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Operating Manual & Parts Lists

800-553-5953

Model FN Cylinder Boring Machine

FN Boring Machine is shown on an Optional 054 Boring Fixture

PURCHASER'S WARRANTY

Kwik-Way Products Inc. 500 57th Street Marion, IA 52302 USA

Kwik-Way Products Inc. guarantees all parts of its equipment, to the original purchaser, for three full years (one year electrical) from date of recorded warranty (except as provided below) against defects in material or workmanship when the equipment is installed in strict accordance with pertinent specifications and procedures.

Kwik-Way Products Inc. will repair and/or replace free of charge all such defective parts *only* when returned to the factory in Marion, with shipping charges *prepaid* and authorized RMA. To obtain an RNA, contact Kwik-Way customer services at 800-553-5953.

This warranty *does not cover* damage caused by accident, abuse or improper installation, nor repair or replacement of parts worn or consumed in normal operation of the machine.

Additionally, this warranty does not cover such items as dresser diamonds, ball bearings, grinding wheels, belts, carbide tool bits and other accessory items, except at the discretion of the company. The warranty on electric motors or electrical component parts is for a period of ninety days from date of delivery.

This warranty is at no time intended to mean the entire machine.



RECEIVING SHIPMENT

Upon taking delivery of your machine, carefully inspect the assembly before removing the crating and packing materials.

If evidence of damage exists, contact the shipper and Kwik-Way Products Inc. immediately. Although Kwik-Way Products Inc. is not responsible for damage incurred during transit; you will be provided assistance in preparation and filing of any necessary claims.

CAREFULLY READ THIS MANUAL BEFORE ATTEMPTING TO SETUP OR OPERATE THIS MACHINE.

IMPORTANT NOTE

Always have your serial number ready when communicating with Kwik-Way Products Inc. regarding parts or service.

Keep this manual in a safe place.

Date Received: _____

Serial Number: ________________________________(Serial Number location is on the belt guard)



SAFETY FIRST

This manual has been prepared for the owner and those responsible for the maintenance of this machine. It's purpose aside from proper maintenance and operations, is to promote safety through the use of accepted practice. READ THE SAFETY AND OPERATING INSTRUCTIONS THOROUGHLY BEFORE OPERATING THE MACHINE.

In order to obtain maximum life and efficiency from your machine, follow all the instructions in the operating manual carefully.

The specifications put forth in this manual were in effect at the time of publication. However, owing to Kwik-Way Products' policy of continuous improvement, changes to these specifications may be made at any time without obligation.



SAFETY INSTRUCTIONS

- 1. Read, understand and follow the safety and operating instructions found in this manual. Know the limitations and hazards associated with operating the machine.
- 2. Eye Safety: Wear an approved safety face shield, goggles or safety glasses to protect eyes when operating the machine.
- 3. Grounding the Machine: Machines equipped with three prong grounding plugs are so equipped for your protection against shock hazards and should be plugged directly into a properly grounded three-prong receptacle in accordance with national electrical codes and local codes and ordinances. A grounding adapter may be used. If one is used, the green lead should be securely connected to a suitable electrical ground such as a ground wire system. Do not cut off the grounding prong or use an adapter with the grounding prong removed.
- 4. Work Area: Keep the floor around the machine clean and free of tools, tooling, stock scrap and other foreign material and oil, grease or coolant to minimize the danger of tripping or slipping. Kwik-Way recommends the use of anti-skid floor strips on the floor area where the operator normally stands and that each machine's work area is marked off. Make certain the work area is well lighted and ventilated. Provide for adequate workspace around the machine.
- 5. Guards: Keep all machine guards in place at all times when machine is in use.
- 6. Do Not Overreach: Maintain a balanced stance and keep your body under control at all times.
- 7. Hand Safety: NEVER wear gloves while operating this machine.
- 8. Machine Capacity: Do not attempt to use the machine beyond its stated capacity or operations. This type of use will reduce the productive life of the machine and could cause the breakage of parts, which could result in personal injury.
- 9. Avoid Accidental Starting: Make certain the main switch is in the OFF position before connecting power to the machine.
- 10. Careless Acts: Give the work you are doing your undivided attention. Looking around, carrying on a conversation and horseplay are careless acts that can result in serious injury.
- 11. Job Completion: If the operation is complete, the machine should be emptied and the work area cleaned.
- 12. Disconnect All Power and Air to Machine before performing any service or maintenance.
- 13. Replacement Parts: Use only Kwik-Way replacement parts and accessories; otherwise, warranty will be null and void.
- 14. Misuse: Do not use the machine for other than its intended use. If used for other purposes, Kwik-Way Products Inc. disclaims any real or implied warranty and holds itself harmless for any injury or loss that may result from such use.

MODEL FN CYLINDER BORING MACHINE

SPECIFICATIONS

CAPACITY: 2 21/32" diameter (67.5mm) to 5 21/64" diameter (135.3mm)

STROKE: 14 ½" (368.33mm)

MOTOR:	3⁄4 HP	115 VAC	60 Hertz
		or	
		230 VAC	60 Hertz
		or	
		230 VAC	50 Hertz
		or	
		115 VAC	50 Hertz

SPEED AND FEED COMBINATIONS:

SELECTOR KNOB POSITION	GEAR SHIFT POSITION	BORING HEAD R.P.M.	TRAVEL (INCH/MIN)	TRAVEL (MM/MIN)
Up	Up	490	2.70	68.58
Up	Down	263	1.47	37.34
Down	Up	490	3.79	96.27
Down	Down	263	2.04	51.82

WEIGHT:	230 lbs.	104.3 kg
OVERALL HEIGHT:	37 1⁄2"	952.5 mm
OVERALL DEPTH:	14 ½"	368.3 mm
OVERALL WIDTH:	12	304.8 mm

CENTER OF GRAVITY (LIFTING): Center of gravity is located at the lifting Eye Bolt located on top of the machine. Use only this eyebolt for lifting this machine into position.

SHIPPING WEIGHT:	285 lbs.	129.3 kg
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CONTROLS AND SWITCHES

MAIN POWER SWITCH: This switch is located on the motor to the Operator's right.

HANDWHEEL: The handwheel is located on the right side of the boring bar and is used for manually raising and lowering of the head. To manually raise or lower the boring head, the toggle must be pointing straight out from the center of the handwheel or the shift lever must be in neutral.

