. Adjust VR601 so that the bias level becomes same level obtained at step 6 on V.T.V.M. 1.
12. Set tape select switch to FeCr position.
13. Adjust VR602 so that the bias level becomes +1.8 dB of level obtained at step 6.
14. Set tape select switch to CrO₂ position.
15. Adjust VR603 so that the bias level becomes +2.5 dB of level obtained at step 6.

RECORD/PLAYBACK LEVEL ADJUSTMENT

Equipment Required: Audio Signal Generator, Dual Channel AC V.T.V.M. and a Normal (TDK AC-222), FeCr (SONY CS-30), CrO₂ (TDK AC-512) and Metal (SCOTCH M-1) Blank Test Tapes

1. Connect dual channel AC V.T.V.M. to TP3 (left), TP2 (right) and TP1 (ground).
2. Connect audio signal generator to both left and right line input jacks.
3. Set tape select switch to METAL position.
4. Set the generator for a 400 Hz signal. Place unit in record mode. Adjust generator input level for an output on the V.T.V.M. of 580 mV -10 dB.
5. Recording this signal on the metal blank test tape and playing it, adjust VR307 (left) and VR308 (right) by repeating record and playback so that the output on V.T.V.M. becomes 580 mV -10 dB \pm 0.5 dB.
6. Adjust VR301 (left) and VR302 (right) for LN position as it is with METAL position by using normal test tape.
7. Adjust VR303 (left) and VR304 (right) for FeCr position as it is with METAL position by using FeCr test tape.
8. Adjust VR305 (left) and VR306 (right) for CrO₂ position as it is with METAL position by using CrO₂ test tape.

ALIGNMENT PROCEDURES

RECORD/PLAYBACK EQUALIZER FREQUENCY CHARACTERISTIC ADJUSTMENT

Equipment Required: Audio Signal Generator, Two Dual Channel AC V.T.V.M. (1 and 2) and a Normal, FeCr, CrO₂ and Metal Blank Test Tapes

1. Connect dual channel AC V.T.V.M. 1 to TP3 (left), TP2 (right) and TP1 (ground), and connect dual channel AC V.T.V.M. 2 to both left and right line output jacks.
2. Connect audio signal generator to both left and right line input jacks.
3. Set tape select switch to METAL position and Dolby NR switch to OFF position.
4. Adjust the generator input level for an output on V.T.V.M. 1 of 580 mV – 25 dB, when the unit is in recording mode.
5. Record the signal from generator on to a metal blank test tape varying the generator frequency from 20 Hz to 30 kHz.
6. Play back the metal tape recorded above, note the frequency response obtained on the V.T.V.M. 2 and compare to Fig. 3.
7. If the above frequency response is not within the shaded DOLBY-NR OFF area on Fig. 3, adjust VR315 (left), VR316 (right), L301 (left peaking) and L302 (right peaking) slightly. Repeat steps 5 and 6 until playback frequency response on the V.T.V.M. 2 is adjusted within the DOLBY-NR OFF range as shown in Fig. 3.
8. Set Dolby NR switch to ON position and check if frequency response is within range of DOLBY-NR ON section of Fig. 3, if not repeat DOLBY-NR OFF procedures.

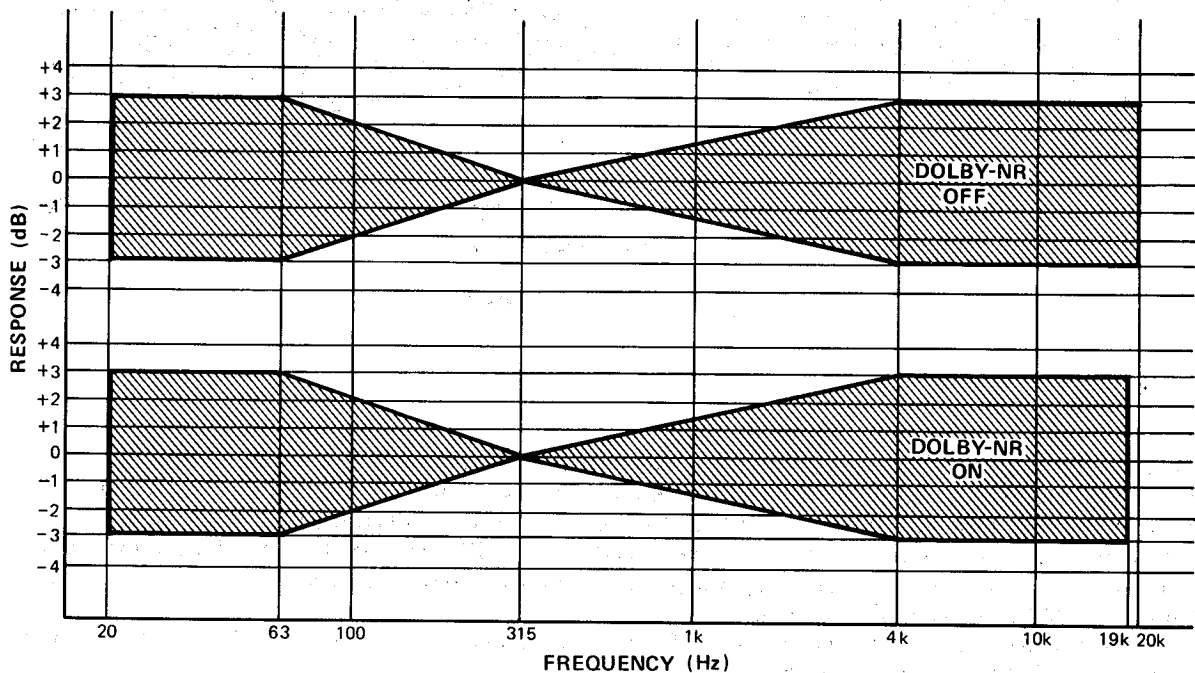


Fig. 3 – Metal

9. Set tape select switch to LN position and Dolby NR switch to OFF position.
10. Record the signal from generator on to a normal blank test tape varying the generator frequency from 20 Hz to 30 kHz.
11. Play back the normal tape recorded above and note the frequency response obtained on the V.T.V.M. 2.
12. If the above frequency response is not within the shaded DOLBY-NR OFF area of Fig. 4, adjust VR309 (left) and VR310 (right) slightly. Repeat steps 10 and 11 until playback frequency response on the V.T.V.M. 2 is adjusted within the DOLBY-NR OFF range as shown in Fig. 4.

ALIGNMENT PROCEDURES

13. Set Dolby NR switch to ON position and check if frequency response is within range of DOLBY-NR ON section of Fig. 4, if not repeat DOLBY-NR OFF procedures.

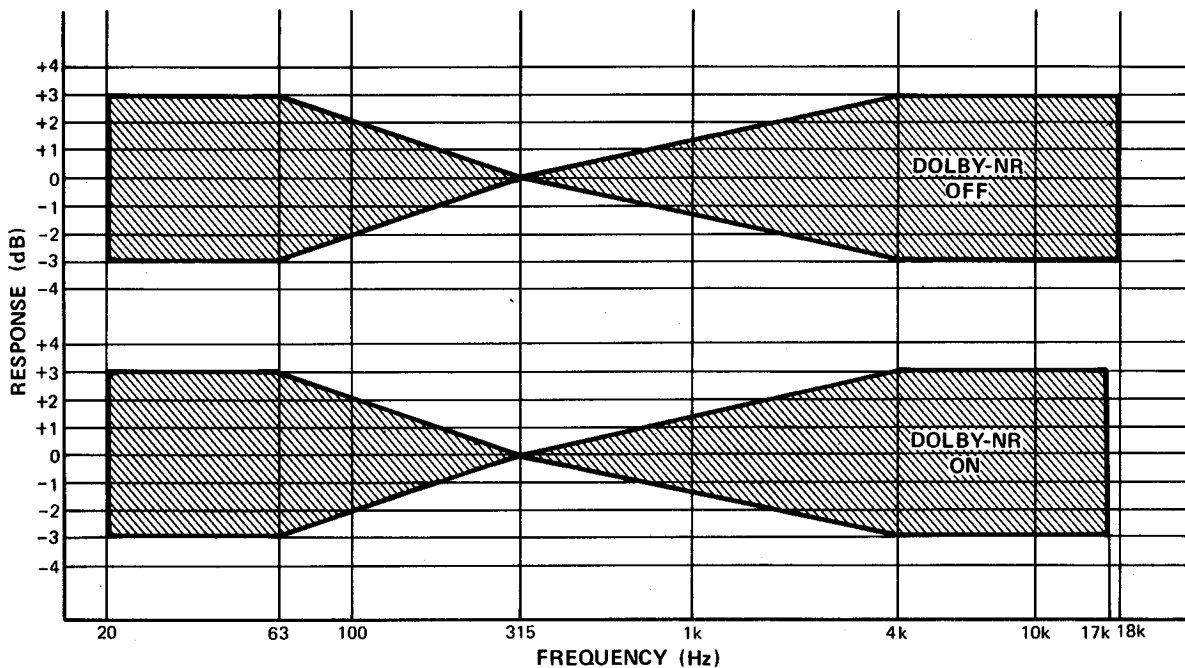


Fig. 4 – Low Noise

14. Set tape select switch to FeCr position and Dolby NR switch to OFF position.
15. Record the signal from generator on to a FeCr blank test tape varying the generator frequency from 20 Hz to 30 kHz.
16. Play back the FeCr tape recorded above and note the frequency response obtained on the V.T.V.M. 2.
17. If the above frequency response is not within the shaded DOLBY-NR OFF area of Fig. 5, adjust VR311 (left) and VR312 (right) slightly. Repeat steps 15 and 16 until playback frequency response on the V.T.V.M. 2 is adjusted within the DOLBY-NR OFF range as shown in Fig. 5.
18. Set Dolby NR switch to ON position and check if frequency response is within range of DOLBY-NR ON section of Fig. 5, if not repeat DOLBY-NR OFF procedures.
19. Set tape select switch to CrO₂ position and Dolby NR switch to OFF position.
20. Record the signal from generator on to a CrO₂ blank test tape varying the generator frequency from 20 Hz to 30 kHz.
21. Play back the CrO₂ tape recorded above and note the frequency response obtained on the V.T.V.M. 2.
22. If the above frequency response is not within the shaded DOLBY-NR OFF area of Fig. 5, adjust VR313 (left) and VR314 (right) slightly. Repeat steps 20 and 21 until playback frequency response on the V.T.V.M. 2 is adjusted within the DOLBY-NR OFF range as shown in Fig. 5.
23. Set Dolby NR switch to ON position and check if frequency response is within range of DOLBY-NR ON section of Fig. 5, if not repeat DOLBY-NR OFF procedures.

ALIGNMENT PROCEDURES

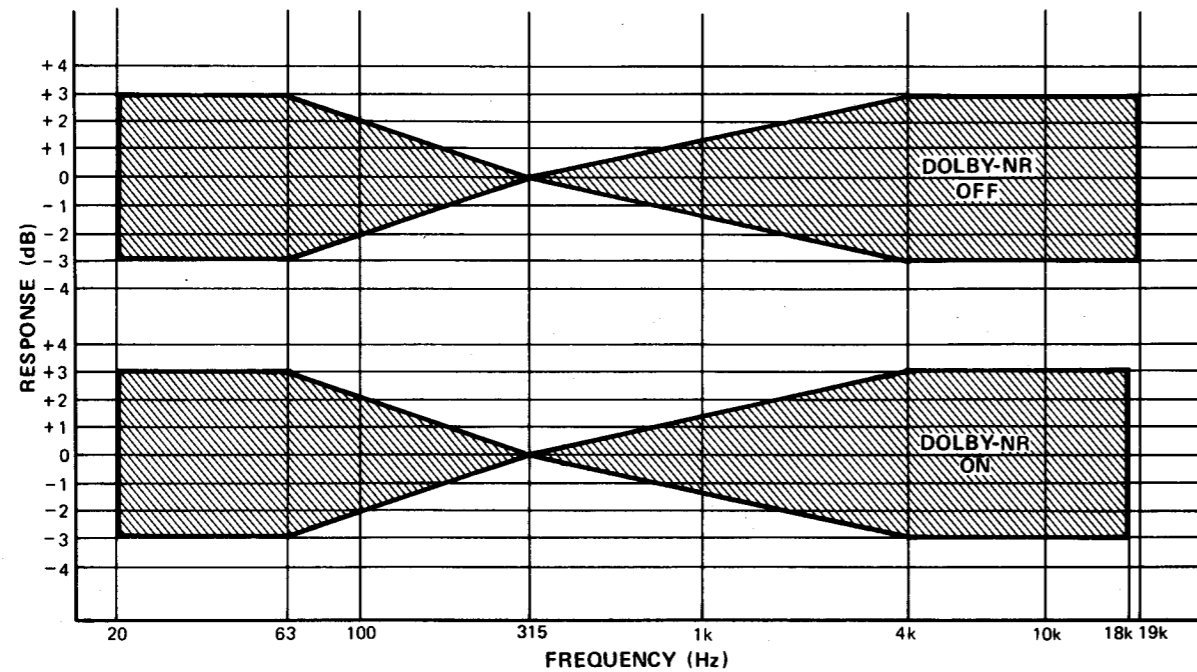


Fig. 5 - FeCr & CrO₂

DOLBY HX THRESHOLD ADJUSTMENT

Equipment Required: Audio Signal Generator and Two Dual Channel AC V.T.V.M. (1 and 2)

1. Connect dual channel AC V.T.V.M. 1 to TP5 (left), TP4 (right) and TP10 (ground), and connect dual channel AC V.T.V.M. 2 to TP3 (left), TP2 (right) and TP1 (ground).
2. Connect audio signal generator to both left and right line input jacks. Set the generator for a 3 kHz signal. Place unit in record mode. Adjust the generator input level for an output on V.T.V.M. 2 of 580 mV.
3. Setting Dolby HX switch to ON, adjust VR501 so that the output on V.T.V.M. 1 becomes -1.8 dB of bias level obtained at Record Bias Level Adjustment instructions.
4. Adjust VR502 for FeCr position as it is with LN position.
5. Adjust VR503 for CrO₂ position as it is with LN position.
6. Adjust VR504 for METAL position as it is with LN position.

