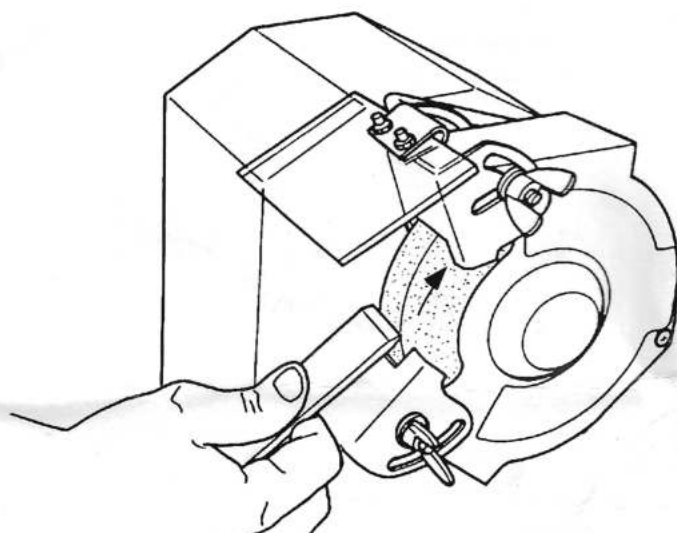


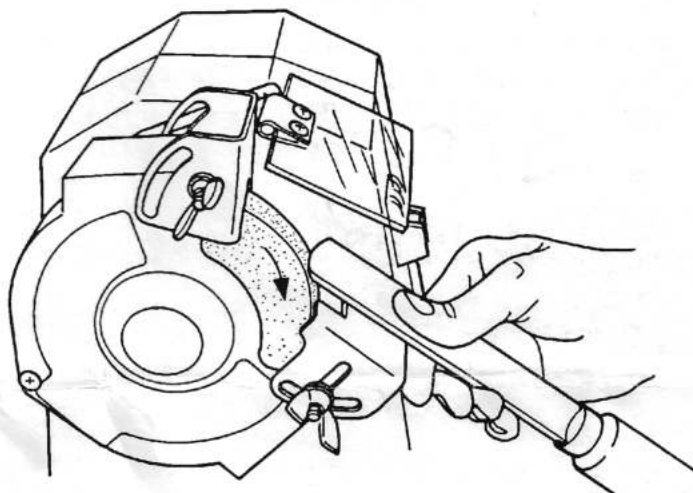


# Grinding Wheel Guard II

*For Honing...*



*For Grinding...*



## **WARNING**

Read and understand the Safety section and complete the Assembly section before operating the Grinding Wheel Guard II.

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# Introduction

The Grinding Wheel Guard II can be used on the Mark V (Models 510 and 500), Power Station, Mark II and VII. You can grind and hone with it, since the Grinding Wheel Guard II has an adjustable tool rest on both sides of the guard. Depending on which grinding wheel, honing wheel, wire brushes and buffing wheel you use, you can now perform virtually any sharpening, resurfacing and polishing function with the Grinding Wheel Guard II.

While the Grinding Wheel Guard II can be used on all the units listed above, all illustrations and references in this Owner's Manual will be for the Mark V and the Power Station. All instructions also apply to the Mark II and VII.

You can purchase extra grinding wheel arbors from Shopsmith. Mounting each wheel on its own arbor saves you time as well as having to locate the tools used to change the wheel on the arbor.

## How to Use this Manual

Read and understand this Grinding Wheel Guard II Owner's Manual thoroughly – especially the Safety section– and then perform the Assembly section before attempting to operate the Grinding Wheel Guard II. For operations, make sure you understand the various techniques described in the Techniques Chart on page 9, and how to match the various wheels to the specific job at hand.

# Safety Rules for the Grinding Wheel Guard II

Here are some safety warnings for the Grinding Wheel Guard II which you should read and follow:

### WARNING

#### General

- Read, understand and follow all the information in this manual and the owner's manual for the power source (Mark V, Power Station, etc...) on which the Grinding Wheel Guard II will be mounted.

- Always wear eye protection when you use power equipment.

- Use hearing protectors to avoid prolonged exposure to high noise levels.

- Use respiratory protection to avoid respiratory injury and fire hazards.

- Always keep the appropriate protective guards in place when operating power equipment.

- Do not wear loose clothing, ties, gloves, or jewelry. Roll sleeves up above your elbows, wear non-slip footwear, and tuck long hair up, out of the way.

- Use only Shopsmith approved wheels and replacement parts. Using non-Shopsmith approved wheels or parts may create a hazardous condition and will void your warranty.

- Never leave any power tool running unattended.

### WARNING

#### Setup

- Inspect wheels before mounting. NEVER USE A CRACKED WHEEL.

- Mount the wheels in the manner described in this owner's manual, and with the hardware provided. Use only the type and size flanges provided with the arbor.

- Do not overtighten the arbor nut. Too much pressure will distort the flanges and stress the wheel.

- After mounting a wheel, secure the guard cover (18). Then stand on the switch side of the wheel and turn on the machine. Allow about one minute of running time at full-rated wheel speed with no load to test the integrity of the wheel.

- Place a board or sheet metal on the way tubes and just beneath the Grinding Wheel Guard II to protect them from grit. Do not use rags or paper, because they could ignite.

- Tool rests and the spark guard are adjustable to compensate for wheel wear. They must be reset when a new wheel is installed or after a wheel has been worn or dressed. The distance between the spark guard and the wheel should be 1/16".

- For *grinding*, the tool rest should be slightly below the center of the wheel with 1/8" or less clearance from the wheel.

- For *honing*, the tool rest should be 1/8" above the center of the wheel with 1/8" or less clearance from the wheel.

#### **WARNING**

#### **Operations**

- Never perform operations without the wheel guard, shield and spark guard in place.

