

Service Manual

Cassette Deck

RS-M273

(Silver Face)
(Black Face)

Microprocessor Controlled Cassette Deck
with 3-Head, Closed Loop System



This is the Service Manual for the following areas.

- ☐ For all European areas except United Kingdom.
☐ For United Kingdom.

RS-M250 MECHANISM SERIES

Specifications

Track system:	4-track 2-channel stereo recording and playback	Inputs:	MIC; sensitivity 0.25mV, input impedance 10k Ω applicable microphone impedance 400 Ω –10k Ω
Tape speed:	4.8cm/s		LINE; sensitivity 60mV, input impedance 40k Ω
Wow and flutter:	0.037% (WRMS), $\pm 0.12\%$ (DIN)	Outputs:	LINE; output level 700mV, output impedance 3.5k Ω or less load impedance 22k Ω over HEADPHONES; output level 125mV (at 8 Ω) load impedance 8–125 Ω
Frequency response: Metal tape;	18–21,000Hz 25–20,000Hz (DIN) 30–19,000Hz ± 3 dB	Bias frequency:	85kHz
CrO ₂ tape;	18–20,000Hz 25–19,000Hz (DIN) 30–18,000Hz ± 3 dB	Motor:	2-motor system (closed loop double capstan system)
Normal tape;	18–18,000Hz 25–17,000Hz (DIN) 30–15,000Hz ± 3 dB	Heads:	3-head system; 1 SX head for recording, 1 SX head for playback 1 double-gap ferrite head for erasure
Signal-to-noise ratio: Dolby* NR in;	69dB (above 5kHz)	Power requirement:	AC; 110/125/220/240V 50/60Hz; Pre-set power voltage 220V 50Hz; Pre-set power voltage 240V for United Kingdom
Dolby NR out;	59dB (signal level = max. recording level, CrO ₂ type tape)	Power consumption:	25W
Fast forward and rewind time: Approx. 80 seconds with C-60 cassette tape		Dimensions:	43.0cm(W) $\times$ 10.9cm(H) $\times$ 33.5cm(D)
		Weight:	6.5kg

Specifications are subject to change without notice.

* 'Dolby' and the double-D symbol are trademarks of Dolby Laboratories.

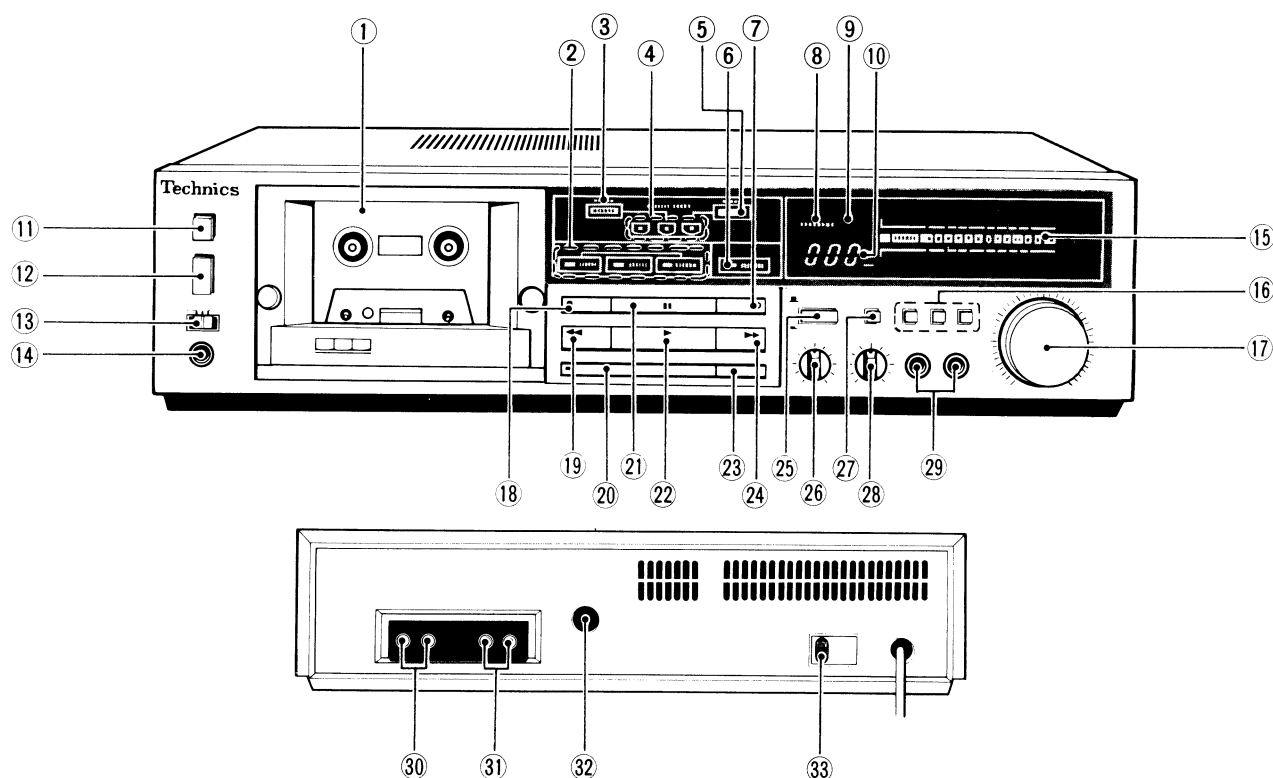
Technics

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LOCATION OF CONTROLS AND COMPONENTS



- | | |
|---|--|
| ① Cassette holder | ⑱ Record button and indicator [rec (○)] |
| ② Auto tape select indicators [ATS (Normal • CrO ₂ • Metal)] | ⑲ Rewind button [rew (◀◀)] |
| ③ Tape monitor source indicator [source] | ⑳ Stop button [stop (■)] |
| ④ Three head indicator | ㉑ Pause button and indicator [pause ()] |
| ⑤ Monitor tape indicator [tape] | ㉒ Playback button and indicator [play (▶)] |
| ⑥ Dolby NR indicator [Dolby NR] | ㉓ Reset button [counter reset] |
| ⑦ Record muting switch [rec mute (●)] | ㉔ Fast forward button [ff (▶▶)] |
| ⑧ Memory stop position indicator [memory] | ㉕ Monitor switch [monitor (▲ source • ■ tape)] |
| ⑨ Repeat position indicator [repeat] | ㉖ Bias fine adjustment control [bias adjust] |
| ⑩ Digital electronic counter [electronic counter] | ㉗ Dolby NR switch [Dolby NR (in • out)] |
| ⑪ Eject button [eject] | ㉘ Output level control [output level] |
| ⑫ Power switch [power (push on)] | ㉙ Microphone jacks [mic (L • R)] |
| ⑬ Timer start switch [⏱ timer (rec • off • play)] | ⑳ Line output jacks [LINE OUT (L • R)] |
| ⑭ Headphones jack [phones] | ㉑ Line input jacks [LINE IN (L • R)] |
| ⑮ FL (fluorescent level) meter | ㉒ Remote control connector [REMOTE CONTROL] |
| ⑯ Memory switch [memory (stop • off • repeat)] | ㉓ Voltage selector [VOLTAGE SELECTOR] |
| ⑰ Input level controls [input level (L → R)] | |

MESSUNGEN UND EINSTELL METHODEN

RS-M273 DEUTSCH

Bandwähler (Band-Betriebsart-Schalten)
Zur Meßeinstellung mit Testbändern ohne Bandspürlöcher (A und B) die Band-Betriebsarten wie folgt schalten.
(Für normale Band-Betriebsart einfach ein normales Band in den Cassettenhalter einführen.)

• Metallband-Betriebsart-Einstellung:
Die Metallband-Betriebsart wird erreicht durch trennen der dreistiftigen Buchse  vom dreistiftigen Ständer  auf dem P.C.B. (Gedrucktes Schaltbrett).

• CrO₂-Band-Betriebseinstellung:
Zuerst die dreistiftige Buchse  auf dieselbe Weise wie oben trennen. Danach, wie in rechtsstehender Abbildung gezeigt, den Anschluß – 3 des dreistiftigen Ständers mit einem Verbindungsdraht erden.

Anm.:
Wenn nicht anders vorgeschrieben, Kurbelschalter und Steuereinrichtungen auf die folgenden Positionen stellen.

• Für saubere Köpfe sorgen.
• Für saubere Tonwelle und Andruckrolle sorgen.
• Auf normale Raumtemperatur achten: 20 ± 5 °C (68 ± 9 °F).
• Monitorschalter: Band-Position.
• Vormagnetisierungsregler: Zentrum.

• Eingangsregler: MAX.
• Ausgangsregler: MAX.
• Dolby-Schalter: Aus.
• Spitzenwertschalter: LINE.
• Timer-Wahlschalter: OFF.
• Speicherschalter: OFF.

Gegenstand	Messung und Einstellung
A Druck der Andruckrolle Bedingung: • Wiedergabe Meßgerät: • Bandzugmesser (max. 500 gr)	1. Gerät auf "Wiedergabe" schalten. 2. Bandzugmesser über die Spitze der Andruckwollenwelle (A) haken und entgegen der Andruckrichtung Andruckrolle-Tonwelle ziehen (Fig. 2). 3. Bandzugmesser in dem Augenblick ablesen, in dem die Andruckrolle von der Tonwelle abhebt und sich zu drehen aufhört. NORMALWERT: 130±20 gr (Zufuhrseite) NORMALWERT: 350±50 gr (Aufwickelseite)
B Bandzug der Aufwickelrolle Bedingung: • Wiedergabe Meßgerät: • Cassetten-Drehmomentmesser (QZZSRKCT)	1. Cassetten-Drehmomentmesser in das Gerät montieren. 2. Gerät auf "Wiedergabe" schalten. NORMALWERT: 40 + 15 - 10 gr-cm
C Bandgeschwindigkeit Bedingung: • Wiedergabe • Betriebsart „Normalband“ Meßgerät: • Elektronischer Digitalzähler • Testband...QZZCWAT	Genauigkeit der Bandgeschwindigkeit 1. Den Meßaufbau zeigt Fig. 3. 2. Testband (QZZCWAT 3000 Hz) wiedergeben und Ausgangssignal dem Zähler zuführen. 3. Die Messung soll im mittleren Teil des Bandes erfolgrn. 4. Frequenz messen. 5. Beträgt die auf dem Testband aufgezeichnete Frequenz 3000 Hz, so ergibt sich die Genauigkeit nach folgender Formel: Genauigkeit der Bandgeschwindigkeit = $\frac{f - 3000}{3000} \times 100 (\%)$ worin f die gemessene Frequenz ist. NORMALWERT: ± 1,5% Einstellung: 1. Den mittleren Teil des Testbandes wiedergeben. 2, 3. Die Einstellschraube VR Vgl Fig. 1 so verstellen, daß eine Frequenz von 3000 Hz angezeigt wird. Schwankung der Bandgeschwindigkeit: Messung, wie oben beschrieben für Anfang, mittleren Teil und Ende des Testbandes wiederholen und Schwankung wie folgt bestimmen: Schwankung = $\frac{f_1 - f_2}{3000} \times 100 (\%)$ f_1 = Maximalwert f_2 = Minimalwert NORMALWERT: weniger als 1,0%

Gegenstand	Messung und Einstellung
D Einstellung der Eingangsabtastzeit Bedingung: • Stop Meßgerät: • Oszilloskop	1. Oszilloskop an Klemme (17) von IC601 anschließen. 2. Mit Oszilloskop die Zeit des Eingangsabtastsignals wie in Fig. 4 dargestellt messen. NORMALWERT: ca. 5msec—6,25msec 3. Falls der gemessene Wert vom oben genannten beträchtlich abweicht, wie folgt erforderliche Justierung vornehmen. Einstellung: 1. Die Stelle (B) unterbrechen und den Punkt (A) im Verdrahtungsplan auf der Hauptleiterplatte kurzschließen. (Siehe Seite 5). 2. Den Löschstrom messen. 3. Überprüfen, ob der gemessene Löschstrom zwischen 5msec und 6,25msec liegt. 4. Falls er außerhalb dieses Bereichs liegt, folgende Schritte ausführen. • Beträgt der Löschstrom weniger als 5msec den Punkt (B) kurzschließen. • Beträgt der Löschstrom mehr als 6,25msec die Stellen (A) unterbrechen.
E Kopfausrichtung und Justierung des Bandlaufs Bedingung: • Aufnahme und Wiedergabe Meßgerät: • Röhrenvoltmeter • Oszillograf • NF-Generator • Abschwächer • Widerstand (600Ω) • Testband (Bandlaufwe-Betrachtungsvorrichtung mit Spiegel) ... QZZCRD • Testband (azimuth)... QZZCFM • Kassettenband ... C-120	Im vorliegenden Gerät ist unsere eigene Doppelwinde mit 2-Motoren für verbesserte Grundleistung verwendet. Infolgedessen macht diese die Genauigkeit des Bandlaufs extrem hoch. Bei Gebrauch des Gerätes (besonders bei Justierung nach Erneuerung des kombinierten Kopfes oder der Druckrille-L) die unten beschriebenen Verfahren zum Aufrechterhalten der vorgeschriebenen Leistung sorgfältig einhalten. Hinweise • Druckrolle-L (Zufuhrseite) nicht justieren, außer dem absolut notwendigen Fall, da sie den Bezug für Höhenjustierungen des Aufnahme/Wiedergabe- und Löschkopfes liefert. • Wenn der Aufnahme/Wiedergabekopf und die Druckrolle-L beide erneuert werden, den Aufnahme/Wiedergabekopf vor Erneuerung und Justierung der Druckrolle-L erneuern und justieren. (Wenn die beiden gleichzeitig erneuert werden, erfährt die Justierung extreme Schwierigkeit, da kein Bezug für Bandlaufhöhe erhältlich ist). a) Justierung des Aufnahme/Wiedergabekopfes Grobe Justierung 1. Schrauben (A) und (B) voll im Uhrzeigersinn drehen. 2. Schraube (A) um eine Drehung und Schraube (C) um 4 Drehungen zurückstellen. 3. Schraube (B) so justieren, daß der Kopf zur Kopfgrundplatte parallel liegt. (Fig. 6-1). Feineinstellung — Höheneinstellung — 1. QZZCRD (Bandverlaufbeobachter) beladen und das Gerät auf PAUSE-Betriebsart stellen. Schrauben (B) und (C) feineinstellen. (Fig. 6-2). — Justierung der Bahnneigung — 1. Unter Einstellung des Gerätes auf WIEDERGABE-Betriebsart das Band während des Bandlaufs nicht gerollt oder verformt wird. (Bandlauf wird normwidrig beeinflußt, wenn Schraube (A) von der optimalen Position mehr als 1/2 Drehung abweicht. Also sorgfältig und genau justieren). 2. QZZCRD mit C-120 (RT-120LN usw.) ersetzen und Bandlauf über prüfen. (Fig. 7). Schraube (A) feineinstellen, wenn das Band während des Bandlaufs rollt oder verformt. Elektrische Überprüfung über Bandlauf — Überprüfung des Löschverhältnisses — 1. Das Prüfgerät wie in Fig. 8 gezeigt anschließen. 2. Bezugsblindtestband (QZZCRD) beladen. (Metallband). 3. Monitorwähler auf SOURCE-Position stellen und den Bandwähler auf METAL-Position stellen. 4. Vom AF-Oszillator über ATT zu LINE IN 100Hz-Signal geben. 5. ATT so justieren, daß der Ausgangspegel bei LINE OUT 0,7V erhält (Der Eingangspegel bei dieser Bedingung wird normaler Eingangspegel genannt). 6. ATT so justieren, daß der Eingangspegel 20dB über dem normalen Eingangspegel liegt.

Gegenstand	Messung und Einstellung																									
	Einstellung der Wiedergabefrequenz * Unterbrechen oder Kurzschließen der Schaltungsanschlußpunkte zur Einstellung des Frequenzganges bei Wiedergabe (siehe Fig. 13). * Der Frequenzgang mit kurzgeschlossenen Anschlußpunkten a (linker Kanal) und a' (rechter Kanal) und unterbrochenen Anschlußpunkten b (linker Kanal) und b' (rechter Kanal) wechselt je nach Bedingung an den Anschlußpunkten wie unten aufgeführt. Abwechselnde Kurzschließ-/Unterbrechbedingungen sind aufgrund der vor der Verschiffung vorgenommenen Feineinstellungen je nach Gerät verschieden. Falls Nachstellungen erforderlich sind, sollten die Ergebnisse möglichst genau den Standardwerten entsprechen. <table><tr><th colspan="2">Anschlußpunkt</th><th rowspan="3">4kHz</th><th rowspan="3">6kHz</th><th rowspan="3">8kHz</th><th rowspan="3">10kHz</th><th rowspan="3">12,5kHz</th></tr><tr><th>a (linker Kanal)</th><th>b (linker Kanal)</th></tr><tr><th>a' (rechter Kanal)</th><th>b' (rechter Kanal)</th></tr><tr><td>kurzgeschlossenen</td><td>kurzgeschlossenen</td><td>ungefähr + 0,2dB</td><td>ungefähr 0,5dB</td><td>ungefähr 0,7dB</td><td>ungefähr 0,8dB</td><td>ungefähr 0,4dB</td></tr><tr><td>unterbrochen</td><td>kurzgeschlossenen</td><td>ungefähr - 0,2dB</td><td>ungefähr - 0,6dB</td><td>ungefähr - 0,8dB</td><td>ungefähr - 1,2dB</td><td>ungefähr - 2,0dB</td></tr></table>	Anschlußpunkt		4kHz	6kHz	8kHz	10kHz	12,5kHz	a (linker Kanal)	b (linker Kanal)	a' (rechter Kanal)	b' (rechter Kanal)	kurzgeschlossenen	kurzgeschlossenen	ungefähr + 0,2dB	ungefähr 0,5dB	ungefähr 0,7dB	ungefähr 0,8dB	ungefähr 0,4dB	unterbrochen	kurzgeschlossenen	ungefähr - 0,2dB	ungefähr - 0,6dB	ungefähr - 0,8dB	ungefähr - 1,2dB	ungefähr - 2,0dB
Anschlußpunkt		4kHz	6kHz						8kHz	10kHz	12,5kHz															
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kurzgeschlossenen	kurzgeschlossenen	ungefähr + 0,2dB	ungefähr 0,5dB	ungefähr 0,7dB	ungefähr 0,8dB	ungefähr 0,4dB																				
unterbrochen	kurzgeschlossenen	ungefähr - 0,2dB	ungefähr - 0,6dB	ungefähr - 0,8dB	ungefähr - 1,2dB	ungefähr - 2,0dB																				
Ⓒ Wiedergabe-Verstärkung Bedingung: * Wiedergabe * Ausgangsregler: MAX. Meßgerät: * Röhrenvoltmeter * Oszillograf * Testband...QZZCFM	1. Den Meßaufbau zeigt Fig. 8. 2. Standard-Frequenz (QZZCFM 315Hz) vom Testband wiedergeben und Ausgangsspannung messen. 3. Messung an beiden Kanälen durchführen. NORMALWERT: Ungefähr 0,7V Einstellung: 1. Abweichungen können durch Abgleich von VR1 (linker Kanal) und VR2 (rechter Kanal) korrigiert werden. (S. Fig. 1). 2. Nach erfolgtem Abgleich ist der Frequenzgang bei Wiedergabe erneut zu kontrollieren.																									
Ⓓ Vorspannungsverlust Bedingung: * Aufnahme * Eingangsregler...MAX. * Ausgangsregler...MAX. * Bandbetriebsarten: Metall Meßgerät: * Röhrenvoltmeter * Oszillograf	Einstellung (zum Aufnahmeverstärker) 1. Den Meßaufbau zeigt Fig. 14. 2. Gerät auf Aufnahme schalten. 3. Sperrkreisspulen L105 (Linker Kanal) und L106 (Rechter Kanal) so abgleichen daß der Meßwert minimal wird. Einstellung (zum Wiedergabeverstärker) 1. Den Meßaufbau zeigt Fig. 15. 2. Auf Aufnahme schalten und den Monitor-Schalter auf „TAPE“ stellen. 3. Die Filterspulen L1 (linker Kanal) und L2 rechter Kanal) so abgleichen, daß an LINE OUT der kleinste Wert gemessen wird.																									
Ⓔ Löschstrom Bedingung: * Aufnahme * Bandbetriebsarten: Normal CrO₂ Metall Meßgerät: * Röhrenvoltmeter * Oszillograf	1. Den Meßaufbau zeigt Fig. 16. 2. Betriebsart auf Aufnahme und Bandwahlschalter auf Metallposition stellen, dann Spannung an Prüfpunkt 7 messen. 3. Löschstrom nach folgender Formel ermitteln: $\text{Löschstrom (A)} = \frac{\text{Die Spannung über beide Enden von R201}}{1(\Omega)}$ NORMALWERT: 185 ± 10mA (Metal) 4. Abweichungen können durch Abgleich von VR203 korrigiert werden.																									
Ⓢ Gesamt-frequenzgang Bedingung: * Aufnahme und Wiedergabe * Bandbetriebsarten: Normal CrO₂ Metall * Eingangsregler...MAX. * Ausgangsregler...MAX.	Anm.: Vor Messung und Abgleich des Gesamtfrequenzganges ist sicherzustellen, daß der Frequenzgang bei Wiedergabe korrekt ist (Vgl. entspr. Abschnitt). Einstellung bei mittleren und hohen Frequenzbereichen unter Verwendung von Vormagnetisierungsstrom 1. Den Meßaufbau zeigt Fig. 17. 2. Testband einlegen. 3. Den Monitor-Wahlschalter in die "source"-Position. 4. 1kHz vom NF-Generator über den Abschwächer dem NF-Eingang zuführen.																									

Gegenstand	Messung und Einstellung
Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer * Widerstand (600Ω) * Testband (Leerband) - QZZCRA für Normal - QZZCRX für CrO₂ - QZZCRZ für Metal	5. Den Abschwächer so einstellen, daß der Eingangspegel (-20dB) des Stand-Aufnahmepegels beträge (Standard-Aufnahmepegel = Anzeige "0" des Pegel-Meters). 6. Zu diesem Zeitpunkt beträgt der Ausgangspegel 0,07 V. 7. Den Monitor-Wahlschalter in die "tape"-Position stellen. 8. Die Aufnahme- und Wiedergabetaste drücken. 9. Tongenerator auf 1kHz, 40Hz, 200Hz, 4kHz, 8kHz und 14kHz und Ausgangspegel an LINE OUT ablesen. 10. Überprüfen, ob der Pegel jeder Frequenz in bezug auf 1kHz innerhalb der in Fig. 18 gezeigten Angabe liegt. Justierung Ⓐ: Wenn die Kurve den vorgeschriebenen Gesamt-frequenzgangbereich (Fig. 18) überschreitet, wie in Fig. 19 gezeigt: 1) Den Vormagnetisierungsstrom durch Drehen von VR 201 (linker Kanal) und VR 202 (rechter Kanal) erhöhen. (S. Fig. 1) 2) Die Schritte 8 und 10 zur Überprüfung wiederholen. (Wenn die Kurve dabei innerhalb des vorgeschriebenen Bereichs liegt (Fig. 18) mit den Schritten 11, 12 und 13 weiterfahren. 3) Wenn die Kurve den vorgeschriebenen Bereich (Fig. 18) noch immer überschreitet, den Vormagnetisierungsstrom weiter erhöhen, und die Schritte 8 und 10 wiederholen. Justierung Ⓑ: Wenn die Kurve unter den vorgeschriebenen Bereich für den Gesamtfrequenzgang (Fig. 18) absinkt, wie in Fig. 20 gezeigt: 1) Den Vormagnetisierungsstrom durch Drehen von VR201 (linker Kanal) und VR202 (rechter Kanal) reduzieren. 2) Die Schritte 8 und 10 zur Überprüfung wiederholen. (Falls die Kurve dabei innerhalb des vorgeschriebenen Bereichs in Fig. 18 liegt, mit den Schritten 11, 12 und 13 weiterfahren.) 3) Falls die Kurve noch immer unter den vorgeschriebenen Bereich (Fig. 18) absinkt, den Vormagnetisierungsstrom weiter reduzieren, und Schritte 8 und 10 wiederholen. 11. Gerät auf Betriebsart „CrO₂ band“ schalten. 12. Testband QZZCRX einlegen, und Signale von 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 10 kHz und 16 kHz aufzeichnen. Anschließend die Signale wiedergeben und prüfen, ob die Kurve innerhalb des Bereichs im Gesamtfrequenzgangdiagramm für CrO₂-band liegt. (Fig. 21). 13. Gerät auf Betriebsart „Metalband“ schalten. Test-band QZZCRZ einlegen und Signale von 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 10 kHz und 16 kHz aufnehmen. Anschließend die Signale wiedergeben und prüfen, ob die Kurve innerhalb des Bereichs im Gesamtfrequenzgangdiagramm für Metalband liegt. (Fig. 21). 14. Überprüfen, daß die Vormagnetisierungsströme ungefähr den folgenden Werten entsprechen, wenn der Betriebsart in die entsprechende Position gestellt ist. * Spannung vom Röhrenvoltmeter ablesen und Vormagnetisierungsstrom nach folgender Formel berechnen: $\text{Vormagnetisierungsstrom (A)} = \frac{\text{Spannung am Röhrenvoltmeter (V)}}{10 (\Omega)}$ NORMALWERT: Ungefähr 0.7mA (Normal position) Ungefähr 1.0mA (CrO₂ position) Ungefähr 1.6mA (Metal position) : Gemessen an TP9 (L-CH) und TP8 (R-CH) Einstellung bei hohen Frequenzbereichen mit der Entzerrerspule zur Aufnahmeentzerrung Verläuft der Frequenzgang bei mittleren Frequenzen flach und zeigt bei höheren Frequenzen einen scharfen Anstieg oder Abfall entsprechend Fig. 22 und Fig. 23, sind die folgenden Korrekturspulen zu erhöhen. L 103 (linker Kanal), L 104 (rechter Kanal)

