AVL Jacquard Loom
Cylinder-Valve Type
Troubleshooting Guide

The AVL Jacquard loom is state of the art for hand weaving Jacquard looms. This loom has design features to provide fast, highly detailed wovens. An AVL Jacquard head provides 336 individual thread controls with similar capabilities and maintenance requirements as available in the power loom industry. Please note that maintenance of the loom is required to achieve continued proper operation. Maintenance can include periodic change out of cylinders and valves as these items are considered consumable items.

Cylinders

This troubleshooting guide has been specifically written to address the AVL Cylinder-Valve Jacquard type loom with the Teco or TPC cylinders. For AVL Jacquard looms equipped with TIS head technology please call AVL for support (530-893-4915). Also, for AVL-manufactured cylinders in the Cylinder-Valve type, much of this guide applies. However, additional troubleshooting activities that are not included in this guide may be proscribed. Again, please consult your AVL Technical Representative for support with these systems.

Whether your loom contains Teco or TPC cylinders, there will be two lengths of cylinder present (short and long). Please note that both TPC and Teco cylinders were life tested to 2 million cycles or more. So, long life is expected.

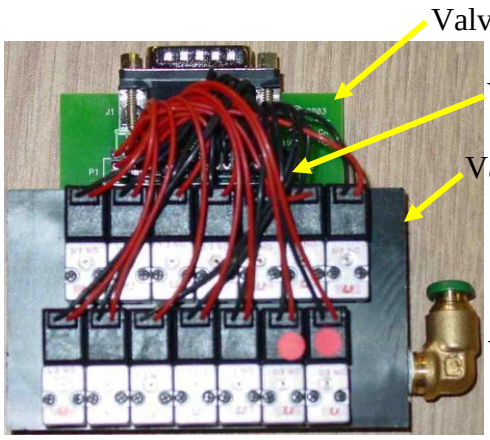
Teco Cylinders during Assembly

TPC Cylinders during Assembly

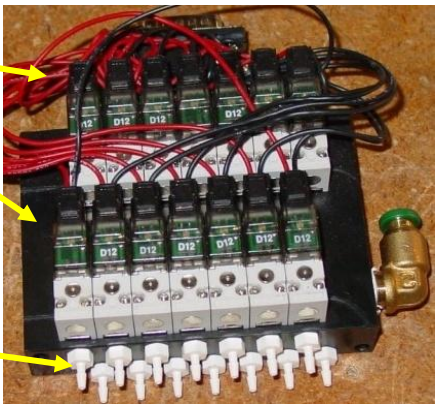
It is easy to tell the cylinder types apart by their color. Teco cylinders are gold and TPC cylinders are silver. Another difference is that the Teco cylinders are secured using a castle nut and require a special AVL castle nut tool to remove them. The TPC cylinders are secured by standard hex nuts and may be accessed with a standard deep socket.

Valves

Your loom was produced with either Univer or TPC Valves. Some looms were delivered with the both types of valves. As the valves have different mounting and air hole configurations, there are valve-specific manifolds. Please note that the most important factor in maximizing the life of your valves is maintaining internal and external cooling air flow. Please ensure that you are using JacqPoint version 1.0.14 or later as it incorporates software to ensure that internal air flow occurs at each pick. For external air flow, please consult with your AVL Sales or Technical Representative regarding the availability and need for upgrades to your loom.



Univer Valves on Valve Manifold



TPC Valves on Valve Manifold

History

During 2005, AVL undertook an initiative to improve the reliability and maintainability of its Jacquard heads. One primary consideration was the cylinder construction and subsequently AVL contracted custom cylinder manufacturing. While the Teco proved excellent from a technical standpoint, other opportunities had AVL move towards a new supplier for the next generation of improved cylinder. Each of these improvements has proven to achieve more reliable, less maintenance intensive and longer life cylinder operation.

