

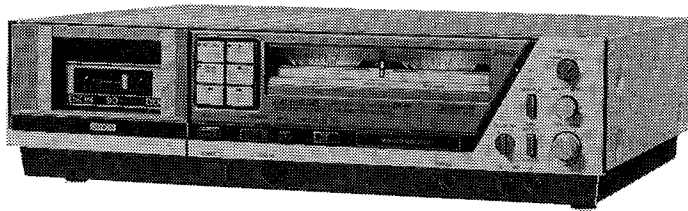
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DENON

Hi-Fi Component

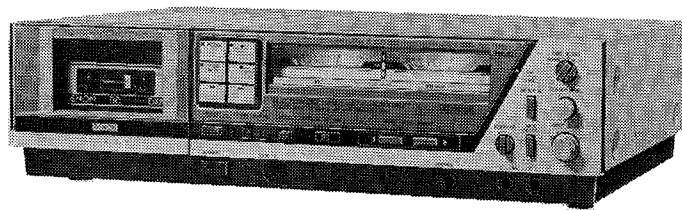
SERVICE MANUAL

STEREO CASSETTE TAPE DECK

MODEL DR-F6/F7/F8



DR-F6



DR-F7/F8

NIPPON COLUMBIA CO., LTD.

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MAIN FEATURES

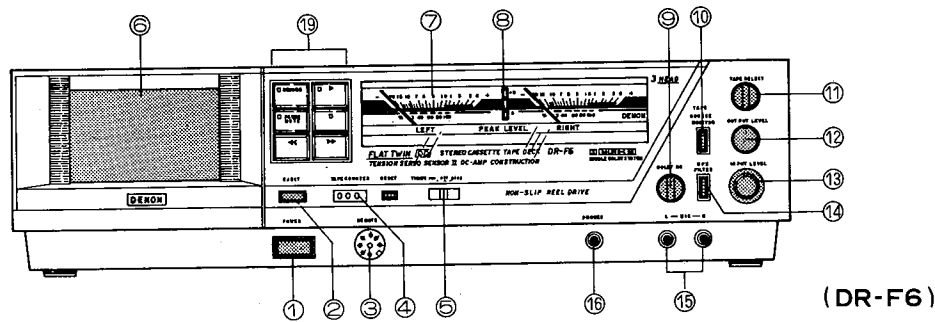
- Three head system with recording/playback combination head, capable of metal tape applications.
- FTS tuning system with microprocessor (DR-F7/F8).
- Flat Twin DD motor with IC logic feather touch controls.
- Quartz Lock Flat Twin DD motor (DR-F8).
- Newly developed tape tension servo sensor.
- DC audio amplifier.
- New non-slip reel drive mechanism.
- Dolby type B and type C.
- Double Dolby systems and separate MPX filter switch.
- DENON original PAUSE/MUTE button.
- Three-color, three-point peak level indicator.
- Timer recordings and timer playback facilities.
- Front panel remote control jack.

SPECIFICATIONS

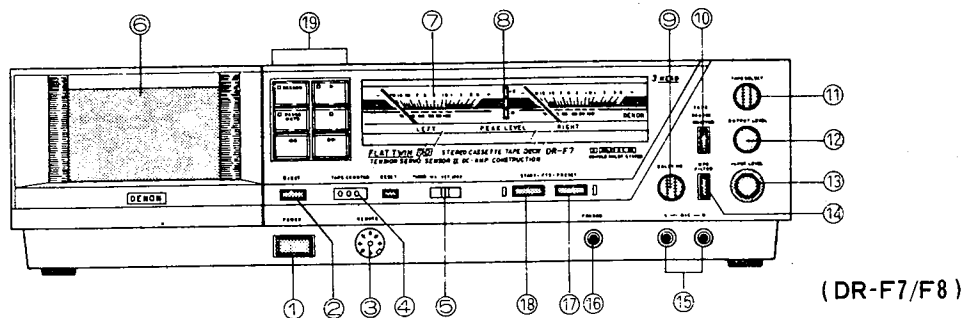
Type	Vertical tape loading 4-track 2-channel stereo cassette tape deck
Heads	Recording/Playback combination head (hard permalloy) x 1 Erase head (Ferrite) x 1
Motors	Flat-Twin direct drive motor (for capstan) x 1 (DR-F6/F7) Quartz lock Flat-Twin direct drive motor x 1 (DR-F8) DC motor (for reel winding) x 1
Tape speed	4.8 cm/sec.
Fast forward, rewind time	Approx. 90 sec. with a C-60 cassette tape
Recording Bias	Approx. 105 KHz
Overall S/N ratio (at 3% THD level)	Dolby B ON more than 67 dB (CCIR/ARM) Dolby C ON more than 73 dB (CCIR/ARM)
Overall frequency response	25-21,000 Hz \pm 3 dB (at -20 dB METAL tape) 30-20,000 Hz \pm 3 dB (at -20 dB CrO ₂ tape) 30-19,000 Hz \pm 3 dB (at -20 dB LH tape)
Frequency range	20-22,000 Hz (at -20 dB METAL tape) 20-21,000 Hz (at -20 dB CrO ₂ tape) 20-20,000 Hz (at -20 dB LH tape)
Channel separation	More than 40 dB (at 1KHz)
Crosstalk	More than 65 dB (at 1 KHz)
Wow & flutter	Less than 0.025% w.rms (DR-F8) Less than 0.027% w.rms (DR-F6/F7)
Input	
microphone	0.35 mV (-67 dB) with input level control at maximum. Input impedance: 10 Kohm unbalanced.
line	70 mV (-21 dB) with input level control at maximum. Input impedance: 47 Kohm unbalanced.
Output	
line	775 mV (0 dB) with output level control at maximum. (with 10 Kohm load, recorded level of 200 Pwb/mm)
headphone	1.2 mW with output level control at maximum (optimum load impedance 8 ohm - 2 Kohm).
Accessories	Parallel pin cord with gold plated terminals x 2, cleaning stick set x 1 (DR-F8) Parallel pin cord x 2, cleaning stick set x 1 (DR-F6/F7)
Power supply	50 Hz/60 Hz compatible Note: The rated supply voltage is preset to match that used in the country of original shipment.
Power consumption	36 W
Dimensions	434W x 117H x 320D (mm)
Weight	7.5 Kg

- Above specifications and design styling are subject to change without notice for improvement.
- "Dolby" and the symbol  are the registered trademarks of Dolby Laboratories Licensing Corporation. The Dolby Noise reduction system is licensed by Dolby Laboratories Licensing Corporation.

PART NAMES AND FUNCTIONS



(DR-F6)



(DR-F7/F8)

1. Power switch (POWER)

Make sure the timer switch is at the "off" position and then push the power switch to turn "on" (■) the power. The lamps in the level meters and the tape window will light up. The set is now ready for operation. Push the switch again to turn "off" (■) the power.

2. Eject button (EJECT)

This button opens the cassette compartment to permit the insertion and removal of the cassette tape.

3. Remote control jack (REMOTE)

The remote controller (Model RC-57), separately available, can be connected for remote control of the deck. Even when the RC-57 is connected to the jack, the control buttons on the deck continue to function.

4. Tape counter (TAPE COUNTER)

The number in the counter indicates the amount of tape wound up. It is a great convenience if you write down the counter indication as well as the recorded content for instant reference. Press the reset button to reset the counter to "000".

5. Timer switch (TIMER)

When starting recordings with the timer, set the timer switch to the "rec" position; for starting playback with the timer, set to the "play" position. Set the timer switch to the "off" position except when recording or playing back using the timer.

6. Cassette compartment

This holds the cassette tape and sets it to its operational position. While the cassette compartment is open, the control buttons do not function.

7. Level meter (LEVEL METER)

The input/output levels are indicated. When the monitor switch is set to SOURCE, the input signal level is indicated. When the switch is set to TAPE, the playback output level is indicated.

8. Peak level indicator (PEAK)

9. Dolby NR switch (DOLBY NR)

The Dolby system functions properly when the conditions for recording and playback are the same. When playing back Dolby encoded tapes, set the Dolby switch to the same position as in recording. (Type C recording — type C playback.)

10. Monitor switch (MONITOR)

The three head system of this tape deck provides simultaneous monitoring during recording.

TAPE (■): The recorded sound on the tape can be monitored during recording. (The green lamp will light up). Be sure to turn it to the TAPE position for playback. If set to the SOURCE position for playback, input signals through the input jacks or the microphone jacks are monitored, but not the playback signals.

SOURCE (■): The signals through the input jacks or the microphone jacks are monitored. (The orange lamp will light up.)

11. Tape selector (TAPE SELECT)

The recording bias and equalizer are simultaneously switched for optimum setting for different kinds of tapes, including high performance metal tapes. Select the position according to the type of tape to be used.

12. Output level (OUTPUT LEVEL)

The playback output level or the record monitoring output level are adjusted independently from the level meter indications. The headphone output level is also adjusted by this knob.

13. Input level (INPUT LEVEL)

The input levels of the left and right channels are adjusted independently in accordance with the signal level to be recorded. The front knob is for the left (L) channel and the rear knob is for the right (R) channel.

14. MPX filter switch (MPX FILTER)

15. Microphone jacks (MIC)

Plug in the microphone plugs for microphone recordings. Use microphones with an output level higher than -67dB and a 6 mm diameter plug.

16. Headphone jack (PHONES)

Use for enjoying music through the headphones or for monitoring the recording. Use a headphone set with an impedance of 8 ohms to 2 Kohms.

