

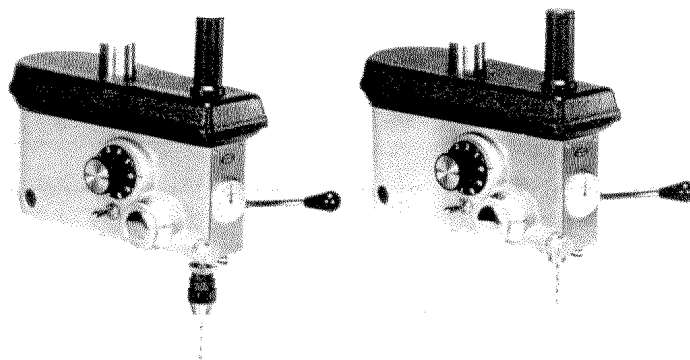
SERVO

Precision Sensitive Drill Press

Operation and Maintenance

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INTRODUCTION

Servo Products Company proudly offers the finest and most complete line of precision sensitive drill presses and accessories in the industry. Ideally suited to small hole drilling in the range of 0.004 inch (.1mm) to 1/8 inch (3.2mm) with a speed range from 200 to 20,000 rpm. It is designed to match virtually any precision drilling requirements, including all types of materials, such as steel, stainless steel, non-ferrous metals, plastic, printed circuit boards, graphite, and diamond drilling in ceramics, sapphire and glass.

Conventions Used in this Manual

Information about situations which can cause personal injury or damage to the system are displayed in boxes with the headings WARNING and CAUTION. NOTES are used to emphasize important information.

WARNING

A WARNING alerts you to a situation or action that could result in personal injury.

CAUTION

A CAUTION provides information about a situation or action that could damage the drill press or result in lost work or time.

□ **NOTE** A NOTE presents information that is important enough to require emphasis.

* **TIP** A TIP provides ideas on techniques and usage based on the experiences of manufacturing experts.

CONVENTIONS

WARNING

CAUTION

NOTE

TIP

INSTALLATION

Plug into electrical supply. When operating voltage is not otherwise specified, 115 volts AC, 50/60 Hertz, is to be used.

WARNING

The receptacle supplying power to the machine must be a three prong grounded type. ***Do not cut the round grounding plug off the machine power plug.*** The wiring polarity to the receptacle must also be correct: the black wire is hot, the white wire is neutral, and the green wire is safety ground. Failure to follow this warning voids all warranty.

INSTALLATION

SPECIAL FEATURES OF THE SERVO DRILL PRESS

FEATURES OF THE DRILL PRESS

All Servo drill press models feature

- Sensitive feel
- Less drill breakage
- Fewer costly scrapped parts
- Ease of operation
- Reliability

1. Smooth, quiet operation is ensured since the tension of the belt is not reflected on the bearings in the spindle, but is taken by separate carrier ball bearings in the spindle drive assembly. The spindle is driven by a floating-splined, high-strength plastic mechanism. All rotating parts are precision balanced.
2. The quill is nickel-plated and ground. The quill bore is hard anodized then lapped to exact size. The ground spindle rotates on precision sealed ball bearings.
3. The rack and pinion drive maintains a sensitive feel to the operation, because the rack is spring-loaded, thus maintaining continuous contact with the handle pinion driving gear, which virtually, eliminates backlash in the quill drive system. This allows the operator to feel the cutting forces on the drill.
4. The weight of the quill is counterbalanced by a spring mechanism which automatically returns the quill to its up position. This mechanism can be adjusted to just counterbalance the quill so that it is "dead" throughout its travel. This is of particular value when using drill sizes below 0.015 inch (.38mm) in diameter.
5. The quill lever is infinitely adjustable with respect to position for operator convenience.
6. The adjustable calibrated quill stop can be utilized as either a down stop or an up stop. This allows the quill to be locked in a fully extended down or up position. This may also be used as a fine down feed drive at 0.100 inch (2.54mm) per revolution or as a continuously adjustable down stop for controlled incremental pecking. This capability is very important in deep hole drilling.
7. A full wave thyristor direct current speed control is infinitely variable over two belt position ranges, 200 to 4,000 and about 2,000 to 20,000 rpm. All machines are capable of speeds from 200 rpm down to approximately 10 rpm at reduced torque. Spindle speed easily adjusts to drill geometry, feed rate, and material of the work piece.

SPINDLE ASSEMBLY & CONTROLS

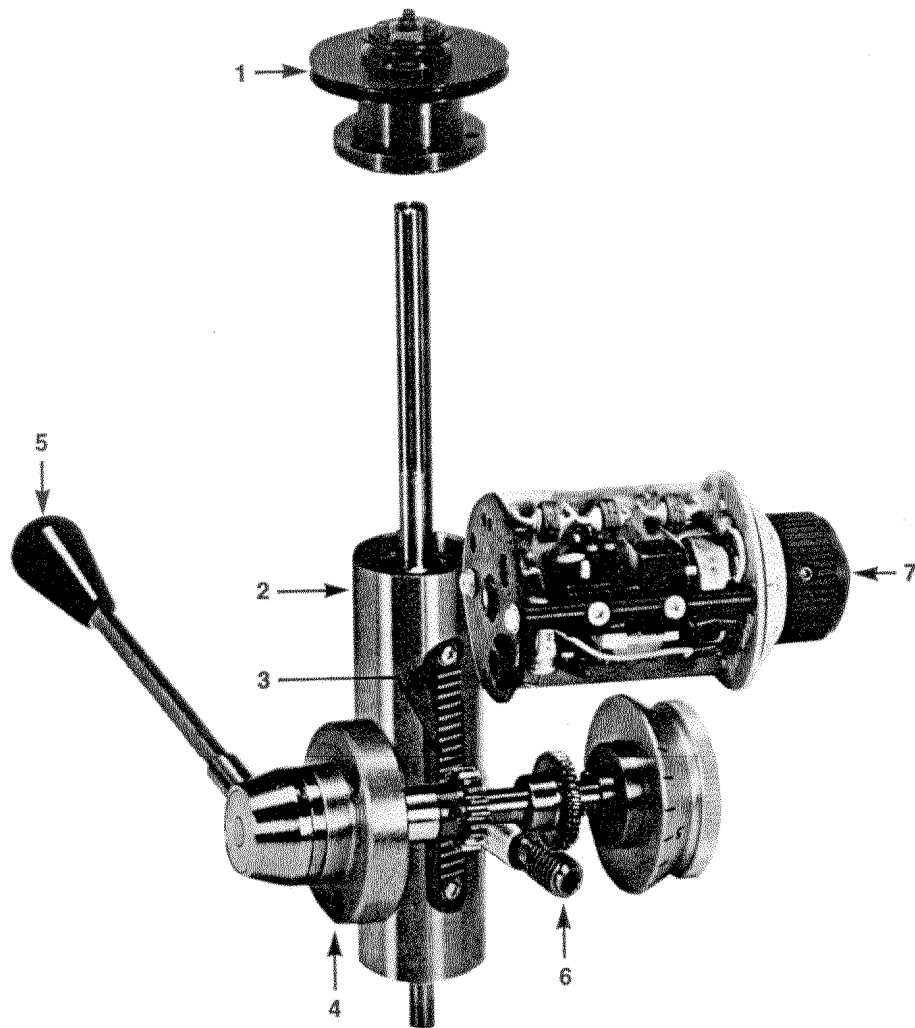


Figure 1. Detailed view of the drill press spindle assembly and controls.

