

OPERATING INSTRUCTIONS

DAREX M-2 PRECISION DRILL SHARPENER

ATTENTION PLEASE!

Your Darex Drill Sharpener is assembled at the factory such that it takes only minutes to set up and operate. HOWEVER, since proper procedure is essential for satisfactory results read the operating instructions carefully on a step by step basis prior to starting. Please follow these steps:

1. Read and pay close attention to the safety precautions.
2. Learn to produce a "standard point" first as shown on page 2.
3. Become proficient on sharpening drills of at least 1/4" diameter or larger before attempting smaller drills.

After a little practice, you will be producing accurate points in less than a minute . . .

Getting to know your Darex Precision Drill Sharpener

The Darex drill sharpener has an unusually broad capacity for handling 1/16 through 1/2-inch, fractional, letter, number, metric, carbon, high-speed, carbide, straight or tapered shank drills. An optional chuck is available to extend the range to 3/4-inch. Clearly marked standard settings quickly produce precision "factory-point" drill geometry. Point angles, relief clearance and chisel point angles can be reset in seconds, without tools, to produce the optimum geometry for soft or hard materials, metals, plastics, wood, etc. Self-centering, multi-chamfer and other special points can be produced as well.

ALIGNMENT FIXTURE . . . automatically and precisely aligns drill in chuck both radially and axially with sharpening cams. Finger tip adjustment to vary clearance angle if desired.

EYE SHIELD . . . Positively attached for maximum protection.

PRECISION CHUCK . . . four jaws firmly grip the drill at eight points insuring utmost accuracy over the full range of drills . . . no fumbling with "V" blocks, no collets to get lost.

SHARPENING MECHANISM . . . works in conjunction with the chuck cams to produce a dual sharpening motion that grinds both lips of the drill in the same operation . . . adjustable wear bushings to insure precision for years.

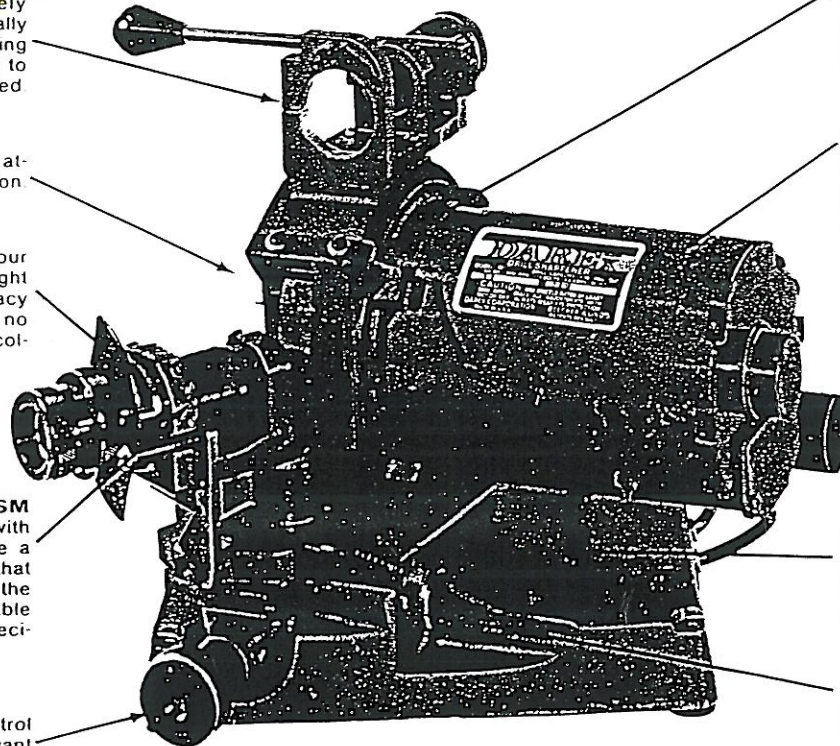
PRECISE FEED . . . you control the amount of material you want to remove . . . from .001" to whatever is needed to clean up a dull drill.

WHEEL GUARD . . . more than meets OSHA requirements for strength and permissible opening. Provision for grinding dust exhaust hook-ups also provided.

HEAVY DUTY MOTOR . . . industrial rated 1/2 HP, 115 volt, 3450 RPM motor, sealed ball bearing construction, permanently lubricated.

POINT ANGLE ADJUSTMENT . . . finger tip adjustment of point angle from 80° to 190° with common drill settings clearly marked.

WHEEL POSITION KNOB . . . permits the use of the entire face of the grinding wheel for maximum economy . . . also used for wheel dressing.



The drill sharpener that gets used!

