

Fig. 6-33-2

1-6-34. Holder Center Post Assembly Replacement

1. Turn over the mechanical deck and remove the center gear pulley and the idle arm. (Refer to item "1-6-33. Idle Arm Assembly Replacement".)
2. Turn over the mechanical deck and remove the top bracket and the cassette holder assembly. (Refer to item "1-6-1. Top Bracket Assembly Replacement and 1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
4. After removing two screws (1), replace the holder center post assembly (2).
5. After replacing, mount the parts in the reverse order of removal.

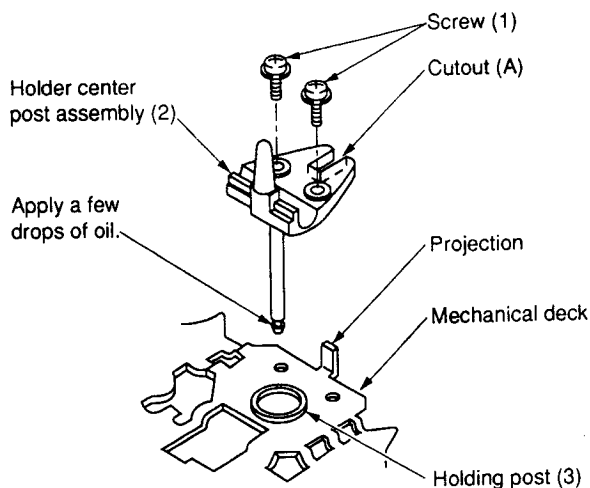


Fig. 6-34-1

Note:

- When mounting, push the cutout (A) on the holder center post assembly (2) aligning with the projection on the mechanical deck.
- Screw tightening torque is 294 – 392 mN•m (3 – 4 kg•cm).
- Before mounting the center gear pulley, apply a few drops of oil. (Refer to Fig. 6-33-1.)

1-6-35. REC Inhibiting Lever Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the cam slider. (Refer to item "1-6-40. Cam Slider Replacement".)
4. Remove the tension spring (2).
5. Undo the claw (A) on the S soft brake (1) sliding and lifting it upward.
6. Remove the projection (B) on the REC inhibiting lever (3) sliding in the direction shown by the arrow and lifting it upward.
7. After replacing the REC inhibiting lever (3), mount the parts in the reverse order of removal.

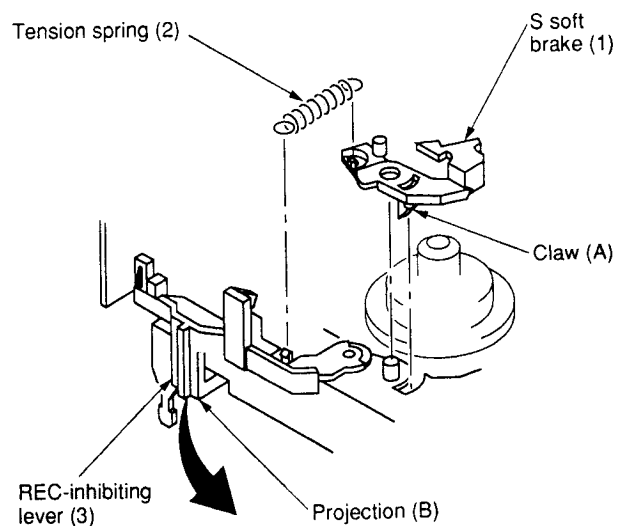


Fig. 6-35-1

1-6-36. S, T Main Brake Assembly Replacement

1. Remove the mechanical deck from the main PC board and turn the mechanical deck upside down.
2. When replacing the T main brake assembly (2), first remove the idle kick lever (3). (Refer to item "1-6-33. Idle Arm Assembly Replacement".)
3. Remove the tension spring (4).
4. Remove the claws on the S, T main brakes (1), (2) from the mechanical deck lifting the S, T main brakes (1), (2) upward.
5. After replacing the S, T Main brake assemblies (1), (2), mount the parts in the reverse order of removal.

Note:

- When mounting the S, T main brake assemblies (1), (2) take care that both ends of the S, T main brakes (1), (2), do not touch the gear of the reel table.

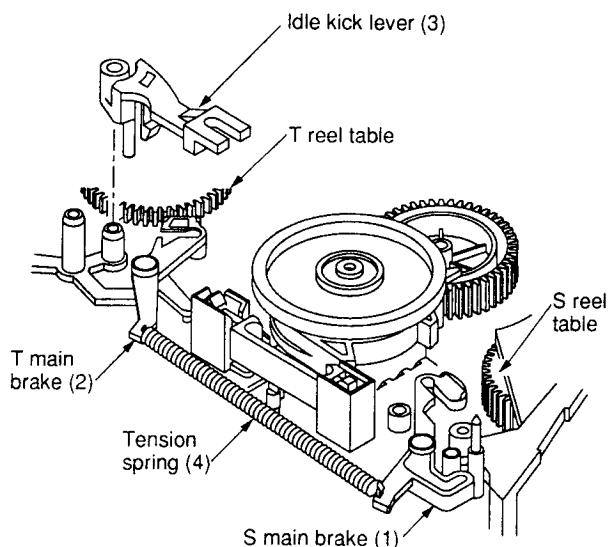


Fig. 6-36-1

1-6-37. S Soft Brake Replacement

1. Remove the cam slider. (Refer to item "1-6-40. Cam Slider Replacement".)
2. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
3. Remove the S soft brake spring (1).
4. Remove the S soft brake (2) after removing the claw (A) on the S soft brake from the mechanical deck.

Note:

- When mounting the S soft brake spring (1), take care not to deform the hook (B).
- When mounting the S soft brake (2), take care of the band brake (3).

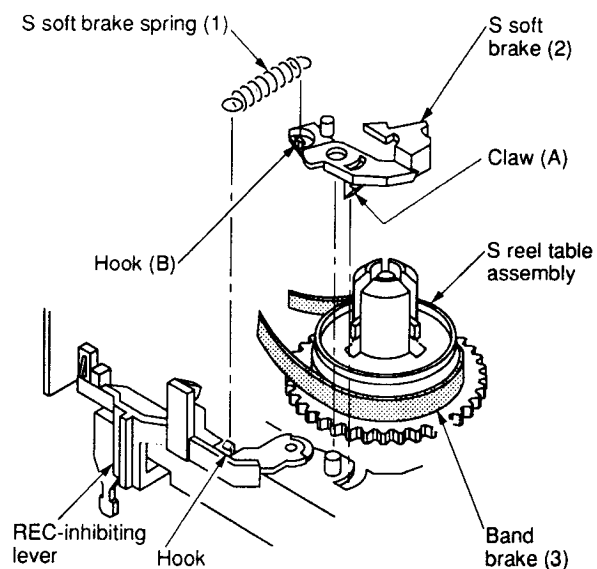


Fig. 6-37-1

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1-6-38. T Soft Brake Replacement

1. Remove the T soft brake spring (1).
2. Remove the claw (A) on the T soft brake (2) from the mechanical deck and remove the T soft brake (2).
3. After replacing the T soft brake (2), mount the parts in the reverse order of removal.

Note:

- When mounting the T soft brake spring (1), take care not to deform the hook (B).
- Take care not to touch the surface (C) on the brake pad.

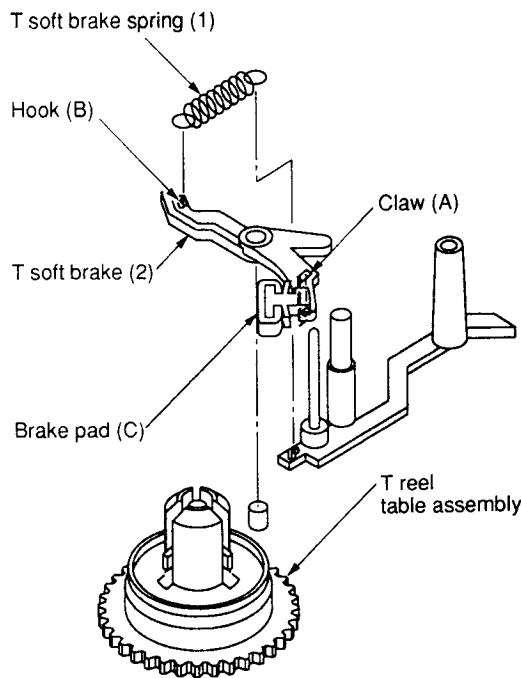


Fig. 6-38-1

1-6-39. Drive Lever Replacement

1. Remove the top bracket. (Refer to item "1-6-1. Top Bracket Replacement".)
2. Remove the cassette holder assembly. (Refer to item "1-6-2. Cassette Holder Assembly Replacement".)
3. Remove the drive arm assembly. (Refer to item "1-6-5. Drive Arm Assembly Replacement".)
4. Remove the cam slider. (Refer to item "1-6-40. Cam Slider Replacement".)
5. Remove the Loading Drive Assembly. (Refer to item "1-6-28. Loading Drive Assembly Replacement".)
6. Remove the drive lever (1).

7. After replacing the drive lever (1), mount the parts in the reverse order of removal.

Note:

- Be sure to align the phase of the cam gear (2). (Refer to item 1-6-40. Cam Slider Replacement".)
- Mount the drive lever (1) so that it is positioned between the mark (A) on the mechanical deck and the outsert (B).
- Apply grease to the surface between the mark (C) on the mechanical deck and the drive lever shaft (D).

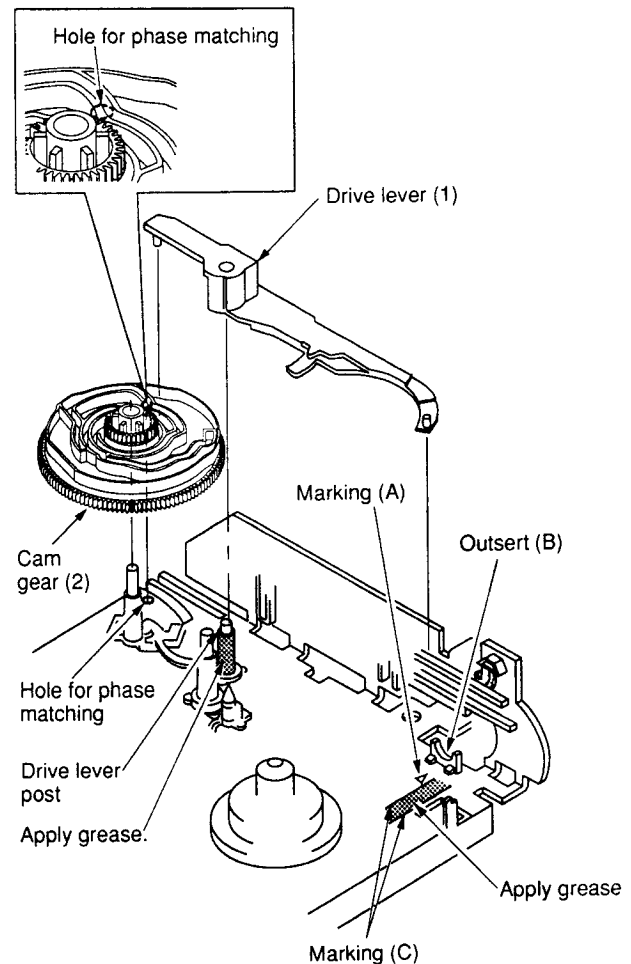


Fig. 6-39-1

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1-6-40. Cam Slider Replacement

1. Remove the top bracket and the cassette holder assembly. (Refer to item "1-6-1. Top Bracket Replacement and 1-6-2. Cassette Holder Assembly Replacement".)
2. Remove the tension spring (1).
3. Turn the hook lever assembly (2) counterclockwise and turn the S soft brake (3) counterclockwise.
4. Move the cam slider (4) to the right and align the projection (A) on the mechanical deck and the cutout portion (B) on the cam slider (4).
5. Remove the claw (C) on the cam slider (4) and remove the cam slider (4) lifting the cam slider (4) upward.

