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Service Manual

Cassette Deck

RS-M280

(Silver Face
Black Face)

Quartz-Locked Direct-Drive Stereo Cassette Deck
with 3 Head, Double Capstan System

DOLBY SYSTEM

This is the Service Manual for the following areas.
- [D] ..... For all European areas except United Kingdom.
- [B] ..... For United Kingdom.
- [N] ..... For Asia, Latin America, Middle East and Africa areas.
- [A] ..... For Australia.

RS-M250 MECHANISM SERIES

Specifications

Track system:	4-track 2-channel stereo recording and playback
Tape speed:	4.8 cm/s
Wow and flutter:	0.024% (WRMS), ±0.09% (DIN)
Frequency response:	Metal tape; 18—22,000 Hz 20—20,000 Hz (DIN) 25—19,000 Hz ±3 dB
	CrO_2 tape; 18—21,000 Hz 20—20,000 Hz (DIN) 25—18,000 Hz ±3 dB
	Normal tape; 18—20,000 Hz 20—19,000 Hz (DIN) 25—17,000 Hz ±3 dB
Signal-to-noise ratio:	Dolby* NR in; 70 dB (above 5 kHz) Dolby NR out; 60 dB (signal level=peak level A weighted, CrO_2 type tape)
Fast forward and rewind time:	Approx. 80 seconds with C-60 cassette tape
Inputs:	MIC; sensitivity 0.25 mV, input impedance 9 kΩ applicable microphone impedance 400Ω—10 kΩ LINE; sensitivity 60 mV, input impedance 42 kΩ
Outputs:	LINE; output level 700 mV, output impedance 2.5 kΩ or less load impedance 22 kΩ over HEADPHONES; output level 125 mV, load impedance 8Ω
Bias frequency:	85 kHz
Heads:	3-head system 2-SX (Sendust Extra) heads for record/playback 1 double-gap ferrite head for erasure
Motor:	3-motor system 1 Quartz locked Direct Drive motor 2 DC motors for reel-table drive
Power requirement:	AC; 110/125/220/240 V, 50-60 Hz
Power consumption:	[D][B][A]; 25 W [N]; 20 W
Dimensions:	43 cm(W)×9.7 cm(H)×34.0 cm(D)
Weight:	6.3 kg

Specifications are subject to change without notice.

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

Technics

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CONTENTS

MESSUNGEN UND EINSTELL METHODEN

RS-M280 DEUTSCH

Verwenden Sie bitte diese Broschüre Zusammen mit der Service-Anleitung für das Modell Nr. RS-M280.

Bandwähler (Schalter für Bandbetriebsarten)

Das vorliegende Gerät verwendet eine automatische Bandwahlmechanik. Diese Mechanik wählt, wie in Fig. A gezeigt, automatisch die Stromkreise für Metall/CrO_2/Normal-Betriebsart, wobei die auf der Hälfte des Kassettenbandes vorgesehenen Banddetektorlöcher verwendet werden.
Ein anderer Typ von Testband ist jedoch nicht mit diesen Banddetektorlöchern versehen. Deshalb, wenn Umschaltung des Stromkreises auf Metall/CrO_2/Normal/Fe-Cr-Betriebsart für Messung und Einstellung notwendig ist, je nach dem Typ des Testbandes die folgenden Messungen vornehmen.

Typ \ Aussparung	A	B
Metall	JA	JA
CrO_2	JA	NEIN
Normal	NEIN	NEIN

○ **Auf Betriebsart "Metall" stellen:**
- Wenn das gebrauchte Band mit Detektorlöchern für Metallband versehen ist, den Bandwähler im Unterbrett des Gerätes auf Auto-Position stellen (Fig. B).
- Wenn das gebrauchte Band nicht mit Detektorlöchern für Metallband vershen ist, den Bandwähler auf Metall-Position stellen (Fig. C).

○ **Auf Betriebsart "Normal" stellen:**
- Den Bandwähler im Unterbrett auf Auto-Position stellen (Fig. B).

○ **Auf Betriebsart "Fe-Cr" stellen:**
- Den Bandwähler im Unterbrett auf Fe-Cr-Manuell-Position stellen (Fig. D).

○ **Auf Betriebsart CrO_2 stellen:**
- Wenn das gebrauchte Band mit Detektorlöchern für CrO_2-Betriebsart versehen ist, den Bandwähler im Unterbrett auf Auto-Position stellen (Fig. B).
- Wenn das gebrauchte Band nicht mit Detektorlöchern für CrO_2-Betriebsart versehen ist, die Dreistiftbüchse [E] vom Dreistifthalter auf P.C.B. entfernen, wie in Fig. E dargestellt, und die Klemme des Dreistifthalters über einem Verbindungskabel an Erdung schließen.

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.
- Monitorschalter: Band-Position.
- Vormagnetisierungsregler: Zentrum.
- Aufnahme-Eichensteuerung: Zentrum.
- Eingangsregler: MAX.
- Ausgangsregler: MAX.
- Dolby-Schalter: Aus.
- Spitzenwertschalter: LINE.
- Timer-Wahlschalter: OFF.
- Speicherschalter: OFF.

Gegenstand	Messung und Einstellung
ⓐ Druck der Andruckrolle Bedingung: * Wiedergabe Meßgerät: * Bandzugmesser (max. 500gr)	1. Gerät auf "Wiedergabe" schalten. 2. Bandzugmesser über die Spitze der Andruckwollenwelle (A) haken und entgegen der Andruckrichtung Andruckrolle-Tonwelle ziehen (Fig. 1). 3. Bandzugmesser in dem Augenblick ablesen, in dem die Andruckrolle von der Tonwelle abhebt und sich zu drehen aufhört. **NORMALWERT: 130±20gr (Zufuhrseite)** **NORMALWERT: 350±50gr (Aufwickelseite)**
ⓑ 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**
ⓒ Bandgeschwindigkeit Bedingung: * Wiedergabe Meßgerät: * Elektronischer Digitalzähler * Testband...QZZCWAT	**Genauigkeit der Bandgeschwindigkeit** 1. Den Meßaufbau zeigt Fig. 2. 2. Testband (QZZCWAT 3000Hz) wiedergeben und Ausgangssignal dem Zähler zuführen. 3. Frequenz messen. 4. Beträgt die auf dem Testband aufgezeichnete Frequenz 3000Hz, so ergibt sich die Genauigkeit nach folgender formel: Genauigkeit der Bandeschwindigkeit $=\frac{f-3000}{3000}\times 100(\%)$ worin f die gemessene Frequenz ist. 5. Die Messung soll im mittleren Teil des Bandes erfolgen. **NORMALWERT: ±0,4%** **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 0,4%**
ⓓ "Wow" und "Flutter" Bedingung: * Wiedergabe Meßgerät: * Wow-Meter * Testband...QZZCWAT	1. Den Meßaufbau zeigt Fig. 3. 2. Testband wiedergeben und dabei Wow-Meter ablesen. 3. "Wow" und "Flutter" wird als Prozentwert angezeigt und kann nach JIS-Norm ausgewertet werden. 4. Die Messung ist im mittleren Teil des Bandes dureh zuführen. **NORMALWERT: 0,04% (Weff)**
ⓔ 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: Ungefähr 5,5msec** 3. Falls der gemessene Wert vom unten gezeigten Signal beträchtlich abweicht, mit VR601 erforderliche Justierung vornehmen.

Gegenstand	Messung und Einstellung
ⓕ **Kopfausrichtung und Justierung des Bandlaufs** Bedingung: * Aufnahma und Wiedergabe Meßgerät: * Röhrenvoltmeter * Oszillograf * NF-Generator * Abschwächer * Widerstand (600Ω) * Testband (azimuth)...QZZCFM * Testband (Bandlaufwe-Betrachtungsvorrichtung mit Spiegel)...QZZCRD * Kassettenband...C-120	Im vorliegenden Gerät ist unsere eigene Doppelwinde mit 3-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 Höhenhustierungen 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 erneuerun 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 S hraube (C) um 4 Drehungen zurückstellen. 3. Schraube (B) so justieren, daß der Kopf zur Kopfgrundplatte parallel liegt. (Fig. 5-1). **Feineinstellung** **— Höheneinstellung —** 1. QZZCRD (Bandverlaufbeobachter) beladen und das Gerät auf PAUSE-Betriebsart stellen. Schrauben (B) und (C) feineinstellen. (Fig. 5-2). **— 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. 6). 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. 7 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. 7. Den Monitorwähler auf TAPE-Position umschalten. 8. Aufnahme- und Wiedergabeknopfe drücken. 9. Nach der Aufnahme den Bereich Ⓑ löschen, indem die Eingangspegelkontrolle auf Minimum unter einer Keinsignalbedingung gestellt wird. (Fig. 8). 10. Bereiche Ⓐ und Ⓑ wiedergeben, und bei LINE OUT Ausgangspegel (dB) messen. 11. Für beide Kanäle Messungen ausführen. Löschverhältnis (dB) = Gemessener Wert des Bereichs Ⓐ − Gemessener Wert des Bereichs Ⓑ **Bezugswert: Größer als 58dB** **— Feststellung des Wiedergabeausgangs bei 8kHz —** 1. Wie in Fig. 9 gezeigt Verbindungen herstellen. 2. Nach Justierung des Richtungswinkels wie unten beschrieben, vom Testband (QZZCFM) 8kHz-Signal wiedergeben und LINE OUT-Ausgang messen.

Gegenstand	Messung und Einstellung
	3. Für beide Kanäle Messungen ausführen. **Bezugswert: Größer als 60mV** 4. Schraube (A) feineinstellen, wenn das Löschverhältnis und der Wiedergabeausgang vom Bezugswert abweicht. (Vgl. die Justierung der Bahnneigung.) **Senkrechtstellen des Kopfes** **— Ausgangsbalance-Justierung für linken und rechten Kanal —** 1. Den Meßaufbau zeigt Fig. 9. 2. 8kHz-Signal des Testbandes (QZZCFM) wiedergeben. Schraube (C) in Fig. 10 auf maximalen Ausgangspegel des linken und rechten Kanals abgleichen. 3. Wenn die Ausgangspegel des linken und rechten Kanals nicht gleichzeitig maximal sind, wie folgt justieren. Durch Drehen der in Fig. 10 gezeigten Schraube die Winkel Ⓐ und Ⓒ (Punkt, wo der Spitzenausgangspegel fül den linken, bzw. rechten Kanal ereicht wird ermitteln. Anschließend den Winkel Ⓑ zwischen dem Winkel Ⓐ und Ⓒ ermitteln, d.h. den Punkt, wo der Ausgangs-pegel des linken und rechten Kanals bei maximalem Pegel zusammentreffen. (Siehe Fig. 10 und 10-1). **— Phasenjustierung für linken und rechten Kanal —** 4. Den Meßaufbau zeigt Fig. 10-2. 5. 8kHz-Signal des Testbandes (QZZCFM) wiedergeben. Schraube (C) in Fig. 10 so einstellen, daß Zeiger von zwei Röhrenvoltmeter auf Maximum ausschlagen, und am Oszillografen eine Wellenform, wie in Fig. 10-3 erreicht wird. 6. Nach Justierung Kopfjustierschraube mit Lack sichern. **b) Löschkopfjustierung** 1. Löschkopfschraube (D) lockern und Löschkopf in der Pfeilrichtung (G) bis zum Maximum erhöhen. (S. Fig. 5). 2. Überprüfen, daß der Löschkopf die Kassettenhälfte in Betriebart Wiedergabe nicht berührt. **c) Justierung der Andrucksrolle-L (Zufuhrseite)** 1. Schraube (E) lockern und die vertikale Position der Mutter (F) justieren, um das Band vor Roller oder Verformen während des Bandlaufs zu schützen. (S. Fig. 5).
⑧ Frequenzgang bei Wiedergabe Bedingung: * Wiedergabe * Ausgangsregler: MAX. Meßgerät: * Röhrenvoltmeter * Oszillograf * Testband...QZZCFM	**Messung:** 1. Den Meßaufbau zeigt Fig. 7. 2. Gerät auf "wiedergabe" schalten. 3. Frequenzgang-Testband QZZCFM wiedergeben. 4. Ausgangsspannungen bei 315kHz, 12,5kHz, 8kHz, 250Hz, 125Hz und 63Hz mit Ausgangsspannung der Standard Frequenz 315Hz vergleichen. 5. Messungen an beiden Kanälen durchführen. 6. Prüfen, ob die Werte innerhalb der in Fig. 11 dargestellten Kurven liegen. **Einstellung:** 1. Falls bei hohen Frequenzen ein kleinerer Wert gemessen wird (siehe Fig. 12), müssen die Leiterplatten-Anschlußpunkte (a) (linker Kanal) und (a') (rechter Kanal) kurzgeschlossen werden (Siehe Fig. 14). Kompensationswert 4kHz: Ungefähr +0,3dB 6kHz: Ungefähr +0,6dB 8kHz: Ungefähr +0,8dB 10kHz: Ungefähr +1,0dB 12,5kHz: Ungefähr +1,4dB 2. Falls der Meßwert im hohen Frequenzbereich ansteigt (Fig. 13) die Leiterplattenstellen (a) (linker Kanal) und (a') (rechter Kanal) unterbrechten. 3. Die Messung wiederholen (Schritte 2 bis 6).

Gegenstand	Messung und Einstellung
ⓗ Wiedergabe-Verstärkung Bedingung: * Wiedergabe * Ausgangsregler: MAX. Meßgerät: * Röhrenvoltmeter * Oszillograf * Testband...QZZCFM	1. Den Meßaufbau zeigt Fig. 7. 2. Standard-Frequenz (QZZCFM 315Hz) vom Testband wiedergeben und Ausgangsspannung messen. 3. Messung an beiden Kanälen durchführen. **NORMALWERT: 0,70±1,5dB** **Einstellung:** 1. Abweichungen können durch Abgleich von VR1 (linker Kanal) und VR2 (rechter Kanal) korrigiert werden. (S. Fig. F). 2. Nach effolgtem Abgleich ist der Frequenzgang bei Wiedergabe erneut zu kontrollieren.
ⓘ Signal/Rauschverhältnis bei "Wiedergabe" Bedingung: * Wiedergabe * Ausgangspegeleinsteller: MAX. * Bandbetriebsarten: CrO_2 Meßgerät: * Röhrenvoltmeter * Oszillograf * Testband...QZZCFM * Leerkassette	1. Den Meßaufbau zeigt Fig. 7. 2. Standardpegel-Testband (QZZCFM 315Hz) wiedergeben und Ausgangsspannung vom Röhrenvoltmeter ablesen (Vgl. "Wiedergabe-Verstärkung"). 3. Leerkassette einsetzen und auf Wiedergabe schalten. 4. Geräuschpegel vom Röhrenvoltmeter ablesen und Verhältnis zum Ausgangspegel des Testbandes bestimmen. **NORMALWERT: Größer als 47dB**
ⓙ Vorspannungsverlust Bedingung: * Aufnahme * Eingangsregler...MAX. * Ausgangsregler...MAX. * Bandbetriebsarten: Metall Meßgerät: * Röhrenvoltmeter * Oszillograf	**Einstellung (zum Aufnahmeverstärker)** 1. Den Meßaufbau zeigt Fig. 16. 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 zeight Fig. 17. 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.
ⓚ Vormagnetisierung Bedingung: * Aufnahme * Bandbetriebsarten: Normal Fe-Cr CrO_2 Metall * Steuerung der Vorspannungsreglung ...Zentrum Meßgerät: * Röhrenvoltmeter * Oszillograf	1. Den Meßaufbau zeigt Fig. 18. 2. Gerät auf "Aufnahme" und Bandwahlschalter auf "Normal" schalten. 3. Spannung vom Röhrenvoltmeter ablesen und Vormagnetisierungsstrom nach folgender Formel berechnen: Vormagnetisierungsstrom (A) = $\frac{\text{Spannung am Röhrenvoltmeter (V)}}{10(\Omega)}$ **NORMALWERT: Ungefähr 0,8mA (Normal)** 4. VR203 (Linker Kanal) und VR204 (Rechter Kanal) abgleichen. 5. Den Bandsortenwähler in jede Position stellen. 6. Überprüfen, ob der Meßwert im vorgeschriebenen Bereich liegt. **NORMALWERT: Ungefähr 0,92mA (Fe-Cr)** **Ungefähr 1,1mA (CrO_2)** **Ungefähr 2,0mA (Metal)**
ⓛ Löschstrom Bedingung: * Aufnahme * Betriebsart * Bandbetriebsarten: Normal Fe-Cr CrO_2 Metall	1. Den Meßaufbau zeigt Fig. 19. 2. Betriebsart auf Aufnahme und Bandwahlschalter auf Metallposition stellen, dann Spannung an Prüfpunkt 9 messen. 3. Löschstrom nach folgender Formel emitteln: Löschstrom (A) = $\frac{\text{Die Spannung über beide Enden von R269}}{1(\Omega)}$ **NORMALWERT: 200±10mA (Metal)**

Gegenstand	Messung und Einstellung
Meßgerät: * Röhrenvoltmeter * Oszillograf	4. Abweichungen können durch Abgleich von VR201 korrigiert werden. 5. Den Bandsortenwähler in jede Position stellen. 6 Überprüfen, ob der Meßwert im vorgeschriebenen Bereich liegt. **NORMALWERT: 85±10mA (Normal) 90±10mA (Fe-Cr) 105±10mA (CrO_2)**
ⓜ **Gesamt-frequenzgang** Bedingung: * Aufnahme und Wiedergabe * Eingangsregler...MAX. * Ausgangsregler...MAX. * Bandbetriebsarten: Normal Fe-Cr CrO_2 Metall Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer * Widerstand (600Ω) * Testband (Leerband) QZZCRA für Normal QZZCRY für Fe-Cr QZZCRX für CrO_2 QZZCRZ für Metal	**Anm.:** Vor Messung und Abgleich des Gesamtfrequenzganges ist sicherzustellen, daß der Frequenzgang bei Wiedergabe korrekt ist (Vgl. entspr. Abschnitt). 1. Den Meßaufbau zeigt Fig. 20. 2. Testband einlegen. 3. Den Monitor-Wahlschalter in die "source"-Position. 4. 1kHz vom NF-Generator über den Abschwächer dem NF-Eingang zuführen. 5. Den Abschwächer so einstellen, daß der Eingangspegel (−20dB) des Stand-Aufnahmepegels berträge (Standard-Aufnahmepegel = Anzeige "0" des Pegel-Meters). 6. Zu diesem Zeitpunkt beträgt der Ausgangspegel 0,07V. 7. Den Monitor-Wahlschalter in die "tape"-Position stellen. 8. Die Aufnahme-und Wiedergabetaste drücken. 9. Tongenerator auf 1kHz, 40Hz, 200Hz, 4kHz, 8kHz und 15kHz (für Fe-Cr, CrO_2 und Metall 17kHz) umschalten und Ausgangspegel an LINE OUT ablesen. 10. Überprüfen, ob der Pegel jeder Frequenz in Bezug auf 1kHz innerhalb der in Fig. 21 und 22 gezeigten Angabe liegt. 11. Für Normal-, Fe-Cr-, CrO_2- und Metallband jeweils in gleicher Weise überprüfen. **Einstellung-1 mit Vormagnetisierungsstrom** 1. Werden die mittleren und hohen Frequenzen gemäßder durchgezogene Linie in Fig. 23 zu stark wiedergegeben, so ist der Vormagnetisierungsstrom durch Drehen, die folgenden VR zu erhöhen. VR203 (linker Kanal), VR204 (rechter Kanal). 2. Erfolgt ein Abfall, wie ihn die Strichlinie in Fig. 25 zeigt, so ist an diesen Reglern entgegen der Pfeilrichtung zu drehen, die folgenden VR zu erhöhen. VR203 (linker Kanal), VR204 (rechter Kanal) **Anm.:** Für die Messung des Vormagnetisierungsstromes sei auf den Abschnitt "ⓚ Vormagnetisierung" hingewiesen. **Einstellung-2 mit der Entzerrerspule zur Aufnahme-Eintzerrung** Verläuft der Frequenzgang bei mitteleren Frequenzen flach und zeigt bei höheren Frequenzen einen schart en Anstieg oder Abfall entsprechend Fig. 24 die folgenden Korrecturspulen zu erhöhen. L103 (L-CH), L104 (R-CH).
ⓝ **Gesamt-Verstärkung** Bedingung: * Aufnahmekalibrierung...Mitte * Aufnahme und Wiedergabe * Bandbetriebsarten: Normal Fe-Cr CrO_2 Metall * Eingangsregler...MAX. * Ausgangsregler...MAX. * Standard-Eingangspegel Mikrofon .....−72±3dB NF-Eingang .....−24±3dB Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer * Oszillograf	1. Den Meßaufbau zeight Fig. 25. 2. Testband (QZZCRA) in das Cassettenfach einsetzen. 3. Gerät auf "Aufnahme" und Bandwahlschalter auf "Normal" schalten. 4. Über den Abschwächer 1kHz-Signal (−24dB) vom NF-Generator dem IN-Eingang zuführen. 5. ATT so justieren, daß Quellenmonitorpegel an LINE OUT 0,7V erreicht. 6. Dieses signal auf Testband aufnehmen. 7. Das aufgenommene Band abspielen und Ausgangspegel des Bandmonitors an LINE OUT auf VTVM messen. **NORMALWERT: 0,7V±0,5dB (Normal)** 8. Falls der gemessene Wert nicht der Toleranz liegt, die folgenden VR abgleichen. VR103 (L-CH), VR104 (R-CH). 9. Ab Punkt 4 wiederholen. 10. Den Bandsortenwähler in jede Position stellen. 11. Nacheinander das Fe-Cr Testband (QZZCRY), das CrO_2 Testband (QZZCRX) und das Metallpartikel-Testband (QZZCRZ) benutzen.

Gegenstand	Messung und Einstellung
* Testband (Leerband) QZZCRA für Normal QZZCRX für Fe-Cr QZZCRY für CrO_2 QZZCRZ für Metal	12. Gerät auf Aufnahme schalten. 13. Die Aufnahme wiedergeben, und den Ausgangspegel an LINE OUT am Röhrenvoltmeter ablesen. **NORMALWERT: 0,7V±1,0dB (Fe-Cr) (CrO_2) (Metal)**
ⓞ **Fluorezenzmeter** Bedingung: * Aufnahme * Eingangsregler...MAX. * Ausgangsregler...MAX. Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer	1. Den Meßaufbau zeigt Fig. 26. 2. Wie in Fig. 25 gezeigt den Kollektor des Q306 an Masse anschließen. 3. Signal vor 1kHz (−24dB) an die Line IN-Buchse eingeben und Monitorschalter auf Quelle-Position stellen. 4. ATT so abstimmen, daß der Ausgangspegel an der LINE OUT-Buchse 0,7V wird. (Der Eingangspegel in dieser Stellung wird als Standardpegel bezeichnet). 5. Justierung auf "−20dB". A. Den Abschwächer so einstellen, daß der Eingangspegel −20dB des Stand-Aufnahmepegels beträge. B. VR303 so ableichen, daß im Bereich von −20dB±0,8dB das Segment −20dB aufleuchtet (NUR RECHTER KANAL) (S. Fig. 27). 6. Justierung auf "0dB". A. ATT so abstimmen, daß der Ausgangspegel an der LINE OUT-Buchse, 0,7V wird. B. VR305 so abgleichen, daß im Bereich von ±0,2dB um den Standardpegel das Segment 0dB aufleuchtet (S. Fig. 28). 7. Balanceabgleich zwischen Kanälen VR301 so abgleichen, daß bei 0dB von R-Kanal Aufleuchtpegel von L-Kanal 0dB wird. 8. Die Anleitungsschritte 5 bis 6 zweimal wiederholen. 9. Die ATT einstellen; kontrollieren, ob alle Segmente aufleuchten, wenn der Eingangspegel 10dB höher als der Standardpegel ist (S. Fig. 29).
ⓟ **Gesamt-Klirrfaktor** Meßgerät: * Klirrfaktor-Meßgerät * NF-Generator * Abschwächer * Oszillograf * Testband (Leerband) QZZCRA	1. Den Meßaufbau zeigt Fig. 30. 2. Den Monitor-Wahlschalter in die "source"-Position stellen. 3. Dem NF-Eingang 1kHz zuführen und den Abschwächer so einstellen, daß am NF-Ausgang 0,7V stehen. 4. Den Monitor-Wahlschalter in die "tape"-Position stellen. 5. Die Aufnahme- und Wiedergabetaste drücken und Klirrfaktor des Bandmonitor-Ausgangssignals messen. 6. Wenn der Klirrfaktor den Normalwert übersteigt, ist der Vormagnetisierungsstrom zu prüfen. Ist dieser Strom kleiner als der Normalwert, nimmt der Klirrfaktor zu. Beim Einstellen des Vormagnetisierungsstromes ist zu beachten, daß dieser auch einen Einfluß auf den Gesamtfrequenzgang hat. Die Abschnitte "Gesamtfresquenzgang" und "Vormagnetisierung" beachten. **NORMALWERT: Weniger als 3%**
ⓠ **Gesamt-Signal/ Rauschverhältnis** Meßgerät: * Röhrenvoltmeter * NF-Generator * Abschwächer * Oszillograf * Testband (Leerband) ...QZZCRX	1. Den Meßaufbau zeigt Fig. 25. 2. Den Monitor-Wahlschalter in die Band-Position und den Bandwahlschalter in die CrO_2-Position stellen. 3. Unbespieltes Bezugsband einsetzen. 4. Die Aufnahme-und Wiedergabetaste drücken. 5. Den NF-Eingang 1kHz zuführen und den Abschwächer so einstellen, daß am NF-Ausgang 0,7V stehen. 6. Dann Stecker von LINE IN-Eingang trennen. 7. Bandmonitor-Ausgangsignalpegel von 1kHz und ohne Signal (Rauschen) messen und das Verhältnis in Dezibel (dB) ermitteln. **NORMALWERT: Größer als 45dB (Ohne Filter)**

Gegenstand	Messung und Einstellung
ⓡ **Test-Oszillator** Bedingung: * Aufnahme * Monitorschalter...Quelle	**Ausgangsabgleich bei 400 Hz** 1. Eingangswähler auf 8kHz/400Hz und Monitorschalter auf Quelle stellen. 2. Eingangswähler auf 400Hz umschalten. 3. VR107 so abgleichen, daß Meteranzeige von 400Hz an der R-Kanalseite dem Ausgangspegel bei 8kHz gleicht. **Feinabstimmung von L-Kanal bei 400 Hz** 1. Eingangswähler auf 400Hz stellen und Eingangs-VR so abgleichen, daß Fluorenzmeteranzeige an R-Kanalseite 0dB zeigt. 2. VR109 so abgleichen, daß Ausgangspegel an L-Kanalseite dem an R-Kanalseite gleicht.
ⓢ **Dolby-Schaltung** Bedingung: * Aufnahme * Eingangsregler...MAX. * Ausgangsregler...MAX. Meßgerät: * Röhrevoltmeter * NV-Generator * Abschwächer * Oszillograf * Widerstand (600Ω)	1. Den Meßaufbau zeigt Fig. 31. 2. Gerät in Stellung "Aufnahme" betreiben und Dolby-Schalter ausschalten. Dem NF-Eingang ein 5kHz-Signal zuführen, daß an TP3 (Linker Kanal) und TP4 (Rechter Kanal) −34,5dB erhalten werden. 3. Prüfen, ob das Signal bei eingeschaltetem Dolby-Schalter um 8 (±2,5)dB größer ist als bei ausgeschaltetem Dolby-Schalter.

DISASSEMBLY INSTRUCTIONS

* The head azimuth can be adjusted by removing the cassette Lid.

Fig. 1

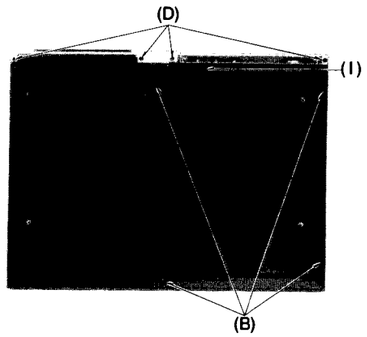


Fig. 2

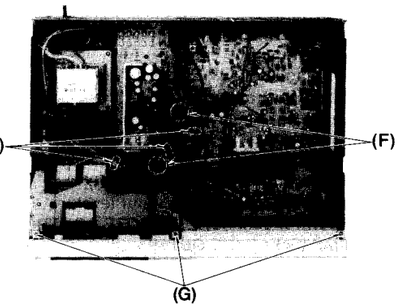


Fig. 3

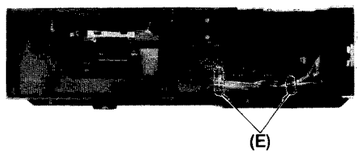


Fig. 4

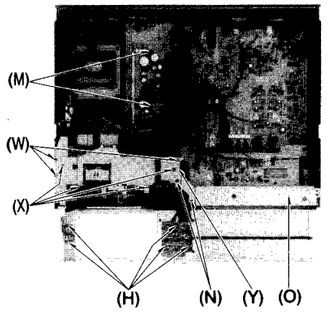


Fig. 5

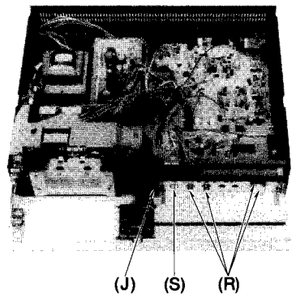


Fig. 6

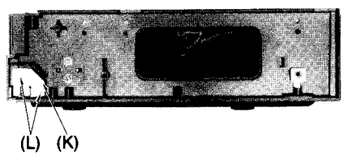


Fig. 7

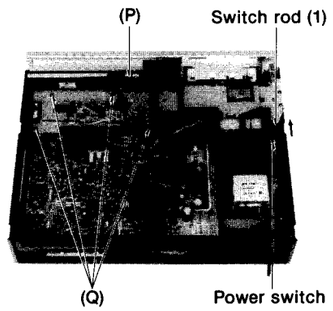


Fig. 8

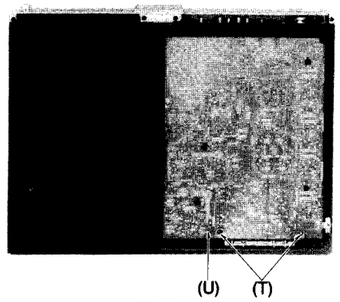


Fig. 9

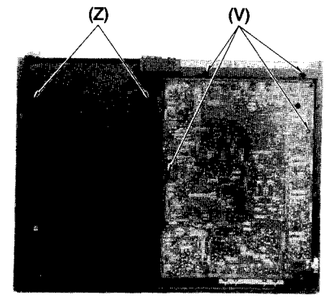


Fig. 10

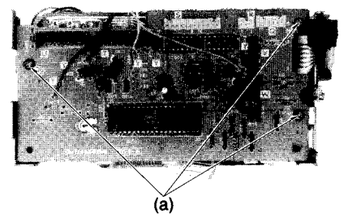


Fig. 11

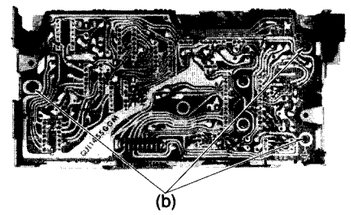


Fig. 12

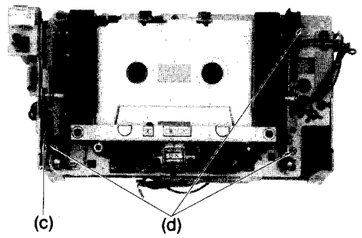
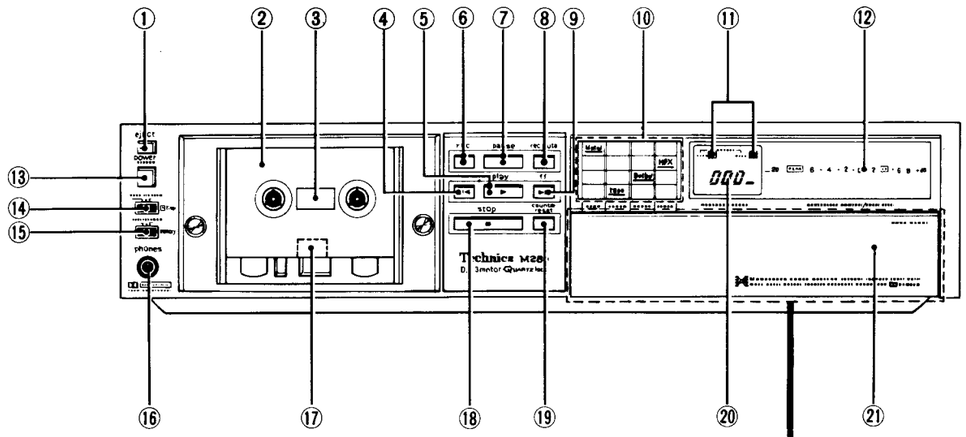


Fig. 13

Ref. No.	Procedure	To remove ——	Remove - - -	Shown in fig. ·····
1	1	Case cover	• 4 screws ····· (A)	1
2	2	Bottom cover	• 4 black screws ····· (B)	2
3	1→3	Front panel	• Cassette lid ····· (C) • 4 black screws ····· (D) • 5 binders ····· (E) • 2 clampers ····· (F) • 3 screws ····· (G) • 5 screws ····· (H)	1 2 3, 4 3 3 5
4	1→3→4	Sub panel	• Black screw ····· (I) • Sub pannel holder-L ····· (J) • 2 screws ····· (K) • Sub pannel holder-R ····· (L)	2 6 7 7
5	1→5	Power supply circuit board	• 2 red screws····· (M)	5
6	1→3→6	FL meter	• 2 red screws····· (N) • Chassis holding angle····· (O) • LED circuit board····· (P) • 4 red screws····· (Q)	5 5 8 8
7	1→2→3→6→7	Main circuit board	• 4 control knobs····· (R) • 1 select knob····· (S) • 2 red screws····· (T) • Insulating sheet-2 ····· (U) • 4 red screws····· (V)	6 6 9 9 10
8	1→3→6→8	Mechanism unit	• 3 red screws····· (W) • 4 screws ····· (X) • Center angle ····· (Y) • 2 red screws····· (Z) • Pull out the switch rod (1) from the power switch.	5 5 5 10 8
9	1→3→6→8→9	Main control circuit board	• 3 screws ····· (a)	11
10	1→3→6→8→9→10	D.D. motor circuit board	• 3 screws ····· (b)	12
11	1→3→6→8→11	Cassette holder Assembly	• Lock lever spring ····· (c) • 3 screws ····· (d)	13 13