PEAK LEVEL DISPLAY SENSITIVITY ADJUSTMENT

Equipment Required: Audio Signal Generator and Dual Channel AC V.T.V.M.

1. Connect dual channel AC V.T.V.M. to TP3 (left), TP2 (right) and TP1 (ground).
2. Connect audio signal generator to both left and right line input jacks. Set the generator for a 400 Hz signal. Place unit in record mode. Adjust generator input level for an output on the V.T.V.M. of 580 mV -20 dB.
3. Adjust VR701 (left) and VR702 (right) so that the 0 dB LEDs will light.
4. Adjust generator input level for an output on the V.T.V.M. of 580 mV -20 dB.
5. Adjust VR703 (left) and VR704 (right) so that the -20 dB LEDs will light.
6. Repeat steps 3 and 5 for best sensitivity.

ALIGNMENT PROCEDURES

PINCH ROLLER TENSION ADJUSTMENT

Bend the adjustment point hooked by spring in the arrow directions so that the tension by pinch roller may be 390g \pm 30g when keeping apart pinch roller from capstan (about 0.5 mm) and returning it to rotate. (Fig. 6)

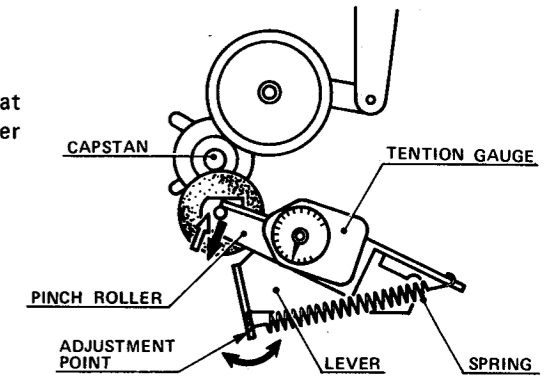


Fig. 6

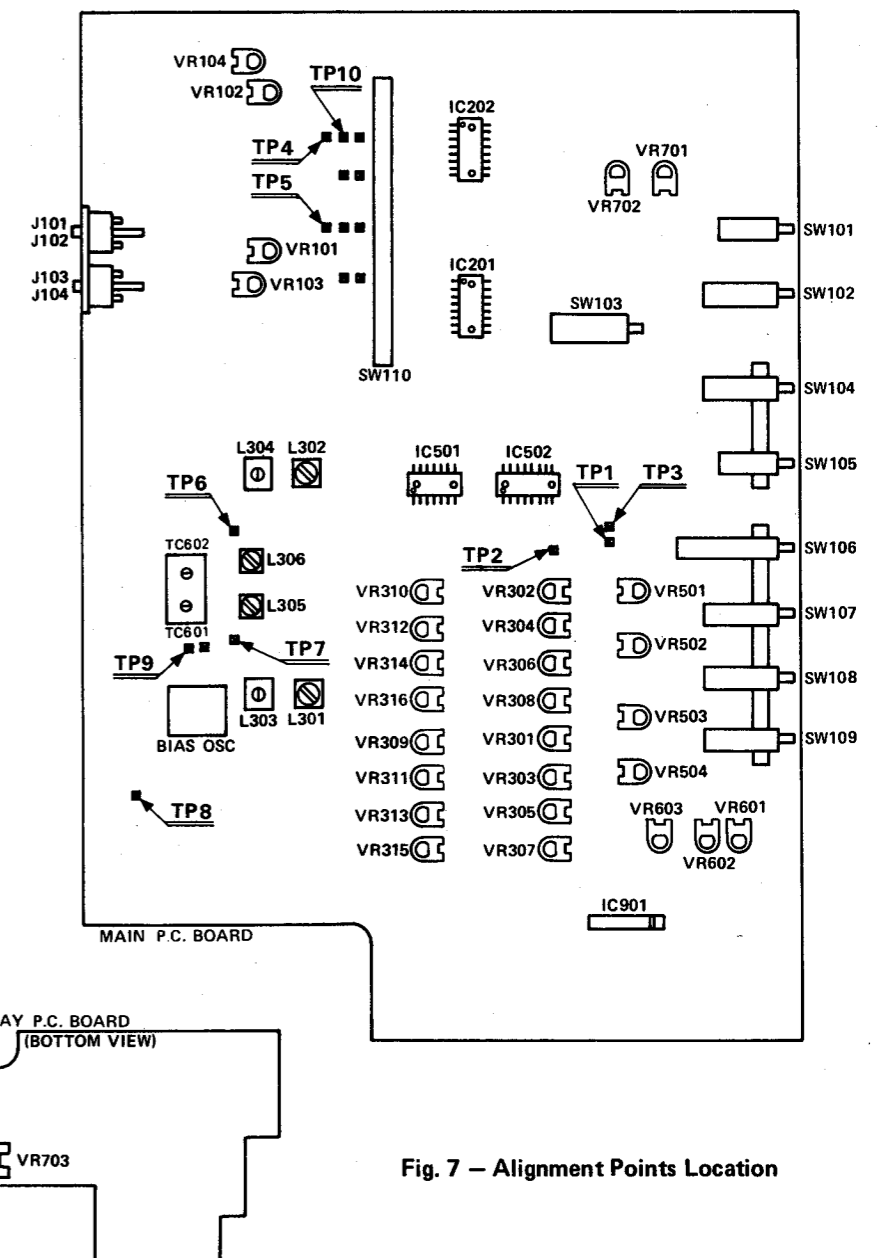


Fig. 7 - Alignment Points Location

ALIGNMENT PROCEDURES

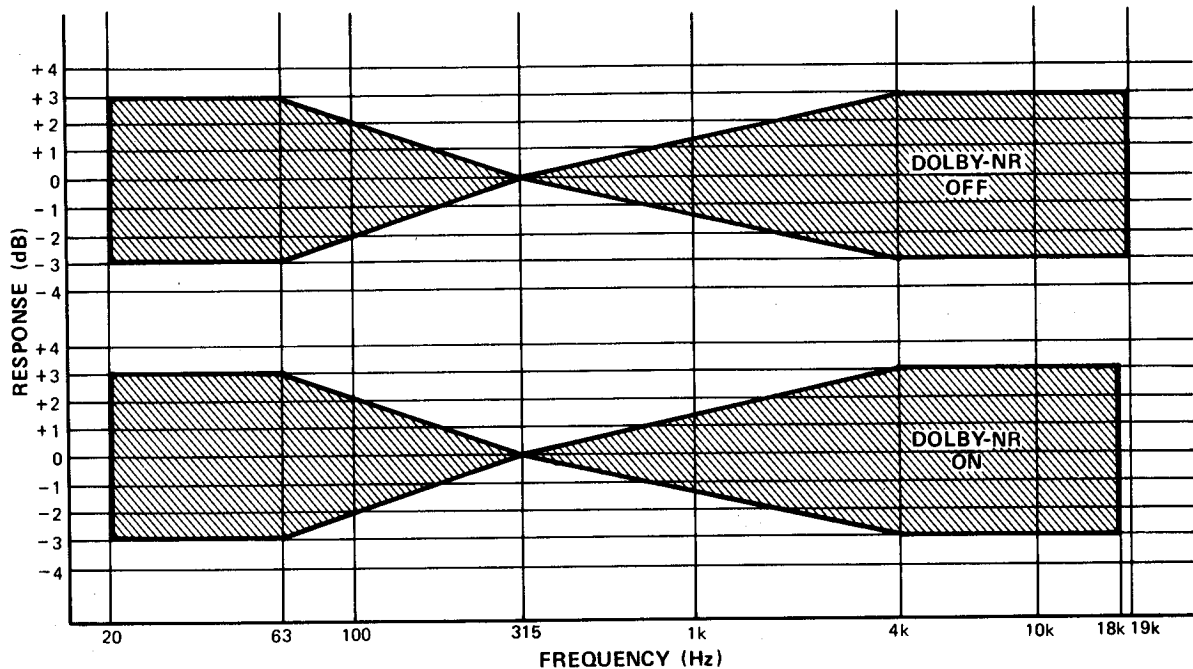


Fig. 5 – FeCr & CrO₂

DOLBY HX THRESHOLD ADJUSTMENT

Equipment Required: Audio Signal Generator and Two Dual Channel AC V.T.V.M. (1 and 2)

1. Connect dual channel AC V.T.V.M. 1 to TP5 (left), TP4 (right) and TP10 (ground), and connect dual channel AC V.T.V.M. 2 to TP3 (left), TP2 (right) and TP1 (ground).
2. Connect audio signal generator to both left and right line input jacks. Set the generator for a 3 kHz signal. Place unit in record mode. Adjust the generator input level for an output on V.T.V.M. 2 of 580 mV.
3. Setting Dolby HX switch to ON, adjust VR501 so that the output on V.T.V.M. 1 becomes -1.8 dB of bias level obtained at Record Bias Level Adjustment instructions.
4. Adjust VR502 for FeCr position as it is with LN position.
5. Adjust VR503 for CrO₂ position as it is with LN position.
6. Adjust VR504 for METAL position as it is with LN position.

PEAK LEVEL DISPLAY SENSITIVITY ADJUSTMENT

Equipment Required: Audio Signal Generator and Dual Channel AC V.T.V.M.

1. Connect dual channel AC V.T.V.M. to TP3 (left), TP2 (right) and TP1 (ground).
2. Connect audio signal generator to both left and right line input jacks. Set the generator for a 400 Hz signal. Place unit in record mode. Adjust generator input level for an output on the V.T.V.M. of 580 mV.
3. Adjust VR701 (left) and VR702 (right) so that the 0 dB LEDs will light.
4. Adjust generator input level for an output on the V.T.V.M. of 580 mV -20 dB.
5. Adjust VR703 (left) and VR704 (right) so that the -20 dB LEDs will light.
6. Repeat steps 3 and 5 for best sensitivity.

ALIGNMENT PROCEDURES

PINCH ROLLER TENSION ADJUSTMENT

Bend the adjustment point hooked by spring in the arrow directions so that the tension by pinch roller may be $390g \pm 30g$ when keeping apart pinch roller from capstan (about 0.5 mm) and returning it to rotate. (Fig. 6)