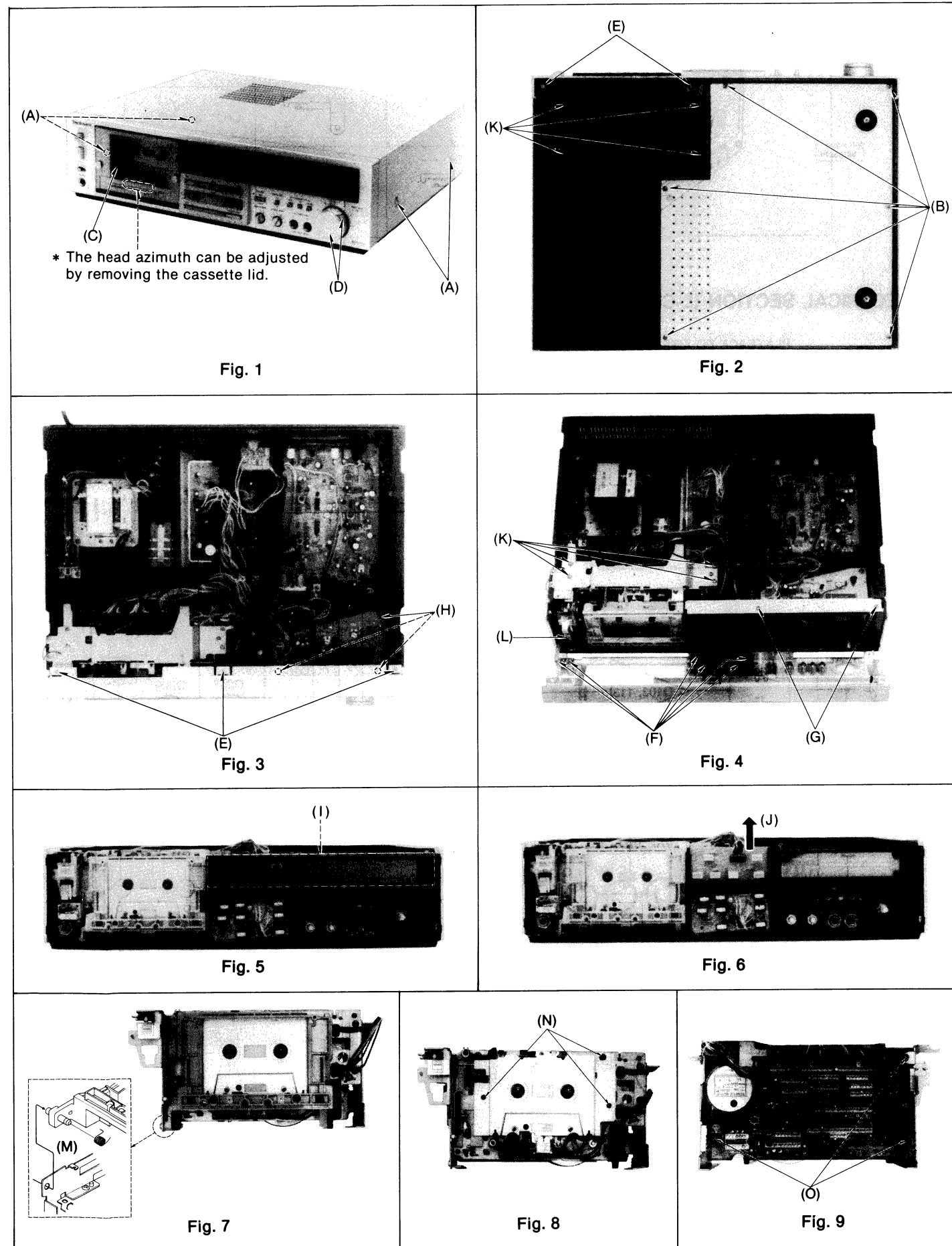
Gegenstand	Messung und Einstellung
Ⓚ Gesamt-frequenzgang Bedingung: * Aufnahme * Aufnahme * Bandbetriebsarten: Normal CrO₂ Metall * Eingangsregler...MAX. * Ausgangsregler...MAX. Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer * Oszillograf * Widerstand (600Ω) * Testband (Leerband) - QZZCRA für Normal - QZZCRX für CrO₂ - QZZCRZ für Metal	Ⓚ Gesamt-frequenzgang Bedingung: * Aufnahme * Aufnahme * Bandbetriebsarten: Normal CrO₂ Metall * Eingangsregler...MAX. * Ausgangsregler...MAX. Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer * Oszillograf * Widerstand (600Ω) * Testband (Leerband) - QZZCRA für Normal - QZZCRX für CrO₂ - QZZCRZ für Metal
Ⓛ Fluoreszenz Bedingung: * Aufnahme * Eingangsregler...MAX. * Ausgangsregler...MAX. Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer	Ⓛ Fluoreszenz Bedingung: * Aufnahme * Eingangsregler...MAX. * Ausgangsregler...MAX. Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer
Ⓜ Dolby Bedingung: * Aufnahme * Eingangsregler...MAX. * Ausgangsregler...MAX. Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer * Oszillograf * Widerstand (600Ω)	Ⓜ Dolby Bedingung: * Aufnahme * Eingangsregler...MAX. * Ausgangsregler...MAX. Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer * Oszillograf * Widerstand (600Ω)

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12,5kHz
ungefähr 0,4dB
ungefähr -2,0dB
und
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ndung

Gegenstand	Messung und Einstellung
Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer * Widerstand (600Ω) * Testband (Leerband) - QZZCRA für Normal - QZZCRX für CrO₂ - QZZCRZ für Metal	- Den Abschwächer so einstellen, daß der Eingangspegel (-20dB) des Stand-Aufnahmepegels beträge (Standard-Aufnahmepegel = Anzeige "0" des Pegel-Meters). - Zu diesem Zeitpunkt beträgt der Ausgangspegel 0,07V. - Den Monitor-Wahlschalter in die "tape"-Position stellen. - Die Aufnahme-und Wiedergabetaste drücken. - Tongenerator auf 1kHz, 40Hz, 200Hz, 4kHz, 8kHz und 14kHz und Ausgangspegel an LINE OUT ablesen. - Überprüfen, ob der Pegel jeder Frequenz in bezug auf 1kHz innerhalb der in Fig. 18 gezeigten Angabe liegt. Justierung A: Wenn die kurve den vorgeschriebenen Gesamt-frequenzgangbereich (Fig. 18) überschreitet, wie in Fig. 19 gezeigt.: - Den Vormagnetisierungsstrom durch Drehen von VR 201 (linker Kanal) und VR 202 (rechter Kanal) erhöhen. (S. Fig. 1) - Die Schritte 8 und 10 zur überprüfung wiederholen. (Wenn die Kurve dabei innerhalb des vorgeschriebenen Bereichs liegt (Fig. 18) mit den Schritten 11, 12 und 13 weiterfahren. - Wenn die Kurve den vorgeschriebene Bereich (Fig. 18) noch immer überschreitet, den Vormagnetisierungsstrom weiter erhöhen, und die Schritte 8 und 10 wiederholen. Justierung B: Wenn die Kurve unter den vorgeschriebenen Bereich für den Gesamtfrequenzgang (Fig. 18) absinkt, wie in Fig. 20 gezeigt: - Den Vormagnetisierungsstrom durch Drehen von VR201 (linker Kanal) und VR202 (rechter Kanal) reduzieren. - Die Schritte 8 und 10 zur Überprüfung wiederholen. (Falls die Kurve dabei innerhalb des vorgeschriebenen Bereichs in Fig. 18 liegt, mit den Schritten 11, 12 und 13 weiterfahren.) - Falls die kurve noch immer unter den vorgeschriebenen Bereich (Fig. 18) absinkt, den Vormagnetisierungsstrom weiter reduzieren, und Schritte 8 und 10 wiederholen. - Gerät auf Betriebsart „CrO₂ band“ schalten. - Testband QZZCRX einlegen, und Signale von 50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz, 10kHz und 16 kHz aufzeichnen. Anschließend die Signale wiedergeben und prüfen, ob die Kurve innerhalb des Bereichs im Gesamtfrequenzgangdiagramm für CrO₂-band liegt. (Fig. 21). - Gerät auf Betriebsart „Metalband“ schalten. Test-band QZZCRZ einlegen und Signale von 50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz, 10kHz und 16kHz aufnehmen. Anschließend die Signale wiedergeben und prüfen, ob die Kurve innerhalb des Bereichs im Gesamtfrequenzgangdiagramm für Metalband liegt. (Fig. 21). - Überprüfen, daß die Vormagnetisierungsströme ungefähr den folgenden Werten entsprechen, wenn der Betriebsart in die entsprechende Position gestellt ist. * Spannung vom Röhrenvoltmeter ablesen und Vormagnetisierungs-strom nach folgender Formel berechnen: $\text{Vormagnetisierungsstrom (A)} = \frac{\text{Spannung am Röhrenvoltmeter (V)}}{10 (\Omega)}$ NORMALWERT: Ungefähr 0.7mA (Normal position) Ungefähr 1.0mA (CrO₂ position) Ungefähr 1.6mA (Metal position) : Gemessen an TP9 (L-CH) und TP8 (R-CH) Einstellung bei hohen Frequenzbereichen mit der Entzerrspule zur Aufnahmeentzerung Verläuft der Frequenzgang bei mittleren Frequenzen flach und zeigt bei höheren Frequenzen einen scharfen Anstieg oder Abfall entsprechend Fig. 22 und Fig. 23, sind die folgenden Korrekturspulen zu erhöhen. L 103 (linker Kanal), L 104 (rechter Kanal)

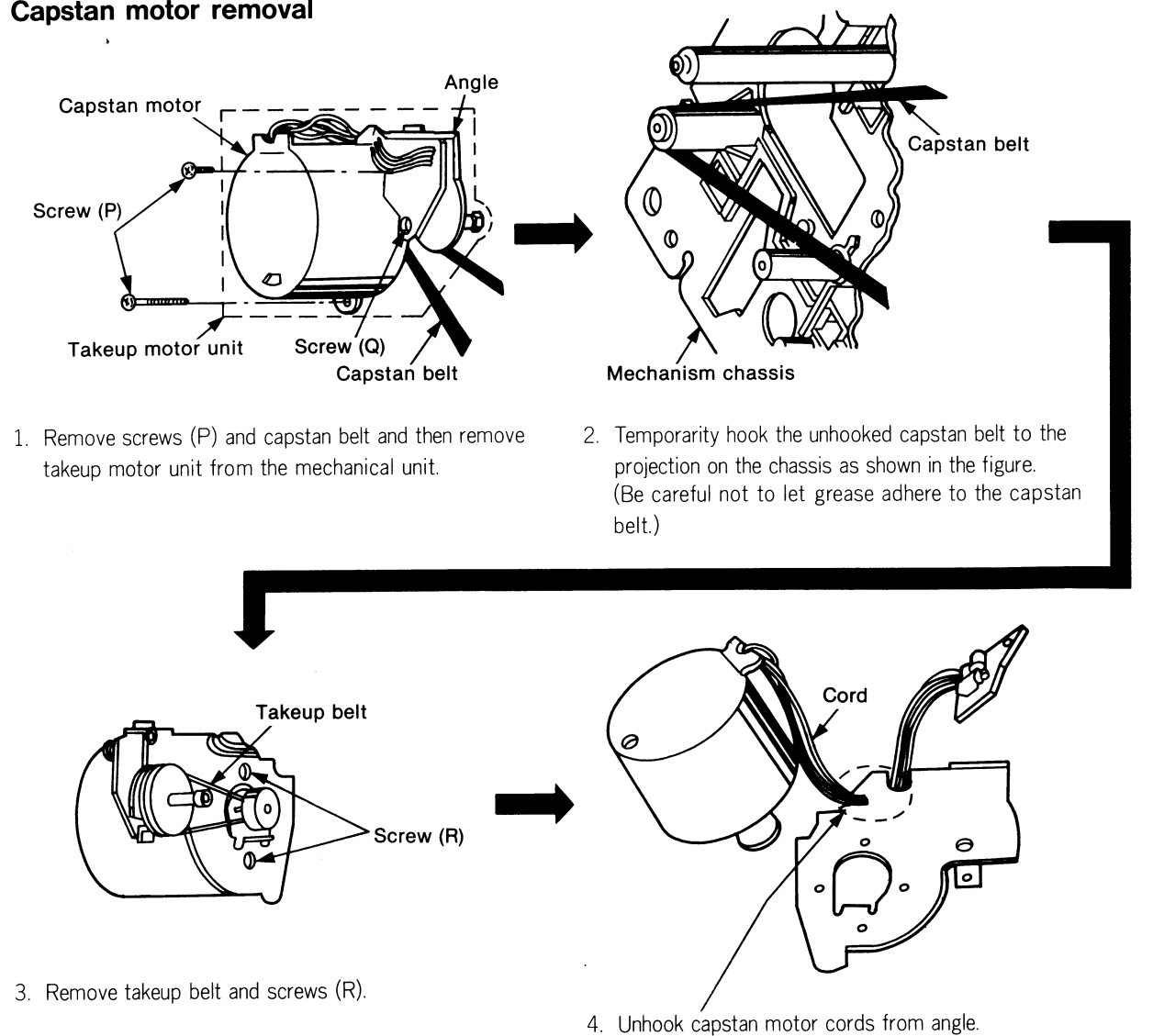
Gegenstand	Messung und Einstellung
K Gesamt-Verstärkung Bedingung: * Aufnahmekalibrierung...Mitte * Aufnahme und Wiedergabe * Bandbetriebsarten: Normal - CrO₂ - Metall * Eingangsregler...MAX. * Ausgangsregler...MAX. * Standard-Eingangspegel Mikrofon-72±3dB NF-Eingang-24±3dB Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer * Oszillograf * Testband (Leerband) QZZCRA für Normal QZZCRX für CrO₂ QZZCRZ für Metal	- Den Meßaufbau zeigt Fig. 24. - Testband (QZZCRA) in das Cassettenfach einsetzen. - Gerät auf „Aufnahme“ und Bandbetriebsarten auf „Normal“. - Über den Abschwächer 1kHz-Signal (-24dB) vom NF-Generator dem IN-Eingang zuführen. - ATT so justieren, daß Quellenmonitorpegel an LINE OUT 0,7V erreicht. - Dieses signal auf Testband aufnehmen. - Das aufgenommene Band abspielen und Ausgangspegel des Bandmonitors an LINE OUT auf VTVM messen. NORMALWERT: Ungefähr 0,7V (Normal) - Falls der gemessene Wert nicht der Toleranz liegt, die folgenden VR abgleichen. - Ab Punkt 4 wiederholen. - Den Bandsortenvähler in jede Position stellen. - Nacheinander das CrO₂ Testband (QZZCRX) und das Metallpartikel-Testband (QZZCRZ) benutzen. - Gerät auf Aufnahme schalten. - Die Aufnahme wiedergeben, und den Ausgangspegel an LINE OUT am Röhrenvoltmeter ablesen. NORMALWERT: Ungefähr 0,7V (CrO₂) (Metal) Einstellung der Gesamtverstärkung mit Metall- und CrO₂-Bändern * Einstellung der Gesamtverstärkung mit Metall- und CrO₂-Bändern muß nach der Einstellung einen normalen Bandes vorgenommen werden. * Einstellung der Gesamtverstärkung von Metall- und CrO₂-Bändern geschieht durch Unterbrechen oder kurzschließen der Anschlußpunkte für die Einstellung der Gesamtverstärkung auf der PCB. (Fig. 25). Die Gesamtverstärkung wird bei Kurzschließen um annähernd 0,6dB reduziert und steigt um annähernd 0,6dB bei Unterbrechen. Unterbrech- und Kurzschließbedingungen an den Anschlußpunkten variieren je nach Gerät aufgrund der vor der Verschiffung vorgenommenen Feineinstellungen. Falls Nachstellungen erforderlich sind, sollten die Ergebnisse den Standardwerten möglichst genau entsprechen.
L Fluorezenzmeter Bedingung: * Aufnahme * Eingangsregler...MAX. * Ausgangsregler...MAX. Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer	- Den Meßaufbau zeigt Fig. 24. - Wie in Fig. 25 gezeigt den Kollektor des Q302 an Masse anschließen. - Signal vor 1kHz (-24dB) an die Line IN-Buchse eingeben und Monitor-schalter auf Quelle-Position stellen. - ATT so abstimmen, daß der Ausgangspegel an der LINE OUT-Buchse 0,7V wird. (Der Eingangspegel in dieser Stellung wird als Standardpegel bezeichnet). - Justierung auf "-20dB". - Den Abschwächer so einstellen, daß der Eingangspegel -20dB des Stand-Aufnahmepegels beträge. - VR301 so abgleichen, daß im Bereich von -20dB±0,8dB das Segment -20dB aufleuchtet (NUR RECHTER KANAL) (S. Fig. 27). - Justierung auf "0dB". - ATT so abstimmen, daß der Ausgangspegel an der LINE OUT-Buchse, 0,7V wird. - VR302 so abgleichen, daß im Bereich von ±0,2dB um den Standard-pegel das Segment 0dB aufleuchtet (S. Fig. 28). - Die Anleitungsschritte 5 bis 6 zweimal wiederholen. - Die ATT einstellen; kontrollieren, ob alle Segmente aufleuchten, wenn der Eingangspegel 10dB höher als der Standardpegel ist (S. Fig. 29).
M Dolby-Schaltung Bedingung: * Aufnahme * Eingangsregler...MAX. * Ausgangsregler...MAX. Meßgerät: * Röhrevoltmeter * NV-Generator * Abschwächer * Oszillograf * Widerstand (600Ω)	Aufnahmesseite - Den Meßaufbau zieht Fig. 30. - Gerät in Stellung „Aufnahme“ betreiben und Dolby-Schalter ausschalten. Dem NF-Eingang ein 5kHz-Signal zuführen, daß an TP3 (Linker Kanal) und TP4 (Rechter Kanl) -34,5dB erhalten werden. - Prüfen, ob das Signal bei eingeschaltetem Dolby-Schalter um 8 (±2,5)dB größer ist als bei ausgeschaltetem Dolby-Schalter. Wiedergabeseite - Den Meßaufbau zeigt Fig. 31. - Gerät in Stellung „Aufnahme“ betreiben und Dolby-Schalter ausschalten. Dem NF-Eingang ein 5kHz-Signal zuführen, daß an TP 1 (Linker Kanal) und TP2 (Rechter Kanal) -34,5dB erhalten werden. - Prüfen, ob das Signal bei eingeschaltetem Dolby-Schalter um 8 (±2,5) kliner ist als bei ausgeschaltetem Dolby-Schalter.

DISASSEMBLY INSTRUCTIONS



Ref. No.	Procedure	To remove —	Remove —	Shown in fig. —
1	1	Case cover	• 4 screws..... (A)	1
2	2	Bottom cover	• 6 screws..... (B)	2
3	1→2→3	Front panel	• Cassette lid (C) • 2 control knobs..... (D) • 5 screws..... (E) • 6 screws..... (F)	1 1 2, 3 4
4	1→2→3→4	FL meter circuit board	• 2 screws..... (G) • 3 screws..... (H) • Meter cover and filter (I)	4 3 5
5	1→2→3→4→5	Mode indicator circuit board	• Slide in direction of arrow ... (J)	6
6	1→2→3→4→6	Mechanism unit	• 8 screws..... (K) • Power button..... (L)	2, 4 4
7	1→2→3→4→6→7	Cassette holder	• Slide in direction of arrow ... (M)	7
8	1→2→3→4→6→7→8	Mechanism cover	• 3 screws..... (N)	8
9	1→2→3→4→6→9	Main control circuit board	• 3 screws..... (O)	9

Capstan motor removal



CHIP PARTS REPAIR PROCEDURE
[MAIN CONTROL CIRCUIT BOARD]
(transistor, diode, resistor and capacitor, etc.)

A. Removal

- 1. Remove the solder from both ends of a chip using the solder sucker (RP8062).
- 2. While the soldering iron is attached to both ends of the chip, as shown in fig. 1, remove the chip by turning with tweezers.
 - * Make sure that the unit is turned OFF when checking the resistance and polarity of a chip. If technician can not check individual parts then we won't be able to service unit, and we might have to change complete foil board.

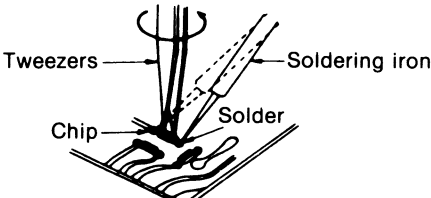


Fig. 1

B. Mounting

Place solder on the foil chip mounting, and solder the chip while applying the soldering iron in the direction of the arrow, as shown in fig. 2.

C. Precautions in mounting the chip

- 1. Do not heat the chip beyond 3 seconds.
- 2. Do not rub the electrode.
- 3. Use tweezers to prevent any damage to the surface.
- 4. It is recommended that a pencil-type soldering iron be used.
- 5. Maintain temperature control under 260°C (500°F) when soldering.
 - * Chip resistance (of not more than 100Ω) may vary greatly with the direction of mounting; therefore, mount the white side on the pattern side.
- 6. Do not re-use the tantalum capacitors or ceramic capacitors after removal (use new components).
- 7. Do not subject the components (chips) to excessive stress.

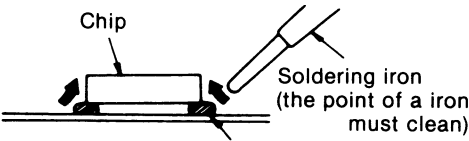


Fig. 2

TECHNICAL EXPLANATION

— AUTO TAPE SELECTOR —

This unit is equipped with an auto-tape selector system that detects these identification recesses and automatically selects the correct bias and equalization for Normal, CrO₂ and Metal tape varieties. Thus, the novice user can obtain the correct tape selector setting automatically to ensure proper recording and playback results.

Metal

Normal (γ-Fe₂O₃)

CrO₂ (or equivalent)

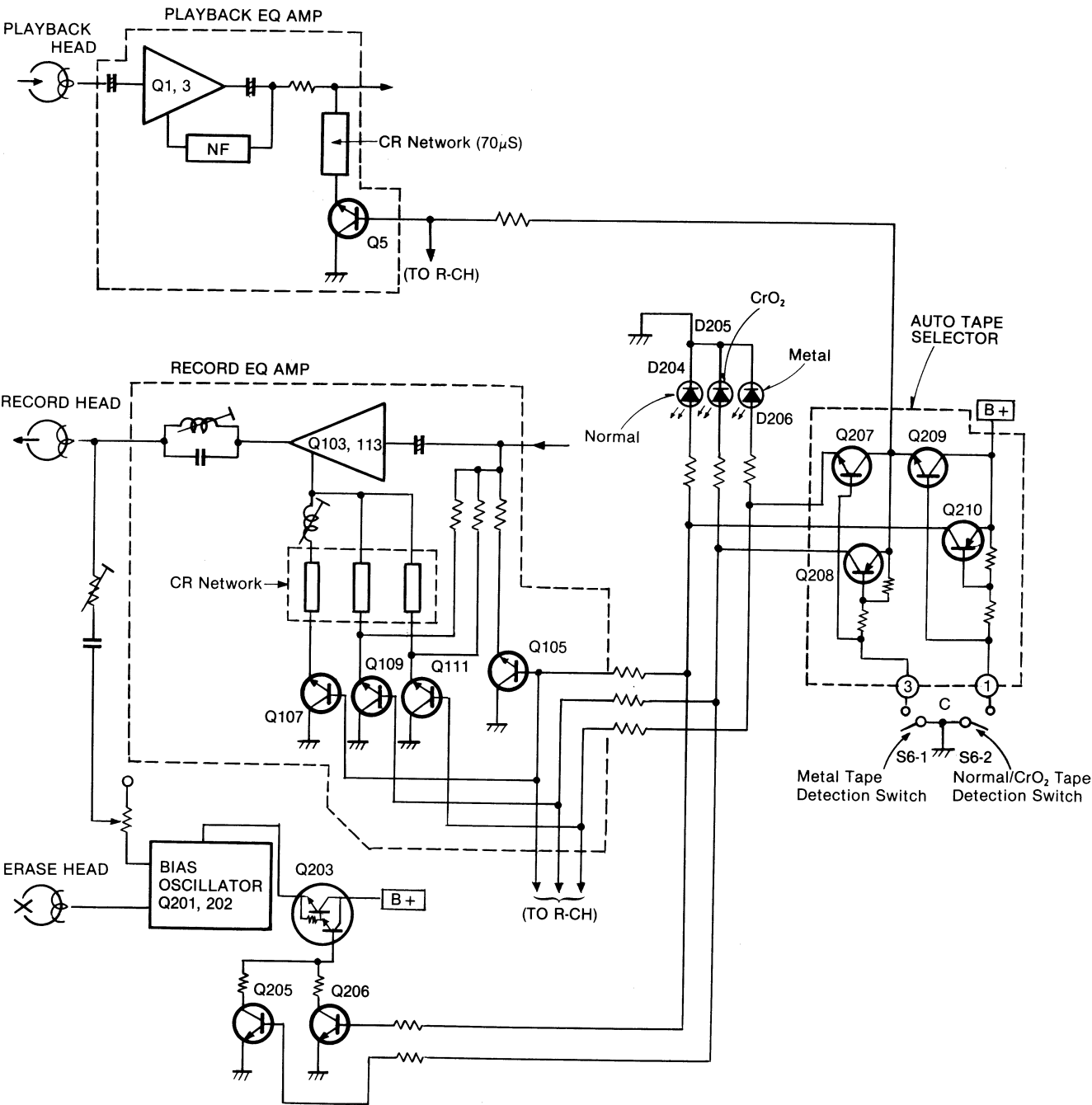
Type \ Recess	A	B
Metal	YES	YES
CrO ₂	YES	NO
Normal	NO	NO

— MECHANICAL SECTION —

Normal/CrO₂ tape detection claw
Normal/CrO₂ tape detection switch (S6-2)
Metal tape detection switch (S6-1)
Metal tape detection claw

S6-1	S6-2	Mode
		Normal tape mode
		CrO ₂ tape mode
		Metal tape mode

— ELECTRICAL SECTION (L-CH ONLY) —



MEASUREMENT AND ADJUSTMENT METHODS

Tape selector (Tape mode switching)

For measurement adjustment with test tapes without tape detection holes (A and B), switch tape modes as follows.

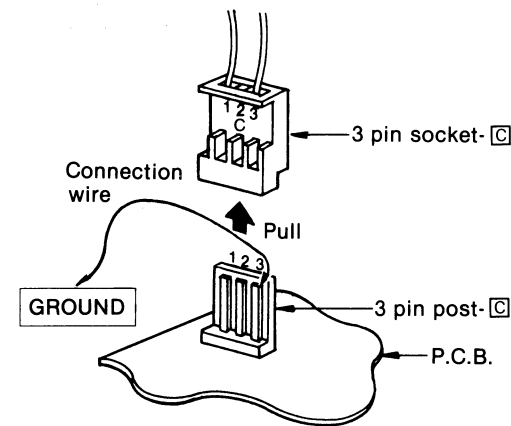
(For normal tape mode, just insert a normal tape into the cassette holder.)

* Metal tape mode setting:

Metal tape mode is obtained by disconnecting the 3 pin socket  from the 3 pin post  on the P.C.B. (Printed Circuit Board).

