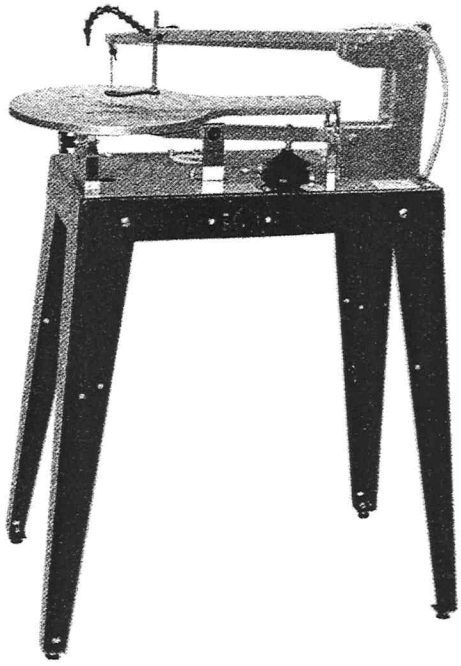
BUSHTON MANUFACTURING, LLC

MAKERS OF

HAWK SCROLL SAWS

OPERATORS MANUAL

MODELS 220-ULTRA AND 226-ULTRA



READ THOROUGHLY BEFORE OPERATING

"America's Woodworking Machinery Manufacturer"

SAFETY FIRST

CONTACT INFORMATION

You can reach our customer service department Monday thru Friday from 8:00 am to 5:00 pm Central Time.

Customer Service
Bushton Manufacturing, LLC
P.O. Box 127
107 South Main Street
Bushton, KS 67427

Phone: 620-562-3557
e-mail: customerservice@hawkwoodworkingtools.com

LIMITED WARRANTY

We guarantee that all Hawk Products are free from defects in materials and workmanship for one full year from the date of purchase. This warranty is automatically started when we ship your new Hawk Product. The warranty is tied to the original owner and is not transferable. If given as a gift, tell us who it is to and what day the gift will be given so that the warranty can be properly registered. The warranty covers parts only labor and shipping charges still apply.

This warranty does not obligate us to bear the cost of shipping charges in connection with the repair or replacement of the defective parts, nor shall it apply to any machine upon which repairs or alterations have been made unless authorized by us. This warranty is void if damage is the result of misuse or abuse of the machine. This warranty is non-transferable. Tampering with any electrical control components voids this warranty.

When receiving a freight item from a common carrier, the customer must note on the receipt any damage to the carton. This is required for all insurance claims. If you do not note any damage to the shipping carton, you assume the cost of any damages caused by shipping that are not covered by insurance.

We shall in no event be liable for consequential damages or contingent liabilities arising out of the use of any machine, or out of the failure of any machine to operate properly. No express, implied or statutory warranty other than herein set forth is made or authorized to b made by us.

Warranty information will be based on information given at the time of purchase. This warranty is not transferable from one owner to another. Any repairs and or replacement parts must be done by Bushton Manufacturing, LLC. In order for parts to be honored by this warranty, the part must be official Hawk Woodworking Tools parts supplied by Bushton Manufacturing, LLC.

ORDERING INFORMATION

To order you can contact customer service by mail, phone or e-mail as listed on top of this page.

You will need to provide the item number, description and quantity you want.

You can pay by check, MasterCard, VISA or Discover Card.

We do not have a set shipping and handling charges table at this time contact customer service for the amount of these charges for your order.

We will have a direct order shopping cart on our web page in the future.
The web page is www.hawkwoodworkingtools.com

TABLE OF CONTENTS (RBI HAWK ULTRA PRECISION SCROLL SAWS)

SETTING UP YOUR HAWK

Your new **Hawk Ultra** has been completely assembled and factory tested before being prepared for shipment. All adjustments have been made except for a few minor assembly procedures. After these procedures are completed, you'll be on your way to scrolling in no time!

The **Hawk Ultra** is shipped in three separate cartons:

Carton #1 contains "**YOUR NEW SAW**" and your personal scroll saw manual.

Carton #2 contains four commercial duty 36 inch steel legs, leg assembly hardware, and glides (rubber feet).

Carton #3 contains the Beginner's Choice Kit (pattern pack, blade assortment pack, scroll saw video, and pattern book).

We often ship additional items in each carton, if ordered. Be sure to compare the items received with the packing list attached to each shipment. There will be one packing list for an entire shipment. If your shipment contains more than one carton, the packing list will be attached to the largest carton. Also listed on the packing list, you will notice an individual six digit customer identification number has been assigned to you. Please record this number for further contact with RBIndustries, Inc.. It identifies you with each piece of RBI equipment purchased.

While removing all items from their cartons, be sure to inspect each one closely for shipping damage. If you feel your shipment may have been damaged, contact the local office of the transportation carrier. You will find their local number in the yellow pages under "Shipping Carriers". Also, please contact our customer service department for help in resolving any problem.

Tools you will need to complete the final assembly of your **Hawk Ultra:**

(Estimated total time needed: 15 minutes - maximum)

- 7/16" wrench or ratchet
- 9/16" open end wrench
- A pair of standard pliers

Step #1

Remove the assembly hardware from the plastic pouch and install one 3/8" hex nut on each glide (rubber foot). Tighten each all the way down until they are touching the rubber on the glide stem. (See Fig. A-1)

Step #2
Insert each glide through the hole in the bottom of each leg. Install another 3/8" hex nut on the glide to hold it in place. Tighten the nut down securely. By tightening the nut down securely, your machine's vibration will be minimized. (see fig. A-1).

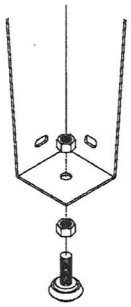


Fig. A-1

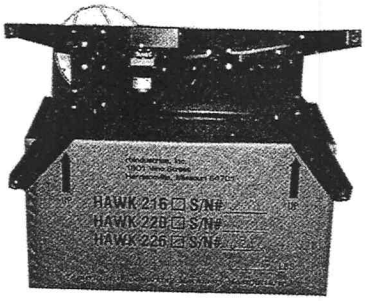


Fig. A-2

Step #3
After removing all items from the saw box, close it and use it as a bench when installing the legs on your saw. Save your box in case a warranty situation arises. Turn the saw on its side and carefully lay it on the box, **switch(controller) side up**. Install one leg on each corner of the base, using the carriage bolts and the1/4" whiz nuts. Do not tighten completely. The carriage bolts should be able to move freely in the holes. Tighten these with a wrench when making final adjustments. Be sure the wide top of the leg is **inside** the base. Arrange bolt heads on the outside of the base with the whiz nuts to the inside of the base (see fig. A-2).

Step #4
With the legs installed, stand your new **Hawk** upright and securely tighten the carriage bolts on the legs with a 7/16" wrench or ratchet. For best operation of your saw, be sure to set it on a solid, level floor.

Step #5
Remove the rubber band from the rear aluminum cam-over handle on the rear of the upper arm. It should be adjusted and pointed in the forward position. This will put tension on the blade. On the left hand side of the front section of the upper arm (Unit #220 & 226 only), there is a small black tension adjustment handle. Push the handle backwards and one should feel tension begin to tighten. See figures A-5 and A-6 on page #13 for configuration of black front tension-cam handle.

Step #6
The final adjustment that you will want to make is to direct the dust blower flexible hose. The adjustable dust blower hose is connected to the hold down arm. Adjust the blower nozzle directly at the hole in the center of the saw table. When adjusting your dust blower, it should keep an area the size of a half dollar directly around the blade clear of dust. Always adjust the blower nozzle to direct the dust away from the operator.

MAINTENANCE

There are a few more things you'll want to do before you begin to saw. Don't forget these handy tips. Later, they should be done about every 20 hours of use.

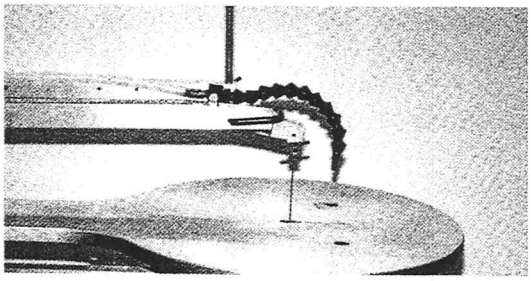


Fig. A-3

Tip #1-Using Dri-Tool-Lub put a few drops under the wedge pivot at the rear tension aluminum cam handle. You should also put a drop of oil on each side of the pivot point bearings (This is where the bolts that pivot the arms are located. The bearings are located between the the arms and the arm supports.)

Tip #2-Apply one drop of oil in the hole located on top of the upper arm (area directly above the black rubber front cam handle) **every 20 hours of operation** (Unit #220 & 226 Only).

Tip #3-Although we hand polish each **Hawk** table at the factory, after about 20 hours of use you may want to reapply a coat of wax to the table for protection as well as making the wood glide easier across the table surface. Apply Minwax Clear Wood Wax or Johnson Paste Wax with light pressure in a circular motion. Polish with a clean dry cloth. Be sure to remove all wax from the table top or it will coat your wood as you cut and make applying finishing stains or sealers difficult and their coatings uneven.

GROUNDING INSTRUCTIONS FOR YOUR HAWK

1. <u>All grounded, cord-connected tools</u>:

In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. Every **Hawk Ultra** is equipped with an electric cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into a matching outlet which is properly installed and grounded in accordance with all local applicable codes and ordinances. (See page # 30)

Do not modify the plug provided --- if it will not fit the outlet, have the proper outlet installed by a qualified electrician.

Improper connection of the equipment-grounding conductor can result in a risk of electric shock. The conductor with insulation having an outer surface that is green, with or without yellow stripes, is the equipment-grounding conductor. If repair or replacement of the electric cord or plug is necessary, do not connect the equipment-grounding conductor to a live terminal.

Check with a qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the tool is properly grounded.

Use only 3-wire extension cords that have 3-prong grounding plugs and a 3-pole receptacle that accepts the tool's plug.

Repair or replace a damaged or worn cord immediately.

2. <u>Grounded, cord-connected tools intended for use on a supply circuit having nominal rating less than 150 volts</u>:

This tool is intended for use on a circuit that has an outlet that looks like the one illustrated in Sketch A Figure 72.1 on page #30. The tool has a grounding plug that looks like the plug illustrated in Sketch A Figure 72.1 on page #30. A temporary adapter, which looks like the adapter illustrated in Sketches B and C, may be used to connect this plug to a 2-pole receptacle as shown in Sketch B if properly grounded outlet is not available. The temporary adapter should be used only until a properly grounded outlet can be installed by a qualified electrician. The green-colored rigid ear, lug, and the like, extending from the adapter must be connected to a permanent ground such as a properly grounded outlet box.

LET'S GO OVER A FEW SAFETY TIPS

Tip #1-Due to using a DC brush type motor, your **Ultra Hawk** saw should not be plugged into a GFI (Ground Fault Interrupt) receptical.

Tip #2-Never allow anyone without proper training to use your **Hawk**. Children should always be carefully supervised while sawing.

Tip #3-A clean workshop is a safe workshop. Keep your work area clean and uncluttered. Also, keep others clear of running machinery. Be sure to remove all tools and wood scraps before starting the machine.

Tip #4-Keep your hands/fingers away from all moving parts. Never try to make any adjustments to your **Hawk** while it's running. The electrical power should be disconnected before making any adjustments on the machine.

Tip #5-Dress for the occasion. Loose clothing and jewelry can be a hazard around working tools. Avoid loose fitting clothes, long sleeves, neckties, jewelry, rings, watches, etc. If you have long hair, be sure to pull it back. Always wear eye protection, ear protection, and a mask in dusty operations.

Tip #6-To avoid electrical shock, do not operate your **Hawk** in a damp or wet area. Always keep safety guards in place. Never leave your saw running unattended.

Tip #7-Be sure to use good materials for a top notch job. When cutting wood, be sure it has no loose knots or splintered surfaces.

Safety With all Tools as Applicable :

1. **KEEP ALL GUARDS IN PLACE** and in working order.

2. **REMOVE ADJUSTING KEYS AND WRENCHES.** Form a habit of checking to see that keys, tools, and adjusting wrenches are removed from the machine before turning it on.

3. **KEEP WORK AREAS CLEAN.** Cluttered areas and benches invite accidents.

4. **DON'T USE IN DANGEROUS ENVIRONMENTS.** Don't use power tools in damp or wet locations, or expose them to rain. Keep work areas well lighted.

5. **KEEP CHILDREN AWAY.** All visitors should be kept at a safe distance from work areas. Visitors should also wear eye, ear, and dust protection.

6. **MAKE YOUR WORKSHOP KID PROOF** with padlocks, master switches, and by removing starter keys. Every Hawk comes equipped with a red locking safety switch key. Remove the red key when the saw is not in use. (see pg.14)

7. **DON'T FORCE TOOL.** It will do the job better and safer at the rate for which it was designed.

8. **USE CORRECT TOOL.** Don't force a tool or attachment to do a job for which it was not designed.

9. **USE PROPER EXTENSION CORD.** Make sure your extension cord is in good condition. When using an extension cord, be sure to use one heavy enough to carry the current load your product will draw. An undersized cord will cause a drop in line voltage resulting in loss of power and over-heating. Table72.1(see page 30) shows the correct size to use depending on cord length and name plate ampere rating. If in doubt, use the next heavier gage. The smaller the gage number, the heavier the cord.

10. **WEAR PROPER APPAREL.** Do not wear loose clothing, gloves, neckties, rings, bracelets, or any other jewelry which may get caught in moving parts. Non-slip footwear is recommended. Wear protective hair covering to contain long hair. Use dust masks if the cutting operation is dusty!

11. **ALWAYS USE "SAFETY GLASSES".** Everyday glasses have very minimal impact resistant lenses. They are **NOT** safety glasses.

12. **SECURE WORK.** Use clamps, vises, or hold downs while working. It's safer than using your hand, and it frees both hands to operate tool.

13. **DON'T OVER-REACH.** Keep proper footing and balance at all times.

14. **MAINTAIN TOOLS WITH CARE.** Keep sharp and clean for best and safest performance. Follow instructions for lubricating and changing instructions.

15. **DISCONNECT TOOLS FROM ELECTRICAL POWER SOURCE** before servicing; when changing accessories, such as blades, bits, cutters, etc.

16. **REDUCE THE RISK OF UNINTENTIONAL STARTING.** Make sure the switch is in the "**off** " position before plugging into the electrical outlet.

17. **USE RECOMMENDED ACCESSORIES.** Consult the owner's manual for recommended accessories. The use of improper accessories may cause risk of injury to the operator.

