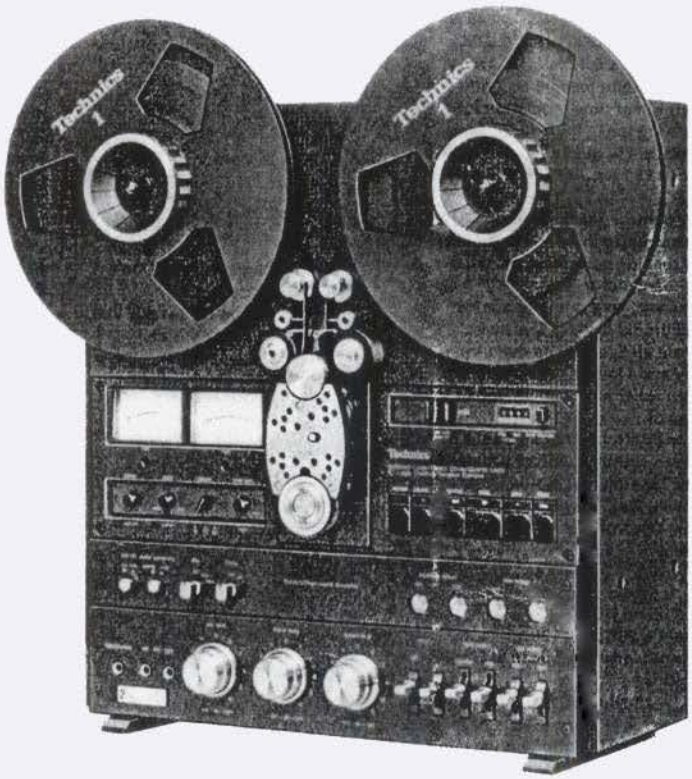
ORDER NO. ARD-7807043C

Service Manual

Open Deck

RS-1520

Quartz-Locked, "Isolated Loop" Three-Motor
Direct-Drive Open-Reel Tape Deck with Fine-Adjustment
Controls for Bias and Equalization



Professional Series

RS-1500U MECHANISM SERIES

Technics

Panasonic Company
Division of Matsushita Electric
Corporation of America
One Panasonic Way, Secaucus,
New Jersey 07094

Panasonic Hawaii, Inc.
320 Waiakamilo Road, Honolulu
Hawaii 96817

Specifications (Catalog specifications for sales)

TRANSPORT

Tape Width:	6.3cm (1/4"), 2.0mm (0.078") track width (2 track) 1.0mm (0.039") track width (2 track)
Channel and Track:	2 channel, 2 track rec/PB and 4 track playback (2 channel, 4 track rec/PB and 2 track playback Head Block RP-2422 optional available)
Tape Speeds:	3 speeds; 38.1, 19.05 and 9.53cm/s (15, 7-1/2 and 3-3/4 ips) max. deviation ±0.1% and fluctuation 0.05% at 38cm/s (15 ips) Pitch Control; ±6% (record and playback)
Reel Size:	127 to 267mm (5 to 10-1/2") EIA or NAB, plastic or metal

Wow and Flutter (overall):	(JIS weighted RMS)	(DIN weighted peak)	(NAB unweighted RMS)
38cm/s(15 ips);	0.018%	±0.035%	0.045%
19cm/s(7-1/2 ips);	0.03%	±0.06%	0.07%
9.5cm/s(3-3/4 ips);	0.06%	±0.12%	0.15%

Timer Counter:	read-out in minutes and seconds (4 digits), real time indication for 38cm/s (15 ips) accuracy ±1% at 38cm/s (15 ips)
Fast Winding Time:	less than 150 sec. for 762m (2500 feet) tape
Capstan Drive:	Quartz control phase-locked DC brushless servo direct-drive motor
Reel Drive:	2 tape tension controlled DC brushless direct-drive motor
Edit Capability:	Edit marker, tape dump or cue/review using Edit dial and/or Cue switch
Tape Tension:	Constant all speeds and reel size, Supply and Take-up tension controlled
Auto Stop Detection:	Tension roller switches for end of tape running or Tension control circuit stops the operation within 3 sec. for accidental stop of Take-up reel motor
Remote Control:	functions; Rec/Play/Pause/FF/Rew Remote Control box RP-9690 optional available

ELECTRONICS

Inputs:

LINE Balanced;	77.5mV (−20dBm)/10kΩ max. input level = +5dBm at 50Hz 1% THD
Unbalanced;	60mV (−22dBm)/47kΩ (phone type jack) max. input level = infinity (Line input connected to LINE IN level control before pass through the amplifier)
MIC Unbalanced;	0.25mV (−70dBm)/4.7kΩ (phone type jack) max. input level −15dBm at 1kHz 1% THD Mic. Attenuation 0/20dB switchable

Outputs:

LINE Balanced;	1.228V (+4dBm) output level control at "8" 2.19V (+8dBm) output level control at maximum load impedance 600Ω /10kΩ or more, switchable
Unbalanced;	0.775V (0dBm) output level control at "8" 1.228V (+4dBm) output level control at maximum load impedance 22kΩ over (phono type jack)
HEADPHONE;	65mV output level control at "8" load impedance 8Ω (stereo phone type jack)

Frequency Response: (overall)
rec. level

38cm/s (15 ips);	−10dB 30—30,000Hz (40 − 22,000Hz ±2dB) 0VU 30—20,000Hz (40—20,000Hz ±2dB)
19cm/s (7-1/2 ips);	−20dB 20—25,000Hz −10dB 20—20,000Hz (30—20,000Hz ±2dB)
9.5cm/s (3-3/4 ips);	−20dB 20—15,000Hz ±3dB

Signal-to-Noise Ratio: (overall A-weighted at 1kHz

	(650nWb/m)	(370nWb/m)
38cm/s (15 ips);	68dB	63dB
19cm/s (7-1/2 ips);	68dB	63dB
9.5cm/s (3/3/4 ips);	66dB	61dB

650nWb/m = 11dB above a 0VU of 185nWb/m, 1kHz THD is less than 3%
370nWb/m = 6dB above a 0VU of 185nWb/m
measured with bulk erased 3M type 207 tape

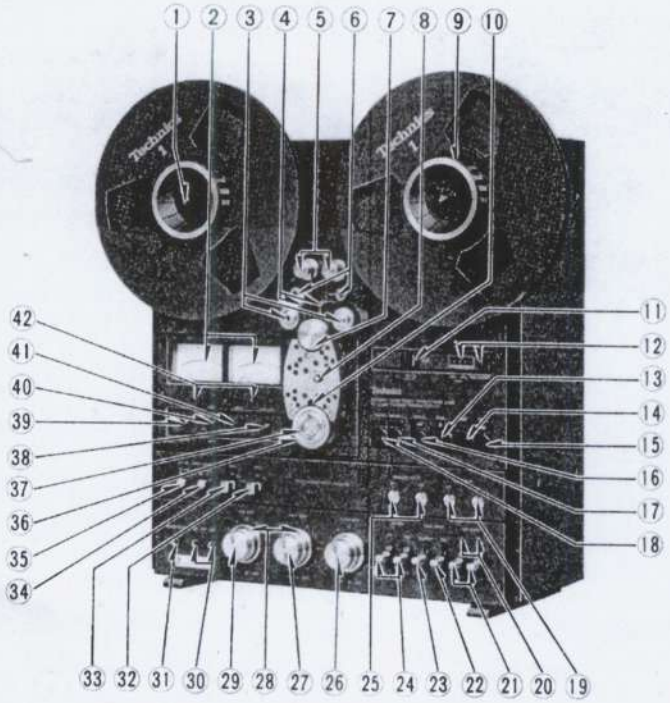
Distortion:	(overall) Total Harmonic Distortion (THD) at 400Hz all speed less than 0.8% at 185nWb/m (0VU) less than 2% than 2% at 370nWb/m (+6dB)
Channel Sparation:	Better than 50dB at 1kHz
Erase Depth:	Better than 65dB recorded 1kHz + 10dB
Operation Level (0VU):	185nWb/m
Recording Bias:	120kHz
Bias level;	3 position Bias selectors (vari. Bias adj. at "center") "1" 90% "2" 100% "3" 110% Variable Bias adjustment (Bias selectors at each position) −50% to +20%
Equalization:	NAB standard for all speeds and switchable IEC (CCIR) standard for 38cm/s (15 ips) playback Recording equalization adjustments; 3 positions EQ selector and variable controls (vary ±3dB at 10kHz with variable control) position "2" of EQ, Bias selector and "center click" of variable Bias, EQ adjustment set for 3M type 207 tape
Test Oscillater:	1kHz/10kHz

PHYSICAL

Power Requirments:	AC 120V, 50-60Hz (not necessary for conversion) consumption; 120W
Weight:	28kg (61 lbs 11 oz)
Dimensions (H x W x D):	502mm x 456mm x 257mm (19-3/4" x 18" x 10-1/8")
Rack Mounting:	with Shelf Brackets (RP-9130) optional available for a standard 19 inch rack

Specifications based on used of 3M type 207 tape.
Specifications are subject to change without notice.

LOCATION OF CONTROLS AND COMPONENTS



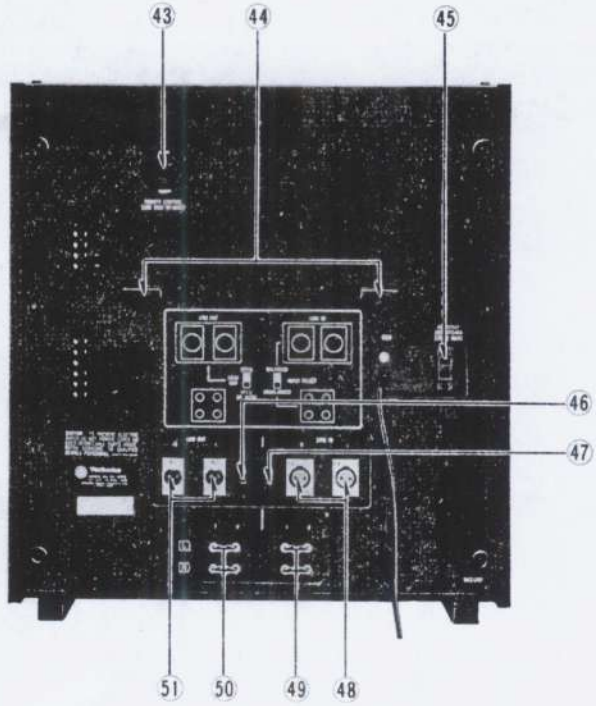


Fig. 1

① Reel clamper
② VU meters
③ Pinch rollers
④ Guide pins
⑤ Tension rollers
⑥ Tape edit marker
⑦ Capstan
⑧ 2- 4-track selector
⑨ Reel adaptor
⑩ Stroboscope LED
⑪ Cue lever/edit switch
⑫ Time counter/reset button
⑬ Stop button
⑭ Playback button
⑮ Fast forward button
⑯ Rewind button
⑰ Pause button
⑱ Record button
⑲ Bias adjustment controls
⑳ Record mode indication lamps
㉑ Record mode switches
㉒ Bias selector
㉓ Equalization selector
㉔ Monitor switches
㉕ Equalization adjustment controls
㉖ Output level controls
㉗ Line-input level controls
㉘ Preset markers
㉙ Microphone level controls
㉚ Microphone jacks
㉛ Headphones jack
㉜ Playback equalization selector
㉝ Oscillator test-tone selector
㉞ Meter sensitivity selector
㉟ Microphone attenuator switch
㊱ Reversing roller
㊲ Edit dial
㊳ Timer start switch
㊴ Power switch
㊵ Pitch control
㊶ Tape speed selector
㊷ VU meter zero-point adjustment screws
㊸ Remote-control connector
㊹ Power cord holders
㊺ AC outlet
㊻ Load impedance selector
㊼ Input selector
㊽ Balanced type line-input connectors
㊾ Unbalanced type line-input jacks
㊿ Unbalanced type line-output jacks
(51) Balanced type line-output connectors

DISASSEMBLY INSTRUCTIONS

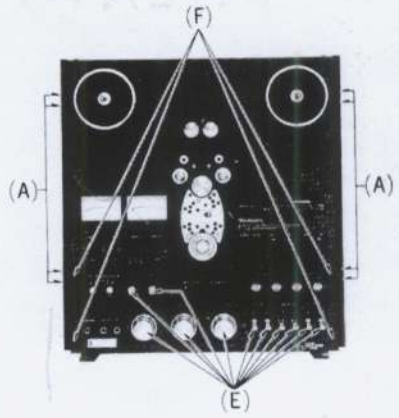


Fig. 2

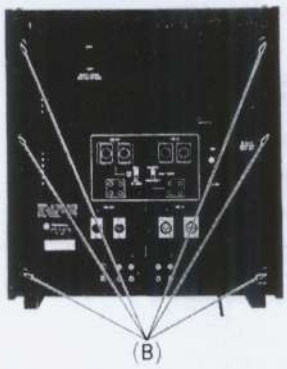


Fig. 3

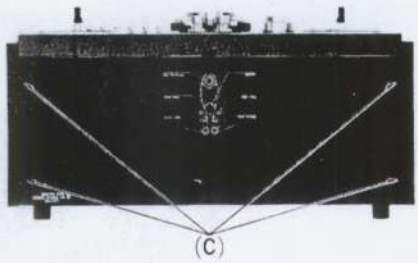


Fig. 4

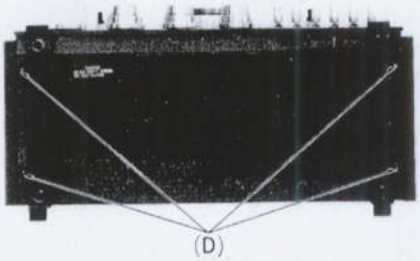


Fig. 5

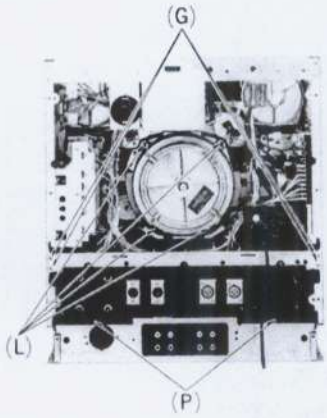


Fig. 6

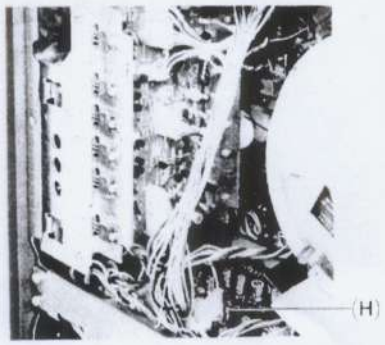


Fig. 7

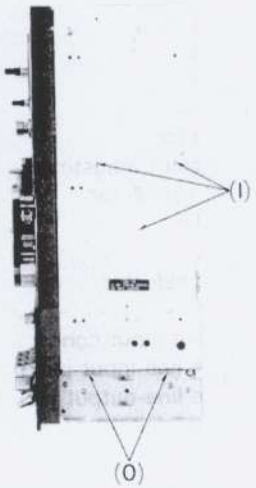


Fig. 8

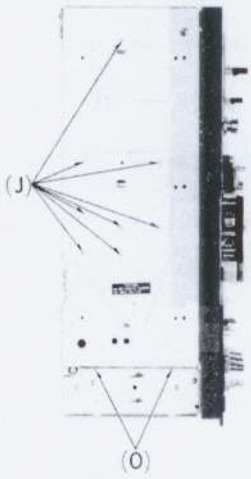


Fig. 9

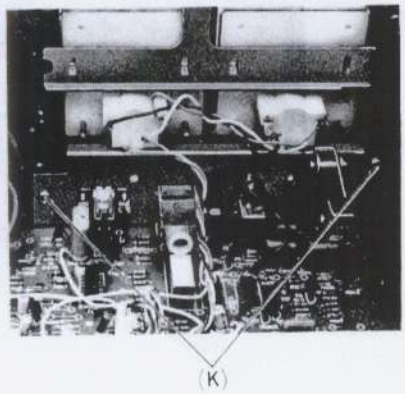


Fig. 10

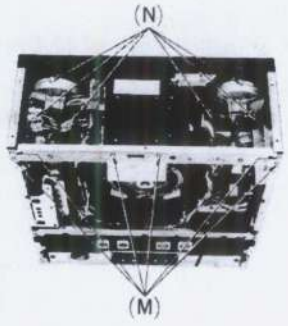


Fig. 11

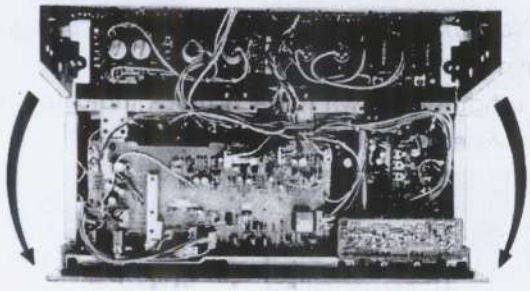
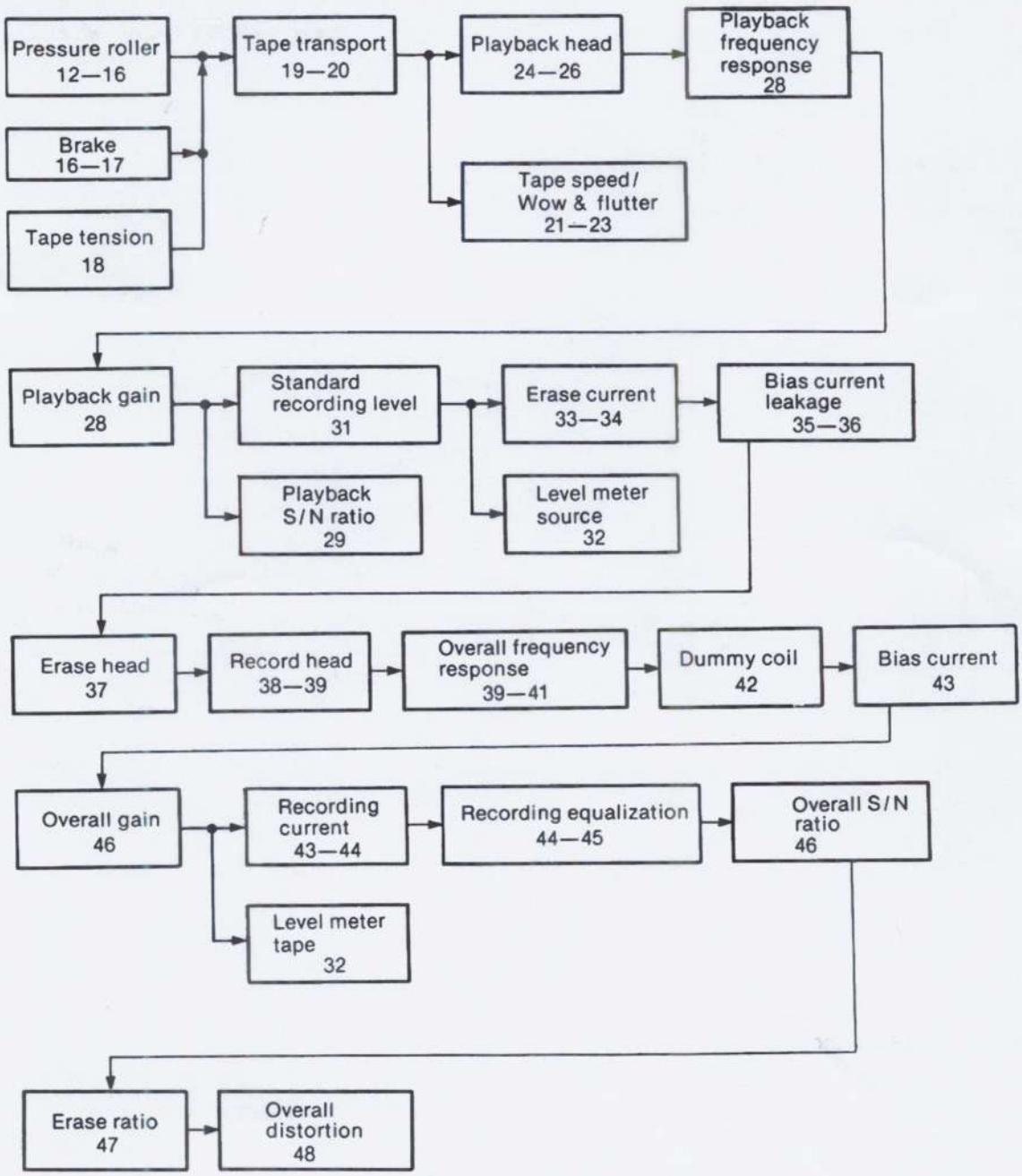


Fig. 12

Procedure	To remove ——.	Remove ——.	Pcs.	Shown in fig. ——.
1	Side board	Screws (A)	(8)	2
——	Rear cover	Screws (B)	(6)	3
——	Top cover	Screws (C)	(4)	4
——	Bottom cover	Screws (D)	(4)	5
2	Function panel	Knobs (E) Screws (F)	(11), (4)	2
——	Main control P.C.B assembly	Screws (G), (H) Connectors	(4), (1)	6, 7
—— ——	Reel motor driving P.C.B and reel motor tension control P.C.B	Screws (I)	(3)	8
——	Power supply P.C.B	Screws (J)	(8)	9
——	Capstan motor control P.C.B	Screws (K)	(2)	10
——	Capstan motor assembly	Screws (L)	(4)	6
——	Power transformer angle assembly	Screws (M)	(6)	11
3	Reel motor assembly	Screws (N)	(6)	11
——	Control unit	Screws (O), (P)	(4), (2)	6, 8, 9, 12

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	• Insufficient pressure between pressure roller and capstan on playback.	• Pressure roller/plunger position adjustment • Pressure roller pressure measurement.	12—14 14
A. High wow and flutter.	• Brakes in contact with supply reel table on playback.	• Brakes.	16—17
B. Longer "Built up time" at 9.5cm/s Tape speed and at changing tape speed.	• Insufficient control operation of capstan motor on playback.	• Measurement of tape speed, wow and flutter.	21—23
Spoilt tape A. Stretched tape.	• Tape takeup torque or back tension is too strong on playback.	• Tape tension adjustment.	18
B. Tape with spoilt edges	• Tape does not travel in center of reel.	• Tape transport.	19—20
	• Tape does not travel in center of tape guide (A).	• Tape transport.	19—20
	• Tape does not travel in center of tape guide (C).	• Tape transport.	19—20
	• Tape does not travel in center of pressure roller.	• Pressure roller height adjustment.	16
Tape travels with cue on even in stop mode.	• Pressure roller in contact with capstan when cue is on.	• Cue lever adjustment.	14
Low playback sound with cue on.	• Too big a space between pressure roller and capstan when cue is turned on.	• Cue lever adjustment.	14
Tape stops running during playback.	• Too strong a pressure between pressure roller and capstan.	•Pressure roller pressure adjustment.	14—15
Tape does not run when PLAY button is again pushed after tape travel has stopped. Tension roller moves up (shut-off condition).	• Weak brake torque on reel tables at stop	• Brakes.	16—17
Tape in contact with head in stop mode.	• Tape shifter is positioned behind head surface at stop position.	• Stopper position adjustment.	15

Symptoms	Check Points	Parts requiring adjustment	Page
Level fluctuation	• Playback head position incompletely adjusted.	• Playback heads.	24—26
	• Pressure roller on one side is not in contact with capstan on playback.	• Pressure roller position adjustment.	13
Low level of playback sound.	• Playback head position incompletely adjusted.	• Playback heads.	24—26
	• Insufbicient tape shifter position.	• Stopper position adjustment.	15
	• Amplifier playback gain incompletely adjusted.	• Playback gain	28
Poor playback frequency response.	• Playback head position incompletely adjusted.	• Playback heads	24—26
	• Amplifier playback equalizer incompletely adjusted.	• Playback frequency response.	28
Playback S/N ratio.		• Playback S/N ratio. • Playback Head	29 24—26
Poor overall frequency response.	• Poor playback frequency response.	• Playback heads. • Playback frequency response.	24—26 28
	• Record head position incompletely adjusted.	• Record head	38—39
	• Bias current incompletely adjusted.	• Bias current.	43
	• Recording equalizer incompletely adjusted.	• Recording equalization	44—45
	• Too much bias current leakage.	• Bias current leakage.	35—36
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 signale channel).	• Dummy coil	42
Overall S/N ratio.	• Playback S/N ratio.	• Playback S/N ratio.	29
	• Erasing is incomplete.	• Overall S/N ratio. • Erase head. • Erase current	46 37 33—34
Insuffcient overall gain.	• Playback level.	• Playback heads. • Playback gain	24—26 28
	• Standard recording level.	• Standard recording level.	31
	• Recording current.	• Recording current.	43

Symptoms	Check Points	Parts requiring adjustment	Page
Level meter		• Level meter for source monitor • Level meter for tape monitor.	32
High overall distortion.	• Poor contact between head and tape.	• Playback heads. • Erase head. • Record head.	24—26 37 38—39
	• Bias current incompletely adjusted.	• Bias current. • Bias current leakage.	43 35—36
Erase ratio		• Erase ratio. • Erase head. • Erase current.	47 37 33—34

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.

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(1) Audio frequency oscillator

a. Oscillation froquency: 5Hz—500kHz (5 ranges)
b. Frequency tolerance: ±(3% + 1Hz)
c. Sine wave
* Output voltage (at 25°C): 5Vrms ± 10% (without load)
2.5Vrms ± 10% (with 600 load)
* Output frequency response: Within ±0.2dB, 20Hz—20kHz
Within ±0.5dB, 5Hz—500kHz
* Distortion factor: Not more than 0.5%, 200Hz—20kHz
Not more than 0.5%, 5Hz—500kHz
* Output impedance: 600 unbalanced, within ±15%
* Output attenuator: 0dB, 20dB, Error: within ±0.2dB
d. Temperature in use ot 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 ± 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 ± 0.3 dB
c. Input impedance:	1 MΩ ± 10%, less than 50 pF
d. Error in indicated value:	Within ± 3% at 1 kHz

C. Output

a. Frequency response:	10 Hz—100 kHz ± 1 dB
	100 kHz—1 MHz ± 3 dB
b. Output voltage:	1 Vrms ± 10% (1 kHz sine wave)

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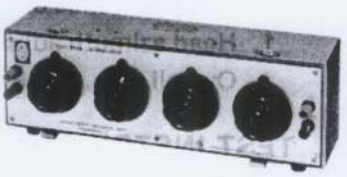
(3) Attenuator



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

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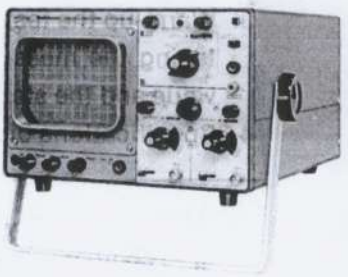
(4) Dual trace oscilloscope



a. Cathode ray tube:	8 × 10 DIV (1 DIV ≒ 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 MΩ , 35 pF.
c. Horizontal axis	
* Sweep speeds:	0.5 S/DIV—0.5 S/DIV in 19 steps

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(5) Digital electronic counter

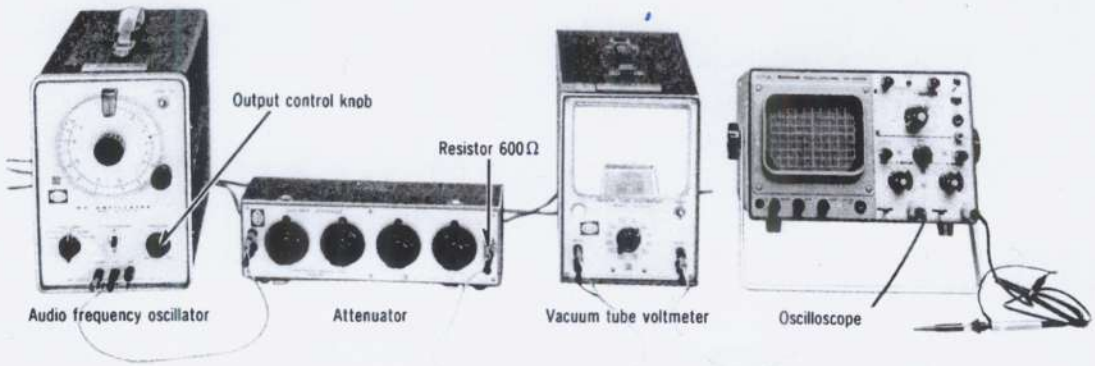
a. Number of figure:	4 (decimal system)
b. Input sensitivity:	100 mVrms
c. Input impedance:	1 MΩ , 40 pF
d. Frequency measurement range:	10 Hz—100 kHz
e. Counting time:	0.1, 1, 10 s

(6) Wow meter

a. Measured center frequency range:	3kHz ± 4%
b. Input level range:	30mV—3V
c. Input impedance:	About 50KΩ unbalanced
d. Measurement:	0.01—3% (5 ranges)
e. Indicator error:	Maximum error in indicated value ± 5% in each range.
f. Frequency response:	Conforming to weighting curve characteristics (WRMS), JIS C5551. Flat characteristics (RMS) 0.5—200Hz, within −3dB (4Hz 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 (3kHz, 3kHz ± 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: ± 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 1V (f = 1kHz) through the attenuator while keeping the attenuator at 0dB.
   * When supplying a signal to the tape recorder amplifier, adjust the input level using the attenuator.



f = 1kHz

Output Voltage 1V (0dB)

III. TEST TAPE

Test tape life

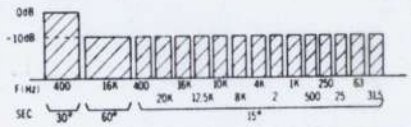
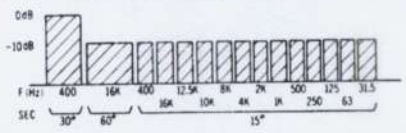
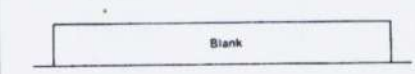
The more frequently the test tape is used, the more the tape characteristics will deteriorate (e.g. lowering of recorded level, worsening of frequency response particularly in high-frequency range, and an increase in wow due to tape elongation) until measured values become unreliable. Even in such a 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.

Frequence 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		• Tape speed: 38cm/s • Full track: • 400Hz 0dB, • 20kHz—31.5Hz −10dB
QZZOF190EX	Standard recording level, azimuth and frequency response tape		• Tape speed: 19cm/s • Full track: • 400Hz, 0dB • 16kHz—31.5Hz −10dB
QZZOW380EX	Wow and tape-speed tape		• Tape speed: 38cm/s • Full track: 8 (min) • 3kHz 0dB
QZZOW190EX	Wow and tape-speed tape		• Tape speed: 19cm/s • Full track: 8 (min) • 3kHz 0dB
QZZORA218	Reference blank tape		• Unrecorded tape (550m)

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.

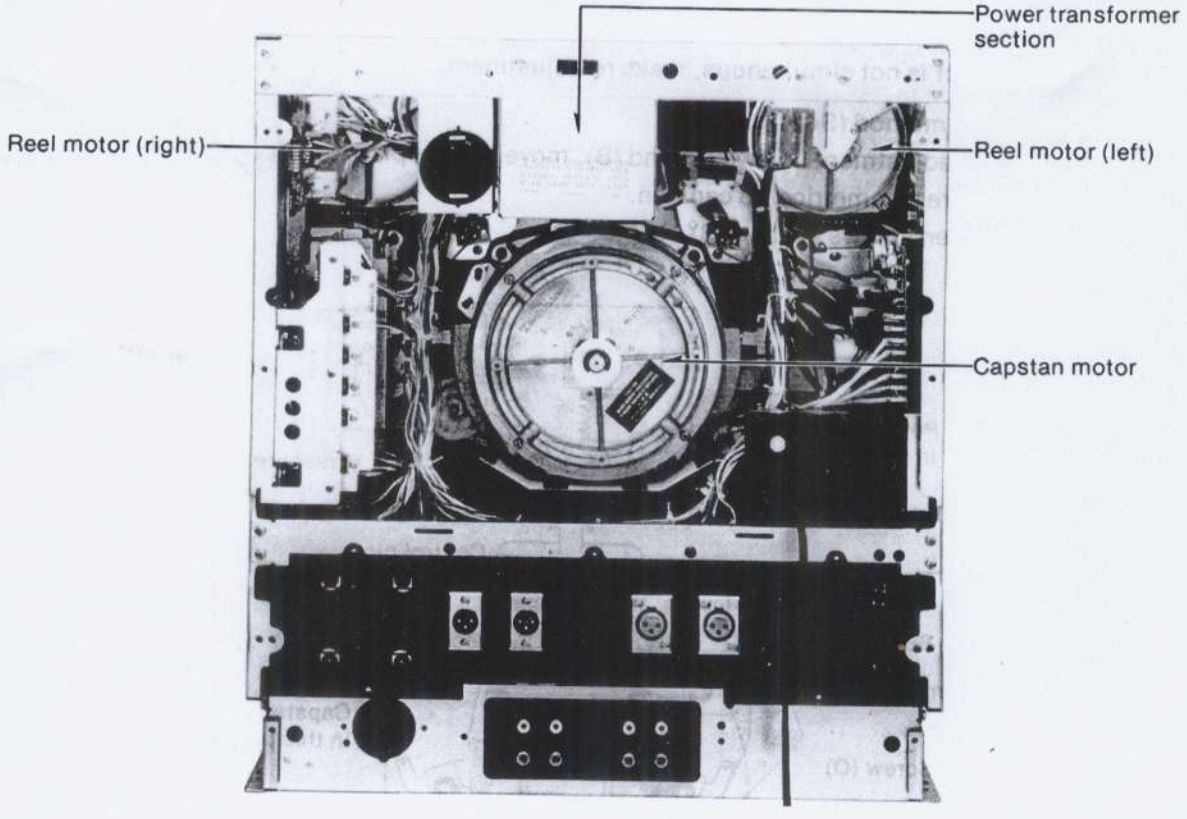


Fig. 13

[A] Pressure Roller Position Adjustment

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

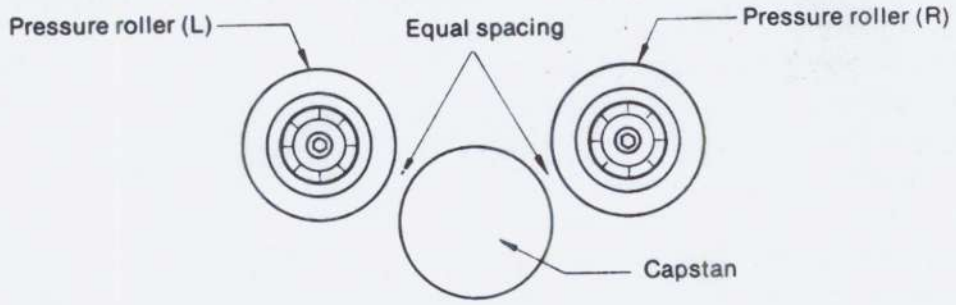


Fig. 14

Checking method (See fig's. 14, and 15)

(1) Pull control plate upward by hand, and confirm that both reressure rollers contact capstan simultenously.

(2) If contact is not simultenous, make re-adjustment.

Adjustment method (See fig. 15)

(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).

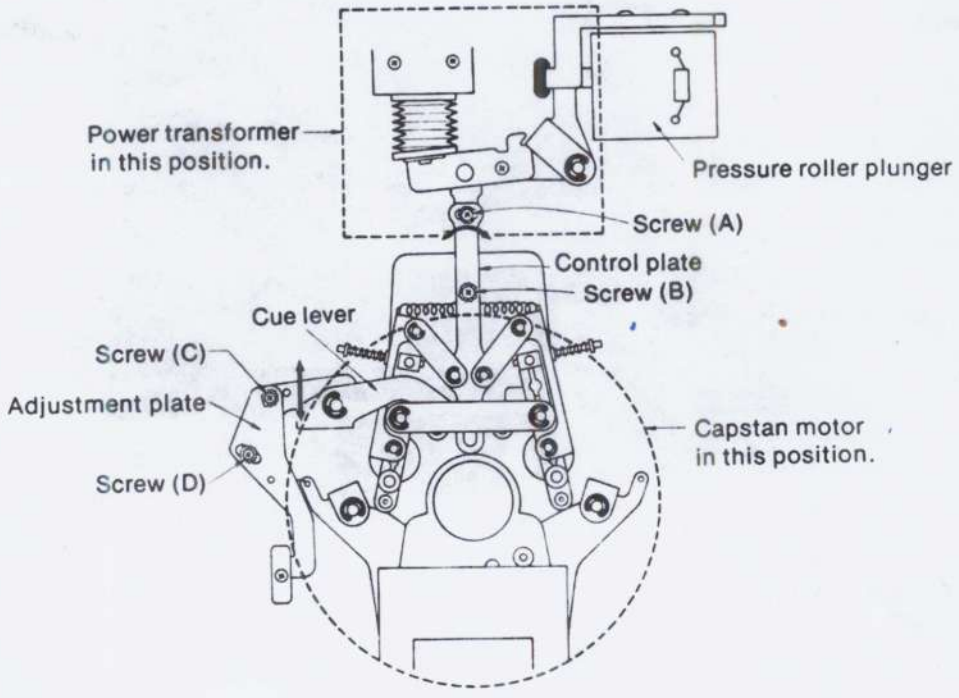


Fig. 15

[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. 16)

(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. 15 and 16)

(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).

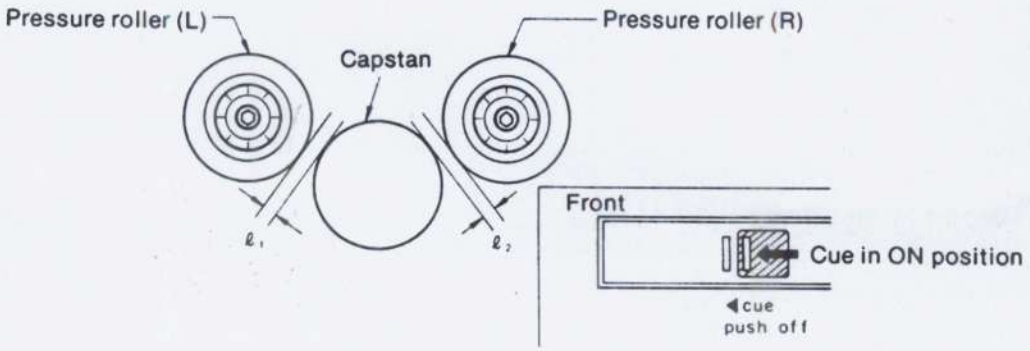


Fig. 16

[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 17, 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].

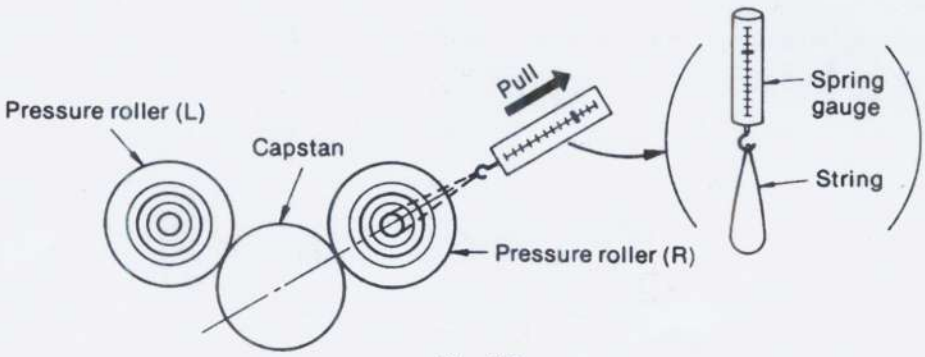


Fig. 17

[D] Pressure Roller/ Plunger Position Adjustment (See figure 18.)

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).

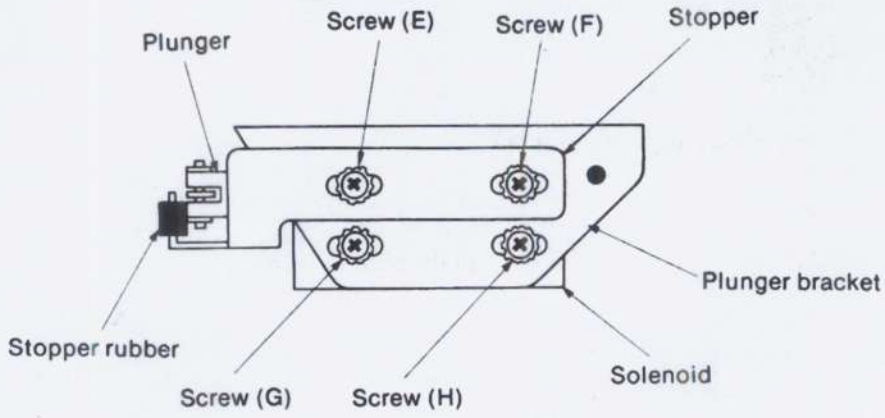


Fig. 18

(3) With the plunger pushed all the way into the solenoid, move the plunger in the direction shown by the arrow in figure 19.
(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.

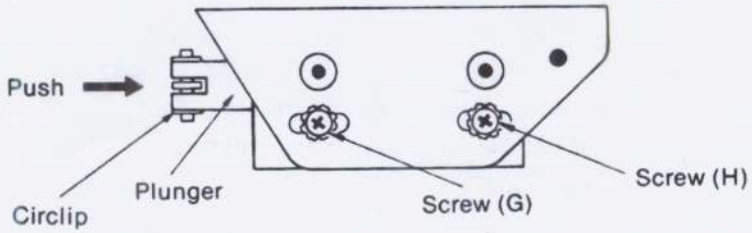


Fig. 19

[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).

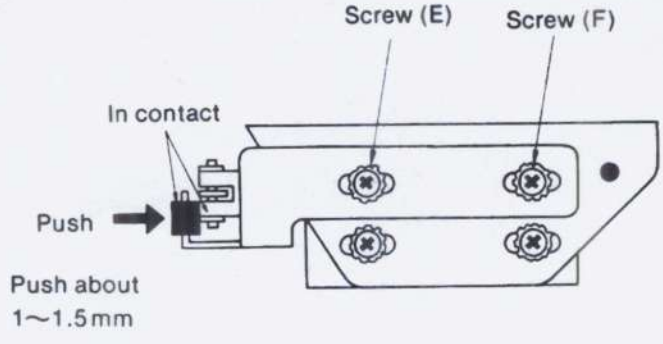


Fig. 20

[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 21.

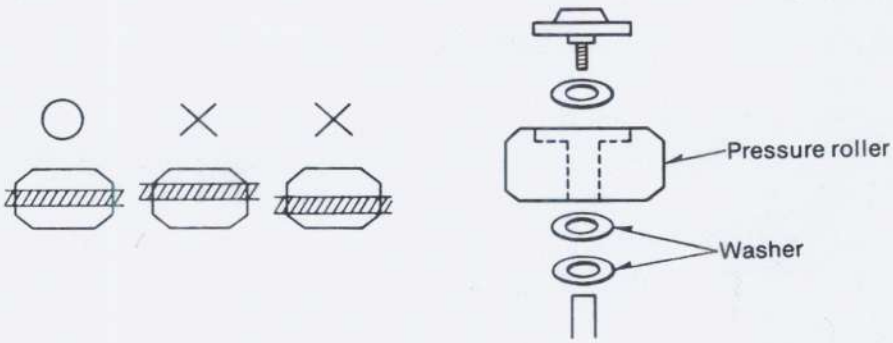


Fig. 21

[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.

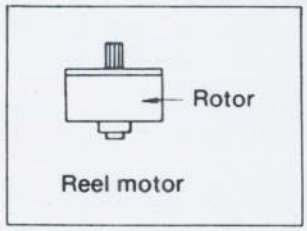


Fig. 22

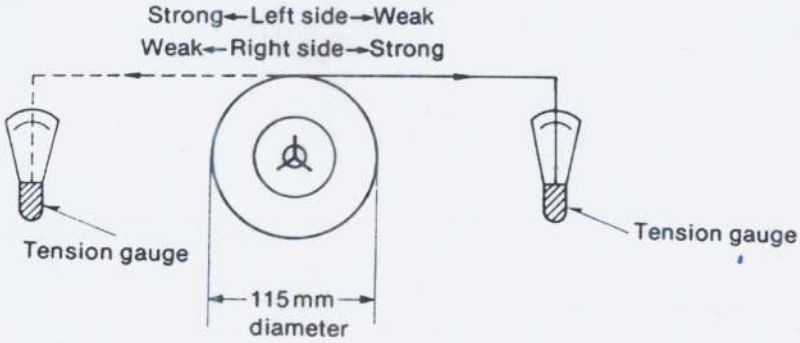


Fig. 23

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

Strong direction: 450 ± 70gr

Weak direction: 140 ± 25gr

Measurement

(1) Attach the tension gauge to the end of tape wound with 115mm 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 24 (for right side) and figure 25 (for left side), secure the bracket so that the space between the pin and bracket is 1—1.5mm.

