

SERIES 27

# OPERATING INSTRUCTIONS AND PARTS LIST

SERIES 27

## DUMORE MICRO-DRILL

MODEL NUMBER 8248

The Model number of the series 27 micro-drill is identified by the first four digits of the serial number shown on the motor name plate.

### INSTRUCTIONS FOR ORDERING PARTS

All parts listed herein may be ordered from your dealer, from any authorized Dumore Service Station, or direct from the factory. When ordering repair parts, always give the following information:

- 1) The part number in this list.
- 2) The part name in this list.
- 3) The catalog and serial number of your drill.

Filing this list for future reference will assure you of obtaining proper parts for service.

### OPERATING INSTRUCTIONS

#### SPECIFICATIONS

**MOTOR** - 1/16 HP universal type, 0-60 cycles, 115 volts, 17,000 RPM no load. Speed adjustable by voltage control.

**SPEED CONTROL** - Variable autotransformer type, 50-60 cycles only, input voltage 115, output 0-115 volts, 1.25 amperes maximum. Speed Control box contains a stepdown transformer providing 3.6 volts for the lamp circuit, and switches for individually controlling the motor and lamp. Speed adjustable from 0 - 17,000 RPM.

**JACOBS CHUCK CAPACITY** - 0 - 5/32"

**MAGNETIC CHUCK** - 3 collets, .030", .040", and .061" for all standard pivot drill shank sizes. Two magnetic drivers for drills from .001" to .020" diameter.

#### MICROMETER DEPTH CONTROL

3.6 VOLT SPOT LIGHT mounted on flexible arm.

#### TEN-POWER TRIplet LENS MAGNIFIER

#### TWO COUNTERBALANCE WEIGHTS

#### PLASTIC DUST COVER

#### DIMENSIONS:

TABLE TO MAGNETIC CHUCK COLLET: 3.3" Maximum  
VERTICAL TABLE TRAVEL: 1-5/8" without micrometer depth control.  
VERTICAL TABLE TRAVEL: 0.7" with micrometer depth control.  
MICROMETER DEPTH CONTROL RANGE: .450"  
OVERALL HEIGHT: 17"  
BASE: 5" x 8"  
TABLE DIAMETER: 3-1/2" with 20 holes tapped 10-24.  
CAT. NO. 27-022 TABLE CROSSFEED: 1" in either direction.

#### POWER SUPPLY

The motor operates on 115 volt supply of any frequency from 0 - 60.

The MICRO-DRILL Speed Control input must be 115 volts, 50-60 cycles. If it is desired to operate the MICRO-DRILL on D.C., a rheostat, Dumore Catalog 2-247 must be used instead of the MICRO-DRILL Speed Control.

#### ASSEMBLY AND SET-UP INSTRUCTIONS

The MICRO-DRILL is shipped unassembled but in units or sub-assemblies that make it easy to assemble. The procedure for assembly of the multiple-hole is outlined step by step on page 8. Also, the photographs accompanying the parts list show the relative position of all components.

The MICRO-DRILL should be set up in a vibration-free location. Excessive vibration, especially high frequency types, can cause the drill to creep out of concentricity.

Adjust fulcrum mounting bracket (Item No. 29 or 34) so that the lever arm (Index No. 18) and the counterbalance lever (Item No. 11) are approximately horizontal when the table is positioned in mid-point of desired travel. This is desirable for obtaining maximum sensitivity.

#### COUNTERBALANCING

Adjust the counterbalance weights, with the fixtures and workpiece in place, permitting the table to have a slight

(Continued on page 7)

DUMORE  
THE  
RACIN **D-260**



**MULTIPLE**





## MICRO-DRILL





use the Micrometer Depth Control as a feed control while learning the technique. In some metals that tend to workharden, a continuous pressure is recommended, provided chip removal is adequate.

Hard spots in the work can often be penetrated by the use of a pecking action. Do not let the drill skate, as this tends to workharden the bottom of the hole. Size and shape of chips should be observed at all times. Two of the best indications of a dull drill are:

1. The increase of pressure required to drill.
2. The presence of a smoky substance around the hole mingled with an occasional full sized chip. This substance is powdered metal removed by the rubbing action of a dull drill, and increased pressure under such conditions will break the drill.

#### WORKPIECE POSITIONING

Accurate positioning of holes within .001" is assured in the multiple hole unit by the use of indicators with 1" range, and especially selected for extreme accuracy. Because the indicator gives the actual position of the table at all times, the problem of lead screw backlash need not be considered.

On the single hole model, Cat. No. 27-011, the workpiece must be manually located in the proper position for drilling. While hand

holding of the workpiece can be done by skilled operators, it is recommended that the piece be mechanically clamped or fastened in a fixture.

