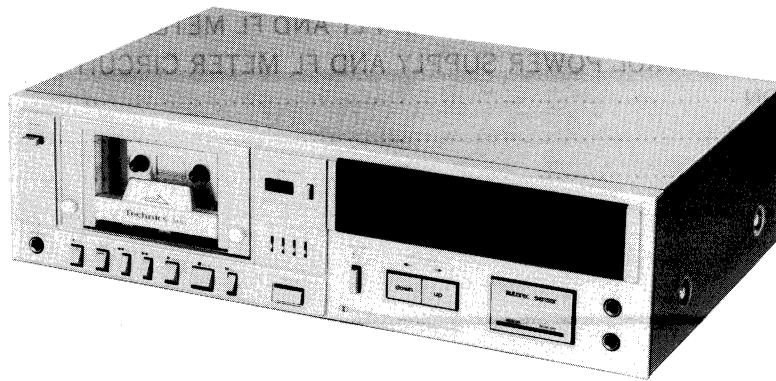


Service Manual

Cassette Deck
RS-M51
 (Silver Face)

Metal Tape Compatible Stereo Cassette Deck with
 Autorec Sensor, Auto-Tape Selector,
 Peak-Hold 2-Color FL Meters and Soft-Touch Controls



This is the Service Manual for the following areas.

- [N] For Asia, Latin America, Middle East and Africa areas.
- [A] For Australia.
- [F] For Asian PX.
- [E] For European PX.

RS-M24 MECHANISM SERIES

Specifications

Track system:	4-track 2-channel stereo recording and playback	Outputs:	LINE; sensitivity 60 mV, input impedance 98 k Ω
Tape speed:	4.8 cm/s (1-7/8 ips.)		LINE; output level 700 mV, output impedance 2.5 k Ω or less load impedance 22 k Ω over
Wow and flutter:	0.045% (WRMS), $\pm 0.13\%$ (DIN)		HEADPHONE; output level 125 mV, load impedance 8/125 Ω
Frequency response:	Metal tape; 20–18,000 Hz 30–17,000 Hz ± 3 dB	Bias frequency:	75 kHz
	CrO ₂ /Fe-Cr tape; 20–18,000 Hz 30–16,000 Hz ± 3 dB	Motor:	Electrical control DC governor motor
	Normal tape; 20–17,000 Hz 30–15,000 Hz ± 3 dB	Heads:	2-head system; 1-MX head for record/playback 1-sendust/ferrite double-gap head for erasure
Signal-to-noise ratio:	Dolby* NR in; 67 dB (above 5 kHz) Dolby NR out; 57 dB (signal level = max. recording level, Fe-Cr/CrO ₂ type tape)	Power requirements:	AC; 110/125/220/240 V, 50-60 Hz (240V: only for Australia)
Fast forward and rewind time:	Approx. 90 seconds with C-60 cassette tape	Power consumption:	17 W
Inputs:	MIC; sensitivity 0.25 mV, input impedance 7.6 k Ω applicable microphone impedance 400 Ω –10 k Ω	Dimensions:	43.0 cm(W) $\times$ 11.9 cm(H) $\times$ 27.0 cm(D) [16-7/8"(W) $\times$ 4-3/4"(H) $\times$ 10-5/8"(D)]
		Weight:	6 kg (13 lbs 3 oz)

Specifications are subject to change without notice.

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

Technics

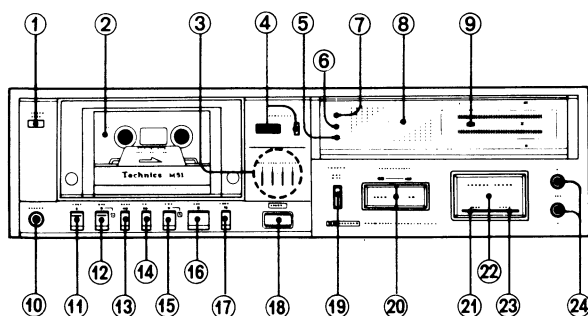
Matsushita Electric Trading Co., Ltd.
 P.O. Box 288, Central Osaka Japan

Panasonic Tokyo
 Matsushita Electric Industrial Co., Ltd.
 17-15, 6-chome, Shinbashi, Minato-ku, Tokyo 105 Japan

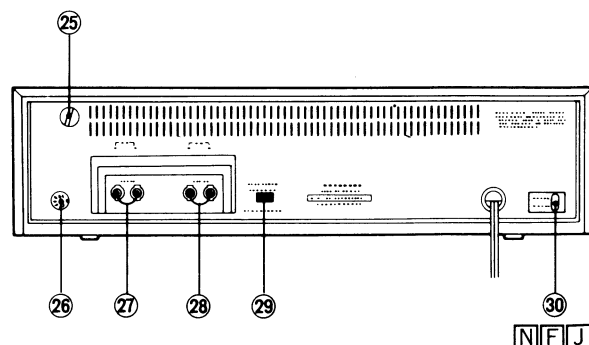
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LOCATION OF CONTROLS AND COMPONENTS



- ① Power switch (power)
- ② Cassette holder
- ③ Tape selector indicators (normal/CrO₂/Metal/Fe-Cr)
- ④ Tape counter and Reset button (tape counter)
- ⑤ Microphone indicator (mic)
- ⑥ Dolby noise reduction indicator (Dolby NR)
- ⑦ Recording indicator (rec)
- ⑧ Recording level setting indicator (level sensor read-out)
- ⑨ FL (fluorescent level) meters
- 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 Play button (▶ play)
- ⑯ Stop button (■ stop)



- ⑰ Pause button (|| pause)
- ⑱ Record-muting button (rec mute)
- ⑲ Dolby noise-reduction switch (Dolby NR)
- ⑳ Recording level variation button [level fine adjust (down/up)]
- ㉑ Recording level detection indicator (search)
- ㉒ Recording level automatic setting button [autorec sensor (autorec level sensor)]
- ㉓ Recording level setting complete indicator (level set)
- ㉔ Microphone jacks (L mic R)
- ㉕ Output level control (OUTPUT LEVEL)
- ㉖ Remote-control connector (REMOTE CONTROL)
- ㉗ Line output jacks (LINE OUT) (R · L)
- ㉘ Line input jacks (LINE IN) (R · L)
- ㉙ Tape selector [tape select **auto** (Metal/CrO₂/normal)/**manual** (Fe-Cr/Metal)]
- ㉚ Voltage selector (VOLTAGE SELECTOR)

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

DISASSEMBLY INSTRUCTIONS

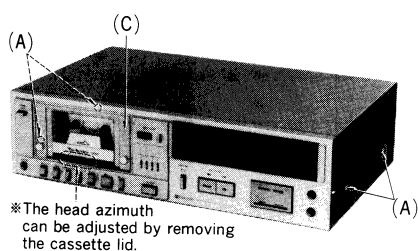


Fig. 1

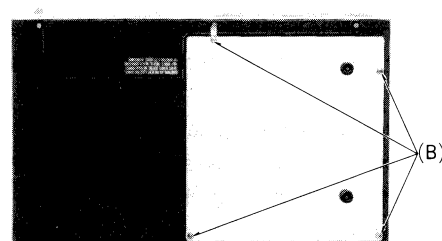


Fig. 2

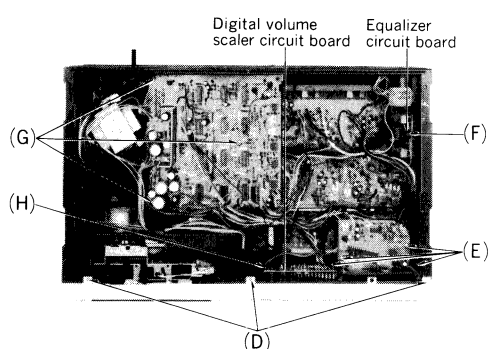


Fig. 3

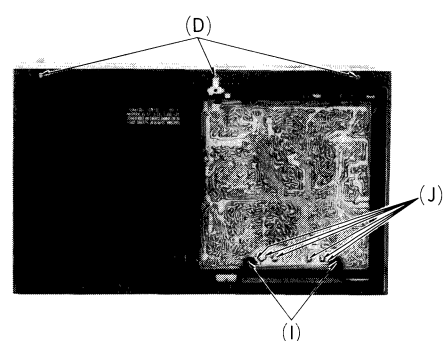


Fig. 4

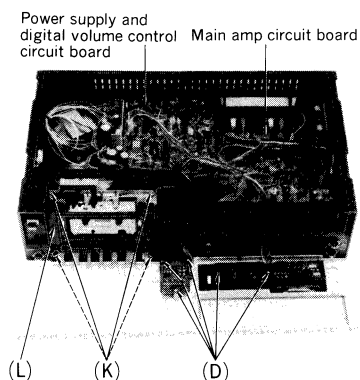


Fig. 5

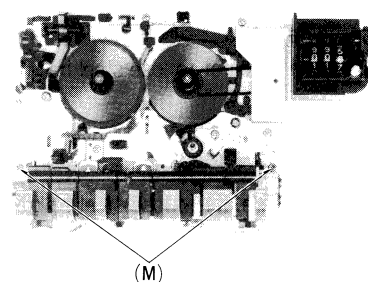


Fig. 6

Ref. No.	Procedure	To remove —	Remove —	Shown in fig. —
1	1	Case cover	• 4 screws (A)	1
2	2	Bottom cover	• 4 red screws (B)	2
3	1→3	Front panel	• Cassette lid (C) • 11 screws (D)	1 3, 4, 5
4	1→4	FL meter and FL meter circuit board	• 4 screws (E)	3
5	1→5	Equalizer circuit board	• 1 screw (F)	3
6	1→6	Power supply and digital volume control circuit board	• 3 red screws (G)	3
7	1→4→7	Digital volume scaler circuit board	• 1 screw (H)	3
8	1→2→5→8	Main amp circuit board	• 2 red screws (I) • 6 solder points (J)	4
9	1→3→9	Mechanism unit	• 4 screws (K)	5
10	1→3→9→10	Operation button assembly	• Cassette holder (L) • 2 screws (M)	5 6

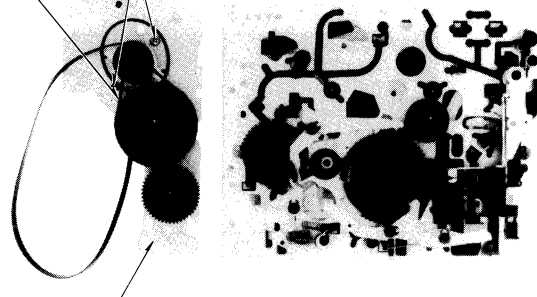
DISASSEMBLY NOTES (MECHANISM UNIT)

• Precautions for removal of the motor

When removing the motor, follow the procedure given below.

1. Remove screw (A), and then detach flywheel retainer (M44) by pulling it in the direction of the arrow as in fig. 1.
2. After removing screws (B), detach takeup belt (M78) and capstan belt (M76), and then sub chassis assembly (M72) can be removed. (fig. 1, 2)
3. When screws (C) is removed after detaching fast forward belt (M77), motor assembly (M71) can be removed. (fig. 2)

Fast Forward Belt (M77) Screw (C)



Sub Chassis Assembly (M72) Fig. 2

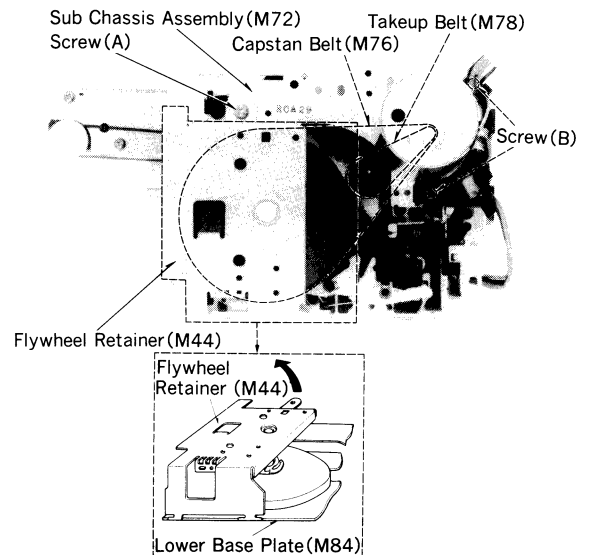


Fig. 1

• Head base plate (M57) and upper base plate (M83) removing procedure

1. With screw (D) removed, head base plate pressure spring (M66) can be detached. In this case, take care not to lose steel ball (M65). (fig. 3)
2. With head release spring (M68) removed, head base plate (M57) can be detached. (fig. 3, 4) In this case, take care not to lose steel ball (M65) and roller (M64) (fig. 4)
3. After removing pressure roller release spring (M25), remove pressure roller assembly (M40). (fig. 4)
4. Remove screw (E), and then upper base plate (M83) can be detached. (fig. 4)

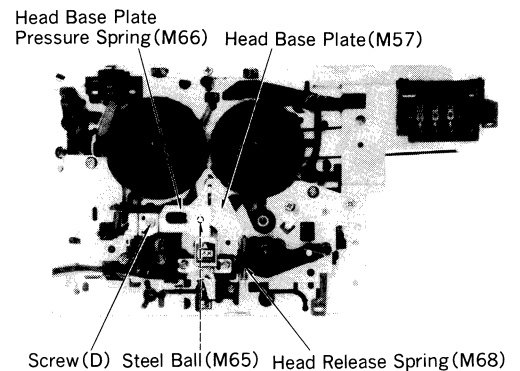


Fig. 3

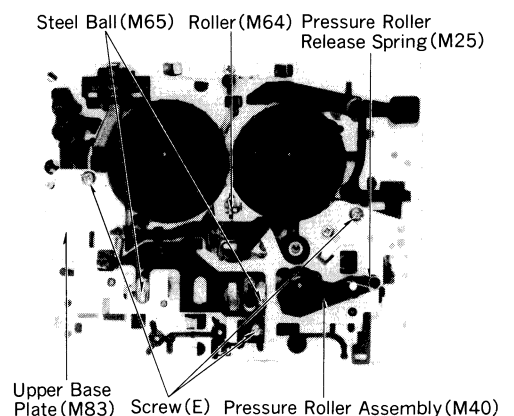


Fig. 4

• 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 earth plate-A (fig. 5).
3. Without grounding, the amplifier does not operate properly.

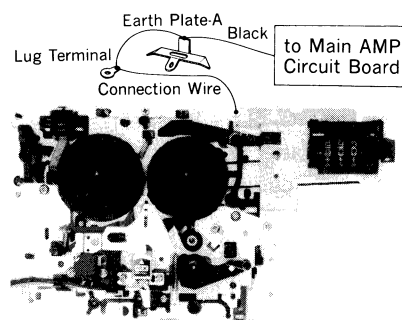


Fig. 5

ASSEMBLY INSTRUCTIONS

• Belt mounting

Check that each belt is free of damage or grease on the surface, after that, set the belt as illustrated, and mount it on the lower base plate (M84) after that, set the takeup belt (M78) on the fast forward connection pulley assembly (M82) (fig. 1).

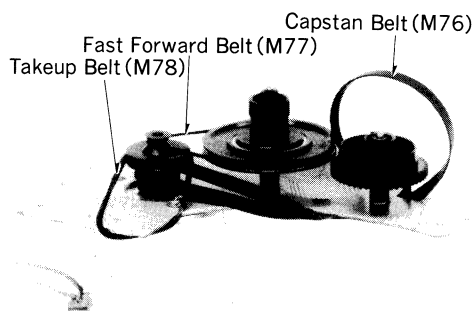


Fig. 1

• Positioning the takeup reel table assembly

When installing the takeup reel table assembly, be sure to mount the auto-stop friction hub (shown in fig. 3), as illustrated in fig. 2.

If the takeup reel table is positioned incorrectly at any place other than that shown in fig. 2, the auto-stop mechanism remains operative at all times.

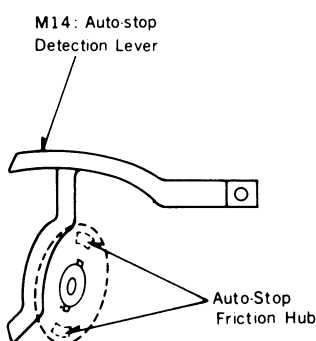


Fig. 2

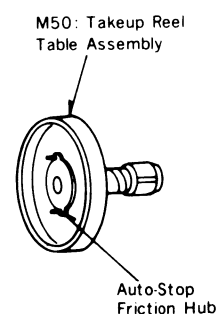


Fig. 3

• Mounting the operation button assembly

Before mounting the operation button assembly on the mechanism body, be sure to lift the main control lever in the direction of the arrow using a screwdriver, as shown in fig. 4, until it locks in place.

If it is not mounted in this manner, the hub of the playback button assembly during playback catches on the main control lever, making it impossible to release playback mode.

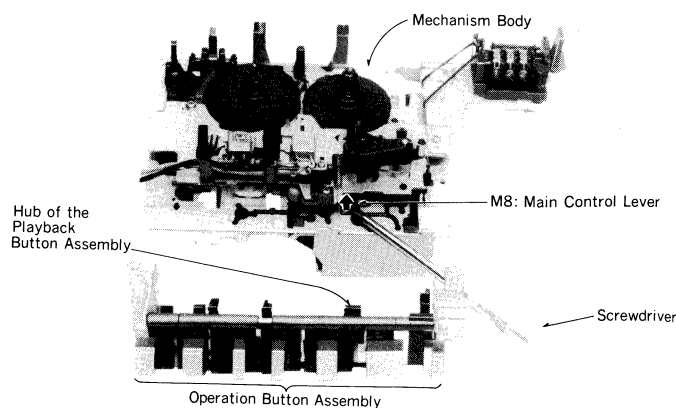
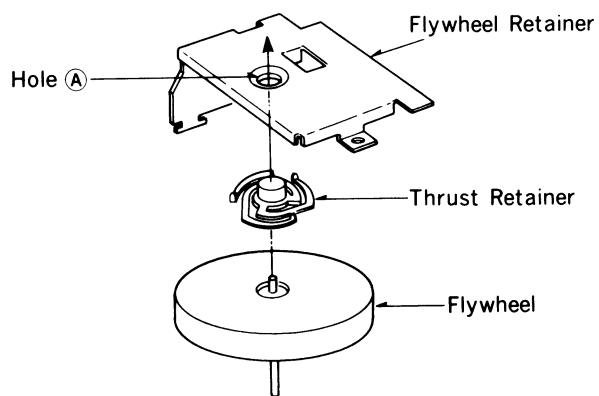
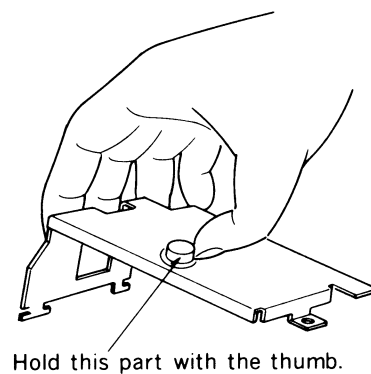
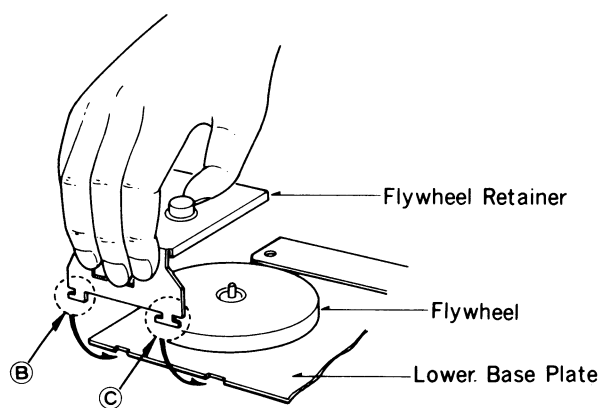
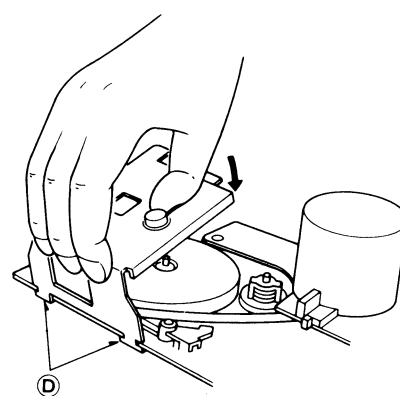


Fig. 4

•How to install the flywheel retainer

1. Insert the thrust retainer into the hole (A) of the flywheel retainer as shown in fig. 5.
2. Hold the thrust retainer with the thumb as shown in fig. 6.
3. Engage the parts (B) and (C) of the flywheel retainer with the lower base plate as shown in fig. 7.
4. Shift down the flywheel retainer, supported at points (D), in the direction of the arrow as illustrated fig. 8.
5. Attach the screw (A) in the position as shown in fig. 1 on page 3.

