Edge Finisher Machine

Model EF-2000

Instruction Manual

5/14/18 n

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Blackstone Industries, LLC
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BLACKSTONE INDUSTRIES, LLC

EC Declaration of Conformity

Product Identification

Product Name: Edge Finisher
Brand: Edge Finisher Co.
Model Number: EF-2000 CE
Serial Number:
(Serial number to be written or typed in if required to accompany a shipment.)

Manufacturer

Name: Edge Finisher Company, A Division of Blackstone Industries, LLC
Address: 16 Stony Hill Road, Bethel, CT 06801, USA

Authorized Representative / Distributor in Europe

Name:
Address:
(To be filled in if requested by a representative or distributor.)

Means of Conformity

Edge Finisher Company declares that the product listed is in conformity with the essential requirements and provisions of the Council Directives.

Applicable Directives:
Machinery Directive: 2006/42/EC
Low Voltage Directive: 2014/35/EU
Electromagnetic Compatibility: 2014/30/EU
Harmonized Standards:
Safety of Machinery EN 60204-1;
Basic and Safety Principles IEC 60446; Risk Assessment ISO/TR 14121-2;
Electromagnetic Compatibility IEC 61000-6-3 ED2.0

Signatures

Place: Blackstone Industries, LLC, 16 Stony Hill Rd., Bethel, CT. 06801

Kishore Reddy

_____
Kishore Reddy, Electrical Design Engineer
Date: 5-4-2018

EF-2000
Principle of Operation

The EF-2000 Edge Finisher is used to put a flat, clear finish on the edge of a saw-cut plastic workpiece. The workpiece is placed, cut edge down, into a belt feed drive, which firmly grips it and moves it over a tool mounted on a precision spindle. The spindle rotates at a high rate of revolutions per minute. The tool has two diamond cutter inserts which provide the cut and polished finish to the workpiece edge. When the workpiece exits the belt feed drive, the edge is flat, with a clarity equal to the surfaces of the piece.

General Safety Instructions

Before installing, adjusting or operating this machine, be sure to read all of the instructions carefully and completely!

- Follow all local electrical and safety codes.
- Always disconnect power before working on or near a motor or its connected load. If the power disconnect point is out of sight, lock it in the open position and tag to prevent unexpected application of power.
- Be careful when touching the exterior of an operating motor as it may be hot enough to be painful or cause injury. With modern motors, this condition is normal if operated at rated load and voltage. Modern motors are built to operate at higher temperatures.
- Make certain that the power source conforms to the requirements of your equipment.
- When cleaning electrical or electronic equipment, always use an approved non-flammable cleaning agent.
- Do not attempt to operate this machine without guards and appropriate personal safety equipment.
- As with any high speed machine, safety is a foremost requirement. Never put hands between belts when machine is running. A safety interlock will disconnect cutter motor when the Belt Drive Guard is opened for cutter examination or replacement.

- **Keep guards in place**
- **Remove adjusting keys and wrenches**
- **Keep work area clear**
- **Never put loose pieces of material over cutter when running**

Specifications and Electrical Requirements

Cutter Drive Motor:	2 HP (1.5KW) 220V/3-Phase/60Hz, 3450 RPM
Spindle RPM (via pulleys):	23,000 RPM
Cutter:	2 tooth inserts - PCD and Natural Diamond
Belt Drive Motor:	1/8 HP (95W). Motor input is 0-90V/DC from electrical controller. Belt speed is adjustable from 0 to approximately 16 feet per minute.
Electrical Supply:	Dedicated 220V/AC, 3-Phase, 60Hz, 15 Amps. Circuit Breaker or Fuse protection, Motor - Starting Time Delay Type.

All bearings and belt drive motor gearhead are permanently lubricated.

Operating Safety Warnings and Precautions

Keep hands, hair, and clothing clear of the rotating cutter tool. Do not insert hands in moving feed belt.

Do not wear loose clothing or jewelry. Keep long hair covered or tied back.

When operating, this machine produces sound levels which may cause permanent hearing damage within 10 feet (3 meters) of the machine. Always wear approved ear protection when the machine is running.

Do not insert hands into feed belt mechanism when machine is running, or when it is in start condition. When replacing or adjusting the spindle drive belt, make sure that the main disconnect is off.

Mechanical and electrical trouble shooting and maintenance are to be performed only by qualified personnel. Before opening the electrical cabinet or the main access door, the main disconnect switch must be off and locked out.

Vacuum Requirements

Quality of finish is one of the primary reasons behind the use of a vacuum system. If chips are not removed from the cutting area, the workpiece is prone to defects, such as drag marks across the surface of the material. Also, plastic debris may build-up on the diamond's cutting edge, which can lead to a reduction in "edge life" (the length of time the blade maintains a sharp cutting edge). Keeping the top plate and surrounding area free of chips maintains a clean surface to locate the workpiece. A functional vacuum system is also desirable in terms of an orderly, clean, and safe working environment.

A system to remove cut plastic debris from the cutting area and surface of the machine has been developed. The EF-2000 is designed to allow for an easy set-up of a vacuum system. There is a vacuum port located in the top plate of the machine, which allows for chip removal from the cutting area. The top plate vacuum port is connected to a vacuum exit port on the side of the machine. The exit port is provided for attachment of an exterior vacuum source, such as a shop vac. Most commercially available shop vacs are suitable for use with the EF-2000.

Set Up Instructions

1. Provide a suitable location allowing space for the operator and sufficient clearance to handle large sheets on both infeed and outfeed tracks. We suggest an area of 6 feet wide by 15 feet long (2m x 5m).

