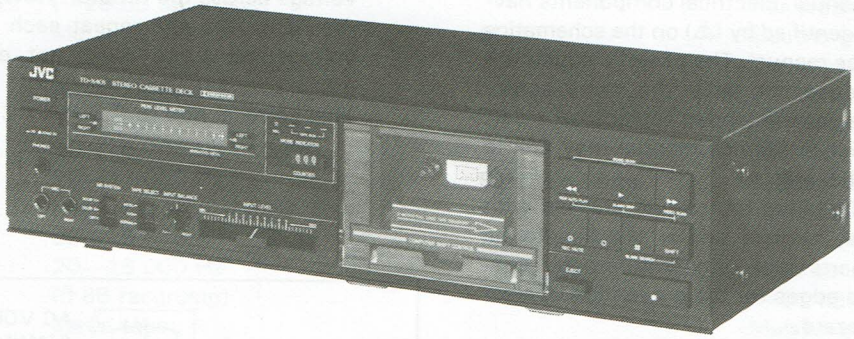
JVC

SERVICE MANUAL

STEREO CASSETTE DECK

MODEL TD-X401 A/B/C/E/G/J/U



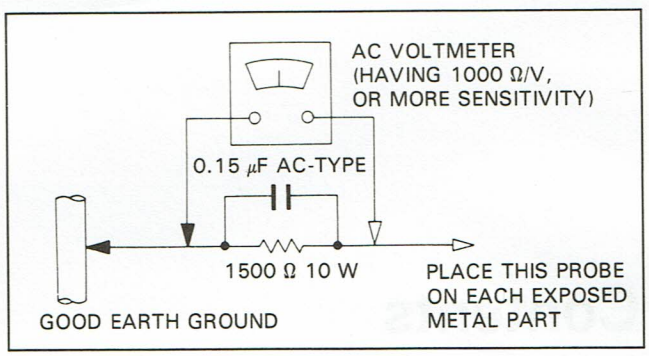
Contents

No. 4264
April 1986

Safety Precautions

1. The design of this product contains special hardware. Many circuits and components specially for safety purposes.
   For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Repacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.
2. Alterations of the design or circuitry of the product should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.
3. Many electrical and mechanical parts in the product have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. Electrical components having such features are identified by (⚠) on the schematics and parts list in Service manual. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list in Service manual may create shock, fire, or other hazards.
4. The leads in the products are routed and dressed with ties, clamps, tubings, barriers and/or the like to be separated from live parts, high temperature part, moving parts and/or sharp edges for the prevention of electric shock and fire hazard.
   When service is required, the original lead routing and dress should be observed, and they should be confirmed to be returned to normal, after re-assembling.
5. Leakage current check
   (Safety for electrical shock hazard)
   After re-assembling the product, always perform an isolation check on the exposed metal parts of the Products (antenna terminals, knobs, metal cabinet, screw heads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.

   Do not use a line isolation transformer during this check.
   - Plug the AC line cord directly into the AC outlet. Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground (water pipe, etc.). Any leakage current must not exceed 0.5 mA AC (r.m.s.).
   - Alternate check method.
     Plug the AC line cord directly into the AC outlet. Use an AC voltmeter having 1,000 ohms per volt or more sensitivity in the following manner. Connect a 1500 Ω 10 W resistor paralleled by a 0.15 μF AC-type capacitor between an exposed metal part and a known good earth ground (water pipe, etc.)
     Measure the AC voltage across the resistor with the AC voltmeter.
     Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.75 V AC (r.m.s.).
     This corresponds to 0.5 mA AC (r.m.s.).



Features

1. **2-motor full logic mechanism**
   - Exclusive motor for mechanism drive.
   - Silent mechanism.
2. **DOLBY* B-C NR (Noise Reduction) system**
3. **2-color FL peak level meter**
4. **Computer shift control system**
   - BLANK SKIP
   - INDEX SCAN
   - REW AUTO PLAY
   - BLANK SEARCH
5. **Microcomputer-controlled mechanism**
   - Auto REC MUTE facility
   - Mechanism mode indicators
6. **Single music scan mechanism for either direction**
   "Under license from Staar S.A., Brussels Belgium."
7. **SYNCHRO Terminal facility**

*Noise reduction system manufactured under license from DOLBY Laboratories Licensing Corporation.
*"DOLBY" and the double-D symbol are trademarks of DOLBY Laboratories Licensing Corporation.