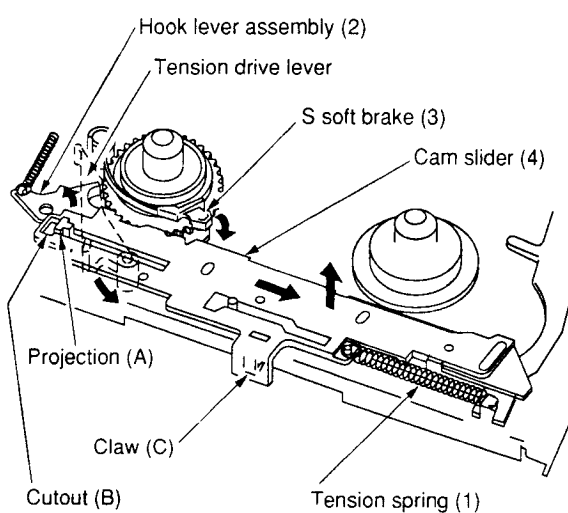
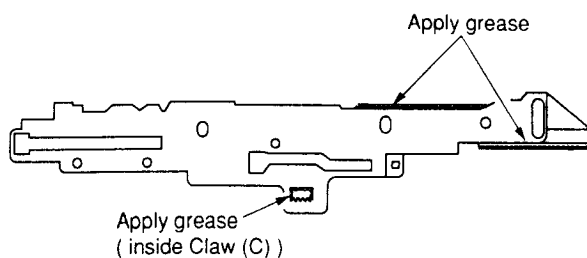


Fig. 6-40-1

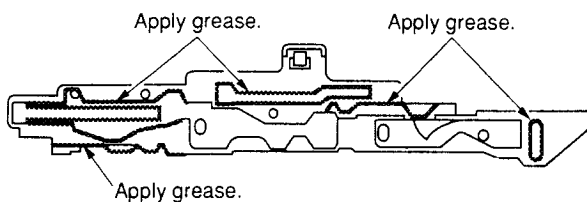
6. Apply grease on the shaded portion of a new slider for the replacement.
7. Mount the parts in the reverse order of removal. After inserting the cam slider, slide it to the left direction till it stops. (Fig. 6-25-2 shows this condition.)

Note:

- When mounting the cam slider (4), slide the tension drive lever in the direction shown by the arrow (counterclockwise).
- After completion of the replacement, confirm that the cam slider (4) can slide to left and right directions smoothly.



Cam slider top side



Cam slider bottom side

Fig. 6-40-2

1-6-41. Idle Centering Lever Replacement

1. Remove the cam slider. (Refer to item "1-6-40. Cam Slider Replacement".)
2. Remove the claw on the idle centering lever (1) and remove the idle centering lever (1) lifting it upward.
3. After replacing the idle centering lever (1), mount the part in the reverse order of removal.

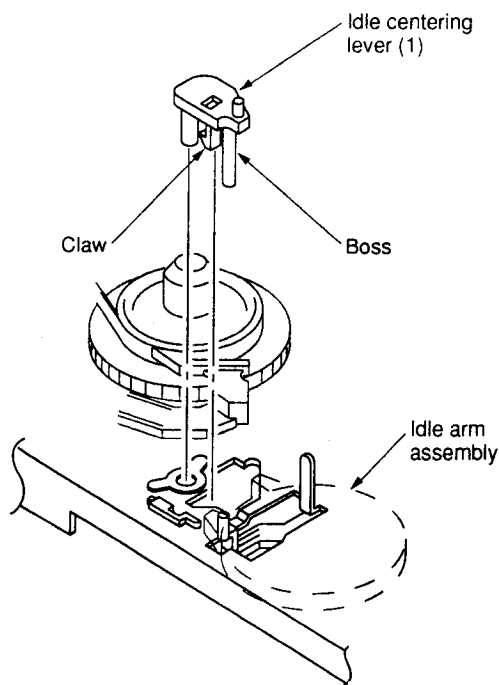


Fig. 6-41-1

1-6-42. Capstan Motor Replacement

1. Remove the reel belt (1).
2. Remove one screw (2) from the bottom of the mechanical deck, and remove the PC board (3).

Note:

- Take care not to misuse the screw with others.

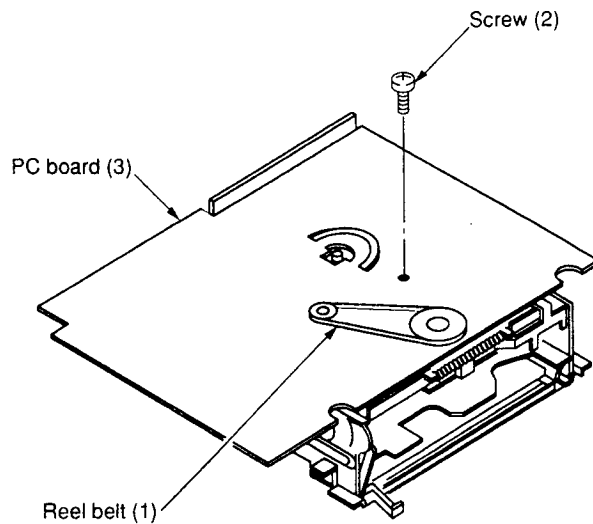


Fig. 6-42-1

3. Remove the capstan motor (4) after removing three screws (5).

Note:

- Take care not to drop the capstan motor.

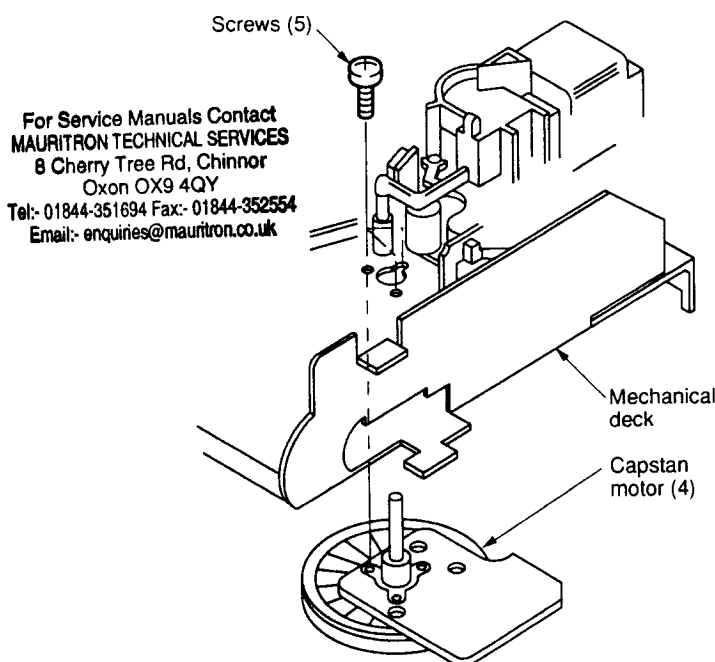


Fig. 6-42-2

4. Take care not to damage and scratch the motor itself, and mount the capstan motor (4) fitting the hole (A) on the mechanical deck and the hole (B) on the capstan motor (4).

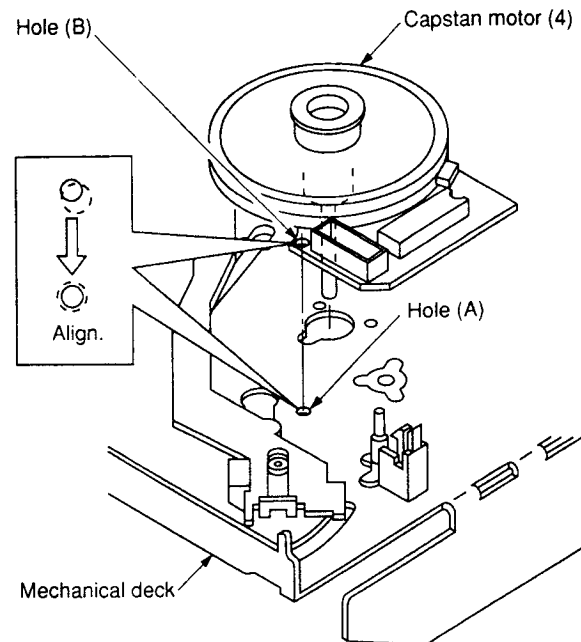


Fig. 6-42-3

5. Mount the capstan motor (4) with three screws (5) viewing from the top side of the mechanical deck.

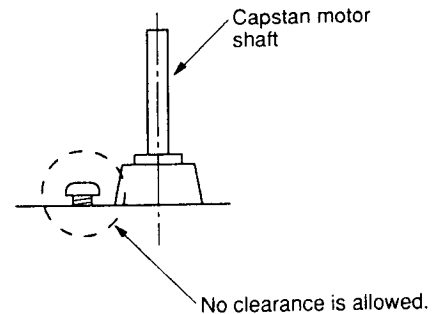


Fig. 6-42-4

Note:

- Do not use once-removed screws again.
 - Take care that no clearance is allowed when securing three screws.
6. After replacement, mount the parts in the reverse order of removal.

Note:

- In this case, take care not to twist the reel belt and stick the grease or etc. on it.
7. After replacing, perform the adjustment according to the tape transport adjustment procedures.

1-6-43. S-VHS Switch Assembly Replacement (S-VHS model only)

1. Slide the cassette holder assembly (1) until the screw (2) can be seen from the hole on the top bracket (3).
2. Insert a screwdriver from the hole provided on the top bracket (3) and secure the screw (2).
3. Remove the S-VHS switch assembly (4) upward.
4. After completion of the replacement, mount the parts in the reverse order of removal.

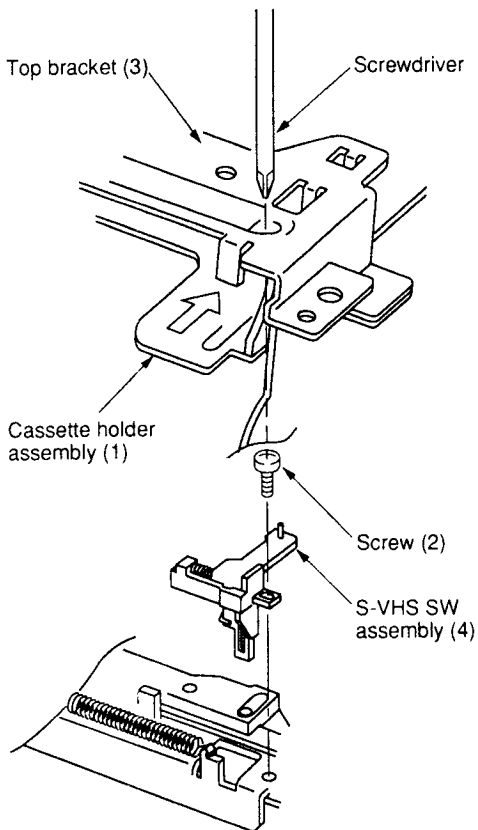


Fig. 6-43-1

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1-7. Check and Adjustment

1-7-1. Check of Tension Pole Position

1. Turn the worm wheel counterclockwise after removing the cassette holder assembly on the front loading mechanism, and set the cam gear at playback position.
2. Turn the S reel table assembly (1) clockwise slowly.
3. Adjust the adjuster (3) counterclockwise from the position shown in Fig. 6-22-1 so that the clearance between the left end of the tension lever assembly (2) and the left side of the mechanical deck becomes 7.5 ± 1 mm.

Note:

- There is a long mark at the position of 7.5 mm from the round surface of the mechanical deck. Make sure the position of the mark when adjusting.

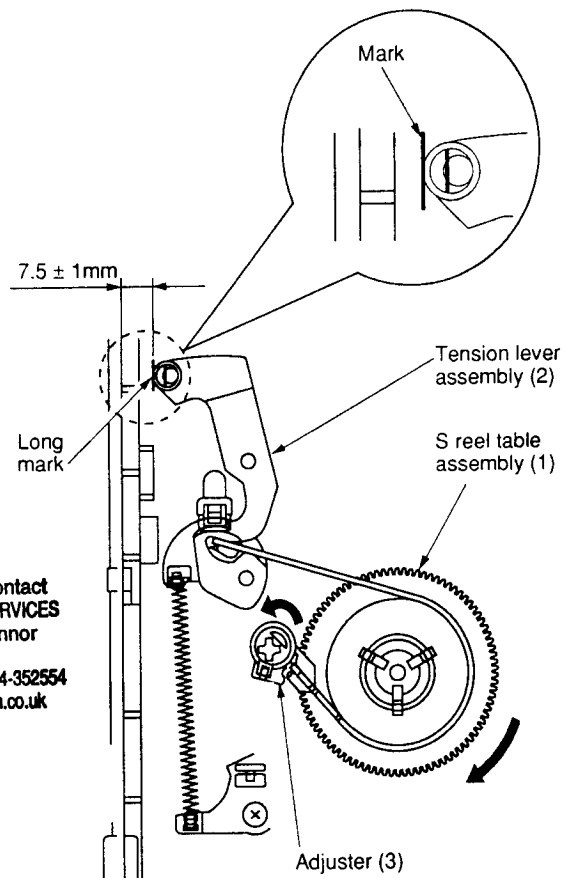


Fig. 7-1-1

1-7-2. Reel Torque Check

(1) Reel torque

1. REVIEW mode (supply side)

Poor torque may not wind the tape. On the other hand, excessive torque will cause damage to the tape during REVIEW mode.

