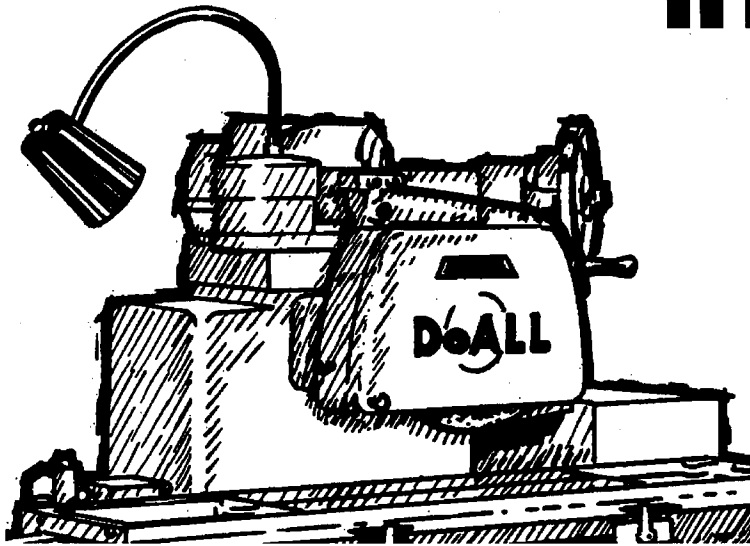


DoALL

**INSTRUCTION
MANUAL**



MODEL: DH-618

SERIAL NO: 292-70101 to 292-76218

SURFACE GRINDER

DAMAGE CLAIM PROCEDURE

VISIBLE DAMAGE AT TIME OF DELIVERY:

1. Note damage on carrier's delivery receipt. Accept the shipment. It can be returned later if repairs are not possible in the field.
2. Request a "damage inspection" from the delivery carrier:
 - a. The carrier will send his own people or contract an independent agency to make the inspection.
 - b. The inspector will request a signature on the report and leave a copy.
 - c. The carrier "damage inspection" report is not final. If additional damage is found when repairs are started, contact the carrier for another inspection; or at least give them the details of the damage.
3. Do not move the equipment from the receiving area and keep all shipping materials until the carrier "damage inspection" report is complete.
4. If possible, take photographs of the damage and keep them for your file. Photos could possibly prove a claim at a later time.
5. Keep a record of all expenses and be sure they are documented.
6. Repair damage in the field whenever possible. Carriers encourage this to keep expenses down.
7. You have nine (9) months to file a claim.

CONCEALED DAMAGE:

1. You have fourteen (14) days to report damage not noted at time of delivery.
 - a. Report damage as soon as possible. This makes it easier to prove that it did not happen cosignee's plant.
 - b. Inspect machines carefully before moving from the receiving area. Again if machine is not moved it is easier to prove your case.
2. Request a "damage inspection" from the delivery carrier:
 - a. The carrier will send his own people or contract an independent agency to make the inspection.
 - b. The inspector will request a signature on the report and leave a copy.
 - c. The carrier "damage inspection" report is not final. If additional damage is found when repairs are started, contact the carrier for another inspection; or, at least give them the details of the damage.
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5. Keep a record of all expenses and be sure they are documented.
6. Repair damage in the field whenever possible. Carriers encourage this to keep expenses down.
7. You have nine (9) months to file a claim.

SURFACE GRINDERS

--SPECIFICATIONS--

This information will be found stamped on your machine data plate.

SERIAL NUMBER VOLTAGE

MODEL NUMBER NORMAL AMPS

INSTANTANEOUS AMPS PHASE CYCLE

DRIVE BELT NO.

STANDARD GRINDING WHEEL SIZE

FOREWORD

Read this manual carefully before operating your machine. The specifications contained herein were in effect at the time this manual was approved for printing. The DoALL Company, whose policy is one of continuous improvement, reserves the right, however to change specifications or design at any time without notice and without incurring obligations.

You can avoid unnecessary delay and inconvenience by specifying correct model and serial number on all parts orders and correspondence.

The following registered
trade marks of The DoALL Company
are used in this handbook:

DoALL, Kleen-Kool,
SELECTRON, and COOL GRINDING*

*U.S. PAT. NO. 2,470,350

Grinders

WARNING

TO AVOID POTENTIAL HAZARDS, OBSERVE THESE PRECAUTIONS WHEN OPERATING OR SERVICING THIS MACHINE-OPERATOR MUST:

READ INSTRUCTION MANUAL BEFORE OPERATING THIS MACHINE.

WEAR SAFETY GLASSES.

AVOID CONTACT WITH COOLANT. ESPECIALLY GUARD YOUR EYES.

STOP WHEEL ROTATION BEFORE INSPECTION OR REMOVAL OF WORK PIECE.

REPLACE WHEEL GUARD, COVERS, AND SAFETY GUARDS BEFORE OPERATING MACHINE.

USE WHEEL AND BLOTTERS THAT ARE IN GOOD CONDITION AND SELECTED WITH CARE.

SELECT ADAPTOR THAT IS CLEAN WITH FLAT AND TRUE BEARING SURFACES.

TIGHTEN THE SPINDLE NUT AND ADAPTOR NUT WITH CARE. DO NOT OVER-TIGHTEN.

GRIND WITH WHEEL'S FACE, NEVER ITS SIDE, EXCEPT WHEN SHOULDER-GRINDING.

BE SURE THE CHUCK IS HOLDING BEFORE WHEEL-DRESSING OR GRINDING.

STAND IN A SAFE OPERATING POSITION.

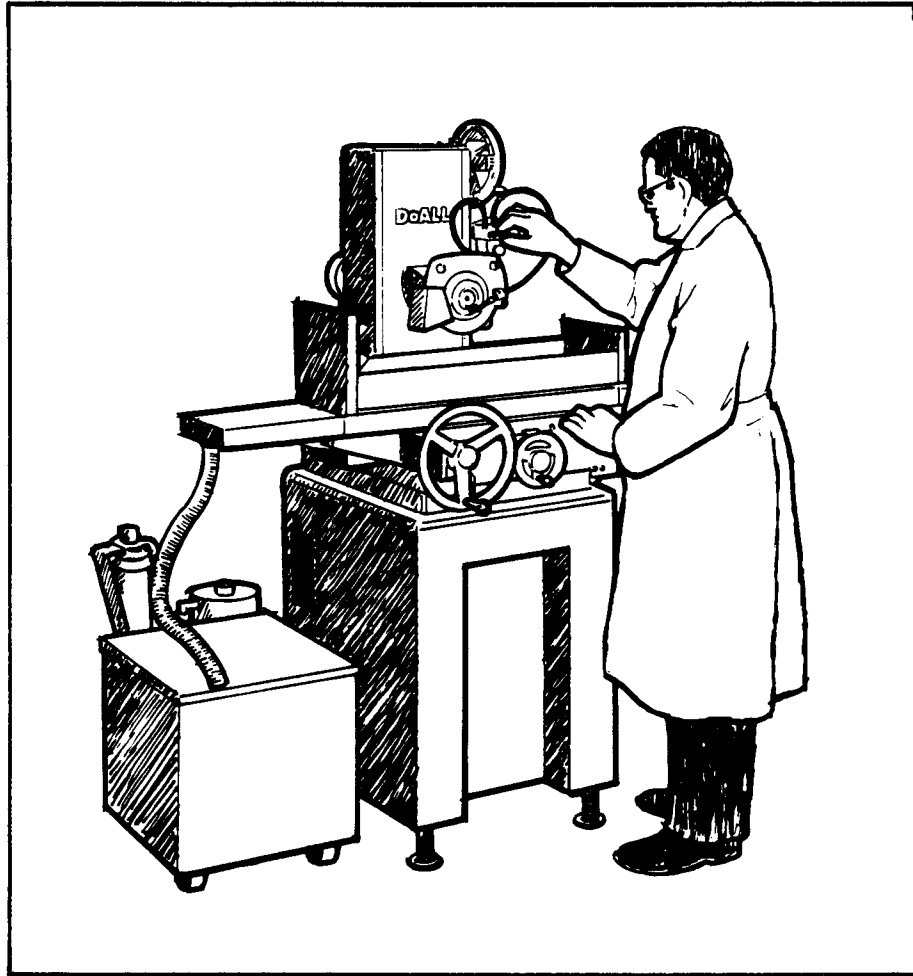
REMOVE LOOSE ITEMS FROM TABLE BEFORE STARTING MACHINE.

DISCONNECT ELECTRICAL SUPPLY BEFORE REMOVING ANY COVERS OR SERVICING MACHINE.

**MAKE SAFETY THE RULE AND FOLLOW SAFE SHOP PRACTICES.
ALWAYS CONSULT THE OPERATOR'S MANUAL PRIOR TO SERVICING.**

404340

OPERATOR'S INSTRUCTION MANUAL



Model DH-618 Surface Grinder

Please read this manual carefully
before operating your machine.



DoALL COMPANY
254 NORTH LAUREL AVENUE
DES PLAINES, ILLINOIS 60016

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CHAPTER 1

INSTALLATION

UNCRATING

- (1) Carefully remove crating, plastic bag and bracing lumber.
- (2) Remove strapping holding down table, saddle, parts, etc.
- (3) Remove hydraulic tank, coolant tank, electro-magnetic chuck and any other accessories which have been attached to skid.
- (4) Remove extra parts such as grinding wheel adapters, wrench, wheel puller and accessories.
- (5) Inspect machine for broken or damaged parts.

LIFTING INSTRUCTIONS

- (1) The best method of lifting the grinder is to use a fork lift truck. The lift truck must have an adequate lifting capacity. Lifting forks must be long enough to support grinder without danger of tipping.

CAUTION

DO NOT ATTEMPT TO LIFT OR MOVE GRINDER BY SADDLE OR TABLE! DO NOT USE OVERHEAD HOIST.

- (2) Use lift truck forks to raise machine base enough so that it can be blocked up and forks inserted under base pads.
- (3) Approaching grinder, slide forks (spread as far apart as possible) under base pads.
- (4) Carefully lift grinder and move it into position.

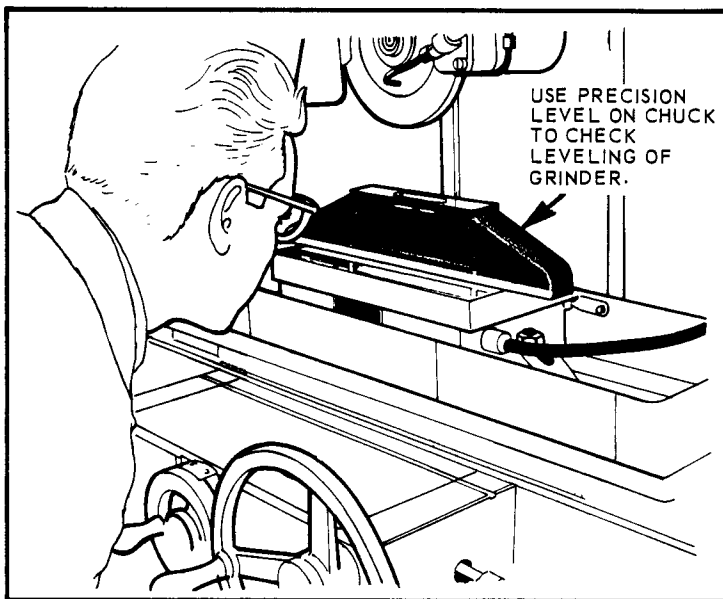
CLEANING

Before shipment, all unpainted surfaces were coated with a rust-preventive compound. This may be removed by wiping with rags saturated with solvent or kerosene. Clean only by wiping or brushing. **DO NOT USE COMPRESSED AIR.** Using compressed air will only tend to force dirt and grit into working parts of grinder.

After cleaning compound has been removed, wipe all finished surfaces with a cloth moistened with lubricating oil. Do not move any controls or moving parts until machine has been thoroughly cleaned and lubricated, and you have read the instruction manual. A coating of oil or a rust-preventive spray (such as DoALL Rust Preventive Mist) should be used to protect bare metal surfaces.

INSTALLATION ON FLOOR

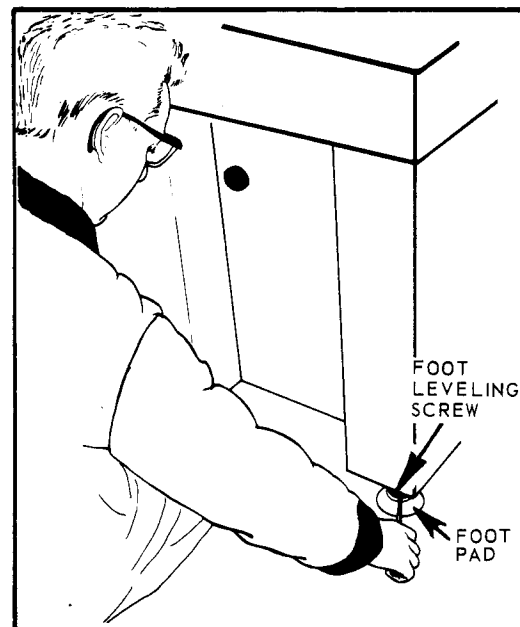
- (1) Place the grinder where the temperature will vary the least. It should, therefore, not be placed too close to outside windows, ventilating fans, or forced air blowers.
- (2) A special foundation is not necessary. Any floor is suitable provided it is strong enough to support the weight of the machine without vibration.
- (3) The grinder should be as free as possible from vibrations set up by other equipment. These outside vibrations have a definite effect on the finish produced by the grinder.
- (4) The grinder is provided with foot screws and pads. Install the screws, lock nuts and pads.