LOCATION OF CONTROLS AND COMPONENTS



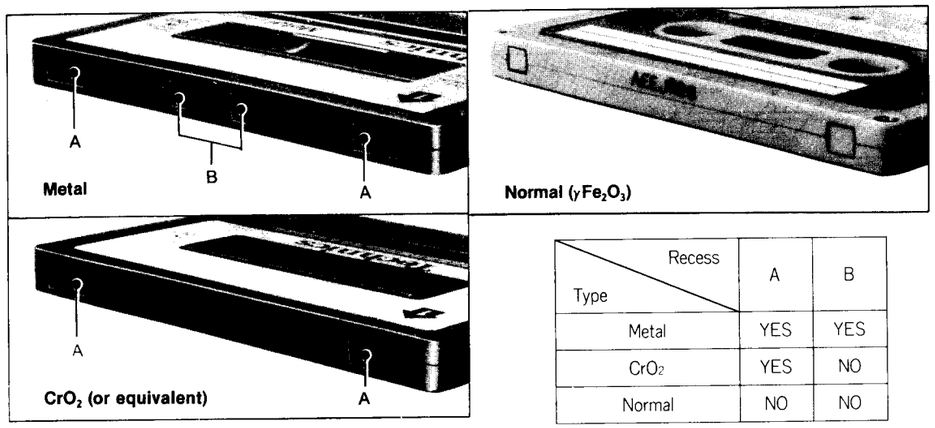
① **Eject button [eject]**
② **Cassette holder**
③ **Remaining tape light**
④ **Rewind button [rew (◀◀)]**
⑤ **Play button and indicator [play (▶)]**
⑥ **Record button and indicator [rec (○)]**
⑦ **Pause button and indicator [pause (❚❚)]**
⑧ **Record muting switch [rec mute (○)]**
⑨ **Fast forward button [ff (▶▶)]**
⑩ **Total operation indicators [tape • monitor • Dolby NR • MPX filter]**
When the Tape selector, Monitor switch, Dolby NR switch, and Multiplex filter switch are set, the corresponding indicator lights.
⑪ **Memory indicator [stop • repeat]**
This lights when the Memory switch is set.
⑫ **FL (fluorescent level) meter**
⑬ **Power switch [power (push on)]**
⑭ **Timer start switch (⏲ timer (play • off • rec))**
This is selected for a timer recording or playback operation. Set it to the "off" position when not performing either a timer recording or playback operation.
⑮ **Memory switch [memory (stop • off • repeat)]**
⑯ **Headphones jack [phones]**
⑰ **Head illuminating lamp**
⑱ **Stop button [stop (■)]**
⑲ **Reset button [counter reset]**
⑳ **Digital electronic counter [electronic counter]**
㉑ **Door [push open]**
This door opens when the top right part of the door is pressed gently with your fingertip. To close the door, raise it and push against it lightly.
㉒ **Record calibrators [rec cal (L • R)]**
These compensate for fluctuations in individual tapes and their sensitivity, they permit the Dolby NR circuit to operate in peak condition and so it reduces the noise without impairing the sound quality.
㉓ **Monitor switch [monitor (source • tape)]**
This switch is set alternately to the positions every time it is depressed.
"tape" .....Green indicator lights.
"source".....Red indicator lights.
㉔ **Dolby NR switch [Dolby NR (in • out)]**
㉕ **Multiplex filter switch [MPX filter (in • out)]**
㉖ **Tape selector [tape select (auto Normal • CrO_2 • Metal • manual Fe-Cr • Metal)]**
This is normally used at the "auto" position where the type of cassette being used is automatically detected but for some cassettes it is used at the "manual" position.
㉗ **Input selector [input select (mic • line • 400Hz • 400Hz/8kHz)]**
"mic" position when recording from a microphone.
"line" position when recording from the line input.
"400Hz," "400Hz/8kHz" position when finely adjusting the tape sensitivity or bias.
㉘ **Bias fine adjustment control [bias adjust]**
This is used to finely adjust the optimum bias current for the tape being used.
㉙ **Output level control [output level]**
This is used to adjust the level of the line output and headphones output.
㉚ **Microphone jacks [mic (L • R)]**
㉛ **Input level controls [input level (L-R)]**
These are used to adjust the input level.
㉜ **Remote control connector [REMOTE CONTROL]**
㉝ **Line output jacks [LINE OUT (R • L)]**
㉞ **Line input jacks [LINE IN (R • L)]**
㉟ **Voltage selector [VOLTAGE SELECTOR]**

RS-M280 RS-M280

MEASUREMENT AND ADJUSTMENT METHODS

Tape selector (Tape Mode Switching)

This unit employs an auto tape select mechanism. This mechanism, as shown in fig. A, automatically selects the circuits for metal/CrO_2/normal modes by using the tape detection holes provided above the cassette tape half.
However, another type of test tape is not provided with these tape detection holes.
Therefore, when it is necessary to change over the electric circuit to metal/CrO_2/normal/Fe-Cr mode for the measurement and adjustment, take the following measures according to the types of the test tapes.



Type \ Recess	A	B
Metal	YES	YES
CrO_2	YES	NO
Normal	NO	NO

Fig. A

◎Setting it to the metal tape mode:
- When the tape used is provided with metal tape mode detection hole, set the tape selector located in the sub panel of the set to auto position (fig. B).
- When the tape used is not provided with the metal tape detection hole, set the tape selector to metal position (fig. C).

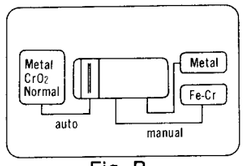


Fig. B

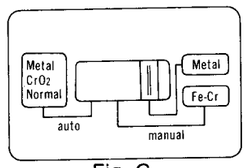


Fig. C

◎Setting it to the Fe-Cr tape mode:
- Set the tape selector located in the sub panel of the set to auto position (fig. B).

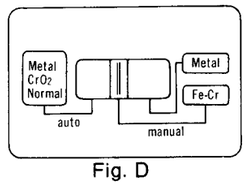


Fig. D

◎Setting it to the CrO_2 tape mode:
- When the tape used is provided with CrO_2 tape mode detection hole, set the tape selector located in the sub panal of the set to auto position (fig. B).
- When the tape used is not provided with the CrO_2 tape detection hole, disconnect the 3 pin socket [E] from the 3 pin post on the P.C.B. and then, as illustrated in the figure E, connect the terminal-3 of the 3 pin post to the ground with a connection wire.

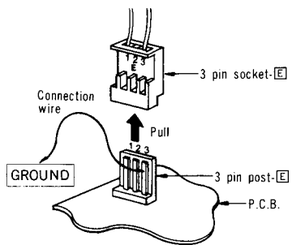
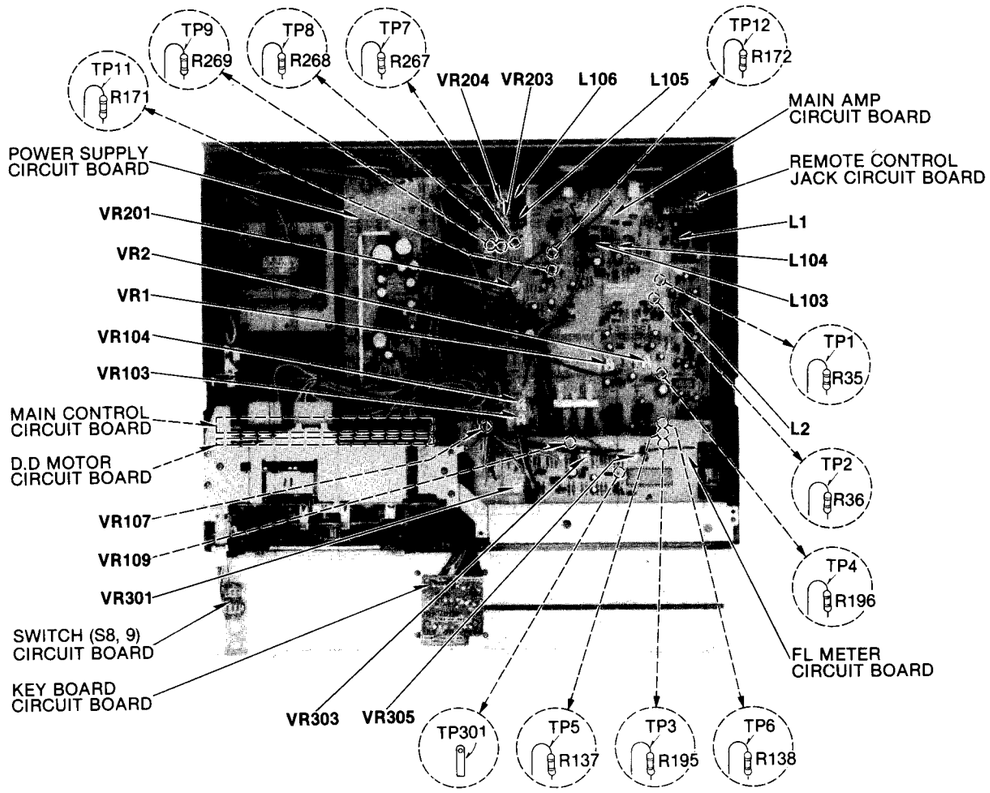


Fig. E



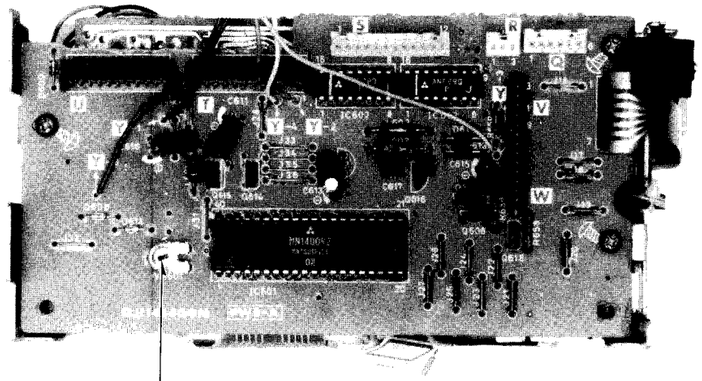


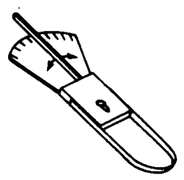
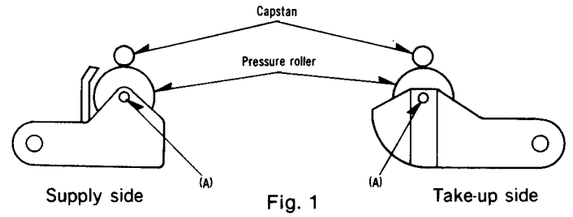
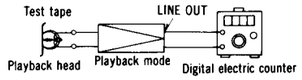
Fig. F

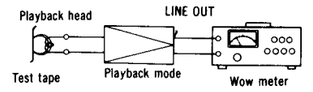
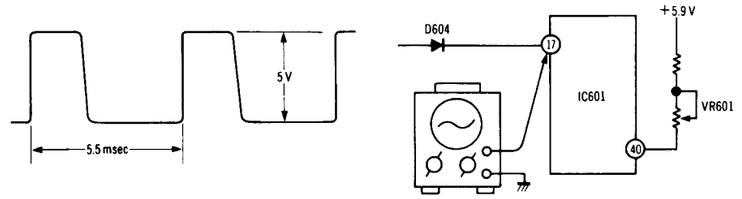
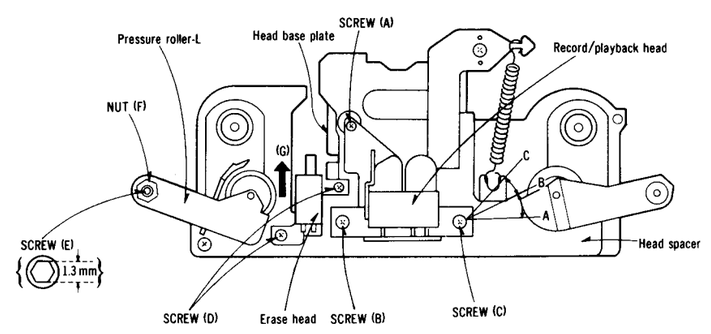
NOTE: Se
- Make s
- Make s
- Judge
- Monitc
- Bias a
- Recor

ITEM
ⓐ Pressure of pres roller Condition: • Playback mode Equipment: • Tension gauge (max
ⓑ Takeup tension Condition: • Playback mode Equipment: • Cassette torque me (QZZSRKCT)
ⓒ Tape speed Condition: • Playback mode Equipment: • Digital electronic co • Test tape ··· QZZC

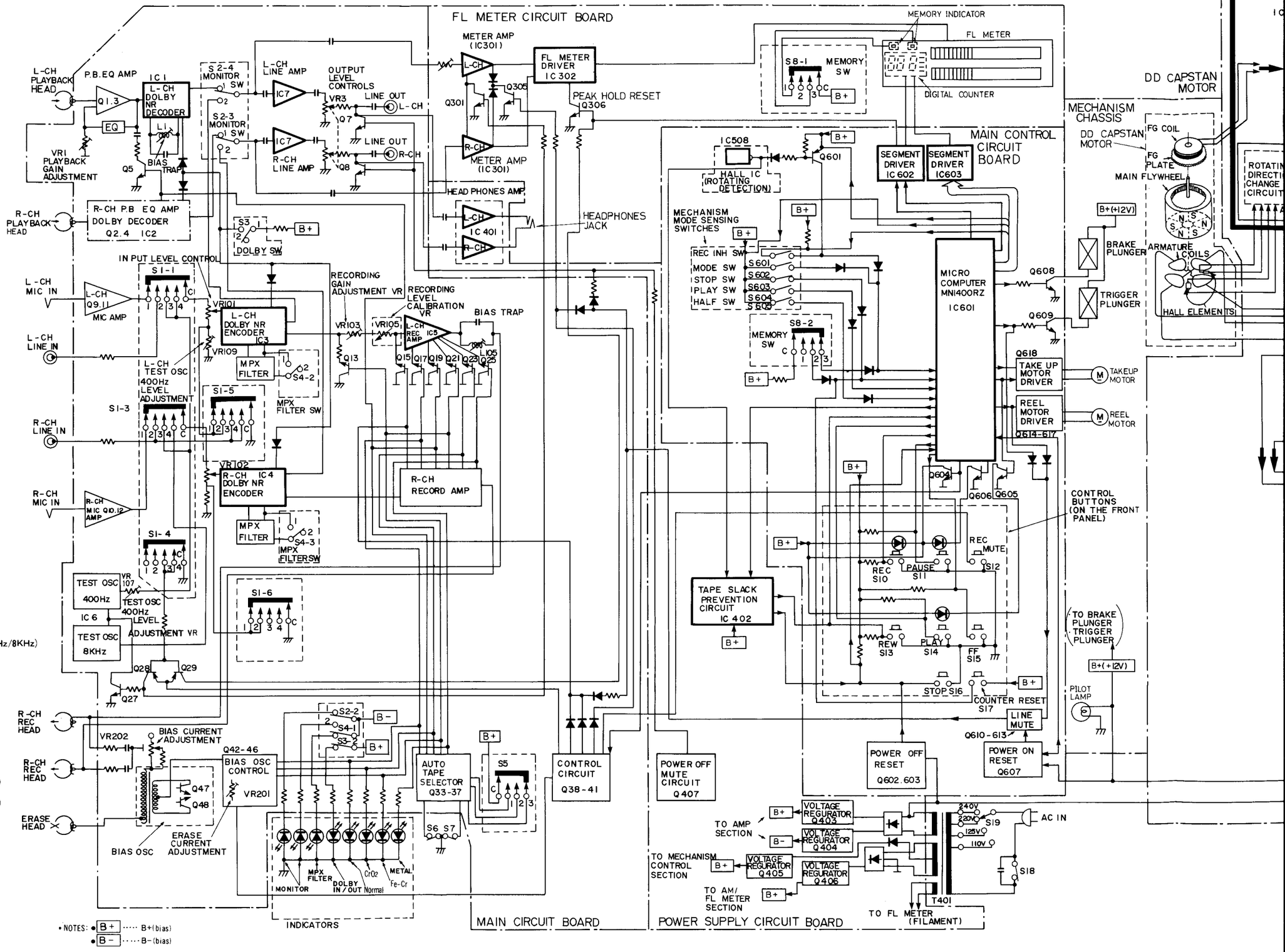
NOTE: Set lever switches and controls in the following positions, unless otherwise specified.

- 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.
- Recording-calibration controls: Center.
- Input level control: Maximum.
- Output level control: Maximum.
- Dolby NR selector: Out.
- Input selector: Line.
- Timer selector: OFF.
- Menory selector: OFF.

ITEM	MEASUREMENT & ADJUSTMENT
ⓐ 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. 1). 3. Read pressure indicated on gauge immediately when pressure roller moves away from capstan and stops rotating.  Fig. 1 Standard value: 130±20 gr Standard value: 350±50 gr
ⓑ 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
ⓒ Tape speed Condition: • Playback mode Equipment: • Digital electronic counter • Test tape ··· QZZCWAT	**Tape speed accuracy** 1. Test equipment connection is shown in fig. 2. 2. Playback test tape (QZZCWAT 3,000 Hz), and supply playback signal to frequency counter. 3. Measure this frequency. 4. On the basis of 3,000 Hz, determine value by following formula: Tape speed accuracy = $\frac{f-3{,}000}{3{,}000}\times 100$ (%) f = measured value 5. Take measurement at middle section of tape.  Fig. 2 Standard value: ±0.4% **Tape speed fluctuation** Make measurements in same manner as above (beginning, middle and end of tape), and determine difference between maximum and minimum values and calculate as follows: Tape speed fluctuation = $\frac{f_1-f_2}{3{,}000}\times 100$ (%) f_1 = maximum value, f_2 = minimum value Standard value: Less than 0.4%

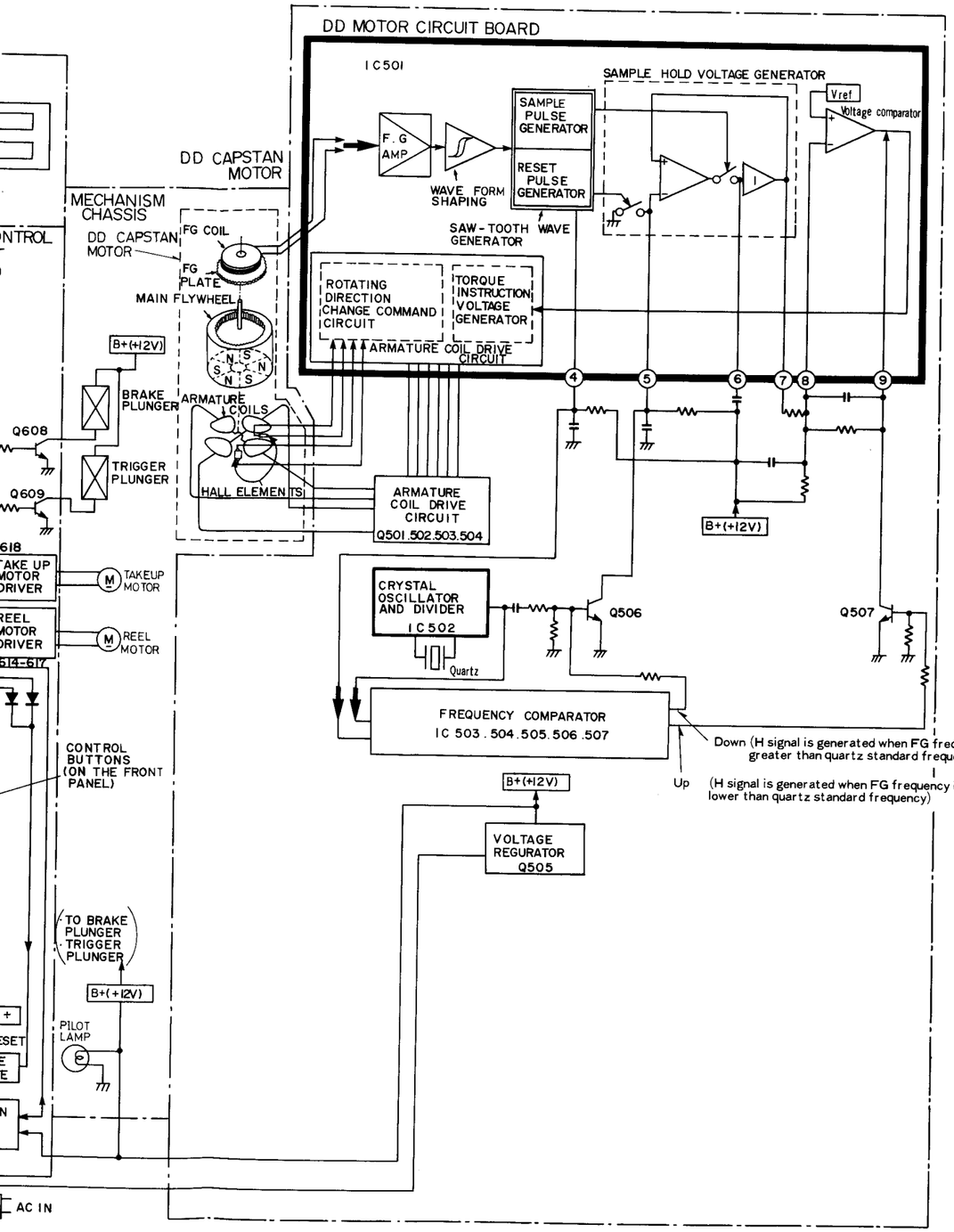
ITEM	MEASUREMENT & ADJUSTMENT
ⓓ Wow and flutter Condition: • Playback mode Equipment: • Wow meter • Test tape ··· QZZCWAT	1. Test equipment connection is shown in fig. 3. 2. Use wow test tape (3,000 Hz) and measure its playback signal on wow meter. 3. Wow and flutter is expressed in percentage and that measurement can be weighted by JIS network (WRMS). 4. Measure at middle section of test tape. Standard value: 0.04% (WRMS)  Fig. 3
ⓔ Input scanning time adjustment Condition: • Stop mode Equipment: • Oscilloscope	1. Connect oscilloscope to ⑰ terminal of IC601. 2. Measure the time of input scanning signal with oscilloscope as shown in fig. 4. Standard value: About 5.5 msec 3. If the measured value is markedly different from the signal shown below, make the necessary adjustment with VR601.  Fig. 4
ⓕ 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 3-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. 5

BLOCK DIAGRAM

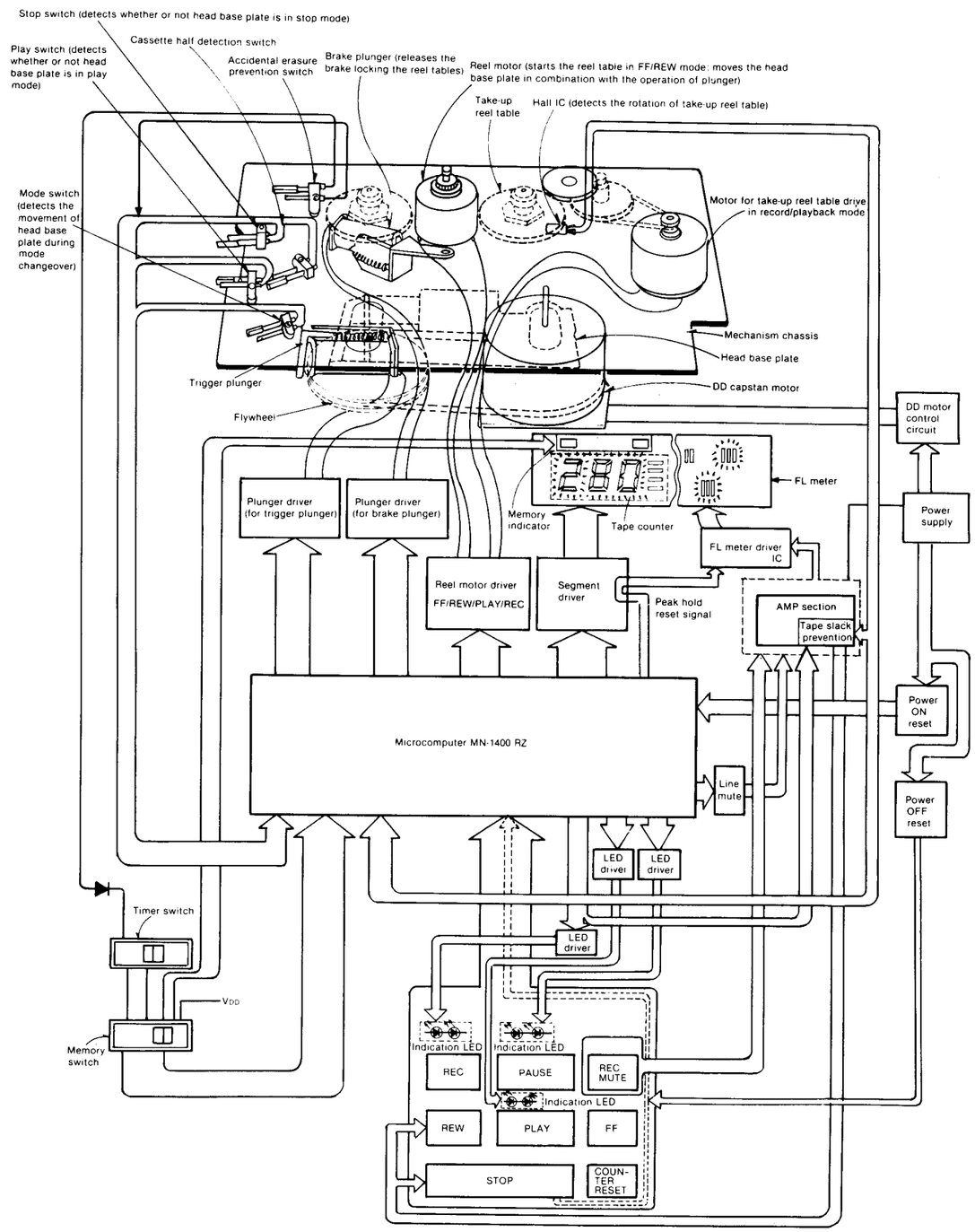


SWITCHES
- S1 ·····INPUT SELECT SW.
  (1. MIC 2. LINE 3400Hz 4. 400Hz/8KHz)
- S2 ·····MONITOR SW.
  (1. TAPE 2. SOURCE)
- S3 ·····DOLBY SW.
  (1. OUT 2. IN)
- S4 ·····MPX FILTER SW.
- S5 ·····TAPE SELECT SW.
  (1. Fe-Cr 2. METAL 3. AUTO
- S6. S7 ···AUTO TAPE SELECT SW
  (NORMAL···S6. S7 ON
  CrO_2·····S6. ON S7. OFF
  METAL ····S6. S7 OFF)
- S8 ·····MEMORY SW.
  (1. STOP 2. OFF 3. REPEAT)
- S9 ·····TIMER SW.
  (1. PLAY 2. OFF 3. RECORD)
- S10·····RECORD SW.
- S11·····PAUSE SW.
- S12·····REC MUTE SW.
- S13·····REC SW.
- S14·····PLAYSW.
- S15·····F.F. SW.
- S16·····STOP SW.
- S17·····COUNTER RESET SW.
- S18·····POWER SW.
- S19·····VOLTAGE SELECT SW.

• NOTES: • B+ ····· B+(bias)
• B− ····· B−(bias)



MECHANISM AND AMPLIFIER SYSTEM BASED ON MICROCOMPUTER OF RS-M280



ITEM	MEASUREMENT & ADJUSTMENT

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. 5-1).

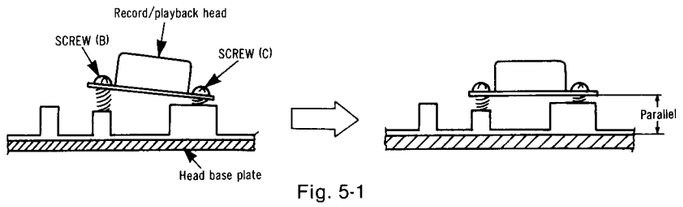


Fig. 5-1

Fine adjustment

— Height adjustment —

1. Load QZZCRD (tape path viewer) and set the unit to pause mode.
   Fine-adjust screws (B) and (C) (fig. 5-2).

— 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. 6).
   Fine-adjust screw (A) if tape curls or deforms during tape run.

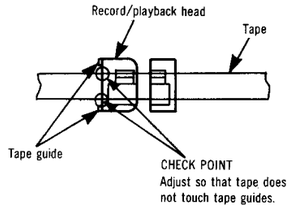


Fig. 5-2

● Adjustment direction of screw A

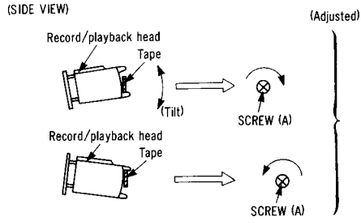


Fig. 5-3

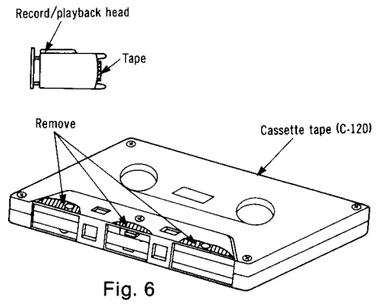


Fig. 6

Electrical check on tape running

— Erasing ratio check —

1. Test equipment connection is shown in fig. 7.
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).

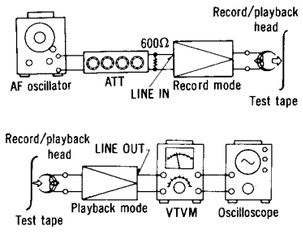


Fig. 7

ITEM	MEASUREMENT & ADJUSTMENT

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 Ⓑ by setting the input level controls to minimum under a no-signal condition (Shown in fig. 8).

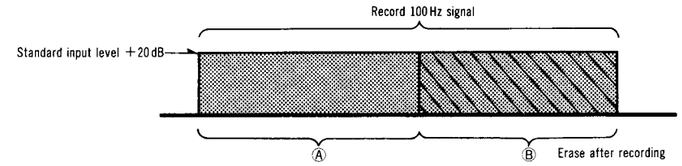


Fig. 8

10. Playback portions Ⓐ and Ⓑ, and measure output levels (dB) at LINE OUT.
11. Perform measurements for both channels.
    Erasing ratio (dB) = Measured value of portion Ⓐ − Measure value of portion Ⓑ

Reference value: Greater than 58 dB

— 8 kHz playback output confirmation —

1. Make connections as shown in fig. 9.

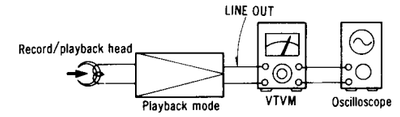


Fig. 9

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 60 mV

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. 9.
2. Playback the 8 kHz signal from the test tape (QZZCFM). Adjust screw (C) in fig. 10 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. 10 to find angles Ⓐ and Ⓒ (points where peak output levels for left and right channels are obtained). Then, locate the angle Ⓑ between angles Ⓐ and Ⓒ, i. e., a point where L-CH and R-CH output levels come together at maximum (Refer to figs. 10 and 10-1).

