

Service Manual

Cassette Deck

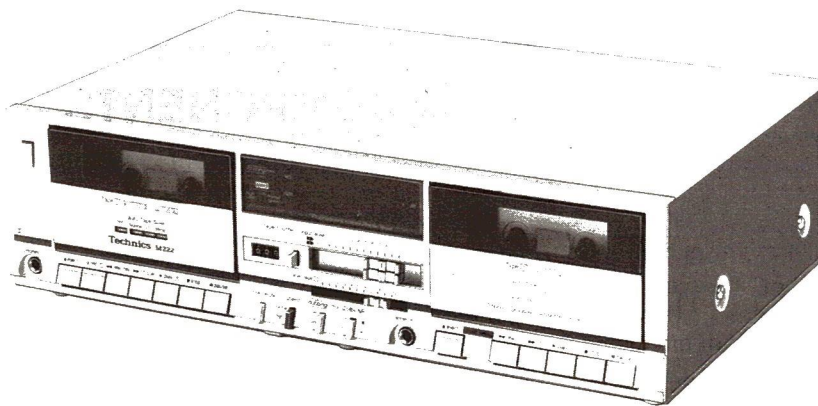
RS-M222

(Silver Face)

Double Cassette Deck Featuring 2 Dubbing Speed

 **DOLBY SYSTEM**

QZK 22 21 2X



This is the Service Manual for the following areas.

- ☐ For all European areas except United Kingdom.
- ☐ For United Kingdom.
- ☐ For Asia, Latin America, Middle East and Africa areas.
- ☐ For Australia.

RS-M24 MECHANISM SERIES

Specifications

Track system:	Tape deck 1: 4-track 2-channel stereo playback	Outputs:	LINE: sensitivity 60mV, input impedance more than 47k Ω
	Tape deck 2: 4-track 2-channel stereo recording and playback		LINE: output level 400mV, output impedance 2.5k Ω or less
Wow and flutter:	0.048% (WRMS), $\pm 0.14\%$ (DIN)		HEADPHONES: output level 80mV (8 Ω) applicable headphone impedance 8 Ω —600 Ω
Tape speed:	4.8cm/s	Bias frequency:	102kHz
Frequency response:	Metal tape: 20—19,000Hz 30—18,000Hz (DIN)	Motor:	Electrical DC governor motor
	CrO ₂ tape: 20—18,000Hz 30—17,000Hz (DIN)	Heads:	Tape deck 1: 1 MX head for playback
	Normal tape: 20—17,000Hz 30—15,000Hz (DIN)		Tape deck 2: 1 MX head for recording and playback 1 double-gap ferrite head for erasure
Signal-to-noise ratio:	Dolby* NR in: 67dB (above 5kHz)	Power requirements:	AC: 110/125/220/240V, 50-60Hz
	Dolby NR out: 57dB (signal level = max. input level A weighted, CrO ₂ type tape)		☐ ... Pre-set power voltage 240V
Fast forward and			☐ ... Pre-set power voltage 220V
rewind time:	Approx. 90 seconds with C-60 cassette tape	Power consumption:	15W
Inputs:	MIC: sensitivity 1.0mV, applicable microphone impedance 400 Ω —10k Ω	Dimensions:	43.0cm(W) $\times$ 11.9cm(H) $\times$ 27.8cm(D)
		Weight:	5.6kg

Specifications are subject to change without notice.

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

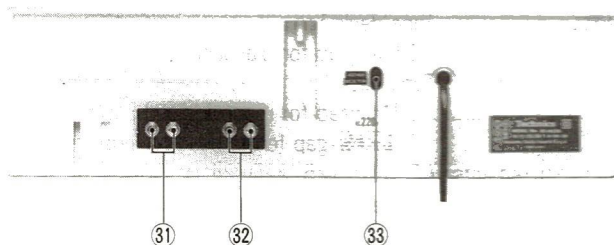
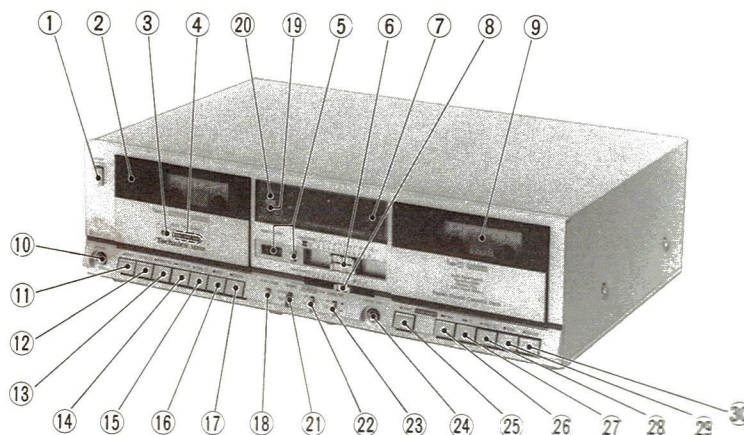
Technics

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

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LOCATION OF CONTROLS AND COMPONENTS



- ① Power switch [power (push on)]
- ② Cassette holder
- ③ Recording indicator [rec]
- ④ Tape indicator [auto tape select (Normal-OrQe-Meta)]
- ⑤ Tape counter and reset button [tape counter]
- ⑥ Input level controls [input level **L** **R**]
- ⑦ Fluorescent level meter
- ⑧ Tape **I** level control [level - tape **I**]
- ⑨ Cassette holder
- ⑩ Headphones jack [phones]
- ⑪ Eject button [**▲** eject]
- ⑫ Rewind button [**O** rec-**B**]
- ⑬ Rewind/reverse button [**◀◀** rew/rev]
- ⑭ Fast forward/cue button [**▶▶** ff/cue]
- ⑮ Playback button [**▶** play-**□**]
- ⑯ Stop button [**■** stop]
- ⑰ Pause button [**||** pause]
- ⑱ Record-muting switch [**○** rec mute]
- ⑲ Dubbing speed indicator [**speed** (high (red) • norma (green))]
- ⑳ Dubbing/mixing indicator [**dubbing** /mix]
- ㉑ Dubbing speed switch [speed (normal (**■** • high (**■**))]
- ㉒ Dubbing/mixing switch [dubbing /mix (**■** - **■**)]
- ㉓ Dolby NR switch [Dolby NR (out **■** - **■**)]
- ㉔ Microphone jack [center mic]
- ㉕ Eject button [**▲** eject]
- ㉖ Rewind button [**◀◀** rew]
- ㉗ Fast forward button [**▶▶** ff]
- ㉘ Playback button [**▶** play-**□**]
- ㉙ Stop button [**■** stop]
- ㉚ Pause button [**||** pause]
- ㉛ Line output jacks [LINE OUT (R-L)]
- ㉜ Line input jacks [LINE IN (R-L)]
- ㉝ Voltage selector [VOLTAGE SELECTOR]

OPERATING INSTRUCTION

DUBBING RECORDING

- Dubbing recording can be performed at two speeds. When the Dubbing Speed Switch is set to "high," a recording of the contents of one tape onto another can be done in half the time it takes normally.
- Set the speed normally (by setting the Dubbing Speed Switch to "normal") for recording sound while you are listening to it during dubbing recording.
The tape speed during high-speed dubbing recording is double the normal speed and so the monitored sound is garbled.
- Observe the FL meter and check that the correct recording level has been set. If the level is either too low or too high, use the Tape **1** Level Control for adjustment.
The FL meter indicates the Tape **2** recording level during high-speed editing recording.

MIXING PLAYBACK AND RECORDING

- Adjust the microphone volume with the Input Level Control and the playback sound of the tape with the Level Tape **1** Control.
- Observe the FL meter during mixing recording and check that the correct recording level has been set.
- The sound from Tape **2** can also be mixed with the sound from a microphone (mic mixing). In this case, the microphone volume can be adjusted with the Input Level Control but the tape volume cannot be adjusted with the Level Tape **1** Control.

SERIES PLAYBACK

- Series playback refers to the fact that the tape in "Tape **1**" starts playing back in succession immediately after the tape in "Tape **2**" has reached the end during playback and the auto-stop mechanism has been activated or after the Stop button has been depressed and the deck set to the stop mode.
- When the Pause button of "Tape **1**" has been depressed and then the Play button is depressed, the tape in "Tape **1**" will start playing back after the tape in "Tape **2**" has finished playing back.
- If the "Tape **1**" Play and Pause buttons are depressed together with "Tape **2**" set to the recording mode, then the tape in "Tape **1**" will start to playback after the tape in "Tape **2**" has finished recording.

SYNCHRO START ("Tape **1**") ("Tape **2**")

Synchro start is a function which allows the tapes in Tape **1** (playback) and Tape **2** (recording) to start at the same time when the recording button of Tape **2** is pushed into position with editing or mixing recording operations.

Operation:

Set the Dubbing/mixing switch to "on," push down the Pause button of Tape **1** and then push down the Play button to set the unit to the playback standby mode.

When the Record button of Tape **2** is pushed down, the Pause button of Tape **1** is automatically released. This starts the recording of Tape **2** and, simultaneously, starts the playback of Tape **1**, thereby allowing edited recording.

Push down the Record Button after having checked that the Pause Button of Tape **1** has been pushed into position.

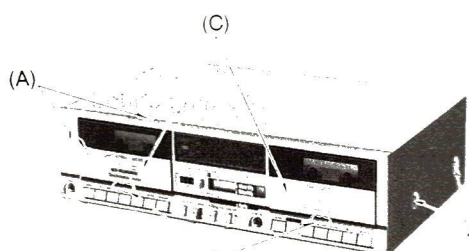
If it is not in position, the synchro start function will not work.

TROUBLESHOOTING

If operation of this unit does not seem normal, check the following points before requesting service. If the trouble cannot in this way be determined and corrected, contact the dealer from whom the unit was purchased.

- **Recordings can be made by microphone, but not from any connected sound source.**
 - Is there a microphone connected to the Center microphone jack?
 - Has the stereo amplifier been connected incorrectly?
- **No "Tape **1**" sound**
 - Has the "Tape **2**" Play button been depressed?
 - Is the Tape **1** level control at the "0" position?
- **Sound of other sources (tuner, turntable, etc.) is mixed when dubbing recording from "Tape 1" to "Tape 2".**
 - Is the Input level control set to any position other than "0"?
- **No high-speed dubbing recording**
 - Is dubbing mixing switch at OFF position?
 - Is dubbing speed switch at normal position?

