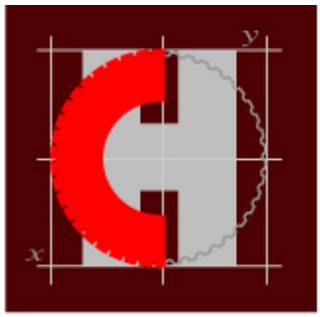

the HAINCOMPANY

www.haincompany.com

Model VBD Manual
&
Model VBD Auto-Feed

Vent Block Drill

Operator's Interface
& Applications Manual

Revision: A

Scope of Manual:

This manual contains procedures for general unpacking, installation, interfacing, interconnecting, adjusting, operation, basic troubleshooting and preventive maintenance.

the HAIN COMPANY

Notice

Patents have been granted and/or patent applications are pending or are in the process of preparation on all **the HAIN COMPANY** developments.

The material in the manual is for informational purposes only and is subject to change without notice.

the HAIN COMPANY assumes no responsibility for any errors that may appear in this manual.

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Table of Contents

Safety Precautions

Safety precautions for operating personnel:

WARNING 1: Operating personnel should perform only the procedures described and recommended in this manual. Only qualified service personnel familiar with electrical shock hazards present inside the equipment should perform disassembly, preventive or corrective maintenance or troubleshooting of the equipment.

WARNING 2: To avoid shock hazard, the equipment must be grounded with an adequate earth ground in accordance with local and national electrical codes.

WARNING 3: The locations of potentially dangerous voltages and other hazards are identified and labeled on the equipment. Be careful to observe these warnings when installing, operating, maintaining or servicing the equipment. Observe all warnings and cautions in this manual.

WARNING 4: Make sure to turn off the equipment power and remove the ~ (AC) line cord from the wall outlet or utility panel before attempting to service the equipment. Do not perform service unless qualified to do so.

WARNING 5: This system contains cutter blades that operate at high speed which can cause severe injury. Never place hands, inside or under the system during operation. This system incorporates many safety covers and shields intended to prevent access to the cutter blades. Do not operate the system with any of the safety covers and/or shields removed or improperly installed. Do not remove the safety covers and/or shields without first disconnecting the equipment by removing the ~ (AC) line cord from the wall outlet or utility panel and disconnecting the compressed air service from the system. Do not perform service unless qualified to do so.

CAUTION 1: Observe the precautions given on the equipment and within this manual to prevent damage to the equipment.

CAUTION 2: Before connecting the equipment to its electrical source, check that the ~ (AC) voltage, frequency and current to be supplied to the equipment are correct.

CAUTION 3: Use proper handling and packaging procedures for Electro-Static Discharge (ESD) sensitive circuit boards. Assume that all circuit boards within the system are the ESD sensitive type.

CAUTION 4: Unauthorized personnel should not remove from the equipment those panels that are provided for protection and/or require a tool to remove.

1. General Product Description and Specifications

the HAIN COMPANY Model Vent Block Drill (VBD) is designed to make lumber, truss and wall panel manufacturing yards more productive by easily and efficiently converting scrap wood into useable vent (frieze) blocks. By simply inserting a pre-cut block, the Model VBD uses one button operation to automatically create vent blocks. It can drill one, two, three, or four hole vent blocks and the block size can be adjusted in seconds. The Model VBD processes each job quickly and studies have shown that it will produce in excess of 360 vent blocks per hour. Operation is simple and even a first time user can begin producing blocks in a matter of minutes. The system is enclosed for safety and the covers can be easily removed for maintenance. **the HAIN COMPANY** uses the highest quality parts to build our products to ensure that each system is built to last, that service is trouble free and is designed to provide our customers high productivity for many years.

Specifications:

Motor: Heavy Duty 5 HP - 3 phase at 220 or 440 VAC (Specified when ordered.)

Block Sizes: 2” X 4” through 2” X 12” on center and 2” X 14” and larger off center.

Air Supply: 100 – 125 PSI.

Cutters: 3-wing carbide tipped.

Spindles: Alloy steel, double ended.

Frame: 2" Steel with powder coat finish.

Covers: Heavy gauge aluminum.

System Dimensions (total envelope):
Model VBD Manual: **61**” High X **61**” Wide X **33**” Deep.
Model VBD Auto-Feed: **72**” High X **84**” Wide X **75**” Deep.

Shipping weight (including crate):
Model VBD Manual: 750 pounds.
Model VBD Auto-Feed: 1,000 pounds.

2. Installation Recommendations

The Model VBD utilizes pre-cut blocks ideally utilizing your off-fall from other framing operations. For efficient operation the Model VBD should be interfaced with some form of lumber on-feed and off-feed systems. This can range from simple workbenches to passive conveyor tables located to the side of the drill which offers a convenient and efficient means for providing the operator with pre-cut lumber to feed into the Model VBD and a place to off-feed completed blocks. A recommended solution is to utilize **the HAIN COMPANY** Measuring System and a cut-off saw for supplying the pre-cut blocks. Or you can use any other means for providing large quantities of pre-cut lumber. Refer to Photos 2-1 through 2-3.

Photo 2-1 Model VBD Manual

Photo 2-2 Model VBD Auto-Feed

Photo 2-3 the HAIN COMPANY Measuring System and Cut-Off Saw

3. Installation Instructions

This section contains instructions for the unpacking, placement, preparation, testing, installation and initial system setup of the Model VBD. Carefully review the following descriptions, sub-sections and each procedure before proceeding with the installation of the system.

The Model VBD comes in two configurations:

Model VBD Manual – Operator hand feeds one pre-cut block at a time.

Model VBD Auto-Feed – Operator manually loads pre-cut blocks into the block feed hopper with up to 22 blocks at a time.

The Manual and Auto-Feed versions are differentiated also by the block feed direction. Blocks are fed from the right to the left (when facing the system) for the Model VBD Manual and from left to right for the Auto-Feed version. On/Off controls for both versions are located on the right side of the system. The equipment illustrated in this manual shows all available optional features for the Model VBD, therefore, your system may vary slightly in appearance from that depicted.

3.1. Unpacking, Placement, Preparation and Testing

1. Before opening the shipping container and unpacking the system, inspect the outside of the container thoroughly for any signs of mishandling or damage during shipping. Report any damage to the shipping carrier immediately and do not proceed with unpacking. Since the shipment is made FOB factory, you should consult your administration concerning claims for shipping damage. Notify **the HAIN COMPANY** immediately in writing of any shipping damage.

2. Remove the shipping container front cover panel and inspect inside the container and equipment thoroughly for any signs of mishandling or damage during shipping. Report any damage to the shipping carrier immediately and do not proceed with unpacking. Since the shipment is made FOB factory, you should consult your administration concerning claims for shipping damage. Notify **the HAIN COMPANY** immediately in writing of any shipping damage.

3. Remove all shipping restraints from the system. Make note of the orientation of the equipment and shipping restraints inside the shipping container to facilitate any repackaging requirements in the future.

4. Remove the four (4) bolts securing the Model VBD frame to the shipping container. These bolts are located at each corner of the base frame.

5. To avoid injury and/or damage to the system, be sure to use adequate manpower and/or lifting equipment to remove the system from the shipping container. To avoid injury and/or damage, lift the system using a lift strap through the throat of the system as shown in Photo 3-1. For the Manual version place the Model VBD in the final installation location. Take the block feed rail from the crate, feed it through the throat of the system and place the vertical tubes of the feed rail onto the studs located on the lifting brackets. The long end of the block feed rail should be to the right of the system (when facing the system). For the Auto-Feed version place the Model VBD near the final installation location and remove the lower frame assembly from the crate and place it in the final installation location.