* CrO₂ tape mode setting:

First, disconnect the 3 pin socket  in the same way as above. Then, as illustrated in the figure right, connect the terminal-3 of the 3 pin post to the ground with a connection wire.



ADJUSTMENT PARTS LOCATION

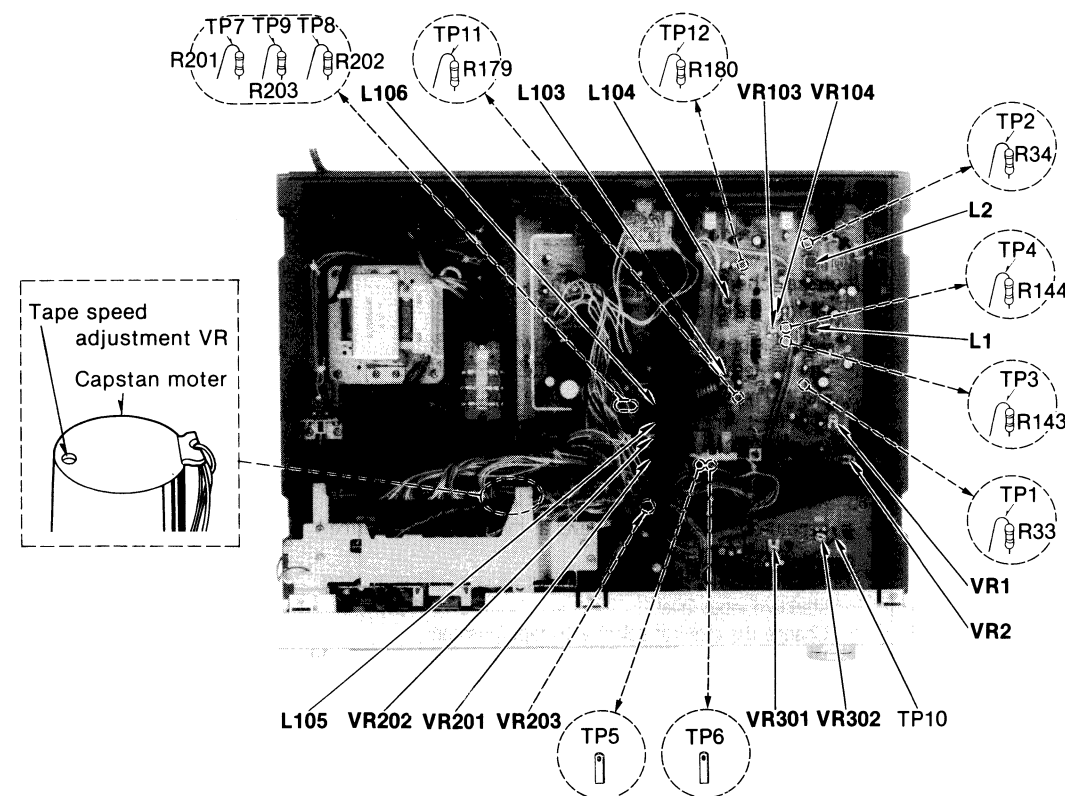
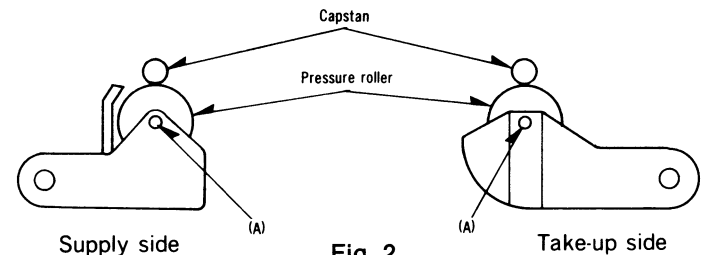
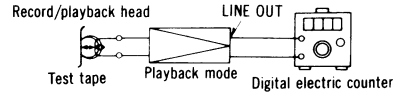
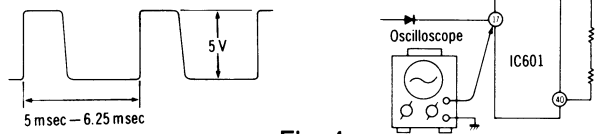
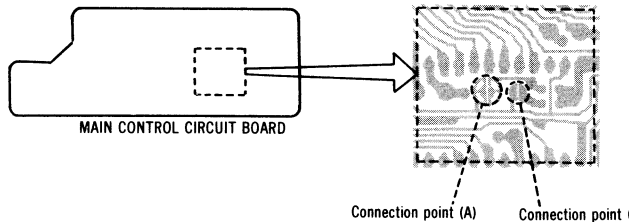
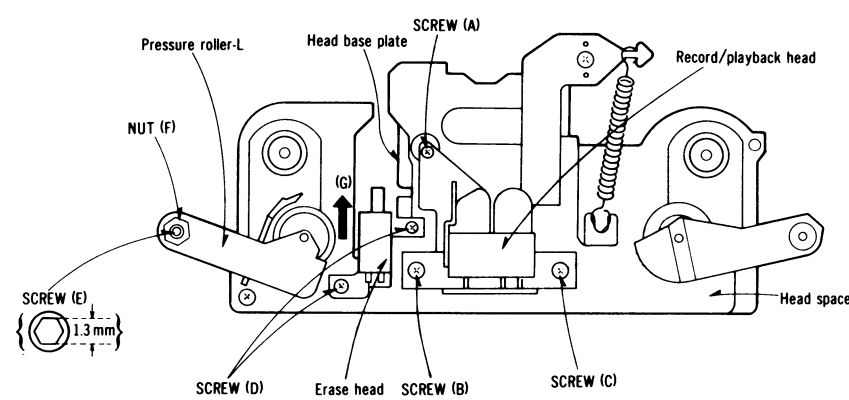
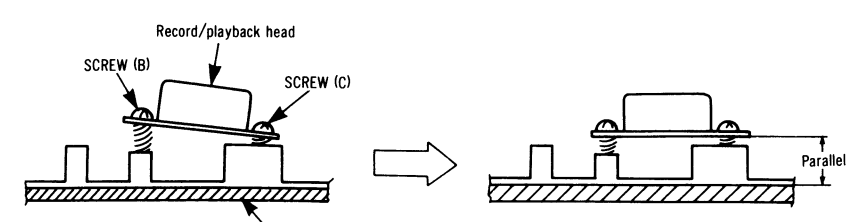


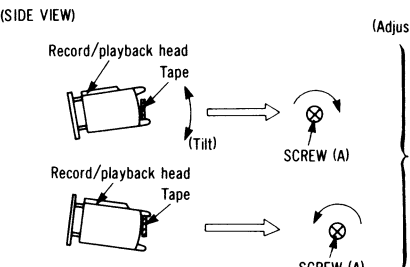
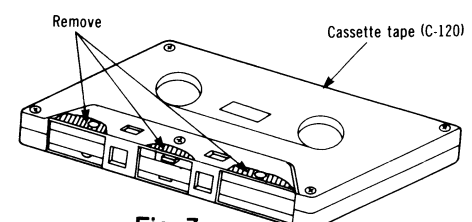
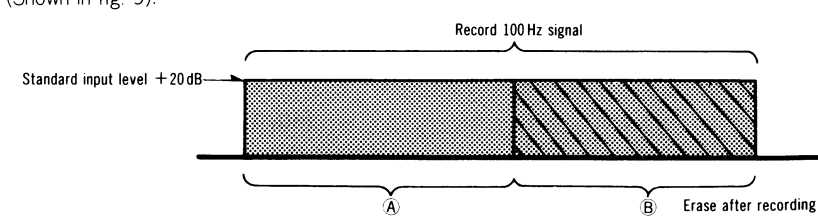
Fig. 1

NOTE: Set lever switches and controls in the following positions, unless otherwise specified.

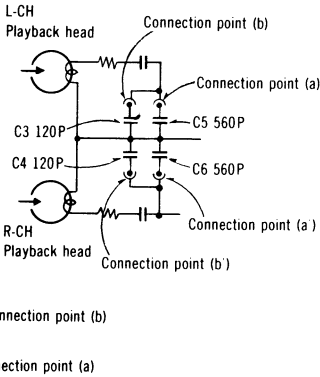
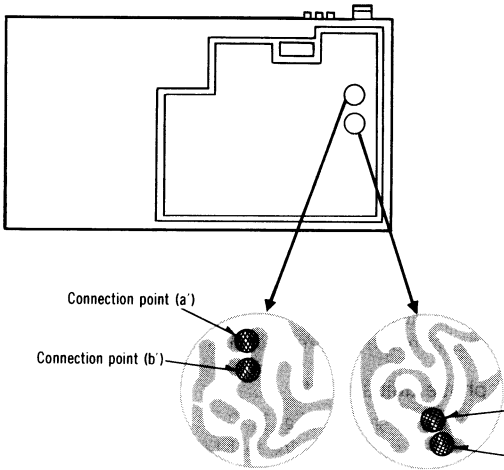
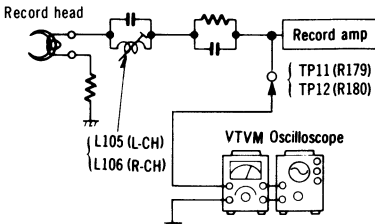
- Make sure heads are clean.
- Make sure capstan and pressure roller are clean.
- Judgeable room temperature: 20±5°C (68±9°F).
- Monitor selector: Tape.
- Bias adjustment control: Center.
- Input level controls: Maximum.
- Output level control: Maximum.
- Dolby NR selector: Out.
- Input selector: Line.
- Timer selector: OFF.
- Memory selector: OFF.

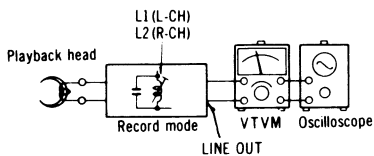
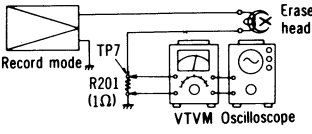
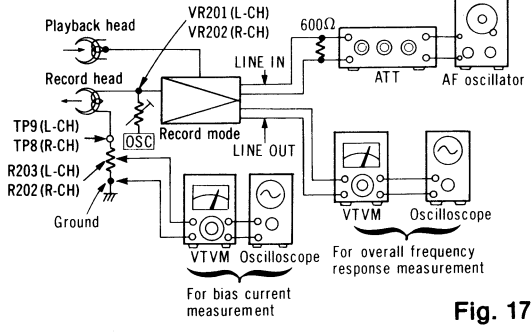
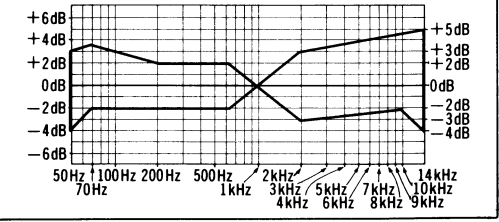
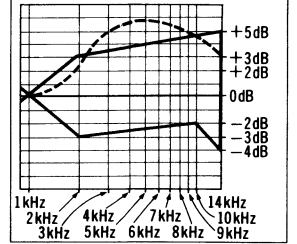
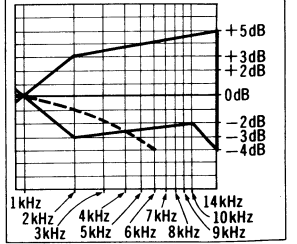
ITEM	MEASUREMENT & ADJUSTMENT
A Pressure of pressure roller Condition: * Playback mode Equipment: * Tension gauge (max. 500 gr)	1. Place UNIT into playback mode. 2. Hook tension gauge to pressure roller shaft top (A), and pull gauge in direction opposite to pressure of pressure roller against capstan (See fig. 2). 3. Read pressure indicated on gauge immediately when pressure roller moves away from capstan and stops rotating.  Fig. 2 Standard value: 130 ± 20 gr Standard value: 350 ± 50 gr
B Takeup tension Condition: * Playback mode Equipment: * Cassette torque meter (QZZSRKCT)	1. Mount cassette torque meter on UNIT. 2. Place UNIT into playback mode. Standard value: 40⁺¹⁵₋₁₀ gr·cm
C Tape speed Condition: * Playback mode * Normal tape mode Equipment: * Digital electronic counter * Test tape ... QZZCWAT	Tape speed accuracy 1. Test equipment connection is shown in fig. 3. 2. Playback test tape (QZZCWAT 3,000Hz), and supply playback signal to frequency counter. 3. Take measurement at middle section of tape. 4. Measure this frequency. 5. On the basis of 3,000Hz, determine value by following formula: $\text{Tape speed accuracy} = \frac{f - 3,000}{3,000} \times 100 (\%)$ where, f = measured value Standard value: ±1.5% Adjustment method 1. Playback the test tape (middle). 2. Adjust so that frequency becomes 3,000 Hz. 3. Tape speed adjustment VR shown in fig. 1. Tape speed fluctuation Make measurements in same manner as above (beginning, middle and end of tape), and determine the difference between maximum and minimum values and calculate as follows: $\text{Tape speed fluctuation} = \frac{f_1 - f_2}{3,000} \times 1000 (\%)$ f₁ = maximum value, f₂ = minimum value Standard value: Less than 1.0%  Fig. 3
D Input scanning time adjustment Condition: * Stop mode Equipment: * Oscilloscope	1. Connect oscilloscope to ⑪ terminal of IC601. 2. Measure the time of input scanning signal with oscilloscope as shown in fig. 4. Standard value: 5 msec — 6.25 msec 3. If the measured value is markedly different from the signal shown below, make the necessary adjustment as follows.  Fig. 4

ITEM	MEASUREMENT & ADJUSTMENT
	Adjustment 1. Open the point (B) and short the point (A) on the main circuit board in the circuit board diagram (See fig. 5). 2. Make measurement for wave form. 3. Make sure that the measured value is within 5 msec to 6.25 msec. 4. If it is beyond the value, carry out the following adjustments: • If the measured value is less than 5 msec, short the point (B). • If the measured value is more than 6.25 msec, open the point (A).  Fig. 5 Head alignment and tape running adjustment Condition: • Record/playback mode Equipment: • VTVM • Oscilloscope • AF oscillator • Resistor (600Ω) • Test tape ... QZZCRD (Tape path viewer with mirror) • Test tape ... QZZCFM (azimuth) • Cassette tape ... C-120 This unit uses our exclusive 2-motor double-capstan system for improved basic performance. Consequently, tape running accuracy is extremely high. When servicing this unit (especially, adjustments after replacement of combination head or pressure roller-L), carefully follow the procedures described below to maintain specified performance. Precautions • Do not adjust pressure roller-L (supply side) except when absolutely necessary, since it provides the reference for height adjustments of record/playback and erase heads. • When replacing both the record/playback head and pressure roller-L, replace and adjust the record/playback head before replacing and adjusting pressure roller-L. (If both are replaced simultaneously, adjustment becomes extremely difficult since no reference is available for tape running height). a) Record/playback head adjustment  Fig. 6 Rough adjustment 1. Turn screws (A) and (B) completely clockwise. 2. Return screw (A) by one turn and screw (C) by four turns. 3. Adjust screw (B) so that the head is parallel to the head base plate. (fig. 6-1).  Fig. 6-1

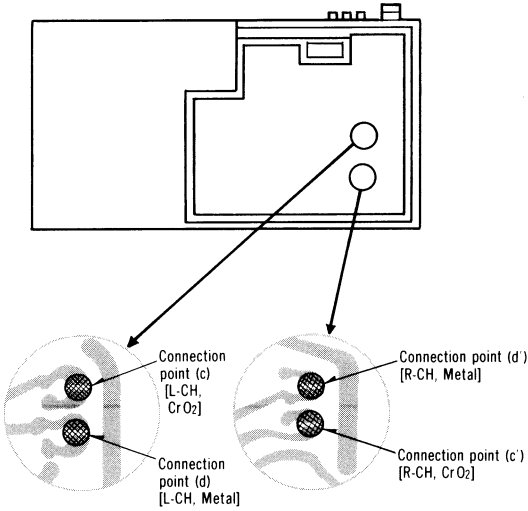
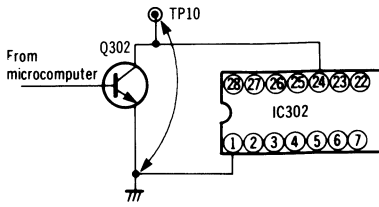
ITEM	MEASUREMENT & ADJUSTMENT
	Fine adjustment — Height adjustment — 1. Load QZZCRD (tape path viewer) and set the unit to pause mode. Fine-adjust screws (B) and (C) (fig. 6-2). — Tilt adjustment — 1. Run the tape by setting the unit to playback mode and adjust screw (A) so that tape does not curl or deform. (Tape running is adversely influenced if screw (A) is displaced by more than 1/2 turn from the optimum position. Adjust carefully and accurately.) 2. Replace QZZCRD with C-120 (RT-120LN, etc.), and check tape running (fig. 7). Fine-adjust screw (A) if tape curls or deforms during tape run. ● Adjustment direction of screw A (SIDE VIEW)  Fig. 6-3  Fig. 7 Electrical check on tape running — Erasing ratio check — 1. Test equipment connection is shown in fig. 8. 2. Load reference blank test tape (QZZCRZ) (Metal tape). 3. Set the monitor selector to source position and the tape selector to metal position. 4. Supply 100 Hz signal from AF oscillator through ATT to LINE IN. 5. Adjust the ATT so that the output level at LINE OUT becomes 0.7 V (The input level at this condition is termed the standard input level). 6. Adjust the ATT so that the input level is 20 dB above the standard input level. 7. Change the monitor selector to tape position. 8. Press the record and playback buttons. 9. After recording, erase portion (B) by setting the input level controls to minimum under a no-signal condition (Shown in fig. 9).  Fig. 9 10. Playback portions (A) and (B), and measure output levels (dB) at LINE OUT. 11. Perform measurements for both channels. Erasing ratio (dB) = Measured value of portion (A) - Measure value of portion (B) Reference value: Greater than 58 dB

ITEM	MEASUREMENT & ADJUSTMENT
	— 8 kHz playback output confirmation — 1. Make connections as shown in fig. 10. Fig. 10 2. After azimuth adjustment described below, playback test tape (QZZCFM) 8 kHz signal and measure LINE OUT output. 3. Make measurements for both channels. Reference value: Greater than 60mV 4. Fine-adjust screw (A) if the erasing ratio and playback output are out of the reference value (Refer to the tilt adjustment). Head azimuth adjustment L-CH/R-CH output balance adjustment 1. Make connections as shown in fig. 10. 2. Playback the 8 kHz signal from the test tape (QZZCFM). Adjust screw (C) in fig. 11 for maximum output L-CH and R-CH levels. When the output levels of L-CH and R-CH are not at maximum at the same time, readjust as follows. 3. Turn the screw shown in fig. 11 to find angles (A) and (C) (points where peak output levels for left and right channels are obtained). Then, locate the angle (B) between angles (A) and (C), i. e., a point where L-CH and R-CH output levels come together at maximum (Refer to figs. 11 and 11-1). Fig. 11 Fig. 11-1 L-CH/R-CH phase adjustment 4. Make connections as shown in fig. 11-2. 5. Playback the 8 kHz signal from the test tape (QZZCFM). Adjust screw (C) shown in fig. 11 so that pointers of the two VTVMs swing to maximum and a waveform as illustrated in fig. 11-3 is obtained on the oscilloscope. 6. After adjustment, lock head adjust screw with lacquer. Fig. 11-2 Fig. 11-3 b) Erase head adjustment 1. Loosen erase head screw (D), and raise the erase head to the maximum in the direction of arrow (G) (fig. 6). 2. Check that the erase head does not contact the cassette half in playback mode. c) Pressure roller-L (supply side) adjustment 1. Loosen screw (E) and adjust nut (F) vertical position to prevent tape from being curled or malformed during tape travel (See fig. 6).
● Playback frequency response Condition: • Playback mode • Normal tape mode • Output level control ... MAX Equipment: • VTVM • Oscilloscope • Test tape ... QZZCFM	Measurement 1. Test equipment connection is shown in fig. 8. 2. Place UNIT into playback mode. 3. Playback the frequency response test tape (QZZCFM). 4. Measure output level at 315Hz, 12.5kHz, 8kHz, 4kHz, 1kHz, 250Hz, 125Hz and 63Hz and compare each output level with the standard frequency 315Hz, at LINE OUT. 5. Make measurement for both channels. 6. Make sure that the measured value is within the range specified in the frequency response chart (fig. 12). Fig. 12

ITEM	MEASUREMENT & ADJUSTMENT																												
	Playback frequency response adjustment - Open or short the circuit's connection points to adjust playback frequency response (see fig. 13). - The frequency response when connection points (a) (L-CH) and (a') (R-CH) are shorted and connection points (b) (L-CH) and (b') (R-CH) are open, changes as short/open condition at connection points changes as described below (table 1) Short/open conditions, in turn, differ with sets due to the differences in fine adjustments made prior to shipping. If readjustments are required, set conditions so that results are as close to the standard value as possible. <table><tr><th colspan="2">Connection point</th><th>4 kHz</th><th>6 kHz</th><th>8 kHz</th><th>10 kHz</th><th>12.5 kHz</th></tr><tr><th>(a) (L-CH) (a') (R-CH)</th><th>(b) (L-CH) (b') (R-CH)</th><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Short</td><td>Short</td><td>around +0.2 dB</td><td>around 0.5 dB</td><td>around 0.7 dB</td><td>around 0.8 dB</td><td>around 0.9 dB</td></tr><tr><td>Open</td><td>Short</td><td>around -0.2 dB</td><td>around -0.6 dB</td><td>around -0.8 dB</td><td>around -1.2 dB</td><td>around -2.0 dB</td></tr></table> Table 1  Fig. 13	Connection point		4 kHz	6 kHz	8 kHz	10 kHz	12.5 kHz	(a) (L-CH) (a') (R-CH)	(b) (L-CH) (b') (R-CH)						Short	Short	around +0.2 dB	around 0.5 dB	around 0.7 dB	around 0.8 dB	around 0.9 dB	Open	Short	around -0.2 dB	around -0.6 dB	around -0.8 dB	around -1.2 dB	around -2.0 dB
Connection point		4 kHz	6 kHz	8 kHz	10 kHz	12.5 kHz																							
(a) (L-CH) (a') (R-CH)	(b) (L-CH) (b') (R-CH)																												
Short	Short	around +0.2 dB	around 0.5 dB	around 0.7 dB	around 0.8 dB	around 0.9 dB																							
Open	Short	around -0.2 dB	around -0.6 dB	around -0.8 dB	around -1.2 dB	around -2.0 dB																							
Ⓜ Playback gain Condition: • Playback mode • Output level control ... MAX Equipment: • VTVM • Oscilloscope • Test tape ... QZZCFM	- Test equipment connection is shown in fig. 8. - Playback standard recording level portion on test tape (QZZCFM 315Hz) and, using VTVM, measure the output level at LINE OUT jack. - Make measurement for both channels. Standard value: around 0.7V Adjustment - If measured value is not standard, adjust VR1 (L-CH), VR2 (R-CH) (See fig. 1). - After adjustment, check "Playback frequency response" again.																												
Ⓜ Bias leakage Condition: • Record mode • Input level controls ... MAX • Output level control ... MAX • Metal tape mode Equipment: • VTVM • Oscilloscope	Adjustment (For record amp) - Test equipment connection is shown in fig. 14. - Place UNIT into record mode. - Adjust trap coils L105 (L-CH), L106 (R-CH), so that measured value becomes minimum.  Fig. 14																												

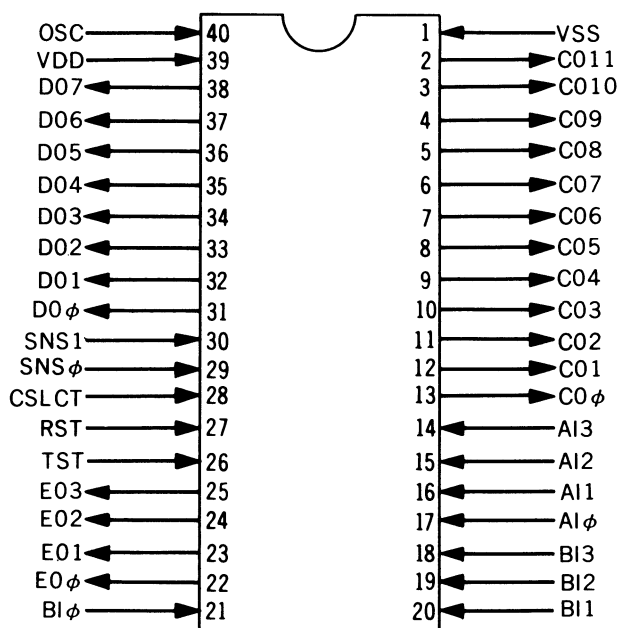
ITEM	MEASUREMENT & ADJUSTMENT
	Adjustment (For playback amp) 1. Test equipment connection is shown in fig. 15. 2. Turn the UNIT into record mode and set the monitor selector to tape position. 3. Adjust trap coils L1 (L-CH) and L2 (R-CH), so that measured values are minimized at LINE OUT.  Fig. 15
① Erase current Condition: • Record mode • Normal tape mode • CrO₂ tape mode • Metal tape mode Equipment: • VTVM • Oscilloscope	1. Test equipment connection is shown in fig. 16. 2. Place UNIT into record mode and tape selector to metal position and then measure voltage at test point 7. 3. Determine erase current with the following formula: $\text{Erase current (A)} = \frac{\text{Voltage across both ends of R201}}{1 (\Omega)}$ Standard value: 185 ± 10mA (Metal) 4. If measured value is not within standard adjust VR203.  Fig. 16
② Overall frequency response Condition: • Record/playback mode • Normal tape mode • CrO₂ tape mode • Metal tape mode • Input level controls ... MAX • Output level control ... MAX Equipment: • VTVM • AF oscillator • ATT • Resistor (600Ω) • Test tape (reference blank tape) ... QZZCRA for Normal ... QZZCRX for CrO₂ ... QZZCRZ for Metal	Note: Before measuring and adjusting, make sure of the playback frequency response (For the method of measurement, please refer to the playback frequency response). Adjustment at middle and high frequency range: Using bias current 1. Test equipment connection is shown in fig. 17. 2. Load reference blank test tape. 3. Set the monitor selector to "source" position. 4. Supply 1kHz signal from AF oscillator through ATT to LINE IN. 5. Adjust ATT so that input level is -20 dB below standard recording level (standard recording level = 0 VU). 6. At this time, LINE OUT level indicates 0.07 V. 7. Change the monitor selector to "tape" position. 8. Press the record and playback buttons. 9. Switch AF oscillator setting to 1kHz, 40Hz, 200Hz, 4kHz, 8kHz and 14kHz and read LINE OUT output levels. 10. Make sure that level of each frequency is within the specification described in fig. 18 based on a reference of 1kHz.  Fig. 17 Overall frequency response chart (Normal)  Fig. 18 For overall frequency response measurement For bias current measurement Adjustment ①: When the curve exceeds the overall frequency response chart specifications (fig. 18) as shown in fig. 19.  Fig. 19 Adjustment ②: When the curve falls below the overall frequency response chart specifications (fig. 18) as shown in fig. 20.  Fig. 20