DISASSEMBLY INSTRUCTION



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

Fig. 1

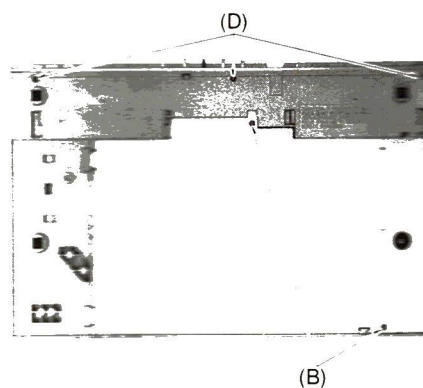


Fig. 2

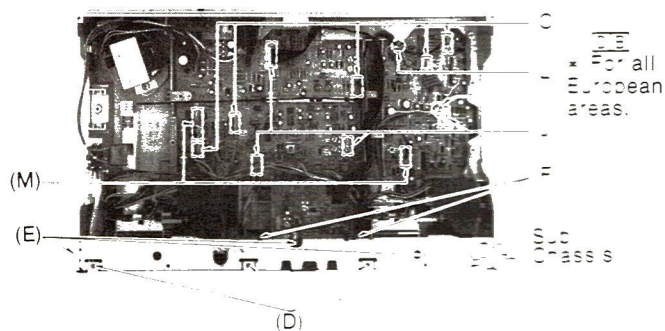


Fig. 3

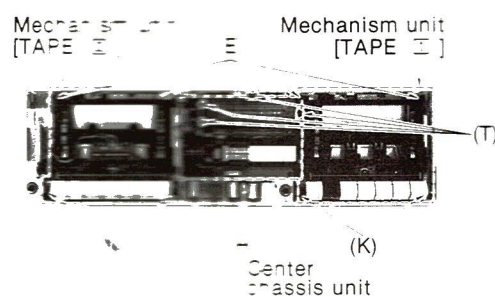


Fig. 4

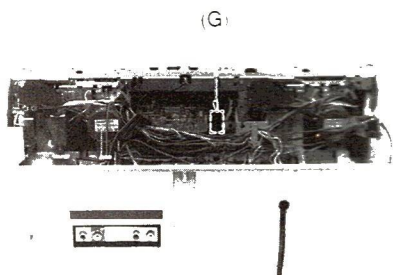


Fig. 5

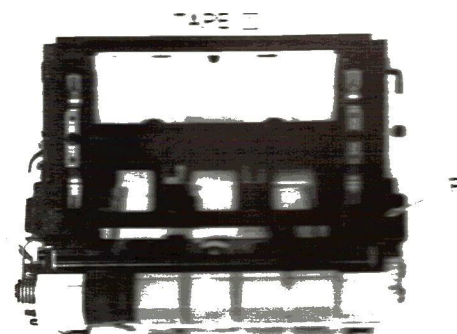


Fig. 6

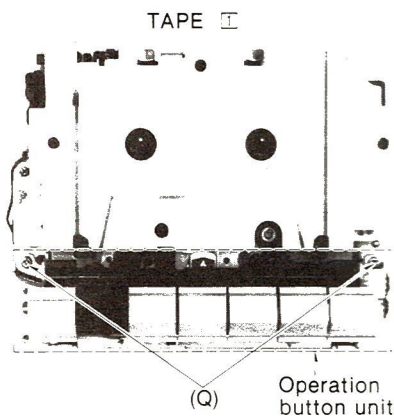


Fig. 7

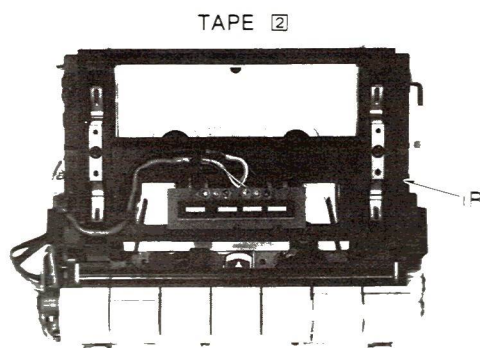


Fig. 8

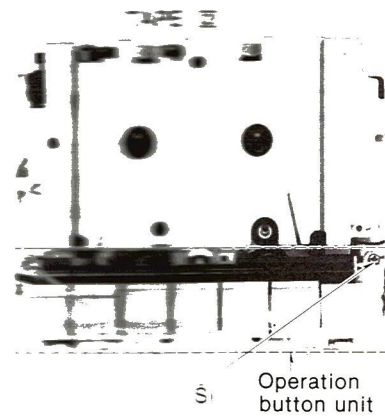


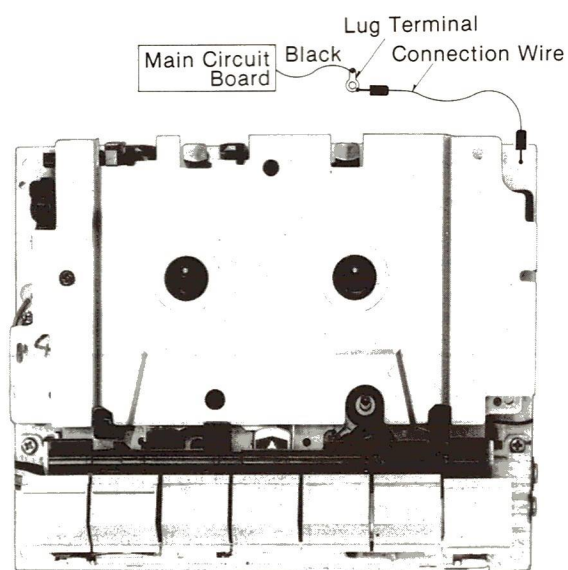
Fig. 9

DISASSEMBLY PROCEDURE

Ref. No.	Procedure	To remove —	Remove —	Shown in fig. —
1	1	Case cover	• 4 screws(A)	1
2	2	Bottom cover	• 2 screws(B)	2
3	1 → 3	Front panel	• 2 cassette lids(C) • 7 screws(D)	1 2, 3
4	1 → 3 → 4	Sub chassis	• 8 screws(E) • 2 holders(F)	3, 4 3
5	1 → 2 → 3 → 4 → 5	Center chassis unit	• Counter belt(G) • 1 screw(H) • 1 binder(I) □□ ※For all European areas. • 4 connectors(J)	5 4 3 3
6	1 → 2 → 3 → 4 → 5 → 6	Mechanism unit [TAPE ①]	• 2 screws(K) • 1 binder(L) □□ ※For all European areas. • 2 connectors(M)	4 3 3
7	1 → 2 → 3 → 4 → 5 → 7	Mechanism unit [TAPE ②]	• 2 screws(N) • 5 connectors(O)	4 3
8	1 → 2 → 3 → 4 → 5 → 6 → 8	Operation button unit [TAPE ①]	• Cassette holder(P) • 2 screws(Q)	6 7
9	1 → 2 → 3 → 4 → 5 → 7 → 9	Operation button unit [TAPE ②]	• Cassette holder(R) • 2 screws(S)	8 9
10	1 → 2 → 3 → 4 → 5 → 10	FL meter circuit board	• 4 holders(T)	4

MECHANISM SECTION

1. For repair, measurement or adjustment with the mechanism removed from the unit be sure to ground the lower base plate of the mechanism.
2. For grounding, connect a extension cord to the mechanism's lower base plate and the Lug terminal from amplifier printed circuit board.
3. Without grounding, the amplifier does not operate properly.



MEASUREMENT AND ADJUSTMENT METHODS

ADJUSTMENT PARTS LOCATION

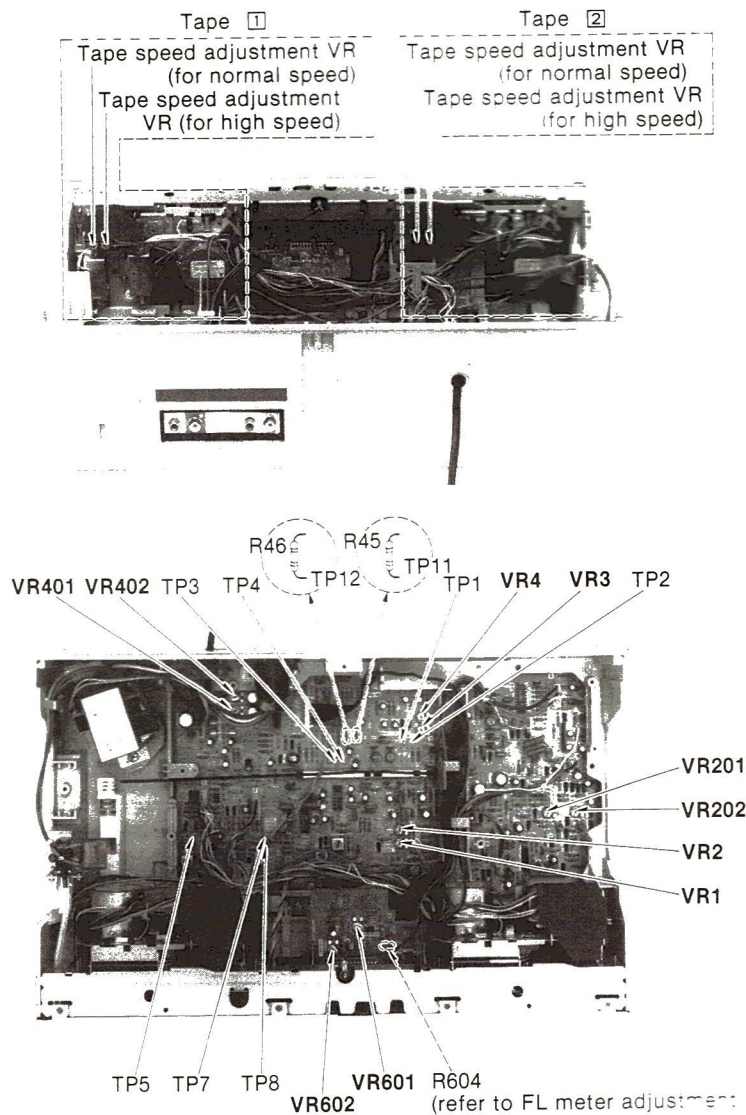


Fig. 1

NOTES: Keep good condition, set switches and controls in the following position.

- Make sure heads are clean
- Make sure capstan and pressure roller are clean
- Judgeable room temperature: $20 \pm 5^{\circ}\text{C}$ ($68 \pm 9^{\circ}\text{F}$)
- Dolby NR switch: "OUT"
- Dolby speed switch: "NORM"
- Tape speed switch: "NORM"
- Tape type switch: "TYPE I"
- Bias switch: "TYPE I"
- Bias level switch: "TYPE I"

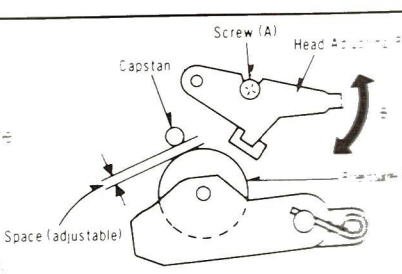
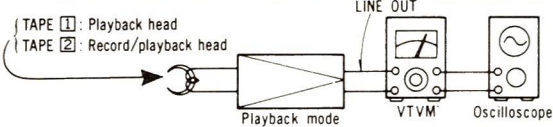
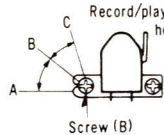
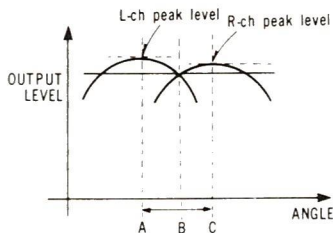
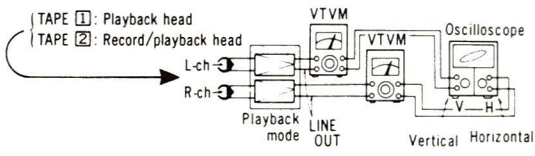
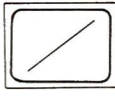
ITEM	MEASUREMENT & ADJUSTMENT
A Head position adjustment [TAPE 1], [TAPE 2] Condition • Playback and pause mode	The head adjusting plate is adjusted so that the gap touch of the head is equal to the standard value. 1. Press the capstan button to the stop position. 2. Measure the space between the capstan and the head. Standard value: 0.50 ± 0.05 mm If the measured value is not the standard value, turn green screw (A) to move the head adjusting plate in the direction of arrow (B) for adjustment. 

Fig. 2

ITEM	MEASUREMENT & ADJUSTMENT
⑤ Head azimuth adjustment [TAPE ①, TAPE ②] Condition: • Playback mode Equipment: • VTVM • Oscilloscope • Test tape (azimuth) ... QZZCFM	L-ch/R-ch output balance adjustment 1. Make connections as shown in fig. 3. 2. Playback the 8kHz signal from the test tape (QZZCFM). Adjust screw (B) in fig. 4 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. 4 to find angles A and C (points where peak output levels for left and right channels are obtained). Then, locate the angle B between angles A and C, i.e., a point where L-ch and R-ch output levels come together at maximum. (Refer to figs. 4 and 5.) L-ch/R-ch phase adjustment 4. Make connections as shown in fig. 6. 5. Playback the 8kHz signal from the test tape (QZZCFM). Adjust screw (B) shown in fig. 4 so that pointers of the two VTVMs swing to maximum and a waveform as illustrated in fig. 7 is obtained on the oscilloscope.  Fig. 3  Fig. 4  Fig. 5  Fig. 6  Fig. 7
⑥ Tape speed [TAPE ①, TAPE ②] Condition: • Playback mode • Dubbing speed switch ... Normal/high Equipment: • Digital electronic counter or frequency counter • Test tape ... QZZCWAT	Normal speed adjustment TAPE ① 1. Make connections as shown in fig. 8. 2. Set the dubbing speed switch to Normal. 3. Play the test tape (QZZCWAT) with the TAPE ① head, and measure the playback signal frequency. If the playback signal frequency does not conform to the standard value, adjust the normal speed adjustment VR for the TAPE ① head (See fig. 1). Standard value: TAPE ① (Playback deck: Normal speed) 3010 ± 45 Hz TAPE ② 4. Play the test tape (QZZCWAT) with the TAPE ② head, and measure the playback signal frequency, and then adjust the normal speed adjustment VR for the TAPE ② head so that the playback signal frequency is 15 Hz lower than the output signal frequency after adjustment of TAPE ①. High speed adjustment Note: Perform high speed adjustment about 10 seconds after the start of motor rotation. 1. Make connections as shown in fig. 8. 2. Set the dubbing/mixing switch to off, and set the dubbing speed switch to high. Short between TP7 and TP8. 3. Play the test tape (QZZCWAT) with the TAPE ① and measure the playback signal frequency. If the playback signal frequency does not conform to the standard value, adjust the high speed adjustment VR for the TAPE ① head (See fig. 1). Standard value: TAPE ① (Playback deck: Normal speed) 6020 ± 90 Hz 4. Play the test tape (QZZCWAT) with the TAPE ② head, and measure the playback signal frequency, and then adjust the high speed adjustment VR for the TAPE ② head so that the playback signal frequency is 30 Hz lower than the output signal frequency after adjustment of TAPE ①. 5. After high speed adjustment, remove the short between TP7 and TP8. Tape speed fluctuation TAPE ①, TAPE ② Make measurements in same manner as above (beginning, middle and end of tape), and determine the difference between maximum and minimum values and calculate as follows: $\text{Tape speed fluctuation (Normal speed)} = \frac{f_1 - f_2}{3000} \times 100(\%)$ f_1 = maximum value f_2 = minimum value $\text{Tape speed fluctuation (High speed)} = \frac{f_1 - f_2}{6000} \times 100(\%)$

L-ch/R-ch phase adjustment

4. Make connections as shown in fig. 6.
5. Playback the 8kHz signal from the test tape (QZZCFM). Adjust screw (B) shown in fig. 4 so that pointers of the two VTVMs swing to maximum and a waveform as illustrated in fig. 7 is obtained on the oscilloscope.

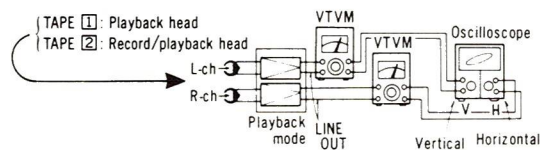


Fig. 6

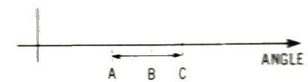


Fig. 5

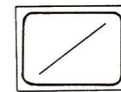


Fig. 7

● Tape speed [TAPE 1, TAPE 2]

Condition:

- * Playback mode
- * Dubbing speed switch
... Normal/high

Equipment:

- * Digital electronic counter or frequency counter
- * Test tape... QZZCWAT

Normal speed adjustment

TAPE 1

1. Make connections as shown in fig. 8.
2. Set the dubbing speed switch to Normal.
3. Play the test tape (QZZCWAT) with the TAPE 1 head, and measure the playback signal frequency. If the playback signal frequency does not conform to the standard value, adjust the normal speed adjustment VR for the TAPE 1 head (See fig. 1).

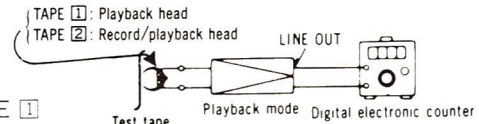


Fig. 8

Standard value: TAPE 1 (Playback deck: Normal speed)
3010 ± 45 Hz

TAPE 2

4. Play the test tape (QZZCWAT) with the TAPE 2 head, and measure the playback signal frequency, and then adjust the normal speed adjustment VR for the TAPE 2 head so that the playback signal frequency is 15 Hz lower than the output signal frequency after adjustment of TAPE 1.