AUTOMATIC STOP PLUNGER: See Figure 11. This device disengages the feed and stops the head when activated by the stop rod, when pre-set.

SELECTOR KNOB: Located on top of the main base casting, this selector in conjunction with the speed control lever allows the Operator to vary the feed rate of the head. See Chart on Page 4.

SHIFT LEVER (Bore/Retract/Neutral): This lever is located on the left side (opposite side of the handwheel) and is used to feed or retract the boring head. With the lever in the rear position, the boring head down feeds and in the full forward position, the head will retract (neutral is centered between these two positions).

CENTERING WHEEL: When turned, the centering fingers extend and automatically center the boring head in the cylinder (see Page 10, Figure 7).

SPEED CONTROL LEVER: This lever is located on the same side as the handwheel and is used in conjunction with the selector knob to vary the feed rate and the speed of the head. See Chart on Page 4.

STOP ROD LOCKSCREW: This device is used for controlling the length of travel of the boring head.

HANDWHEEL TOGGLE: Engages and disengages the Automatic Feed: straight out – Neutral – No Feed – Dropped Down – Auto Feed.

WARNING: Never leave this machine unattended as it reaches the end of the boring stroke.

MACHINE ILLUSTRATION



Selector Knob



Figure 1 FN Boring Machine is shown on an Optional 054 Boring Fixture

FN CYLINDER BORING MACHINE



ANCHORING CLAMP INSTALLATION

This device is used to quickly and positively clamp the boring bar to the deck surface of the block. On 4 cylinder and V-8 blocks, the #1 and #3 cylinders will be bored with the anchoring clamp installed in the #2 cylinder. The #2 and #4 cylinders will be bored with the clamp installed in the #3 cylinder. 6 or 8 cylinder in-line block requires four settings.

NOTE: Before installing this anchoring clamp, draw file the deck to remove any burrs.

1. Select the clamp with the widest "A" dimension that will fit into the bore (Figure 2) and adjust the screws out (equally) until side movement is minimal.



2. Remove the clamp and attach it to the anchor body using the clamp pivot pin. See Figure 5



Figure 2



ANCHORING CLAMP INSTALLATION (continued)

- 3. Adjust the centering spider screw (all three equally) until just will enter the bore.
- 4. Tilt the clamp and lower it into the bore (see Figure 3) until the clamp clears the bore.
- 5. Pull up on the clamp nut, moving back and forth making sure both adjusting screws are inside the bore and that the shoulders are contacting the surface outside the bore (see Figure 5).

NOTE: Whenever possible, the clamp should be "crosswise" (see Figure 6) to the cylinder block.

CAUTION: Never allow the clamp to be positioned lengthwise with the block or allow the end of the clamp to project into a position where the boring tool may strike it.

ANCHORING CLAMP INSTALLATION (continued)



Figure 6

- 6. Continue to pull up on the clamp nut and adjust the centering screws of the center spider out to lock the assembly in place.
- 7. Adjust the clamp nut until the "U" shaped gauge can slip into place, then tighten the clamp nut slightly. See Figures 4 and 5.

INSTALLING THE BORING BAR

- 1. Place the bar on the deck so that the open end of both the bar and the gauge face each other.
- 2. Slide the bar ahead until- the gauge is free and the "Tee" slot of bar engages clamp nut.

CENTERING

Your Kwik-Way Boring Bar is equipped with a manual three-finger centering system which accurately centers on the position of the greatest cylinder wear. Before attempting to center, be sure clamp is loose and the bar is free to "float."

- 1. Select the centering fingers, which best fit the bore and install the POINTED END into the head (be sure they are all the way in).
- 2. Lower the head into the bore using the handwheel. Tighten centering wheel (see Figure 7) until all three fingers are tight against the cylinder wall. See Figure 7.

NOTE: Attempt to rotate the boring spindle by turning the drive shaft. (Be sure the motor is "OFF" and shift lever in "NEUTRAL"). If fingers are tight, the spindle will not turn.

3. The head is now centered in the bore. Clamp the bar to the block using the special wrench on the locking nut.

4. Extract the bar from the cylinder. Leave centering fingers in at all times.



Figure 7

NOTE: Use ONLY the special wrench provided and with medium pressure.

CAUTION: Excessive clamping pressure will distort the block and will resort in "Out-of-Round" bores and may also deform the "Tee" slot causing future centering problems.

SETTING THE MICROMETER

Use an inside micrometer to measure all cylinder bores. Loosen the thumbscrew and adjust the micrometer to the desired finished size (each mark on the body is equal to 0.050 and each mark on the thimble equals 0.001). Tighten the finger screw.

SETTING PLUNGER DEPTH

Adjust the plunger body (in or out) so that the overall length, from tool bit tip to the end of the plunger is approximately 1/2" longer than the "X" dimension (see Figure 8). Then tighten the plunger locking screw.

NOTE: Unless the plunger is properly adjusted, it will be impossible to maintain uniform bore diameters.





SETTING THE TOOL IN THE HEAD

- 1. Remove the micrometer hole cover and clean with the bristle brush.
- 2. Loosen the tool holder set screw and insert the tool holder.

NOTE: When removing a tool holder, grasp it with one hand then loosen the setscrew.



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Figure 9

SETTING THE TOOL IN THE HEAD (continued)

4. Insert the micrometer stem into the head until it "clicks" into place. See Figures 9 and 10.

NOTE: Be certain the tool holder set screw is loosened to allow the tool bit and holder to retract feely as the micrometer is inserted.



CAUTION: Rotating the micrometer with the tool bit point in contact with the face will mar this surface, making accurate settings impossible.

6. Lock the tool holder in place and remove the micrometer.

WARNNG: DO NOT attempt to bore without first checking the micrometers accuracy in scrap block.

OPERATING INSTRUCTIONS

Before attempting to operate this machine, be sure you are completely familiar with all the cautions, warnings and the functions of the controls and switches.

BLOCK PREPARATION:

- 1. Clean the carbon and oil from the surface.
- 2. Draw file top of block to remove burrs.
- 3. Mike the cylinders.

OPERATING INSTRUCTIONS (continued)

ANCHOR CLAMP ASSEMBLY (if anchor bolt is not used): Select proper length clamp and centering screws. See Page 8.