17. FTS preset button (FTS PRESET)

This button allows the switchover between the preset standard bias/recording sensitivity and those calculated by the FTS using a microprocessor.

18. FTS start button (FTS START)

This button starts the operation of the microprocessor controlled FTS system. While the bias and the sensitivity are being automatically adjusted by the FTS, the green lamp on the left will flash. Once the adjustments are completed, the lamp will stay lit.

19. Tape control buttons

PAUSE/MUTE Button

When this button is pressed during playback, the tape transport will stop and the green lamp in the PLAY button will be turned off. An orange lamp in the PAUSE/MUTE button will light up, indicating the PAUSE condition. While this button is pressed during recording, the tape will run with no signals being recorded. When the button is released, the tape transport will stop. The orange lamp and red lamp in the REC button will light up, indicating the standby condition. When starting the recording again, press the PLAY button (▶).

RECORD Button

Load the cassette tape and press this button. This places the unit in standby for recording (pause). The red and orange lamps will light up. Press the PLAY button (▶) to start recording.

*If the erase prevention tab of the loaded cassette tape is broken off, this button does not function.

PLAY Button ▶

When pressed during STOP, FAST FORWARD or REWIND mode, playback begins and the green lamp will light up. When pressed during standby in the recording (pause) mode, the recording will start.

STOP Button ■

When pressed during any operational mode, the operation is stopped.

REWIND Button ◀◀

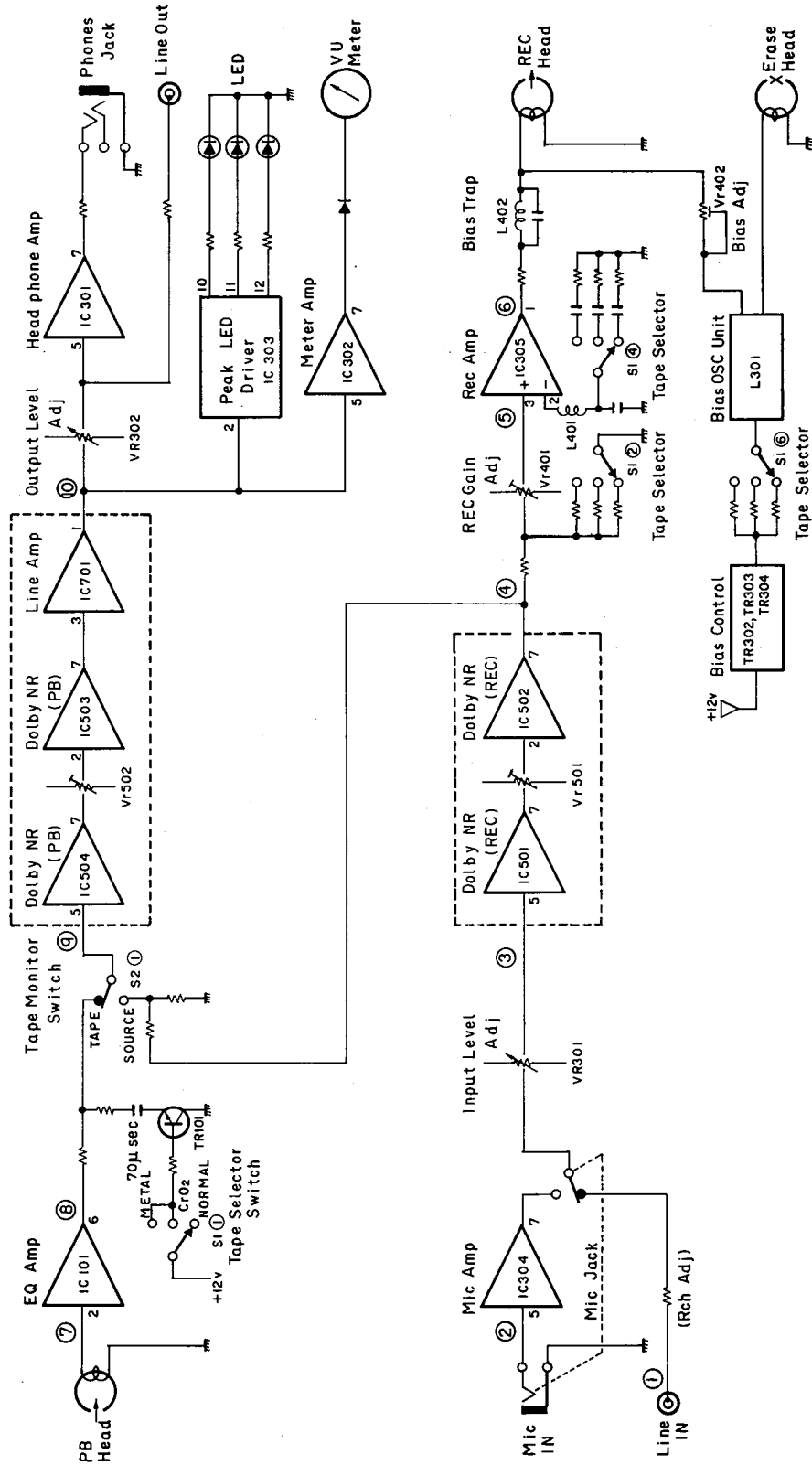
When pressed, the tape is rewound onto the left spool rapidly.

FAST FORWARD Button ▶▶

When pressed, the tape is wound onto the right spool rapidly.

BLOCK DIAGRAM

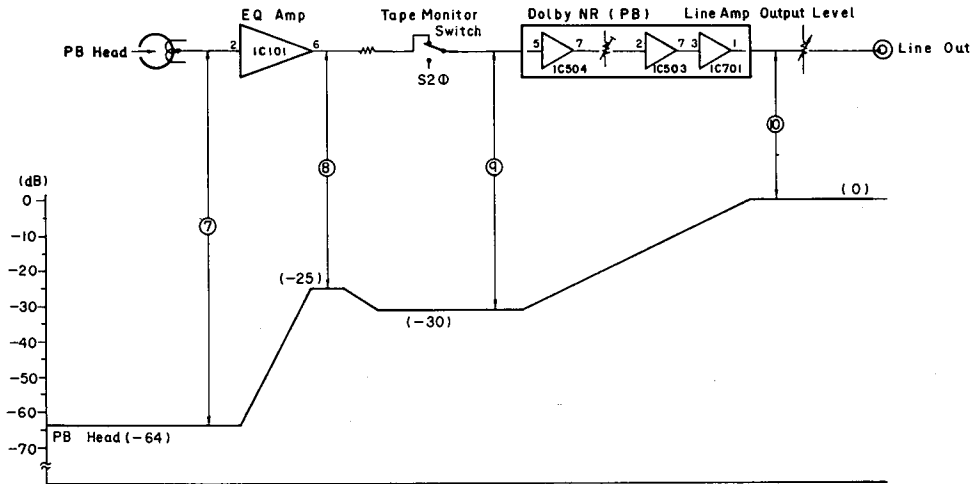
(DR-F6)



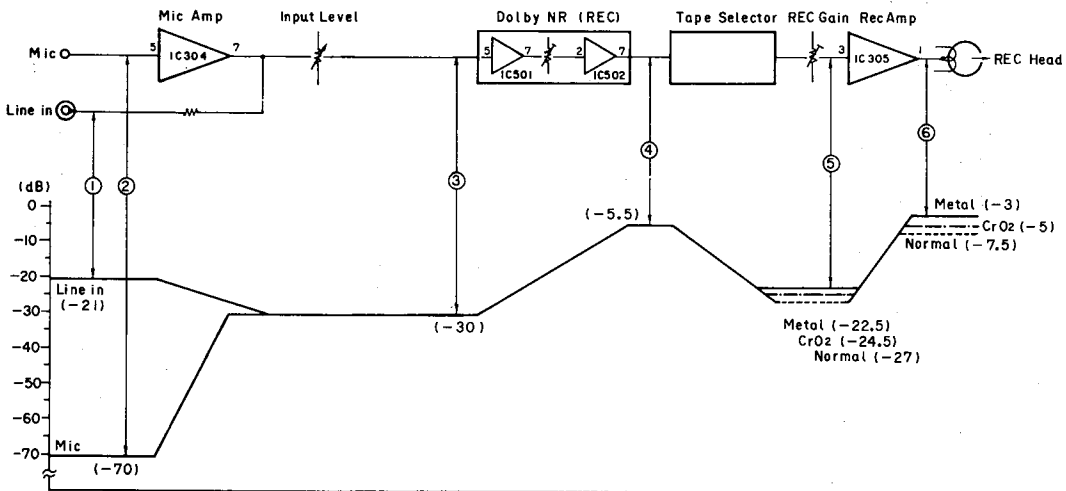
LEVEL DIAGRAM

(DR-F6)