The grinder must be level in all directions.

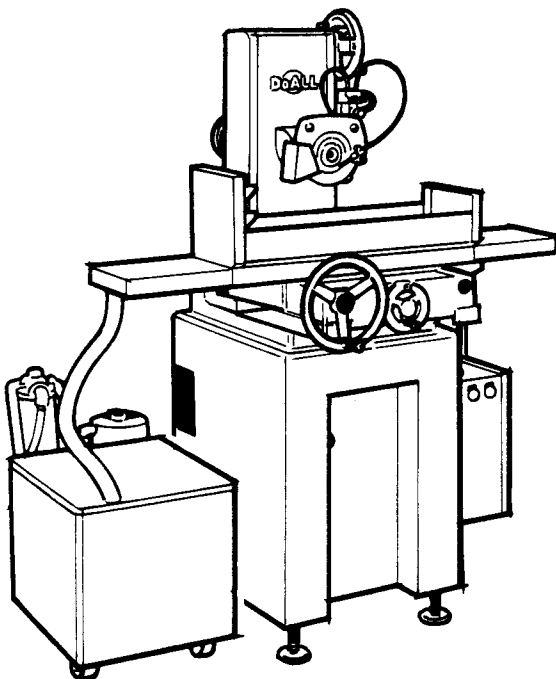
- (5) With a spirit level placed upon the ground top surface of the table pad or chuck, level the machine in all directions by adjusting the foot screws. The machine weight must bear evenly on all four base pads. Adjust as required to obtain an even weight distribution and eliminate any tendency for the grinder to "rock".

Adjust foot screws to level machine.

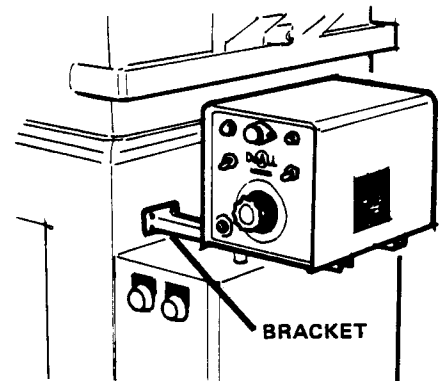


FINAL MACHINE ASSEMBLY

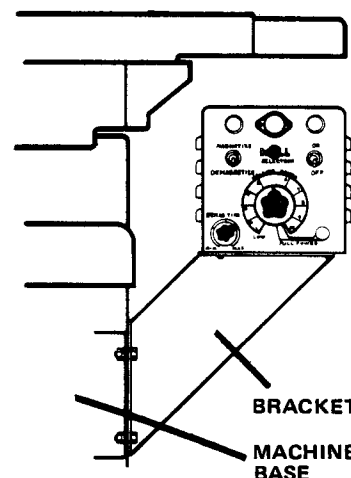
- (1) Belt driven spindle (if used) - If spindle is belt-driven, install motor (if removed for shipment) and check belt tension.
- (2) SELECTRON (if used) - Install bracket on right-hand side of grinder base. Mount SELECTRON unit on bracket. (see sketch).
- (3) Chuck - Uncrate chuck and degrease. After reading instruction manual and becoming familiar with machine operation, install chuck as described under "Grinding in the Chuck" in chapter on Preparation for Operation. Use chuck clamps mounted in table T-slot.
- (4) Coolant tank (if used) - Remove any extra parts or tools which have been packed in tank. Position tank at left-hand side of grinder so that coolant return hose from table can be inserted in tank cover. Connect pressure line from coolant tank to machine wheel guard. NOTE: Coolant tank hose and cover must be positioned so that return coolant is directed into the tank compartment which is farthest away from pump intake.



Position coolant tank as shown here (cool grind tank shown).



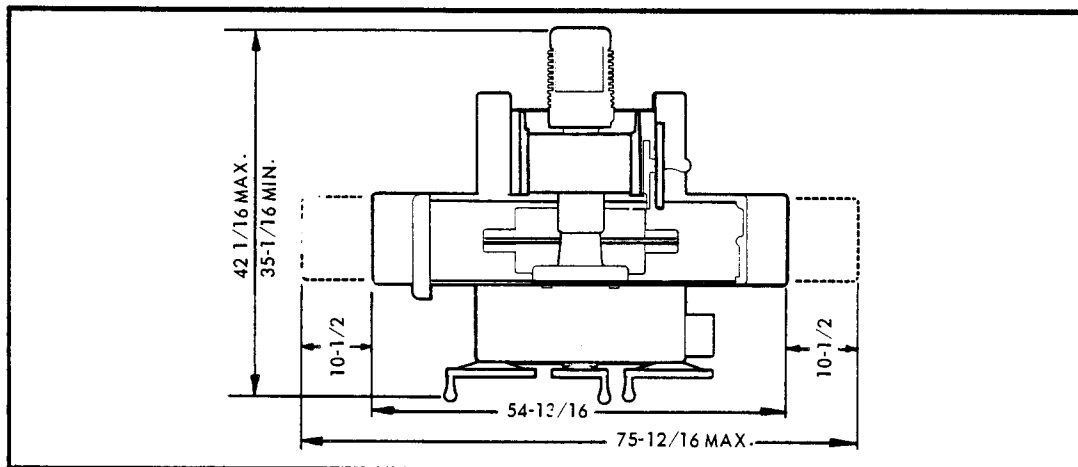
Selectron mounting on machine with magnetic starters.



Selectron mounting on machine with manual starters.

ELECTRICAL CONNECTIONS

- (1) Spindle - The grinder is completely wired at the factory and equipped with the electrical controls ordered. In setting up the grinder, it is necessary to connect a fused disconnect switch. See wiring diagram furnished with machine. Wire so that spindle revolves clockwise when facing shaft before mounting grinding wheel. **WARNING:** Check to be sure the spindle (without grinding wheel) rotates clockwise. Spindle nose nut has left-hand thread and clockwise rotation will tend to tighten it. However, if spindle motor rotates counterclockwise nose nut will rapidly loosen and grinding wheel may be thrown from spindle.
- (2) Coolant pump motor (if used) - Connect lines to the coolant pump motor. Pump motor is provided with escutcheon indicating correct direction of rotation.



Plan view dimensions.

INITIAL LUBRICATION AND CHECK-UP

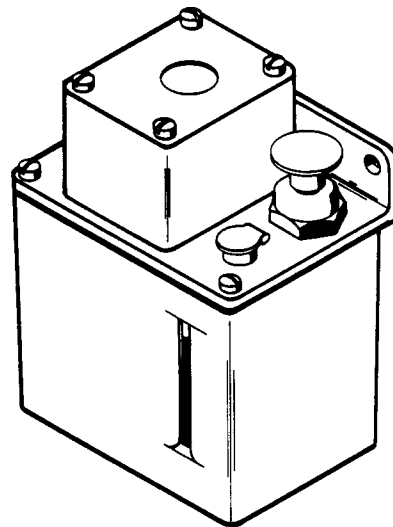
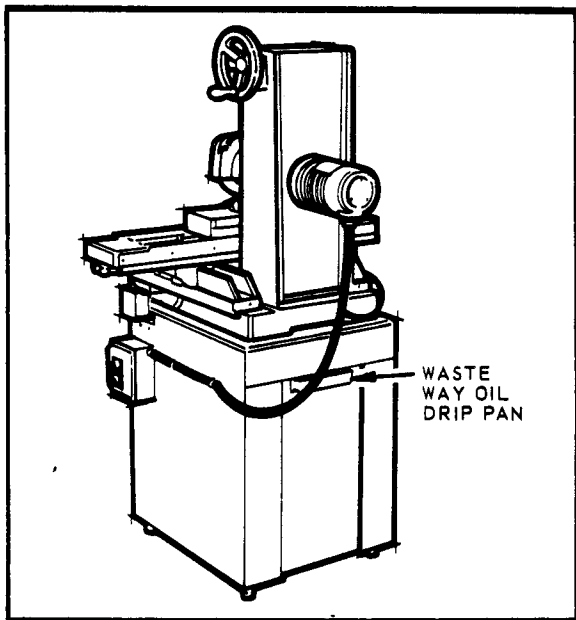
(1) Initial Lubrication of Ways.

CAUTION

When setting up a new machine, or whenever the table has been removed, it is necessary to "charge" the system with oil. Charging the system will fill all lines and way grooves with oil and will prevent premature wear of the ways.

To charge the system, center the table on the ways, then allow the spindle to run for about 10 hours. The charging process is complete when way oil can be seen dripping off both ends of the two table ways. (Note: The charging process can also be accomplished by operating the manual knob on the lubricator about 30 times, but the lubricator automatic cam must be in a position that allows a full stroke of the knob).

During grinding, the lubricator operates automatically whenever the spindle is running. Keep lubricator tank filled with DoALL Way Lubricant.



The Automatic Lubricator.

- (2) A drip pan is provided to catch spent oil from ways. Install this pan below column at rear of machine.
- (3) Fill coolant tank (if used) with Kleen-Kool coolant made by DoALL. Mix coolant as instructed on the container label. Tank capacity is 20 gallons.