FOR YOUR SAFETY

Your Servo precision drill press will provide the best performance if you comply with the following safety guidelines.

SAFETY PUBLICATIONS

Safety Publications

American National Standard Safety Requirements for the Construction, Care and Use of Drilling, Milling, and Boring Machines (ANSI B11.8-1983). Available from the American National Standards Institute, Inc., 1430 Broadway, New York, New York, 10018.

Concepts and Techniques of Machine Safeguarding (OSHA Publication #3067). Available from the Publication Office - Occupational Safety and Health Administration, United States Department of Labor, 200 Constitution Avenue, NW, Washington, DC, 20210.

MACHINE OPERATION SAFETY GUIDELINES

Machine Operation Safety Guidelines

Proper safety precautions are the responsibility of *every* machine operator and shop supervisor. A safety program must be conscientiously followed. This will help prevent injury to personnel and damage to equipment, thereby increasing worker morale, increasing production, and decreasing downtime. Your Servo Precision Drill Press will provide the best performance if you comply with the following safety guidelines.

1. **KNOW YOUR MACHINE.** All supervisory and operating personnel should read this manual thoroughly before proceeding. Learn the machine features and limitations. Follow all recommended operating procedures.
2. **GROUND THE MACHINE.** Follow the instructions for grounding as described in the manual.
3. **KEEP GUARDS AND COVERS IN PLACE** and in working order. Never run spindle with cover removed. Exposed belts and pulleys are dangerous. Keep hands away from cutting edges and moving parts.
4. **REMOVE ADJUSTING KEYS AND WRENCHES.** Form a habit of removing adjusting wrenches and keys before operating the machine. Do not leave parts or tools on the table.
5. **KEEP WORK AREA CLEAN.** Cluttered areas and benches invite accidents.
6. **AVOID DANGEROUS ENVIRONMENTS.** Do not use this machine in damp, wet, gaseous, or explosive locations. Keep work area well lighted.
7. **KEEP CHILDREN AWAY.** All visitors should be kept at a safe distance from the work area. Make your workshop kid proof with padlocks, master switches, or by removing starter keys.
8. **DO NOT FORCE THE TOOL.** It will do the job better and safer at the rate for which it was designed.
9. **USE THE RIGHT TOOL.** Do not force a tool or attachment to do a job it was not designed for.

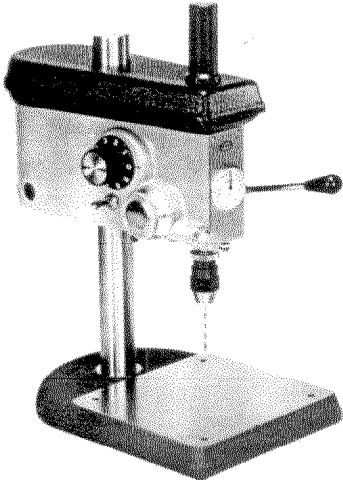
10. **WARNING - WEAR PROPER APPAREL.** Loose clothing, ties, jewelry (including rings), and long hair can get caught in moving parts. Rubber-soled footwear is recommended for best footing. For your own safety, ***do not wear gloves*** when operating machinery.
11. **USE SAFETY GLASSES.** Cutting tools can throw dangerous and hot chips. Also use face or dust mask if cutting operation is dusty.
12. **SECURE WORK.** Use clamps or a vise to hold work when practical. It is safer than using your hand and it frees both hands to operate the tool.
13. **DO NOT OVERREACH.** Keep proper footing and balance at all times.
14. **MAINTAIN TOOLS WITH CARE.** Keep tools sharp and clean for best and safest performance. Follow instructions for lubricating and changing accessories.
15. **DISCONNECT MACHINE** when not in use and before servicing. High voltage exists in the spindle head.
16. **SERVICE** must be done by qualified personnel only.
17. **AVOID ACCIDENTAL STARTING.** Make sure switch is in OFF position before plugging in.
18. **USE RECOMMENDED ACCESSORIES.** Consult the owner's manual for recommended accessories. The use of improper accessories may cause hazards.

SPECIFICATIONS

Electrical		115 volts AC, 50/60 Hz, 2 amps
Spindle speed (continuously variable)	Low range High range	200-4,000 rpm 1,000-20,000 rpm Speeds from approx. 10 rpm to 200 rpm available at reduced torque
Spindle runout		.0002"/.005mm TIR
Spindle square to base		.0005" per inch/.005mm per cm
Quill travel (stroke)		1.5"/38mm
Capacity of chuck models		.012"-.156" / .3mm-4mm
Capacity of collet models		.004"-.252" / .1mm-6mm
Drill capacity		to 1/6" in inconel to 1/8" in steel to 3/16" in aluminum (collet only)