CENTERING AND CLAMPING

- 1. Wipe base of machine clean and place machine in position over anchor bolt.
- 2. Remove anchor gage.
- 3. Select proper centering fingers, then put pointed end of each into the boring head and push all the way in.
- 4. Using the handwheel, lower sleeve to desired position for centering.
- 5. Tighten centering handwheel until all three fingers are tight against cylinder wall
- 6. Clamp machine to cylinder block. Use wrench furnished a longer wrench will clamp too tightly.
- 7. Loosen centering handwheel all the way and raise sleeve back to top position.

NOTE: Leave the center fingers in the bar while boring.

BORING:

- 1. Lap the tool to the desired setting (Rough, Finish, Single Pass).
- 2. Set bar micrometer to the desired size and then set the plunger length.
- 3. Insert the tool holder in the head and set it with the micrometer (lock in place).

NOTE: Clean micrometer hole in boring head with brush before installing micrometer. Always replace the micrometer hole plug.

- 4. Lower sleeve carefully until tool is 1/16" above top of block (set stop rod according to bore length and flip the toggle so that it is pointing straight out).
- 5. Determine the boring head RPM's and feed rate required and set the speed control lever and selector plunger to match.
- 6. To switch on the motor, flip the rocker switch located on the boring bar motor.



BORING:

- 7. When machine stops (both head rotation and feed), rotate head until the index line (See Figure 7) is forward. (This will eliminate any marking of the cylinder by the tool when retracting).
- 8. To retract the sleeve from the cylinder:
 - a. Flip the toggle on the handwheel so that it is pointing straight out.
 - b. Press the retraction release button while at the same time pulling the shift lever forward into the retraction position.

NOTE: Once the boring head starts to retract, it is no longer necessary to hold either the button or the lever.

CAUTION: Handwheel spins during auto retract – keep hands clear.

9. If finish boring, chamfering or counterboring is not required, unclamp the machine and move to next cylinder.

FINISH BORE:

If the cylinder is to be Finish bored, remove the roughing tool from the boring head and replace with the finish tool. Follow Steps 1-8.

SPECIAL BORING

CHAMFERING:

It is desirable to remove the knife-edge at the top of the cylinder or sleeve and this needs to be accomplished before the bar is moved to the next cylinder (Use Kwik-Way's 60 degree chamfering tool bit, Part No. 062-1076-00 not included).

Proceed as follows:

- 1. Remove the tool bit used for boring and replace with the chamfering tool bit. (Page 19 for Lapping).
- 2. Set chamfering tool bit so that the center contacts knife-edge.
- 3. Lower the head until the tool bit is just above the cylinder.



4. Place the shift lever in neutral, the toggle in the straight out position and select the desired head R.P.M. See Chart on Page 4.

5. Turn the handwheel slowly, feeding the tool bit into the edge, until the desired amount of chamfer is achieved.

BORING CLOSED CYLINDER:

There are applications where the Operator may find it necessary to bore to the bottom of a closed cylinder. This type of boring requires the use of an offset boring tool and special offset tool holder (not included). This will allow the tool bit to extend below the bottom of the boring head.

- 1. Lap the tool bit (Page 19) set the bar micrometer to the desired size and then set the plunger length.
- 2. Insert the tool holder in the head and set it with the micrometer (lock in place).
- 3. Lower sleeve carefully until tool is 1/16" above top of block and set stop rod according to bore length.
- 4. When machine stops, rotate head until the index line is forward. (This will eliminate any marking of the cylinder by the tool when retracting).
- 5. Retract the sleeve from cylinder, being certain that the toggle is pointing straight out (disengaged).
- 6. If Finish boring is not required, unclamp the machine and move to next cylinder.

COUNTERBORING:

A special tool bit is required to counterbore (#062-1074-05 Counterboring Tool Bit – included.

- 1. Lap the tool bit (See Page 19), set the bar micrometer to desired size and set the plunger length.
- 2. Insert the tool holder in the head and set it with the micrometer lock in place.
- 3. Lower the head until the tool bit just touches the top of the block.
- 4. Determine the depth of the counterbore and select feeler gauges whose total thickness is equal to this dimension.
- 5. Hold depth gauge in the keyway of the boring sleeve, insert feeler gauges between top of machine and the lower end of the gauge and adjust the screw until the depth gauge is tight against pulley bracket. Lock adjustment with locknut.
- 6. Raise the head slightly and turn the power on. Be sure shift lever is in neutral and that the toggle is pointing straight out.
- 7. Hand feed the head down slowly to produce the counterbore. With the depth gauge in place, downward travel is stopped when the pulley bracket contacts the top of the gauge.
- 8. Retract the boring head and chamfer as required.

TOOL LAPPING

In preparing the tool to both rough and finish boring, four distinct surfaces must be lapped. The angle and width that each surface is faced, determines the amount of material that can be removed and the finish that is derived. Study the two illustrations and compare to actual tools. This will help you to understand the purpose of each lapping operation.



LAPPING THE TOOL FOR ROUGH BORING:

On the roughing tool, a part of 1 and all of 2 remove material when boring. However, there will be material build-up on the face of the tool that must be removed. Face 3 is used to reduce the width of 2.

1. Place the tool holder in the large lapping jig and set the swivel casting to position 1 (Figure 15) and lap until face is smooth.

NOTE: Use STAD-OIL Lapping Oil (K-W. Part Number 002-0023-45) on lapping disc prior to and during tool lapping operation (See Figure 17).

- 2. Shift the swivel casting to position 3R and lap this face until it is in good condition.
- 3. Shift the swivel casting to position 2 and lap this face until Face 2 is to desired width, usually 0.020/0.030".

NOTE: The roughing tool will generally bore 8 cylinders before needing to be re-lapped. However, hard material or large and long bores require more frequent lapping. Check tool condition after each hole.



Figure 15 Large Lapping Jig Showing the Different Positions for Lapping the Tool

- 4. Insert the tool bit holder into the small lapping jig (4R) and place the jig over the guidepost.
- 5. Lap this face until all material build-up has been removed.



LAPPING THE TOOL FOR FINISH BORING

The functions of the surfaces of the tool bit for finish boring are the same as for roughing. However, the angles are somewhat different. Position 2 produces the finish cut thus, its condition will determine the final finish of the cylinder wall. (Use only large jig shown in Figure 15, to lap the tool for finish boring).