- Never operate the Dust Collector or other dust collection system while you are also operating the Grinding Wheel Guard II. Also, do not connect any dust collection hoses to equipment near the Grinding Wheel Guard II. Sparks generated during operations could ignite dust and shavings inside the dust collection hose or bag.

- Handle and store the grinding wheels carefully to prevent damage and cracking.

- Never exceed the recommended speed setting for the wheel being used.

- Never turn on the power source (Mark V, Power Station, etc...) with the workpiece – the item to be ground or honed– held against the wheel.

- Let the machine come up to full rated wheel speed before you contact the wheel with the workpiece.

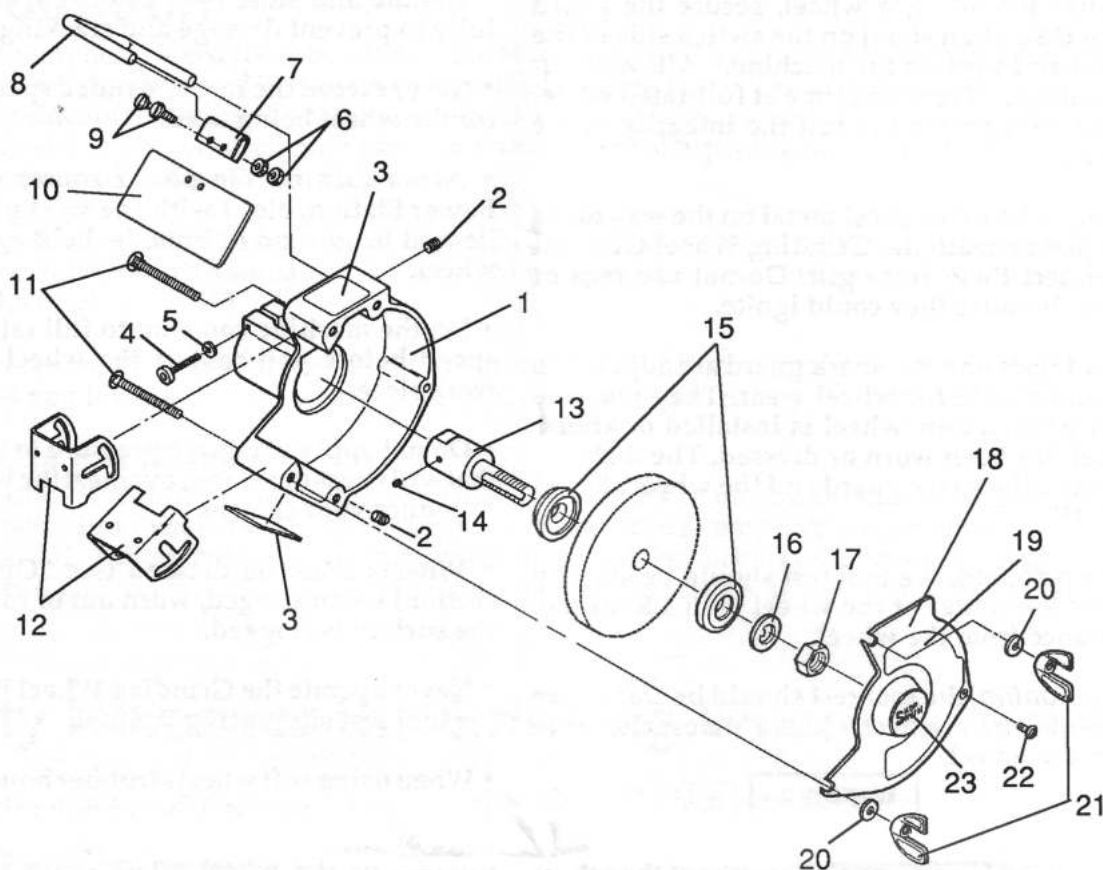
- Do not apply excessive pressure to the wheel that will stress the wheel, overheat the workpiece or reduce your control.

- Wheels must be dressed (see "Operations" section) when gouged, worn out of round, or if the surface is clogged.

- Never operate the Grinding Wheel II without the tool rest supporting the tool.

- When using soft wheels (rubber bonded abrasive or multi-purpose), never point the cutting edge of the tool you are sharpening into the rotation of the wheel. The sharp edge will damage the wheel and possibly cause an accident. Always point the cutting edge in the same direction as the rotation of the wheel.

- Remove material or debris that might be ignited by sparks. Be sure other people in the workshop are not in the path of the sparks or debris. Keep a properly charged fire extinguisher in your workshop.



### PARTS LIST

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	516088	Guard	1	—	515341	Arbor Assembly (inc. 13-17)	1
2	222460	Socket Setscrew, 5/16"-18 x 3/8"	2	13	501450	. Arbor	1
3	516081	Warning Label	2	14	115321	. Socket Setscrew, 5/16"-18 x 5/16"	1
4	514513	Socket Head Cap Screw, #10-24 x 1-1/4"	1	15	515340	. Flange Washer	2
5	502973	Split Lock Washer, #10	1	16	501454	. Key Washer	1
6	274737	Hex Nut, #10-24	2	17	501452	. Arbor Nut	1
7	515319	Shield Hinge	1	18	516200	Cover	1
8	515320	Shield Bar	1	19	516089	Warning Label	1
9	436732	Pan Head Machine Screw, #10-24 x 1/2"	2	20	120392	Flat Washer, 1/4"	2
10	515318	Shield	1	21	515316	Special Wing Nut	2
11	514612	Carriage Bolt, 1/4"-20 x 2-3/4"	2	22	514236	Button Head Cap Screw, 1/4-20 x 3/8"	1
12	516086	Tool Rest	2	23	513808	Logo Decal	1

# Assembly

## Tools Needed:

- 5/32" Allen wrench
- 3/8" wrench
- 15/16" wrench (or  
Shopsmith arbor wrench)
- 1" wrench (or a vise)
- Medium Phillips  
screwdriver

Please follow the instructions below:

## ATTACH THE SCREWS TO THE GUARD

1. Thread a socket setscrew (2) into each side of the guard (1), as seen in Fig. 1. Do not tighten yet.

2. Place a split lock washer (5) on the socket head cap screw (4). Thread the screw through the hole in neck of the guard (1), as shown in Fig. 2. Finger tighten. Set aside the guard.