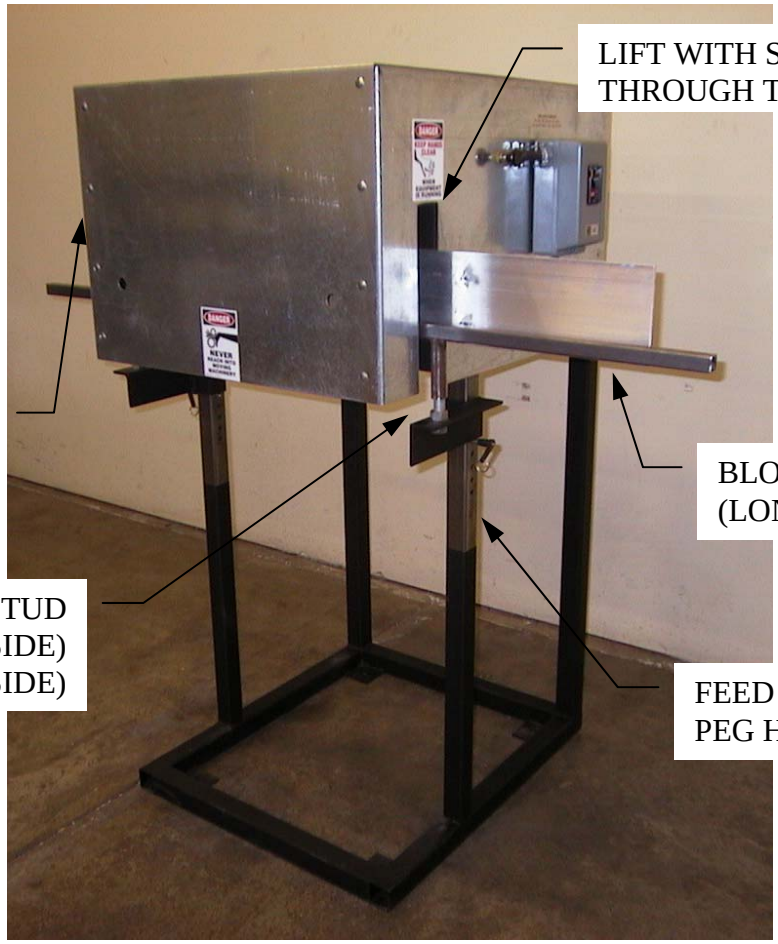

Photo 3-1 Model VBD Manual

6. The preferred foundation (floor) for installing the Model VBD system is a level concrete slab (pad/foundation). Make sure the frame is supported evenly all around the perimeter of the frame. The level of the floor and overall installation affects short and long-term performance, accuracy and repeatability of the system.

7. Using appropriate concrete anchors securely fasten the Model VBD Manual to the concrete slab or for the Auto-Feed version securely fasten the base frame to the slab. For the Auto-Feed version use the supplied hardware to bolt the Model VBD to the base frame.

8. Proper motor operation and cutter rotation of the Model VBD must be verified before beginning system operation. Utilizing a certified electrician and in accordance with local and national electrical codes connect a supply voltage cord using the schematic on the inside cover of the Start/Stop Motor Control. After wiring, proper motor operation and cutter rotation must be verified before proceeding with the remainder of the installation. Make sure the Motor Control is switched to STOP (refer to Photo 3-2). Connect the Motor Control Power Cord to an electrical source supplying the proper ~ (AC) power. Note: Unless otherwise specified at time of order, the standard Model VBD is powered by a 220 VAC, 60 Hz, 20 Amp circuit. Jog the Motor Power Switch to START then STOP by pushing the START Switch, all four (4) cutter blades should activate (rotate), then immediately push the STOP Switch. As the cutter blades coast to a stop look in from the left or right side of the system to observe the cutter rotation making sure all cutters rotate in the proper direction (counterclockwise, when facing system) as indicated in Photo 3-3. If they do not, the electrical wiring is backward. Reverse the wiring and repeat this test to confirm proper cutter rotation before proceeding. **While operating the Model VBD never reach up into the system at any time. The block hole cutters operate at very high speed and can cause serious injury**.

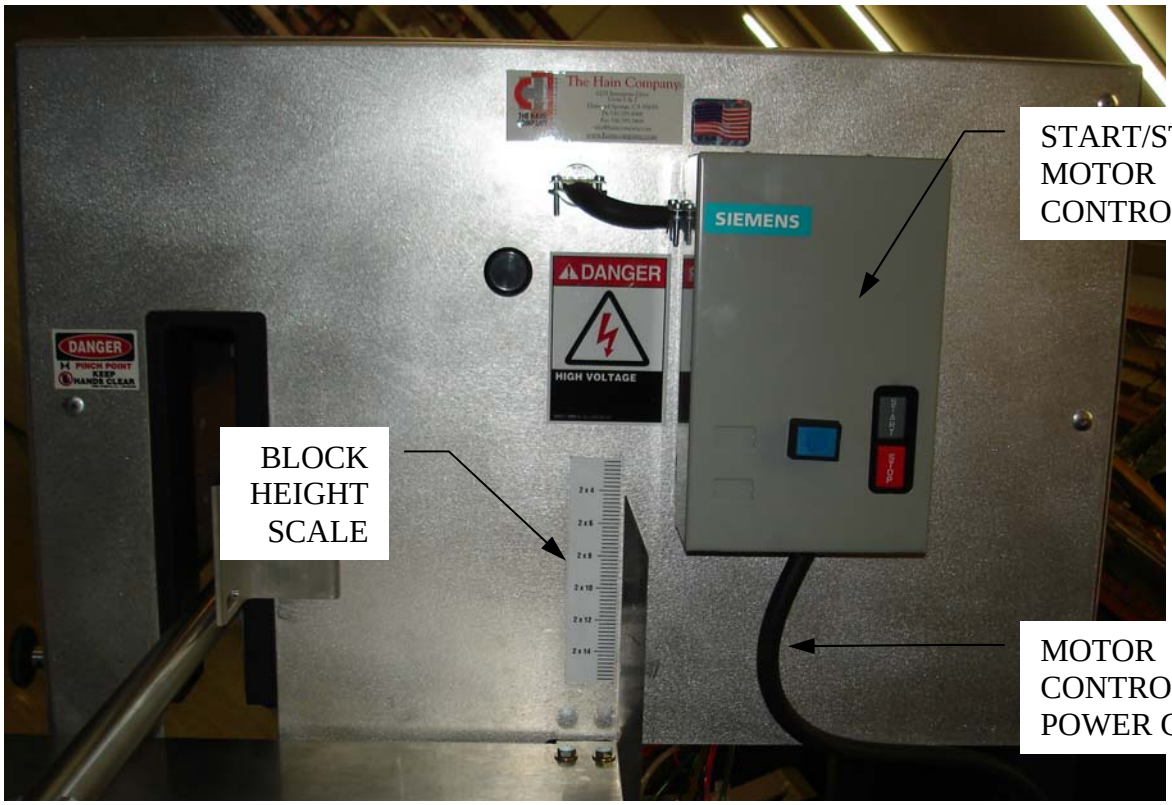

Photo 3-2 Model VBD Auto-Feed Start/Stop Motor Control, Power Cord and Height Scale

Photo 3-3 Cutter Rotation (counterclockwise when facing the system)

9. Verify proper mechanical/cycle operation of the Model VBD through test cycling before proceeding with the remainder of the installation. Make sure the Motor Power STOP switch is depressed. Connect a compressed air supply line to the Compressed Air Input Fitting. For the Model VBD Manual it is located up inside the main cover on the right side (when facing the system) directly behind the black Push/Pull air valve. Refer to Photo 3-4. For the Model VBD Auto-Feed it is located on the right side of the Electro/Pneumatic Control Box (when facing rear of system). Refer to Photo 3-5. The Model VBD should be supplied with a minimum of 100 Pounds per Square Inch (PSI) at a minimum of 10 Standard Cubic Feet per Minute (SCFM). This pressure and flow is measured at the Model VBD. For the Model VBD Auto-Feed plug the supplied Electro/Pneumatic Control Box power cord [Controller Power Cord] into a surge suppressing power strip (not supplied) which is plugged into a standard wall outlet supplying 115 VAC, 60 Hz at 15 Amp. Turn the Controller Power switch ON, located on the right side of the Electro/Pneumatic Control Box (when facing rear of system). Refer to Photo 3-5.