2. Using a spirit level or carpenter's level on the top plate, level the machine in two axes, side to side and front to back, by adjusting the mounting pads. Ensure that all four pads are in contact with the floor so that the machine cannot rock. Then tighten the jam nuts to lock the leveling pads in place.

3. Fasten the tracks to the machine top using the 10-32 x 1″ socket head cap screws provided. The bolt hole patterns on each track are different, so they will assemble only the correct way. Be sure the machine top surface and the underside of the tracks are free of chips and debris prior to assembly. Bolt on the turnbuckle supports.

4. With the cutter removed, use a long, accurate straight edge to adjust the left track first using the turnbuckle so that the track's top face is completely flat. Repeat procedure for the right track. Note: Track heights are different from one another by around .015″ to compensate for material removal.

5. Connect the vacuum exit port to the shop dust collection system.

6. Connect the electrical plug to a dedicated 220V three phase, 15 Amp, 60 Hz electrical supply, capable of supplying the momentary starting 30 Amperage inrush current.

7. Install the cutter on the spindle mounting plate. ***See Precision Adjustable Spindle Instructions on page 11.***

8 Remove all tools and loose items from the machine table before operating the machine.

Operating Instructions

The EF-2000 Edge Finisher is designed to remove .017″– .025″ (.44mm – .65mm) of material in one pass through the machine. Material may be run individually or in stacks up to a total thickness of 2″ (50mm). Be advised, as with any cutting process regardless of material type, cut edge quality is reduced significantly on stacks of four or more parts, irrespective of part thickness.

Before using this machine, read and observe all operating safety warnings and precautions!

Caution: **Never run material through the Edge Finisher machine on the tracks unless the spindle is rotating, as serious damage to the cutter may result.**

1. Before operating this machine, make sure that the main disconnect switch on the control panel is in the ***"ON"*** position and that the emergency stop switch is pulled out in the ***"RESET"*** position. Make sure the tracks are clean and free of chips.

2. With the belt drive and the cutter in the stopped position, insert the plastic sheet between the belts with both Cam Adjust Levers wide open.

Caution: **Do not advance the workpiece beyond the end of the infeed rail. If the workpiece touches the diamond inserts when the cutter is not rotating, they may be damaged or destroyed.**

3. Close both Cam Adjust Levers to snug up the acrylic sheet(s) for proper grip and central alignment with the cutter head.

4. Turn up the speed control to #40 (5″/min / 1.52m/min.) and start the spindle motor by pushing the start button on the electrical panel.

Note: **On first use, make sure that the cutter is rotating in a counter-clockwise direction. If it is not, shut down the machine and turn the Main Disconnect switch to the *"OFF"* position. Have an electrician interchange the white and red wires connected to terminal block terminals 108 and 109 in the Electrical Box. Refer to *Location of Components* on page 18, and *Wiring Diagram* on page 20. Re-check the spindle rotation. If spindle rotation is counterclockwise, proceed with next step.**

5. Turn on vacuum dust collector system.

6. Place plastic on the infeed track pushing down squarely against the track, and push workpiece inward until the belts take hold of the material. ***This will feed the workpiece over the cutter and on to the exit rail. When the workpiece leaves the pressure plates, the spring loaded pressure plate opposite the operator should spring closed slightly, about 3/16″– 1/4″ (4.7mm – 6.5mm), indicating that there is sufficient pressure on the plastic going through the machine.***

> ***Caution:*** **Slight pressure downward on the workpiece may be required until the belt grips firmly, but never push on the workpiece when it is over the cutter.**

7. After workpiece is ejected, check for quality of finish. If the finish is unsatisfactory, check the cutter height, the feed speed, the infeed and outfeed rails for flatness, and consult ***Hints for Obtaining Best Results*** on page 10.

8. If the trial workpiece is satisfactory, proceed with production.

Hints for Obtaining Best Results

1. Keep cutter sharp. ***Never touch the diamond inserts with any object including your fingers and the tool height gauge.*** Clean the diamond inserts occasionally with a Q-tip dipped in denatured alcohol. If you run with the paper masking or plastic protective coat on the plastic, this cleaning will be required much more often.

2. Be sure cutter is set at correct height. ***See page 11 Precision Adjustable Spindle Instructions.*** A cutter set too high can cause the workpiece to upset or shift during the cutting operation. A cutter set too low can cause a small step to be cut into the work piece near the front of the part.

3. Adjust speed of belts for optimum cut. Generally the thicker the plastic, the slower the feed speed. Chipping may occur if the feed speed is too high.

4. Do not over-tighten the belt feed pressure. It is important to adjust to obtain a proper grip while spindle and feed motors are both off. (See page 8, step 3). Similarly, be sure the grip isn't too loose as the workpiece may upset during the cutting operation.

5. Four guide wheels are supplied with the Edge Finisher for supporting large sheets or strips exceeding 18″ (46 cm) in height. Adjust the four guide wheel supports so that the wheels lightly touch the plastic sheet when the sheet is clamped between the drive heads.

6. To prepare parts for edge finishing, be sure the initial cut (table or panel saw) is even and straight. This will ensure the finish cut through your Edge Finisher machine will clean up the workpiece evenly in one pass through the machine.