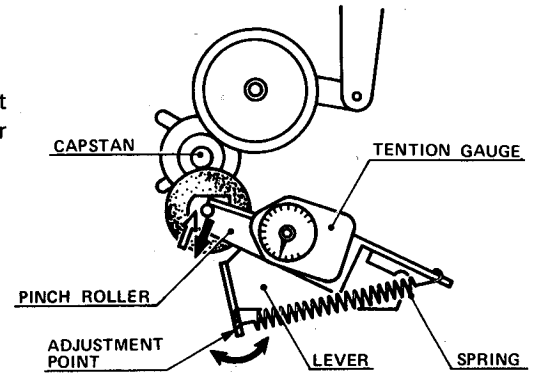


Fig. 6

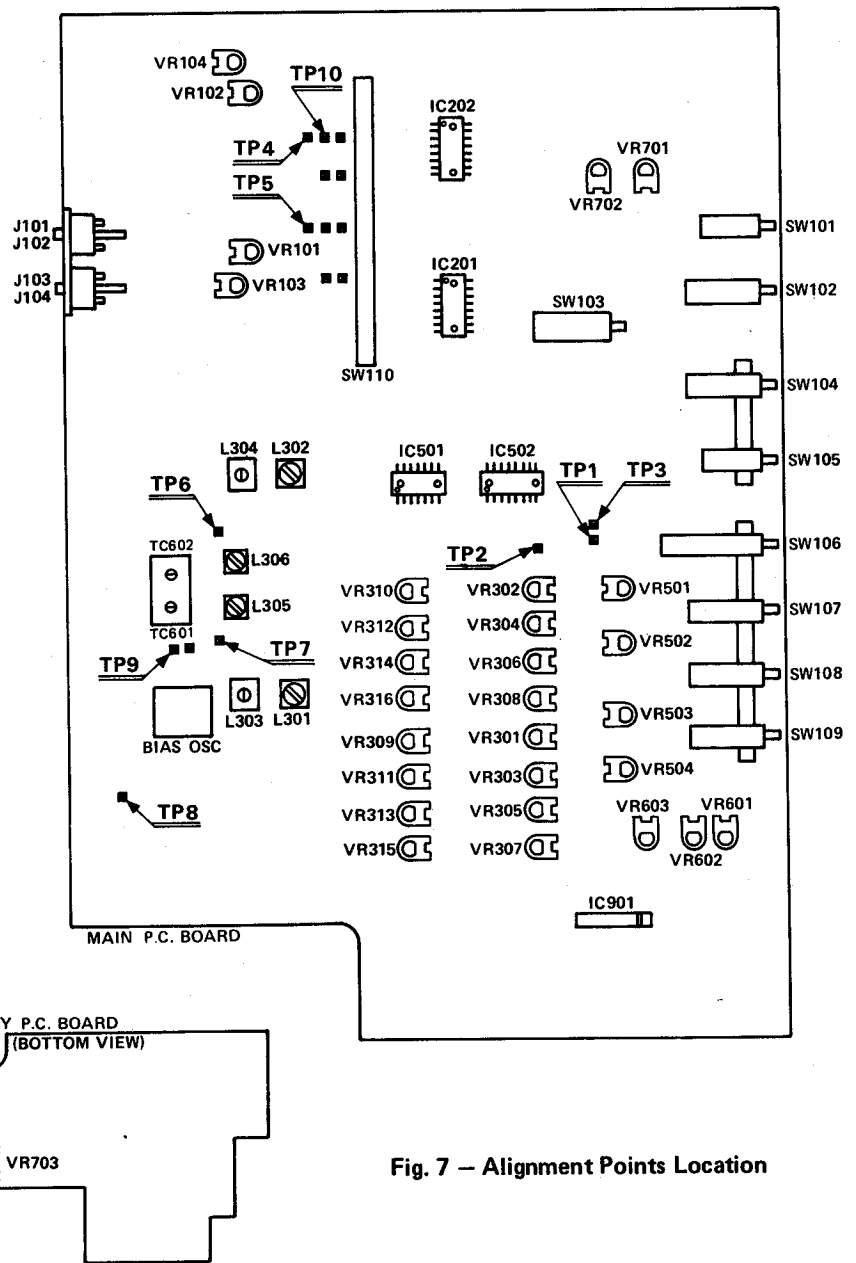
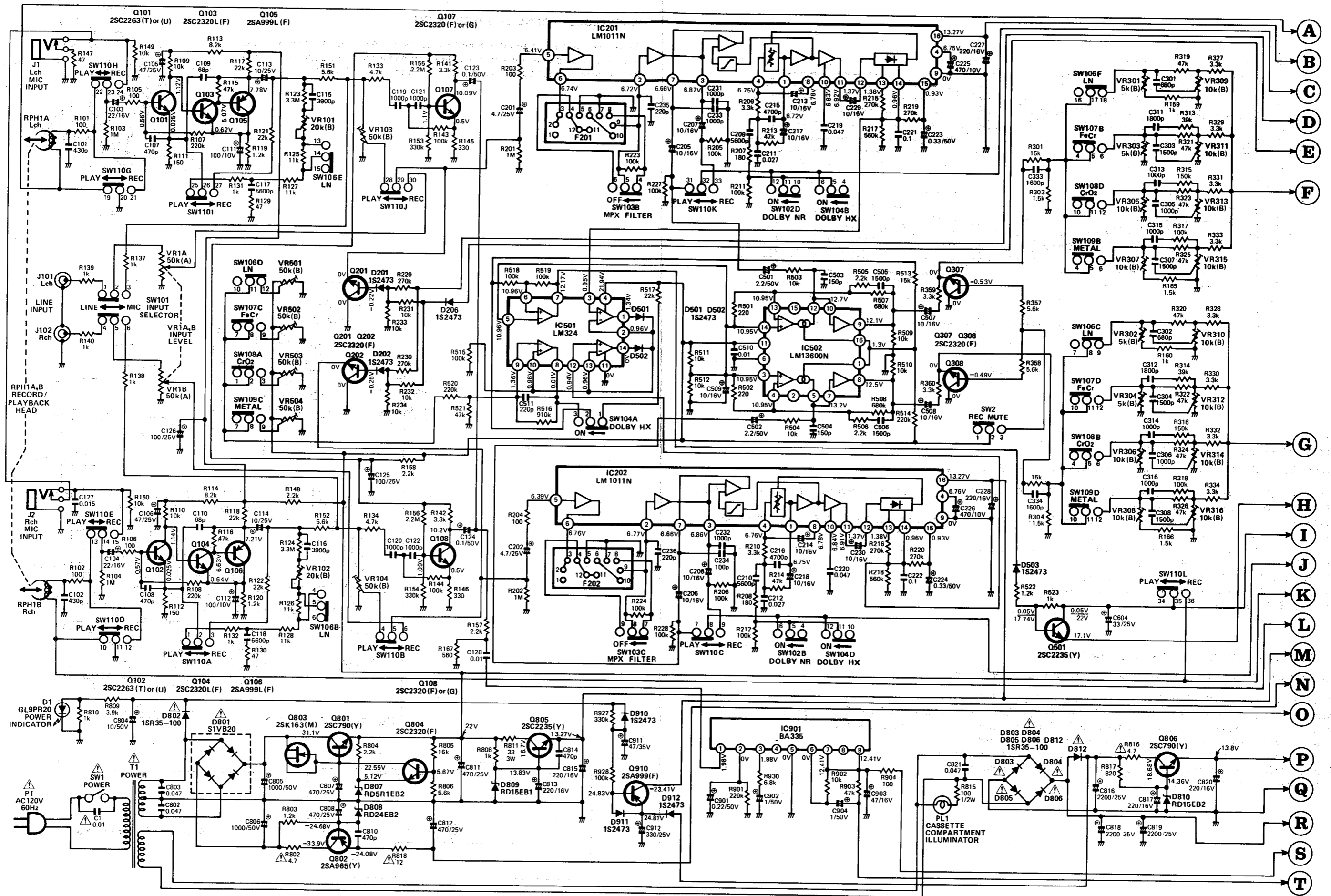


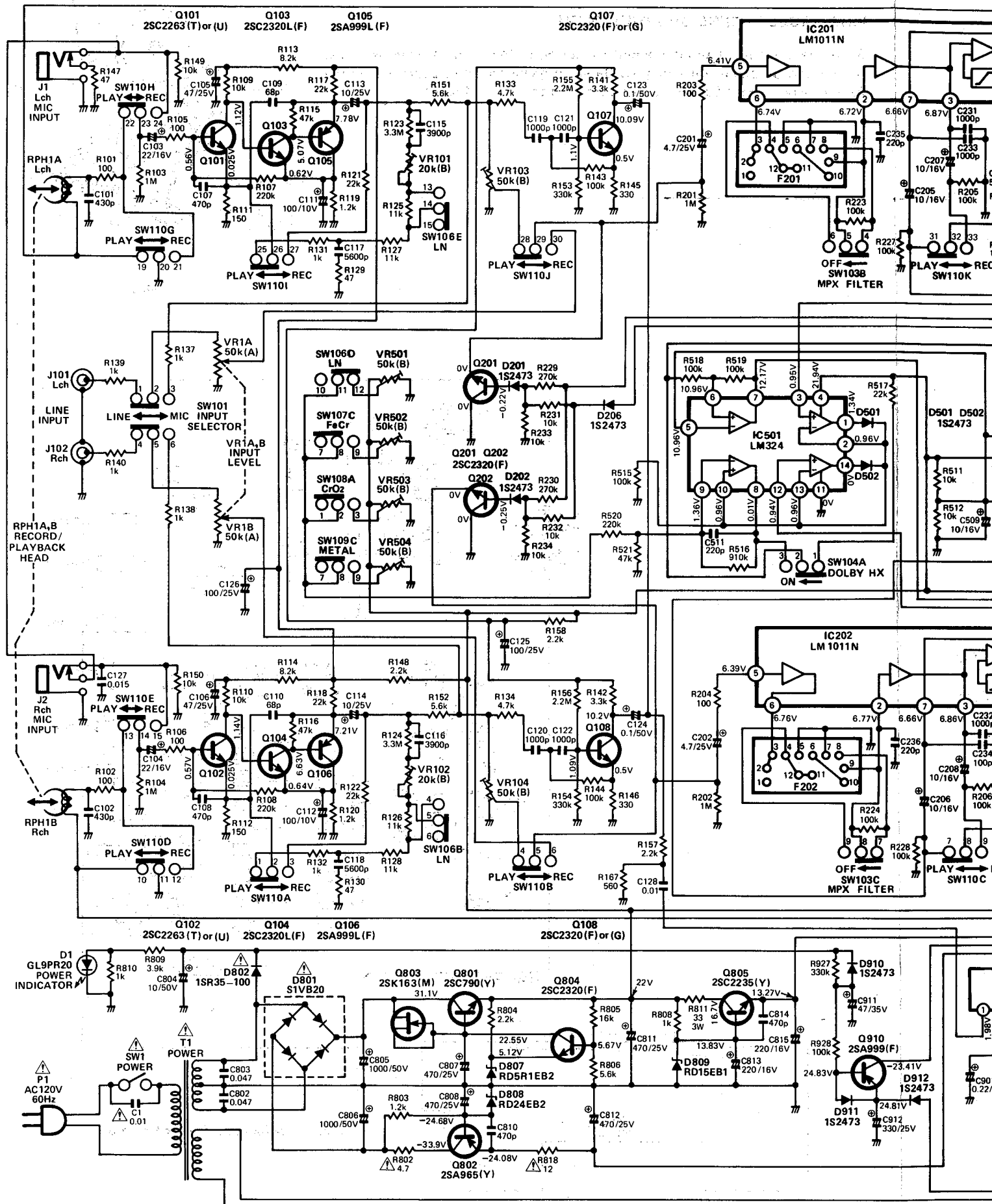
Fig. 7 - Alignment Points Location

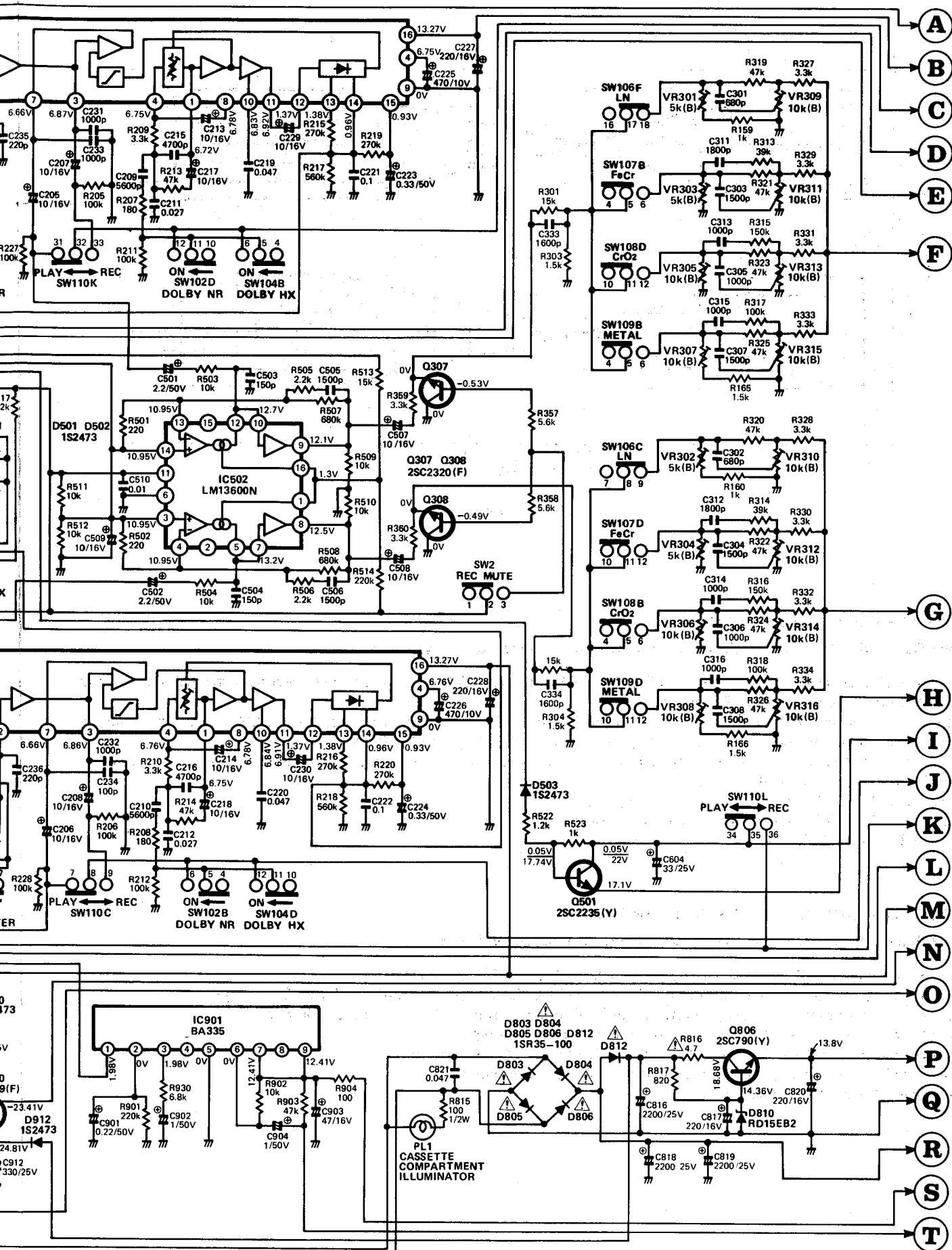
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SCHEMATIC DIAGRAM