Right Side

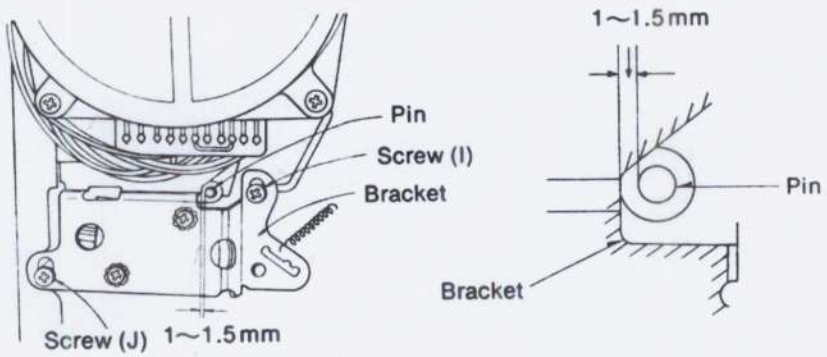


Fig. 24

Left Side

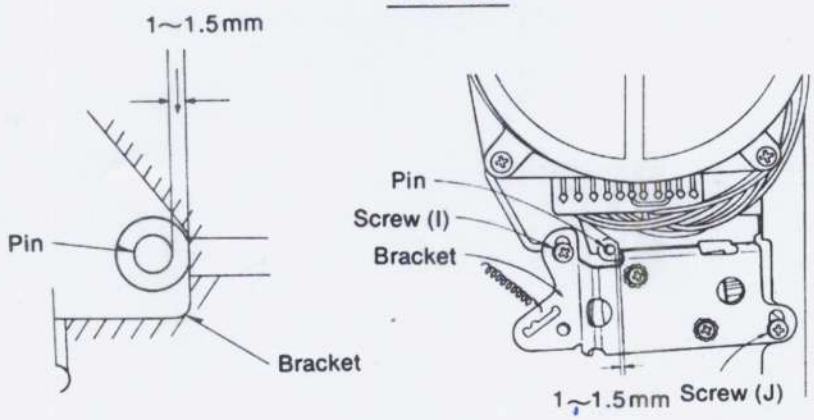


Fig. 25

* 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. 26.

(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

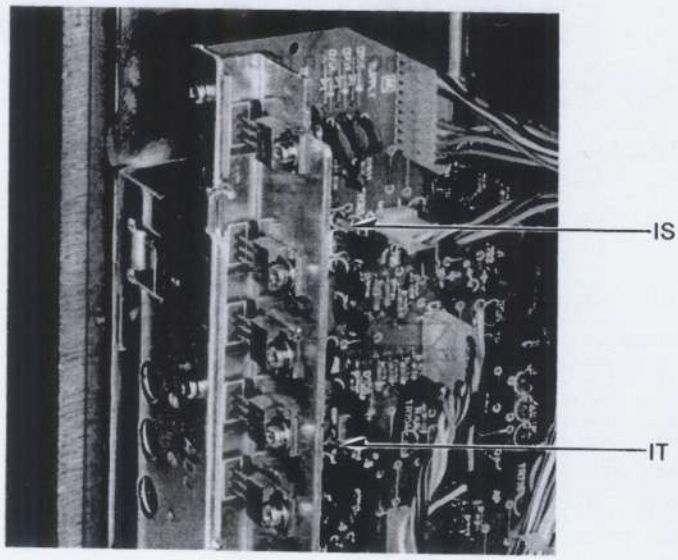


Fig. 26

Ordinary Method

Use a tension analyzer, as shown in figure 27.

(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.

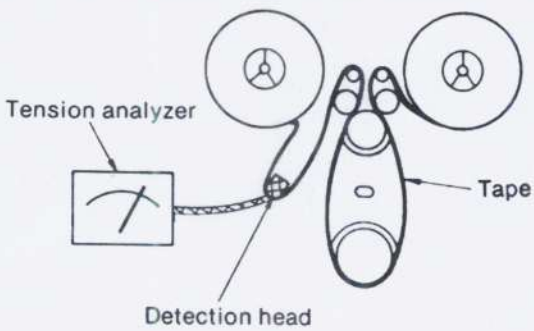


Fig. 27

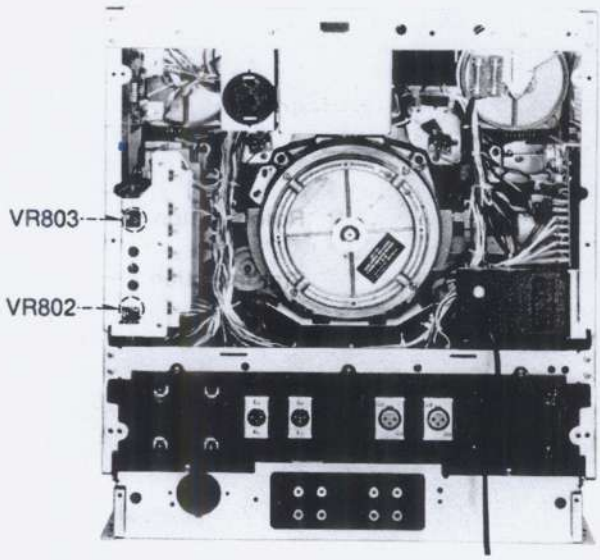


Fig. 28

[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] Tesnion 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 29.

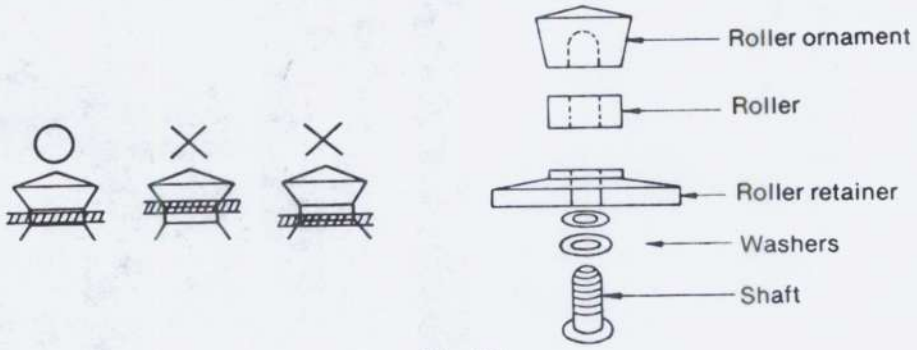


Fig. 29

[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.

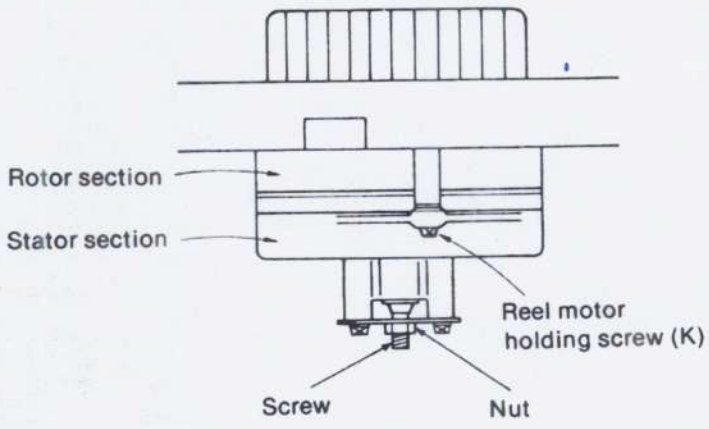


Fig. 30

[C] Tape Guide Adjustment

Six tape guides are used. As shown in figure 31, 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. 31

Adjustment of Tape Guides (A) (Refer to figure 32.)

(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.

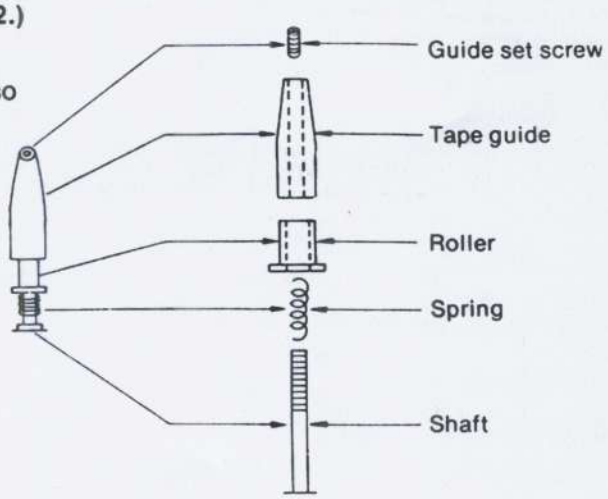


Fig. 32

Adjustment of Tape Guides (C)

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

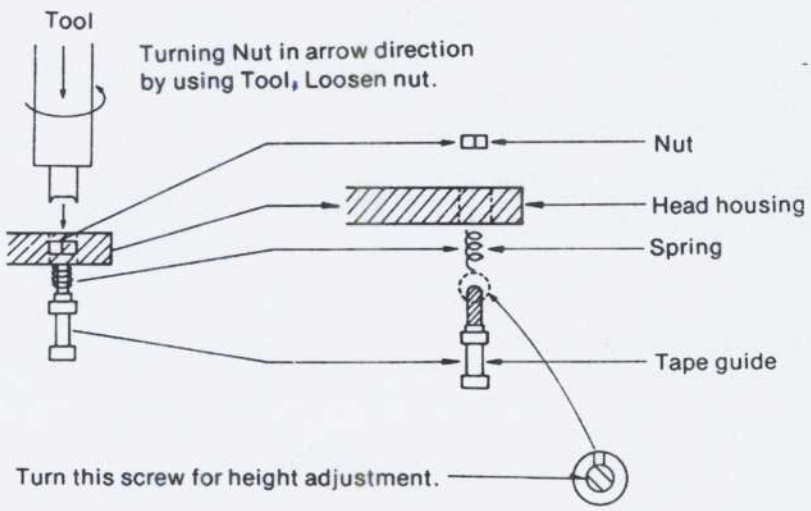


Fig. 33

[5] Measurement of Tape Speed, Wow and Flutter

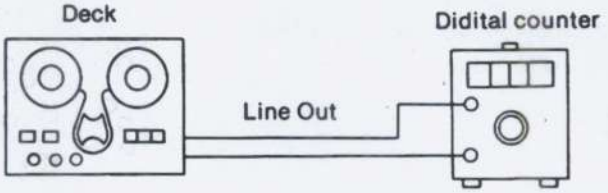


Fig. 34

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 balanced type line output connectors.
(2) Set tape speed selector to 38cm/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 formura.

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

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

[B] Pitch Control Adjustment

(1) Connect a digital counter to balanced type line output connectors.
(2) Set tape speed selector to 38cm/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 3000Hz.
(7) If it is not 3000Hz, adjust VR904 so that it becomes 3000Hz.
(8) After adjustment described above, turning pitch control to maximum and minimum position, confirm that more than 3180Hz is obtained at its maximam position and less than 2820Hz at its minimum position.

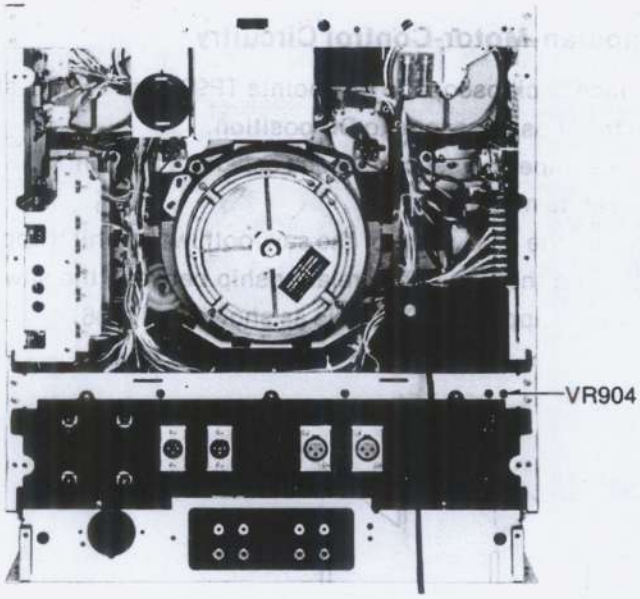


Fig. 35

[C] Tape Speed Fluctuation Measurement

(1) Connect a digital counter to balanced type line output connectors.
(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 balanced type line output connectors.
(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.

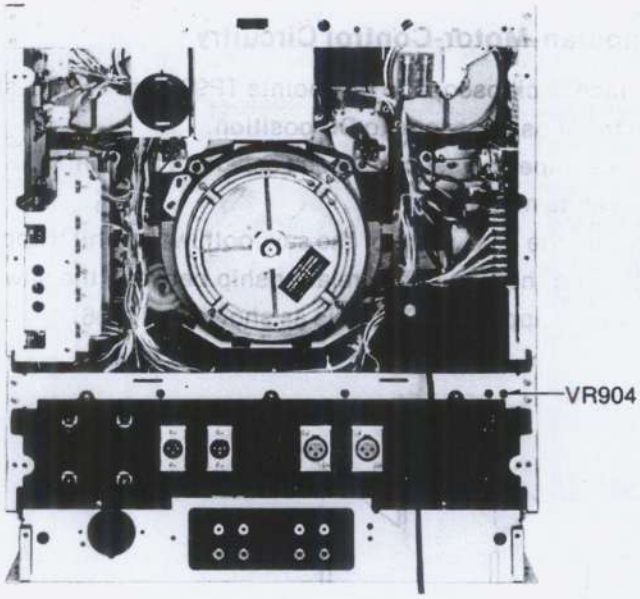


Fig. 35

[C] Tape Speed Fluctuation Measurement

(1) Connect a digital counter to balanced type line output connectors.
(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.

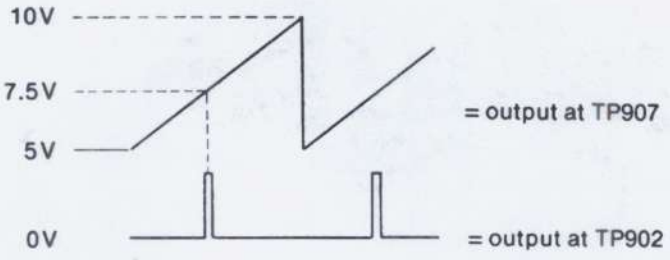
Note: Use test tape QZZOW190EX for 19 cm/s tape speed, measurement method is by the procedure described above.

[D] Wow and Flutter Measurement

(1) Connect a wow-flutter meter to a balanced type line output connectors.
(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. 37.
(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 10 V.
(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. 36.



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

Fig. 36

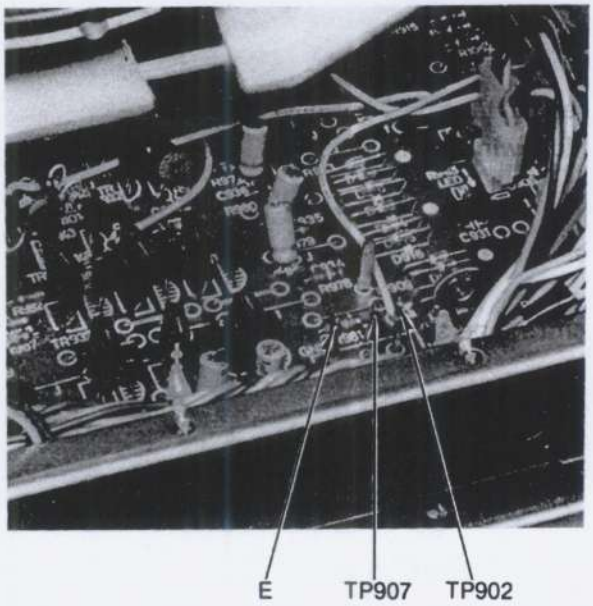


Fig. 37

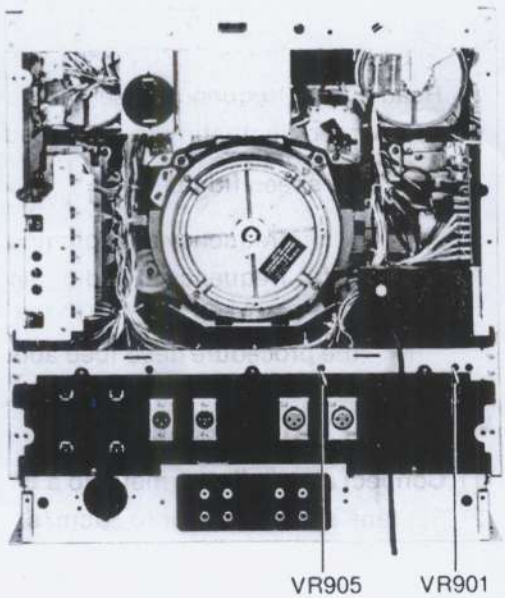


Fig. 38

2. PLAYBACK HEADS

As shown in figure 39, 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.

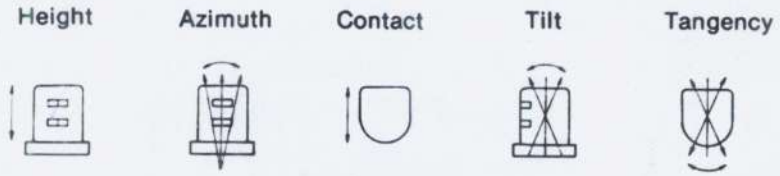
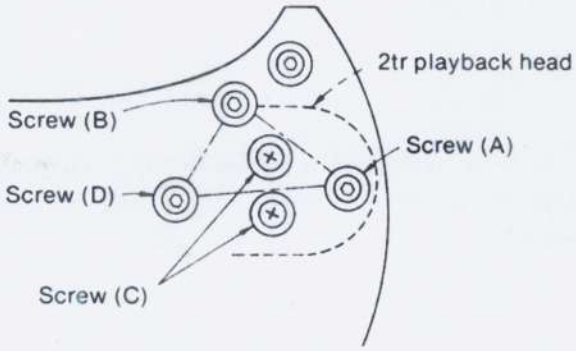


Fig. 39

* **2tr Playback Head**

The screws used to make each adjustment of the 2-track playback head are in the places shown in figure 40.



Screw (A): for height

Screw (B): for azimuth

Screw (C): for contact and tangency

Screw (D): for tilt

Fig. 40

(1) Set the head selector to the 2-track position.
(2) As shown in figure 41, connect a VTVM's to the balanced type line output connectors.
(3) Set to the 19 cm/s tape speed.
(4) Use 16 kHz position (for azimuth adjustment) in test tape QZZOF190EX.

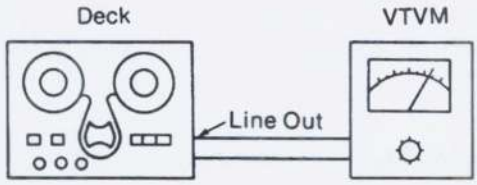


Fig. 41

[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 42.

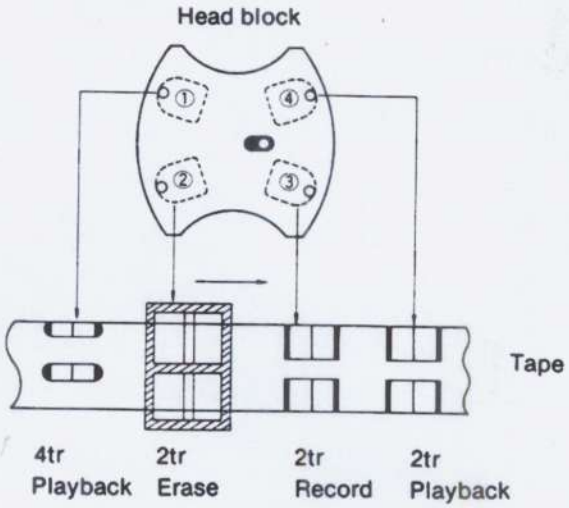


Fig. 42

(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 41, playback test tape QZZOF190EX.
(2) Adjust the azimuth-adjustment screw (B) (figure 40) so that playback output (VTVM readout) becomes maximum.

[C] Tilt Adjustment

(1) In the condition shown in figure 41, 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°.

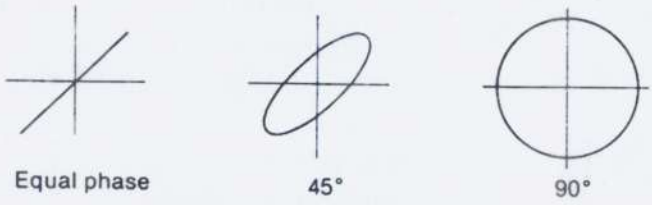


Fig. 43

* **4 Track Playback Head**

The screws used for adjustment of the 4-track playback head are as shown in figure 44. The adjustments should be made in the same way as for the 2-track playback head.

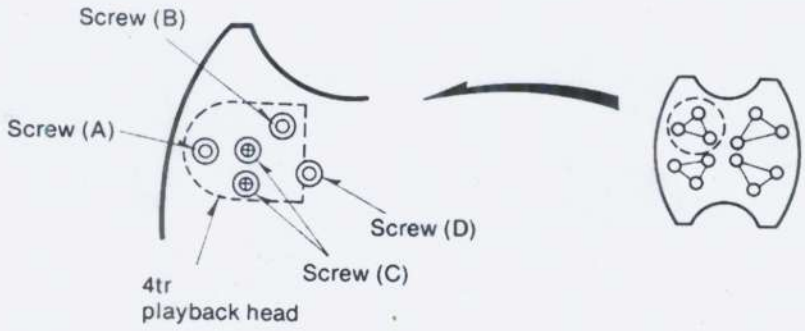


Fig. 44

3. PLAYBACK AMPLIFIER

Equipment:

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

UNIT CONDITIONS

* 2t/4t head-selector: 2t
* Pitch-control switch: OFF
* Timer-start switch OFF
* Meter sensitivity selector: Normal
* 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)
* PB EQ selector: NAB
* OSC selector: OFF
* Input selector: Balanced
* Load impedance selector: 10KΩ or more
* Equalization adjustment controls: Center
* Bias adjustment controls: Center

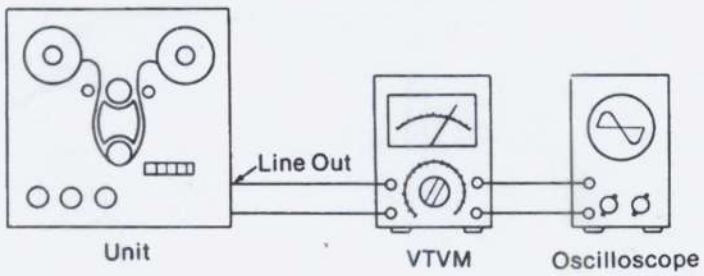
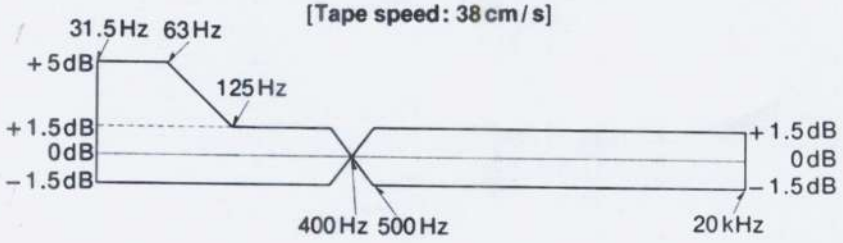
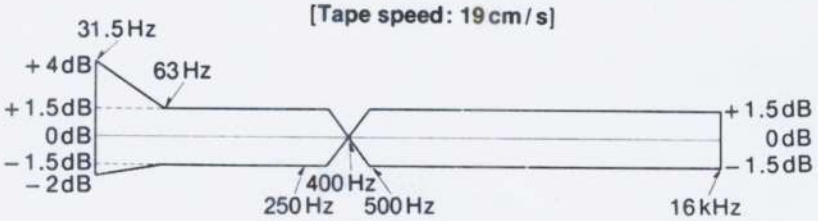


Fig. 45

ITEM	MEASUREMENTS & ADJUSTMENTS
Playback frequency response	1. Test equipment connections are shown in fig. 45. 2. Place unit into playback mode. 3. Play frequency response test tape (QZZOF380EX or QZZOF 190EX). 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 balanced type line output connectors. 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: 38cm/s]**  **[Tape speed: 19cm/s]**  Fig. 46 **[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. 47.
Playback gain	1. Test equipment connections are shown in fig. 45. 2. Play standard recording level portion on test tape, and, using VTVM, measure the output level at balanced type line output connectors. 3. Make measurement for both channels. Standard value: 1.228V (4dBm) **[Adjustment]** 1. If measured value is not standard, adjust the playback level adjustment VR, VR106 (L-CH) and VR206 (R-CH) (See fig. 47.) 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 ±2.5dB.

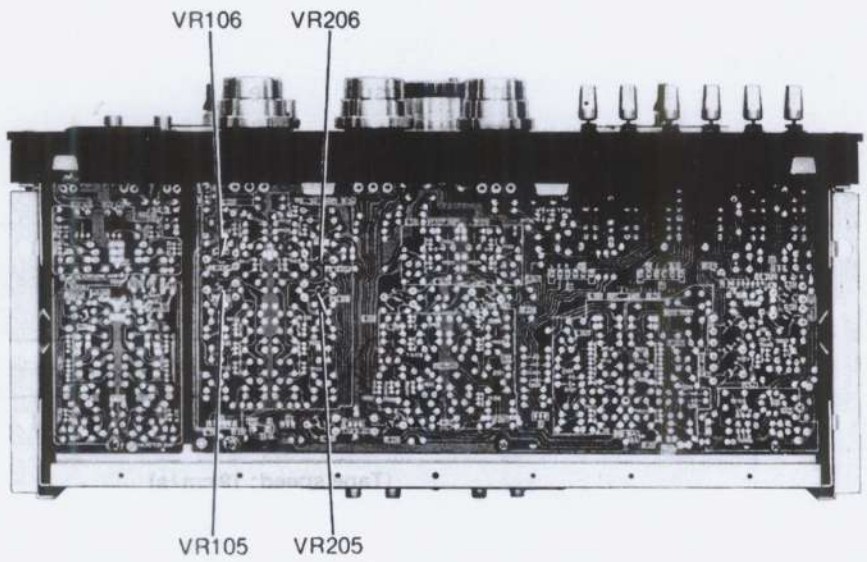


Fig. 47

Playback S/N ratio	1. Test equipment is shown in fig. 45. 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 = 1.228V, 4dBm). Standard value: Greater than 48dB for 38cm/s (unweighted) Greater than 48dB for 19cm/s

4. RECORD AMPLIFIRER

Equipment:

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

UNIT CONDITIONS

* 2t/4t head selector:	2t
* Pitch-control switch:	OFF
* Timer-start switch:	OFF
* Meter sensitivity selector:	Normal
* 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)
* PB EQ selector:	NAB
* OSC selector:	OFF
* Input selector:	Balanced
* Load impedance selector:	10KΩ or more
* Equalization adjustment controls:	Center
* Bias adjustment controls:	Center

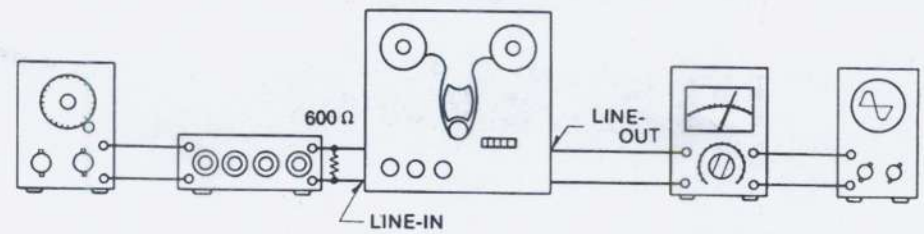


Fig. 48

ITEM	MEASUREMENTS & ADJUSTMENTS
Standard recording level	1. Test equipment connections are shown in fig. 48. 2. Supply 1 kHz signal (-22 dB $^{+1}_{-3}$ dB) from AF oscillator, through ATT, to balanced type line input connectors. 3. Set the output control to "8" position on front panel and confirm that the output level at balanced type line output connectors on VTVM becomes 1.228 V. **[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. 49.) Standard recording levels: Line-in (Balanced): -22 dB $^{+1}_{-3}$ dB Mic-in: -72 dB $\pm$ 2 dB

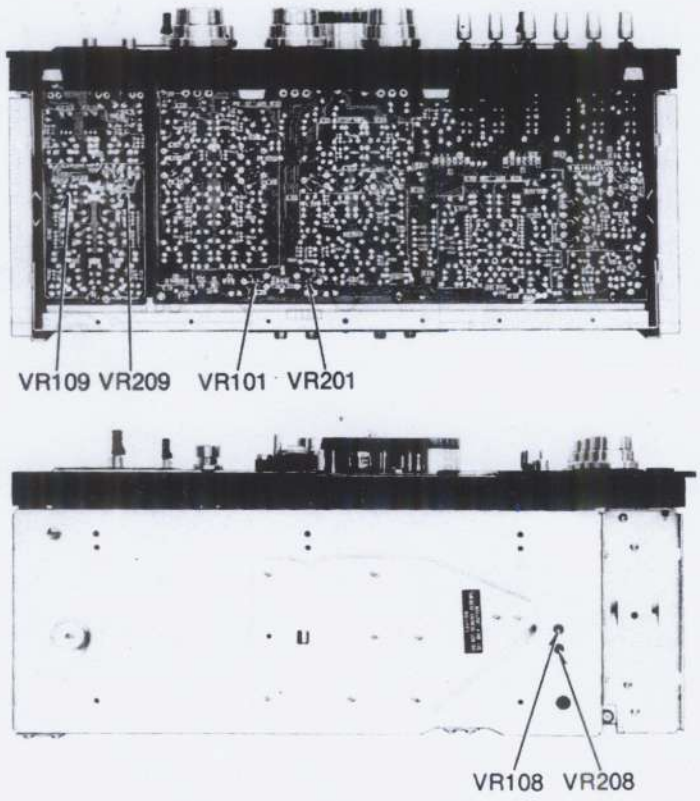
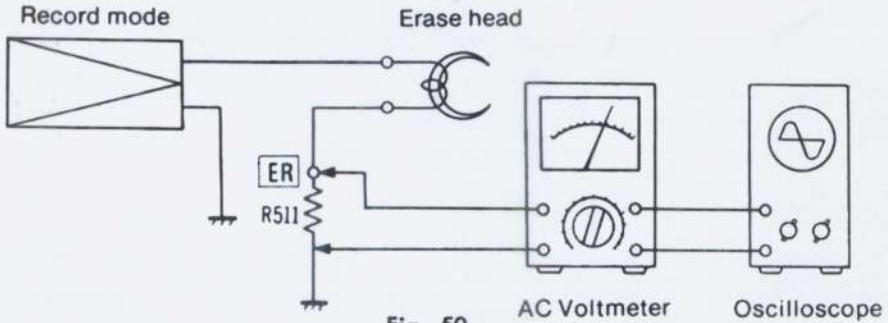


Fig. 49

ITEM	MEASUREMENTS & ADJUSTMENTS
Level meter for source monitor	1. Test equipment connections are shown in fig. 48. 2. Set the monitor selector to "SOURCE" position. 3. Set the output control to "8" position on front panel. 4. Supply 1 kHz signal (-22 dB $^{+1}_{-3}$ dB) from AF oscillator, through ATT, to balanced type line input connectors. 5. Adjust ATT so that the output level at LINE-OUT jacks on VTVM becomes 1.228 V. 6. Then confirm that the level meter indicates 0 VU position. **[Adjustment]** 1. If the level meter does not indicate 0 VU position in the above condition, adjust the level meter adjustment VR, VR108 (L-CH) and VR208 (R-CH). (See fig. 49.)
Level meter for tape monitor	1. Test equipment connections are shown in fig. 48. 2. Place unit in the same condition as for "Standard recording level adjustment." 3. Thread "open" blank test tape (QZZORA218EX). 4. Set the monitor selector to "tape" position (both channels). 5. Set the recording mode selector to "ON" position (both channels). 6. Place unit into recording mode. 7. Then confirm that the level meter indicates 0 VU. **[Adjustment]** 1. If the level meter does not indicate 0 VU in the above condition, adjust the level meter adjustment VR, VR109 (L-CH) and VR209 (R-CH). (See fig. 49.)

ITEM	MEASUREMENTS & ADJUSTMENTS
Erase current	1. Test equipment connections are shown in fig. 50. 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 [ER] and then calculate erase current by formula below. $\text{Erase current} = \frac{\text{Value read on VTVM (V)}}{1\ (\Omega)}$ Standard value: Bias selector "1" position: around 70 mA 8. Then set the recording mode selectors to "OFF" (L-CH) and (R-CH), and confirm that the above standard value can be obtained. **[Adjustment]** If the measured value is not satisfied, adjust the erase current adjustment VR, VR501. (See fig. 51.) 9. Next, set the bias selector to the "2" position, and confirm that the standard value shown below can be obtained. Standard value: Bias selector "2" position: around 78 mA **[Adjustment]** If the measured value is not satisfied, adjust the erase current adjustment VR, VR502. (See fig. 51.)

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 86 mA **[Adjustment]** If the measured value is not satisfied, adjust the erase current adjustment VR, VR503. (See fig. 51.) **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. 50

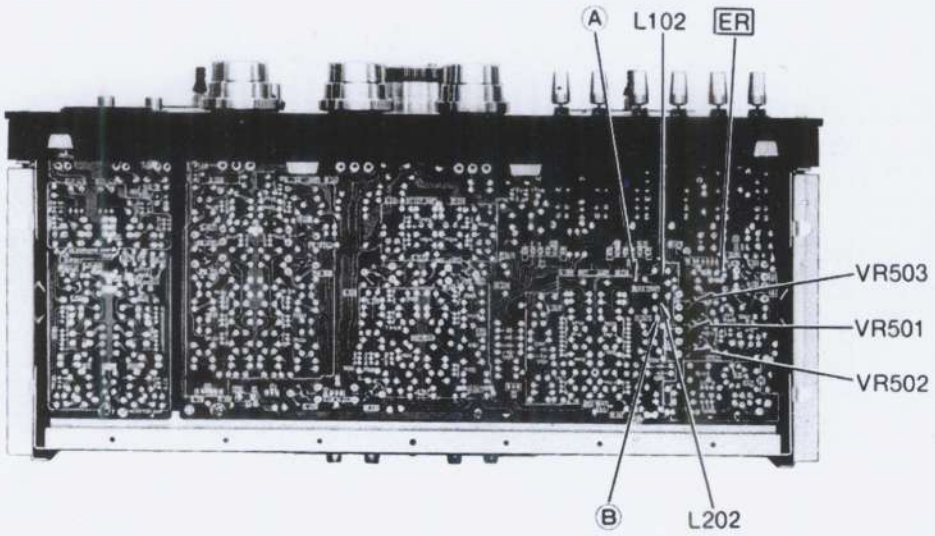


Fig. 51

ITEM	MEASUREMENTS & ADJUSTMENTS
Bias current leakage-1	To prevent bias current leakage to REC-AMP.

(L-channel)

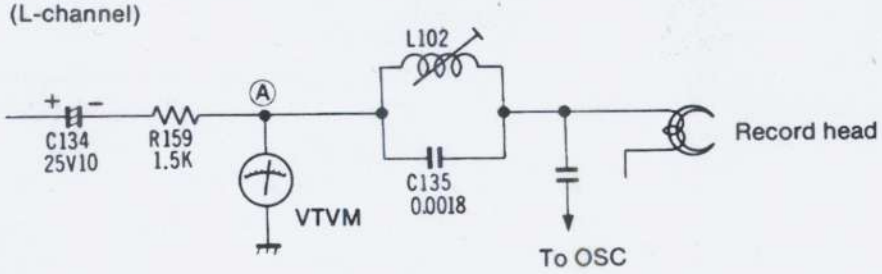


Fig. 52

1. Test equipment connections are shown in fig. 52.
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 51.

ITEM	MEASUREMENTS & ADJUSTMENTS
Bias current leakage-2	To prevent bias current leakage to LINE-OUT.

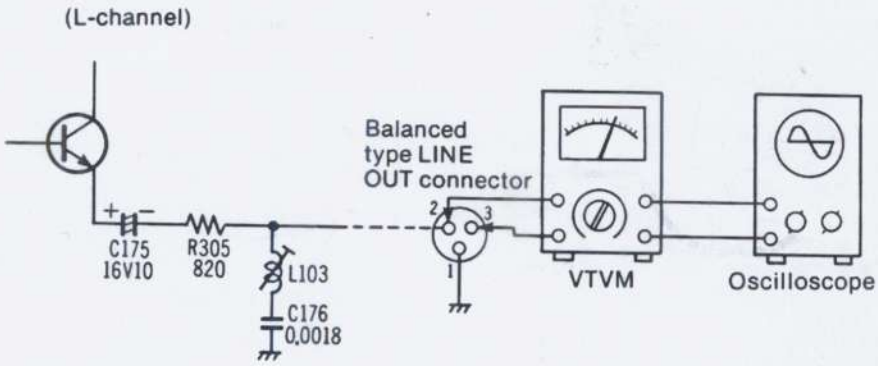


Fig. 53

1. Test equipment connections are shown in fig. 53.
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 at balanced type line output connectors.

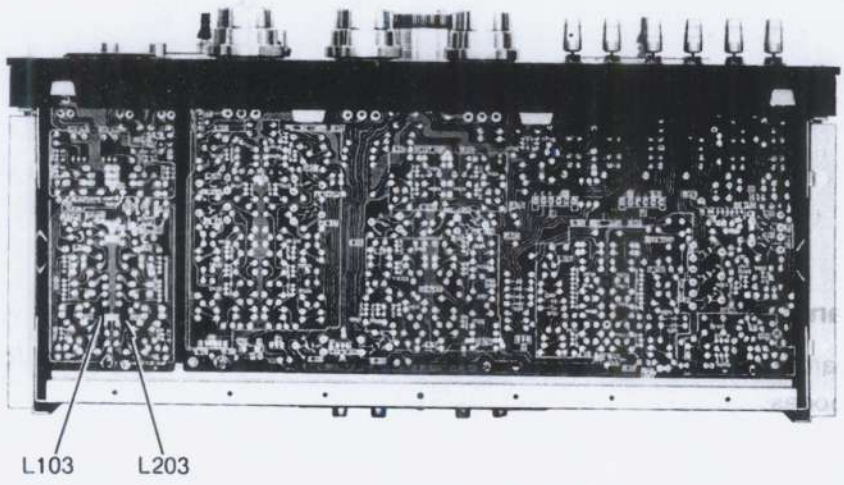
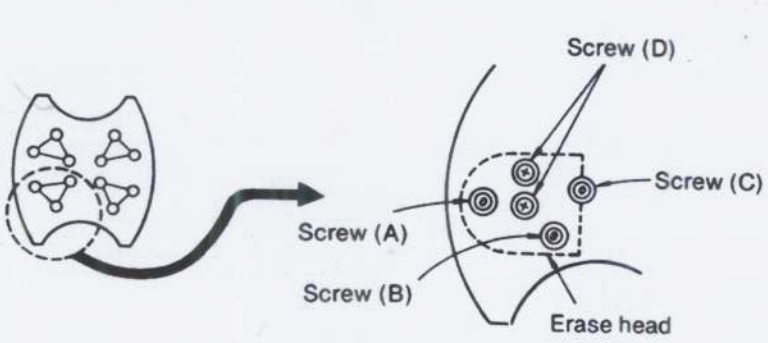


Fig. 54

5. ERASE HEAD

The adjustment screws for adjustment of the erase head are located as shown in figure 55.



Screw (A): for Height
Screw (B): for Azimuth
Screw (C): for Tilt
Screw (D): for Contact & Tangency

Fig. 55

[A] Height Adjustment

Use the height-adjustment screw (A) to adjust so that the head-to-tape relationship is as shown in figure 42.

[B] Azimuth and Tilt Adjustments

Use screws (B) and (C) respectively to adjust so that the condition will be as shown in figure 56, estimating azimuth and tilt visually.

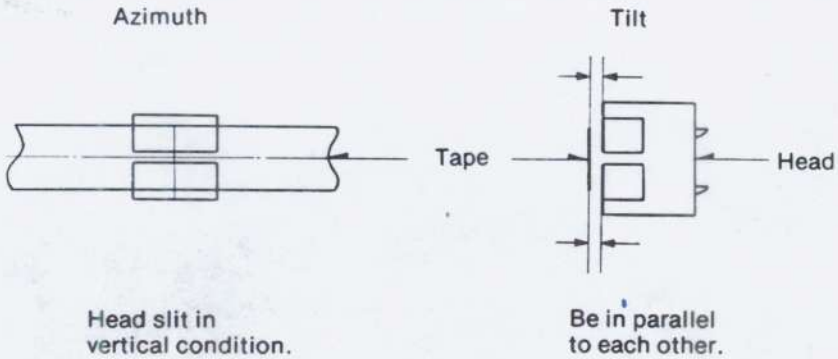


Fig. 56

[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 57.

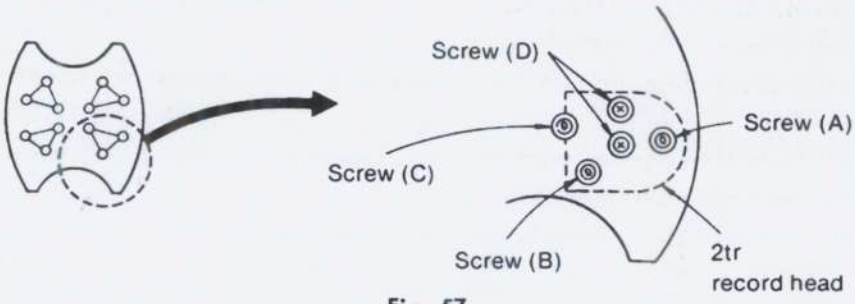


Fig. 57

* Measurement instrument connections are as shown in figure 48.

* **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 42.

[B] Azimuth Adjustment

(1) Set the tape speed to 38 cm/s.
(2) Supply a 16 kHz, −42 dB signal from an audio oscillator to the balanced type line input connectors, and record the signal.
(3) Use azimuth-adjustment screw (B) to adjust so that the output from the balanced type line output connectors, (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

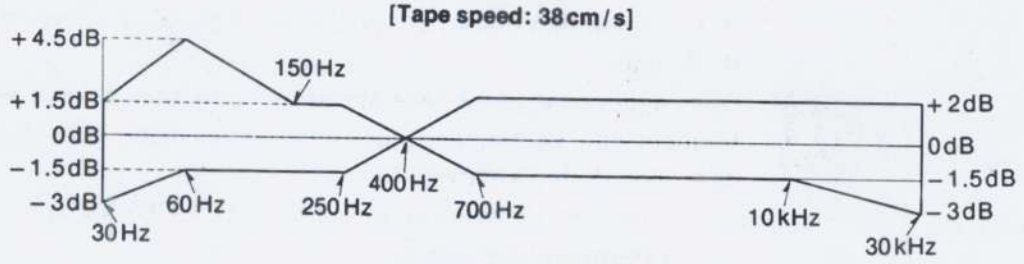
(1) Connect the left and right line-output jacks to the horizontal input and vertical input jacks of the oscilloscope.
(2) Set the tape speed selector to 38 cm/s.
(3) Supply a −42 dB signal from the audio oscillator, and record the signal while varying the frequency from 1 kHz to 5 kHz.
(4) View this 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 43 concerning the Lissajou's figure on the oscilloscope.

7. OVERALL SPECIFICATION

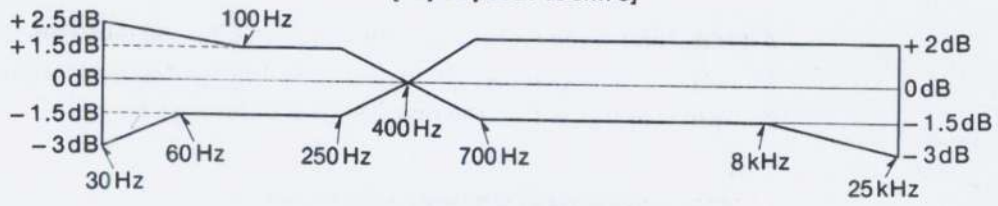
ITEM	MEASUREMENTS & ADJUSTMENTS
Overall frequency response	1. Test equipment connections are shown in fig. 48. 2. Thread blank test tape QZZORA218EX. 3. Supply 400 Hz signal (-22 dB $\pm\frac{1}{3}$ dB) from AF oscillator, through Att, to balanced type line input connectors and adjust ATT so that the output level at balanced type line output connectors on VTVM becomes 1.228 V. 4. Next, adjust ATT so that the input level is −20 dB below standard recording level. (Standard recording level = 400 Hz, -22 dB $\pm\frac{1}{3}$ 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. 58. 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]

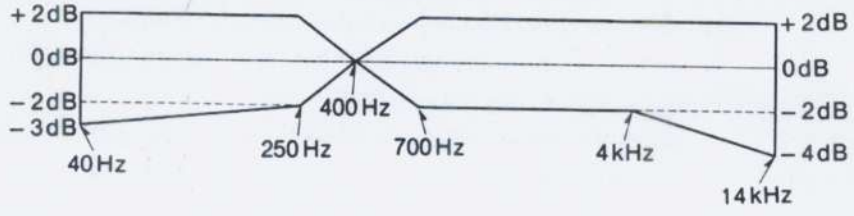


Fig. 58

[Adjustments]

Characteristics at 19 cm/s and 38 cm/s

1. Set tape speed to 19 cm/s, apply an input of 400 Hz, −42 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. 58.
7. Next change tape speed to 38 cm/s, apply an input of 26 kHz, −42 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 19 cm/s, and input signal frequency to 24 kHz, 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 59. After the above measurements and adjustments, measure the overall frequency response at 19 cm/s and 38 cm/s tape speeds, and confirm that it is within the range shown in fig. 58. **Characteristics at 9.5 cm/s tape speed** After adjustments described above are complete for 38 cm/s and 19 cm/s, confirm frequency response at 9.5 cm/s. 1. Record an input signal of 14 kHz, – 42 dB at 9.5 cm/s tape speed, and measure the playback output. 2. If the measured value is not within the range shown in fig. 58, adjust VR506 so that it is within this range.