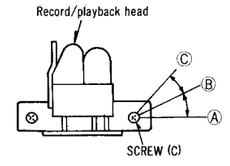


Fig. 10

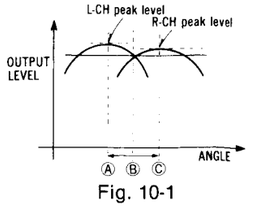
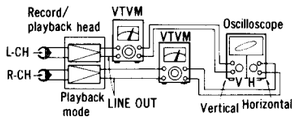
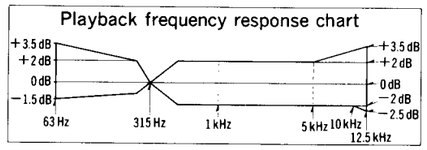
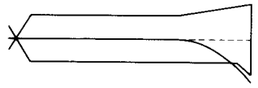
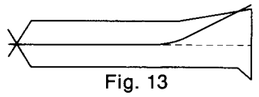
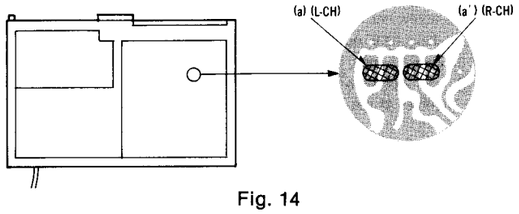
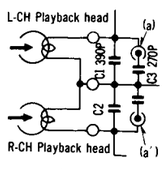
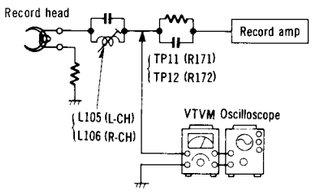
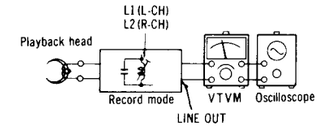
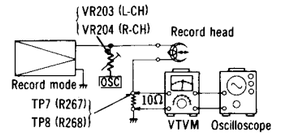
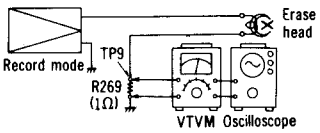
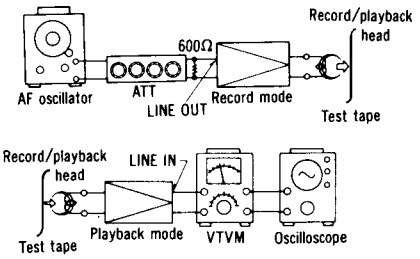
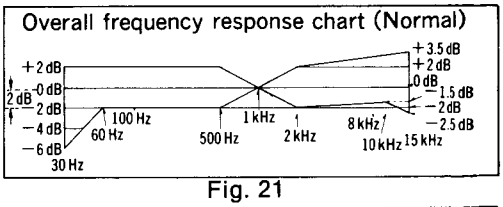
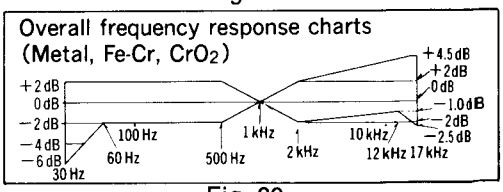
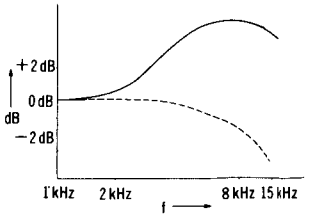
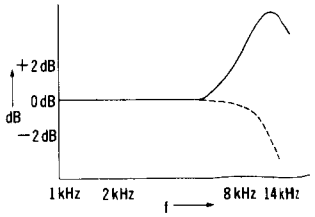
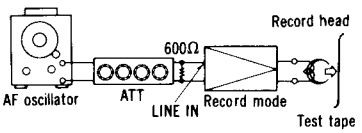
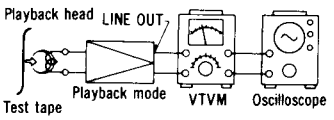
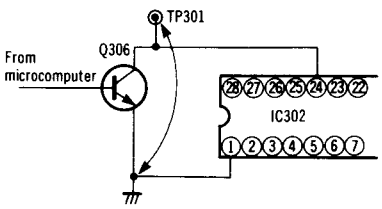
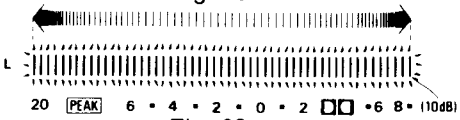


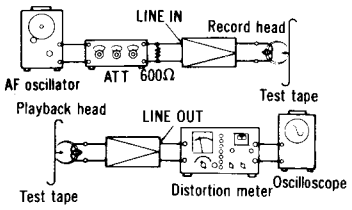
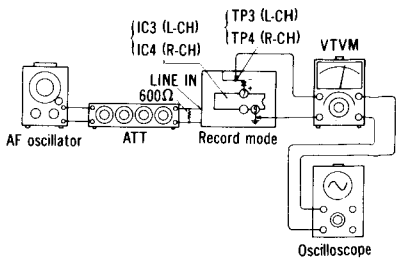
Fig. 10-1

ITEM	MEASUREMENT & ADJUSTMENT
	L-CH/R-CH phase adjustment 4. Make connections as shown in fig. 10-2. 5. Playback the 8kHz signal from the test tape (QZZCFM). Adjust screw (C) shown in fig. 10 so that pointers of the two VTVMs swing to maximum and a waveform as illustrated in fig. 10-3 is obtained on the oscilloscope. 6. After adjustment, lock head adjust screw with lacquer.  Fig. 10-2 **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. 5). 2. Check that the erase head does not contact the cassette half in playback mode.  Fig. 10-3 **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. 5).
e 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. 7. 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.  Fig. 11 5. Make measurement for both channels. 6. Make sure that the measured value is within the range specified in the frequency response chart (Fig. 11). **Adjustment method** 1. If the measured value decreases at high frequency range, as shown in fig. 12, P.C.B. connection points (a) (L-CH) and (a') (R-CH) should be shorted (Fig. 14). **Compensation value** 4kHz: around +0.3dB; 6kHz: around +0.6dB; 8kHz: around +0.8dB; 10kHz: around +1.0dB; 12.5kHz: around +1.4dB  Fig. 12 2. If the measured value increases at the high frequency range, as shown in fig. 13, P.C.B. connection points (a) (L-CH) and (a') (R-CH) should be opened.  Fig. 13 3. Make measurement again according to steps from (2) to (6) of the "Measurement" above. **Connection point**  Fig. 14  Fig. 15

ITEM	MEASUREMENT & ADJUSTMENT
f Playback gain Condition: * Playback mode * Output level control ··· MAX Equipment: * VTVM * Oscilloscope * Test tape ··· QZZCFM	1. Test equipment connection is shown in fig. 7. 2. Playback standard recording level portion on test tape (QZZCFM 315Hz) and, using VTVM, measure the output level at LINE OUT jack. 3. Make measurement for both channels. **Standard value: 0.7V ± 1.5dB** **Adjustment** 1. If measured value is not standard, adjust VR1 (L-CH), VR2 (R-CH) (See fig. F on page 5). 2. After adjustment, check "Playback frequency response" again.
i Playback S/N ratio Condition: * Playback mode * Output level control ··· MAX * CrO_2 tape mode Equipment: * VTVM * Oscilloscope * Test tape ··· QZZCFM * Empty cassette	1. Test equipment connection is shown in fig. 7. 2. Playback standard recording level test tape (QZZCFM 315Hz) and read output level on VTVM. Refer to "Playback gain adjustment". 3. Place empty cassette (which has been cut) and playback again. 4. Measure noise level at this time using VTVM, and determine ratio of this level to test tape output signal voltage (315Hz). **Standard value: Greater than 47dB**
j Bias leakage Condition: * Record mode * Input level controls ··· MAX * Output level control ··· MAX * Metal tape mode Equipment: * VTVM * Oscilloscope	**Adjustment (For record amp)** 1. Test equipment connection is shown in fig. 16. 2. Place UNIT into record mode. 3. Adjust trap coils L105 (L-CH), L106 (R-CH), so that measured value becomes minimum.  Fig. 16 **Adjustment (For playback amp)** 1. Test equipment connection is shown in fig. 17. 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. 17
k Bias current Condition: * Record mode * Normal tape mode * Fe-Cr tape mode * CrO_2 tape mode * Metal tape mode * Bias adjustment control ··· Center Equipment: * VTVM * Oscilloscope	1. Test equipment connection is shown in fig. 18. 2. Place UNIT into record mode, and tape selector to normal position. 3. 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: around 0.8mA (Normal)** 4. Adjust VR203 (L-CH) and VR204 (R-CH). 5. Set the tape selector to each position. 6. Make sure that the measured value is within standard. **Standard value: around 0.92mA (Fe-Cr)** **around 1.1mA (CrO_2)** **around 2.0mA (Metal)**  Fig. 18

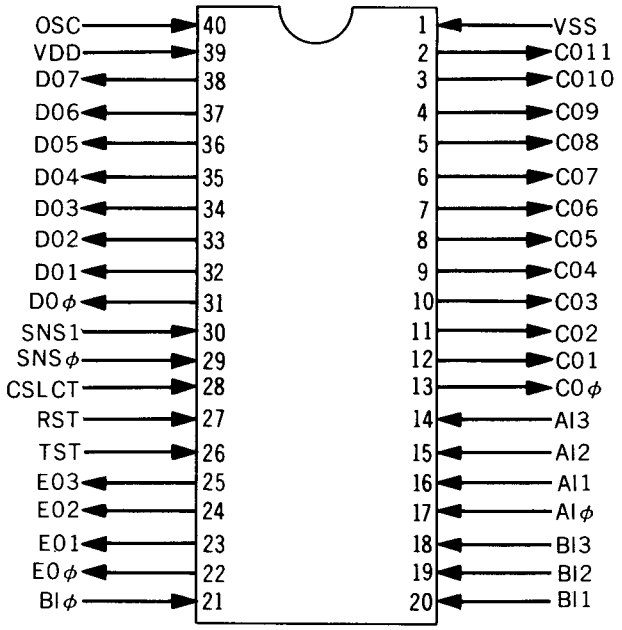
ITEM	MEASUREMENT & ADJUSTMENT
❶ Erase current Condition: * Record mode * Tape selector * Normal tape mode * Fe-Cr tape mode * CrO_2 tape mode * Metal tape mode Equipment: * VTVM * Oscilloscope	1. Test equipment connection is shown in fig. 19. 2. Place UNIT into record mode and tape selector to metal position and then measure voltage at test point 9. 3. Determine erase current with the following formula: $\text{Erase current (A)} = \frac{\text{Voltage across both ends of R269}}{1\ (\Omega)}$ **Standard value: 200 ± 10 mA (Metal)**  Fig. 19 4. If measured value is not within standard adjust VR201. 5. Set the tape selector to each position. 6. Make sure that the measured value is within standard. **Standard value: 80 ± 10 mA (Normal)** **90 ± 10 mA (Fe-Cr)** **105 ± 10 mA (CrO_2)**
❿ Overall frequency response Condition: * Record/playback mode * Normal tape mode * Fe-Cr tape mode * CrO_2 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 CrO_2 ··· QZZCRY for Fe-Cr ··· 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). 1. Test equipment connection is shown in fig. 20. 2. Load reference blank test tape. 3. Set the monitor selector to "source" position. 4. Supply 1 kHz 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 1 kHz, 40 Hz, 200 Hz, 4 kHz, 8 kHz and 15 kHz (17 kHz for Fe-Cr, CrO_2 and metal tapes) and read LINE OUT output levels. 10. Make sure that level of each frequency is within the specification described in fig. 21 and 22 based on a reference of 1 kHz. 11. Check the above items with normal, Fe-Cr, CrO_2 and metal tapes.  Fig. 20  Fig. 21  Fig. 22 **Adjustment-1: Using bias current** 1. When the frequency response between the middle and high frequency range becomes higher than the standard value, as shown by the solid line in fig. 23, increases the bias current by turning VR203 (L-CH), VR204 (R-CH). 2. When it becomes lower, as shown by dotted line, reduce the bias current by turning VR203 (L-CH), VR204 (R-CH).  Fig. 23  Fig. 24

ITEM	MEASUREMENT & ADJUSTMENT
	Note: For the method of bias current measurement, refer to "ⓚ Bias current adjustment" on page 7. **Adjustment-2: 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. 24, adjust by turning the following peaking coils L103 (L-CH), L104 (R-CH).
ⓝ Overall gain Condition: * Recording calibration ··· center * Record/playback mode * Normal tape mode * Fe-Cr tape mode * CrO_2 tape mode * Metal tape mode * Input level controls ··· MAX * Output level control ··· MAX * Standard input level: MIC ····· −72±3dB LINE IN ··· −24±3dB Equipment: * VTVM * AF oscillator * ATT * Oscilloscope * Test tape (reference blank tape) ··· QZZCRA for Normal ··· QZZCRX for Fe-Cr ··· QZZCRY for CrO_2 ··· QZZCRZ for Metal	1. Test equipment connection is shown in fig. 25. 2. Place the test tape (QZZCRA) in the cassette holder. 3. Place UNIT into record mode, and tape selector to normal position. 4. Supply 1kHz signal (−24dB) from AF oscillator, through ATT to LINE IN. 5. Adjust ATT until source monitor level at LINE OUT becomes 0.7V. 6. Using test tape, make recording. 7. Playback recorded tape, and measure the tape monitor output level at LINE OUT on VTVM. **Standard value: 0.7V±0.5dB (Normal)** 8. If measured value is not within standard, adjust VR103 (L-CH), VR104 (R-CH). 9. Repeat from step (4). 10. Change the tape selector to each position. 11. Change test tape to Fe-Cr (QZZCRY), CrO_2 (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: 0.7V±1.0dB (Fe-Cr, CrO_2 and Metal)**   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. 25. 2. As shown in fig. 26, connect the collector of Q306 and ground. 3. Supply 1kHz signal (−24dB) 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 0.7V (The input level at this condition is termed the standard input level). 5. Adjustment at "−20dB". A. Adjust the ATT so that input level is −20dB below standard recording level. B. Adjust VR303 so that the −20dB segment lights up in the −20dB±0.8dB range (R-CH ONLY) (See fig. 27). 6. Adjustment at "0dB". A. Adjust the ATT so that the output level at LINE OUT jack becomes 0.7V. (The input level at this condition is termed the standard input level.) B. Adjust VR305 so that the 0dB segment lights up in the 0±0.2dB range of the standard input level (See fig. 28). 7. Channel balance adjustment adjust VR301 so that L-CH lighting level is 0dB when R-CH lighting level is 0dB.  Fig. 26  Fig. 27  Fig. 28  Fig. 29

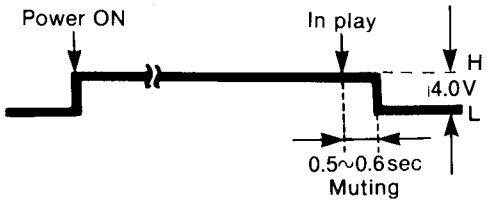
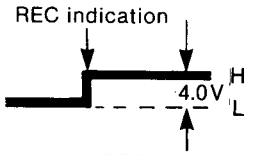
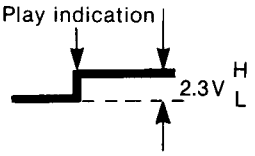
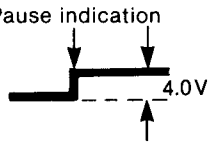
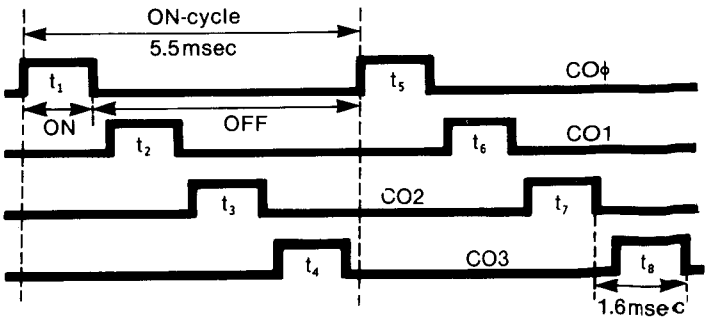
ITEM	MEASUREMENT & ADJUSTMENT
	8. Repeat twice between steps 5 and 6 above. 9. Adjust ATT and check that all segments light up when an input signal level is increased to 10 dB higher than the standard input level (See fig. 29).
(p) Overall distortion Equipment: * Distortion meter * AF oscillator * ATT * Oscilloscope * Test tape ··· QZZCRA (reference blank tape)	1. Test equipment connection is shown in fig. 30. 2. Set the monitor selector to "source" position. 3. Supply 1 kHz signal to LINE IN and adjust ATT so that output level at LINE OUT indicates 0.7 V. 4. Change the monitor selector to "tape" position. 5. Press the record and playback buttons, and measure distortion factor of tape monitor output signal. 6. When the distortion factor does not satisfy the standard, check the bias current. When the bias current is lower than standard, distortion will increase. Care should be exercised in the adjustment because the bias current also has an influence on the overall frequency response. Refer to "The overall frequency response" and "The bias current adjustment". **Standard value: Less than 3%**  Fig. 30
(q) Overall S/N ratio Equipment: * VTVM * AF oscillator * ATT * Oscilloscope * Test tape ··· QZZCRX (reference blank tape)	1. Test equipment connection is shown in fig. 25. 2. Set the monitor selector to tape position and tape selector to CrO_2 position. 3. Load reference blank test tape (QZZCRX). 4. Press the record and playback buttons. 5. Supply 1 kHz signal to LINE IN and adjust ATT so that tape monitor output level at LINE OUT indicates 0.7 V. 6. Then, disconnect input plug to LINE IN. 7. Measure tape monitor output signal levels of 1 kHz and no signal level (noise), and determine the ratio in decibels (dB). **Standard value: Greater than 45 dB (without NAB filter)**
(r) Test oscillator Condition: * Record mode * Monitor switch ··· source	**R-CH 400 Hz output adjustment** 1. Set the input select switch to 8 kHz, and set the monitor switch to SOURCE. 2. Change the input select switch to 400 Hz. 3. Adjust VR107 so that the meter indication at 400 Hz in R-CH is the same as with 8 kHz output. **L-CH 400 Hz fine adjustment** 1. Set the input select switch to 400 Hz, and adjust the input VR so that R-CH FL meter indication is 0 dB. 2. Adjust VR109 so that L-CH output is identical to R-CH output.
(s) Dolby NR circuit Condition: * Record mode * Input level controls ··· MAX * Output level control ··· MAX Equipment: * VTVM * AF oscillator * ATT * Oscilloscope * Resistor (600Ω)	1. Test equipment connection is shown in fig. 31. 2. Place UNIT into record mode, set the Dolby NR switch to OUT position and supply to LINE IN to obtain −34.5 dB at TP3 (L-CH), TP4 (R-CH) (frequency 5 kHz). 3. Confirm that the value at IN position is 8 (±2.5) dB greater than the value at OUT position of Dolby NR switch.  Fig. 31

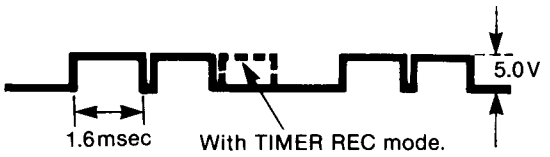
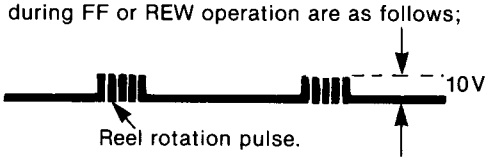
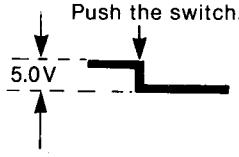
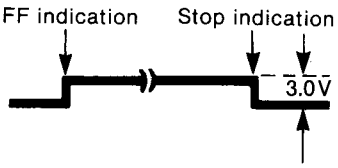
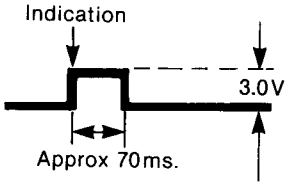
MN1400RZ (IC601): EACH TERMINAL FUNCTION & WAVEFORM

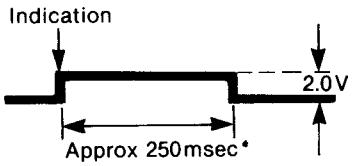
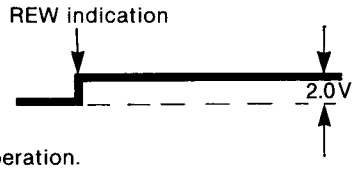
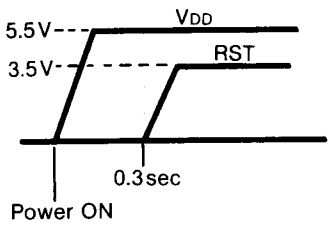
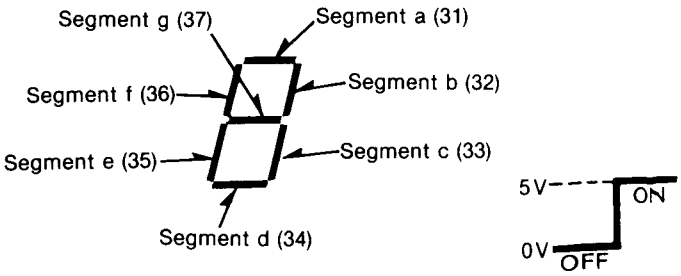
(BOTTOM VIEW)

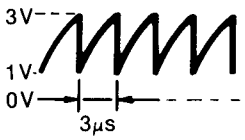


Terminal No.	Symbol	Name	Function/operation
1.	VSS	GND	
2.	CO11	Half SW OUT	Open / Close H / 5.0V / L It is interlocked with cassette half detection switch (Cassette half detection switch is open with cassette lid closed.)
3.	CO10	FL meter reset	H / 5.0V / L Approx. 2sec This output is for resetting 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. 11. 12. 13.	CO3 CO2 CO1 COϕ	FL grid & input SW. scan FL grid & input SW. scan FL grid & input SW. scan FL grid & input SW. scan	

Terminal No.	Symbol	Name	Function/operation
14. 15. 16. 17.	Ai3 Ai2 Ai1 Aiϕ	Input SW read Input SW read Input SW read 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; 
18. 19. 20. 21. 29. 30	Bi3 Bi2 Bi1 Biϕ SNSϕ SNS1	REW key FF key PLAY key STOP key REC key PAUSE key	 "H" in the normal case, "L" when the switch is pushed.
22.	EOϕ	Brake plunger	 "H" during FF/REW operations.
23.	EO1	Trigger plunger	 "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	 "H" until MODE SW is changed from "close" to "open" following the indication that the mechanism mode has been changed.  "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. 
28.	CSLCT	CSLCT	Connected to VDD.
31.	DOϕ	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	

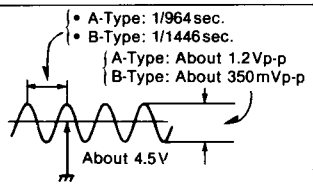
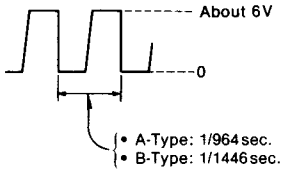
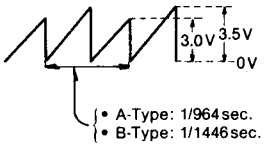
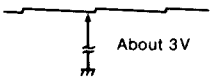
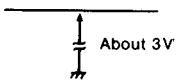
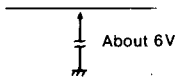
Terminal No.	Symbol	Name	Function/operation
38.	DO7	No connection	Not used.
39.	VDD	Power source	Operated at 4.5V to 6.0V.
40.	OSC	Oscillation terminal	 Oscillation is approx. 300kHz. Because the connection of a probe affects the terminal, nothing should be connected to this terminal for any other measurements.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

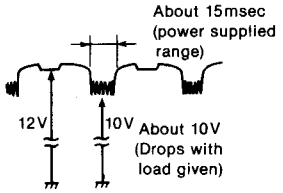
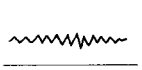
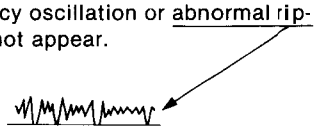
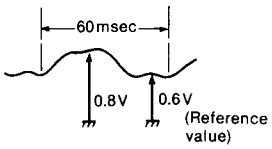
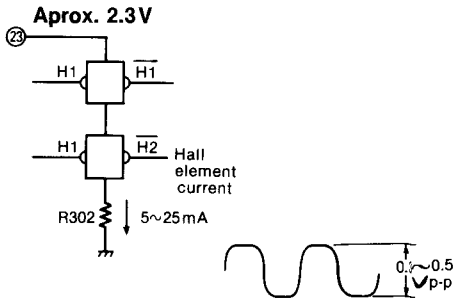
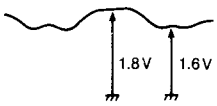
TROUBLESHOOTING OF MAIN CONTROL CIRCUIT

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		C614, VR601
	Reset locked.	27 (RST)		C613,D611,Q607
	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.	D606
MODE indicator lighting OK.	Motor circuit faulty.	24, 25	Motor connection	Q614 to 617

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	
FF/REW motor rotating, reel not rotating.	Brake plunger not being with drawn.	22 (EOϕ)	Brake plunger disconnection, etc.	Q608
CAM continuous rotation in PLAY.	MODE SW. defective.	15 (Ai2)	MODE SW.	D602
Motor rotating in PLAY, but CAM's not switched.	Trigger plunger not operating	23 (EO1)	Trigger plunger	Q609
Motor rotates in reveise and does not stop after switching to PLAY or PAUSE.	PLAY or STOP SW, defective.	16 (Ai1) 17 (Aiϕ)	STOP PLAY Leaf SW.	D604 D605
REC IND. due not light up. (Operation is normal)	LED or drive transistor defective.	7 (CO6)		Q604, R627
PLAY IND. dues not light up.	-do-	8 (CO5)		Q605, R626
PAUSE IND. dues not light up.	-do-	9 (CO4)		Q606, R625
Not counting.	Hall IC faulty, buffer circuit faulty.	14 (Ai3)	Reel magnet	IC508 (Hall IC) Q601, D608
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)		
Accidental erase prevention mechanism not functioning.	Leaf SW	15 (Ai2)	Accidental erasure Leaf SW	D602
Operating during EJECT.	Half detection SW.	14 (Ai3)	Half detection SW.	D606

D.D MOTOR CIRCUIT CHECK POINTS (IC501: AN6633)

No.	Name of terminal	Normal wave	Standard min. max.	Description
(1)	FZ (FG AMP non-inversion input)	About 4.5V DC	3.9V 4.7V	
(2)	FI (FG AMP inversion input)	Same potential as FZ (1)		Input terminal of OP amp to amplify FG signal [about 964Hz (A-Type), 1446Hz (B-Type)].
(3)	FO (FG AMP output)			FG signal amplifying output. Check that the signal is not subjected to oscillation or great AM modulation.
(4)	CSR (Sample reset)			
(5)	St (Speed discrimination)			This circuit converts the phase difference between standard frequency and FG frequency into voltage. The waveform is of the constant voltage charged of CR. When a load is given to the motor by hand, the peak value due to FG timing rises as FG is delayed as compared with the standard timing.
(6)	CH (Charge Hold)			Voltage which held the peak value of ST (5) appears. Sags appear at 1/964sec (A-Type), 1/1446sec (B-Type) cycles, but this is acceptable if not excessive.
(7)	Vo (Speed detecting output)			DC voltage which lowered the impedance of CH (6) output through buffer appears. **The levels of (6) and (7) rise with the motor loaded.** (Note) When measuring at (4), (5) and (6), use a high impedance probe (10MΩ at least). Input terminal of the secondary active filter which consists of OP amp.
(8)	AI (Error amplifier input)			
(9)	AO (Error amplifier output)			After making sure that AO (9) is free of oscillation or abnormal riple, giving a load to the motor causes the voltage of (9) to decrease, and when synchronizing is descontinued, the voltage is clamped at 2~3V.

No.	Name of terminal	Normal wave	Standard min. max.	Description
(10)	PC (Phase compensation)	About 11V DC		This is a phase compensating condenser in the motor drive stage. Great oscillation is generated if it is remove.
(11) (12) (14) (15)	A4 A3 A2 A1			Terminal to supply power to armature coil (attraction): the phase differs by 1/4 each. Make sure that high frequency oscillation or abnormally large ripple does not exist in the power supplied range shown at left.
(13)	CS (Armature current detection)			The current flows into armature coil from power source Vcc and goes into the circuit from terminals A1—A4, and all the current flows out of this terminal. When the motor is in no-load operation, potential including ripples of about 40mV is generated, and its level rises when the motor is manually loaded. It is clamped at about 350mV, and the current limiter works. High frequency oscillation or abnormal ripples should not appear. 
(16) (17)	$\overline{H2}$ (Hall element output) H2 (Hall element output)			Example: This is the position detecting output by hall element. If this stage is defective, a lock point is generated in the motor. Normal waveform between H1 and H2 and H2 observed on the synchroscope should be as follows: 
(18) (19)	$\overline{H1}$ (Hall element output) H1 (Hall element output)			
(22)	RX	About 11V		
(23)	RY (Hall element voltage)	About 2.3V		
(20)	PB (Power supply control)	About 17V	11V 13V	When output voltage is abnormal, check Q505 or condenser C518/C517. The output should not include oscillation waveform. DC regulator circuit.
(21) (24)	Vcc (Constant output) GND	About 12V		

TROUBLESHOOTING OF D.D MOTOR CIRCUIT

(1) Motor does not rotate at all.

1) Check the voltage at 21 of IC501. (Normal value: 12± 1V)
   - No output → Check Q505 (2SB761)
     - Check C517 for short-circuit.
   - Normal output → Check that the voltage at both ends of R520 is about 60mV.
     - If not, measure the internal resistance between terminals of the hall element (H1, H2).
       - OK if it is 200 ~ 300 ohms. Replace if it is ∞.

2) Check the standard frequency rectangular wave at (9) of IC502.
   - If it is NG, crystal oscillation stops or frequency is NG.

(2) Motor rise is defective. (When the motor is released after stopping its rotation by hand, it takes several seconds for it to start rotating.)

If it is NG, crystal oscillation stops or frequency is NG.
- [U] Is the speed increasing instruction delivered?
  - If it isn't the speed comparator circuit is defective. ... Check according to the follwoing **(3)**-2).
  - If it is the problem is in IC507 ⑥ — IC501 ⑨.

(3) Motor speed is not synchronized. (The saw-tooth wave of IC501 ⑤ changes irregularly, causing the motor rotation to become uneven.)

When only 5V is cut off, the motor speed is nearly doubled; the waveforms as shwon in the separate check sheet appear at ⑪, ⑫, ⑭ and ⑮ of IC501, and check if there is no dead point.

- 1) In case of NG, it is due to signle-phase operation.
  - Check Q501 — Q504, R509 — R516.
  - Check the waveforms at ⑪, ⑫, ⑭, ⑮ of IC501.
    - If it is OK, turn off power supply.
      - Check Q501 — Q504 again.
      - Measure resistance between A1 — A3, A2 — A4.
        If it is about 27 ohms, armature coil is OK.
    - If it is NG, position signal is in trouble.
      - Check voltage at both ends of R520 (about 60mV).
      - Turn off power supply and measure resistance between terminals of Hall element (H1, H2).
        If it is about 200~300 ohms. Hall element is OK.

A

A

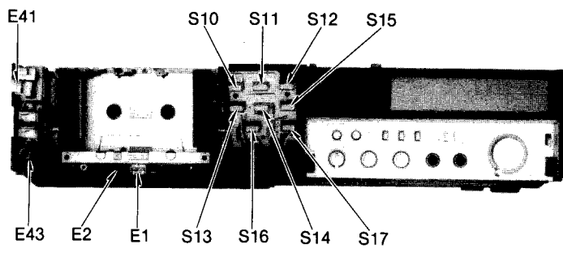
2) In case of OK,
- check the frequency comparator circuit.
  - (i) When motor rotation is stopped by hand, [U] instruction is delivered and the specified delay detection signal is emitted to each part of the frequency comparator circuit at the time of rise. (Observation with special care is required because pulse is small in width an transient.)
    - In case of NG, check Vcc of each TTL and each terminal connection.
    - In case of OK, check the following (ii).
  - (ii) When the state with 5V voltage cut off (motor speed is nearly doubled) is shifted to the state with it connected, the speed reducing instruction [D] is delivered until it becomes the normal speed and the specified advance detection signal is emitted to the speed comparator circuit.
    - In case of NG, check Vcc of each TTL and each terminal connection.
    - In case of OK, check the above (i).
  - Does Q506 ON/OFF at standard frequency?
    - If it turns ON/OFF only with the instruction [D], check C535 and R533.

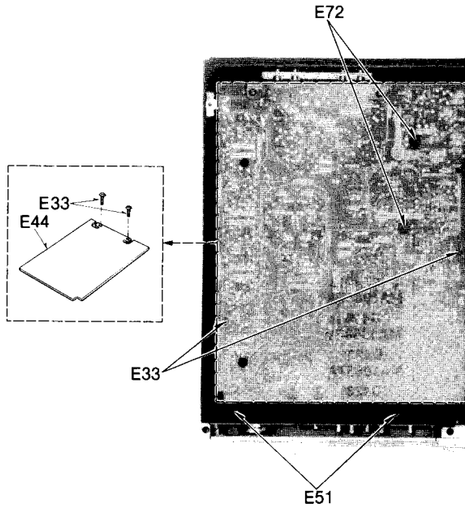
(4) Motor rotating speed is nearly doubled.

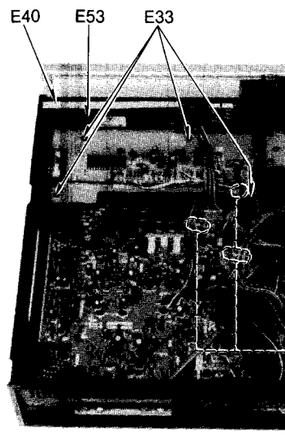
Is Vcc of IC502 — IC507 OK? (about 5V)
- If it is OK, check if Q506 is open.

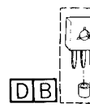
(5) Motor speed is abnormal.

