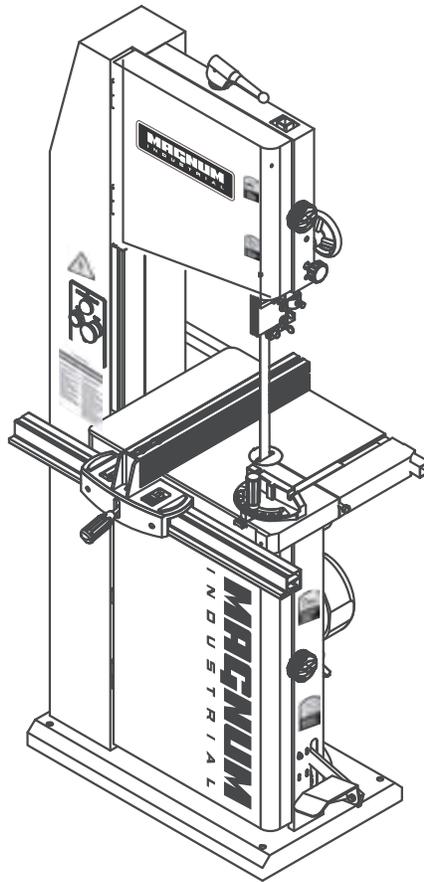


MAGNUM

INDUSTRIAL

MODEL NO.: MI-91500



Specifications:

Motor: 1.5 HP, 110V / 220V, 1 Ph, 12.5 A / 7.2 A
Maximum cutting depth: 12"
Maximum cutting width: 13.5"
Wheel size: 14"
Wheel speeds: 588 and 840 RPM
Blade speeds: 2300 and 3250 LFM
Blade width: 1/8" to 3/4"

Blade length: 112"
Table size: 16" x 20"
Table tilt (right / left): 0° to 45° / 7°
Table height: 36-1/2"
Dust collection outlets: 2 x 4"
Base dimensions (l x w): 25" x 15"
Weight: 297 lbs (135 kg)

OPERATING MANUAL

RULES for SAFE OPERATION

MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

To help ensure safe operation, please take a moment to learn the how to operate the machine and understand its applications and limitations, as well as potential hazards. KMS Tools and Equipment disclaims any real or implied warranty and holds itself harmless for any injury that may result from the improper use of its equipment.

- Do not operate the band saw when tired, distracted or under the effects of drugs, alcohol or any medication that impairs reflexes or alertness.
- Ensure your working area is well lit and free of debris.
- Keep children and visitors at a safe distance when the band saw is in operation. Do not permit them to operate the band saw.
- Prevent unauthorized or unsupervised use by child proofing and tamper proofing your shop and all machinery with locks, master electrical switches and switch keys.
- Stay alert! Give your work your undivided attention. Even a momentary distraction can lead to serious injury.
- Fine particulate dust is a carcinogen that can be hazardous to health. Work in a well-ventilated area and whenever possible use a dust collector. Wear face, eye, ear, respiratory and body protection devices.
- Do not wear loose clothing, gloves, bracelets, necklaces or other jewelry while the band saw is in operation.
- Remove adjusting wrenches, tools and other clutter from the machine and the table surface before using the machine.
- Keep hands well away from the blade and all moving parts. Use a brush, not hands, to clear away chips and dust.
- Adjust and position upper and lower blade guides before cutting. Upper blade guide should be adjusted to approximately 1/8" above the material to be cut.
- Adjust blade tension and tracking before cutting.
- Saw teeth must point down toward the table.
- Be sure that the blade reaches full operating speed before starting your cut.
- Always use a clean, properly sharpened blade. Dirty or dull blades are unsafe and can lead to accidents.
- Use suitable workpiece support if the workpiece does not have a flat surface.
- Hold material firmly against the table.
- Do not work on long stock without adequate support on the outfeed end of the table.
- If using a power feeder, stop the feeder before stopping the band saw.
- Do not push or force stock into the blade. The band saw will perform better and more safely when working at the rate for which it was designed.
- Avoid working from awkward or off balance positions. Do not overreach and keep both feet on floor.
- Keep guards in place and in working order. If a guard must be removed for maintenance or cleaning, properly re-attach it before using the tool again.
- Never leave the machine unattended while it is running or with the power on.
- Never stand on machinery. Serious injury could result if the tool is tipped over or if the cutting tool is unintentionally contacted.
- Always disconnect the machine from the power source before servicing or changing accessories such as blades, or before performing any maintenance or cleaning, or if the machine will be left unattended.
- Ensure the switch is in the OFF position before plugging in the power cord.
- Make sure the tool is properly grounded. If equipped with a three-prong plug it should be used with a three-pole receptacle. Never remove the third prong.
- Do not use this band saw for other than its intended use. If used for other purposes, KMS Tools and Equipment disclaims any real or implied warranty and holds itself harmless for any injury that may result from that use.

TOOL OVERVIEW

MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

MAIN COMPONENTS

- (A) BLADE TENSION ADJUSTMENT HANDLE
- (B) UPPER WHEEL COVER DOOR LOCK KNOB
- (C) BLADE GUARD
- (D) RIP FENCE
- (E) RESAW GUIDE BLOCK
- (F) MITER GAUGE
- (G) TABLE ALIGNMENT PIN
- (H) FENCE FRONT RAIL
- (I) LOWER WHEEL COVER DOOR LOCK KNOB
- (J) FOOT BRAKE
- (K) MAGNETIC SAFETY SWITCH
- (L) BLADE TRACKING ADJUSTMENT KNOBS
- (M) BLADE GUARD ADJUSTMENT HANDWHEEL
- (N) BLADE GUARD LOCK KNOB
- (O) UPPER BLADE GUIDES
- (P) REAR FENCE RAIL
- (Q) TABLE TILT LOCK KNOB
- (R) DUST OUTLET
- (S) MOTOR PIVOT LOCKING LEVER



FIGURE 1: FRONT VIEW



FIGURE 2: REAR VIEW

ASSEMBLY INSTRUCTIONS

MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

- Before you assemble your band saw, review the parts breakdown and keep it ready for reference.
- Start by removing the parts from the packaging.
- Carefully check the packaging for small pieces before you continue.
- Lay out the parts on a large, clear and unobstructed area and ensure that all parts are accounted for.
- If you have any questions or require further information, please contact the KMS Tools Service Department at 604.395.4134 or email repairs@kmstools.com



FIGURE 3: CONTENTS

LIST OF CONTENTS

For your convenience this band saw is shipped from the factory partially assembled and requires only minimal assembly and set up. In addition to your new band saw (not shown), the carton should contain the following:

- (A) **BAND SAW** (not shown)
- (B) **TABLE**
- (C) **TABLE LOCK KNOB** (x2)
- (D) **MITER GAUGE**
- (E) **MITER GAUGE STORAGE BRACKET**
- (F) **RIP FENCE STORAGE BRACKET**
- (G) **8 MM ALLEN KEY**
- (H) **3 MM ALLEN KEY**
- (I) **10-12 MM OPEN END WRENCH**
- (J) **FOOT BRAKE**
- (K) **CAP SCREW** (x2)
- (L) **LOCK WASHER** (x2)

ADDITIONAL REQUIREMENTS FOR SET UP

- Extra person to help lift
- Phillips screwdriver
- Flat head screwdriver
- 10 mm wrench
- 15 mm wrench
- Feeler gauge set
- Combination square

WARNING!

Serious personal injury could occur if you connect the saw to the power source before you have completed the installation and assembly steps!

ASSEMBLY INSTRUCTIONS

MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

WARNING!

This saw is heavy. You will need the help of at least one other person or a hoist for the following steps! To limit the risk of serious injury or damage to the machine, any equipment used to lift this machine must have a rated capacity in excess of 297 lbs (133 kg)!

LIFTING AND HANDLING THE MACHINE

To limit the potential for damage in transport, this band saw is shipped from the factory bolted to its crate in a vertical position. With a forklift or hydraulic pallet jack, move the entire crate as close to the final installation location as possible, and then uncrate the saw and remove the four bolts that secure it to the crate using a 15 mm wrench.

PLACING THE BAND SAW IN YOUR SHOP

This machine should be installed and operated on a solid, flat and stable floor that can support the weight of the band saw and the operator. Using the dimensions shown as a guideline, plan for placement within your shop that will allow the operator to work unencumbered and unobstructed by foot traffic (either passing shop visitors or other shop workers) or other tools or machinery.

ESTABLISHING A SAFETY ZONE

Shops with frequent visitors or multiple operators should establish a safety zone around machinery. A clearly defined safety zone on the floor around each machine can help avoid accidents that could cause injury to either the operator or the shop visitor. Mark out the safety zone with non-slip paint or tape. Take steps to ensure that all operators and shop visitors are aware that these areas are off limits whenever a machine is running.

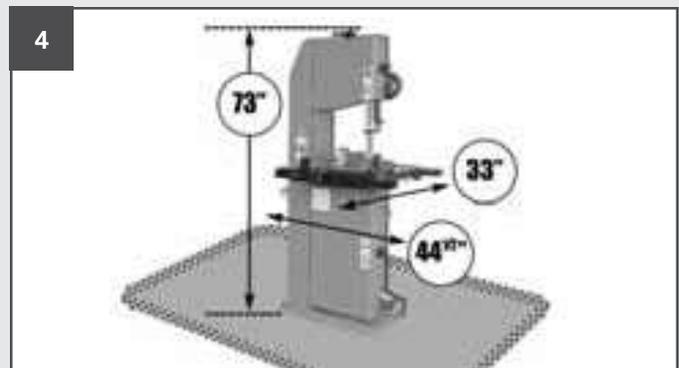


FIGURE 4: SAFETY ZONE

CLEANING THE SAW

The protective coating on the saw table prevents rust from forming during shipping and storage. Remove it with a rag dipped in environmentally friendly degreaser and dispose of the rag according to the degreaser manufacturer's safety recommendations. To clean the T-slots, push the rag through the slots with a screwdriver. If necessary, scrape the coating with a putty knife held flat to avoid scratching the surface and then clean with degreaser. Avoid rubbing the saw's painted surfaces. To prevent rust, apply a light coating of paste wax or use regular applications of any aftermarket surface protectant or rust inhibitor.

WARNING!

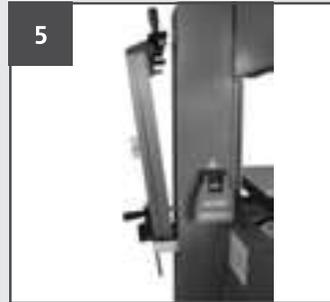
Do not connect the saw to the power source until instructed to do so!

ASSEMBLY INSTRUCTIONS

MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

ATTACHING THE STORAGE BRACKETS

The MI-91500 is equipped with onboard storage brackets to store the rip fence and miter gauge when not in use. Attach the rip fence storage bracket and miter gauge storage brackets to the back of the saw as shown in Figures 5 and 6, using the bolts and washers already mounted to the saw.



FIGURES 5 and 6: STORAGE

ATTACHING THE TABLE

The worktable mounts on a bracket. This bracket can adjust from 0° to 45° to the right. These adjustments are easy to make with the angle scale and lock knobs.

1. Remove the **RED INSERT (A)** from the centre of the table and the **TABLE ALIGNMENT PIN (B)** from the table slot. See Figure 7.
2. Turn the table right side up. Verify that the **LONG BOLTS (C)** in the centre of each trunnion are pointing down. See Figure 8.
3. Carefully position the table over the **TABLE-TILT BRACKET (D)**, guiding the saw blade through the **TABLE SLOT (E)**. See Figures 9 and 10.