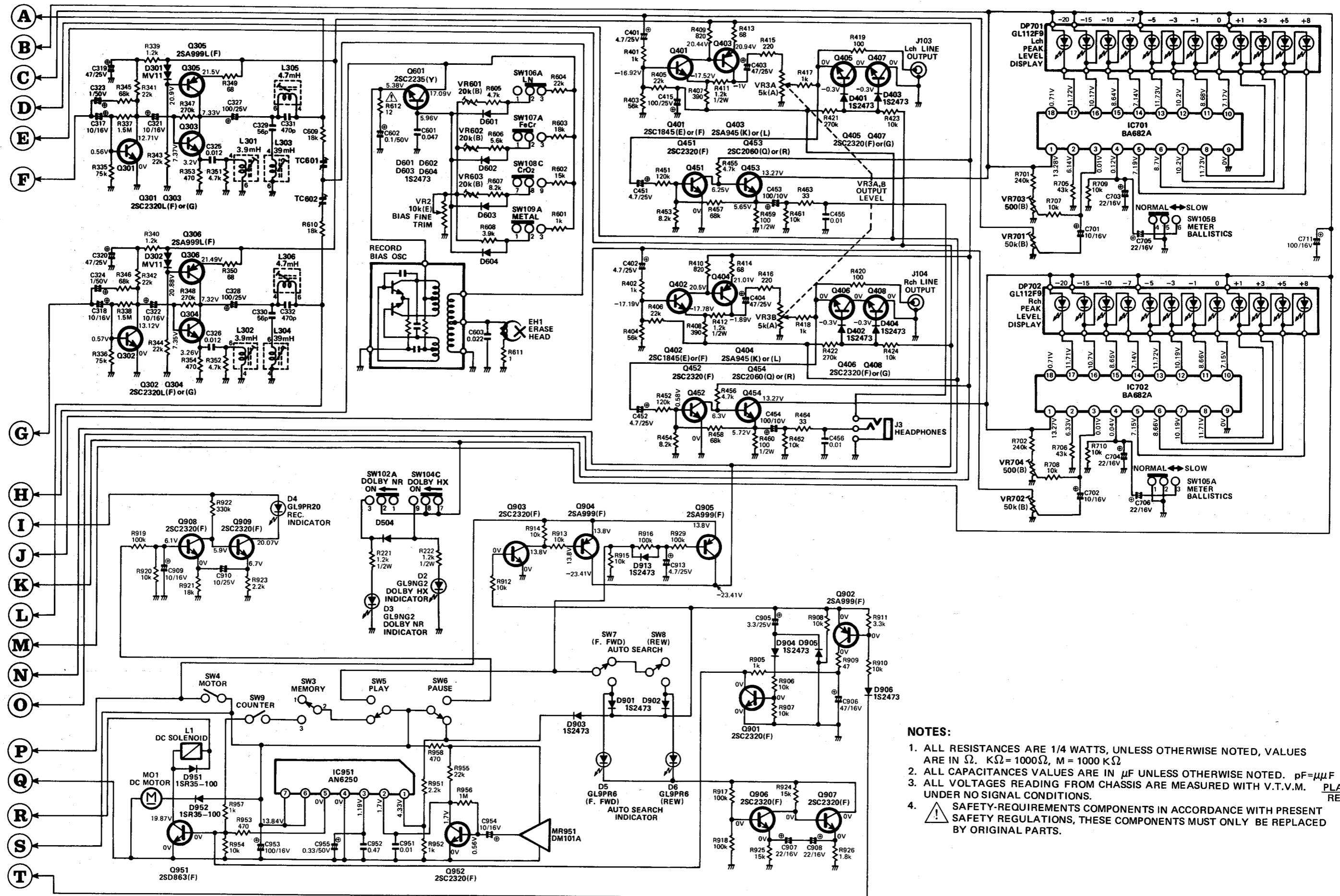


SCHEMATIC DIAGRAM





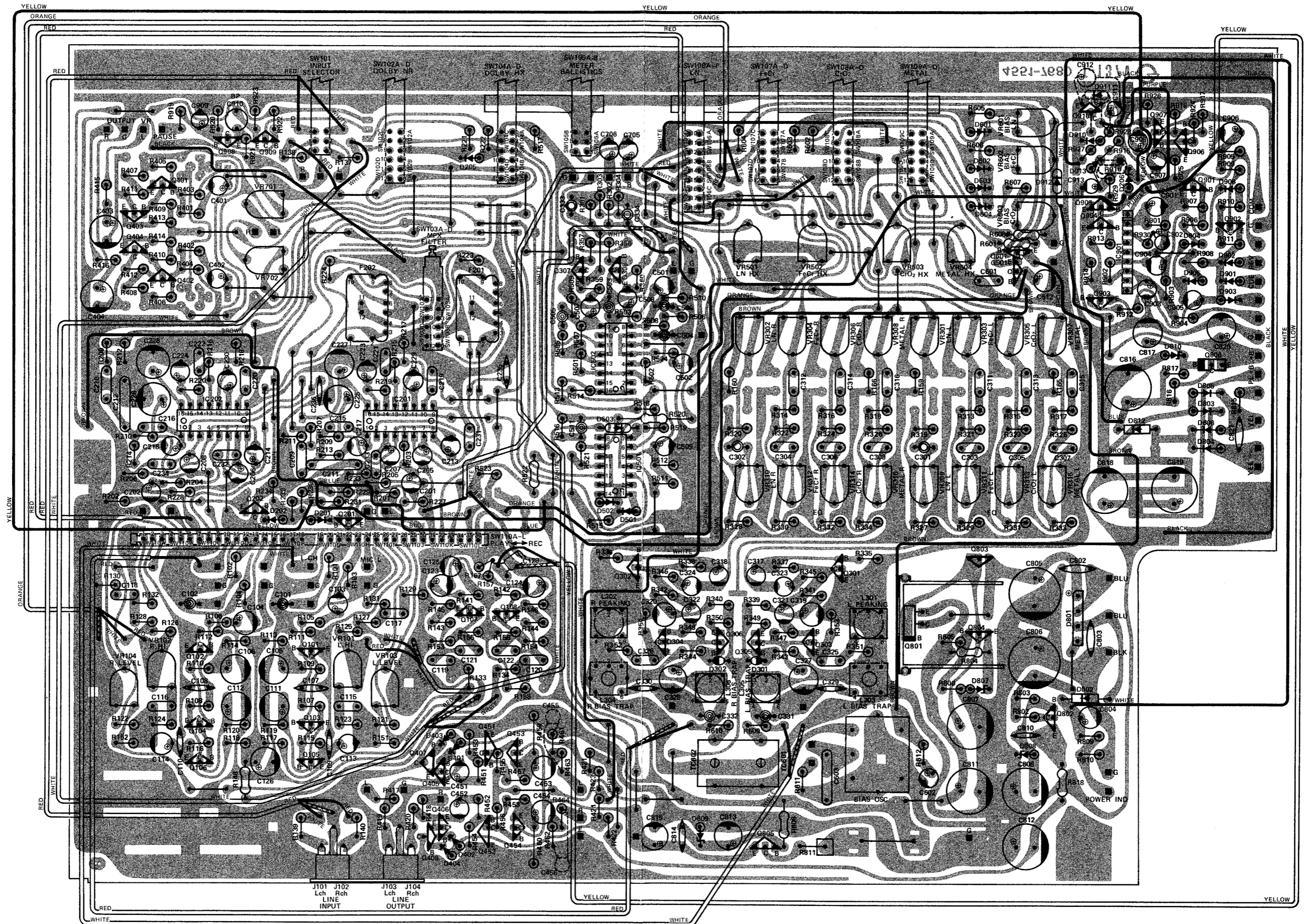
SCHEMATIC DIAGRAM



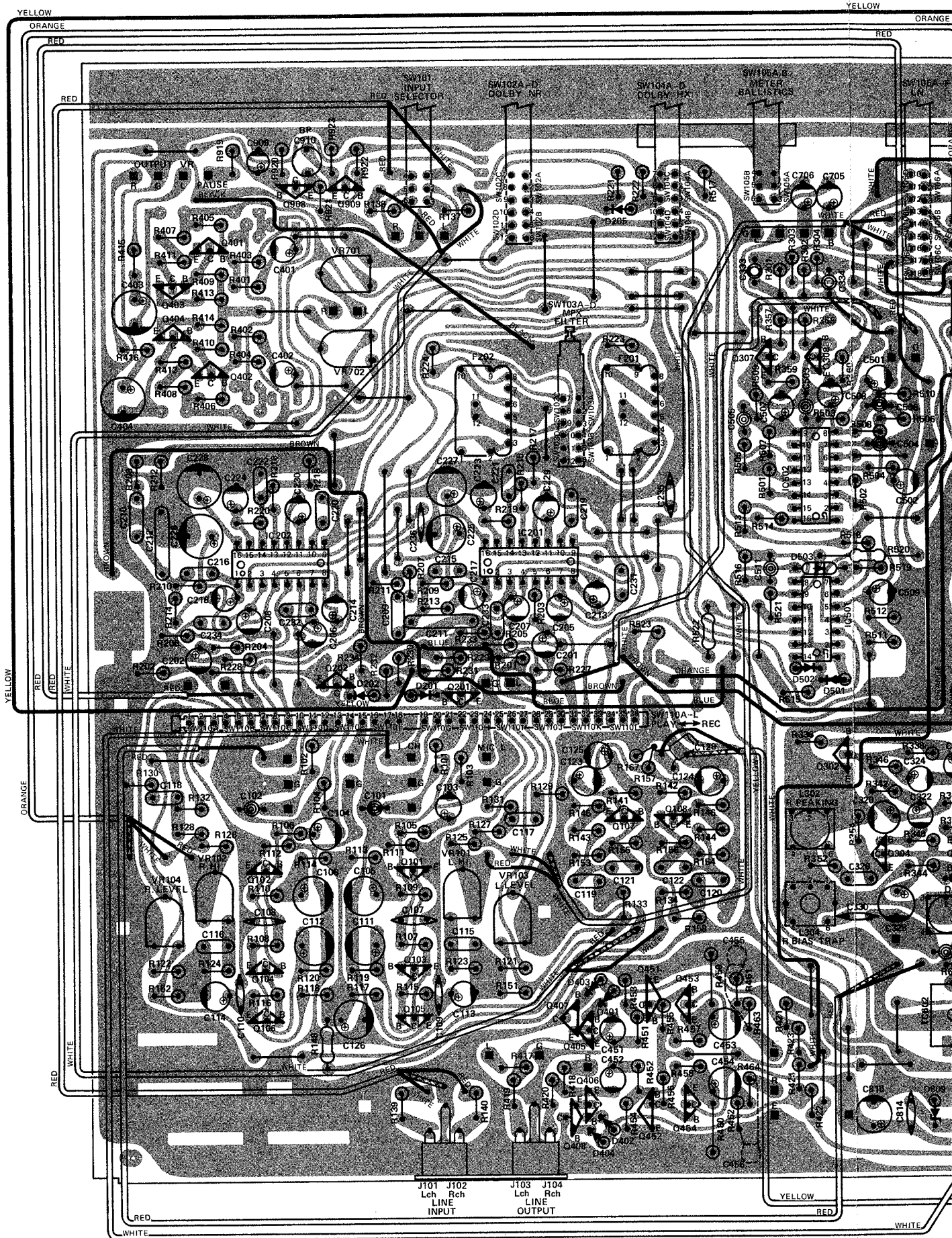
NOTES:

1. ALL RESISTANCES ARE 1/4 WATTS, UNLESS OTHERWISE NOTED, VALUES ARE IN Ω . $K\Omega = 1000\Omega$, $M = 1000 K\Omega$
2. ALL CAPACITANCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. $pF = \mu\mu F$
3. ALL VOLTAGES READING FROM CHASSIS ARE MEASURED WITH V.T.V.M. UNDER NO SIGNAL CONDITIONS. PLAY
REC
4. SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS, THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.

