

## DLT Tape Cartridge Overview

A DLT™ tape drive is susceptible to being rendered un-useable if a broken or damaged tape is loaded into the drive. It contains special features such as reel locks to hold the tape under tension when not in the tape drive. Problems can develop when a tape has been dropped or damaged, either by mishandling or other environmental conditions. For these reasons this brief handling and inspection procedure has been developed to help the user identify a tape cartridge problem before it damages the tape drive.

## DLT Tape Cartridge General Handling Precautions

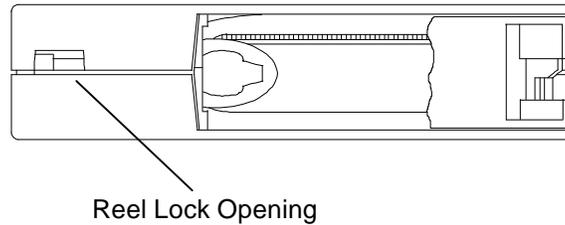
- Always keep tape cartridges in their protective plastic case when they are not in a tape drive.
- When carrying the cartridges, always orient the cartridge cases so the grooves in the cases interlock (this prevents the cases from slipping apart).
- Never stack the tape cartridges more than five high.
- Always observe the proper tape storage environmental conditions. The ideal archival environment for storing tape cartridges is at a temperature range of 64-79 Fahrenheit and a relative humidity of 40 to 60 percent.
- Stand each cartridge vertically, when placing them in archival (long term) storage.
- Avoid placing tape cartridges near any source of high intensity magnetic fields, such as monitors or electric motors.
- Never apply adhesive labels to the tape cartridge and never put a label anywhere but in the front label slot.
- Only use ink when marking the non-adhesive labels. Do not use pencils, grease pens, or other debris-producing writing instruments.
- Do not carry cartridges loosely in a container. Allowing them to bang together creates undesirable physical shock.
- Do not touch or allow direct contact with the tape or tape leader. Dust or skin oils can contaminate the tape and impact performance.
- Do not expose the tape cartridge to moisture or direct sunlight.
- If a cartridge has been dropped, do not load it into a tape drive as the drive could be damaged.

## DLT Tape Cartridge Inspection

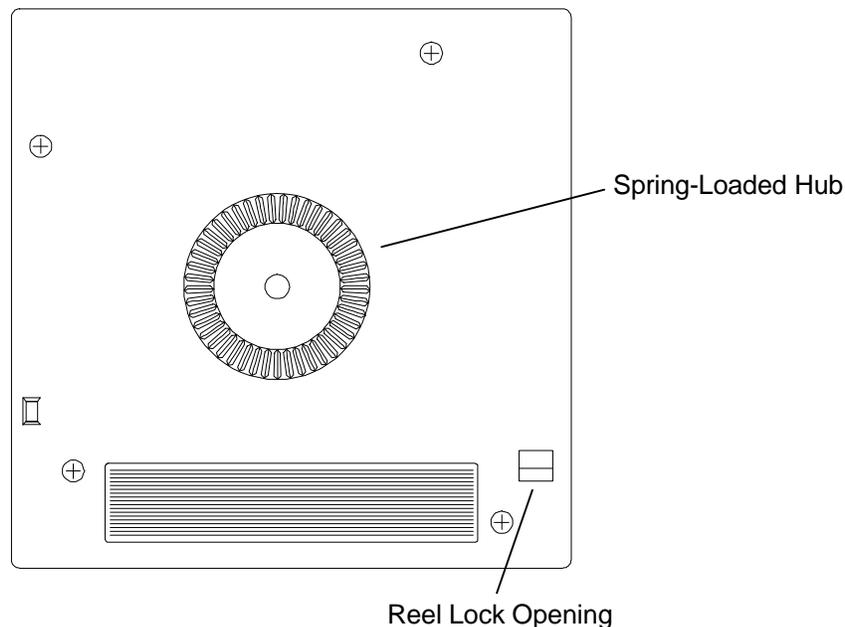
As a general practice, DLT tape cartridges should be inspected before use whenever cartridges are being changed or new ones are loaded.

