IDDO HAND AUGER KIT
Operations and Maintenance Manual

September 16, 2019

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1.0   PURPOSE

The objective of this document is to provide the operator a working knowledge of how the IDDO Hand Auger is assembled, tuned and operated under a variety of conditions. Step by step instructions are included for those with no experience with hand coring drills. Those who have experience are encouraged to scan the Tips, Notes, Cautions and Warnings. The appendices section may be useful should problems arise or unique ice conditions be encountered.

Note: The hand auger was designed and built by the IDDO group and therefore maintains the name "IDDO Hand Auger (Kit)".

2.0   SCOPE

2.1   This document applies to the use and operation of the IDDO model of Hand Augers.

3.0   REFERENCES

3.1   8507-0010 Sidewinder Operations and Maintenance Manual

4.0   DEFINITIONS

4.1   Firn – Porous snow more than one year old.

4.2   IDDO – Ice Drilling Design and Operations.

4.3   IDP – U.S. Ice Drilling Program, formerly IDDO.

4.4   Operator – Any person involved in the assembly or use of the equipment described in this document.

4.5   QAS – Quality Assurance and Safety group.

4.6   Sidewinder – A motorized accessory package for the IDDO, PICO, SIPRE and Kovacs hand augers. It provides power for rotating as well as lifting and lowering the drill string.

4.7   SSEC – University of Wisconsin-Space Science & Engineering Center.

5.0   RESPONSIBILITIES

5.1   IDP Management is responsible for ensuring that drill operators are provided with accurate, up-to-date operating procedures.

5.2   IDP Engineering is responsible for the creation and maintenance of this manual.

5.3   IDDO Hand Auger Operators are responsible for ensuring these procedures are followed and any safety warnings contained herein are heeded.

5.4   SSEC QAS is responsible for ensuring that the proper procedures of document creation, review, approval, maintenance and updating are followed.

6.0   **OPERATOR'S MANUAL**

6.1   Introduction

6.1.1   The IDDO Hand Auger drill system is a small lightweight, portable drill system. It is designed to take core from firn and many kinds of solid ice.

6.1.2   The IDDO Hand Auger comes in two varieties. One will take cores of 3.1" diameter and make a 4.3" diameter hole. The other will take cores of 4.0" diameter and make a 5.2" diameter hole.

6.1.3   The IDDO Hand Auger produces a roughly ½-meter long core sample with the 1-meter barrel and a 1-meter long core with the 2-meter core barrel.

6.1.4   The standard IDDO Hand Auger Kit contains everything needed to take core to a depth of 20-meters.

6.1.5   Customized kits are provided on request for deeper coring or lighter weight requirements.

6.1.6   The IDDO Hand Auger may be hand or power driven. If power is desired, request the Sidewinder kit in addition.

6.2   Inspection

6.2.1   If possible, before leaving for the field, inspect the IDDO Hand Auger to make sure all the parts, tools and spares are there and in good condition. An inventory form (Section 12.0) will be included in the kit to assist you in this inspection.

6.2.2   It is also a good idea to assemble the drill in order to familiarize yourself with the assembly and function of all components.
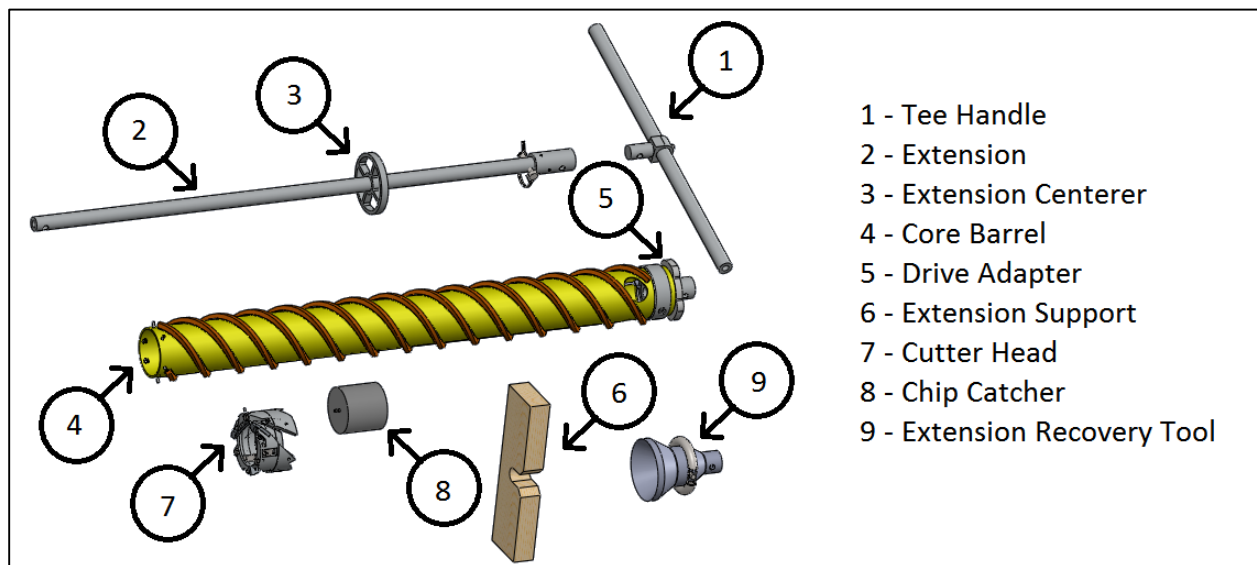

1 - Tee Handle
2 - Extension
3 - Extension Centerer
4 - Core Barrel
5 - Drive Adapter
6 - Extension Support
7 - Cutter Head
8 - Chip Catcher
9 - Extension Recovery Tool

Figure 1: IDDO Hand Auger Assembly Parts

6.3   Assembly

⚠️ **CAUTION!** THE CUTTERS AND CORE DOGS ARE SHARP. USE OF THE CUTTERHEAD GUARD AND GLOVES IS RECOMMENDED.

