

# OWNER'S MANUAL

## ROTO/TRIM<sup>®</sup>, MODELS 172, 272 & 272HD

Roto Form Manufacturing Corporation

**ROTO TRIM<sup>®</sup> OWNER'S MANUAL**



Thank you for purchasing the Roto/Trim ®, Model 272 or 272 HD Lead Trimmer from Roto Form Manufacturing Corporation.

Roto Form specializes in designing and building machinery for the assembly of printed circuit boards and has done so since 1972. Currently Roto Form manufactures a complete line of component cutting and forming equipment, circuit board lead trimmers, and automatic soldering machines.

The Roto/Trim ® has proven itself over the years to be a product superior in design, easy to use, and cost effective to own. Applied properly It will be an asset to your operations resulting in both increased productivity and high quality output. Nevertheless, an operator's intelligent input is the key to its superior performance.

The Roto/Trim is easy to set up and to operate. If you will take a few moments to look through this manual, the task will move quickly and you will be trimming boards within the next few minutes.

Of all the tips and suggestions included in this manual there is one which is universally important. PLEASE BE CERTAIN TO LEVEL THE VISE RAILS BEFORE ATTEMPTING TO OPERATE THIS MACHINE. (Section I, Unpacking & Setup).

The Model 272 is designed for selective trimming of printed circuit boards. This design allows the operator to see the board as it is being trimmed. A "see-through" shield and protects the user. A vibration-resistant light located just behind the cutter on the cutting arm illuminates the cutting area.

A cantilevered arm holds the rotating spindle and cutter. The arm is leveled relative to the base of the machine during the manufacturing process and, therefore, requires no adjustment. The height of the cut leads is adjusted by loosening the knurled nuts on the post supporting the arm. Details of this are discussed in Section I of the manual.

Thank you again for purchasing from us. Contact me personally if I can be of assistance.

Charles Slover  
President

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## I. This is what you purchased:

**Arm Assembly:**



**Base:**



**Shield:**



## Unpacking and Assembly:

Always lift Arm Assembly as shown and from the right end. Protect the spindle from damage.



Remove the Base from the shipping carton and place it on a flat surface.

**TIP: It is best to either clamp it or bolt it to the surface to prevent "tipping" once the Arm is installed.**

Install the Arm as shown



Make certain that the thrust bearing is "sandwiched" between the two thrust spacers before the Knurled Adjust Knob is placed on the Arm



## How to Install a Cutter

You may wish to install the cutter at this time or after you attach the Arm to the Base

Examine the next four (4) photos

The cutter is held firmly to the machine with a collet and nut combination.

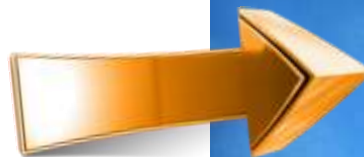


**WARNING: THE CUTTERS ARE VERY SHARP; HANDLE CAREFULLY**

Using a 3/8" and a 1/2" wrench, tighten the cutter



When properly installed

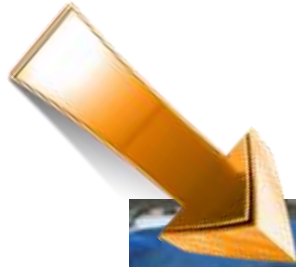
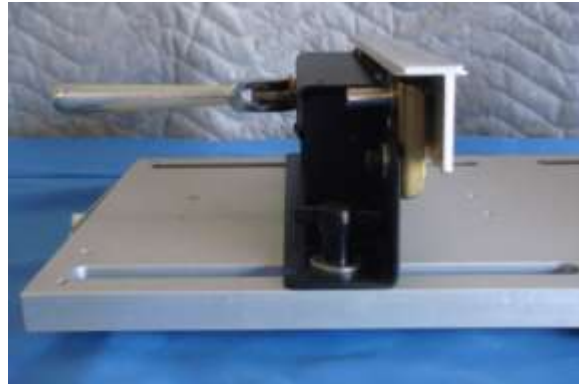


Now, let's attach the Arm to the Base.....

**Leveling Arm to Base:**

It is easier to level the Vise Jaw Rails before installing the Shield. Subsequent leveling, if necessary, can be accomplished with the Shield in place.

Examine the opening and closing of the Vise Jaw system



Notice that the front adjustable rail pivots around a center pin.



It is adjusted, if necessary, by loosening the two (2) 1/4 x 28 Cap Screws.



Notice that the Rear Rail does not have a center pin, and therefore can be adjusted vertically. It is always the last rail to be leveled.

We must now install a cutter before continuing with the leveling procedure.







## Leveling the Front Vise Jaw Rail

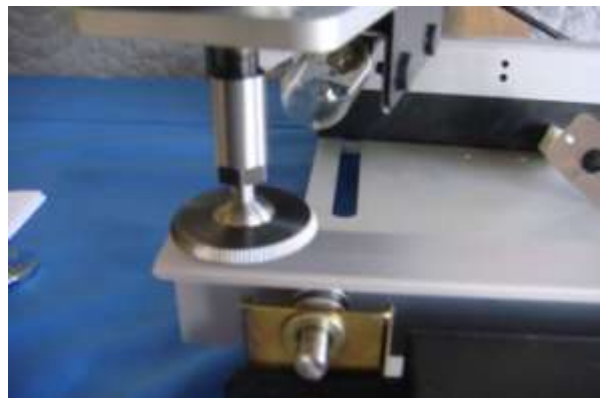
Notice that the cutter height above the front rail is adjusted up or down by the knurled knobs located on the upright post.



Begin by placing the cutter at the center point above the front rail as shown. Adjust the height of the cutter as needed to avoid the cutter hitting the rail.



