

OPERATING INSTRUCTIONS & DRILL INFORMATION



US Patents
D385567, & 4,471,581
5,735,732 & 5,400,546
other Patents Pending

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MATERIAL SAFETY DATA SHEETRequired under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding and Shipbreaking
(29 CFR 1915, 1916, 1917)**SECTION I**

MANUFACTURER NAME: Professional Tool Manufacturing LLC
 EMERGENCY PHONE NO: (541) 552-1301
 ADDRESS: 210 East Hersey Street, Ashland, Oregon 97520
 CHEMICAL NAME & SYNONYMS: Diazon-Electroplated Diamond/CBN Products, Diamond (uncoated), Man-Made * Diamond, RVG, MBG, MBS Product Families, Standard Series and 300 Series Diamond Micon Powder
 TRADE NAME & SYNONYMS: Electroplated CBN Wheels, Electroplated Diamond Wheels
 CHEMICAL FAMILY: Abrasive/Any Grade
 FORMULA: N/A

SECTION II - COMPOSITION

CHEMICAL NAME:	Nickel	Industrial Diamond
REGULATED:*	Yes	No
CAS#:	7440-02-0	7882-40-3
AGIH / TLV:	1.0 mg/m3	10.0 mg/m3 (PNOG)
CARCINOGEN:	Yes	No

*Materials are regulated by OSHA 29 CFR 1910,1200, Hazard Communication Standard.

SECTION III - PHYSICAL AND CHEMICAL DATA

BOILING POINT (F)	n/a	MELTING POINT	n/a
SPECIFIC GRAVITY	n/a	VAPOR PRESSURE	n/a
VAPOR DENSITY	n/a	EVAPORATION RATE	n/a
SOLUBILITY IN WATER	n/a	SOLUBILITY IN ALCOHOL	n/a
SOLUBILITY IN OTHER SOLVENT	n/a		
PERCENT VOLATILE BY VOLUME (%)	n/a		

APPEARANCE AND ODOR: Solid, Clear, White To Yellow To Dark Crystals Silver Color.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT	n/a		
(METHOD USED)	FLAMMABLE LIMITS	LEL	UEL
EXTINGUISHING MEDIA:	n/a		
SPECIAL FIRE FIGHTING PROCEDURES:	n/a		
UNUSUAL FIRE AND EXPLOSION HAZARDS:	n/a		

SECTION V - HEALTH, FIRST AID AND MEDICAL DATA

PRIMARY ROUTE(S) OF ENTRY:
 Inhalation, Ingestion, Skin, Eye(s)

EFFECTS OF OVEREXPOSURE:

INHALATION: Difficulty in breathing (Dust from wheel use).

INGESTION: If dust, symptoms are variable.

SKIN: Irritation (especially if sensitive to Ni).

EYE(S): Irritation (from Ni or diamond particle).

FIRST AID AND MEDICAL INFORMATION:

INHALATION: Move to fresh air. Give oxygen if necessary.

INGESTION: Obtain medical attention.

SKIN: Wash thoroughly with water. Obtain medical help if necessary.

EYE(S): Flush thoroughly with water. Obtain medical assistance.

OTHER POTENTIAL HEALTH RISKS:

Nickel (Ni) is listed as a carcinogen. Avoid long exposure. Consult medical personnel for first aid and medical information.

SECTION VI - CORROSIVITY AND REACTIVITY DATA

STABILITY:	Unstable ()	Stable (x)
POLYMERIZATION:	May occur ()	Will not occur (x)
INCOMPATIBILITY (Materials to avoid)	n/a	
HAZARDOUS COMPOSITIONS PRODUCTS:	n/a	

CONDITIONS TO BE AVOIDED: Contact with strong acids/caustics; enclosed areas.

SECTION VII - SPILL, LEAK AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

Normal clean up procedure

WASTE DISPOSAL METHOD: Waste will contain nickel. Dispose in accordance with all applicable federal, state, and local regulations.

SECTION VIII - PERSONAL PROTECTION INFORMATION**RESPIRATORY PROTECTION:**

Respiratory protection as needed see OSHA 29 CFR 1910.134

VENTILATION: LOCAL EXHAUST: strongly preferred

MECHANICAL (GENERAL): Use only if adequate to maintain below TLV's.

PROTECTIVE GLOVES: As desired by user.

EYE PROTECTION: Recommended see OSHA 29 CFR 11910.215

OTHER PROTECTIVE EQUIPMENT: Use standard precautions for grinding operations.

SECTION IX - STORAGE AND HANDLING PROCEDURES

NORMAL STORAGE AND HANDLING: Store in clean, dry area, away from chemicals.

NORMAL USE: Use adequate ventilation (see Section VIII)

IMPORTANT SAFETY INSTRUCTIONS

REMEMBER, FOR YOUR OWN SAFETY, READ INSTRUCTION MANUAL BEFORE OPERATING TOOL. Wear Eye Protection. Never touch internal parts of the sharpener when the sharpener is on. The rotating diamond grinding wheel can cause injury. Use caution when replacing the grinding wheel. Follow instructions entitled "Replacing The Grinding Wheel" in this Instruction Manual. Regularly empty accumulated grinding dust. Follow instructions entitled "Drill Doctor Maintenance" in this Instruction Manual.

WARNING : WHEN USING ELECTRIC TOOLS, BASIC SAFETY PRECAUTIONS INCLUDING THE FOLLOWING SHOULD ALWAYS BE FOLLOWED TO PREVENT THE RISK OF FIRE, ELECTRIC SHOCK AND PERSONAL INJURY.

1. KEEP GUARDS IN PLACE
2. REMOVE WRENCHES. Form a habit of checking to see that the wrench is removed from tool before turning on.
3. KEEP WORK AREA CLEAN. Cluttered areas and benches invite accidents.
4. DO NOT USE IN DANGEROUS ENVIRONMENT Don't use power tools in damp or wet locations, avoid exposure to rain.
5. STORE EQUIPMENT in a safe place when not in use.
6. DON'T FORCE TOOL. It will do the job better and safer at the rate for which it was designed.
7. USE RIGHT TOOL. Don't force tool or attachment to do a job it was not designed for.
8. ALWAYS USE SAFETY GLASSES. Also use face or dust mask if cutting operation is dusty. Everyday eyeglasses only have impact resistance lenses, they are NOT safety glasses.
9. MAINTAIN TOOL WITH CARE. Keep tools sharp and clean for best and safest performance.
10. DISCONNECT TOOLS from the power supply before servicing, when cleaning accessories.
11. AVOID ACCIDENTAL STARTING. Make sure switch is in "OFF" position before plugging in.
12. USE RECOMMENDED ACCESSORIES.
13. CHECK FOR DAMAGED PARTS. Before further use of the tool, a guard or other part that is damaged should be carefully checked to assure that it will operate properly and perform its intended function. Check for alignment of moving parts, binding of moving parts, breakage of parts, mounting and any other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced.
14. NEVER LEAVE TOOL RUNNING UNATTENDED.
15. USE PROPER EXTENSION CORD. Make sure extension cord is in good condition. When using an extension cord be sure to use one heavy enough to carry the current the Drill Doctor® will draw. An undersized cord will cause a drop in line voltage, resulting in a loss of power and/or overheating. Maximum cord length (50 ft), minimum gauge (16). The smaller the gauge the heavier the cord.