SAFETY PRECAUTIONS

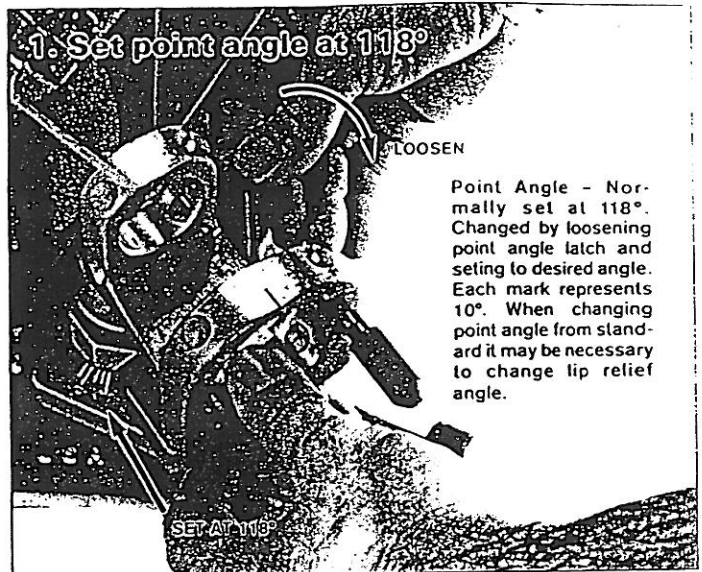
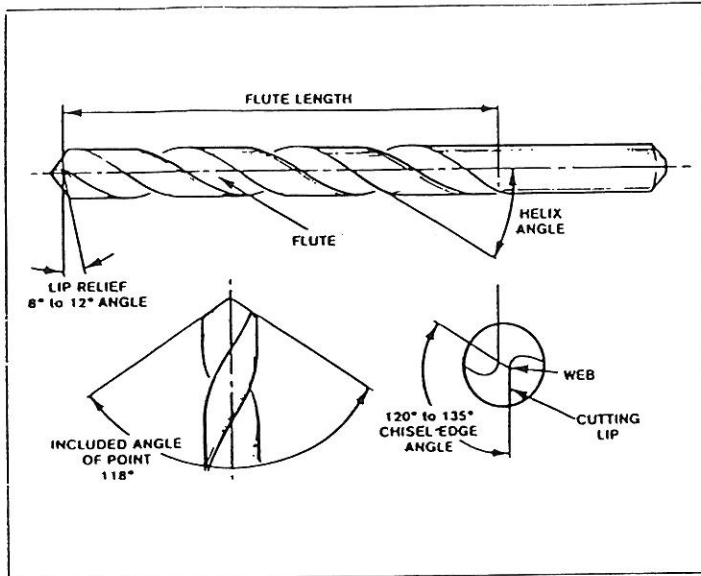
1. Use Safety Goggles. Safety goggles must comply with ANS Z87.1-1968. Also use face or dust mask if cutting operation is dusty.
2. Do not operate without guard, covers, or eyeshield.
3. Do not operate with a cracked or damaged grinding wheel. Use only wheels in sound condition rated for 3600 R P M.

4. When replacing grinding wheels use only the mounting parts provided with the tool and do not overtighten.
5. Any damaged parts should be replaced immediately.
6. Power connection must be made to the proper grounding type receptacle at voltage marked on nameplate.
7. Disconnect power before disassembling any part of tool.
8. ALL ADJUSTMENTS SHOULD BE MADE WITH MOTOR OFF AND WHEELS MOTIONLESS.

HOW TO SHARPEN A STANDARD DRILL POINT

The general purpose, or manufacturers standard drill point is the first and most important drill point to learn to sharpen correctly. It is the drill point that has the broadest range of efficient application. Once the simple techniques required

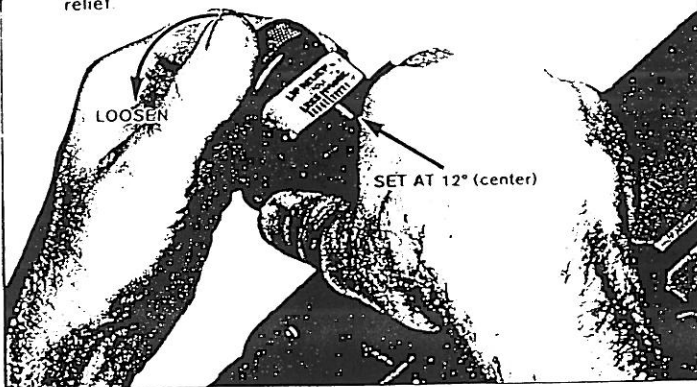
to produce this point have been mastered, other drill points to meet special needs will require only a few extra moments



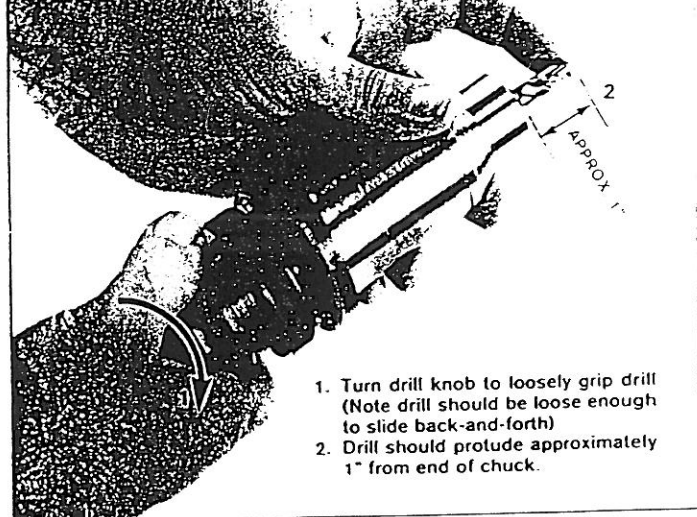
Point Angle - Normally set at 118°. Changed by loosening point angle latch and setting to desired angle. Each mark represents 10°. When changing point angle from standard it may be necessary to change lip relief angle.

