Owner's Manual and Operating Instructions

MODEL
BW/BWD
BULL WHEEL MACHINE

Caution: **Read** and **Understand** all Safety and Operating Instructions before using this equipment

Introduction

The beautifully engineered Highland Park Lapidary Bull Wheel Machine is a time tested design. Known for enabling fast grinding and polishing of cut specimens the Bull Wheel is a great addition to your shop. The Model BW/BWD was built with the lapidarist in mind, designed to give high performance and fast results to the user.

Table Of Contents

Safety Precautions

Used incorrectly, all equipment with electrical components carries some risk. To eliminate danger to either yourself or the machine, please read and follow all safety, operating and maintenance instructions! Failure to *read, understand and follow* these instructions could result in injury or death to you or others, or result in damage and/or reduced equipment life.

EYE PROTECTION

Safety glasses should always be worn when operating this machine. Regular eyeglasses do not provide proper protection and may not prevent eye injury.

HEARING PROTECTION

To reduce the possibility of hearing loss, always use hearing protection when operating this machine.

PROTECT YOUR LUNGS

An OSHA certified respirator for dust (OV/R95) or equivalent should always be worn when running the machine, because rock dust can be hazardous to your health.

> ***WARNING:*** *Some materials contain minerals or metals that can be more toxic. For instance, metallic ores may contain some toxic materials, so before grinding and polishing any unfamiliar material, make certain that it will not produce toxic fumes or dust. Extra protection may be necessary for more toxic materials.*

AVOID LOOSE CLOTHING AND HAIR

Do not wear loose clothing, gloves, neckties, rings, bracelets or other jewelry that may be caught in moving parts. Wear protective hair covering to contain long hair. Non-slip footwear is also recommended.

DO NOT OPERATE MACHINE WITH GUARDS REMOVED

To prevent injury, never operate the machine without the guards in place.

CONNECTING AND DISCONNECTING POWER

- DISCONNECTING The machine should always be disconnected (unplugged) before servicing or when changing wheels or belts.
- CONNECTING - REDUCE THE RISK OF UNINTENTIONAL STARTS Make sure the ON/OFF switch is in the OFF position before plugging in the machine.

ELECTRICAL SAFETY

Never touch electrical wires or motor components while the motor is running. Exposed, frayed or worn electrical

wiring and plugs can be sources of electrical shock that could cause severe injury or burns.

- If an extension cord is used, it must not be longer than 12 feet and must be at least 14-gauge wire with a ground.
- Use this tool only with the proper power source 120V 60 Hz.
- If the wiring becomes damaged or frayed, replace it immediately.
- Do not allow water to come in contact with electrical components, and do not connect or disconnect the power with wet hands.
- Disconnect the power before servicing the machine or changing the wheels or belts.

ROTATING OR MOVING PARTS

Keep hands, feet, hair, and clothing away from all moving parts to prevent injury. Never operate the motor with covers, shrouds or guards removed.

KEEP WORK AREA CLEAN

Cluttered work areas invite accidents. Keep your work area clean and organized.

DO NOT USE IN DANGEROUS OR HAZARDOUS ENVIRONMENTS Do not operate equipment in dangerous or hazardous environments. Do not use the machine in damp or wet locations nor expose them to rain. Always keep the work area well lighted. Always work in a well-ventilated area.

KEEP CHILDREN AWAY All visitors and children should be kept at a safe distance from the work area.

WORK METHOD

- **DO NOT PRESS TOO HARD AGAINST THE WHEELS:** Your machine will do a better job, and the belts will last longer if you use the appropriate degree of pressure against the wheels. Pressing too hard can damage the belts and workpiece.
- **USE THE RIGHT TOOLS TO SERVICE THE BULL WHEEL MACHINE:** Do not force a tool or an attachment when servicing or operating this machine. Use the correct tools for service or adjustments.
- **DO NOT OVERREACH:** Keep proper footing and balance at all times by not overreaching.
- **DO NOT OPERATE A TOOL WHEN TIRED:** When tired, take a break and relax.
- **NEVER LEAVE A TOOL RUNNING UNATTENDED – TURN POWER OFF:** Always turn the tool off when leaving the work area or when work is finished.

MAINTAINING THE MACHINE

- **CHECK FOR DAMAGED OR WORN PARTS** Before using the machine, check for damaged parts or wires. A guard or any other part that is damaged or worn should be replaced. Regularly check moving parts for proper alignment or binding.
- **USE RECOMMENDED ACCESSORIES AND PARTS** Consult the owner's manual for recommended accessories and parts. Using improper parts and accessories may increase the risk of personal and/or bystander injury

Specifications

Bull Wheel Model	BW
Machine Weight	146 lbs
Main Motor	
Horsepower	3/4HP
Motor Voltage	110V/60Hz/ Single Phase
Motor RPM	1725 RPM
Main Arbor RPM	575-2156 RPM
Arbor Shaft	1 inch
Wheel Size	12" (304.8 mm) diameter

MODEL BW BULL WHEEL MACHINE SPECIFICATIONS:

Motor: The Model BW comes with a heavy duty 3/4 horsepower 1725 RPM, Nema 56 motor.

Belt: The BW uses a typical A series v-belt.

Pulleys and Speeds: The Model BW/BWD has 5 speeds allowing operation from 575 RPM to 2156 RPM

Frame: The BW heavy duty frame is made from cast aluminum and is mounted on a heavy duty steel stand.

Main Expanding Wheel: The Highland Park BW/BWD have 12” diameter, 4” wide precision balanced Main Expanding

Wheels. (BWD comes with 2 of these wheels)

Polishing Pad: The BW Machine comes with a 12” leather polishing dome wheel. This wheel is used for getting a mirror polish on your workpieces. (Not Included on the BWD machine)

12” Flat Disk: The BW Machine comes with a 12” Flat Disk that allows the user to put the adhesive silicon carbide abrasive disks on for grinding and finishing larger pieces. (Not included on the BWD machine)

Main Shaft and Bearings: The BW Main Shaft is made from precision ground 45 Steel and is mounted on 2 heavy duty 1” bearings for smooth vibration free operation and long bearing life.

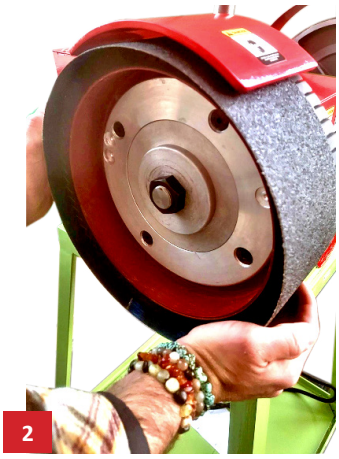
Setting Up Your Machine

Find a suitable work space where you can stand in front of the machine, making sure it is on a solid, dry, flat surface so that the machine cannot move or rock during use. Many people prefer to run the machine outside on their driveway or walkway so less dust gets inside their shop. If you prefer to run it inside, we recommend using a dust collector hose behind the main wheel to collect the majority of the dust.

