



CASTLE, INC.



Owners Manual

TSM-22 Pocket Hole Machine

Machines with PLC control, Serial numbers 68261 and above

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1 Introduction

Thank you for making the Castle TSM-22 Screw Pocket Machine (Toe Screw Mortise) the latest addition to your shop. Since 1985 our goal is to manufacture and develop machines that make cabinetmaking and casework easier, faster, and more profitable for woodworking professionals. This machine represents our patented screw pocket cutting technology. Castle machines are made in Petaluma, California and are manufactured to the highest standards using local vendors wherever possible.

The Castle model TSM-22 is designed for use on a wide variety of materials. The machine performs well in hardwoods, softwoods, melamine, particleboard and MDF. The machine will work on materials varying in thickness from ½" to 1 ¾".

This instruction manual is intended for use by any one working with this machine. It should be kept available for immediate reference so that all operations can be performed with maximum efficiency and safety.


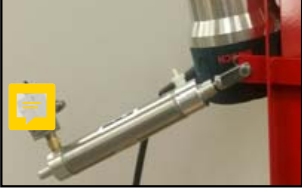
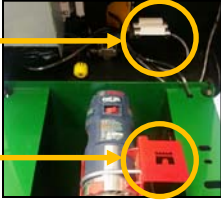


Warning: Do not attempt to perform maintenance or operate this machine until you have read and understand the information contained in this manual.

1.1 Definition of Terms

TERM	DEFINITION
Pocket	The depression cuts into material to allow for toe-screw mortise joinery.
Pocket Cycle	The machine function that clamps the work piece, cuts the mortised pocket, drills the pilot hole and then releases the work piece.
Web	The offset distance from the end of the pocket to the edge of the work piece.

1.2 Identification of Operating Features and Controls

	Power Switch: Located on the left side of the machine, this toggle switch turns on the Pocket Router Motor and the Pilot Drill Motor as well as energizing the Controls.
	Clamp Cylinder: The large cylinder on the top of the machine is a clamp that holds the work piece safely in place during operation. This is a single-acting, spring-return, pneumatic cylinder with a padded foot on the end of the cylinder rod.
	Clamp Guard: The yellow metal Clamp Guard on top of the machine serves to secure the Clamp Cylinder and to safeguard the operator from the clamping and pocket cutting action.
	Router Stop Plate: Located on the operator right side, this black metal plate extends through the top of the case and along the side of the Clamp Guard. The position of this plate determines the size of the "Web."
	Foot Pedal and Guard: Mounted inside a yellow metal guard, the Foot Pedal is connected to the machine by an electrical cord. Pressing the Foot Pedal will activate the machine cycle (but only if the Safety Buttons are depressed by the work piece as well).
	Safety Buttons: Two small, silver button-head screws under the Clamp Guard detect if a work piece is in place for pocketing. The machine will not cycle unless these buttons are depressed simultaneously with the Foot Pedal.
	Safety Switch: This magnetic proximity switch is mounted inside, near the top of the TSM-22. It is activated when the Safety Buttons are depressed by the work piece.

	<p>Motor Carriage: The Motor Carriage is the red, pivoting A-frame structure inside the machine. Both the Router Motor and the Drill Motor are mounted to this carriage. The forward and back carriage motion during the machine cycle is provided by the Drive Cylinder.</p>
	<p>Drive Cylinder: This double-acting pneumatic cylinder connected to the Motor Carriage and the machine case, moves the carriage through the routing and drilling phases of the cycle. When the cylinder rod extends (moving the carriage toward the rear) the router cuts the pocket. When the cylinder rod retracts (moving the carriage forward) the pilot drill bores the pilot hole into the pocket.</p>
	<p>Router Stop Switch: This magnetic proximity switch is mounted on the Router Stop Plate inside of the machine. At the full extension of the routing stroke, the “Castle” plate on the carriage interrupts this switch to signal the start of the drilling stroke.</p>
	<p>Drill Stop Switch: This magnetic proximity switch is mounted inside the machine case near the Safety Buttons. At the full extension of the drilling stroke, the carriage interrupts this switch to signal the end of the cutting cycle. The carriage returns to the neutral position and the clamp releases the work piece.</p>
	<p>Control Box: The Control Box is the sheet metal enclosure containing the electrical and pneumatic controls. Mounted in the Control Box are the power switch and the power outlets for the motors. Mounted on the underside of the Control Box are the air inlet, the Pressure Regulator, the Router Speed Control valve, and the solenoid valves.</p>

1.3 Manual Contents Notice

This manual is not fully comprehensive. It may not convey every possible safety and operational problem that may arise while using this machine. The manual will cover many of the basic and specific safety procedures needed in a shop environment.

All federal and state laws and any regulations having jurisdiction, covering the safety requirements for use of this machine, take precedence over the statements in this manual. Users of this machine must adhere to all such regulations.

Most national and international standards that may apply to your machines and accessories contain requirements for manuals. These change from time to time and will require constant monitoring to assure that your products and manuals are in compliance.

Castle products and the information in this manual are the proprietary property of Castle, Inc. or its licensors, and may not be copied, disclosed, or used for any purpose not expressly authorized by the owner thereof.

Since Castle, Inc. constantly strives to improve all of its products, we reserve the right to change this manual and hardware mentioned therein at any time without notice.

2 Machine Safety

The Castle Model TSM-22 pocket machine was designed with operator safety as a priority. This machine was carefully prepared for shipment at our factory. Upon receipt of this machine, inspect for shipping damage. Report any damage **IMMEDIATELY** to the freight company, your Castle dealer and to Castle, Inc. **DO NOT** attempt to operate this machine if you observe any physical damage. If you detect any damage to your machine contact Castle, Inc. at 800-282-8338 for instructions.

2.1 Safety Rules

The Castle Model TSM-22 Pocket Machine was designed with operator safety as a priority, which is why Castle highly recommends the following:

1. **USE CAUTION WHEN OPERATING THIS MACHINE!** Only skilled operators should use this machine, or be within ten feet when the machine is in operation.
2. Read the Operator Manual carefully before operating. An Operator Manual should be attached to this machine. It contains important information and warnings concerning the use and operation of this machine. Improper use of this machine may result in serious injuries to persons and property.
3. Always wear protective eyewear when operating or standing near an operating machine.
4. Be certain that this machine is properly grounded before operating it.
5. Keep all body parts away from the moving parts of this machine whether it is in operation or at rest.
6. Do not place hands or fingers between the work piece and the clamp or near the cutters at any time. Always use a securing device when undertaking close work.
7. Do not wear gloves or loose clothing (such as sweaters, jackets, or jewelry) when operating or standing near an operating machine.

8. Keep two hands on the work piece when initiating a pocket cycle on this machine.
9. Before attempting adjustments, maintenance, or repair, **TURN OFF** this machine, disconnect it from its power source and air supply. Wait for all motion to stop.
Failure to disconnect this machine from its power source and air supply or wait for all motion to stop could result in electrocution or injury.
10. Always keep the area around this machine clean and uncluttered. Poor housekeeping could result in slips, falls, or other injuries.
11. Concentrate at all times. Failure to pay attention to the task at hand is the cause of most accidents.

2.2 Inventory

With your Castle machine you should have received the following:

CASTLE TSM-21 POCKET CUTTER MACHINES HARDWARE PACK		
Part #	Part Description	Qty
S90022	TSM-22 Operator Manual with Warranty Activation Card	1
	Router Wrench Set Bosch 1617EVS	2
	Trimmer Wrench Set Bosch PR120EVS	2
B00622	#2x 6" Square Driver Bit	1
G00234	Bit Gauge	1
G00101	Door Spring	1
F14125	1/4 x 20 Bolt	1
H00141	T-Handle	1
F51616	5/16 SAE Flat Washer	4
F51699	5/16 -18 Nylon Locknut	2
H24002	Gas Spring – 20.12" Extended	1
F14553	1/4-20 x 1-1/4 FH Socket Head Cap Screw	6
F01420	1/4-20 Nylon Locknut	9
F01410	1/4 SAE Flat Washer	9
F44100	1/4-20 X 1 FH Socket Head Cap Screw	1
M24010	Stainless Lid Plate	1
F14340	1/4-20 x 3/4 Carriage Bolt	2
T00532	Allen Hex L-Key – 5/32"	1
H55202	Rare Earth Magnet	1

2.3 Machine Requirements

Power Supply: 115 VAC \pm 10%, 60 Hz, 20 Amp Service

Warning: Do not use an extension cord. Using an extension cord to power your TSM-22 may void your warranty!