Follow these steps to inspect a DLT tape cartridge:

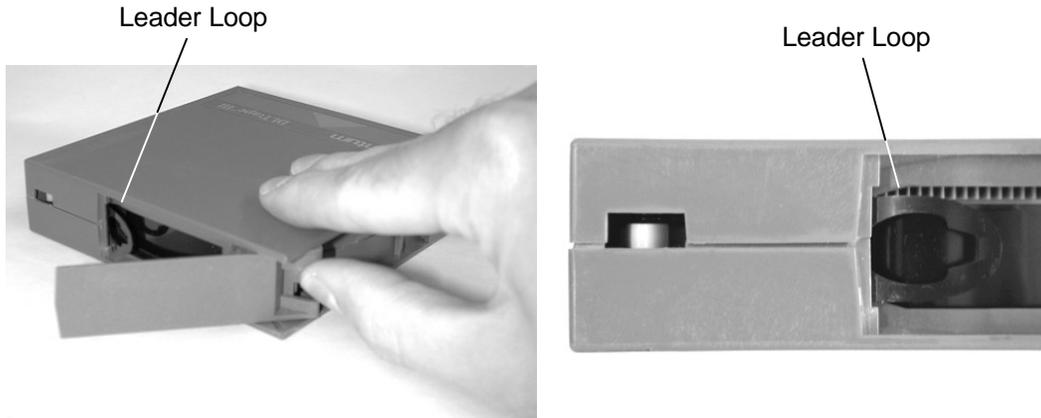
1. Remove the tape cartridge from its protective plastic case.
2. Look at the cartridge to check for any obvious cracks or other physical damage. Look for broken or missing parts.
3. Gently shake the tape cartridge. Listen for rattling or sounds of any loose pieces inside the cartridge. **If you hear anything loose inside, do not use the cartridge.**
4. Hold the tape cartridge so that the end of the cartridge that is normally inserted into the tape drive is instead facing you. Locate the small reel lock opening on the left side of the tape cartridge (Figure 1) Inside and near the center of this opening, you should see a small plastic tab. This is one of the reel locks. The reel locks can break if the cartridge is dropped and this may cause any rattling sound when the tape cartridge is gently shaken. **If this reel lock tab is not visible do not use the cartridge.**

**Figure 1 Location of Side Reel Lock Tab**

5. Look at the bottom of the tape cartridge, oriented as in Figure 2. Check the reel lock opening and ensure that the plastic tab is partially visible. This is the second reel lock, which can break if the cartridge is dropped. This may cause any rattling sound when the tape cartridge is gently shaken. **If this reel lock tab is not visible do not use the cartridge.** Also located on the bottom of the tape cartridge is the spring-loaded hub. Verify that the hub is centered within the circular opening in the tape cartridge. Gently press the hub and make sure that it springs back into place. Make sure that it ends up centered within its circular opening.

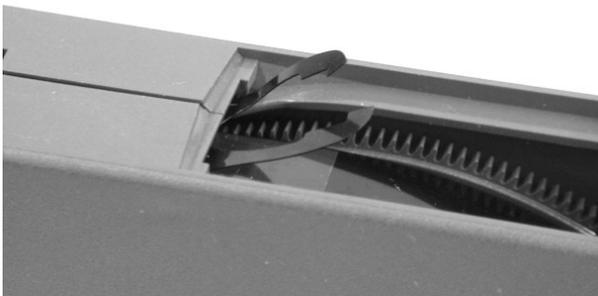
**Figure 2 Location of Bottom Reel Lock Tab**

6. Check that the tape leader within the tape cartridge is in the correct position. Open the door by holding the DLT tape cartridge as shown in Figure 3. On the right side corner of the tape cartridge there is a small tab in a cut-out section of the cartridge. Using your thumb, gently lift up on the tab and swing the door open (Figure 3). Inside the door, you will see the tape and cartridge leader loop. This loop should stick up about 1/8-inch when viewed from the edge. **If the loop is torn, bent, pulled in, or not sticking up about 1/8-inch, do not use the tape cartridge.**



**Figure 3 Open Door on Tape Cartridge Showing Tape Leader in Correct Position**

- 7. Examples of three different tape cartridge loop problems are shown in Figure 4. **No tape cartridge that exhibits the problems shown should be used in a tape drive.**



Torn or Broken Leader Loop



Tape is Loosely Wound

**Figure 4 Examples of Tape Cartridge Loop Problems**

## Tape Drive Leader Re-Attachment

### CAUTION

*This procedure should only be done by trained personnel. Damage to the leader, head or drive may occur if leader is not threaded properly in the tape path.*

*Cotton lint free gloves must be worn to protect the leader surface from skin oils, which can cause drive failure. The read/write elements of the DLT head can be contaminated and the drive functionality can be adversely affected.*

