

ORDER NO. ARD-7706057C

Service Manual

Open Deck
RS-1500US

Vol. 1

"Isolated Loop" Three-Motor, Direct-Drive Tape Deck



Professional Series

RS-1500U MECHANISM SERIES

Information:

The Service Manual for model RS-1500US is in 2 parts: Vol. 1 and Vol. 2. Vol. 1 does not include measurements and adjustments. Refer to Vol. 2 for these items.

Technics
by Panasonic

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② RS1500 US

Specifications (Catalog specifications for sales)

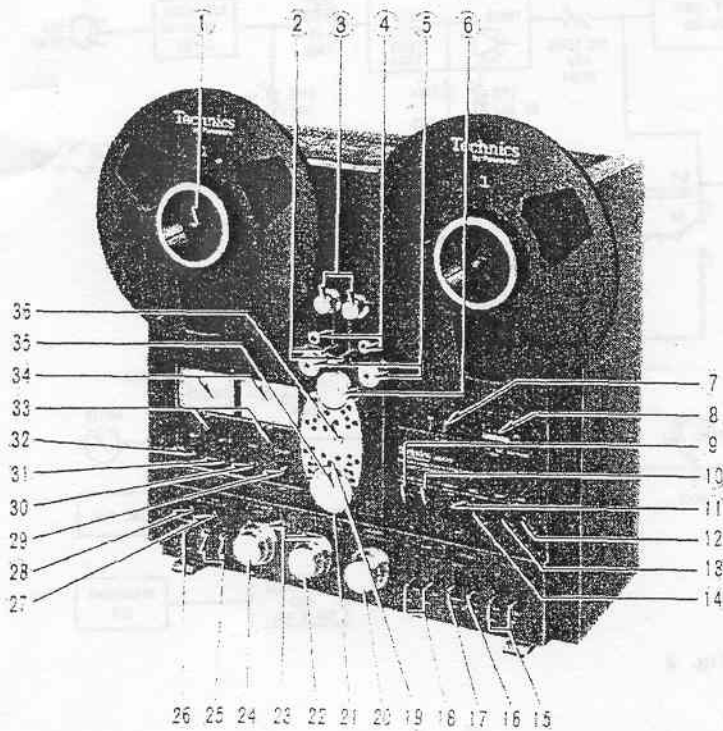
Track system:	4 heads system 2-track 2-channel recording, playback, erasing and 4-track 2-channel playback
Motors:	3 direct-drive motors system
Capstan:	Quartz control phase-locked DC brushless servo direct-drive motor
Reel tables:	2 tape tension controlled DC brushless direct-drive motors
Reel size:	5" to 10-1/2" (13 cm to 26.5 cm) outside diameter
Tape tension control:	Automatic control for above size of reel
Tape speed:	15 ips, 7-1/2 ips and 3-3/4 ips (38 cm/s, 19 cm/s and 9.5 cm/s)
Speed deviation:	±0.1% at 15 ips (38 cm/s)
Speed fluctuation:	0.05% at 15 ips (38 cm/s)
Pitch control:	±6% (recording and playback)
Wow and flutter:	Recording and playback
15 ips (38 cm/s);	0.018% (WRMS), ±0.035% (DIN peak)
7-1/2 ips (19 cm/s);	0.03% (WRMS), ±0.06% (DIN peak)
Time counter accuracy:	±1% at 15 ips (38 cm/s)
Fast winding time:	150 sec. for 2500 ft (1.5 mil for 762 m) tape
Auto-Stop sensing:	
End of tape;	Tension roller switches
During running;	Within 3 sec. after accidental stop of takeup reel table
Frequency response:	
15 ips (38 cm/s);	30~30,000 Hz ±3 dB (recording level= -10 dB from 0 VU)
7-1/2 ips (19 cm/s);	20~25,000 Hz ±3 dB (recording level= -20 dB from 0 VU)
3-3/4 ips (9.5 cm/s);	20~15,000 Hz ±3 dB (recording level= -20 dB from 0 VU)
Signal-to-noise ratio:	NAB weighted (185 nWb/m +6 dB)
15 ips (38 cm/s);	60 dB
7-1/2 ips (19 cm/s);	60 dB
3-3/4 ips (9.5 cm/s);	58 dB
Distortion (THD):	Measured via tape at 400 Hz (at any speed) Less than 2% peak level (185 nWb/m +6 dB) Less than 0.8% operating level (0 VU)
Channel separation:	Better than 50 dB
Erasing ratio:	Better than 65 dB (recording level= +10 dB at 1 kHz)
Recording bias:	120 kHz
Bias level;	BIAS selector at "1" 90%, BIAS selector at "2" 100%, BIAS selector at "3" 110%
Equalization:	NAB standard Position "2" of "EQ" and "BIAS" selector set for scotch #207 tape
Recording level calibration:	Referenced to 185 nWb/m
Inputs:	
MIC;	Unbalanced phone type jack Sensitivity 0.25 mV (-72 dB), input impedance 4.7 KΩ (at 0 VU, microphone level control at maximum position) 2.5 mV (-52 dB)/4.7 KΩ with 20 dB microphone attenuator switch on overload margin 55 dB (75 dB with 20 dB microphone attenuator) Applicable microphone impedance 200Ω~10 KΩ
LINE;	Phono type jack Sensitivity 60 mV (-24 dB), input impedance 150 KΩ Overload margin=infinity (line input connected to LINE IN level control before pass through the amplifier)
THROUGH OUT;	Same as LINE IN (connected in parallel to LINE IN)
Outputs:	
LINE;	2 pair of phono type jack Output level 0.42 V at 0 VU (output level control at "8") 0.6 V or more at output level control maximum output impedance less than 3 KΩ Load impedance 22 KΩ over
HEADPHONE;	Stereo phone type jack Output level 60 mV at 0.42 V line output, load impedance 8Ω
Power requirements:	AC 120 V, 50/60 Hz DC 24 V, 4.5 A (with RP-086 optional battery adaptor)
Power consumption:	120 W
Weight:	57 lbs. 4 oz (26 kg)
Dimensions (H×W×D):	17-1/2"×19-3/8"×10-1/8" (44.6 cm×49.2 cm×25.8 cm)

Specifications based on use of Scotch #207 tape.
Specifications are subject to change without notice.

③ RESISTORS

LOCATION OF CONTROLS

AND COMPONENTS



- 1. Reel clippers
- 2. Guide pin
- 3. Tension rollers
- 4. Tape marker
- 5. Double pressure rollers
- 6. Capstan
- 7. Cue level DC power switch
- 8. Timer counter - Reset button
- 9. Record button
- 10. Pause button
- 11. Rewind button
- 12. Fast forward button
- 13. Playback button
- 14. Stop button
- 15. Record mode switches
- 16. Bias selector
- 17. Equalization selector
- 18. Monitor switches
- 19. Stroboscope lamp
- 20. Output level controls
- 21. Reversing lever
- 22. Line input level controls
- 23. Preset markers
- 24. Microphone level controls
- 25. Microphone jacks
- 26. Headphones jack
- 27. Meter zero selector
- 28. Microphone attenuator switch
- 29. Timer start button
- 30. Tape speed selector
- 31. Pilot lamp
- 32. Power switch
- 33. Level meter zero adjustment screw
- 34. Level meters
- 35. Eject dial
- 36. A - Extract selector
- 37. Remote control connector
- 38. Power transformer
- 39. Ground terminal
- 40. Battery selector
- 41. AC outlets
- 42. DC-IN connector
- 43. Power cord
- 44. Line input jacks
- 45. "Through out" jacks
- 46. Line output jacks

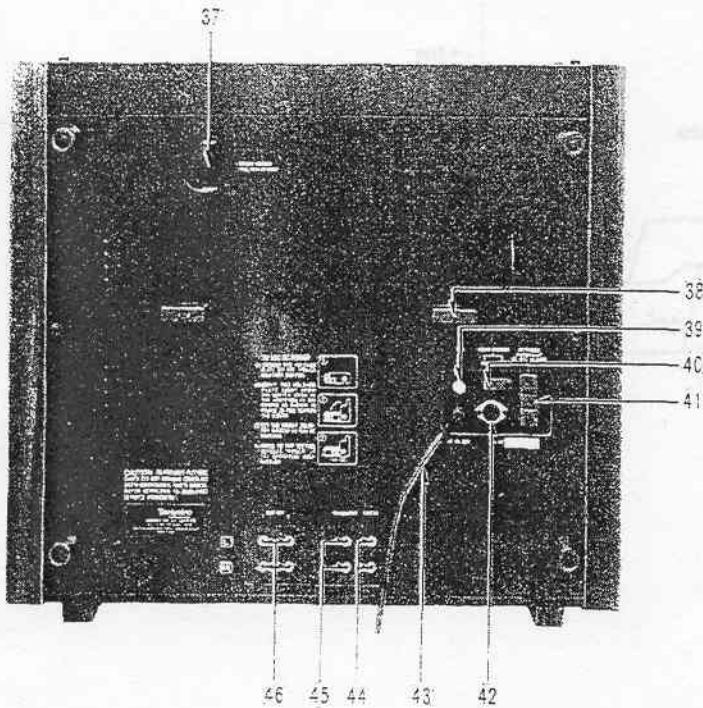


Fig. 1

④ 25/100 US

AMPLIFIER SECTION

BLOCK DIAGRAM

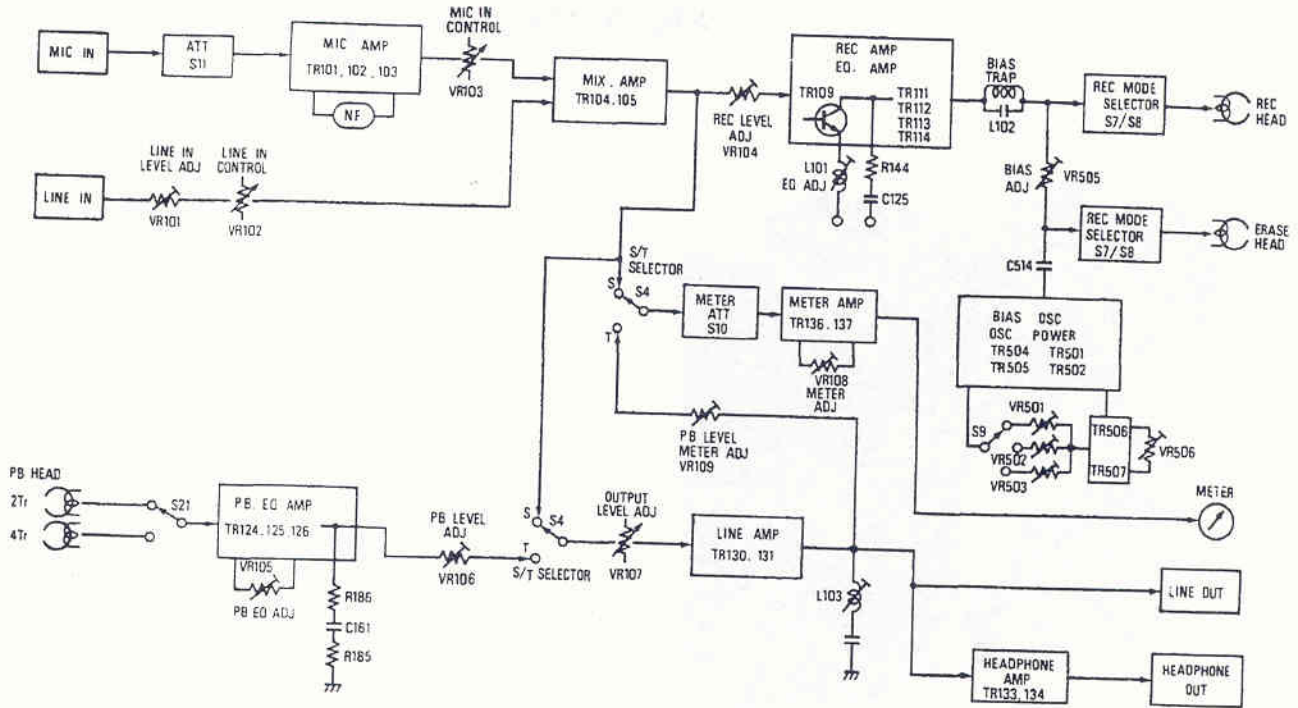


Fig. 2

LEVEL DIAGRAM

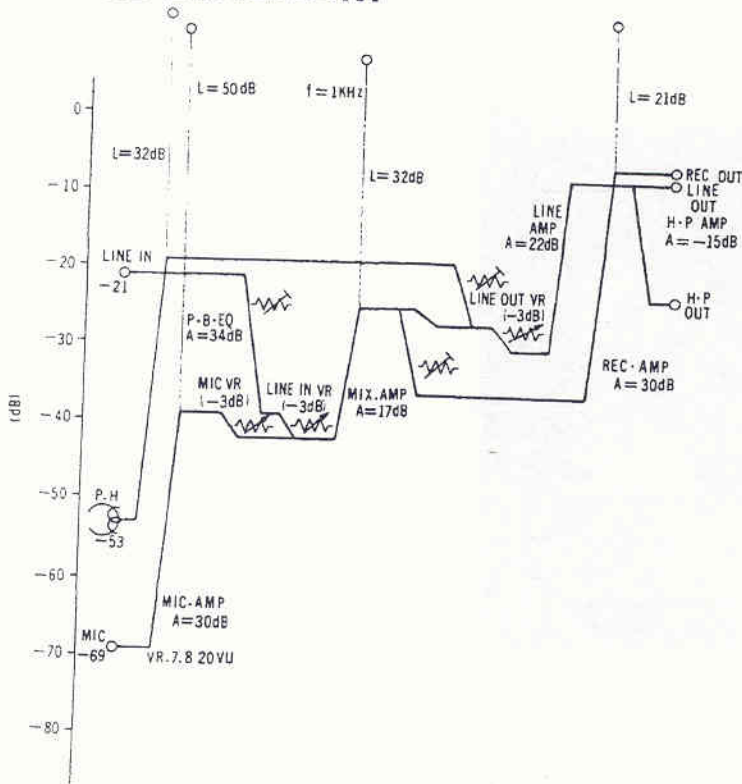


Fig. 3

Ⓟ 251000 US

DISASSEMBLY INSTRUCTIONS

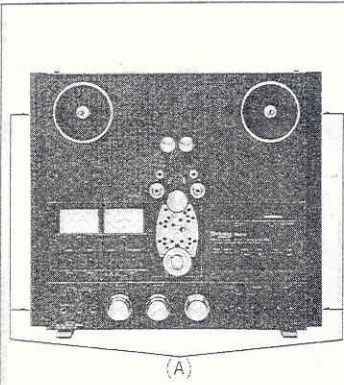


Fig. 4

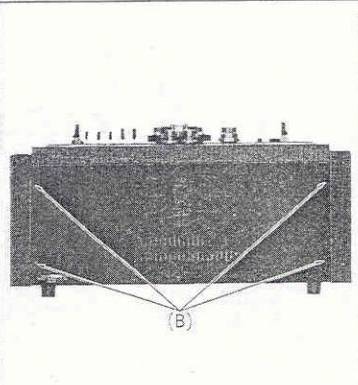


Fig. 5

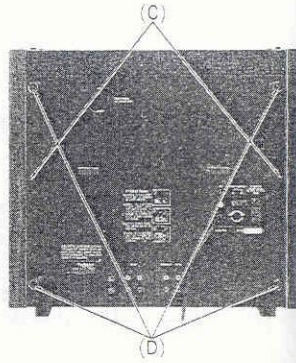


Fig. 6

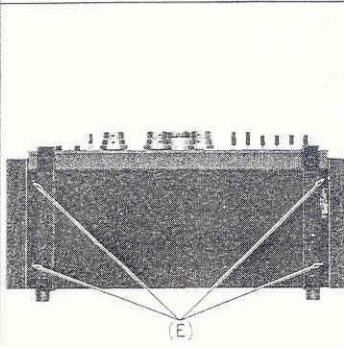


Fig. 7

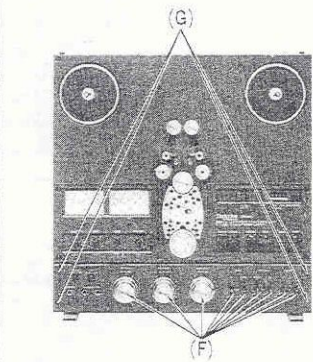


Fig. 8

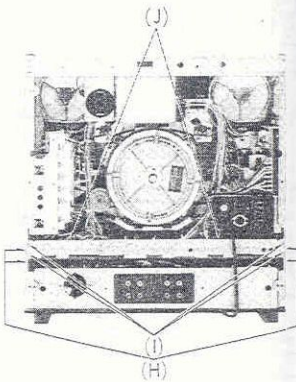


Fig. 9

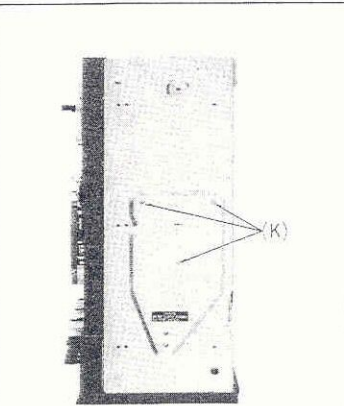


Fig. 10

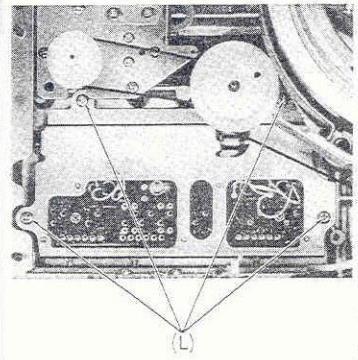


Fig. 11

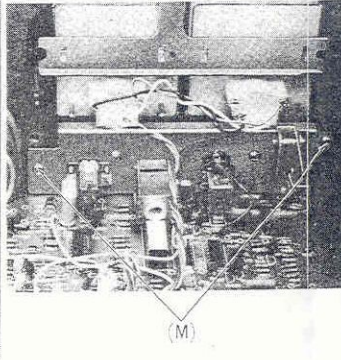


Fig. 12

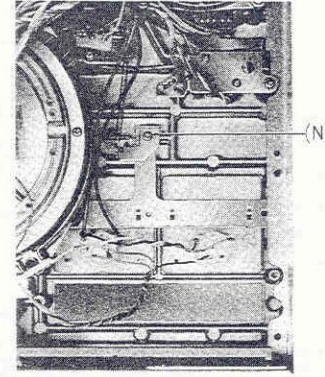


Fig. 13

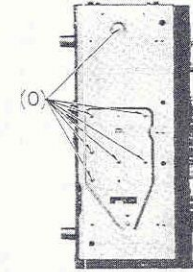


Fig. 14

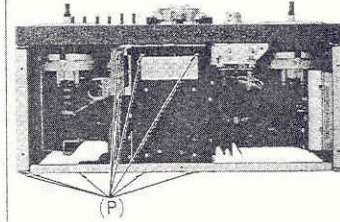
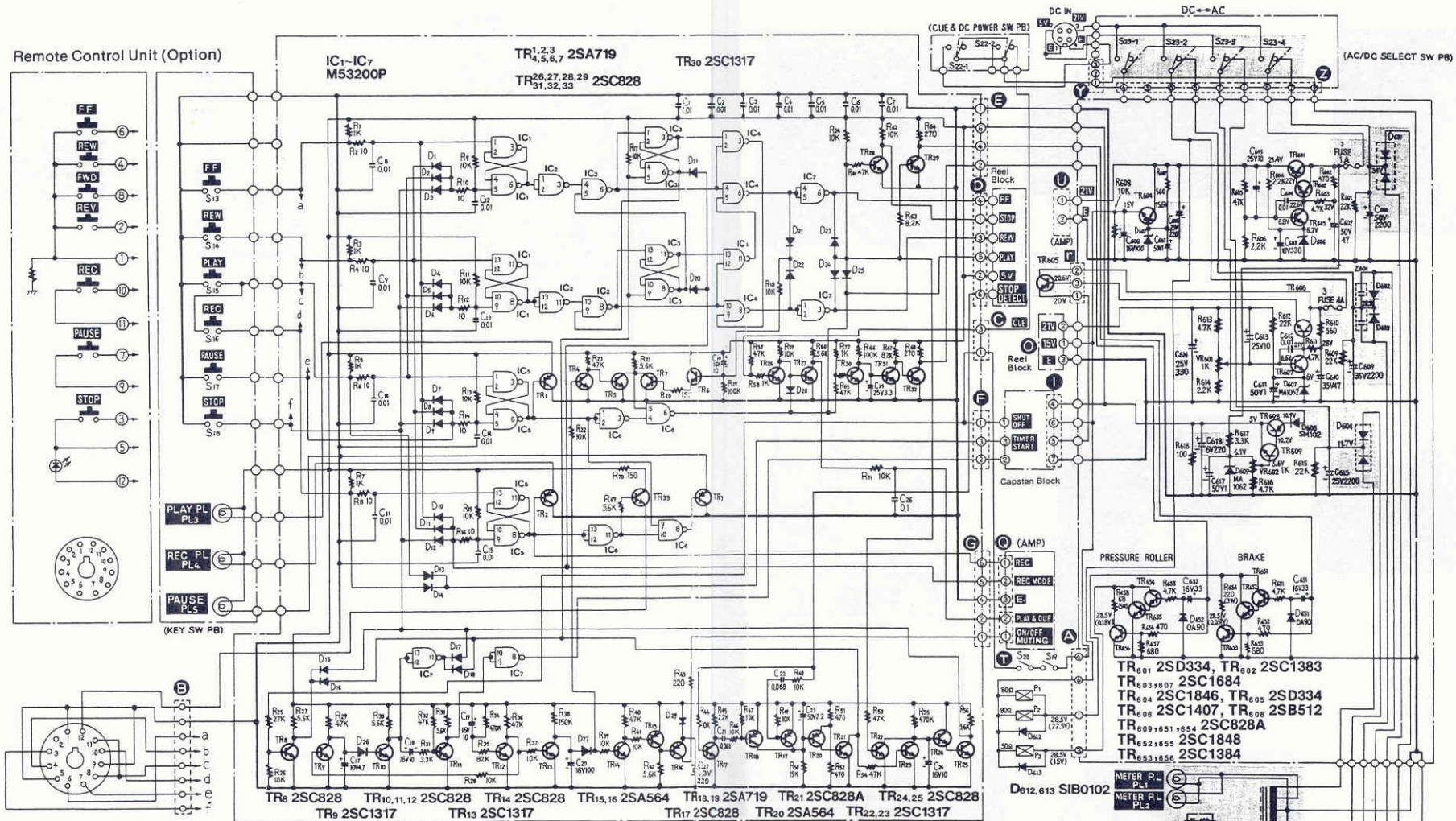


Fig. 15

Procedure	To remove ———	Remove ———	Pcs.	Shown in fig. ———
1	Side board	Screws (A)	(4)	4
2	Top cover	Screws (B)	(4)	5
3	Back cover	Screws (C), (D)	(2), (4)	6
4	Bottom cover	Screws (E)	(4)	7
5	Function panel assembly and main P.C.B assembly	Knobs (F) Screws (G)	(9), (4)	8
6	P.C.B holding angle I and II	Screws (H), (I), (J)	(4), (4), (2)	9
7	Tension control P.C.B assembly	Screws (K) Housing No. (J), (M), (N), (O), (P)	(3), (5)	10
8	Function button control P.C.B assembly	Housing No. (B), (C), (D), (E), (F), (G)	(6)	11
9	Function button assembly	Screws (L)	(4)	11
10	Capstan control P.C.B assembly	Screws (M) Housing No. (F), (H), (I), (J), (K), (L)	(2), (6)	12
11	Level meter	Screw (N)	(1)	13
12	Power supply control P.C.B assembly	Screws (O)	(7)	14
13	Power transformer angle assembly	Screws (P)	(9)	15

SCHEMATIC DIAGRAM MODEL RS-1500US

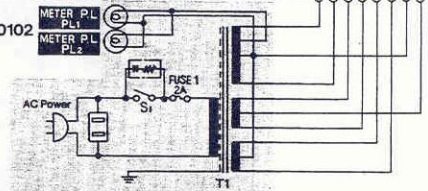
Power Supply Section and Main Control Circuit



- NOTE:**
- S₁.....Power ON/OFF switch.
 - S₁₃.....FF switch.
 - S₄.....Rew switch.
 - S₁₅.....Play switch.
 - S₁₆.....Rec switch.
 - S₁₇.....Pause switch.
 - S₁₈.....Stop switch.
 - S₁₁, S₂₈.....Shut-off switch.
 - S₂₂₋₁—S₂₂₋₂.....Cue ON/OFF & DC power ON/OFF switch, (shown in cue off position).
 - S₂₂₋₁—S₂₂₋₄.....AC/DC select switch (shown in AC position).
 - VR₈₀₁.....Voltage (5V) adjustment VR.
 - P₁, P₂.....Brake plunger.

- P₁.....Pressure roller plunger.
- Resistor values are in ohms (Ω), 1/4W watt unless specified otherwise. K = 1000.
- Capacitor values are in microfarads (μF) unless specified otherwise. P = Pico-farads.
- Voltages shown in () are voltages when plunger is in "ON" condition.
- Important safety notice.
The shaded area on this schematic diagram incorporates special features important for safety. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

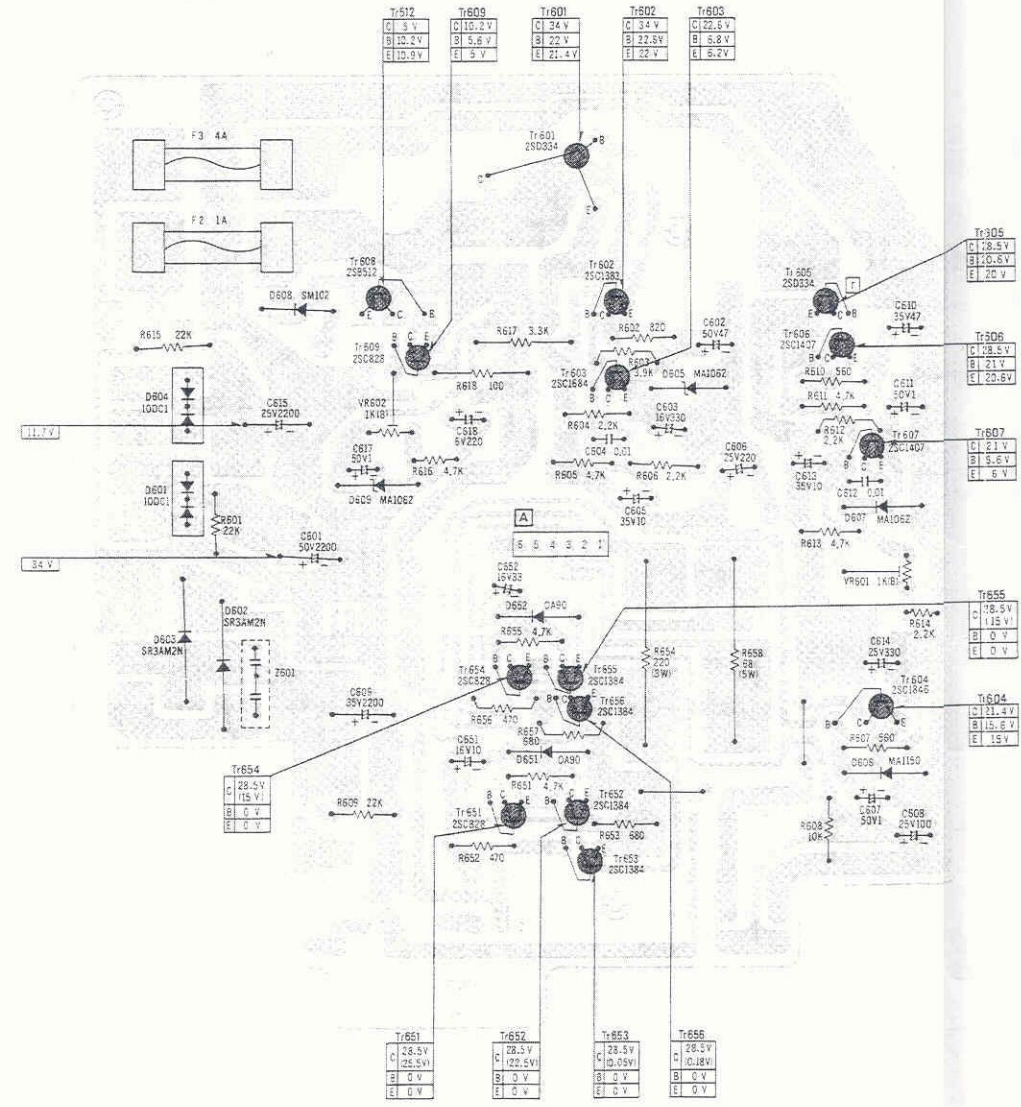
Specifications are subject to change without notice.



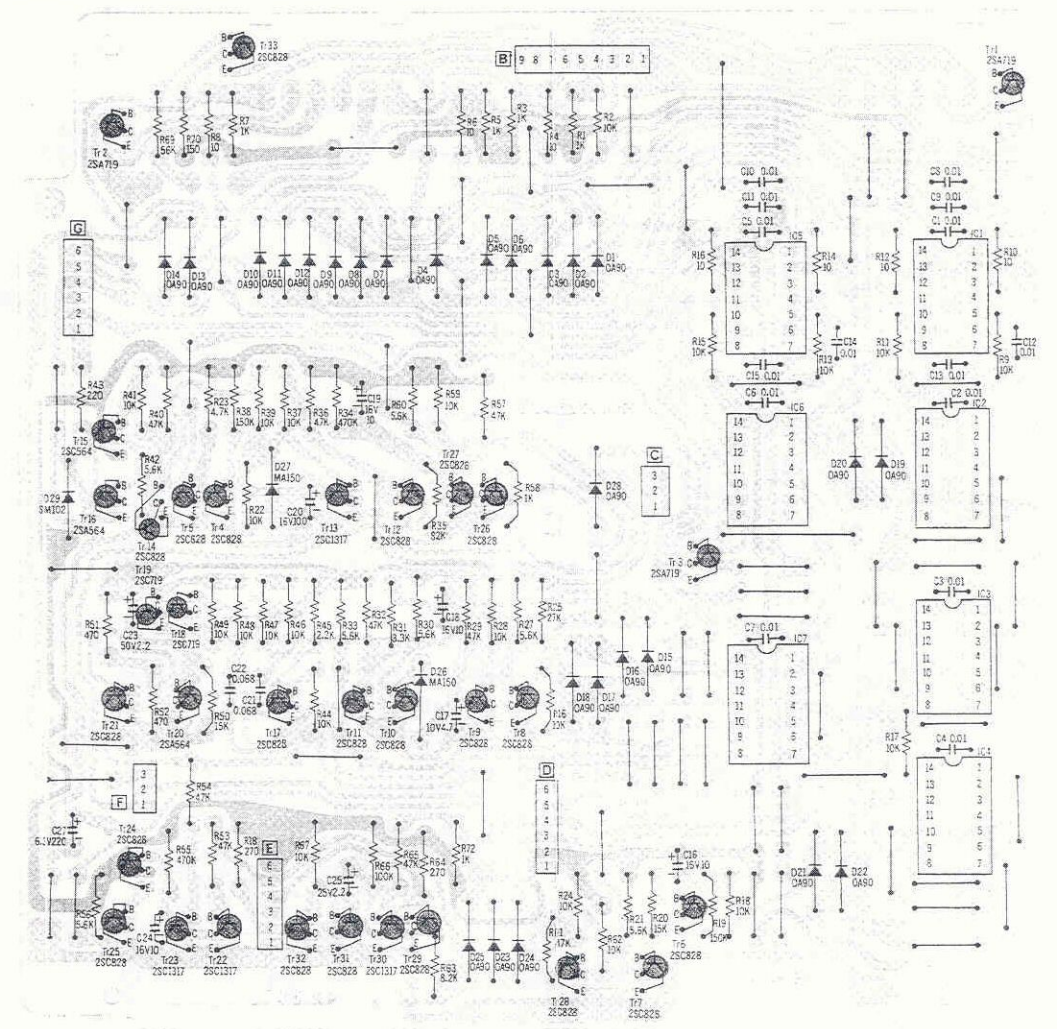
7 25 1500 112

CIRCUIT BOARD

Power Supply Circuit Board



Main Control Circuit Board

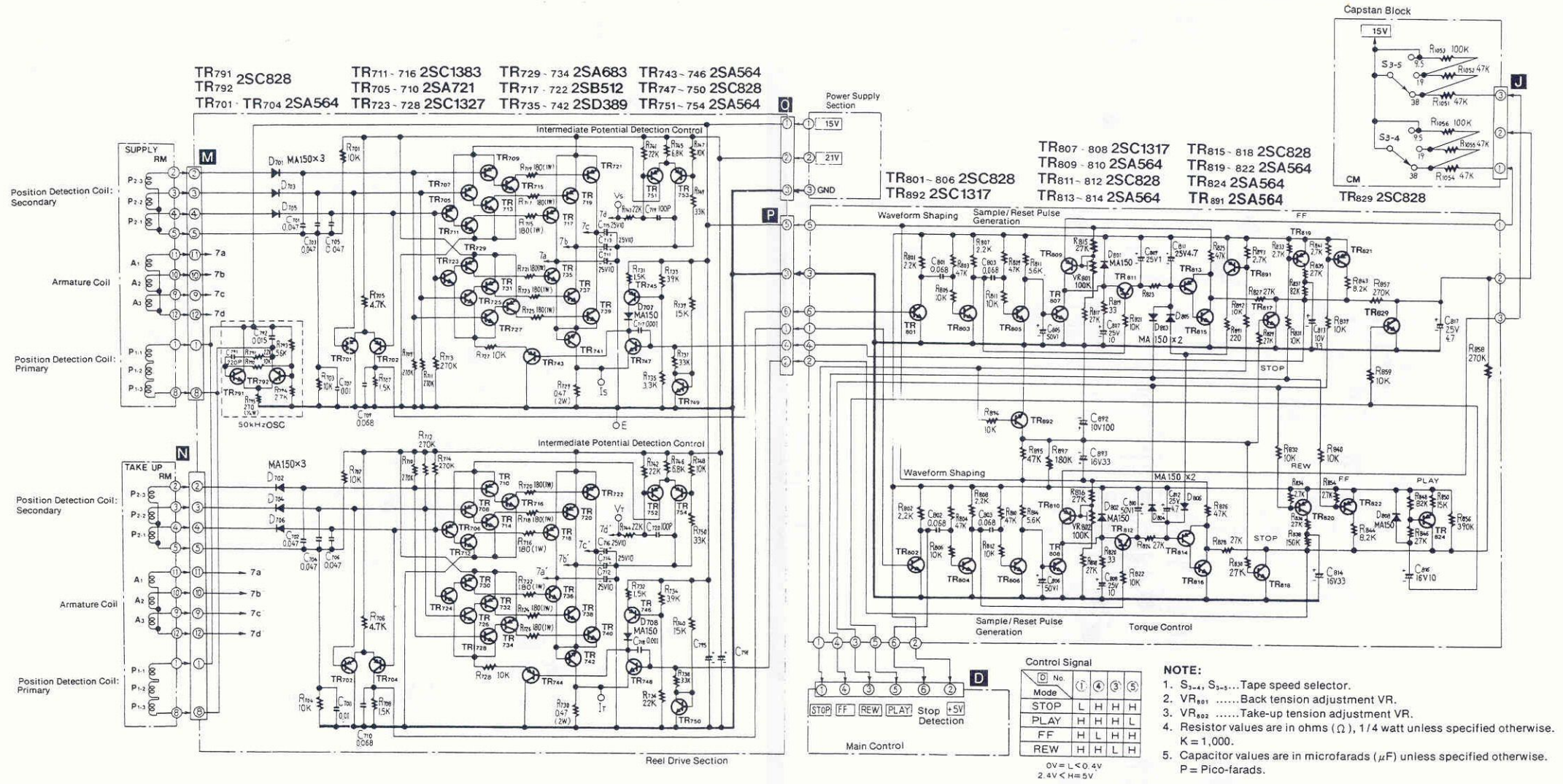


NOTE:
 The circuit shown in red on the conductor is B circuit.
 Values indicated in are DC voltage between the chassis and electrical parts.
 Voltages shown in () are voltages when plunger is in "ON" condition.

25/1500 45

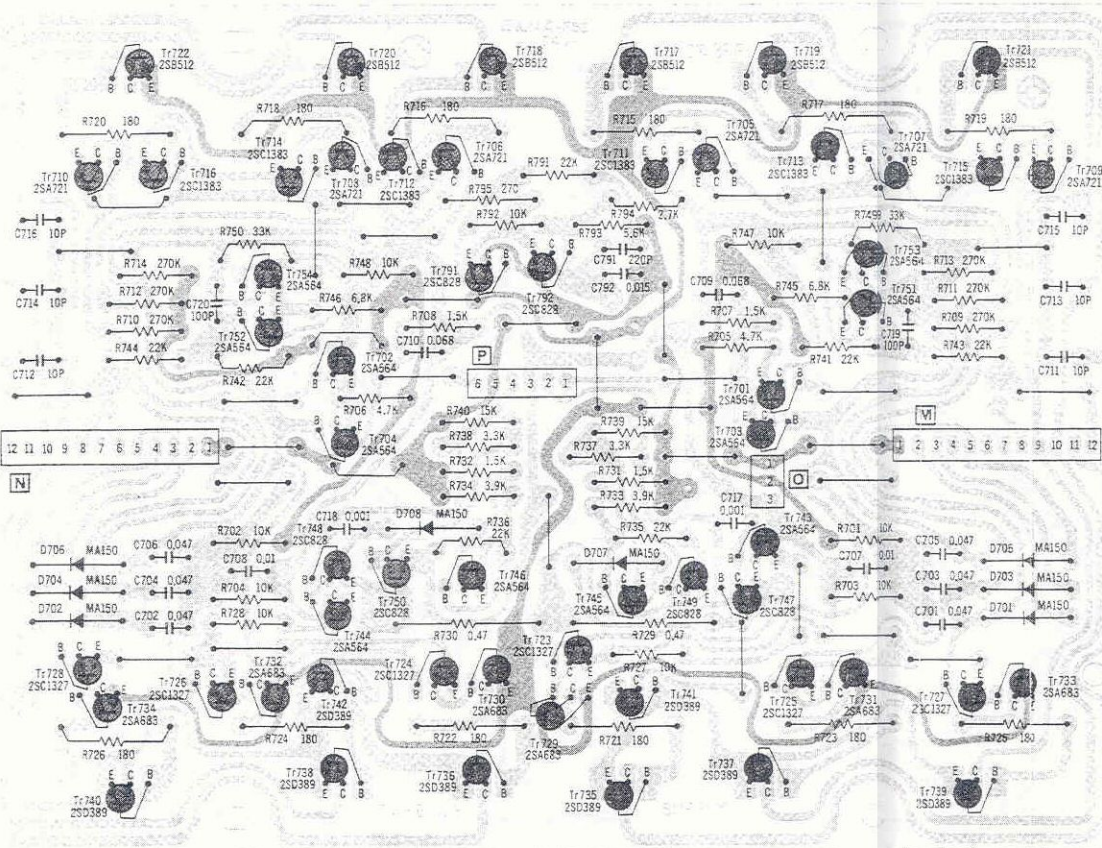
SCHEMATIC DIAGRAM MODEL RS-1500US

Reel Motor Section

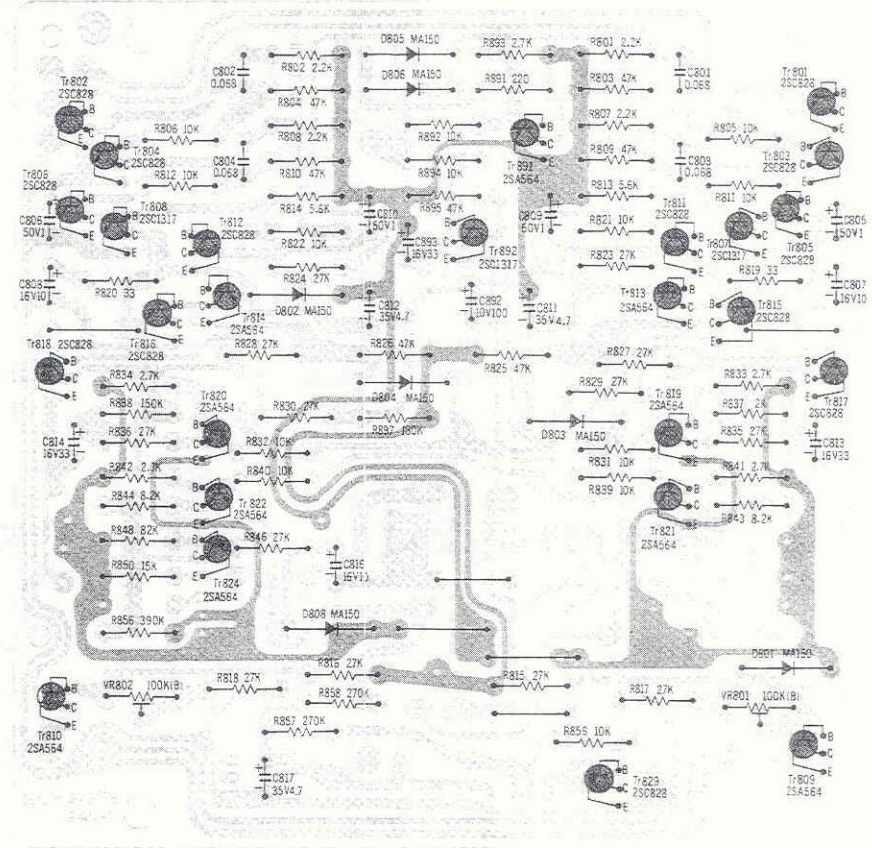


CIRCUIT BOARD

Reel Motor Driving Circuit Board



Reel Motor Tension Control Circuit Board

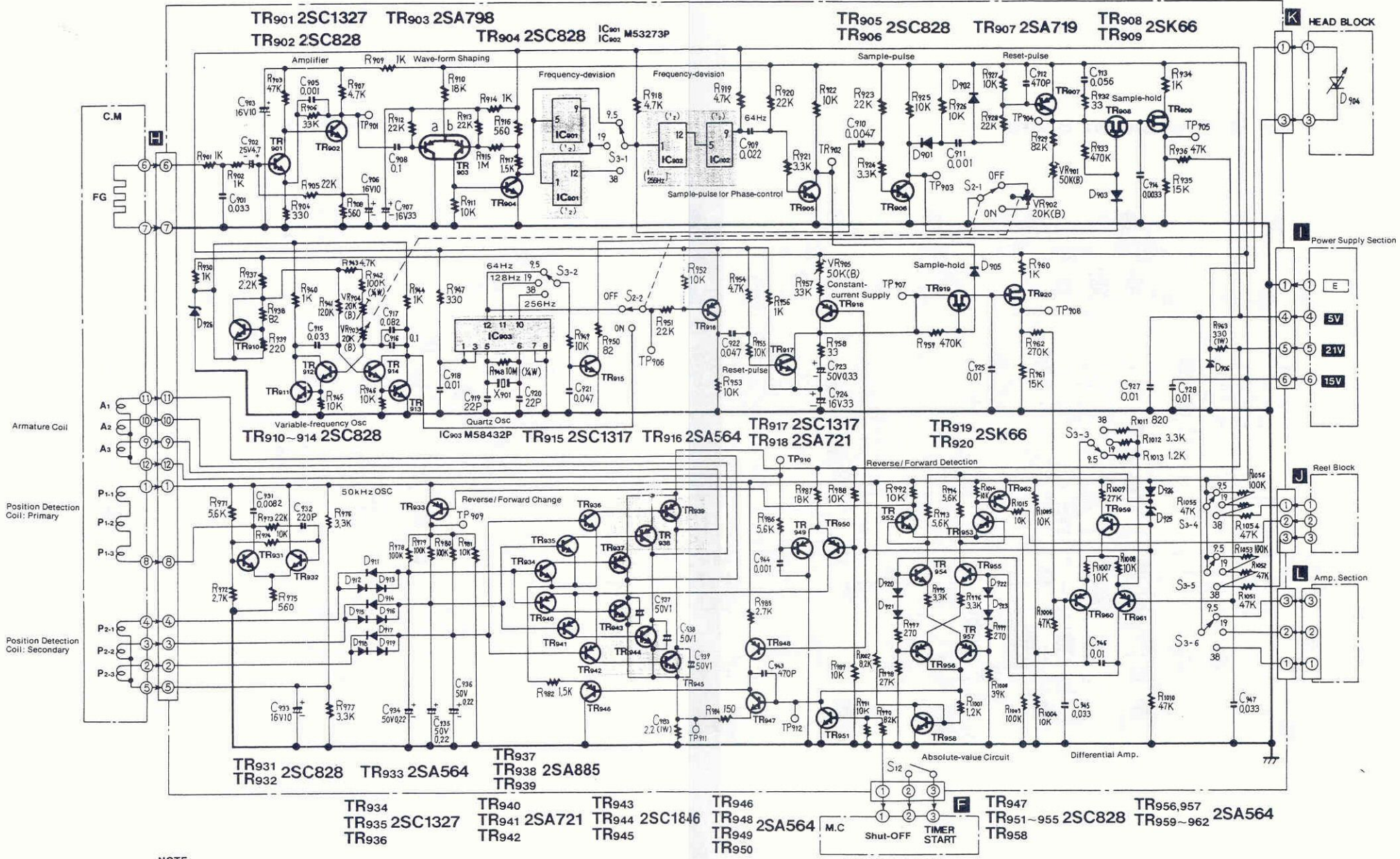


NOTE:
The circuit shown in red on the conductor is B circuit.
Values indicated in [] are DC voltage between the chassis and electrical parts.

RS1500 US

SCHEMATIC DIAGRAM MODEL RS-1500US

Capstan Motor Section



- NOTE:**
1. S₂₋₁, S₂₋₂Pitch control ON/OFF switch.
 2. S₃₋₁—S₃₋₆ ...Tape speed selector.
 3. S₁₂Timer start ON/OFF switch (shown in OFF position).
 4. VR₉₀₁Phase adjustment VR.
 5. VR₉₀₂, VR₉₀₃...Pitch control.
 6. VR₉₀₅Sawtooth-waveform adjustment VR.

7. Resistor values are in ohms(Ω), 1/4 watt unless specified otherwise.
K = 1000 , M = 1,000,000.
8. Capacitor values are in micfarads (μF) unless specified otherwise.
P = Pico-farads.

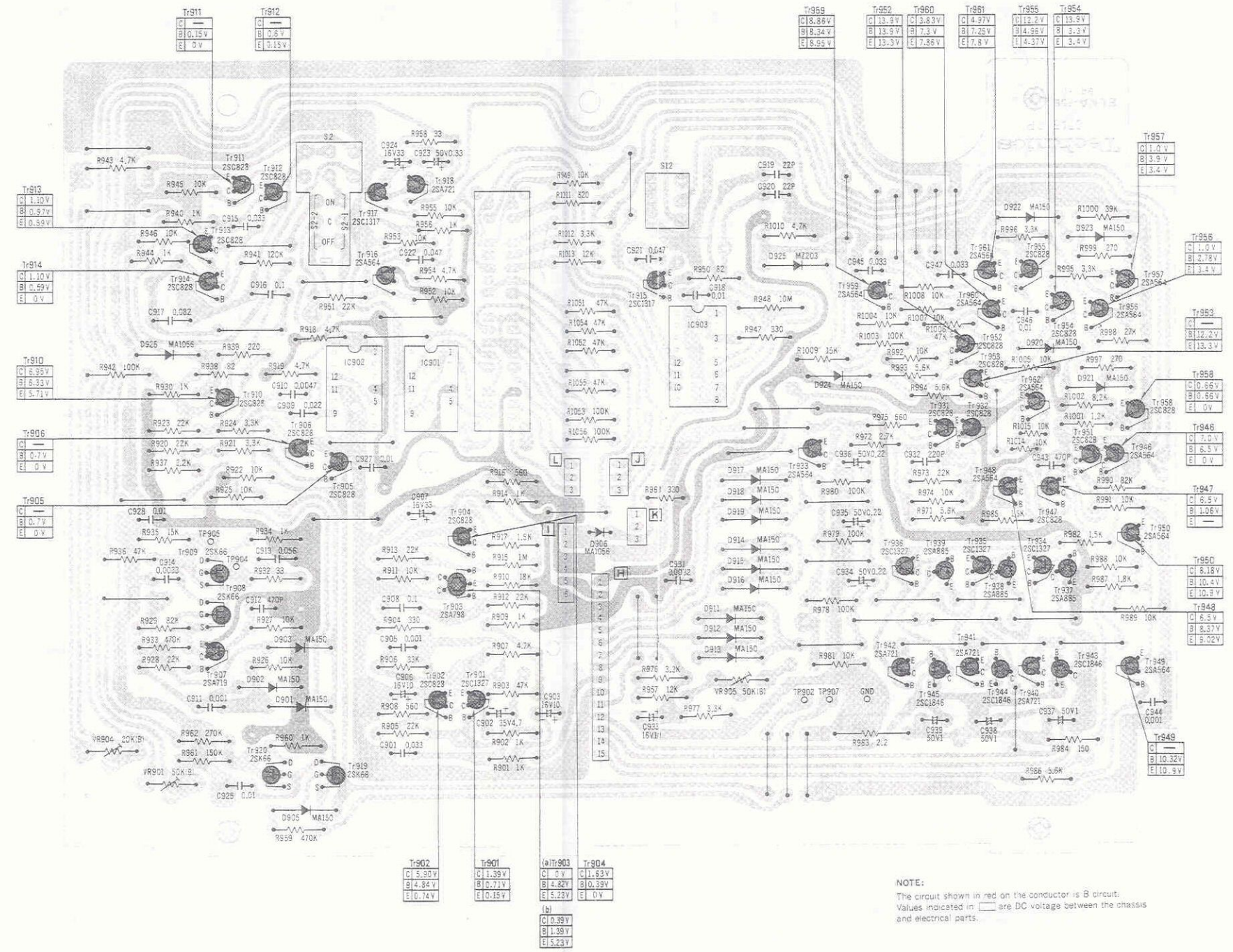
9. Important safety no tics.
The shaded area on this schematic diagram incorporates special features important for safety. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

Specifications are subject to change without notice.

