

# SONY®

## TROUBLESHOOTING GUIDE

# WM-10 WM-20

STEREO CASSETTE PLAYER

*US, Canadian Model*

*AEP, UK, E Model*

Sony Corporation

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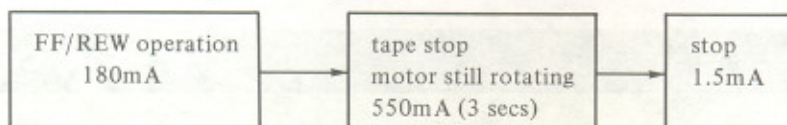
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This book is for quick and easy repairing.  
File with the service manual.



**(1) General Precautions for Repair**

- 1) There is a safety switch built into the headphone jack, but it does not operate unless the headphone plug is plugged in.
- 2) When screwing in the control panel and audio board screws, be sure to insert a cassette tape first.  
Reason: If pressure is applied to the tape transport reel chassis, its plane is affected.
- 3) When performing repair which involves the removal of the function plate block or sleeve ass'y, be sure to check shut-off for FWD.
- 4) In FF/REW mode, there is a rolling noise for about 3 seconds at tape end, then the motor stops. Check by referring to the power changes below.



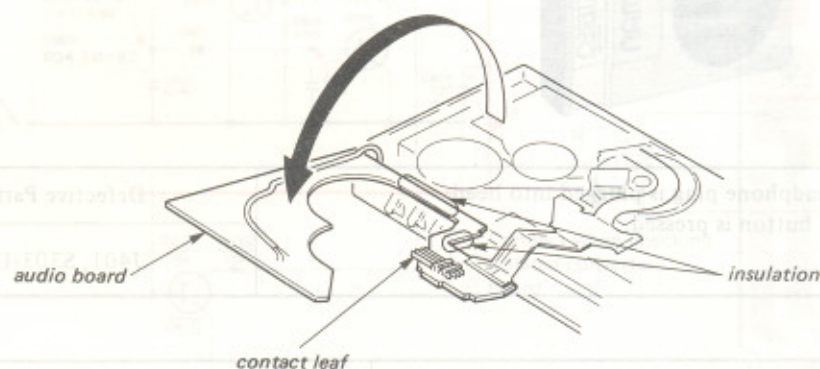
- 5) Do not reuse the capstan bush after having removed it.
- 6) By removing the audio board from the set and touching S303-1 (Power ON) the motor will rotate without pushing the FWD button (belt is on).  
There will be a clicking noise, but this is not a defect, and will stop when the FWD button is pushed.
- 7) Defective soldering, pattern cuts, parts touching, etc. are not included under "Defective Parts" and "Defective Locations", but be sure to check these also.



- No Operation
- Noise when battery is worn out (less than 0.9V)

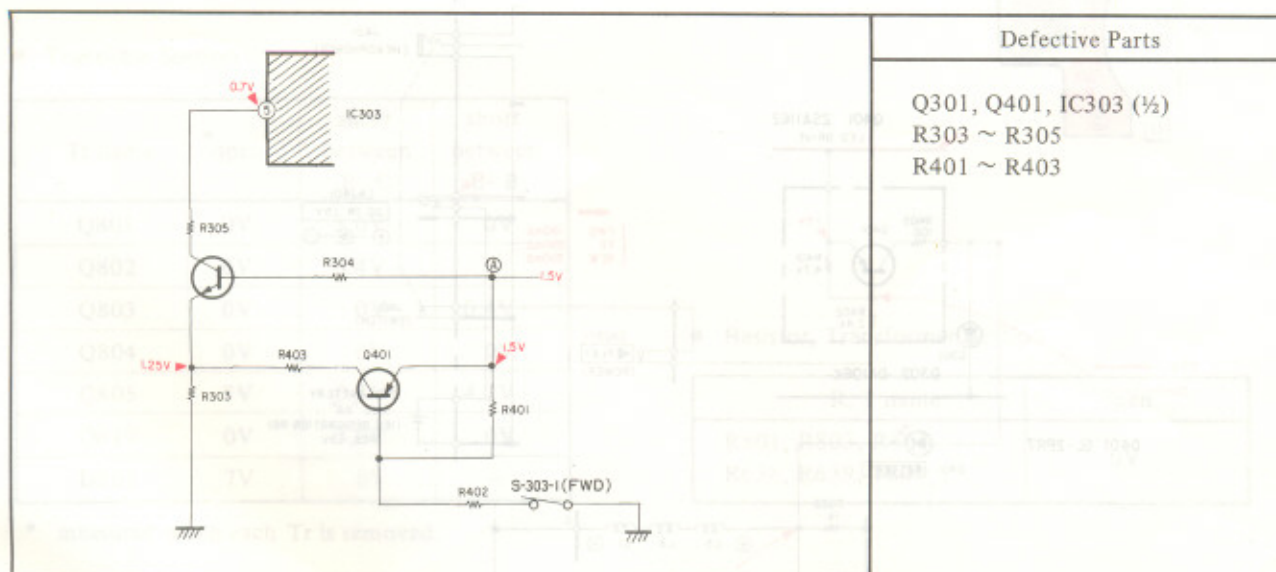
- No Operation

Cause	Defective Location
Battery worn out Battery terminal plate dirty.	Clean terminal plate (Daifron solvent)
Dirty leaf switch contact point.	S303-1 contact point cleaning (Daifron solvent)
Battery short: battery + terminal and audio board ground touched.	Stick insulation on audio board.
Short of function plate ass'y mounting screw tip and audio board pattern.	Stick insulation on audio board.



- Noise when battery is worn out

Operation: When ① becomes 1.0V, Q401 goes off, Q301 turns on, grounds IC303 ⑤ and reduces buzz noise.

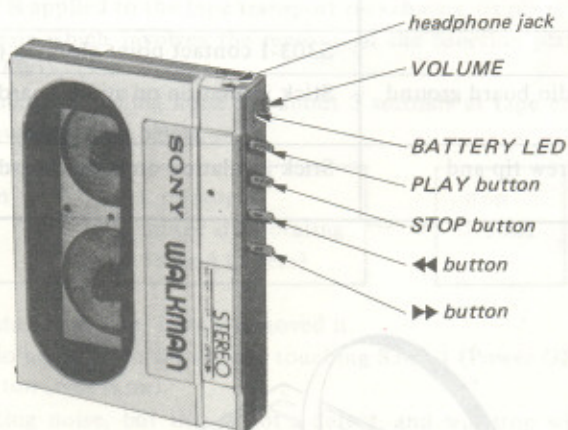




- No Power
- LED does not light up
- No converter operation
- Converter Board Simple Check Method

## • No Power

If the battery LED lights up and reel table rotates when the headphone plug is plugged into the headphone jack and PLAY button is pressed, OK.