High speed adjustment

Note: Perform high speed adjustment about 10 seconds after the start of motor rotation.

1. Make connections as shown in fig. 8.
2. Set the dubbing/mixing switch to off, and set the dubbing speed switch to high. Short between TP7 and TP8.
3. Play the test tape (QZZCWAT) with the TAPE 1 head and measure the playback signal frequency. If the playback signal frequency does not conform to the standard value, adjust the high speed adjustment VR for the TAPE 1 head (See fig. 1).

Standard value: TAPE 1 (Playback deck: Normal speed)
6020 ± 90 Hz

4. Play the test tape (QZZCWAT) with the TAPE 2 head, and measure the playback signal frequency, and then adjust the high speed adjustment VR for the TAPE 2 head so that the playback signal frequency is 30 Hz lower than the output signal frequency after adjustment of TAPE 1.
5. After high speed adjustment, remove the short between TP7 and TP8.

Tape speed fluctuation

TAPE 1, TAPE 2

Make measurements in same manner as above (beginning, middle and end of tape), and determine the difference between maximum and minimum values and calculate as follows:

$$\text{Tape speed fluctuation (Normal speed)} = \frac{f_1 - f_2}{3,000} \times 100 (\%)$$

f_1 = maximum value, f_2 = minimum value

$$\text{Tape speed fluctuation (High speed)} = \frac{f_1 - f_2}{6,000} \times 100 (\%)$$

f_1 = maximum value, f_2 = minimum value

Standard value: Less than 1%

Note:

Please use non metal type screwdriver when you adjust tape speed on this unit.

● Playback frequency response

[TAPE 1, TAPE 2]

Condition:

- * Playback mode
- * Normal tape mode
- * Set TAPE 1 level control to "8".

Equipment:

- * VTVM
- * Oscilloscope
- * Test tape... QZZCFM

1. Test equipment connection is shown in fig. 3.
2. Place UNIT into Normal tape mode.
3. Playback the frequency response test tape (QZZCFM).
4. Measure output level at 315 Hz, 12.5 kHz, 8 kHz, 4 kHz, 1 kHz, 250 Hz, 125 Hz and 63 Hz, and compare each output level with the standard frequency 315 Hz, at LINE OUT.
5. Make measurement for both channels.
6. Make sure that the measured value is within the range specified in the frequency response chart (shown in fig. 9).

Playback frequency response chart

[TAPE 1, TAPE 2]

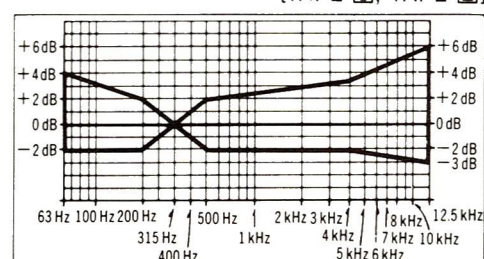
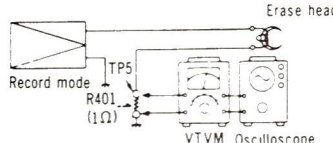
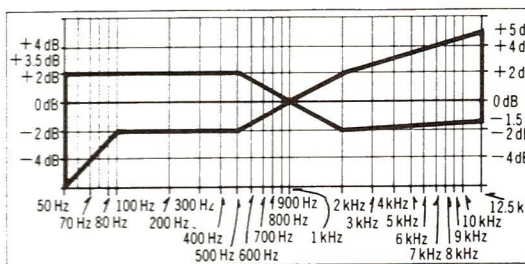
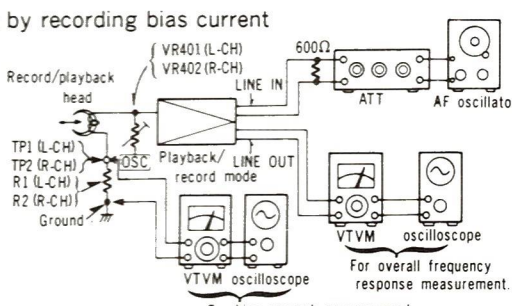


Fig. 9

ITEM	MEASUREMENT & ADJUSTMENT
E Playback gain [TAPE ①, TAPE ②] Condition • Playback mode • Normal tape mode • Set TAPE ① level control to "8". Equipment • VTVM • Oscilloscope • Test tape... QZZCFM	1. Test equipment connection is shown in fig. 3. 2. Playback standard recording level portion on test tape (QZZCFM 315Hz, 0dB), and using VTVM measure the output level at LINE OUT. 3. Make measurement for both channels Standard value: TAPE ①, ②; $0.4V \pm 1dB$ [0.42V; at test point TP3 (L-CH) and TP4 (R-CH)] Adjustment 1. If measured value is not within standard, adjust VR201 (TAPE ①: L-CH), VR202 (TAPE ①: R-CH), VR1 (TAPE ②: L-CH), VR2 (TAPE ②: R-CH). 2. After adjustment check "Playback frequency response" again.
F Erase current [TAPE ②] Condition • Record mode • Metal tape mode Equipment • VTVM • Oscilloscope	1. Test equipment connection is shown in fig. 10. 2. Place UNIT into Metal tape mode. 3. Press the record and pause buttons 4. Read voltage on VTVM and calculate erase current by following formula $\text{Erase current (A)} = \frac{\text{Voltage across both ends of R401}}{1 (\Omega)}$ Standard value: 160^{+10}_{-20} mA (Metal position)  Fig. 10 5. If measured value is not within standard, adjust as follows. Adjustment 1. Open the point (A) and short the point (B) on the main circuit board in the circuit board diagram (See page 15). 2. Make measurement for erase current. 3. Make sure that the measured value is within the erase current of 140mA to 170mA. 4. If it is beyond the value, carry out the following adjustments: • If the erase current is less than 140mA, short the point (A) • If the erase current is more than 170mA, open the points (A) and (B).
G Overall frequency response [TAPE ②] Condition: • Record/playback mode • Normal tape mode • CrO₂ tape mode • Metal tape mode • Input level controls... MAX Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω) • Test tape (reference blank tape) ...QZZCRA for Normal ...QZZCRX for CrO₂ ...QZZCRZ for Metal	Note Before measuring and adjusting, make sure of the playback frequency response (For the method of measurement, please refer to the playback frequency response)  Fig. 11 Overall frequency response adjustment by recording bias current (Recording equalizer is fixed.) 1. Make connections as shown in fig. 12. 2. Place UNIT into normal tape mode and load the test tape (QZZCRA). 3. Input a 1kHz, -24dB signal through LINE IN. Place the set in record mode. 4. Fine adjust the attenuator to obtain 0.4V LINE OUT output. • Make sure that the input signal level is $-24 \pm 4dB$ with 0.4V output voltage. 5. Adjust the attenuator to reduce the input signal level by 20dB. 6. Adjust the AF oscillator to generate 50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz, 10kHz and 12.5kHz signals, and record these signals on the test tape. 7. Playback the signals recorded in step 6, and check if the frequency response curve is within the limits shown in the overall frequency response chart for normal tapes (fig. 11). (If the curve is within the charted specifications, proceed to steps 8, 9 and 10.) If the curve is not within the charted specifications, adjust as follows: Adjustment A : Adjustment B :  Fig. 12

- Record mode
 - Metal tape mode
- Equipment
- VTVM
 - Oscilloscope

following formula

$$\text{Erase current (A)} = \frac{\text{voltage across both ends of R401}}{1 (\Omega)}$$

Standard value: 160 ± 10 mA (Metal position)

5 If measured value is not within standard, adjust as follows.

Adjustment

- 1 Open the point (A) and short the point (B) on the main circuit board in the circuit board diagram (See page 15).
- 2 Make measurement for erase current.
- 3 Make sure that the measured value is within the erase current of 140mA to 170mA.
- 4 If it is beyond the value, carry out the following adjustments:
 - If the erase current is less than 140mA, short the point (A).
 - If the erase current is more than 170mA, open the points (A) and (B).

Fig. 10

Overall frequency response

[TAPE 2]

Condition:

- Record/playback mode
- Normal tape mode
- CrO₂ tape mode
- Metal tape mode
- Input level controls ... MAX

Equipment:

- VTVM
- AF oscillator
- ATT
- Oscilloscope
- Resistor (600Ω)
- Test tape (reference blank tape)
- ... QZZCRA for Normal
- ... QZZCRX for CrO₂
- ... QZZCRZ for Metal

Note

Before measuring and adjusting, make sure of the playback frequency response (For the method of measurement, please refer to the playback frequency response).

Overall frequency response chart (Normal) [TAPE 2]

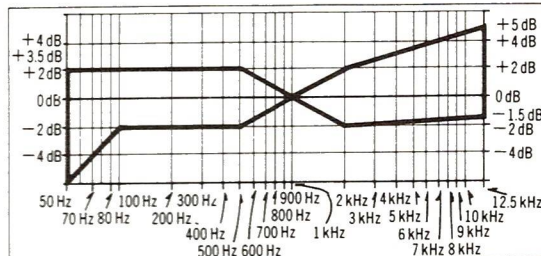


Fig. 11

Overall frequency response adjustment by recording bias current

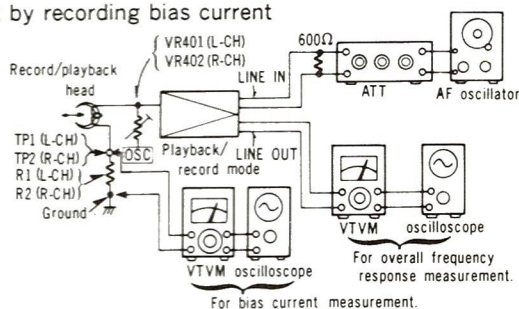


Fig. 12

(Recording equalizer is fixed.)

- 1 Make connections as shown in fig. 12.
 - 2 Place UNIT into normal tape mode and load the test tape (QZZCRA).
 - 3 Input a 1 kHz, -24 dB signal through LINE IN. Place the set in record mode.
 - 4 Fine adjust the attenuator to obtain 0.4 V LINE OUT output.
 - Make sure that the input signal level is -24 ± 4 dB with 0.4 V output voltage.
 - 5 Adjust the attenuator to reduce the input signal level by 20 dB.
 - 6 Adjust the AF oscillator to generate 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 10 kHz and 12.5 kHz signals, and record these signals on the test tape.
 - 7 Playback the signals recorded in step 6, and check if the frequency response curve is within the limits shown in the overall frequency response chart for normal tapes (fig. 11). (If the curve is within the charted specifications, proceed to steps 8, 9 and 10.)
- If the curve is not within the charted specifications, adjust as follows:

Adjustment A :

When the curve exceeds the overall frequency response chart specifications (fig. 11) as shown in fig. 13.

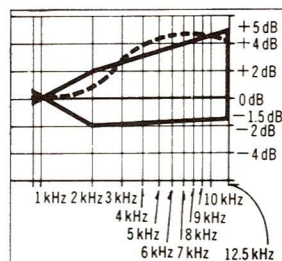


Fig. 13

- 1 Increase bias current by turning VR401 (L-CH) and VR402 (R-CH). (See fig. 1 on page 6.)
- 2 Repeat steps 6 and 7 to confirm. (Proceed to steps 8, 9 and 10 if the curve is now within the charted specifications in fig. 11.)
- 3 If the curve still exceeds the specifications (fig. 13), reduce bias current by turning VR401 (L-CH) and VR402 (R-CH) and repeat steps 6 and 7.

Adjustment B :

When the curve falls below the overall frequency response chart specifications (fig. 11) as shown in fig. 14.

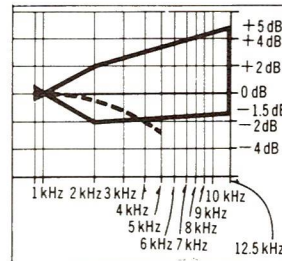
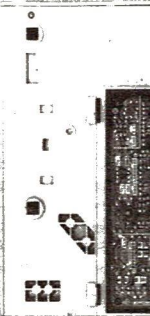
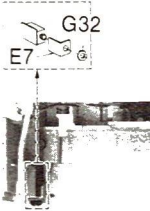
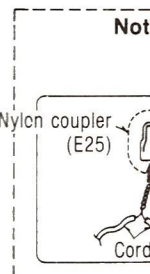
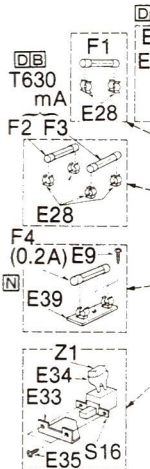


Fig. 14

- 1 Reduce bias current by turning VR401 (L-CH) and VR402 (R-CH).
- 2 Repeat steps 6 and 7 to confirm. (Proceed to steps 8, 9 and 10 if the curve is now within the charted specifications in fig. 11.)
- 3 If the curve still falls below the charted specifications (fig. 14), reduce bias current further and repeat steps 6 and 7.