7. **When running a stack of material through the Edge Finisher, be sure the individual pieces in the stack are firmly in contact with the track. This will help to ensure all pieces will clean up completely. Also, check to be sure that frayed edge of paper masking doesn't prevent any of the workpieces from having clean contact with the track. Keeping the track clear of cut plastic debris can similarly prevent uneven contact between workpiece and track.**

Note: When the material you are running has paper masking, the cutter wipes the adhesive over the edge being polished. Before inspecting the edge, be sure to wipe off the edge carefully to remove the streaks of adhesive.

Precision Adjustable Spindle Instructions

This machine is equipped with a high precision adjustable spindle. Proper care and use will assure many years of service.

Caution: **Be sure the main disconnect switch is in the *"OFF"* position before proceeding.**

To Adjust Spindle with New Cutter

1. Loosen the feed belt assembly hex head screws and pivot the feed belt assemblies to the open position. This will allow access to the cutter.

Caution: **When mounting or dismounting cutters on the spindle, be careful to avoid touching the teeth of the cutter with tools, fingers, pieces of plastic, brushes, or cleaning cloth. The diamond inserts are very hard, but also brittle and sharpened to microscopically fine edges, which can easily chip.**

2. Check that the cutter and the spindle mounting plate are clean and free of chips. If the cutter needs cleaning use compressed air. Fasten new cutter to spindle with four, #10-32 x 3/4″ socket head cap screws, supplied. Make sure the screws are tight while exercising care to avoid contacting the cutter's diamonds with the hex wrench.

3. Turn the motor mount handle one turn to loosen the spindle drive belt so that the spindle pulley turns freely.

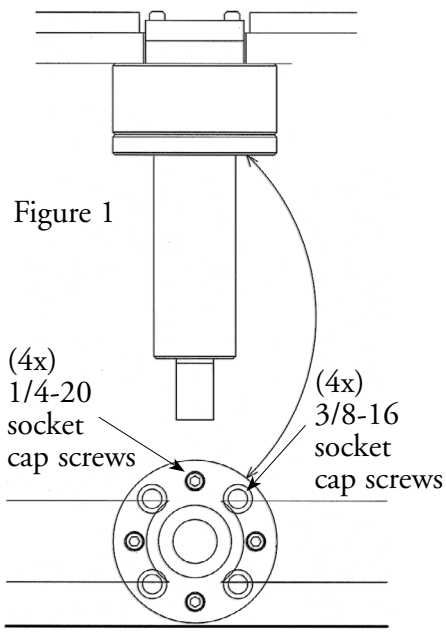


Figure 1

4. Loosen the four 1/4-20 socket head cap screws on the spindle flange approximately one half turn. Do not loosen the four 3/8-16 socket head cap screws used to mount the spindle, shown at left.

5. Make sure the outfeed track is clean and free of chips. Place the indicator, mounted on its base, on the outfeed track of the machine so that the indicator's tip touches the track. Also, take note of the marks around the face of the dial indicator. Each mark represents .001″ (.025mm).

6. Twist the rim of the dial face until the zero mark aligns with the indicator needle as shown in Figure 2 below.

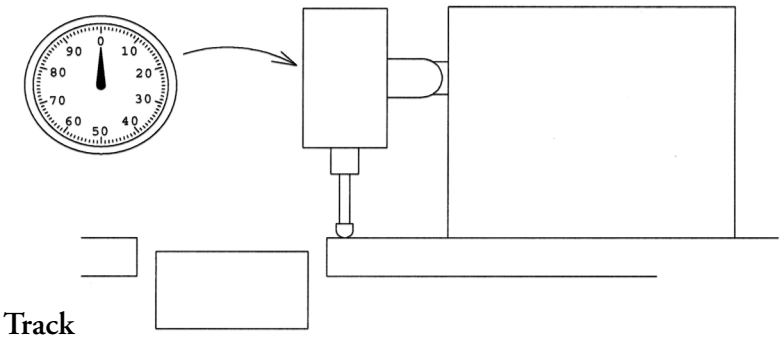


Figure 2
Indicator on Track

7. On the cutter face is stamped a ***Cutting Height*** number. This number (.240″ or 6.096mm) indicates the distance between the tip of the natural diamond and the face of the cutter. This cutter height reference number allows you accurately adjust the height of your cutter without placing the indicator tip directly on the diamond tips.

8. Move the dial indicator to the side of the diamond cutter nearest the outfeed rail, making sure that the stem of the indicator is on the body of the cutter. *Never touch the diamond tips of the cutter.* The reading on the indicator should read minus .242″–.243″ (forty two to forty three graduations past "0")(Metric = 6.14 – 6.17mm, 14 to 17 grad uations past "0") See Fig. 3.

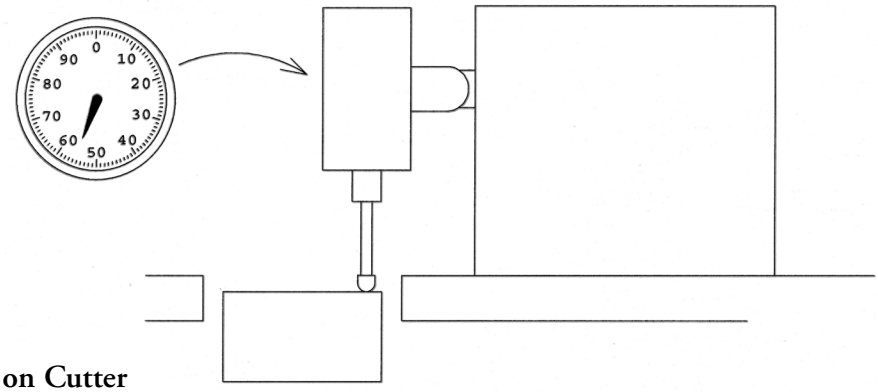


Figure 3
Indicator on Cutter

Caution: **Do not touch the teeth of the cutter with the indicator tip, your fingers, or anything else as damage to the cutter may result!**

