ORDER NO. ARD82060157A4-01

Service Manual

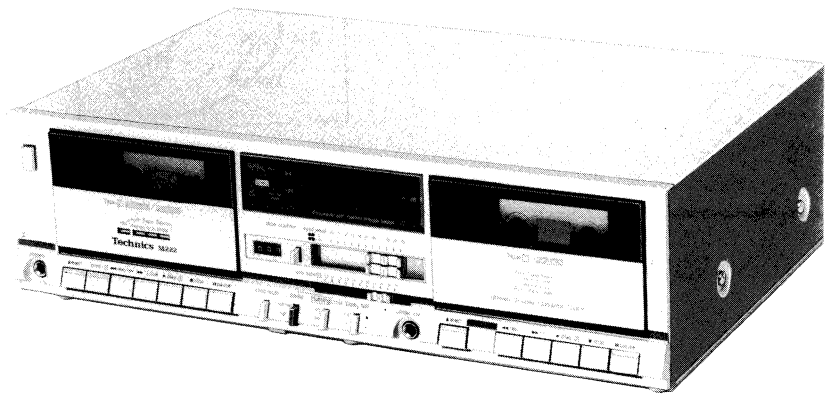
Cassette Deck

RS-M222

(Silver Face)

Double Cassette Deck Featuring 2 Dubbing Speed

* DOLBY SYSTEM



This is the Service Manual for the following areas.
F ····· For Asian PX.
J ····· For European PX.

RS-M24 MECHANISM SERIES

Please use this manual together with the service manual for model No. RS-M222 (Original) order No. ARD82040132C8-12.
This Service Manual indicates the main differences between;
RS-M222 [Original (for the N mark areas)] and RS-M222 for PX.

PARTS COMPARISON TABLE:

Please revise the original parts list in the Service Manual RS-M222 (for the N mark areas) to conform to the changes shown herein.
If new part numbers are shown, be sure to use them when ordering parts.

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 Name & Description	Part Numbers		Remarks
		N ··· For Asia, Latin America, Middle East and Africa areas.	F ··· **For Asian PX.** J ··· **For European PX.**	
G37	Tapping Screw ⊕4×10	XTB4+10BFN	———	Deleted
G39	Washer 3φ	———	XWA3B	Added
G43	Obstruction Rod [TAPE 2]	———	QMR1823	Added
G44	Lock Arm	QML3649	QML3649 [TAPE 1] QML3593 [TAPE 2]	
G57	Main Name Plate	QGS3010	QGS3035	
G61	Obstruction Rod Spring [TAPE 2]	———	QBT1597	Added
G65	Tapping Screw ⊕2×6	———	XTN2+6B	Added
G66	Switch Angle	———	QMA4224	Added
A1	Instruction Book	QQT3311	QQT3350	
A3 ⚠	AC Plug Adaptor	QJP0603S	———	Deleted
P1	Inside Carton	QPN4320	QPN4343	

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

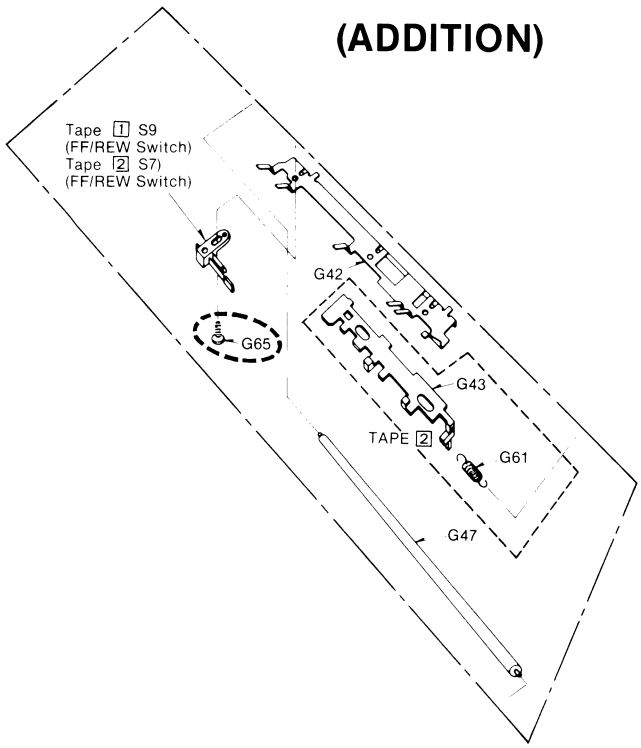
Technics

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

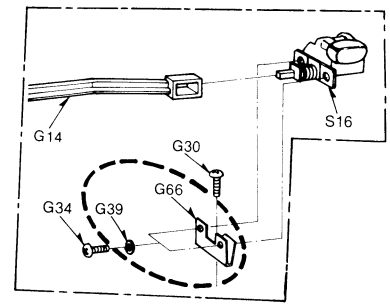
Panasonic Tokyo
Matsushita Electric Industrial Co., Ltd.
1-2, 1-chome, Shibakoen, Minato-ku, Tokyo 105 Japan

CABINET PARTS LOCATION

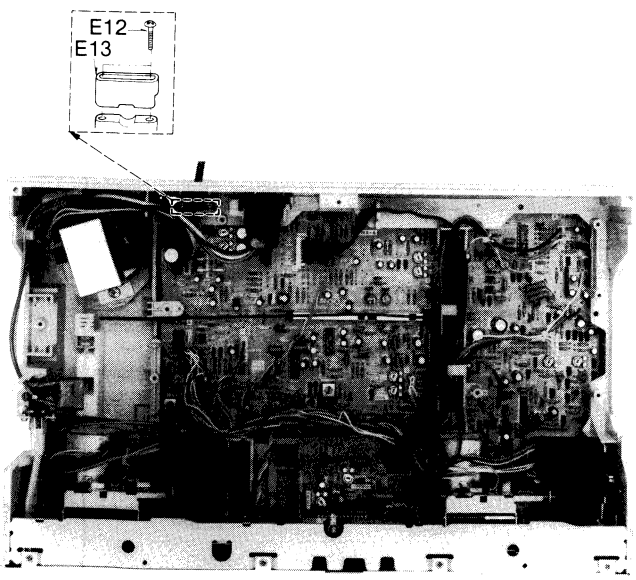
(ADDITION)



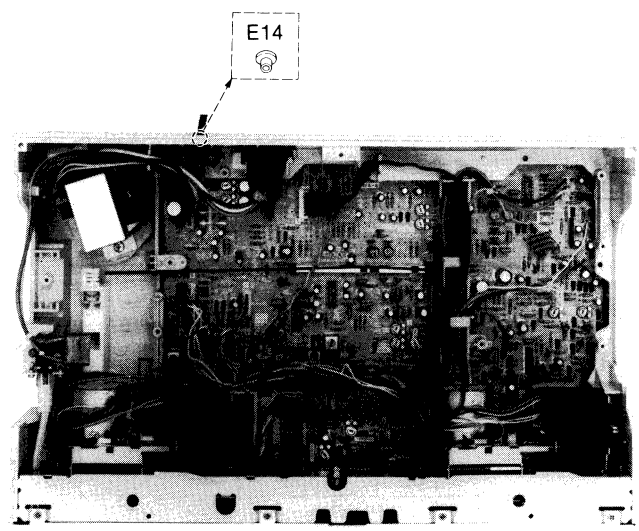
(ADDITION)



ELECTRICAL PARTS LOCATION (DIFFERENCE)



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



* For PX.

ARD
Y.M F J
Printed in Japan

ORDER NO. ARD82040132C8-12

Service Manual

Cassette Deck

RS-M222

(Silver Face)

Double Cassette Deck Featuring 2 Dubbing Speed

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.

DOLBY SYSTEM

RS-M24 MECHANISM SERIES

Specifications

Track system:	Tape deck 1; 4-track 2-channel stereo playback Tape deck 2; 4-track 2-channel stereo recording and playback
Wow and flutter:	0.048% (WRMS), ±0.14% (DIN)
Tape speed:	4.8cm/s
Frequency response:	Metal tape; 20–19,000Hz 30–18,000Hz (DIN) CrO_2 tape; 20–18,000Hz 30–17,000Hz (DIN) Normal tape; 20–17,000Hz 30–15,000Hz (DIN)
Signal-to-noise ratio:	Dolby* NR in; 67dB (above 5kHz) Dolby NR out; 57dB (signal level = max. input level A weighted, CrO_2 type tape)
Fast forward and rewind time:	Approx. 90 seconds with C-60 cassette tape
Inputs:	MIC; sensitivity 1.0mV, applicable microphone impedance 400Ω–10kΩ LINE; sensitivity 60mV, input impedance more than 47kΩ
Outputs:	LINE; output level 400mV, output impedance 2.5kΩ or less HEADPHONES; output level 80mV (8Ω) applicable headphone impedance 8Ω–600Ω
Bias frequency:	102kHz
Motor:	Electrical DC governor motor
Heads:	Tape deck 1; 1 MX head for playback Tape deck 2; 1 MX head for recording and playback 1 double-gap ferrite head for erasure
Power requirements:	AC; 110/125/220/240V, 50-60Hz [N][A][B] ... Pre-set power voltage 240V [D] ... Pre-set power voltage 220V
Power consumption:	15W
Dimensions:	43.0cm(W) × 11.9cm(H) × 27.8cm(D)
Weight:	5.6kg

Specifications are subject to change without notice.

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

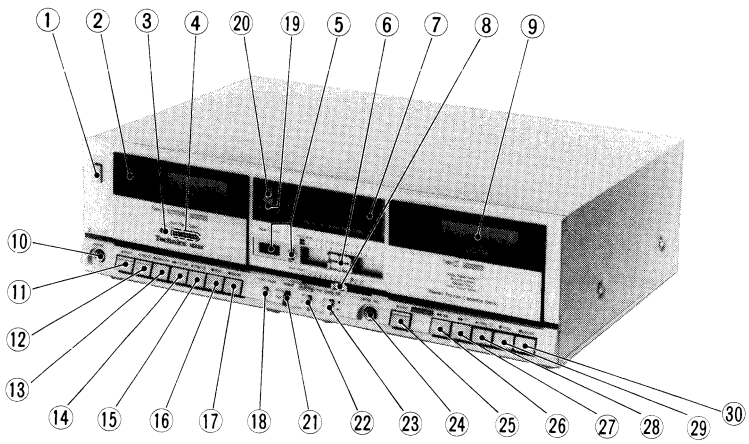
Technics

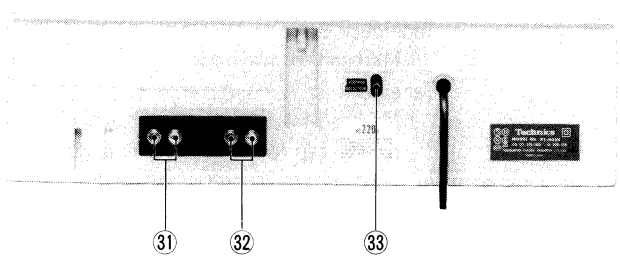
Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

RS-M222

CONTENTS

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 • CrO_2 • Metal)]
⑤ Tape counter and reset button [tape counter]
⑥ Input level controls [input level (▙-L • ▛-R)]
⑦ Fluorescent level meter
⑧ Tape [1] level control [level — tape [1]]
⑨ Cassette holder
⑩ Headphones jack [phones]
⑪ Eject button [▲ eject]
⑫ Record button [○ rec-◱]
⑬ Rewind/review 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 [o rec mute]
⑲ Dubbing speed indicator [[speed] (high (red) • normal (green))]
⑳ Dubbing/mixing indicator [[dubbing]/mix]
㉑ Dubbing speed switch [speed (normal (▟) • high (▁))]
㉒ Dubbing/mixing switch [dubbing/mix (off (▟) • on (▁))]
㉓ Dolby NR switch [Dolby NR (out (▟) • in (▁))]
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 adjust 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.

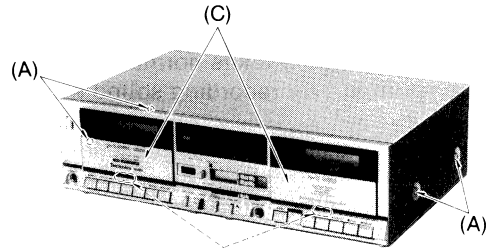
Operation:
Set the Dubbing/mixing switch to "on," push down the Pause button of Tape [1] and then push down the Play button to set the unit to the playback standby mode.
When the Record button of Tape [2] is pushed down, the Pause button of Tape [1] is automatically released. This starts the recording of Tape [2] and, simultaneously, starts the playback or 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