#### DRILL SHARPENING

Proper drill sharpening procedure should not be ignored by the user of any micro-drilling machine. Drills can be resharpened. Replacing dull drills is expensive, especially when drilling hard, tough materials. Drills can be resharpened by hand with the use of a small 1/4" or 3/16" sq. Arkansas stone. The stone should be ground to a thin wedge sharp on the end to about 1/2" back on both sides. This enables the operator to retouch his drill while it is still mounted in the machine, the thin wedged stone can maneuver in the limited working space available under such conditions. The stone may easily be ground on a "Crystolon" wheel -- used to rough out carbide tool bits. Do not attempt to grind Arkansas stones on a hard wheel -- the stone will chip, crack, and break up faster than can be ground away.

The clearance and drill point angle must be equal and centered as in large drills in order to operate efficiently. A stereo microscope will help in sharpening drills so that the operator can closely observe the drill sharpening operation and also inspect the finished work before proceeding.

## ASSEMBLY INSTRUCTIONS FOR MULTIPLE-HOLE UNIT

(Numbers in brackets refer to numbers on photographs)

1. Unpack carefully.
2. Mount table assembly on the column (36) and lock in place with handwheel.
3. Mount flexible arm bracket (26) on column, with knurled knob to right front.
4. Mount motor assembly on column and lock in place with handwheel.
5. Attach counterweight arm (11) on left hand side using shoulder screw (14) and having small pin on cam (18) in slot of counterweight arm. Slide counterweight (13) on arm.
6. Mount indicators (3 & 3A) in bracket (25) having stem just touching contact brackets (8). Cross feed screws (15 & 22) can now be operated.
7. Using hexagon wrench from magnetic chuck kit, loosen lock screw of micrometer depth control (4) and move feed control down on the table spindle and lock in place. Table (1) should now be free to move up and down when handwheel (6) is operated.
8. On left side of bracket (26), insert the light flexible arm assembly (23) and secure with cap screw being careful to clamp just tight enough to keep arm from falling.
9. Mount viewer and bracket (24) using the two front vent holes of motor housing as shown in photograph of unit.
10. Light cord (39) is attached by inserting one end into the flexible arm assembly (23) and the other end into the jack on side of speed control box.
11. Motor cord plug is inserted in outlet on speed control box.
12. Plug in power supply cord of speed control into a 115-volt outlet.
13. Refer to Instructions for operation and adjustment.

## MAINTENANCE INSTRUCTIONS

#### LUBRICATION

The motor requires no lubrication. It is equipped with grease sealed ball bearings that are lubricated for the life of the bearing.

Oil the table shaft occasionally with a few drops of No. 0 Dumore oil. Then work the table feed up and down a few times to distribute oil along the shaft. A few drops of oil on the feed gear is also occasionally recommended.

#### BRUSHES

Normal brush life varies from 500 to 2000 hours depending on the severity and continuity of service. Inspect brushes periodically and wipe clean before returning them to their respective brush holders if they are long enough for additional use. Each brush should be returned to its exact position before removal to prevent changes in the brush seating. Brushes should be replaced when worn to 1/4" length. Occasionally inspect the commutator for excessive wear or grooving. Whenever brushes are replaced, the commutator should be turned down and undercut. New brushes on a badly worn commutator will spark excessively, giving very little wear. When brushes need replacement and the commutator has to be turned down and undercut, disassemble the motor and clean it of all grit and grease. When the motor is re-assembled, it will be in excellent

operating condition to give a considerable number of hours of trouble free service.

If the MICRO-DRILL requires servicing, the operator will find it to his advantage to consult the Dumore Company, and whenever possible, to send the MICRO-DRILL in for a thorough inspection.

Always use genuine Dumore parts for longer tool life and better performance. These parts may be ordered through your Dumore distributor, or directly from the Dumore Company.

#### STORAGE

When not in use, keep MICRO-DRILL in a clean, dry place and protected with the dust cover supplied with each unit. When storing for a long period of time, coat exposed metal parts with a rust preventive grease.

#### REPAIR SERVICE

This MICRO-DRILL is made with the highest quality material and workmanship and if not abused should give long and trouble free service. If, for any reason, this MICRO-DRILL does not operate satisfactorily after the above precautions have been taken, return it to your nearest Dumore service station or direct to the Dumore Company, Racine, Wisconsin to secure prompt and efficient service with original factory parts and methods.

## GUARANTEE

All Dumore products are thoroughly checked and tested before shipment.

THE DUMORE COMPANY guarantees this product against imperfections in workmanship and material for a period of 90 days after purchase, and will replace without charge any part that proves defective during that period. Guarantee does not apply to parts failing due to ordinary wear, abuse, or accidental damage, and does not apply if the tool has been tampered with in any way. Defective materials in warranty should be returned PREPAID to THE DUMORE COMPANY -- RACINE, WISCONSIN, or to an authorized service station.