9. Be sure that when you move the stem of the indicator down to the cutter body, the dial goes around counterclockwise two full turns from zero, and then continues until it reads minus .042″–.043″ past “0”. (Metric = 6 full turns from “0” and then continues until it reads minus 0.14 – 0.17mm past “0”.) This setting insures that enough material is removed so that the workpiece does not bump the outfeed rail, which causes a poor finish. The aim is to remove sufficient material to avoid bumping, and to leave a gap no greater than 0.002″ (0.050mm) between the workpiece and the outfeed rail.

10. If result is not within optimum range, grasp the body of the spindle and turn to raise or lower the cutter head. When looking down on the cutter head, turning the spindle body clockwise lowers the cutter head; turning counterclockwise raises it. If the indicated read ing is higher then the optimate range, turn the spindle clockwise to lower it. If it is lower, turn the spindle counterclockwise to raise the spindle.

11. Re-tighten the four 1/4″ socket head cap screws previously loosened. This may raise the cutter .001″ or .002″. This is not a problem.

12. After using the indicator, remove it from the machine and store it in a safe place.

13. Re-apply belt tension. Turn the motor mount handle counterclockwise to adjust the spindle belt to the proper tension. The proper tension is achieved when the belt deflects 1/8″ (3.2mm) when finger pushed midway between drive pulley and spindle.

14. Swing both feed belt assemblies toward the track as far as they will go and re-tighten the two 3/8-16 hex head screws which hold them in place. Remove all tools from the machine table.

Caution: **Never run material through the Edge Finisher machine on the tracks unless the spindle is turned on, as serious damage to the cutter will result.**

15. Turn on the Main Disconnect Switch and check that Emergency Stop Switch is pulled out in the “Reset” position.

16. Start the feed belt and spindle drive motors to check for vibration or any obstruction before setting up the machine to run material.

Troubleshooting Guide

Problem	Cause	Action
Spindle motor won't start	Main disconnect switch is off.	Turn on disconnect switch.
	Feed belts not in closed position, locking screws loose.	Close feed belts, tighten locking screws.
	Emergency stop switch not in reset position.	Pull out knob to reset position.
	Base access door open, not latched.	Close and latch the door.

Next three steps to be performed by qualified technician *only.*

	Main fuse(s) open.	Check for shorts in wiring, controls, motor. Replace fuse(s).
	5 amp. control fuse open.	Check for shorts in control circuit. Replace fuse.
	Motor starter overload tripped.	Check that the yellow trip adjust knob on the overload module is set to 5.5 Amps. Press the red re-set button on the overload module. Check that the cutter spindle rotates freely. Check spindle motor.

Troubleshooting Guide continued

Problem	Cause	Action
Belt drive motor won't start.	Belt drive rocker switch in *"OFF"* position.	Put the rocker switch in the *"ON"* position.
	Speed adjustment knob at minimum position.	Turn knob to desired setting.

Next two steps to be performed by qualified technician *only.*

	DC controller, no output.	Turn speed control knob fully clockwise, check voltage at terminals A1 and A2 on controller chassis. It should read 80-90 VDC. If A1 and A2 voltage is incorrect, replace controller.
	Belt drive gear motor.	If A1, A2 voltage is correct, check for obstructions in gearbox, check motor brushes for wear. Replace gear motor.
Spindle runs too hot.	Spindle belt tension is too high.	Reduce belt tension by turning motor mount handle clockwise until belt deflection at mid-point is 1/8″ (3.2mm).

Troubleshooting Guide continued

Problem	Cause	Action
Spindle speed sluggish.	Spindle drive belt too loose.	Adjust belt tension (see page 15). Worn spindle belt requiring replacement.
Spindle belt runs high or low on pulley.	Spindle and motor pulley not parallel.	Loosen and remove the belt. Slightly loosen the motor mounting bolts. With a machinist's square, adjust motor position so that the drive face of the pulley is square to the bottom of the top plate, and the bottom of the pulley is the same distance from the top plate as the bottom of the spindle pulley. Tighten the mounting bolts, replace the belt and adjust to proper tension by turning the motor mount crank handle until the belt deflection at midpoint is 1/8″ (3.2mm).

Replacement of Feed Belts

Note: **Before proceeding, ensure that the main disconnect switch is in the *"OFF"* position.**

1. Loosen and remove the jam nut that secures the cam lever to the cam adjustment shaft.

2. Loosen and remove both 1/4-20 x 5/8″ button-head cap screws that secure the guard to the feed assembly. Remove and set aside guard cover.

3. Loosen and remove both 1/4-20 x 1-1/4″ flat head screws from the pulley block and remove the pulley block. (The pulley block is located on the outfeed side of the belt feed assembly. The pulley block is the top plate that extends over the drive pulleys.)

4. Carefully remove the pulley cap and thrust bearing assembly and set aside.

5. At the front of the belt feed assembly (infeed side), carefully compress the belt and pulley inward to produce enough slack to slide the belt off of the outfeed pulley.

6. Install new belt by positioning it against pulley on the infeed side and compress belt and pulley against the spring in order to slide the belt over the pulley on the outfeed side.