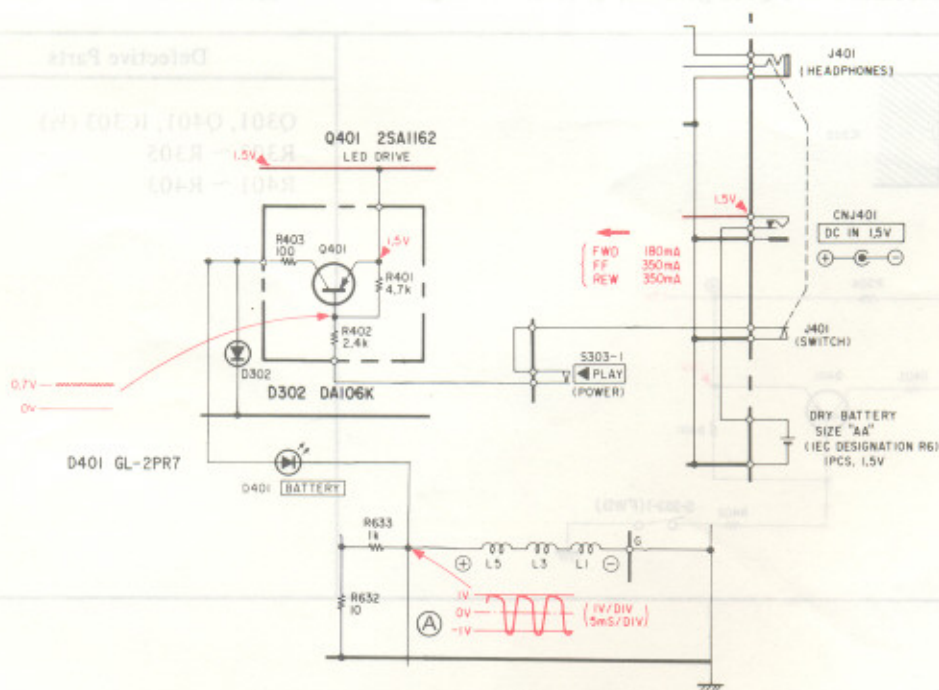
No operation when headphone plug is plugged into headphone jack and PLAY button is pressed.

Defective Part

J401, S303-1

## • LED does not light up

Voltage, Waveform	Defective Parts	Notes
<p>(A)</p>	<p>D401, R401 ~ R403 } open</p> <p>Q401, L1, L3, L5</p> <p>flexible board</p> <p>D302 short</p>	<p>This LED (D401) uses motor reverse voltage, so does not light up if the motor does not rotate.</p> <p>Lights up at 2.5V</p>





- No converter operation

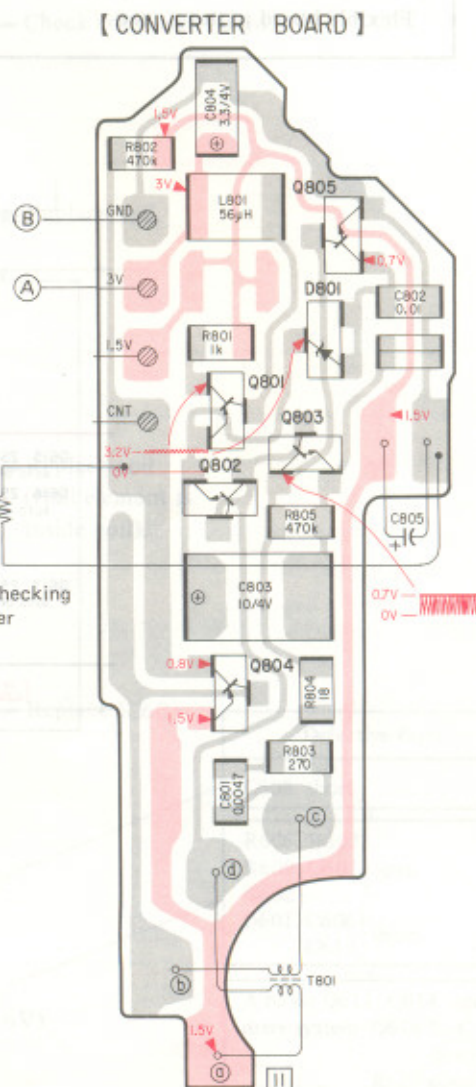
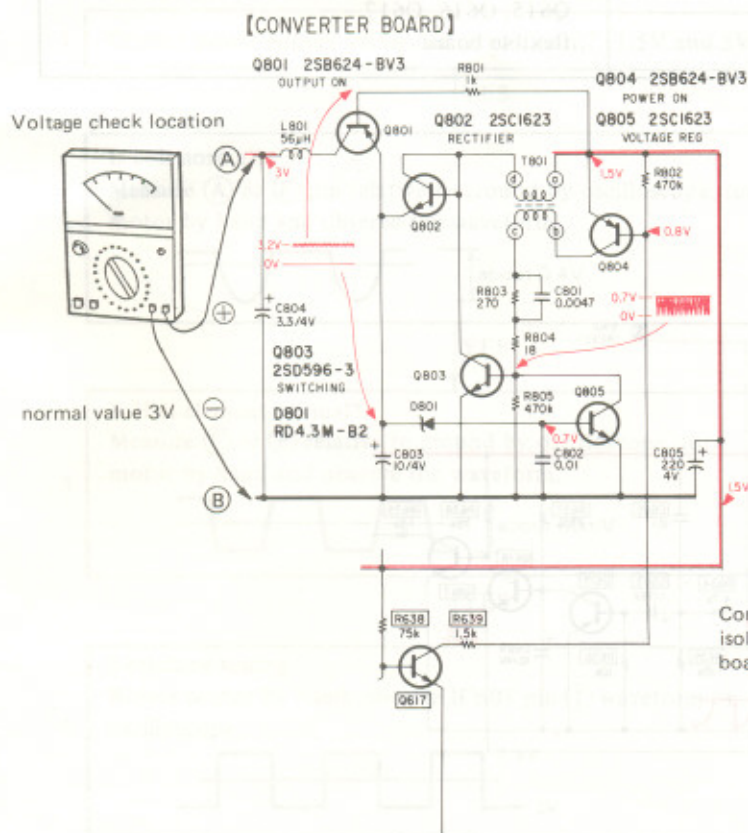
Operation:

1.5V is first made AC, raised to 3.0V, then DC 3.0V is obtained. Frequency approx. 100kHz.

- Converter Board Simple Check Method

When the converter board is on the servo board (A), check for 3V between (A) and (B).

When the converter board is by itself, solder on a 1.5k $\Omega$  resistor as shown in the figure below and check for 3V between (A) and (B).



- Transistor Section

Tr name	* open	short between E-C	short between E-B
Q801	0V	3.0V	0V
Q802	0V	0.4V	—
Q803	0V	0V	0.4V
Q804	0V	0V	0V
Q805	7V	0.5V	4.2V
Q617	0V	3.0V	0V
D801	7V	0V	—

\* measured when each Tr is removed.

- Resistor, Transformer Section

R, T name	open
R801, R803, R804, R638, R639, T801	0V







- No Muting
- No Sound (FWD, but no sound)
- Low level
- No Dolby
- Hum Noise during Playback
- Noise on L-CH

- No Muting

Operation:

Mutes click noise immediately after power on at power IC (IC303) pin ⑩.

During FF/REW, IC303 pin ① becomes 0.2V and muting is applied.