2. Set lip relief at 12°

Grinder is normally set for standard 12° lip relief (clearance) angle. More or less angle can be obtained by loosening pawl locking knob and rotating pawl block to desired relief.



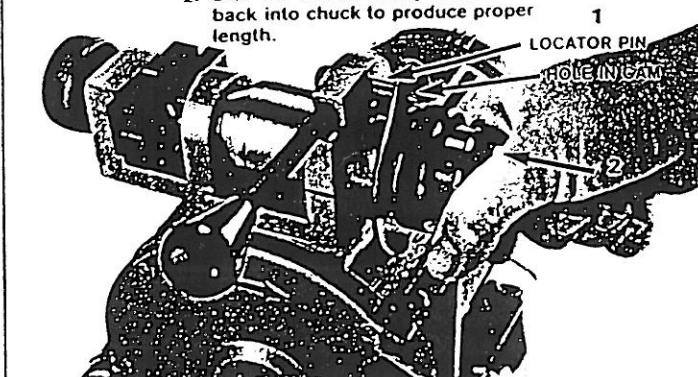
3. Insert drill into chuck



1. Turn drill knob to loosely grip drill (Note drill should be loose enough to slide back-and-forth)
2. Drill should protrude approximately 1" from end of chuck.

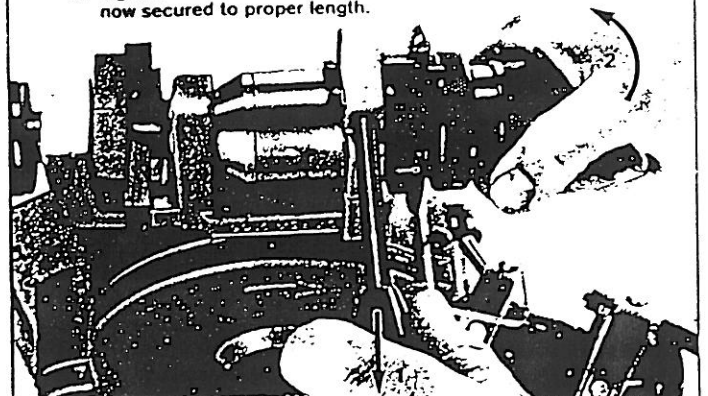
4. Set drill to length

1. Insert chuck into alignment fixture until either hole on cam seats on locator pin shoulder.
2. Drill will automatically be pushed back into chuck to produce proper length.