# THE DUMORE COMPANY, RACINE, WIS.



# PARTS LIST

Index numbers refer to either a single part or to an assembly. Motor parts are listed separately on page 5

ITEM	PART NUMBER	PART NAME	REQ.
1	R-752-0010	Table .....	1
2	R-444-0119	Table Support .....	1
	R-565-0006	Short Gib .....	1
	R-561-0059	Table Gear .....	1
	R-822-0306	Gib Set Screw 4-40 x 3/16 .....	4
	R-822-0414	Gear Set Screw 10-32 x 1/4 .....	1
3	R-573-0007	Indicator .....	1
3A	R-573-0006	Indicator .....	1
4	R-790-0003	Micrometer Infeed Stop Assembly .....	1
	R-788-0016	Allen Wrench No. 10 .....	1
5	R-699-5069	Long Compensator Screw .....	1
	R-645-0200	Compensator Nut 1/4-28 Thread .....	1
6	R-618-0008	Hand Wheel .....	1
	R-702-0065	Gear Shaft .....	1
7	R-878-0004	Hand Wheel & Shaft Assembly .....	1
	R-720-0069	Shaft Sleeve .....	1
	R-502-0080	Lock Collar .....	1
8	R-444-0114	Indicator Contact Bracket .....	2
	R-699-5073	Limit Screw .....	1
	R-830-0413	Cap Screw 10-24 x 1/4 .....	1
9	R-699-5067	Thumb Screw .....	1
10	R-699-5071	Short Compensator Screw .....	1
	R-645-0200	Compensator Nut 1/4-28 Thread .....	1
11	R-632-0014	Counterbalance Lever .....	1
12	R-699-5065	Counterweight Clamp Screw .....	1
13	R-416-0019	Counterweight 1 lb. 6 oz. ....	1
	R-416-0020	Counterweight 13 oz. ....	1
14	R-699-5064	Fulcrum Pin Screw .....	1
15	R-699-5112	Long Lead Screw .....	1
	R-822-0314	Knob Set Screw 10-32 x 3/16 .....	1
	R-618-0007	Lead Screw Knob .....	1
	R-720-0082	Lead Screw Sleeve .....	1
	R-766-0377	Brass Washers .....	2
16	R-444-0115	Lead Screw Mounting Bracket .....	1
	R-830-0711	Mounting Bracket Cap Screw 8-32 x 3/8" .....	2
17	R-444-0116	Knee Bracket .....	1
	R-565-0005	Long Gib .....	1
	R-822-0306	Knee Bracket Set Screw 4-40 x 3/16" .....	4
18	R-413-0013	Lever Arm .....	1
	R-456-0065	Brass Plug .....	1
	R-655-0129	Lever Arm Pin .....	1
	R-822-0718	Lever Arm Set Screw 1/4-20 x 3/8 .....	1
19	R-655-0128	Table Stabilization Pin .....	1
20	R-494-0025	Stabilization Clip .....	1
	R-830-0707	Clip Set Screw 5-40 x 3/8" .....	1
21	R-444-0117	Lead Screw Mounting Bracket .....	1
	R-830-0711	Mounting Bracket Cap Screw 8-32 x 3/8" .....	2
22	R-699-5070	Short Lead Screw .....	1
	R-618-0007	Lead Screw Knob .....	1
	R-822-0314	Knob Set Screw 10-32 x 3/16" .....	1
	R-720-0071	Lead Screw Sleeve .....	1
	R-766-0377	Brass Washer .....	2
✓ 23	R-413-0018	Light & Flexible Arm Assembly Complete .....	1
	R-616-0003	Lamp .....	1
	R-413-0017	Flexible Arm Assembly .....	1
24	R-659-0002	Triplet Lens .....	1
	R-496-0011	Lens Body .....	1
	R-859-0010	Eyeiece .....	1
	R-413-0016	Viewer Arm Assembly (Not including eyeiece assy.) ...	1
	R-699-5113	Viewer Adjusting Screw .....	1
	R-699-5114	Viewer Height Adjusting Screw .....	1
25	R-444-0118	Indicator Mounting Bracket .....	1
	R-830-1313	Cap Screw 10-24 x 3/4 .....	2
26	R-444-0112	Light and Lens Arm Mounting Bracket .....	1
27	R-830-0913	Cap Screw 10-24 x 1/2 .....	2
28	R-444-0113	Knee Support Bracket .....	1
29	R-444-0121	Fulcrum Support Bracket .....	1
	R-830-1813	Cap Screw 10-24 x 1-1/8" .....	1
	R-830-1513	Cap Screw 10-24 x 7/8" .....	1
31	419-0086	Base .....	1
36	504-0001	Column .....	1
37	456-0043	Column Cap .....	1
38	R-535-0007	Speed Control .....	1
39	R-517-0133	Cord Assembly (Control to Light) .....	1
40	R-583-0007	Large Magnet Holder .....	1
	R-583-0008	Small Magnet Holder .....	1
41	R-487-0045	Cup Collet Assembly (.040 Dia.) .....	1
	R-487-0046	Cup Collet Assembly (.030 Dia.) .....	1
	R-487-0047	Cup Collet Assembly (.061 Dia.) .....	1
42	R-788-0036	Wrench .....	1
	Cat. No. 27-050	Magnetic Chuck Kit Asby.-Consisting of Items 40 Thru 42 In Wood Case	1
43	R-520-0065	Dust Cover (Not Shown) .....	1



tendency to lower. Proper adjustment procedures will vary according to size and weight of workpiece and fixture. It is better to use a heavy weight near the pivot point than a lighter weight further from the pivot point.