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CIRCUIT BOARD

Capstan Motor Control Circuit Board



NOTE:
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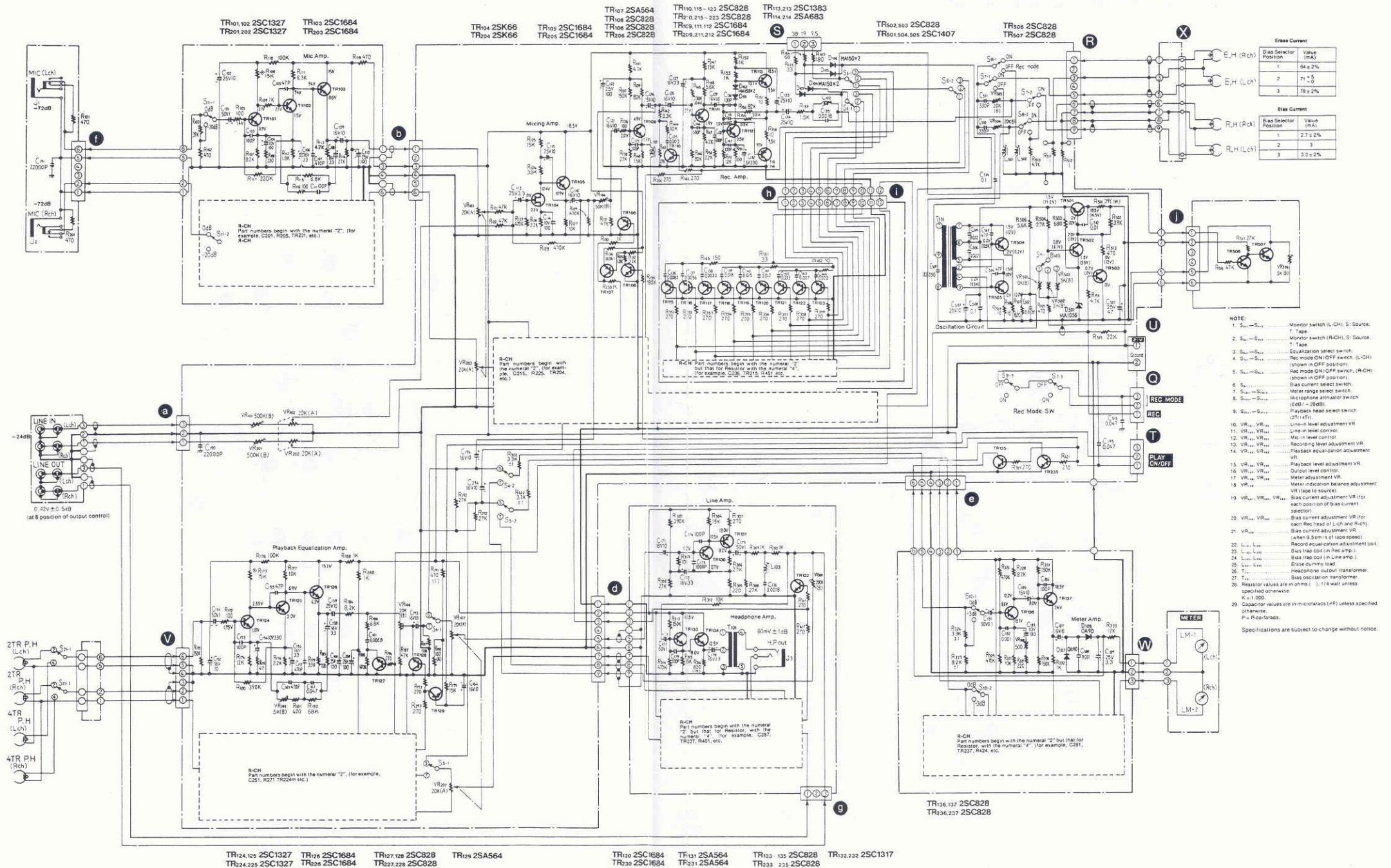
Tr902	Tr901	(a) Tr903	Tr904
C 5.80V	C 1.39V	C 0 V	C 1.82V
B 4.84V	B 0.71V	B 4.82V	B 0.39V
E 0.74V	E 0.15V	E 5.23V	E 0 V

(b)
C 0.39V
B 1.39V
E 5.23V

RS 1500 UJ

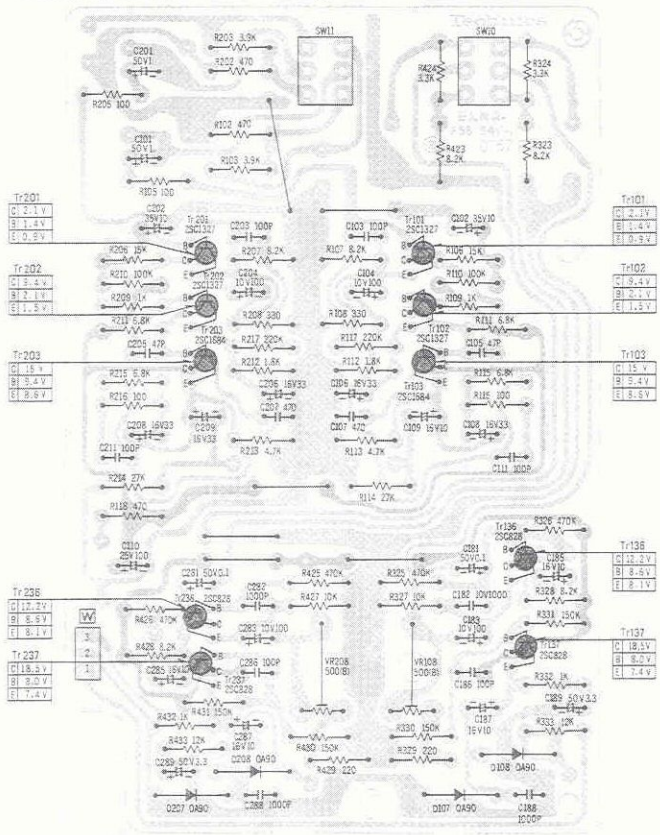
SCHEMATIC DIAGRAM MODEL RS-1500US

Main Amp. Section

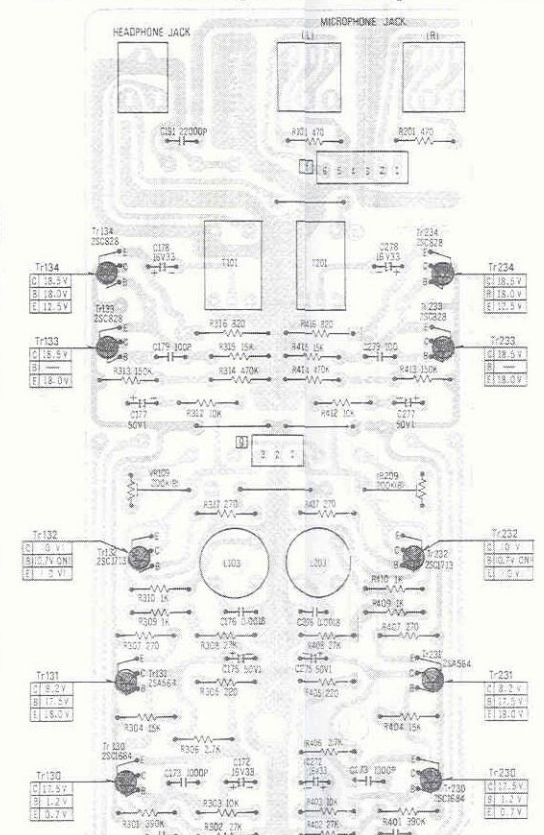


CIRCUIT BOARD

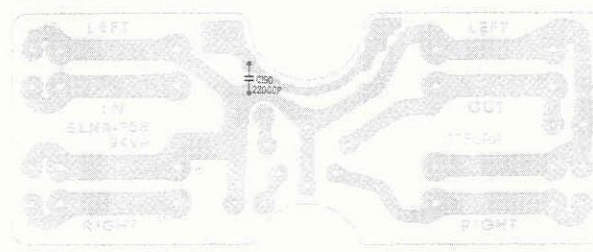
Mic and Meter Amp. Circuit Board



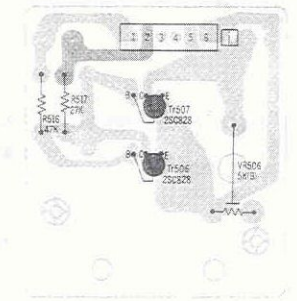
Line-out Headphone Amp. Circuit



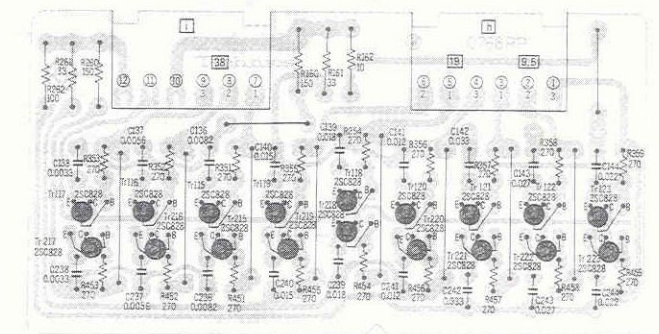
Jack Circuit Board



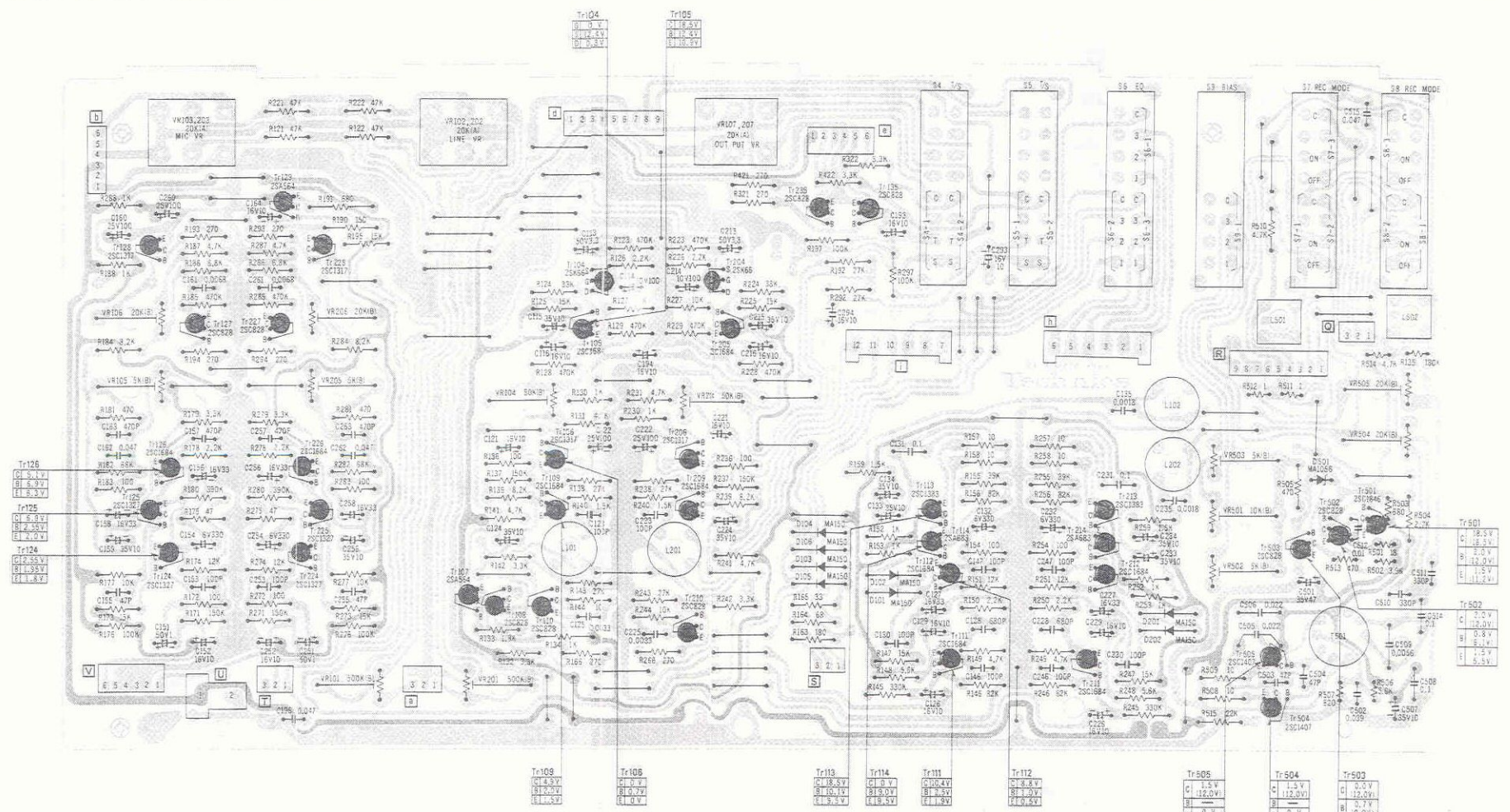
Tr507 Circuit Board



Equalization Circuit Board



Main Amp. Circuit Board

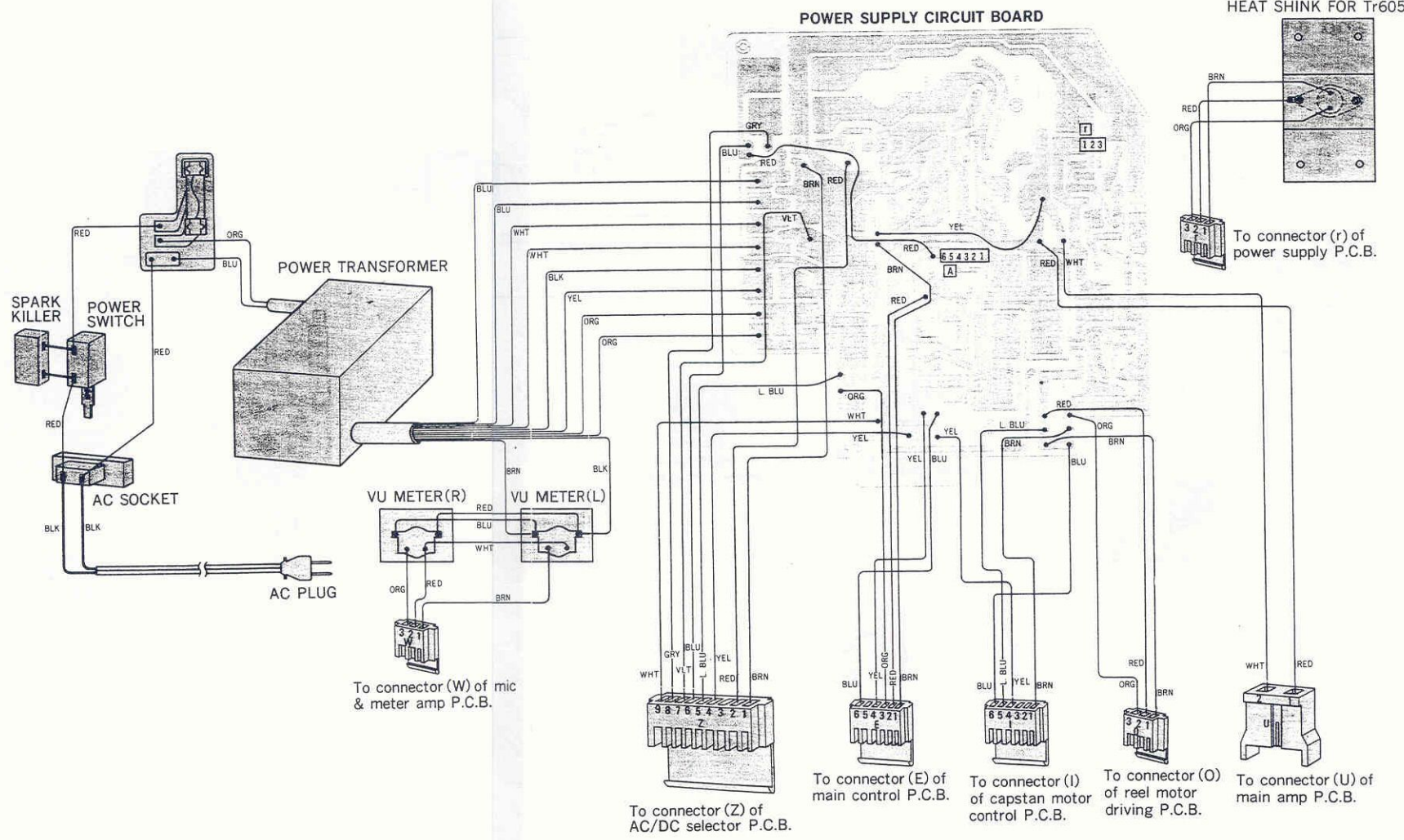
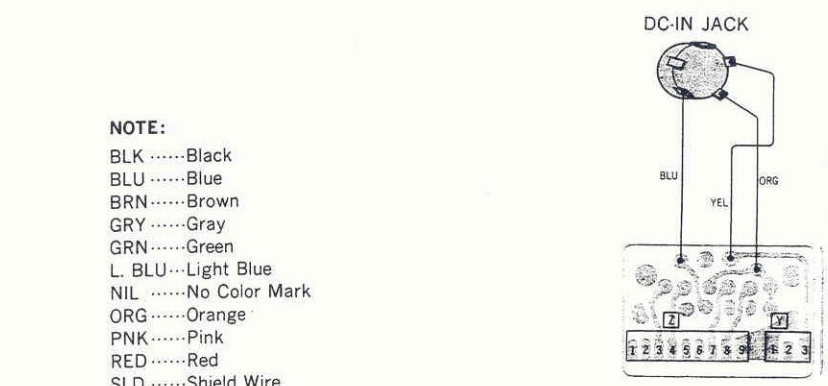
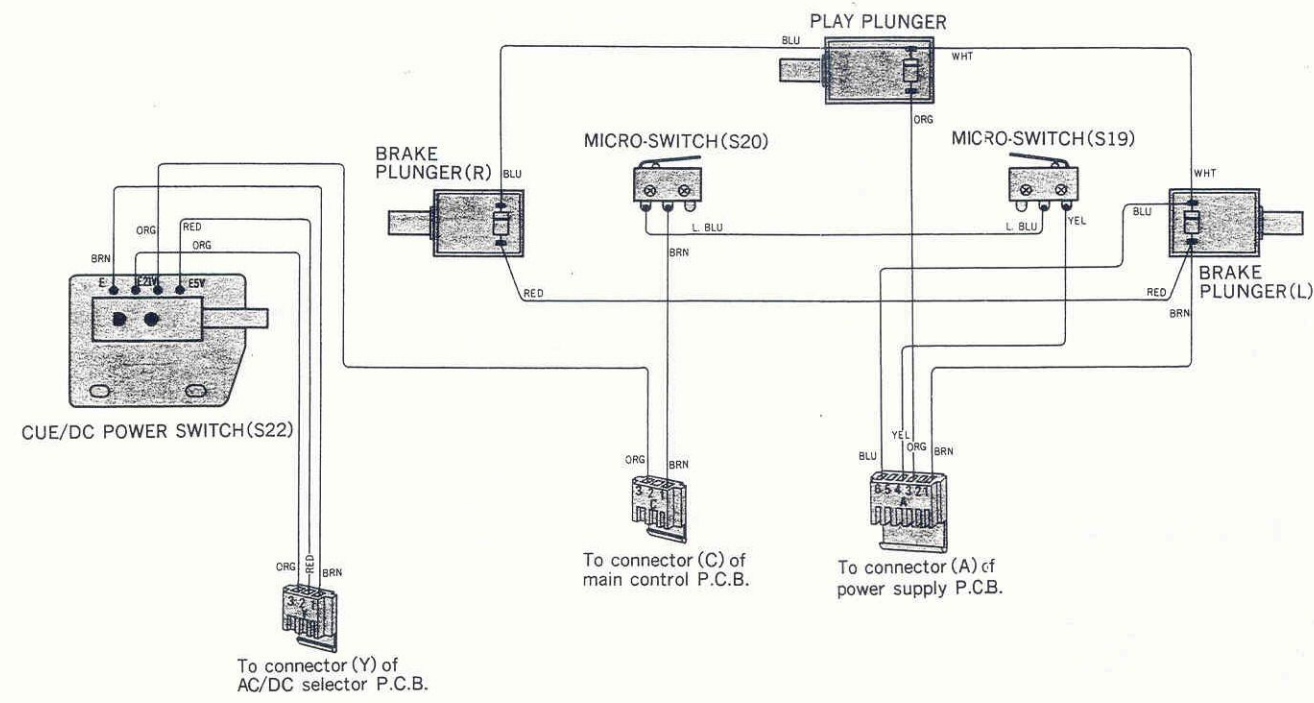


NOTE:
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Values indicated in □ are DC voltage between the chassis and electrical parts.
Voltages shown in () are voltages when plunger is in "ON" condition.

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WIRING CONNECTION DIAGRAM MODEL RS-1500US

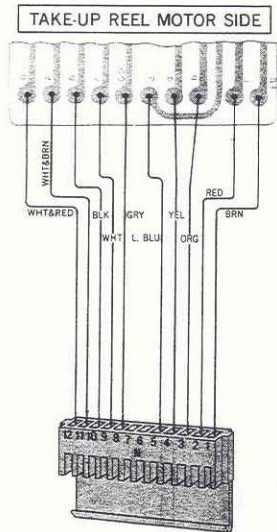
Power Supply Section, Plunger and Micro Switch Section



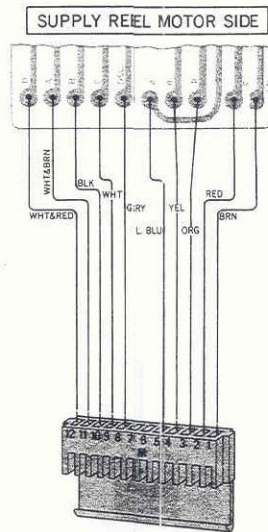
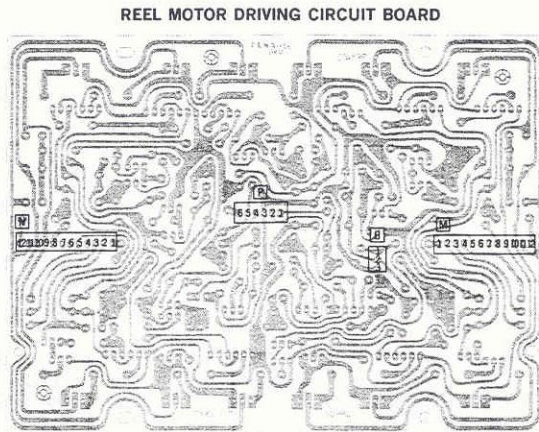
- NOTE:**
- BLKBlack
 - BLUBlue
 - BRNBrown
 - GRYGray
 - GRNGreen
 - L. BLU...Light Blue
 - NILNo Color Mark
 - ORGOrange
 - PNKPink
 - REDRed
 - SLDShield Wire
 - VLTViolet
 - WHTWhite
 - YELYellow

WIRING CONNECTION DIAGRAM MODEL RS-1500US

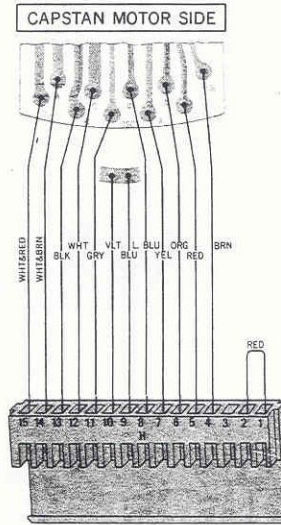
Reel, Capstan and Main Control Section



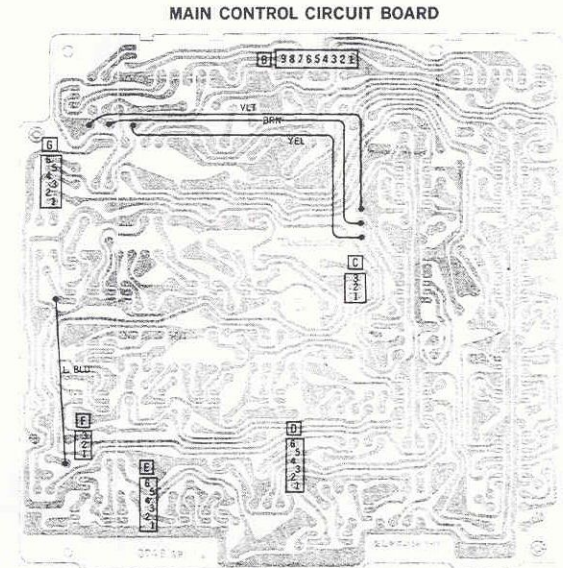
To connector (N) of reel motor driving P.C.B.



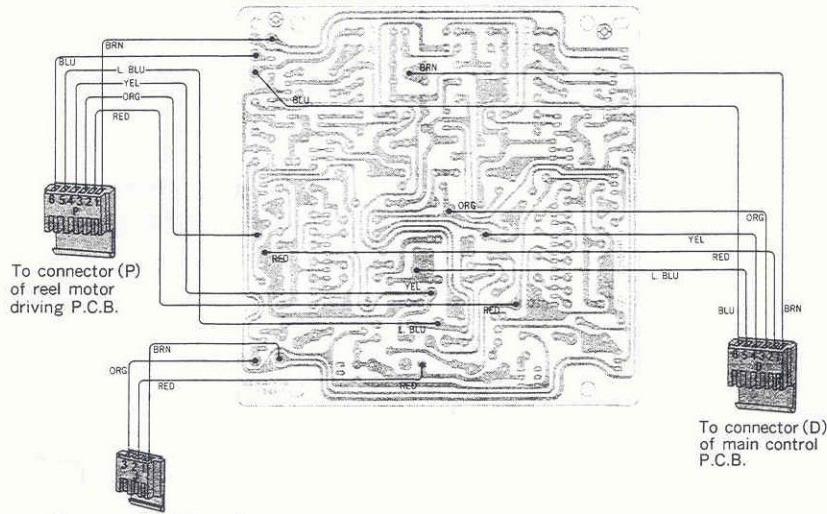
To connector (M) of reel motor driving P.C.B.



To connector (H) of capstan motor control P.C.B.



REEL MOTOR TENSION CONTROL CIRCUIT BOARD

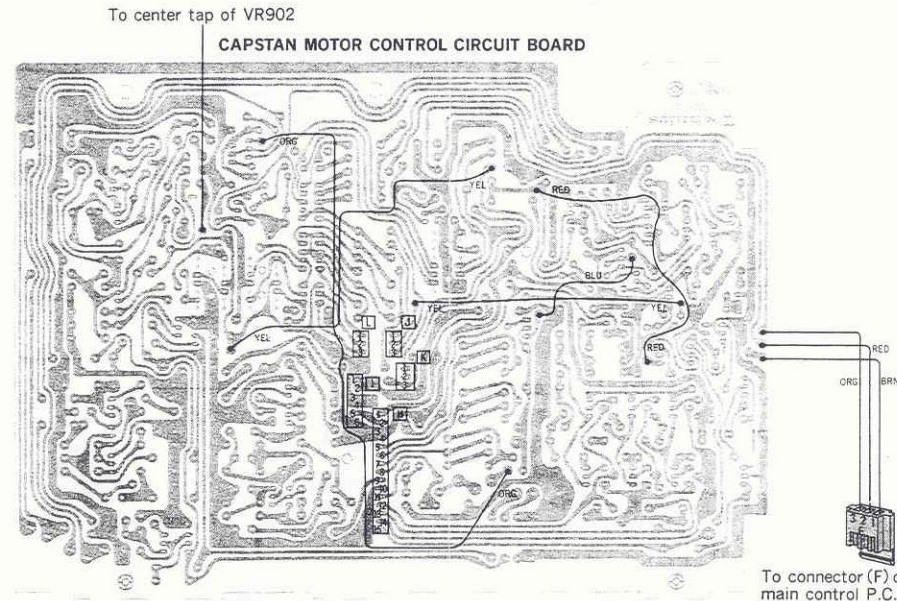


To connector (P) of reel motor driving P.C.B.

To connector (J) of capstan motor control P.C.B.

To connector (D) of main control P.C.B.

- NOTE:**
- BLKBlack
 - BLUBlue
 - BRNBrown
 - GRYGray
 - GRNGreen
 - L. BLU.....Light Blue
 - NILNo Color Mark
 - ORGOrange
 - PNKPink
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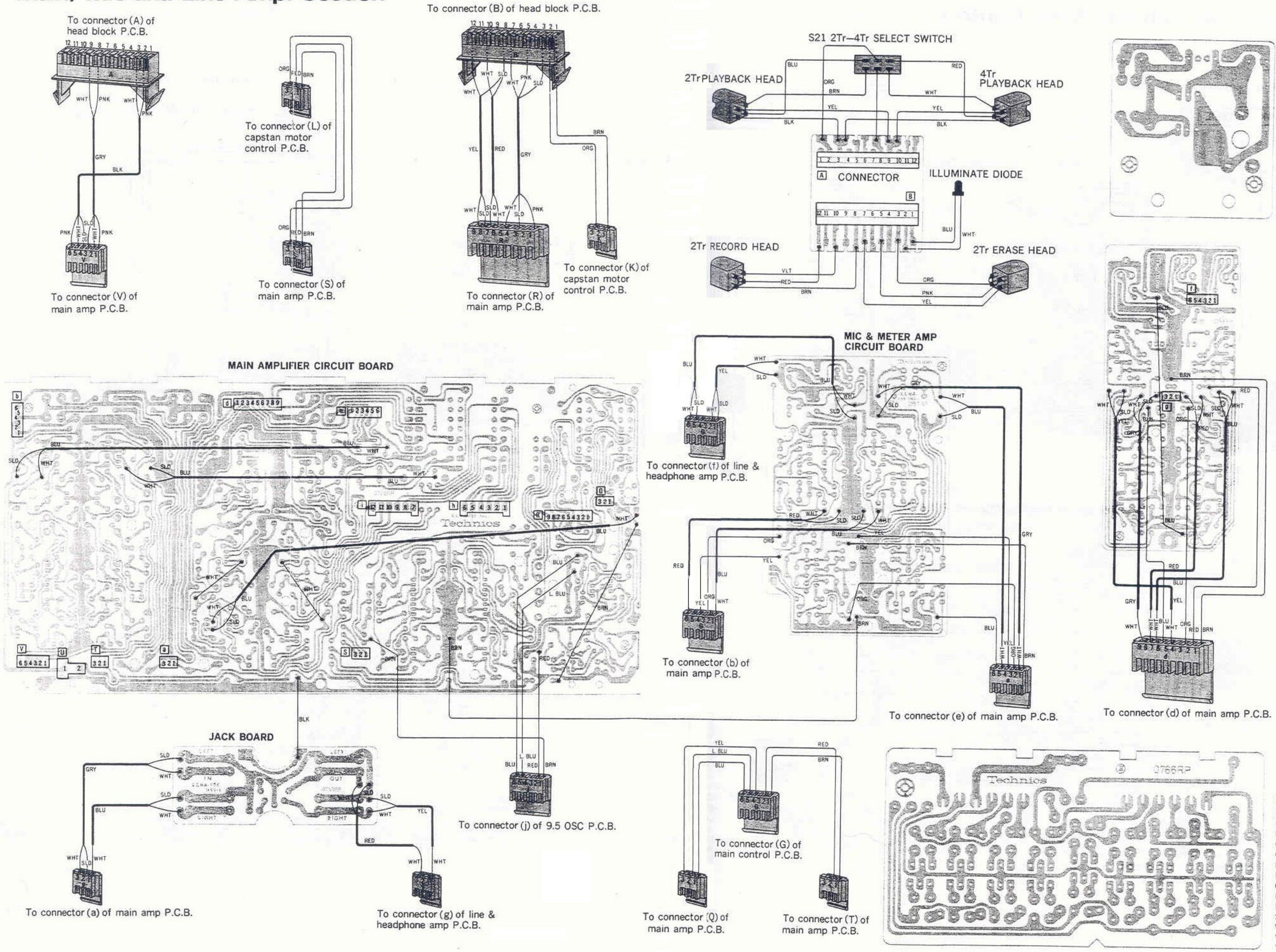
To center tap of VR902

To connector (F) of main control P.C.B.

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WIRING CONNECTION DIAGRAM MODEL RS-1500US

Main, Mic and Line Amp. Section

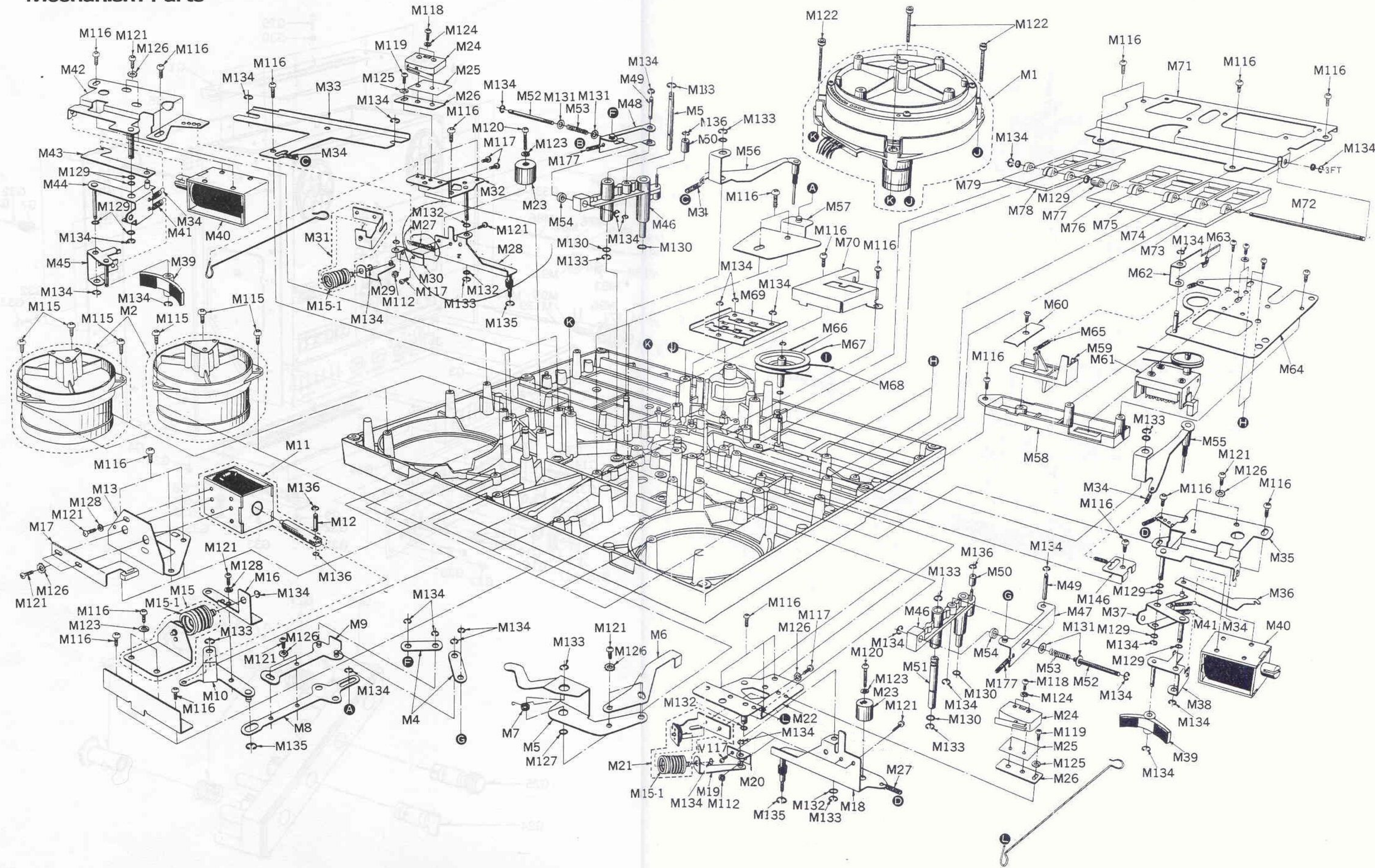


- NOTE:**
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 - SLDShield Wire
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 - YELYellow

17 RS 1500 US

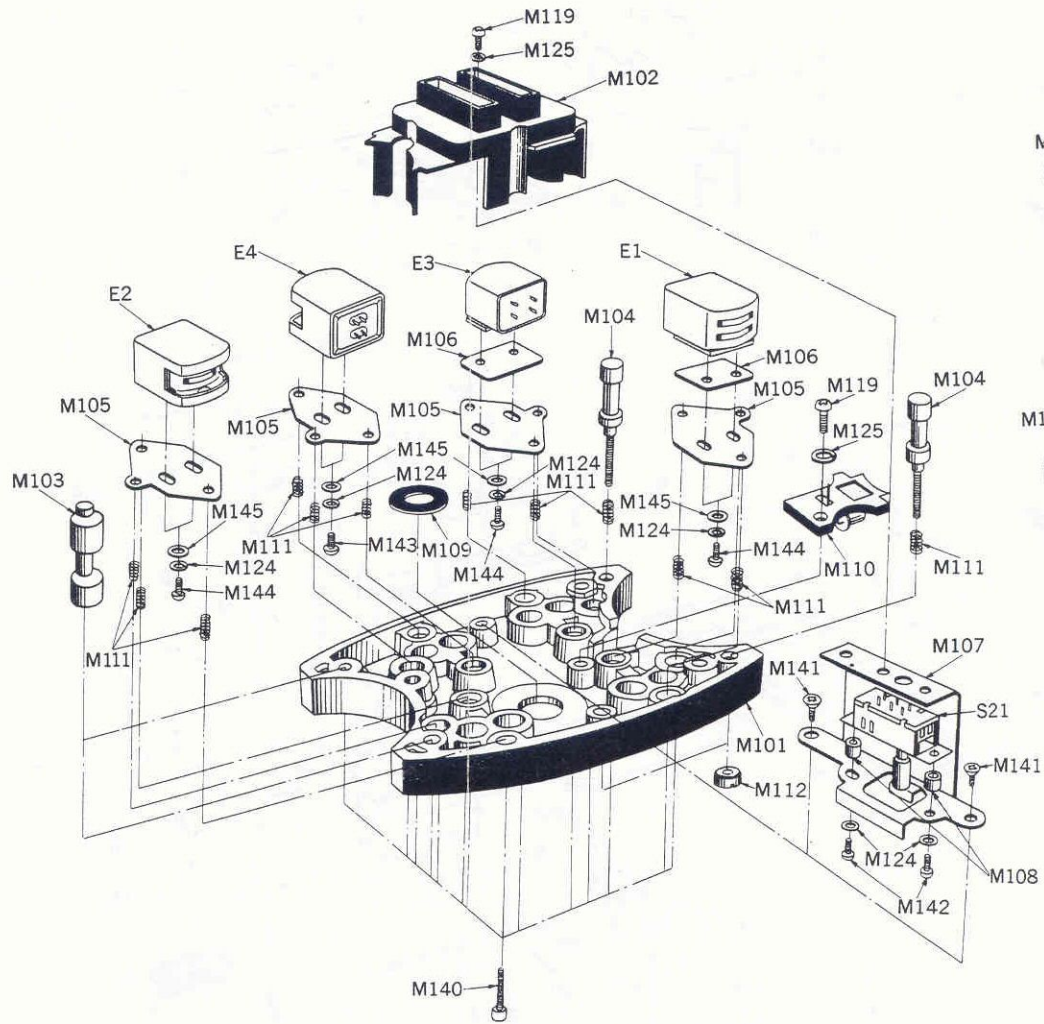
EXPLODED VIEWS

Mechanism Parts

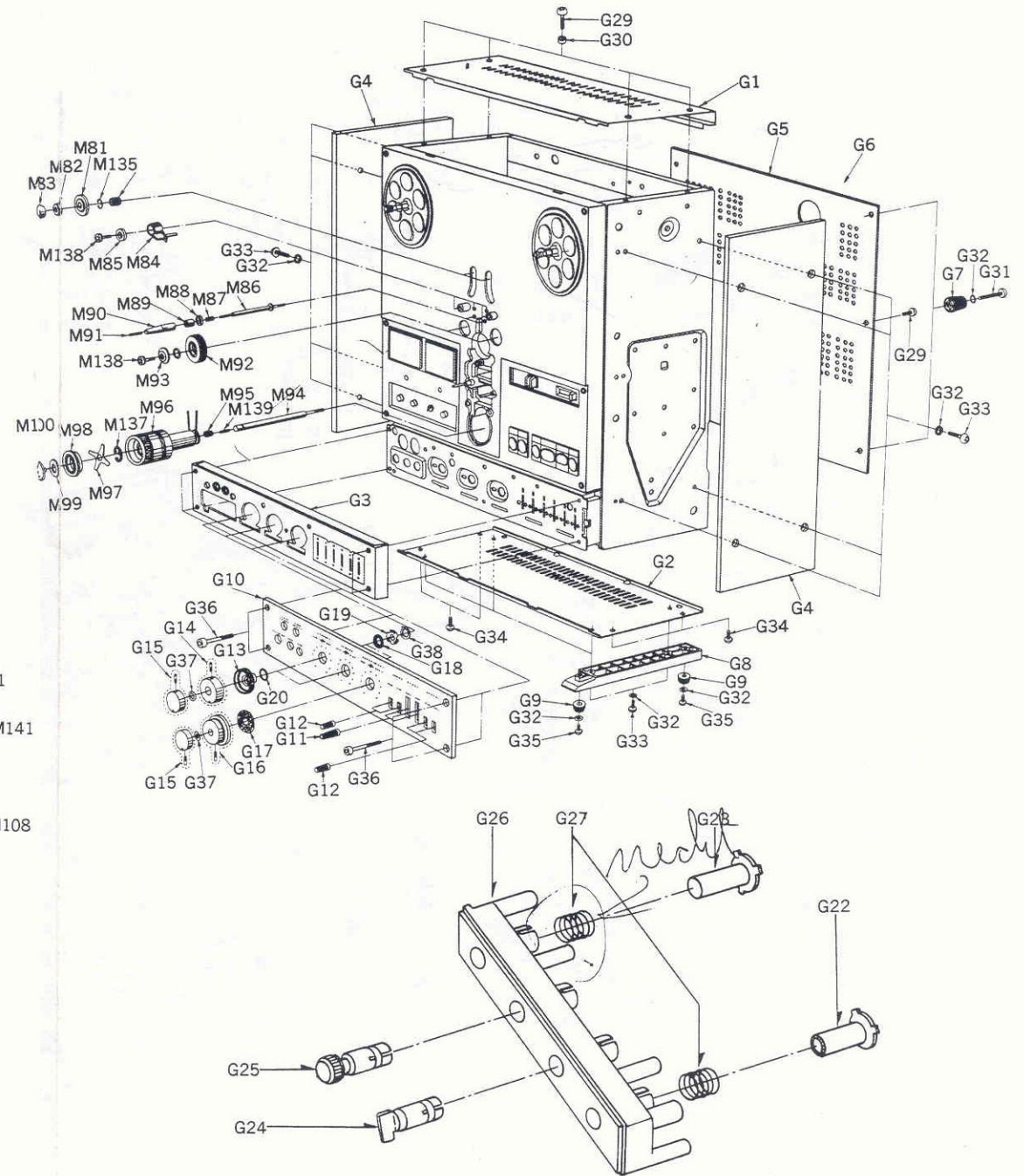


Ⓟ RS/500 US

Mechanism Parts

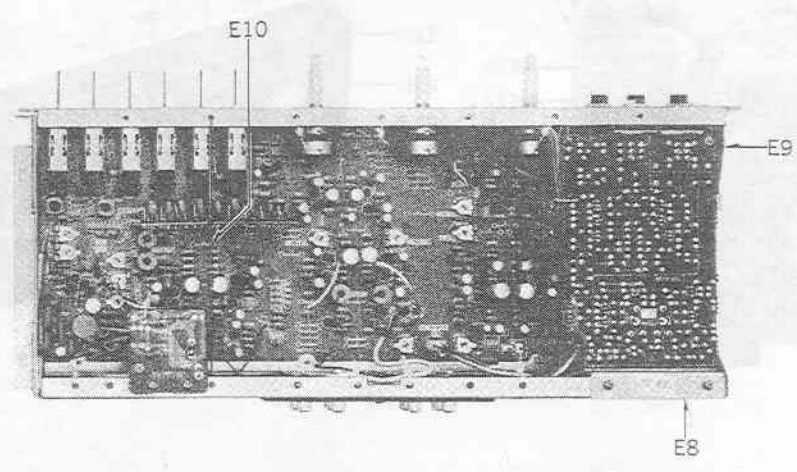
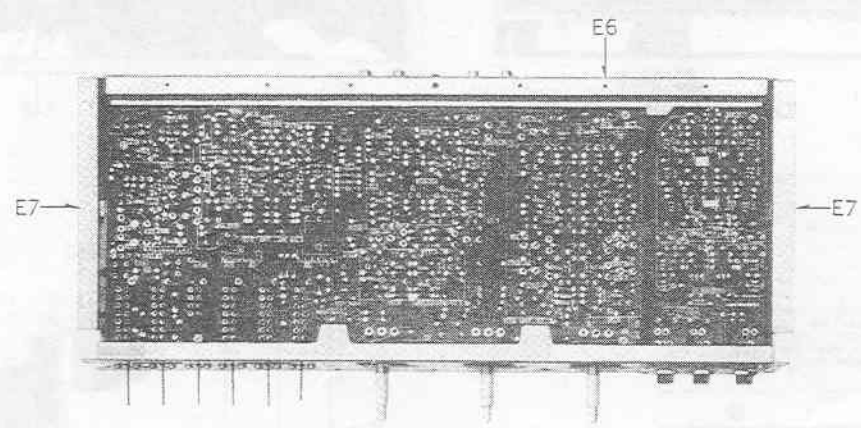
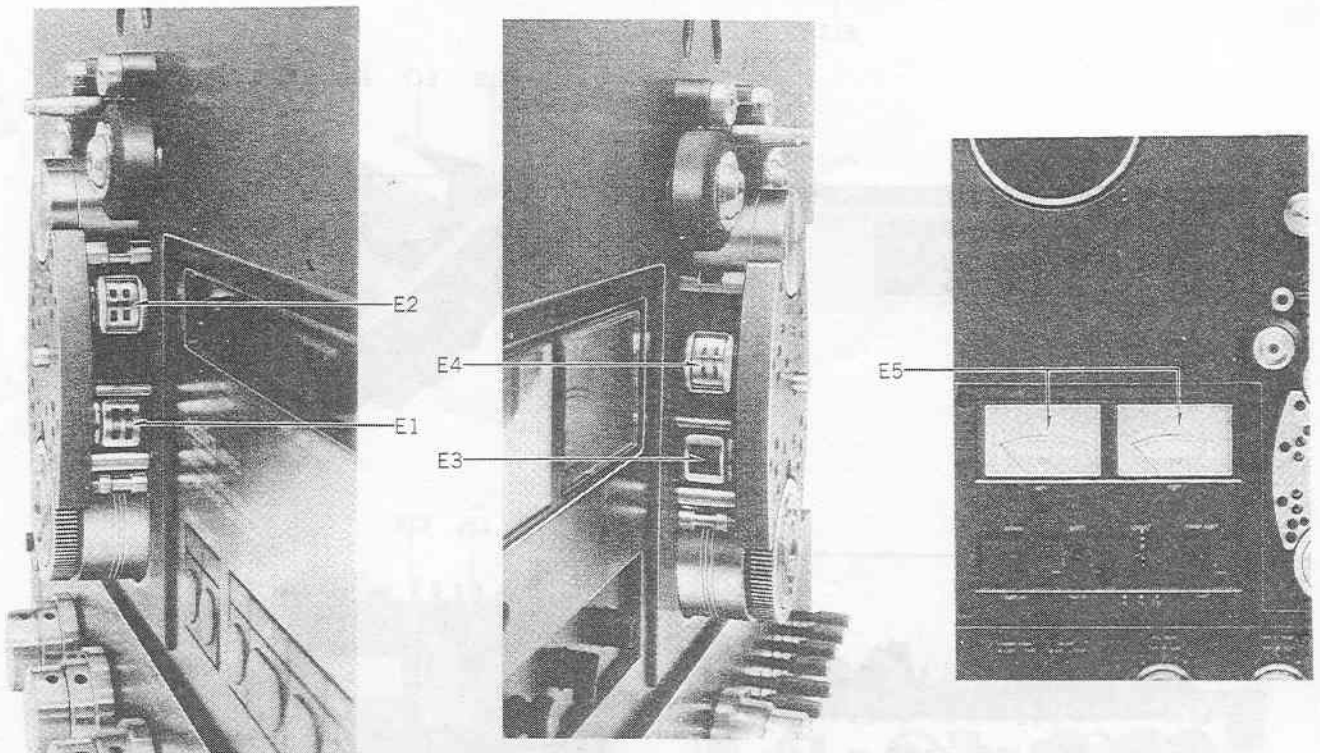


Mechanism and Cabinet Parts

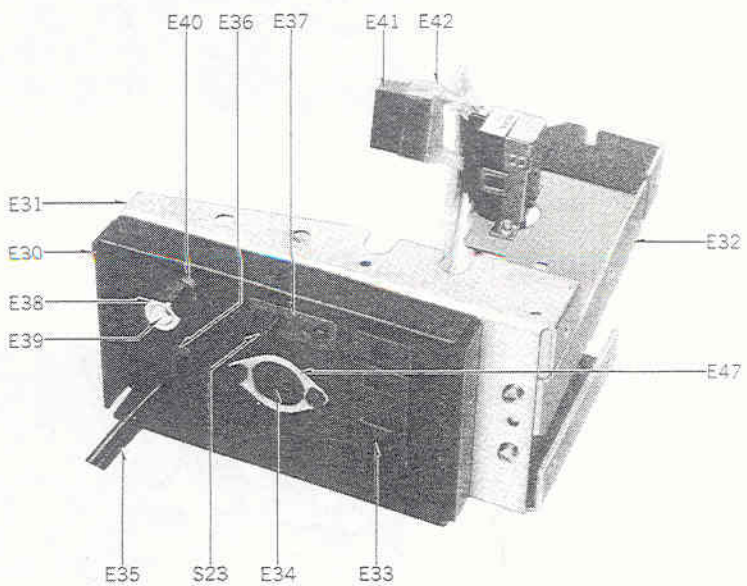
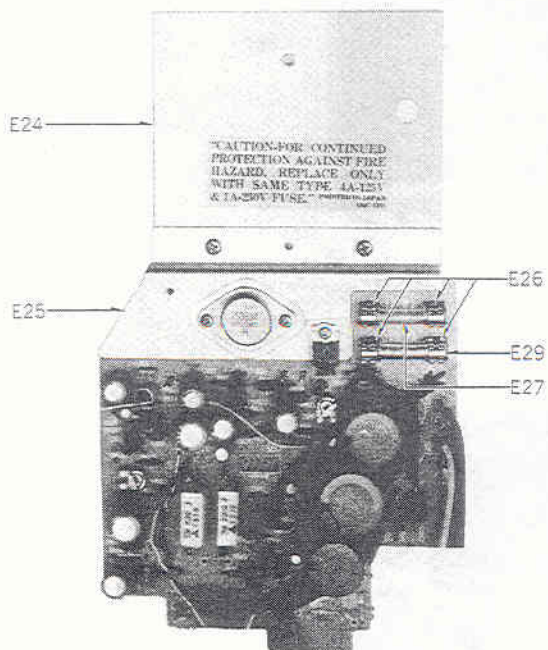
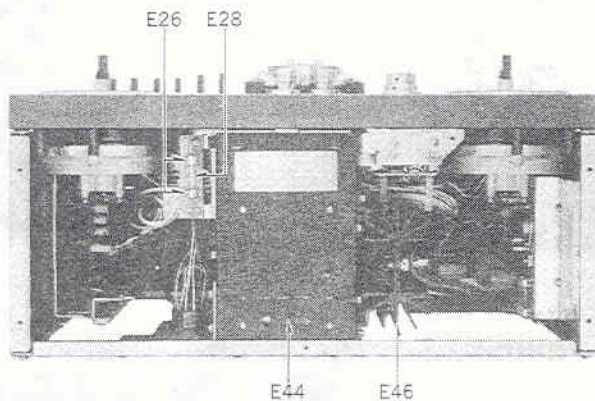
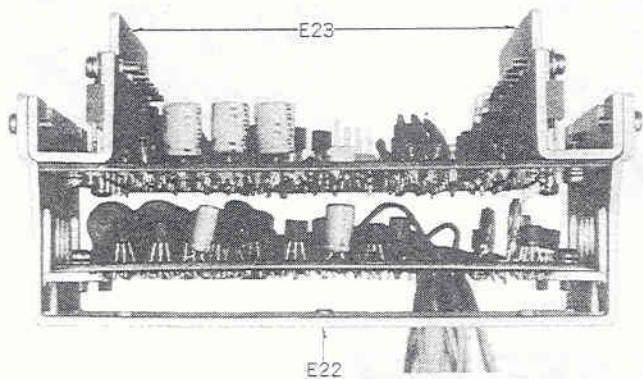
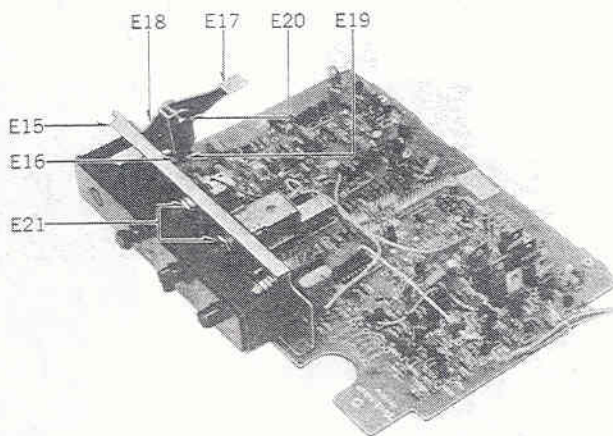
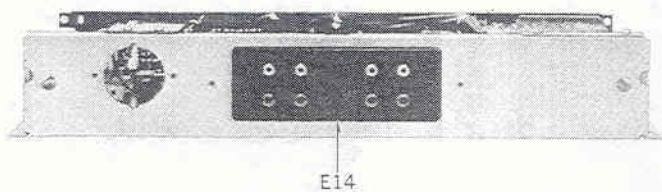
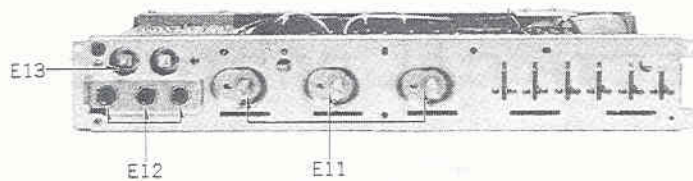


① 251570 UJ

ELECTRICAL PARTS LOCATION

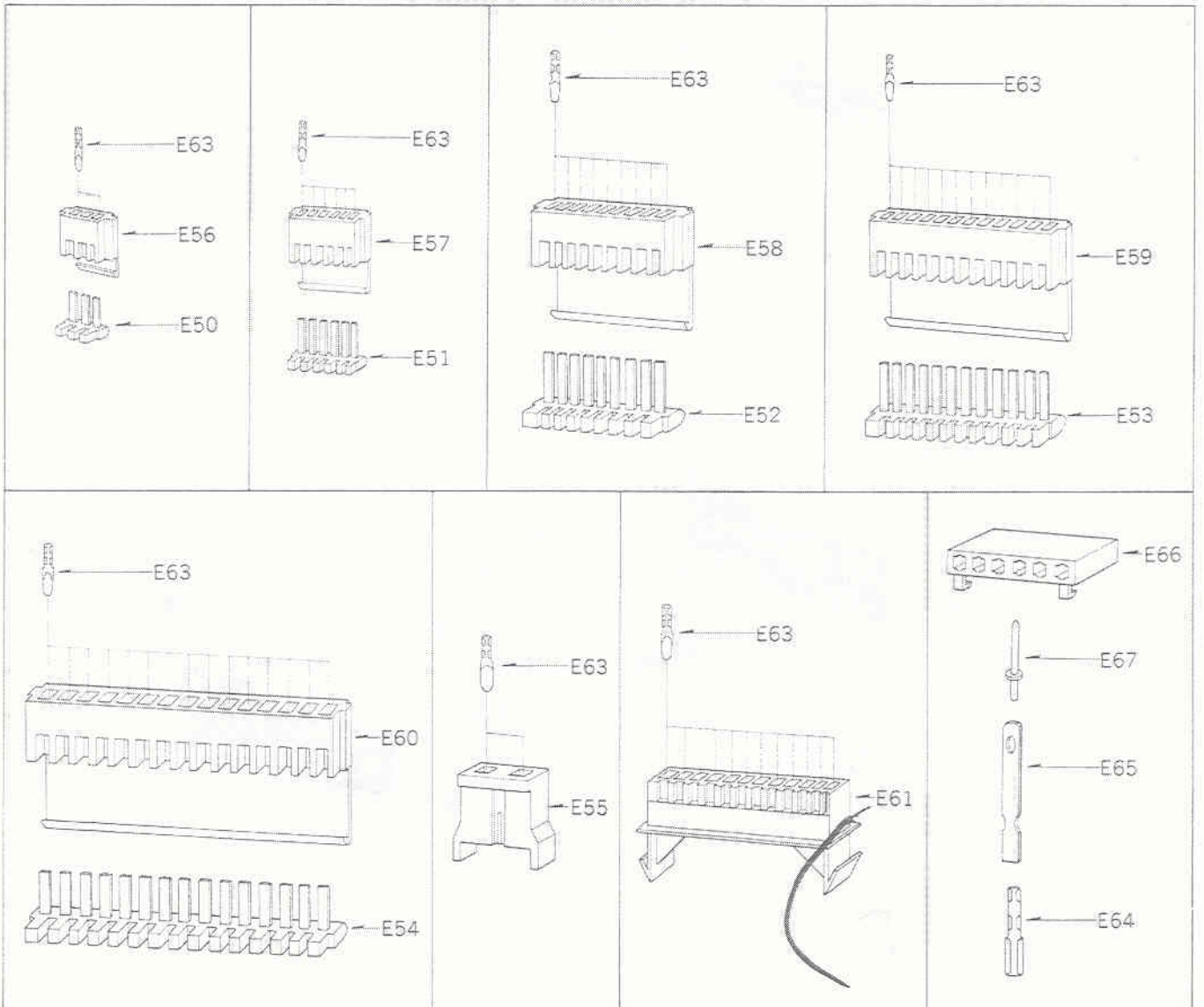
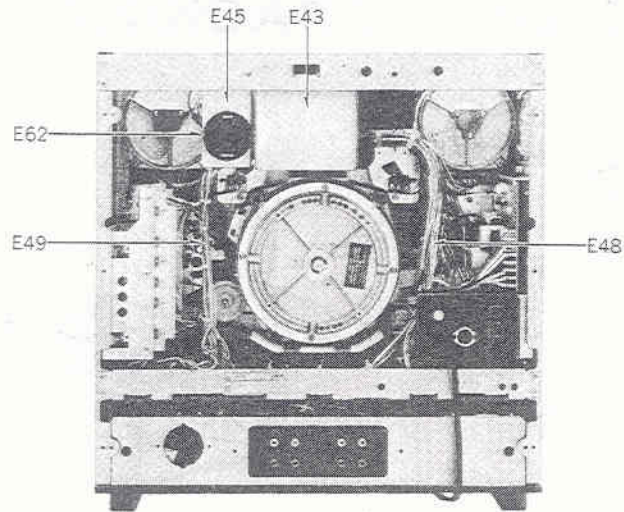


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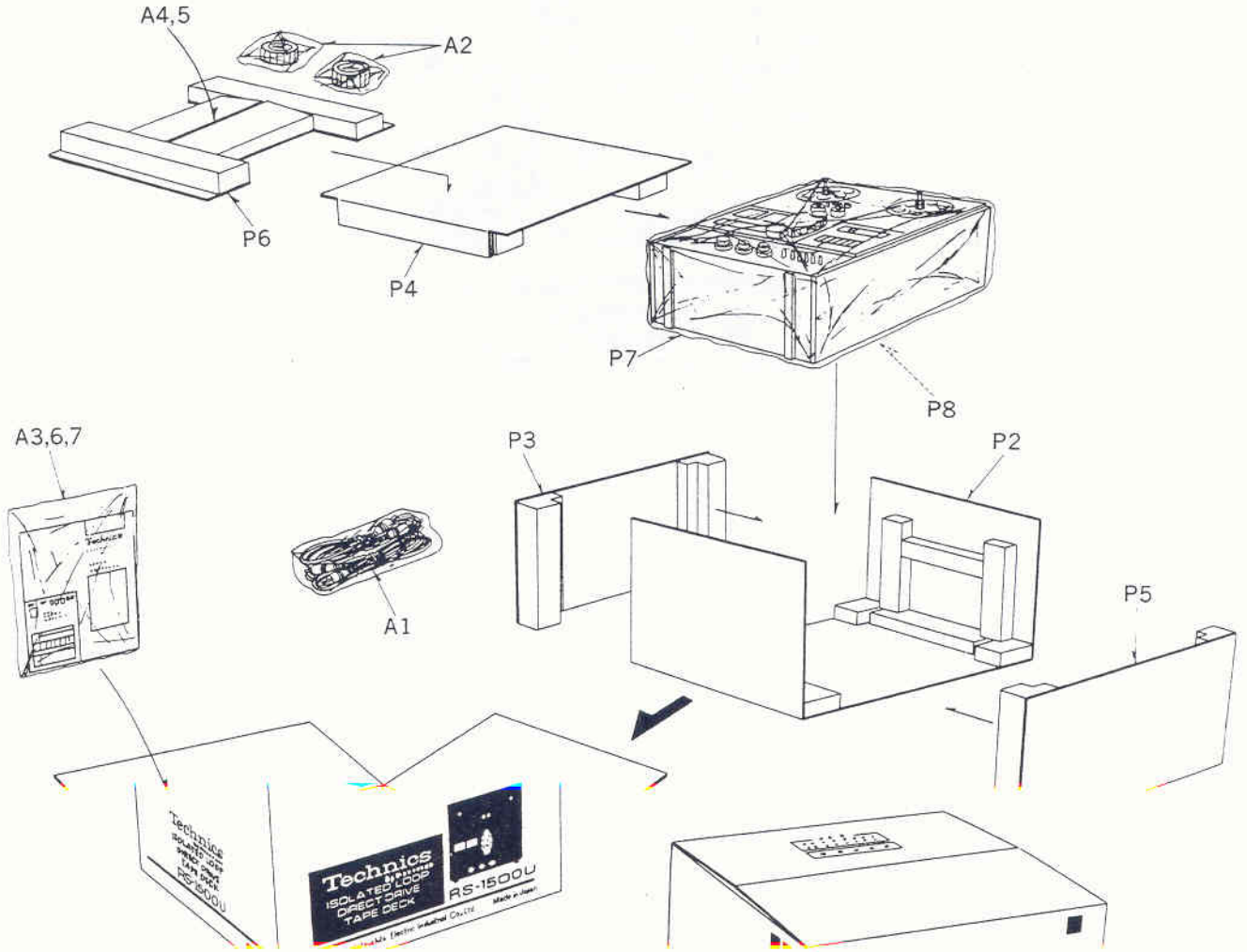
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RS 1500 US



22 251500 UJ

COMPONENT PACKING



Service Manual

Open Deck

RS-1500US RS-1506US

Vol. 2

"Isolated Loop" Three-Motor, Direct-Drive Tape Deck

MEASUREMENTS & ADJUSTMENTS



Professional Series

RS-1500U MECHANISM SERIES

Information:

The Service Manual for model RS-1500US is in 2 parts: Vol. 1 and Vol. 2.