2. Record/Playback mode (take-up side)

Too little torque does not rewind the tape to the end. If too large torque, the tape may be stretched by excessive tension.

3. Inspection

Rewind the torque cassette to the end, then check the torque values shown below:

Review	$15.95 \pm 3.65 \text{ mN}\cdot\text{m}$ ($162.5 \pm 37.5 \text{ g}\cdot\text{cm}$)
--------	--

Record/Playback	$6.85 \pm 2.45 \text{ mN}\cdot\text{m}$ ($70 \pm 25 \text{ g}\cdot\text{cm}$)
-----------------	--

For checking method, refer to the following item (2).

(2) Reel torque and back tension check

1. First, record a TV broadcast program on the entire torque cassette tape (KT-300NR) in the SP mode.
2. Load the torque cassette tape (KT-300NR) in the VTR and feed it forward until the end of the tape, before proceeding with measurement.
3. Set the VTR to the REVIEW mode and feed the tape for about 15s, and then make sure the take-up torque described above is obtained while observing the left torque meter.
4. After completion of step 3), feed forward to tape start position and set the VTR to the PLAY mode and feed the tape for about 30s. Read the right torque meter and check the torque described above is obtained.
5. If the review torque and playback torque are out of limit, replace the clutch assembly.
6. When the S reel table assembly, the T reel table assembly and the idle arm assembly are replaced, perform the reel torque check.

<Precautions for Use of Torque Cassette (KT-300NR)>

1. Before loading a torque cassette in a VTR, always remove tape slack. The tape slack can be removed by rotating the reel to its take-up direction. (The tape tends to slack when there is no reel brake actions.)
2. When the torque cassette is loaded, confirm followings:
 - Make sure the tape does not ride up or over the No. 8 cap. If it does, do not eject the tape but return the tape to its correct position, taking care not to damage the tape.
 - Make sure the tape is not slackened. If slackened, operate the VTR in FF or REW mode and then stop the tape. Then make sure the tape is not slackened again.
 - After above confirmation, proceed to the reel torque adjustment and confirmation.
3. Caution for removal of torque cassette
 - When removing the torque cassette from the VTR, set the VTR to the STOP mode and wait for several seconds. Then, make sure the tape is not slackened. Push the EJECT button to remove the cassette.
4. If the previous precautions 1), 2) and 3) are not performed properly, the tape may be damaged and correct measurements can not be performed.
5. Do not use worn out or damaged tape, if used they may damage video heads on the cylinder. In such a case always replace the tape with a new one. The replacement tape is of E-180, 10 m in length.

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1-7-3. Tape Transport System

The tape transport system has been precisely adjusted in the factory, so no check and alignment are necessary except the followings:

- Noises observed on the screen
- Tape damage
- Parts, shown in the adjustment procedures for the tape transport system were replaced.

Electrical signal output terminal required for adjustment differs depending upon the models. Refer to the test point location in the Electrical Adjustment Section.

(1) Location of tape transport adjustment

<Adjustment reference>

Lower flange height of No. 8 guide is used as the basic reference for the transport adjustment. To keep height of the No. 8 guide, do not apply excessive force onto the main base to prevent the main base from deformation.

Rectangles shown in Figs. 7-3-1, 7-3-2 show the adjusting locations.

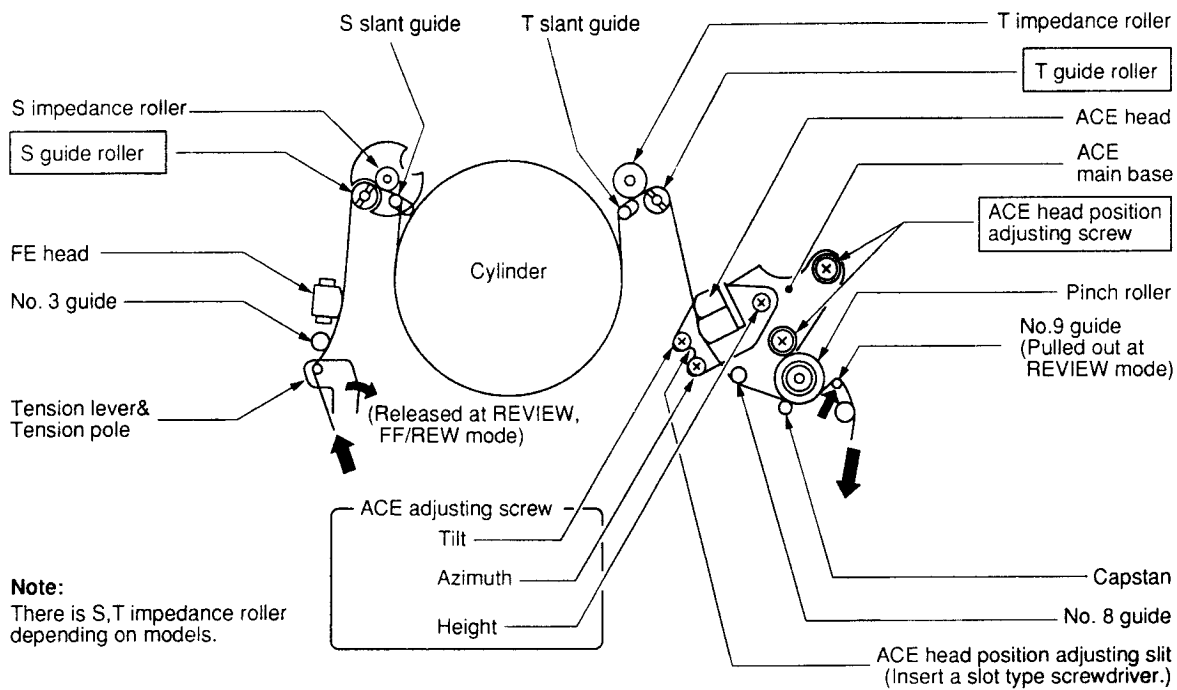


Fig. 7-3-1 Tape travel diagram

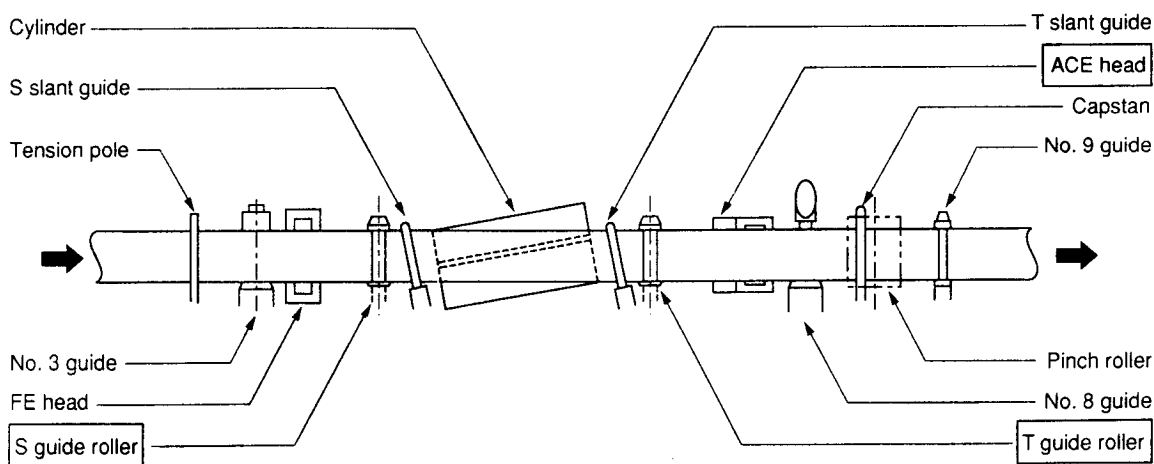
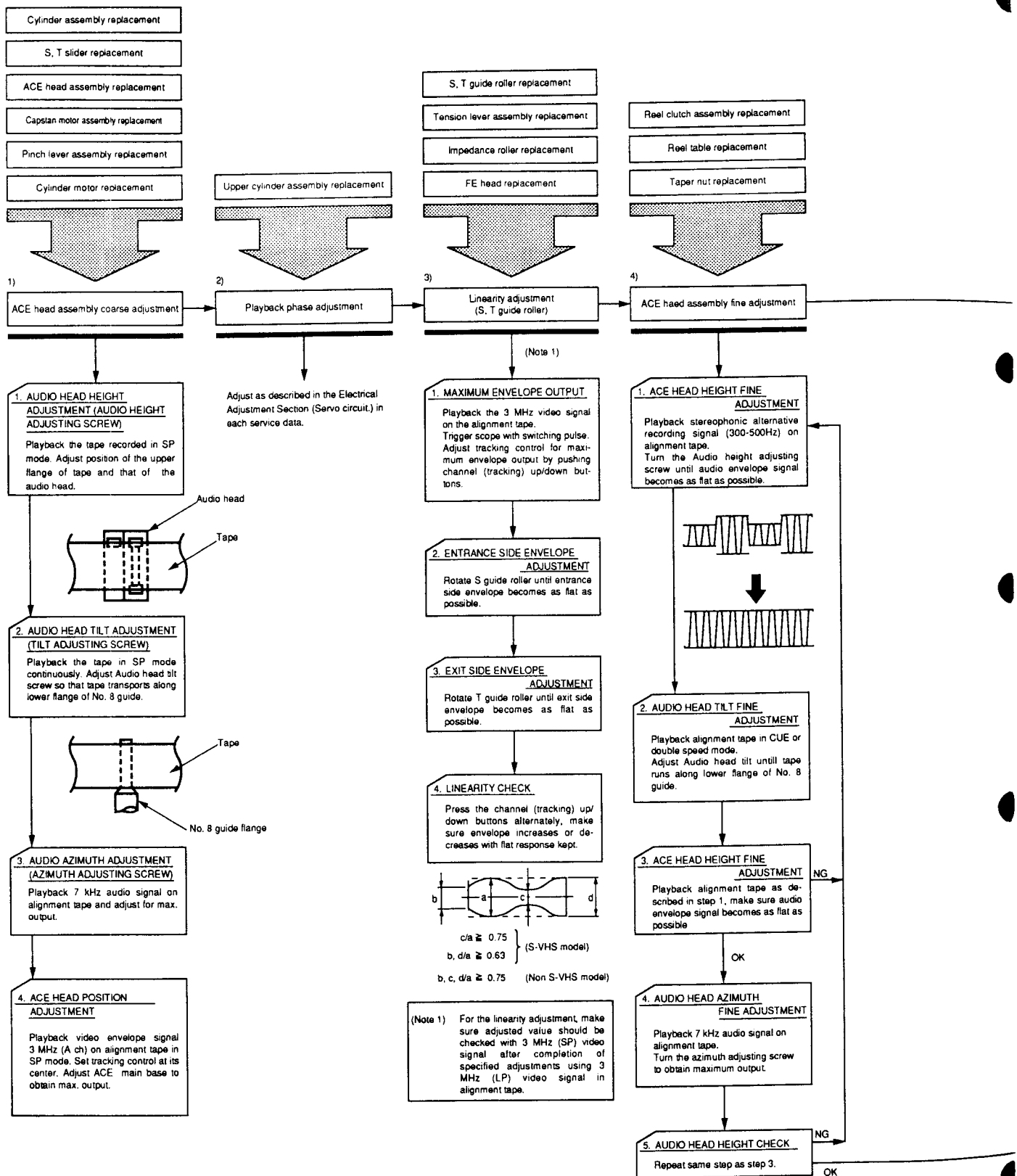
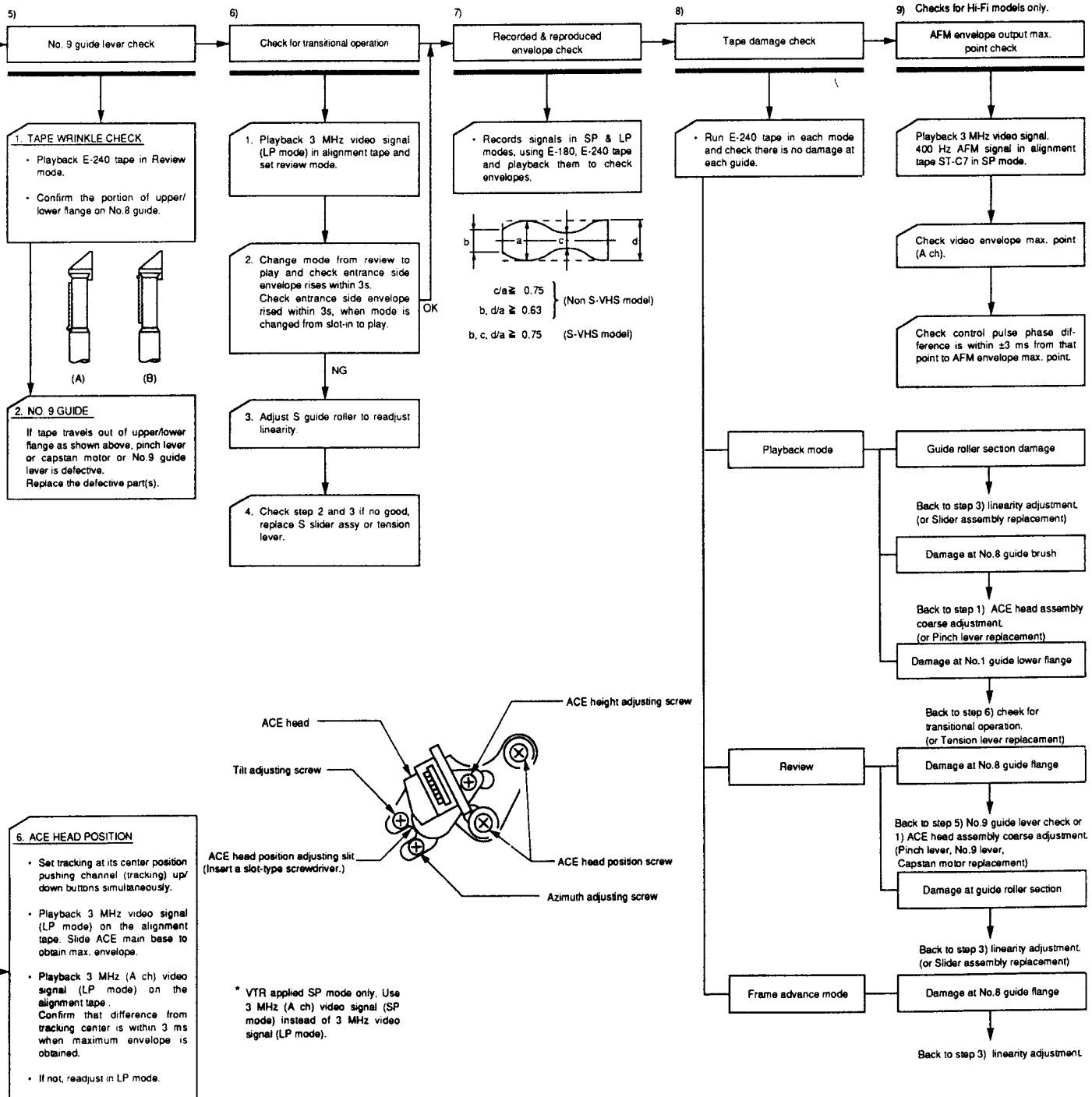