Then check each corner and adjust the rail by lightly tapping on it until the cutter can be moved across the entire length of the rail without touching it. Then tighten the rail and recheck. A second adjustment may be necessary to obtain the best setting.



And now to the rear rail.....

## 2. Leveling the Rear Rail

The rear rail is leveled only after the front vise jaw rail has been leveled (see previous page),

Place the cutter at one corner of the rear rail and bring the rail up to meet the cutter. Tighten slightly and repeat for the other corner.



A couple of reiterations will be necessary before a final tightening.



## 3. Checking the Level

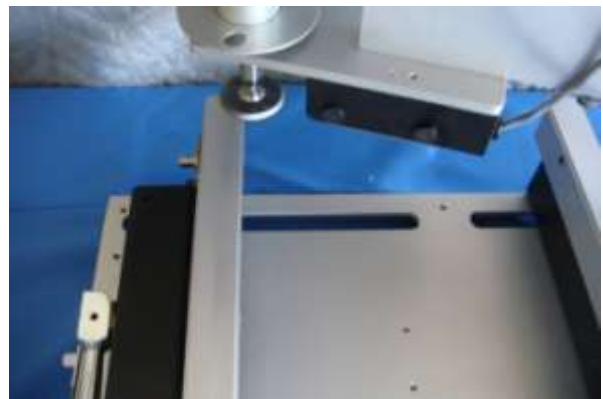
Raise the cutter slightly above the vise jaw rails.

This is accomplished by turning the knurled nuts located on the upright post (top one first) about a half-turn in a counter-clock-wise direction. Each full rotation of the knurled top will move the cutter 0.050".

Tighten the knurled nuts once again, by hand only.

Move the cutter completely across both the front and rear rails and check visually to see if the gap between the cutter the top surface of the rails is even. If not, readjust as needed.

Check all four corners.



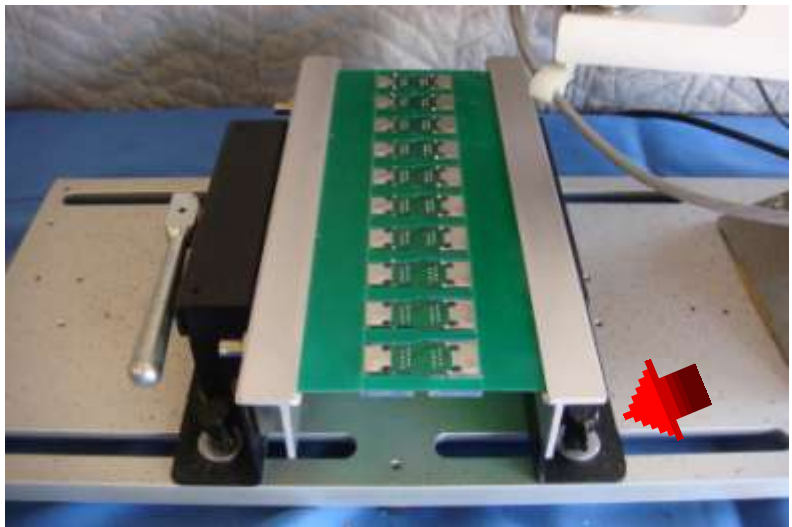
## Adjusting for Your Circuit Board

**Note: Proper fixturing of the printed circuit board is probably the single most important item to insure good trimming. Take the time to fixture your board flat.**

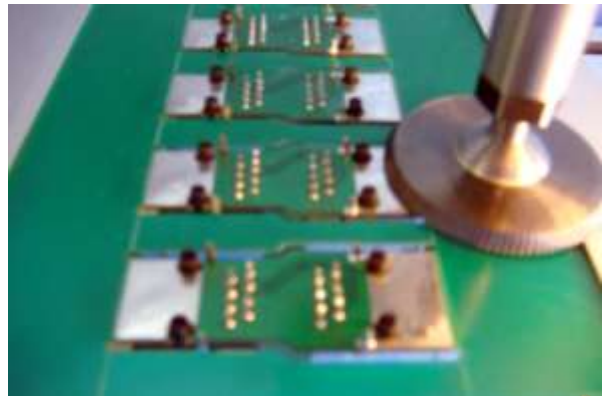
### Tips:

- The pcb should be held tightly enough that it neither moves nor is flexed as it is trimmed.
- A board that is held too loosely will result in flagged or bent leads
- A board that is held too tightly can "bow" causing an uneven cut length
- Panelized boards or heavily warped board may require custom fixturing.

Tighten the rear rail thumbscrews to the base and do all further adjustments to the Front Vise Jaw rail assembly.



The correct result should be that the cutter can be moved across the board at a given height with very little variation.



When possible avoid this.....



## **Connecting the Arm to the Base Electrically**

Connect the molex connectors together, pushing them inside the black tripod base and seal the hole with the stainless cover and two 8-32 screws provided.



## OPERATING THE MACHINE

When operating the Roto/Trim®, always wear safety glasses.

### Switches

To operate the Roto/Trim®, the ON/OFF switch must be turned "ON", the Speed Control Switch must be rotated to a setting above 4, and the two safety switches must be simultaneously activated.