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SM-RS1500USII
SERVICE MANUAL VOL. 2

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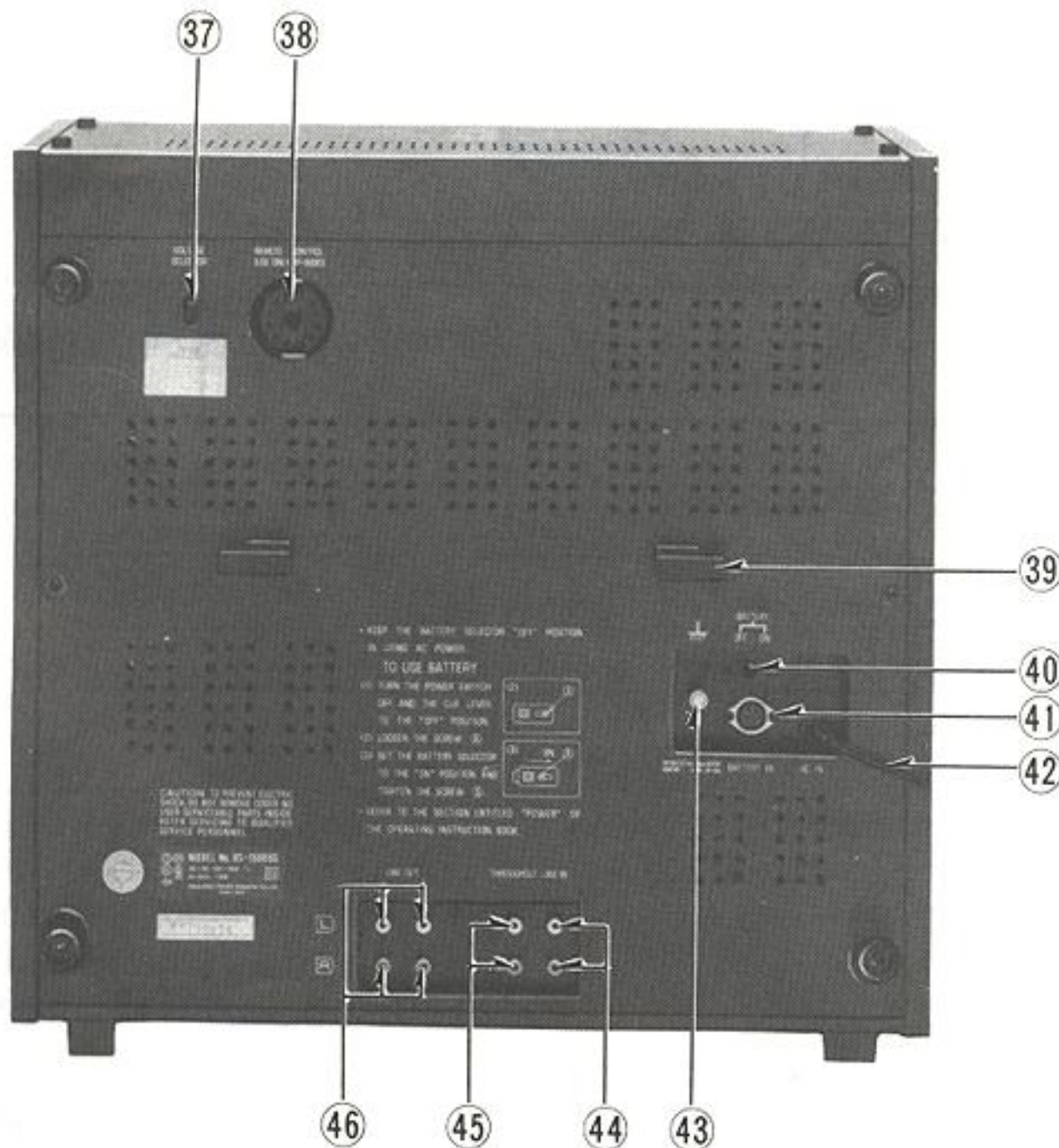
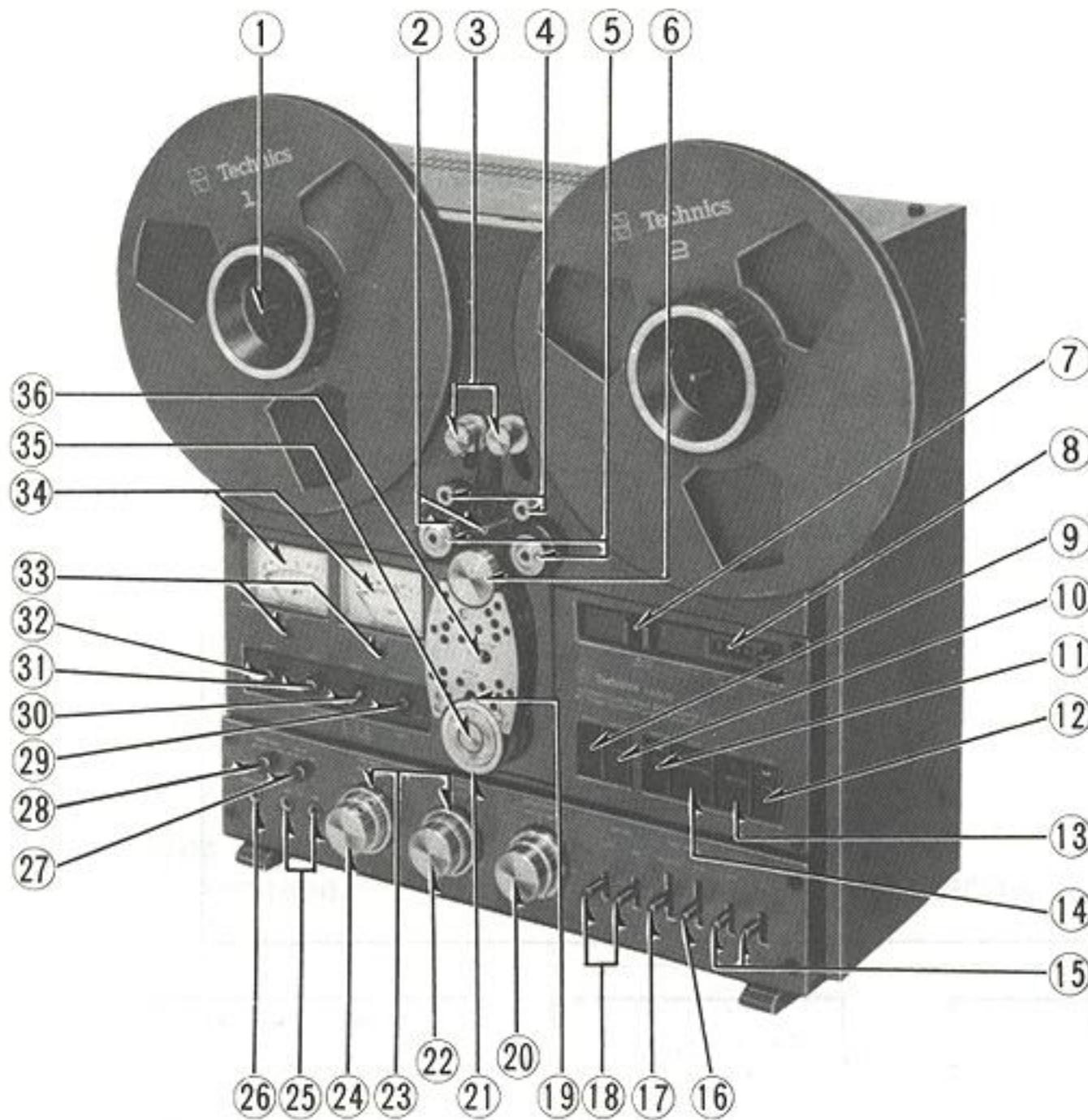
Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Specifications (Catalog specifications for sales)

Track system:	4-heads system 2-track 2-channel recording, playback, erasing and 4-track 2-channel playback
Motors:	3 direct-drive motors system
Capstan;	Quartz control phase-locked DC brushless servo direct-drive motor
Reel tables;	2 tape tension controlled DC brushless direct-drive motors
Reel size:	5" to 10-1/2" (13cm to 26.5cm) outside diameter
Tape tension control:	Automatic control for above size of reel
Tape speed:	15 ips, 7-1/2 ips and 3-3/4 ips (38 cm/s, 19 cm/ and 9.5 cm/s)
Speed deviation:	± 0.1% at 15 ips (38 cm/s)
Speed fluctuation:	0.05% at 15 ips (38 cm/s)
Pitch control:	± 6% (recording and playback)
Wow and flutter:	Recording and playback
15 ips (38 cm/s);	0.018% (WRMS), ± 0.035% (DIN)
7-1/2 ips (19 cm/s);	0.03% (WRMS), ± 0.06% (DIN)
Time counter accuracy:	± 1% at 15 ips (38 cm/s)
Fast winding time:	150 sec. for 2500 ft (1.5 mil to 762m) tape
Auto-Stop sensing:	
End of tape;	Tension roller switches
During running;	Within 3 sec. after accidental stop of takeup reel table
Frequency response:	
15 ips (38 cm/s);	30—30,000 Hz ± 3dB (recording level = - 10dB from 0VU)
7-1/2 ips (19 cm/s);	20—25,000 Hz ± 3dB (recording level = - 20dB from 0VU)
3-3/4 ips (9.5 cm/s);	20—15,000 Hz ± 3dB (recording level = - 20dB from 0VU)
Signal-to-noise ratio:	NAB weighted (185 nWb/m + 6dB)
15 ips (38 cm/s);	60dB
7-1/2 ips (19 cm/s);	60dB
3-3/4 ips (9.5 cm/s);	58dB
Distortion (THD):	Measured via tape at 400 Hz (at any speed) Less than 2% peak level (185 nWb/m + 6dB) Less than 0.8% operating level (0VU)
Channel separation:	Better than 50dB
Erasing ratio:	Better than 65dB (recording level = + 10dB at 1 kHz)
Recording bias:	120kHz
Bias level;	BIAS selector at "1" 90%, BIAS selector at "2" 100%, BIAS selector at "3" 110%
Equalization:	NAB standard Position "2" of "EQ" and "BIS" selector set for Technics RT-10B218 (scotch #207) tape
Recording level	
calibration:	Reference to 185 nWb/m
Inputs:	
MIC;	Unbalanced phone type jack Sensitivity 0.25 mV (- 72dB), input impedance 4.7 K Ω (at 0VU, microphone level control at maximum position) 2.5 mV (- 52dB/4.7 K Ω with 20dB microphone attenuator switch on overload margin 55dB (75dB with 20dB microphone attenuator) Applicable microphone impedance 200 Ω — 10 K Ω
LINE;	Phono type jack Sensitivity 60 mV (- 24dB), input impedance 150 K Ω Overload margin = infinity (line input connected to LINE IN level control before pass through the amplifier)
THROUGH OUT;	Same as LINE IN (connected in parallel to LINE IN)
Outputs:	
LINE;	2 pair of phono type jack Output level 0.55V at 0VU (output level control at "8") 0.77V or more at output level control maximum output impedance less than 3 K Ω Load impedance 22 K Ω over
HEADPHONE;	Stereo phone type jack Output level 80 mV at 0.55V line output, load impedance 8 Ω
Power requirements:	AC 110/125/220/240 V, 50/60 Hz DC 24V, 4.5A (with RP-086 optional battery adaptor)
Power consumption:	120W
Weight:	55 lbs (25 kg)
Dimensions (H x W x D):	17-1/2" x 18" x 10-1/8" (44.6 cm x 45.6 cm x 25.8 cm)

Specifications base on use of Technics RT-10B218 (Scotch #207) tape.
Specifications are subject to change without notice.

LOCATION OF CONTROLS AND COMPONENTS



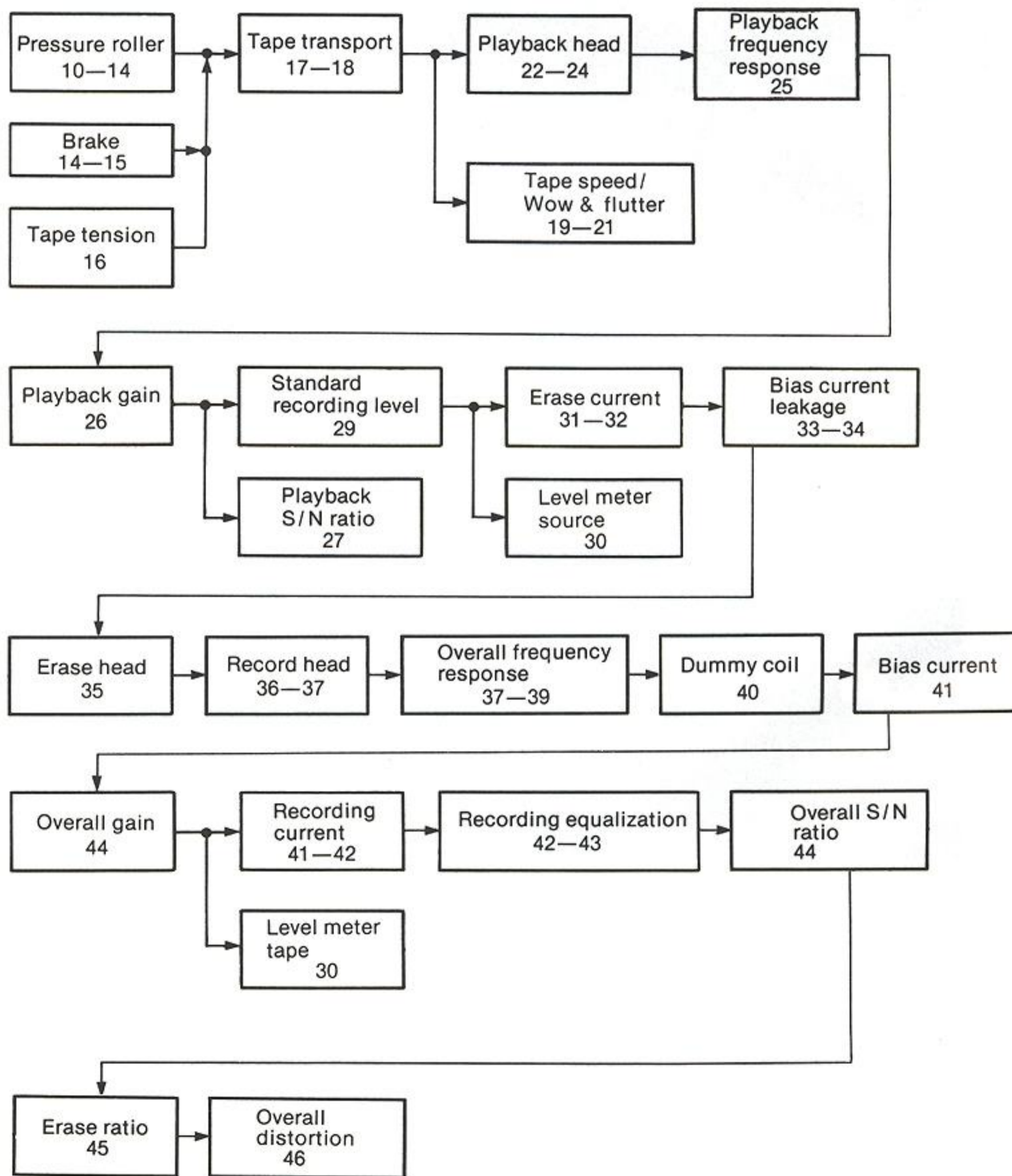
- ① Reel clampers
- ② Guide pin
- ③ Tension rollers
- ④ Tape marker
- ⑤ Double pressure rollers
- ⑥ Capstan
- ⑦ Cue lever/ DC power switch
- ⑧ Timer counter/ Reset button
- ⑨ Record button
- ⑩ Pause button
- ⑪ Rewind button
- ⑫ Fast forward button
- ⑬ Playback button
- ⑭ Stop button
- ⑮ Record mode switches
- ⑯ Bias selector
- ⑰ Equalization selector
- ⑱ Monitor switches
- ⑲ Stroboscope lamp
- ⑳ Output level controls
- ㉑ Reversing roller
- ㉒ Line input level controls
- ㉓ Pre-set markers
- ㉔ Microphone level controls
- ㉕ Microphone jacks
- ㉖ Headphones jack
- ㉗ Meter scale selector
- ㉘ Microphone attenuator switch
- ㉙ Timer start switch
- ㉚ Tape speed selector
- ㉛ Pitch control
- ㉜ Power switch
- ㉝ Level meter zero-point adjustment screws
- ㉞ Level meters
- ㉟ Edit dial
- ㊱ 2, 4-track selector
- ㊲ Voltage selector switch
- ㊳ Remote control connector
- ㊴ Power cord holder
- ㊵ Battery selector
- ㊶ DC-IN connector
- ㊷ Power cord
- ㊸ Ground terminal
- ㊹ Line input jacks
- ㊺ "Through out" jacks
- ㊻ Line output jacks

Fig. 1

BLOCK DIAGRAM OF MEASUREMENTS & ADJUSTMENTS

Before making each measurement and adjustment, be sure that all adjustments of previous steps have been completed.

The figures shown in each block indicate the page on which the adjustment or measurement is explained.



The following chart summarizes the necessary measurement and adjustment of items according to symptoms. Please be sure to refer to this chart when attempting any measurement or adjustment on this unit.

Symptomatic Check List

Symptoms	Check Points	Parts requiring adjustment	Page
Wow and flutter	<ul style="list-style-type: none"> Insufficient pressure between pressure roller and capstan on playback. 	<ul style="list-style-type: none"> Pressure roller/plunger position adjustment Pressure roller pressure measurement. 	10—12 12
A. High wow and flutter.	<ul style="list-style-type: none"> Brakes in contact with supply reel table on playback. 	<ul style="list-style-type: none"> Brakes. 	14—15
B. Longer “Built up time” at 9.5cm/s Tape speed and at changing tape speed.	<ul style="list-style-type: none"> Insufficient control operation of capstan motor on playback. 	<ul style="list-style-type: none"> Measurement of tape speed, wow and flutter. 	19—21
Spoilt tape A. Stretched tape.	<ul style="list-style-type: none"> Tape takeup torque or back tension is too strong on playback. 	<ul style="list-style-type: none"> Tape tension adjustment. 	16
B. Tape with spoilt edges	<ul style="list-style-type: none"> Tape does not travel in center of reel. 	<ul style="list-style-type: none"> Tape transport. 	17—18
	<ul style="list-style-type: none"> Tape does not travel in center of tape guide (A). 	<ul style="list-style-type: none"> Tape transport. 	17—18
	<ul style="list-style-type: none"> Tape does not travel in center of tape guide (C). 	<ul style="list-style-type: none"> Tape transport. 	17—18
	<ul style="list-style-type: none"> Tape does not travel in center of pressure roller. 	<ul style="list-style-type: none"> Pressure roller height adjustment. 	14
Tape travels with cue on even in stop mode.	<ul style="list-style-type: none"> Pressure roller in contact with capstan when cue is on. 	<ul style="list-style-type: none"> Cue lever adjustment. 	12
Low playback sound with cue on.	<ul style="list-style-type: none"> Too big a space between pressure roller and capstan when cue is turned on. 	<ul style="list-style-type: none"> Cue lever adjustment. 	12
Tape stops running during playback.	<ul style="list-style-type: none"> Too strong a pressure between pressure roller and capstan. 	<ul style="list-style-type: none"> Pressure roller pressure adjustment. 	12—13
Tape does not run when PLAY button is again pushed after tape travel has stopped. Tension roller moves up (shut-off condition).	<ul style="list-style-type: none"> Weak brake torque on reel tables at stop 	<ul style="list-style-type: none"> Brakes. 	14—15
Tape in contact with head in stop mode.	<ul style="list-style-type: none"> Tape shifter is positioned behind head surface at stop position. 	<ul style="list-style-type: none"> Stopper position adjustment. 	13

Symptoms	Check Points	Parts requiring adjustment	Page
Level fluctuation	• Playback head position incompletely adjusted.	• Playback heads.	22—23
	• Pressure roller on one side is not in contact with capstan on playback.	• Pressure roller position adjustment.	11
Low level of playback sound.	• Playback head position incompletely adjusted.	• Playback heads.	22—23
	• Insufficient tape shifter position.	• Stopper position adjustment.	13
	• Amplifier playback gain incompletely adjusted.	• Playback gain	23
Poor playback frequency response.	• Playback head position incompletely adjusted.	• Playback heads	22—23
	• Amplifier playback equalizer incompletely adjusted.	• Playback frequency response.	26
Playback S/N ratio.		• Playback S/N ratio. • Playback Head	27 22—23
Poor overall frequency response.	• Poor playback frequency response.	• Playback heads. • Playback frequency response.	22—23 26
	• Record head position incompletely adjusted.	• Record head	36—37
	• Bias current incompletely adjusted.	• Bias current.	41
	• Recording equalizer incompletely adjusted.	• Recording equalization	42—43
	• Too much bias current leakage.	• Bias current leakage.	33—34
When recording, and playing back with REC mode selector off on single channel, playback level lowers.	• Dummy coil incompletely adjusted. • Insufficient overall frequency response at high frequency range when monoral recording (with REC mode selector turned off on signal channel).	• Dummy coil	40
Overall S/N ratio.	• Playback S/N ratio.	• Playback S/N ratio.	27
	• Erasing is incomplete.	• Overall S/N ratio. • Erase head. • Erase current	44 35 31—32
Insufficient overall gain.	• Playback level.	• Playback heads. • Playback gain	22—24 26
	• Standard recording level.	• Standard recording level.	29
	• Recording current.	• Recording current.	41

Symptoms	Check Points	Parts requiring adjustment	Page
Level meter		<ul style="list-style-type: none"> Level meter for source monitor Level meter for tape monitor. 	30
High overall distortion.	<ul style="list-style-type: none"> Poor contact between head and tape. 	<ul style="list-style-type: none"> Playback heads. Erase head. Record head. 	22—24 35 36—37
	<ul style="list-style-type: none"> Bias current incompletely adjusted. 	<ul style="list-style-type: none"> Bias current. Bias current leakage. 	41 33—34
Erase ratio		<ul style="list-style-type: none"> Erase ratio. Erase head. Erase current. 	45 35 31—32

Before measuring and adjusting “Overall frequency response”, “Overall distortion” and “Overall S/N ratio”, confirm that the characteristics of 5 items below are within standard which have much relation to or influence on electrical performances above.

1. Head azimuth adjustment.
2. Bias current.
3. Playback gain.
4. Overall gain.
5. Playback frequency response.

I. TEST INSTRUMENTS

1. Prepare test instruments which are equivalent in accuracy to those shown below.
2. The test instruments should be inspected and corrected by specialists once every 6 months, because a long period of use without maintenance may increase errors in indication.
3. Warm-up the test instruments for 30 minutes and the set to be measured for 10 minutes before taking the measurements. If not, there may arise an error or difference between the initial value and the stabilized value measured after “aging”.
4. Specifications of test instruments.

(1) Audio frequency oscillator

- | | |
|-------------------------------|--|
| a. Oscillation frequency: | 5 Hz—500 kHz (5 ranges) |
| b. Frequency tolerance: | $\pm (3\% + 1 \text{ Hz})$ |
| c. Sine wave | |
| * Output voltage (at 25°C): | 5 Vrms $\pm 10\%$ (without load)
2.5 Vrms $\pm 10\%$ (with 600 Ω load) |
| * Output frequency response: | Within $\pm 0.2 \text{ dB}$, 20 Hz—20 kHz
Within $\pm 0.5 \text{ dB}$, 5 Hz—500 kHz |
| * Distortion factor: | Not more than 0.5%, 200 Hz—20 kHz
Not more than 0.5%, 5 Hz—500 kHz |
| * Output impedance: | 600 Ω unbalanced, within $\pm 15\%$ |
| * Output attenuator: | 0 dB, 20 dB, Error: within $\pm 0.2 \text{ dB}$ |
| d. Temperature in use of set: | Temperature = 0—40°C, Humidity = 90% or less |



(2) Automatic-spot distortion meter (with vacuum tube voltmeter)

- A. Distortion factor measurement
- a. Frequency (fundamental wave): 400 Hz, 1 kHz \pm 10%
 - b. Measurement: 0.1—100% (6 ranges)
 - c. Input: 50 mV—50 V
 - d. Fundamental wave attenuation: 60 dB or more
- B. Level measurement
- a. Measurement: 1 mV (–60 dB)—30 V (30 dB) (9 ranges)
 - b. Frequency response (1 kHz basis): 20 Hz—100 kHz \pm 0.3 dB
 - c. Input impedance: 1 M Ω \pm 10%, less than 50 pF
 - d. Error in indicated value: Within \pm 3% at 1 kHz
- C. Output
- a. Frequency response: 10 Hz—100 kHz \pm 1 dB
100 kHz—1 MHz \pm 3 dB
 - b. Output voltage: 1 V_{rms} \pm 10% (1 kHz sine wave)



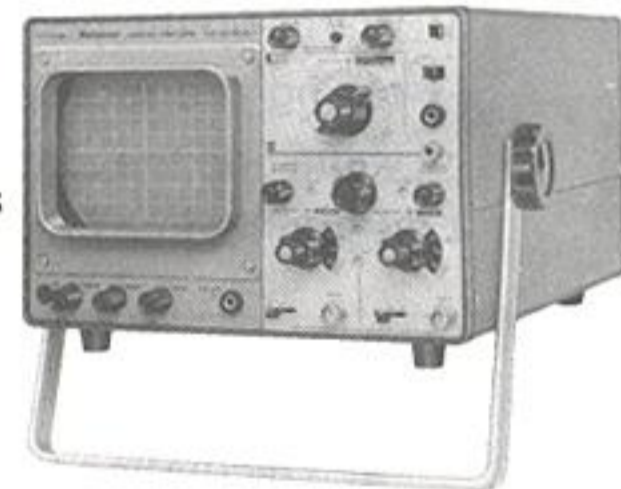
(3) Attenuator

- a. Input impedance: 600 Ω unbalanced
- b. Maximum attenuation: 121 dB
- c. Minimum attenuation: 0.1 dB



(4) Dual trace oscilloscope

- a. Cathode ray tube: 8 \times 10 DIV (1 DIV \doteq 9.5 mm)
- b. Vertical axis
 - * Input sensitivity: 10 mV/DIV—5 V/DIV in 9 steps
 - * Frequency range: DC—7 MHz
 - * Transient time: 50 ns.
 - * Input impedance: 1 M Ω , 35 pF.
- c. Horizontal axis
 - * Sweep speeds: 0.5 S/DIV—0.5 S/DIV in 19 steps



(5) Digital electronic counter

- a. Number of figure: 4 (decimal system)
- b. Input sensitivity: 100 mV_{rms}
- c. Input impedance: 1 M Ω , 40 pF
- d. Frequency measurement range: 10 Hz—100 kHz
- e. Counting time: 0.1, 1, 10 s



(6) Wow meter

- | | |
|-------------------------------------|--|
| a. Measured center frequency range: | 3 kHz \pm 4% |
| b. Input level range: | 30 mV—3 V |
| c. Input impedance: | About 50 K Ω unbalanced |
| d. Measurement: | 0.01—3% (5 ranges) |
| e. Indicator error: | Maximum error in indicated value \pm 5% in each range. |
| f. Frequency response: | Conforming to weighting curve characteristics (WRMS), JIS C5551.
Flat characteristics (RMS) 0.5—200 Hz, within -3 dB (4 Hz basis) |
| g. Meter indication system: | Effective value indication, conforming to JIS C5551. |
| h. Meter response characteristic: | About 5—7 sec. |
| i. Oscillation frequency: | 3 frequencies (3 kHz, 3 kHz \pm 3%) |
| j. Temperature range: | 0—40°C |



II. MEASUREMENT CONDITIONS

1. Standard measurement conditions

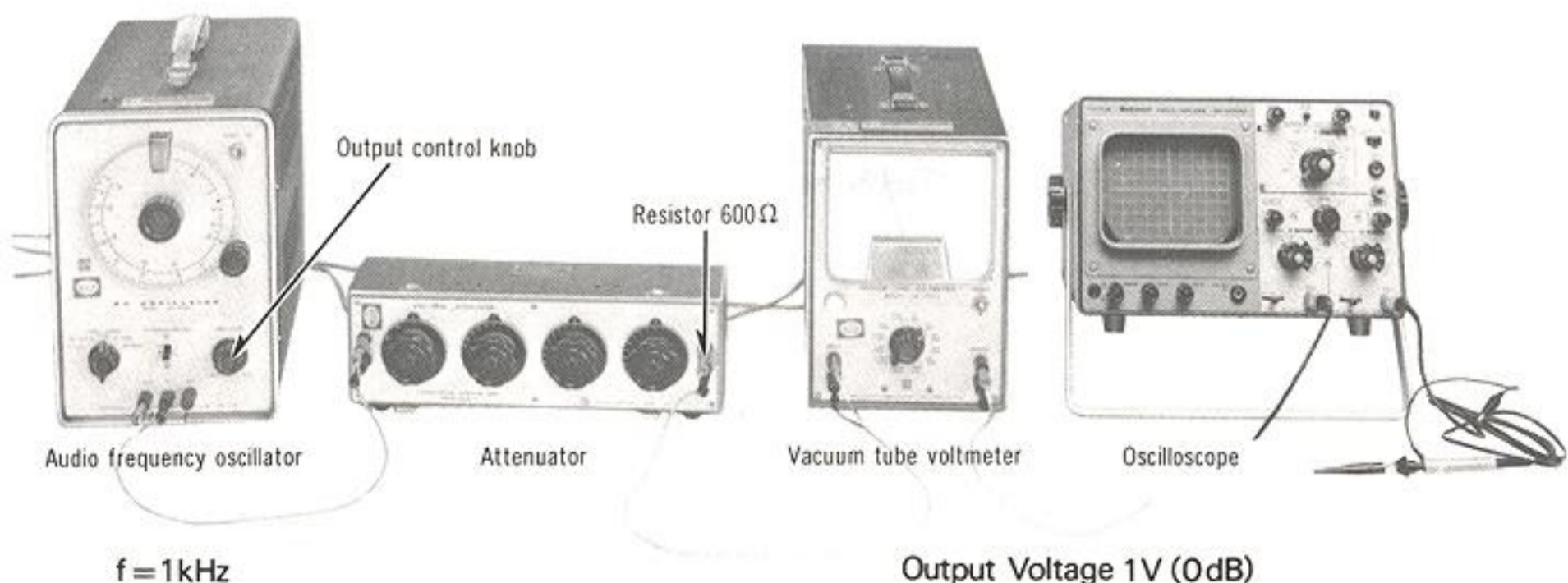
- * Ambient temperature: 10—30°C (50—86°F)
- * Ambient humidity: 30—90% RH
- * Power voltage accuracy: \pm 3%

2. Position of tape recorder

- * When measuring, place the unit under test in a horizontal position.

3. Oscillator output voltage adjustment

- * Connect the equipments as shown in the following and adjust the oscillator output control for 1 V ($f = 1$ kHz) through the attenuator while keeping the attenuator at 0 dB.
- * When supplying a signal to the tape recorder amplifier, adjust the input level using the attenuator.



III. TEST TAPE

Test tape life

The more frequently the test tape is used, the more the tape characteristics will deteriorate (e.g. lowering of recorded level, worsening of frequency response particularly in high-frequency range, and an increase in wow due to tape elongation) until measured values become unreliable. Even in such a case when a tape is not used, but stored, for a long period of time, tape shows deterioration in performance because of self damagenetization due to storage conditions, etc.

Please refer to the tape life specification and take care not to use a tape longer than its rated life when servicing.

Frequency of use: Not more than 20 times for each tape length.

Storage period: Not more than 60 months.

* Test tape

PARTS NO.	PARTS NAME	SPECIFICATIONS	REMARKS
QZZOF380EX	Standard recording level, azimuth and frequency response tape		<ul style="list-style-type: none"> • Tape speed: 38 cm/s • Full track: • 400 Hz 0 dB, • 20kHz—31.5 Hz - 10dB
QZZOF190EX	Standard recording level, azimuth and frequency response tape		<ul style="list-style-type: none"> • Tape speed: 19 cm/s • Full track: • 400 Hz, 0 dB • 16kHz—31.5 Hz - 10dB
QZZOW380EX	Wow and tape-speed tape		<ul style="list-style-type: none"> • Tape speed: 38 cm/s • Full track: 8 (min) • 3kHz 0dB
QZZOW190EX	Wow and tape-speed tape		<ul style="list-style-type: none"> • Tape speed: 19 cm/s • Full track: 8 (min) • 3kHz 0dB
QZZORA218	Reference blank tape		<ul style="list-style-type: none"> • Unrecorded tape (550 m)

1. MECHANISM

[1] Pressure Roller

Make the following checks/adjustments if the left and right pressures are different, or if any other replacement related to pressure rollers is made.

- [A] Pressure Roller Position Adjustment
- [B] Cue Lever Adjustment
- [C] Pressure Roller/Plunger Position Adjustment
- [D] Stopper Position Adjustment
- [E] Adjustment of Tape Travel to Pressure Roller Center
- [F] Pressure Roller Pressure Measurement/Adjustment

For adjustment of parts related to pressure rollers:

- Remove top cover, and rear cover.
- Remove power-supply transformer section.

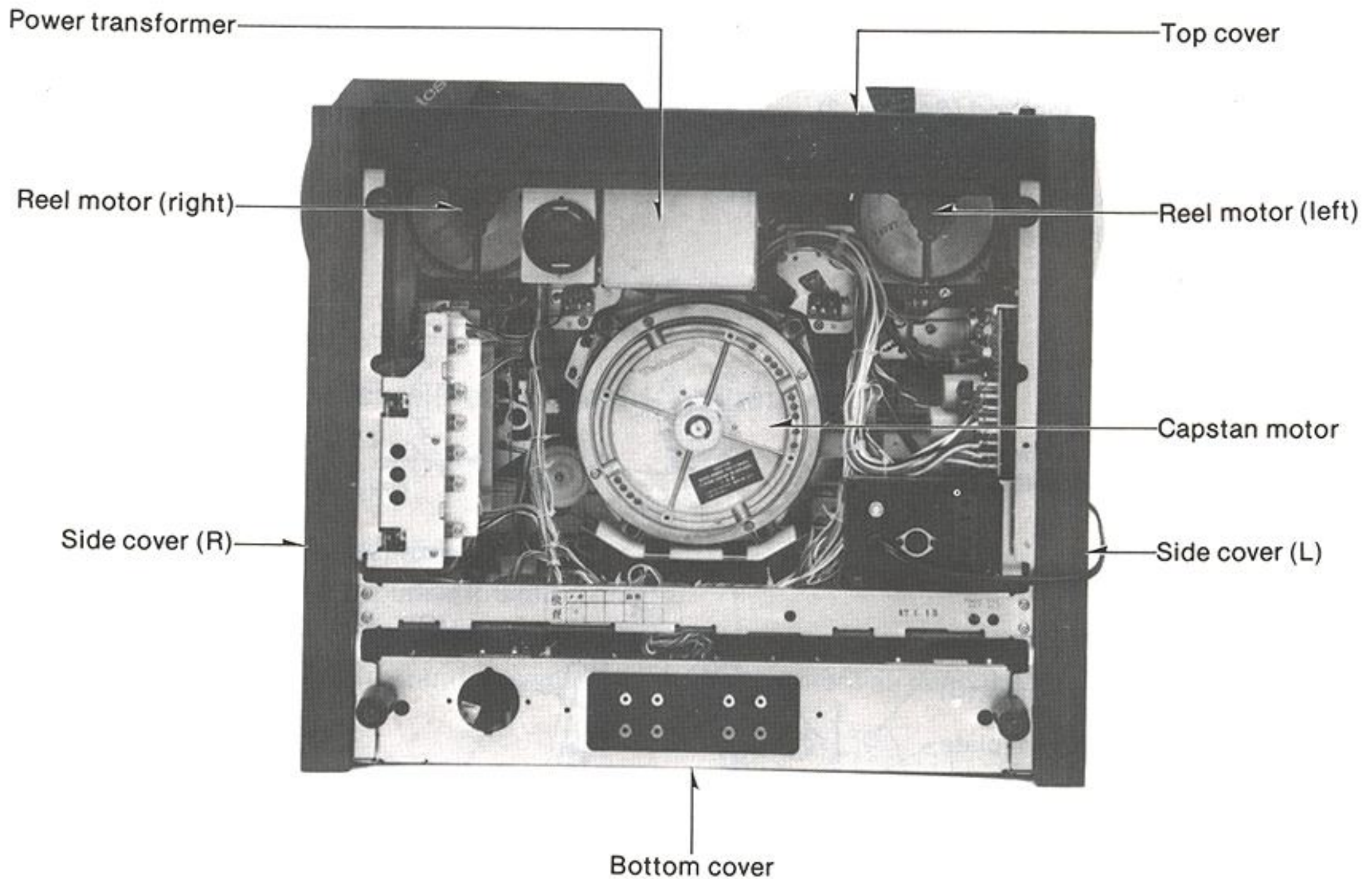


Fig. 1

[A] Pressure Roller Position Adjustment

The pressure rollers must be symmetrical left and right with relation to the capstan.

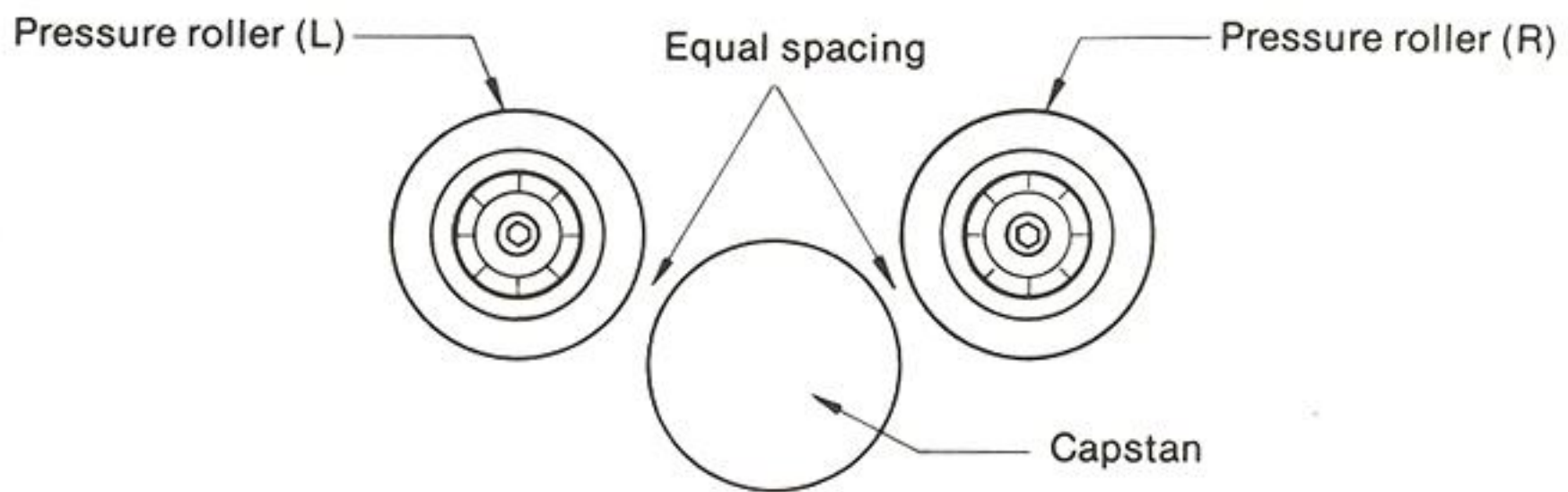


Fig. 2

Checking method (See fig's. 2, and 3)

- (1) Pull control plate upward by hand, and confirm that both pressure rollers contact capstan simultaneously.
- (2) If contact is not simultaneous, make re-adjustment.

Adjustment method (See fig. 3)

- (1) Loosen adjustment screws (A) and (B), move control plate to left or right so that pressure rollers are symmetrical to capstan.
- (2) Re-tighten screws (A) and (B).

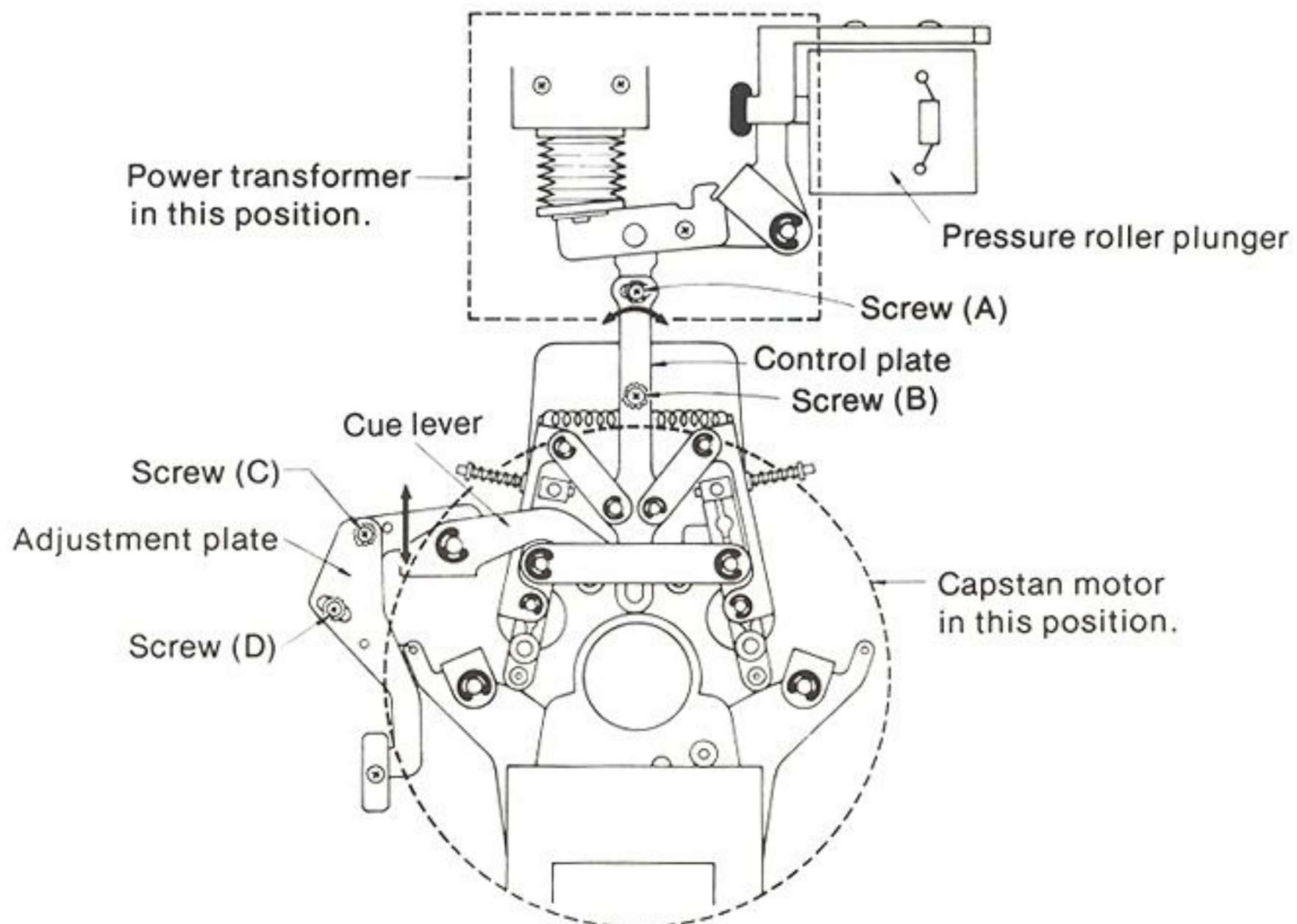


Fig. 3

[B] Cue Lever Adjustment

The purpose of the cue lever adjustment is to adjust the space between the capstan and both pressure rollers.

Checking method (See fig. 4)

- (1) Set cue button (on front of unit) to ON position and confirm that approx. 1 mm of space is left between capstan and pressure rollers.
- (2) If it is not, make re-adjust.

Adjustment method (See fig's. 3 and 4)

- (1) Loosen screws (C) and (D).
- (2) Set cue button (on front of unit) to "ON" position.
- (3) Adjust setting position of adjustment plate on cue lever so that l_1 and l_2 are about 1 mm, and tighten screws (C) and (D).

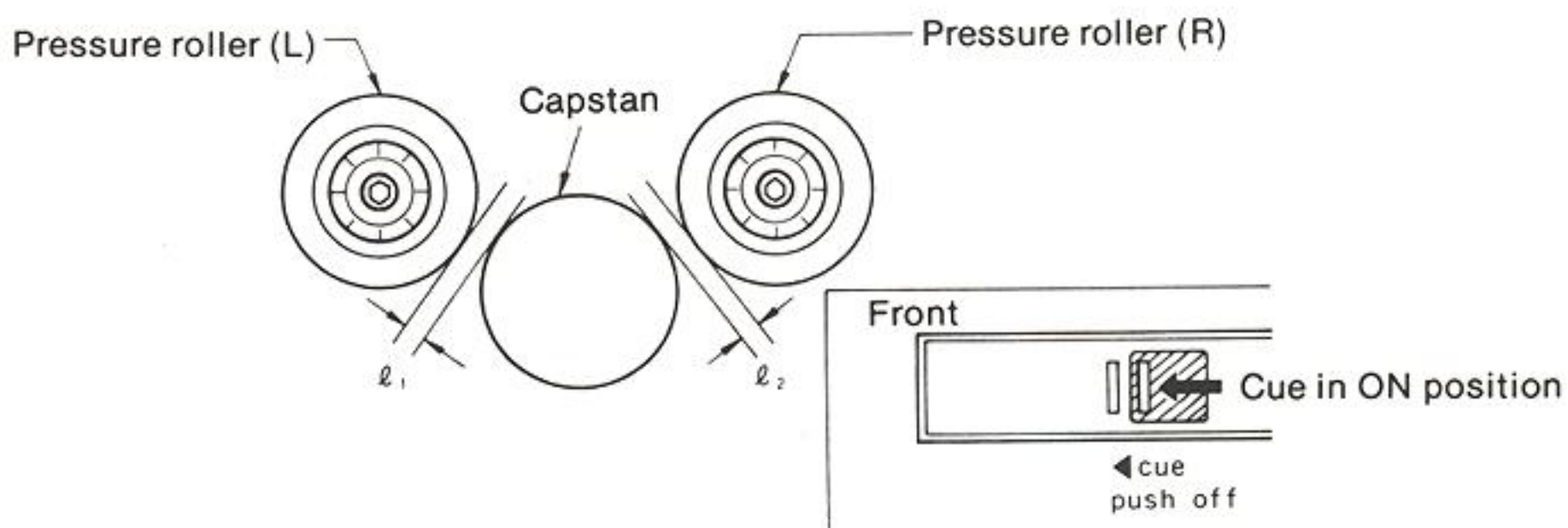


Fig. 4

[C] Pressure Roller Pressure Measurement / Adjustment

Pressure roller pressure: 900 ± 100 gr.

Checking method

- (1) Place unit in playback mode.
- (2) As shown in figure 5, pull with spring gauge.
- (3) Measure tension at moment when pressure rollers move away from capstan.
- (4) If tension is not within standard value, make readjustment as described in item [D].

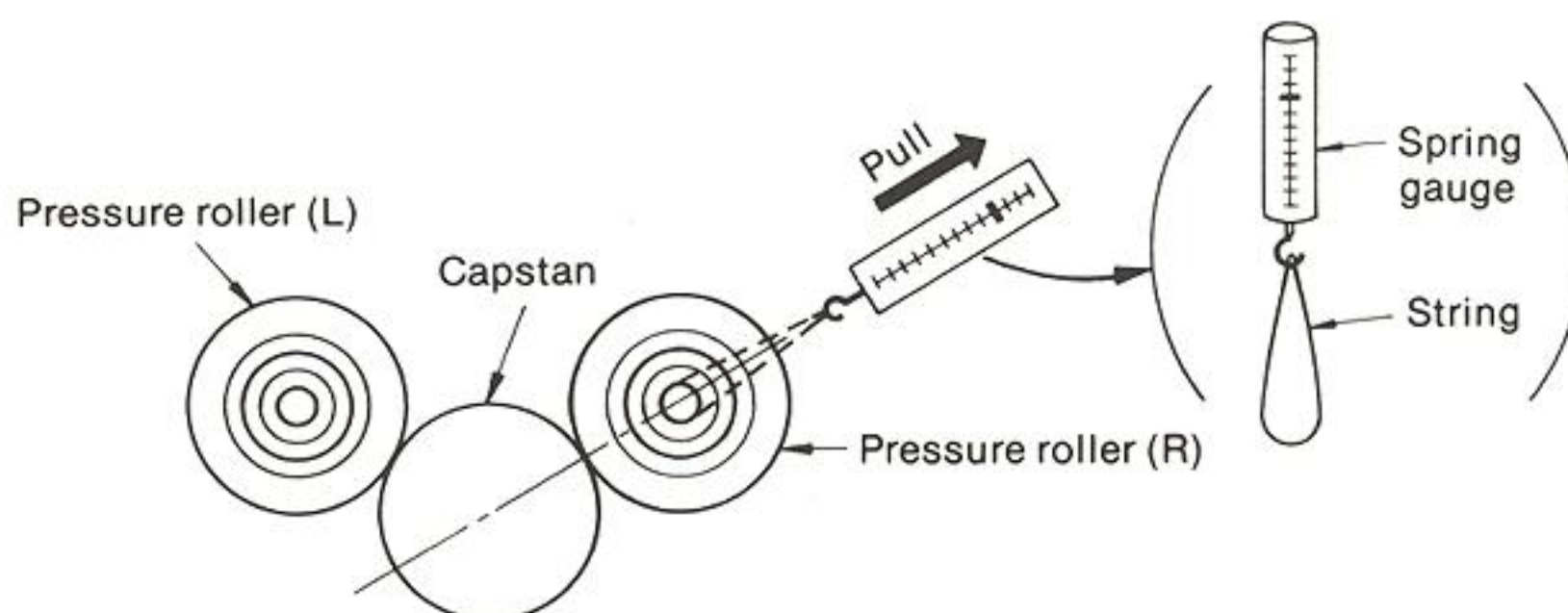


Fig. 5

[D] Pressure Roller/Plunger Position Adjustment (See figure 6.)

This plunger position is adjusted to obtain the specified pressure of pressure roller.

- (1) Remove screws (E) and (F), and remove stopper.
- (2) Loosen screws (G) and (H).

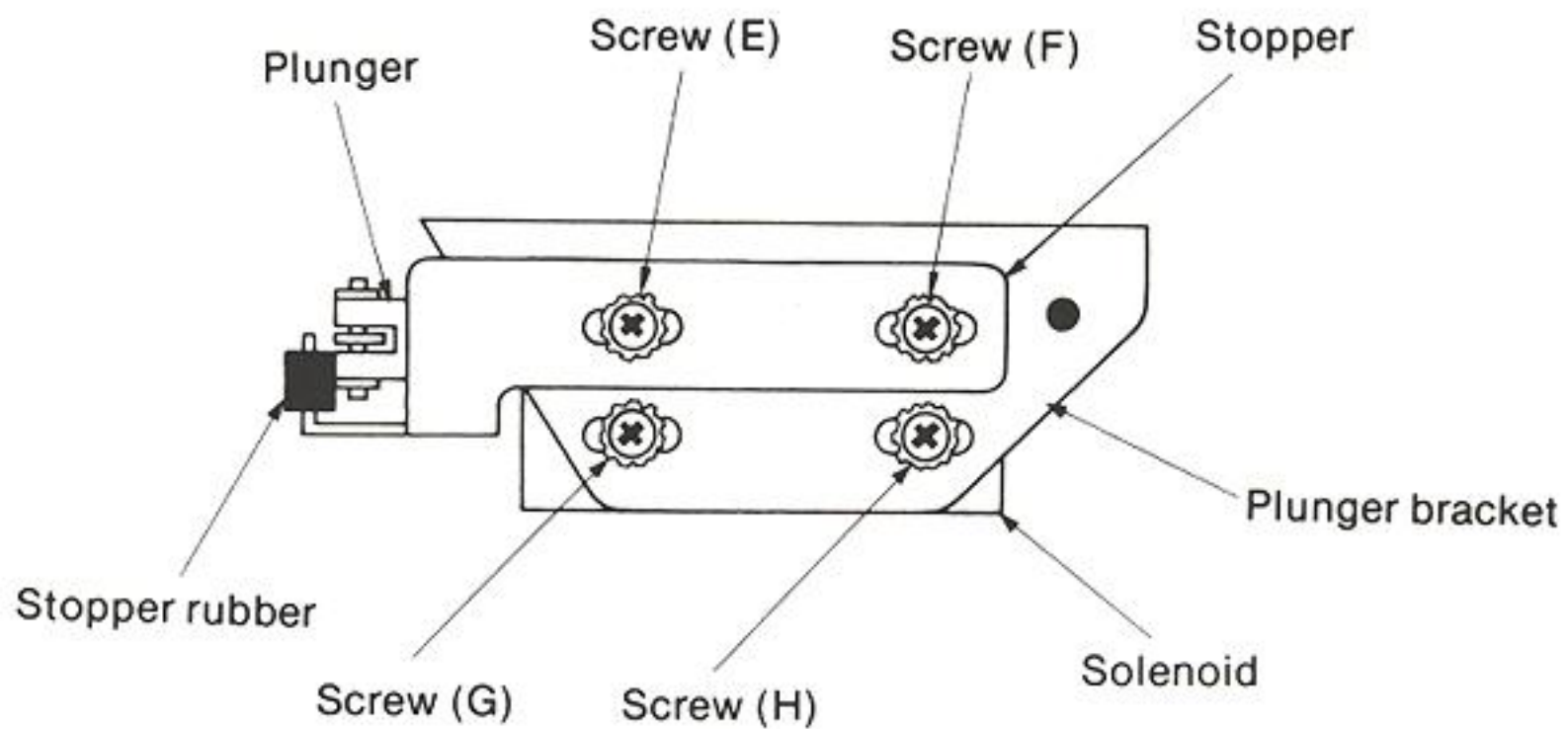


Fig. 6

- (3) With the plunger pushed all the way into the solenoid, move the plunger in the direction shown by the arrow in figure 7.
- (4) When it is moved, the pressure rollers will move closer to the capstan.
- (5) Move the plunger in the direction of the arrow to a point about 1 mm beyond where the pressure rollers contact the capstan, and then secure the solenoid.

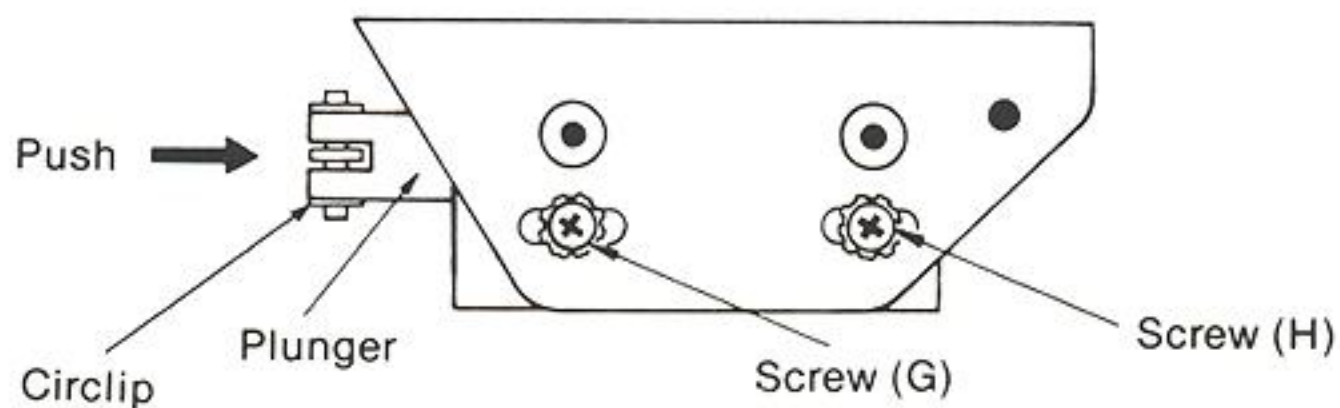


Fig. 7

[E] Stopper Position Adjustment

The stopper is used to match the timing of other mechanisms with the start of tape movement.

- (1) With the stopper rubber piece and plunger pushed (in direction of arrow) 1—1.5mm beyond where they come into contact, tighten screws (E) and (F).

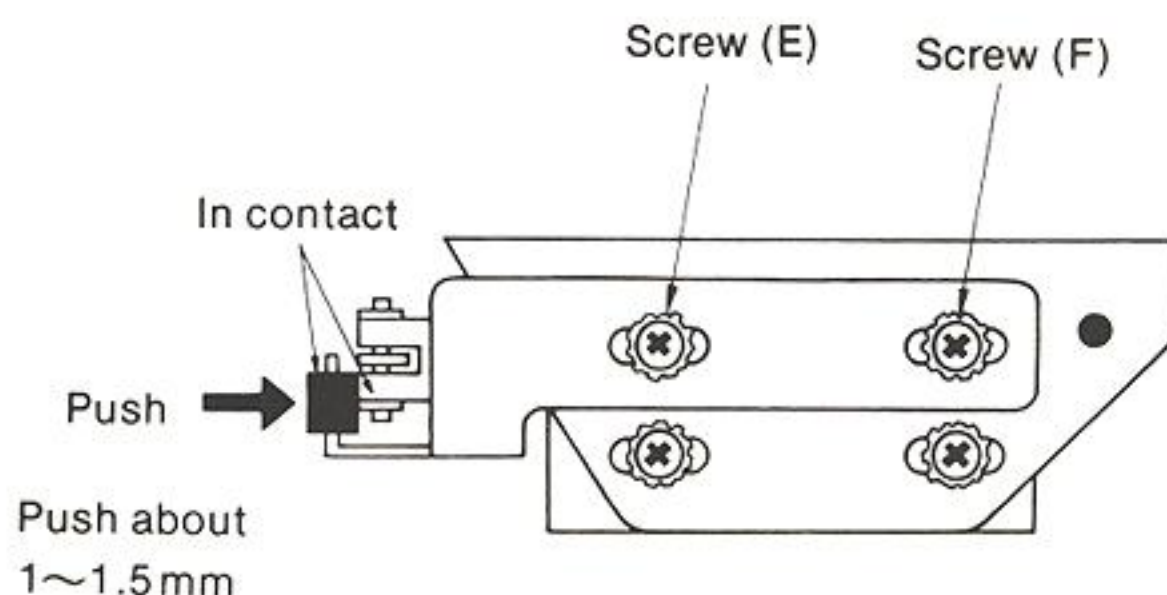


Fig. 8

[F] Pressure Roller Height Adjustment

To make tape movement come to the center of the pressure rollers.