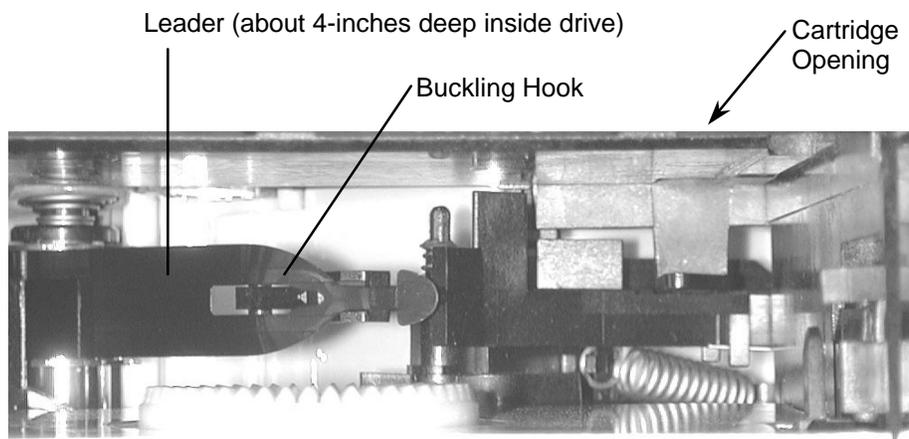
*It is important to determine the cause of the leader detachment. If it is due to a faulty or damaged cartridge, the cartridge must be identified and taken out of service. If the leader itself is physically damaged it must not be reused. Do not loosen or remove either of the two plastic tape guides or head; they are adjusted precisely at the factory.*

### Tools required for re-attaching a tape drive leader:

- Pair of cotton lint free gloves.
- Phillips screwdriver.
- Small flat screwdriver.
- 1/4-inch nutdriver.
- Lint free cotton pads and isopropyl alcohol.

### Symptoms of a detached leader

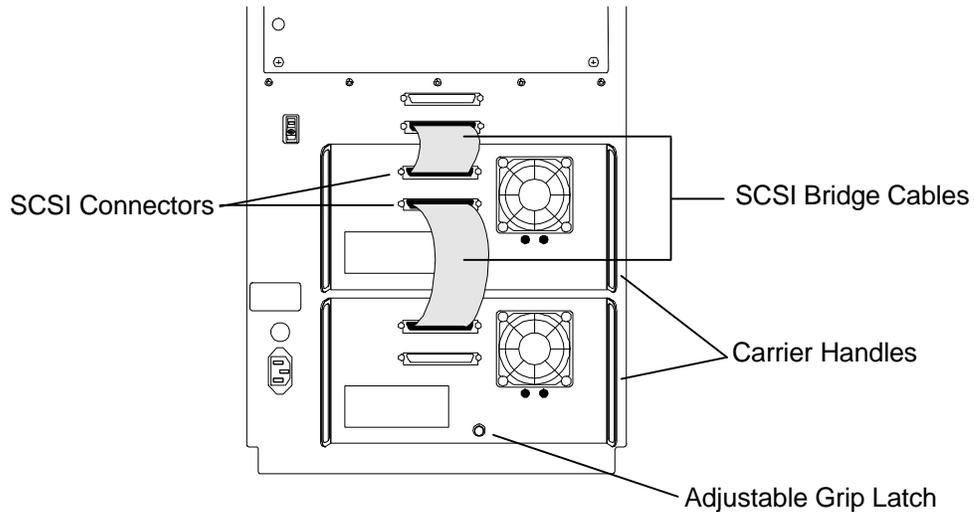
- When a Quantum tape drive is powered up with a detached leader, the "Tape in Use" light blinks continuously. The handle will not operate in this condition.
- When a cartridge load results in a dropped leader, all lights flash a couple of times in unison on the right side, then the "Tape in Use" light blinks indefinitely. The handle will not operate in this condition and the cartridge cannot be removed.
- If the drive is unloaded, look inside to see if the leader is on the buckling hook. If not, it will have to be repaired. See Figure 5.