Air Supply: 80psi (minimum), 150psi (maximum) 1.5cfm; Minimum ¼" ID air line

Warning: Failure to provide an adequate supply of CLEAN, DRY air may void your warranty!

Dust Collection: The TSM-22 will function better with proper dust collection attached. A vent for this purpose has been provided. Attaching dust collection will prolong motor life by keeping the router motors cooler and free from sawdust buildup.

Warning: Failure to clean sawdust from your machine may void your warranty!

3 Setting Up Your TSM-22

Caution: CAUTION: Always use eye protection when operating power equipment. Please be sure to visit our YouTube page for videos on set up and use of the TSM-22. [Click here to go to our TSM-22 Playlist.](#)

[Watch the TSM-22 Pocket Cutter Assembly Video here.](#)

- Your Castle TSM-22 Pocket Cutter was set up and tested for proper operation at the factory. It is normal to find a small amount of sawdust in the TSM-22 from this process.

3.1 Unpack Your TSM-22

Step 1: Inspect shipping carton for signs of freight damage. Pocket machines are all shipped in a white cardboard cover (Fig 1), with plastic shrink-wrap underneath to help highlight any potential damage. Remove cardboard covering to further inspect any signs of marring and potential damage.



Fig 1

Step 2: Remove wrapping, power cord, foot switch, and accessories from inside the machine (Fig 2). Remove 2x4 skids used for shipping purposes, removing bolts on the interior of the base (Fig 3).



Fig 3

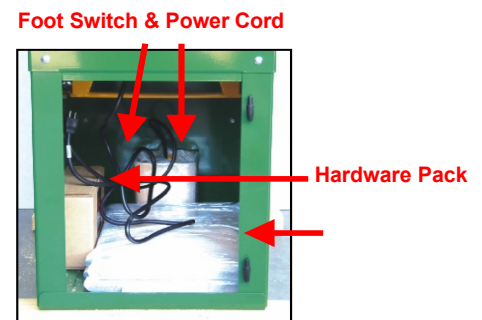


Fig 2

Install Air Supply line to Clamp Cylinder

Step 3: Remove the swivel elbow from the black urethane hose by pushing the floating ring toward the elbow and pulling the hose at the same time. (Fig 4)

Step 4: Thread the elbow into the top of the Clamp Cylinder. It is pre-primed and self-sealing. Point it toward the rear of the machine and firmly push the hose back into the fitting. (Fig 5)

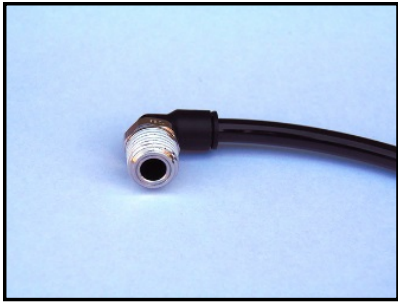


Fig 4

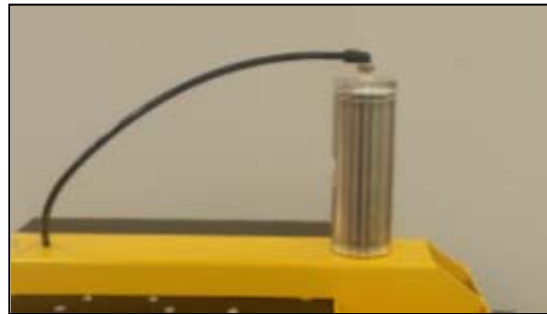


Fig 5

Install Router Stop Plate

Step 5: Open the lid and locate the wrapped Router Stop Plate hanging inside the back of the machine. (Fig 6) Unwrap to begin installation process.

NOTE: The machine will not cycle correctly without the Router Stop Plate in place.



Fig 6

Step 6: Remove the nut, washer and carriage bolt loosely attached to the clamp guard. (Fig 7)



Fig 7

Step 7: Insert the Router Stop Plate from inside the lid through the slot by the clamp guard. (Fig 8) The white magnetic sensors should face toward the operator when the lid is closed.(Fig 9)

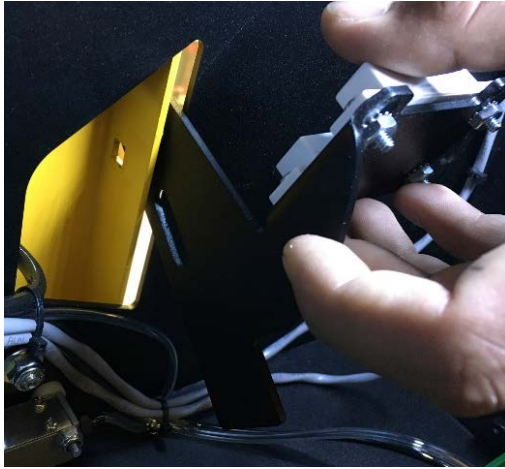


Fig 8



Fig 9

Step 8: Insert the carriage bolt with the head inside the machine. (Fig 10)

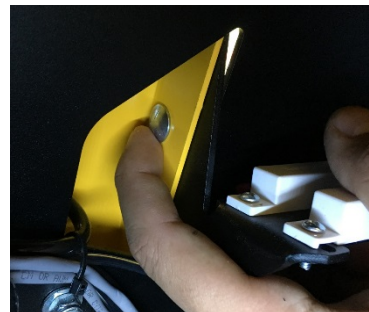


Fig 10

Step 9: Place the washer and nut on the carriage bolt and leave loose. Position the Router Stop Plate between the two pieces of tape and tighten the nut. (Fig 11) Remove the tape when done.



Fig 11

Installing the Gas Spring

Step 10: Install Gas Spring(Fig 12) on Right side of Case Side and Cast Top. Remove the plastic covers on the threaded studs and insert the stud on the bottom of the gas spring into the hole located on the bottom of the Case Right as shown.



Fig 12



Fig 13

Step 11: Secure the stud using a 5/16" Washer and Nylock Nut provided on the inside of the case. (Fig 13)

Step 12: Raise the Case Top and place the stud located at the top of the gas spring through the hole shown. Secure with a 5/16" washer and Nylock Nut. (Fig 14)



Fig 14

Installing the Work Top

Step 13: Install work top with the 6 flat head bolts and nylon lock nuts supplied. Install 4 on the outer edges of the top first.(Fig 15) The 2 mounting holes closet to router slot will be used in next step.

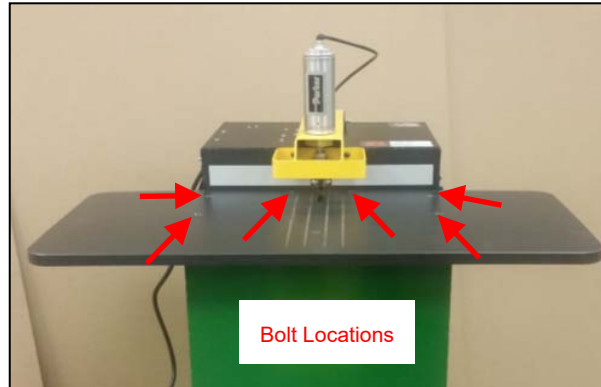


Fig 15

Step 14: Install the dust diverter using the two remaining socket head screws and nuts in the mounting holes that sit closest to the router slot. See proper orientation of dust diverter in (Fig 16).