PLAYBACK SYSTEM

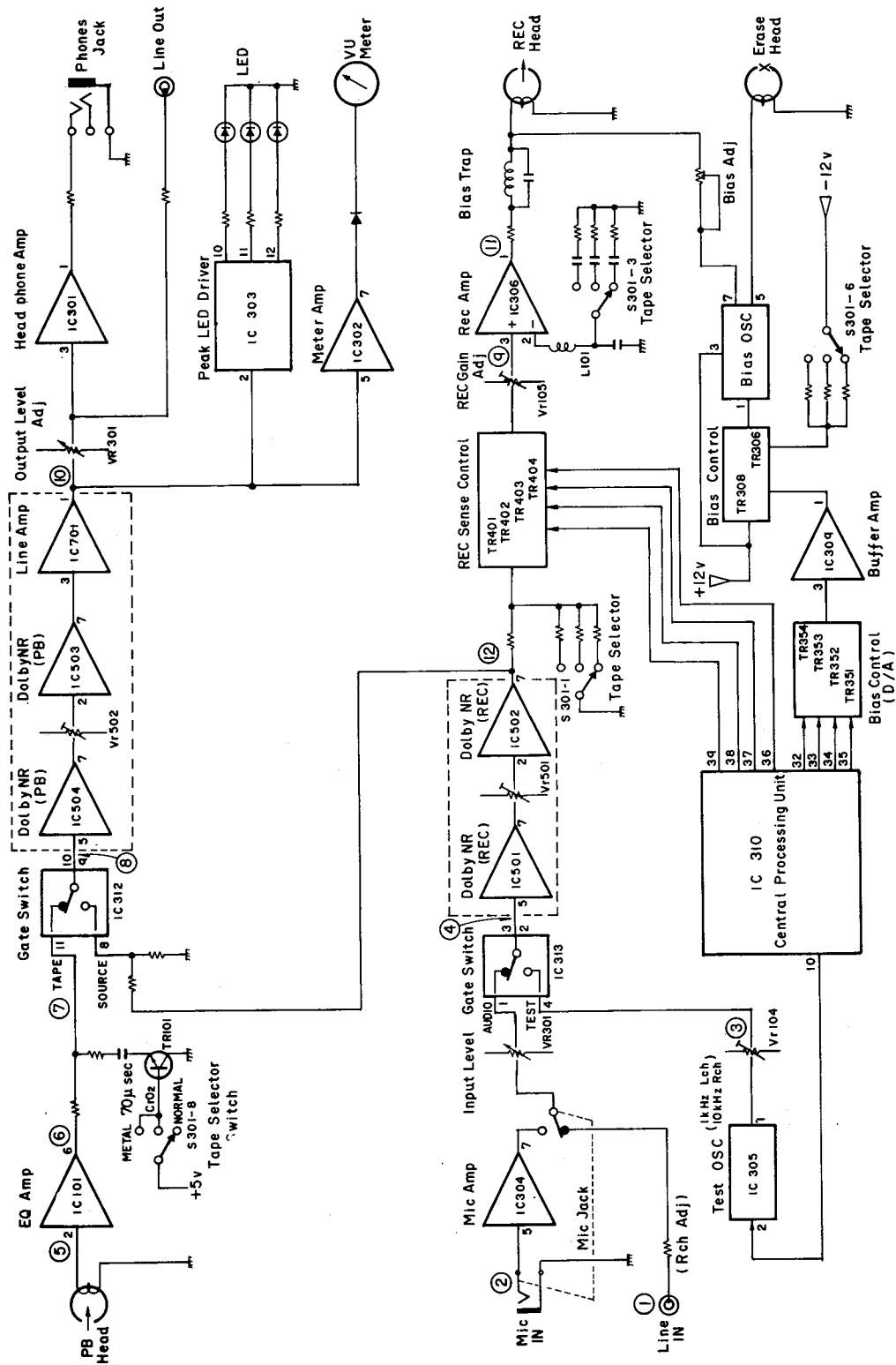


RECORDING SYSTEM



BLOCK DIAGRAM

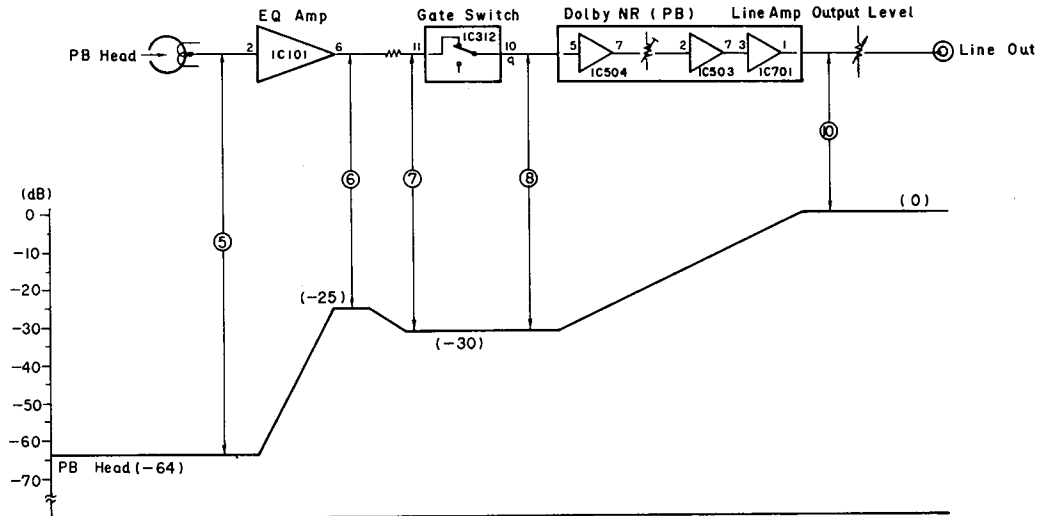
(DR-F7/F8)



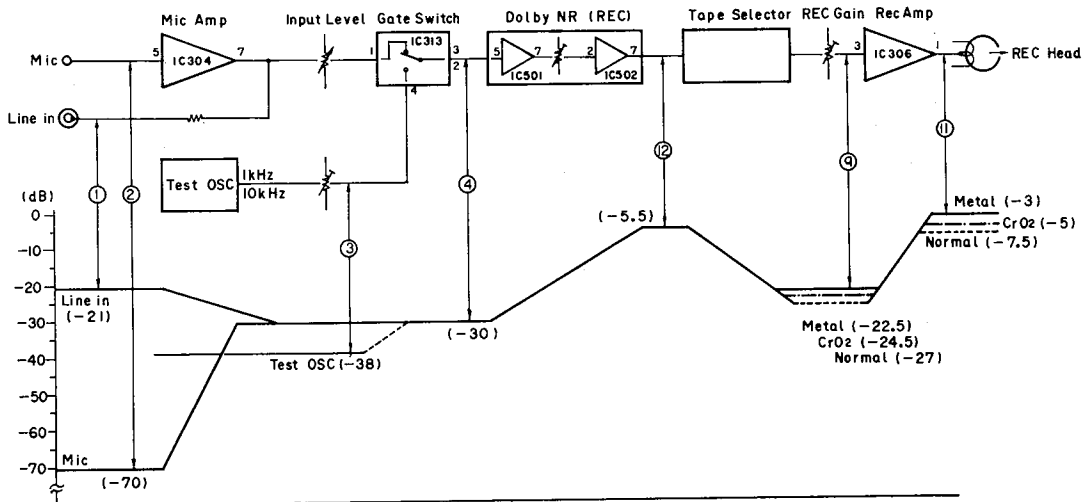
LEVEL DIAGRAM

(DR-F7/F8)

PLAYBACK SYSTEM

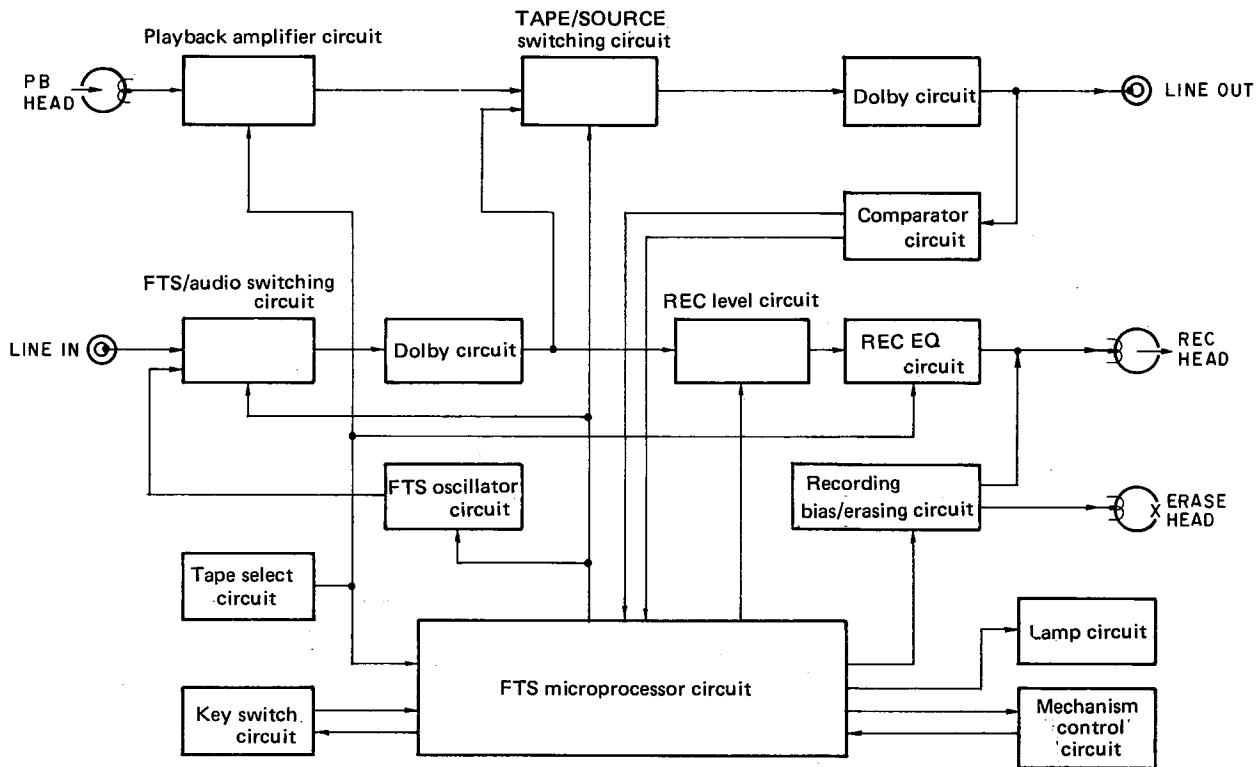


RECORDING SYSTEM



THE FTS

The FTS (Flat Tuning System) automatically adjusts the recording sensitivity and the bias, resulting in recordings with a flat frequency response.