**NOTE: THERE IS A 3-4 SECOND DELAY FOR THE MACHINE TO START.**



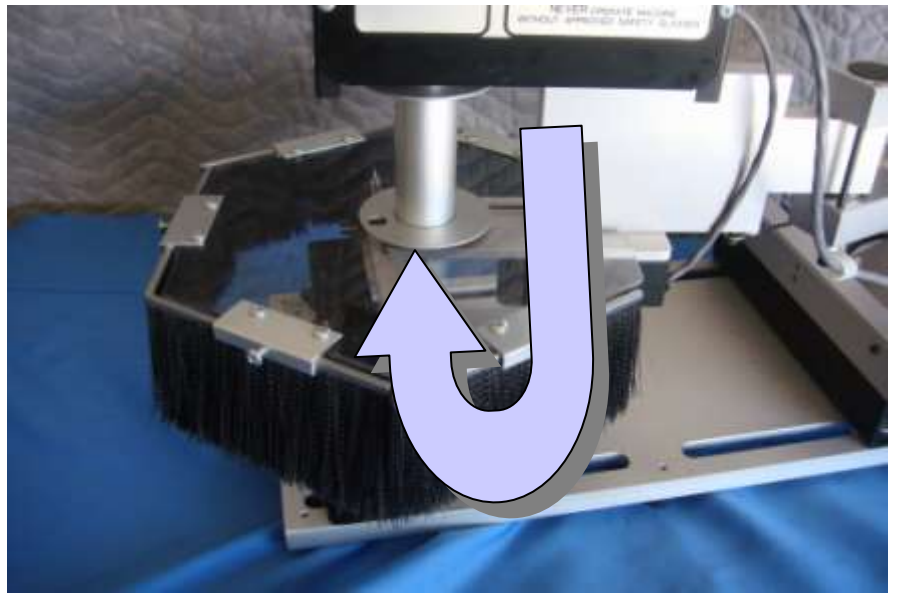
With one hand, push and hold the white safety switch located on the base of the machine.



.....and.....

With the other hand, lift the spindle handle and hold it up.

When either switch is released, the machine will stop.

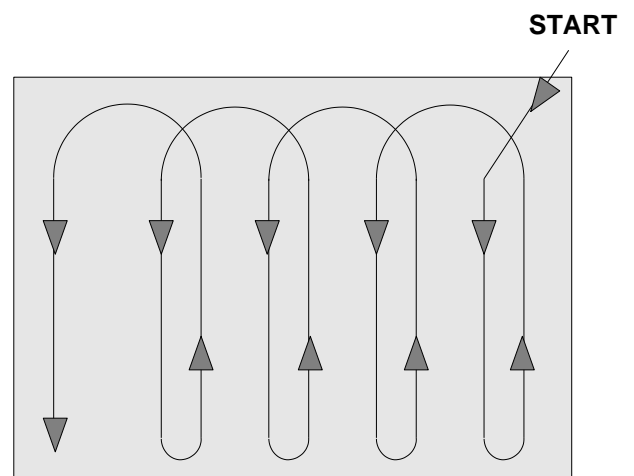


### Cutting Tips:

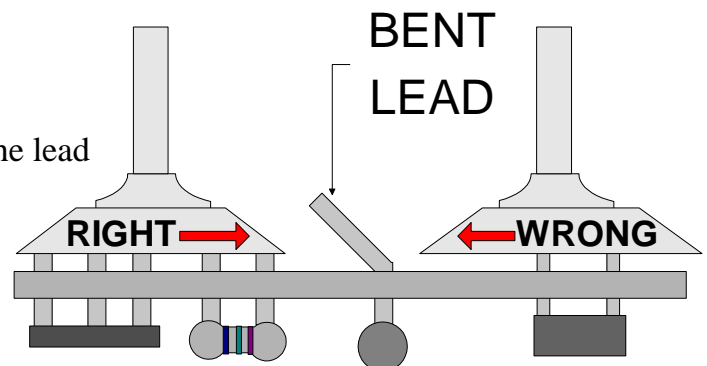
1. A cutting pattern should be established to minimize multiple passes over the same area.

One such cutting pattern used is this

2. The cutter should be moved through the leads with minimal lateral force. Let the cutter to do the work.



3. When cutting bent leads, approach the lead from the acute angle side as shown here



4. Cutter speed is adjustable by the operator. When using the new and improved Model 272HD, Roto Form recommends operating the machine no faster than approximately 75% of its capability. It is the cutting torque that provides the increased capability, and not the cutting speed. The standard Model 272 probably will have to run faster to develop the desired cutting torque.

## **Choosing the Right Cutter**

Two cutters are available for the Roto/Trim®, one is serrated, the other has a smooth or sharp edge. For very light gauge wire diameters, either cutter should work well for you.

Smooth edged cutters are the industry standard, they are less expensive to purchase and to sharpen. A smooth cutter creates less dust but dulls more quickly on heavy gauge wire.

Serrated cutters work better on heavy gauged and/or harder leads such as those made of steel or kovar. Less operator force is required to cut the same diameter lead with a serrated cutter.

## **Inspection**

After cutting, inspect the finished board for quality of cut. It may be desirable to brush the board with a stiff-bristled brush after cutting to remove any cut leads which might tend to adhere to the surface. This is a standard procedure in many companies after hand or machine trimming.

Frequently clean the trimmed leads from the machine so they do not lodge in tight places and upset the tolerances of movable parts. A cutter should be returned to Roto Form for sharpening when its cut becomes unacceptable.

## Install Shield

A new and improved horizontal lexan shield with strip brushes is used to contain cut leads and to protect the Operator. The machine should not be operated without the shielding installed and the Operator should wear safety glasses.

Use the four 8-32 threaded screws provided to fasten the shield under the Spindle Sleeve and into the four threaded holes provided.

A short handle Phillips screw driver will make the task easier.



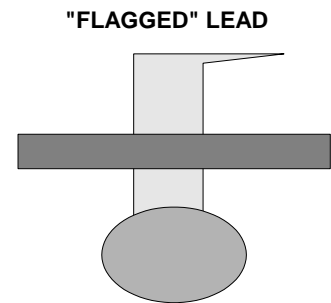


## IV FOUR MOST FREQUENTLY ASKED QUESTIONS

### Q. What causes flagging of leads?

A. There are four causes of "flagged" leads:

1. Cutting height of leads exceeds 0.050" and/or
2. Dull cutter and/or
3. Vibration due to
  - loosely held PCB and/or
  - a machine problem and/or
4. Cutting too rapidly through the leads, causing the cutter to push a lead before cutting it.