CHAPTER 2

OPERATION OF CONTROLS

CROSSFEED HANDWHEEL

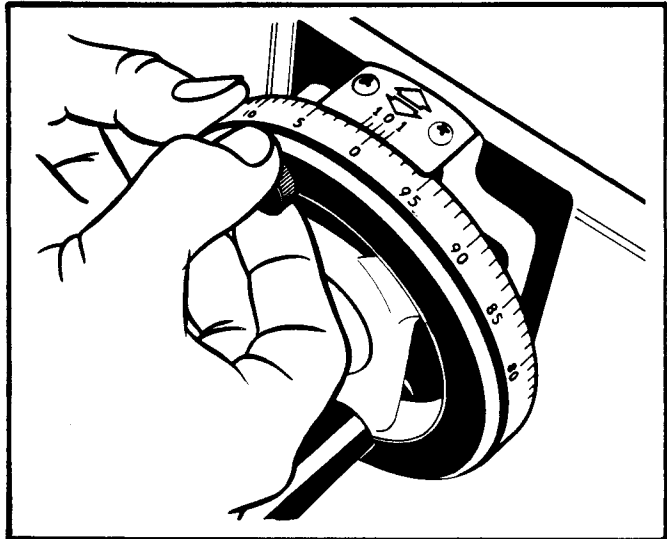
A. Standard Handwheel

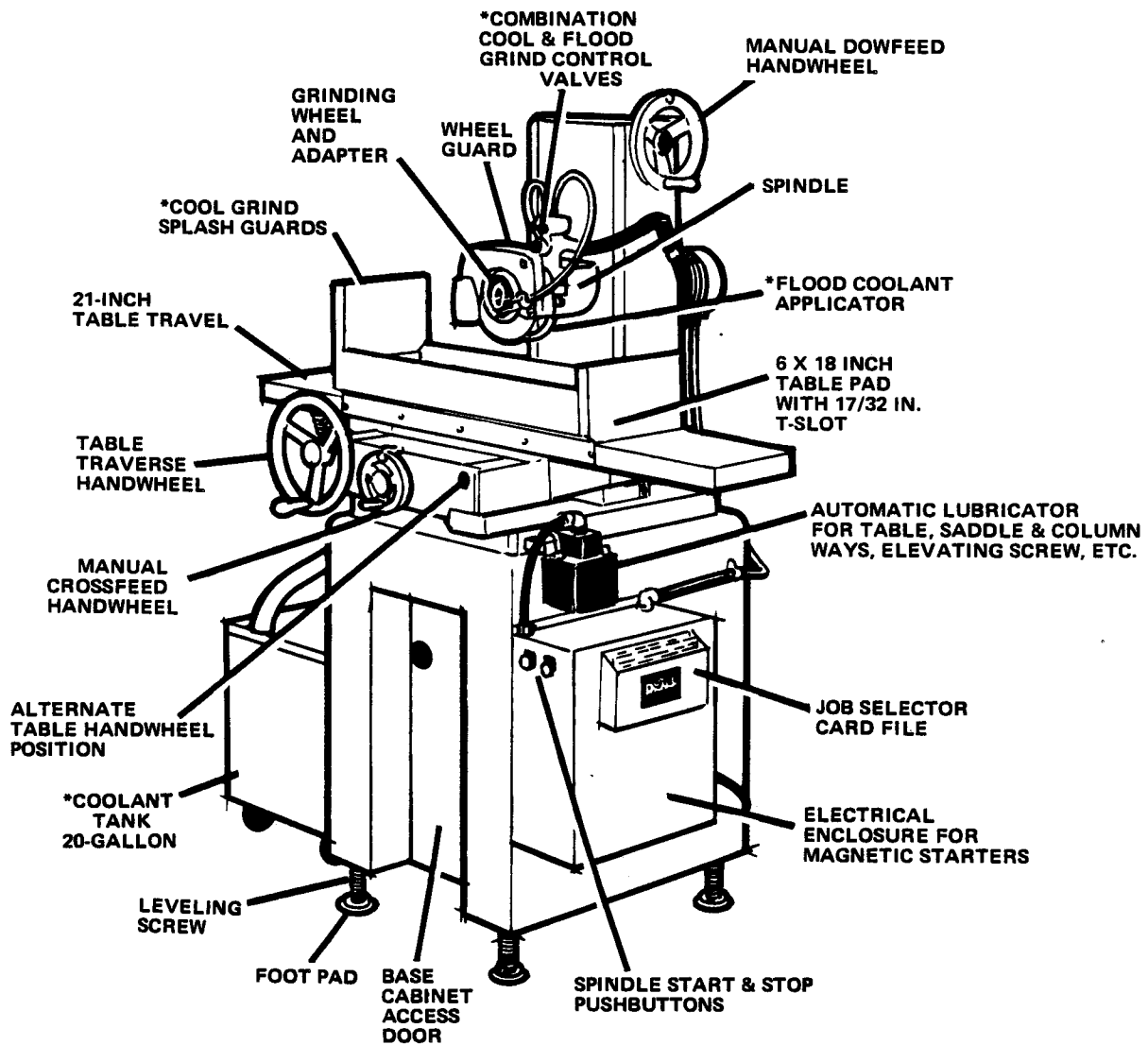
The crossfeed handwheel has 100 lines engraved around its circumference. Turning the handwheel from one line to the next moves the saddle and table forward or backward .001 inch. In addition, an auxiliary scale mounted next to the handwheel makes it possible to split each graduation in half. Consequently, turning the handwheel from one line to the next on the auxiliary scale moves the saddle and table .0005 inch. One complete revolution of the handwheel moves the saddle .100 inch.

B. The Zeroing Slip Ring (accessory)

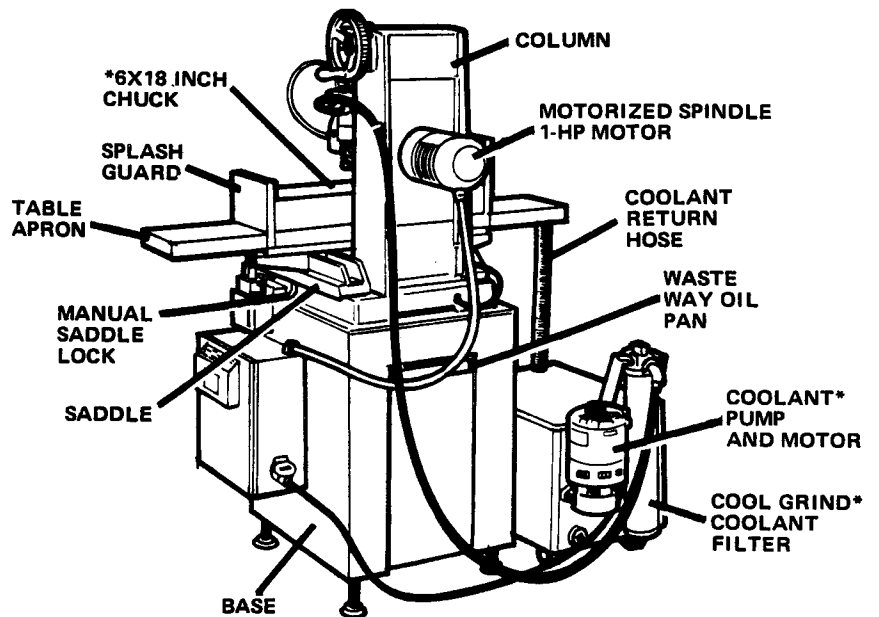
A slip ring is available as an accessory. Use the slip ring to establish a "zero" reference point from which to make adjustments. Loosen the locking knob in order to adjust the slip ring.

Saddle crossfeed handwheel equipped with the zeroing slip ring. Loosen the locking knob as shown to adjust the slip ring. The auxiliary scale splits each handwheel graduation in half providing an adjustment down to .0005 inch.

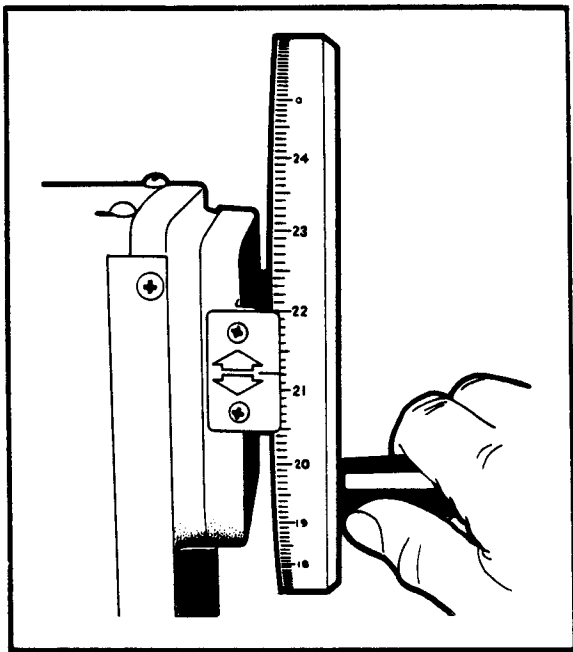




**MODEL
DH-618
CONTROLS
AND
FEATURES**



**Accessories.*



The Vertical Feed Handwheel .

VERTICAL FEED ("downfeed")

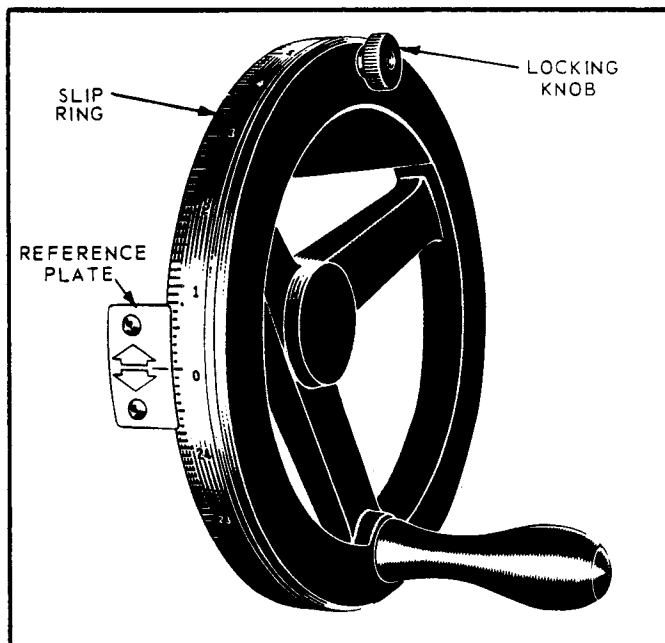
HANDWHEEL

A. Standard Handwheel

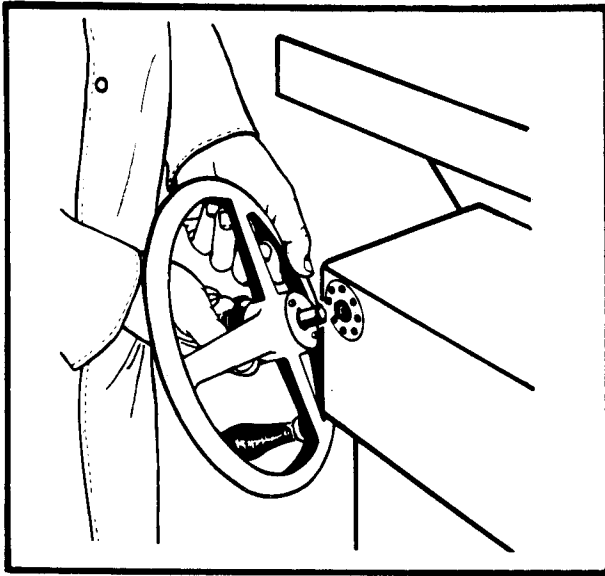
The downfeed handwheel has 250 lines engraved about its circumference. Turning the handwheel from one line to the next raises or lowers the grinding wheel .0001 inch. One complete revolution of the handwheel raises or lowers the grinding wheel .025 inch.

B. Using The Zeroing Slip Ring (accessory)

The zeroing slip ring is provided with a locking knob. The advantage in using a zeroing slip ring is that it eliminates the need to do mental arithmetic, a potential source of grinding error. For example, suppose that you wished to grind a step in a workpiece so that it is exactly .00XX inch below the top surface of the workpiece. The slip ring is simply set so that the handwheel reading is at zero. Then, to grind a step .00XX below the workpiece surface, the handwheel is turned to the .00XX reading. No mental calculations are required.



Adjust the zeroing slip ring by loosening the locking knob and sliding the ring.



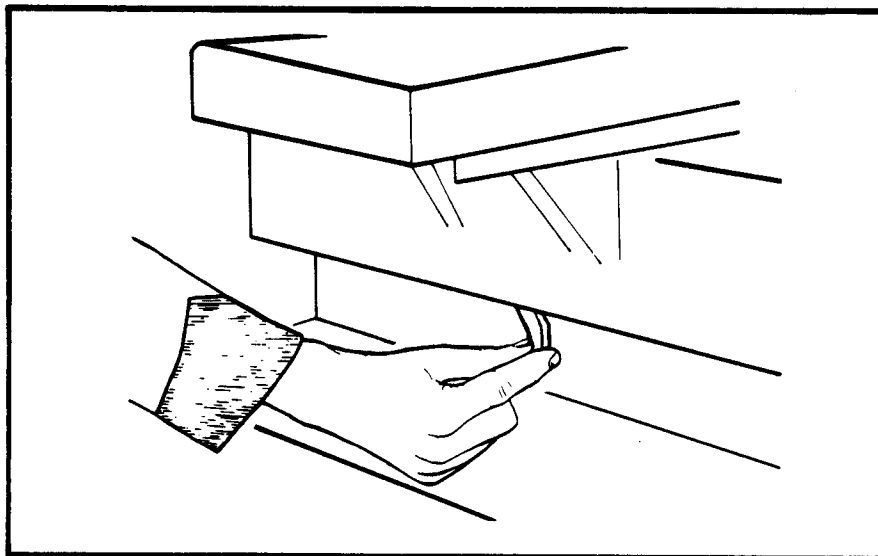
Removing the table feed handwheel.

MANUAL TABLE FEED HANDWHEEL

Use the manual table feed handwheel for table traverse. For the convenience of left- or right-handed operators, the handwheel can be installed at either the left or right hand side of the base. To remove the handwheel unscrew the locking knob at the center of the wheel as shown above and pull out the wheel, then install at other side of base.

SADDLE LOCK

The saddle lock is located on the right-hand side of the base. It is used to prevent saddle movement during work such as form grinding, slot grinding, production grinding with fixture, etc. Move the locking lever forward to lock the saddle.



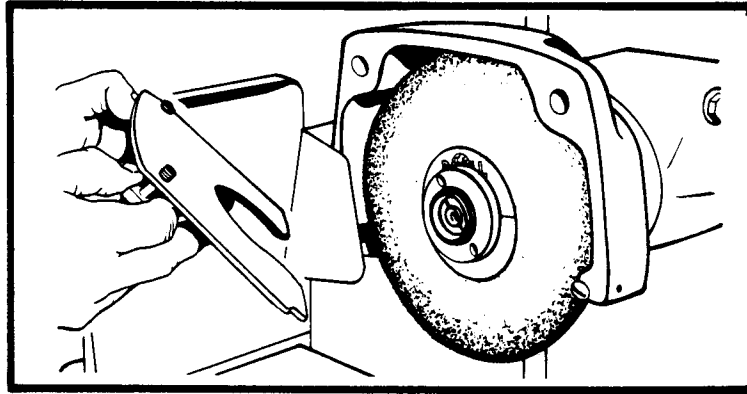
The saddle locking lever is located at the right-hand side of the base.

WHEEL GUARD

The wheel guard cover can be removed by unscrewing the two thumb screws on the front of the cover. The dust guard used for dry grinding can be positioned vertically by loosening the locking knob on the left side of the wheel guard. The DH-618 wheel guard can be tilted, if desired, by loosening clamping screw on the back of the guard.

NOTE: The special wheel guards used with the over-the-wheel-dresser and the Optidress accessories cannot be tilted.

Removing the
wheel guard
cover.