During this time, valves and valve manifold construction was also being improved. Univer valves were originally designed into the system. These valves operate well in the system. However, they produce more heat. The Teco valve enabled an equal function with lower heat output, resulting in longer valve life. Also, the valve manifolds were redesigned with simplified construction to ensure more reliable air flow.

TROUBLESHOOTING

The primary failures that occur during operation of these designs are:

A) **Hook sticks in up position**
   Causes:
   i. The hook has not been de-selected in the software pattern. Verify that the hook was intended to be dropped in the design. This is often overlooked due to the high count of hooks in the pattern.
   ii. The Pin Frame has not been lowered. A lack of tension on the heddle springs will not allow proper movement and reaction of the system. Lower it and re-check the hook performance.
   iii. Heddles are tangled. Strumming the heddles will often separate them. However, you may need to manually untangle each heddle from the others, and then re-check the hook performance.
   iv. The heddle strings are overlapping on the deflector rods. This added friction can cause poor performance. Separate the heddle strings on the deflector rods so that no overlapping occurs, and re-check the hook performance.
   v. Early in a cylinders life there can be tightness around the pin seal requiring higher break away force. While rare, this condition may be self correcting with loom usage. For solutions – see Procedure A
   vi. The cylinder or valve has degraded in performance requiring replacement. For solutions – see Procedure C.

B) **Hook rises or drops significantly slower than the other hooks** – It is normal to see some variation in hook speed. However, if a hook is taking longer than 4 seconds to ascend or descend, it should be considered out of compliance.

Causes:

i. The Pin Frame has not been lowered. A lack of tension on the heddle springs will not allow proper movement and reaction of the system. Lower it and re-check the hook performance.
ii. Heddles are tangled. Strumming the heddles will often separate them. However, you may need to manually untangle each heddle from the others, and then re-check the hook performance.
iii. The heddle strings are overlapping on the deflector rods. This added friction can cause poor performance. Separate the heddle strings on the deflector rods so that no overlapping occurs, and re-check the hook performance.
iv. Early in a cylinders life there can be tightness around the pin seal requiring higher break away force. While rare, this condition may be self correcting with loom usage. For solutions – see Procedure A
v. The cylinder or valve has degraded in performance requiring replacement. For solutions – see Procedure C.

C) **Hook stays in the down position** – This is usually a dead hook, but occasionally might be an issue similar to A.

Causes:

i. The hook has not been selected in the software pattern. Verify that the hook was intended to be lifted in the design. This is often overlooked due to the high count of hooks in the pattern.
ii. Heddles are tangled. Strumming the heddles will often separate them. However, you may need to manually untangle each heddle from the others, and then re-check the hook performance.
iii. The heddle strings are overlapping on the deflector rods. This added friction can cause poor performance. Separate the heddle strings on the deflector rods so that no overlapping occurs, and re-check the hook performance.
iv. Early in a cylinders life there can be tightness around the pin seal requiring higher break away force. While rare, this condition may be self correcting with loom usage. For solutions – see Procedure B
v. The cylinder or valve has degraded in performance requiring replacement. For solutions – see Procedure C.

PROCEDURES

AVL recommends that during loom startup, you:
1) Verify that the Pin Frame has been moved to the down position.
2) Run a pattern of row-by-row hook selection/deselection pattern. This is a quick way to identify any problematic hooks and help prevent adding flaws to your work.

The following procedures assume that you have accomplished these basic steps and provide procedures for corrective action beyond them.

Procedure A (For hooks that stick in the up position)

1) Pull the hook down. Re-run the row-by-row hook selection/deselection pattern for the affected hooks to check if the issue is corrected.
2) If issue continues, either raise the Pin Frame or unhook the heddle string. Turn the cylinder pin in both directions while slowly pistoning the pin its full extension and retraction approximately 10 cycles. This process re-spreads lubricant within the cylinder and is considered an occasional maintenance activity. All of the cylinders would benefit from this activity every three months or as required. Lower the Pin Frame/Re-hook the heddle string and re-run the row-by-row hook selection/deselection pattern for the affected hooks to check if the issue is corrected.
3) If issue persists, either the cylinder or the valve has degraded to the point of needing replacement. Use Procedure C.