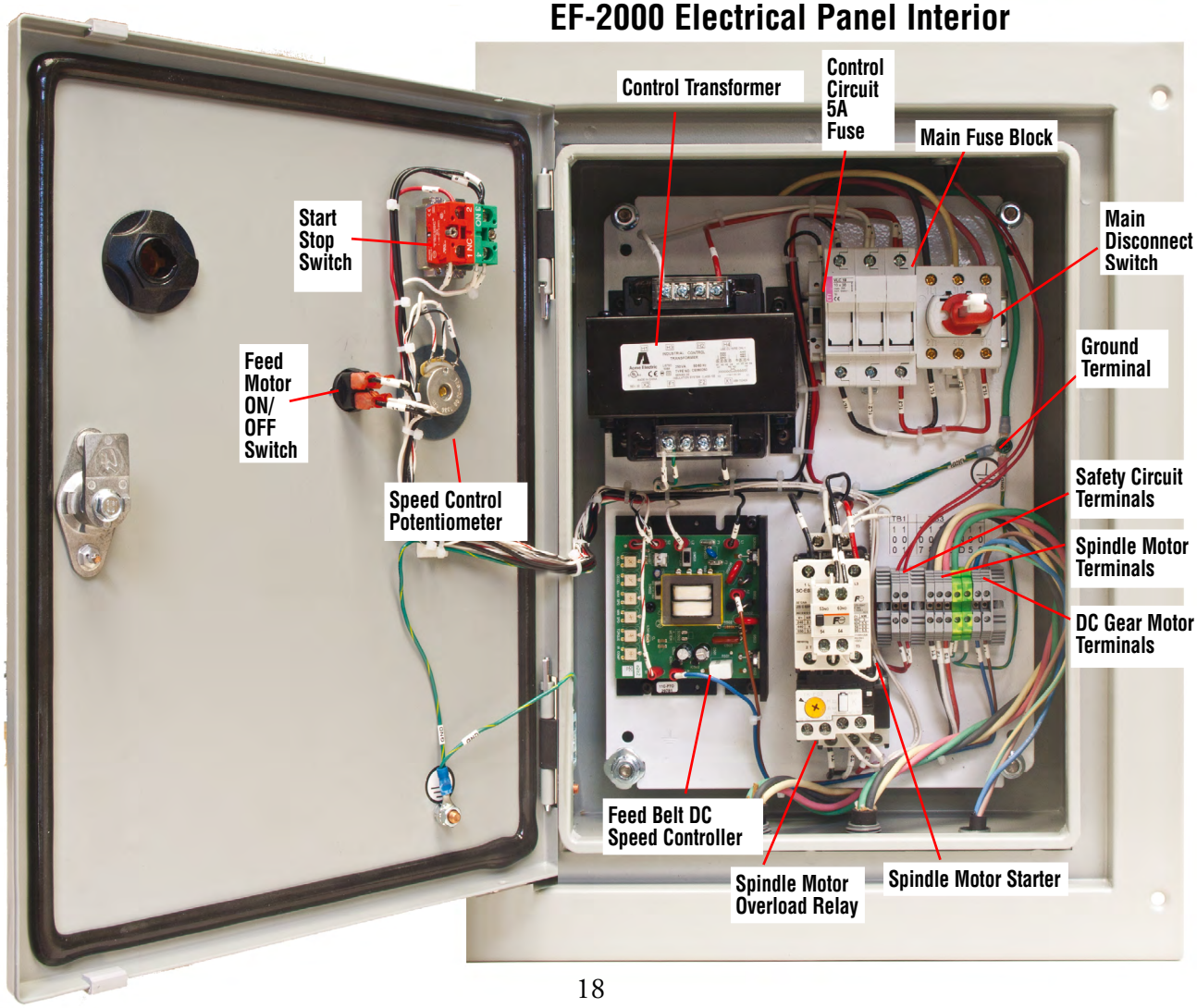
7. Re-install all parts in reverse order that they were removed.

