TC-D5PRO

E Model

STEREO CASSETTE-CORDER

SPECIFICATIONS

Power Requirements: 3 V dc, two batteries (size D) IEC designation R20

Battery Life: Approx. 4.5 hours with Eveready Alkaline Batteries No. E95
Approx. 1.5 hours with Sony Super Batteries SUM-1S

Dimensions: Approx. 237 (w) x 48 (h) x 168 (d) mm
9 3/8 (w) x 1 7/8 (h) x 6 5/8 (d) inches
including projecting parts and controls

Weight: Approx. 1.7 kg, 3 lb 12 oz
including batteries

Recording System: 4-track 2-channel stereo

Tape Speed Deviation: ± 1 %

Fast Winding Time: Approx. 150 sec. with Sony Cassette C-60

Operating Temperature: 0°C to 40°C (32°F – 104°F)

Frequency Response: DOLBY NR OFF

- With Ferri-Chrome Cassette
  (TAPE SELECT: TYPE III)
  40–16,000 Hz ± 3 dB (NAB)
  40–16,000 Hz (DIN)
- With CrO_2 type cassette
  40–15,000 Hz ± 3 dB (NAB)
  40–15,000 Hz (DIN)
- With standard cassette
  (TAPE SELECT: TYPE I)
  40–12,000 Hz ± 3 dB (NAB)
  40–12,000 Hz (DIN)

S/N Ratio: DOLBY NR OFF

- With Ferri-Chrome Cassette
  (TAPE SELECT: TYPE III)
  58 dB at peak level (NAB)
  57 dB (DIN, 1975 rev.)
- With Chromium Dioxide Cassette
  55 dB at peak level (NAB)
- With standard cassette
  (TAPE SELECT: TYPE I)
  53 dB at peak level (NAB)

DOLBY NR ON
Improved by 6 dB

Torque Measurement	
FWD torque	28 – 48 g·cm (0.39 – 0.66 oz·inch)
FF torque	more than 100 g·cm (1.38 oz·inch)
REW torque	more than 70 g·cm (0.96 oz·inch)
Back-tension torque	less than 5 g·cm (0.07 oz·inch)

– Continued on page 2 –

This set is equipped with DOLBY FM circuit.
'Dolby' and the double-D symbol are the trade marks of Dolby Laboratories. Noise reduction system manufactured under license from Dolby Laboratories.

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SERVICE MANUAL

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Inputs: Two microphone input connectors
(Cannon Connectors XLR-3-32 type),
balanced sensitivity 0.25 mV
(—70 dB) for low impedance
microphone with Cannon Connector XLR-
3-IIC

Outputs: Two line output jacks (phono jack)
load impedance 10 kΩ or higher
rated output 0.435 V (—5 dB) at load
impedance 47 kΩ
Headphones jack (stereo binaural jack)
for low impedance headphones
rated output 0.2 mW
(at load impedance 8 Ω)
maximum output 20 mW
(at load impedance 8 Ω)

0 dB = 0.775 V

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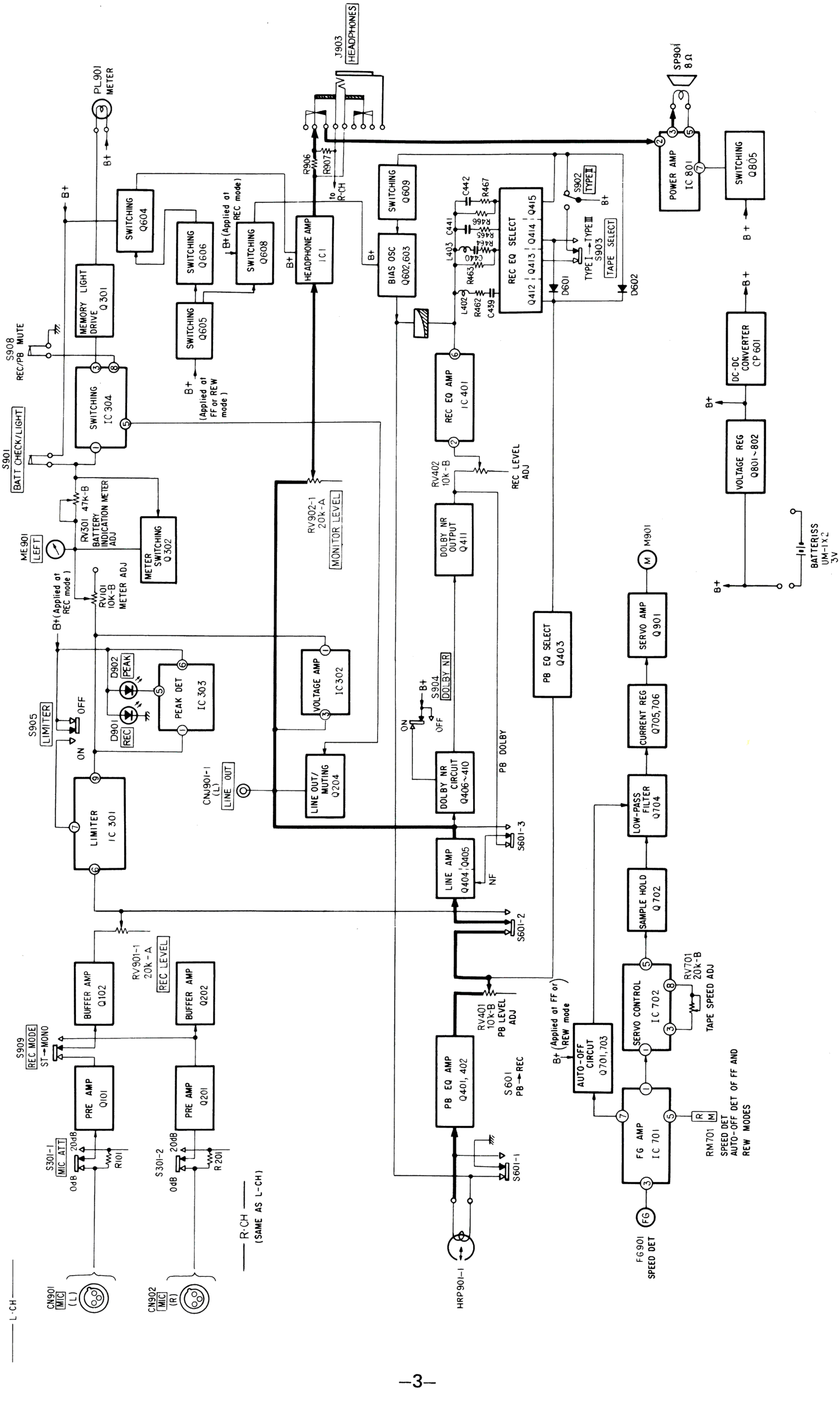
SECTION 1
OUTLINE

1-1. BLOCK DIAGRAM



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• Disc Drive System

An elastic rubber coating is applied to the flywheel and the motor pulley is pressed directly against this rubber coating to drive the flywheel.
The compliance of this elastic materials and the inertial mass of the flywheel together function as a mechanical filter, to eliminate any flutter components above approximately 100Hz.
Motor torque increases in inverse proportion to the reduction ratio between the motor and the flywheel.
Meanwhile, since the inertial mass of the flywheel itself is low, excellent start-up characteristics (The time from start-up to rated speed is less than 0.2 sec) and anti-rolling effect are obtained.

• Capstan Servo Control Mechanism

The speed is detected through the flywheel which is directly coupled to the capstan, to apply the servo control.
As shown in Fig. 1-1, the bearing assembly comprises a bias magnet, coil, and stator.
The flywheel has a rotor and the coil senses fluctuations in magnetic flux caused by variations in the air gap between the rotor and the stator, to generate the servo control frequencies.
This serves to remove any wow components from 10Hz down to the vicinity of DC, to improve the anti-rolling effect.

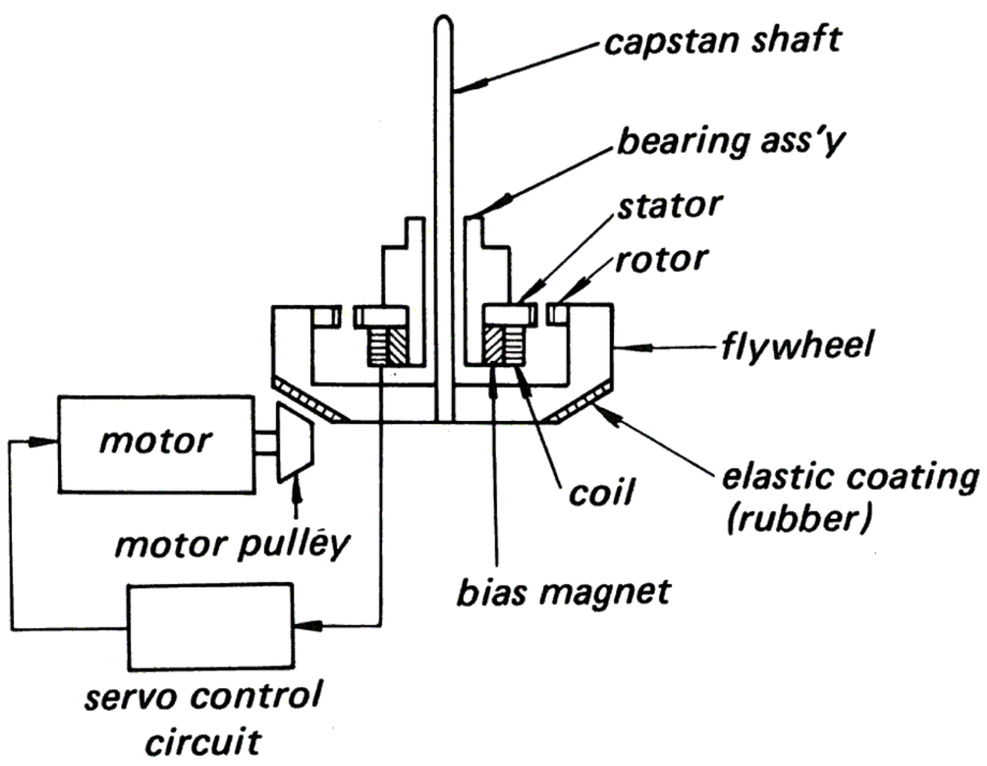

Fig. 1-1

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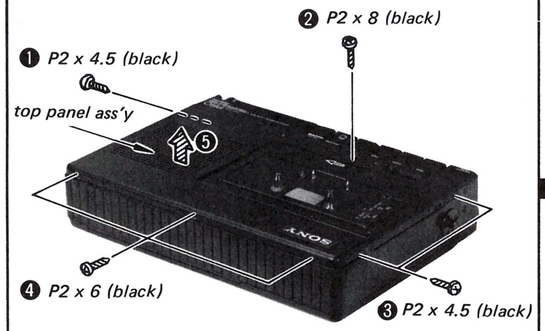
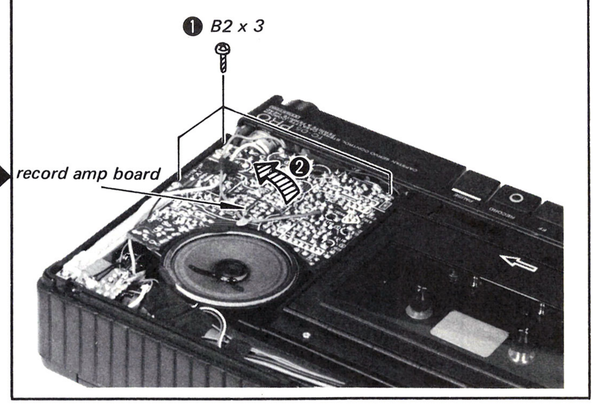
SECTION 2
DISASSEMBLY

Note: Follow the disassembly procedure in the numerical order given.

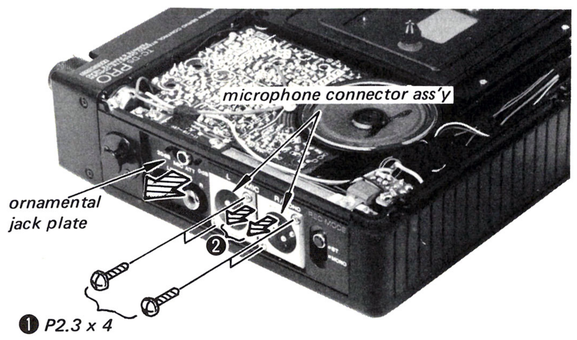
Top Panel



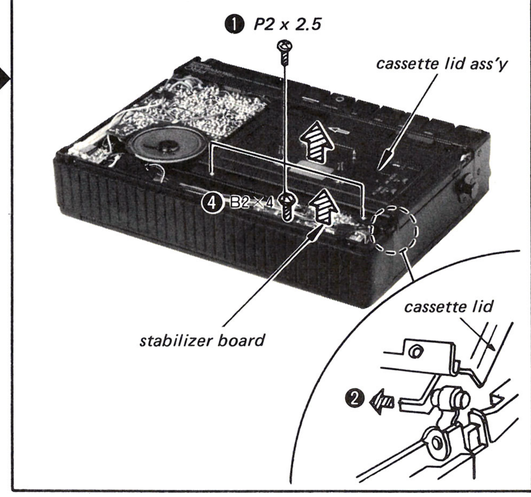
Record Amp Board



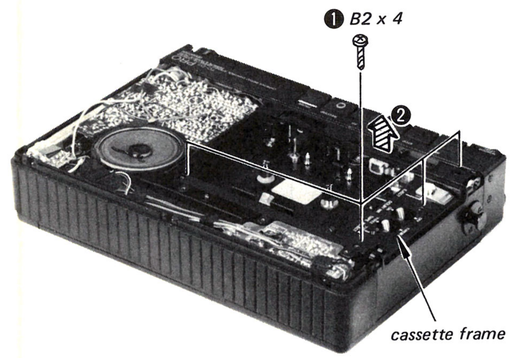
Microphone Connector Ass'y and Ornamental Jack Plate