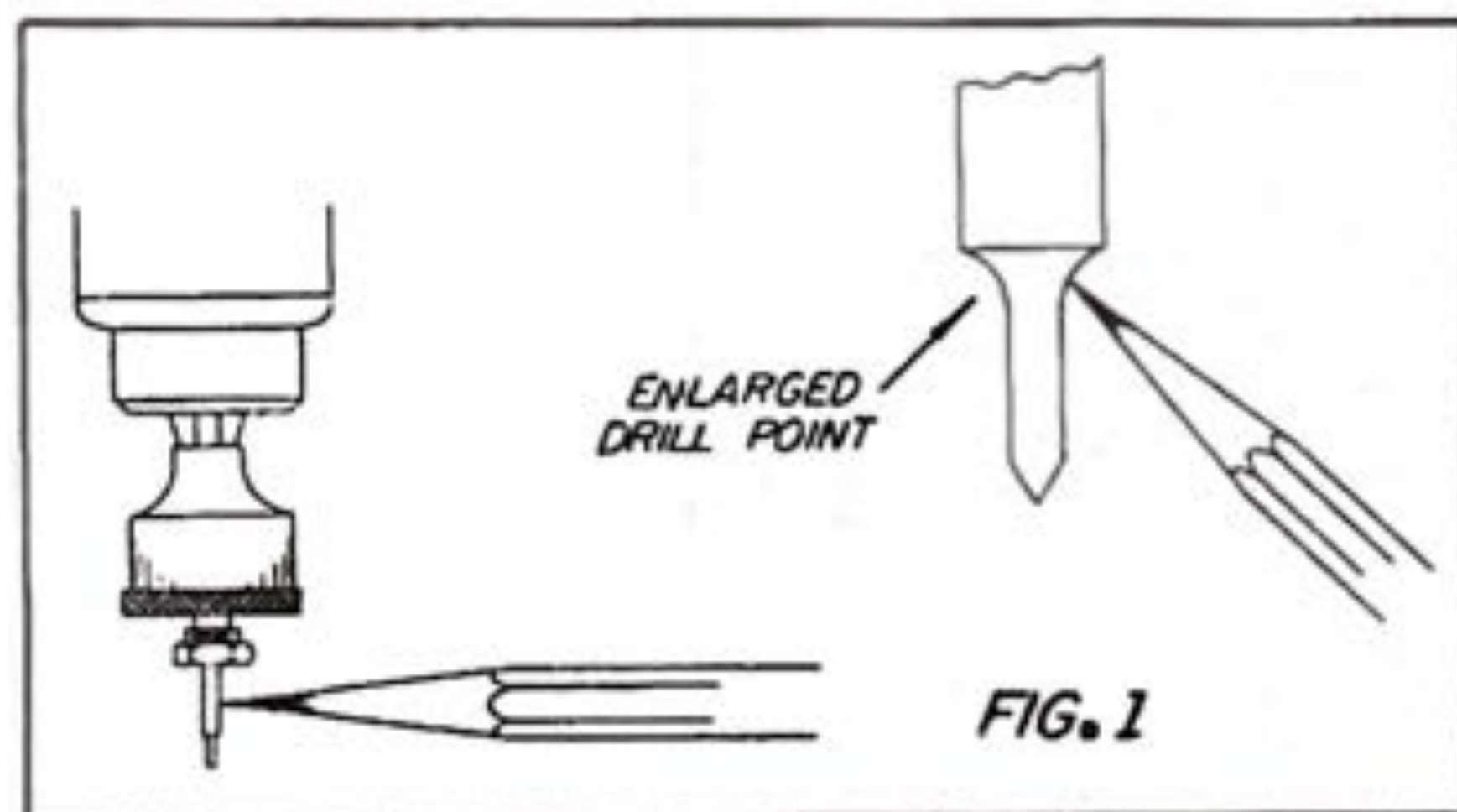
#### MOUNTING OF MAGNETIC CHUCK AND DRILLS

Select the appropriate magnetic driver, large for drills .006" to .020" diameter, small for .001" to .006" diameter. Insert magnetic driver shank in Jacobs Chuck, alternate the tightening and rotation of driver shank in Jacobs Chuck until driver housing runout is at a minimum. Insert the shank of the desired drill in the proper collet, maintaining the shortest practical distance between tip of drill and collet. For pivot drills with extremely long shanks, either extend the excess shank thru the collet into the center hole of the magnetic driver, or shorten the shank by grinding or snipping off the excess, being careful to remove any burr before inserting drill in collet. Tighten tapered collet nut and place the collet on the driver.