IC303 pin ⑩

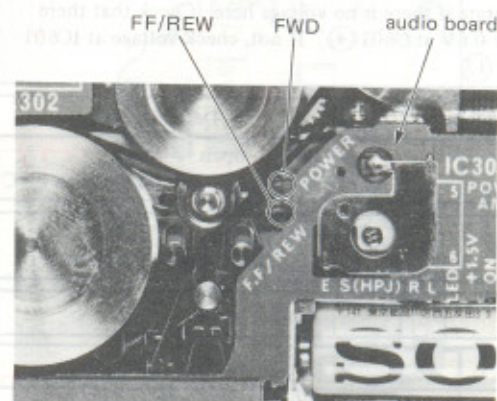
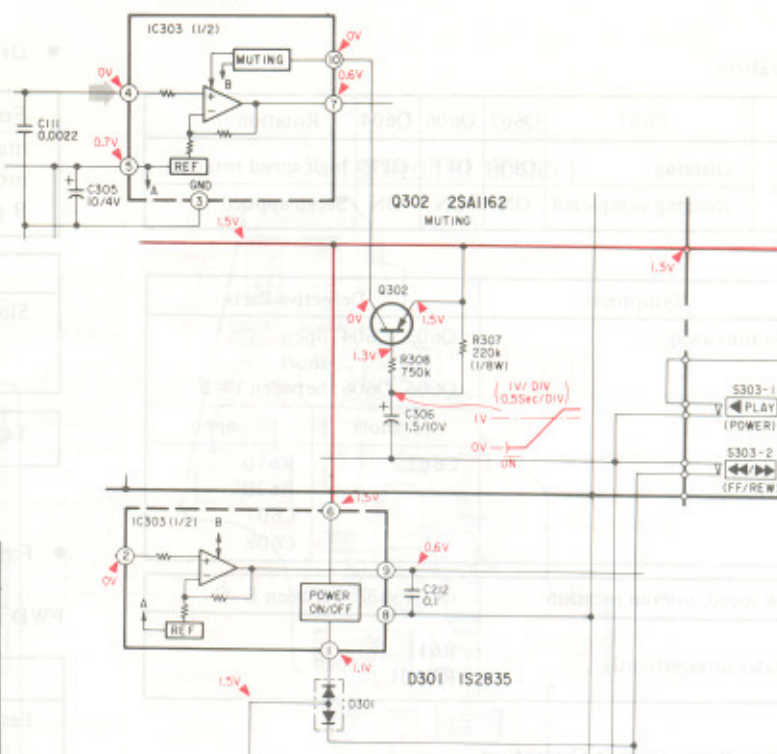
Voltage, Waveform	Defective Parts
	Q302, R307, R308 C306, IC303

IC303 pin ①

Voltage, Waveform	Defective Parts
	D301, IC303

Note: Use an oscilloscope to measure IC303 pin ① voltage.

IC303 CX-20089  
POWER AMP



- No Sound (FWD, but no sound)

Cause	Remedy
Head lead open, defective head contact.	Check head lead, head position.
If leaf switch S303-2 (FF/REW) is on, muting is applied.	Move audio board in direction of the arrow to change FF/REW switch contact point.
Defective preamp IC (IC301), Dolby IC (IC302), power IC (IC303), circuit structural parts, or audio volume defective.	Check IC301, IC302, IC303, Circuit parts, audio volume
Defective contact point because of ground plate solder on rear of audio board.	Check ground plate solder. (8 locations)
No playback level.	*See next page "Level".



## \* Conditions

DOLBY: OFF  
 TYPE: NORMAL  
 standard tape: P-4-L81  
 Headphone connected

HEAD IN IC301 L⑧ } 1mVp-p  
 IC301 R① }  
 PRE AMP IC301 L⑩ } 60mVp-p  
 IC301 R⑮ }  
 DOLBY OUT IC302 L⑭ } 110mVp-p  
 IC302 R③ }  
 Adjust so that VR OUT is 60mVp-p.  
 POWER AMP IC303 L④ } 60mVp-p  
 INPUT IC303 R② }  
 HEADPHONE OUT 700mVp-p

## ● Low Level

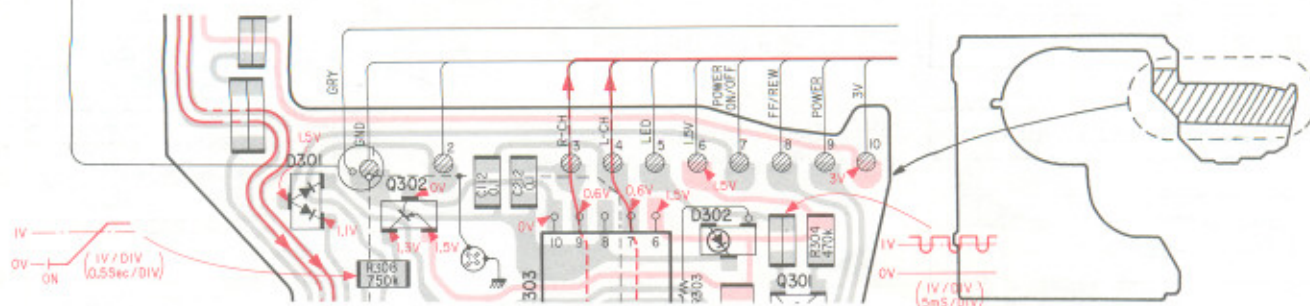
Cause	Defective Locations		
Dolby (PB) level off	Adjust variable resistors (RV101, 201) so that sound volume entrance is $-27.7\text{dBs} \pm 1\text{dB}$ when standard tape is played back.		
$-27.7\text{dBs}$	actual value	$0.028\text{V} \sim 0.036\text{V}$	Measure by VTVM
$\pm 1\text{dB}$	P-P	$79.2\text{mVp-p} \sim 102\text{mVp-p}$	Measure by oscilloscope

## ● No Dolby

Cause	Defective Parts	
Dolby circuit	IC302	L-CH R111, R106 ~ R109, C104 ~ C109
Dolby adjustment also should be checked	S302	
	R302	R211, R206 ~ R209, C204 ~ C209

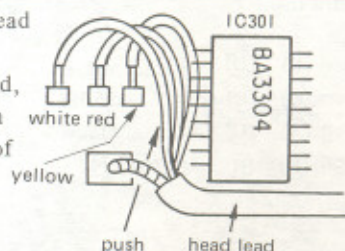
## ● Hum Noise during Playback

Cause	Remedy
Generated when battery voltage is down.	Replace batteries.
Defective soldering on flexible board next to Q302 (GND pattern) and GRY lead (for GND).	Repair soldering on flexible board and GRY lead.