## ASSEMBLE THE SPARK SHIELD

3. Place the shield hinge (7) on the shield (10), lining up the two holes in each, as seen in Fig. 3.

4. Insert a pan head machine screw (9) through each hole in the hinge. Attach a hex nut (6) to each screw, as in Fig. 4. Finger tighten.

5. Insert an end of the U-shaped shield bar (8) through the shield hinge, as shown in Fig. 5.

6. Use a 3/8" wrench and a Phillips screwdriver to tighten both hex nuts. See Fig. 6. **Do not overtighten.** Tighten **only enough** so the shield moves on the bar but still securely holds position.

7. Insert the free end of the shield bar (8) through one of the two holes in the "neck-side" of the guard, as demonstrated in Fig. 7.

8. While holding the shield in place at its uppermost position, use a 5/32" Allen wrench to tighten the setscrew (2). See Fig. 8.

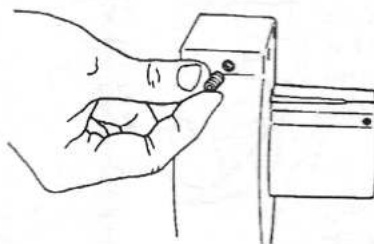


Fig. 1

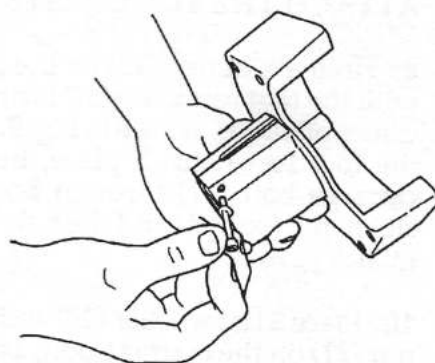


Fig. 2

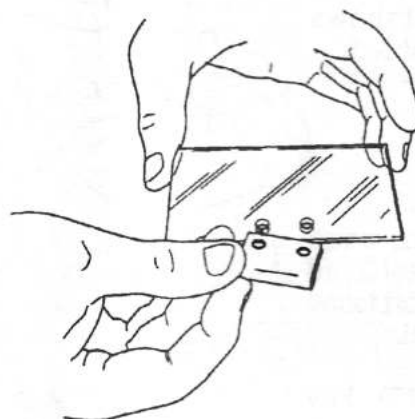


Fig. 3

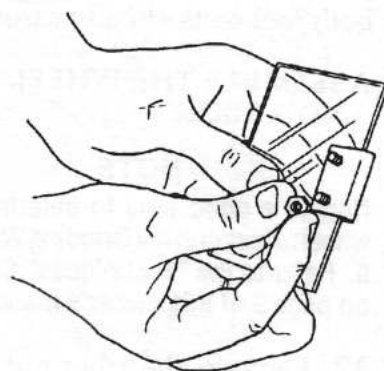


Fig. 4

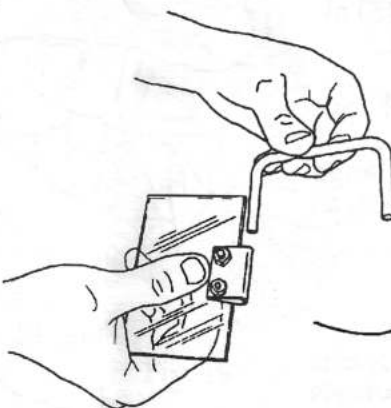


Fig. 5

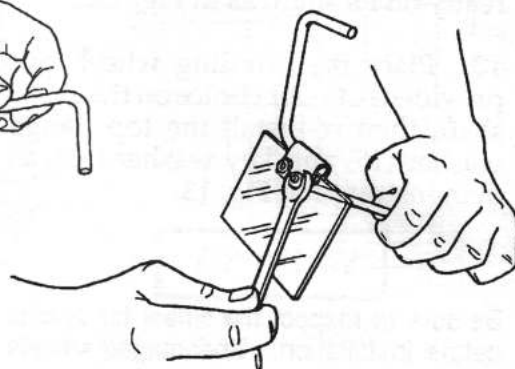


Fig. 6

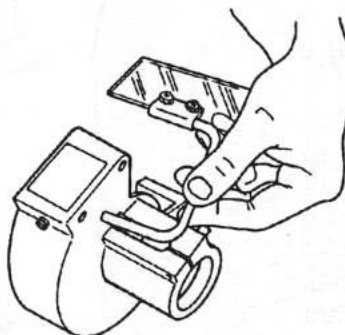


Fig. 7

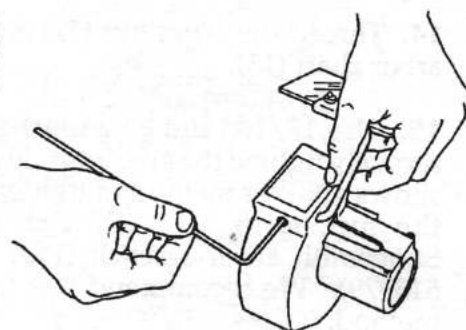


Fig. 8



## ATTACH THE TOOL RESTS

9. Hold a tool rest (12) on the guard with the tool rest's "notch" facing the center opening, as seen in Fig. 9. With the tool rest held in place, insert a carriage bolt (11) through both the slot in the tool rest and the hole in the guard.