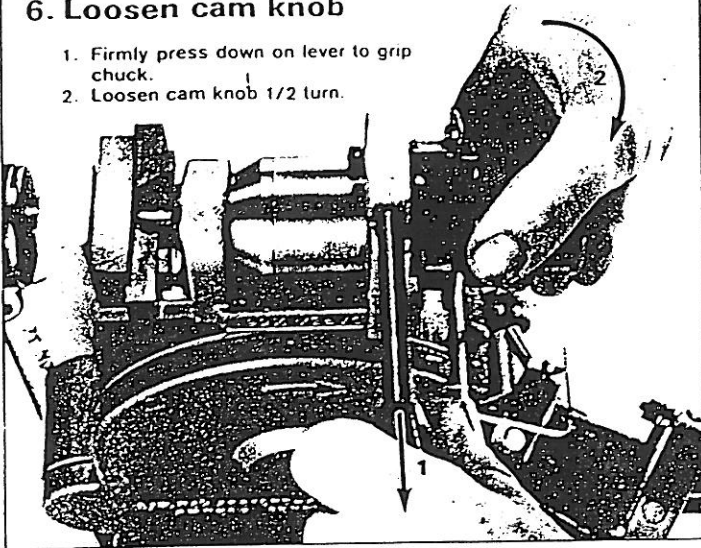
5. Tighten drill

1. Firmly press down on lever to grip chuck.
2. Tighten drill knob securely-drill is now secured to proper length.



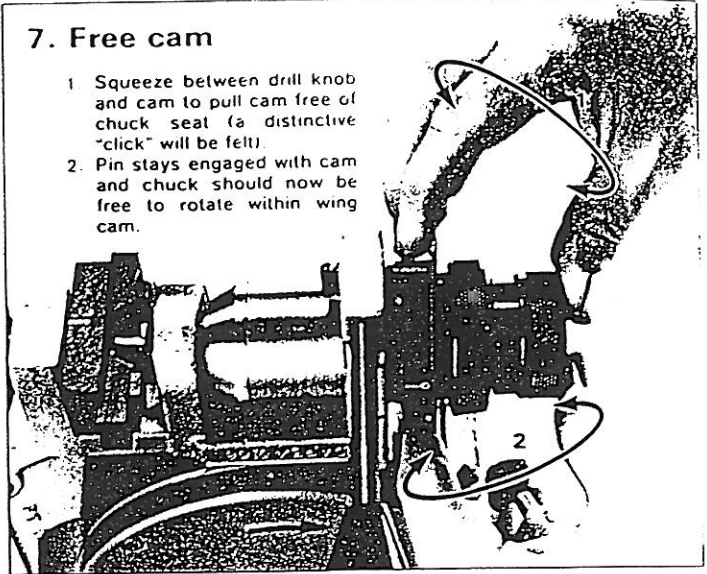
6. Loosen cam knob

1. Firmly press down on lever to grip chuck.
2. Loosen cam knob 1/2 turn.



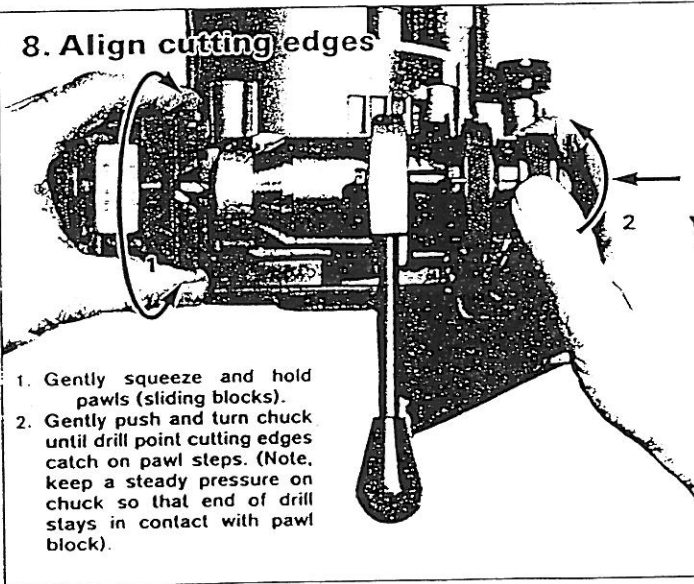
7. Free cam

1. Squeeze between drill knob and cam seat to pull cam free of chuck seat (a distinctive "click" will be felt).
2. Pin stays engaged with cam and chuck should now be free to rotate within wing cam.



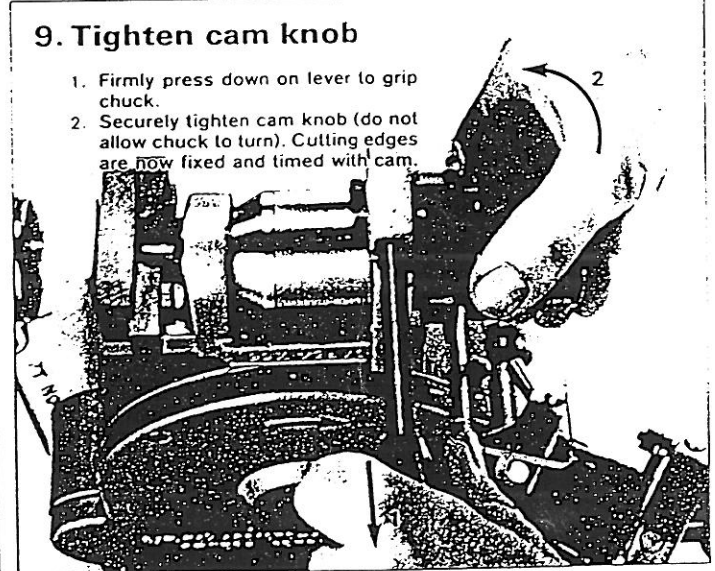
8. Align cutting edges

1. Gently squeeze and hold pawls (sliding blocks).
2. Gently push and turn chuck until drill point cutting edges catch on pawl steps. (Note, keep a steady pressure on chuck so that end of drill stays in contact with pawl block).



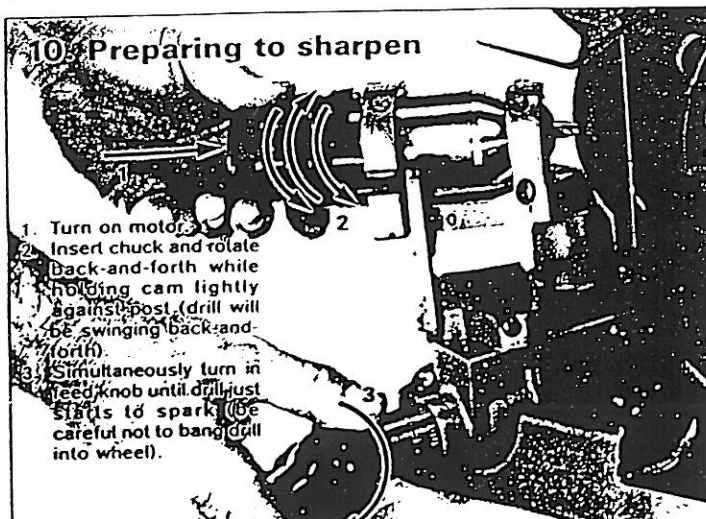
9. Tighten cam knob

1. Firmly press down on lever to grip chuck.
2. Securely tighten cam knob (do not allow chuck to turn). Cutting edges are now fixed and timed with cam.