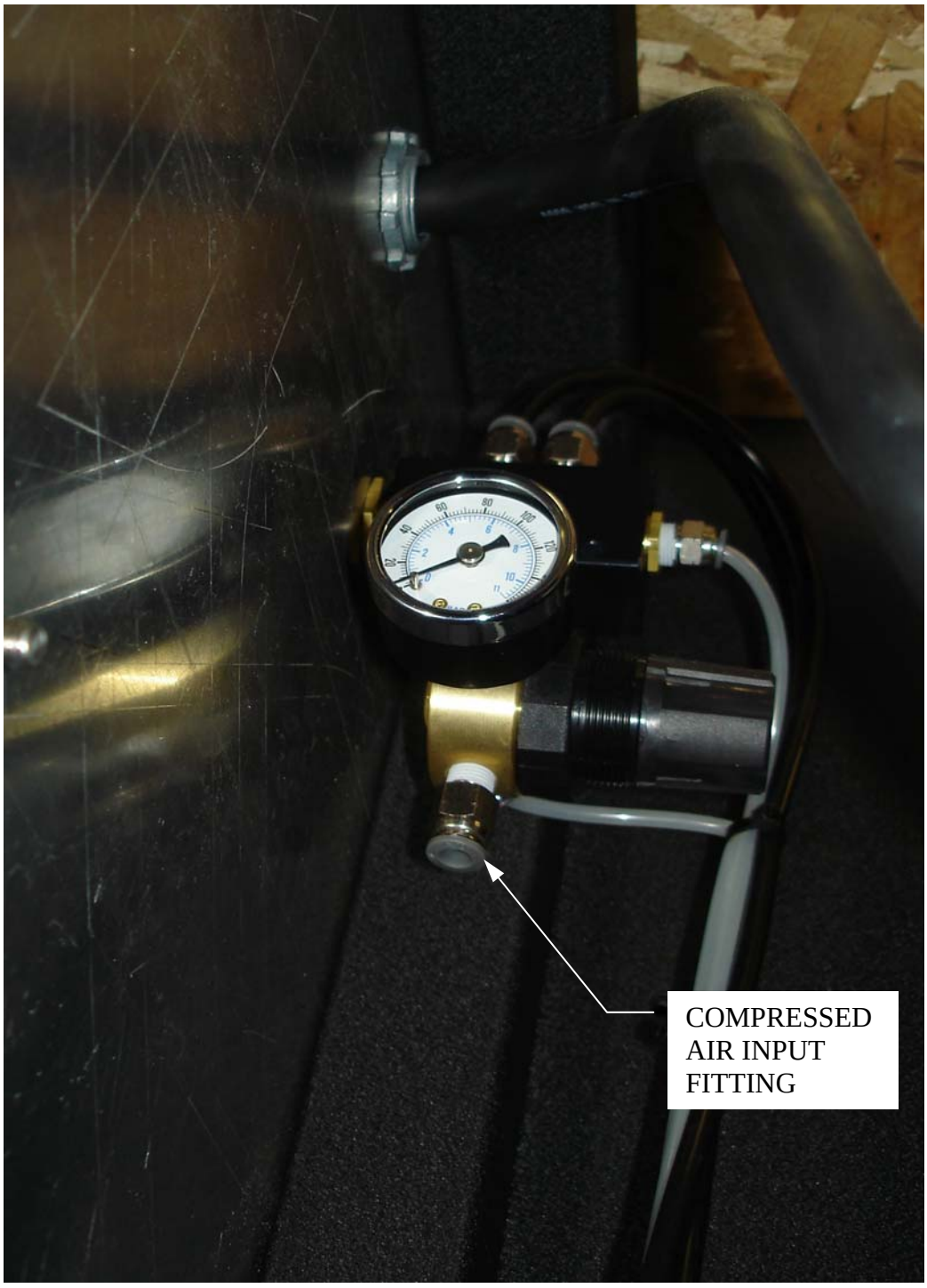

Photo 3-4 Model VBD Manual Compressed Air Input Fitting

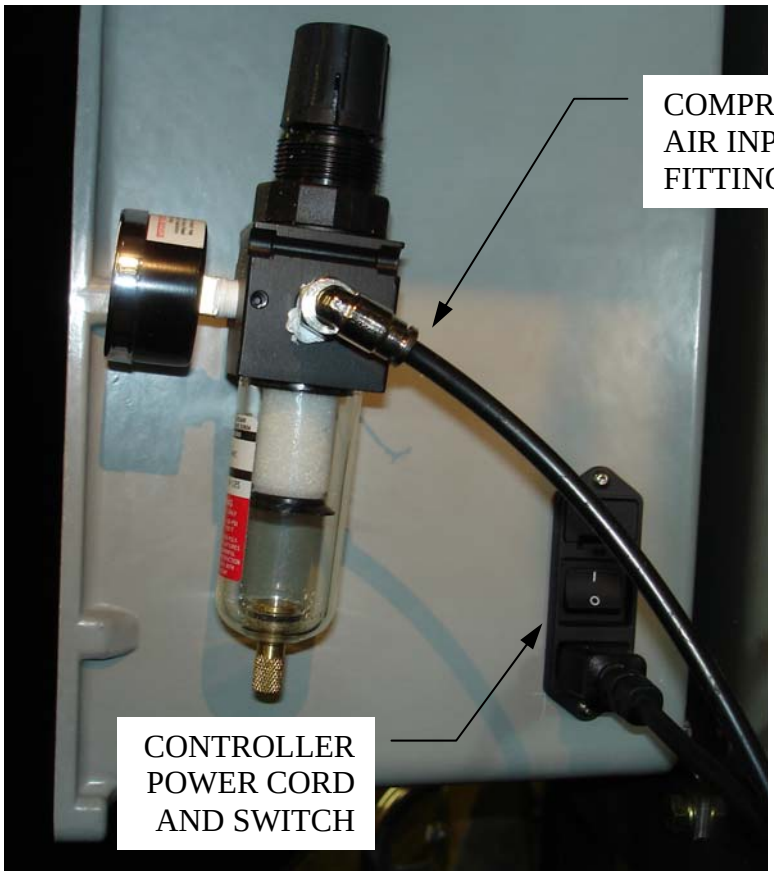

Photo 3-5 Model VBD Auto-Feed
Compressed Air Input Fitting, Controller Power Cord and Switch

Test Cycling:

Model VBD Manual: Without any lumber in the throat of the system press in on the black Push/Pull knob on the right side of the system. This initiates a vent block production sequence. The cutters should move forward through their full feed stroke then retract to their starting position and the black Push/Pull knob should be automatically reset to the out (STOP) position. This sequence takes approximately 7-10 seconds at 100 PSI supply pressure. Perform this test sequence several times to verify proper operation of the system.

Model VBD Auto-Feed: Without any lumber in the throat or the block feed hopper of the system press in on the black Push/Pull knob on the right side of the system. This initiates

a vent block production cycle sequence. The loader cleat (air cylinder) should traverse left to right as if pulling a block into the throat of the system and then return. The two (2) internal block clamps should activate simulating holding the block in place. The cutters should then move forward through their full feed stroke then retract to their starting position. This cutter stroke sequence takes approximately 7-10 seconds at 100 PSI supply pressure. Next the block clamps should release and the cycle should automatically repeat with the loader cleat loading the next block. This sequence will repeat for as long as the black Push/Pull knob is pushed in. To stop the system from cycling, pull out on the black Push/Pull Knob. Perform this sequence several times to verify proper operation of the system. It should be noted that the cycling can be stopped at any time by pulling out on the black Push/Pull knob no matter where in the cycle the system is. The controls will automatically reset the system to the home or start condition.