Block Diagram

1. FTS Function Outline

The outline of the FTS system, from start to finish will be explained in order of operations.

(1) FTS start (0 sec.)

When the FTS START button is pressed, the START/FTS lamp will flash and the operation begins.

(2) Detection of the tape magnetic coating (0-10 sec.)

If the magnetic coating on the tape is detected within 10 seconds after the FTS START button is pressed, the operation moves to the next item. However, when the magnetic coating is not detected within 10 sec. the FTS operation is stopped; the preset standard bias/recording sensitivity is set and the PRESET lamp is lit.

(3) Stand-by run (approx. 1 sec.)

After detecting the magnetic coating, the tape is run for approximately 1 sec. before going to the next operation.

(4) First sensitivity adjustment (approx. 1 sec.)

A reference signal of 1 KHz - 38 dB, generated from the FTS oscillator is recorded and played back. The sensitivity D/A is adjusted so that the normal output level of -20 dB is obtained.

(5) Bias adjustment (approx. 1 sec.)

A reference signal of 12 KHz - 38 dB, generated from the FTS oscillator is recorded and played back. The sensitivity D/A is adjusted so that the normal output level of -20 dB is obtained.

(6) Second sensitivity adjustment (approx. 1 sec.)

The same operation as the first sensitivity adjustment is carried out.

(7) FTS finish

The tape is rewound to the FTS starting point; the mechanism is stopped and the START/FTS lamp is lit, completing the FTS operations.

2. The Main Functions of the FTS Microprocessor

The main functions of the microprocessor for each item listed above will be explained. Also refer to the Microprocessor Terminal Function Chart.

(1) FTS start

1) When the \overline{KM} input terminal 1 detects the FTS START button being pressed, the FTS oscillator is operated by the H signal which comes out from the FTS/Audio terminal 10. After this, the START/FTS lamp is flashed by the pulse signal which comes out from the FTS lamp output terminal 12.

2) The mechanism is set to the REC/PLAY mode by the active L control pulse signal which comes out from the \overline{REC} output terminal 6 and the \overline{PLAY} output terminal 7.

3) The \overline{REC} check terminal 26 (L) and the PLAY check terminal 27 (H) confirms the mechanism in the REC/PLAY mode, and this operation is finished. If the FTS START button is pressed within 5 seconds of turning on the power supply, the FTS will not operate.

(2) Detection of the tape magnetic coating

1) The sensitivity data output is set to \overline{FH} (36 - 39 : L) and the bias data output to FH (32 - 35 : H), setting them to the maximum recording level.

2) The sensitivity comparison signal, which becomes L when the magnetic coating is detected, is confirmed* at the sensitivity comparison terminal 40.

(3) Stand-by run

The tape is run for approximately 1 second with the sensitivity data output set at $\overline{8H}$ (36 - 38 : H, 39 : L), and the bias data output at 8H (32 - 34 : L, 35 : H).

(4) First sensitivity adjustment

1) The bias data output is set to 8H (32 - 34 : L, 35 : H).

2) The sensitivity comparison data is taken in from the sensitivity comparison terminal 40, and the sensitivity adjustment is performed.

(5) Bias adjustments

1) The sensitivity data output is set to the sensitivity adjustment value obtained in item (4).

2) The bias comparison data is taken in from the bias comparison terminal 41, and the bias adjustment is performed.

(6) Second sensitivity adjustment

1) The bias data output is set to the bias value obtained in item (5).

2) The sensitivity comparison data is taken in from the sensitivity comparison terminal 40, and the sensitivity adjustment is performed again.

(7) FTS finish

1) The mechanism is set to the RWD mode by the active L control pulse signal which comes out from the \overline{RWD} output terminal 9.

2) The RWD check terminal 28 (H) confirms* the mechanism in the RWD mode.

3) After the tape has been rewound for the number of pulse counts taken in from the TAPE COUNT terminal 31 from the FTS start to just before RWD, the mechanism is set to the STOP mode by the active L control pulse signal which comes out from the \overline{STOP} output terminal 8.

4) After the internal oscillator is stopped by the L signal which comes out from the FTS/Audio terminal 10, the START/FTS lamp is changed to lit from flashing by the H signal which comes out from the FTS lamp output terminal 12, and the entire operation is completed.

*Confirm

The confirmation time is a maximum of approximately 10 seconds. If the designated mode cannot be confirmed within this time, the preset data output is made and the operation is completed.

TERMINAL FUNCTION CHART

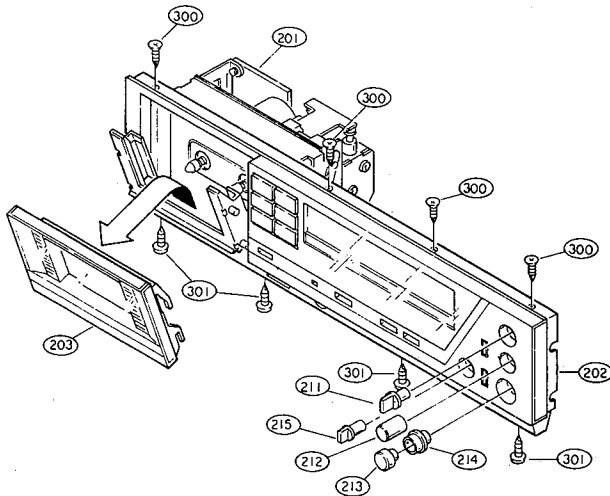
Terminal No.	Name	Input/Output	Function
1	$\overline{\text{KM}}$	Input	Mode distinction key input
2	KM0	Output	FTS start clock output
3	KM1	Output	Preset out clock output
4	KM2	Output	Memory out clock output
5	KM3	Output	Memory mode clock output
6	$\overline{\text{REC}}$ output	Output	Active L 200 mS REC control pulse output
7	$\overline{\text{PLAY}}$ output	Output	Active L 200 mS PLAY control pulse output
8	$\overline{\text{STOP}}$ output	Output	Active L 200 mS STOP control pulse output
9	$\overline{\text{RWD}}$ output	Output	Active L 200 mS RWD control pulse output
10	FTS/Audio	Output	FTS → H, Audio → L
11	HOLD RESET	Output	Active H 3 mS output pulse to reset the playback hold
12	FTS LAMP	Output	During FTS → Clock pulse output FTS DATA output is made → H
13	PRESET LAMP	Output	PRESET DATA output is made → H
14	NC	—	NON CONNECTION
15	RESET	Input	RESET input terminal
16	GND	Output	GND
17	OSC 1	Input	Internal oscillator excitation
18	OSC 2	Input	Terminal
19	CE	Input	Data maintenance; 5V
20	$\overline{\text{TEST}}$	Input	Microprocessor test; 3V
21	VDD	Input	VDD; 5V
22	$\overline{\text{LH}}$ memory	Input	Active L with LH memory designated input
23	$\overline{\text{FeCr}}$ memory	Input	Active L with FeCr memory designated input

Terminal No.	Name	Input/Output	Function
24	$\overline{\text{CrO}_2}$ memory	Input	Active L with CrO ₂ memory designated input
25	$\overline{\text{METAL}}$ memory	Input	Active L with METAL memory designated input
26	$\overline{\text{REC}}$ check	Input	Active L with REC check input
27	PLAY check	Input	Active H with PLAY check input
28	RWD check	Input	Active H with RWD check input
29	STOP check	Input	Active H with STOP check input
30	STOP sense	Input	When an H input is made at the STOP sense input, the FTS operation is stopped.
31	TAPE COUNT	Input	Pulse taken in from the tape counter
32	BIAS D ₀	Output	(LSB) } Data output for BIAS adjustments
33	BIAS D ₁	Output	
34	BIAS D ₂	Output	
35	BIAS D ₃	Output	
36	Sensitivity D ₀	Output	(LSB) } Data output for sensitivity adjustments
37	Sensitivity D ₁	Output	
38	Sensitivity D ₂	Output	
39	Sensitivity D ₃	Output	
40	Sensitivity comparison	Input	Sensitivity comparison data input
41	Bias comparison	Input	Bias comparison data input
42	Timer	Input	Active L timer sense input

DISASSEMBLY INSTRUCTIONS

1. How to Remove the Front Panel

- (1) Remove the six screws 303 from both sides of the top cover 239, and take off the top cover.
- (2) Press the EJECT button 220 and open the cassette compartment. Push the cassette window 203 upward to remove from the cassette compartment. Return the cassette compartment to the original position.
Note: Be careful when handling the cassette window, as it is easily scratched.
- (3) Pull out the knobs 211, 212, 213, 214, 215.
Note: Be careful not to scratch the knobs and the clear plastic parts.
- (4) Unscrew the four upper screws 300 and the four lower screws 301 of the front panel 202; pull the front panel forward.