MAIN P.C. BOARD



MAIN P.C. BOARD



MAIN P.C. BOARD

Ref. No.	Part No.	Description
RESISTORS		
R612, 818	5102-1204713	12 ohm +2%—2% 1/4W Fuse
R802, 816	5102-4R74713	4.7 ohm +2%—2% 1/4W Fuse
VR101, 102, 601, 602, 603	5101-20371913	Variable Resistor, 20 k ohm
VR103, 104, 501, 502, 503, 504, 701, 702	5101-50371913	Variable Resistor, 50 k ohm
VR301, 302, 303, 304	5101-50271913	Variable Resistor, 5 k ohm
VR305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316	5101-10371913	Variable Resistor, 10 k ohm
CAPACITORS, ELECTROLYTIC		
C103, 104, 705, 706	5345-226C0212	22uF +20%—20% 16V
C105, 106, 319, 320, 403, 404	5345-476-25	47uF +50%—10% 25V
C111, 112, 453, 454	5345-107-10	100uF +50%—10% 10V
C113, 114	5345-106D0212	10uF +20%—20% 25V
C123, 124, 602	5345-104F0212	0.1uF +20%—20% 50V
C125, 126	5345-107-25	100uF +50%—10% 25V
C201, 202	5345-475F0212	4.7uF +20%—20% 50V
C205, 206, 207, 208, 213, 214, 217, 218, 229, 230, 507, 508, 509, 909	5345-106-16	10uF +50%—10% 16V
C223, 224	5345-334F0212	0.33uF +20%—20% 50V
C225, 226	5345-477B041	470uF +50%—10% 10V
C227, 228, 813, 815, 817, 820	5345-227-16	220uF +50%—10% 16V
C317, 318, 321, 322	5345-106C0212	10uF +20%—20% 16V
C323, 324, 902, 904	5345-105-50	1uF +75%—10% 50V
C327, 328	5345-107D0212	100uF +20%—20% 25V
C401, 402	5345-475D0212	4.7uF +20%—20% 25V
C451, 452	5345-475-25	4.7uF +50%—10% 25V
C501, 502	5345-225F0212	2.2uF +20%—20% 50V
C604	5345-336-25	33uF +50%—10% 25V
C804	5345-106-50	10uF +50%—10% 50V
C805, 806	5345-108-50	1000uF +50%—10% 50V
C807, 808, 811, 812	5345-477D041	470uF +50%—10% 25V
C816, 818, 819	5345-228-25	2200uF +50%—10% 25V
C901	5345-224F0212	0.22uF +20%—20% 50V
C903, 906	5345-476-16	47uF +50%—10% 16V
C905	5345-335-25	3.3uF +75%—10% 25V
C907, 908	5345-226C0211	22uF +20%—20% 16V
C910	5342-106D022	10uF +20%—20% 25V
C911	5345-476E0211	47uF +20%—20% 35V
C912	5345-337-25	330uF +50%—10% 25V
C913	5345-475D0211	4.7uF +20%—20% 25V
TC601, 602	5372-61	Trimmer Capacitor
INTEGRATED CIRCUITS		
IC201, 202	5652-LM1011N	LM1011N Dolby NR Amp.
IC501	5652-LM324	LM324 Dolby HX Control
IC502	5652-LM13600N	LM13600N Dolby HX Variable Equalizer
IC901	5654-BA335	BA335 Signal Comparator
TRANSISTORS		
Q101, 102	5613-2263(T)	2SC2263(T)or(U) Play Equalizer Amp.
Q103, 104	5613-2320L(F)	2SC2320L(F) Play Equalizer Amp.
Q105, 106	5611-999L(F)	2SA999L(F) Play Equalizer Amp.
Q107, 108	5613-2320(F)	2SC2320(F)or(G) Auto Search Amp.
Q201, 202	5613-2320(F)	2SC2320(F) Muting

MAIN P.C. BOARD

Ref. No.	Part No.	Description
TRANSISTORS (continued)		
Q301, 302, 303, 304	5613-2320L(F)	2SC2320L(F)or(G) Rec. Equalizer Amp.
Q305, 306	5611-999L(F)	2SA999L(F) Rec. Equalizer Amp.
Q307, 308	5613-2320(F)	2SC2320(F) Rec. Mute
Q401, 402	5613-1845(E)	2SC1845(E)or(F) Line Output Amp.
Q403, 404	5611-954(K)	2SA954(K)or(L) Line Output Amp.
Q405, 406, 407, 408	5613-2320(F)	2SC2320(F)or(G) Audio Muting
Q451, 452	5613-2320(F)	2SC2320(F) Buffer Amp.
Q453, 454	5613-2060(Q)	2SC2060(Q)or(R) Headphones Amp.
Q501	5613-2235(Y)	2SC2235(Y) Dolby HX Bias Control
Q601	5613-2235(Y)	2SC2235(Y) Bias Control
Q801, 806	5613-790(Y)	2SC790(Y) Voltage Regulator
Q802	5611-965(Y)	2SA965(Y) Voltage Regulator
Q803	5616-2SK163(M)	F.E.T., 2SK163(M) Current Regulator
Q804	5613-2320(F)	2SC2320(F) Voltage Regulator
Q805	5613-2235(Y)	2SC2235(Y) Voltage Regulator
Q901	5613-2320(F)	2SC2320(F) Muting
Q902	5611-999(F)	2SA999(F) Solenoid Pre-Driver
Q903	5613-2320(F)	2SC2320(F) Muting Control
Q904, 905, 910	5611-999(F)	2SA999(F) Muting Control
Q906, 907	5613-2320(F)	2SC2320(F) Auto Search Indicator Driver
Q908, 909	5613-2320(F)	2SC2320(F) Rec. Indicator Driver
DIODES		
D201, 202, 205, 206, 401, 402, 403, 404, 501, 502, 503, 601, 602, 603, 604, 901, 902, 903, 904, 905, 906, 910, 911, 912, 913	5631-1S2473	1S2473
D301, 302	5641-MV11	Varistor, MV11
D801	5685-S1VB20	Bridge Silicon, S1VB20
D802, 803, 804, 805, 806, 812	5632-1SR35-10	1SR35-100
D807	5635-RD5R1EB2	Zener, RD5R1EB2
D808	5635-RD24EB2	Zener, RD24EB2
D809	5635-RD15EB1	Zener, RD15EB1
D810	5635-RD15EB2	Zener, RD15EB2
COILS		
L301, 302	5933-70316	3.9 mH Peaking
L303, 304	5633-70214	39 mH Bias Trap
L305, 306	5933-70416	4.7 mH Bias Trap
MISCELLANEOUS		
F201, 202	6171-0401	Complex, Bias Oscillator
SW101	5214-18	LC Components, MPX Filter
SW102A-D, 103A-D	4431-01027194	Push Switch, Input Selector
SW104A-D, 105A,B	4431-01047794	Push Switch, Dolby NR, MPX Filter
SW106A-F, 107A-D, 108A-D, 109A-D	4431-02067157	2-Gang Push Switch, Dolby HX, Meter Ballistics
SW110A-L	4431-04187157	4-Gang Push Switch, Tape Selector
J101, 102, 103, 104	4421-122718	Slide Switch, Record/Playback
	4484-24	4-Pin Jack, Line Input & Line Output

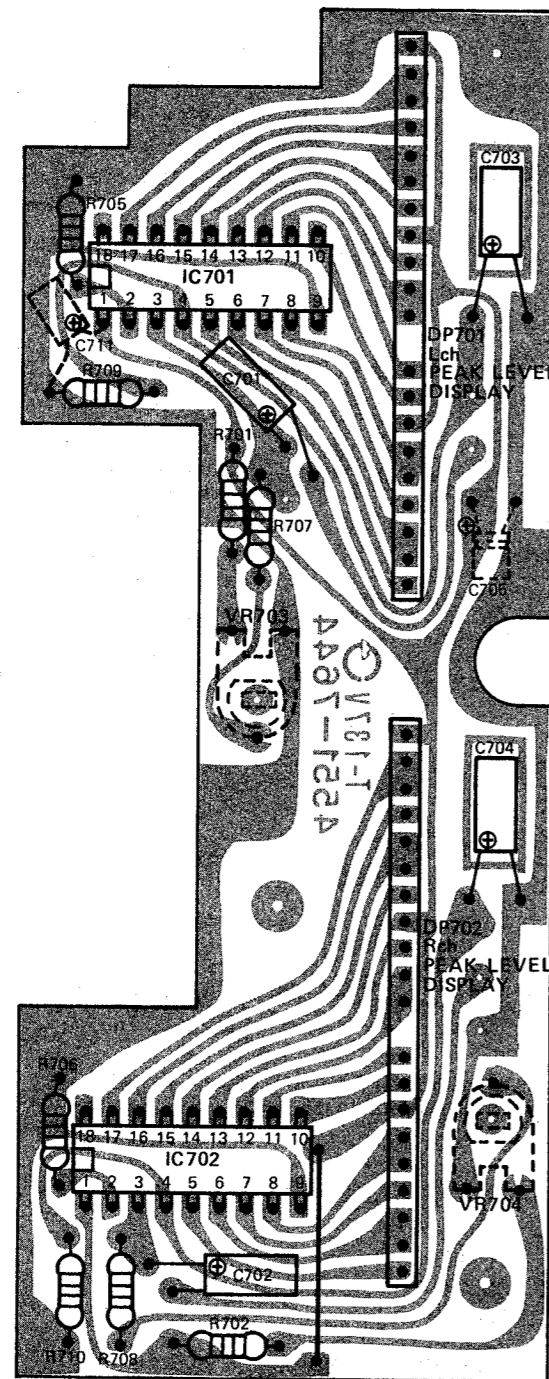
MAIN P.C. BOARD

Ref. No.	Part No.	Description
RESISTORS		
R612, 818	5102-1204713	12 ohm +2%—2% 1/4W Fuse
R802, 816	5102-4R74713	4.7 ohm +2%—2% 1/4W Fuse
VR101, 102, 601, 602, 603	5101-20371913	Variable Resistor, 20 k ohm
VR103, 104, 501, 502, 503, 504, 701, 702	5101-50371913	Variable Resistor, 50 k ohm
VR301, 302, 303, 304	5101-50271913	Variable Resistor, 5 k ohm
VR305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316	5101-10371913	Variable Resistor, 10 k ohm
CAPACITORS, ELECTROLYTIC		
C103, 104, 705, 706	5345-226C0212	22uF +20%—20% 16V
C105, 106, 319, 320, 403, 404	5345-476-25	47uF +50%—10% 25V
C111, 112, 453, 454	5345-107-10	100uF +50%—10% 10V
C113, 114	5345-106D0212	10uF +20%—20% 25V
C123, 124, 602	5345-104F0212	0.1uF +20%—20% 50V
C125, 126	5345-107-25	100uF +50%—10% 25V
C201, 202	5345-475F0212	4.7uF +20%—20% 50V
C205, 206, 207, 208, 213, 214, 217, 218, 229, 230, 507, 508, 509, 909	5345-106-16	10uF +50%—10% 16V
C223, 224	5345-334F0212	0.33uF +20%—20% 50V
C225, 226	5345-477B041	470uF +50%—10% 10V
C227, 228, 813, 815, 817, 820	5345-227-16	220uF +50%—10% 16V
C317, 318, 321, 322	5345-106C0212	10uF +20%—20% 16V
C323, 324, 902, 904	5345-105-50	1uF +75%—10% 50V
C327, 328	5345-107D0212	100uF +20%—20% 25V
C401, 402	5345-475D0212	4.7uF +20%—20% 25V
C451, 452	5345-475-25	4.7uF +50%—10% 25V
C501, 502	5345-225F0212	2.2uF +20%—20% 50V
C604	5345-336-25	33uF +50%—10% 25V
C804	5345-106-50	10uF +50%—10% 50V
C805, 806	5345-108-50	1000uF +50%—10% 50V
C807, 808, 811, 812	5345-477D041	470uF +50%—10% 25V
C816, 818, 819	5345-228-25	2200uF +50%—10% 25V
C901	5345-224F0212	0.22uF +20%—20% 50V
C903, 906	5345-476-16	47uF +50%—10% 16V
C905	5345-335-25	3.3uF +75%—10% 25V
C907, 908	5345-226C0211	22uF +20%—20% 16V
C910	5342-106D022	10uF +20%—20% 25V
C911	5345-476E0211	47uF +20%—20% 35V
C912	5345-337-25	330uF +50%—10% 25V
C913	5345-475D0211	4.7uF +20%—20% 25V
TC601, 602	5372-61	Trimmer Capacitor
INTEGRATED CIRCUITS		
IC201, 202	5652-LM1011N	LM1011N Dolby NR Amp.
IC501	5652-LM324	LM324 Dolby HX Control
IC502	5652-LM13600N	LM13600N Dolby HX Variable Equalizer
IC901	5654-BA335	BA335 Signal Comparator
TRANSISTORS		
Q101, 102	5613-2263(T)	2SC2263(T)or(U) Play Equalizer Amp.
Q103, 104	5613-2320L(F)	2SC2320L(F) Play Equalizer Amp.
Q105, 106	5611-999L(F)	2SA999L(F) Play Equalizer Amp.
Q107, 108	5613-2320(F)	2SC2320(F)or(G) Auto Search Amp.
Q201, 202	5613-2320(F)	2SC2320(F) Muting