- 1. Install the tool in the holder and position as shown in Figure 15.
- 2. Set the swivel casting Position 1 and lap this face until it is smooth.
- 3. Shift the swivel casting to Position 1 and lap this face until it is smooth.
- 4. Shift the swivel casting to Position 2 and lap this surface until Position 2 is 0.005 to 0.015 wide.
- 5. Install the tool bit holder in the 4F position of the jig and lock it in place.
- 6. Place the jig on the guidepost and remove all material build-up.

LAPPING THE TOOL FOR ONE PASS BORING

When properly dressed, this tool will produce an excellent finish even with heavy 0.030 to 0.040 cuts. The tool produced in the following procedure is a combination of both rough and finish tool.

- 1. Start with a roughing tool and place it in the large jig. (See Figure 15).
- 2. Set the swivel casting in Position 1 and lap.
- 3. Set the swivel casting in Position 3F and lap until a sharp edge is achieved.
- 4. Set the swivel casting in Position 2 and carefully touch it to the lapping wheel to produce a face, which is 0.005 to 0.010 wide.
- 5. Remove tool from large jig and install it in the small lapping jig in Position 4R (See Figure 16).
- 6. Place the jig on the guidepost and lap to the front face of the tool.

NOTE: This tool also works well when boring extremely hard sleeves – material because of the added tool support at the cutting edge.

LAPPING THE CHAMFERING TOOL

The only surface needing to be lapped on this tool is the face. Use the 4F Position on the large lapping fixture shown in Figure 15.

- 1. Install the tool bit holder in the jig and lock it in place.
- 2. Place the jig on the guide post and remove all the material build-up.

NOTE: The 60° face may require occasional touch-up which can be done by free hand to the original angle ground on the tool.

LAPPING THE OFFSET TOOL BIT

The #1,2,3 faces on the tool bit are lapped with the large swivel-lapping jig (See Figure 15) that is used for standard boring tools. The #4 face must be lapped with a special jig. (See Figure 18). **062-0540-26 Not Included**

- 1. Install the tool bit holder in Position 1 in the large swivel casting and lap until this face is smooth.
- 2. Shift the swivel casting to Position 3F and lap this face.
- 3. Shift the swivel casting to Position 2 and lap to the desired width.
- 4. Remove the holder from the large jig and install it in the special lapping jig. Place jig over the guidepost.

NOTE: When installing the holder in this jig, tool bit set screws must be on the same side as the jig thumbscrew.

5. Lap this face until all material build-up is removed.



Figure 18

NOTE: Face #2 should be 0.020 to 0.040 wide for gray blocks and 0.010 to 0.015 high alloy blocks.

LAPPING THE COUNTERBORING TOOL BIT

Only two surfaces need to be lapped, the face and the relief angle.

- 1. Install the tool bit holder in the special jig (062-0581-53 not included) and lock it in place.
- 2. Place the jig on the guidepost and remove all the material build-up from face.

Figure 19



3. Rotate the tool bit holder 90° and lap the relief angle.

BORING SLEEVE BEARING

It is extremely important that proper sleeve bearing adjustment be maintained and it needs to be checked most frequently during the break-in period.

CHECKING SLEEVE BEARING ADJUSTMENT

The adjustment at the bottom and at the top of the boring sleeve main bearing should be checked prior to placing the bar into service.

- 1. Using the handwheel, lower the head approximately 6" (152.4mm).
- 2. Place a magnetic base dial indicator so that the plunger is centered on the front of the sleeve approximately 1" above the casting top.
- 3. Grip the sleeve near the top and while pushing and pulling, observe and record the indicator reading.
- 4. Relocate the indicator (See Figure 20) so the plunger is 1" below and repeat Step 3.

NOTE: the dial indicator should be 0 to 2 ten thousands (0.0000 to 0.0002) in one direction (0.0004 total).

5. If the dial is more that 4 ten thousands (0.0004), refer to adjusting the boring sleeve bearing.



Figure 20

ADJUSTING THE BORING SLEEVE BEARING

The following procedure is designed to adjust and maintain the maximum amount of bearing area on the sleeve.

- 1. Loosen all 4 large clamping screws and the four locking screws.
- 2. When tightening clamping screws, rock the handwheel back and forth. The amount of drag felt should be ever increasing as each is tightened in sequence (See Figure 21). After tightening the handwheel.
- 3. As with the clamping screws, when tightening the locking screws, rock the handwheel back and forth. The amount of drag will decrease as each is tightened in sequence (See Figure 21). There must be definite drag handwheel as the sleeve is lowered or raised.

WARNING: Over tightening the locking screws will distort the bearing and cause uneven wear

4. Re-check with a dial indicator per Figure 20.



Figure 21

MICROMETER CALIBRATION

The micrometer you received has been calibrated to the boring bar prior to shipment. However, be sure its settings correspond with those of the micrometer being used to measure the bore diameters. If you find it necessary to reset, proceed in the following manner:

- 1. Set the boring tool to take a light cut and bore (in a scrap block) about one inch down.
- 2. Retract the boring head (**do not move the base**), measure the cylinder bore and compare to the reading of the bar micrometer.

EXAMPLES:	3.825	Bar Mike reading	3.8355	Bore (measured)
	3.8145	Bore (measured)	3.825	Bar Mike reading
	0.0105	(undersize)	0.0105	(oversize)



Figure 22

NOTE: Before making adjustment, study the component parts shown in Figure 22.

- 3. Set the "O" on the thimble to the nearest division line and note this reading (this is your reference point). See examples in Figure 23.
- 4. If the bore is undersized, turn the thimble clockwise the amount of difference. If oversized, turn it counter-clockwise the amount of difference.



- 5. Lock the thumbscrew and loosen the setscrew (with this screw loose, the thimble is free to move without disturbing the actual set length of the micrometer stem).
- 6. Return the "O" to the reference line and tighten the set screw.
- 7. Set the bar micrometer to the **actual measured bore** diameter plus 0.003 and again bore about one inch down. (Both the bar micrometer and the inside micrometer should now read the same).