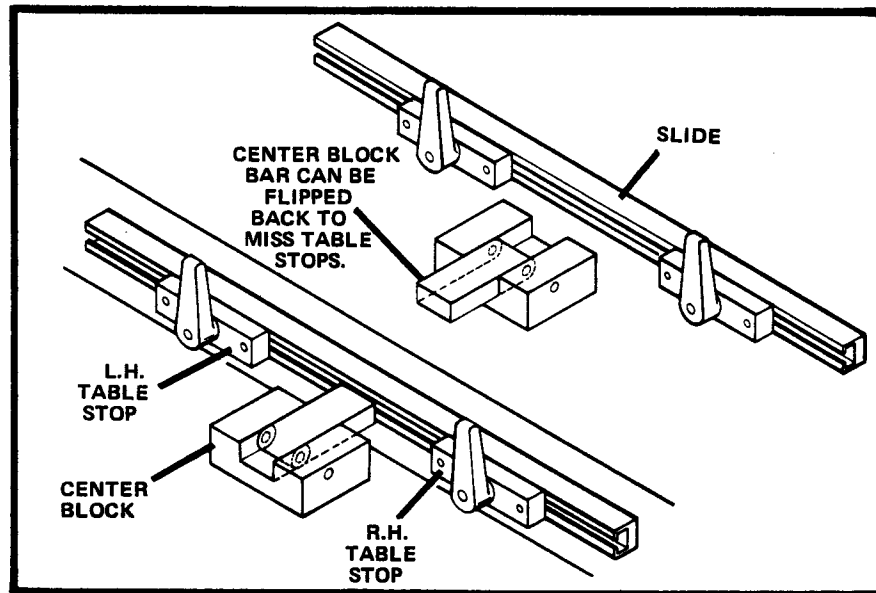


ADJUSTABLE TABLE STOPS with RETRACTABLE CENTER BLOCK (accessory)

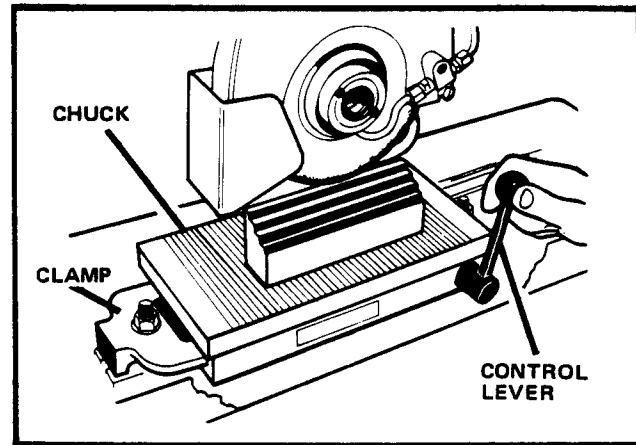
The adjustable table stops can be positioned on a track to control the maximum table stroke in each direction. To adjust the stops, run the table to the desired stroke length in one direction, loosen the stop locking lever and slide the stop up to the center stop, then tighten the lever. Then repeat for the other stop.

If desired, the center stop block can be swung out of the way, allowing maximum table travel without having to readjust the table stops.

The adjustable table stops can be set to limit table travel to cover the length of the workpiece. The center block can be flipped out of the way, if desired.



The permanent-magnet type chuck. Turn on chuck holding power by swinging lever 180 degrees.

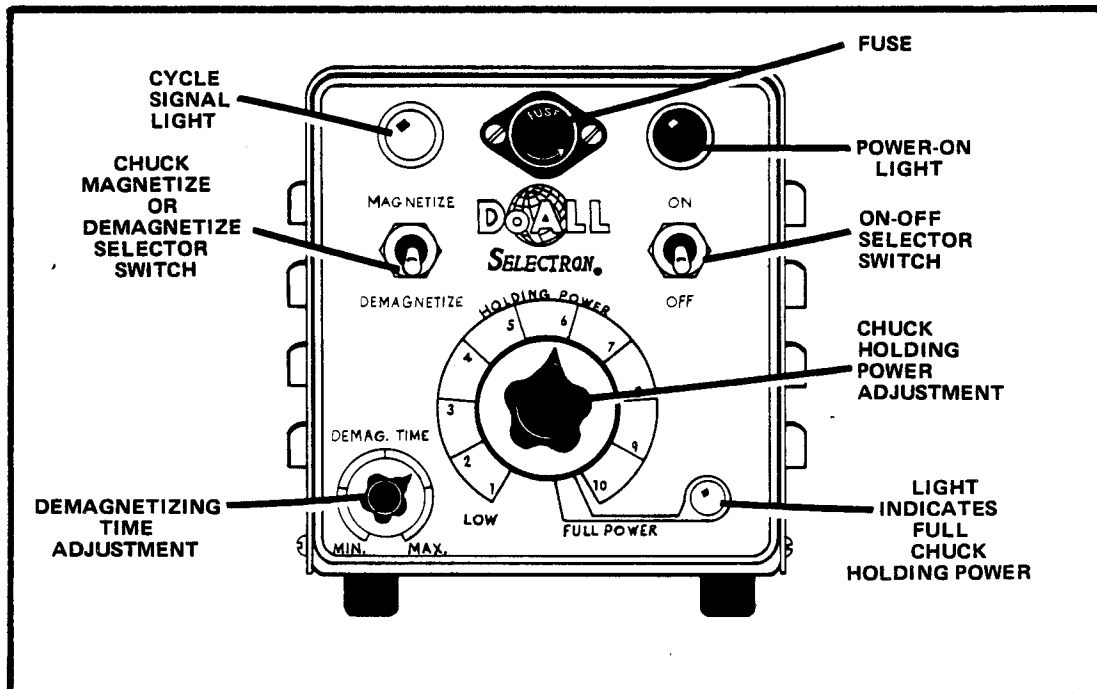


PERMANENT MAGNET CHUCK

The chuck magnetic power is turned on and off by moving the lever shown in sketch above. Install and "grind in" the chuck in the same manner as described for the electromagnetic chuck.

USING THE SELECTRON (Accessory control for electromagnetic chuck)

Chuck holding power is regulated by turning the "holding power" control knob. Reduce the holding power on thin workpieces to prevent warping them. An indicator light on the panel turns on only when the chuck has attained full holding power. If the knob is set at any point below full power, the light will not come on. Selector switches are provided to turn the SELECTRON "on or off", and for "magnetize or demagnetize". Signal lights are provided to indicate "power on" and the "mag.-demag." cycle. A control knob is provided for the adjustment of demagnetizing time. This will normally be about 10 to 15 seconds -- large workpieces and harder steels will require more time than small workpieces and mild steel or cast iron.



The Selectron Magnetic Chuck Control Panel.

CHAPTER 3

PREPARATION FOR OPERATION

GRINDING WHEEL INSPECTION

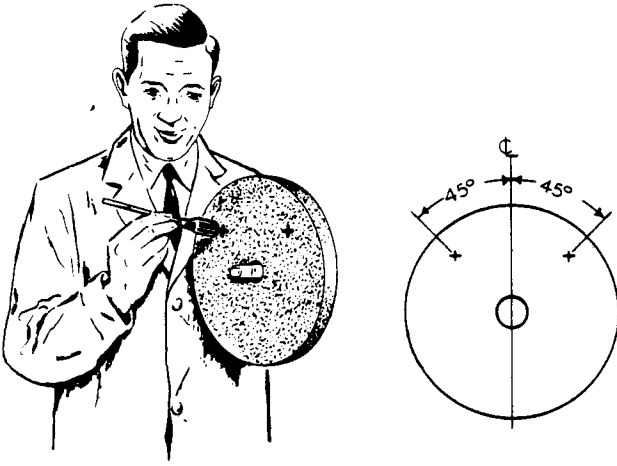
(1) VISUAL INSPECTION - Examine the wheel carefully immediately after it has been unpacked. Look for cracks or chips which would indicate damage during shipping.

(2) "RING" TEST - Next give the wheel the "ring" test. This is done by suspending the wheel from its center hole on a small bar or finger. Tap the wheel gently with a nonmetallic implement such as a wooden screwdriver handle. The best spot to tap a wheel is about 45° on either side of the vertical centerline and about 1 or 2 inches from the outside edge of the wheel. Rotate the wheel about 45° and repeat the test. A sound and undamaged wheel will give a clear metallic tone. If it is cracked, there will be a "dead" sound.

Repeat the ring test immediately before mounting either a new or used wheel, especially if the wheel has been in storage or out of service for a long time.

(3) "RUN-IN" TEST - The "ring" test will usually detect a cracked wheel; but it is not a positive indication, especially if performed by an inexperienced operator. Therefore, an additional "run-in" test is essential.

Mount the new wheel that has passed the ring test on the correct adapter as described next in this chapter. Close wheel guard securely. Stand back from the machine and run the spindle for at least one minute before starting grinding.



WARNING

It is recommended that the operator read USA Standard Safety Code for the "Use, care and protection of abrasive wheels", (USA Standard B7.1 - 1964).

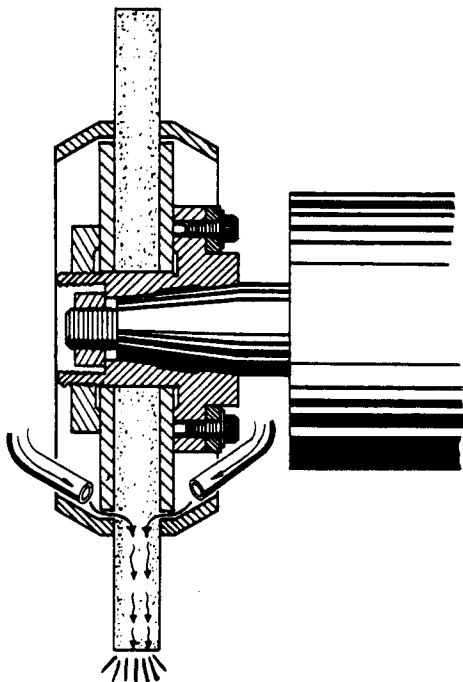
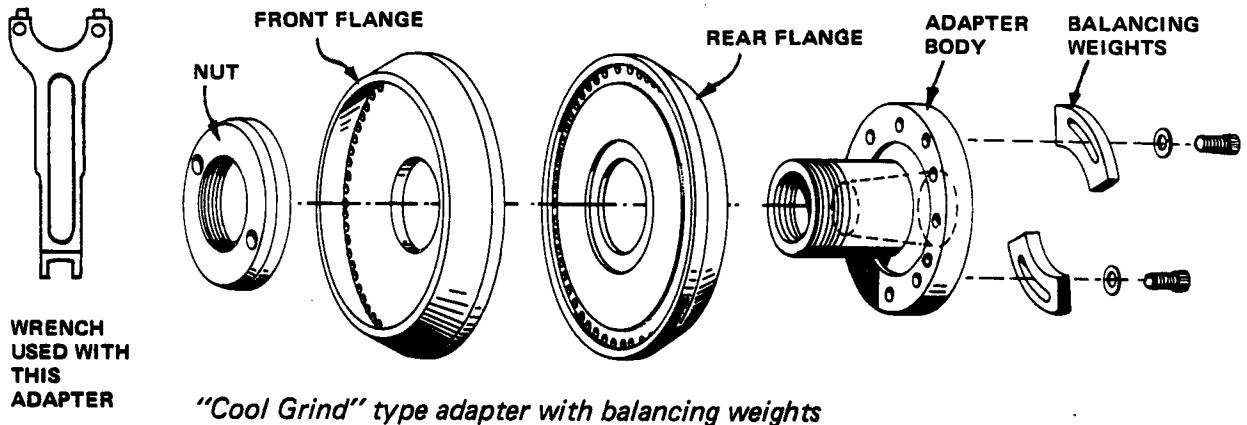
RING TEST NOTE

If the wheel is struck *directly* along the vertical centerline, the "ring" of even a sound wheel will sometimes be muffled and may give the false impression that the wheel is cracked. Wheels must be dry and free from sawdust when applying the ring test, otherwise the sound will be deadened.

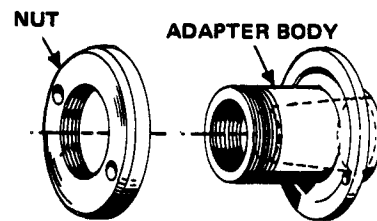
Before mounting a new or used wheel, always give the wheel the "Ring Test".

GRINDING WHEEL ADAPTERS

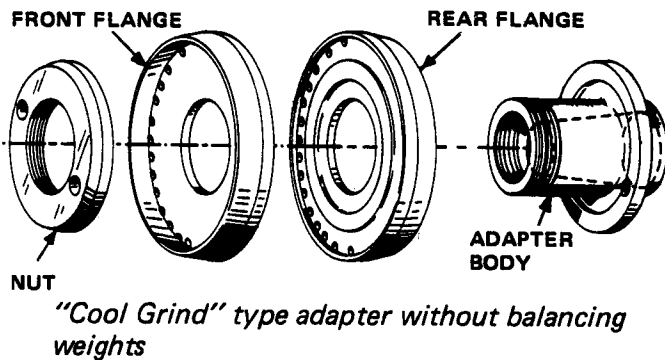
Standard wheel adapters supplied with all models are of the "dry" or "flood" grind type as shown in drawings. This type consists of a rear flange designed to fit over the spindle tapered nose and a front flange which attaches to the rear flange and holds the grinding wheel in place. The assembled adapter is attached to the spindle by the nose nut. ("Cool grind" adapters are identical to dry or flood grind adapters, except for the addition of coolant collector flanges. Assemble adapters and wheels in same manner as dry or flood type.)