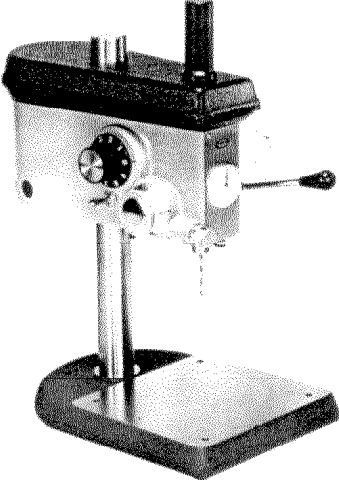
ALBRECHT CHUCK VERSIONS

Inch	Metric	Column Height
7000	7100	12"/304.8 mm
7010	7110	19"/482.6 mm



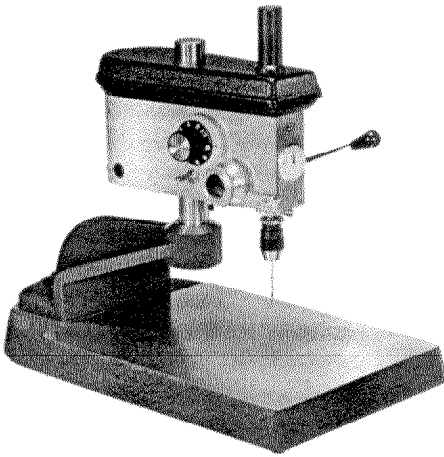
WW COLLET VERSIONS

Inch	Metric	Column Height
7050	7150	12"/304.8 mm
7060	7160	19"/482.6 mm



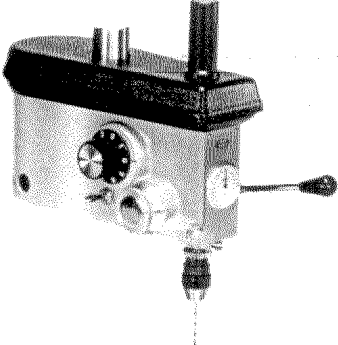
ALBRECHT CHUCK-

Inch	Metric
7030	7130



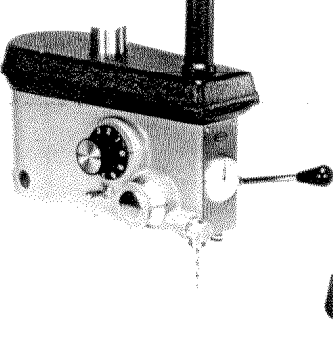
ALBRECHT CHUCK VERSIONS

Inch	Metric
7400	7403



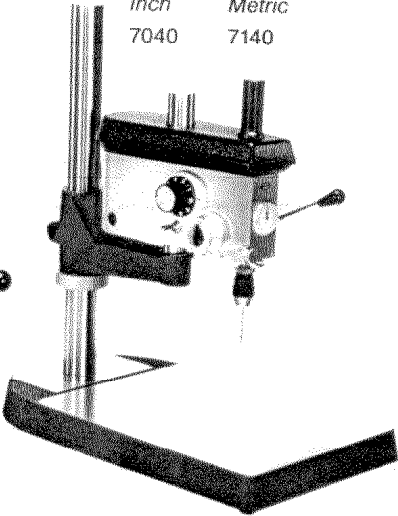
WW COLLET VERSIONS

Inch	Metric
7401	7404



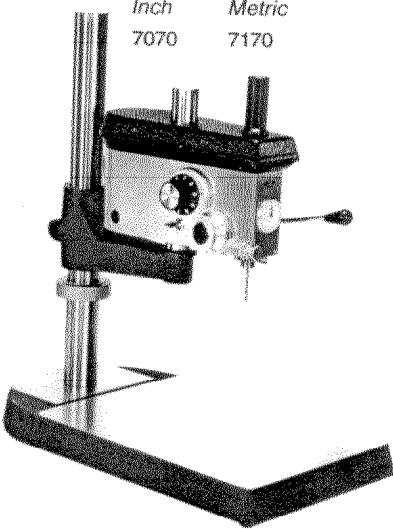
ALBRECHT CHUCK VERSIONS

Inch	Metric
7040	7140



WW COLLET VERSIONS

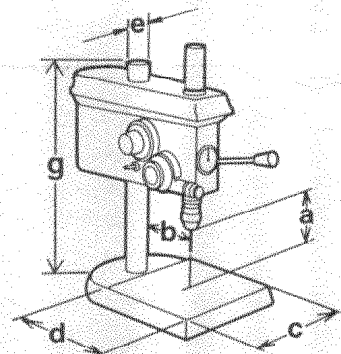
Inch	Metric
7070	7170



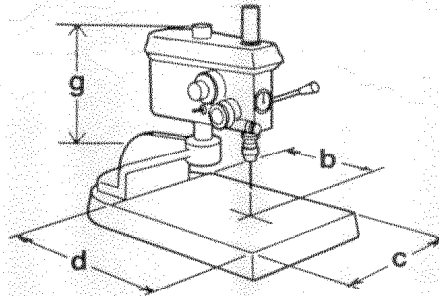
SPECIFICATIONS CONTINUED

	7000-I 7100-M	7010-I 7110-M	7050-I 7150-M	7060-I 7160-M	7030-I 7130-M	7040-I 7140-M	7070-I 7170-M
Max. chuck, collet to base [a]	6" 152mm	13" 330mm	7.5" 190mm	14.5" 368mm	6" 152mm	16.5" 419mm	18" 457mm
Throat depth [b]	3.5" 89mm	3.5" 89mm	3.5" 89mm	3.5" 89mm	8.5" 216mm	9.4" 239mm	9.4" 239mm
Working base area (width) [c]	6.5" 165mm	6.5" 165mm	6.5" 165mm	6.5" 165mm	9.75" 248mm	9.75" 248mm	9.75" 248mm
Working base area (depth) [d]	6.5" 152mm	6.5" 152mm	6.5" 152mm	6.5" 152mm	13.25" 324mm	13.25" 324mm	13.25" 324mm
Column diameter through head [e]	1.25" 31mm	1.25" 31mm	1.25" 31mm	1.25" 31mm	1.25" 31mm	1.25" 31mm	1.25" 31mm
Column diameter through elbow [f]	- -	- -	- -	- -	- -	1.625" 41mm	1.625" 41mm
Column length [g]	12" 305mm	19" 483mm	12" 305mm	19" 483mm	7.5" 191mm	18" 457mm	18" 457mm
Footprint width	7.15" 181mm	7.15" 181mm	7.15" 181mm	7.15" 181mm	10.5" 267mm	10.5" 267mm	10.5" 267mm
Footprint depth	11.8" 299mm	11.8" 299mm	11.8" 299mm	11.8" 299mm	18.5" 470mm	18.5" 470mm	18.5" 470mm
Overall height	18" 457mm	25" 635mm	18" 457mm	25" 635mm	18" 457mm	29.5" 749mm	29.5" 749mm
Weight	21# 9.5kg	21# 9.5kg	21# 9.5kg	21# 9.5kg	27# 12.2kg	40# 18.1kg	40# 18.1kg