**Fig. 5****Fig. 6****Fig. 7****Fig. 8**

OPERATING PRINCIPLE OF AUTOMATIC INPUT CHANGEOVER MECHANISM

This unit uses an automatic input changeover mechanism.

Automatic input changeover of this unit is built-in the MIC jack.

With the microphone plug inserted into the microphone jack, the mechanism automatically changes an input source from LINE IN to the MIC.

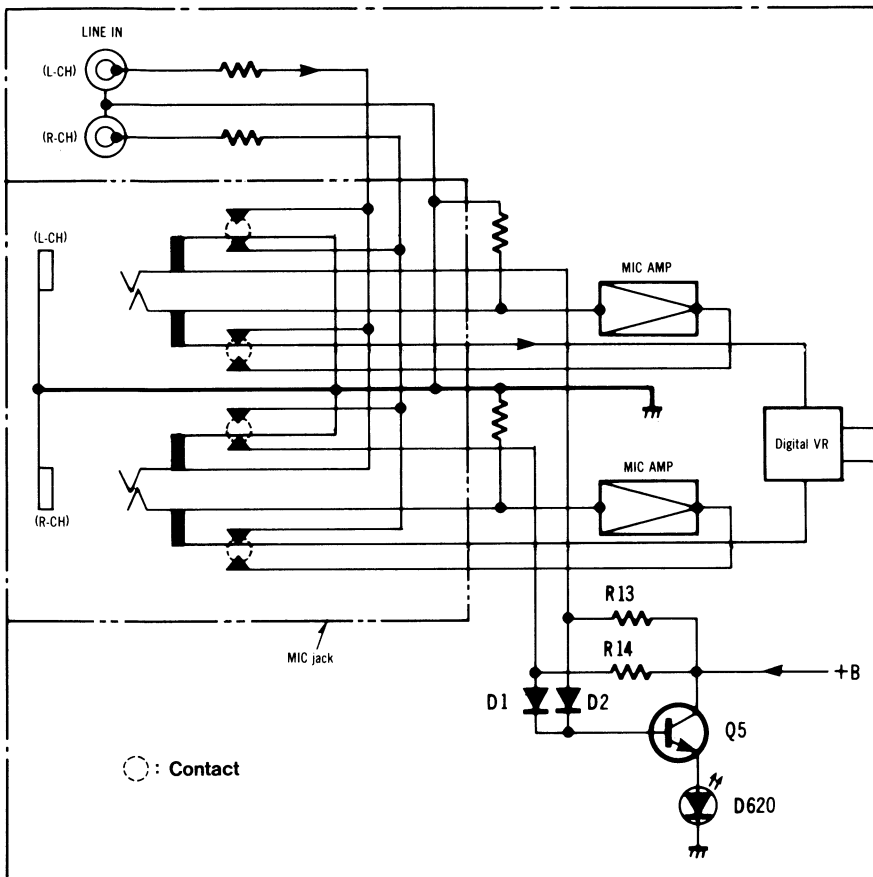


Fig. 1

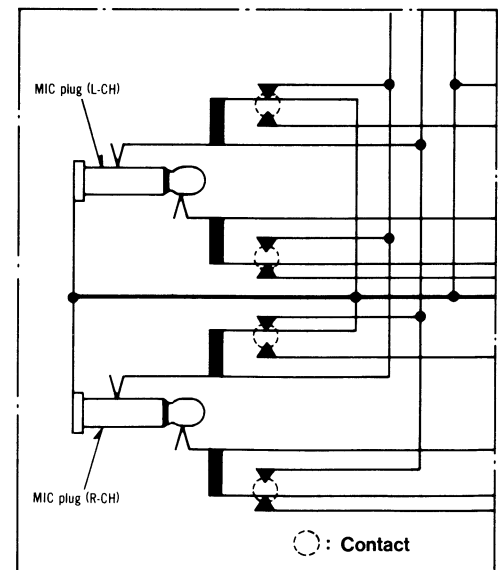


Fig. 2

The automatic input changeover mechanism is simplified as shown in fig. 1.

With the microphone unplugged, the contact is positioned as shown in fig. 1, where an input source is at the LINE IN.

Inserting the microphone plug into the jack causes an automatic contact changeover (shown in fig. 2).

The input source is changed from the LINE IN to the MIC, turning on the transistor (Q5) to cause the LED (D620) to light up, thus indicating that the input has been changed from the LINE IN to the MIC.

NOTE:

Even the microphone plug is inserted into the jack of a single channel alone, an input source at both channels is changed to the microphone, and the microphone display LED (D620) lights up.

TECHNICAL INFORMATION OF AUTO-REC SENSOR

The recording input control of this unit is of a digital control attenuator system based on the electronic circuitry.

An ordinary tape deck using a manual variable resistor system monitors the peak level of input signal by a level meter for correct recording level setting.

In contrast, however, this unit is equipped with a function that can set the recording level automatically with a single touch of a button. Furthermore, fine adjustment is possible to any required recording level.

INPUT/OUTPUT CHARACTERISTICS OF AUTO-REC SENSOR

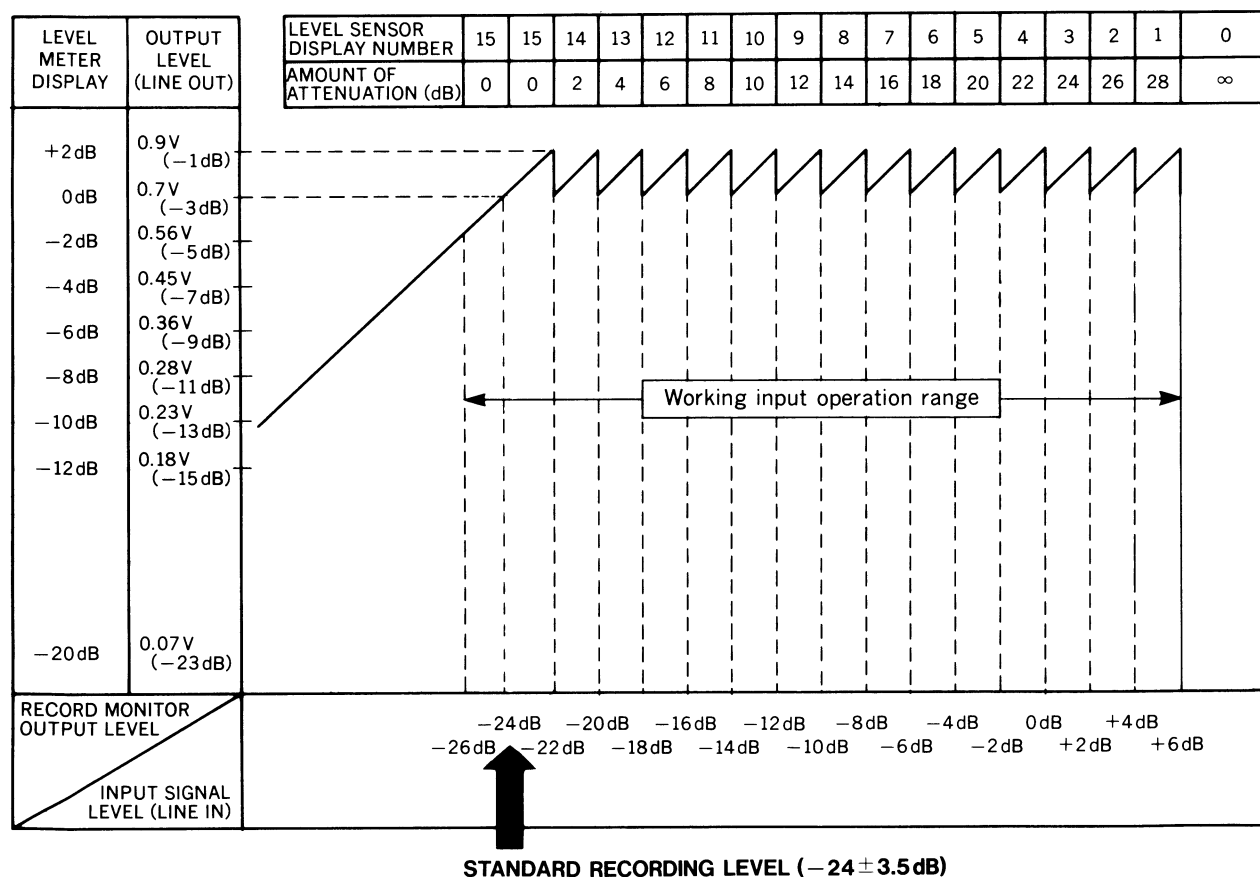


Fig. 1

Fig. 1 shows the record monitor output level at LINE OUT after operation of the Auto-Rec Sensor, with 1 kHz sine wave signal applied to LINE IN.

As shown in fig. 1, when the input level is less than the standard input level of LINE IN -24 dB, the output level decrease in proportion to the input. Also, the input applied is over $+6$ dB (2V), no signal is generated on the output side. This is because the digital volume level is minimized by the Auto-Rec Sensor when the input is excessive.

Also, the Auto-Rec Sensor in the working input operation range is adjusted so that the amount of attenuation is automatically increased by 2 dB every time the input signal level increases by 2 dB, compared with the standard level as shown in fig. 1. For example, when -8 dB input signal, 16 dB higher than the standard recording level, is applied to LINE IN, it is automatically attenuated by 16 dB by the auto record level setting circuit. This causes the output level at LINE OUT to become 0.7V (-3 dB). Displayed on the LEVEL SENSOR READ-OUT at this time is 7.

The output level after setting the recording level by the Auto-Rec Sensor, is in the range of 0.7V–0.9V (Level meter display: 0 dB – $+2$ dB) as shown in fig. 1.

MEASUREMENT AND ADJUSTMENT METHODS

• Circuit boards and adjustment parts location

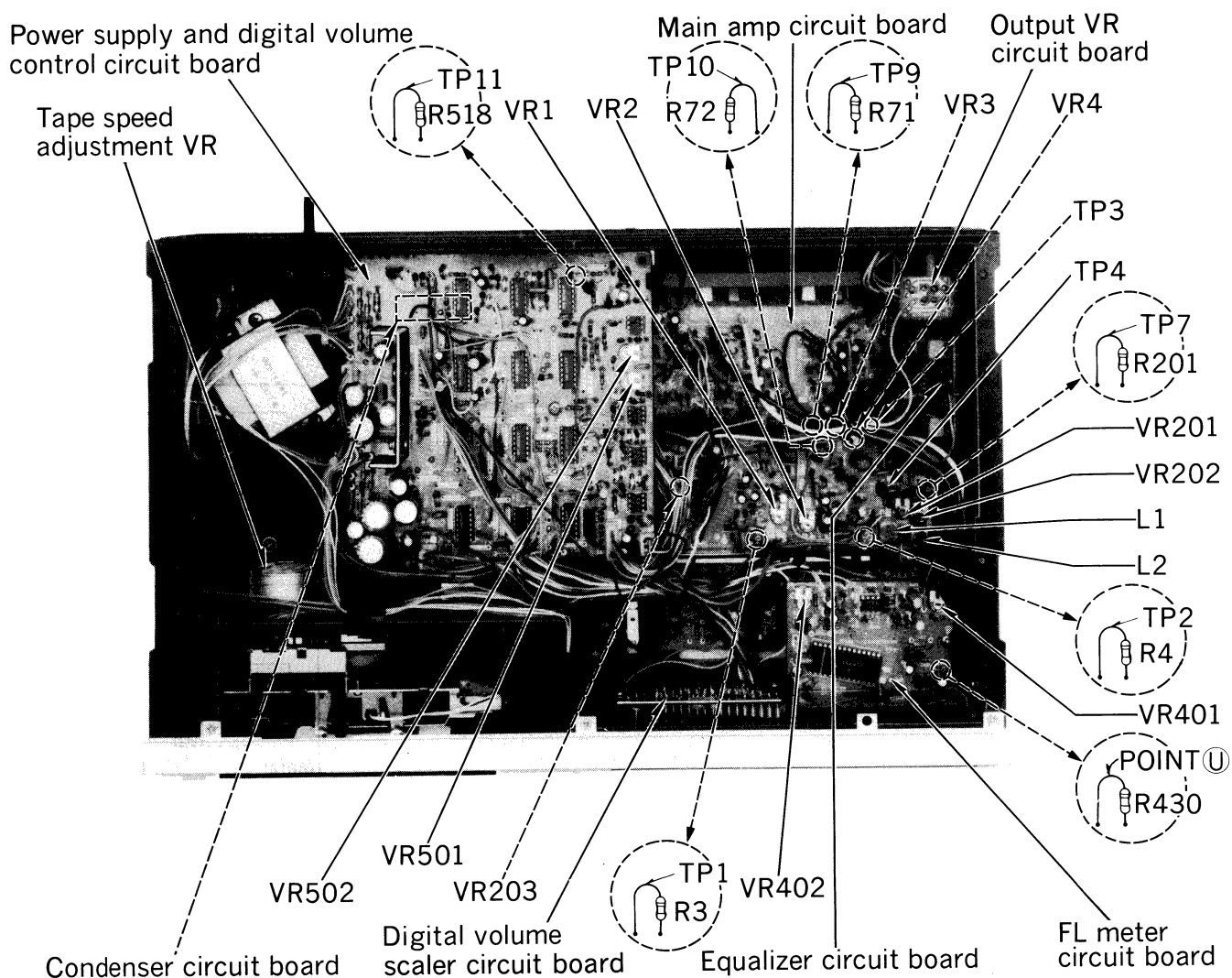


Fig. 1

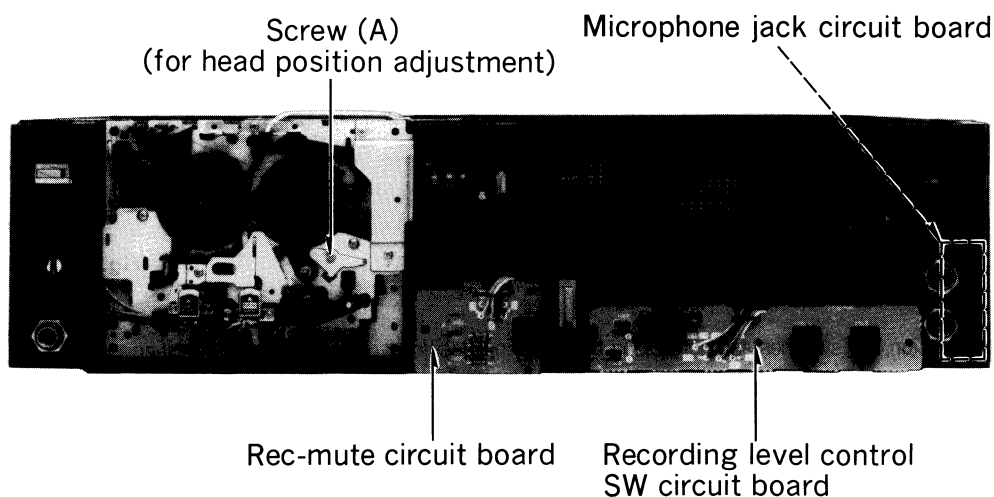


Fig. 2

NOTES 1: Tape selector

This unit employs an auto tape select mechanism. This mechanism, as shown in fig. 3, automatically selects the circuits for metal/CrO₂/normal modes by using the tape detection holes provided above the cassette tape half.

However, another type of test tape is not provided with these tape detection holes.

Therefore, when it is necessary to change over the electric circuit to metal/CrO₂/normal/Fe-Cr mode for the measurement and adjustment, take the following measures according to the types of the test tapes.

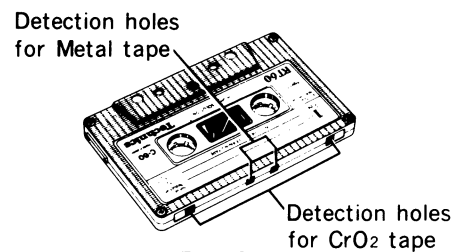


Fig. 3

◎Setting it to the metal tape mode:

- When the tape used is provided with metal tape mode detection hole, set the tape selector located at the back of the set to auto position (fig. 4).
- When the tape used is not provided with the metal tape detection hole, set the tape selector to metal-manual position (fig. 5).

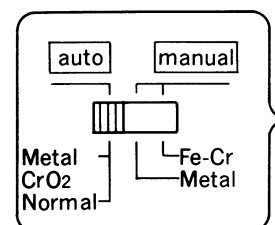


Fig. 4

◎Setting it to the normal tape mode:

- Set the tape selector located at the back of the set to auto position (fig. 4).

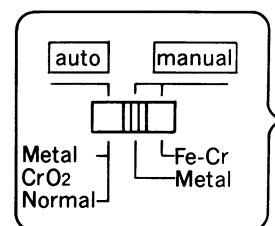


Fig. 5

◎Setting it to the Fe-Cr tape mode:

- Set the tape selector located at the back of the set to Fe-Cr-manual position (fig. 6).

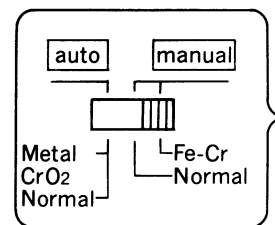


Fig. 6

◎Setting it to the CrO₂ tape mode:

- When the tape used is provided with CrO₂ tape mode detection hole, set the tape selector located at the back of the set to auto position (fig. 4).
- When the tape used is not provided with the CrO₂ tape detection hole, set the tape selector to auto position as shown in fig. 4, and pull out the 6 pin socket-, and short-circuit the terminal of the 6 pin post- as shown in fig. 7, then the circuit is set to CrO₂ mode.