Fig. 7-3-2 Location of tape transport adjustment

(2) Tape transport system adjustment flow chart



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(3) Tape transport system adjustment

<Pre-adjustment>

When the part(s) listed in Table 7-3-1 is replaced, perform required adjustments by referring to procedures for the tape transport system. When the part(s) listed in Table 7-3-1 is replaced, the tape path may be changed and may damage alignment tape. To prevent this, first run a E-240 tape and make sure excessive tape wrinkle does not occur at each tape guide.

1. If tape wrinkle is observed at the S, T guide rollers, turn the S, T guide rollers until wrinkle disappears.
2. If tape wrinkle is observed at the No. 8 guide, perform the tilt adjustment of the ACE head.

Table 7-3-1

Parts replacement	Adjustment procedure
<ul style="list-style-type: none"> • Cylinder assembly • S, T sliders • ACE head • Pinch lever assembly • Capstan motor • No. 9 guide lever assembly 	From item 1)
<ul style="list-style-type: none"> • Upper cylinder 	From item 2)
<ul style="list-style-type: none"> • S, T guide rollers • Tension lever assembly • FE head 	From item 3)
<ul style="list-style-type: none"> • Reel clutch assembly • S, T reel tables 	From item 4)

<Adjustment procedures>

1) ACE head assembly coarse adjustment

a. Audio head height adjustment

1. Play back the tape recorded in the SP mode. Observe the surface of the ACE head.
2. Turn the ACE height adjusting screw so that upper tape edge matches to the upper edge of the audio head core.

b. ACE head tilt adjustment

1. Play back the tape recorded in the SP mode and observe running condition of the tape at the lower flange of No.8 guide.

2. Turn the ACE tilt adjusting screw until tape wrinkle is caused at the lower flange of No. 8 guide as shown in Fig. 7-3-4 (A).
3. Turn the ACE tilt adjusting screw counterclockwise until the tape travels along the lower flange as shown in Fig. 7-3-4 (B).

c. Audio head azimuth adjustment

1. Play back the 7 kHz audio signal on the alignment tape in the SP mode.
2. Connect a millivoltmeter or oscilloscope to the audio line output terminal.
3. Turn the ACE azimuth adjusting screw to obtain maximum audio output.

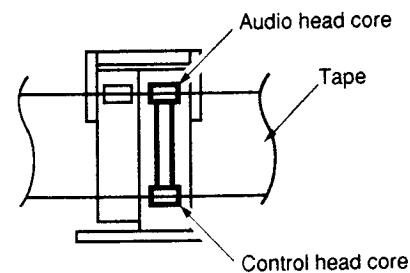


Fig. 7-3-3

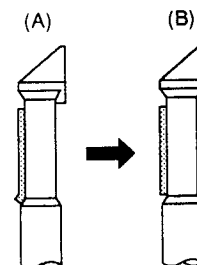


Fig. 7-3-4 No. 8 guide rough adjustment

d. ACE head position adjustment

1. Play back the 3 MHz video envelope signal in the alignment tape in the SP mode. Loosen the ACE head position securing screw.
2. Insert a slot-type screwdriver into the ACE head position adjusting slit on the ACE main base and adjust the ACE main base so that the video envelope reaches a peak level at the tracking center position when the channel (tracking) up/down buttons of VTR are pressed simultaneously.

2) Playback phase adjustment

1. Perform the adjustment according to the methods stated in the electrical adjustment (servo circuit).

3) Linearity adjustment

1. Play back the LP mode 3 MHz video signal on the alignment tape

Note:

- For models SP mode only, use the 3 MHz (A ch) video signal in the SP mode.
2. Trigger the scope with the switching pulse to issue the envelope signal output.
 3. Make sure the video envelope waveform (in its maximum output) meets the specification shown in Fig. 7-3-5. Again make sure the same by playing back the SP mode 3 MHz video signal on the alignment tape. If not satisfied, adjust as follows:

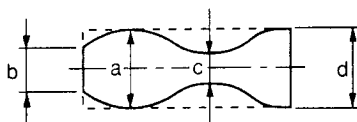
Note:

a = maximum output of the video RF envelope

b = minimum output of the video RF envelope at the entrance side

c = minimum output of the video RF envelope at the center point of cylinder

d = minimum output of the video RF envelope at the exit side of cylinder



$$\left. \begin{array}{l} c, b, d/a \geq 0.75 \\ b, d/a \geq 0.63 \\ c/a \geq 0.75 \end{array} \right\} \begin{array}{l} \text{(S-VHS model)} \\ \text{(Non S-VHS model)} \end{array}$$

Fig. 7-3-5

4. If the (A) section in Fig. 7-3-6 does not meet the specifications, adjust the S guide roller in up or down direction.
5. If the (B) section in Fig. 7-3-6 does not meet the specifications, adjust T guide roller in up or down direction.

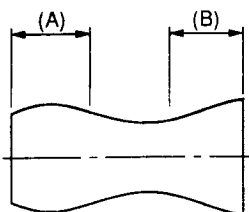


Fig. 7-3-6

6. After completion of the adjustment(s), push the channel (tracking) up/down button and make sure video envelope variations are almost flat. Next, play back the 3 MHz SP mode video signal on the alignment tape and makes the video RF envelope variations are also flat when channel (tracking) UP/DOWN buttons is pushed.
7. If the envelope varies like NG figures as shown in Fig. 7-3-7, perform the adjustment again. Smooth secondary curves are allowable level.

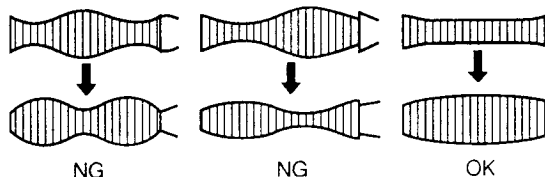


Fig. 7-3-7 Abnormal waveform variation

4) ACE head assembly fine adjustment

a. ACE head height fine adjustment

1. Play back the stereophonic alternative recording 300 – 500 Hz audio signal on the alignment tape.
2. Adjust the ACE height adjusting screw so that the signal envelope is obtained almost flat.

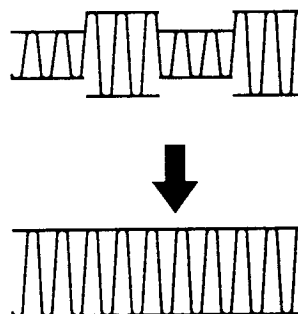


Fig. 7-3-8

Note:

- If there is no alignment tape (ST-C6, ST-C7), do not perform this item "a. ACE head height fine adjustment", and perform the process of the note in item "e. Audio head height check" described later.

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b. ACE tilt adjustment

1. Observe the lower flange of No. 8 guide. If any wrinkle is observed, turn the ACE tilt adjusting screw counterclockwise until the wrinkle disappears.
2. If a gap is observed between the lower flange of No. 8 guide and the lower edge of tape, turn the ACE tilt adjusting screw clockwise until the tape travels along the lower flange.

Note:

- This adjustment is performed easily in SP mode playback, double speed playback mode or CUE mode.

c. Audio head height check

1. Play back the stereophonic alternative recorded 300 – 500 Hz audio signal as described in the step 4)-a, and check if the audio envelope is flat. If not, repeat the adjustment described in step 4)-a again.

d. Audio azimuth adjustment

1. Play back the 400 Hz, 7 kHz audio signal on the alignment tape.
2. Turn the ACE azimuth adjusting screw until the maximum audio output is obtained.

e. Audio head hight check

1. Play back the alignment tape desribed in step 4)-a and check if the audio envelope is flat. If not, repeat the adjustment described in step 4)-a.

Note:

- If there is no alignment tape (ST-C6, ST-C7), perform the audio height alignment using the current alignment tape at this adjustment step.

1. Playback the 400 Hz audio signal (SP mode) on the alignment tape.
2. Turn each three alignment screw of the ACE head to the same direction in 45 degrees steps evenly so that the audio output level becomes maximum.
3. Perform the confirmation and adjustment for the tilt and the azimuth again.

f. ACE head postion adjustment

1. Play back the 3 MHz video signal (LP mode) on the alignment tape.
2. Push the channel (tracking) up/down buttons simultaneously and reset the tracking at its center position.

3. Trigger the oscilloscope with the video switching pulse and observe the video envelope waveform.
4. Slide the ACE main base until the maximum envelope output is obtained as described in ACE head position coarse adjustment.
5. Play back the 3 MHz video signal (SP mode) on the alignment tape.
6. Make sure the envelope output is maximum when the tracking control is placed at its center position. If no envelope output is obtained with the tracking control set to the center position, again adjust it for maximum envelope output in SP and LP modes. When envelope output is maximum in the LP mode at the tracking center, difference with the case in the SP mode is within 3 ms.
7. Tighten the ACE head position fixing screw and secure the ACE main base.
- g. After completion of ACE head fine adjustment, apply screw lock to two screws (tilt, azimuth adjusting screws) in front of the ACE head.

5) No. 9 guide lever adjustment

1. Set the VTR to Cue mode with E-240 tape (at beginning portion) loaded. Switch the Cue mode to the review mode when the tape has been rewound into the T-reel table to some extent.
2. Check tape wrinkle at the upper and lower flange of No. 8 guide. Check the tape does not come off from the flange while running. If the tape comes off from the flange, replace the pinch lever, capstan motor or No. 9 guide lever since the part(s) is (are) defective.

Note:

- Modify the lid of the cassette for the alignment tape E-240 previsously so that the alignment is performed easily.