ITEM	MEASUREMENT & ADJUSTMENT
	8. Place UNIT into CrO₂ tape mode. 9. Change test tape to QZZCRX, and record 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 10 kHz and 15 kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for CrO₂ tapes (fig. 15). Overall frequency response chart (CrO₂, Metal) [TAPE 2] Fig. 15 10. Place UNIT into Metal tape mode change test tape to QZZCRZ and record 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 10 kHz, 12.5 kHz and 15 kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for metal tapes (fig. 15). 11. Confirm that bias currents are approximately as follows when the UNIT is set at different tape mode. • Read voltage on VTVM and calculate bias current by following formula: $\text{Bias current (A)} = \frac{\text{Value read on VTVM (V)}}{10 (\Omega)}$ around 410 μA (Normal position) around 545 μA (CrO₂ position) around 800 μA (Metal position) } : measured at TP1 (L-CH) and TP2 (R-CH)
Overall gain [TAPE 2] Condition: - Record/playback mode - Normal tape mode - Input level controls ... MAX - Standard input level: MIC -59.5 $\pm$ 4 dB LINE IN ... -24 $\pm$ 4 dB Equipment: - VTVM - AF oscillator - ATT - Oscilloscope - Resistor (600 Ω) - Test tape (reference blank tape) ... QZZCRA for Normal	1. Test equipment connection is shown in fig. 16. 2. Place UNIT into Normal tape mode, and load the test tape (QZZCRA). 3. Place UNIT into record mode. 4. Supply 1 kHz signal (-24 dB) from AF oscillator, through ATT to LINE IN. 5. Adjust ATT until monitor level at LINE OUT becomes 0.4 V. 6. Playback recorded tape, and make sure the value at LINE OUT on VTVM becomes 0.4 V. 7. If measured value is not 0.4 V, adjust VR3 (L-CH), VR4 (R-CH) 8. Repeat from step (2) Fig. 16
Fluorescent meter [TAPE 2] Condition: - Record mode - Input level controls ... MAX Equipment: - VTVM - AF oscillator - ATT - Resistor (600 Ω)	1. Test equipment connection is shown in fig. 17. 2. Short R604 by connecting a connection cord across it, as shown in fig. 17, to stop oscillation of the astable multivibrator consisting of Q601 and Q602. 3. Supply 1 kHz signal (-24 dB) to the LINE IN then press the record button. 4. Adjust the ATT so that the output level at LINE OUT becomes 0.4 V (The input level at this condition is termed the standard input level). 5. Adjustment at "-20 dB": A. Adjust the ATT so that the input level is -20 dB below standard recording level. B. Adjust VR601 so that the -20 dB segment lights up in the -20 $\pm$ 0.8 dB range (L-CH only) (See fig. 18). 6. Adjustment at "0 dB": A. Adjust the ATT so that the output level at LINE OUT becomes 0.4 V. (The input level at this condition is termed the standard input level.) B. Adjust VR602 so that the +1 dB segment lights up in the 0 $\pm$ 0.2 dB range of the standard input level (See fig. 19). 7. Repeat twice between steps (5) and (6) above 8. Adjust ATT and check that all segments lights up when an input signal level is increased to 10 dB higher than the standard input level (See fig. 20). Fig. 17 Fig. 18 Fig. 19



$$\text{Bias current (A)} = \frac{\text{Value read on VTVM (V)}}{10 (\Omega)}$$

around 410 μ A (Normal position)
around 545 μ A (CrO₂ position)
around 800 μ A (Metal position) } : measured at TP1 (L-CH) and TP2 (R-CH)

Overall gain [TAPE 2]

Condition:

- Record/playback mode
- Normal tape mode
- Input level controls ... MAX
- Standard input level:
MIC -59.5 $\pm$ 4 dB
LINE IN ... -24 $\pm$ 4 dB

Equipment:

- VTVM
- AF oscillator
- ATT
- Oscilloscope
- Resistor (600 Ω)
- Test tape
(reference blank tape)
... QZZCRA for Normal

- Test equipment connection is shown in fig. 16.
- Place UNIT into Normal tape mode, and load the test tape (QZZCRA).
- Place UNIT into record mode.
- Supply 1 kHz signal (-24 dB) from AF oscillator, through ATT to LINE IN.
- Adjust ATT until monitor level at LINE OUT becomes 0.4 V.
- Playback recorded tape, and make sure the value at LINE OUT on VTVM becomes 0.4 V.
- If measured value is not 0.4 V, adjust VR3 (L-CH), VR4 (R-CH)
- Repeat from step (2).

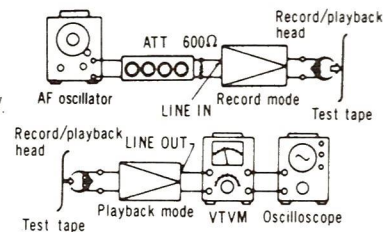


Fig. 16

Fluorescent meter [TAPE 2]

Condition:

- Record mode
- Input level controls ... MAX

Equipment:

- VTVM
- AF oscillator
- ATT
- Resistor (600 Ω)

- Test equipment connection is shown in fig. 17.
- Short R604 by connecting a connection cord across it, as shown in fig. 17, to stop oscillation of the astable multivibrator consisting of Q601 and Q602.
- Supply 1 kHz signal (-24 dB) to the LINE IN then press the record button.
- Adjust the ATT so that the output level at LINE OUT becomes 0.4 V (The input level at this condition is termed the standard input level).
- Adjustment at "-20 dB":
A. Adjust the ATT so that the input level is -20 dB below standard recording level.
B. Adjust VR601 so that the -20 dB segment lights up in the -20 $\pm$ 0.8 dB range (L-CH only) (See fig. 18).
- Adjustment at "0 dB":
A. Adjust the ATT so that the output level at LINE OUT becomes 0.4 V.
(The input level at this condition is termed the standard input level.)
B. Adjust VR602 so that the +1 dB segment lights up in the 0 $\pm$ 0.2 dB range of the standard input level (See fig. 19).
- Repeat twice between steps (5) and (6) above
- Adjust ATT and check that all segments lights up when an input signal level is increased to 10 dB higher than the standard input level (See fig. 20).

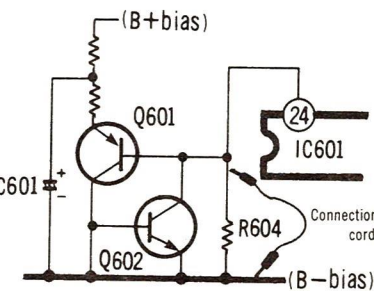


Fig. 17

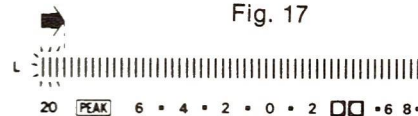


Fig. 18

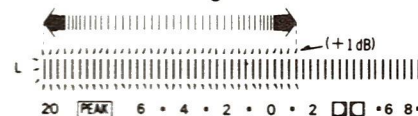


Fig. 19



Fig. 20

Dolby NR circuit [TAPE 2]

Condition:

- Record mode
- Dolby NR switch ... IN/OUT
- Input level controls ... MAX

Equipment:

- VTVM
- AF oscillator
- ATT
- Oscilloscope
- Resistor (600 Ω)

- Test equipment connection is shown in fig. 21.
- Place UNIT into record mode, set the Dolby NR switch to OUT position and supply to LINE IN to obtain -34.5 dB at TP11 (L-CH), TP12 (R-CH) (frequency 5 kHz).
- Confirm that the value at IN position is 8 ($\pm$ 2.5) dB greater than the value at OUT position of Dolby NR switch.

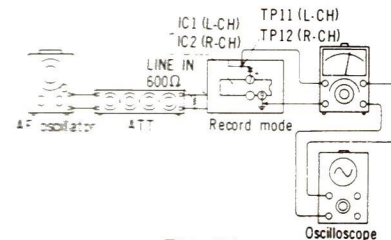
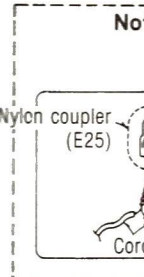
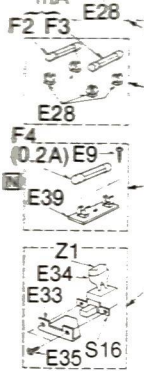


Fig. 21



REPLACEMENT PARTS



REPLACEMENT PARTS
Important safety
Components id
characteristics i
When replacing
only manufactur

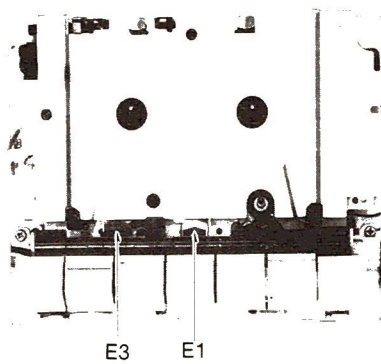
Ref No. P

E 1	QWY
E 2	QWY
E 3	QWY
E 4	QJS
E 5	QJT
E 6	QJS
E 7	QTW
E 8	QTW
E 9	XTN
E 10	XTN

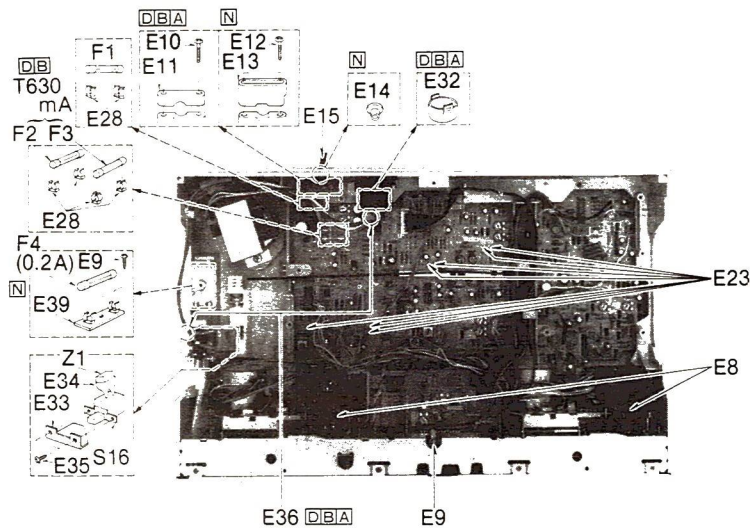
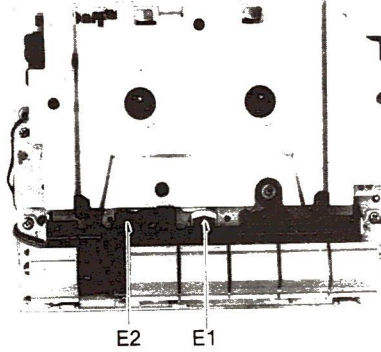
E 11
[DBA] QTD
[For all Euro
E 14 [N] QTD
[For Asia, L
areas.]
E 15[D] Δ SJA8
[For all Euro
[B] Δ RJA4
[For United
[A] Δ SJA8
[For Austr

ELECTRICAL PARTS LOCATION

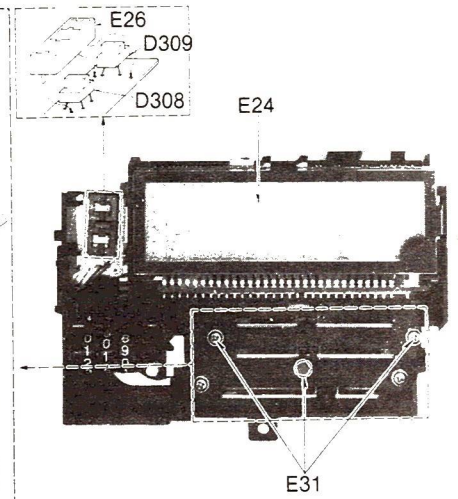
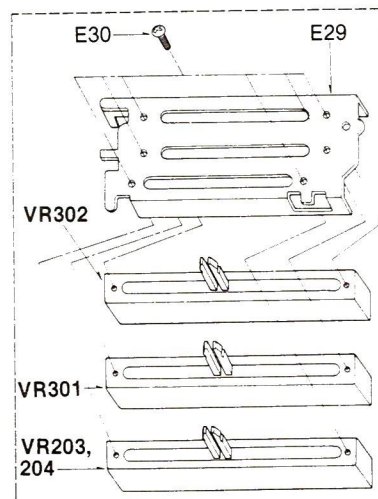
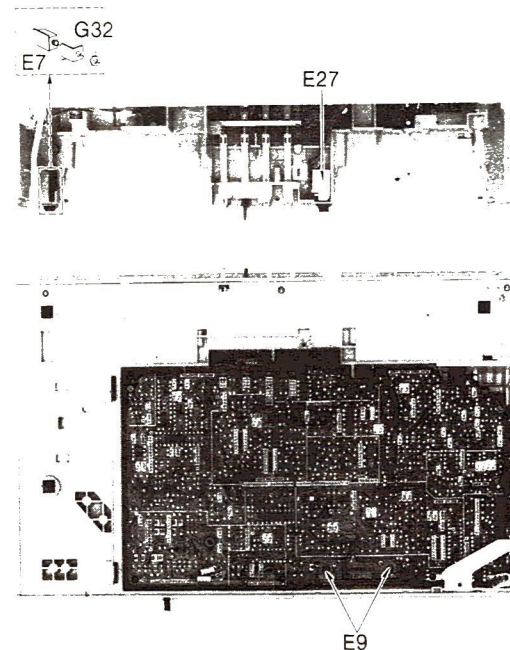
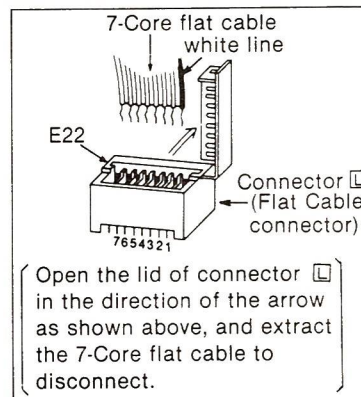
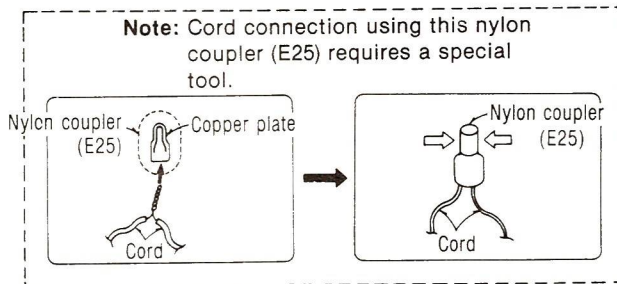
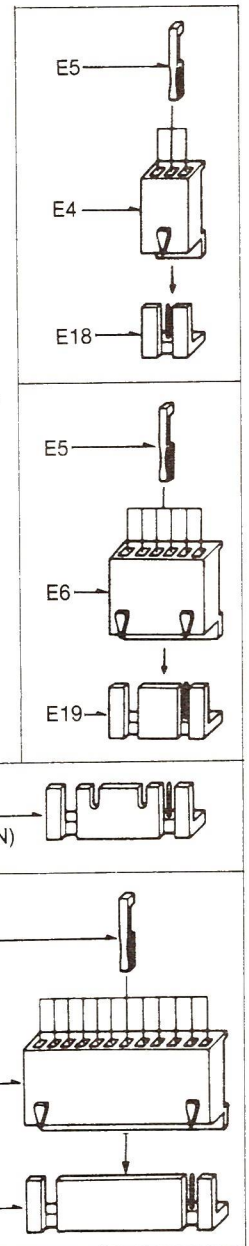
TAPE ②