- (1) Thread tape; place unit in playback mode.
- (2) Check whether or not tape movement is at center of pressure rollers.
- (3) If tape movement is too high or too low, adjust the number of washers shown in figure 9.

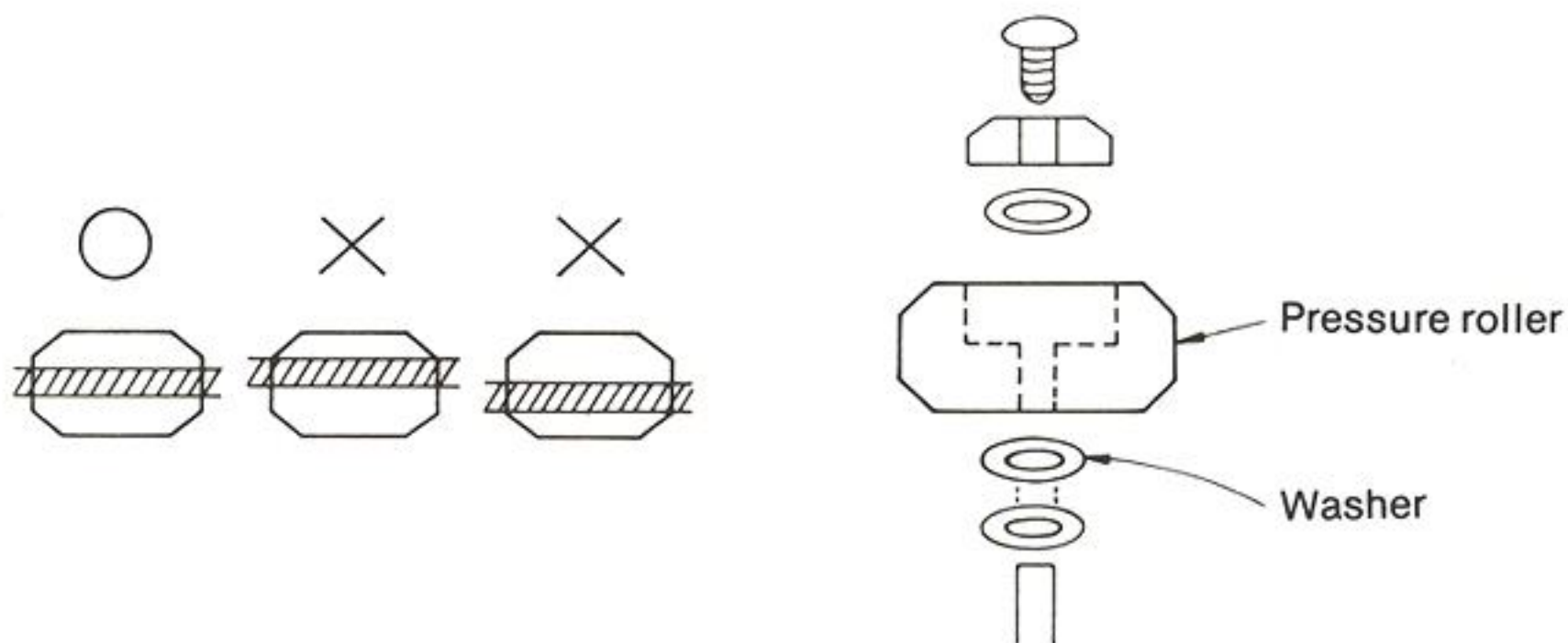


Fig. 9

[2] Brakes

Make the following checks/adjustment if any braking effect is poor, or if any replacement related to the brakes is made.

Note that the rotor section of the reel motors should be cleaned with alcohol before making adjustment.

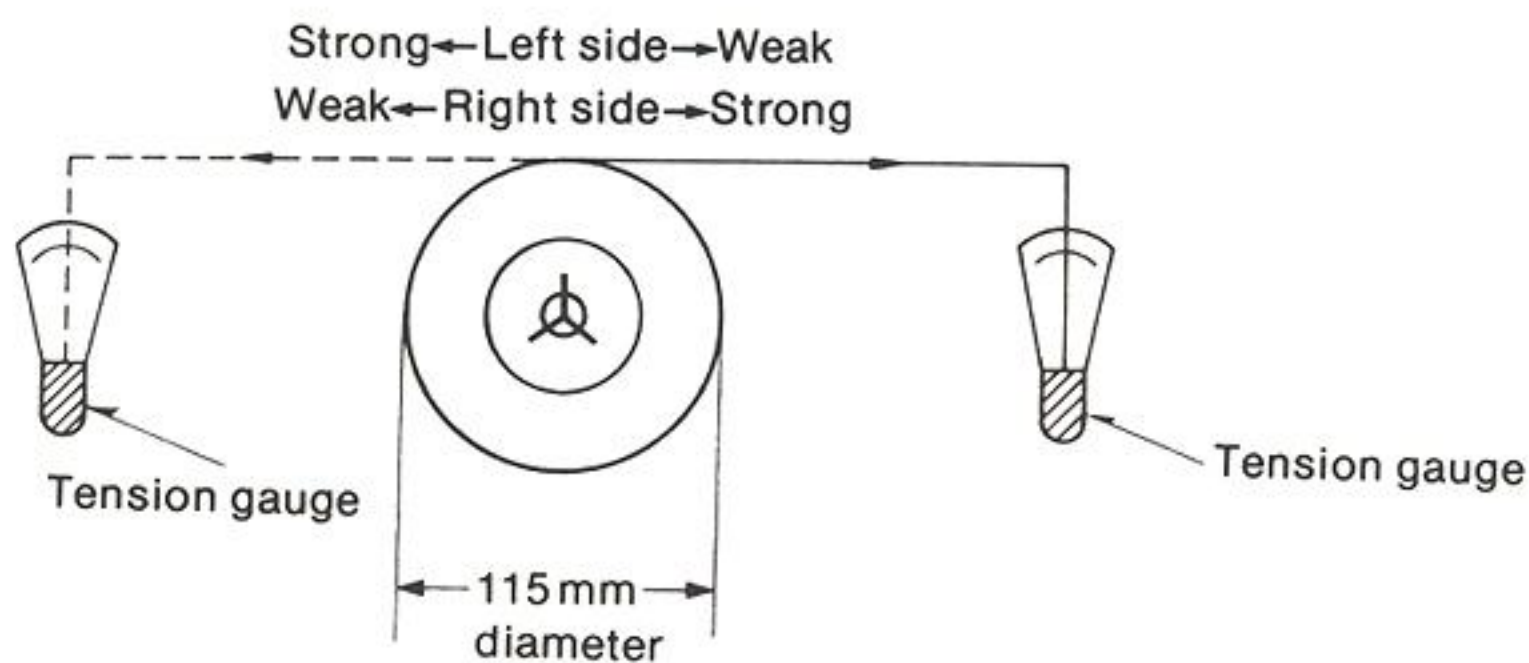


Fig. 11

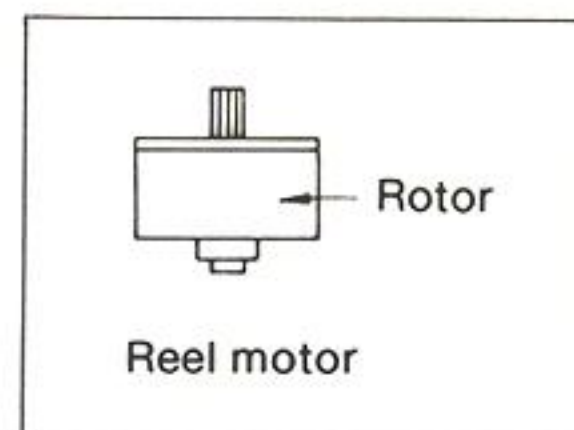


Fig. 10

Braking force differs depending upon direction. For both the take-up side and the supply side:

Strong direction: 450 ± 70 gr

Weak direction: 140 ± 25 gr

Measurement

- (1) Attach the tension gauge to the end of tape wound with 115 mm diameter on a reel.
- (2) With the unit in stop mode, measure the tension while pulling in the direction of the arrow.

Adjustment

If measured value is not within standard value, or if plunger, brake, etc. are replaced, adjust as described below.

- (1) Loosen the plunger bracket screws (I) and (J).
- (2) As shown in figure 12 (for right side) and figure 13 (for left side), secure the bracket so that the space between the pin and bracket is 1—1.5 mm.

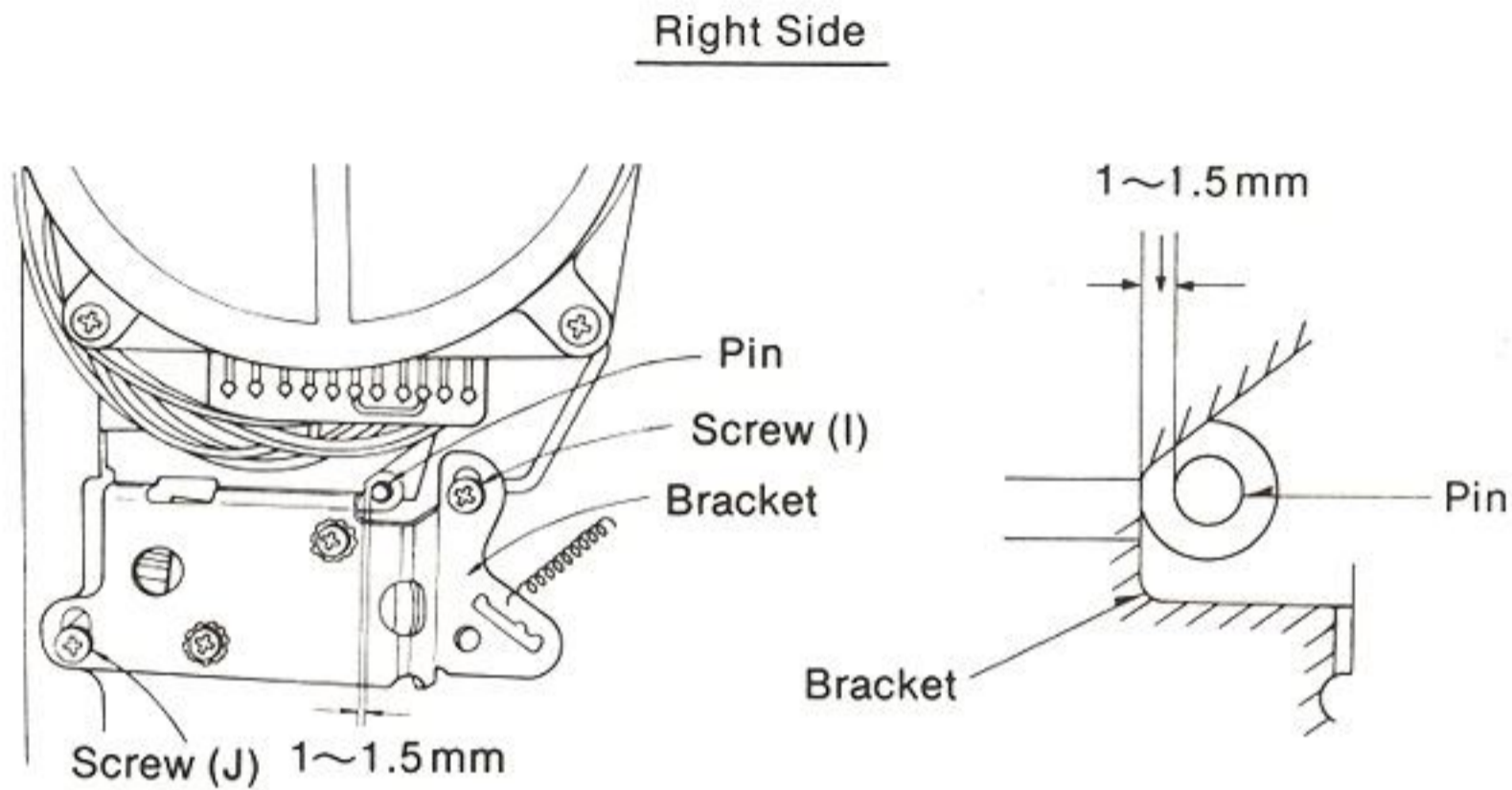


Fig. 12

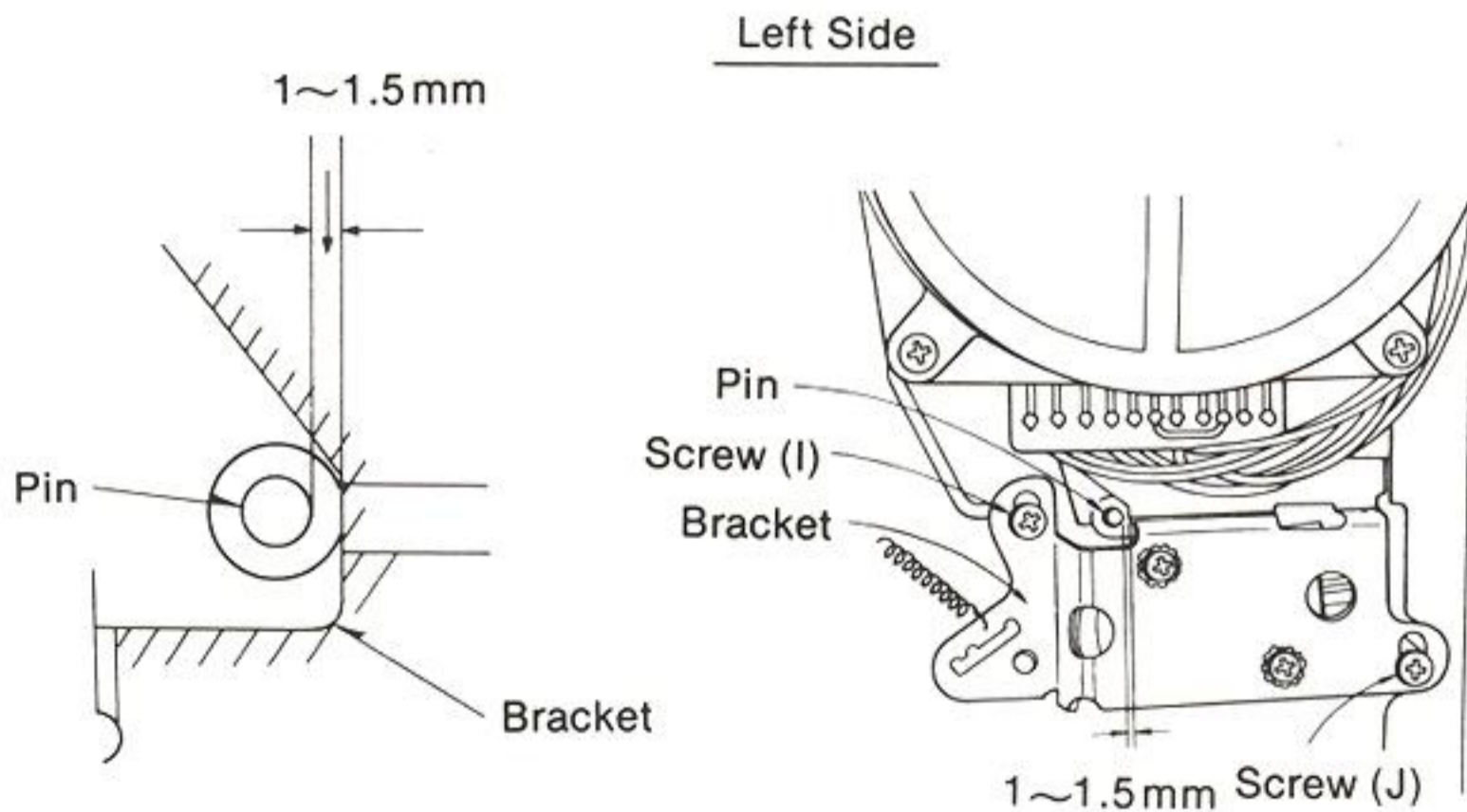


Fig. 13

- * For replacement of plungers, it will be necessary to remove either the reel-drive circuit board (for the right plunger) or the power-supply circuit board (for the left plunger) after remove the side covers.

[3] Tape Tension Adjustment

Tape tension during playback mode:

Takeup torque: 65 ± 5 gr

Back tension: 75 ± 5 gr

Simple Method

- (1) Install a full wound tape (10" or 7").
- (2) Set tape-speed selector to 19 cm/s.
- (3) Connect a VTVM to terminal IT (for take-up torque) or IS (for back tension) on reel-drive circuit board as shown in fig. 14.
- (4) Playback the tape about its middle.
- (5) At this time, voltage at each terminal;

	IT	IS
with 10" reel tape	0.31 V	0.21 V
with 7" reel tape	0.21 V	0.14 V

- (6) If there is a large deviation, adjust;
 - IT terminal voltage: with VR802
 - TS terminal voltage: with VR801

Reel Drive Circuit Board

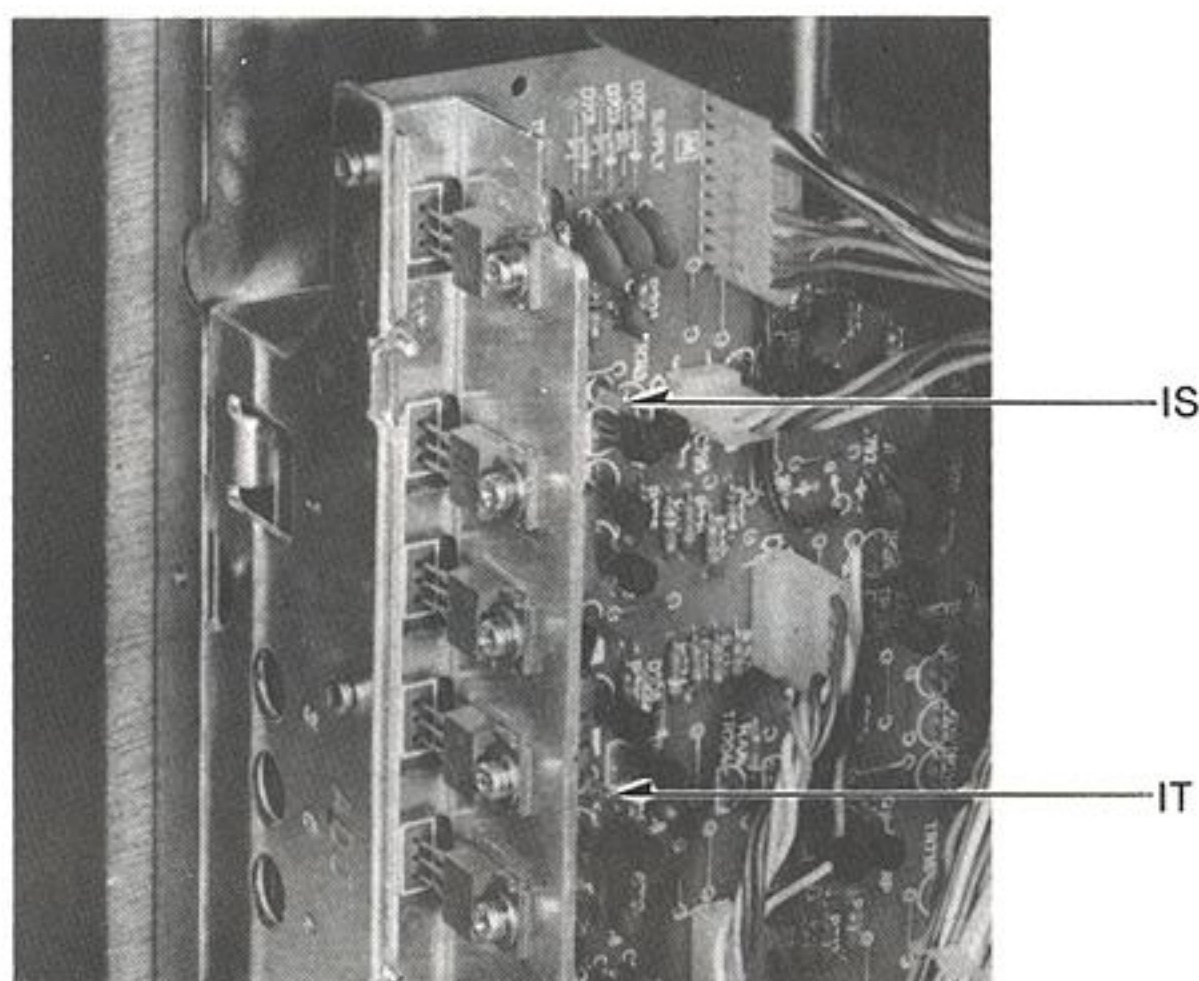


Fig. 14

Ordinary Method

Use a tension analyzer, as shown in figure 15.

- (1) Thread a 10" reel of tape, and begin playback.
- (2) Check whether standards described above are satisfied.
- (3) If standards are not satisfied, adjust:
 - Take-up side with VR802
 - Supply side with VR801
- (4) Confirm the tension for each tape speed.

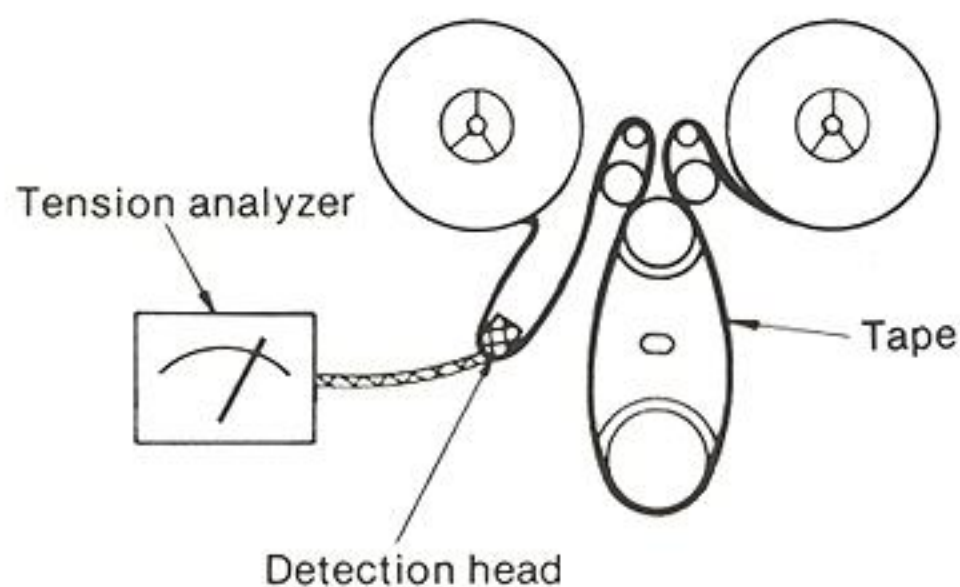


Fig. 15

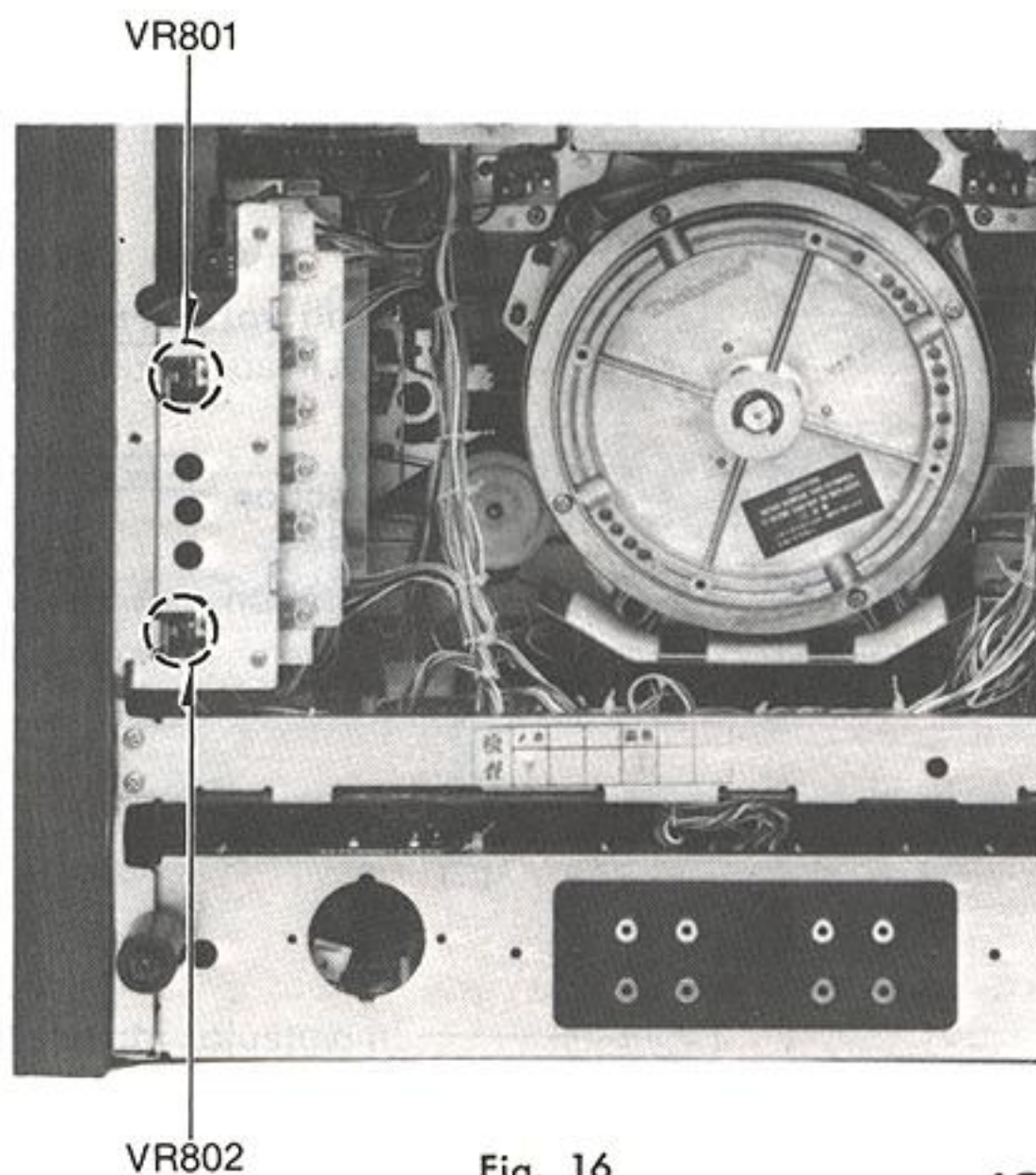


Fig. 16

[4] Tape Transport

For adjustment of the tape transport section, it is necessary to adjust the following parts.

Be sure that the moving tape does not curl at the tape guides, etc., and that the tape moves at their center.

- (A) Tension Rollers
- (B) Reel Tables
- (C) Guides

[A] Tension Roller Height Adjustment

To make the tape move at the center of the tension roller.

- If the tape moves up and down as it passes over the tension roller, adjust the number of washers shown in figure 17.

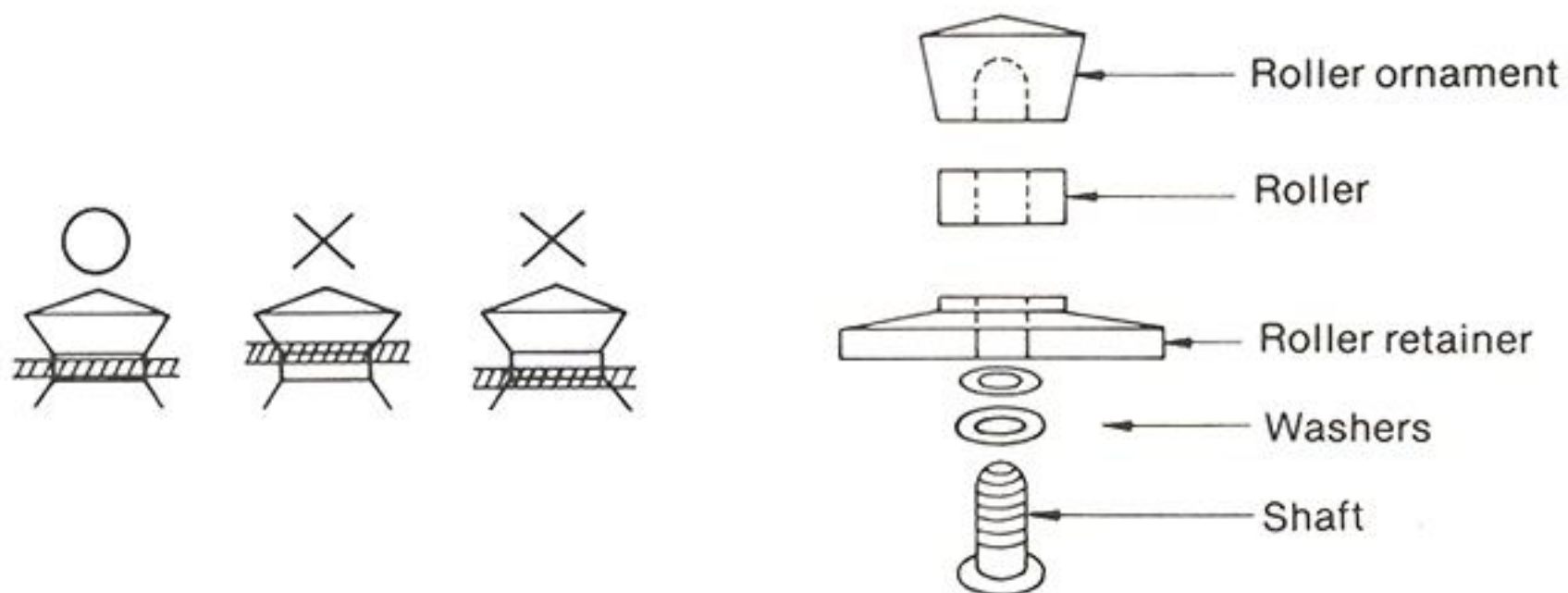


Fig. 17

[B] Reel Table Height Adjustment

- (1) Loosen a nut.
- (2) Adjust screw so that the tape moves at center of a reel and is wound on the center of the reel.

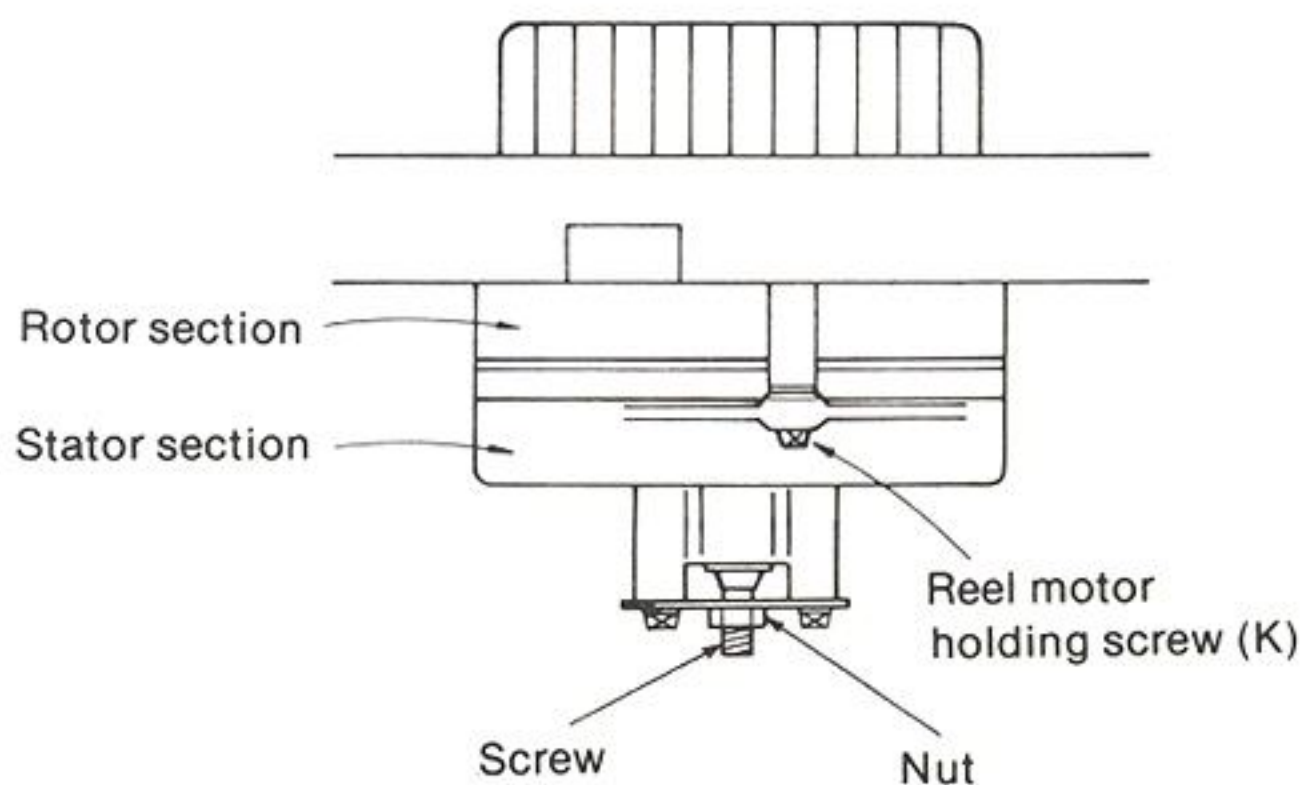


Fig. 18

[C] Tape Guide Adjustment

Six tape guides are used. As shown in figure 19, they are divided into 3 groups (A, B and C). Of these, tape guides (B) are fixed, and thus become the standard for tape movement.

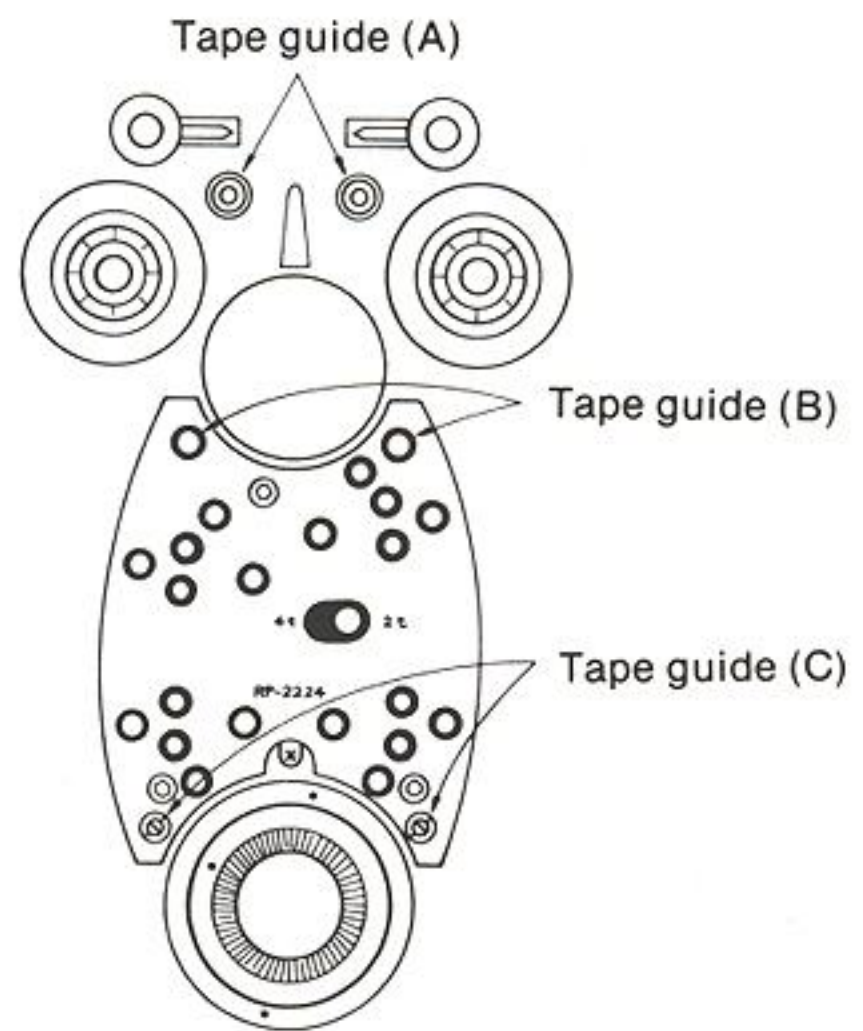


Fig. 19

Adjustment of Tape Guides (A) (Refer to figure 20.)

- (1) Loosen the guide set screw.
- (2) Begin tape movement, and turn tape guides so that tape is at center of guide (B).
- (3) After adjustment, tighten the guide screw.

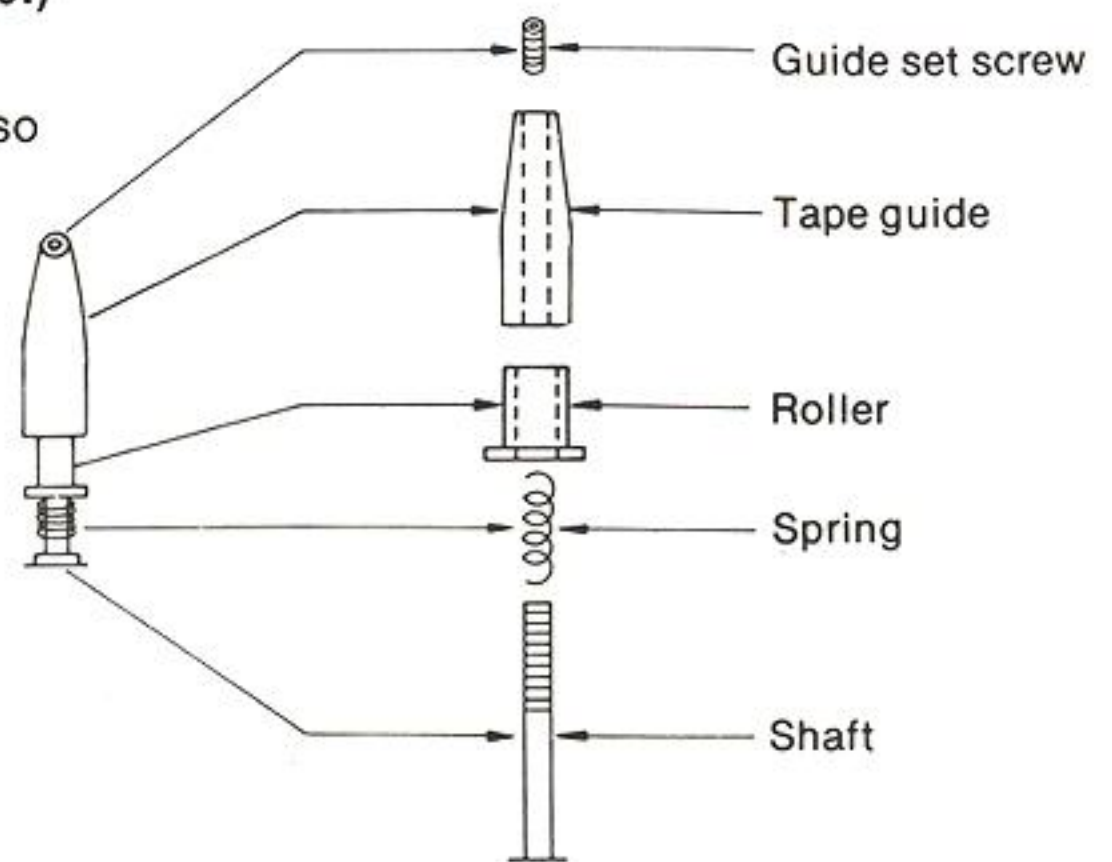


Fig. 20

Adjustment of Tape Guides (C)

- (1) Loosen the guide nut.
- (2) Adjust the guide so that tape is at center of guide.

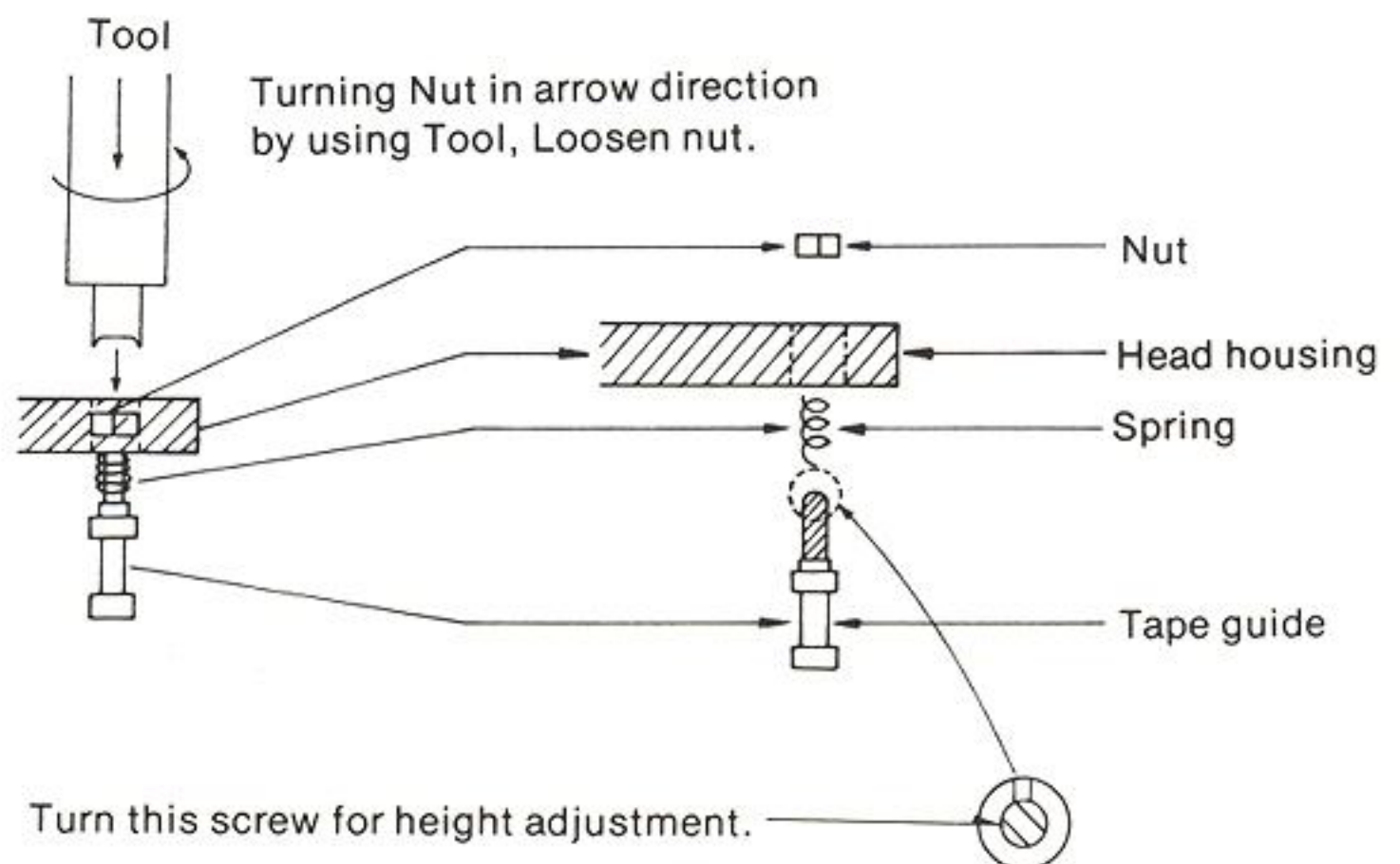


Fig. 21

[5] Measurement of Tape Speed, Wow and Flutter

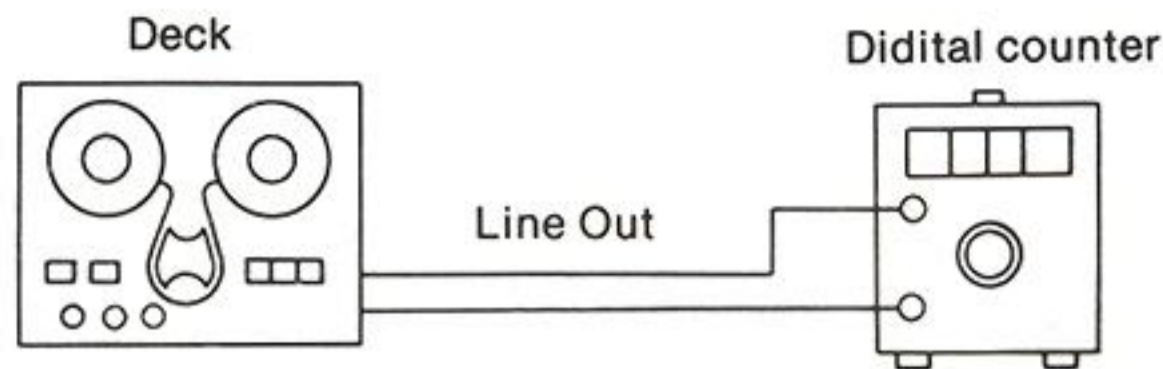


Fig. 22

Tape Speed (cm/s)	Speed Deviation $\frac{f-3000}{3000} \times 100\%$	Speed Fluctuation $\frac{f_1-f_2}{3000} \times 100\%$	Wow & Flutter		Pitch Control (%)
			JIS WRMS (%)	DIN W/P-P (%)	
38	± 0.10	0.10	0.018	± 0.035	± 6
19	± 0.15	0.15	0.03	± 0.080	

[A] Tape Speed Measurement

- (1) Connect a digital counter to line output jack.
- (2) Set tape speed selector to 38 cm/s.
- (3) Set pitch control to OFF position.
- (4) Thread test tape QZZOW380EX, and begin playback.
- (5) Read the playback output frequency (f) with digital counter.
- (6) Tape speed deviation is expressed by the following formula.

$$\text{Speed Deviation} = \frac{f-3000}{3000} \times 100(\%)$$

Note: Use test tape QZZOW190EX for 19 cm/s tape speed, measurement method is by the procedure described above.

[B] Pitch Control Adjustment

- (1) Connect a digital counter to line output jack.
- (2) Set tape speed selector to 38 cm/s.
- (3) Set pitch control to ON position.
- (4) Set pitch control knob to center position.
- (5) Playback test tape QZZOW380EX.
- (6) Read the output frequency, and confirm that output frequency is 3000 Hz.
- (7) If it is not 3000 Hz, adjust VR904 so that it becomes 3000 Hz.
- (8) After adjustment described above, turning pitch control to maximum and minimum position, confirm that more than 3180 Hz is obtained at its maximum position and less than 2820 Hz at its minimum position.

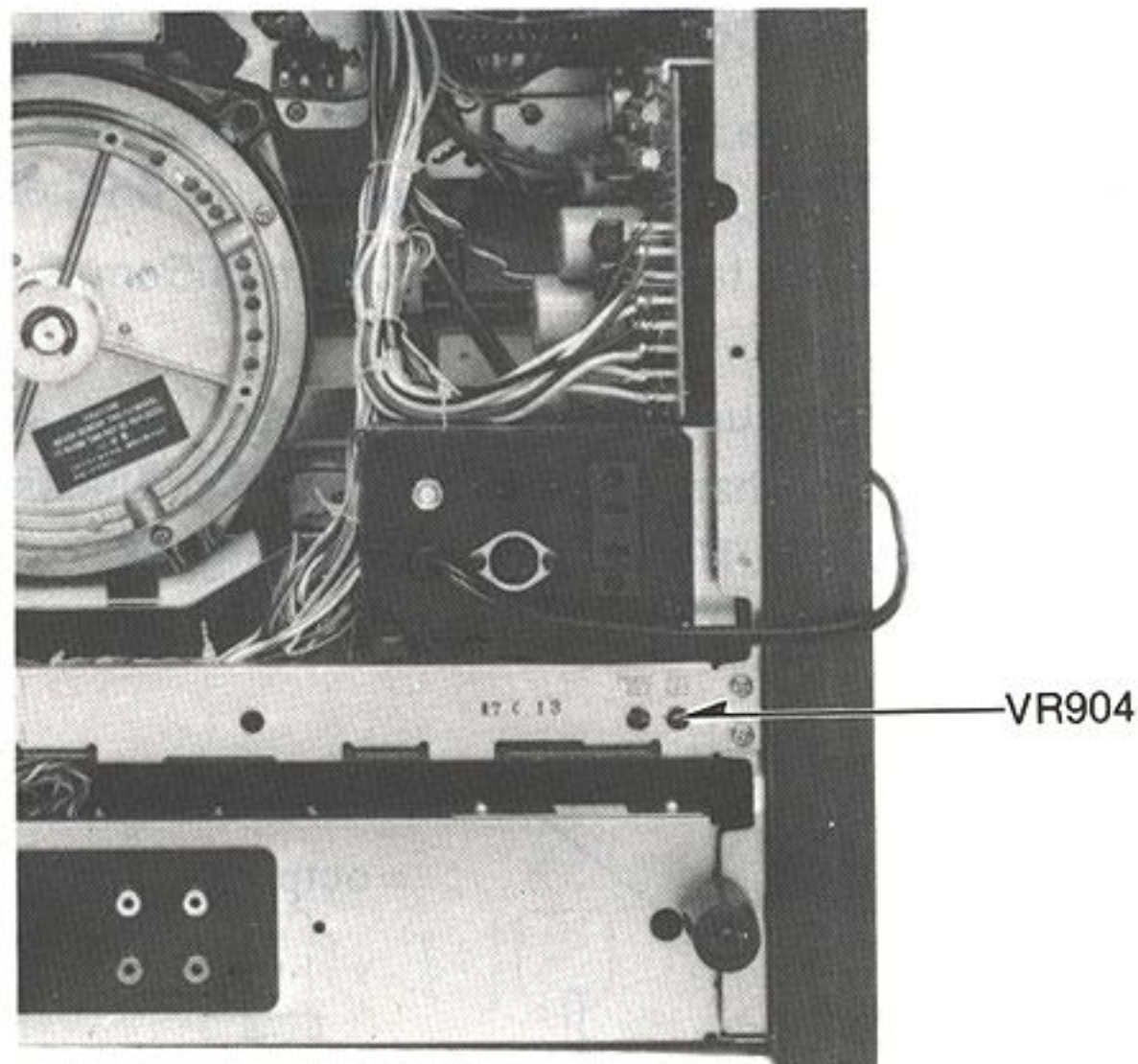


Fig. 23

[C] Tape Speed Fluctuation Measurement

- (1) Connect a digital counter to line output jack.
- (2) Set tape speed selector to 38 cm/s.
- (3) Set pitch control to OFF position.
- (4) Playback test tape QZZOW380EX.
- (5) Read output frequency at beginning and at end of tape.
- (6) Tape speed fluctuation is expressed by the following formula.

$$\text{Tape speed fluctuation} = \frac{f_1 - f_2}{3000} \times 100\%$$

f_1 : frequency at beginning of tape.

f_2 : frequency at end of tape.

Note: Use test tape QZZOW190EX for 19 cm/s tape speed, measurement method is by the procedure described above.

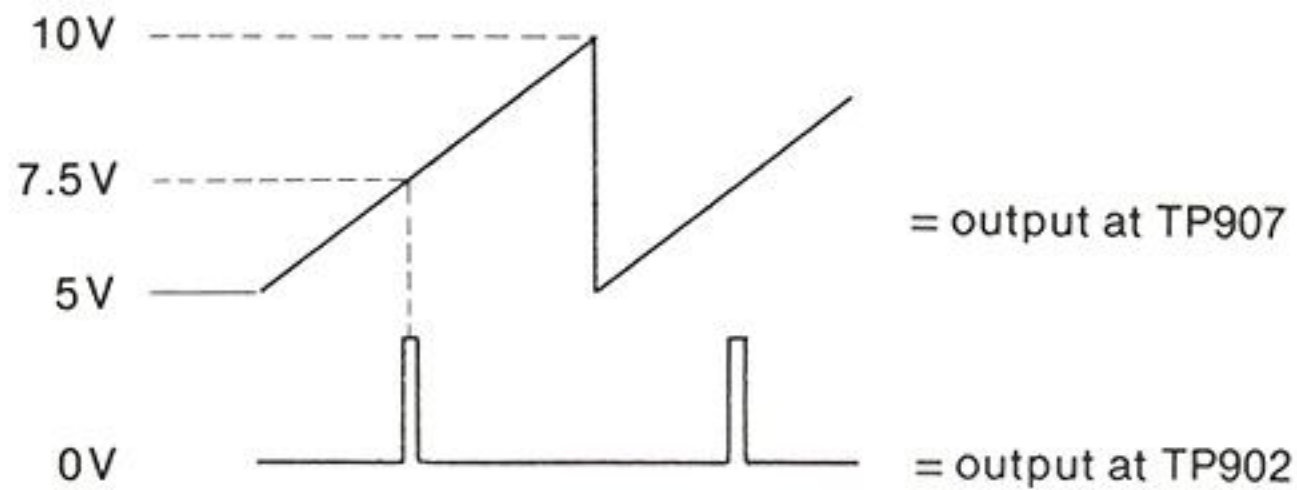
[D] Wow and Flutter Measurement

- (1) Connect a wow-flutter meter to a line output jack.
- (2) Set tape speed selector to 38 cm/s.
- (3) Set pitch control to OFF position.
- (4) Playback test tape QZZOW380EX and read wow & flutter.

Note: Use test tape QZZOW190EX for 19 cm/s tape speed.

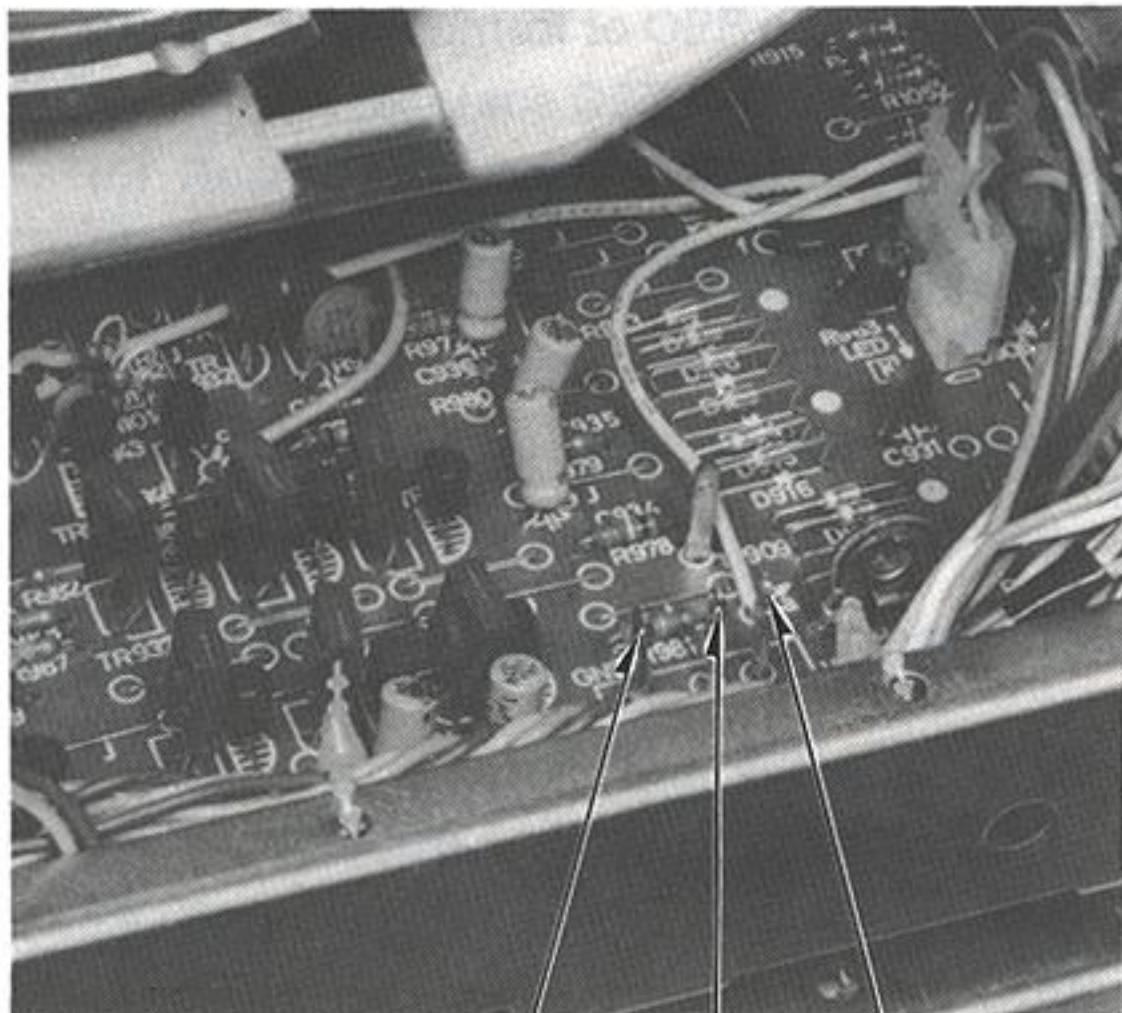
[E] Adjustment of Capstan-Motor-Control Circuitry

- (1) Connect a dual-trace oscilloscope to test points TP902 and TP907, shown in fig. 25.
- (2) Set AC/DC selector of oscilloscope to DC position.
- (3) Thread 10" or 7" reel tape and set tape speed selector to 9.5 cm/s.
- (4) Playback the tape at its middle.
- (5) Adjust VR905 so that the peak value of the sawtooth wave which appears at TP907 is 10V.
- (6) Next, adjust VR901 so that the phase relationship between the sawtooth wave in (4) and the pulse signal which appears at TP902 is as shown in fig. 24.