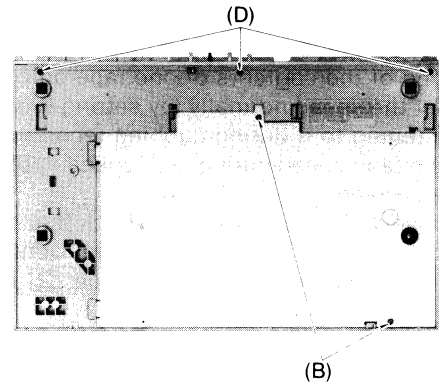


Fig. 2

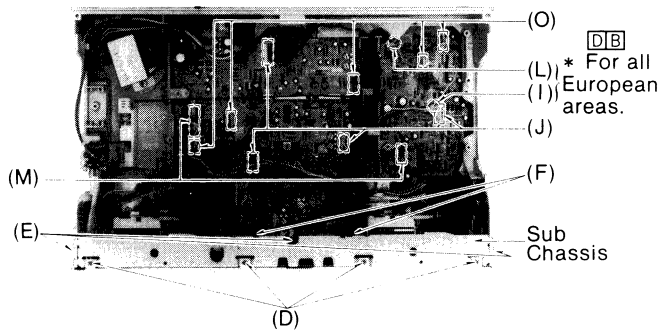


Fig. 3

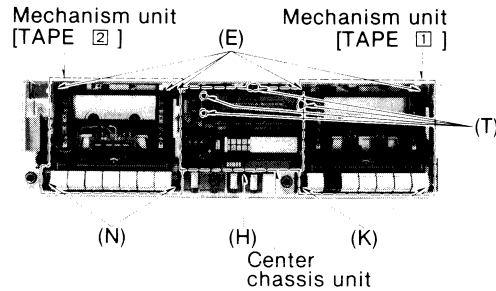


Fig. 4

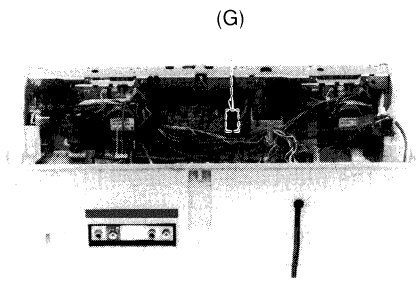


Fig. 5

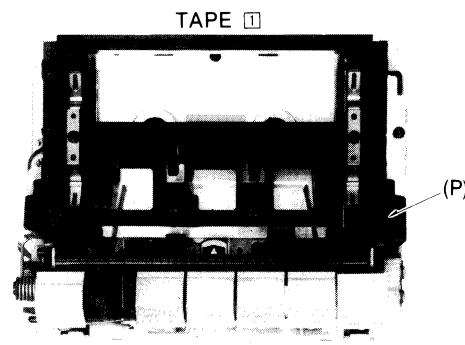


Fig. 6

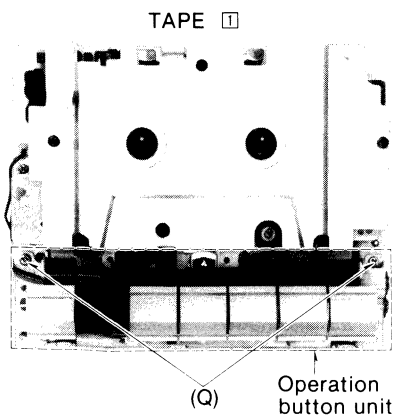


Fig. 7

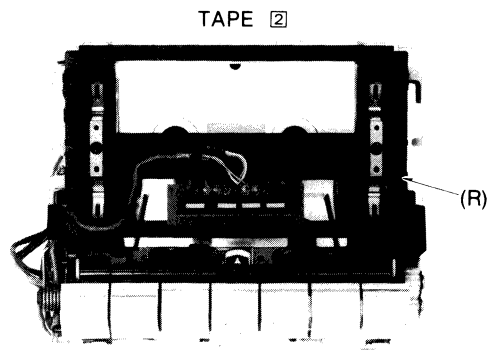


Fig. 8

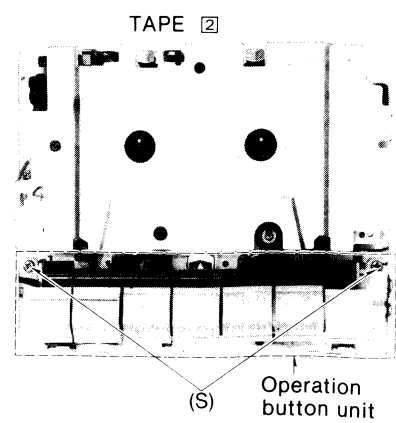


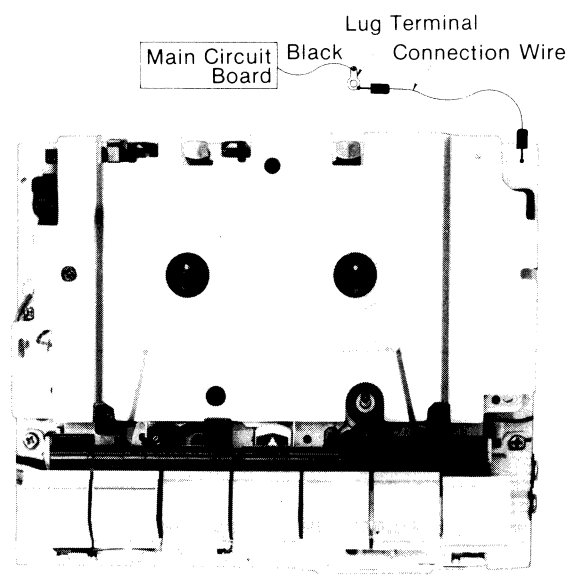
Fig. 9

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) [D][B] ※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) [D][B] ※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

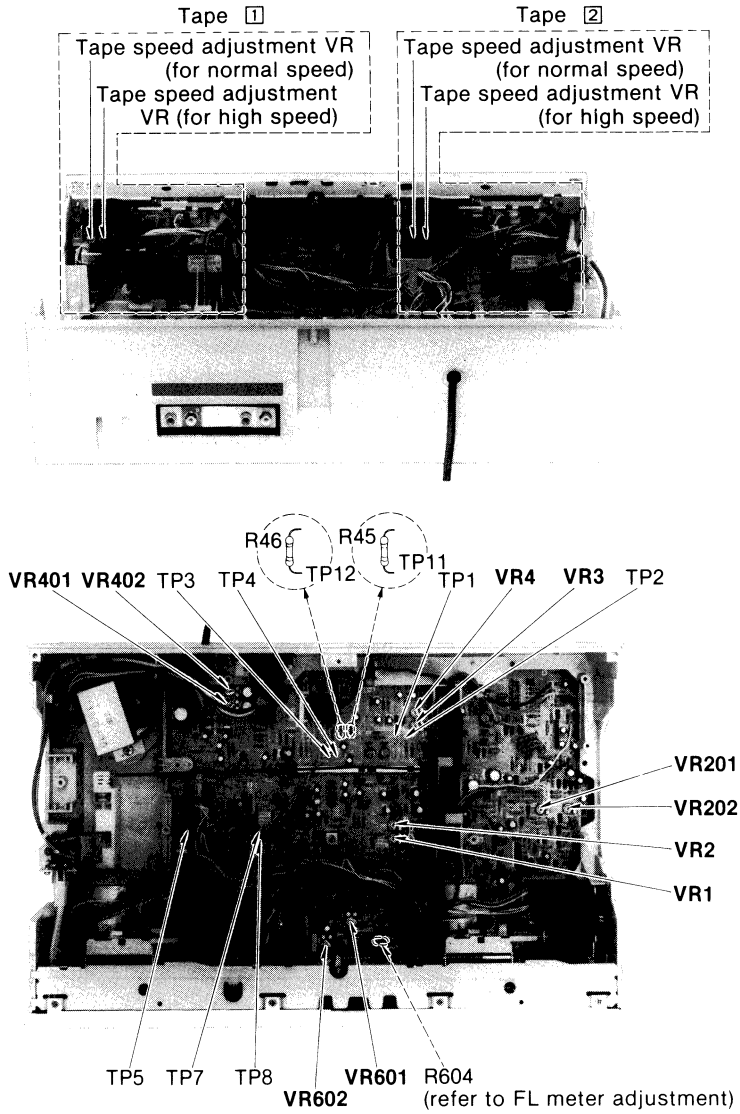


Fig. 1

NOTES: Keep good condition, set switches and controls in the following 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)
- Dolby NR switch: OUT
- Input level controls: Maximum
- TAPE 1 level control to "8"
- Dubbing/Mixing switch: OFF
- Dubbing speed switch: Normal

ITEM	MEASUREMENT & ADJUSTMENT
Ⓐ Head position adjustment [TAPE 1, TAPE 2] Condition * Playback and pause mode	(The head adjusting plate is provided to adjust the tape touch of the head in cue or review mode.) 1 Press the playback button and pause button. 2 Measure the space between the pressure roller and the capstan. Standard value: 0.5 ± 0.3mm 3 If the measured value is not within the standard value, untighten screw (A), and slide the head adjusting plate in the direction of arrow (B) for adjustment.

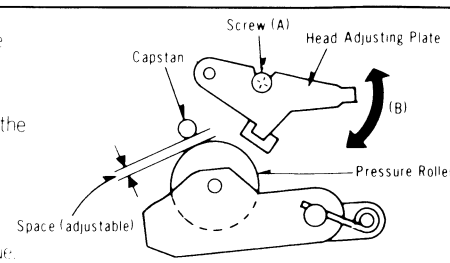
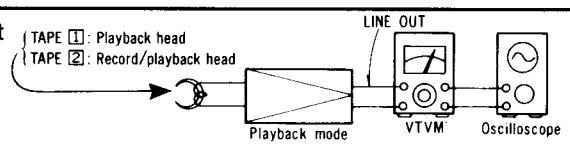
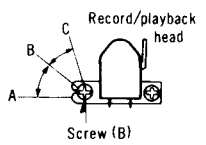
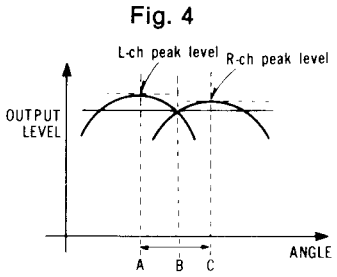
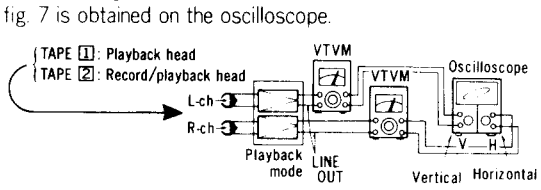
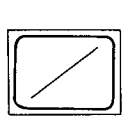
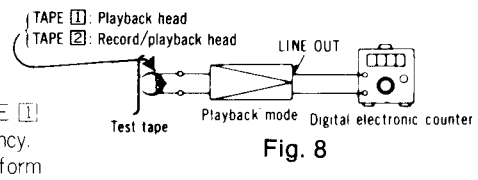
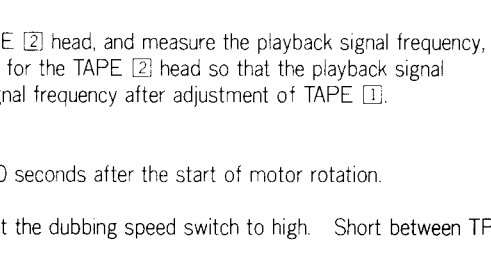
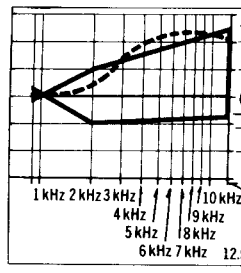


Fig. 2

ITEM	MEASUREMENT & ADJUSTMENT
Ⓑ 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.  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.)  Fig. 4  Fig. 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. 6  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**  Fig. 8 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±45Hz** **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 15Hz 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±90Hz** 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 30Hz 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 315Hz, 12.5kHz, 8kHz, 4kHz, 1kHz, 250Hz, 125Hz and 63Hz, and compare each output level with the standard frequency 315Hz, at LINE OUT. 5. Make measurement for both channels. 6. Make sure that the measured value is within the range specified in the frequency response chart (shown in fig. 9). **Playback frequency response chart [TAPE 1, TAPE 2]**  Fig. 9

ITEM	MEA
Ⓔ 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 show 2 Playback standard recording level measure the output level at LINE 3 Make measurement for both chann **Standard value: TAPE 1, [0.42V; at** **Adjustment** 1. If measured value is not within star VR1 (TAPE 2: L-CH), VR2 (TAP 2. After adjustment check "Playback f
Ⓕ Erase current [TAPE 2] Condition: • Record mode • Metal tape mode Equipment: • VTVM • Oscilloscope	1 Test equipment connection is show 2. Place UNIT into Metal tape mode. 3. Press the record and pause button 4. Read voltage on VTVM and calcula following formula Erase current (A) = Voltage **Standard value: 160^{+10}_{-20} m** 5 If measured value is not within star **Adjustment** 1 Open the point (A) and short the p (See page 15). 2. Make measurement for erase curre 3. Make sure that the measured value 4. If it is beyond the value, carry out t • If the erase current is less than • If the erase current is more than
Ⓖ Overall frequency response [TAPE 2] Condition: • Record/playback mode • Normal tape mode • CrO_2 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 CrO_2 ··· QZZCRZ for Metal	**Note** Before measuring and adjusting, make the playback frequency response (For t method of measurement, please refer t playback frequency response) **Overall frequency response adjus** (Recording equalizer is fixed.) 1. Make connections as shown in fig. 2. Place UNIT into normal tape mode load the test tape (QZZCRA). 3. Input a 1kHz, −24dB signal throu LINE IN. Place the set in record 4. Fine adjust the attenuator to obtai 0.4V LINE OUT output. • Make sure that the input signal is −24 ±4dB with 0.4V outpu voltage. 5. Adjust the attenuator to reduce the 6. Adjust the AF oscillator to generat 12.5kHz signals, and record these 7. Playback the signals recorded in st shown in the overall frequency resp (If the curve is within the charted s If the curve is not within the charte **Adjustment Ⓐ:** When the curve exceeds the overa response chart specifications (fig. in fig. 13.  **Fig. 13** 1) Increase bias current by turning VR (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 t is now within the charted specificat fig. 11.) 3) If the curve still exceeds the specifi (fig. 11), increase bias current furth repeat steps 6 and 7.

MEASUREMENT & ADJUSTMENT

ection is shown in fig. 3.
cording level portion on test tape (QZZCFM 315Hz, 0dB), and using VTVM
evel at LINE OUT.
or both channels.

: TAPE [1], [2]; 0.4V±1dB
[0.42V; at test point TP3 (L-CH) and TP4 (R-CH)]

not within standard, adjust VR201 (TAPE [1]: L-CH), VR202 (TAPE [1]: R-CH),
H), VR2 (TAPE [2]: R-CH).
ck"Playback frequency response" again.

ection is shown in fig. 10.
al tape mode.
pause buttons
VM and calculate erase current by

$) = \frac{\text{Voltage across both ends of R401}}{1\,(\Omega)}$

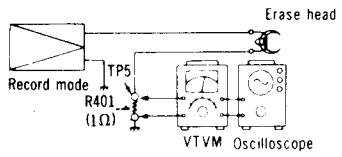


Fig. 10

: 160^{+10}_{-20}mA (Metal position)

not within standard, adjust as follows.

nd short the point (B) on the main circuit board in the circuit board diagram

or erase current.
easured value is within the erase current of 140mA to 170mA.
ue, carry out the following adjustments:
is less than 140mA, short the point (A).
is more than 170mA, open the points (A) and (B).

Overall frequency response chart (Normal) [TAPE [2]]

justing, make sure of
esponse (For the
please refer to the
nse).

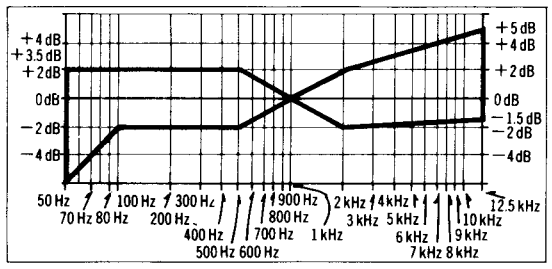


Fig. 11

ponse adjustment by recording bias current

xed.)
shown in fig. 12.
mal tape mode and
QZZCRA).
dB signal through
set in record mode.
uator to obtain
tput.
e input signal level
th 0.4V output

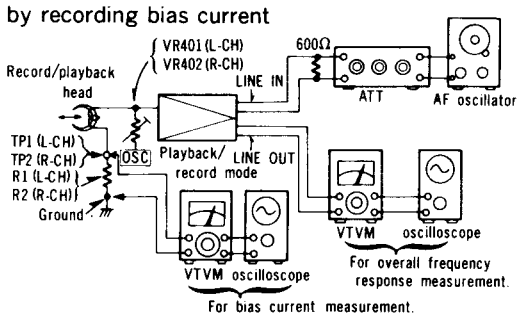
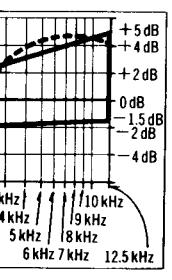


Fig. 12

r to reduce the input signal level by 20dB.
tor to generate 50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz, 10kHz and
d record these signals on the test tape.
recorded in step 6, and check if the frequency response curve is within the limits
frequency response chart for normal tapes (fig. 11).
the charted specifications, proceed to steps 8, 9 and 10.)
thin the charted specifications, adjust as follows;

eeds the overall frequency
cifications (fig. 11) as shown



g. 13

by turning VR401
R-CH).
5.)
7 to confirm.
9 and 10 if the curve
rted specifications in

eds the specifications
as current further and
.