**CAUTION:** Do not allow fingers or other holding device to come in contact with drill. Use the shank only for holding purposes. Contact with the drill tip will cause either bending or instant breakage.

#### TRUING OF DRILLS

With the chuck rotating at approximately 1,500 RPM, true the drill quickly in two stages by (1) exerting a light pressure on the drill shank, then (2) on the base of the drill proper, where it joins the shank, and not on the drill point. A lead pencil, sharpened to a chisel edge makes a good tool for applying pressure on the drill shank. See Figure No. 1.



Most pivot drills vary from .0002" to .0007" total indicated runout of drill point to shank, according to the manufacturer's standards. A major factor in long drill life is drill concentricity while in operation. To check on concentricity, observe the drill point closely while varying motor speed from 100 to 1,200 RPM. Drill runout will become immediately apparent. A drill runout of .0005" in a .002" dia. drill is equivalent to a runout of 1/4" in a 1" drill. The .002" dia. drill with such a runout practically has no chance of survival. The rotating but slideable feature of the Dumore Magnetic Chuck permits the operator to obtain the all important drill concentricity together with a quick change feature provided by no other chuck.

A little practice will prove that this operation can be done easily and quickly--within a few seconds, with no danger to delicate drills. A true-running drill is a necessity for successful micro-drilling.

#### DRILLS

Both wire drills (twist and flat types), and pivot drills can be used in the Dumore MICRO-DRILL. Wire drills are commercially available as small as .006" diameter, and pivot drills .001" diameter. The easy centering feature of the Dumore Magnetic Chuck permits the use of inexpensive types of pivot drills (which may have a total indicated runout approaching .001".) The more expensive types have, of course, greater accuracy in total indicated runout, and hold drill diameters to within .0002". Extra drill length is usually available on special order from most manufacturers.

#### SPEEDS

Optimum operating speeds vary according to drill diameter and workpiece material. Drill speeds range between 150 and 3,000 RPM. Contrary to popular opinion, extremely high speeds for micro-drilling are not only unnecessary, but could seriously reduce drill life. Standard practice of "smaller the drill, the higher its speed" holds true only

down to drills of approximately .020" diameter. From this point, as drill diameters reduce in size, a sharp decrease in drill speed becomes necessary, with drills of .001" diameter operating with best efficiency at speeds of 150 to 300 RPM. At high speeds micro-drills do not have enough surface area or mass to dissipate the heat generated by its cutting action. The wide variation of job conditions usually require a certain amount of experimentation to determine the best operating speeds. In general, MICRO-DRILL speeds are critical mainly on hard, tough, or abrasive materials. On soft materials, a wide variation of speeds is permissible. The paramount problem then becomes one of chip disposal instead of tool wear.

A rough estimate of the speed can be made by visual observation of a chalk mark placed on the chuck body. The mark will change from a perceptible flicker to a blur at about 1700 RPM when viewed under daylight or incandescent lighting.

#### LUBRICANTS

The best types of coolant or cutting oils for micro-drilling a given material are the same as those used in larger drilling operations, except for the emphasis placed on the following conditions peculiar to micro-drilling. In general, any clear coolant or cutting oil with a low surface tension may be used; from white (purified) lard oil to carbon-tetrachloride (excellent on hard materials but difficult to apply because of its rapid evaporation.) Cutting oils are applied, in most cases, by a camel's hair brush. In production, a thin jet of coolant on the drill may be used. (Precaution: Do not permit coolant to wash chips into the working parts of the machine.)

#### OPTICAL SYSTEM

A ten-power triplet viewer is supplied with each DUMORE MICRO-DRILL. This is very satisfactory for observing the location and cutting conditions of drills as small as .008" diameter. The viewer provides a wide flat field of vision, clear, with minimum edge distortion, and is truly the best of its type.

For production use or with drills smaller than .008", a Spencer Stereoscopic Microscope Model 27, produced by the American Optical Company, is recommended. The stereoscopic microscope is fundamentally two microscopes, one for each eye, combined for convenient use in a single instrument. The two eyes view the drilling operation from separate angles, and the result is a real perception of depth, and a minimum of operator fatigue. The image is erect, and the operator is placed in a normal world of vision while closely observing the cutting action of the drill. A magnification of between 25x and 35x is desirable.

#### MICROMETER DEPTH CONTROL

Turn knurled ring on the depth control clockwise until approximately 1/4" of thread is exposed. Loosen Allen set screw, and with table held in full down position, slide control up as far as it will go. Tighten set screw just sufficiently to keep the control from sliding off. Raise the table until the workpiece is close to drill point, then tighten set screw firmly. Rotate the knurled ring counter-clockwise just sufficiently to permit the workpiece to barely make drill tip contact. Note the graduation reading. This is your zero point.