18. **NEVER STAND ON TOOL.** Serious injury can occur if the tool is tipped or if the cutting blade is unintentionally contacted.

19. **CHECK DAMAGED PARTS.** Before further use of the tool, a guard or other part that is damaged should be carefully checked to determine that it will still 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 could affect its operation. Again, a guard or other part that is damaged should be properly repaired or replaced.

20. **DIRECTION OF FEED.** Feed work into the blade or cutter, against the direction of rotation of the blade or cutter only.

21. **NEVER LEAVE ANY TOOL RUNNING UNATTENDED. TURN THE POWER OFF.** Don't leave the tool until it comes to a complete stop.

22. **DO NOT OPERATE MACHINE** under influence of medication, alcohol, or drugs or in a state of severe fatigue.

23. **KEEP EQUIPMENT IN PROPER WORKING ORDER.** Follow recommended maintenance procedures in the operators manual. It is the owners' responsibility to maintain equipment to RBI manual specifications.

LET'S TRY IT OUT

After we test each **Hawk** saw, we leave the "test run" blade installed. This blade is a size #7 fret saw blade. (There are many different sizes and types of blades available, see pages 10-11 for a partial listing). This #7 blade will work very well for the beginning exercises. The most important thing to remember is to relax. Don't be afraid of the saw --- It is a very safe tool --- but it must be respected!

For this project you will need:

1 = 1" x 9" x 11" piece of clear soft wood (pine will work great).

Before you begin, you will need to get the pattern of the jumping dolphin puzzle located in the RBI Pattern Pak enclosed with your saw. There are several ways to transfer patterns to your project material. Here are a couple of inexpensive ways we have found to be of help:

1. Carbon Method -- Using a sheet of carbon paper (available at the local stationary shop), place it directly on the surface you plan to cut. Lay the original pattern or a photocopy directly on top of the carbon paper and carefully trace the pattern using a pencil or ball-point pen (if you use a sharp pencil you might tear the carbon paper, so a dull pencil may be better for you). Lift the pattern and carbon paper from the surface and you're ready to cut. **Warning: Depending on the material you plan to cut, the carbon from the paper may be very difficult to remove from the surface. Be sure to carefully sand away all carbon or it will tend to bleed when applying stain or finish sealer later.**

2. Stick it -- This is our most used method. Make a photocopy pattern, carefully spray aerosol adhesive directly to the back side of the **pattern.** Never spray the wood itself. Always spray the paper pattern! Place the pattern face-side-up on the surface to be cut and rub gently to make sure all edges will be secure while cutting. **Note: When choosing a spray glue, use repositional glue. The type intended for photographs is best.** After your cutting is completed, remove the pattern from the surface and lightly sand to remove any glue residue before finishing. (Some crafters tell us that they use the same technique with rubber cement or a craft glue stick instead of spray adhesive.)

For your first project, it is better to choose a soft wood to cut. We recommend sugar pine or ponderosa pine if it is available. Use the pattern of the jumping dolphin puzzle and prepare your project to be cut by attaching the pattern by the method of your personal preference.

Now it's time to adjust the "hold down foot" on your **Hawk** to fit the thickness of the wood you will be cutting. The "hold down foot" is the black nylon (plastic) piece that surrounds the blade on your saw (see item #70 on the parts listing for your particular saw). Using the black plastic knob on the right hand side of the hold-down arm, located next to the upper arm, loosen the knob and raise the "hold down foot". Now place the project you plan to cut on the table and bring the "hold down foot" back down until it gently rests on the top surface of your project (minimal pressure is needed to hold the project in place). Re-tighten the knob, thereby lightly securing the project under the hold-down foot.

SAWING TECHNIQUES THE PROFESSIONALS USE

It is best to start your cut at a "point" or "corner" of the project. Even for an experienced cutter, it is almost impossible to blend starting and ending cuts on a straight line. If your pattern doesn't have a corner, start sawing into the pattern line cutting across the grain. Your chances of the blade not "wandering" will be minimized.

If it becomes necessary to start a cut on a long curve, try to cut just a little outside the line --- you can sand off the resulting bump.

HERE'S A PRACTICE EXERCISE FOR TECHNIQUE

Over the years, we've learned several ways to help beginners enjoy working with their new **Hawk** right away. Here's a technique-building tip that has helped many get started, while getting used to the cutting action of their saw.

Step #1 --- Take a piece of paper (or draw directly on the wood with a felt tip or ball-point pen) and draw a series of straight and zigzag lines like the ones in the diagram. (See fig. A-4.)

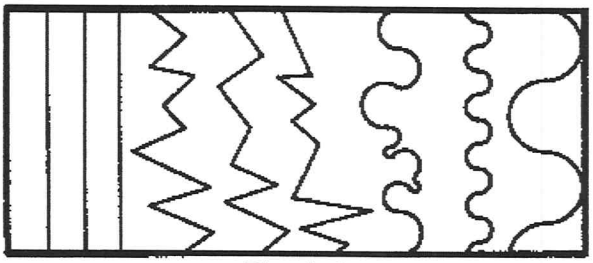


Fig. A-4

Step #2 --- After your wood is covered with lines, start cutting using the techniques above. After you've completed this project and you're comfortable with making sharp turns and straight lines, you're ready to start your first project.

Cutting corners and sharp turns --- This is the most exciting part of owning a **Hawk** -- the flexibility to make cuts as intricate or as simple as you want. Your new **Hawk Ultra** can make a complete 360 degree turn in a project with less than 1/64" cutting radius. When cutting a project that requires sharp turns and points, here are a few helpful suggestions:

1. Start by making your cut all the way to the point where you want to make a sharp turn.

2. Now, without feeding your project forward into the blade, slowly spin the wood around the blade in its own "kerf". If you're used to sawing with a bandsaw or a jigsaw, you may be tempted to "set" the blade, **DON'T!** If you find that while cutting you tend to break blades often, or there is smoke while you are trying to make a turn or corner you're not alone. Many people have this problem, initially.

3. If your project clatters on the table or it tries to pull from your hands while making turns, you may want to go to a smaller blade and consider using the hold-down foot. The smaller the blade size, the smaller the turning radius capability. For very intricate projects, the smallest size blade that you are comfortable with is best. (See our blade recommendation chart on page 10-11).

LET'S MAKE A PROJECT

Now it's time to put what you have learned to work for you! Remember, begin at a corner of your pattern and cut across the grain when you first start. Follow the line around; if you're right-handed, you will probably be most comfortable feeding your project counter-clockwise (vice-versa for a left-handed scroller). It really doesn't matter which direction you cut. Go in the direction that feels most comfortable to you. Start at the outside of the pattern and work your way inward.

When cutting along the line, you can saw as fast or as slow as you want. You can adjust the variable speed knob speed up or slow your work down. If you're cutting and you start to wander from the line of the pattern, don't try to jerk back onto the line --- you'll just end up with a bumpy project. The best technique is the "near hit" method. In most cases you would have to wander more than 1/8" from your pattern line to make a noticible variation.

Always remember that the blade of your new **Hawk Ultra** is stationary and you control your project. You must spin the wood --- the blade will not turn. This is how most people break blades when getting started. Remember, the saw blade has teeth on the front side only. Always remember to feed directly into the front of the blade --- never lean to the side. Let the blade do the cutting.

After you've completed your test project, step back and take look at your first success...CONGRATULATIONS! Look at the sides of the project and inspect for burn marks. If there are burn marks on your projects, you have room for improvement on feeding straight into the blade or you may need to switch to a different blade size. If your line seems a little bumpy, you'll want to concentrate on the "near hit" technique. Now you're ready to finish this project and get going again.

Be sure to read over the "Sawing Techniques" section for more tips and techniques on all types of cutting.

BLADES FOR EVERY OCCASION

There are literally hundreds of types, styles, and sizes of blades available for cutting most any material you choose. On the next two pages are charts that will help you better understand the most popular types and sizes of blades for your saw.

Fret Saw Blades
Originally designed for a hand fret saw, these blades are ideal for the power scroll saw. This is the best blade for general cutting. It is recommended for wood, plastics, rubber, fabric, paper, alabaster, and most other non-metalic materials.

Diamond Blades
The diamond blade is the newest and most unique blade yet. This blade is manufactured by impregnating a round rod with diamond chips. For crafters who enjoy making stained glass projects or do large amounts of ceramic and marble cutting, the diamond blade is the answer. The diamond blade must be used with the drip tank system to keep the blade wet at all times and keep it from loading up with glass particles which causes the blade to break.

Metal Cutting / Jeweler's Saw Blades
These blades are designed for use in the hand held jewelers saw frame still used frequently among jewelry designers. Its hardened steel composition and teeth configuration make it ideal for cutting both ferrous and non-ferrous metals such as gold, silver, steel, copper, brass, bronze, and aluminum.

Your new RBI Ultra Hawk uses standard 5 inch long, plain end (not pin end) scroll saw blades. Some of the many varieties and sizes are shown on the following pages. Make sure you use quality blades for best performance of your saw and achieve best results with your project. Experiment with the various types and sizes of blades to determine which works best for your application, cutting style and speed, and the type of material you are working with. Our blade guide is only a starting point, not a rule. Use the blade size you feel most comfortable with and gives you the best results.

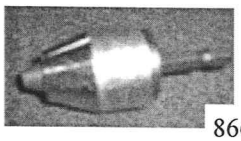
SCROLL SAW BLADES FOR EVERY NEED

Not all scroll saw blades are the same. The differences include the hardness of the metal it is cut from; the method of cutting the tooth; the geometry of the tooth and others. Each of these effects how the blade cuts in different material. The speed at which the blade moves and the rate you feed the material you are cutting also makes a difference . That is why all of our scroll saws are variable speed.

To ensure that you can cut what every material you want, we stock a large selection of scroll saw blades from 4 different sources.

Which blade and what cutting speeds work for you on a given material will be up to you to decide which works best for you. But here is our list and some starting point recommendation on blade uses.

MINI DRILL



866-0000 $7.50

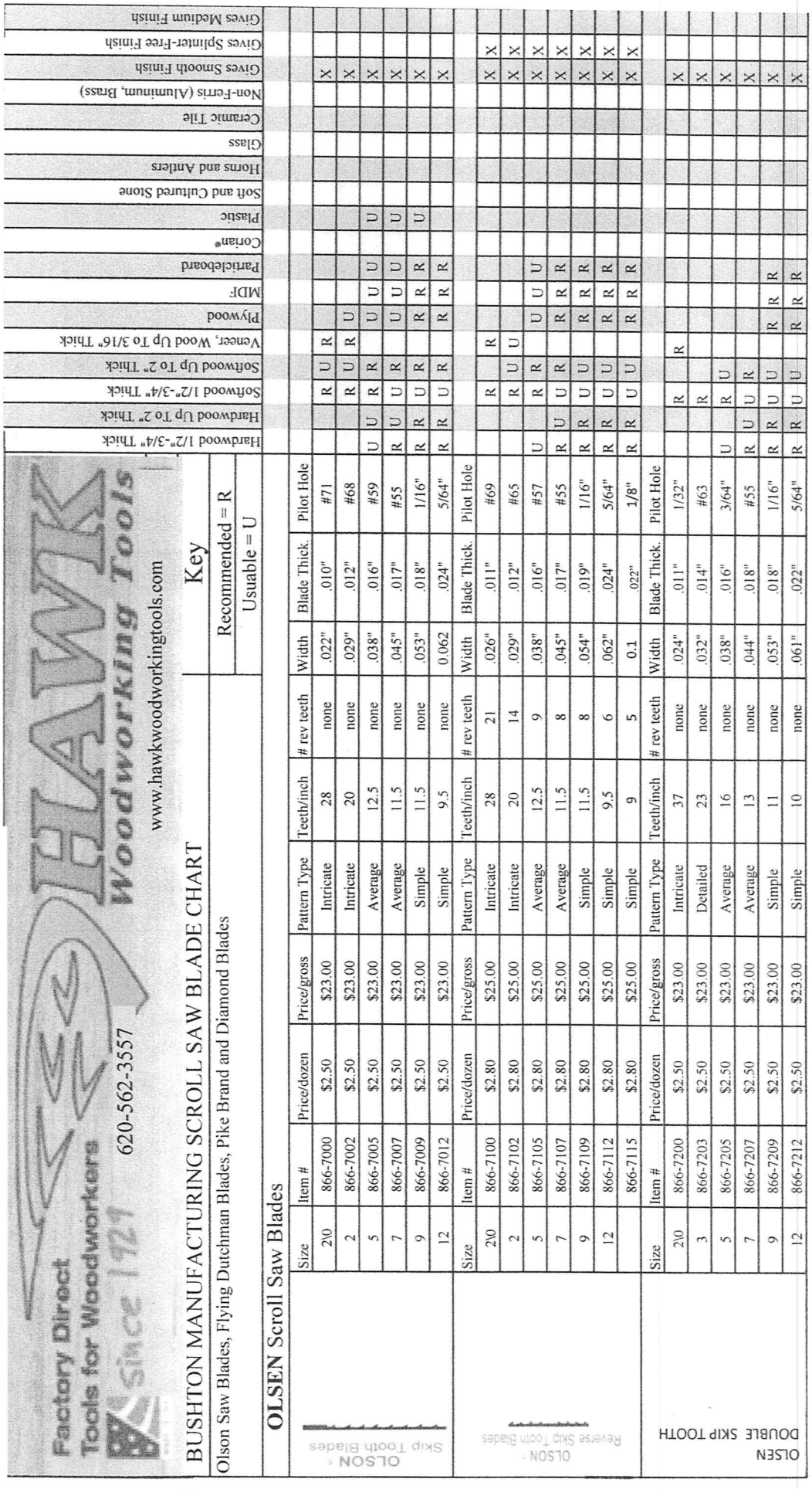
DRILL BITS

JOBBER LENGTH

ITEM #	SIZE	DIA	PRICE per 5
866-0055	#55	.0520"	$3.68
866-0056	#56	.0465"	$3.68
866-0057	#57	.0430"	$4.55
866-0059	#59	.0410"	$4.55
866-0063	#63	.0370"	$4.55
866-0065	#65	.0350"	$4.99
866-0068	#68	.0310"	$4.99
866-0070	#70	.0280"	$6.56
866-0071	#71	.0260"	$6.56
866-0076	#76	.0200"	$6.56
866-0077	#77	.0180"	$6.56
866-0102	1/32	.0313"	$3.90
866-0103	3/64	.0469"	$3.90
866-0104	1/16	.0625"	$3.90
866-0105	5/64	.0781"	$4.10
866-0106	3/32	.0938"	$4.10
866-0107	7/64	.1094	$4.10
866-0108	1/8	.1250"	$4.10