INSTALLING THE BELTS:

When starting on a flat specimen, it’s best to start with an 80 grit belt for most stones. If the saw cuts are more rough, then it might be better to start with a 40 grit belt.


1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1. To install the belt, align the belt with the side of the wheel and slowly proceed to slide the belt on, keeping it as even as possible sliding it gradually as you go around the protruding edge of the belt.
2. When the Main Wheel is new, the belts will be a snug fit. As the wheel gets broken in more, the belts will be a bit easier to put on and remove. As you install the belt, don’t force it, as that can cause the edge of the belt to kink, damaging the belt.

INSTALLING THE ADHESIVE BACKED DISKS ON THE FLAT DISK.

Clean the flat disk to remove any oil or dirt before applying the silicon carbide sanding disk. Peel the backing off the sanding disk and carefully align the disk to the wheel. Then, slowly smooth the surface of the disk to prevent air from getting trapped under the sanding disk.


1


2


3

1. Remove the set screws holding the leather wheel onto the machine.
2. Clean the flat disk with a little soap and water and a soft cloth to remove oil and dirt before applying the silicon disk.
3. Peel the backing off the sanding disk and carefully apply it to the sanding disk. Slowly smooth the surface of the disk to prevent air from getting trapped under the sanding disk.
4. Replace the disk onto the machine and tighten the set screws aligning them with the flat on the shaft.

CAUTION: *NEVER run the machine without a belt on the main wheel!*

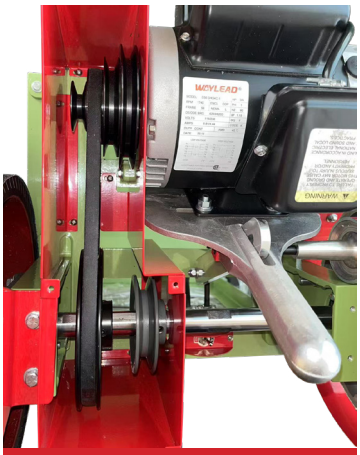
PREPARING FOR HIGH SPEED OPERATION

The first and most important thing to do before starting the machine on high speed is to **remove the leather polishing wheel.** The leather polishing wheel should only be used on the slowest speed. **Running it on the higher speeds will make the leather get loose, which could cause it to come off and cause injury!**

CHANGING THE BELT SPEED

Once you have removed the leather polishing wheel, set the pulleys to the desired speed, see the speed table and figures below:


SPEED 1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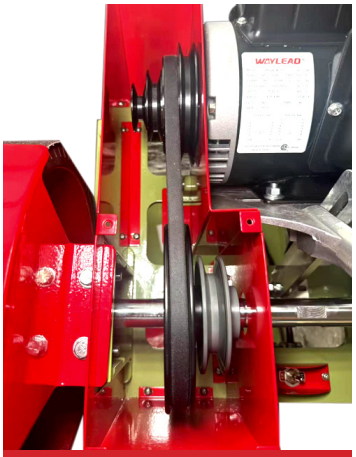
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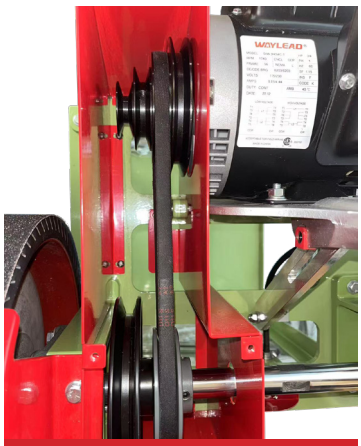

SPEED 4


SPEED 5

SPEED CHART

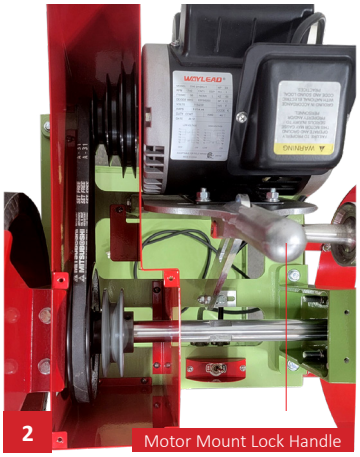
Figure #	Motor Pulley Size	Arbor Pulley Size	Ratio	Motor RPM	Arbor RPM
1	2	6	0.33	1725	575
2	3	6	0.5	1725	863
3	4	6	0.67	1725	1150
4	4	4	1	1725	1725
5	5	4	1.25	1725	2156

For all the different grit belts and disks, selecting either 1725RPM or 2156 RPM is a good choice. It's possible to grind at slower speeds but running below 1150 on the main drum should be avoided, because the main drum won't expand inside and securely hold the belt at the lower RPMs.

MOVING THE BELT

1. Remove the belt cover by removing the screws on top.
2. This is a view of the bull wheel from the top. Release motor mount lock handle, allowing the motor to pivot forward. This allows the motor to pivot forward so the belt can easily be moved to different pulley positions.
3. Use a 5/32" Allen wrench to loosen the set screws on the pulleys so they can easily be shifted right or left to the desired position. Depending on which speed you select, you may need to move one of the arbor shaft pulleys into alignment with the desired step on the motor pulley.


1



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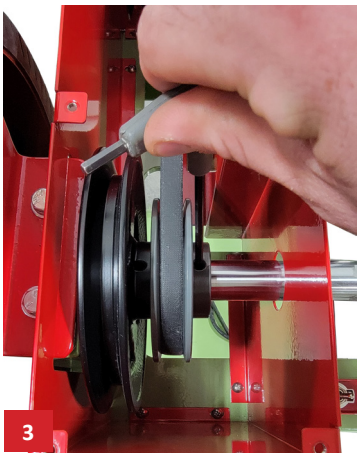
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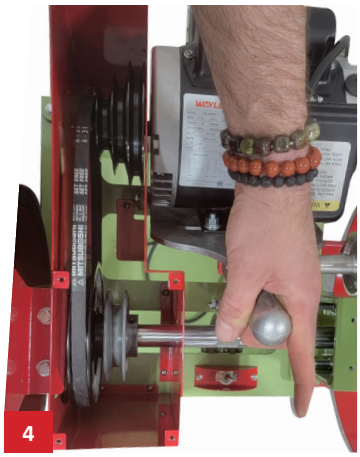
4. Move the belt onto the desired pulley position (see the speed chart).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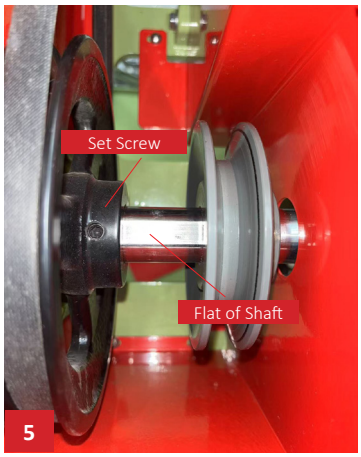