### Q. Why do leads bend rather than be cut?

A. The cutter being set too high, (i.e. greater than 0.050") usually causes this. See "flagging".

### Q. How many times can the cutter be sharpened?

A. Approximately 8 to 10 times. The real issue is a financial one. The cost effectiveness of sharpening a cutter to less than 3/4" diameter is questionable.

### Q. What cutter speed setting should I use?

A. Optimal rpm settings are usually found between 3 and 7 on the speed dial.

## V SPECIFICATIONS

Base width . . . . .	11 1/2"
Base length . . . . .	23 1/4"
Overall height . . . . .	17 3/4"
Shipping Weight . . . . .	50 lbs.

### Electrical:

- **Power Requirements** - 120 VAC, 6 Amp 50/60 Hz (240 VAC optional).
- **Motor** - Wound armature, wound stator brush motor - sleeve bearings - oil impregnated oilite bronze.
- **Fused** - 250v - 5 AMP.
- **Speed Control** - Solid state continuous control
- **Light** - 25 watt.
- **Safety Switch** - Base mounted.
- **Safety Switch** - Handle mounted.

### Mechanical:

- **Dimensions, Basic Overall Unit** - Length 24" x 11 1/2" x 16 1/2" high.
- **Weight** -50 lbs. (shipping weight ~approximately)

### Materials:

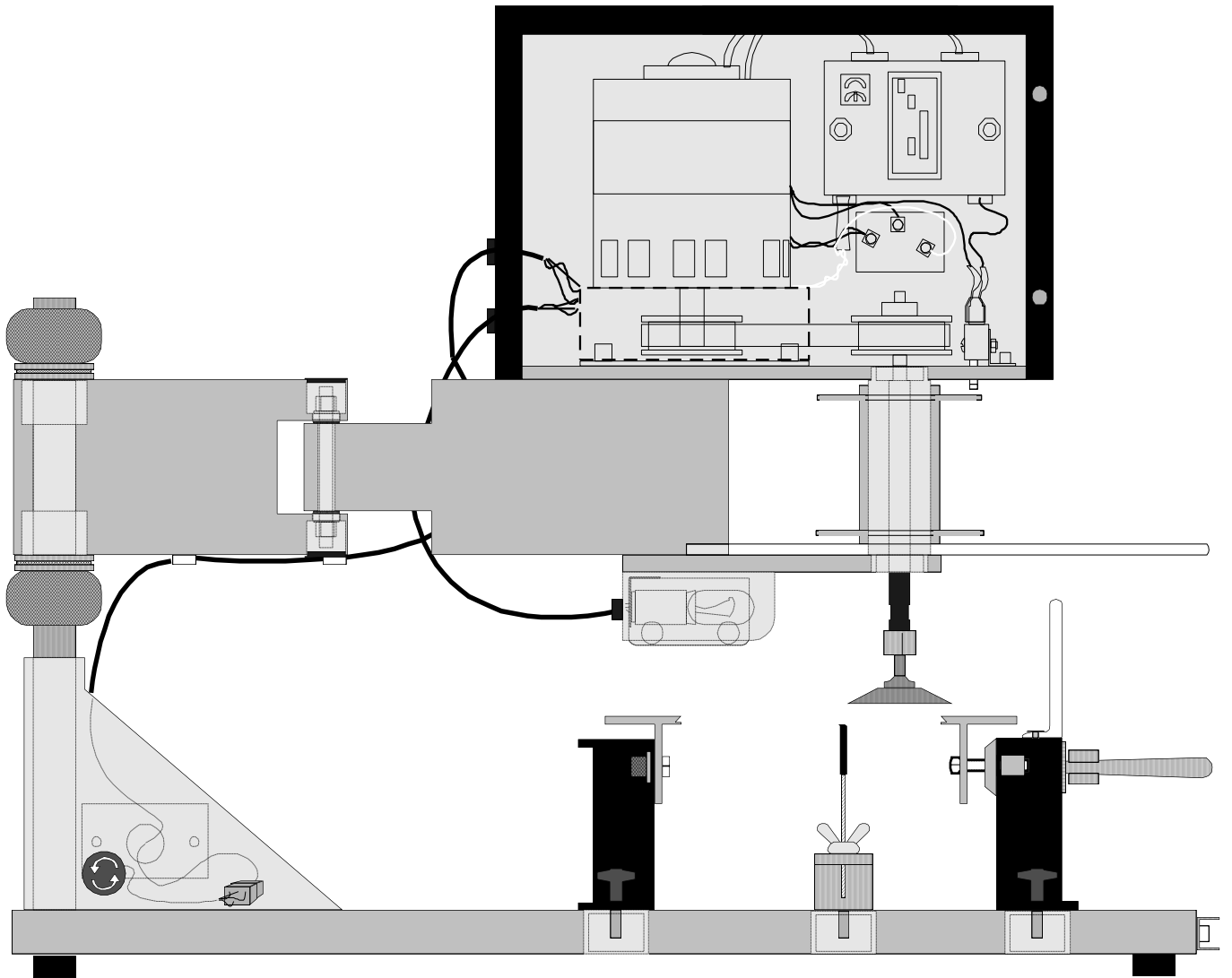
- **Base** - Milled/Anodized Aluminum Plate 5/8" thick.
- **Upright Post** - 1.0" plated steel.
- **Arms** - Solid anodized aluminum stock.
- **Housing** - Cold rolled steel with enamel finish.
- **Vise Jaw Rails** - Anodized extruded aluminum.
- **Safety Shield** – Scratchproof polycarbonate type material.
- **Cutters**- Diamond-ground blended tungsten carbide brazed onto 1/4" diameter stainless steel shank. Various sizes from 3/4" to 2" diameter.
- **Bearings** - Thrust needle roller, sealed roller and ball bearings.