DRILL DOCTOR® WARRANTY

Professional Tool Manufacturing LLC warranties your Drill Doctor® to be free of defects due to workmanship and design for 1 year following the first day of in service use.

For warranty service see warranty card instructions or contact your authorized Drill Doctor® dealer.

Congratulations

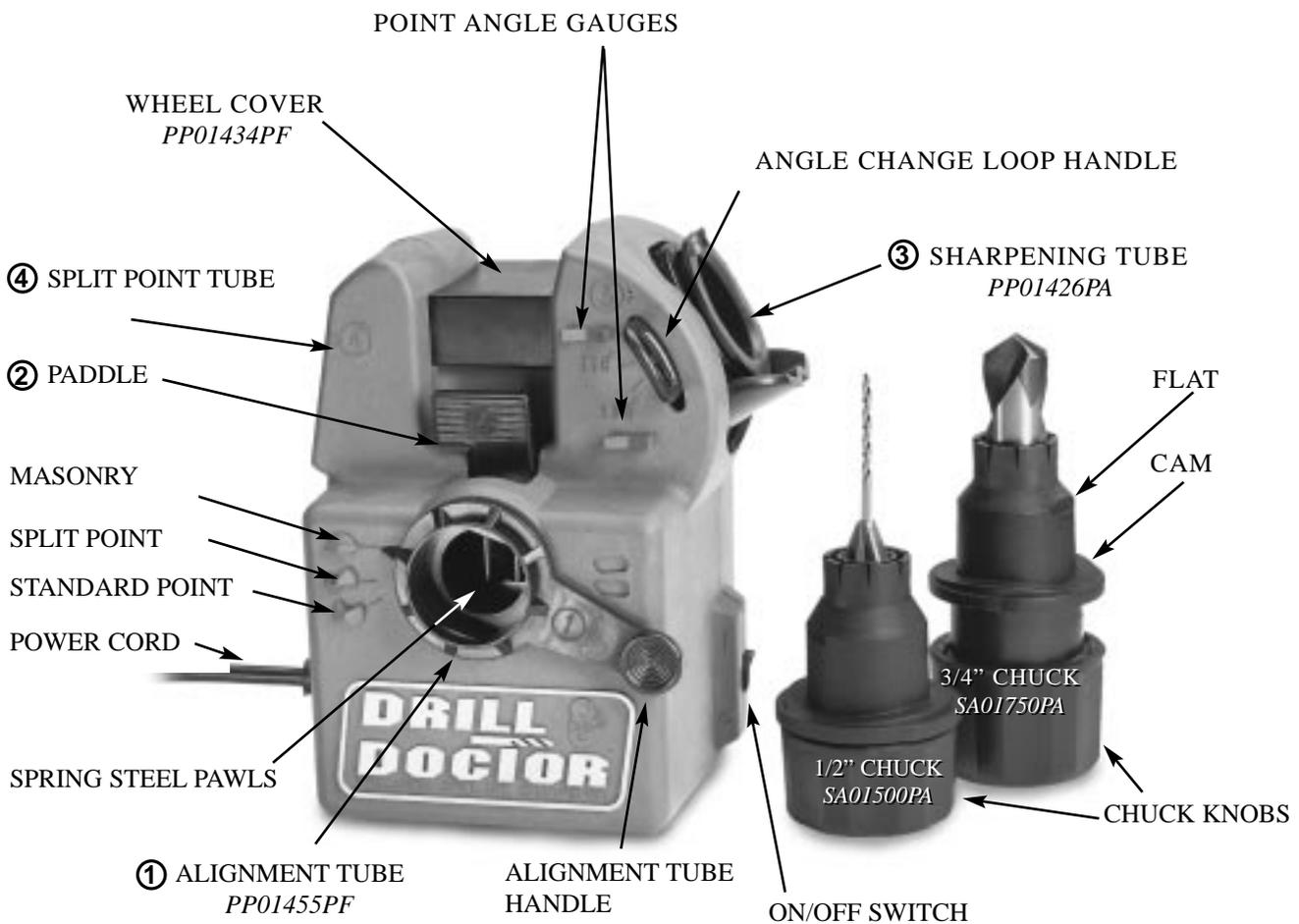
You have just purchased the finest, most accurate and best engineered drill bit sharpener ever created for home and professional use. It is likely that your experience with this sharpener will be unlike any sharpener you have used before. We hope that in the next several minutes you will discover how Professional Tool Manufacturing LLC and the Drill Doctor® help to SIMPLY improve the quality of your life (and your drill bits' too!).

Before you sharpen your first drill bit

Take a few minutes to familiarize yourself with your new Drill Doctor® and its basic parts. We will refer to all of the parts and features (Figure 1) during the course of this manual and in the video. There are some features and characteristics unique to the Drill Doctor® which are explained and illustrated within the instruction section of this manual and the video. Don't worry, the time it takes to watch the video or read this manual will be made up when you sharpen your first drill bits. Keep in mind that learning to sharpen drill bits is like learning to ride a bike: it takes a few tries to get it right, so you should expect that it may take a couple of drill bits to get the "point".

DRILL DOCTOR® (MODEL 750SP Shown)

Fig. 1



About the Drill Doctor® and this manual

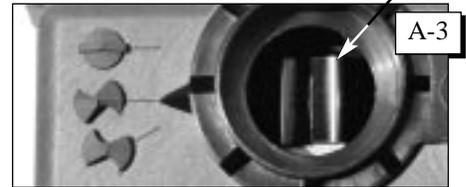
The Drill Doctor® is most efficient when used to resharpen a drill bit's original point angle. It has been designed and engineered to sharpen three of the most common drill bit types: standard 118°, high-performance split point 135°, and carbide 135° masonry (see page 9 for illustrations and applications). With its standard diamond grinding wheel it will sharpen high-speed steel, cobalt, parabolic, TiN coated, and solid carbide drill bits. The troubleshooting section of this manual is designed to anticipate many common questions and applications. To keep your Drill Doctor® and your drill bits in top condition please refer to the maintenance section of this manual. Available replacement wheels and parts are shown in the exploded diagram (page 8). They are available from Drill Doctor® or your dealer. Please note that the ① ③ ④ symbols refer to the three tubes and the ② refers to the paddle on the Drill Doctor®.