10. Preparing to sharpen

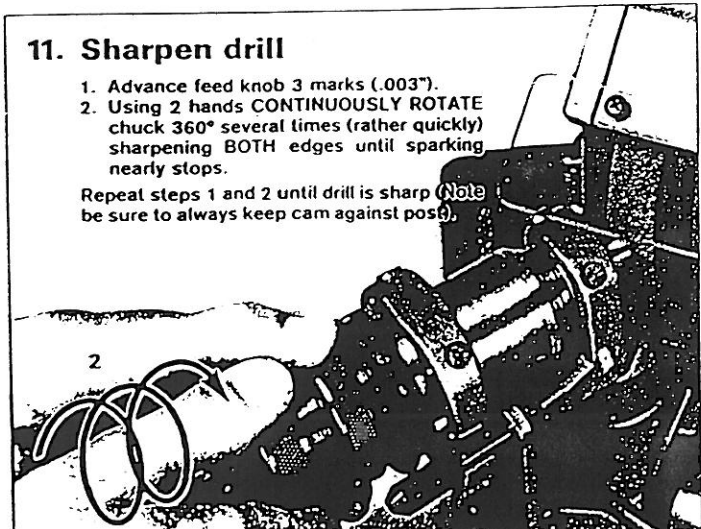
1. Turn on motor.
2. Insert chuck and rotate back-and-forth while holding cam lightly against post (drill will be swinging back-and-forth).
3. Simultaneously turn in feed knob until drill just starts to spark (be careful not to bang drill into wheel).



11. Sharpen drill

1. Advance feed knob 3 marks (.003").
2. Using 2 hands CONTINUOUSLY ROTATE chuck 360° several times (rather quickly) sharpening BOTH edges until sparking nearly stops.

Repeat steps 1 and 2 until drill is sharp (Note be sure to always keep cam against post).

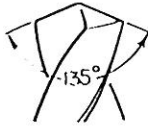


SHARPENING SPECIAL DRILL POINTS

In many applications a special drill point geometry can yield more economical hole production and/or longer drill life.

135° ANGLE POINT

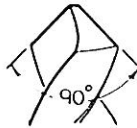
This point is frequently preferred for hard and tough materials such as high alloy steels. Increasing the point angle increases the effective rake angle of the cutting edge (lip) and reduces the length of the lip. The result is a reduction of the driving torque required to drill these materials. The feed pressures are increased. Reducing the lip relief angle strengthens the lip.



Producing this point requires only that the point angle and lip relief angle adjustments of the Darex drill sharpener be reset. Then proceed to sharpen in the conventional manner.

90° ANGLE POINT

Many soft and low strength materials, such as some cast irons, aluminum, plastic, and wood can be drilled more efficiently with a reduced point angle. Although this change reduces the effective rake angle of the cutting edge (lip) and the length of the lip is increased, the driving torque required to drill these materials usually remains within acceptable limits. The reduced feed pressures, and the increased lip relief angle frequently permits higher feed rates.



Producing this point requires only that the point angle and lip relief angle adjustments of the Darex drill sharpener be reset. Then proceed to sharpen in the conventional manner.

CHAMFERED POINT

The chamfered point can reduce burr generation in many materials. The chamfer is also very effective in reducing wear at the corner of the lip in abrasive materials such as cast iron or fiberglass.



The results that this point can give are well worth the few extra moments it takes to produce.

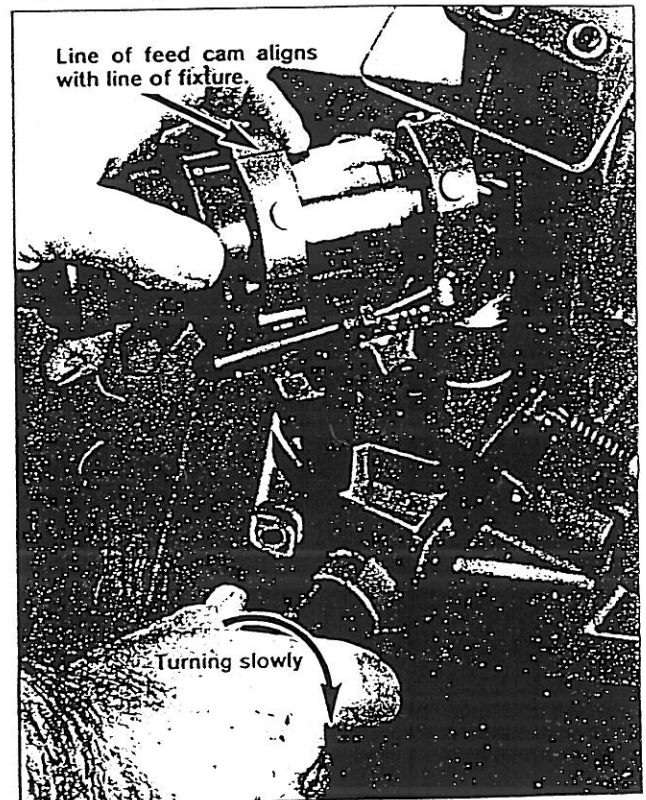
1. Sharpen the drill to the standard 118° point configuration in the conventional manner.
2. Reset the drill in the setting fixture.
3. Set the point angle to 90°.
4. Proceed as if sharpening a 90° point angle drill but only until the desired chamfer is produced.