Specifications

Type	: Stereo cassette deck
Track system	: 4-track, 2-channel
Tape speed	: 4.8 cm/sec (1-7/8 inch/sec)
Frequency response	: (−20 dB recording) Metal tape: 30−16,000 Hz (±3 dB) 20−17,000 Hz CrO_2 tape: 30−16,000 Hz (±3 dB) 20−17,000 Hz Normal tape: 30−15,000 Hz (±3 dB) 20−16,000 Hz (0 dB recording) Metal tape: 30−12,500 Hz (±3 dB) CrO_2 tape: 30−8,000 Hz (±3 dB) Normal tape: 30−8,000 Hz (±3 dB)
S/N ratio	: 58 dB (S = 1 kHz, K3 = 3%, N = A-weighted, Metal tape) The S/N is improved by about 15 dB at 500 Hz and by max. 20 dB at 1 kHz ~ 10 kHz with DOLBY C NR on and improved by 5 dB at 1 kHz and by 10 dB at above 5 kHz with DOLBY B NR on. Improvement of MOL 4 dB at 10 kHz with DOLBY C NR on.
Wow and flutter	: 0.08% (WRMS) 0.20% (DIN 45 500)
Crosstalk	: 55 dB (1 kHz)
Harmonic distortion	: K3; 0.5% THD; 1.0% (Metal tape, 1 kHz 0 dB)
Channel separation	: 40 dB (1 kHz)
Heads	: METAPERM head (for record/playback) × 1 2-Gap ferrite head (for erasing) × 1
Motor	: Electric governed DC motor (for capstan and reel) × 1 DC Motor (for FF & Rewind) × 1 DC Motor (for Mechanical drive) × 1
Fast wind time	: Approx. 95 sec. with C-60 cassette
Input terminals	
MIC × 2	: Max. sensitivity; 0.4 mV (−68 dBV) Matching impedance; 600 Ω−10 kΩ
LINE IN × 2	: Min. input level; 80 mV Input impedance; 50 kΩ
Output terminals	
LINE OUT × 2	: Output level; 300 mV Output impedance; 5 kΩ
PHONES × 1	: Output level; 0.3 mW/8 Ω Matching impedance; 8 Ω−1 kΩ
Other terminals	
SYNCHRO × 2	
Power requirement	
TD-X401 A/B	: AC 240 V, 50/60 Hz
TD-X401 E/G	: AC 220 V, 50/60 Hz
TD-X401 C/J	: AC 120 V, 60 Hz
TD-X401 U	: AC 230/127/110 V, 50/60 Hz
Power consumption	: 12 W
Dimensions	: 435 mm (17-1/8") W 109 mm (4-3/8") H 229 mm (9") D (with feet, buttons, switches)
Weight	: Approx. 3.7 kg (8.2 lbs)

Design and specifications are subject to change without notice.