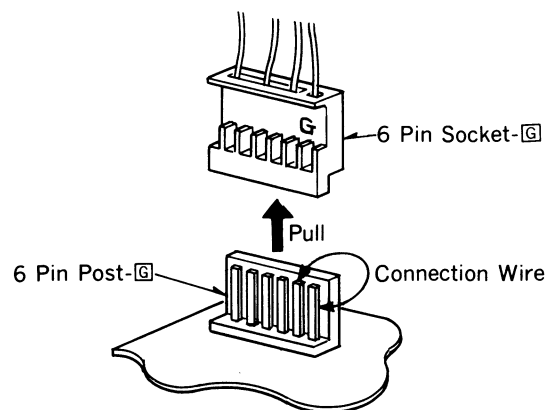
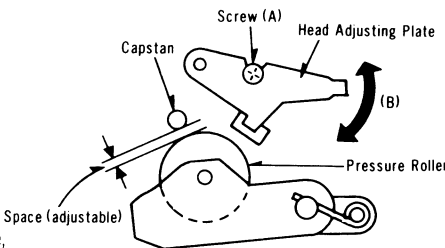
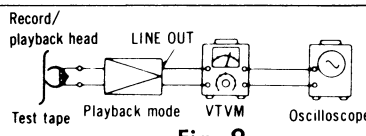
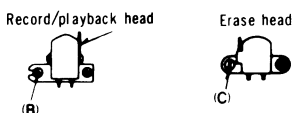
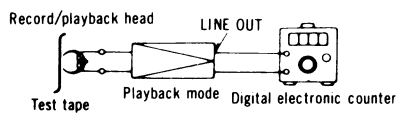
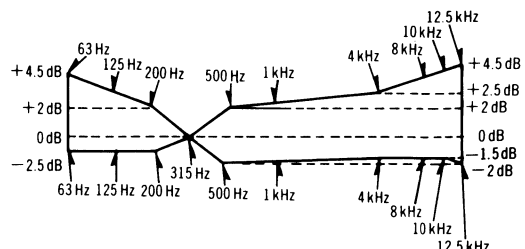
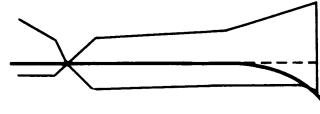
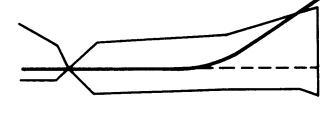
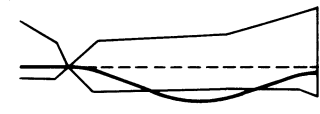
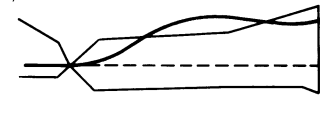
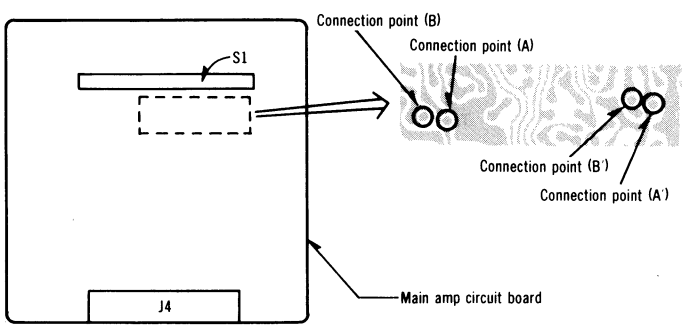


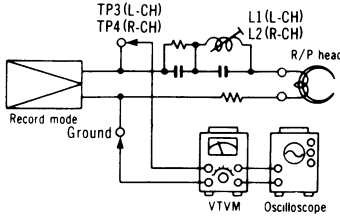
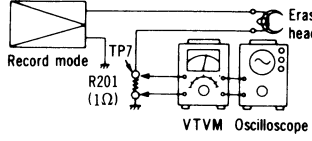
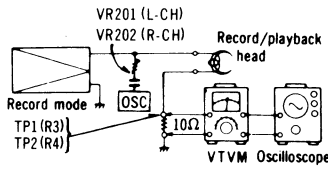
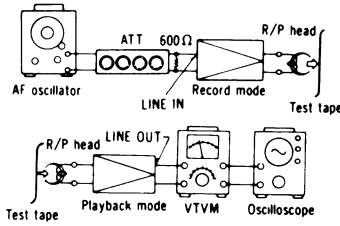
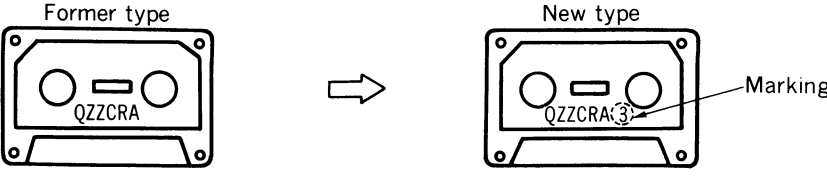
Fig. 7

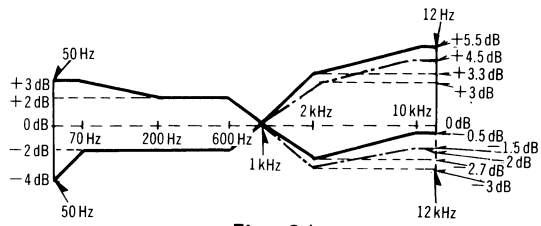
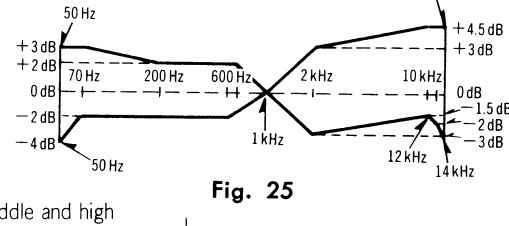
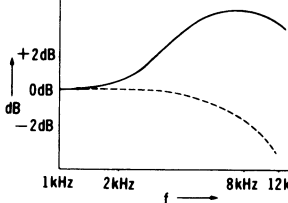
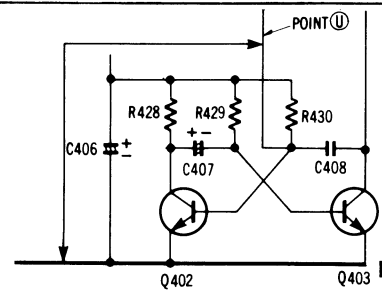
NOTES 2: Keep good condition, set switches and controls in the following positions, unless otherwise specified.

- | | |
|---|---|
| <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Tape selector: Auto position • Output level control: Maximum • Level fine adjust: Maximum |
|---|---|

ITEM	MEASUREMENT & ADJUSTMENT
Ⓐ Head position adjustment 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 pinch roller and the capstan. Standard value: 0.5 ± 0.3 mm 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. 8).  Fig. 8
Ⓑ Head azimuth adjustment Condition: * Playback mode Equipment: * VTVM * Oscilloscope * Test tape (azimuth) ... QZZCFM * Test tape (tape path viewer) ... QZZCRD	Record/playback head azimuth adjustment 1. Test equipment connection is shown in fig. 9. 2. Playback azimuth tape (QZZCFM 8kHz). 3. Adjust record/playback head angle adjustment screw (B) in fig. 10 so that output level at LINE OUT becomes maximum. 4. Measure both channels, and adjust levels for equal output. 5. After adjustment lock head adjustment screw with lacquer.  Fig. 9 Erase head azimuth adjustment 1. Test equipment connection is the same above but use the tape path viewer (QZZCRD) instead of test tape (QZZCFM). 2. Playback this tape. 3. Adjust screw (C) shown in fig. 11 so that the tape may not get curled or malformed by tape guide of the erase head. 4. After adjustment, lock head adjust screw with lacquer.  Fig. 10 Fig. 11
Ⓒ Tape speed Condition: * Playback mode Equipment: * Digital electronic counter or frequency counter * Test tape ... QZZCWAT	Tape speed accuracy 1. Test equipment connection is shown in fig. 12. 2. Playback test tape (QZZCWAT 3,000Hz), and supply playback signal to frequency counter. 3. Measure this frequency. 4. On the basis of 3,000Hz, determine value by following formula: $\text{Tape speed accuracy} = \frac{f - 3,000}{3,000} \times 100 (\%) \quad \text{where, } f = \text{measured value}$ 5. Take measurement at middle section of tape. Standard value: $\pm 1.5\%$ Adjustment method 1. Playback the test tape (middle). 2. Adjust so that frequency becomes 3,000Hz. 3. Tape speed adjustment VR shown in fig. 1. Note: Please use non metal type screwdriver when you adjust tape speed accuracy on this unit. Tape speed fluctuation Make measurements in same manner as above (beginning, middle and end of tape), and determine the difference between maximum and minimum values and calculate as follows: $\text{Tape speed fluctuation} = \frac{f_1 - f_2}{3,000} \times 100 (\%) \quad f_1 = \text{maximum value, } f_2 = \text{minimum value}$ Standard value: Less than 1%  Fig. 12
Ⓓ Playback frequency response Condition: * Playback mode * Normal tape mode * Output level control ... MAX Equipment: * VTVM * Oscilloscope * Test tape ... QZZCFM	Playback frequency response chart 1. Test equipment connection is shown in fig. 9. 2. Place UNIT into playback mode. 3. Playback the frequency response test tape (QZZCFM). 4. Measure output level at 315Hz, 12.5kHz, 8kHz, 4kHz, 1kHz, 250Hz, 125Hz and 63Hz and compare each output level with the standard frequency 315Hz, at LINE OUT. 5. Make measurement for both channels.  Fig. 13

ITEM	MEASUREMENT & ADJUSTMENT																																								
	6. Make sure that the measured value is within the range specified in the frequency response chart (Fig. 13). Adjustment method 1. If the measured value decreases at high frequency range, as shown in fig. 14, P.C.B. connection points (A) (L-CH) and (A') (R-CH) should be shorted (Fig. 18). Compensation value <table><tr><td>4 kHz</td><td>6 kHz</td><td>8 kHz</td><td>10 kHz</td><td>12.5 kHz</td></tr><tr><td>around +0.1 dB</td><td>around +0.2 dB</td><td>around +0.5 dB</td><td>around +0.8 dB</td><td>around +1.2 dB</td></tr></table>  Fig. 14 2. If the measured value increases at high frequency range, as shown in fig. 15, P.C.B. connection points (A) (L-CH) and (A') (R-CH) should be opened (Fig. 18). Compensation value <table><tr><td>4 kHz</td><td>6 kHz</td><td>8 kHz</td><td>10 kHz</td><td>12.5 kHz</td></tr><tr><td>around -0.1 dB</td><td>around -0.2 dB</td><td>around -0.5 dB</td><td>around -0.8 dB</td><td>around -1.2 dB</td></tr></table>  Fig. 15 3. If the measured value decreases at middle frequency range, as shown in fig. 16, P.C.B. connection points (B) (L-CH) and (B') (R-CH) should be opened (Fig. 18). Compensation value <table><tr><td>700 Hz</td><td>1 kHz</td><td>2 kHz</td><td>4 kHz</td><td>10 kHz</td></tr><tr><td>around +0.1 dB</td><td>around +0.2 dB</td><td>around +0.5 dB</td><td>around +0.6 dB</td><td>around +0.8 dB</td></tr></table>  Fig. 16 4. If the measured value increases at middle frequency range, as shown in fig. 17, P.C.B. connection points (B) (L-CH) and (B') (R-CH) should be shorted (Fig. 18). Compensation value <table><tr><td>700 Hz</td><td>1 kHz</td><td>2 kHz</td><td>4 kHz</td><td>10 kHz</td></tr><tr><td>around -0.1 dB</td><td>around -0.2 dB</td><td>around -0.5 dB</td><td>around -0.6 dB</td><td>around -0.8 dB</td></tr></table>  Fig. 17  Fig. 18	4 kHz	6 kHz	8 kHz	10 kHz	12.5 kHz	around +0.1 dB	around +0.2 dB	around +0.5 dB	around +0.8 dB	around +1.2 dB	4 kHz	6 kHz	8 kHz	10 kHz	12.5 kHz	around -0.1 dB	around -0.2 dB	around -0.5 dB	around -0.8 dB	around -1.2 dB	700 Hz	1 kHz	2 kHz	4 kHz	10 kHz	around +0.1 dB	around +0.2 dB	around +0.5 dB	around +0.6 dB	around +0.8 dB	700 Hz	1 kHz	2 kHz	4 kHz	10 kHz	around -0.1 dB	around -0.2 dB	around -0.5 dB	around -0.6 dB	around -0.8 dB
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700 Hz	1 kHz	2 kHz	4 kHz	10 kHz																																					
around -0.1 dB	around -0.2 dB	around -0.5 dB	around -0.6 dB	around -0.8 dB																																					
Ⓔ Playback gain Condition: * Playback mode * Normal tape mode * Output level control...MAX Equipment: * VTVM * Oscilloscope * Test tape...QZZCFM	1. Test equipment connection is shown in fig. 9. 2. Playback standard recording level portion on test tape (QZZCFM 315Hz), and using VTVM measure the output level at LINE OUT. 3. Make measurement for both channels. Standard value: around 0.7 V Adjustment 1. If measured value is not standard, adjust VR1 (L-CH), VR2 (R-CH) (See fig. 1). 2. After adjustment, check "Ⓓ Playback frequency response" again.																																								

ITEM	MEASUREMENT & ADJUSTMENT
Ⓔ Bias leakage Condition: * Record mode * Metal tape mode Equipment: * VTVM * Oscilloscope	- Test equipment connection is shown in fig. 19. - Place UNIT into record mode. - Adjust trap coil L1 (L-CH), L2 (R-CH) so that measured value on VTVM becomes minimum. - Take adjustment for both channels.  Fig. 19
Ⓕ Erase current Condition: * Record mode * Metal tape mode Equipment: * VTVM * Oscilloscope	- Test equipment connection is shown in fig. 20. - Place UNIT into record mode and measure voltage at test point 7. - Determine erase current with the following formula: $\text{Erase current (A)} = \frac{\text{Voltage across both ends of R201}}{1 (\Omega)}$  Fig. 20 Standard value: 95 ± 5 mA (Tape selector... Metal) - If measured value is not within standard, adjust VR203.
Ⓖ Bias current Condition: * Record mode * Normal tape mode * Fe-Cr tape mode * CrO ₂ tape mode * Metal tape mode * Output level control... MAX Equipment: * VTVM * Oscilloscope	- Test equipment connection is shown in fig. 21. - Set UNIT into record mode, and normal tape mode. - Read voltage on VTVM and calculate bias current by following formula: $\text{Bias current (A)} = \frac{\text{Value read on VTVM (V)}}{10 (\Omega)}$  Fig. 21 Standard value: around 360 μA (Normal tape mode) - If measured value is not within standard, adjust VR201 (L-CH) and VR202 (R-CH). - Set the tape selector to each position. - Make sure that the measured value is within standard. Standard value: around 380 μA (Fe-Cr tape mode), around 450 μA (CrO₂ tape mode), around 700 μA (Metal tape mode)
Ⓘ Overall frequency response Condition: * Record/playback mode * Normal tape mode * Fe-Cr tape mode * CrO ₂ tape mode * Metal tape mode * Level fine adjust... MAX * Output level control... MAX * Standard input level; MIC - 72 ± 3.5 dB LINE IN ... - 24 ± 3.5 dB Equipment: * VTVM * Oscilloscope * ATT * AF oscillator * Resistor (600 Ω) * Test tape (reference blank tape) ... QZZCRA for Normal ... QZZCRX for CrO ₂ ... QZZCRY for Fe-Cr ... QZZCRZ for Metal	Note 1: Before measuring and adjusting, make sure of the playback frequency response (For the method of measurement, please refer to the playback frequency response).  Fig. 22 Note 2: Test tape QZZCRA to be supplied after July 1980 has higher recording sensitivity in the middle and high frequency range. *  This chart indicates the standard values for the new type of QZZCRA when in use. *  This chart indicates the standard values for the former type of QZZCRA when in use. The new type of QZZCRA is marked as shown in fig. 23.  Fig. 23

ITEM	MEASUREMENT & ADJUSTMENT
Measurement - Test equipment connection is shown in fig. 22. - Place the test tape (QZZCRA) in the cassette holder. - Set UNIT into record mode, and normal tape mode. - Supply 1 kHz signal from AF oscillator through ATT to LINE IN. - Adjust ATT so that input level is - 20 dB below standard recording level (standard recording level = 0 VU). - At this time, LINE OUT level indicates 0.07 V. - Record each frequency 50 Hz, 70 Hz, 600 Hz, 1 kHz, 2 kHz, 8 kHz, 10 kHz, and 12 kHz (14 kHz for CrO₂, Fe-Cr and Metal). - Playback and express in dB the difference between playback output level of each frequency based on playback output level of 1 kHz. - Make sure that the measured value is within the range specified in the overall frequency response chart (shown in fig. 24). - Change test tape to Fe-Gr (QZZCRY), CrO₂ (QZZCRX) and Metal (QZZCRZ). - Set UNIT into each tape mode. - Measure as same as manner from step (3) to step (8). - Make sure that the measured value is within the range specified in the overall frequency response chart for Fe-Cr, CrO₂ and Metal tape shown in fig. 25.	Overall frequency response chart (Normal)  Fig. 24 Overall frequency response chart (Fe-Cr, CrO₂, Metal)  Fig. 25 Adjustment—Using bias current - When the frequency response between the middle and high frequency range becomes higher than the standard value, as shown by the solid line in fig. 26, increases the bias current by turning VR201 (L-CH), VR202 (R-CH). - When it becomes lower, as shown by dotted line, reduce the bias current by turning VR201 (L-CH), VR202 (R-CH).  Fig. 26 Note: For the method of bias current measurement, refer to "Ⓖ Bias current adjustment" on page 12.
Ⓙ Overall gain Condition: * Record/playback mode * Normal tape mode * Level fine adjust... MAX * Output level control... MAX * Standard input level; MIC - 72 ± 3.5 dB LINE IN ... - 24 ± 3.5 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. 22. - Place UNIT into record mode, and normal tape mode. - Supply 1 kHz signal (- 24 dB) from AF oscillator, through ATT to LINE IN. - Adjust ATT until monitor level at LINE OUT becomes 0.7 V. - Using test tape, make recording. - Playback recorded tape, and make sure the value at LINE OUT on VTVM becomes 0.7 V. - If measured value is not 0.7 V, adjust VR3 (L-CH), VR4 (R-CH) (See fig. 1). - Repeat from step (2).
Ⓚ Fluorescent meter Condition: * Record mode * Level fine adjust... MAX * Output level control... MAX Equipment: * VTVM * AF oscillator * ATT * Oscilloscope * Resistor (600 Ω)	- Test equipment connection is shown in fig. 22. - As shown in fig. 27, connecting the base of Q402 (Point ①, see fig. 1 on page 8) and ground stops the oscillation of the astable multivibrator comprising Q402 and Q403. - Supply 1 kHz signal (- 24 dB) to the LINE IN jack, then press the record button. - Adjust the ATT so that the output level at LINE OUT jack becomes 0.7 V (The input level at this condition is termed the standard input level).  Fig. 27

Ⓛ Dolby N

Condition:

- * Record m
- * Dolby NR
- * Level fine

Equipment:

- * VTVM
- * ATT
- * Resistor (

Ⓜ Digital i
control

Condition:

- * Record m
- * Level fine
- ... Indicat
- and "1"

Equipment:

- * VTVM
- * ATT
- * Resistor
- * DC voltm

1 (L-CH)
2 (R-CH)
R/P head
Oscilloscope

Erase head
VM Oscilloscope

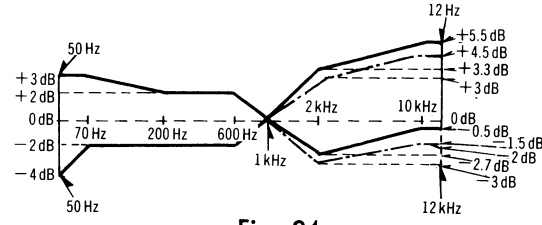
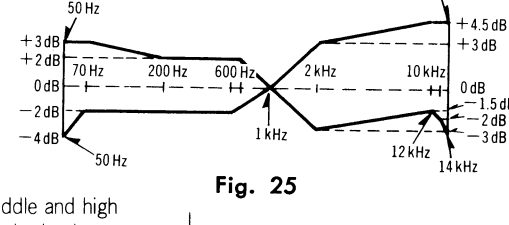
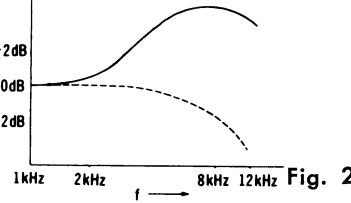
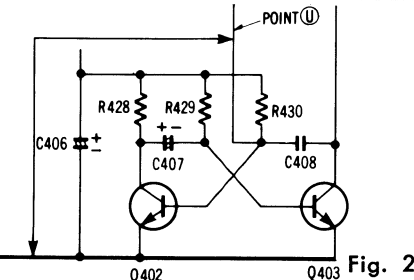
Record/playback head
VTVM Oscilloscope

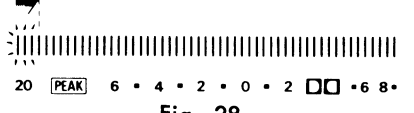
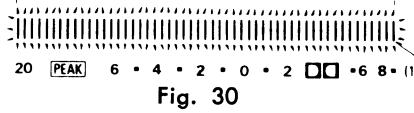
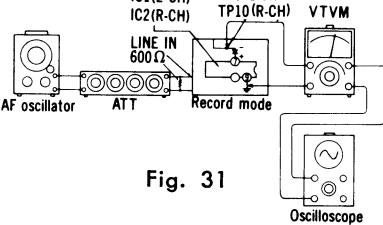
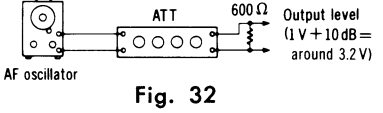
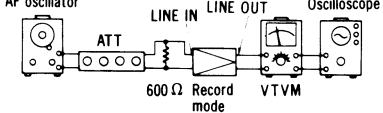
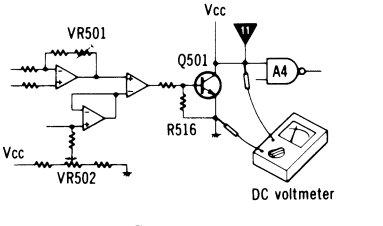
Test tape
Oscilloscope

in use.

then in use.