6.3.1   Assemble the drive adapter to the core barrel:

6.3.1.1   Remove the adapter pin from the drive adapter.

6.3.1.2   Place the drive adapter into the end of the core barrel. Align them and replace the adapter pin.

6.3.2   Adding extensions:

6.3.2.1   Remove the safety pin and handle from the drive adapter.

6.3.2.2   Place an extension onto the end of the drive adapter.

6.3.2.3   Replace the safety pin.

6.3.2.4   Slide the handle over the end of the extension.

6.3.2.5   Align the holes and insert another safety pin (Figure 2).
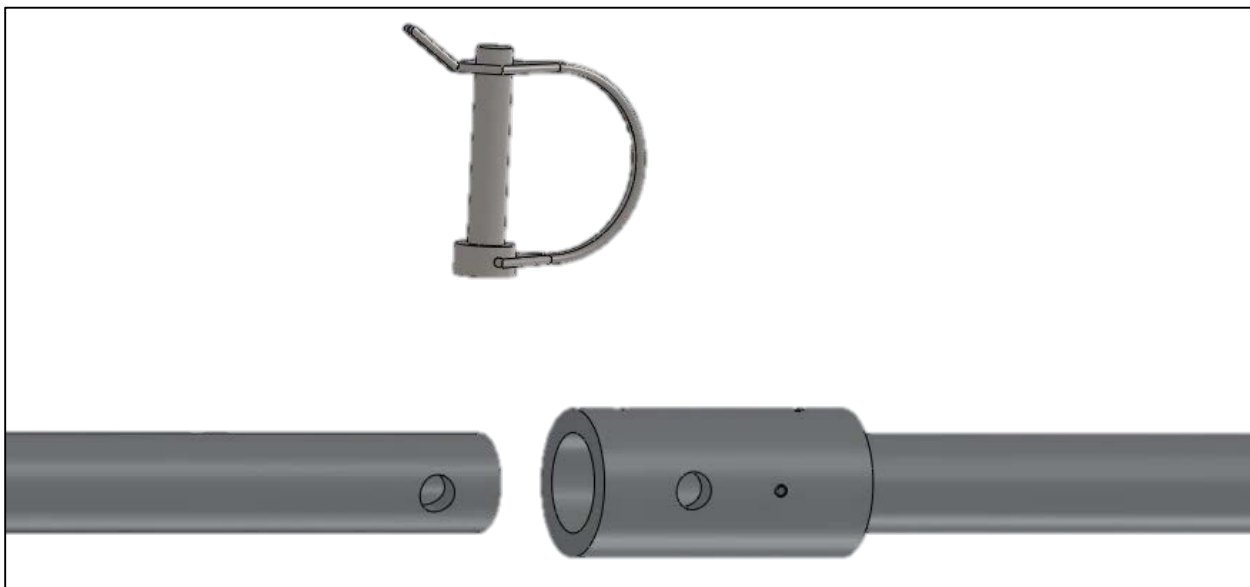

Figure 2: Assemble Drill Extension

Note: If you use the 2-meter core barrel, you will be able to retrieve a full meter of core each trip. To use the 2-meter core barrel, you must remove the cutter head from the 1-meter core barrel and mount it onto the 2-meter core barrel.

6.3.3   Removing the cutter head from the core barrel:

6.3.3.1   Using the 9/64" Allen wrench, remove the three socket head cap screws that attach the cutter head to the barrel adapter (Figure 3).

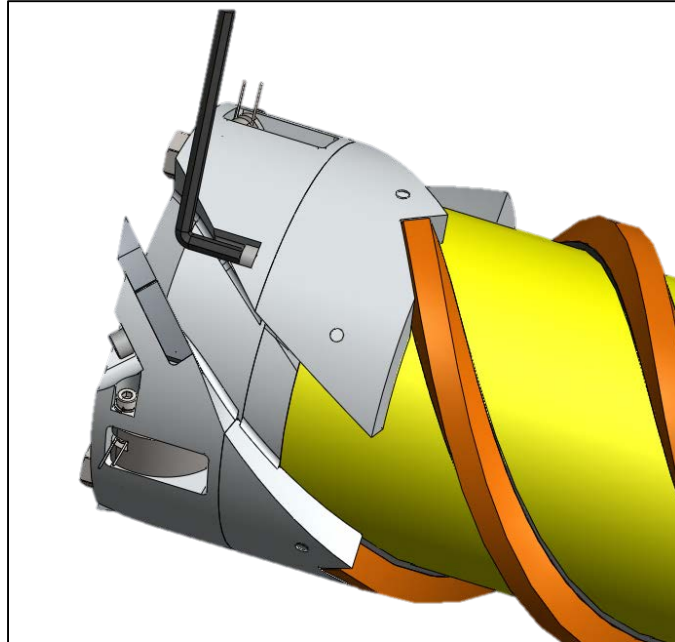6.3.3.2   Pull the cutter head off by hand.

Figure 3: Removing the Cutter Head

6.3.4   Mounting the cutter head to the core barrel:

6.3.4.1   Carefully slide the cutter head onto the core barrel.

6.3.4.2   Align the cutter head so the chip paths line up.

6.3.4.3   Using the 9/64 inch Allen, tighten all three socket head cap screws.

6.4   Operation

6.4.1   Introduction

The IDDO Hand Auger was designed primarily to take core samples from firn ice. Therefore, the operation instructions in this section describe how one would take core samples from firn ice. The IDDO Hand Auger will also take core samples from many other ice types. Refer to 10.0 for tips on drilling other ice types.

6.4.2   Drill Site Preparation

6.4.2.1   When drilling on a sloped surface, consider cutting a shelf into the slope large enough for the drilling operation. Place barriers uphill from the drill site to minimize the chance of contamination.

6.4.2.2   If possible, erect tarps to shade the core handling area to prevent the sun from heating up the drill and melting the core samples.

6.4.2.3   Keep insulated core boxes close at hand for safe storage of the core. Consider burying filled core boxes in the snow for extra protection. If core boxes are not available, bagged core samples can be buried in the snow for safe keeping until core boxes arrive.

6.4.3   Taking the First Core Sample

6.4.3.1   Remove the casing from the kit, and pound it into the snow surface. Leave a couple inches above the surface to minimize the chance of hole contamination. The casing also stabilizes the top of the hole and prevents crumbling around the hole.

Note: If the kit is being used in conjunction with a Sidewinder, use the plywood Sidewinder platform instead of a casing tube on the surface. If drilling into an ice surface the casing will be neither necessary nor possible to use.

⚠️ **WARNING!** BE CAREFUL NOT TO DROP ANYTHING DOWN THE HOLE! THIS CAN CONTAMINATE THE SAMPLES, AND MAY DAMAGE THE CUTTING EDGES OF THE DRILL.

6.4.3.2   Scoop the snow out of the casing.

6.4.3.3   Remove the protective hood from the cutter head.

6.4.3.4   Place the cutter head inside the casing, centering it as well as possible.

TIP!   If the surface conditions are neither ice nor heavily compacted firn it may be possible to start the hole with the 2m barrel and take a 2m core on the first run.