## Features:

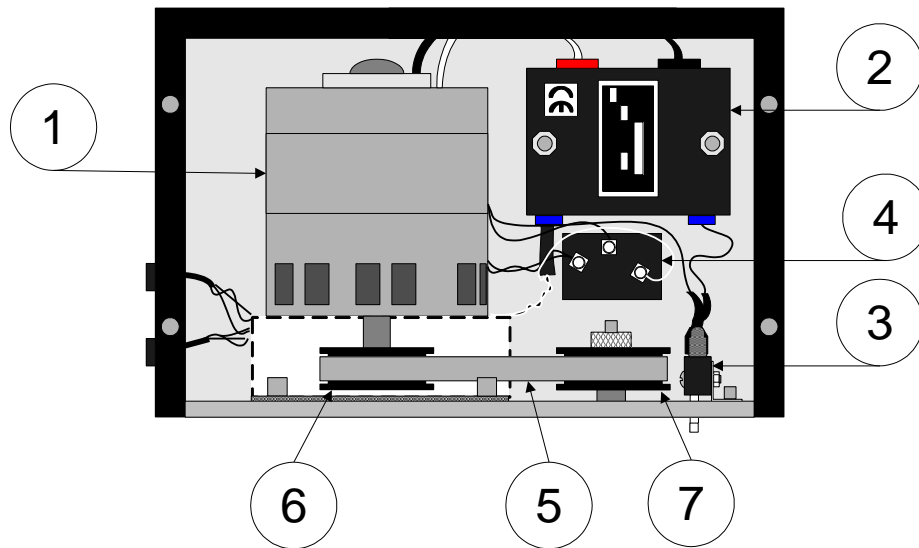
- **Board size** - Up to 12" wide, by any length.
- **Lead Material** - Cutters will trim copper, steel and kovar.
- **Maximum Component Height** - 3.20".
- **Recommended Cutting Height** - .025" to .050".
- **Set-Up Time** - Takes only a few seconds using the sturdy, spring-loaded, vise jaw rails.
- **Speed** - Up to 10,000 RPM will cut up to 2500 leads per minute depending on the material and diameter of the leads.
- **Accuracy** - The Roto-Trim, as designed, operates within a  $\pm 0.003$ " accuracy across its length and width.
- **Safety Features** - Both hands are used. Each hand activates a safety switch. Horizontal shield with skirt protector protects the operator. Safety glasses are also provided. A 25W lamp illuminates the cutting area providing increased visibility.
- **Cutter Blades** - Specially blended tungsten carbide provides long life. Cutters may be sharpened several times.
- **Selective Cutting** - The high visibility design of the Roto-Trim® provides the operator the convenient ability to selectively trim around devices, connectors, mounting hardware, etc.
- **Inspection** - The illuminated design permits easy inspection of the cut leads.

# VI PARTS LIST AND DIAGRAMS

most of the parts the Models 272 & 272HD are common to both machines. However, the motors and drive components are different. Model 272HD parts are indicated in “red.”