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

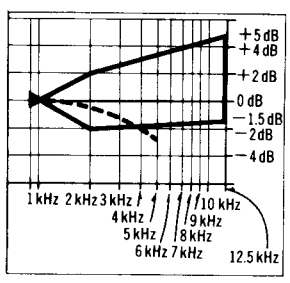
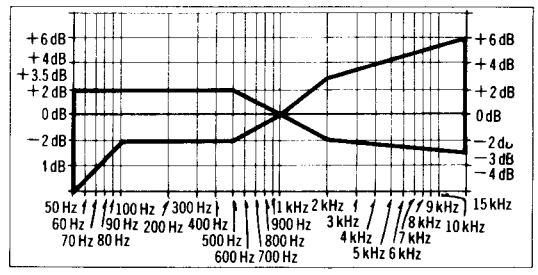
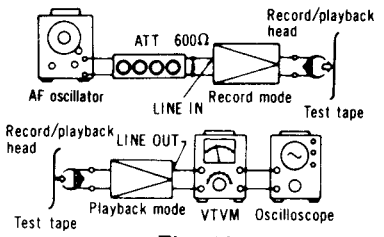
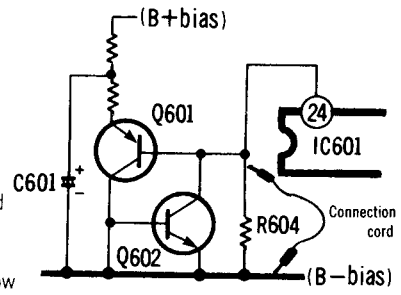
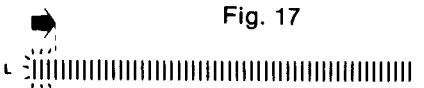
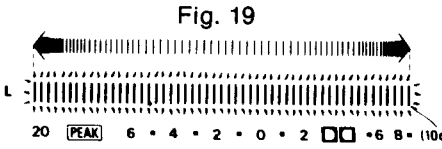
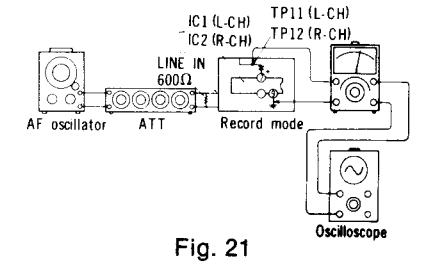


Fig. 14

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. 11), reduce bias current further and repeat steps 6 and 7.

ITEM	MEASUREMENT & ADJUSTMENT
	Overall frequency response chart (CrO2, Metal) [TAPE [2]] 8. Place UNIT into CrO_2 tape mode. 9. Change test tape to QZZCRX, and record 50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz, 10kHz and 15kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for CrO_2 tapes (fig. 15).  Fig. 15 10. Place UNIT into Metal tape mode change test tape to QZZCRZ and record 50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz, 10kHz, 12.5kHz and 15kHz 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 410μA (Normal position)** **around 545μA (CrO_2 position)** **around 800μA (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±4dB LINE IN ··· −24±4dB Equipment: * VTVM * AF oscillator * ATT * Oscilloscope * Resistor (600Ω) * 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 1kHz signal (−24dB) from AF oscillator, through ATT to LINE IN. 5. Adjust ATT until monitor level at LINE OUT becomes 0.4V. 6. Playback recorded tape, and make sure the value at LINE OUT on VTVM becomes 0.4V. 7. If measured value is not 0.4V, adjust VR3 (L-CH), VR4 (R-CH). 8. Repeat from step (2).  Fig. 16
❶ Fluorescent meter [TAPE [2]] Condition: * Record mode * Input level controls ··· MAX Equipment: * VTVM * AF oscillator * ATT * Resistor (600Ω)	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 1kHz signal (−24dB) to the LINE IN then press the record button. 4. Adjust the ATT so that the output level at LINE OUT becomes 0.4V (The input level at this condition is termed the standard input level). 5. Adjustment at "−20dB": A. Adjust the ATT so that the input level is −20dB below standard recording level. B. Adjust VR601 so that the −20dB segment lights up in the −20±0.8dB range (L-CH only) (See fig. 18). 6. Adjustment at "0dB": A. Adjust the ATT so that the output level at LINE OUT becomes 0.4V. (The input level at this condition is termed the standard input level.) B. Adjust VR602 so that the +1dB segment lights up in the 0±0.2dB 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 10dB higher than the standard input level (See fig. 20).  Fig. 17  Fig. 18  Fig. 19  Fig. 20
❶ Dolby NR circuit [TAPE [2]] Condition: * Record mode * Dolby NR switch ··· IN/OUT * Input level controls ··· MAX Equipment: * VTVM * AF oscillator * ATT * Oscilloscope * Resistor (600Ω)	1. Test equipment connection is shown in fig. 21. 2. Place UNIT into record mode, set the Dolby NR switch to OUT position and supply to LINE IN to obtain −34.5dB at TP11 (L-CH), TP12 (R-CH) (frequency 5kHz). 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. 21

MEASUREMENT & ADJUSTMENT

pe mode.
ZCRX, and
200 Hz, 500 Hz,
kHz and
, playback the
curve is within
verall frequency
tapes (fig. 15).

Overall frequency response chart
(CrO_2, Metal) [TAPE 2]

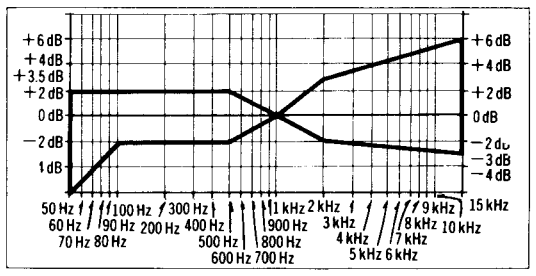


Fig. 15

tape mode change test tape to QZZCRZ. and record 50 Hz, 100 Hz, 200 Hz,
kHz, 10 kHz, 12.5 kHz and 15 kHz signals. Then, playback the signals and check
e limits shown in the overall frequency response chart for metal tapes (fig. 15).
nts are approximately as follows when the UNIT is set at different tape mode.

M and calculate bias current by following formula:

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

ormal position)
O_2 position)
etal position)
} : measured at TP1 (L-CH) and TP2 (R-CH)

on is shown in fig. 16.
tape mode, and load the test

node.
24 dB) from AF oscillator, through

level at LINE OUT becomes 0.4 V.
and make sure the value at LINE
0.4 V.
0.4 V, adjust VR3 (L-CH), VR4

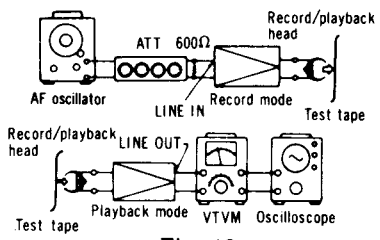


Fig. 16

on is shown in fig. 17.
ng a connection cord across it,
top oscillation of the astable
of Q601 and Q602.
24 dB) to the LINE IN then press

he output level at LINE OUT
t level at this condition is termed

at the input level is −20 dB below
vel.
t the −20 dB segment
±0.8 dB range (L-CH

at the output level at
0.4 V.
s condition is termed
vel.)
t the +1 dB segment
.2 dB range of the
See fig. 19).
eps (5) and (6) above.
at all segments lights
evel is increased to
ndard input level (See

Fig. 17

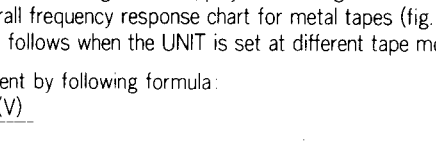


Fig. 18

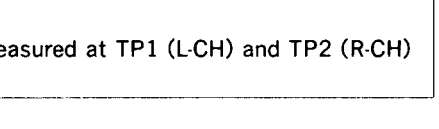


Fig. 19

Fig. 20

on is shown in fig. 21.
node, set the Dolby NR switch
pply to LINE IN to obtain
H), TP12 (R-CH) (frequency

IN position is 8 (±2.5) dB
OUT position of Dolby NR

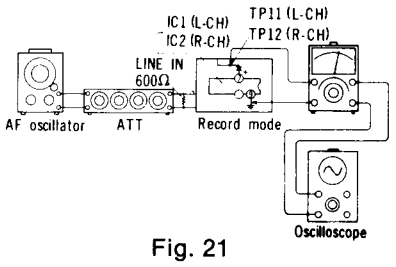
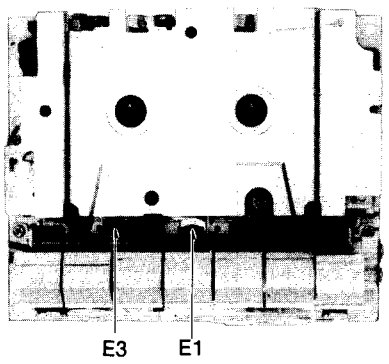
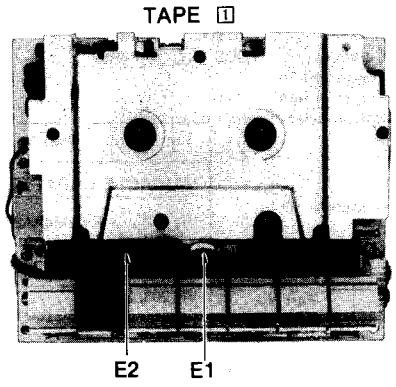
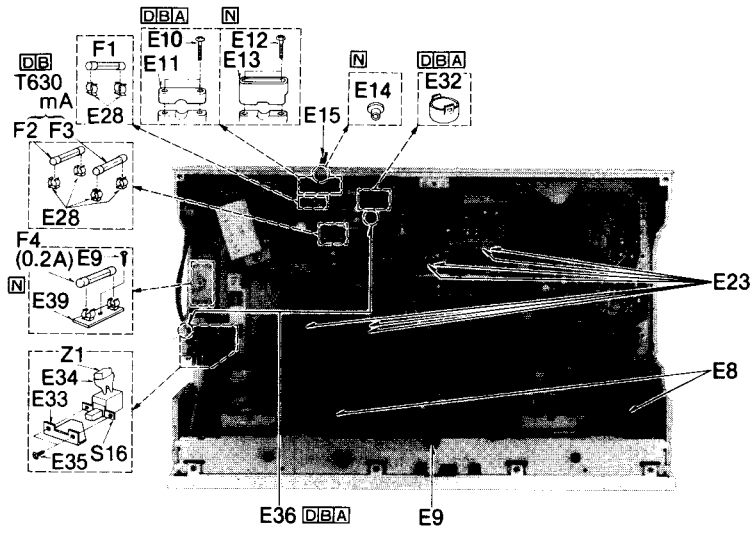


Fig. 21

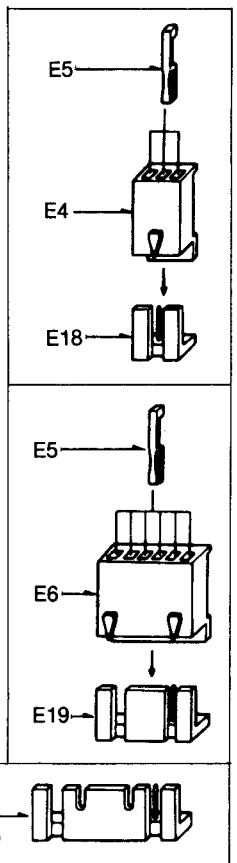
ELECTRICAL PARTS LOCATION



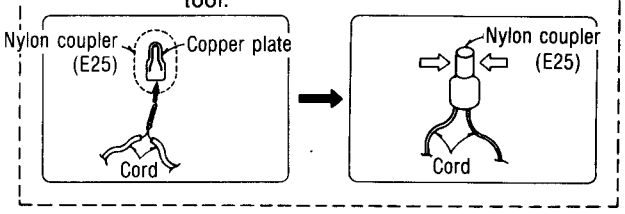


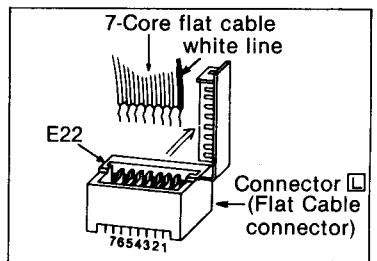


D ..... For all European areas except United Kingdom.
B ..... For United Kingdom.
N ..... For Asia, Latin America, Middle East and Africa areas.
A ..... For Australia.

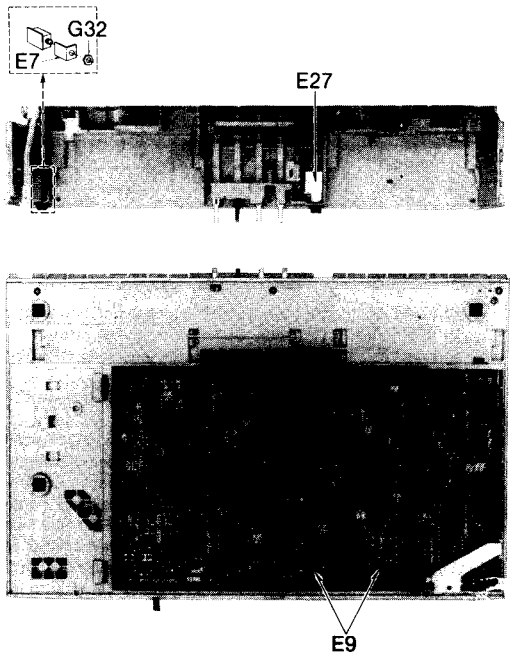


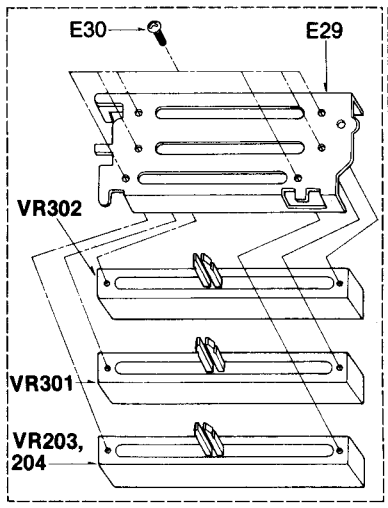
Note: Cord connection using this nylon coupler (E25) requires a special tool.

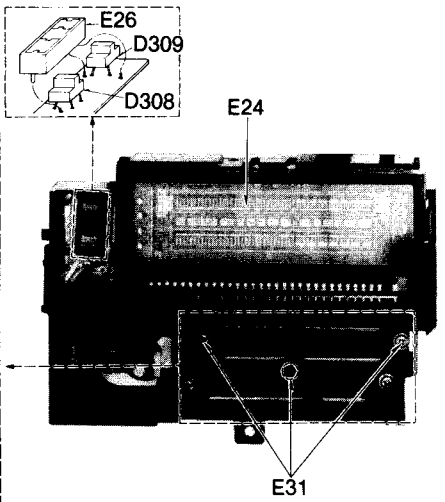




Open the lid of connector L in the direction of the arrow as shown above, and extract the 7-Core flat cable to disconnect.