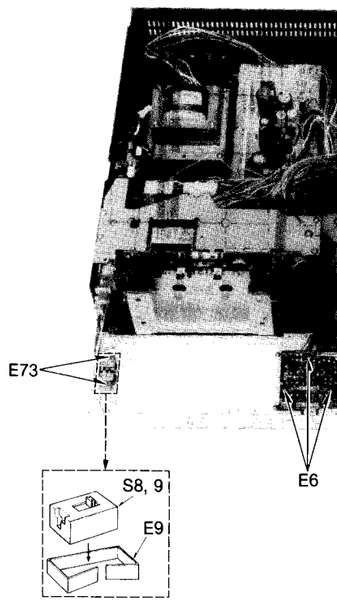
1) Is the FG lead wire connected?
- Observe the waveform of IC501 3.
  - If it is NG, check R501 and C502.
  - In case of OK.
    - Check if Q507 is kept ON.
      - In case of NG, check the frequency comparator circuit. Refer to the above **(3)**-2)



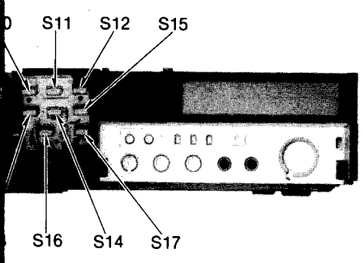


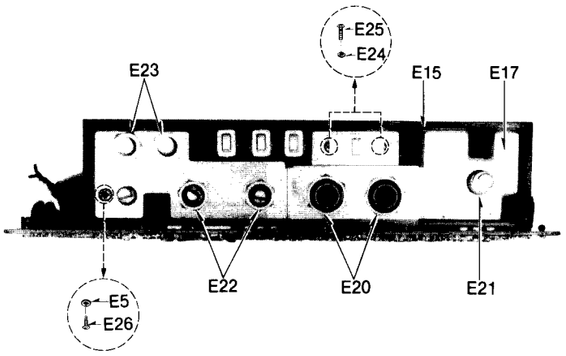


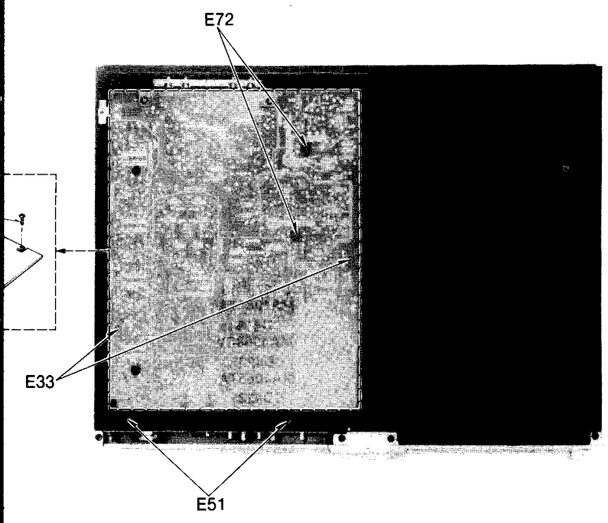


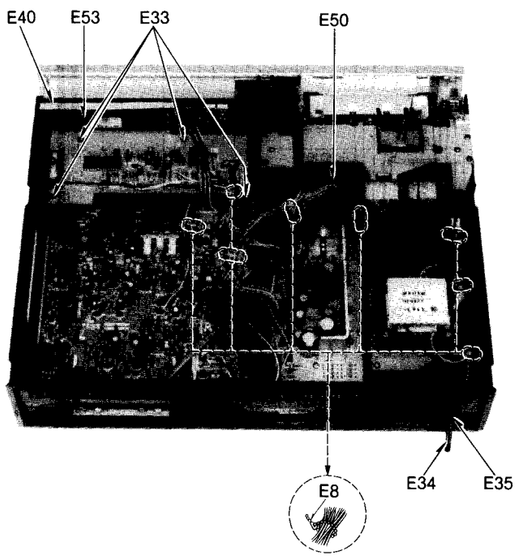


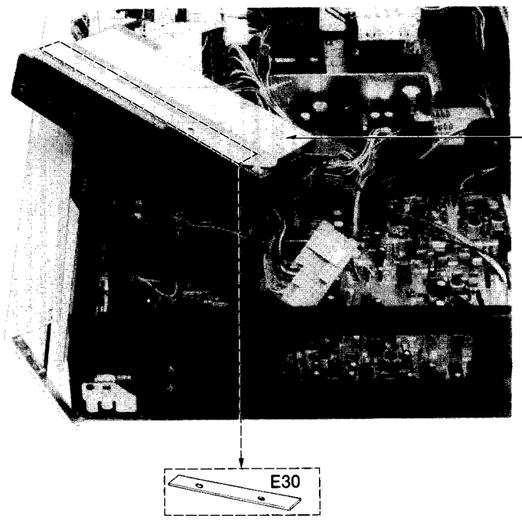
ELECTRICAL PARTS LOCATION

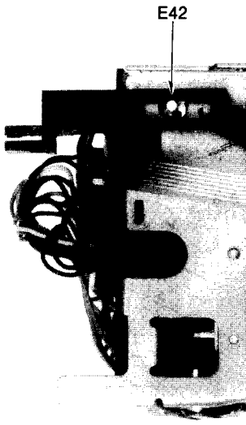


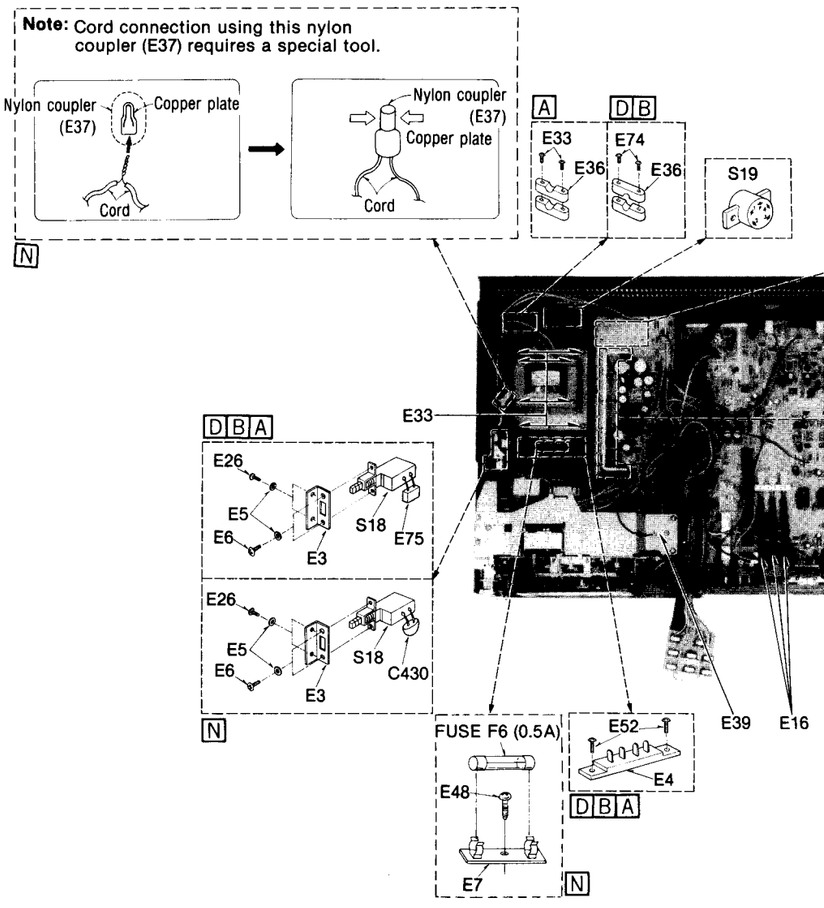


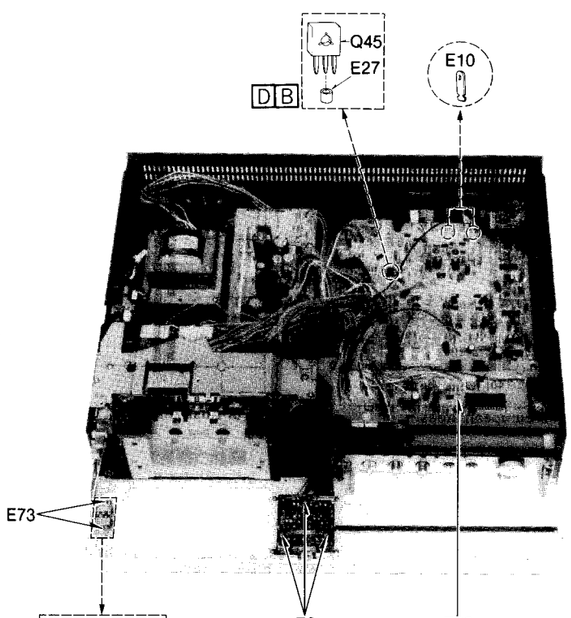


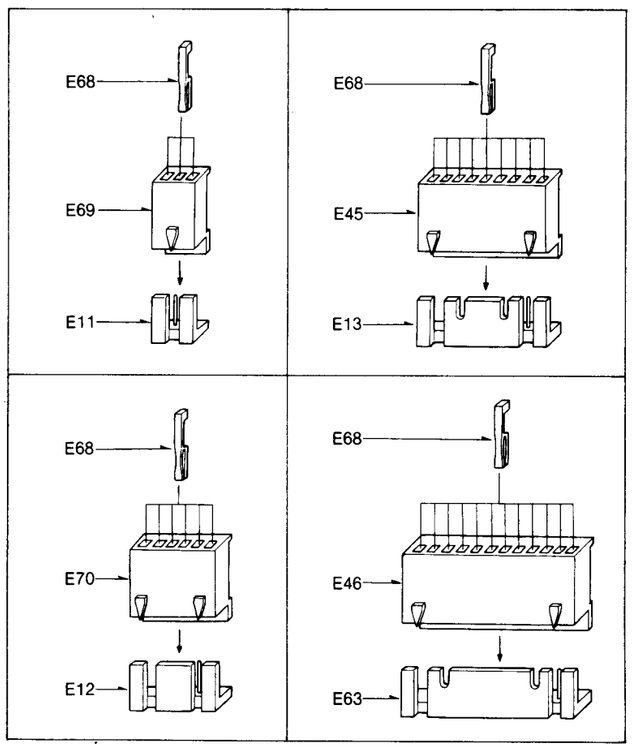


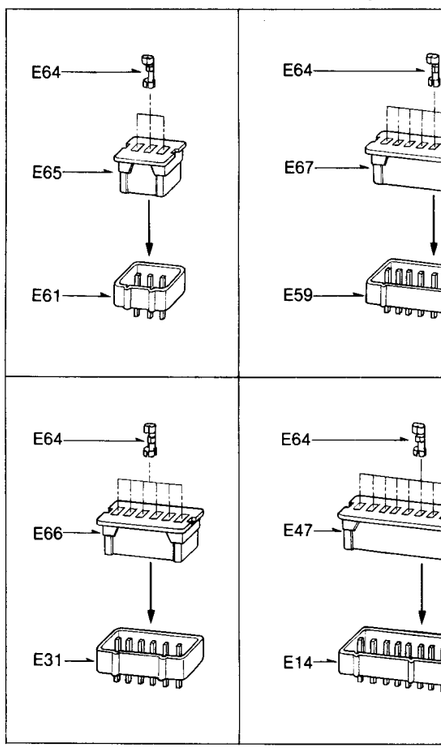


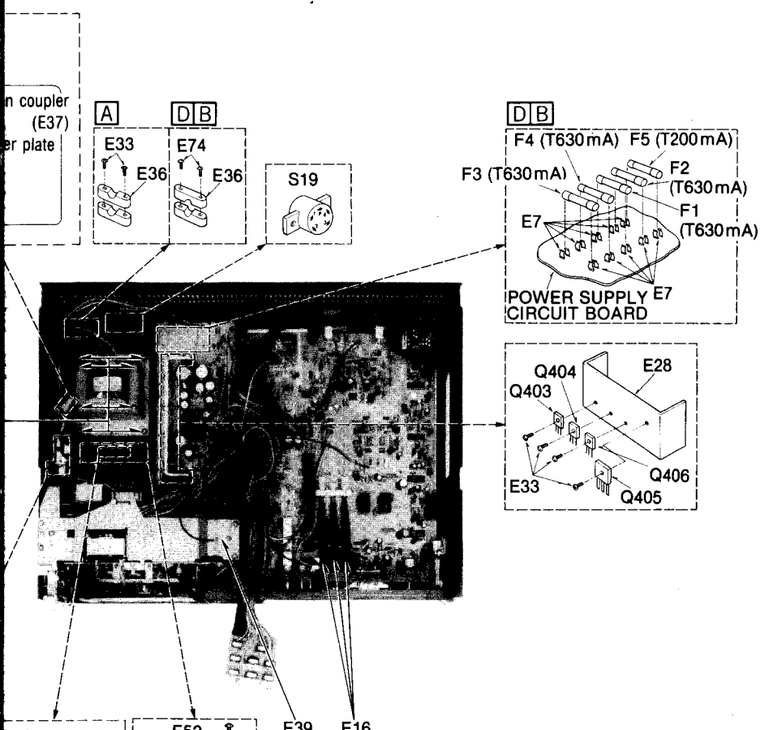


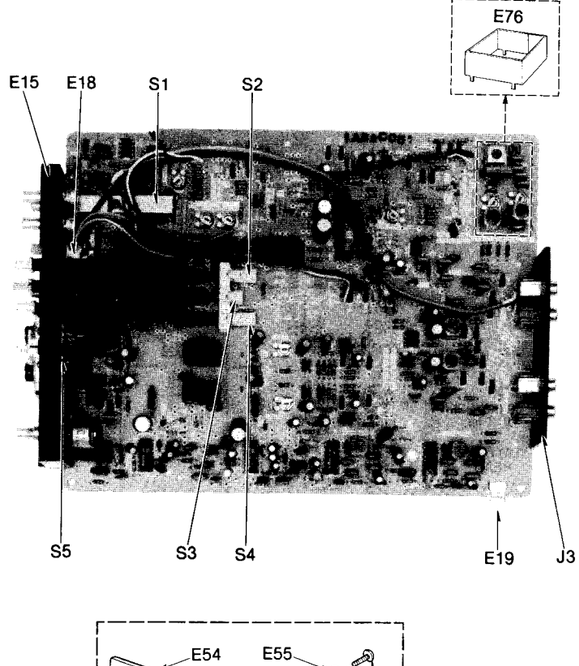


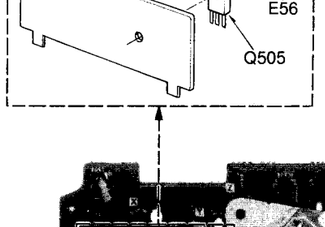


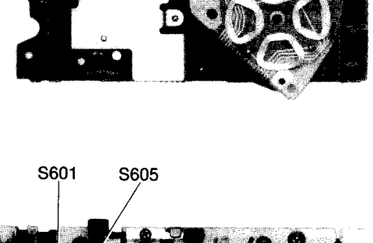


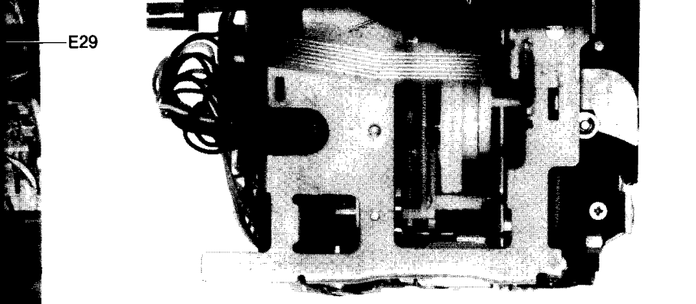


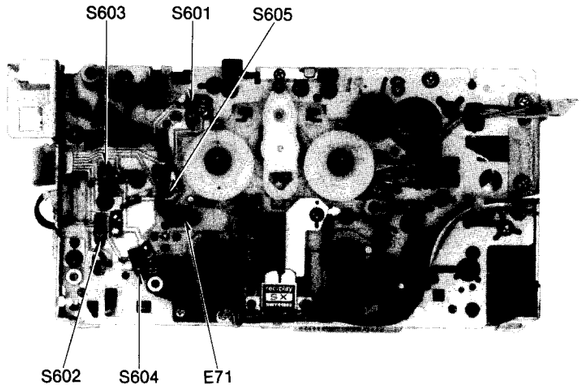


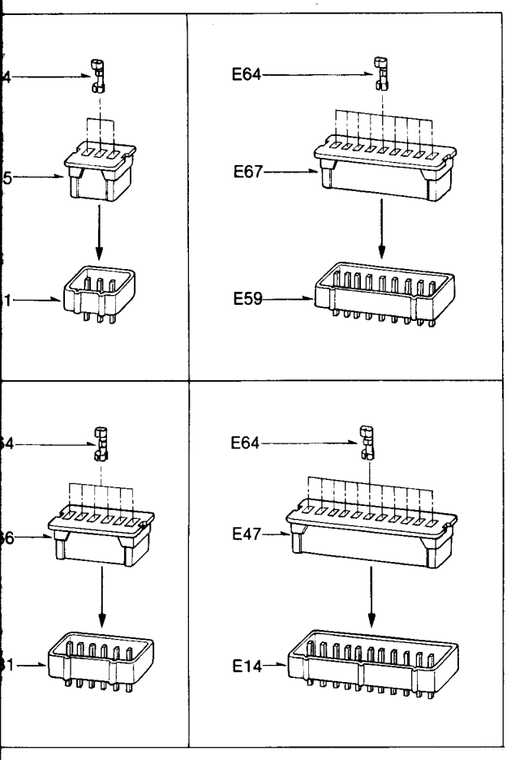












REPLACEMENT PARTS LIST

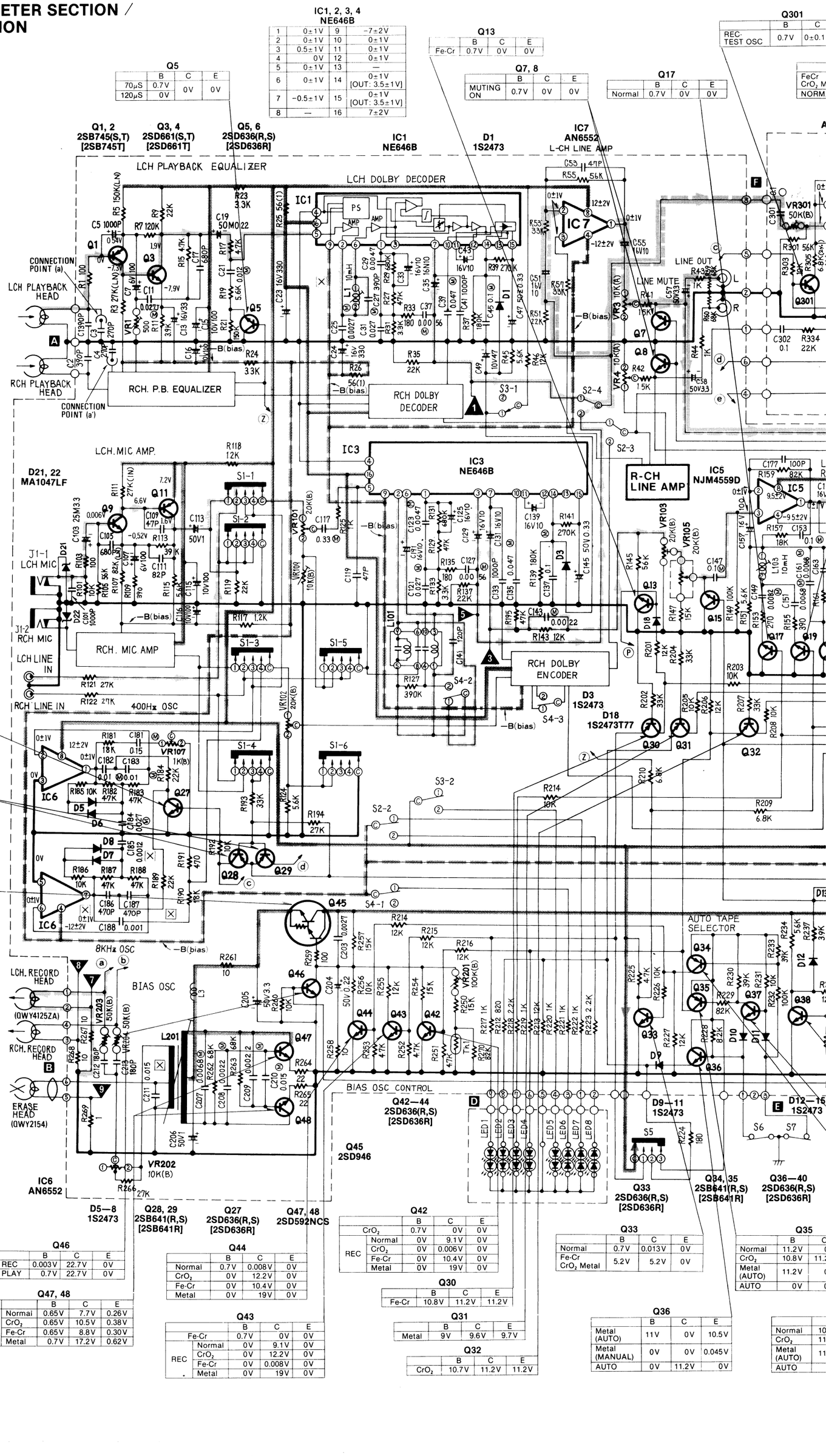
Important safety notice
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

Ref. No.	Part No.	Part Name & Description
	ELECTRICAL PARTS	
E1	QWY4125ZA	Record/Playback Head
E2	QWY2154	Erase Head
E3	QMAM0135	Switch Holding Angle (for S18)
E4 DEA	QJT4017	4 Pin Terminal
※For all European areas and Australia.		
E5	XWA3B	Washer 3φ
E6	XSN3+6S	Screw ⊕3×6
E7 DB ⚠	QTF1054	Fuse Holder
※For all European areas.		
N	QTF1032	〃
※For Asia, Latin America, Middle East and Africa areas.		
E8	QTD1181	Nylon Binder
E9	QMAM0143	Switch Holding Angle (for S8, 9)
E10	QJT1053	Pin Terminal
E11	QJP1921TN	3 Pin Post-A
E12	QJP1922TN	6 Pin Post-A
E13	QJP1923TN	9 Pin Post-A
E14	QJP1980M	11 Pin Post-B
E15	QKJM0052	Volume Angle
E16	QKJM0057	Switch Rod-2
E17	QTSM0046	Shield Plate-1
E18	QTSM0051	Shield Plate-3
E19	QTSM0048	Earth Plate-1
E20	QNQ1070	Nut (for Microphone Jack)
E21	XNS9	Nut 9φ (for Input VR)
E22	XNS8	Nut 8φ (for Output VR)
E23	XNS7	Nut 7φ
E24	XWA26B	Washer 2.6φ
E25	XSN26+6	Screw ⊕2.6×6
E26	XSN3+8S	Screw ⊕3×8
E27 DB	QZE0003	Porcelain Tube
※For all European areas.		
E28	QTHM0012	Heat Sink
E29	QTSM0047	Shield Plate-2
E30	QTWM0033	Insulating Sheet
E31	QJP1977M	6 Pin Post-B
E32	QJT0053	Check Pin
E33	XTN3+10B	Tapping Screw ⊕3×10
E34 DA ⚠	SJA88	AC Power Cord
※For all European areas except United Kingdom.		
B ⚠	QFC1205M	〃
※For United Kingdom.		
DA ⚠	RJA52ZBK	〃
※For Asia, Latin America, Middle East and Africa areas.		
A ⚠	QFC1208M	〃
※For Australia.		
E35 DBA	QBJ1425A	Cord Bushing
※For all European areas and Australia.		
N	QTD1129	〃
※For Asia, Latin America, Middle East and Africa areas.		
E36 DEA	QTD1164	Cord Clamper
※For all European areas and Australia.		
E37 DA ⚠	QJT1029	Nylon Coupler
※For Asia, Latin America, Middle East and Africa areas.		
E38	QKJM0056	Switch Rod-1
E39	QTD1001	Lug Terminal
E40	QTWM0035	Insulating Sheet-3
E41	QXBM0027	Power Button Assembly
E42	XUC25FT	Stop Ring 2.5φ
E43	QNQM0003	Nut
E44	QTWM0034	Insulating Sheet-2
E45	QJS1923TN	9 Pin Socket-A
E46	QJS1924TN	12 Pin Socket-A
E47	QJS1980M	11 Pin Socket-B
E48 N	XTB3+8BFN	Screw ⊕3×8
※For Asia, Latin America, Middle East and Africa areas.		
E49	QJS1981M	12 Pin Socket-B
E50	QTW1251	Insulating Sheet
E51	XTB3+10BFZ	Tapping Screw ⊕3×10
E52 DEA	XTN3+12B	Tapping Screw ⊕3×12
※For all European areas and Australia.		
E53	QSiFM001F	FL Meter
E54	QTH1155	Heat Sink (for Q505)
E55	XWG3	Washer 3φ
E56	XSN3+10S	Screw ⊕3×10
E57	QJP1969M	3 Pin Post-B (L-Type)
E58	QJP1970M	6 Pin Post-B (L-Type)
E59	QJP1979M	9 Pin Post-B
E60	QJP1972M	12 Pin Post-B (L-Type)
E61	QJP1974M	3 Pin Post-B
E62	QJP1982M	11 Pin Post-B (L-Type)
E63	QJP1924TN	12 Pin Post-A
E64	QJT1083	Contact-B
E65	QJS1974M	3 Pin Socket-B
E66	QJS1977M	6 Pin Socket-B
E67	QJS1979M	9 Pin Socket-B
E68	QJT1054	Contact-A
E69	QJS1921TN	3 Pin Socket-A
E70	QJS1922TN	6 Pin Socket-A
E71	XAMQ44P300	Pilot Lamp
E72	QBG1717	Rubber Spacer
E73	XTN26+8B	Tapping Screw ⊕2.6×8
E74 DB	XTN3+16B	Tapping Screw ⊕3×16
※For all European areas.		
E75 DBA ⚠	QCR0011B	Spark Killer
※For all European areas and Australia.		
E76	QTSM0056	Shield Plate-4

NOTE:
- D .....For all European areas except United Kingdom.
- B .....For United Kingdom.
- N .....For Asia, Latin America, Middle East and Africa areas.
- A .....For Australia.

SCHEMATIC DIAGRAM

MAIN SECTION / FL METER SECTION / POWER SUPPLY SECTION



IC1, 2, 3, 4 NE646B			
1	0±1V	9	−7±2V
2	0±1V	10	0±1V
3	0.5±1V	11	0±1V
4	0V	12	0±1V
5	0±1V	13	—
6	0±1V	14	0±1V (OUT: 3.5±1V)
7	−0.5±1V	15	0±1V (OUT: 3.5±1V)
8	—	16	7±2V

Q5	B	C	E
70μS	0.7V	0V	0V
120μS	0V		

Q13	B	C	E
Fe-Cr	0.7V	0V	0V

Q7, 8	B	C	E
MUTING ON	0.7V	0V	0V

Q17	B	C	E
Normal	0.7V	0V	0V

Q301	B	C
REC-TEST OSC	0.7V	0±0.1

Q27	B	C	E
REC-TEST OSC	0.7V	0V	0V

Q28, 29	B	C	E
REC	20V	0V	20V
REC-TEST OSC	19.3V	19.3V	0V

Q45		B	C	E
REC	Normal	9.1V	22.7V	8V
	CrO_2	12.2V	22.7V	10.9V
	Fe-Cr	10.4V	22.7V	9.1V
	Metal	19V	22.7V	17.7V

Q46	B	C	E
REC	0.003V	22.7V	0V
PLAY	0.7V	22.7V	0V

Q47, 48		B	C	E
REC	Normal	0.65V	7.7V	0.26V
	CrO_2	0.65V	10.5V	0.38V
	Fe-Cr	0.65V	8.8V	0.30V
	Metal	0.7V	17.2V	0.62V

Q44	B	C	E
Normal	0.7V	0.008V	0V
CrO_2	0V	12.2V	0V
Fe-Cr	0V	10.4V	0V
Metal	0V	19V	0V

Q43		B	C	E
Fe-Cr		0.7V	0V	0V
REC	Normal	0V	9.1V	0V
	CrO_2	0V	12.2V	0V
	Fe-Cr	0V	0.008V	0V
	Metal	0V	19V	0V

Q42		B	C	E
REC	CrO_2	0.7V	0V	0V
	Normal	0V	9.1V	0V
	CrO_2	0V	0.006V	0V
	Fe-Cr	0V	10.4V	0V
	Metal	0V	19V	0V

Q30	B	C	E
Fe-Cr	10.8V	11.2V	11.2V

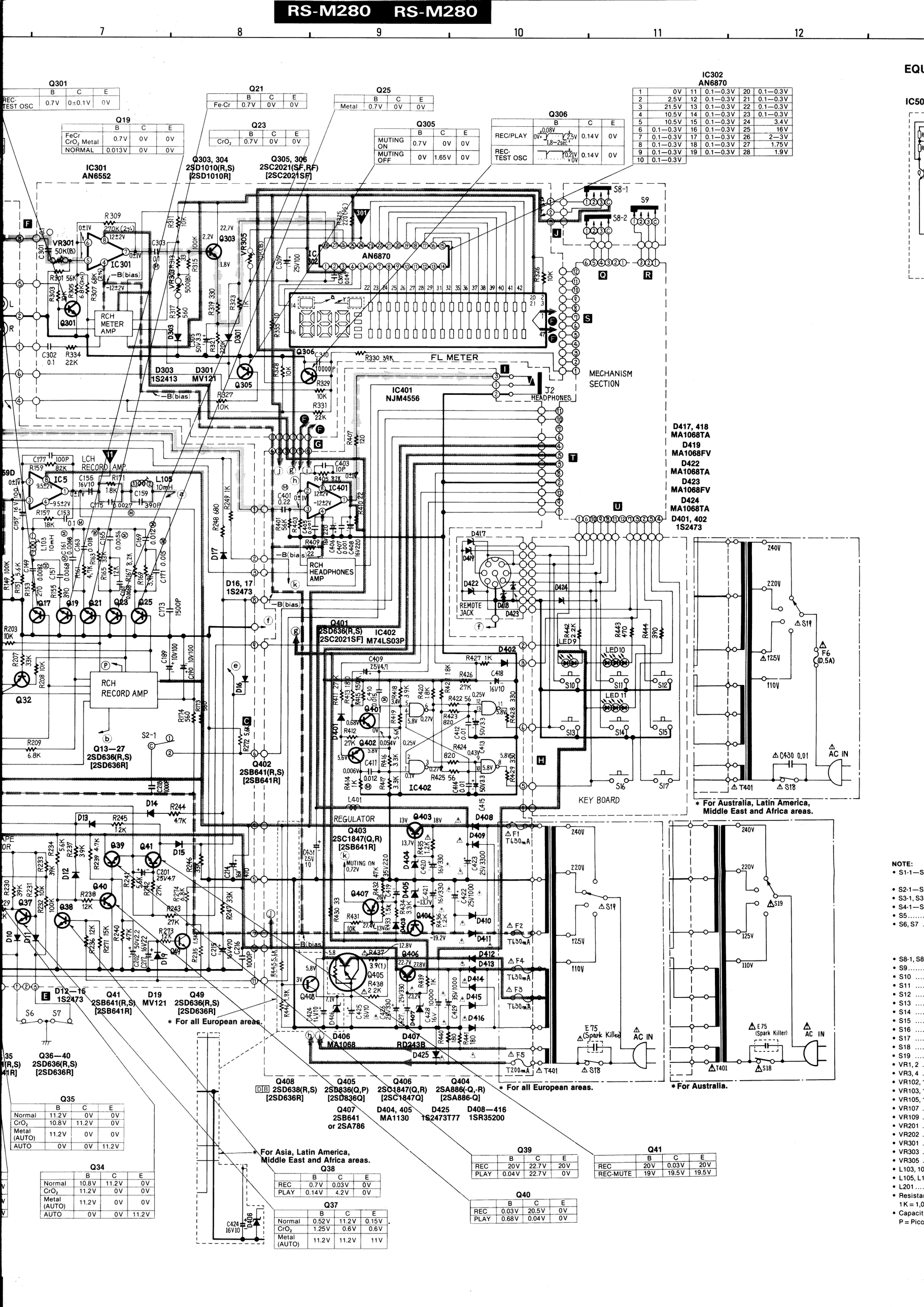
Q31	B	C	E
Metal	9V	9.6V	9.7V

Q32	B	C	E
CrO_2	10.7V	11.2V	11.2V

Q33	B	C	E
Normal	0.7V	0.013V	0V
Fe-Cr CrO_2 Metal	5.2V	5.2V	0V

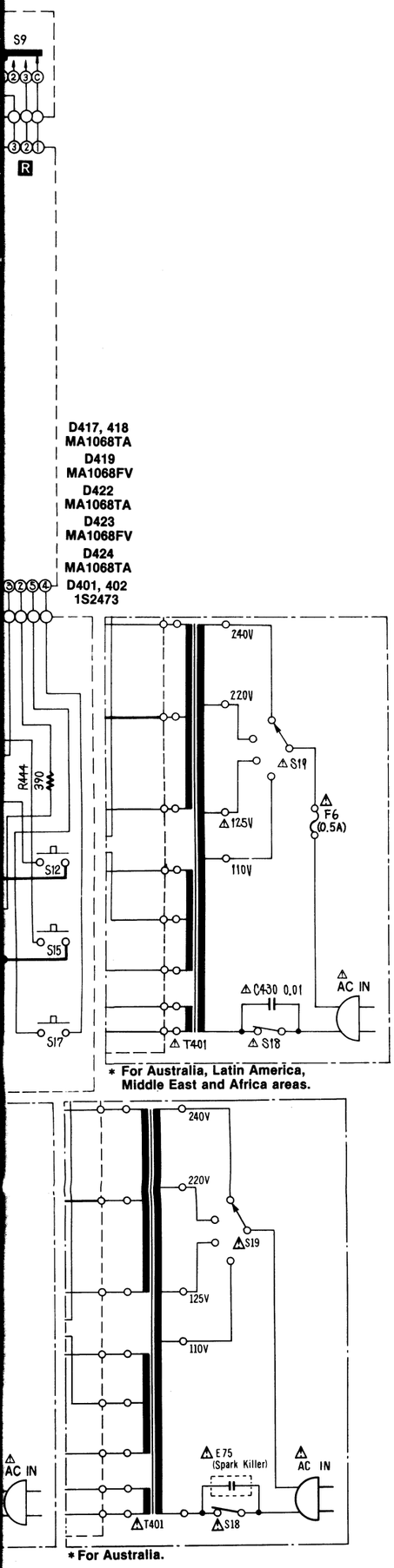
Q36	B	C	E
Metal (AUTO)	11V	0V	10.5V
Metal (MANUAL)	0V	0V	0.045V
AUTO	0V	11.2V	0V