Fig 16

Step 15: Install Stainless Lid Plate. With the ¼-20 carriage bolts inserted through the top of the plate, add the ¼" washers and finger tighten the ¼-20 Nylock nuts. (Fig 17) & (Fig 18)



Fig 17



Fig 18

Step 16: Lower the Work Top and place the ¼-20 x 1" Flat Head Socket Head Cap Screw in the hole in the Work Top. Start the Cap Screw with included allen wrench in the Lid Plate to position the Lid Plate. (Fig 19)



Fig 19



Fig 20

Step 17: Once the Lid Plate has been positioned, reach up inside the case through the front door opening to secure the Nylock Nuts for the Lid Plate. (Fig 20)

Step 18: A Rare Earth Magnet has been provided to secure the Allen wrench to the case in a convenient location for quick access when making tooling changes. (Fig 21)



Fig 21

Install front access door

Step 19: Install the door by placing the hinges mounted to the door on the opposing hinge pins on the cabinet. Allow the door to completely seat on hinges. Fig 22 and Fig 23



Fig 22



Fig 23

Step 20: Install the door latch by using the included door spring, 1/4-20 bolt, and the T-handle. See proper orientation in Fig 24 and Fig 25. Tighten T-handle.



Fig 24



Fig 25

Warning: Do not introduce lubricants, oils, or solvents into the pneumatic system. Irreparable damage to pneumatic seals and components may occur. Using lubricants in the pneumatics of your TSM-22 may **void your Warranty!**

Final Setup Procedures

- Since the routers may have shifted in transit it is important to inspect the U-Bolts on the carriage (Fig 26) making sure that the routers are secure and tight.

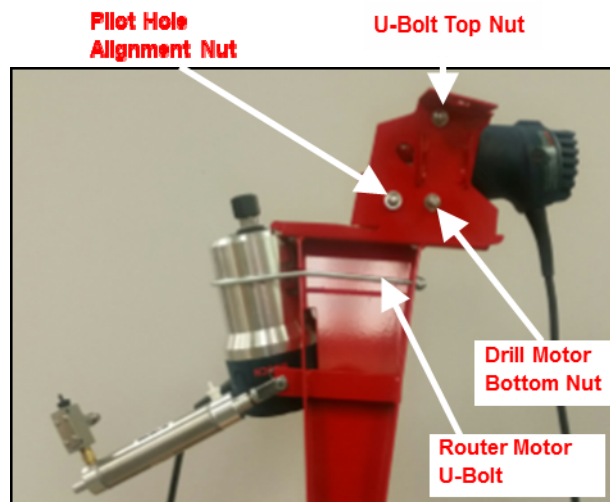


Fig 26

- Using the wrenches located inside the manual package, make sure the router bit and the drill bit are secure in the respective collets. (Fig 27) Once done, lower the Work Top and secure the work top with the ¼-20 Socket Head Cap Screw. (Fig 28)



Fig 27

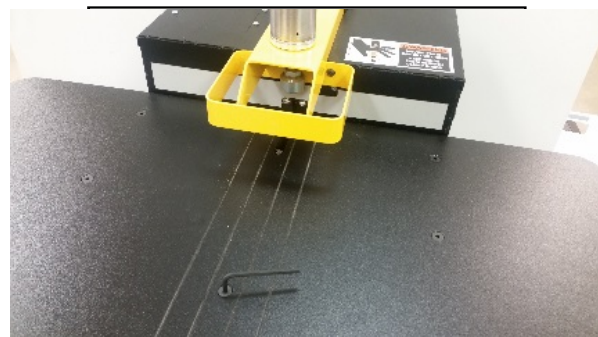


Fig 28

- Connect a clean, dry air supply to the back side of the machine (Fig 29) (1/4" pipe thread) with a minimum supply of 80 PSI.

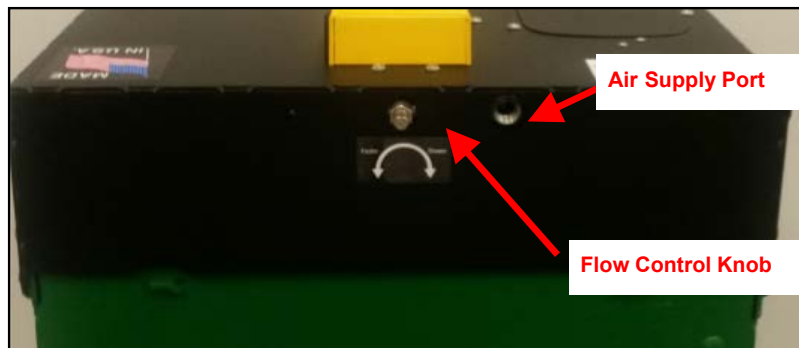


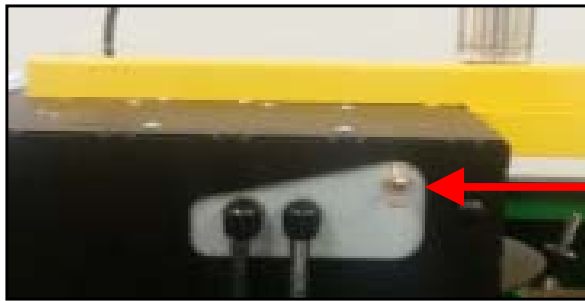
Fig 29

3.1 Initial Configuration

Now that the machine is connected to a power source and air supply, it is suggested that you test the machine's controls for proper function.

Caution: Read the Operator Manual carefully before operating. Make sure that you have followed all assembly and installation instructions correctly. Make sure that you are familiar with the functions described in the rest of the manual as well. Failure to follow this warning may result in serious injuries to persons and property.

- Plug the machine into a grounded 115VAC, 20-amp outlet.
- Turn on the Power Switch. (Fig 30)



Power Switch

Fig 30

- Place a piece of scrap wood under the Clamp Guard against the faceplate to depress the Safety Buttons (Fig 31).

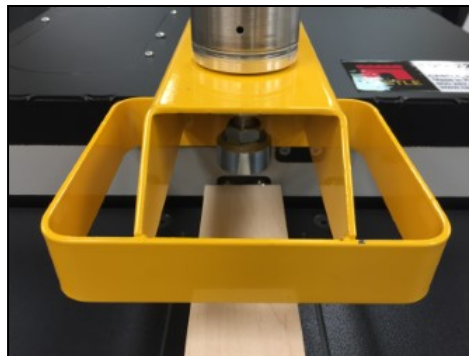


Fig 31

- Be sure to keep your hands clear of the clamp, and then step on the Foot Pedal. A full cycle should take 1½ to 2 seconds.
- Inspect the pocket. If the drilled hole is off center (Fig 32), it can be centered using the adjusting nut on the Pilot Hole Adjustment Nut just below the drill motor. (Fig 33)



Fig 32

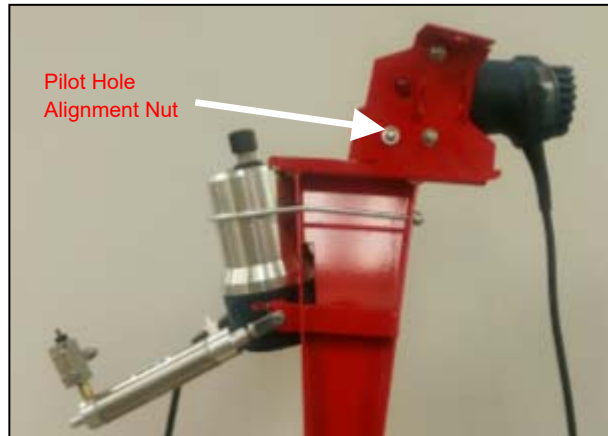


Fig 33

Caution: Do not overtighten the adjustment nut. Overtightening may cause an uneven bias to the pilot hole position.