Names of Parts and Their Functions

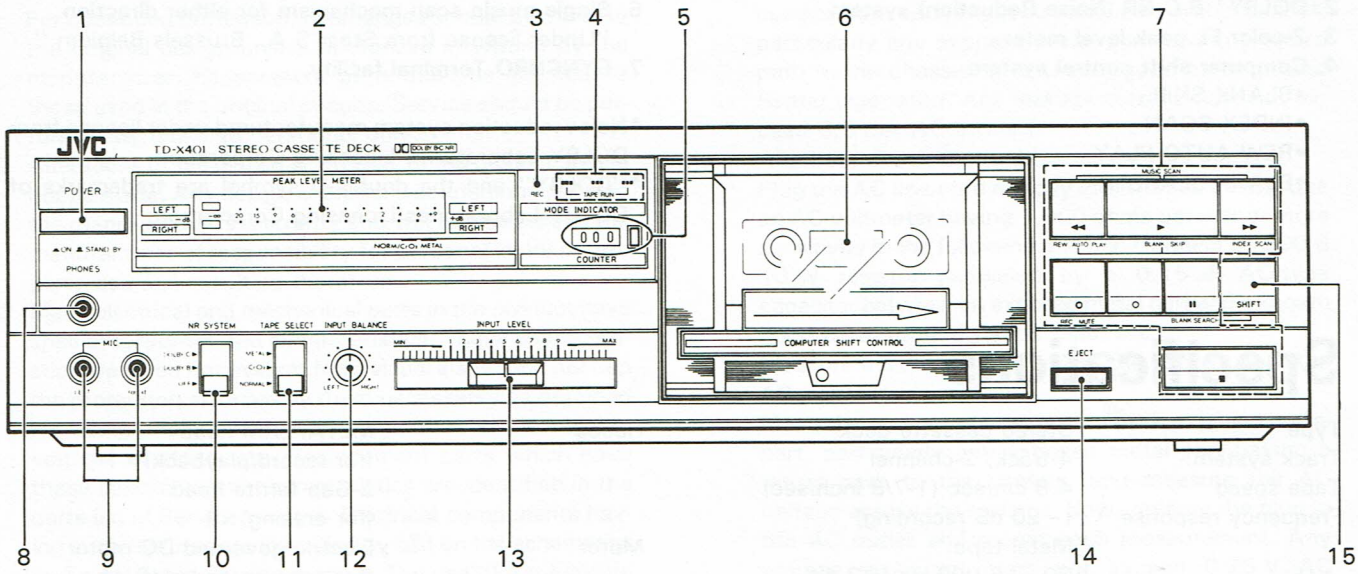


Fig. 1

1. **POWER switch**
2. **PEAK LEVEL METER**
   This indicates the record input level when recording and recorded signal level on the tape when playing back.
3. **REC indicator**
   Lights in the recording and record-pause modes; flashes during the record muting operation.
4. **Mechanism mode indicators**
   - Tape RUN (the center indicator lights during the pause mode).
5. **TAPE COUNTER and RESET button**
6. **Cassette holder**
7. **Cassette operation buttons**
   - ◀◀ **(rewind):**
     Press to wind the tape quickly from right to left. Press this and the ▶(play) button for music scanning.
   - ▶ **(play):**
     Press to play back tape. Also press to record or music scan.
   - ▶▶ **(fast forward):**
     Press to wind the tape quickly from left to right. Press this and the ▶(play) button for music scanning.
   - ○ **REC MUTE:**
     Press to make about a 4 — 5-second nonrecorded section between tunes.
   - ○ **(record):**
     Press this button together with the ▶(play) button when recording.
   - ▮▮ **(pause):**
     Press to stop the tape temporarily. To release the pause mode press the ▶(play) button.
   - ■ **(stop):**
     Press to stop the tape.
8. **PHONES jack**
   Connect headphones (with an impedance of 8 Ω — 1 kΩ).
9. **MIC jacks (L, R)**
   Connect microphones (with an impedance of 600 Ω to 10 kΩ) to these jacks.
   With microphones connected to these jacks, the input to LINE IN (REC) or DIN for G version terminals is cut off automatically.
10. **NR SYSTEM switch**
11. **TAPE SELECT switch**
    Select the switch position according to the tape to be used during recording and playback.
12. **INPUT BALANCE control**
    Adjust the balance between the left and right channels of recording input levels. The center click position is the standard position.
13. **INPUT LEVEL control**
    This controls the right and left channel recording input levels simultaneously.
14. **EJECT button**
    Press to open the cassette holder.
15. **SHIFT button**
    Use when the computer shift control system (i.e. blank skip, index scan, rewind auto play or blank search function) is operating.

Using the Computer Shift Control System

Using this system adds a new function to the operations of the cassette operation buttons.
This system is automatically released by entering another operation mode, including the direction change mode, or when the tape stops.

☆ Do not press the ● REC MUTE button when using the computer shift control system.
If it is pressed, this control system is cancelled.

Back skip

When a blank (non-recorded section) of more than approx. 13 seconds is detected during playback, the tape is fast-forwarded in the fast-forward scan mode and playback is resumed at the beginning of the next tune.

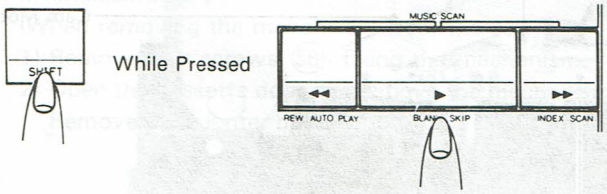


Fig. 2

Index scan

This is convenient to locate the tune because 13 seconds at the beginning of each tune is played back.

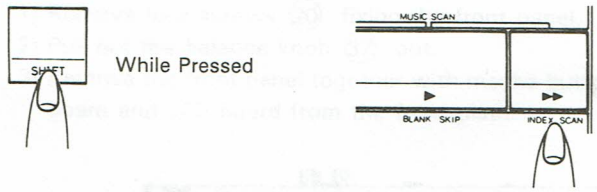


Fig. 3

- When the tune you want to listen to is heard, press the ► (play) button. To listen from the beginning of the tune, press the ◄◄ (rewind) and the ► (play) buttons simultaneously.
- Press the ■ (stop) button when you wish to cancel the index scan mode in the middle of its operation.

Rewind Auto Play

Playing from the beginning of the tape can be automatically performed after rewinding.

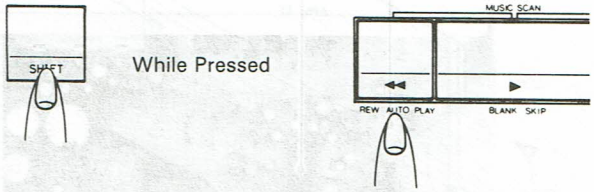


Fig. 4

Blank search

This function automatically searches for the position from which recording should start.

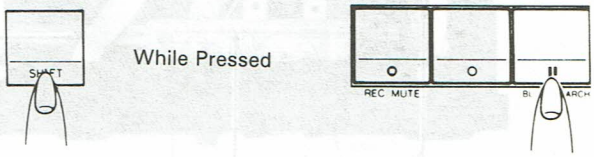


Fig. 5

- When a non-record section of approx. 13 seconds (which equals about 2—6 minutes of playback time) is located in the fast-forward mode, the tape is rewound to the end of the previous tune and it is played back to leave a non-recorded section of approx. 5 seconds and stops.
- Press the ■ (stop) button when you wish to cancel the blank search mnode in the middle of its operation.

Note:

In the following cases, INDEX SCAN, BLANK SKIP or BLANK SEARCH mechanism may not operate correctly. This is not a mulfunction; use the mechanism to accommodate the program material.