6.4.3.5   Turn the drill clockwise, while applying minimal downward pressure on the drill. Continue until the top of the core barrel is a few inches above the surface.

TIP!   When taking the first sample, have someone standing off to your right or left to verify you are not leaning the drill toward or away from you.

TIP!   When first starting a hole, it may be easier to keep the drill stable by turning the core barrel directly with your hands.

6.4.3.6   Stop turning the drill, attach the T-handle (if not already attached), and grasp the T-handle with both hands. Pull up slightly to engage the core dogs / collet and then give a sharp jerk upward to break the core sample free from the bottom of the hole.

TIP!   Do not gradually apply force, as this will only serve to compact the chips in the flights and stick the barrel.

TIP!   The primary purpose of the ½ meter extension is to allow you to adjust the height of T-handle at core break to a comfortable position.

6.4.3.7   Remove the drill from the hole.

6.4.3.8   Remove the drive adapter pin using a screwdriver as a punch and then remove the drive adapter from the core barrel.

6.4.3.9   Carry the core barrel to the core handling area.

6.4.3.10   If using core dogs, put the head protector onto the core head.

6.4.3.11 Push the core sample (from the head end of the core barrel) out of the core barrel using a core pusher.

6.4.3.12 The core must be supported by a core tray. There are many designs in use. IDP has a few available upon request.

6.4.4   Taking the Second Core Sample

Note: **The first sample should be the full length of the core barrel. The chips that were in the flights of the core barrel when the first sample was removed fall to the bottom of the hole. When the second core sample is taken you must first drill through these chips. The core barrel will be partially filled with these chips, which leaves less room for core. Also, while drilling the second core, chips travel up the flights and fall into the core barrel on top of the core sample. For these reasons, you will only get about ½ the length of the barrel in core the second trip (and all subsequent trips) down the hole. So now is likely the best time to switch to the 2-meter core barrel.**

TIP!   **Clean the snow and ice off the cutter head, cutters, and core dogs/collet before every run. Ice and snow may pack and cause poor performance.**

6.4.4.1   Remove the handle from the drive adapter.

6.4.4.2   Add an extension to the drive adapter and replace the handle.

6.4.4.3   Slide the chip catcher into the barrel and clip it into its hole.

6.4.4.4   Attach the core barrel to the drive adapter.

6.4.4.5   Place the core barrel into the hole and turn clockwise until the core barrel is full.

CAUTION! DO NOT OVER DRILL! IF YOU SEE ICE CHIPS PILING UP ON TOP OF THE DRIVE ADAPTER, YOU ARE OVER DRILLING. THIS MAY CAUSE THE DRILL TO BECOME STUCK IN THE HOLE. IF THE DRILL BECOMES STUCK, REFER TO APPENDIX E, PROBLEM SOLVING.

TIP!   **The top of the assembled core barrel has a few strips of reflective tape on it. A small signal mirror is included in the tool kit. If weather conditions are right, this mirror can be used to check if the top of the barrel is covered by chips or not.**

6.4.4.6   Break the core free from the bottom of the hole and deliver it to the core handling area.

6.4.4.7   Continue adding extensions as you get deeper.

Note: **Once you have reached a depth of about 5-6 meters, you will find the drill string is getting a bit unwieldy. At this point, you will need to break the string into sections in order to take the drill out of the hole in a more manageable way.**

6.4.5   Breaking the Drill String

6.4.5.1   Pull the drill string out of the hole so only a manageable number of extensions are clear of the hole (3 to 6 meters).

6.4.5.2   Slide the extension support (Figure 4) onto the stem just below the point the string will be broken and close its gate.

6.4.5.3   Lower the drill string until the connection joint rests on the extension support.

6.4.5.4   Remove the drill string above the extension clamp.

6.4.5.5   Remove the T-handle and attach it to the drill string remaining in the hole.

6.4.5.6   While supporting the weight of the drill by the T-handle, remove the extension support.
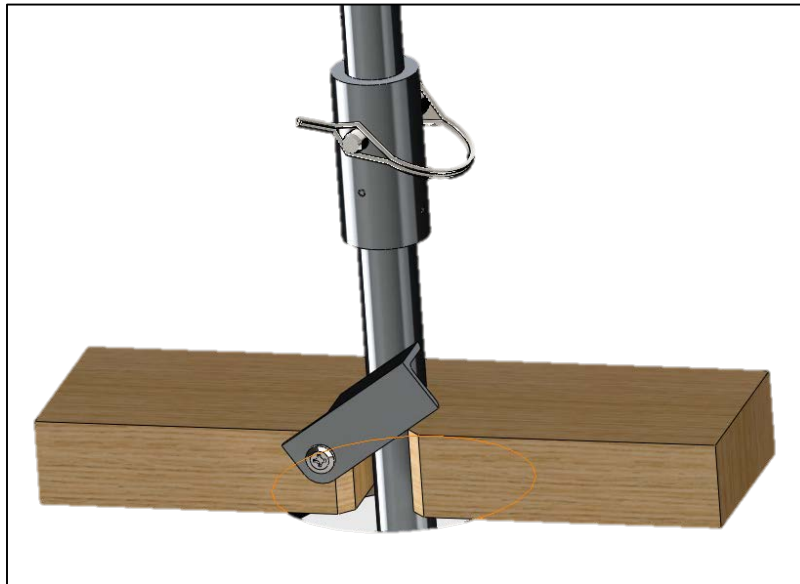

Figure 4: Extension Support

⚠ **WARNING!** NEVER BREAK THE STRING WITHOUT USING THE EXTENSION SUPPORT! NEVER REMOVE THE EXTENSION SUPPORT UNLESS THE T-HANDLE IS ATTACHED! IF THE DRILL STRING SLIPS OUT OF YOUR HANDS, IT WILL FALL DOWN THE HOLE.

6.5   Disassembly and Packing

6.5.1   Disassembly of the drill is done in the reverse order it was assembled.

6.5.2   It is not necessary to remove the cutter head from the 2-meter core barrel and remount it on the 1-meter core barrel.