**Roto Trim®, Model 272**

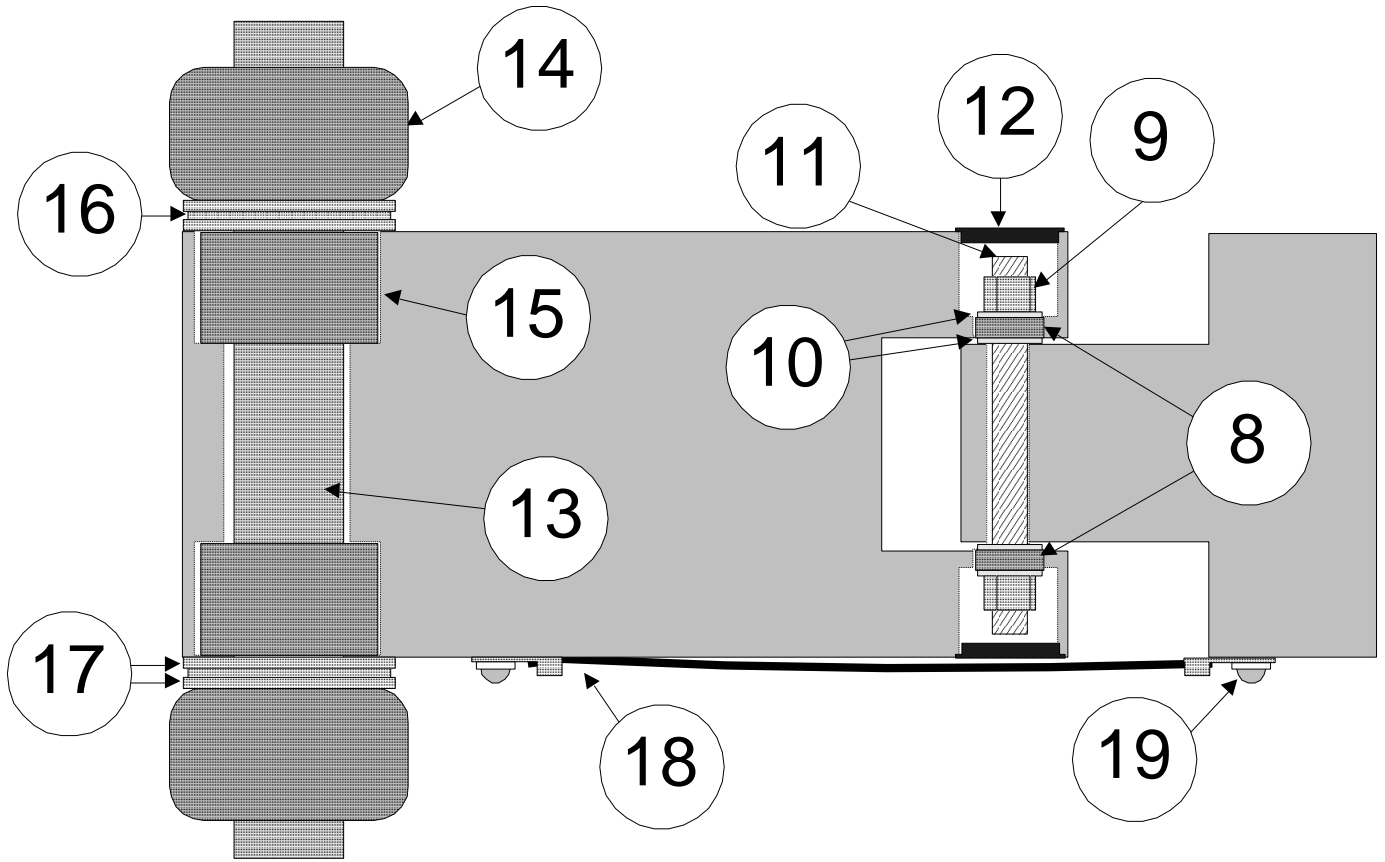


### Motor, Sprockets & Electronics

## ROTO TRIM, MODEL 272 & **272HD**

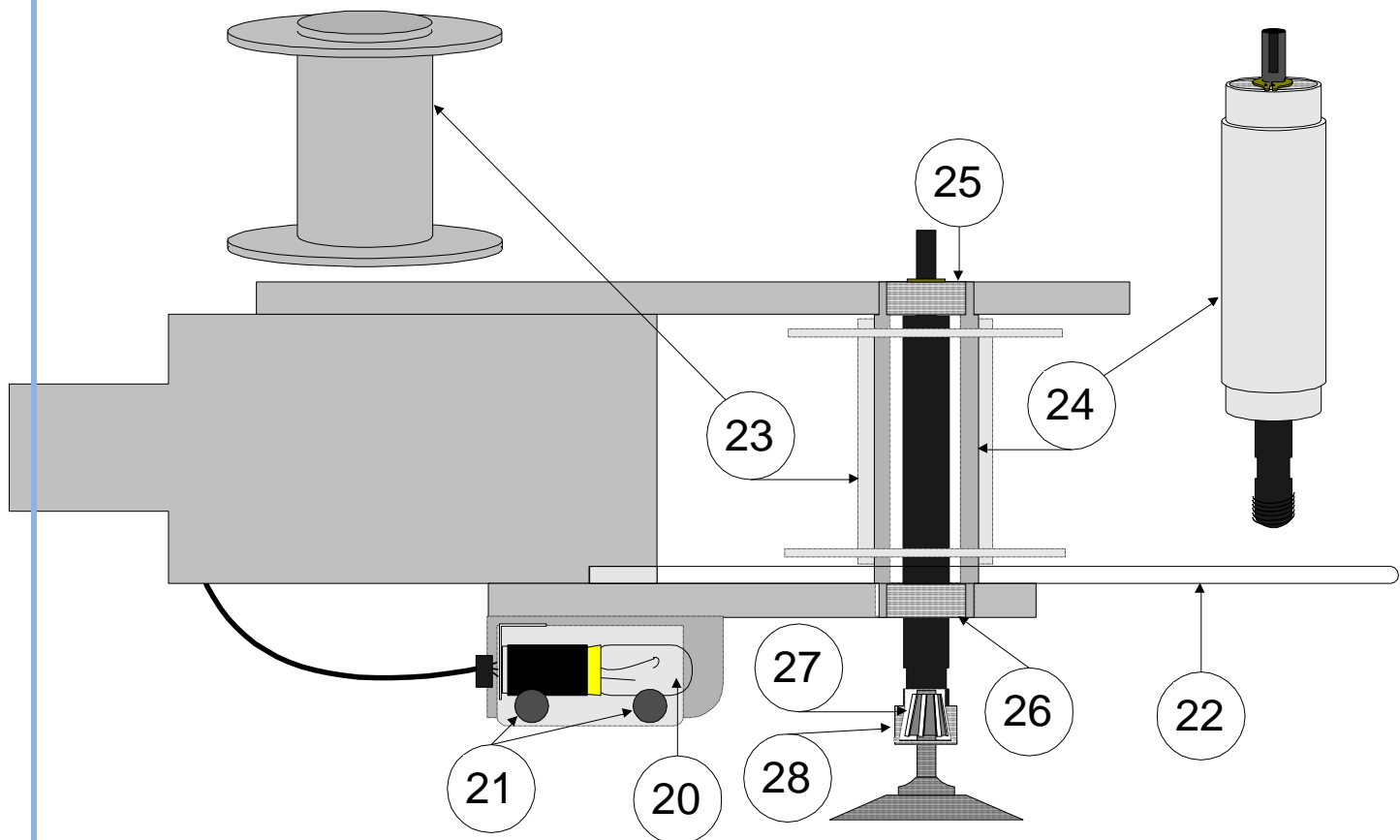
ITEM	DESCRIPTION	PART #
1	Drive Motor	172-201
	<b>Drive Motor HD</b>	<b>272-201HD</b>
	Motor Brushes (set)	172-263
	<b>Motor Brushes (set) HD</b>	<b>272-263HD</b>
2	Speed Control 120V	172-202
2	<b>Speed Control HD</b>	<b>272-202HD</b>
3	Safety Switch (motor)	172-203
4	On/Off Switch	172-248
5	Timing Belt (teeth) model 272	172-148
5	<b>Timing Belt (teeth) Model 272HD</b>	<b>272-148HD</b>
5	Timing Belt (round) model 172	172-260
6	Sprocket – Motor for 272	172-150
	<b>Sprocket – Motor for 272HD</b>	<b>272-150HD</b>
7	Sprocket - Spindle	172-147
	<b>Sprocket – Spindle for 272HD</b>	<b>272-147HD</b>
5, 6 and 7	Belt Repair Kit for 272	172-148K
	<b>Belt Repair Kit for 272HD</b>	<b>272-148KHD</b>