- Tapes with tunes having long pianissimo passages (very quiet parts) or non-recorded portions during tunes
- Tapes with tunes recorded at low recording levels
- Tapes with short non-recorded sections
- Tapes with high level noise or hum between tunes
- Tapes with recorded sections having a very short playback time

Location of Main Parts

Top View

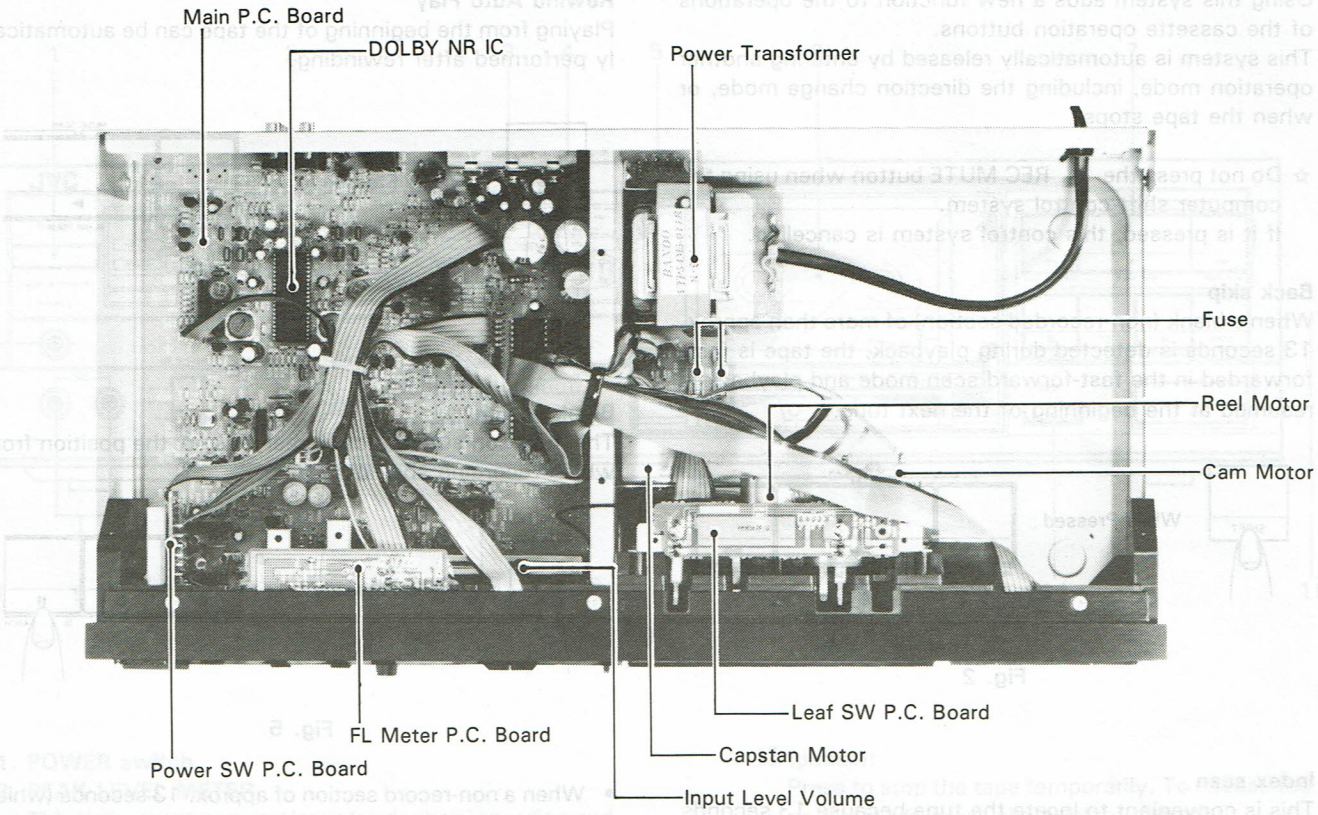


Fig. 6

Bottom View

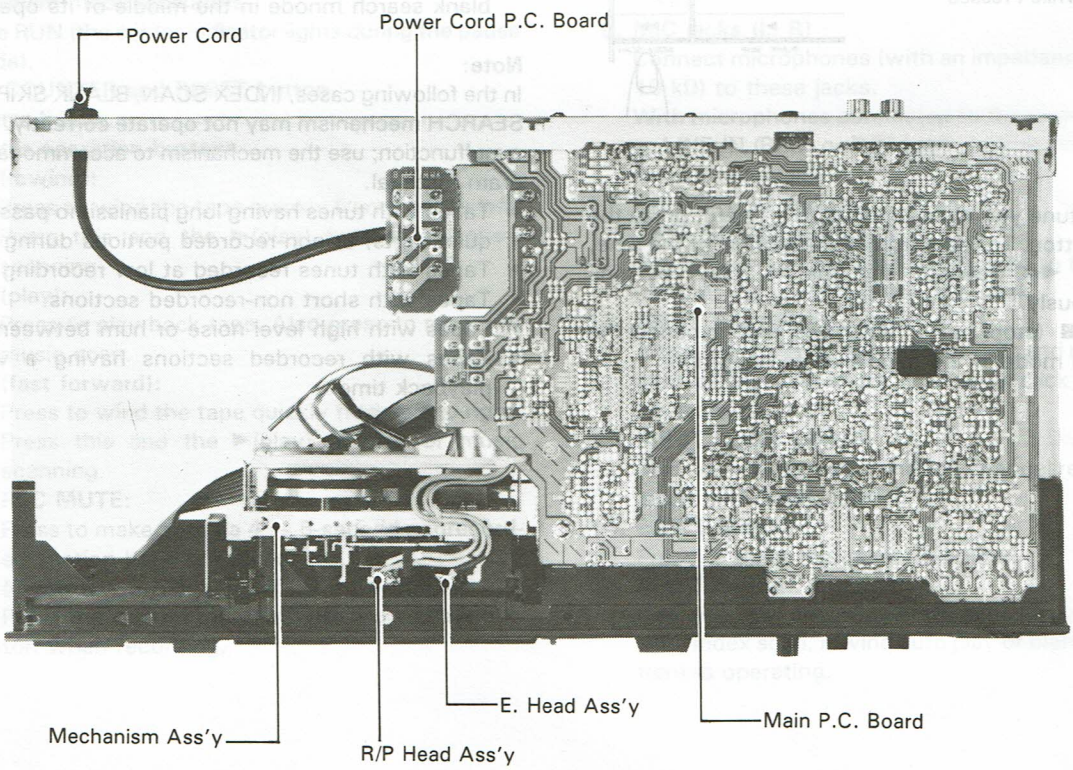


Fig. 7

Removal of Main Parts

■ Cabinet Section

1. Top cover and bottom covers
   1) Remove six screws (41) on both the sides.
   2) Remove one screw (42) from the back.
   3) Remove three screws (47) and (51) from the bottom cover.
   4) Remove three hooks from the rear panel.

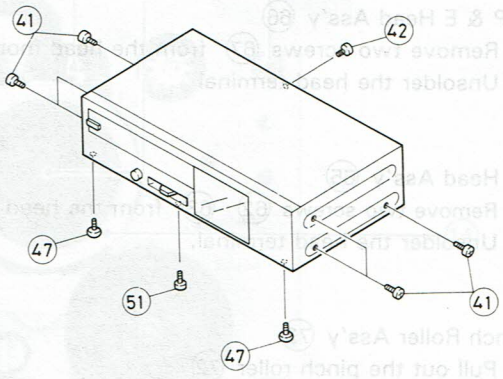


Fig. 8

2. Mechanism Ass'y
   (When removing the mehcnaism from the set)
   1) Remove four screws (56) fixing the mechanism.
   2) Open the cassette door and remove the mechanism. Remove the counter belt (64) from the tape counter.

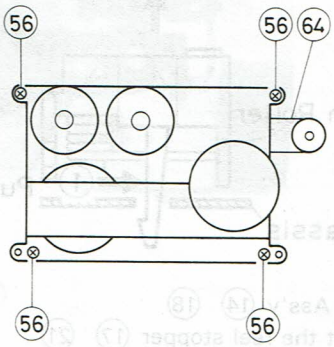


Fig. 9

3. Front Panel