## ● Noise on L-CH

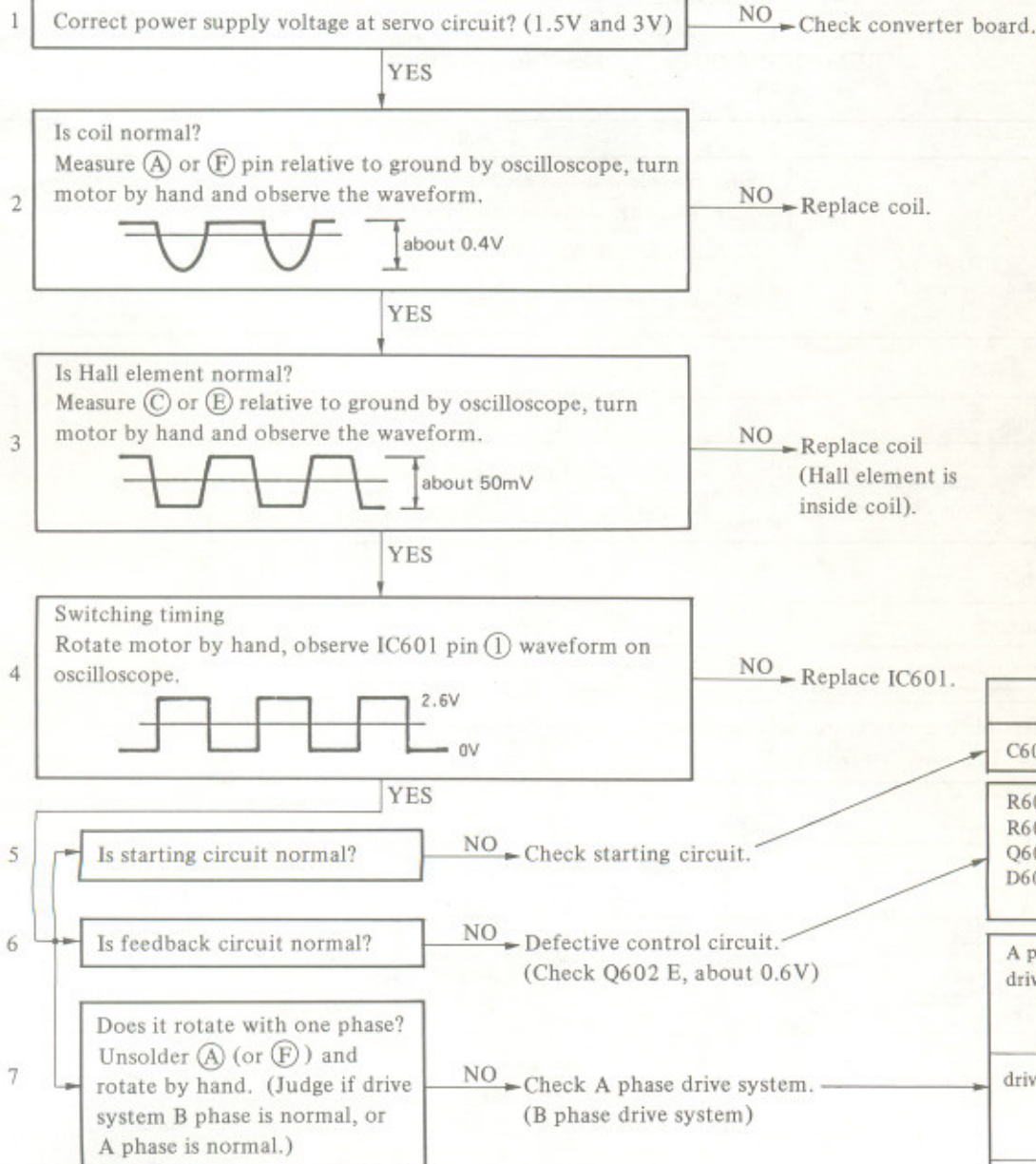
Cause	Defective Location
Rotation switch (S901) noise goes onto head lead.	Change head lead positioning. Press white, red, yellow leads in the direction of the arrow.





- No Motor Rotation
- Motor Coil Check Method
- Fast, Slow Speed
- No Speed Acceleration
- Servo Board (A) (B) Simple Check Method

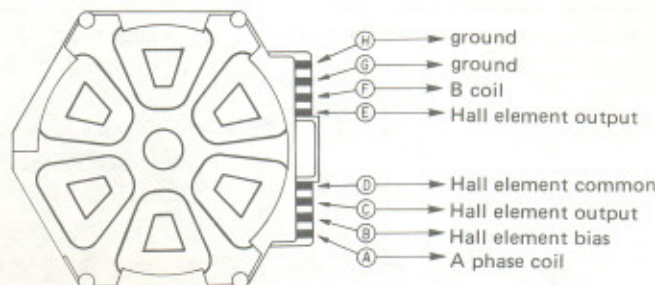
• No Motor Rotation



Defective Parts	
C608	short
R606, R607 R609, Q601 Q602	open
D601, C606 C610	short
A phase Q611, Q614 drive system Q614 E-C	open
	short
R627	open
drive system Q608 E-C	short
	short
C601	short
common R603, R621	open

• Motor Coil Check Method

- a. Hall element between (B) - (D) } normal value  
between (C) - (E) } 240Ω-550Ω
- b. coil check between (A) - (G) } normal value  
between (F) - (H) } approx. 1Ω



• Starting Circuit Operation

Q605	
Goes on by motor reverse voltage at the same time as motor rotation.	ch ch

Tape runs

Slow speed,

Rotates into

• Feedback

Motor can  
is approxi  
pins ⑩,

Tape runs a

Tends to ru

Slightly fast

Rotation un



## Circuit Operation

	C607	Q603	Q606	Q604	Rotation
For reverse	charging	OFF	OFF	OFF	high speed rotation
the time as	charging completed	ON	ON	ON	Servo applied

Symptoms	Defective Parts
Tape runs away.	Q603, Q604 } open
	} short
	Q605, Q606 } between E-B
	short      open
	C607      R610 R620 C607 C608

Slow speed, uneven rotation	Q604 short between E-C
Rotates intermittently	R611 } open RV601 }

## • Feedback Circuit Operation

Motor cannot rotate if there is no voltage here. Check that there is approximately 0.6V at C601 (+). If not, check voltage at IC601 pins (10), (11), (13).

Symptoms	Defective Parts
Tape runs away	R605 open Q601, Q602 short between E-C
Tends to run slow	C606 open Q602 short between E-B
Slightly fast	D601 open
Rotation uneven	R628 open

## • Drive Circuit Operation

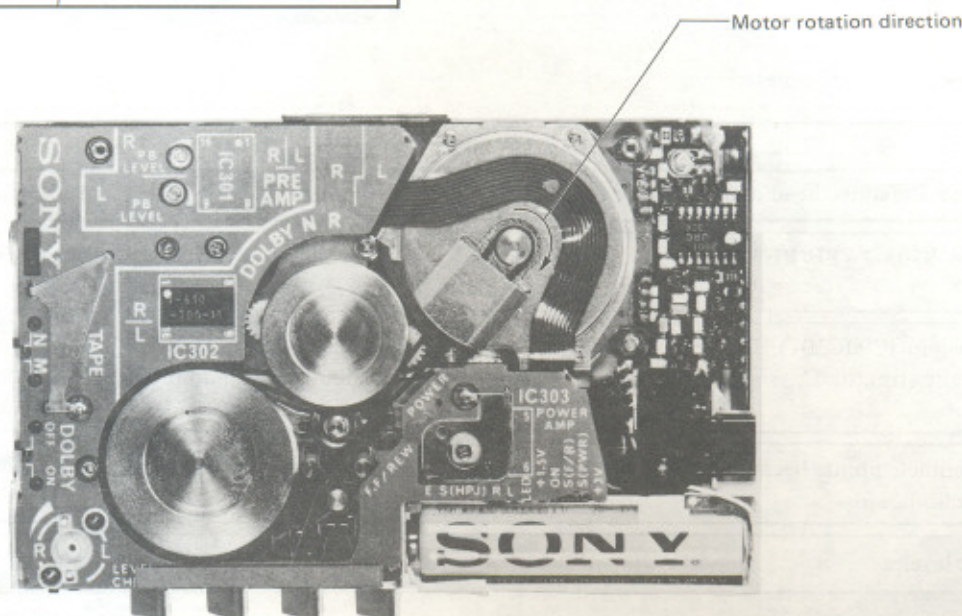
For no rotation, unsolder A phase (or B phase) to make it open and rotate the motor by hand. If the motor rotates at high speed only for B phase only, B phase drive circuit is OK and A phase is defective.