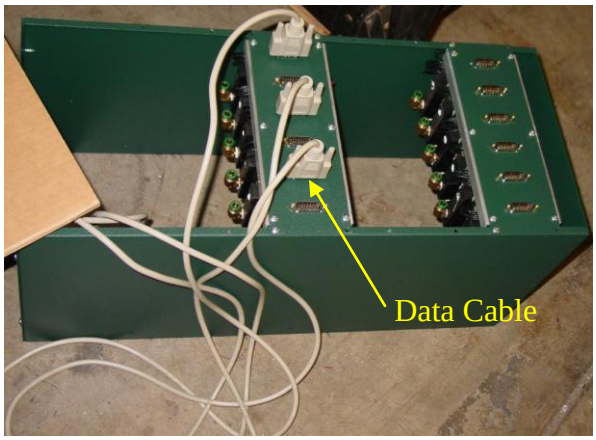
Procedure B (For hooks that stay or stick in the down position)

1) Push the hook up.
2) If the hook raises and stays raised, either raise the Pin Frame or unhook the heddle string. Turn the cylinder pin in both directions while slowly pistoning the pin its full extension and retraction approximately 10 cycles. This process re-spreads lubricant within the cylinder and is considered an occasional maintenance activity. All of the cylinders would benefit from this activity every three months or as required. Lower the Pin Frame/Re-hook the heddle string and re-run the row-by-row hook selection/de-selection pattern for the affected hooks to check if the issue is corrected.
3) If issue persists, either the cylinder or the valve has degraded to the point of needing replacement. Use Procedure C.

Procedure C (For slow moving hooks)

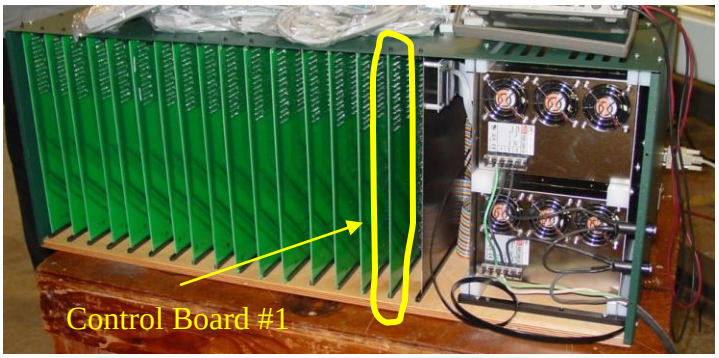
With slow moving hooks, the order of troubleshooting is electronics in the control box, pneumatics, valves, electronics in the valve manifolds and lastly cylinders.

1) **Electronics – Data Cable to Control Box:**
(A) Swap the Data Cable with the one next to it and run the row by row hook selection/de-selection pattern for the affected hooks. If the problem persists with the same hook, move on to step 2). If the problem follows the data cable, the issue is in the Data Cable or electronics in the Control Box.



(B) Follow the two swapped Data Cables back to the control box and swap them there. Run the row by row hook selection/de-selection pattern for the affected hooks. If the problem follows the Data Cable back to the original hook, the Data Cable is bad and needs replacement. If the problem stays with same hook, the issue is located within the control box.

(C) The next step requires that you open the Control Box.



CAUTION: THE CONTROL BOX CONTAINS THE LOOM POWER SUPPLIES CARRYING POTENTIALLY LETHAL VOLTAGES. ALWAYS COMPLETELY REMOVE POWER BY UNPLUGGING THE POWER CORD FROM THE WALL OUTLET PRIOR TO PERFORMING ANY WORK WITHIN THE CONTROL BOX. PROCEED WITH EXTREME CARE AND IF YOU ARE ALL AT UNSURE OF PROPER SAFETY PRECAUTIONS PLEASE CALL AVL FOR ASSISTANCE.