2. How to Remove the Control Switch Circuit Board and the FTS Switch Circuit Board (DR-F7/F8)

- (1) Remove the front panel 202.
- (2) The control switch circuit board and the FTS switch circuit board can be removed when the circuit board holding screws 305, behind the front panel, are unscrewed.
Note: When assembling, make sure the cushions 210 and 217 in between the switches and the buttons are inserted into the guides of the front panel 202. Poor button operations may result if the cushions are not properly placed into the guides.

3. How to Remove the Mechanisms

- (1) Remove the top cover 239 and the front panel 202.
- (2) Unscrew the Hall IC circuit board holding screw 304 and take out the circuit board.
- (3) Remove the belt from the counter 224.

- (4) Pull the push lever (G) 245 forward to remove it from the Dolby switch 279. Unscrew the three Dolby circuit board 278 holding screws 304 and lift the circuit board upward.
- (5) Disconnect the connectors with the lead wires, which are connected to the mechanism, from the three places on the audio circuit board and two places on the logic circuit board.
Note: The orange line is the (R) channel and the white line is the (L) channel for the two 2P connectors used on the audio circuit boards. Make sure the connections are correct when assembling.
- (6) Unscrew the four holding screws 306 in the front section of the front chassis 226 and the two bottom cover 231 holding screws; by lifting, the mechanism unit can be taken out.
- (7) When assembling, the gap between the Hall IC and the counter magnet should be 0.5-1 mm.

4. How to Remove the Logic Circuit Board

Removing the three logic circuit board 280 holding screws 304 and the two screws holding the radiator 248 and the center angle 229 to lift out the logic circuit board.

5. How to Remove the Dolby Circuit Board

- (1) Remove the top cover 239.
- (2) Remove the front panel 202 and the various knobs 211, 212, 213, 214, 215.
- (3) Remove the push lever (G) 245 from the Dolby switch 279 and unscrew the four Dolby circuit board holding screws 304 to take out the Dolby circuit board.

6. How to Remove the Audio Circuit Board. () denotes DR-F6

- (1) Remove the Dolby circuit board together with the hinge.
- (2) Unscrew the selector switch 261 holding screws and the nuts from the volumes 262, 263. (Remove the nut from volume 263.)
- (3) Unscrew the four screws 304 holding the audio circuit board 260, and take out the screws 306 and the nuts 311 at the rear of the vertical mounted circuit board. (Unscrew the five screws 304 holding the audio circuit board 260.)
- (4) The audio circuit board can be taken out by sliding it back and lifting.
Note: Most repairs to the logic and audio circuit boards can be done by removing the bottom cover. Refer to the above removal instructions as necessary.

7. Power Supply Section

Since the safety regulation applies to the power supply section, be careful of the parts used and the soldering of these parts when replacing.

ADJUSTING AND CHECKING THE MECHANISM SECTION

1. Replacing the Pinch Roller 31

Before replacing the pinch roller, clean the tape contact surface of the pinch roller and the capstan shaft 30.

Most causes of poor tape transport can be traced to dirty pinch rollers and capstan shafts.

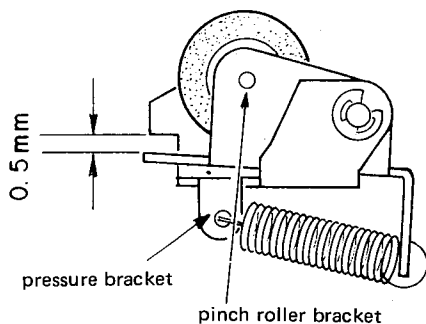
By removing the pinch roller spring 33 and the 2.5E ring 139, the pinch roller 31 can be taken out, along with the pressure bracket. When assembling, always insert the pressure bracket 32 shaft into the long hole of the connecting lever 11 on the back side of the mechanism chassis 1.

After replacing, run a pad-less C-90 tape to check for tape curls at the tape guide section of the head.

2. Checking the Pressure Force of the Pinch Roller

In the playback mode, hook a dial tension meter (500 g) onto the bracket at the center of the pinch roller. After separating the pinch roller from the capstan shaft, allow the pinch roller to contact the capstan shaft again. Check to make sure the dial tension meter reads between 375-475 g when the pinch roller starts to rotate. If it is not within the normal range, replace the pinch roller spring.

Note: In the playback mode, check to make sure that there is a gap of more than 0.5 mm between the pinch roller bracket 31 and the pressure bracket 32.



3. Replacing the Record/Playback Head

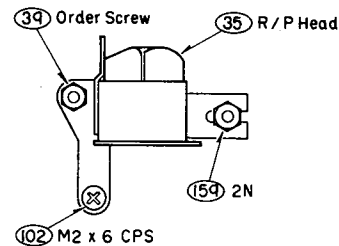
* Before replacing, remove the mechanism unit from the chassis.

(1) How to remove the R/P HEAD.

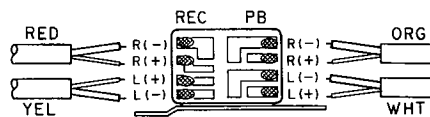
- 1) When the R/P HEAD holding screw 102 is taken out, be careful as the CORD CLAMPERS 49 and 47 as well as the 3T-LUG with the wire will come off.

Next, take out the azimuth adjustment NUT 159 and the height adjustment ORDER SCREW 39 loosening them alternately.

If they are not loosened alternately, the R/P HEAD base may become warped.



- 2) By unsoldering the HEAD WIRES on the circuit board section of the R/P HEAD, the entire R/P HEAD can be taken off the mechanism unit.
- (2) How to assemble the R/P HEAD.
Reverse the above (1) procedures for removing the R/P HEAD.



- * Solder the HEAD WIRES according to the diagram above.
- * In replacing the R/P HEAD, whenever possible, do not remove the WIRE CLAMPER, which holds the HEAD WIRES to the CORD CLAMPER 77. It is adjusted so that the HEAD WIRES do not become a load during the HEAD PLATE operations.
If the WIRE CLAMPER must be removed, after replacing the R/P HEAD, check to make sure that (1) the HEAD WIRES do not contact the pinch roller spring during the HEAD PLATE operations; (2) the HEAD WIRES are not creating a load at the bottom plate and that the HEAD PLATE lowers to the required position at the STOP mode.

4. Adjusting the R/P HEAD

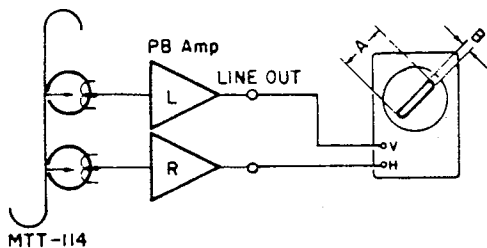
(1) Height adjustments (Use the head adjusting jig M-300)

Set the M-300 tool plate on the mechanism unit; turn the height adjustment ORDER SCREW 39 and adjust so that the 3.8 mm measure section of the M-300 (tool grip) can pass without contacting the tape guide of the R/P HEAD 35.

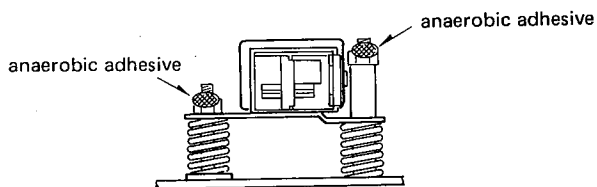
- * Only the height adjustment is necessary; no tilt adjustments are required.
- * When adjusting the height, make sure the R/P HEAD is not tilted by turning the azimuth adjustment nut, and checking with your eyes.
- * Never allow the M-300 (tool grip) to hit the tape contact surface of the R/P HEAD strongly. It may scratch the surface.
- * After the height adjustments, replace the mechanism unit to the chassis and re-connect all connectors.

(2) Azimuth adjustments

Play back the TEAC MTT-114 test tape. Turn the azimuth adjustment nut and adjust so that A of the resurge wave form is maximum and B is minimum. After the azimuth adjustments, re-check the head height with the M-300 to make sure the height has not deviated.



- * After the various adjustments, apply anaerobic adhesive on the positions indicated in the diagram.

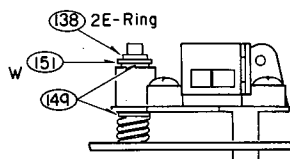


5. Replacing the ERASE HEAD 40 .

The ERASE HEAD can be replaced by removing the 2E ring 138, which holds the detecting arm 46, and the two ERASE HEAD holding screws 119.

6. Adjusting the ERASE HEAD Height

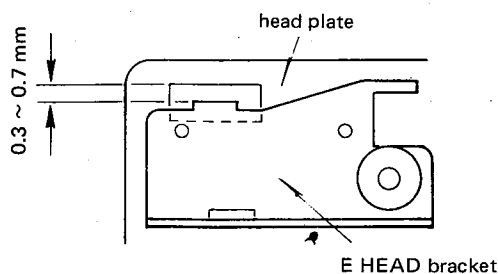
After the washers 149 and 151 are properly placed as mentioned below, check the height of the ERASE HEAD tape guide section using the M-300 (tool grip).



- * The above diagram illustrates the placement of the various washers under normal conditions. If the M-300 indicates that height adjustments are required, reverse the position of washer 151 and lower side washer 149, or change the thickness of the upper side washer 149 to 0.13 mm and adjust the various washers so that the total thickness becomes the same. In this case, make sure that a poly washer is always placed above and below the boss section of the E. HEAD bracket 41.