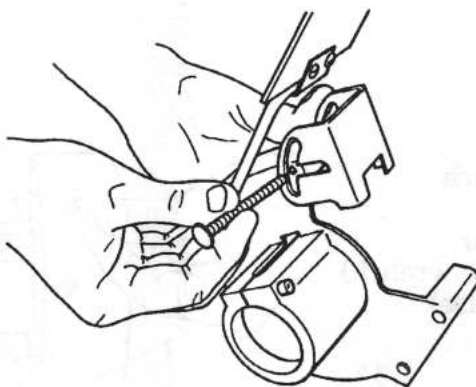


Fig. 9

10. Place a flat washer (20) and wing nut (21) on the carriage bolt, as demonstrated in Fig. 10. Finger tighten.

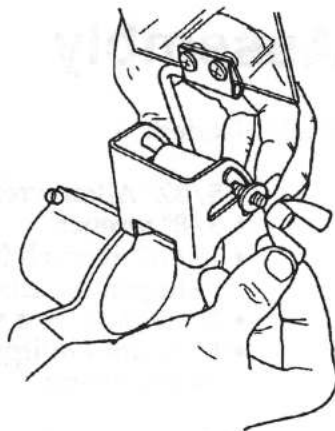


Fig. 10

11. Repeat Steps 9 and 10 for the other side of the guard. Fig. 11 shows both tool rests already assembled.

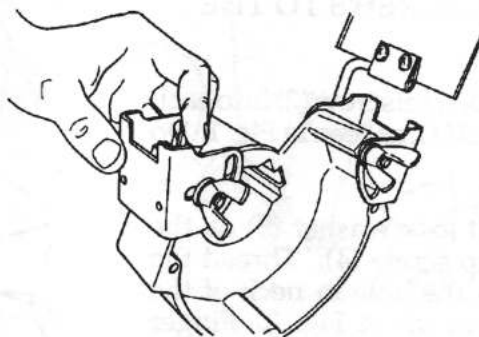


Fig. 11

## ASSEMBLE THE WHEEL AND ARBOR

### NOTE

Now is a good time to determine which wheel to install in the Grinding Wheel Guard II. Refer to the "Techniques" Chart found on page 9 of this owner's manual.

12. Remove the arbor nut (17), key washer (16), and the top flange washer (15) from the arbor (13). Your arbor should have a flange washer (15) already on its shaft, as in Fig. 12.

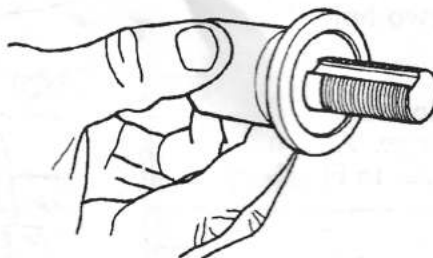


Fig. 12

13. Place the grinding wheel (not provided) of your choice on the arbor shaft, then re-install the top flange washer (15) and key washer (16), as demonstrated in Fig. 13.

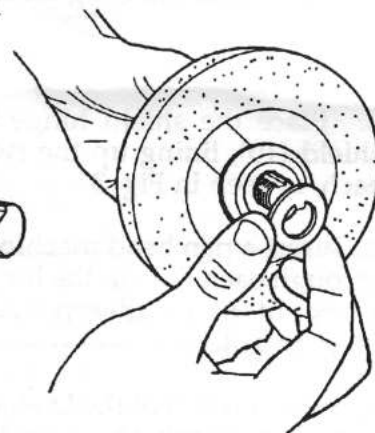


Fig. 13

### WARNING

Be sure to inspect the wheel for cracks before installation. Undamaged wheels emit a clear ringing tone; cracked wheels emit a dull thud.

14. Thread the arbor nut (17) on the arbor shaft (13).

15. Use 15/16" and 1" wrenches to securely tighten the arbor nut. Fig. 14 shows another method of tightening the nut, with a bench vise and Shopsmith arbor wrench (Part No. 515979). We recommend this latter method.

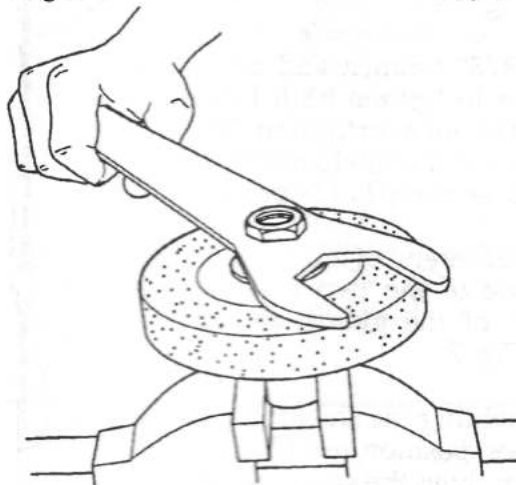


Fig. 14

**16.** Insert the arbor (13) into the "neck" of the guard, as seen in Fig. 15.

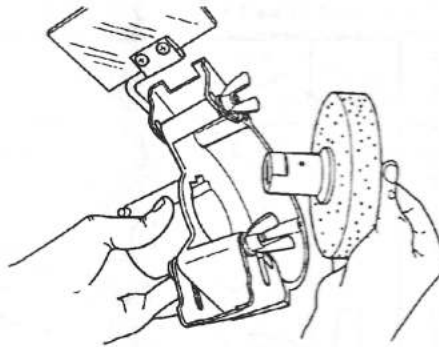


Fig. 15

**17.** Slip the guard cover (18) notches between the guard and each tool rest. See Fig. 16. Do not tighten the wing nuts yet.