- Tightening the nut moves the drill tip left relative to the operator. Adjust accordingly.
- The Router Feed rate can be adjusted by using the flow control knob next to the air supply port. (Fig 34) Turning it clockwise will reduce Router Feed rate, and turning it counter-clockwise will increase it. If the feed rate is too slow it can cause burning of the bit and burning of the pocket. If the rate is too fast it can cause the wood to shift.

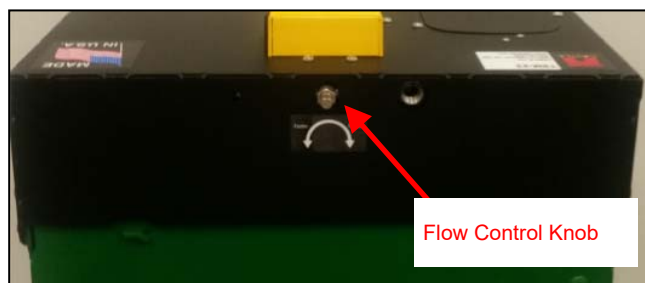


Fig 34

- Turn the Power Switch off when initial configuration is complete.

4 Adjustments

4.1 Router Feed Rate Adjustment

The Router Feed Rate Adjustment knob is located right next to the air inlet port on the back side of the machine. (Fig 35) The adjustment knob only affects the cutting stroke of the pocket router.



Fig 35

Turning the knob clockwise selects a slower Feed Rate. Turning the knob counter-clockwise selects a faster Feed Rate. A suggested Router Feed Rate Adjustment for hardwoods such as oak or maple is described as follows:

- Loosen the jam nut on the threaded stem and spin the nut counter-clockwise.
- Turn the knob clockwise until it reaches a mechanical stop.
- Turn the knob counter-clockwise two full revolutions.
- Adjust slower or faster in small increments as required.
- Tighten the jam nut.

Note: If the work piece shifts noticeably during the Pocket Cycle, this usually means the Router Feed Rate is faster than the toolings ability to clear the Pocket. In general the desired Feed Rate is slower for harder, denser materials.

4.2 Pocket Web Adjustment

The offset distance from the end of the pocket to the edge of the work piece is called the “Web.” (Fig 36) It has been factory set at approximately $\frac{7}{8}$ ” to accommodate 1 $\frac{1}{2}$ ” screws.

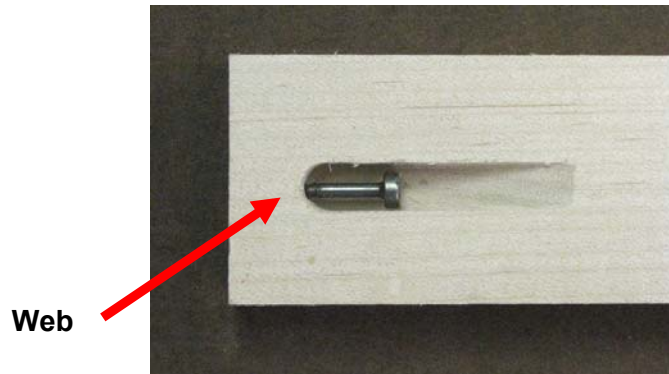


Fig 36

If you are using 1 $\frac{1}{4}$ ” screws you may choose to shorten the Web to $\frac{5}{8}$ ”.

Note: Castle does not recommend a web under $\frac{5}{8}$ ”.

The Web is adjusted by shortening or lengthening the travel of the router’s cutting stroke.

- Locate the Router Stop Plate nut on the right side of the yellow Clamp Guard on top of the machine. (Fig 37)

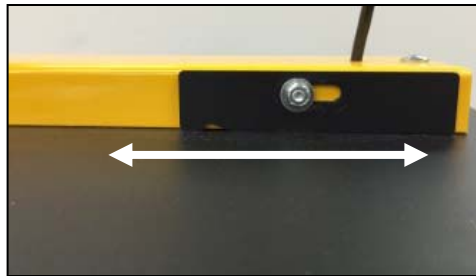


Fig 37

- Loosen the nylon locking nut.
- To shorten the Web, slide the black Stop Plate toward the rear of the machine slightly.
- To lengthen the Web, slide the plate toward the front of the machine slightly.

Note: When the desired position has achieved, tighten the nylon locking nut securely to prevent shifting during operation. Subsequent adjustment of the Router Stop Switch may also be necessary.

4.3 Pocket Depth Adjustment

The router bit for cutting the pocket is inserted into the router collet at the factory for a distance of $1 \frac{1}{8}$ " from the tip of the bit to the collet. This setting cuts at an optimal depth of approximately $\frac{7}{16}$ " for $\frac{5}{8}$ " and up material thicknesses.

To cut a shallower pocket (in $\frac{1}{2}$ " material for example):

- Place a shim with a known thickness (example $\frac{1}{8}$ " hardboard) on the work top and place your work piece over it.

To cut a shallower pocket:

- Loosen the motor collet and slide the bit to the desired exposure. (If the bit does not move easily, try gently tapping on the bit near the collet with a wrench.)
- Secure the collet.

For your convenience, a blank Bit Gauge (Fig 38) is included with your machine so that you may scribe a mark to record the depth of the drill bit and router bit that is most suitable for your purposes. Refer to the "Pilot Drill Depth Adjustment" for this procedure.



Fig 38

4.4 Drill Feed Rate Adjustment

The stroke speed with which the machine drills the pilot hole (and clamps the work piece) is solely a function of the air pressure set at the internal Pressure Regulator. There is no separate adjustment knob.

Note: If the Drill Feed Rate is so fast that the machine shakes violently during the Pocket Cycle or if the Drill Feed Rate is so slow that the Pocket Cycle is significantly longer than two seconds, then it may be necessary to adjust the Pressure Regulator. Do not adjust the internal Pressure Regulator unless absolutely necessary.

The internal Pressure Regulator knob is located next to the Control Box (Fig 39). If in doubt whether the internal Pressure Regulator is set correctly, follow the steps described below:

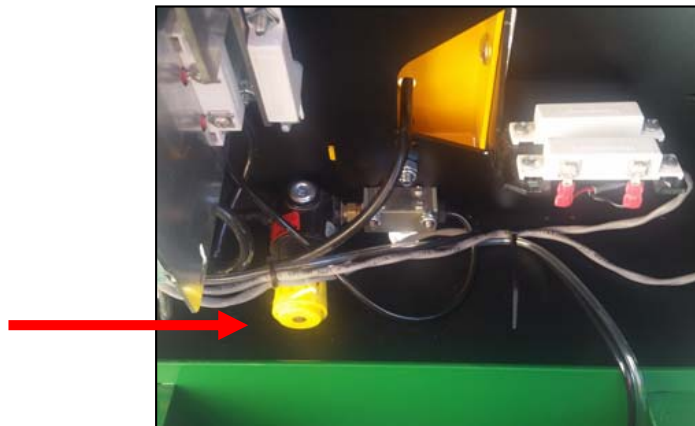


Fig 39

- Unlock the knob by pulling it slightly away.
- Turn the knob counter-clockwise until it reaches a mechanical stop.
- Turn the knob clockwise five full revolutions (it's helpful to make an index mark on the knob.)
- Lock the knob by pushing it slightly inward.

4.5 Pilot Drill Depth Adjustment

The Pilot Drill operation works best when the drill depth is adjusted so that the drill bit just barely breaks into the pocket. If the drill bit extends farther than necessary, it can cause shorter bit life and over-size holes. The drill bit is set at the factory for a length of approximately $1 \frac{13}{16}$ " from tip to drill motor collet (this is a suitable distance for the factory default $\frac{7}{8}$ " Web). As a general rule, if the Web is decreased, then the Pilot Drill depth should also be decreased.