QUICK OPERATING STEPS

Models 500SP & 750SP

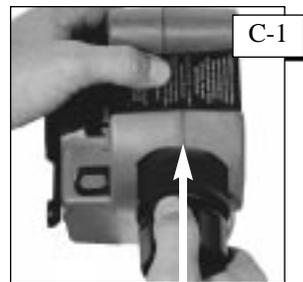
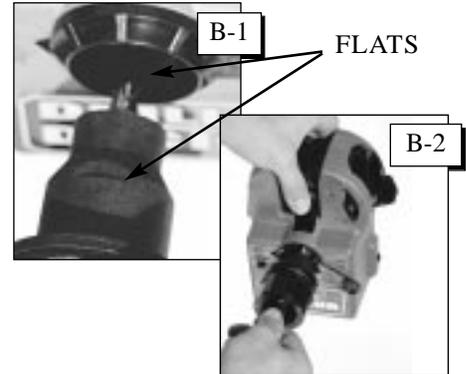
A. Setting for split point style (full instructions page 4)

1. Determine the point angle of your drill by placing the drill point in the point angle gauges. See A-1
2. Insert a chuck (without drill) into the sharpening tube ③ and pull the loop handle out. Move point angle indicator to the setting needed (118° or 135°). Make sure the loop seats properly. See A-2
3. Pull the alignment tube ① handle slightly away from the housing and move to the (Split Point) setting. See A-3



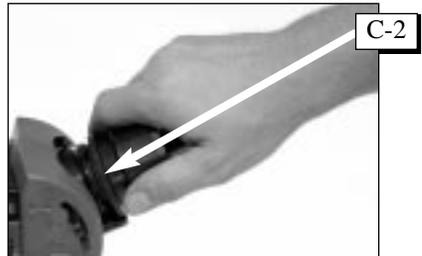
B. Aligning the drill bit (full instructions page 4 and figure 9)

1. Insert the drill loosely into the chuck. Tighten the chuck knob clockwise, then loosen it so the metal chuck jaws are just loose enough for the drill bit to slide in and out.
2. Align the flat on the chuck with the flat in the alignment tube ①. See B-1
3. Push the paddle ② to open the blue spring steel pawls. See A-3. Push chuck and drill assembly into alignment ① tube so that the flat on the chuck is entirely hidden. See B-2
4. Push the drill in to the drill stop. Release the paddle and rotate the drill by the shank until the *pawls grip inside the drill flutes*. Keep the drill bit pushed to the drill stop and turn the chuck knob clockwise to tighten the jaws onto the drill bit. Push the paddle ② back and remove the chucked drill (see Figures 8 and 24 for correct alignment and terminology).



C. Sharpening the drill bit point (full instructions page 5)

1. Turn the switch below the sharpening tube ③ on. Position the sharpener so that you are looking at it from the perspective shown in C-1. Insert the chuck in the tube ③.
2. Rotate the chuck clockwise, in half rotation increments, 12 to 20 times (on a medium size drill bit 1/4" to 3/8") in the sharpening tube ③. It is important to keep consistent pressure going INTO the tube ③. Let the cam dictate the natural in and out sharpening motion. The sharpening will occur in the low part of the chuck cam. Do not push the chuck down to the base. See C-2



D. Splitting the drill point (full instructions page 6)

1. Move the chucked drill to the point splitting tube ④ and again match the flats on the chuck with the flats in the tube ④. Insert the chucked drill until the flats are touching and the chuck does not rotate.
2. Slowly pull the chuck forward giving the drill bit one or two short "pecks" on the wheel. Repeat until the split is to the middle of the drill point. To avoid over-splitting inspect the drill point periodically. See D-1
3. Pull the chuck out of the point split tube just far enough to rotate the chuck 180°. Repeat steps 1 and 2 above.



If possible, the first couple of drill bits you sharpen should be about 3/8" in diameter, or large enough to see how the point looks. Study Figure 1 on page 2 and the Figures 26 and 27 on page 8. Various Drill Doctor® and drill bit parts will be referenced in the following sections.

Step 1: Drill Identification and Sharpener Set Up

- A. Place the drill in the point angle gauge (see Figure 2). Note how the chisel edge and cutting lip fits in the gauge. A correct fit is along the entire point, an incorrect fit is not.
- B. The "correct fit" gauge is what point angle you should set. Insert a chuck, without a drill in it, into the sharpening tube ③. Pull the "loop" handle away from the housing with your index finger and thumb, then using the chuck as a lever, move up or down to set the angle indicator (see Figure 3). Make sure the angle indicator seats in the notches on the left and right sides of the sharpening tube ③.
- C. Pull the alignment tube ① handle slightly away from the housing and move the alignment tube to the appropriate drill bit profile (see Figure 4). Make sure to seat the handle into the corresponding notch in the housing behind the handle. The alignment tube ① is now set and ready to "set" the drill bit in the alignment procedure.

Note: This procedure can be used to increase or decrease "relief" on a drill bit. See pages 5 and 10 for full discussion and applications.

STEP 2: Aligning Drill Bit For Sharpening

- A. Turn the chuck knob, counter-clockwise (CCW) to open the chuck jaws, until you can insert the drill bit into the chuck (see Figure 5). With the drill bit in the chuck, turn the chuck knob clockwise (CW). This will close the chuck jaws onto the "flutes". Turn the chuck knob until it stops then loosen the chuck jaws slightly by turning the chuck knob CCW. At this stage the drill bit should have a "slip-fit" and will slide in or out and rotate freely within the chuck.
- B. Align the flats on the chuck with the flats in the alignment tube ①. Slide the chuck into the alignment tube ① all the way until it stops. At this point the flat on the chuck nose should be entirely hidden inside the alignment tube ① (see Figure 6).
- C. Push the paddle ② back all the way to the housing. Hold the paddle then grasp the shank of the drill bit and push it into the chuck to the drill stop (see Figures 7 & 8).

Note: At this stage, if the drill bit is too short to push, see "Sharpening Short Drill Bits" on page 6.

- D. Release the paddle, but continue pushing the drill bit in against the stop. The two pawls will close onto the drill bit.