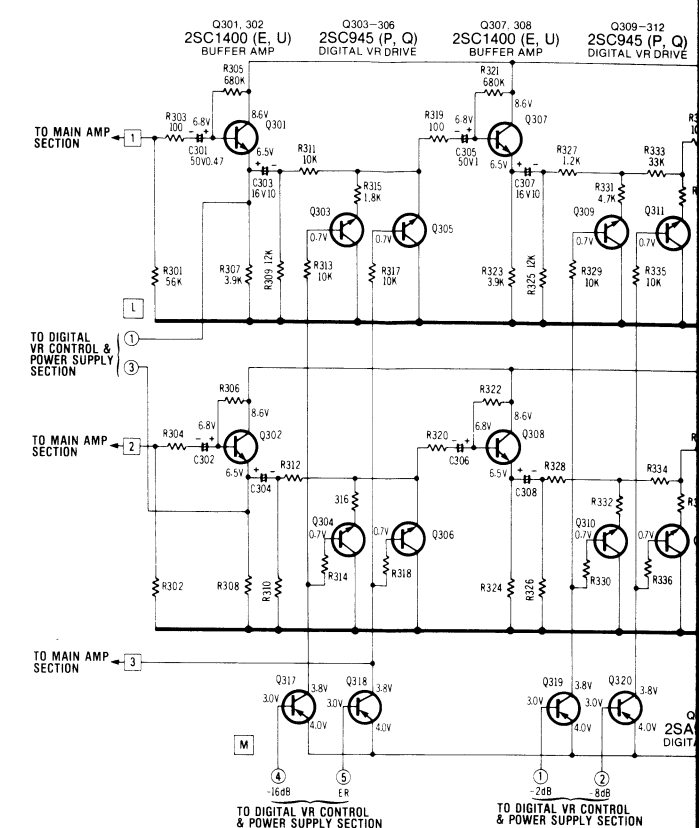
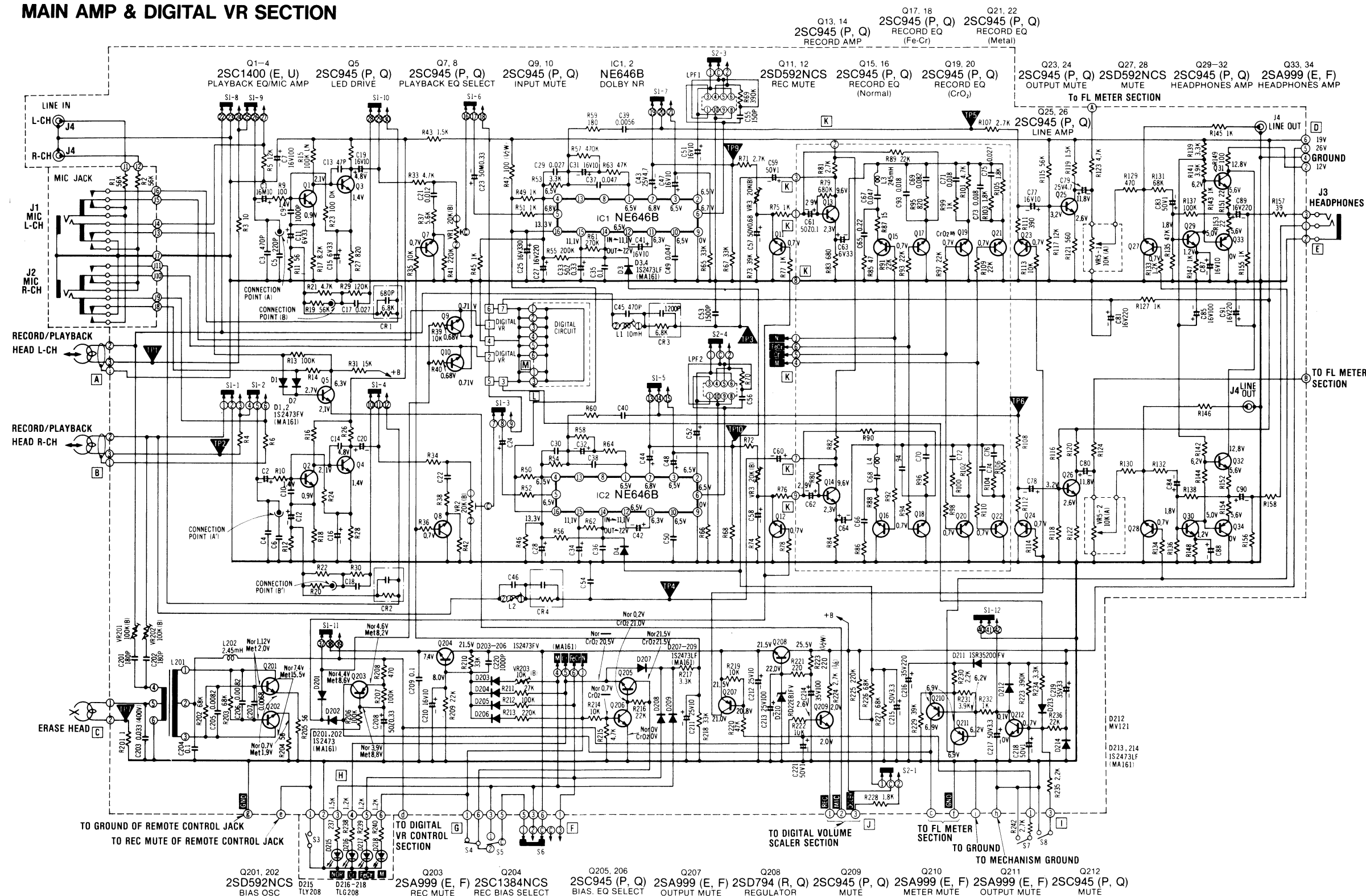
marking

ITEM	MEASUREMENT & ADJUSTMENT
	Measurement - Test equipment connection is shown in fig. 22. - Place the test tape (QZZCRA) in the cassette holder. - Set UNIT into record mode, and normal tape mode. - Supply 1 kHz signal from AF oscillator through ATT to LINE IN. - Adjust ATT so that input level is -20 dB below standard recording level (standard recording level = 0 VU). - At this time, LINE OUT level indicates 0.07 V. - Record each frequency 50 Hz, 70 Hz, 600 Hz, 1 kHz, 2 kHz, 8 kHz, 10 kHz, and 12 kHz (14 kHz for CrO₂, Fe-Cr and Metal). - Playback and express in dB the difference between playback output level of each frequency based on playback output level of 1 kHz. - Make sure that the measured value is within the range specified in the overall frequency response chart (shown in fig. 24). - Change test tape to Fe-Gr (QZZCRY), CrO₂ (QZZCRX) and Metal (QZZCRZ). - Set UNIT into each tape mode. - Measure as same as manner from step (3) to step (8). - Make sure that the measured value is within the range specified in the overall frequency response chart for Fe-Cr, CrO₂ and Metal tape shown in fig. 25. Adjustment—Using bias current - When the frequency response between the middle and high frequency range becomes higher than the standard value, as shown by the solid line in fig. 26, increases the bias current by turning VR201 (L-CH), VR202 (R-CH). - When it becomes lower, as shown by dotted line, reduce the bias current by turning VR201 (L-CH), VR202 (R-CH). Note: For the method of bias current measurement, refer to "Bias current adjustment" on page 12.
	Overall frequency response chart (Normal)  Fig. 24 Overall frequency response chart (Fe-Cr, CrO₂, Metal)  Fig. 25 Fig. 26 
Overall gain Condition: - Record/playback mode - Normal tape mode - Level fine adjust... MAX - Output level control... MAX - Standard input level; MIC... -72 ± 3.5 dB - LINE IN... -24 ± 3.5 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. 22. - Place UNIT into record mode, and normal tape mode. - Supply 1 kHz signal (-24 dB) from AF oscillator, through ATT to LINE IN. - Adjust ATT until monitor level at LINE OUT becomes 0.7 V. - Using test tape, make recording. - Playback recorded tape, and make sure the value at LINE OUT on VTVM becomes 0.7 V. - If measured value is not 0.7 V, adjust VR3 (L-CH), VR4 (R-CH) (See fig. 1). - Repeat from step (2).
Fluorescent meter Condition: - Record mode - Level fine adjust... MAX - Output level control... MAX Equipment: - VTVM - AF oscillator - ATT - Oscilloscope - Resistor (600 Ω)	- Test equipment connection is shown in fig. 22. - As shown in fig. 27, connecting the base of Q402 (Point ①, see fig. 1 on page 8) and ground stops the oscillation of the astable multivibrator comprising Q402 and Q403. - Supply 1 kHz signal (-24 dB) to the LINE IN jack, then press the record button. - Adjust the ATT so that the output level at LINE OUT jack becomes 0.7 V (The input level at this condition is termed the standard input level).  Fig. 27

ITEM	MEASUREMENT & ADJUSTMENT
	- Adjustment at "-20 dB": - Adjust the ATT so that input level is -20 dB below standard recording level. - Adjust VR401 so that the -20 dB segment lights up in the -20 ± 0.8 dB range (L-CH only) (See fig. 28). - Adjustment at "0 dB": - Adjust the ATT so that the output level at LINE OUT jack becomes 0.7 V (The input level at this condition is termed the standard input level). - Adjust VR402 so that the $+1$ dB segment lights up in the 0 ± 0.2 dB range of the standard input level (See fig. 29). - Repeat twice between steps (5) and (6) above. - Adjust ATT and check that all segments light up when an input signal level is increased to 10 dB higher than the standard input level (See fig. 30).  Fig. 28  Fig. 29  Fig. 30
Dolby NR circuit Condition: - Record mode - Dolby NR switch... IN/OUT - Level fine adjust... MAX Equipment: - VTVM - AF oscillator - ATT - Oscilloscope - Resistor (600 Ω)	- Test equipment connection is shown in fig. 31. - Place UNIT into record mode, set the Dolby NR switch to OUT position and supply to LINE IN to obtain -34.5 dB at TP9 (L-CH), TP10 (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. 31
Digital input level controller Condition: - Record mode - Level fine adjust... Indication number "3" and "15" Equipment: - VTVM - AF oscillator - ATT - Oscilloscope - Resistor (600 Ω) - DC voltmeter	- Increase the output level of the oscillator to 10 dB. Notes: The adjustment of this circuit is performed by applying about 1.25 V, 26 dB higher than the standard recording level (-24 ± 3.5 dB), and the input signal of about 0.08 V, 2 dB higher than the standard recording level, to LINE IN. Normally, the output of the oscillator is adjusted so that the output from the attenuator is 1 V when the attenuator is set to 0 dB. However, this does not generate an output higher than 1 V, and requires the output of the oscillator to be increased by 10 dB. In this case, the output level from the attenuator is around 3.2 V (Fig. 32). - Test equipment connection is shown in fig. 33. - Place the test tape in the cassette holder. - Press the record button and pause button. - Push the level fine adjust button so that the level sensor read-out display is 15. - Supply 1 kHz signal from AF oscillator, through ATT to LINE IN. - Adjust ATT until monitor level at LINE OUT becomes 0.7 V. - The attenuation of ATT at this time is the standard recording level. (Since the output level of the AF oscillator has been increased by 10 dB, the attenuation of ATT is at around -34 dB.) - Apply 1 kHz signal (around 1.25 V), 26 dB higher than the standard recording level, to LINE IN. (Apply it simultaneously to LEFT and RIGHT channels.) - Push the level fine adjust button so that the level sensor read-out display is "3". - Connect the DC voltmeter or oscilloscope (DC display) to TP11 (Fig. 34). - Slowly turn VR502 clockwise and stop it when the DC voltmeter display changes from L (0 V) to H (about 5 V). - Next, apply 1 kHz signal (around 0.08 V), 2 dB higher than the standard recording level, to LINE IN. - Push the level fine adjust button so that the level sensor read-out display is "15". - Slowly turn VR501 counterclockwise and stop it when the potential of TP11 changes from L to H. - Repeat steps (8) to (14) above several times.  Fig. 32  Fig. 33  Fig. 34

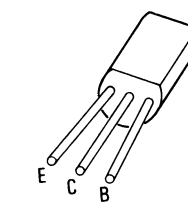
SCHEMATIC DIAGRAM

MAIN AMP & DIGITAL VR SECTION

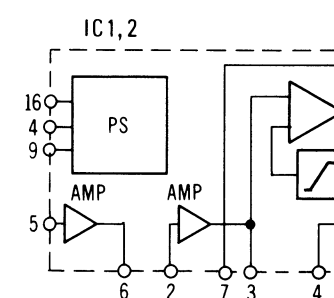


TERMINATION (BOTTOM VIEW)

Q1-4, 5, 7-34, 201-212



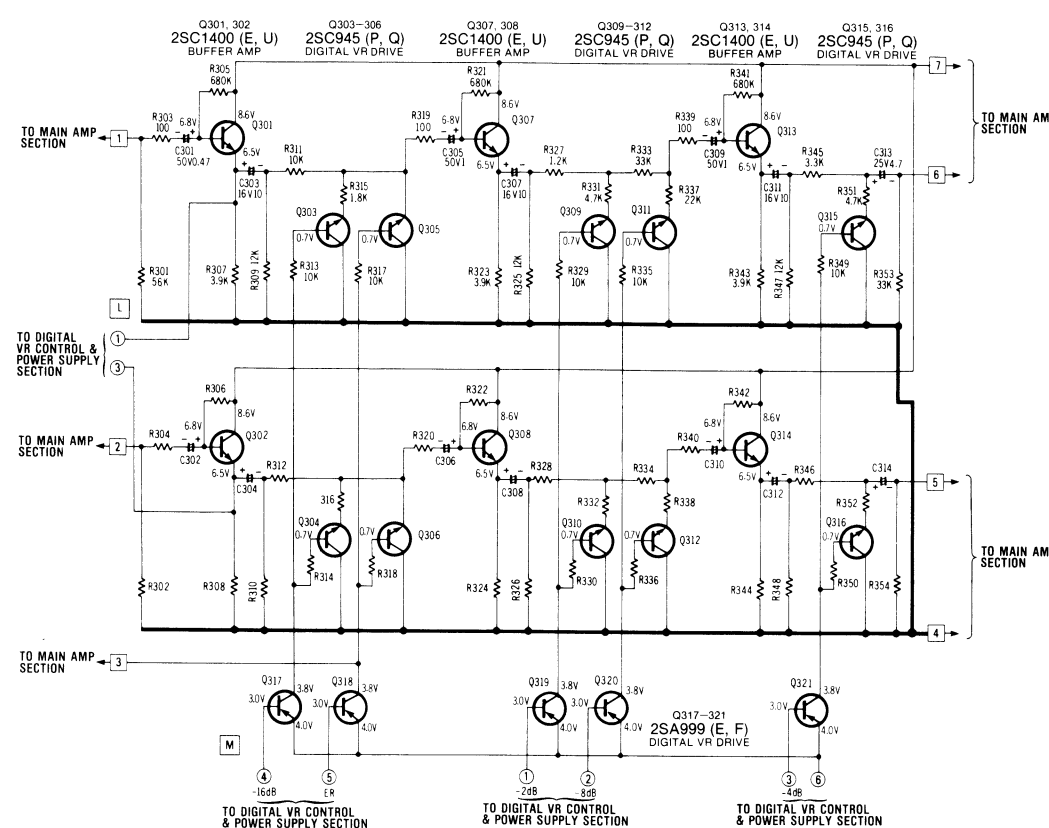
EQUIVALENT CIRCUIT



SPECIFICATIONS

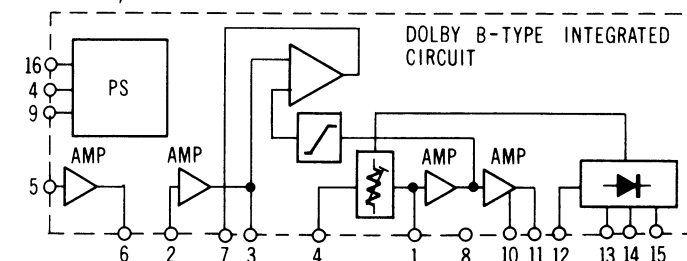
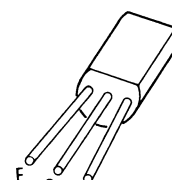
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* Output level control... MAX

Playback S/N ratio * Test tape... QZZCFM	More than 46 dB (without NAB filter)
Overall distortion * Test tape ... QZZCRA for Normal ... QZZCRX for CrO ₂ ... QZZCRY for Fe-Cr	Less than 3% (Normal) Less than 3.5% (Fe-Cr, CrO ₂ , Metal)
Overall S/N ratio * Test tape... QZZCRA	More than 43 dB (without NAB filter)



EQUIVALENT CIRCUIT

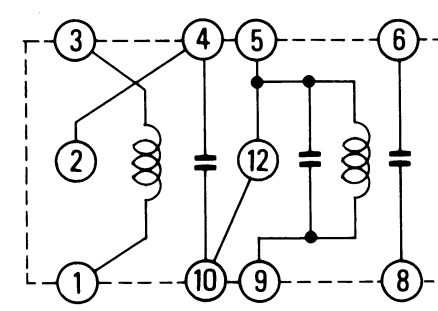
IC1,2



- * Level fine adjust ... MAX
- * Output level control ... MAX

Playback S/N ratio * Test tape... QZZCFM	More than 46 dB (without NAB filter)
Overall distortion * Test tape ... QZZCRA for Normal ... QZZCRX for CrO ₂ ... QZZCRY for Fe-Cr	Less than 3% (Normal) Less than 3.5% (Fe-Cr, CrO ₂ , Metal)
Overall S/N ratio * Test tape... QZZCRA	More than 43 dB (without NAB filter)