### Arm & Upright Post



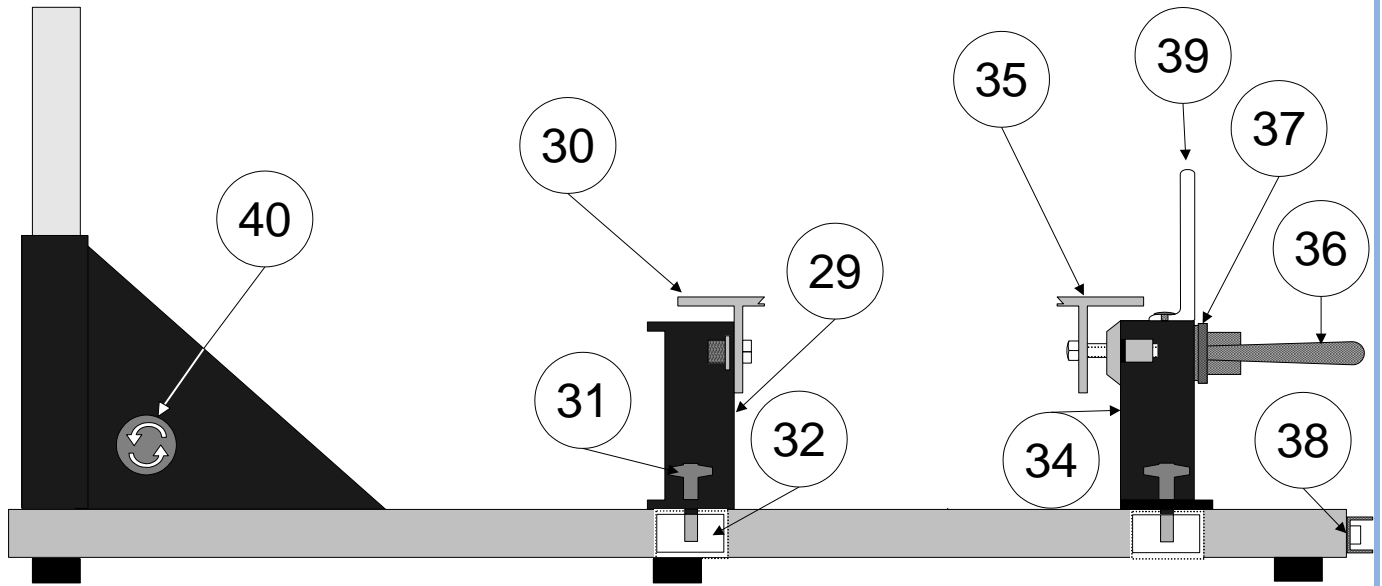
8	Elbow Bearing (2 reqd)	172-212
9	Elbow Nut (2 reqd)	172-219
10	Elbow Washer (4 reqd)	172-220
11	Elbow Shaft	172-125
12	Elbow Plug (2 reqd)	172-204
13	Upright Post	172-111
14	Knurled Adjusting Nut (2 reqd)	172-122
15	Upright Needle Bearing (2 reqd)	172-213
16	Upright Thrust Bearing (2 reqd)	172-214
17	Upright Thrust Washer (4 reqd)	172-215
18	Bunge Cord Assembly	172-1103
19	Shoulder Screws (2 reqd)	150-211

20	Lamp 120V	172-209
20	Lamp 230V	172-209B
	Lamp Holder (socket)	172-210
21	Rubber Vibration Pads (4 reqd)	172-256
22	Shield (NEW SHIELD USED)	172-905 (272-905)
	Roto-Cutter 1.5" Dia (smooth)	172-1603
	Roto-Cutter 2.0" Dia (smooth)	172-1605
	Roto-Cutter 1.5" Dia (serrated)	172-2603
23	Spindle Sleeve Assy (1reqd)	172-1602
24	Spindle Assembly (1reqd)	172-137
25	Spindle Bearing (top)	172-111
26	Spindle Bearing (bottom)	172-211 (B)
27	Spindle Flexible Chuck (1reqd)	172-270
28	Spindle Nut (stainless)	172-265



**Spindle, Front Arm & Light**

## Base & Vise Jaw Rails



	Rubber Feet (6 reqd)	181-246
29	Rear Sliding Angle (black)	172-1606
30	Vise Jaw Rear	172-104
31	T-Bolt/Spacer (4 reqd)	181-1104
32	Sliding Nut (delrin, 6 reqd)	172-134
34	Front Sliding Angle (Black)	172-1608
35	Vise Jaw - Front	172-104
36	Handle - Vise Jaw (Assy)	172-1115
37	Thrust Washer	172-245
	Guide Pin Bushing (4 reqd)	172-106
	Guide Pin (2 reqd)	172-105
	Clamp Spring (3 reqd)	172-218
	Retaining Ring (3 reqd)	172-222
38	Safety Switch - Base	150-308
	Base Safety Switch Guard	172-612
	172 Shield - (NEW SHIELD USED)	172-901 (272-905)
39	272 Shield - (NEW SHIELD USED)	272-903 (272-905)
40	Fuse Holder	162-120
	Fuse - 5 Amp	163-121



## VII CUTTERS & SHARPENING

Roto Form offers a complete selection of cutter styles and sizes to meet your various trimming requirements. The next page of this manual is a one-page brochure entitled *Roto/Cutters© for the Roto/Trim®* in which our offerings are described. Please contact us directly if you have special needs or questions.