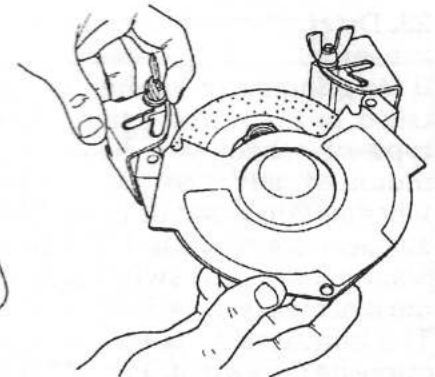


Fig. 16

**18.** Thread a button head cap screw (22) through the guard cover and into the guard. See Fig. 17.

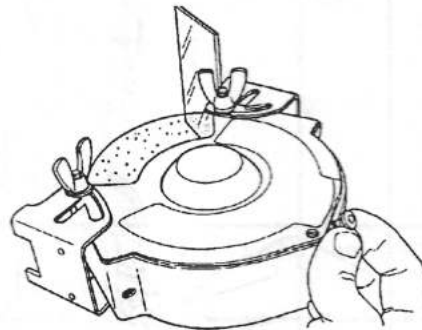


Fig. 17

**19.** Use a 5/32" Allen wrench to securely tighten the cap screw (22), as shown in Fig. 18.

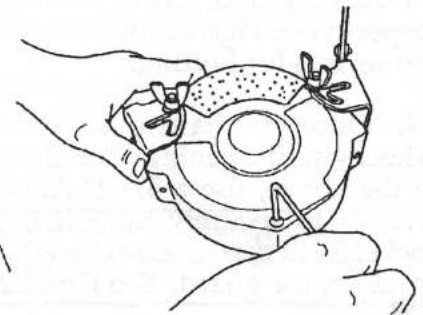


Fig. 18

### **MOUNT THE GRINDING WHEEL GUARD ON THE MARK V (OR POWER STATION)**

**20.** Place the "neck" of the grinding wheel guard on the Mark V quill, as demonstrated in Fig. 19. Do not tighten anything yet.

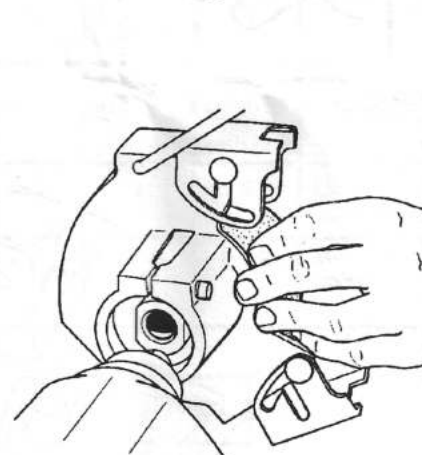


Fig. 19

**21.** Line up the knurled collar's "putty spot" with the arbor's setscrew (14), as viewed through the "neck" of the grinding wheel guard. See Fig. 20.

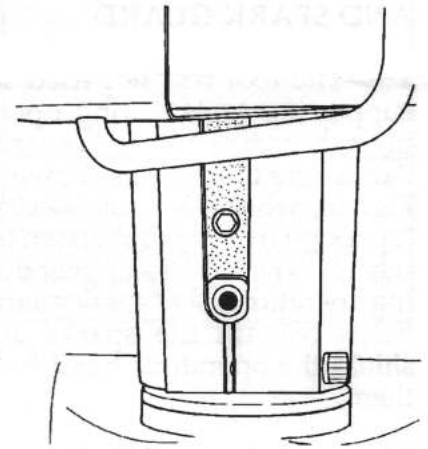


Fig. 20

**22.** Use a 5/32" Allen wrench to tighten the arbor setscrew (14), as in Fig. 21.

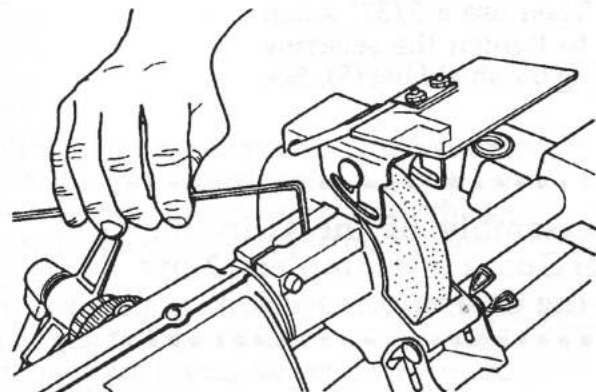


Fig. 21

23. Determine whether you want to use the Grinding Wheel Guard II for grinding or honing, as detailed in the Introduction. The type of wheel you have just mounted will also determine whether you grind or hone. For all power sources (Mark V, Power Station, etc...), the switch side of the machine is the **grinding** side. The **honing** side is on the side opposite the switch. Figs. 22 and 23 show the Grinding Wheel Guard II set up for grinding with the Mark V and Power Station, respectively. Figs. 24 and 25 show the set ups for honing.

24. Once you have placed the wheel guard opening according to the above, use a 5/32" Allen wrench to securely tighten the socket head cap screw (4) on the "neck" of the guard. See Figs. 22 - 25.

#### ADJUST THE TOOL RESTS AND SPARK GUARD

25. The tool rest not used for supporting tools during operations, becomes a "spark guard." Adjust the tool rest as shown in Fig. 26, where the notch in the "spark guard" is 1/16" above the wheel. When sparks appear during operations, the "spark guard" helps contain the sparks and shield the operator's hand from them.

26. Adjust the spark shield to be between your eyes and the contact point of metal and grinding wheel. Then use a 5/32" Allen wrench to tighten the setscrew (2) holding the shield bar (8). See Fig. 27.

