



## AVL LOOMS

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### AVL Tech Bulletin: **Compu-Dobby® III Negative Dobby Troubleshooting**

Topic: **Troubleshooting Harness Lift and Dobby Issues with Compu-Dobby III-Equipped Looms**

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## Overview

This document covers issues of miss lifting with AVL looms equipped with the Compu-Dobby III negative dobby, including: A-Series, Folding Dobby Loom (FDL) and Workshop Dobby Loom (WDL) where the loom came equipped with a Compu-Dobby III. This document does not cover

- negative dobbies equipped with Compu-Dobby III+, IV, or 5
- positive dobbies
- countermarch dobbies

## Issues Covered

The primary issue this document reviews is incorrect harness lifts with either harnesses failing to lift and/or lifting when they shouldn't. The causes of this problem can be broken into three areas:

- Weaving techniques
- Harness float
- Mechanical causes

This document focuses on these causes and how to resolve them. It is crucial to address harness float first, before dealing as its existence tends to mask mechanical causes. The primary exception to this problem is where specific mechanical issues are visibly obvious, such as crossed cables, chains or springs.

This document does not focus on issues of loom miss assembly or threading errors. Before using this document, it is prudent to verify that the harnesses are connected the correct harness cable loops and spring lever chains. It is also a good idea to make sure that no warp ends are miss threaded into heddles on different harnesses.

## Harness Float

Harness float is a condition that is possible on the AVL rising shed looms due to the alignment of at-rest harnesses below the warp center line. When the warp tension overcomes the weight of the harnesses and the harness spring force, the harnesses floats up. Another cause of harness float is where the rising warp ends threaded into adjacent harnesses pulls up on the floating harness. This second cause typically coincides with a tight warp sett, dense patterning and/or sticky yarns. In any case of harness float the primary cause of miss lifts is the slack created in the cables, harness and dobby, as they extend down through the dobby head.

### Diagnosing Harness Float

The test for harness float is straight forward:

1. If there is a warp on the loom, eliminate the warp tension and make the warp visibly slack. This step removes any influence of the warp on the dobby lifts.
2. Make the harness spring-chains under each harness visibly slack. Or, with WDL and 40H looms, make sure all harnesses are using a single set of standard harness springs. This step eliminates this adjustment from influencing the dobby lifts.
3. Treadle through your weaving pattern. If the miss lifts are eliminated, or reduced, then we can conclude that your loom, or more accurately, your warp has a harness float problem. If the issues remain, we can conclude they are being caused by mechanical issues.



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### Fixing Harness Float

Harness float can be fixed by one or more of 3 choices. The choices are arranged in the order of priority you should consider:

- **Increase the harness spring tension for the harnesses that are miss lifting.** Increasing the harness spring tension is a simple, yet very effective approach to countering the pulling up of a floating harness with more force pulling down. The downside to this option is that if too much harness spring force is added, treading the right treadle will require more effort. The process for the fix is incremental trial and error, where the spring force is increased a small amount and then tested. The fix is accomplished on spring lever equipped looms by shortening up on the chain one or two links at a time where it hooks into the spring lever. For the WDL and 40H spring configuration, the fix is accomplished by adding a 2<sup>nd</sup> set of harness springs to the harness, or if that is insufficient, replacing the standard harness spring set with a set of heavy duty harness springs. Testing should be done with warp tension ON. *Please note: Because this problem is a warp-related issue, the fix is only for that specific warp. The harness spring setup for all harnesses should be set back to the standard configuration with the next warp.*
- **Decrease warp tension.** Given that too much warp tension is one of the causes of harness float, it follows that reducing warp tension may fix harness float. From experience it has been observed that higher-than-necessary warp tension is often a result of habit. Many weavers were taught early in their weaving careers to overcome inconsistent end to end warp tension variation by increasing warp tension. Jim Ahrens's approach was instead to focus on more consistent warping through better tools so that the damaging effects of over tensioning the warp could be avoided. The key focus on setting warp tension should be at the shed. The shed needs to open cleanly, but any additional warp tension beyond creating a clean shed may cause issues. That stated, some warp conditions do not allow for reducing warp tension enough to avoid harness float and still allow for a clean shed.
- **Reduce density and/or reduce warp stickiness.** This is a catch all fix for a number of related conditions. Generally speaking, thicker warp yarn, tighter warp sett, denser patterning and stickier warp all make rising warp ends want to grab and pull up on the ends that are intended to stay down on a particular pick. Changing most of these factors is a design consideration that cannot easily happen with an existing warp. Hence, it is wise to sample designs before committing to a full warp. The one exception to this rule is the use of sizing on the warp. Sizing is a term for conditioning the warp to reduce its hairiness/stickiness. In situ, a spray starch is one method of sizing a warp.

### **Weaving Techniques**

There are a lot of ways to successfully warp and weave. However, there is only one way to treadle a negative dobby. During weaving the weaver must keep a foot on each treadle and move the left and right treadles in unison. When using only one foot to treadle, the tension on the other treadle cable is loose resulting in two possible problems. The first is that the treadle cable might come off the pulley immediately above. When this happens and the weaver continues weaving, the cable will break due to the small radius of the pulley axle on which it is now riding. The second issue, which is more directly related to this document is that failing to depress the left treadle fully will result in the dobby slide plate not ascending high enough to release all the dobby cable balls from the dobby insert. Some dobby cables might not be able to catch under the dobby insert in this scenario, as well.



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### Mechanical Issues

Mechanical issues range from worn out parts to misadjusted areas of the loom. Review for worn parts first.