**Figure 5 Quantum DLT Tape Drive Leader shown in its normally hooked position**

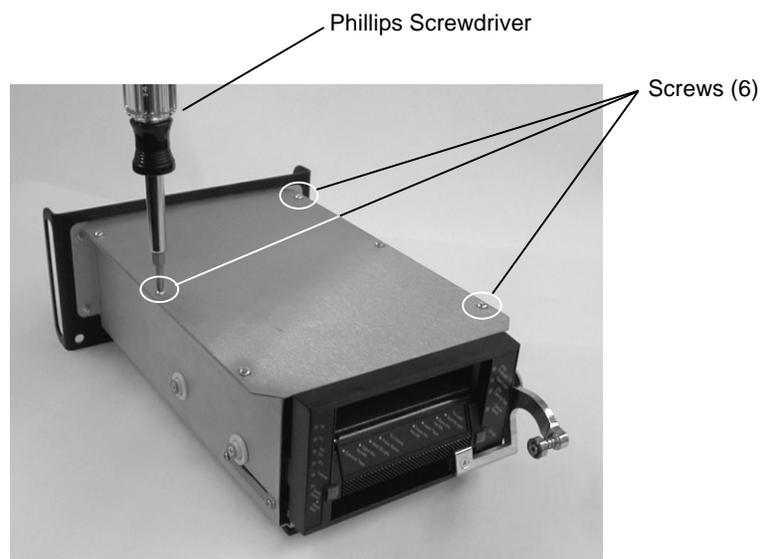
## Re-Attachment Procedure

1. Remove power from the TLS: first turn the power switch off and then remove the power cord.
2. Detach SCSI cables attached to the rear of the assembly. See Figure 6.



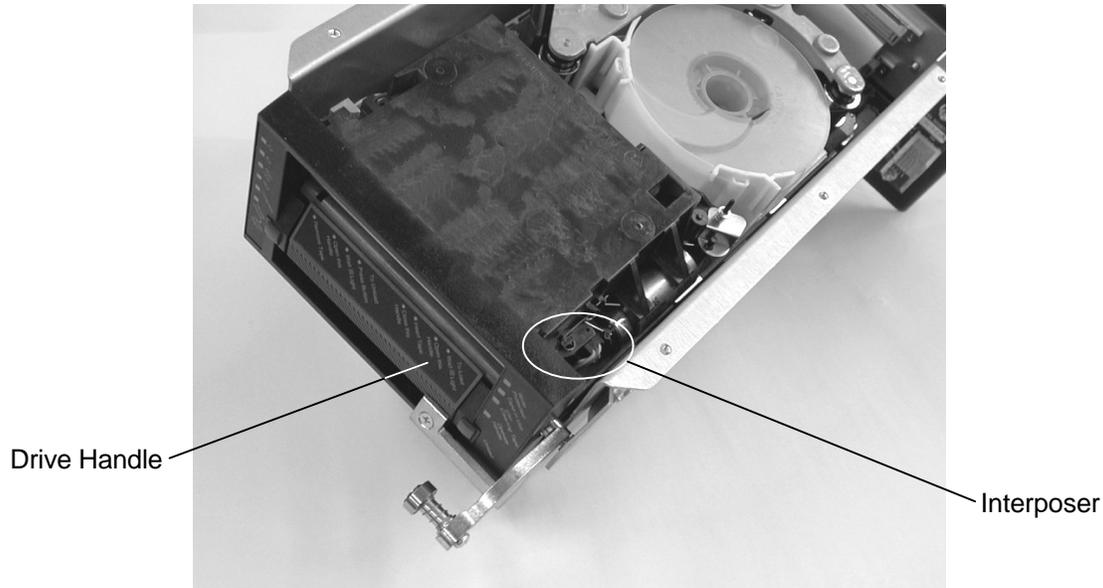
**Figure 6 Tape Drives in rear of Library**

3. Turn the Adjustable Grip Latch on the tape drive assembly all the way counterclockwise.
4. Grasp the tape drive assemblies Carrier Handles and gently slide the unit rearward, until it is removed from the TLS.
5. Using a Phillips screwdriver, remove the six screws that secure the top cover. See Figure 7.



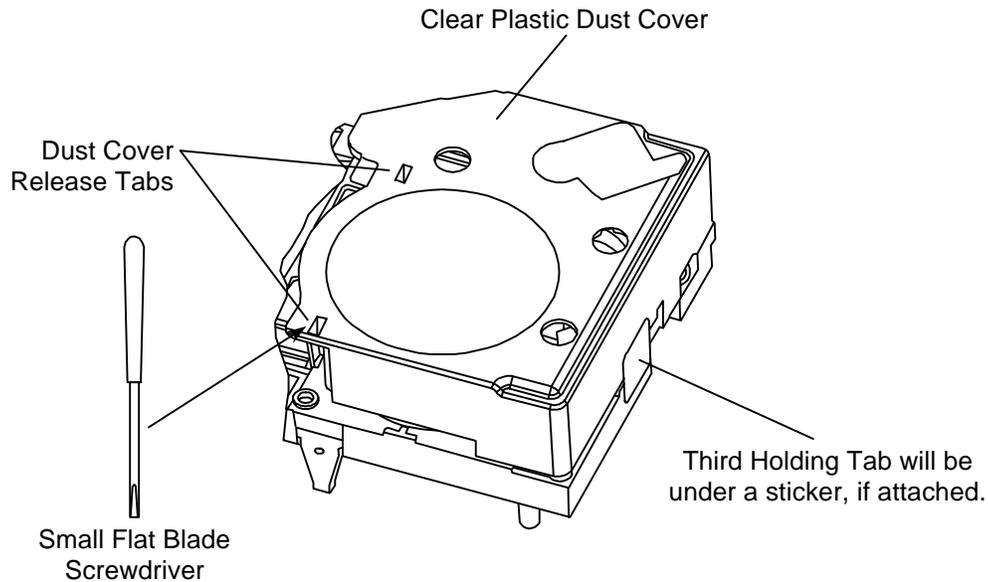
**Figure 7 Screws in Top Cover of DLT Tape Drive**