Symptoms	Defective Parts
Slow speed	R602, R608, R624 open Q610, Q611, Q612 } short Q609, Q613 } between E-C
Tape runs away	R601, R604 open

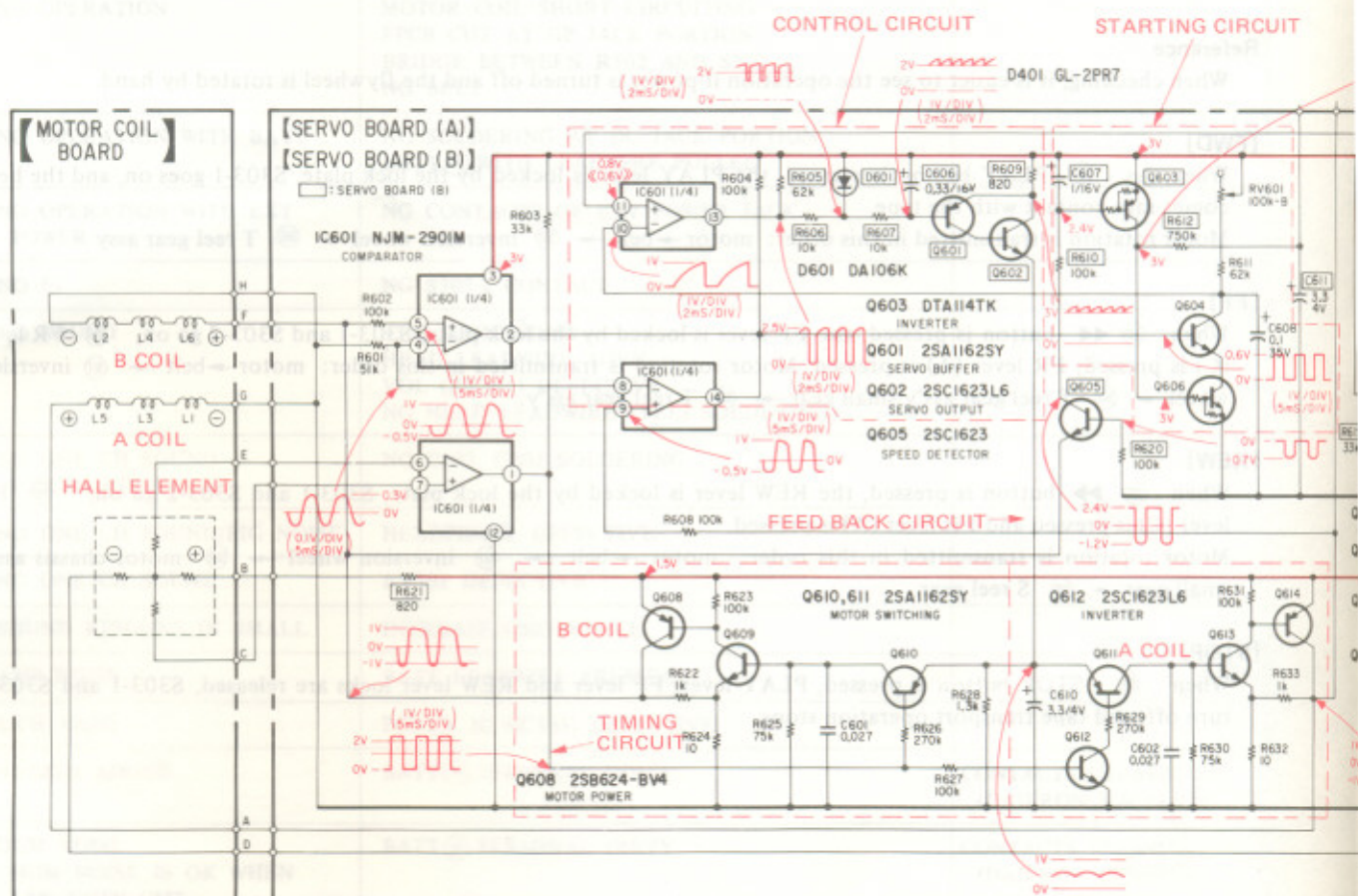
## • Fast, Slow Speed

### FWD mode

Symptoms	Defective Parts
Fast speed	R613, R614 } open (TH601, R640) } C612      short
Slow speed	R618 open Q607 short between E-C RV601 hits control panel.
Slow speed, uneven rotation	R615 open







- No Speed Acceleration
- Acceleration Circuit Operation  
Leaf switch S303-2 (FF/REW SW) on turns on Q607, lowering reference voltage which controls servo voltage (normally 0.8V - 0.6V), and accelerates to about 1.2 times normal speed.

- FF/REW Mode

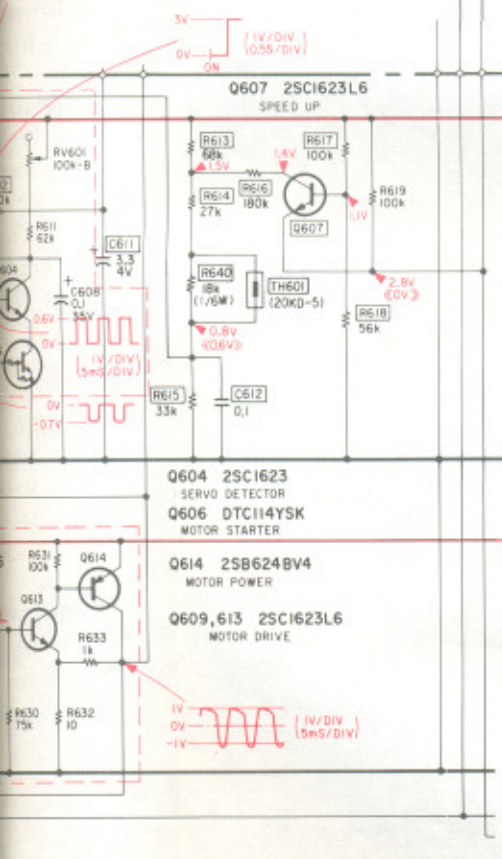
Symptoms	Defective Parts
No speed acceleration	<div> R616, R617 } open  Q607 }  S303-2 } short between E-B </div>

- Servo Board (A) (B) Simple Check Method

Check servo board (A) motor side pins (8), A and B waveforms and the voltages of each of the 8 flexible board pins.