8. Repeat steps 1–7 to replace belt on other belt feed assembly.

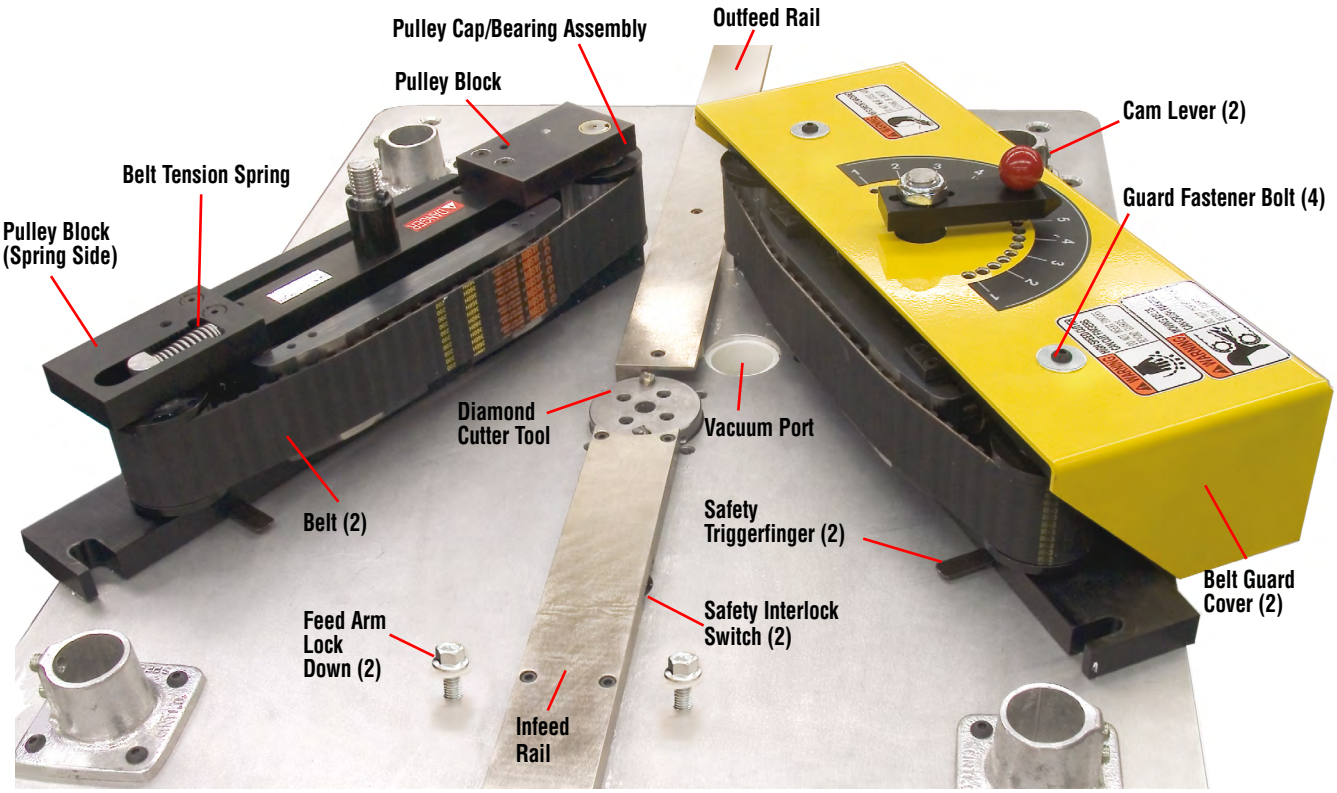
Location of Components

EF-2000
Electrical Panel Exterior

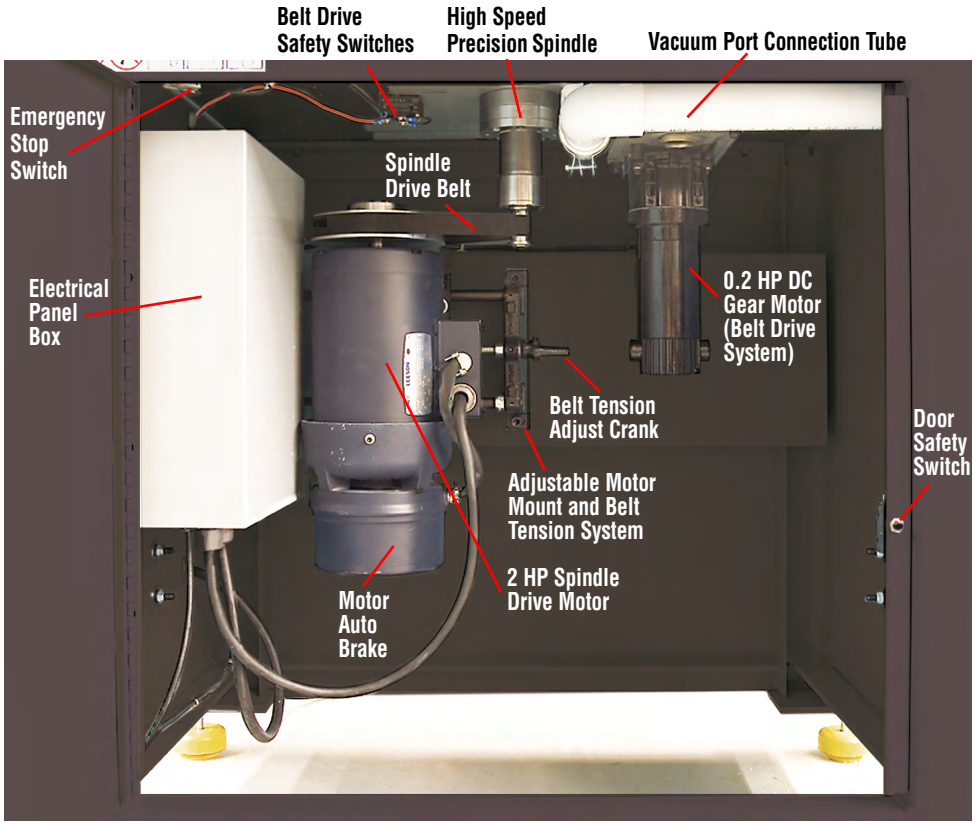
EF-2000 Electrical Panel Interior



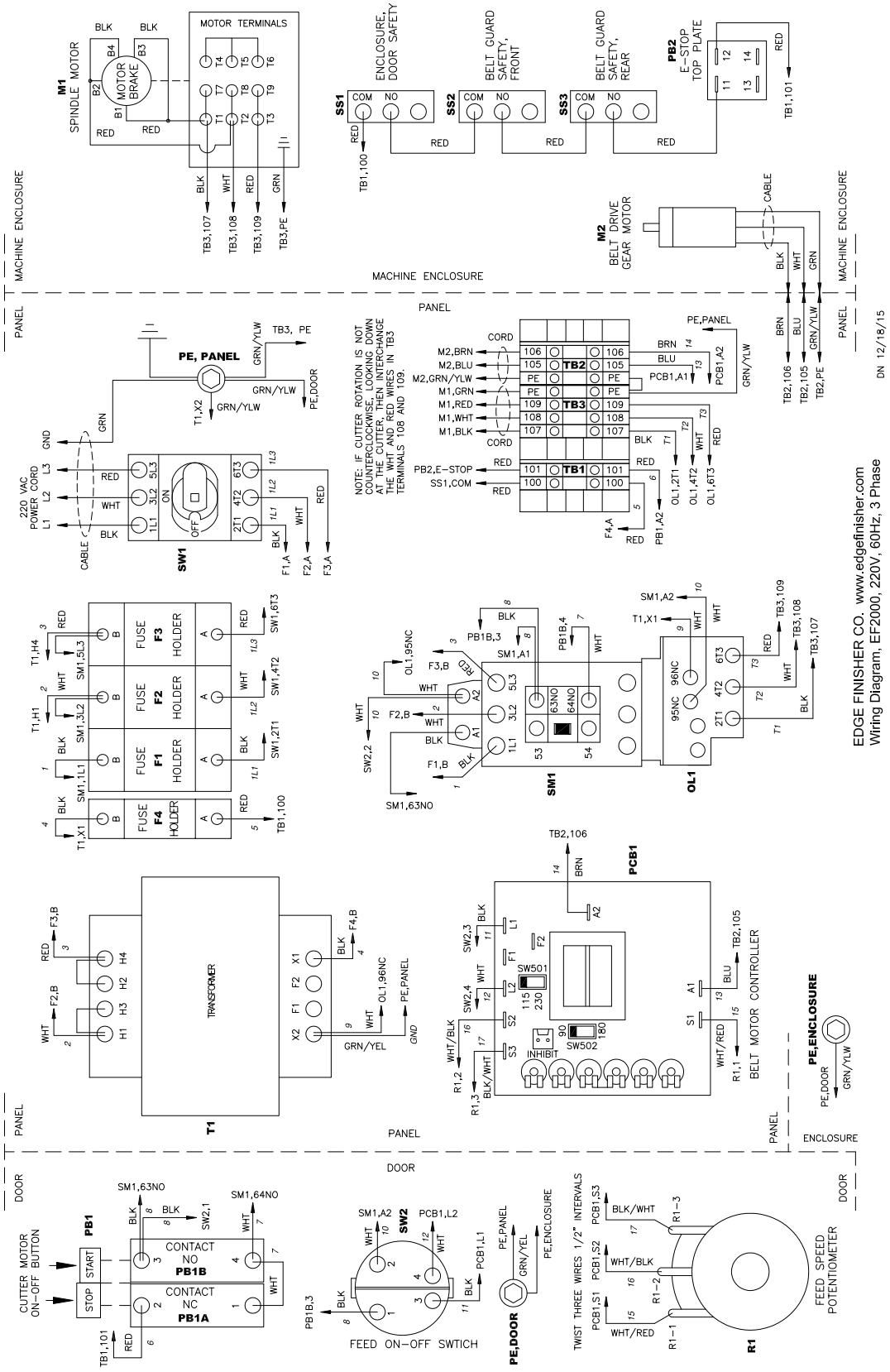
EF-2000 Feed Belt Assembly - Open



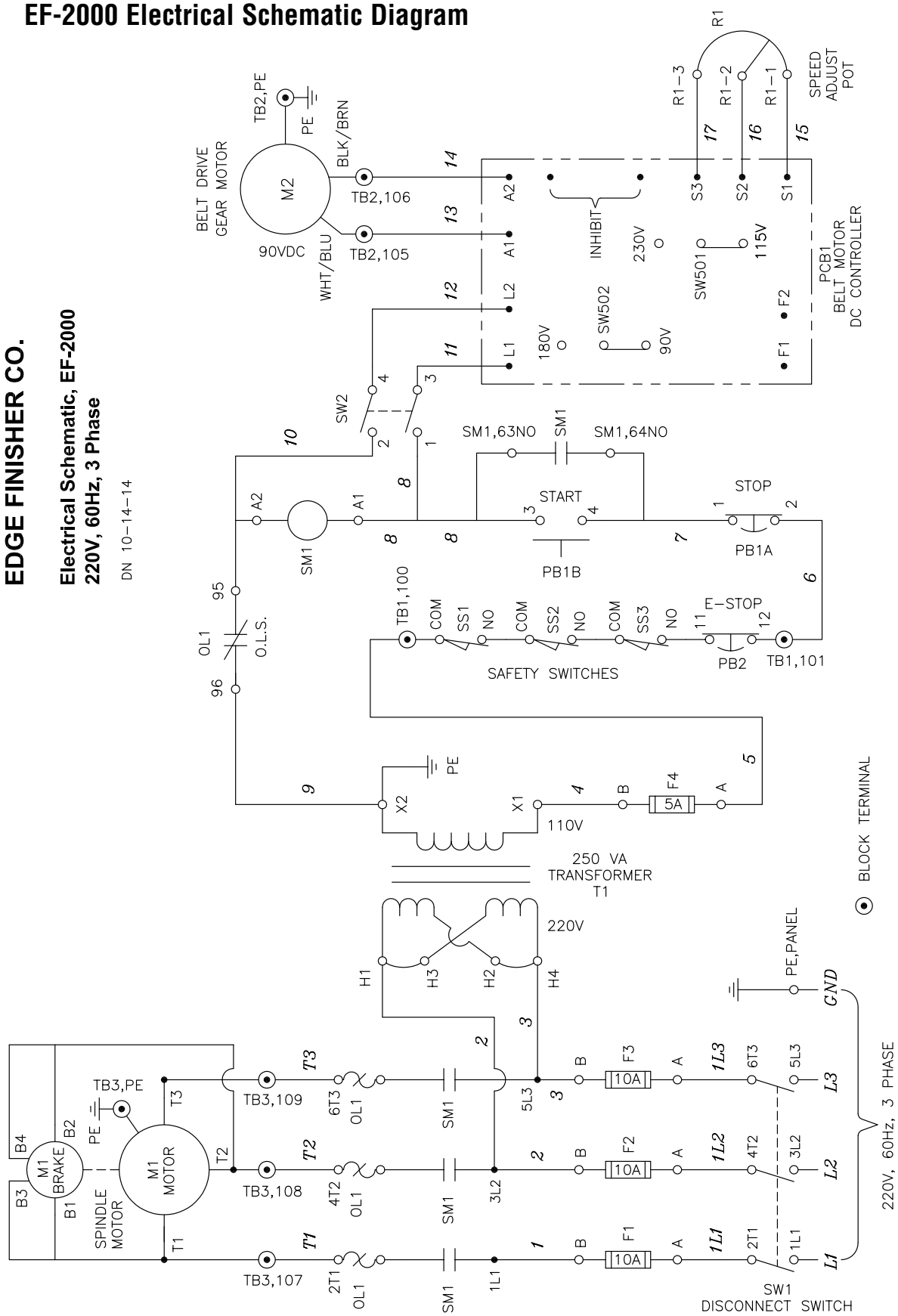
EF-2000 Interior



EF-2000 Wiring Diagram



EF-2000 Electrical Schematic Diagram



Care and Handling of Diamond Cutters

The cutters for your EF-2000 Edge Finisher machine are made with polycrystalline (man-made) and monocrystalline (natural) diamonds. These are two of the hardest substances known to man. But diamonds, when sharpened to the fine edges used in cutting tools, are also very brittle. When used correctly and handled with care, they can have a long and productive life and repay your cutter investment many times over.

Here are some suggestions to help you get the most out of your diamond cutters:

1. **Packing and Storage**
   Your cutter is sent to you packed in protective plastic packaging. Each cutter is protected by a piece of solidified dipping solution. These pieces should be retained and stored in the cutter box while the cutter is in use on your machine.Whenever the cutter is removed from the machine, replace the hardened dipping solution over the cutter and store the tool in its protective packaging.

2. **Handling**
   When handling your diamond cutter, treat it as if it were made of glass. Do not touch the diamonds with anything (except as described below under ***Cleaning***). Never put the cutter face down so that the diamonds are in contact with any surface as this could damage the diamonds.