DIAMOND

ITEM #	DIA	PRICE EACH
866-0203	.75 mm	$8.00
866-0204	1 mm	$8.00
866-0205	1.25 mm	$8.00
866-0206	1.5 mm	$8.00



BUSHTON MANUFACTURING SCROLL SAW BLADE CHART

Olson Saw Blades, Flying Dutchman Blades, Pike Brand and Diamond Blades

Key
Recommended = R
Usuable = U

OLSEN Scroll Saw Blades

	Size	Item #	Price/dozen	Price/gross	Pattern Type	Teeth/inch	# rev teeth		Blade Dia.	Pilot Hole	Hardwood 1/2"-3/4" Thick	Hardwood Up To 2" Thick	Softwood 1/2"-3/4" Thick	Softwood Up To 2" Thick	Veneer, Wood Up To 3/16" Thick	Plywood	MDF	Particleboard	Corian®	Plastic	Soft and Cultured Stone	Horns and Antlers	Glass	Ceramic Tile	Non-Ferris (Aluminum, Brass)	Gives Smooth Finish	Gives Splinter-Free Finish	Gives Medium Finish
OLSON Regular Scroll Blades	2\0	866-7420	$3.00	$32.00	Intricate	51	none		.030"	3/64"			U	U														X
	0	866-7400	$3.00	$32.00	Detailed	46	none		.032"	3/64"			U	U														X
	2	866-7402	$3.00	$32.00	Average	41	none		.035"	5/64"	U	U	U	U		U	U											X
OLSON CROWNTOOTH	Size	Item #	Price/dozen	Price/gross	Pattern Type	Teeth/inch	#rev teeth	Width	Blade Thick.	Pilot Hole																		
	2\0	866-7500	$3.00	$32.00	Intricate	20	every other	.024"	.011"	1/32"			R		R				U	R					X	X	
	2	866-7502	$3.00	$32.00	Intricate	20	every other	.026"	.013"	#65			R		R				U	R					X	X	
	5	866-7505	$3.00	$32.00	Detailed	16	every other	.038"	.016"	#56			R		U	U	U		U	R					X	X	
	7	866-7507	$3.00	$32.00	Average	11	every other	.045"	.017"	#55	U		U	U		U	U	U	R	R					X	X	
	9	866-7509	$3.00	$32.00	Simple	6	every other	.053"	.018"	1/16"	R	U	U	R		R	R	R	R	R					X	X	
	12	866-7512	$3.00	$32.00	Simple	6	every other	.065"	0.024	5/64"	R	U	U	R		R	R	R	R	R					X	X	
OLSON Metal Cutting Blades	Size	Item #	Price/dozen	Price/gross	Metal Type	Teeth/inch	# rev teeth	Width	Blade Thick.	Pilot Hole																		
	0	866-7700	$3.20	$33.00	Soft Metals	48	none	.024"	.012"	#65															R			X
	2	866-7702	$3.20	$33.00	Soft Metals	43	none	.028"	.013"	#63															R			X
	5	866-7705	$3.20	$33.00	Soft Metals	36	none	.033".	.016"	#59															R			X
	7	866-7707	$3.20	$33.00	Soft Metals	30	none	.041"	.019"	#55															R			X
	9	866-7709	$3.20	$33.00	Soft Metals	25	none	.049"	.022"	1/16"															R			X
	12	866-7712	$3.20	$33.00	Soft Metals	20	none	.070"	.023"	5/64"															R			X
OLSON Skip/Reverse	PGT	Size	Item #	Price/dozen	Price/gross	Pattern Type	Teeth/inch	# rev teeth	Width	Blade Thick.	Pilot Hole																		
		5	866-7305	$3.90	$39.00	Average	12	9	.044"	.018"	#55	U		R	R		U	U	U						U	X	X	
		7	866-7307	$3.90	$39.00	Average	10	7	.046"	.018"	#55	U	U	R	U		R	R	R						U	X	X	
		9	866-7309	$3.90	$39.00	Average	8	6	.048"	.018"	1/16"	R	R		U		R	R	R							X	X	
OLSON Double/Reverse	PGT	Size	Item #	Price/dozen	Price/gross	Pattern Type	Teeth/inch	# rev teeth	Width	Blade Thick.	Pilot Hole																		
		5	866-7605	$3.90	$39.00	Average	12	8	.045"	.018"	#55	U		R	R		U	U	U						U	X	X	
		7	866-7607	$3.90	$39.00	Average	10.5	8	.047"	.018"	1/16"	R	U	R	U		R	R	R						U	X	X	
		9	866-7609	$3.90	$39.00	Average	9	6	.049"	.018"	1/16"	R	R		U		R	R	R							X	X	
OLSEN MACH SPEED	Size	Item #	Price/dozen	Price/gross	Pattern Type	Teeth/inch	# rev teeth	Width	Blade Thick.	Pilot Hole																		
	3	866-7803	$3.00	$32.00	Intricate	13	7	0.032	0.014	#57	U		R	R		U	U	U	R	R	U	U			U	X	X	
	5	866-7805	$3.00	$32.00	Average	13	7	0.038	0.016	#56	U		R	R		U	U	U	R	R	U	U			U	X	X	
	7	866-7807	$3.00	$32.00	Average	8	6	0.046	0.017	#55	R	U	R	U		R	R	R	R	R	U	U			U	X	X	
	9	866-7809	$3.00	$32.00	Average	8	6	0.055	0.018	5/64"	R	R		U		R	R	R	R	R	U	U				X	X	
OLSON Scroll Saw Files	Size	Item #	Price/each	Price/dozen	Pattern Type	Teeth/inch		Width	Blade Thick.	Pilot Hole																		
	~	866-7910	$2.00	$22.00	All	~		0.156"	.056""	~	R	R	R	R	R	R	R	R	U	U	U	U			R	X	X	

Factory Direct Tools for Woodworkers
Since 1929
620-562-3557
HAWK Woodworking Tools
www.hawkwoodworkingtools.com

BUSHTON MANUFACTURING SCROLL SAW BLADE CHART

Olson Saw Blades, Flying Dutchman Blades, Pike Brand and Diamond Blades

Key
Recommended = R
Usable = U

Flying Dutchman Scroll Saw Blades

Flying Dutchman Ultra Reverse

Size	Item #	Price/dozen	Price/gross	Pattern Type	Teeth/inch	# rev teeth	Width	Blade Thick.	Pilot Hole	Hardwood 1/2"-3/4" Thick	Hardwood Up To 2" Thick	Softwood 1/2"-3/4" Thick	Softwood Up To 2" Thick	Veneer, Wood Up To 3/16" Thick	Plywood	MDF	Particleboard	Corian®	Plastic	Soft and Cultured Stone	Horns and Antlers	Glass	Ceramic Tile	Non-Ferris (Aluminum, Brass)	Gives Smooth Finish	Gives Splinter-Free Finish	Gives Medium Finish
1	866-6001	$3.20	$29.50	Intricate	15	every 3rd	0.029	0.011	#68			R		R				U	R						X	X	
3	866-6003	$3.20	$29.50	Detail	15	every 3rd	0.031	0.013	#65			R		U	U	U		U	R						X	X	
5	866-6005	$3.20	$29.50	Detail	15	every 3rd	0.037	0.015	#63	U		U	U		U	U	U	U	R						X	X	

Flying Dutchman Scroll Reverse

Size	Item #	Price/dozen	Price/gross	Pattern Type	Teeth/inch	# rev teeth	Width	Blade Thick.	Pilot Hole	Hardwood 1/2"-3/4" Thick	Hardwood Up To 2" Thick	Softwood 1/2"-3/4" Thick	Softwood Up To 2" Thick	Veneer, Wood Up To 3/16" Thick	Plywood	MDF	Particleboard	Corian®	Plastic	Soft and Cultured Stone	Horns and Antlers	Glass	Ceramic Tile	Non-Ferris (Aluminum, Brass)	Gives Smooth Finish	Gives Splinter-Free Finish	Gives Medium Finish
1	866-6021	$2.90	$27.50	Intricate	13	7	0.026	0.011	#68			R		R											X	X	
3	866-6023	$2.90	$27.50	Detail	13	7	35	0.013	#65			R													X	X	
5	866-6025	$2.90	$27.50	Detail	13	7	37	0.015	#63	U		R	U		U	U	U								X	X	
7	866-6027	$2.90	$27.50	Average	10	7	43	0.017	#57	R	U	U	R		R	R	R								X	X	

Flying Dutchman Polar

Size	Item #	Price/dozen	Price/gross	Pattern Type	Teeth/inch	# rev teeth	Width	Blade Thick.	Pilot Hole	Hardwood 1/2"-3/4" Thick	Hardwood Up To 2" Thick	Softwood 1/2"-3/4" Thick	Softwood Up To 2" Thick	Veneer, Wood Up To 3/16" Thick	Plywood	MDF	Particleboard	Corian®	Plastic	Soft and Cultured Stone	Horns and Antlers	Glass	Ceramic Tile	Non-Ferris (Aluminum, Brass)	Gives Smooth Finish	Gives Splinter-Free Finish	Gives Medium Finish
2\0	866-6040	$2.95	$27.50	Intricate	30.5	none	0.023	0.010	#71									R	R	R	R				X		
1	866-6041	$2.95	$27.50	Intricate	28	none	0.026	0.011	#68									R	R	R	R				X		
3	866-6043	$2.95	$27.50	Detail	24	none	0.031	0.013	#65									R	R	R	R				X		
5	866-6045	$2.95	$27.50	Detail	17	none	0.037	0.015	#63									R	R	R	R				X		
7	866-6047	$2.95	$27.50	Average	15	none	0.043	0.017	#57									R	R	R	R				X		

F.D. Pengiun Silver reverse

Size	Item #	Price/dozen	Price/gross	Pattern Type	Teeth/inch	# rev teeth	Width	Blade Thick.	Pilot Hole	Hardwood 1/2"-3/4" Thick	Hardwood Up To 2" Thick	Softwood 1/2"-3/4" Thick	Softwood Up To 2" Thick	Veneer, Wood Up To 3/16" Thick	Plywood	MDF	Particleboard	Corian®	Plastic	Soft and Cultured Stone	Horns and Antlers	Glass	Ceramic Tile	Non-Ferris (Aluminum, Brass)	Gives Smooth Finish	Gives Splinter-Free Finish	Gives Medium Finish
5	866-6105	$2.75	$26.50	Detail	18	8	0.037	0.015	#63	U	U	R	U		U	U	U								X	X	

Flying Dutchman New Spiral

Size	Item #	Price/dozen	Price/gross	Pattern Type	Teeth/inch	# rev teeth		Blade Dia	Pilot Hole	Hardwood 1/2"-3/4" Thick	Hardwood Up To 2" Thick	Softwood 1/2"-3/4" Thick	Softwood Up To 2" Thick	Veneer, Wood Up To 3/16" Thick	Plywood	MDF	Particleboard	Corian®	Plastic	Soft and Cultured Stone	Horns and Antlers	Glass	Ceramic Tile	Non-Ferris (Aluminum, Brass)	Gives Smooth Finish	Gives Splinter-Free Finish	Gives Medium Finish
2\0	866-6140	$3.55	$34.00	Intricate	35	none		0.027	#65			R	R														X
1	866-6141	$3.55	$34.00	Intricate	27	none		0.030	#63			R	R		U	U	U										X
3	866-6143	$3.55	$34.00	Detail	27	none		0.035	#59	R	R	R	R		U	U	U										X
5	866-6145	$3.55	$34.00	Detail	27	none		0.037	#56	R	R	R	R		U	U	U										X

F. D. Puzzle

Size	Item #	Price/dozen	Price/gross	Pattern Type	Teeth/inch	# rev teeth	Width	Blade Thick.	Pilot Hole	Hardwood 1/2"-3/4" Thick	Hardwood Up To 2" Thick	Softwood 1/2"-3/4" Thick	Softwood Up To 2" Thick	Veneer, Wood Up To 3/16" Thick	Plywood	MDF	Particleboard	Corian®	Plastic	Soft and Cultured Stone	Horns and Antlers	Glass	Ceramic Tile	Non-Ferris (Aluminum, Brass)	Gives Smooth Finish	Gives Splinter-Free Finish	Gives Medium Finish
	866-6240	$2.80	$27.50	Very Intricate	31	none	0.015	0.008	#71			R		R											X		

Pike Brand Jewelers' Saw Blades

Size	Item #	Price/dozen	Price/gross	Pattern Type	Teeth/inch	# rev teeth	Width	Blade Thick.	Pilot Hole
8\0	866-5000				96	none	0.013	0.006	#77
5\0	866-5002				70	none	0.016	0.008	#76
1	866-5004				47	none	0.025	0.012	#70

LAPCRAFT DIAMOND Scroll Saw Blades

Diamond Wire Blades

Size	Item #	Price/each		Pattern Type				Blade dia.	Pilot Hole	Hardwood 1/2"-3/4" Thick	Hardwood Up To 2" Thick	Softwood 1/2"-3/4" Thick	Softwood Up To 2" Thick	Veneer, Wood Up To 3/16" Thick	Plywood	MDF	Particleboard	Corian®	Plastic	Soft and Cultured Stone	Horns and Antlers	Glass	Ceramic Tile	Non-Ferris (Aluminum, Brass)	Gives Smooth Finish	Gives Splinter-Free Finish	Gives Medium Finish
1mm	866-7902	$19.00		Average				1mm														R	R		X	X	
3/4mm	866-7903	$18.00		Average				3/4mm														R	R		X	X	

HOW TO CHANGE A BLADE ON MODELS 220 & 226 HAWK ULTRAS

Front Cam Benefits

By utilizing the front cam, the blade can be changed without getting off your stool or stretching to reach the back of the saw. This feature is great when making multiple inside cuts or for someone who is physically challenged. It's another example of how RBI is working to make your saw a more "user friendly" machine.

Here's an easy step-by-step method for changing the blade on your Hawk ULTRA 220 & 226.

Step #1 --- The front cam has two positions: the released position - for changing blades, (see fig. A-5) and the tensioned position - for sawing (see fig. A-6). The blade tension is adjusted with the cam-over handle on the back of the saw. Begin blade changing by releasing the front cam (black handle on the left side of the upper arm). By flipping the handle in the complete forward position, your blade tension will be released. Loosen the thumb screw on the upper blade holder to release the old sawblade.