Q35	B	C
Normal	11.2V	
CrO_2	10.8V	11.
Metal (AUTO)	11.2V	
AUTO	0V	


Q301
REC-TEST OSC | B 0.7V | C 0±0.1V | E 0V
Q19
FeCr / CrO2 Metal | B 0.7V | C 0V | E 0V
NORMAL | B 0.013V | C 0V | E 0V
Q21
Fe-Cr | B 0.7V | C 0V | E 0V
Q23
CrO2 | B 0.7V | C 0V | E 0V
Q25
Metal | B 0.7V | C 0V | E 0V
Q305
MUTING ON | B 0.7V | C 0V | E 0V
MUTING OFF | B 0V | C 1.65V | E 0V
Q306
REC/PLAY | B 0V 0.08V 2.5V 1.8–2sec | C 0.14V | E 0V
REC-TEST OSC | B 0.21V 0V | C 0.14V | E 0V
IC302 AN6870
1 0V | 11 0.1—0.3V | 20 0.1—0.3V
2 2.5V | 12 0.1—0.3V | 21 0.1—0.3V
3 21.5V | 13 0.1—0.3V | 22 0.1—0.3V
4 10.5V | 14 0.1—0.3V | 23 0.1—0.3V
5 10.5V | 15 0.1—0.3V | 24 3.4V
6 0.1—0.3V | 16 0.1—0.3V | 25 16V
7 0.1—0.3V | 17 0.1—0.3V | 26 2—3V
8 0.1—0.3V | 18 0.1—0.3V | 27 1.75V
9 0.1—0.3V | 19 0.1—0.3V | 28 1.9V
10 0.1—0.3V
IC301 AN6552
Q303, 304 2SD1010(R,S) [2SD1010R]
Q305, 306 2SC2021(SF,RF) [2SC2021SF]
IC302 AN6870
FL METER
MECHANISM SECTION
IC401 NJM4556
J2 HEADPHONES
D417, 418 MA1068TA
D419 MA1068FV
D422 MA1068TA
D423 MA1068FV
D424 MA1068TA
D401, 402 1S2473
LCH RECORD AMP
RCH RECORD AMP
RCH HEADPHONES AMP
REMOTE JACK
D16, 17 1S2473
Q401 2SD636(R,S) 2SC2021SF
IC402 M74LS03P
Q13—27 2SD636(R,S) [2SD636R]
Q402 2SB641(R,S) [2SB641R]
KEY BOARD
REGULATOR
Q403 2SC1847(Q,R) [2SB641R]
MUTING ON 0.72V
D12—15 1S2473
Q41 2SB641(R,S) [2SB641R]
D19 MV121
Q49 2SD636(R,S) [2SD636R]
* For all European areas.
D406 MA1068
D407 RD243B
Q408 2SD638(R,S) [2SD636R]
Q405 2SD836(Q,P) [2SD836Q]
Q406 2SC1847(Q,R) [2SC1847Q]
Q404 2SA886(-Q,-R) [2SA886-Q]
Q407 2SB641 or 2SA786
D404, 405 MA1130
D425 1S2473T77
D408—416 1SR35200
* For Asia, Latin America, Middle East and Africa areas.
* For Australia, Latin America, Middle East and Africa areas.
* For Australia.
Q35
Normal | B 11.2V | C 0V | E 0V
CrO2 | B 10.8V | C 11.2V | E 0V
Metal (AUTO) | B 11.2V | C 0V | E 0V
AUTO | B 0V | C 0V | E 11.2V
Q34
Normal | B 10.8V | C 11.2V | E 0V
CrO2 | B 11.2V | C 0V | E 0V
Metal (AUTO) | B 11.2V | C 0V | E 0V
AUTO | B 0V | C 0V | E 11.2V
Q38
REC | B 0.7V | C 0.03V | E 0V
PLAY | B 0.14V | C 4.2V | E 0V
Q37
Normal | B 0.52V | C 11.2V | E 0.15V
CrO2 | B 1.25V | C 0.6V | E 0.6V
Metal (AUTO) | B 11.2V | C 11.2V | E 11V
Q39
REC | B 20V | C 22.7V | E 20V
PLAY | B 0.04V | C 22.7V | E 0V
Q41
REC | B 20V | C 0.03V | E 20V
REC-MUTE | B 19V | C 19.5V | E 19.5V
Q40
REC | B 0.03V | C 20.5V | E 0V
PLAY | B 0.68V | C 0.04V | E 0V
NOTE:
• S1-1—S
• S2-1—S
• S3-1, S3
• S4-1—S
• S5.....
• S6, S7 .
• S8-1, S8
• S9.....
• S10 ....
• S11 ....
• S12 ....
• S13 ....
• S14 ....
• S15 ....
• S16 ....
• S17 ....
• S18 ....
• S19 ....
• VR1, 2 .
• VR3, 4 .
• VR102,
• VR103,
• VR105,
• VR107 .
• VR109 .
• VR201 .
• VR202 .
• VR301 .
• VR303 .
• VR305 .
• L103, 10
• L105, L1
• L201 ....
• Resistar 1K = 1,0
• Capacit P = Pico

IC302 AN6870

1	0V	11	0.1—0.3V	20	0.1—0.3V
2	2.5V	12	0.1—0.3V	21	0.1—0.3V
3	21.5V	13	0.1—0.3V	22	0.1—0.3V
4	10.5V	14	0.1—0.3V	23	0.1—0.3V
5	10.5V	15	0.1—0.3V	24	3.4V
6	0.1—0.3V	16	0.1—0.3V	25	16V
7	0.1—0.3V	17	0.1—0.3V	26	2—3V
8	0.1—0.3V	18	0.1—0.3V	27	1.75V
9	0.1—0.3V	19	0.1—0.3V	28	1.9V
10	0.1—0.3V				



* For Australia, Latin America, Middle East and Africa areas.

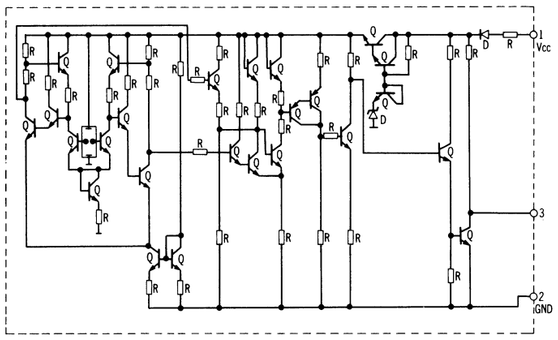
* For Australia.

Q41

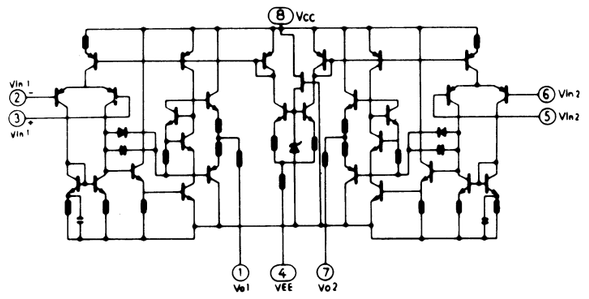
	B	C	E
	20V	0.03V	20V
	19V	19.5V	19.5V

EQUIVALENT CIRCUIT

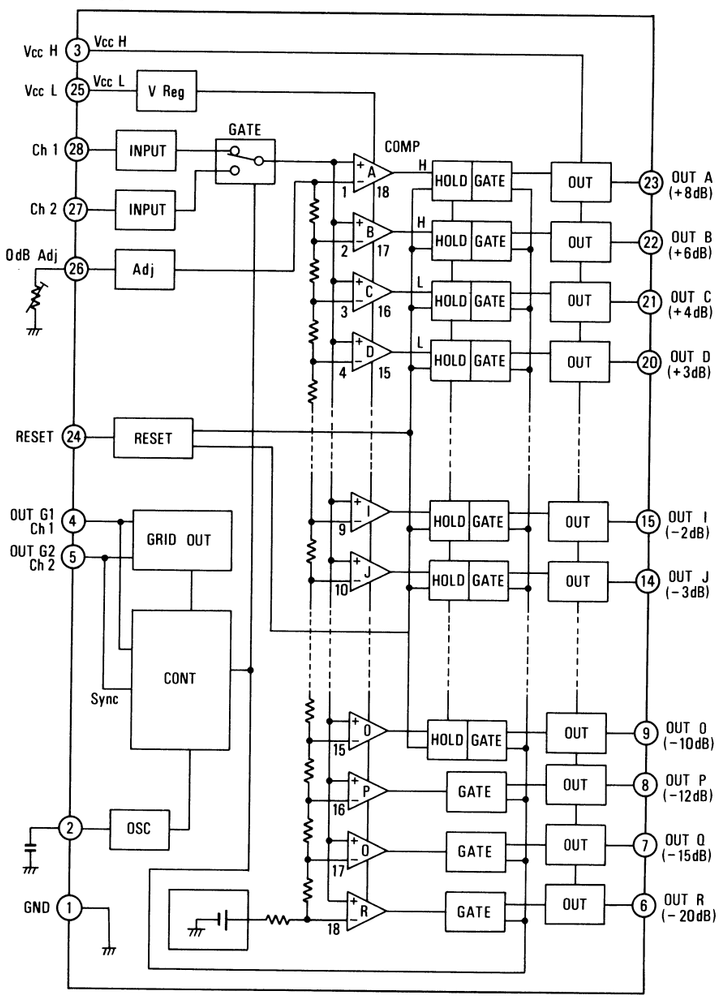
IC508



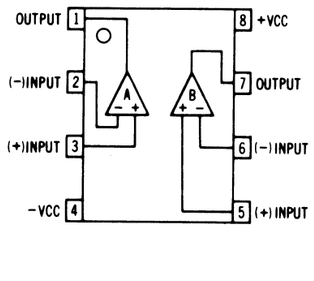
IC6, 7, 301 AN6552



IC302 AN6870



IC401 NJM4556



NOTE:

- S1-1—S1-6 .....Input select switch.
  [①: MOC, ②: LINE IN, ③: TEST OSC (400Hz), ④: TEST OSC (400Hz/800Hz)].
- S2-1—S2-4 .....Monitor select switch (①: Tape, ②: Source).
- S3-1, S3-2.....Dolby NR IN/OUT select switch (①: OUT, ②: IN).
- S4-1—S4-3 .....MPX filter IN/OUT select switch (①: OUT, ②: IN).
- S5.....Tape select switch (①: Fe-Cr, ②: Metal, ③: Auto).
- S6, S7 .....Auto tape select switch.
  Normal mode.....S6, S7: ON
  CrO_2 mode .....S6: ON, S7: OFF
  Metal mode .....S6, S7: OFF
- S8-1, S8-2.....Memory switch (①: Stop, ②: OFF, ③: Repeat).
- S9.....Timer switch (①: Play, ②: OFF, ③: Record).
- S10 .....Record switch.
- S11 .....Pause switch.
- S12 .....Record mute switch.
- S13 .....Rewind switch.
- S14 .....Playback switch.
- S15 .....Fast forward switch.
- S16 .....Stop switch.
- S17 .....Counter reset switch.
- S18 .....Power ON/OFF switch (shown in ON position).
- S19 .....AC power voltage select switch.
- VR1, 2 .....Playback gain adjustment VR.
- VR3, 4 .....Output level controls.
- VR102, 103 .....Input level controls.
- VR103, 104 .....Recording gain adjustment VR.
- VR105, 106 .....Recording gain calibration VR.
- VR107 .....Test oscillation (400Hz) level adjustment VR.
- VR109 .....Test oscillation (400Hz) level fine adjustment (L-CH) VR.
- VR201 .....Erase current adjustment VR.
- VR202 .....Recording bias current adjustment VR.
- VR301 .....FL meter adjustment VR (L-CH, 0dB indication).
- VR303 .....FL meter adjustment VR (R-CH, -20dB indication).
- VR305 .....FL meter adjustment VR (R-CH, 0dB indication).
- L103, 104 .....Recording equalization adjustment coil.
- L105, L106 .....Recording bias trap coil.
- L201 .....Recording bias oscillation coil.
- Resistance are in ohms (Ω) 1/4 watt unless specified otheriwse.
  1K = 1,000Ω, M = 1,000KΩ.
- Capacity are in micro-farads (μF) unless specified otherwise.
  P = Pico-farads

- The mark (▼) shows test paint e.g ▼ = Test point 1.
- (▒▒) indicates B + (bias).
- (▒ ▒ ▒) indicates − (bias).
- (▒▒▒) indicates the flow of playback signal.
- (▒ ▒ ▒) indicates the flow of recording signal.
- 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.
- Values indicated 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.
  REC/PLAY .....Voltage at record/playback mode.
  Normal .....Voltage at Normal tape mode.
  CrO_2.....Voltage at CrO_2 tape mode.
  Metal .....Voltage at Metal tape mode.
  Fe-Cr .....Voltage at Fe-Cr tape mode.
  REC-TEST OSC ...Voltage at record mode (Test oscillator: ON).
  REC-MUTE .....Voltage at record mode (Rec mute: ON).
  Metal (Auto) .....Voltage at Metal tape mode (AUTO-TAPE SELECTOR: AUTO position).
  Metal (Manual) ...Voltage at Metal tape mode
  (AUTO TAPE SELECTOR: Metal tape position).
  AUTO .....Voltage at AUTO TAPE SELECT mode
  (AUTO TAPE SELECTOR: AUTO position.
  MUTING ON .....Voltage at muting mode (During power off muting circuit is operating).
  MUTING OFF .....Voltage at non muting mode
  (During power off muting circuit is not operating).
  70μS .....Voltage at Metal, CrO_2 or Fe-Cr tape mode.
  120μS .....Voltage at Normal tape mode.
- 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—4
  2SD1011(S,R,T)◄—Production parts number
  [2SD1011S]◄———Supply parts number
  D309
  QVD1S2473T◄—Production parts number
  [MA161]◄———Supply parts numbers
- **The supply parts number is described alone in the replacement parts list.**

CIRCUIT BOARDS

MAIN CIRCUIT BOARDS

Q43
2SD636(R,S)
[2SD636R]

		B	C	E
REC	Fe-Cr	0.7V	0V	0V
	Normal	0V	9.1V	0V
	CrO_2	0V	12.2V	0V
	Fe-Cr	0V	0.008V	0V
	Metal	0V	19V	0V

Q32
2SB641(R,S)
[2SB641R]

	B	C	E
CrO_2	10.7V	11.2V	11.2V

Q31
2SB641(R,S)
[2SC641R]

	B	C	E
Metal	9V	9.6V	9.7V

Q46
2SD636(R,S)
[2SD636R]

	B	C	E
Record	0.003V	22.7V	0V
Playback	0.7V	22.7V	0V

Q40
2SD636(R,S)
[2SD636R]

	B	C	E
Record	0.03V	20.5V	0V
Playback	0.68V	0.04V	0V

Q41
2SB641(R,S)
[2SB641R]

	B	C	E
Record	20V	0.03V	20V
Rec-Mute	19V	19.5V	19.5V

Q37
2SD636(R,S)
[2SD636R]

	B	C	E
Normal	0.52V	11.2V	0.15V
CrO_2	1.25V	0.6V	0.6V
Metal (AUTO)	11.2V	11.2V	11V

Q44
2SD636(R,S)
[2SD636R]

	B	C	E
Normal	0.7V	0.008V	0V
CrO_2	0V	12.2V	0V
Fe-Cr	0V	10.4V	0V
Metal	0V	19V	0V

Q30
2SB641(R,S)
[2SB641R]

	B	C	E
Fe-Cr	10.8V	11.2V	9.7V

Q38
2SD636(R,S)
[2SD636R]

	B	C	E
Record	0.7V	0.03V	0V
Playback	0.14V	4.2V	0V

Q39
2SD636(R,S)
[2SD636R]

	B	C	E
Record	20V	22.7V	20V
Playback	0.04V	22.7V	0V

Q34
2SB641(R,S)
[2SB641]

	B	C	E
Normal	10.8V	11.2V	0V
CrO_2	11.2V	0V	0V
Metal (AUTO)	11.2V	0V	0V
AUTO	0V	0V	11.2V

Q35
2SB641(R,S)
[2SB641R]

	B	C	E
Normal	11.2V	0V	0V
CrO_2	10.8V	11.2V	0V
Metal (AUTO)	11.2V	0V	0V
AUTO	0V	0V	11.2V

IC6
AN6652

1	0±1V	5	
2	0±1V	6	
3	0V	7	
4	12±2V	8	1

Q42
2SD636(R,S)
[2SD636R]

		B	C	E
REC	CrO_2	0.7V	0V	0V
	Normal	0V	9.1V	0V
	CrO_2	0V	0.006V	0V
	Fe-Cr	0V	10.4V	0V
	Metal	0V	19V	0V

Q47, 48
2SD592NCS

		B	C	E
REC	Normal	0.65V	7.7V	0.26V
	CrO_2	0.65V	10.5V	0.38V
	Fe-Cr	0.65V	8.8V	0.30V
	Metal	0.7V	17.2V	0.62V

Q7, 8
2SD592NCS

	B	C	E
MUTING ON	0.7V	0V	0V

Q45
2SD946

		B	C	E
REC	Normal	9.1V	22.7V	8V
	CrO_2	12.2V	22.7V	10.9V
	Fe-Cr	10.4V	22.7V	9.1V
	Metal	19V	22.7V	017.7V

Q15, 18
2SD636(R,S)
[2SD636R]

	B	C	E
REC/PLAY	0V	0V	0V

Q23, 24
2SD636(R,S)
[2SD636R]

	B	C	E
CrO_2	0.7V	0V	0V

Q21, 22
2SD636(R,S)
[2SD636R]

	B	C	E
Fe-Cr	0.7V	0V	0V

Q17, 18
2SD636(R,S)
[2SD636R]

	B	C	E
Normal	0V	0V	0V

Q19, 20
2SD636(R,S)
[2SD636R]

	B	C	E
Normal	0.013V	0V	0V
Fe-Cr, CrO_2, Metal	0.7V		

Q25, 26
2SD636(R,S)
[2SD636R]

	B	C	E
Metal	0.7V	0V	0V

IC5
NJM4559D

1	0±1V	5	0±1V
2	0±1V	6	0±1V
3	0±1V	7	0±1V
4	−9.5±2V	8	9.5±2V

IC1, 2, 3, 4
NE646B

1	0±1V	9	−7±2V
2	0±1V	10	0±1V
3	0.5±1V	11	0±1V
4	0V	12	0±1V
5	0±1V	13	—
6	0±1V	14	0±1V [OUT: 3.5±1V]
7	−0.5±1V	15	0±1V [OUT: 3.5±1V]
8	—	16	7±2V

Q5, 6
2SD636(R,S)
[2SD636R]

	B	C	E
70μS	0.7V	0V	0V
120μS	0V		

Q3, 4
2SD661(S,T)
[2SD661T]

C	1.9V
B	−7.3V
E	−7.9V

Q1, 2
2SB745(S,T)
[2SB745T]

C	−7.3V
B	0V
E	0.54V

Q27
2SD636(
[2SD636

	B
REC-TEST OSC	0.7V

Q28,
2SB641
[2SB64

	B
REC	20V
REC-TEST OSC	19.3V

Q36
2SD636(
[2SD63

	B
Metal (AUTO)	11V
AUTO	0V
Metal (Manual)	0V

Q33
2SD636(
[2SD636

	B
Normal	0.7V
Fe-Cr CrO_2 Metal	5.2V

Q13, 14
2SD636(R,S
[2SD636R]

	B	C
Fe-Cr	0.7V	0V

IC7
AN6552

1	0±1V	5	
2	0±1V	6	
3	0±1V	7	
4	12±2V	8	1

Q9, 10
2SD661(S,T)
[2SD661T]

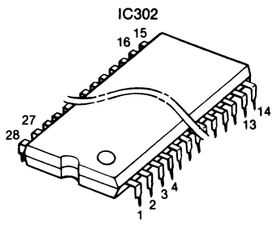
C	6.6V
B	−0.006V
E	−0.52V

Q11, 12
2SD745(S,T)
[2SD745T]

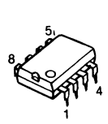
C	1.6V
B	6.6V
E	7.2V

TERMINATIONS (Side View)

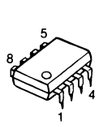
IC302



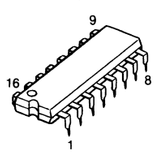
IC7, 301



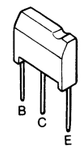
IC5, 401



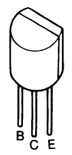
IC602, 603



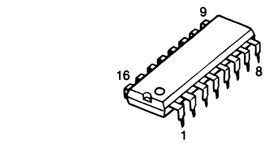
Q1—6, 9—44, 46, 49, 301, 302, 305, 306, 401, 402, 408, 501—504, 506, 507, 614, 615, 618



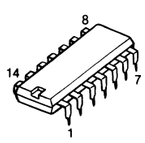
Q7, 8, 47, 48, 303, 304, 407, 608, 609, 616, 617



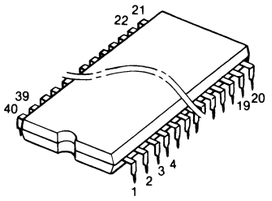
IC1—4, 402



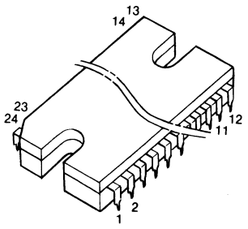
IC402, 502—507



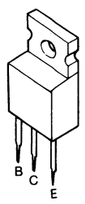
IC601



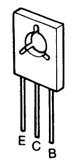
IC501



Q405, 505



Q45, 403, 404, 406



CHIP TRANSISTORS

CHIP RESISTORS

CHIP CAPACITORS

CHIP DIODES

D612, 613

Q602—607, 611, 612

Q601, 610, 613

DAN202

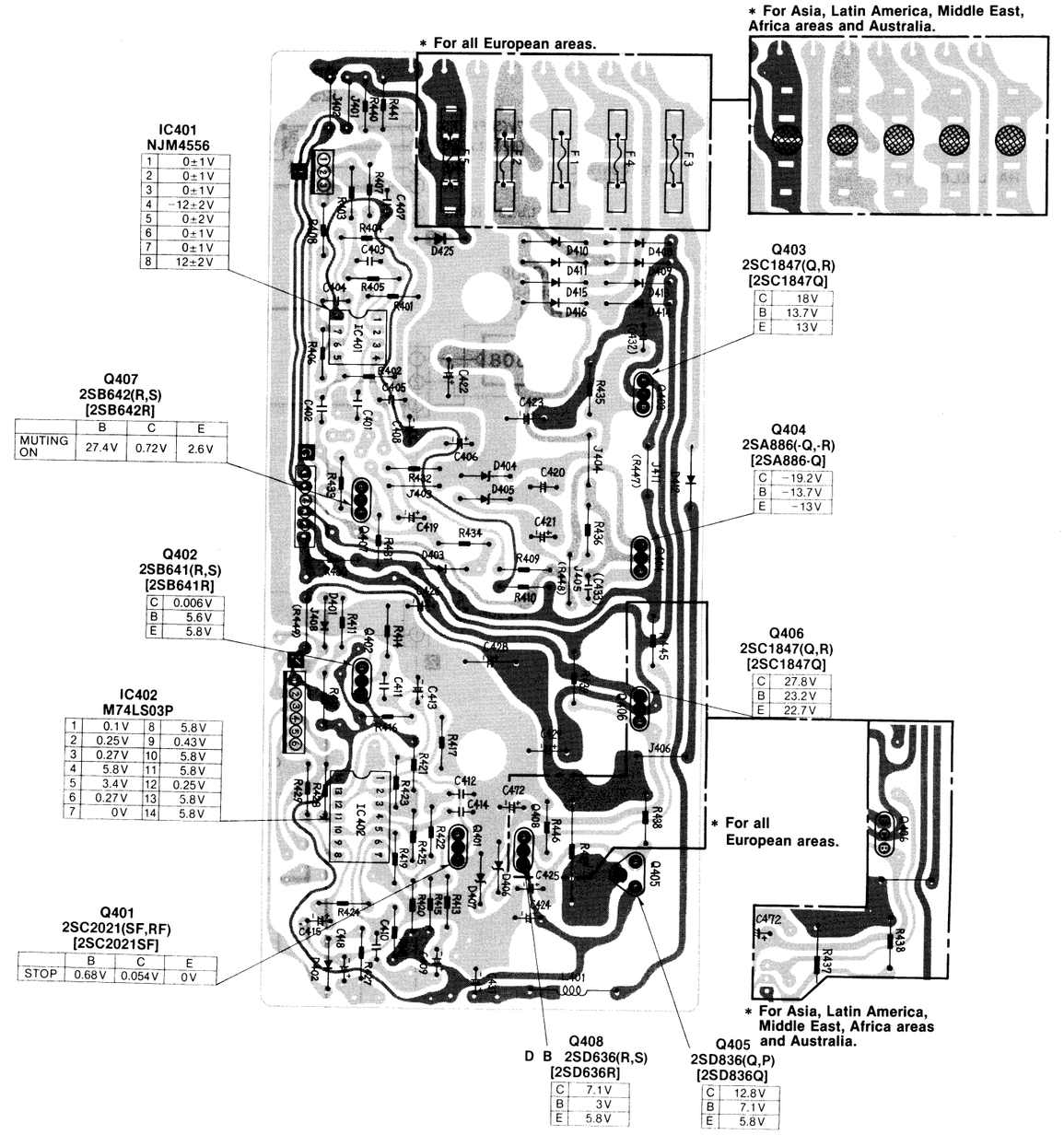
DAP202

NOTES:

- The circuit shown in ■ on the conductor is
- The circuit shown in ▒ on the conductor is
- The circuit shown in ▒ on the conductor si back side of the printed circuit board.
- Values indicates in □ are DC voltage betwe
- All voltage values shown in circuitry are under n Unless otherwise specified, voltage measuremer at STOP, tape mode at NORMAL, and Dolby NR
  - REC .....Voltage at record mode.
  - PLAY .....Voltage at playback mode.
  - REC/PLAY .....Voltage at record/playback mo
  - Normal .....Voltage at Normal tape mode.
  - CrO_2.....Voltage at CrO_2 tape mode.
  - Metal .....Voltage at Metal tape mode.
  - Fe-Cr .....Voltage at Fe-Cr tape mode.
  - REC-TEST OSC ...Voltage at record mode (Test
  - REC-MUTE .....Voltage at record mode (Rec r
  - Metal (AUTO) .....Voltage at Metal tape mode (AUTO TAPE SELECTOR: AUT
  - Metal (Manual) ...Voltage at Metal tape mode (AUTO TAPE SELECTOR: Meta
  - AUTO .....Voltage at AUTO TAPE SELEC (AUTO TAPE SELECTOR: AUT
  - MUTING ON .....Voltage at mode (During powe
  - MUTING OFF .....Voltage at non muting mode (During power off muting circu
  - 70μS .....Voltage at Metal, CrO_2 or Fe-C
  - 120μS .....Voltage at Normal tape mode.
- Described in the circuit board diagram are two t number and production parts number for transis for supply parts number and production parts nu
  - e.g. Q1
    - [2SB745(T,U)] ◄— Production parts numb
    - [2SB745T] ◄— Supply parts number
- The supply parts number is described alone in th

- **This circuit board diagram may be m the development of new technology.**

POWER SUPPLY CIRCUIT BOARDS



IC401 NJM4556

1	0±1V
2	0±1V
3	0±1V
4	−12±2V
5	0±2V
6	0±1V
7	0±1V
8	12±2V

Q403 2SC1847(Q,R) [2SC1847Q]

C	18V
B	13.7V
E	13V

Q407 2SB642(R,S) [2SB642R]

	B	C	E
MUTING ON	27.4V	0.72V	2.6V

Q404 2SA886(-Q,-R) [2SA886-Q]

C	−19.2V
B	−13.7V
E	−13V

Q402 2SB641(R,S) [2SB641R]

C	0.006V
B	5.6V
E	5.8V

Q406 2SC1847(Q,R) [2SC1847Q]

C	27.8V
B	23.2V
E	22.7V

IC402 M74LS03P

1	0.1V	8	5.8V
2	0.25V	9	0.43V
3	0.27V	10	5.8V
4	5.8V	11	5.8V
5	3.4V	12	0.25V
6	0.27V	13	5.8V
7	0V	14	5.8V

Q401 2SC2021(SF,RF) [2SC2021SF]

	B	C	E
STOP	0.68V	0.054V	0V

Q408 2SD636(R,S) [2SD636R]

C	7.1V
B	3V
E	5.8V

Q405 2SD836(Q,P) [2SD836Q]

C	12.8V
B	7.1V
E	5.8V

IC6 AN6652

1	0±1V	5	0V
2	0±1V	6	0±1V
3	0V	7	0±1V
4	−12±2V	8	12±2V

Q27 2SD636(R,S) [2SD636R]

	B	C	E
REC-TEST OSC	0.7V	0V	0V

Q28, 29 2SB641(R,S) [2SB641R]

	B	C	E
REC	20V	0V	20V
REC-TEST OSC	19.3V	19.3V	0V

Q36 2SD636(R,S) [2SD636R]

	B	C	E
Metal (AUTO)	11V	0V	10.5V
AUTO	0V	11.2V	0V
Metal (Manual)	0V	0V	0.045V

Q33 2SD636(R,S) [2SD636R]

	B	C	E
Normal	0.7V	0.7V	0V
Fe-Cr	5.2V	5.2V	0V
CrO_2 Metal			

Q13, 14 2SD636(R,S) [2SD636R]

	B	C	E
Fe-Cr	0.7V	0V	0V

IC7 AN6552

1	0±1V	5	0±1V
2	0±1V	6	0±1V
3	0±1V	7	0±1V
4	−12±2V	8	12±2V

Q9, 10 2SD661(S,T) [2SD661T]

C	6.6V
B	−0.006V
E	−0.52V

Q11, 12 2SD745(S,T) [2SD745T]

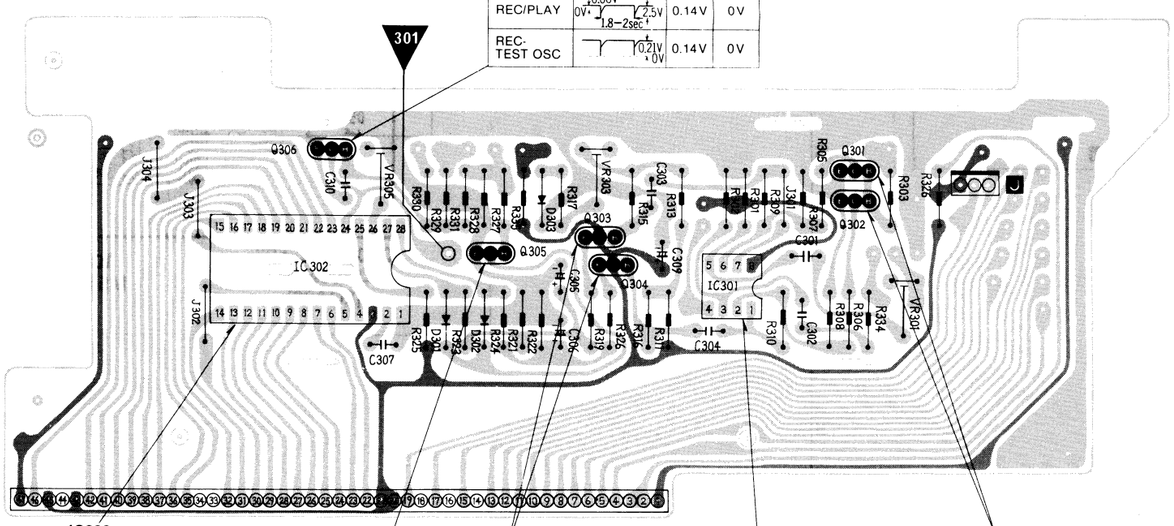
C	1.6V
B	6.6V
E	7.2V

on the conductor is B+ (bias) circuit.
on the conductor is B− (bias) circuit.
on the conductor side indicates printed circuit on the circuit board.
are DC voltage between the ground and electrical parts.
in circuitry are under no signal condition.
d, voltage measurement conditions are that tape travel is ORMAL, and Dolby NR switch at OFF.
e at record mode.
e at playback mode.
e at record/playback mode.
e at Normal tape mode.
e at CrO_2 tape mode.
e at Metal tape mode.
e at Fe-Cr tape mode.
e at record mode (Test oscillator: ON).
e at record mode (Rec mute: ON).
e at Metal tape mode
TAPE SELECTOR: AUTO position.
e at Metal tape mode
TAPE SELECTOR: Metal tape position).
e at AUTO TAPE SELECTOR mode
TAPE SELECTOR: AUTO position).
e at mode (During power off muting circuit is operating).
e at non muting mode
power off muting circuit is not operating).
e at Metal, CrO_2 or Fe-Cr tape mode.
e at Normal tape mode.
oard diagram are two types of numbers; the supply parts arts number for transistors. One type of number is used and production parts number when they are identical.

–Production parts number
–Supply parts number
is described alone in the replacement parts list.

diagram may be modified at any time with new technology.