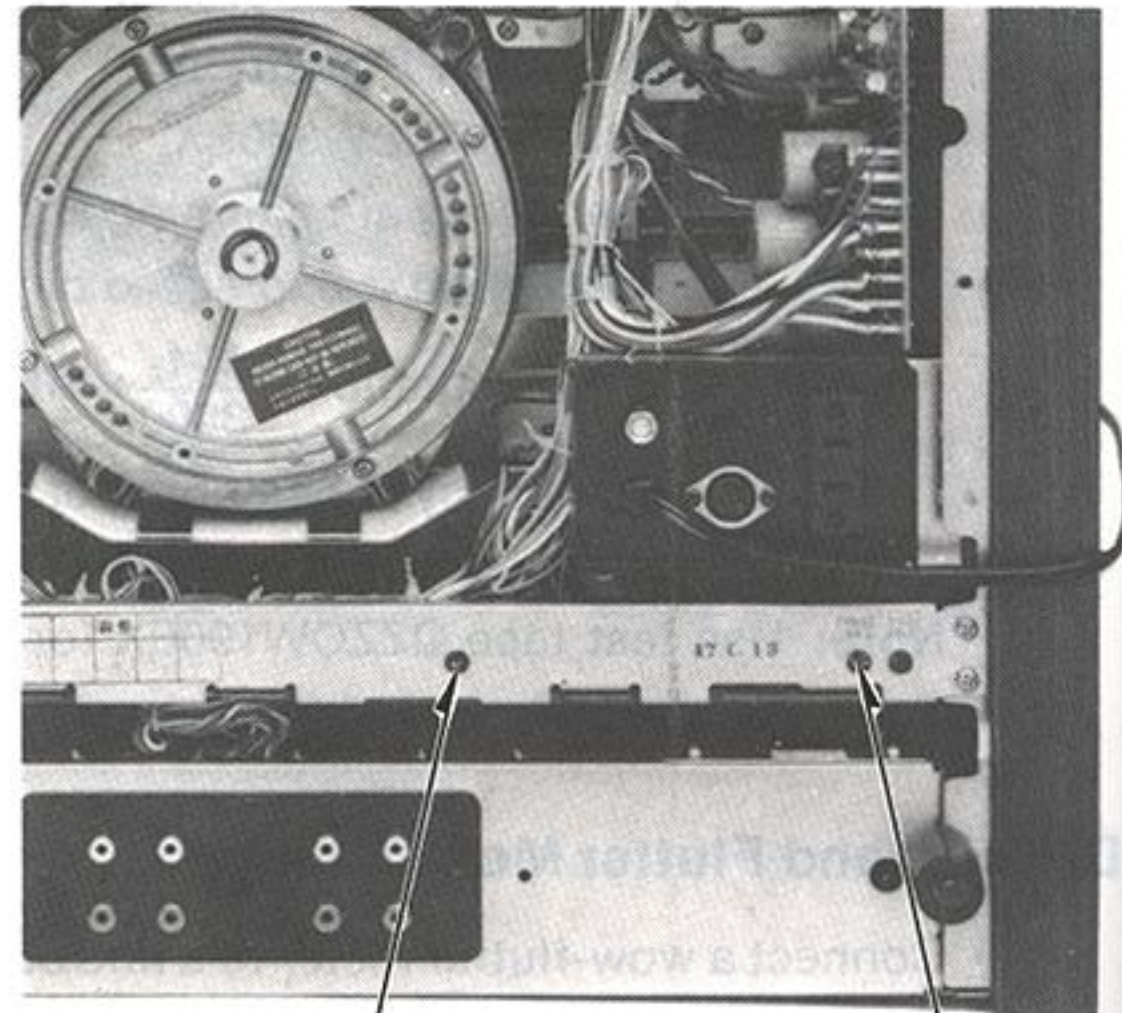
Adjust so that the pulse signal at 50% of the amplitude of the sawtooth wave.

Fig. 24



E TP907 TP902

Fig. 25



VR905 VR901

Fig. 26

2. PLAYBACK HEADS

As shown in figure 27, the following items are involved in head adjustment:

- [A] Head Height
- [B] Azimuth
- [C] Tilt
- [D] Contact and Tangency
- [E] Other Adjustments

When replacing a head, therefore, it is necessary to make readjustment for each of these items.

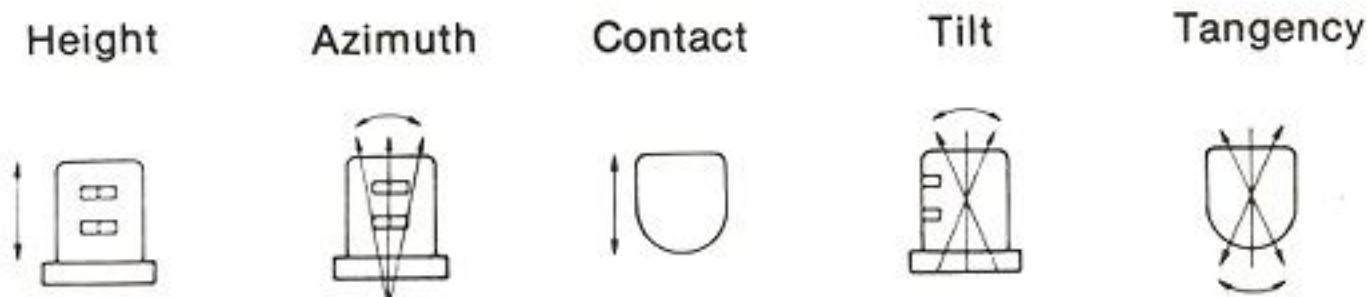


Fig. 27

* 2tr Playback Head (4tr Playback Head in RS-1506US)

The screws used to make each adjustment of the 2-track playback head are in the places shown in figure 28.

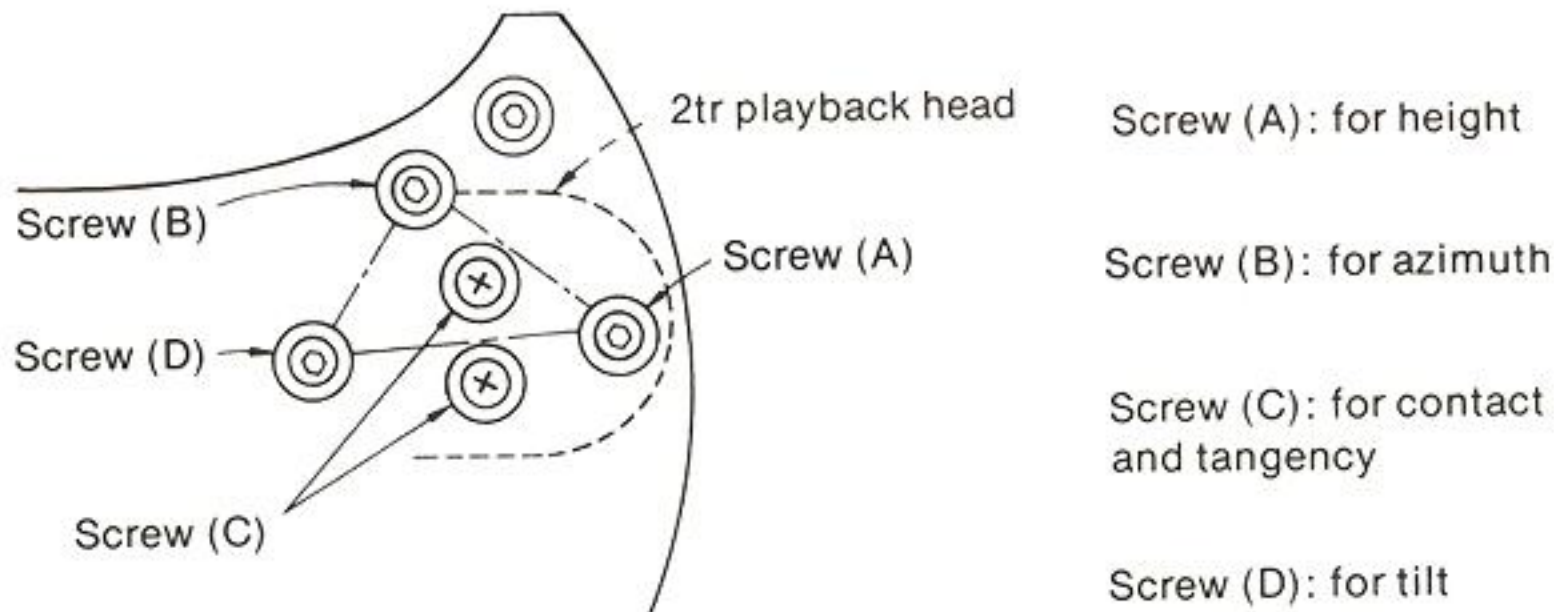


Fig. 28

- (1) Set the head selector to the 2-track position.
- (2) As shown in figure 29, connect a VTVM's to the line-output jacks.
- (3) Set to the 19 cm/s tape speed.
- (4) Use 16 kHz position (for azimuth adjustment) in test tape QZZOF190EX.

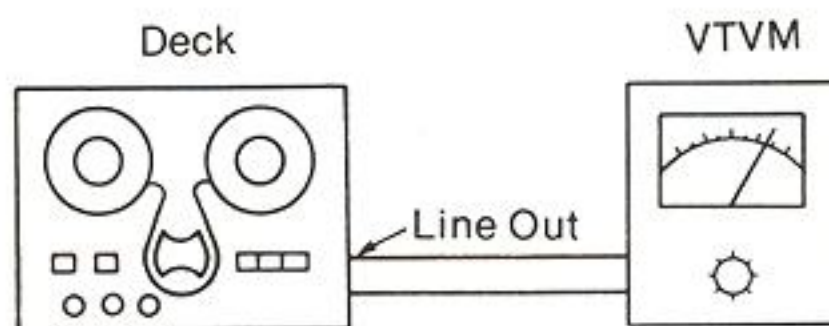


Fig. 29

[A] Head Height Adjustment

First use the height-adjustment screw (A) to adjust so that the tape-to-head relationship are, as visually estimated, approximately as shown in figure 30.

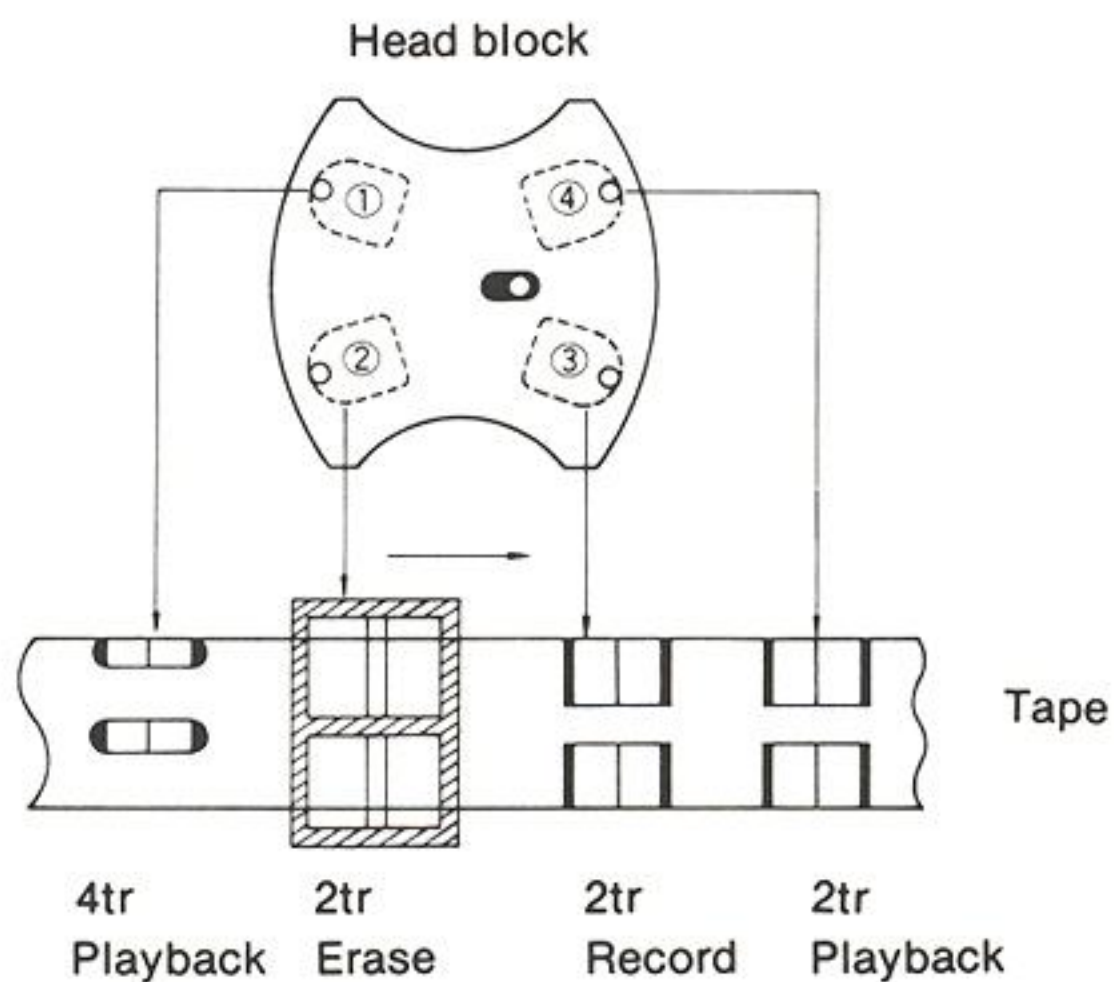


Fig. 30

- (1) Playback test tape QZZOF190EX, and adjust the screw (A) so that both left and right outputs are maximum.

[B] Azimuth Adjustment

- (1) In the condition shown in figure 29, playback test tape QZZOF190EX.
- (2) Adjust the azimuth-adjustment screw (B) (figure 28) so that playback output (VTVM readout) becomes maximum.

[C] Tilt Adjustment

- (1) In the condition shown in figure 29, playback test tape QZZOF190EX, and adjust the tilt-adjustment screw (D) so that output becomes maximum.

Because the adjustments described in [A]—[C] above mutually influence each other, adjustments should be repeated about 3 times.

[D] Contact and Tangency Adjustments

- (1) Set the tape selector to the 19cm/s position, and playback the 16kHz section (for azimuth adjustment) of test tape QZZOF190EX.
- (2) Lightly touch the supply reel in order to increase back tension.
- (3) If playback output increases, Loosen screws (C) and adjust the head contact and tangency.
- (4) Tighten screws (C) at the position where playback output does not increase even when back tension is increased.

[E] Other Adjustments

* Playback Head Phase Adjustment

After completing the adjustments in items [A]—[D], check the phase between both channels.

- (1) Playback test tape QZZOF190EX, and visually inspect the left and right channel Lissajous' waveform by oscilloscope.
- (2) When the phase difference is not within 60° , turn the azimuth-adjustment screw (B) slightly so that it will be within 60° .

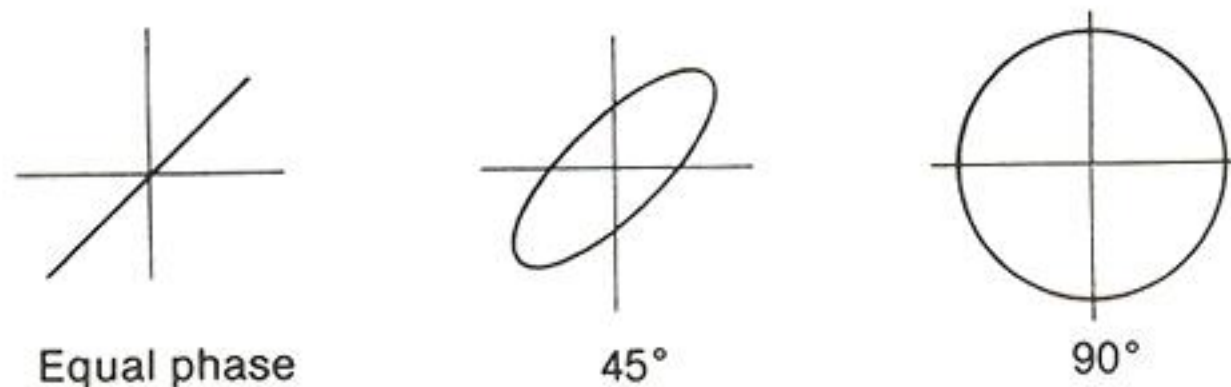


Fig. 31

* 4 Track Playback Head (2tr Playback Head in RS-1506US)

The screws used for adjustment of the 4-track playback head are as shown in figure 32. The adjustments should be made in the same way as for the 2-track playback head.

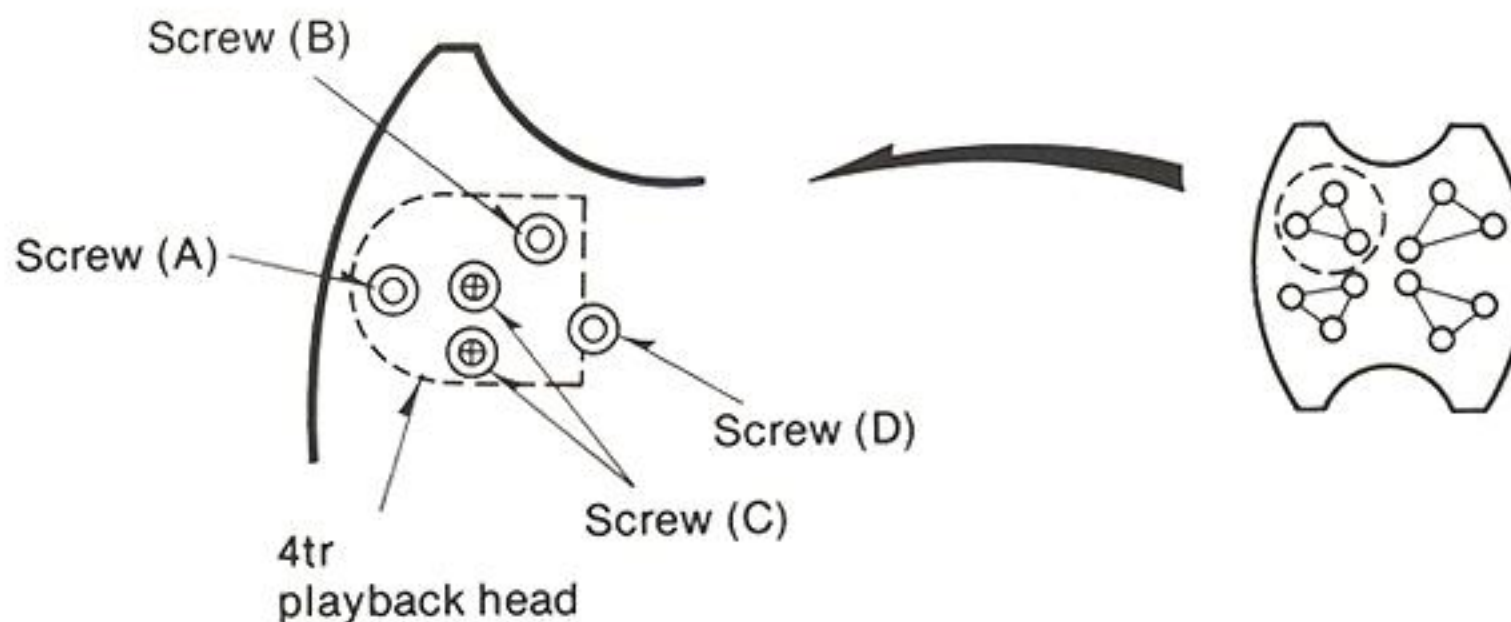


Fig. 32

3. PLAYBACK AMPLIFIER

Equipment:

- * VTVM
- * Oscilloscope
- * Test tape
QZZOF380EX: 38 cm/s
QZZOF190EX: 19 cm/s

UNIT CONDITIONS

- * 2t/4t head-selector: 2t (4t in RS-1506US)
- * Pitch-control switch: OFF
- * Timer-start switch: OFF
- * Meter scale selector: +3dB
- * Mic. att. selector: 0dB
- * Mic. level VR: Minimum
- * Line-in level VR: Minimum
- * Output level VR: "8" position on front panel
- * Monitor selector: Tape (both channels)
- * Equalizer selector: 2
- * Bias selector: 2
- * Recording mode selector: OFF (both channels)

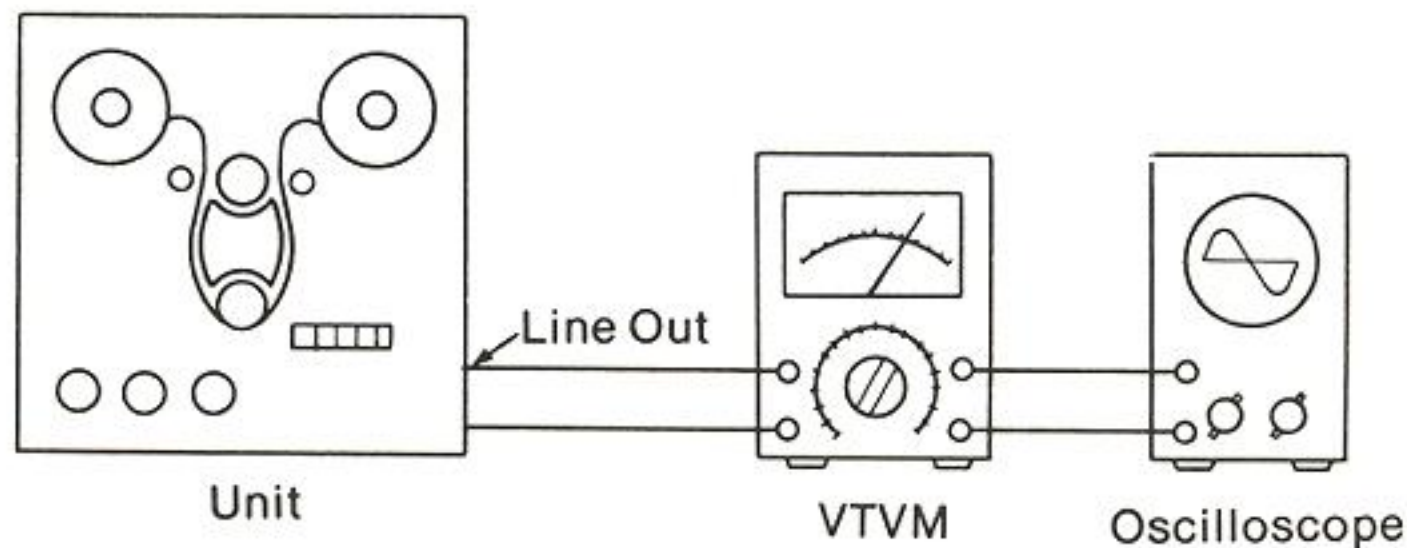


Fig. 33

ITEM

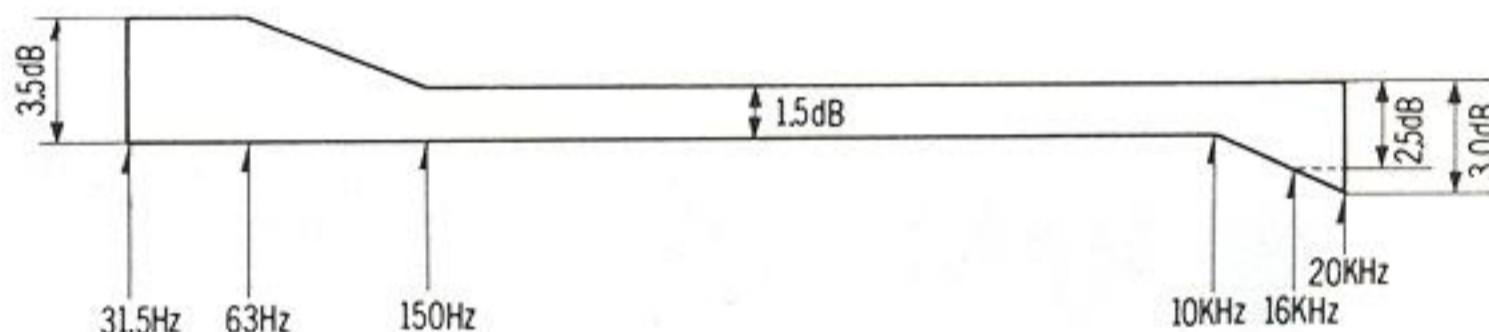
MEASUREMENTS & ADJUSTMENTS

Playback frequency response

1. Test equipment connections are shown in fig. 33.
2. Place unit into playback mode.
3. Play frequency response test tape (QZZOF380EX or QZZOF190EX).
4. Measure output level at 20kHz (38cm/s), 16kHz, 12.5kHz, 10kHz, 8kHz 4kHz, 2kHz, 1kHz, 500Hz, 250Hz, 125Hz, 63Hz, and 31.5Hz and compare output level with standard frequency 400Hz 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 below.

Playback frequency response charts.

[Tape speed: 38 cm/s]



[Tape speed: 19 cm/s]

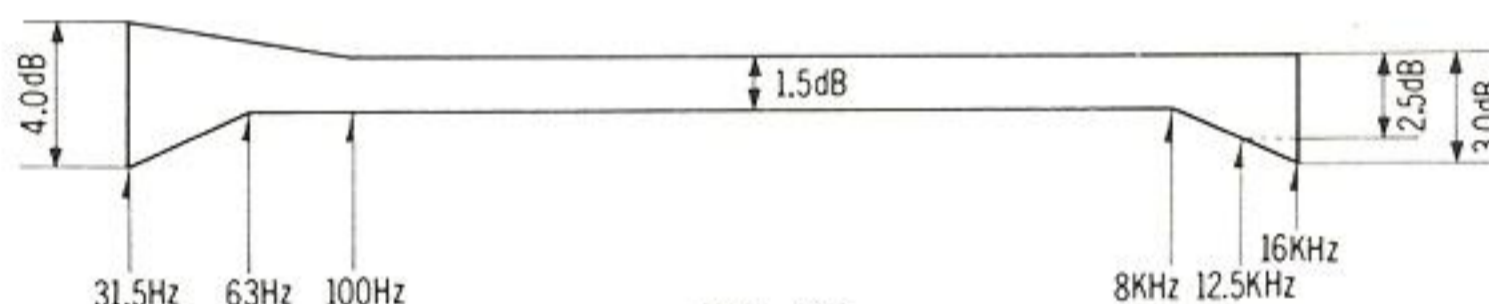


Fig. 34

[Adjustment]

1. If the measured value is not within standard, adjust the playback equalizer VR, VR105 (L-CH) and VR205 (R-CH) shown in fig. 35.

Playback gain

1. Test equipment connections are shown in fig. 33.
2. Play standard recording level portion on test tape, and, using VTVM, measure the output level at LINE-OUT jacks.
3. Make measurement for both channels.
Standard value: 0.55 V (- 5.2 dB)

[Adjustment]

1. If measured value is not standard, adjust the playback level adjustment VR, VR106 (L-CH) and VR206 (R-CH) (See fig. 35.)
2. After adjustment, check "Playback frequency response" again.

ITEM

MEASUREMENTS & ADJUSTMENTS

[Confirmation]

1. Change 2t/4t head selector.
2. Confirm that deviation of output between 4tr and 2tr is within $\pm 2.5\text{dB}$.

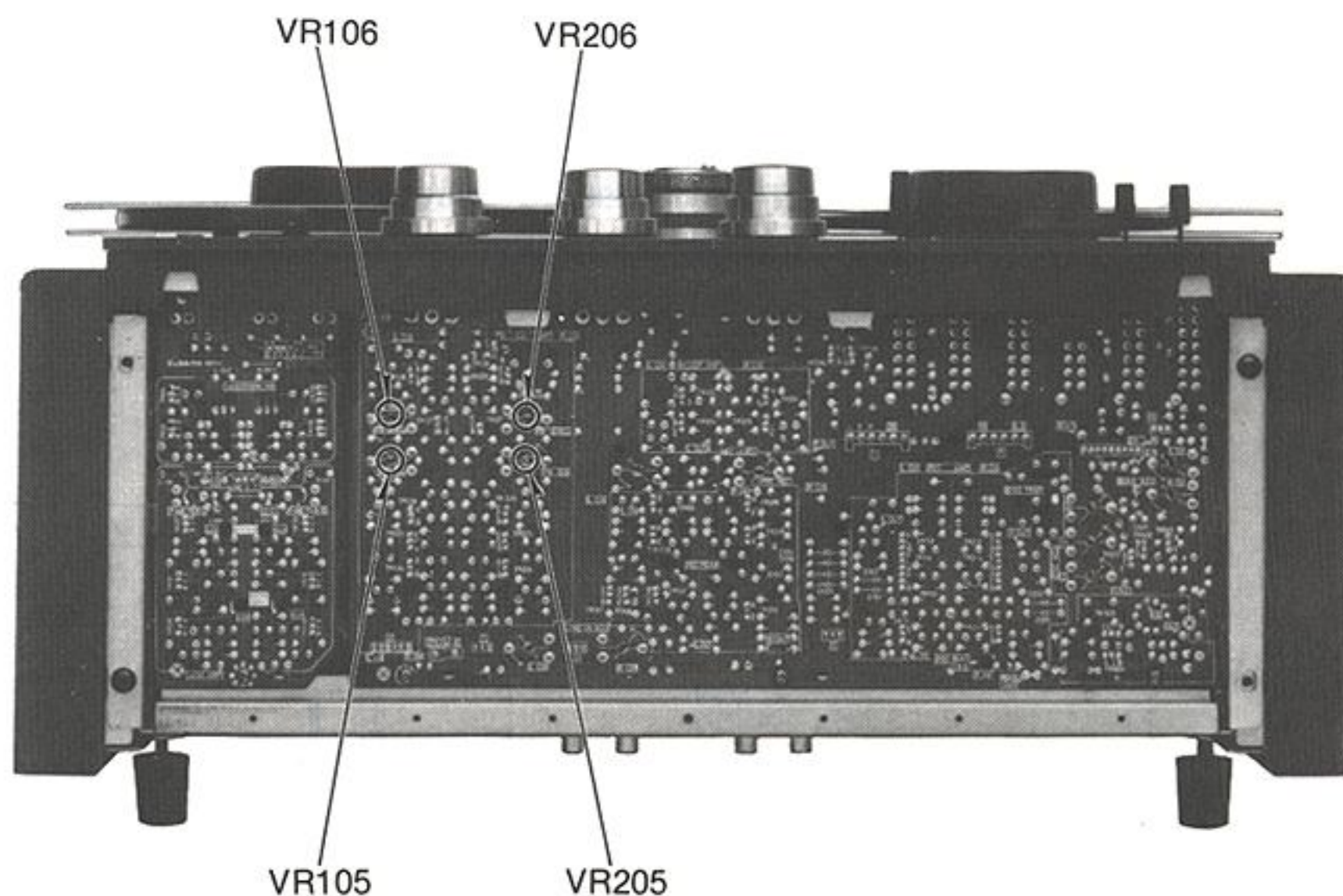


Fig. 35

Playback
S/N ratio

1. Test equipment is shown in fig. 33.
2. Play standard recording level portion on test tape, and read output level on VTVM.
3. Refer to "Playback gain adjustment."
4. Play again without tape.
5. Measure noise level at this time, using VTVM, and determine ratio of this level to test tape output signal voltage (400Hz = 0.55V, -5.2dB).

Standard value: Greater than 50dB for 38cm/s (unweighted) Greater than 48dB for 19cm/s
--

4. RECORD AMPLIFIER

Equipment:

- * AF Oscillator
- * Attenuator
- * VTVM
- * Oscilloscope
- * Blank test tape
QZZORA218EX

UNIT CONDITIONS

- * 2t/4t head selector: 2t (4tr in RS-1506US).
- * Pitch-control switch: OFF
- * Timer-start switch: OFF
- * Meter scale selector: +3dB
- * Mic. att. selector: 0dB
- Mic. level VR: Minimum
- * Line-in level VR: Maximum
- * Output level VR: "8" position on front panel
- * Monitor selector: Source (both channels)
- * Equalizer selector: 2
- * Bias selector: 2
- * Recording mode selector: OFF (both channels)

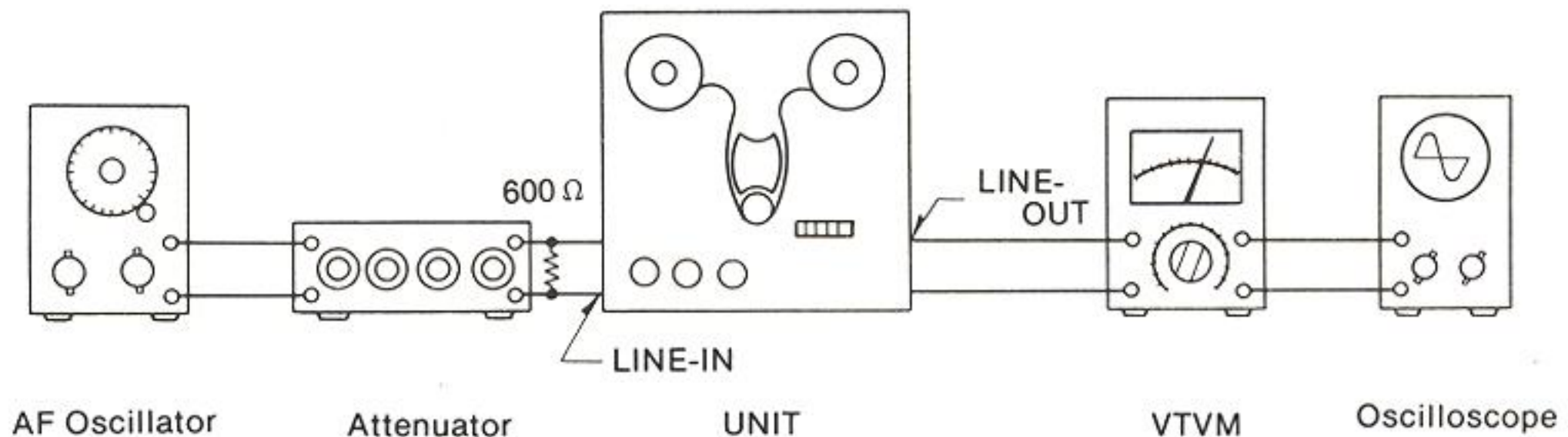


Fig. 36

ITEM

MEASUREMENTS & ADJUSTMENTS

Standard recording level

1. Test equipment connections are shown in fig. 36.
2. Supply 1 kHz signal ($-24\text{dB} \pm 3\text{dB}$) from AF oscillator, through ATT, to LINE-IN jacks.
3. Set the output control to "8" position on front panel and confirm that the output level at LINE-OUT jacks on VTVM becomes 0.55V.

[Adjustment]

1. If the measured value is not within standard value, adjust the Line-in level adjustment VR, VR101 (L-CH) and VR201 (R-CH), (See fig. 37.)

Standard recording levels: Line-in: $-24\text{dB} \pm 3\text{dB}$
Mic-in: $-72\text{dB} \pm 2\text{dB}$

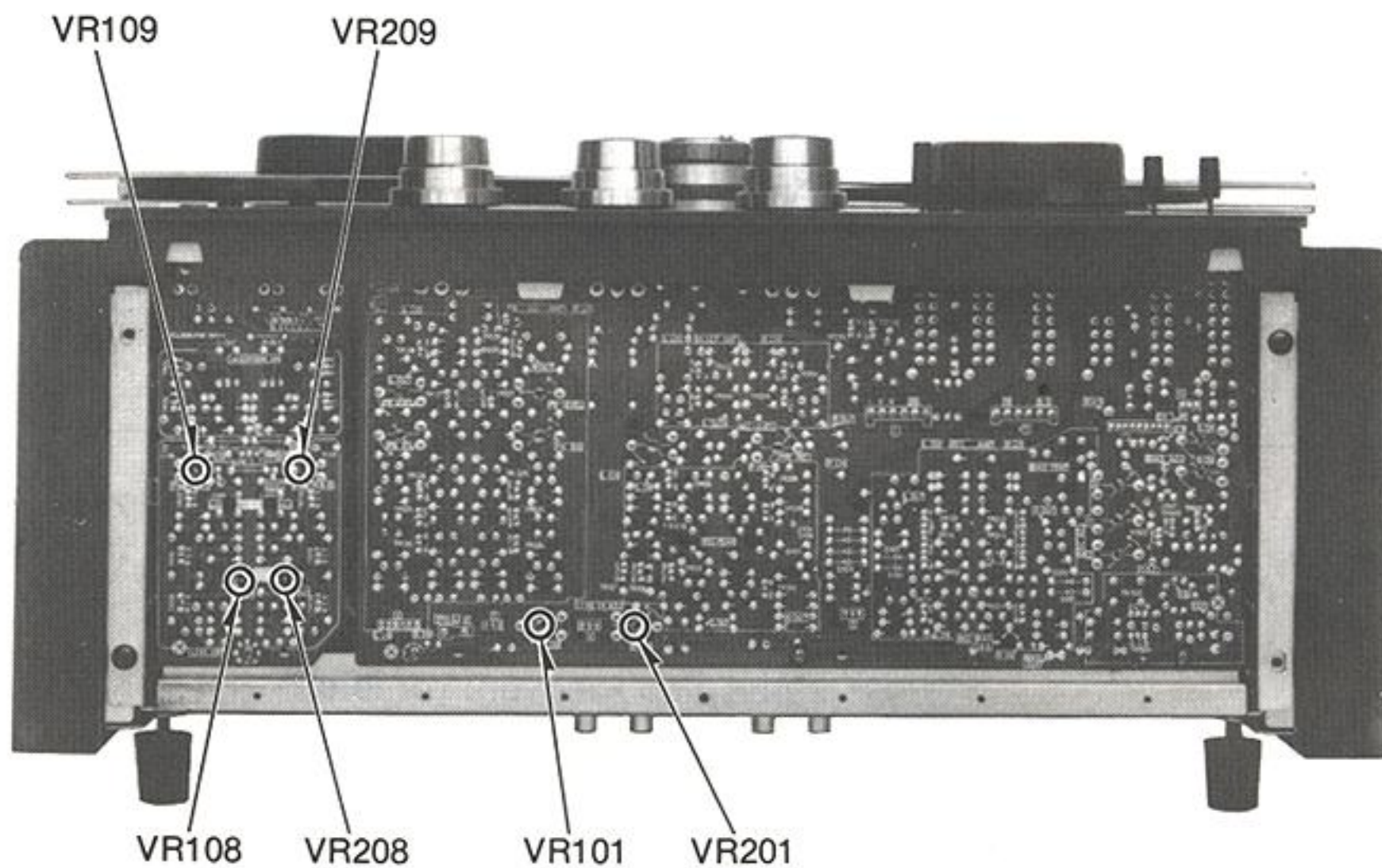


Fig. 37

ITEM	MEASUREMENTS & ADJUSTMENTS
<p>Level meter for source monitor</p>	<ol style="list-style-type: none"> 1. Test equipment connections are shown in fig. 36. 2. Set the monitor selector to "SOURCE" position. 3. Set the output control to "8" position on front panel. 4. Supply 1 kHz signal ($-24\text{dB} \pm 3\text{dB}$) from AF oscillator, through ATT, to LINE-IN jacks. 5. Adjust ATT so that the output level at LINE-OUT jacks on VTVM becomes 0.55V. 6. Then confirm that the level meter indicates 0VU position. <p>[Adjustment]</p> <ol style="list-style-type: none"> 1. If the level meter does not indicate 0VU position in the above condition, adjust the level meter adjustment VR, VR108 (L-CH) and VR208 (R-CH). (See fig. 37.) <p>[Confirmation]</p> <ol style="list-style-type: none"> 1. Place unit into the above measurement condition. 2. Set the meter scale selector to "+6dB" position. 3. Confirm that the level meter indicates within $-3 \pm 1\text{VU}$ on "+3dB" scale.
<p>Level meter for tape monitor</p>	<ol style="list-style-type: none"> 1. Test equipment connections are shown in fig. 36. 2. Place unit in the same condition as for "Standard recording level adjustment." 3. Thread "open" blank test tape (QZZORA218EX). 4. Set the meter scale selector to "+3dB" position. 5. Set the monitor selector to "tape" position (both channels). 6. Set the recording mode selector to "ON" position (both channels). 7. Place unit into recording mode. 8. Then confirm that the level meter indicates 0VU. <p>[Adjustment]</p> <ol style="list-style-type: none"> 1. If the level meter does not indicate 0VU in the above condition, adjust the level meter adjustment VR, VR109 (L-CH) and VR209 (R-CH). (See fig. 37.)

ITEM	MEASUREMENTS & ADJUSTMENTS
Erase current	<ol style="list-style-type: none"> 1. Test equipment connections are shown in fig. 38. 2. Set the Line-in level control to minimum position. 3. Set the bias selector to "1" position. 4. Set the tape speed selector to "38" position. 5. Set the recording mode selector to "ON" (L-CH) and "OFF" (R-CH). 6. Place unit into recording mode. 7. Measure voltage at point (A) and then calculate erase current by formula below. $\text{Erase current} = \frac{\text{Value read on VTVM (V)}}{1 (\Omega)}$ <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p>Standard value: Bias selector "1" position: around 65 mA</p> </div> 8. Then set the recording mode selectors to "OFF" (L-CH) and (R-CH), and confirm that the above standard value can be obtained. <p>[Adjustment] If the measured value is not satisfied, adjust the erase current adjustment VR, VR501. (See fig. 39.)</p> <ol style="list-style-type: none"> 9. Next, set the bias selector to the "2" position, and confirm that the standard value shown below can be obtained. <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p>Standard value: Bias selector "2" position: around 71 mA</p> </div> <p>[Adjustment] If the measured value is not satisfied, adjust the erase current adjustment VR, VR502. (See fig. 39.)</p>

ITEM

MEASUREMENTS & ADJUSTMENTS

10. Next, set the bias selector to "3" position and confirm that the standard value shown below can be obtained.

Standard value:

Bias selector "3" position: around 78 mA

[Adjustment]

If the measured value is not satisfied, adjust the erase current adjustment VR, VR503.

(See fig. 39.)

Note: When there is difference between values of L-CH "ON" and R-CH "ON", adjustment should be made so that the lower side becomes within each standard value.

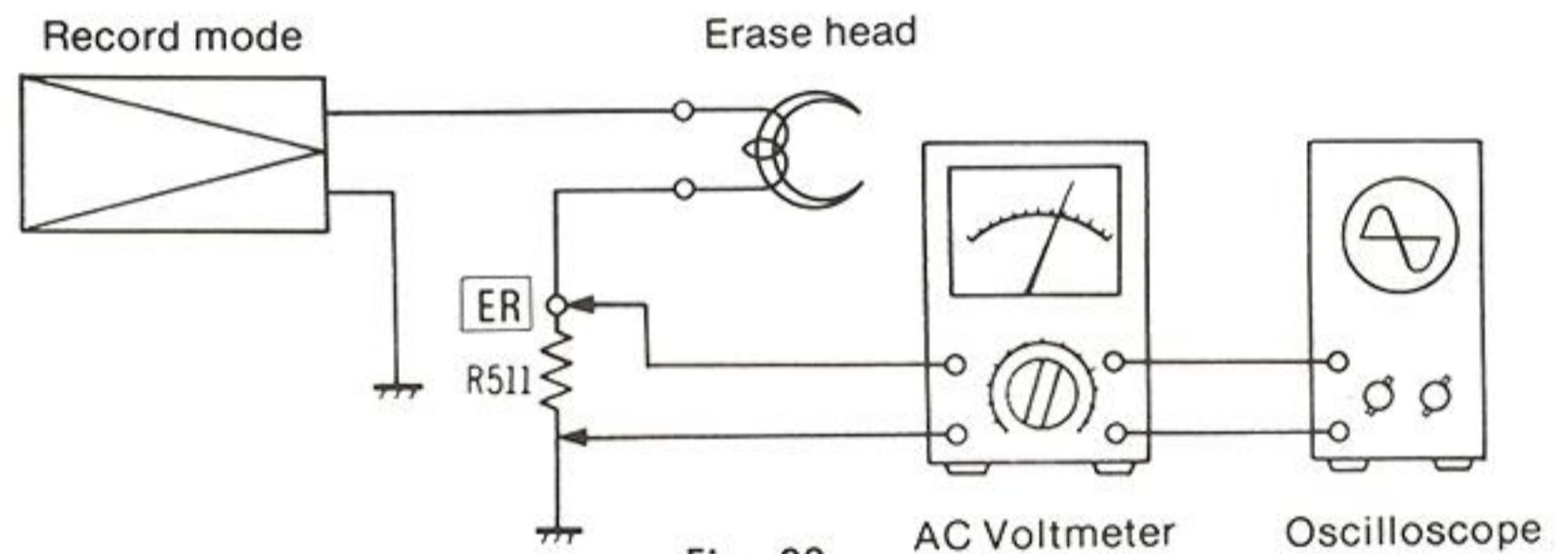


Fig. 38

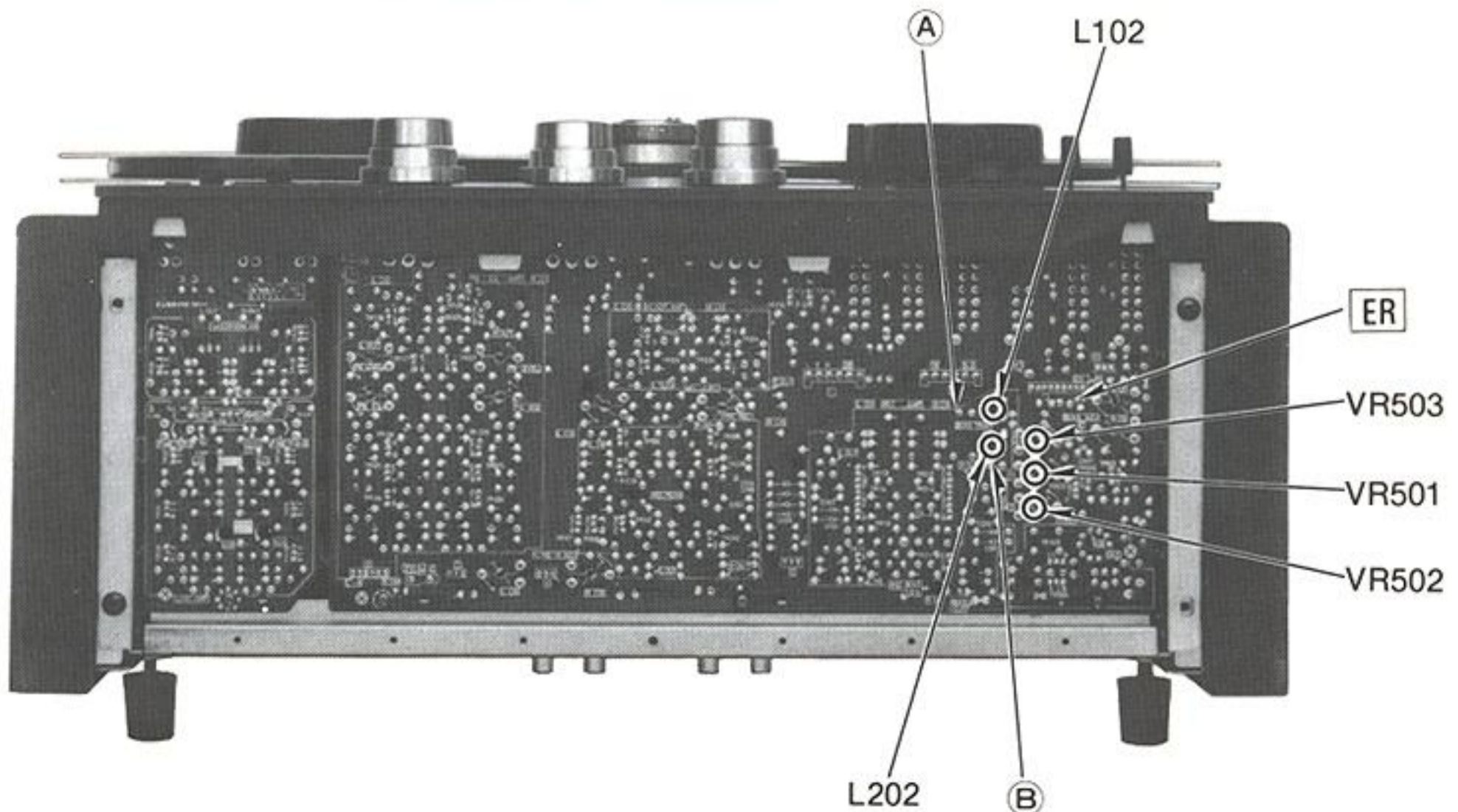


Fig. 39

ITEM

MEASUREMENTS & ADJUSTMENTS

Bias current leakage-1

To prevent bias current leakage to REC-AMP.

(L-channel)

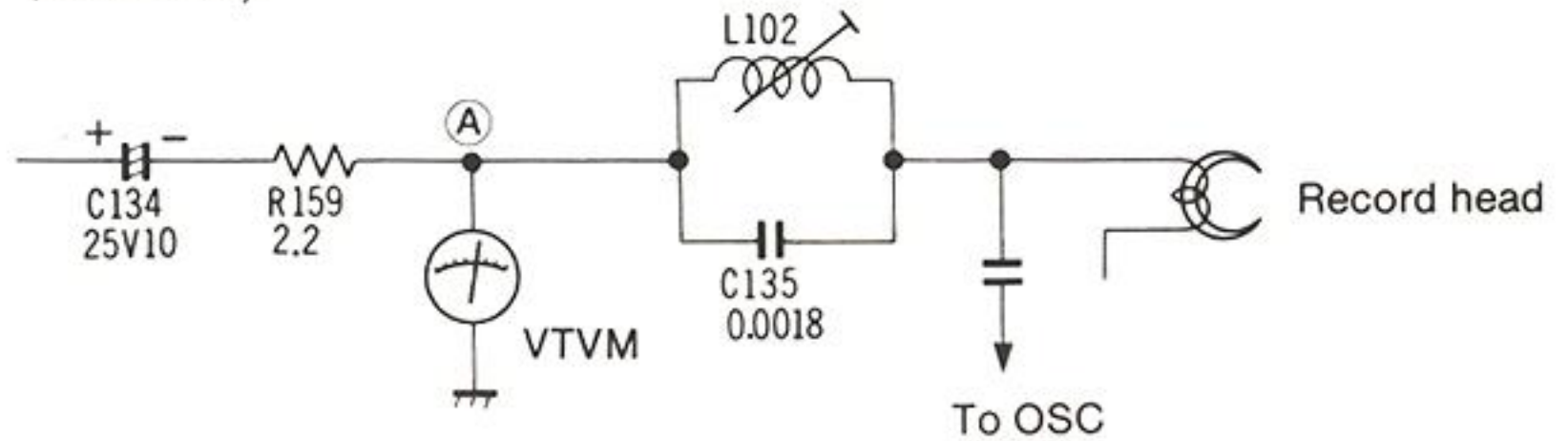


Fig. 40

1. Test equipment connections are shown in fig. 40.
2. Thread "open" blank test tape (QZZORA218EX).
3. Place unit into recording and playback modes.
4. Set the recording mode selectors to "ON" (L-CH) and "OFF" (R-CH).
5. Measure and adjust bias trap coil L102 (L-CH) to obtain minimum voltage (less than 3V) at point (A).
6. Change the recording mode selectors to "OFF" (L-CH) and "ON" (R-CH).
7. Measure and adjust the bias trap coil L202 (R-CH) to obtain minimum voltage (less than 3V) at point (B).

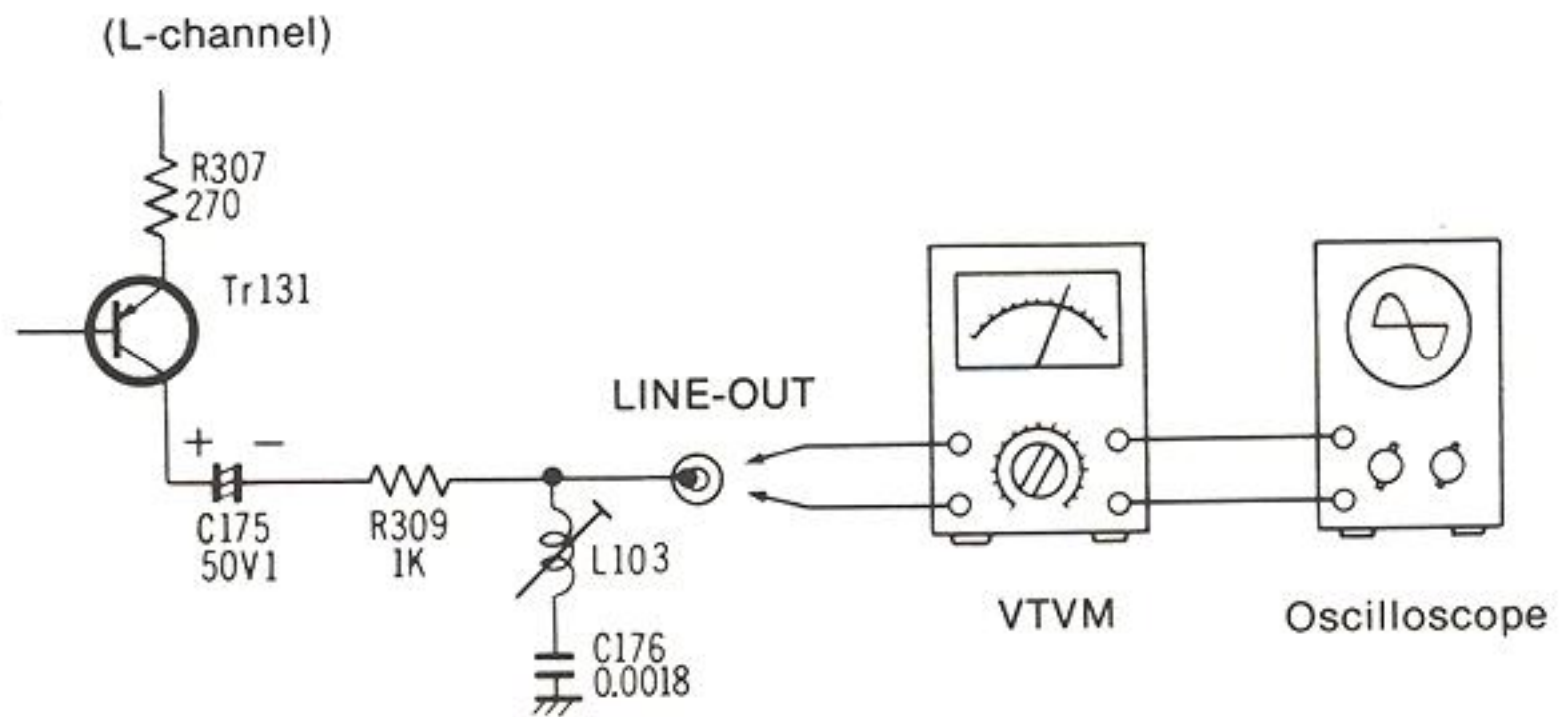
Adjustment parts and test points (A) and (B) are shown in figure 39.

ITEM

MEASUREMENTS & ADJUSTMENTS

Bias current leakage-2

To prevent bias current leakage to LINE-OUT.



1. Test equipment connections are shown in fig. 41.
2. Thread "open" blank test tape (QZZORA218EX).
3. Place unit into recording and pause modes.
4. Set the both of REC mode selectors to "ON" position.
5. Measure and adjust the bias trap coils L103 (L-CH) and L203 (R-CH) to obtain minimum voltage (less than 3mV) at LINE OUT jacks.