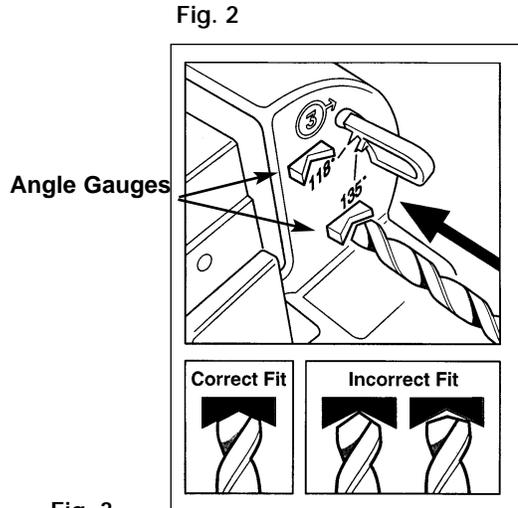


Fig. 3

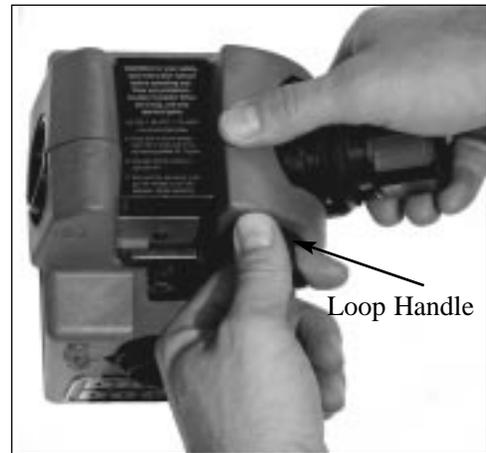


Fig. 4

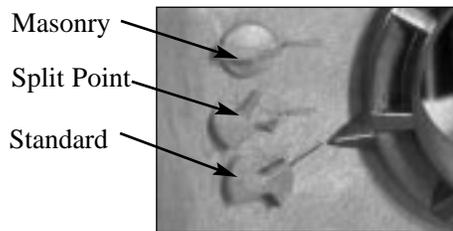


Fig. 5



Fig. 6

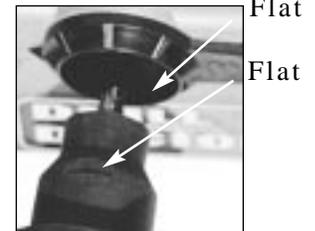
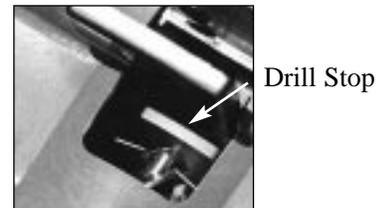


Fig. 7



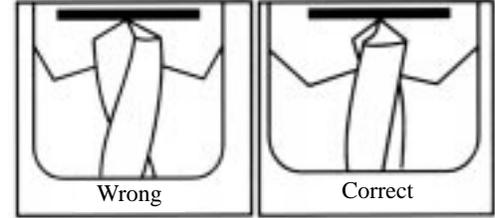
Fig. 8



STEP 2: Aligning Drill Bit For Sharpening (continued)

- E. Look into the opening in front of the paddle. Note the location of the two spring steel pawls. Rotate the drill bit until the pawls slip in and grab the flutes at the narrowest point. Continue to push the drill bit against the drill stop (see Figure 9).
- F. With the drill point against the drill stop and the pawls in their correct position, tighten the chuck by turning the chuck knob CW with the other hand. Push the paddle ② back again to release the drill bit. Remove the chuck and drill assembly from alignment tube ①. Snug the chuck knob CW using both hands to secure the drill bit in the chuck.

Fig. 9



STEP 3: Sharpening The Drill Point

- A. Turn the Drill Doctor® switch on.
- B. Place the chuck into the sharpening tube ③. Align the high part of the cam with the top cam follower and push it in all the way. This will prevent the drill bit from crashing into the wheel.
- C. **Lightly pushing INTO** the sharpening tube ③ (see Figures 10&11). Rotate the chuck CW in half rotation increments, similar to the motion used to turn a doorknob. Rotate the chuck 12 to 20 times on a medium size drill bit 1/4" to 3/8". It will take more rotations for larger drill bits and as few as 2 rotations on small drill bits. **The sharpening tube will move in and out during this process.** Let the cams dictate the natural in and out sharpening motion. The sharpening will occur in the "valley" of the cam. **Maintain consistent contact with the cams and cam followers.**

Fig. 10

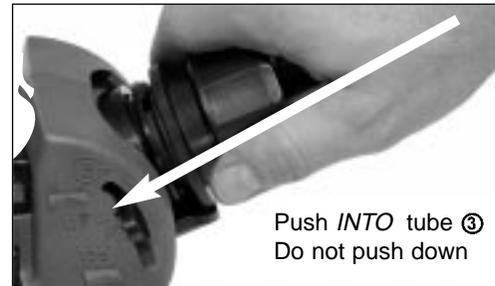
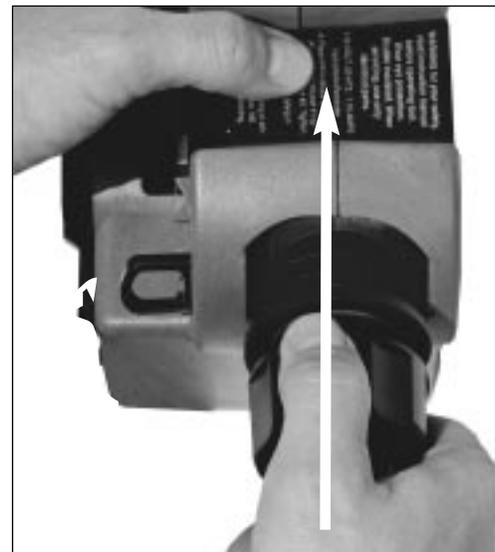
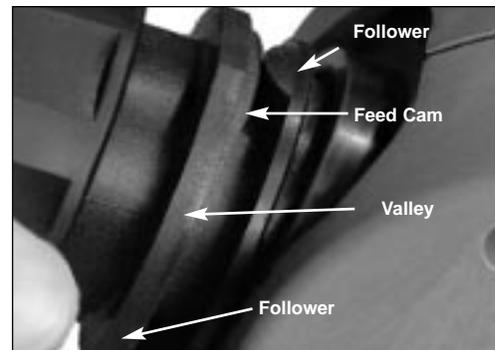


Fig. 11



NOTE: The sharpening tube is moving in and out due to the secondary or feed cam on the chuck riding against the top cam follower. The initial grinding occurs when the "valley" of the feed cam rides against the top cam follower (see Figure 12). If at the start of the grind, the feed cam on the chuck is NOT touching the top cam follower, then it is the result of the drill point being against the wheel and preventing the feed cam from touching the follower. As you continue to grind and remove material, the feed cam will begin touching the cam follower and start to produce the correct relief angle behind the drill bit's cutting lips. Additionally its important to keep the bottom cam follower in contact with the high lobes on the feed cam. These cams work together in producing the radial grind and proper relief on the drill point.

Fig. 12

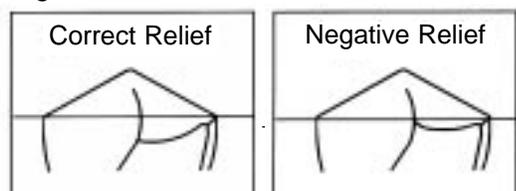


About Relief Angle Settings

If after aligning your bit and sharpening it, the relief needs to be increased or decreased, then the following procedure is required.