6. Remove the top cover.
7. If a tape cartridge is stuck in the drive, it is necessary to open the interposer and lift the drive handle to remove the cartridge. See Figure 8. The interposer must be pulled back to release the handle and allow it to be lifted. While slowly lifting the drive handle use a finger to prevent rapid ejection of the tape cartridge. This will help to ensure the leader will unbuckle properly. Note that the interposer must be held open in order for the tape cartridge to be completely removed from the tape drive.

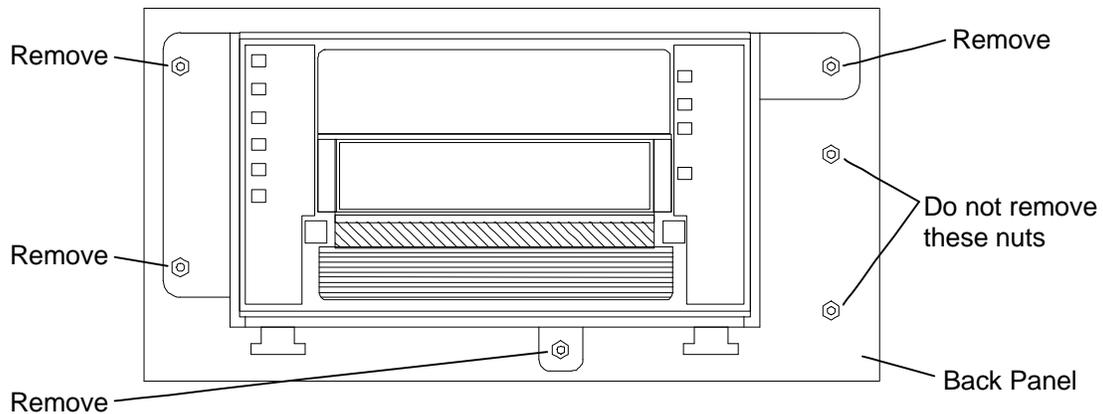


**Figure 8 Location of Interposer**

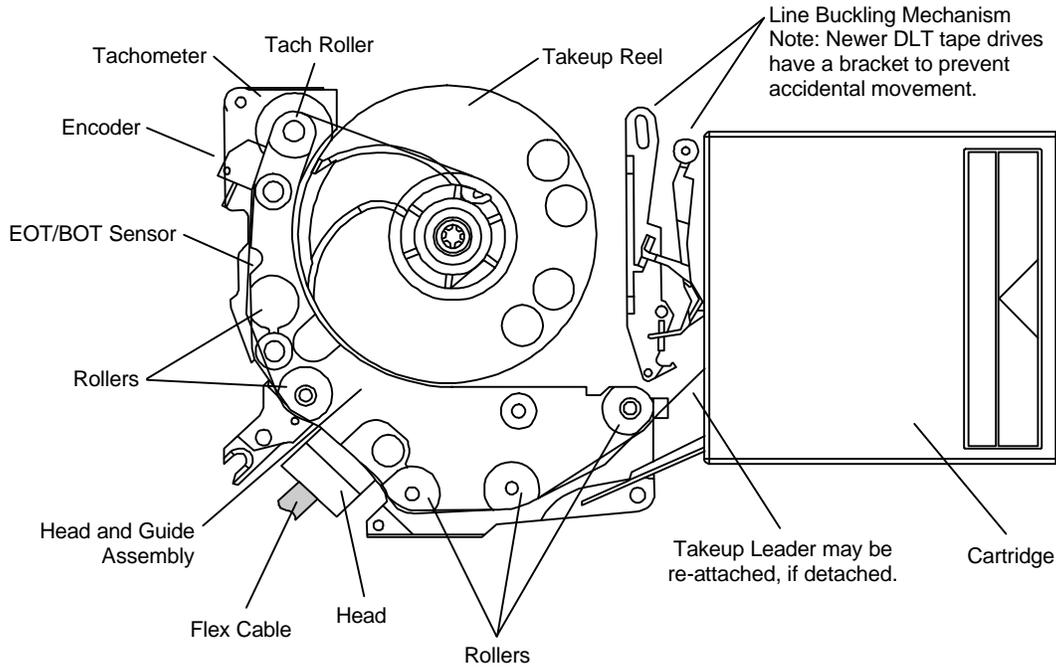
8. Put on the cotton lint free gloves before proceeding.
9. Locate the clear plastic dust cover over the take-up reel (Figure 9). Some older tape drives may have a warranty sticker on the rear of the drive. Ignore the message on the sticker and remove it. Locate the two rectangular slots near the front of the plastic cover. Insert a small flat screwdriver into each slot, gently pry each tab, and lift the front of the cover. A third holding tab is located at the rear of the drive, which can be pried open with just a finger. The back panel of the tape drive assembly can be detached if more room is required to open the third holding tab. See steps 10 and 11 if detaching the back panel. If not, proceed to step 12.