SELF-CENTERING DRILL POINT

The Darex drill sharpener can produce an effective geometry for applications requiring that the drill be self-centering:



1. Sharpen the drill in the conventional manner to produce the general purpose 118° point – then turn the feed knob counterclockwise one-half turn.
2. Reset the sharpening fixture point angle setting to approximately 115°.



3. Align either of the feed cam lines with the line on top of the sharpening fixture.
4. With the chuck held firmly in the fixture, turn the feed knob very slowly clockwise until the wheel has cut to the center of the drill.
5. Pull the chuck straight back from the wheel approximately 1/4" (6mm) and turn to align the other feed cam line with the sharpening fixture line. DO NOT DISTURB THE FEED KNOB SETTING.
6. While keeping the two lines in alignment, carefully push the chuck back into the fixture until the feed cam seats against its follower pin. This grinds the other side of the drill point to the correct dimensions.
7. Inspect the drill point – correct insufficient secondary clearance by repeating steps 3 through 6 – excessive secondary clearance is corrected by resetting the point angle to 118° and sharpening further in the conventional manner.

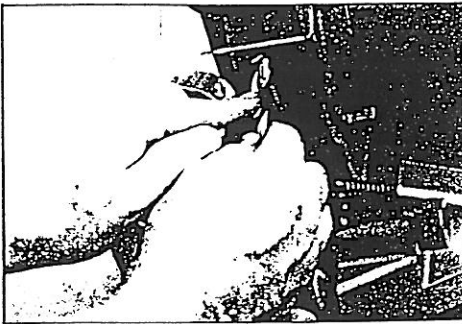
NOTE: This point requires considerable expertise and should only be attempted after becoming completely familiar with the machine.

DAREX

POINT THINNING

Point thinning is occasionally applied to reduce the feed pressure requirements of special drills with extra heavy webs or of large drills over 3/4" (19mm). The web thickness of standard drills does not warrant this specialized practice until design life is exceeded.

The Darex drill sharpener incorporates no mechanism for point thinning. Web thinning can be performed by the usual manual techniques on the corner of the wheel as shown.



LEFT HAND DRILLS . . . A cam and pawl-block set (pt. no. 2109) is available for left-hand drills. Instructions are included with the kit.

SHARPENING CARBIDE DRILLS

Carbide-tipped and solid carbide drills can be sharpened on the Darex drill sharpener with a silicon carbide wheel available from Darex (Cat. No. 2108). The basic technique for sharpening these drills is the same as for high-speed steel drills. For best results:

1. Handle carbide drills carefully. They are subject to damage from impact.
2. When positioning the drill in the chuck, using the setting fixture – do not tighten the cam knob fully while the drill lips remain engaged with the pawls. Turn the cam knob until it lightly engages the cam. Pull the chuck back approximately 1/2" (12mm), reapply chuck brake – then securely tighten cam knob. This prevents chipping of the drill lip corners.
3. Begin sharpening with a newly dressed wheel. Dressing procedure is the same as for the standard wheel.
4. The carbide drill will not sharpen as quickly as a high-speed steel drill. Material cannot be removed as fast – and the wheel will dull more quickly. Reposition the sharpening action across the face of the wheel during sharpening.

SHARPENING SMALL DRILLS 1/16 – 5/32"

The sharpening of small drills does require more care and patience. Excellent points can be produced using the following:

1. The "Wear-Bushings" and "Hinge Bearing" should be set up with minimum tolerance (see adjustments on next page).
2. Remove only a few thousand at a time (it is very easy to remove too much).
3. Rotate chuck quickly, with a "light-touch" to remove an equal amount from each side of drill.

4. After sharpening examine drill before removing from chuck – if necessary reinsert chuck into sharpening fixture to "touch-up" one lip to balance drill.

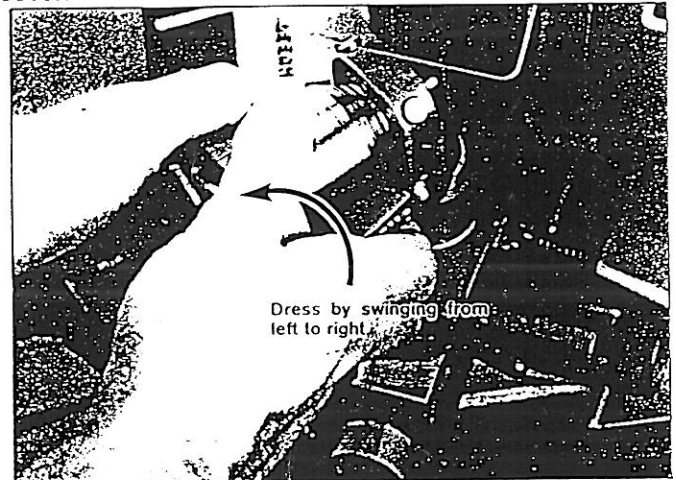
SHARPENING LARGE DRILLS 1/2 – 3/4"

It is often easier and more desirable in sharpening larger drills to use a slightly different technique.

1. Proceed exactly the same way as shown on pages 2 and 3 thru step 10.
2. Move the drill completely off the wheel to the right.
3. Advance the feed knob 4 numbers (.012").
4. While rotating the chuck, slowly move the drill across the wheel by turning in the WHEEL POSITION KNOB a small amount for each rotation of the chuck.