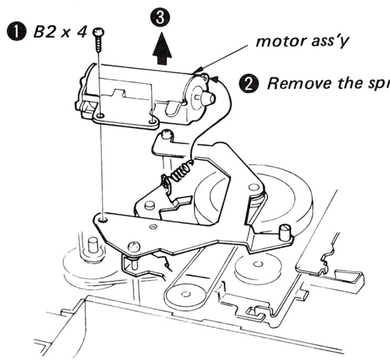
Cassette Lid Ass'y and Stabilizer Board



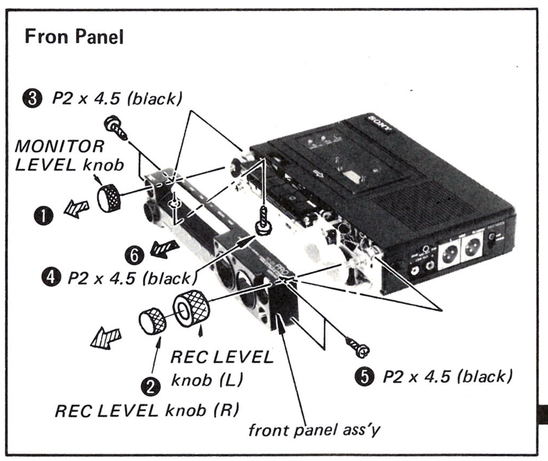
Cassette Frame



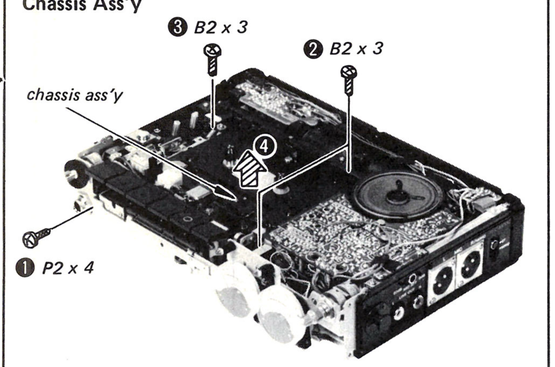
Motor Ass'y



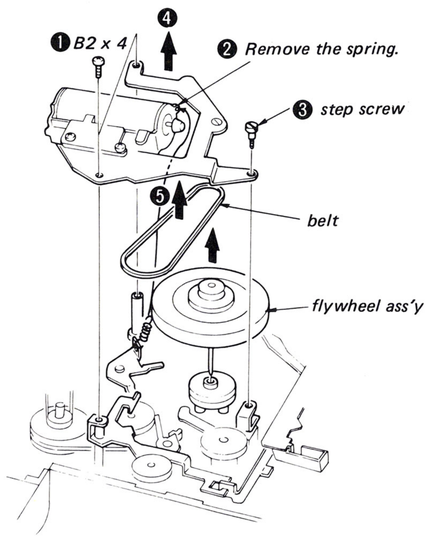
Fron Panel



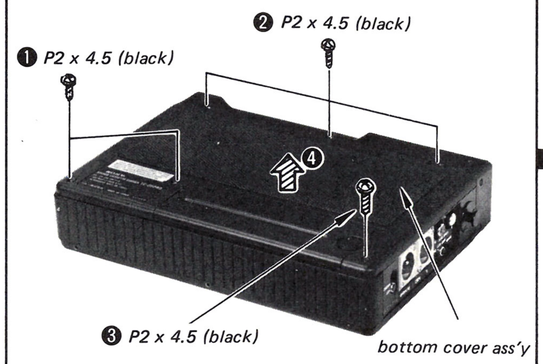
Chassis Ass'y



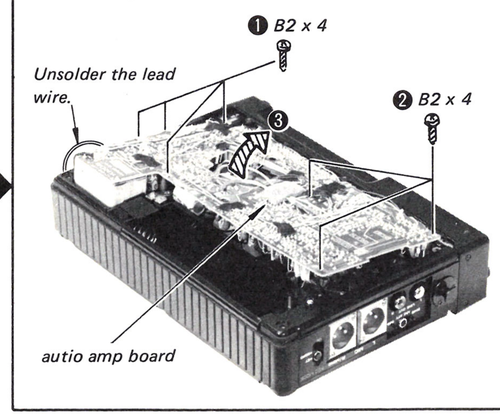
Flywheel Ass'y



Bottom Cover



Audio Amp Board



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SECTION 3
ADJUSTMENTS

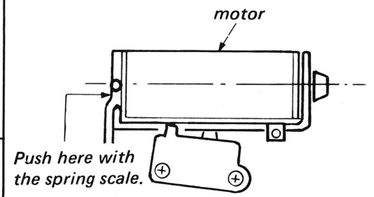
3-1. MECHANICAL ADJUSTMENTS

PRECAUTION

1. Clean the following parts with a denatured-alcohol-moistened swab:
   - record/playback head
   - erase head
   - capstan
   - pinch roller
   - rubber belts
   - idlers
2. Demagnetize the rocrd/playback head with a head demagnetizer.
3. Do not use a magnetized screwdriver for the adjustments.
4. After the adjustments, apply suitable locking compound to the parts adjusted.
5. The adjustments should be performed with the rated power supply voltage unless otherwise noted.

Motor Pressure Measurement — playback mode —

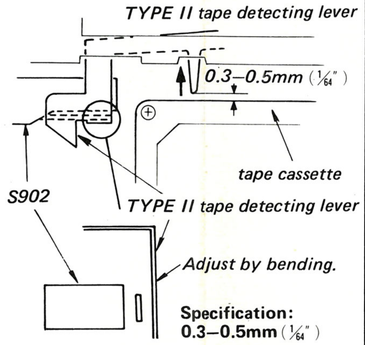
1. Place the set vertically.
2. Push the end of motor with the spring scale as shown. The flywheel will not stop rotating.
3. Measure the pressure of motor against the flywheel when the flywheel starts to rotate, while returning the spring scale slowly.



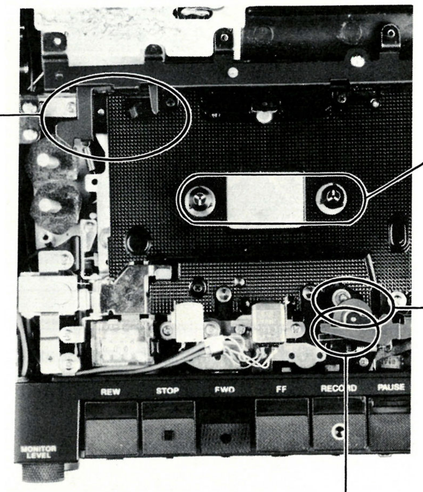
Specification: 50–90g (1.76–3.17 oz)

TYPE II Tape Detecting Lever Adjustment — stop mode —

1. Insert the tape cassette (except for TYPE II tape) into the set.
2. Push the CrO_2 tape detecting lever in the direction of the arrow.
   Make sure that the clearance between the cassette and TYPE II tape detecting lever is 0.3–0.5mm (1/64"). If necessary, bend the lever.
3. Make sure that the miniature switch (S902) is turned off when returning the TYPE II tape detecting lever to the original position.



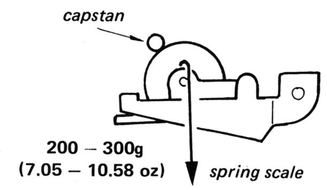
Specification: 0.3–0.5mm (1/64")

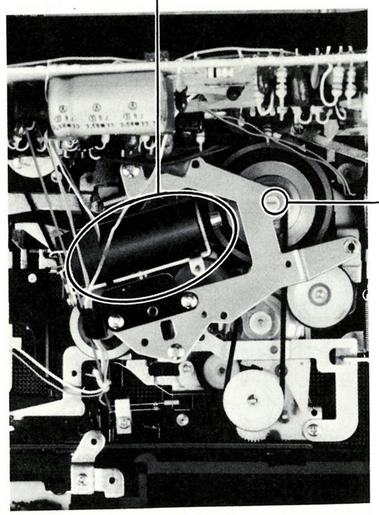


Torque Measurement	
FWD torque	28 – 48 g·cm (0.39 – 0.66 oz·inch)
FF torque	more than 100 g·cm (1.38 oz·inch)
REW torque	more than 70 g·cm (0.96 oz·inch)
Back-tension torque	less than 5 g·cm (0.07 oz·inch)

Pinch Roller Pressure Adjustment — playback mode —

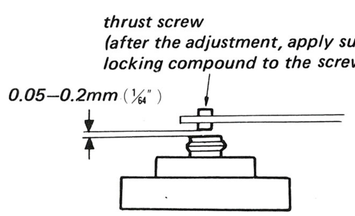
1. Hook the pinch roller with a spring scale.
2. Pull the spring scale.
3. Slowly return the pinch roller and read the spring scale as soon as the pinch roller starts to rotate.





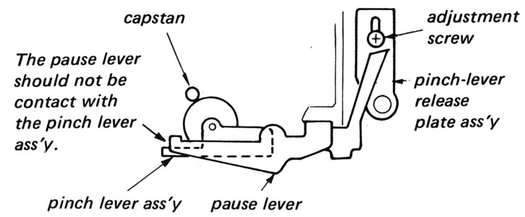
Flywheel Thrust Play Adjustment — playback mode —

1. Connect a dc voltmeter across the motor.
2. Turn the screw clockwise for the position where the meter reading suddenly increases.
3. Loosen the screw ¼ turn from the position obtained in step 2.



Pause Timing Adjustment — playback mode —

1. Adjust the position of pinch-lever release plate ass'y so that the pinch roller and the take-up reel spindle stop rotating at the same time when depressing the PAUSE button slowly.
2. Make sure that the pinch roller touches the capstan after the take-up reel spindle starts to rotate when the PAUSE button is released.



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3-2. ELECTRICAL ADJUSTMENTS

Note: The adjustment should be performed in the order given in this service manual.
The adjustments should be performed for both L-CH and R-CH.

- Set the TAPE SELECT switch in accordance with the tape used as follows.

Tape	TAPE SELECT switch
CS-10	TYPE I
CS-20	TYPE II
CS-30	TYPE III

Switches and controls should be set as follows unless otherwise specified.

DOLBY NR switch: OFF
TAPE SELECT switch: TYPE I
LIMITER switch: OFF
MIC ATT switch: 0 dB

Standard Record:

Deliver the standard input signal level to the input jack and set the REC LEVEL control to obtain the standard output signal level.

Standard Input Level

	MIC
source impedance	300Ω
input level	0.77mV (−60dB)

Standard Output Level

	LINE OUT
load impedance	100kΩ
output level	0.44V (−5dB)

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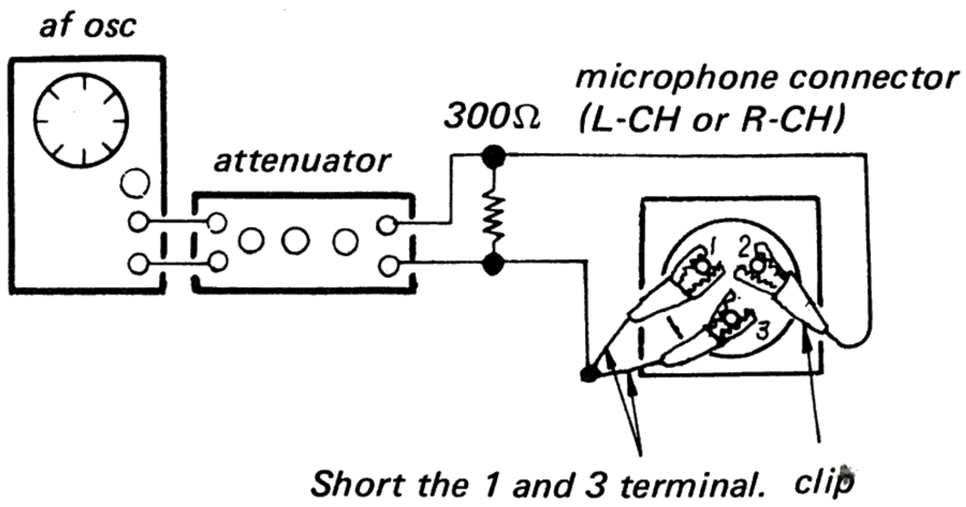
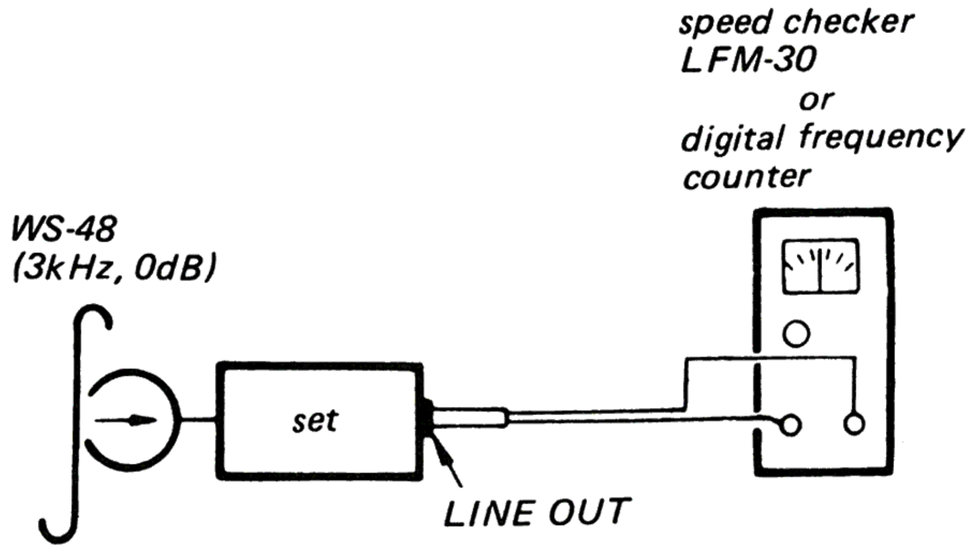
Input Signal Connection for Record Bias Record Level Adjustments, Level Meter Calibration



Tape Speed Adjustment

Procedure:

Mode: Playback



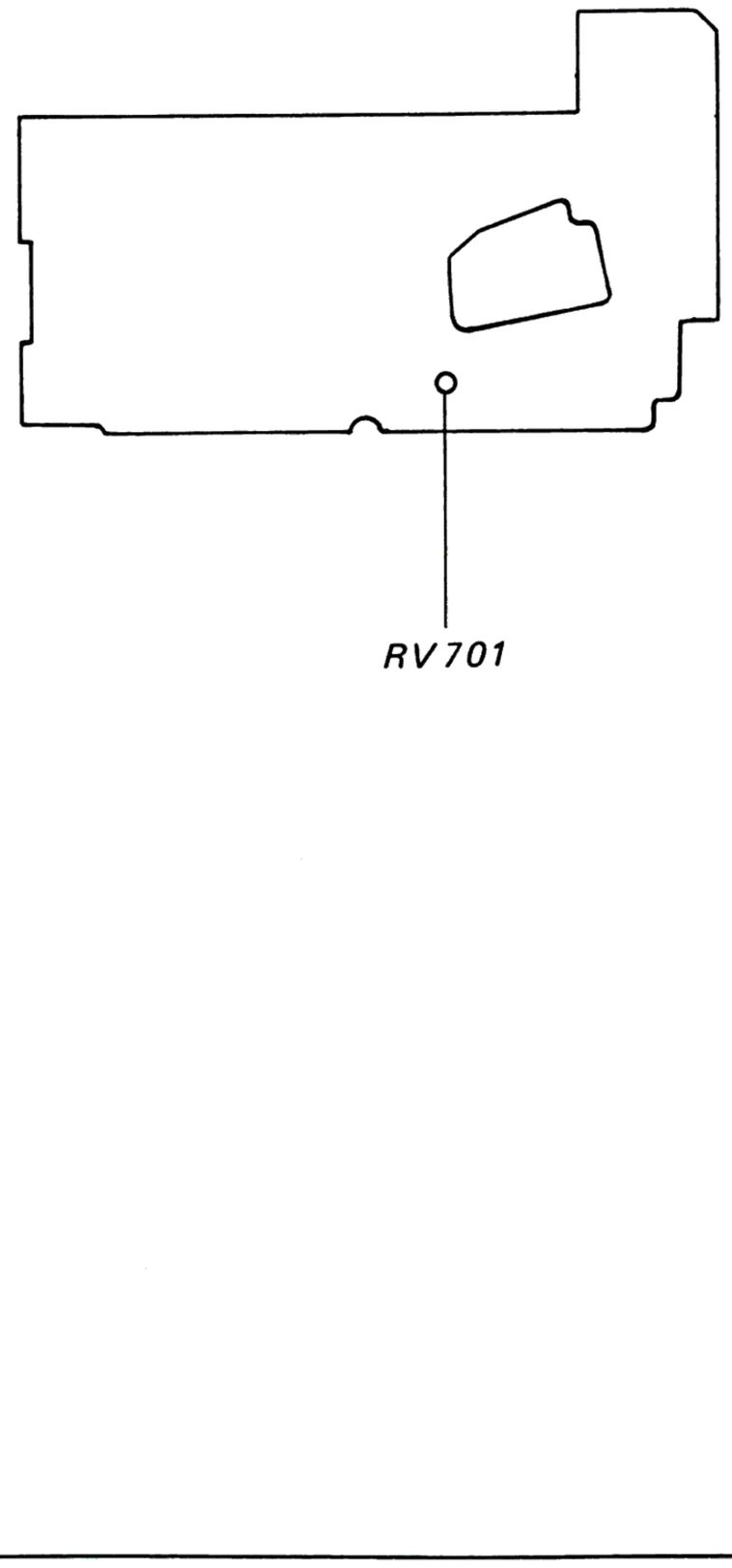
Adjust RV701 to obtain the specified value below.

Specification:

Speed checker	Digital frequency counter
–1.0 ~ +1.0%	2,970 ~ 3,030Hz

Adjustment Location:

– audio amp board (conductor side) –



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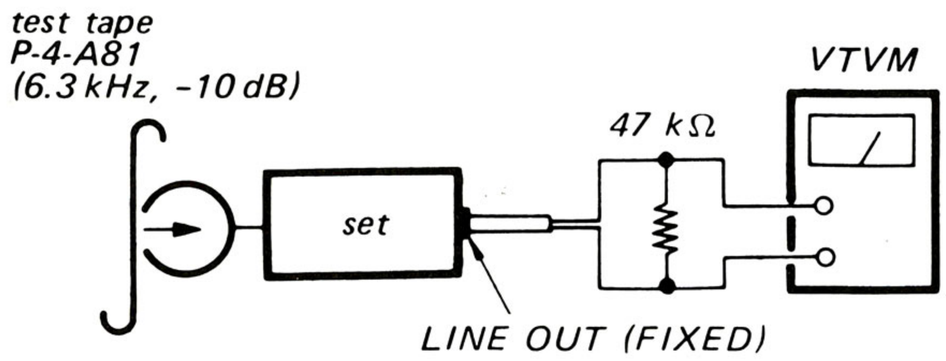
Record/playback Head Azimuth Adjustment

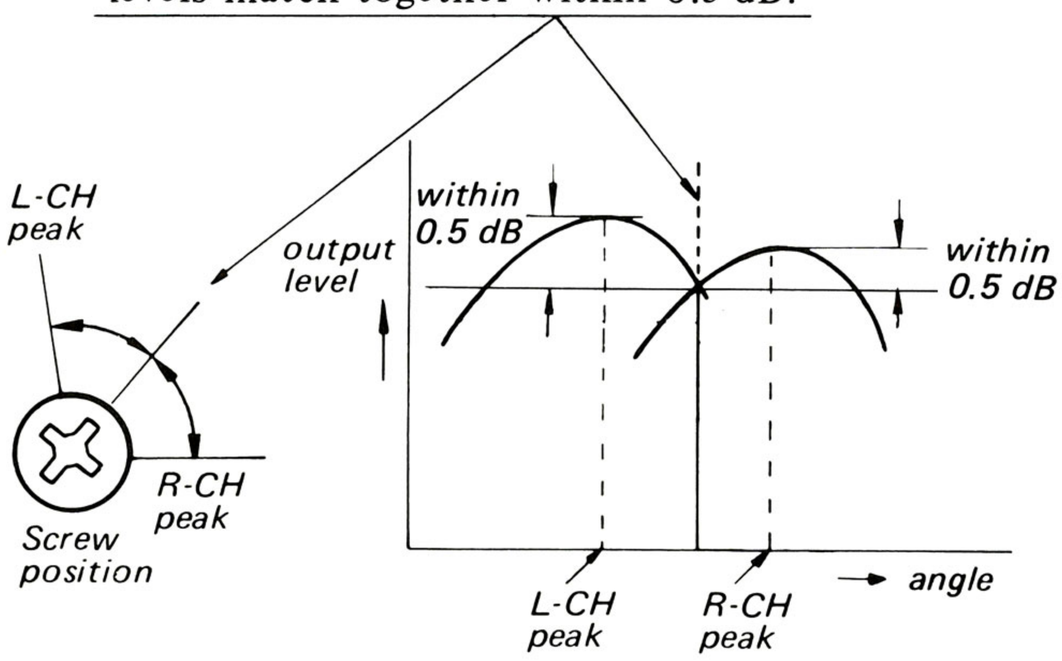
Procedure:

1. Mode: playback

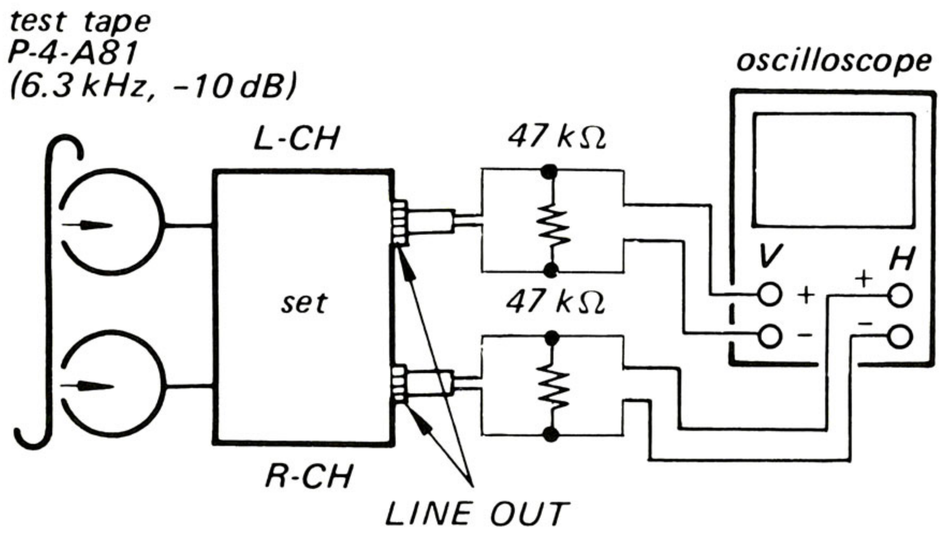


*

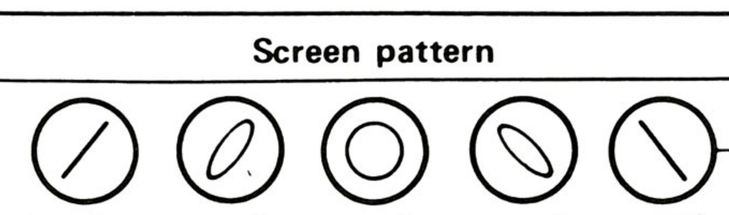
2. Turn the adjustment screw for the maximum output levels. If these levels do not match, turn the adjustment screw where both of output levels match together within 0.5 dB.



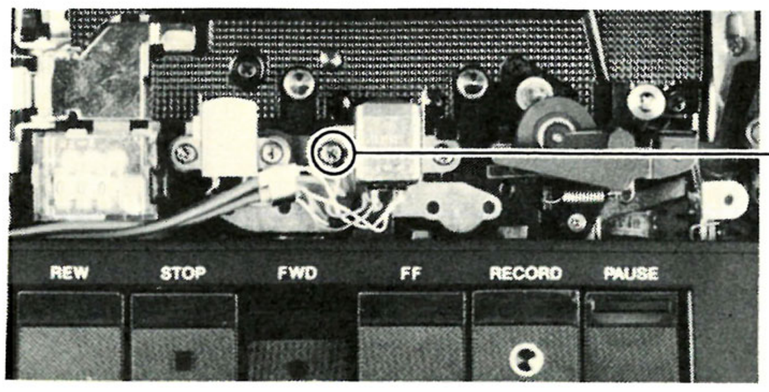
3. Phase Check
   Mode: playback



Screen pattern



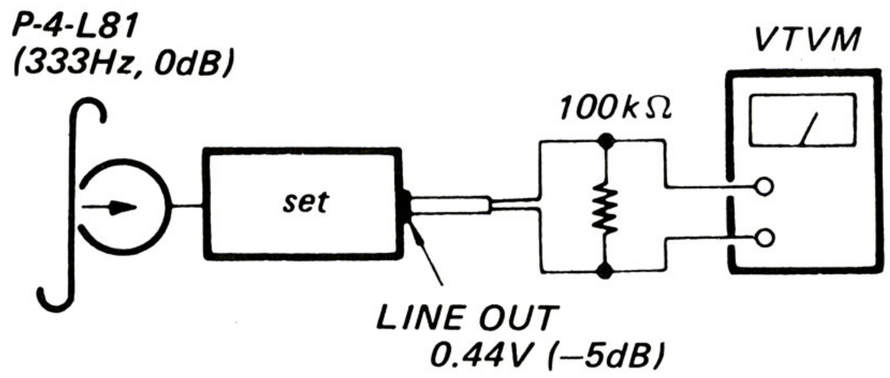
Adjustment Location:



Playback Level Adjustment

Procedure:

1. Mode: Playback



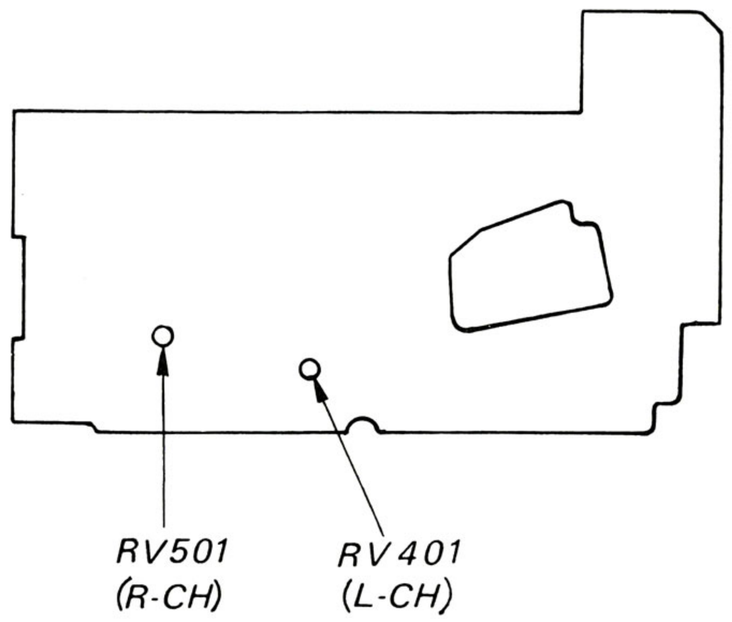
2. Adjust RV401 (L-CH) and RV501 (R-CH) to obtain 0.56V (–3dB) VTVM reading.
3. Make sure that the LINE OUT level does not change when the mode is changed from play-back to stop several times.

Specification:

LINE OUT level: 0.52 – 0.58V (–3.5 to –2.5dB)

Adjustment Location:

– audio amp board (conductor side) –



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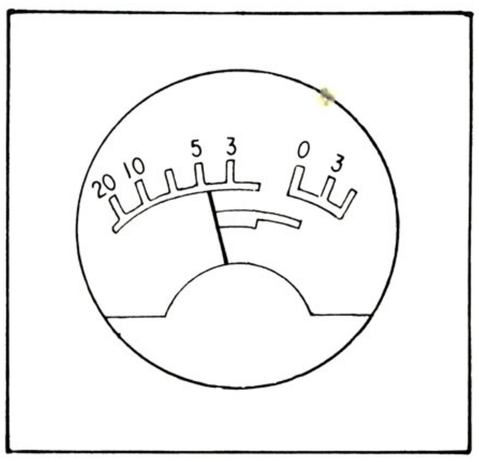
Battery Indication Meter Calibration

Procedure:

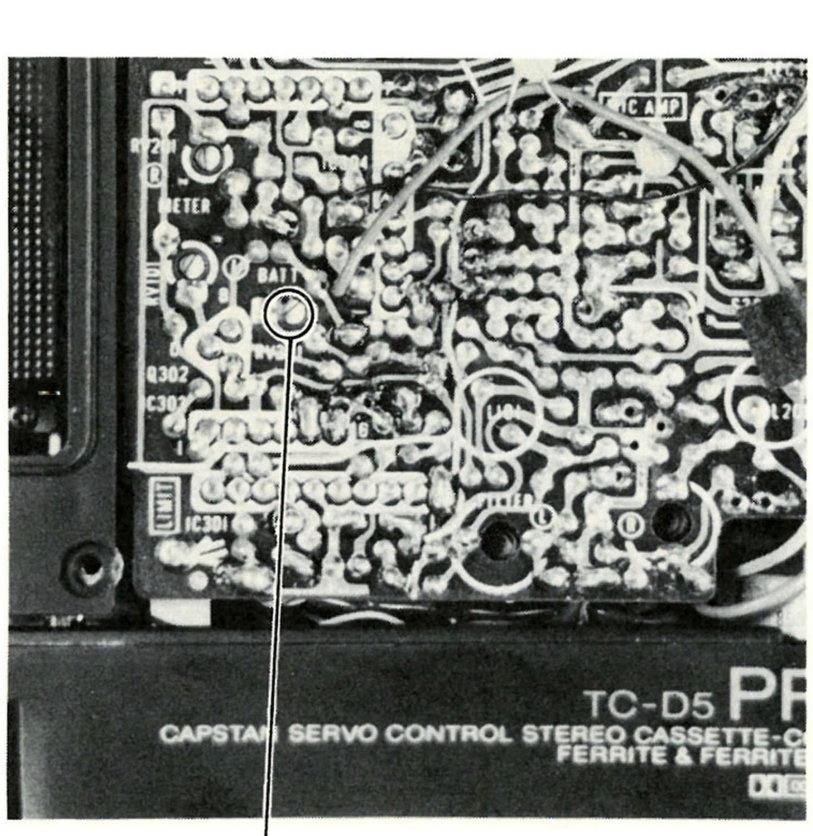
1. Mode: Playback (with no cassette installed)
2. Feed 2.2V dc to the battery terminals.
3. When the BATT CHECK/LIGHT button is pushed, adjust RV301 so that the meter indicates the position as shown below.