Cross-section through cool-grind adapter and wheel.

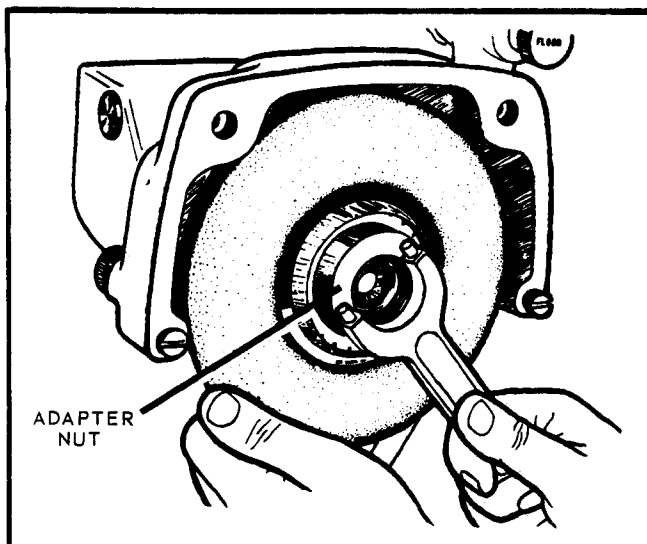
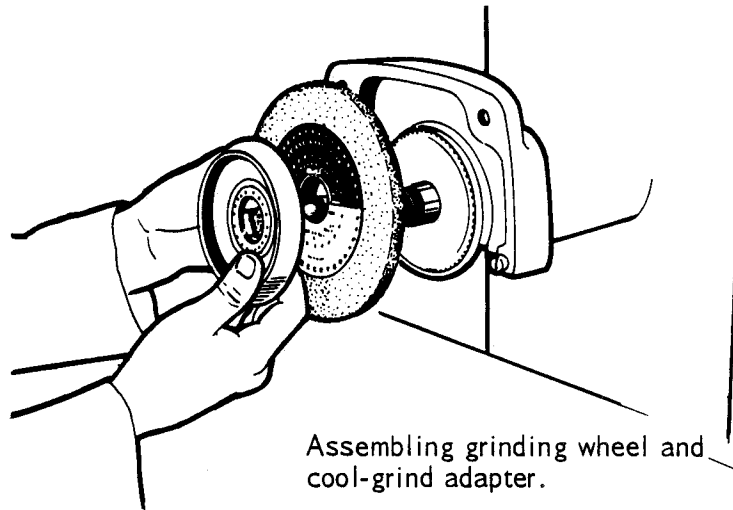


Dry or flood type adapter w/o balancing weights

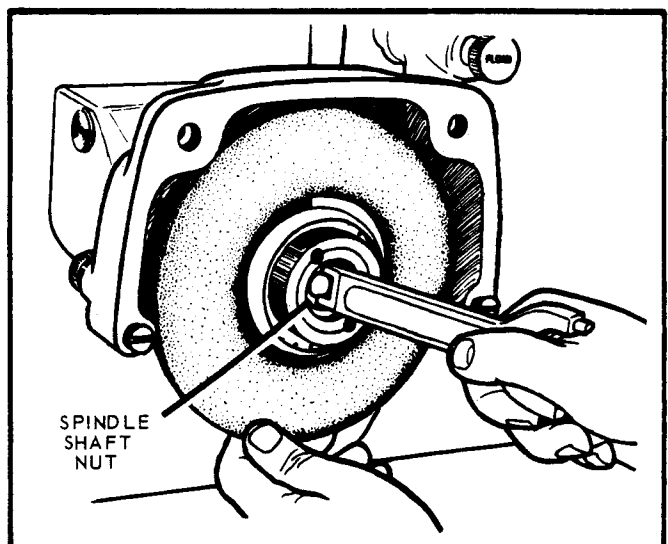


MOUNTING THE GRINDING WHEEL

- (1) Degrease and clean adapter. Inspect adapter inside diameter carefully for scratches or burrs. The I.D. bore of adapter is not a hardened surface and can be easily scratched if it is carelessly placed over the hardened spindle nose threads.
- (2) Place adapter rear flange on spindle nose. Lightly tighten spindle nose nut (do not tighten nut excessively) with spanner wrench provided. NOTE: Spindle nose has left-hand threads.
- (3) Place wheel on adapter rear flange (do not remove wheel blotters, DoALL perforated wheel blotters must be used with "Cool grinding" adapters).
- (4) Install adapter nut, using spanner wrench as shown in sketch. Do not tighten excessively or wheel may crack. Another method is to assemble wheel on adapter before installing on spindle.



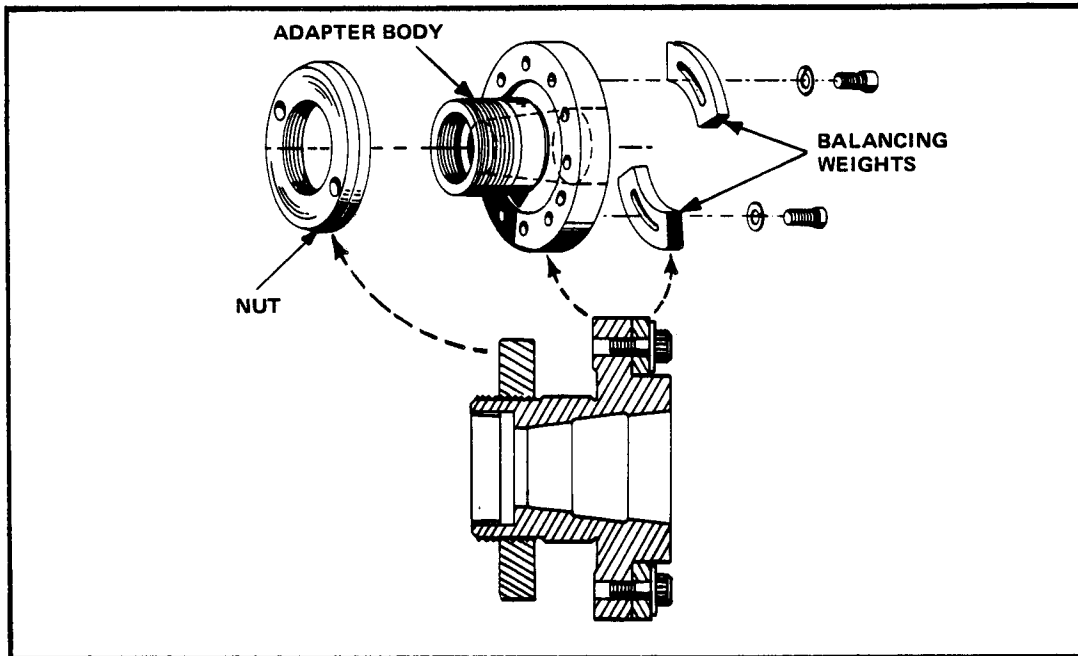
Tightening the adapter nut.



Use wrench handle to tighten spindle nut.

USING ADAPTERS WITH BALANCING WEIGHTS

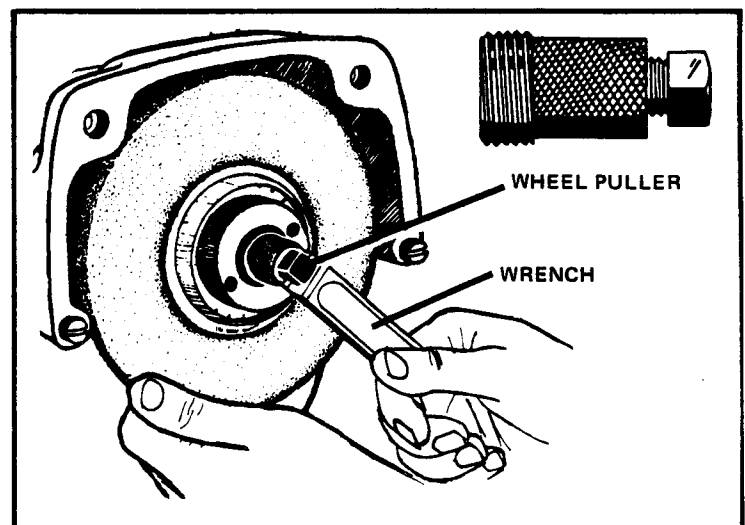
These adapters are installed in the same manner as standard adapters. Balance the assembled wheel and adapter as described in "Wheel Balancing". WARNING: If a balancing arbor and stand are not available, position the balancing weights at exactly 180° opposed.



Dry or flood type adapter with balancing weights.

REMOVING WHEEL AND ADAPTER

- (1) If the grinding wheel is being replaced, the adapter rear flange can be left installed on the spindle shaft. Remove adapter front flange and replace wheel. The wheel should be dressed and balanced on its adapter, of course.
- (2) To remove adapter rear flange or the assembled wheel and adapter, use wheel puller furnished with grinder. Screw puller into I.D. threads of adapter. Then turn in puller center screw until screw contacts spindle shaft and forces adapter off.



Using wheel puller to remove wheel and adapter.

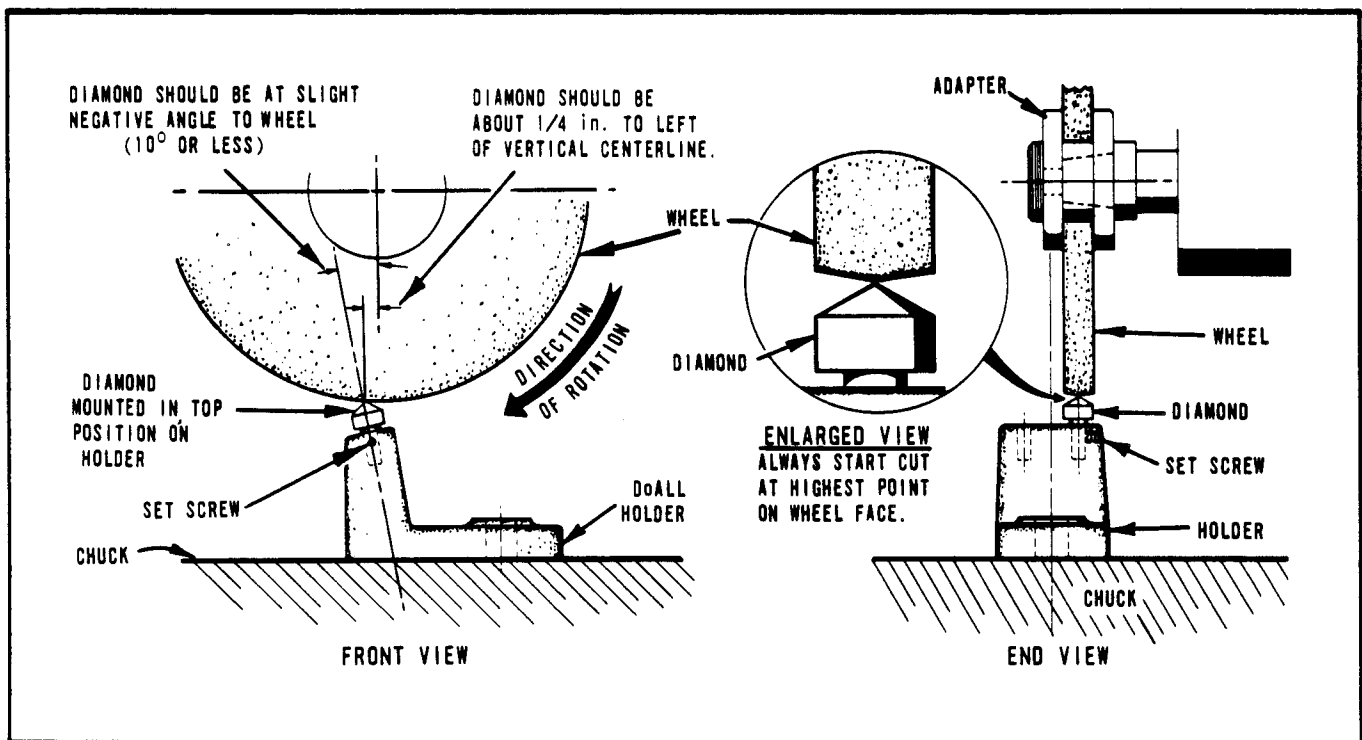
"TRUING" THE GRINDING WHEEL FACE

(1) The position of the diamond on the table with respect to the grinding wheel is important for proper truing. The diamond point should be located slightly to the left of the wheel centerline (about 1/4 in.) as shown below. This is a safety precaution to prevent the diamond from digging into the wheel.