This technique removes more material yet leaves a high surface finish without burning or bluing.

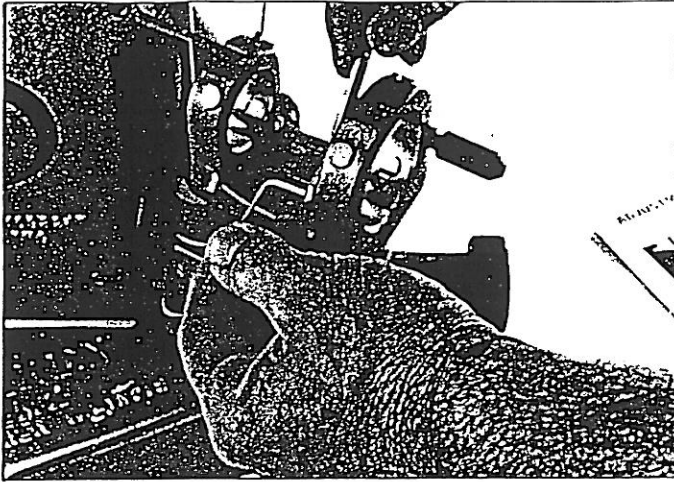
WHEEL DRESSING



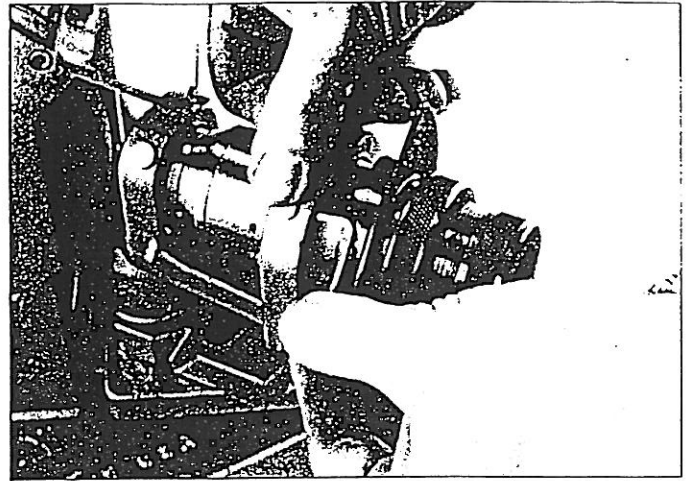
Wheel dressing can be kept to a minimum by repositioning drill sharpening action to different areas of the sharpening wheel face. Dress when discoloration of the drill point occurs or the face of the wheel appears glazed or grooved. To dress:

1. Grip the diamond dresser in drill chuck and set point angle adjustment to 135°.
2. Retract the sharpening fixture by turning the feed knob counterclockwise until diamond will clear wheel when chuck is placed in fixture.
3. Turn positioning knob until diamond is approximately 1/16" (1.5mm) beyond right edge of wheel.
4. Holding chuck and fixture firmly, apply force to move the fixture past the face of the wheel and approximately 1/16" (1.5mm) beyond the left edge.
5. Turn feed knob clockwise one graduation and then allow fixture and diamond to travel slowly across the face of the wheel. NOTE: Traveling too quickly across the face of the wheel will produce a "threaded" condition which results in a rough drill point finish.
6. Repeat steps 5 and 6 until wheel is dressed square and clean.

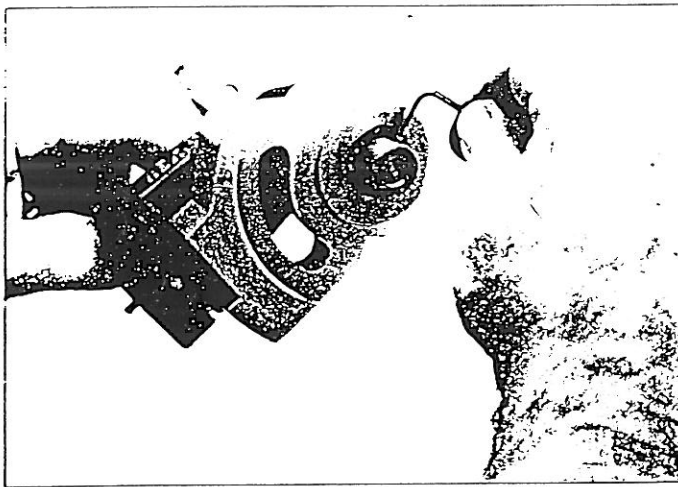
ADJUSTMENTS



FEED-CAM PIN ADJUSTMENT . . . In the event that all drills appear to be sharpened off-center then an adjustment of the cam set-screw is necessary. To adjust, loosen lock nut and turn set screw 1/4 turn in either direction. Sharpen drill to see if off-center condition becomes better or worse. then continue adjustment until desired accuracy is obtained and tighten lock-nut



WEAR-BUSHINGS . . . When excessive tolerance develops between chuck and sharpening fixture wear-bushings should be adjusted by loosening set-screw and moving bushings in. Normally only the top bushings need to be moved. DO NOT OVER ADJUST causing the chuck to bind



HINGE BEARING . . . If the sharpening swing fixture gets "sloppy" it can be adjusted by removing point angle adjustment screw exposing adjustable tapered bearing CAUTION Do not allow grit to enter bearing area.