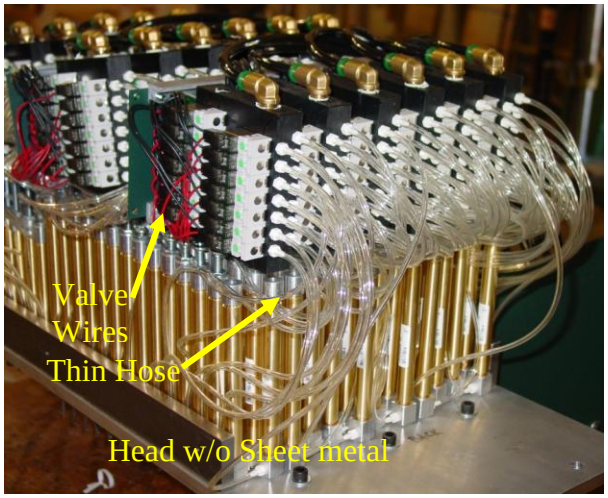
Remove the rear panel using a Phillips screwdriver to gain access to the Control Boards. You might also consider removing the top of the Control Box if accessing the Ribbon Cables at the rear of the Control Board. However, replacing the top can be difficult as it requires getting each control board into its proper slot/holders which are located in the

top and bottom of the control box. Trace the failing hook to its proper control board. This can be a bit tricky so have patience. Hints: Each Control Board controls 168 hooks and follows in the same order as the hooks, from left to right. There are 12 Data Cables assigned to each Control Board. Now, carefully remove and disconnect the Control Board and the one next to it. The Control Board will slide rearward for removal and you will need to reach into the Control Box to disconnect the Outbound Data Ribbon Cable, the Inbound Data Ribbon Cable and the Power Cable. Swap the Control Boards reconnect the Ribbon Cables, reassemble, re-power and run the row by row hook selection/de-selection pattern for the affected hooks. If the problem stays with the same hook, you have a bad Outbound Data Ribbon Cable requiring replacement.

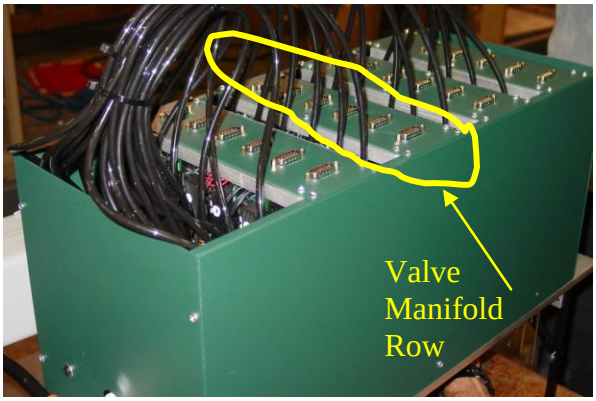
(D) The Ribbon Cable connects the board to the Delta Connector mounted on the rear wall of the Control Box, which is in turn connected to the Data Cable. Replacing a Ribbon Cable requires the removal of the Control Box top, but is otherwise straight forward. If the problem hook follows the Control Board, you have either a bad Control Board or Inbound Data Ribbon Cable requiring replacement.

(E) To determine which one is bad, unplug the Inbound Data Ribbon Cable, move it to the next board and run the row by row hook selection/de-selection pattern for the affected hooks. If the problem follows the board, the Control Board is bad, and if the problem does not follow the Control Board, the Inbound Data Ribbon Cable is Bad.

2) **Valves – Valve Manifolds:** Each valve is connected to its associated cylinder via a thin hose. Hoses can be kinked in the surrounding sheet metal or disconnected when the air pressure on the head exceeds 80 PSI. There are also several small wires connecting the Valve Manifold PCB to the individual Valves that can get kinked/shorted. When gaining access to the Valve Manifolds, you are presented with a good opportunity to check hoses (A) and wires (B). The following procedures are intended to be performed sequentially.