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
E 1	QWY4122Z	Record/Playback Head
E 2	QWY2143Z	Erase Head [TAPE 1]
E 3	QWY2138Z	Erase Head [TAPE 2]
E 4	QJS1921TN	3 Pin Socket
E 5	QJT1054	Contact
E 6	QJS1922TN	6 Pin Socket
E 7	QTW1281	Insulator Sheet
E 8	QTW1283	Insulator Sheet
E 9	XTN3 + 10B	Tapping Screw
E 10	XTN3 + 12B	Tapping Screw
E 11 [DBA]	QTD1164	Cord Bushing [For all European areas and Australia.]
E 14 [N]	QTD1129	Cord Bushing [For Asia, Latin America, Middle East and Africa areas.]
E 15 [D] ⚠	SJA88	AC Power Cord [For all European areas except United Kingdom.]
[B] ⚠	RJA45YAK	AC Power Cord [For United Kingdom.]
[A] ⚠	SJAG23	AC Power Cord [For Australia.]
[N] ⚠	RJA52ZBK	AC Power Cord [For Asia, Latin America, Middle East and Africa areas.]
E 16	QJS1924TN	12 Pin Socket
E 18	QJP1921TN	3 Pin Post
E 19	QJP1922TN	6 Pin Post
E 20	QJP1923TN	9 Pin Post
E 21	QJP1924TN	12 Pin Post
E 22	QJS1962S	Socket
E 23	QJT1041	Contact Terminal
E 24	QSiFL005F	FL Meter
E 25 ⚠	QJT1079	Nylon Coupler
E 26	QKJ0534	LED Holder
E 27	QTS1544	Microphone Shield Plate
E 28 ⚠	QTF1054	Fuse Holder
E 29	QMA4394	Volume Angle
E 30	XSN2 + 3	Screw ⊕2 × 3
E 31	XSN26 + 5	Screw ⊕2.6 × 5
E 32 [DBA]	QTWM0026	Switch Cover [For all European areas and Australia.]
E 33	QMA4224	Power Switch Angle
E 34 [N]	QTW1118	Spark Killer Cover [For Asia, Latin America, Middle East and Africa areas.]
E 34 [DBA]	QTW1195	Spark Killer Cover [For all European areas and Australia.]
E 35	XSN3 + 6S	Screw
E 36 [DBA]	QTD1315	Cord Clamper [For all European areas and Australia.]
E 39 [N] ⚠	QTF1051	Fuse Holder [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
ECQF .....Polypropylene
ECE□.....Electrolytic
ECE□N ...Non polar electrolytic
ECQS .....Polystyrene
ECS□.....Tantalum
QCS .....Tantalum

REPLACEMENT PARTS LIST

Important safety notice
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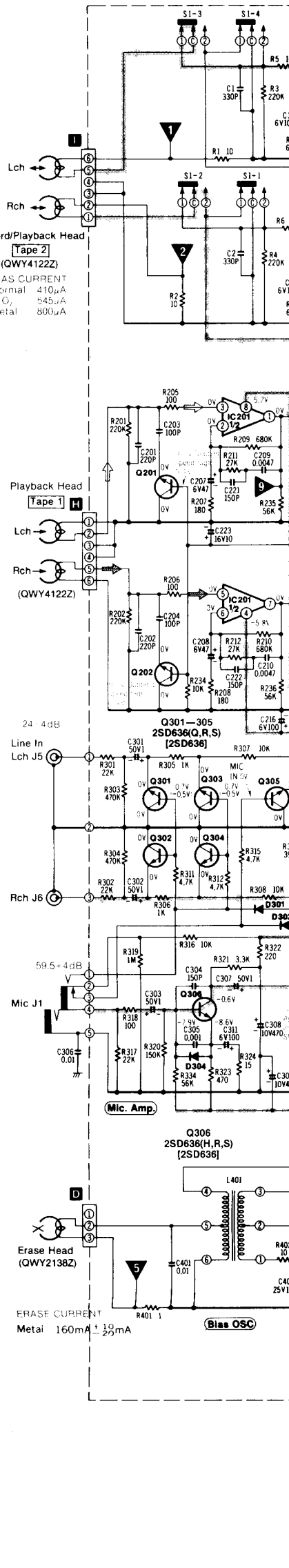
Ref No.	Part No.
RESISTORS	
R 1, 2	ERD25FJ100
R 3, 4	ERD25TJ224
R 5, 6	ERD25FJ101
R 7, 8	ERD25FJ680
R 9, 10	ERD25TJ124
R 11, 12, 13, 14, 15, 16	ERD25FJ472
R 17, 18	ERD25FJ560
R 19, 20	ERD25TJ473
R 21, 22	ERD25TJ683
R 23, 24	ERD25TJ224
R 25, 26	ERD25FJ102
R 27, 28	ERD25TJ274
R 29, 30	ERD25TJ105
R 31, 32	ERD25TJ474
R 33, 34	ERD25TJ473
R 35, 36	ERD25FJ332
R 37, 38	ERD25FJ181
R 39, 40	ERD25TJ274
R 41, 42	ERD25TJ184
R 43	ERD25FJ151
R 44	ERD25FJ181
R 45, 46	ERD25FJ272
R 47, 48, 49, 50	ERD25FJ102
R 51, 52	ERD25FJ822
R 55, 56	ERD25FJ820
R 57, 58	ERD25TJ123
R 59, 60	ERD25FJ102
R 61, 62	ERD25FJ392
R 63, 64	ERD25FJ152
R 67, 68	ERD25TJ104
R 69, 70	ERD25TJ393
R 71, 72	ERD25TJ154
R 73, 74	ERD25FJ102
R 75 [DB]	ERG12ANJ270
[For all European areas.] [AN]	ERD25FJ270
[For Australia, Asia, Latin America, Middle East and Africa areas.]	
R 76 [DB]	ERG2ANJ560
[For all European areas.] [AN]	ERD25FJ560
[For Australia, Asia, Latin America, Middle East and Africa areas.]	
R 77, 78	ERD25FJ152
R 79, 80	ERD25TJ474
R 81, 82	ERD25FJ151
R 83, 84	ERD25FJ103
R 85, 86	ERD25TJ563
R 87, 88 [DB]	ERD25TJ333
[For all European areas.]	
R 101	ERD25FJ103
R 102, 103	ERD25FJ472
R 105, 106	ERD25FJ103
R 108	ERD25FJ102
R 111, 112	ERD25FJ103
R 113	ERD25TJ563
R 113	ERD25TJ562
R 114	ERD25TJ563
R 116	ERD25FJ562
R 117 [DB]	ERD25TJ104
[For all European areas.]	
R 118	ERD25FJ103
R 119, 120	ERD25FJ472
R 121, 122	ERD25FJ103
R 123	ERD25FJ102
R 124 [DB]	ERD25TJ563
[For all European areas.] [AN]	ERD25FJ562
[For Australia, Asia, Latin America, Middle East and Africa areas.]	
R 125 [DB]	ERD25TJ563
[For all European areas.] [AN]	ERD25FJ562
[For Australia, Asia, Latin America, Middle East and Africa areas.]	
R 126 [DB]	ERD25FJ103
[For all European areas.] [AN]	ERD25FJ102
[For Australia, Asia, Latin America, Middle East and Africa areas.]	
R 128	ERD25TJ273
R 129	ERD25FJ562
R 130 [DB]	ERD25TJ104
[For all European areas.] [AN]	ERD25FJ103
[For Australia, Asia, Latin America, Middle East and Africa areas.]	
R 131, 132	ERD25FJ472
R 133, 134	ERD25FJ103
R 135	ERD25FJ102
R 136	ERD25FJ152
R 137	ERD25TJ104
R 138	ERD25TJ683
R 139	ERD25TJ104
R 140	ERD25TJ223
R 141	ERD25TJ104
R 142, 143	ERD25FJ103
R 145, 146	ERD25TJ563
R 147	ERD25FJ103
R 148	ERD25TJ223
R 149	ERD25FJ472
R 150	ERD25FJ562
R 151	ERD25FJ472
R 152	ERD25FJ272
R 153	ERD25FJ103
R 154	ERD25FJ272
R 155	ERD25TJ223
R 156	ERD25TJ153
R 157	ERD25TJ473
R 158	ERD25FJ182
R 159, 160	ERD25FJ101
R 161, 162, 163	ERD25FJ103
R 164	ERD25TJ223
R 165	ERD25FJ103
R 166	ERD25FJ561
R 167, 168	ERD25FJ103
R 169	ERD25TJ563
R 170	ERD25FJ103
R 171	ERD25FJ182
R 172	ERD25FJ562
R 201, 202	ERD25TJ224
R 205, 206	ERD25FJ101
R 207, 208	ERD25FJ181
R 209	ERD25FJ684
R 211, 212	ERD25TJ273
R 213, 214	ERD25FJ392
R 217, 218	ERD25FJ152
R 219, 220	ERD25FJ821
R 221, 222	ERD25FJ472
R 223, 224	ERD25TJ224
R 225, 226	ERD25FJ272
R 227, 228	ERD25TJ224
R 229, 230	ERD25FJ272
R 231, 232	ERD25TJ473
R 233	ERD25FJ472
R 234	ERD25FJ103
R 235, 236	ERD25TJ563
R 301, 302	ERD25TJ223
R 303, 304	ERD25TJ474
R 305, 306	ERD25FJ102
R 307, 308	ERD25FJ103
R 309, 310	ERD25TJ393
R 311, 312	ERD25FJ472
R 313, 314	ERD25TJ473
R 315	ERD25FJ472
R 316	ERD25FJ103
R 317	ERD25TJ223
R 319	ERD25TJ105
R 320	ERD25TJ154
R 321	ERD25TJ332
R 322	ERD25FJ221
R 323	ERD25FJ471
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
[For all European areas.] [AN]	ERD25FJ181
[For Australia, Asia, Latin America, Middle East and Africa areas.]	
R 610, 611, 612	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] ⚠	ERQ12HJ5R6
[For all European areas.] [AN] ⚠	ERD25FJ3R9
[For Australia, Asia, Latin America, Middle East and Africa areas.]	
R 702 [DB] ⚠	ERQ12HJ5R6
[For all European areas.] [AN] ⚠	ERD25FJ3R9
[For Australia, Asia, Latin America, Middle East and Africa areas.]	
R 703, 704 ⚠	ERD25FJ681
R 705	ERD25FJ102

Ref No.	Part No.
VARIABLE CAPACITORS	
VR 1, 2	EVNM4AA00B24
VR 3, 4	EVNM4AA00B54
VR 201, 202	EVNM4AA00B24
VR 203, 204	QVBG1LU10A24
VR 301, 302	QVAG1AU10A24
VR 401	EVNM4AA00B
VR 402	EVNM4AA00B54
VR 601	EVNM4AA00B14
VR 602	EVNM4AA00B24
CAPACITORS	
C 1, 2	ECKD1H331KB
C 3, 4	ECEA1AS101
C 7, 8	ECQM1H273JZ
C 9, 10	ECEA50Z4R7
C 11, 12	ECFDD153KXY
C 15, 16	ECCD1H090DC
C 17, 18	ECEA50ZR33
C 19, 20	ECEA1HS100
C 21, 22	ECFDD392KVY
C 23, 24	ECQM1H472JZ
C 25, 26	ECQM1H273JZ
C 27, 28	ECEA1HS100
C 29, 30	ECQM1H562JZ
C 31, 32	ECEA50MR3R3
C 33, 34	ECQM1H104JZ
C 35, 36	ECEA1HS100
C 37, 38	ECFDD473KXY
C 39, 40	ECEA1HS100
C 41	ECEA1AS331
C 42	ECEA0JS102
C 43, 44	ECEA50Z3R3
C 45, 46	ECCD1H221K
C 49, 50	ECQM1H183JZ
C 51, 52	ECQM1H272JZ
C 53, 54	ECQM1H103JZ
C 55, 56	ECQM1H822JZ
C 57, 58, 59, 60	ECFDD223KXY
C 61, 62	ECKD2H121KB
C 63, 64	ECEA1HN010
C 65, 66	ECEA50Z1
C 71, 72	ECEA50Z4R7
C 73, 74	ECKD1H102MD
C 75, 76	ECEA50Z2R2
C 77, 78	ECKD1H391KB
C 79, 80	ECKD1H561KB
C 101	ECEA1HS100
C 102, 103	ECEA1ES220
C 104	ECEA1AS470
C 105	ECEA1ES220
C 106	ECEA50Z4R7
C 107	ECEA1ES101
C 108, 109	ECEA50Z3R3
C 110 [DB]	ECEA50Z2R2
[For all European areas.] [AN]	ECEA1ES220
[For Australia, Asia, Latin America, Middle East and Africa areas.]	
C 111	ECEA50Z2R2
C 201, 202	ECCD1H221K
C 203, 204	ECCD1H101KC
C 207, 208	ECEA1AS470
C 209, 210	ECQM1H472JZ
C 211, 212	ECEA50Z3R3
C 215	ECEA1AS470
C 216	ECEA1AS101
C 217, 218, 219, 220	ECFDD153KXY
C 221, 222	ECCD1H151KD
C 223	ECEA1HS100
C 301, 302, 303	ECEA50Z1
C 304	ECCD1H151KD
C 305	ECKD1H102MD
C 306	ECKD1H103ZF
C 307	ECEA50Z1
C 308, 309	ECEA1AS471
C 310	ECEA50Z3R3
C 311	ECEA1AS101
C 401	ECQP1103JZ
C 402	ECEA1ES101
C 403	ECFDD153KXY
C 404	ECFDD822KVY
C 405, 406	ECCD1H101KC
C 501	ECKD1H102MD
C 502	ECEA50Z1
C 503	ECEA50Z3R3
C 504	ECEA50ZR22
C 505	ECEA1HS100
C 506	ECEA50Z4R7
C 507	ECEA1CS330
C 601	ECEA1HS100
C 603, 604	ECEA50Z1
C 607	ECFDD473KXY
C 701, 702	ECKD1H223ZF
C 703, 704	ECEA1CS331
C 705 ⚠	ECEA1CV102
C 706 ⚠	ECEA1CS471
C 707 ⚠	ECEA1CS102
C 708, 709	ECEA1HS0R1
SPARK KILLERS	
Z 1 [N] ⚠	QCR0008T
[For Asia, Latin America, Middle East and Africa areas.] [DBA] ⚠	QCR0011B
[For all European areas and Australia.]	
DIODES & RECTIFIERS	
D 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134	MA161
D 135	SM112
D 136, 137	MA161
D 138	QVD1SS141T
D 301, 302, 304, 305, 306, 307	MA161
D 308	SPB26MUW
D 309	SLB26GG4
D 401, 402, 403, 404	QVDLS004EM
D 405, 406, 601, 602, 603, 604, 605, 606	MA161
D 607	MA1039
D 701	MA1220M
D 702, 703, 704, 705, 706, 707, 708, 709, 710	
⚠	SM112
INEGRATED CIRCUITS	
IC 2	AN6552
IC 3, 4	NE646N
IC 5	NJM4556D
IC 6	AN6552
IC 201	M5219L
IC 401	AN6256
IC 501	BA336
IC 601	AN6870N
MULTIPLEX FILTERS	
MPX 1, 2	QLM9Z9K
TRANSISTORS	
Q 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14	2SD636
Q102, 103, 104, 105	2SD636
Q 106	2SB641
Q 107	2SB641
Q 108	2SD636
Q 109	2SB641
Q 110	2SD636
Q 111	2SB641
Q 112, 112	2SD636
Q 113	2SB641
Q 114	2SD636
Q 115	2SD946
Q 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211	2SB641
Q 301, 302, 303, 304, 305, 306	2SD636
Q 307	2SB641
Q 401	2SD592
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

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] ⚠	QLPD70ELC	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 ⚠	QSW1117AS	Power Switch
S 17 ⚠	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