3. **Cleaning**
   When running acrylic with paper masking on your Edge Finisher machine, there may be some build up of adhesive from the masking paper on the diamonds of the cutter. To clean this off, dip a Q-tip (or other cotton swab) in denatured alcohol and gently rub it over the diamonds. This will clean off the adhesive.

4. **Sharpening** (return to factory)
   Keeping your cutters sharp will give the best quality finish and, at the same time, extend the life of your cutters, while resulting in the lowest overall cutter cost. We recommend that you possess at least two diamond cutters, this way one can be used in production, while the other is being re-sharpened.

   Carefully check the workpiece as it comes out of the machine. When the surface is no longer perfectly clear, it is time to change cutters and send the used cutter to Edge Finisher Company for sharpening. Please re-pack into the plastic cutter box with the cutter tips facing upwards and cover the cutter tips with the hardened solidified protective material. Please note the serial number on the cutter and replace in the box with the matching serial number. Also, please note the cutter's serial number on all correspondence.

If you continue to run a cutter that shows signs of getting dull, there will be increasing damage to the cutter, resulting in higher repair costs.

If you have any questions about the care and handling of the diamond cutters for your EF-2000 Edge Finisher machine, please contact us:

Tel.: 203-792-8622 or 800-272-2885
Fax.: 203-730-4524
Web: www.edgefinisher.net