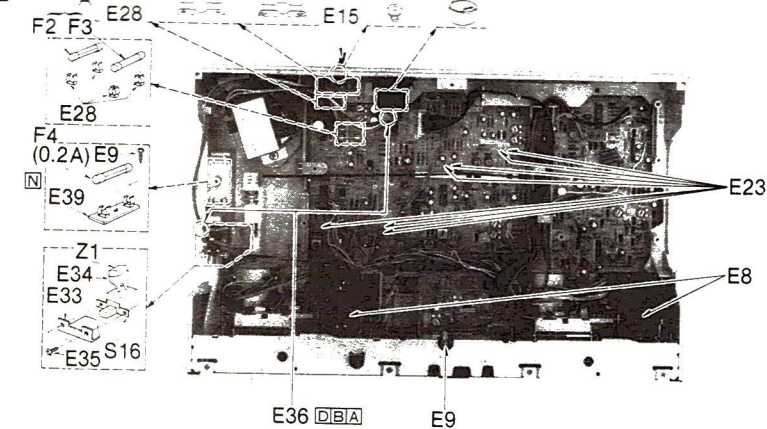


TAPE ①

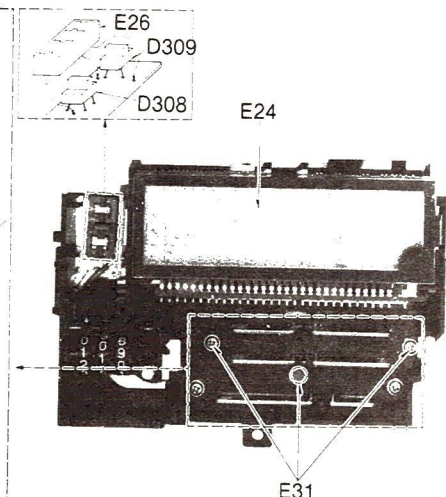
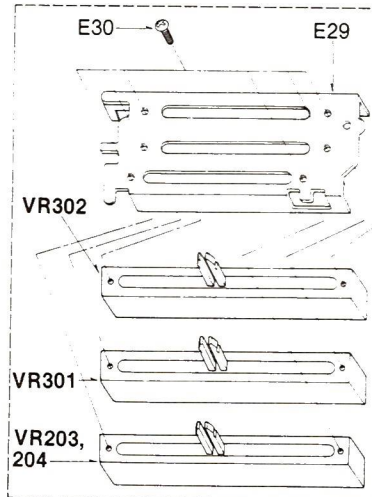
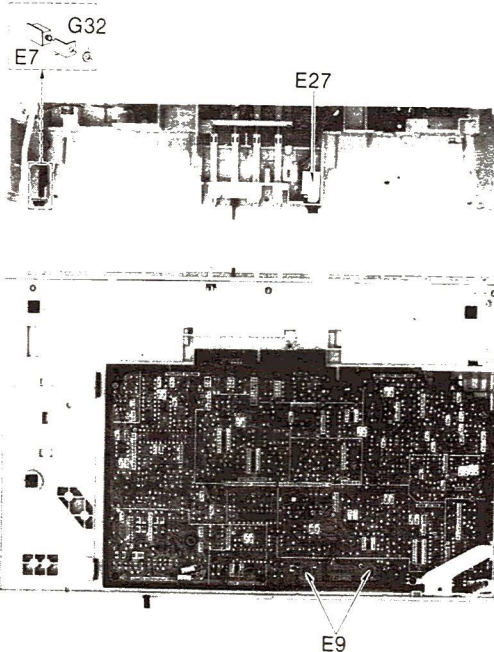
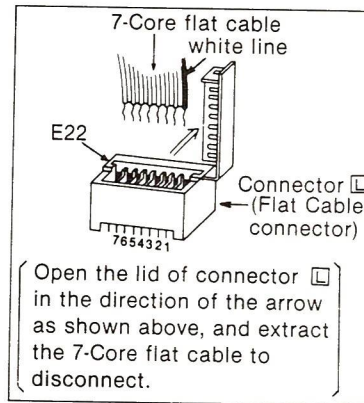
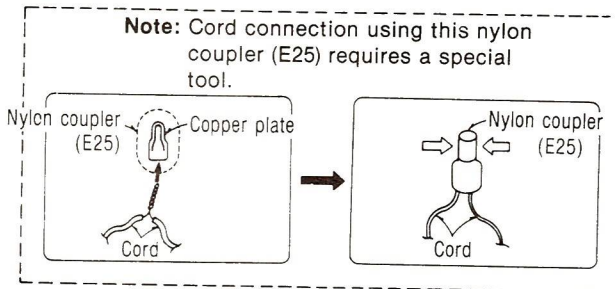
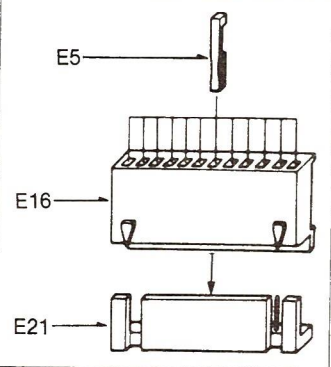
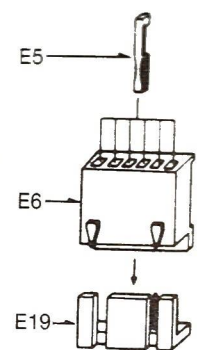


- ① For all European areas except United Kingdom.
- ② For United Kingdom.
- ③ For Asia, Latin America, Middle East and Africa areas.
- ④ For Australia.





Middle East and Africa areas.
[A] For Australia.



REPLACEMENT PARTS LIST

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

Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description
ELECTRICAL PARTS			[N] Δ RJA52ZBK AC Power Cord [For Asia, Latin America, Middle East and Africa areas.]			E 34 [DBA] QTW1195 Spark Killer Cover [For all European areas and Australia.]		
E 1	QWY4122Z	Record/Playback Head	E 16	QJS1924TN	12 Pin Socket	E 35	XSN3 + 6S	Screw
E 2	QWY2143Z	Erase Head [TAPE 1]	E 18	QJP1921TN	3 Pin Post	E 36		
E 3	QWY2138Z	Erase Head [TAPE 2]	E 19	QJP1922TN	6 Pin Post	[DBA] QTD1315		Cord Clamper
E 4	QJS1921TN	3 Pin Socket	E 20	QJP1923TN	9 Pin Post	[For all European areas and Australia.]		
E 5	QJT1054	Contact	E 21	QJP1924TN	12 Pin Post	E 39		
E 6	QJS1922TN	6 Pin Socket	E 22	QJS1962S	Socket	[N] Δ QTF1051		Fuse Holder
E 7	QTW1281	Insulator Sheet				[For Asia, Latin America, Middle East and Africa areas.]		
E 8	QTW1283	Insulator Sheet	E 23	QJT1041	Contact Terminal			
E 9	XTN3 + 10B	Tapping Screw	E 24	QSiFL005F	FL Meter			
E 10	XTN3 + 12B	Tapping Screw	E 25	Δ QJT1079	Nylon Coupler			
E 11			E 26	QKJ0534	LED Holder			
[DBA] QTD1164		Cord Bushing	E 27	QTS1544	Microphone Shield Plate			
[For all European areas and Australia.]			E 28	Δ QTF1054	Fuse Holder			
E 14 [N] QTD1129		Cord Bushing	E 29	QMA4394	Volume Angle			
[For Asia, Latin America, Middle East and Africa areas.]			E 30	XSN2 + 3	Screw $\phi 2 \times 3$			
E 15[D] Δ SJA88		AC Power Cord	E 31	XSN26 + 5	Screw $\phi 2.6 \times 5$			
[For all European areas except United Kingdom.]			E 32					
[B] Δ RJA45YAK		AC Power Cord	[DBA] QTW0026		Switch Cover			
[For United Kingdom.]			[For all European areas and Australia.]					
[A] Δ SJAG23		AC Power Cord	E 33	QMA4224	Power Switch Angle			
[For Australia.]			E 34 [N] QTW1118		Spark Killer Cover			
			[For Asia, Latin America, Middle East and Africa areas.]					

NOTES: RESISTORS

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

CAPACITORS

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

ECED.....Electrolytic
ECEDN.....Non polar electrolytic
EQS.....Polystyrene
ECSD.....Tantalum
QCS.....Tantalum

REPLACEMENT PARTS LIST

Important safety notice
Components identified by Δ mark have special characteristics important for safety.

When replacing any of these components, use only manufacturer's specified parts.

Ref No.	Part No.	Ref No.	Part No.
RESISTORS			
R 1, 2	ERD25FJ100	R 155	ERD25TJ223
R 3, 4	ERD25TJ224	R 156	ERD25TJ153
R 5, 6	ERD25FJ101	R 157	ERD25TJ473
R 7, 8	ERD25FJ680	R 158	ERD25FJ182
R 9, 10	ERD25TJ124	R 159, 160	ERD25FJ101
R 11, 12, 13, 14, 15, 16		R 161, 162, 163	
		R 164	ERD25FJ103
R 17, 18	ERD25FJ472	R 165	ERD25TJ223
R 19, 20	ERD25FJ560	R 166	ERD25FJ103
R 21, 22	ERD25TJ473	R 167, 168	ERD25FJ561
R 23, 24	ERD25TJ683		
		R 169	ERD25FJ103
		R 170	ERD25FJ182
R 25, 26	ERD25FJ102	R 171	ERD25FJ182
R 27, 28	ERD25TJ274	R 172	ERD25FJ562
R 29, 30	ERD25TJ105	R 201, 202	ERD25TJ224
R 31, 32	ERD25TJ474	R 205, 206	ERD25FJ101
R 33, 34	ERD25TJ473	R 207, 208	ERD25FJ181
R 35, 36	ERD25FJ332	R 209	ERD25FJ684
R 37, 38	ERD25FJ181	R 211, 212	ERD25TJ273
R 39, 40	ERD25TJ274	R 213, 214	ERD25FJ392
R 41, 42	ERD25TJ184		
R 43	ERD25FJ151	R 217, 218	ERD25FJ152
		R 219, 220	ERD25FJ821
R 44	ERD25FJ181	R 221, 222	ERD25FJ472
R 45, 46	ERD25FJ272	R 223, 224	ERD25TJ224
R 47, 48, 49, 50		R 225, 226	ERD25FJ272
		R 227, 228	ERD25TJ224
R 51, 52	ERD25FJ102	R 229, 230	ERD25FJ272
R 55, 56	ERD25FJ822	R 231, 232	ERD25TJ473
R 57, 58	ERD25TJ123	R 233	ERD25FJ472
R 59, 60	ERD25FJ102	R 234	ERD25FJ103
R 61, 62	ERD25FJ392	R 235, 236	ERD25TJ563
R 63, 64	ERD25FJ152	R 301, 302	ERD25TJ223
R 67, 68	ERD25TJ104	R 303, 304	ERD25TJ474
		R 305, 306	ERD25FJ102
R 69, 70	ERD25TJ393	R 307, 308	ERD25FJ103
R 71, 72	ERD25TJ154	R 309, 310	ERD25TJ393
R 73, 74	ERD25FJ102	R 311, 312	ERD25FJ472
R 75 [DB]	ERG12ANJ270	R 313, 314	ERD25TJ473
	[For all European areas.]	R 315	ERD25FJ472
	[AN] ERD25FJ270	R 316	ERD25FJ103
	[For Australia, Asia, Latin America, Middle East and Africa areas.]		
R 76 [DB]	ERG2ANJ560	R 317	ERD25TJ223
	[For all European areas.]	R 319	ERD25TJ105
	[AN] ERD25FJ560	R 320	ERD25TJ154
	[For Australia, Asia, Latin America, Middle East and Africa areas.]	R 321	ERD25FJ332
R 77, 78	ERD25FJ152	R 322	ERD25FJ221
R 79, 80	ERD25TJ474	R 323	ERD25FJ471
R 81, 82	ERD25FJ151	R 324	ERD25FJ150
R 83, 84	ERD25FJ103	R 325	ERD25FJ221
R 85, 86	ERD25TJ563	R 326	ERD25FJ562
		R 327	ERD25TJ563
R 87, 88		R 328	ERD25TJ563
		R 329, 330, 331	
[DB] ERD25TJ333			ERD25FJ103
[For all European areas.]		R 332, 333	ERD25FJ821
R 101	ERD25FJ103	R 334	ERD25TJ563
R 102, 103	ERD25FJ472	R 401	ERD25FJ180
R 105, 106	ERD25FJ103	R 402	ERD25FJ100
R 108	ERD25FJ102	R 403, 404	ERD25FJ562
R 111, 112	ERD25FJ103	R 405	ERD25FJ100
R 113	ERD25TJ563	R 406	ERD25FJ821
R 113	ERD25FJ562		
R 114	ERD25TJ563	R 407, 408	
R 116	ERD25FJ562		[DB] ERG2ANJ101
			[For all European areas.]
			[AN] ERD25FJ101
			[For Australia, Asia, Latin America, Middle East and Africa areas.]
R 117 [DB]	ERD25TJ104		
	[For all European areas.]	R 410	ERD25FJ821
R 118	ERD25FJ103	R 411	ERD25FJ681
R 119, 120	ERD25FJ472	R 412	ERD25FJ152
R 121, 122	ERD25FJ103	R 413	ERD25FJ182
R 123	ERD25FJ102	R 414	ERD25FJ222
R 124 [DB]	ERD25TJ563	R 415	ERD25FJ272
	[For all European areas.]	R 501, 502, 503	
	[AN] ERD25FJ562		ERD25FJ562
	[For Australia, Asia, Latin America, Middle East and Africa areas.]	R 504	ERD25TJ154
R 125 [DB]	ERD25TJ563	R 506	ERD25FJ822
	[For all European areas.]	R 507	ERD25FJ391
	[AN] ERD25FJ562		
	[For Australia, Asia, Latin America, Middle East and Africa areas.]	R 601	ERD25TJ684
		R 602	ERD25FJ471
		R 603	ERD25FJ472