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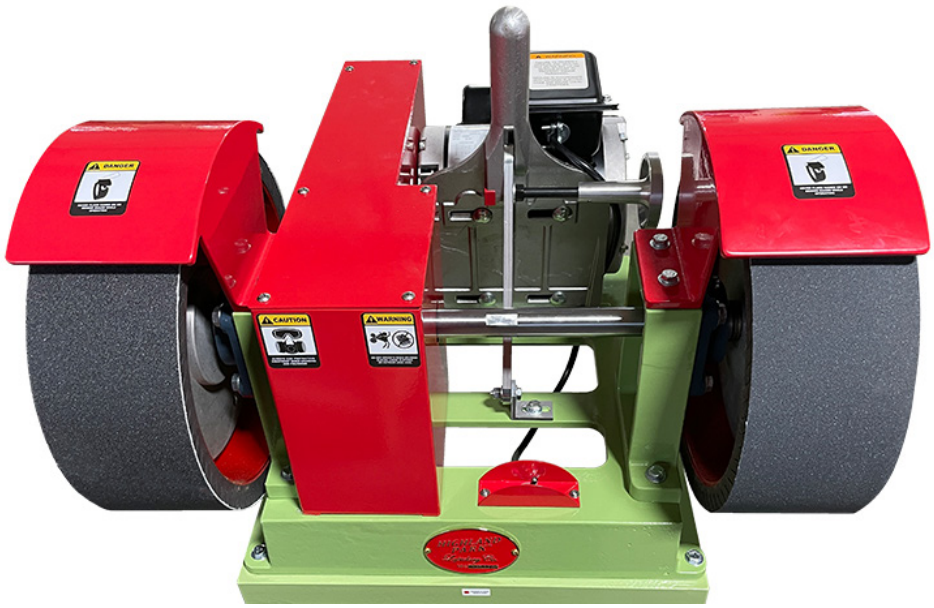
5. Then re-tighten the set screws after the pulleys are aligned, making sure they are tightened on the machined flat on the arbor shaft. This will prevent them from coming loose during operation. Tilt the motor back, creating some tension on the belt. Then, tighten the motor mount lock handle.
6. Replace the belt guard cover with the screws. Make the screws snug, but not over tight, as this may damage the threads.



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USING THE BULL WHEEL

Now that you are set up for success, let's get started grinding and polishing a specimen!

- Put your eye protection and respirator on, and make sure any loose clothing and hair are secured.
- Set to 2156 RPM or 1725 RPM, an 80 grit belt installed
- Remove the leather polish wheel

Now you are now ready to begin the rough grind.

Move the toggle switch to the on position to start the machine. After allowing the machine to come up to speed, you are now ready to grind your first specimen.

CAUTION: *Never allow others to be near or behind the machine when you switch it on and operate it. Never run the machine without a belt on the main wheel; it can permanently damage the wheel!*

MOVING THE WORKPIECE ON THE WHEEL

1. It's best to make first contact with the belt in the center of the stone, then move it up and down smoothly, keeping the face of the stone tangent to the wheel. Do not move the workpiece all the way down to the top edge or the edge could be caught by the wheel and pulled out of your hands. Do not angle the workpiece so just the edge is contacting the wheel. This will cause excess heat in the edge and may result in the workpiece getting pulled out of your hands or overheat the workpiece causing it to chip or crack.

We offer belts in the following grits: 40 grit, 80 grit, 100 grit, 220grit, 400 grit and 600 grit. When starting a new workpiece, start working on your 80 grit belt. Because the wheel is turning at a high speed, it's important to never allow the top edge of the workpiece to dig into or catch on the belt.

2. Use a light pressure, move the stone up and down, staying in contact with the belt for only 4-6 seconds at a time. Keep feeling the surface of the stone as you progress to make sure it's not getting hot. Overheating the stone will damage it.

3. You can turn the workpiece a little each time you grind, this will ensure that the full face of the stone is ground evenly.

4. When doing the rough grind, the main objective is to remove all the blade marks and produce a continuous smooth surface. You should wipe the surface of the stone with each 4-6 seconds of passes. Once you have achieved a smooth surface, and see that all the saw marks are removed, then you can proceed to the next grit.

5. Depending on the particular stone, you may be able to move to 220 directly from 80 grit. If the 220 step seems to be taking a long time, then don't skip the 100 grit step for that material. In our experience, most agates and jaspers can go from 80 grit directly to 220.

6. Repeat the same motion with your workpiece and maintain a light touch. Continue to be mindful of not allowing the workpiece to get hot. You will see the surface finish getting better very quickly. For a 3"x 3" size piece, each step should only be a minute or two.

7. Proceed to the 400 grit next (some stones will be able to go directly to 600 grit.) Repeat the same grinding method as you work through each grit step to achieve a very smooth satin finish. Once you finish the 600 grit, you will see that the workpiece will start to have a bit of a shine to it, indicating that you are ready to move to final polish on the leather dome wheel.

PRO TIP:

When grinding, it's best to have a selection of stones to cycle through, so if one starts to get too warm, you can switch to a different stone, allowing the first one to cool down. Don't attempt to put the stone in water as a way to cool it, this can cause fracturing because of the thermal shock of cooling off too quickly.

Unless the saw cut is very poor, the grinding step should only take a few minutes. If your workpiece has a very rough cut or a step on it, then it's best to use a diamond flat lap to smooth the workpiece before starting on the Bull Wheel Machine.

POLISHING ON YOUR BULL WHEEL

To prepare for polishing, change your speed back to the lowest speed (position #1 in the speed table), and install the leather polishing wheel, making sure to tighten the leather set screws on the flat on the shaft.

CHARGING THE LEATHER WHEEL WITH CERIUM

If it is the first time you are using the leather polish wheel then you will need to charge it with cerium oxide SKU- PP0101.