HELPFUL HINTS

- 1. Get acquainted with your Kwik-Way Boring Bar. We recommend that you use a scrap block and practice before beginning the actual job. This will avoid any undue pressure or failure while learning a new product.
- 2. Occasionally a lapping disc will become "gummed-up" and appear dull. Cleaning with solvent will improve its cutting ability.
- 3. For best uniformity of tool setting, use the same part of the mike face to contact with the tool bit. (Use the lockscrew for reference).
- 4. The accuracy of the Boring Bar depends on the machine base. Always set the machine on a soft piece of wood or cardboard.
- 5. If the micrometer face becomes scratched or damaged, variations in bore diameter can occur. NEVER rotate the mike with tool bit in contact with the face or allow the tool bit to slam into the "mike" face.
- 6. If in doubt, DON'T DO IT!

MAINTENANCE

- 1. Clean the machine, removing all chips and dust acquired during use.
- 2. ALWAYS clean the machine base before use to be sure it is free of debris.
- 3. Check oil level in transmission weekly. Change at least once a year.
 - a) Remove Allen Head screw directly below speed lever (handwheel side). Oil should flow out. **DO NOT overfill.**
 - b) To add oil, remove the Allen Head Screw located below the motor on the handwheel and using SAE #30, add until it flows out of the hole below the speed lever. (Replace both Allen Head Screws) – **DO NOT overfill.**
- 4. There is one Snap-Lid Oiler, located inside of the handwheel, which should be oiled regularly.
- 5. Feedscrew occasionally apply oil directly to the threads (filling the ring at the base of the screw will lubricate the thrust bearing).
- 6. Occasionally, wipe a thin layer of oil on the drive shaft.
- 7. Keep the felt wick in the lapping disc guard saturated with Kwik-Way Special Lapping Disc Oil.

CAUTION: Use of any other oil may damage the lapping disc/tool bit or cause the disc to be too "slick".

8. The boring spindle bearing, motor bearings and the drive shaft pulley bearings are prelubricated and sealed and require no additional lubrication. NOTES:



FN BASE ASSEMBLY

FN BASE ASSEMBLY

ltem	Part Number	Description	Required
1.	055-0101-02	Base	1
2.	055-0146-04	Gear Case Cover - Front	1
3.	055-0150-07	Gear Case Cover – Rear	1
4.	062-0201-64	Worm Gear Shaft Bearing – Front	1
4A.	000-2200-70	Seal	1
5.	055-0202-48	Worm Gear Shaft Bearing – Rear	1
6.	055-0162-08	Top Cover	1
6A.	000-2200-80	Seal	1
6B.	000-2200-90	Seal	1
7.	000-0345-17	8-32 x 5/8 Flat Head Machine Screw (FHMS)	4
8.	000-1900-12	1/4 Snap Lid Oiler	1
9.	000-0230-27	1⁄4-20 x 5/8 FHMS	7
10.	062-0421-41	Main Clamp Casting	1
11.	062-0422-06	Clamp Lever	2
12.	000-1542-50	Cap Plug	1
13.	000-9203-39	Oilite Bushing	3
14.	000-0222-76	8-32 x ½ FHMS	6
15.	055-0168-01	Felt Retainer	2
16.	000-1702-32	3-1/4 x 2-5/8 x ¼ Felt Washer	2
17.	000-2000-69	Gear Case Cover Gasket	2
18.	000-0100-22	1⁄4-20 x 5/8 Hex Head Cap Screw (HHCS)	12
19.	062-0165-82	Drive Shaft Center Bushing	2
20.	000-0227-64	12-24 x 1/2 FHMS	1
21.	055-0181-46	Boring Sleeve Key	1
22.	062-0248-60	Feed Screw Bearing	1
23.	062-0424-00	Clamp Screw	1
24.	055-0160-46	Return Shaft Upper Bushing	1
25.	000-0487-63	5/16-18 x 5/16 Socket Cup Point Set Screw	3
26.	062-0126-09	Counter Shaft Bearing Plug	4
27.	062-0423-03	Clamp Nut – Front	1
28.	062-0423-89	Clamp Nut - Rear	1
29.	063-0162-92	Filler Plug	1
30.	055-0103-15	Motor Thumbscrew Assembly	1
31.	062-0427-45	Clamp Locating Arm	1
32.	000-1542-45	18/ Socket Pipe Plug	1
33.	000-1740-09	1/16 x ½ x 13 Felt Strip	1
34.	000-0170-78	3/8-14 x 1 Socket Head Cap Screw (SHCS)	4
35.	000-0505-39	3/8-16 x 7/8 Socket Flat Point Set Screw	4
36.	000-0212-96	¹ ⁄ ₄ -20 x 5-8 Round Head Machine Screw (RHMS)	2
37.	000-1800-17	Compression Spring	1
38.	000-2300-49	"O" Ring	4
39.	057-0149-46	Plunger Holder Assembly	1
40.	055-0186-26	Dust Guard	1
41.	000-0225-27	10-24 x 3/8 FHMS – Z.P.	3

FN BASE ASSEMBLY



FN BASE ASSEMBLY (continued)

Item	Part Number	Description	Required
42.	062-0116-02	Bearing Cap	1
43.	062-0133-03	Drive Shaft Lower Bushing	1
44.	000-0485-18	1/4-20 x 1/4 Socket Head Cup Point Set Screw	1
45.	000-2000-50	Gasket	1
46.	055-0134-46	Lower Bushing End Plate	1
47.	000-0240-15	6-32 x 1/4 Fillester Head Machine Screw	2
48.	000-0213-00	1⁄4-20 x 3⁄4 RHMS	1
49.	065-0428-43	Locating Arm Pivot	2
50.	000-2000-42	Gasket	1
51. NS	000-6610-07	Handwheel Caution Label	1
52. NS	051-0388-00	Traverse Control Decal	1
53. NS	051-0389-08	Speed Control decal	1
51. NS	055-0099-22	Speed-Feed decal	1