6) Check for transitional operation from Review to Play, slot-in to play

1. Play back the LP mode white video signal on the alignment tape in Review mode and observe the video envelope with the oscilloscope.
2. Switch the Review mode to the Play mode. When switched to the Play mode, make sure the entrance side envelope comes to an approximate steady state within 3s as shown in Fig. 7-3-9.

If it does not rise within 3s, take the following steps starting 4).

3. Switch the cassette slot-in mode to the Play mode. As in item 2), if it does not rise within 3s, adjust as follows.

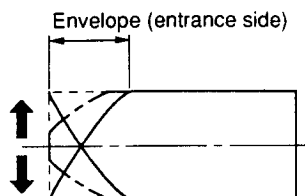


Fig. 7-3-9 Video envelope rising when operation mode is switched from review to play mode

4. Adjust the S guide roller and perform the linearity adjustment again.
5. Check above items 2) and 3) to see that the video envelope rises within 3s. If not, S slider assembly or the tension lever is damaged. Replace either (or both) of them.

Note:

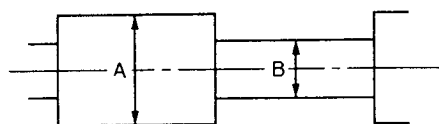
- If the rising characteristic is poor in Review mode, screen noise may occur in synchronous editing recording. Perform the adjustment carefully.

7) Envelope check

1. Make recordings and play back the tapes (E-180 and E-240) in SP and LP modes and make sure the playback output envelope meets the specifications shown in Fig. 7-3-5.
2. In playback the tape (with a E-180), the video envelope should meet the specification as shown in Fig. 7-3-10.

Note:

- Check for both modes, SP and LP. Also check for AFM envelope when using a Hi-Fi model.



- $B/A \geq 0.55$
- $B \geq 120\text{mV}$

Fig. 7-3-10 Envelope output and output difference

3. If the performance does not meet both specifications above 1 and 2 above, replace the upper cylinder assembly.

4. Set the VTR to Rec mode (LP) with the E-180 tape loaded (at the beginning part) and check operation of the synchronous editing recording.
5. If picture noises are observed at the starting position of the editing, perform "6) Check for transitional operation from Review to Play, slot-in to play".

8) Tape wrinkle check

1. Playback the E-240 tape in the normal Play mode, CUE mode, Review mode and the frame advance mode, and check each guide for wrinkle.
2. If excessive tape wrinkle is observed at the mode shown below, perform the associated adjustments also shown below. (The parts described in () may need to replace.)

a. Playback mode

Tape wrinkle at the S, T-guide rollers section

Item 3) Linearity adjustment
(Slider assembly)

Tape wrinkle at No. 8 guide flange

Item 1) ACE head assembly coarse adjustment
(Pinch roller)

Tape wrinkle at lower flange of No. 1 guide

Item 6) Check for transitional operations from
Review to Play, and Slot-In to Play
(Tension lever)

b. Review mode

Tape wrinkle at No. 8 guide

Item 1) ACE head assembly coarse adjustment
(Pinch lever, No. 9 guide lever.
capstan motor)

Tape wrinkle at the guide rollers

Guide roller adjustment (Slider assembly)

c. Frame advance mode

Tape wrinkle at No. 8 guide

Item 3) Linearity adjustment
(Pinch lever, capstan motor)

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9) Maximum AFM envelope output point check (Hi-Fi model)

1. Playback the SP mode 3 MHz video signal and the 400 Hz AFM signal on the alignment tape.
2. Trigger the oscilloscope with the video switching pulse, adjust the tracking control and check the control pulse phase at the maximum video envelope (A ch) output point.
3. Make sure the control pulse phase difference among each maximum point of AFM envelope, Ach and Bch is within ± 3 ms with the above point used as the basic reference.

Note:

- If the phase difference exceeds 3 ms, replace the upper cylinder.

<Color bar signal>

Color bar signals of 75% recorded on the alignment tapes are shown in Fig. 2-1-1.

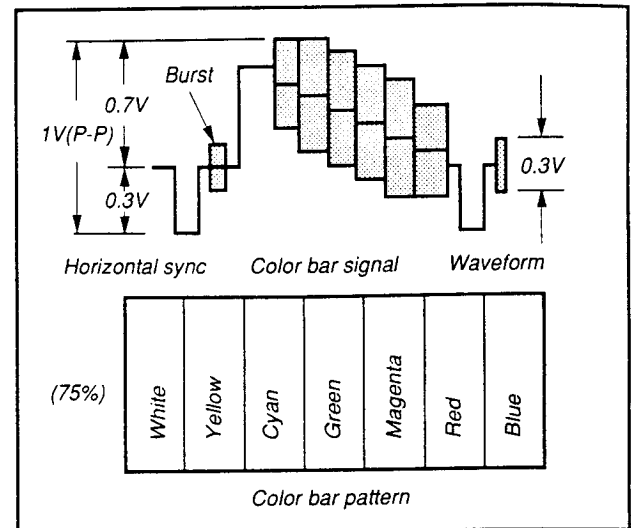


Fig. 2-1-1

2. ELECTRICAL ADJUSTMENT

<Test equipment required>

Adjustment will be performed with the following test equipment.

1. Color TV (Monitor)
2. Oscilloscope, 2 CHs, 15 MHz or higher with delay system
3. Frequency counter (7 digits or higher)
4. Millivoltmeter
5. Digital voltmeter
6. Tester (20 k Ω /V)
7. Audio generator
8. Audio attenuator
9. Alignment tapes
Part code: ST-C6: 70909409, ST-C7: 70909410
10. Alignment screw driver (jig)
11. Color pattern generator
12. Video sweep generator

<Specified input and output levels, and impedance>

- Video input: Negative sync, standard composite video signal 1 V(p-p), 75 Ω
- Video output: Same as the video input 1 V(p-p), 75 Ω
- Audio input: 308 mV(rms), more than 47 k Ω (phono type), more than 10 k Ω (21 pin type)
- Audio output: 308 mV(rms), less than 1.0 k Ω (21 pin type)

<Alignment sequence>

Recorded the alignments in the sequence as shown in Fig. 2-1-2.

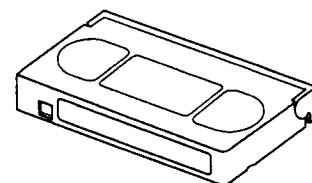
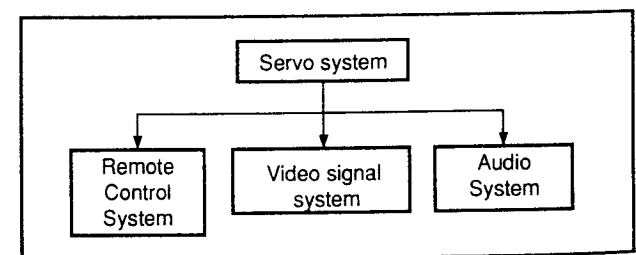


Fig. 2-1-2

Alignment tape specifications

[1] ST-C6

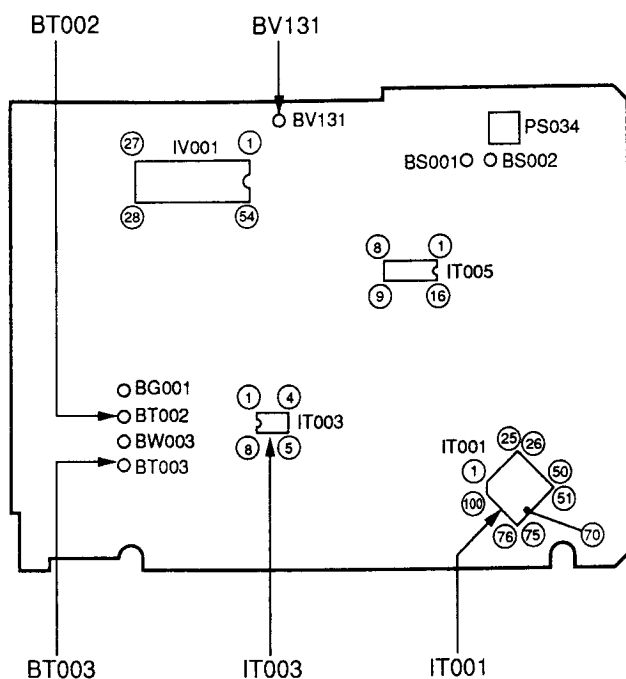
Segment	System	Playback		Video Signal	Audio Signal	Applications
		Time (min)	Mode			
1	PAL & SECAM	10	SP	Mono Scope	1 kHz	Playback phase check, audio level check
2	PAL & SECAM	5	SP	3 MHz A ch	400 Hz and 7 kHz	ACE head position adjustment, ACE head azimuth adjustment, Linearity adjustment
3	PAL & SECAM	5	SP	3 MHz A ch	1 kHz (stereo)	ACE head position adjustment, ACE head height adjustment, Linearity adjustment
4	PAL	5	SP	Color bar	3 kHz	Video and Sound checks
5	SECAM	5	SP	Color bar	3 kHz	Video and Sound checks
6	MESECAM	5	SP	Color bar	3 kHz	Video and Sound checks
7	NTSC	5	SP	Color bar	1 kHz	Video and Sound checks

[2] ST-C7

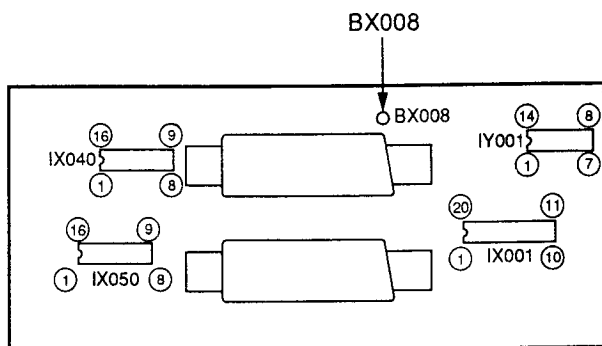
Segment	System	Playback		Video Signal	Audio Signal	Applications
		Time (min)	Mode			
1	PAL	5	LP	3 MHz A ch	500 Hz (stereo)	ACE head position adjustment, ACE head height adjustment, Linearity adjustment
2	PAL	3	LP	Color bar	3.2 kHz	LP mode operation check, ACE head azimuth check and adjustment
3	PAL	3	SP	Color bar	AFM 400 Hz	SP mode operation check, AFM check
4	PAL & SECAM	5	SP	3 MHz A ch	AFM 400 Hz	AFM tracking checks
5	SECAM	5	LP	3 MHz A ch	No signal	Linearity adjustment
6	SECAM	3	LP	Color bar	No signal	LP mode operation check
7	SECAM	3	SP	Color bar	AFM 400 Hz	SP mode operation check, AFM check

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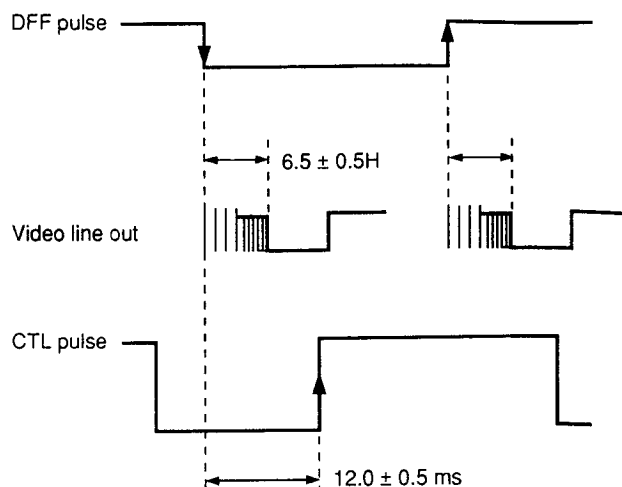
2-1. Servo Circuit



Main PC Board



Terminal PC Board



4. Press the unit's channel up/down buttons simultaneously for more than 5s.
5. Afterwards, within 2s, press the PLAY button on the remote controller.
6. The automatic adjustment will be made for about 10s, all the displays will blink. If the automatic adjustment is not carried out, confirm that the alignment tape has a safety tab or not, and redo from the step 3.
 - 1) When adjustment has been completed:
The display will blink for 10s, stop blinking and return to the normal display in the STILL mode, then it shifts to the playback display in the playback mode.
 - 2) When adjustment fails:
It goes into the STOP mode.
7. Confirm that the play indicator is displayed, and confirm that the rising and falling edge of the SW pulse is $6.5 \pm 0.5H$ from the V-sync front edge of the video signal.