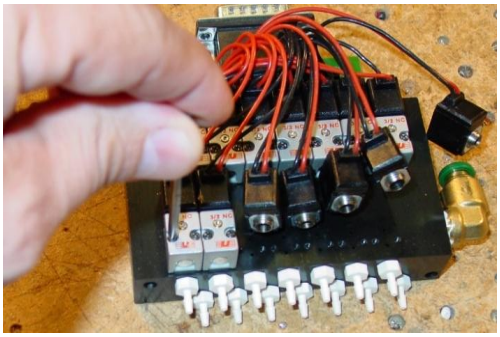
(A) Pinched hoses will cause slow moving hooks. If you find that when pulling down on a slow moving hook, it wants to spring back to its previous position, you probably have a kinked hose. Unscrew the valve manifold row using a Phillips screwdriver, and carefully pull up on the row until you can see down below. This may require a flashlight. As you do this, check the hose for the offending cylinder to see if it has become

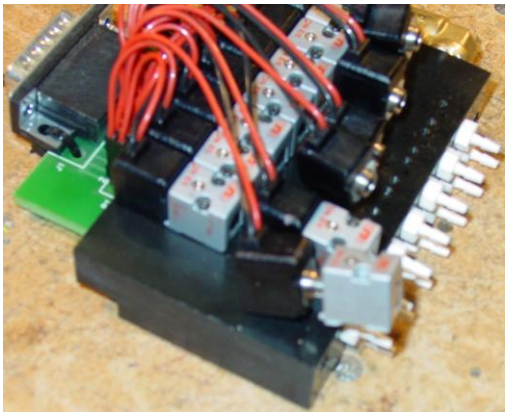


kinked or pinched. Run the row-by-row hook selection/de-selection pattern for the affected hooks to check if the issue is corrected.

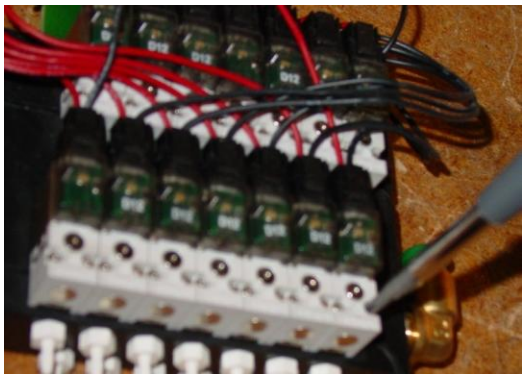
(B) A kinked or shorted wire will either activate (short) or deactivate (open) the hook, regardless of the weaving pattern. Activate all hooks on the Valve Manifold in question and gently wiggle the wires to test if you suspect one has been pinched. Repeat with deactivated hooks. If you find a bad wire, either repair the wire or replace the Valve Manifold. AVL also offers repair services.

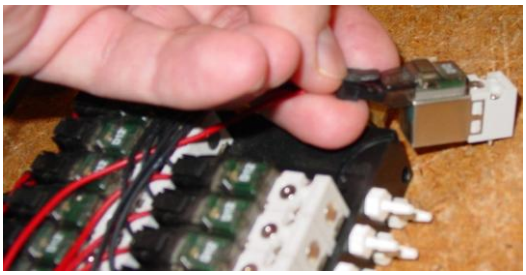
(C) The valves in the AVL Jacquard are 'consumable' items, meaning it is normal for a valve to degrade over time and require replacement. So, it is often when you find a dead hook or slow moving hook that the valve is ready to be replaced. To replace a valve, turn off the air supply to the head. Remove the Valve Manifold Row by removing the 4 screws