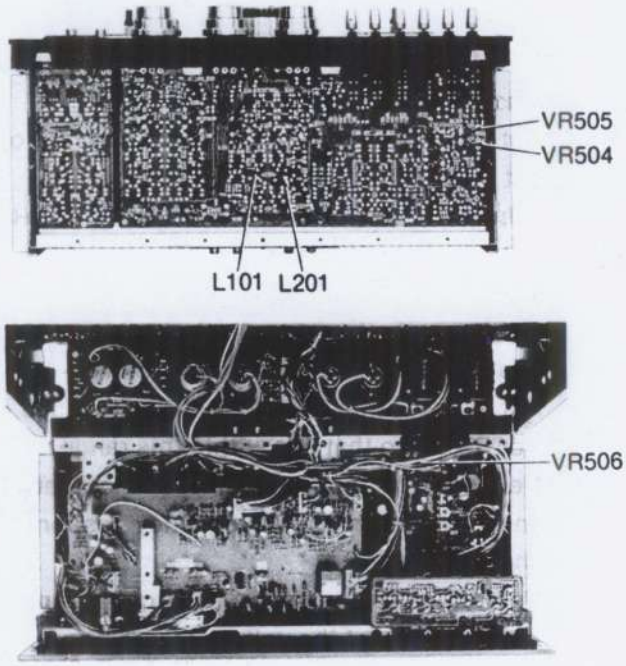


Fig. 59

ITEM	MEASUREMENTS & ADJUSTMENTS
Dummy coil	The purpose of Dummy coils adjustment is to obtain overall frequency response specified with mono-channel recording. Specification: Within ±2dB at 16kHz with relation to overall frequency response specified with stereo mode. 1. Test equipment connections are shown in fig. 48. 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, −42dB 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 ±2dB. 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. (Note, however, that peaking coil L502 is to be adjusted.)

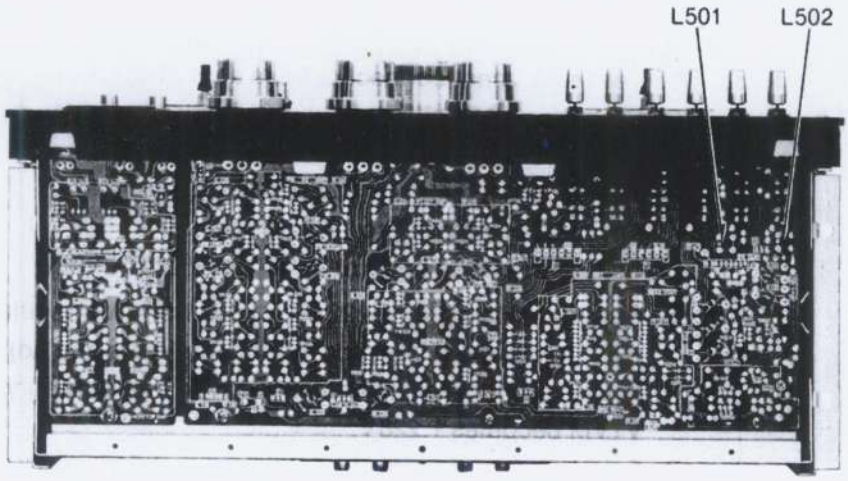
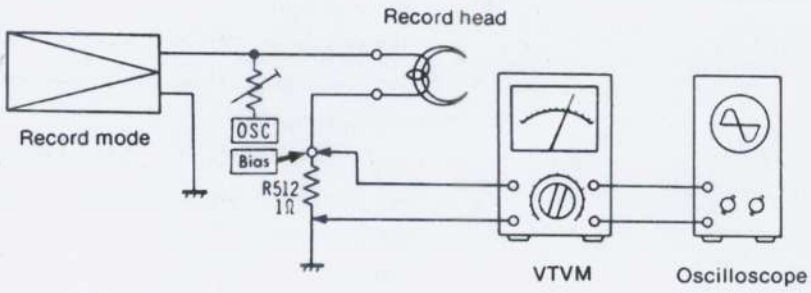


Fig. 60

ITEM	MEASUREMENTS & ADJUSTMENTS
Bias current	1. Test equipment connections are shown in fig. 61. 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. 62. 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. $\text{Bias Current} = \frac{\text{Voltage read on VTVM}}{1\,\Omega}$ (V) Standard value at 38 cm/s tape speed and at "2" position of Bias Selector: around 3 mV 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. 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.)
Recording current	1. Test equipment connections are shown in fig. 61. 2. Stop the bias oscillation by unsoldering the connection point [Bias Cut] for bias current ON/OFF shown in figure 62. 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 ($-22\,\text{dB}\,^{+1}_{-3}\,\text{dB}$) from AF oscillator, through ATT, to balanced type line input connectors and adjust ATT until source monitor level at balanced type line output connectors on VTVM becomes 1.228 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. 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. 61
Recording equalization	1. Test equipment connections are shown in fig. 61. 2. Place unit in the same condition as for "Recording current measurement" on page 43. (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 vlaue 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: +3dB±1dB higher than "2" position.
      "3" position: −3dB±1dB lower than "2" position.
   B) Standard level (dB):
      (tape speed: 19cm/s, Input frequency: 16kHz)
      "1" position +3dB±2dB higher than "2" position.
      "3" position: −3dB±2dB lower than "2" position.
   C) Standard level difference (dB):
      (tape speed: 9.5cm/s, Input frequency: 12.5kHz)
      "1" position: +4dB±3dB higher than "2" position.
      "3" position: −4dB±3dB lower than "2" position.

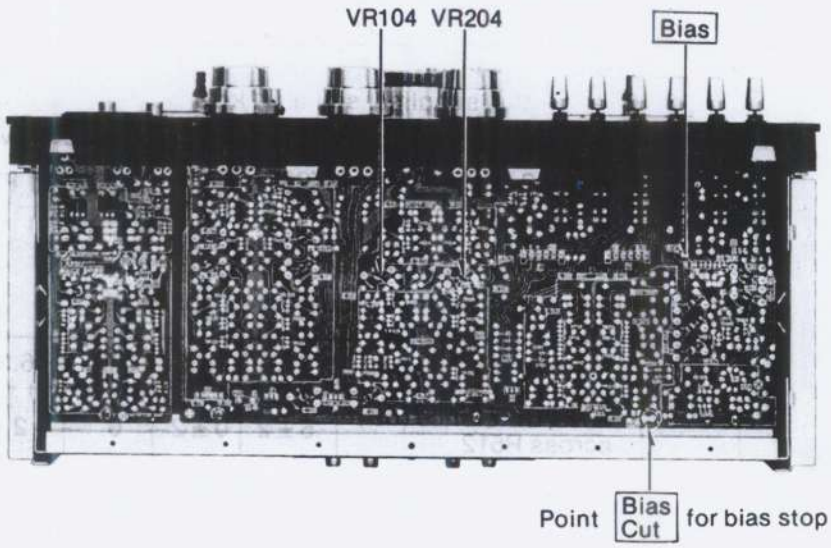
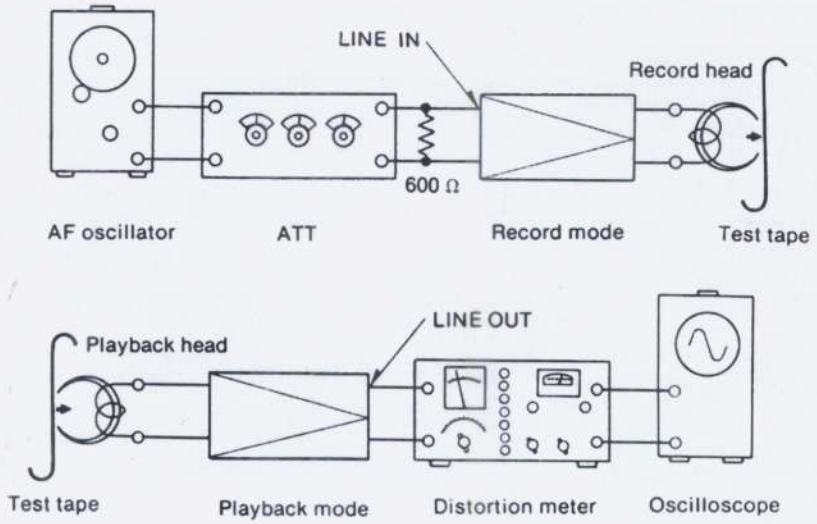
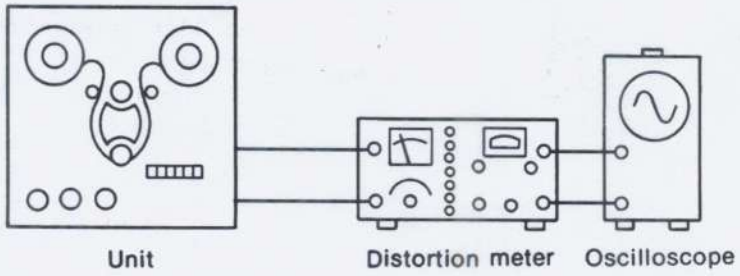
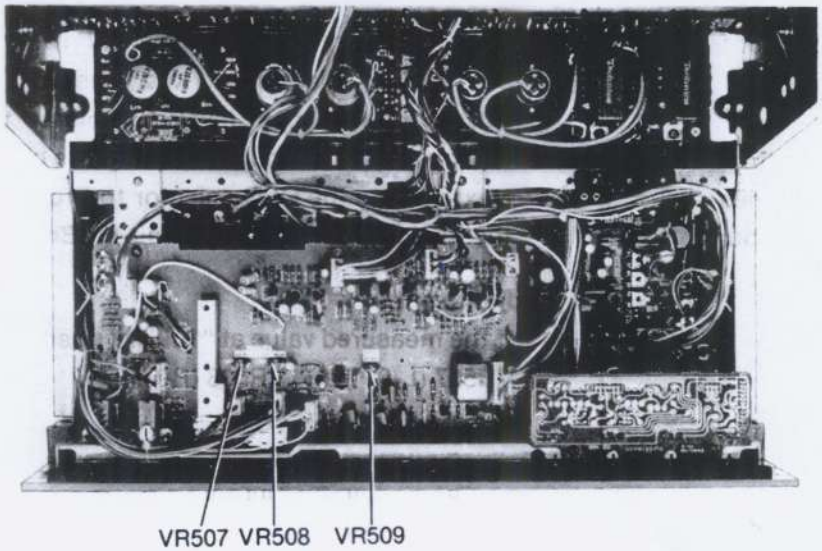


Fig. 62

ITEM	MEASUREMENTS & ADJUSTMENTS
Overall gain	1. Test equipment connections are shown in fig. 48. 2. Thread blank test tape QZZORA218EX. 3. Supply 400 Hz signal (-22 dB $^{+1}_{-3}$ dB) from AF oscillator, through ATT, to balanced type line input connectors. 4. Adjust ATT so that the output level at balanced type line output connectors on VTVM becomes 1.228 V. 5. Place unit into recording mode. 6. Set the monitor selector to "Tape" position (both channels). 7. Then, measure the output level at balanced type line output connectors indicates 1.228 V. **[Adjustment]** 1. If the measured value is not satisfied, adjust the overall gain adjustment VR, VR104 (L-CH) and VR204 (R-CH) shown in figure 62.
Overall S/N ratio	1. Test equipment connections are shown in fig. 48. 2. Thread blank test tape QQZORA218EX. 3. Set monitor selector to "Source" position. 4. Supply 1 kHz signal with -22 dB $^{+1}_{-3}$ db from AF oscillator, through ATT, to balanced type line input connectors and adjust ATT so that the output level at balanced type line output connectors indicates 1.228 V. 5. Record the above signal. 6. Next, make another recording without supplying signal (disconnect inputs to balanced type line input connectors.) 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". **Standard values** Tape speed — Greater than 38 cm/s — Greater than 49 dB 19 cm/s — Greater than 49 dB 9.5 cm/s — Greater than 47 dB Bias and EQ: position 2 and without NANB filter.

ITEM	MEASUREMENTS & ADJUSTMENTS
Erase ratio	1. Test equipment connections are shown in fig. 48. 2. Thread blank test tape QZZORA218EX. 3. Supply 1 kHz signal (-22 dB $^{+1}_{-3}$ dB) from AF oscillator, through ATT, to balanced type line input connectors, and adjust ATT so that the output level at balanced type line output connectors indicates 1.228 V. 4. Next, adjust ATT so that the input level is +10 dB higher than standard recording level. (Standard recording level = 1 kHz, -22 dB $^{+1}_{-3}$ 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 balanced type line input connectors, 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 levle and the erased level. **Standard values (using band-pass filter)** 1 KHz: Greater than 70 dB 100 Hz: Greater than 60 dB With position 1 of Bias and position 2 of EQ.
Overall distortion	1. Test equipment connections are shown in fig. 63. 2. Thread blank test tape QZZORA218EX. 3. Supply 1 kHz signal (-24 dB $\pm$ 3 dB) from AF oscillator, through ATT, to balanced type line input connectors and adjust ATT so that the output level at balanced type line output connectors indicates 1.228 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. **[Adjustment]** 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. 63
Oscillator test-tone level * Monitor switches ...source	1. Test equipment connections are shown in fig. 45. 2. Set the OSC selector to "1 kHz" position. 3. Adjust the line input level controls so that the output level at balanced type line output connectors on VTVM become – 6dBm. 4. Next change the OSC selector to "10kHz" position and confirm that the output level becomes – 6dBm. **[Adjustment]** 1. If the measured value at "10kHz" position is not satisfied, adjust VR507 (L-CH) and VR508 (R-CH).

ITEM	MEASUREMENTS & ADJUSTMENTS
Oscillator test-tone distortion * Monitor switches ...source	1. Test equipment connections are shown in figure below.  Fig. 64 2. Set the OSC selector to "1 kHz" position. 3. Adjust the line input level controls so that the output level at balanced type line output connectors on VTVM becomes −6dBm. 4. Measure the distortion factor of output level. Standard value: Less than 3% **[Adjustment]** 1. If the distortion factor does not satisfy the standard, adjust VR509.  Fig. 65

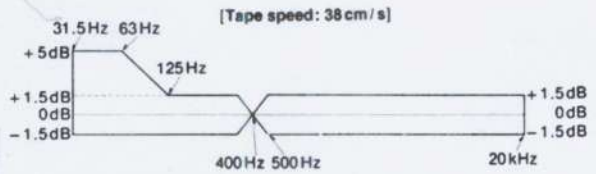
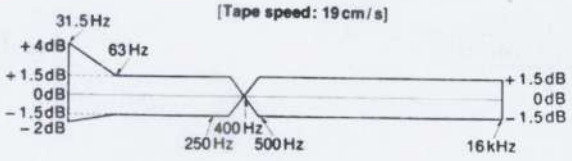
SPECIFICATIONS

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

Selector	Position
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 sensitivity selector:	Normal
8. Microphone attenuator switch:	0 dB
9. Output level control:	8 position
10. Mic in control:	Maximum
11. Line in control:	Maximum
12. PB EQ selector:	NAB
13. OSC selector:	OFF
14. Input selector:	Balanced
15. Load impedance selector:	10 KΩ or more
16. Equalization adjustment controls:	Center
17. Bias adjustment controls:	Center

B) Test tape used: QZZOF380EX
QZZOF190EX
QZZOW380EX
QZZOW190EX
QZZORA218EX

C) Standard output level: 1.228 V

Item	Specification	Adjustment Part	Remarks
Playback System			
Playback frequency response		VR105 (L-CH) VR205 (R-CH)	———
			
Standard playback output	1.228V	VR106 (L-CH) VR206 (R-CH)	See page 28
Playback S/N ratio (unweighted)	48dB or more (38cm/s, 19cm/s) 46dB or more (9.5cm/s)	———	
Playback level meter	0VU	VR109 (L-CH) VR209 (R-CH)	See page 32
Recording System			
Standard recording level	Line in: -22^{+1}_{-3}dB Mic in: -72 ± 2dB	VR101 (L-CH) VR201 (R-CH)	
Recording level meter	0VU	VR108 (L-CH) VR208 (R-CH)	See page 32
Erase current	70mA (at Bias position 1) 78mA (at Bias position 2) 86mA (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	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 heavyly enfluence upon overall frequency response
Recording current	Around 160μA	(VR104: L-CH) (VR204: R-CH)	
Recording equalization		———	See page 44

Compensation values depending upon frequencies.

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

Frequency (Hz)	31.5	100	400	6.3K	20K
Value (dB)	5±2	0±2	0	−2±3	2±3

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

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

Tape speed: 9.5cm, EQ position: 2

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

Compesation values depending upon EQ position.

Tape speed: 38cm/s, Frequency 20kHz

EQ position	1	2	3
Value (dB)	+3±1	0	−3±1

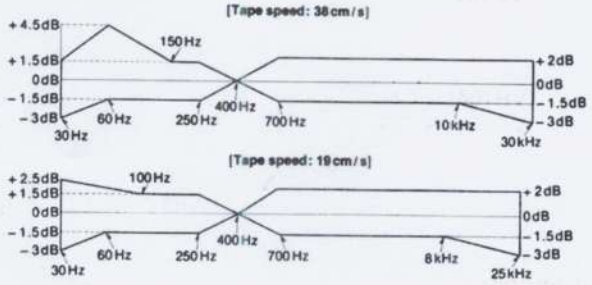
Tape speed: 19cm/s, Frequency: 16kHz

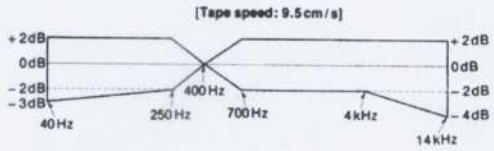
EQ position	1	2	3
Value (dB)	+3±2	0	−3±2

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

EQ position	1	2	3
Value (dB)	+4±3	0	−4±3

Item	Specification	Adjustment Part	Remarks
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)	





Overall frequency response (monaural mode)	Within ±2dB	L502 (L-CH) L501 (R-CH)	With retation to that of stereo mode. See page 42
Overall gain	1.228V±1dB	VR104 (L-CH) VR204 (R-CH)	
Overall S/N ratio		———	

Tape speed	
38cm/s	49dB or more
19cm/s	49dB or more
9.5cm/s	47dB or more
Bias & EQ positions: 2, and without NAB filter.	

Erase ratio			

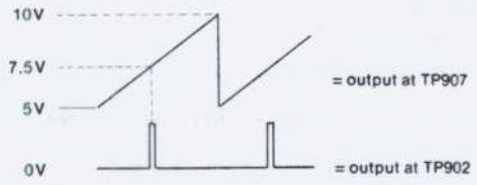
Frequency	Standard value
1kHz	70dB or more
100Hz	60dB or more
Bias and EQ position: 2, Tape speed: 38cm/s	

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 13 See page 14
Pressure of pressure roller	900 ± 100 gr	Pressure roller plunger	See page 14
Pressure roller height	See page 16	Number of washer	See page 16
Brakes	450 ± 70 gr: Strong direction 140 ± 25 gr: Weak direction	Brake plunger	See page 16
Tape tension	65 ± 5 gr: Take up torque 75 ± 5 gr: Back tension	VR802 VR801	IT: 0.31 V IS: 0.21 V using 10" reel
Tension roller height	See page 19	Number of washer	See page 19
Reel table height	See page 19	Height adjustment screw	See page 19
Tape guides position	See page 20	Each guide	See page 20
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

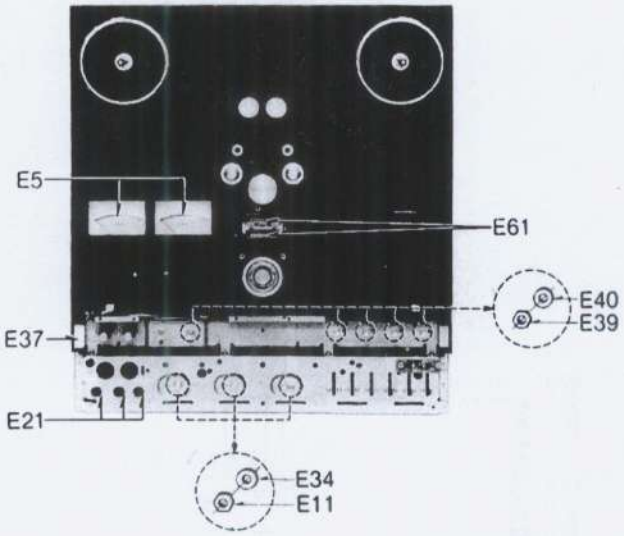
Item	Specification	Adjustment Part	Remarks
Pitch control	±6%	VR904	See page 21
Capstan motor control circuit		VR905, VR901	See page 23

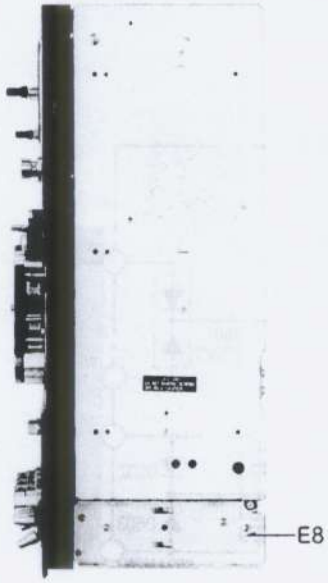


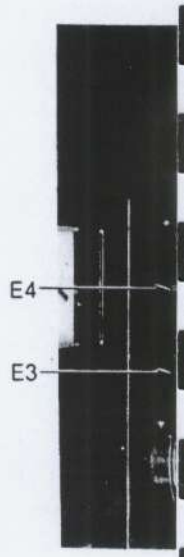
Adjust so that the pulse signal at 50% of the amplitude of the sawtooth wave.

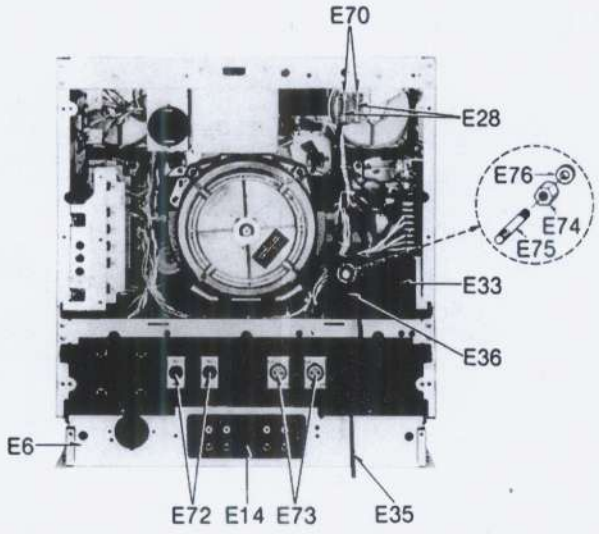
Playback heads	See page 24	Head set screws	See page 24
Playback head phase	Within 60°	Azimuth adjustment screw	See page 26
Erase head	See page 37	Head set screws	See page 37
Record head	See page 38	Head set screws	See page 38
Record head phase	See page 39	Azimuth adjustment screw	See page 39

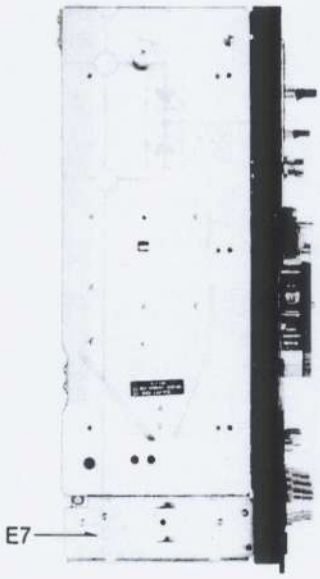
ELECTRICAL PARTS LOCATION

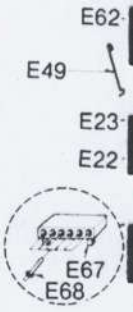


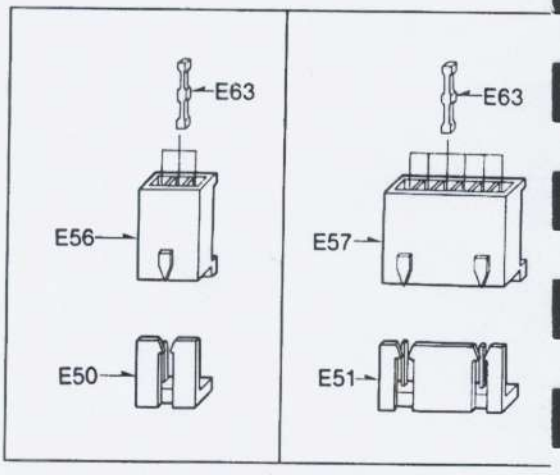


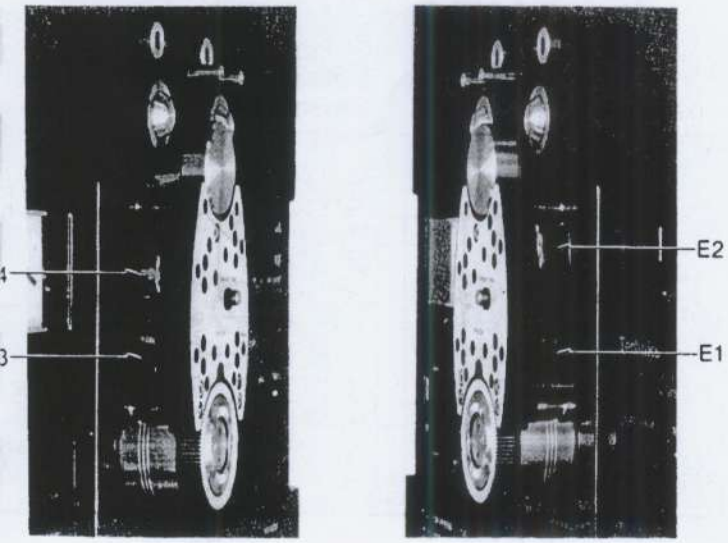


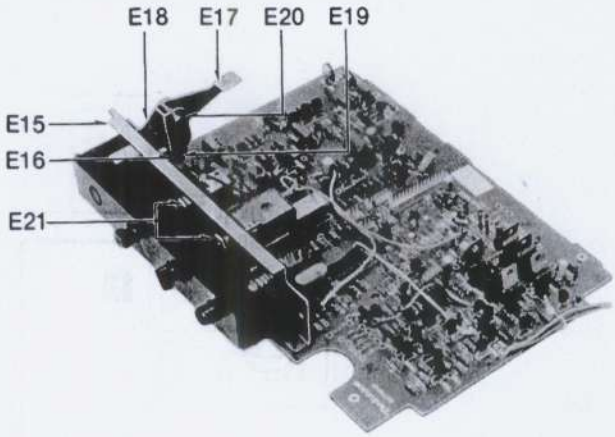


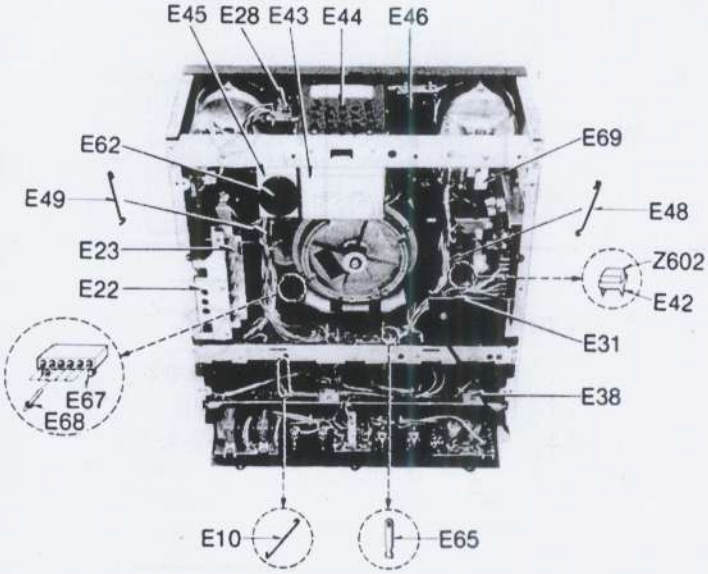


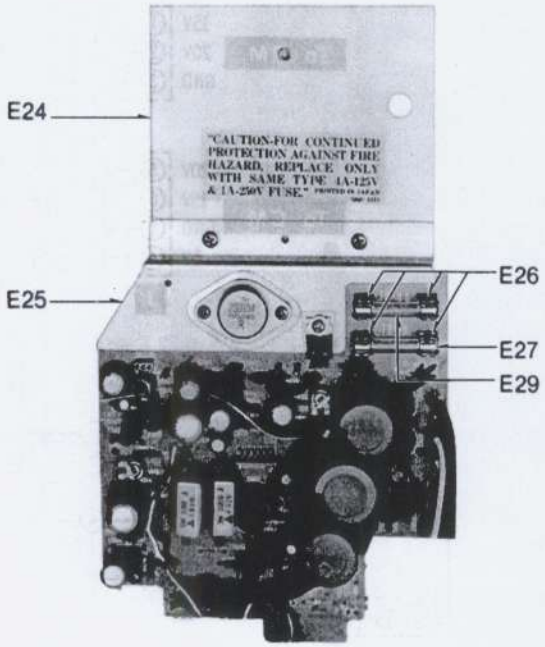


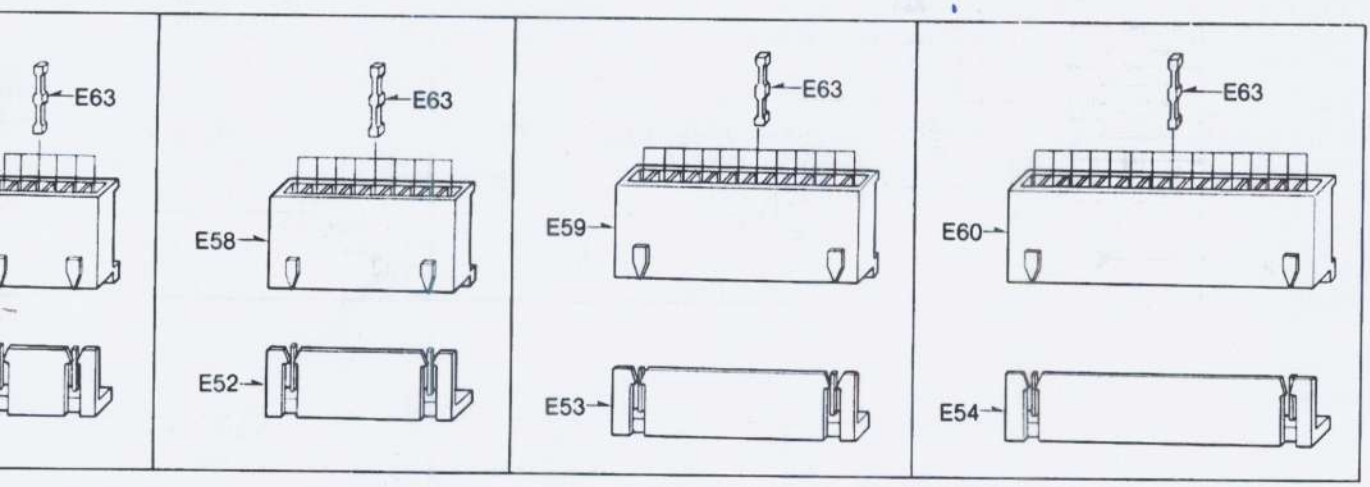



E2
E1


E18
E17
E20
E19
E15
E16
E21

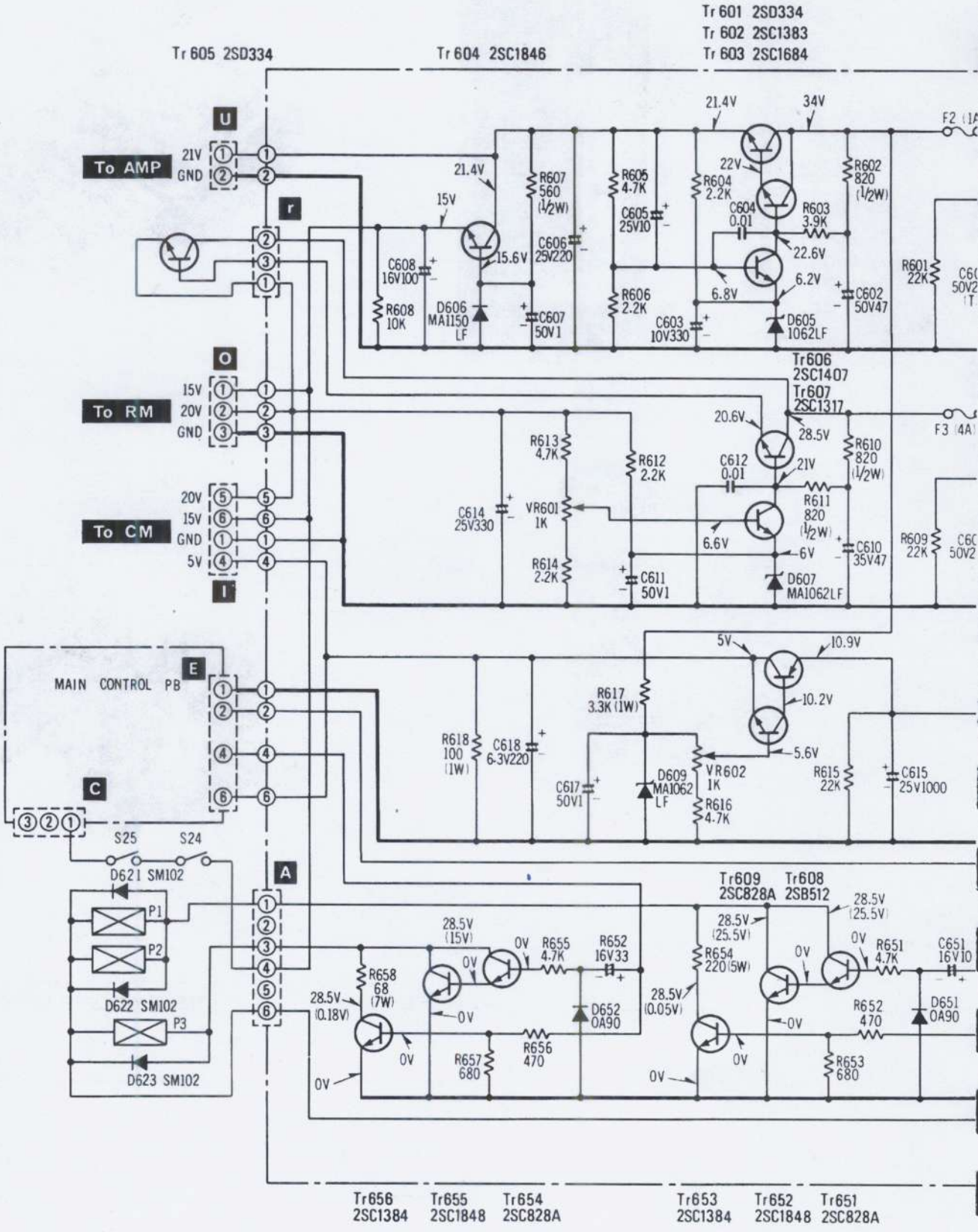

E45
E28
E43
E44
E46
E62
E69
E49
E48
E23
Z602
E22
E42
E31
E67
E68
E38
E10
E65

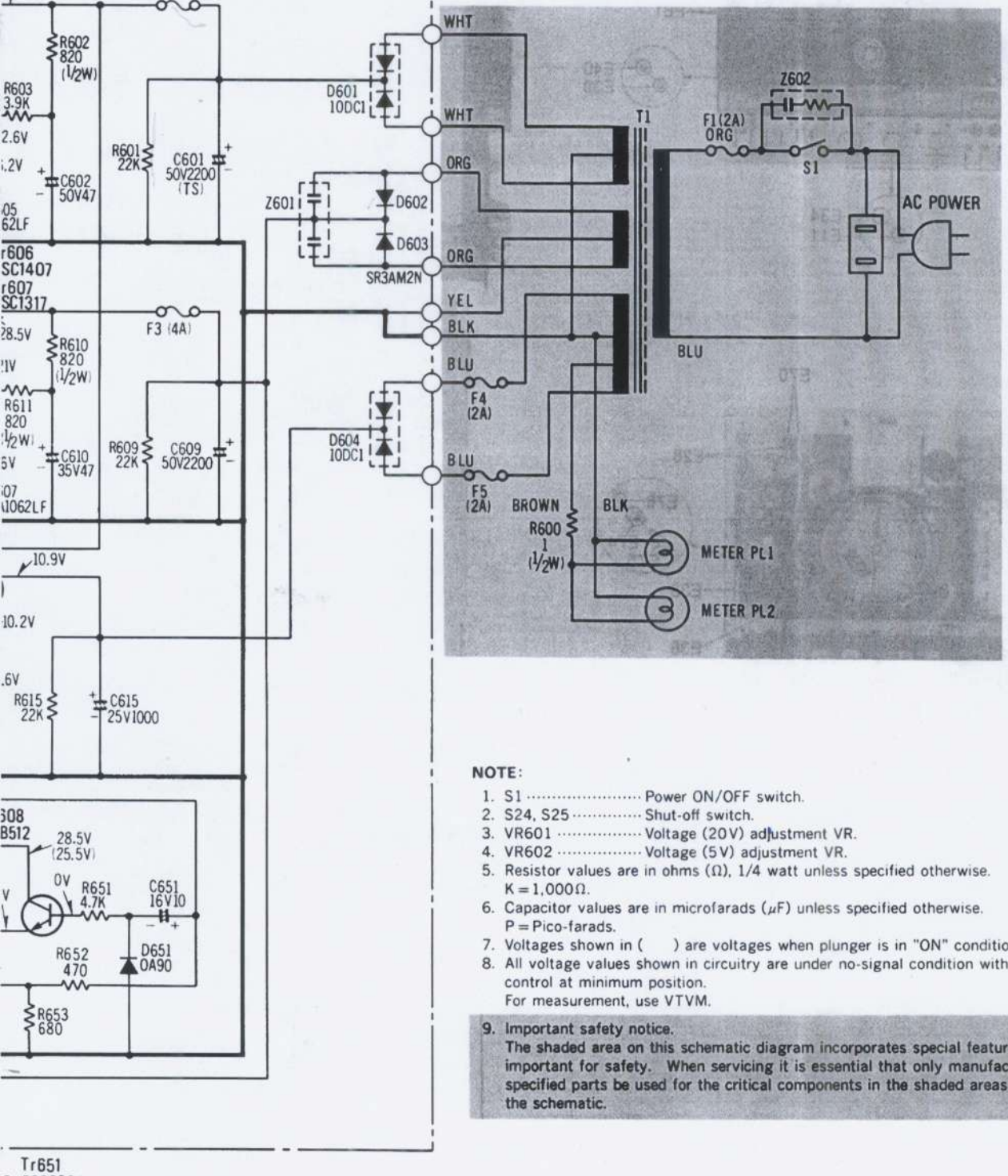

E24
"CAUTION-FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH SAME TYPE 1A-125V & 1A-250V FUSE."
E25
E26
E27
E29


E63
E58
E52
E63
E59
E53
E63
E60
E54

SCHEMATIC DIAGRAM MODEL RS-1520

Power Supply Section



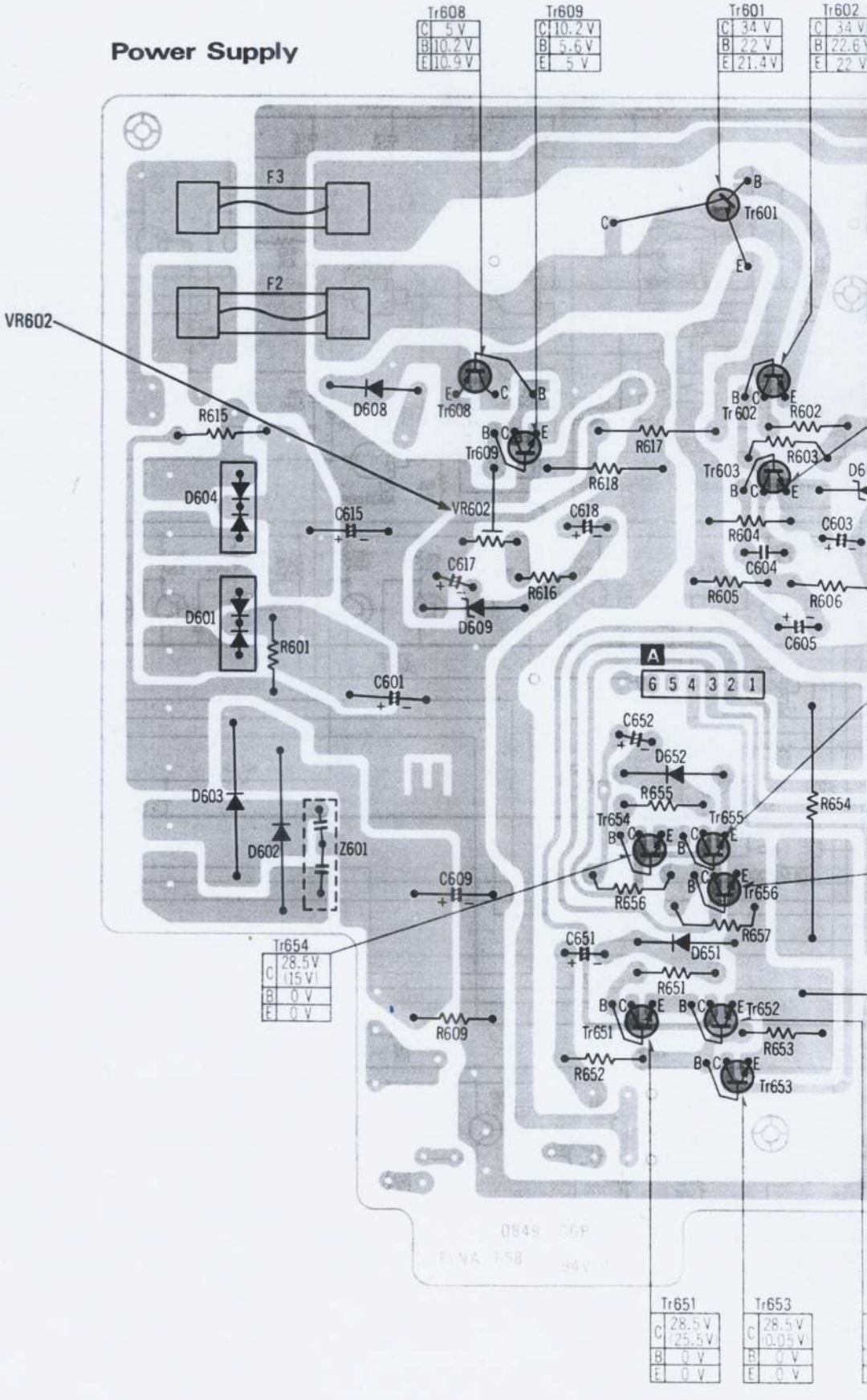


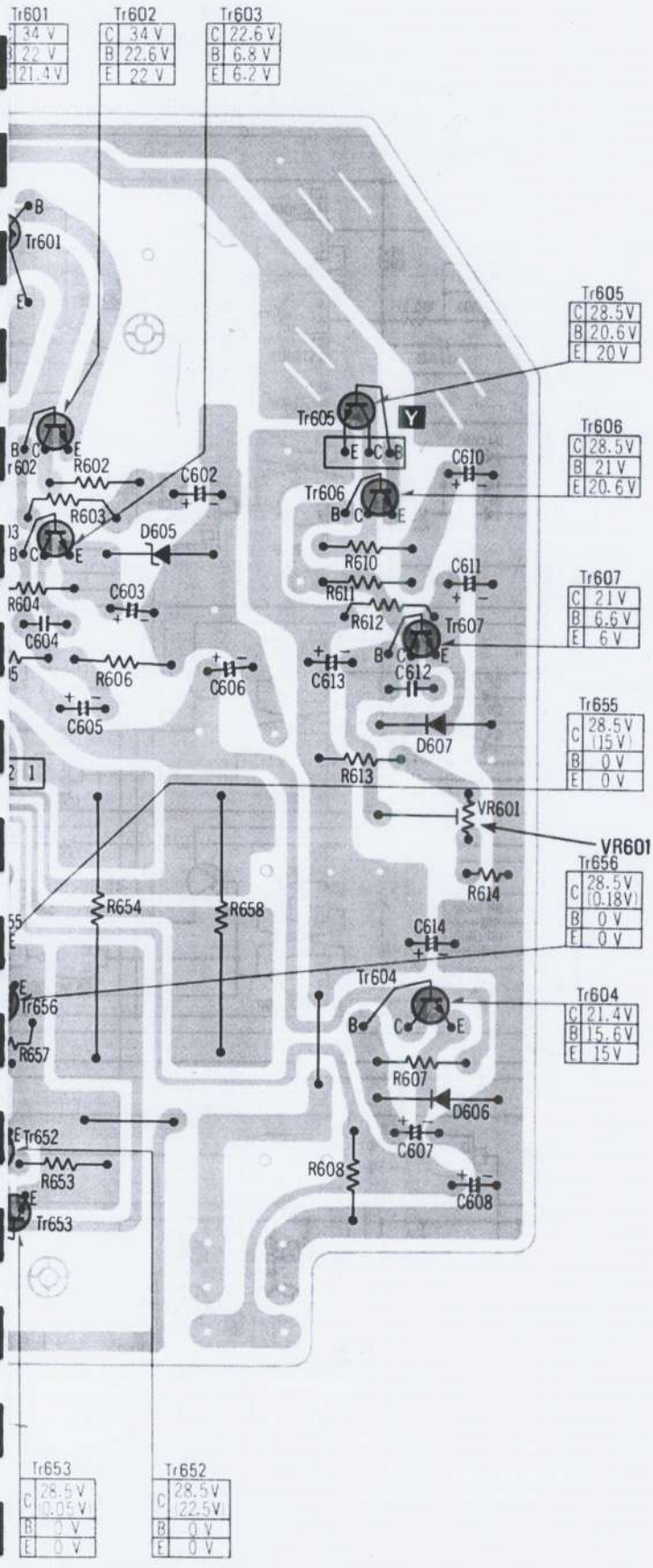
NOTE:

1. S1 ..... Power ON/OFF switch.
2. S24, S25 ..... Shut-off switch.
3. VR601 ..... Voltage (20V) adjustment VR.
4. VR602 ..... Voltage (5V) adjustment VR.
5. Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise.
   K = 1,000Ω.
6. Capacitor values are in microfarads (μF) unless specified otherwise.
   P = Pico-farads.
7. Voltages shown in ( ) are voltages when plunger is in "ON" condition.
8. All voltage values shown in circuitry are under no-signal condition with volume control at minimum position.
   For measurement, use VTVM.
9. **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.