LPF 1,2



Ref. No.	Part No.	Ref. No.	Part No.	Ref. No.	Part No.	Ref. No.	Part No.
RESISTORS							
R1.2	ERD25FJ563	R213	ERD25TJ224	R518	ERD25FJ222	C35. 36	ECFWD104KXY
R3.4	ERD25FJ100	R214	ERD25FJ103	R519	ERD25FJ472	C37. 38	ECQM1H472JZ
R5.6	ERD25FJ103	R215	ERD25FJ472	R520	ERD25TJ123	C39. 40	ECQM1H562JZ
R9.10	ERD25TJ121	R216	ERD25TJ223			C41. 42	ECEA1HS100
R11.12	ERD25FJ560	R217	ERD25FJ332	R521	ERD25TJ823	C43. 44	ECEA1JS4R7
R13.14.15.16	ERD25TJ104	R218	ERD25TJ333	R522	ERD25TJ474	C45. 46	ECQP1471JZ
		R219	ERD25FJ103	R523. 524. 525. 526. 527	ERD25TG2003	C47. 48	ECEA1HS100
		R220	ERD25TJ473	R528. 529. 530		C49. 50	ECQM1H473KZ
R17.18	ERD25FJ822	R221	ERD25FJ221		ERD25TG1003	C51. 52	ECEA1HS100
R19.20	ERD25FJ563	R222	ERD25FJ103	R531. 532. 533. 534. 535		C53. 54	ECKD1H152KB
R21.22	ERD25FJ472	R223	ERD25FJ221		ERD25FJ562	C55. 56	ECQW1H151KC
R23.24	ERD25TJ104	R224	ERD25FJ272	R537	ERD25FJ471	C57. 58	ECEASO2R68
		R225	ERD25TJ224	R538	ERD25FJ122	C59. 60	ECEA2AS010
		R226. 227	ERD25TJ683	R540	ERD25FJ121		
R25.26	ERD25FJ472			R541	ERD25FJ391	C61. 62	ECEA502R1
R27.28	ERD25FJ821	R228	ERD25FJ182	R542	ERD25TJ183	C63. 64	ECEA1CS330
R29.30	ERD25TJ124	R229	ERD25TJ393			C65. 66	ECQV05224JZ
R31	ERD25FJ152	R230	ERD25FJ222	R543. 544	ERD25FJ122	C67. 68	ECQM1H473JZ
R33.34	ERD25FJ472	R231	ERD25FJ392	R545	ERD25TJ223	C69. 70	ECQM1H823KZ
R35.36	ERD25FJ103	R232	ERD25FJ102	R546	ERD25FJ332	C71. 72. 73. 74	
R37.38	ERD25FJ562	R233	ERD25TJ394	R547	ERD25TJ223		
R39.40	ERD25FJ103	R234	ERD25FJ332	R548	ERD25FJ222	C75. 76	ECQM1H273KZ
R41.42	ERD25TJ224	R235	ERD25FJ222	R549. 550	ERD25TJ223	C77. 78	ECEA1HS100
R43	ERD25FJ152	R236	ERD25TJ223	R551	ERD25FJ471	C79. 80	ECEA1JS4R7
		R237	ERD25FJ152	R552	ERD25TJ223	C81	ECEA1CS221
R45.46	ERD25FJ102			R553	ERD25FJ222		
R47	ERC12G101	R238	ERD25FJ102	R555. 556. 557. 558. 559	ERD25TJ123	C83. 84	ECEA2AS010
R49.50.51.52	ERD25FJ102	R239. 240	ERD25FJ122			C85	ECEA1ES101
		R242	ERD25FJ272			C87. 88	ECEA1HS100
R53.54	ERD25FJ332	R301. 302	ERD25FJ563	R560	ERD25FJ562	C89. 90. 91	ECEA1CS221
R55.56	ERD25TG2003	R303. 304	ERD25FJ101	R561	ERD25FJ103	C93. 94	ECQM1H183KZ
R57.58	ERD25TJ474	R305. 306	ERD25FJ684	R562	ERD25FJ102	C201. 202	ECQW1H181K
R59.60	ERD25FJ181	R307. 308	ERD25FJ392	R563	ERD25FJ222	C203	ECQF4333KXZ
R61.62	ERD25TJ274	R309. 310	ERD25TJ123	R564. 565	ERD25TJ473	C204	ECFWD104KXY
R63.64	ERD25TJ473	R311. 312. 313. 314	ERD25FJ103	R566	ERD25TJ333	C205. 206	ECQM1H822KZ
R65.66.67.68	ERD25TJ333		ERD25FJ182	R567	ERD25FJ470	C207	ECQM1H682KZ
		R315. 316		R568	ERD25TJ153		
R69.70	ERD25TJ394	R317. 318	ERD25FJ103	R569	ERD25FJ102	C208	ECEA502R33
R71.72	ERD25FJ272	R319. 320	ERD25FJ101	R570	ERD50FJ100	C209	ECFWD104KXY
R73.74	ERD25FJ392	R321. 322	ERD25FJ684			C210. 211. 212	
R75.76.77.78	ERD25FJ102	R323. 324	ERD25FJ392	R571. 572	ERD25FJ821	C213	ECEA1HS100
		R325. 326	ERD25TJ123	R573	ERD50FJ470	C214	ECEA1ES101
R79.80	ERD25TJ684	R327. 328	ERD25FJ122	R574	ERD25FJ122	C215	ECEA1VS101
R81.82	ERD25FJ272	R329. 330	ERD25FJ103	R575	ERD25T		

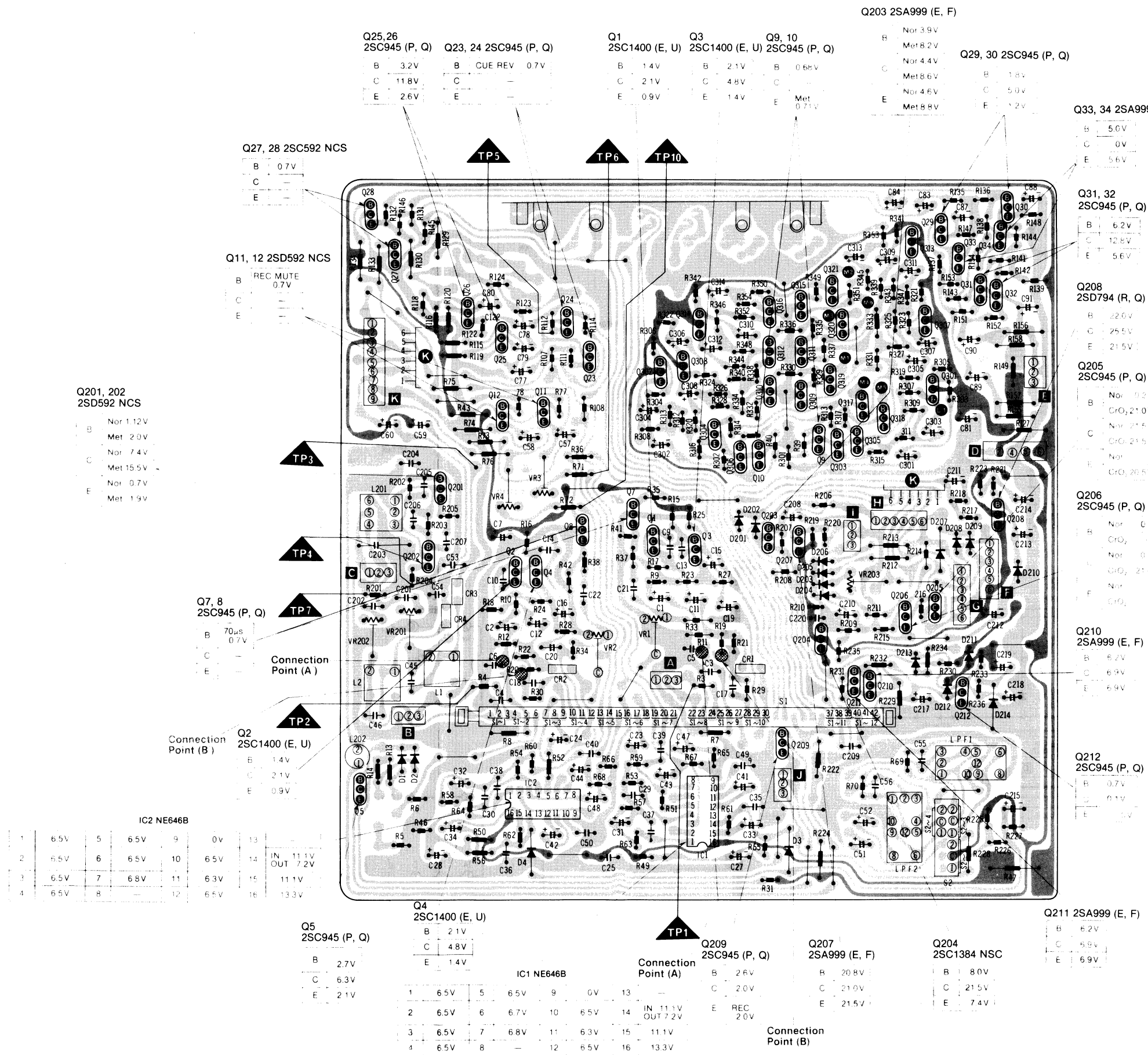
NOTE:  indicates that only parts specified by the manufacturer be used for safety.

Ref. No.	Part No.	Ref. No.	Part No.	Ref. No.	Part No.
C554, 555, 556, 557, 558, 559, 560	ECKD1H681KB	Q209	2SC945	D404, 405	MA161
C561, 562	ECKD1H103PF	Q210, 211	2SA999E	D501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512	MA161
C563	ECEAIAS470	Q212	2SC1400E	D513	Δ RD22EB1
C564, 565, 566	ECKD1H103PF	Q301, 302	2SC945	D514	Δ RD20EB3
C567	ECKF1E4732V	Q303, 304, 305, 306	2SC1400E	D515, 516, 517, 518, 519, 520, 521, 522	Δ SM112
C568	ECKD1H103PF	Q307, 308	2SC945	D523	SM112
C569	ECKD1E104ZF	Q309, 310, 311, 312	2SC1400E	D601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615	TLR205
C570 Δ	ECKD1H103PF	Q313, 314	2SC945	D616	TLY205
C701	ECQM6103MZ	Q315, 316	2SA999E	D618	LN220RP
☐☐☐☐	ECQM6103MZ	Q317, 318, 319, 320, 321	2SC945	D619, 620	LN320GP
*For P.X.		Q401, 402, 403	2SC945	D701	SLR54JURC
*For Asia, Latin America, Middle East and Africa areas.		Q501, 502, 503, 504	2SA999E	D702	SLR54G
COMBINATION PARTS		Q505	2SC945	INTEGRATED CIRCUITS	
CR1, 2	EXRP681K682	Q506, 507, 508	2SC1847	IC1, 2	NE646B
CR3, 4	EXRP122K682	Q509, 510	2SC945	IC401	AN6552
LPF1, 2	QLM326K	Q601, 602, 603, 604	2SC2021	IC402	AN6870
XR501	RM5222K	Q701, 702	2SC2021	IC501, 502, 503, 504	AN6552
TRANSISTORS		DIODES & RECTIFIERS		IC511	M74LS00P
Q1, 2, 3, 4	2SC1400E	D1, 2, 3, 4	MA161	IC512	M74LS04P
Q5	2SC945	D201, 202, 203, 204, 205, 206, 207, 208, 209	MA161	IC513	M74LS00P
Q7, 8, 9, 10	2SC945	D210, 211	RD22EB1	IC521	M74LS04P
Q11, 12	2SD592NCS	D212	SM112	IC522	M53202P
Q13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26	2SC945	D215	MV121	IC523	M74LS221P
Q27, 28	2SD592NCS	D216, 217, 218	TLG208	IC531	M74LS193P
Q29, 30, 31, 32	2SC945	D401, 402	MA161	IC532	M74LS08P
Q33, 34	2SA999E	D403	MV121	IC533	M74LS00P
Q201, 202	2SD592NCS			IC541	M74LS20P
Q203	2SA999E			IC542	M53275P
Q204	2SC1384			IC543	M74LS10P
Q205, 206	2SC945			IC551	UPC78M05H
Q207	2SA999E			IC601	M53242P
Q208	2SD794				

Ref. No.	Part No.	Part Name & Description
<u>TRANSFORMER</u>		
T701		
NEFA	QLPD58EME	Power Transformer
*For PX.		
*For Asia, Latin America, Middle East and Africa areas.		
	LA	QLPA57ELE
*For Australia.		
<u>COILS</u>		
L1. 2	QLQX1032W	Bias Trap Coil
L3. 4	QLQX2421Y	Peaking Coil
L201	QLB0194K	Bias Oscillation Coil
L202	QLQX2421Y	RF Trap Coil
<u>SWITCHES</u>		
S1	QSS204T	Slide Switch (Record/Playback Selector)
S2	QSW420T	Push Switch (Dolby IN/OUT Selector)
S3	QSW1111H	Push Switch (Rec-Mute ON/OFF)
S4	QSB0253M	Leaf Switch (Auto Tape Selector)
S5	QSM0067	Micro Switch (Auto Tape Selector)
S6	QSS1048	Slide Switch (Tape Select Manual/Auto)
S7	QSB0251I	Leaf Switch (Fast Wind Muting Switch)
S8	QSB0251I	Leaf Switch (Playback Muting Switch)
S701, 702, 703		
	QSW1111H	Push Switch (Level Fine Adjust UP/ DOWN and Auto-Rec Sensor)
S704		
NEFA	RSH1A11ZAS	Push Switch (Power ON/OFF)
*For PX.		
*For Asia, Latin America, Middle East and Africa areas.		
	LA	RSH1B04ZAS
*For Australia.		
S705		
NEFA	QSR1407H	Rotary Switch (AC Power Voltage Selector)
*For PX.		
*For Asia, Latin America, Middle East and Africa areas.		
<u>FUSE</u>		
F1	LA	XBA2E03NS5
Fuse (0.3A)		
<u>JACKS</u>		
J1. 2	QJA0253	Microphone Jack
J3	QJA0255H	Headphones Jack
J4	QEJ5003S	Jack Board (LINE IN/OUT Jack)
J5	QJS1956H	Remote Control Jack

CIRCUIT BOARDS

MAIN AMP CIRCUIT BOARD



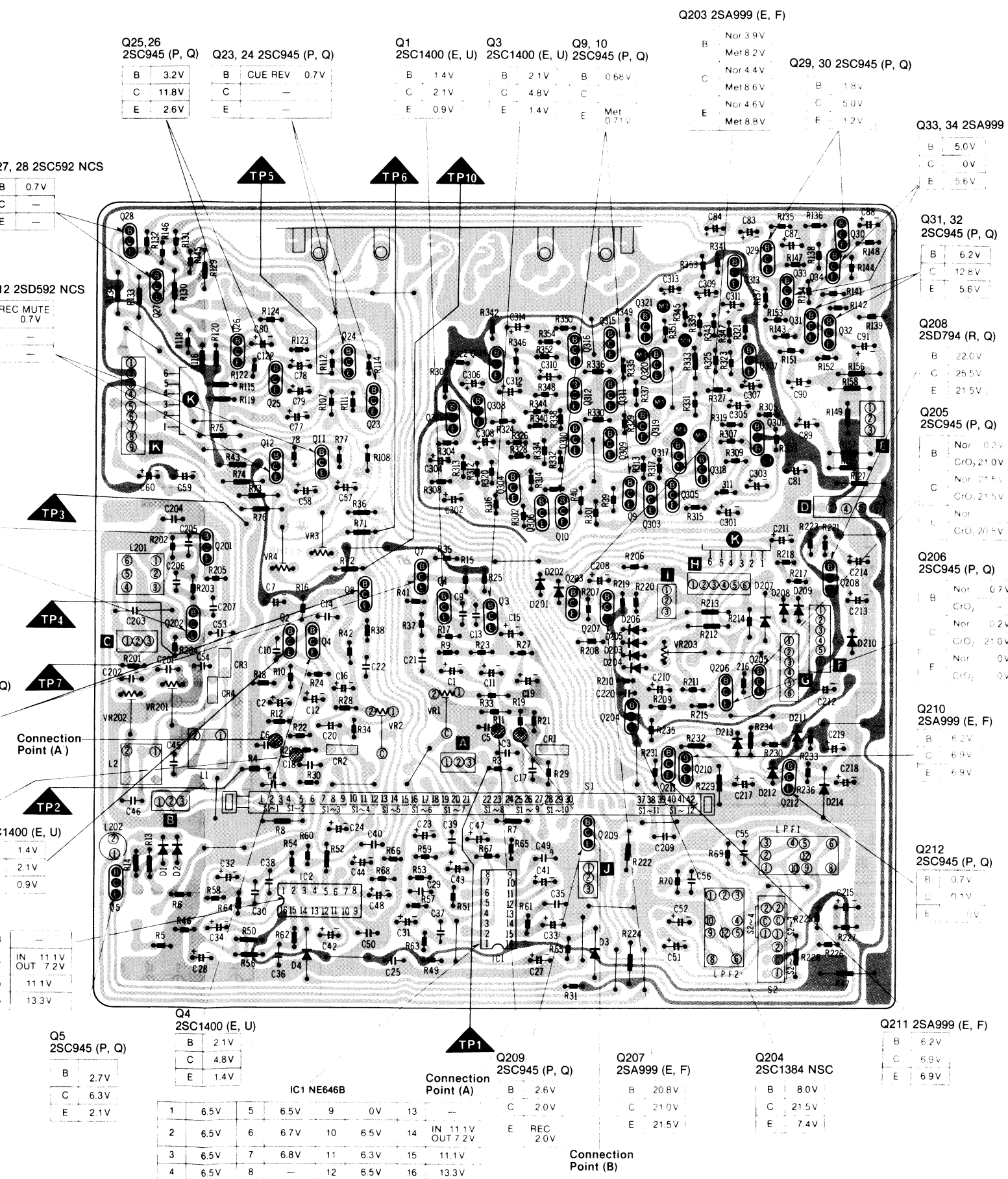
EQUALIZER

Q15, 16
2SC945 (P, Q)

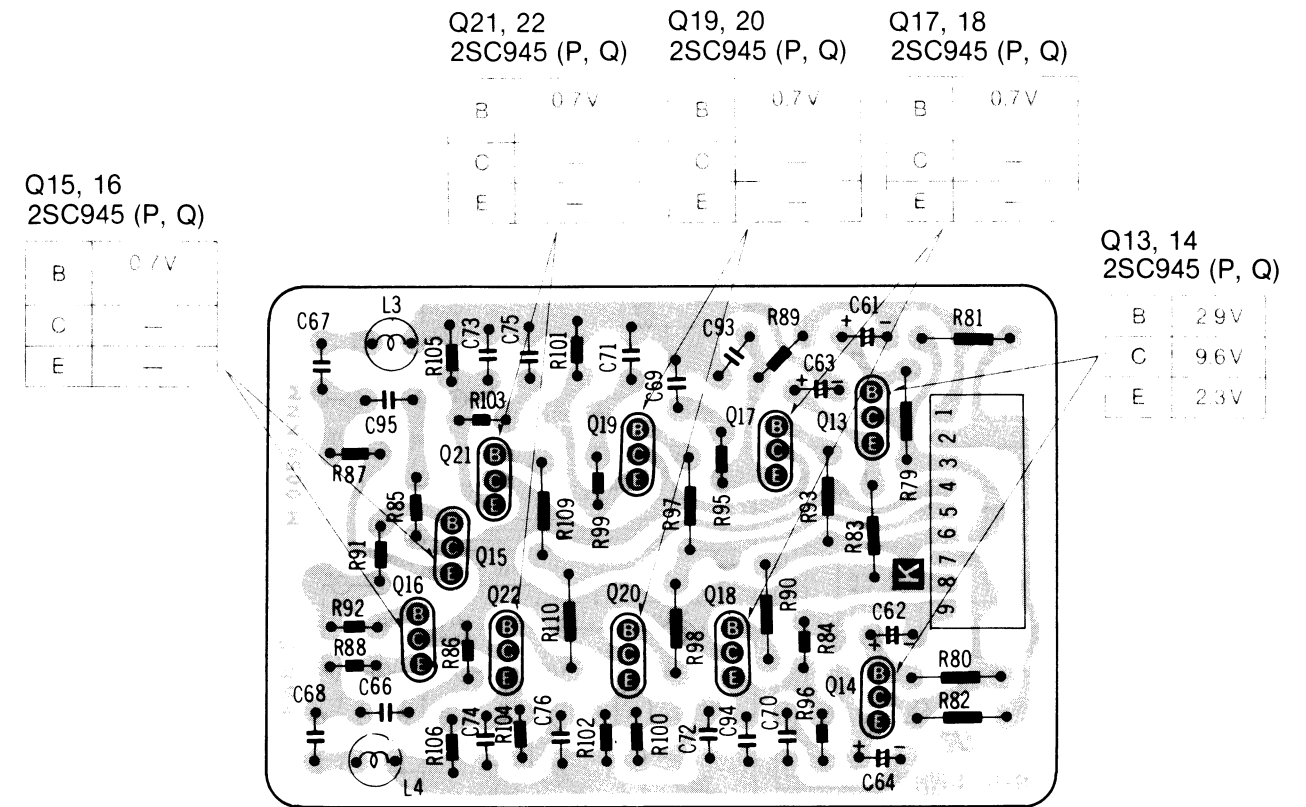
MICROPHO

NOTES:

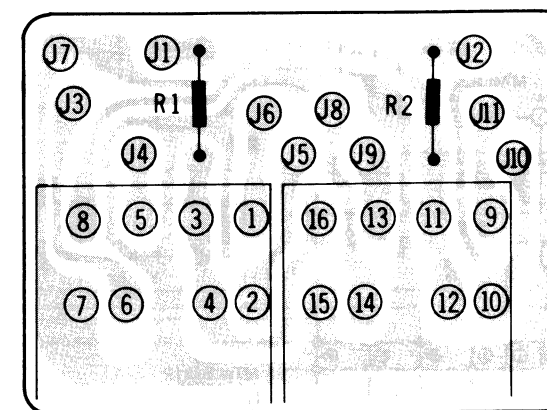
Nor		N
CrO ₂		C
Met		M



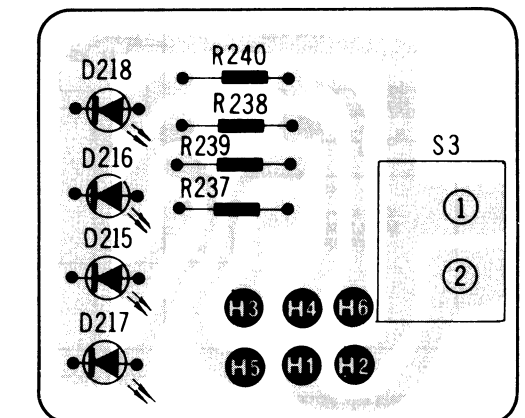
EQUALIZER CIRCUIT BOARD



MICROPHONE JACK CIRCUIT BOARD



REC-MUTE CIRCUIT BOARD



NOTES:

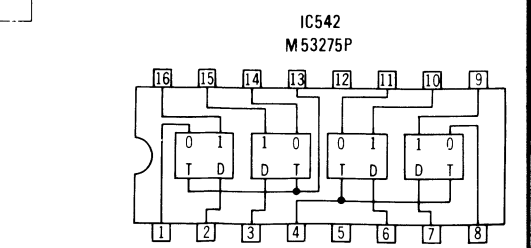
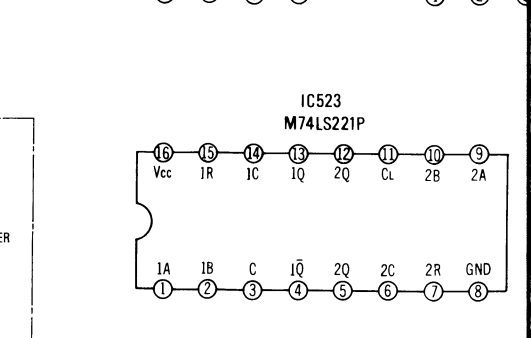
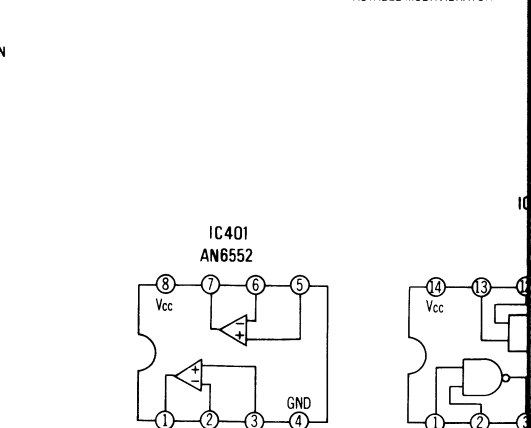
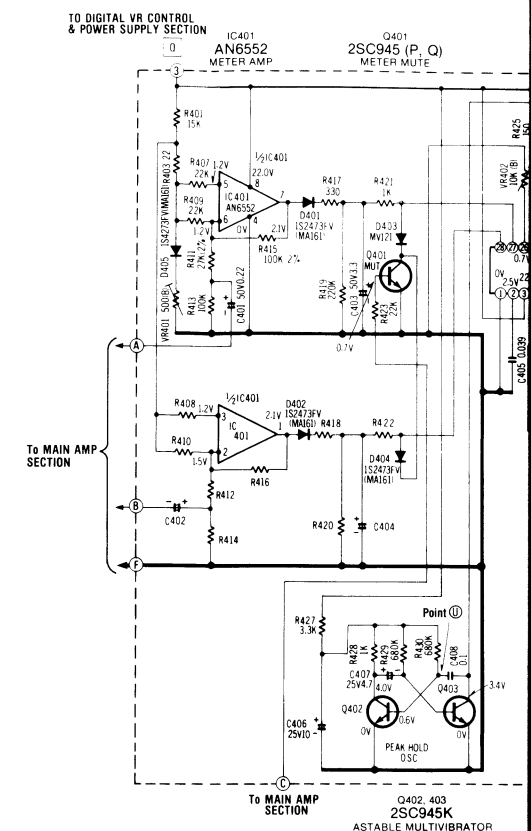
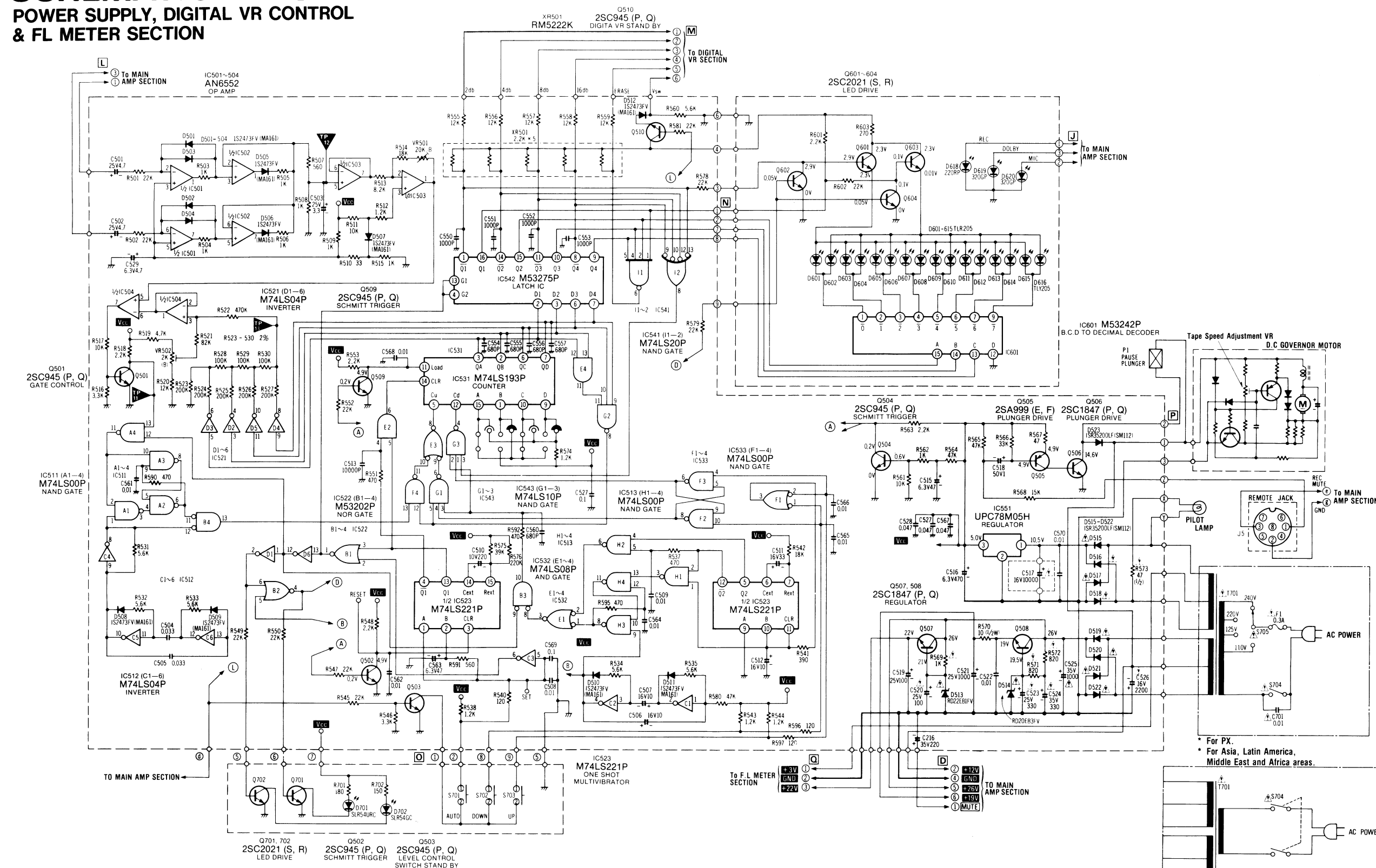
- Nor Normal tape mode
- CrO₂ CrO₂ tape mode
- Met Metal tape mode

NOTES:

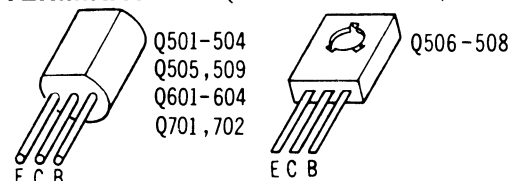
- The circuit shown in  on the conductor is +B (bias) circuit.
- The circuit shown in  on the conductor indicates printed circuit on the back side of the printed circuit board.
- Values indicated in  are DC voltage between the ground and electrical parts.
- The voltage indicates are measured during record mode.

SCHEMATIC DIAGRAM

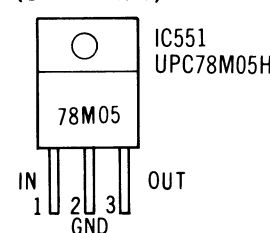
POWER SUPPLY, DIGITAL VR CONTROL & FL METER SECTION



TERMINATIONS (BOTTOM VIEW)



(SIDE VIEW)



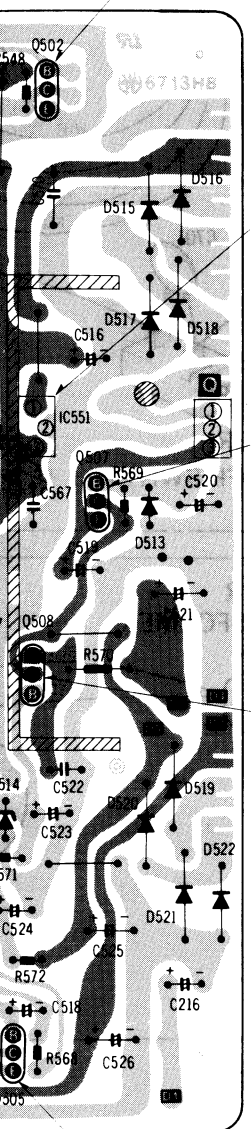
NOTES:

- S701 Auto-rec sensor setting switch.
- S702 Level fine adjust "down" switch.
- S703 Level fine adjust "up" switch.
- S704 Power ON/OFF switch (shown in OFF position).
- S705 AC power voltage select switch.
- For PX.
- For Asia, Latin America, Middle East and Africa areas.
- VR401 FL meter adjustment VR (for -20dB indication).
- VR402 FL meter adjustment VR (for 0dB indication).
- VR501 Level sensor read-out indication adjustment VR (for indication number "3"/input level "-22dB").
- VR502 Level sensor read-out indication adjustment VR (for indication number "15"/input level "+2dB").
- Resistance are in ohms (Ω), 1/4 watt unless specified otherwise. K=1,000 Ω , M=1,000k Ω .
- Capacity are in microfarads (μ F) unless specified otherwise. P=Pico-farads.
- The mark (▼) shows test point. e.g. ▼=Test point 1.
- All voltage values shown in circuitry are under no signal condition and record mode with volume control at minimum position. For measurement, use VTVM.
- Δ indicates that only parts specified by the manufacturer used for safety.

CIRCUIT BOARD

Q502
2SC945 (P, Q)

B	0.2V
C	4.9V
E	0V



IC551 UPC78M05H

1	10.5V
2	0V
3	5.0V

Q507 2SC1847 (P, Q)

B	21.0V
C	26.0V
E	22.0V

Q508 2SC1847 (P, Q)

B	19.5V
C	26.0V
E	19.0V

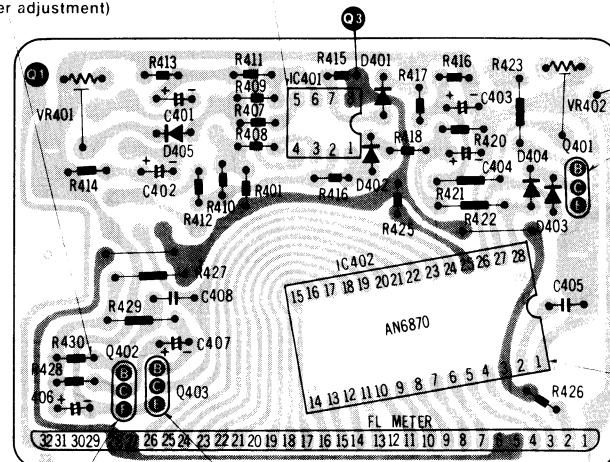
Q505 2SA999 (E, F)

B	4.9V
C	—
E	4.9V

FL METER CIRCUIT BOARD

IC401 AN6552

1	2.1V	5	1.2V
2	1.5V	6	1.2V
3	1.2V	7	2.1V
4	0V	8	22.0V

Point (U) (Refer to
FL meter adjustment)

Q402 2SC945K

B	0.6V
C	4.0V
E	0V

Q403 2SC945K

B	—
C	3.4V
E	0V

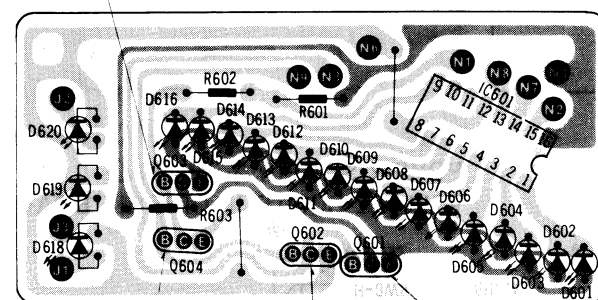
IC402 AN6870

1	0V
2	2.5V
3	22.0V
4	3.3V
5	3.3V
6	ON 20.5V
23	OFF 0.1V
24	3.4V
25	18.0V
26	0.7V
28	20dB 1.7V
27	+8dB 6.9V

DIGITAL VOLUME SCALER CIRCUIT BOARD

Q603
2SC2021 (S, R)

B	0.1V
C	2.3V
E	0.01V

Q604
2SC2021 (S, R)

B	0.05V
C	0.1V
E	0V

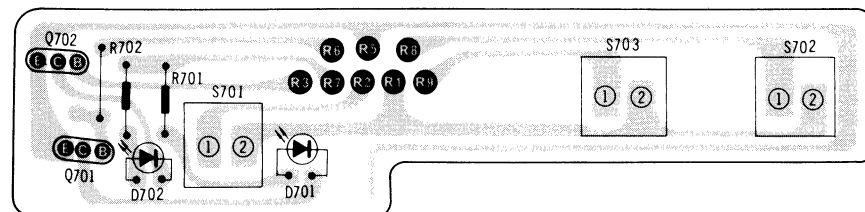
Q602
2SC2021 (S, R)

B	0.05V
C	2.9V
E	0V

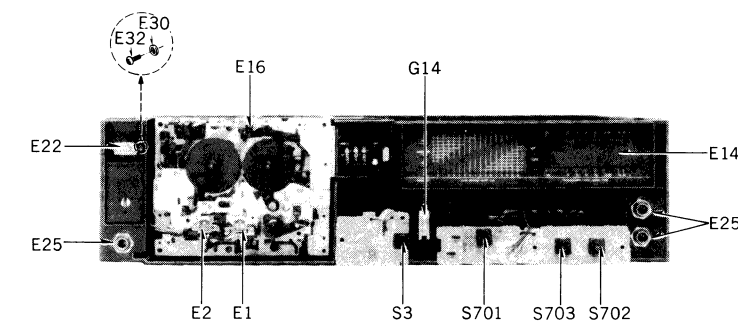
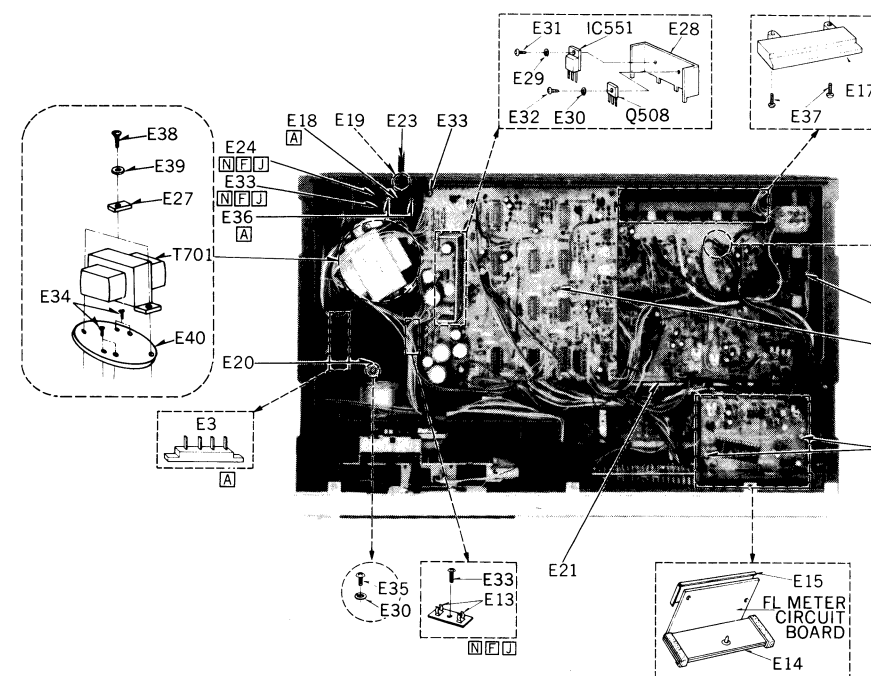
Q601
2SC2021 (S, R)

B	2.9V
C	2.3V
E	2.3V

RECORDING LEVEL CONTROL CIRCUIT BOARD



ELECTRICAL PARTS LOCATION

NOTE: Δ indicates that only parts specified
by the manufacturer be used for safety.