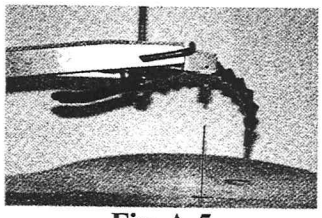


Fig. A-5

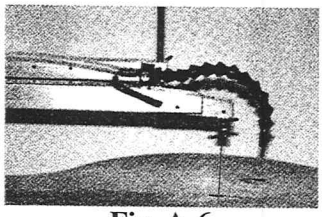
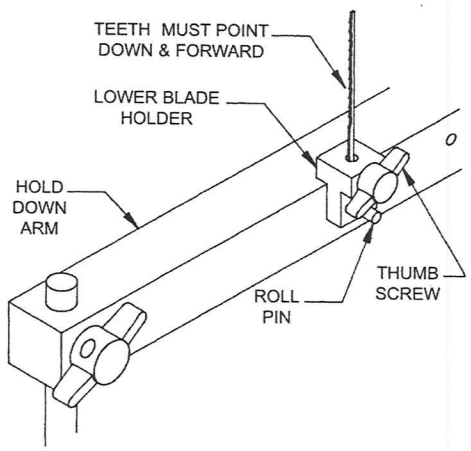


Fig. A-6

Step #2 --- Choose the size and type of blade you will be using. (Make your selection from the blade chart located on pages 10-11).

The lower blade holder is located at the front end of the lower arm. By holding the blade holder at both ends (with your index finger and thumb), you can remove it by pushing down slightly and sliding the blade holder forward.



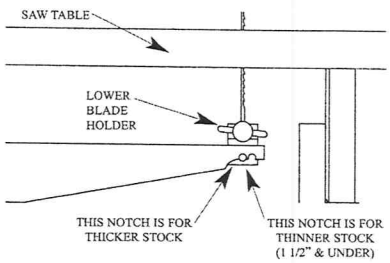
Step #3 --- Now, let's mount the blade in the bottom blade chuck. The lower blade holder is "T" shaped when viewed from the front. It has a pin through the bottom and a thumb screw to clamp the blade. To hold the chuck while changing blades, there are two holes in the hold down arm. Only one hole is needed; there is an extra. Place the lower blade holder against the hold down arm with the pin in the hole and the top portion over the hold down arm (see figure at right) so the blade will not rotate when the thumb screw is turned.

Step #4 --- Remove any remaining portion of the old blade and saw dust from the chuck. Make sure that all broken blade pieces are cleared away. With the teeth pointing forward and down toward the front of the chuck, insert the new blade through the hole in the top of the of the lower blade holder so the bottom end of the blade is touching the bottom of the hole in the chuck. The blade must come straight out of the chuck.

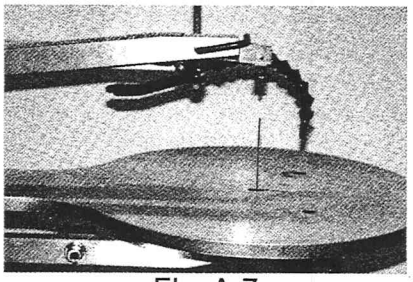
Step #5 --- Using the thumb screw, tighten the new blade in the chuck. Be careful not to over tighten the chuck --- more is not always better! When the blade is "over tightened", you will crimp the blade and weaken it at the point where the blade enters the chuck. This will make the blade prone to breaking next to the blade holder.

Step #6 --- Remove the blade holder from the hold down arm and thread the blade up through the slot in the table. Be sure the teeth on the blade are facing the front of the saw. (See Fig. A-7). Slide the chuck back under the lower arm in the slot. There are two notches in the lower arm for the lower blade holder to fit into. The front one is for thinner stock --- (1-1/2" and under), and the back notch is for thicker stock (see figure on the next page).

Step #7 --- Using your index finger, bring the upper arm down while pinching the blade between your thumb and second finger (see fig. A-8). Push the blade back into the slot in the front of the upper blade holder. Make sure the blade is completely to the back of the blade holder and the top of the blade is touching the stop pin. Tighten the blade holder knob with your right hand. The blade should be square with the upper blade holder.



Step #8 --- Now it's time to begin re-tensioning the blade. Almost every size and/or type of blade requires an alteration in the tension put on the blade. A good rule of thumb is this: when moving to a smaller blade, lighten the tension --- when moving to a larger blade, increase the tension.



Flg. A-7

Step #9 --- Begin the tensioning process by flipping the front cam back to the tensioned position. Now begin tensioning the blade with the rear cam by slowly moving the rear cam-over handle back to the original position. Adjusting the tension is done with the rear cam. Stop tensioning when the blade makes a clear ping when plucked like a guitar string. For more information see **BLADE TENSIONING.** Follow the blade tension chart guidelines located of the left rear of your saw.

Step #10 --- You're finished changing the blade! Congratulations! You're ready to get started sawing. Each time you change the blade, it will become easier. Soon you'll be changing blades in seconds, and the more experienced you are, the longer the life of each blade that you are using.

Note: If you break a blade, simply move the front cam handle to the released position (to release the blade tension) and change the blade. Return the front cam handle to the tensioned position. The tension should be correct and should not need adjusting.

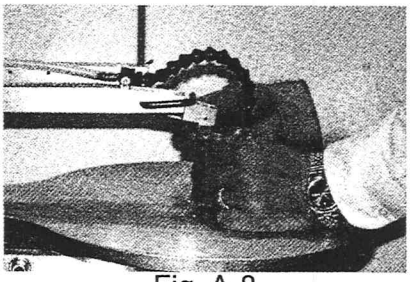
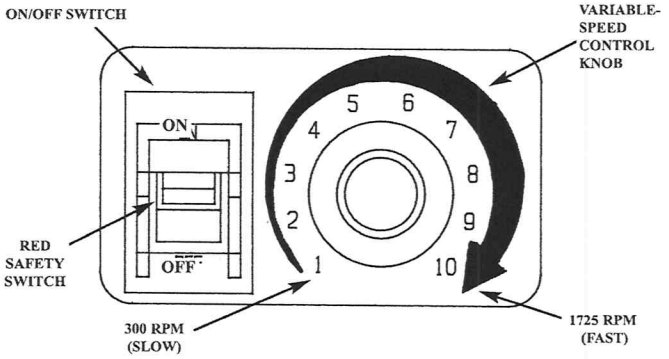


Fig. A-8

VARIABLE SPEED CONTROL

SPEED CORRELATION CHART			
NO.	SPEED	NO.	SPEED
#1	300 RPM	#6	1200 RPM
#2	500 RPM	#7	1325 RPM
#3	725 RPM	#8	1500 RPM
#4	850 RPM	#9	1650 RPM
#5	1025 RPM	#10	1725 RPM



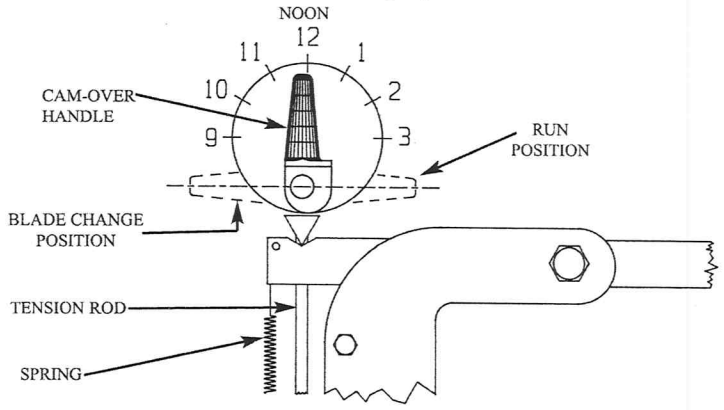
BLADE TENSIONING

To adjust the blade tension, release the cam-lock at the rear of the saw by flipping the cam handle toward the back, or away from the front of the saw. This will release blade tension.

Clock Method: If you look at the saw from the left side (rear cam-lock at your left hand) imagine the cam-over handle as the hour hand of a clock. If you look at the chart on the following page, you will see the cam-handle in the straight up or 12 o'clock position. The object here is to set the point at which tension starts as you lift the cam-handle toward the front of the saw with the suggested clock position in the chart. To change the point at which tension starts, you grasp the tension rod and either turn it clockwise or counter-clockwise. Turning it clockwise will reduce the tension (make the cam stop at a higher clock position) and turning it counter-clockwise will increase the tension (make the cam stop at a lower clock position).

Once you have tension starting at the correct clock position, pull the rear cam-over handle all the way over toward the front of the saw and the tension will be set at the correct pressure for each blade. (If you have questions, view the Hawk Scroll Saw Video for a visual demonstration). The positions in the diagram below are to be used as a reference point only. You may use a little more or a little less tension depending on your preference and cutting style.

BLADE TENSION CHART			
BLADE SIZE	CLOCK POSITION # 216	# 220	# 226
#12	11:30	11:00	10:30
#9	11:30	11:00	10:30
#7	12:00	11:30	11:00
#5	12:30	12:00	11:00
#2	1:00	12:30	12:00
#2/0	1:00	1:00	12:30



BLADE CHANGING AND TENSION ADJUSTMENT DIAGRAM

ADVANCED SCROLL SAWING

Bevel Sawing

Bevel Sawing is a fun way to add another dimension to a project. To make a bevel cut, simply tilt the table of your Hawk and begin cutting. Many crafters use the bevel sawing technique to create inlays and 3-D pictures like the one we'll make for this project.

Make a copy of the "***Desert Pattern***" from your Pattern Pak and attach it, by the method of your choice, to a piece of 1/2" wood --- just about any kind of wood will work.

Tilt the saw table approximately three degrees to the left. Beginning with the most inside line (in this case, it's the desert floor and cactus), make the first cut, following the direction of the arrows.

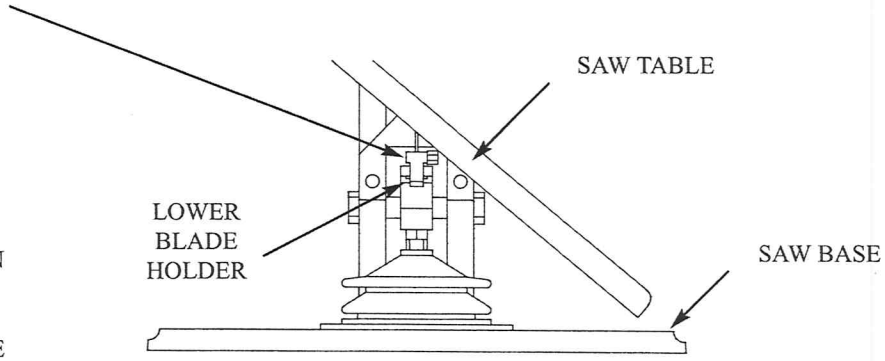
For the second cut, follow the next pattern line (the ground and mountains), again going the direction of the arrows

For the final cut, follow the last line, again, going in the direction of the arrows. Push each piece into position to make a fun 3-D project.

The bevel cutting technique may also be used for making all types of inlays. There is a detailed pattern in your RBI Pattern Pak for complete instructions on making inlays.

NOTE: If you are tilting the table more than 40 degrees to the right, the lower blade holder must be reversed so the thumb screw is on the left side of your lower arm. This will allow the thumb screw to clear the saw table.(See picture below) The blade holder and the blade itself will have to be reversed to accomplish the 40 degree plus bevel to the right.

THE T-HANDLE THUMB SCREW WILL HIT THE TABLE ON THE UPWARD STROKE WHEN THE TABLE IS TILTED MORE THAN 40 DEGREES TO THE RIGHT. TO AVOID THIS, TURN THE LOWER BLADE HOLDER AROUND IN THE SLOT. ALSO, REMEMBER TO TURN THE BLADE AROUND IN THE HOLDER. THE TEETH MUST ALWAYS FACE FORWARD AND DOWNWARD. THE T-HANDLE WILL NOW BE ON THE LEFT.



NOTE: THE TABLE TILT & BASE TILT WERE REMOVED FOR CLARITY

Stack Cutting

This is a technique most pros use when they are making several projects of the same pattern. Your Hawk has the ability to cut up to a full 2-5/8" thick material, so you can stack most projects at least 2" high. There are many ways to keep the projects from slipping while cutting. Here are a few of our favorites:

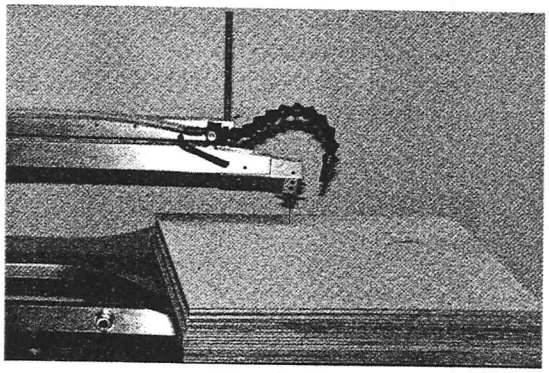


Fig. A-10

: Hot Melt Glue --- Many times when pros are cutting they use a hot glue gun to glue all the pieces together. They put the pieces together in a stack (remember, not more than 2"), and run a bead of glue in a zigzag down two sides of the project material. By making a zigzag, the material will hold together when cutting in any direction.

: Double Sided Tape --- Some Hawk owners tell us that they think the glue is messy and they prefer to use carpet layer's double stick tape. To hold your project together with tape, you just sandwich a couple of strips between each layer and you're ready to go.

: Masking Tape --- Simply wrap the corners, thereby sandwiching multiple pieces together. Remove the tape when completed and lightly sand to remove any sticky tape residue.

: Nails --- We've even talked to some real purists that prefer to stick with traditional woodworking item and just stack'em up and nail'em. If you use this method, **be sure your nails are not sticking out of the projects** or they will scratch and mar the table surface. This is the most solid way to hold your stack together. Make sure your nails are in the waste area of the project.

NOTE: USE A METHOD WHICH WORKS BEST FOR <u>YOUR</u> APPLICATION!

To practice the technique of stack cutting we will make a pair of identical shelf support brackets. For this project you will need two pieces of 1" x 8" lumber. Any kind of wood will do --- either hard or soft wood. Make sure both pieces are the same size. Stack them up and lock them together the way you like best. Now put your project to the side --- we've got another technique to learn before we can start cutting your project.