ITEM	MEASUREMENT & ADJUSTMENT				
	1) Increase bias current by turning VR201 (L-CH) and VR202 (R-CH). (See fig. 1 on page 4.) 2) Repeat steps 8 and 10 to confirm. (Proceed to steps 11, 12 and 13 if the curve is now within the charted specifications in fig. 18.) 3) If the curve still exceeds the specifications (fig. 18), increase bias current further and repeat steps 8, 9 and 10. 1) Reduce bias current by turning VR201 (L-CH) and VR202 (R-CH). 2) Repeat steps 8 and 10 to confirm. (Proceed to steps 11, 12 and 13 if the curve is now within the charted specifications in fig. 18.) 3) If the curve still falls below the charted specifications (fig. 18), reduce bias current further and repeat steps 8, 9 and 10. 11. Place UNIT into CrO₂ tape mode. 12. Change test tape to QZZCRX, and record 50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz, 10kHz and 16kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for CrO₂ tapes (fig. 21). 13. Place UNIT into metal tape mode change test tape to QZZCRZ, and record 50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz, 10kHz, 12.5kHz and 16kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for metal tapes (fig. 21). Overall frequency response chart (CrO₂, Metal) Fig. 21 14. Confirm that bias currents are approximately as follows when the UNIT is set at different tape mode. * Read voltage on VTVM and calculate bias current by following formula: $\text{Bias current (A)} = \frac{\text{Value read on VTVM (V)}}{10 (\Omega)}$ Standard value: <table border="0"> <tr> <td>around 0.7 mA (Normal position)</td> <td rowspan="3">} : measured at TP9 (L-CH) and TP8 (R-CH)</td> </tr> <tr> <td>around 1.0 mA (CrO₂ position)</td> </tr> <tr> <td>around 1.6 mA (Metal position)</td> </tr> </table> Adjustment at high frequency range: Using the peaking coil for recording equalization When the frequency response is flat in the middle frequency range and makes a sharp rise or drop in the high frequency range, as shown in fig. 22 and fig. 23, adjust by turning the following peaking coils L103 (L-CH), L104 (R-CH). Fig. 22 Fig. 23	around 0.7 mA (Normal position)	} : measured at TP9 (L-CH) and TP8 (R-CH)	around 1.0 mA (CrO ₂ position)	around 1.6 mA (Metal position)
around 0.7 mA (Normal position)	} : measured at TP9 (L-CH) and TP8 (R-CH)				
around 1.0 mA (CrO ₂ position)					
around 1.6 mA (Metal position)					
Ⓚ Overall gain Condition: * Recording calibration ... center * Record/playback mode * Normal tape mode * CrO₂ tape mode * Metal tape mode * Input level controls ... MAX * Output level control ... MAX	1. Test equipment connection is shown in fig. 24. 2. Place the test tape (QZZCRA) in the cassette holder. 3. Place UNIT into record mode and normal tape mode. Fig. 24				

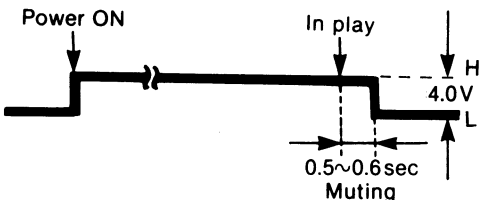
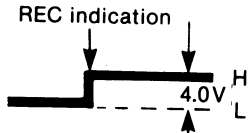
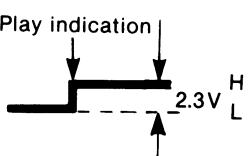
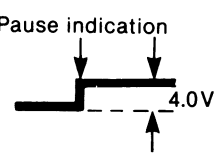
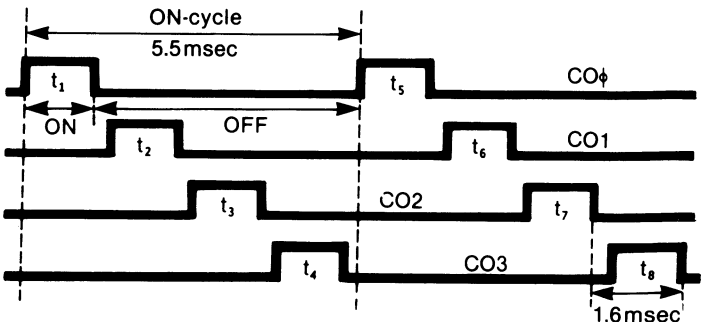
ITEM	MEASUREMENT & ADJUSTMENT
• Standard input level: MIC -72 ± 3 dB LINE IN ... -24 ± 3 dB Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Test tape (reference blank tape) ... QZZCRA for Normal ... QZZCRY for CrO₂ ... QZZCRZ for Metal	4. Supply 1 kHz signal (-24 dB) from AF oscillator, through ATT to LINE IN. 5. Adjust ATT until source monitor level at LINE OUT becomes 0.7 V. 6. Using test tape, make recording. 7. Playback recorded tape, and measure the tape monitor output level at LINE OUT on VTVM. Standard value: around 0.7 V(Normal) 8. If measured value is not within standard, adjust VR103 (L-CH), VR104 (R-CH). 9. Repeat from step (4). 10. Place UNIT into each tape mode. 11. Change test tape to CrO₂ (QZZCRX) and Metal (QZZCRZ). 12. Place UNIT into record mode. 13. Playback recorded tape, and measure the output level at LINE OUT on VTVM. Standard value: around 0.7 V(CrO₂ and Metal) Overall gain adjustment with metal and CrO₂ tapes 1. Overall gain adjustment with metal and CrO₂ tapes must be done after setting overall gain with normal tape. 2. Overall gain adjustment with metal and CrO₂ tapes is done by opening and shorting connection points for overall gain adjustment on the printed circuit board (fig. 25). Overall gain is reduced by approximately 0.6 dB when shorted connection points are opened. Open/short condition at connection points differ with set due to the differences in fine adjustments made prior to shipping. If readjustments are required, set conditions so that results are as close to the standard value as possible.  Fig. 25
● Fluorescent meter Condition: • Record mode • Input level controls ... MAX • Output level control ... MAX Equipment: • VTVM • AF oscillator • ATT	1. Test equipment connection is shown in fig. 24. 2. As shown in fig. 26, connect the collector of Q302 and ground. 3. Supply 1 kHz signal (-24 dB) to the LINE IN jack, then set the monitor switch to source position. 4. Adjust the ATT so that the output level at LINE OUT jack becomes 0.7 V (The input level at this condition is termed the standard input level). 5. Adjustment at "-20 dB". A. Adjust the ATT so that input level is -20 dB below standard recording level. B. Adjust VR301 so that the -20 dB segment lights up in the -20 dB ± 0.8 dB range (R-CH ONLY) (See fig. 27).  Fig. 26

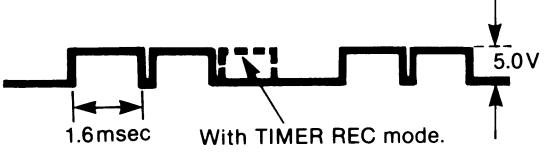
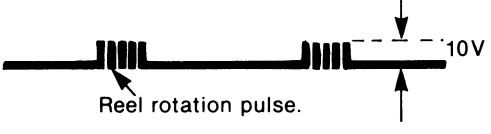
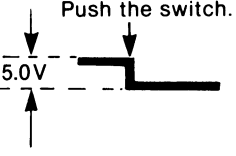
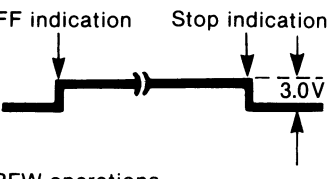
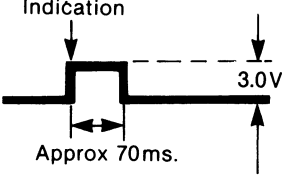
MN1400RZ (IC601) EACH TERMINAL FUNCTION AND WAVEFORM

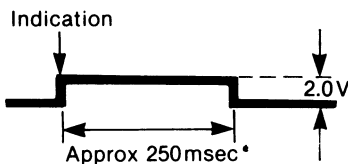
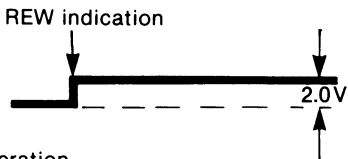
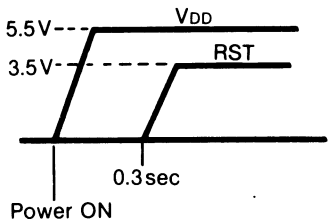
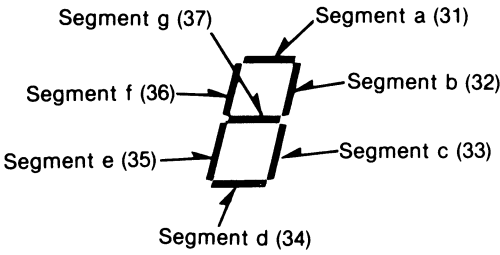
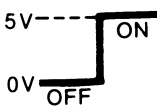
(BOTTOM VIEW)

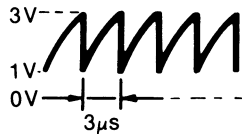


Terminal No.	Symbol	Name	Function/operation
1.	VSS	GND	
2.	CO11	Half SW OUT	Open Close It is interlocked with cassette half detection switch (Cassette half detection switch is open with cassette lid closed.)
3.	CO10	FL meter reset	Approx. 2sec This output is for resetting the Peak Hold of the FL Meter. The pulse 2.5msec. width is transmitted in approx. 2-second cycles, regardless of the mechanism operation.
4.	CO9	No connection	Not used.
5.	CO8	No connection	Not used.

Terminal No.	Symbol	Name	Function/operation
6.	CO7	Muting	 "L" level 0.5 to 0.6 second after "PLAY" finish. "H" level in PAUSE, FF, REW STOP. "L" level approx. 0.3 second after "REC PAUSE" is switched to REC. "L" level approx. 0.3 second after command in case PAUSE mode is set to REC command.
7.	CO6	REC indication	 "H" level simultaneously with REC indication. "H" level immediately after power is ON in TIMER REC mode. "H" level held if in TIMER REC position, when STOP AUTO RESET mechanism operates.
8.	CO5	PLAY indication	 "H" level simultaneously with PLAY indication. Same as the above for TIMER PLAY and STOP AUTO RESET.
9.	CO4	PAUSE indication	 "H" level simultaneously with PAUSE indication.
10.	CO3	FL grid & input SW. scan	
11.	CO2	FL grid & input SW. scan	
12.	CO1	FL grid & input SW. scan	
13.	COφ	FL grid & input SW. scan	

Terminal No.	Symbol	Name	Function/operation
14.	Ai3	Input SW read	Each switch is read in accordance with the scans of COϕ to 3. STOP SW, MEMORY STOP, TIMER REC and COUNTER RESET are connected to Aiϕ. If only STOP SW and MEMORY STOP are closed, their waveforms are as follows;  HALF SW and HALL IC output are connected to Ai3. The waveforms during FF or REW operation are as follows; 
15.	Ai2	Input SW read	
16.	Ai1	Input SW read	
17.	Ai ϕ	Input SW read	
18.	Bi3	REW key	Push the switch.  "H" in the normal case, "L" when the switch is pushed.
19.	Bi2	FF key	
20.	Bi1	PLAY key	
21.	Bi ϕ	STOP key	
29.	SNS ϕ	REC key	
30.	SNS1	PAUSE key	
22.	EO ϕ	Brake plunger	FF indication Stop indication  "H" during FF/REW operations.
23.	EO1	Trigger plunger	Indication  Approx 70ms. "H" until MODE SW is closed after the input to switch the mechanism, such as PLAY, PAUSE, STOP, etc. has been applied. (Approx. 70ms. depending on the mechanism condition.)

Terminal No.	Symbol	Name	Function/operation
24.	EO2	Motor CL	 Indication Approx 250msec * 2.0V "H" until MODE SW is changed from "close" to "open" following the indication that the mechanism mode has been changed.  REW indication 2.0V "H" in REW operation.
25.	EO3	Motor UNCL	Same as the above in MODE conversion. "H" during FF.
26.	TST	Chip test	Connected to GND.
27.	RST	RESET	Computer's RESET terminal. Reset is less than 0.8V.  5.5V 3.5V VDD RST 0.3sec Power ON
28.	CSLCT	CSLCT	Connected to VDD.
31.	DO ϕ	FL counter Segment a	 
32.	DO1	FL counter Segment b	
33.	DO2	FL counter Segment c	
34.	DO3	FL counter Segment d	
35.	DO4	FL counter Segment e	
36.	DO5	FL counter Segment f	
37.	DO6	FL counter Segment g	

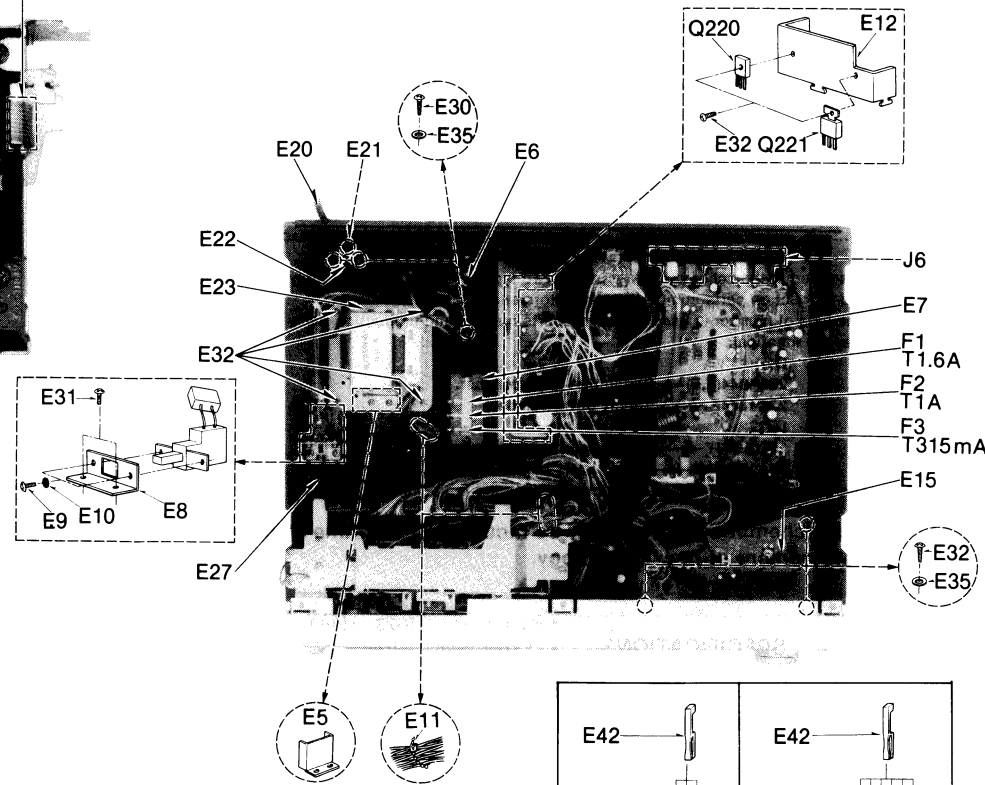
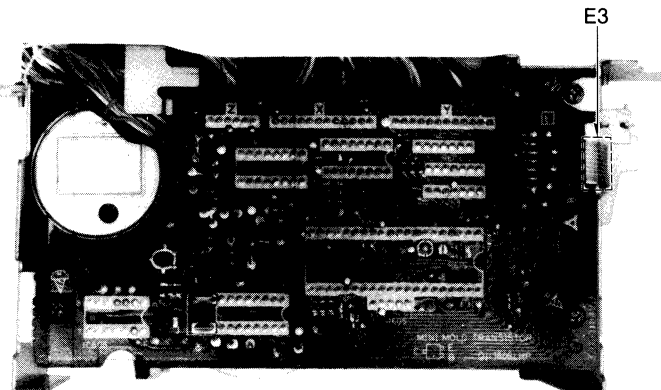
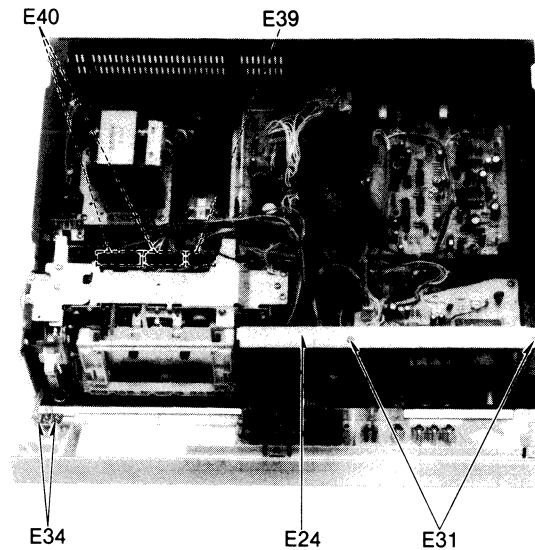
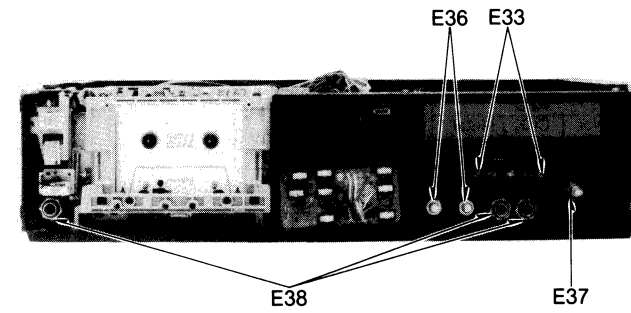
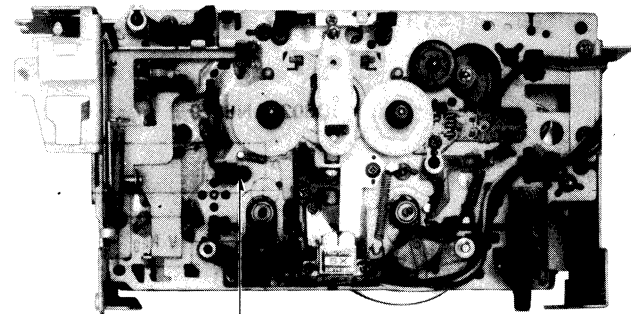
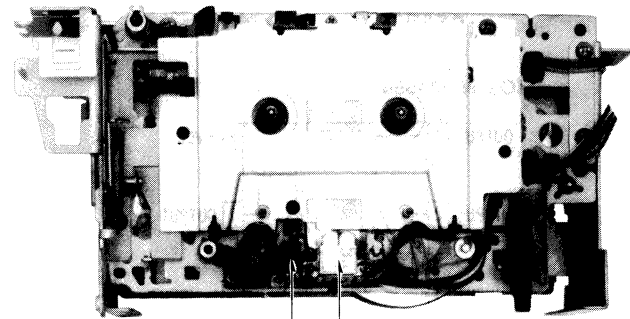
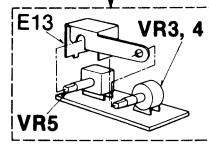
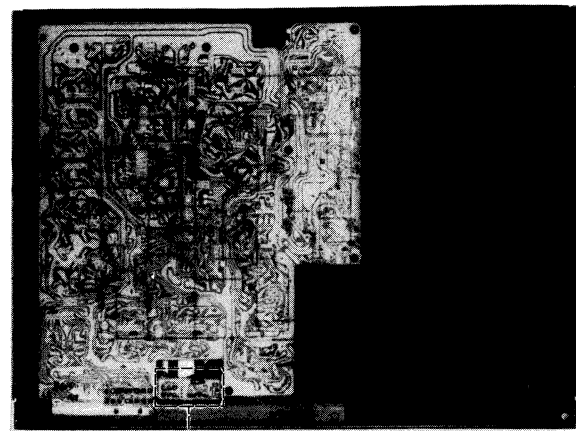
Terminal No.	Symbol	Name	Function/operation
38.	DO7	No connection	Not used.
39.	VDD	Power source	Operated at 4.5V to 6.0V.
40.	OSC	Oscillation terminal	 Oscillation is approx. 300kHz. Because the connection of a probe affects the terminal, nothing should be connected to this terminal for any other measurements. Use COϕ to 3 in measuring the computer's velocity; Approx. 155Hz in STOP condition.

TROUBLESHOOTING OF MAIN CONTROL CIRCUIT

Fault	Probable cause	Microcomputer terminal to check	Relevant mechanism parts	Relevant external parts
Mechanism dose not operate at all.				
FL not lighting	Microcomputer not operating			
	Power not supplied.	39 (VDD)		
	Clock not oscillating.	40 (OSC 10 to 13		C604, R613 to 615
	Reset locked.	27 (RST)		C606,D606,Q217, IC605
	Microcomputer normal. (Scan normal)			
	Connection to FL Driver.	10 to 13 31 to 37		
FL lighting OK. (MODE LED not lighting.)	Half SW. closed.	14 (Ai3)	Half SW.	D603
MODE indicator lighting OK.	Motor circuit faulty.	24, 25	Motor connection	IC602

Fault	Probable cause	Microcomputer terminal to check	Relevant mechanism parts	Relevant external parts
Mechanism defective.				
FF/REW reverse rotation.	Reverse connection of motor.	24, 25	Motor connection	IC602
FF/REW motor rotating, reel not rotating.	Brake plunger not being with drawn.	22 (EO ϕ)	Brake plunger disconnection, etc.	IC602
CAM continuous rotation in PLAY.	MODE SW. defective.	15 (Ai2)	MODE SW.	D605
Motor rotating in PLAY, but CAM's not switched.	Trigger plunger not operating	23 (EO1)	Trigger plunger	IC602
Motor rotates in reverse and does not stop after switching to PLAY or PAUSE.	PLAY or STOP SW, defective.	16 (Ai1) 17 (Ai ϕ)	STOP PLAY Leaf SW.	D602 D604
REC IND. does not light up. (Operation is normal)	LED or drive transistor defective.	7 (CO6)		IC602
PLAY IND. does not light up.	- do -	8 (CO5)		IC602
PAUSE IND. does not light up.	- do -	9 (CO4)		IC602
Not counting.	Hall IC faulty, buffer circuit faulty.	14 (Ai3)	Reel magnet	IC603 (Hall IC) Q601, D601
AUTO STOP functioning soon after operation begins.	Same as the above. (Not counting)			
No muting.	Muting output connection etc.	6 (CO7)		
No peak-resetting.	Connection	3 (CO10)		IC605
Accidental erase prevention mechanism not functioning.	Leaf SW	15 (Ai2)	Accidental erasure Leaf SW	D605
Operating during EJECT.	Half detection SW.	14 (Ai3)	Half detection SW.	D603

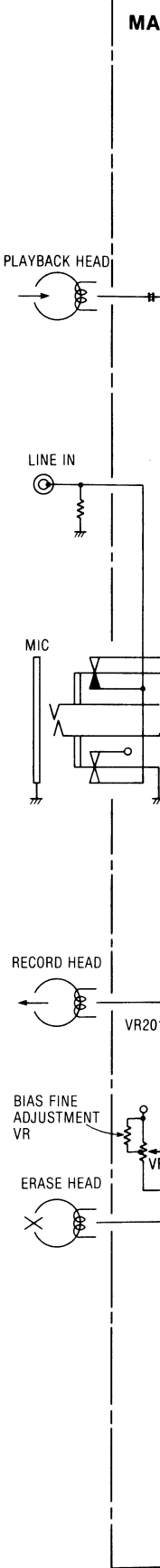
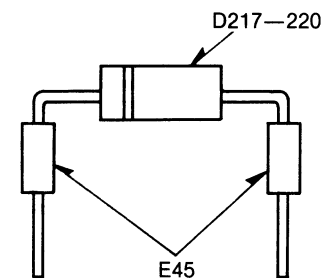
ELECTRICAL PARTS LOCATION



REPLACEMENT PARTS LIST

Important safety notice
Components identified by Δ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

Ref No.	Part No.	Part Name & Description
ELECTRICAL PARTS		
E 1	QWY4125ZA	Head (Record/Playback)
E 2	QWY2145	Head (Erase)
E 3	QJ11466RR	Switch-P.B
E 4	QJC0025	Earth Plate
E 5	QMAM0148	Transformer Angle
E 6	QJT4017	4 Pin Terminal Plate
E 7	Δ QTF1040	Fuse Holder
E 8	QMAM0144	Switch Angle
E 9	XSN3 + 6S	Screw $\varnothing 3 \times 6$
E 10	XWA3B	Washer
E 11	QTD1181	Wire Clamper
E 12	QTM0014	Heat Sink
E 13	QTSM0059	Shield Plate
E 14	QTSM0060	Shield Plate
E 15	QJT1067	Check Pin
E 16	QJP1921TN	3 Pin Post
E 17	QJP1922TN	6 Pin Post
E 18	QSiFM003F	FL Meter
E 19	QTSM0058	Shield Plate
E 20	[D] Δ SJA88	AC Power Cord
[For all European areas except United Kingdom.]		
[B] Δ QFC1205M		AC Power Cord
[For United Kingdom.]		
E 21	QBJ1425	Cord Bushing
E 22	QTD1164	Cord Bushing
E 23	QMF00018	Transformer Angle
E 24	QMAM0145	Pressure Angle
E 25	QKJM0068	Switch Rod (Dolby)
E 26	QKJM0069	Switch Rod (Monitor)
E 27	QKJM0070	Switch Rod (Power Switch)
E 30	XTN3 + 16B	Tapping Screw $\varnothing 3 \times 16$
E 31	XTN3 + 10B	Tapping Screw $\varnothing 3 \times 10$
E 32	XTN3 + 8B	Tapping Screw $\varnothing 3 \times 8$
E 33	XSN3 + 6S	Screw $\varnothing 3 \times 6$
E 34	XTN26 + 8B	Tapping Screw
E 35	XWG3	Washer
E 36	XNS7	Nut
E 37	XNS9	Nut
E 38	QNJ1070	Nut
E 39	QJP1970M	Plug
E 40	QJP1972M	Plug
E 41	QJS1922TN	Socket (6 Pin)
E 42	QJT1054	Contact
E 43	QJS1921TN	Socket (3 Pin)
E 44	XAMQ44P500	Pilot Lamp
E 45	QZE0003	Porcelain Tube



BLOCK DIAGRAM

LIST

mark have special
safety.
components, use
parts.