ltem	Part Number	Description	Required
1.	055-0301-46	Boring Sleeve	1
2.	062-0332-40	Spindle Pulley Spacer	1
3.	000-1603-85	Ball Bearing	1
4.	000-1640-11	Bearing	1
5. NS	051-0423-01	Micrometer Hole Plug	1
6.	062-0302-67	Lower Sleeve Insert	1
7.	062-0311-23	Boring Spindle	1
8.	062-0358-46	Split Washer	2
9.	000-7300-41	#5 Woodruff Key	2
10.	062-0355-60	Centering Rod	1
11.	062-0357-49	Handwheel Thrust Plate	1
12.	000-0300-31	8-32 x 5/8 FHMS	2
13.	000-2300-57	"O" Ring	1
14.	000-9200-96	Oilless Bushing	1
15.	062-0356-09	Centering Handwheel	1
16.	062-0334-44	Spindle Nut	1
17.	062-0333-47	Spindle Handwheel	1
18.	055-0331-02	Spindle Pulley – Below FN-876	
18.	055-0331-45	Spindle Pulley – FN-876 and up	1
19.	000-1801-73	Compression Spring	1
20.	062-0355-87	Jam Nut	6
21.	062-0354-47	Centering Cone	1
22.	055-0313-12	Boring Head Assembly	1
23.	000-1701-78	2-1/8 x 1-5/8 x 1/8 Felt Washer	1
24.	055-0312-15	Nozzle Plate Assembly	1
25.	000-1802-38	Compression Spring	1
26.	055-0328-40	Tool Lockscrew Plug	1
27.	000-0505-12	3/8-16 x 3/8 Flat Point Socket Set Screw	1
28.	062-0324-48	Tool Holder Gib	1
29.	000-0245-38	10-24 x ¾ Fillester HMS	1
30.	000-0700-17	3/8-16 x 27/32 Long Eye Bolt Z.P.	1
31.	000-6602-13	Nameplate	1
32.	055-0337-49	Belt Guard	1
33.	000-0595-21	5/16-18 x 1-1/4 BHMS	1
34.		NO PART ASSIGNED	
35.	062-0373-69	Idle Pulley	1
36.	000-9201-69	Oilless Bushing	1
37.	021-0223-06	Ferrule	1
38.	000-1840-20	Tension Spring	1
39.	057-0378-06	Spring Pin – Long	1
40.	000-0105-53	3/8-16 x 1-1/4 HHCS	1
41.	000-1150-37	5/16 Wrought Iron Washer	1
42.	062-0372-61	Idler Arm Pivot	1
43.	062-0371-64	Idler Arm	1
		*NS – Not Shown (found in Boring Head Assembly)	



ltem	Part Number	Description	Required
44.	055-0335-01	Pulley Bracket Spacer	1
45.	000-0105-53	3/8-16 x 1-1/4 HHCS	1
46.	see page 24	Micrometer Assembly – Standard	
46.	see page 24	Micrometer Assembly – Metric	
47.	055-0336-09	Pulley Bracket	1
48.	000-0105-70	3/8-16 x 1-3/4 HHCS	1
49.	062-0346-61	Feed Nut	1
50.	000-0487-63	5/16-18 x 5/16 Socket Cup Point Set Screw	4
51.	081-0729-81	Spring Pin – Short	1
52.	000-1601-21	Bearing	2
53.	057-0343-00	Bearing Spacer	1
54.	001-1902-45	V-Belt (matched set of 2)	1
55.	062-0342-46	Pulley Drive Key	1
56.	055-0341-17	Drive Shaft Pulley Assembly	1
57.	055-0344-00	Flange Bearing – Nylon	1
58.	000-1831-30	Spiroloc Ring	1
59.	000-0215-20	5/16-18 x 3/8 RHMS	1
60.	062-0175-89	Stop Rod	1
61.	057-0174-22	Lockscrew Assembly	1
62.	000-1833-34	Ring	1
63.	000-1042-64	5/16-18 Hex Finish Jam Nut	1
64.	000-0103-08	5/16-18 x 1 HHCS	1
65. NS	000-0407-70	5/16-18 x 5/16 Cup Point Headless Set Screw	3
66. NS	000-1800-92	Compression Spring	3
67. NS	000-2100-64	1/4 Steel Ball	3



ltem	Part Number	Description	Required
1.	062-0245-00	Handwheel Handle	1
2.	062-0208-65	Feed Handwheel	1
3.	057-0128-03	Clutch Shaft Arm	1
4.	000-1150-10	3/16 Wrought Iron Washer	1
5.	055-0126-01	Return Yoke Shaft	1
6.	055-0206-20	Worm Gear Shaft	1
7.	057-0223-29	Clutch Yoke Pin	1
8.	055-0145-07	Clutch Yoke Shaft	1
9.	000-7200-20	#2 x 1 Taper Pin	3
10.	055-0129-11	Bar Assembly	1
11.	057-0130-01	Bar Roller	1
12.	000-7300-41	#5 Woodruff Key	1
13.	055-0249-01	Drive Key	1
14.	000-0407-70	5/16-18 x 5/16 Headless Cup Point Set Screw	1
15.	057-0219-26	Toggle	1
16.	063-0219-89	Toggle Pivot	1
17.	000-1180-52	Washer	1
18.	062-0218-88	Toggle Link	1
19.	057-0218-29	Feed Release Plunger	1
20.	000-1800-68	Compression Spring	1
21.	000-2100-64	1/4 Steel Ball	2
22.	055-0210-23	Clutch Collar	1
23.	057-0213-14	Worm Gear	1
24.	055-0246-42	Bevel Gear	1
25.	055-0215-03	Bevel Gear Spacer	1
26.	055-0212-01	Feed Throwout Rod	1
27.	055-0222-08	Return Rod	1
28.	000-7300-33	#3 Woodruff Key	1
29.	000-0770-11	1/6 x 1/2 Cotter Pin	1
30.	000-0100-57	1⁄2-20 x 1 HHCS	2
31.	057-0147-09	Clutch Lever	2
32.	000-0408-27	5/16-18 x 1 Headless Cup Point Set Screw	2
33.	000-4500-22	Dimco Ball	2
34.	000-0170-35	3/8-16 x 1-1/4 SHCS	1
35.	055-0228-28	Stop Plunger	1
36.	000-0522-64	5/16-18 x 5/16 Half Dog Point Socket Set Screw	1
37.	000-1802-46	Spring	1
38.	000-0166-16	1/4-20 x 2 SHCS	1
39.	055-0226-15	Plunger Arm	1
40.	000-1806-02	Plunger Release Spring	1
41.	055-0224-29	Plunger Arm Release	1
42.	000-1800-33	Compression Spring	1
43.	057-0229-22	Plunger Nut	1
44.	000-1067-63	7/16-20 Hex Jam Nut	1
45.	055-0229-84	Plunger Arm Stop	1