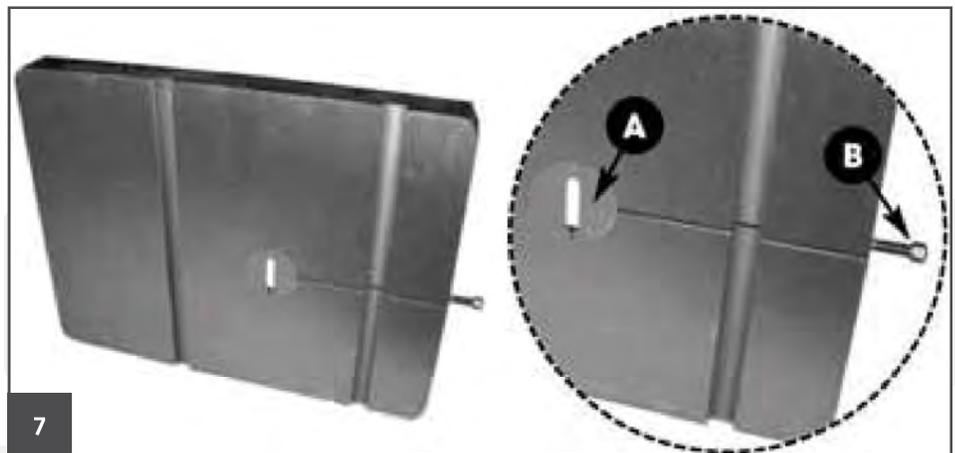
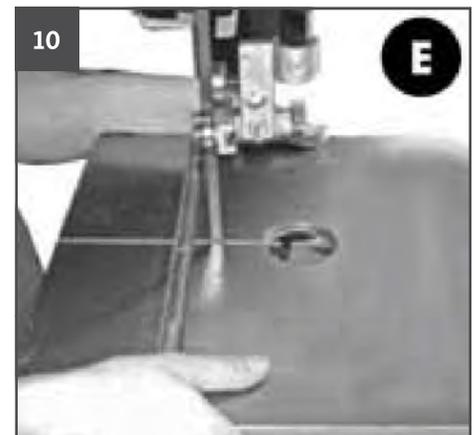
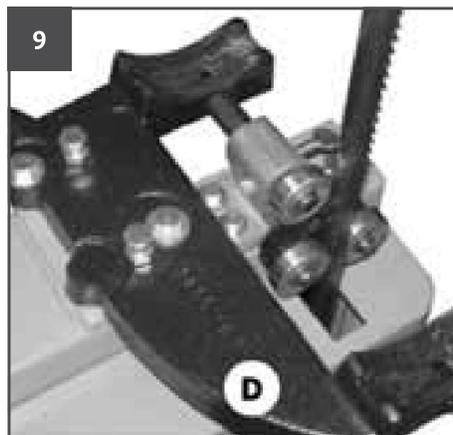
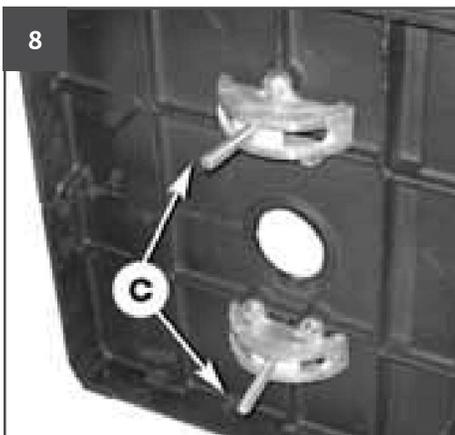


FIGURE 7: TABLE INSTALLATION

Note: If the long bolts have moved out of position, have an assistant tap them into place with a screwdriver.



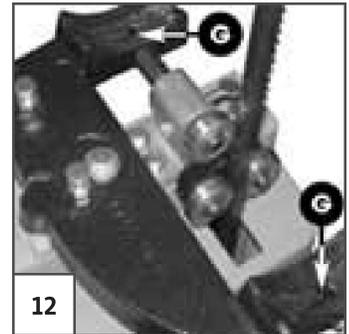
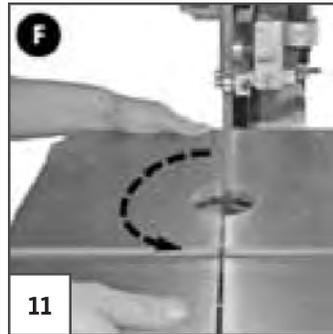
FIGURES 8, 9 and 10: TABLE INSTALLATION

ASSEMBLY INSTRUCTIONS

MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

ATTACHING THE TABLE CONTINUED

4. Rotate the table 1/4 turn counterclockwise so that the saw blade is now perpendicular to the **TABLE SLOT (F)**. See Figure 11.
5. Gently lower the table onto the bracket so the **LONG BOLTS (C)** in the centre of the trunnions pass through the holes in the **TABLE-TILT BRACKET (G)**. See Figure 12.
6. Thread the two small **LOCK KNOBS (H)** onto the **LONG BOLTS (I)** now protruding from the underside of the table-tilt bracket and tighten carefully. See Figure 13.
7. Attach the **TABLE TILT SUPPORT BRACKET (J)** to the rear of the saw using the **BIG LOCK KNOB (K)** with the two **FLAT WASHERS (L)** already mounted on the frame. See Figure 14.
8. Make sure that the blade is centered in the **TABLE OPENING (M)**. If the blade is not centered, slide the table back or forward until the blade is centered in the table opening. Then fully tighten the two **LOCK KNOBS (H)**. See Figure 15.
9. Reinstall the insert into the centre of the table, with the opening in the **SLOT (O)** facing the rear of the saw. See Figure 16.
10. Reinstall the table alignment pin into the **TABLE SLOT (P)**. See Figure 17.



FIGURES 11 and 12: TABLE INSTALLATION

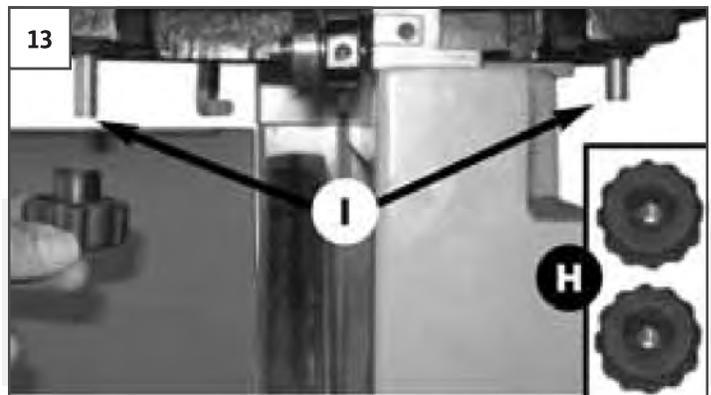
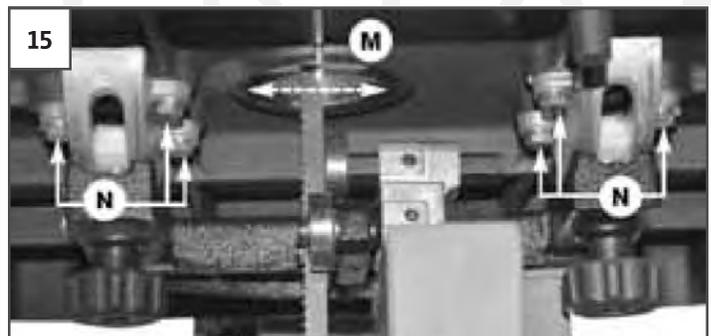
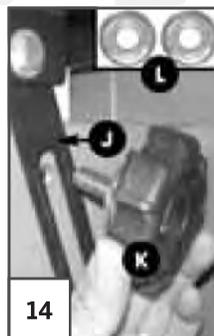
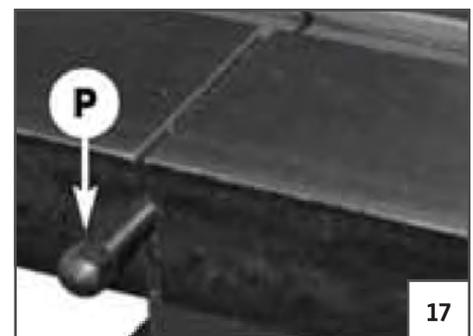
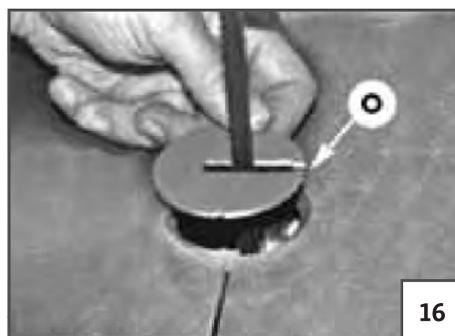


FIGURE 13: TABLE INSTALLATION



FIGURES 14 and 15: TABLE INSTALLATION



FIGURES 16 and 17: TABLE INSTALLATION

WARNING!

Serious personal injury could occur if you connect the saw to the power source before you have completed the installation and assembly steps!

ASSEMBLY INSTRUCTIONS

MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

INSTALLING THE FENCE ASSEMBLY

The MI-91500 is equipped with a deluxe T-fence and guide rail system. Follow all assembly and adjustment instructions **INSTALLATION OF THE FRONT AND REAR MOUNTING BRACKETS TO THE BANDSAW'S TABLE** on page 18~23

INSTALLING THE FENCE ASSEMBLY

This band saw is equipped with a foot brake located at the bottom of the machine. The foot brake allows for immediate immobilization of the blade and machine shut off.

1. Open the lower wheel cover door.
2. Attach the foot brake to the **FOOT BRAKE MOUNTING BAR (Q)** using the two supplied **CAP SCREWS AND LOCK WASHERS (R)**, in the assembly order shown in Figure 20.
3. Firmly tighten with the supplied 8 mm Allen key.

The foot brake is not designed to function as the primary stop mechanism of this saw. The foot brake should be used for emergency situations or any time it is necessary to immobilize the blade quicker than normal. Under normal working conditions the red stop button should be used as the primary stop mechanism. Continuously using the foot brake as the primary stop mechanism can lead to premature wear of the brake and may cause damage to the motor.

EMERGENCY FOOT PEDAL STOP MAY NEED TO BE ADJUSTED MACHINE WILL NOT START IF THE LIMIT SWITCH IS ACTIVATED

WARNING!

This tool is for indoor use only. Do not expose to rain or use in wet or damp locations.

WARNING!

Do not operate the unit with a damaged power cord or plug.



FIGURE 18: FENCE INSTALLATION



FIGURE 19: FOOT BRAKE LOCATION

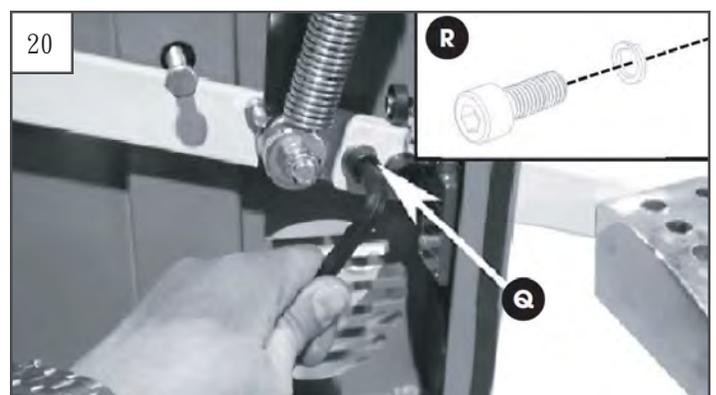


FIGURE 20: FOOT BRAKE INSTALLATION

ASSEMBLY INSTRUCTIONS

MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

WARNING!

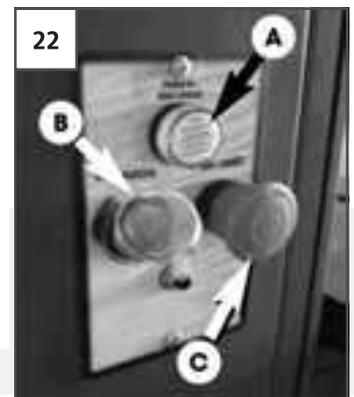
Ensure power switch is in the OFF position before connecting to a power source.

CONNECTING TO A POWER SOURCE

Before connecting the machine to the power source, verify that the voltage of your power supply corresponds with the voltage specified on the motor nameplate. A power source with greater voltage than needed can result in serious injury to the user as well as damage to the machine. If in doubt, contact a qualified electrician before connecting to the power source.

MAGNETIC SAFETY SWITCH

The MI-91500 features a MAGNETIC SAFETY SWITCH, which is mounted to the machine's frame. This magnetic switch is designed to protect the unit and the user from power surges, power outages and unwanted or unintentional start-up. The switch has a green **ON BUTTON WITH PROTECTIVE CAP (B)** to prevent unwanted or unintentional start-up, and a RED spring loaded **OFF BUTTON (C)**. Once the red OFF button has been pressed, the machine can only be started by turning the red button to the right to release the stop button. When you have finished using the machine be sure to unplug the band saw from the power source.



FIGURES 21 and 22: MAGNETIC SAFETY SWITCH

Once the assembly has been completed, plug the power cord into an appropriate outlet. The **POWER-IN INDICATOR LIGHT (A)** will illuminate. See Figures 21 and 22.