Email: info.efc@blackstoneind.com

Replacement Parts List

	EF72229	Belts, Timing (Feed)
	EF72222	Belts, Spindle 1″x 27″
	EF12761	Fuse, 10A (FNM10)
	EF79235	Bearing, Sleeve, Oilite 3/4″ id x 7/8″ od x 3/4″ long
	EF12591	Bearing, Thrust
	EF12593	Washer, Thrust (race)
	EF19123	Washer, Wavy
	EF12629	Spring, Belt Tension

Limited Warranty

Product Warranty Information (as amended, 1 July 2000)

Edge Finisher Company will repair or replace, at our discretion, any EF-2000 machine or part thereof that is defective in materials or workmanship for a period of three years forward from purchase date. This warranty is inclusive of parts, labor and if necessary, upon our determination, transportation costs to and from our factory.

Drive belts, and tooling are excluded and not covered under this warranty. Use of the machinery other than described in the related operations manuals, alterations to, or repair work performed by persons other than authorized Edge Finisher Company technicians or subcontractors will render this warranty void.

Edge Finisher Company assumes no responsibility or liability for machinery damaged due to circumstances beyond our control, inclusive of but not limited to fire, theft, flood, electrical power surge, natural disasters, or other act of God.

This warranty covers only the original purchaser of the product. Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages so the above limitations may not apply in all instances. This warranty gives you specific legal rights, and you may have other legal rights that vary from state to state.

For additional information contact:

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