MAIN P.C. BOARD

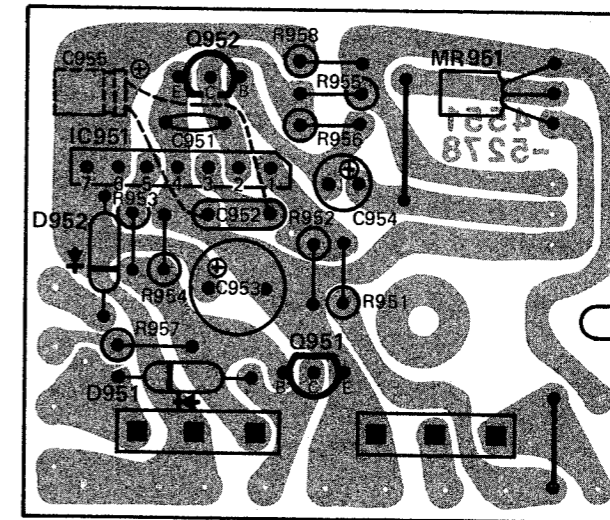
Ref. No.	Part No.	Description
TRANSISTORS (continued)		
Q301, 302, 303, 304	5613-2320L(F)	2SC2320L(F)or(G) Rec. Equalizer Amp.
Q305, 306	5611-999L(F)	2SA999L(F) Rec. Equalizer Amp.
Q307, 308	5613-2320(F)	2SC2320(F) Rec. Mute
Q401, 402	5613-1845(E)	2SC1845(E)or(F) Line Output Amp.
Q403, 404	5611-954(K)	2SA954(K)or(L) Line Output Amp.
Q405, 406, 407, 408	5613-2320(F)	2SC2320(F)or(G) Audio Muting
Q451, 452	5613-2320(F)	2SC2320(F) Buffer Amp.
Q453, 454	5613-2060(Q)	2SC2060(Q)or(R) Headphones Amp.
Q501	5613-2235(Y)	2SC2235(Y) Dolby HX Bias Control
Q601	5613-2235(Y)	2SC2235(Y) Bias Control
Q801, 806	5613-790(Y)	2SC790(Y) Voltage Regulator
Q802	5611-965(Y)	2SA965(Y) Voltage Regulator
Q803	5616-2SK163(M)	F.E.T., 2SK163(M) Current Regulator
Q804	5613-2320(F)	2SC2320(F) Voltage Regulator
Q805	5613-2235(Y)	2SC2235(Y) Voltage Regulator
Q901	5613-2320(F)	2SC2320(F) Muting
Q902	5611-999(F)	2SA999(F) Solenoid Pre-Driver
Q903	5613-2320(F)	2SC2320(F) Muting Control
Q904, 905, 910	5611-999(F)	2SA999(F) Muting Control
Q906, 907	5613-2320(F)	2SC2320(F) Auto Search Indicator Driver
Q908, 909	5613-2320(F)	2SC2320(F) Rec. Indicator Driver
DIODES		
D201, 202, 205, 206, 401, 402, 403, 404, 501, 502, 503, 601, 602, 603, 604, 901, 902, 903, 904, 905, 906, 910, 911, 912, 913	5631-1S2473	1S2473
D301, 302	5641-MV11	Varistor, MV11
D801	5685-S1VB20	Bridge Silicon, S1VB20
D802, 803, 804, 805, 806, 812	5632-1SR35-10	1SR35-100
D807	5635-RD5R1EB2	Zener, RD5R1EB2
D808	5635-RD24EB2	Zener, RD24EB2
D809	5635-RD15EB1	Zener, RD15EB1
D810	5635-RD15EB2	Zener, RD15EB2
COILS		
L301, 302	5933-70316	3.9 mH Peaking
L303, 304	5633-70214	39 mH Bias Trap
L305, 306	5933-70416	4.7 mH Bias Trap
MISCELLANEOUS		
F201, 202	6171-0401	Complex, Bias Oscillator
SW101	5214-18	LC Components, MPX Filter
SW102A-D, 103A-D	4431-01027194	Push Switch, Input Selector
SW104A-D, 105A,B	4431-01047794	Push Switch, Dolby NR, MPX Filter
SW106A-F, 107A-D, 108A-D, 109A-D	4431-04187157	2-Gang Push Switch, Dolby HX, Meter Ballistics
SW110A-L	4421-122718	4-Gang Push Switch, Tape Selector
J101, 102, 103, 104	4484-24	Slide Switch, Record/Playback 4-Pin Jack, Line Input & Line Output

PEAK LEVEL DISPLAY P.C. BOARD

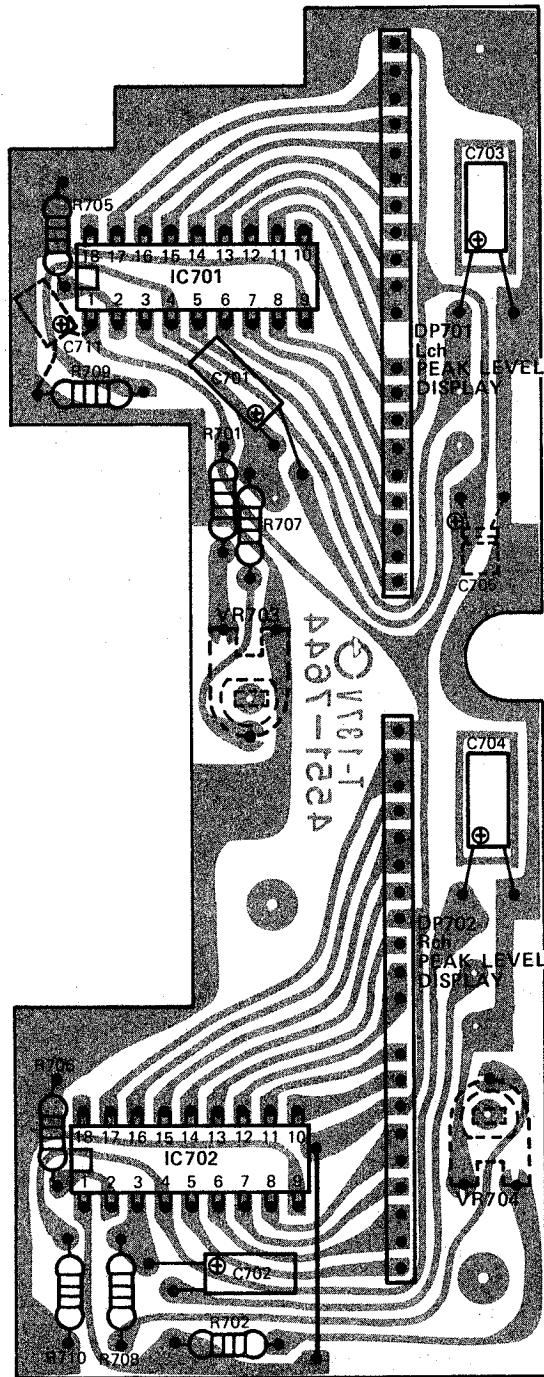


Ref. No.	Part No.	Description
VR703, 704	5101-50171913	Variable Resistor, 500 ohm
C701, 702	5345-106-16	Capacitor, 10uF +50%—10% 16V Electrolytic
C703, 704	5345-226C0211	Capacitor, 22uF +20%—20% 16V Electrolytic
C711	5345-107-16	Capacitor, 100uF +50%—10% 16V Electrolytic
IC701, 702	5652-BA682A	Integrated Circuit, BA682A Peak Level Display Driver
DP701, 702	5623-GL112F9	LED Display, Peak Level

AUTO STOP P.C. BOARD

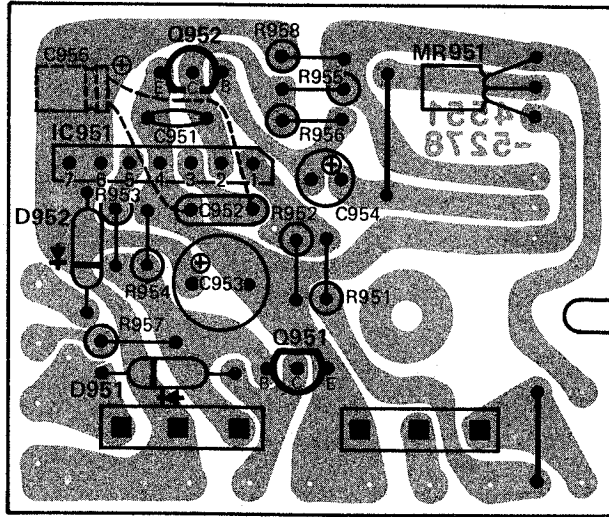


Ref. No.	Part No.	Description
CAPACITORS, ELECTROLYTIC		
C953	5345-107-16	100uF +50%—10% 16V
C954	5345-106-16	10uF +50%—10% 16V
C955	5345-334F0951	0.33uF +20%—20% 50V
INTEGRATED CIRCUIT		
IC951	5654-AN6250	AN6250 Auto Stop Driver
TRANSISTORS		
Q951	5614-863(F)	2SD863(F) Solenoid Driver
Q952	5613-2320(F)	2SC2320(F) Auto Stop Pre-Driver
DIODES		
D951, 952	5632-1SR35-10	1SR35-100
MAGNETO-RESISTANCE ELEMENT		
MR951	5193-DM101A	Auto Stop Sensor



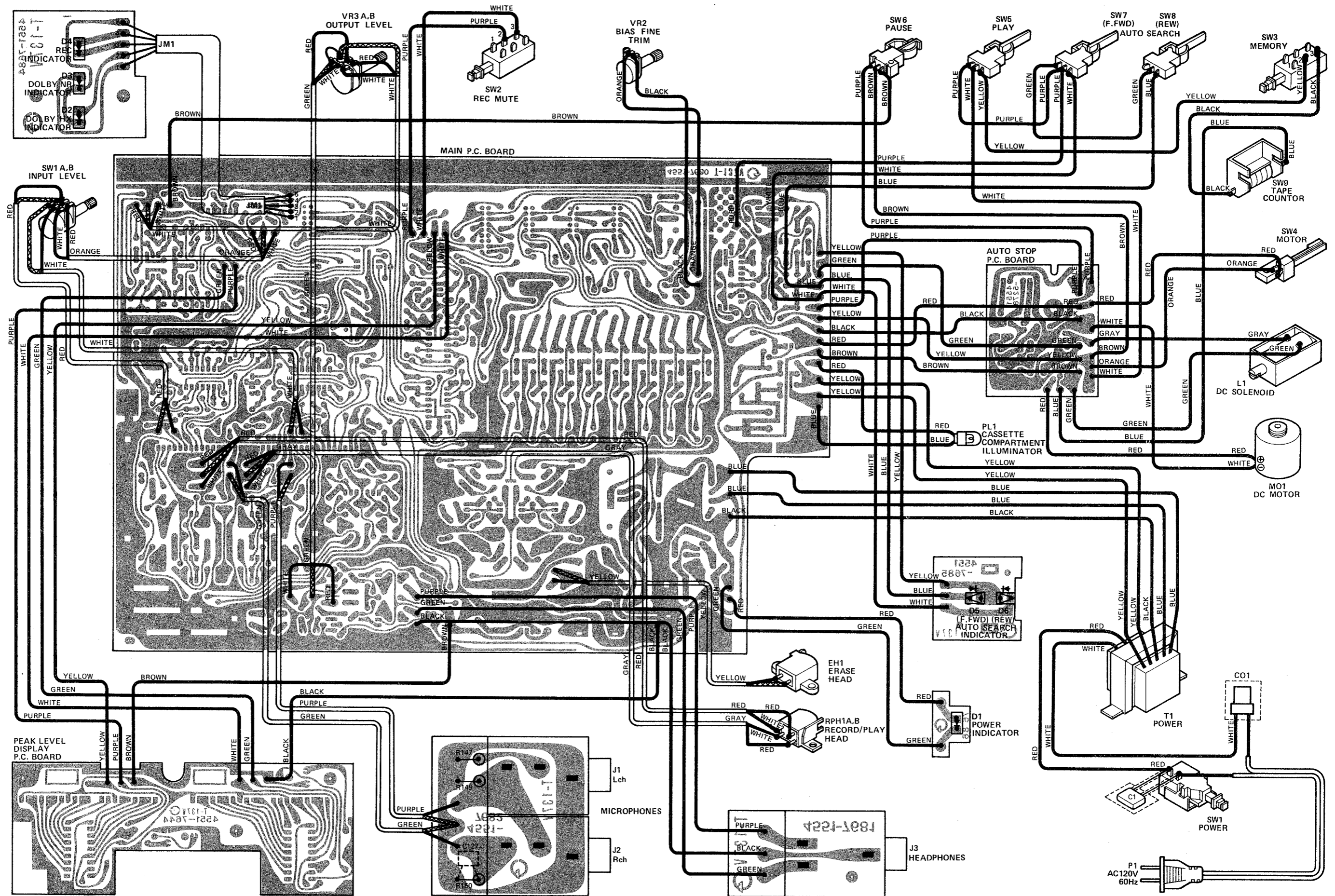
Ref. No.	Part No.	Description
VR703, 704	5101-50171913	Variable Resistor, 500 ohm
C701, 702	5345-106-16	Capacitor, 10uF +50%–10% 16V Electrolytic
C703, 704	5345-226C0211	Capacitor, 22uF +20%–20% 16V Electrolytic
C711	5345-107-16	Capacitor, 100uF +50%–10% 16V Electrolytic
IC701, 702	5652-BA682A	Integrated Circuit, BA682A Peak Level Display Driver
DP701, 702	5623-GL112F9	LED Display, Peak Level