- A. Rotate the alignment tube ① from the point split setting to the standard setting to increase the relief. The further counterclockwise the tube is turned the more relief the drill will have.
- B. To decrease relief set the timing tube to the masonry location. The further clockwise the tube is turned the less relief the drill will have.
- C. Reference Figure 13 and #2 in the troubleshooting section on page 10 for more information on negative relief.

Fig. 13



STEP 4: Splitting The Drill Point

You can split either a 118° or 135° drill point. Refer to Figure 31 on page 10 for a drawing and definition of a properly split drill bit point.

- A. After sharpening the drill point, do not remove the drill bit from the chuck. Align the flats on the chuck with flats in the splitting tube ④ and insert to the point where the flats are touching (See Figure 14).
- B. Slowly pull the chuck forward giving the drill bit one or two short "pecks" on the wheel (See Figure 15). Pull the chuck out and inspect the point. Depending on the size of the drill bit, it may be necessary to repeat steps A and B until the drill point is split to the middle (See Figure 31).
- C. Pull the chuck out of the splitting tube ④ far enough to rotate it 180°. Repeat steps A & B to split the other side.

NOTE: The rule of thumb is "it's better to grind off not enough rather than too much". If the drill point is over-split, try re-sharpening in the sharpening tube ③ to reduce the over-split. If this doesn't work repeat steps #2 – #4.

Sharpening Short or Small Diameter Drill Bits

- A. Complete Step 2A on page 4. When completed, remove the drill bit from the chuck.
- B. Push the paddle ② back, and insert the individual drill bit into the alignment tube ① all the way to the drill stop. Release the paddle and turn the drill bit until it is secured by the pawls and pointing straight out (see Figure 16).
- C. Continue to hold the drill bit with one hand and carefully slide the chuck onto the drill bit with the other (See Figure 17). Align the flats on the chuck with the flats in the alignment tube ① and push the chuck all the way in until the flats on the chuck are entirely hidden. Tighten the chuck jaws onto the drill bit with the chuck knob. Push the paddle ② back and remove the chucked drill bit.
- D. Look in to the back of the chucked drill. The chuck jaws around the drill bit should be in line. If not, turn the chuck knob counter clockwise to straighten (See Figure 18).
- E. Sharpen in tube ③.

NOTE: Too many rotations on small diameter bits will result in a negative rake angle. Example: 3/8" rotate (16-20) 180 degree turns, 1/8" rotate (4-6) and 3/32" (2-4).

Sharpening Masonry Drill Bits

- A. Set the point angle indicator to 135° (see Figure 2 on page 4).
- B. Set the alignment tube ① pointer to the masonry position. (See Figure 4 on page 4)
- C. Complete Steps 2A and 2B on page 4.

NOTE: When aligning the masonry drill bit, the pawls are not used in the alignment process. Push the paddle ② back to the housing and insert the drill bit to the stop, then release the paddle. Disregard the position of the pawls.

- D. Grasp the shank end of the drill bit and rotate it so that the right cutting lip is high in a 2 o'clock position (See Figure 19 and 20). Tighten the chuck knob. Push the paddle ② back and remove the chuck from the tube.
- E. Sharpen in the sharpening tube ③.

NOTE: The masonry drill bit may also require fewer rotations than similar diameter standard drill bits.

Fig. 14

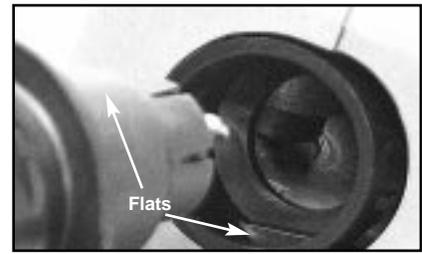


Fig. 15



Fig. 16



Fig. 17



Fig. 18

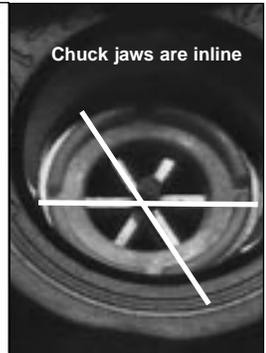
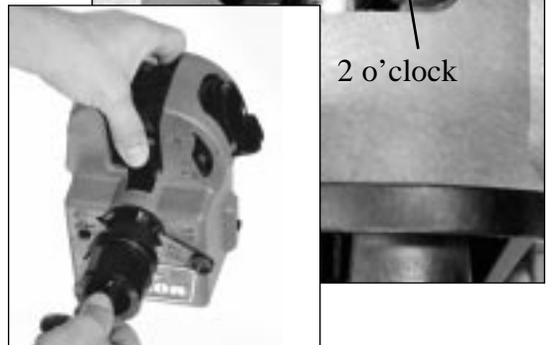


Fig. 19



Fig. 20



After sharpening many drill bits, the drill bit grinding dust will accumulate in the grinding compartment. Grinding particles will promote wear in the three tubes and chucks, so cleaning on a consistent basis can add life to your machine. **Before any maintenance or cleaning is performed, be sure to unplug your Drill Doctor®.**

Cleaning The Drill Doctor®

Unplug the Drill Doctor®. With a dry cloth wipe the inside and outside of the three tubes to remove any grinding dust that may have accumulated. A standard 1" vacuum hose works equally well. To empty the drill bit grinding dust remove the black cover from the top of the machine.

Removing The Wheel Cover

Unplug the Drill Doctor®. Using the narrow end of the wrench provided (or a flat head screwdriver) insert into the slot on the rear of the machine and use a twisting motion to pry the cover off. Shake accumulated drill bit grinding dust into a disposable container. Remove dust particles around wheel with a small dry brush. Dispose of container and drill bit dust in a safe and environmentally approved manner.

Cleaning The Chucks

With pressurized air, blow the chuck out from the chuck knob end. For further cleaning, disassemble the chuck by simply unscrewing the closing knob on the chuck and removing the chuck body. Clean the inside of the chuck with a dry paint brush. **(Do not remove the springs and jaws from the holder!)** Once the inside of the chuck has been cleaned - slide the chuck body onto the jaws - sighting down the nose make sure that the jaws go into the grooves inside the chuck body. Rotate the closing knob clockwise to reassemble the chuck, checking that all of the jaws are in their respective grooves (see Figures 21 and 22).

Determining if a Wheel Change is Required

A wheel may need to be changed if:

1. Sharpened drill bits will burn or turn blue no matter how fast or slow you rotate the chuck.
2. Upon inspecting the wheel, by touching it, it feels like there is not any abrasive on the lower portion.
3. When sharpening the drill bit, it takes too many rotations to sharpen.