Part Name & Description

CAL PARTS

Head (Record/Playback)
Head (Erase)
Switch-P.B
Earth Plate
Transformer Angle
4 Pin Terminal Plate
Fuse Holder
Switch Angle
Screw $\Phi 3 \times 6$
Washer

Wire Clamper
Heat Sink
Shield Plate
Shield Plate
Check Pin
3 Pin Post
6 Pin Post
FL Meter
Shield Plate
AC Power Cord
ept United Kingdom.)
AC Power Cord

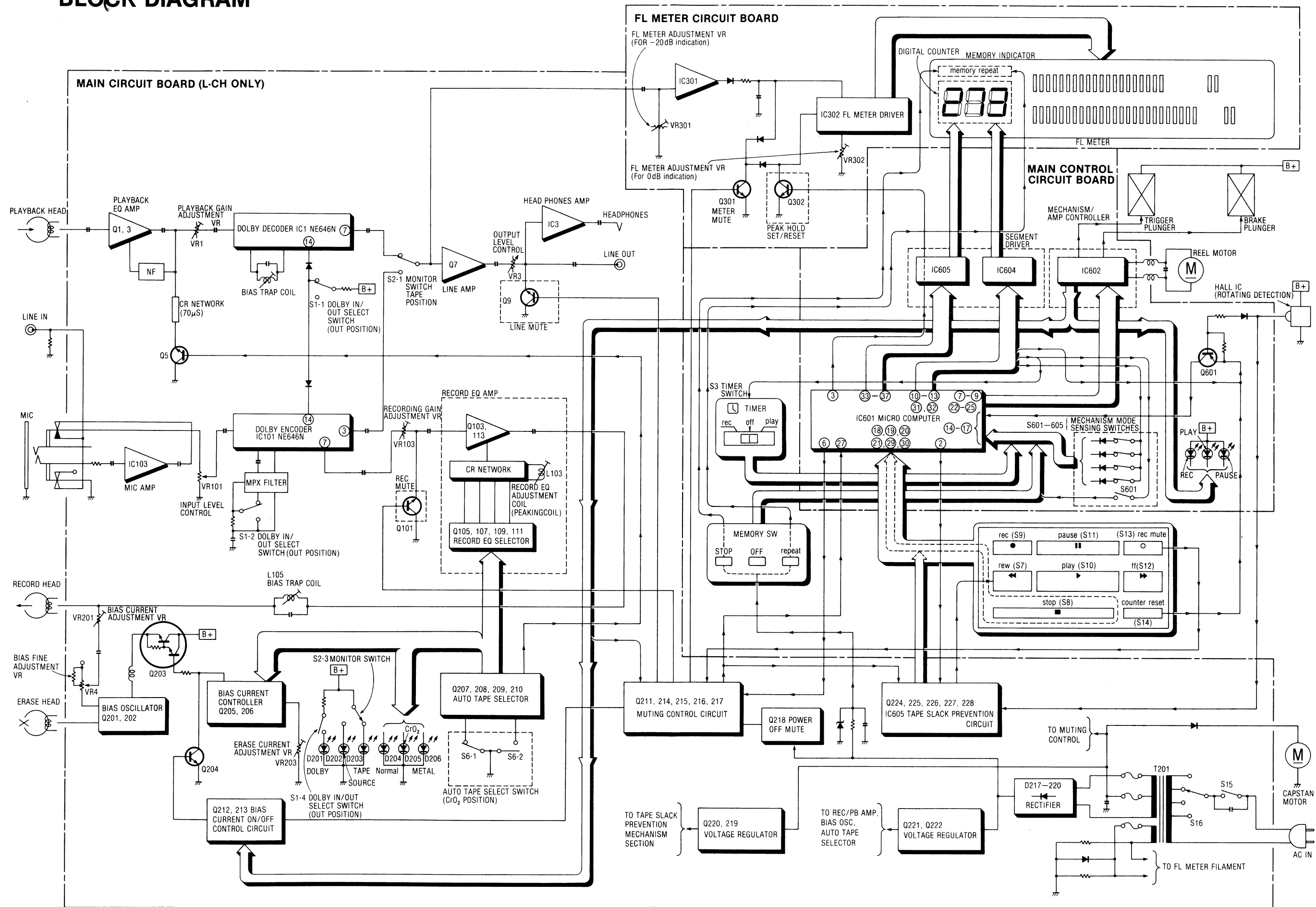
Cord Bushing
Cord Bushing
Transformer Angle
Pressure Angle
Switch Rod (Dolby)
Switch Rod (Monitor)
Switch Rod (Power Switch)
Tapping Screw $\Phi 3 \times 16$
Tapping Screw $\Phi 3 \times 10$
Tapping Screw $\Phi 3 \times 8$

Screw $\Phi 3 \times 6$
Tapping Screw
Washer
Nut
Nut
Nut
Plug
Plug
Socket (6 Pin)
Contact

Socket (3 Pin)
Pilot Lamp
Porcelain Tube

D217-220

E45



SCHEMATIC DIAGRAM MAIN SECTION

MAIN CIRCUIT BOARD
MAIN CIRCUIT BOARD

FL METER SECTION
FL METER CIRCUIT BOARD

D304, 305, 306
IS2473T77
[MA161]

Q301, 302
2SC945(P,K)
[2SC945-Q]

IC302
AN6870

L-CH LEVEL METER AMP.

D301, 303
IS2473T77
[MA161]

R-CH LEVEL METER AMP.

FL METER

REMOTE JACK BOARD

MECHANISM SECTION

IC605
M74LS00P

Q227, 228
2SC945(P,K)
[2SC945-Q]

Q224, 225, 226
2SC945(P,K)
[2SC945-Q]

Q221, 216
RD6R8EB2T
[RVDRD6R8EB]

Q218, 219, 220, 222, 223
IS2473T77
[MA161]

Q221
IS2473T77
[MA161]

Q221
IS2473T77
[MA161]

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IS2473T77
[MA161]

Q221
IS2473T77
[MA161]

Q221
IS2473T77
[MA161]

1	7.1V
2	7.1V
3	7.2V
4	7.1V
5	7.0V
6	7.1V
7	7.0V
8	0V

1	7.1V
2	7.2V
3	7.2V
4	7.2V
5	7.2V
6	7.2V
7	7.1V
8	7.2V

Normal	
E	
C	
B	0V

STOP PAUSE	
E	
C	
B	0.7V

Normal	
E	0.3V
C	5.9V
B	0.8V

Normal	
E	6.1V
C	20.5V
B	7.4V

NOTES:

- S1-S1-S4 Dolby IN/OUT select.
- S2-S2-S3 Monitor switch (show).
- S3 Timer switch (show).
- S4 Memory stop switch.
- S5 Memory repeat switch.
- S6-1, S6-2 Auto tape select switch.
- S7 Rewind switch.
- S8 Stop switch.
- S9 Record switch.
- S10 Playback switch.
- S11 Pause switch.
- S12 Fast Forward switch.
- S13 Rec mute switch.
- S14 Counter reset switch.
- S15 Power ON/OFF switch.
- S16 AC power voltage switch.
- VR1, 2 Playback gain adjust.
- VR3, 4 Output level control.
- VR5 Bias current adjust.
- VR101, 102 Input level controls.
- VR103, 104 Recording gain adjust.
- VR201, 202 Bias current adjust.
- VR203 Erase current adjust.
- VR301 FL meter adjuster.
- VR302 FL meter adjuster.
- L1, 2 Bias trap adjuster.
- L103, 104 Recording EQ adjust.
- L105, 106 Bias trap adjuster.
- Resistance are in ohms (Ω) 1/4 watt
- 1K = 1,000 Ω , 1M = 1,000K Ω .
- Capacity are in micro-farads (μ F) unless otherwise specified.
- P = Pico-farads.
- The mark (∇) shows test point. e.g.
- (∇) indicates B+ (bias).
- ($\rightarrow$) indicates the flow of playback.
- ($\rightarrow$) indicates the flow of recording.
- Important safety notice
- Components identified by Δ mark have to be replaced when replacing any of these components.
- Values indicated in $\square$ are DC voltage.
- All voltage values shown in circuitry are at NORMAL mode.
- STOP, tape mode at NORMAL, and
- PLAY Voltage at record/playback.

IC1			
1	7.1V	9	0V
2	7.1V	10	7.1V
3	7.2V	11	7.1V
4	7.1V	12	7.1V
5	7.0V	13	7.1V
6	7.1V	14	9.5V 7.2V
7	7.0V	15	9.3V 7.0V
8	0V	16	14.1V 14.4V
OUT		IN	Dolby

IC101			
1	7.1V	9	0V
2	7.2V	10	7.2V
3	7.2V	11	7.3V
4	7.2V	12	7.3V
5	7.2V	13	7.2V
6	7.2V	14	9.5V 7.2V
7	7.1V	15	9.2V 7.0V
8	7.2V	16	14.2V 14.4V
OUT		IN	Dolby

Q5		
	Normal	CrO ₂ , Metal
E	0V	
C	0V	
B	0V	0.7V

Q9		
	STOP PAUSE	SOURCE POSITION
E	0V	
C	0V	
B	0.7V	0V

Q201, 202		
	Normal	CrO ₂ , Metal
E	0.3V	0.4V 0.7V
C	5.9V	7.5V 14.4V
B	0.8V	0.9V 1.1V

Q203		
	Normal	CrO ₂ , Metal
E	6.1V	7.8V 14.9V
C	20.5V	20.5V 20.5V
B	7.4V	9.0V 16.2V

Q204			
	PLAY	REC	
		Nor	CrO ₂ , Metal
E	0V	0V	
C	0V	7.4V	9.0V 10.2V
B	0.7V	0V	

Q205			
	PLAY	REC	
		Nor	CrO ₂ , Metal
E	0V	0V	
C	0V	7.4V	0V 16.2V
B	0V	0V	0.7V 0V

Q206			
	PLAY	REC	
		Nor	CrO ₂ , Metal
E	0V	0V	
C	0V	7.4V	0V 16.2V
B	0V	0V	0.7V 0V

Q207		
	Normal	CrO ₂ , Metal
E	0V	16V
C	0V	17.8V 18.2V
B	0V	16.7V

Q208		
	Normal	CrO ₂ , Metal
E	0V	17.8V 18.2V
C	0V	17.7V 0V
B	0V	17.1V 18.1V

Q209		
	Normal	CrO ₂ , Metal
E	0V	17.7V 18.1V
C	20.5V	20.5V 20.5V
B	0V	18.4V 18.8V

Q210		
	Normal	CrO ₂ , Metal
E	20.5V	20.5V 20.5V
C	20.5V	0V 0V
B	19.8V	20.4V 20.4V

Q211			
	PLAY	REC	REC MUTE
E	8.2V	8.2V	—
C	7.3V	0V	7.3V 7.3V
B	10.0V	8.1V	7.5V —

Q212	
	PLAY REC
E	0V
C	10.5V 0V
B	0V 0.7V

Q213	
	PLAY REC
E	13.4V 11V
C	0V 11V
B	13.4V 10.4V

Q214			
	PLAY	REC	PAUSE
E	8.2V	8.2V	—
C	0V	0V	8V
B	8.8V	8.8V	7.5V

Q215		
	STOP	PLAY REC SOURCE
E	—	8.2V
C	8V	0V
B	7.4V	8.1V

Q216		
	STOP	PLAY REC SOURCE
E	—	0V
C	0V	8.1V
B	0.7V	0V

Q227, 228		
E	0V	
C	5.3V	★ 0V
B	0V	★ 0.7V

REC/PLAY Voltage at record/playback mode.
 Normal Voltage at Normal tape mode.
 CrO₂ Voltage at CrO₂ tape mode.
 Metal Voltage at Metal tape mode.
 REC-MUTE Voltage at record mode (Rec mute: ON).
 Power OFF Voltage at muting mode (During power off muting circuit is operating).
 STOP Voltage at stop mode.
 Dolby IN Voltage at dolby in mode.
 Source Voltage at source mode.
 Pause Voltage at pause mode.
 ★ Voltage at tape slack prevention circuit (during tape slack prevention circuit is operating).

• Described in the schematic diagram are two types of numbers; the supply parts number and production parts number for transistors and diodes.
 One type of number is used for supply parts number and production parts number when they are identical.

e.g. Q1
 25C1844(E,F) ← Production parts number
 25C1844E ← Supply parts number
 D212
 1S2473T77 ← Production parts number
 [MA161] ← Supply parts numbers

• The supply parts number is described alone in the replacement parts list.

• This schematic diagram may be modified at any time with the development of new technology.

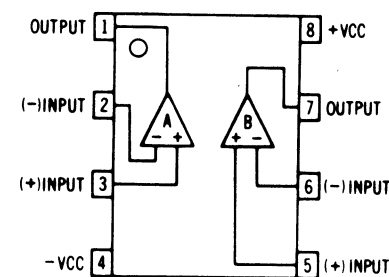
SPECIFICATIONS

Playback S/N ratio * Test tape ... QZZCFM	Greater than 47 dB
Overall distortion * Test tape ... QZZCRA for Normal ... QZZCRX for CrO ₂ ... QZZCRZ for Metal	Less than 2.3% (Normal) Less than 3.0% (CrO ₂ , Metal)
Overall S/N ratio * Test tape ... QZZCRX	Greater than 45 dB (without NAB filter)

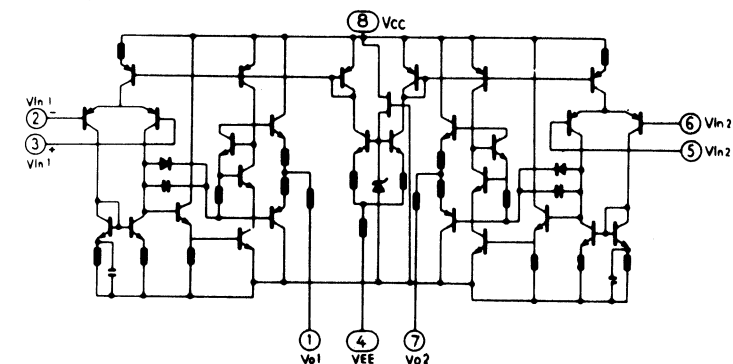
* Input level controls... MAX
 * Output level control... MAX

EQUIVALENT CIRCUIT

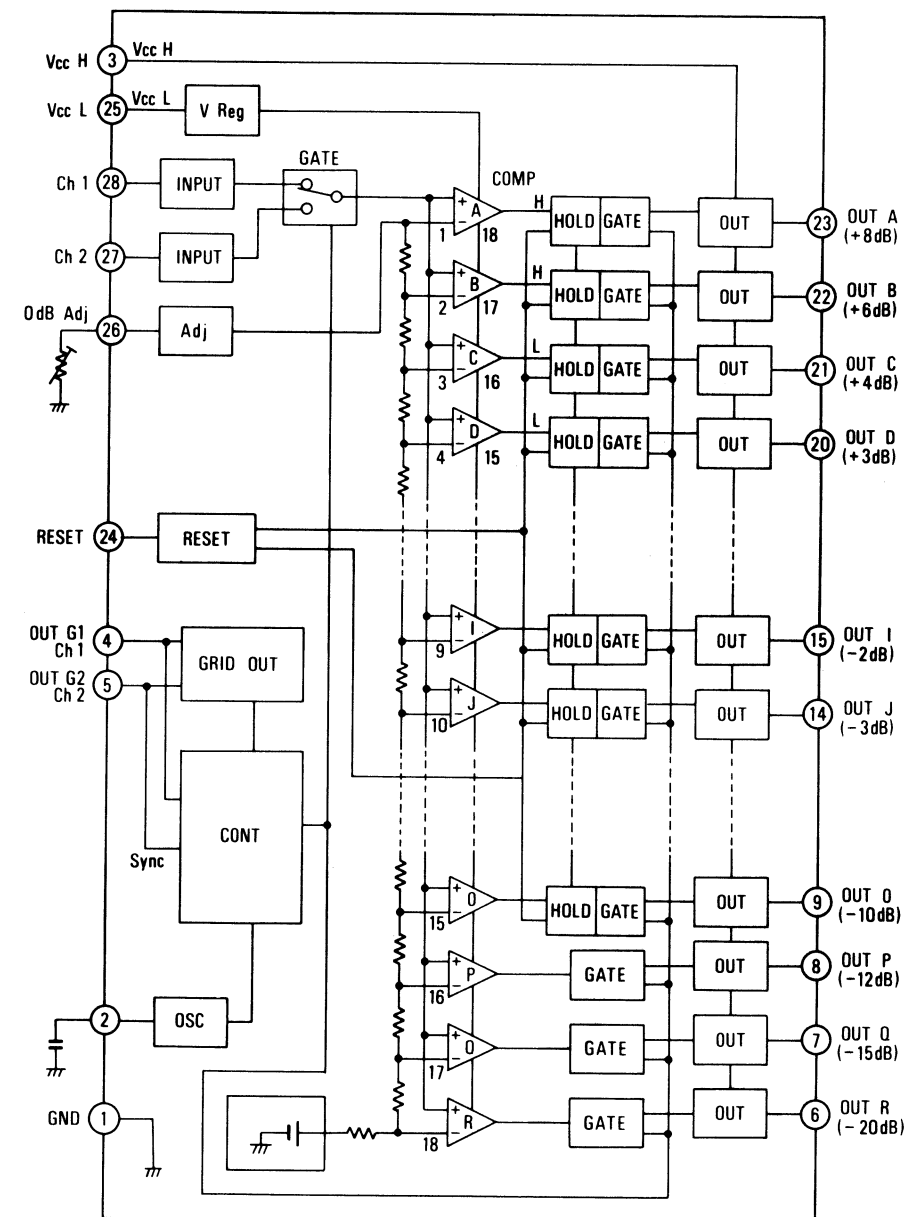
IC3 NJM4556



IC3, 401 AN6552



IC302 AN6870

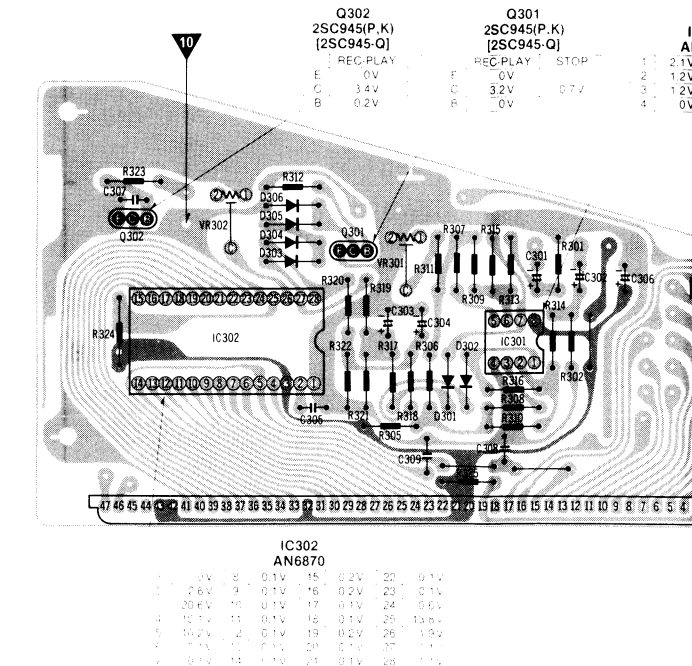
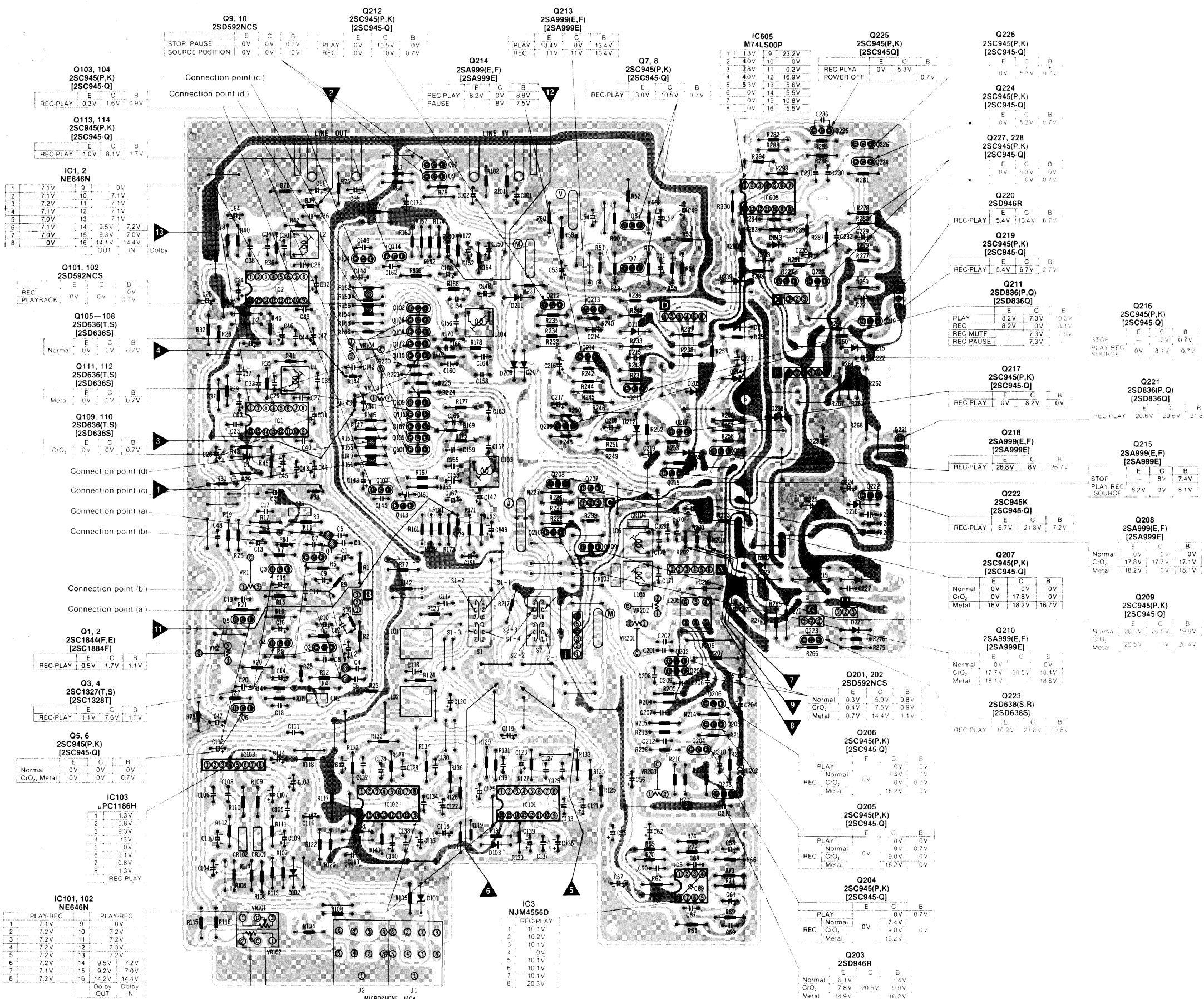


- NOTES:**
- S1-1-S1-4Dolby IN/OUT select switch (shown in OUT position).
 - S2-1-S2-3Monitor switch (shown in TAPE position).
 - S3Timer switch (shown in OFF position).
 - S4Memory stop switch (shown in OFF position).
 - S5Memory repeat switch (shown in OFF position).
 - S6-1, S6-2Auto tape select switch (shown in Metal position).
 - S7Rewind switch.
 - S8Stop switch.
 - S9Record switch.
 - S10Playback switch.
 - S11Pause switch.
 - S12Fast Forward switch.
 - S13Rec mute switch.
 - S14Counter reset switch.
 - S15Power ON/OFF switch (shown in OFF position).
 - S16AC power voltage select switch.
 - VR1, 2Playback gain adjustment VR.
 - VR3, 4Output level controls.
 - VR5Bias current adjustment VR (front panel).
 - VR101, 102Input level controls.
 - VR103, 104Recording gain adjustment VR.
 - VR201, 202Bias current adjustment VR.
 - VR203Erase current adjustment VR.
 - VR301FL meter adjustment VR (0dB indication).
 - VR302FL meter adjustment VR (-20dB indication).
 - L1, 2Bias trap adjustment coil (playback side).
 - L103, 104Recording EQ adjustment coil.
 - L105, 106Bias trap adjustment coil (record side).
 - Resistance are in ohms (Ω) 1/4 watt unless specified otherwise.
 1K = 1,000Ω, 1M = 1,000KΩ.
 - Capacity are in micro-farads (μF) unless specified otherwise.
 P = Pico-farads.
 - The mark (▼) shows test point. e.g. ▼ = test point 1.
 - () indicates B+ (bias).
 - () indicates the flow of playback signal.
 - () indicates the flow of recording signal.
 - Important safety notice
 Components identified by Δ mark have special characteristics important for safety.
 When replacing any of these components, use only manufacturer's specified parts.
 - Values indicates in [] are DC voltage between the chassis and electrical parts.
 - All voltage values shown in circuitry are under no signal condition.
 Unless otherwise specified, voltage measurement conditions are that tape travel is at
 STOP, tape mode at NORMAL, and Dolby NR switch at OFF.
 - REC Voltage at record mode.
 - PLAY Voltage at playback mode.