Note: Always make sure your table top is completely square before making a stack cut project or you will find that the projects will be smaller on the bottom than they are on the top. This is a perfect application for use of the RBI precision blade square. (see page 31)

Inside Cuts

Making an inside cut is simply cutting an opening in your project without making an entry cut. Making inside cuts is impossible with the band saw, but the Hawk can make them in a snap! First, begin by drilling a hole in the scrap area which is to be removed. Make sure the hole is big enough for the blade to fit through.

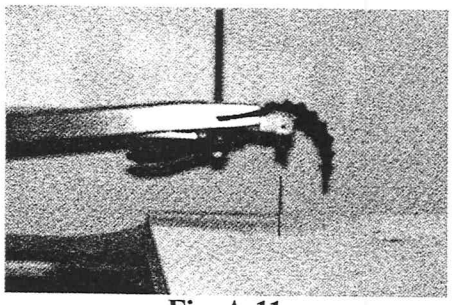


Fig. A-11

You will need to release the tension on the blade. Remember the front cam tension release lever? (It"s the little black lever on the left front side of the upper arm.) Flip the front cam lever all the way to the front. This should release the tension on the blade. Now remove the blade from the upper blade holder by unscrewing the knob on the right side of the upper blade chuck (see Fig. A-11).

Tilt the blade forward to the front of the slot in the table and thread the blade through the hole you drilled in the wood. You're now ready to replace the blade in the upper blade chuck and put your front tension cam lever back in its rear or tensioned position (see fig. A-12).

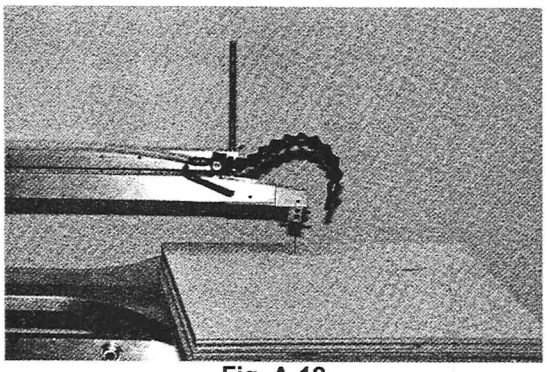


Fig. A-12

After you have made your cut, release the blade tension again, remove the top end of the blade from the top blade holder, and remove the workpiece. You did it!

Here's where your project comes in --- there's a few inside cuts. You need to drill a hole in the shaded area of the pattern and follow the instructions above for technique. Be sure to cut all shaded sections in the pattern. Now you've made the brackets into a beautiful gingerbread style shelf! These are great to use as shelf brackets, or you might even want to finish them in a window or doorway just to add a warm touch.

Compound Sawing

This is probably the toughest technique to learn for most crafters, but making a compound cut can certainly be rewarding when you finally master it. By cutting all four sides of a project you add a completely new dimension to a simple project. We've enclosed a pattern for one of our favorite Christmas tree ornaments for you to try.

To begin your compound cut project you will need a 2" x 2" x 4" piece of soft wood. Our favorite is basswood, but pine will work very similar. Begin by taking the face pattern (the one that looks like you're looking at a reindeer head on), and attach the pattern (the one that looks like the profile of a reindeer), and glue it on the adjoining side. Now using the cutting techniques you've already learned, cut out the face pattern. Be sure to keep all the pieces if they separate.

After you have made the entire face cut, carefully put all of the pieces together and tape them securely back in their original place with masking tape. Next, take the profile pattern and cut it out in the same way you did the face pattern. After you take all the pieces apart you will find a perfectly dimensioned reindeer inside. (This is a fun way to make brain teaser puzzles.) Some wood carver's tell us that they like to cut out their blanks first by compound cutting, then they finish them with wood carving tools.

TROUBLESHOOTING

If you're getting a little frustrated, here are some troubleshooting tips that might help.

: Excessive Blade Breakage

If you think you are breaking an excessive amount of blades, here are a few tips:

A. Be sure you are using the right size and type of blade for the material you are trying to cut. You can make sure by checking the blade recommendation chart on pages 10-11.

B. If the blade tends to break right above the bottom blade chuck, your blade is not installed in the lower blade chuck correctly. Helpful hint: be sure the blade is coming straight out of the blade chuck as pictured on page 12 or 13. Remember --- when tightening the blade, don't over tighten. If you tighten the chuck too tightly, you'll crimp the blade and weaken it just above the blade chuck. This will cause the blade to break.

C. If the blade is breaking just below the upper blade chuck, chances are that you are not installing it in the upper blade chuck correctly. Remember --- The blade must be all the way to the back of the slot and the top of the blade must be touching the roll pin. The blade should be square with the upper blade holder.

: Excessive Blade Breakage Continued

D. If the blade is breaking in the middle, your blade is probably installed just fine. After you've been sawing for a while, you'll find your blade life will increase. Some folks call us and say that they've cut for so many hours that they have worn the teeth right off the front of the blade. If you're like most sawyer's starting out, you should expect about 15 to 30 minutes cutting for a blade. After the first few weeks you'll find that time increasing. To get the longest possible life from the blade, here are a few tips:

1. Always remember to drive the wood, not the blade. If you have trouble getting your saw to turn and it smokes while cutting, often that signifies that you need to practice your technique. Feed straight into the front of the blade.

2. If you have poor control of your blade and it seems to wander and respond very slowly, you might not have quite enough tension on the blade.

Here's a test: Install a #5 blade in your saw.. Take a 1" piece of lumber and slide it across the table of your saw. When the blade touches the wood, draw a line across the saw table 1" on both sides of the blade. Now applying about 15 lbs. of pressure, push evenly into the blade with the wood. Draw another line parallel with the first one. There should be 3/16" between the two parallel lines. If there is more ar less than that distance, adjust the tension with the rear cam by releasing it and turning it like a knob.

: Blade is Burning the Wood

1. Make sure you're using the right size and type of blade for the project. (See blade selection chart on pages 10-11.)

2. It may take a little practice, but you're leaning on the blade side to side when cutting. Remember that it's the project that moves --- not the blade. Your cutting surface is on the front side of the blade only.

3. Some woods just seem to be more prone to burning than others. Of course, hardwood like oak and walnut will burn if cut at too high of a RPM speed. Take advantage of your variable speed saw and slow it down. Slower speeds are recommended for metals, glass, plastics, some harder woods, and thin metals. Cherry and mahogany are difficult woods to cut without burning because of their resin content.

: Blade Keeps Bending and Twisting

1. If your blade is bending backwards farther than you feel it should, check your tensioning by doing the test listed under **Excessive Blade Breakage.**

2. You might be using the wrong size blade for the project. If your blade seems to be twisting when making sharp turns, go to the next smaller size blade.

: Blade is Cutting Too Large of a Radius

When most crafters get started, they have a little difficulty making sharp turns. Here are a few pointers you'll want to keep in mind:

A. Feed your project right to the point where you want to make the turning point and stop feeding. Now without feeding the wood into the blade, spin the project around in the sawblade radius or kerf.

B. If your blade tends to "swing" out when attempting a sharp point, you may have to increase the tension to the blade.

: Wood is Jumping on Table

1. Constant down pressure must always be applied while cutting. In most cases the weight of your hand is more than enough to keep the project on the table, but you must maintain the pressure during the entire cutting process.

2. If you prefer, every Hawk comes complete with a hold down foot that surrounds the blade and keeps the project securely on the table. (Be sure you have lowered the hold down foot to lightly touch the top of the wood surface.)

3. You may find that you are using a blade that is too large for the type of cutting you are doing. If the blade is too coarse, the project will lift from the worktable when making turns. In addition, when using a reverse tooth blade, the reverse teeth will give added lift to your project on the upward stroke. Additional downward pressure or use of the hold-down foot may be needed.

: Saw Does Not Start Immediately When Switch Is Turned On

Your new Hawk is equiped with a "soft start" motor/controller assembly. This short time delay after the switch has been turned on, allows for the electrical system to become fully charged before coming up to full power or speed, thereby reducing motor burnout. It is also a safety factor in that it allows the operator time to return both of his hands to the project before full speed is achieved. Soft start is the preferred operating procedure on better quality machinery.

ORDERING REPLACEMENT PARTS AND ACCESSORIES

To speed delivery and reduce errors when ordering parts always give the name, model number, and a serial number of your machine. Use the part number and description as shown in the parts list. Do not use the key numbers (the numbers in the circles on the parts breakdown drawing), always use the seven digit part number and the description given in the parts list.

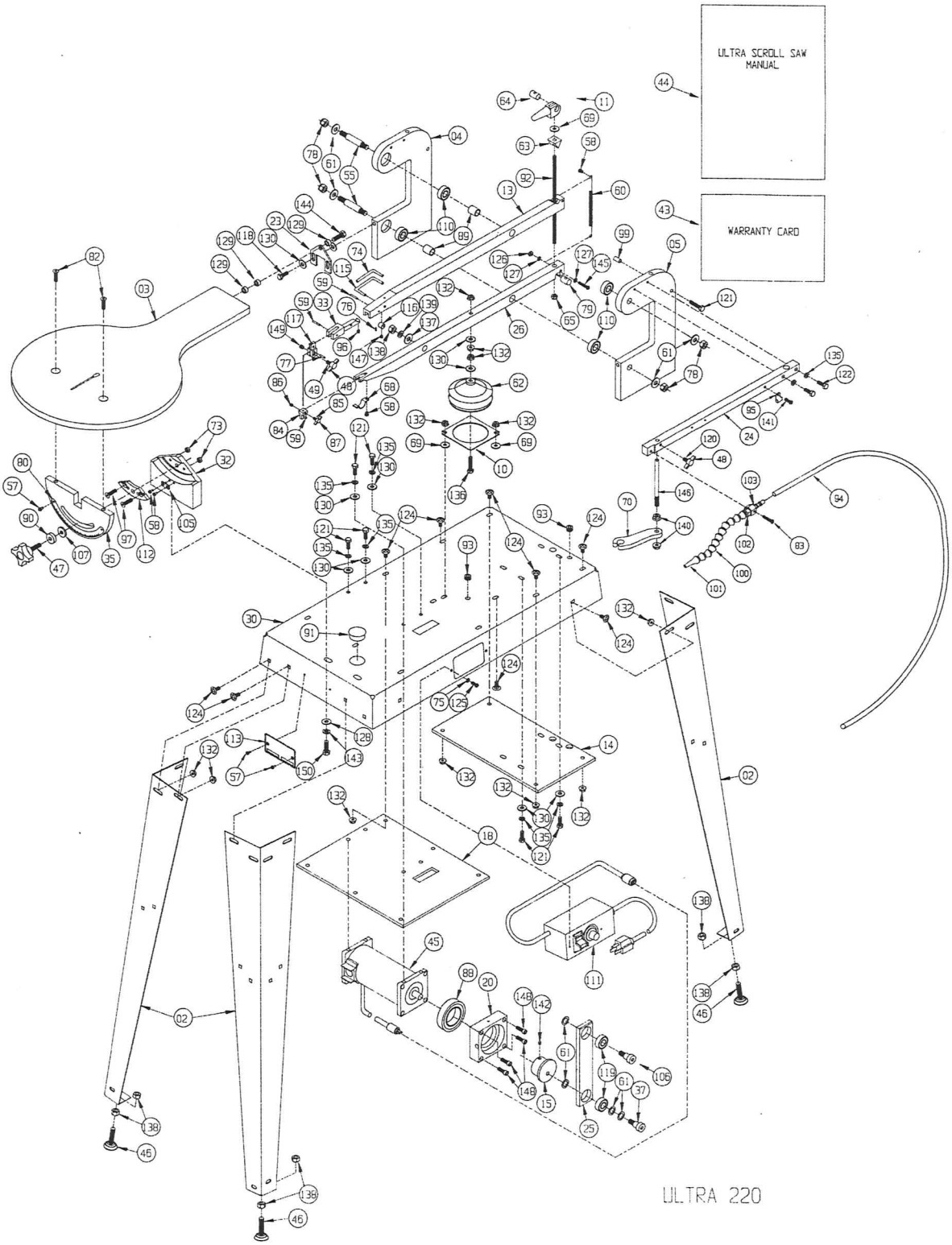
1. Give Complete Machine Identification:
   A. Machine Name_____
   B. Model Number_____
   C. Serial Number_____

2. Seven Digit Part Number and Name:
   A. 7-Digit Part Number_____
   B. Part Name_____

3. State Your Return Address:
   Your Name_____
   Company_____
   Street Address_____
   P.O. Box:_____ _____
   City_____State_____Zip_____
   Telephone (_____)_____-_____

4. Send The Order ' Bushton Manufacturing

PARTS BREAKDOWN
220 ULTRA HAWK

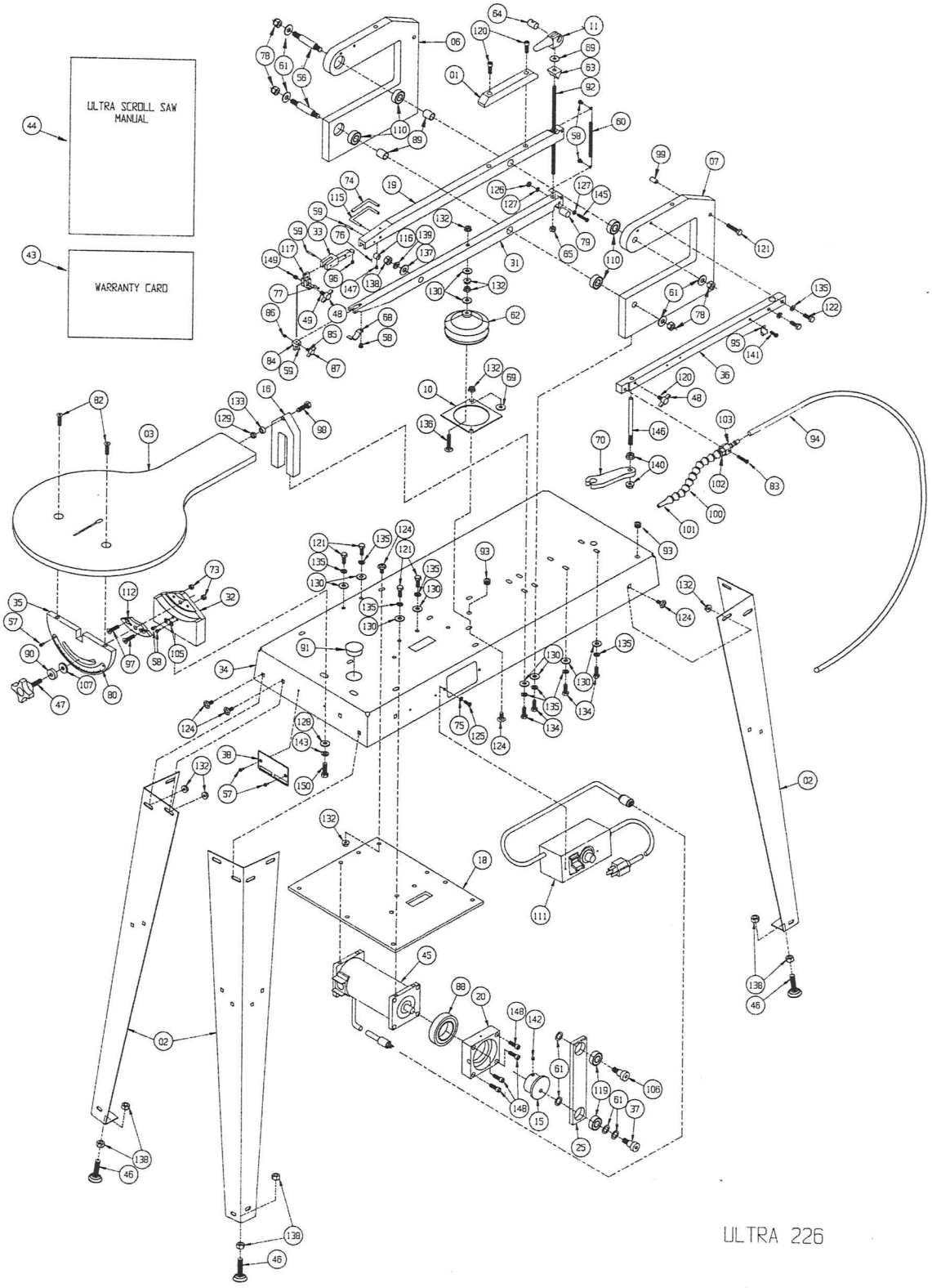


PARTS LIST MODEL 220 ULTRA HAWK

To speed up delivery an reduce errors when ordering parts always give the name, model number, and serial number of your machine. Use the part number and description as shown in the parts list. Do not use the key number (the numbers in the circles on the parts breakdown drawing). Always use the part number and description given in the parts list.