2-1-1. Playback Phase (PG) Adjustment

Test point: BT002, BT003, BX008 (Video out)

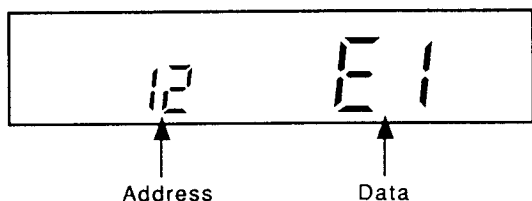
Test equipment: Oscilloscope

1. Confirm that phase difference between the fall of the DFF pulse (BT002) and the rise of CTL pulse (BT003) is $12.0 \pm 0.5 \text{ ms}$.
2. Further, observe the envelope (BV131) waveform, and confirm that the ACE head position adjustment and linearity adjustment have been made, and C-SYNC (pin 70 of IT001) is being input during playback.
3. Set the VTR to the STOP mode.

2-1-2. In Case of IT003 is Replaced

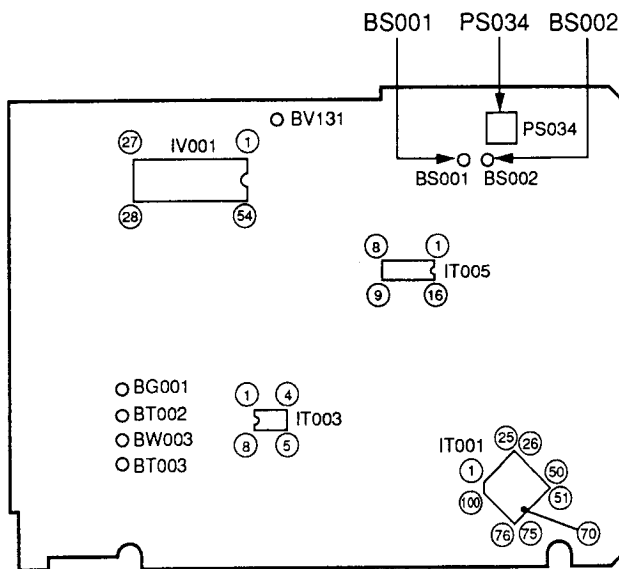
When IT003 is replaced, the data in the VTR is required to memorize in the new one. So perform the following procedures.

1. Press the channel up/down buttons on the VTR simultaneously for more than 5s while the display blinks and the unit is in the power off mode.
2. And then within 2s, press the CANCEL button on the remote controller.
3. After displaying the address at the channel display area and the data at the minute display area, set the address to 12 using the channel up/down buttons on the remote controller.
Next, set the data to E1 using the FF/REW buttons on the remote controller. The data goes up using FF button and down using REW button.
4. Perform the adjustment described in the item "2-1-1. Playback Phase (PG) Adjustment".
5. Pull out the power cord plug from the AC outlet once and insert the power cord plug into the AC outlet again.



6. Perform the channel presetting as the IT003 replaced has no channel data.

2-2. Audio Circuit



Main PC Board

2-2-1. Bias Level Adjustment

Test Point: BS001, BS002

Test equipment: Millivoltmeter

Adjusting point: PS034

1. Set the VTR to record mode.
2. Connect BS001 to the millivoltmeter and BS002 to GND.
3. Adjust PS034 to obtain 3.6 ± 0.1 mV(rms).

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2-3. Self Diagnosis Function

2-3-1. Outline

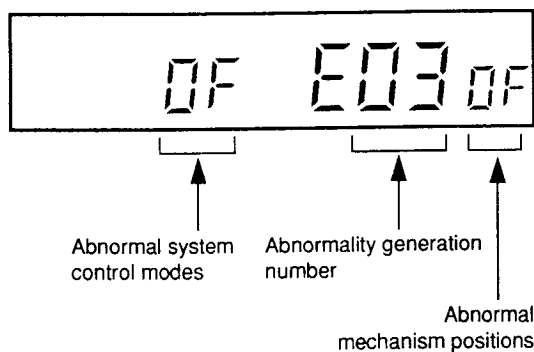
When a tape running stops or the VTR enters the power OFF mode, etc. due to some abnormality, the abnormality is stored in the EEPROM and displayed on the display tube.

2-3-2. Storing abnormal modes

- The abnormality is classed into 5 groups, and the abnormality number, system control mode, and the mechanism position at which the abnormality occurred are stored in the EEPROM.
- The writing timing is just after the abnormality occurred.

2-3-3. Abnormality mode display

- Press the CH UP and CH DOWN buttons on the VTR simultaneously for more than 5s.
- And then within 2s, press the STILL button on the remote control.
- The system control mode at which the abnormality occurred is displayed at the channel display area, "E" is displayed at the hour digit, abnormality generation number is displayed at the minute digit, and the mechanism position is displayed in the second digit position.
- The abnormality mode is displayed regardless of the power on off.



- When the Counter Reset button is pressed in the display period, the abnormality display data is initialized and "-" is displayed.

The data displayed are as follows:

Abnormality generation number

01	Cylinder stop
02	Reel abnormality (take up)
03	Reel abnormality (supply)
04	Abnormal slot in/ slot out
05	Abnormal loading

Abnormal system control modes

00	Standby
01	Stop
02	Rewind
03	Review
04	FF
05	Cue
06	Playback
07	Still, slow playback
08	2X speed
09	Unloading Stop
0A	Reverse playback
0b	Still in reverse playback, Reverse slow playback
0C	Recording
0d	Record pause
0E	Power off eject
0F	Eject
10	Short FF
11	Short REW
12	Audio dubbing
13	Audio dubbing pause

Abnormal mechanism positions

01	F/L out
03	F/L down
05	Loading/unloading
07	Reverse rotation with pinch roller ON
09	Playback with pinch roller ON
0b	Stop with main brake ON
0d	FF/REW
0F	Position detection impossible

Positions 0, 2, 4 exist as mechanism positions. For example, 8 shows a position between 7 and 9 (between playback position and review position).

SECTION 3

SERVICING DIAGRAMS

1. INSPECTION PROCEDURE

Operation steps		Items to be confirmed	Inspection block	Page	
				Block Diagram	Circuit Diagram
1. AC Plug-in	Clock setting Program timer setting	Clock display Clock setting operation	Power (AC system) KDB	3-11 3-13	3-29 3-35
2. Power SW ON	Timer/counter, Memory Channel selection, EE picture & tone quality	Mode display lamp TV receive condition, Channel select operation, EE picture quality, Tone signal level	Power Logic RF reception Audio (EE, REC mode)	3-11 3-17 3-12 3-27	3-29 3-38 3-32 3-49
3. Cassette-in and Cassette-out	Cassette-in Cassette loading Eject Cassette-out	F/L mechanism operation Cassette loading operation Eject operation Indicator lamp Abnormal sound	Logic	3-17	3-38
4. Key Entry Operation Remote Control	REC, PLAY Cue/Review Still, Frame advance/slow FF/REW	Indicator lamp Each mode operation (Tape drive operation) Abnormal sound	Logic	3-17	3-38
5. Special Functions Counter Functions Tracking	Linear time counter, Remaining time display, Index/skip search, Time search Digital auto tracking	Each mode operation Mode operation	Servo/Logic Servo/Logic	3-17 3-17	3-38 3-38
6. Playback Function Picture Sharpness Tone Quality Others	PLAY (Test tape: ST-C6, ST-C7) Cue/Review Still/Slow	Resolution, S/N Hue, Saturation, Color unevenness, Color dropout, Sound distortion, Level variation, Picture noise, Jitter Picture swing, Skew distortion, Flicker, Beat	Video PLAY system Audio PLAY system Servo system	3-24 3-27 3-17	3-42 3-49 3-38
7. REC/PLAY Functions Picture Sharpness Tone Quality Others	REC/PLAY	Resolution, S/N Hue, Saturation, Color unevenness, Color dropout, Sound distortion, Level variation, Picture noise, Jitter Picture swing, Skew distortion, Flicker, Beat	Video PLAY system Audio PLAY system Servo system For Service Manuals Contact MAURITRON TECHNICAL SERVICES 8 Cherry Tree Rd, Chinnor Oxon OX9 4QY Tel:- 01844-351694 Fax:- 01844-352554 Email:- enquiries@mauritron.co.uk	3-24 3-27 3-17	3-42 3-49 3-38

How to use the table

1. When inspecting a defective VTR, proceed according to the steps shown in the table.
2. Check the items to be confirmed for each operation step.
3. If a problem is found on the item, check waveforms (level) referring to the block diagram relating to the items.
4. Use PC board pattern diagram and schematic diagram to examine the circuit precisely.

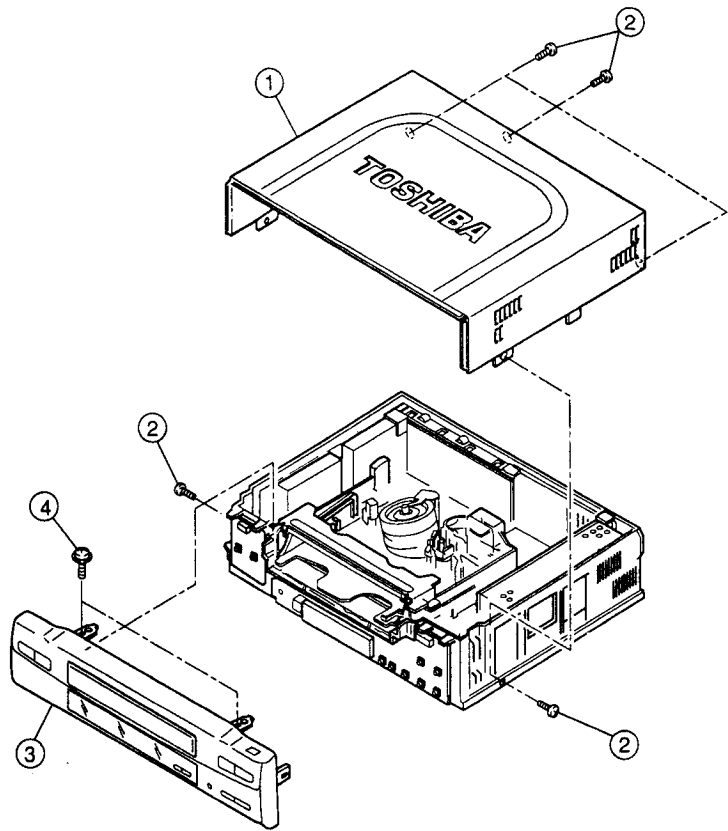
2. REMOVAL OF CABINET

1. Disconnect power cord plug from AC outlet.
2. Remove 5 screws ② securing top cover ①.
3. Remove the top cover ① by sliding it backward.
4. Remove 2 screws ④.

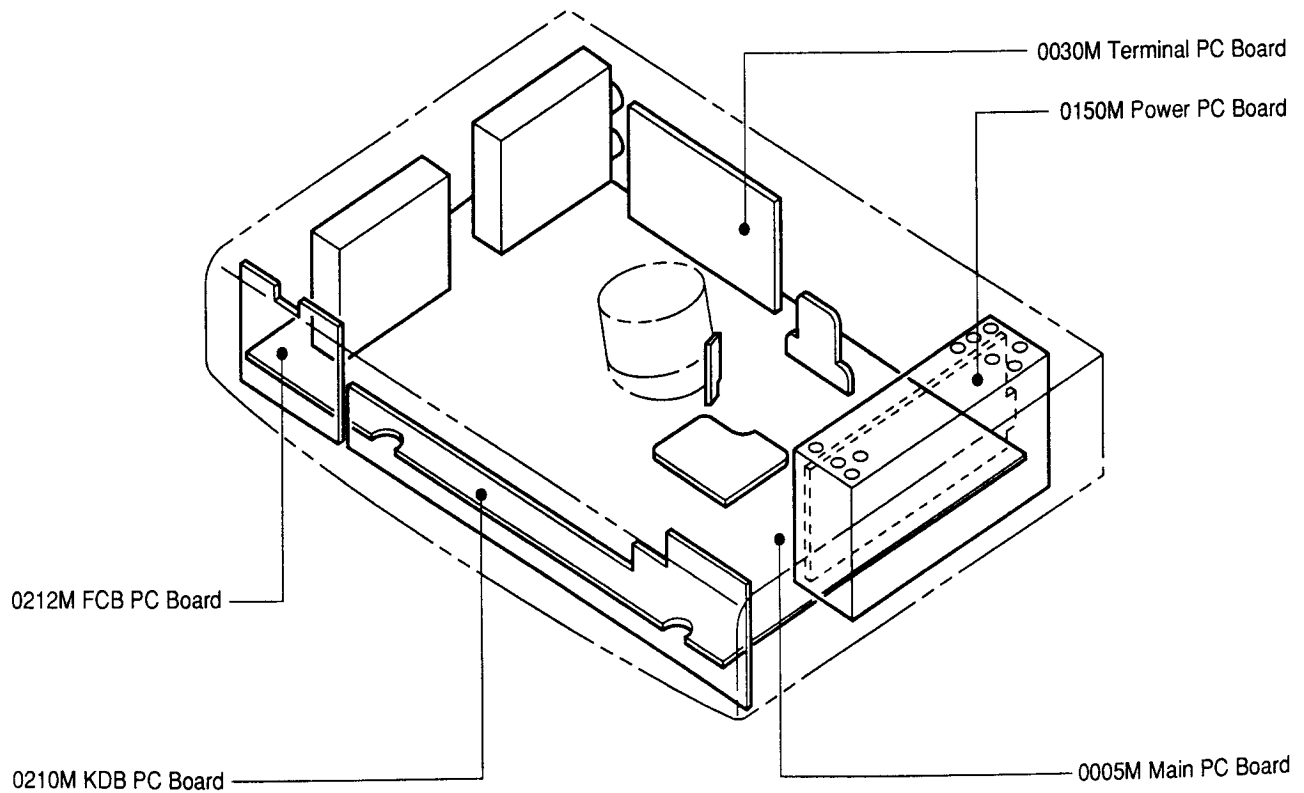
Note:

These screws are not always applied to all VTRs.