THERMAL RELAY / CIRCUIT BREAKER

The unit features a thermal relay / circuit breaker (See Figure 23) located under the magnetic switch to protect the motor from power surges or spikes in line voltage. In the event of a power surge, the thermal relay will automatically trip and cut off power to the motor.

To reset the thermal relay after it has been tripped, complete the following steps:

1. Set the power switch to the OFF position.
2. Press the **THERMAL RELAY RESET BUTTON (D)**.
3. Restart the machine.



FIGURE 23: CIRCUIT BREAKER / THERMAL RELAY

WARNING!

To avoid unexpected or unintentional start-up be certain that the power switch has been set to the off position before resetting the thermal relay.

BASIC ADJUSTMENTS

MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

WARNING!

To avoid injury, ensure the power switch is OFF and the power cord is unplugged before adjusting the band saw.

TILTING THE TABLE

The table can tilt from 0° to 45° to the right to allow for bevel cutting. To set the table angle refer to the **TABLE TILT ANGLE INDICATOR (A)** located under the band saw table.

1. Loosen **LOCK KNOBS (C)** (See Figure 25) and **LOCK KNOB (B)** (See Figure 24) located under the band saw table.
2. Tilt the table to desired angle. Refer to the **ANGLE INDICATOR (A)**.
3. Tighten the **LOCK KNOBS** to lock the table in position.

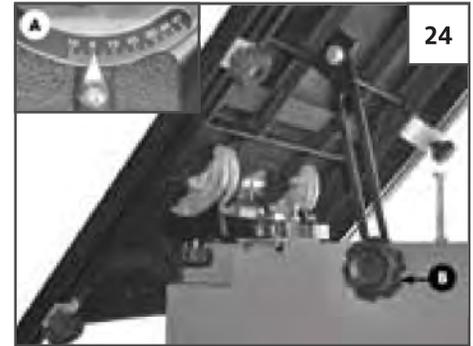


FIGURE 24: TABLE TILT ADJUSTMENT

ADJUSTING 90° TABLE STOP AND RE-ALIGNING ANGLE POINTER

To ensure accurate cuts, align the table so the angle pointer reads 0 when the table is set to 90°, the default position.

Begin by setting the table-stop bolt:

1. Loosen **LOCK KNOBS (C)** and **LOCK KNOB (B)**.
2. Place a **COMBINATION SQUARE (D)** flat on the table with the heel of the square flat against the **SAW BLADE (E)**. See Figure 26.
3. Level the table until it is exactly 90° to the blade, then tighten **LOCK KNOBS**.
4. Using the supplied open-end wrench, loosen the **JAM NUT (F)** on the 90° table-stop bolt then adjust the height of the **BOLT (G)** until it touches the underside of the table as shown in Figure 28.
5. Loosen the **LOCK KNOBS (B AND C)** and make sure the table is resting on the table-stop bolt.
6. Check the square and make sure the table is still at 90° to the blade. If not, re-adjust the table-stop bolt.
7. Re-tighten **JAM NUT (F)**.

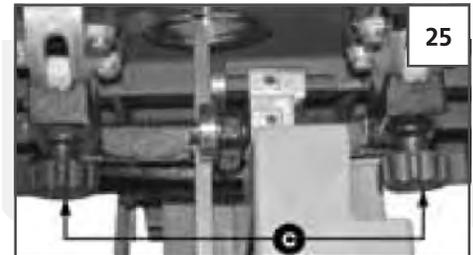
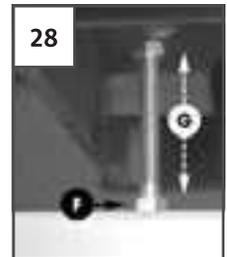
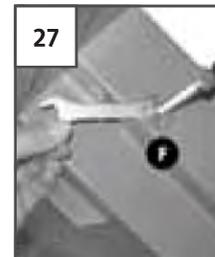
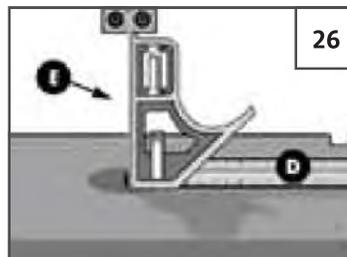


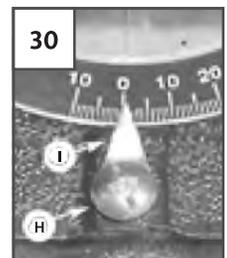
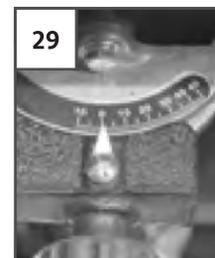
FIGURE 25: TABLE TILT ADJUSTMENT



FIGURES 26, 27 and 28: ANGLE POINTER ADJUSTMENT

With the table set to 90° and the stop bolt at the correct height, check that the table tilt angle indicator pointer on the front trunnion is set to 0. See Figure 29.

To adjust the pointer, loosen the **SCREW (H)** on the pointer and align the **POINTER (I)** to 0 on the scale. Then re-tighten the screw to secure the pointer in place. See Figure 30. You will now be able to accurately return the table to the 90° position automatically without further adjustments and scale reading for any angle other than 0° will also be accurate.



FIGURES 29 and 30: ANGLE POINTER ADJUSTMENT

BASIC ADJUSTMENTS

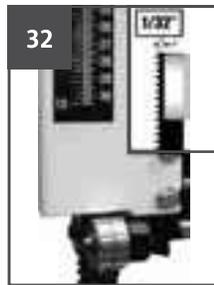
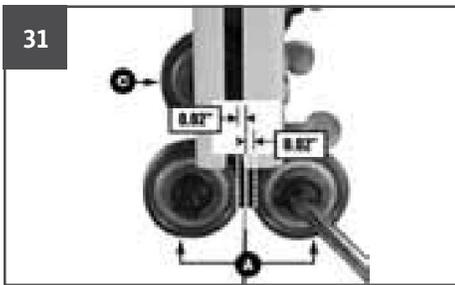
MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

WARNING!

To avoid injury, ensure the power switch is OFF and the power cord is unplugged before adjusting the band saw.

ADJUSTING THE UPPER AND LOWER BLADE GUIDES

The **GUIDE BEARINGS (A)** keep the blade from moving from side to side during cutting and, to ensure accuracy, must be snug to the blade but not touching it. The space between each guide bearing and the blade must not exceed 0.02" (the thickness of a sheet of paper). If less space is left, the blade can jam between the bearings. This can cause the blade to overheat and break. See Figure 31. Also, the guide bearings must remain at least 1/32" behind the blade teeth to prevent damage to the blade. See Figure 32. The **THRUST BEARING (C)** keeps the blade from moving back and out of position when the work is being fed into the blade and must be very close to the back of the blade to prevent damage to the blade during cutting.

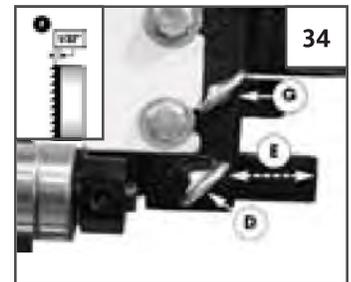


FIGURES 31 and 32: BLADE GUIDE ADJUSTMENT

Before adjusting the upper and lower blade guides assemblies, make sure the blade is tensioned and tracking properly. Adjust the upper and lower blade guides assemblies after each blade tension and tracking adjustment. Whenever the upper guide bearings and thrust bearing are adjusted, the lower guide bearings and thrust bearing should also be adjusted.

To adjust the upper guide bearings, follow these steps:

1. Loosen **SET SCREW (A)** with the supplied 3 mm Allen key.
2. With a **FLATHEAD SCREWDRIVER (B)** rotate the bearing clockwise about one quarter turn until the gap between the bearing and blade is 0.02". See Figure 33. Use a feeler gauge or piece of paper to check the clearance.
3. Re-tighten **SET SCREW (A)** to secure the guide bearing.
4. Repeat Steps 1 to 3 with the other upper guide bearing.
5. Loosen the **LOWER THUMB SCREW (D)**.
6. Move the **UPPER GUIDE BEARING SHAFT (E)** in or out until the guide bearing are at least 1/32" behind the **BLADE TEETH (F)**. See Figure 34.
7. Re-tighten the **LOWER THUMB SCREW (D)**.



FIGURES 33 and 34: BLADE GUIDE ADJUSTMENT

Next adjust the upper thrust bearing:

8. Loosen the **UPPER THUMB SCREW (G)**.
9. Move the **UPPER THRUST BEARING SHAFT (H)** in or out until the thrust bearing barely touches the blade. (Should be 1/64" behind the back of the blade). See inset of Figure 35.
10. Re-tighten the **UPPER THUMB SCREW (G)**.



FIGURE 35: BLADE GUIDE ADJUSTMENT

To adjust the positioning of the lower guide bearings and thrust bearing, repeat steps 1 to 10 with the lower guide bearings and thrust bearing.

BASIC ADJUSTMENTS

MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

WARNING!

To avoid injury, ensure the power switch is OFF and the power cord is unplugged before adjusting the band saw.

CHANGING SPEED SETTINGS

The MI-91500 has two speed settings: 2,300 LFM (low) and 3,250 LFM (high).

- Low speed is ideal for cutting soft woods over 4" in height or hardwoods over 2" in height.
- High speed is best for cutting soft woods under 4" in height or hardwoods under 2" in height.

If wood starts to burn at high speed, stop and change to the lower speed setting.

To change the speed of your band saw complete the following steps:

At the back of the band saw, next to the motor, there is a **RATCHET LEVER (A)** for loosening the tension on the drive belt. When you pull it out as shown in Figure 37, it disengages. When you release it, it engages the bolt for screwing or unscrewing. See Figure 38.

1. Unscrew the bolt a few turns counterclockwise then lift the **MOTOR (D)** by hand and tighten **RATCHET LEVER (A)** to lock the motor in position. This will loosen the drive belt enough to move it between one set of pulleys and the other.
2. Open the lower wheel cover door.
3. To set the band saw speed to low (2,300 LFM), place the belt on the front set of pulleys. See Figure 39.
4. To set the band saw speed to high (3,250 LFM), place the belt on the rear set of pulleys. See Figure 40.
5. After the belts are in position, set the motor back to its initial position to tighten the belt around the pulleys
6. To secure the motor, turn the **RATCHET LEVER (A)** clockwise until it is tight and the motor does not move.

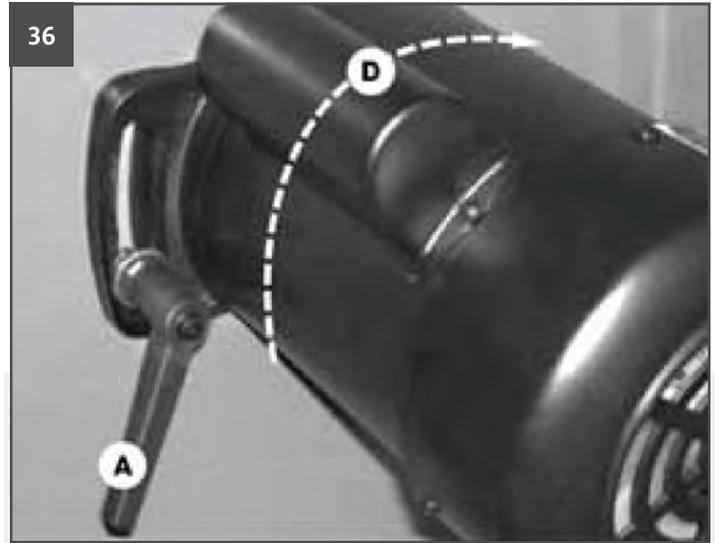
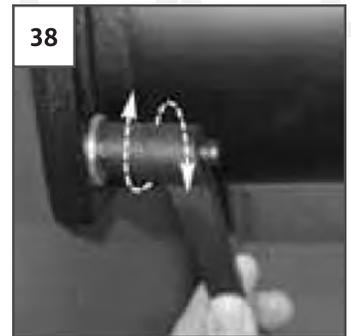
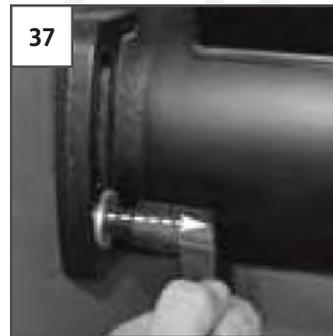
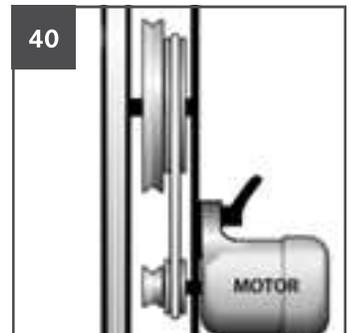
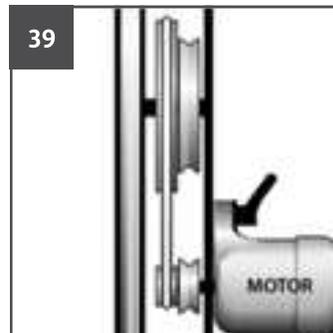


FIGURE 36: SPEED ADJUSTMENT



FIGURES 37 and 38: SPEED ADJUSTMENT



FIGURES 39 and 40: SPEED ADJUSTMENT

BASIC ADJUSTMENTS

MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

WARNING!