level meter

Adjustment Location:

– record amp board –

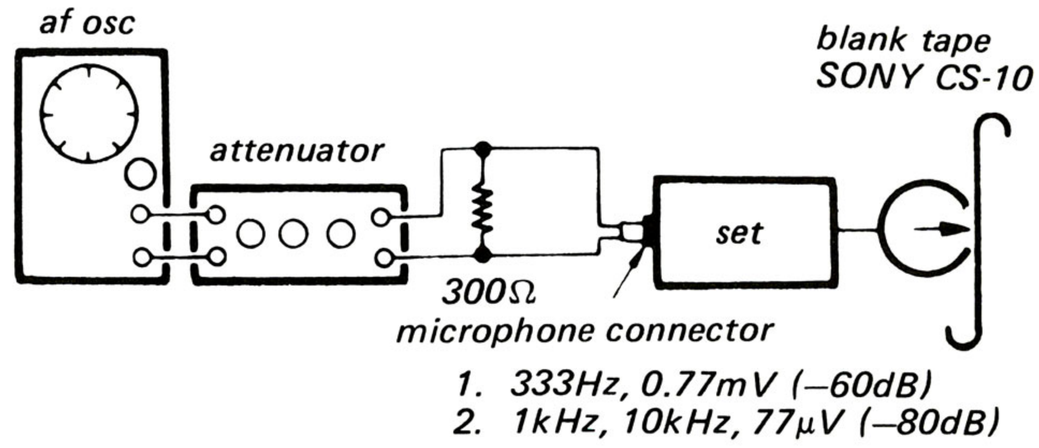


RV301

Record Bias Adjustment

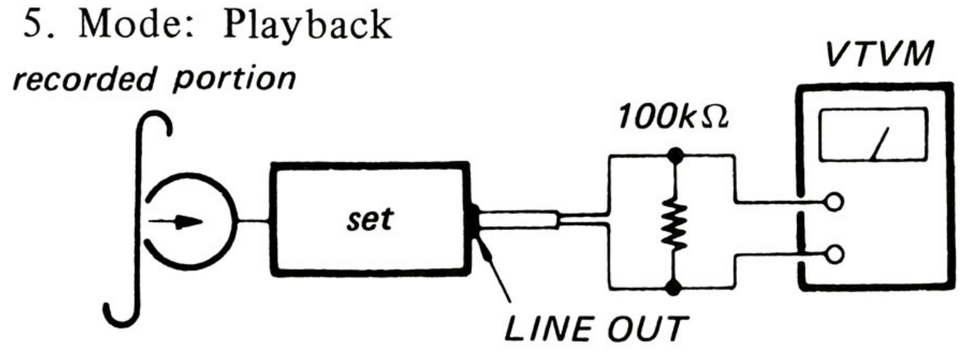
Procedure:

1. Mode: Record
   TAPE SELECT switch: TYPE I
   LIMITER switch: OFF



1. 333Hz, 0.77mV (–60dB)
2. 1kHz, 10kHz, 77μV (–80dB)

2. Feed a signal of 333Hz, 0.77mV (–60dB) into the microphone connector.
3. Playback the signal of 333Hz and adjust the REC LEVEL control for –5dB (0.44V) on the VTVM.
4. Feed the signals of 1kHz and 10kHz, 77μV (–80dB) into the microphone connector.
5. Mode: Playback



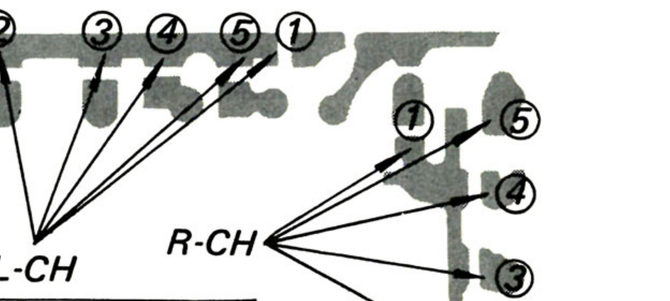
6. Playback the signals of 1kHz and 10kHz. Confirm the playback signal levels are as follows. If necessary, change the pattern connection and repeat the steps given above.

Specification:

±0.5dB or less (10kHz level deviation from 1kHz)

Adjustment Location:

– audio amp board (conductor side) –



Connecting Point	Record Bias Level
① ② ①+②+③+④+⑤	up ↕ down

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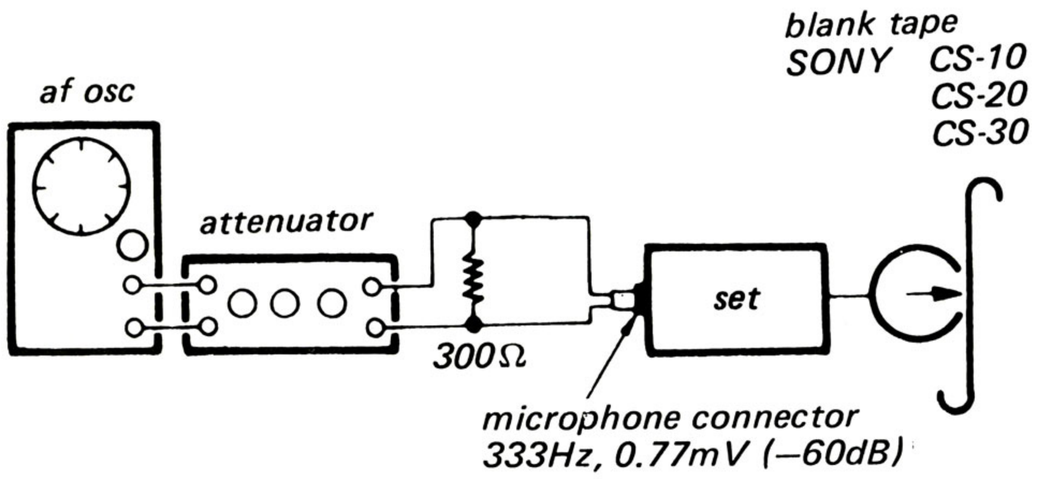
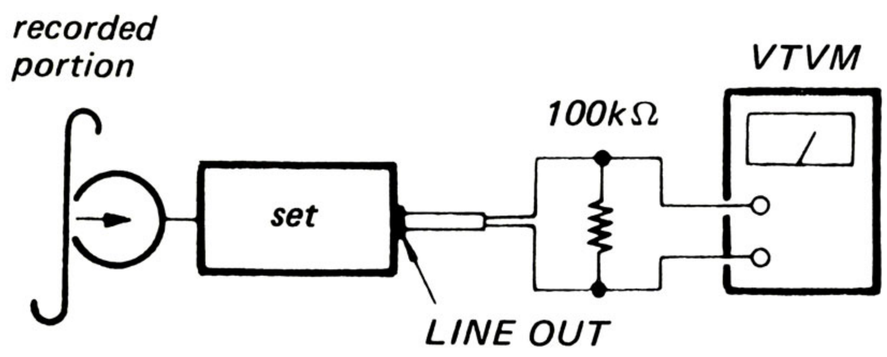
Record Level Adjustment

Procedure:

1. Mode: Standard record (See page 9)
   MIC ATT switch: 0dB
   LIMITER switch: OFF



2. Mode: Playback



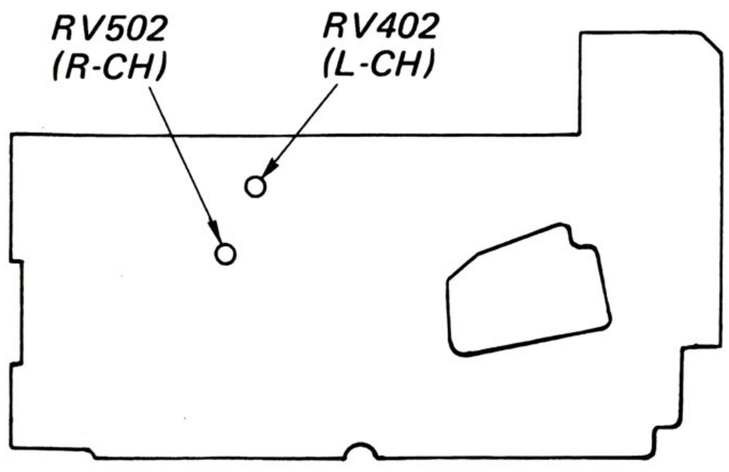
3. Adjust RV402 (L-CH) and RV502 (R-CH) to obtain the specified VTVM reading.

Specification:

Tape	TAPE SELECT or TYPE II switch	LINE OUT level
CS-10	TYPE I	0.40 – 0.45V (–6.0 to –5.0dB)
CS-20	automatically changed to TYPE II position.	0.31 – 0.50V (–8.0 to –4.0dB)
CS-30	TYPE III	

Adjustment Location:

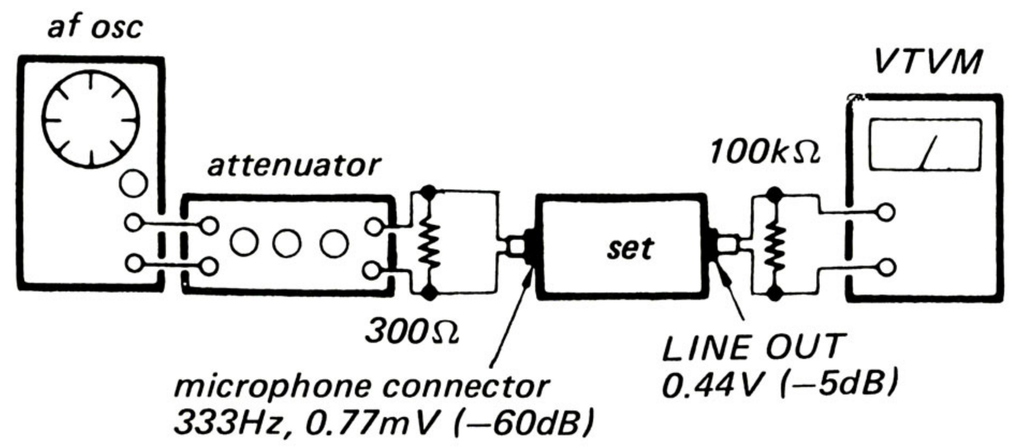
– audio amp board (Conductor Side) –



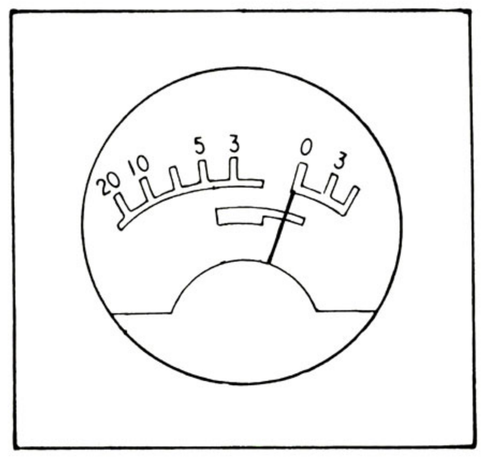
Level Meter Calibration

Procedure:

1. Mode: Standard record (See page 9.)
   MIC ATT switch: 0dB
   LIMITER switch: OFF



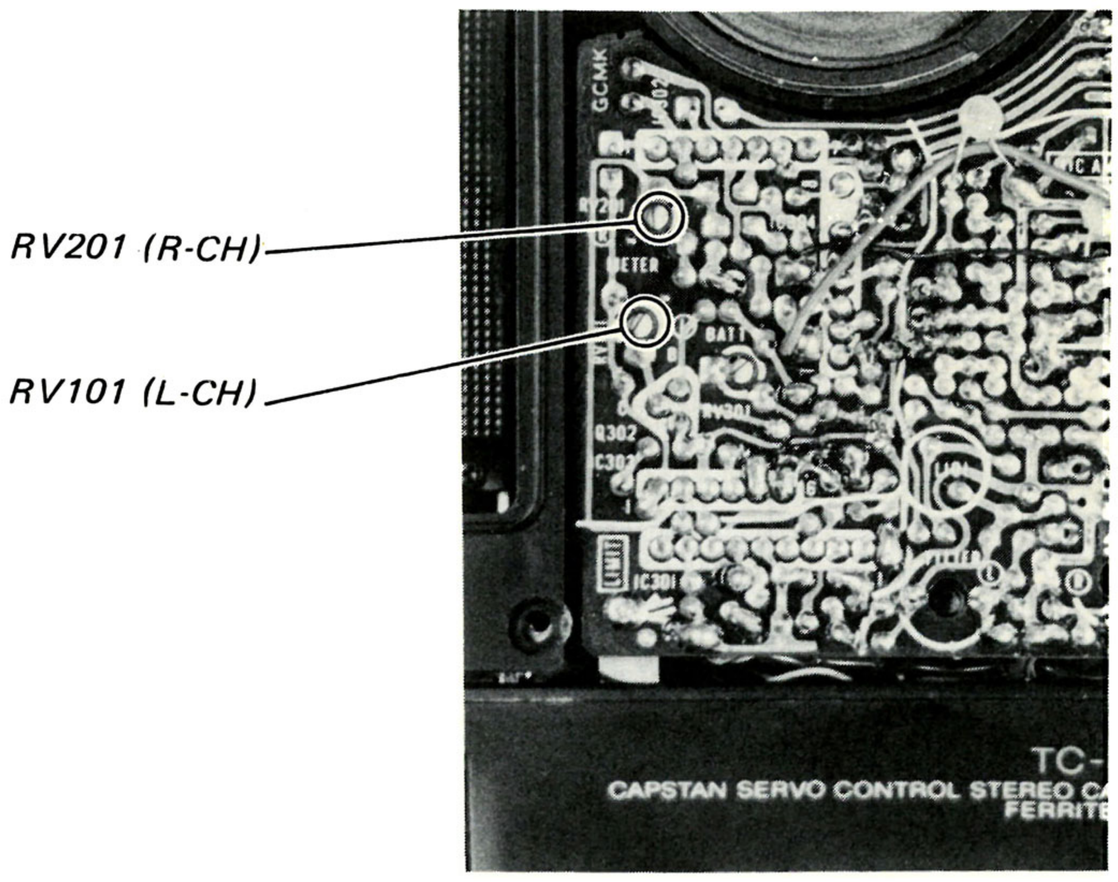
2. Make sure that the VTVM reads 0.44V (–5dB).
3. Adjust RV101 (L-CH) and RV201 (R-CH) for specified reading on the level meter.