5. Remove the front panel ③.



3. ELECTRICAL UNITS LOCATION DIAGRAM

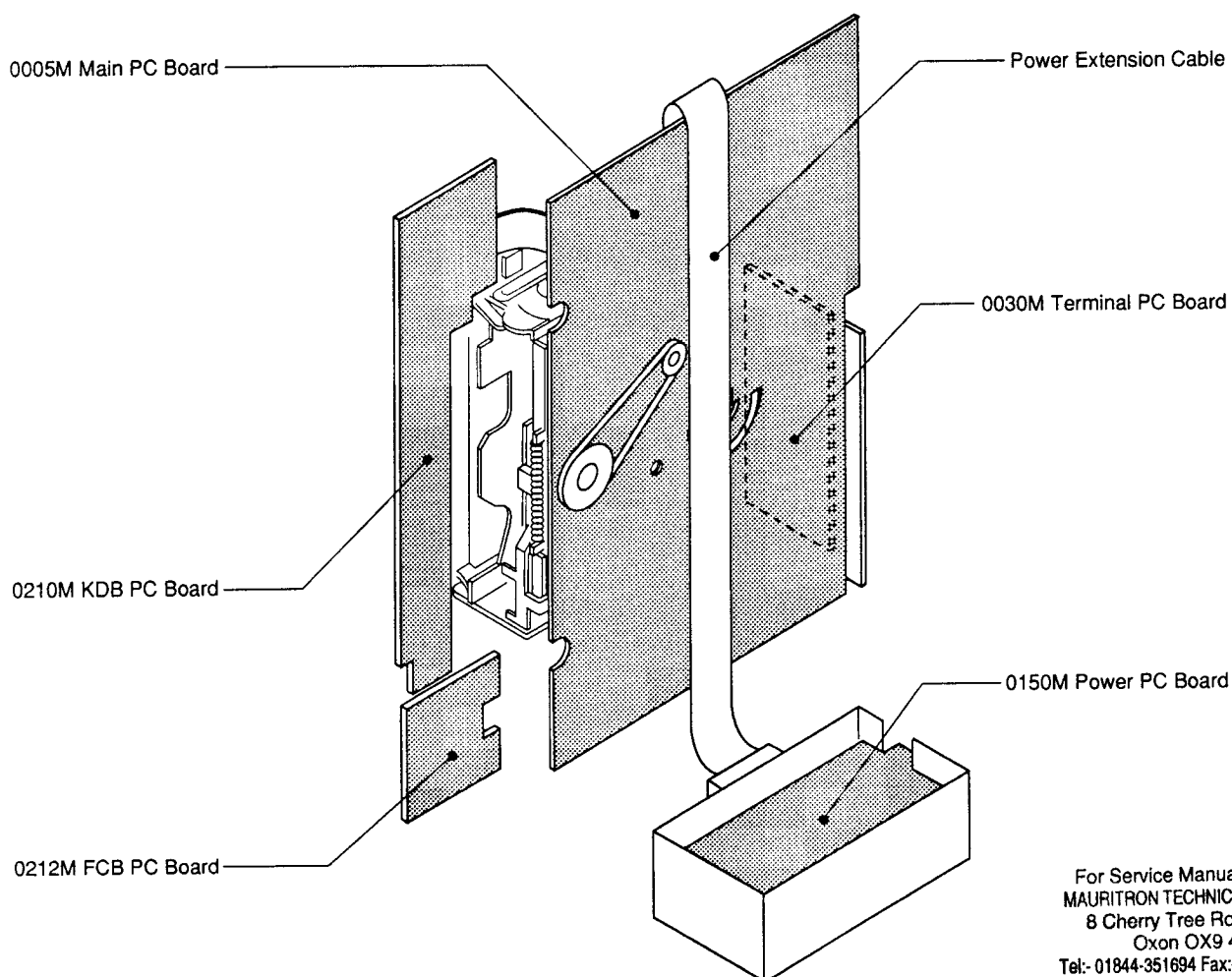
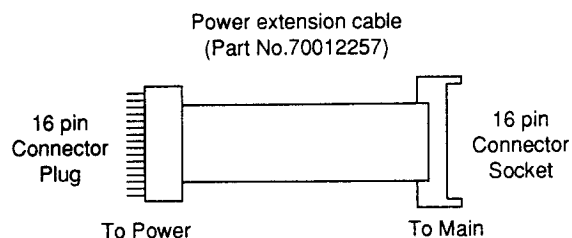


4. STANDING PC BOARDS FOR SERVICING

After removing the mechanical deck with the main PC board, place the mechanical deck to upright. Then perform servicing in the condition that all the units are connected each other.

Note:


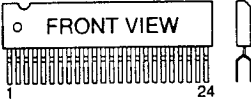
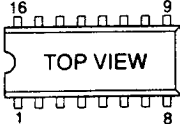
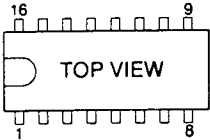
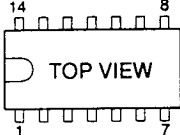
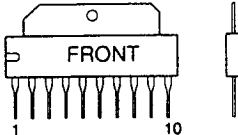
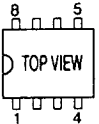
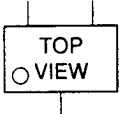
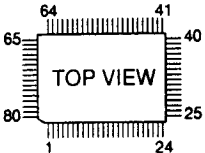
- Connect the Power PC board to the Main PC board using the power extension cable (Part No. 70012257).

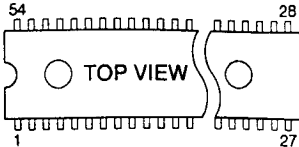
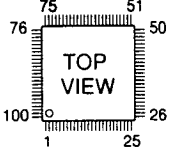
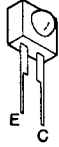



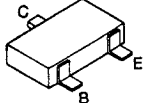


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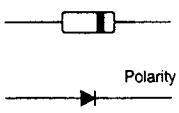
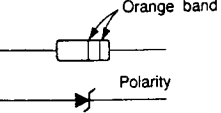

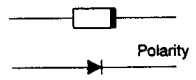
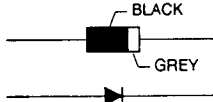


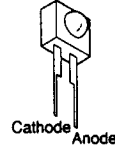
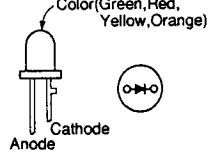
5. PART CONFIGURATION AND THEIR SYMBOLS

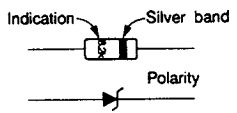
1.ICs

NAME	SHAPE
STV6400	
BA7795LS	
TB6515AP TL8850AP MC14053BCP	
MC14052/BCP	
SDA5649 U4614B	
TA7291S	
LM393N ST24C04	
PST7032MT	
TMP87CM70AF-6413	

NAME	SHAPE
TA8892BN	
TMP90CS74DF-7824	
2.TRANSISTORs	
PT493F	
2SC2236-Y(C) 2SA1020-Y	
BC337 BC548B	
BUL310XI	
RN1402,DTC144E,BC848B 2SA1162-Y,RN1401 2SC2712-Y,BC858 RN2403,BC848 RN1405,BC857B RN1404,BC847B	

3.DIODEs

NAME	SHAPE
1N4007 1N4148 1N4148	
ZPD5.6	
MUR115	
BAV20 1N4001	
FUF5404 BA157 BA157 1N5822	
LL4448 LL4148	
ZMM5.1 ZMM5.6/2 ZMM5.6	
GL451V	
SE303AC	

NAME	SHAPE
ZPD12	

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5-1. Replacing Subminiature "CHIP" Parts

5-1-1. Required Tools:

1. Fine tipped, well insulated soldering "pencil", about 30 Watts.
2. Tweezers.
3. Blower type hair dryer.

5-1-2. Soldering Cautions:

1. Do not apply heat for more than 3s.
2. Avoid using a rubbing stroke when soldering.
3. Discard removed chips; do no reuse them.
4. Supplementary cementing is not required.
5. Use care not to scratch or otherwise damage the chips.

5-1-3. Removal (Resistors, Capacitors, etc.):

1. Melt the solder at one side.

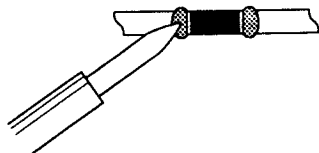


Fig. 1

2. Grasp the part with tweezers and melt the solder at the other side.

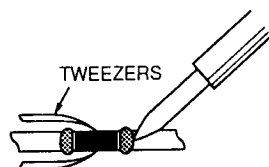


Fig. 2

3. Remove the part with a twisting motion.

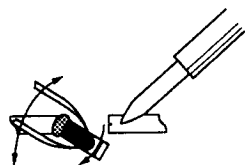


Fig. 3

5-1-4. Removal (Transistors, Diodes, etc.):

1. Melt the solder of one lead.

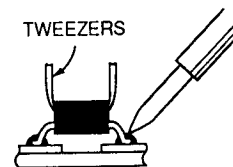


Fig. 4

2. Lift the side of that lead upward.

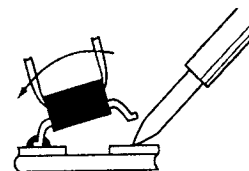


Fig. 5

3. Simultaneously heat solder the two remaining leads and lift part to remove.

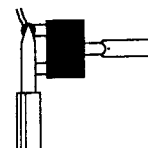


Fig. 6

5-1-5. Preheating (Except for semiconductors):

Immediately before installing new resistors or capacitors, use a blower type hair dryer and preheat the part for about two min. at approximately 150°C.

5-1-6. Replacement:

1. Presolder the contact points of the circuit pattern.

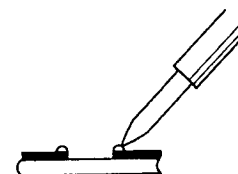


Fig. 7

2. Press the part downward with tweezers and apply the soldering pencil as indicated in the figure.

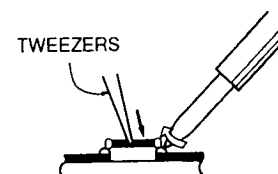


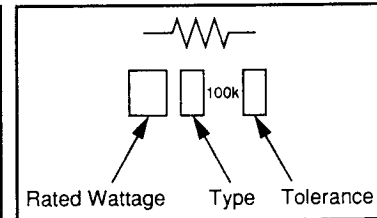
Fig. 8

5-2. Precautions for Part Replacement

- In the schematic diagram, parts marked Δ (ex. Δ F801) are critical part to meet the safety regulations, so always use the parts bearing specified part codes (SN) when replacing them.
- Using the parts other than those specified shall violate the regulations, and may cause troubles such as operation failures, fire etc.