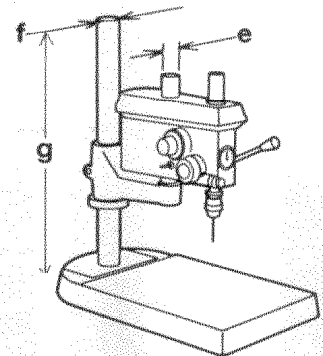
STANDARD DRILL PRESS VERSIONS



DRILL PRESS w/UNIQUE OFFSET COLUMN



ELBOW AND DEEP THROAT VERSIONS



HEAD
ASSEMBLY
TOP AND
LEFT SIDE

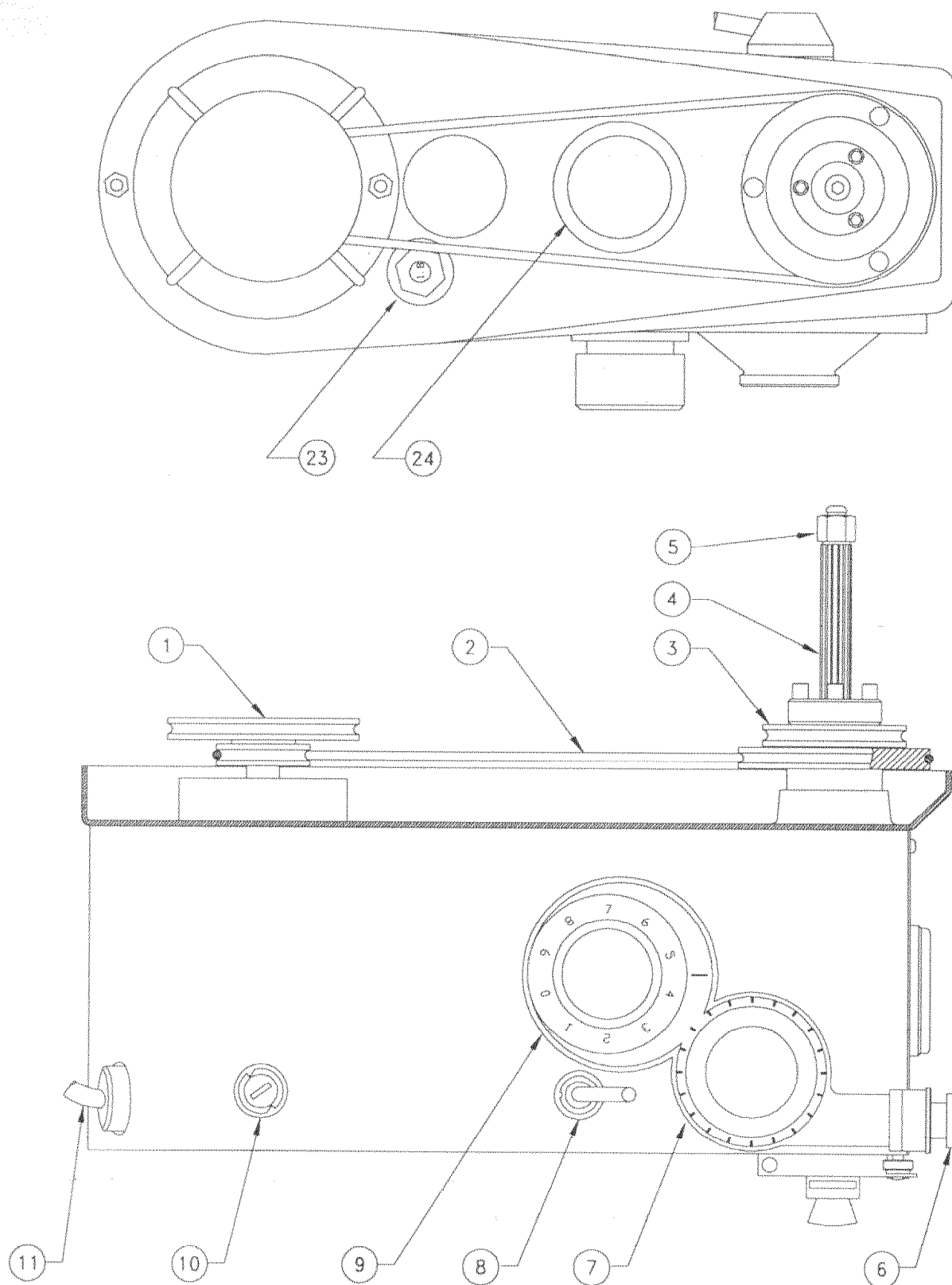


Figure 2. Drill/mill head with collet spindle, left side and top views.

- | | |
|--------------------------------|--|
| 1) Motor pulley | 13) Dial indicator (inch or metric) |
| 2) Spindle drive belt | 14) Quill lock (mill head only) |
| 3) Spindle pulley | 15) Dial indicator zero set knob |
| 4) Draw bar/Spindle assembly | 16) Collet (not included) |
| 5) Draw bar knob | 17) Spindle (collet-type shown) |
| 6) Adjustable down stop & dial | 18) Quill |
| 7) Coarse depth dial | 19) Speed control mounting screw (nylon) |
| 8) Spindle on/off switch | 20) Quill lever |
| 9) Spindle speed control | 21) Head column lock |
| 10) Brush cap (2 places) | 22) Dial gage clamp* |
| 11) Power cord | 23) Circuit breaker |
| 12) Cover | 24) Cap plug |

❑ **NOTE*** The dial gage clamp screw is factory set. **Do not** adjust the tightness of the screw as this will affect the life of the spindle bearing.

**HEAD
ASSEMBLY
RIGHT SIDE**

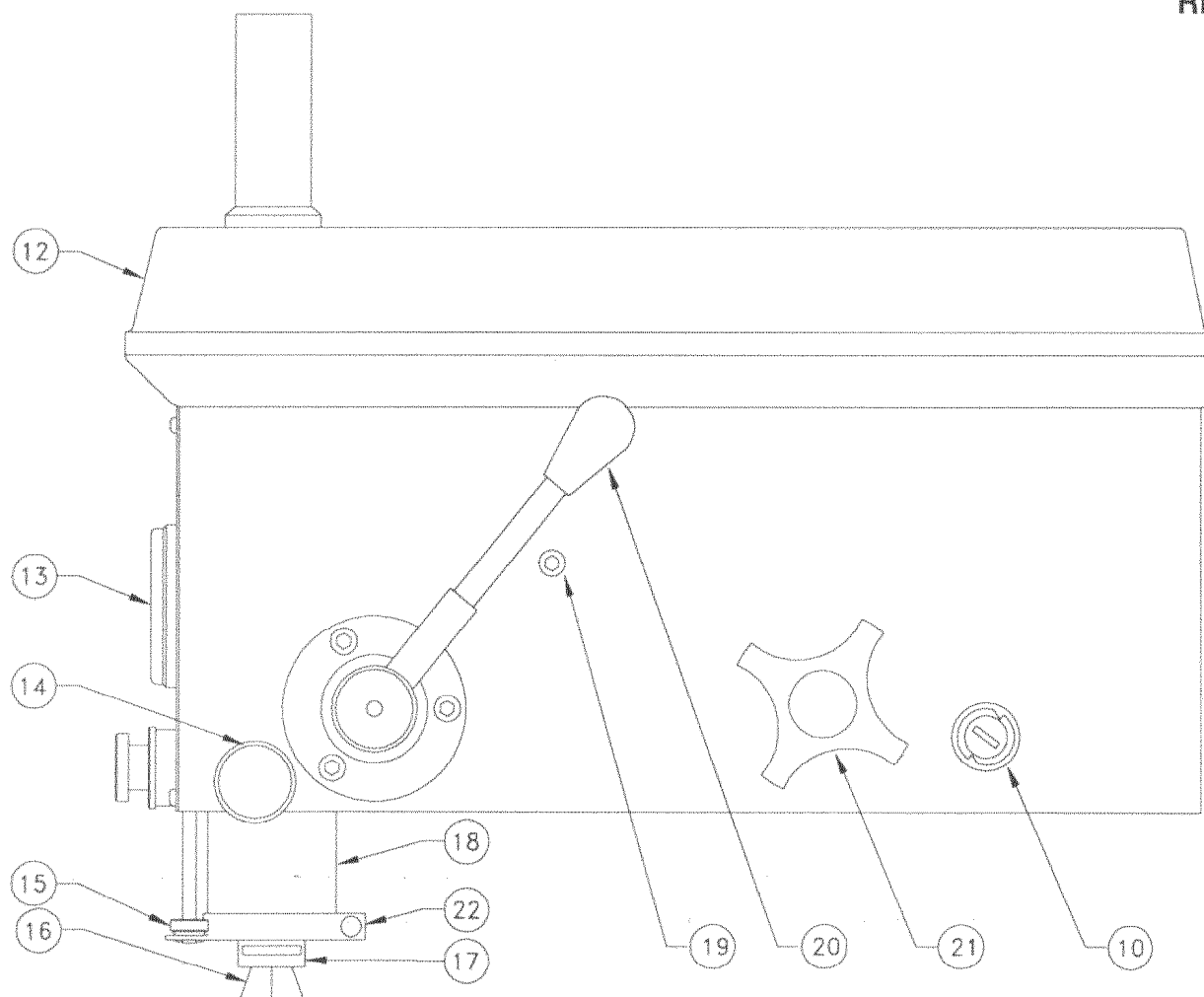


Figure 3. Drill/mill head with collet spindle, right side view.

OPERATION

SPINDLE ON/OFF

Spindle On/Off Switch

The on/off switch for the spindle (8) is a toggle located on the left side of the head under the speed control knob.

CHANGE BELT RANGES

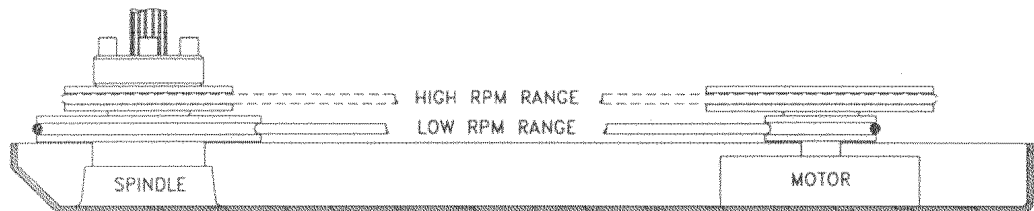


Figure 4. Spindle drive belt positions.

VARIABLE SPEED CONTROL

Change Belt Ranges

To change belt ranges, remove the black plastic cover on the head. The top pulley positions the high rpm range. The bottom pulley positions the low rpm range.