**Figure 9 DLT Tape Drive Dust Cover**

10. If the back panel is being detached, use a 1/4-inch nutdriver or wrench to remove the four locking nuts that secure the back panel. Do not remove the two locking nuts securing the circuit board. See Figure 10.

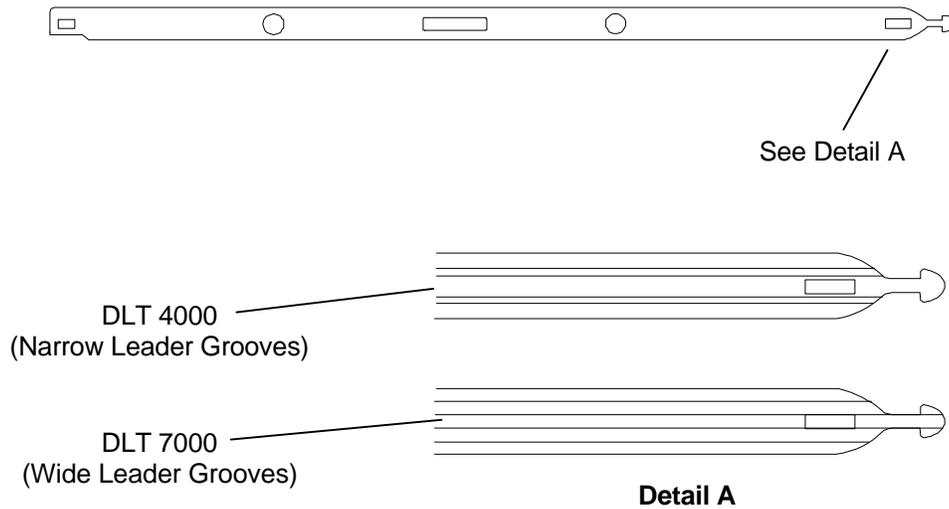
**Figure 10 Front View of Tape Drive Assembly**

11. Gently move the back panel to gain access to the third holding tab on the plastic dust cover.
12. After the plastic dust cover has been removed, gently rotate the take-up reel until the leader "Mushroom" tip is exposed (rotate clockwise). See Figure 11.