To avoid injury, ensure the power switch is OFF and the power cord is unplugged before adjusting the band saw.

ADJUSTING BLADE GUARD

The **BLADE GUARD (A)** can be adjusted to accommodate the height of the workpiece. To prevent the blade (which is flexible and which would not otherwise be supported) from slipping out of position during cutting, and to reduce risks of injuries, expose a minimum amount of blade.

The blade guard should be set 1/8" to 1/4" above the workpiece to prevent the blade from flexing out of position or offline during cutting. See Figure 41.

To adjust the height of the blade guard

1. Make sure the band saw is turned off and the power cord is disconnected from the power source.
2. Loosen the **LOCK KNOB (B)**. See Figure 42.
3. Move the blade guide assembly up or down by turning the **HAND WHEEL (C)**. Then re-tighten the lock knob C.

*The **DEPTH GAUGE (D)** on the blade guard can be used as a reference but it is not intended for precise measurements. See Figure 43.*

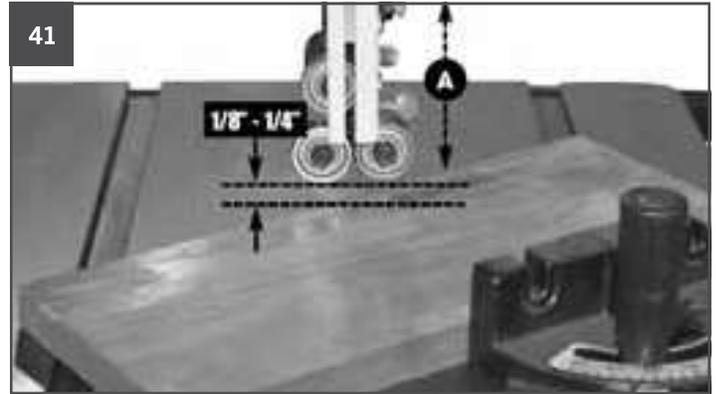
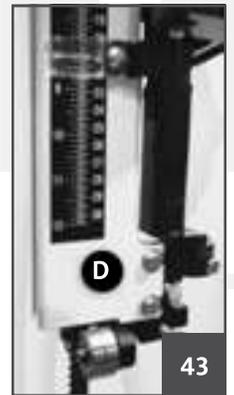
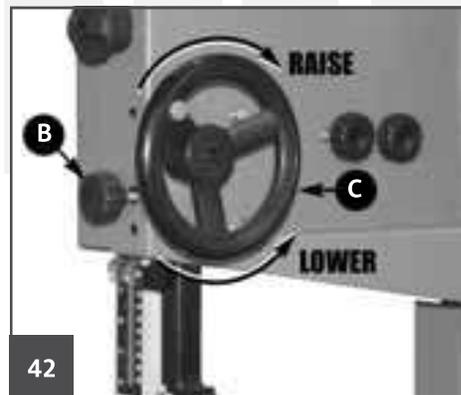


FIGURE 41: BLADE GUARD ADJUSTMENT



FIGURES 42 and 43: BLADE GUARD ADJUSTMENTS

NOTES

MAINTENANCE

MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

WARNING!

Always disconnect the machine from the power source before performing any lubrication or maintenance.

PERIODIC MAINTENANCE and LUBRICATION

Lubrication

Keep the **RACK AND PINION (A)**, **BLADE TENSION ADJUSTMENT SCREW (B)**, and the **TABLE TRUNNION (C)** well greased and free of dust and debris.

Clean and remove dust, debris and old grease after every 10 to 15 hours of use. After cleaning, re-apply grease as needed. Use any all-purpose grease.

The motor and all bearings are sealed and permanently lubricated. They require no further lubrication. No other part of this band saw needs lubrication.

WARNING!

If any part is damaged, do not use the band saw. Replace any damaged part as soon as you notice the damage.

PERIODIC MAINTENANCE

- Inspect and test the ON/OFF switch before each use. Do not operate the band saw with a damaged switch. Replace a damaged switch immediately.
- Periodically inspect the power cord, plug and the blade for damage.
- Keep the machine clean and free of sawdust. Frequently blow out or vacuum up the sawdust and wipe down the machine occasionally with a damp rag.

Keep the band saw wheels and tires clean. Dirt and debris on the wheels can cause the blade to slip.

- Do not allow dirt, pitch or gum to build up on the table, blade, guide and thrust bearings. Clean as needed with gum and pitch remover. But do not immerse the bearings in gum and pitch remover.
- To prevent rust from forming on the unpainted cast iron of the table, and so that the wood slides easily while cutting, apply a light coating of paste wax or use regular applications of any aftermarket surface protectant or rust inhibitor.

WARNING!

To avoid eye injury from blowing debris, wear safety goggles when blowing out sawdust.

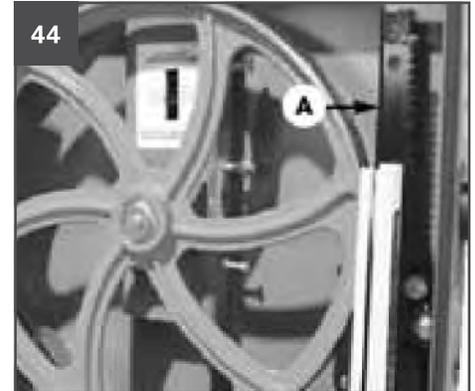


FIGURE 44: MAINTENANCE and LUBRICATION

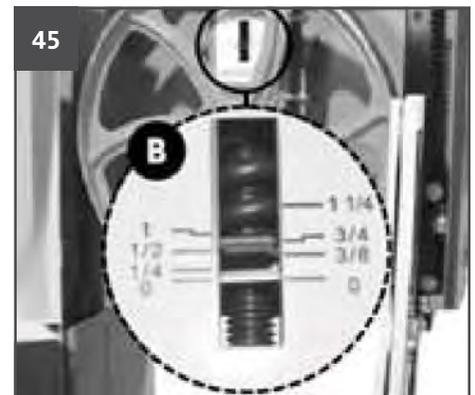


FIGURE 45: MAINTENANCE and LUBRICATION

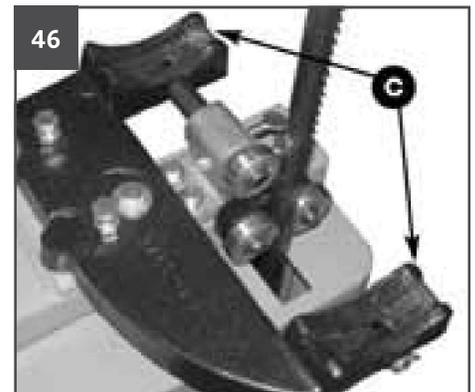


FIGURE 46: MAINTENANCE and LUBRICATION

MAINTENANCE

MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

Wheel Alignment

When wheels are aligned, or coplanar, the bandsaw cuts straighter, with much less vibration, heat, and blade wear because the blade is automatically balanced on the wheel. See Figure 55 to better understand coplanarity. If your bandsaw develops tracking problems that can't be fixed by adjusting the upper wheel tracking knobs, then check the wheel alignment before taking any other steps. Verifying Upper/Lower Wheels are Coplanar

1. DISCONNECT BANDSAW FROM POWER!
2. With the blade on and properly tensioned, hold a straightedge or a self-made "coplanarity gauge" (Figure 55) close to the center of both wheels. Make sure the straightedge or gauge fully extends across the wheels as shown in Figure 55.
 - If the wheels are coplanar, the straightedge will evenly touch the top and bottom of both wheels.
 - If the wheels are not coplanar, place the straightedge on the lower wheel first (ensuring that it touches both the top and bottom rim), then adjust the upper wheel tracking knob to make the upper wheel parallel with the lower wheel.
 - If the straightedge does not touch both wheels evenly, the upper wheel needs to be shimmed or the lower wheel needs to be adjusted.

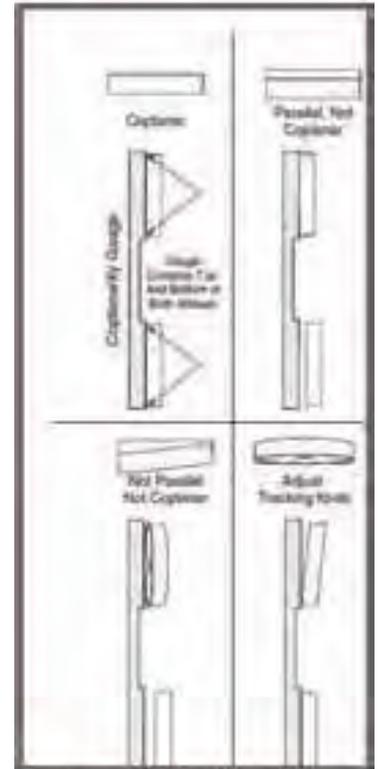


Figure 55. Coplanar diagram.

Shimming Upper Wheel

1. DISCONNECT BANDSAW FROM POWER!
2. Make sure the top wheel is adjusted parallel with the bottom wheel.
3. With the straightedge touching both points of the wheel that does not need to be adjusted, measure the distance away from the incorrect wheel with a fine ruler (see Figure 56).
4. Remove the blade from the saw, then remove the wheel that needs to be shimmed.
5. Determine how many shim washers you need to compensate for the distance measured in Step 3 and place them on the wheel shaft.
6. Replace the wheel, the original washers, and the securing nut.
7. Tighten the blade, then check the wheels. (Coplanar wheels may pull out of alignment when the blade is tightened.)
8. When the wheels are coplanar, place a mark on each wheel where you held the straightedge. This assures repeated accuracy every time you adjust your wheels.

Note: When wheels are properly coplanar, the blade may not be centered on the crown of the wheel, but it will be balanced.



Figure 56. Measuring wheel difference.

Adjusting Lower Wheel

Only do this procedure if you cannot make the wheels coplanar with the tracking knob or by shimming the upper wheel. Make sure the upper wheel is adjusted as close as possible to being coplanar with the lower wheel before beginning. Do this procedure with the blade fully tensioned.

To adjust the lower wheel, do these steps:

1. DISCONNECT BANDSAW FROM POWER!
2. Loosen the four hex bolts on the lower wheel adjustment hub (Figure 57).
3. Rotate the wheel adjustment sleeves to tilt the lower wheel as necessary to make it coplanar with the upper wheel.
4. Tighten the hex bolts to lock the wheel adjustment sleeves in position.



Figure 57. Wheel adjustment hub.

110V CHANGED TO 220V MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

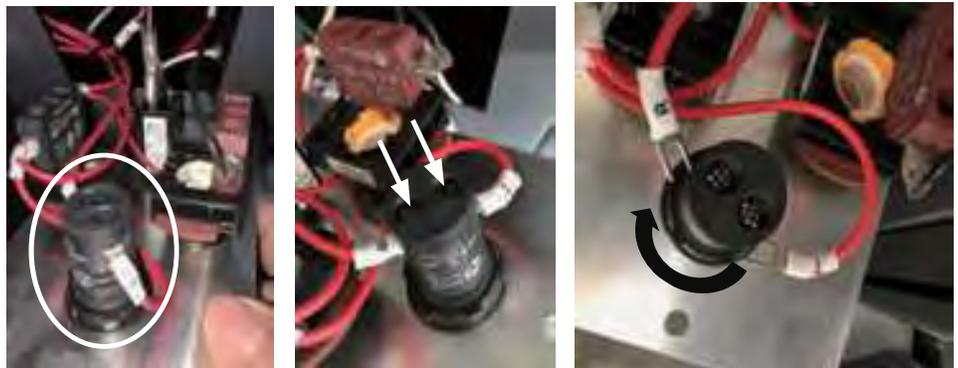
WARNING!

Always disconnect the machine from the power source before servicing.