CIRCUIT BOARD

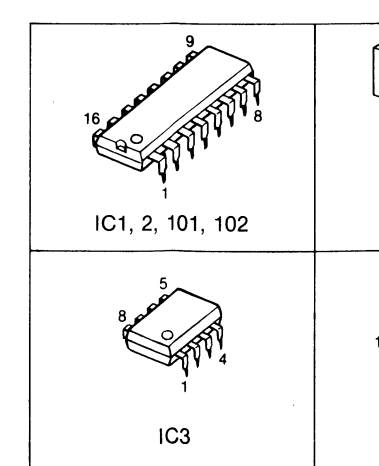
MAIN CIRCUIT BOARD

FL METER CIRCUIT BOARD

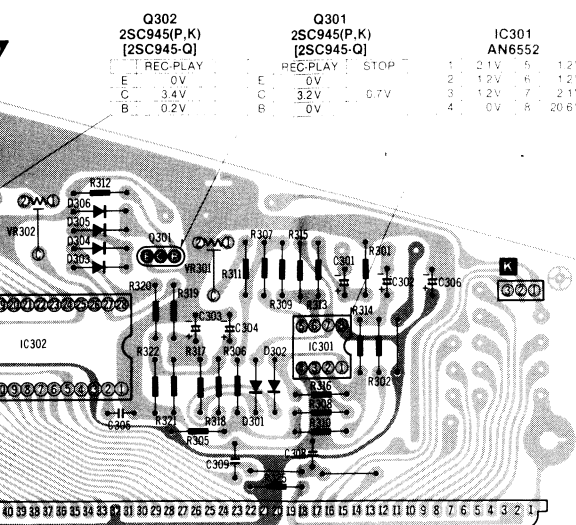


- NOTES:**
- The circuit shown in [shaded area] on the conductor is B+ (bias) circuit.
 - The circuit shown in [unshaded area] on the conductor side indicates printed circuit on back side of the printed circuit board.
 - Values indicates in [] are DC voltage between the ground and electrical points.
 - All voltage values shown in circuitry are under no signal condition.
 - Unless otherwise specified, voltage measurement conditions are that tape transport at STOP, tape mode at NORMAL, and Dolby NR switch at OFF.
 - REC Voltage at record mode.
 - PLAY Voltage at playback mode.
 - Normal Voltage at Normal mode.
 - CrO₂ Voltage at CrO₂ tape mode.
 - Metal Voltage at Metal tape mode.
 - REC-MUTE Voltage at record mode (Rec mute: ON).
 - Source Voltage at Source mode.
 - Described in the circuit board diagram are two types of numbers; the supply number and production parts number for transistors. One type of number is used for supply parts number and production parts number when they are identical.
 - e.g. Q212
2SC945(P,K) — Production parts number
[2SC945-Q] — Supply parts number
 - The supply parts number is described alone in the replacement parts list.
 - This circuit board diagram may be modified at any time with the development of new technology.

TERMINATIONS



R CIRCUIT BOARD



IC301 AN6552	IC302 AN6870
1 2V 5 12V	1 0.1V 15 0.2V 22 0.1V
2 1.2V 6 1.2V	2 0.1V 16 0.2V 23 0.1V
3 1.2V 7 2.1V	3 0.1V 17 0.1V 24 0.6V
4 0V 8 20.6V	4 0.1V 18 0.1V 25 1.3V
	5 0.1V 19 0.2V 26 1.9V
	6 0.1V 20 0.1V 27 1.1V
	7 0.1V 21 0.1V 28 1.1V

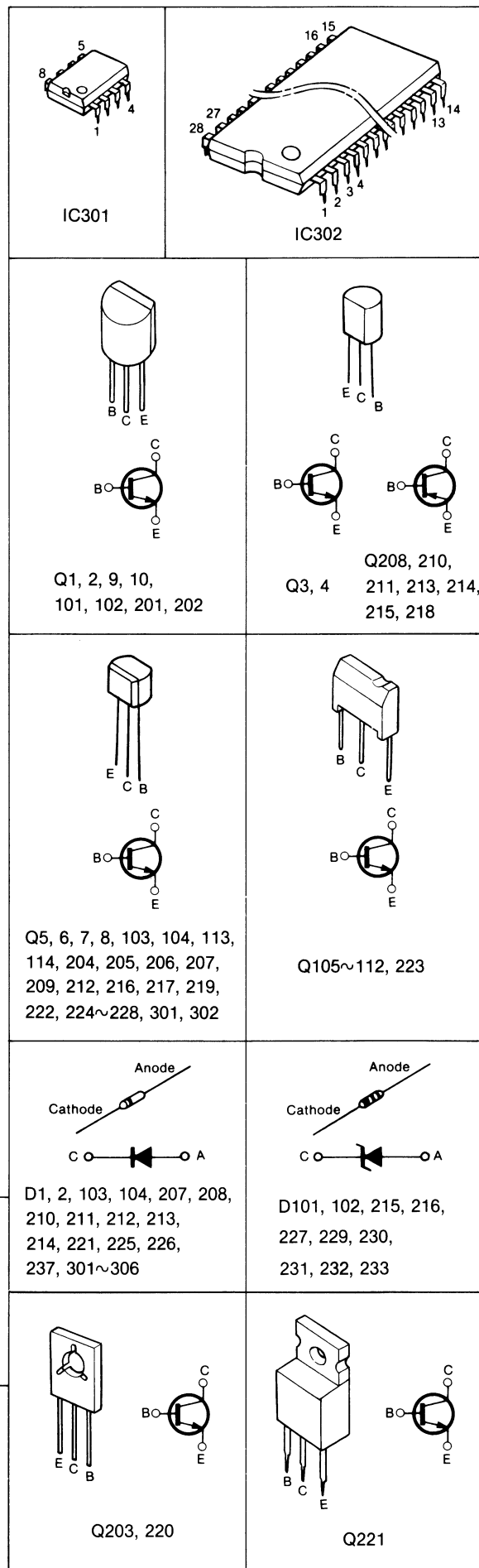
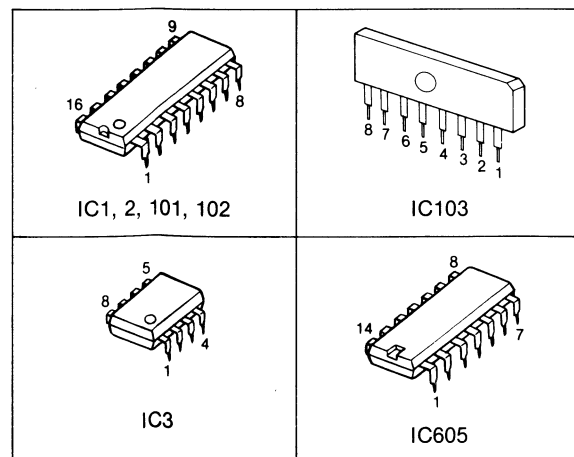
shown in on the conductor is B+ (bias) circuit.
shown in on the conductor side indicates printed circuit on the printed circuit board.
values in are DC voltage between the ground and electrical parts.
values shown in circuitry are under no signal condition.
wise specified, voltage measurement conditions are that tape travel is
e mode at NORMAL, and Dolby NR switch at OFF.
.....Voltage at record mode.
.....Voltage at playback mode.
.....Voltage at Normal at mode.
.....Voltage at CrO₂ tape mode.
.....Voltage at Metal tape mode.
.....Voltage at record mode (Rec mute: ON).
.....Voltage at Source mode.

the circuit board diagram are two types of numbers; the supply parts
production parts number for transistors. One type of number is used
parts number and production parts number when they are identical.
212

Q945(P,K) — Production parts number
SC945-Q — Supply parts number
parts number is described alone in the replacement parts list.

it board diagram may be modified at any time with
opment of new technology.

TERMINATIONS



NOTES: RESISTORS

ERD ... Carbon
ERG ... Metal-oxide
ERS ... Metal-oxide
ERO ... Metal-film
ERX ... Metal-film
ERQ ... Fuse type metallic
ERC ... Solid
ERF ... Cement

CAPACITORS

ECBA ... Ceramic
ECG ... Ceramic
ECK ... Ceramic
ECC ... Ceramic
ECF ... Ceramic
ECQM ... Polyester film
ECQE ... Polyester film
ECQF ... Polypropylene

ECED ... Electrolytic
ECE ... Non polar electrolytic
ECQS ... Polystyrene
ECSC ... Tantalum
QCS ... Tantalum

REPLACEMENT PARTS LIST

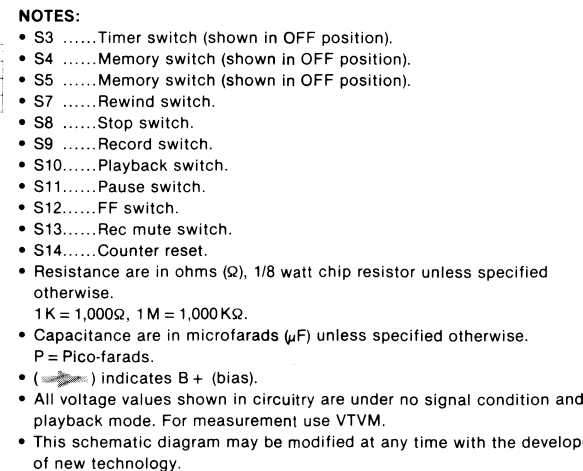
Important safety notice
Components identified by mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

Ref No.	Part No.	Ref No.	Part No.
RESISTORS			
R 1, 2	ERD25FJ221	R 165, 166	ERD25FJ332
R 3, 4	ERD25TJ104	R 167, 168	ERD25FJ330
R 5, 6	ERD25FJ472	R 169, 170	ERD25FJ471
R 7, 8	ERD25FJ221	R 171, 172	ERD25FJ103
R 9	ERD25FJ560	R 173, 174	ERD25TJ224
R 10	ERD25TJ560	R 175, 176	ERD25FJ182
R 11, 12	ERD25TJ104	R 177, 178	ERD25FJ102
R 13, 14	ERD25FJ472	R 179, 180	ERD25FJ152
R 15, 16	ERD25FJ821	R 181, 182	ERD25FJ151
R 17, 18	ERD25TJ124	R 201	ERD25FJ1R0
R 19, 20	ERD25FJ472	R 202, 203	ERD25FJ100
R 21, 22	ERD25FJ562	R 204, 205	ERD25TJ683
R 23	ERD25FJ222	R 206, 207	ERG1ANJ220
R 25, 26	ERD25FJ102	R 208	ERD25TJ183
R 27	ERG1ANJ151	R 209	ERD25FJ101
R 29, 30, 31, 32	ERD25FJ102	R 210	ERD25TJ153
R 33, 34	ERD25TJ183	R 211	ERD25FJ100
R 35, 36	ERD25FJ332	R 212	ERD25FJ103
R 37, 38	ERD25TJ274	R 213, 214, 215	ERD25TJ153
R 39, 40	ERD25TJ473	R 216	ERD25TJ333
R 41, 42	ERD25FJ181	R 217	ERG12ANJ102
R 43, 44	ERD25TKG2003	R 218	ERD25FJ222
R 45, 46	ERD25TJ274	R 219	ERG12ANJ102
R 49, 50	ERD25TJ683	R 220	ERD25FJ222
R 51, 52	ERD25TJ223	R 221, 222	ERD50FJ821
R 53	ERD25FJ271	R 223	ERD25FJ103
R 55, 56	ERD25FJ102	R 224, 225	ERD25FJ822
R 57, 58	ERD25FJ471	R 226	ERD25TJ183
R 59, 60	ERD25FJ152	R 227, 228	ERD25FJ152
R 61, 62	ERD25TJ124	R 229	ERD25TJ222
R 63, 64	ERD25FJ152	R 230	ERD25FJ223
R 65, 66	ERD25TJ683	R 231	ERD25FJ562
R 67	ERG14AJ470P	R 232	ERD25TJ274
R 69, 70	ERD25TJ334	R 233	ERD25FJ102
R 71, 72	ERD25FJ680	R 234	ERD25TJ563
R 73, 74	ERD25FJ121	R 235	ERD25TJ183
R 75, 76	ERD25TJ473	R 236	ERD25FJ562
R 77	ERD25FJ822	R 237	ERD25FJ682
R 78	ERD25TJ563	R 238	ERD25TJ183
R 79	ERD25FJ681	R 239	ERD25TJ104
R 80	ERD25FJ103	R 240	ERD25TJ333
R 101, 102	ERD25TJ474	R 241	ERD25FJ562
R 103, 104	ERD25TJ273	R 242	ERD25TJ333
R 105, 106	ERD25FJ101	R 243	ERD25TJ154
R 107, 108	ERD25FJ103	R 244	ERD25FJ102
R 109, 110	ERD25FJ680	R 245	EVNM4AA00B51
R 111, 112	ERD25TJ104	R 246, 247	ERD25TJ223
R 113, 114	ERD25TJ224	R 248	ERD25TJ183
R 115, 116	ERD25FJ102	R 249	ERD25FJ562
R 117	ERG1ANJ151	R 250, 251	ERD25FJ101
R 118	ERD25FJ182	R 252, 253	ERD25TJ273
R 119, 120, 121, 122	ERD25FJ102	R 254	ERD25FJ271
R 123, 124	ERD25TJ274	R 255	ERD25TJ223
R 125, 126	ERD25TJ473	R 256	ERD25FJ102
R 127, 128	ERD25FJ332	R 257	ERD25FJ561
R 129, 130	ERD25TJ274	R 258	ERD25TJ223
R 131, 132	ERD25TJ473	R 259	ERD25FJ332
R 133, 134	ERD25FJ181	R 260	ERG2ANJ5R6
R 135, 136	ERD25TJ183	R 261	ERD25FJ152
R 137, 138	ERD25TKG2003	R 262	ERD25TJ223
R 139, 140	ERD25TJ274	R 263	ERD25TJ224
R 142, 143, 144	ERD25TJ473	R 264	ERD25KF1502
R 145, 146	ERD25TJ123	R 265	ERD25FJ392
R 147, 148	ERD25FJ103	R 266	ERD25FJ472
R 149, 150	ERD25TJ104	R 267	ERD25CKF8201
R 151, 152	ERD25TJ153	R 268	ERD25FJ332
R 153, 154	ERD25TJ154	R 269	ERG1ANJ3R9
R 155, 156	ERD25TJ333	R 270	ERD25FJ682
R 157	ERD25FJ221	R 271	ERG1ANJ221
R 159, 160	ERD25TJ104	R 272	ERD25FJ222
R 161, 162	ERD25FJ222	R 273	ERG12AJ181P
R 163, 164	ERD25TJ393	R 274	EPX1ANJ1R5
		R 275, 276	ERQ14AJ181P
		R 277	ERD25TJ154
		R 278	ERD25TJ473
		R 279	ERD25FJ221

Ref No.	Part No.
R 280	ERD25FJ103
R 281	ERD25TJ153
R 282	ERD25FJ103
R 283, 284	ERD25FJ121
R 285, 286	ERD25FJ103
R 287	ERD25FJ330
R 288	ERD25TJ223
R 289	ERD25FJ473
R 290	ERD25FJ822
R 291	ERD25TJ473
R 292	ERD25FJ103
R 293	ERD25FJ182
R 294	ERD25FJ222
R 295	ERD25FJ152
R 296, 297	ERG12ANJ681
R 299, 300	ERD25FJ102
R 301, 302	ERD25TJ104
R 305	ERD25TJ153
R 306	ERD25FJ180
R 307, 308, 309, 310	ERD25TJ223
R 311	ERD25FJ561
R 312	ERD25TJ183
R 313, 314	ERO25KG2702S
R 315, 316	ERO25CKF1003
R 317, 318	ERD25FJ331
R 319, 320	ERD25FJ102
R 321, 322	ERD25TJ224
R 323	ERD25TJ223
R 324	ERG12ANJ221P
R 325	ERD25FJ103
R 601	RRD18XJ473
R 602	RRD18XK273
R 603, 604	EXBD86181K
R 605	EXBEQ4272K
R 606, 607	RRD18XK2R2
R 613	RRD18XK153
R 614	RRD18XK273
R 615	RRD18XK563
R 616	RRD18XJ473
R 617, 618	RRD18XJ222
CHIP JUMPERS	
JP 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22	RRD18XK000
VARIABLE RESISTORS	
VR 1, 2	EVNM4AA00B24
VR 3, 4	QVJRAF15A14
VR 5	VJK0AF15B24
VR 101, 102	QVK16B20MA24
VR 103, 104	EVNM4AA00B15
VR 201, 202	EVNM4AA00B54
VR 301	EVNM4AA00B52
VR 302	EVNM4AA00B14
CAPACITORS	
C 1, 2	ECEA16M10R
C 3, 4	ECCD1H121KC
C 5, 6	ECKD1H561KB
C 7, 8	ECKD1H102KB
C 9, 10	ECEA1CS330
C 11	ECCD1H560K
C 12	ECCD1H560K
C 13, 14	ECEA1HS100
C 15, 16	ECEA1CS330
C 17, 18	ECQM1H273JZ
C 19, 20	ECQM1H123JZ
C 21, 22	ECEA1ES101
C 23, 24	ECEA50MR33R
C 25, 26	ECEA1AS221
C 27, 28	ECKD1H152KB
C 29, 30	ECQP1391JZ
C 31, 32	ECEA1HS100
C 33	ECQM1H273JZ
C 35, 36	ECQM1H562JZ
C 37, 38	ECQM1H472JZ
C 39, 40	ECQV05473JZ
C 41, 42	ECEA1HS100
C 43	ECQV05104JZ
C 44	ECQV05104JZ
C 45, 46	ECEA50ZR33
C 47	ECEA1HS100

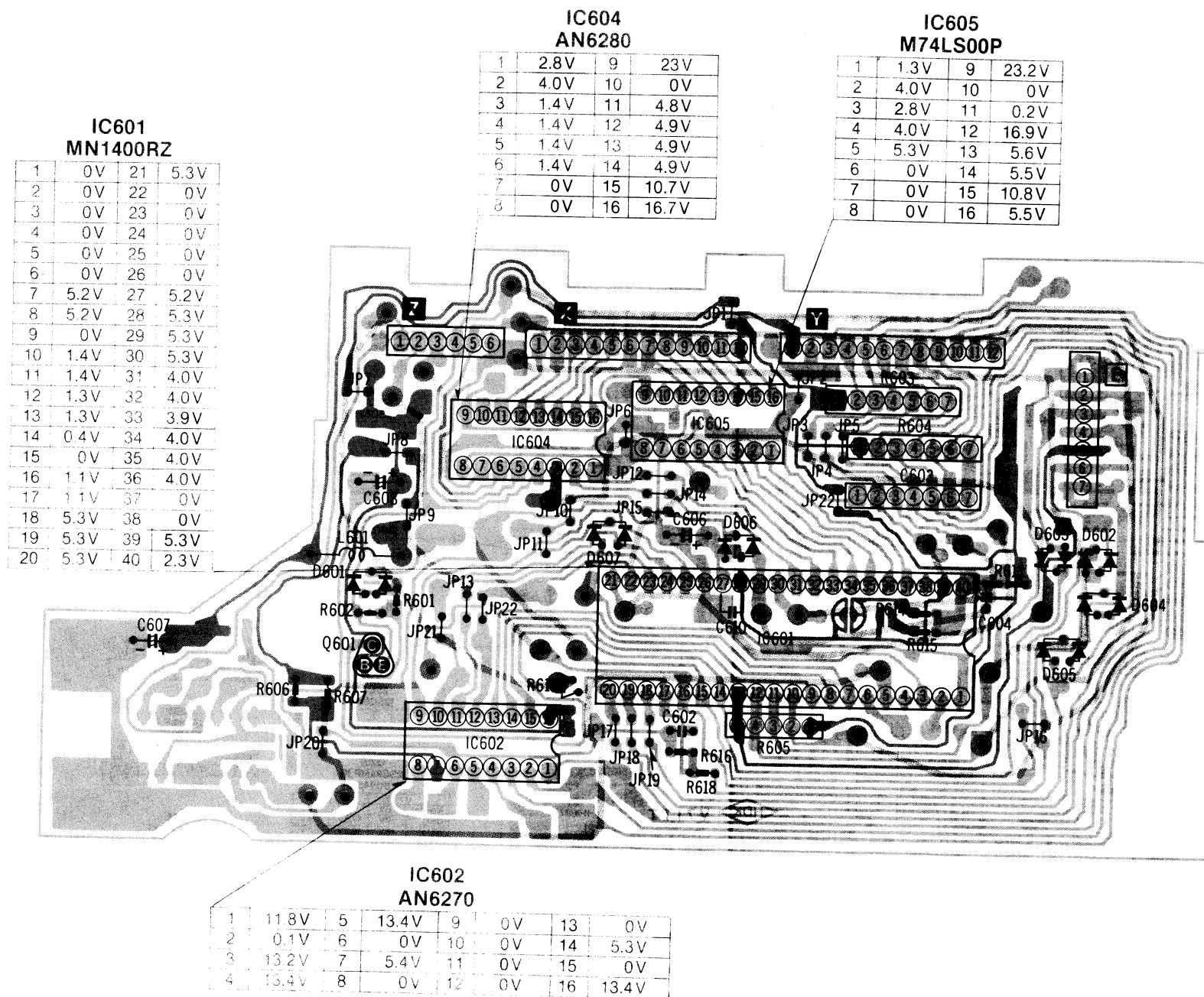
Ref No.	Part No.	Ref No.	Part No.	Ref No.	Part No.
C 48	ECKD1H102KB	CR 101, 102	EXRP152K562	D 202	LD001UR
C 49	ECEA1ES331	CR 103, 104	EXRP152K222	D 203	LD001GG
C 51, 52, 53, 54	ECEA25Z4R7	SPARK KILLER		D 204	LD001UR
C 55, 56	ECEA50ZR47	Z 1	△ QCR0011	D 205	LD001GG
C 57	ECEA1ES331	TRANSISTORS		D 206	LD001YY
C 58	ECEA50Z3R3	Q 1, 2	2SC1844F	D 207, 208	MA161
C 59, 60	ECCD1H560K	Q 3, 4	SC1328T	D 209	RD8R2EB
C 61, 62	ECEA1ES101	Q 5, 6, 7, 8	2SC945-Q	D 210, 211, 212, 213, 214	MA161
C 63, 64	ECEA1HS100	Q 9, 10,	2SD592NCS	D 215, 216	RVDRD6R8EB
C 65, 66	ECEA50Z3R3	Q 101, 102	2SD592NCS	D 217, 218, 219, 220	△ SM112
C 67, 68	ECCD1H121KC	Q 103, 104	2SC945-Q	D 221	△ MA161
C 69	ECKD1H102KB	Q 105, 106, 107, 108, 109, 110, 111, 112	2SD946R	D 222, 223	△ SM112
C 101, 102	ECEA25Z4R7	Q 113, 114	2SC945-Q	D 224, 225, 226	MA161
C 103, 104	ECEA16M10R	Q 201, 202	2SD592NCS	D 227	RVDRD6R8EB
C 105, 106	ECKD1H103MD	Q 203	2SD946R	D 228	SVDRD16EB
C 107, 108	ECEA1AS101	Q 204, 205, 206, 207	2SC945-Q	D 229, 230, 231, 232, 233	RVDRD6R8EB
C 109, 110	ECEA50ZR47	Q 208	2SA999E	D 234	SLR54URC
C 111, 112	ECEA50MR33R	Q 209	2SC945-Q	D 235	SLR54GC
C 113, 114	ECEA1ES101	Q 210, 211	2SA999E	D 236	SLR54YC
C 115, 116	ECEA1AS221	Q 212	2SC945-Q	D 237	MA161
C 117, 118	ECQP1392JZ	Q 213, 214, 215	2SA999E	D 238	RD5R6EB
C 119, 120, 121, 122, 123, 124, 125, 126	ECEA1HS100	Q 216, 217	2SC945-Q	D 239	SVDRD16EB
C 127, 128	ECQM1H273JZ	Q 218	2SA999E	D 241	△ MA161
C 129, 130	ECQM1H562JZ	Q 219	2SC945-Q	D 301, 302, 303, 304, 305, 306	MA161
C 131, 132	ECQM1H472JZ	Q 220	2SD946R	D 601, 602, 603, 604, 605, 606, 607	DAN202
C 133, 134	ECQV05473JZ	Q 221	2SD836Q	INTEGRATED CIRCUITS	
C 135, 136	ECEA1HS100	Q 222	2SC945-Q	IC 1, 2	NE646N
C 137, 138	ECQV05104JZ	Q 223	2SD638S	IC 3	NJM4556D
C 139, 140	ECEA50ZR33	Q 224, 225, 226, 227, 228, 301, 302	2SC945-Q	IC 101, 102	NE646N
C 141, 142	ECCD1H271K	Q 601	2SA1037Q	IC 103	UPC1186H
C 143, 144	ECEA50ZR47	DIODES & RECTIFIERS		IC 301	AN6552
C 145, 146	ECKD1H561KB	D 1, 2	MA161	IC 302	AN6870
C 147, 148	ECEA1CS330	D 101, 102	RVDRD6R8EB	IC 601	MN1400RZ
C 149, 150	ECEA50ZR33	D 103, 104	MA161	IC 602	AN6270
C 151, 152	ECEA1HS100	D 201	LD001GG	IC 603	DN6838
C 153, 154	ECQV05183JZ	TRANSFORMER		IC 604, 605	AN6280
C 155, 156	ECQV05153JZ	Ref No.	Part No.	IC 606	M74LS00P
C 157, 158	ECQV05273JZ	COILS			
C 159, 160	ECQV05393JZ	L 1, 2	QLQX1032W	Bias Trap Coil	
C 161, 162	ECCD1H151KC	L 101, 102	QLM9Z9K	MPX Filter	
C 163, 164	ECQV05473JZ	L 103, 104	QLQC2721K	Peaking Coil	
C 165, 166	ECQV05273JZ	L 105, 106	QLQX1032W	Bias Trap Coil	
C 167, 168	ECEA25Z4R7	L 201	QLB0202K	Bias Oscillation Coil	
C 169, 170	ECKD1H152KB	L 202	QLQX2421Y	RF Trap Coil	
C 171, 172	ECQP1391JZ	L 601	ELEH101KA	Noise Trap Coil	
C 173	ECEA1ES101	L 602, 603	QLQZ1014D	Noise Trap Coil	
C 201, 202	ECCD1H121KC	FUSES			
C 203	ECQF4153KZH	T 201	△ QLPD59EME	AC Power Transformer	
C 204, 205	ECEA1HS100	FUSES			
C 206	ECQF6682KZH	F 1	△ XBA0010	Fuse (T1.6A)	
C 207	ECQM1H222JZ	F 2	△ XBAQ100027	Fuse (T1A)	
C 208	ECQM1H822KZ	F 3	△ XBAQ0006	Fuse (T315mA)	
C 209	ECQM1H222JZ	SWITCHES			
C 210	ECEA50ZR22	S 1	QSWY205A	Push Switch (Dolby IN/OUT)	
C 211, 212	ECKD1H103MD	S 2	QSWY205A	Push Switch (Monitor/Tape)	
C 213	ECKD1H102KB	S 3	QSS2303H	Slide Switch (Timer ON/OFF)	
C 214	ECEA1CN100S	S 4	QSWX309A	Push Switch (Memory Stop)	
C 215	ECEA1CN100S	S 5	QSWX309A	Push Switch (Memory Repeat)	
C 216	ECEA1HS100	S 6	QSB0266	Switch (Leaf Type)	
C 217	ECEA50ZR47	S 7	QSW1118H	Push Switch (Rewind)	
C 218	ECEA25Z4R7	S 8	QSW1118H	Push Switch (Stop)	
C 219	ECEA1HS100	S 9	QSW1118H	Push Switch (Record)	
C 220	ECEA1VS221	S 10	QSW1118H	Push Switch (Play back)	
C 221, 222	ECEA1HS100	S 11	QSW1118H	Push Switch (Pause)	
C 223	ECET16R103S	S 12	QSW1118H	Push Switch (Fast Forward)	
C 224	△ ECEA1VS101	S 13	QSW1118H	Push Switch (Rec Mute)	
C 225	△ ECEA1VS222	S 14	QSW1118H	Push Switch (Counter Reset)	
C 226	△ ECEA1ES471	S 15	△ QSW117AS	Push Switch (Power ON/OFF)	
C 227	△ ECKD1H103MD	S 16	△ QSR1407	Rotary Switch	
C 228	ECEA1HS470	S 601, 602, 603	QSB0260	Switch (Leaf Type)	
C 229	ECEA25Z4R7	S 604, 605	QSB0261	Switch (Leaf Type)	
C 230, 231	ECKD1H103MD	JACKS			
C 232, 233	ECKD1H152KB	J 1, 2	QJA0261H	MIC Jack	
C 234	ECKD1H103MD	J 3	QJA0259H	Headphones (Jack)	
C 235	ECEA50ZR47	J 4	QJS1955H	Socket (Remote Jack)	
C 236	ECKD1H152KB	J 5	QEJ5003H	Jack Board	
C 301, 302, 303, 304	ECEA50Z3R3				
C 305	ECQV05473JZ				
C 306	ECEA1ES101				
C 307	ECKD1H103MD				
C 308, 309	ECCD1H560K				
C 602	QCUX1H152MRX				
C 603	EXFP6472W				
C 604	QCUX1H331KCX				
C 606	ECEA50ZR1				
C 607	ECEA1AS221				
C 608	ECEA1CS221				
C 609	ECEA1CN100				
C 610	QCUX1H102MRX				
COMBINATION PARTS					
CR 1, 2	EXRP681K472				