   1) Remove four screws (20) fixing the front panel.
   2) Pull out the balance knob (37) out.
   3) Remove the front panel together with mecha button board and LED board from the front plate.

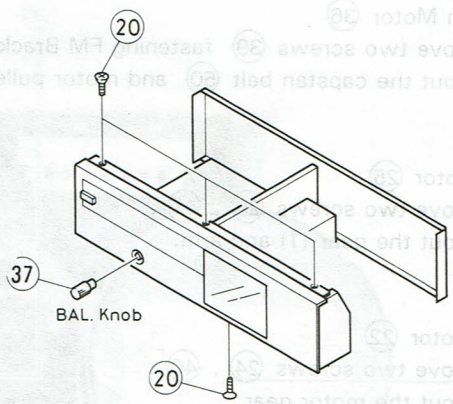


Fig. 10

4. FL Board Ass'y
   1) Remove the front panel.
   2) Remove the FL Board Ass'y by pulling it front side.

5. Rear Panel
   1) Remove the top and bottom covers.
   2) Remove six screws (8), (9), (10) fixing the rear panel.

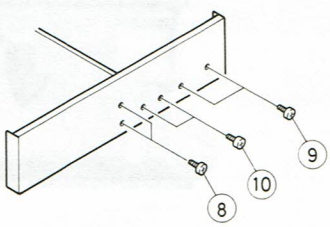


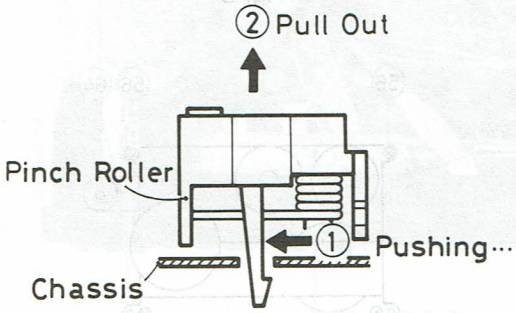
Fig. 11

■ Mechanism Section

1. R/P & E Head Ass'y (66)
   1) Remove two screws (67) from the head mount base.
   2) Unsolder the head terminal

2. E. Head Ass'y (65)
   1) Remove two screws (62) (63) from the head mount base.
   2) Unsolder the head terminal.

3. Pinch Roller Ass'y (72)
   1) Pull out the pinch roller (72) .



4. Reel Disk Ass'y (14) (18)
   1) Pull out the reel stopper (17) (21) .

5 Capstan Motor (36)
   1) Remove two screws (39) fastening FM Bracket.
   2) Pull out the capstan belt (50) and motor pulley.