CIRCUIT BOARD

Power Supply



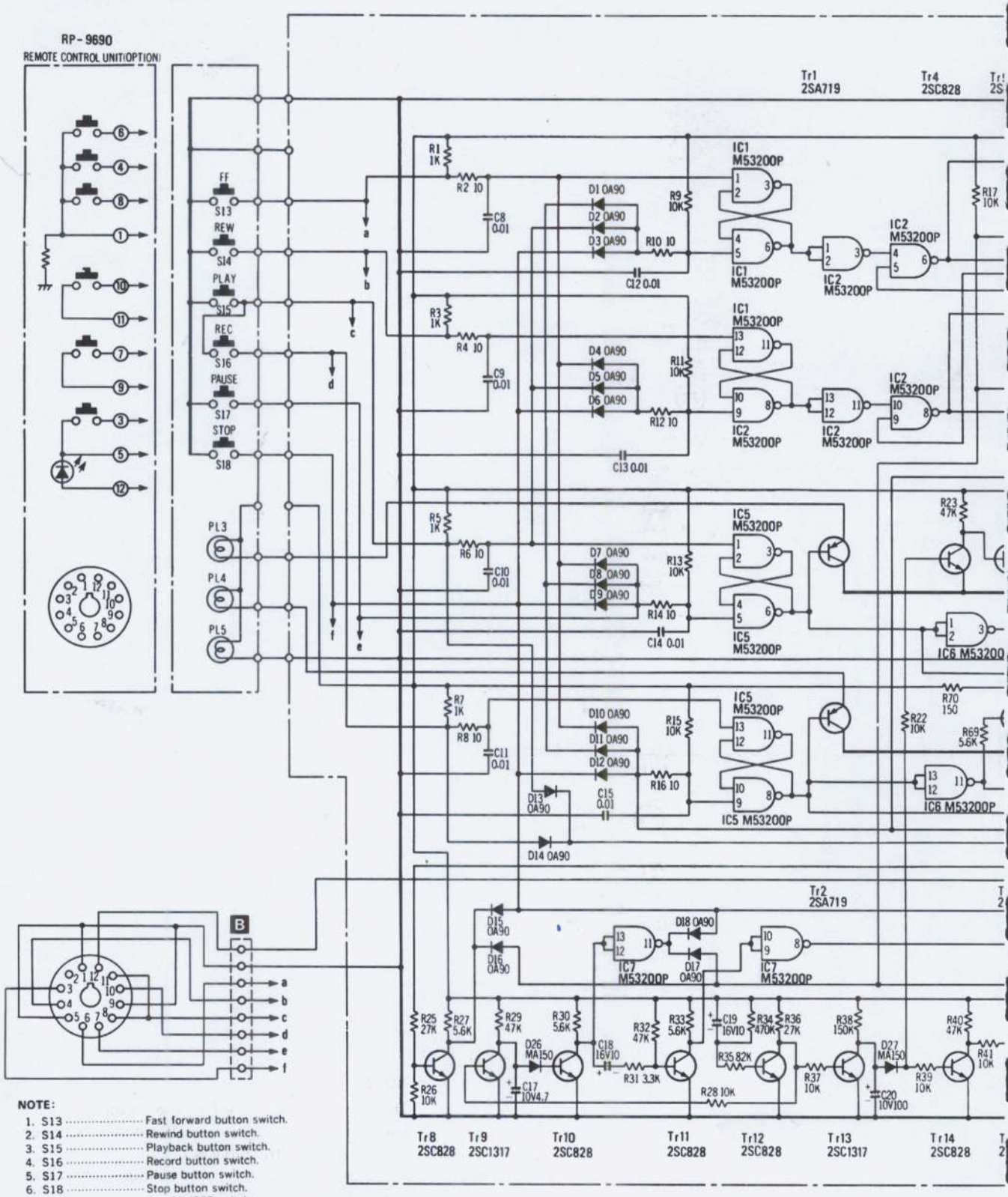


NOTE:

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.

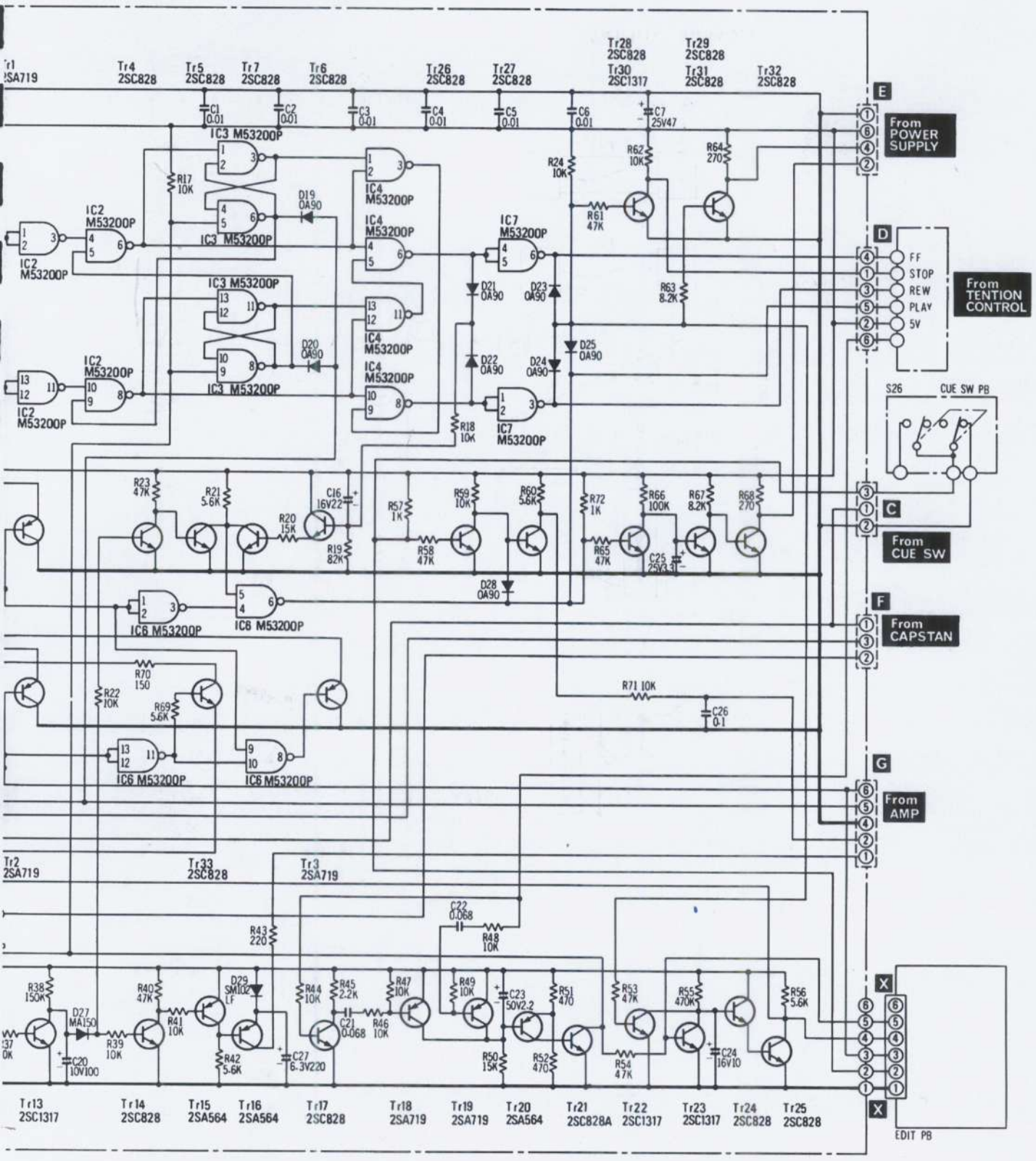
SCHEMATIC DIAGRAM MODEL RS-1520

Main Control Section



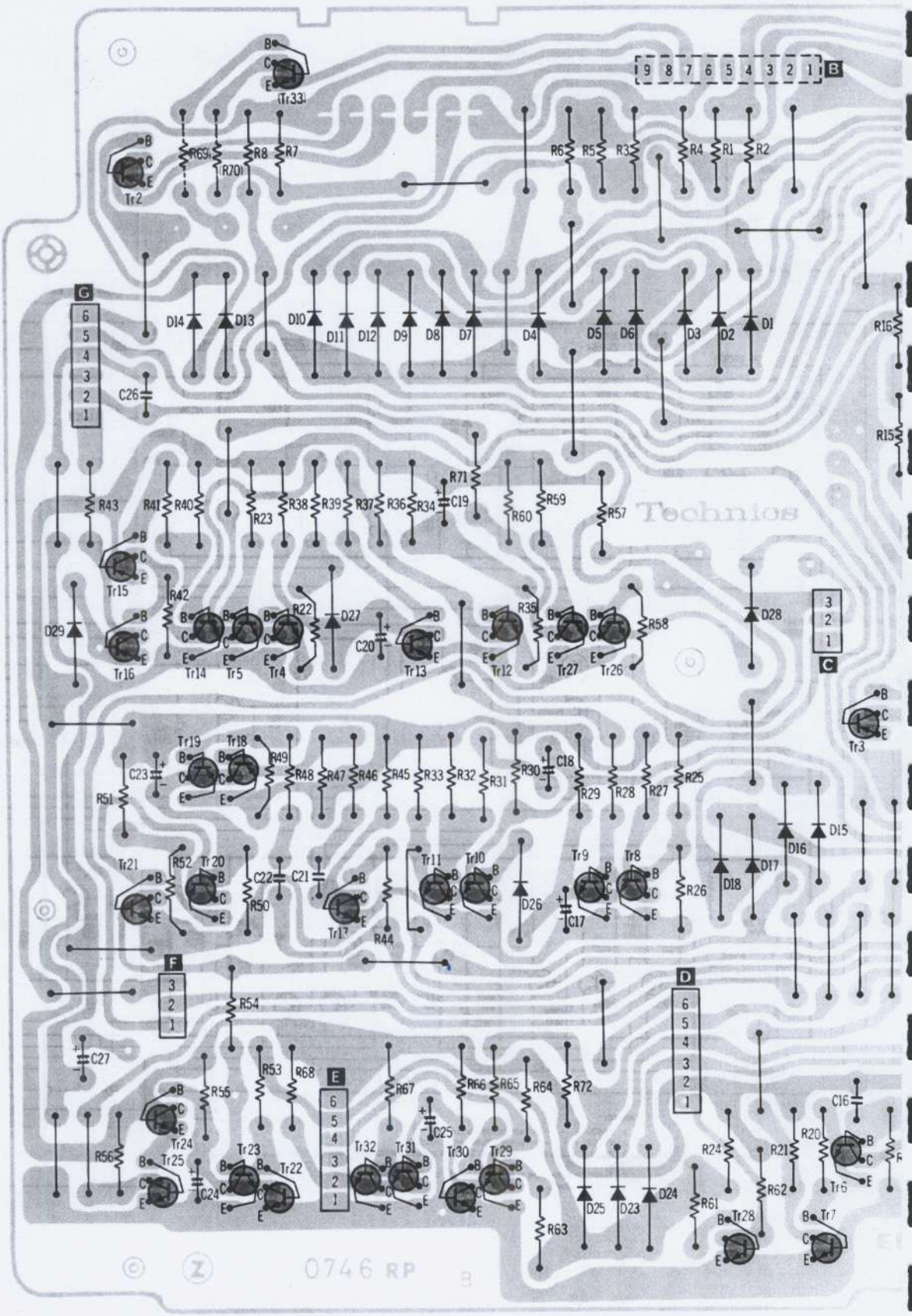
NOTE:

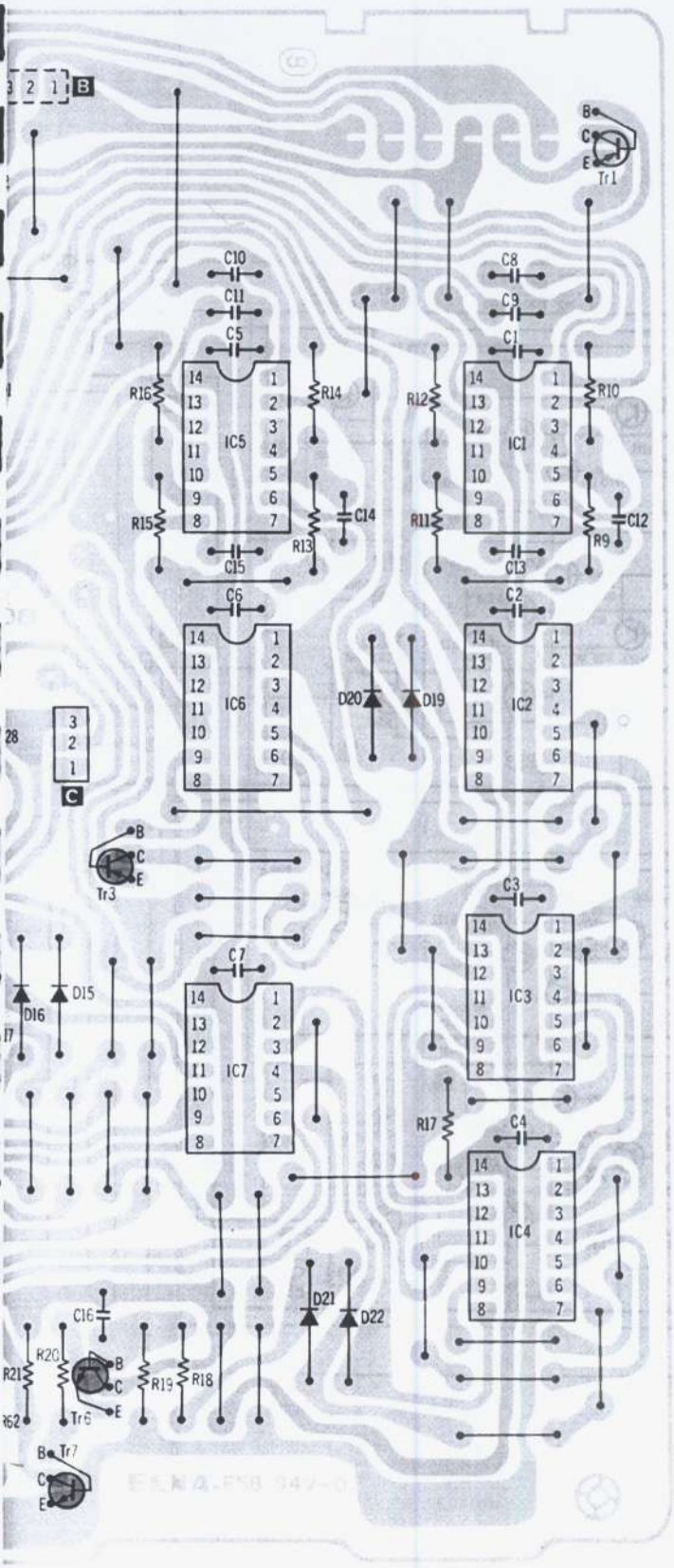
1. S13 ..... Fast forward button switch.
2. S14 ..... Rewind button switch.
3. S15 ..... Playback button switch.
4. S16 ..... Record button switch.
5. S17 ..... Pause button switch.
6. S18 ..... Stop button switch.
7. S26 ..... Cue ON/OFF switch.
8. Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise. K = 1,000Ω.
9. Capacitor values are in microfarads (μF) unless specified otherwise. P = Pico-farads.


Tr1 2SA719
Tr4 2SC828
Tr5 2SC828
Tr7 2SC828
Tr6 2SC828
Tr26 2SC828
Tr27 2SC828
Tr28 2SC828
Tr30 2SC1317
Tr29 2SC828
Tr31 2SC828
Tr32 2SC828
C1 0.01
C2 0.01
C3 0.01
C4 0.01
C5 0.01
C6 0.01
C7 25V47
IC3 M53200P
IC4 M53200P
IC7 M53200P
IC2 M53200P
IC6 M53200P
R17 10K
R18 10K
R24 10K
R61 47K
R62 10K
R63 8.2K
R64 270
D19 0A90
D20 0A90
D21 0A90
D22 0A90
D23 0A90
D24 0A90
D25 0A90
E
From POWER SUPPLY
D
FF
STOP
REW
PLAY
5V
From TENTION CONTROL
S26
CUE SW PB
C
From CUE SW
R23 47K
R21 5.6K
C16 16V22
R20 15K
R19 82K
R57 1K
R58 47K
R59 10K
R60 5.6K
R72 1K
R65 47K
R66 100K
R67 8.2K
R68 270
C25 25V3.3
D28 0A90
F
From CAPSTAN
R70 150
R22 10K
R69 5.6K
R71 10K
C26 0.1
G
From AMP
Tr2 2SA719
Tr33 2SC828
Tr3 2SA719
C22 0.068
R48 10K
R43 220
R38 150K
D27 MA150
C20 10V100
R39 10K
R40 47K
R41 10K
D29 SM102 LF
R42 5.6K
C27 6.3V220
R44 10K
R45 2.2K
C21 0.068
R46 10K
R47 10K
R49 10K
C23 50V2.2
R50 15K
R51 470
R52 470
R53 47K
R54 47K
R55 470K
C24 16V10
R56 5.6K
X
EDIT PB
Tr13 2SC1317
Tr14 2SC828
Tr15 2SA564
Tr16 2SA564
Tr17 2SC828
Tr18 2SA719
Tr19 2SA719
Tr20 2SA564
Tr21 2SC828A
Tr22 2SC1317
Tr23 2SC1317
Tr24 2SC828
Tr25 2SC828

CIRCUIT BOARD

Main Control



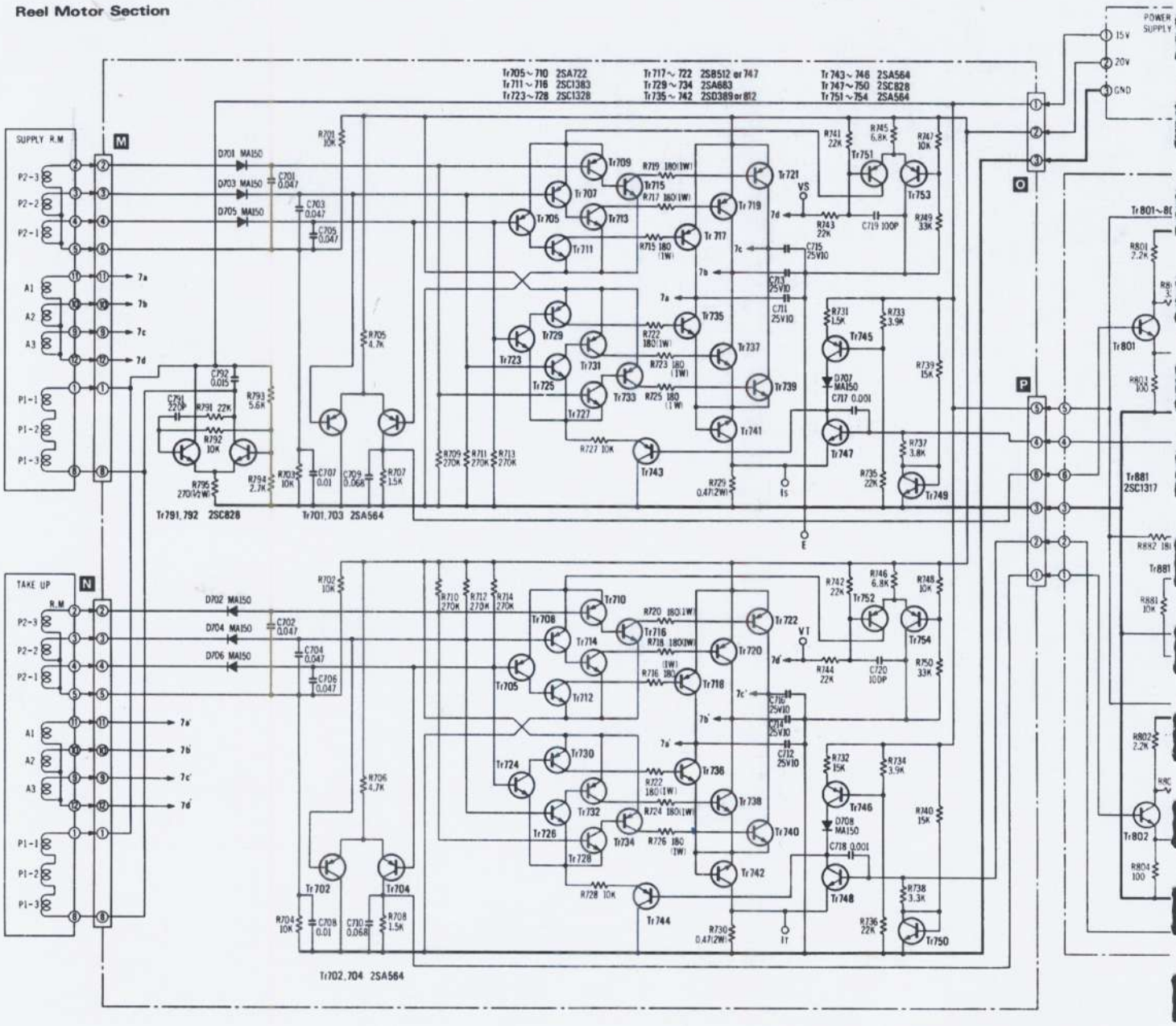


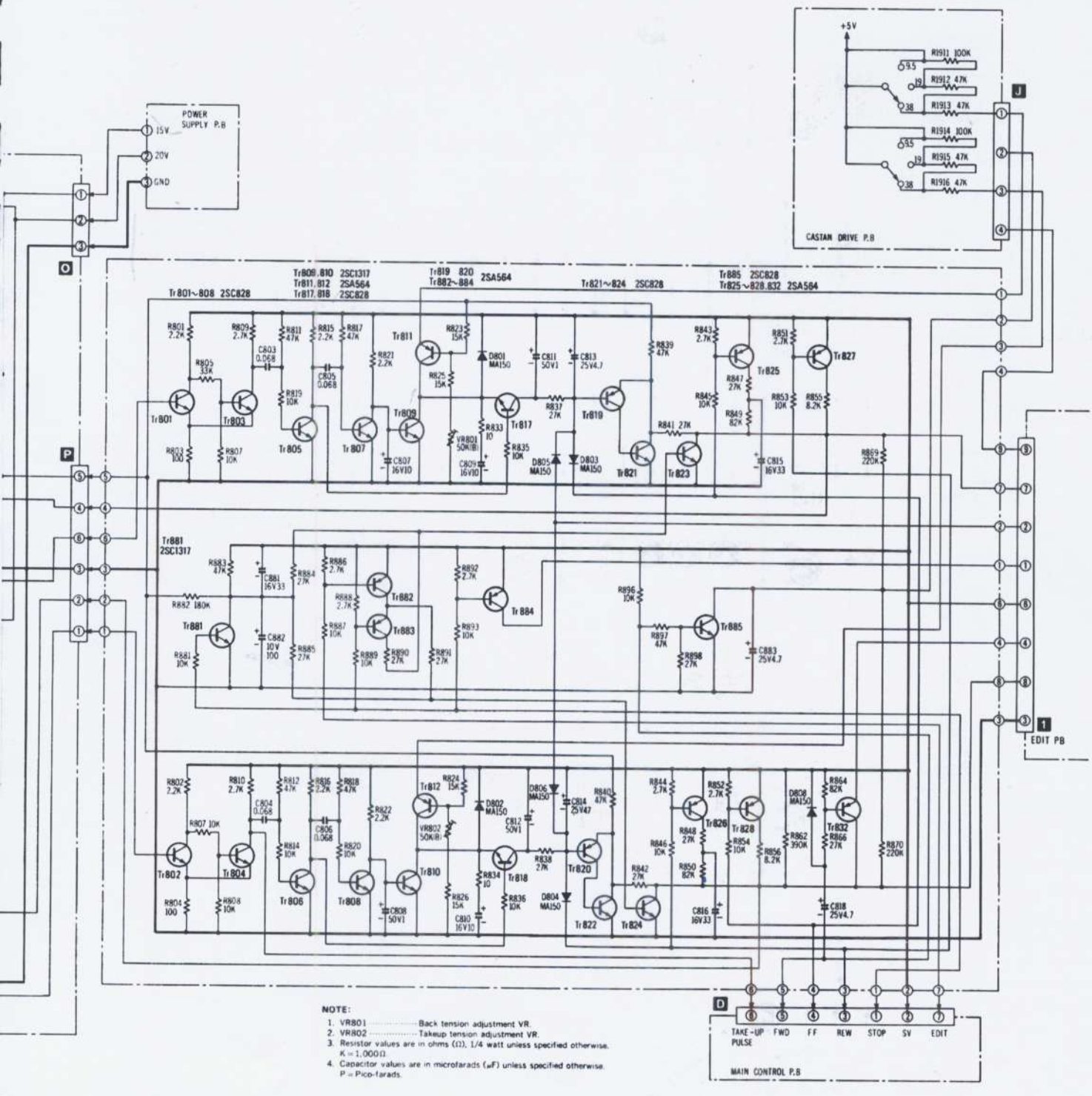
NOTE:

The circuit shown in red on the conductor is B circuit.

SCHEMATIC DIAGRAM MODEL RS-1520

Reel Motor Section



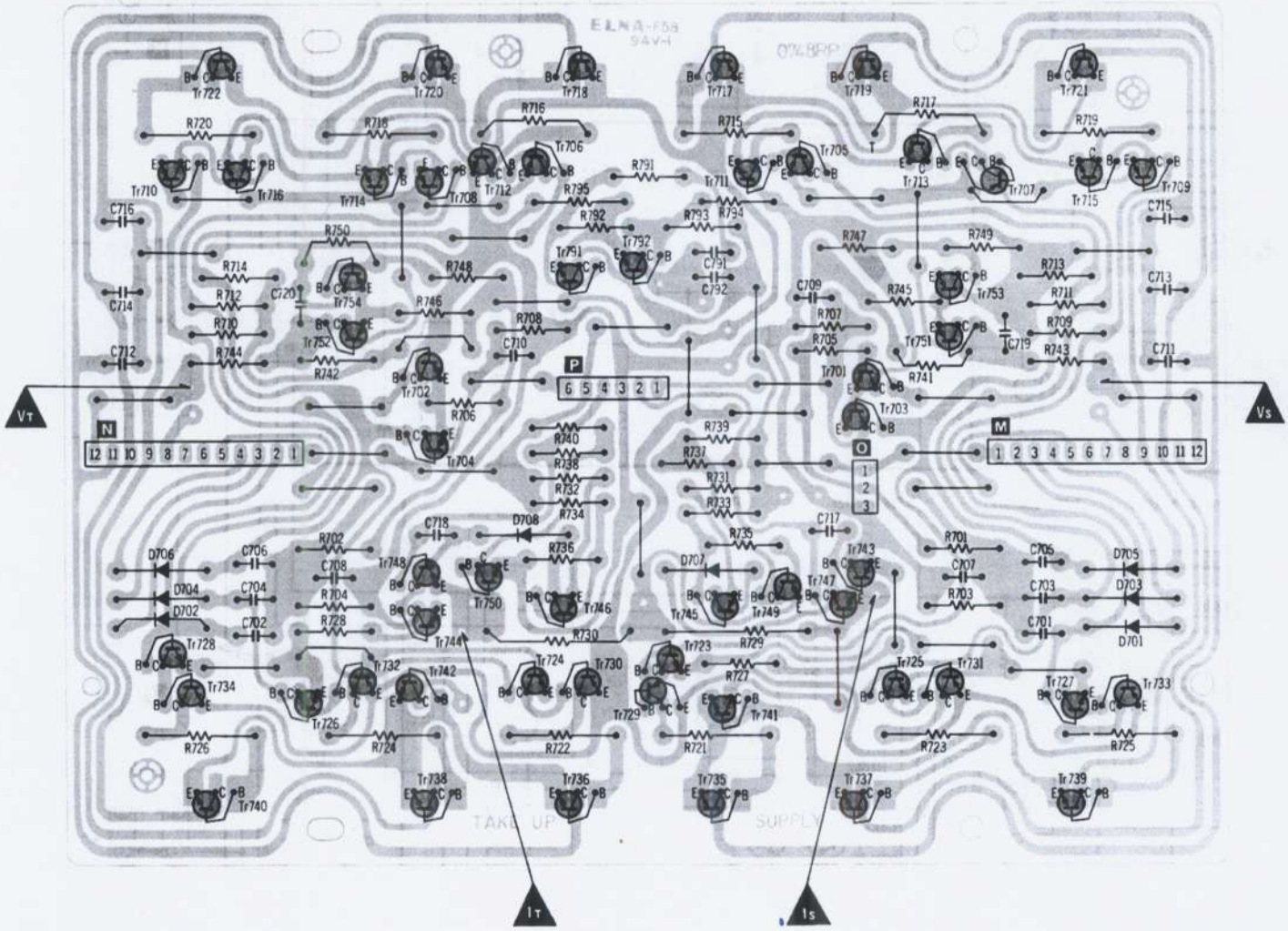


NOTE:

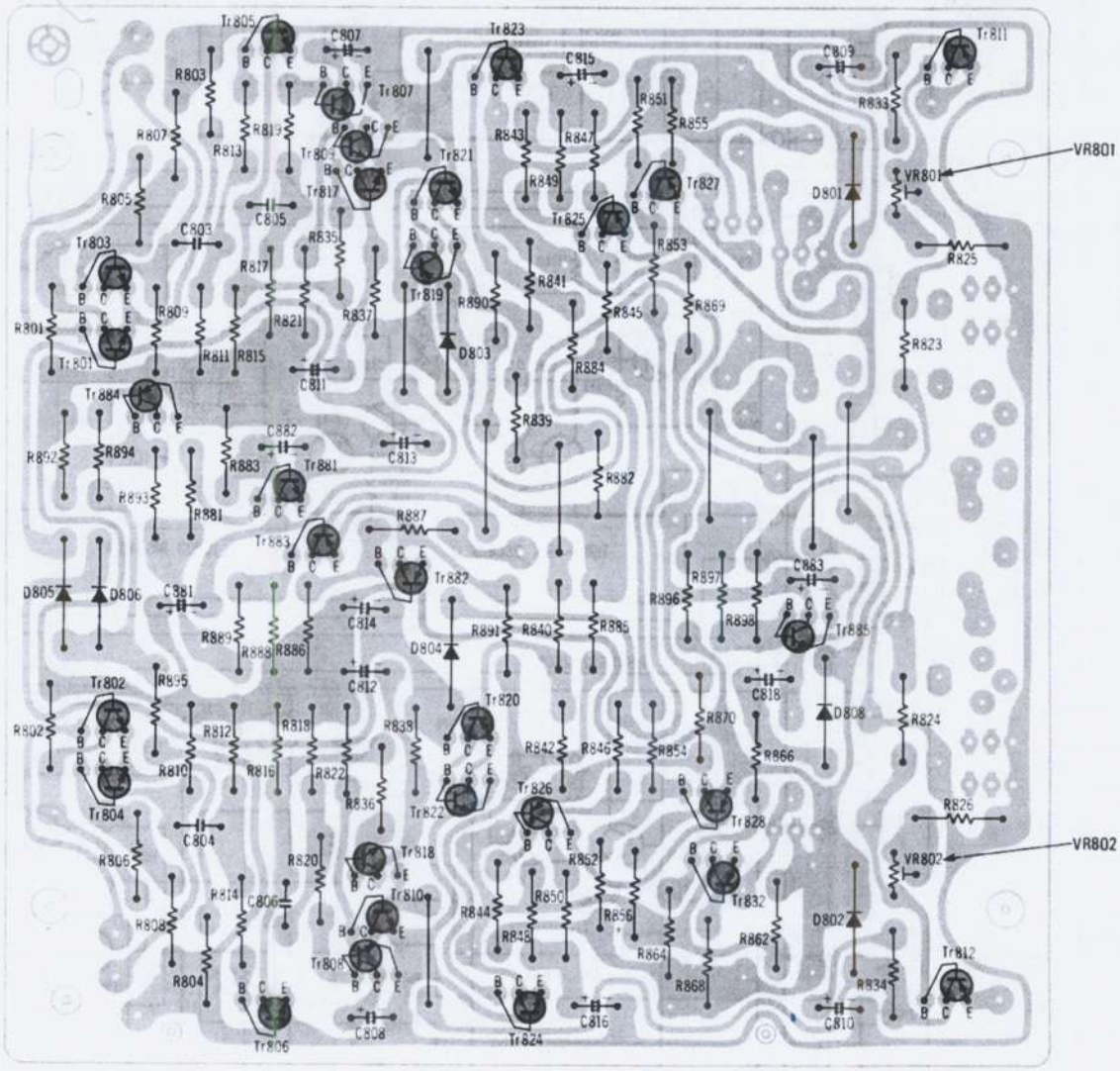
1. VR801 ..... Back tension adjustment VR.
2. VR802 ..... Takeup tension adjustment VR.
3. Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise. K = 1,000Ω.
4. Capacitor values are in microfarads (μF) unless specified otherwise. P = Pico-farads.

CIRCUIT BOARD

Reel Motor Driving



Tension Control

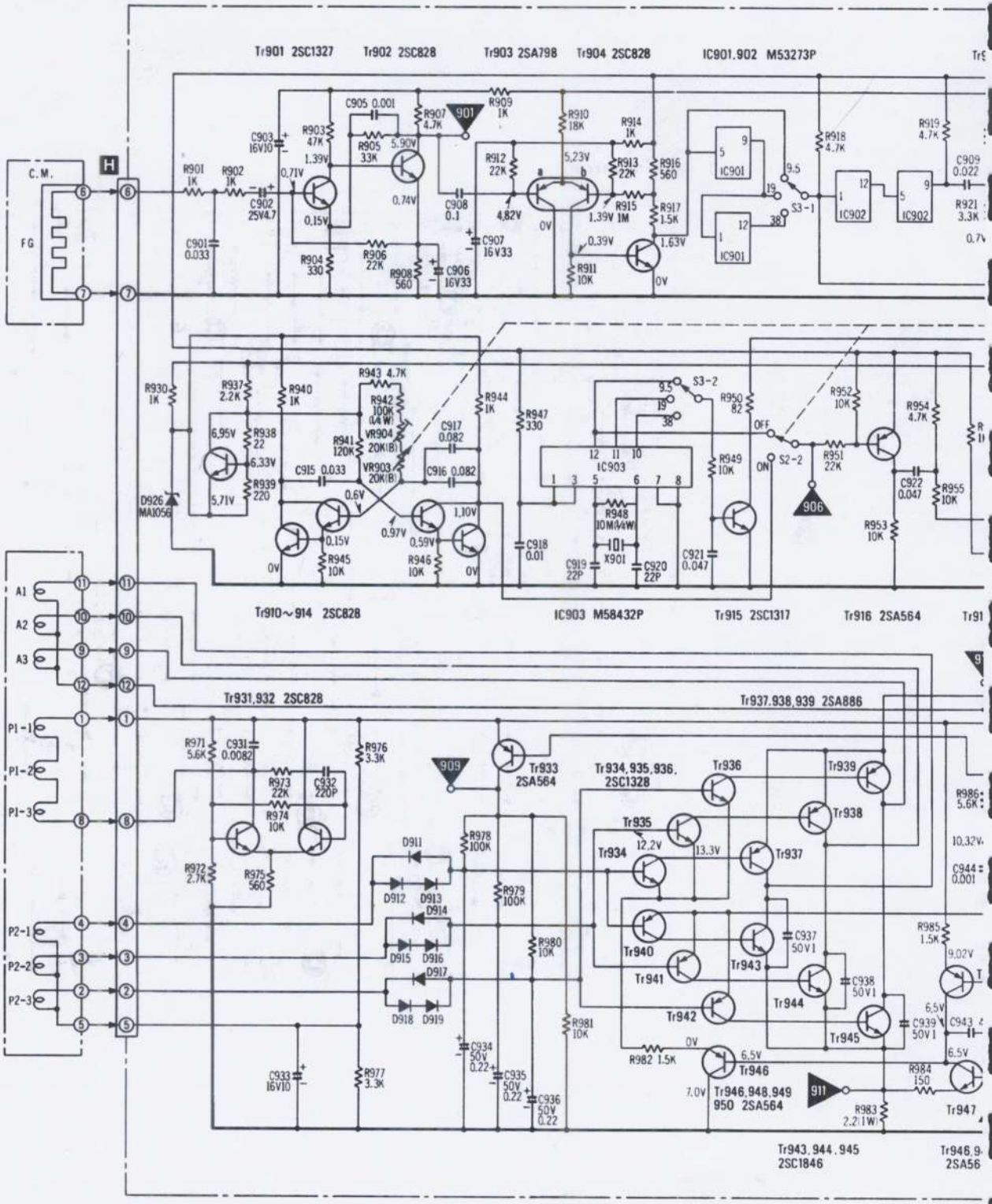


NOTE:

The circuit shown in red on the conductor is B circuit.

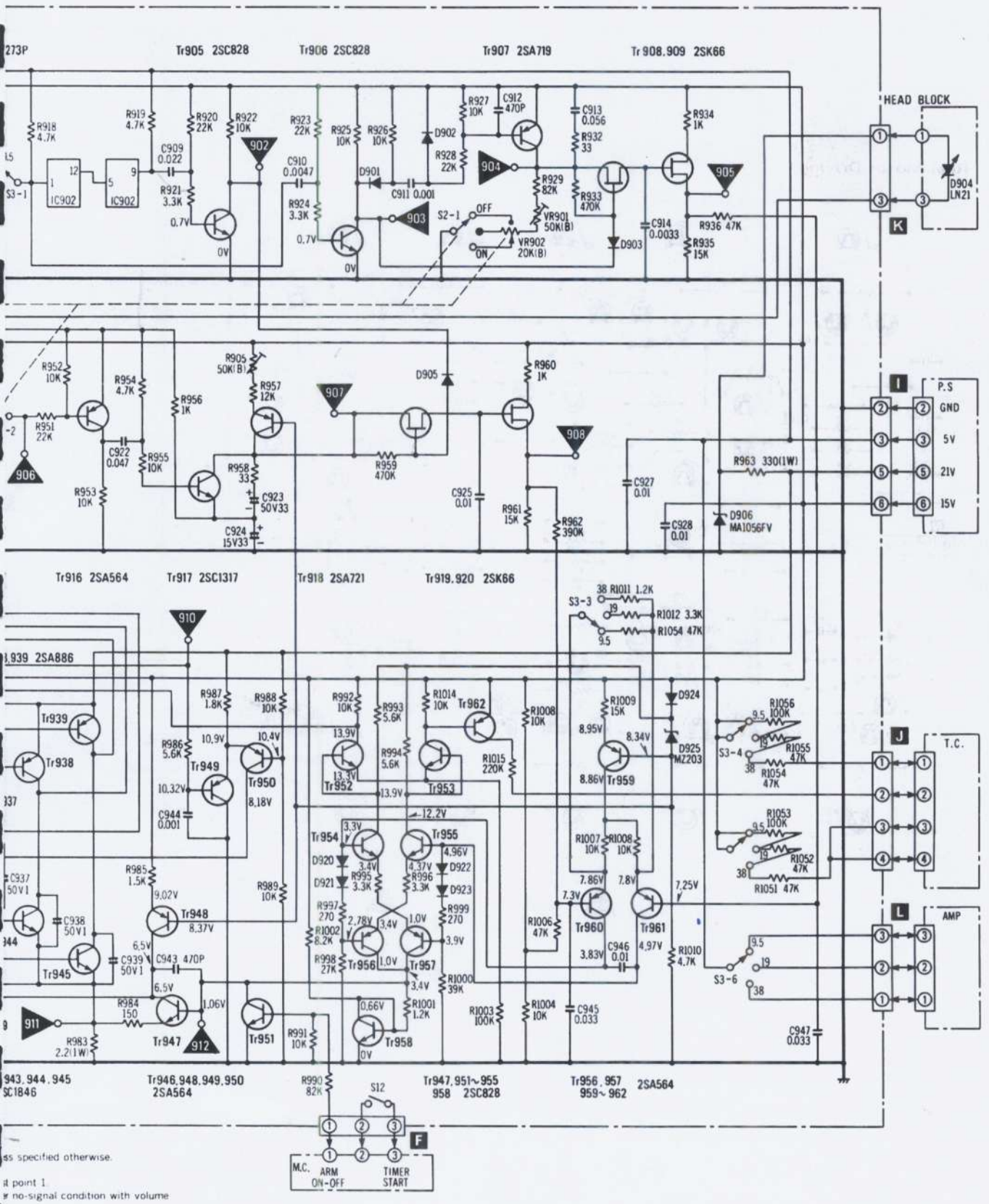
SCHEMATIC DIAGRAM MODEL RS-1520

Capstan Motor Section



NOTE:

1. S2-1, S2-2 ..... Pitch control switch.
2. S3-1~S3-6 ..... Tape speed selector.
3. S12 ..... Timer start switch.
4. VR901 ..... Phase adjustment VR.
5. VR902, VR903 ..... Pitch control.
6. VR905 ..... Sawtooth-waveform adjustment VR.
7. Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise. K = 1,000Ω.
8. Capacitor values are in microfarads (μF) unless specified otherwise. P = Pico-farads.
9. The mark (▼) shows test point. e.g. ▼ = Test point 1.
10. All voltage values shown in circuitry are under no-signal condition with volume control at minimum position. For measurement, use VTVM.