ltem	Part Number	Description	Required
46.	000-0591-02	10-24 x 5/16 Socket Cup Point Set Screw	1
47.	000-0505-12	3/8-16 x 3/8 Flat Point Socket Set Screw	1
48.	000-0485-18	1⁄4-20 x 1⁄4 Cup Point socket Set Screw	1
49.	055-0183-40	Stop Plunger Pin	1
50.	057-0230-07	Stop Plunger Pin	1
51.	055-0221-43	Return Stop Plunger	1
52.	057-0225-31	Feed Control Plunger	1
53.	000-1800-76	Compression Spring	1
54.	000-1803-19	Compression Spring	2
55.	000-2104-04	3/16 Nylon Ball	1
56.	055-0143-02	Clutch Yoke	1
57.	055-0127-09	Return Yoke	1
58.	025-0221-06	Clutch Shifter Finger	4



ltem	Part Number	Description	Required
1.	055-0110-44	Motor Driven Shaft Coupling	1
2.	000-7300-68	#606 Woodruff Key	1
3.	000-9202-58	Oilless Bushing	1
4.	057-0164-00	Check Valve	1
5.	000-1802-38	Compression Spring	1
6.	057-0115-05	Spacer	1
7.	000-1603-77	Bearing	2
8.	062-0112-89	Oil Slinger	1
9.	055-0109-43	Motor Driven Shaft	1
10.	000-7300-41	#5 Woodruff Key	1
11.	062-0113-00	Motor Driven Gear	1
12.	062-0112-03	Gear Spacer	1
13.	000-1832-96	Snap Ring	2
14.	055-0117-45	Bearing Spacer – Lower	1
15.	055-0237-00	Small Feed Idler Gear	1
16.	055-0238-40	Large Feed Idler Gear	1
17.	062-0125-01	Counter Shaft Large Gear	1
18.	055-0121-05	Counter Shaft	1
19.	000-7200-20	#2 x 1 Taper Pin	3
20.	055-0124-07	Counter Shaft Medium Gear	1
21.	055-0123-00	Counter Shaft Large Gear	1
22.	000-9200-45	Oilless Bushing	1
23.	062-0131-68	Drive Shaft	1
24.	055-0236-03	Bevel Gear Bearing	1
25.	055-0101-88	Spacer	1
26.	062-0132-65	Drive Shaft End Washer	1
27.	000-0235-07	5/16-18 x 5/8 Nylon Socket Head Cap Screw	1
28.	055-0247-07	Feed Screw Gear	1
29.	055-0216-43	Bevel Gear	1
30.	055-0216-43	Idler Shaft	1
31.	055-0140-00	Drive Shaft Large Gear	1
32.	000-7300-33	#3 Woodruff Key	5
33.	055-0136-24	Drive Shaft Return Gear	1
34.	062-0137-02	Clutch Pin	4
35.	062-0139-07	Upper Thrust Washer	1
36.	062-0141-05	Sliding Clutch	1
37.	055-0241-20	Feed Screw & Collar Assembly	1
38.	000-1690-48	Thrust Bearing	1
39.	062-0142-02	Clutch Key	2
40.	062-0138-00	Lower Thrust Washer	1
41.	062-0135-08	Drive Shaft Small Gear	1
42.	000-1803-19	Compression Spring	1
43.	053-0293-02	Sliding Shaft Knob	1
44.	000-7204-96	1/8 x ½ Roll Pin	1
45.	000-2300-49	"O" Ring	1



ltem	Part Number	Description	Required
46.	055-0231-23	Sliding Shaft Knob	1
47.	000-7101-13	3/32 x 3/8 Roll Pin	1
48.	071-0237-45	Sliding Key	
49.	000-1802-20	Compression Spring	1
		(Item 42 to be sold as a set)	
50.	000-1830-59	Spirolox Ring	1
51.	055-0151-47	Return Gear Shaft	1
52.	000-0412-70	7/16-14 x 3/8 Cup Point Socket Set Screw	1
53.	000-2300-81	"O" Ring	2
54.	000-7200-70	#3 x 1 Taper Pin	1
55.	055-0159-02	Return Shaft Drive Gear	1
56.	055-0161-00	Return Shaft Bushing	1
57.	055-0240-22	Return Shaft feed Gear #2	1
58.	053-0276-01	Feed Gear Spacer – small	1
59.	055-0239-21	Return Shaft feed Gear #1	1
60.	055-0157-32	Return Gear	1
61.	057-0156-08	Return Clutch Pin	2
62.	003-0002-49	44P Poly Flow Tubing Black 13" Long	1
63.	0000207-61	10-24 x ¼ RHMS	1
64.	000-1242-22	Hold Down Clip	1
65.	057-0158-45	Return Gear Thrust Washer	1
66.	055-0154-06	Return Clutch	1
67.	055-0155-03	Return Clutch Key	2
68.	055-0153-41	Pump Cam	1
69.	000-7000-53	3/8 x ³ / ₄ Dowel Pin	1
70.	000-1561-75	Ball Check Valve	1
71.	057-0152-41	Pump Body	1
72.	003-0050-97	Spider	1
73.	055-0610-41	Motor Coupling	1