The grinding wheel can be reversed to utilize the unused half. If the wheel has already been reversed, it will need to be replaced. Contact the store or dealer where you purchased the Drill Doctor® to purchase a replacement wheel **(Part #SA01326GA).**

Reversing or Replacing The Diamond Grinding Wheel

Unplug the Drill Doctor®. Remove the wheel cover as described above. The wheel is attached to the hub with two Phillips head screws and a wheel retainer. Use the wrench provided by inserting it directly below the wheel onto flats located on the wheel hub. Remove the screws, wheel retainer and the worn wheel using a twisting motion. Install the new wheel, wheel retainer and the screws. Do not over tighten the mounting screws (see Figures 23 and 28).

Cleaning or Replacing the #1 Alignment tube

Grasp the alignment tube handle and pull it forward slightly. This will disengage the handle from the notches in the front of the housing. Rotate the handle counter-clockwise until it is almost vertical. Once it is in that position, pull forward and it will unlock from the front of the housing. Wipe the part off with a dry rag and vacuum the front alignment hole to remove any particles from the machine. Reinsert the alignment tube in the opposite way that it was removed.

Fig. 21

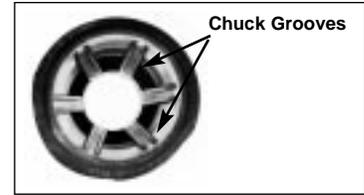


Fig. 22

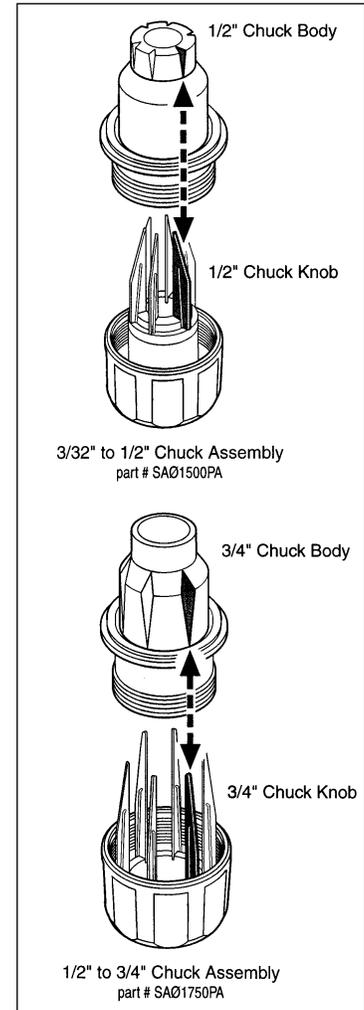


Fig. 23

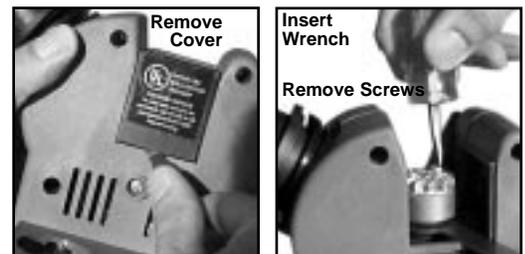


Fig. 24



Quick Facts About Drill Bits

118° STANDARD POINT: This drill bit point angle is considered a standard general purpose geometry. It is used for drilling soft or mild materials such as cold rolled steel, aluminum, and wood. Typically the standard drill bit is made of High Speed Steel (HSS). The tip of the drill bit can easily be split making it a High Performance drill bit.

135° HIGH PERFORMANCE SPLIT-POINT: The flatter point angle of this drill is designed for harder, tougher materials such as tempered steels, hard alloys or hard cast metals. Metal types in split-point drill bits vary (see below). Due to the thicker web and flat point angle this drill point works best when its split-point is maintained.

MASONRY DRILL BITS: This point angle is typically 130° to 135°. New masonry drill bits are generally sharpened with a facet or flat style grind. Masonry drilling is typically not a precision operation. The masonry drill bits resharpened with the Drill Doctor® will look different due to a radial (curved) grind. However, this style of grind will perform as well as the original drill point.

SPLIT POINTS: Split point drill bits tend not to walk around on the material before they begin to cut. This feature is described as self centering. The need to center punch is effectively eliminated. A standard drill bit chisel point has to wear an area in the middle of the hole prior to the cutting lips removing material. Due to its additional cutting lips along the chisel edge a split point will begin cutting immediately. Up to 70% less thrust (when compared to a non-split or conventional point) is required to drill a hole with a split point. You can split either the 118° or the 135° degree points with Drill Doctor®.

CARBIDE DRILL BITS: This point angle is typically 130° to 135°. Carbide is harder and more brittle than high speed steel and cobalt. This type of drill is used for drilling tempered steels, alloys, glass, Etc. Carbide drill bits can be sharpened with your Drill Doctor®.

PARABOLIC AND COBALT DRILL BITS: Have a thicker web than regular drill bits. Parabolic drill bits are designed to drill deep holes. Cobalt drill bits are Titanium Nitride (TiN) coated. TiN is applied to increase a drill bit's cutting efficiency. Most of these drill bits can be sharpened with your Drill Doctor®.

LIP RELIEF ANGLE: The relief on a drill bit is the downward angle between the cutting lips (leading edge) and the heel (trailing edge) on the drill point. If the drill bit cutting lips are not higher than the heel, then the drill bit will not cut into the material. This is often referred to as negative relief (see page 5 & 10). The Drill Doctor® is designed to grind a standard factory relief on your drill bits.

CHISEL EDGE ANGLE: The chisel edge is the line across the point of a drill bit. Note in Figure 27 the chisel edge angle is between 120° and 135°. Another way to look at a chisel edge is to imagine the drill point as a clock face with the chisel angle pointing to an approximate one o'clock position. Most drill bits are set to this angle.

WEB: The web is the core thickness of a drill point. It is typically around 10% of the drill bit diameter. As a drill bit is sharpened the web thickness will increase. Splitting the point or thinning the web on a drill bit will maintain drill bit performance (See Figure 26).