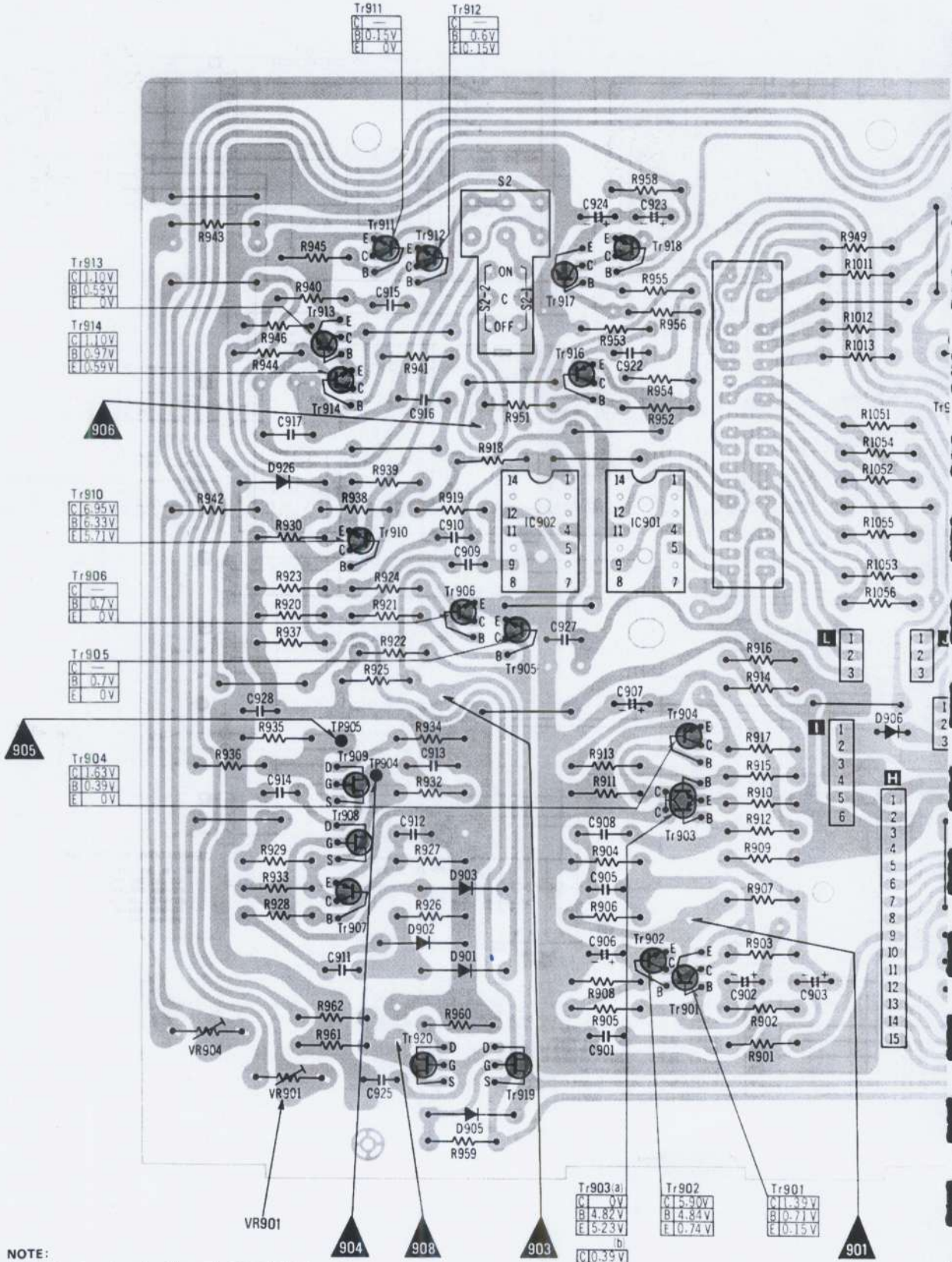
ss specified otherwise.

it point 1.

r no-signal condition with volume

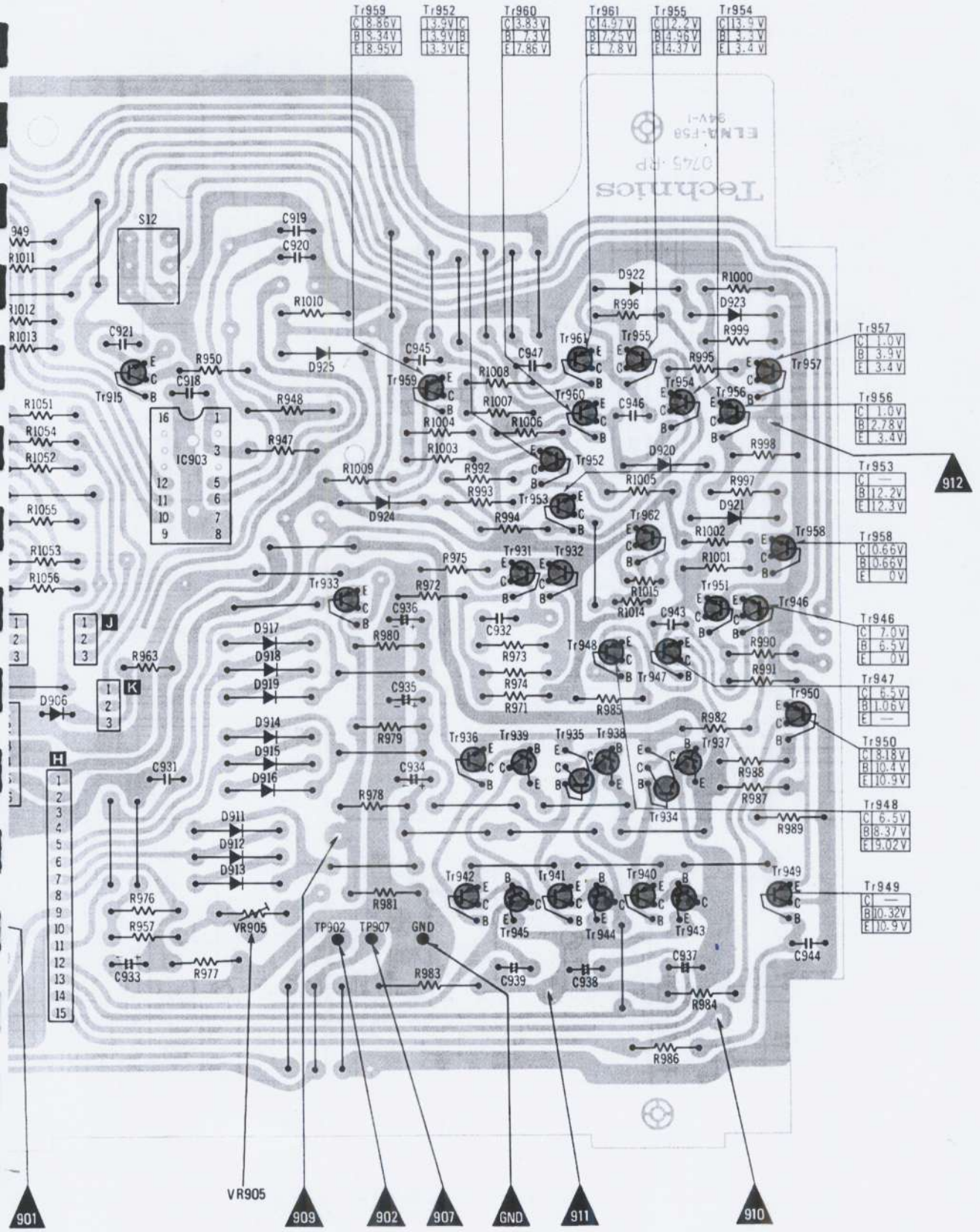
CIRCUIT BOARD

Capstan Motor Control



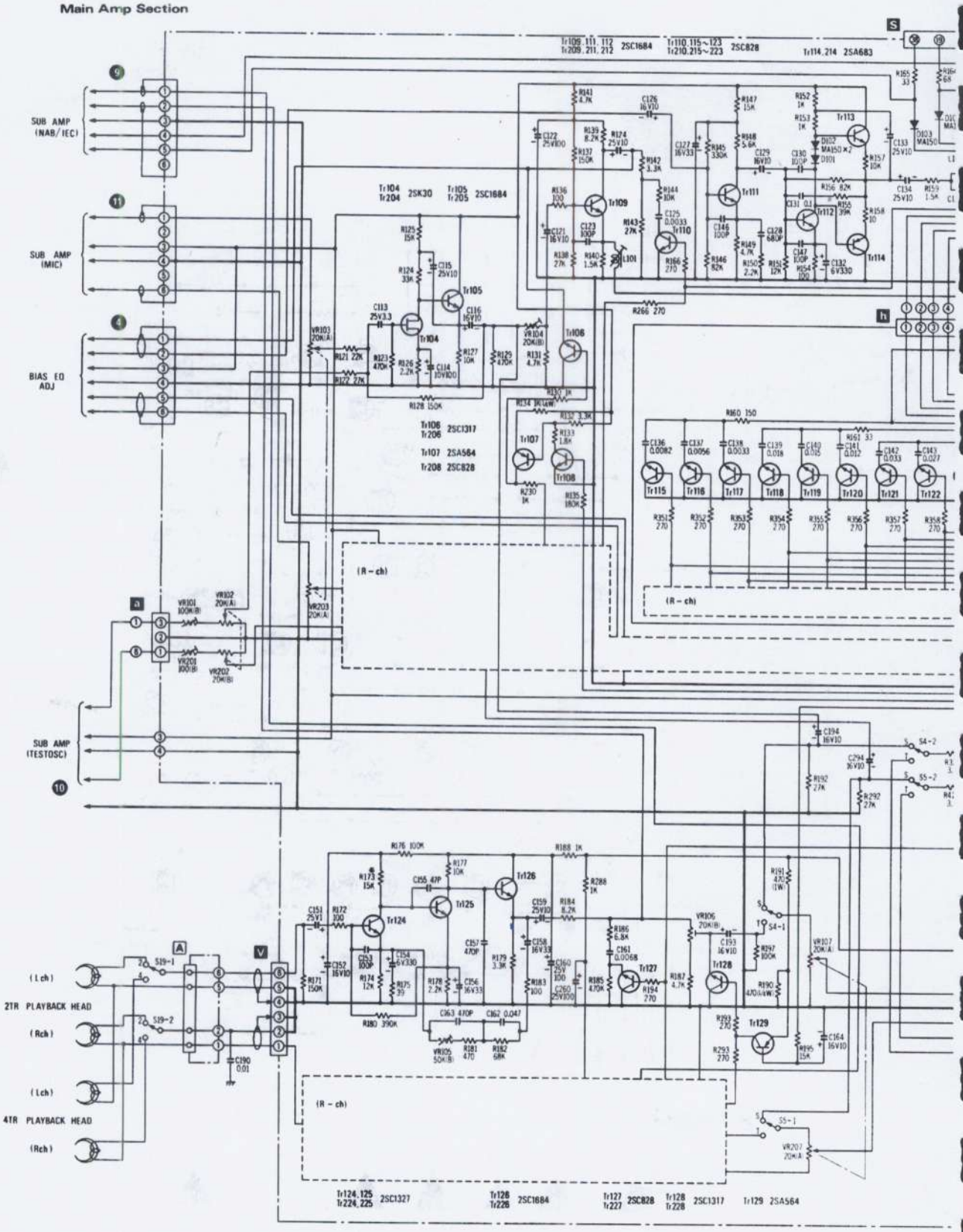
NOTE:

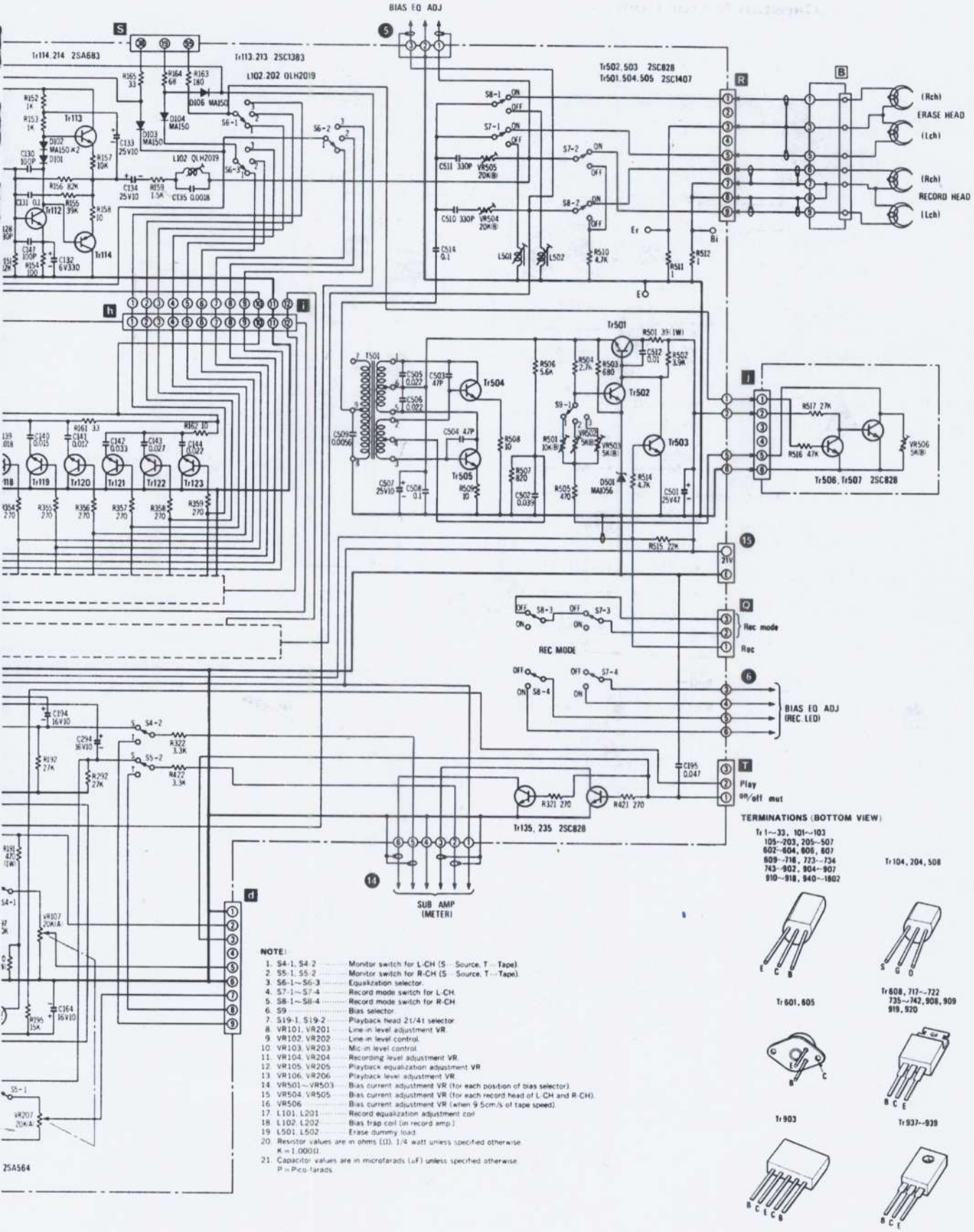
The circuit shown in red on the conductor is B circuit.
Values indicated in [ ] are DC voltage between the chassis and electrical parts.


Tr959 C 8.86V B 8.34V E 8.95V
Tr952 C 13.9V B 13.9V E 13.3V
Tr960 C 3.83V B 7.3V E 7.86V
Tr961 C 4.97V B 7.25V E 7.8V
Tr955 C 12.2V B 4.46V E 4.37V
Tr954 C 13.9V B 3.3V E 3.4V
Tr957 C 1.0V B 3.9V E 3.4V
Tr956 C 1.0V B 2.78V E 3.4V
Tr953 C — B 12.2V E 12.3V
Tr958 C 0.66V B 0.66V E 0V
Tr946 C 7.0V B 6.5V E 0V
Tr947 C 6.5V B 1.06V E —
Tr950 C 8.18V B 10.4V E 10.9V
Tr948 C 6.5V B 8.37V E 9.02V
Tr949 C — B 10.32V E 10.9V
S12
IC903
TP902
TP907
GND
VR905
901
909
902
907
GND
911
910
912

SCHEMATIC DIAGRAM MODEL RS-1520

Main Amp Section



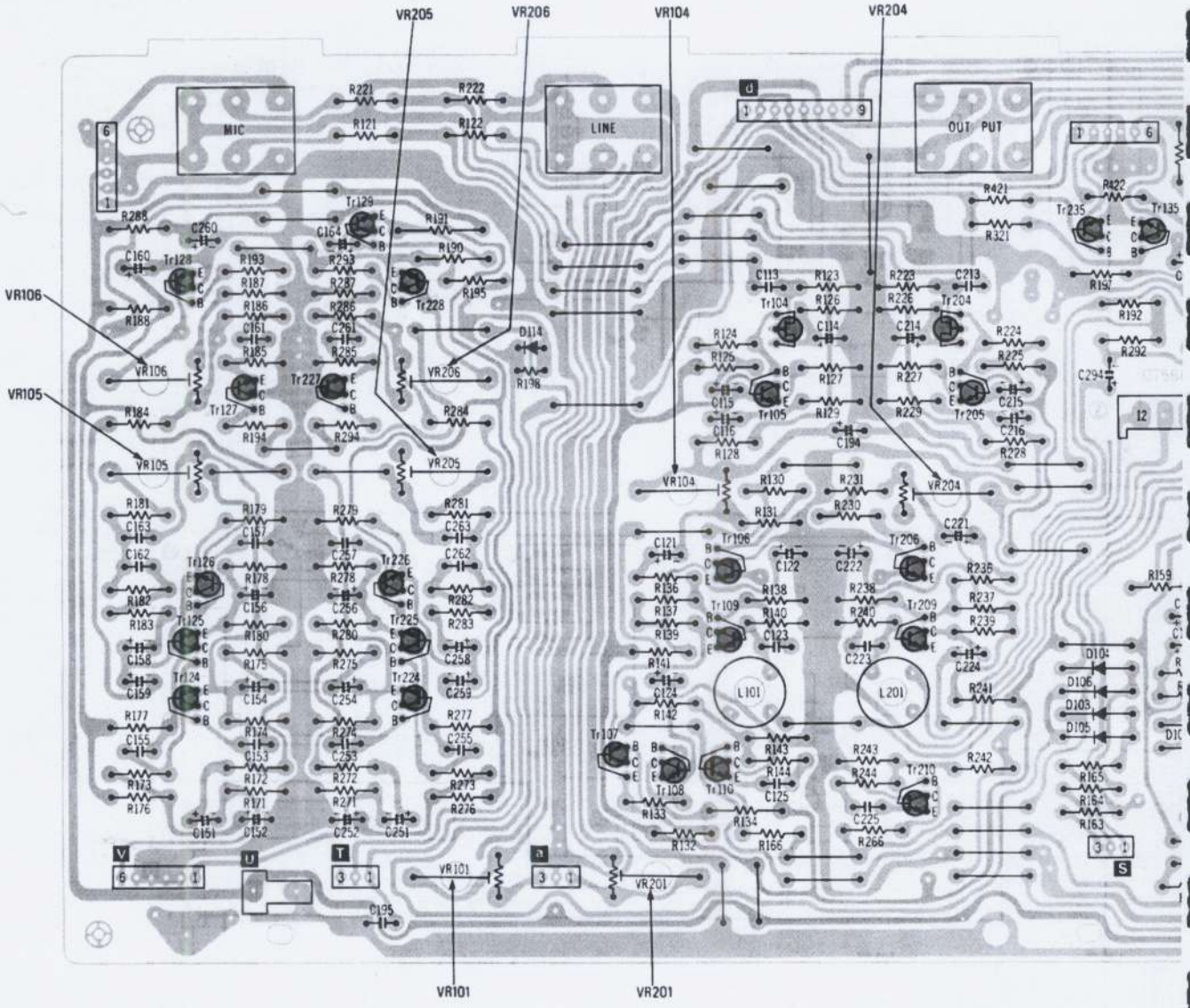


NOTE:

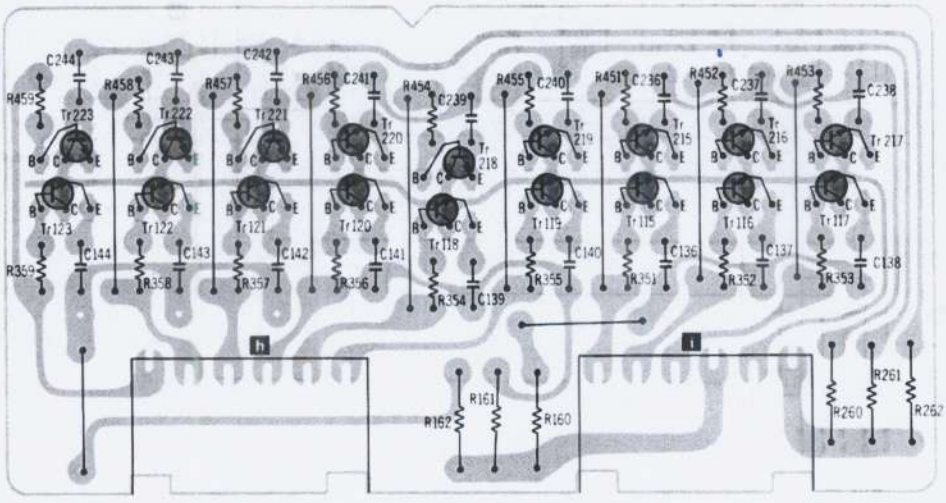
1. S4-1, S4-2 ..... Monitor switch for L-CH (S ... Source, T ... Tape).
2. S5-1, S5-2 ..... Monitor switch for R-CH (S ... Source, T ... Tape).
3. S6-1~S6-3 ..... Equalization selector.
4. S7-1~S7-4 ..... Record mode switch for L-CH.
5. S8-1~S8-4 ..... Record mode switch for R-CH.
6. S9 ..... Bias selector.
7. S19-1, S19-2 ..... Playback head 21/41 selector.
8. VR101, VR201 ..... Line-in level adjustment VR.
9. VR102, VR202 ..... Line-in level control.
10. VR103, VR203 ..... Mic-in level control.
11. VR104, VR204 ..... Recording level adjustment VR.
12. VR105, VR205 ..... Playback equalization adjustment VR.
13. VR106, VR206 ..... Playback level adjustment VR.
14. VR501~VR503 ..... Bias current adjustment VR (for each position of bias selector).
15. VR504, VR505 ..... Bias current adjustment VR (for each record head of L-CH and R-CH).
16. VR506 ..... Bias current adjustment VR (when 9.5cm/s of tape speed).
17. L101, L201 ..... Record equalization adjustment coil.
18. L102, L202 ..... Bias trap coil (in record amp.).
19. L501, L502 ..... Erase dummy load.
20. Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise.
    K = 1,000Ω
21. Capacitor values are in microfarads (μF) unless specified otherwise.
    P = Pico-farads.

CIRCUIT BOARD

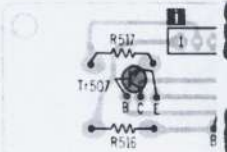
Main Amp

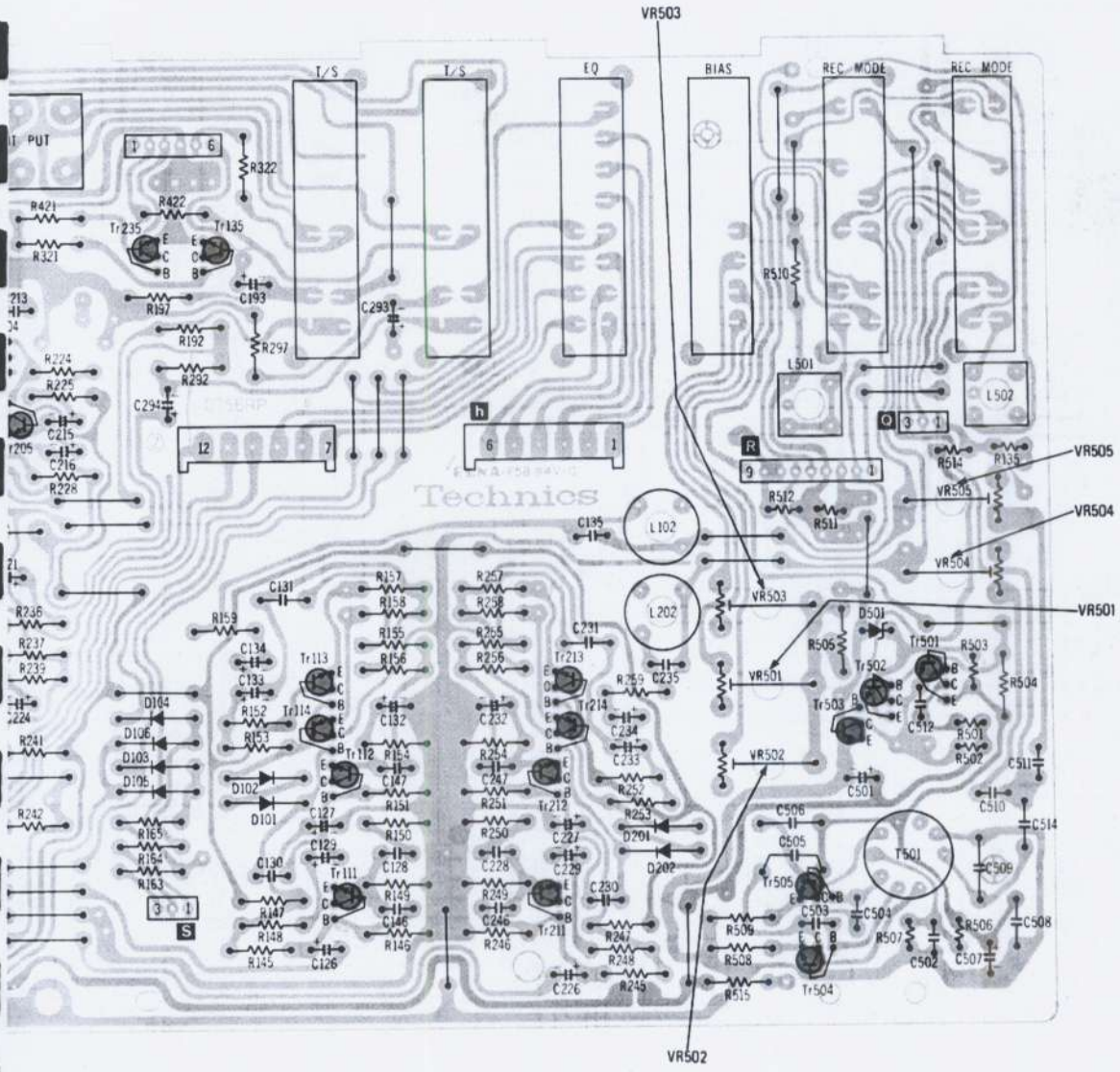


Equalization

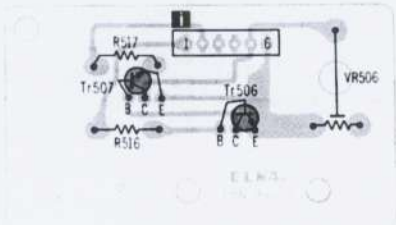


9.5cm OSC



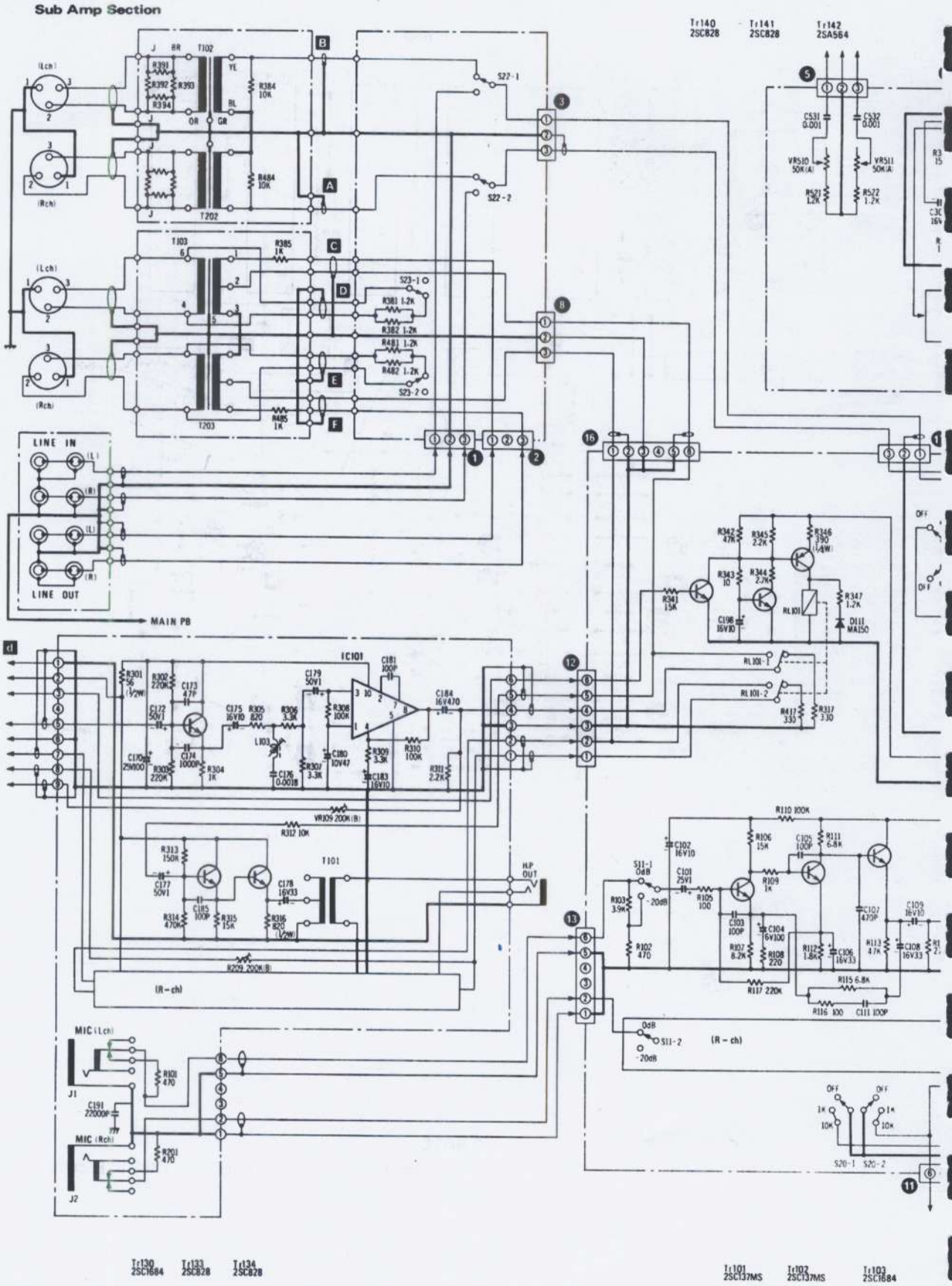


9.5cm OSC

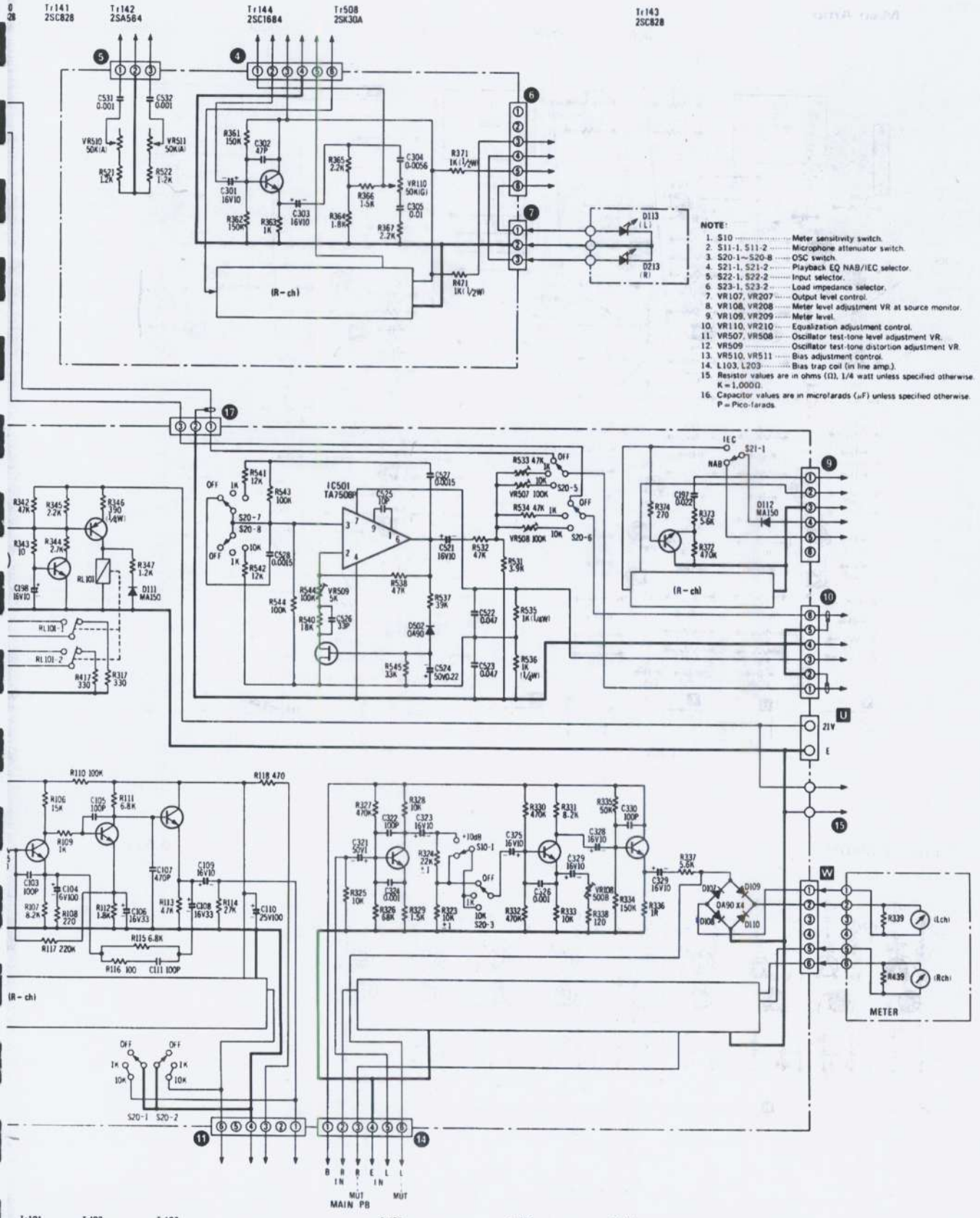


NOTE:
The circuit shown in red on the conductor is B circuit.

SCHEMATIC DIAGRAM MODEL RS-1520



520

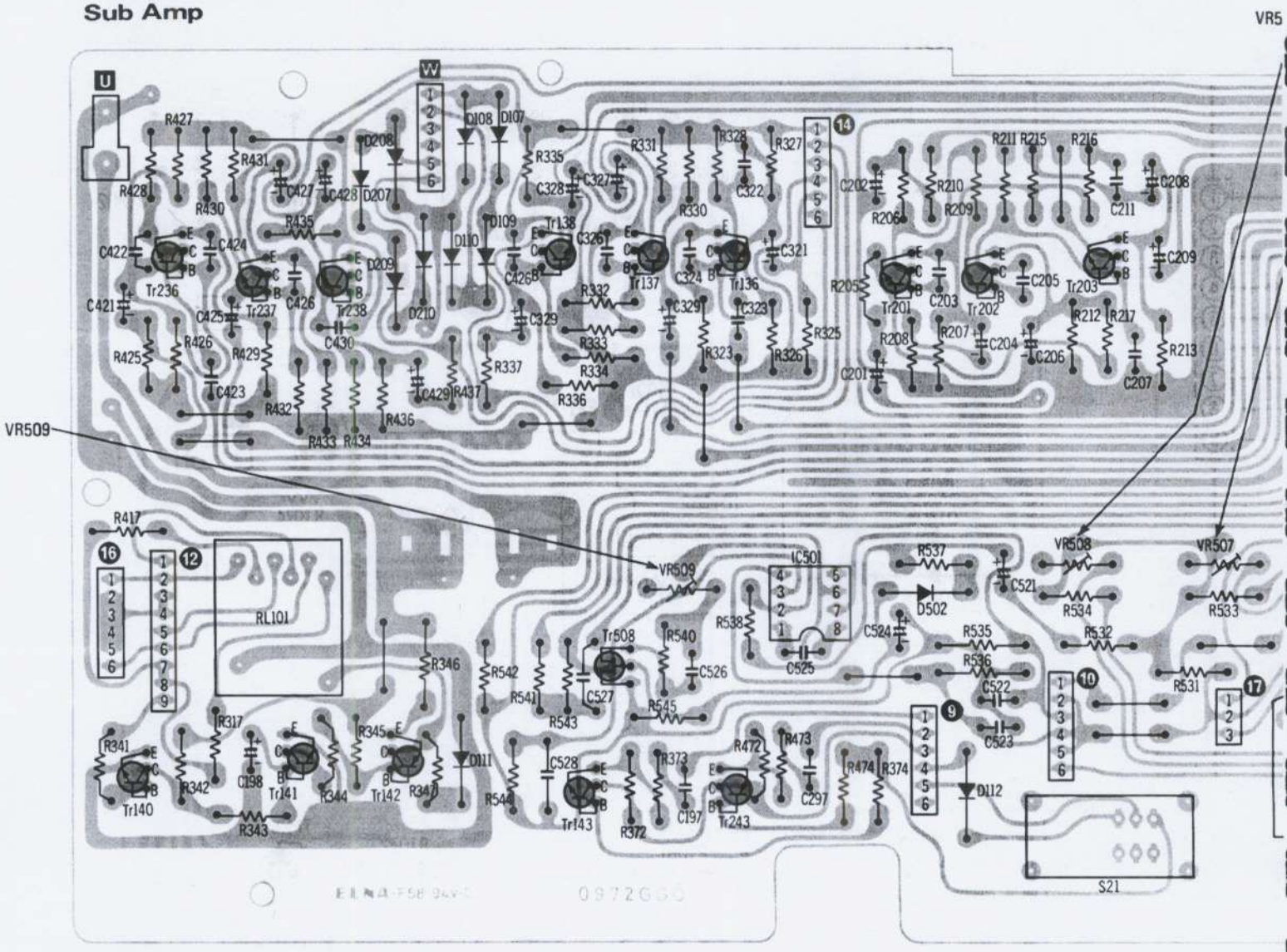


NOTE:

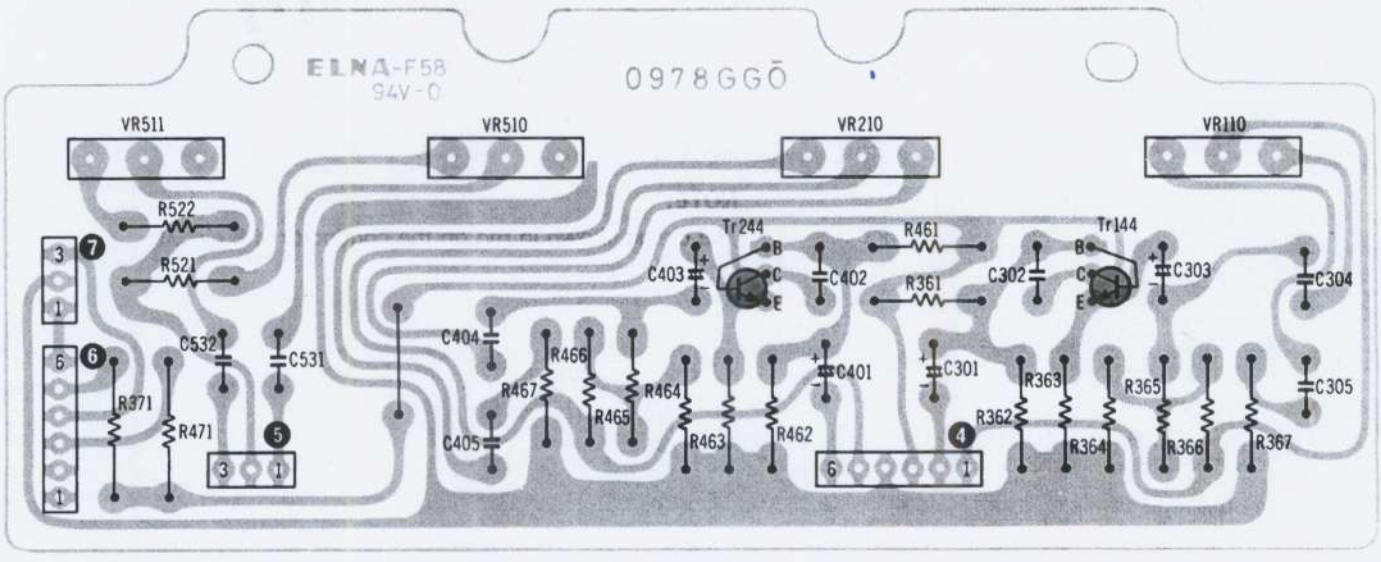
1. S10 ..... Meter sensitivity switch.
2. S11-1, S11-2 ..... Microphone attenuator switch.
3. S20-1~S20-8 ..... OSC switch.
4. S21-1, S21-2 ..... Playback EQ NAB/IEC selector.
5. S22-1, S22-2 ..... Input selector.
6. S23-1, S23-2 ..... Load impedance selector.
7. VR107, VR207 ..... Output level control.
8. VR108, VR208 ..... Meter level adjustment VR at source monitor.
9. VR109, VR209 ..... Meter level.
10. VR110, VR210 ..... Equalization adjustment control.
11. VR507, VR508 ..... Oscillator test-tone level adjustment VR.
12. VR509 ..... Oscillator test-tone distortion adjustment VR.
13. VR510, VR511 ..... Bias adjustment control.
14. L103, L203 ..... Bias trap coil (in line amp.).
15. Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise. K = 1,000Ω.
16. Capacitor values are in microfarads (μF) unless specified otherwise. P = Pico-farads.

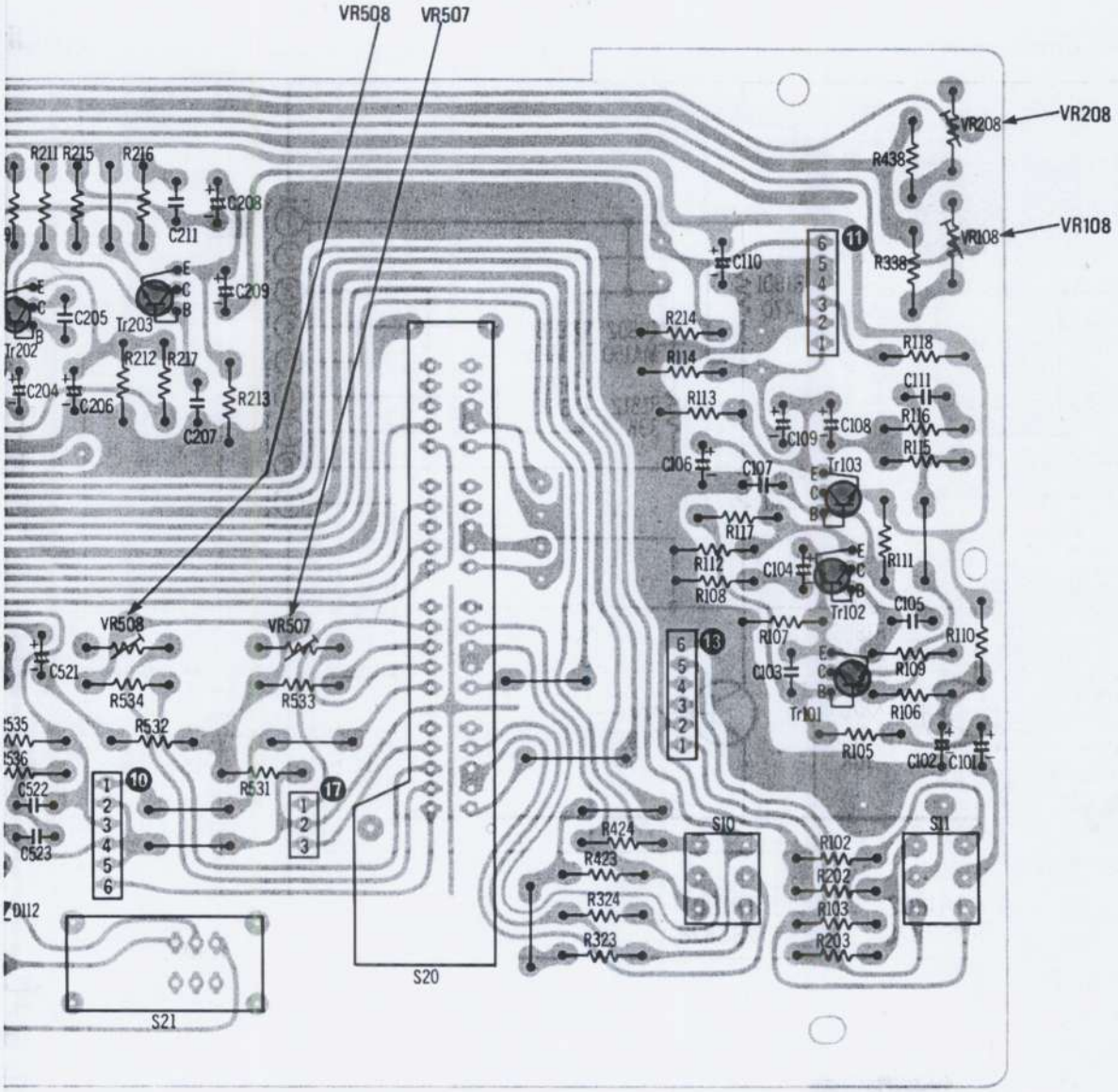
CIRCUIT BOARD

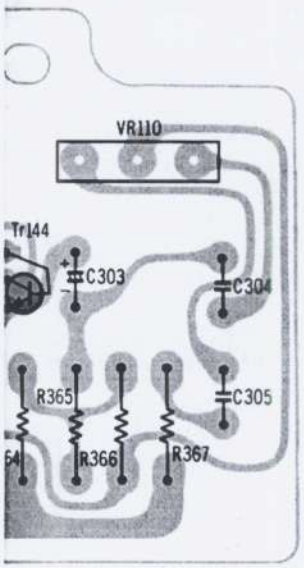
Sub Amp



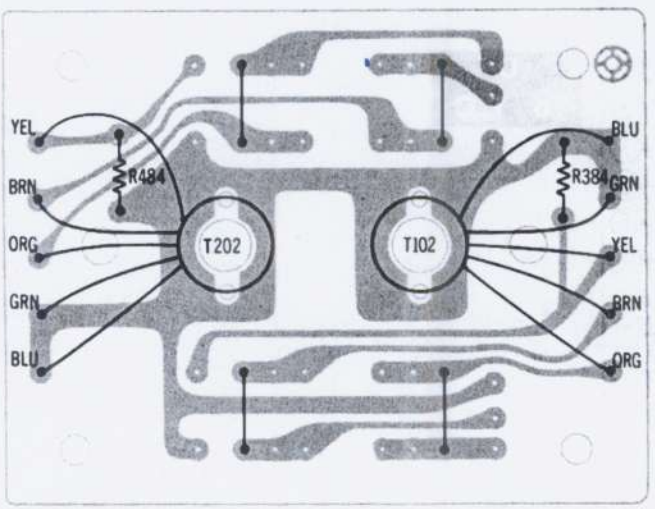
Bias & EQ Adjustment



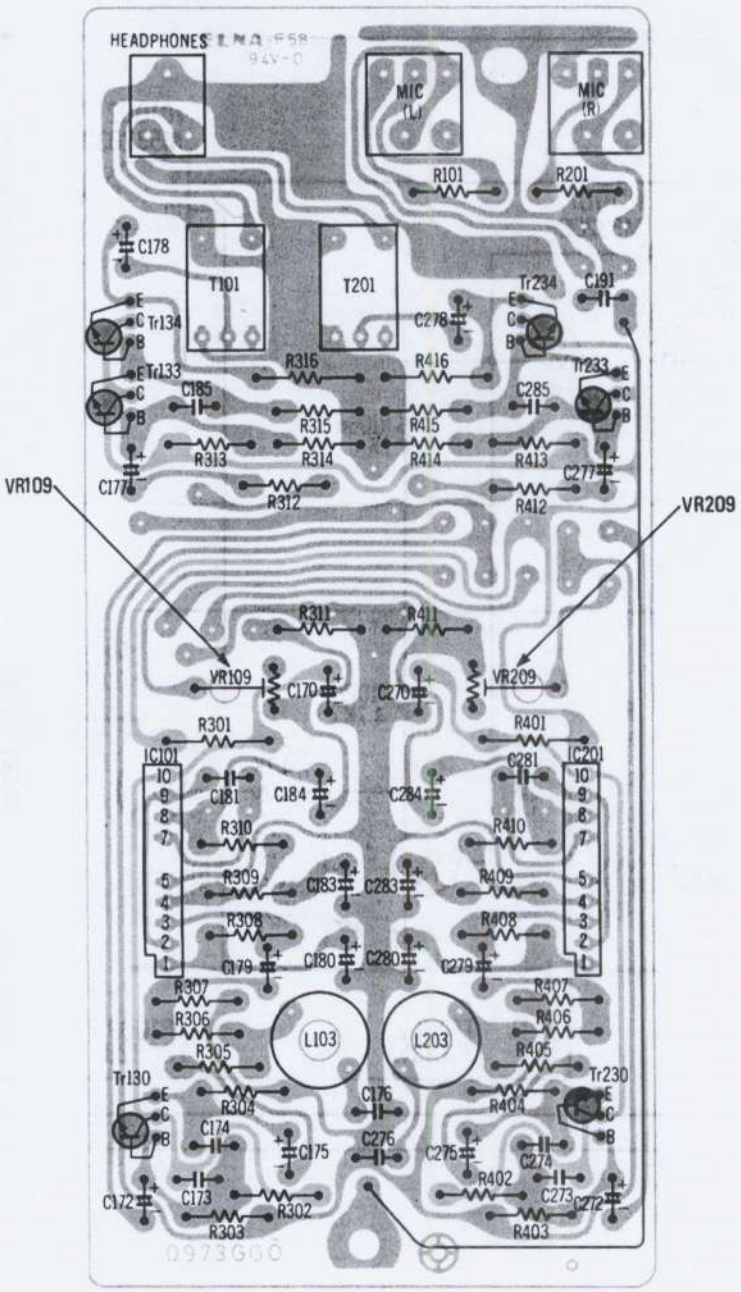

VR508
VR507
VR208
VR108
R211
R215
R216
C208
C211
C209
C205
Tr203
Tr202
R212
R217
R213
C204
C206
C207
C110
R214
R114
R113
C109
C108
C106
C107
Tr103
R117
R112
R108
C104
Tr102
R107
C105
R110
C103
R109
Tr101
R106
R105
C102
C101
R438
R338
R118
C111
R116
R115
R111
C521
R534
R533
R532
R535
R536
C522
C523
R531
R424
R423
R324
R323
S10
S11
R102
R202
R103
R203
S20
S21