level meter

Adjustment Location:

– record amp board –



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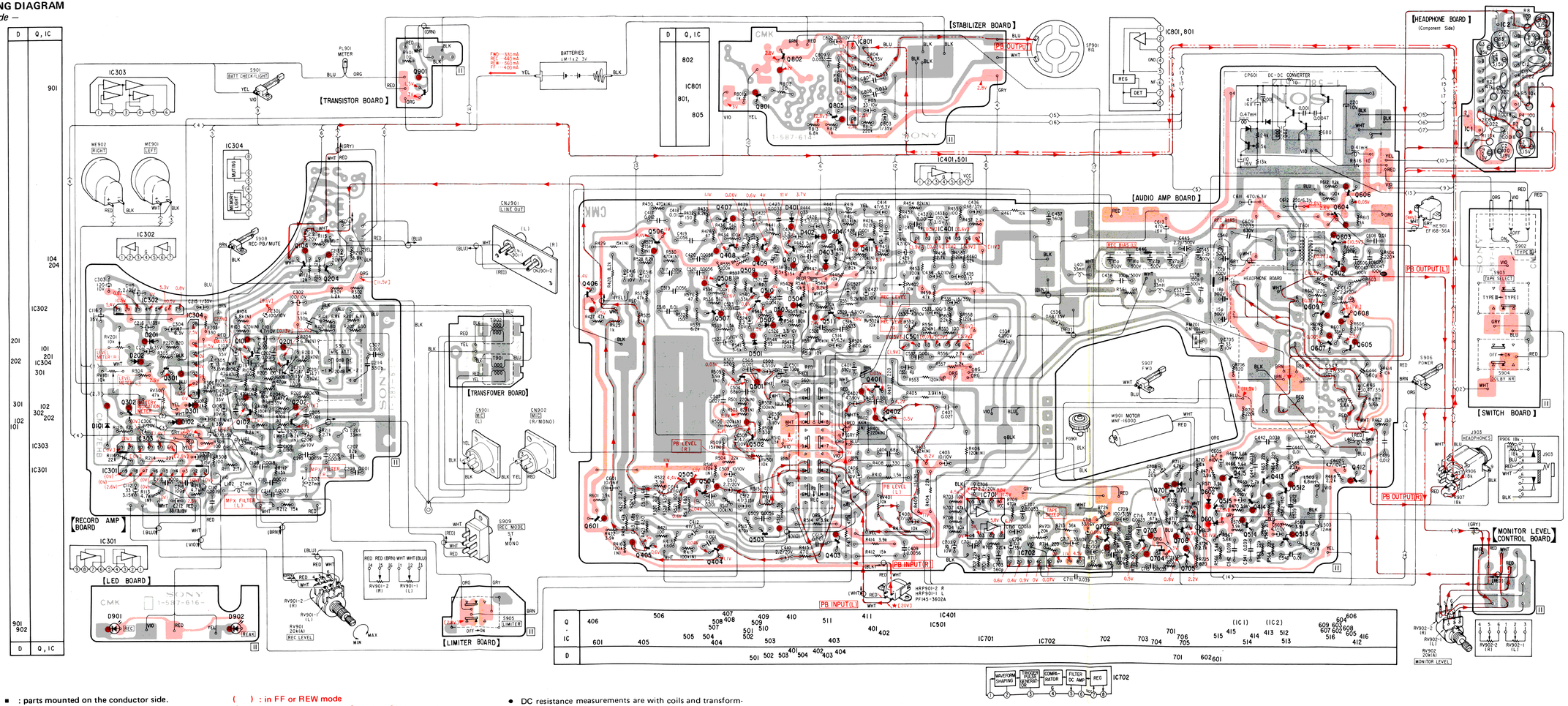
4-1. MOUNTING DIAGRAM

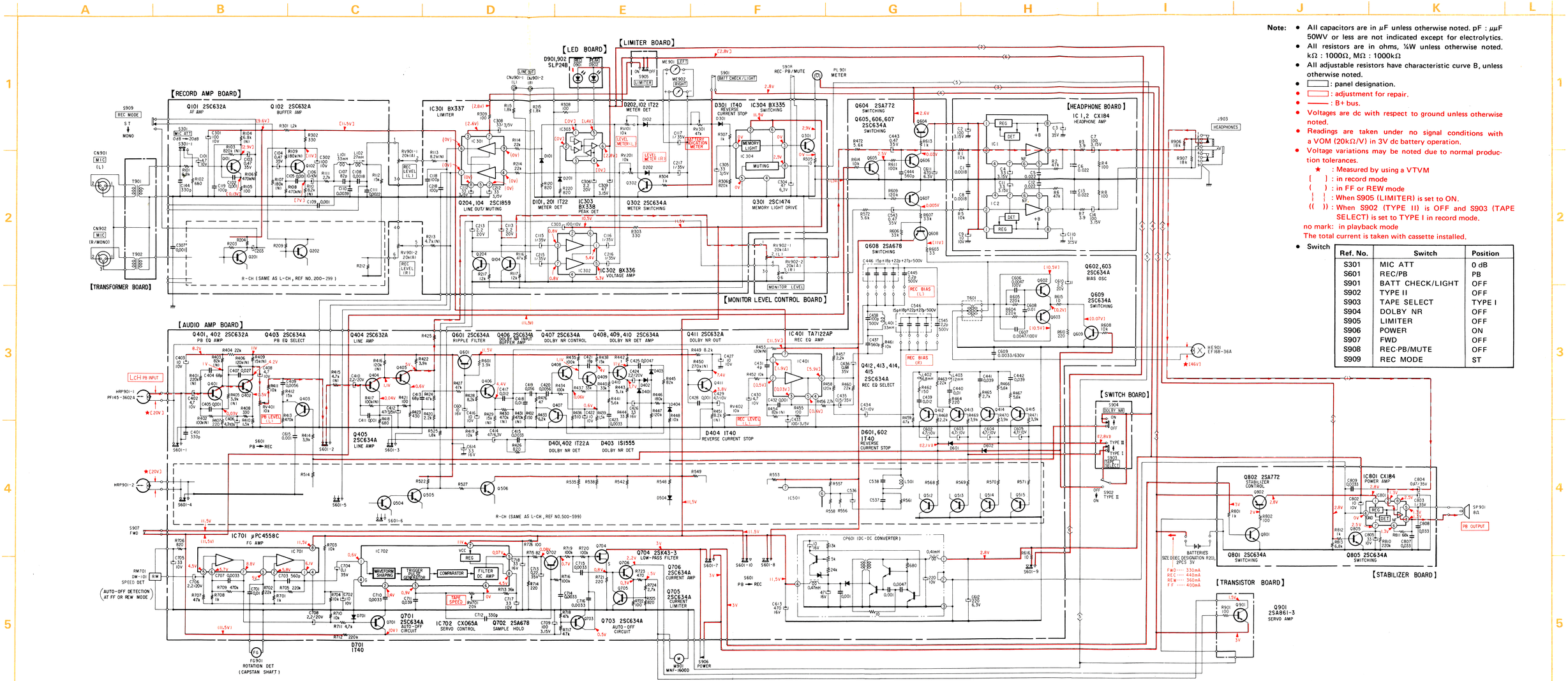
– Conductor Side –



Note: ■ : parts mounted on the conductor side.
: B+ pattern.
– – – → : L-CH playback signal path
——→ : R-CH playback signal path
★ : Measured by using a VTVM
[ ] : in record mode
( ) : in FF or REW mode
{ } : When S905 (LIMITER) is set to ON in record mode.
(( )) : When S902 (TYPE II) is set to TYPE II and S903 (TAPE SELECT) is set to TYPE I in record mode.
no mark: in playback mode
The total current is taken with cassette installed.

• DC resistance measurements are with coils and transformers connected on the circuit board, and are approximate.

4-2. SCHEMATIC DIAGRAM



Note:

- All capacitors are in μF unless otherwise noted. pF : μμF
  50WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼W unless otherwise noted.
  kΩ : 1000Ω, MΩ : 1000kΩ
- All adjustable resistors have characteristic curve B, unless otherwise noted.
- ▭ : panel designation.
- ▭ : adjustment for repair.
- ——— : B+ bus.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no signal conditions with a VOM (20kΩ/V) in 3V dc battery operation.
- Voltage variations may be noted due to normal production tolerances.
  - ★ : Measured by using a VTVM
  - [ ] : in record mode
  - ( ) : in FF or REW mode
  - ¦ ¦ : When S905 (LIMITER) is set to ON.
  - (( )) : When S902 (TYPE II) is OFF and S903 (TAPE SELECT) is set to TYPE I in record mode.

  no mark: in playback mode

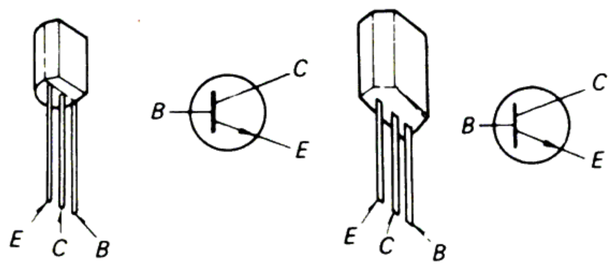
  The total current is taken with cassette installed.
- Switch

Ref. No.	Switch	Position
S301	MIC ATT	0 dB
S601	REC/PB	PB
S901	BATT CHECK/LIGHT	OFF
S902	TYPE II	OFF
S903	TAPE SELECT	TYPE I
S904	DOLBY NR	OFF
S905	LIMITER	OFF
S906	POWER	ON
S907	FWD	OFF
S908	REC-PB/MUTE	OFF
S909	REC MODE	ST

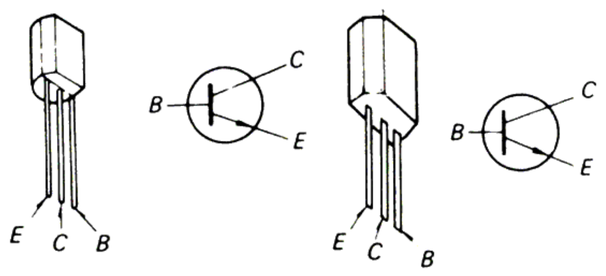
Replacement Semiconductors

For replacement, use semiconductors except in ( ).

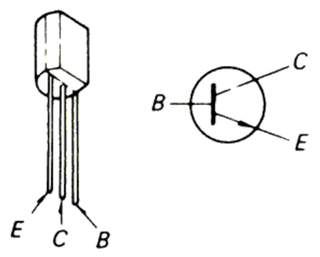
Q101, 102, 201, 202, 401, 402
Q404, 411, 501, 502, 504, 511
2SC1345 (2SC632A)



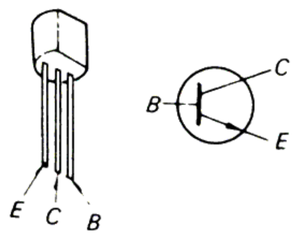
Q302, 403, 405–410
Q412–415, 503, 505–510, 512–515
Q601–603, 605–607
Q609, 701, 703, 705, 706
Q801, 803–804
2SC1364 (2SC634A)



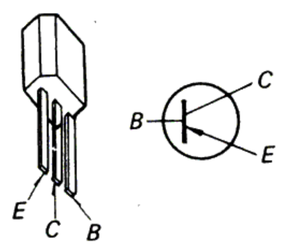
Q104, Q204): 2SC1859



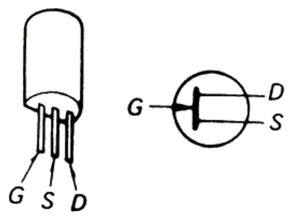
Q301: 2SC1474 (2SC1474-3)



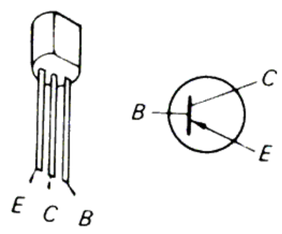
Q608, 702: 2SA1027R (2SA678)



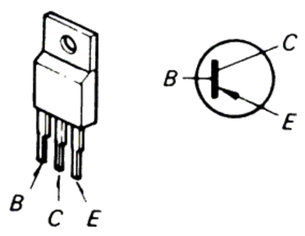
Q704: 2SK43-13 (2SK43-3)



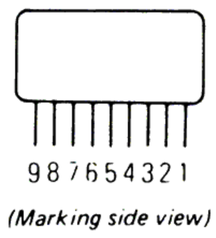
Q604, 802: 2SA772-14 (2SA772)



Q901: 2SA861

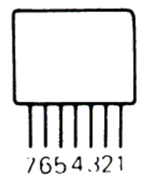


IC301: BX337



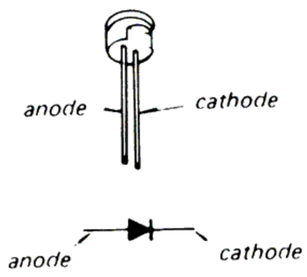
(Marking side view)

IC302: BX336

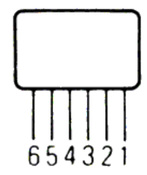


(Marking side view)

D901, 902
SLP24B

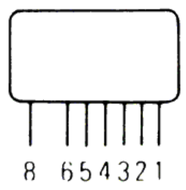


IC303: BX338



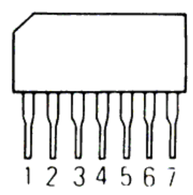
(Marking side view)

IC304: BX335

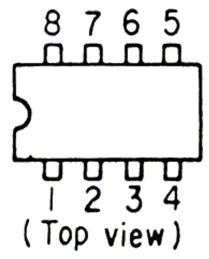


(Marking side view)

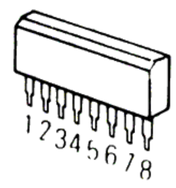
IC401, 501: TA7122BP



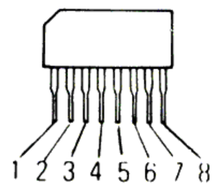
μPC4558C
IC701: (μPC4558)