Key #	Part #	Description	Qty.
002	600-2007	ULTRA SCROLL SAW LEG	4
003	605-5005	LARGE SAW TABLE, ULTRA 220/226	1
004	609-0013	ARM SUPPORT, ULTRA 220, LEFT	1
005	609-0014	ARM SUPPORT, ULTRA 220, RIGHT	1
010	615-1025	BLOWER BELLOWS BRACKET	1
011	615-1074	REAR CAM-OVER HANDLE, ULTRA SAWS	1
013	615-1212	TOP ARM, ULTRA 220	1
014	615-1260	ARM SUPPORT BRACE, ULTRA 220	1
015	615-1263	COUNTERWEIGHT, ULTRA SAWS	1
018	615-2222	MOTOR BRACE, ULTRA SAWS	1
020	615-2261	CARRIER BEARING CRADLE, ULTRA SAWS	1
023	615-4211	REAR TABLE SUPPORT BRACKET ULTRA 220	1
024	615-3215	HOLD-DOWN ARM, ULTRA 220	1
025	615-4193	PITMAN ARM, ULTRA 220/226	1
026	615-4213	BOTTOM ARM, ULTRA 220	1
030	615-5217	SAW BASE, ULTRA 220	1
032	615-6027	TALL BASE TILT, ULTRA 220/226	1
033	615-6153	TOP BLADE HOLDER BRACKET, ULTRA 220/226	1
035	615-7020	TABLE TTLT, SOLID, ULTRA SAWS	1
037	625-0033	1/2 X 1/2 SOCKET HEAD SHOULDER BOLT	1
039	702-0002	DECAL, RBI MADE IN USA (ROUND)	1
040	702-0011	DECAL, KEEP FINGERS FROM UNDER ARM	1
041	702-0025	DECAL, PATENT #4,848,761	1
042	702-0034	DECAL, RBI BLADE TENSION CHART	1
043	703-0700	WARRANTY CARD, GENERAL	1
044	703-5729	MANUAL, ULTRA SAWS 216-220-226	1
045	704-1013	MOTOR, 1/5 HP, 90 VDC, 60 HZ	1
046	705-0057	GLIDE	4
047	705-1042	5/16-18 X 1-1/4 SQUARE KNOB	1
048	707-6030	1/4 TEE KNOB	2
049	707-6286	1/4-20 X 1/2 SOCKET HEAD CAP SCREW	1
050	709-0096	DECAL, CONSULT TECHNICAL MANUAL	1
051	709-0097	DECAL, CAUTION, CUTTING OF FINGERS	1
052	709-0098	DECAL, WEAR EYE PROTECTION	1
053	709-0099	DECAL, LIGHTENING BOLT/SHOCK	1
055	709-0123	BOLT, SAW ARM PIVOT, ULTRA 216/220	2
057	710-0012	#7 X 5/16 ROUND HEAD DRIVE SCREW	4
058	710-0035	10-32 X 1/4 ROUND HEAD MACHINE SCREW	4
059	710-0042	1/8 X 3/4 ROLL/TENSION PIN	3
060	710-2036	SAW ARM SAFETY SPRING	1
061	715-0014	1/2" ID X 3/4" OD X 18 GUAGE WASHER	8
062	715-0024	RUBBER BLOWER BELLOWS	1
063	715-0075	ALUMINUM WEDGE PIVOT	1
064	715-0077	ROUND PIVOT, REAR CAM-OVER HANDLE	1
065	715-0078	1/4-20 NYLON INSERT LOCK HEX NUT	1
066	715-0091	DECAL, SCROLLER"S HOTLINE	1
067	715-0092	DECAL, RBI HAWK	1
068	715-0099	BLADE HOLDER C-CLIP, ULTRA SAWS	1
069	715-0103	1/4" ID X 3/4" OD X 1/16" NYLON SPACER	3
070	715-0104	HOLD-DOWN FOOT, ULTRA SCROLL SAWS	1
071	715-0107	WIRE TIE, 6-3/4" TO 7-3/4" LONG	1
073	715-0163	10-32 ACORN CAP NUT	2
074	715-0164	CAP, BLACK RUBBER, 3" LONG	1
075	715-0191	3/16 INTERNAL LOCK WASHER	2
076	715-0201	5/64 X 3/8 ROLL/TENSION PIN (220/226)	1
077	715-0205	3/16 X 1/2 ROLL/TENSION PIN	1
078	715-0210	1/2-13 NYLON INSERTED LOCKNUT	4
079	715-0216	ROUND PIVOT, BOTTOM ARM(REAR)	1
080	715-0236	TABLE TILT SCALE, ALUMINUM	1
082	715-0244	1/4-20 X 3/4 FLAT HEAD SOCKET CAP SCREW	2
083	715-0247	8-32 X 1 ROUND HEAD MACHINE SCREW	1
084	715-0252	ULTRA LOWER BLADE HOLDER (ALUMINUM)	1
085	715-0255	10-32 X 1/2 SOCKET HEAD CAP SCREW	1
086	715-0256	10-32 X 3/16 SOCKET SET SCREW, FLAT POINT	1
087	715-0257	PLASTIC T-HANDLE (#10)	1
088	715-0262	CARRIER BEARING, ULTRA SAWS	1
089	715-0264	POWDERED METAL BRG: 1/2" ID X 5/8" OD X .073"	2
090	715-0268	KNOB SPACER (TABLE TILT-ULTRA SAWS)	1
091	715-0271	DUST PORT PLUG, ULTRA 220/226	1
092	715-0272	TENSION ROD, 9-3/8" LONG	1
093	715-0273	RUBBER GROMMET, 3/8" ID	2
094	715-0274	POLYETHYLENE TUBIBG, 3/8" OD	45
095	715-0275	NYLON CABLE CLAMP, ULTRA SAWS	1
096	715-0287	10-32 X 1/4 SKT. ST. SCR., BRASS W / NYL. INSERT	1
097	715-0292	10-32 X 3/4 FLAT HEAD SOCKET CAP SCREW	2
099	715-0295	RUBBER CAP, .207" X 1/2"	1
100	715-0298	LOC-LINE 1/4" SEGMENT (BLACK)	1
101	715-0299	LOC-LINE 1/8" ROUND NOZZLE (BLACK)	1
102	715-0307	LOC-LINE 1/4" NPT CONNECTOR (BLACK)	1
103	715-0308	FEMALE PIPE THREAD / HOSE BARB (BLACK)	1
104	715-0310	DECAL, WARNING: DO NOT EXPOSE TO.	1
105	715-1101	SCROLL SAW POINTER	1
106	715-1109	1/2 X 1 ROUND HEAD SOCKET SHOULDER BOLT	1
107	715-1120	5/16" ID X 7/8" OD X 1/8" NYLON SPACER	1
110	715-1208	THRUST BEARING, SHIELDED	4
111	715-1259	VARIABLE SPEED CONTROLLER, 90 VDC, 60 HZ	1
112	715-1288	BASE/TABLE TILT SLIDE (DELRIN)	1
113	715-2070	SERIAL TAG, ULTRA 220 SCROLL SAW	1
115	715-2168	ULTRA FRONT CAM HANDLE (220/226)	1
116	715-3154	ROUND FRONT CAM (220/226)	1
117	715-5181	ULTRA ALUMINUM UPPER BLADE HOLDER	1
118	725-0043	1/4-20 X 1/2 HEX HEAD BOLT	2
119	735-0007	1/2" ID BALL BEARING	2
120	735-0017	1/4-20 X 3/4 SOCKET HEAD CAP SCREW	1
121	735-0052	1/4-20 X 1 HEX HEAD BOLT	9
122	735-0080	1/4-20 X 1-1/4 HEX HEAD BOLT	2
124	745-0099	1/4-20 X 5/8 CARRIAGE BOLT	24
125	745-0106	10-32 X 1/2 ROUND HEAD MACHINE SCREW	2
126	745-0107	10-32 HEX NUT	1
127	745-0112	3/16" ID X 1/2" OD RIVET BURR	2
128	745-0150	5/16 FLAT WASHER	2
129	745-0158	5/16" ID X 1/2" OD X 3/16" NYLON SPACER	3
130	745-0177	1/4 FLAT WASHER	14
131	745-0205	DECAL, MADE IN USA (OCTAGON)	1
132	745-0223	1/4-20 FLANGED LOCK / WHIZ NUT	27
135	750-0207	1/4 SPLIT LOCKWASHER	10
136	750-0213	1/4-20 X 2 CARRIAGE BOLT	1
137	770-0050	3/8 FLAT WASHER	1
138	770-0058	3/8-16 HEX NUT	9
139	770-0071	3/8 SPLIT LOCKWASHER	1
140	770-0080	5/16-18 FLANGED LOCK / WHIZ NUT	2
141	770-0088	8-32 X 1/2 ROUND HEAD MACHINE SCREW	1
142	770-0095	1/4-20 X 1/4 SKT. SET SCREW, KNURLED CUP PT.	1
143	770-0178	5/16 SPLIT LOCKWASHER	2
144	770-0181	5/16-18 X 1 HEX HEAD BOLT	1
145	780-0019	10-32 X 1 ROUND HEAD MACHINE SCREW	1
146	785-2012	HOLD-DOWN FOOT ROD, 6 INCH	1
147	790-0031	10-32 X 3/16 SKT. SET SCREW, KNURLED CUP PT.	1
148	790-0059	1/4-20 X 1-1/4 SOCKET HEAD CAP SCREW	4
149	791-0053	1/4-20 X 1/4 SOCKET SET SCREW, FLAT POINT	1
150	795-0063	5/16-18 X 3/4 HEX HEAD BOLT	2
	965-2900	SAW LEG ASSEMBLY	1
	615-1182	ULTRA UPPER BLADE HOLDER ASSEMBLY	1
	615-1231	ULTRA LOWER BLADE HOLDER ASSEMBLY	1
	615-1251	BOLT BAG ASSEMBLY FOR ULTRA SAWS	1

PARTS BREAKDOWN
226 ULTRA HAWK



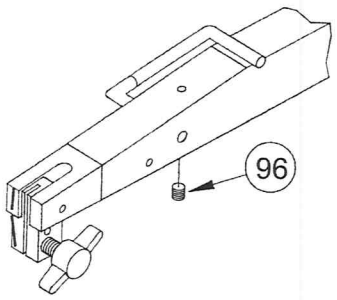
PARTS LIST MODEL 226 ULTRA HAWK

To speed up delivery an reduce errors when ordering parts always give the name, model number, and serial number of your machine. Use the part number and description as shown in the parts list. Do not use the key number (the numbers in the circles on the parts breakdown drawing). Always use the part number and description given in the parts list.