If the system performs as described above then you are ready to proceed with the rest of the installation. If not, adjustments and/or troubleshooting may be required which are explained in the following sections. Make sure the black Push/Pull knob is in the out (STOP) position, disconnect the Motor and Controller Power Cords and disconnect the compressed air from the system.

3.2. Installation

It must be noted that commercial grade lumber is subject to wide variations in quality, size, shape, dryness, density and other differences which have a direct impact on the quality of vent block production. It is impracticable to produce a system that can accommodate all of these variations without affect. Therefore, in all cases the Model VBD was designed around published nominal lumber dimensions. When utilizing lumber outside these norms differences in performance should be expected and are not signs of improper system operation. The closer the lumber used with the Model VBD to these published nominal standards the higher the quality of vent blocks that can be achieved.

Prepare the work cell area around the Model VBD to facilitate easy and efficient input and output of pre-cut and finished blocks. To maximize production pre-cut block input and finished block output should be arranged for maximum operator efficiency. Due to the vast variation in facilities where the Model VBD can be utilized it is impracticable to describe every possible installation scenario. Simply put the easier it is to load pre-cut blocks and retrieve completed blocks the more vent blocks that can be produced.

3.3. Initial System Setup

You are now ready to confirm and/or make the final adjustments to your system before producing vent blocks. Both the Manual and Auto-Feed Model VBD systems are configured at the factory to run 2" X 4" X 22-7/16" Long blocks. If this is the size block you intend to run no adjustments are necessary and you can skip to the next section. If however you intend to run some other size, follow the instructions below for your version of system.

Model VBD Manual: There are six (6) peg holes in each of the front legs of the frame to adjust the block feed rail up or down to accommodate differing block heights. Refer to Photo 3-1. The upper holes are for 2" X 4" blocks, the next holes down are for 2" X 6", the third for 2" X 8" and so on down to the bottom holes which are for 2" X 14" high blocks. To adjust the feed rail to various block heights lift up on the feed rail guides, pull the lynch pin from each leg and replace them in the appropriate holes and then set the rail guides back onto the pins. To fine adjust the centering of the holes which are cut into the block use the two sets of jam nuts on the feed rail studs to position the hole up or down on the block. Refer to Photo 3-1. To center the holes along the length of the block place the first block into the throat of the system followed up by a second block. Slide the second block flush with the right end of the feed rail. This pushes the first block into place and provides the nominal position for placing the holes in the center of the length of the block. To adjust this position from nominal push the second block in further or leave it further out to adjust the position. If you are making 14-7/16" blocks place a mark 8" in from the right end of the feed rail and line up the right end of the second block with this mark. Any other block lengths can be accommodated in similar fashion.

Model VBD Auto-Feed: There is a hand wheel located at the right side of the system down toward the floor. Refer to Photo 3-6. This hand wheel is used to adjust the block feed rail height up or down to accommodate differing block heights. While using the pointer and block height scale located on the right side of the system (above the hand wheel area, refer to Photo 3-2) as a guide, turn the hand wheel to adjust the block height. Once the first block is produced you may need to fine adjust the centering of the holes up or down with this hand wheel. Next there is a hand wheel located on the left side of the system just below the block feed hopper. Refer to Photos 3-7 and 3-8. This hand wheel is used to adjust the position of the holes in the block from right to left to center them on the block. Once the first block is produced you may need to fine adjust the centering of the holes right to left with this hand wheel.