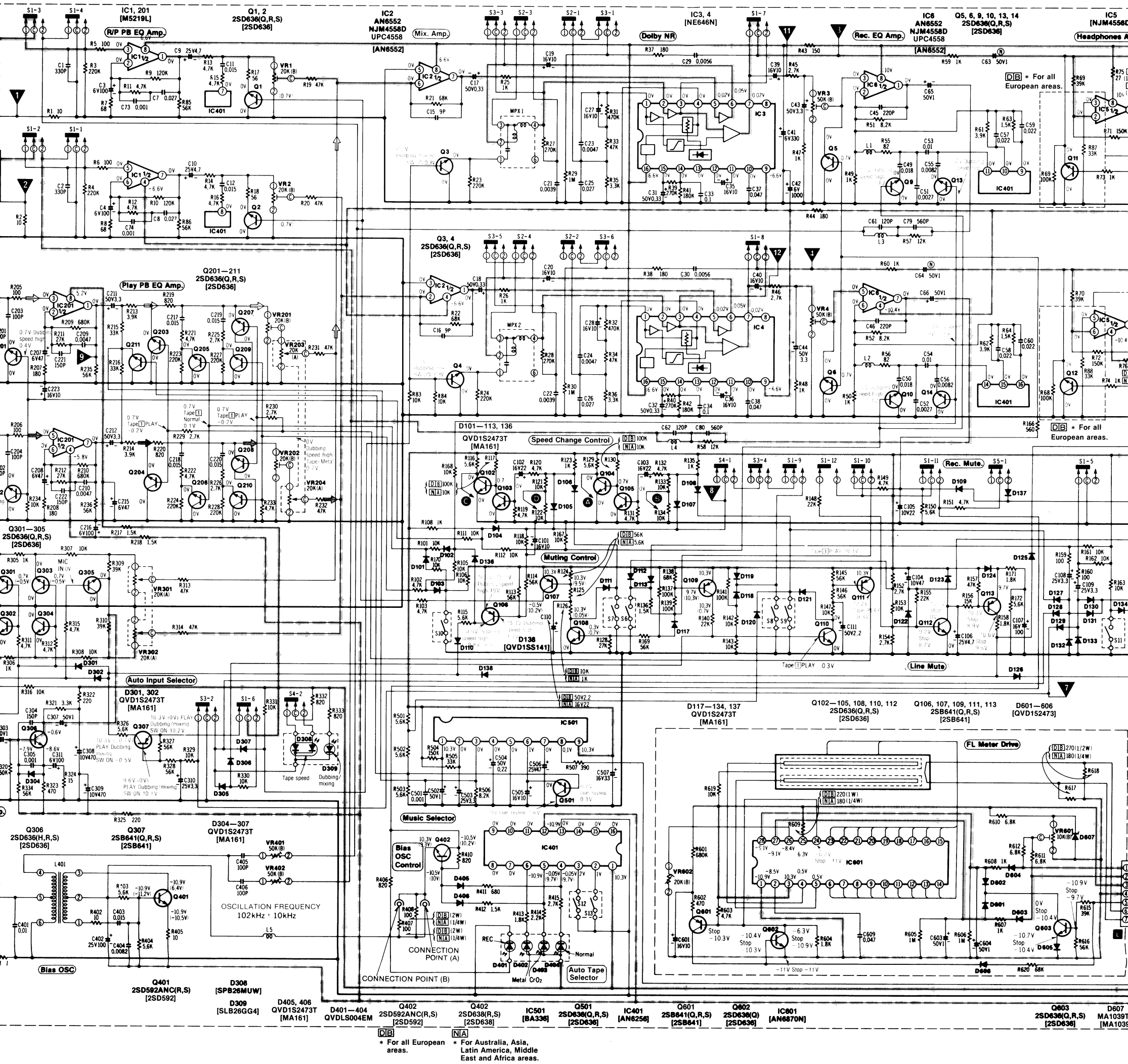
NOTES:
- S1-1—S1-12.....Record/playback select switch (shown in playback position). (①...Playback, ②...Record)
- S2-1—S2-4 .....Dolby NR IN/OUT select switch (shown in OUT position). (①...Dolby OUT, ②...Dolby IN)
- S3-1—S3-6 .....Dubbing/Mixing switch (shown in OFF position). (①...OFF, ②...ON)
- S4-1, S4-2.....Dubbing speed switch (shown in Normal: 4.8cm/s). (①...NORMAL, ②...HIGH)
- S5-1 .....Record muting switch (shown in OFF position).
- S6.....TAPE 2 (Record/Playback deck): playback switch (shown in stop mode).
- S7.....TAPE 2 (Record/Playback deck): FF/Rewind switch (shown in stop mode).
- S8.....TAPE 1 (Playback deck): playback switch (shown in stop mode).
- S9.....TAPE 1 (Playback deck): FF/Rewind switch (shown in stop mode).
- S10 .....TAPE 1 (Playback deck): playback EQ select switch (shown in 70μs mode).
- S11 .....TAPE 1 (Playback deck): pause switch (shown in OFF position).
- S12 .....TAPE 2 (Record/Playback deck): auto tape select switch (For Metal tape).
- S13 .....TAPE 2 (Record/Playback deck): auto tape select switch (For CrO_2 tape).
- S14 .....TAPE 1 (Playback deck) Motor switch.
- S15 .....TAPE 2 (Record/Playback deck) Motor switch.
- S16 .....Power ON/OFF switch (shown in OFF position).
- S17 .....AC power voltage select switch.
- VR1, 2 .....TAPE 2 (Record/Playback deck): playback gain adjustment VR.
- VR3, 4 .....TAPE 2 (Record/Playback deck): Recording gain adjustment VR.
- VR201, 202 .....TAPE 1 (Playback deck): playback gain adjustment VR.
- VR203, 204 .....TAPE 1 (Playback deck): output level/dubbing level controls.
- VR301, 302 .....TAPE 2 (Record/Playback deck): input level controls.
- VR401, 402 .....Recording bias current adjustment VR.
- VR601 .....FL meter adjustment VR (for −20dB indication).
- VR602 .....FL meter adjustment VR (for 0dB indication).
- VR01 .....Tape speed adjustment VR (for NORMAL speed).
- VR02 .....Tape speed adjustment VR (for HIGH speed).
- L1, 2, 5 .....Peaking coil.
- L3, 4 .....Trap coil.
- L401.....Bias oscillation coil.
- MPX1, 2 .....M.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 PLAY .....Voltage at playback mode (TAPE 1)
  TAPE 1 Normal .....Voltage Normal tape mode (TAPE 1)
  Dubbing speed high tape Metal .....Voltage at Dubbing speed high, Metal tape mode.
  PLAY DUBBING/MIXING SW ON .....Voltage at playback, dubbing/mixing on mode.
  CUE/REVIEW .....Voltage at CUE/REVIEW mode.
  Dubbing speed high .....Voltage at Dubbing speed high mode.
  STOP .....Voltage at STOP mode.
  TAPE 1 PAUSE .....Voltage at Pause mode (TAPE 1).
  MIC IN .....Voltage at MIC IN mode (Auto INPUT selector).
  For measurement use VTVM.

SCHEMATIC DIAG



- 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]
- Described in the schematic diagram are two types of numbe production parts number for transistors and diodes. One type of number is used for supply parts number and pro are identical.

ATIC DIAGRAM



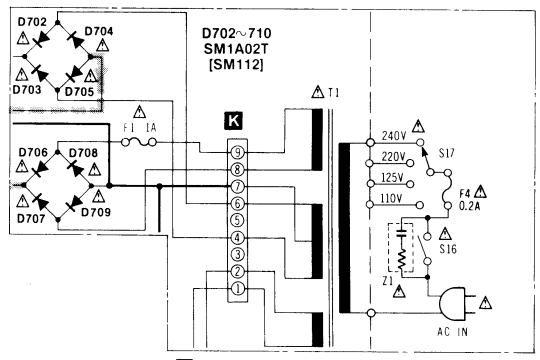
▼ = Test point 1.

layback signal [TAPE 2].
ecording signal [TAPE 2].
layback signal [TAPE 1].
layback signal [TAPE 1]. (Dubbing/Mixing switch: ON).
n are two types of numbers; the supply parts number and
stors and diodes.
pply parts number and production parts number when they

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.

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



N * For Asia, Ltin America, Middle East and Africa areas.

IC6 AN6552 NJM4558D UPC4558 — Rec. EQ Amp.
Q5, 6, 9, 10, 13, 14 2SD636(Q,R,S) [2SD636]
IC5 [NJM4558D] — Headphones Amp.
Q11, 12 2SD636(Q,R,S) [2SD636]

[AN6552]

DB * For all European areas.

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

Line Out 0.4V±1dB — J3 Lch
Line Out — J4 Rch
Headphones 80mV — J2

Q114 2SD636(Q,R,S) [2SD636]
Q115 [2SD946]

Rec. Mute. — Line Mute — Syncro. Start

D135 SM1A02T [SM112]

Q102—105, 108, 110, 112 2SD636(Q,R,S) [2SD636]
Q106, 107, 109, 111, 113 2SB641(Q,R,S) [2SB641]
D601—606 [QVD152473]

Regulated Power Supply
FL Meter Drive
Power Trans.
Motor Control

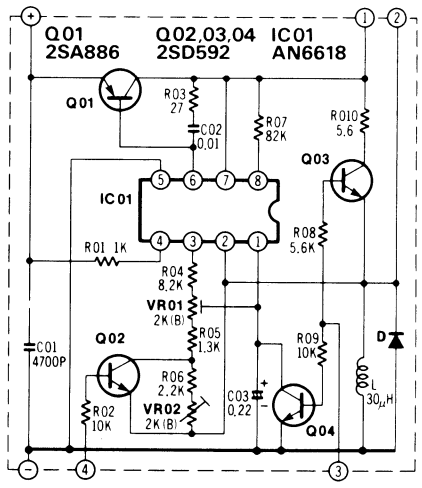
D702—710 SM1A02T [SM112]

DB * For all European areas.

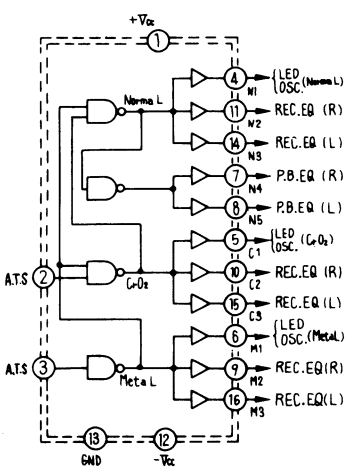
MOTOR WITH MOTOR GOVERNOR CIRCUIT BOARD (QXU0290)

Q603 2SD636(Q,R,S) [2SD636] | D607 MA1039TA [MA1039] | D701 MA1220MTA [MA1220M] | Q701 2SC1265(O,P) [2SC1265] | Q702 2SA941(P,Q) [2SA941] | Q703 [2SD965]

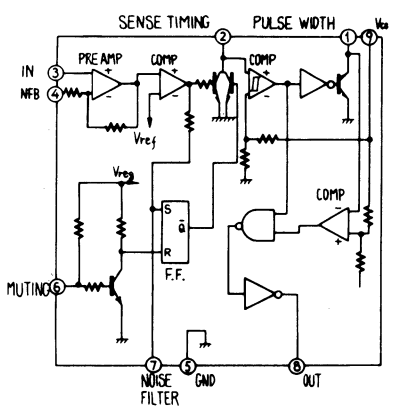
MOTOR GOVERNOR CIRCUIT (TAPE 1, TAPE 2)



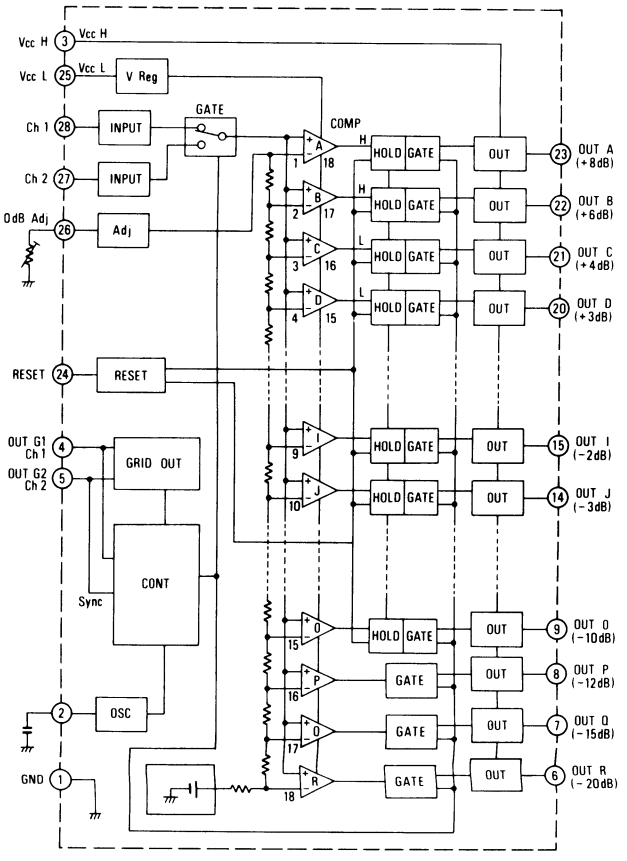
IC401 AN6256 AUTO TAPE SELECTOR

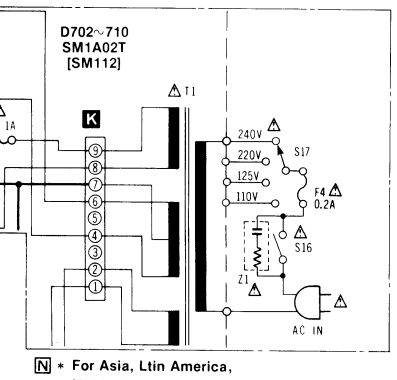


IC501 BA336 MUSIC SELECTOR

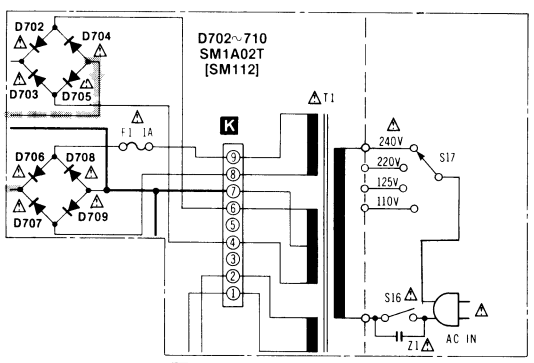


IC601 AN6870N





N * For Asia, Ltin America, Middle East and Africa areas.



A * For Australia.

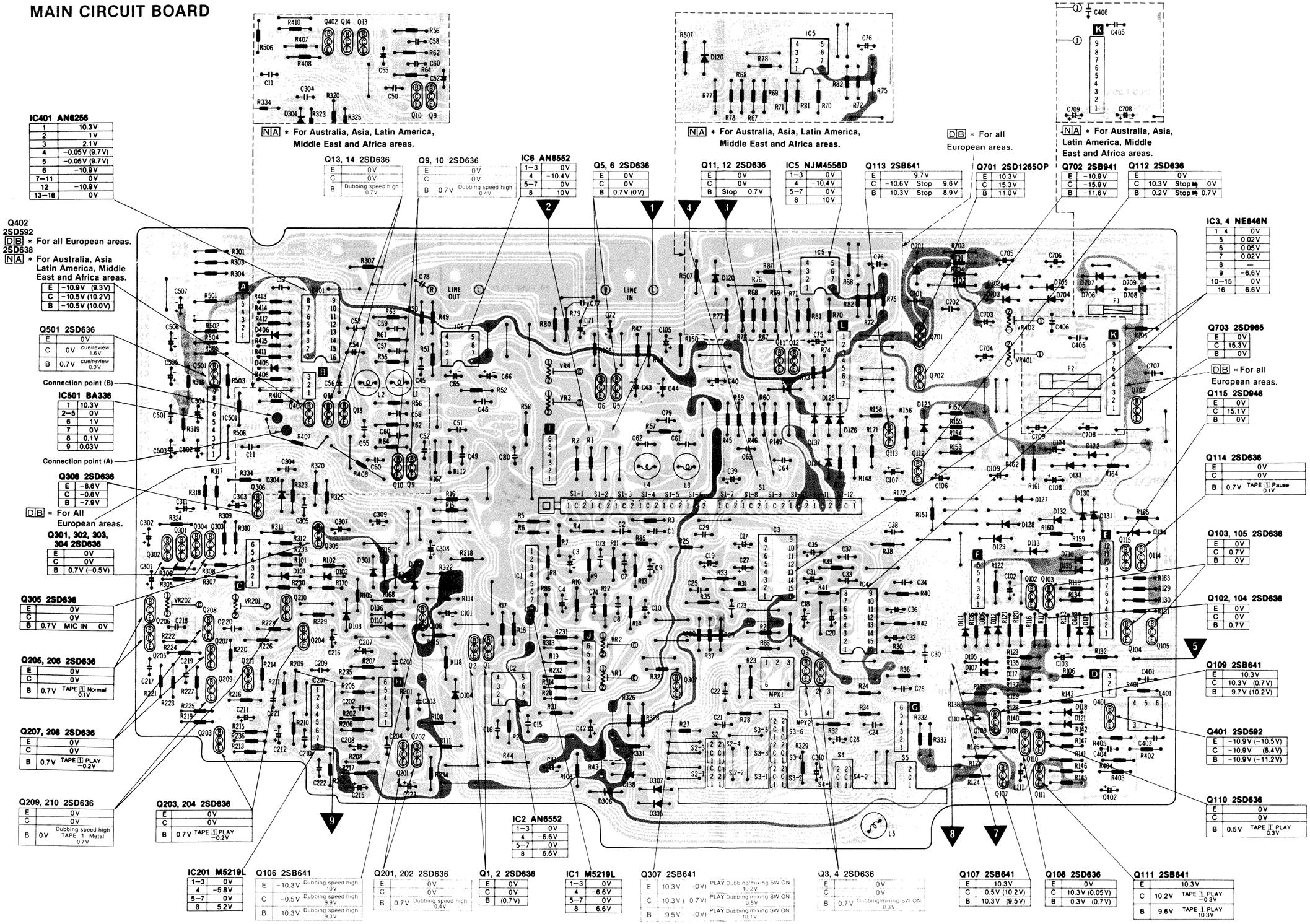
SPECIFICATIONS

* Input level controls ·····MAX
* Tape 1 level control ·····"8" position

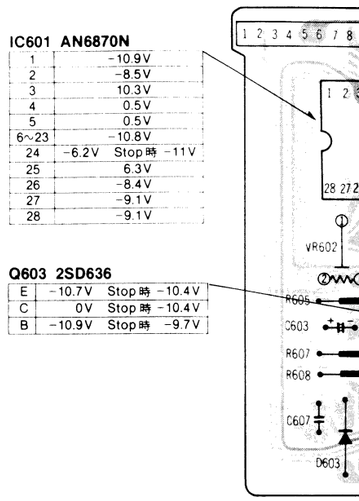
Playback S/N ratio Test tape····· QZZCFM	Greater than 45dB
Overall distortion Test tape ··· QZZCRA for Normal ··· QZZCRX for CrO_2 ··· QZZCRZ for Metal	Less than 4%
Overall S/N ratio Test tape····· QZZCRA	Greater than 43dB (without NAB filter)