Ref No.	Part No.	Ref No.	Part No.
VARIABLE CAPACITORS			
VR 1, 2	EVNM4AA00B24	D 135	SM112
VR 3, 4	EVNM4AA00B54	D 136, 137	MA161
VR 201, 202	EVNM4AA00B24	D 138	QVD1SS141T
		D 301, 302, 304, 305, 306, 307	MA161
VR 203, 204	QVBG1LU10A24	D 308	SPB26MUW
VR 301, 302	QVAG1AU10A24	D 309	SLB26GG4
		D 401, 402, 403, 404	QVDLS004EM
VR 401	EVNM4AA00B	D 405, 406, 601, 602, 603, 604, 605, 606	MA161
VR 402	EVNM4AA00B54	D 607	MA1039
VR 601	EVNM4AA00B14		
VR 602	EVNM4AA00B24	D 701	MA1220M
		D 702, 703, 704, 705, 706, 707, 708, 709, 710	Δ SM112
CAPACITORS			
C 1, 2	ECKD1H331KB	INTEGRATED CIRCUITS	
C 3, 4	ECEA1AS101	IC 2	AN6552
C 7, 8	ECQM1H273JZ	IC 3, 4	NE646N
C 9, 10	ECEA5024R7	IC 5	NJM4556D
C 11, 12	ECFDD153KXY	IC 6	AN6552
C 15, 16	ECCD1H090DC	IC 201	M5219L
C 17, 18	ECEA502R33	IC 401	AN6256
C 19, 20	ECEA1HS100	IC 501	BA336
C 21, 22	ECFDD392KVY	IC 601	AN6870N
C 23, 24	ECQM1H472JZ	MULTIPLEX FILTERS	
C 25, 26	ECQM1H273JZ	MPX 1, 2	QLM929K
C 27, 28	ECEA1HS100	TRANSISTORS	
C 29, 30	ECQM1H562JZ	Q 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14	
C 31, 32	ECEA50MR3R3		2SD636
C 33, 34	ECQM1H104JZ	Q102, 103, 104, 105	2SD636
C 35, 36	ECEA1HS100	Q 106	2SB641
C 37, 38	ECFDD473KXY	Q 107	2SB641
C 39, 40	ECEA1HS100	Q 108	2SD636
C 41	ECEA1AS331	Q 109	2SB641
C 42	ECEA0JS102	Q 110	2SD636
		Q 111	2SB641
C 43, 44	ECEA502R33	Q 112, 112	2SD636
C 45, 46	ECCD1H221K	Q 113	2SB641
C 49, 50	ECQM1H183JZ	Q 114	2SD636
C 51, 52	ECQM1H272JZ	Q 115	2SD946
C 53, 54	ECQM1H103JZ	Q 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211	
C 55, 56	ECQM1H822JZ		2SB641
C 57, 58, 59, 60		Q 301, 302, 303, 304, 305, 306	2SD636
		Q 307	2SB641
C 61, 62	ECFDD223KXY	Q 401	2SD592
C 63, 64	ECKD2H121KB	Q 402 [DB]	2SD592
C 65, 66	ECEA1HN010		[For all European areas.]
			[AN] 2SD636
C 71, 72	ECEA5024R7		[For Australia, Asia, Latin America, Middle East and Africa areas.]
C 73, 74	ECKD1H102MD	Q 501	2SD636
C 75, 76	ECEA502R2	Q 601	2SB641
C 77, 78	ECKD1H391KB	Q 602, 603	2SD636
C 79, 80	ECKD1H561KB	Q 701	2SD1265
C 101	ECEA1HS100		
C 102, 103	ECEA1ES220	Q 702	2SB941
C 104	ECEA1AS470	Q 703	2SD965
C 105	ECEA1ES220		
C 106	ECEA5024R7		
C 107	ECEA1ES101		
C 108, 109	ECEA502R33		
C 110 [DB]	ECEA502R2		
	[For all European areas.]		
	[AN] ECEA1ES220		
	[For Australia, Asia, Latin America, Middle East and Africa areas.]		
C 111	ECEA502R2		
C 201, 202	ECCD1H221K		
C 203, 204	ECCD1H101KC		
C 207, 208	ECEA1AS470		
C 209, 210	ECQM1H472JZ		
C 211, 212	ECEA502R33		
C 215	ECEA1AS470		
C 216	ECEA1AS101		
C 217, 218, 219, 220			
C 221, 222	ECFDD153KXY		
C 223	ECCD1H151KD		
C 301, 302, 303	ECEA1HS100		
	ECEA5021		
C 304	ECCD1H151KD		
C 305	ECCD1H102MD		
C 306	ECCD1H103ZF		
C 307	ECEA5021		
C 308, 309	ECEA1AS471		
C 310	ECEA502R33		
C 311	ECEA1AS101		
C 401	ECQP1H03JZ		
C 402	ECEA1ES101		
C 403	ECFDD153KXY		
C 404	ECFDD822KVY		
C 405, 406	ECCD1H101KC		

NOTES:

- S1-1—S1-12.....Record/playback select switch (shown in playback position).
①...Playback, ②...Record
- S2-1—S2-4Dolby NR IN/OUT select switch (shown in OUT position).
①...Dolby OUT, ②...Dolby IN
- S3-1—S3-6Dubbing/Mixing switch (shown in OFF position).
①...OFF, ②...ON
- S4-1, S4-2.....Dubbing speed switch (shown in Normal; 4.8cm/s).
①...NORMAL, ②...HIGH
- S5-1Record muting switch (shown in OFF position).
- S6TAPE ② (Record/Playback deck): playback switch (shown in stop mode)
- S7TAPE ② (Record/Playback deck): FF/Rewind switch (shown in stop mode)
- S8TAPE ① (Playback deck): playback switch (shown in stop mode)
- S9TAPE ① (Playback deck): FF/Rewind switch (shown in stop mode)
- S10TAPE ① (Playback deck): playback EQ select switch (shown in 7.5kHz)
- S11TAPE ① (Playback deck): pause switch (shown in OFF position)
- S12TAPE ② (Record/Playback deck): auto tape select switch (For M)
- S13TAPE ② (Record/Playback deck): auto tape select switch (For C)
- S14TAPE ① (Playback deck) Motor switch.
- S15TAPE ② (Record/Playback deck) Motor switch.

Ref No.	Part No.	Part Name & Description
COILS		
L 1, 2	QLQX0332KWA	Peaking Coil
L 3, 4	QLQX0343KWA	Bias Trap Coil
L 5	QLQX0332KWA	Peaking Coil
L 401	QLB0198K	Bias Oscillation Coil
TRANSFORMER		
T 1 [DB]	QLQPD70ELC	AC Power Transformer
	[For all European areas.]	
	[AN] QLPN77ELC	AC Power Transformer
	[For Australia, Asia, Latin America, Middle East and Africa areas.]	
FUSES		
F 1 [DB]	XBAQ0004	Fuse (T 1A)
	[For all European areas.]	
	[AN] XBA1C10NS5	Fuse (T 1A)
	[For Australia, Asia, Latin America, Middle East and Africa areas.]	
F 2, 3		
	[DB] XBAQ0008	Fuse (T 630mA)
	[For all European areas.]	
F 4 [N]	XBAQ2E02NS5	Fuse (0.2A)
	[For Asia, Latin America, Middle East and Africa areas.]	
SWITCHES		
S 1	QSSC208	Slide Switch (Record/Playback)
S 2	QSWX411	Push Switch (Dolby, DUB/MIX, Speed Rec Mute)
S 3, 4, 5	QSWX411	Push Switch (Dolby, DUB/MIX, Speed, Rec Mute)
S 6	QSB0251	Leaf Switch (Tape ① Playback Switch)
S 7	QSB0251	Leaf Switch (Tape ② FF/REW Switch)
S 8	QSB0251	Leaf Switch (Tape ② Playback Switch)
S 9	QSB0251	Leaf Switch (Tape ① FF/REW Switch)
S 10	QSB0251	Leaf Switch (Tape ① Playback EQ Switch)
S 11	QSB0251	Leaf Switch (Tape ① Pause Switch)
S 12	QSB0251	Leaf Switch (Auto Tape Select Switch for Metal)
S 13	QSB0251	Leaf Switch (Auto Tape Select Switch for CrO ₂)
S 14	QSB0253	Leaf Switch (Tape ① Motor Switch)
S 15	QSB0253	Leaf Switch (Tape ② Motor Switch)
S 16 Δ	QSW1117AS	Power Switch
S 17 Δ	QSR1407	AC Power Voltage Select Switch
JACKS		
J 1	QJA0258	Mic Jack
J 2	QJA0259	Headphones Jack
J 3, 4, 5, 6	QEJ5003S	Jack Board

21 22	ERD25FJ683	R 169	ERD25FJ563	C 9, 10	ECEA50Z4R7
23 24	ERD25TJ224	R 170	ERD25FJ103	C 11, 12	ECEA50Z4R7
25 26	ERD25FJ102	R 171	ERD25FJ182	C 15, 16	ECCD1H090DC
27 28	ERD25TJ274	R 172	ERD25FJ562	C 17, 18	ECEA50Z3R3
29 30	ERD25TJ105	R 201, 202	ERD25TJ224	C 19, 20	ECEA1HS100
31 32	ERD25TJ474	R 205, 206	ERD25FJ101	C 21, 22	ECCDD392KVY
33 34	ERD25TJ473	R 207, 208	ERD25FJ181	C 23, 24	ECQM1H472JZ
35 36	ERD25FJ332	R 209	ERD25FJ684	C 25, 26	ECQM1H273JZ
37 38	ERD25FJ181	R 211, 212	ERD25TJ273	C 27, 28	ECEA1HS100
39 40	ERD25TJ274	R 213, 214	ERD25FJ392	C 29, 30	ECQM1H562JZ
41 42	ERD25TJ184			C 31, 32	ECEA50MR3R3
43	ERD25FJ181			C 33, 34	ECQM1H104JZ
44	ERD25FJ181	R 217, 218	ERD25FJ152	C 35, 36	ECEA1HS100
45 46	ERD25FJ272	R 219, 220	ERD25FJ821	C 37, 38	ECCDD473KXY
47 48 49 50		R 221, 222	ERD25FJ472	C 39, 40	ECEA1HS100
51 52	ERD25FJ102	R 223, 224	ERD25TJ224	C 41	ECEA1AS331
53 54	ERD25FJ820	R 225, 226	ERD25FJ272	C 42	ECEA0JS102
55 56	ERD25TJ123	R 227, 228	ERD25TJ224		
57 58	ERD25FJ102	R 229, 230	ERD25FJ272		
59 60	ERD25FJ392	R 231, 232	ERD25TJ473		
61 62	ERD25FJ152	R 233	ERD25FJ472		
63 64	ERD25TJ104	R 234	ERD25FJ103		
65 66		R 235, 236	ERD25TJ563		
67 68		R 301, 302	ERD25TJ223		
69 70	ERD25TJ393	R 303, 304	ERD25TJ474		
71 72	ERD25TJ154	R 305, 306	ERD25FJ102		
73 74	ERD25FJ102	R 307, 308	ERD25FJ103		
75 [DB]	ERG12ANJ270	R 309, 310	ERD25TJ393		
[For all European areas.]		R 311, 312	ERD25FJ472		
[AN] ERD25FJ270		R 313, 314	ERD25TJ473		
[For Australia, Asia, Latin America, Middle East and Africa areas.]		R 315	ERD25FJ472		
[5 [DB] ERG2ANJ560		R 316	ERD25FJ103		
[For all European areas.]					
[AN] ERD25FJ560		R 317	ERD25TJ223		
[For Australia, Asia, Latin America, Middle East and Africa areas.]		R 319	ERD25TJ105		
[77 78	ERD25FJ152	R 320	ERD25TJ154		
79 80	ERD25TJ474	R 321	ERD25FJ332		
81 82	ERD25FJ151	R 322	ERD25FJ221		
83 84	ERD25FJ103	R 323	ERD25FJ471		
85 86	ERD25TJ563	R 324	ERD25FJ150		
		R 325	ERD25FJ221		
		R 326	ERD25FJ562		
		R 327	ERD25TJ563		
		R 328	ERD25TJ563		
		R 329, 330, 331			
			ERD25FJ103		
		R 332, 333	ERD25FJ821		
		R 334	ERD25TJ563		
		R 401	ERD25FJ1R0		
		R 402	ERD25FJ100		
		R 403, 404	ERD25FJ562		
		R 405	ERD25FJ100		
		R 406	ERD25FJ821		
		R 407, 408			
		[DB] ERG2ANJ101			
		[For all European areas.]			
		[AN] ERD25FJ101			
		[For Australia, Asia, Latin America, Middle East and Africa areas.]			
		R 410	ERD25FJ821		
		R 411	ERD25FJ681		
		R 412	ERD25FJ152		
		R 413	ERD25FJ182		
		R 414	ERD25FJ222		
		R 415	ERD25FJ272		
		R 501, 502, 503			
			ERD25FJ562		
		R 504	ERD25TJ154		
		R 506	ERD25FJ822		
		R 507	ERD25FJ391		
		R 601	ERD25TJ684		
		R 602	ERD25FJ471		
		R 603	ERD25FJ472		
		R 604	ERD25FJ182		
		R 605, 606	ERD25TJ105		
		R 607, 608	ERD25FJ102		
		R 609 [DB]	ERG1ANJ221		
			ERD25FJ682		
		R 615	ERD25TJ393		
		R 616	ERD25TJ563		
		R 617, 618			
		[DB] ERD25FJ271			
		[For all European areas.]			
		[AN] ERD25FJ181			
		[For Australia, Asia, Latin America, Middle East and Africa areas.]			
		R 619	ERD25FJ103		
		R 620	ERD25TJ683		
		R 701 [DB]	ΔERQ12HJ5R6		
		[For all European areas.]			
		[AN] ΔERD25FJ3R9			
		[For Australia, Asia, Latin America, Middle East and Africa areas.]			
		R 702 [DB]	ΔERQ12HJ5R6		
		[For all European areas.]			
		[AN] ΔERD25FJ3R9			
		[For Australia, Asia, Latin America, Middle East and Africa areas.]			
		R 703, 704 ΔERD25FJ681			
		R 705	ERD25FJ102		