6.5.3   Be sure the protective boot is firmly attached on the cutter head.

6.5.4   Before putting the parts back into the bag, remove as much snow as you can and dry all parts if possible.

6.5.5   Use the inventory form (Section 12.0) to make sure everything is repacked into the kit.

6.5.6   Once everything is back in the kit, tighten down the bag straps.

7.0   APPENDIX A: FIELD MAINTENANCE

    7.1   Cutters

        7.1.1   Removing Cutters:

            7.1.1.1   Using the 5/64-inch Allen wrench, remove the 8-32 socket head cap screw (Figure 5).

            7.1.1.2   Slide the cutter out, away from the barrel.
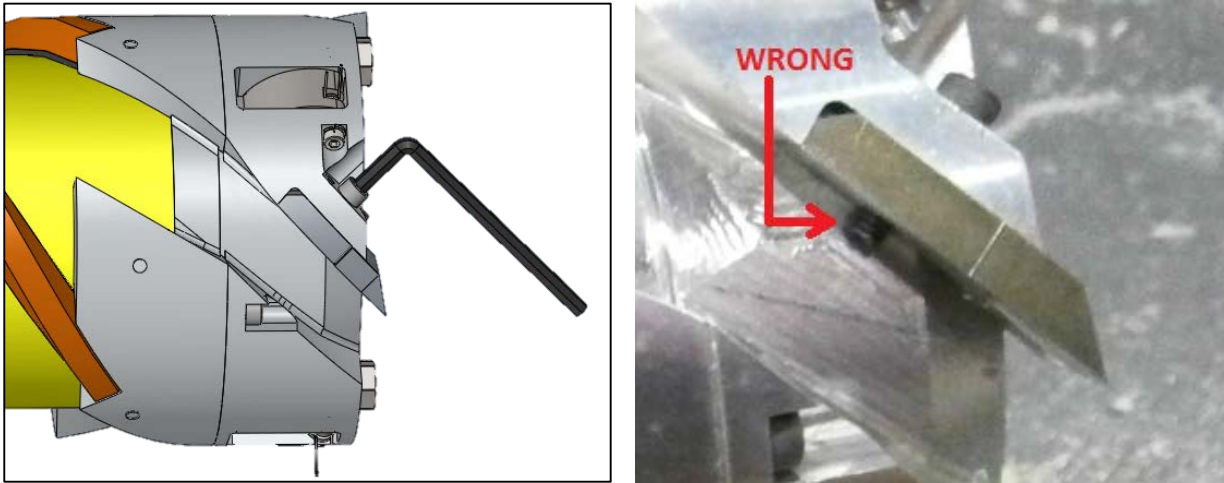

Figure 5: Cutter Installation and Removal

        7.1.2   Installing the cutters:

            7.1.2.1   Slide the cutters in so that the dowel pins ride in the groove on the cutter.

            7.1.2.2   Install the socket head 8-32 cap screws and tighten them with the 5/64-inch Allen wrench. Use the ½" long screws (shorter of included lengths) so that the end of the screw is nearly flush with the cutter (Figure 5).

⚠️ **WARNING!** THE CUTTER SCREWS ARE PRONE TO CROSSTHREADING. THERE SHOULD BE NO RESISTANCE WHEN STARTING THEM. IF THERE IS SOME, TRY WIGGLING THE CUTTER UNTIL THERE ISN'T.

Note: The configuration of the coring head is such that one may be able to capture the core WITHOUT core dogs or collets; therefore, one might try using them only after failed attempts to catch the core. The collet will likely perform better in loose firn and core dogs will likely perform better in ice or compact firn.

    7.2   Collets

        7.2.1   Installing a collet (Figure 6):

            7.2.1.1   Detach the cutter head from the core barrel adapter by removing the three socket head cap screws.

            7.2.1.2   Slide the collet inside the cutter head, tapered end first.

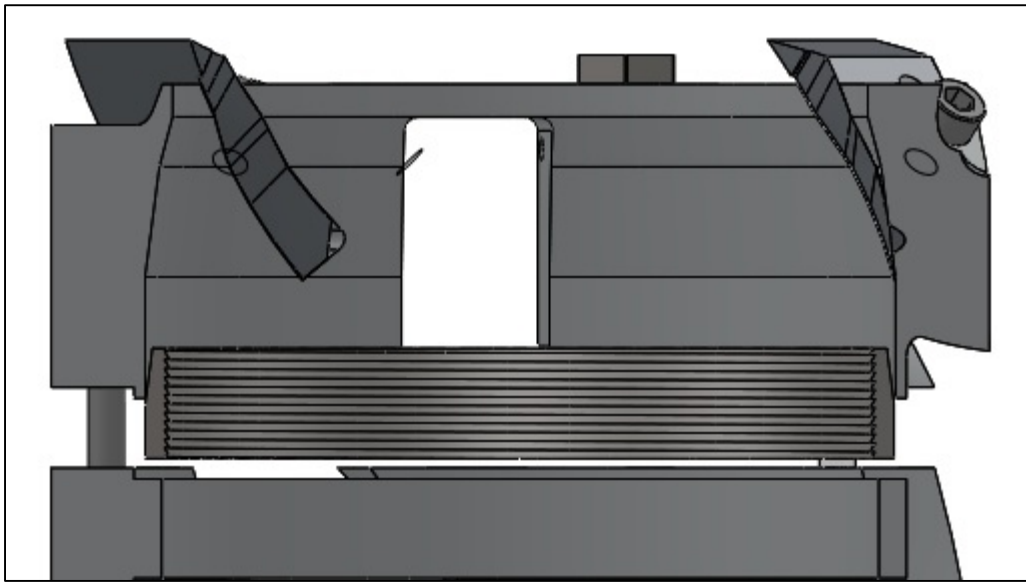7.2.1.3   Reattach the cutter head to the core barrel adapter.

Figure 6: Installing the Collet

Note: When using the collet, it is critical to inspect, clean, and align it after every run as chips can easily jam in its taper and wedge it crooked.