Key #	Part #	Description	Qty.
001	600-0037	TOP ARM REINFORCEMENT, ULTRA 226	1
002	600-2007	ULTRA SCROLL SAW LEG	4
003	605-5005	LARGE SAW TABLE, ULTRA 220/226	1
006	609-0015	ARM SUPPORT, ULTRA 226, LEFT	1
007	609-0016	ARM SUPPORT, ULTRA 226, RIGHT	1
010	615-1025	BLOWER BELLOWS BRACKET	1
011	615-1074	REAR CAM-OVER HANDLE, ALUMINUM	1
015	615-1263	COUNTERWEIGHT, ULTRA SAWS	1
016	615-1270	REAR TABLE SUPPORT, ULTRA 226	1
018	615-2222	MOTOR BRACE, ULTRA SAWS	1
019	615-2237	TOP ARM (LONG), ULTRA 226	1
020	615-2261	CARRIER BEARING CRADLE, ULTRA SAWS	1
025	615-4193	PITMAN ARM, ULTRA 220/226	1
031	615-5238	BOTTOM ARM (LONG), ULTRA 226	1
032	615-6027	TALL BASE TILT, ULTRA 220/226	1
033	615-6153	TOP BLADE HOLDER BRACKET, ULTRA 220/226	1
034	615-6225	SAW BASE, ULTRA 226	1
035	615-7020	TABLE TILT, SOLID, ULTRA SAWS	1
036	615-7066	HOLD-DOWN ARM, ULTRA 226	1
037	625-0033	1/2 X 1/2 SOCKET HEAD SHOULDER BOLT	1
038	700-1034	SERIAL TAG, ULTRA 226	1
039	702-0002	DECAL, RBI MADE IN USA (ROUND)	1
040	702-0011	DECAL, KEEP FINGERS FROM UNDER ARM	1
041	702-0025	DECAL, PATENT #4,848,761	1
042	702-0034	DECAL, RBI BLADE TENSION CHART	1
043	703-0700	WARRANTY CARD, GENERAL	1
044	703-5729	MANUAL, ULTRA 216-220-226	1
045	704-1013	MOTOR, 1/5 HP, 90 VDC, 60 HZ	1
046	705-0057	GLIDE	4
047	705-1042	5/16-18 X 1-1/4 SQUARE KNOB	1
048	707-6030	1/4 TEE KNOB	2
049	707-6286	1/4-20 X 1/2 SOCKET HEAD CAP SCREW	1
050	709-0096	DECAL, CONSULT TECHNICAL MANUAL	1
051	709-0097	DECAL, CAUTION, CUTTING OF FINGERS	1
052	709-0098	DECAL, WEAR EYE PROTECTION	1
053	709-0099	DECAL, LIGHTENING BOLT / SHOCK	1
056	709-0124	BOLT, SAW ARM PIVOT, ULTRA 226	2
057	710-0012	#7 X 5/16 ROUND HEAD DRIVE SCREW	4
058	710-0035	10-32 X 1/4 ROUND HEAD MACHINE SCREW	5
059	710-0042	1/8 X 3/4 ROLL/TENSION PIN	3
060	710-2036	SAW ARM SAFETY SPRING	1
061	715-0014	1/2" ID X 3/4" OD X 18 GUAGE WASHER	8
062	715-0024	RUBBER BLOWER BELLOWS	1
063	715-0075	ALUMINUM WEDGE PIVOT	1
064	715-0077	ROUND PIVOT, REAR CAM-OVER HANDLE	1
065	715-0078	1/4-20 NYLON INSERT LOCK HEX NUT	1
066	715-0091	DECAL, SCROLLER'S HOTLINE	1
067	715-0092	DECAL, RBI HAWK	1
068	715-0099	BLADE HOLDER C-CLIP, ULTRA SAWS	1
069	715-0103	1/4" ID X 3/4" OD X 1/16" NYLON SPACER	3
070	715-0104	HOLD-DOWN FOOT, ULTRA SCROLL SAWS	1
071	715-0107	WIRE TIE, 6-3/4" TO 7-3/4" LONG	1
073	715-0163	10-32 ACORN NUT	2
074	715-0164	CAP, BLACK RUBBER, 3" LONG	1
075	715-0191	3/16 INTERNAL LOCK WASHER	2
076	715-0201	5/64 X 3/8 ROLL/TENSION PIN (220/226)	1
077	715-0205	3/16 X 1/2 ROLL/TENSION PIN	1
078	715-0210	1/2-13 NYLON INSERTED LOCK NUT	4
079	715-0216	ROUND PIVOT, BOTTOM ARM(REAR)	1
080	715-0236	TABLE TILT SCALE, ALUMINUM	1
082	715-0244	1/4-20 X 3/4 FLAT HEAD SOCKET CAP SCREW	2
083	715-0247	8-32 X 1 ROUND HEAD MACHINE SCREW	1
084	715-0252	ULTRA LOWER BLADE HOLDER, (ALUMINUM)	1
085	715-0255	10-32 X 1/2 SOCKET HEAD CAP SCREW	1
086	715-0256	10-32 X 3/16 SOCKET SET SCREW, FLAT POINT	1
087	715-0257	PLASTIC T-HANDLE (#10)	1
088	715-0262	CARRIER BEARING, ULTRA SAWS	1
089	715-0264	POWDERED METAL BRG: 1/2"ID X 5/8"OD X .730"	2
090	715-0268	KNOB SPACER, TABLE TILT, ULTRA SAWS	1
091	715-0271	DUST PORT PLUG, ULTRA SAWS	1
092	715-0272	TENSION ROD, 9-3/8" LONG	1
093	715-0273	RUBBER GROMMET, 3/8" ID	2
094	715-0274	POLYETHYLENE TUBING, 3/8" OD	55
095	715-0275	NYLON CABLE CLAMP, ULTRA SAWS	1
096	715-0287	10-32 X 1/4 SKT. ST. SCR., BRASS W / NYL. INSERT	1
097	715-0292	10-32 X 3/4 FLAT HEAD SOCKET CAP SCREW	2
098	715-0293	5/16-18 X 1-1/2 HEX HEAD BOLT	1
099	715-0295	RUBBER CAP, .207" X 1/2"	1
100	715-0298	LOC-LINE 1/4" SEGMENT (BLACK)	1
101	715-0299	LOC-LINE 1/8" ROUND NOZZLE (BLACK)	1
102	715-0307	LOC-LINE 1/4" NPT CONNECTOR (BLACK)	1
103	715-0308	FEMALE PIPE THREAD / HOSE BARB (BLACK)	1
104	715-0310	DECAL, WARNING: DO NOT EXPOSE TO	1
105	715-1101	SCROLL SAW POINTER	1
106	715-1109	1/2 X 1 ROUND HEAD SOCKET SHOULDER BOLT	1
107	715-1120	5/16" ID X 7/8" OD X 1/8" NYLON SPACER	1
110	715-1208	THRUST BEARINGS, SHIELDED	4
111	715-1259	VARIABLE SPEED CONTROLLER, 90 VDC, 60 HZ	1
112	715-1288	BASE/TABLE TILT SLIDE (DELRIN)	1
115	715-2168	ULTRA FRONT CAM HANDLE (220/226)	1
116	715-3154	ROUND FRONT CAM (220/226)	1
117	715-5181	ULTRA ALUMINUM UPPER BLADE HOLDER	1
119	735-0007	1/2" ID BALL BEARING	2
120	735-0017	1/4-20 X 3/4 SOCKET HEAD CAP SCREW	3
121	735-0052	1/4-20 X 1 HEX HEAD BOLT	5
122	735-0080	1/4-20 X 1-1/4 HEX HEAD BOLT	2
124	745-0099	1/4-20 X 5/8 CARRIAGE BOLT	20
125	745-0106	10-32 X 1/2 ROUND HEAD MACHINE SCREW	2
126	745-0107	10-32 HEX NUT	1
127	745-0112	3/16" ID X 1/2" OD RIVET BURR	2
128	745-0150	5/16 FLAT WASHER	2
129	745-0158	5/16" ID X 1/2" OD X 3/16" NYLON SPACER	1
130	745-0177	1/4 FLAT WASHER	14
131	745-0205	DECAL, MADE IN USA (OCTAGON)	1
132	745-0223	1/4-20 FLANGED LOCK / WHIZ NUT	23
133	745-0517	5/16" ID X 1/2" OD X 1/4" NYLON SPACER	1
134	750-0206	1/4-20 X 3/4 HEX HEAD BOLT	8
135	750-0207	1/4 SPLIT LOCK WASHER	14
136	750-0213	1/4-20 X 2 CARRIAGE BOLT	1
137	770-0050	3/8 FLAT WASHER	1
138	770-0058	3/8-16 HEX NUT	9
139	770-0071	3/8 SPLIT LOCK WASHER	1
140	770-0080	5/16-18 FLANGED LOCK / WHIZ NUT	2
141	770-0088	8-32 X 1/2 ROUND HEAD MACHINE SCREW	1
142	770-0095	1/4-20 X 1/4 SKT. SET SCREW, KNURLED CUP PT.	1
143	770-0178	5/16 SPLIT LOCK WASHER	2
145	780-0019	10-32 X 1 ROUND HEAD MACHINE SCREW	1
146	785-2012	HOLD-DOWN FOOT ROD, 6 INCH	1
147	790-0031	10-32 X 3/16 SKT. SET SCREW, KNURLED CUP PT.	1
148	790-0059	1/4-20 X 1-1/4 SOCKET HEAD CAP SCREW	4
149	791-0053	1/4-20 X 1/4 SOCKET SET SCREW, FLAT POINT	1
150	795-0063	5/16-18 X 3/4 HEX HEAD BOLT	2
	965-2900	SAW LEG ASSEMBLY, ULTRA SAWS	1
	615-1231	ULTRA LOWER BLADE HOLDER ASSEMBLY	1
	615-1182	ULTRA UPPER BLADE HOLDER ASSEMBLY	1
	615-1251	BOLT BAG FOR ULTRA SAWS	1

Front Cam-Over Handle And Its Blade Holder Bracket *Set Screw* Adjustment

HAWK has manufactured and installed, in the Hawk Ultra 220 & 226 saws, a set screw adjustment mechanism which allows the saw operator the abliity to readjust the front cam-over tension handle. Item #96 (see diagram at right) is a 10-32 x 1/4 Brass set screw with a 3/32 hex wrench opening. Over the course of the lifetime of the saw, one could experience a lifting of the front cam handle, ie: the front-cam handle will not hold in the locked down position. If the cam is wearing the set screw, the handle will try to move into the forward, or released position, by itself.



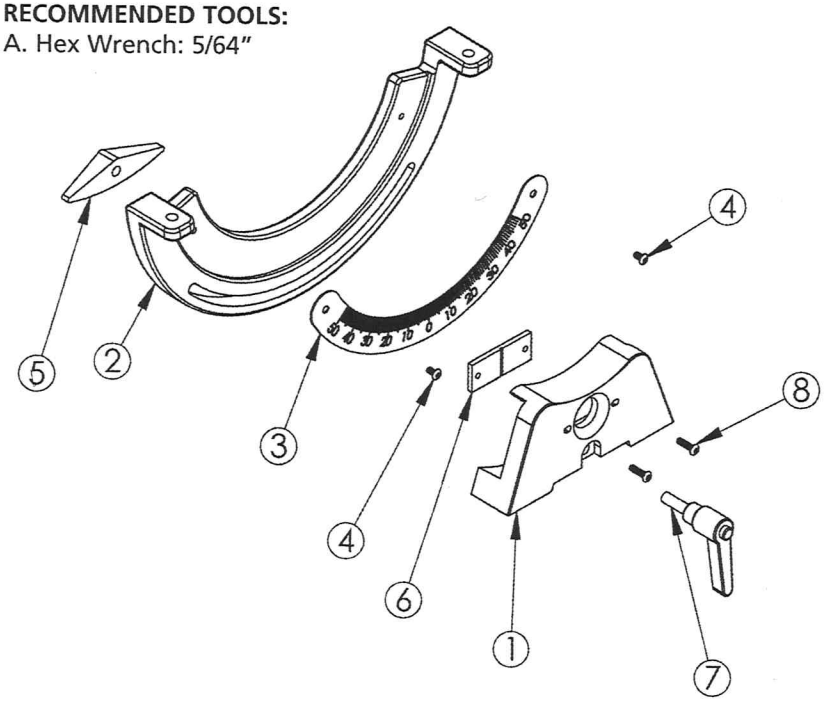
The remedy is to use a 3/32 hex wrench and turn the brass set screw 1/4 to 1/2 turn in a clockwise or tightening direction. By doing this, it applies pressure on the cam thereby holding it in the locked position. Be careful to not exceed these recommendations, as putting excessive tension on the cam will make cam release a problem and premature wear on the cam and blade holder bracket will occur.

This set screw has nothing to do with tension it is just to keep the cam over handle locked into the back or tensioned position. When set correctly, the cam over handle will require you to apply pressure on the last of the stock to latch it into place when there is no blade present. The purpose of this set screw is only to keep it latched when you are sawing.

HAWK Tilt Table Assembly and Parts List

The diagram below shows the parts of the Tilt Table Assembly for the late model ULTRA scroll saws. This Tilt Table Assemble is for use with table part number 705-0006 where the blade holder is in front of the tilt table miter gauge.

RECOMMENDED TOOLS:
A. Hex Wrench: 5/64"



ITEM NO.	PART NO.	QTY.	DESCRIPTION
1	715-0002	1	TABLE TILT, BASE MOUNT
2	705-0004	1	TABLE TILT, TABLE MOUNT
3	702-0060	1	TABLE TILT, GAUGE
4	705-0102	1	#6-32 X 1/4" LG., BUTTON HD., STNLS STL.
5	705-0025	1	TABLE TILT, CLAMP
6	715-0003	1	TABLE TILT, POINTER
7	705-0026	1	KNOB, ADJ. LEVER, 1/4-20 X 1-1/2" LG.
8	705-0016	2	#6-32 X 1/2" LG., BUTTON HD., STNLS STL.

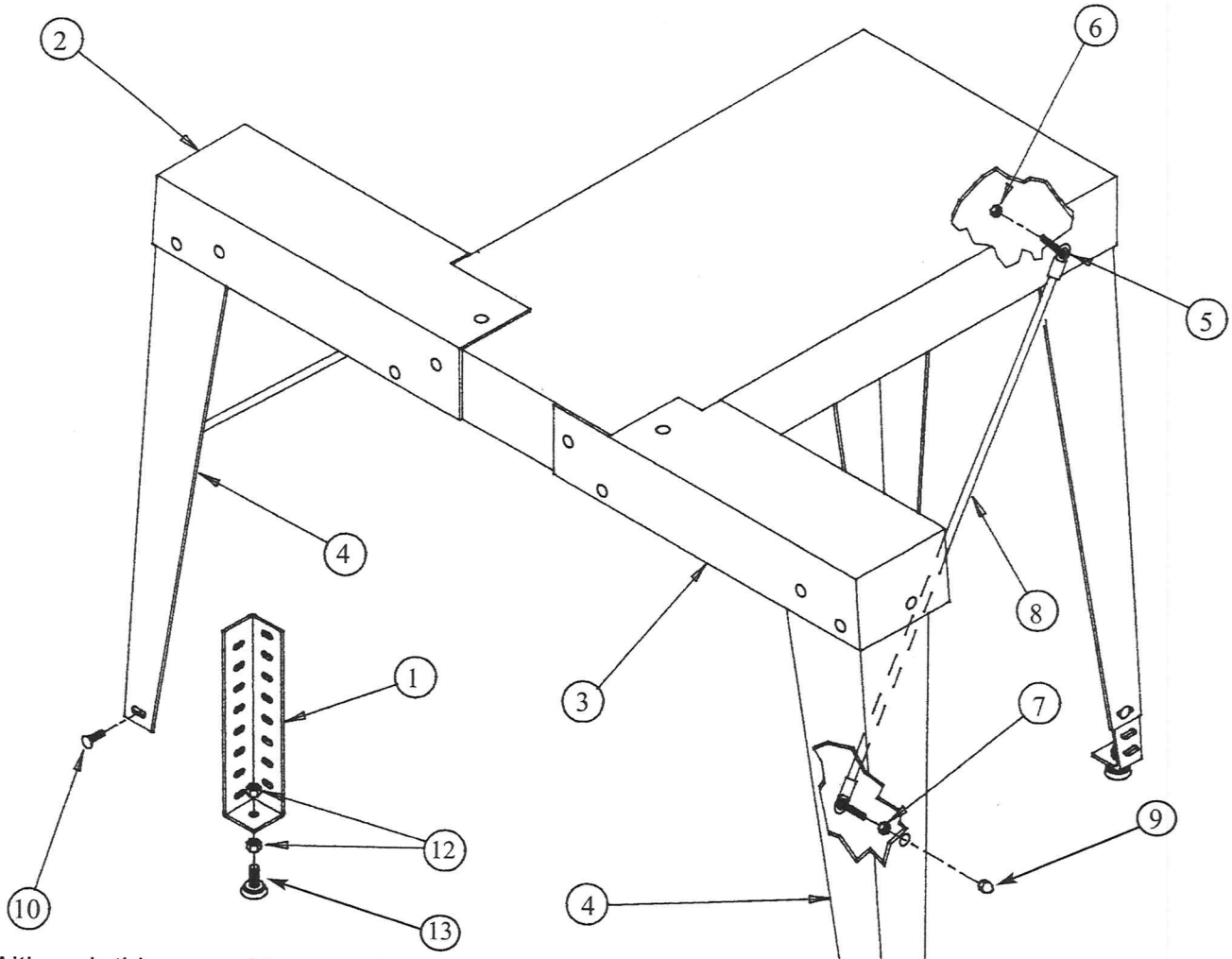
HAWK MOTOR ASSEMBLY FOR ULTRA AND G4

The parts and assembly of the motor for the ULTRA and G4 scroll saws are replaced by part number 704-4013.