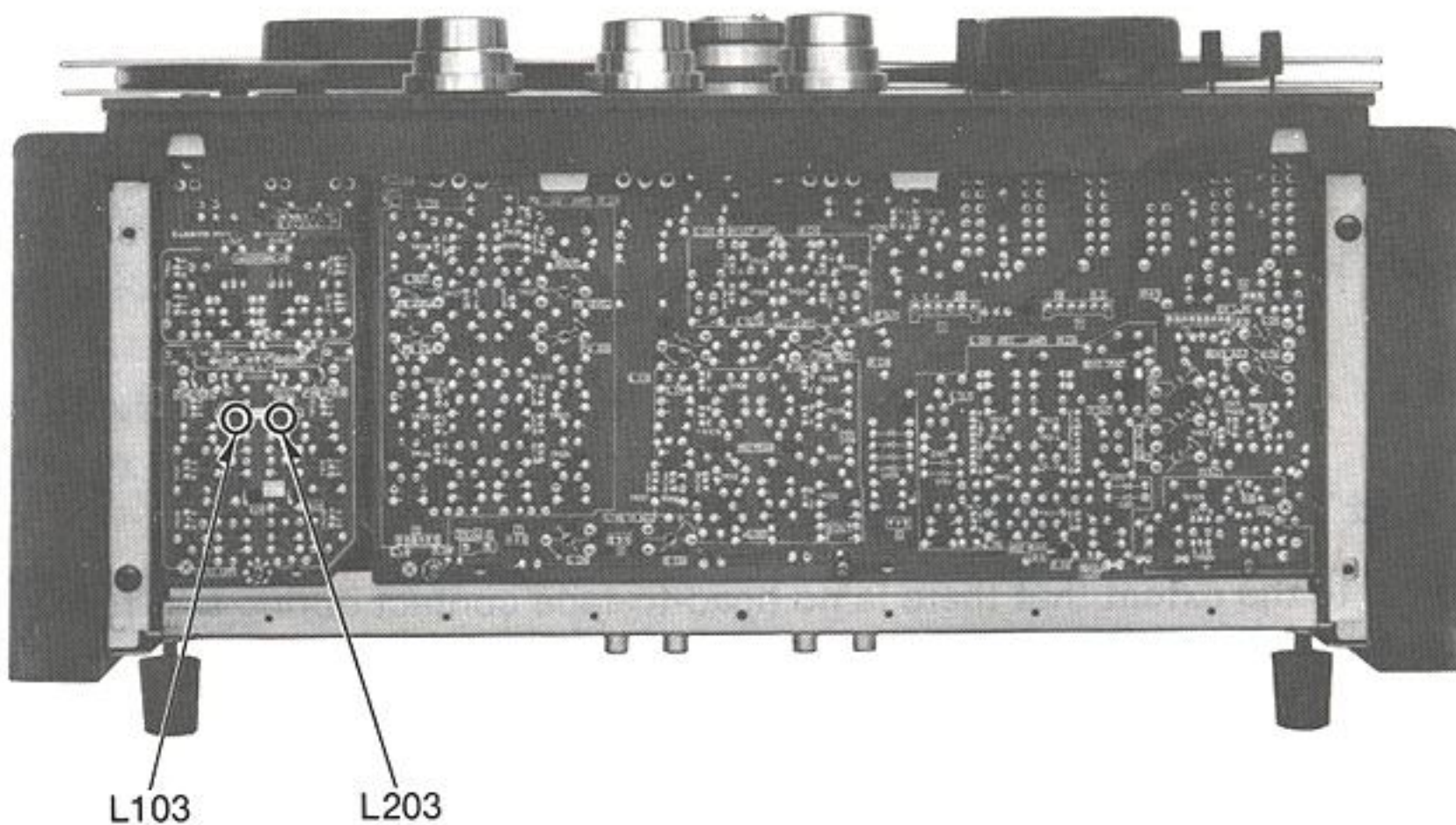


Fig. 42

5. ERASE HEAD

The adjustment screws for adjustment of the erase head are located as shown in figure 43.

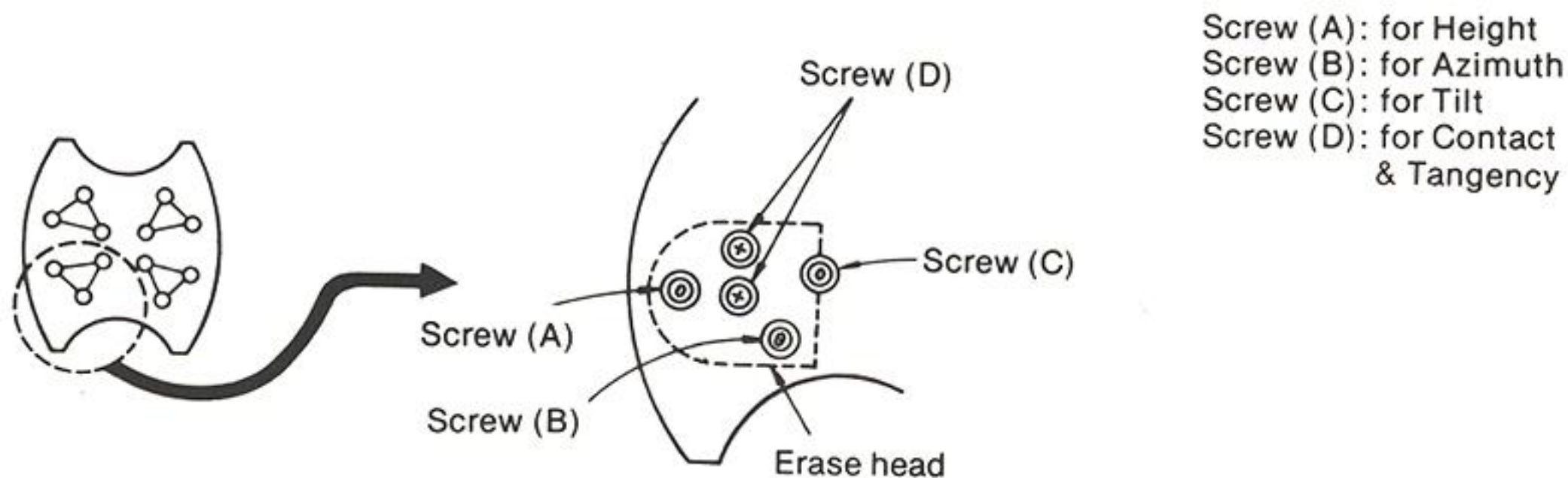


Fig. 43

[A] Height Adjustment

Use the height-adjustment screw (A) to adjust so that the head-to-tape relationship is as shown in figure 30.

[B] Azimuth and Tilt Adjustments

Use screws (B) and (C) respectively to adjust so that the condition will be as shown in figure 44, estimating azimuth and tilt visually.

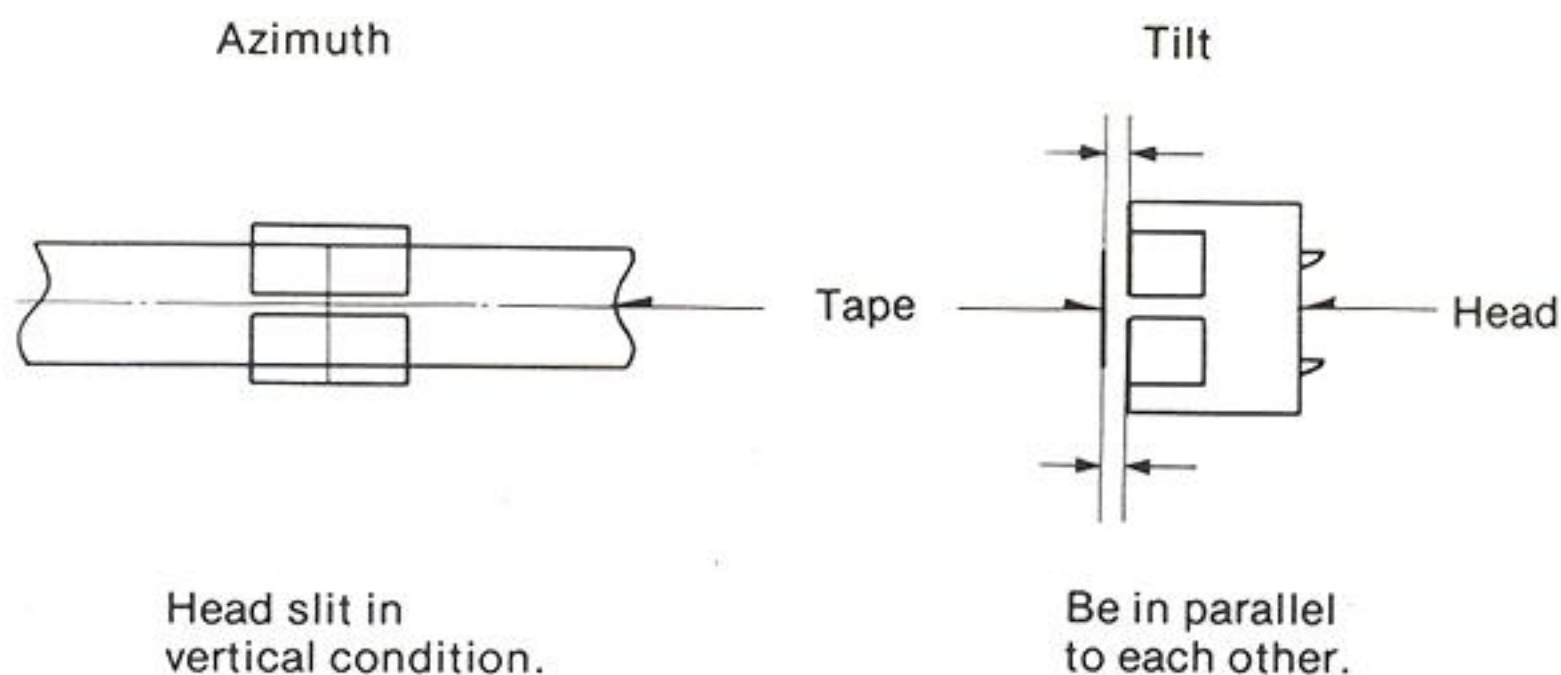


Fig. 44

[C] Contact and Tangency Adjustments

Push outward to the extent that there is no head-to-tape contact during fast forward, rewind and stop modes.

6. RECORD HEAD

The adjustment of the record head should be made only after the playback heads are completely adjusted.

- * The items for adjustment of the record head are the same as those for the playback heads.
- * The screws for each adjustment are in the positions shown in figure 45.

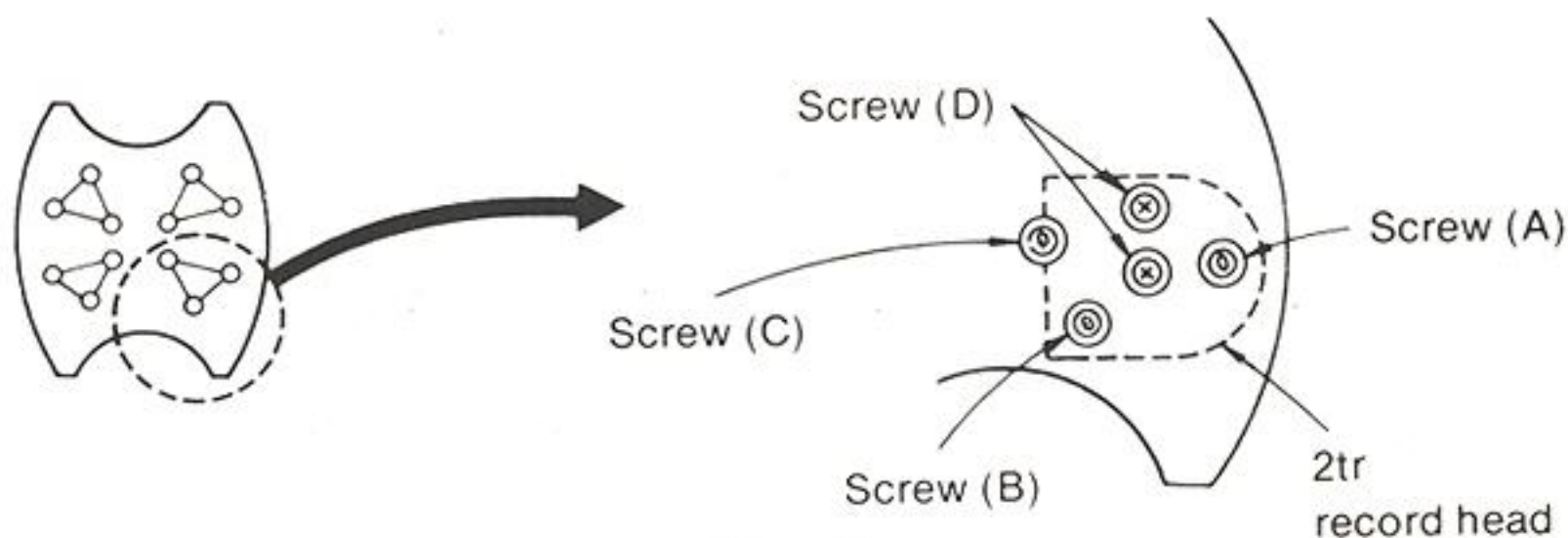


Fig. 45

- * Measurement instrument connections are as shown in figure 36.

* Prepare the tape deck as follows:

- Set the monitor switches to the "tape" position.
- Set the record mode switches to the "on" position.
- Set the line level control to its maximum position.
- Set the output level control to "8."
- Thread a blank test tape QZZORA218EX.

[A] Height Adjustment

Use the height-adjustment screw (A) to adjust to the tape-to-head relationship shown in figure 30.

[B] Azimuth Adjustment

- (1) Set the tape speed to 38 cm/s.
- (2) Supply a 26 kHz, -44 dB signal from an audio oscillator to the line-input terminals, and record the signal.
- (3) Use azimuth-adjustment screw (B) to adjust so that the output from the line-output jacks (both left and right) is maximum.

[C] Tilt Adjustment

With the unit in the condition described in [B], use the head-holding screws so that left/right balance is good and maximized.

Adjustments [A] through [C] have mutual effect upon each other, and therefore should be repeated about 3 times.

[D] Contact and Tangency Adjustments

In the same way as for the playback heads.

[E] Phase Adjustment

- (1) Connect the left and right line-output jacks to the horizontal input and vertical input jacks of the oscilloscope.
- (2) Set the tape speed selector to 38 cm/s.
- (3) Supply a -44 dB signal from the audio oscillator, and record the signal while varying the frequency from 1 kHz to 5 kHz.
- (4) View this playback output on the oscilloscope, and confirm that the phase difference is within 60° .
- (5) When phase difference is not within 60° , turn the azimuth-adjustment screw (B) slightly so that it will become within 60° .

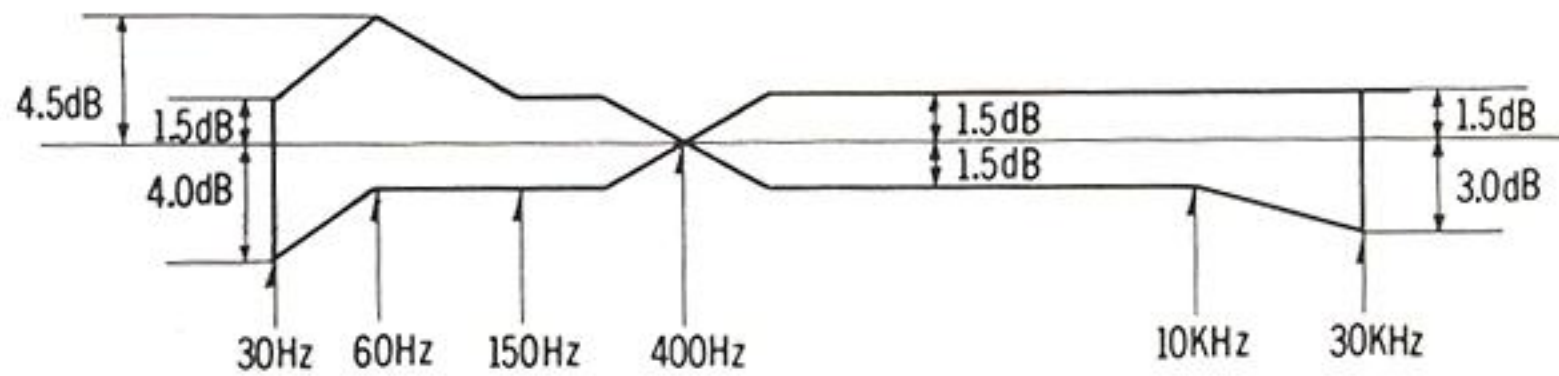
* Refer to figure 31 concerning the Lissajou's figure on the oscilloscope.

7. OVERALL SPECIFICATION

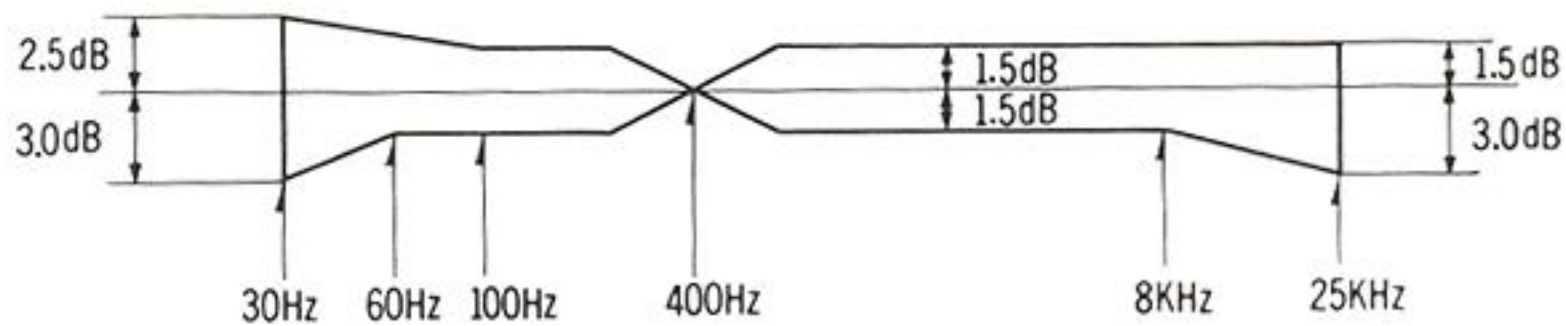
ITEM	MEASUREMENTS & ADJUSTMENTS
Overall frequency response	<ol style="list-style-type: none">1. Test equipment connections are shown in fig. 36.2. Thread blank test tape QZZORA218EX.3. Supply 400 Hz signal (-24 dB \pm 3 dB) from AF oscillator, through ATT, to LINE-IN jacks and adjust ATT so that the output level at LINE-OUT jacks on VTVM becomes 0.55 V.4. Next, adjust ATT so that the input level is -20 dB below standard recording level. (Standard recording level = 400 Hz, -24 dB)5. Place unit into recording mode.6. Set the monitor selector to "Tape" position (both channels).7. Record each frequency (400 Hz, 30 Hz, 60 Hz, 150 Hz, 1 kHz, 10 kHz, 20 kHz and 30 kHz) at the same level.8. Playback (or tape monitor) and express in dB the difference between playback (or tape monitor) output level of each frequency based on playback (or tape monitor) output level of 400 Hz.9. Make sure that the measured value is within the range specified in the overall frequency response chart, as shown in fig. 46.10. If the measured value is not within the range specified, adjust following points.

Overall frequency response chart

[Tape speed: 38 cm/s]



[Tape speed: 19 cm/s]



[Tape speed: 9.5 cm/s]

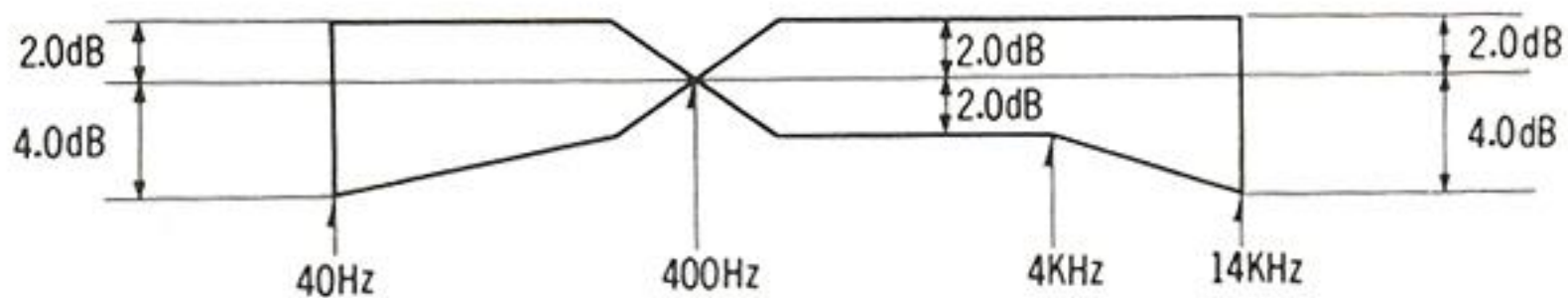


Fig. 46

[Adjustments]

Characteristics at 19 cm/s and 38 cm/s

1. Set tape speed to 19 cm/s, apply an input of 400 Hz, -44 dB, and set the unit for recording.
2. Adjust VR505 (for L-CH) and VR504 (for R-CH) so that playback output becomes maximum. Then read the playback output.
3. Next, change the frequency of the input signal to 24 kHz.
4. Confirm whether or not the 24 kHz playback output is, with relation to the 400 Hz output, within 0— -1 dB.
5. If it is not within 0— -1 dB, adjust VR505 (for L-CH) and VR504 (for R-CH) so that it is within this range.
6. Next vary the input signal frequency between 24 kHz and 5 kHz, and confirm that the frequency response is within the range shown in fig. 46.
7. Next change tape speed to 38 cm/s, apply an input of 26 kHz, -44 dB, and set the unit for recording.
8. Confirm whether or not the playback output is, with relation to the 400 Hz output in step 2 above, within 0— -1 dB.

ITEM

MEASUREMENTS & ADJUSTMENTS

9. If it is not within 0— -1 dB, adjust VR505 and VR504 for within this range.
10. Once again change the tape speed to 19cm/s, and input signal frequency to 24kHz, and confirm that playback output is as described in step 4 above.
11. If it is not, adjust peaking coils L101 (for L-CH) and L201 (for R-CH) shown in figure 47.

After the above measurements and adjustments, measure the overall frequency response at 19cm/s and 38cm/s tape speeds, and confirm that it is within the range shown in fig. 46.

Characteristics at 9.5 cm/s tape speed

After adjustments described above are complete for 38cm/s and 19cm/s, confirm frequency response at 9.5cm/s.

1. Record an input signal of 14kHz, -44dB at 9.5cm/s tape speed, and measure the playback output.
2. If the measured value is not within the range shown in fig. 46, adjust VR506 so that it is within this range.

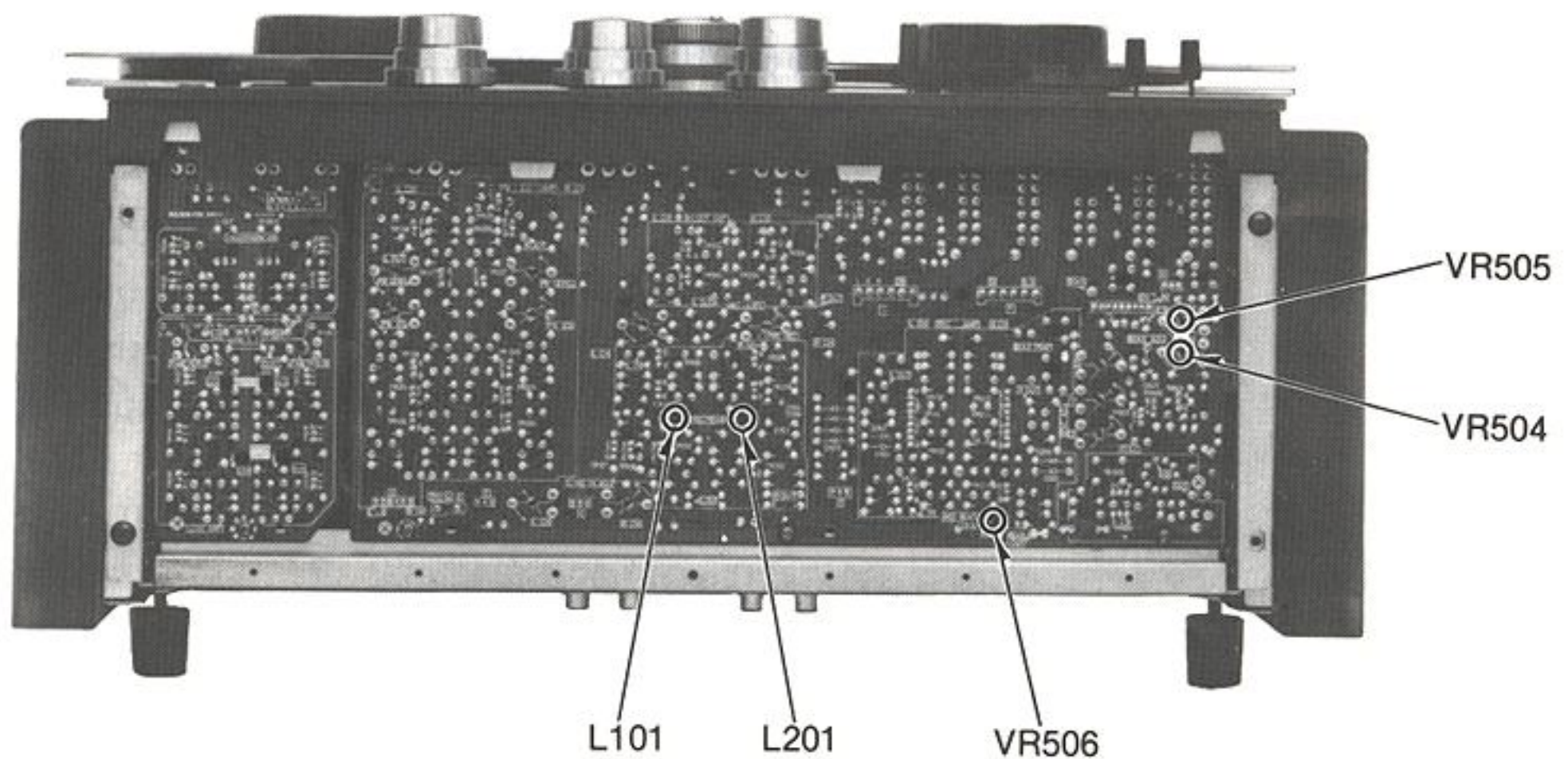


Fig. 47

ITEM	MEASUREMENTS & ADJUSTMENTS
Dummy coil	<p>The purpose of Dummy coils adjustment is to obtain overall frequency response specified with mono-channel recording. Specification: Within $\pm 2\text{dB}$ at 16kHz with relation to overall frequency response specified with stereo mode.</p> <ol style="list-style-type: none"> 1. Test equipment connections are shown in fig. 36. 2. Set tape speed selector to 19cm/s. 3. Set bias selector to "2" position. 4. Set equalizer selector to "2" position. 5. Thread blank test tape QZZORA218EX. 6. Set recording mode selectors to "ON" position. 7. Apply an input signal of 16kHz, -44dB and set the unit for recording. 8. Measure the playback outputs of both channels. 9. Next change recording mode selector L-CH only to "OFF" position. 10. Confirm whether or not R-CH playback output is, with relation to the output in step 8 above, within $\pm 2\text{dB}$. 11. If it is not, adjust dummy coil L501 so that it is within this range. 12. Next set the L-CH recording mode selector to "ON" position, and R-CH to "OFF" position. 13. Make the same measurements and adjustments described in steps 10 to 11 above. <p>(Note, however, that peaking coil L502 is to be adjusted.)</p>

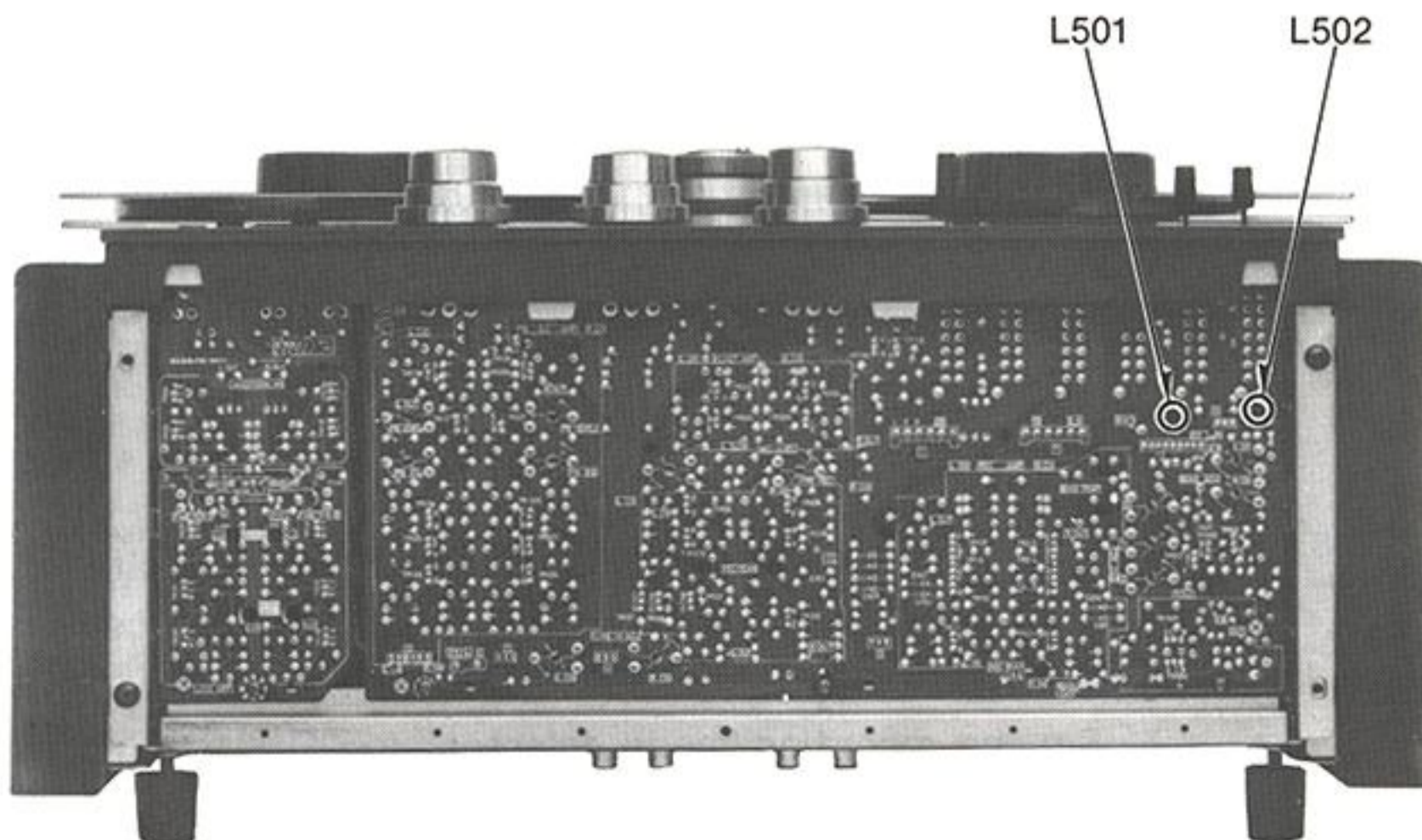


Fig. 48

ITEM	MEASUREMENTS & ADJUSTMENTS
Bias current	<ol style="list-style-type: none"> 1. Test equipment connections are shown in fig. 49. 2. Set the bias selector to "2" position. 3. Set the tape speed to 38 cm/s. 4. Set the unit to the recording mode. 5. Set the recording mode selectors: L-CH to ON and R-CH to OFF. 6. Measure voltage across R512 (1Ω) (at point Bias) shown in fig. 50. 7. Next set the record mode selectors: R-CH to ON and L-CH to OFF. 8. Measure voltage at point Bias. 9. Bias current is calculated by formula below. $\text{Bias Current} = \frac{\text{Voltage read on VTVM}}{1 \Omega} \text{ (V)}$ <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Standard value at 38 cm/s tape speed and at "2" position of Bias Selector: around 3 mV</p> </div> <ol style="list-style-type: none"> 10. Next set bias selector to "1" position, and measure the bias current in the same way as described in steps 3 to 9 above. 11. Confirm that the bias current is 10% less than at the "2" position of the bias selector. 12. Next set bias selector to "2" position and confirm that bias current is 10% greater than at the "2" position of the bias selector. <p>In the same way, measure bias current at 9.5 cm/s tape speed. (Standard value at "2" position of bias selector is around 2.6 mV.)</p>
Recording current	<ol style="list-style-type: none"> 1. Test equipment connections are shown in fig. 49. 2. Stop the bias oscillation by unsoldering the connection point Bias Cut for bias current ON/OFF shown in figure 50. 3. Thread blank test tape QZZORA218EX. 4. Set the tape selector to "38" position. 5. Set the equalizer selector to "2" position. 6. Supply 1 kHz signal (−24 dB ± 3 dB) from AF oscillator, through ATT, to LINE-IN jacks, and adjust ATT until source monitor level at LINE-OUT jacks on VTVM becomes 0.55 V. 7. Set the recording mode selectors to "ON" (L-CH) and "OFF" (R-CH). 8. Place unit into recording modes.

ITEM

MEASUREMENTS & ADJUSTMENTS

9. Measure voltage across R512 (1 Ω), and then calculate recording current by formula below.

$$\text{Recording current} = \frac{\text{Value read on VTVM (V)}}{1 (\Omega)}$$

Standard value: around 0.16 mV

10. Then set the recording mode selectors to "OFF" (L-CH) and "ON" (R-CH), and confirm that the above standard value can be obtained.

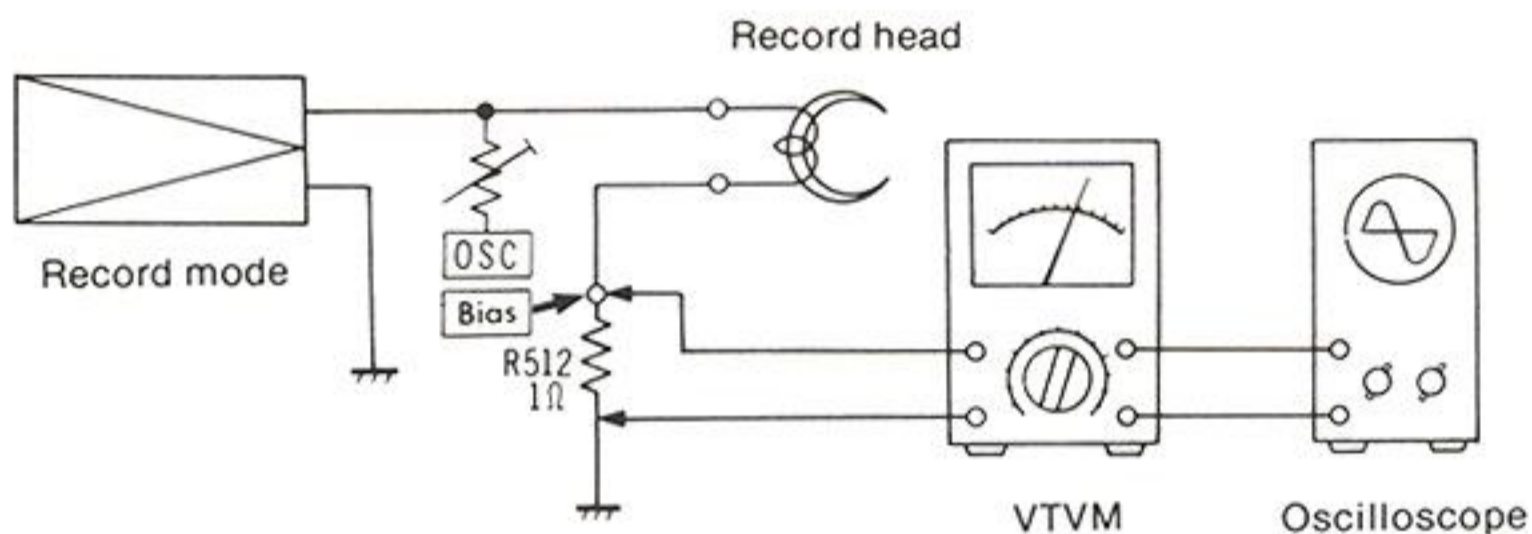


Fig. 49

Recording equalization

1. Test equipment connections are shown in fig. 49.
2. Place unit in the same condition as for "Recording current measurement" on page 41. (Step 1—Step 10).
3. Change the supplied signal (1 kHz) to 31.5 Hz, 100 Hz, 400 Hz, 6.3 kHz and 20 kHz, and compare output level with standard recording current value across R512 (1 Ω) = Bias point.

Standard level difference:

(tape speed: 38 cm/s, equalizer: 2 position)

Input frequency (Hz)	31.5	100	400	6.3K	20K
Level difference (dB) across R512	5 ± 2	0 ± 2	0	-2 ± 2	2 ± 3

ITEM

MEASUREMENTS & ADJUSTMENTS

Reference of standard level difference:
(tape speed: 19cm/s, 9.5cm/s, equalizer: 2 position)

Input frequency (Hz)	100	400	6.3K	12.5K	16K
Level difference (dB) for 19cm/s	0 ± 2	0	3 ± 3	—	12 ± 4
for 9.5cm/s	0 ± 2	0	4 ± 3	15 ± 4	—

4. Next, set the equalizer selector to "3" or "1" position in the above condition. The following standard level difference should be obtained.

A) Standard level difference (dB):

(tape speed: 38cm/s, Input frequency: 20kHz).

"1" position: $+3\text{dB} \pm 1\text{dB}$ higher than "2" position.

"3" position: $-3\text{dB} \pm 1\text{dB}$ lower than "2" position.

B) Standard level (dB):

(tape speed: 19cm/s, Input frequency: 16kHz)

"1" position $+3\text{dB} \pm 2\text{dB}$ higher than "2" position.

"3" position: $-3\text{dB} \pm 2\text{dB}$ lower than "2" position.

C) Standard level difference (dB):

(tape speed: 9.5cm/s, Input frequency: 12.5kHz)

"1" position: $+4\text{dB} \pm 3\text{dB}$ higher than "2" position.

"3" position: $-4\text{dB} \pm 3\text{dB}$ lower than "2" position.

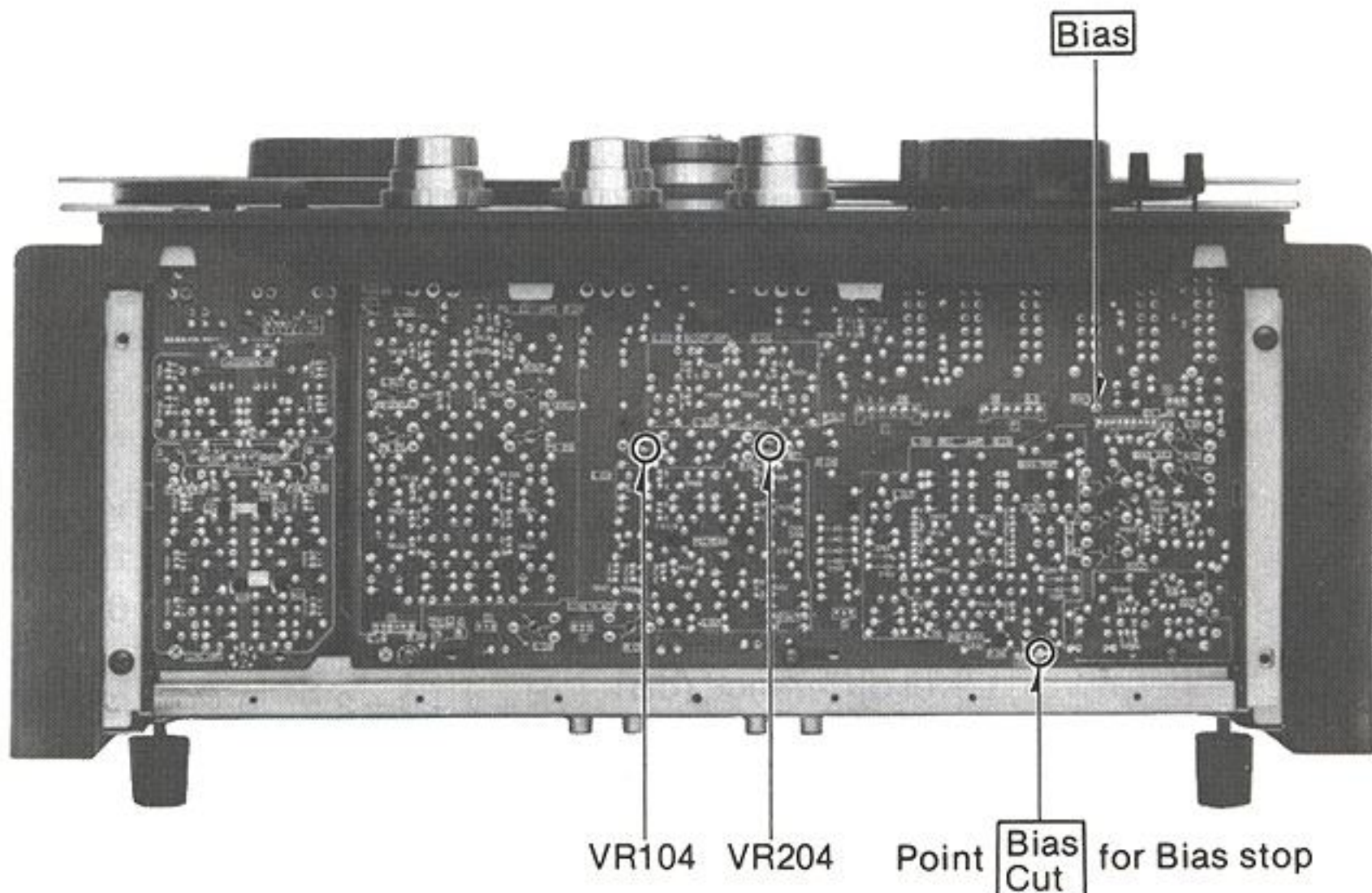


Fig. 50

ITEM	MEASUREMENTS & ADJUSTMENTS															
Overall gain	<ol style="list-style-type: none"> 1. Test equipment connections are shown in fig. 36. 2. Thread blank test tape QZZORA218EX. 3. Supply 400Hz signal (-24 ± 3dB) from AF oscillator, through ATT, to LINE-IN jacks. 4. Adjust ATT so that the output level at LINE-OUT jacks on VTVM becomes 0.55V. 5. Place unit into recording mode. 6. Set the monitor selector to "Tape" position (both channels). 7. Then, measure the output level at LINE-OUT jacks when VTVM indicates 0.55V. <p>[Adjustment]</p> <ol style="list-style-type: none"> 1. If the measured value is not satisfied, adjust the overall gain adjustment VR, VR104 (L-CH) and VR204 (R-CH) shown in figure 50. 															
Overall S/N ratio	<ol style="list-style-type: none"> 1. Test equipment connections are shown in fig. 36. 2. Thread blank test tape QZZORA218EX. 3. Set monitor selector to "Source" position. 4. Supply 1 kHz signal with $-24 \text{dB} \pm 3 \text{dB}$ from AF oscillator, through ATT, to LINE IN jacks and adjust ATT so that the output level at LINE OUT jacks indicates 0.55V. 5. Record the above signal. 6. Nex, make another recording without supplying signal (Disconnect inputs to LINE IN jacks.) 7. Then, rewind the tape and playback it with monitor selector at "Tape" position. 8. Measure the output level of 1 kHz signal and no-signal (noise), and determine the ratio in decibels (dB). 9. The value is different between "playback S/N" and "Overall S/N". For decibel calcuration, however, refer to "Playback S/N". <p style="text-align: center;">Standard values</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Tape speed</th> <th>RS-1500US</th> <th>RS-1506US</th> </tr> </thead> <tbody> <tr> <td>38cm/s</td> <td>Greater than 49dB</td> <td>Greater than 46dB</td> </tr> <tr> <td>19cm/s</td> <td>Greater than 49dB</td> <td>Greater than 46dB</td> </tr> <tr> <td>9.5cm/s</td> <td>Greater than 47dB</td> <td>Greater than 44dB</td> </tr> <tr> <td colspan="3">Bias and EQ: position 2 and without NANB filter.</td> </tr> </tbody> </table>	Tape speed	RS-1500US	RS-1506US	38cm/s	Greater than 49dB	Greater than 46dB	19cm/s	Greater than 49dB	Greater than 46dB	9.5cm/s	Greater than 47dB	Greater than 44dB	Bias and EQ: position 2 and without NANB filter.		
Tape speed	RS-1500US	RS-1506US														
38cm/s	Greater than 49dB	Greater than 46dB														
19cm/s	Greater than 49dB	Greater than 46dB														
9.5cm/s	Greater than 47dB	Greater than 44dB														
Bias and EQ: position 2 and without NANB filter.																

ITEM	MEASUREMENTS & ADJUSTMENTS			
Erase ratio	<ol style="list-style-type: none"> 1. Test equipment connections are shown in fig. 36. 2. Thread blank test tape QZZORA218EX. 3. Supply 1 kHz signal ($-24\text{ dB} \pm 3\text{ dB}$) from AF oscillator, through ATT, to LINE-IN jacks, and adjust ATT so that the output level at LINE-OUT jacks indicates 0.55 V. 4. Next, adjust ATT so that the input level is $+10\text{ dB}$ higher than standard recording level. (Standard recording level = 1 kHz, -24 dB). 5. Record above signal with 38 cm/s tape speed. 6. Set the monitor selector to "Tape" position (both channels). 7. Next, rewind to recorded part, disconnect inputs to LINE-IN jacks, and erase the above recorded part. 8. Measure the output level of the part which is erased, and determine the ratio in decibels (dB) between the playback output signal level and the erased level. <p style="text-align: center;">Standard values (using band-pass filter)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>1 KHz: Greater than 70 dB</td> </tr> <tr> <td>100 Hz: Greater than 60 dB</td> </tr> <tr> <td>With position 1 of Bias and position 2 of EQ.</td> </tr> </table>	1 KHz: Greater than 70 dB	100 Hz: Greater than 60 dB	With position 1 of Bias and position 2 of EQ.
1 KHz: Greater than 70 dB				
100 Hz: Greater than 60 dB				
With position 1 of Bias and position 2 of EQ.				
Overall distortion	<ol style="list-style-type: none"> 1. Test equipment connections are shown in fig. 51. 2. Thread blank test tape QZZORA218EX. 3. Supply 1 kHz signal ($-24\text{ dB} \pm 3\text{ dB}$) from AF oscillator, through ATT, to LINE-IN jacks and adjust ATT so that the output level at LINE-OUT indicates 0.55 V. 4. Place unit into recording mode. 5. Set the monitor selector to "Tape" position (both channels). 6. Measure the distortion factor of output level. <p>[Adjustment]</p> <ol style="list-style-type: none"> 1. If the distortion factor does not satisfy the standard, check the bias current. If the bias current is lower than standard, distortion will increase. Care should be exercised in the adjustment because the bias current also has an influence on the overall frequency response. Refer to "Overall frequency response." 			

ITEM

MEASUREMENTS & ADJUSTMENTS

Standard value:

Tape speed: 38 cm/s, Bias and EQ selectors: 2

Less than 0.8%

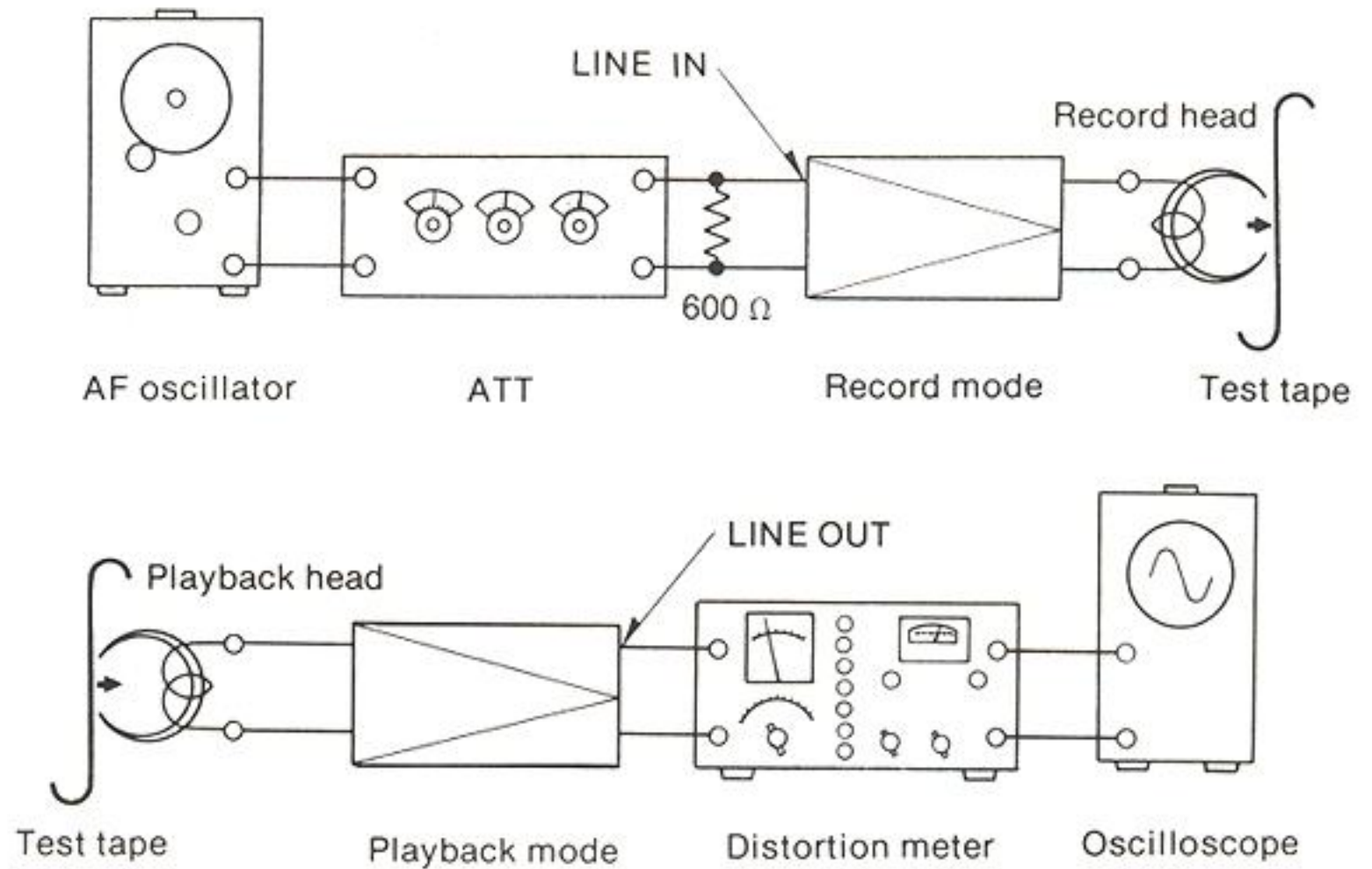


Fig. 51

SPECIFICATIONS

RS-1500US, RS-1506US

A) The specifications are prescribed provided that the tape deck conditions should be as follows, unless otherwise specified:

<u>Selector</u>	<u>Position</u>
1. Tape speed selector:	38 cm/s
2. 2T/4T head selector:	2T
3. Equalizer selector:	2
4. Bias selector:	2
5. Pitch-control:	OFF
6. Timer-start switch:	OFF
7. Meter scale selector	+3 dB
8. Microphone attenuator switch:	0 dB
9. Output level control:	8 position
10. Mic in control:	Maximum
11. Line in control:	Maximum

B) Test tape used: QZZOF380EX
QZZOF190EX
QZZOW380EX
QZZOW190EX
QZZORA218EX

C) Standard output level: 0.55 V

Item	Specification	Adjustment Part	Remarks
Playback System			
Playback frequency response		VR105 (L-CH) VR205 (R-CH)	_____
	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>[Tape speed: 38 cm/s]</p> </div> <div style="text-align: center;"> <p>[Tape speed: 19 cm/s]</p> </div> </div>		
Standard playback output	0.55 V	VR106 (L-CH) VR206 (R-CH)	See page 26
Maxmam playback output	0.775 V	_____	Output level control: maximum
Playback S/N ratio (unweighted)	50dB or more (38cm/s) 48dB or more (19cm/s, 9.5cm/s)	_____	
Playback level meter	0VU	VR109 (L-CH) VR209 (R-CH)	See page 30

Recording System

Standard recording level	Line in: -24 ± 3 dB Mic in: -72 ± 2 dB	VR101 (L-CH) VR201 (R-CH)	
Recording level meter	0VU	VR108 (L-CH) VR208 (R-CH)	See page 30
Erase current	65 mA (at Bias position 1) 71 mA (at Bias position 2) 78 mA (at Bias position 3)	VR501 VR502 VR503	
Bias current reakage-1	Minimum (less than 3V)	L102 (L-CH) L202 (R-CH)	
Bias current reakage-2	Minimum (less than 3mV)	L103 (L-CH) L203 (R-CH)	

Item	Specification	Adjustment Part	Remarks
Bias current	When 38cm/s, 19cm/s Around 2.7mA (at Bias position 1) Around 3mA (at Bias position 2) Around 3.3mA (at Bias position 3) When 9.5cm/s Around 2.6mA (at Bias position 2)	(VR501) (VR502) (VR503) (VR506)	Note the bias current has heavily influence upon overall frequency response
Recording current	Around 160 μ A	(VR104: L-CH) (VR204: R-CH)	
Recording equalization		_____	See page 42

Compensation values depending upon frequencies.

Tape speed: 38cm/s, Eq position: 2

Frequency (Hz)	31.5	100	400	6.3K	20K
Value (dB)	5 \pm 2	0 \pm 2	0	-2 \pm 3	2 \pm 3

Tape speed: 19cm/s, EQ position: 2

Frequency (Hz)	100	400	6.3K	16K
Value (dB)	0 \pm 2	0	3 \pm 3	12 \pm 4

Tape speed: 9.5cm, EQ position: 2

Frequency (Hz)	100	400	6.3K	12.5K
Value (dB)	0 \pm 2	0	4 \pm 3	15 \pm 4

Compensation values depending upon EQ position.

Tape speed: 38cm/s, Frequency 20kHz

EQ position	1	2	3
Value (dB)	+3 \pm 1	0	-3 \pm 1

Tape speed: 19cm/s, Frequency: 16kHz

EQ position	1	2	3
Value (dB)	+3 \pm 2	0	-3 \pm 2

Tape speed: 9.5cm/s, Frequency: 12.5kHz

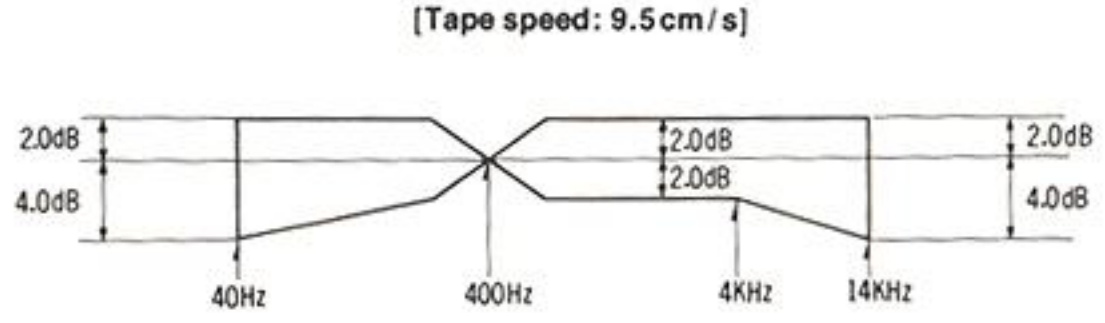
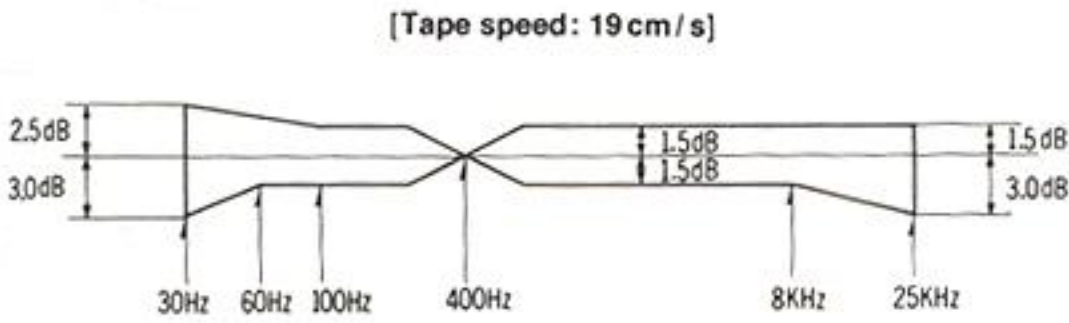
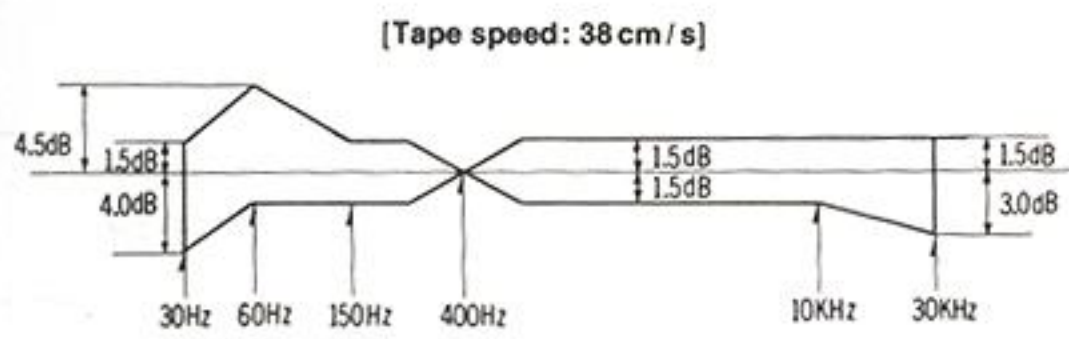
EQ position	1	2	3
Value (dB)	+4 \pm 3	0	-4 \pm 3

Item	Specification	Adjustment Part	Remarks
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Overall System

Overall frequency response (stereo mode)

VR505 (L-CH)
VR504 (R-CH)
L101 (L-CH)
L201 (R-CH)
(for 38cm/s, 19cm/s)
VR506
(for 9.5cm/s)



Overall frequency response (monaural mode)

Within ± 2 dB

L502 (L-CH)
L501 (R-CH)

With relation to that of stereo mode. See page 40

Overall gain

0.55 V \pm 0.5 dB

VR104 (L-CH)
VR204 (R-CH)

Overall S/N ratio

—————

Tape speed	RS-1500US	RS-1506US
38 cm/s	49 dB or more	46 dB or more
19 cm/s	49 dB or more	46 dB or more
9.5 cm/s	47 dB or more	44 dB or more

Bias & EQ positions: 2, and without NAB filter.