Variable Speed Control

The variable spindle speed control (9) is a black knob with graduations from zero to nine located on the left side of the head. The full wave thyristor direct current speed control is infinitely variable over two belt position ranges: low range is 200 to 4000 and high range is 1000 to 20,000 rpm. The spindle is also capable of speeds from 10 to 200 rpm at reduced torque. The approximate rpm calibration is graphed in figure 5.

NOTE Running the spindle motor at three-quarter speed or less will greatly extend brush and commutator life. If your process does not require the higher speed, don't use it. Also remember to check the spindle motor brushes every two weeks.

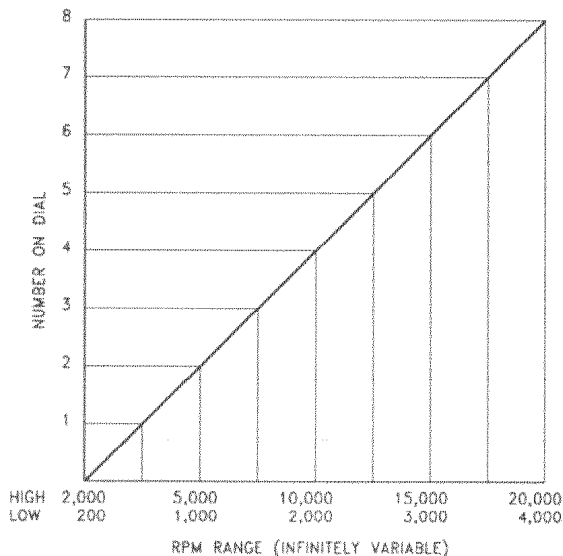


Figure 5. RPM spindle speed calibration graph.

Dial Indicator Depth Control;

The dial indicator (13) on the front of the head serves as a fine depth gage. It is calibrated in .001"/.025mm increments and reads .200"/5mm per revolution. Zero the dial by rotating the knurled wheel (15) at the bottom of the front panel.

Coarse Depth Gage

The coarse depth gage (7) is the aluminum dial located on the left side of the head. It turns with the quill lever, thereby serving as an accumulator to keep track of the turns made by the front dial indicator. The dial is calibrated in .1"/2.5mm increments and is friction loaded so that it can be zeroed at any point throughout the travel of the quill.

Adjustable Up/down Stop

The adjustable up/down stop (6) is the graduated knob to the left of the front panel. This can be set anywhere over the 1.5" range of the quill movement. Each graduation is .001"/.025mm. Turn clockwise to raise the quill. The dial is friction loaded and can be turned to zero at any point.

Quill Lever

The quill lever (20) is located on the right side of the head. It can be adjusted to operate at any convenient angle. The weight of the quill is counterbalanced by a spring mechanism which automatically returns the quill to its up position.

Step 1: To adjust the quill lever, turn the black knob on the end of the quill lever counter-clockwise.

Step 2: Move the quill lever to the desired position.

Step 3: Firmly tighten the knob in the clockwise direction.

Height Adjustment

The column clamping knob is located on the right side of the head. It is used for height adjustment and to rotate the head left and right 90 degrees on the column, keeping the tool perpendicular \perp to the table.

CAUTION

Do not loosen the clamping knob without holding on to the drill/mill head.

Step 1: Grasp the head and loosen the knob (21).

Step 2: Adjust the height and the angular position of the head as needed.

Step 3: Then tighten the knob.

DIAL INDICATOR

COARSE DEPTH GAGE

ADJUSTABLE UP/DOWN STOP

QUILL LEVER

HEIGHT ADJUSTMENT

SETTING TOOLS ALBRECHT CHUCKS

REMOVE CHUCK

INSTALL CHUCK

SETTING TOOLS COLLET SPINDLES

Setting Tools in Albrecht Chucks

The Albrecht chuck is a keyless precision chuck. To open and close, hold the top rim stationary and twist the body in the appropriate direction. Some machines may be furnished with the Jacob #0 key type chuck such as when the Model 709 drill tap control is provided. The chuck is mounted on a #0 Jacobs taper.

To remove the chuck:

Step 1: Lay cloth or cardboard under the chuck as a cushion if the chuck falls.

Step 2: Using two flat blade screw drivers, insert the two blades opposite each other and between the shoulder of the spindle and the chuck.

Step 3: Gently pry down.

To install the chuck:

Step 1: Clean both tapers thoroughly.

Step 2: With the jaws completely retracted and using a thin piece of wood to protect the chuck nose, tap the chuck into place on the spindle.

Step 3: Check for run-out.

IF: If the run-out is too large, remove the chuck and repeat Step 2 and Step 3.

Holding Tools in Collet Spindles

The collets improve drilling accuracy. They allow better centering of the drill and allow it to be held closer to the spindle bearing. This eliminates the overhang of chuck-type machines. It is particularly important in high speed, small hole drilling where small imbalances and a large overhang can cause problems. Type WW collets are available in a complete range of sizes from .004 inch (.1mm) to .252 inch (6.4mm). A 1/8 inch (3.2mm) Albrecht chuck can be adapted to the collet spindle models by using an appropriate arbor for collet style WW to Jacobs #0 taper. (Part #01841)

☐ **NOTE** *Make sure the collet receiver taper in the spindle, the collet, and the tool are clean to maintain concentricity and avoid damage. If there is oil on the tool shank or inside the collet, wash them in acetone and then dry carefully. The tool may pull out if the tool and collet are not completely dry.*

Step 1: Lift off the top half of the black plastic belt cover to access the drawbar. The top of the drawbar has a hex knob and a Philips head screw. Be sure the screw is 2 or more turns loose.

- Step 2:** Insert the collet into the spindle. Rotate the spindle with one hand while holding the collet with the other, and gently pushing it up. When you feel the slot in the collet click into the spindle key, you can push the collet up to the drawbar. Turn the drawbar enough to engage a few threads.
- Step 3:** Insert the tool into the collet, at least far enough to ensure a good grip.
- Step 4:** Hand tighten (turn CW) the hex drawbar knob on top of the spindle until it grips the tool firmly.
- Step 5:** Hold the bottom end of the spindle with the supplied open end wrench. Tighten the Phillips head screw on the top of the drawbar, using a #2 Phillips screwdriver. When the screw is tight you will have drawn up the collet enough to hold the drill so it won't slip. Doing the final tightening with a screwdriver is a convenient way of limiting the drawbar torque to a safe value. If you want to do the tightening with just the hex knob, that is ok as long as you don't exceed 25 lb-in torque. Above that, the drawbar may break.

CAUTION

Over tightening may damage the draw bar, but "finger tight" is usually not tight enough.

- Step 6:** Replace the cover. It serves as a safety shield to protect you from rotating parts as well as protecting the head.

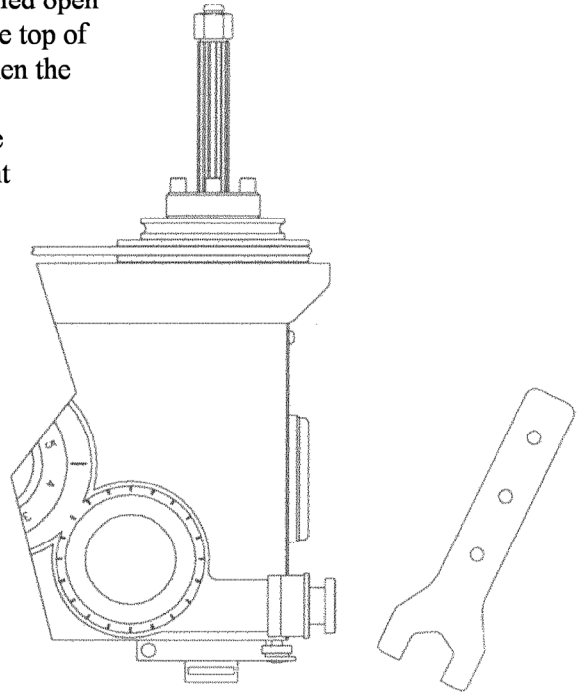


Figure 6. Setting tools.