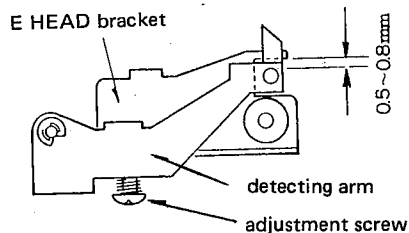
7. Adjusting the Gap Between the HEAD PLATE and the ERASE HEAD Bracket During Playback

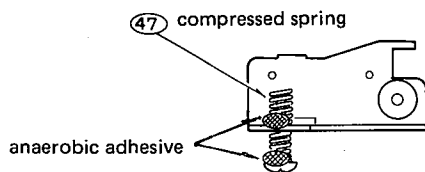
Adjust the attachment position of the ERASE HEAD, making sure the gap between the ERASE HEAD bracket and the HEAD PLATE is 0.3-0.7 mm.



8. Adjusting the Gap Between the Detecting Arm 46 and the ERASE HEAD Bracket

With a cassette loaded, turn screw 104 and adjust to that the gap between the detecting arm and the ERASE HEAD bracket is 0.5-0.8 mm during playback. After adjusting, apply anaerobic adhesive as shown in the diagram.





* When replacing the E HEAD BRACKET 41, apply anaerobic adhesive at the bottom of the spring 47 to prevent it from falling, as shown in the diagram.

9. Checking for Axis Direction Movements of the Capstan Shaft

Hold the capstan shaft from the front of the mechanism and move it in the axis direction; check to make sure the movement is within 0.2-0.8 mm.

If it is not within this range, change the thickness of the poly washer 146. In addition, when replacing the flywheel, be careful of the positions of the poly washers 146 and 148.

10. Checking the Take-up Torque

Load the cassette type torque meter. Check to make sure that the torque meter average reading is within 35-60 g-cm during playback. If it is not within this range, check the voltage (3.4 V) of the reel motor. If the voltage is low, the torque will be weak; if it is high, the torque will be strong. In addition, check for reel thrust movement in section 11.

11. Adjusting the Reel Thrust Movement

Check to make sure that the reel thrust movement is within 0.2-0.4 mm. If it is not within this range, change the thickness of the washer 146, 0.25t, which is placed behind the reel. Do not reuse the holding washer 145.

12. Checking the FF and REW Torques

- * When using the cassette type torque meter. Check to make sure the torque meter indicates more than 80 g-cm at the end of FF and REW.
- * When using a modified cassette half. (See Service Manual "Model DR-230", page 12)
Load the modified cassette half; hook the end of the dial tension meter (full scale 100-300 g) onto the triangle section. In the FF (REW) mode, feed the tape in at a rate somewhat slower than the take up speed. Check to make sure the dial tension meter reads more than 60 g-cm.

13. Checking the Back Tension Torque During Record/Playback

Load the cassette type torque meter; check to make sure the torque meter reads between 2-5 g-cm during playback and that there are no unevenness.

If it is not within this range, check the section on adjusting the reel thrust movement; or else replace the spring 53.

14. Checking the FF and REW Times

Load a C-60 cassette tape; check to make sure the tape is fast forwarded or rewound in between 60-100 seconds. If it is not within this range, check sections 11 and 13.

15. Adjusting the Position of the Erase Prevention Lever

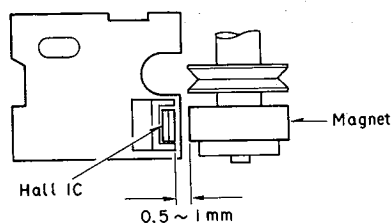
Adjust the mounting position of the switch, so that when the cassette is loaded, switch 59 turns ON-OFF properly.

16. Checking the EJECT Switch 82.

To check the operation of the EJECT SW with only the mechanism unit, do so by attaching the EJECT LEVER 221.

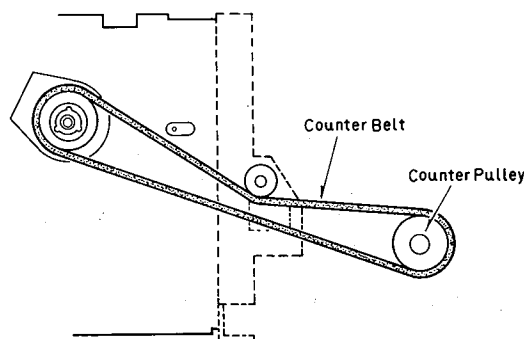
17. Adjusting the Position or Replacing the Hall IC

Adjust the gap between the Hall IC and the outer edge of the magnet of the counter 224 to 0.5-1 mm, as shown in the diagram below.



18. Checking the Position of the Counter Belt

After replacing the mechanism unit, check to make sure the counter belt is hooked in the position as shown in the diagram below.



ADJUSTING THE ELECTRICAL SECTIONS

● Measuring instruments necessary for adjustments

- (1) Audio signal generator
- (2) Variable resistance attenuator
- (3) Vacuum tube voltmeter
- (4) Oscilloscope
- (5) Frequency counter
- (6) Adjustment screwdriver
- (7) Trap coil adjustment square stick
- (8) Test tapes (TEAC MTT-111, MTT-114, MTT-150, MTT-316 or 116K) (MAXELL XL-II) C-46 or C-60 (DENON DX 3, DXM) (COLUMBIA LX-C60)
- (9) Transport check cassette tape (COLUMBIA C-120, modified)

● Cautions on adjusting

- (1) Before adjusting, clean the head surface, capstan and the pinch roller with a gauze or a cotton swab moistened with alcohol.
- (2) Demagnetize the R/P HEAD and the E.HEAD with a head eraser.
- (3) Completely demagnetize the adjustment screwdriver.
- (4) Unless instructed otherwise, set the various controls as follows:
 - INPUT volume maximum clockwise
 - OUTPUT LEVEL volume . . maximum clockwise
 - DOLBY NR switch OFF
 - TAPE SELECT switch CrO₂
 - MONITOR switch TAPE

1. Tape Transport Check

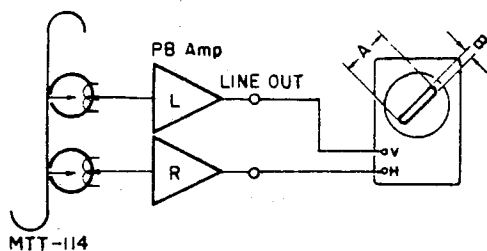
Load the transport check cassette. In the operational mode, illuminate the fixing guides of the R/P HEAD with a lamp and check to make sure the tape edge does not come in contact with the tape guide section.

The tape transport is the most important element in determining the performance of a cassette deck.

Avoid moving the various adjustment screws, nuts, etc., as much as possible. Refer to the pages on "Adjusting and Checking the Mechanism Section" when replacing or adjusting the R/P HEAD.

2. Adjusting the Azimuth

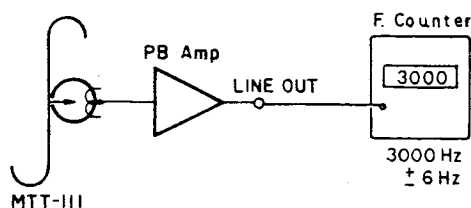
- (1) After completing the tape transport check, load the test tape (TEAC MTT-114).
- (2) Play back the test tape; adjust the azimuth screw so that section A of the resurge wave form is maximum and section B is minimum.



3. Checking and Adjusting the Tape Speed

(1) (DR-F6/F7)

- 1) Connect the frequency counter to the LINE OUT terminal and load the test tape (TEAC MTT-111).



- 2) Play back the test tape; at the midpoint of the tape, where the transport is stable, adjust VR 1 of KU-0426 (DD MOTOR UNIT) so that the frequency counter reading is in the range of 3,000 Hz \pm 6Hz.

(2) (DR-F8)

- 1) Adjusting the lock position

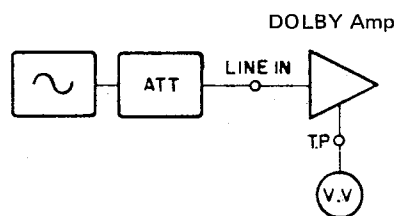
Measure the T.P. of KU-0434 (QUARTZ LOCK UNIT) with the oscilloscope and adjust VR 1 of KU-0426 (DD MOTOR UNIT) so that the duty is 50% (906 Hz).

At this time, LE 901 (red LED) of KU-0434 will light up.

- 2) Connect the frequency counter to the LINE OUT terminal and play back the test tape (TEAC MTT-111). Check to make sure the frequency counter reading is in the range of 3,000 Hz \pm 6 Hz.

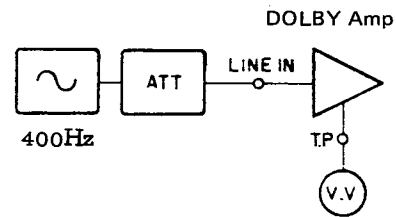
4. Adjusting the Input Sensitivity

- (1) Set the MONITOR switch to SOURCE position, the operational mode at STOP. Supply a 400 Hz signal using audio signal generator to the LINE IN terminal and set the input signal level (approx. -18 dB) so that the output level at the test point TP 51 (L ch) on the Dolby circuit board becomes -2.5 dB.
- (2) Adjust Vr 301 on the audio circuit board so that the output level at the test point TP 61 (R ch) on the Dolby circuit board becomes -2.5 dB. In the case of DR-F6, adjust Vr 204.