To adjust the Pilot Bit Depth:

- For your convenience, a blank Bit Gauge (Fig 40) is included with your machine so that you may scribe a mark to record the depth that is most suitable for your purposes.



Fig 40



Fig 41

- Set the Bit Gauge on top of the collet and use any sharp object to scratch a reference line in the soft aluminum where each bit should be. (Fig 41)
- Both sides of the plate can be used to mark settings for different processes in the shop.
- Loosen the motor collet and slide the bit to the desired height. (If the bit does not move easily, try gently tapping on the shank of the bit near the collet with a wrench.)
- Secure the collet.

4.6 Pilot Drill Height Adjustment

The position of the Pilot Hole can be raised or lowered slightly to accommodate various thickness in work pieces or various pocket depths. In general, most users will be fine with the stock settings.

- On the sides of the machine case, secure the Carriage Centering Screw with a $\frac{1}{8}$ " Allen wrench. Loosen - but do not remove - the nylon lock nuts securing the set screw of the Motor Carriage to the machine case. (Fig 42)

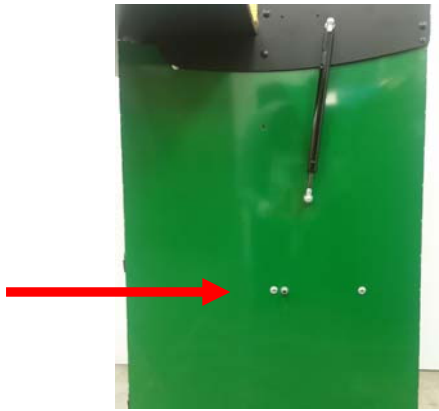


Fig 42

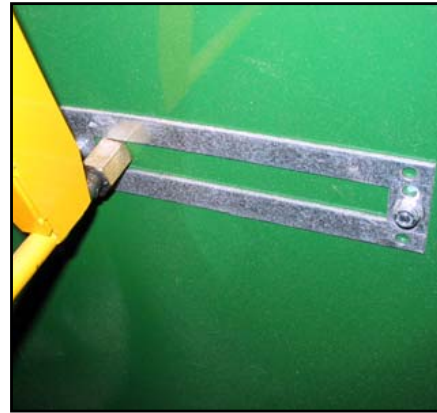


Fig 43

Note: The left-to-right alignment of the Motor Carriage may shift if care is not taken during the loosening of the nylon lock nuts. Make sure that each preload set screw is secured with an Allen wrench before loosening each lock nut.

- From the Front Door of the machine locate the Bearing Jack plate on the inner wall of the cabinet. (Fig 43)
- Loosen, but do not remove, the nut on the plate that is nearest to the carriage axle.
- Remove the nut and bolt on the plate that is farthest from the carriage axle. Typically this nut and bolt are factory set to the center hole of the five holes on this end of the plate.
- To raise the pilot hole, slide the plate upward one or two hole positions (each hole position equals $\frac{1}{16}$ " of drill position). To lower the pilot hole, slide the plate downward.
- Reattach the nut and bolt in the new hole position, and secure in place.
- Tighten the nut on the plate that is nearest to the carriage axle.
- Repeat for the other side.
- On the outside of the machine, secure the Carriage Centering Screw with a $\frac{1}{8}$ " Allen wrench and tighten the nuts securing the pivot point of the Motor Carriage to the machine case.

5 Operation

Caution: Read the Operator Manual carefully before operating. Make sure that you are familiar with the functions described in the rest of the manual as well. Failure to follow this warning may result in serious injuries to persons and property.

Warning: Always use eye protection when operating power equipment.

- With the Power Switch turned off, reach through the door opening in the front of the case to pull the carriage forward and push it back to be sure it actuate the carriage to insure it moves freely without impediment. (Fig 44). Neither the router bit nor the drill bit should be protruding from the machine while at rest.



Fig 44

- Place the Foot Pedal in front of the machine in a safe and comfortable position (Fig 45).



Fig 45

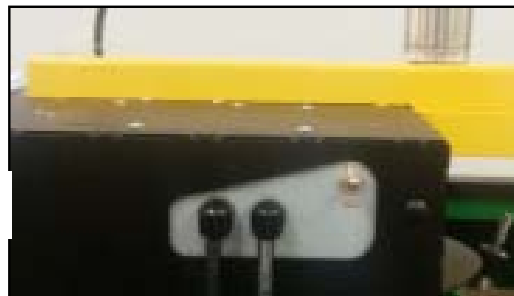


Fig 46

- Turn the Power Switch on (Fig 46).

- Place the work piece to be pocketed on the Work Top. Slide it under the Clamp Guard and firmly push it against the face plate of the machine to press the Safety Buttons. (Fig 47).

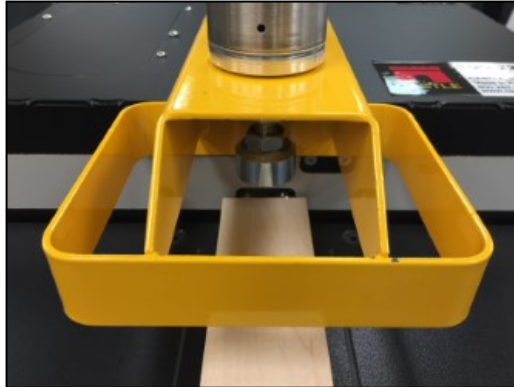


Fig 47

- Be sure to keep your hands clear of the clamp, then press and release the Foot Pedal to activate the cutting cycle.
- The pocket will be cut at the point directly under the center of the Clamp Cylinder.
- When the Pocket Cycle has been completed the Clamp Foot will automatically release the material.
- A typical machine cycle will take from 1½ to 2 seconds to complete.
- Reposition the same work piece or a new work piece under the Clamp Guard, then press and release the Foot Pedal again to activate the next cutting cycle.
- Be sure to turn off the Power Switch when you are finished.
- If the machine fails to cycle properly, call Castle at **(800) 282-8338**

6 Service and Maintenance

6.1 Tool Changes

Caution: Do not attempt to change tooling with compressed air power supplied to the machine!

6.2 Router Bit

- Loosen the 1/4-20 Socket Head Cap screw to allow the Work Top to lift up. (Fig 48)



Fig 48



Fig 49

Using the wrenches provided, loosen the collet nut on the router motor. Tap the collet nut with the wrench if the router bit is difficult to remove. (Fig 49)

- Using the bit gauge provided, install a fresh router bit to the depth indicated by the score mark on the gauge and tighten the collet nut. (Fig 50) See Section 4.3 and 4.5 for further information.



Fig 50

6.3 Pilot Drill Bit

- Loosen the 1/4-20 Socket Head Cap screw to open the Work Top.
- Using the Collet Wrenches provided, loosen the Collet Nut. Tap the Collet Nut if necessary to loosen the bit from the collet.



Fig 51

- Using the bit gauge provided, install a fresh drill bit to the depth indicated by the score mark on the gauge and tighten the collet nut. (Fig 51) See Section 4.5 for further information.

6.4 General Machine Maintenance

The model TSM-22 requires some maintenance. To ensure the productivity and longevity of your Castle Pocket Cutter, it is essential to follow a few simple steps. How often these steps are performed depends upon the number of hours the machine is operated each day. As a general rule, operators should visually inspect the machine at the start of each work shift in the following manner:

- Check the Power Cord and the Foot Switch cord for wear or damage.
- Ensure that the Router Bit and the Drill Bit are clean, sharp, and undamaged.
- Keep the Router and Drill Motors free from dust build up.
- On a monthly basis, we recommend removing the control box panel on top of the unit and removing any dust that has accumulated in the control box. Note: Only the removal of one screw is necessary to removal the panel for access.