Erase ratio

Frequency	Standard value
1 kHz	70 dB or more
100 Hz	60 dB or more

Bias and EQ position: 2,
Tape speed: 38 cm/s

Overall distortion

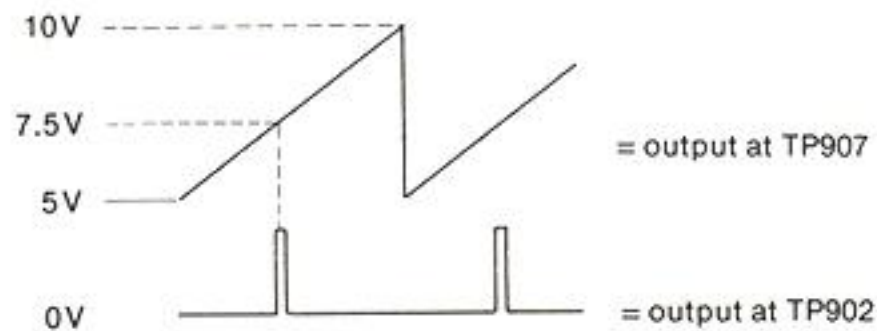
0.8% or less

—————

Item	Specification	Adjustment Part	Remarks
Mechanism System			
Pressure roller position	Symmetrical with relation to capstan Approx. 1 mm space left between capstan and pressure rollers	Control plate Adjustment plate	See page 11 See page 12
Pressure of pressure roller	900 ± 100 gr	Pressure roller plunger	See page 13
Pressure roller height	See page 14	Number of washer	See page 14
Brakes	450 ± 70 gr: Strong direction 140 ± 25 gr: Weak direction	Brake plunger	See page 14
Tape tension	65 ± 5 gr: Take up torque 75 ± 5 gr: Back tension	VR802 VR801	IT: 0.31 V IS: 0.21 using 10" reel
Tension roller height	See page 17	Number of washer	See page 17
Reel table height	See page 17	Height adjustment screw	See page 17
Tape guides position	See page 18	Each guide	See page 18
Tape speed			

Tape Speed (cm/s)	Speed Deviation (%)	Speed Fluctuation (%)	Wow & Flutter	
			JIS, WRMS (%)	DIN, W/P-P (%)
38	± 0.10	0.10	0.018	± 0.035
19	± 0.15	0.15	0.03	± 0.080
9.5	± 0.15	0.20	0.06	± 0.16

Item	Specification	Adjustment Part	Remarks
Pitch control	$\pm 6\%$	VR904	See page 19
Capstan motor control circuit		VR905, VR901	See page 21

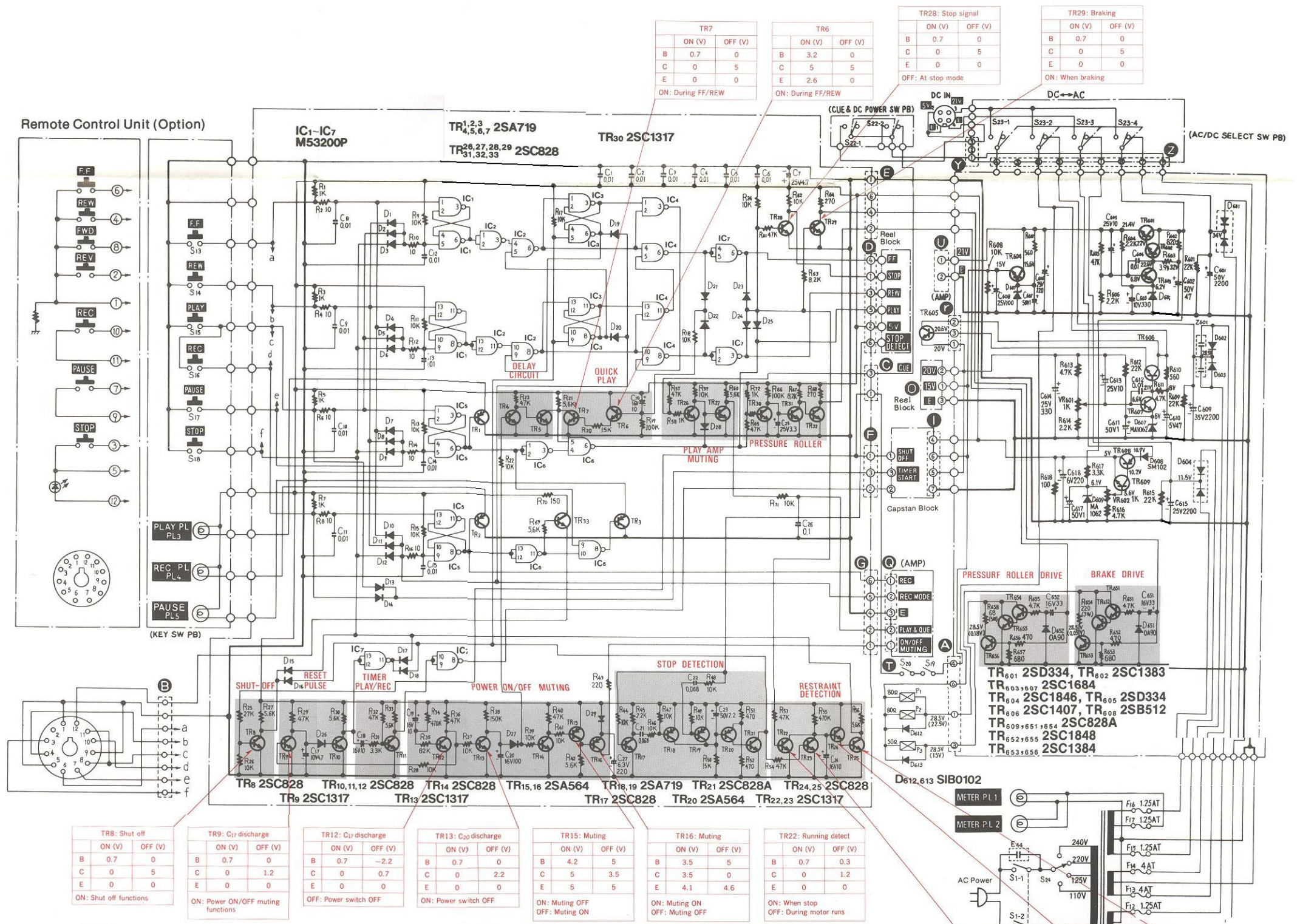


Adjust so that the pulse signal at 50%
of the amplitude of the sawtooth wave.

Playback heads	See page 22	Head set screws	See page 22
Playback head phase	Within 60°	Azimuth adjustment screw	See page 24
Erase head	See page 35	Head set screws	See page 35
Record head	See page 36	Head set screws	See page 36
Record head phase	See page 37	Azimuth adjustment screw	See page 37

SCHEMATIC DIAGRAM MODEL RS-1500US

Power Supply Section and Main Control Circuit



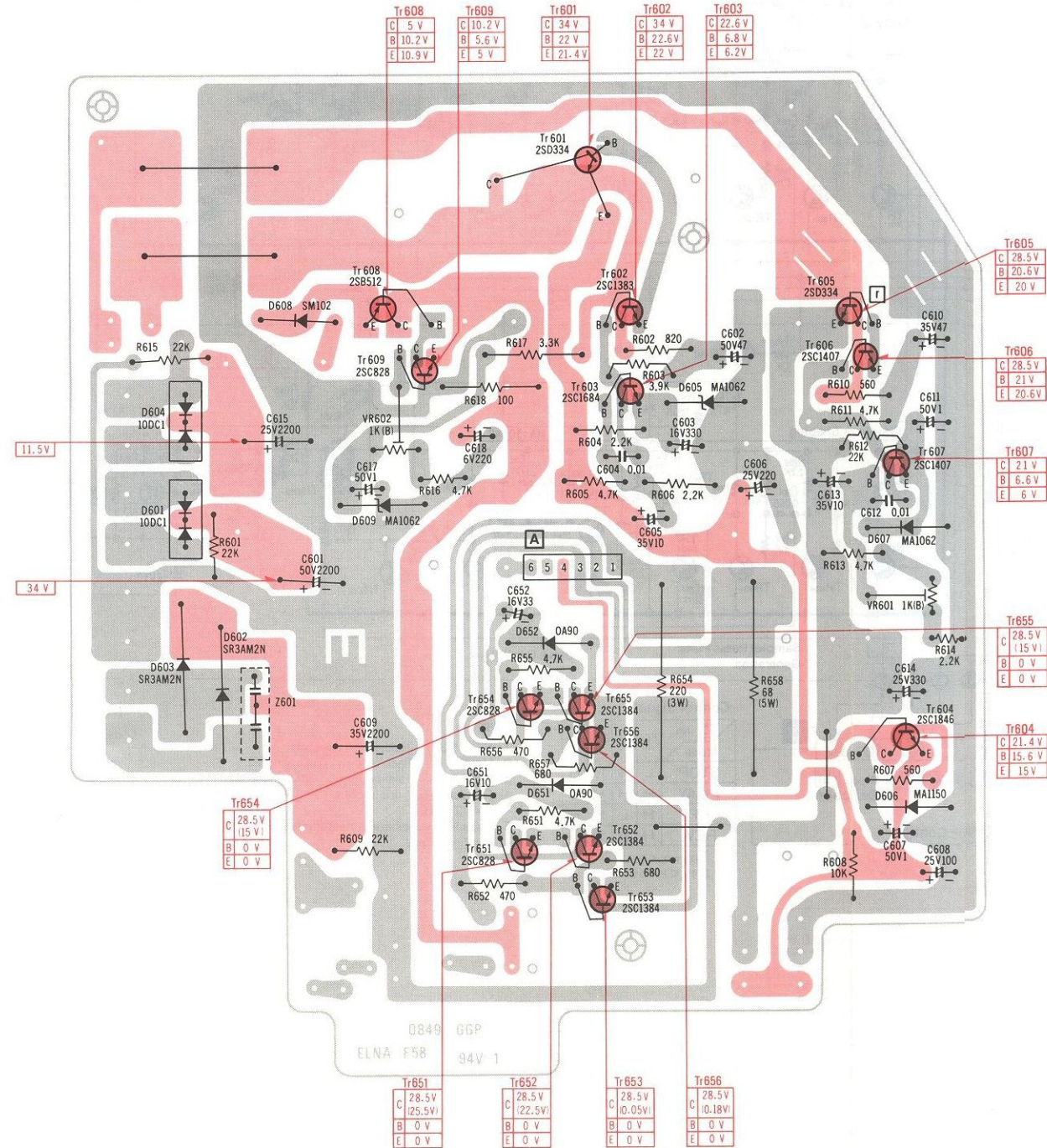
NOTE:

- S₁ Power ON/OFF switch.
- S₁₃ FF switch.
- S₁₄ Rew switch.
- S₁₅ Play switch.
- S₁₆ Rec switch.
- S₁₇ Pause switch.
- S₁₈ Stop switch.
- S₁₉, S₂₀ Shut-off switch.
- S₂₂₋₁—S₂₂₋₂.....Cue ON/OFF & DC power ON/OFF switch, (shown in cue off position).
- S₂₃₋₁—S₂₃₋₄.....AC/DC select switch (shown in AC position).
- S₂₄ Voltage selector switch.
- VR₀₁ Vol
- P₁, P₂ Bra
- P₃ Pre
- Resistor values a K = 1000.
- Capacitor values P = Pico-farads.
- Voltagess shown i

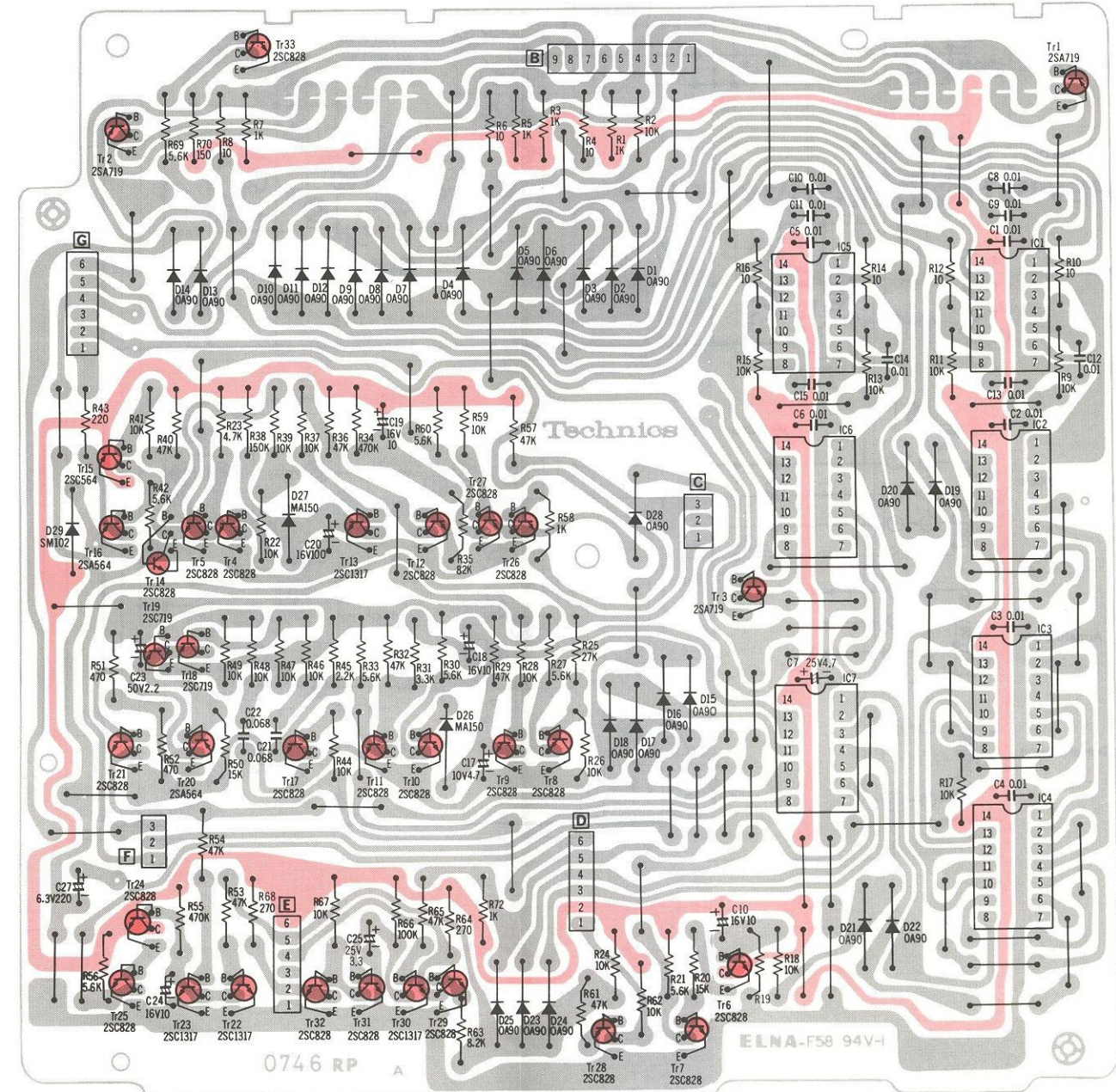
Specificati

CIRCUIT BOARD

Power Supply Circuit Board

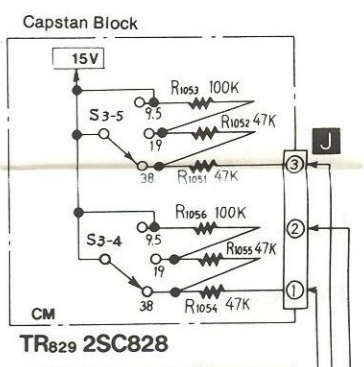
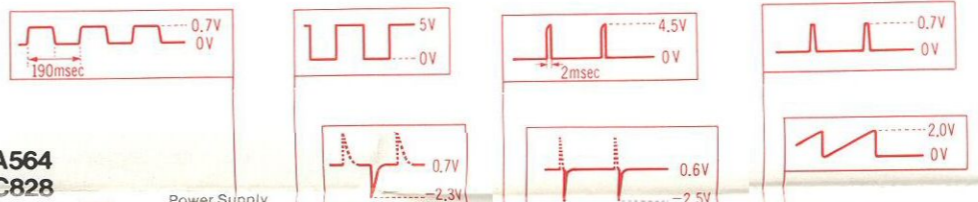
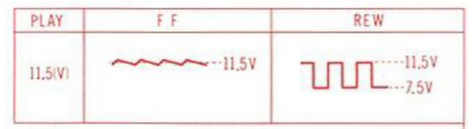


Main Control Circuit Board

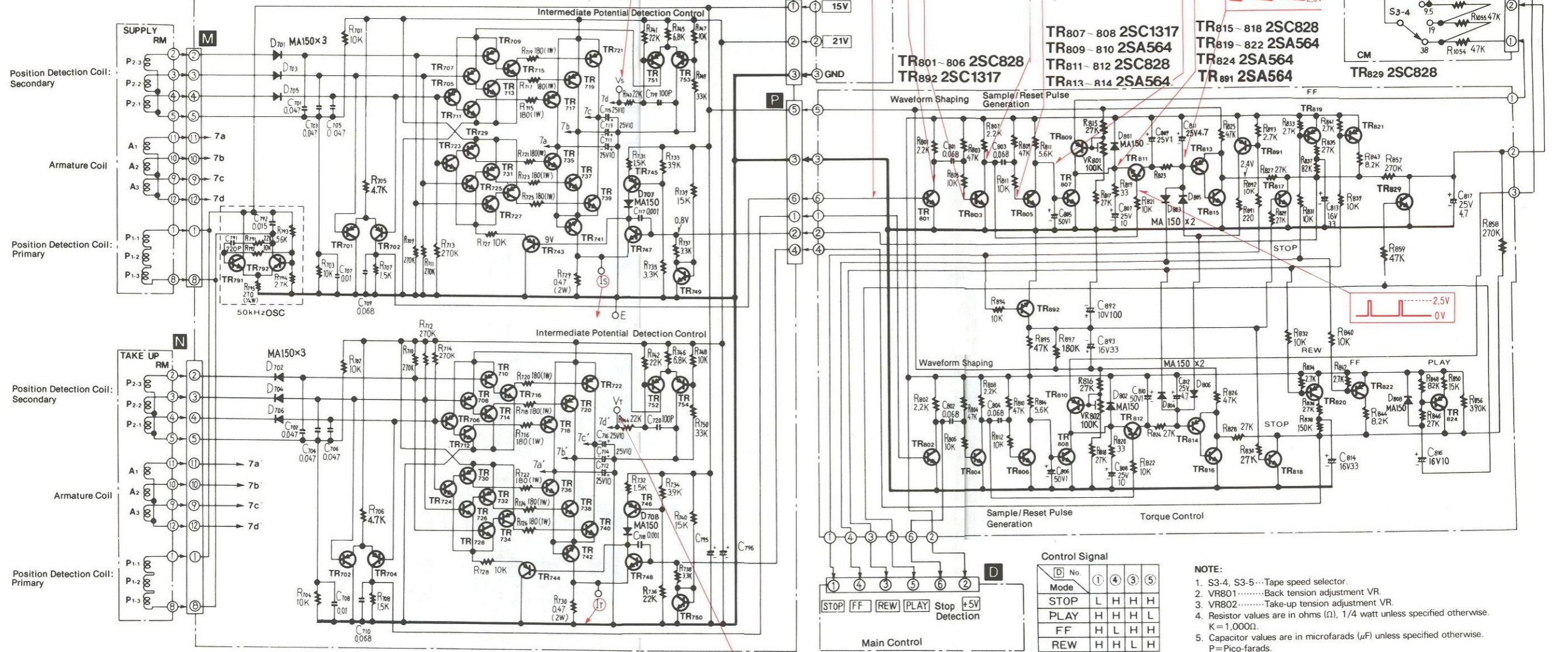


NOTE:
The circuit shown in red on the conductor is B circuit.
Values indicated in () are DC voltage between the chassis and electrical parts.
Voltages shown in () are voltages when plunger is in "ON" condition.

Reel Motor Section



TR791 2SC828 **TR711 - 716 2SC1383** **TR729 - 734 2SA683** **TR743 - 746 2SA564**
TR792 **TR705 - 710 2SA722** **TR717 - 722 2SB512** **TR747 - 750 2SC828**
TR701 - TR704 2SA564 **TR723 - 728 2SC1328** **TR735 - 742 2SD389** **TR751 - 754 2SA564**

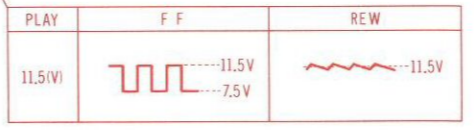
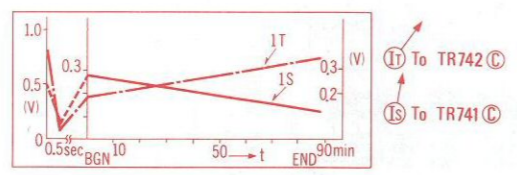


SUPPLY RM
 Position Detection Coil: Secondary
 Armature Coil
 Position Detection Coil: Primary
 TAKE UP RM
 Position Detection Coil: Secondary
 Armature Coil
 Position Detection Coil: Primary

Control Signal

D No.	1	4	3	5
Mode	L	H	H	H
STOP	L	H	H	H
PLAY	H	H	H	L
FF	H	L	H	H
REW	H	H	L	H

- NOTE:
- S3-4, S3-5...Tape speed selector.
 - VR801...Back tension adjustment VR.
 - VR802...Take-up tension adjustment VR.
 - Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise. K = 1,000 Ω .
 - Capacitor values are in microfarads (μ F) unless specified otherwise. P = Pico-farads.



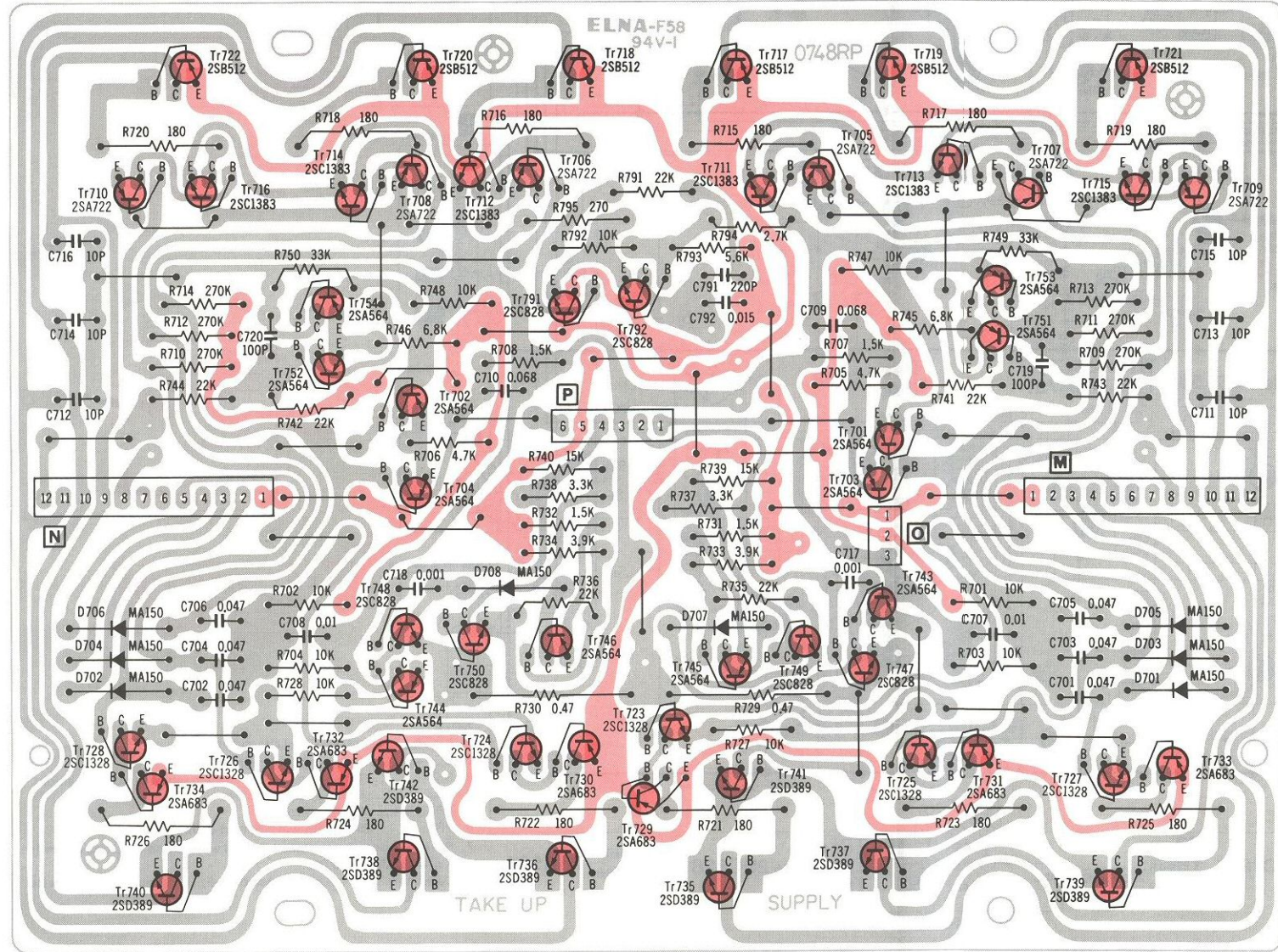
Reel Drive Section

Main Control

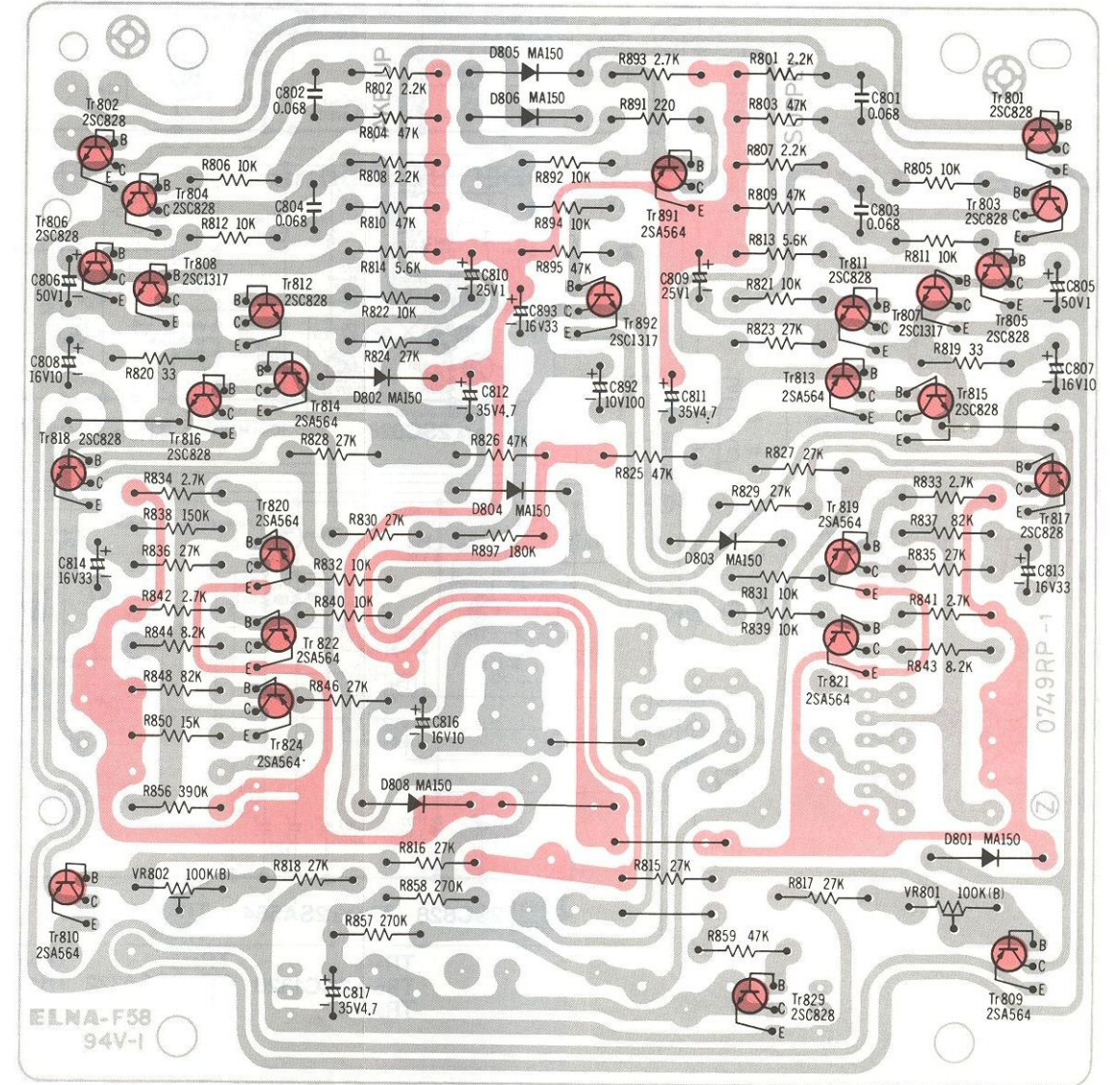
0V = L < 0.4V
2.4V < H = 5V

CIRCUIT BOARD

Reel Motor Driving Circuit Board



Reel Motor Tension Control Circuit Board

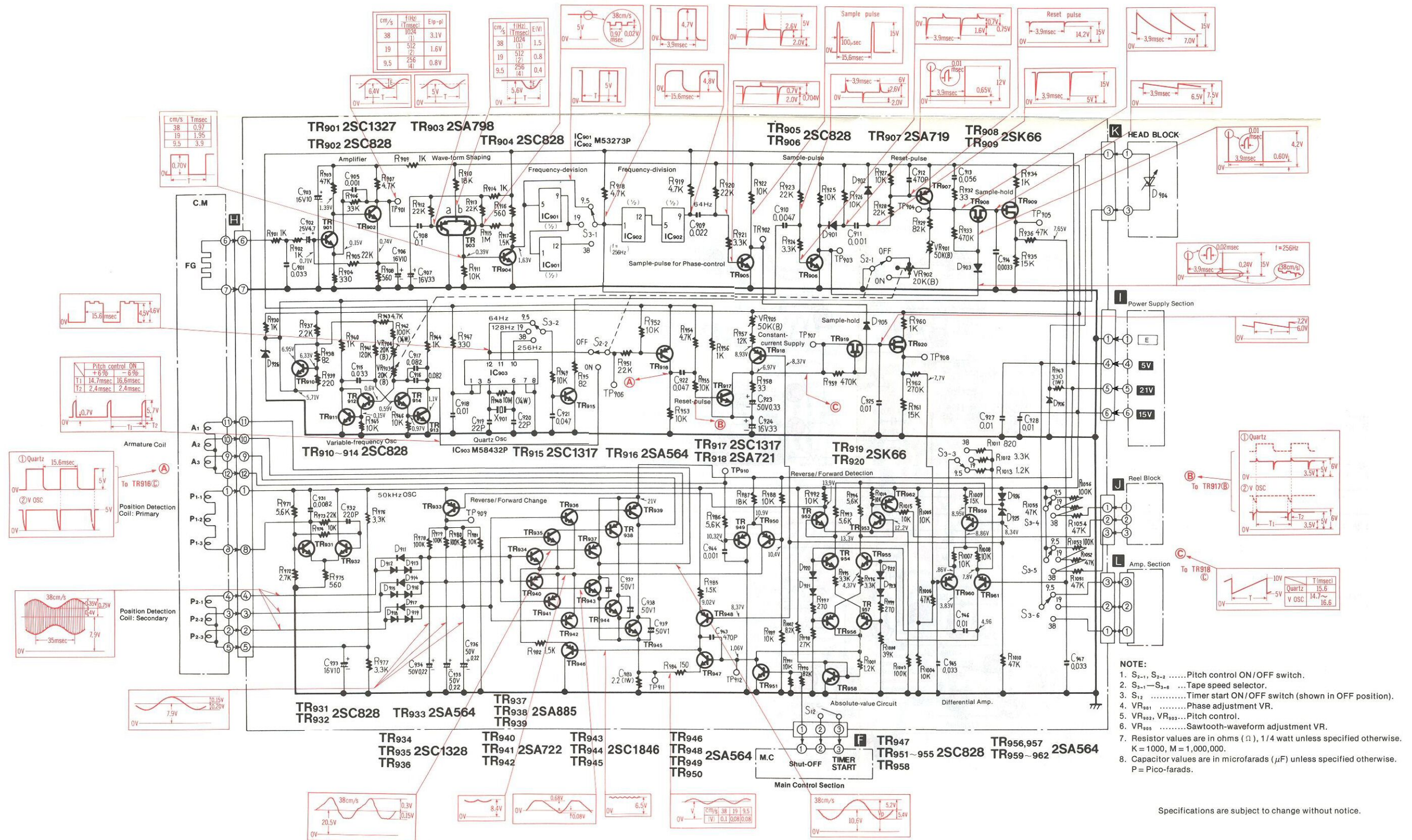


NOTE:

The circuit shown in red on the conductor is B circuit.
Values indicated in are DC voltage between the chassis and electrical parts.

SCHEMATIC DIAGRAM MODEL RS-1500US

Capstan Motor Section

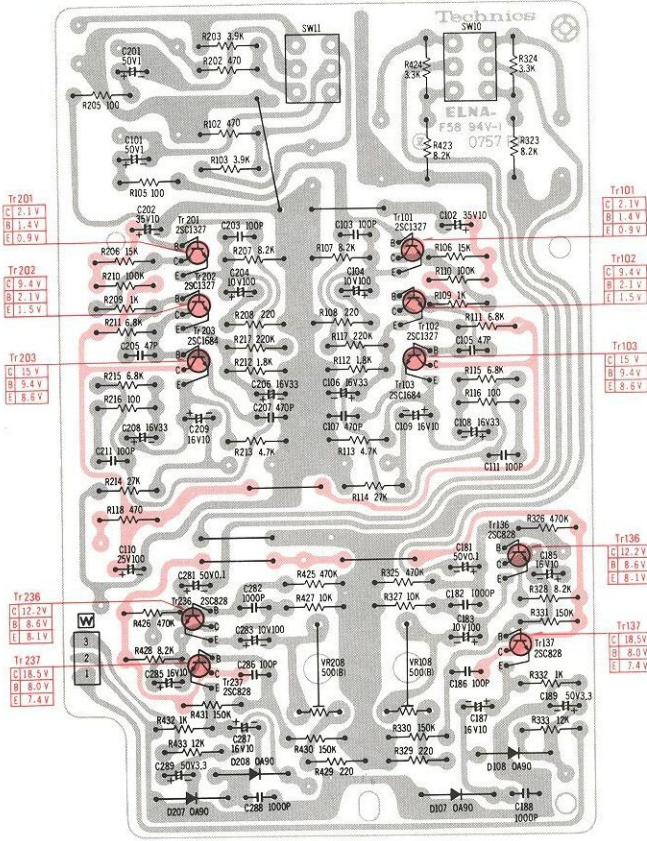


- NOTE:**
- S₂₋₁, S₂₋₂ Pitch control ON/OFF switch.
 - S₂₋₁—S₂₋₆ ... Tape speed selector.
 - S₁₂ Timer start ON/OFF switch (shown in OFF position).
 - VR₉₀₁ Phase adjustment VR.
 - VR₉₀₂, VR₉₀₃... Pitch control.
 - VR₉₀₅ Sawtooth-waveform adjustment VR.
 - Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise. K = 1000, M = 1,000,000.
 - Capacitor values are in microfarads (μ F) unless specified otherwise. P = Pico-farads.

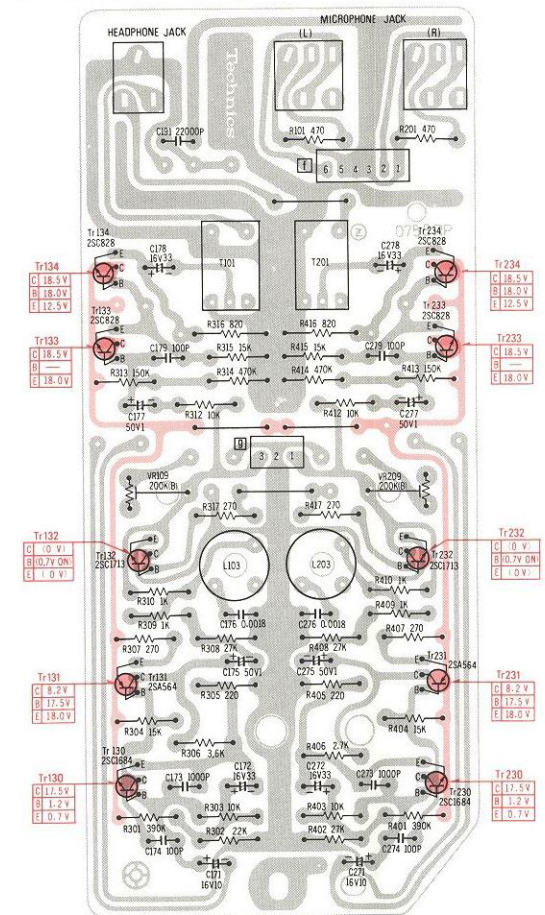
Specifications are subject to change without notice.

CIRCUIT BOARD

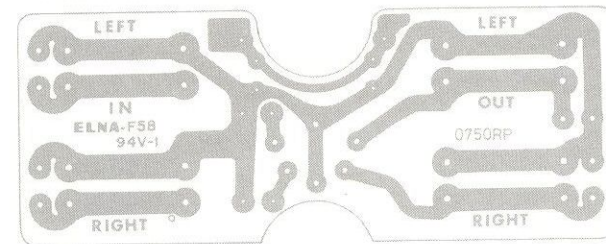
Mic and Meter Amp. Circuit Board



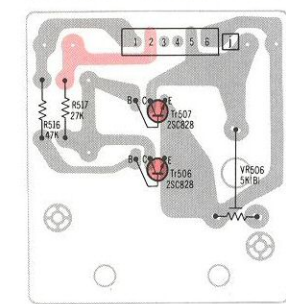
Line-out Headphone Amp. Circuit



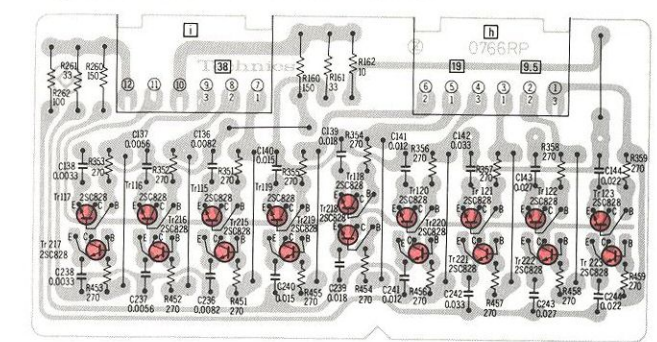
Jack Circuit Board



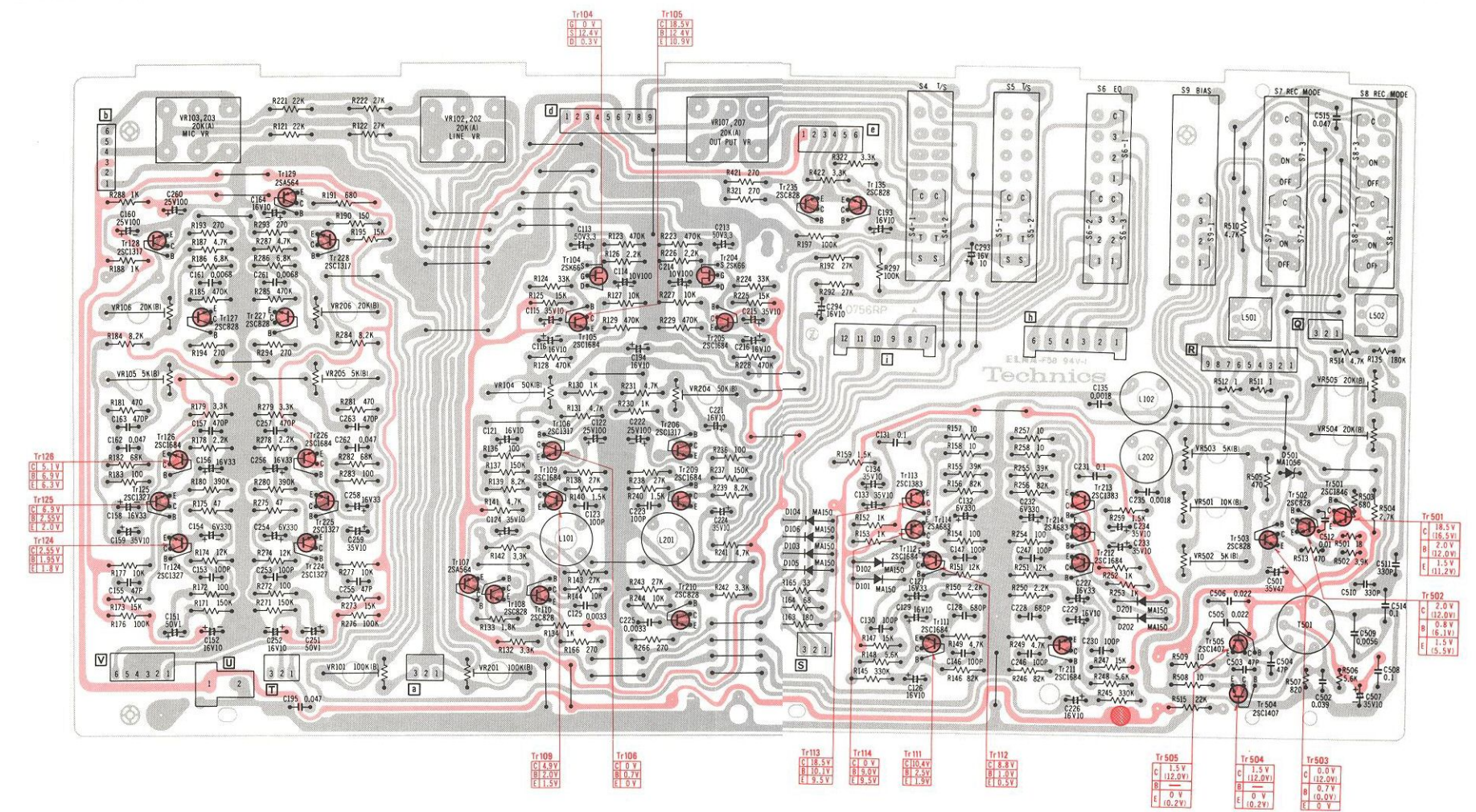
Tr507 Circuit Board



Equalization Circuit Board



Main Amp. Circuit Board



NOTE:
 The circuit shown in red on the conductor is B circuit.
 Values indicated in are DC voltage between the chassis and electrical parts.
 Voltages shown in () are voltages when UNIT is in "recording" condition.
 Voltages for R-channel are same voltages as L-channel.

REPLACEMENT PARTS LIST
MODEL RS-1500US (Technics)
by Panasonic

RS-1500US

ATTENTION:

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



RS-1500US

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
M29	QXR0308	Air Damper Rod (L) Assembly	1	
M30	QMA2985	Air Damper Holding Angle	1	
M31	QXQ0096	Air Damper (L) Assembly	1	
M32	QXH0257	Tension Lever Holding Plate	1	
M33	QMF1860B	Meter Holding Plate	1	
M34	QBT1687M	Spring	2	RS-625US
M35	QXA0607	Angle (R) Assembly	1	
M36	QMR1572A	Rod (R)	1	
M37	QXL1111	Arm (R) Assembly	1	
M38	QXL1109	Sub-arm (R) Assembly	1	
M39	QXL1112	Brake Lever Assembly	2	
M40	QME0147BK	Plunger (for Brake)	2	
M41	QBT1420	Spring	1	RQ-437S
M42	QXA0606	Angle (L) Assembly	1	"
M43	QMR1571A	Rod (L)	1	"
M44	QXL1110	Arm (L) Assembly	1	"
M45	QXL1108	Sub-arm (L) Assembly	1	"
M46	QXL1098	Pressure Roller Lever Assembly	2	"
M47	QXL1104	Pressure Roller Sub-arm (R) Assembly	1	"
M48	QXL1103	Pressure Roller Sub-arm (L) Assembly	1	"
M49	QMN2139	Shaft (1)	2	"
M50	QDP1704	Roller	1	"
M51	QMS2428A	Shaft (2)	2	"
M52	QMN2140	Shaft (3)	2	"
M53	QBC1071	Spring	2	"
M54	QMC0053	Spacer	2	"
M55	QXL1073	Shifter Arm (R) Assembly	1	"
M56	QXL1072	Shifter Arm (L) Assembly	1	"
M57	QXH0248	Mask Plate Assembly	1	"
M58	QMH2004B	Cue Holder	1	"
M59	QGO1284	Cue Button	1	"
M60	QMF1862	Stopper Plate	1	"
M61	QDC0087	Counter	1	"
M62	QML3024	Stopper Arm	1	
M63	QBG1132	Stopper Rubber	1	RS-630US

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
MECHANICAL PARTS				
M1	QXS1090	Capstan Motor Assembly	1	
M2	QXD0077	Reel Motor (Rotor) Assembly	2	
M4	QMR1531	Connection Rod	2	
M5	QML3007	Cue Lever	1	
M6	QMF1852A	Adjustment Plate	1	
M7	QBN1346A	Spring	1	RS-284S
M8	QMF1855A	Control Plate	1	
M9	QXH0259	Adjustment Plate Assembly	1	
M10	QXL1107	Driving Lever Assembly	1	
M11	QME0138A	Plunger (for Pressure Roller)	1	RS-1030US
M12	QMN2168	Plunger Pin	1	
M13	QMF1874A	Plunger Holding Plate	1	
M15	QXQ0097	Air Damper Assembly	1	
M15-1	QBG1561	Bellows	3	
M16	QMA3124	Air Damper Angle	1	
M17	QMA2965	Stopper Angle	1	
M18	QXL1106A	Tension Lever (R) Assembly	1	
M19	QXR0307	Air Damper Rod (R) Assembly	1	
M20	QMA2984	Air Damper Holding Angle	1	
M21	QXQ0015	Air Damper (R) Assembly	1	
M22	QXH0258	Tension Lever Holding Plate	1	
M23	QMC0052	Spacer	2	
M25	QBK1217	Isolation Sheet	2	RS-671AUS
M26	QMF1682	Micro Switch Mounting Plate	2	"
M27	QBC1189	Spring	2	RS-740US
M28	QXL1105A	Tension Lever (L) Assembly	1	

RS-1500US

RS-1500US

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
M64	QXA0608	Counter Holding Plate Assembly	1	
M65	QBT1601M	Spring	1	
M66	QDP1702	Intermediate Pulley	1	
M67	QDB0215	Counter Belt-A	1	RS-671AUS
M68	QDB0173	"	1	RS-1030US
M69	QMF1863	Wires Connector Holding Angle	1	
M70	QMA2955	Wires Connector Cover Angle	1	
M71	QMF1850	Function Buttons Holding Plate	1	
M72	QMN2142	Function Buttons Holding Shaft	1	
M73	QGO1278	Fast Forward Button	1	
M74	QGO1282	Play Button	1	
M75	QGO1283	Stop Button	1	
M76	QGO1279	Rewind Button	1	
M77	QMC0050	Coller	1	
M78	QGO1280	Pause Button	1	
M79	QGO1281	Record Button	1	
M80	QBM1227	Cushion	1	
M81	QMG0033	Tape Guide-1 of Shifter Arm	2	
M82	XLCQ0001	Roller	2	
M83	QMG0034	Tape Guide-2 of Shifter Arm	2	
M84	QKJ0200	Tape Marker	2	
M85	QMC0054	Spacer	2	
M86	QMS2428A	Tape Guide Shaft	2	
M87	QBC1087	Tape Guide Spring	2	RS-796US
M88	QMG0046	Tape Guide-3	2	
M89	QMG0045	Tape Guide-4	2	
M90	QMG0031	Tape Guide-5	2	
M91	QHQ1247	Screw with Hexagon Hole	2	
M92	QXP0544A	Pressure Roller Assembly	2	
M93	Q GK2731A	Pressure Roller Ornament	2	
M94	QMS2430	Reversing Roller Shaft	1	
M95	QSC1202	Spring	1	RS-1030US
M96	QXP0559	Reversing Roller Assembly	1	
M97	QBP1714	Plate Spring	1	
M98	QDP1701	Roller	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
M99	QBF1254	Felt	1	
M100	Q GK2643	Roller Ornament	1	
M101	QMK1598A	Head Base Plate	1	
M102	QGC1065A	Head Bottom Cover	1	
M103	QMG0029	Tape Guide-6	2	
M104	QMG0030	Tape Guide-7	2	
M105	QMZ1181A	Head Sheet-1	4	
M106	QMF1866	Head Spacer	2	
M107	QMA2929A	Switch Holding Angle	1	
M108	QMP1330	Spacer	2	
M109	QKJ0164	Mask	1	
M110	QKJ0163	LED Holder	1	
M111	QBC1180	Head Mounting Spring	14	RS-715US
M112	QNQ1069	Nut	4	
M115	XTN4+14B	Screw 4×14	6	COMMON
M116	XTN4+10B	Screw 4×10	28	"
M117	XTN3+8B	Screw 3×8	5	"
M118	XSN2+12	Screw 2×12	4	"
M119	XSN26+6	Screw 2.6×6	4	"
M120	XSN4+30S	Screw 4×30	2	"
M121	XSN3+6S	Screw 3×6	14	"
M122	XVE5C30FZS	Screw with Hexagon Hole	3	
M123	XWA4	Spring Washer	4	COMMON
M124	XWA2BFZ	"	14	"
M125	XWA26B	"	4	"
M126	XWC3B	Lock Washer	10	"
M127	QBW2023	Poly Washer	1	
M128	XWA3B	Spring Washer	2	COMMON
M129	QBW2019	Poly Washer	11	RS-630US
M130	QBW0034	Washer	4	
M131	XWG4	Flat Washer	4	COMMON
M132	QBW2022	Poly Washer	3	
M133	XUC5FT	Stop Ring 5φ	10	COMMON
M134	XUC3FT	Stop Ring 3φ	31	"
M135	XUC4FT	Stop Ring 4φ	4	"

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RS-1500US

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
M136	XUC2FT	Stop Ring 2φ	3	COMMON
M137	XUC7FT	Stop Ring 7φ	1	"
M138	XVE3C8FZS	Screw with Hexagon Hole	4	
M139	XXE3D10FZS	"	1	COMMON
M140	QHQ1248	"	14	"
M141	XSS26+6BV	Screw 26×6	2	"
M142	XSN2+8BV	Screw 2×8	2	"
M143	XSN2+4BV	Screw 2×4	2	"
M144	XSN2+5BV	Screw 2×5	6	"
M145	XWG2FZ	Flat Washer	8	"
M146	QMF1858	Spring Holding Plate	1	
		RESISTORS		
R1	ERD25TJ102	Carbon Resistor 1KΩ 1/4W	1	
R2	ERD25TJ100	" 10Ω 1/4W	1	
R3	ERD25TJ102	" 1KΩ 1/4W	1	
R4	ERD25TJ100	" 10Ω 1/4W	1	
R5	ERD25TJ102	" 1KΩ 1/4W	1	
R6	ERD25TJ100	" 10Ω 1/4W	1	
R7	ERD25TJ102	" 1KΩ 1/4W	1	
R8	ERD25TJ100	" 10Ω 1/4W	1	
R9	ERD25TJ103	" 10KΩ 1/4W	1	
R10	ERD25TJ100	" 10Ω 1/4W	1	
R11	ERD25TJ103	" 10KΩ 1/4W	1	
R12	ERD25TJ100	" 10Ω 1/4W	1	
R13	ERD25TJ103	" 10KΩ 1/4W	1	
R14	ERD25TJ100	" 10Ω 1/4W	1	
R15	ERD25TJ103	" 10KΩ 1/4W	1	
R16	ERD25TJ100	" 10Ω 1/4W	1	
R17, 18	ERD25TJ103	" 10KΩ 1/4W	2	
R19	ERD25TJ104	" 100KΩ 1/4W	1	
R20	ERD25TJ153	" 15KΩ 1/4W	1	
R21	ERD25TJ562	" 5.6KΩ 1/4W	1	
R22	ERD25TJ103	" 10KΩ 1/4W	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R23	ERD25TJ473	Carbon Resistor 1KΩ 1/4W	1	
R24	ERD25TJ103	" 10KΩ 1/4W	1	
R25	ERD25TJ273	" 27KΩ 1/4W	1	
R26	ERD25TJ103	" 10KΩ 1/4W	1	
R27	ERD25TJ562	" 5.6KΩ 1/4W	1	
R28	ERD25TJ103	" 10KΩ 1/4W	1	
R29	ERD25TJ473	" 47KΩ 1/4W	1	
R30	ERD25TJ562	" 5.6KΩ 1/4W	1	
R31	ERD25TJ332	" 3.3KΩ 1/4W	1	
R32	ERD25TJ473	" 47KΩ 1/4W	1	
R33	ERD25TJ562	" 5.6KΩ 1/4W	1	
R34	ERD25TJ474	" 470KΩ 1/4W	1	
R35	ERD25TJ823	" 82KΩ 1/4W	1	
R36	ERD25TJ273	" 27KΩ 1/4W	1	
R37	ERD25TJ103	" 10KΩ 1/4W	1	
R38	ERD25TJ154	" 150KΩ 1/4W	1	
R39	ERD25TJ103	" 10KΩ 1/4W	1	
R40	ERD25TJ473	" 47KΩ 1/4W	1	
R41	ERD25TJ103	" 10KΩ 1/4W	1	
R42	ERD25TJ562	" 5.6KΩ 1/4W	1	
R43	ERD25TJ221	" 220Ω 1/4W	1	
R44	ERD25TJ103	" 10KΩ 1/4W	1	
R45	ERD25TJ222	" 2.2KΩ 1/4W	1	
R46, 47, 48, 49	ERD25TJ103	" 10KΩ 1/4W	1	
R50	ERD25TJ153	" 15KΩ 1/4W	1	
R51, 52	ERD25TJ471	" 470Ω 1/4W	2	
R53, 54	ERD25TJ473	" 47KΩ 1/4W	2	
R55	ERD25TJ474	" 470KΩ 1/4W	1	
R56	ERD25TJ562	" 5.6KΩ 1/4W	1	
R57	ERD25TJ473	" 47KΩ 1/4W	1	
R58	ERD25TJ102	" 1KΩ 1/4W	1	
R59	ERD25TJ103	" 10KΩ 1/4W	1	
R60	ERD25TJ562	" 5.6KΩ 1/4W	1	
R61	ERD25TJ473	" 47KΩ 1/4W	1	
R62	ERD25TJ103	" 10KΩ 1/4W	1	