FL METER CIRCUIT BOARD



Q306 2SC2021(SF,RF) [2SC2021SF]

	B	C	E
REC/PLAY	0V, 0.08V, 1.8–2sec, 2.5V	0.14V	0V
REC-TEST OSC	0.2V, 0V	0.14V	0V

IC302 AN6870

1	0V	11	0.1—0.3V	20	0.1—0.3V
2	2.5V	12	0.1—0.3V	21	0.1—0.3V
3	21.5V	13	0.1—0.3V	22	0.1—0.3V
4	10.5V	14	0.1—0.3V	23	0.1—0.3V
5	10.5V	15	0.1—0.3V	24	3.4V
6	0.1—0.3V	16	0.1—0.3V	25	16V
7	0.1—0.3V	17	0.1—0.3V	26	2—3V
8	0.1—0.3V	18	0.1—0.3V	27	1.75V
9	0.1—0.3V	19	0.1—0.3V	28	1.9V
10	0.1—0.3V				

Q305 2SC2021(SF,RF) [2SC2021SF]

	B	C	E
MUTING ON	0.7V	0V	0V
MUTING OFF	0V	1.65V	0V

Q303, 304 2SD1010(R,S) [2SD1010R]

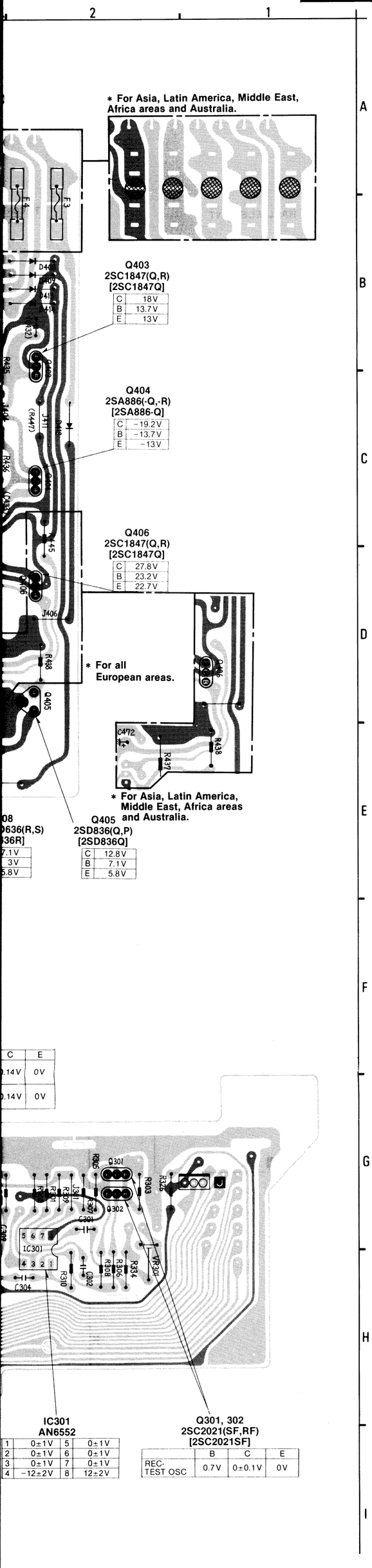
C	2.2V
B	22.7V
E	1.8V

IC301 AN6552

1	0±1V	5	0±1V
2	0±1V	6	0±1V
3	0±1V	7	0±1V
4	−12±2V	8	12±2V

Q301, 302 2SC2021(SF,RF) [2SC2021SF]

	B	C	E
REC-TEST OSC	0.7V	0±0.1V	0V



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

CAPACITORS
ECBA.....Ceramic
ECGC.....Ceramic
ECKC.....Ceramic
ECCC.....Ceramic
ECFC.....Ceramic
QCUT.....Ceramic
ECQM.....Polyester film
ECQE.....Polyester film
ECQF.....Polypropylene
ECEC.....Electrolytic
ECENC...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.

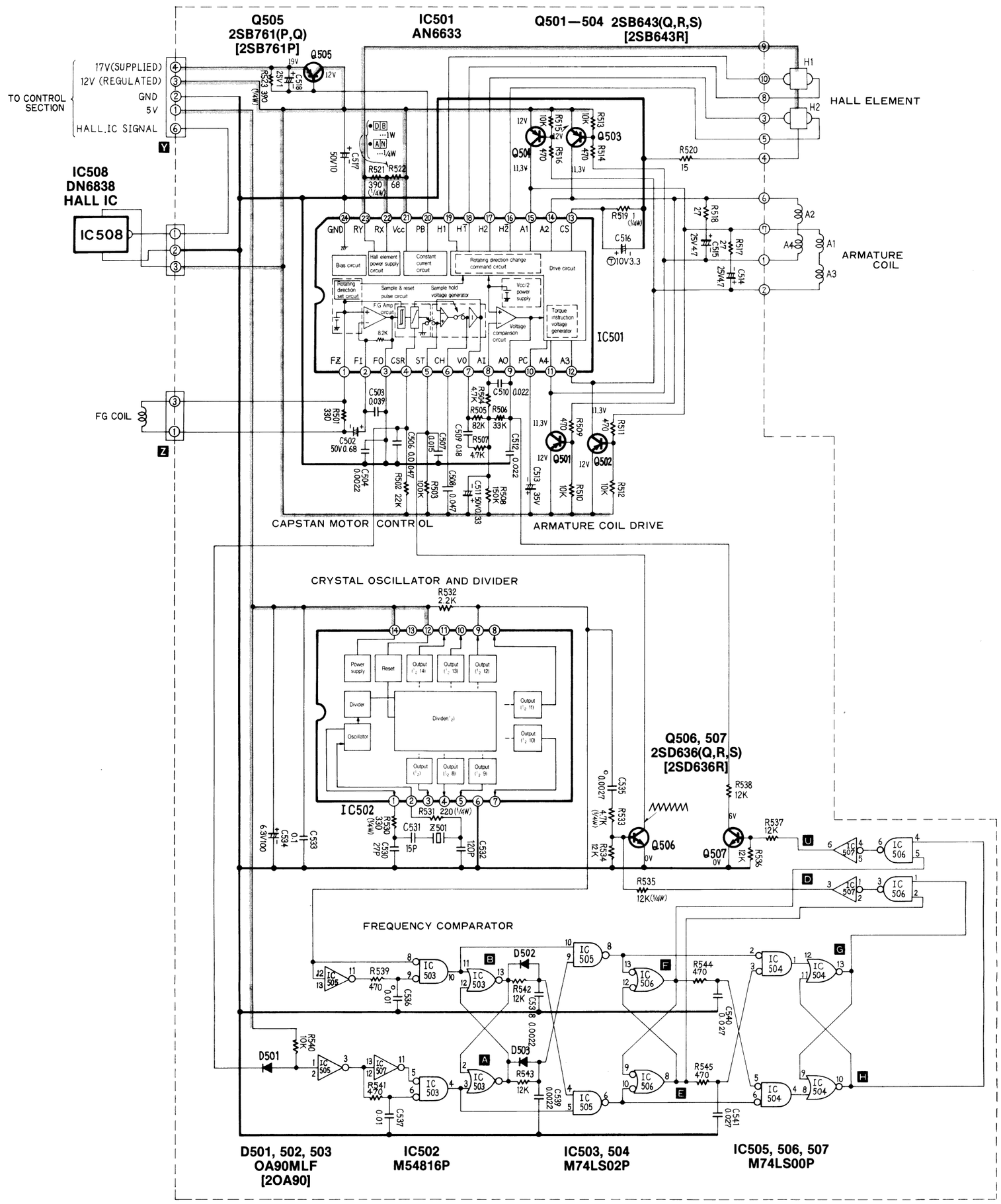
Ref. No.	Part No.
RESISTORS	
R1, 2	ERD25FJ101
R3, 4	ERD25TSJ273
R5, 6	ERO25CKF1503
R7, 8	ERD25TJ124
R9, 10	ERD25TJ223
R11, 12	ERD25FJ392
R15, 16, 17, 18	ERD25FJ472
R19, 20	ERD25FJ562
R21, 22	ERD25TJ154
R23, 24	ERD25FJ332
R25, 26	ERG1ANJ680
R27, 28	ERD25TJ473
R29, 30	ERD25TJ684
R31, 32	ERD25FJ332
R33, 34	ERD25FJ181
R35, 36	ERD25TJ223
R37, 38	ERD25TJ184
R39, 40	ERD25TJ274
R41, 42	ERD25FJ152
R43, 44	ERD25FJ102
R45	ERD25FJ562
R46	ERD25TJ123
R51, 52	ERD25TJ223
R53, 54	ERD25TJ333
R55, 56	ERD25TJ563
R57, 58	ERD25TJ333
R59, 60	ERD25TJ683
R101, 102	ERD25FJ103
R103, 104	ERD25FJ101
R105, 106	ERD25TJ563
R107, 108	ERO25CKF8202
R109, 110	ERD25FJ391
R111, 112	ERD25TSJ273
R113, 114	ERD25TJ393
R115, 116	ERD25FJ562
R117, 118	ERD25FJ122
R119, 120	ERD25TJ223
R121, 122	ERD25TJ273
R124	ERD25FJ562
R125, 126	ERD25FJ102
R127, 128	ERD25TJ394
R129, 130	ERD25TJ473
R131, 132	ERD25TJ684
R133, 134	ERD25FJ332
R135, 136	ERD25FJ181
R137, 138	ERD25TJ223
R139, 140	ERD25TJ184
R141, 142	ERD25TJ274
R143, 144	ERD25TJ123
R145, 146	ERD25TJ563
R147, 148	ERD25TJ153
R149, 150	ERD25TJ104
R151, 152	ERD25FJ562
R153, 154	ERD25FJ331
R155, 156	ERD25FJ391
R157, 158	ERD25TJ183
R159, 160	ERD25TJ823
R161, 162	ERD25FJ472
R163, 164	ERD25TJ333
R165, 166	ERD25TJ123
R167, 168	ERD25FJ822
R169, 170	ERD25FJ392
R171, 172	ERD25FJ182
R173, 174	ERD25FJ561
R181	ERD25TJ183
R182, 183	ERD25TJ473
R184	ERD25TJ223
R185, 186	ERD25FJ103
R187, 188	ERD25TJ473
R189	ERD25TJ223
R190	ERD25TJ183
R191	ERD25FJ471
R192	ERD25FJ103
R193	ERD25TJ333
R194	ERD25TJ273
R195, 196	ERD25TJ473
R201	ERD25TJ123
R202	ERD25TJ333
R203	ERD25FJ103
R204	ERD25TJ333
R205	ERD25FJ103
R206	ERD25TJ123
R207	ERD25TJ333
R208	ERD25FJ103
R209, 210	ERD25FJ682
R211	ERD25FJ103
R212	ERD25FJ821
R213, 214, 215, 216	ERD25TJ123
R217	ERD25FJ102
R218	ERD25FJ222
R219, 220, 221, 222	ERD25FJ102
R223	ERD25FJ222
R224	ERD25FJ181
R225	ERD25FJ472
R226	ERD25FJ103
R227	ERD25TJ123
R228	ERD25FJ822
R229	ERD25TJ823
R230	ERD25TJ393
R231	ERD25FJ103
R232	ERD25TJ104
R233	ERD25TJ393
R234	ERD25FJ562
R235	ERD25FJ152
R236	ERG12AJ123
R237	ERD25FJ392
R238	ERD25TJ123
R239	ERD25FJ472
R240	ERD25TJ473
R241	ERD25FJ562
R242, 243	ERD25TJ273
R244	ERD25FJ472
R245	ERD25FJ122
R246, 247	ERD25TJ333
R248	ERD25FJ681
R249	ERD25FJ102
R250	ERD25TJ223
R251, 252, 253	ERD25FJ472
R254, 255	ERD25TJ153
R256	ERD25FJ103
R257	ERD25TJ153
R258	ERD25FJ100
R259	ERD25FJ101
R260	ERD25FJ103
R261 DB	ERQ14AJ100P
※For all European areas.	
NA	ERD25FJ100
※For Asia, Latin America, Middle East, Africa areas and Australia.	
R262, 263	ERD25TJ683
R264, 265	
DB	ERQ14AJ220P
※For all European areas.	
NA	ERD25FJ220
※For Asia, Latin America, Middle East, Africa areas and Australia.	
R266	ERD25TJ273
R267, 268	ERD25TJ100
R269	ERD25FJ1R0
R270	ERD25TJ823
R271	ERD25FJ153
R272	ERD25FJ562
R273	ERD25TJ123
R274	ERD25FJ682
R301, 302	ERD25TJ563
R303	ERD25FJ562
R305, 306	ERO25TKG6801
R307, 308	ERO25TKG6802
R309, 310	ERO25TKG2703
R311	ERD25FJ103
R313	ERD25FJ220
R315, 316	ERD25TJ104
R317	ERD25FJ561
R319, 320	ERD25FJ331
R321, 322	ERD25TJ224
R323, 324	ERD25FJ102
R325	ERG12ANJ221
R326, 327, 328, 329	ERD25FJ103
R330	ERD25TJ393
R331, 334	ERD25TJ223
R335 DB	ERQ14AJ100P
※For all European areas.	
NA	ERD25FJ100
※For Asia, Latin America, Middle East, Africa areas and Australia.	
R401, 402	ERD25TJ563
R403, 404	ERD25TJ473
R405, 406	ERD25TJ823
R407, 408	ERD25FJ121
R409, 410	
DB	ERQ14AJ220P
※For all European areas.	
NA	ERD25FJ220
※For Asia, Latin America, Middle East, Africa areas and Australia.	
R411, 412	ERD25TJ273
R413	ERD25FJ181
R414	ERD25FJ102
R415	ERD25TJ154
R416, 417	ERD25FJ332
R418	ERD25FJ392
R419	ERD25FJ562
R420, 421	ERD25FJ182
R422	ERD25FJ560
R423, 424	ERD25FJ821
R425	ERD25FJ560
R426	ERD25TJ273
R427	ERD25FJ102
R428, 429	ERD25FJ331
R430 DB	ERQ14AJ181P
※For all European areas.	
NA	ERD25FJ470
※For Asia, Latin America, Middle East, Africa areas and Australia.	
R431	ERD25FJ103
R432	ERD25TJ473
R433	ERD25FJ152
R434	ERD25FJ332
R435, 436	
⚠	ERD25FJ102
R437 ⚠	ERX1ANJ3R9
R438 ⚠	ERD25FJ222
R439 ⚠	ERD25FJ102
R440, 441	
DB ⚠	ERQ14AJ470P
※For all European areas.	
NA ⚠	ERD25FJ181
※For Asia, Latin America, Middle East, Africa areas and Australia.	
R442	ERD25FJ222
R443	ERD25FJ471
R444	ERD25FJ391
R445 DB	ERD25FJ562
※For all European areas.	
R446 DB	ERD25FJ182
※For all European areas.	
R501	RRD18XJ331
R502	RRD18XJ223 "A-Type" RRD18XJ473 "B-Type"
R503	RRD18XJ104
R504	RRD18XJ472 "A-Type" RRD18XJ822 "B-Type"
R505	RRD18XJ823 "A-Type" RRD18XJ124 "B-Type"
R506	RRD18XJ333 "A-Type" RRD18XJ104 "B-Type"
R507	RRD18XJ472 "A-Type" RRD18XJ822 "B-Type"
R508	RRD18XJ154 "A-Type" RRD18XJ224 "B-Type"
R509	RRD18XJ471
R510	RRD18XJ103
R511	RRD18XJ471
R512, 513	RRD18XJ103
R514	RRD18XJ471
R515	RRD18XJ103
R516	RRD18XJ471
R517, 518	RRD18XK270
R519	ERD25FJ1R0
R520	RRD18XK150
R521	ERD25FJ391
R522 DB	ERG1ANJ680H
※For all European areas.	
NA	ERD25FJ680
※For Asia, Latin America, Middle East, Africa areas and Australia.	
R523	ERD25FJ391
R530	ERD25FJ331
R531	ERD25FJ221
R532	RRD18XJ222
R533	ERD25FJ472
R534	RRD18XJ123
R535	ERD25FJ123
R536, 537, 538	RRD18XJ123
R539	ERD25FJ471
R540	RRD18XJ103 "A-Type" RRD18XJ563 "B-Type"
R541	RRD18XJ471
R542, 543	RRD18XJ123
R544, 545	RRD18XJ471
R601	RRD18XJ473
R602	RRD18XJ273
R607, 608, 609, 610, 611, 612	RRD18XJ562
R613, 614, 615, 616, 617, 618	RRD18XJ471
R619	RRD18XJ123
R620	RRD18XJ273
R621	RRD18XJ102
R622, 623, 624, 625, 626, 627	RRD18XJ123
R628, 629, 630, 631	RRD18XJ272
R632	RRD18XJ562
R633, 634, 635, 636	RRD18XJ272
R637, 638	RRD18XJ182
R640, 641	RRD18XJ331
R642, 643	RRD18XJ273
R644	RRD18XJ562
R645, 646	RRD18XJ182
R647	RRD18XJ562
R648	RRD18XJ182
R649	RRD18XJ101
R650, 651	RRD18XJ273
R652	RRD18XJ123
R653, 654	RRD18XJ182
R655, 656, 657	RRD18XJ331
R659	ERD25FJ120
R660	RRD18XJ123
R661	RRD18XJ821
VARIABLE RESISTORS	
VR1, 2	EVNM4AA00B52
VR3, 4	QWKGTA024A14
VR101, 102	QVK16B20MA24
VR103, 104	EVNM4AA00B24
VR105, 106	QVK121B0B24
VR107	EVNM4AA00B13
VR109	EVNM0AA00B14
VR201	EVNM4AA00B15
VR202	QVK16110B14
VR203, 204	EVNM4AA00B54
VR301	EVNM4AA00B54
VR303	EVNM4AA00B52
VR305 DB	EVNM4AA00B14
※For all European areas.	
NA	EVNM4AA00B14
※For Asia, Latin America, Middle East, Africa areas and Australia.	
VR601	EVNM4AA00B14
CAPACITORS	
C1, 2	ECKD1H391KB
C3, 4	ECKD1H271KB
C5, 6	ECKD1H102KB
C7, 8	ECEA1AS101
C11, 12	ECQV05273JZ
C13, 14	ECEA1CS330
C15, 16	ECEA1AS101
C17, 18	ECKD1H681KB
C19, 20	ECEA50MR22R
C21, 22	ECQV05123JZ
C23, 24	ECEA1CS331
C25, 26	ECQM1H272KZ
C27, 28	ECQP1391JZ
C29, 30	ECQM1H472JZ
C31, 32	ECQV05273JZ
C33, 34	ECEA1HS100
C35, 36	ECEA1CN100S
C37, 38	ECQM1H562JZ
C39, 40	ECQV05473JZ
C41, 42	ECKD1H102KB
C43, 44	ECEA1HS100
C45, 46	ECQV05104JZ
C47, 48	ECEA50ZR33
C49	ECEA1AS470
C51, 52	ECEA1CN100S
C53, 54	ECCD1H470KD
C55, 56	ECEA1CN100S
C57, 58	ECEA1HS3R3
C101, 102	ECKD1H102KB
C103, 104	ECEA25M3R3R
C105, 106	ECKD1H681KD
C107, 108	ECEA1AS101
C109, 110	ECCD1H470KD
C111, 112	ECCD1H820KD
C113, 114	ECEA50Z1
C115, 116	ECEA1AS101
C117, 118	ECQV05334JZ
C119, 120	ECCD1H470KD
C121, 122	ECQV05273JZ
C123, 124	ECQM1H472JZ
C125, 126	ECEA1HS100
C127, 128	ECQM1H562JZ
C129, 130, 131, 132	ECEA1CN100S
C133, 134	ECKD1H102KB
C135, 136	ECQV05473JZ
C137, 138	ECQV05104JZ
C139, 140	ECEA1HS100
C141, 142	ECQP1121JZ
C143, 144	ECQM1H222KZ
C145, 146	ECEA50ZR33
C147, 148	ECEA50ZR1
C149, 150	ECQM1H822JZ
C151, 152	ECQM1H682JZ
C153, 154	ECQV05124JZ
C155, 156	ECEA1CN100S
C157, 158	ECEA0JN101S
C159, 160	ECQP1391JZ
C161, 162	ECQM1H682KZ
C163, 164	ECQV05183JZ
C165, 166	ECQM1H562JZ
C167, 168	ECQM1H682JZ
C169, 170	ECQV05123JZ
C171, 172	ECQV05153JZ
C173, 174	ECKD1H152KB
C175, 176	ECQM1H272KZ
C177, 178	ECCD1H101KD
C181	ECQV05154JZ
C182, 183	ECQV05103JZ
C184	ECQV05273JZ
C185	ECQP1122JZ
C186, 187	ECQP1471JZ
C188	ECKD1H102KB
C189, 190	ECEA1AS101
C191, 192	ECEA1CS100
C201	ECEA25Z4R7
C202	ECEA50Z2R
C203	ECKD1H272KB
C204	ECEA50ZR22
C205	ECEA50Z3R3
C206	ECEA50Z1
C207	ECQM1H682JZ
C208, 209	ECQM1H222KZ
C210	ECQM1H682JZ
C211	ECQF4153KZH
C212, 213	ECCD1H181KD
C214, 215	ECEA1CS471
C216	ECKD1H102KB
C217	ECEA1CS220
C218	ECKT1H102KB
C301, 302, 303, 304	ECQV05104JZ
C305, 306	ECEA50Z3R3
C307	ECQV05473JZ
C309	ECEA1ES101
C310	ECKD1H103MD
C401, 402	ECQV05224JZ
C403, 404	ECCD1H100DD
C405	ECKD1H102KB
C406	ECEA1CS221
C407	ECKD1H102KB
C408	ECEA1CS221
C409	ECEA25M4R7RK
C410	ECQV05153JZ
C411	ECQV05123JZ
C412	ECKD1H103MD
C413	ECEA50Z3R3
C414	ECKD1H103MD
C415	ECEA50Z3R3
C418	ECEA1HS100
C419	ECEA1VS221
C420, 421	
⚠	ECEA1CS331
C422 ⚠	ECEA1VS102
C423 ⚠	ECEA1ES332
C424, 425	ECEA1HS100
C426, 427	
⚠	ECEA1ES331
C428 ⚠	ECET16R103S
C429 ⚠	ECEA1VS102
C430 NA ⚠	ECQM6103MZ
※For Asia, Latin America, Middle East and Africa areas.	
C431	ECEA1HS100
C502	ECEA50MR68R "A-Type" ECEA50MR33R "B-Type"
C503	ECQV05393JZ "A-Type" ECQM1H682JZ "B-Type"
C504	QCUX1H153MRX
C506	QCUX1H472MRX "A-Type" QCUX1H152MRX "B-Type"
C507	QCUX1H153MRX "A-Type" QCUX1H123MRX "B-Type"
C508	ECQV05473JZ
C509	ECQV05184JZ "A-Type" ECQM1H563JZ "B-Type"
C510	QCUX1H223MRX "A-Type" QCUX1H682MRX "B-Type"
C511	ECEA50ZR33 "A-Type" ECQM1H102KZ "B-Type"
C512	QCUX1H223MRX
C513	ECSF35ER47
C514, 515	ECEA25N4R7
C516	ECSF10E3R3
C517	ECEA1HF100
C518	ECSF25E1
C530	QCUX1H270KCX "A-Type" QCUX1H390KCX "B-Type"
C531	ECCD1H150KC "A-Type" ECCD1H470KC "B-Type"
C532	ECCD1H121KD "A-Type" ECCD1H101KD "B-Type"
C533	ECQV05104JZ
C534	ECEA1AS101
C535	QCUX1H272MRX "A-Type" QCUX1H152MRX "B-Type"
C536, 537	QCUX1H103MRX
C538, 539	QCUX1H222MRX
C540, 541	QCUX1H273MRX
C601, 602, 603	QCUX1H471MRX
C605, 606, 607, 608, 609, 610	QCUX1H103MRX
C611	ECEA1AS470
C612	QCUX1H103MRX
C613	ECEA50ZR1
C614	QCUX1H331JCX
C615	ECEA1ES220
C616	ECEA25Z4R7
C617	ECEA1CN100
C618, 619	ECKD1H102ZF
TRANSISTORS	
Q1, 2	2SB745T
Q3, 4	2SD661T
Q5, 6	2SD636R
Q7, 8	2SD592NCS
Q9, 10	2SD661T
Q11, 12	2SD745T
Q13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27	2SD636R
Q28, 29, 30, 31, 32	2SB641R
Q33	2SD636R
Q34, 35	2SB641R
Q36, 37, 38, 39, 40	2SD636R
Q41	2SB641R
Q42, 43, 44	2SD636R
Q45	2SD946
Q46	2SD636R
Q47, 48	2SD592NCS
Q49	2SD636R
Q301, 302	2SC2021SF
Q303, 304	2SD1010R
Q305, 306	2SC2021SF
Q401	2SC2021SF
Q402	2SB641R
Q403	2SC1847Q
Q404	2SA886-Q
Q405	2SD836Q
Q406	2SC1847Q
Q407	2SB642R
Q408 DB	2SC2021SF
※For all European areas.	
Q501, 502, 503, 504	2SB643R
Q505	2SB761P
Q506, 507	2SD636R
Q601	2SA1037R
Q602, 603, 604, 605, 606, 607	2SC2412R
Q608, 609	2SC1317R
Q610	2SA1037R
Q611, 612	2SC2412R
Q613	2SA1037R
Q614, 615	2SB835T
Q616, 617	2SD965R
Q618	2SD638R
DIODES	
D1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17	MA161
D18	1S2473T77
D19	MV121
D21, 22	MA1047LF
D301	MV121
D302, 303	MA161
D401, 402, 403	MA161
D404, 405	SVDEQA0113RA
D406	RVDRD6R8EB
D407 ⚠	RD24ER1
D408, 409, 410, 411, 412, 413, 414, 415, 416	
⚠	SM112
D417, 418	RVDRD6R8ED
D419	RVDRD6R8ED
D422	RVDRD6R8ED
D423, 424	RVDRD6R8ED
D425	MA161
D501, 502, 503	20A90
D601, 602, 603, 604, 605, 606	DAN202
D607	DAP202
D608	QVD1S2473T
D609	MA161
D610, 611	DAN202
D612, 613	SM112
D614	QVD1S2473T
D615	DAN202
L.E.D.	
LED1	LD001GG
LED2	LD001YY
LED3	LD001UR
LED4, 5, 6, 7	LD001GG
LED8, 9	LD001UR
LED10	LD701YY
LED11	LD701GG
INTEGRATED CIRCUITS	
IC1, 2, 3, 4	NE646B
IC5	NJM4559D
IC6, 7	AN6552
IC301	AN6552
IC302	AN6870
IC401	NJM4556
IC402	M74LS03P
IC501	AN6633
IC502	M54816P
IC503, 504	M74LS02P
IC505, 506, 507	M74LS00P
IC508	DN6838
IC601	MN1400RZ
IC602, 603	AN6280
THERMISTOR	
TH1	ERTD2FK333S
CRYSTAL	
Z501	QZE0012 "A-Type" QZE0049 "B-Type"
HALL ELEMENTS	
H1, 2	QVZHE711H

Ref. No.	Part No.	Part Name & Description
TRANSFORMER		
T401 DB ⚠	QLPD57EME	AC Power Transformer
※For all European areas.		
NA ⚠	QLPZ18EME	"
※For Asia, Latin America, Middle East, Africa areas and Australia.		
COILS		
L1, 3	QLQX1032W	Bias Trap Coil (for Playback System)
L3	QLQX1021Y	Bias Trap Coil
L101, 102	QLM9Z6K	MPX Filter
L103, 104	QLQX1032W	Peaking Coil
L105, 106	QLQX1032W	Bias Trap Coil (for Recording System)
L201	QLB0202K	Bias Oscillation Coil
L401	QLQZ1014D	Choke Coil
L601	ELEH101KA	"
L602, 603, 604, 605	QLQZ1014D	"
SWITCHES		
S1	QSR6403A	Rotary Switch (Input Selector)
S2, 3, 4	QSWY306A	Function Switch (Monitor/Dolby/MPX Filter)
S5	QSS1081	Slide Switch (Tape Selector)
S6, 7	QSB0266	Leaf Switch (Auto Tape Selector)
S8	QSS2226	Slide Switch (Memory Selector)
S9	QSS2226	Slide Switch (Timer Selector)
S10	QSW1118H	Key Board Switch (Record Switch)
S11	QSW1118H	Key Board Switch (Pause Switch)
S12	QSW1118H	Key Board Switch (Rec Mute Switch)
S13	QSW1118H	Key Board Switch (Rewind Switch)
S14	QSW1118H	Key Board Switch (Playback Switch)
S15	QSW1118H	Key Board Switch (Fast Forward Switch)
S16	QSW1118H	Key Board Switch (Stop Switch)
S17	QSW1118H	Key Board Switch (Counter Reset)
S18		
DB EA ⚠	QSW1117	Push Switch (Power ON/OFF)
※For all European areas and Australia.		
N ⚠	QSW1117AZ	"
※For Asia, Latin America, Middle East and Africa areas.		
S19 ⚠	QSR1407	Rotary Switch (Voltage Selector)
S601	QSB0260	Leaf Switch (Erase Safety Switch)
S602	QSB0260	Leaf Switch (Mode Switch)
S603	QSB0261	Leaf Switch (Stop Switch)
S604	QSB0260	Leaf Switch (Playback Switch)
S605	QSB0261	Leaf Switch (Cassette Half Detector)
JACKS		
J1	QJA0165	Microphone Jack
J2	QJA0231	Headphones Jack
J3	QEJ5003H	Jack Board Assembly
J4	QJS1955H	Remote Control Jack
FUSES		
F1, 2, 3, 4		
DB ⚠	XBAQ0008	Fuse (T 630mA)
※For all European areas.		
F5 DB ⚠	XBAQ0013	Fuse (T 200mA)
※For all European areas.		
F6 N ⚠	XBA1E05NR1	Fuse (0.5A)
※For Asia, Latin America, Middle East and Africa areas.		

SCHEMATIC DIAGRAM

D.D MOTOR SECTION

*** For A-TYPE**



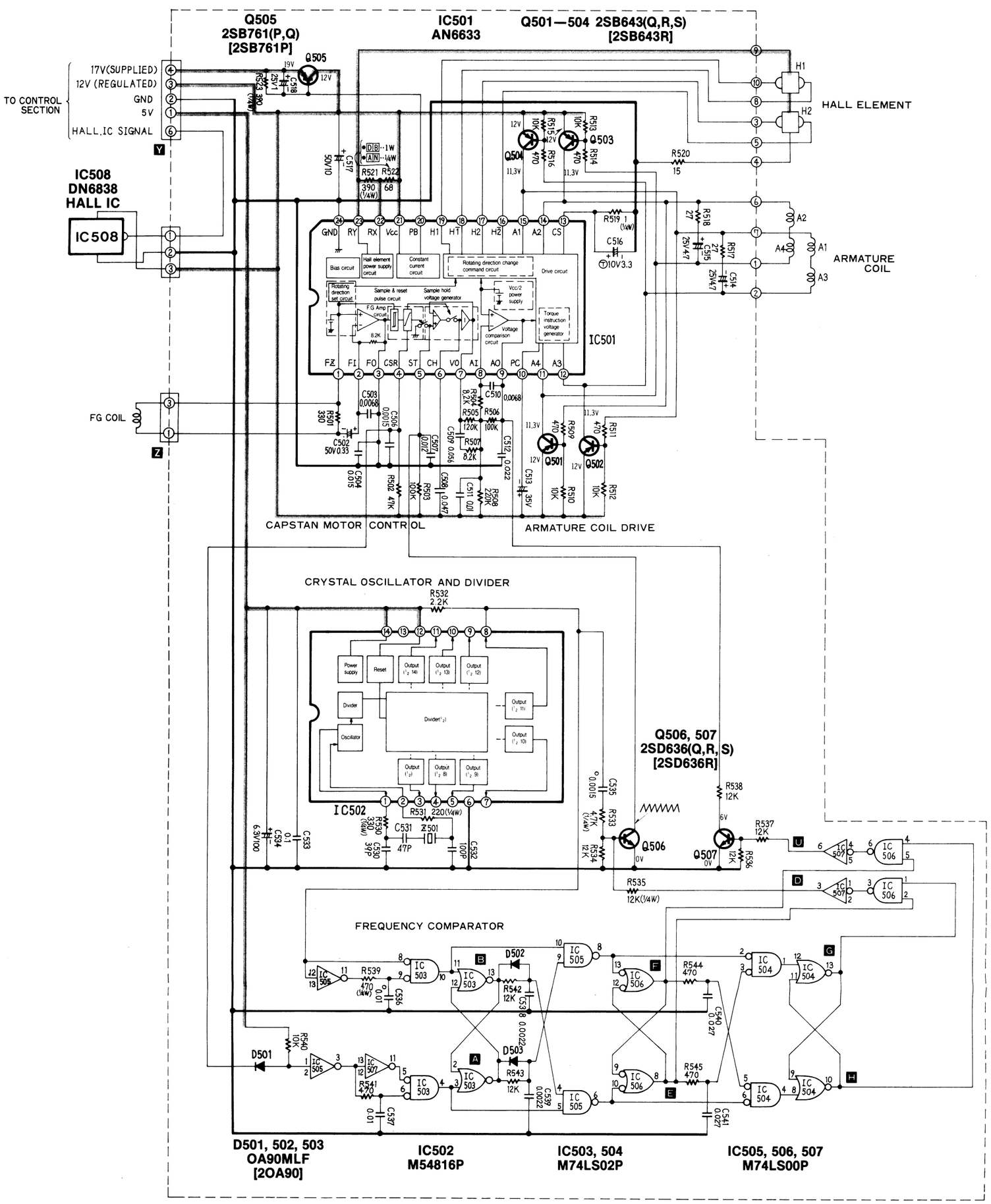
NOTES:

- Resistance are in ohms (Ω) 1/8 watt unless specified otherwise.
  1K = 1,000Ω, 1M = 1,000KΩ.
- Capacity are in micro-farad (μF) unless specified otherwise.
  P = Pico-farads.
- ( ) indicates B+ (bias).
- Values indicated in [ ] are under no signal condition and record mode with volume control at minimum position.
  However, the voltage in playback mode is indicated in ( ) when it differs from that in record mode.
  For measurement, use VTVM.