6. Reel Motor (25)
   1) Remove two screws (29) , (41) .
   2) Pull out the gear (1) and arm.

7. Cam Motor (22)
   1) Remove two screws (24) , (40) .
   2) Pull out the motor gear.

8. Disk Base Ass'y
   1) Disassembly reel and cam motor.
   2) Remove one screw (31) .

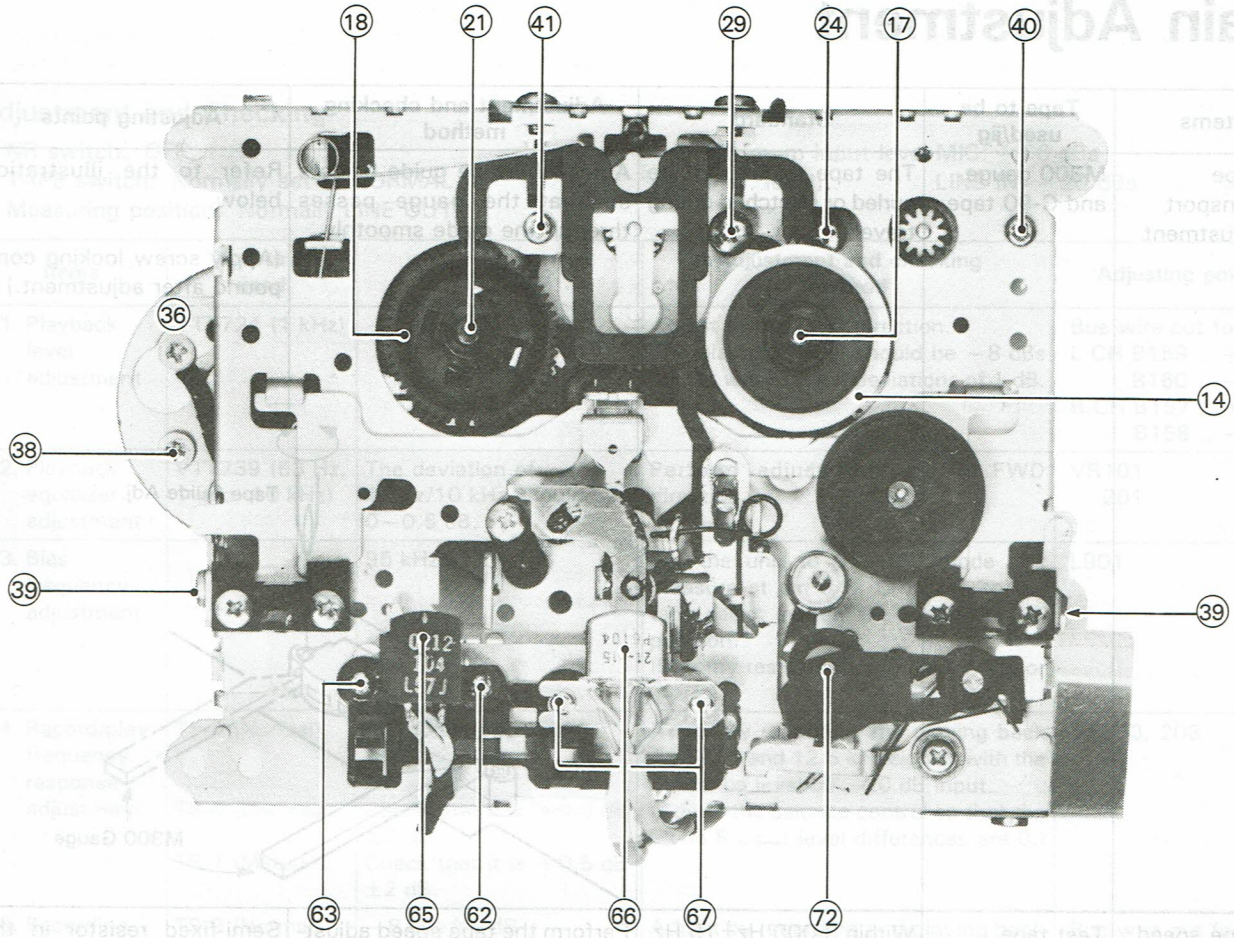

18
21
41
29
24
17
40
36
14
38
39
39
63
65
62
66
67
72

Fig. 12

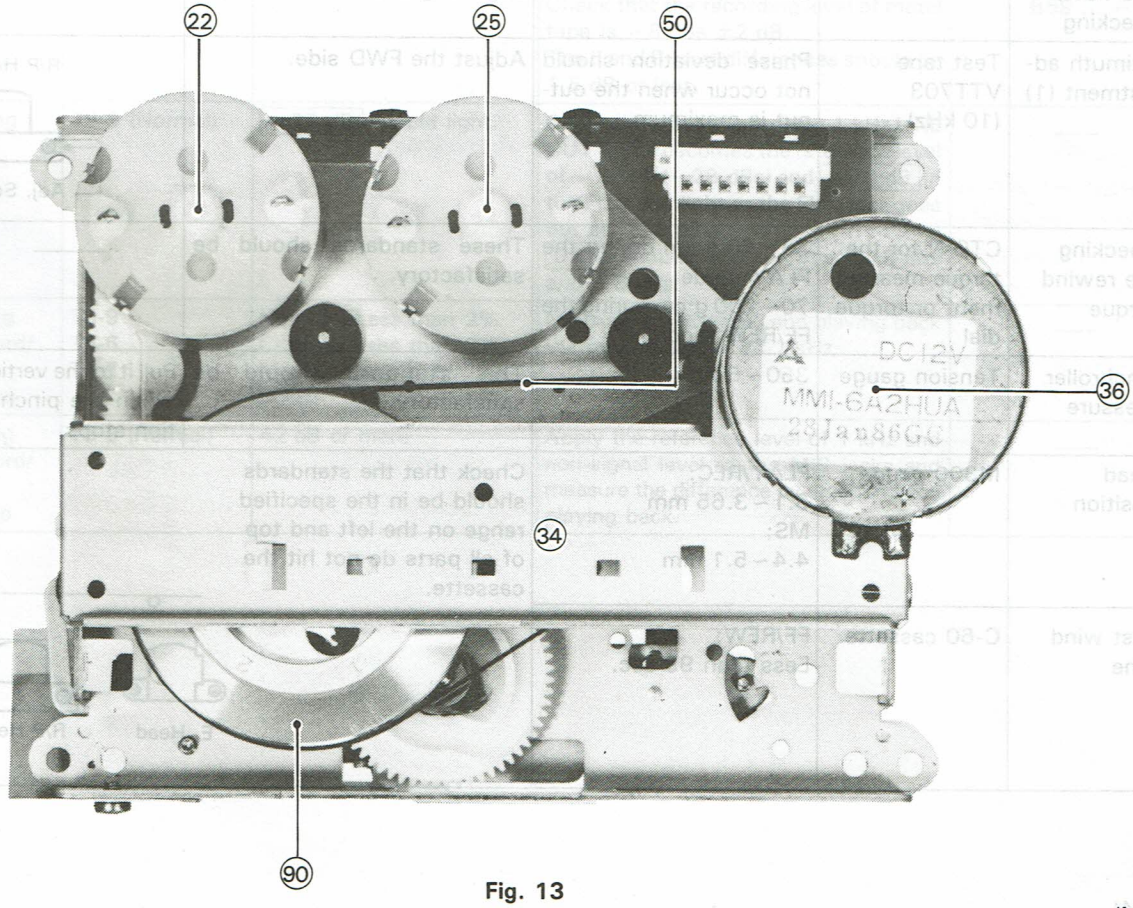
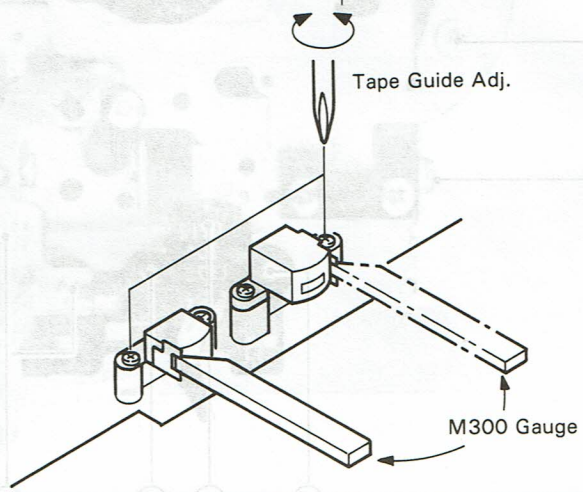
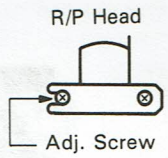
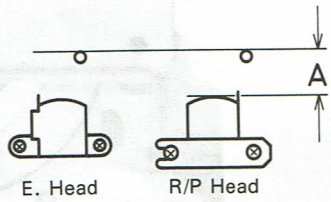

22
25
50
DC12V
MMI-6A2HUA
36
34
90

Fig. 13

Main Adjustment

Items	Tape to be used/jig	Standard	Adjustment and checking method	Adjusting points
1. Tape transport adjustment	M300 gauge and C-90 tape	The tape should not be curled or stretched during travel.	Adjust the tape guide heights so that the gauge passes through the guide smoothly.	Refer to the illustration below. (Apply screw locking compound after adjustment.) 
2. Tape speed adjustment and wow and flutter checking	Test tape VTT712 (3 kHz)	Within 3,000 Hz±15 Hz, 0.11% (WRMS)	Perform the tape speed adjustment at the tape end. Check the wow and flutter at the beginning and end of the tape.	Semi-fixed resistor in the capstan motor.
3. Azimuth adjustment (1)	Test tape VTT703 (10 kHz)	Phase deviation should not occur when the output is maximum.	Adjust the FWD side.	
4. Checking the rewind torque	CTG-N for the torque measurement or torque dial	35 ~ 75 g·cm during the PLAY mode 70 ~ 200 g·cm during the FF/REW mode	These standards should be satisfactory.	———
5. Pinchroller pressure	Tension gauge	350 ~ 500 g	This standard should be satisfactory.	Pull it to the vertical direction when the pinch roller rotation stops.
6. Head position	M300 gauge	PLAY/REC: 3.1 ~ 3.65 mm MS: 4.4 ~ 5.1 mm	Check that the standards should be in the specified range on the left and top of all parts do not hit the cassette.	
7. Fast wind time	C-60 cassette	FF/REW: Less than 95 sec.		