AUTO STOP P.C. BOARD

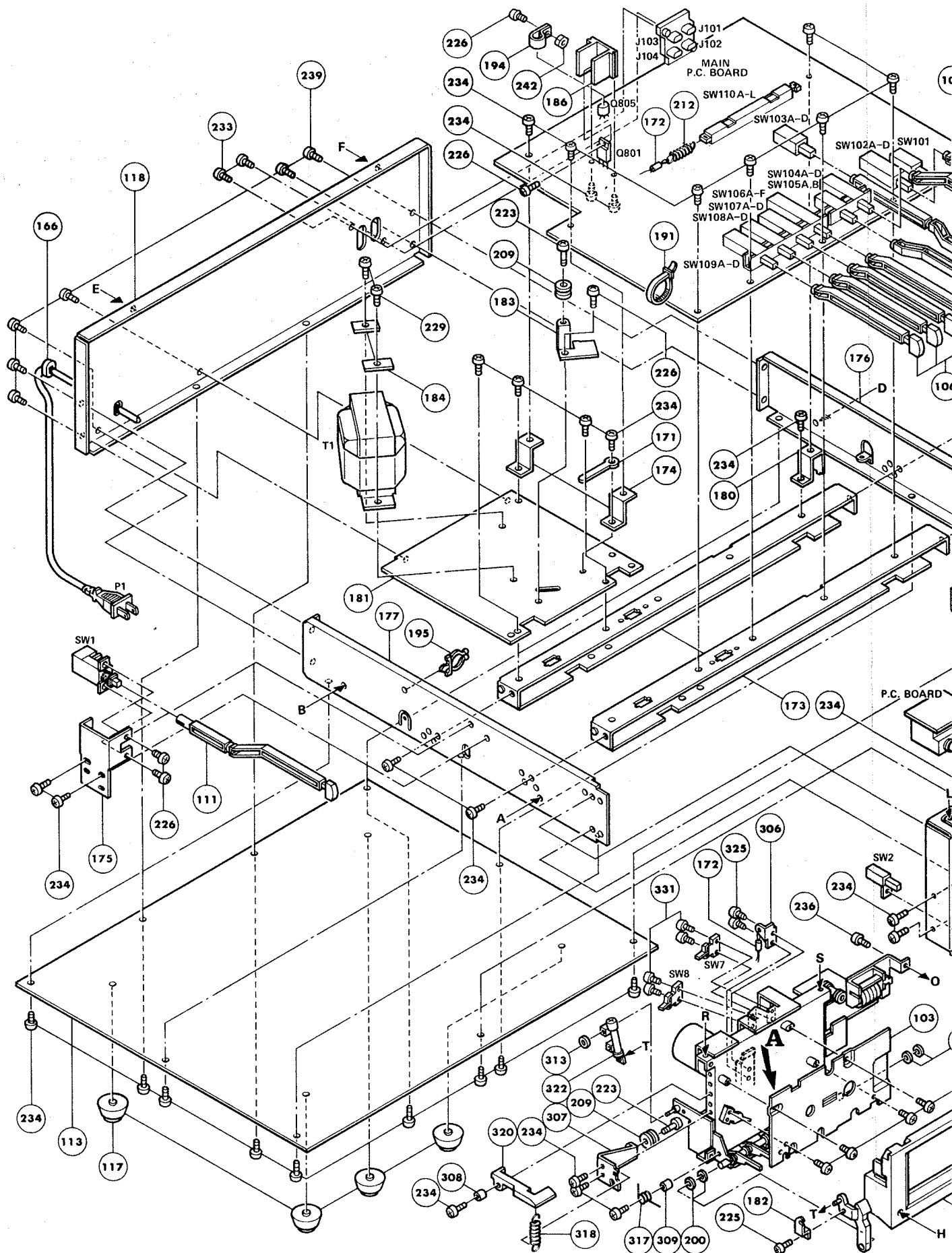


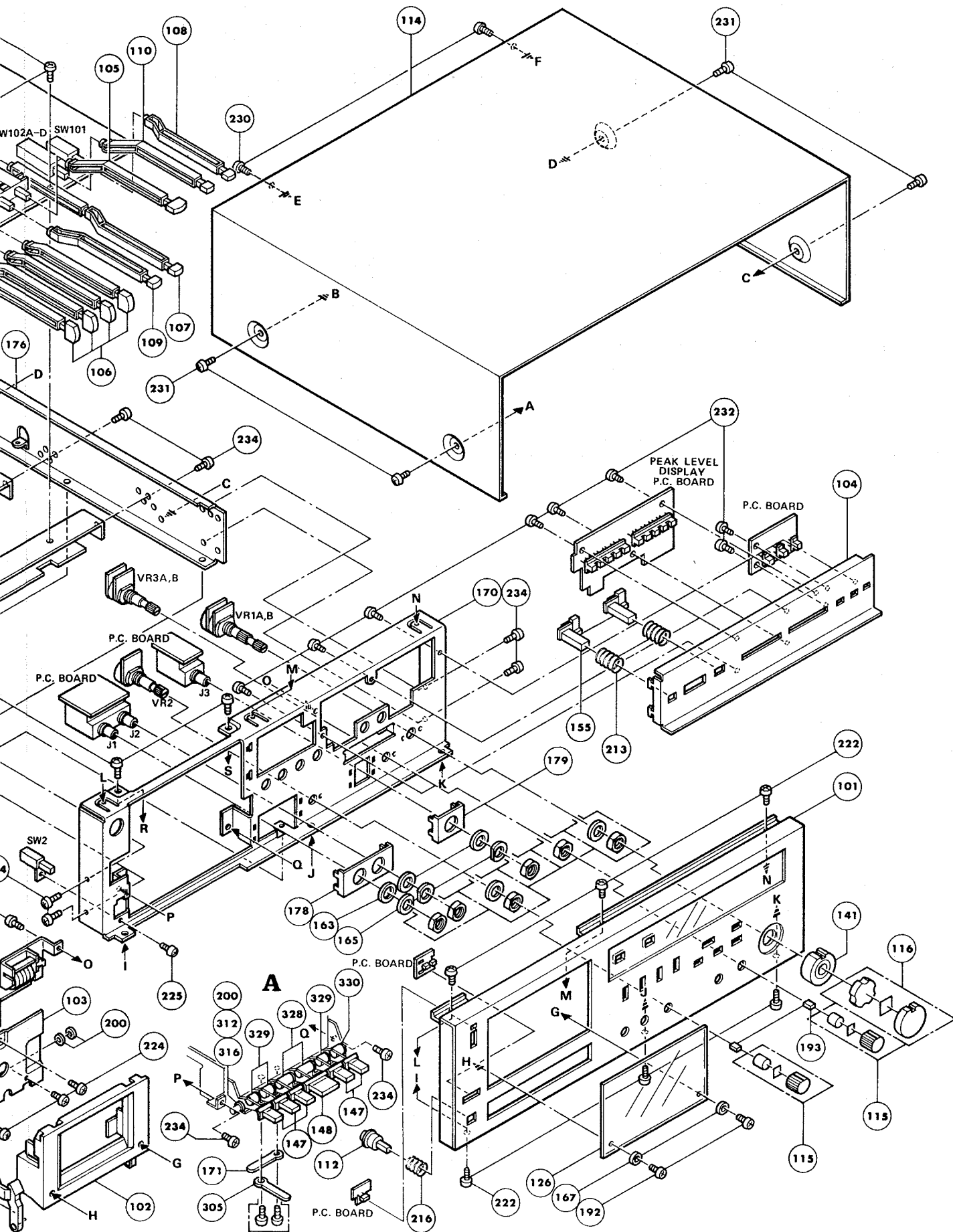
Ref. No.	Part No.	Description
CAPACITORS, ELECTROLYTIC		
C953	5345-107-16	100uF +50%—10% 16V
C954	5345-106-16	10uF +50%—10% 16V
C955	5345-334F0951	0.33uF +20%—20% 50V
INTEGRATED CIRCUIT		
IC951	5654-AN6250	AN6250 Auto Stop Driver
TRANSISTORS		
Q951	5614-863(F)	2SD863(F) Solenoid Driver
Q952	5613-2320(F)	2SC2320(F) Auto Stop Pre-Driver
DIODES		
D951, 952	5632-1SR35-10	1SR35-100
MAGNETO-RESISTANCE ELEMENT		
MR951	5193-DM101A	Auto Stop Sensor