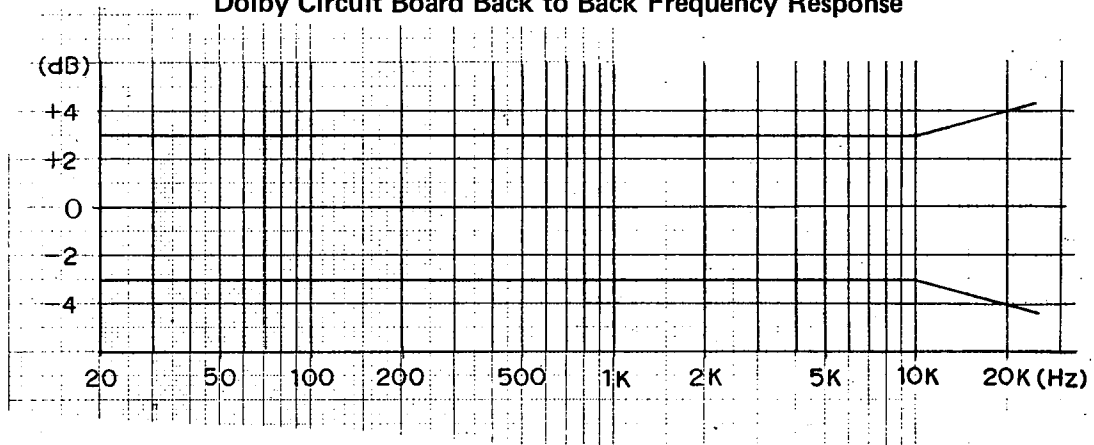


5. Adjusting the Dolby Circuit Board (KU-0423)

- (1) Supply a 400 Hz signal to the LINE IN terminal and set the input level so that the levels at the test points TP 51 (L ch), TP 61 (R ch) become -22.5 dB.
- (2) Adjust Vr 501 (L ch), Vr 601 (R ch) so that the levels at test points TP 52 (L ch), TP 62 (R ch) becomes -22.5 dB.
- (3) Next, check to make sure that the levels at the test points TP 53 (L ch), TP 63 (R ch) are -22.5 dB \pm 0.5 dB.
- (4) Adjust Vr 502 (L ch), Vr 602 (R ch) so that the levels at the test points TP 54 (L ch), TP 64 (R ch) becomes -22.5 dB.
- (5) Check to make sure that the overall frequency response meets the specifications in the diagram below.

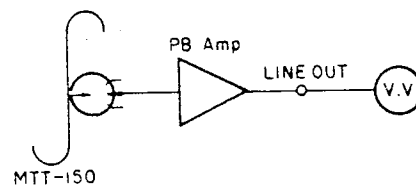


Dolby Circuit Board Back to Back Frequency Response

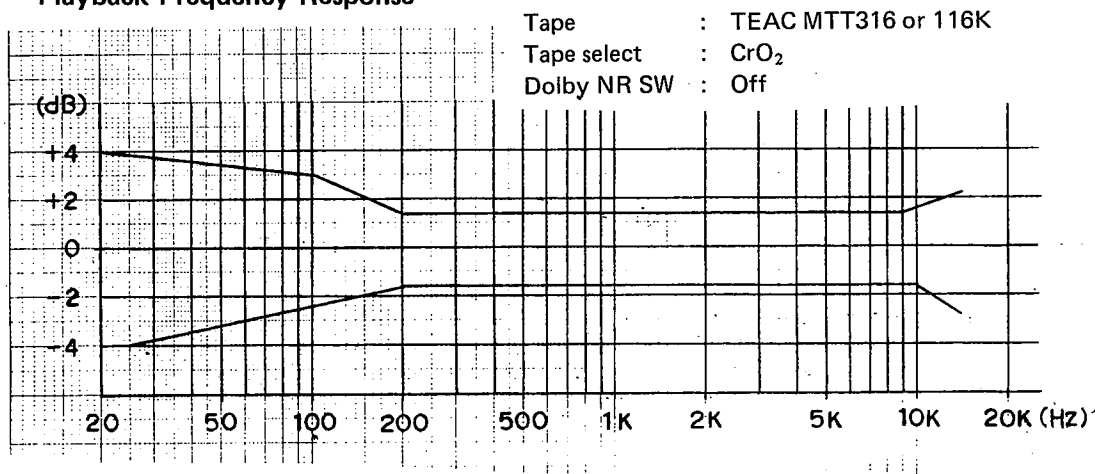


6. Adjusting the Playback Section

- (1) Adjusting the playback level
Play back the Dolby standard level test tape (TEAC MTT-150) and adjust Vr 101 (L ch), Vr 201 (R ch) so that the LINE OUT voltage becomes 0 dB (0.775 V).
- (2) Adjusting the playback frequency response
Play back the test tape (TEAC MTT-316 or 116K) and adjust Vr 102 (L ch), Vr 202 (R ch) so that the frequency response meets the specifications in the diagram.

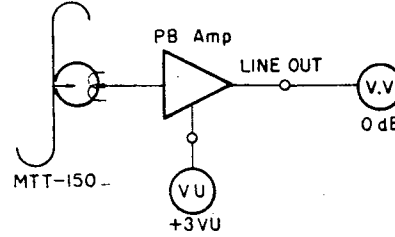


Playback Frequency Response



7. Adjusting the Meter

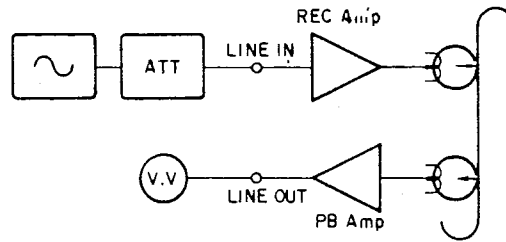
After adjusting the playback level, play back the test tape (TEAC MTT-150) and adjust Vr 103 (L ch), Vr 203 (R ch) so that the VU meter indicates +3 VU when the LINE OUT voltage is 0 dB (0.775 V).



8. Adjusting the Recording Section

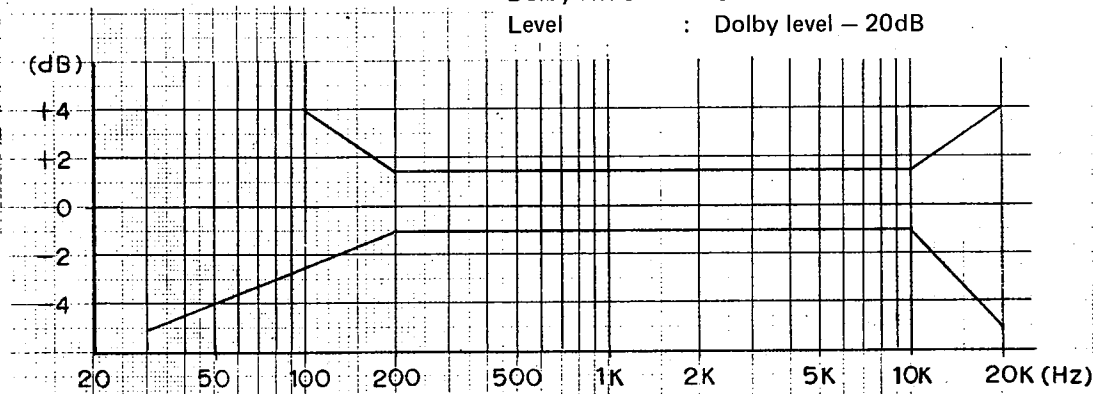
(1) Adjusting the record/playback overall frequency response.

- 1) Load the test tape MAXELL XL-II (C-60); record a signal with an input level of -38 dB, 1 KHz at the LINE IN terminal; play back this recording.
- 2) Change the frequency of the input signal from 1 KHz to 12 KHz with same levels -38 dB; record and play back; adjust Vr 106 (L ch), Vr 206 (R ch) so that the output level is about equal compared to the 1 KHz signal output level. In the case of DR-F6, adjust Vr 402 (L ch), Vr 502 (R ch). Check to make sure that the overall frequency response meets the specifications in the diagram below.



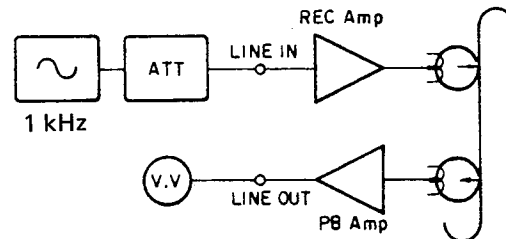
Record/Playback Overall Frequency Response

Tape : MAXELL XL-II C-60
 Tape Select : CrO₂
 Dolby NR SW : Off
 Level : Dolby level -20 dB



(2) Adjusting the record/playback levels

- 1) Load the test tape MAXELL XL-II (C-60) and record a signal of 1 KHz (-38 dB).
- 2) Adjust Vr 105 (L ch), Vr 205 (R ch) so that the output level is the same when the MONITOR switch is switched from SOURCE to TAPE position. In the case of DR-F6, adjust Vr 401 (L ch), Vr 501 (R ch).