Univer Valve Removal





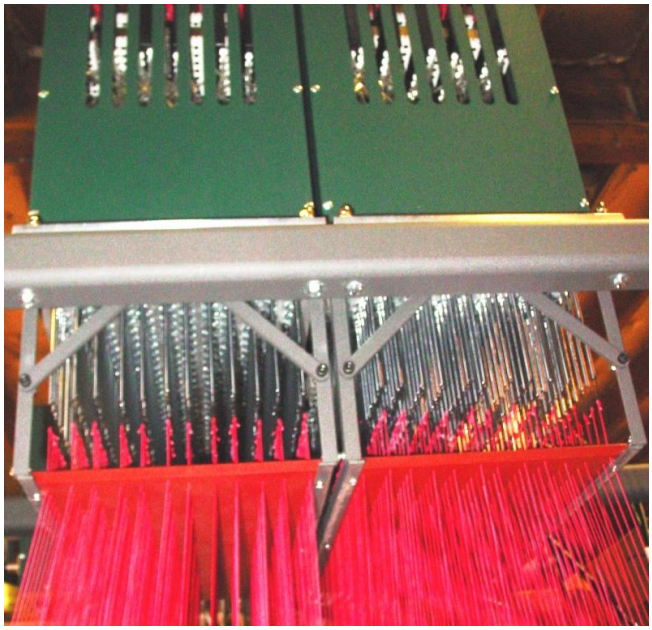
TPC Valve Removal

with a Phillips screwdriver. Next, identify which Valve Manifold contains the suspect valve, disconnect the Data Cable, and remove the Valve Manifold by unscrewing the 2 nuts with a Nut Driver. Identify the problematic Valve and remove the 2 screws holding the Valve to the Valve Manifold using a jewelers-type Phillips screwdriver. There will be small gaskets between the Valve and Valve Manifold that usually stay imbedded in their grooves. However, ensure that you do not drop them in case they have come loose. Unsnap the Valve from the Plastic retainer/wires. On the Univer Valves, the aluminum body snaps away from the plastic top and on the TPC Valves, you press down on the plastic clip to release the Valve. Replace the valve with a new one, being very careful to only tighten the retaining screws to a finger tight condition. Over tightening may strip the plastic manifold necessitating R&R of the manifold. Reverse steps to return to a working loom. Run the row-by-row hook selection/de-selection pattern for the affected hooks to check if the issue is corrected. If the valve replacement doesn't resolve the issue, the issue is either in the Valve Manifold PCB or in the Cylinder.

If you find that you are having frequent valve failures, you might consider a fan cooling system add-on for your AVL Jacquard head. This is an upgrade that was not originally offered on these looms, but has proven to greatly extend the life of the valves.

(D) For the offending hook, remove the thin hose from the Valve Manifold and swap it with a one adjacent. The hose will be difficult to remove, but will snap off most easily with a hard, fast pull. Repeated removal/replacement may stretch the hose at the end where it fits over the white barb. Replacement hose is available, but often there will be sufficient excess hose where you can cut off the 1/8th of an inch that is stretched. Run the row-by-row hook selection/de-selection pattern for the affected hooks. If the problem follows the hose, the issue is in the Valve Manifold PCB or wiring. The valve wiring and the PCB require soldering skills and equipment to repair, or, can be sent to AVL for repair. Repair parts are also available. If the issue remains with the same hook, then the Cylinder is at fault.

3) **Cylinders:** Cylinder replacement. can be the most challenging as it requires that you gain access to both the top and bottom of the cylinder at the same time. A helper can be very useful for this step.