Fig. 25

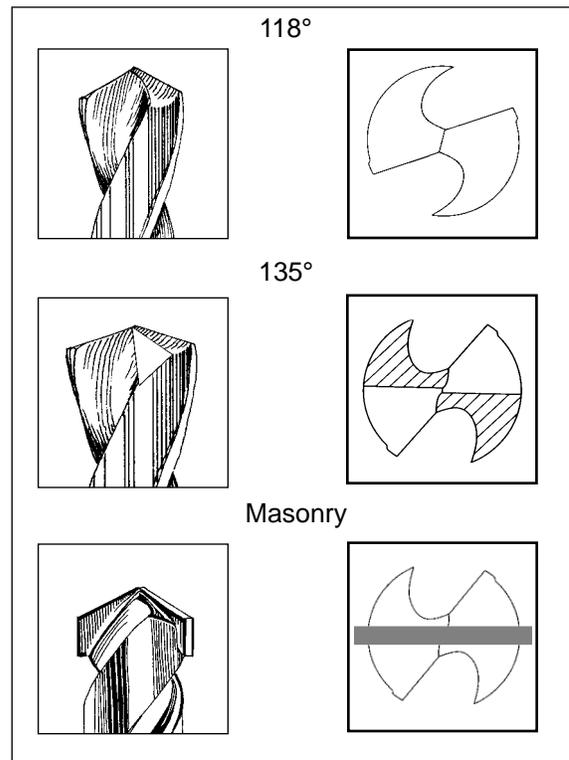


Fig. 26

ANATOMY OF A DRILL BIT

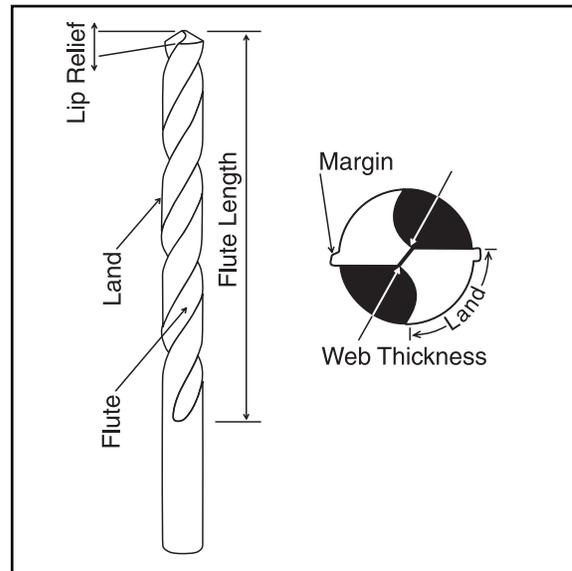


Fig. 27

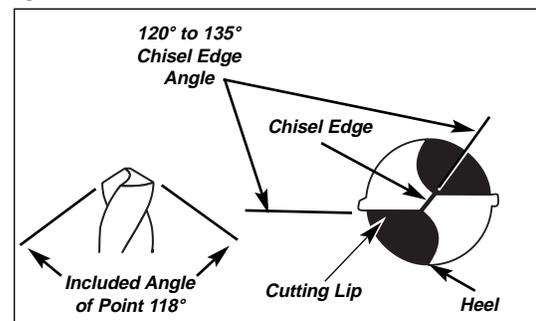
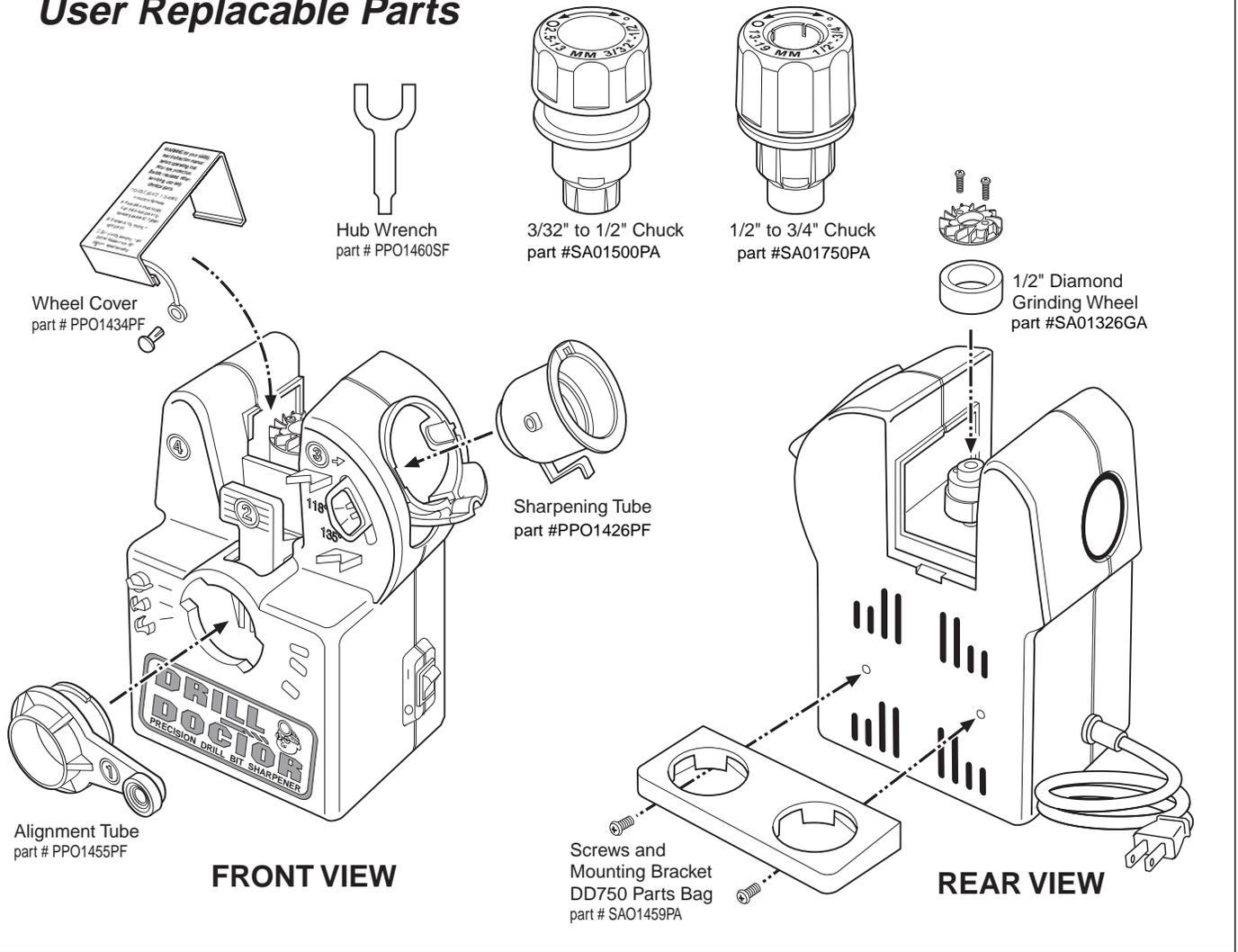


Fig. 28

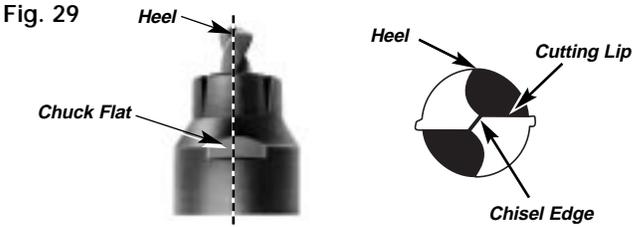
User Replacable Parts



DRILL DOCTOR® TIPS

Slow and Fast Spiral / Helix Drill Bits, Raised Margin Drill Bits & Negative Relief: Using the standard drill setting align the bit in the chuck. Visually check the alignment of the bit before sharpening. Note the position of the two chuck flats, (remember the flats are what lock the chuck in the alignment & splitting tubes). Draw an imaginary line from the middle of the flat up through the drill bit. That line should end up on the heel of the drill bit (see Figure 29). This check will hold true on drill bits from 3/32" to 1/2". If the line does not fall on the heel, then the alignment tube must be adjusted. If the line falls to the right of the heel, move tube ① slightly below the standard setting. The chisel edge will rotate clockwise if the alignment setting is moved too far. If the line falls left of the heel

move tube 1 slightly above the standard setting. Check the alignment again and adjust accordingly.