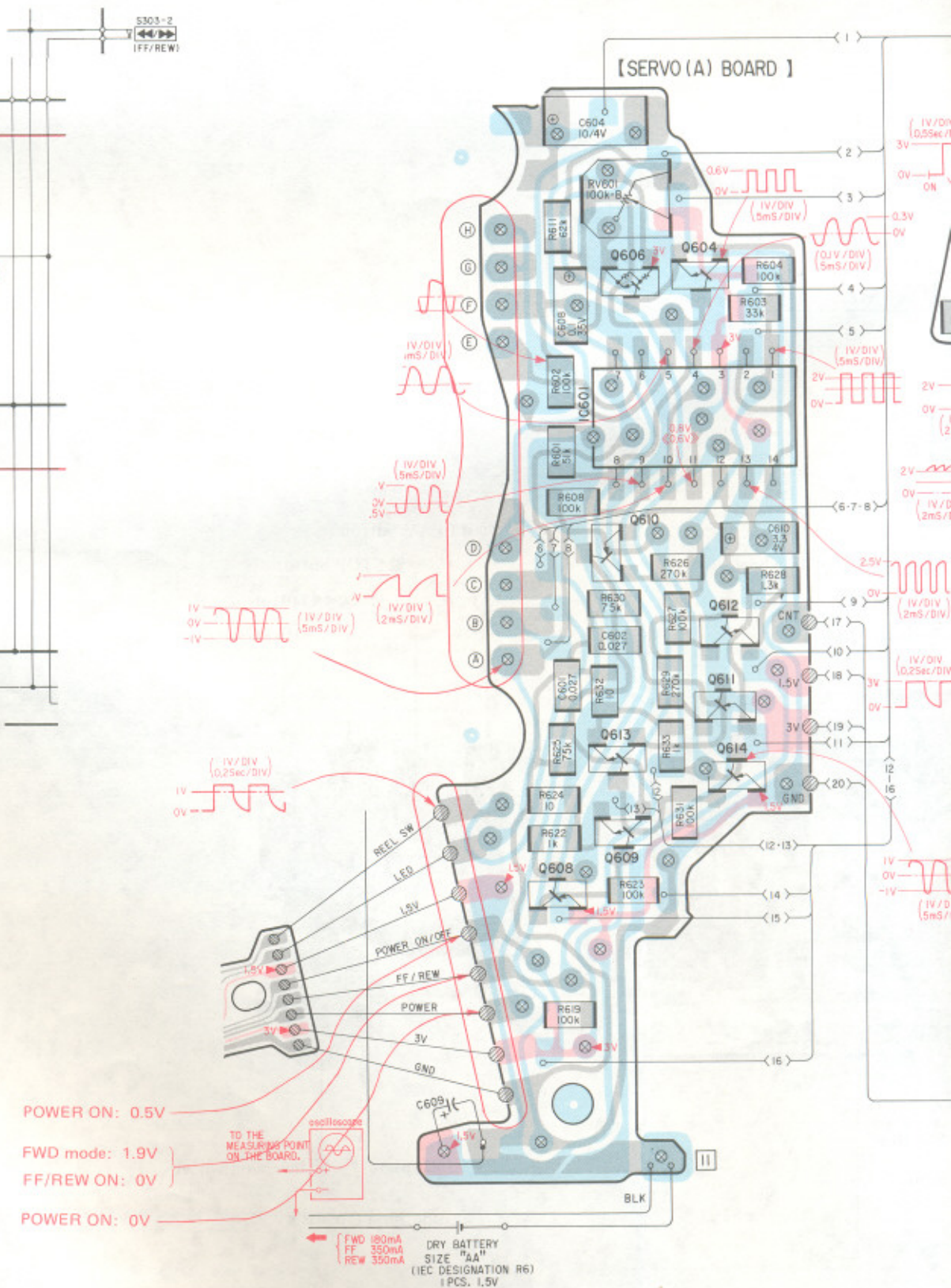
The voltages and waveforms should be as shown in figure.





### Back Method

each of the 8 flexible









## ( • Defective Tape Transport I )

- Belt must be strung properly.
- The 3 operations given here are common for each mode, so if these are not normal, each mode will not operate.

Operation 1:

Does motor rotate when S303-1 (leaf switch) is turned on by hand?

NO

{ motor,  
S303-1

Operation 2:

YES

Is the button (any button) locked by the lock plate when pressed?

NO

{ function  
plate ass'y

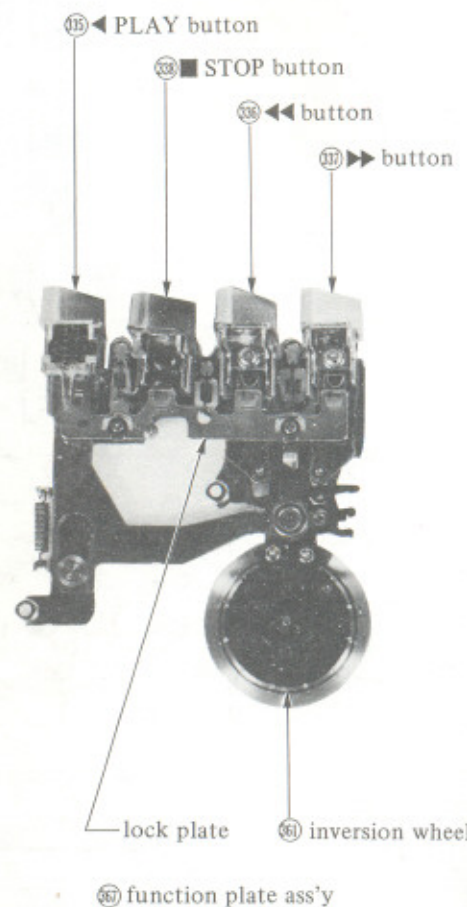
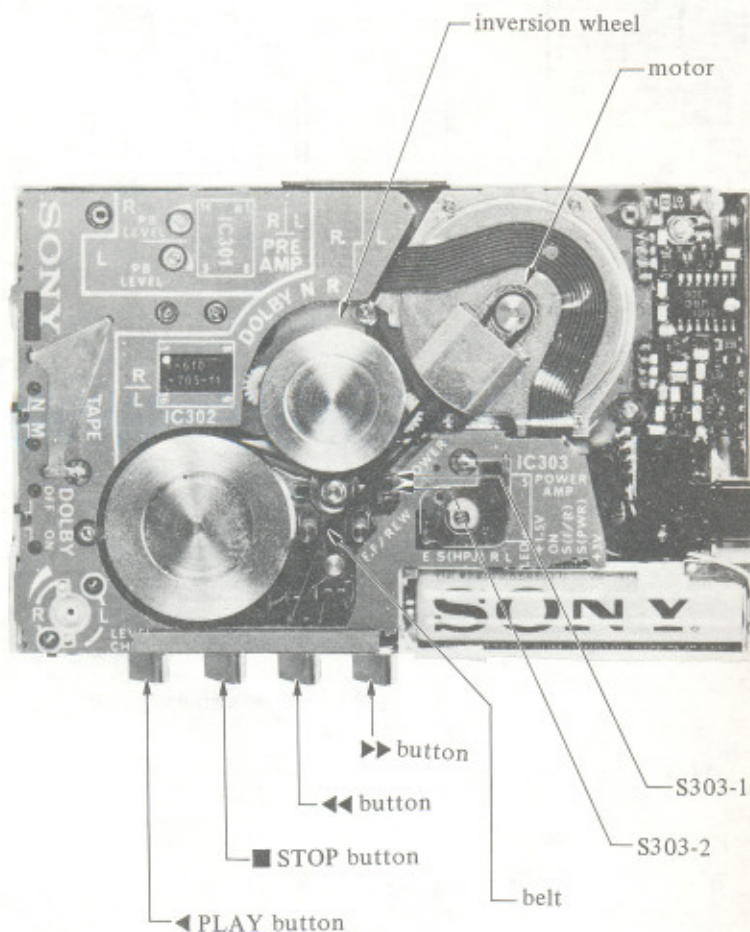
Operation 3:

YES

Is capstan shaft rotating?