7.2.2   Removing a collet:

7.2.2.1   Detach the cutter head from the core barrel adapter by removing the three socket head cap screws.

7.2.2.2   Slide the collet out of the cutter head.

7.2.2.3   Reattach the cutter head to the core barrel adapter.

7.3   Core Dogs:

7.3.1   Removing core dogs (Figure 7):

7.3.1.1   Using a 3/32" Allen wrench, remove the core dog socket head #5 cap screw.

CAUTION! BE CAREFUL WHEN PULLING OUT THE SOCKET HEAD CAP SCREW, AS THE CORE DOG SPRING IS UNDER TENSION AND IT CAN FLING OUTWARD ONCE THE SCREW IS NO LONGER RESTRAINING IT.
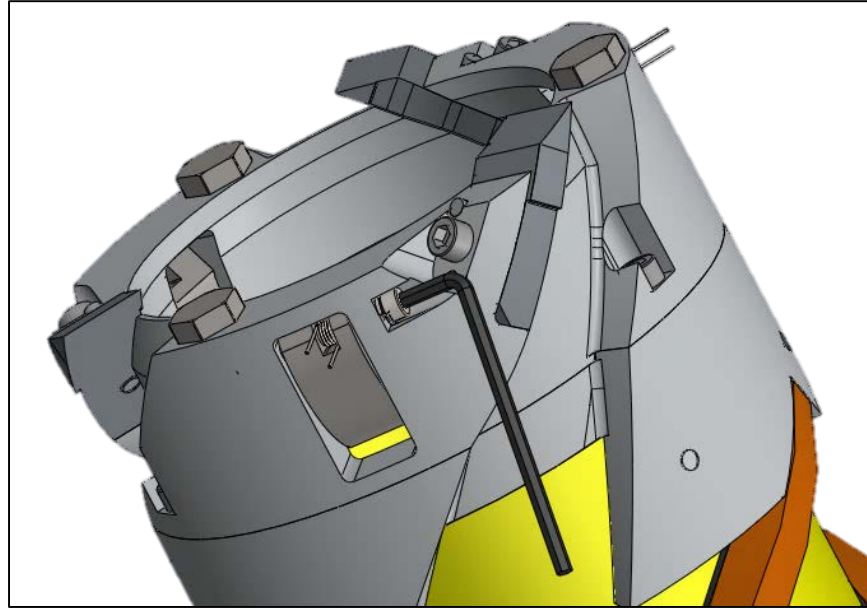
Figure 7: Removing the Core Dogs

      7.3.1.2   Remove the core dog, core dog spring, and lock washer.

   7.3.2   Installing core dogs (Figure 8):

Note: **Some users have had better results when only two core dogs are used and the third window is left open. Results vary from site to site, so consider this a possible option to improve core break and recovery.**

      7.3.2.1   Insert the socket head #5 cap screw with a lock washer part way into its hole in the cutter head.

      7.3.2.2   Insert the core dog into the core dog window such that its concave surface is facing towards a theoretical core (Figure 8, left highlight) (Figure 8, center highlight). Then slide the screw part way into the core dog through the first leg.
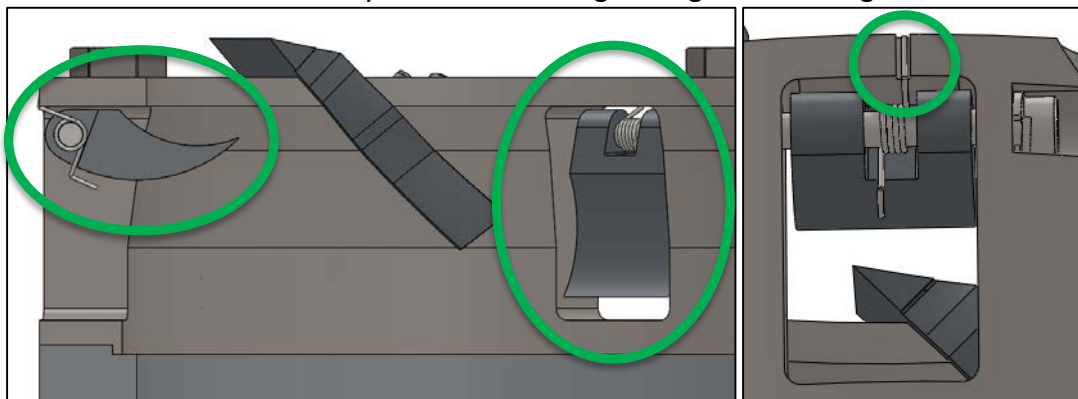

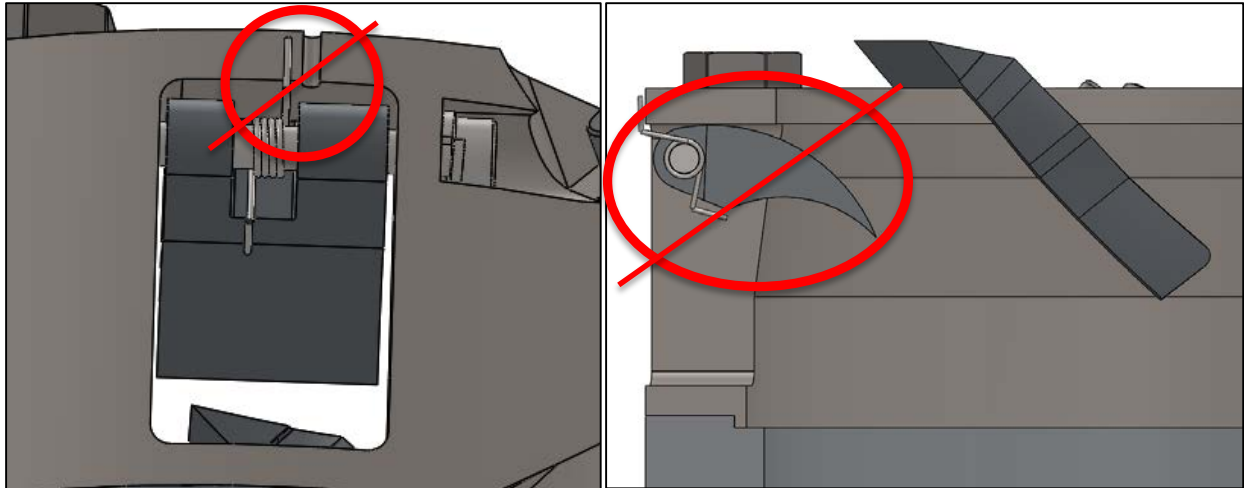Figure 8: Correct Core Dog Installation

Figure 9: Incorrect Core Dog Installation

Note: **There are three varieties of core dog springs. Different springs work better in different scenarios. If you experience difficulty recovering a core, try stronger springs. If there is deep spiraling on the cores, try weaker springs.**

7.3.2.3   Compress the core dog spring, insert it into the slot in the core dog, and push the screw the rest of the way into its hole. The screw should pass through the coil of the core dog spring.

Note: **It is best to use a new core dog spring each time the core dogs are replaced.**

7.3.2.4   Using the 3/32" Allen wrench, tighten the screw.

7.3.2.5   Bend both ends of the core dog spring back against the core dog and cutter head, respectively (Figure 10).

7.3.2.6   Using the side cutting wire cutters, snip off the long ends of the core dog spring (Figure 10).

Figure 10: Core Dog Spring Bend and Trimming

8.0 APPENDIX B: SHARPENING CUTTERS

8.1 The short answer as to how to sharpen the cutters is to not do it in the field. If you expect dirty, sandy or rocky ice, request plenty of spares.