NOTE

IF COOLANT WILL BE USED DURING GRINDING,
USE COOLANT DURING WHEEL DRESSING ALSO.

The diamond should also be canted at a negative rake angle of 15° to the direction of wheel travel. In this way the diamond will be worn at a bevel. Then, in order to present a sharp cutting surface to the wheel, all that is necessary is to turn the diamond in the holder (15° or 20°) so that the high, sharp edge of the bevel encounters the wheel. This should be done regularly. The DoALL diamond holder (available as accessory) has an arrow that indicates the direction in which the holder should be placed on the table with respect to wheel rotation. The arrow on the holder should point in the direction of wheel rotation as observed at the bottom of the wheel. This holder locates the diamond at the desired 15° angle.



This is the correct position of a chuck-mounted diamond dresser when used for truing and dressing the wheel. (DoALL Dresser shown).

"TRUING" THE GRINDING WHEEL FACE (Continued) . . .

(2) Start the spindle motor. Position the grinder saddle and adjust the wheel height so that the cutting edge of the diamond will just contact the highest point on the wheel periphery (usually at the center). The precaution is necessary to prevent the diamond from taking too deep a cut in the wheel with subsequent damage to the diamond and the wheel.

(3) It is vital that the diamond be sharp, particularly for truing. When the diamond has worn, turn it a few degrees so that a sharp face is always against the wheel. Use Coolant (especially the Cool Grinding method, if that is available.)

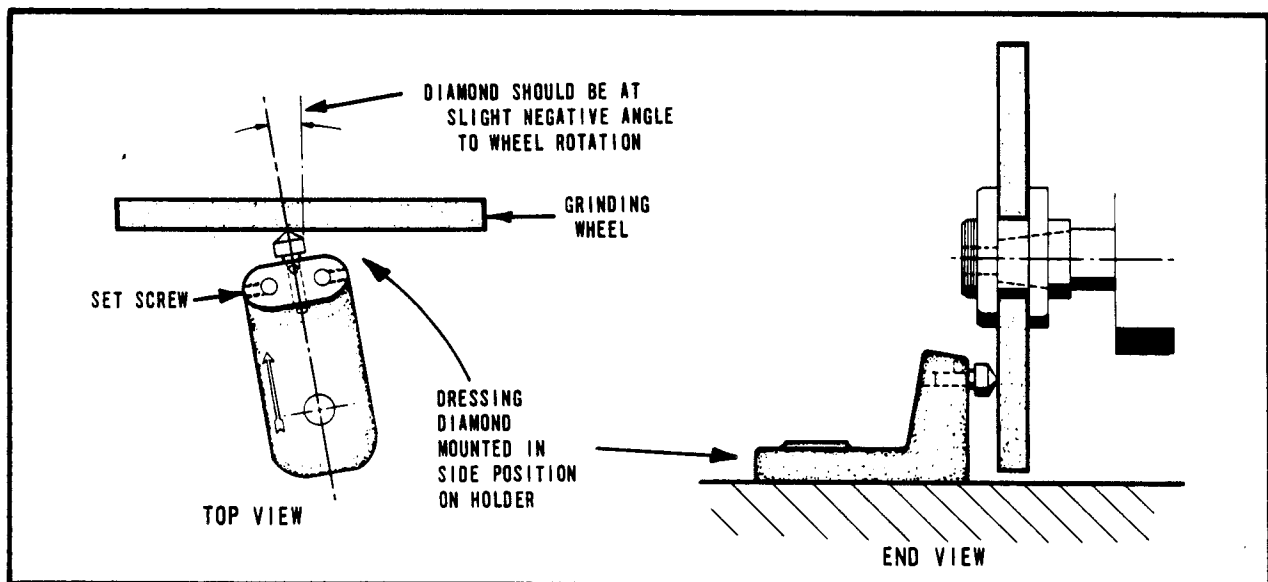
TRUING THE WHEEL SIDES

"Side" truing of the wheel may be necessary. Turn off the spindle motor and observe the wheel from its edge as it slows down. If any wobble is visible (this will produce lines in the work piece), the sides of the wheel must be trued.

(1) Loosen the set screw holding the diamond in place and position the diamond in the side position on the holder.

(2) Position the holder as shown in drawing below. Once again, the rule applies of placing the diamond at a negative rake angle of 15° . Make sure that the wheel guard will clear the diamond during table traverse.

(3) Feed the diamond across the side of the wheel (using manual table control) at a very slow table speed and a light cut. Then adjust the crossfeed handwheel for another cut and make another pass in the opposite direction.



Side truing the grinding wheel, using the DoALL Diamond Dresser.

DRESSING THE WHEEL *

After a wheel has been properly "flat trued" it may or may not have the desired "dress". If the wheel is to be dressed for removal of material at a moderate rate and a fine finish is also desired, its face should be as even and flat as possible. This may have been accomplished in the truing process, but in general, a wheel should be purposely dressed for the finish desired. Sometimes, however, the wheel will be heavily "loaded", i.e., glutted with chips from a previous grinding operation. If insufficient wheel material was removed in the truing operation, some of this loading may remain in the trued wheel.

Additional wheel material must then be removed to obtain a clean, sharp wheel. Consistent clean color of the wheel can be a guide to this.

For good dressing it is essential that diamond be sharp so abrasive grains will be completely fractured and project from wheel bond. Turn the diamond in its holder 15° or 20° when necessary.

A dull diamond tends to crush grains into bond and crack them without producing a clean break. Grains mashed into wheel give effect of wheel loading while cracked grains come out while grinding and produce scratch lines in work.

For fine finishes on flat grinding jobs, wheel edges should be rounded off with a hand stone after dressing. This will remove chipped wheel edges and will keep feed lines on the work at a minimum. Shoulder grinding will necessitate a true 90° wheel edge.

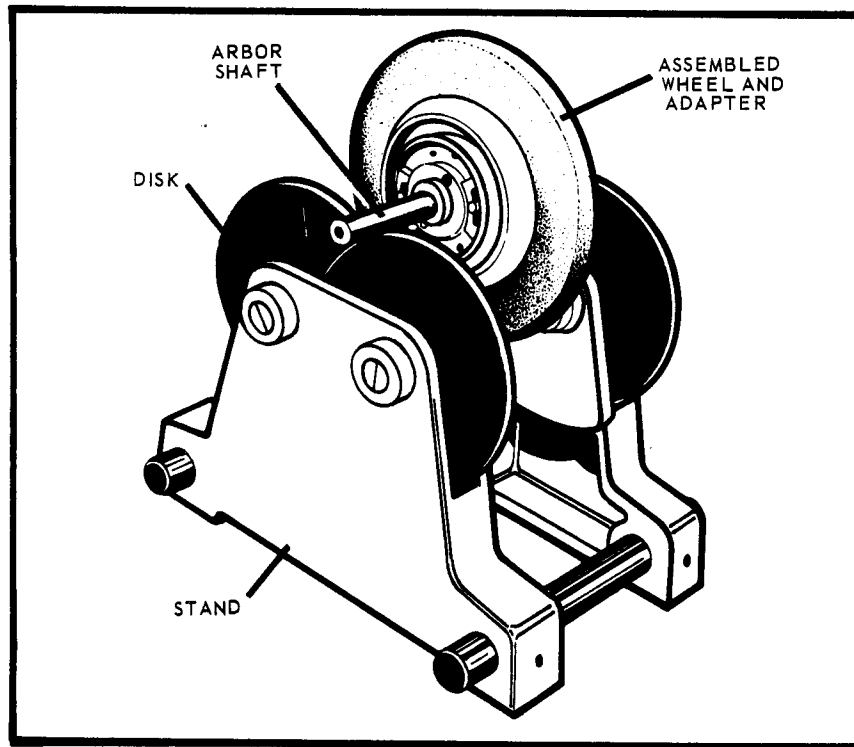
CAUTION

Care should be taken to avoid burning the diamond.
Coolant applied to a hot diamond may cause it to crack.

*Instructions for the use of the "Over-the-Wheel" Dresser Accessory are given in the Accessories Chapter.

BALANCING THE GRINDING WHEEL

For accurate grinding, it is essential that a grinding wheel be in good balance. All advantages of well conditioned equipment, skillful set-up and operation are sacrificed if the grinding wheel is out of balance. The pounding or vibration of an unbalanced wheel, no matter how slight, will result in poor grinding.



The DoALL Balancing Arbor and Stand.

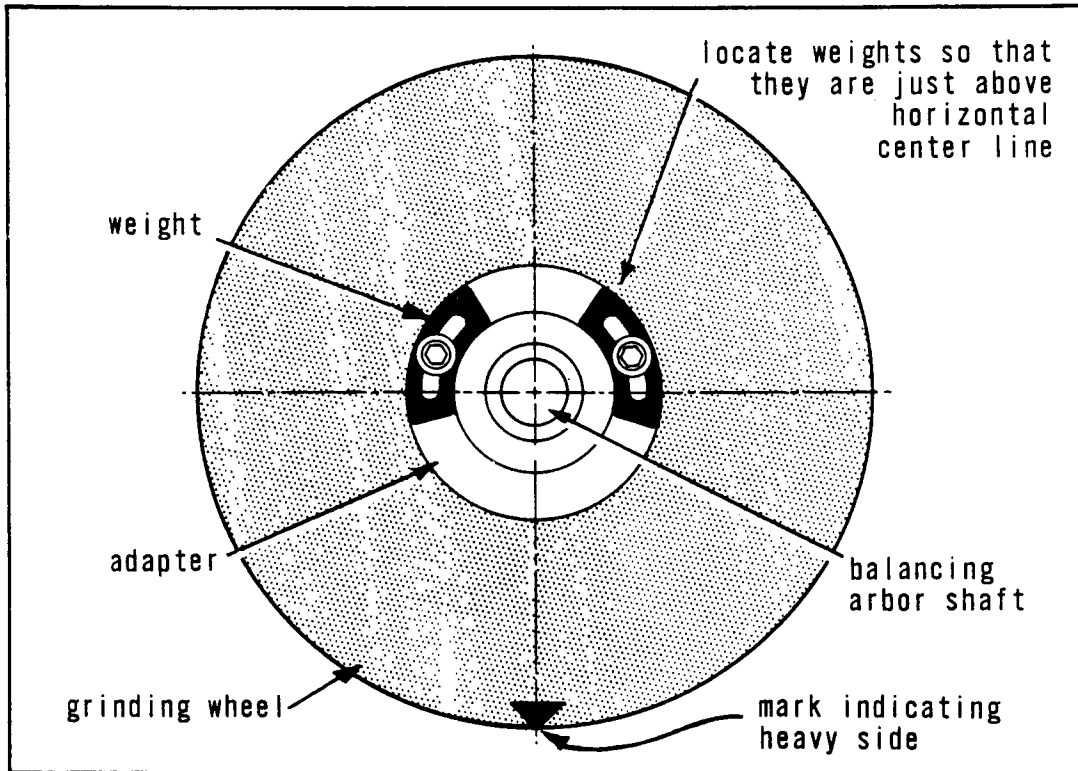
The balancing arbor and stand consist of an arbor shaft which supports the wheel and adapter upon two V's formed by overlapping disks. To avoid false indication, the arbor and stand must be kept clean, in good condition and level. Before balancing, the wheel should be run several minutes without coolant to sling out excess water. Follow this procedure to balance a wheel:

(1) Mount the wheel on the grinder and true the wheel. Mount the assembled wheel adapter on the tapered nose of the arbor shaft. Then place on the stand disks.

(2) When the wheel is placed on the stand, it will oscillate for a moment before coming to rest. Mark the exact bottom of the wheel with chalk, rotate it 90° and allow it to come to rest again. If the chalk mark is again at the bottom, the wheel is out of balance and the chalk mark indicates the heavy side.

(CONTINUED ON NEXT PAGE) . . .

BALANCING THE WHEEL (Continued)



How to locate the weights on a balancing-type wheel adapter.

(3) The heavy side of the wheel is offset by moving balancing weights incorporated in the adapter. Adjust the weights so that they are located on each side of the wheel just above the horizontal dia. when the heavy spot is centered at the bottom (see drawing above).

(4) Then move each weight upward slightly and rotate the wheel. If it comes to rest with the heavy spot down, move the weights higher. Continue until the wheel is in balance when set in any position.

(5) It is important that the wheel be trued on its own adapter before balancing, and again after it is balanced. Make sure the balance weights are tight before placing the balanced wheel on the machine.

(6) If original heavy spot is so heavy that no arrangement of counterweights will balance the heavy side, check arbor and adapter for run-out and all corrective measures set forth in mounting wheel.