1. Use cross screwdriver to loosen the screws and remove the switch plate.



2. Remove the connecting wire of the indicator light by cross screwdriver, and turn the nut on the indicator light counterclockwise; then remove the indicator light set.



3. Take the 220V indicator light and install at reverse direction by the above steps, and connect the connecting wire.

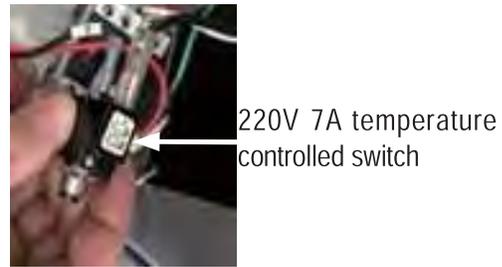
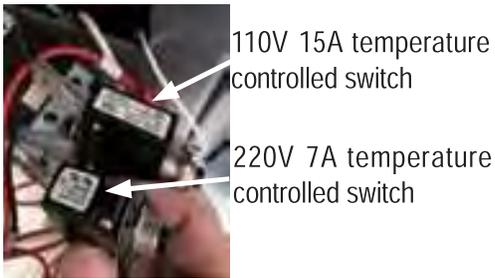


4. Dismantle the nut of the temperature controlled switch by 14mm wrench, and remove the temperature controlled switch.

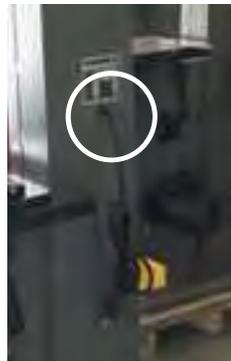


110V CHANGED TO 220V MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

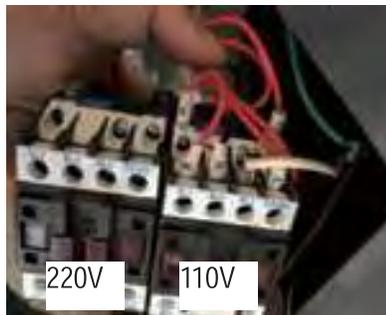
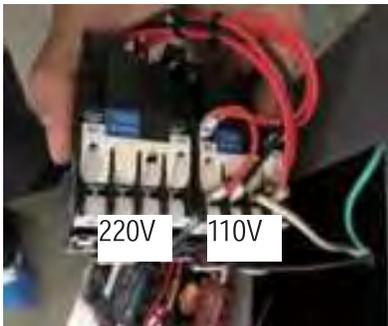
5. Dismantle the connecting wire on 110V 15A temperature controlled switch and connect on 220V 7A temperature controlled switch; then install at reverse direction by the above steps.



6. Remove the retainer and pull the contactor out of the machine.



7. Take 220V contactor and connect the each junction one by one. Besides, exchange the connecting wire from 110V contactor to 220V contactor.



110V CHANGED TO 220V MAGNUM INDUSTRIAL MI-91500 DELUXE 14" BAND SAW

8. Push the contactor to the middle through the groove and Aluminum plate.



9. Pull out power cord and fasten the cable retainer. (You can refer to the original indentation of the cable retainer.)



10. Lock the switch plate back to the machine. NOTE: Do NOT pinch the connecting wire.



11. Remove the motor junction box by cross screwdriver, and change the connecting wire from 110V to 220V. The joining part needs to be wrapped the tape, and install back the cover of the motor junction box.

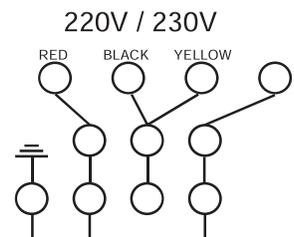
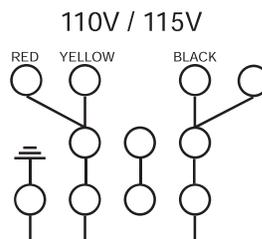


110V



220V

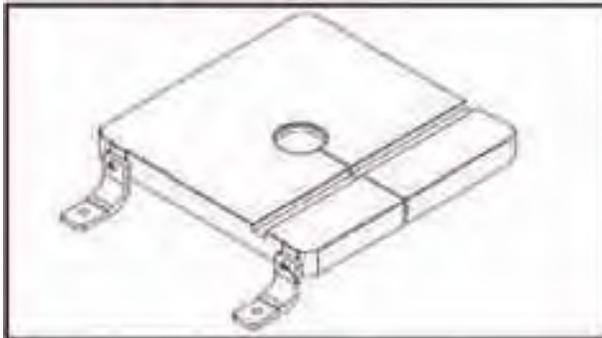
12. Modify the plug and use 220V socket.



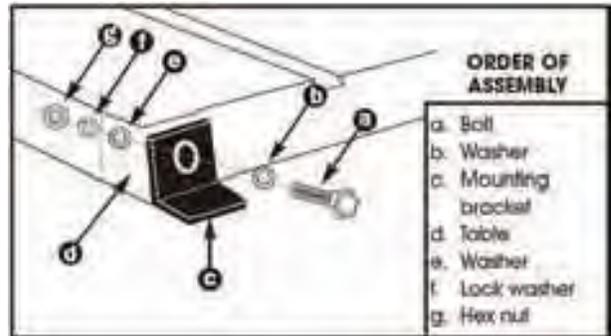
INSTALLATION OF THE FRONT AND REAR MOUNTING BRACKETS TO THE BANDSAW'S TABLE

Note: The M6 bolts, washers, lock washers and hex nuts required for this step are provided with your Excalibur® Universal Bandsaw Rip Fence System. However, if they do not fit into the mounting holes on your table, use the fasteners provided with your original fence.

1. The image above shows the positioning of the mounting brackets when properly installed to the table (front and rear brackets are installed at opposite sides of the table).



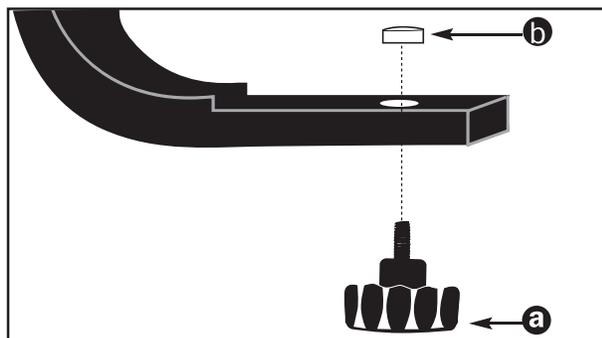
2. Place the bolts, washers, lock washers and hex nuts as shown above to attach the mounting brackets (front and rear) to the table. Don't tighten the nuts yet.



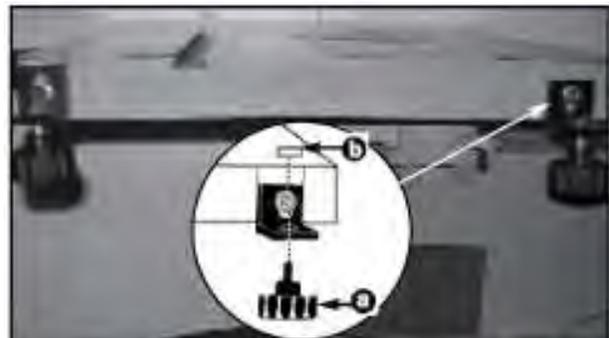
INSTALLATION OF THE FRONT AND REAR RAILS

Note: The front rail is the wider one of the two rails.

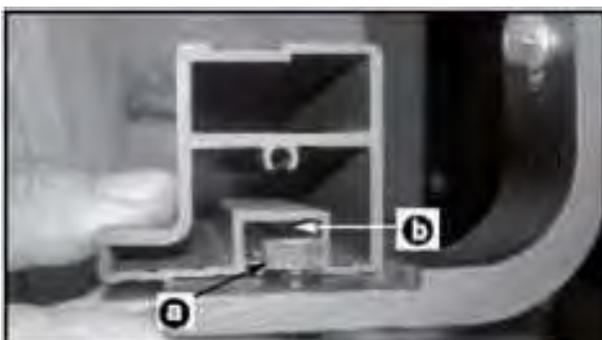
1. Install a 5/16" screw **a**, and a square nut **b** on both front mounting brackets.



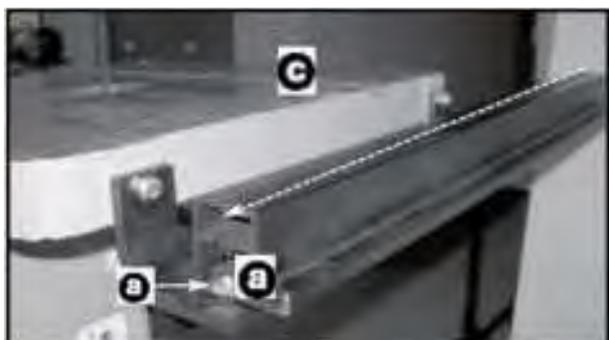
2. Install a 5/16" x 5/8" lock knob **a** and a square nut **b** on both rear mounting brackets.



3. Insert the square nut **a** of the first front mounting bracket into the T-slot of the front rail **b**.



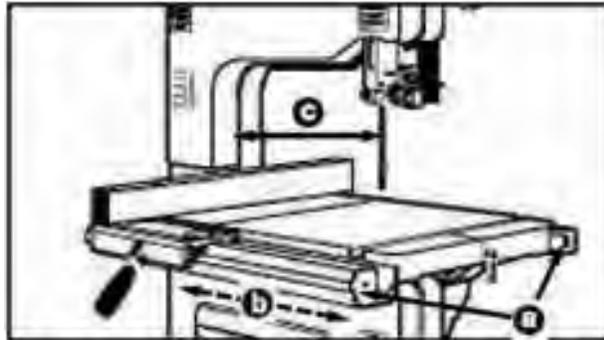
4. Then, slide the rail onto the second square nut **a**.



5. Insert the square nut **a** of the first rear mounting bracket into the T-slot of the rear rail **b**.



6. Then, slide the rail up to the second square nut **a**.



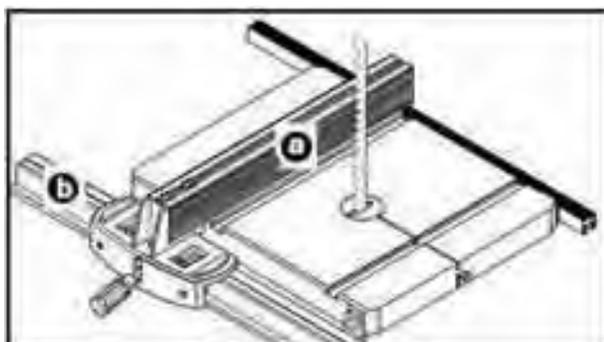
7. Position the rails **a** to the left or right of the table **b**, depending upon the size of your bandsaw **c** i.e. the space between the frame of the saw and the blade (see image left), and your personal preferences, then tighten the nuts to lock the rails in position.

Tip: You can adjust the rail positioning in relation to the blade as needed to accommodate the need for more cutting capacity. For example, if you intend to use this fence for cutting longer or wider workpieces, it may be preferable to position the fence rails further to the right. For shorter workpieces (that fit between the frame of the saw and the blade), position the rails further to the left.

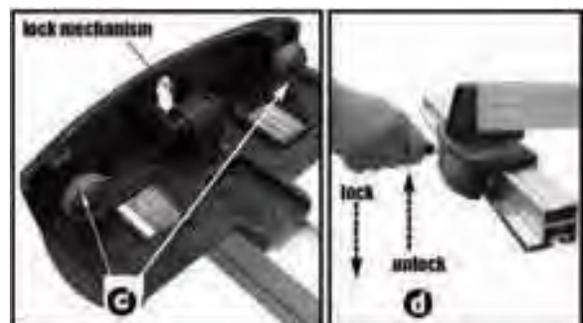
Note: You can always reposition the fence rails further left or right as needed. However, once the measuring tape is installed (see "Installation of the measuring tape and pointer" on page 8) on the front rail, you'll be able to use the zero reference of the tape only when the rail is positioned as it was during initial alignment. When the rails are repositioned, you will need to use a separate measuring tape (or ruler) to determine the distance between the fence and the blade. You will still be able to use the tape as a reference, but not for accurate measurements from the zero point.