If the depth control feature is to be used, turn dial counter-clockwise by an amount equal to depth of hole required. One revolution of the knurled ring equals .025".

If the depth control is to be used as a feed control, and clearing of chips, (a help to inexperienced operators), alternately turn the knurled ring a few "tenths" or a few thousandths, as you wish, feed the work, release and turn the ring again, feed, etc., until the desired depth is reached.

#### LIGHT ADJUSTMENT

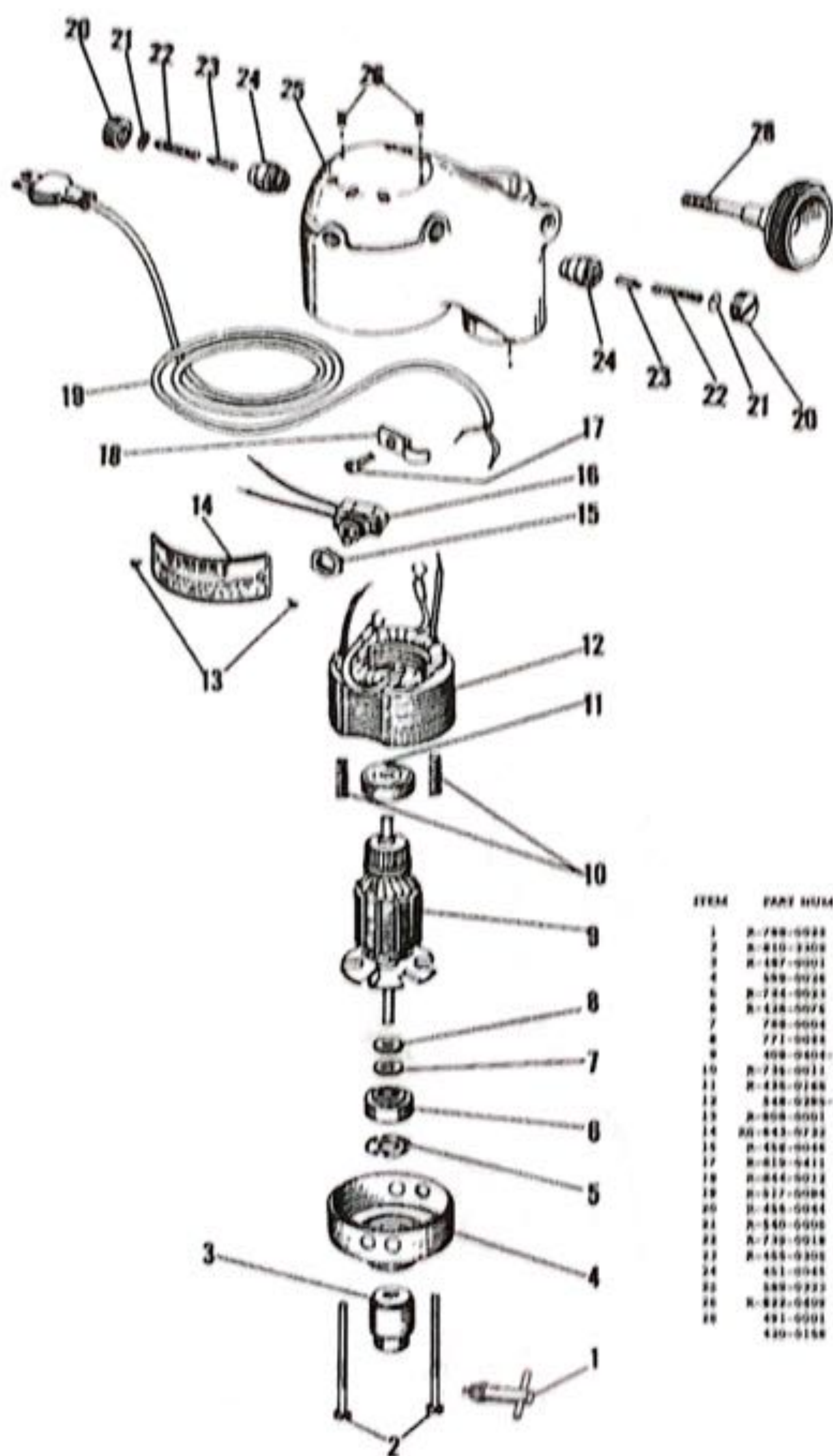
Adjust the clamping screw so that the flexible arm will not quite fall of its own weight. Move the arm up and down without putting any excess stress at the junction point of flexible arm and terminal. Avoid bending flexible arm at the junction point of cable and end fittings. Bending and adjustment should be done in the center of the flexible arm about one inch away from the junction point at either end.