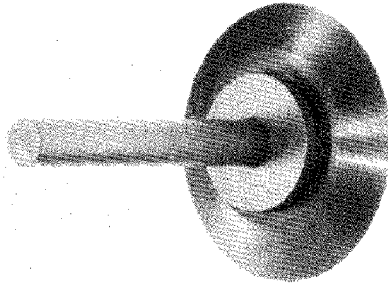
### **Sharpening Services:**

Roto Form Manufacturing operates a complete cutter maintenance service for its customers with fast turn around times. Our machinery is set-up exclusively for making and sharpening Roto/Cutters. Consequently, it is a task with which we are both familiar and experienced in performing. Visit our website [www.rotoform.com](http://www.rotoform.com) for details.

# Roto/Cutters® for the Roto/Trim®

*Material Specifications: All Roto/Cutters® are manufactured using blended tungsten carbide diamond ground and dynamically balanced for long life. The shafts are 1/4" diameter stainless steel*

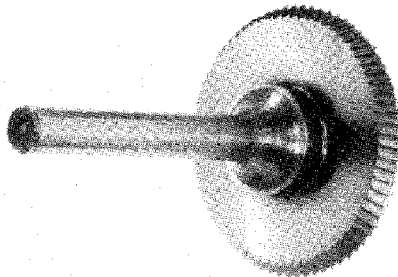
## SMOOTH-EDGE CUTTERS



SIZES	PART NUMBER
1½" Diameter	172-1603
2" Diameter	172-1605
Custom sizes available	

APPLICATIONS
Copper, Steel, and Kovar leads. Blade life should last approximately 100,000 leads to more than 1,000,000 before sharpening.

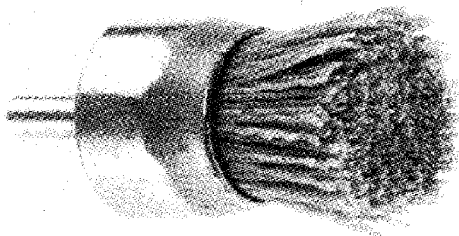
## SERRATED-EDGE CUTTERS



SIZE	PART NUMBER
1½" Diameter	172-2603
Custom sizes available	

APPLICATIONS
Steel and Kovar leads. IC and transformer leads. Wire wrap and connector pins. Can be used on small and large diameter leads. Can be sharpened several times.

## ROTO / BRUSH



SIZE	PART NUMBER
1" Diameter	172-2000

Manufactured of impregnated filament for removing trimmed leads from PCB.
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## ROTO SHARPENING SERVICES – F♦A♦S♦T AND ECONOMICAL

**Buy the Combination Six-Pack and save money:** Six-Pack contains 6 new cutters and 24 sharpenings at significant cost savings. Contact office for current pricing and details.



**ROTO FORM MANUFACTURING CORPORATION**  
P.O. Box 118, Signal Mountain, TN 37377  
Factory Parts & Warehouse: 711 Signal Mtn Rd # 189, Chattanooga, TN 37405  
Telephone: 423.266.0067  
FAX: 423.266.0105

# New & Improved Shield for your Roto/Trim

Horizontal Shield Assembly  
PN 272-905



Shield is equipped with vertical strip brushes which contain cut leads. This new shield eliminates the 2-part shielding previously used.

Price: \$105 complete

Fits Models: 172  
272

272 HD

Shipped disassembled



PO Box 118, Signal Mtn, TN 37377  
Tel: 423-266-0067  
Fax: 423-266-0105  
Email: [mgmt@rotoform.com](mailto:mgmt@rotoform.com)

## VIII WARRANTY & REPAIRS

### **Warranty:**

The Roto/Trim ®, Model 272 Printed Circuit Board Lead Trimmer is warranted to be free of defects in material and workmanship for 6 months after delivery to the first purchaser for use, providing that the unit has not been misapplied. Since Roto Form has no control over its use, and sometimes misuse, we cannot guarantee against failure. Roto Form's obligations hereunder, at Roto Form's option, are limited to replacement or repair of parts which upon examination prove to be defective within the warranty period specified. This warranty does not apply to damage resulting from transportation, alteration, misuse, or abuse.

### **Repairs:**

If repair services are required, Roto Form provides quick turn around service for your assistance. Package the machine and ship it to Roto Form Mfg, Attention: Repair Dept. 711 Signal Mountain Road, # 189, Chattanooga, TN 37405 (freight prepaid - COD **not** accepted). Provide a brief description of the observed problem.

At no charge to you Roto Form disassembles the machine and examines it for needed parts and/or service. Any replacement parts required are identified along with the labor charges and a quote is generated. Roto Form personnel will contact you via telephone or fax and discuss the situation with you.

You may choose any of the three following actions:

1. Authorize the repair. In this case the machine is repaired and returned within 48 hours.
2. Purchase the parts yourself and perform the repairs at your location. In this case the machine is returned to you along with the purchased parts.
3. Not to authorize the repair and have the machine returned. In this case you pay only for the return freight.

All repairs done by Roto Form are warranted for 90 days.