INSTALLATION OF THE FENCE

1. Position the fence **a** firmly down on top of the front **b** rail.

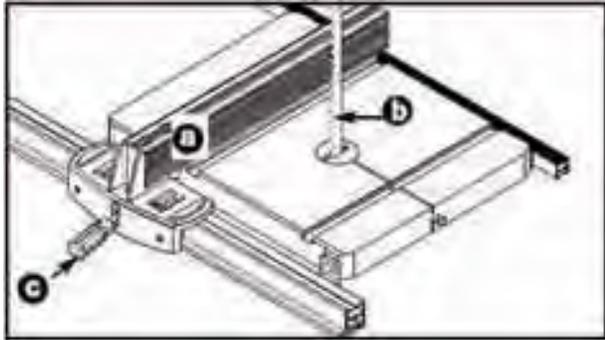


2. Make sure the bearings **a** are sitting flush on the rail, then lock down the fence locking handle **d**.

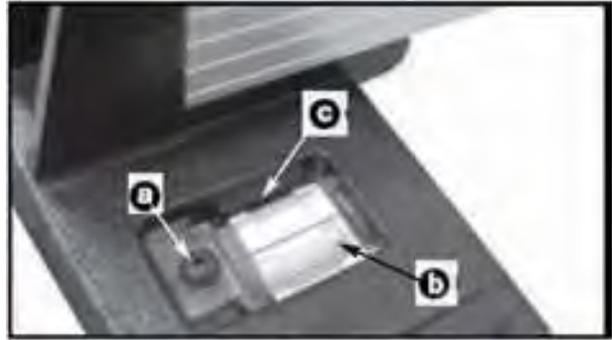


INSTALLATION OF THE MEASURING TAPE AND POINTER

1. Place the fence **a** to the right of the saw blade, so it touches the blade **b**, then lock down the fence **c**.



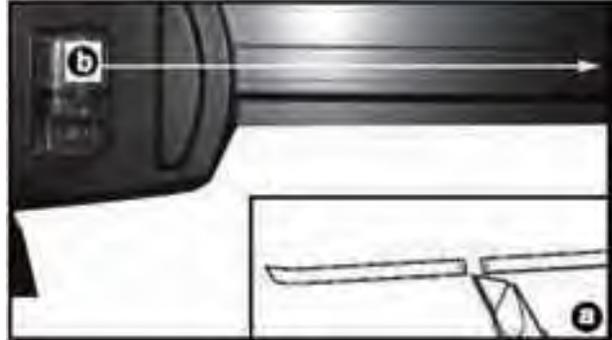
2. With a 3 mm Allen key, unscrew and remove the screw **a** that holds the pointer **b** into the right pointer's window of the fence base **c**.



3. Make a pencil mark on the rail, in line with the pointer's center mark. Then, unlock the fence and put aside the pointer, screw and fence for now.

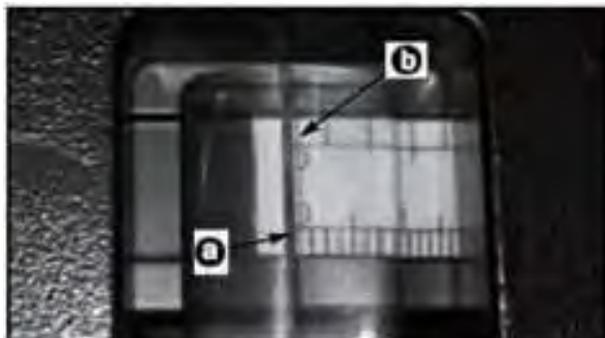


4. Cut the measuring tape between both zeros **a**. Remove the backing strip from the first half of the measuring tape (the one with the zero on the left) and carefully install along the rail slot, using your pencil mark as the zero-point of the tape **b**. Trim off excess tape with a knife or scissors.



Tip: Try removing only an inch of backing strip from the start of the tape, stick that down, then remove the rest of the backing and pull the measuring tape taut to the end of the rail slot and carefully lower it against the slot.

Note: For accurate readings, the tape must be placed straight parallel with the rail slot, with no folds along its length.

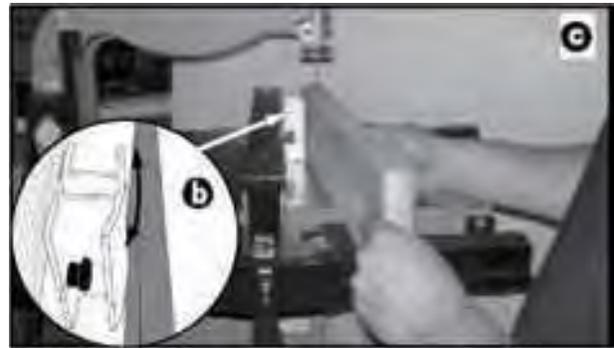


5. Reinstall the fence on the front rail and lock it down. Then, reinstall the pointer (place the screw in the middle of the hole to allow maximum adjustment capacity on the left or right afterward), and slide the pointer right or left, so that its center mark **a** is in line with the zero-point **b** of the tape. Tighten the screw to lock the pointer in place.

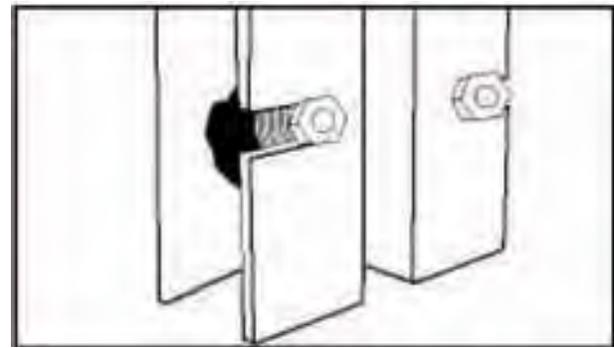
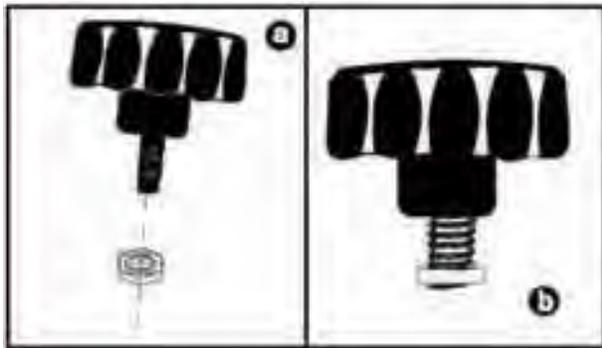
6. Unlock the guide fence and repeat steps 1 to 5 with the fence to the left of the blade this time, aligning the center mark of the left pointer with the zero of the second half of the measuring tape.

Note: Recheck and, if necessary, readjust the left and right pointers against the zero-point of both measuring tapes whenever you change blades. Different blades have different thicknesses, which can throw off the pointer a few fractions.

INSTALLATION OF THE RESAW GUIDE



The 3 1/2" resaw guide (a) facilitates resawing of wide boards by allowing you to pivot your workpiece on its curved surface (b) to correct the line of the cut as you push the work piece into the blade (c).



1. Screw a hex nut onto each of the 2 lock knobs (a), just a few turns only, leaving a good space between the nut and the knob (b).

2. Slide the nut/knob sets into the slots on the flat face of the resaw guide with the nuts on the outside face as shown above.

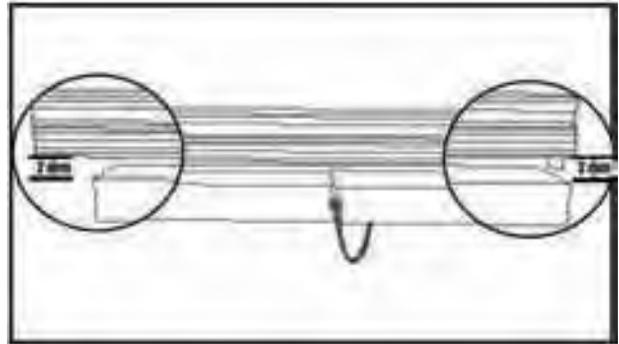
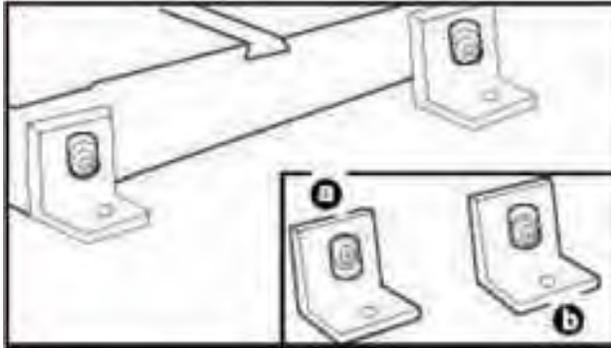


3. Slide the resaw guide onto the fence by sliding the nuts into the slot (a) in the fence, from the rear.

4. Position the resaw guide along the fence, lining up the center of the guide with the blade of the saw.

LEVELING THE FENCE

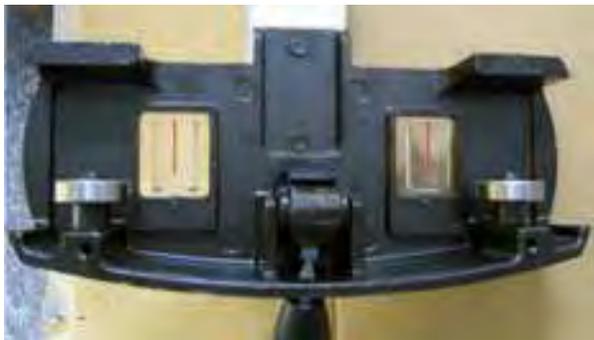
The fence should be parallel to the bandsaw's table and sit approximately 2 mm above the table's surface (so the fence will not scratch the table and a thin work piece will not get stuck or jammed under the fence.)



1. To level and adjust the height of the fence, loosen the hex nuts that hold the mounting brackets to the table (see image left), and raise **a** or lower **b** the front and rear rails along the elongated holes in the mounting brackets. Level the fence, front and back as needed, and set the spacing between the bottom of the fence and the table to 2mm (approx.) as shown in image right. Then, tighten the hex nuts to lock the rails in position.

VERTICAL ADJUSTMENT OF THE FENCE 90° TO THE TABLE

Place a machinist square on the table against the fence (See Step 4 below) and, either by eye or with a feeler gauge, look for a gap between the square and the fence (bottom and top) or the table. If needed, adjust as follows.



1. Remove the fence from the rails and turn it up side down.



2. With a 5 mm Allen key, loosen the set screw (without removing it).
3. Put the fence back on the rails, but do not engage the locking handle to lock the fence.



4. Reposition the square on the table against the fence as a reference.



5. With a flat head screwdriver, slowly turn the screw **a** (eccentric shaft) on the fence base. This will tilt the fence slightly, allowing you to eliminate the gap between the square and either the fence or the table.

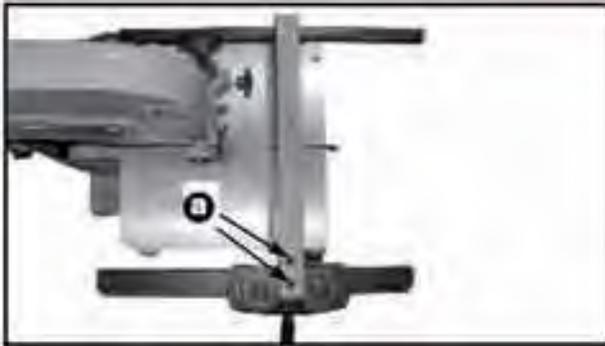
6. With the fence adjusted 90° to the table, remove it from the rails, turn it up side down and retighten the set screw to lock the fence in place.

ALIGNMENT OF THE FENCE PARALLEL TO THE MITER SLOT

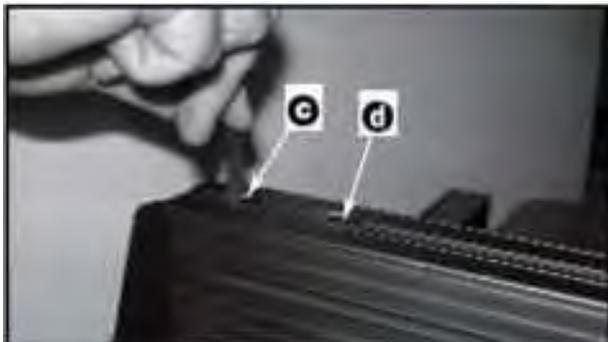
To make satisfactory rip cuts, your fence must be aligned perfectly parallel with the miter slot in the table. Slide the fence over to the T-slot on your saw, as shown in the second diagram. Lock down the fence handle and make a visual check to verify if the fence is parallel with the T-slot along its entire length. You can also place a small block of wood, upright into the T-slot and slide it from front to back checking its distance from the face of the fence.