NO

{ belt off





## Reference

When checking, it is easier to see the operation if power is turned off and the flywheel is rotated by hand.

## [FWD]

When the ③③ PLAY button is pressed, the PLAY lever is locked by the lock plate, S303-1 goes on, and the head comes into contact with the tape.

Motor rotation is transmitted in this order: motor → belt → ③① inversion wheel → ③⑤ T reel gear ass'y

## [FF]

When ③④ ◀ button is pressed, the FF lever is locked by the lock plate, S303-1 and S303-2 go on, ③① FR lever (C) is pressed, FR lever (A) is pressed. Motor rotation is transmitted in this order: motor → belt → ③① inversion wheel → ③④ T reel gear ass'y small gear → ③⑤ T reel gear ass'y.

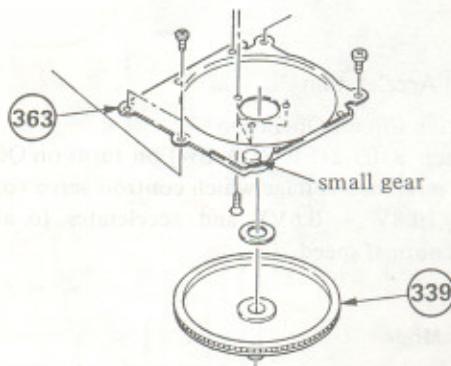
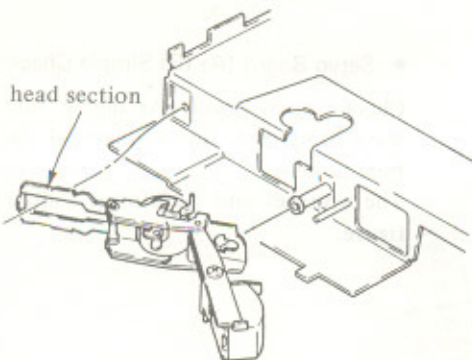
## [REW]

When ③⑦ ▶ button is pressed, the REW lever is locked by the lock plate, S303-1 and S303-2 go on, ③① FR lever (C) is pressed and FR lever (A) is pressed.

Motor rotation is transmitted in this order: motor → belt → ③① inversion wheel → ③③ motor chassis ass'y small gear → ③③ S reel gear.

## [STOP]

When ③⑨ STOP button is pressed, PLAY lever, FF lever and REW lever locks are released, S303-1 and S303-2 turn off, and tape transport operation stops.

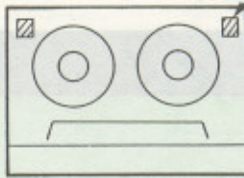




( • Defective Tape Transport II )

- Defective tape transport
- Noise
- Wow/flutter
- No shut-off
- Shuts off during tape transportation
- Defective button operation
- Tape winds around pinch roller during FWD
- Tape is damaged during ejection

• Defective tape transport

Cause	Defective Location
1) Capstan shaft and roller not parallel. 2) Cassette inserted position not good.	 <p>transparent spacer</p> <p>Stick transparent spacers (Luminer) at left or right, or both. Luminer No. 3-315-483-01 (5x5x0.35)</p>

• Noise

Cause	Defective Location
1) Foreign object in gears. 2) ③④ T reel shaft bent. 3) ③⑤ S reel table warped.	Replace parts. Rotate T, S reel tables and check that there is no noise or catching.

• Wow/Flutter

Cause	Defective Location
1) Imperfection in ③① capstan bush. 2) Not enough oil between ③① capstan bush and ③② sleeve. 3) ③③ pinch roller dirty. 4) No ③④ flywheel thrust play.	1) Replace parts. 2) Lubricate, but be careful not to apply too much. 3) Cleaning. But be careful that the shut-off lever spring under pinch roller does not come off. 4) Play is lost when mounting the capstan bush; pull the flywheel gently to get clearance.

• No Shut-off

Cause	Defective Location
1) Defective positioning between ③⑤ shut off lever (pinch roller) and ③⑥ shut-off gear C (sleeve ass'y). 2) ③⑦ function plate ass'y lock plate release operation heavy.	1) Move ③⑥ sleeve ass'y to the right as seen from the rear. 2) Replace ③⑦ function plate ass'y.

• Shuts off during tape transportation

Cause	Defective Location
1) Play lever and lock plate lock separates during FWD. 2) ③⑧ shut-off lever return spring comes off.	1) Replace ③⑦ function plate ass'y. Check: With power off, lock FWD, then if button is released when the pinch roller is pushed to the button side, the lock is defective. 2) Replace ③⑧ shut-off lever return spring or ③⑨ shut-off lever (pinch lever ass'y)



## • Defective Button Operation

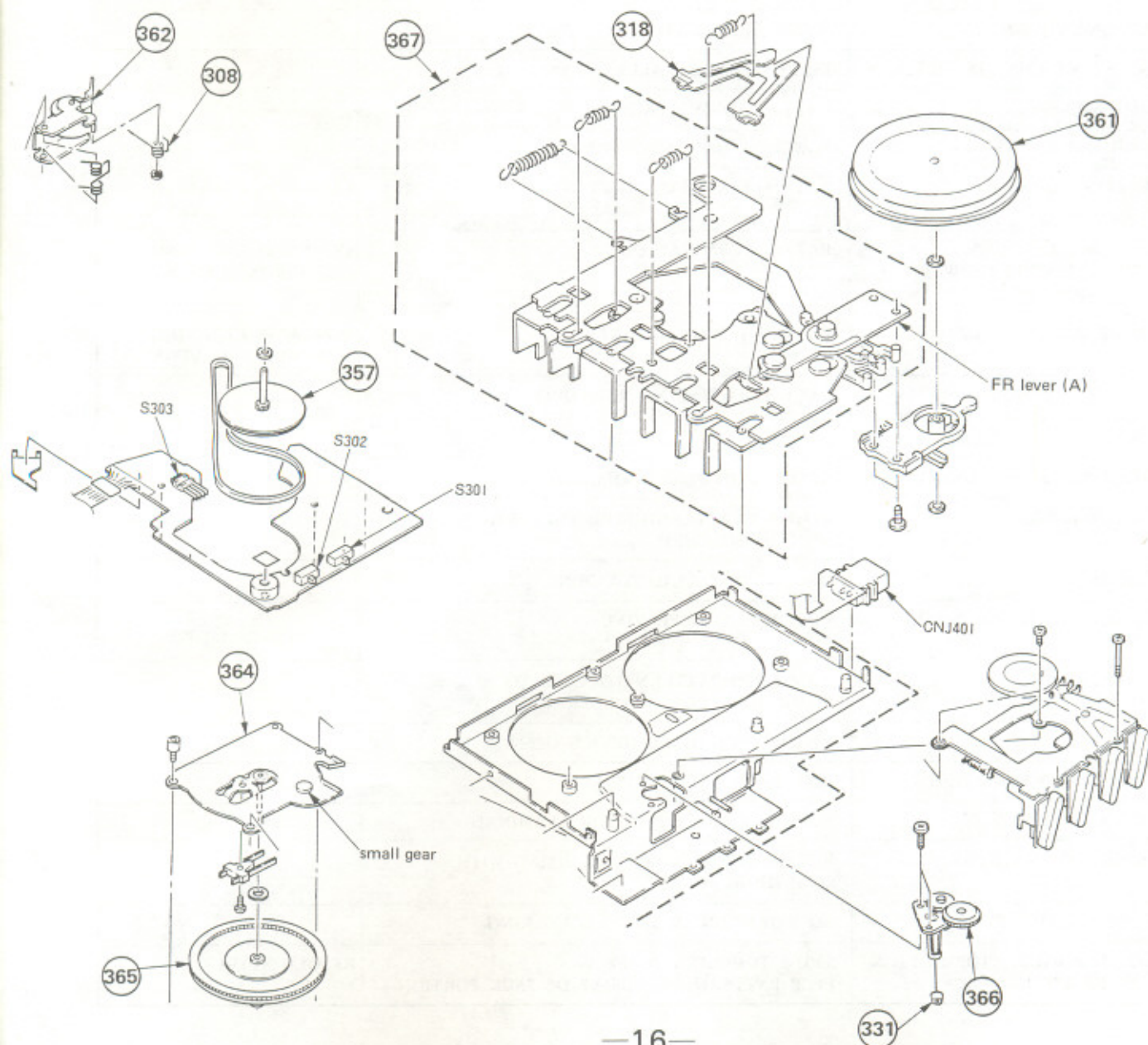
Cause	Defective Location
Lock plate plane and button lever bent.	Replace ③⑥⑦ function plate ass'y.