#### Worn or Failed Parts

The following are parts that should be reviewed for excessive wear:

- **Dobby cable balls.** These should be round on top. If misshapen, the dobbie cable must be replaced. Misshapen dobbie cable balls will more easily slip out from under the dobbie insert as the pick is lifting.
- **Dobby insert.** The slots on the dobbie insert should have clean edges with little to no evidence of rounding or flaring on the leading edges. Replace if rounding or flaring of the slot edges is evident. Worn dobbie insert slots will more easily allow the dobbie cable balls to slip out from under the dobbie insert as the pick is lifting.
- **Dobby arm to cam-cylinder cable.** If depressing the left treadle does not bring the dobbie slide plate up to touch the bumper at the top of the right side slide rod, the left treadle/dobbie cable has become over stretched and must be replaced.
- **Compu-Dobbie solenoid.** If a solenoid on the Compu-Dobbie doesn't extend when activated, or is always activated/extended, it must be replaced.

#### Misadjustments

- **Dobbie slide plate height (for A-Series and FDL).** When the left treadle is down, the dobbie slide plate must be touching the rubber bumper at the top of the right slide rod. Adjust the turnbuckle in the dobbie arm to cam-cylinder cable to address this problem. When making this adjustment, it is helpful to also make sure that the treadle paths are kept so that the treadles do not hit the floor or the pulley above.
- **Dobbie slide plate height (for WDL).** When the left treadle is down, the dobbie slide plate must be touching the rubber bumpers at the top of the slide rods. When encountering this problem, first check that none of the small pulleys along the cable paths have come loose and turned, as this will cause the lifted height to be shorter.
- **Compu-Dobbie solenoid tip turn to dobbie cable alignment.** The solenoid plunger tips should be turned to cradle the dobbie cables. To fix, remove the Compu-Dobbie, align the tips and reinstall the Compu-Dobbie.
- **Compu-Dobbie solenoid tip to dobbie cable side to side alignment.** The dobbie cables should be aligned in the center of the solenoid plunger tips. A dobbie cable should not be pressing against either side of the tip. To fix this misalignment, loosen the two large screws on the outside face of the Compu-Dobbie. This loosens the entire pack of solenoids enabling side to side movement. With the Philips screw driver still engaged in one of the screws, push the screwdriver & screw with it to the side necessary to make the adjustment. Observation of the adjustment should be made by looking down the dobbie cables from above the dobbie head through the narrow opening between the Compu-Dobbie sheet metal and the dobbie head.
- **Dobbie insert to dobbie cables side to side alignment.** The dobbie cables should align center side to side in the dobbie insert slots, i.e. a dobbie cable should not touch the side wall of the slot. If not aligned properly, the dobbie insert and dobbie cable balls will wear prematurely. To fix, loosen the screws securing the dobbie insert to the dobbie slide plate (WDL) or mount arms (A-Series & FDL) and slide the insert to the side to move the dobbie cable(s) off the side wall of the slots.



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- **Dobby insert to dobbie cables in/out alignment.** The dobbie cables should align nearer to the dobbie insert slot openings. They should not touch the back of the slots. With the WDL, the adjustment is made by loosening the same two screws noted in the side to side alignment. For the A-Series and FDL, the in/out adjustment is made after loosening the screws holding the dobbie insert mounting arms to the dobbie slide plate (on the underside the slide plate). Note: When making this adjustment, the magnet bracket is also being adjusted and may need to be individually adjusted. Please refer to the technical bulletin titled *Compu-Dobby (Negative Compu-Dobby) Magnet Alignment*. When making this adjustment, testing is required to ensure that the cables are not adjusted too far out of the slots. The test is to ensure that all harnesses lift when the right treadle is depressed.
- **Compu-Dobby straightness.** Two type of dobbie cables were used with the Compu-Dobby III:
  - Standard wire-rope cable with a round compression swagged ball, and a small compression spring at the bottom necessary for straightening and providing a small amount of tension on the cable. This is called a “CDIII dobbie cable”.
  - Straightened music wire with a mounting loop at the top and compression stop in the middle used to catch in the dobbie insert. This is called a “CDIII dobbie wire”.

Each of these types presents different troubleshooting needs.

- **CDIII dobbie cable straightness.** The small compression spring at the bottom of the cable is intended to provide a small amount of tension on the dobbie cable in order to keep it straight. Wire-rope cables have a natural curve which along with loose tension will cause ineffective control of the cable. If the compression spring is loose, it must be elongated to make it slightly longer and thus provide some compression force to the cable. Please note that over elongating the spring can create too much tension on the cable making it more difficult for the solenoid to push the cable out of the dobbie insert. Please note that over elongating the spring can create too much tension on the cable making it more difficult for the solenoid to push the cable out of the dobbie insert.
- **CDIII dobbie wire straightness.** Dobby wires must be straight from the loop to the free end. If a kink in the wire (usually above or below the compression stop) is present, it must be removed by bending the wire at that spot.
- **CDIII dobbie wire angle.** Dobby wires are intended to hang loose and centered in the slot at the bottom of the dobbie head. If the dobbie wire is pressed against either the front or back of the slot, it may not be possible for the solenoid tip to effectively position the dobbie wire. This alignment would have been factory adjusted and the fix is often turning the dobbie wire 180 degrees where it loops into the intermediate cable at the top of the dobbie head. If that does not resolve the alignment issue, the loop in the dobbie wire must be tweaked to change the angle of the dobbie wire hang.