MARK V

Grinding

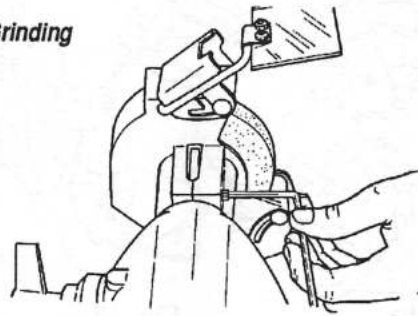


Fig. 22

Honing



Fig. 24

POWER STATION

Grinding

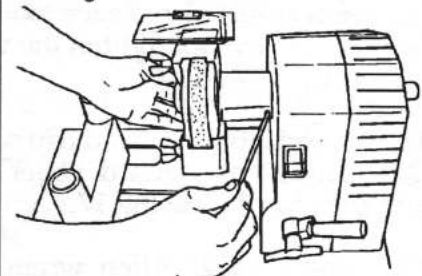


Fig. 23

Honing

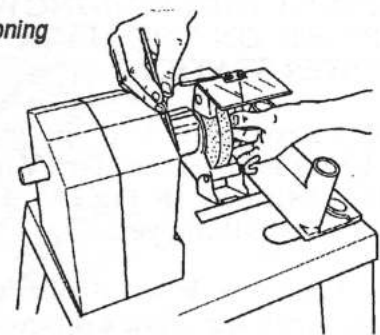


Fig. 25

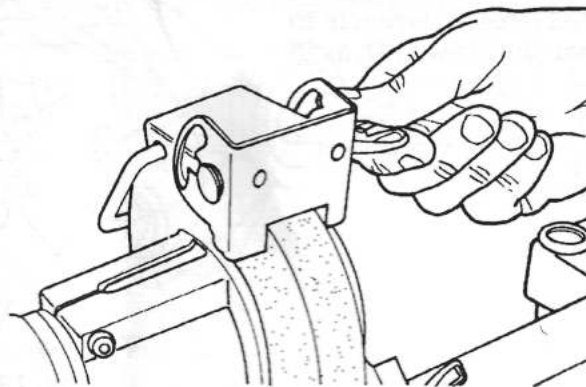


Fig. 26

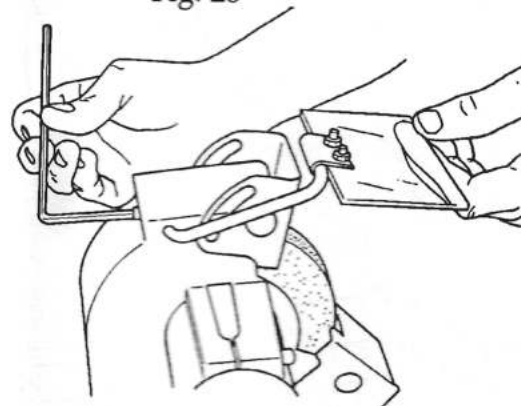


Fig. 27

The assembly of the Grinding Wheel Guard II is complete. Now go to the Operations section.



## TECHNIQUES FOR THE GRINDING WHEEL GUARD II

Operation	Wheel Type and Grit to use	Highest Approximate RPM Speed*	Mark V Setting*	Power Station Setting*	Final Finish	How to Use
Grind bench chisels, plane irons, lathe chisels, punches, screwdriver.  Remove nicks and dents.  Minor reshaping of metal objects.	Hard—Coarse to Fine	3,450	R	8-1/2	Scratches	1. Set up in the Grinding mode. 2. Tool handle pointing down.  3. Position the tool rest to the angle of the tool.  4. Keep the workpiece moving from side to side. If metal becomes too hot, quench it with water. then continue.
Hone bench chisels, plane irons, lather chisels, punches, screwdrivers.  Remove burrs created by grinding.  Remove scratches from metal created by hard wheels.	Soft—Rubber-bonded	3,450	R	8-1/2	Near mirror-like	1. Set up in the Honing mode. 2. Keep the workpiece moving. If metal becomes too hot, quench it with water. Then continue.
Remove paint and/or light rust from metal, wood, glass, etc...	Soft—Multi-Purpose	1,750	I	5	Near mirror-like	1. Set up in the Honing mode. 2. Keep the workpiece moving.
Remove sharp edges and burrs.  Remove rust and weld splatter.  Soften sharp edges.  Remove scratch marks from metal.	Wire—Wire Brush	3,450	R	8-1/2	Soft matt	1. Set up in the Honing mode. 2. Keep the workpiece moving.
Shape small pieces to a final contour.	Soft—Multi-Purpose	1,750	I	5	Light scratches	1. Set up the Grinding mode. 2. Keep the workpiece moving.
Polish metals to the finest surface.	Cotton—Buffing abrasive	3,450	R	8-1/2	Mirror-like polish	1. Set up the Honing mode. 2. Keep the workpiece moving & use a light touch.

### WARNING

\* Never exceed the recommended speed setting for the wheel being used.

## Operations

### General Information

The Grinding Wheel Guard II should become an integral part of your woodworking efforts. Sharp tools are safer than dull tools, because sharp tools perform their intended tasks more efficiently and reliably than dull tools. You can grind and hone with the Grinding Wheel Guard II, as mentioned in the Introduction and Assembly instructions.

The difference between grinding and honing on the Grinding Wheel Guard II is that for grinding, the wheel rotates **into** the workpiece, (see Figs.35-37). For honing the wheel rotates **away** from the workpiece. Grinding techniques are useful for removing more material than with honing techniques (see Figs. 38-40). Honing is more useful when you are trying to put a very keen edge on a workpiece.

**For both grinding and honing, there are several things to remember:**

1. Do not hold the workpiece too long against the wheel. The workpiece could overheat and ruin the temper or discolor the metal. A good idea is to periodically quench the workpiece in cold water.
2. The roundness of the wheel has a tendency to make the workpiece's bevel concave. This is called "hollow ground". In some tools, a hollow ground bevel is not desirable. You can avoid a hollow ground bevel by several methods—

a. Grind or hone the workpiece on the side of the wheel which is flat. Fig. 28 illustrates using the side of the wheel for honing a carving knife. Notice the tool rest is at 90° to the wheel.