1. Put a couple teaspoons of the cerium oxide in a small cup and add a little water and mix it until it becomes a smooth paste. (When you are not using your cerium, cover the container so grit or contaminants don't get in your polish)
2. Use a spray bottle to spray water a couple times onto the leather wheel and rub the water into the leather to get it slightly damp. This will help the cerium to stay on the leather.
3. Use an old toothbrush or paintbrush to brush the cerium onto the surface of the leather evenly.
4. Switch the Bull Wheel machine on, and then use the brush or your finger to work the cerium into the leather. Don't put too much cerium on the wheel or it will just get wasted as you start to polish.

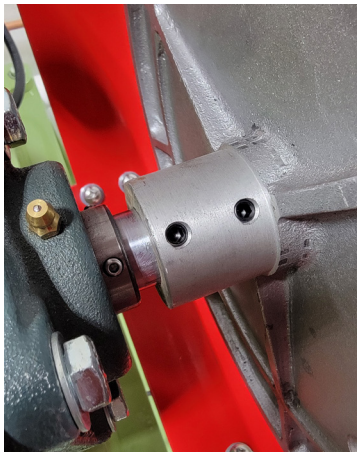
Maintaining Your Bull Wheel Machine

GREASING THE BEARINGS

On your Bull Wheel Machine, the bearings should be greased with every 100 hours of running.

Use a NLGI2 No. 2 rated or equivalent lithium grease. The grease fittings are on each bearing.

Using a grease gun, put 2 pumps of grease into each bearing and then wipe off the excess. Avoid getting grease on your polish wheel and main wheel.



Troubleshooting

ISSUE	SOLUTION
Parts are missing or something was damaged during shipment.	Contact us directly at 512-348-8528.
Unit vibrates when running	Remove the Flat Disk and run the machine to see if the vibration persists. If it still persists, then check the bearings for any excess play.
Belt squeals when starting up	Loosen the motor mount lock knob and push the handle back to increase belt tension and then lock the motor mount into position.
New machine doesn't start spinning, motor hums	Turn off the machine immediately and make sure the main wheel rotates freely. If the machine is humming and not running, it WILL burn up the motor, so shut it off immediately if this happens. If your machine is new, contact your Highland Park Lapidary sales representative. Machines are covered under warranty for one year.
Turned on the machine, doesn't start, no hum	Make sure that there is power to the outlet that you are plugged into. If you verify that you have power, then either the on/off switch is bad or the motor has failed.

Warranty Coverage

Machines, Polishers, Diamond Blades & Core Bits and Motors
Highland Park warrants to the original purchaser for a period of one year except as noted, from the date of purchase all products covered by this Warranty to be free of defects in materials and workmanship. This warranty is non-transferable and applies only to the original purchaser.

This Warranty shall not apply to any parts that have been subjected to misuse or improper service, that had been damaged in transit or handling, or that have been altered or repaired by unauthorized representatives. This Warranty does not cover defects caused by or resulting from misuse, abuse, neglect, or damage caused by accident or the failure to provide reasonable maintenance. This Warranty is void if the product or any of its individual components is altered or modified by the purchaser or if the product is used in a manner or with a blade not recommended by the manufacturer.

Any claim arising under this Warranty must be submitted by the original purchaser within the warranty period specified above and shall include proof of purchase. During said warranty period Highland Park shall, at its option, either replace or repair, at no charge to the original purchaser, any parts or components that are found to be defective by Highland Park. Highland Park shall not be responsible for or obligated to pay for freight or other transportation-related costs or expenses in connection with any defective products or components that are either returned to Highland Parks facility or any authorized repair station and/or any replacement products or components that are shipped from Highland Park pursuant to this Warranty.

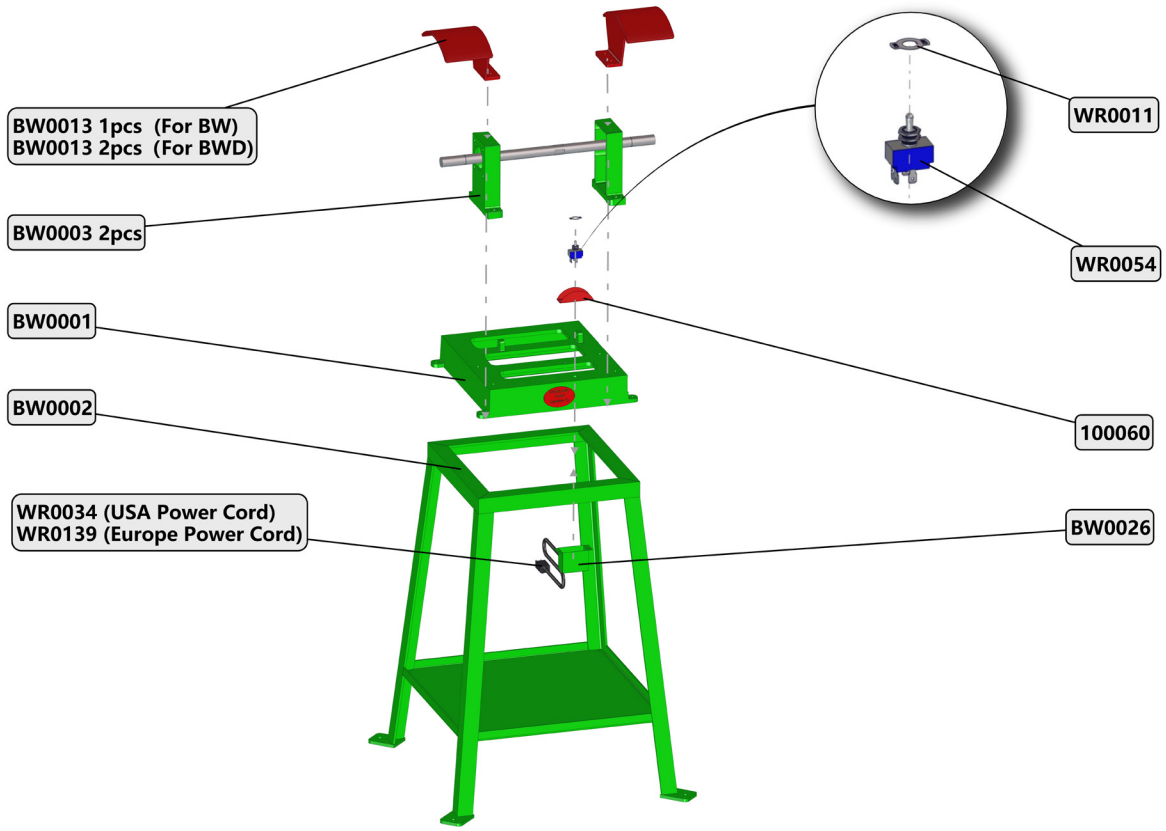
Parts and labor needed to maintain products and the replacement of components due to normal use are the purchaser's responsibility and are not covered by this Warranty. All products or components replaced under warranty become the property of Highland Park. All replacement parts will be considered to be part of the original product and any warranty on such parts will expire coincidentally with the original Warranty. Replacement part(s) installed by anyone else will be provided without a charge for such replacement part(s), but this Warranty will not apply to labor charges in connection therewith.