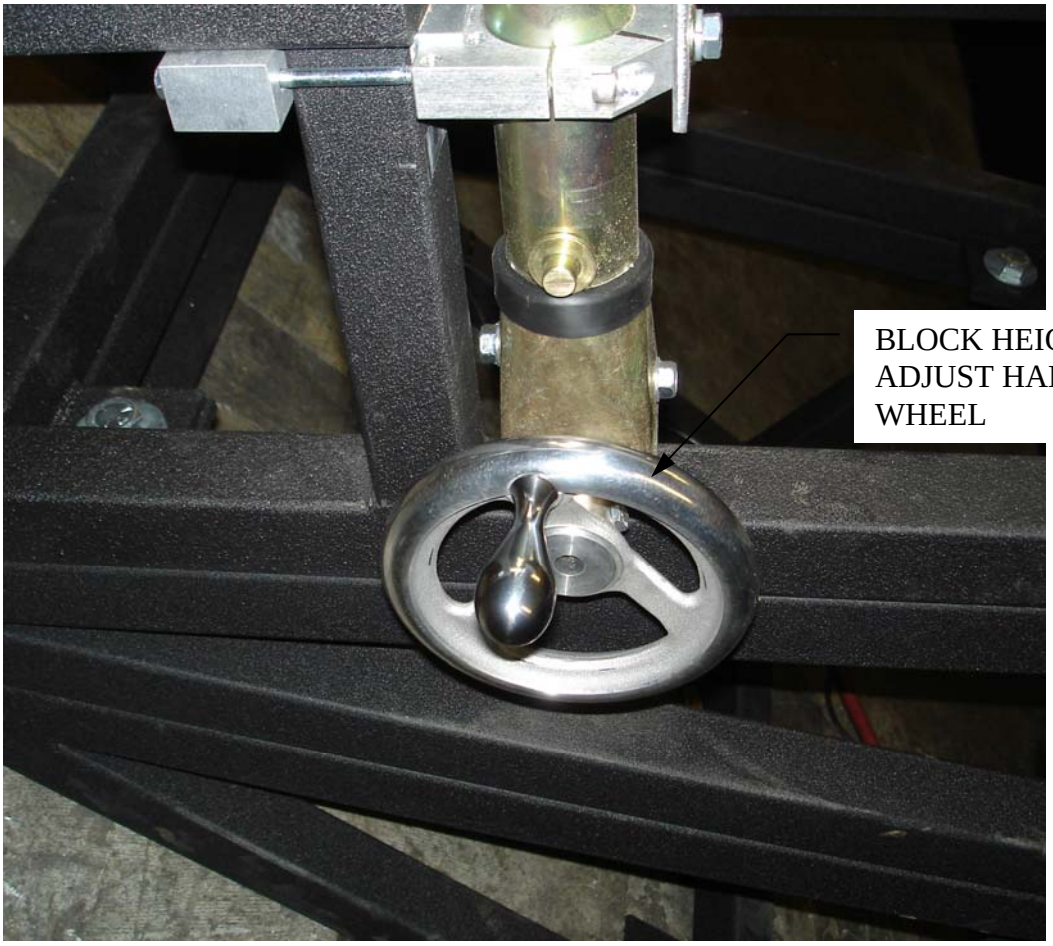

Photo 3-6 Model VBD Auto-Feed Block Height Adjust Hand Wheel

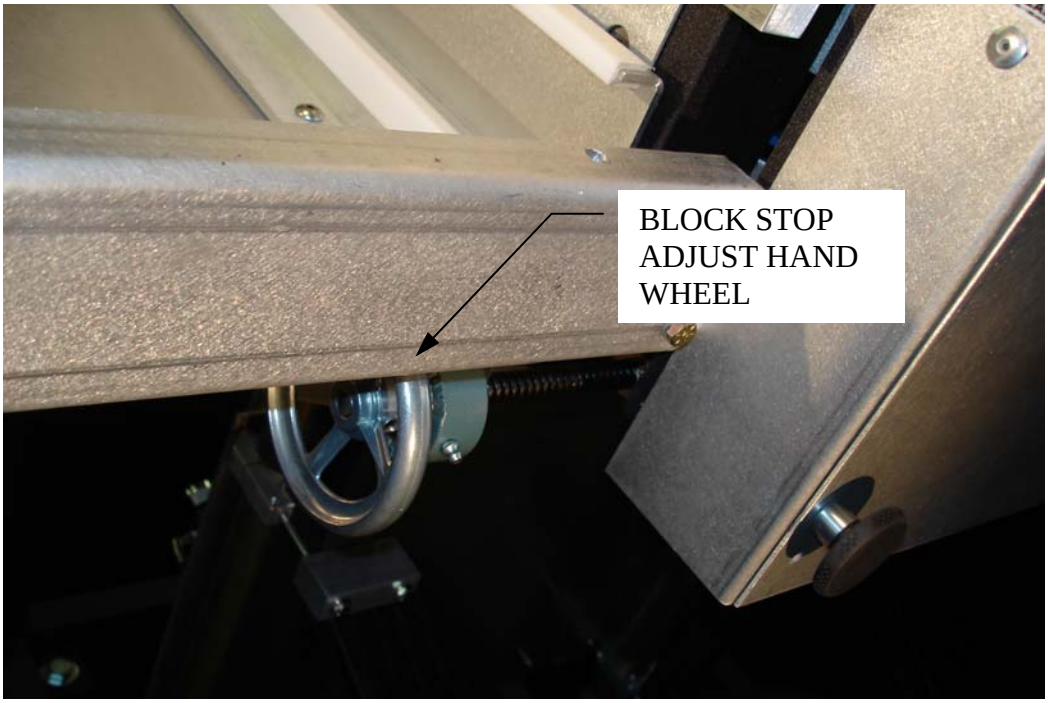

Photo 3-7 Model VBD Auto-Feed Block Stop Adjust Hand Wheel

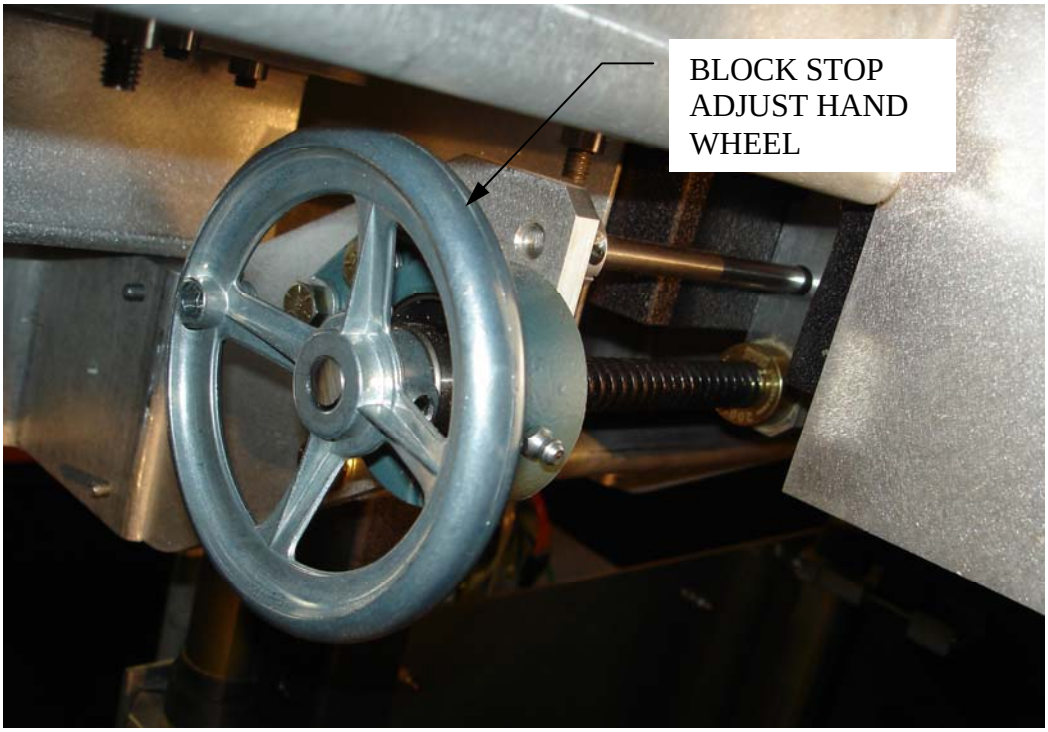

Photo 3-8 Model VBD Auto-Feed Block Stop Adjust Hand Wheel

Once you have made the necessary adjustments to accommodate the block sizes you will be running you are ready to begin operation.

4. Operation

While operating the Model VBD never reach up into the system at any time. The block hole cutters operate at very high speed and can cause serious injury.

Operation of the Model VBD Manual and Auto-Feed systems is very easy and as you have learned from prior sections most of the operation is automated. Due to the high throughput capacity of the Model VBD accommodation must be made for the large amount of wood shavings produced. Special attention must be paid and care taken to keep the area below the system where shavings are expelled clean. Many facilities use two 50-55 gallon plastic trash bins or other such containers as interchangeable receptacles for the shavings rotating an empty container for a full one and so on. Additionally the Model VBD Auto-Feed is equipped with internal blow-off nozzles to help keep the cutter and surrounding areas free from shavings. For both systems shavings can build up inside the system over time which can hinder proper system operation so it is good practice to periodically look up into the system throughout operation to check for excessive shavings buildup. If this occurs use a pneumatic blow-off nozzle to clear out the shavings buildup.

Following are descriptions for the normal operating procedures for each of the Manual and Auto-Feed versions.

Model VBD Manual: With the appropriate power and air connected and the Motor Power Switch START depressed (cutters running) load the first pre-cut block from the right side of the system onto the feed rail and into the throat of the system. The block should protrude approximately 3" from the right side of the system. **Never insert your hand into the throat of the system beyond the right or left side panels of the system**. Take the second pre-cut block and place it onto the feed rail touching the right end of the first block. Slide the second block to the right so the right end of the block is flush with the right end of the feed rail. Refer to Section 3.3 for an explanation of handling different block lengths and/or adjusting hole position right to left. Once the second block is in place depress the black Push/Pull knob on the right side of the system to initiate a vent block production sequence. The cutters will automatically move through their feed stroke sequence at the end of which the black Push/Pull knob is automatically reset to the out (STOP) position in preparation for making the next block. This feed stroke

sequence takes approximately 7-10 seconds at 100 PSI supply pressure. After the cycle is complete take the next pre-cut block and push it against the "second" block moving it to the right then resting it on the feed rail and sliding it to the right until flush with the right side of the feed rail (or other appropriate position based on block length or hole positions). Depress the black Push/Pull knob to produce the next block. Repeat this process for as many vent blocks you wish to produce. Use a completed vent block or a setup block as a feed tool to place the last block into position in the system for cutting.

Model VBD Auto-Feed: With the appropriate power and air connected and the Motor Power Switch START depressed (cutters running) load the block feed hopper with an appropriate amount of pre-cut blocks. An appropriate amount of pre-cut blocks is based on both the moisture content of the blocks as well as their size. Larger blocks and blocks that are excessively wet or damp may require less than the maximum capacity of the block feed hopper of 22 blocks. Overloading the block feed hopper can hinder proper system operation. Once the block feed hopper is loaded depress the black Push/Pull knob on the right side of the system to initiate the automated vent block production sequence. As long as blocks are placed into the block feed hopper the Model VBD Auto-Feed will continue to produce vent blocks. Once the last block to be produced is complete pull out on the black Push/Pull knob to stop the production sequence. Use a completed vent block or a setup block as a feed tool to extract the last block from the throat of the system. **Never insert your hand into the throat of the system beyond the right or left side panels of the system**.

5. Cutter Blade Replacement

This section contains instructions for the removal, replacement and reinstallation of the cutter blades located within the Model VBD. Carefully review the following precautions and each procedure before attempting to replace the cutter blades. **Never attempt to change the cutter blades when the system is connected to power and/or compressed air sources. The cutter blades, even used ones, are sharp and safety gloves should be worn at all times whenever handling the cutter blades**.