VR110
Tr144
C303
C304
R365
R366
R367
C305

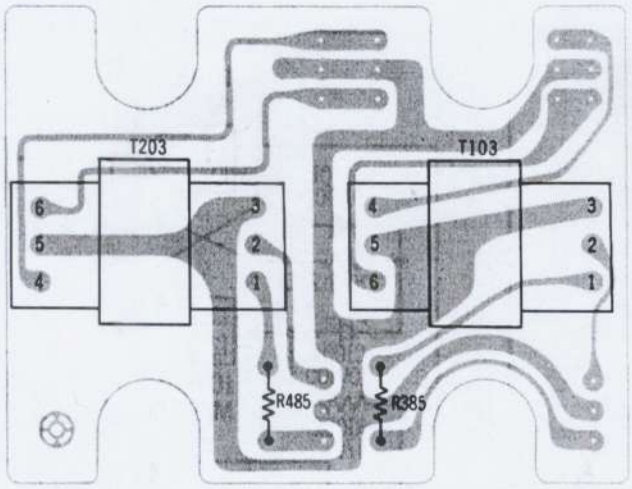
Input Trans


YEL
BRN
ORG
GRN
BLU
R484
T202
T102
R384
BLU
GRN
YEL
BRN
ORG

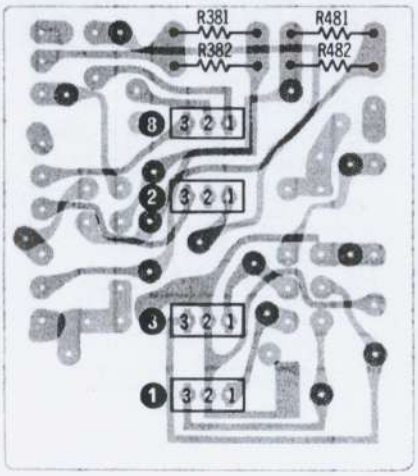
Line & Headphone Amp



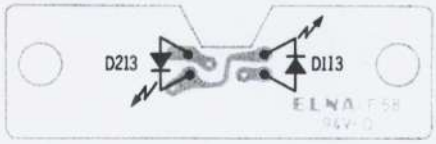
Output Trans



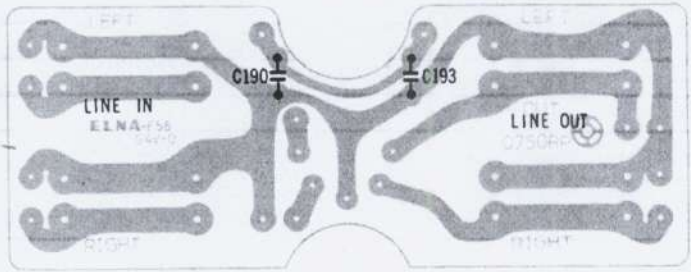
Input & Load Impedance Select



LED Indication



Line Jack

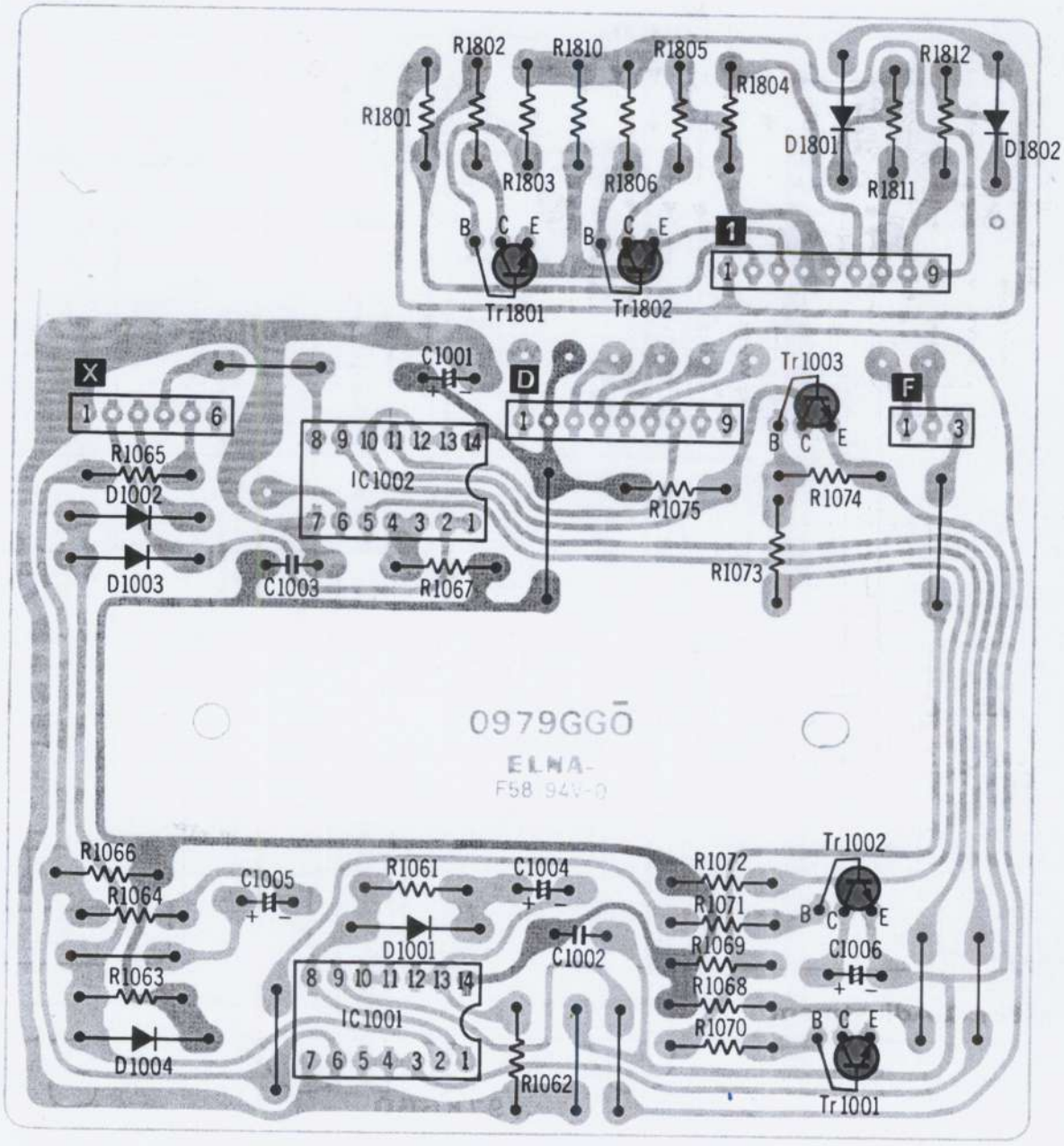


NOTE:

The circuit shown in red on the conductor is B circuit.

CIRCUIT BOARD

Edition

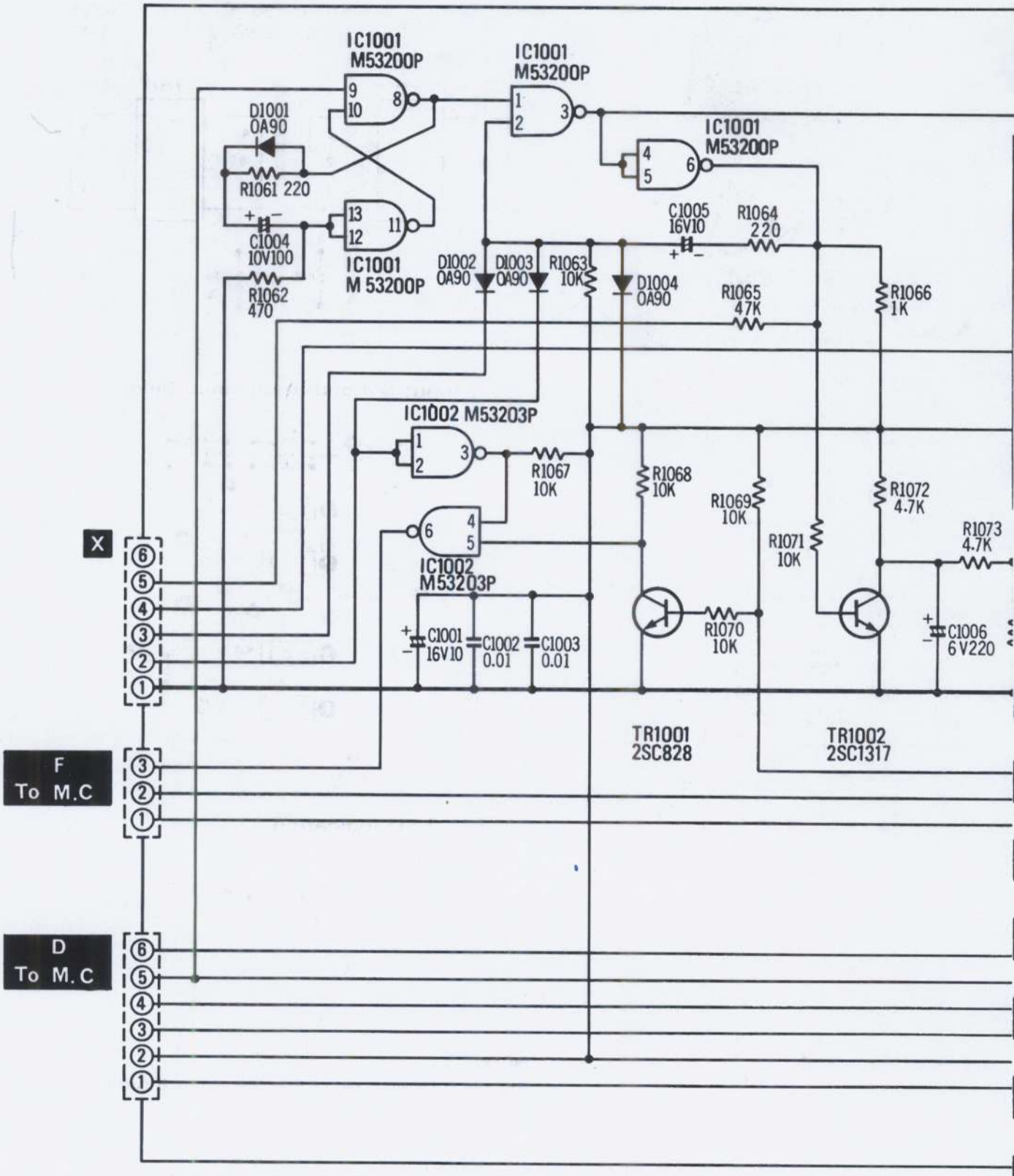


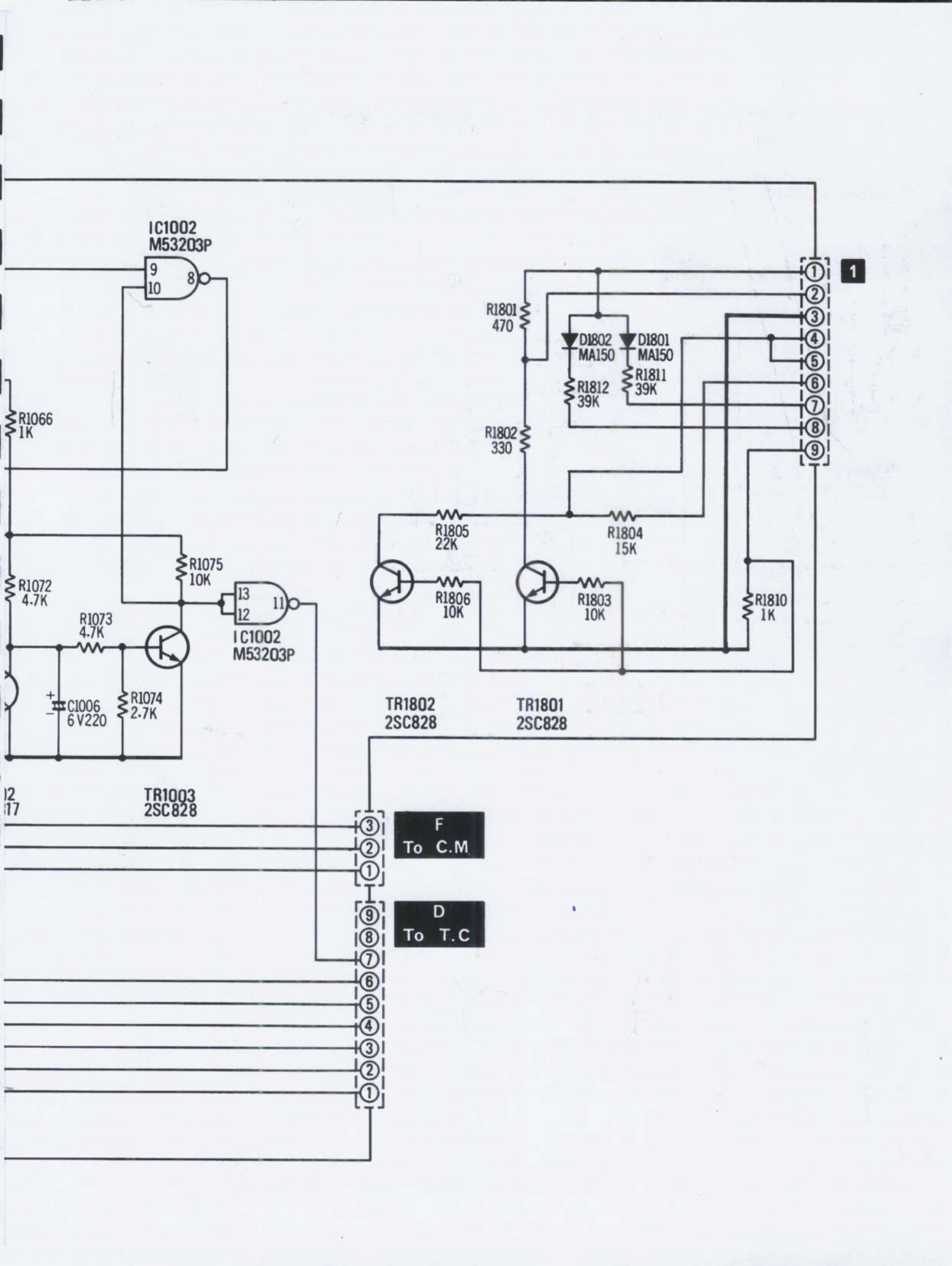
NOTE:

The circuit shown in red on the conductor is B circuit.

SCHEMATIC DIAGRAM MODEL RS-1520

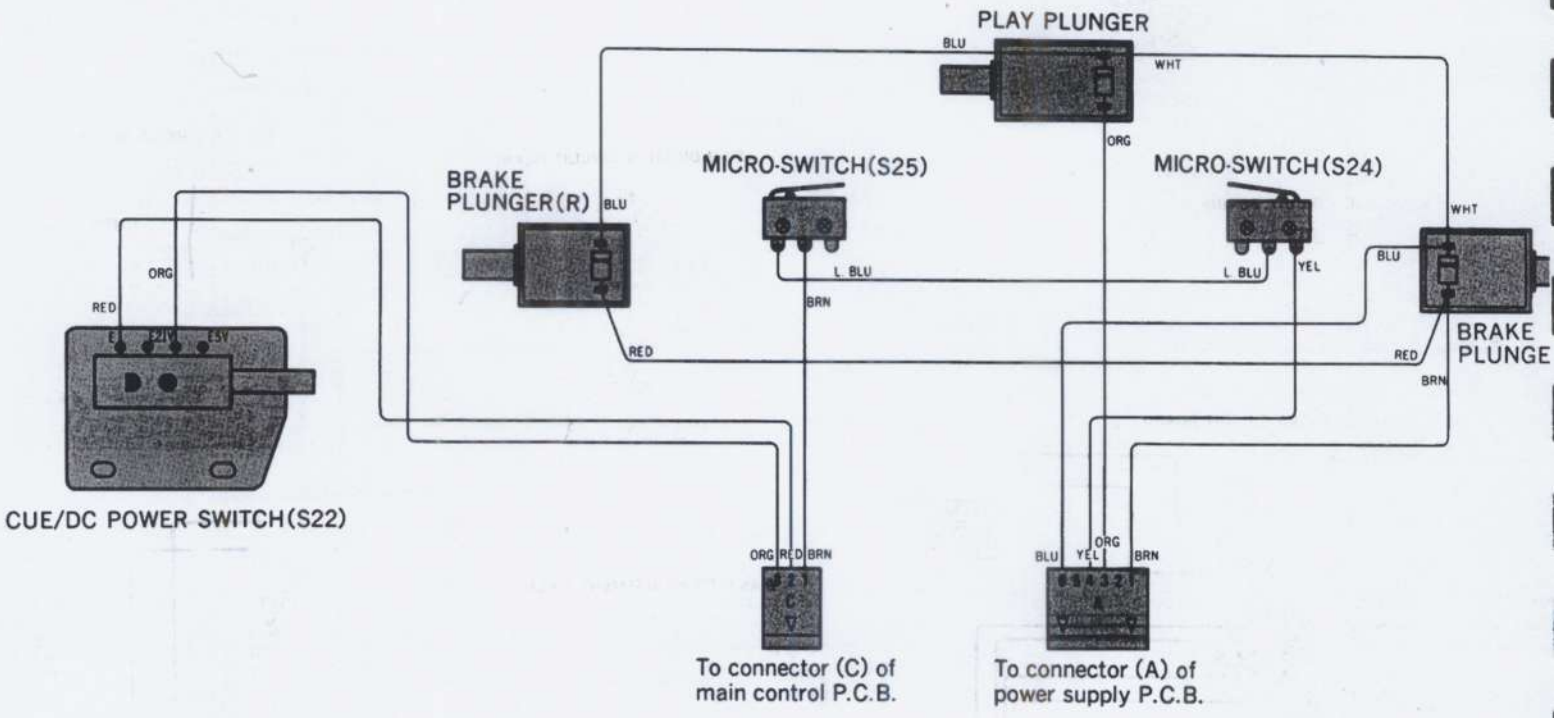
Edition Section




IC1002
M53203P
9
10
8
R1066
1K
R1072
4.7K
R1073
4.7K
R1075
10K
13
12
11
IC1002
M53203P
C1006
6V220
R1074
2.7K
TR1003
2SC828
R1801
470
D1802
MA150
D1801
MA150
R1812
39K
R1811
39K
R1802
330
R1805
22K
R1804
15K
R1806
10K
R1803
10K
R1810
1K
TR1802
2SC828
TR1801
2SC828
1
F
To C.M
D
To T.C

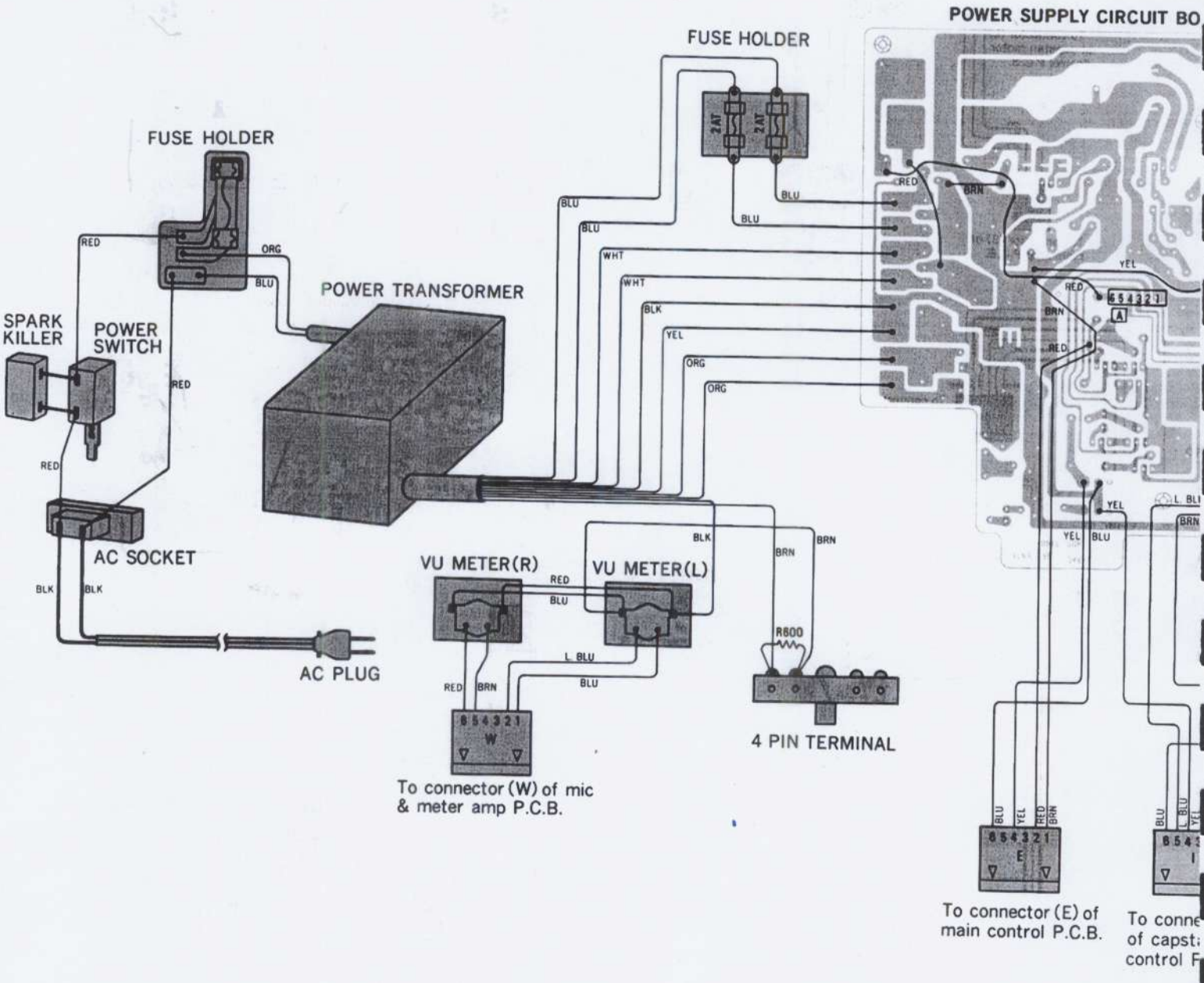
WIRING CONNECTION DIAGRAM MODEL RS-1520

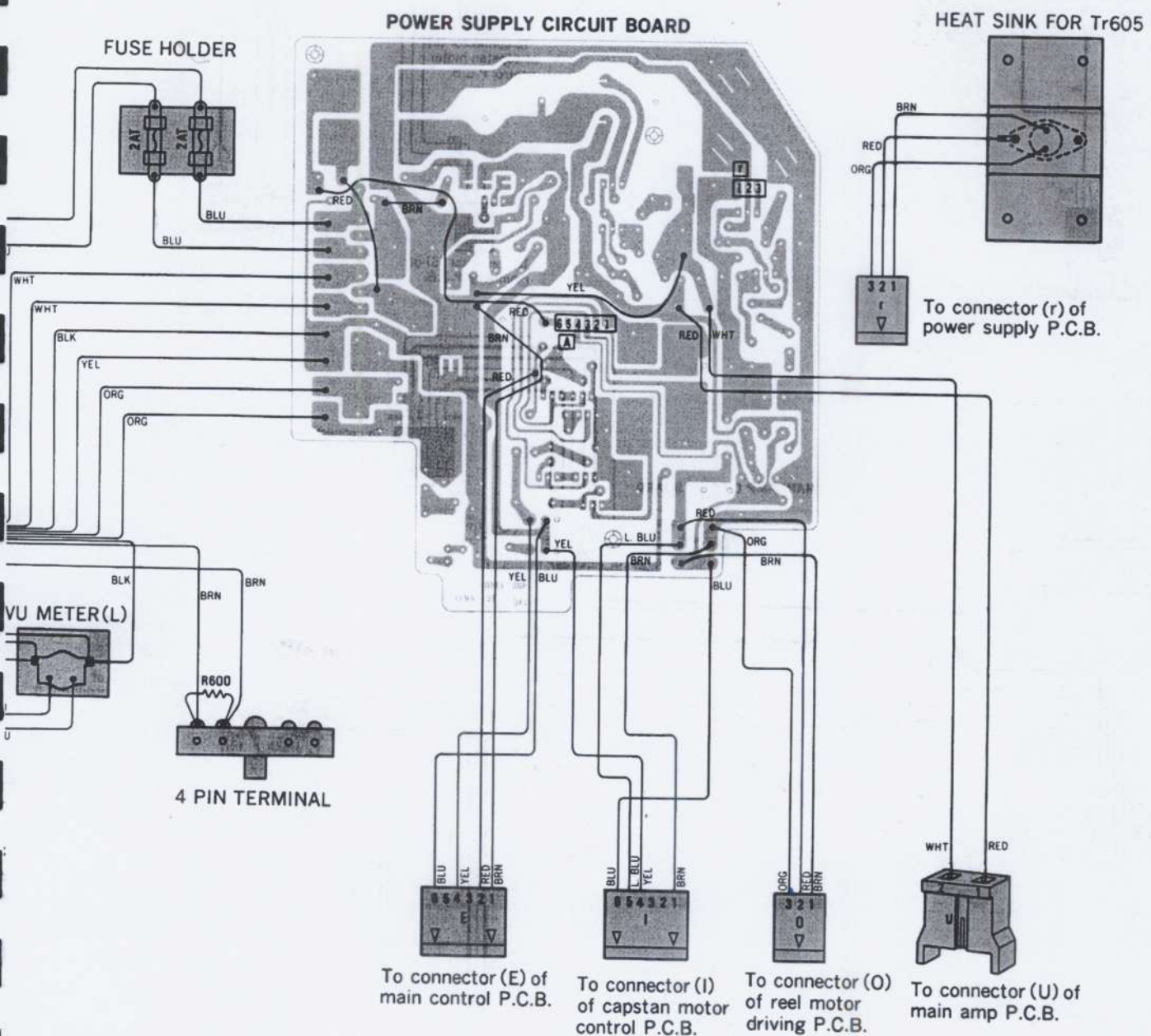
Power Supply Section, Plunger and Micro Switch Section



NOTE:

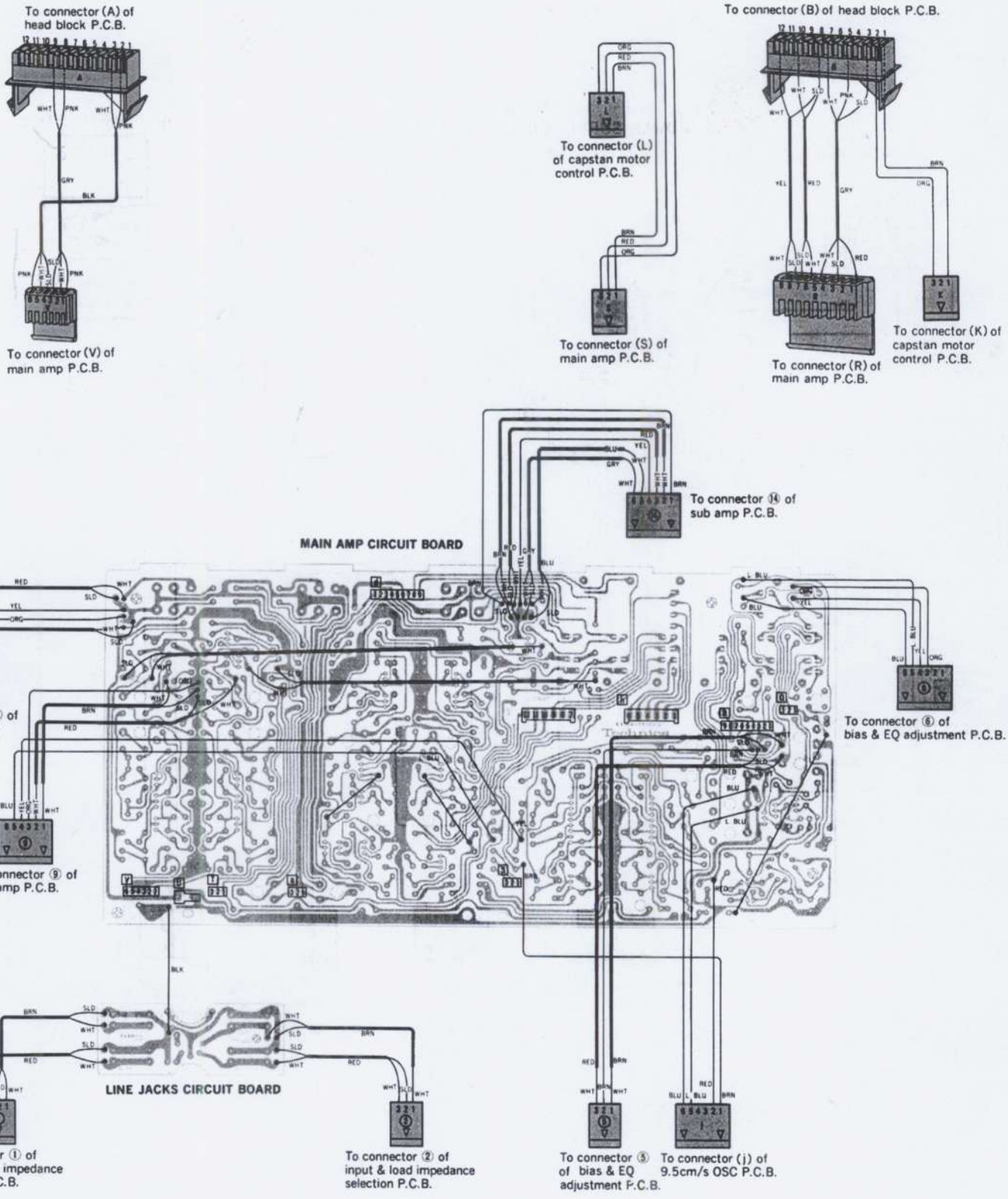
BLK ·····Black
BLU ·····Blue
BRN·····Brown
GRY ·····Gray
GRN·····Green
L. BLU···Light Blue
NIL ·····No Color Mark
ORG·····Orange
PNK·····Pink
RED·····Red
SLD ·····Shield Wire
VLT ·····Violet
WHT ···White
YEL ·····Yellow

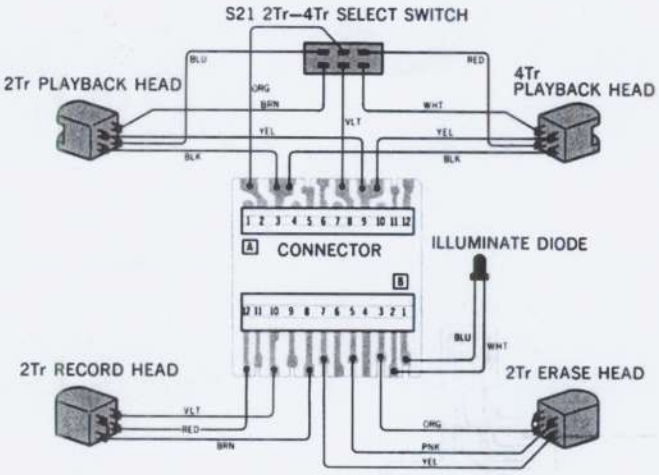

POWER SUPPLY CIRCUIT BO
FUSE HOLDER
2AT
2AT
BLU
BLU
BLU
WHT
WHT
BLK
YEL
ORG
ORG
RED
BRN
YEL
RED
BRN
RED
YEL
BLU
L BLU
BRN
FUSE HOLDER
RED
ORG
BLU
POWER TRANSFORMER
SPARK KILLER
POWER SWITCH
RED
RED
AC SOCKET
BLK
BLK
AC PLUG
VU METER(R)
VU METER(L)
RED
BLU
L BLU
BLU
RED
BRN
BLK
BRN
BRN
R600
4 PIN TERMINAL
To connector (W) of mic & meter amp P.C.B.
To connector (E) of main control P.C.B.
To conne of capst control F


POWER SUPPLY CIRCUIT BOARD
FUSE HOLDER
2AT
2AT
HEAT SINK FOR Tr605
BRN
RED
ORG
3 2 1
r
To connector (r) of power supply P.C.B.
BLU
BLU
WHT
WHT
BLK
YEL
ORG
ORG
RED
BRN
YEL
RED
RED
WHT
RED
YEL
L. BLU
ORG
BRN
YEL
BLU
BLU
BLK
BRN
BRN
VU METER(L)
R600
4 PIN TERMINAL
BLU
YEL
RED
BRN
E
To connector (E) of main control P.C.B.
BLU
L. BLU
YEL
BRN
I
To connector (I) of capstan motor control P.C.B.
ORG
RED
BRN
O
To connector (O) of reel motor driving P.C.B.
WHT
RED
U
To connector (U) of main amp P.C.B.

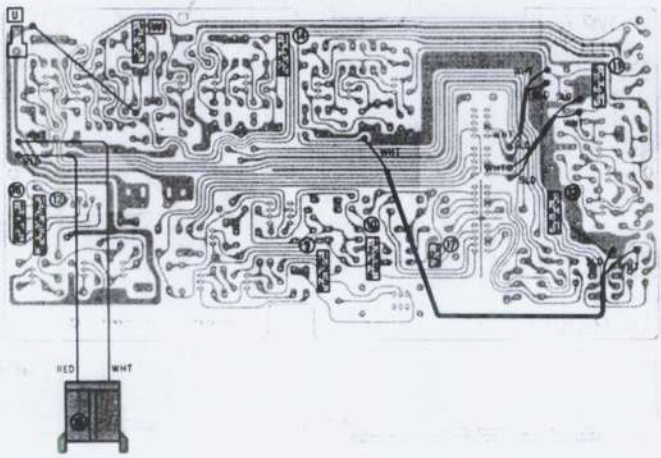
WIRING CONNECTION DIAGRAM MODEL RS-1520

Main, Mic and Line Amp Section

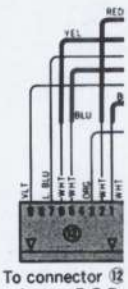




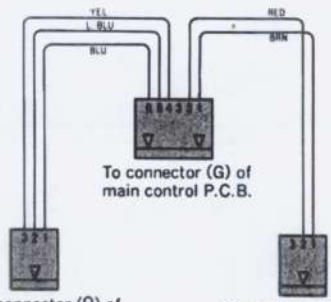
SUB AMP CIRCUIT BOARD



To connector ⑮ of main amp P.C.B.



To connector ⑫ sub amp P.C.B.



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

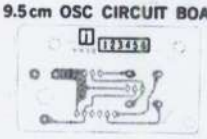
To connector (Q) of main amp P.C.B.

To connector (T) of main amp P.C.B.

NOTE:

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

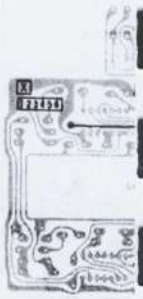
9.5cm OSC CIRCUIT BOARD



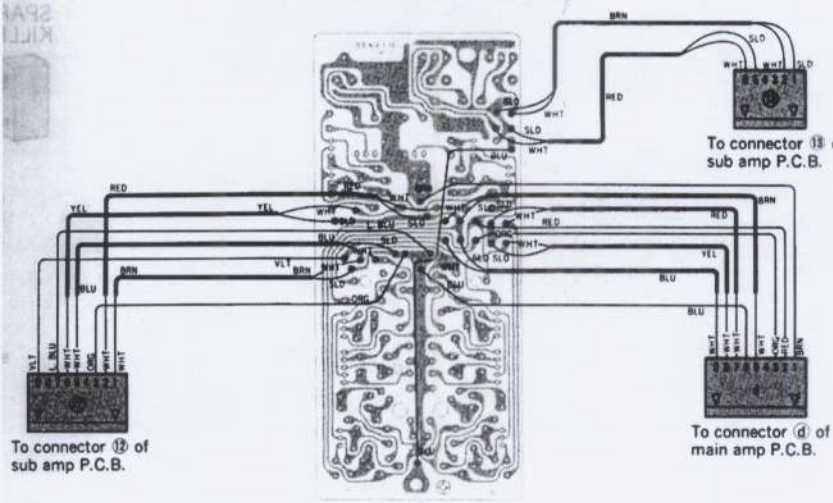
LED INDICATION CIRCUIT BOARD

To connector ⑦ of bias & EQ adjustment P.C.B.

EDITION C



LINE & HEADPHONE AMP CIRCUIT BOARD

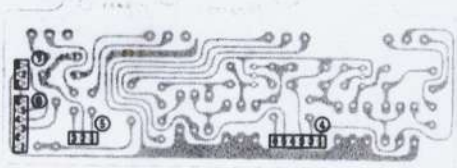


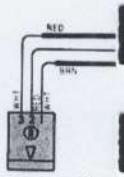
To connector ⑬ of sub amp P.C.B.

To connector ⑫ of sub amp P.C.B.

To connector ⓓ of main amp P.C.B.

BIAS & EQ ADJUSTMENT CIRCUIT BOARD

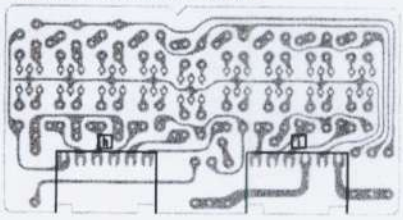




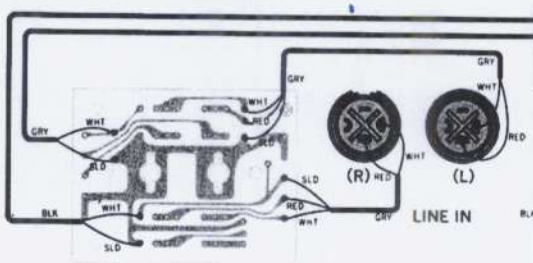
To connector ⑧ of input & load impedance selection P.C.B.

To c sub

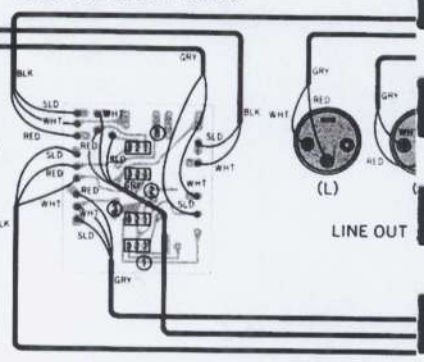
EQUALIZATION CIRCUIT BOARD



INPUT TRANS CIRCUIT BOARD



INPUT & LOAD IMPEDANCE SELECTION CIRCUIT BOARD



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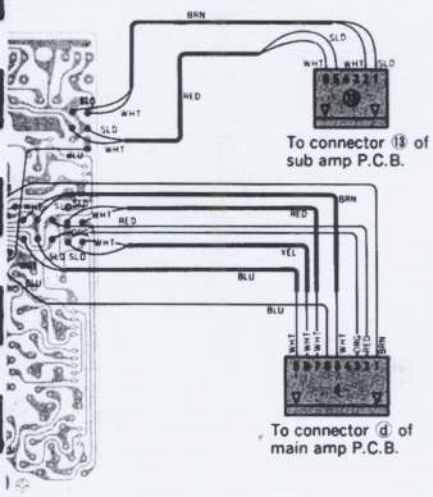
:UIT BOARD

MP CIRCUIT BOARD



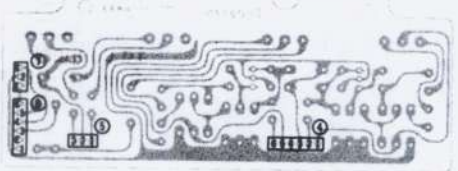
To connector ⑬ of sub amp P.C.B.

To connector ⓓ of main amp P.C.B.

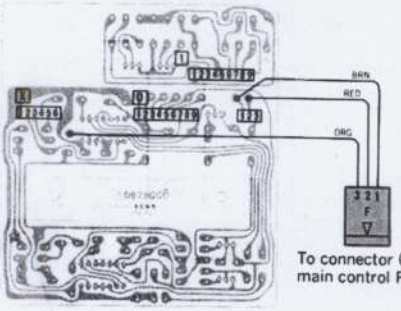
LED INDICATION CIRCUIT BOARD

To connector ⑦ of bias & EQ adjustment P.C.B.

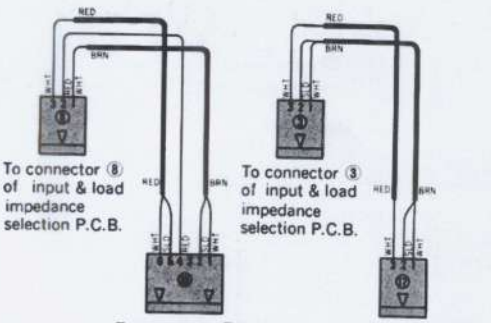
BIAS & EQ ADJUSTMENT CIRCUIT BOARD



EDITION CIRCUIT BOARD



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



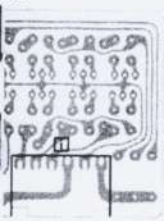
To connector ⑧ of input & load impedance selection P.C.B.

To connector ⑯ of sub amp P.C.B.

To connector ③ of input & load impedance selection P.C.B.

To connector ⑰ of sub amp P.C.B.

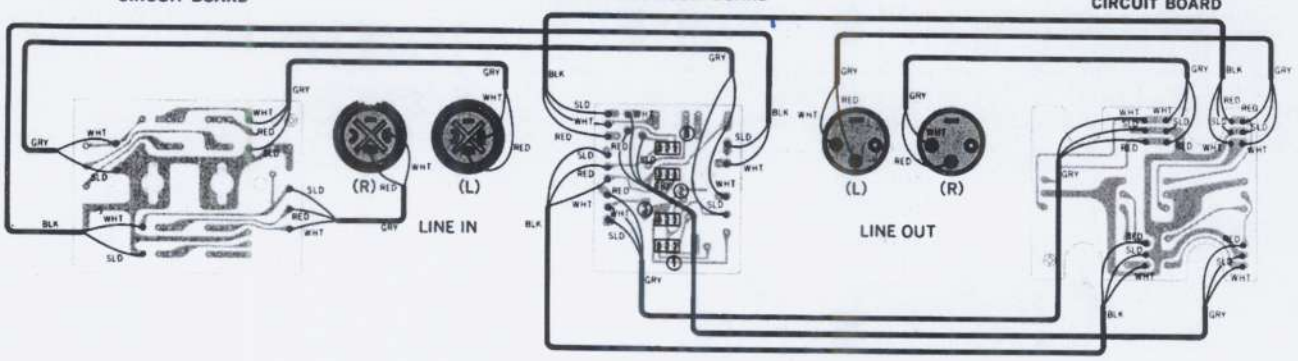
RD



INPUT TRANS CIRCUIT BOARD

INPUT & LOAD IMPEDANCE SELECTION CIRCUIT BOARD

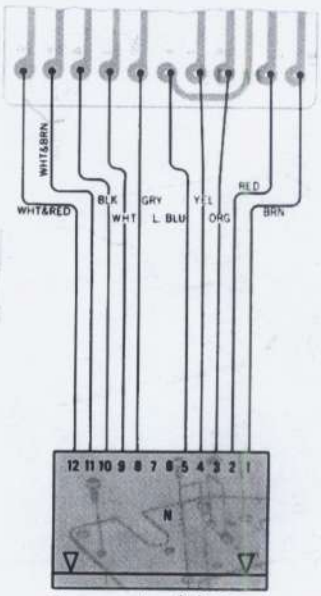
OUTPUT TRANS CIRCUIT BOARD



WIRING CONNECTION DIAGRAM MODEL RS-1520

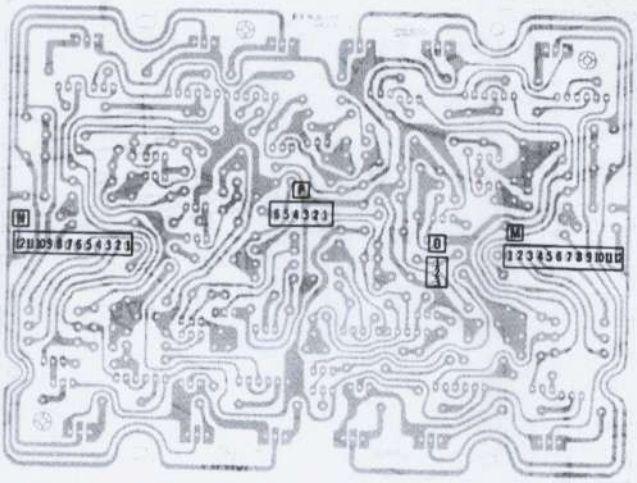
Reel, Capstan and Main Control Section

TAKE-UP REEL MOTOR SIDE

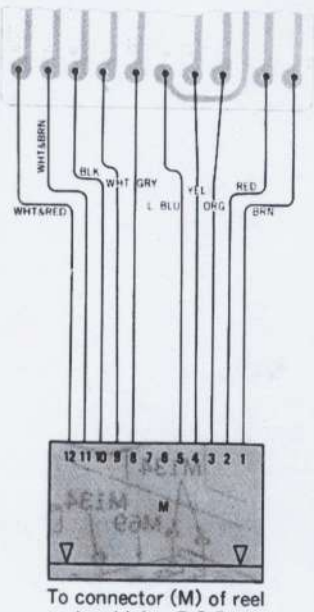


To connector (N) of reel motor driving P.C.B.