IN NO EVENT SHALL ANY LIABILITY UNDER THIS WARRANTY EXCEED THE REPLACEMENT COST OF ANY DEFECTIVE PRODUCT OR COMPONENT THEREOF, AND HIGHLAND PARK SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OR FOR ANY OTHER DAMAGE OR LOSS NOT EXPRESSLY ASSUMED AS SET FORTH HEREIN.

The foregoing constitutes an expressed warranty on the terms set forth above and is the only warranty or warranties applicable to the products it covers. All other warranties, including, without limitation, the implied warranty of merchantability and/or fitness for a particular purpose or use being denied. This limited warranty is expressly in lieu of all other warranties, whether expressed or implied.

Exploded Views

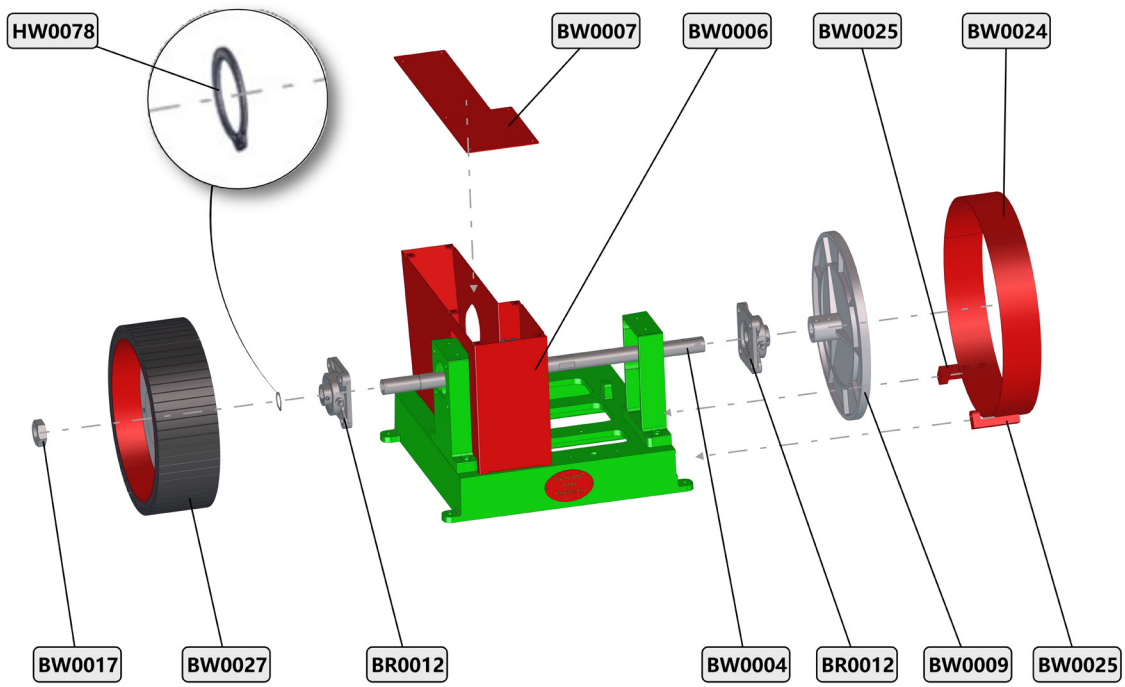
BW/BWD PARTS LIST #1



Part Number	Description	Quantity
100060	Toggle Switch Guard	1
BW0001	Carriage Base	1
BW0002	Stand Assembly	1
BW0003	Arbor Support	2
BW0013	Drum Guard	1
BW0026	Switch Box	1
WR0011	On Off Switch Plate	1

WR0034	USA Power Cord	1
WR0054	Heavy Duty Toggle Switch	1
WR0139	Europe Power Cord	1