## • Tape winds around pinch roller during FWD

Cause	Defective Location
The inversion wheel has vertical play, so because of shock, etc. there is a gear behind the inversion wheel, but that gear disengages with the other gear.	FR lever (A) bending adjustment as shown below (for better gear engagement).

## • Tape is damaged during ejection

Cause	Defective Location
Tape catches because of imperfection on part of ②⑥ sleeve comp ass'y.	Replace ③⑥ sleeve comp ass'y.





## REPAIR KNOW HOW

DESCRIPTION	CAUSE	REPAIR
NO OPERATION	MOTOR COIL SHORT CIRCUITING FPCB CUT AT HP JACK PORTION BRIDGE BETWEEN R302 AND S302 NG BELT	
NO OPERATION WITH BATT	NG SOLDERING AT DC JACK PORTION BATT⊕ WITH LEADWIRE PULLED	
NO OPERATION WITH EXT POWER	NG CONTACTS OF EXT POWER JACK	
NO FF	NG S303-2 CONTACT	
NO SOUND	S303-2 TOUCHING HEAD LEADWIRE TORN VOL (RV301) DEFECTIVE NG HEAD LEADWIRE (YEL) SOLDERING	
NO ONE CH SOUND (OSCILLATION)	NG C102, C202 SOLDERING	
NO ONE CH SOUND/BIG NOISE	HEADPHONE DEFECTIVE	
NO ONE CH SOUND	RV301 DEFECTIVE	
SOUND REMAINS IN SMALL	INCREASE C303 VALUE	
AMP NOISE	BATT LEADWIRE PRESSED	
L-CH NOISE	POWER IC (IC303) DEFECTIVE	
BUZZER SOUND	BATT⊕ TERMINAL DIRTY	CONTACTS CLEANING (DAIFRON SOLVENT)
HUM NOISE HUM NOISE IS OK WHEN LED GOES OUT	BATT⊕ TERMINAL DIRTY	CONTACTS CLEANING (DAIFRON SOLVENT)
INTERMITTENT SOUND	BATT⊖ TERMINAL DIRTY	CONTACTS CLEANING (DAIFRON SOLVENT)
LOW POWER NOISE INTERMITTENT SOUND OR NOISE WITH SHOCK	BATT TERMINAL NO RESILIENT	
NOISE WHEN PRESSING UNIT	NG GROUND PLATE SOLDERING	
MOTOR NOISE	MOTOR WHEEL AND COIL TOUCHING NO C305 SOLDERING	
FRICTION NOISE	MAGNET AND COIL TOUCHING	
MONOURAL SOUND WHEN TURNING VOL	VOL (RV301) DEFECTIVE	
OSCILLATION	AUDIO PCB PATTERN TOUCHES TO REW. BUTTON/ NG GROUND PLATE SOLDERING	
BATT HEAT	MOTOR COIL (HALL DEVICE OPEN)	
SLOW SPEED WITH SHOCK	COIL SHORTCIRCUITING	
TOO FAST SPEED	NG SOLDERING AT MOTOR TERMINAL	
NO FF/REW ROTATION	ROTATION SW SHORT CIRCUITING WITH SOMETHING	
FF/REW AUTO-OFF	NG ROTATION SW (S901) SOLDERING	
NO STOP WHEN STOP BUTTON RELEASED	S303-1 TOUCHING TO FPCB FPCB PATTERN BRIDGE AT DC JACK PORTION	RESOLD S303-1



<p>Defective button operation</p> <ul style="list-style-type: none"> <li>• Tape winds around pinch roller during FWD</li> <li>• Tape is damaged during ejection</li> </ul>	<p>Defective tape transport</p> <ol style="list-style-type: none"> <li>1) Capstan shaft and roller not parallel</li> <li>2) Capstan inserted position not good</li> </ol>
<p>Defective Location</p> <p>Stick transparent spacer (Luminer) at left or right or both</p> <p>Luminer No. 3-512-467-01 (2x2x0.2)</p>	<p>Cause</p> <ol style="list-style-type: none"> <li>1) Foreign object in main</li> <li>2) T test shaft bent</li> <li>3) or 2 test table warped</li> </ol>
<p>Defective Location</p> <p>Replace parts</p> <p>Remove T 2 test table and check that there is no noise or catching</p>	<p>Cause</p> <ol style="list-style-type: none"> <li>1) Impaction in capstan part</li> <li>2) Not enough oil between capstan head and sleeve</li> <li>3) Pinch roller dirty</li> <li>4) No oil (fewer than 1mm)</li> </ol>
<p>Defective Location</p> <ol style="list-style-type: none"> <li>1) Lubricate parts</li> <li>2) Lubricate, but be careful not to spray too much</li> <li>3) Cleaning, but be careful that the shut-off lever spring angle pinch roller does not come off</li> <li>4) Play is lost when mounting the capstan head, pull the (flywheel gently to get clearance)</li> </ol>	<p>Cause</p> <ol style="list-style-type: none"> <li>1) Defective positioning between shut-off lever (flywheel) and shut-off lever C (sleeve ass'y)</li> <li>2) Function plate ass'y lock with release operation</li> </ol>
<p>Defective Location</p> <ol style="list-style-type: none"> <li>1) Move sleeve ass'y to the right as seen from the rear</li> <li>2) Replace function plate ass'y</li> </ol>	<p>Cause</p> <ol style="list-style-type: none"> <li>1) Play lever and lock plate lock separates during FWD</li> <li>2) Shut-off lever return spring comes off</li> </ol>
<p>Defective Location</p> <ol style="list-style-type: none"> <li>1) Replace function plate ass'y</li> <li>2) Check: With power off, lock FWD, then if button is released when the pinch roller is pulled to the button side, the lock is defective</li> <li>3) Replace shut-off lever return spring or shut-off lever (pinch lever ass'y)</li> </ol>	<p>Cause</p> <ol style="list-style-type: none"> <li>1) Play lever and lock plate lock separates during FWD</li> <li>2) Shut-off lever return spring comes off</li> </ol>