Removing Tools from Collet Spindles

*** TIP** Put some soft padding right under the spindle to protect tools or chucks that may be dropped accidentally.

- Step 1:** Remove the black plastic cover on the head.
- Step 2:** Rotate the draw bar knob counter-clockwise. If tight, get leverage by using a 7/16" hex wrench on the draw bar knob and the draw bar wrench on the spindle nose. Rotate the draw bar knob until collet and tool drop out, hopefully into your hand.
- Step 3:** Replace the cover.

REMOVING TOOLS COLLET SPINDLES

PREVENTIVE MAINTENANCE

MAINTENANCE

CAUTION

Do not attempt to replace the spindle bearings. A special fixture is required to install the bearings correctly.

The following list is the minimum recommended spares.

Quant	P/N	Item
6	02800	Spindle drive belt
6	01283	Spindle motor brush
2	05744	Spindle motor brush holder
8	00573	Spindle motor brush cap

A little effort in preventive maintenance can provide a large benefit in up-time. The system has a high level of reliability when properly maintained.

Cleanliness

- Use a shop vacuum cleaner to remove chips. **Do not** use air to blow off chips. This can blow chips into areas that are normally inaccessible. The chips can build up and eventually cause problems.
- Do not allow liquid (such as coolants) to get into the motor housing.
- Keep the air vent on the motor controller clean to permit proper air flow. There is no filter to be changed, but the air passage must be open to allow air to flow across the heat transfer system.

Quill Lubrication

- For smooth operation, periodically lubricate with WD40 spray. Wipe the quill with clean cloth or clean paper towel. Repeat as required.

Mechanical Maintenance

- Check the condition of the spindle drive belt weekly by removing the black plastic cover on the head. See below for the procedure for replacing the spindle drive belt.
- Check the spindle motor brushes every month or more often if you are running multiple shifts. See the next page for the procedure.

Spindle Drive Belt Replacement

The spindle drive belt is Servo part #02800 and is (2) on figure 4. It is an O-ring type belt. A spare is included with the shipment.

To check or change the spindle drive belt, remove the black plastic cover on the head. Make sure the belt is not cracked or too loose.

*** TIP** When removing the belt, first pull it away from the motor pulley. Trying to stretch the belt over the spindle may stretch the belt too much.

SPINDLE DRIVE BELT REPLACEMENT

Spindle Motor Brush Replacement

SPINDLE MOTOR BRUSH REPLACEMENT

WARNING

Before checking or changing the brushes, unplug the spindle power cable from the wall outlet. The brushes are at line potential.

- ❑ **NOTE** *Running the spindle motor at three-quarter speed will greatly extend brush and commutator life. If your process does not require the higher speed, don't use it.*

The spindle motor brushes are Servo part #01283. There are two brushes, one on either side of the head toward the back. Check the spindle motor brushes every two weeks. When only 3/16" is remaining, they must be changed.

Step 1: Use a flat head screw driver to unscrew the brush cap #00573. (The brush caps are (10) on figures 1 and 2.) The brush is on a spring and can be pulled out easily.

Step 2: When replacing the brush, make sure it is aligned with the brush holder. The clip on the end of the spring must also align properly. Then replace the brush cap.

- ❑ **NOTE** *When re-installing an old brush, insert it the same way it came out. Be careful not to rotate the brushes 180° when checking. This prevents having to "break in" the brush.*

CAUTION

New brushes must be broken in! Run the new brushes at low spindle speed for several hours before running at high speed.

Commutator

COMMUTATOR

After brushes have been replaced two or three times, it may be necessary to replace the armature or turn the commutator. Check with Servo Products Technical Support before undertaking this procedure.

Step 1: Remove both motor brushes before removing the armature.

Step 2: To remove the armature:

- Take off the black cover and the belt.
- Remove two screws holding the motor end bell in place.
- Pull the motor assembly out and remove the armature.

Step 3: Turning the armature:

On a lathe, use a very sharp tool to give the smoothest possible finish. The commutator must not run out more than .0005" TIR. The commutator slots may need to be undercut after turning. Slot width is .025 inch.

Step 4: Reinstall the motor assembly. Be sure the brushes are **not** in place when reinstalling the armature. Install the brushes after the armature is in place.

SPINDLE MOTOR SPEED CONTROL INSTALLATION/ REMOVAL

Spindle Motor Speed Control Installation/Removal

WARNING

Before removing or installing the speed control unplug the spindle power cable from the wall outlet.

The spindle motor speed control may need to be repaired or replaced if resetting the spindle motor circuit breaker does not get the spindle going again. The circuit breaker (23) is under the black plastic cover on the head.

Step 1: Remove the socket screw (19) that is located on the middle right side of the head.

Step 2: Grasp the speed control knob (9) and pull it straight out. The speed control will hang by its wires. **Do not** pull too hard or you may damage the wires and/or the circuit board. **Do not** disconnect or unsolder any wires. The speed control can be removed from the unit by disconnecting the Molex connector.

Remove the cap plug (24) on top and use your other hand to help to remove the assembly.

Step 4: Reinstall the new speed control by reversing the directions in Step 2. Rotate the speed control so that the speed reference mark is closest to the front of the machine.

TIPS ON SMALL HOLE DRILLING

TIPS ON SMALL HOLE DRILLING

☐ **NOTE** *The following information is provided solely for customer information in regards to small hole drilling. Servo Products Company can in no way assume any responsibility for damage.*

General

The product line of precision sensitive drill presses addressed in this manual are suited for small hole drilling in the range of .004 inch (.1mm) to 1/8 inch (3.2mm). Cutting tools up to 1/4 inch (6.35mm) can be held by the WW collet type of machines. The size range from 1/8 inch (3.2mm) to 1/4 inch (6.35mm) is for work only in most non-ferrous metals and plastics.

For purposes of this discussion, small hole drilling will be defined as covering the range from .004 inch (.1mm) to 1/16 inch (1.59mm).

One of the most important factors involved in small hole drilling is the ability of the cutting tool to accomplish "work" at a predetermined rate. This ability is considerably reduced with small cutting tools over their larger counterparts due to the delicate nature of their construction and the problems encountered with uniform hand feeding rates.

An additional factor when using small cutting tools is the percentage of "runout" relative to their diameter. As an example, if a .500" (12.7mm)

diameter cutting tool has a Total Indicated Runout (TIR) of 5%, this would amount to .025 inch (.64mm). This amount of runout would be readily noticeable to the operator. However, when the same percentage of TIR is applied to a diameter of .005 inch (.127mm), this results in a runout of only .00025 inch (.00635mm) which would not be readily observed by the operator. From the above comparison, it is apparent that while the amount of TIR is relatively small as an absolute amount for the .005 inch (.127mm), it is just as damaging to the finished hole size and to potential drill breakage as the TIR is for the .500 inch (12.7mm) diameter cutting tool.