**WARNING**

This technique can only be used with Shopsmith approved grinding wheels.

b. Make several lighter passes at progressively steeper angles. This will equalize the amount of metal removed from the heel, middle and tip of the bevel.

c. Instead of holding the workpiece's bevel perpendicular to the wheel's rotation, hold the workpiece on the tool rest so its bevel is in line with the wheel. You should get a good, flat bevel, assuming the wheel surface is flat.

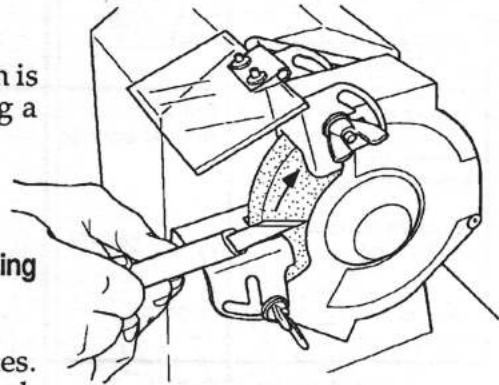


Fig. 28

## Wheel Composition

A wheel is either soft or hard, depending on the material from which it is made. Shopsmith offers both types of grinding wheels. They contain abrasive compounds embedded in rubber and plastic (soft wheels), or are made completely of aluminum oxide (hard). We recommend using Shopsmith wheels because they are safer and easier to work with than traditional hard, vitrified wheels. They also run cooler, which in turn, allows the workpiece to stay cooler.

**WARNING**

Shopsmith grinding wheels are intended for sharpening tools and minor reshaping of metal objects. Do not attempt to grind away large amounts of metal from objects such as welds, or do major re-contouring of metal objects. This will heat up and ruin the wheels as well as expose your hands to hot metal and sparks.

## Dressing the Wheels

When a hard or soft wheel becomes distorted, loaded with material or ceases to cut properly, it needs to be resurfaced, or dressed. Dressing will clean and true the grinding surface. To dress a wheel hold a dressing stick against the edge of the wheel and move it back and forth across the wheel, as demonstrated in Fig. 29 (note the use of a stop collar on the dressing stick for assured uniformity). After dressing the wheel, remember to re-adjust the spark shield so it is no more than 1/16" away from the wheel. Replace the wheel if you cannot adjust the tool rest to within 1/16" away from the wheel.

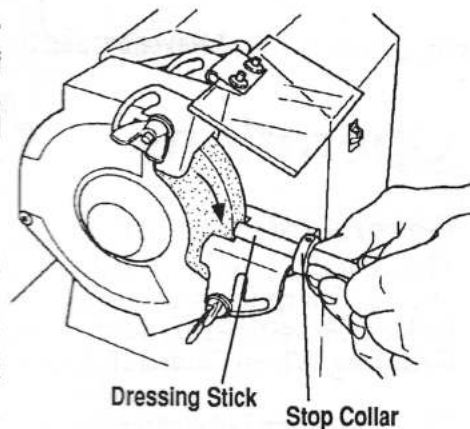


Fig. 29

# Changing the Wheel

Follow these instructions:

1. Make sure the power source is turned off, unplugged and the speed dial is set to "1" (Power Station) or "Slow" (Mark V).
2. Loosen both wing nuts (19). See Fig. 30.
3. Use a 5/32" Allen wrench to remove the cap screw (23) which attaches the cover to the guard. See Fig. 31.
4. Remove the cover (2) from the guard, as in Fig. 32.
5. Use a 5/32" Allen wrench to loosen the arbor setscrew (11).
6. Use 5/16" and 1" wrenches to remove the arbor nut. Or use an arbor wrench and vise, as shown in Fig. 33. (We recommend using the arbor wrench and vise method.)
7. Remove the key washer (13), as seen in Fig. 34, top flange washer and the wheel.
8. Install the new wheel and re-assemble. Make sure you securely tighten the arbor nut.

## WARNING

Be sure to inspect the wheel for cracks before installation. Undamaged wheels emit a clear ringing tone; cracked wheels emit a dull "thud".

9. Re-install the arbor on the spindle of the Mark V (or Power Station), securely tightening the arbor setscrew.

10. Re-install the cover. Make sure the cover's cap screw (23) and both wing nuts are securely tightened before performing any operations.

## Grinding

Mount the Grinding Wheel Guard II to the switch side of the power source, according to the instructions found in the Assembly section of this manual. Select the proper wheel for the workpiece you will be grinding and install it, as detailed in the **General Information** section and the **Techniques Chart** on page 9.

Fig. 35 demonstrates grinding a gouge chisel on the Power Station. Fig. 36 demonstrates a parting chisel. Fig. 37 shows grinding a skew chisel (note the guide block attached to the chisel with a C-clamp. This fixes the blade's angle just as the tool rest fixes the blade's bevel).