Regular use of the Model VBD system will induce wear on the block hole cutters. This wear is normal and an expected phenomenon. Cutter replacement/resharpening should be performed on a regular basis in order to keep the Model VBD at peak performance. A primary indicator the cutters are dull is when the chips expelled from the system turn to sawdust as opposed to the typical shavings produced by sharp cutters. Further indication is the smell of burnt wood and small puffs of smoke produced during the cutter stroke sequence. These later indicators are

usually only present with excessively worn cutters. In all cases worn cutters will slow down the typical 7-10 second timing of the cutter stroke sequence.

Once any one or more of these indicating conditions is present it is recommended to replace and/or sharpen the hole cutters. **In all cases before performing cutter replacement do NOT remove the safety covers and/or shields without first disconnecting the equipment by removing the ~ (AC) line cord(s) from the wall outlet or electrical panel and disconnecting the compressed air service from the system. For both the electrical and compressed air service supplies use lock-out and tag-out procedures to prevent inadvertent system operation in any form during cutter replacement. Do not perform these services unless qualified to do so**.

Model VBD Manual: With power locked out disconnect the compressed air. Depress the black Push/Pull knob on the right side of the system, reconnect the compressed air and apply 100 PSI. Watch carefully as the cutters move forward. Before the motor travel plate reaches the limit switch which sends it back disconnect/turn off the compressed air. Refer to Photos 5-1 and 7-2. This positions the cutters for replacement.

Model VBD Auto-Feed: With power and air locked out the motor travel plate will naturally lower all the way forward by gravity. This positions the cutters for replacement. This process can take several minutes once the compressed air source has been disconnected.

In order to remove the cutters the cutter backing plate must be removed from the system. Refer to Section 6 for instructions on removing the cutter backing plate. Each cutter is held in place with two (2) set screws. Using a 3/16" hex Allen key loosen the set screws on each cutter. Slide the cutter from within the drive shaft until the cutter shaft is free of the drive shaft then lower the cutter out of the system. Install the new and/or resharpened cutters in the reverse order of disassembly. It is important that the cutters are installed all the way into their respective drive shafts (bottomed-out) so that the cutter tips are all flush. Refer to Photo 5-2. Retighten the set screws making sure the tips are tightened against the flat of the cutter shaft.

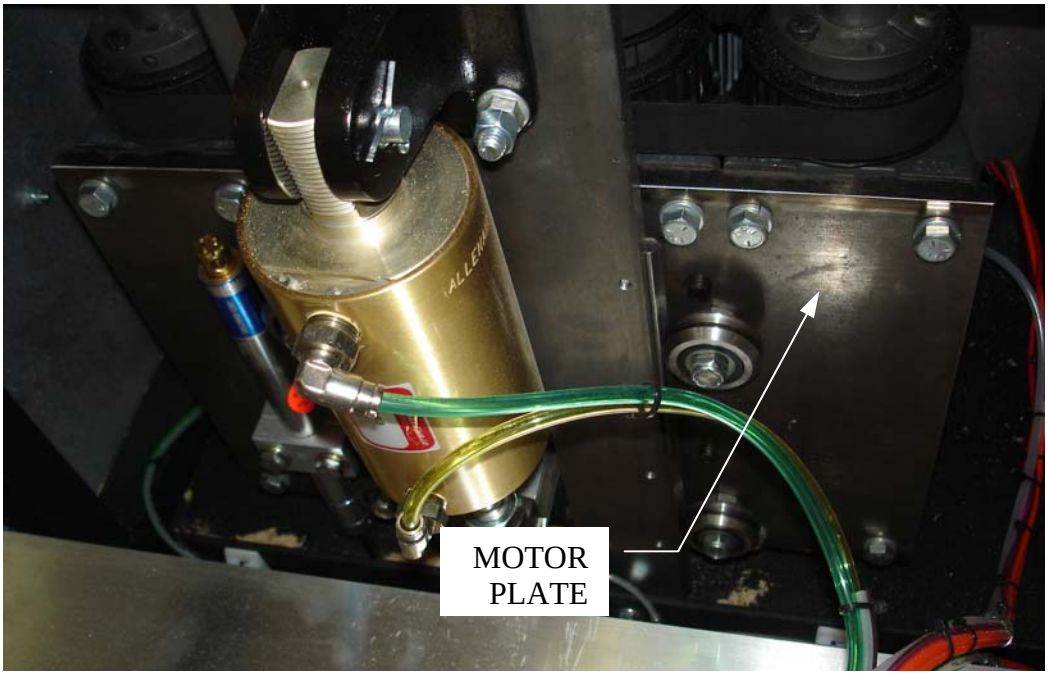

Photo 5-1 Model VBD Manual Motor Plate

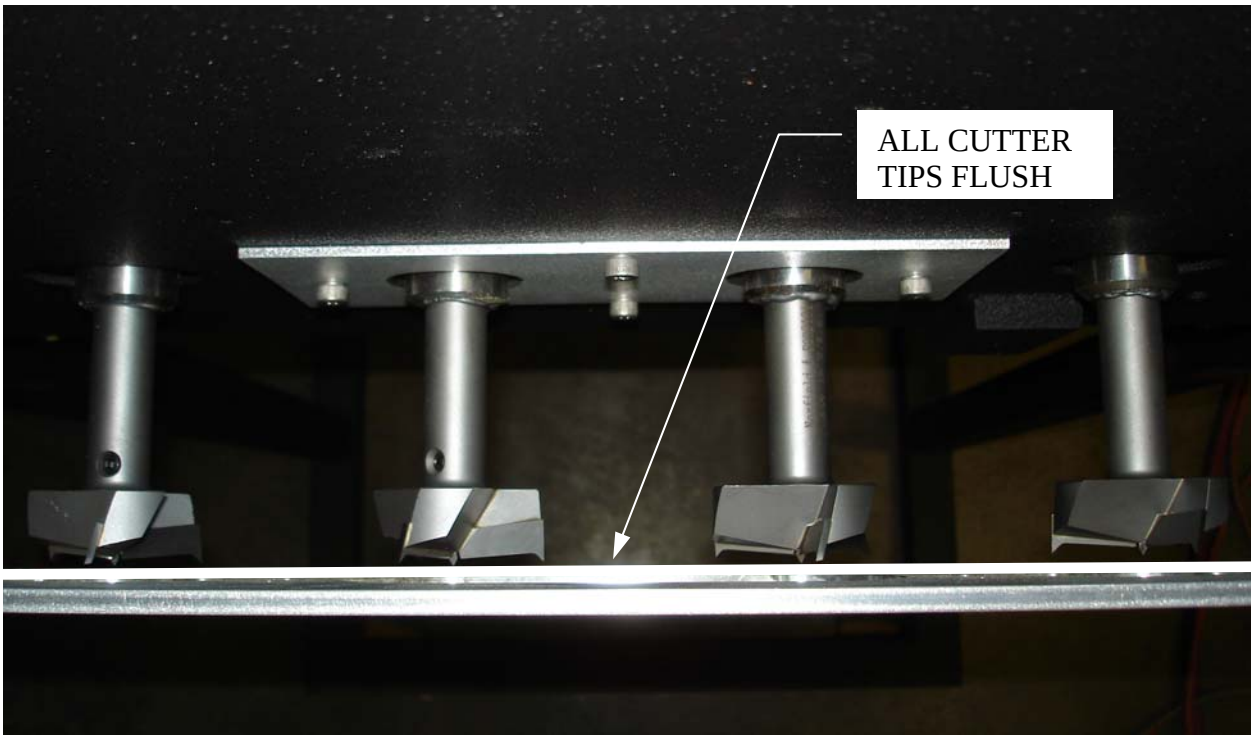

Photo 5-2 All Cutter Tips Flush

Reconnect the power and air service to the Model VBD system.

6. Cutter Backing Block Replacement

This section contains instructions for the removal, replacement and reinstallation of the cutter backing block located within the Model VBD. Carefully review the following precautions and each procedure before attempting to replace the cutter backing block. **Never attempt to change the cutter backing block when the system is connected to power and/or compressed air sources. The cutter blades within the Model VBD, even used ones, are sharp and safety gloves should be worn at all times whenever performing service within the system**.