- 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. Q505
  { 2SB761(P,Q) ◄— Production parts number
  { [2SB761P] ◄— Supply parts number
  D501, 502, 503
  { OA90MLF ◄— Production parts number
  { [2OA90] ◄— Supply parts number
- **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.**

* For B-TYPE



IC507
M74LS0(
14 5.6

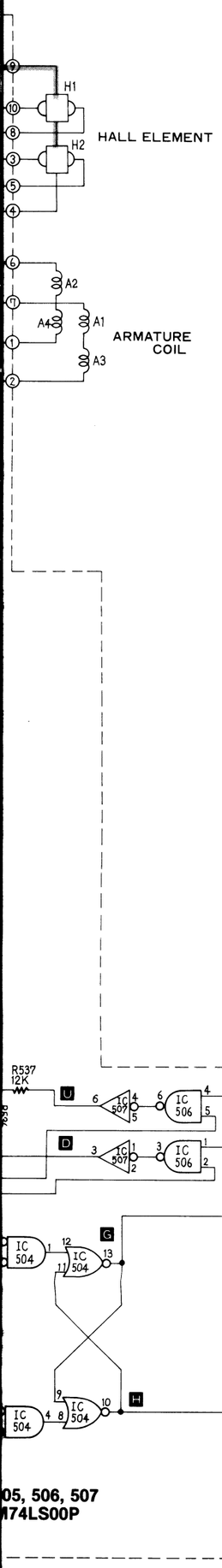
Q507
2SD636(R,
[2SD636
C 6V
E 0V

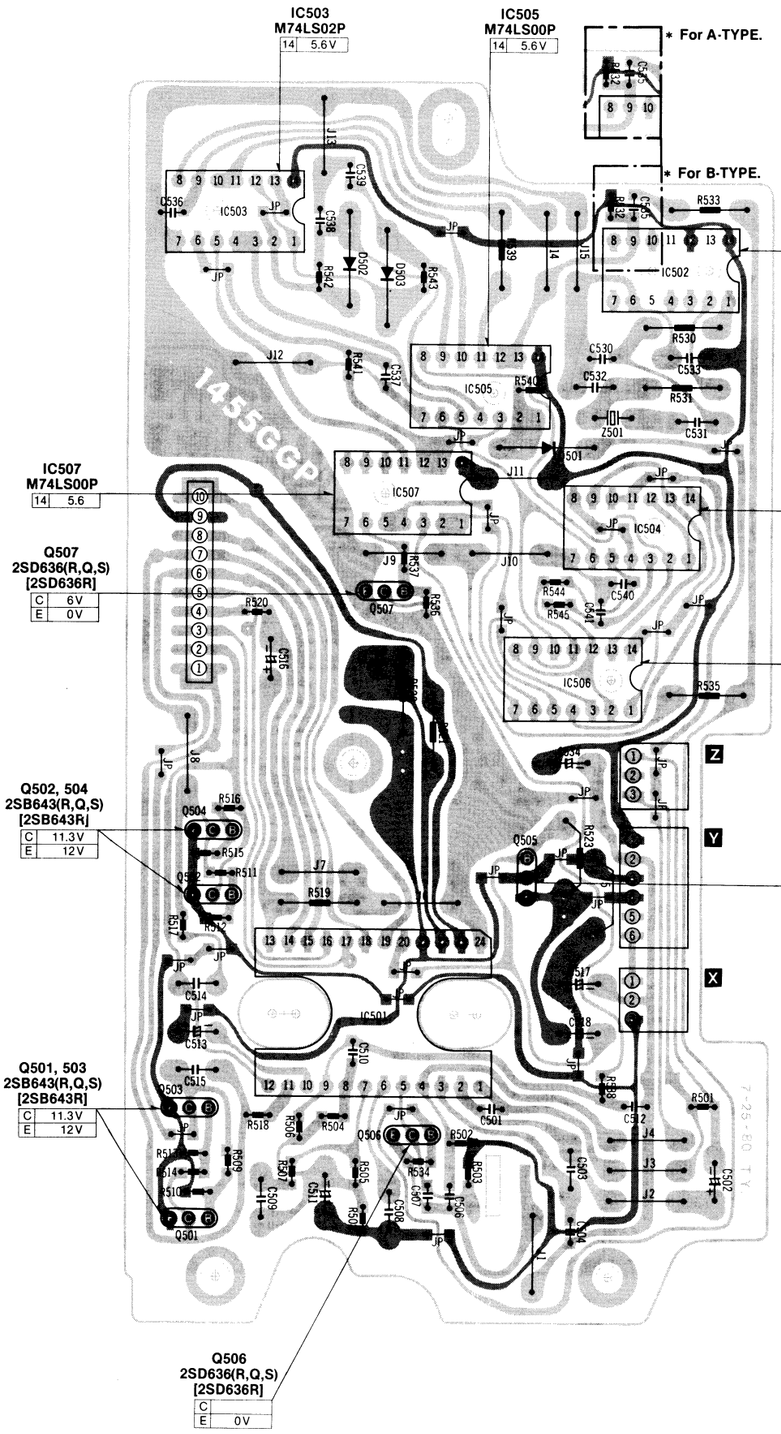
Q502, 504
2SB643(R,Q
[2SB643R
C 11.3V
E 12V

Q501, 503
2SB643(R,Q
[2SB643R
C 11.3V
E 12V

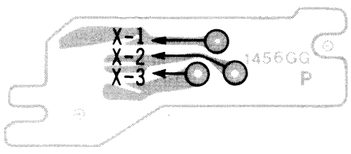
CIRCUIT BOARD

D.D. MOTOR CIRCUIT BOARD



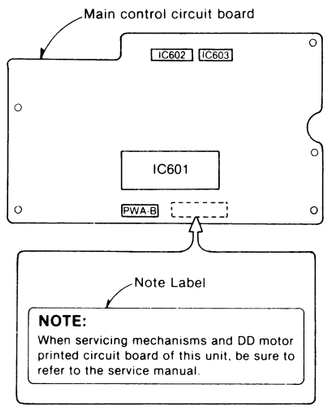


HALL IC CIRCUIT BOARD



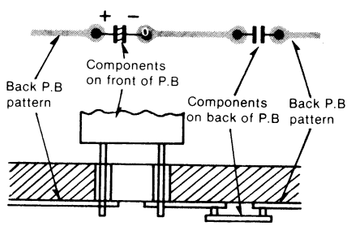
CAUTIONS:

This model is available with two different types of D.D. MOTOR CIRCUITS Type A and Type B.
Units with a note lable as shown in the figure are type A.
Ones without a note label are type B.
Service according to type.



NOTES:

- The circuit shown in ■ on the conductor is B+ (bias) circuit.
- The circuit shown in ▒ on the conductor indicates printed circuit on the back side of the printed circuit board.
- Black pattern represents back of P.B (chip side).
- Components on front of P.B are identified by black symbols.
- Components on back of P.B are identified by blue symbols.

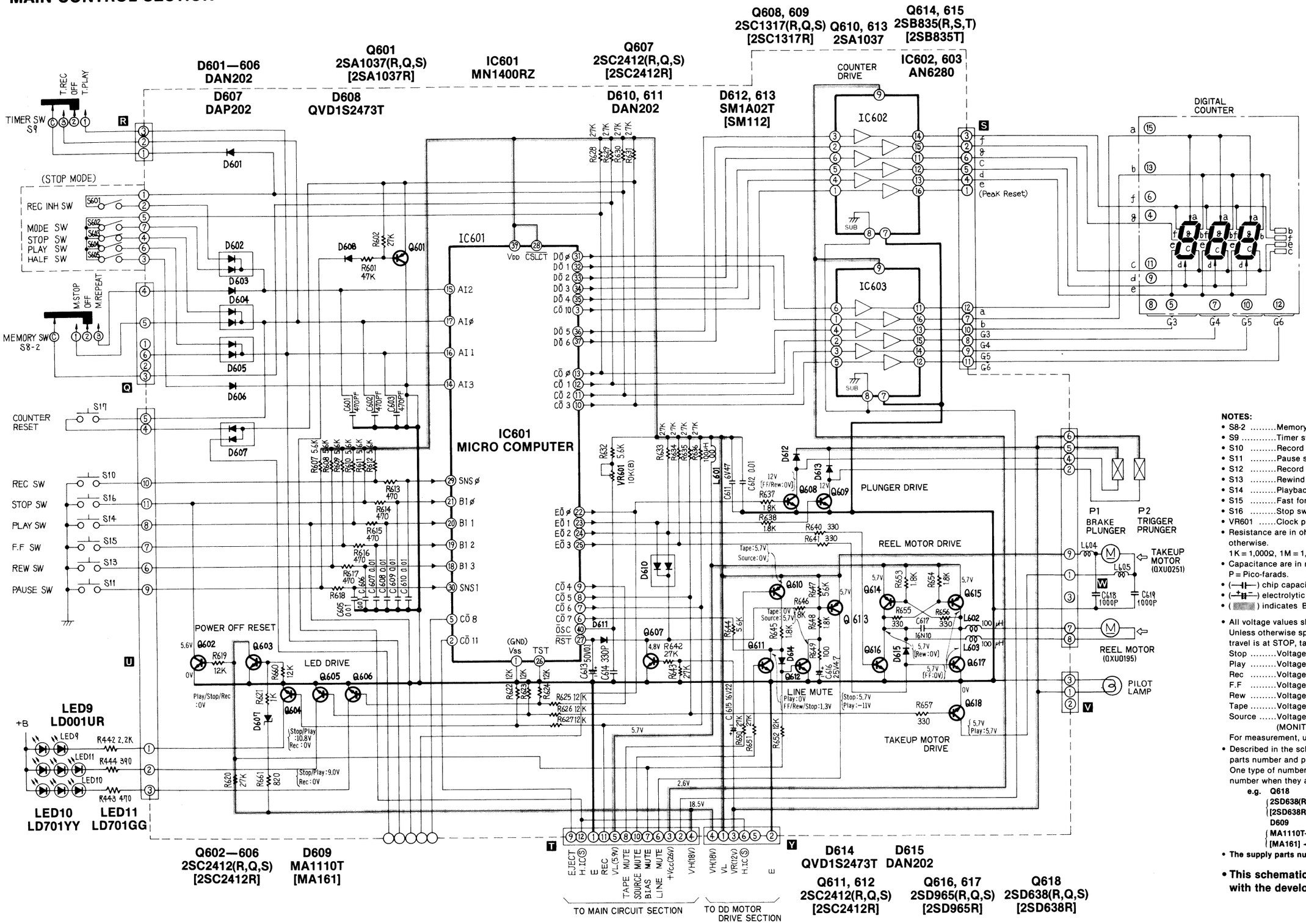


- Values indicated in [ ] are under no signal condition and record mode with volume control at minimum position.
  However, the voltage in playback mode is indicated in ( ) when it differs from that in record mode.
  For measurement, use VTVM.
- Described in the circuit board diagram are two type of numbers; the supply parts 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. Q506
  2SD636(Q,R,S)←Production parts number
  [2SD636R]←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.**

SCHEMATIC DIAGRAM

MAIN CONTROL SECTION



NOTES:

- S8-2 .....Memory switch ①: Stop, ②: OFF, ③: Repeat).
- S9 .....Timer switch ①: Play, ②: OFF, ③: Record).
- S10 .....Record switch.
- S11 .....Pause switch.
- S12 .....Record mute switch.
- S13 .....Rewind switch.
- S14 .....Playback switch.
- S15 .....Fast forward switch.
- S16 .....Stop switch.
- VR601 .....Clock pluse oscillation frequency adjustment VR.
- Resistance are in ohms (Ω), 1/8 watt chip resistor unless specified otherwise.
  1K = 1,000Ω, 1M = 1,000KΩ.
- Capacitance are in microfarads (μF) unless specified otherwise.
  P = Pico-farads.
- (—||—) chip capacitor.
- (—±||—) electrolytic capacitor.
- (▒▒) indicates B + (bias).

- 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.
  Stop .....Voltage at Stop mode.
  Play .....Voltage at Playback mode.
  Rec .....Voltage at Record mode.
  F.F .....Voltage at Fast Forward mode.
  Rew .....Voltage at Rewind mode.
  Tape .....Voltage at Tape mode (MONITOR SELECTOR: Tape position).
  Source .....Voltage at Source mode
  (MONITOR SELECTOR: Source position).
  For measurement, use VTVM.
- 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. Q618
  2SD638(R,Q,S) ← Production parts number
  [2SD638R] ← Supply parts number
  D609
  MA1110T ← Production parts number
  [MA161] ← Supply parts number
- **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.**

emory switch ①: Stop, ②: OFF, ③: Repeat).
mer switch ①: Play, ②: OFF, ③: Record).
ecord switch.
ause switch.
ecord mute switch.
ewind switch.
ayback switch.
st forward switch.
op switch.
ock pluse oscillation frequency adjustment VR.
e in ohms (Ω), 1/8 watt chip resistor unless specified

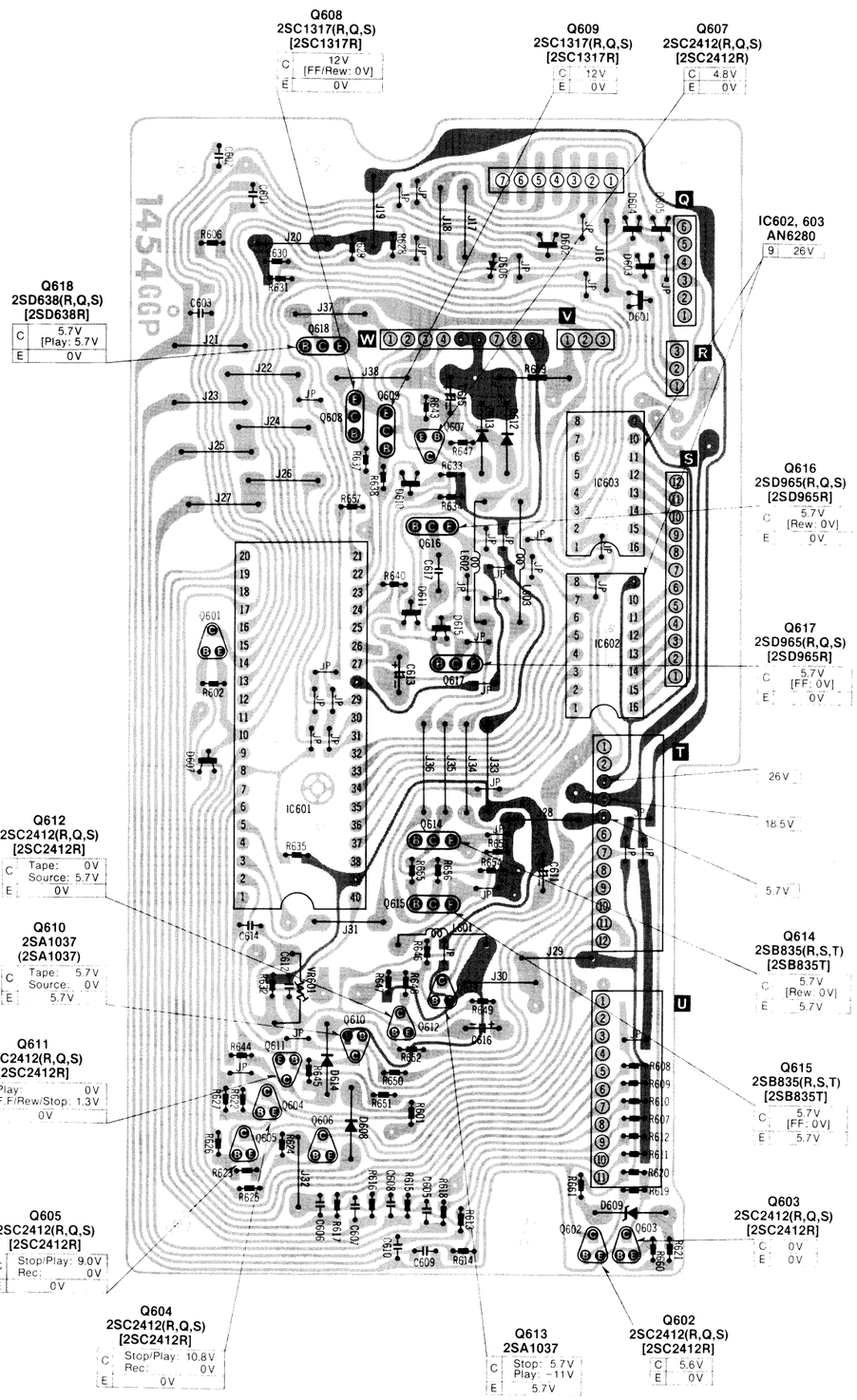
M = 1,000KΩ.
re in microfarads (μF) unless specified otherwise.
apacitor.
olytic capacitor.
tes B + (bias).

ues shown in circuitry are under no signal condition.
se specified, voltage measurement conditions are that tape
OP, tape mode at NORMAL, and Dolby NR switch at OFF.
ltage at Stop mode.
ltage at Playback mode.
ltage at Record mode.
ltage at Fast Forward mode.
ltage at Rewind mode.
ltage at Tape mode (MONITOR SELECTOR: Tape position).
ltage at Source mode
ONITOR SELECTOR: Source position).
ent, use VTVM.
he schematic diagram are two types of numbers; the supply
nd production parts number for transistors and diodes.
mber is used for supply parts number and production parts
hey are identical.
3
638(R,Q,S)◄—Production parts number
638R]◄——Supply parts number
)
110T◄——Production parts number
61] ◄——Supply parts number
ts number is described alone in the replacement parts list.

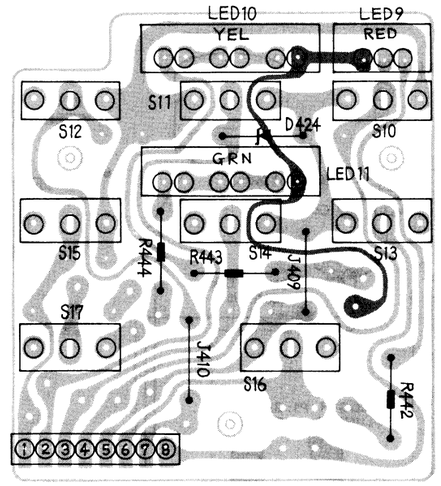
atic diagram may be modified at any time
velopment of new technology.

CIRCUIT BOARD

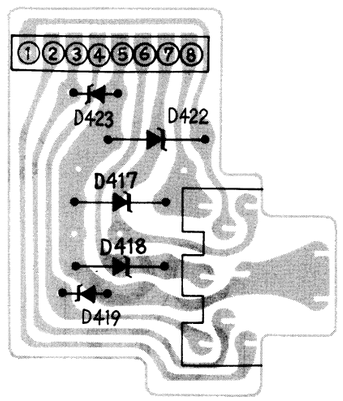
MAIN CONTROL CIRCUIT BOARDS



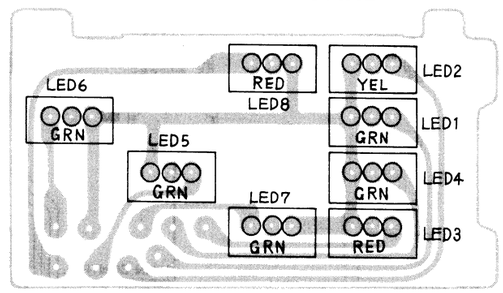
KEY BOARD CIRCUIT BOARDS



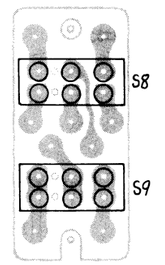
REMOTE CONTROL JACK CIRCUIT BOARD



LED CIRCUIT BOARD

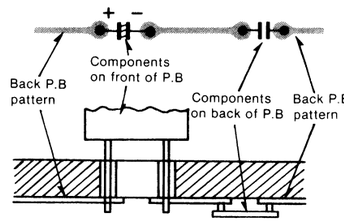


SWITCH (S8, 9) CIRCUIT BOARD



NOTES:

- The circuit **shown in** ■ on the conductor is B + (bias) circuit.
- The circuit **shown in** ▒ on the conductor indicates printed circuit on the back side of the printed circuit board.
- Black pattern represents back of P.B (chip side).
- 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. Unless otherwise specified, voltage measurement conditions are that tape travel is at STOP, tape mode at NORMAL, and Dolby NR switch at OFF.
  Stop .....Voltage at Stop mode.
  Play .....Voltage at Playback mode.
  Rec .....Voltage at Record mode.
  F.F .....Voltage at Fast Forward mode.
  Rew .....Voltage at Rewind mode.
  Tape .....Voltage at Tape mode (MONITOR SELECTOR: Tape position).
  Source .....Voltage at Source mode
  (MONITOR SELECTOR: Source position).
  For measurement, use VTVM.
- Described in the circuit board diagram are two types of numbers; the supply parts 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. Q601
  2SA1037(R,Q,S)◄—Production parts number
  [2SA1037R]◄——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.**

RS-M280 RS-M280

WIRING CONNECTION DIAGRAM

ARMATURE COIL

ARMATURE COIL F.P.C.

HALL ELEMENT

HALL IC CIRCUIT BOARD

F.G. COIL

LUG TERMINAL

REEL MOTOR

C619

TAKEUP MOTOR

C618

CHOKE COIL L604, 605

P2: TRIGGER PLUNGER

P1: BREAK PLUNGER

D.D. MOTOR CIRCUIT BOARD

SWITCH (S601—S605) F.P.C.

S604

S605

S601

S603

S602

PILOT LAMP

MAIN CONTROL CIRCUIT BOARD

SWITCH (S8, 9) CIRCUIT BOARD

KEY BOARD CIRCUIT BOARD

REMOTE CONTROL JACK CIRCUIT BOARD

FL-METER CIRCUIT BOARD

POWER SUPPLY CIRCUIT BOARD

T401: AC POWER TRANSFORMER

S19: AC POWER VOLTAGE SELECT SWITCH

S18: POWER ON/OFF SWITCH

4 PIN TERMINAL PLATE

E75: AC POWER CORD

SPARK KILLER

HEADPHONES JACK

S6: AUTO TAPE SELECT SWITCH

S7: AUTO TAPE SELECT SWITCH

S5: TAPE SELECT SWITCH

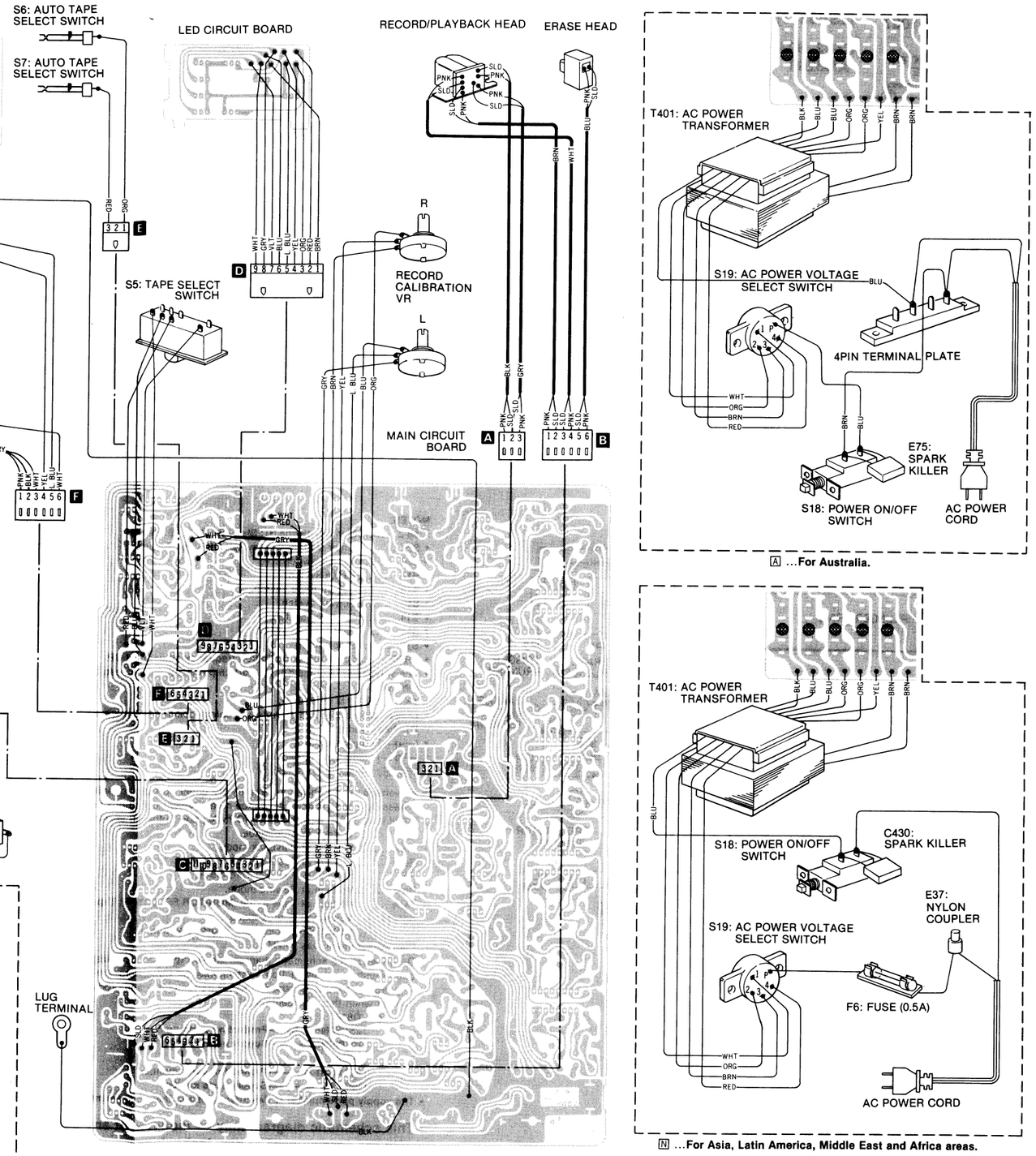
LED CIRCUIT BOARD

LUG TERMINAL

NOTES:

BLK ..... Black
BLU ..... Blue
BRN ..... Brown
GRY ..... Gray
GRN ..... Green
L BLU ... Light Blue
NIL ..... No Color Mark
ORG ..... Orange
PNK ..... Pink
RED ..... Red
SLD ..... Shield Wire
VLT ..... Violet
WHT ..... White
YEL ..... Yellow

DB ...For all European areas.

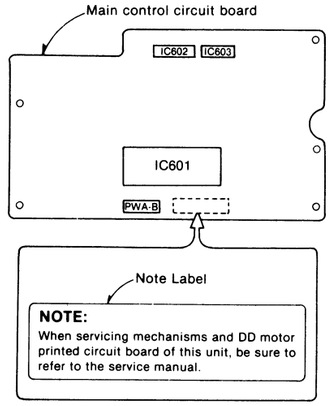


[A] ...For Australia.

[N] ...For Asia, Latin America, Middle East and Africa areas.

MECHANICAL PARTS LOCATION

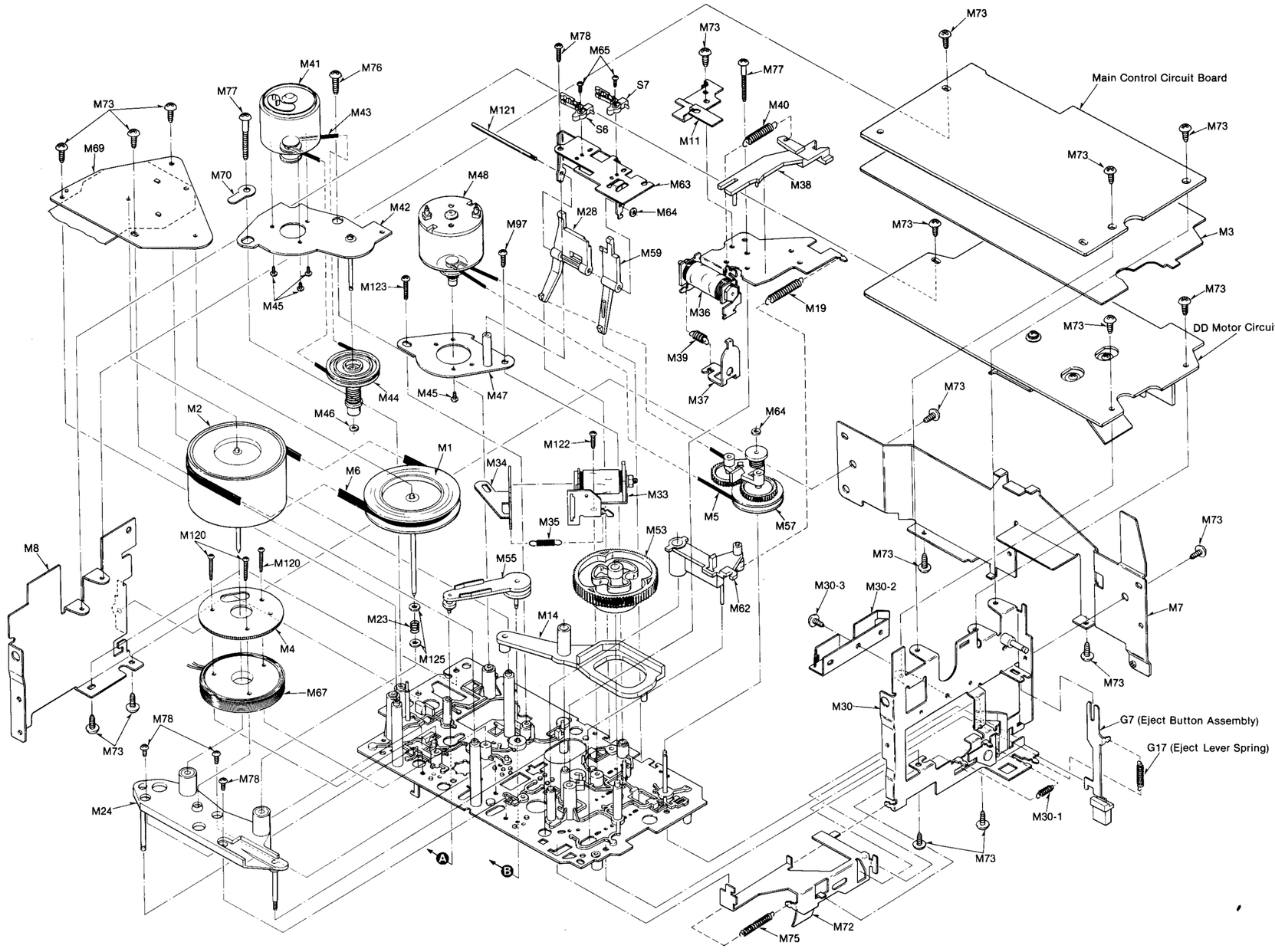
CAUTIONS:
This model is available with two different types of D.D. motor circuits: Type A and Type B.
Units with a note lable as shown in the figure are type A. Ones without a note label are type B.
Service according to type.