CAUTION

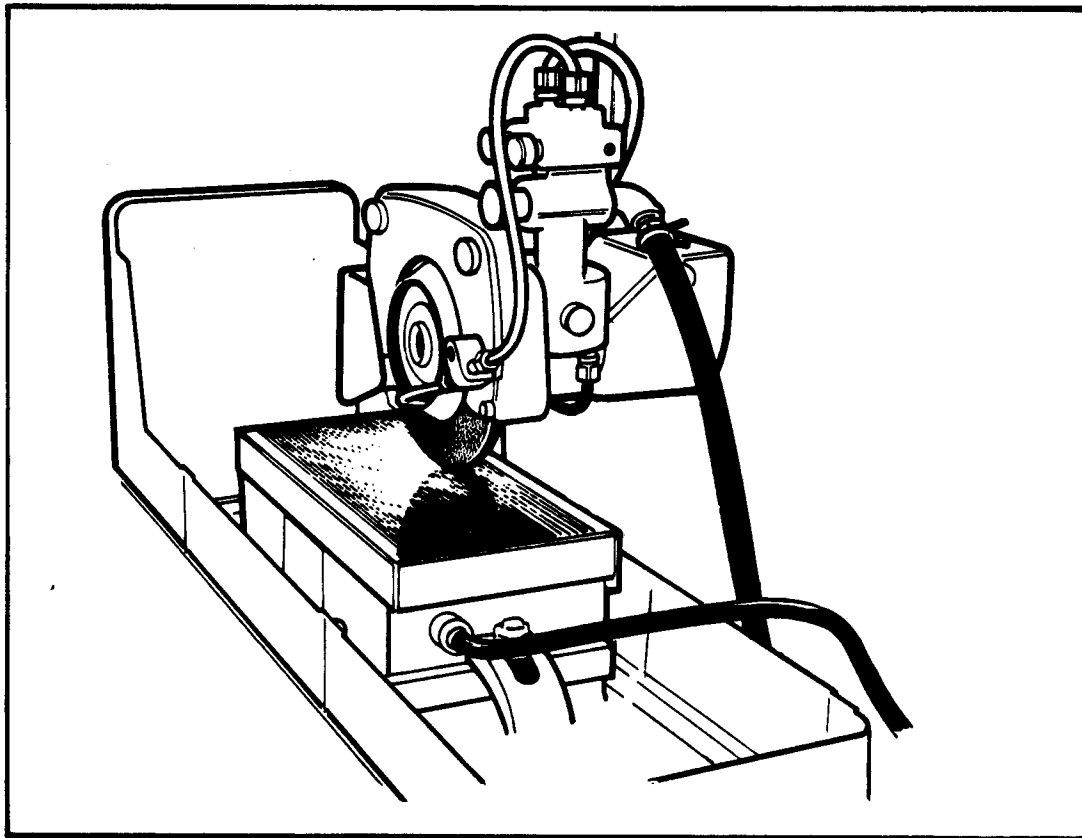
If the unbalanced condition still persists, do not operate the wheel. Contact the supplier concerned for instructions, as wheel may be damaged and unsafe to operate.

"GRINDING IN" THE CHUCK AND FINAL CHUCK INSTALLATION

The chuck has been ground flat during its factory assembly, but to insure accuracy, it is necessary to "grind in" the chuck on the grinder with which it is to be used. The following procedure is recommended for a new chuck. Each time the chuck is removed from the machine, the top surface should again be ground, to insure parallelism between this surface and the saddle and table ways. Use a coarsely-dressed, "46-I" or "46-J" grinding wheel. Use coolant if available.

- (1) Carefully clean and degrease new chuck and machine table pad.
- (2) Use a file, oilstone or deburring tool to break outside edges of bottom side of chuck. Check bottom surface for burrs. Apply a light film of oil to table pad.
- (3) Grind top (holding) surface of chuck first. Place chuck on table and block in place. Do not clamp chuck down (this will provide a true, undistorted surface for grinding).

(CONTINUED ON NEXT PAGE)



For maximum accuracy, it is necessary to "Grind-in" the chuck on its own grinder.

GRINDING IN THE CHUCK (Continued)

- (4) Do not turn chuck electric power on. Grinding should start with highest spot on chuck (If your grinder has a downfeed slip ring, this can be located by finding high point at back side of chuck, setting downfeed slip ring to 0, raising wheel and locating highest point of front side of chuck. Then compare two sides and start grinding at highest spot).

Grind in both directions, reducing downfeed a little on second grind. Take .004 deep cuts, using .025 to .030 crossfeed and highest table speed. (Note: If your grinder is not equipped with a coolant system, use .0001 downfeed, .050 crossfeed and fast table speed.)

- (5) Dress the wheel (using magnetic chuck power to hold diamond dresser).
- (6) Remove chuck, deburr, break corners and clean chuck and table pad.
- (7) Place a light film of oil on table pad and place chuck on pad with holding surface down. Block chuck in place. Do not use magnetic power.
- (8) Grind bottom of chuck until it is flat. Note: If it is necessary to dress wheel again, use machinists' clamp to hold wheel dresser on chuck.
- (9) Remove chuck, deburr, break corners and clean chuck and table pad very thoroughly (remove all oil). Apply light film of oil to table pad.
- (10) Place chuck in normal position with holding surface up. Use table clamps this time, tighten all clamps finger tight first. Adjust chuck so that it is parallel to table travel, use a .001 indicator. Tighten left-hand clamp. Tighten right-hand clamp tight, then back off slightly. When chuck is correctly positioned, tighten right-hand clamp nut slightly more than finger tight. This will allow chuck to expand in a horizontal plane without distorting.
- (11) Dress wheel.
- (12) Grind top surface (with full holding power on) until it is flat. The final cut should be at .0001 to .0002 downfeed and .030 crossfeed with highest table speed.

CHAPTER 4

OPERATION

SELECTING and MIXING COOLANT

DoALL Kleen-Kool is a nontoxic, chemical type coolant developed specifically for precision "Cool Grinding". When mixed with water it instantly forms a true chemical solution without the danger of inverting or separating in the machine. The solution is transparent, allowing the operator a clear view of the workpiece.

Kleen-Kool has the distinct advantage of not attacking aluminum or copper as do some of the cheaper synthetics. This allows its use over a wide range of materials.

Any evaporative product of Kleen-Kool is readily redissolvable in water, resulting in a clean wheel. Solvent type cleaners are not recommended. Their use may create a film which is extremely messy to remove.

Kleen-Kool was formulated to be used in dilutions of from 1:20 to 1:80 as indicated on the container. Using in a more concentrated form than 1:20 does not materially improve the performance. Using in a more dilute form than 1:80 may result in rusting.

Two other types of cutting fluids may be used in grinding operations under certain conditions.

(1) DoALL No. 470 Soluble Oil is recommended for grinding high-alloy steels where premature wheel breakdown is to be avoided and better surface finishes are desired. Being a water "soluble oil" or emulsion type cutting fluid, Number 470 exhibits heat conductivity between that of water and of oil alone.

(2) DoALL No. 150 Cutting Oil is recommended for grinding high-chrome, high-nickel materials to super-fine finishes. It is also recommended for machining active metals such as zinc, magnesium, etc.

WARNING

WHEN USING CUTTING OILS, IF A FINE SPRAY OR MIST IS CREATED, ACTION SHOULD BE TAKEN TO CONFINE THE MIST TO AS SMALL AN AREA AS POSSIBLE.

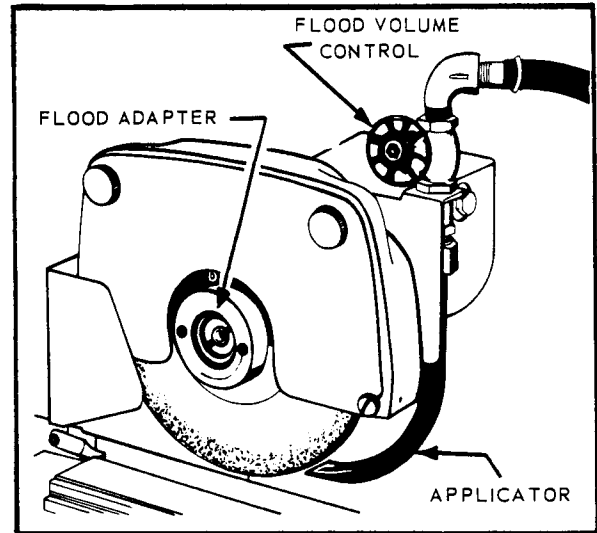
COOLANT APPLICATION

There are two different coolant systems available as accessories; one is a flood coolant system and the other is a combination flood and "Cool Grinding" system. Adjustment is as follows:

(1) Flood grinding adjustment -

The flood coolant volume control is located on the right-hand side of the wheel guard. The flood applicator nozzle can be positioned vertically by loosening the locking knob. The splash and dust guard at the left side of the wheel is adjusted by loosening the knob.

The coolant serves both as a lubricant and a coolant. It should be directed between the work and wheel in sufficient quantity to prevent overheating the work.

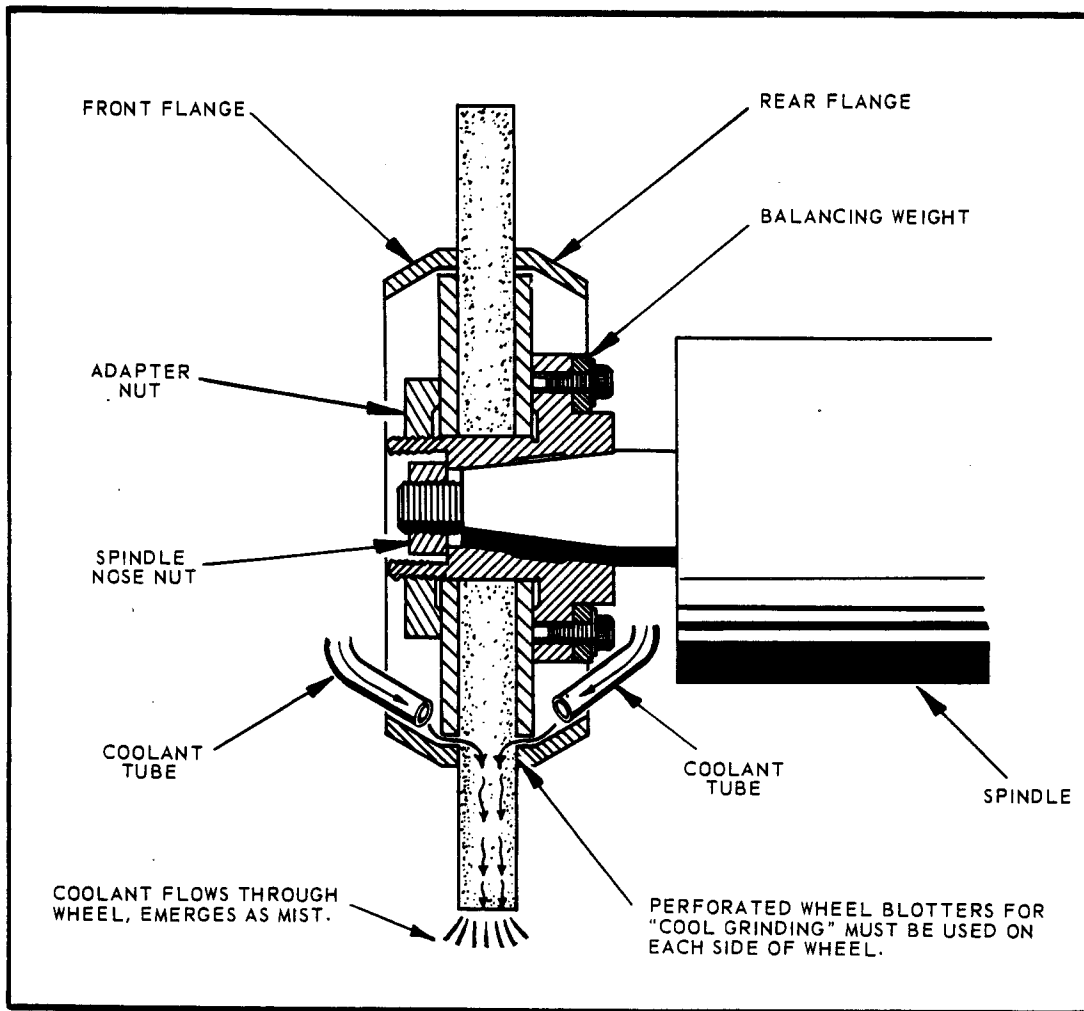


Flood Coolant Controls.