8.2 The cutting edge of the cutter is made up of two intersecting angles. The rake angle (Figure 11) is 45º. The relief angle (Figure 11) is 10º. When sharpening the cutters, care should be taken to avoid changing either of these angles, particularly the relief angle. Changing the relief angle will adversely affect the penetration rate of the drill.
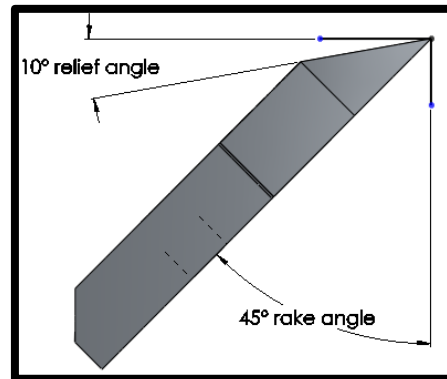
Figure 11: Rake and Relief Angles

8.3 It is also very important that all cutters are sharpened equally. If one is sharpened more than the others, the high cutter will do all the cutting. Also, it may cause the drill to wobble in the hole. This may adversely affect core quality.

8.4 Place the diamond hone on a firm level surface.

8.5 Place the rake angle surface flat on the diamond hone and slide it along the hone's length. Slight pressure will be required. At the end of the stroke, repeat the process. Count the number of strokes, and repeat them on the other cutter(s).

8.6 Turn the cutter over and place the relief surface flat on the diamond hone. Repeat step 8.5 with the relief surface.

8.7 Repeat this process until all nicks are removed and the cutter is razor sharp.

9.0   APPENDIX C: PENETRATION SHOE ADJUSTMENT

9.1   The IDDO Hand Auger uses solid penetration shoes rather than adjustable ones.

9.2   In order to change the penetration rate, replace the current shoes with a different set.

9.3   The numbers on the shoes refer to the pitch in millimeters. A larger number means more penetration depth per revolution.

9.4   Use shoes of the same pitch at all three locations and tighten snugly.

9.5   In general, the harder the ice, the smaller cutting pitch you should use. When drilling in firn, use a greater cutting pitch to minimize coring times.

9.6   If there is no number stamped on the head of the screw, the screw is worn and should be removed and not reused unless necessary.

10.0 APPENDIX D: SPECIAL DRILLING CONDITIONS

10.1 Firn

10.1.1 Firn is the easiest ice to core. The surface will probably be harder, with softer ice underneath. Normally, core dogs are not required to break the core when drilling firn. In softer firn, you may want to remove the core dogs to prevent them from damaging the surface of the core.

10.2 Solid Ice which includes:

10.2.1 Blue Ice is ice that is formed at depth but comes up as the glacier moves to an area where sublimation occurs exposing the blue ice. It will probably have a near uniform temperature profile in its upper few meters and should be straightforward to core with a hand corer.

10.2.2 Lake Ice can be multiple years old and meters thick or just annual ice only a few centimeters thick. Any embedded dirt/dust will dull the cutters and slow drilling.

10.2.3 Sea Ice is ice that forms on the surface of salt water. No special drilling considerations other than extra care should be taken in fully cleaning the drill.

10.3 Ice with Dirt, Sand or very small Rocks

10.3.1 In ice with dirt, sand and rock, wear on the shoes and cutters will be accelerated, so check them occasionally and replace as needed.

10.3.2 Whether core dogs, collets, or neither is required depends upon what kind of ice it would be without the embedded material. These parts may also require frequent replacement from accelerated wear. Dirt and sand can build up and prevent them from moving freely. Clean them after each trip down the hole.

Note: Request plenty of spares.

10.4 Rocky ice

10.4.1 The IDDO Hand Auger is NOT designed to operate in rocky ice. If you expect these conditions, please request a different drill.

10.5 Temperate Ice/Snow

10.5.1 Core drilling in temperate ice (ice that is at or very near 0°C) should NOT be freely attempted with the IDDO Hand Augers. The chips will pack to form near solid ice around the auger flights and coring head and will become stuck so that one will have to dig the drill out or abandon it. Only drills with both inner and outer core barrels should be considered for easy core drilling in temperate ice and snow. If a hand auger is the only option, special care should be taken. Whenever the resistance in cutting changes noticeably (increase or decrease), immediately break core and clean/dry the drill on the surface in a shaded area. Full 1-meter cores will not be possible on all drill runs.

11.0   APPENDIX E: PROBLEM SOLVING

11.1   Loss of Penetration

11.1.1   There are a variety of reasons that could cause the drill to lose penetration, and it's often difficult to diagnose a specific cause, but here are some common hints:

11.1.2   It does not need to be all that warm for temperature issues to arise. If it is sunny and 20°F, temperature issues are common. The main issue is that the barrel/head heats up while on the surface, so that when down hole, some of the chips melt and refreeze into a thin glaze on the cutters effectively dulling them. While drilling, it will feel like everything is cutting as normal (a couple turns or the majority of a run) and then it will seem to be free spinning without resistance. Do not apply extra downward force, instead bring the partial drill run back to the surface. The fixes for this issue are to cover the drill with a tarp while on the surface and to thoroughly dry the head and cutters before sending the drill down hole.

11.1.3   Drilling with dull cutters will either feel like the cutting is very bouncy and uneven or will feel like the drill is free spinning. The fix here is to replace or re-sharpen the cutters.

11.1.4   If several cores in a row are drilled near over-drilling, there is a good chance that excess amounts of chips are being left in the hole, which can accumulate to a point where the drill completely fills with chips before it can start coring. If this occurs, it will likely be necessary to abandon the hole and start over, unless a vacuum is easily accessible. The preventative measure is if several runs in a row bring up a fully packed barrel, try doing a shorter core run in order to pull out some of the excess chips.

11.1.5   If drilling feels very erratic, it could be that something is wedged down hole, possibly a carrot of core that wasn't recovered or a small screw. Attempt to fish out anything solid (Section 11.3) or attempt to core through the carrot with some downward force on the drill string.

11.1.5.1   If there is noticeable scratching on the relief face (Figure 11) of the cutter, this means that there is something hard in the bottom of the hole; likely a rock or a small screw/washer. If something cannot be recovered (Section 11.3.1) from the borehole, this hole will need to be abandoned because every subsequent set of cutters used in it will be quickly destroyed.

11.1.6   A barrel can become full early if a carrot of core was not recovered on the prior run, there's an excess amount of chips in the hole, or the operator loses track of their starting depth. A full core barrel may feel like it is cutting normally for a while, then it will either feel like the cutting resistance increases significantly or disappears completely. In either case, bring the drill to the surface and empty it.