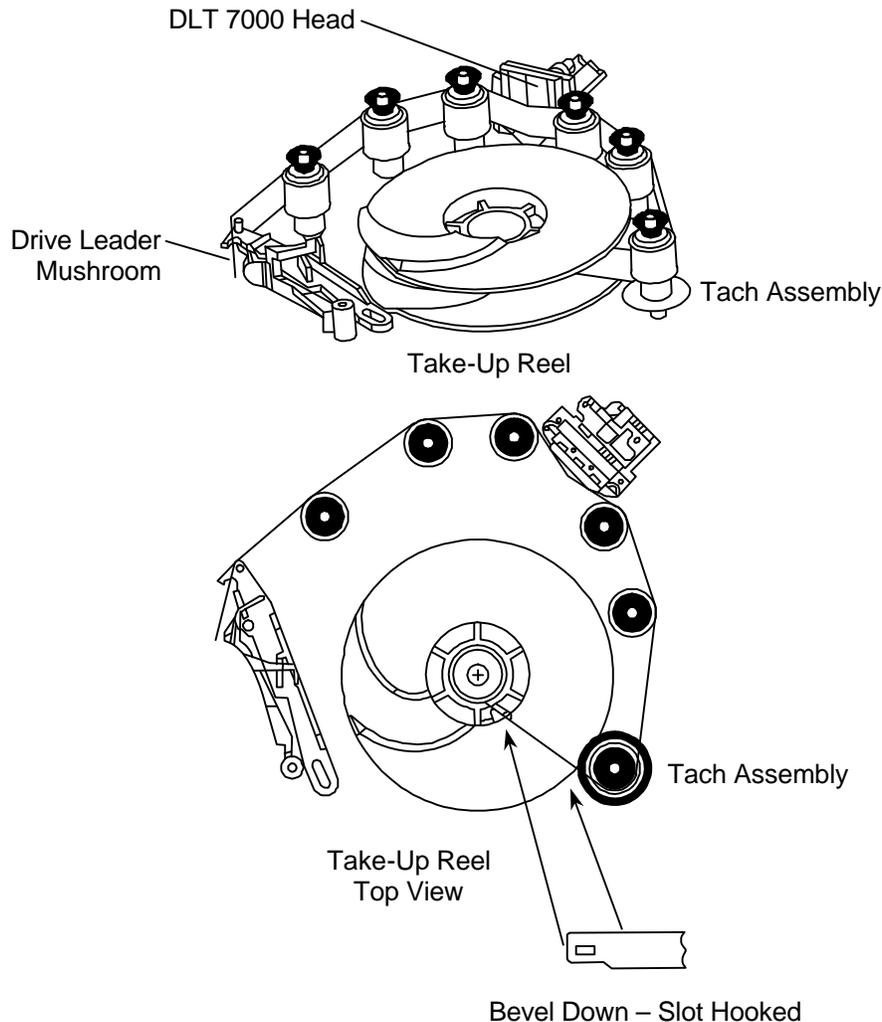
**Figure 11 Tape Paths**

13. Pull the leader to its full length and wipe the entire leader with a lint free cloth pad dampened with isopropyl alcohol. **Do not use solvents. Wipe only the leader. Do not touch the rollers or heads.** If the leader is not damaged and appears to be free of scratches it can be re-attached to the buckling mechanism of the drive. If the "Mushroom" tip is bent, torn or missing, the leader must be replaced. The leader must also be flat (not bowed or curved). If the leader is in need of replacement, please contact Qualstar Customer Service at (818) 592-0061 for assistance. The visual differences between the DLT 4000 and 7000 leaders are shown in Figure 12. Proceed to step 14 to begin re-attaching a leader.



**Figure 12 Leader Types**

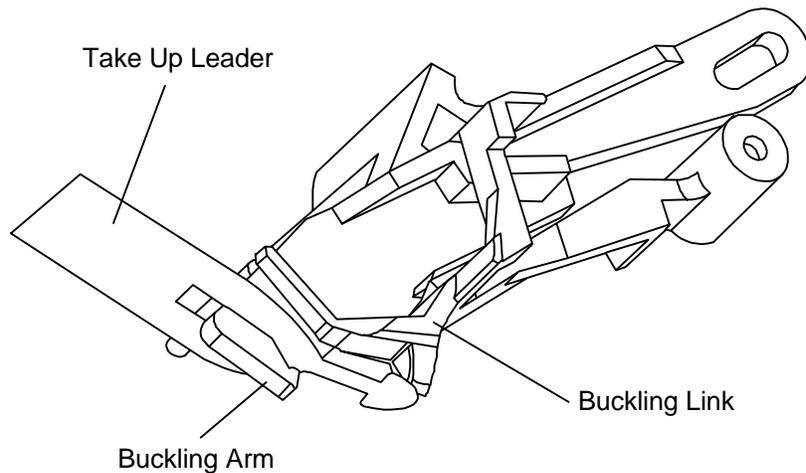
14. Very carefully slide the leader in front of the head positioning the leader so that it enters the tape path and passes around all six rollers. Refer to Figure 13. Each roller has a flange that holds the leader in alignment and the mushroom end of the leader will protrude into the rear of the drive receiver.