WIRING DIAGRAM

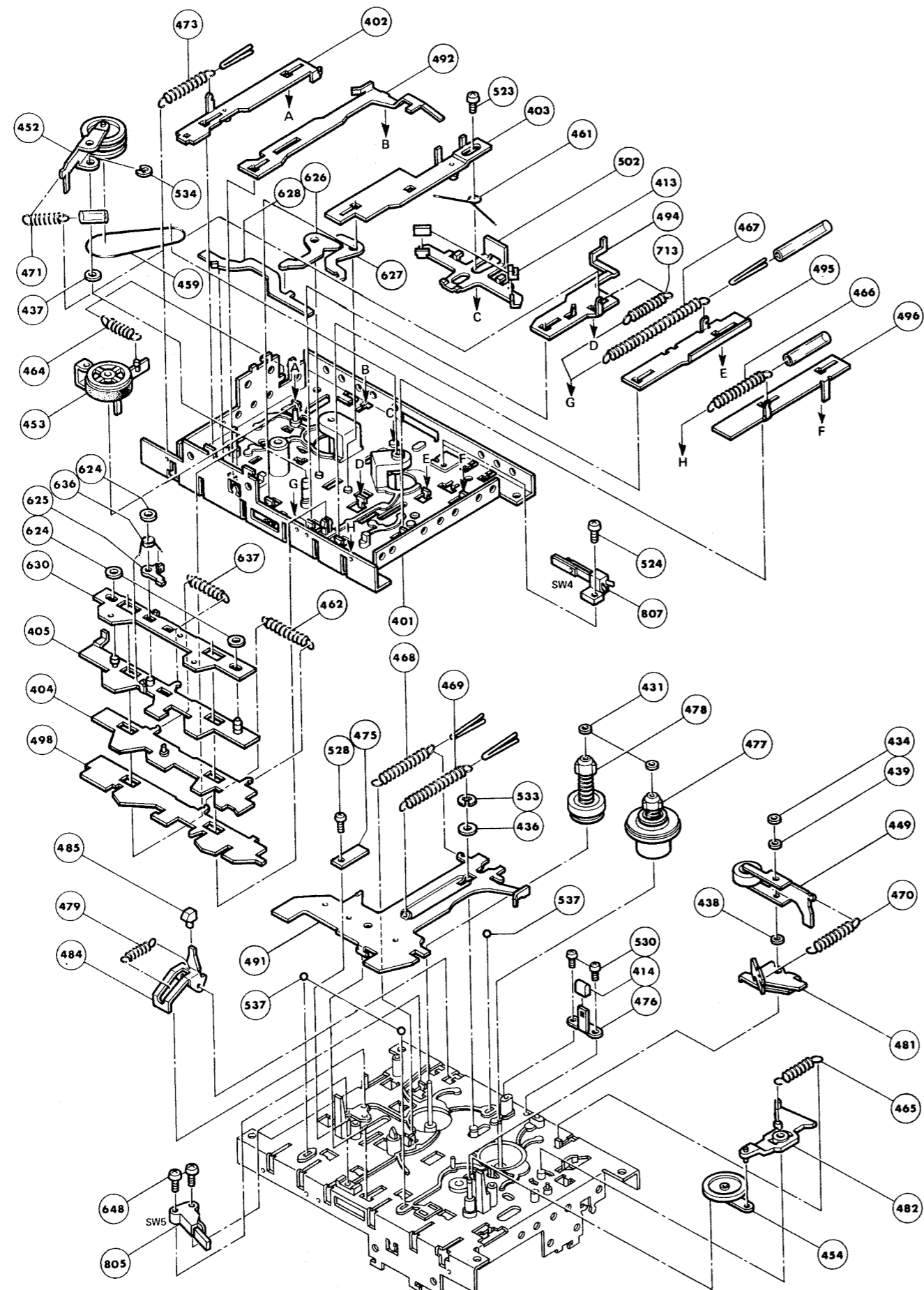


GENERAL UNIT EXPLODED VIEW

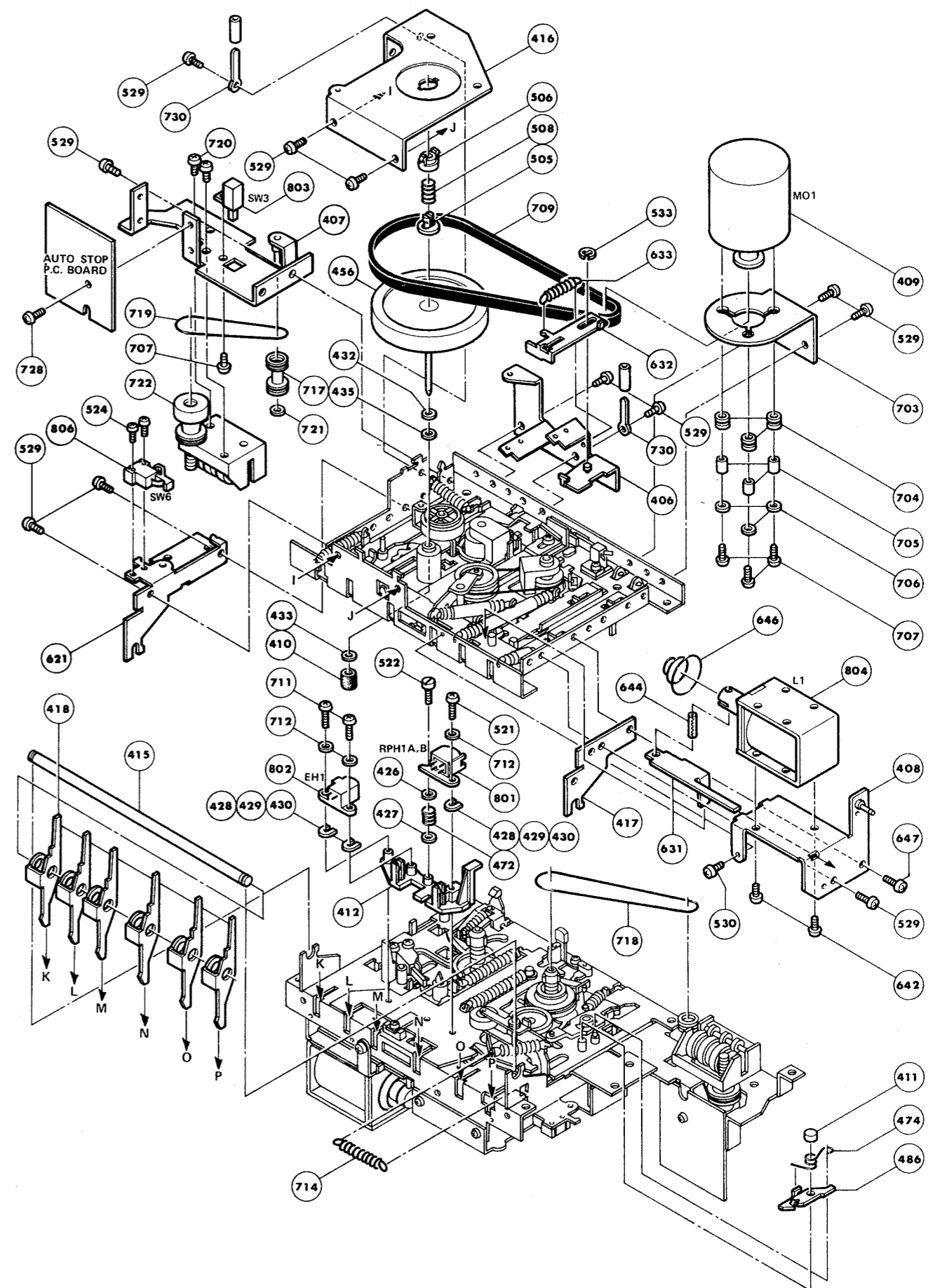




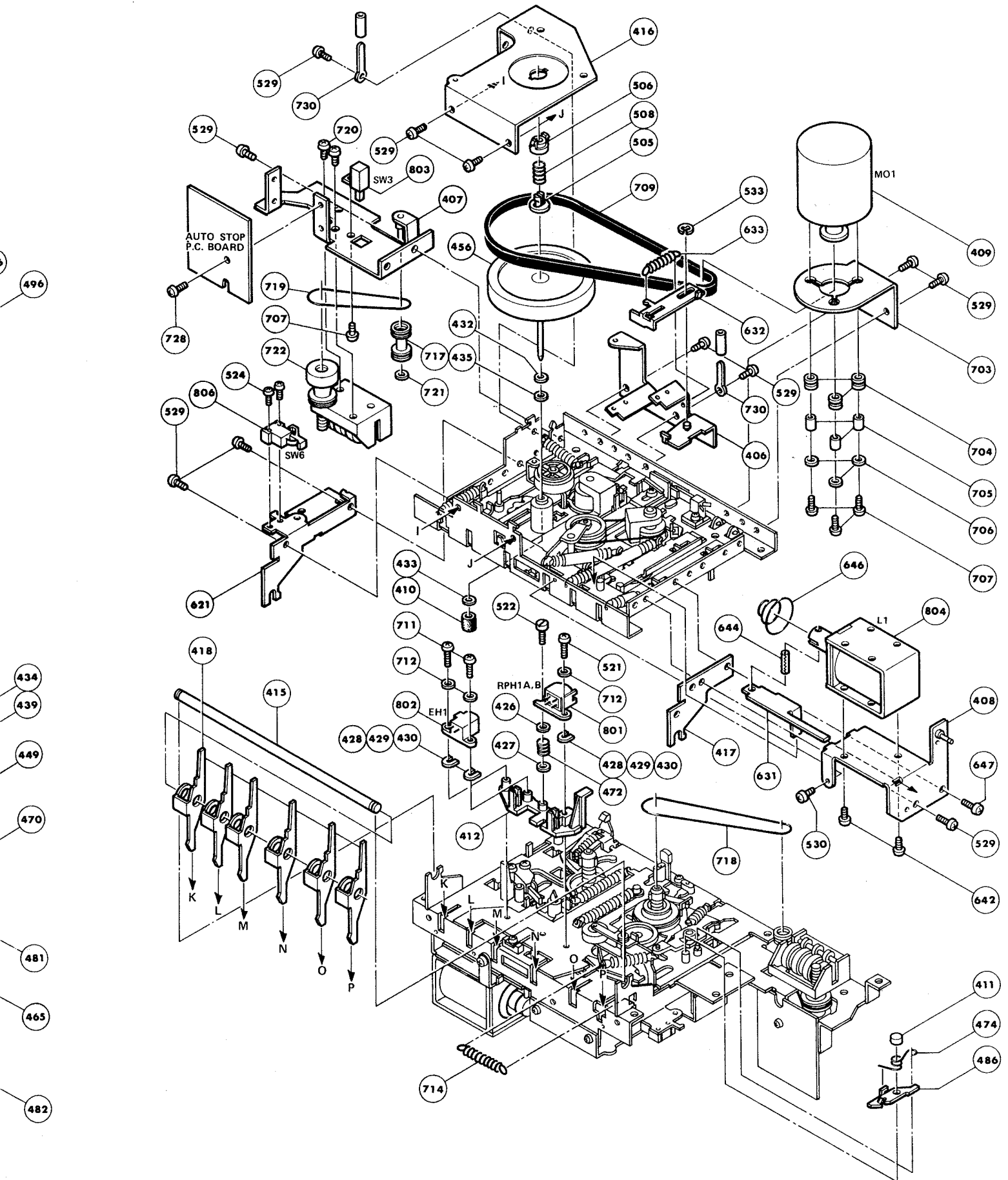
CASSETTE TAPE RECORDER EXPLODED VIEW



CASSETTE TAPE RECORDER EXPLODED VIEW



CASSETTE TAPE RECORDER EXPLODED VIEW



CHASSIS PARTS LIST

Ref. No.	Part No.	Description
GENERAL UNIT		
101	A443-HK200	Front Panel Assembly
102	A612-HK200	Cassette Compartment Slot Assembly
105	A622-HK200-A	Push Button Assembly, Dolby HX
106	A662-HK200-B	Push Button Assembly, Metal, CrO ₂ , FeCr, LN
107	A662-HK200-C	Push Button Assembly, MPX Filter
108	A662-HK200-D	Push Button Assembly, Input Selector
109	A662-HK200-E	Push Button Assembly, Meter Ballistics
110	A662-HK200-F	Push Button Assembly, Dolby NR
111	A662-HK200-G	Push Button Assembly, Power
112	A662-HK200-H	Push Button Assembly, Rec. Mute
114	A414-HK200	Cabinet Top Assembly
115	A634-HK200-A	Knob Assembly, Bias Fine Trim, Output Level
116	A634-HK200-B	Knob Assembly, L ch. Input Level
117	1319-0139	Foot, Cabinet Botton
118	1424-03802	Cabinet Back
126	1532-04201	Cassette Compartment Cover
141	1630-01301	Knob, R ch. Input Level
147	1652-02103VN	Push Button, Stop/Eject, Record, Rew., F.FWD, Pause
148	1652-02202VN	Push Button, Play
155	1662-05801VN	Push Button, Memory, Reset
209	2612-52273	Pulley, Record Cord
322	2692-2	Damper, Eject

CASSETTE TAPE RECORDER

409 (MO1)	D311-MR058MFA	DC Motor Assembly (w/Pulley)
449	2614-5025	Pinch Roller
452	2615-5032	Idler, Rew.
453	2662-5010	Clutch, F. FWD
454	2615-5019	Idler, Play
456	2617-5144	Flywheel
459	2642-01452	Belt, Rew. Idler - Supply Reel Spindle
477	2661-415029	Take-Up Reel Spindle
478	2661-415030	Supply Reel Spindle
709	2642-02410	Belt, Motor - Flywheel
718	2642-01454	Belt, Take-Up Reel Spindle - Wheel
719	2642-01458	Belt, Wheel - Tape Counter
722	3131-445006	Tape Counter (w/SW9)
801 (RPH1A, B)	5874-1320	Record/Playback Head
802 (EH1)	5873-1217	Erase Head
803 (SW3)	4431-01027169	Push Switch, Memory
804 (L1)	4333-40312	DC Solenoid
805 (SW5)	4463-51	Spring Switch, Play
806 (SW6)	4463-50	Spring Switch, Pause
807 (SW4)	4463-53	Spring Switch, Motor

ELECTRICAL

T1	5584-701318	Power Transformer
SW1	4431-01017358	Push Switch, Power
SW2	4431-01027195	Push Switch, Rec. Mute
SW7, 8	4463-51	Spring Switch, Auto Search (F. FWD, Rew.)
J1, 2	4452-019	2-Pin Jack, Microphones
J3	4451-00107	Headphones Jack
P1	4161-0487	AC Line Cord
VR1A, B	5113-5037282	Variable Resistor, 50 k ohm Input Level Control
VR2	5113-1037521	Variable Resistor, 10 k ohm Bias Fine Trim Control
VR3A, B	5113-5027G40	Variable Resistor, 5 k ohm Output Level Control

CHASSIS PARTS LIST

Ref. No.	Part No.	Description
ELECTRICAL (continued)		
D1	5637-GL9PR20	Light Emitting Diode, GL9PR20 Power Indicator
D2, 3	5637-GL9NG2	Light Emitting Diode, GL9NG2 Dolby HX Indicator, Dolby NR Indicator
D4	5637-GL9PR20	Light Emitting Diode, GL9PR20 Rec. Indicator
D5, 6	5637-GL9PR6	Light Emitting Diode, GL9PR6 Auto Search Indicators
PL1	5731-1404123	Lamp, 14V 50mA Cassette Compartment Illuminator

CHASSIS PARTS LIST

Ref. No.	Part No.	Description
GENERAL UNIT		
101	A443-HK200	Front Panel Assembly
102	A612-HK200	Cassette Compartment Slot Assembly
105	A622-HK200-A	Push Button Assembly, Dolby HX
106	A662-HK200-B	Push Button Assembly, Metal, CrO ₂ , FeCr, LN
107	A662-HK200-C	Push Button Assembly, MPX Filter
108	A662-HK200-D	Push Button Assembly, Input Selector
109	A662-HK200-E	Push Button Assembly, Meter Ballistics
110	A662-HK200-F	Push Button Assembly, Dolby NR
111	A662-HK200-G	Push Button Assembly, Power
112	A662-HK200-H	Push Button Assembly, Rec. Mute
114	A414-HK200	Cabinet Top Assembly
115	A634-HK200-A	Knob Assembly, Bias Fine Trim, Output Level
116	A634-HK200-B	Knob Assembly, L ch. Input Level
117	1319-0139	Foot, Cabinet Botton
118	1424-03802	Cabinet Back
126	1532-04201	Cassette Compartment Cover
141	1630-01301	Knob, R ch. Input Level
147	1652-02103VN	Push Button, Stop/Eject, Record, Rew., F.FWD, Pause
148	1652-02202VN	Push Button, Play
155	1662-05801VN	Push Button, Memory, Reset
209	2612-52273	Pulley, Record Cord
322	2692-2	Damper, Eject

CASSETTE TAPE RECORDER

409 (MO1)	D311-MR058MFA	DC Motor Assembly (w/Pulley)
449	2614-5025	Pinch Roller
452	2615-5032	Idler, Rew.
453	2662-5010	Clutch, F. FWD
454	2615-5019	Idler, Play
456	2617-5144	Flywheel
459	2642-01452	Belt, Rew. Idler — Supply Reel Spindle
477	2661-415029	Take-Up Reel Spindle
478	2661-415030	Supply Reel Spindle
709	2642-02410	Belt, Motor — Flywheel
718	2642-01454	Belt, Take-Up Reel Spindle — Wheel
719	2642-01458	Belt, Wheel — Tape Counter
722	3131-445006	Tape Counter (w/SW9)
801(RPH1A, B)	5874-1320	Record/Playback Head
802(EH1)	5873-1217	Erase Head
803(SW3)	4431-01027169	Push Switch, Memory
804(L1)	4333-40312	DC Solenoid
805(SW5)	4463-51	Spring Switch, Play
806(SW6)	4463-50	Spring Switch, Pause
807(SW4)	4463-53	Spring Switch, Motor

ELECTRICAL

T1	5584-701318	Power Transformer
SW1	4431-01017358	Push Switch, Power
SW2	4431-01027195	Push Switch, Rec. Mute
SW7, 8	4463-51	Spring Switch, Auto Search (F. FWD, Rew.)
J1, 2	4452-019	2-Pin Jack, Microphones
J3	4451-00107	Headphones Jack
P1	4161-0487	AC Line Cord
VR1A, B	5113-5037282	Variable Resistor, 50 k ohm Input Level Control
VR2	5113-1037521	Variable Resistor, 10 k ohm Bias Fine Trim Control
VR3A, B	5113-5027G40	Variable Resistor, 5 k ohm Output Level Control

CHASSIS PARTS LIST

Ref. No.	Part No.	Description
ELECTRICAL (continued)		
D1	5637-GL9PR20	Light Emitting Diode, GL9PR20 Power Indicator
D2, 3	5637-GL9NG2	Light Emitting Diode, GL9NG2 Dolby HX Indicator, Dolby NR Indicator
D4	5637-GL9PR20	Light Emitting Diode, GL9PR20 Rec. Indicator
D5, 6	5637-GL9PR6	Light Emitting Diode, GL9PR6 Auto Search Indicators
PL1	5731-1404123	Lamp, 14V 50mA Cassette Compartment Illuminator