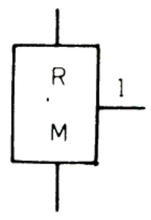
IC702: CX065A



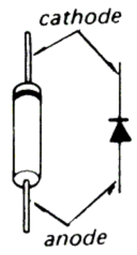
IC1, 2, IC801): CX184



RM701: DM101



D101, 103
D102, 104
D401, 402, 501, 502
1T22AM (1T22)
D301, 404, 504
D601, 602
1S1555 (1T40)
D403, 503, 701
1S1555



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SECTION 5
EXPLODED VIEW

5-1. **Note:**

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

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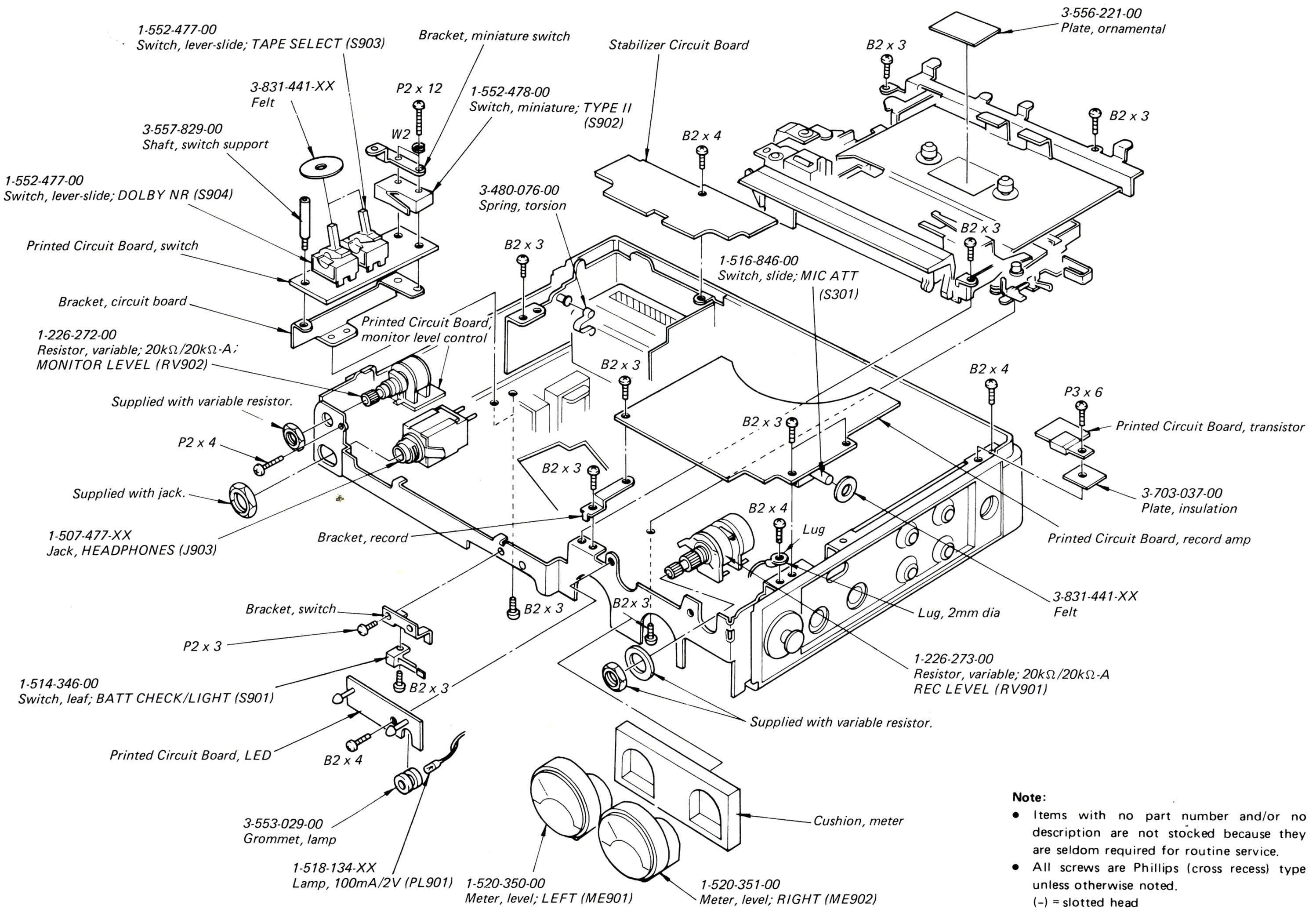

Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

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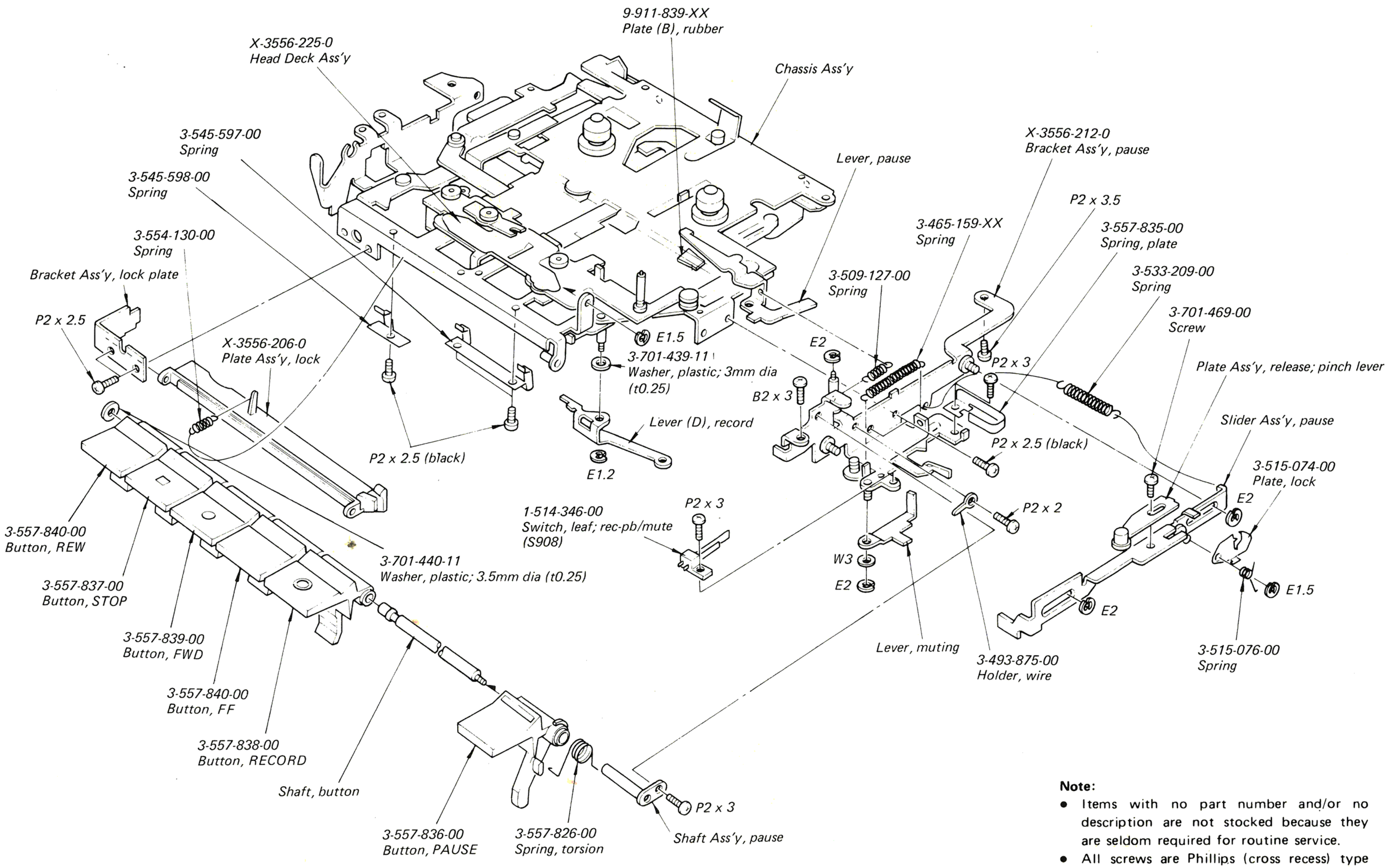

Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (-) = slotted head
- (□□T) shows the number of coils in spring.

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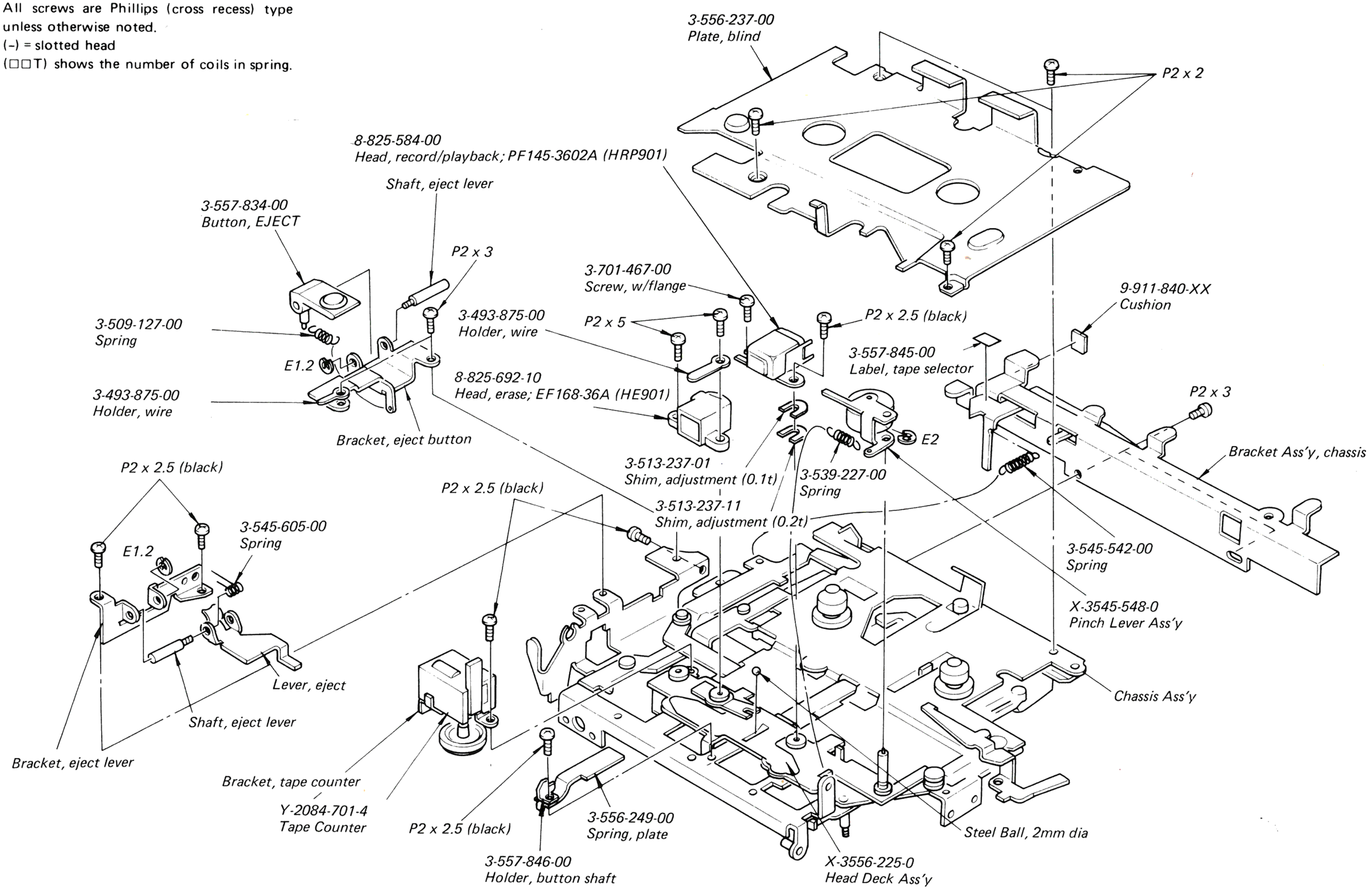
Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (-) = slotted head
- (□□T) shows the number of coils in spring.



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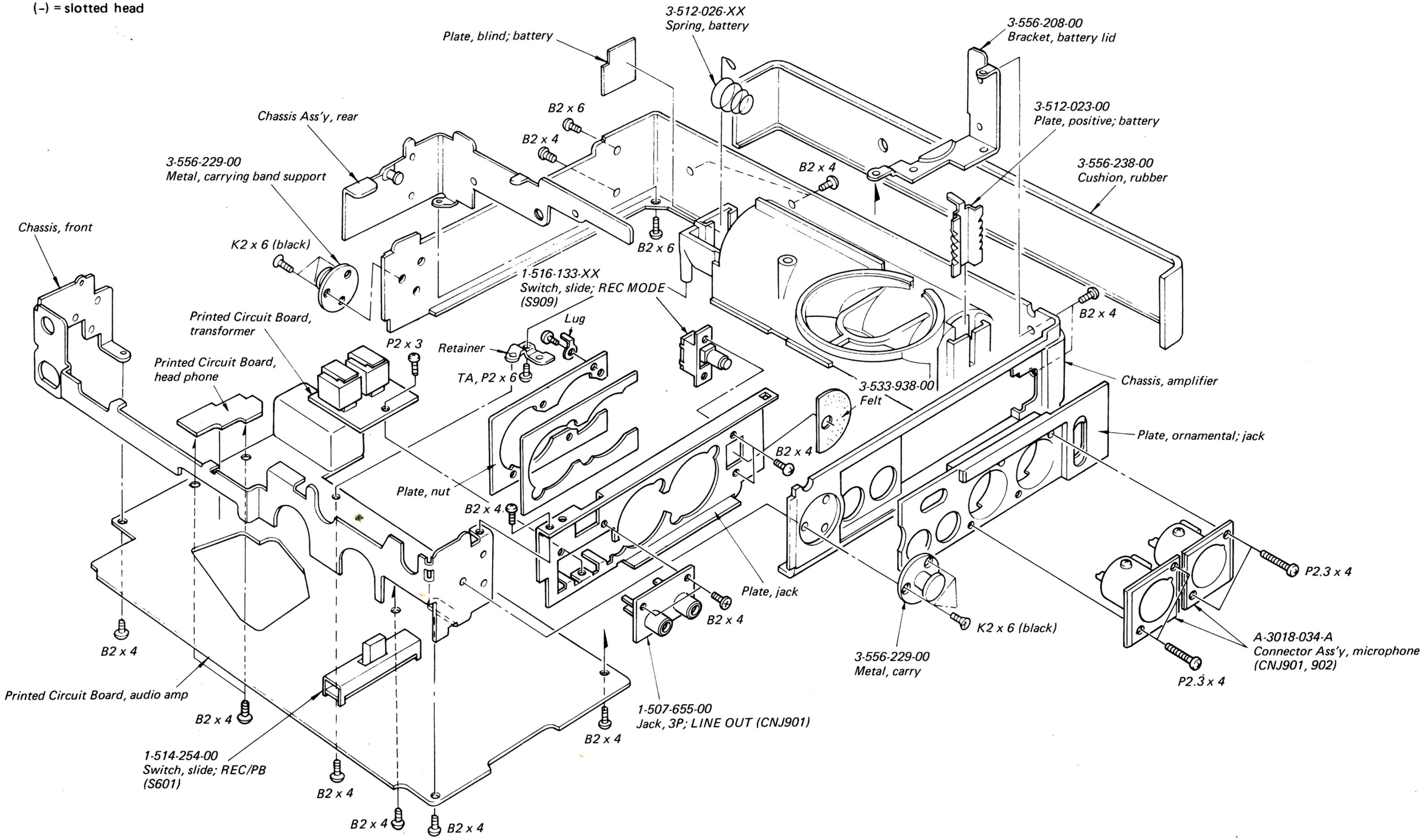
Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head



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5-6.

Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- (□□T) shows the number of coils in spring.

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5-7. **Note:**

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (-) = slotted head
- (□□T) shows the number of coils in spring.

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SECTION 6
ELECTRICAL PARTS LIST

Ref. No.	*Part No.*	*Description*
		SEMICONDUCTORS
		Transistors
⇒ Q101, 201 ⇒ Q102, 202	8-729-334-58	2SC1345
⇒ Q104, 204	8-765-052-20	2SC1859
⇒ Q301	8-760-335-10	2SC1474
⇒ Q302	8-729-663-47	2SC1364
⇒ Q401, 501 ⇒ Q402, 502	8-729-334-58	2SC1345
⇒ Q403, 503	8-729-663-47	2SC1364
⇒ Q404, 504	8-729-334-58	2SC1345
⇒ Q405–410 ⇒ Q505–510	8-729-663-47	2SC1364
⇒ Q411, 511	8-729-334-58	2SC1345
⇒ Q412–415 ⇒ Q512–515 ⇒ Q601–603	8-729-663-47	2SC1364
⇒ Q604	8-760-514-00	2SA772-4
⇒ Q605–607	8-729-663-47	2SC1364
Q608	8-729-612-77	2SA1027R
⇒ Q609 ⇒ Q701	8-729-663-47	2SC1364
Q702	8-729-612-77	2SA1027R
⇒ Q703	8-729-663-47	2SC1364
⇒ Q704	8-723-303-13	2SK43-13
⇒ Q705, 706 ⇒ Q801	8-729-663-47	2SC1364
⇒ Q802	8-760-514-10	2SA772-14
⇒ Q803, 804	8-729-663-47	2SC1364
Q901	8-763-213-00	2SA861
		ICs
IC1, 2	8-751-840-00	CX184
IC302	8-751-360-00	BX336
IC303	8-751-380-00	BX338
IC304	8-751-350-00	BX335
IC401, 501	8-759-271-22	TA7122AP
⇒ IC701	8-759-145-58	μPC4558C
IC702	8-759-600-65	CX065A
IC801	8-751-840-00	CX184
		Diodes
⇒ D101, 103 ⇒ D102, 104	8-719-422-21	1T22AM
⇒ D301	8-719-815-55	1S1555
⇒ D401, 501 ⇒ D402, 502	8-719-422-21	1T22AM
D403, 503	8-719-815-55	1S1555
⇒ D404, 504 ⇒ D601, 602	8-719-815-55	1S1555
D701	8-719-815-55	1S1555
D901, 902	8-719-900-24	SLP24B
		COILS
L101, 201	1-407-879-00	33mH, microinductor
L102, 202	1-407-938-00	27mH, variable
L401, 501	1-407-212-XX	33mH, microinductor
L402, 502	1-407-502-XX	6.8mH, microinductor
L403, 503	1-407-207-XX	12mH, microinductor
		TRANSFORMERS
T601	1-433-200-00	Bias Oscillator
T901, 902	1-423-242-00	Input

CAPACITORS

All capacitors are in μF and common capacitors are omitted.
Refer to the lists on pages 24 and 25 for their part numbers.

C446, 546	1-107-253-00	15+18+22+27	500V	mica
C711	1-130-140-00	0.039	100V	film

⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

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Ref. No.	*Part No.*	*Description*		
		RESISTORS		
All resistors are in ohms. Common ¼W carbon resistors are omitted. Refer to the list on page 26 for their resistance values. kΩ : 1000Ω				
R616	1-246-759-11	10k	1/8W	carbon
R703, 704	1-209-781-11	10k	1/16W	micro
R705	1-210-840-11	220k	1/16W	micro
R707	1-210-384-11	47k	1/16W	micro
R708	1-204-122-11	1k	1/16W	micro
R709	1-210-844-11	470k	1/16W	micro
R713	1-214-169-00	36k	¼W	metal oxide
R801	1-204-122-11	1k	1/16W	micro
R802	1-246-771-11	100k	1/8W	carbon
R810	1-210-840-11	220k	1/16W	micro
R811	1-210-388-11	68k	1/16W	micro
R812	1-204-122-11	1k	1/16W	micro
R813	1-209-777-11	6.8k	1/16W	micro
R906, 907	1-246-798-11	18k	1/8W	carbon
RV101,201	1-224-252-XX	10k-B, adjustable LEVEL METER		
RV301	1-224-254-XX	47k-B, adjustable; BATTERY INDICATION METER		
RV401,501	1-224-252-XX	10k-B, adjustable; PB LEVEL		
RV402,502	1-224-252-XX	10k-B, adjustable; REC LEVEL		
RV701	1-226-274-00	20k-B, adjustable; TAPE SPEED		
RV901	1-226-273-00	20kΩ-A, variable; REC LEVEL		
RV902	1-226-272-00	20k-A, variable; MONITOR LEVEL		
		SWITCHES		
S301	1-516-846-00	Slide, MIC ATT		
S601	1-514-254-00	Slide, REC/PB		
S901	1-514-346-00	Leaf, BATTERY CHECK/ LIGHT		
S902	1-552-478-00	Miniature, TYPE II		
S903–905	1-552-477-00	Lever-slide; TAPE SELECT, DOLBY NR, LIMITER		
S906–908	1-514-346-00	Leaf, POWER, FWD, rec-pb/mute		
S909	1-516-133-XX	Slide, REC MODE		
		JACKS		
CN901,902	A-3018-034-A	Connector, MICROPHONE		
CNJ901	1-507-655-00	LINE OUT		
J903	1-507-477-XX	HEADPHONES		
		MISCELLANEOUS		
CP601	1-464-081-00	DC-DC Converter		
HE901	8-825-692-00	Head, erase; EF168-36A		
HRP901	8-825-584-00	Head, record/playback; PF145-3602A		
M901	X-3556-235-1	Motor Ass'y		
ME901	1-520-350-00	Meter, level (LEFT)		
ME902	1-520-351-00	Meter, level (RIGHT)		
PL901	1-518-134-XX	Lamp 100mA/2V		
RM701	8-845-101-01	Head, speed detecting DM-101		
SP901	1-502-582-00	Speaker		
	1-452-130-00	Magnet		

ACCESSORIES AND PACKING MATERIALS

Part No.	*Description*
X-3556-239-1	Belt Ass'y, carring
X-3701-105-1	Tip Ass'y, head cleaning
1-551-734-11	Cord, connector; RK-74A
3-527-213-02	Label, serial number
3-557-848-01	Box, accessories
3-557-850-01	Cushion
3-557-859-01	Label, specification
3-557-837-01	Case, carring
3-557-874-01	Belt
3-557-875-01	Spacer, carring case
3-557-876-01	Carton
3-701-625-01	Bag, plastic
3-701-631-01	Bag, plastic
3-770-908-51	Manual, instruction
3-793-828-11	Card, cassette caution
3-882-538-02	Metal, carring adjust

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ELECTROLYTIC CAPACITORS

Note: Circled letter (Ⓐ to Ⓩ) are applicable to European models only.

CAP. (μF)	RATING → : Use the high voltage rated one.					
	6.3 VOLT.	10 VOLT.	16 VOLT.	25 VOLT.	35 VOLT.	50 VOLT.
	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
0.47					→	1-121-726-00 Ⓐ
1.0					→	1-121-391-00 Ⓐ
2.2					→	1-121-450-00 Ⓐ
3.3	→	→	→	1-121-392-00 Ⓐ	→	1-121-393-00 Ⓐ
4.7	→	→	→	1-121-395-00 Ⓐ	→	1-121-396-00 Ⓐ
10	→	→	1-121-651-00 Ⓐ	1-121-398-00 Ⓐ	→	1-121-738-00 Ⓐ
22	→	→	1-121-479-00 Ⓐ	1-121-480-00 Ⓐ	1-121-662-00 Ⓐ	1-121-152-00 Ⓐ
33	→	→	1-121-403-00 Ⓐ	1-121-404-00 Ⓐ	1-121-652-00 Ⓑ	1-121-405-00 Ⓐ
47	→	1-121-352-00 Ⓐ	1-121-409-00 Ⓐ	1-121-410-00 Ⓐ	1-121-653-00 Ⓑ	1-121-411-00 Ⓐ
100	→	1-121-414-00 Ⓐ	1-121-415-00 Ⓐ	1-121-416-00 Ⓐ	1-121-357-00 Ⓑ	1-121-417-00 Ⓑ
220	1-121-419-00 Ⓑ	1-121-420-00 Ⓑ	1-121-421-00 Ⓐ	1-121-422-00 Ⓑ	1-121-261-00 Ⓒ	1-121-423-00 Ⓑ
330	1-121-751-00 Ⓑ	1-121-805-00 Ⓑ	1-121-521-00 Ⓒ	1-121-654-00 Ⓑ	1-121-655-00 Ⓓ	1-121-656-00 Ⓒ
470	1-121-424-00 Ⓑ	1-121-425-00 Ⓒ	1-121-426-00 Ⓒ	1-121-733-00 Ⓑ	1-121-361-00 Ⓔ	1-121-810-00 Ⓓ
1000	–	1-121-736-00 Ⓒ	1-121-245-00 Ⓓ	1-121-657-00 Ⓓ	1-121-388-00 Ⓔ	1-123-061-00 Ⓕ
2200	1-121-658-00 Ⓑ	1-121-659-00 Ⓒ	1-121-660-00 Ⓓ	1-123-067-00 Ⓕ	1-121-984-00 Ⓕ	–
3300	1-121-661-00 Ⓓ	1-123-075-00 Ⓔ	1-123-071-00 Ⓕ	–	–	–

CAP. (μF)	100 VOLT.	160 VOLT.	250 VOLT.	350 VOLT.
	PART No.	PART No.	PART No.	PART No.
0.47	–	–	–	–
1.0	1-123-249-00 Ⓐ	1-123-252-00 Ⓐ	1-123-003-00 Ⓑ	1-121-168-00 Ⓑ
2.2	1-123-250-00 Ⓐ	1-123-026-00 Ⓑ	–	1-123-028-00 Ⓑ
3.3	1-121-995-00 Ⓐ	–	1-123-004-00 Ⓑ	1-123-006-00 Ⓒ
4.7	1-123-255-00 Ⓐ	1-121-246-00 Ⓑ	1-121-759-00 Ⓑ	1-123-007-00 Ⓓ
10	1-121-126-00 Ⓑ	1-121-999-00 Ⓑ	1-123-254-00 Ⓒ	1-123-008-00 Ⓓ
22	1-121-996-00 Ⓒ	1-123-253-00 Ⓒ	1-123-005-00 Ⓓ	1-123-022-00 Ⓓ
33	1-121-997-00 Ⓒ	1-121-757-00 Ⓒ	–	–
47	1-123-251-00 Ⓒ	1-121-919-00 Ⓒ	–	–
100	1-123-084-00 Ⓔ	–	–	–

CERAMIC CAPACITORS Ⓐ

CAP. (pF)	RATING 50 VOLT. PART No.	CAP. (pF)	50 VOLT. PART No.	CAP. (pF)	50 VOLT. PART No.	CAP. (μF)	50 VOLT. PART No.
0.5	1-101-837-00	22	1-102-959-00	150	1-101-361-00	0.001	1-102-074-00
0.75	1-101-586-00	24	1-102-960-00	160	1-101-367-00	0.0012	1-102-118-00
1.0	1-102-934-00	27	1-102-961-00	180	1-102-976-00	0.0015	1-102-119-00
1.5	1-101-576-00	30	1-102-962-00	200	1-102-977-00	0.0018	1-102-120-00
2.0	1-102-935-00	33	1-102-963-00	220	1-102-978-00	0.0022	1-102-121-00
3	1-102-936-00	36	1-102-964-00	240	1-102-979-00	0.0027	1-102-122-00
4	1-102-937-00	39	1-102-965-00	270	1-102-980-00	0.0033	1-102-123-00
5	1-102-942-00	43	1-102-966-00	300	1-102-981-00	0.0039	1-102-124-00
6	1-102-943-00	47	1-101-880-00	330	1-102-820-00	0.0047	1-102-125-00
7	1-102-944-00	51	1-101-882-00	360	1-102-821-00	0.0056	1-102-126-00
8	1-102-945-00	56	1-101-884-00	390	1-102-822-00	0.0068	1-102-127-00
9	1-102-946-00	62	1-101-886-00	430	1-102-823-00	0.0082	1-102-128-00
10	1-102-947-00	68	1-101-888-00	470	1-102-824-00	0.01	1-102-129-00
11	1-102-948-00	75	1-101-890-00	510	1-101-059-00	0.022	1-101-005-00
12	1-102-949-00	82	1-102-971-00	560	1-102-115-00	0.047	1-101-006-00
13	1-102-950-00	91	1-102-972-00	680	1-102-116-00		
15	1-102-951-00	100	1-102-973-00	820	1-102-117-00		
16	1-102-952-00	110	1-102-815-00				
18	1-102-953-00	120	1-102-816-00				
20	1-102-958-00	130	1-101-081-00				