IC601
MN1400RZ

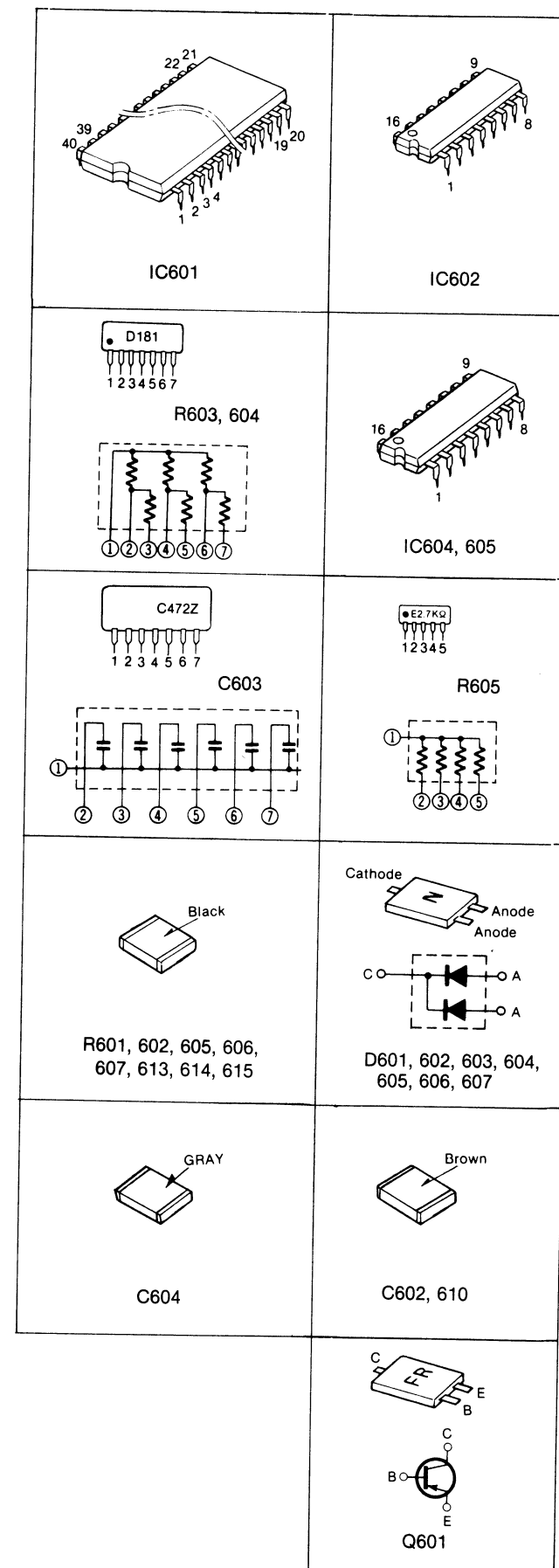


CIRCUIT BOARD

MAIN CONTROL CIRCUIT BOARD

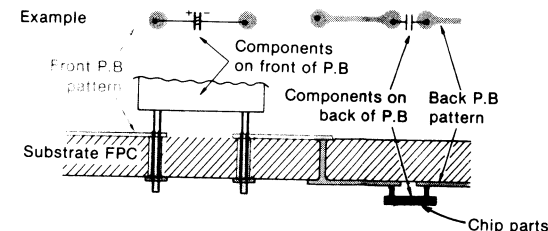


TERMINATIONS



NOTES:

- The circuit shown in on the conductor is B+ (bias) circuit.
- The circuit shown in on the conductor indicates printed circuit on the front side of the printed circuit board.
- Black pattern represents back of P.B (chip side).
- The symbols (●) shown in the circuit board indicate connection point between conductors on the front side and back side of the circuit board.
- Components on front of P.B are identified by black symbols.
- Components on back of P.B are identified by green symbols.

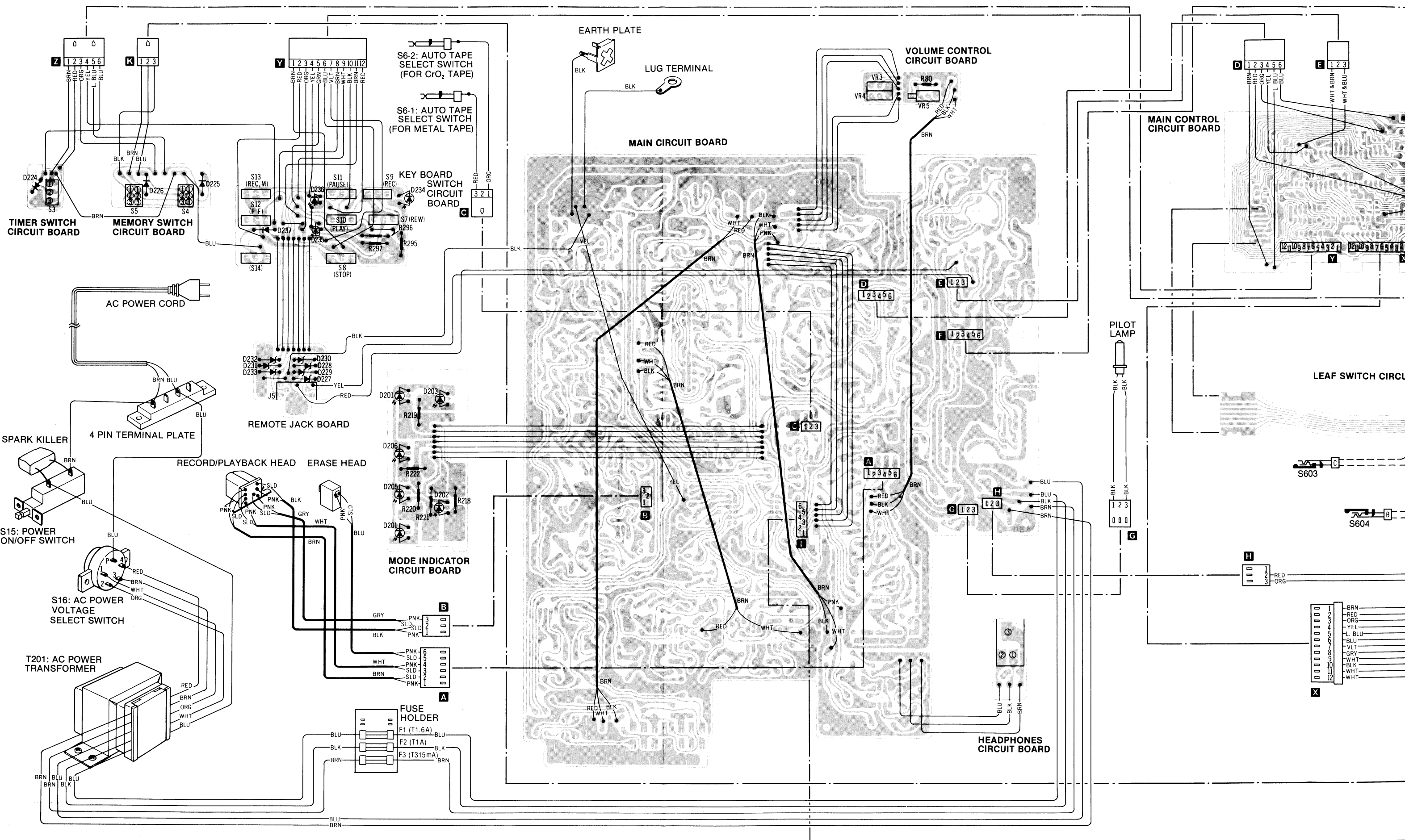


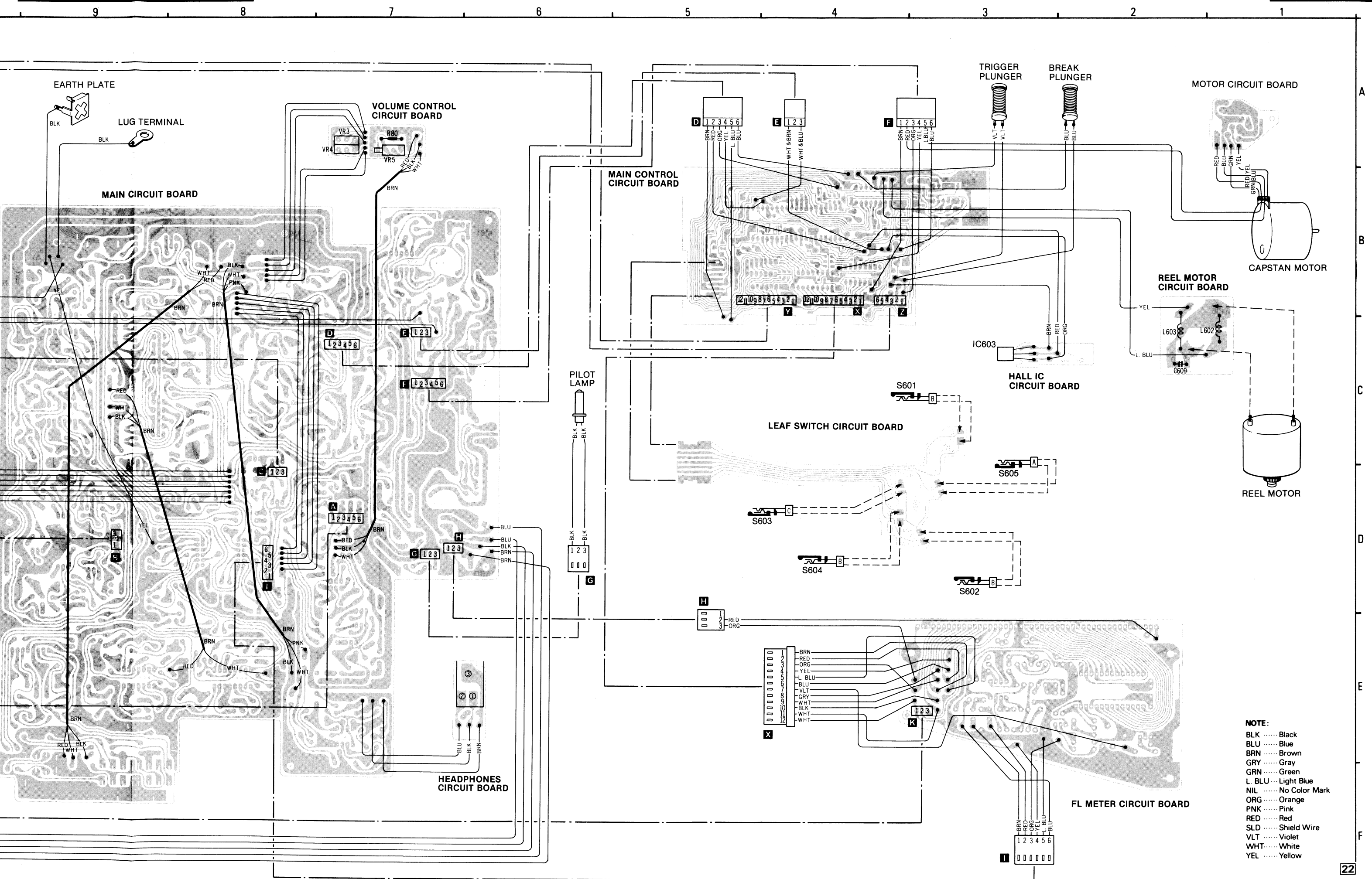
- All voltage values shown in circuitry are under no signal condition and playback mode.

This circuit board diagram may be modified at any time with development of new technology.

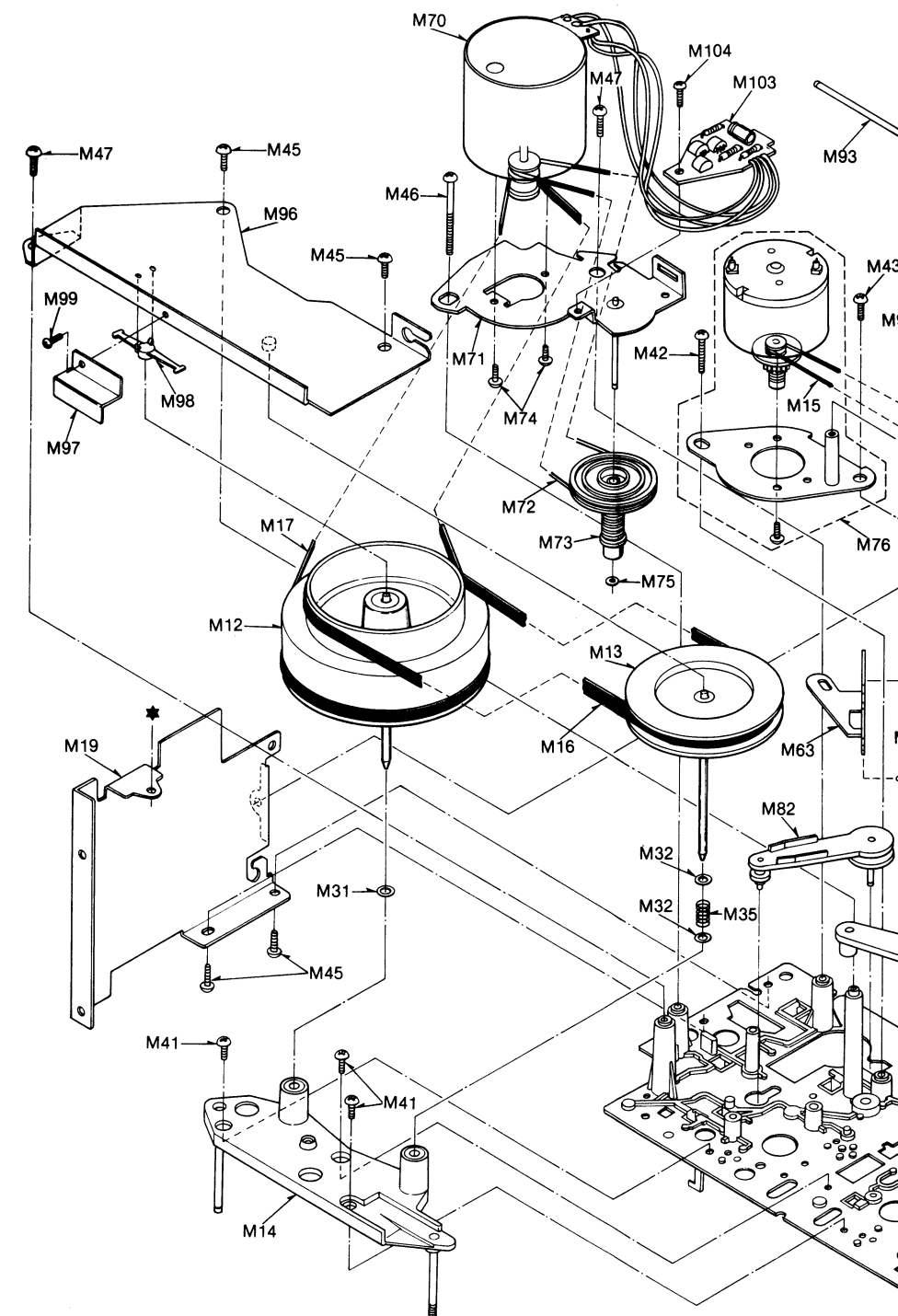
Timer switch (shown in OFF position).
Memory switch (shown in OFF position).
Memory switch (shown in OFF position).
Rewind switch.
Stop switch.
Record switch.
Playback switch.
Pause switch.
FF switch.
Rec mute switch.
Counter reset.
Resistance are in ohms (Ω), 1/8 watt chip resistor unless specified otherwise.
Capacitance are in microfarads (μF) unless specified otherwise.
100Ω, 1M = 1,000KΩ.
● indicates B+ (bias).
Voltage values shown in circuitry are under no signal condition and playback mode. For measurement use VTVM.
Circuit diagram may be modified at any time with the development of new technology.

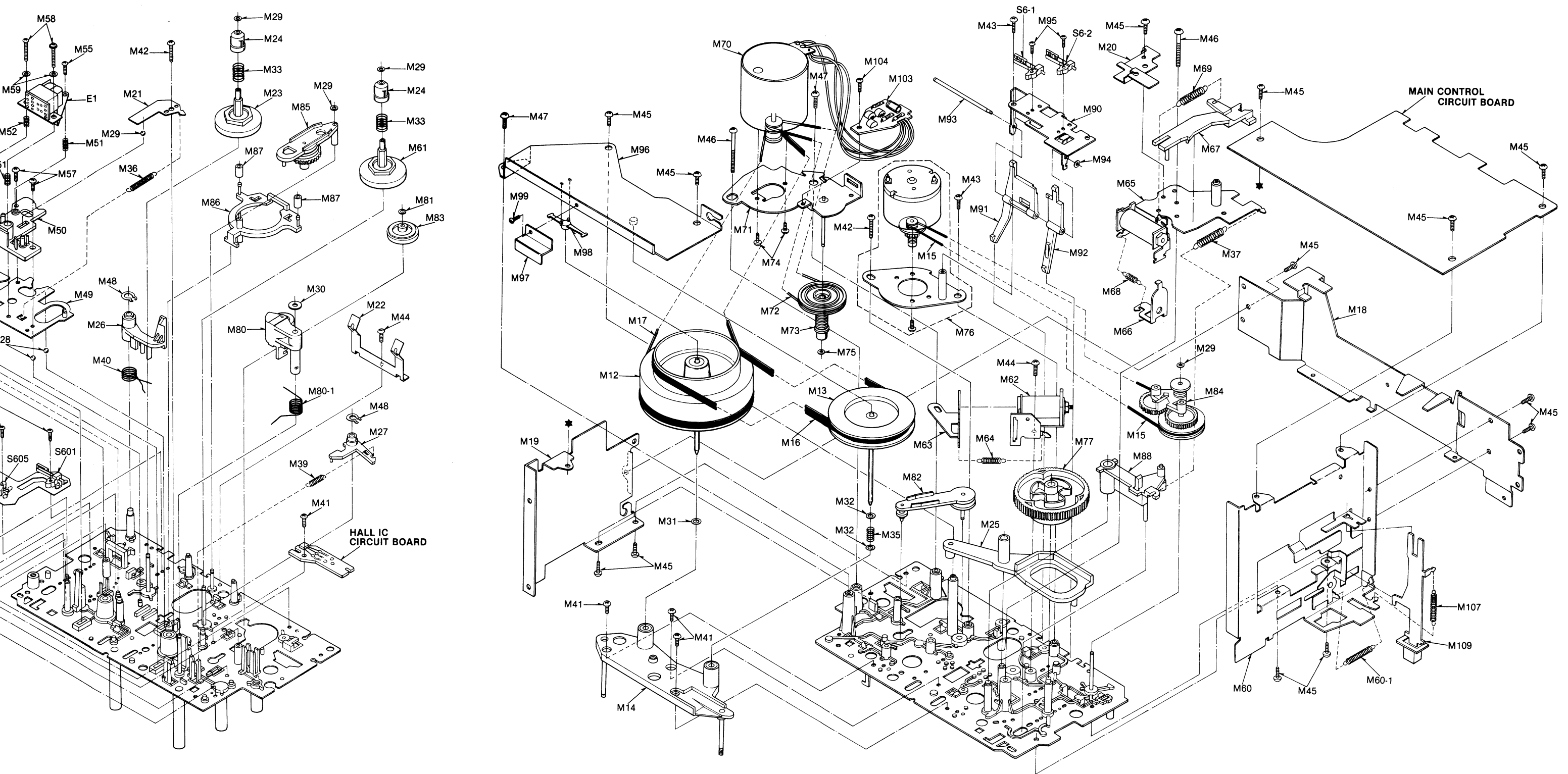
WIRING CONNECTION DIAGRAM





A vertical scale with labels A, B, C, D, E, and F from top to bottom. There are tick marks between each label.

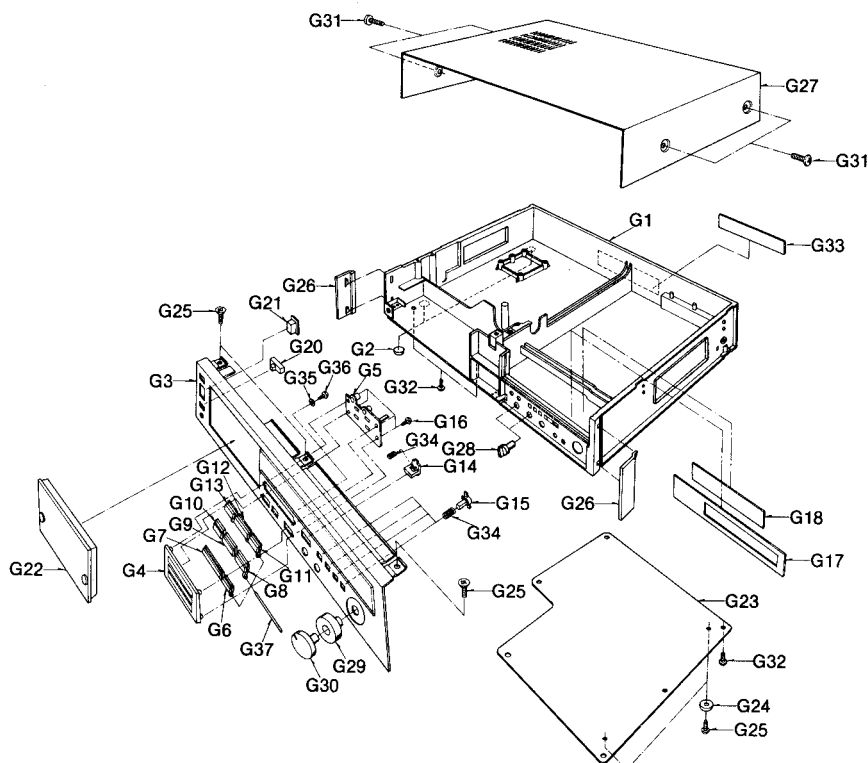




SPECIFICATIONS

Wow and flutter (JIS)	Less than
* Use test tape ... QZZCWAT	0.065% (WRMS)

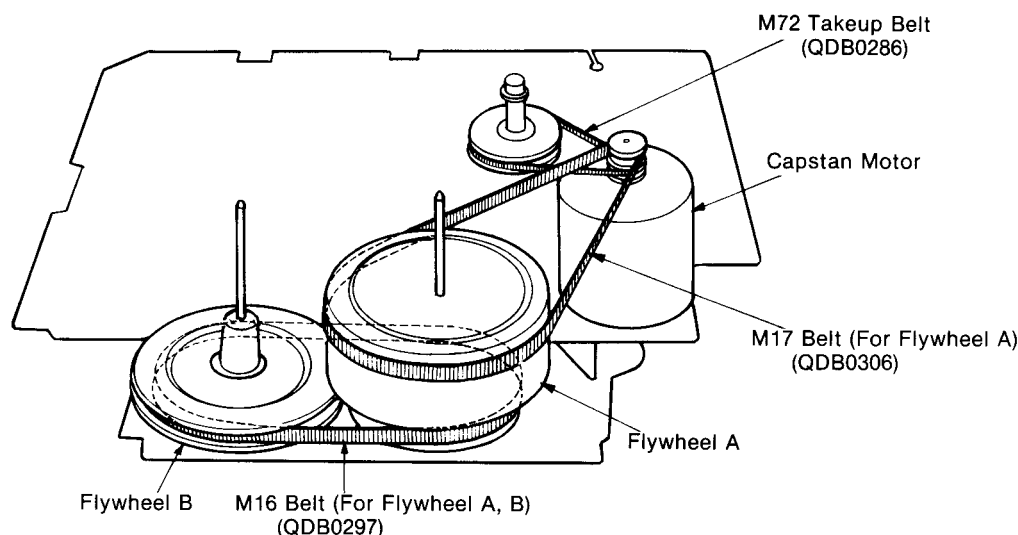
CABINET PARTS LOCATION



REPLACEMENT PARTS LIST

Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description
CABINET PARTS					
G 1	QKMM0039K	Main Case	G 23	QGCM0056	Bottom Cover
G 2	QKA1081	Rubber Foot	G 24	QKA1082	Leg (Rubber Foot)
G 3	QYPM0053	Front Panel	G 25	XTS3 + 10B	Tapping Screw
	"Silver Type"		G 26	QGK3201	Side Board
	QYPM0053YK	Front Panel		"Silver Type"	
	"Black Type"			QGK3201K	Side Board
G 4	QGKM0154	Operation Panel	G 27	QGCM0057	Case Cover
	"Silver Type"			"Silver Type"	
	QGKM0154K	Operation Panel		QGCM0057K	Case Cover
	"Black Type"			"Black Type"	
G 5	QKJM0067	Push Button Holder	G 28	QGT1565	Volume Knob (Output Level Control)
G 6	QGOM0067	Counter Button	G 29	QYT0636	Volume Knob-R
G 7	QGOM0068	Stop Button	G 30	QYT0367	Volume Knob-L
	"Silver Type"		G 31	XTB4 + 10BFN	Tapping Screw
	QGOM0068Y	Stop Button		"Silver Type"	
	"Black Type"			XTB4 + 10BFZ	Tapping Screw
G 8	QGOM0069	Fast Forward Button		"Black Type"	
	"Silver Type"		G 32	XTB3 + 10B	Tapping Screw
	QGOM0069Y	Fast Forward Button	G 33	[D] QGSM0154	Main Name Plate
G 9	QGOM0070	Playback Button		[For all European areas except United Kingdom.]	
G 10	QGOM0071	Rewind Button		[B] QGSM0155	Main Name Plate
	"Silver Type"			[For United Kingdom.]	
	QGOM0071Y	Rewind Button	G 34	QBC1407	Switch Spring
	"Black Type"		G 35	QBW2015	Poly Washer
G 11	QGOM0072	Rec Mute Button	G 36	XSN26 + 5	Screw $\varnothing 2.6 \times 5$
	"Silver Type"		G 37	QMN2732	Switch shaft
	QGOM0072Y	Rec Mute Button			
	"Black Type"		ACCESSORIES		
G 12	QGOM0073	Pause Button	A 1	RP023A	Connection Cord
G 13	QGOM0074	Record Button	A 2	[D] QQT3147	Instruction Book
G 14	QGOM0075	Monitor Button		[For all European areas except United Kingdom.]	
G 15	QGOM0076	Push Button		[B] QQT3148	Instruction Book
G 16	XTN26 + 8B	Tapping Screw		[For United Kingdom.]	
G 17	QGLM0026	Meter Cover	PACKINGS		
	"Silver Type"		P 1	OPNM0176	Inside Carton
	QGLM0026Y	Meter Cover	P 2	QPAM0048	Cushion-R
	"Black Type"		P 3	QPAN0049	Cushion-L
G 18	QKJM0053	Filter	P 4	XZB50X65A02	Poly Bag
G 20	QGOM0066	Timer Button	P 5	QPQ1052	Sheet
G 21	QGO1900	Push Button (Power ON/OFF)	P 6	QPCM0005	Sheet
				"Black Type"	
G 22	QYFM0051	Cassette Lid Assembly			
	"Silver Type"				
	QYFM0051K	Cassette Lid Assembly			
	"Black Type"				