11.2   Stuck Drill

11.2.1 Try turning the drill backwards while pulling up on the T-handle. If the flights are packed with snow you may be able to screw it out.

11.2.2 Pour 1 or 2 liters of alcohol slowly down the center of the extensions. Let it sit for 2 or 3 hours and try removing the drill. Don't use alcohol mixes less than 25%.

TIP!   **The extension stem is hollow all the way down to the core barrel, so it can be used as a tube to get alcohol to the bottom of the hole without splashing a bunch into the borehole wall.**

11.2.3 If all else fails, start digging.

11.3   Items Dropped Down the Hole

11.3.1 It depends on what is down the hole. If it's magnetic, try fishing it out with the included magnet. If it's small and non-magnetic, try to carefully drill beyond it and bring it up with the chips. This may damage the cutters so be prepared to replace them. If you have a generator and a shop vacuum you can try to vacuum it out.

11.3.2 If a core barrel has been dropped down the hole, try fishing it out with a wire hook on the end of some P cord. If you can hook one of the chip holes you should be able to pull it out. If you have a couple of bungee cords, hook one end in the holes at the bottom the extension tubes (remove the core barrel adapter first). Trip the extension tube string down the hole. Wiggle it around a bit and see if you can hook the core barrel on the bungee cords.

11.3.3 If there are any extensions attached to the core barrel, try using the extension recovery tool (Figure 12). Attach it to the end of an extension string long enough to reach the down hole components. Lower it down and use the funnel to center the stem. Rotate the extensions until the locking pins attach to the down hole portion and then pull up the entire assembly.
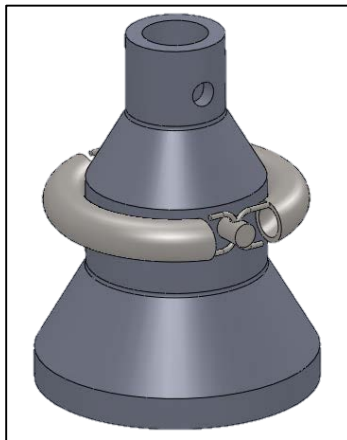

Figure 12: Extension Recovery Tool

12.0 APPENDIX F: INSPECTION PROCEDURES AND FORMS

12.1 Upon arrival of any parts in Madison, IDP staff will:

12.1.1 Clean, test, and store all components.

12.1.1.1 Track quantities through the Hand Auger Inventory spreadsheet at C:\EPDM\IDDO\Hand Augers\.

12.1.1.2 Use the Extension Gauges on all extensions and mating parts.

12.1.1.3 Any parts that are out of spec or broken will be removed from the general inventory until they are repaired or replaced.

12.2 Prior to any parts leaving Madison, IDP staff will:

12.2.1 Pack the kit per the PI's field request.

12.2.2 Fill out a Fit Checklist (12.5) and an Inventory Checklist (12.6), including a paper copy in the kit.

12.2.3 Update the Hand Auger Inventory spreadsheet.

12.2.4 If sending part designs that have not been field tested, proven backup methods will be included as well.

12.3 Upon arrival of any parts in the field, field personnel will:

12.3.1 Verify that all components arrived undamaged.

12.4 Prior to any parts leaving the field, field personnel will:

12.4.1 Clean and dry all components as best as possible.

12.4.2 Use the Inventory Checklist (12.6) to verify that the correct components are being returned.

12.5 IDP Staff Fit Checklist

Season:		IDDO Hand Auger ID #_____	Size:	3"	4"
User:		Where Used:			
Content:					
Done?	Task				
	Fit tee handle to all extensions				
	Fit tee handle to barrel adapter				
	Fit all extensions to each other				
	Fit extension support to all extensions				
	Fit extension recovery tool to all extensions				
	Fit extension centralizers to all extensions				
	Fit all extensions to barrel adapter(s)				
	Fit barrel adapter(s) to each barrel				
	Fit chip catcher to each barrel				
	Fit cutter head(s) to each barrel				
	Install cutters in cutter head(s)				
	Fit core dogs to cutter head(s)				
	Fit collets to cutter head(s)				

12.6   Inventory Checklist

Season:	IDDO Hand Auger ID #_____ Size: 3″ 4″		
User:	Where Used:		
Contents of the Short Bag:			
	Item	Standard Qty	Qty Packed	Notes
1	Short Bag	1 Each		
2	1-m Core Barrel	1 Each		
3	1-m Extensions	6 Each		
4	Cutter Head (w/ cutters + guard)	1 Each		
5	T-handle	1 Each		
6	½-m Extensions	1 Each		
7	Core Barrel Adaptor w/ Pin	1 Each		
8	Extension Support	1 Each		
9	IDDO Hand Auger Manual	1 Each		
10	Extension Recovery Tool	1 Each		
11	Atlas Gloves	8 Each (2 per size)		
12	Tool Bag	1 Each		
Contents of the Tool Bag:			
13	Spare CB Adaptor Pin	1 Each		
14	Collet	2 Each		
15	Allen Wrench Set	1 Each		
16	Diamond Hone	1 Each		
17	3/16″ Standard Screwdriver	1 Each		
18	Phillips Screwdriver	1 Each		
19	Flat Bastard File	1 Each		
20	Needle Nose Pliers	1 Each		
21	Slip Joint Pliers	1 Each		
22	Crescent Wrench	1 Each		
23	Side Cutters	1 Each		
24	Duct Tape	1 Roll		
25	Dead Blow Mallet	1 Each		
26	Safety Pins	15 Each		
27	7/16″ Wrench	1 Each		
28	Straight Probe	1 Each		
29	Extension Centralizer	3 Each		
30	Tape Measure	1 Each		
31	Signal Mirror	1 Each		
32	Brush	1 Each		
33	Shop Towel	1 Each		
34	Plano Case	1 Each		
35	Magnet with cord	1 Each		
Contents of the Plano Case:			
36	Core Dogs (2 sizes)	3 Each/ size		
37	Core Dog Springs (3 sizes)	10 Each / size		
38	SHCap Screws 5-40 x 1	6 Each		
39	#5 Lock Washer	6 Each		
40	Low Head SHCap Screws 8-32 x ½	6 Each		
41	SHCap Screws 8-32 x 5/8	6 Each		
42	Dowel Pin 1/8 x 3/8	6 Each		
43	Penetration shoes (3 sizes)	6 Each / size		
44	Cutters	9 Each		
Contents of the Long Bag:			
45	Long Bag	1 Each		
46	2-m Core Barrel + Chip Catcher	1 Each		
47	2-m Extensions	6 each		
48	Extendable Push Rod	1 Each		
49	Casing	1 Each		
50	Back Pack Harness	1 Each		