The above comparison outlines the importance of maintaining the TIR to as low a percentage of the tool diameter as practical. This is the reason the collet system of chucking is preferred over the three-jaw chuck since the TIR for the collet system is approximately 1/5 to 1/3 the value of the three-jaw chuck. Generally speaking, the TIR of the collet system will run within .0002 inch (.0051mm) to .0003 inch (.0076mm). The TIR for the three-jaw chuck will run within .0005 inch (.027mm) to .0015 inch (.0381 mm).

Cutting Tool RPM

The rpm is most important when drilling small holes, particularly in the more exotic ferrous metals covering all of the high strength steels including stainless steel. The best rule to follow is to start at a low rpm such as 1,000 and gradually increase the speed as a "feel" is developed for the proper feed rate to maintain a continuous chip structure. When the drill starts to enter the work, it is extremely important that the feed pressure be maintained in a sufficient amount to immediately start cutting while at the same time not overloading the drill, which would cause breakage. This technique will prevent "work hardening" on the surface of the material to be drilled during the early entry stages of the drill point. A typical speed range for these materials would be between 1,000 and 5,000 rpm.

The rpm for non-ferrous metals can generally be increased approximately three times over the ones outlined above. Some materials such as hard brass, etc. would be required to start at a slower speed and slowly increase the rpm until the proper chip is produced.

The drilling of plastics and printed circuit boards can generally be accomplished in the higher ranges of speeds between 10,000 and 20,000 rpm.

When using diamond drills in hard materials such as glass, ceramics, sapphire, etc., rpm would be in the 2,000 to 5,000 region. It is most important that the diamond drill be permitted to cut the work without being forced and the rate of "pecking" be in the 1-3 second time interval.

CONTACTING TECHNICAL SUPPORT

HELP!

If you are having a problem, call Servo Products Technical Support, 440-942-9999 or 800-521-7359. Have the following information available:

Servo Product Model # _____

Product Serial # _____

RETURN AUTHORIZATION

☐ **NOTE** *Do not return any item to Servo Products Company without first receiving a Return Authorization (RA) number from Servo Products Company. Package the item properly to avoid additional damage. Also include the company name, address, telephone number, name of contact, and reason for return. If we don't know what's broke, we can't fix it!*

These conditions must be met for Servo Products Company to accept returned goods from customers for in-warranty or out-of-warranty repairs.

1. The freight must be prepaid on all products sent to Servo Products Company for warranty repair. Servo Products Company will pay the return surface freight on all products under warranty. We will repair or replace, at our own option, products which prove to be defective during the warranty period.
2. The freight will be paid by the customer both ways on products which are not under warranty and the repaired item will be returned C.O.D.

Forward all shipments to:

Servo Products Company
34940 Lakeland Blvd.
Eastlake, OH 44905

OPTIONS AND OTHER PRODUCTS

TOOLING SUGGESTIONS

Tooling Suggestions

- WW collets .004" to .252" (.1mm to 6.4mm)
- Miniature vise
- Set of Allen wrenches
- Albrecht keyless chuck (accessory part #00944) with WW collet to Jacobs No. 0 taper adaptor (accessory part #01841) (for drilling only)
- WW arbors, boring head, fly cutter, etc.

WW collets and basic mini drill/mill tooling are available from Servo Products Company.

Option Model 705

Standard Mill Head Adaptor Kit

Model 705 mounting kit adapts all Servo precision drill press heads to a Bridgeport-type mill that provides a rigid XY table. The device fits the R8 taper in the spindle of the milling machine and a dual collar locks the quill on the mill spindle firmly together as one unit.

Option Model 708

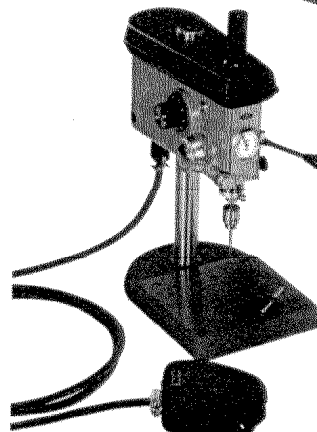
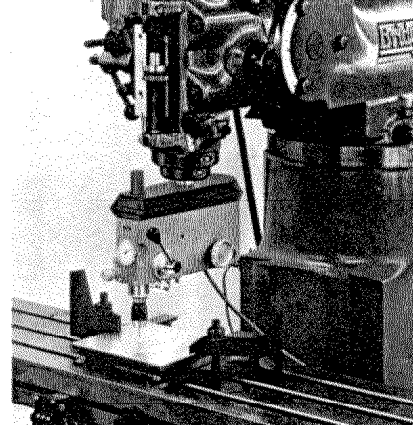
Microprocessor-Controlled Quill Feed

The Model 708 Micro Driller is a microprocessor-controlled quill feed linked to any of Servo's 7000 Series precision milling machines. Automatic peck drilling and reaming cycles are programmed and initiated from the keyboard. Input values are displayed in red 5/8-inch LED numerals. The unit features feed rates from .01 to 30 inches per minute (.25 to 750mm per minute) and peck steps from .001 to 1.400 inches (.02 to 35.6mm). Programmable dwell, chip clearing offset, and ability to decrease peck step size as the hole deepens permit routine drilling of deep holes with small drills. A foot switch is available as an accessory.

Option Model 709 (Factory installed only)

Drill Tap Control

All Servo precision drill presses may be ordered with a unique feature which eliminates the requirement for a separate tapping attachment. The normal operation of the machine remains unchanged when adding this additional capability. The modifications to the head include a toggle switch that can select either drill or tap mode and a small multi-pin electrical receptacle for connecting a floor foot control reversing switch which is provided. The drill/tap mode select toggle switch has three positions: the central position is OFF, the up position is normal drilling operation, and the down position is tap mode. In the tap mode, the motor runs over a lower speed range with foot switch reversing to allow tapping to the desired depth and then instant reverse to bring the tap out. Tapping capacity in steel is #0000-#8/MO-M4.