0.001μF = 1,000pF

CERAMIC (SEMICONDUCTOR) CAPACITORS Ⓐ

CAP. (μF)	RATING → : Use the high voltage rated one. 25 VOLT. PART No.	50 VOLT. PART No.	CAP. (μF)	25 VOLT. PART No.	50 VOLT. PART No.
0.001	→	1-161-039-00	0.018	1-161-016-00	1-161-054-00
0.0012	→	1-161-040-00	0.022	1-161-017-00	1-161-055-00
0.0015		1-161-041-00	0.027	1-161-018-00	1-161-056-00
0.0018		1-161-042-00	0.033	1-161-019-00	1-161-057-00
0.0022		1-161-043-00	0.039	1-161-010-00	1-161-058-00
0.0027	→	1-161-044-00	0.047	1-161-021-00	1-161-059-00
0.0033	→	1-161-045-00	0.056	→	1-161-060-00
0.0039	→	1-161-046-00	0.068	→	1-161-061-00
0.0047	→	1-161-047-00	0.082	1-161-024-00	1-161-062-00
0.0056	→	1-161-048-00	0.1	1-161-025-00	1-161-063-00
0.0068	→	1-161-049-00			
0.0082	1-161-012-00	1-161-050-00			
0.01	1-161-013-00	1-161-051-00			
0.012	→	1-161-052-00			
0.015	1-161-015-00	1-161-053-00			

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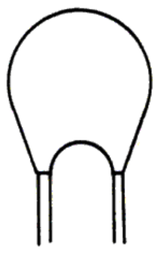
MYLAR CAPACITORS Ⓐ

Note: Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

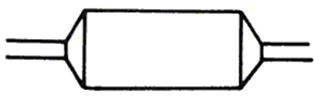
CAP. (μF)	RATING											
	50 VOLT.	100 VOLT.	200 VOLT.		50 VOLT.	100 VOLT.	200 VOLT.		50 VOLT.	100 VOLT.	200 VOLT.
	PART No.	PART No.	PART No.		PART No.	PART No.	PART No.		PART No.	PART No.	PART No.
0.001	1-108-227-00	1-108-365-00	1-108-409-00	0.01	1-108-239-00	1-108-377-00	1-108-421-00	0.1	1-108-251-00	1-108-389-00	1-108-433-00
0.0012	1-108-351-00	1-108-366-00	1-108-410-00	0.012	1-108-357-00	1-108-378-00	1-108-422-00	0.12	1-108-363-00	1-108-390-00	1-108-434-00
0.0015	1-108-228-00	1-108-367-00	1-108-411-00	0.015	1-108-240-00	1-108-379-00	1-108-423-00	0.15	1-108-252-00	1-108-391-00	1-108-435-00
0.0018	1-108-352-00	1-108-368-00	1-108-412-00	0.018	1-108-358-00	1-108-380-00	1-108-424-00	0.18	1-108-364-00	1-108-392-00	1-108-436-00
0.0022	1-108-230-00	1-108-369-00	1-108-413-00	0.022	1-108-242-00	1-108-381-00	1-108-425-00	0.22	1-108-254-00	1-108-393-00	1-108-437-00
0.0027	1-108-353-00	1-108-370-00	1-108-414-00	0.027	1-108-359-00	1-108-382-00	1-108-426-00	0.27	1-108-854-00	–	–
0.0033	1-108-232-00	1-108-371-00	1-108-415-00	0.033	1-108-244-00	1-108-383-00	1-108-427-00	0.33	1-108-855-00	–	–
0.0039	1-108-354-00	1-108-372-00	1-108-416-00	0.039	1-108-360-00	1-108-384-00	1-108-428-00	0.39	1-108-856-00	–	–
0.0047	1-108-234-00	1-108-373-00	1-108-417-00	0.047	1-108-246-00	1-108-385-00	1-108-429-00	0.47	1-108-857-00	–	–
0.0056	1-108-355-00	1-108-374-00	1-108-418-00	0.056	1-108-361-00	1-108-386-00	1-108-430-00				
0.0068	1-108-237-00	1-108-375-00	1-108-419-00	0.068	1-108-249-00	1-108-387-00	1-108-431-00				
0.0082	1-108-356-00	1-108-376-00	1-108-420-00	0.082	1-108-362-00	1-108-388-00	1-108-432-00				

TANTALUM CAPACITORS



CAP. (μF)	RATING → : Use the high voltage rated one.						
	3.15 VOLT.	6.3 VOLT.	10 VOLT.	16 VOLT.	20 VOLT.	25 VOLT.	35 VOLT.
	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
0.01					→	→	1-131-396-00 Ⓑ
0.015						→	1-131-397-00 Ⓑ
0.022						→	1-131-398-00 Ⓑ
0.033						→	1-131-399-00 Ⓑ
0.047						→	1-131-400-00 Ⓑ
0.068					→	→	1-131-401-00 Ⓑ
0.1					→	→	1-131-402-00 Ⓑ
0.15					→	→	1-131-403-00 Ⓑ
0.22					→	→	1-131-404-00 Ⓑ
0.33					→	1-131-409-00 Ⓑ	1-131-405-00 Ⓑ
0.47	–	–	–	–	1-131-412-00 Ⓑ	→	1-131-406-00 Ⓑ
0.68	–	–	–	1-131-415-00 Ⓑ	→	1-131-410-00 Ⓑ	1-131-407-00 Ⓑ
1.0	–	–	1-131-418-00 Ⓑ	–	1-131-413-00 Ⓑ	→	1-131-408-00 Ⓑ
1.5	–	1-131-421-00 Ⓑ	–	1-131-416-00 Ⓑ	→	1-131-411-00 Ⓑ	1-131-348-00 Ⓑ
2.2	1-131-424-00 Ⓑ	–	1-131-419-00 Ⓑ	–	1-131-414-00 Ⓑ	1-131-355-00 Ⓑ	1-131-349-00 Ⓑ
3.3	–	1-131-422-00 Ⓑ	–	1-131-417-00 Ⓑ	1-131-362-00 Ⓑ	1-131-356-00 Ⓑ	1-131-350-00 Ⓑ
4.7	1-131-425-00 Ⓑ	–	1-131-420-00 Ⓑ	1-131-369-00 Ⓑ	1-131-363-00 Ⓑ	1-131-357-00 Ⓑ	1-131-351-00 Ⓒ
6.8	–	1-131-423-00 Ⓑ	1-131-376-00 Ⓑ	1-131-370-00 Ⓑ	1-131-364-00 Ⓑ	1-131-358-00 Ⓒ	1-131-352-00 Ⓒ
10	1-131-426-00 Ⓑ	1-131-383-00 Ⓑ	1-131-377-00 Ⓑ	1-131-371-00 Ⓑ	1-131-365-00 Ⓒ	1-131-359-00 Ⓒ	1-131-353-00 Ⓓ
15	1-131-390-00 Ⓑ	1-131-384-00 Ⓑ	1-131-378-00 Ⓑ	1-131-372-00 Ⓑ	1-131-366-00 Ⓒ	1-131-360-00 Ⓓ	–
22	1-131-391-00 Ⓑ	1-131-385-00 Ⓑ	1-131-379-00 Ⓒ	1-131-373-00 Ⓒ	1-131-367-00 Ⓓ		
33	1-131-392-00 Ⓑ	1-131-386-00 Ⓒ	1-131-380-00 Ⓒ	1-131-374-00 Ⓓ			
47	1-131-393-00 Ⓒ	1-131-387-00 Ⓒ	1-131-381-00 Ⓓ	–			
68	1-131-394-00 Ⓑ	1-131-388-00 Ⓒ	–	–			
100	1-131-395-00 Ⓓ	–	–	–			

TANTALUM CAPACITORS



CAP. (μF)	RATING					
	3 VOLT.	6.3 VOLT.	10 VOLT.	16 VOLT.	20 VOLT.	35 VOLT.
	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
0.033						1-131-273-00 Ⓔ
0.047						1-131-274-00 Ⓔ
0.068						1-131-275-00 Ⓔ
0.1						1-131-276-00 Ⓓ
0.15						1-131-277-00 Ⓓ
0.22			–	–	1-131-262-00 Ⓓ	1-131-278-00 Ⓓ
0.33			–	–	1-131-263-00 Ⓓ	1-131-279-00 Ⓓ
0.47			1-131-169-00 Ⓓ	–	1-131-264-00 Ⓓ	1-131-280-00 Ⓓ
0.68			–	1-131-258-00 Ⓓ	1-131-265-00 Ⓓ	1-131-281-00 Ⓓ
1.0			1-131-254-00 Ⓓ	–	1-131-266-00 Ⓓ	1-131-282-00 Ⓓ
1.5		1-131-250-00 Ⓓ	–	–	1-131-267-00 Ⓓ	1-131-283-00 Ⓔ
2.2		–	–	1-131-259-00 Ⓓ	1-131-268-00 Ⓓ	1-131-284-00 Ⓔ
3.3		–	1-131-255-00 Ⓓ	–	1-131-269-00 Ⓓ	–
4.7		1-131-251-00 Ⓔ	1-131-171-00 Ⓓ	–	1-131-270-00 Ⓓ	–
6.8		–	–	1-131-260-00 Ⓓ	1-131-271-00 Ⓔ	–
10	–	–	1-131-256-00 Ⓓ	–	1-131-272-00 Ⓔ	–
15	–	1-131-252-00 Ⓓ	–	1-131-261-00 Ⓔ		
22	–	–	1-131-257-00 Ⓔ	–		
33	1-131-176-00 Ⓓ	1-131-253-00 Ⓔ	1-131-173-00 Ⓒ	–		
47	1-131-288-00 Ⓕ	1-131-174-00 Ⓓ	–	–		
100	1-131-177-00 Ⓓ					

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1/4 WATT CARBON RESISTORS Ⓐ

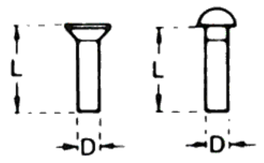
Note: Circled letter Ⓐ is applicable to European models only.

Ω	*Part No.*	Ω	*Part No.*	Ω	*Part No.*	Ω	*Part No.*	Ω	*Part No.*	Ω	*Part No.*	Ω	*Part No.*
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00	1.0M	1-246-545-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00	1.1M	1-210-814-00
1.2	1-246-403-00	12	1-246-427-00	120	1-246-451-00	1.2k	1-246-475-00	12k	1-246-499-00	120k	1-246-523-00	1.2M	1-210-815-00
1.3	1-246-404-00	13	1-246-428-00	130	1-246-452-00	1.3k	1-246-576-00	13k	1-246-500-00	130k	1-246-524-00	1.3M	1-210-816-00
1.5	1-246-405-00	15	1-246-429-00	150	1-246-453-00	1.5k	1-246-577-00	15k	1-246-501-00	150k	1-246-525-00	1.5M	1-210-817-00
1.6	1-246-406-00	16	1-246-430-00	160	1-246-454-00	1.6k	1-246-578-00	16k	1-246-502-00	160k	1-246-526-00	1.6M	1-210-818-00
1.8	1-246-407-00	18	1-246-431-00	180	1-246-455-00	1.8k	1-246-579-00	18k	1-246-503-00	180k	1-246-527-00	1.8M	1-210-819-00
2.0	1-246-408-00	20	1-246-432-00	200	1-246-456-00	2.0k	1-246-580-00	20k	1-246-504-00	200k	1-246-528-00	2.0M	1-210-820-00
2.2	1-246-409-00	22	1-246-433-00	220	1-246-457-00	2.2k	1-246-581-00	22k	1-246-505-00	220k	1-246-529-00	2.2M	1-210-821-00
2.4	1-246-410-00	24	1-246-434-00	240	1-246-458-00	2.4k	1-246-582-00	24k	1-246-506-00	240k	1-246-530-00	2.4M	1-244-754-00
2.7	1-246-411-00	27	1-246-435-00	270	1-246-459-00	2.7k	1-246-583-00	27k	1-246-507-00	270k	1-246-531-00	2.7M	1-244-755-00
3.0	1-246-412-00	30	1-246-436-00	300	1-246-460-00	3.0k	1-246-584-00	30k	1-246-508-00	300k	1-246-532-00	3.0M	1-244-756-00
3.3	1-246-413-00	33	1-246-437-00	330	1-246-461-00	3.3k	1-246-585-00	33k	1-246-509-00	330k	1-246-533-00	3.3M	1-244-757-00
3.6	1-246-414-00	36	1-246-438-00	360	1-246-462-00	3.6k	1-246-586-00	36k	1-246-510-00	360k	1-246-534-00	3.6M	1-244-758-00
3.9	1-246-415-00	39	1-246-439-00	390	1-246-463-00	3.9k	1-246-587-00	39k	1-246-511-00	390k	1-246-535-00	3.9M	1-244-759-00
4.3	1-246-416-00	43	1-246-440-00	430	1-246-464-00	4.3k	1-246-488-00	43k	1-246-512-00	430k	1-246-536-00	4.3M	1-244-760-00
4.7	1-246-417-00	47	1-246-441-00	470	1-246-465-00	4.7k	1-246-489-00	47k	1-246-513-00	470k	1-246-537-00	4.7M	1-244-761-00
5.1	1-246-418-00	51	1-246-442-00	510	1-246-466-00	5.1k	1-246-490-00	51k	1-246-514-00	510k	1-246-538-00	5.1M	1-244-762-00
5.6	1-246-419-00	56	1-246-443-00	560	1-246-467-00	5.6k	1-246-491-00	56k	1-246-515-00	560k	1-246-539-00		
6.2	1-246-420-00	62	1-246-444-00	620	1-246-468-00	6.2k	1-246-492-00	62k	1-246-516-00	620k	1-246-540-00		
6.8	1-246-421-00	68	1-246-445-00	680	1-246-469-00	6.8k	1-246-493-00	68k	1-246-517-00	680k	1-246-541-00		
7.5	1-246-422-00	75	1-246-446-00	750	1-246-470-00	7.5k	1-246-494-00	75k	1-246-518-00	750k	1-246-542-00		
8.2	1-246-423-00	82	1-246-447-00	820	1-246-471-00	8.2k	1-246-495-00	82k	1-246-519-00	820k	1-246-543-00		
9.1	1-246-424-00	91	1-246-448-00	910	1-246-472-00	9.1k	1-246-496-00	91k	1-246-520-00	910k	1-246-544-00		

HARDWARE NOMENCLATURE

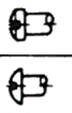
Screw:

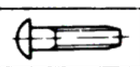
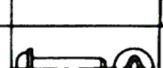
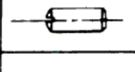
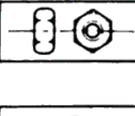
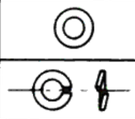
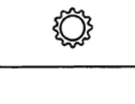
– P 3 x 10
- *L: Length in mm*
- *D: Diameter in mm*
- *Type of head*
- *Indicated slotted-head only. Unless otherwise indicated, it means cross-recessed head (Phillips type).*



Nut, Washer, Retaining ring:

N 3
- *Diameter of usable screw or shaft*
- *Reference designation*

Reference Designation	Shape	Description	Remarks
SCREWS			
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		braizer-head screw	

Reference Designation	Shape	Description	Remarks
SELF-TAPPING SCREWS			
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
SET SCREWS			
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
NUT			
N		nut	
WASHERS			
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
RETAINING RINGS			
E		retaining ring	
G		grip-type retaining ring	

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