RS-1500US

RS-1500US

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R63	ERD25TJ822	Carbon Resistor 8.2KΩ 1/4W	1	
R64	ERD25TJ271	" 270Ω 1/4W	1	
R65	ERD25TJ473	" 47KΩ 1/4W	1	
R66	ERD25TJ104	" 100KΩ 1/4W	1	
R67	ERD25TJ822	" 8.2KΩ 1/4W	1	
R68	ERD25TJ271	" 270Ω 1/4W	1	
R69	ERD25TJ562	" 5.6KΩ 1/4W	1	
R70	ERD25TJ151	" 150Ω 1/4W	1	
R71	ERD25TJ103	" 10KΩ 1/4W	1	
R72	ERD25TJ102	" 1KΩ 1/4W	1	
R101, 102	ERD25TJ471	" 470Ω 1/4W	2	
R103	ERD25TJ392	" 3.9KΩ 1/4W	1	
R105	ERD25TJ101	" 100Ω 1/4W	1	
R106	ERD18TSJ153	" 15KΩ 1/8W	1	
R107	ERD25TJ822	" 8.2KΩ 1/4W	1	
R108	ERD25TJ331	" 330Ω 1/4W	1	
R109	ERD25TJ102	" 1KΩ 1/4W	1	
R110	ERD25TJ104	" 100KΩ 1/4W	1	
R111	ERD25TJ682	" 6.8KΩ 1/4W	1	
R112	ERD25TJ182	" 1.8KΩ 1/4W	1	
R113	ERD25TJ472	" 4.7KΩ 1/4W	1	
R114	ERD25TJ273	" 27KΩ 1/4W	1	
R115	ERD25TJ682	" 6.8KΩ 1/4W	1	
R116	ERD25TJ101	" 100Ω 1/4W	1	
R117	ERD25TJ224	" 220KΩ 1/4W	1	
R118	ERD25TJ471	" 470Ω 1/4W	1	
R121, 122	ERD25TJ473	" 47KΩ 1/4W	2	
R123	ERD25TJ474	" 470KΩ 1/4W	1	
R124	ERD25TJ333	" 33KΩ 1/4W	1	
R125	ERD25TJ153	" 15KΩ 1/4W	1	
R126	ERD25TJ222	" 2.2KΩ 1/4W	1	
R127	ERD25TJ103	" 10KΩ 1/4W	1	
R128, 129	ERD25TJ474	" 470KΩ 1/4W	2	
R130	ERD25TJ102	" 1KΩ 1/4W	1	
R131	ERD25TJ472	" 4.7KΩ 1/4W	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R132	ERD25TJ332	Carbon Resistor 3.3KΩ 1/4W	1	
R133	ERD25TJ182	" 1.8KΩ 1/4W	1	
R134	ERD25TJ102	" 1KΩ 1/4W	1	
R135	ERD25TJ184	" 180KΩ 1/4W	1	
R136	ERD25TJ101	" 100Ω 1/4W	1	
R137	ERD25TJ154	" 150KΩ 1/4W	1	
R138	ERD25TJ273	" 27KΩ 1/4W	1	
R139	ERD25TJ822	" 8.2KΩ 1/4W	1	
R140	ERD25TJ152	" 1.5KΩ 1/4W	1	
R141	ERD25TJ472	" 4.7KΩ 1/4W	1	
R142	ERD25TJ332	" 3.3KΩ 1/4W	1	
R143	ERD25TJ273	" 27KΩ 1/4W	1	
R144	ERD25TJ103	" 10KΩ 1/4W	1	
R145	ERD25TJ334	" 330KΩ 1/4W	1	
R146	ERD25TJ823	" 82KΩ 1/4W	1	
R147	ERD25TJ153	" 15KΩ 1/4W	1	
R148	ERD25TJ562	" 5.6KΩ 1/4W	1	
R149	ERD25TJ472	" 4.7KΩ 1/4W	1	
R150	ERD25TJ222	" 2.2KΩ 1/4W	1	
R151	ERD25TJ123	" 12KΩ 1/4W	1	
R152, 153	ERD25TJ102	" 1KΩ 1/4W	2	
R154	ERD25TJ101	" 100Ω 1/4W	1	
R155	ERD25TJ393	" 39KΩ 1/4W	1	
R156	ERD25TJ823	" 82KΩ 1/4W	1	
R157, 158	ERD25TJ100	" 10Ω 1/4W	2	
R159	ERD25TJ152	" 1.5KΩ 1/4W	1	
R160	ERD25TJ151	" 150Ω 1/4W	1	
R161	ERD25TJ330	" 33Ω 1/4W	1	
R162	ERD25TJ100	" 10Ω 1/4W	1	
R163	ERD25TJ181	" 180Ω 1/4W	1	
R164	ERD25TJ680	" 68Ω 1/4W	1	
R165	ERD25TJ330	" 33Ω 1/4W	1	
R166	ERD25TJ271	" 270Ω 1/4W	1	
R171	ERD25TJ154	" 150KΩ 1/4W	1	
R172	ERD25TJ101	" 100Ω 1/4W	1	

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Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R173	ERD18TSJ153	Carbon Resistor 15K Ω 1/8W	1	
R174	ERD25TJ123	" 12K Ω 1/4W	1	
R175	ERD25TJ470	" 47 Ω 1/4W	1	
R176	ERD25TJ104	" 100K Ω 1/4W	1	
R177	ERD25TJ103	" 10K Ω 1/4W	1	
R178	ERD25TJ222	" 2.2K Ω 1/4W	1	
R179	ERD25TJ332	" 3.3K Ω 1/4W	1	
R180	ERD25TJ394	" 390K Ω 1/4W	1	
R181	ERD25TJ471	" 470 Ω 1/4W	1	
R182	ERD25TJ683	" 68K Ω 1/4W	1	
R183	ERD25TJ101	" 100 Ω 1/4W	1	
R184	ERD25TJ822	" 8.2K Ω 1/4W	1	
R185	ERD25TJ474	" 470K Ω 1/4W	1	
R186	ERD25TJ682	" 6.8K Ω 1/4W	1	
R187	ERD25TJ472	" 4.7K Ω 1/4W	1	
R188	ERD25TJ102	" 1K Ω 1/4W	1	
R190	ERD25TJ101	" 100 Ω 1/4W	1	
R191	ERG1ANJ471	Metal-oxide Resistor 470 Ω 1W	1	
R192	ERD25TJ273	Carbon Resistor 27K Ω 1/4W	1	
R193, 194	ERD25TJ271	" 270 Ω 1/4W	2	
R195	ERD25TJ153	" 15K Ω 1/4W	1	
R197	ERD25TJ104	" 100K Ω 1/4W	1	
R201, 202	ERD25TJ471	" 470 Ω 1/4W	2	
R203	ERD25TJ392	" 3.9K Ω 1/4W	1	
R205	ERD25TJ101	" 100 Ω 1/4W	1	
R206	ERD18TJ153	" 15K Ω 1/8W	1	
R207	ERD25TJ822	" 8.2K Ω 1/4W	1	
R208	ERD25TJ331	" 330 Ω 1/4W	1	
R209	ERD25TJ102	" 1K Ω 1/4W	1	
R210	ERD25TJ104	" 100K Ω 1/4W	1	
R211	ERD25TJ682	" 6.8K Ω 1/4W	1	
R212	ERD25TJ182	" 1.8K Ω 1/4W	1	
R213	ERD25TJ472	" 4.7K Ω 1/4W	1	
R214	ERD25TJ273	" 27K Ω 1/4W	1	
R215	ERD25TJ682	" 6.8K Ω 1/4W	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R216	ERD25TJ101	Carbon Resistor 100 Ω 1/4W	1	
R217	ERD25TJ224	" 220K Ω 1/4W	1	
R221, 222	ERD25TJ473	" 47K Ω 1/4W	2	
R223	ERD25TJ474	" 470K Ω 1/4W	1	
R224	ERD25TJ333	" 33K Ω 1/4W	1	
R225	ERD25TJ153	" 15K Ω 1/4W	1	
R226	ERD25TJ222	" 2.2K Ω 1/4W	1	
R227	ERD25TJ103	" 10K Ω 1/4W	1	
R228, 229	ERD25TJ474	" 470K Ω 1/4W	2	
R230	ERD25TJ102	" 1K Ω 1/4W	1	
R231	ERD25TJ472	" 4.7K Ω 1/4W	1	
R236	ERD25TJ101	" 100 Ω 1/4W	1	
R237	ERD25TJ154	" 150K Ω 1/4W	1	
R238	ERD25TJ273	" 27K Ω 1/4W	1	
R239	ERD25TJ822	" 8.2K Ω 1/4W	1	
R240	ERD25TJ152	" 1.5K Ω 1/4W	1	
R241	ERD25TJ472	" 4.7K Ω 1/4W	1	
R242	ERD25TJ332	" 3.3K Ω 1/4W	1	
R243	ERD25TJ273	" 27K Ω 1/4W	1	
R244	ERD25TJ103	" 10K Ω 1/4W	1	
R245	ERD25TJ334	" 330K Ω 1/4W	1	
R246	ERD25TJ823	" 82K Ω 1/4W	1	
R247	ERD25TJ153	" 15K Ω 1/4W	1	
R248	ERD25TJ562	" 5.6K Ω 1/4W	1	
R249	ERD25TJ472	" 4.7K Ω 1/4W	1	
R250	ERD25TJ222	" 2.2K Ω 1/4W	1	
R251	ERD25TJ123	" 12K Ω 1/4W	1	
R252, 253	ERD25TJ102	" 1K Ω 1/4W	2	
R254	ERD25TJ101	" 100 Ω 1/4W	1	
R255	ERD25TJ393	" 39K Ω 1/4W	1	
R256	ERD25TJ823	" 82K Ω 1/4W	1	
R257, 258	ERD25TJ100	" 10 Ω 1/4W	2	
R259	ERD25TJ152	" 1.5K Ω 1/4W	1	
R260	ERD25TJ151	" 150 Ω 1/4W	1	
R261	ERD25TJ330	" 33 Ω 1/4W	1	

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Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R262	ERD25TJ100	Carbon Resistor 10Ω 1/4W	1	
R266	ERD25TJ271	" 270Ω 1/4W	1	
R271	ERD25TJ154	" 150KΩ 1/4W	1	
R272	ERD25TJ101	" 100Ω 1/4W	1	
R273	ERD18TSJ153	" 15KΩ 1/8W	1	
R274	ERD25TJ123	" 12KΩ 1/4W	1	
R275	ERD25TJ470	" 47Ω 1/4W	1	
R276	ERD25TJ104	" 100KΩ 1/4W	1	
R277	ERD25TJ103	" 10KΩ 1/4W	1	
R278	ERD25TJ222	" 2.2KΩ 1/4W	1	
R279	ERD25TJ332	" 3.3KΩ 1/4W	1	
R280	ERD25TJ394	" 390KΩ 1/4W	1	
R281	ERD25TJ471	" 470Ω 1/4W	1	
R282	ERD25TJ683	" 68KΩ 1/4W	1	
R283	ERD25TJ101	" 100Ω 1/4W	1	
R284	ERD25TJ822	" 8.2KΩ 1/4W	1	
R285	ERD25TJ474	" 470KΩ 1/4W	1	
R286	ERD25TJ682	" 6.8KΩ 1/4W	1	
R287	ERD25TJ472	" 4.7KΩ 1/4W	1	
R288	ERD25TJ102	" 1KΩ 1/4W	1	
R292	ERD25TJ273	" 27KΩ 1/4W	1	
R293, 294	ERD25TJ271	" 270Ω 1/4W	2	
R297	ERD25TJ104	" 100KΩ 1/4W	1	
R301	ERD25TJ394	" 390KΩ 1/4W	1	
R302	ERD25TJ273	" 27KΩ 1/4W	1	
R303	ERD25TJ103	" 10KΩ 1/4W	1	
R304	ERD25TJ153	" 15KΩ 1/4W	1	
R305	ERD25TJ221	" 220Ω 1/4W	1	
R306	ERD25TJ272	" 2.7KΩ 1/4W	1	
R307	ERD25TJ271	" 270Ω 1/4W	1	
R308	ERD25TJ273	" 27KΩ 1/4W	1	
R309, 310	ERD25TJ102	" 1KΩ 1/4W	2	
R312	ERD25TJ103	" 10KΩ 1/4W	1	
R313	ERD25TJ154	" 150KΩ 1/4W	1	
R314	ERD25TJ474	" 470KΩ 1/4W	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R315	ERD25TJ153	Carbon Resistor 15KΩ 1/4W	1	
R316	ERG12ANJ821	Metal-oxide Resistor 820Ω 1/2W	1	
R317, 321	ERD25TJ271	Carbon Resistor 270Ω 1/4W	2	
R322	ERD18TF3301	" 3.3KΩ 1/8W	1	
R323	ERD18TF8201	" 8.2KΩ 1/8W	1	
R324	ERD18TF3301	" 3.3KΩ 1/8W	1	
R325, 326	ERD25TJ474	" 470KΩ 1/4W	1	
R327	ERD25TJ103	" 10KΩ 1/4W	1	
R328	ERD25TJ822	" 8.2KΩ 1/4W	1	
R329	ERD25TJ221	" 220Ω 1/4W	1	
R330, 331	ERD25TJ154	" 150KΩ 1/4W	2	
R332	ERD25TJ102	" 1KΩ 1/4W	1	
R333	ERD25TJ123	" 12KΩ 1/4W	1	
R351, 352, 353, 354, 355, 356, 357, 358, 359				
	ERD25TJ271	" 270Ω 1/4W	9	
R401	ERD25TJ394	" 390KΩ 1/4W	1	
R402	ERD25TJ273	" 27KΩ 1/4W	1	
R403	ERD25TJ103	" 10KΩ 1/4W	1	
R404	ERD25TJ153	" 15KΩ 1/4W	1	
R405	ERD25TJ221	" 220Ω 1/4W	1	
R406	ERD25TJ272	" 2.7KΩ 1/4W	1	
R407	ERD25TJ271	" 270Ω 1/4W	1	
R408	ERD25TJ273	" 27KΩ 1/4W	1	
R409, 410	ERD25TJ102	" 1KΩ 1/4W	2	
R412	ERD25TJ103	" 10KΩ 1/4W	1	
R413	ERD25TJ154	" 150KΩ 1/4W	1	
R414	ERD25TJ474	" 470KΩ 1/4W	1	
R415	ERD25TJ153	" 15KΩ 1/4W	1	
R416	ERG12ANJ821	Metal-oxide Resistor 820Ω 1/2W	1	
R417, 421	ERD25TJ271	Carbon Resistor 270Ω 1/4W	2	
R422	ERD18TF3301	" 3.3KΩ 1/8W	1	
R423	ERD18TF8201	" 8.2KΩ 1/8W	1	
R424	ERD18TF3301	" 3.3KΩ 1/8W	1	
R425, 426	ERD25TJ474	" 470KΩ 1/4W	2	
R427	ERD25TJ103	" 10KΩ 1/4W	1	

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Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R428	ERD25TJ822	Carbon Resistor 8.2K Ω 1/4W	1	
R429	ERD25TJ221	" 220 Ω 1/4W	1	
R430, 431	ERD25TJ154	" 150K Ω 1/4W	2	
R432	ERD25TJ102	" 1K Ω 1/4W	1	
R433	ERD25TJ123	" 12K Ω 1/4W	1	
R451, 452, 453, 454, 455, 456, 457, 458, 459				
	ERD25TJ271	" 270 Ω 1/4W	9	
R501	ERG1ANJ390	Metal-oxide Resistor 39 Ω 1W	1	
R502	ERD25TJ392	Carbon Resistor 3.9K Ω 1/4W	1	
R503	ERD25TJ681	" 680 Ω 1/4W	1	
R504	ERD25TJ272	" 2.7K Ω 1/4W	1	
R505	ERD25TJ471	" 470 Ω 1/4W	1	
R506	ERD25TJ562	" 5.6K Ω 1/4W	1	
R507	ERD25TJ821	" 820 Ω 1/4W	1	
R508, 509	ERD25TJ100	" 10 Ω 1/4W	2	
R510	ERD25TJ472	" 4.7K Ω 1/4W	1	
R511, 512	ERD25TJ1R0	" 1 Ω 1/4W	2	
R513	ERD25TJ471	" 470 Ω 1/4W	1	
R514	ERD25TJ472	" 4.7K Ω 1/4W	1	
R515	ERD25TJ223	" 22K Ω 1/4W	1	
R516	ERD25TJ473	" 47K Ω 1/4W	1	
R517	ERD25TJ273	" 27K Ω 1/4W	1	
R601	ERD25TJ223	" 22K Ω 1/4W	1	
R602	ERD25TJ471	" 470 Ω 1/4W	1	
R603	ERD25TJ472	" 4.7K Ω 1/4W	1	
R604	ERD25TJ222	" 2.2K Ω 1/4W	1	
R605	ERD25TJ472	" 4.7K Ω 1/4W	1	
R606	ERD25TJ222	" 2.2K Ω 1/4W	1	
R607	ERD25TJ561	" 560 Ω 1/4W	1	
R608	ERD25TJ103	" 10K Ω 1/4W	1	
R609	ERD25TJ223	" 22K Ω 1/4W	1	
R610	ERG12ANJ561	Metal-oxide Resistor 560 Ω 1/2W	1	
R611	ERD25TJ472	Carbon Resistor 4.7K Ω 1/4W	1	
R612	ERD25TJ222	" 2.2K Ω 1/4W	1	
R613	ERD25TJ472	" 4.7K Ω 1/4W	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R614	ERD25TJ222	Carbon Resistor 2.2K Ω 1/4W	1	
R615	ERD25TJ223	" 22K Ω 1/4W	1	
R616	ERD25TJ472	" 4.7K Ω 1/4W	1	
R617	ERG1ANJ332	Metal-oxide Resistor 3.3K Ω 1W	1	
R618	ERG1ANJ101	" 100 Ω 1W	1	
R651	ERD25TJ472	Carbon Resistor 4.7K Ω 1/4W	1	
R652	ERD25TJ471	" 470 Ω 1/4W	1	
R653	ERD25TJ681	" 680 Ω 1/4W	1	
R654	ERE3SJ221	" 220 Ω 3W	1	
R655	ERD25TJ472	" 4.7K Ω 1/4W	1	
R656	ERD25TJ471	" 470 Ω 1/4W	1	
R657	ERD25TJ681	" 680 Ω 1/4W	1	
R658	ERF5SJ680	" 68 Ω 5W	1	
R701, 702, 703, 704				
	ERD25TJ103	" 10K Ω 1/4W	4	
R705, 706	ERD25TJ472	" 4.7K Ω 1/4W	2	
R707, 708	ERD25TJ152	" 1.5K Ω 1/4W	2	
R709, 710, 711, 712, 713, 714				
	ERD25TJ274	" 270K Ω 1/4W	6	
R715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726				
	ERG1ANJ181	Metal-oxide Resistor 180 Ω 1W	12	
R727, 728	ERD25TJ103	Carbon Resistor 10K Ω 1/4W	2	
R729, 730	ERX2ANJR47	Metal-oxide Resistor 0.47 Ω 2W	2	
R731, 732	ERD25TJ152	Carbon Resistor 1.5K Ω 1/4W	2	
R733, 734	ERD25TJ392	" 3.9K Ω 1/4W	2	
R735, 736	ERD25TJ223	" 22K Ω 1/4W	2	
R737, 738	ERD25TJ332	" 3.3K Ω 1/4W	2	
R739, 740	ERD25TJ153	" 15K Ω 1/4W	2	
R741, 742, 743, 744				
	ERD25TJ223	" 22K Ω 1/4W	4	
R745, 746	ERD25TJ682	" 6.8K Ω 1/4W	2	
R747, 748	ERD25TJ103	" 10K Ω 1/4W	2	
R749, 750	ERD25TJ333	" 33K Ω 1/4W	2	
R791	ERD25TJ223	" 22K Ω 1/4W	1	
R792	ERD25TJ103	" 10K Ω 1/4W	1	

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Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R793	ERD25TJ562	Carbon Resistor 5.6K Ω 1/4W	1	
R794	ERD25TJ272	" 2.7K Ω 1/4W	1	
R795	ERD25TJ271	" 270 Ω 1/4W	1	
R801, 802	ERD25TJ222	" 2.2K Ω 1/4W	2	
R803, 804	ERD25TJ473	" 27K Ω 1/4W	2	
R805, 806	ERD25TJ103	" 10K Ω 1/4W	2	
R807, 808	ERD25TJ222	" 22K Ω 1/4W	2	
R809, 810	ERD25TJ473	" 47K Ω 1/4W	2	
R811, 812	ERD25TJ103	" 10K Ω 1/4W	2	
R813, 814	ERD25TJ562	" 5.6K Ω 1/4W	2	
R815, 816, 817, 818				
	ERD25TJ273	" 27K Ω 1/4W	4	
R819, 820	ERD25TJ330	" 33 Ω 1/4W	2	
R821, 822	ERD25TJ103	" 10K Ω 1/4W	2	
R823, 824	ERD25TJ273	" 27K Ω 1/4W	2	
R825, 826	ERD25TJ473	" 47K Ω 1/4W	2	
R827, 828, 829, 830				
	ERD25TJ273	" 27K Ω 1/4W	4	
R831, 832	ERD25TJ103	" 10K Ω 1/4W	2	
R833, 834	ERD25TJ272	" 2.7K Ω 1/4W	2	
R835, 836	ERD25TJ273	" 27K Ω 1/4W	2	
R837	ERD25TJ823	" 82K Ω 1/4W	1	
R838	ERD25TJ154	" 150K Ω 1/4W	1	
R839, 840	ERD25TJ103	" 10K Ω 1/4W	2	
R841, 842	ERD25TJ272	" 2.7K Ω 1/4W	2	
R843, 844	ERD25TJ822	" 8.2K Ω 1/4W	2	
R846	ERD25TJ273	" 27K Ω 1/4W	1	
R848	ERD25TJ823	" 82K Ω 1/4W	1	
R850	ERD25TJ153	" 15K Ω 1/4W	1	
R856	ERD25TJ394	" 390K Ω 1/4W	1	
R857, 858	ERD25TJ274	" 270K Ω 1/4W	2	
R859	ERD25TJ103	" 10K Ω 1/4W	1	
R891	ERD25TJ221	" 220 Ω 1/4W	1	
R892	ERD25TJ103	" 10K Ω 1/4W	1	
R893	ERD25TJ272	" 2.7K Ω 1/4W	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R894	ERD25TJ103	Carbon Resistor 10K Ω 1/4W	1	
R895	ERD25TJ473	" 47K Ω 1/4W	1	
R897	ERD25TJ184	" 180K Ω 1/4W	1	
R901, 902	ERD25TJ102	" 1K Ω 1/4W	2	
R903	ERD25TJ473	" 47K Ω 1/4W	1	
R904	ERD25TJ331	" 330 Ω 1/4W	1	
R905	ERD25TJ223	" 22K Ω 1/4W	1	
R906	ERD25TJ333	" 33K Ω 1/4W	1	
R907	ERD25TJ472	" 4.7K Ω 1/4W	1	
R908	ERD25TJ561	" 560 Ω 1/4W	1	
R909	ERD25TJ102	" 1K Ω 1/4W	1	
R910	ERD25TJ183	" 18K Ω 1/4W	1	
R911	ERD25TJ103	" 10K Ω 1/4W	1	
R912, 913	ERD25TJ223	" 22K Ω 1/4W	2	
R914	ERD25TJ102	" 1K Ω 1/4W	1	
R915	ERD25TJ105	" 1M Ω 1/4W	1	
R916	ERD25TJ561	" 560 Ω 1/4W	1	
R917	ERD25TJ152	" 1.5K Ω 1/4W	1	
R918, 919	ERD25TJ472	" 4.7K Ω 1/4W	2	
R920	ERD25TJ223	" 22K Ω 1/4W	1	
R921	ERD25TJ332	" 3.3K Ω 1/4W	1	
R922	ERD25TJ103	" 10K Ω 1/4W	1	
R923	ERD25TJ223	" 22K Ω 1/4W	1	
R924	ERD25TJ332	" 3.3K Ω 1/4W	1	
R925, 926, 927				
	ERD25TJ103	" 10K Ω 1/4W	3	
R928	ERD25TJ223	" 22K Ω 1/4W	1	
R929	ERD25TJ823	" 82K Ω 1/4W	1	
R930	ERD25TJ102	" 1K Ω 1/4W	1	
R932	ERD25TJ330	" 33 Ω 1/4W	1	
R933	ERD25TJ474	" 470K Ω 1/4W	1	
R934	ERD25TJ102	" 1K Ω 1/4W	1	
R935	ERD25TJ153	" 15K Ω 1/4W	1	
R936	ERD25TJ473	" 47K Ω 1/4W	1	
R937	ERD25TJ222	" 2.2K Ω 1/4W	1	

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Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R938	ERD25TJ820	Carbon Resistor 82Ω 1/4W	1	
R939	ERD25TJ221	" 220Ω 1/4W	1	
R940	ERD25TJ102	" 1KΩ 1/4W	1	
R941	ERD25TJ124	" 120KΩ 1/4W	1	
R942	ERD25CKF1003	Metal-oxide Resistor 100KΩ 1/4W	1	
R943	ERD25TJ472	Carbon Resistor 4.7KΩ 1/4W	1	
R944	ERD25TJ102	" 1KΩ 1/4W	1	
R945, 946	ERD25TJ103	" 10KΩ 1/4W	2	
R947	ERD25TJ331	" 330Ω 1/4W	1	
R948	ERD25TJ106	" 10MΩ 1/4W	1	
R949	ERD25TJ103	" 10KΩ 1/4W	1	
R950	ERD25TJ820	" 82Ω 1/4W	1	
R951	ERD25TJ223	" 22KΩ 1/4W	1	
R952, 953	ERD25TJ103	" 10KΩ 1/4W	2	
R954	ERD25TJ472	" 4.7KΩ 1/4W	1	
R955	ERD25TJ103	" 10KΩ 1/4W	1	
R956	ERD25TJ102	" 1KΩ 1/4W	1	
R957	ERD25TJ123	" 12KΩ 1/4W	1	
R958	ERD25TJ330	" 33Ω 1/4W	1	
R959	ERD25TJ474	" 470KΩ 1/4W	1	
R960	ERD25TJ102	" 1KΩ 1/4W	1	
R961	ERD25TJ153	" 15KΩ 1/4W	1	
R962	ERD25TJ274	" 270KΩ 1/4W	1	
R963	ERG1ANJ331	Metal-oxide Resistor 330Ω 1W	1	
R971	ERD25TJ562	Carbon Resistor 5.6KΩ 1/4W	1	
R972	ERD25TJ272	" 2.7KΩ 1/4W	1	
R973	ERD25TJ223	" 22KΩ 1/4W	1	
R974	ERD25TJ103	" 10KΩ 1/4W	1	
R975	ERD25TJ561	" 560Ω 1/4W	1	
R976, 977	ERD25TJ332	" 3.3KΩ 1/4W	2	
R978, 979, 980				
	ERD25TJ104	" 100KΩ 1/4W	3	
R981	ERD25TJ103	" 10KΩ 1/4W	1	
R982	ERD25TJ152	" 1.5KΩ 1/4W	1	
R983	ERX1ANJ2R2	Metal-oxide Resistor 2.2Ω 1W	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R984	ERD25TJ151	Carbon Resistor 150Ω 1/4W	1	
R985	ERD25TJ152	" 1.5KΩ 1/4W	1	
R986	ERD25TJ562	" 5.6KΩ 1/4W	1	
R987	ERD25TJ182	" 1.8KΩ 1/4W	1	
R988, 989	ERD25TJ103	" 10KΩ 1/4W	2	
R990	ERD25TJ823	" 82KΩ 1/4W	1	
R991, 992	ERD25TJ103	" 10KΩ 1/4W	2	
R993, 994	ERD25TJ562	" 5.6KΩ 1/4W	2	
R995, 996	ERD25TJ332	" 3.3KΩ 1/4W	2	
R997	ERD25TJ271	" 270Ω 1/4W	1	
R998	ERD25TJ273	" 27KΩ 1/4W	1	
R999	ERD25TJ271	" 270Ω 1/4W	1	
R1000	ERD25TJ393	" 39KΩ 1/4W	1	
R1001	ERD25TJ122	" 1.2KΩ 1/4W	1	
R1002	ERD25TJ822	" 8.2KΩ 1/4W	1	
R1003	ERD25TJ104	" 100KΩ 1/4W	1	
R1004, 1005	ERD25TJ103	" 10KΩ 1/4W	2	
R1006	ERD25TJ473	" 47KΩ 1/4W	1	
R1007, 1008	ERD25TJ103	" 10KΩ 1/4W	2	
R1009	ERD25TJ153	" 15KΩ 1/4W	1	
R1010	ERD25TJ472	" 4.7KΩ 1/4W	1	
R1011	ERD25TJ821	" 820Ω 1/4W	1	
R1012	ERD25TJ332	" 3.3KΩ 1/4W	1	
R1013	ERD25TJ123	" 12KΩ 1/4W	1	
R1014, 1015	ERD25TJ103	" 10KΩ 1/4W	2	
R1051, 1052	ERD25TJ473	" 47KΩ 1/4W	2	
R1053	ERD25TJ104	" 100KΩ 1/4W	1	
R1054, 1055	ERD25TJ473	" 47KΩ 1/4W	2	
R1056	ERD25TJ104	" 100KΩ 1/4W	1	
		VARIABLE RESISTORS		
VR101	EVLS3AA00B55	Semi-fixed Variable Resistor 500KΩ(B)	1	
VR102, 103, 202, 203				
	EWWFFWAR30A24	Variable Resistor 20KΩ(A)	4	
VR104	EVLS3AA00B54	Semi-fixed Variable Resistor 50KΩ(B)	1	

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Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
VR105	EVLS3AA00B53	Semi-fixed Variable Resistor 5K Ω (B)	1	
VR106	EVLS3AA00B24	" 20K Ω (B)	1	
VR107, 207	EWFFWAR30A24	Variable Resistor 20K Ω (A)	2	
VR108	EVLS3AA00B52	Semi-fixed Variable Resistor 500 Ω (B)	1	
VR109	EVNK4AA00B25	" 200K Ω (B)	1	
VR201	EVLS3AA00B55	" 500K Ω (B)	1	
VR204	EVLS3AA00B54	" 50K Ω (B)	1	
VR205	EVLS3AA00B53	" 5K Ω (B)	1	
VR206	EVLS3AA00B24	" 20K Ω (B)	1	
VR208	EVLS3AA00B52	" 500 Ω (B)	1	
VR209	EVNK4AA00B25	" 200K Ω (B)	1	
VR501	EVLS3AA00B14	" 10K Ω (B)	1	
VR502, 503	EVLS3AA00B53	" 5K Ω (B)	2	
VR504, 505	EVLS3AA00B24	" 20K Ω (B)	2	
VR506	EVLS3AA00B53	" 5K Ω (B)	1	
VR601, 602	EVNK4AA00B13	" 1K Ω (B)	2	
VR801, 802	EVLS0AA00B15	" 100K Ω (B)	2	
VR901	EVLS0AA00B54	" 50K Ω (B)	1	
VR902, 903	QVKF25B24	Variable Resistor 20K Ω (B)	1	
VR904	EVLS0AA00B24	Semi-fixed Variable Resistor 20K Ω (B)	1	
VR905	EVLS0AA00B54	" 50K Ω (B)	1	
CAPACITORS				
C1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15				
	ECKD1H103PF	Ceramic Capacitor 0.01 μ F	15	
C16	ECEA16Z10	Electrolytic Capacitor 10 μ F	1	
C17	ECEA16V47	" 47 μ F	1	
C18, 19	ECEA16V10	" 10 μ F	2	
C20	ECEA10V100	" 100 μ F	1	
C21, 22	ECQM05683MZ	Ceramic Capacitor 0.0068 μ F	2	
C23	ECEA50Z2R2	Electrolytic Capacitor 2.2 μ F	1	
C24	ECEA16Z10	" 10 μ F	1	
C25	ECEA50Z3R3	" 3.3 μ F	1	
C26	ECQM05104MZ	Ceramic Capacitor 0.01 μ F	1	
C27	ECEA6V220	Electrolytic Capacitor 220 μ F	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C101	ECEA50M1	Electrolytic Capacitor 1 μ F	1	
C102	ECEA35V10	" 10 μ F	1	
C103	ECCD1H101K	Ceramic Capacitor 100pF	1	
C104	ECEA10V100	Electrolytic Capacitor 100 μ F	1	
C105	ECCD1H470KC	Ceramic Capacitor 47pF	1	
C106	ECEA16V33	Electrolytic Capacitor 33 μ F	1	
C107	ECKD1H471KB	Ceramic Capacitor 470pF	1	
C108	ECEA16V33	Electrolytic Capacitor 33 μ F	1	
C109	ECEA16V10	" 10 μ F	1	
C110	ECEA25V100	" 100 μ F	1	
C111	ECCD1H101K	Ceramic Capacitor 100pF	1	
C113	ECEA25N3R3	Electrolytic Capacitor 3.3 μ F	1	
C114	ECEA10V100	" 100 μ F	1	
C115	ECEA35V10	" 10 μ F	1	
C116, 121	ECEA16V10	" 10 μ F	2	
C122	ECEA25V100	" 100 μ F	1	
C123	ECCD1H101K	Ceramic Capacitor 100pF	1	
C124	ECEA35V10	Electrolytic Capacitor 10 μ F	1	
C125	ECQM05332JZ	Mylar Capacitor 0.0033 μ F	1	
C126	ECEA16V10	Electrolytic Capacitor 10 μ F	1	
C127	ECEA16V33	" 33 μ F	1	
C128	ECQS1681JZ	Strol Capacitor 680pF	1	
C129	ECEA16V10	Electrolytic Capacitor 10 μ F	1	
C130	ECCD1H101K	Ceramic Capacitor 100pF	1	
C131	ECQM05104JZ	Mylar Capacitor 0.1 μ F	1	
C132	ECEA6V330	Electrolytic Capacitor 330 μ F	1	
C133, 134	ECEA35V10	" 10 μ F	2	
C135	ECQM05182KZ	Mylar Capacitor 0.0018 μ F	1	
C136	ECQM05822JZ	" 0.0082 μ F	1	
C137	ECQM05562JZ	" 0.0056 μ F	1	
C138	ECQM05332JZ	" 0.0033 μ F	1	
C139	ECQM05183JZ	" 0.018 μ F	1	
C140	ECQM05153JZ	" 0.015 μ F	1	
C141	ECQM05123JZ	" 0.012 μ F	1	
C142	ECQM05333JZ	" 0.033 μ F	1	

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Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C143	ECQM05273JZ	Mylar Capacitor 0.027 μ F	1	
C144	ECQM05223JZ	" 0.022 μ F	1	
C146, 147	ECCD1H101K	Ceramic Capacitor 100pF	2	
C151	ECEA50M1	Electrolytic Capacitor 1 μ F	1	
C152	ECEA16V10	" 10 μ F	1	
C153	ECCD1H101K	Ceramic Capacitor 100pF	1	
C154	ECEA6V330	Electrolytic Capacitor 330 μ F	1	
C155	ECCD1H470KC	Ceramic Capacitor 47pF	1	
C156	ECEA16V33	Electrolytic Capacitor 33 μ F	1	
C157	ECKD1H471KB	Ceramic Capacitor 470pF	1	
C158	ECEA16V33	Electrolytic Capacitor 33 μ F	1	
C159	ECEA35V10	" 10 μ F	1	
C160	ECEA25V100	" 100 μ F	1	
C161	ECQM05682JZ	Mylar Capacitor 0.0068 μ F	1	
C162	ECQM05473JZ	" 0.047 μ F	1	
C163	ECKD1H471KB	Ceramic Capacitor 470pF	1	
C164	ECEA16V10	Electrolytic Capacitor 10 μ F	1	
C171	ECEA16V10	" 10 μ F	1	
C172	ECEA16V33	" 33 μ F	1	
C173	ECKD1H102PF	Ceramic Capacitor 1000pF	1	
C174	ECCD1H101K	" 100pF	1	
C175	ECEA50V1	Electrolytic Capacitor 1 μ F	1	
C176	ECQM05182KZ	Mylar Capacitor 0.0018 μ F	1	
C177	ECEA50V1	Electrolytic Capacitor 1 μ F	1	
C178	ECEA16V33	" 33 μ F	1	
C179	ECCD1H101K	Ceramic Capacitor 100pF	1	
C181	ECEA50ZR1	Electrolytic Capacitor 0.1 μ F	1	
C182	ECKD1H102PF	Ceramic Capacitor 1000pF	1	
C183	ECEA10V100	Electrolytic Capacitor 100 μ F	1	
C185	ECEA16V10	" 10 μ F	1	
C186	ECCD1H101K	Ceramic Capacitor 100pF	1	
C187	ECEA16V10	Electrolytic Capacitor 10 μ F	1	
C188	ECQM05102KZ	Semi-conductor Capacitor 1000pF	1	
C189	ECEA50V3R3	Electrolytic Capacitor 3.3 μ F	1	
C190	ECKD1H223PF	Ceramic Capacitor 22000pF	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C191	ECKD1H223PF	Ceramic Capacitor 22000pF	1	
C193, 194	ECEA16V10	Electrolytic Capacitor 10 μ F	2	
C195	ECQM05473MZ	Mylar Capacitor 0.047 μ F	1	
C201	ECEA50M1	Electrolytic Capacitor 1 μ F	1	
C202	ECEA35V10	" 10 μ F	1	
C203	ECCD1H101K	Ceramic Capacitor 100pF	1	
C204	ECEA10V100	Electrolytic Capacitor 100 μ F	1	
C205	ECCD1H470KC	Ceramic Capacitor 47pF	1	
C206	ECEA16V33	Electrolytic Capacitor 33 μ F	1	
C207	ECKD1H471KB	Ceramic Capacitor 470pF	1	
C208	ECEA16V33	Electrolytic Capacitor 33 μ F	1	
C209	ECEA16V10	" 10 μ F	1	
C211	ECCD1H101K	Ceramic Capacitor 100pF	1	
C213	ECEA25N3R3	Electrolytic Capacitor 3.3 μ F	1	
C214	ECEA10V100	" 100 μ F	1	
C215	ECEA35V10	" 10 μ F	1	
C216	ECEA16V10	" 10 μ F	1	
C221	ECEA16V10	" 10 μ F	1	
C222	ECEA25V100	" 100 μ F	1	
C223	ECCD1H101K	Ceramic Capacitor 100pF	1	
C224	ECEA35V10	Electrolytic Capacitor 10 μ F	1	
C225	ECQM05332JZ	Mylar Capacitor 0.0033 μ F	1	
C226	ECEA16V10	Electrolytic Capacitor 10 μ F	1	
C227	ECEA16V33	" 33 μ F	1	
C228	ECQS16B1JZ	Strol Capacitor 680pF	1	
C229	ECEA16V10	Electrolytic Capacitor 10 μ F	1	
C230	ECCD1H101K	Ceramic Capacitor 100pF	1	
C231	ECQM05104JZ	Mylar Capacitor 0.1 μ F	1	
C232	ECEA6V330	Electrolytic Capacitor 330 μ F	1	
C233, 234	ECEA35V10	" 10 μ F	2	
C235	ECQM05182KZ	Mylar Capacitor 0.0018 μ F	1	
C236	ECQM05822JZ	" 0.0082 μ F	1	
C237	ECQM05562JZ	" 0.0056 μ F	1	
C238	ECQM05332JZ	" 0.0033 μ F	1	
C239	ECQM05183JZ	" 0.018 μ F	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C240	ECQM05153JZ	Mylar Capacitor	0.015 μ F	1
C241	ECQM05123JZ	"	0.012 μ F	1
C242	ECQM05333JZ	Mylar Capacitor	0.033 μ F	1
C243	ECQM05273JZ	"	0.027 μ F	1
C244	ECQM05223JZ	"	0.022 μ F	1
C246, 247	ECCD1H101K	Ceramic Capacitor	100pF	2
C251	ECEA50M1	Electrolytic Capacitor	1 μ F	1
C252	ECEA16V10	"	10 μ F	1
C253	ECCD1H101K	Ceramic Capacitor	100pF	1
C254	ECEA6V330	Electrolytic Capacitor	330 μ F	1
C255	ECCD1H470KC	Ceramic Capacitor	47pF	1
C256	ECEA16V33	Electrolytic Capacitor	33 μ F	1
C257	ECKD1H471KB	Ceramic Capacitor	470pF	1
C258	ECEA16V33	Electrolytic Capacitor	33 μ F	1
C259	ECEA35V10	"	10 μ F	1
C260	ECEA25V100	"	100 μ F	1
C261	ECQM05682JZ	Mylar Capacitor	0.0068 μ F	1
C262	ECQM05473JZ	"	0.047 μ F	1
C263	ECKD1H471KB	Ceramic Capacitor	470pF	1
C271	ECEA16V10	Electrolytic Capacitor	10 μ F	1
C272	ECEA16V33	"	33 μ F	1
C273	ECKD1H102PF	Ceramic Capacitor	1000pF	1
C274	ECCD1H101K	"	100pF	1
C275	ECEA50V1	Electrolytic Capacitor	1 μ F	1
C276	ECQM05182KZ	Mylar Capacitor	0.0018 μ F	1
C277	ECEA50V1	Electrolytic Capacitor	1 μ F	1
C278	ECEA16V33	"	33 μ F	1
C279	ECCD1H101K	Ceramic Capacitor	100pF	1
C281	ECEA50ZR1	Electrolytic Capacitor	0.1 μ F	1
C282	ECKD1H102PF	Ceramic Capacitor	1000pF	1
C283	FCEA10V100	Electrolytic Capacitor	100 μ F	1
C285	ECEA16V10	"	10 μ F	1
C286	ECCD1H101K	Ceramic Capacitor	100pF	1
C287	ECEA16V10	Electrolytic Capacitor	10 μ F	1
C288	ECFWD102KVY	Semi-conductor Capacitor	1000pF	1

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C289	ECEA50V3R3	Electrolytic Capacitor	3.3 μ F	1
C293, 294	ECEA16V10	"	10 μ F	2
C501	ECEA35V47	"	47 μ F	1
C502	ECQM05393KZ	Mylar Capacitor	0.039 μ F	1
C503, 504	ECCD1H470KC	Ceramic Capacitor	47pF	2
C505, 506	ECQF4223KZ	"	0.022 μ F	2
C507	ECEA35V10	Electrolytic Capacitor	10 μ F	1
C508	ECQM05104MZ	Mylar Capacitor	0.1 μ F	1
C509	ECQF6562KZH	"	0.0056 μ F	1
C510, 511	ECQS1331JZ	Strol Capacitor	330pF	2
C512	ECKD1H103PF	Ceramic Capacitor	0.01 μ F	1
C514	ECQM05104MZ	Mylar Capacitor	0.1 μ F	1
C515	ECQM05473MZ	"	0.047 μ F	1
C601	ECET50R2200S	Electrolytic Capacitor	2200 μ F	1
C602	ECEA50V47	"	47 μ F	1
C603	ECEA16V330	"	330 μ F	1
C604	ECKD1H103PF	Ceramic Capacitor	0.01 μ F	1
C605	ECEA35V10	Electrolytic Capacitor	10 μ F	1
C606	ECEA25V220	"	220 μ F	1
C607	ECEA50V1	"	1 μ F	1
C608	ECEA25V100	"	100 μ F	1
C609	ECET35V2200	"	2200 μ F	1
C610	ECEA35V47	"	47 μ F	1
C611	ECEA50V1	"	1 μ F	1
C612	ECKD1H103PF	Ceramic Capacitor	0.01 μ F	1
C613	ECEA35V10	Electrolytic Capacitor	10 μ F	1
C614	ECEA25V330	"	330 μ F	1
C615	ECET25R2200S	"	2200 μ F	1
C617	ECEA50V1	"	1 μ F	1
C618	ECEA6V220	"	220 μ F	1
C651	ECEA16V10	"	10 μ F	1
C652	ECEA16V33	"	33 μ F	1
C701, 702, 703, 704, 705, 706				
	ECQM05473MZ	Semi-conductor Capacitor	0.047 μ F	6
C707, 708	ECQM05103KZ	"	0.01 μ F	2

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C709, 710	ECQM05683MZ	Semi-conductor Capacitor	0.068 μ F	2
C711, 712, 713, 714, 715, 716				
	ECEA25N10	Electrolytic Capacitor (Non Polarity)	10 μ F	6
C717, 718	ECQM05102KZ	Semi-conductor Capacitor	0.001 μ F	2
C719, 720	ECCD1H101K	Ceramic Capacitor	100 pF	2
C791	ECCD1H221K	"	220 pF	1
C792	ECQM05153MZ	Semi-conductor Capacitor	0.015 μ F	1
C801802, 803804	ECQM05683MZ	"	0.068 μ F	4
C805, 806	ECEA50V1	Electrolytic Capacitor	1 μ F	2
C807, 808	ECEA16V10	"	10 μ F	2
C809, 810	ECEA50V1	"	1 μ F	2
C811, 812	ECEA25Z4R7	"	4.7 μ F	2
C813, 814	ECEA16V33	"	33 μ F	2
C816	ECEA16V10	"	10 μ F	1
C817	ECEA35V4R7	"	4.7 μ F	1
C892	ECEA10V100	"	100 μ F	1
C893	ECEA16V33	"	33 μ F	1
C901	ECQM05333MZ	Semi-conductor Capacitor	0.033 μ F	1
C902	ECEA35V4R7	Electrolytic Capacitor	4.7 μ F	1
C903	ECEA16V10	"	10 μ F	1
C905	ECQM05102KZ	Semi-conductor Capacitor	0.001 μ F	1
C906	ECEA16V10	Electrolytic Capacitor	10 μ F	1
C907	ECEA16V33	"	33 μ F	1
C908	ECQM05104KZ	Mylar Capacitor	0.1 μ F	1
C909	ECQM05223MZ	Semi-conductor Capacitor	0.022 μ F	1
C910	ECQM05472KZ	"	0.0047 μ F	1
C911	ECQM05102KZ	"	0.001 μ F	1
C912	ECKD1H471KB	Ceramic Capacitor	470 pF	1
C913	ECQM05563JZ	Mylar Capacitor	0.056 μ F	1
C914	ECQM05332KZ	"	0.0033 μ F	1
C915	ECQM05333JZ	"	0.033 μ F	1
C916	ECQM05104JZ	"	0.1 μ F	1
C917	ECQM05823JZ	"	0.082 μ F	1
C918	ECQM05103KZ	Semi-conductor Capacitor	0.01 μ F	1
C919, 920	ECCD1H220KC	Ceramic Capacitor	22 pF	2

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C921, 922	ECQM05473MZ	Semi-conductor Capacitor	0.047 μ F	2
C923	ECEA50ZR33	Electrolytic Capacitor	0.33 μ F	1
C924	ECEA16V33	"	33 μ F	1
C925	ECQM05103KZ	Mylar Capacitor	0.01 μ F	1
C927, 928	ECQM05103KZ	Semi-conductor Capacitor	0.01 μ F	2
C931	ECQM05822KZ	"	0.0082 μ F	1
C932	ECCD1H221K	Ceramic Capacitor	220 pF	1
C933	ECEA16V10	Electrolytic Capacitor	10 μ F	1
C934, 935, 936				
	ECEA50ZR22	"	0.22 μ F	3
C937, 938, 939				
	ECEA50N1	Electrolytic Capacitor (Non Polarity)	1 μ F	3
C943	ECKD1H471KB	Ceramic Capacitor	470 pF	1
C944	ECQM05102KZ	Semi-conductor Capacitor	0.001 μ F	1
C945	ECQM05333MZ	"	0.033 μ F	1
C946	ECQM05103KZ	"	0.01 μ F	1
C947	ECQM05333MZ	"	0.033 μ F	1
COMBINATION PART				
Z601	QCRFWR1	Combination Part		1
TRANSISTORS				
Tr1, 2, 3	2SA719(R)	Transistor		3
Tr4, 5, 6, 7, 8, 9, 10, 11, 12				
	2SC828(S)	"		9
Tr13	2SC1317(R)	"		1
Tr14	2SC828	"		1
Tr15, 16	2SA564(S)	"		2
Tr17	2SC828	"		1
Tr18, 19	2SC719(R)	"		2
Tr20	2SA564(S)	"		1
Tr21	2SC828(S)	"		1
Tr22, 23	2SC1317(R)	"		2
Tr24, 25, 26, 27, 28, 29				
	2SC828(S)	"		6

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Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
Tr30	2SC1317(R)	Transistor	1	
Tr31, 32, 33	2SC828(S)	"	3	
Tr101, 102	2SC1327(U)	"	2	
Tr103	2SC1684(S)	"	1	
Tr104	2SK660	"	1	
Tr105	2SC1684	"	1	
Tr106	2SC1317(S)	"	1	
Tr107	2SA564(S)	"	1	
Tr108	2SC828(S)	"	1	
Tr109	2SC1684(S)	"	1	
Tr110	2SC828(S)	"	1	
Tr111, 112	2SC1684(S)	"	2	
Tr113	2SC1383(R)	"	1	
Tr114	2SA683(R)	"	1	
Tr115, 116, 117, 118, 119, 120, 121, 122, 123				
	2SC828(S)	"	9	
Tr124, 125	2SC1327(U)	"	2	
Tr126	2SC1684(S)	"	1	
Tr127	2SC828(S)	"	1	
Tr128	2SC1317(S)	"	1	
Tr129	2SA564(S)	"	1	
Tr130	2SC1684(S)	"	1	
Tr131	2SA564(S)	"	1	
Tr132	2SC1317(S)	"	1	
Tr133, 134, 135, 136, 137				
	2SC828(S)	"	5	
Tr201, 202	2SC1327(U)	"	2	
Tr203	2SC1684(S)	"	1	
Tr204	2SK660	"	1	
Tr205	2SC1684	"	1	
Tr206	2SC1317(S)	"	1	
Tr209	2SC1684(S)	"	1	
Tr210	2SC828(S)	"	1	
Tr211, 212	2SC1684(S)	"	2	
Tr213	2SC1383(R)	"	1	

Ref. No.	Part No.	Part Name & Description	Pcs/Set	Remarks
Tr214	2SA683(R)	Transistor	1	
Tr215, 216, 217, 218, 219, 220, 221, 222, 223				
	2SC828(S)	"	9	
Tr224, 225	2SC1327(U)	"	2	
Tr226	2SC1684(S)	"	1	
Tr227	2SC828(S)	"	1	
Tr228	2SC1317(S)	"	1	
Tr230	2SC1684(S)	"	1	
Tr231	2SA564(S)	"	1	
Tr232	2SC1317(S)	"	1	
Tr233, 234, 235, 236, 237				
	2SC828(S)	"	5	
Tr501	2SC1407(R)	"	1	
Tr502, 503	2SC828(S)	"	2	
Tr504, 505	2SC1407(R)	"	2	
Tr506, 507	2SC828(S)	"	2	
Tr601	2SD334	"	1	
Tr602	2SC1383	"	1	
Tr603	2SC1684	"	1	
Tr604	2SC1846Q	"	1	
Tr605	2SD334	"	1	
Tr606	2SC1407	"	1	
Tr607	2SC1684	"	1	
Tr608	2SB5120	"	1	
Tr609, 651	2SC828(A)	"	2	
Tr652, 653	2SC1384	"	2	
Tr654	2SC828(A)	"	1	
Tr655, 656	2SC1384	"	2	
Tr701, 702, 703, 704				
	2SA564(T)	"	4	
Tr705, 706, 707, 708, 709, 710				
	2SA721(U)	"	6	
Tr711, 712, 713, 714, 715, 716				
	2SC1383(S)	"	6	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
Tr910, 911, 912, 913, 914				
	2SC828(T)	Transistor	5	
Tr915	2SC1317(S)	"	1	
Tr916	2SA564(T)	"	1	
Tr917	2SC1317(S)	"	1	
Tr918	2SA721(U)	"	1	
Tr919, 920	2SK66(Q)	FET	2	
Tr931, 932	2SC828(T)	Transistor	2	
Tr933	2SA564(T)	"	1	
Tr934, 935, 936				
	2SC1327(U)	"	3	
Tr937, 938, 939				
	2SA885Q	"	3	
Tr940, 941, 942				
	2SA721(U)	"	3	
Tr943, 944, 945				
	2SC1846Q	"	3	
Tr946, 948, 949, 950				
	2SA564(T)	"	4	
Tr951, 952, 953, 954, 955				
	2SC828(T)	"	5	
Tr956, 957	2SA564(T)	"	2	
Tr958	2SC828(T)	"	1	
Tr959, 960, 961, 962				
	2SA564(T)	"	4	
		DIODES		
D1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25				
	OA90MLF	Diode	25	
D26, 27	MA150LF	"	2	
D28	OA90MLF	"	1	
D29	SM102LF	"	1	
D101, 102, 103, 104, 105, 106				
	MA150LF	"	6	
D107, 108	OA90MLF	"	2	

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Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
D201, 202	MA150LF	Diode	2	
D207, 208	OA90MLF	"	2	
D501	MA1056FV	"	1	
D601	10DC1	"	1	
D602, 603	8R8AM2N	"	2	
D604	10DC1	"	1	
D605	MA1062LF	"	1	
D606	MA1150LF	"	1	
D607	MA1062LF	"	1	
D608	MA103LF	"	1	
D609	MA1062LF	"	1	
D621, 622, 623				
	SIB0102	"	3	
D651, 652	OA90MLF	"	2	
D701, 702, 703, 704, 705, 706, 707, 708, 801, 802, 803, 804, 805, 806, 808, 901, 902, 903				
	MA150LF	"	18	
D904	LN21	Illuminate Diode	1	
D905	MA150LF	Diode	1	
D906	MA1056FV	"	1	
D911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924				
	MA150LF	"	14	
D925	MZ203	"	1	
D926	MA1056LF	"	1	
CRYSTAL				
X901	QZE0004	Crystal	1	
TRANSFORMERS				
T1	QLPW4FOL	Power Transformer	1	
T101	QLT2D10A	Headphone Transformer	1	RS-671AUS
T201	QLT2D10A	"	1	"
T501	QLB0140	OSC Transformer	1	RS-275US
COILS				
L101	QLH2008	Peaking Coil	1	RS-263AUS

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
L102, 103	QLH2009	Peaking Coil	2	RS-740US
L201	QLH2008	"	1	RS-263AUS
L202, 203	QLH2009	"	2	RS-740US
L501, 502	QLQC6021K	Erase	2	
SWITCHES				
S1	QSW1206AA	Power ON/OFF Switch	1	
S2	Refer to VR902, 903	Pitch Control Switch with VR	1	
S3	QSR6301H	Speed Selector Switch	1	
S4, 5	QST4211A	Tape/Source Selector Switch	2	RS-9900US
S6	QST4306A	EQ Selector Switch	1	
S7, 8	QST4208A	Record Mode ON/OFF Switch	2	RS-9900US
S9	QST2302A	Bias Selector Switch	1	"
S10, 11	QSW2209A	Mic ATT/Meter Switch	2	
S12	QSW2208AA	Timer Start Switch	1	
S13, 14, 15, 16, 17, 18				
	EVQPAR11K	Control Key Switch	6	
S19, 20	QSM0068	Micro Switch	2	
S21	QSS2211S	Slide Switch	1	
S22	QSS1133	Cue and DC Power Switch	1	RS-272US
S23	QSS4212A	AC/DC Selector Switch	1	
JACKS				
J1, 2	QJA0250H	Microphone Jack	2	RS-600US
J3	QJA0249H	Headphone Jack	1	"
LAMPS				
PL1, 2	XAMQ85	VU Meter Lamp	2	RS-640US
PL3, 4, 5	XAMQ34S50W	Lamp For Function Button	3	⊕
INTEGRATED CIRCUITS				
IC1, 2, 3, 4, 5, 6, 7				
	M53200P	Integrated Circuit	7	RS-9900US
IC901, 902	M53273P	IC For Frequency Divider	2	
IC903	M58432P	IC For Crystal OSC, Frequency Divider	1	

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Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
ELECTRICAL PARTS				
E1	QWY2021	Record Head (2 Track)	1	
E2	QWY2002A	Playback Head (2 Track)	1	
E3	QWY0001	Erase Head (2 Track)	1	
E4	QWY4011A	Playback Head (4 Track)	1	
E5	QSL9009RNM	Level Meter	2	
Main Amplifier Section (See page 18, 19)				
E6	QMA2926A	Back Side Angle	1	
E7	QMA2932	Side Angle (L.R)	2	
E8	QMA2944	Mic and Meter Amp Holding Angle	1	
E9	QMA2938A	Mic and Meter Amp Sub-Holding Angle	1	
E10	QBS1107	P.C.B. Holding Wire	1	
E11	QNG1039	Nut For VR	3	RS-630US
E12	QNG1070	Nut For Mic and Headphone Jack	3	RS-600US
E13	QMA3147	Mic and Meter Switch Holding Angle	1	
E14	QEJ5001SM	LINE IN, OUT Jack Board Assembly	1	
Capstan Motor Control P.C.B. Section (See page 19)				
E15	QMA2937	Switch Angle	1	
E16	QML3013	Power Switch Lever	1	
E17	QML3194	Power Switch Lever Arm	1	
E18	QMA2934	Power Switch Lever Holding Angle	1	
E19	QHQ1177S	Step Screw	1	RS-671AUS
E20	XUC4FT	Stop Ring	1	COMMON
E21	QNG1004	Nut For Speed and Pintch Control	2	RQ-542S
Reel Motor Control P.C.B. Section (See page 19)				
E22	QMA2941	P.C.B. Holding Angle-C	1	
E23	QMA2942	P.C.B. Holding Angle-D	1	
Power Supply P.C.B. Section (See page 19)				
E24	QMF1861	P.C.B. Holding Plate	1	
E25	QMA3148	P.C.B. Holding Angle	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
E26	QTF1007	Fuse Holder	6	RS-9900US
E27	XBA2F10NU100	"	1	
E28	XBA1F20NU100	"	1	
E29	XBA1F40NU100	"	1	
E30	QMA2943A	Power Source Board Angle	1	
E31	QMA2945	Power Source Board Holding Angle	1	
E32	QMA2946	Power Source Board Holding Angle-2	1	
E33	QJS0326	AC-IN Socket	1	
E34	QJS0748A	4 Pin Din Socket	1	
E35	QFC1201M	AC Cord	1	RS-268US
E36	QTD1129	AC Cord Bushing	1	"
E37	QMF1933	AC/DC Select Switch Holding Plate	1	
E38	QJT1027	Earth Terminal Nut	1	RS-9900US
E39	QJT1025	Earth Terminal Shaft	1	"
E40	QJT1026	Earth Terminal Seat	1	"
E41	EQJ0187A	Spark Killer	1	RS-630US
E42	QTW1118A	Spark Killer Cover	1	RS-640US
Power Transformer Section (See page 20)				
E43	QMA3150	Power Transformer Cover Angle	1	
E44	QMA3149	Power Transformer Angle	1	
E45	QMA2986	Connector Angle	1	
E46	QTH1131	Heat Shink	1	
Other Parts				
E47	QKJ0189	Connector Cover	1	
E48	QBS1108	Clamper-A	1	
E49	QBS1109	Clamper-B	1	
E50	QJP1908JO	3 Pin Plug	15	RS-600US
E51	QJP1902JO	6 Pin Plug	12	"
E52	QJP1903JO	9 Pin Plug	4	RS-9900US
E53	QJP1904JO	12 Pin Plug	2	"
E54	QJP1905JO	15 Pin Plug	1	"
E55	QJS0776	2 Pin Housing	1	RQ-544AS
E56	QJS0784JN	3 Pin Housing	13	RS-600US