Drill bit backing up into chuck during sharpening procedure: Follow the chuck disassembly procedure on page 7 of the ops manual. Using compressed air, a small brush or rag, wipe between the white/black pusher (the pusher is the piece holding the jaws and springs) and the chuck knob. Rotate the knob to make sure all dust/grit is removed. Reinstall chuck body to chuck knob; ensuring the jaws are in the jaw grooves.

Reverse the grinding wheel before you replace it. The grinding wheel supplied with the Drill Doctor® is designed to give you long and trouble-free service, on average over 200 sharpenings. Eventually, you will need to replace the wheel. However, before you replace the wheel you can flip it over. Drill point burning and an increase in drill bit sharpening time are indicators that the wheel needs replacement. See page 7

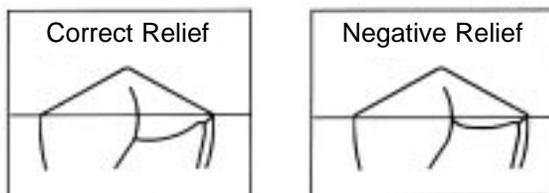
You can take less material off of a drill bit. The sharpener will remove approximately .015" to .025" depending upon the point angle that is sharpened. To align the drill bit to remove less material, merely insert a shim or feeler gauge between the drill bit point and the metal stop where the drill bit normally touches during alignment.

TROUBLESHOOTING

1. I aligned the drill bit and sharpened it, but no material gets removed. You may have allowed the paddle ② to knock the drill back into the chuck. Carefully realign the drill in the alignment tube ① again. Make sure the drill is pushed all the way against the drill stop (see Figure 8 on page 4).

2. I'm getting negative relief. Negative relief is present when the heel of the flute is higher than the cutting lip on a drill. When this happens the drill will not cut. To correct negative relief, set the alignment tube to the non-split setting. Turning lever number 1 counter clockwise will increase relief. Realign the drill and resharpen in the sharpening tube ③. Maintain consistent inward pressure to the grinding wheel during the chuck rotation.

Fig. 30



3. Why is the drill point off center? If the tip of the drill bit appears to be sharpened off center, check the following items:

- Make sure that there are no particles between the chuck jaws and the drill bit, which could hold it off center.
- Note if the closing knob is closed firmly enough to hold the drill bit on center.
- During the sharpening process be sure not to push unevenly during the rotations. If the point split appears off center see #10.

4. Why don't my drills align like the "correct" diagram? There may be a burr on the drill shank (remove burrs with a flat file). Also, the drill may be too loose or too tight in chuck.

5. What can I do about the flat spot between the lip and the heel? The flat spots or chattering on a sharpened drill, are the result of an incomplete or fast rotation of the chuck in the sharpening tube ③. To correct, apply firm, not excessive inward pressure and rotate the chuck smoothly while sharpening. Be sure to complete the grind.

6. The chisel edge on my drill bit is flat. During the alignment process the pawls were gripping "ON" the flutes of the drill bit. Re-align the drill bit making sure that the pawls are located in the narrowest section of the flutes.

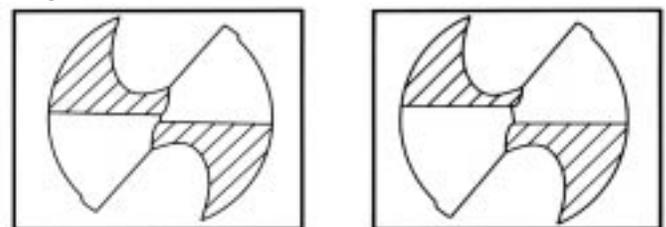
7. After sharpening, the grind finish on my drill is rough. Grind finish is initially rough when sharpened by a new diamond wheel. Drill performance will not be noticeably affected however. The finish will improve as the diamond coating breaks down.

8. My small drills are grinding off center. After aligning the small drill, look into the back of the chuck and notice if the jaws are straight to each other. If the jaws are twisted in a spiral direction, grasp the closing knob and very carefully turn it counter clockwise to straighten the jaws. This procedure will center the drill in the chuck.

9. My drill point was sharpened improperly. The most common cause of improper sharpening is not aligning the drill in the chuck properly. Key causes are: 1. Drill point not pushed all the way to the drill stop. 2. Chuck not pushed all the way into the alignment tube. 3. Drill not aligned in the pawls correctly. In order to correct these problems be sure the chuck is all the way in the alignment tube ① with the flats entirely hidden. The drill point is against the drill stop and the pawls are located in the narrowest section of the drill flutes.

10. Why is my point split uneven? Figure 31 shows a drill point that is under split and a drill point that is correctly split. To correct an uneven point split take more material off of the under split flute. To do this, reinsert the chuck in the ④ splitting tube with the under split flute on top. Repeat Step 2B (page 6) until split is correct. A correct split point should look symmetrical. The two parallel lines formed by the split should have a separation of .005 to .012 of an inch on the chisel angle.

Fig. 31



Correct

Incorrect

If this guide and the video do not answer your questions call Professional Tool Manufacturing LLC customer service at 1-800-597-6170 or 1-541-552-1301.

**Watch Professional Tool Manufacturing LLC
for new innovative products.
<http://www.drilldr.com>**

Dear Customer,

We appreciate the confidence you have placed in us by purchasing the Drill Doctor® and we want you to be as excited about this remarkable tool as we are. It's easy to use correctly, if you follow the instructions. We have created this manual and video in order to give you the information you need to effectively master its operation and get the satisfactory results you expect from Professional Tool Manufacturing LLC.

MODEL 500SP
3/32" - 1/2" CHUCK
1/2" DIAMOND WHEEL
110V 60Hz 1.75 AMP MOTOR

MODEL 750SP
3/32" - 1/2" CHUCK
1/2" - 3/4" CHUCK
1/2" DIAMOND WHEEL
CHUCK STORAGE RACK
110V 60Hz 1.75 AMP MOTOR



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