IC 2	AN6552	F2 3	DBA XBAQ0008	Fuse IT 630mA
IC 3, 4	NE646N		[For a European areas.]	
IC 5	NJM4556D		F4 [N] XBAQ2E02NS5 Fuse 0.2A	
IC 6	AN6552		[For Asia, Latin America, Middle East and Africa areas.]	
IC 201	M5219L			
IC 401	AN6256			
IC 501	BA336			
IC 601	AN6870N			
SWITCHES				
MULTIPLEX FILTERS				
MPX 1, 2	QLM9Z9K	S 1	QSSC208	Slide Switch (Record/Playback)
TRANSISTORS				
Q 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14		S 2	QSWX411	Push Switch (Dolby, DUB/MIX, Speed Rec Mute)
	2SD636	S 3, 4, 5	QSWX411	Push Switch (Dolby, DUB/MIX, Speed, Rec Mute)
Q102, 103, 104, 105	2SD636	S 6	QSB0251	Leaf Switch (Tape 1 Playback Switch)
Q 106	2SB641	S 7	QSB0251	Leaf Switch (Tape 2 FF/REW Switch)
Q 107	2SB641	S 8	QSB0251	Leaf Switch (Tape 2 Playback Switch)
Q 108	2SD636	S 9	QSB0251	Leaf Switch (Tape 1 FF/REW Switch)
Q 109	2SB641	S 10	QSB0251	Leaf Switch (Tape 1 Playback EQ Switch)
Q 110	2SD636	S 11	QSB0251	Leaf Switch (Tape 1 Pause Switch)
Q 111	2SB641	S 12	QSB0251	Leaf Switch (Auto Tape Select Switch for Metal)
Q 112, 112	2SD636	S 13	QSB0251	Leaf Switch (Auto Tape Select Switch for CrO ₂)
Q 113	2SB641	S 14	QSB0253	Leaf Switch (Tape 1 Motor Switch)
Q 114	2SD636	S 15	QSB0253	Leaf Switch (Tape 2 Motor Switch)
Q 115	2SD946	S 16	QSW1117AS	Power Switch
Q 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211		S 17	QSR1407	AC Power Voltage Select Switch
	2SB641			
Q 301, 302, 303, 304, 305, 306		J 1	QJA0258	Mic Jack
	2SD636	J 2	QJA0259	Headphones Jack
Q 401	2SB641	J 3, 4, 5, 6	QEJ5003S	Jack Board
Q 402 [DB]	2SD592			
[For all European areas.]				
[AN] 2SD638				
[For Australia, Asia, Latin America, Middle East and Africa areas.]				
Q 501	2SD636			
Q 601	2SB641			
Q 602, 603	2SD636			
Q 701	2SD1265			
Q 702	2SB941			
Q 703	2SD965			

NOTES:

- S1-1—S1-12.....Record/playback select switch (shown in playback position).
①...Playback, ②...Record
- S2-1—S2-4Dolby NR IN/OUT select switch (shown in OUT position).
①...Dolby OUT, ②...Dolby IN
- S3-1—S3-6Dubbing/Mixing switch (shown in OFF position).
①...OFF, ②...ON
- S4-1, S4-2.....Dubbing speed switch (shown in Normal: 4.8cm/s).
①...NORMAL, ②...HIGH
- S5-1Record muting switch (shown in OFF position).
- S6TAPE ② (Record/Playback deck): playback switch (shown in stop mode).
- S7TAPE ② (Record/Playback deck): FF/Rewind switch (shown in stop mode).
- S8TAPE ① (Playback deck): playback switch (shown in stop mode).
- S9TAPE ① (Playback deck): FF/Rewind switch (shown in stop mode).
- S10TAPE ① (Playback deck): playback EQ select switch (shown in 70μs mode).
- S11TAPE ① (Playback deck): pause switch (shown in OFF position).
- S12TAPE ② (Record/Playback deck): auto tape select switch (For Metal tape).
- S13TAPE ② (Record/Playback deck): auto tape select switch (For CrO₂ tape).
- S14TAPE ① (Playback deck) Motor switch.
- S15TAPE ② (Record/Playback deck) Motor switch.
- S16Power ON/OFF switch (shown in OFF position).
- S17AC power voltage select switch.
- VR1, 2TAPE ② (Record/Playback deck): playback gain adjustment VR.
- VR3, 4TAPE ② (Record/Playback deck): Recording gain adjustment VR.
- VR201, 202TAPE ① (Playback deck): playback gain adjustment VR.
- VR203, 204TAPE ① (Playback deck): output level/dubbing level controls.
- VR301, 302TAPE ② (Record/Playback deck): input level controls.
- VR401, 402Recording bias current adjustment VR.
- VR601FL meter adjustment VR (for -20dB indication).
- VR602FL meter adjustment VR (for 0dB indication).
- VR01Tape speed adjustment VR (for NORMAL speed).
- VR02Tape speed adjustment VR (for HIGH speed).
- L1, 2, 5Peaking coil.
- L3, 4Trap coil.
- L401Bias oscillation coil.
- MPX1, 2M.P.X coil.
- Resistance are in ohms (Ω), 1/4 watt unless specified otherwise.
1K = 1000Ω, 1M = 1000KΩ.
- Capacity are in microfarads (μF) unless specified otherwise.
P = Pico-farads.
- All voltage values shown in circuitry are under no signal condition and volume control at minimum position.

However, the voltage in record mode is indicated in () when it differs from that in playback mode.

TAPE ① PLAYVoltage at playback mode (TAPE ①)
TAPE ① NormalVoltage at Normal tape mode (TAPE ①)
Dubbing speed high tape MetalVoltage at Dubbing speed high, Metal tape mode.
PLAY DUBBING/MIXING SW ONVoltage at playback, dubbing/mixing on mode.
CUE/REVIEWVoltage at CUE/REVIEW mode.
Dubbing speed highVoltage at Dubbing speed high mode.
STOPVoltage at STOP mode.
TAPE ① PAUSEVoltage at Pause mode (TAPE ①).
MIC INVoltage at MIC IN mode (Auto INPUT selector).

For measurement use VTVM.

SPARK KILLERS

- Z 1 [N] Δ QCR0008T
[For Asia, Latin America, Middle East and Africa areas.]
- [DBA] Δ QCR0011B
[For all European areas and Australia.]

DIODES & RECTIFIERS

- D 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134

SCHEMATIC DIAGRAM

& Description

il
oil
il
ation Coil

transformer
transformer
Middle East

Middle East

(mA)

ast and Africa

n
(back)n
/MIX, Speedn
/MIX, Speed,

(back Switch)

(back Switch)

(back Switch)

(back EQ

se Switch)

Select Switch

Select Switch

(or Switch)

(or Switch)

Voltage Select

s Jack

(back position).

(T position).

on).

(cm/s).

switch (shown in stop mode).

switch (shown in stop mode).

switch (shown in stop mode).

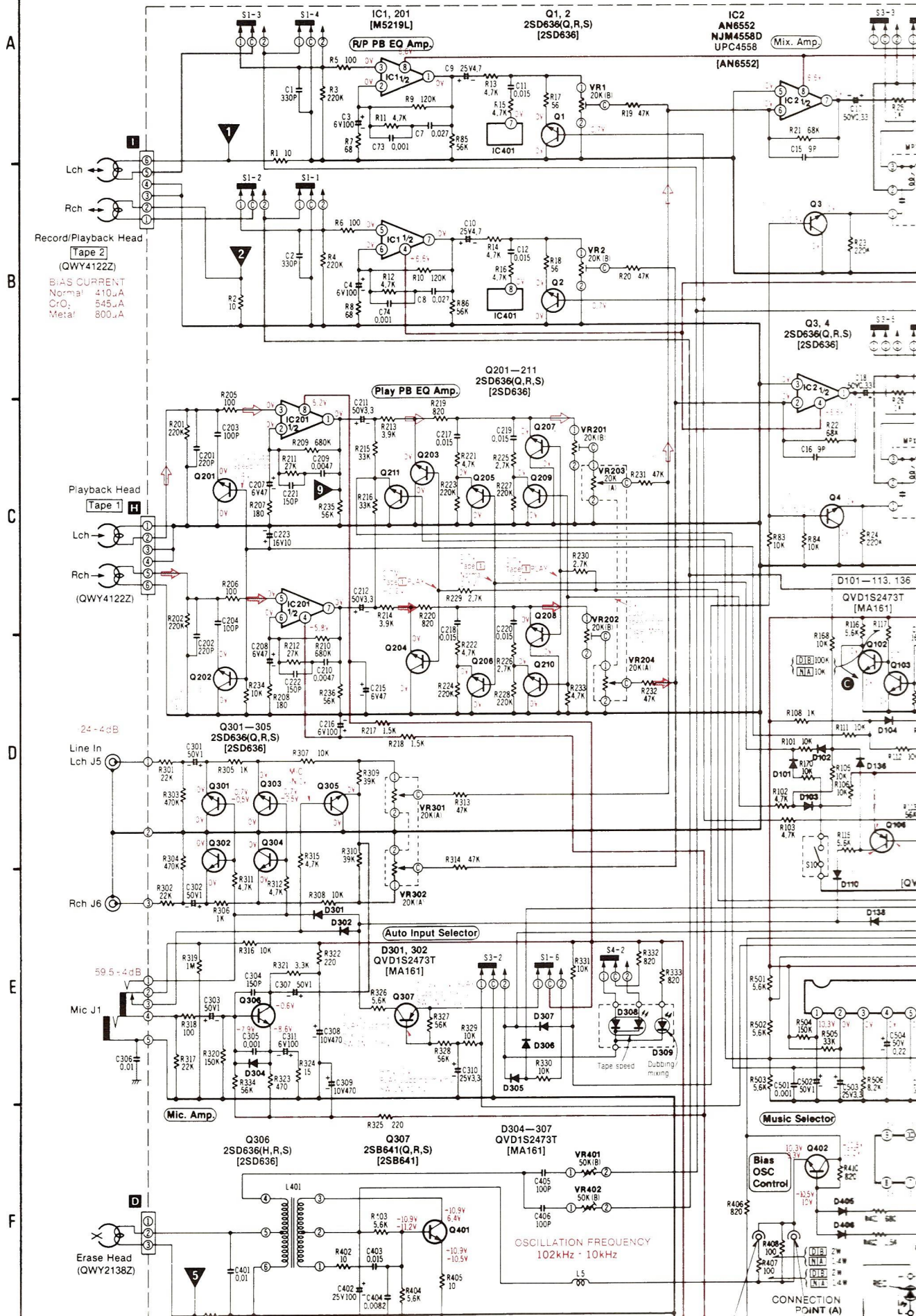
ect switch (shown in 70μs mode).

own in OFF position).

select switch (For Metal tape).

select switch (For CrO₂ tape).

ch.



st: and Africa

(back)

/MIX, Speed

/MIX, Speed,

(back Switch)

REW Switch)

(back Switch)

REW Switch)

back EQ

se Switch)

Select Switch

Select Switch

or Switch)

or Switch)

oltage Select

s Jack

(back position).

T position).

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cm/s).

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n).