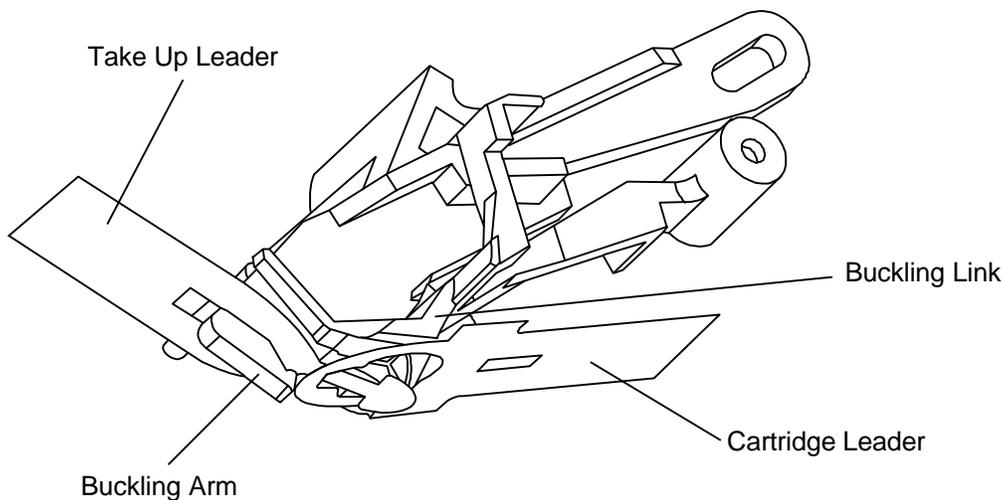
**Figure 13 Drive Leader Attachment and Path**

15. Gently pull the leader to its full length. Position the leader so that the buckling link arm aligns to the rectangular slot in the leader and gently pull back the buckling arm with the index finger so that the hook engages the slot. Release the mechanism and verify that the mushroom tip is in front of the buckling mechanism.
16. You must know verify that the leader is completely in the tape path and that it is between the flanges of each roller. Rotate the take-up reel clock-wise and 1/8th turn (two or three times) to seat the leader. You will hear a click when the leader is seated. Visually verify this.

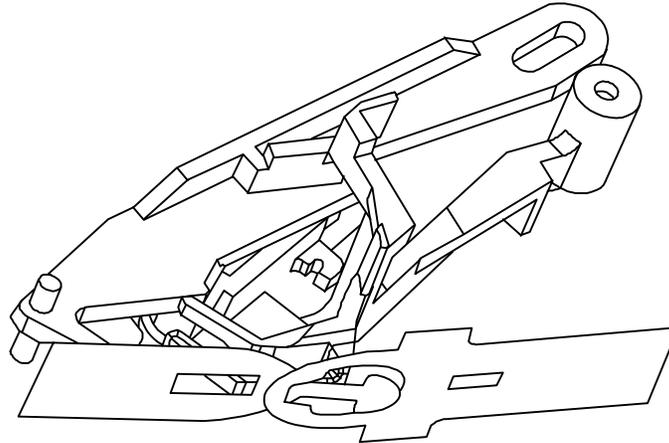
17. If a sticker was attached to the dust cover, use a lint free cloth pad dampened with isopropyl alcohol to remove any residue from the sticker. Replace the dust cover. On DLT 4000 models, make sure that the flex cable leading away from the head is on the inside of the dust cover when it is attached. See Figure 11. Bending or crushing the flex cable can damage the wires.
18. If the back panel was detached, reattach it to the rear of the tape drive and use a 1/4-inch nutdriver or wrench to retighten the four locking nuts that were removed earlier.
19. Position the top cover over the tape drive and secure it using a Philips screwdriver and the six screws that were removed earlier.
20. See Figure 14 through Figure 17 for views of the proper take up leader load sequence.



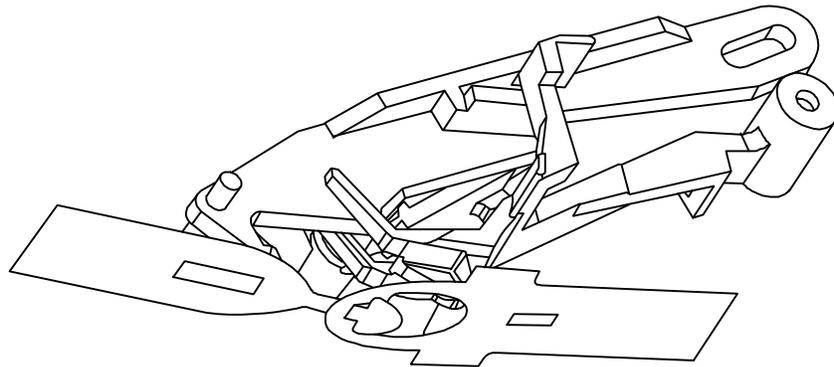
**Figure 14 Correct Position of Take Up Leader / Buckling Link**



**Figure 15 Take Up Leader Partially Installed in Cartridge**



**Figure 16 Take Up Leader Engages into Cartridge Leader**



**Figure 17 Load Sequence Begins**