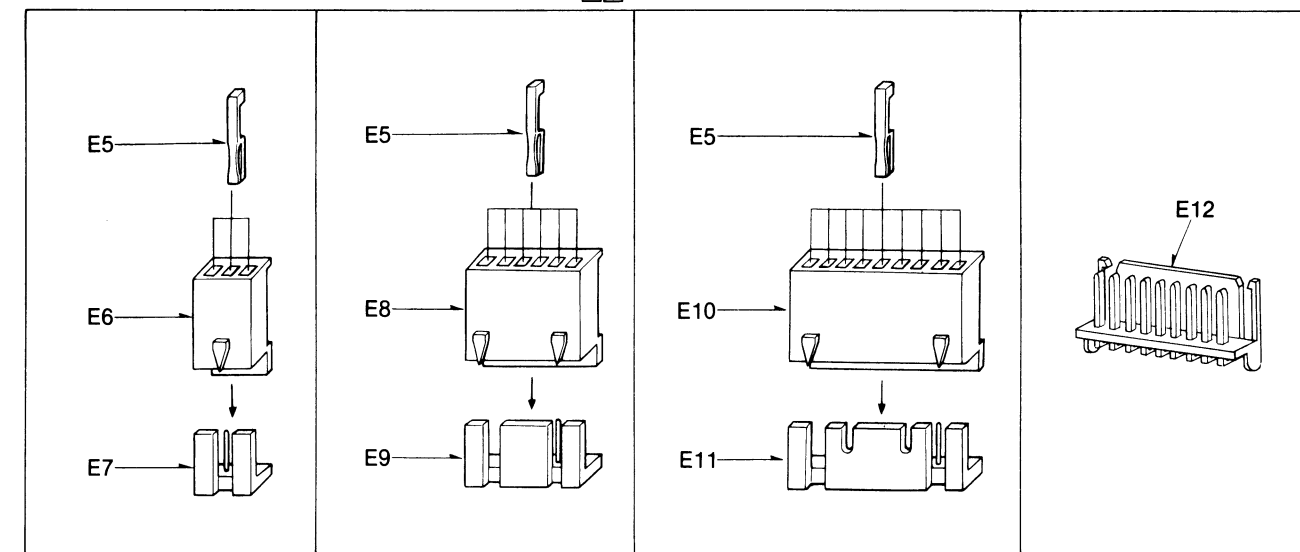
Ref. No.	Part No.	Part Name & Description
ELECTRICAL PARTS		
E1	QWY4122Z	Record/Playback Head
E2	QWY2133Z	Erase Head
E3	QJT4017	4 Pin Terminal Plate
E4	QJT1067	Check Pin
E5	QJT0055	Contact
E6	QJS1921TN	3 Pin Socket
E7	QJP1921TN	3 Pin Post
E8	QJS1922TN	6 Pin Socket
E9	QJP1922TN	6 Pin Post
E10	QJS1923TN	9 Pin Socket
E11	QJP1923TN	9 Pin Post
E12	QJS1923TNL	9 Pin Post (Horizontal Type)
E13	QTF1056	Fuse Holder
*For PX.		
*For Asia, Latin America, Middle East and Africa areas.		
E14	QSL5006RF	FL Meter
E15	QTS0036	Shield Plate
E16	XAMQ41S500	Pilot Lamp (for Mechanism Section)
E17	QKJM0030	Jack Holding Plate
E18	QTD1164	Cord Clamper
*For Australia.		
E19	QTD1129	Cord Bushing
*For PX.		
*For Asia, Latin America, Middle East and Africa areas.		
E20	QMLM0039	Recording Lever
*For Australia.		
E21	QBSM0005	Recording Wire
E22	QGM00029	Power Button
E23	QFC1208M	AC Power Cord
*For PX.		
*For Asia, Latin America, Middle East and Africa areas.		
E24	QKJM0043	Switch Holding Plate
*For PX.		
*For Asia, Latin America, Middle East and Africa areas.		
E25	QNQ1070	Nut (for Headphone/MIC Jack)
E26	XTB3+8BFZ	Tapping Screw +3x8
E27	QTTM011	Transformer Retaining Metal
E28	QTHM0008	Heat Sink
E29	XWA3B	Washer 3φ
E30	XWG3	"
E31	XSN3+6S	Screw +3x6
E32	XSN3+8S	Screw +3x8
E33	XTB3+10BFZ	Screw +3x10
E34	XTB4+10BFZ	Screw +4x10
E35	XTN3+10B	Screw +3x10
E36	XTN3+16B	Screw +3x16
*For Australia.		
E37	XTB3+12BFZ	Screw +3x12
E38	XSN4+8S	Screw +4x8
E39	XWA4B	Washer 4φ
E40	QAMM0128	Transformer Angle

NOTES:

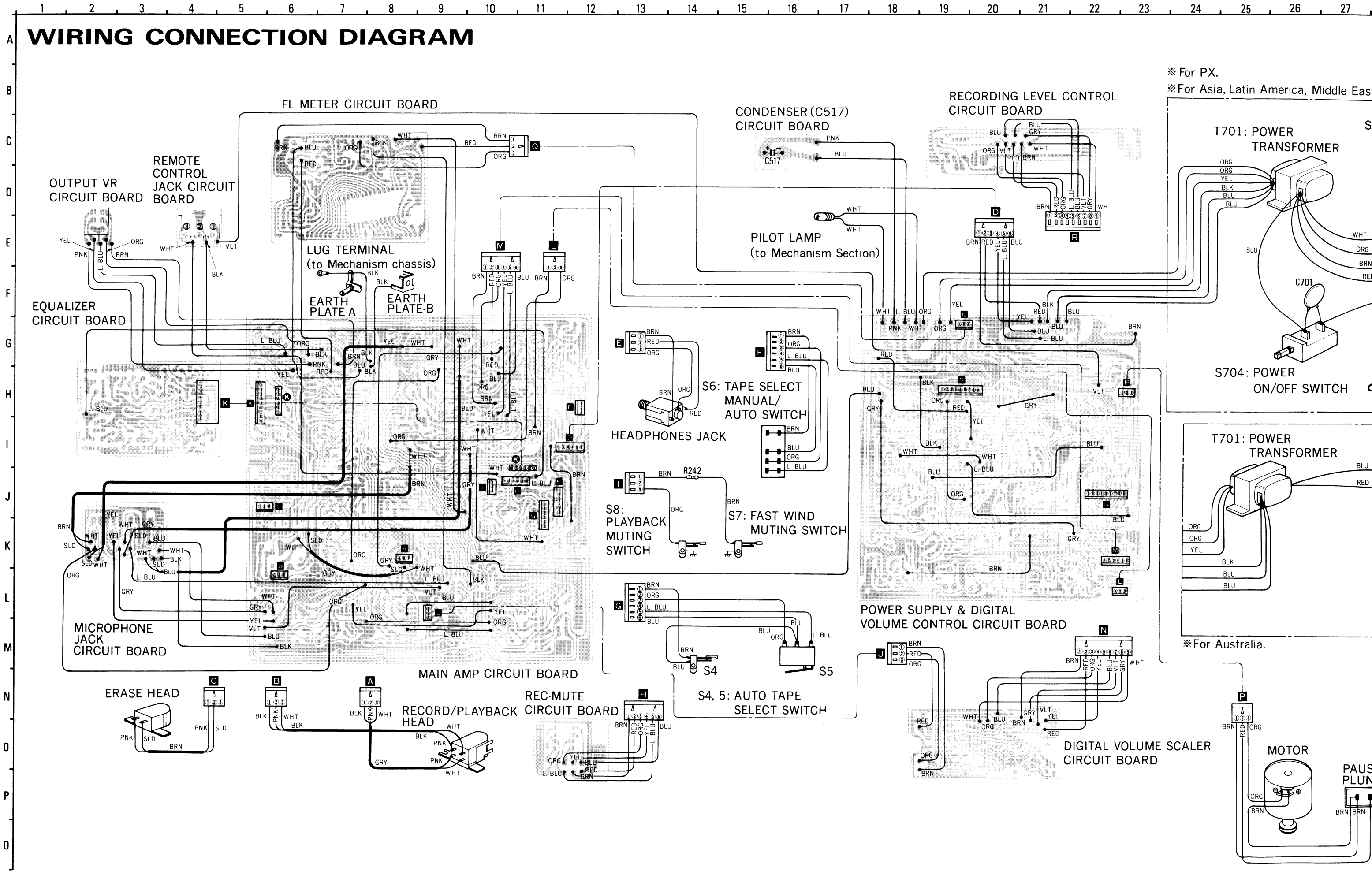
N For Asia, Latin America, Middle East and Africa areas.

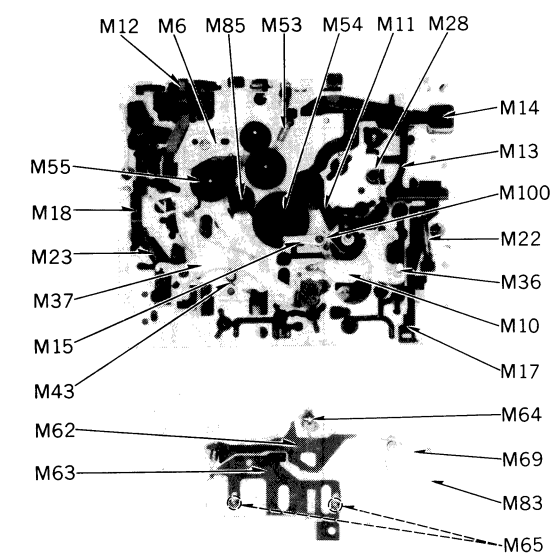
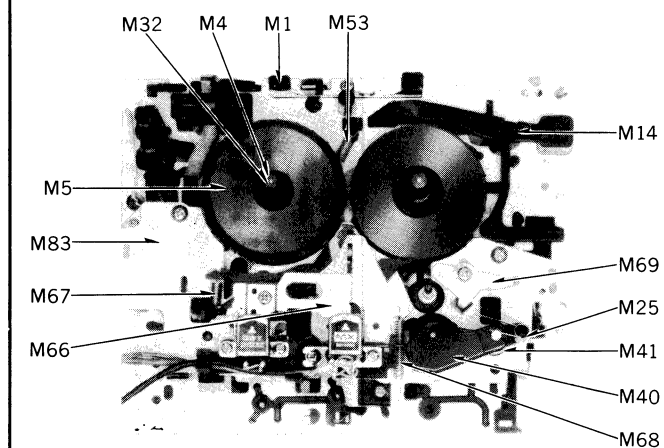
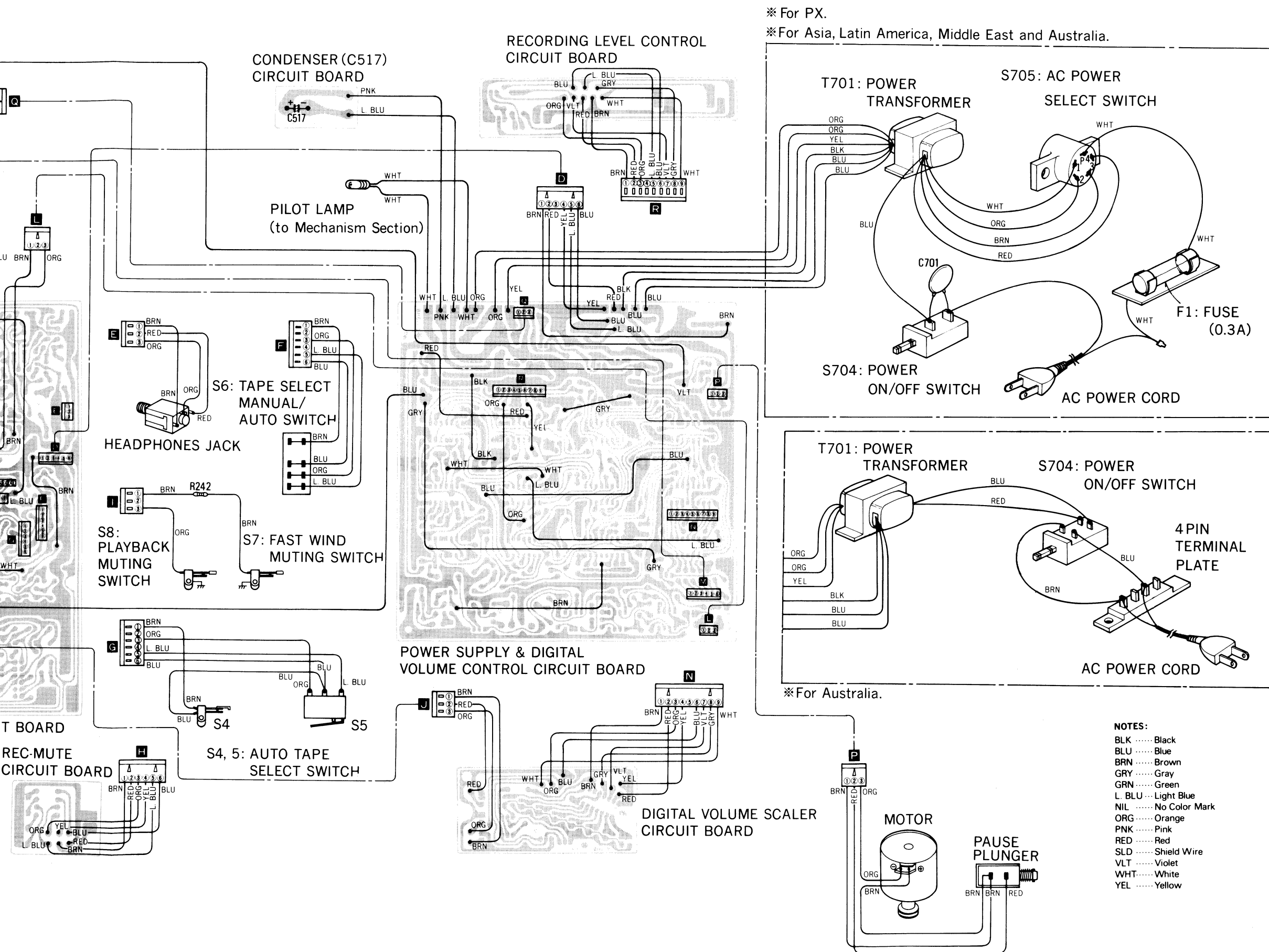
A For Australia.

F For PX.

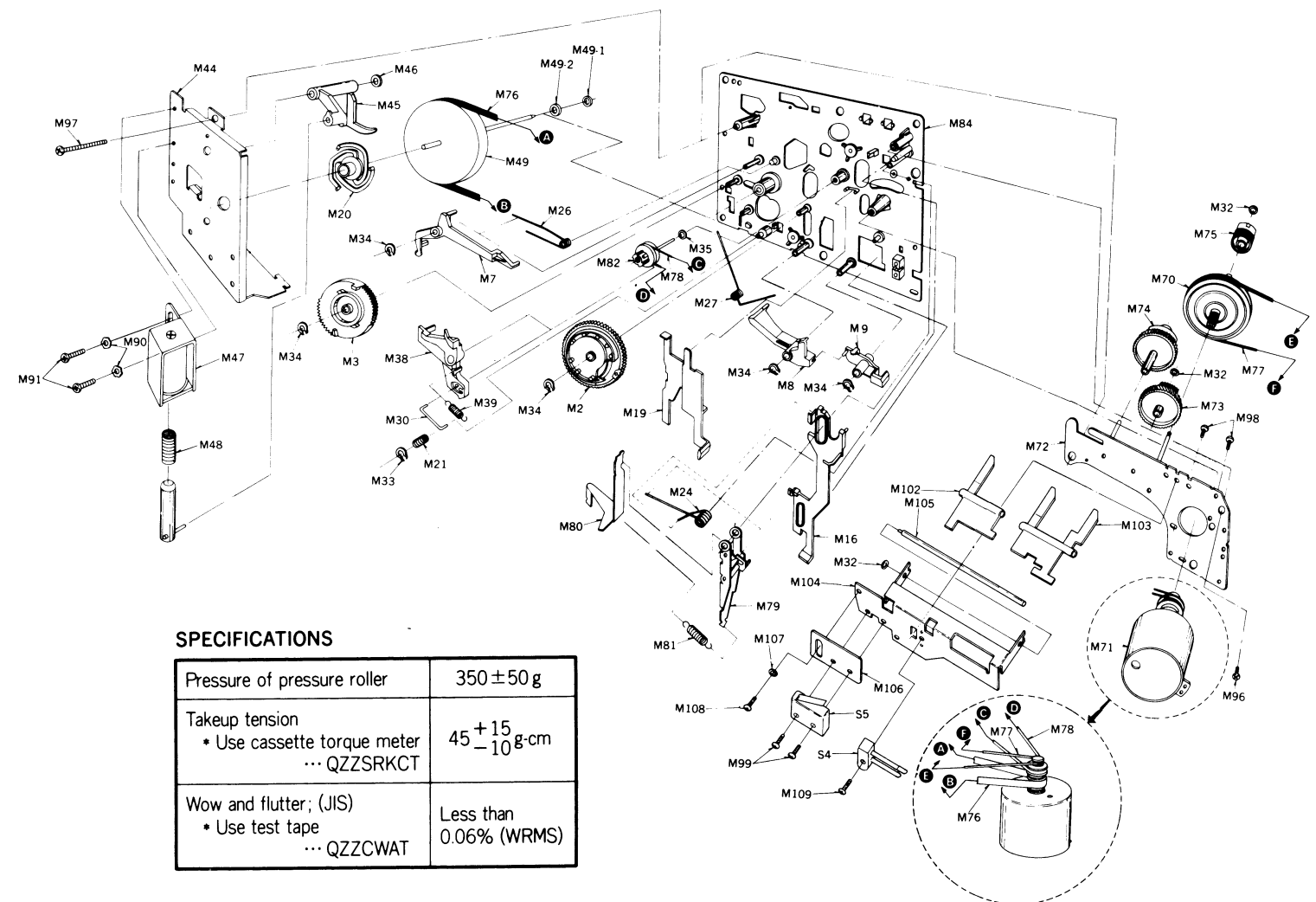
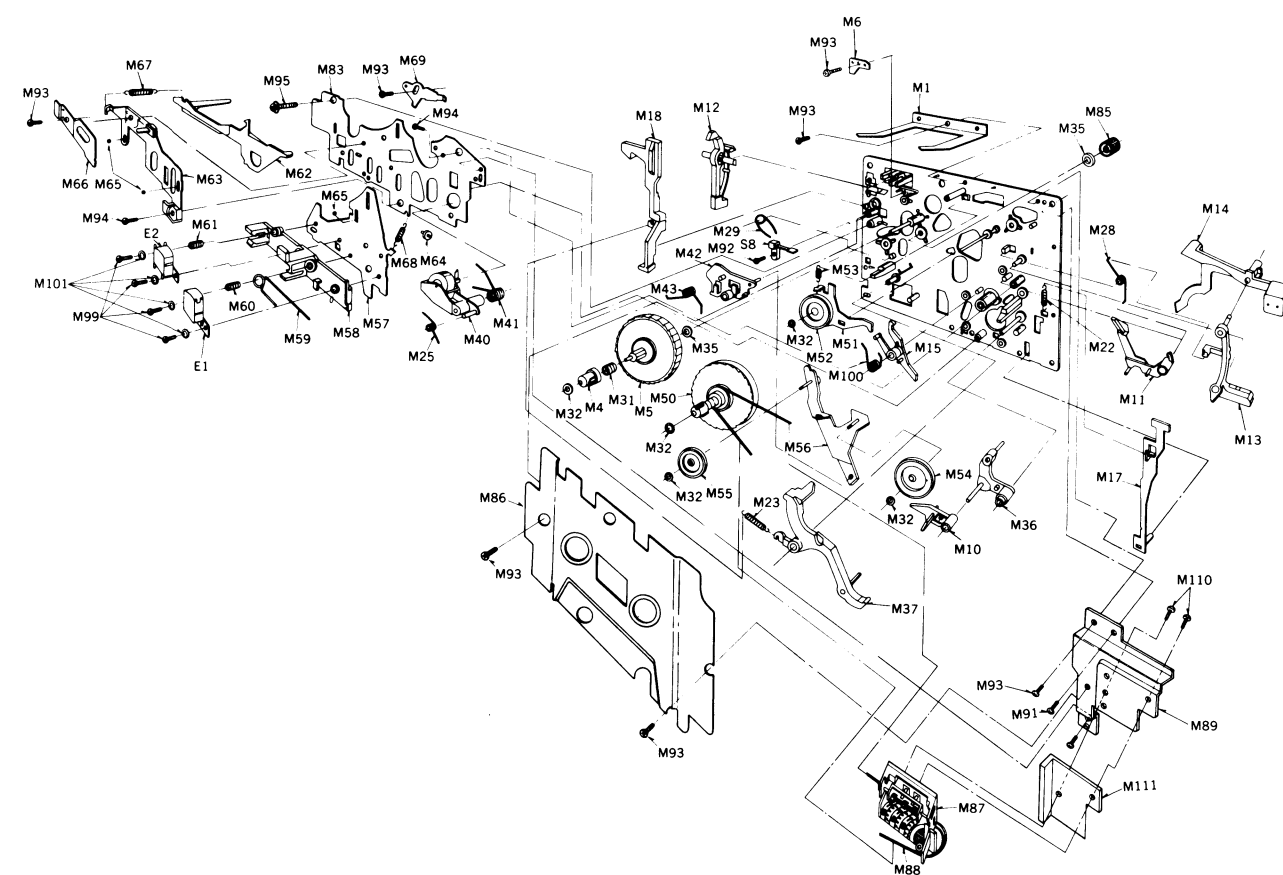