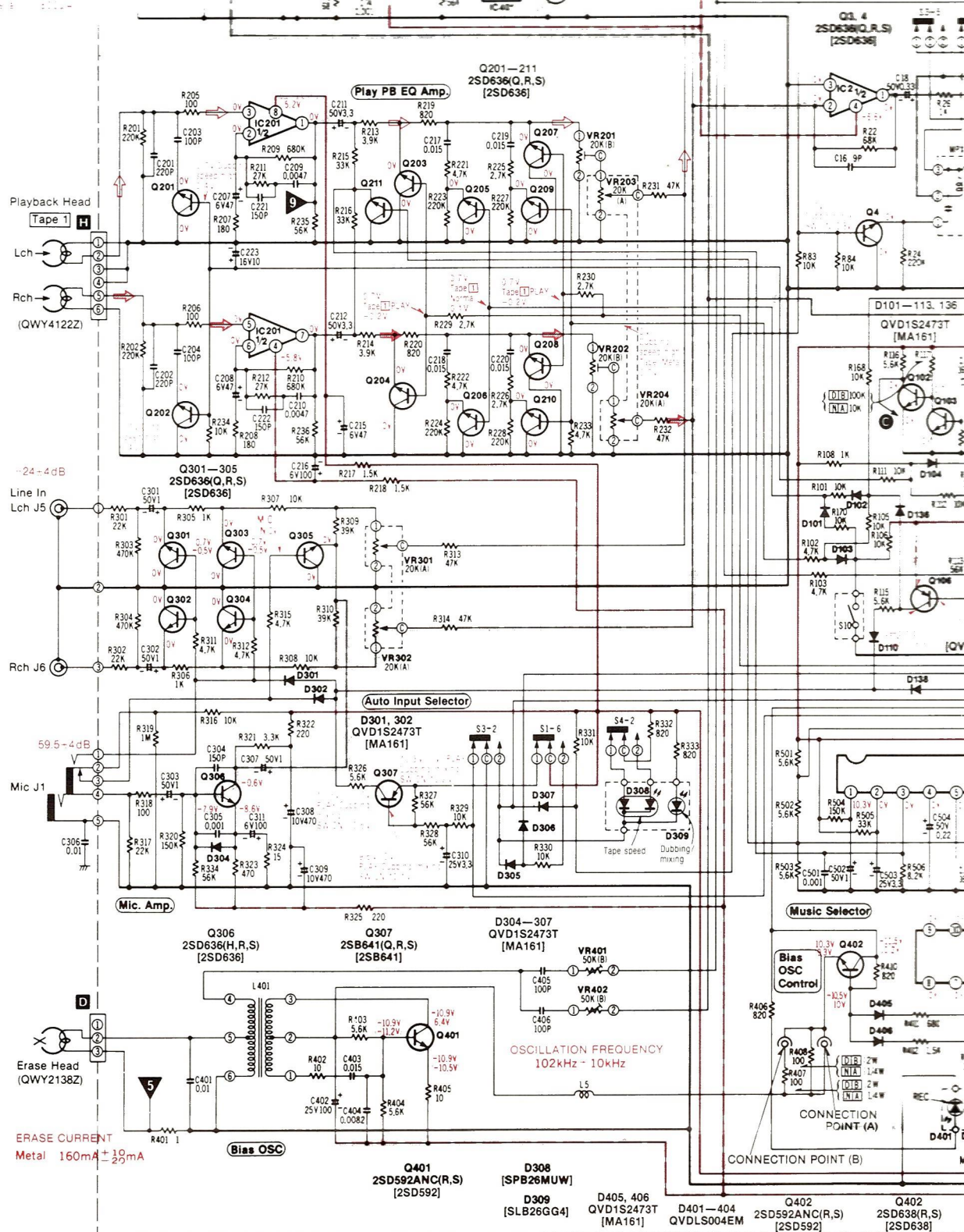
C

D

E

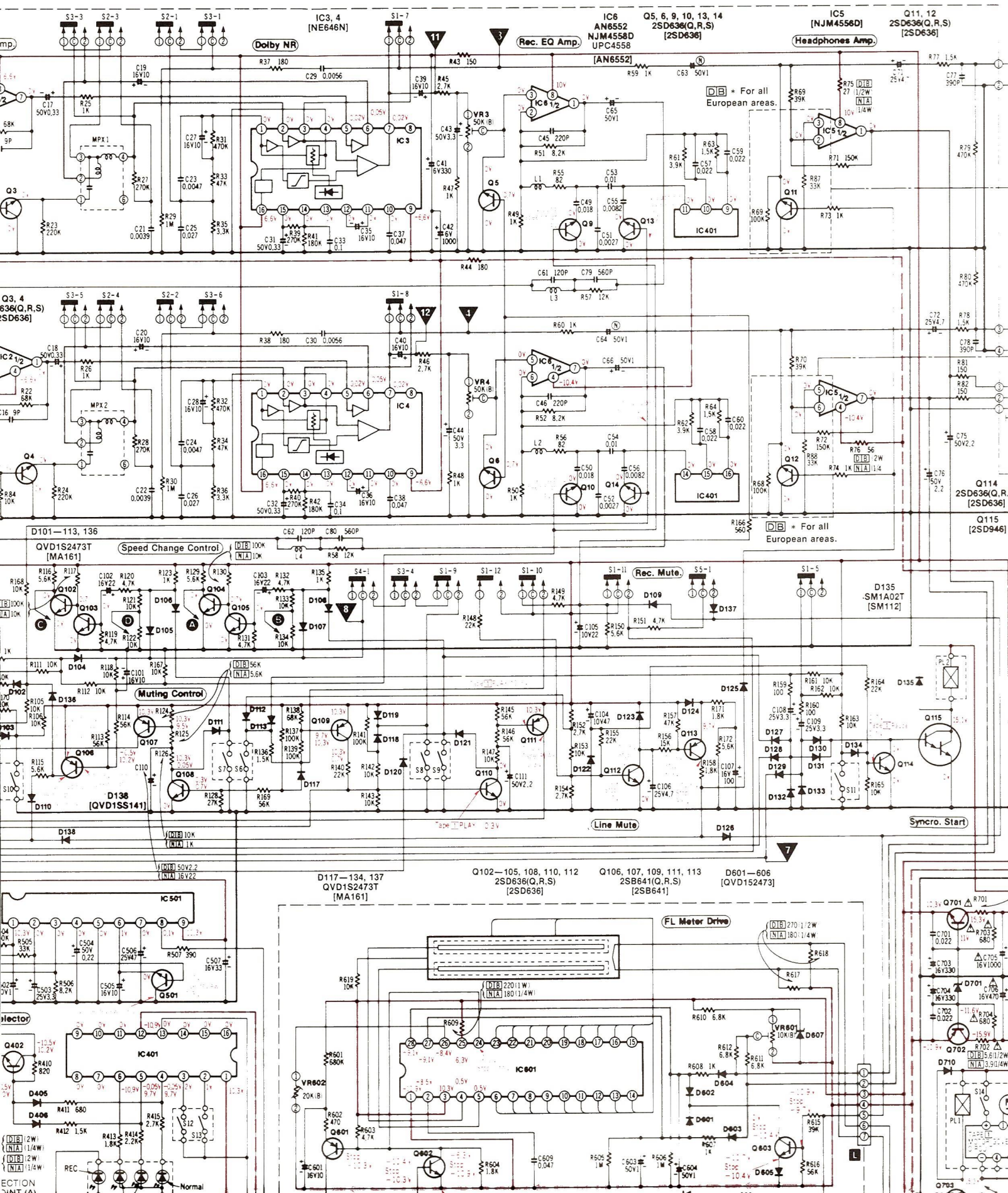
F

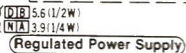
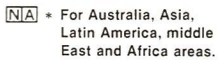
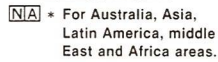
G



- The mark (▼) shows test point e.g. ▼ = Test point 1.
- () indicates +B (bias).
- () indicates B- (bias).
- () indicates the flow of the playback signal [TAPE 2].
- () indicates the flow of the recording signal [TAPE 2].
- () indicates the flow of the playback signal [TAPE 1].
- () indicates the flow of the playback signal [TAPE 1]. (Dubbing/Mixing switch: ON).
- 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.

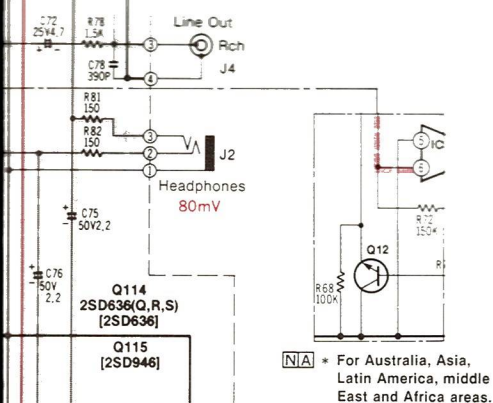
- e.g. Q701
2SC1265(O,P) — Production parts number
[2SC1265] — Supply parts number
D405, 406
QVD1S2473T — Production parts number
[MA161] — Supply parts number
- [D] For all European areas, except United Kingdom.
 - [B] For United Kingdom.
 - [N] For Asia, Latin America, Middle East and Africa areas.
 - [A] For Australia.



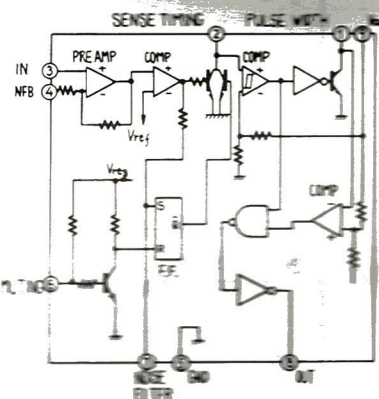
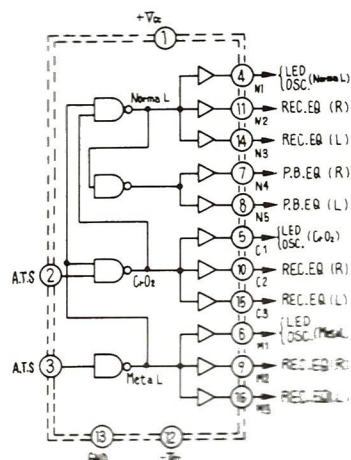


* For all European areas.

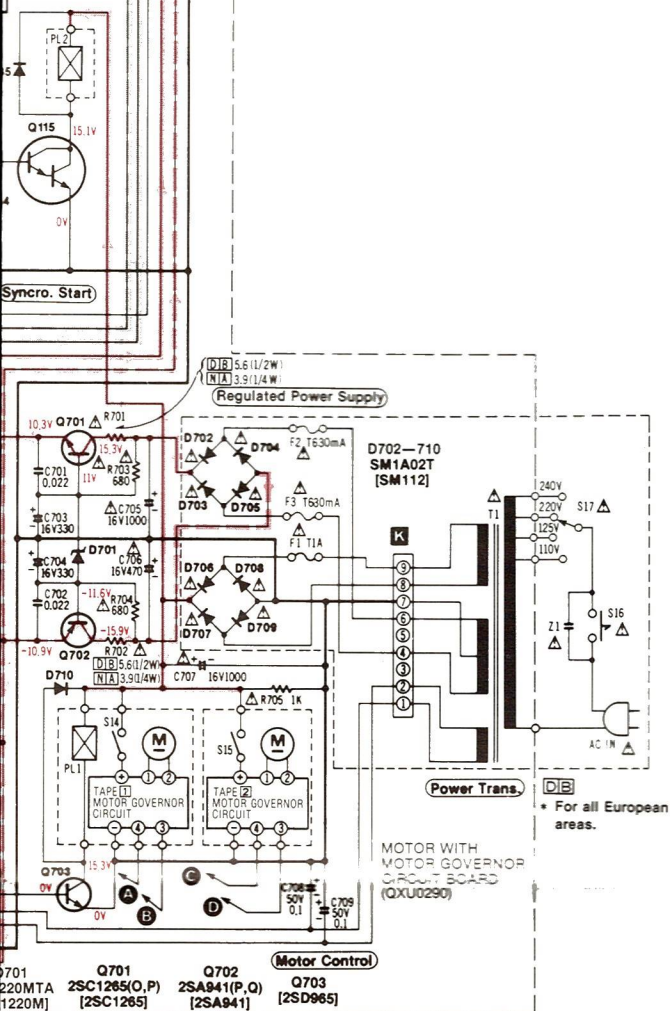
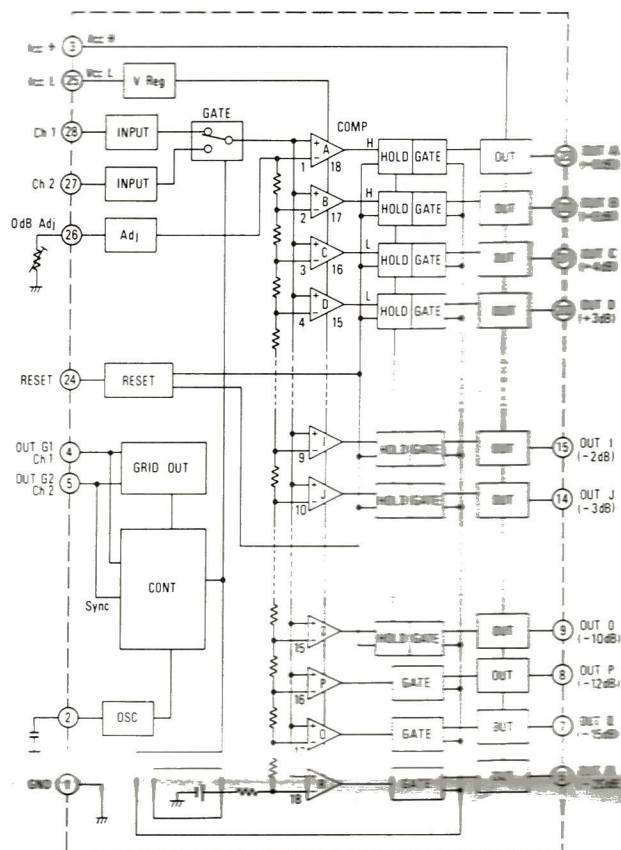
IC501 BA338
MUSIC SELECTOR



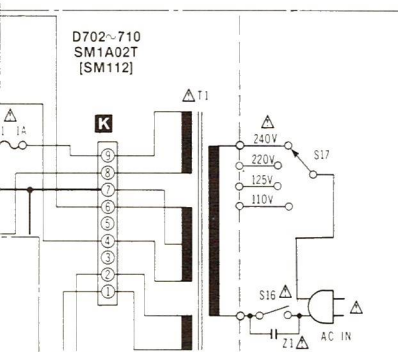
NA * For Australia, Asia, Latin America, middle East and Africa areas.



IC601 AN6870N



* For all European areas



[A] * For Australia.

SPECIFICATIONS

- * Input level controlsMAX
- * Tape **1** level control "8" position

Playback S/N ratio Test tape..... QZZCFM	Greater than 45 dB
Overall distortion Test tape ... QZZCRA for Normal ... QZZCRX for CrO ₂ ... QZZCRZ for Metal	Less than 4 %
Overall S/N ratio Test tape..... QZZCRA	Greater than 43 dB (without NAB filter)