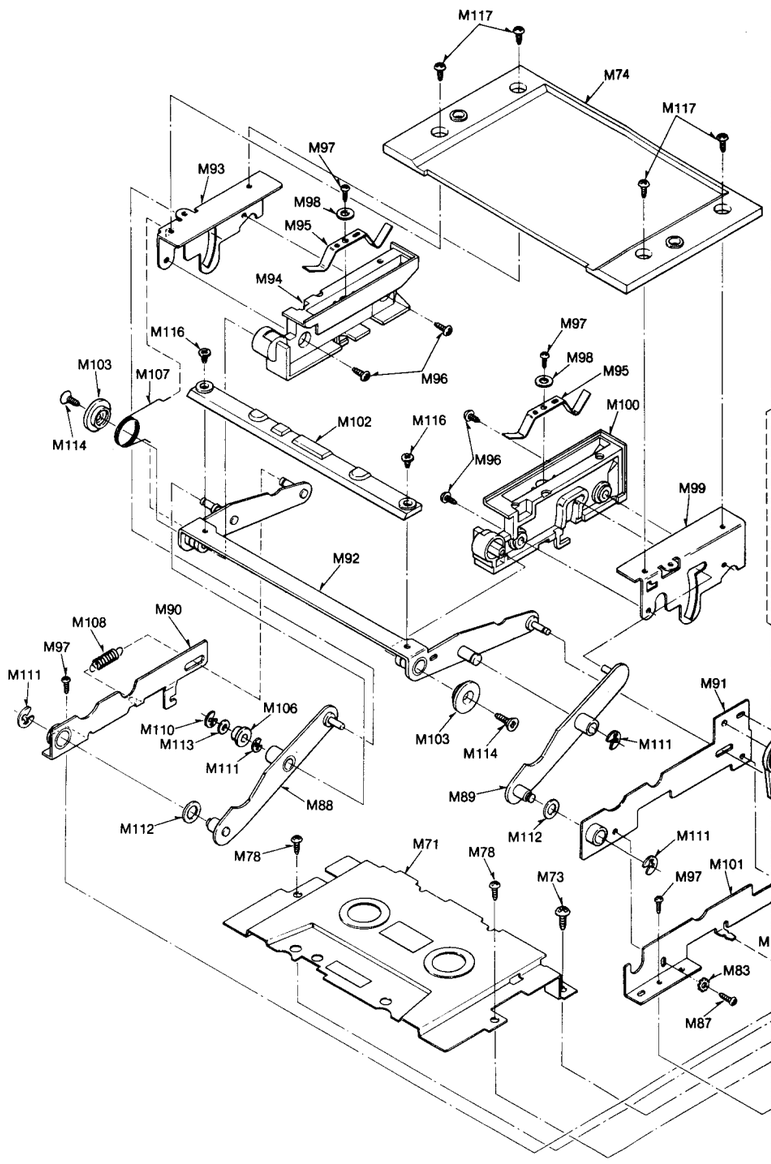


REPLACEMENT PARTS LIST

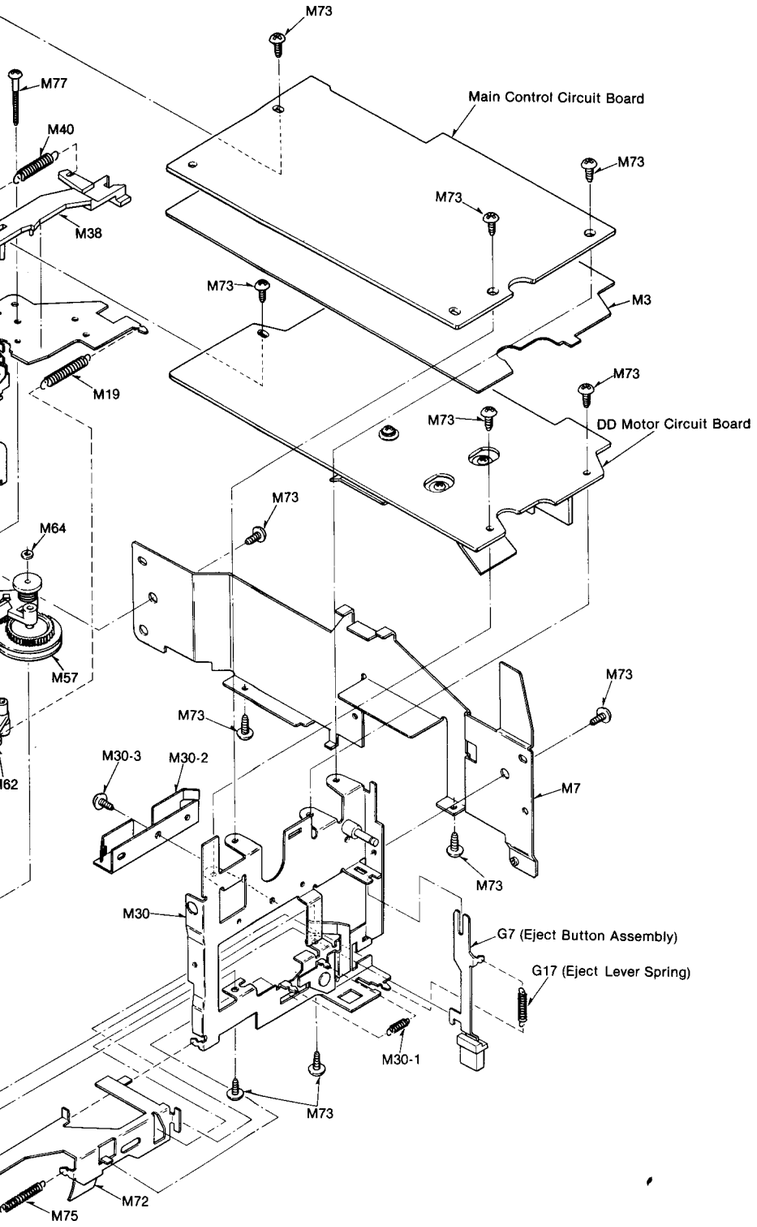
Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description
	MECHANICAL PARTS		M38	QML3653	Control Lever	M78	XTN26+5B	Tapping Screw ⊕2.6×5
M1	QXF0175	Sub Flywheel Assembly	M39	QBT1938	Trigger Plunger Spring	M79	XSN2+3	Screw ⊕2×3
M2	QXF0176	Main Flywheel Assembly	M40	QBT1278	Record Lock Lever Spring			
	"A-Type"		M41	QXU0251	Takeup Motor Assembly	M80	XSN2+8	Screw ⊕2×8
	QXF0189	"	M42	QXA1077	Takeup Motor Angle Assembly	M81	XSN2+12	Screw ⊕2×12
	"B-Type"		M43	QDB0286	Takeup Belt	M82	QMZ1265	Erase Head Retainer Plate
M3	QTW1251	Insulating Sheet	M44	QXP0621	Takeup Pulley Assembly	M83	XWC3B	Washer
M4	QDG1128	F.G. Plate-1	M45	XSN26+3	Screw ⊕2.6×3	M84	XWG2	"
	"A-Type"		M46	QBW2008	Washer 2φ	M85	XSN2+4	Screw ⊕2×4
	QDG1240	"	M47	QXH0360	Reel Motor Angle Assembly	M86	QDK1012	Steel Ball 2.5φ
	"B-Type"		M48	QXU0195	Reel Motor Assembly	M87	XSN3+6S	Screw ⊕3×6
M5	QDB0287	Changing Belt	M49	QXL1448	Pressure Roller Lever-L Assembly (Supply Side)	M88	QXL1450	Link Lever-L Assembly
M6	QDB0297	Flywheel Belt				M89	QXL1451	Link Lever-R Assembly
M7	QMA4085	Center Angle	M50	QBN1804	Pressure Roller-L Spring	M90	QXA1137	Angle-L Assembly
M8	QMA4087	Side Angle-R	M51	QXL1406	Pressure Roller Lever-R Assembly (Takeup Side)	M91	QXH0361	Angle-R Assembly
M9	QBP1894	Head Base Plate Spring				M92	QXL1452	Center Lever Assembly
M10	QBP1895	Cassette Pressure Spring	M52	QBN1771	Pressure Roller-R Spring	M93	QMA4115	Holder Angle-L
			M53	QXG1059	Main Gear Assembly	M94	QMH2070	Cassette Holder-L
M11	QMA4080	Guard Angle	M54	QBW2008	Washer 2φ	M95	QBP1925	Holder Spring
M12	QDR1150	Supply Reel Table	M55	QXL1423	Idler Lever Assembly	M96	XSN26+4	Screw ⊕2.6×4
M13	QMB1336	Reel Table Hub	M56	QXi0116	Takeup Idler Assembly	M97	XTN26+6B	Tapping Screw ⊕2.6×6
M14	QML3655	Cam Follower				M98	XWG26	Washer 2.6φ
M15	QML3661	Erase Safety Lever	M57	QXL1408	Swing Lever Gear Assembly	M99	QMA4114	Holder Angle-R
M16	QML3660	Idler Select Lever	M58	QXL1409	Fast Wind Arm Assembly			
M17	QBC1373	Reel Table Spring	M59	QML3716	Tape Detection Lever (for Normal/CrO2 Tape)	M100	QMH2069	Cassette Holder-R
M18	QBT1927	Head Base Plate Return Spring				M101	QMA4112	Angle-R
M19	QBT1939	Lock Lever Spring	M60	QML3659	Brake Lever	M102	QGKM0150	Head Cover Plate
M20	QBN1772	Erase Safety Lever Spring	M61	QBG1132	Stopper		"Silver Type"	
			M62	QXL1411	Lock Lever Assembly		QGKM0150Y	"
M21	QBT1920	Idler Spring	M63	DMA4072	Auto Tape Selector Angle		"Black Type"	
M22	QBC1376	Height Adjust Spring (for Pressure Roller Lever-L)	M64	QBW2008	Washer 2φ	M103	QKJ0465	Damper Cover
			M65	XTN2+5B	Tapping Screw ⊕2×5	M104	QDP1892	Damper Pulley-1
M23	QBC1375	Sub Flywheel Assembly	M66	QXQ0112	Adjustment Nut Assembly (for Pressure Roller-L)	M105	QDP1893	Damper Pulley-2
M24	QXM0172	Holder (for Double Capstan and Double Pressure Roller Lever)				M106	QDP1894	Roller
						M107	QBN1827	Holder-L Spring
M25	QXK2541	Head Base Plate Assembly	M67	QXQ0113	F.G. Coil Assembly (with 3-Pin Socket)	M108	QBT1932DM	Link Lever-L Spring
M26	QMZ1264	Head Spacer				M109	QBT1931DM	Link Lever-R Spring
M27	QBC1103	Head Spring-A	M68	QJi1466RR	Leaf Switch F.P.C. (for S601, 602, 603, 604, 605)	M110	XUC2FT	Stop Ring 2φ
M28	QML3717	Tape Detection Lever (for Metal Tape)	M69	QXK2470	Armature Coil Assembly (with H1, H2 and F.P.C.)	M111	XUC3FT	Stop Ring 3φ
M29	QBC1339	Head Spring-B				M112	QBW2020	Poly Washer
M30	QXA1135	Side Angle-L Assembly	M70	QJT0015	Lug Terminal	M113	QBW2014	"
			M71	QXH0362	Chassis Cover Assembly	M114	XTS26+8B	Screw ⊕2.6×8
M30-1	QBT1920	Idler Spring		"Silver Type"		M115	XSS26+8	"
M30-2	QTD1296	Wire Clamper		QXH0362K	"	M116	XQS26+4FZ	Screw ⊕2.6×4
M30-3	XTN3+6B	Screw ⊕3×6		"Black Type"		M117	XSN26+4	"
M31	QXD0120	Takeup Reel Table Assembly	M72	QML3772	Lock Lever	M118	XUB4FT	Stop Ring 4φ
M32	QXL1449	Back Tension Lever Assembly	M73	XTN3+6B	Tapping Screw ⊕3×6	M119	XTN2+5B	Tapping Screw ⊕2×5
M32-1	QBT1922	Back Tension Lever Spring	M74	QKFM2008X	Cassette Holder Plate			
M33	QXA1075	Brake Plunger Assembly		"Silver Type"		M120	XTN2+10B	Tapping Screw ⊕2×10
M34	QML3650B	Plunger Lever		QKFM2009X	"	M121	QMN2642	Detection Lever Shaft
M35	QBT1924	Plunger Spring		"Black Type"		M122	XTN26+8B	Tapping Screw ⊕2.6×8
M36	QXA1175	Trigger Plunger Assembly	M75	QBT1933	Lock Lever Spring	M123	XTN26+12B	Tapping Screw ⊕2.6×12
			M76	XTN3+10B	Tapping Screw ⊕3×10	M124	QBW2046	Washer
M37	QML3800	Trigger Plunger Lever	M77	XTN3+24B	Tapping Screw ⊕3×24	M125	QBW2089	"

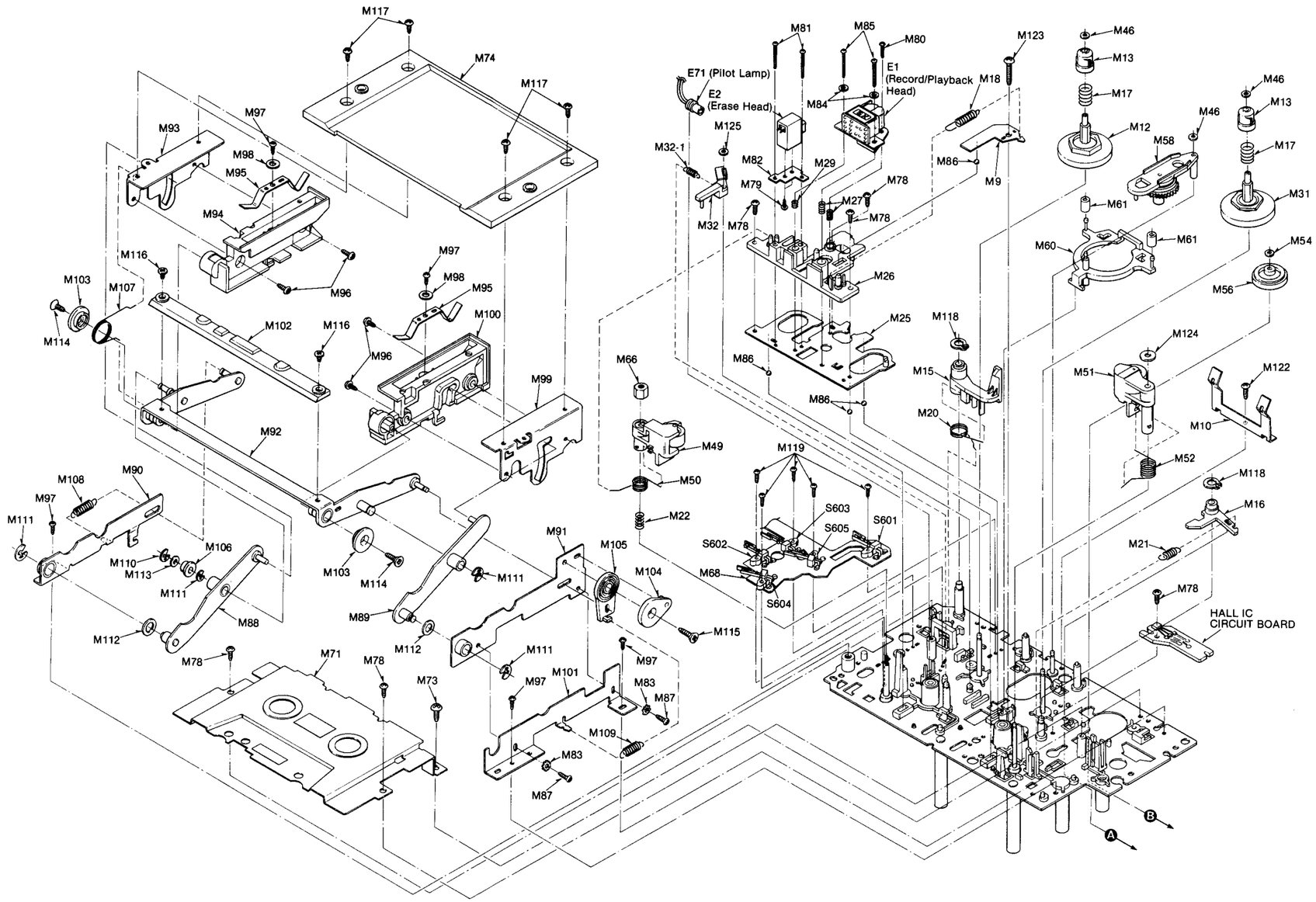
13 12 11 10 9 8 7 6 5 4





RS-M280


M73
M77
Main Control Circuit Board
M40
M73
M73
M38
M73
M3
M19
M73
M73
DD Motor Circuit Board
M73
M64
M57
M73
M73
M73
M30-3
M30-2
M7
M73
M30
G7 (Eject Button Assembly)
G17 (Eject Lever Spring)
M30-1
M73
M72
M75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M104
M115
M89
M112
M88
M112
M78
M71
M78
M73
M111
M97
M101
M97
M83
M87
M109
M83
M87
M81
M85
M80
E71 (Pilot Lamp)
E1
(Record/Playback
Head)
E2
(Erase Head)
M84
M123
M18
M125
M32-1
M82
M29
M86
M9
M79
M78
M27
M78
M32
M78
M26
M25
M86
M118
M15
M86
M20
M66
M49
M50
M22
M119
S603
S605
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M61
M31
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M124
M51
M122
M10
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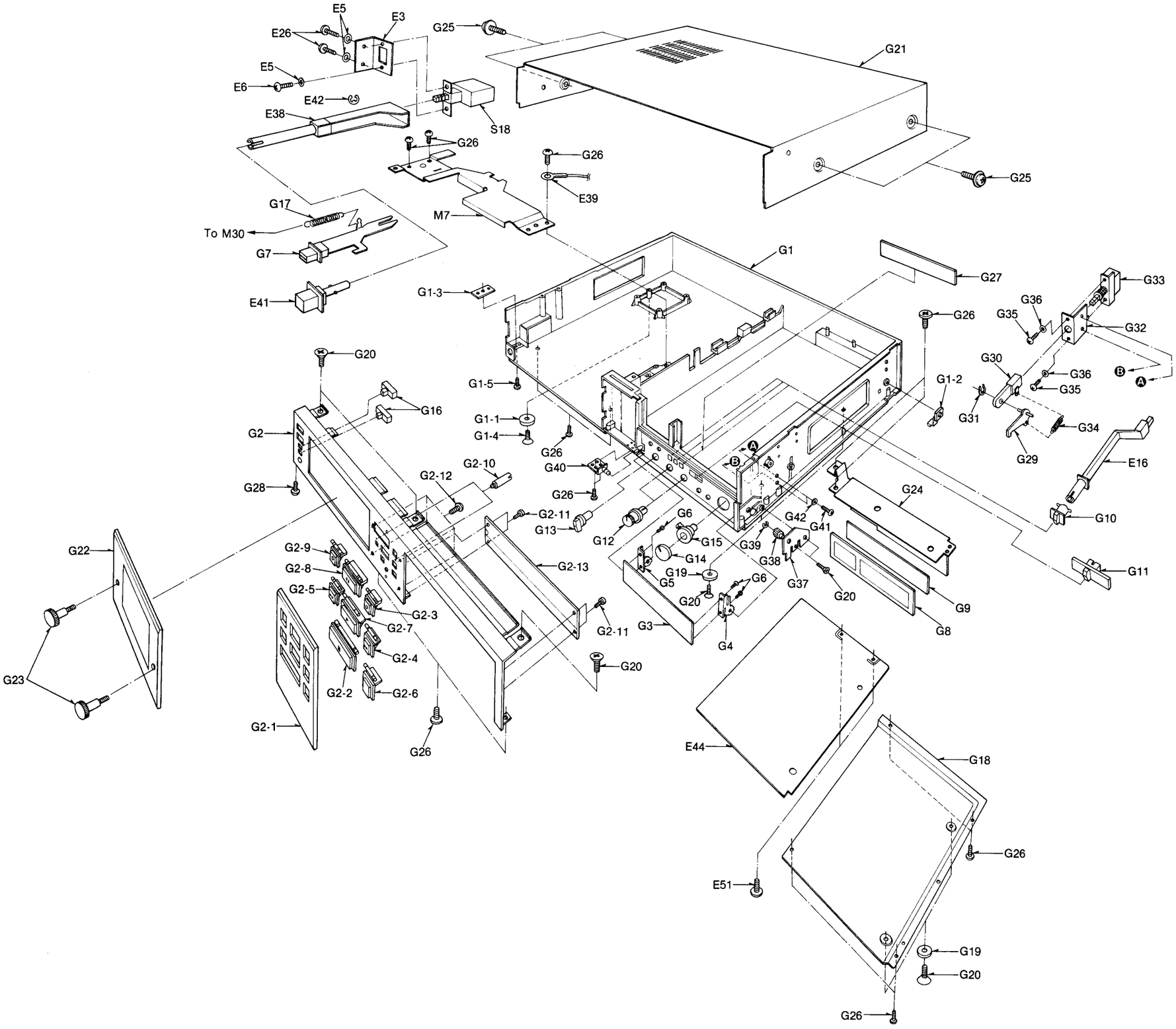
M118
M16
M21
M78
HALL IC
CIRCUIT BOARD
B
A

RS-M280 RS-M280

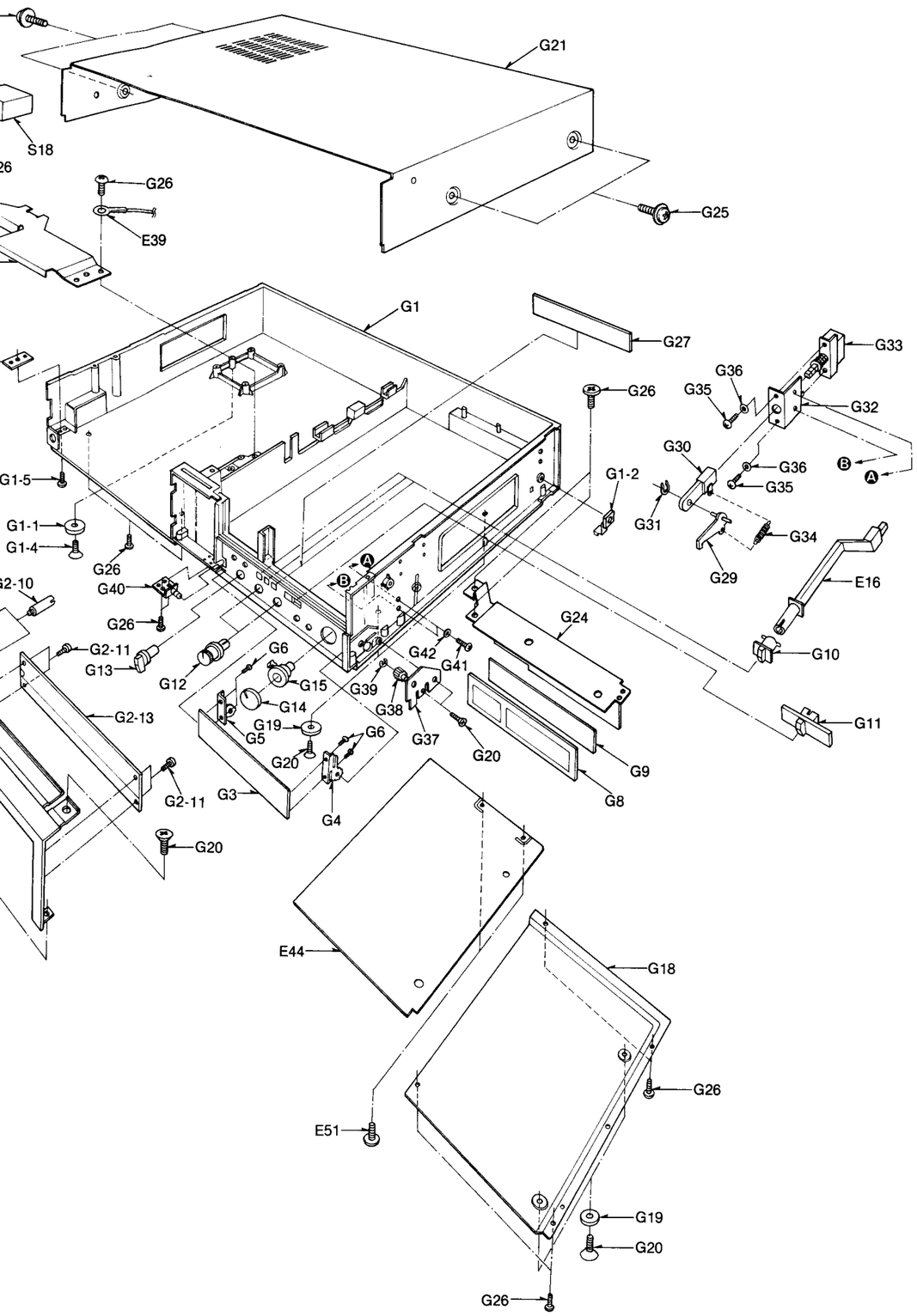
CABINET PARTS LOCATION



REPLACEMENT PART

Important safety notice
Components identified by ⚠ m
characteristics important for sa
When replacing any of these
only manufacturer's specified p

Ref. No.	Part No.	
	CABINET PA	
G1	QYMM0081 "Silver Type" QYMM0081K "Black Type"	Main
G1-1	QKA1082*	Rubbe
G1-2	QTSM0049	Earth
G1-3	QMAM0136	Front
G1-4	XTS3+8B	Screw
G1-5	XSN3+6S	Screw
G2	QYPM0045 "Silver Type" QYPM0045K "Black Type"	Front Front
G2-1	QGPM0059 "Silver Type" QGPM0059K "Black Type"	Opera
G2-2	QGOM0054 "Silver Type" QGOM0054Y "Black Type"	Stop
G2-3	QGOM0055 "Silver Type" QGOM0055Y "Black Type"	Rec M
G2-4	QGOM0056 "Silver Type" QGOM0056Y "Black Type"	Fast
G2-5	QGOM0057 "Silver Type" QGOM0057Y "Black Type"	Rewir
G2-6	QGOM0058	Coun
G2-7	QXBM0024 "Silver Type" QXBM0024Y "Black Type"	Playb
G2-8	QXBM0025 "Silver Type" QXBM0025Y "Black Type"	Pause
G2-9	QXBM0026 "Silver Type" QXBM0026Y "Black Type"	Recor
G2-10	QMP1803	P.C.B
G2-11	XTN2+4FFN	Tappi
G2-12	XTV26+6B	Screw
G2-13	QGRM0009 "Silver Type" QGRM0009K "Black Type"	Meter
G3	QGPM0057 "Silver Type" QGPM0057K "Black Type"	Sub P "
G4	QKJM0061 "Silver Type" QKJM0061K "Black Type"	Sub P
G5	QKJM0062 "Silver Type" QKJM0062K "Black Type"	Sub P
G6	XTN2+4FFN "Silver Type" XTN2+4FZ "Black Type"	Tappi
G7	QXBM0029	Eject
G8	QGKM0145 "Silver Type" QGKM0145K "Black Type"	Meter
G9	QKJM0053	Meter
G10	QGOM0050	Push (Moni
G11	QGOM0062	Tape
G12	QGT1536	Input Knob



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.	Part Name & Description
	CABINET PARTS	
G1	QYMM0081 "Silver Type"	Main Case Assembly
	QYMM0081K "Black Type"	"
G1-1	QKA1082*	Rubber Foot
G1-2	QTSM0049	Earth Plate
G1-3	QMAM0136	Front Panel Holding Plate
G1-4	XTS3+8B	Screw ⊕3×8
G1-5	XSN3+6S	Screw ⊕3×6
G2	QYPM0045 "Silver Type"	Front Panel Assembly
	QYPM0045K "Black Type"	Front Panel Assembly
G2-1	QGPM0059 "Silver Type"	Operation Panel
	QGPM0059K "Black Type"	"
G2-2	QGOM0054 "Silver Type"	Stop Button
	QGOM0054Y "Black Type"	"
G2-3	QGOM0055 "Silver Type"	Rec Mute Button
	QGOM0055Y "Black Type"	"
G2-4	QGOM0056 "Silver Type"	Fast Forward/Cue Button
	QGOM0056Y "Black Type"	"
G2-5	QGOM0057 "Silver Type"	Rewind/Review Button
	QGOM0057Y "Black Type"	"
G2-6	QGOM0058	Counter Button
G2-7	QXBM0024 "Silver Type"	Playback Button Assembly
	QXBM0024Y "Black Type"	"
G2-8	QXBM0025 "Silver Type"	Pause Button Assembly
	QXBM0025Y "Black Type"	"
G2-9	QXBM0026 "Silver Type"	Record Button Assembly
	QXBM0026Y "Black Type"	"
G2-10	QMP1803	P.C.B. Shaft
G2-11	XTN2+4FFN	Tapping Screw ⊕2×4
G2-12	XTV26+6B	Screw ⊕2.6×6
G2-13	QGRM0009 "Silver Type"	Meter Cover-A
	QGRM0009K "Black Type"	"
G3	QGPM0057 "Silver Type"	Sub Panel
	QGPM0057K "Black Type"	"
G4	QKJM0061 "Silver Type"	Sub Panel Holder-R
	QKJM0061K "Black Type"	"
G5	QKJM0062 "Silver Type"	Sub Panel Holder-L
	QKJM0062K "Black Type"	"
G6	XTN2+4FFN "Silver Type"	Tapping Screw ⊕2×4
	XTN2+4FZ "Black Type"	"
G7	QXBM0029	Eject Button Assembly
G8	QGKM0145 "Silver Type"	Meter Cover-B
	QGKM0145K "Black Type"	"
G9	QKJM0053	Meter Filter
G10	QGOM0050	Push Button (Monitor, Dolby NR, MPX Filter)
G11	QGOM0062	Tape Select Button
G12	QGT1536	Input Level/Bias Adjust Control Knob
G13	QGT1537	Input Select Knob
G14	QYT0622	Input Level Control Knob-L Assembly
G15	QGT1538	Input Level Control Knob-R
G16	QGOM0061	Memory/Timer Button
G17	QBT1484	Eject Lever Spring
G18	QGCM0039	Bottom Cover
G19	QKA1082	Rubber Foot
G20	XTS3+8B	Screw ⊕3×8
G21	QGCM0040 "Silver Type"	Case Cover
	QGCM0040K "Black Type"	"
G22	QKFM2007X "Silver Type"	Cassette Lid
	QKFM2010X "Black Type"	"
G23	QHQ1311 "Silver Type"	Step Screw (for Cassette Lid)
	QHQ1311K "Black Type"	"
G24	QMAM0132	Chassis Holding Angle
G25	XYA4+BJ10FN "Silver Type"	Screw ⊕4×10
	XYA4+BJ10FZ "Black Type"	"
G26	XTB3+8BFZ	Screw ⊕3×8
G27	D QGSM0145	Main Name Plate
	*For all European areas except United Kingdom.	
	BA QGSM0146	"
	*For United Kingdom and Australia.	
	N QGSM0149	"
	*For Asia, Latin America, Middle East and Africa areas.	
G28	XSB3+6FZS	Screw ⊕3×6
G29	QKJM0059 "Silver Type"	Sub Panel Lock Plate
	QKJM0059K "Black Type"	"
G30	QKJM0058 "Silver Type"	Sub Panel Lock Guide
	QKJM0058K "Black Type"	"
G31	XUB3FT	Stop Ring 3φ
G32	QMAM0138	Lock Switch Holding Angle
G33	QSW001A	Lock Switch
G34	QBT1936	Lid Lock Spring
G35	XSN3+6S	Screw ⊕3×6
G36	XWA3B	Washer 3φ
G37	QXAM0022	Sub Panel Holding Angle
G38	QDG1102	Holding Gear
G39	XUC4FT	Stop Ring 4φ
G40	QXAM0019	Lid Holding Metal-2 Assembly
G41	XSN3+8S	Screw ⊕3×8
G42	XWA3B	Washer 3φ
	ACCESSORIES	
A1	RP023A	Connection Cord
A2	XZB15X20A05	Poly Bag
A3	N⚠ QJP0603S	AC Plug Adaptor
	*For Asia, Latin America, Middle East and Africa areas.	
A4	D QQT3053	Instruction Book
	*For all European areas except United Kingdom.	
	BA QQT3052	"
	*For United Kingdom and Australia.	
	N QQT3051	"
	*For Asia, Latin America, Middle East and Africa areas.	
	PACKINGS	
P1	QPNM0168	Inside Carton
P2	QPAM0044	Cushion-A (Front Side)
P3	QPAM0045	Cushion-B (Back Side)
P4	XZB50X65A02	Poly Bag (for UNIT)
P5	QPQ1052	Poly Sheet (for AC Cord)
P6	QPCM0005 "Black Type"	Poly Sheet (for Cassette Lid)
P7	QPCM0007 "Black Type"	Poly Sheet (for Sub Panel)
P8	QPG1986	Pad

MNE
H.M D DK BK N NK AK
Printed in Japan

ORDER NO. ARD8311320S8-01

Service Manual

Supplement-2

Cassette Deck

RS-M280

(Silver Face
Black Face)

Quartz-Locked Direct-Drive
Stereo Cassette Deck with 3 Head,
Double Capstan System

* DOLBY SYSTEM

This is the Service Manual for the following areas.

D ...For all European areas except United Kingdom.

B ...For United Kingdom.

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

A ...For Australia.

RS-M250 MECHANISM SERIES

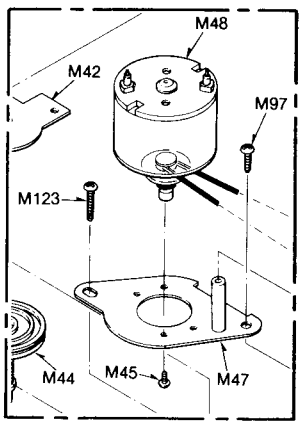
Please use this manual together with the service manual for model No. RS-M280 (Original) order No. ARD81070071C8-34 and (Supplement-1) order No. ARD82030071S8-01.

PARTS COMPARISON TABLE:

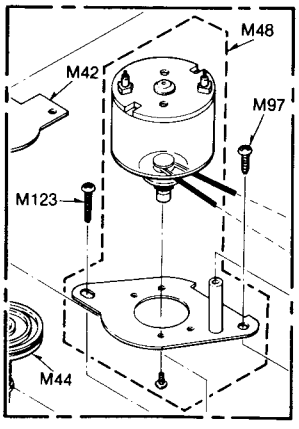
Please revise the original parts list in the Service Manual (RS-M280) to conform to the changes shown herein.
If new part numbers are shown, be sure to use them when ordering parts.

Ref. No.	Part Name & Description	Part Numbers		Remarks
		Former Type	**New Type**	
M48	Reel Motor Assembly	QXH0360 (M47) QXU0195 (M48)	**QXU0250**	
M58	Fast Wind Arm Assembly	QXL1409	**QXL1604**	

MECHANICAL PARTS LOCATION (DIFFERENCE)



Former Type



New type

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

Technics

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

(MNE, A.H) Printed in

Audio Tape Recorder Division	**QUALITY REPORT**	**Ref. No.:** 1
		Date: January
	Model: RS-M280	**Cases reported (country):** Italy, Hong Kong

SYMPTOM: Incomplete erasing

1. Tape becomes loose between the right and left capstans.
2. Tape has poor contact with the head due to loose tape, resulting in incomplete erasing.

CAUSE: Due to variations of parts accuracy, speed difference between the right and left capstans is lost, and tape becomes loose.

COUNTERMEASURE: The sub-flywheel diameter was increased by 5/100mm to increase the speed difference between the right and left capstans from 0.1% to 0.2%. (See figure below.)

REMEDY: Replace the existing sub-flywheel with the new one (QXF0175B) (5/100mm larger in diameter).

NO. CHANGE: QXF0175 → QXF0175B

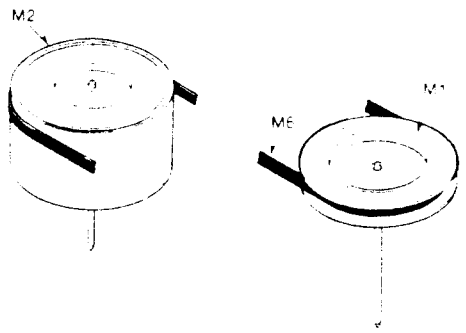


Fig.