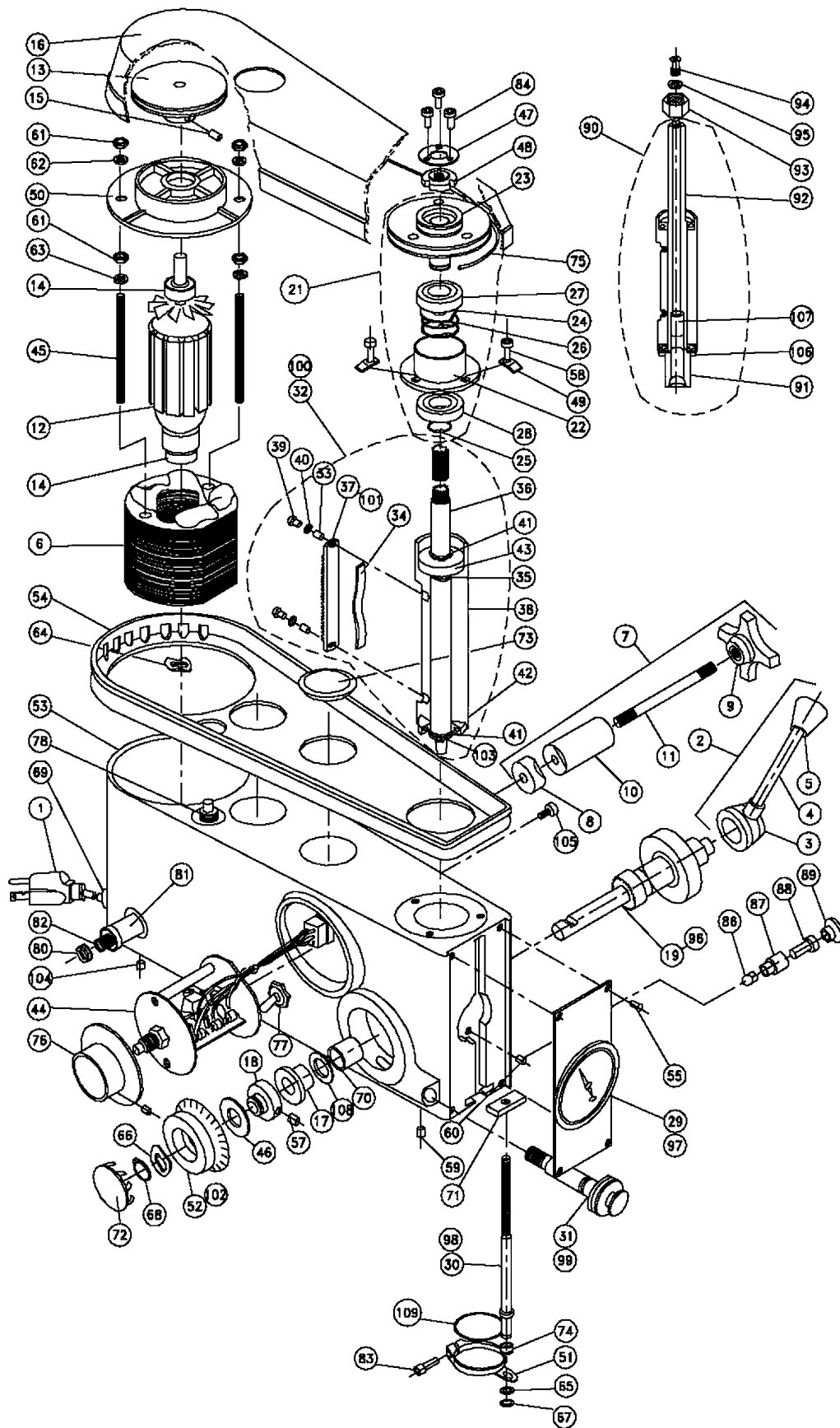


SERVO DRILL PRESS HEAD PARTS LIST

Ordering instructions:

1. Serial number and model number must be specified on all parts orders.
2. Parts may be ordered as complete assembly or individually where listed.
3. For Quill Lock, Collet, and Metric Models, see following pages.

Item	Quant.	Part #	Description
1	1	2770	Assembly - Power Cord
2	1	3886	Assembly - Hand Lever
3	1	1077	Assembly - Hand Lever Clamp Ring
4	1	1075	Shaft Hand Lever
5	1	00822	Knob
6	1	0349	Assembly - Field
7	1	1054	Assembly - Column Clamp
8	1	1057	Nut Column Clamp
9	1	05294	Knob, 4 Prong Black Phen.
10	1	1056	Sleeve Column Clamp
11	1	05295	1/4-20 x 3" Threaded Steel Stud
12	1	1155	Assembly - Armature
13	1	2794	Pulley
14	2	00553	Bearing
15	2	01745	6-32 x 3/16" Socket Set Screw
16	1	2798	Assembly - Cover
17	1	2808	Assembly - Worm Gear
18	1	2809	Assembly - Dial Bushing
19	1	1069-1	Assembly - Cross Shaft (inch)
20			No longer used.
21	1	1856	Assembly - Spindle Pulley
22	1	1849	Pulley Support Housing
23	1	2793	Spindle Pulley
24	2	3331	Washer Wave
25	1	01207	Retaining Ring
26	2	01938	Retaining Ring
27	1	05244	Bearing
28	1	05244	Bearing
29	1	2184-1	Assembly - Dial Indicator
30	1	2185-1	Assembly - Dial Indicator Rack
31	1	1061-1	Assembly - Down Stop
32	1	1874-1	Assembly - Quill Inch
33	2	1279	Bushing Rack
34	1	1280	Spring Rack
35	2	3331	Washer Wave
36	1	1879	Spindle
37	1	1067-2	Rack Quill
38	1	1847	Quill
39	2	05001	4-40 x 1/4 Phillips Pan Head Screw
40	2	04926	SS Flat Washer
41	2	01207	Retaining Ring
42	1	05244	Bearing
43	1	05244	Bearing
44	1	3414-1	Assembly - Circuit Board
45	2	05603	Stud - Field
46	1	1081	Gasket - Friction
47	1	1841	Clamp - Disc
48	1	1843	Drive - Ring
49	2	2977	Clip - Cover
50	1	3805	Motor - End Bell
51	1	57633	Clamp - Dial Indicator
52	1	1080-2	Dial - Cross Shaft
53	1	1858-1,-2	Housing - Drill Press
54	1	3762-1	Cover - Bottom
55	4	00811	2-56 x 3/16 Phillips Pan Head Screw
56			No longer used.
57	1	05060	8-32 x 5/16 Long Socket Set Screw w/ Nylon Patch



N859649

Item	Quant.	Part #	Description
58	6	00796	6-32 x 3/8 Socket Head Cap Screw
59	1	05063	6-32 x 3/16 Half Dog Pt. Socket Set Screw
60	1	00507	10-32 x 3/16 Half Dog Pt. Socket Set Screw
61	4	01117	8-32 Hex Nut
62	2	00520	#8 Split Lockwasher
63	2	01118	#8 Lockwasher
64	2	00555	Washer - Wave
65	1	00751	Washer - Fiber
66	1	00790	Washer - Wave
67	1	00739	Retaining Ring
68	1	00821	Retaining Ring
69	1	01864	Heyco Clip
70	1	01291	Bushing
71	1	1310	Seal Felt
72	1	00899	Cap Plug
73	1	00952	Cap Plug
74	1	01292	O-Ring
75	2	02800	Drive Belt
76	1	01409	Knob Speed Control
77	1	00987	Power Switch
78	1	01149	Circuit Breaker 1.8A
79			No longer used.
80	2	00573	Brush Cap
81	2	01282	Brush Holder
82	2	01283	Brush
83	1	01859	4/40 x 1/2 Socket Head Cap Screw
84	3	02481	4-40 x 3/8 Socket Head Cap Screw
85	1	00944	Chuck Albrecht

QUILL LOCK

86	1	3254	Shoe
87	1	2792	Quill Lock Bushing
88	1	01777	1/4-28 x 1/2 Socket Head Cap Screw
89	1	01481	Shear Lock Thumb Screw

COLLET

90	1	1836-1	Assembly - Quill
91	1	4829	Assembly - Spindle Collet with Groove Pin
92	1	57659	Draw Bar
93	1	57272	Knob - Draw Bar
94	1	57861	Screw - Draw Bar
95	1	05667	Washer - Conical

METRIC

96	1	1069-2	Assembly - Cross Shaft
97	1	2184-2	Assembly - Dial Indicator
98	1	2185-2	Assembly - Dial Indicator Rack
99	1	1061-2	Assembly - Down Stop
100	1	1874-2	Assembly - Quill
101	1	1067-3	Rack Quill
102	1	1080-3	Dial Cross Shaft

ITEMS OUT OF SEQUENCE DUE TO CHANGES

103	1	57662	Seal, Slinger, Chuck
104	2	01745	6-32 x 3/16 Lg Socket Set Screw
105	1	05586	6-32 x 3/8 Nylon Filister Head Screw
106	1	57629	Seal, Slinger, Collet
107	1	1844	Spindle, Collet
108	3	00803	Washer, shim
109	1	07796	O-Ring

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Use this page wisely.

This Manual was created in an alternate universe by endemic alien engineers.