If the fence is not parallel, it can be adjusted as follows:

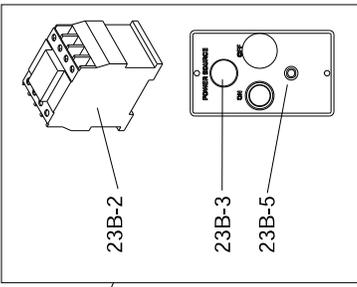
1. Make sure the guide fence is locked on the rails (locking handle down).
2. With a 8 mm Allen key, loosen (without removing) both screws **a** that attach the fence to the fence base.
3. Manually adjust the fence **b**, so that it is parallel with the miter slot **c**.



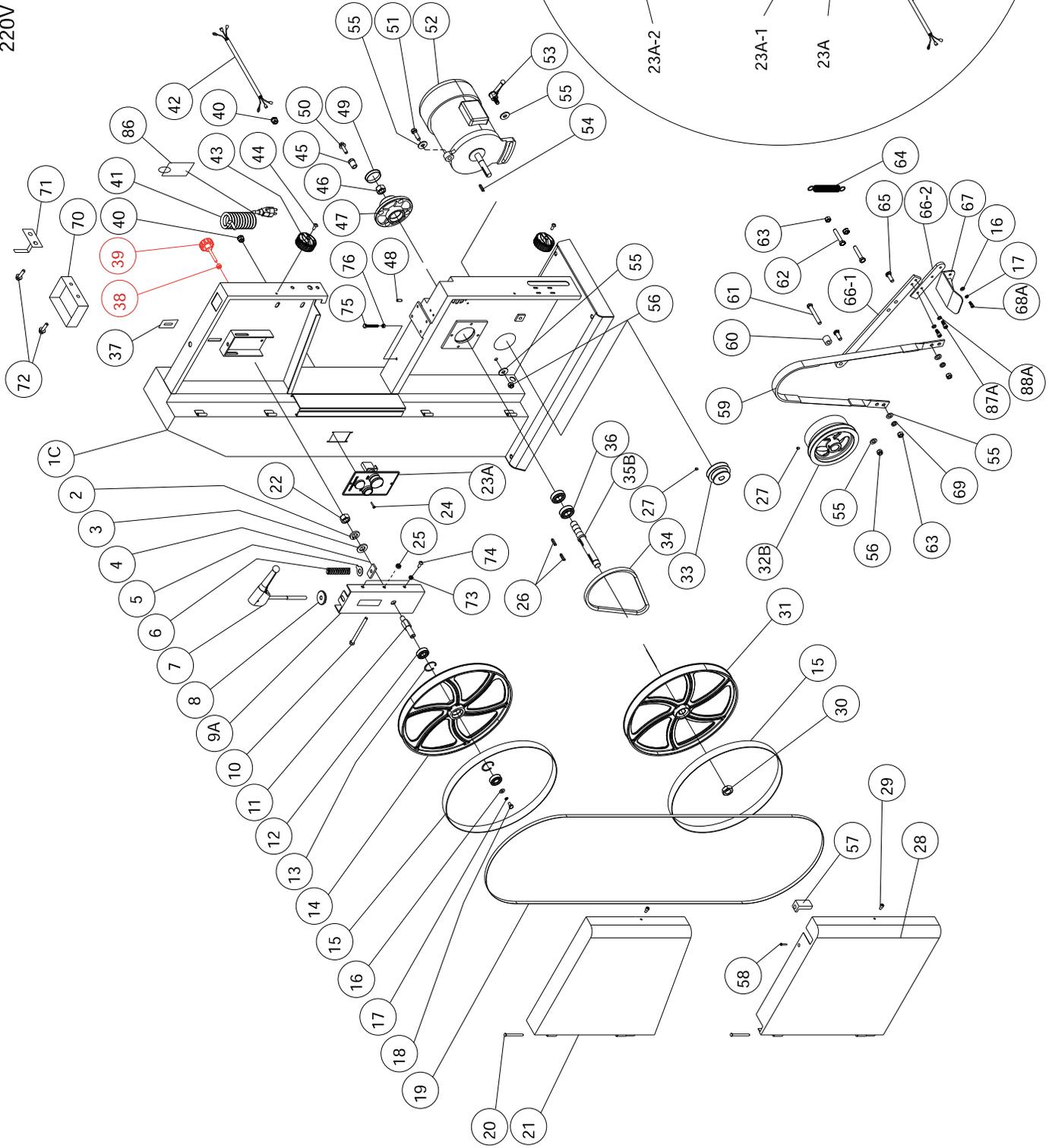
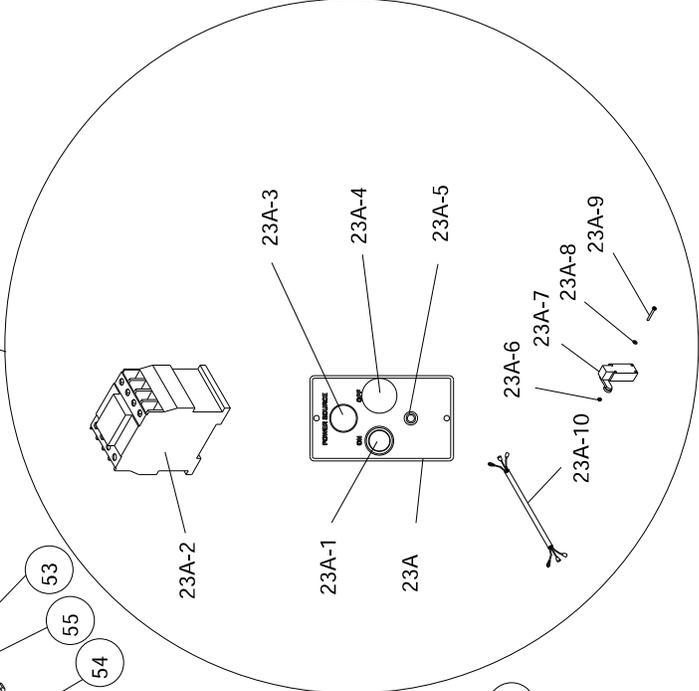
4. Hold the fence in place with one hand and tighten the first screw **c**.
5. If needed, adjust a little further with the remaining bit of play, then tighten the second screw **d**.