Check for proper Safety Switch function. To protect the bits in case of failure, place a piece of material under the clamp foot, but not pressed against the Safety Buttons. Turn the machine on

and press the Foot Pedal. The machine should not cycle if the Safety Buttons are not pressed. If you suspect a Safety Switch malfunction, contact a Castle, Inc. Support Technician at 1-800-282-8338 as soon as possible for corrective action.

Warning: Do not introduce lubricants, oils, or solvents into the pneumatic system. Irreparable damage to pneumatic seals and components may occur. Using lubricants in the pneumatics of your TSM-22 may void your Warranty!

6.5 Motors and Bits

The life of the machine is directly related to the care of the motors that cut the pocket and drill the pilot hole. Because the motors are enclosed in the machine care must be taken to ensure that they do not overheat. Use the motors as you would use typical router motors in your shop. It is important that the maintenance guidelines provided in the Bosch instruction manual be strictly followed.

- Regularly blow out the air passages on both motors with compressed air.

Caution: Always wear safety goggles when using compressed air.

- Do not run the motors for more than **one hour** at a time.
- To prolong motor life, and avoid costly downtime, it is strongly recommended that a dust collection system be connected to the machine. A port has been provided on the left side of the machine for this purpose.
- To ensure safe and effective operation, make certain that there is at least 80psi air pressure to the machine. Pay attention to the cycle time of machine. A typical cycle will last from 1½ to 2 seconds. A cycle significantly longer than this may indicate low Router Feed rate, or low internal air pressure. This will lead to excessive bit wear and shortened motor life.

Note: Failure to clean sawdust from your machine may void your Warranty!

Castle provides premium versions of the Router Bit and Drill Bit in the TSM-22 as standard equipment from the factory. Castle recommends these bits for all applications:

Part No	Part Description	Function
B00338	Solid Carbide, $\frac{3}{8}$ " Rough Mill, Three Flute Bit	Routs pocket – Works in all materials, especially particle board, plywood, MDF, Melamine, etc.
B00438	Cobalt Steel, $\frac{3}{8}$ " Rough Mill, Four Flute (RM-38)	An alternative when cutting pockets exclusively in solid woods such as maple, oak, ash or alder. The B00438 will cut in any material, however exposure to glue and resin found in particle board, plywood, MDF, Melamine, etc. will lead to premature wear on the bit.
B02964	TiN Coated, $\frac{9}{64}$ " Brad and Spur Bit	Drills pilot hole – Works well in all materials. TiN coating provides longer life than standard bits.
B00964	$\frac{9}{64}$ " Brad and Spur Bit w/ $\frac{1}{4}$ " Shank (CDB-964)	An economic alternative based on the geometry of our premium TiN coated pilot bit.
B01964	$\frac{9}{64}$ " Split Point Bit w/ $\frac{1}{4}$ " Shank	An alternative to the B00964. The split point construction is stiffer and is preferred in plywood and tightly grained hard woods.
B00764	$\frac{7}{64}$ " Split Point Bit w/ $\frac{1}{4}$ " Shank	An alternative for smaller diameter pilot hole
B00316	$\frac{3}{16}$ " Split Point Bit w/ $\frac{1}{4}$ " Shank	An alternative for larger diameter pilot hole

To purchase bits feel free to contact your local Castle dealer or contact our Parts Department TOLL FREE at 800-282-8338 or visit our website at www.CastleUSA.com for information and pricing on tooling and accessory products for your TSM-22.

7 Troubleshooting

Please Note: There is a more extensive Diagnostic Manual on this machine available at <https://castleusa.com/pages/support/manuals-and-troubleshooting.html> Only the basics are covered below.

Warning: Electrical Hazard: Do not attempt to service Control Box components. Contact a Castle Support Technician for proper service information.

7.1 Dry Cycle Test

Dry Cycling is an extremely useful troubleshooting technique if your Pocket Machine's performance and cycling sequence seem irregular or questionable. It affords the opportunity to closely observe the mechanical, electrical, and pneumatic systems without routing pockets or drilling holes.

- Locate the ON/OFF switches on the motor housings and turn them off.
- Connect air and power to the machine. Turn the machine's Power Switch ON.
- Place a piece of scrap wood on the Table Top but do not cover the router slot. Align the piece with one of the Safety Buttons so that the button can be depressed but the piece will not block the path of the router bit or the drill bit.
- Start a Pocket Cycle by pressing the scrap of wood against one of the Safety Buttons and stepping on the Foot Pedal. **Observe the following actions in the described order:**
 1. The Clamp Foot extends to rest partly on the wood scrap while the router bit extends toward the rear of the Table Top slot.
 2. Almost immediately the router bit returns beneath the slot and the drill bit extends forward through the Pilot Hole under the Clamp Guard.
 3. Almost immediately the drill bit retracts while the Clamp Foot releases the wood scrap.

NOTE: The Clamp Foot will not release until the final drill stroke is complete.

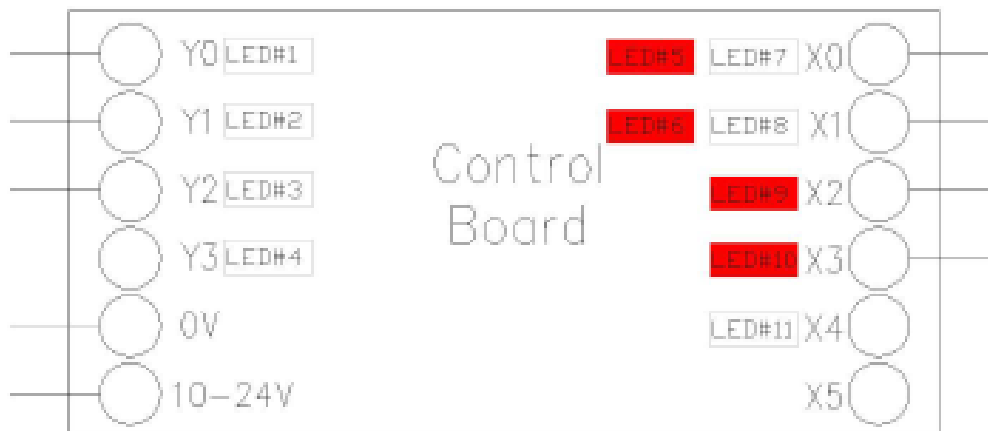
1. If the cycle does not begin, inspect the Power Switch, the machine power cord, the Safety Switch (page 39), or the Foot Switch (page 40). Make sure that your air supply is connected to the machine and inspect the internal Pressure Regulator (page 41). Check LED function on PLC(control board), see section 7.2 PLC.
2. If the Clamp Foot extends but the router does not, inspect or reset the Router Feed Rate Adjustment (page 19)
3. If the router extends at an excessive rate, inspect or reset the Router Feed Rate Adjustment (page 19).
4. If the router retracts and the drill extends at an excessive rate, inspect or reset the internal Pressure Regulator (page 41).
5. If the cycle takes significantly longer than two seconds to complete, inspect the Air Supply, the Pressure Regulator (page 41), or the Router Feed Rate Adjustment (page 19). Also check LED #4 on the PLC(control board), see section 7.2 PLC.
6. If the Dry Cycle is successful, but a regular cycle fails when routing pockets and drill-ing holes, inspect the Tooling (pages 31), or the Motor Operation (Bosch instruction manual).
7. After Dry Cycling is completed, turn the Power Switch OFF and turn the motor switches ON.

The list of possible behaviors described in Steps 5 through 7 is by no means exhaustive. Careful observation and description of the cycle behavior is essential when troubleshooting or seeking Technical Support.

Please Note: There is a more extensive **Diagnostic Manual** on this machine available at <https://castleusa.com/pages/support/manuals-and-troubleshooting.html>

7.2 PLC (Control Board)

This machine is equipped with a PLC (Programmable Logic Controller) that not only enhances the machine operation but also makes troubleshooting easier. It is important to understand the function of the PLC and its LEDs for quicker troubleshooting. Make sure you also understand the proper order of the cycle as listed above in the Dry Cycle Test, see section 7.1 Dry Cycle Test.