PARTS LIST FOR WHEEL CHAIR ACCESSIBLE PACKAGE

Key #	Part #	Description	Qty.
01	600-1027	MULTI-POSITION 10 GA. LEG EXT.	4
02	615-0277	SAW BASE / LEG EXTENSION - LEFT	1
03	615-0278	SAW BASE / LEG EXTENSION - RIGHT	1
04	633-2011	MULTI-POSITION SHORT SAW LEGS	4
05	715-0281	SPHERICAL ROD ENDS	4
06	715-0282	1/4-28 HEX NUTS	2
07	715-0283	1/4-28 JAM NUT	2
08	715-0284	W/C STABILIZER ROD, ULTRA 220	2
	715-0285	W/C STABILIZER ROD, ULTRA 226	2

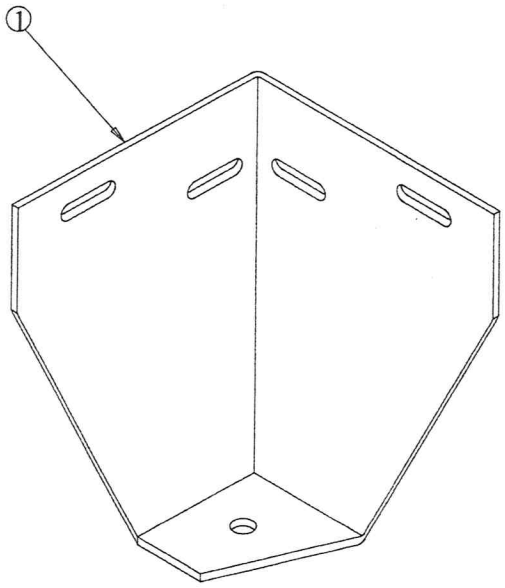
Key #	Part #	Description	Qty.
09	715-0286	1/4-28 ACORN NUT	2
10	745-0099	1/4-20 X 5/8 CARRIAGE BOLT	26
11	745-0223	1/4-20 FLANGED LOCK / WHIZ NUT	26
12	770-0058	3/8-16 HEX NUT	8
13	705-0057	GLIDE, BLACK RUBBER	4



Although this assembly was originally designed for the physically challenged scroller, we are finding it also works well for the person who prefers to sit in a backed chair to scroll saw. It comes with four adjustable leg extensions which allow the user the ability to tilt the entire saw slightly from back to front, which allows the user to maintain better posture and thereby causes less tension to the back, neck, and wrists. Legs in this assembly package are 32 inches tall. Note: available for Hawk 220 & 226 only!

PARTS LIST FOR BENCHMOUNT LEG ASSEMBLY

Key #	Part #	Description	Qty.
01	615-1139	BENCHMOUNT SAW LEG (10 GA.)	4
	615-1251	BOLT BAG, ULTRA SERIES	1



Made for the scroller who has limited floor space but who already has an abundance of either bench or table space. This assembly comes complete with rubber feet and mounting hardware.
Legs are six inches tall. (Four legs per assembly)

PARTS LIST FOR LEG EXTENSION KIT

Key #	Part #	Description	Qty.
01	600-1027	MULTI POSITION 10 GA. LEG EXT.	2
02	745-0099	1/4-20 X 5/8" CARRIAGE BOLT	4
03	745-0223	1/4-20 FLANGED LOCK/WHIZ NUT	4

The leg extensions can be added to the rear legs of the saw to give a slight tilt to the entire saw so that while one is sitting on a stool, sawing presents less strain to the neck, back, and wrists. In addition, the extensions can be added to all four legs to give the entire saw a lift. This position can be a definite plus for a taller person or a person who prefers to stand while sawing.

Leg extensions are six inches tall with variable adjustment settings.

(Two extensions and hardware per assembly)

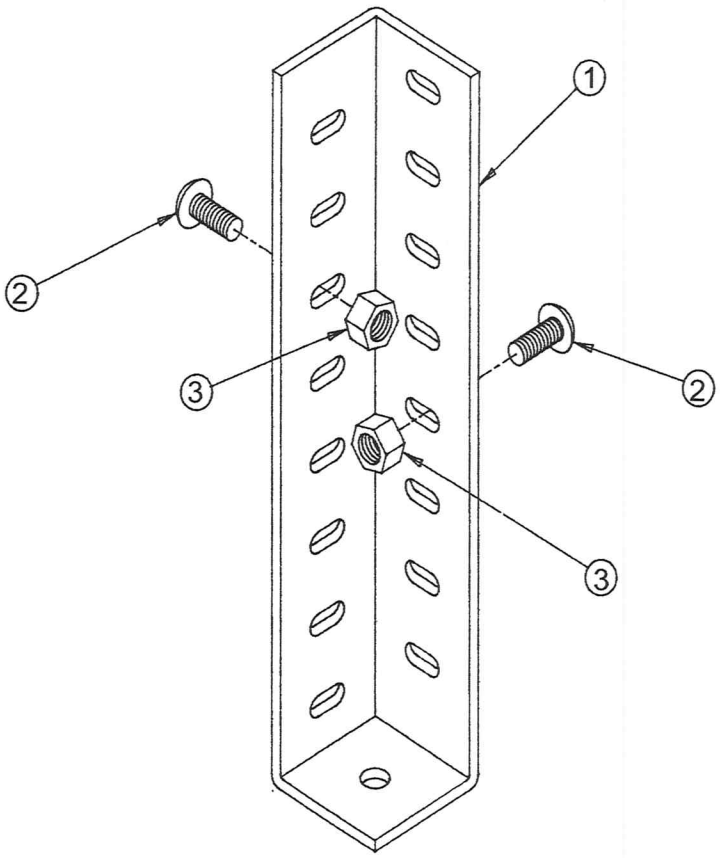
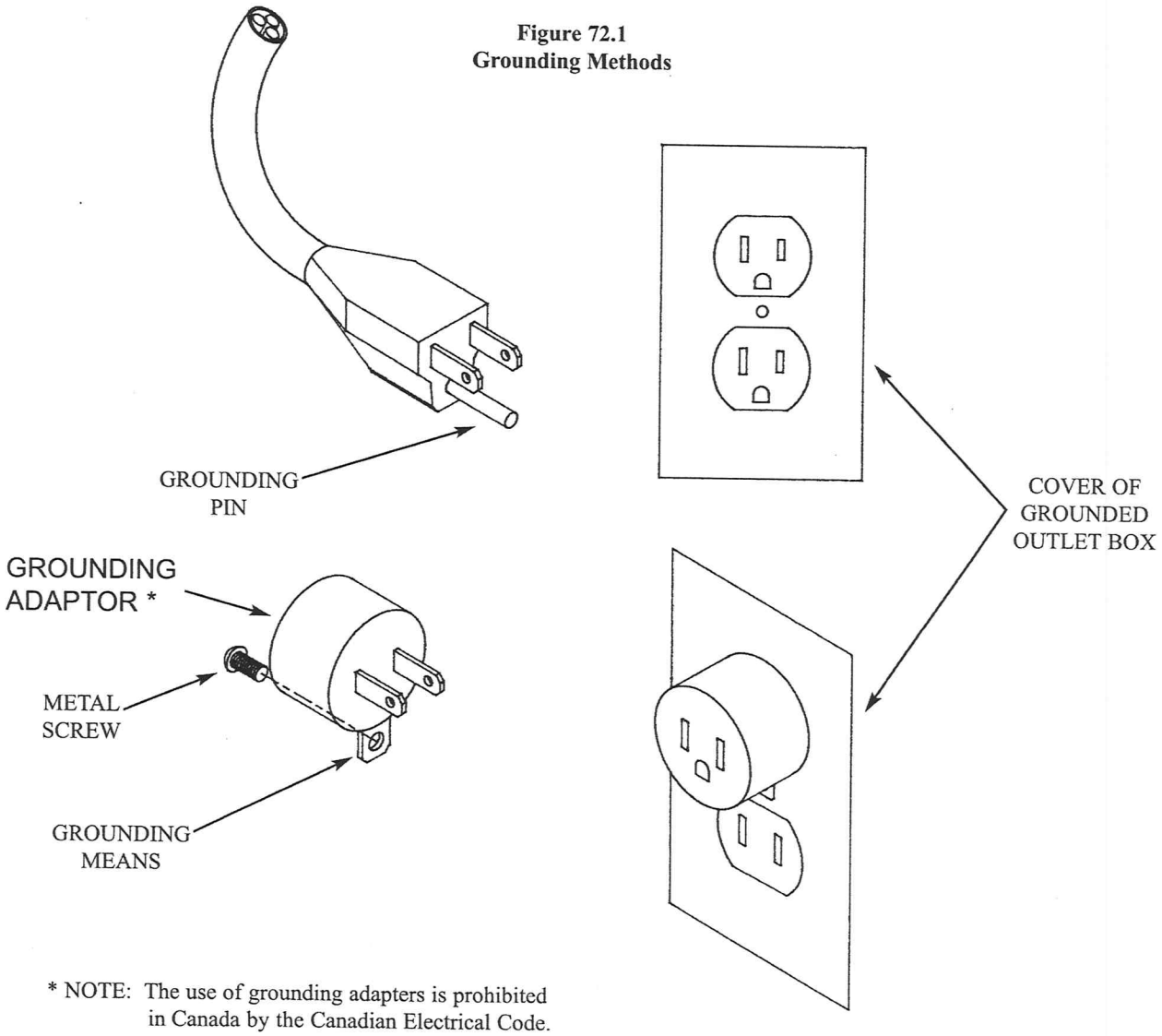


Figure 72.1
Grounding Methods



* NOTE: The use of grounding adapters is prohibited in Canada by the Canadian Electrical Code.

Table 72.1
Minimum Gage For Cordage

Ampere Rating		Volts	Total Length of Cord in Feet			
		120 V	25ft.	50ft.	100ft.	150ft.
		240 V	50ft.	100ft.	200ft.	300ft.
More Than	Not More Than		AWG			
0	6		18	16	16	14
6	10		18	16	14	12
10	12		16	16	14	12
12	16		14	12	NOT RECOMMENDED	

INTERNATIONAL PICTOGRAMS & THEIR MEANINGS:

CONSULT THE SCROLL SAW OPERATORS MANUAL FOR PROPER SET-UP, MAINTENANCE, TENSIONING, LUBRICATION, AND OPERATIONAL PROCEDURES AS WELL AS A PROBLEM SOLVING GUIDE FOR VARIOUS COMMON OCCURRANCES.

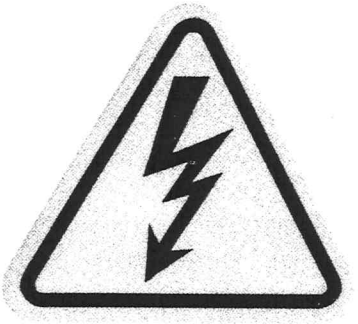
INFORMATION & HELP!

ALWAYS WEAR SAFETY GLASSES OR GOGGLES FOR PROPER EYE PROTECTION. EVERYDAY GLASSES ONLY HAVE IMPACT RESISTANT LENSES AND ARE NOT SAFETY GLASSES.

CAUTION!

KEEP ALL HANDS AND FINGERS AWAY FROM ALL MOVING PARTS, INCLUDING THE SCROLL SAW BLADE. SERIOUS INJURY CAN RESULT IF DIRECT CONTACT IS MADE WITH THE BLADE WHILE THE MACHINE IS RUNNING. KEEP ALL GUARDS IN PLACE!

WARNING!



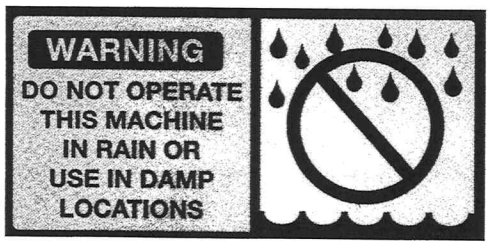
ELECTRICAL SHOCK - ELECTROCUTION SYMBOL: UNPLUG THIS MACHINE BEFORE PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURES. REPLACE ANY WORN OR DAMAGED ELECTRICAL CABLES. KEEP ALL ELECTRICAL GUARDS AND/OR SHIELDS IN PLACE.

WARNING!

CAUTION: KEEP FINGERS FROM UNDER THIS ARM WHILE IN OPERATION

KEEP FINGERS AND ARMS AWAY FROM THE VERTICAL MOTION OF BOTH UPPER AND LOWER ARMS. DIRECT CONTACT WHILE THE SAW IS RUNNING COULD RESULT IN BRUISING OR MINOR INJURY.

INTERNATIONAL PICTOGRAMS CONTINUED:



DO NOT OPERATE THIS MACHINE IN THE RAIN OR USE IN DAMP CONDITIONS OR STANDING WATER. FAILURE TO OBSERVE THIS WARNING MAY RESULT IN SERIOUS INJURY OR ELECTROCUTION!

WARNING!

NOTES