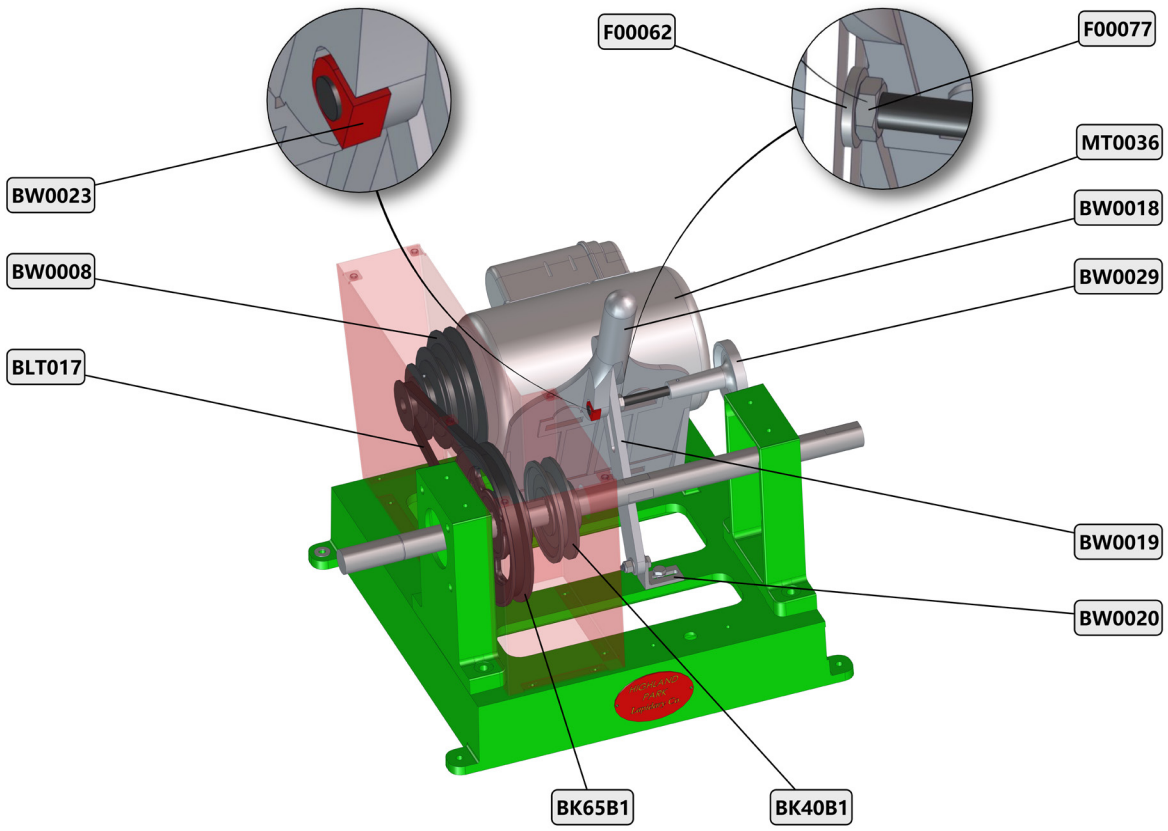
BW/BWD PARTS LIST #2



Part Number	Description	Quantity
BR0012	Flange Mount Arbor Bearing	2
BW0004	Arbor Shaft	1
BW0006	Pulley Guard Assembly	1
BW0007	Pulley Guard Cover	1
BW0009	Flat Disc	1
BW0017	Left Arbor Nut	1
BW0024	Ring Guard	1
BW0025	Ring Guard Mounting Bracket	2

BW0027	Expanding Bullwheel and Hub Assembly	1
HW0078	1" Retaining Ring	1

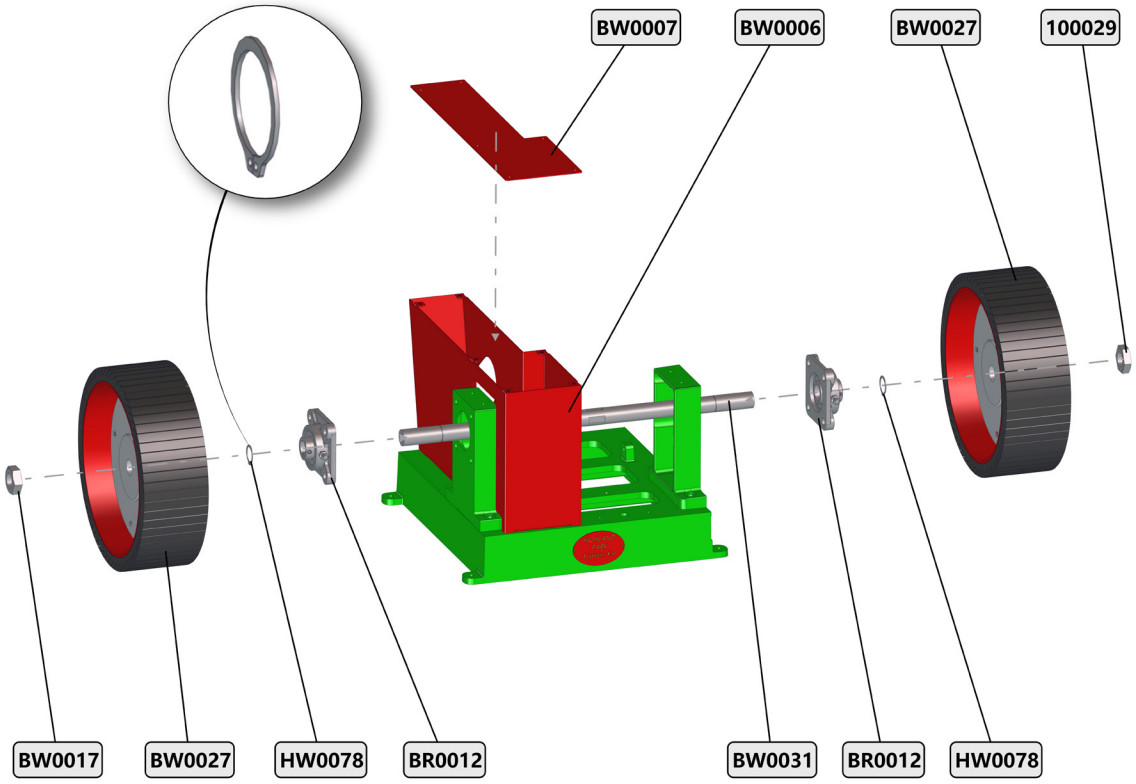
BW/BWD PARTS LIST #3



Part Number	Description	Quantity
BK40B1	4 inch Pulley	1
BK65B1	6-1/4 inch Pulley	1
BLT017	Motor Belt	1
BW0008	2-3-4-5 inch Step Pulley	1
BW0018	Motor Mount	1
BW0019	Motor Adjustment Bar	1
BW0020	Angle Bracket Mount	1
BW0023	Motor Adjustment Jam Nut	1

BW0029	Motor Adjustment Handle Assembly	1
F00062	3/8 Flat Washer	1
F00077	3/8-24 crossfeed jam nut	1
MT0036	1725 RPM 3/4 HP 110 230V High Torque NEMA 56 Motor	1