- When machine is ON and at rest, **LEDs 5,6,9 and 10** should be solid RED. Machine will NOT cycle if either **LED #9 or #10** is not RED at rest. If **LED #9** is not solid RED at rest, see **LED#9** below. If **LED #10** is not solid RED at rest, see **LED #10** below.
- **Y0-LED #1** will quickly flash RED when Clamp Solenoid has been activated.
- **Y1-LED #2** will quickly flash RED when Router Solenoid has been activated.
- **Y2-LED #3** will quickly flash RED when Drill Solenoid has been activated.
- **Y3-LED #4** DOES NOT blink RED in a normal cycle. If **LED #4** blinks RED, then either the router stop switch or drill stop switch is not activating correctly. Note: The machine WILL complete the cycle but the cycle time will be increased. This increased cycle time may shorten the life of the drill and router bits. A long blinking LED denotes an issue with the Drill Stop Switch, see **LED #10**. A short blinking LED denotes an issue with the Router Stop Switch, see **LED #9**. **Note:** Total cycle time should be about 2 seconds during a normal cycle.

- **X0-LED #5** is always RED when main switch is ON. **LED #7** will flash RED when the foot switch is activated. You can test the foot switch by simply pressing the foot switch. **LED #7** will turn RED when pressed.
- **X1-LED #6** is always RED when main switch is ON. **LED #8** will flash RED when the stock sense buttons are activated. You can test the stock sense switch by simply pressing in on the stock sense buttons on the front of the fence. **LED #8** will turn RED when pressed.
- **X0-LED #7**, see above **LED #5**.
- **X1-LED #8**, see above **LED #6**.
- **X2-LED #9** will remain RED until Router Stop Switch is triggered. When **LED #9** is RED, there is continuity with the Router Stop Switch (NC switch). When **LED #9** is OFF, there is no continuity on the Router Stop Switch (indicating the switch has been triggered) . When **LED #9** is OFF when the machine is ON and at rest, the machine will NOT start a cycle. Check Router Stop Switch by pushing the carriage (through the front door) to rear of machine. **LED #9** should go from RED to OFF. If during a cycle, the Router Stop Switch is not triggered, the machine WILL still finish the cycle. However, there will be a small delay before the machine will drill the pilot hole. Please Note, this delay will allow you to continue to use the machine. However the extended router cycle may shorten the life of the router bit. **Note:** Total cycle time should be about 2 seconds during a normal cycle.
- **X3-LED #10** will remain RED until Drill Stop Switch is triggered. When **LED #10** is RED, there is continuity with the Drill Stop Switch (NC switch). When **LED #10** is OFF, there is no continuity with the Drill Stop Switch (indicating the switch has been triggered) . When **LED #10** is off with machine when the machine is ON and at rest, the machine will NOT start a cycle. Check the Drill Stop Switch by pulling the carriage (through the front door) to front of machine. **LED #10** should go from RED to OFF. If during a cycle, the Drill Stop Switch is not triggered, the machine WILL still finish the cycle. However, there will be a small delay before the machine will return the drill to its resting position and release the clamp. Please Note, this delay will allow you to continue to use the machine. However the extended drill cycle may shorten the life of the drill bit. **Note:** Total cycle time should be about 2 seconds during a normal cycle.

7.3 Safety Switch (Stock Sense)

The Safety Switch (or Stock Sense) on the TSM-22 consists of a magnet (no wires) mounted near a magnetic reed switch (with wires). (Fig 52) When the Safety Buttons are pushed by the work piece, they raise an L-shaped metal blade that rests between the reed switch and the magnet inside the machine. The assembly is wired in such a way that when the blade is raised the switch closes allowing electricity to flow to the Foot Pedal.

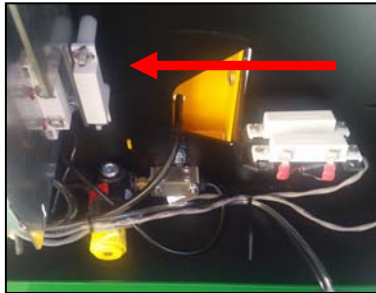


Fig 52

Check the PLC with the machine ON. LED #6 should always be RED when main switch is ON. LED #8 will turn RED when the stock sense buttons have been activated. You can test the stock sense switch by simply pressing in on the stock sense buttons on the front of the fence. LED #8 will turn RED when pressed. If LED#8 is RED all of the time, the distance between the switch and the magnet will need to be adjusted. The distance between the Reed Switch and the Magnet is critical. In the event that a small distance correction (1/32" to 1/16" or so) will not fix the issue, replace the Reed Switch and Magnet.

Additional Procedure/Adjustment:

- Turn the power to the machine off.
- First make sure that the side of the magnet housing with the notch in it is facing the Safety Blade. This ensures that the magnet is as close to the reed switch as possible.
- If there is no notch in the housing, then detach it from the machine and visually inspect it. Make sure that the magnet is turned so that it is closest to the Safety Blade.
- If the above steps don't work then test for proper function at the switch by connecting ohmmeter leads to the screw terminals on the reed switch.
- When the blade is resting between the reed switch and magnet, an open circuit should be registered (a few kilo ohms of resistance is acceptable).
- When the blade is raised a closed circuit should be registered (approximately 0 ohms). If an open circuit is still registered, then a new switch assembly (magnet and reed switch) should be installed.

7.4 Foot Switch

Designed to work in series with the Safety Switch, the Foot Switch is a simple mechanical micro-switch operated by a spring-loaded pedal. At rest the switch condition should be normally open. Closing the switch begins the cycle.

Check the PLC with the machine ON. LED #5 should always be RED when main switch is ON. LED #7 will turn RED when the foot switch is pressed. You can test the foot switch by simply pressing the foot switch. LED#7 will turn RED when pressed. If the LED does not turn RED, then the foot switch is most likely faulty.

Additional Procedure:

- Turn the power to the machine off.
- Turn the Foot Pedal and guard over and remove the two small screws that hold the pedal to the base.
- Use a flat tip screwdriver to pry the pedal free from the yellow guard (it is held by a silicone caulk).
- Using a Flat head or Phillips screw driver, remove the two screws on the left and right side of the pedal. This will allow the pedal to come apart exposing the switch underneath.
- Use two leads of the ohmmeter to probe the wire terminals while the switch is still in the pedal. (Fig 53)



Fig 53

- Without depressing the spring plate, the switch should register as an open circuit. When depressing the plate, the switch should register as a closed circuit (approximately 0 ohms).
- If an open circuit is still registered, then a new switch should be installed.

7.5 Pressure Regulator

The Pressure Regulator determines the Drill Feed rate and overall speed of the machine. It's important that at least 80 PSI is going into the machine from the compressor. Other machines on the same air line as your Castle machine can affect this pressure.

Note: Do not adjust the internal Pressure Regulator unless absolutely necessary.

The internal Pressure Regulator knob is located outside the Control Box as shown (Fig 54)

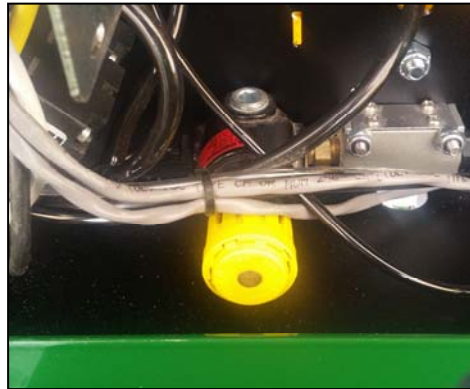


Fig 54

- Unlock the knob by pulling it slightly away from the Control Box.
- Turn the knob counter-clockwise until it reaches a mechanical stop.
- Turn the knob clockwise **five (5)** full revolutions (it's helpful to make an index mark on the knob as a reference.)
- Lock the knob by pushing it slightly toward the Control Box.