#### DRILLING

Bring the workpiece up to the drill, apply lubricant, and by a very light pressure, feed the drill into the work, relieving the drill every few seconds. It is recommended to

(Continued on page 8)

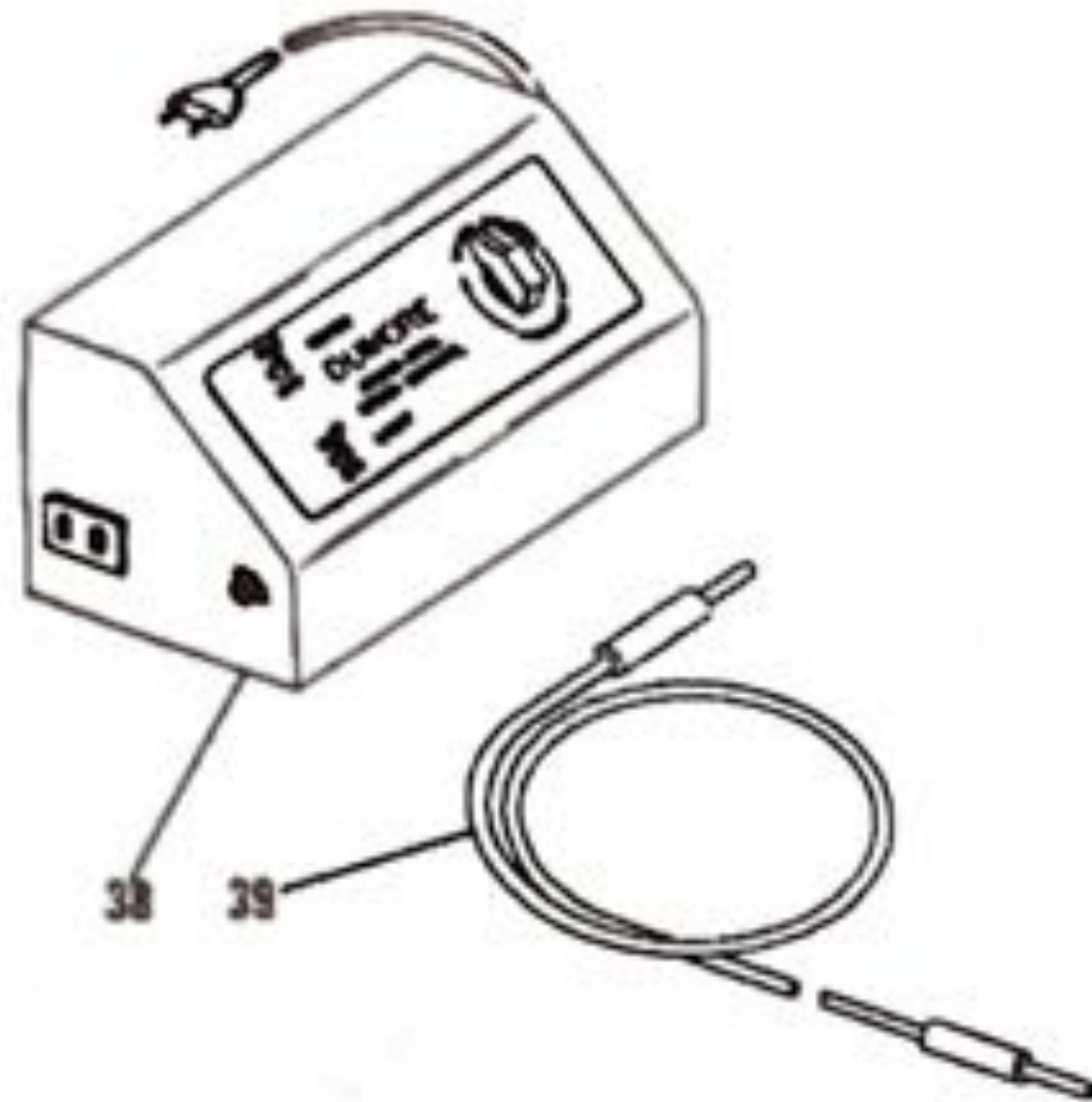




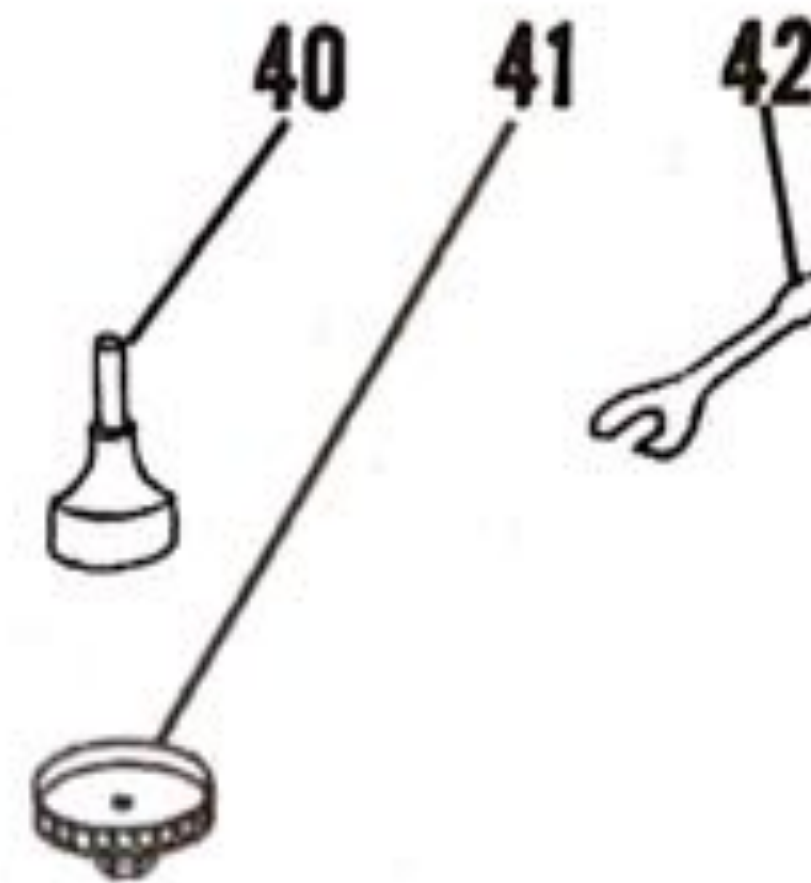
ITEM	PART NUMBER	MOTOR PARTS LIST	REQ.
1	R-788-0023	Clutch Wrench .....	1
2	R-810-3302	Housing Screw, Flt. Head 5-32 x 3-1/4 .....	2
3	R-487-0001	Clutch Assembly, Jacobs No. 0 .....	1
4	589-0026	Plain End Housing .....	1
5	R-744-0021	Flat Spring .....	1
6	R-428-0075	Ball Bearing, Plain End .....	1
7	788-0004	Shiny Washer .....	As Req.
8	771-0028	Shiny Washer .....	1
9	408-0404-210	Armature Assembly, 115V .....	1
10	R-736-0011	Coil Spring .....	1
11	R-428-0166	Ball Bearing, Brush End .....	1
12	548-0285-270	Field Assembly, 115V .....	1
13	R-808-0001	Drive Screw, No. 2 x 1/4 .....	1
14	R-843-0722	Hammerplate .....	1
15	R-458-0046	Pin (Not Shown) .....	1
16	R-819-0411	Round Head Screw 5-32 x 1/4 .....	1
17	R-844-0012	Lead Spring .....	1
18	R-517-0084	Coil Spring .....	1
19	R-458-0044	Brush Pin .....	1
20	R-540-0000	Brush Gap Gasket .....	1
21	R-739-0018	Brush Coil Spring .....	1
22	R-455-0300	Carbon Brush .....	1
23	451-0045	Brush Holder Assembly .....	1
24	589-0023	Brush End Housing .....	1
25	R-822-0409	Allen Head Set Screw, 5-32 x 1/4 .....	1
26	491-0001	Motor Looking Wheel .....	1
27	420-0168	Motor Assembly, Complete .....	1



## SPEED CONTROL



## MAGNETIC CHUCK PARTS



### TWIST DRILL MICRO CHUCK INSTRUCTIONS

#### 1) Insertion of the Drill.