WIRING CONNECTION DIAGRAM



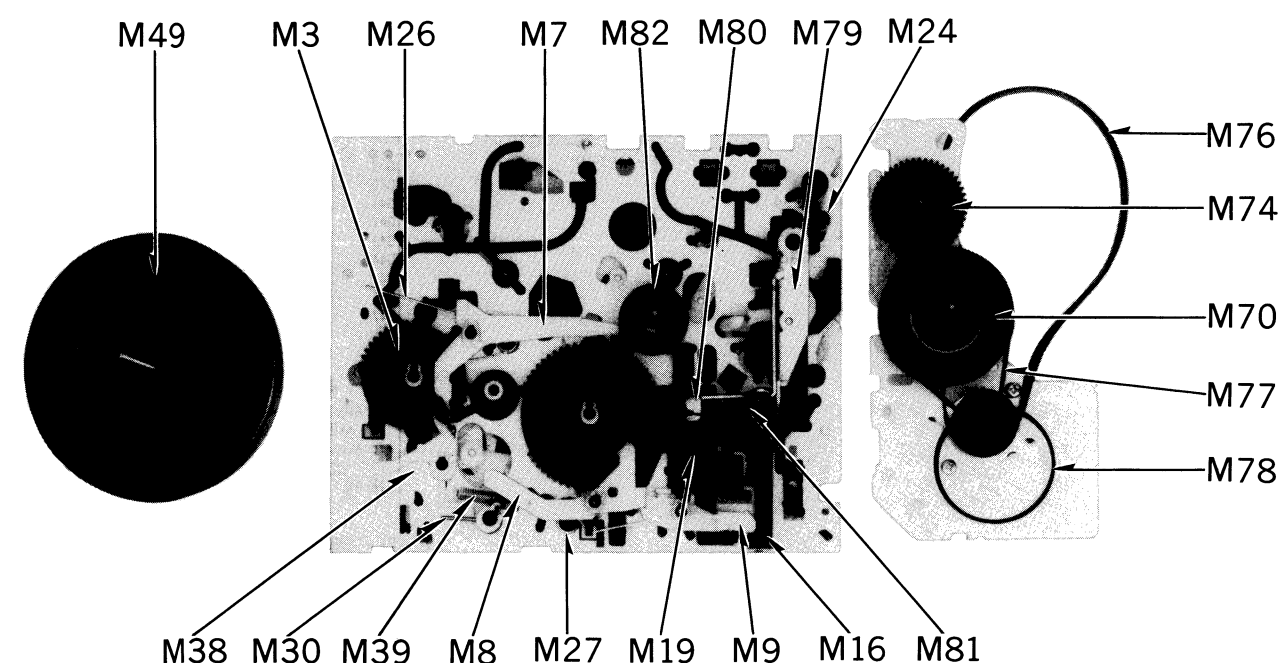


MECHANICAL PARTS LOCATION



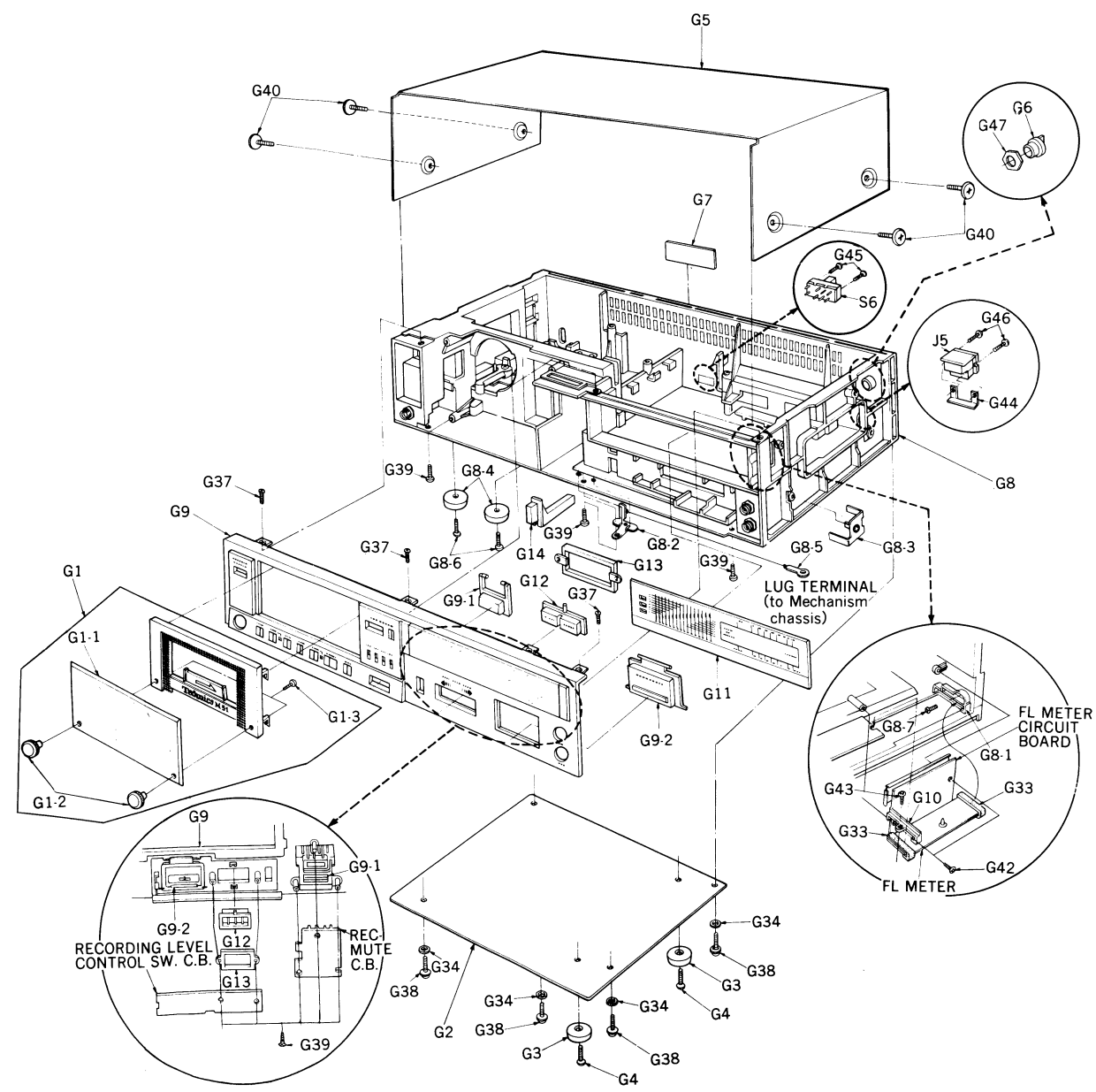
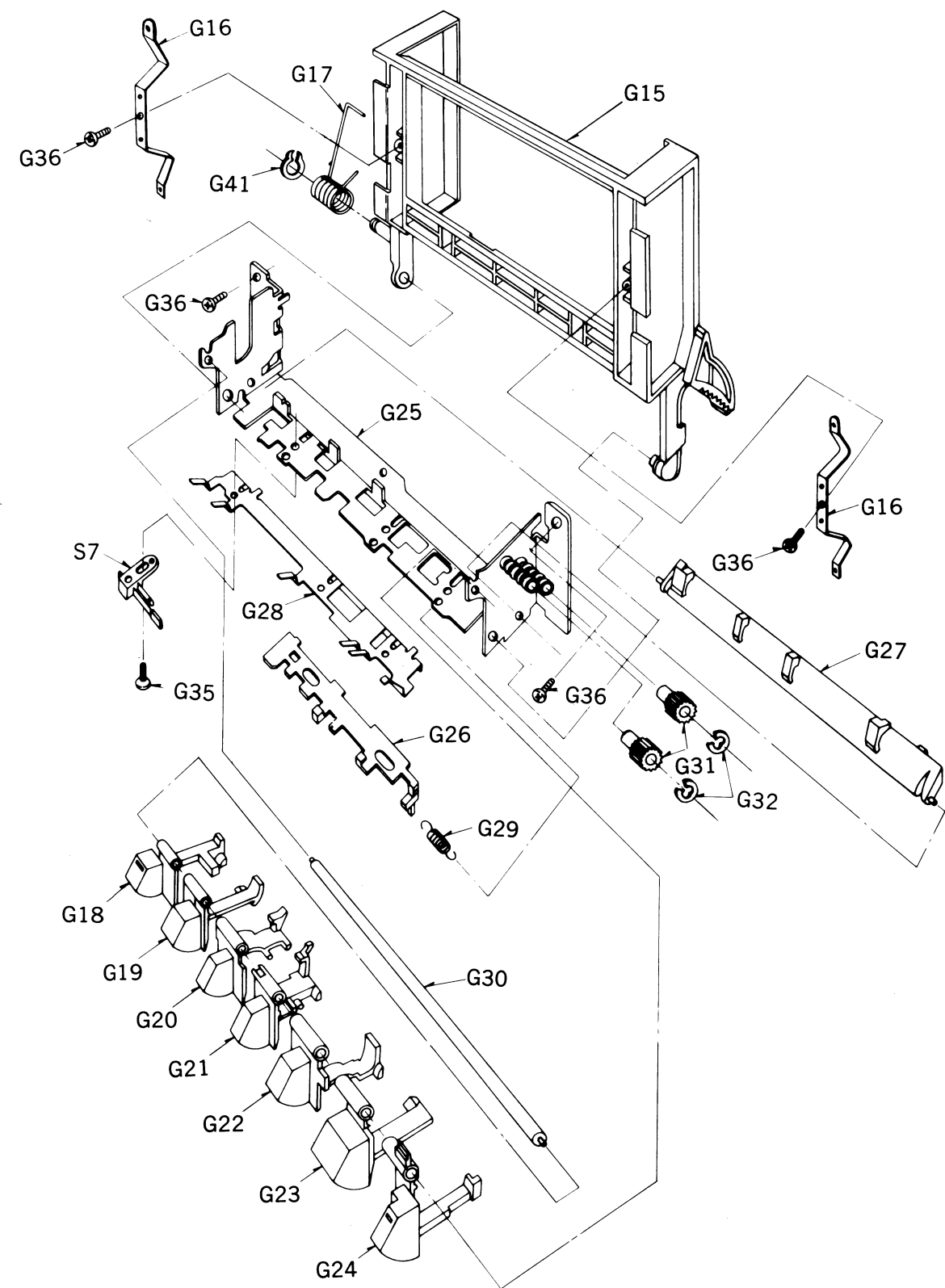
SPECIFICATIONS

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)



Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description	Ref. No.	Part No.	Part Name & Description
MECHANICAL PARTS								
M1	QBP1874	Cassette Pressure Spring	M40	QXL1381	Pressure Roller Assembly	M77	QDB0273	Fast Forward Belt
M2	QDG1201	Main Gear	M41	QBN1743	Pressure Roller Spring	M78	QDB0274	Takeup Belt
M3	QDG1202	Sub Gear	M42	QML3588	Fast Forward Lever	M79	QXL1360	Record/Playback Selection Arm Assembly
M4	QMB1336	Supply Reel Table Hub	M43	QBN1748	Fast Forward Spring	M80	QML3580	Record/Playback Selection Lever
M5	QDR1139	Supply Reel Table	M44	QXA1042	Flywheel Retainer	M81	QBT1895	Record/Playback Selection Lever Spring
M6	QMF2118	Fast Forward Arm Bracket	M45	QML3607	Pause Driving Lever	M82	QXP0607	Fast Forward Connection Pulley Assembly
M7	QML3581	Sub Control Lever	M46	QBW2083	Snap Ring	M83	QMK1838	Upper Base Plate
M8	QML3583	Main Control Lever	M47	QME0157	Plunger	M84	QXK2276	Lower Base Plate
M9	QML3584	Record Operation Lever	M48	QBC1358	Plunger Release Spring	M85	QDP1828	Fast Forward Pulley
M10	QML3586	Head Base Plate Lift Lever	M49	QXF0164	Flywheel Assembly	M86	QXH0341	Chassis Cover Assembly
M11	QML3494	Auto-Stop Release Arm	M49-1	QBW2049	Poly Washer	M87	QXC0064	Tape Counter
M12	QML3603	Erase Safety Lever	M49-2	QBW2026	Washer	M88	QDB0169	Counter Belt
M13	QML3604	Auto-Stop Driving Lever	M50	QXD1143	Takeup Reel Table Assembly	M89	QMA00126	Counter Angle
M14	QML3605	Auto-Stop Detection Lever	M51	QXL1382	Idle Lever Assembly	M90	XWC3B	Washer 3φ
M15	QML3592	Change Lever	M52	QXI0111	Takeup Idler Assembly	M91	XSN3+6S	Screw ±3×6
M16	QMR1820	Record Rod	M53	QBT1893	Takeup Idler Spring	M92	XTN2+6B	Tapping Screw ±2.6×6
M17	QMR1821	Auto-Stop Connection Rod	M54	QXI0113	Fast Forward Idler Assembly	M93	XTN26+6B	Tapping Screw ±2.6×6
M18	QMR1822	Eject Rod	M55	QXI0112	Rewind Idler Assembly	M94	XTN26+10B	Tapping Screw ±2.6×10
M19	QMR1824	Control Rod	M56	QXL1383	Fast Forward Arm Assembly	M95	XTN26+12B	Tapping Screw ±2.6×12
M20	QML21239	Flywheel Thrust Retainer	M57	QMK1840	Head Base Plate	M96	XTN3+10B	Tapping Screw ±3×10
M21	QBC1357	Lock Pin Pressure Spring	M58	QMZ1241	Head Spacer	M97	XTN3+24B	Tapping Screw ±3×24
M22	QBT1682	Auto-Stop Connection Rod Spring	M59	QBN1740	Head Pressure Spring	M98	XSN26+3S	Screw ±2.6×3
M23	QBT1894	Main Lever Spring	M60	QBC1278	Head Spring (for Record/Playback Head)	M99	XSN2+10	Screw ±2×10
M24	QBN1739	Selection Lever Spring	M61	QBCA0008	Head Spring (for Erase Head)	M100	QBN1741	Change Lever Spring
M25	QBN1742	Pressure Roller Release Spring	M62	QML3591	Brake Arm	M101	XWA2	Washer 2φ
M26	QBN1744	Sub Gear Spring	M63	QML21240	Sub Head Base Plate	M102	QML3644	Tape Detection Lever-A (for Metal Tape)
M27	QBN1745	Main Gear Spring	M64	QMN2550	Roller	M103	QML3645	Tape Detection Lever-B (for CrO ₂ Tape)
M28	QBN1746	Auto-Stop Lever Spring	M65	QDK1017	Steel Ball 2φ	M104	QMA3920	Detection Lever Angle
M29	QBN1747	Connection Spring	M66	QBP1873	Head Base Plate Pressure Spring	M105	QMS2546	Detection Lever Shaft
M30	QBS1128	Lock Pin	M67	QBT1597	Brake Arm Spring	M106	QMF1682	Switch Retaining Plate
M31	QBC1372	Reel Table Spring	M68	QBT1892	Head Release Spring	M107	XWC26B	Washer 2.6φ
M32	QBW2008	Poly Washer 2φ	M69	QMA3858	Head Adjustment Plate	M108	XSN26+6	Screw ±2.6×6
M33	XUB4FT	Stop Ring 4φ	M70	QXG1047	Takeup Gear Assembly	M109	XSN2+6	Screw ±2×6
M34	XUB3FT	Stop Ring 3φ	M71	XMU0170	Motor Assembly	M110	XSN3+10S	Screw ±3×10
M35	QBW2012	Poly Washer	M72	QXK2286	Sub Chassis Assembly	M111	QKJM0042	Spacer (for Counter)
M36	QXL1354	Sub Lever Assembly	M73	QDG1199	Auto-Stop Gear			
M37	QXL1355	Main Lever Assembly	M74	QDG1200	Cam Gear			
M38	QML3582	Pause Lock Lever	M75	QDP1823	Connection Pulley			
M39	QBT1896	Lever Release Spring	M76	QDB0281	Capstan Belt			

CABINET PARTS



Ref. No.	Part No.	Part Name & Description
CABINET PARTS		
G1	QYFM0045	Cassette Lid Assembly
G1-1	QGKM0130	Cassette Lid
G1-2	QNQ1088	Nut
G1-3	XSN26+6BV	Screw $\varnothing 2.6 \times 6$
G2	QGCM0033	Bottom Cover
G3	QKA1050	Rubber Foot
G4	XTN3+10BFZ	Tapping Screw $\varnothing 3 \times 10$
G5	QGCM0032	Case Cover
G6	QGT1506K	Output Volume Knob
G7	QGSMT0116	Main Name Plate
*For Asia, Latin America, Middle East and Africa areas.		
*For Australia.		
*For PX.		
G8	QYMM0067K	Main Case Assembly
*For Asia, Latin America, Middle East and Africa areas.		
*For Australia.		
*For PX.		
G8-1	QKJM0041	Meter Holder-B
G8-2	QTSMT0034	Earth Plate-A
G8-3	QTSMT0035	Earth Plate-B
G8-4	QKA1050	Case Foot
G8-5	QTD1001	Lug Terminal
G8-6	XTN3+10B	Tapping Screw $\varnothing 3 \times 10$
G8-7	XTB3+12BFZ	Tapping Screw $\varnothing 3 \times 12$
G9	QYPM0040	Front Panel Assembly
G9-1	QGM0025	Rec-Mute Button
G9-2	QXB0703	Auto-Rec Sensor Button
G10	QKJM0040	Meter Holder-A
G11	QKGM0126	Meter Ornament
G12	QGM0027	Level Fine Adjust Button
G13	QKJM0037	Button Holder
G14	QGM0026	Dolby Button
G15	QKFM6005K	Cassette Holder
G16	QBP1900	Holder Spring
G17	QBN7008	Eject Spring
G18	QXL1363	Eject Button Assembly
G19	QXL1364	Record Button Assembly
G20	QXL1365	Rewind/Review Button Assembly
G21	QXL1366	Fast Forward/Cue Button Assembly
G22	QXL1367	Playback Button Assembly
G23	QXL1368	Stop Button Assembly
G24	QXL1369	Pause Button Assembly
G25	QXA1044	Operation Button Angle Assembly
G26	QMR1823	Obstruction Rod
G27	QML3593	Lock Arm
G28	QBP1875	Operation Lever Spring
G29	QBT1597	Obstruction Rod Spring
G30	QMN2554	Operation Lever Shaft
G31	QDG1102	Holder Gear
G32	QUC4FT	Stop Ring 4 ϕ
G33	QBM0018	Meter Cushion
G34	XWG3	Washer 3 ϕ
G35	XTN2+6B	Tapping Screw $\varnothing 2 \times 6$
G36	XTN26+6B	Tapping Screw $\varnothing 2.6 \times 6$
G37	XTS3+10B	Tapping Screw $\varnothing 3 \times 10$
G38	XTN3+10B	"
G39	XTB3+10BFZ	"
G40	XTB4+10BFN	"
G41	XUB5FT	Stop Ring 5 ϕ
G42	XTB3+8BFZ	Tapping Screw $\varnothing 3 \times 8$
G43	XTB3+12BFZ	Tapping Screw $\varnothing 3 \times 12$
G44	QMA3872	Switch Angle
G45	XSN26+5FZ	Screw $\varnothing 2.6 \times 5$
G46	XSN3+10FZS	Screw $\varnothing 3 \times 10$
G47	XNS7	Nut (for Output Volume)
ACCESSORIES		
A1	RP023A	Connection Cord
A2	QQT2861	Instruction Book
*For Asia, Latin America, Middle East and Africa areas.		
*For Australia.		
*For PX.		
P1	QPNM0153	Inside Carton
*For Asia, Latin America, Middle East, Africa areas and Australia.		
*For PX.		
P2	QPAM0038	Cushion-R
P3	QPAM0039	Cushion-L
P4	XZB5OX65A02	Poly Bag
P5	QPG1985	Pad