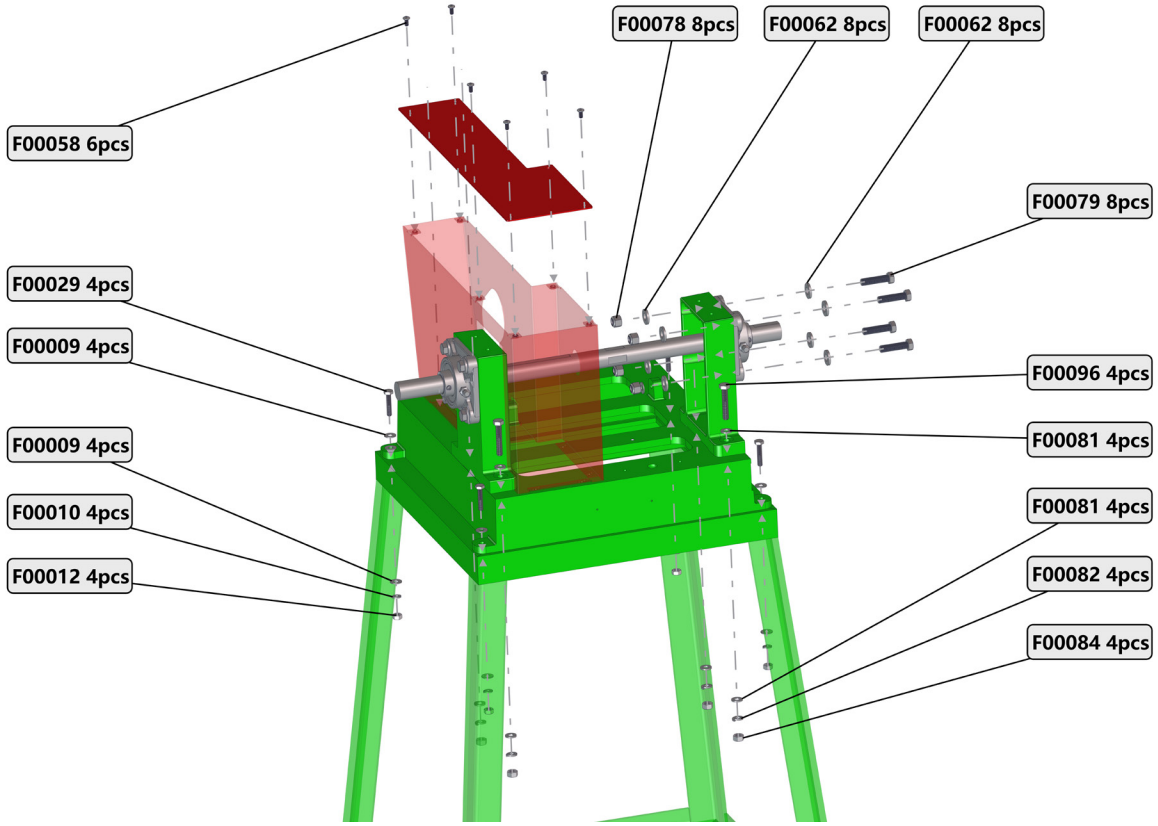
BW/BWD SCREWS & FASTENERS #1



Part Number	Description	Quantity
100029	Right Arbor shaft nut	1
BR0012	Flange Mount Arbor Bearing	2
BW0006	Pulley Guard Assembly	1
BW0007	Pulley Guard Cover	1

BW0017	Left Arbor Shaft Nut	1
BW0027	Expanding Bullwheel and Hub Assembly	2
BW0031	BWD Dual Wheel Shaft	1
HW0078	1" Retaining Ring	2

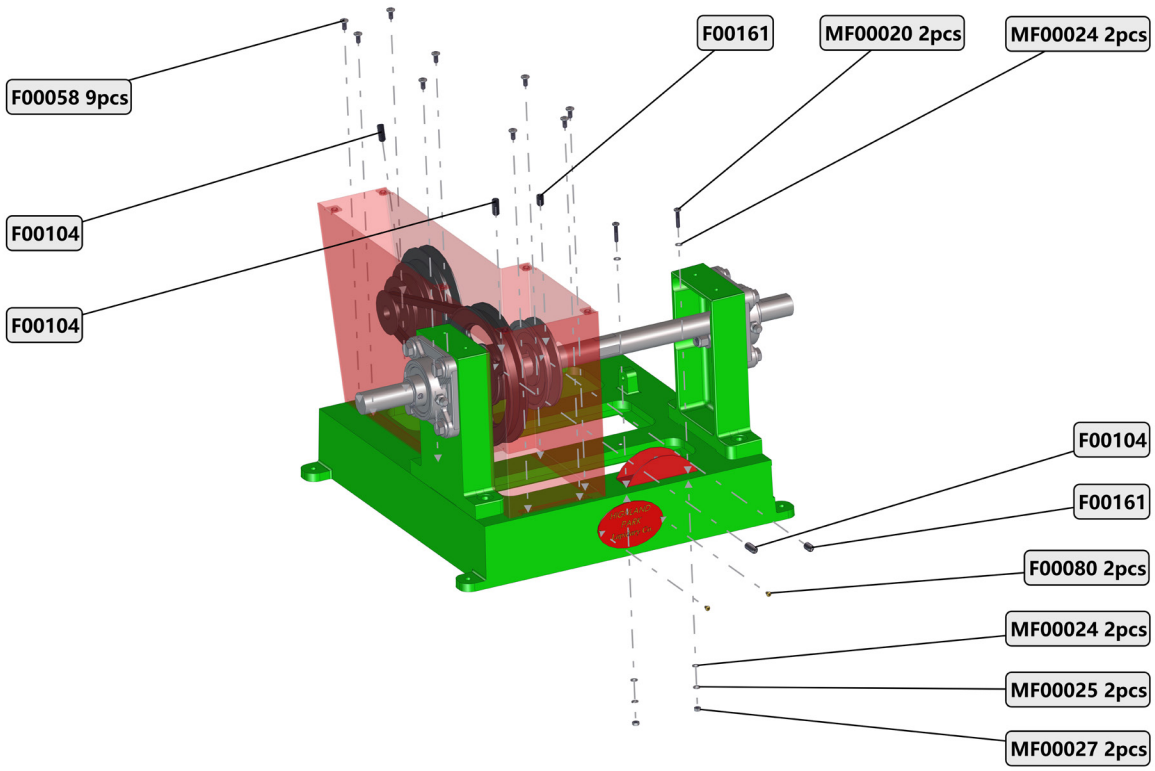
BW/BWD SCREWS & FASTENERS #2



Part Number	Description	Quantity
F00009	1/4-20 Flat Washer	8
F00010	1/4-20 Lock Washer	4
F00012	1/4-20 Hex Nut	4