Note: Cycling too slow may cause the drill bits to heat up potentially causing separation at the shank. Cycling too fast will put too much pressure on the drill bits and cause them to break and/or cut over-size holes.

7.6 Router Stop Switch

The Router Stop Switch consists of a magnet (no wires) mounted near a magnetic reed switch (with wires) on the Router Stop Plate. At the full extension of the routing stroke, a tab on the Motor Carriage interrupts this switch to signal the start of the drilling stroke. If the router cycle time has increased then the Router Stop Switch may require a simple adjustment or replacement. If during a cycle, the Router Stop Switch is not triggered, the machine WILL still finish the cycle. However, there will be a small delay before the machine will drill the pilot hole. Please Note, this delay will allow you to continue to use the machine, however the extended router cycle may shorten the life of the router bit. Total cycle time should be about 2 seconds during a normal cycle.

Check the PLC (under oval cover on top of machine) with the machine ON. LED #9 will remain RED until Router Stop Switch is triggered. When LED #9 is RED, there is continuity with the Router Stop Switch (NC switch). When LED #9 is OFF, there is no continuity on the Router Stop Switch (indicating the switch has been triggered). Again, if the Router Stop Switch is not triggered, the machine will still finish the cycle, but the Router cycle time will be extended. When LED #9 is OFF when the machine is ON and at rest, the machine will NOT start a cycle. Check Router Stop Switch by pushing the carriage (through the front door) to rear of machine. LED #9 should go from RED to OFF. This distance between the reed switch and the magnet is critical. In the event that a small distance correction (1/32" to 1/16" or so), will not correct the issue, replace the Reed Switch and Magnet.

Additional Procedure/Adjustment:

- Open the front door of the machine and observe if the Motor Carriage has stalled with the router fully extended into the pocket. If the carriage is fully extended then it's likely that the magnet is too close to the reed switch.
- Turn the power to the machine off and loosen the screw that secures the work top down. Lift up the work top
- Loosen the two lower screws on the Router Stop Plate and slide the magnet (no wires) approximately 1/32" to 1/16" further away from the reed switch. (Fig 55)



Fig 55

- Turn on the power to the machine and make a test pocket.
- If the router still stalls in the pocket, test with a continuity tester as described in Section 7.4 Safety. If no continuity registers, a new switch assembly is needed.

7.7 Drill Stop Switch

The Drill Stop Switch consists of a magnet (no wires) mounted near a magnetic reed switch (with wires) mounted inside the machine case near the Safety Buttons. (Fig 56) At the full extension of the drilling stroke, the carriage interrupts this switch to signal the end of the drilling stroke and the end of the cycle. If the router cycle time has increased then the Router Stop Switch may require a simple adjustment or replacement. If during a cycle, the Drill Stop Switch is not triggered, the machine will still finish the cycle. However, there will be a small delay before the machine will return the drill to its resting position and release the clamp. **Please Note**, this delay will allow you to continue to use the machine, however the extended drill cycle may shorten the life of the drill bit. Total cycle time should be about 2 seconds during a normal cycle.

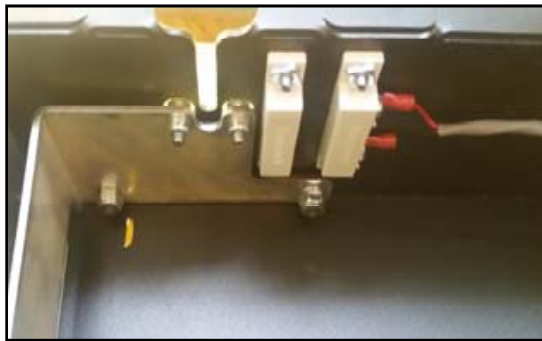


Fig 56

Check the PLC with the machine ON. LED #10 will remain RED until the Drill Stop Switch is triggered. When LED #10 is RED, there is continuity with the Drill Stop Switch (NC switch). When LED #10 is OFF, there is no continuity with the Drill Stop Switch (indicating the switch has been triggered). Again, if the Drill Stop Switch is not triggered, the machine will still finish the cycle, but the Drill cycle will be extended. When LED #10 is off with machine when the machine is ON and at rest, the machine will NOT start a cycle. Check the Drill Stop Switch by pulling the carriage (through the front door) to front of machine. LED #10 should go from RED to OFF. This distance between the read switch and the magnet is critical. In the event that a small distance correction (1/32" to 1/16" or so), will not correct the issue, replace the Reed Switch and Magnet.

Additional procedure/Adjustment:

- Turn the power to the machine off.
- Loosen the socket cap screw that secures the work top and lift up the work top.
- Loosen, but do not remove, the screws (Fig 57) that secure the magnet and the reed switch to the machine case. Although the mounts are not slotted, spread the magnet and the reed switch as far from each other as possible, then re-tighten the screws.

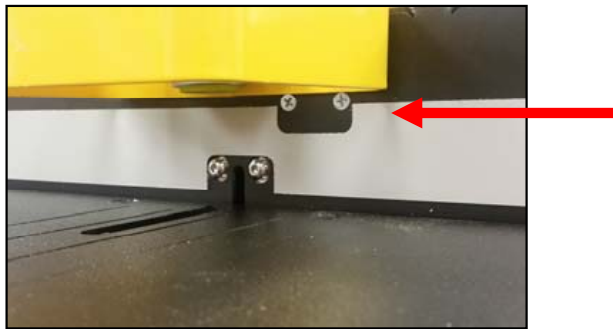


Fig 57

- Turn on the power to the machine and make a test pocket.
- If the drill still stalls in the pocket, loosen and remove the screws that secure the magnet and the reed switch to the machine case.
- Make sure that the side of the magnet housing with the notch in it is facing away from the reed switch. This ensures that the magnet is as far from the reed switch as possible.
- If there is no notch in the housing, then detach it from the machine and visually inspect it. Make sure that the magnet is turned so that it is farthest from the reed switch.
- If possible, use a small file or drill bit to slot the mounting holes on the plastic housings, and then reinstall the magnet and the reed switch.
- If the drill still stalls in the pocket, test with a continuity tester as described in Section 7.3 Safety Switch (page 39). If no continuity registers, a new switch assembly will be needed.

7.8 Serial Number Log

SERIAL NUMBER LOG		
MANUFACTURER	PART NUMBER	SERIAL NO.
Castle, Inc	A00022 – TSM-21 Pocket Hole Machine	
Robert Bosch Co.	E21610 – Bosch PR20EVS 1.0 HP Motor	
Robert Bosch Co.	E21617 – Bosch 1617EVS 2.25 HP Motor	
PURCHASE DATE:		

8 Warranty Information

8.1 Warranty

Castle USA is a Castle, Inc. Brand. Castle uses only the highest quality materials available for the construction of our machines. Your TSM-22 Pocket Hole Machine is warranted for one full year from the date of purchase against workmanship or material defects under normal use and service. We are not responsible for negligence, misuse or accidents. We suggest any and all machine maintenance or repair be discussed with an authorized Castle Representative prior to any disassembly. We will gladly answer any questions you may have prior to any part removal.

Castle, at its sole discretion, may either repair or replace machines that are found to be defective. This shall be the End User's sole remedy under this warranty.

Castle will not, under any circumstances, be liable to the End User for consequential, incidental, special or exemplary damages, or for loss of profits, revenue or use. Further, Castle disclaims any warranty, expressed or implied, as to the merchantability or fitness of a Castle product for any particular purpose.

Bosch warrants their router motors for one (1) year from date of purchase. We recommend that you keep your bill of sale and motor serial numbers. You will need this information for verification should there be any issues covered by the machine or motor warranty.

For Technical Assistance, Parts & Tooling contact Castle USA at 800-282-8338

Monday through Friday, 7:30am – 3:30pm, Pacific Time