13.0   APPENDIX G: SIDEWINDER ADAPTERS GUIDE

13.1   Refer to 8507-0010, Sidewinder Operator's Guide for a full description of the use of the Sidewinder accessory. This guide is only intended to explain the adapters specific to the IDDO Hand Auger system (Figure 13).
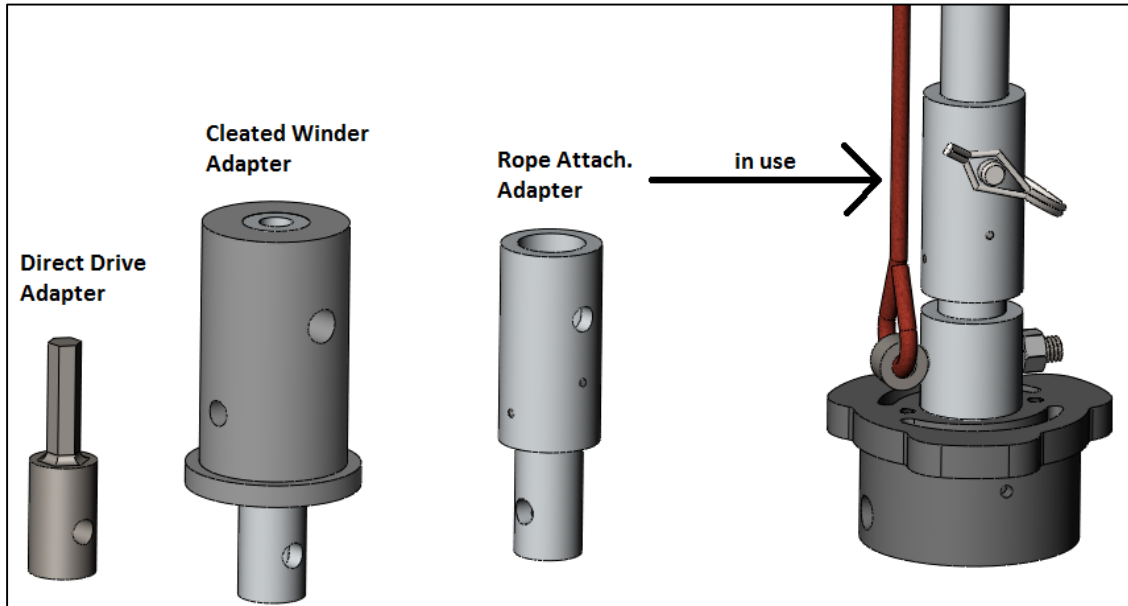

Figure 13: IDDO Hand Auger to SideWinder Adapters

13.2   Direct Drive Adapter

13.2.1 If the Sidewinder is only being used for coring (not raising/lowering), this adapter greatly simplifies the process.

13.2.2 Simply connect the adapter between the Milwaukee drill and the drill stem extensions with the standard safety pins while coring.

13.2.3 Use the T-handle for raising and lowering the drill system.

13.3   Cleated Winder Adapter

13.3.1 This adapter allows the Sidewinder to be used identical as it was to the PICO hand auger systems, the predecessor of the IDDO Hand Auger.

13.3.2 The adapter connects to the cleated winder with a bolt/nut and the IDDO Hand Auger extensions with a standard safety pin.

13.4   Rope Attachment Adapter

13.4.1 This adapter offers a more secure method of connecting the Sidewinder rope to the core barrel.

13.4.2 The adapter is attached to the drive adapter with a threaded eyebolt/nut and the other end is open to connect to the drill stem extensions with safety pins.

14.0   APPENDIX H: QUICK GUIDE

14.1   Verify that the kit is complete and that all critical pieces fit together before use.

14.2   It is significantly easier to drill on a level surface, so if drilling on a sloped area, consider cutting a level shelf into the snow to operate on.

14.3   To start drilling, press the starting casing firmly into the snow, place the cutters against the surface and turn clockwise while applying slight downward pressure. During the first meter of drilling, periodically check for plumbness, as it determines the orientation of the entire hole.

14.4   Depending on the surface conditions, the hole may be able to be started by rotating the barrel without the T-handle. If this is the case, a 2-meter barrel may be used on the first run.

14.5   Coring can be done with an empty head, with core dogs, or with a collet. Do NOT attempt to core with both core dogs and a collet in the head.

14.6   Cutter screws are prone to stripping and cross-threading. Do not crank through any resistance, try to wiggle the cutter instead. Do not overtighten, snug is fine.

14.7   To drill, rotate the handle clockwise while applying minimal (ideally zero) downward pressure. As the depth increases, add extensions to the drill stem.

14.8   On the first run, the drill can recover a full barrel of core, but on subsequent runs, it will only be able to obtain half the barrel length of core because of chips.

14.9   Do not over-drill. Doing so will cause the chips to overflow on top of the barrel and wedge it firmly in place. Measure/mark a stop point before beginning each drill run. If there are any unexpected changes to cutting resistance, stop drilling and break the core.

14.10   Break the core free by giving a quick, sharp jerk upwards on the T-handle. Do not gradually apply force, as this will only serve to compact the chips in the flights and stick the barrel. If core breaks are extremely hard, verify correct core dog setup.

14.11   Remove the core from the barrel by disconnecting the barrel adapter from the barrel, inserting the plastic guard into the head, and then sliding the core out the top of the barrel.

14.12   When raising or lowering the drill to depths greater than 6 meters, use the extension support to hold the drill while breaking the stem into ~4m sections.

14.13   In between runs, it is a good idea to brush off and/or dry the core barrel and head, as water accumulation may freeze the barrel into the hole, making it nearly impossible to remove.

14.14   Briefly inspect the cutters after every run for damage or dullness. If they've been in use for 30 meters or more and are only dull, replace them. Otherwise start troubleshooting because there is an issue, likely in the borehole.

14.15   Be careful when the cutter head is exposed, as the cutters are very sharp. Consider wearing gloves when dealing with the head.

14.16   If the drill gets stuck down hole, the hollow extension stem can be used as a tube to get alcohol/ethanol to the bottom of the hole to melt the drill head out.

14.17   When finished using the IDDO Hand Auger kit, be sure to dry off all parts and remove snow/ice chunks from the bags to prevent corrosion during transport and/or storage.