Adjustment and Checking

- NR switch: OFF
- TAPE switch: Normally set to NORMAL
- Measuring position: Normally LINE OUT
- Minimum input level (Ref. level) MIC: −66 dBs LINE IN: −20 dBs

Items	Tape to be used	Standards	Adjustment and checking method	Adjusting points
1. Playback level adjustment	VTT724 (1 kHz)	−8 dBs	Adjust in the FWD direction. The playback level should be −8 dBs ±1 dB with L and R deviations of 1 dB.	Bus wire cut for L CH B159 .. +1 dB B160 .. −1 dB R CH B157 .. +1 dB B158 .. −1 dB
2. Playback equalizer adjustment	VTT739 (63 Hz, 1 kHz, 10 kHz)	The deviation of 1 kHz/10 kHz should be 0 ~ 0.5 dB.	Perform adjustment in the FWD direction.	VR101 201
3. Bias frequency adjustment	——	95 kHz±1 kHz	Set the unit to the REC mode and measure at pin 8 of CP901 with the tape select switch set to the METAL position. (Dummy resistor should be 1.2 MΩ or more.)	L901
4. Record/play frequency response adjustment	TS-9 (Normal) TS-6 (Chrome) TS-7 (Metal)	Adjust to +0.5 dB ±0.5 dB. Check that it is +0.5 dB ±2 dB. Check that it is +0.5 dB ±2 dB.	Adjust by recording and playing back 1.25 kHz and 12.5 kHz signals with the reference level of −20 dB input. (Adjust the balance control so that the L and R input level differences are 0.)	VR103, 203
5. Recording level adjustment	TS-9 (Normal)	−8 dBs±1 dB	Adjust by recording and playing back the reference level of 1 kHz. Check that the recording level of chrome tape is −8 dBs ± 1.5 dB. Check that the recording level of metal tape is −8 dBs ±2 dB. The L and R level differences should be 1.5 dB or less.	Bus wire cut for L CH B61 ... +1 dB B62 ... −1 dB R CH B60 ... +1 dB B59 ... −1 dB
6. Checking the FL meter	TS-9 (Normal)	[−20 dB] should light.	Check the input level so that 1 kHz LINE OUT signal becomes the reference level of −20 dB (−28 dBs) and [−20 dB] in the FL meter light or the FL meter goes out at −29 dBs. [0 dB] should light between −9 dBs and −8 dBs.	——
7. Checking the record/play distortion	TS-9 TS-6 TS-7	Normal: Less than 2% Chrome: Less than 3% Metal: Less than 2% (THD)	Measure by recording and playing back the reference level of 1 kHz.	——
8. Checking the record/play S/N ratio	TS-9 (Normal)	42 dB or more	Apply the reference level of 1 kHz and non-signal level to the MIC jacks and measure the difference by recording and playing back.	——

Items	Tape to be used	Standards	Adjustment and checking method		Adjusting points
9. Azimuth adjustment (2)	Test tape VTT703 (10 kHz) TS-9 (Normal)	Minimum phase difference and maximum output	Set the unit to the PLAY mode and adjust the left screw to the maximum output position with no phase difference. Check the level difference by recording and playing back the reference level of 12.5 kHz, – 20 dB. Repeat the PLAY and STOP operations to check it.		Head azimuth adjustment screw
10. Checking the auto stop	Cassette tape (general)	Auto stop should be performed within 5 sec.	Check at the tape's end in PLAY, FF/REW modes. (The clearance between the Hall IC and magnet should be 1 ± 0.5 mm.)		——
11. Checking the music scan operation	Test tape TMT6447 (700 Hz) TMT6448 (700 Hz)	——	Check that the unit enters the playback mode after music scan when TMT6447 reaches its near end. Check that the music scan operation is not performed when the beginning of TMT6448 is used.		——
12. Checking the MPX filter response	——	30 dB or more	Measure the LINE OUT output when inputting a 19 kHz signal with the required level and the NR switch set to ON or OFF.		——
13. Checking DOLBY NR response at Encode (REC)	DOLBY B NR	Test point Pin ⑦ ㊱ of IC902 Measuring reference level 400 Hz, – 6 dBs (=Cal level)	Frequency and input level	Output value and deviation	Make connections after first removing soldering for the BIAS CUT, stopping oscillation and making measurements.
			1 kHz Cal – 40 dB	+ 5.7 dB ± 2 dB	
			5 kHz Cal – 20 dB	+ 3.5 dB ± 1.5 dB	
			1 kHz Cal	0 dB $^{+0.5}_{-1.0}$ dB	
	DOLBY C NR		1 kHz Cal – 40 dB	+16.2 dB $^{+3.0}_{-2.0}$ dB	
			5 kHz Cal – 20 dB	+ 2.9 dB ± 2.5 dB	
			1 kHz Cal	0 dB ± 1 dB	

■ Equipment and Measuring Instruments used for Adjustment

1. Electrical adjustment

1) Electronic voltmeter
2) Audio frequency oscillator
   (range: 50 Hz—20 kHz and output 0 dB with impedance 600 Ω)
3) Attenuator

2. Mechanical adjustment

Torque testing cassette gauge

Notes: TS-9 is used for recording/playback with normal tape with TD-X401.
TS-9 is not compatible with TS-5.