FN ACCESSORY GROUP



FN ACCESSORY GROUP

ltem	Part Number	Description	Required
1.	055-0452-75	Clamping Nut	1
2.	065-0456-05	Centering Set Screw – Short	3
3.	055-0457-05	Centering Set Screw – Medium	3
4.	062-0457-01	Centering Set Screw – Long	3
5.	055-0451-43	Anchor Body	1
6.	062-0469-10	Anchor Clamp Pivot Assembly	1
7.	055-0455-42	Centering Spider	1
8.	055-0472-43	Extension Rod, 6-5/8	1
9.	055-0473-40	Extension Rod, 8-5/8	1
10.	055-0471-46	Extension Rod, 4-5/8	1
11.	065-0476-08	Extension Rod Coupling	1
12.	055-0464-25	Anchor Clamp Assembly #4	1
13.	055-0463-28	Anchor Clamp Assembly #3	1
14.	055-0462-20	Anchor Clamp Assembly #2	1
15.	055-0461-23	Anchor Clamp Assembly #1	1
16.	062-0459-49	Anchor Gage	1
17. NS	000-6606-63	Kwik-Way Label	1
18.	062-0540-18	Lapping Fixture Assembly	1
19.	062-0555-10	Lapping Fixture Assembly – Roughing	1
20.	000-8800-19	#5 Engineers Wrench	1
21.	062-0361-33	Centering Finger #1 (set of 3)	1
22.	062-0362-30	Centering Finger #2 (set of 3)	1
23.	062-0363-38	Centering Finger #3 (set of 3)	
24.	062-0364-35	Centering Finger #4 (set of 3)	
25.	062-0365-24	Centering Finger #5 (set of 3)	
26.	062-0366-30	Centering Finger #6 (set of 3)	
27.	000-8900-22	3/8 Bristle Brush	1
28.	062-1021-28	Tool Holder – Short (Roughing)	1
29.	062-1025-27	Tool Holder – Long (Roughing)	1
30.	000-0590-21	Tool Bit Screw	3
31.	062-0317-19	Plunger Holder Assembly	2
32.	062-1071-03	Boring Tool Bit – Roughing	2
33.	000-0600-20	5/16 Across Flats Hex Wrench	1
34.	000-0600-70	3/16 Across Flats Hex Wrench	1
35.	000-0600-62	5/32 Across Flats Hex Wrench	1
36.	000-0600-54	1/8 Across Flats Hex Wrench	1
37.	055-0620-16	Micrometer – Standard	1
37.	055-0620-30	Micrometer – Metric	1
38. NS	002-0023-45	Diamond Lapping Oil – 1 ounce	1
39. NS	000-6636-11	FN Tool Lapping Set-Up Instruction Label	1
40. NS	000-6636-03	FN Capacity Label	1

NS- Not Shown

FN MOTOR ASSEMBLY



FN MOTOR ASSEMBLY

ltem	Part Number	Description		Re	quire	ed
			115-60-1	230-60-1	115-50-1	230-50-1
1.	062-0612-00	Lapping Disc Guard	1	1	1	1
2.	062-0605-81	Lapping Disc Guard Spacer	1	1	1	1
3.	062-0605-30	Upper Motor Endshield	1	1	1	1
4.	062-0601-40	Lower Motor Endshield	1	1	1	1
5.	061-0115-01	Lapping Fixture Stud	1	1	1	1
6.	001-1957-27	Rotor/Shaft/Switch	1	1	-	-
6.	001-1956-20	Rotor/Shaft/Switch	-	-	1	1
7.	001-1957-19	Stator	1	1	-	-
7.	001-1956-11	Stator	-	-	1	1
8.	000-2410-08	16 x 4" Jumper Wire	1	1	1	1
9.	000-1820-44	Loading Spring	1	1	1	1
10.	000-1732-66	5/8" x 5/8" Felt Disc	1	1	1	1
11.	000-1701-00	Felt Washer 1-1/2" x 1⁄2" x 1⁄4"	1	1	1	1
12.	000-1604-58	Bearing	2	2	2	2
13.	000-1243-03	Connector (3/8)	1	1	1	1
14.	000-1242-57	Hook Terminal	1	1	1	1
15.	000-1440-37	Thrubolt 7-11/16	4	4	-	-
15.	000-1439-52	Thrubolt 9-1/16	-	-	4	4
16.	000-1260-71	Cordset (SO) 14-3	1	-	1	-
16.	000-1261-28	Cordset (SJO) 16-3	-	1	-	1
17.	000-1242-49	Flag Terminal – Female	2	2	2	2
18.	000-1242-45	Flag Terminal – Female	2	2	2	2
20.	000-1205-36	Rocker Switch – ON/OFF	1	1	1	1
21.	000-1097-62	10-32 Hex Machine Screw Nut	4	4	4	4
22.	000-0250-38	1/4-20 x 1 Fill. Head Machine Screw	3	3	3	3
23.	000-0100-22	1⁄2-20 x 5/8 HHCS	2	2	2	2
24.	062-0611-20	Lapping Disc	1	1	1	1
25.	000-6400-18	Lockscrew Plug	1	1	1	1
26.	000-0407-70	5/16-18 x 5/16 Cup Point Headless Set Screw	1	1	1	1



Conditions	Possible Cause			
1. Unit will not operate	1. Not plugged in.			
	2. Line fuse open. Check fuse/breaker.			
2. Tool bit breakage	 Tool bit lowered against the cylinder with head not rotating. Tool bit allowed to snap-out against the micrometer face. Rough handling/dropping tool bit. Belt slippage. Extreme overloading. 			
3. Belt slippage	 Extreme overloading. Worn belt(s) – replace with set of 2 only. Oil on belt(s). Tension pulley adjustment. 			
4. Chatter	 Boring tool dull – sharpen. Loose clamping – check deck for burrs/unevenness. #2 face on tool bit too wide. Tool bit loose in tool holder. Sleeve adjustment too large. Belts worn/damaged. 			
5. Out-of-round boring (length of bore)	Excessive clamping pressure.			
6. Out-of-round boring (bottom of the cylinder)	Improperly adjusted sleeve.			
7. Cylinder bore variation	 Hand pressure on the micrometer while locking tool bit. Scratched or marred micrometer face. Variation in the length or roughing and finish tool bits too great. Loose ball adjusting screw. Spring plunger in tool bit holder not properly set. Metal chips in mike hole. Micrometer stop screw adjustment – see Figure 10 			
8. Taper (bottom of cylinder smaller)	 Sleeve adjustment too loose. Tool holder loose in boring head. 			

TROUBLE SHOOTING GUIDE

FN BORING BAR WORM GEAR SHAFT ASSEMBLY



FN BORING BAR







25 Teeth

FN BORING BAR BASIC GEAR DESCRIPTION



21 Teeth

0.484*

1.250"

1.000

1.748"

T



057-0213-14 Bronze Worm Gear 59 Teeth



062-0113-00 Motor Driven Gear 22 LH Spiral Teeth



20 RH Spiral Teeth



42 LH Spiral Teeth



NEUTRAL





LOW FEED (toggle at 90° to shaft, return shaft feed plunger up)



HIGH SPINDLE SPEED (transmission lever up)







RETRACT (toggle straight)



FN BORING BAR DRIVE SHAFT ASSEMBLY





FN BORING BAR COUNTER SHAFT ASSEMBLY AND MOTOR DRIVEN SHAFT ASSEMBLY





FN BORING BAR



Feed Screw Assembly

Idler Shaft Assembly



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