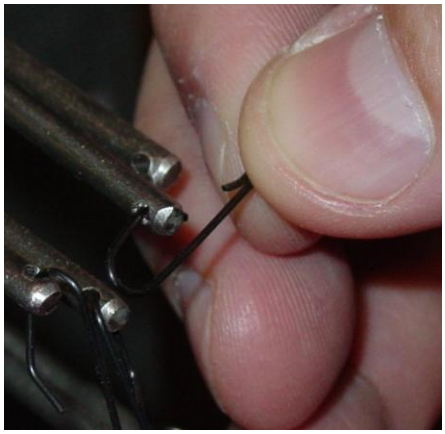
Unhook the Heddle Strings in a "V" to Allow Access for Both Your Hand and Socket Wrench

As noted earlier, there will be two cylinders lengths in the head. Identify whether it is the long or short one and acquire a replacement. Disconnect the Air Hose associated with the bad Cylinder from the Valve Manifold. Next, to gain suitable access to the bad Cylinder, you may need to lift out of the way more than one Valve Manifold Row (without removing the air hose!) and possibly even remove the sheet metal housing surrounding the head. Most everything can be removed using a Phillips screwdriver. Clearing the path will go quite quickly and will often save considerable time over fighting for space in the head.

Hook Travel Adjusting Screws and Jam Nuts on TPC Cylinders

Once you have access to the top of the Cylinder, it is time to gain access to the bottom. If you are lucky, the Cylinder will be located near a side, front or back with easy access. Select the closest and easiest access point and begin un-hooking the heddle strings from the Cylinders. Generally, you want to create a space coming in and around the Cylinder you

are going to replace, and we recommend a “V” shape as it appears to be the optimal shape for tool use access.



Unhooking the Heddle Cord from the Cylinder

You may see a hook-travel adjusting screw and jam nut on the top of the Cylinder. If so, you will use a deep socket wrench and appropriately sized socket to hold the Jam Nut on the Cylinder while loosening the nut from below. If not, hold the Cylinder top with a pair or Plyers. Each Cylinder type has a different hold down nut. The Teco Cylinder uses a Castle nut. As there is insufficient room for a standard socket, an AVL Castle Nut tool must be acquired for use in removing the Teco Cylinder. The alternative to acquiring the tool from AVL is to acquire the same size Castle nut to use as a tool. Engage the tool Castle nut’s teeth with those on the Cylinder Castle nut of which you want to remove. Then engage the tool Castle nut’s body with a short socket or wrench.

The TPC Cylinders use standard nuts and allow for the use of deep socket. It is recommended that you use a shorty-style socket wrench as space will undoubtedly be limited.

Note the orientation of the white barb/nipple on the Cylinder for when you position the new Cylinder. Loosen the nut on the bottom of the Cylinder. Once loosened, you can typically unscrew the nut by hand, but take caution not to lose the lock washer. Once you have unscrewed the bottom nut from the Cylinder, remove the Cylinder by pulling it straight up.

Castle Nut on bottom of Teco Cylinder

Inspect the air hose and white barb/nipple. If they have been damaged show signs of kinking or stretching, replace them with new ones. Don’t skimp or get lazy now, these are inexpensive parts and you don’t want to go back into the head just to replace one.

Prepare the new Cylinder with hose, white barb/nipple, adjusting screw and jam nut. Measure the proper height of the adjusting screw from the old Cylinder or from the row of Cylinders in the head and make final adjustments on the new Cylinder. Lower the Cylinder into its hole being careful to retain the hose along the Cylinder shaft (a rubber band may come in handy). Replace the lock washer and tighten the nut to the bottom of the Cylinder being careful not to turn the Cylinder and damage the white barb/nipple. Torque the nut to 8 ft-lbs or just beyond finger tight. Connect the air hose to the Valve Manifold and run the row-by-row hook selection/de-selection pattern for the affected hook to verify completion of the repair. Reassemble the head and return to weaving.

Whether it is a Univer or TPC Valve, an entire Valve Manifold or Control Board, etc., AVL can supply a broad range of replacement parts for your AVL Jacquard head. Call AVL for prices at 800-626-9615 or +1.530.893.4915. AVL offers expert repair service at AVL or at your location. Repair services at AVL are $80/hour and provide the most capability of diagnostic and repair. On-site services are $395/day + travel expenses.