CIRCUIT BOARDS

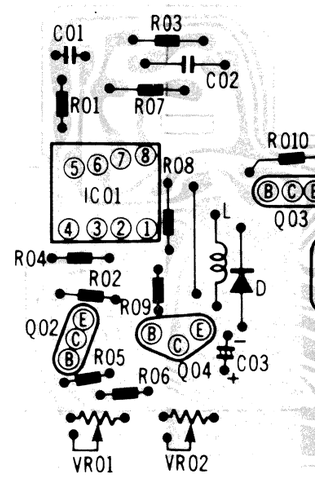
MAIN CIRCUIT BOARD

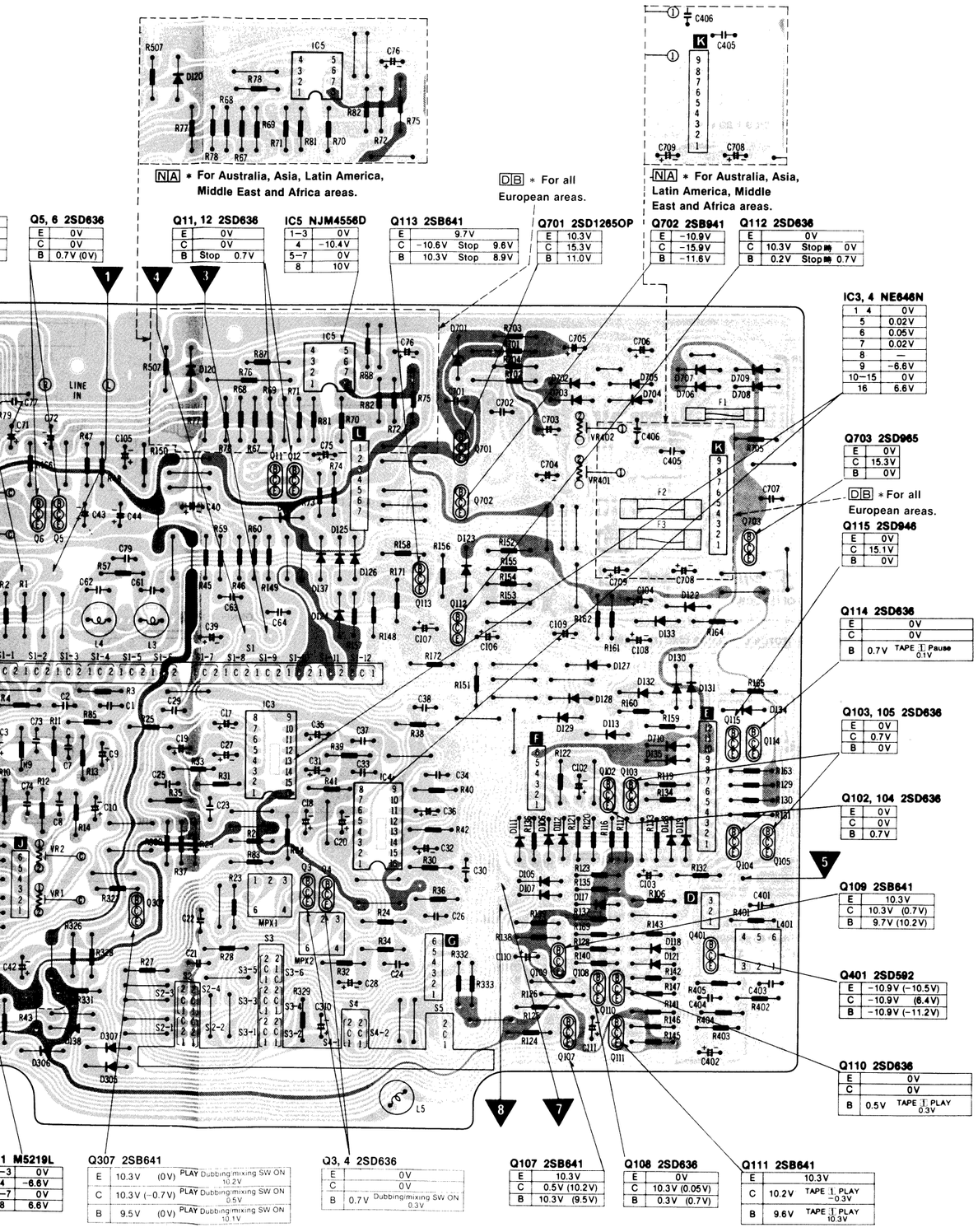


FL METER CIRCUIT BOARD

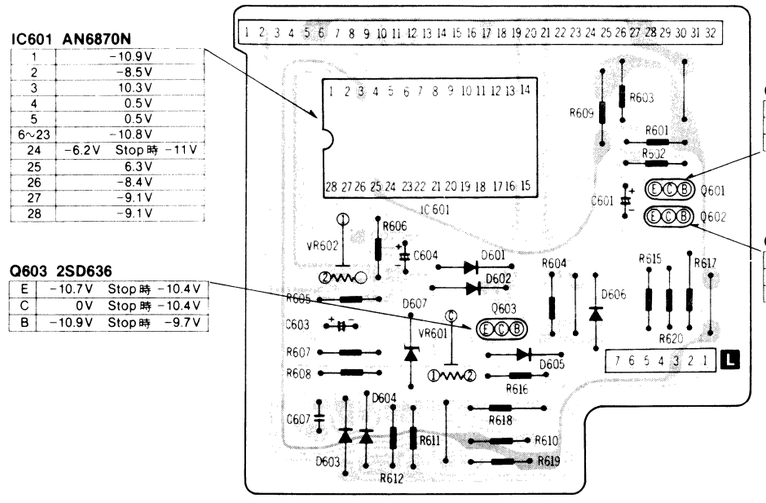


MOTOR GOVERNOR CIRC (TAPE 1

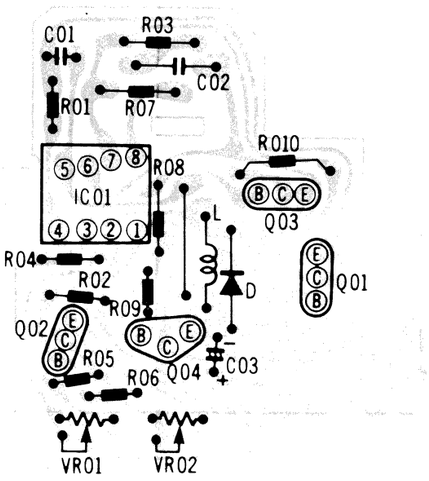




FL METER CIRCUIT BOARD



MOTOR GOVERNOR CIRCUIT BOARD (TAPE 1, TAPE 2)



NOTES:

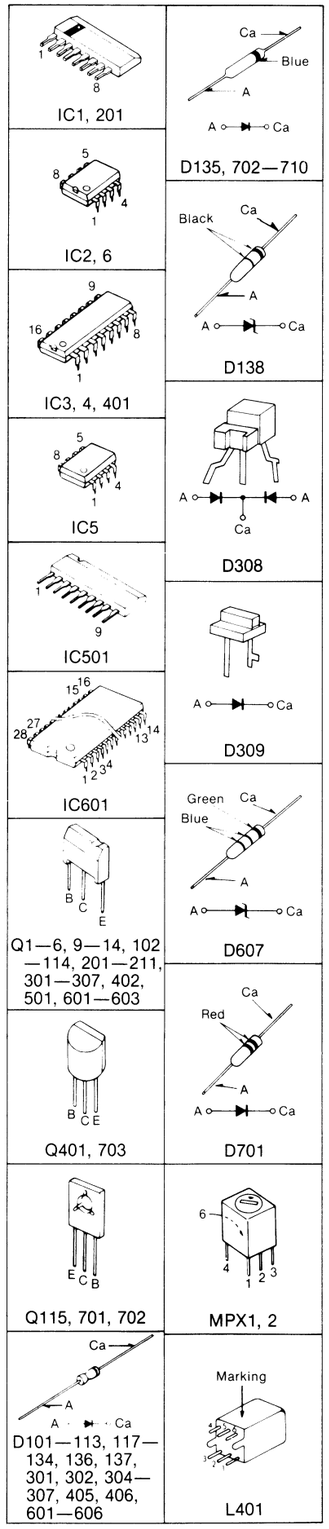
- The circuit shown in ..... on the conductor side indicates printed circuit on the back side of the printed circuit board.
- Voltage values indicated in [ ] are under no signal condition and playback mode with volume control at minimum position otherwise specified.

( ) .....Voltage at record mode.
TAPE 1 PLAY .....Voltage at playback mode (TAPE 1).
TAPE 1 Normal ...Voltage at Normal tape mode (TAPE 1).
Dubbing speed high tape Metal.....Voltage at Dubbing speed high, Metal tape mode.
PLAY DUBBING/MIXING SW ON.....Voltage at playback, dubbing/mixing on mode.
CUE/REVOEW .....Voltage at CUE/REVIEW mode.
Dubbing speed high.....Voltage at Dubbing speed high mode.
STOP .....Voltage at STOP mode.
TAPE 1 PAUSE ...Voltage at Pause mode (TAPE 1).
MIC IN.....Voltage at MIC IN mode (Auto INPUT selector).
For measurement use VTVM.

- 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.

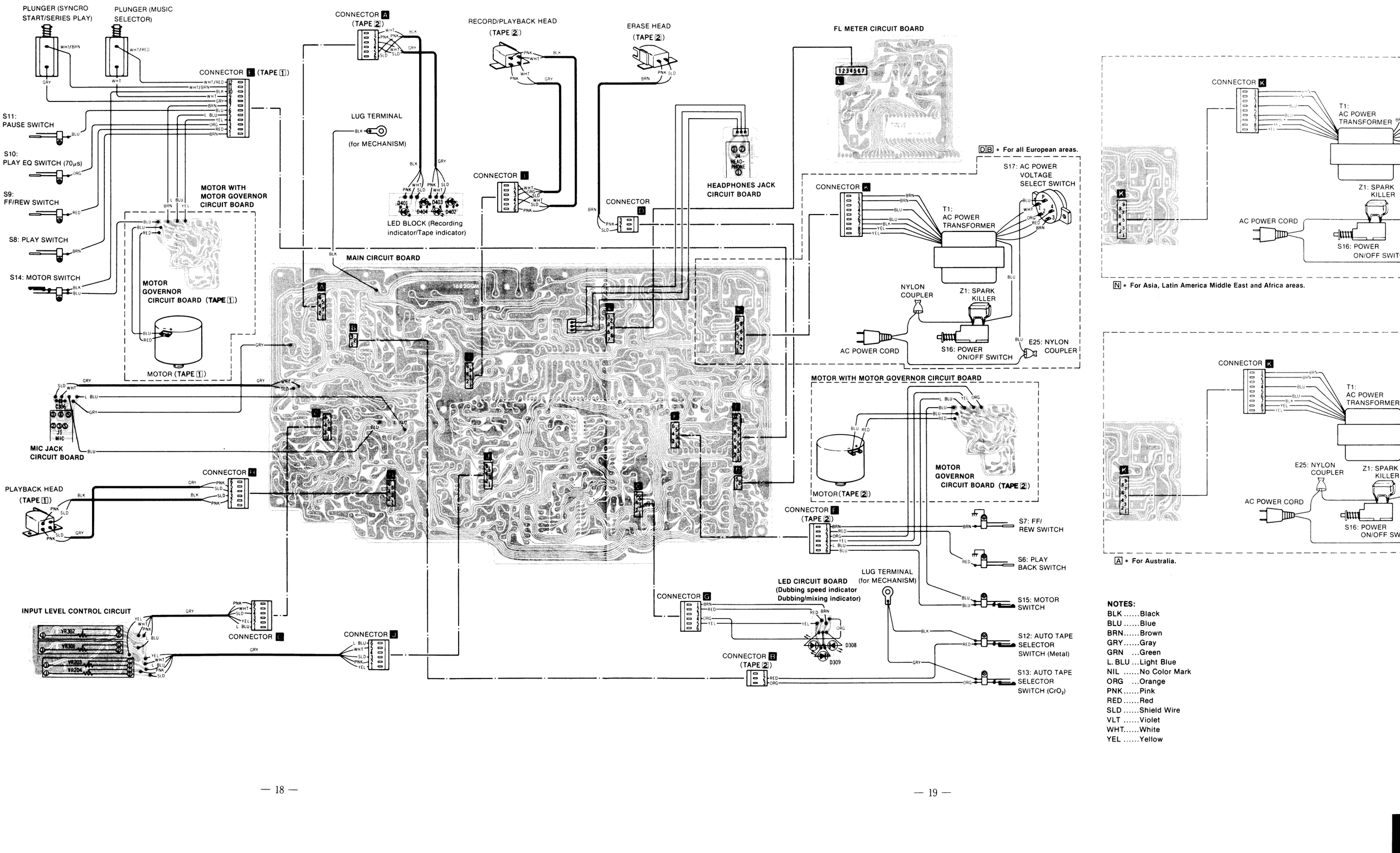
- **This circuit board diagram may be modified at any time with the development of new technology.**