REEL MOTOR DRIVING CIRCUIT BOARD

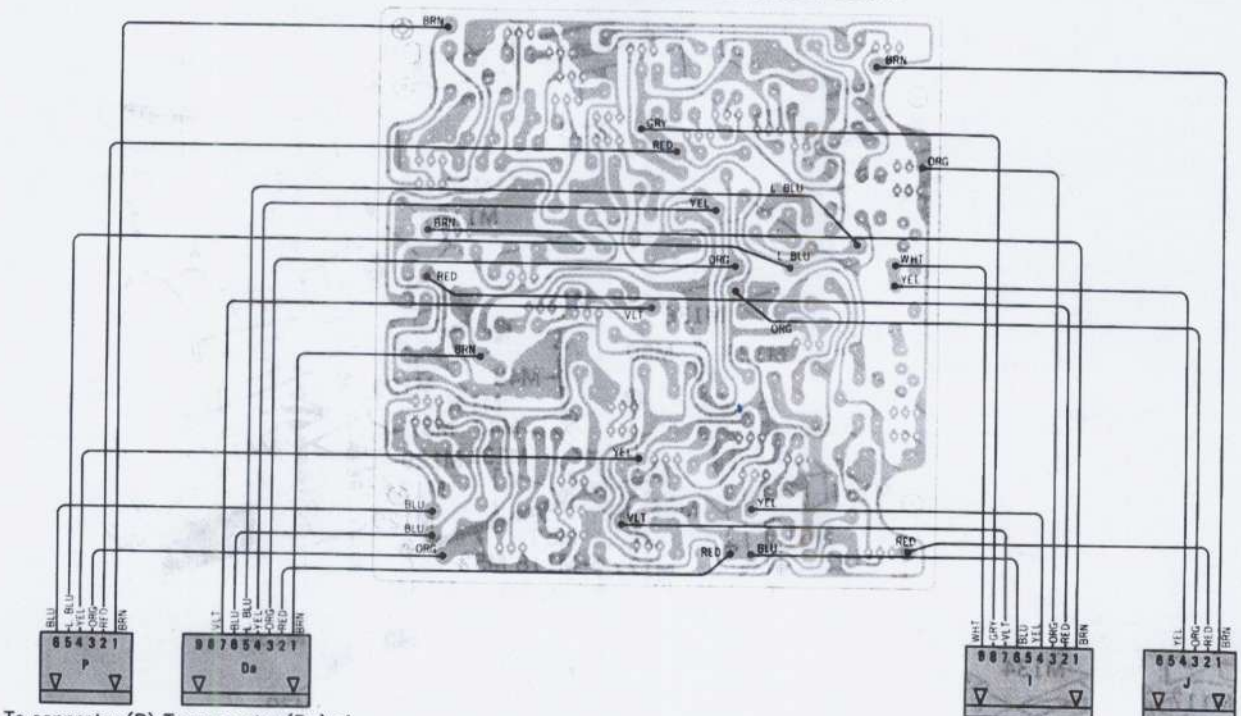


SUPPLY REEL MOTOR SIDE



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

REEL MOTOR TENSION CONTROL CIRCUIT BOARD

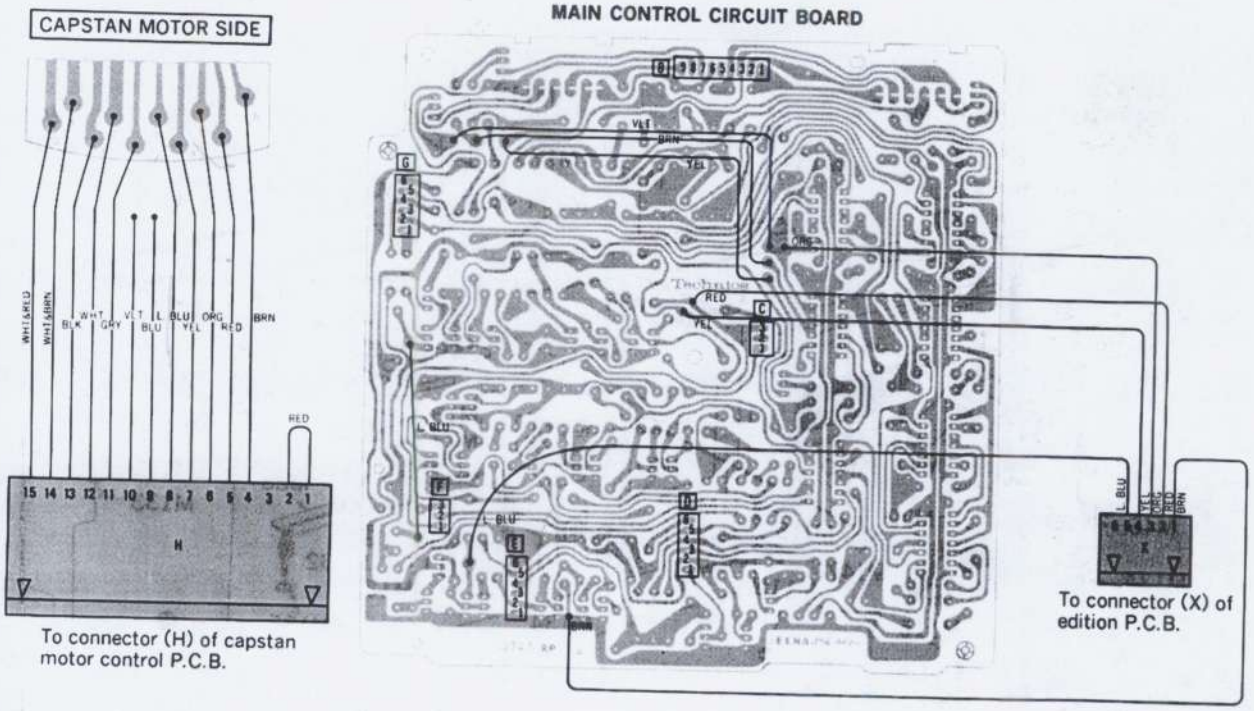


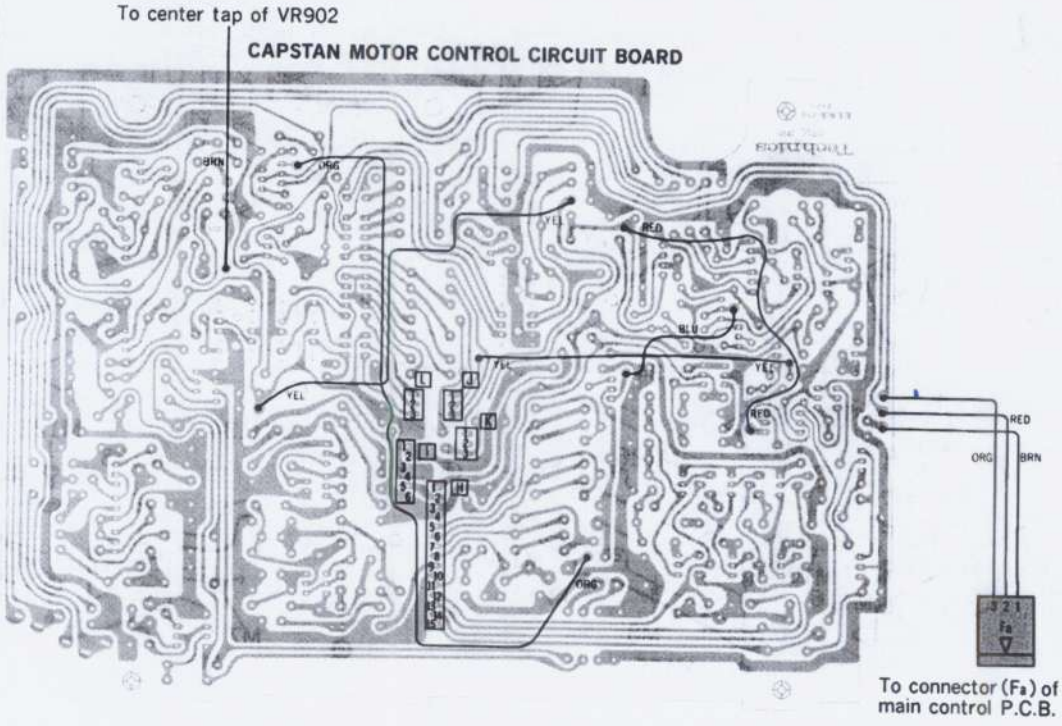
To connector (P) of reel motor driving P.C.B.

To connector (Da) of edition P.C.B.

To connector (I) of edition P.C.B.

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





NOTE:

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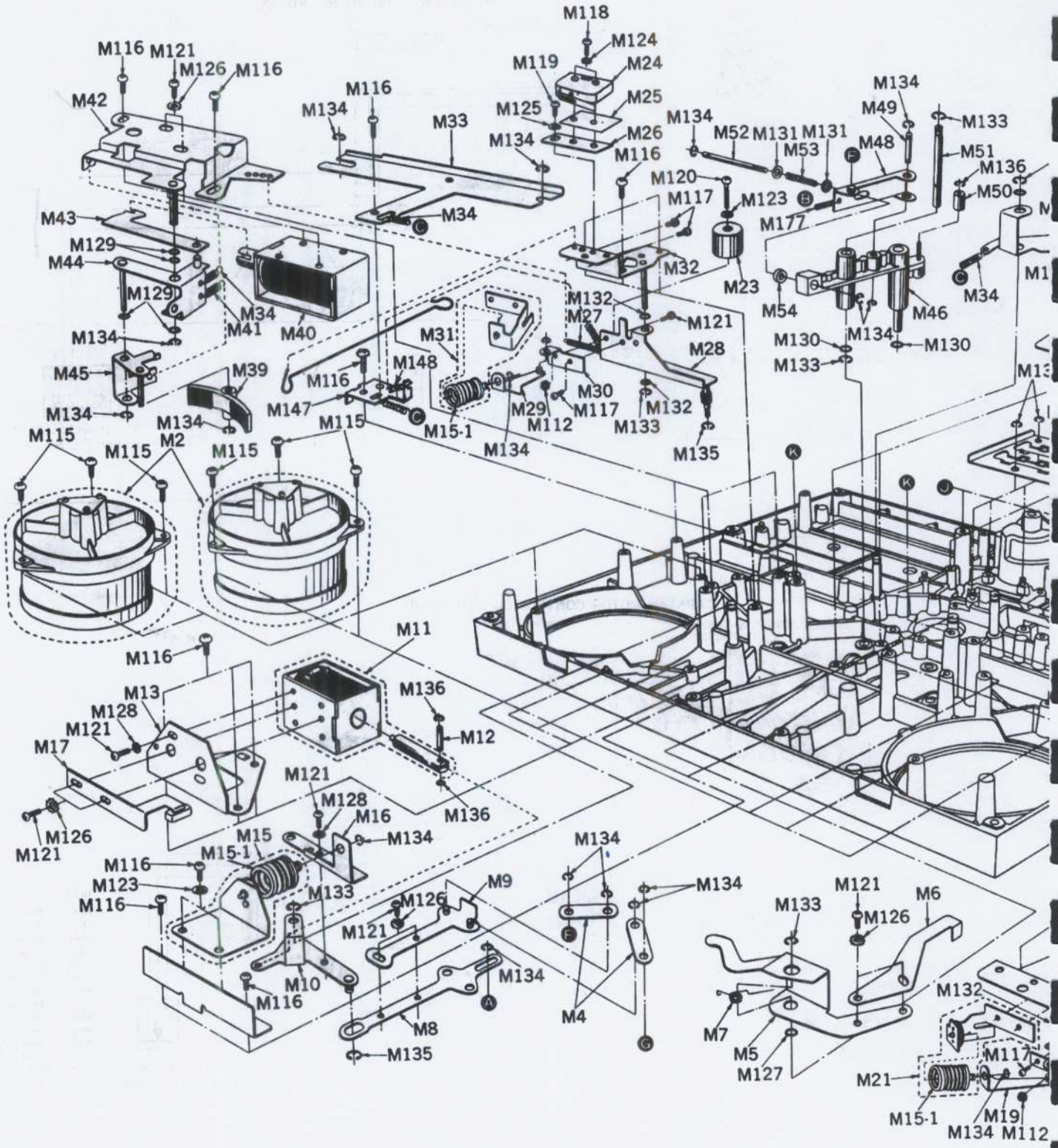
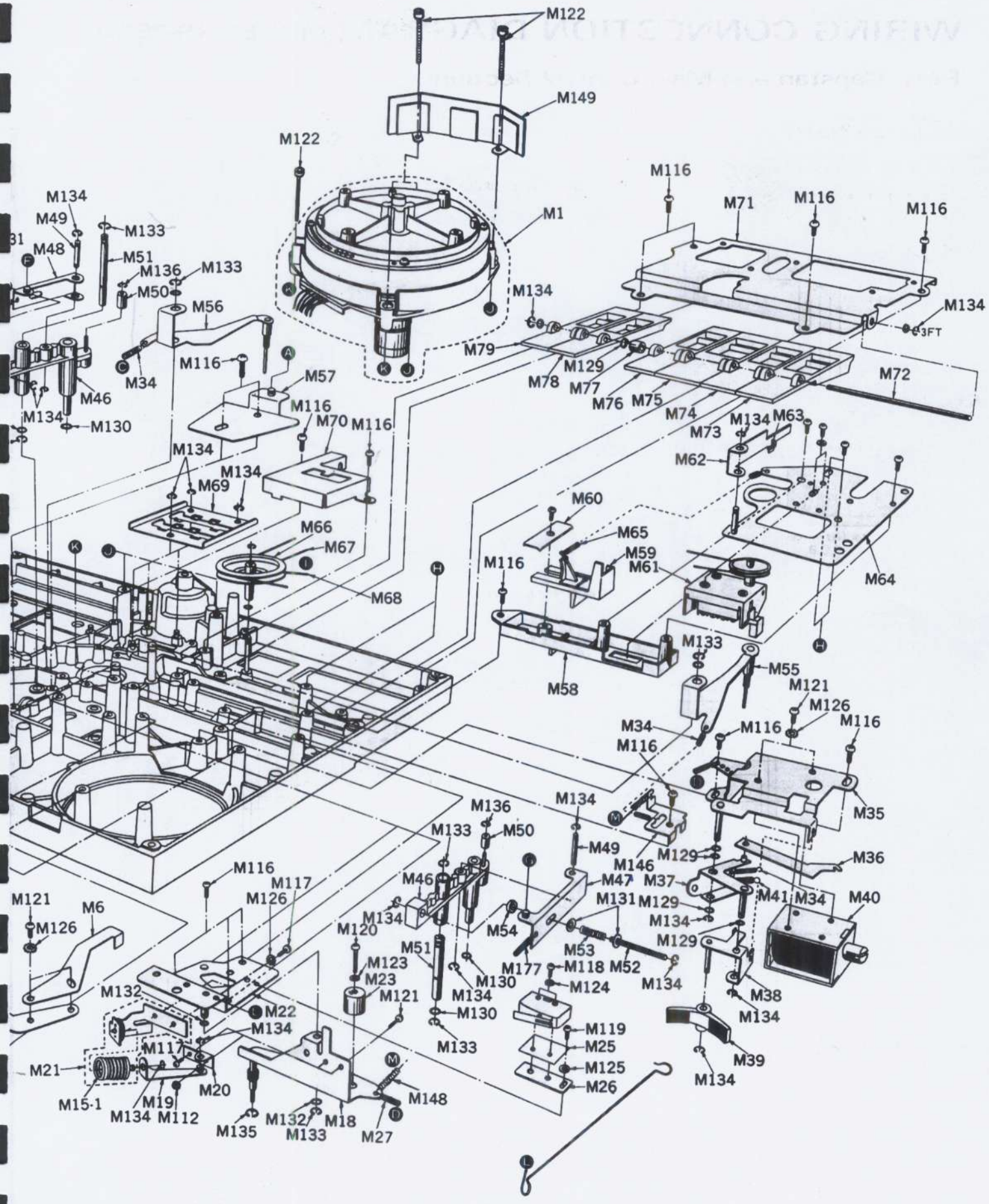
GRY	Gray
GRN	Green
L. BLU	Light Blue
NIL	No Color Mark
ORG	Orange
PNK	Pink
RED	Red
SLD	Shield Wire
VLT	Violet
WHT	White
YEL	Yellow

EXPLODED VIEWS

Mechanism Parts

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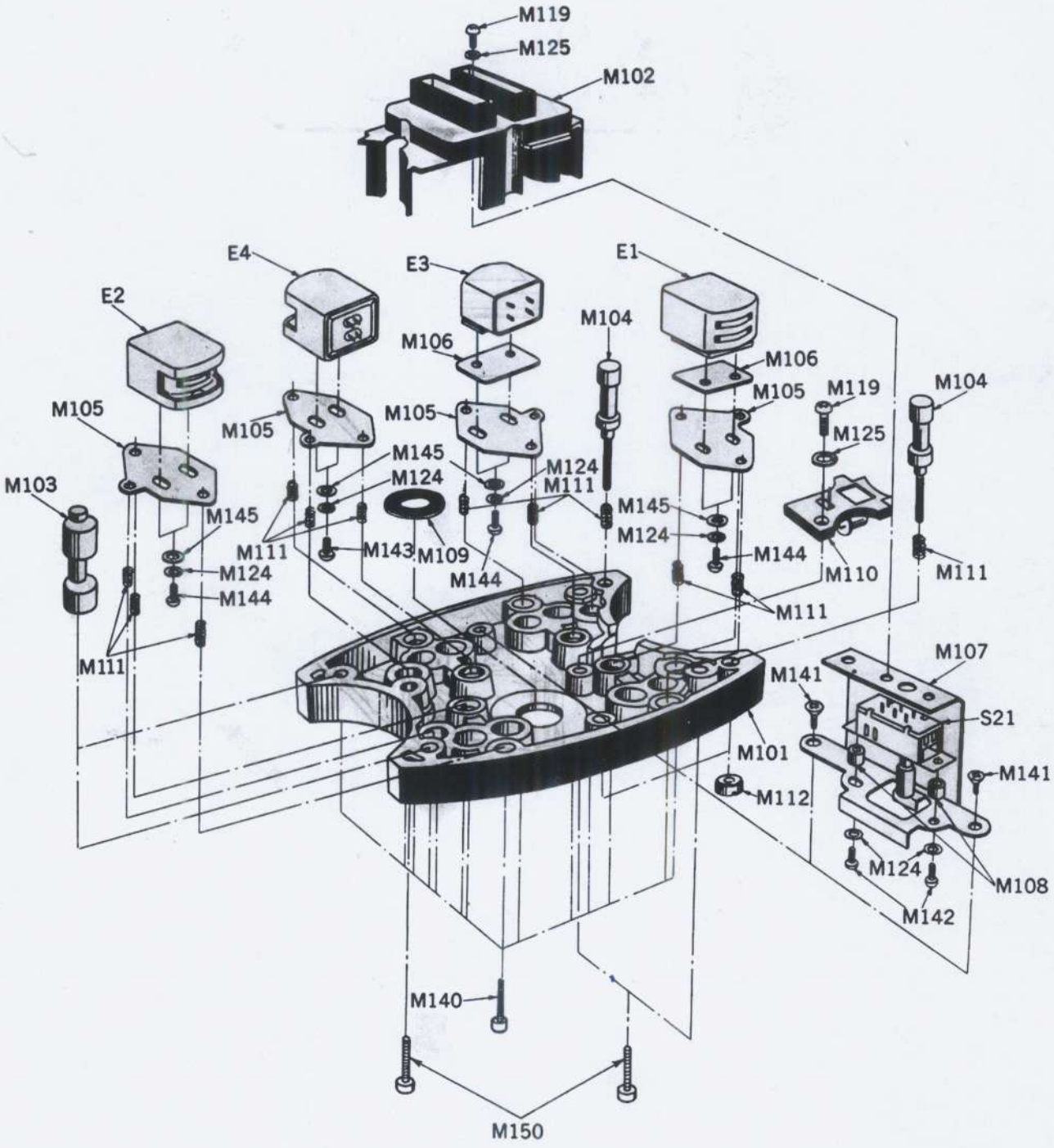
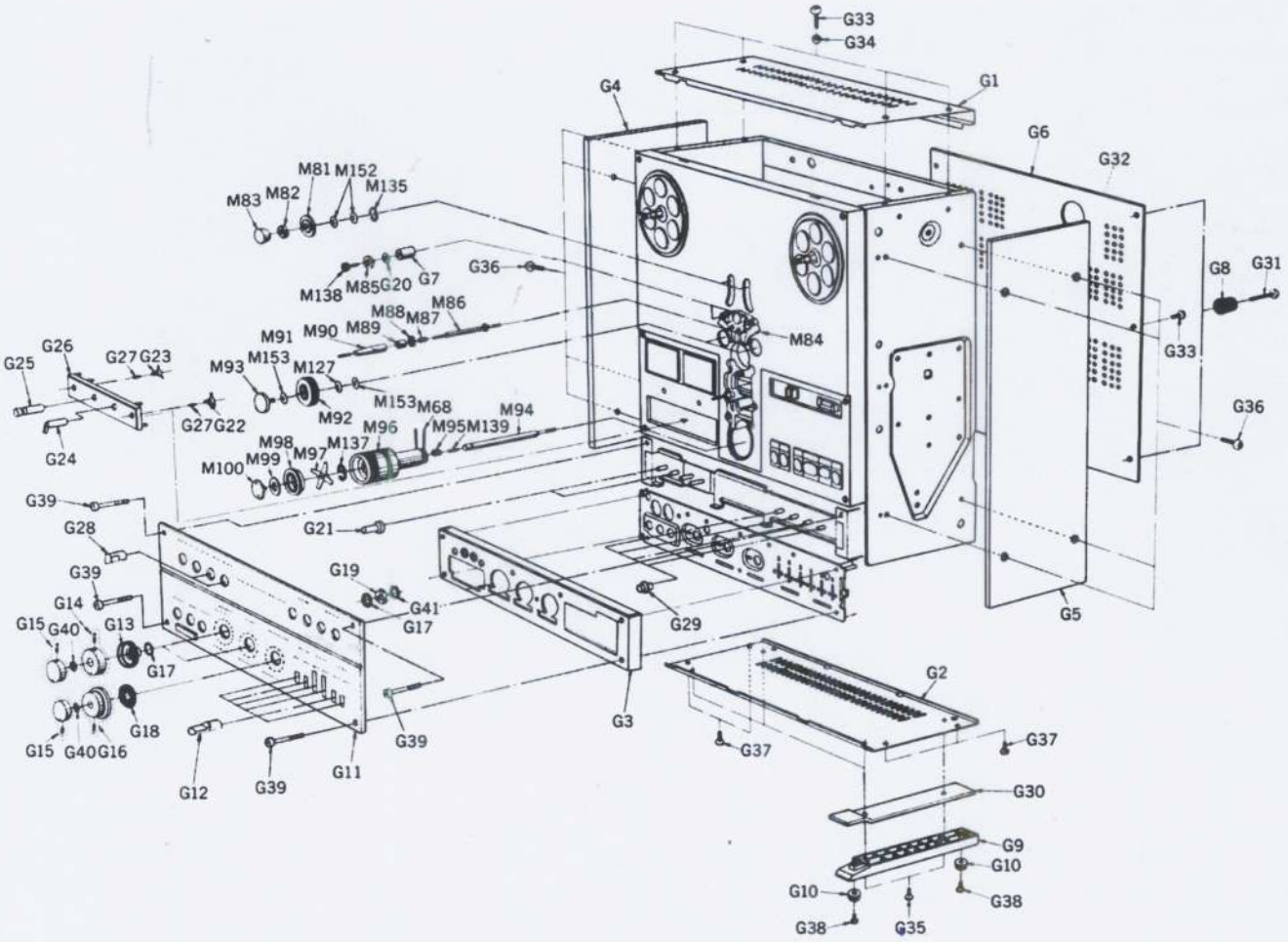
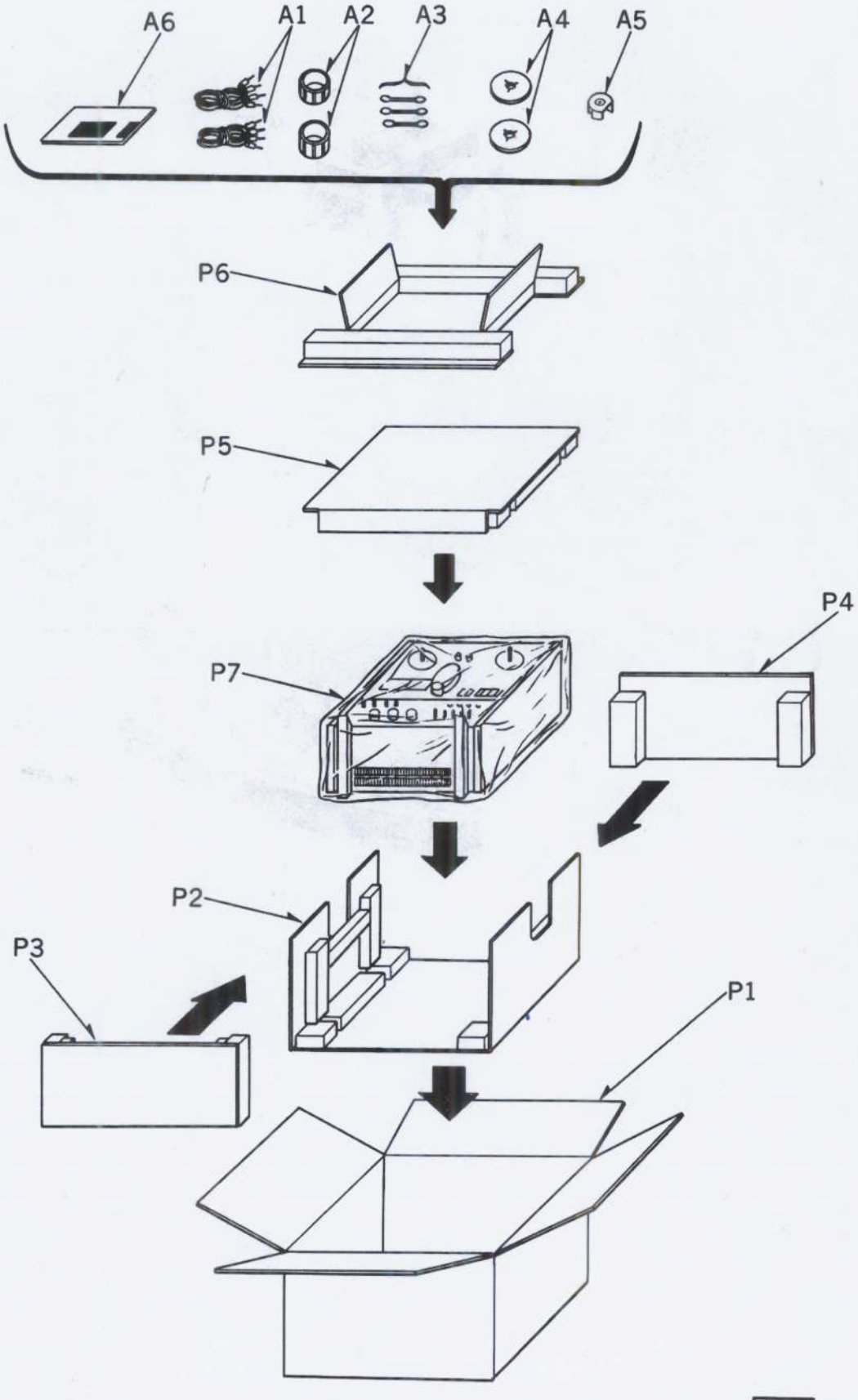
Mechanism Parts



Mechanism and Cabinet Parts



COMPONENT PACKINGS



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Printed in Japan

REPLACEMENT PARTS LIST MODEL RS-1520 (Technics)

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.