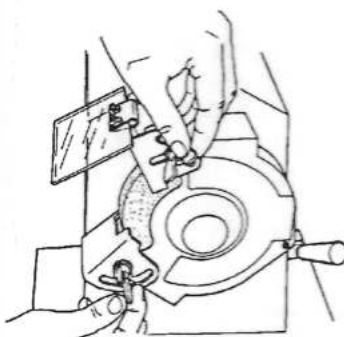


Fig. 30

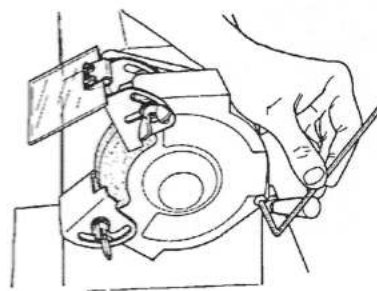


Fig. 31

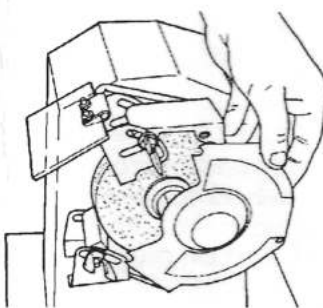


Fig. 32

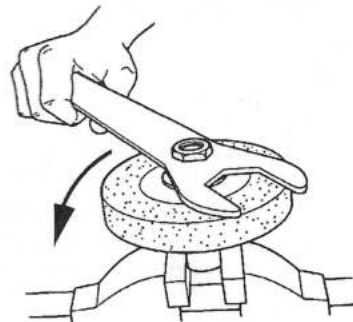


Fig. 33



Fig. 34

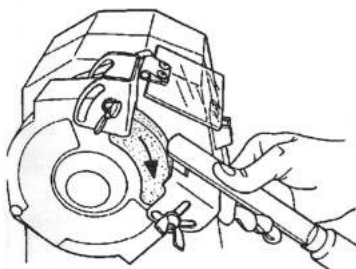


Fig. 35

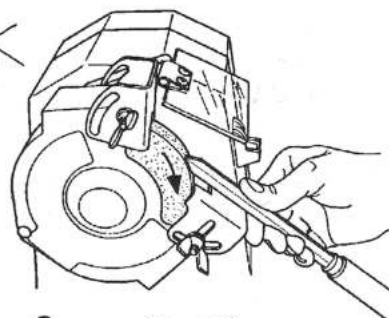


Fig. 36

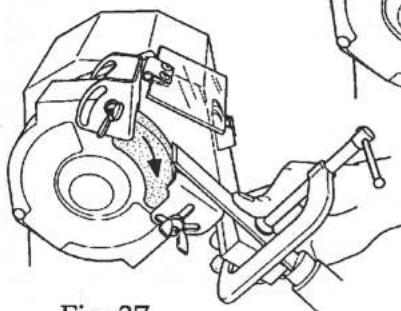


Fig. 37

### ***For Grinding, follow these steps—***

1. Set the angle of the tool rest so the workpiece's bevel is presented to the wheel according to what you wish to do with the workpiece.
2. Hold the workpiece against the tool rest and gently ease it into the rotating wheel. Do not force the workpiece. Too much force will soften the workpiece and may damage the wheel.
3. Inspect the workpiece after every pass or two. Reset the angle of the tool rest when needed.

#### **WARNING**

Do not dig the end or edge of the workpiece into the wheel, because the wheel could grab the workpiece and throw it, causing injury to yourself and damage to the equipment.

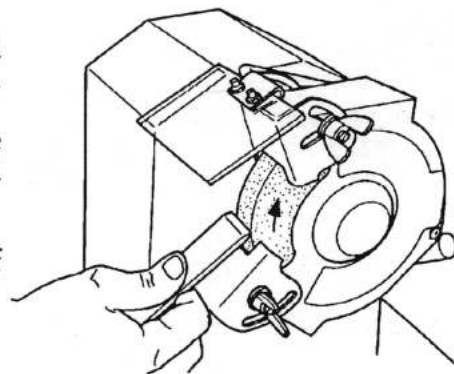


Fig. 38

### **Honing**

Mount the Grinding Wheel Guard II to the side opposite the switch, according to the instructions found in the Assembly section of this manual. Select the proper wheel for the workpiece you will be honing and install it, as detailed in the **General Information** section above and the **Techniques Chart** on page 9.

Fig. 38 demonstrates honing a bench chisel. Fig. 39 demonstrates honing a roundnose chisel. Fig. 40 shows honing a utility knife. Usually thin-bladed items (pocket knives, scissors, etc...) should only be honed. There is not enough material in the blade to support grinding because the metal will become heated too quickly. This excessive heat could ruin the steel's temper and discolor it, preventing it from maintaining a sharp, long-lasting edge.

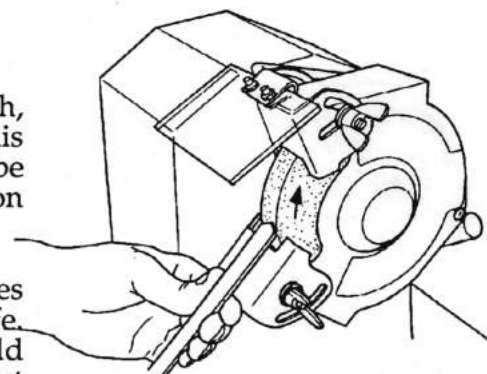


Fig. 39

### ***For Honing, follow these steps—***

1. Set the angle of the tool rest so the workpiece's bevel is presented to the wheel according to what you wish to do with the workpiece.
2. Hold the workpiece against the tool rest and gently ease it into the rotating wheel. Do not force the workpiece. Too much force will soften the workpiece and may damage the wheel.
3. Inspect the workpiece after every pass or two. Reset the angle of the tool rest when needed.

Hold the workpiece firmly against the tool rest. Gently ease the workpiece on the wheel, which is rotating away from the edge of the workpiece.

#### **WARNING**

Never push the workpiece onto the wheel. It could grab the workpiece from your hands, hurting you and damaging both the equipment.

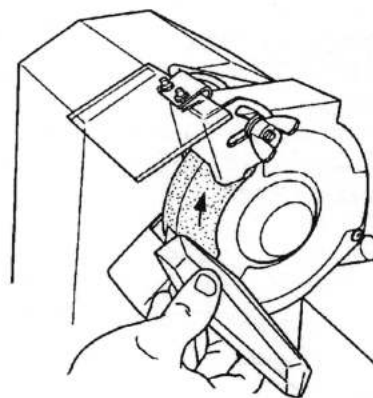


Fig. 40

Date Code \_\_\_\_\_



**Shopsmith Inc.**

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**Note:** If you have further questions or need help, visit the Shopsmith Store in your area. If there is no store in your area, call Customer Service: Toll Free 1-800-762-7555 (in Canada, 1-800-268-3998).

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