TERMINATIONS



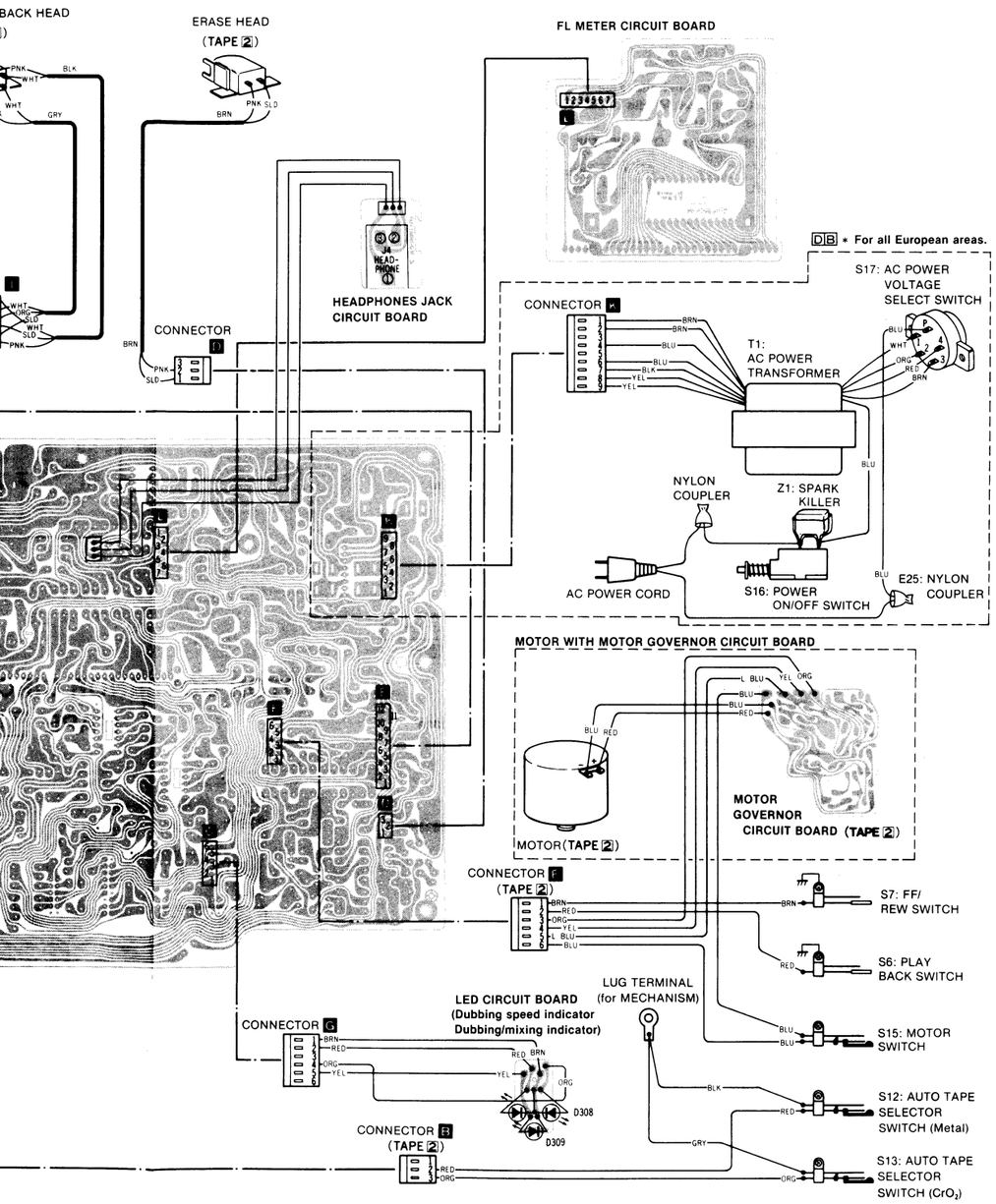
RS-M222

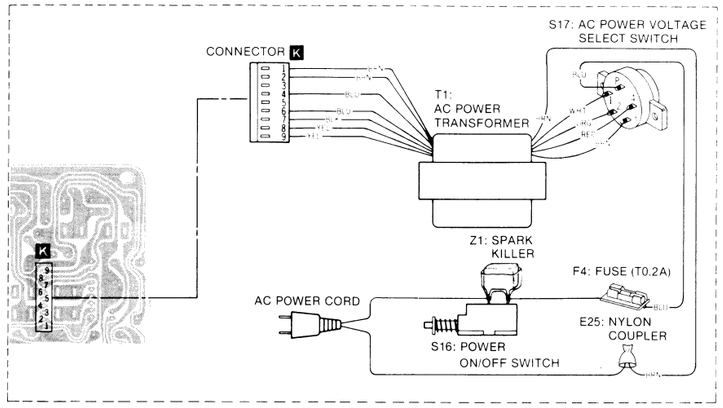
WIRING CONNECTION DIAGRAM



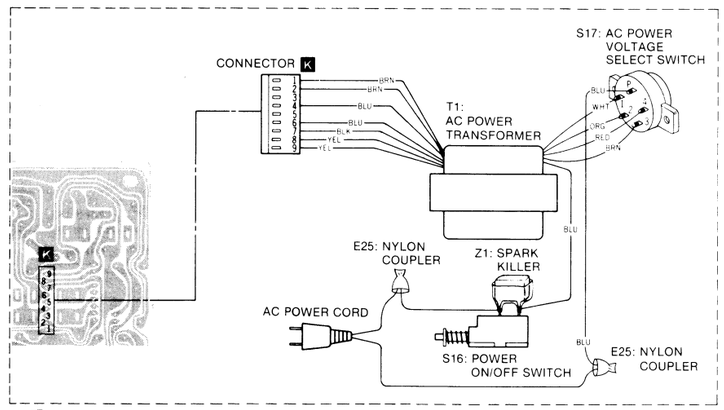
NOTES:

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





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



A * For Australia.

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

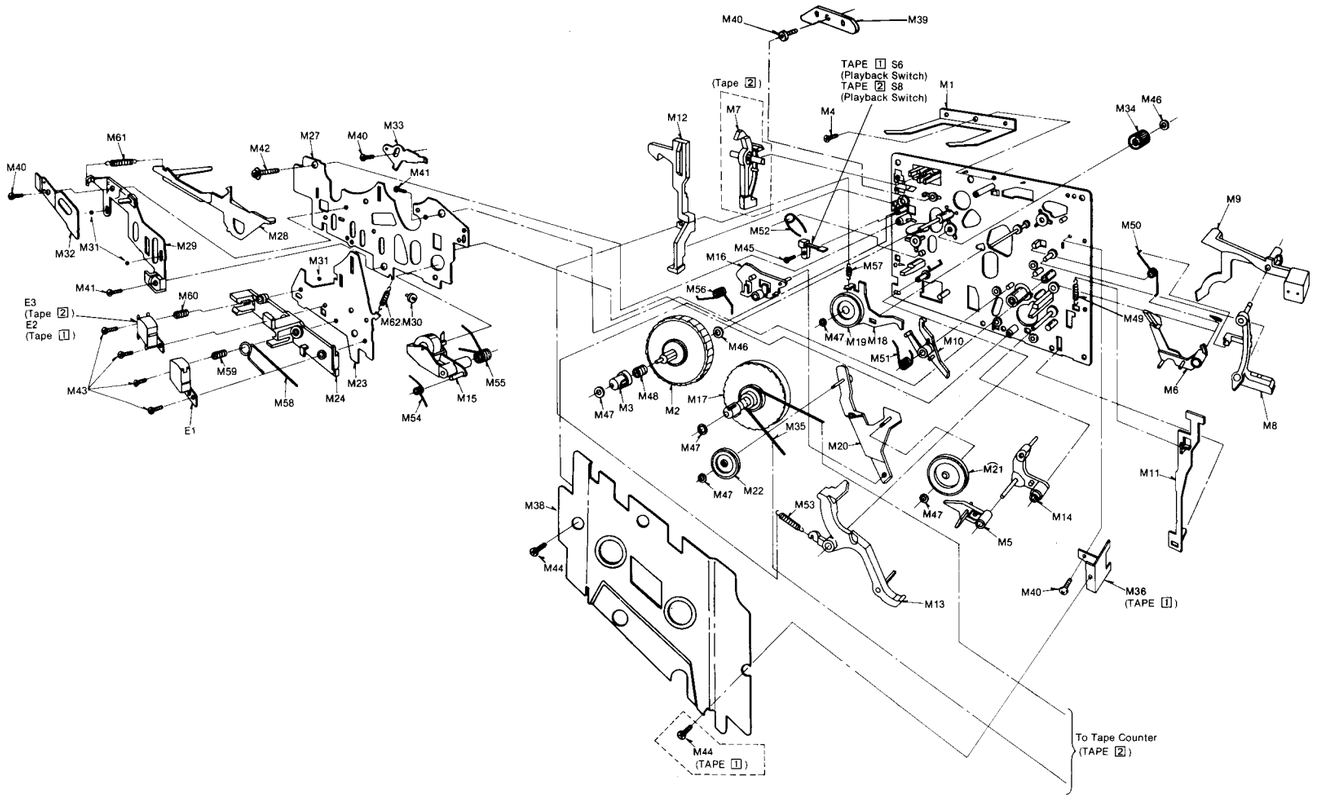
REPLACEMENT PARTS LIST (For mechanism unit)

REPLACEMENT PARTS LIST

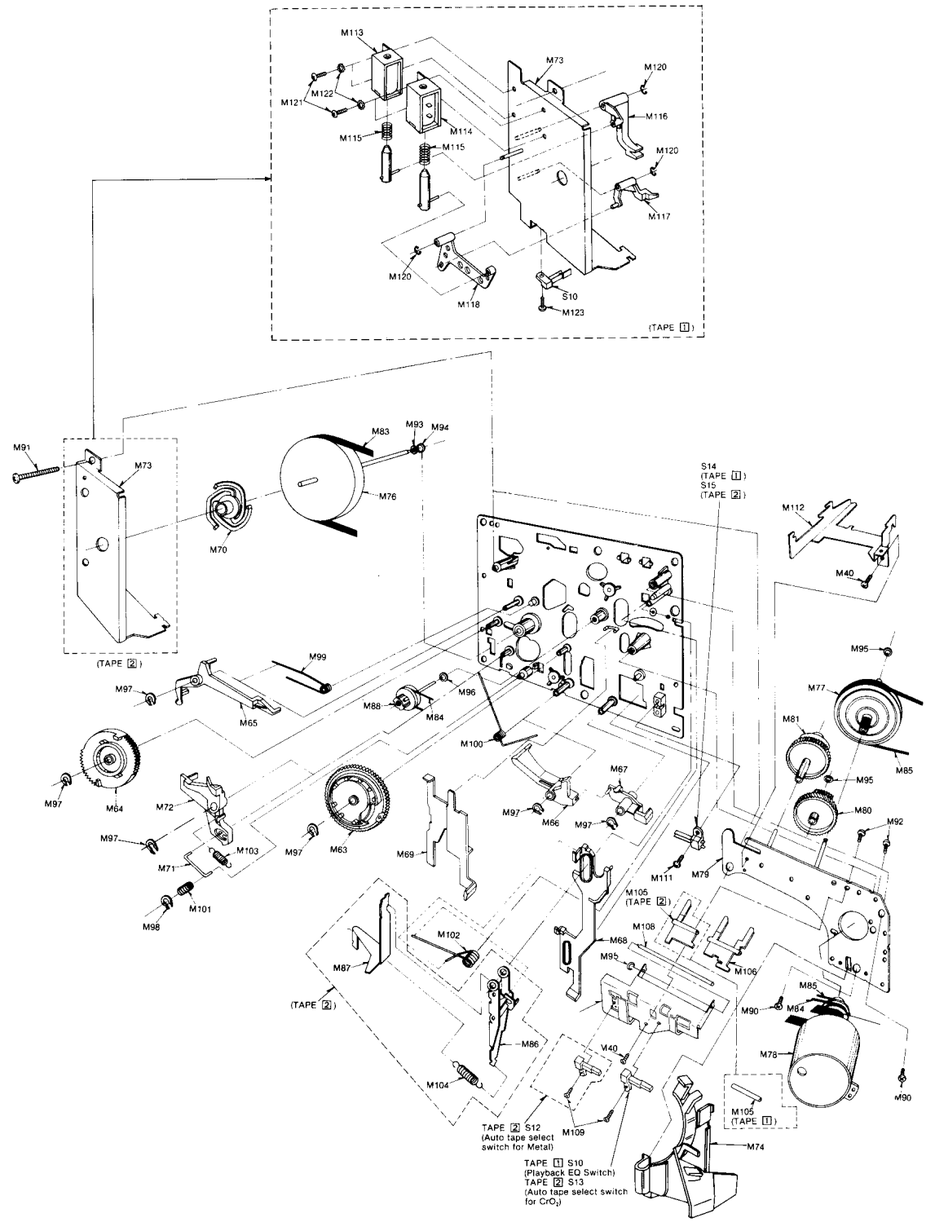
Ref No.	Part No.	Part Name & Description
		MECHANICAL PARTS
M 1	QBP1874	Cassette Pressure Spring
M 2	QDR1139	Reel Table
M 3	QMB1336	Supply Reet Table Hub
M 5	QML3586	Music Select Lever
M 6	QML3594	Auto Stop Release Arm
M 7	QML3603	Erase Safety Lever
M 8	QML3604	Auto Stop Driving Lever
M 9	QML3605	Auto Stop Detection Lever
M 10	QML3592	Change Lever
M 11	QMR1821	Auto Stop Connection Rod
M 12	QMR1822	Eject Rod
M 13	QXL1355	Main Lever Assembly
M 14	QXL1354	Sub Lever Assembly
M 15	QXL1381	Pressure Roller Lever
M 16	QML3588	Fast Forward Lever
M 17	QXD1143	Takeup Reel Table Assembly
M 18	QXL1382	Idler Lever Assembly
M 19	QXi0111	Takeup Idler Assembly
M 20	QXL1383	Fast Forward Arm Assembly
M 21	QXi0112	Rewind Idler Assembly
M 22	QXi0113	Fast Forward Idler Assembly
M 23	QMK1840	Head Base Plate
M 24	QMZ1241	Head Spacer
M 27	QMK1838	Supper Base Plate
M 28	QML3591	Brake Arm
M 29	QMZ1240	Sub Head Base Plate
M 30	QMN2550	Roller
M 31	QDK1017	Steel Ball
M 32	QBP1873	Head Base Plate Pressure Spring
M 33	QMA3858	Head Adjustment Plate
M 34	QDP1828	Fast Forward Pulley
M 35	QDB0235	Belt
M 36	QMA4437	Angle
M 38	QXH0369	Chassis Cover
M 39	QMF2118	Lock Plate
M 40	XTN26 + 6B	Tapping Screw ⊕2.6×6
M 41	XTN26 + 10B	Tapping Screw ⊕2.6×10
M 42	XTN26 + 12B	Tapping Screw ⊕2.6×12
M 43	XSN2 + 10	Screw ⊕2×10
M 44	XTN26 + 6BFZ	Tapping Screw ⊕2.6×6
M 46	QBW2012	Washer
M 47	QBW2008	Poly Washer 2φ
M 48	QBC1372	Reel Table Spring
M 49	QBT1682	Auto Stop Connection Rod Spring
M 50	QBN1746	Auto Stop Lever Spring
M 51	QBN1741	Change Lever Spring
M 52	QBN1747	Connection Spring
M 53	QBT1894	Main Lever Spring
M 54	QBN1742	Pressure Roller Release Spring
M 55	QBN1743	Pressure Roller Spring
M 56	QBN1748	Fast Forward Spring
M 57	QBT1893	Idler Spring
M 58	QBN1740	Spring
M 59	QBC1278	Head Spring
M 60	QBCA0008	Head Spring
M 61	QBT1597	Brake Arm Spring
M 62	QBT1892	Head Release Spring
M 63	QDG1201	Main Gear
M 64	QDG1202	Sub Gear
M 65	QML3581	Sub Control Lever
M 66	QML3583	Main Control Lever
M 67	QML3584	Reverse Lever
M 68	QMR1820	Record Rod
M 69	QMR1824	Control Rod
M 70	QMZ1239	Flywheel Thrust Retainer
M 71	QBS1128	Lock Pin
M 72	QML3582	Pause Lock Lever
M 73	QXA1178	Plunger Angle [TAPE 1]
M 73	QMA4063	Flywheel Retainer [TAPE 2]
M 74	QMZ1254	Wire Clamper
M 76	QXF0164	Flywheel Assembly
M 77	QZK0241	Takeup Gear Assembly
M 78	QXU0290	Motor Assembly
M 79	QXK2286	Sub Chassis Assembly
M 80	QDG1199	Auto Stop Gear
M 81	QDG1200	Cam Gear
M 83	QDB0316	Capstan Belt
M 84	QDB0290	Fast Forward Belt
M 85	QDB0274	Takeup Belt
M 86	QXL1360	Record/Playback Change Arm Assembly
M 87	QML3580	Record/Playback Change Lever
M 88	QXP0607	Fast Forward Connection Pulley Assembly
M 90	XTN3 + 10B	Tapping Screw ⊕3×10
M 91	XTN3 + 24B	Tapping Screw ⊕3×24
M 92	XSN26 + 3	Screw ⊕2.6×3
M 93	QBW2049	Washer
M 94	QBW2026	Washer
M 95	QBW2008	Washer 2φ
M 96	QBW2012	Poly Washer
M 97	XUB3FT	Stop Ring 3φ
M 98	XUB4FT	Stop Ring 4φ
M 99	QBN1744	Sub Gear Spring
M 100	QBN1745	Main Gear Spring
M 101	QBC1357	Lock Pin Pressure Spring
M 102	QBN1739	Change Lever Spring
M 103	QBT1896	Lever Release Spring
M 104	QBT1895	Spring R/P Change Arm Spring
M 105	QMC0136	Spacer [TAPE 1]
M 105	QML3644	Tape Detection Lever-A (for Metal Tape) [TAPE 2]
M 106	QML3645	Tape Detection Lever-B (for CrO_2)
M 107	QWA4228	Detection Lever Angle-B
M 108	QMS2546	Detection Lever Shaft
M 109	XSN2 + 5	Screw ⊕2×5
M 111	XTN2 + 10B	Tapping Screw ⊕2×10
M 112	QMA4392	Circuit Board Angle
M 113	QME0157	Plunger
M 114	QME0163	Plunger
M 115	QBC1358	Plunger Release Spring
M 116	QML3616	Lock Release Lever
M 117	QML3801	Pause Release Lever
M 118	QML3802	Pause Connection Lever
M 120	XUC3FT	Stop Ring 3φ
M 121	XSN3 + 6S	Screw ⊕3×6
M 122	XWA3B	Washer 3φ
M 123	XSN26 + 8	Screw ⊕2.6×8
M 124	QBW2085	Washer