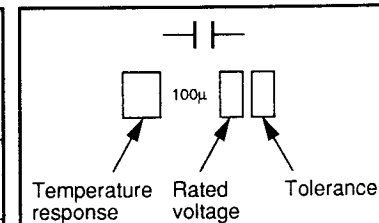
5-3. Solid Resistor Indication

Unit	None Ω k $k\Omega$ M $M\Omega$
Tolerance	None $\pm 5\%$ B $\pm 0.1\%$ C $\pm 0.25\%$ D $\pm 0.5\%$ F $\pm 1\%$ G $\pm 2\%$ K $\pm 10\%$ M $\pm 20\%$
Rated Wattage	(1) Chip Parts None 1/16W (2) Other Parts None 1/6W Other than above, described in the Circuit Diagram.
Type	None Carbon film S Solid R Oxide metal film W Metal film W Cement FR Fusible



5-4. Capacitance Indication

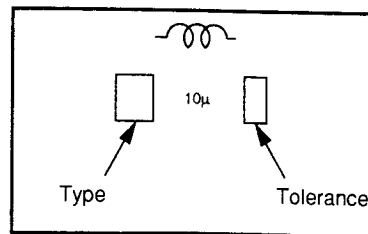
Symbol	$\begin{array}{l} \text{---} \text{ } \text{---} \\ \text{---} \text{ } \text{---} \\ \text{---} \text{ } \text{---} \\ \text{---} \text{ } \text{---} \\ \text{---} \text{ } \text{---} \end{array}$ Electrolytic, Special electrolytic $\begin{array}{l} \text{---} \text{ } \text{---} \\ \text{---} \text{ } \text{---} \\ \text{---} \text{ } \text{---} \end{array}$ Non polarity electrolytic $\begin{array}{l} \text{---} \text{ } \text{---} \\ \text{---} \text{ } \text{---} \end{array}$ Ceramic, plastic $\begin{array}{l} \text{---} \text{ } \text{---} \\ \text{---} \text{ } \text{---} \end{array}$ Film $\begin{array}{l} \text{---} \text{ } \text{---} \\ \text{---} \text{ } \text{---} \end{array}$ Trimmer
Unit	None F μ μF p pF
Rated voltage	None 50V For other than 50V and electrolytic capacitors, described in the Circuit Diagram.
Tolerance	(1) Ceramic, plastic, and film capacitors of which capacitance are more than 10 pF. None $\pm 5\%$ or more B $\pm 0.1\%$ C $\pm 0.25\%$ D $\pm 0.5\%$ F $\pm 1\%$ G $\pm 2\%$ (2) Ceramic, plastic, and film capacitors of which capacitance are 10 pF or less. None more than $\pm 5\%$ pF B ± 0.1 pF C ± 0.25 pF (3) Electrolytic, Trimmer Tolerance is not described.
Temperature characteristic (Ceramic capacitor)	None SL For others, temperature characteristics are described. (For capacitors of 0.01 μF and no indications are described as F.)



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5-5. Inductor Indication

Unit	None H μ μH m mH
Tolerance	None ±5% B ±0.1% C ±0.25% D ±0.5% F ±1% G ±2% K ±10% M ±20%
Type	PL Peaking For other, model name is described.



5-6. Waveform and Voltage Measurement

- Measurement of waveform and voltage at each section in the color circuits was conducted with sufficient service color bar signal being received and reproduced in normal conditions.
- Waveforms and voltage values for the remaining circuit were measured with a broadcasting signal normally received, so they may vary slightly according to the programs being received. Use them as a measure for servicing.
- All voltage values except the waveforms are expressed in DC and measured by a digital voltmeter.

3. If it is difficult to remove the part, temporarily stop the desoldering job and wait until temperature of the part lowers.
Then, repeat steps 1 and 2.
4. Form leads of the replacement part (general part equivalent to the chip part) as shown in the figures and solder place. (Fig. 10)

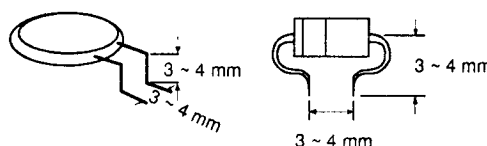


Fig. 10

5-7. Chip Part Replacement

(Use spare part with wire leads connected.)

1. Hold a Chip part to be removed with tweezers and apply heat to the solder at one end of the part with a soldering iron. (Fig. 9)

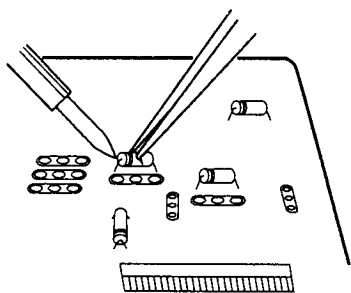


Fig. 9

2. Apply heat to the solder at the other end of the part and remove it.

The heating time should be as short as possible so the excessive heat is not applied to foil patterns and the PC Board.

5. Mount the replacement part so that it does not touch any other parts. (Fig. 11)

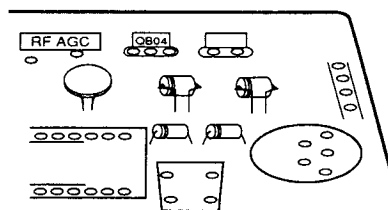
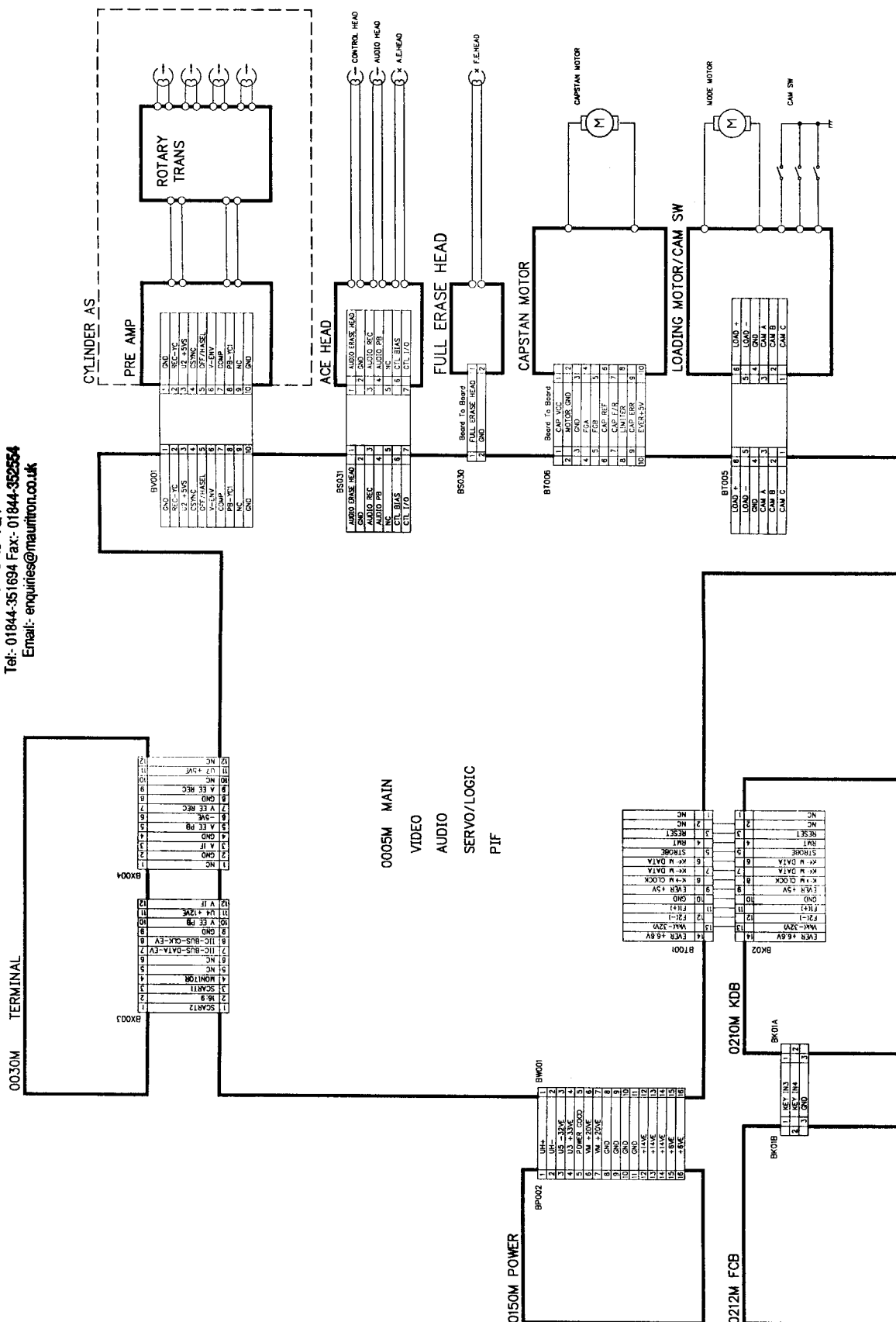


Fig. 11

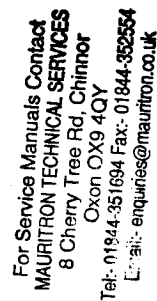
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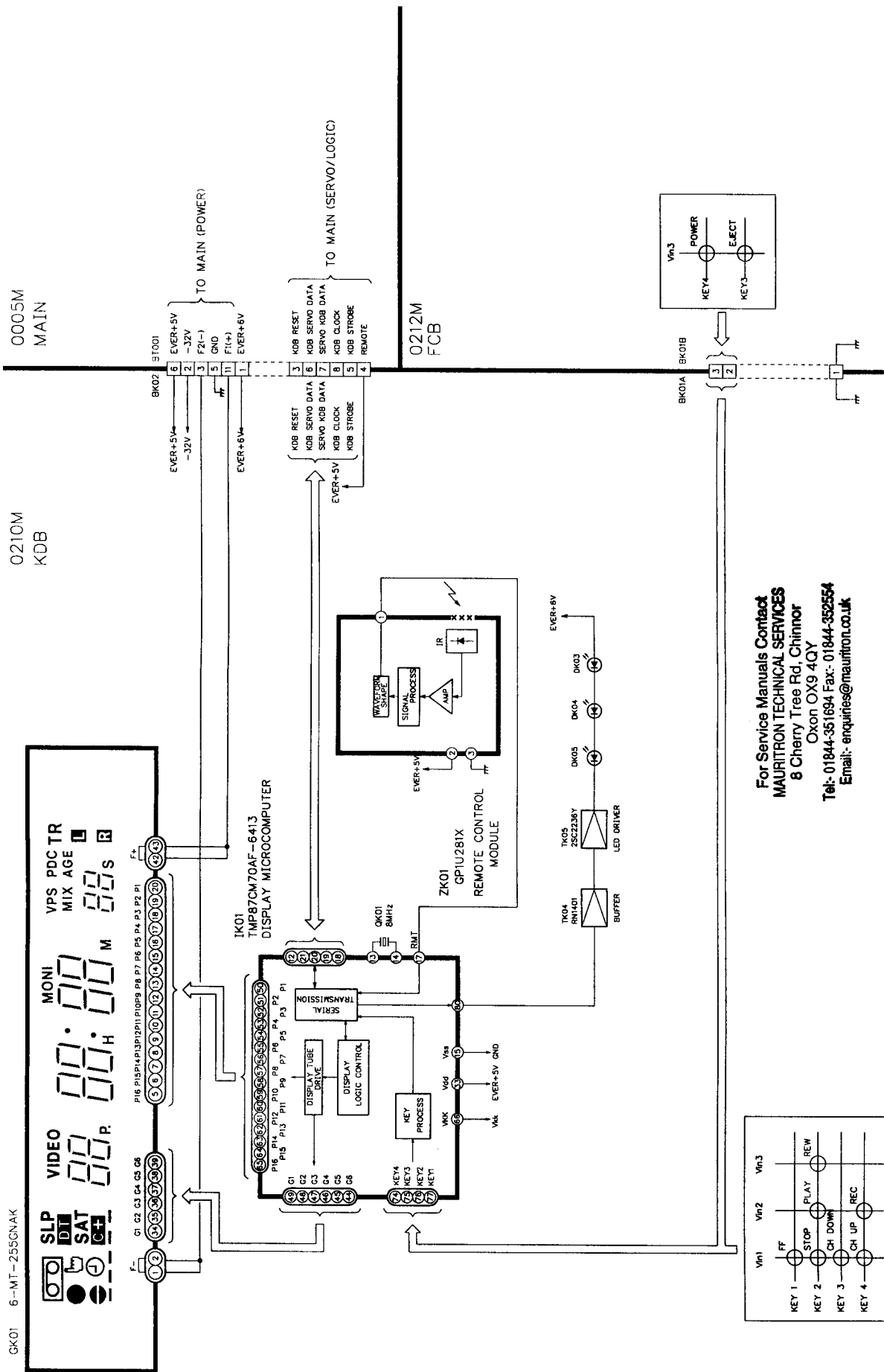


7-1. Power Block Diagram

7-2. PIF Block Diagram



7-3. KDB Block Diagram



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