MECHANICAL PARTS

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
M1	QXS1090	Capstan Motor Assembly	1	
M2	QXD0070	Reel Motor (Rotor) Assembly	2	
M4	QMR1531	Connection Rod	2	
M5	QML3007	Cue Lever	1	
M6	QMF1852	Adjustment Plate	1	
M7	QBN1346	Spring	1	
M8	QMF1855	Control Plate	1	
M9	QXH0259	Adjustment Plate Assembly	1	
M10	QXL1107	Driving Lever Assembly	1	
M11	QME0138	Plunger (for Pressure Roller)	1	
M12	QMN2168	Plunger Pin	1	
M13	QMF1874	Plunger Holding Plate	1	
M15	QXQ0097	Air Damper Assembly	1	
M15-1	QBG1561	Bellows	3	
M16	QMA3124	Air Damper Angle	1	
M17	QXA0633	Stopper Angle	1	
M18	QXL1106	Tension Lever (R) Assembly	1	
M19	QXR0307	Air Damper Rod (R) Assembly	1	
M20	QMA2984	Air Damper Holding Angle	1	
M21	QXQ0095	Air Damper (R) Assembly	1	
M22	QXH0258	Tension Lever Holding Plate	1	
M23	QMC0052	Spacer	2	
M25	QBK1217	Isoluation Sheet	2	
M26	QMF1682	Micro Switch Mounting Plate	2	
M27	QBC1189	Spring	2	
M28	QXL1105	Tension Lever (L) Assembly	1	
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	QXH0269	Meter Holding Plate		
M34	QBT1687	Spring	1	
M35	QXA0607	Angle (R) Assembly	1	
M36	QMR1572	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	
M42	QXA0606	Angle (L) Assembly	1	
M43	QMR1571	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	QMS2428	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	QXH0265	Mask Plate Assembly	1	
M58	QMH2034	Cue Holder	1	
M59	QGO1486	Cue Button	1	
M60	QMF1862	Stopper Plate	1	
M61	QDC0087	Counter	1	
M62	QML3024	Stopper Arm	1	
M63	QBG1132	Stopper Rubber	1	
M64	QXA0608	Counter Holding Plate Assembly	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
M65	QBT1601	Spring	1	
M66	QDP1702	Intermediate Pulley	1	
M67	QDB0215	Counter Belt-A	1	
M68	QDB0173	"	1	
M69	QMF1863	Wires Connector Holding Angle	1	
M70	QMA2952	Wires Connector Cover Angle	1	
M71	QXH0273	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	QMS2428	Tape Guide Shaft	2	
M87	QBC1278	Tape Guide Spring	2	
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	QXP0544	Pressure Roller Assembly	2	
M93	QYK0097	Pressure Roller Ornament	2	
M94	QMS2430	Reversing Roller Shaft	1	
M95	QBC1202	Spring	1	
M96	QXP0559	Reversing Roller Assembly	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
M97	QBP1714	Plate Spring	1	
M98	QDP1701	Roller	1	
M99	QBF1254	Felt	1	
M100	QGK2643	Roller Ornament	1	
M101	QMK1598	Head Base Plate	1	
M102	QGC1065	Head Bottom Cover	1	
M103	QMG0029	Tape Guide-6	2	
M104	QMG0048	Tape Guide-7	2	
M105	QMZ1181	Head Sheet-1	4	
M106	QMF1866	Head Spacer	2	
M107	QMA2929	Switch Holding Angle	1	
M108	QMP1330	Spacer	2	
M109	QKJ0164	Mask	1	
M110	QKJ0163	LED Holder	1	
M111	QBC1180	Head Mounting Spring	14	
M112	QNQ1069	Nut	4	
M115	XTN4 +14B	Screw 4 ×14	6	
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	
M124	XWA2BFZ	"	14	
M125	XWA26B	"	4	
M126	XWC3B	Lock Washer	10	
M127	QBW2023	Poly Washer	1	
M128	XWA3B	Spring Washer	2	
M129	QBW2019	Poly Washer	11	
M130	QBW0034	Washer	4	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
M131	XWG4	Flat Washer	4	
M132	QBW2022	Poly Washer	3	
M133	XUC5FT	Stop Ring 5	10	
M134	XUC3FT	Stop Ring 3	31	
M135	XUC4FT	Stop Ring 4	4	
M136	XUC2FT	Stop Ring 2	3	
M137	XUC7FT	Stop Ring 7	1	
M138	XVE3C8FZS	Screw with Hexagon Hole	4	
M139	XXE3D6FZS	"	1	
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	QMF1930	Spring Holding Plate-R	1	
M147	QMF1929	Spring Holding Plate-L	1	
M148	QBT1322	Spring	2	
M149	QXH0281	Flywheel Cover	1	
M150	XVE3C10FNS	Screw with Hexagon Hole	3	
			2	
M151	QBW2016	Poly Washer	2	
M152	QBW2020	"	5	
M153	QBW2058	"	2	
	RESISTORS			
R1	ERD25TJ102	Carbon Resistor	1	SD SUPPLY
R2	ERD25TJ100	"	1	"
R3	ERD25TJ102	"	1	"
R4	ERD25TJ100	"	1	"
R5	ERD25TJ102	"	1	"
R6	ERD25TJ100	"	1	"
R7	ERD25TJ102	"	1	"
R8	ERD25TJ100	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R9	ERD25TJ103	Carbon Resistor	1	SD SUPPLY
R10	ERD25TJ100	"	1	"
R11	ERD25TJ103	"	1	"
R12	ERD25TJ100	"	1	"
R13	ERD25TJ103	"	1	"
R14	ERD25TJ100	"	1	"
R15	ERD25TJ103	"	1	"
R16	ERD25TJ100	"	1	"
R17, 18	ERD25TJ103	"	2	"
R19	ERD25TJ823	"	1	"
R20	ERD25TJ153	"	1	"
R21	ERD25TJ562	"	1	"
R22	ERD25TJ103	"	1	"
R23	ERD25TJ473	"	1	"
R24	ERD25TJ103	"	1	"
R25	ERD25TJ273	"	1	"
R26	ERD25TJ103	"	1	"
R27	ERD25TJ562	"	1	"
R28	ERD25TJ103	"	1	"
R29	ERD25TJ473	"	1	"
R30	ERD25TJ562	"	1	"
R31	ERD25TJ332	"	1	"
R32	ERD25TJ473	"	1	"
R33	ERD25TJ562	"	1	"
R34	ERD25TJ474	"	1	"
R35	ERD25TJ823	"	1	"
R36	ERD25TJ273	"	1	"
R37	ERD25TJ103	"	1	"
R38	ERD25TJ154	"	1	"
R39	ERD25TJ103	"	1	"
R40	ERD25TJ473	"	1	"
R41	ERD25TJ103	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R42	ERD25TJ562	Carbon Resistor	1	SD SUPPLY
R43	ERD25TJ221	"	1	"
R44	ERD25TJ103	"	1	"
R45	ERD25TJ222	"	1	"
R46, 47, 48, 49	ERD25TJ103	"	4	"
R50	ERD25TJ153	"	1	"
R51, 52	ERD25TJ471	"	2	"
R53, 54	ERD25TJ473	"	2	"
R55	ERD25TJ474	"	1	"
R56	ERD25TJ562	"	1	"
R57	ERD25TJ102	"	1	"
R58	ERD25TJ473	"	1	"
R59	ERD25TJ103	"	1	"
R60	ERD25TJ562	"	1	"
R61	ERD25TJ473	"	1	"
R62	ERD25TJ103	"	1	"
R63	ERD25TJ822	"	1	"
R64	ERD25TJ271	"	1	"
R65	ERD25TJ473	"	1	"
R66	ERD25TJ104	"	1	"
R67	ERD25TJ822	"	1	"
R68	ERD25TJ271	"	1	"
R69	ERD25TJ562	"	1	"
R70	ERD25TJ151	"	1	"
R71	ERD25TJ103	"	1	"
R72	ERD25TJ102	"	1	"
R101, 102	ERD25TJ471	"	2	"
R103	ERD25TJ392	"	1	"
R105	ERD25TJ101	"	1	"
R106	ERD25TJ153	"	1	"
R107	ERD25TJ822	"	1	"
R108	ERD25TJ221	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R109	ERD25TJ102	Carbon Resistor	1	SD SUPPLY
R110	ERD25TJ104	"	1	"
R111	ERD25TJ682	"	1	"
R112	ERD25TJ182	"	1	"
R113	ERD25TJ472	"	1	"
R114	ERD25TJ273	"	1	"
R115	ERD25TJ682	"	1	"
R116	ERD25TJ101	"	1	"
R117	ERD25TJ224	"	1	"
R118	ERD25TJ471	"	1	"
R121	ERD25TJ223	"	1	"
R122	ERD25TJ273	"	1	"
R123	ERD25TJ474	"	1	"
R124	ERD25TJ333	"	1	"
R125	ERD25TJ153	"	1	"
R126	ERD25TJ222	"	1	"
R127	ERD25TJ103	"	1	"
R128	ERD25TJ154	"	1	"
R129	ERD25TJ474	"	1	"
R130	ERD25TJ102	"	1	"
R131	ERD25TJ472	"	1	"
R132	ERD25TJ332	"	1	"
R133	ERD25TJ182	"	1	"
R134	ERD25TJ102	"	1	"
R135	ERD25TJ184	"	1	"
R136	ERD25TJ101	"	1	"
R137	ERD25TJ154	"	1	"
R138	ERD25TJ273	"	1	"
R139	ERD25TJ822	"	1	"
R140	ERD25TJ152	"	1	"
R141	ERD25TJ472	"	1	"
R142	ERD25TJ332	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R143	ERD25TJ273	Carbon Resistor	1	SD SUPPLY
R144	ERD25TJ103	"	1	"
R145	ERD25TJ334	"	1	"
R146	ERD25TJ823	"	1	"
R147	ERD25TJ153	"	1	"
R148	ERD25TJ562	"	1	"
R149	ERD25TJ472	"	1	"
R150	ERD25TJ222	"	1	"
R151	ERD25TJ123	"	1	"
R152, 153	ERD25TJ102	"	2	"
R154	ERD25TJ101	"	1	"
R155	ERD25TJ393	"	1	"
R156	ERD25TJ823	"	1	"
R157, 158	ERD25TJ100	"	2	"
R159	ERD25TJ152	"	1	"
R160	ERD25TJ151	"	1	"
R161	ERD25TJ330	"	1	"
R162	ERD25TJ100	"	1	"
R163	ERD25TJ181	"	1	"
R164	ERD25TJ680	"	1	"
R165	ERD25TJ330	"	1	"
R166	ERD25TJ271	"	1	"
R171	ERD25TJ154	"	1	"
R172	ERD25TJ101	"	1	"
R173	ERD25TJ153	"	1	"
R174	ERD25TJ123	"	1	"
R175	ERD25TJ470	"	1	"
R176	ERD25TJ104	"	1	"
R177	ERD25TJ103	"	1	"
R178	ERD25TJ222	"	1	"
R179	ERD25TJ332	"	1	"
R180	ERD25TJ394	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R181	ERD25TJ471	Carbon Resistor	1	SD SUPPLY
R182	ERD25TJ683	"	1	"
R183	ERD25TJ101	"	1	"
R184	ERD25TJ822	"	1	"
R185	ERD25TJ474	"	1	"
R186	ERD25TJ682	"	1	"
R187	ERD25TJ472	"	1	"
R188	ERD25TJ102	"	1	"
R190	ERD25TJ101	"	1	"
R191	ERG1ANJ471	Metal-oxide Resistor	1	"
R192	ERD25TJ273	Carbon Resistor	1	"
R193, 194	ERD25TJ271	"	2	"
R195	ERD25TJ153	"	1	"
R197	ERD25TJ104	"	1	"
R201, 202	ERD25TJ471	"	2	"
R203	ERD25TJ392	"	1	"
R205	ERD25TJ101	"	1	"
R206	ERD25TJ153	"	1	"
R207	ERD25TJ822	"	1	"
R208	ERD25TJ221	"	1	"
R209	ERD25TJ102	"	1	"
R210	ERD25TJ104	"	1	"
R211	ERD25TJ682	"	1	"
R212	ERD25TJ182	"	1	"
R213	ERD25TJ472	"	1	"
R214	ERD25TJ273	"	1	"
R215	ERD25TJ682	"	1	"
R216	ERD25TJ101	"	1	"
R217	ERD25TJ224	"	1	"
R221	ERD25TJ223	"	1	"
R222	ERD25TJ273	"	1	"
R223	ERD25TJ474	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R224	ERD25TJ333	Carbon Resistor	1	SD SUPPLY
R225	ERD25TJ153	"	1	"
R226	ERD25TJ222	"	1	"
R227	ERD25TJ103	"	1	"
R228	ERD25TJ154	"	1	"
R229	ERD25TJ474	"	1	"
R230	ERD25TJ102	"	1	"
R231	ERD25TJ472	"	1	"
R236	ERD25TJ101	"	1	"
R237	ERD25TJ154	"	1	"
R238	ERD25TJ273	"	1	"
R239	ERD25TJ822	"	1	"
R240	ERD25TJ152	"	1	"
R241	ERD25TJ472	"	1	"
R242	ERD25TJ332	"	1	"
R243	ERD25TJ273	"	1	"
R244	ERD25TJ103	"	1	"
R245	ERD25TJ334	"	1	"
R246	ERD25TJ823	"	1	"
R247	ERD25TJ153	"	1	"
R248	ERD25TJ562	"	1	"
R249	ERD25TJ472	"	1	"
R250	ERD25TJ222	"	1	"
R251	ERD25TJ123	"	1	"
R252, 253	ERD25TJ102	"	1	"
R254	ERD25TJ101	"	1	"
R255	ERD25TJ393	"	1	"
R256	ERD25TJ823	"	1	"
R257, 258	ERD25TJ100	"	1	"
R259	ERD25TJ152	"	2	"
R260	ERD25TJ151	"	1	"
R261	ERD25TJ330	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R262	ERD25TJ100	Carbon Resistor	1	SD SUPPLY
R266	ERD25TJ271	"	1	"
R271	ERD25TJ154	"	1	"
R272	ERD25TJ101	"	1	"
R273	ERD25TJ153	"	1	"
R274	ERD25TJ123	"	1	"
R275	ERD25TJ470	"	1	"
R276	ERD25TJ104	"	1	"
R277	ERD25TJ103	"	1	"
R278	ERD25TJ222	"	1	"
R279	ERD25TJ332	"	1	"
R280	ERD25TJ394	"	1	"
R281	ERD25TJ471	"	1	"
R282	ERD25TJ683	"	1	"
R283	ERD25TJ101	"	1	"
R284	ERD25TJ822	"	1	"
R285	ERD25TJ474	"	1	"
R286	ERD25TJ682	"	1	"
R287	ERD25TJ472	"	1	"
R288	ERD25TJ102	"	1	"
R292	ERD25TJ273	"	1	"
R293, 294	ERD25TJ271	"	2	"
R297	ERD25TJ104	"	1	"
R301	ERG12ANJ560	Metal-oxide Resistor	1	"
R302, 303	ERD25TJ224	Carbon Resistor	2	"
R304	ERD25TJ102	"	1	"
R305	ERD25TJ821	"	1	"
R306, 307	ERD25TJ332	"	2	"
R308	ERD25TJ104	"	1	"
R309	ERD25TJ332	"	1	"
R310	ERD25TJ104	"	1	"
R311	ERD25TJ222	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R312	ERD25TJ103	Carbon Resistor	1	SD SUPPLY
R313	ERD25TJ154	"	1	"
R314	ERD25TJ474	"	1	"
R315	ERD25TJ153	"	1	"
R316	ERG12ANJ821	Metal-oxide Resistor	1	"
R317	ERD25TJ680	Carbon Resistor	1	"
R321	ERD25TJ271	"	1	"
R322	ERD25TJ332	"	1	"
R323	ERD25TJ103	"	1	"
R324	ERD25TJ223	"	1	"
R325	ERD25TJ103	"	1	"
R326	ERD25TJ683	"	1	"
R327	ERD25TJ474	"	1	"
R328	ERD25TJ103	"	1	"
R329	ERD25TJ152	"	1	"
R330	ERD25TJ474	"	1	"
R331	ERD25TJ822	"	1	"
R332	ERD25TJ474	"	1	"
R333	ERD25TJ103	"	1	"
R334, 335	ERD25TJ154	"	1	"
R336	ERD25TJ102	"	1	"
R337	ERD25TJ562	"	1	"
R338	ERD25TJ121	"	1	"
R341	ERD25TJ153	"	1	"
R342	ERD25TJ473	"	1	"
R343	ERD25TJ100	"	1	"
R344	ERD25TJ272	"	1	"
R345	ERD25TJ222	"	1	"
R346	ERD25TJ391	"	1	"
R347	ERD25TJ122	"	1	"
R351, 352, 353, 354, 355, 356, 357, 358, 359	ERD25TJ271	"	9	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R361, 362	ERD25TJ154	Carbon Resistor	2	SD SUPPLY
R363	ERD25TJ102	"	1	"
R364, 365	ERD25TJ222	"	2	"
R366	ERD25TJ152	"	1	"
R367	ERD25TJ182	"	1	"
R371	ERG12ANJ102	Metal-oxide Resistor	1	"
R372	ERD25TJ474	Carbon Resistor	1	"
R373	ERD25TJ392	"	1	"
R374	ERD25TJ271	"	1	"
R381, 382	ERD25TJ122	"	2	"
R384	ERD25TJ103	"	1	"
R385	ERD25TJ102	"	1	"
R401	ERG12ANJ560	Metal-oxide Resistor	1	"
R402, 403	ERD25TJ224	Carbon Resistor	2	"
R404	ERD25TJ102	"	1	"
R405	ERD25TJ821	"	1	"
R406, 407	ERD25TJ332	"	2	"
R408	ERD25TJ104	"	1	"
R409	ERD25TJ332	"	1	"
R410	ERD25TJ104	"	1	"
R411	ERD25TJ222	"	1	"
R412	ERD25TJ103	"	1	"
R413	ERD25TJ154	"	1	"
R414	ERD25TJ474	"	1	"
R415	ERD25TJ153	"	1	"
R416	ERG12ANJ821	Metal-oxide Resistor	1	"
R417	ERD25TJ680	Carbon Resistor	1	"
R421	ERD25TJ271	"	1	"
R422	ERD25TJ332	"	1	"
R423	ERD25TJ103	"	1	"
R424	ERD25TJ223	"	1	"
R425	ERD25TJ103	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R426	ERD25TJ683	Carbon Resistor	1	SD SUPPLY
R427	ERD25TJ474	"	1	"
R428	ERD25TJ103	"	1	"
R429	ERD25TJ152	"	1	"
R430	ERD25TJ474	"	1	"
R431	ERD25TJ822	"	1	"
R432	ERD25TJ474	"	1	"
R433	ERD25TJ103	"	1	"
R434, 435	ERD25TJ154	"	2	"
R436	ERD25TJ102	"	1	"
R437	ERD25TJ562	"	1	"
R438	ERD25TJ121	"	1	"
R451, 452, 453, 454, 455, 456, 457, 458, 459				
	ERD25TJ271	"	9	"
R461, 462	ERD25TJ154	"	2	"
R463	ERD25TJ102	"	1	"
R464, 465	ERD25TJ222	"	2	"
R466	ERD25TJ152	"	1	"
R467	ERD25TJ182	"	1	"
R471	ERG12ANJ102	Metal-oxide Resistor	1	"
R472	ERD25TJ474	Carbon Resistor	1	"
R473	ERD25TJ392	"	1	"
R474	ERD25TJ271	"	1	"
R481, 482	ERD25TJ122	"	1	"
R484	ERD25TJ103	"	1	"
R485	ERD25TJ102	"	1	"
R501	ERG1ANJ390	Metal-oxide Resistor	1	"
R502	ERD25TJ392	Carbon Resistor	1	"
R503	ERD25TJ681	"	1	"
R504	ERD25TJ272	"	1	"
R505	ERD25TJ471	"	1	"
R506	ERD25TJ821	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R507	ERD25TJ562	Carbon Resistor	1	SD SUPPLY
R508, 509	ERD25TJ100	"	2	"
R510	ERD25TJ472	"	1	"
R511, 512	ERD25TJ1R0	"	2	"
R514	ERD25TJ472	"	1	"
R515	ERD25TJ223	"	1	"
R516	ERD25TJ473	"	1	"
R517	ERD25TJ273	"	1	"
R521, 522	ERD25TJ122	"	2	"
R531	ERD25TJ392	"	1	"
R532, 533, 534				
	ERD25TJ473	"	3	"
R535, 536	ERD25TJ102	"	2	"
R537	ERD25TJ393	"	1	"
R538	ERD25TJ473	"	1	"
R540	ERD25TJ183	"	1	"
R541, 542	ERD25TJ123	"	2	"
R543, 544	ERD25TJ104	"	2	"
R545	ERD25TJ333	"	1	"
R600	ERX12ANJ1R0	Metal-oxide Resistor	1	"
R601	ERD25TJ223	Carbon Resistor	1	"
R602	ERG12ANJ821	Metal-oxide Resistor	1	"
R603	ERD25TJ392	Carbon Resistor	1	"
R604	ERD25TJ222	"	1	"
R605	ERD25TJ472	"	1	"
R606	ERD25TJ222	"	1	"
R607	ERG12ANJ561	Metal-oxide Resistor	1	"
R608	ERD25TJ103	Carbon Resistor	1	"
R609	ERD25TJ223	"	1	"
R610, 611	ERG12ANJ821	Metal-oxide Resistor	2	"
R612	ERD25TJ222	Carbon Resistor	1	"
R613	ERD25TJ472	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R614	ERD25TJ222	Carbon Resistor	1	SD SUPPLY
R615	ERD25TJ223	"	1	"
R616	ERD25TJ472	"	1	"
R617	ERG1ANJ332	Metal-oxide Resistor	1	"
R618	ERD25TJ101	"	1	"
R651	ERD25TJ472	Carbon Resistor	1	"
R652	ERD25TJ471	"	1	"
R653	ERD25TJ681	"	1	"
R654	ERF5Z221	Cement Resistor	1	
R655	ERD25TJ472	Carbon Resistor	1	SD SUPPLY
R656	ERD25TJ471	"	1	"
R657	ERD25TJ681	"	1	"
R658	ERF7Z680	Cement Resistor	1	
R701, 702, 703, 704				
	ERD25TJ103	Carbon Resistor	4	SD SUPPLY
R705, 706	ERD25TJ472	"	2	"
R707, 708	ERD25TJ152	"	2	"
R709, 710, 711, 712, 713, 714				
	ERD25TJ274	"	6	"
R715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726				
	ERG1ANJ181	Metal-oxide Resistor	12	"
R727, 728	ERD25TJ103	Carbon Resistor	1	"
R729, 730	ERX2ANJR47	Metal-oxide Resistor	2	"
R731, 732	ERD25TJ152	Carbon Resistor	2	"
R733, 734	ERD25TJ392	"	2	"
R735, 736	ERD25TJ223	"	2	"
R737, 738	ERD25TJ332	"	2	"
R739, 740	ERD25TJ153	"	2	"
R741, 742, 743, 744	ERD25TJ223	"	4	"
R745, 746	ERD25TJ682	"	2	"
R747, 748	ERD25TJ103	"	2	"
R749, 750	ERD25TJ333	"	2	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R791	ERD25TJ223	Carbon Resistor	1	SD SUPPLY
R792	ERD25TJ103	"	1	"
R793	ERD25TJ562	"	1	"
R794	ERD25TJ272	"	1	"
R795	ERG12ANJ271	Metal-oxide Resistor	1	"
R801, 802	ERD25TJ222	Carbon Resistor	2	"
R803, 804	ERD25TJ101	"	2	"
R805, 806	ERD25TJ333	"	2	"
R807, 808	ERD25TJ103	"	2	"
R809, 810	ERD25TJ272	"	2	"
R811, 812	ERD25TJ473	"	2	"
R813, 814	ERD25TJ103	"	2	"
R815, 816	ERD25TJ222	"	2	"
R817, 818	ERD25TJ473	"	2	"
R819, 820	ERD25TJ103	"	2	"
R821, 822	ERD25TJ222	"	2	"
R823, 824 825, 826	ERD25TJ153	"	4	"
R833, 834	ERD25TJ100	"	2	"
R835, 836	ERD25TJ103	"	2	"
R837, 838	ERD25TJ273	"	2	"
R839, 840	ERD25TJ473	"	2	"
R841, 842	ERD25TJ273	"	2	"
R843, 844	ERD25TJ272	"	2	"
R845, 846	ERD25TJ103	"	2	"
R847, 848	ERD25TJ273	"	2	"
R849, 850	ERD25TJ822	"	2	"
R851, 852	ERD25TJ272	"	2	"
R853, 854	ERD25TJ103	"	2	"
R855, 856	ERD25TJ822	"	2	"
R862	ERD25TJ394	"	1	"
R864	ERD25TJ823	"	1	"
R866	ERD25TJ273	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R869, 870	ERD25TJ224	Carbon Resistor	2	SD SUPPLY
R881	ERD25TJ103	"	1	"
R882	ERD25TJ184	"	1	"
R883	ERD25TJ473	"	1	"
R884, 885	ERD25TJ273	"	2	"
R886	ERD25TJ272	"	1	"
R887	ERD25TJ103	"	1	"
R888	ERD25TJ272	"	1	"
R889	ERD25TJ103	"	1	"
R890, 891	ERD25TJ273	"	2	"
R892	ERD25TJ272	"	1	"
R893, 896	ERD25TJ103	"	2	"
R897	ERD25TJ473	"	1	"
R898	ERD25TJ273	"	1	"
R901, 902	ERD25TJ102	"	2	"
R903	ERD25TJ473	"	1	"
R904	ERD25TJ331	"	1	"
R905	ERD25TJ223	"	1	"
R906	ERD25TJ333	"	1	"
R907	ERD25TJ472	"	1	"
R908	ERD25TJ561	"	1	"
R909	ERD25TJ102	"	1	"
R910	ERD25TJ183	"	1	"
R911	ERD25TJ103	"	1	"
R912, 913	ERD25TJ223	"	2	"
R914	ERD25TJ102	"	1	"
R915	ERD25TJ105	"	1	"
R916	ERD25TJ561	"	1	"
R917	ERD25TJ152	"	1	"
R918, 919	ERD25TJ472	"	2	"
R920	ERD25TJ223	"	1	"
R921	ERD25TJ332	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R922	ERD25TJ103	Carbon Resistor	1	SD SUPPLY
R923	ERD25TJ223	"	1	"
R924	ERD25TJ332	"	1	"
R925, 926, 927	ERD25TJ103	"	3	"
R928	ERD25TJ223	"	1	"
R929	ERD25TJ823	"	1	"
R930	ERD25TJ102	"	1	"
R932	ERD25TJ330	"	1	"
R933	ERD25TJ474	"	1	"
R934	ERD25TJ102	"	1	"
R935	ERD25TJ153	"	1	"
R936	ERD25TJ473	"	1	"
R937	ERD25TJ222	"	1	"
R938	ERD25TJ820	"	1	"
R939	ERD25TJ221	"	1	"
R940	ERD25TJ102	"	1	"
R941	ERD25TJ124	"	1	"
R942	ERO25CKF1003	Metal-oxide Resistor	1	
R943	ERD25TJ472	Carbon Resistor	1	SD SUPPLY
R944	ERD25TJ102	"	1	"
R945, 946	ERD25TJ103	"	2	"
R945, 946	ERD25TJ103	"	2	"
R947	ERD25TJ331	"	1	"
R948	ERD25TJ106	"	1	"
R949	ERD25TJ103	"	1	"
R950	ERD25TJ820	"	1	"
R951	ERD25TJ223	"	1	"
R952, 953	ERD25TJ103	"	2	"
R954	ERD25TJ472	"	1	"
R955	ERD25TJ103	"	1	"
R956	ERD25TJ102	"	1	"
R957	ERD25TJ123	"	1	"
R958	ERD25TJ330	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R959	ERD25TJ474	Carbon Resistor	1	SD SUPPLY
R960	ERD25TJ102	"	1	"
R961	ERD25TJ153	"	1	"
R962	ERD25TJ394	"	1	"
R963	ERG1ANJ331	Metal-oxide Resistor	1	"
R971	ERD25TJ562	Carbon Resistor	1	"
R972	ERD25TJ272	"	1	"
R973	ERD25TJ223	"	1	"
R974	ERD25TJ103	"	1	"
R975	ERD25TJ561	"	1	"
R976, 977	ERD25TJ332	"	2	"
R978, 979 980	ERD25TJ104	"	3	"
R981	ERD25TJ103	"	1	"
R982	ERD25TJ152	"	1	"
R983	ERX1ANJ2R2	Metal-oxide Resistor	1	"
R984	ERD25TJ151	Carbon Resistor	1	"
R985	ERD25TJ152	"	1	"
R986	ERD25TJ562	"	1	"
R987	ERD25TJ182	"	1	"
R988, 989	ERD25TJ103	"	2	"
R990	ERD25TJ823	"	1	"
R991, 992	ERD25TJ103	"	2	"
R993, 994	ERD25TJ562	"	2	"
R995, 996	ERD25TJ332	"	2	"
R997	ERD25TJ271	"	1	"
R998	ERD25TJ273	"	1	"
R999	ERD25TJ271	"	1	"
R1000	ERD25TJ393	"	1	"
R1001	ERD25TJ122	"	1	"
R1002	ERD25TJ822	"	1	"
R1003	ERD25TJ104	"	1	"
R1004, 1005	ERD25TJ103	"	2	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R1006	ERD25TJ473	Carbon Resistor	1	SD SUPPLY
R1007, 1008	ERD25TJ103	"	2	"
R1009	ERD25TJ153	"	1	"
R1010	ERD25TJ472	"	1	"
R1011	ERD25TJ122	"	1	"
R1012	ERD25TJ332	"	1	"
R1013	ERD25TJ682	"	1	"
R1014, 1015	ERD25TJ103	"	2	"
R1051, 1052	ERD25TJ473	"	2	"
R1053	ERD25TJ104	"	1	"
R1054, 1055	ERD25TJ473	"	2	"
R1056	ERD25TJ104	"	1	"
R1061	ERD25TJ221	"	1	"
R1062	ERD25TJ471	"	1	"
R1063	ERD25TJ103	"	1	"
R1064	ERD25TJ221	"	1	"
R1065	ERD25TJ473	"	1	"
R1066	ERD25TJ102	"	1	"
R1067, 1068, 1069, 1070, 1071	ERD25TJ103	"	5	"
R1072, 1073	ERD25TJ472	"	2	"
R1074	ERD25TJ272	"	1	"
R1075	ERD25TJ103	"	1	"
R1801	ERD25TJ471	"	1	"
R1802	ERD25TJ331	"	1	"
R1803	ERD25TJ103	"	1	"
R1804	ERD25TJ153	"	1	"
R1805	ERD25TJ223	"	1	"
R1806	ERD25TJ103	"	1	"
R1810	ERD25TJ102	"	1	"
R1811, 1812	ERD25TJ393	"	2	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
		VARIABLE RESISTORS		
VR101	EVLS3AA00B15	Semi-fixed Variable Resistor	1	
VR102, 103, 202, 203				
	EWF3BAR30A24	Variable Resistor	4	
VR104	EVLS3AA00B54	Semi-fixed Variable Resistor	1	
VR105	EVLS3AA00B53	"	1	
VR106	EVLS3AA00B24	"	1	
VR107, 207	EWFFWAR30A24	Variable Resistor	2	
VR108	EVLS3AA00B52	Semi-fixed Variable Resistor	1	
VR109	EVNK4AA00B25	"	1	
VR110	EVHF2A207G54	Variable Resistor	1	
VR201	EVLS3AA00B15	Semi-fixed Variable Resistor	1	
VR204	EVLS3AA00B54	"	1	
VR205	EVLS3AA00B53	"	1	
VR206	EVLS3AA00B24	"	1	
VR208	EVLS3AA00B52	"	1	
VR209	EVNK4AA00B25	"	1	
VR210	EVHF2A207G54	Variable Resistor	1	
VR501	EVLS3AA00B14	Semi-fixed Variable Resistor	1	
VR502, 503	EVLS3AA00B53	"	2	
VR504, 505	EVLS3AA00B24	"	2	
VR506	EVLS3AA00B53	"	1	
VR507, 508	EVLS0AA00B15	"	2	
VR509	EVLS0AA00B53	"	1	
VR510, 511	EVHF2A207A54	Variable Resistor	2	
VR601, 602	EVNK4AA00B13	"	2	
VR801, 802	EVNK0AA00B15	"	2	
VR901	EVLS0AA00B54	"	1	
VR902, 903	QVKF25B24	"	1	
VR904	EVLS0AA00B24	Semi-fixed Variable Resistor	1	
VR905	EVLS0AA00B54	"	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
		CAPACITORS		
C1, 2, 3, 4, 5, 6				
	ECKD1H103ZF	Ceramic Capacitor	6	
C7	ECSZ25AF4R7	Tantalum Capacitor	1	
C8, 9, 10, 11, 12, 13, 14, 15				
	ECKD1H103ZF	Ceramic Capacitor	8	
C16	ECEA16Z22	Electrolytic Capacitor	1	SD SUPPLY
C17	ECEA1ES470	"	1	"
C18, 19	ECEA1HS100	"	2	"
C20	ECEA1AS101	"	1	"
C21, 22	ECQM05683KZ	Ceramic Capacitor	2	
C23	ECEA50Z2R2	Electrolytic Capacitor	1	SD SUPPLY
C24	ECEA16Z10	"	1	"
C25	ECEA50Z3R3	"	1	"
C26	ECQM05104KZ	Ceramic Capacitor	1	
C27	ECEA1AS221	Electrolytic Capacitor	1	SD SUPPLY
C101	ECSZ25AF1	Tantalum Capacitor	1	
C102	ECEA1HS100	"	1	SD SUPPLY
C103	ECCD1H101K	Ceramic Capacitor	1	
C104	ECEA1AS101	Electrolytic Capacitor	1	SD SUPPLY
C105	ECCD1H101K	Ceramic Capacitor	1	
C106	ECEA1CS330	Electrolytic Capacitor	1	SD SUPPLY
C107	ECKD1H471KB	Ceramic Capacitor	1	
C108	ECEA1CS330	Electrolytic Capacitor	1	SD SUPPLY
C109	ECEA1HS100	"	1	"
C110	ECEA1ES101	"	1	"
C111	ECCD1H101K	Ceramic Capacitor	1	
C113	ECEA25N3R3	Electrolytic Capacitor	1	SD SUPPLY
C114	ECEA1AS101	"	1	"
C115	ECEA1HS100	"	1	"
C116, 121	ECEA1HS100	"	2	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C122	ECEA1ES101	Electrolytic Capacitor	1	SD SUPPLY
C123	ECCD1H101K	Ceramic Capacitor	1	
C124	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C125	ECQM05332JZ	Mylar Capacitor	1	
C126	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C127	ECEA1CS330	"	1	"
C128	ECQS1681JZ	Strol Capacitor	1	
C129	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C130	ECCD1H101K	Ceramic Capacitor	1	
C131	ECQM05104JZ	Mylar Capacitor	1	
C132	ECEA1AS331	Electrolytic Capacitor	1	SD SUPPLY
C133, 134	ECEA1HS100	"	2	"
C135	ECQM05182KZ	Mylar Capacitor	1	
C136	ECQM05822JZ	"	1	
C137	ECQM05562JZ	"	1	
C138	ECQM05332JZ	"	1	
C139	ECQM05183JZ	"	1	
C140	ECQM05153JZ	"	1	
C141	ECQM05123JZ	"	1	
C142	ECQM05333JZ		1	
C143	ECQM05273JZ	"	1	
C144	ECQM05223JZ	"	1	
C146, 147	ECCD1H101K	Ceramic Capacitor	2	
C151	ECEA50M1	Electrolytic Capacitor	1	SD SUPPLY
C152	ECEA1HS100	"	1	"
C153	ECCD1H101K	Ceramic Capacitor	1	
C154	ECEA1AS331	Electrolytic Capacitor	1	SD SUPPLY
C155	ECCD1H470KC	Ceramic Capacitor	1	
C156	ECEA1CS330	Electrolytic Capacitor	1	SD SUPPLY
C157	ECKD1H471KB	Ceramic Capacitor	1	
C158	ECEA1CS330	Electrolytic Capacitor	1	SD SUPPLY
C159	ECEA1HS100	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C160	ECEA1ES101	Electrolytic Capacitor	1	SD SUPPLY
C161	ECQM05682JZ	Mylar Capacitor	1	
C162	ECQM05473JZ	"	1	
C163	ECKD1H471KB	Ceramic Capacitor	1	
C164	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C170	ECEA1ES101	"	1	"
C171	ECEA1HS100	"	1	"
C172	ECEA2AS010	"	1	"
C173	ECCD1H470KC	Ceramic Capacitor	1	
C174	ECKD1H102ZF	"	1	
C175	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C176	ECQM05182KZ	Mylar Capacitor	1	
C177	ECEA2AS010	Electrolytic Capacitor	1	SD SUPPLY
C178	ECEA1CS330	"	1	"
C179	ECEA2AS010	"	1	"
C180	ECEA1ES470	"	1	"
C181	ECCD1H101K	Ceramic Capacitor	1	
C182	ECKD1H102PF	"	1	
C183	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C184	ECEA1CS471	"	1	"
C185	ECCD1H101K	Ceramic Capacitor	1	
C186	ECCD1H101K	"	1	
C187	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C188	ECQM05102KZ	Semi-conductor Capacitor	1	
C189	ECEA2AS3R3	Electrolytic Capacitor	1	SD SUPPLY
C190	ECQM05103KZ	Mylar Capacitor	1	
C191	ECKD1H223ZF	Ceramic Capacitor	1	
C193, 194	ECEA1HS100	Electrolytic Capacitor	2	SD SUPPLY
C195	ECQM05473KZ	Mylar Capacitor	1	
C197	ECQM05103KZ	"	1	
C198	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C201	ECSZ25AF1	Tantalum Capacitor	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C202	ECEA1HS100	Tantalum Capacitor	1	SD SUPPLY
C203	ECCD1H101K	Ceramic Capacitor	1	
C204	ECEA1AS101	Electrolytic Capacitor	1	SD SUPPLY
C205	ECCD1H101KC	Ceramic Capacitor	1	
C206	ECEA1CS330	Electrolytic Capacitor	1	SD SUPPLY
C207	ECKD1H471KB	Ceramic Capacitor	1	
C208	ECEA1CS330	Electrolytic Capacitor	1	SD SUPPLY
C209	ECEA1HS100	"	1	"
C210	ECEA1ES101	"	1	"
C211	ECCD1H101K	Ceramic Capacitor	1	
C213	ECEA25N3R3	Electrolytic Capacitor	1	SD SUPPLY
C214	ECEA1HS100	"	1	"
C215	ECEA1HS100	"	1	"
C216, 221	ECEA1HS100	"	2	"
C222	ECEA1ES101	"	1	"
C223	ECCD1H101K	Ceramic Capacitor	1	
C224	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C225	ECQM05332JZ	Mylar Capacitor	1	
C226	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C227	ECEA1CS330	"	1	"
C228	ECQS1681JZ	Strol Capacitor	1	
C229	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C230	ECCD1H101K	Ceramic Capacitor	1	
C231	ECQM05104JZ	Mylar Capacitor	1	
C232	ECEA1AS331	Electrolytic Capacitor	1	SD SUPPLY
C233, 234	ECEA1HS100	"	2	"
C235	ECQM05182KZ	Mylar Capacitor	1	
C236	ECQM05822JZ	"	1	
C237	ECQM05562JZ	"	1	
C238	ECQM05332JZ	"	1	
C239	ECQM05183JZ	"	1	
C240	ECQM05153JZ	"	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C241	ECQM05123JZ	Mylar Capacitor	1	
C242	ECQM05333JZ	"	1	
C243	ECQM05273JZ	"	1	
C244	ECQM05223JZ	"	1	
C246, 247	ECCD1H101K	Ceramic Capacitor	2	
C251	ECEA50M1	Electrolytic Capacitor	1	SD SUPPLY
C252	ECEA1HS100	"	1	"
C253	ECCD1H101K	Ceramic Capacitor	1	
C254	ECEA1AS331	Electrolytic Capacitor	1	SD SUPPLY
C255	ECCD1H470KC	Ceramic Capacitor	1	
C256	ECEA1CS330	Electrolytic Capacitor	1	SD SUPPLY
C257	ECKD1H471KB	Ceramic Capacitor	1	
C258	ECEA1CS330	Electrolytic Capacitor	1	SD SUPPLY
C259	ECEA1HS100	"	1	"
C260	ECEA1ES101	"	1	"
C261	ECQM05692JZ	Mylar Capacitor	1	
C262	ECQM05473JZ	"	1	
C263	ECKD1H471KB	Ceramic Capacitor	1	
C270	ECEA1ES101	Electrolytic Capacitor	1	SD SUPPLY
C271	ECEA1HS100	"	1	"
C272	ECEA2AS010	"	1	"
C273	ECCD1H470KC	Ceramic Capacitor	1	
C274	ECKD1H102K	"	1	
C275	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C276	ECQM05182KZ	Mylar Capacitor	1	
C277	ECEA2AS010	Electrolytic Capacitor	1	SD SUPPLY
C278	ECEA1CS330	"	1	"
C279	ECEA2AS010	"	1	"
C280	ECEA1ES470	"	1	"
C281	ECCD1H101KD	Ceramic Capacitor	1	
C282	ECKD1H102PF	"	1	
C283	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C501	ECEA1HS470	Electrolytic Capacitor	1	SD SUPPLY
C502	ECQM05393KZ	Mylar Capacitor	1	
C503, 504	ECCD1H470KC	Ceramic Capacitor	2	
C505, 506	ECQF4223KZH	"	2	
C507	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C508	ECQM05104KZ	Mylar Capacitor	1	
C509	ECQF6562KZH	"	1	
C510, 511	ECQS1331JZ	Strol Capacitor	2	
C512	ECKD1H103PF	Ceramic Capacitor	1	
C514	ECQM05104MZ	Mylar Capacitor	1	
C521	ECEA1HS100	Electrolytic Capacitor	1	
C522, 523	ECQM05473MZ	Mylar Capacitor	2	
C524	ECEA50MR22	Electrolytic Capacitor	1	SD SUPPLY
C525	ECCD1H100KC	Ceramic Capacitor	1	
C526	ECCD1H330KC	"	1	
C527, 528	ECQF6152KZH	Polypropylene Capacitor	2	
C531	ECQM05102KZ	Mylar Capacitor	1	
C601	ECET50R2200S	Electrolytic Capacitor	1	
C602	ECEA1HS470		1	SD SUPPLY
C603	ECEA1CS331	"	1	"
C604	ECKD1H103PF	Ceramic Capacitor	1	
C605	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C606	ECEA1ES221	"	1	"
C607	ECEA2AS010	"	1	"
C608	ECEA1ES101	"	1	"
C609	ECET50R2200	"	1	
C610	ECEA1HS470	"	1	SD SUPPLY
C611	ECEA2AS010	"	1	"
C612	ECKD1H103PF	Ceramic Capacitor	1	
C614	ECEA1ES331	Electrolytic Capacitor	1	SD SUPPLY
C615	ECEA1VS102	"	1	"
C617	ECEA2AS010	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C285,286	ECCD1H101K	Ceramic Capacitor	2	
C287	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C288	ECQM05102KZ	Mylar Capacitor	1	
C289	ECEA2AS3R3	Electrolytic Capacitor	1	SD SUPPLY
C293,294	ECEA1HS100	"	2	"
C297	ECQM05103KZ	Mylar Capacitor	1	
C301	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C302	ECCD1H470KC	Ceramic Capacitor	1	
C303	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C304,305	ECQM05682JZ	Mylar Capacitor	2	
C321	ECEA2AS010	Electrolytic Capacitor	1	SD SUPPLY
C322	ECCD1H101K	Ceramic Capacitor	1	
C323	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C324	ECKD1H102ZF	Ceramic Capacitor	1	
C325	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C326	ECKD1H102ZF	Ceramic Capacitor	1	
C327	ECEA1AS101	Electrolytic Capacitor	1	SD SUPPLY
C328, 329	ECEA1HS100	"	2	"
C330	ECCD1H101K	Ceramic Capacitor	1	
C332	ECQM05102KZ	Mylar Capacitor	1	
C401	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C402	ECCD1H470KC	Ceramic Capacitor	1	
C403	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C404,405	ECQM05682JZ	Mylar Capacitor	2	
C421	ECEA2AS010	Electrolytic Capacitor	1	SD SUPPLY
C422	ECCD1H101K	Ceramic Capacitor	1	
C423	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C424	ECKD1H102ZF	Ceramic Capacitor	1	
C425	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C426	ECKD1H102ZF	Ceramic Capacitor	1	
C427	ECEA1AS101	Electrolytic Capacitor	1	SD SUPPLY
C428,429	ECEA1HS100	"	2	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C617	ECEA1AS221	Electrolytic Capacitor	1	SD SUPPLY
C651	ECEA1HS100	"	1	"
C652	ECEA1CS330	"	1	"
C701, 702, 703, 704, 705, 706				
	ECQM05473KZ	Semi-conductor Capacitor	6	
C707, 708	ECQM05103KZ	"	2	
C709, 710	ECQM05683KZ	"	2	
C711, 712, 713, 714, 715, 716				
	ECEA25N10	Electrolytic Capacitor (Non Polarity)	6	SD SUPPLY
C717, 718	ECQM05102KZ	Semi-conductor Capacitor	2	
C719, 720	ECCD1H101K	Ceramic Capacitor	2	
C791	ECCD1H221K	"	1	
C792	ECQM05153KZ	Semi-conductor Capacitor	1	
C803, 804, 805, 806				
	ECQM05683KZ	"	4	
C807, 808	ECEA2AS010	Electrolytic Capacitor	2	SD SUPPLY
C809, 810	ECEA1HS100	"	2	"
C811, 812	ECEA2AS010	"	2	"
C813, 814	ECEA25Z4R7		2	"
C815, 816	ECEA1CS330	"	2	"
C818	ECEA1JS4R7	"	1	"
C881	ECEA1CS330	"	1	"
C882	ECEA1AS101	"	1	"
C883	ECEA25Z4R7	"	1	"
C901	ECQM05333KZ	Semi-conductor Capacitor	1	
C902	ECEA1JS4R7	Electrolytic Capacitor	1	SD SUPPLY
C903	ECEA1HS100	"	1	"
C905	ECQM05102KZ	Semi-conductor Capacitor	1	
C906	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C907	ECEA1CS330	"	1	"
C908	ECQM05104KZ	Mylar Capacitor	1	
C909	ECQM05223KZ	Semi-conductor Capacitor	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C910	ECQM05472KZ	Semi-conductor Capacitor	1	
C911	ECQM05102KZ	"	1	
C912	ECKD1H471KB	Ceramic Capacitor	1	
C913	ECQM05563JZ	Mylar Capacitor	1	
C914	ECQM05332KZ	"	1	
C915	ECQM05333JZ	"	1	
C916, 917	ECQM05823JZ	"	2	
C918	ECQM05103KZ	Semi-conductor Capacitor	1	
C919, 920	ECCD1H220KC	Ceramic Capacitor	2	
C921, 922	ECQM05473KZ	Semi-conductor Capacitor	2	
C923	ECEA50ZR33	Electrolytic Capacitor	1	SD SUPPLY
C924	ECEA1CS330	"	1	"
C925	ECQM05103KZ	Mylar Capacitor	1	
C927, 928	ECQM05103KZ	Semi-conductor Capacitor	2	
C931	ECQM05822KZ	"	1	
C932	ECCD1H221K	Ceramic Capacitor	1	
C933	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C934, 935 936	ECEA50ZR22	"	3	"
C937, 938, 939	ECEA50N1	Electrolytic Capacitor (Non Polarity)	3	"
C943	ECKD1H471KB	Ceramic Capacitor	1	
C944	ECQM05102KZ	Semi-conductor Capacity	1	
C945	ECQM05333KZ	"	1	
C946	ECQM05103KZ	"	1	
C947	ECQM05333KZ	"	1	
C1001	ECEA1HS100	Electrolytic Capacitor	1	SD SUPPLY
C1002, 1003	ECKD1H103ZF	Ceramic Capacitor	2	
C1004	ECEA1AS101	Electrolytic Capacitor	1	SD SUPPLY
C1005	ECEA1HS100	"	1	"
C1006	ECEA1AS221	"	1	"

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
		COMBINATION PART		
Z601	QCRFWR1	Combination Part	1	
Z602	ECQJ0187	Spark Killer	1	
		TRANSISTORS		
Tr1, 2, 3	2SA719 (R)	Transistor	3	
Tr4, 5, 6, 7, 8				
	2SC828 (S)	"	5	
Tr9	2SC1317 (S)	"	1	
Tr10, 11, 12	2SC828 (S)	"	3	
Tr13	2SC1317 (R)	"	1	
Tr14	2SC828	"	1	
Tr15, 16	2SA564 (S)	"	2	
Tr17	2SC828 (S)	"	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	
Tr30	2SC1317 (R)	"	1	
Tr31, 32, 33				
	2SC828 (S)	"	3	
Tr101,102	2SC1327(U)	"	2	
Tr103	2SC1684(S)		1	
Tr104	2SK30A(R)	"	1	
Tr105	2SC1684	"	1	
Tr106	2SC1317(S)	"	1	
Tr107	2SA564(S)	"	1	
Tr108	2SC828(S)	"	1	
Tr109	2SC1684(S)	"	1	
Tr110	2SC828(S)	"	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
Tr111, 112	2SC1684(S)	Transistor	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				
	2SC828(S)	"	3	
Tr136, 137, 138				
	2SC1684(S)	"	3	
Tr140, 141	2SC828(S)	"	2	
Tr142	2SA564(S)	"	1	
Tr143	2SC828(S)	"	1	
Tr144	2SC1684(S)	"	1	
Tr201, 202	2SC1327(U)	"	2	
Tr203	2SC1684(S)	"	1	
Tr204	2SK30A(R)	"	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	
Tr214	2SA683(R)	"	1	
Tr215, 216, 217, 218, 219, 220, 221, 222, 223				
	2SC828(S)	"	9	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
Tr224, 225	2SC1327(U)	Transistor	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	2SC828(S)	"	3	
Tr236, 237, 238	2SC1684(S)	"	3	
Tr243	2SC828(S)	"	1	
Tr244	2SC1684(S)	"	1	
Tr501	2SC1407(R)	"	1	
Tr502, 503	2SC828(S)	"	2	
Tr504, 505	2SC1407(R)	"	2	
Tr506, 507	2SC828(S)	"	2	
Tr508	2SK30(R)	"	1	
Tr601	2SD334	"	1	
Tr602	2SC1383	"	1	
Tr603	2SC1684	"	1	
Tr604	2SC1846Q	"	1	
Tr605	2SD334	"	1	
Tr606	2SC1407	"	1	
Tr607	2SC1317(S)	"	1	
Tr608	2SB512(O)	"	1	
Tr609, 651	2SC828(S)	"	2	
Tr652	2SC1848	"	1	
Tr653	2SC1384	"	1	
Tr654	2SC828(S)	"	1	
Tr655	2SC1848	"	1	
Tr656	2SC1384	"	1	
Tr701, 702, 703, 704	2SA564(T)	"	4	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
Tr705, 706, 707, 708, 709, 710	2SA722(U)	Transistor	6	
Tr711, 712, 713, 714, 715, 716	2SC1383(S)	"	6	
Tr717, 718, 719, 720, 721, 722	2SB512(O)	"	6	
Tr723, 724, 725, 726, 727, 728	2SC1328(U)	"	6	
Tr729, 730, 731, 732, 733, 734	2SA683(S)	"	6	
Tr735, 736, 737, 738, 739, 740, 741, 742	2SD389(O)	"	8	
Tr743, 744, 745, 746	2SA564(T)	"	4	
Tr747, 748, 749, 750	2SC828(T)	"	4	
Tr751, 752, 753, 754	2SA564(T)	"	4	
Tr791, 792, 801, 802, 803, 804, 805, 806, 807, 808	2SC828(T)	"	10	
Tr809, 810	2SC1317(S)	"	2	
Tr811, 812, 813, 814	2SA564(T)	"	4	
Tr817, 818	2SC828(T)	"	2	
Tr819, 820	2SA564(T)	"	2	
Tr821, 822, 823, 824	2SC828(T)	"	4	
Tr825, 826, 827, 828, 832	2SA564(T)	"	5	
Tr881	2SC1317(S)	"	1	
Tr882, 883, 884	2SA564(T)		3	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
Tr885	2SC828(T)	Transistor	1	
Tr901	2SC1327(U)	"	1	
Tr902	2SC828(T)	"	1	
Tr903	2SA798(H)	"	1	
Tr904, 905, 906		"		
	2SC828(T)	"	3	
Tr907	2SA719(S)	"	1	
Tr908, 909	2SK66(Q)	FET	2	
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				
	2SC1328(U)	"	3	
Tr937, 938, 939				
	2SA885Q	"	3	
Tr940, 941, 942				
	2SA722(U)	"	3	
Tr943, 944, 945				
	2SC1846Q	"	3	
Tr946	2SA564(T)	"	1	
Tr947	2SC828(T)	"	1	
Tr948, 949, 950				
	2SA564(T)	"	3	
Tr951, 952, 953, 954, 955				
	2SC828(T)	"	5	
Tr956, 957	2SA564(T)	"	2	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
Tr958	2SC828(T)	Transistor	1	
Tr959, 960, 961, 962				
	2SA564(T)	"	4	
Tr1001	2SC828(T)	"	1	
Tr1002	2SC1317(S)	"	1	
Tr1003, 1801, 1802				
	2SC828(T)	"	3	
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				
	OA90M	Diode	25	
D26, 27	MA150	"	2	
D28	OA90M	"	1	
D29	SM102	"	1	
D101, 102, 103, 104, 106				
	MA150	"	5	
D107, 108, 109, 110				
	OA90M	"	4	
D111, 112	MA150	"	2	
D113, 114	LN26RPLCF	LED	2	
D201, 202	MA150	Diode	2	
D207, 208, 209, 210				
	OA90M	"	2	
D501	MA1056	"	1	
D502	OA90M	"	1	
D601	RVD10DC2	"	1	RD SUPPLY
D602,603	SR3AM2N	"	2	
D604	RVD10DC2	"	1	RD SUPPLY
D605	MA1062	"	1	
D606	MA1150	"	1	
D607	MA1062	"	1	
D608	SM102	"	1	
D609	MA1062	"	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
D621, 622, 623				
	SIB0102	Diode	3	
D651, 652	OA90M	"	2	
D701, 702, 703, 704, 705, 706, 707, 708, 801, 802, 803, 804, 805, 806, 808, 901, 902, 903				
	MA150	Diode	18	
D904	LN21	Illuminate Diode	1	
D905	MA150	Diode	1	
D906	MA1056	"	1	
D911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924				
	MA150	Diode	14	
D925	MZ203	"	1	
D926	MA1056	"	1	
D1001, 1002, 1003, 1004				
	OA90M	"	4	
D1801, 1802	MA150	"	2	
CRYSTAL				
X901	QZE0004	Crystal	1	
TRANSFORMERS				
T1	QLPW4FQL	Power Transformer	1	
T101	QLT2D10A	Headphone Transformer	1	
T102	QZE0019	Input Transformer	1	
T103	QLT2J30A	Output Transformer	1	
T201	QLT2D10A	Headphone Transformer	1	
T202	QZE0019	Input Transformer	1	
T203	QLT2J30A	Output Transformer	1	
T501	QLB0140	OSC Transformer	1	
COILS				
L101	QLH2008	Peaking Coil	1	
L102, 103	QLH2019	"	2	
L201	QLH2008	"	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
L202, 203	QLH2019	Peaking Coil	2	
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	
S6	QST4306A	EQ Selector Switch	1	
S7, 8	QST4208A	Record Mode ON/OFF Switch	2	
S9	QST2302A	Bias Selector Switch	1	
S10	QSW2219A	Meter Sensitivity Switch	1	
S11	QSW2218A	Mic ATT Switch	1	
S12	QSW2208AA	Timer Start Switch	1	
S13, 14, 15, 16, 17, 18				
	EVQPAR11K	Control Key Switch	6	
S19	QSS2211S	Playback Head Selector	1	
S20	QSR8301A	OSC Switch	1	
S21	QSR2201H	Playback EQ Switch	1	
S22, 23	QSS4212A	Input Selector/Load IMP Selector	2	
S24, 25	QSM0068	Shut OFF Switch	2	
S26	QSS1133	CUE ON/OFF Switch	1	
RELAY				
RL101	QSK0234	Relay	1	
JACKS				
J1, 2	QJA0250H	Microphone Jack	2	
J3	QJA0249H	Headphone Jack	1	
LAMPS				
PL1, 2	XAMQ35	VU Meter Lamp	2	
PL3, 4, 5	XAMQ34S50W	Lamp For Function Button	3	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
		INTEGRATED CIRCUITS		
IC1, 2, 3, 4, 5, 6, 7				
	M53200P	Integrated Circuit	7	
IC101,201	TA7220P	Integrated Circuit	2	
IC501	TA7506P	"	1	
IC901,902	M53273P	"	2	
IC903	M58432P	"	1	
IC1001	M53200P	"	1	
IC1002	M53203P	"	1	
		ELECTRICAL PARTS		
E1	QWY0021	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	QSL9013RNM	Level Meter	2	
E6	QMA2926	Back Side Angle	1	
E7	QMA3463	Side Angle-L	1	
E8	QMA3462	Side Angle-R	1	
E9	QMA2938	Mic and Meter Amp Sub-Holding Angle	1	
E10	QBS1107	P.C.B. Holding Wire	1	
E11	QNQ1039	Nut For VR	1	
E12	QNQ1070	Nut For Mic and Headphone Jack	1	
E13	QMA3147	Mic and Meter Switch Holding Angle	1	
E14	QEJ5001SM	LINE IN, OUT Jack Board Assembly	1	
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	
E20	XUC4FT	Stop Ring	1	
E21	QNQ1004	Nut For Speed and Pintch Control	1	
E22	QMA2941	P.C.B. Holding Angle-C	1	
E23	QMA2942	P.C.B. Holding Angle-D	2	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
E24	QMF1861	P.C.B. Holding Plate	1	
E25	QMA3148	P.C.B. Holding Angle	1	
E26	QTF1007	Fuse Holder	6	
E27	XBA2F10NU100	"	1	
E28	XBA1F20NU100	"	3	
E29	XBA1F40NU100	"	1	
E30	QMA3468	Power Source Board Angle	1	
E31	QMA3158	Power Source Board Holding Angle	1	
E32	QMA2946	Power Source Board Holding Angle-2	1	
E33	QJS0326	AC-IN Socket	1	
E34	QWQ1133	Washer	3	
E35	QFC1201M	AC Cord	1	
E36	QTD1129	AC Cord Bushing	1	
E37	QMA3465	Switch Angle	1	
E38	QMA3464	Main P.B. Holding Angle	2	
E39	XNS8	Nut 8	5	
E40	XWS8A	Washer 8	5	
E41	QJP1904JO	12 Pin Plug	2	
E42	QTW1118	Spark Killer Cover	1	
E43	QMA3150	Power Transformer Cover Angle	1	
E44	QMA3149	Power Transformer Angle	1	
E45	QMA2986	Connector Angle	1	
E46	QTH1131	Heat Shink	1	
E47	QJT1042	Contact	12	
E48	QBS1108	Clamper-A	1	
E49	QBS1109	Clamper-B	1	
E50	QJP1921TN	3 Pin Plug	12	
E51	QJP1922TN	6 Pin Plug	15	
E52	QJP1923TN	9 Pin Plug	3	
E53	QJP1924TN	12 Pin Plug	2	
E54	QJP1925TN	15 Pin Plug	1	
E55	QJS0776	2 Pin Housing	2	
E56	QJS1921TN	3 Pin Housing	18	
E57	QJS1922TN	6 Pin Housing	19	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
E58	QJS1923TN	9 Pin Housing	6	
E59	QJS1924TN	12 Pin Housing	1	
E60	QJS1925TN	15 Pin Housing	1	
E61	QJS0789JN	12 Pin Socket For Head	2	
E62	QJS0803X	12 Pin Socket	1	
E63	QJT1054	Contact	212	
E64	QJT1053	Contact For 12 Pin Connector	11	
E65	QJT1041	Flat Pin	36	
E67	QJS0754	6 Pin Mold Connector	2	
E68	QJT0080	6 Pin Connector Pin	12	
E69	QMA3210	Fuse Angle	1	
E70	QTF1034	Fuse Holder	2	
E71	QJT1040	Contact	4	
E72	QJP0804X	Balanced Type LINE OUT Terminal	2	
E73	QJS0804X	Balanced Type LINE IN Terminal	2	
E74	QJT1027	Earth Terminal Nut	1	
E75	QJT1025	Earth Terminal Shaft	1	
E76	QJT1026	Earth Terminal Seak	1	

CABINET PARTS

G1	QGC1066	Top Cover	1	
G2	QGC1067	Bottom Cover	1	
G3	QYP0683	Function Panel Assembly	1	
G4	QKS1248(L)	Side Board-L	1	
G5	QKS1249(R)	Side Board-R	1	
G6	QKS1247	Back Board	1	
G7	QMC0074	Sleeve	2	
G8	QKJ0178	Foot for Back Side	4	
G9	QMH2005	Foot Holder	2	
G10	QKA1053	Foot for Bottom Side	4	
G11	QYK0094	Function Panel Assembly	1	
G12	QYT0450	Lever Knob Assembly	6	
G13	QYT0413	Marker Knob Assembly	2	
G14	QYT0407	Volume Knob (D) Assembly	2	
G15	QYT0406	Volume Knob (C) Assembly	3	
G16	QYT0412	Knob (L) Assembly	1	
G17	QKJ0167	Spacer-A	4	
G18	QBJ1459	Spacer-B	1	
G19	QBP1712	Flat Spring	2	
G20	QBG1559	Stopper Rubber	1	
G21	QXB0492	Push Button	2	
G22	QGO1286A	"	1	
G23	QGO1287	"	1	
G24	QYT0411	Volume Knob For Speed	1	
G25	QYT0415	Volume Knob For Pitch Control	1	
G26	QYP0684	Button Panel Assembly	1	
G27	QBC1231	Button Spring	2	
G28	SBSA10S	Volume Knob-A	2	
G29	QYT0487	Volume Knob-B	4	
G30	QKJ0285	Spacer for Foot Holder	2	
G31	XSN4+30BVS	Screw +4×30	4	
G32	QGS2559	Name Plate	1	
G33	XSN4+10BVS	Screw ⊕ 4×10	6	
G34	QBJ3205	Ornament Washer	4	
G35	XSN4+20BVS	Screw ⊕ 4×20	4	
G36	XSN4+14BVS	Screw ⊕ 4×14	8	
G37	XSN4+8BVS	Screw ⊕ 4×8	4	
G38	XTV3+12BFZ	Screw ⊕ 3×12	4	
G39	XVE4C30FNS	Screw with Hexagon Hole	4	
G40	QBJ3299	Poly Washer	3	
G41	XUB16FP	Stop Ring	2	

ACCESSORIES

A1	RP023P	Connection Cord	2	
A2	QYQ0271	Reel Holder Assembly	2	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
A3	QFX0013	Head Cleaner	1	
A4	QYQ0273	Spacer for Reel Table	2	
A5	QGC1114	Pressure Roller Cover	1	
A6	QQT2329	Instruction Book	1	
		PACKINGS		
P1	QPN3737	Inside Carton	1	
P2	QPA0426	Inside Cushion-A	1	
P3	QPA0239	Inside Cushion-B	1	
P4	QPA0240	Inside Cushion-C	1	
P5	QPA0427	Inside Cushion-D	1	
P6	QPA0428	Inside Cushion-E	1	
P7	XZB50X58XA05	Poly Bag	1	