MECHANICAL PARTS LOCATION

(FRONT SIDE)



(REAR SIDE)

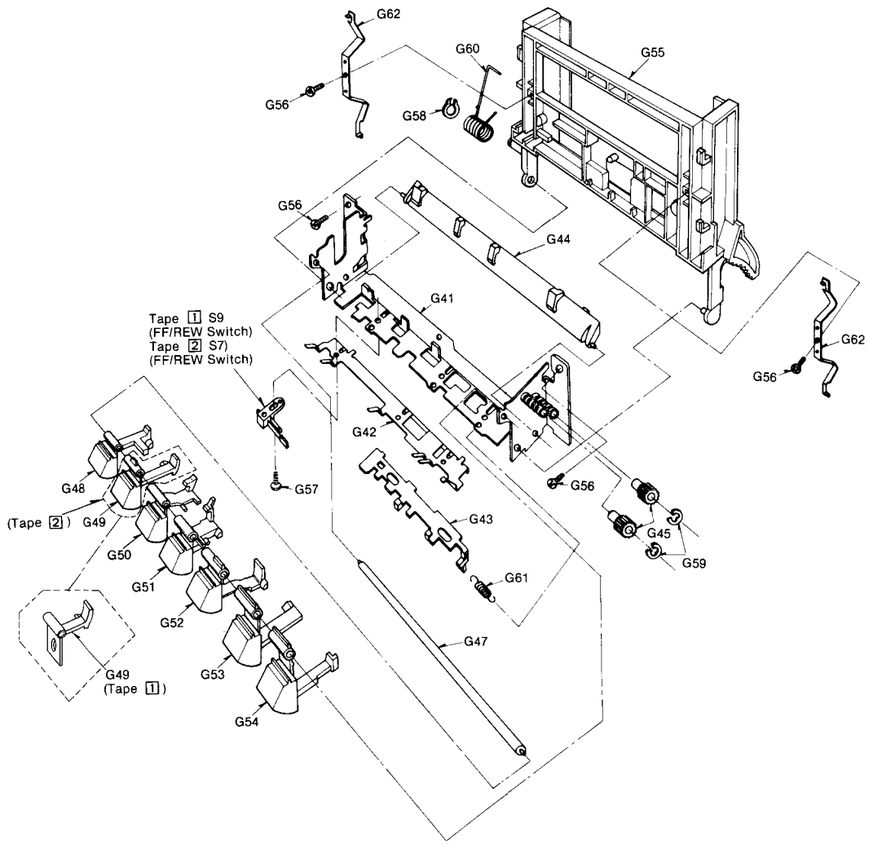


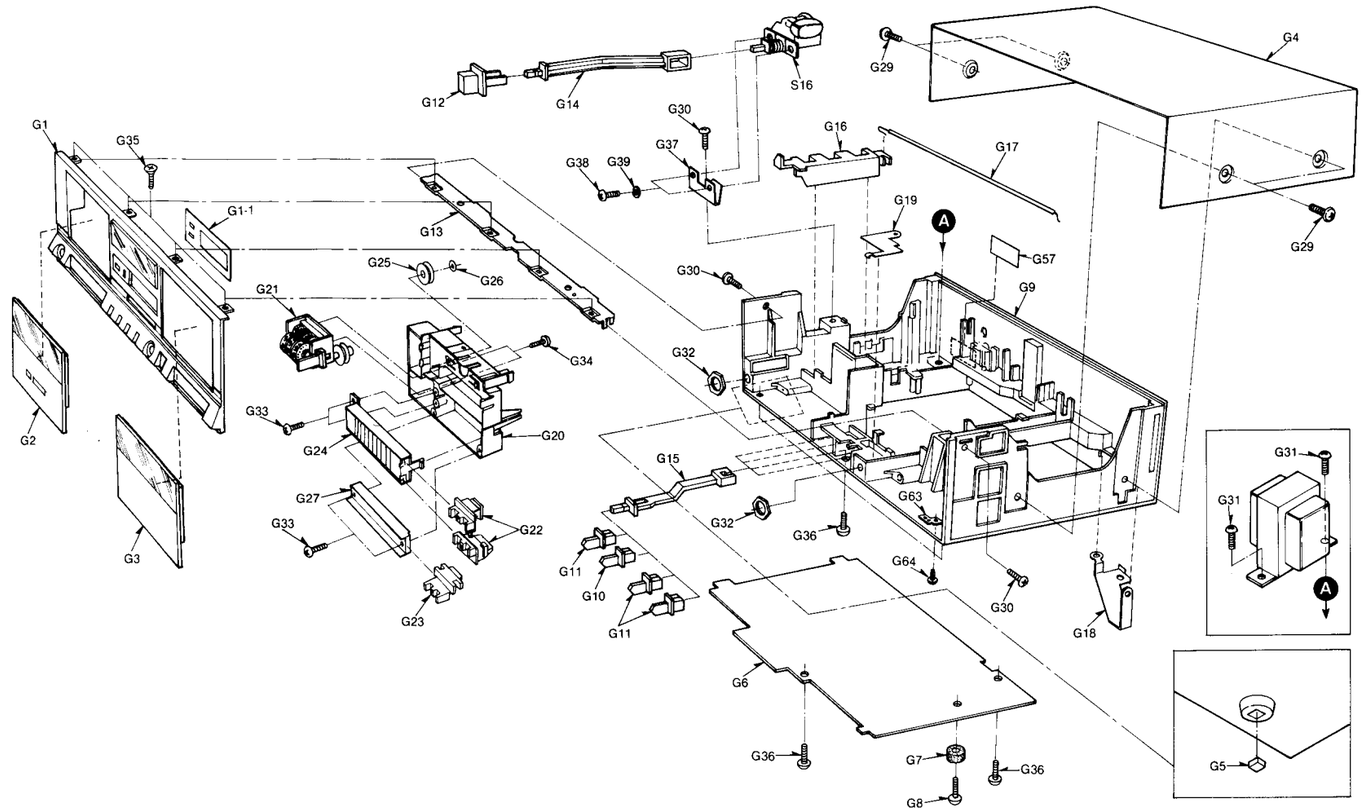
- When servicing this mechanism unit, refer to the disassembly notes and assembly instructions described in the service manuals of RS-M51, RS-M13, RS-M14 and RS-M04 (RS-M24 mechanism series).
- Components identified by TAPE [1] in the mechanism parts location diagram are used only for mechanisms loaded with TAPE [1] (Playback deck), while components identified by TAPE [2] are used only for mechanisms loaded with TAPE [2] (Record/playback deck). Components without tape identification are common to both mechanisms.

SPECIFICATIONS

Pressure of pressure roller	350 ± 50 g
Takeup tension • Use cassette torque meter ··· QZZSRKCT	45^{+15}_{-10} g-cm
Wow and flutter; (JIS) • Use test tape ··· QZZCWAT	Less than 0.06% (WRMS)

CABINET PARTS LOCATION





REPLACEMENT PARTS LIST

Ref No.	Part No.	Part Name & Description
		CABINET PARTS
G 1	QYP1082	Front Panel
G 1-1	QGL1176	Meter Filter
G 2	QYF0539	Cassette Lid-A
G 3	QYF0540	Cassette Lid-B
G 4	QGC1216W	Case Cover
G 5	QKA1084	Rubber Foot
G 6	QGC1217	Bottom Cover
G 7	QKA1083	Rubber Foot
G 8	QHQ1313	Screw
G 9	QKM1542W	Main Chassis
G 10	QGO1881B	Push Button
G 11	QGO1881S	Push Button
G 12	QGO2032	Push Button
G 13	QMA4223	Angle
G 14	QMR1922	Rod (Power Switch)
G 15	QMR1921	Rod
G 16	QML3788	Record Lever
G 17	QBS1135	Spring Record Wire
G 18	QJC0040	Earth Plate-A
G 19	QJC0041	Earth Plate-B
G 20	QYB0417	Chassis Plate
G 21	QXC0080	Counter A'ssy
G 22	QYK0139	Volume Knob-A
G 23	QYK0140	Volume Knob-B
G 24	QYG1592	Dial Scale
G 25	QBJ2088	Connection Pulley
G 26	QBW2008	Washer
G 27	QGG0202	Slide Guide
G 29	XTB4 + 10GFN	Screw ⊕4 × 10
G 30	XTV3 + 10BFN	Screw ⊕3 × 10
G 31	XTB4 + 14BFZ	Tapping Screw ⊕4 × 14
G 32	QNQ1070	Nut
G 33	XTN26 + 8BFZ	Tapping Screw ⊕2.6 × 8
G 34	XSN3 + 6S	Screw ⊕3 × 6
G 35	XTS3 + 6B	Screw ⊕3 × 6
G 36	XTV3 + 12BFN	Tapping Screw ⊕3 × 12
G 37	XTB4 + 10BFN	Tapping Screw ⊕4 × 10
G 41	QXA1044	Operation Button Angle Assembly
G 42	QBP1875	Operation Lever Spring
G 44	QML3649	Lock Arm-B
G 45	QDG1102	Holder Gear
G 47	QMN2554	Operation Lever Shaft
G 48	QXL1493	Eject Button Assembly
G 49	QML3601	Record Lever [Tape [1]]
	QXL1494	Record Button Assembly [Tape [2]]
G 50	QXL1495	Rewind Button Assembly
G 51	QXL1496	Fast Forward Button Assembly
G 52	QXL1497	Playback Button Assembly
G 53	QXL1498	Stop Button Assembly
G 54	QXL1499	Pause Button Assembly
G 55	QMH2090	Cassette Holder
G 56	XTN26 + 6BFZ	Tapping Screw ⊕2.6 × 6
G 57 [D]	QGS3008	Main Name Plate
		[For all European areas except United Kingdom.]
[N]	QGS3010	Main Name Plate
		[For Asia, Latin America, Middle East and Africa areas.]
[BA]	QGS3009	Main Name Plate
		[For United Kingdom and Australia.]
G 58	XUB5FT	Stop Ring
G 59	QBW2082	Snap Washer
G 60	QBN7010	Spring
G 62	QBP1923	Spring
G 63	QMF2253	Angle
G 64	XSN3 + 6	Screw ⊕3 × 6
		ACCESSORIES
A 1 [D]	QQT3286	Instruction Book
		[For all European areas except United Kingdom.]
[N]	QQT3311	Instruction Book
		[For Asia, Latin America, Middle East and Africa areas.]
[BA]	QQT3287	Instruction Book
		[For United Kingdom and Australia.]
A 2	QEB0125	Connection Cord
A 3 [N] ⚠	QJP0603S	AC Plug Adaptor
		[For Asia, Latin America, Middle East and Africa areas.]
		PACKINGS
P 1	QPN4320	Inside Carton
P 2	QPA0670	Cushion-A
P 3	QPA0671	Cushion-B
P 4	QPS0434	Pad
P 5	XZB50X65A02	Poly Sheet
P 6	QPC0072	Poly Sheet

ARD
Y.F DBNA Printed in Japan

ORDER NO. ARD83110302S9-01

Service Manual

Supplement

Cassette Deck

RS-M222

(Silver Face
Black Face)

Double Cassette Deck
Featuring 2 Dubbing Speed

* DOLBY SYSTEM

RS-M24 MECHANISM SERIES

- For [D] [B] [N] [A] mark areas, use this manual together with the service manual for model No. RS-M222 (Original) order No. ARD82040132C8-12 and RS-M222 (Supplement-1) order No. ARD82100132S8-01.
- For [F] [J] mark areas, use this manual together with the service manual for model No. RS-M222 [Original (for [N] mark areas)] order No. ARD82040132C8-12 and RS-M222 (for [F] [J] mark areas) order No. ARD82060157A4-01.

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.
- [F] ...For Asian PX.
- [J] ...For European PX.

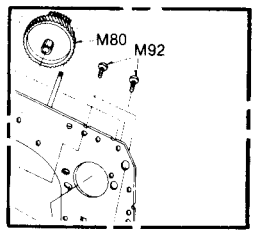
PARTS COMPARISON TABLE:

Please revise the original parts list in the Service Manual (RS-222) to conform to the changes shown herein.
If new part numbers are shown, be sure to use them when ordering parts.

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.

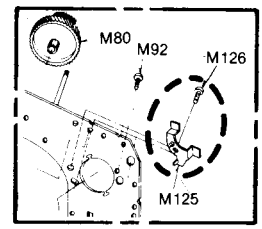
Ref. No.	Part Name & Description	Part Numbers		Remarks
		Former Type	**New Type**	
E25 [N] [F] [J] ⚠	Nylon Coupler	QJT1079	**QJT1096**	
※ For PX, Asia, Latin America, Middle East and Africa areas.				
M125	Protection Angle (for Flywheel Belt)	——	**QMA4678**	Added
M126	Screw ⊕26×4	——	**XSN26+4**	Added

MECHANICAL PARTS LOCATION



Former Type

(ADDITION)



New Type

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