BELT LOCATION



REPLACEMENT PARTS LIST

Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description
MECHANICAL PARTS					
M 1	QXL1414	Lock Lever-A	M 53	QMZ1265	Erase Head Spacer
M 2	QXL1507	Lock Lever-B	M 54	XSN2 + 12	Screw $\varnothing 2 \times 12$
M 3	XUC25FT	Stop Ring	M 55	XSN2 + 8	Screw $\varnothing 2 \times 8$
M 4	QMH2085	Cassette Holder	M 56	XSN2 + 3	Screw $\varnothing 2 \times 3$
	"Silver Type"		M 57	XTN26 + 5B	Tapping Screw
	QMH2085K	Cassette Holder	M 58	XSN2 + 14	Screw $\varnothing 2 \times 14$
	"Black Type"		M 59	XWG2	Washer
M 5	QBP1946	Holder Spring	M 60	QXA1191	Side Angle-L
M 6	XTN26 + 6BFZ	Tapping Screw $\varnothing 2.6 \times 6$	M 60-1	QBT1755	Spring
M 7	QDG1254	Dumper Gear	M 61	QXD0120	Reel Table
M 8	QKJ0499	Dumper Gear Holder	M 62	QXA1075	Angle (with Plunger)
M 9	XWG26	Washer	M 63	QML3650	Lever (for Plunger)
M 10	XTN26 + 8	Tapping Screw $\varnothing 2.6 \times 8$	M 64	QBT1924	Spring
M 11	QXH0386	Mechanism Cover	M 65	QXA1195	Pressurer Plate
	"Silver Type"		M 66	QML3800	Lever
	QXH0386K	Mechanism Cover	M 67	QML3653	Lever
	"Black Type"		M 68	QBT1938	Trigger Spring
M 12	QXF0186	Flywheel-A Assembly	M 69	QBT1278	Lock Spring
	(Takeup Side)		M 70	QXU0268	Capstan Motor
M 13	QXF0175	Flywheel-B Assembly	M 71	QXA1077	Angle (for Takeup Motor)
	(Supply Side)		M 72	QDB0286	Takeup Belt
M 14	QXM0172	Thrust Retainer (for Flywheel)	M 73	QXP0621	Takeup Pulley
M 15	QDB0287	Belt (for Change Over)	M 74	XSN26 + 3	Screw $\varnothing 2.6 \times 3$
M 16	QDB0297	Belt (for Flywheel-A, B)	M 75	QBW2008	Washer
M 17	QDB0306	Belt (for Flywheel-A)	M 76	QXU0250	Reel Motor
M 18	QMA4313	Center Angle	M 77	QXG1059	Gear
M 19	QMA4312	Side Angle-R	M 78	QXL1448	Pressure Roller Lever-L
M 20	QMA4080	Angle (Guard)	M 78-1	QBN1804	Pressure Roller Spring
M 21	QBP1894	Spring (for Head Base Plate)	M 79	QXL1449	Lever
M 22	QBP1895	Spring (for Cassette Pressure)	M 79-1	QBT1922	Spring
M 23	QDR1150	Reel Table (Supply Side)	M 80	QXL1406	Pressure Roller Lever-R
M 24	QMB1336	Supply Driving Click	M 80-1	QBN1771	Pressure Roller Spring
M 25	QML3655	Lever (Cam Forrower)	M 81	QBW2008	Washer
M 26	QML3611	Lever (Detector)	M 82	QXL1423	Lever
M 27	QML3660	Lever (for Idrer Change Over)	M 83	QXI0116	Idler
M 28	QDK1012	Steel Ball	M 84	QXL1408	Lever
M 29	QBW2008	Washer	M 85	QXL1409	Lever (Fast Forward)
M 30	QBW2046	Washer	M 86	QML3659	Lever
M 31	QBW2049	Washer	M 87	QBG1132	Stopper Rubber
M 32	QBW2089	Washer	M 88	QXL1411	Lever
M 33	QBC1373	Spring	M 89	QXQ0112	Nut
M 34	QBC1376	Spring	M 90	QMA4072	Angle (Auto Tape Select)
M 35	QBC1375	Spring	M 91	QML3717	Lever (CrO ₂ Tape Detect)
M 36	QBT1927	Spring	M 92	QML3716	Lever (Metal Tape Detect)
M 37	QBT1939	Lock Lever Spring	M 93	QMN2642	Shaft
M 39	QBT1920	Spring (for Idler)	M 94	QBW2008	Washer
M 40	QBN1772	Spring (for Detector)	M 95	XTN2 + 5B	Tapping Screw
M 41	XTN2 + 5B	Tapping Screw	M 96	QXA1217	Flywheel Retainer
M 42	XTN26 + 12B	Tapping Screw	M 97	QMA4336	Cover Angle
M 43	XTN26 + 6B	Tapping Screw $\varnothing 2.6 \times 6$	M 98	QMZ1283	Flywheel Thrust Retainer
M 44	XTN26 + 8B	Tapping Screw $\varnothing 2.6 \times 8$	M 99	XTN26 + 6B	Tapping Screw $\varnothing 2.6 \times 6$
M 45	XTN3 + 6B	Tapping Screw $\varnothing 3 \times 6$	M 101	XTN26 + 10B	Tapping Screw $\varnothing 2.6 \times 10$
M 46	XTN3 + 24B	Tapping Screw $\varnothing 3 \times 24$	M 102	XUB4FT	Stop Ring
M 47	XTN3 + 10B	Tapping Screw $\varnothing 3 \times 10$	M 103	QE1934	Motor Circuit Board
M 48	XUB4FT	Stop Ring	M 104	XSN2 + 6	Screw $\varnothing 2 \times 6$
M 49	QXK2541	Head Base Plate	M 105	XNG26	Nut
M 50	QMZ1264	Head Spacer	M 106	QBN1878	Holder Spring
M 51	QBC1103	Spring	M 107	QBT1566	Eject Spring
M 52	QBC1339	Spring	M 108	QBT1691	Lock Lever Spring
			M 109	QXR0780	Eject Button

Parts Change Notice

(D)...For all European areas
except United Kingdom.
(B)...For United Kingdom.

(N)...For Asia, Latin America,
Middle East and Africa
areas.

(P)...For U.S.A.
(C)...For Canada.

Model No.

RS-M273

Please revise the original parts list in the Service Manual to conform to the change(s) shown herein. If new part numbers are shown, be sure to use them when ordering parts.

Reason for Change		*The circled item indicates the reason. If no marking, see the Notes in the bottom column.			
1. Improve performance					
2. Change of material or dimension					
3. To meet approved specification					
4. Standardization					
5. Addition					
6. Deletion					
7. Correction					
8. Other					
Interchangeability Code		**The circled item indicates the interchangeability. If no marking, see the Notes in the bottom column.			
Parts	Set Production				
A	Original → Early New → Late	Original or new parts may be used in early or late production set. Use original parts until exhausted, then stock new parts.			
B	Original → Early New → Late	Original parts may be used in early production sets only. New parts may be used in early or late production sets. Use original parts where possible, then stock new parts.			
C	Original → Early New → Late	New parts only may be used in early or late production sets. Stock new parts.			
D	Original → Early New → Late	Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.			
E	Other				
Part Number					
Model No.	Ref. No.	Original Part No.	New Part No.	Notes (* - **)	Part Name & Descriptions
RS-M273	G29	QYT0636	QYT0647	2-D	Volume Knob-R
"	G30	QYT0367 ↓ correction QYT0637	QYT0648	"	Volume Knob-L

File this Parts Change Notice with your copy of the Service Manual.

Original Service Manual is Model No. RS-M273(P/C) Order No. ARD82010114C1-23.
(D/B) Order No. ARD81090091C2-23.
(N) Order No. ARD82020123C3-17.

Technics
National / Panasonic

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan
Printed in Japan

Service Manual

Cassette Deck

RS-M273

(Silver Face)
(Black Face)

Microprocessor Controlled Cassette Deck
with 3-Head, Closed Loop System

Supplement-1

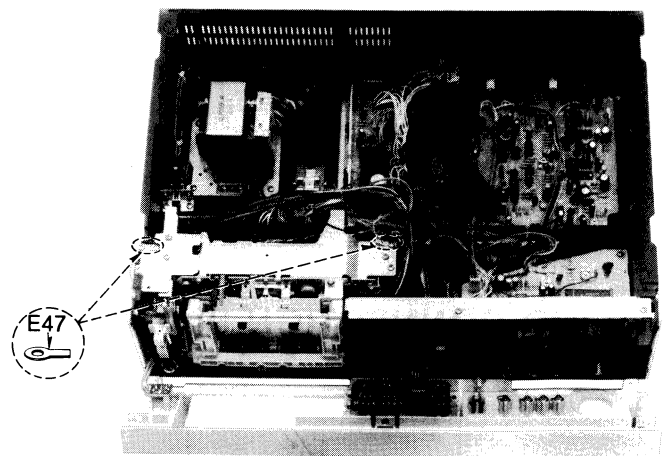
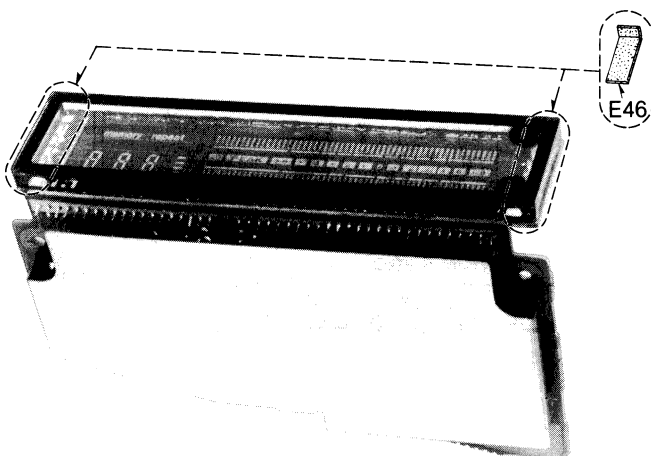


This is the Service Manual for the following areas.

- ☐ For all European areas except United Kingdom.
- ☐ For United Kingdom.

Please use this manual together with the service manual for model No. RS-M273 (original) order No. ARD81090091C2-23.

ELECTRICAL PARTS LOCATION (ADDITION)



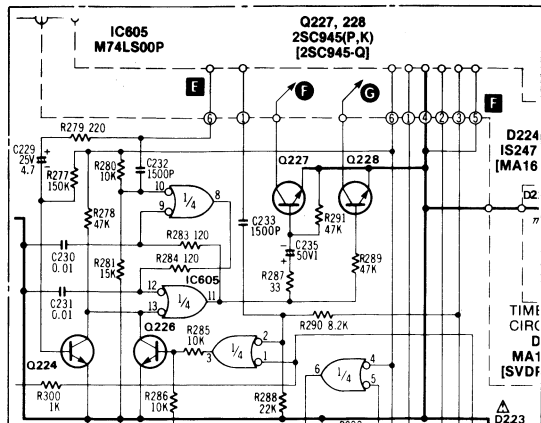
* 'Dolby' and the double-D symbols are trademarks of Dolby Laboratories.

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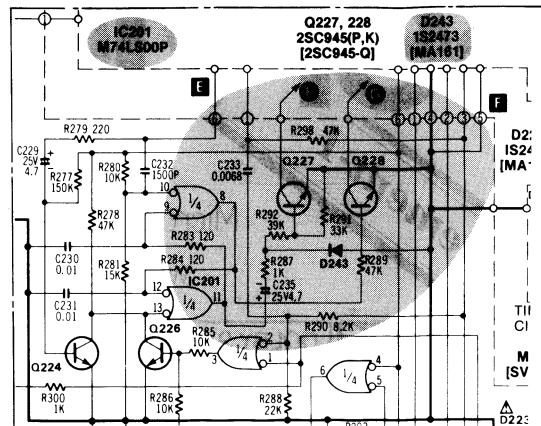
RS-M273

SCHEMATIC DIAGRAM



Former Type

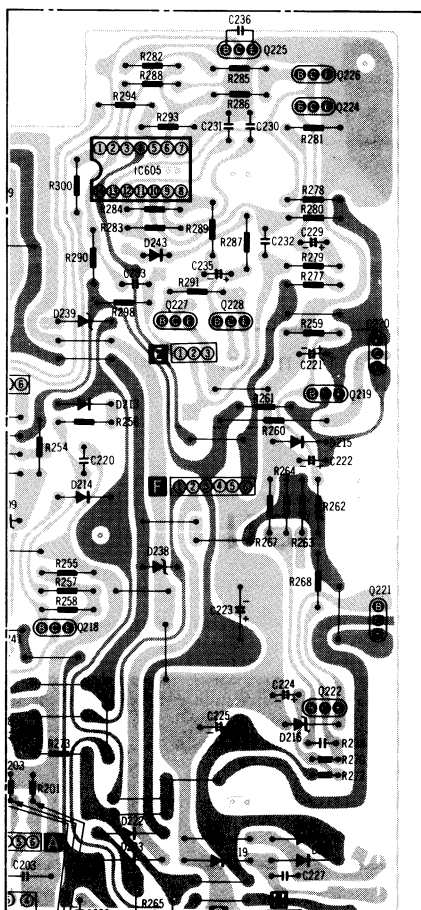
Main Section (DIFFERENCE)



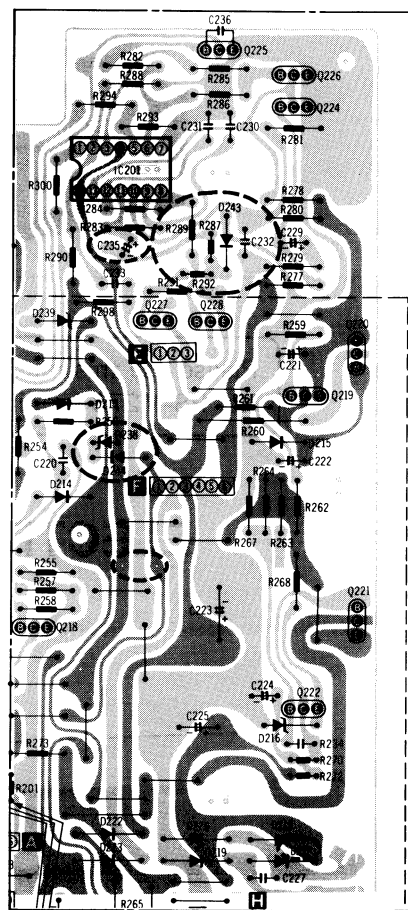
New Type

CIRCUIT BOARDS

Main Circuit Board (DIFFERENCE)

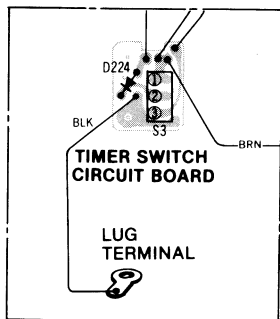


Former Type

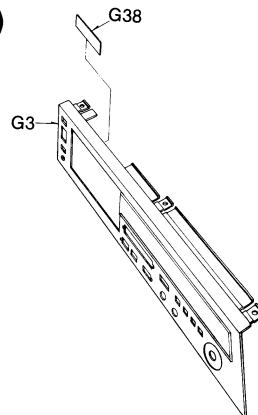


New Type

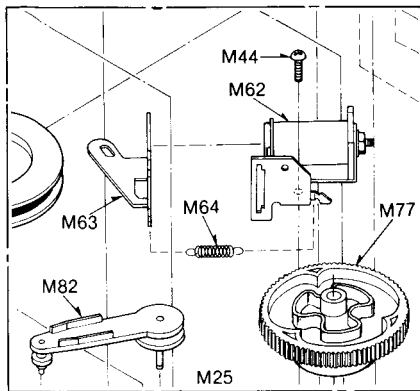
WIRING CONNECTION DIAGRAM (ADDITION)



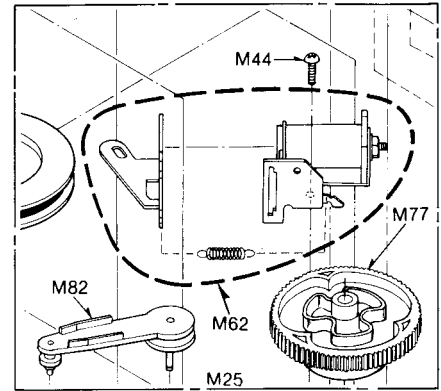
CABINET PARTS LOCATION (ADDITION)



MECHANICAL PARTS LOCATION (DIFFERENCE)

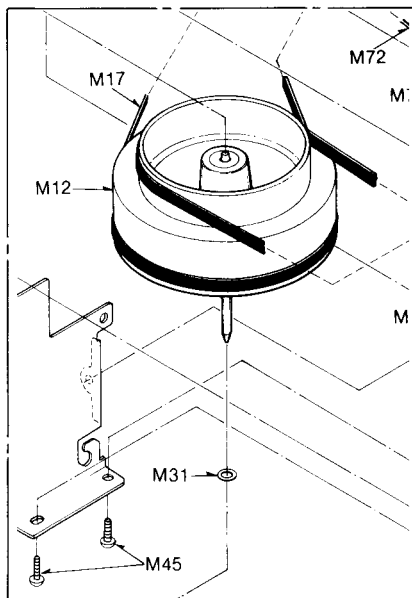


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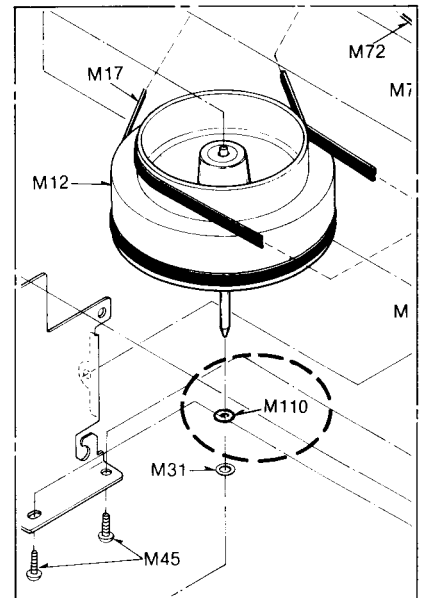


New Type

(ADDITION)

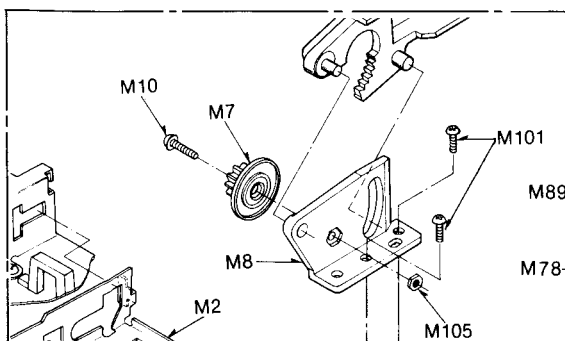


Former Type

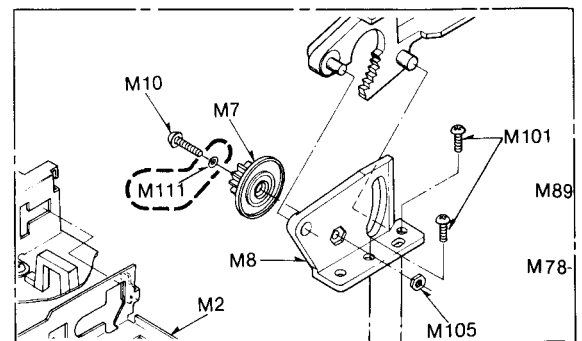


New Type

(ADDITION)



Former Type



New Type

PARTS COMPARISON TABLE :

Please revise the original parts list in the Service Manual to conform to the changes shown herein.

If new parts number are shown, be sure to use them when ordering parts.

Important safety notice.
Components identified by Δ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

Ref. No.	Parts Name & Description	Parts Number		Remarks
		Former Type	New Type	
M10	Screw $\Phi 2.6 \times 8$	XTN26+8	XSN26+8	
M26	Lever (Detector)	QML3611	QML3661	
M62	Angle Assembly (with Plunger)	QXA1075	QXA1072	
M63	Lever (for Plunger)	QML3650	—————	Deleted
M64	Spring	QBT1924	—————	Deleted
M70	Capstan Motor	QXU0268	QXU0269	
M80	Pressure Roller Lever-R	QXL1406	QXL1532	
M80-1	Pressure Roller Spring	QBN1771	QBN1884	
M110	Washer	—————	QBJ3221	Added
M111	Washer 2.6 ϕ	—————	XWG26	Added
R137, 138	Resistor	ERO25TKG2003 (200k Ω)	ERO25CKG2003 (200k Ω)	
R157	Resistor	ERD25FJ221 (220 Ω)	ERQ14AJ181P (180 Ω)	
R167, 168	Resistor	ERD25FJ330 (33 Ω)	ERD25FJ101 (100 Ω)	
R235	Resistor	ERD25TJ183 (18k Ω)	ERD25TJ393 (39k Ω)	
R236	Resistor	ERD25FJ562 (5.6k Ω)	ERD25FJ472 (4.7k Ω)	
R237	Resistor	ERD25FJ682 (6.8k Ω)	ERD25FJ472 (4.7k Ω)	
R253	Resistor	ERD25TJ273 (2.7k Ω)	ERD25TJ104 (100k Ω)	
R256	Resistor	ERD25FJ122 (1.2k Ω)	ERD25FJ272 (2.7k Ω)	
R264	Resistor	ERO25KF1502 (15k Ω)	ERO25CKF1502 (15k Ω)	
R269	Resistor	ERG1ANJ3R9 (3.9 Ω)	—————	Deleted
R273	Resistor	ERQ12AJ181P (180 Ω , 1/2W)	ERD25FJ271 (270 Ω , 1/4W)	
R287	Resistor	ERD25FJ330 (33 Ω)	ERD25FJ102 (1k Ω)	
R289	Resistor	ERD25FJ473 (47k Ω)	ERD25FJ102 (1k Ω)	
R291	Resistor	ERD25TJ473 (47k Ω)	ERD25TJ393 (39k Ω)	
R292	Resistor	ERD25FJ103 (10k Ω)	ERD25TJ393 (39k Ω)	
R298	Resistor	—————	ERD25TJ473 (47k Ω)	Added
R313, 314	Resistor	ERO25KG2702S (27k Ω)	ERO25CKF2702S (27k Ω)	
C5, 6	Capacitor	ECKD1H561KB (560pF)	ECKD1H471KB (470pF)	
C21	Capacitor	ECEA1ES101 (16V 100 μ F)	ECEA1CS221 (16V 220 μ F)	
C34	Capacitor	—————	ECQM1H273JZ (0.027 μ F)	Added
C58	Capacitor	ECEA50Z3R3 (50V 3.3 μ F)	ECEA50Z1 (50V 1 μ F)	
C155, 156	Capacitor	ECQV05153JZ (0.015 μ F)	ECQV05103JZ (0.01 μ F)	
C206	Capacitor	ECQF6682KZH (0.0068 μ F)	ECQM1H682JZ (0.0068 μ F)	
C215	Capacitor	ECEA1CN100S (16V 10 μ F)	ECEA1CN220S (16V 22 μ F)	
C233	Capacitor	ECKD1H152KB (0.0015 μ F)	ECQM1H682JZ (0.0068 μ F)	
C235	Capacitor	—————	ECEA25Z4R7 (25V 4.7 μ F)	Added
C301, 302	Capacitor	ECEA50Z3R3 (50V 3.3 μ F)	ECEA50ZR22 (50V 0.22 μ F)	
D238	Diode	RD5R6EB	RD3R9EB	
D243	Diode	—————	MA161	Added
IC201	Integrated Circuit	—————	M74LS00P	Added
IC606	Integrated Circuit	M74LS00P	—————	Deleted
F1 Δ	Fuse (T 1.6A)	XBA0010	XBAQ0010	
E1	Head (Record/Playback)	QWY4125ZA	QWY4125W	
E46	Meter Cushion	—————	QBMM0019	Added
E47	Lug Terminal	—————	QTD1001	Added
G17	Meter Cover "Silver Type"	QGLM0026	QGLM0033	
	Meter Cover "Black Type"	QGLM0026Y	QGLM0033Y	
G38	Spacer	—————	QGKM0167	Added
P7	Spacer	—————	QPAM0051	Added
P8	Pad	—————	QPS0434	Added