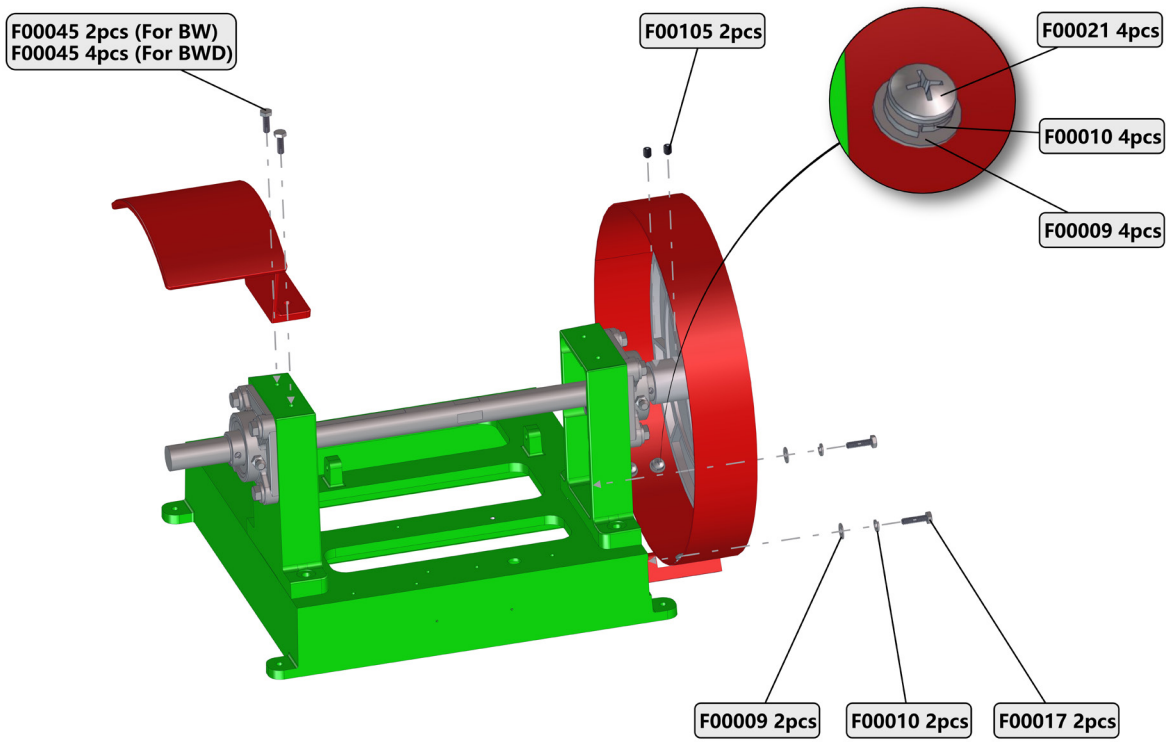
F00029	1/4-20 x 1-1/4'' HHCS Hex Head Bolt	4
F00058	10-32 x 3/8'' PHP Pan Head Phillips	6
F00062	3/8 Flat Washer	16
F00078	3/8-24 Nylon Lock Nut	8
F00079	3/8-24 x 1-1/2 HHCS Hex Bolt	8
F00081	5/16-18 Flat Washer	8
F00082	5/16-18 Lock Washer	4
F00084	5/16-18 Hex Nut	4
F00096	5/16-18 x 1-3/4'' HHCS Hex Bolt	4

BW/BWD SCREWS & FASTENERS #3



Part Number	Description	Quantity
F00058	10-32 x 3/8'' PHP Pan Head Phillips	9
F00080	4-40 x 3/16'' PHP Pan Head Phillips Brass	2
F00104	5/16-18 x 3/4'' Black Set Screw	3
F00161	5/16-18 x 1/2'' inch Set Screw	2
MF00020	M4-0.7 x 20mm PHP Pan Head Phillips	2
MF00024	M4-0.7 Flat Washer	4
MF00025	M4-0.7 Lock Washer	2
MF00027	M4-0.7 Hex Nut	2

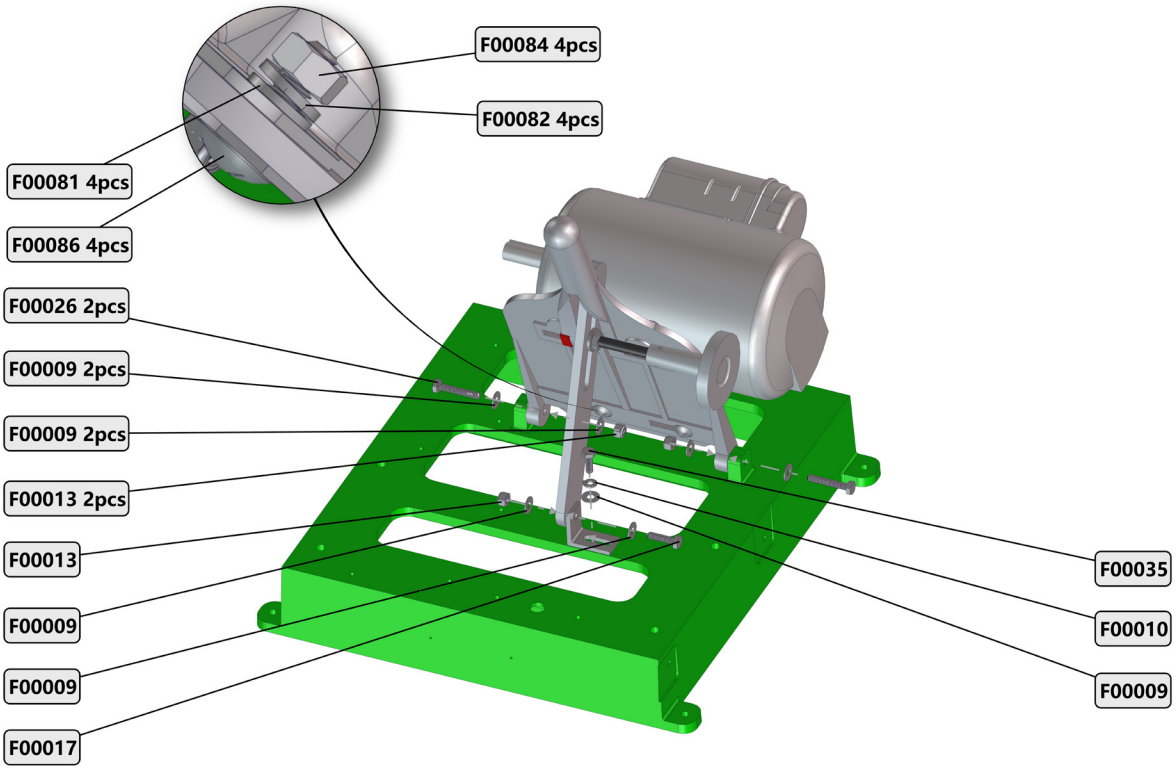
BW/BWD SCREWS & FASTENERS #3



Part Number	Description	Quantity
F00009	1/4-20 Flat Washer	6
F00010	1/4-20 Lock Washer	6

F00017	1/4-20 x 1'' HHCS Hex Bolt	2
F00021	1/4-20 x 1/2'' PHP Pan Head Phillips	4
F00045	1/4-28 x 3/4'' HHCS Hex Bolt	2
F00105	5/16-18 x 3/8'' Black Set Screw	2

BW/BWD SCREWS & FASTENERS #4



Part Number	Description	Quantity
F00009	1/4-20 Flat Washer	7
F00010	1/4-20 Lock Washer	1
F00013	1/4-20 Nylon Lock Nut	3
F00017	1/4-20 x 1'' HHCS Hex Bolt	1
F00026	1/4-20 x 1-1/2'' HHCS Hex Head Cap Fully Threaded	2

F00035	1/4-20 x 3/4'' HHCS Hex Bolt	1
F00081	5/16-18 Flat Washer	4
F00082	5/16-18 Lock Washer	4
F00084	5/16-18 Hex Nut	4
F00086	5/16-18 x 1'' CHCS Carriage Head Bolt	4

Highland Park Bull Wheel Machine
Owner's Manual & Operating Instructions

www.hplapidary.com

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