Close the chuck jaws until the central opening is only slightly larger than the drill. This can best be done by successively inserting and tightening the jaws. It is relatively easy to get small drills (such as .006" diameter) clamped off center. Tighten the jaws and slide the drill axially alternately until the drill is tight and clamped at the slot intersection. A magnifying glass is essential.

Leave as short an extension outside of the jaws as possible. Usually only the flutes plus about 1/32 of the shank should be visible.

#### 2) Insertion in the Geared Chuck.

Insert the double tapered shank into the geared chuck of the drill press to within about 1/32" of the stop. Tighten the geared chuck by means of the key to a point where the wire drill chuck is held in place but can be disturbed by means of side pressure. A little experience is necessary to determine the proper amount of tightening.

#### 3) Truing of the Drill.

The drill point will not run true when first installed. With the motor rotating at 1000 RPM or less, pencil or fingernail pressure on the chuck sleeve will correct major runout.

To obtain zero runout of the drill point, observe the drill by means of the magnifier and repeatedly touch the chuck sleeve with a pencil point or fingernail until the point is observed to run true. Since the sleeve may not be perfectly true with the drill point, this is cut and try procedure. With a little experience this should seldom take longer than 30 seconds. It may be necessary to adjust the tightening of the geared chuck to obtain a proper response of the wire drill chuck to this side pressure.

Because of slight manufacturing tolerances, the drill shank may exhibit some runout while the point runs true. This slight runout will not interfere with the operation of the drill for most normal applications.