SOME HINTS FOR BETTER DRILL SHARPENING

When the drill bit has been allowed to wear beyond desirable limits or is broken, do not attempt to do the whole sharpening job without resetting the drill bit in the chuck. No more than .015" – about five numbers of the graduated feed knob – can be removed at one chuck setting without beginning to adversely effect the chisel and relief angles.

When heating of the drill bit occurs during roughing or sharpening, do not cool by placing in water. Checking of the drill surfaces may occur resulting in reduced durability of the cutting edges. Allow the drill to air cool and then remove any discolored portion of the drill with continued sharpening.



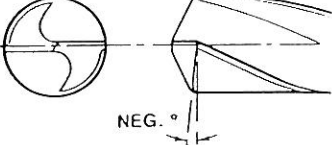

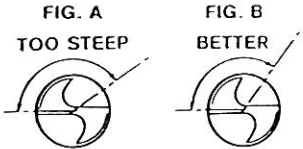
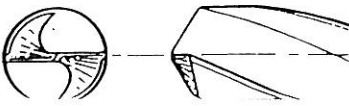
The life and effectiveness of the cutting surface of the sharpening wheel can be extended by frequently repositioning the cutting action across the wheel. Repositioning before the sharpening of each drill is ideal.

The very best sharpening results are obtained with a sharp, clean wheel. Do not attempt to sharpen on a worn or glazed wheel or drill burning will result. Many dressings of the wheel are possible before replacement becomes necessary and replacement wheels are inexpensive and simple to install.

Clean this tool frequently. Use compressed air to blow grinding residue from the surfaces of the machine and the interior of the chuck. Doing this each time after wheel dressing will prolong the life of this tool.

Lubrication of this tool is not normally required. The bearings within the unit are of the self-lubricating type.

TROUBLE SHOOTING GUIDE

PROBLEM	CAUSE	SOLUTION
Drill off center 	<ol style="list-style-type: none"> 1. Improper sharpening procedure 2. Feed in cam pin out of adjustment. 3. Excessive dirt or dust in chuck. 	<ol style="list-style-type: none"> 1. Operator should apply equal pressure as both cutting edges are ground, also do not attempt to remove more than 3-5 thousands per feed setting. Do not turn chuck too slowly, a quick action is better. 2. If all drills are off-center it is generally an indication that the adjustable feed in cam pin needs adjustment (see "adjustments"). 3. Normally occasional blowing out with air is all that is required to service dirty chucks. In extreme cases it may be necessary to disassemble chuck to thoroughly clean - NEVER LUBRICATE CHUCK.
Drill Burning 	<ol style="list-style-type: none"> 1. Rotating drill too slowly. 2. Glazed wheel 3. Attempting to grind off too much with each setting 	<ol style="list-style-type: none"> 1. Chuck should be rotated quite quickly during sharpening (approx. one full turn per second). Turning too slowly allows friction heat to build up in drill. 2. If grinding wheel appears glazed or slightly shiny - wheel needs redressing 3. Advance feed knob only 3-5 thousandths and spark out before advancing another 3-5 thousandths etc. etc. <p>NOTE: Never quench drill in water after grinding or else checking and cracking of the drill point will result.</p>
Negative Relief 	<ol style="list-style-type: none"> 1. Improper relief setting 2. Drill pushed back from pawl block while setting 3. Removing more than 25 thousandths from end of drill 	<ol style="list-style-type: none"> 1. Set "Lip Relief" in alignment fixture to "less". 2. Make sure drill is held against pawl block while setting pawls. 3. Drill should be realigned if more than 25 thousandths is required to sharpen drill
Curved Relief 	<ol style="list-style-type: none"> 1. Attempting to remove too much material off the end of the drill with each feed knob setting. 2. Cams not held in proper engagement 	<ol style="list-style-type: none"> 1. Only remove 3-5 thousandths per each feed knob setting. Also, see "Sharpening Large Drills (Page 5). 2. Make sure wing cam is always held against cam follower.
Drilled hole over size or egg shaped 	<ol style="list-style-type: none"> 1. Drill sharpened off-center 2. Chisel edge angle too great (Fig. A) 3. Work piece not clamped. 4. Excessive wear in spindle. 	<ol style="list-style-type: none"> 1. See instructions above. 2. Set Lip Relief in alignment fixture to "less" position until chisel edge angle is similar to Fig. B. 3. Secure workpiece. 4. See drilling equipment manufacturers instructions.
Machine Vibration	<ol style="list-style-type: none"> 1. Wheel out of round 2. Wheel wobbles 3. Bad grinding wheel 	<ol style="list-style-type: none"> 1. Dress wheel 2. Check wheel nut and flange for dirt and tightness (Do not over tighten) 3. Disguard wheel
Chatter Marks 	<ol style="list-style-type: none"> 1. Machine vibrating 2. Rough cam 	<ol style="list-style-type: none"> 1. See above 2. As delivered the feed in cam may have machining marks - this is normal and does not effect drilling efficiency - as machine wears in this will disappear.