Regular use of the Model VBD system will induce wear on the cutter backing block. This wear is normal and an expected phenomenon. Cutter backing block replacement should be performed on a regular basis in order to keep the Model VBD at peak performance. A primary indicator the cutter backing block needs replacement is excessive block breakout on the backside of the vent block holes.

Once this indicating condition is present it is recommended to replace the cutter backing plate. **In all cases before performing cutter backing plate replacement do NOT remove the safety covers and/or shields without first disconnecting the equipment by removing the ~ (AC) line cord(s) from the wall outlet or electrical panel and disconnecting the compressed air service from the system. For both the electrical and compressed air service supplies use lock-out and tag-out procedures to prevent inadvertent system operation in any form during cutter backing plate replacement. Do not perform these services unless qualified to do so**.

Reach up into the Model VBD and remove the four bolts securing the cutter backing plate and remove it from the system. Refer to Photo 6-1. Cut a new piece of hardwood the same size and thickness as the existing cutter backing plate. Match drill the mounting holes from the existing cutter backing plate into the new plate and tap to 3/8-16 UNC-2B.

Photo 6-1 Cutter Backing Block Replacement

Next, refer to Section 5 for instructions on positioning the cutters for gaining access to the cutter set screws. Loosen the cutter set screws and pull the cutters out approximately one inch and retighten the set screws. This is a onetime procedure to make the cutter backing block ready for use. Push or pry the motor travel plate back to retract the cutters.

Reinstall the cutter backing plate in the reverse order of disassembly using the hardware previously removed. Make sure all the bolts are tight. Reconnect the power and air service, start the motor and run one vent block production sequence to "drill-out" the cutter clearance holes in the cutter backing plate. <u>This procedure is very important as it provides a path for the hole material removed during the cutting process to be expelled from the vent block through the cutter backing plate</u>.

Once this procedure is complete, disconnect, lock-out and tag-out the power and air as previously instructed and reset the cutters making sure they are installed all the way into the drive shaft (bottomed-out) so that the cutter tips are all flush. Refer to Photo 5-2. Retighten the set screws making sure the tips are tightened against the flat of the cutter shaft.

Reconnect the power and air service to the Model VBD system.

7. Basic Troubleshooting Guide

The Model VBD system is designed and manufactured to provide years of trouble free operation. During normal operation some parts may go out of adjustment, become worn or under extended use may wear out. Refer to the following troubleshooting table to remedy most common abnormal operating conditions of the Model VBD. **In all cases before performing any corrective actions do NOT remove the safety covers and/or shields without first disconnecting the equipment by removing the ~ (AC) line cord(s) from the wall outlet or electrical panel and disconnecting the compressed air service from the system. For both the electrical and compressed air service supplies use lock-out and tag-out procedures to prevent inadvertent system operation in any form during service. Do not perform these services unless qualified to do so**.

The following table applies to both the Manual and Auto-Feed versions of the Model VBD.

Model VBD Manual & Auto-Feed Troubleshooting Table

Symptom	Possible Cause(s)	Remedy
Cutter stroke sequence runs slow (>10 second).	Dull cutters.	Replace/sharpen cutters. Refer to Section 5.
Block chatters excessively during cut.	Dull Cutters. Cutter center pin (point) does not protrude beyond cutter wing tips.	Replace/sharpen cutters. Refer to Section 5. Using a 1/8" hex Allen key adjust center tip to protrude 1/16" beyond cutter wing tips. **Refer to Photo 7-1.**
Holes shift off centerline of block.	Cutter center pin (point) does not protrude beyond cutter wing tips.	Using a 1/8" hex Allen key adjust center tip to protrude 1/16" beyond cutter wing tips. **Refer to Photo 7-1.**
Excessive block breakout on backside of hole.	Dull cutters. Hardwood cutter backing block is worn out. Cutter stroke cylinder traveling too far.	Replace/sharpen cutters. Refer to Section 5. Replace cutter backing block with same size and thickness hardwood. Refer to Section 6. Adjust motor return limit switch screw so screw head contacts switch when cutters are at extended position. **Refer to Photo 7-2.**
Block kicks up during cut.	Cutter tips not flush.	All cutter tips must be flush to provide consistent hole cutting. Adjust all cutter tips flush making sure they are fully seated (bottomed-out) into cutter shafts. **Refer to Photo 5-2.**
Block overshoots centering position.	Manual: Operator pushing too hard on second feed block. Auto-Feed: Feed cylinder binding.	Manual: Reduce in-feed push. Auto-Feed: Run system without any wood and watch for uneven cylinder movement. Remove any obstruction as necessary.
Holes vary in horizontal positioning.	Manual: Operator pushing too hard on second feed block. Auto-Feed: Friction wheel out of adjustment.	Manual: Reduce in-feed push. Auto-Feed: Loosen friction wheel mounting bolt and adjust wheel tension up or down then retighten bolt. Typically more tension is required if the holes are shifting to the left (when facing system) and less tension when the holes are shifting to the right. **Refer to Photo 7-3.**
Hole positions vary randomly.	Loose or worn motor travel plate guide bearings.	Adjust or replace motor travel plate guide bearings. **Refer to Photos 7-4 and 7-5.**
Cutters do not retract.	Motor travel plate return limit switch is out of adjustment.	Adjust motor return limit switch screw so screw head contacts switch when cutters are at extended position. **Refer to Photo 7-2.**
Cutter stroke sequence is not smooth and makes pulsating sound.	Motor travel speed control shock is worn out.	Replace motor travel speed control shock. **Refer to Photo 7-6.**
Cutters running in clockwise direction (when facing system, Refer to Photo 3-3).	Motor is wired backward.	Re-wire Start/Stop Motor Control.