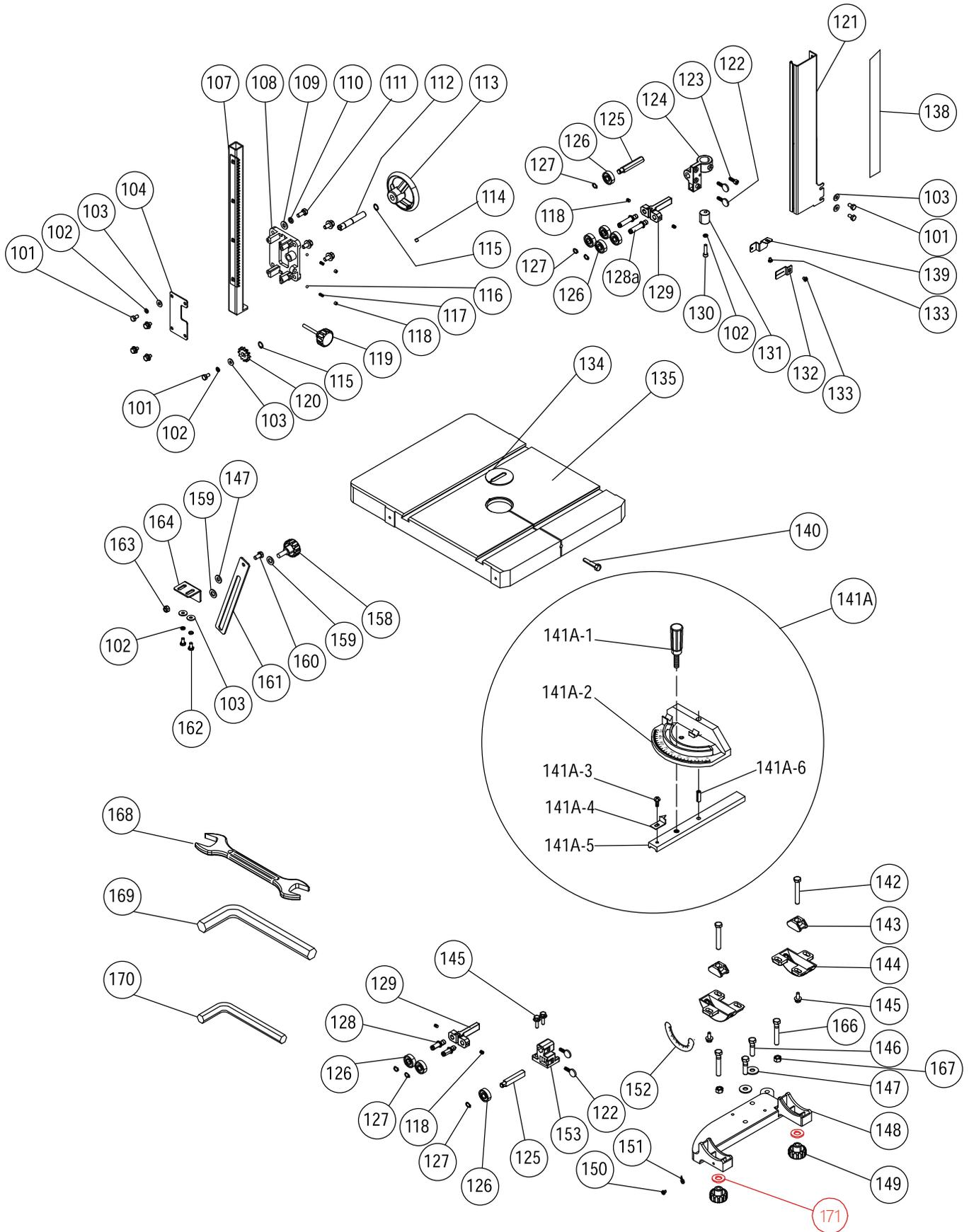


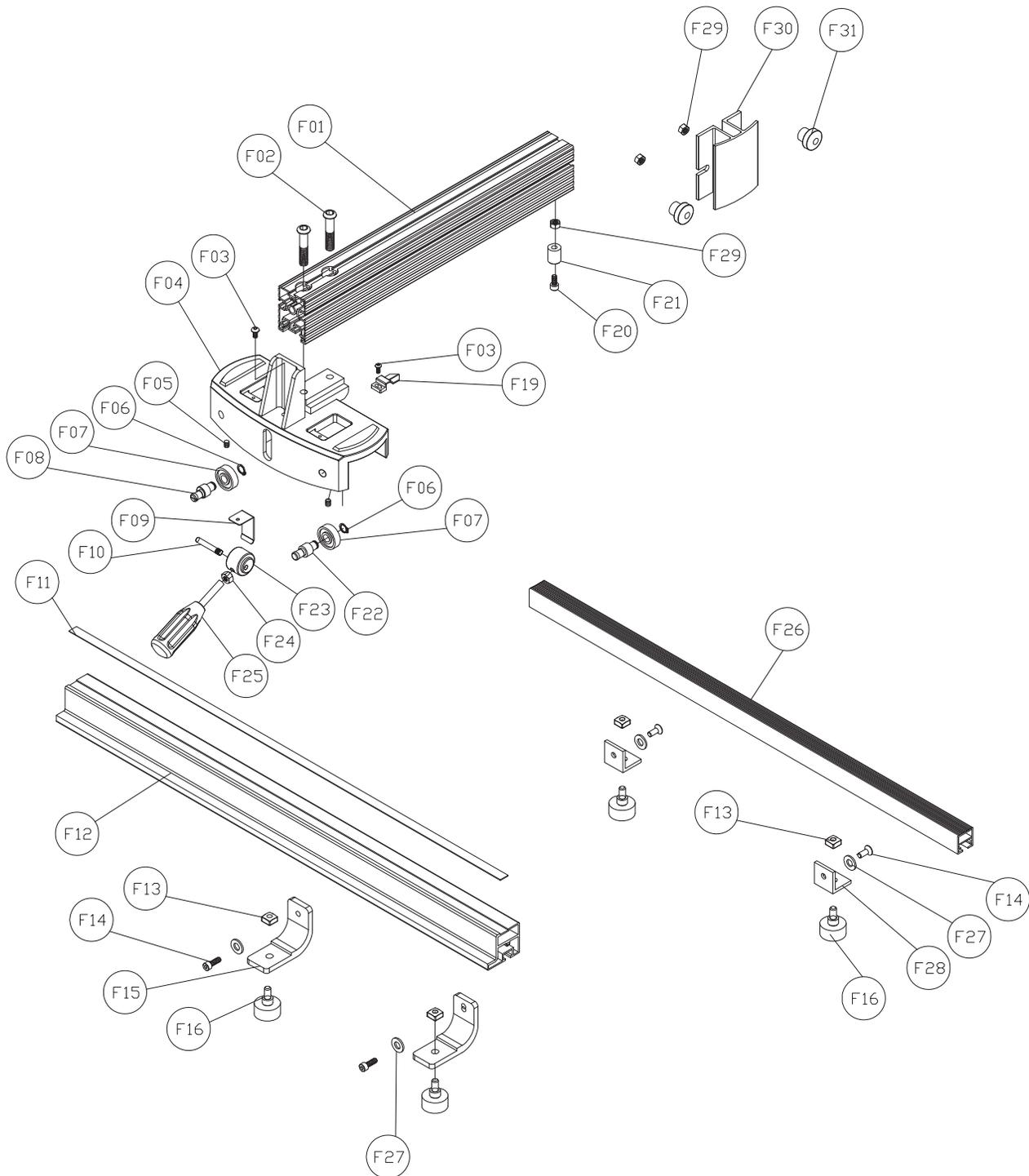
220V CONVERSION
23B



MAG. SWITCH ASSY
23A







PARTS LIST FOR MI-91500

PART NO.	DESCRIPTION	SPECIFICATION	QTY
MI-91500-001C	SAW FRAME		1
MI-91500-002	LOCK WASHER	1/2 "	1
MI-91500-003	WASHER	1/2 "	1
MI-91500-004	SQUARE NUT		1
MI-91500-005	POINTER		1
MI-91500-006	SPRING		1
MI-91500-007	HANDLE		1
MI-91500-008	WASHER		1
MI-91500-009A	UPPER WHEEL BRACKET		1
MI-91500-010	SCREW		1
MI-91500-011	UPPER WHEEL SHAFT		1
MI-91500-012	BEARING	6202ZZ	2
MI-91500-013	C-RING	R-35	2
MI-91500-014	UPPER WHEEL		1
MI-91500-015	TIRE		1
MI-91500-016	WASHER	1/4 "	1
MI-91500-017	LOCK WASHER	1/4 "	1
MI-91500-018	HEX BOLT	1/4-1/4"	1
MI-91500-019	BLADE (SEE MI-91500-B34)		1
MI-91500-020	HINGE PIN		4
MI-91500-021	UPPER DOOR		1
MI-91500-022	NUT	1/2 "	2
MI-91500-023A	SWITCH ASSEMBLY		1
MI-91500-023A-1	ON SWITCH		1
MI-91500-023A-2	CONTACTOR	110V	1
MI-91500-023A-3	POWER LIGHT	110V	1
MI-91500-023A-4	OFF SWITCH		1
MI-91500-023A-5	OVERLOAD SWITCH	110V / 15A	1
MI-91500-023A-6	NUT	M4	4
MI-91500-023A-7	LIMIT SWITCH		1
MI-91500-023A-8	WASHER	M4	4
MI-91500-023A-9	SCREW	M4x35	4
MI-91500-023A-10	WIRE		1
MI-91500-023B	220V CONVERSION		1
MI-91500-023B-2	CONTACTOR	220V	1
MI-91500-023B-3	POWER LIGHT	220V	1
MI-91500-023B-5	OVERLOAD SWITCH	220V / 7A	1
MI-91500-024	PHILLIPS HD. SCREW	M4	2
MI-91500-025	NUT	M8	1
MI-91500-026	KEY	5x5	1
MI-91500-027	SET SCREW	1/4-3/8"	2
MI-91500-028	LOWER DOOR		1
MI-91500-029	CAP SCREW	1/4-3/8" "	2
MI-91500-030	HEX NUT (LH)	3/4 "	1
MI-91500-031	LOWER WHEEL		1
MI-91500-032B	PULLEY		1
MI-91500-033	MOTOR PULLEY		1
MI-91500-034	DRIVE BELT	A-33	1
MI-91500-035B	SHAFT		1
MI-91500-036	BEARING	6005ZZ	2
MI-91500-037	BLADE TENSION SCALE		1
MI-91500-038	HEX NUT	5/16 "	2
MI-91500-039	KNOB		2
MI-91500-040	RETAINER		2
MI-91500-041	POWER CORD		1
MI-91500-042	MOTOR CORD		1
MI-91500-043	DOOR LOCK KNOB		2
MI-91500-044	CAP SCREW	1/4-3/4" "	3
MI-91500-045	ADJUSTING SCREW		4

PARTS LIST FOR MI-91500

PART NO.	DESCRIPTION	SPECIFICATION	QTY
MI-91500-046	HEX NUT	3/4"	1
MI-91500-047	BEARING HOUSING		1
MI-91500-048	PIN	6mm	2
MI-91500-049	COVER		1
MI-91500-050	HEX SCREW	3/8"-1 1/2	4
MI-91500-051	HEX SCREW	3/8"-2 1/2"	2
MI-91500-052	MOTOR		1
MI-91500-053	LEVER	3/8"-1"	1
MI-91500-054	KEY	5x5	2
MI-91500-055	WASHER	3/8"	1
MI-91500-056	HEX NUT	3/8"	1
MI-91500-057	WHEEL BRUSH		1
MI-91500-058	HEX BOLT	3/16"	1
MI-91500-059	BRAKE BELT		1
MI-91500-060	SHAFT		1
MI-91500-061	SCREW	3/8"-2 1/2"	1
MI-91500-062	SCREW	3/8"-2"	1
MI-91500-063	NUT	3/8"	3
MI-91500-064	SPRING		1
MI-91500-065	SCREW	3/8"-1 1/4"	1
MI-91500-066-1	BRAKE BAR(LONG)		1
MI-91500-066-2	BRAKE BAR(SHORT)		1
MI-91500-067	BRAKE BAR		1
MI-91500-068A	CAP SCREW	1/4"-3/4"	1
MI-91500-069	LOCK WASHER	3/8"	2
MI-91500-070	MITER GAUGE STORAGE BRACKET		2
MI-91500-071	RIP FE		1
MI-91500-072	HEX HEND BOLT	1/4"-3/4"	1
MI-91500-073	NUT		4
MI-91500-082	LABEL		1
MI-91500-083	LABEL		1
MI-91500-084	ELECTRIC WARNING LABEL		1
MI-91500-085	MACHINE PLATE		1
MI-91500-086	LABEL		1
MI-91500-087A	CAP SCREW	3/8"-1"	2
MI-91500-088A	LOCK WASHER	3/8"	2
MI-91500-101	HEX BOLT	3/16"	1
MI-91500-102	LOCK WASHER	1/4"-3/8"	4
MI-91500-103	WASHER	1/4"	16
MI-91500-104	GUIDE BAR COVER	1/4"	1
MI-91500-107	GUIDE BAR		1
MI-91500-108	BRACKET		1
MI-91500-109	WASHER	5/16"	4
MI-91500-110	LOCK WASHER	5/16"	4
MI-91500-111	HEX BOLT	5/16"-5/8"	4
MI-91500-112	SHAFT		1
MI-91500-113	HAND WHEEL		1
MI-91500-114	SET SCREW	1/4 "	1
MI-91500-115	C-RING	S13	1
MI-91500-116	BALL		2
MI-91500-117	SPRING		2
MI-91500-118	SET SCREW	1/4 "	6
MI-91500-119	KNOB		1
MI-91500-120	GEAR		1
MI-91500-121	BLADE GUARD		1
MI-91500-122	THUMB SCREW	1/4-3/4" "	2
MI-91500-123	HEX BOLT	1/4-3/4" "	1
MI-91500-124	UPPER BLADE GUIDE HOLDER		1
MI-91500-125	BEARING SHAFT		1

PARTS LIST FOR MI-91500

PART NO.	DESCRIPTION	SPECIFICATION	QTY
MI-91500-126	BEARING	6200ZZ	6
MI-91500-127	C-RING	S-10	6
MI-91500-128	BEARING SHAFT		2
MI-91500-128A	BEARING LONG SHAFT		
MI-91500-129	BEARING MOUNT		2
MI-91500-130	CAP SCREW	1/4-3/4" "	1
MI-91500-131	GUARD POST		1
MI-91500-132	POINTER		1
MI-91500-133	PHILLIPS HD. SCREW	3/16 -1/2" "	2
MI-91500-134	TABLE INSERT		1
MI-91500-135	TABLE		1
MI-91500-138	SCALE		1
MI-91500-139	POINTER PLATE		1
MI-91500-140	TABLE ALIGNMENT PIN	3/8-2/1/2" "	2
MI-91500-141A	MITER GAUGE		2
MI-91500-141A-1	LOCKING KNOB		1
MI-91500-141A-2	GAUGE BODY		1
MI-91500-141A-3	PHILLIPS HD. SCREW	3/16 - 1/4" "	1
MI-91500-141A-4	POINTER		1
MI-91500-141A-5	GAUGE BAR		1
MI-91500-141A-6	BLOCK		1
MI-91500-142	HEX BOLT	3/8 - 2-1/2"	2
MI-91500-143	TRUNNION CLAMP SHOE	5/16-3/4"	4
MI-91500-144	TRUNNION	5/16-1 1/4"	4
MI-91500-145	SHOULDER BOLT	1/4-20P*3/4"	8
MI-91500-146	HEX BOLT	5/16 - 1-1/4"	1
MI-91500-147	WASHER	3/8 "	2
MI-91500-148	TABLE TILT BRACKET	3/16 -3/4	2
MI-91500-149	LOCK KNOB	3/8 "	1
MI-91500-150	PHILLIPS HD. SCREW	3/16 - 1/4"	1
MI-91500-151	POINTER		1
MI-91500-152	SCALE	1/4-3/4"	2
MI-91500-153	LOWER BLADE GUIDE HOLDER		1
MI-91500-158	LOCK KNOB	5/16 "	1
MI-91500-159	WASHER	3/8 "	1
MI-91500-160	HEX BOLT	1/4 "	2
MI-91500-161	ANGLE ADJUSTMENT BRACKET	1/4 "	1
MI-91500-162	HEX BOLT	1/4 - 5/8" "	1
MI-91500-163	HEX NUT	3/8-1 "	1
MI-91500-164	BASE	3/8 "	1
MI-91500-166	HEX BOLT	3/8-1 "	2
MI-91500-167	HEX NUT	3/8 "	2
MI-91500-168	OPEN END WRENCH	10 x 12	1
MI-91500-169	ALLEN KEY	5 mm	1
MI-91500-170	ALLEN KEY	3 mm	1
MI-91500-171	FLAT WASHER	3/8"-19	2
MI-91500-F01	FENCE BODY		1
MI-91500-F02	CAP SCREW	10*16	2
MI-91500-F03	BUTTON HEAD SCREW	5*10MM	2
MI-91500-F04	FENCE BASE		1
MI-91500-F05	SET SCREW	1/4*1/4"	2
MI-91500-F06	EXTERNAL RETAINING RING	S10	1
MI-91500-F07	BEARING		2
MI-91500-F08	ECCENTRIC SHAFT		1
MI-91500-F09	PRESSURE PLATE		1
MI-91500-F10	PIN		1
MI-91500-F11	SCALE		1
MI-91500-F12	FENCE RAIL FRONT		1

PARTS LIST FOR MI-91500

PART NO.	DESCRIPTION	SPECIFICATION	QTY
MI-91500-F13	SQUARE NUT	5/16 "	4
MI-91500-F14	CAP SCREW		4
MI-91500-F15	L TYPE PLATE		2
MI-91500-F16	KNOB	5/16*5/8"	2
MI-91500-F19	POINTER		1
MI-91500-F20	HEX BOLT	1/4*3/4"	1
MI-91500-F21	RUNNER		1
MI-91500-F22	BEARING SHAFT		1
MI-91500-F23	LOCK MECHANISM		1
MI-91500-F24	HEX NUT	8MM	1
MI-91500-F25	FENCE HANDLE		1
MI-91500-F26	REAR RAIL		1
MI-91500-F27	FLAT WASHER	1/4 "	4
MI-91500-F28	L BRACKET		2
MI-91500-F29	HEX NUT	1/4 "	2
MI-91500-F30	RESAW ATTACHMENT		1
MI-91500-F31	KNOB	1/4*3/8"	2