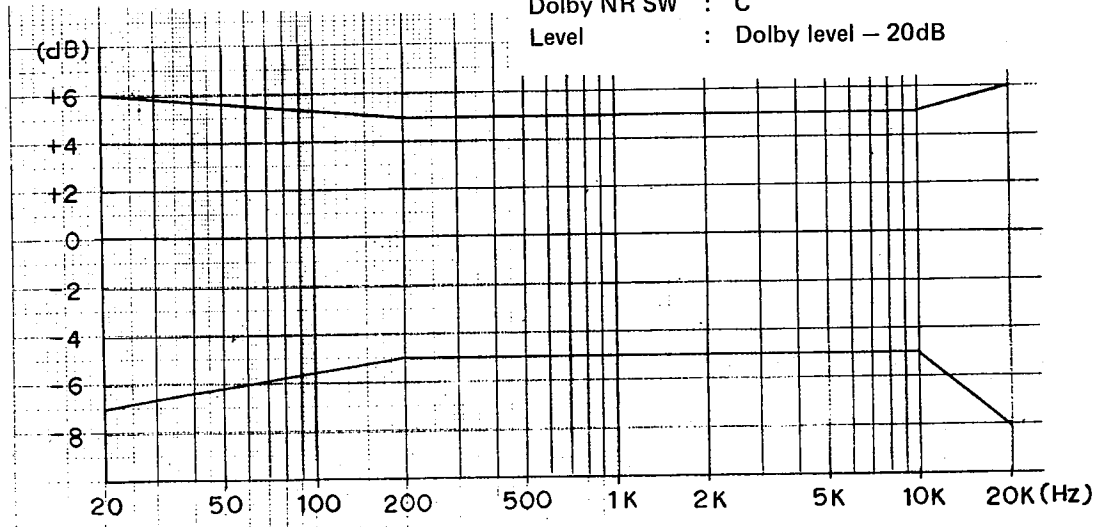


(3) Checking the Dolby C record/playback overall frequency response

- 1) Set the DOLBY NR switch to the "C" position.
- 2) Using the test tapes DXM, XL-II, DX-3, perform record/playback in the same manner as 8-(1).
- 3) Check to make sure that the record/playback overall frequency response meets the specifications in the diagram.

Dolby C Record/Playback Overall Frequency Response.

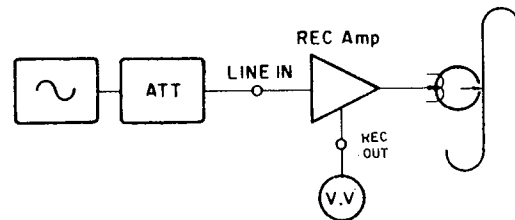
Tape : XL-II, DX3, DXM
 Tape Select : CrO₂, NORMAL, METAL
 Dolby NR SW : C
 Level : Dolby level - 20dB



9. Adjusting the FTS Section (DR-F7/F8)

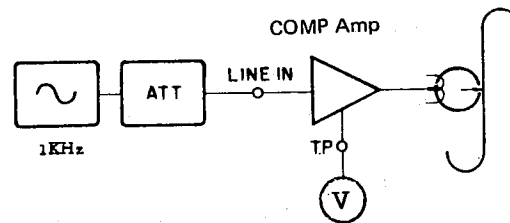
(1) Adjusting the FTS test signal, oscillator

- 1) Supply a -38 dB, 1 KHz signal to the LINE IN (L) terminal and read the level at the REC OUT (L) terminal.
- 2) Press the FTS START button to switch over to the FTS test signal. Adjust Vr 104 so that the level after the switch-over is the same as the value read in 9-(1)-1).
- 3) Supply a -38 dB, 12 KHz signal to the LINE IN (R) terminal and read the level at the REC OUT (R) terminal.
- 4) Press the FTS START button to switch-over to the FTS test signal. Adjust Vr 204 so that the level after the switch-over is the same as the value read in 9-(1)-3).



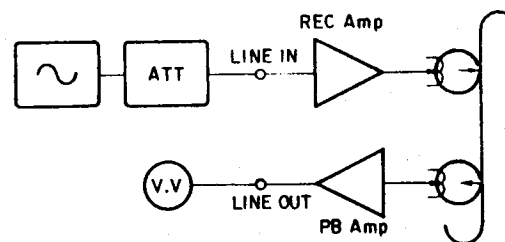
(2) Adjusting the reference level of the FTS comparator circuit

Supply a -38 dB, 1 KHz signal to the LINE IN terminal and adjust Vr 302 so that the level at the test point TP 31 is set immediately after H → L or L → H alteration.



(3) Checking the FTS operations

- 1) Set the TAPE SELECT switch to the NORMAL position and load a tape (LX-C60).
- 2) Light up the PRESET LAMP, setting the unit in the PRESET mode. Record and play back 1 KHz and 12 KHz signals at -38 dB, and take a note of the frequency response.
- 3) Press the FTS START button. After completion, (check the lit FTS lamp) record and play back the 1 KHz and 12 KHz signals at -38 dB. Check to make sure that the frequency response is improved when compared to the ones noted in 9-(3)-2).



● Beat Interference

Beat interference may result if the unit is used close to an AM tuner. In this case separate the distance between the tuner and the cassette deck.

PARTS LIST OF MECHANISM UNIT

Ref. No.	Part No.	Part Name	Remarks
1	9J250101F	MECH. CHASSIS ASS'Y	
2	9J250131	FELT	
3	9J250112A	C. SUPPORT SPRING	
4	9J250113	SPRING PLATE	
5	9J250219	BRAKE	
6	9J250275	BRAKE SHOE	
7	9J250209	HEAD SLIDER ASS'Y	
8	9J250288	BRAKE SPRING	
9	9J2502010	BRAKE SLIDERS ASS'Y	
10	9J2502103	BRAKE LEVER	
11	9J2502104	CONNECTING LEVER	
12	9J2502802	SPRING	
13	9J250289	SPRING	
14	9J2502011	S. LEVER ASS'Y	
15	9J2502012	S. BRACKET ASS'Y	
16	9J250272	SIDE STOPPER	
17	2148062005	SOLENOID (A)	
18	2148062018	SOLENOID (B)	25-02-93A
19	9J250249	SHAFT	25-02-93B
20	KU-0426	D.D UNIT	
	KU-0426-1	D.D UNIT	DR-F8 only
21	9J250295	STATOR COIL ASS'Y	
22	2680033000	H-200A (PNK)	25-02-96
23	9J2502105	SHIELD PLATE	25-02-105
24	9J2502106	BRACKET	
25	9J250304	BEARING ASS'Y	
26	9J250311	FG. YOKE	
27	9J250312	FG. GENERATER (B)	
28	9J250391	FG. MAGNET	
29	9J250392	FG. COIL ASS'Y	
30	9J250307	FLY WHEEL ASS'Y	
31	9J250401	P. ROLLER BRACKET ASS'Y	
32	9J250402	PRESSURE BRACKET ASS'Y	
33	9J250481	P. ROLLER SPRING	
34	9J250505	HEAD PLATE ASS'Y	
35	3918051009	R/P HEAD	25-05-99
36	9J250598	WIRE ASS'Y	
37	9J250584	SPRING	
38	9J250588	SPRING	
39	9J2505502	ORDER SCREW	
40	3918031003	E. HEAD	25-05-92
41	9J250503	E. HEAD BRACKET ASS'Y	
42	9J250582A	TOSION SPRING	
43	9J250583	ADJUST SPRING	
44	9J250514	SPRING PLATE	
45	9J250515	BRACKET	
46	9J250506	DETECTING ARM ASS'Y	

Ref. No.	Part No.	Part Name	Remarks
47	9J250587	SPRING	
48	9J250597	LUG	
49	9J11140302	LUG	
50	9J250709	REEL BASE ASS'Y	
51	9J2507010	REEL ASS'Y	
52	9J250722	SPRING SUPPORT	
53	9J2507801	SUPPLY SPRING	
54	2178061209	REEL MOTOR UNIT	25-07-93
55	9JSIE14007	IDLER	S1E14007
56	9J191471	COUNTER BELT	
57	9J251302	REC LEVER ASS'Y	
58	9J251381	TORSION SPRING	
59	9J251791	SWITCH	
60	9J2517120	EJECT LEVER (B)	
61	9J251783	SPRING	
62	9J201703	DAMPER PISTON ASS'Y	
63	9J201761	DAMPER CYLINDER	
64	9J2517118	DAMPER ARM	
65	9J2517122	E.S.C PLATE	
66	9J2517113	CASSETTE BOX	
67	9J251761	CASSETTE HOLDER (R)	
68	9J251762	CASSETTE HOLDER (L)	
69	9J251717	C. PRESSURE SPRING	
70	9J181705	HINGE (L) ASS'Y	
71	9J2517013	HINGE (R) ASS'Y	
72	9J251753A	BOSS	
73	9J251785	TORSION SPRING	
74	9J2517121	EJECT LEVER (C)	
75	9J250282	SPRING	
76	9J251764	LAMP LENS	
77	9J04681	LUG	
78	9J251706	SIDE BRACKET (L) ASS'Y	
79	9J251752	ROLLER	
80	9J251793	LAMP	
81	9J251771	LAMP COVER	
82	9J251391	EJECT SWITCH	
83	9J251709	SIDE BRACKET ASS'Y	
84	9J191463	PULLEY	
85	9J2517011	EJECT ARM	
101	9JDRF101	CPS 2x2	SCPMS2002
102	4711103014	CPS 2x6	
103	9JDRF103	CPS 2x7	
104	4711810006	CPS 2x10	
105	4711201013	CPS 2.6x4	
107	4711301010	CPS 3x4	
108	9JDRF208	2.6x4 FT	SCPTS2604
109	9JDRF110	2.6x5 FT	SCPTS2605
112	4713101014	CBS 2x4	