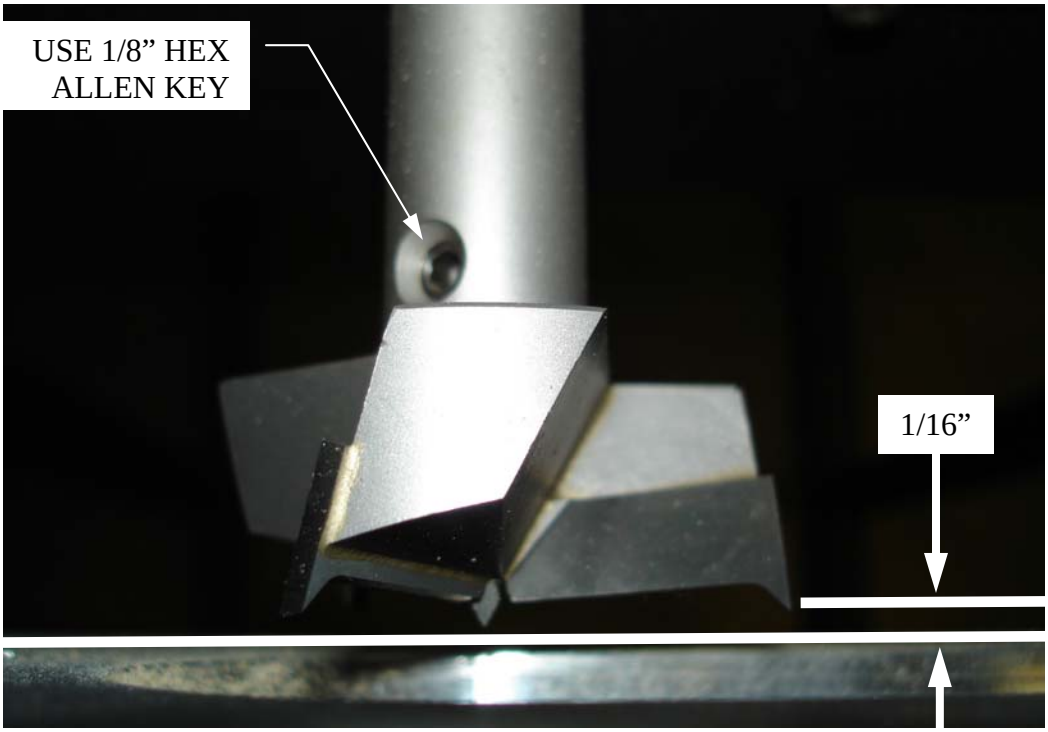

Photo 7-1 Cutter Center Tip Protrusion

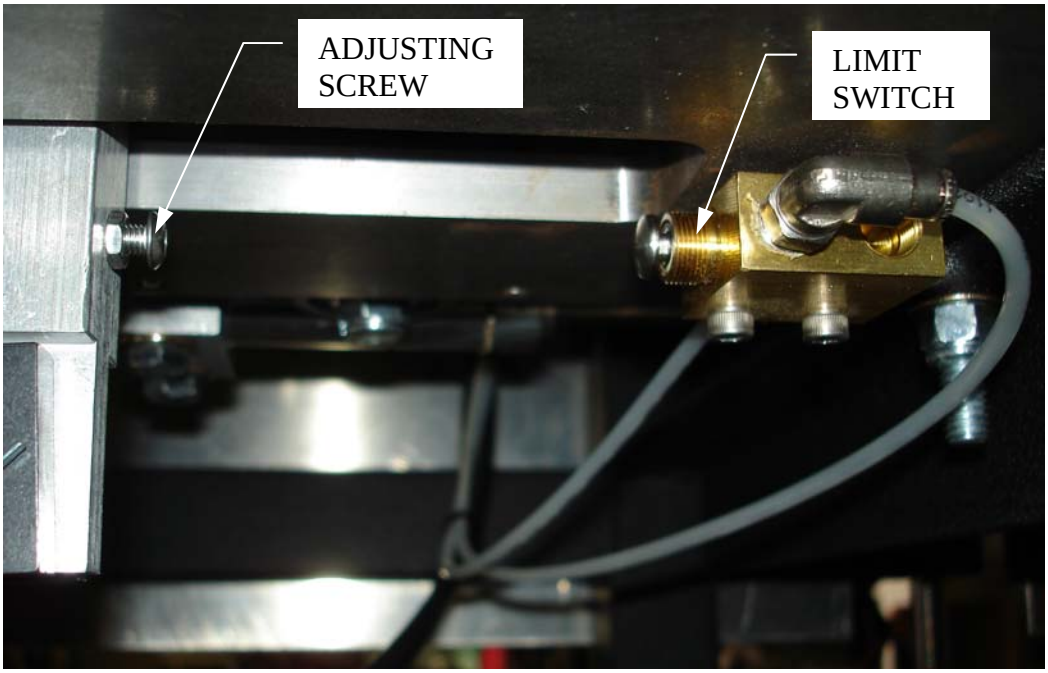

Photo 7-2 Motor Return Limit Switch

Photo 7-3 Friction Wheel Adjustment

Photo 7-4 Motor Plate Guide Bearings (left)

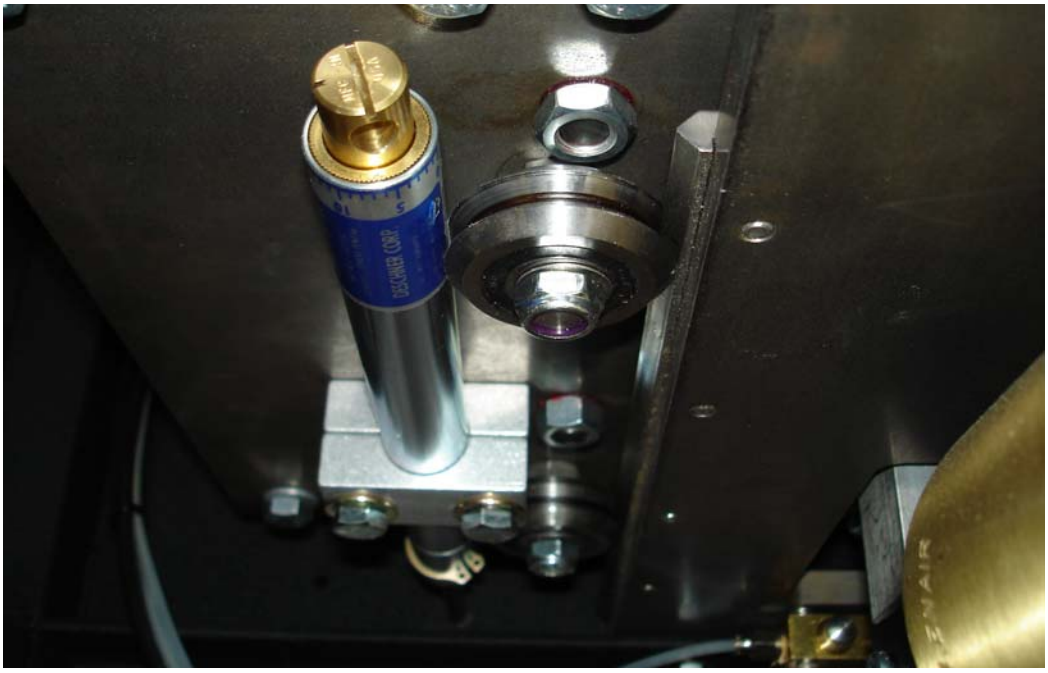

Photo 7-5 Motor Plate Guide Bearings (right)

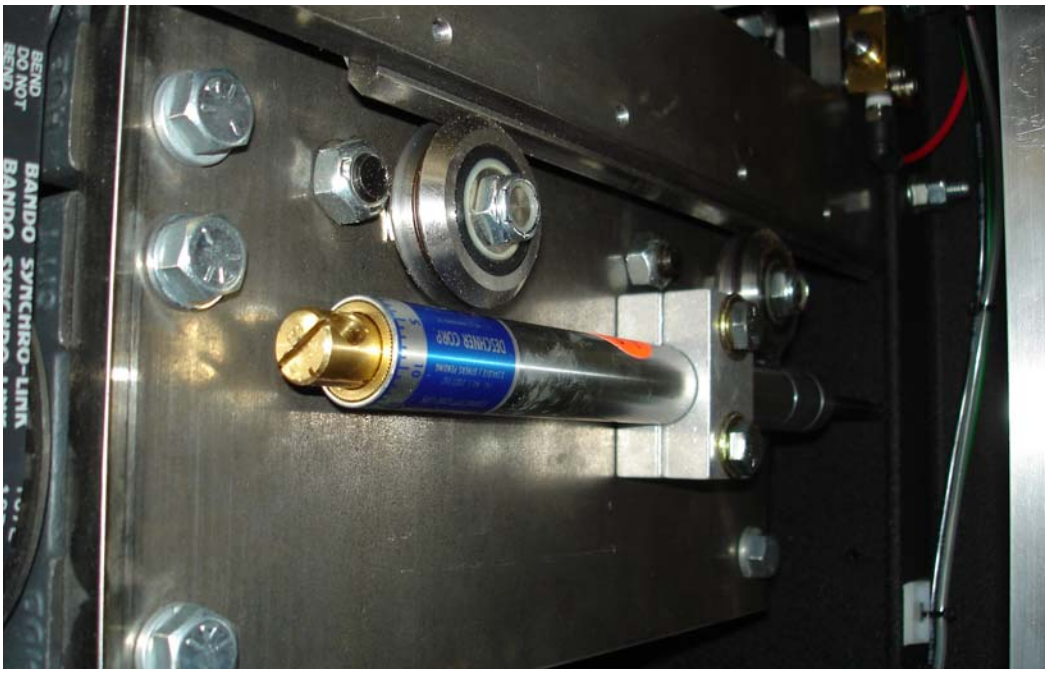

Photo 7-6 Motor Travel Speed Control Shock

END OF MANUAL