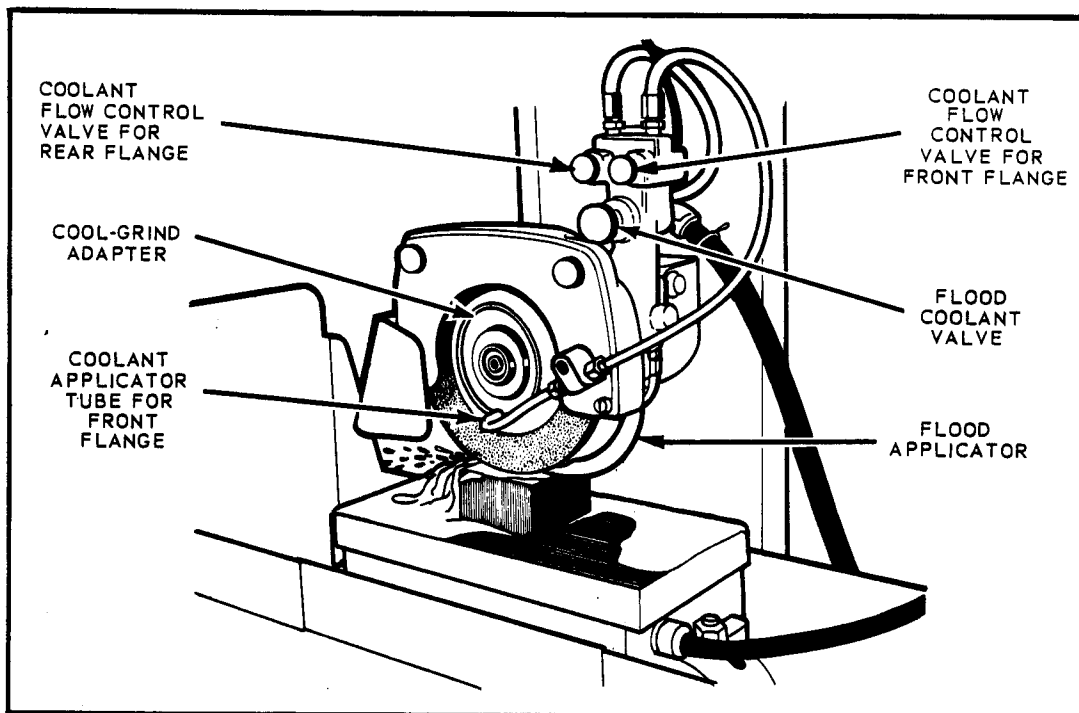
(2) "Cool grinding" and flood grinding combination adjustment-

"Cool grinding" is a method of applying coolant through the wheel directly to the point of wheel contact, reducing the temperature of the work being ground. This is done by directing coolant to the adapter collector rings on either side of the wheel. Due to centrifugal action, the coolant is sucked into the wheel and then thrown out at the face of the wheel. By applying coolant at the point of contact, much less coolant is required. This gives 100% visibility of the work and the wheel.

Cool grinding volume controls are located above the wheel guard. Maximum cooling effect can be obtained by applying a light mist through the wheel. Adjust the two control valves so that the flow is even to both sides of the wheel. Always have spindle running during "cool grinding" adjustment. Make sure the application tubes are positioned correctly for directing coolant into the adapter collector rings. Perforated wheel blotters must be used with the cool grinding adapters. If both systems are used, always make the cool grinding coolant adjustments first, then the flood adjustments last. After grinding, always run the wheel for a few seconds without coolant flowing. This will "spin-off" any excess coolant which could unbalance the wheel.



Cross-section thru cool-grind wheel and adapter.



Coolant Application Controls. (Cool and flood grinding combination).

SAFETY PRECAUTIONS

- (1) DON'T use a wheel that HAS BEEN DROPPED.
- (2) DON'T FORCE a wheel onto the machine OR ALTER the size of the mounting hole- if wheel won't fit the machine, get one that will.
- (3) DON'T ever EXCEED MAXIMUM OPERATING SPEED established for the wheel. Check maximum speed printed on wheel blotter.
- (4) DON'T use mounting adapters on which the bearing surfaces ARE NOT CLEAN AND FLAT.
- (5) DON'T TIGHTEN the spindle nose or adapter nut EXCESSIVELY.
- (6) DON'T grind on the SIDE OF THE WHEEL.
- (7) DON'T start the machine until the WHEEL GUARD IS CLOSED.
- (8) DON'T LEAVE LOOSE ITEMS ON TABLE.
- (9) DON'T STAND to left of grinding wheel when the grinder is started.
- (10) DON'T grind material for which the WHEEL IS NOT DESIGNED.
- (11) DON'T POSITION OR CHECK WORK NEAR ROTATING WHEEL.

WARNING

Prolonged continued contact of the hands with cutting fluids may lead to difficulty. Water soluble cutting fluids tend to remove the natural oils from the skin. The hands become dry and may crack, exposing the body to attack by bacteria. Individual susceptibility varies greatly.

Most important, contaminants must be kept out of cutting fluid systems. Food particles, cigarettes, and spitting will introduce external bacteria to the system and contaminate the fluid. This will contaminate the fluid so that it can not do its job and also encourages the growth of bacteria and mold. The best protection the operator has is his own observation of good, regular hygiene habits.

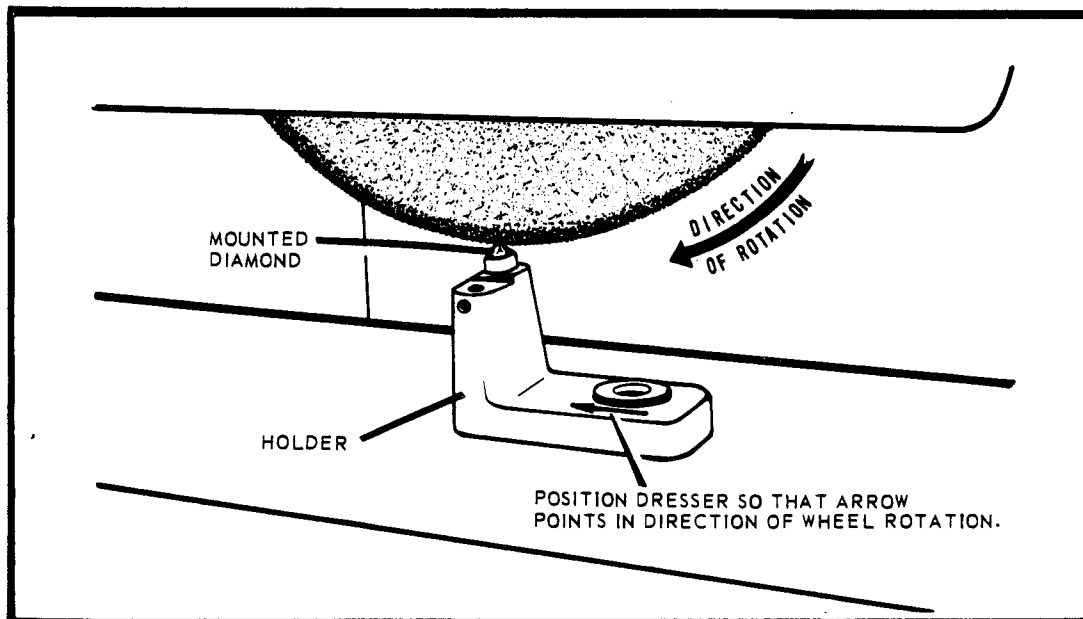
IMPORTANCE OF CORRECT WHEEL DRESSING

It is very important that the portion of the diamond dressing the wheel have a sharp edge, rather than a point, or, worse yet, a dull, rounded edge.

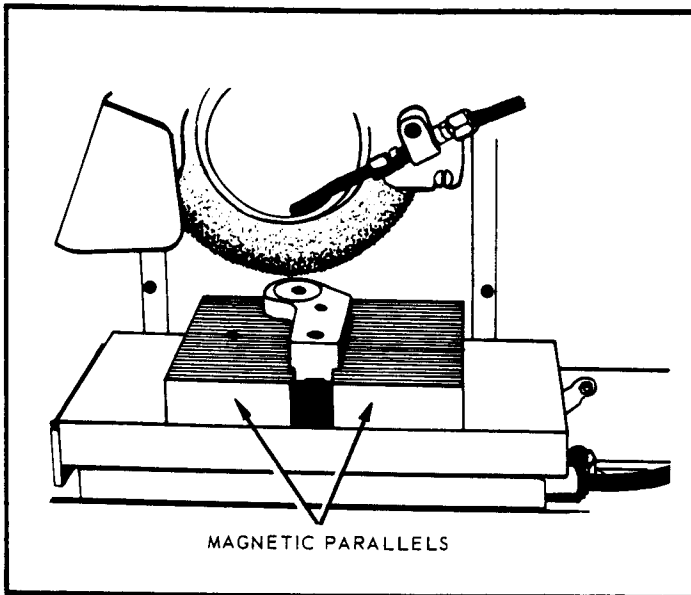
Where dull diamonds are used to dress wheels, the grits are either broken out of the wheel or are burnished by the diamond with the result that their cutting edges are made ineffective. The friction created by the dulled grits in the wheel can therefore generate great heat and is one of the common causes of so called "burnt" work. If care is taken to present an edge of the diamond rather than the point to the wheel, this "dulling" of the wheel can be overcome.

One of the easiest ways to accomplish this is to rotate the diamond 15 or 20 degrees with each dressing; and it thereby tends to keep itself sharp in the same way that a pencil keeps sharp when it is rotated in use.

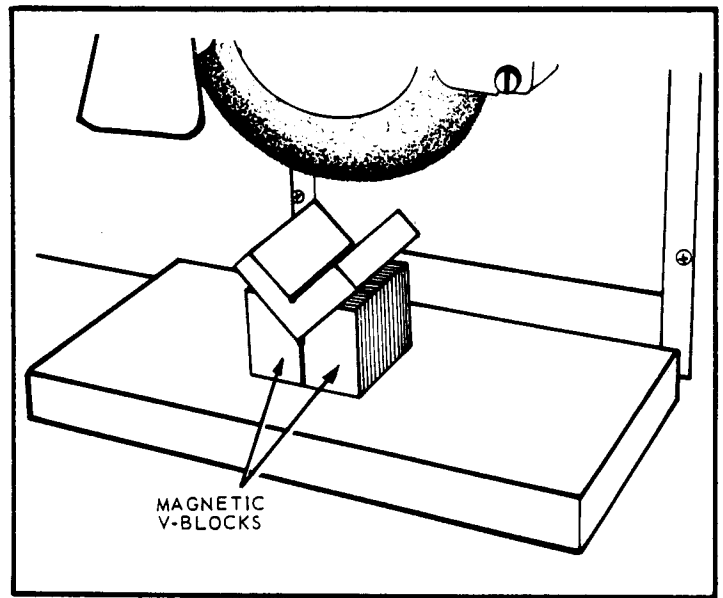
Where heavy, deep cuts are to be taken the wheel should be dressed coarsely enough to provide space for the increased chip load. A loaded wheel acts more as a burnishing wheel and can generate enough heat to melt the material and wipe it off rather than cut it off in the form of minute chips.



The diamond wheel dresser, available as an accessory, positions the diamond at the correct angle for dressing.



An oddly-shaped workpiece which has projections on side facing chuck can be held with magnetic parallels.



Use magnetic V-blocks to hold round, square or irregularly-shaped bar stock.

MAGNETIC PARALLELS & V-BLOCKS

Magnetic parallels and V-blocks should be used to hold irregularly shaped workpieces on the chuck. The fixtures are made of alternate laminations, similar to the surface of the chuck, which allows the flow of magnetic holding power from the chuck. The magnetic parallels are especially useful in grinding work which has bosses or projections on the side facing the chuck. Use the V-blocks for holding round, square, etc. pieces for light grinding.

GRINDING THIN PARTS

To get a high degree of flatness, the workpiece must not be too thin, with respect to its other dimensions. There are several reasons for this:

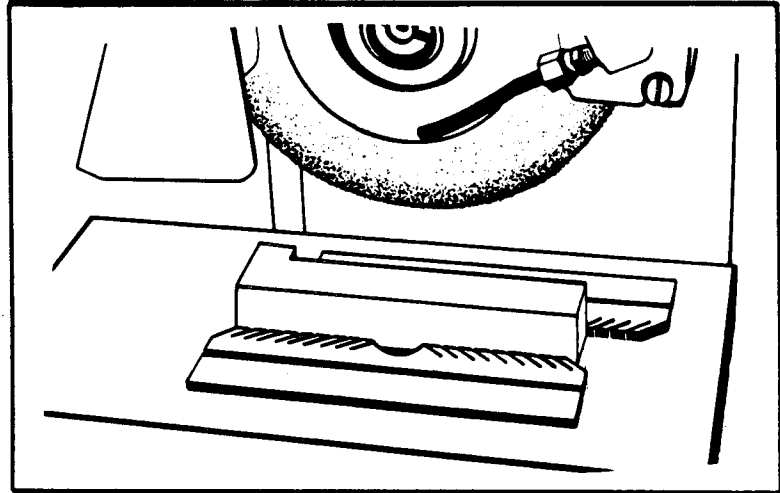
(1) If the part is quite thin, it heats up faster, and is more subject to springing (bending) under the load of the grinding wheel.

(2) Furthermore, the magnetic chuck force may pull down some parts more than others. Then, when removed, the part may spring back to its original warped condition. You can overcome this problem by turning the SELECTRON down to 10% holding power. If this does not work, turn SELECTRON current off, and simply block the part at each end, so that it doesn't slide while being ground.

GRINDING NON-MAGNETIC MATERIALS

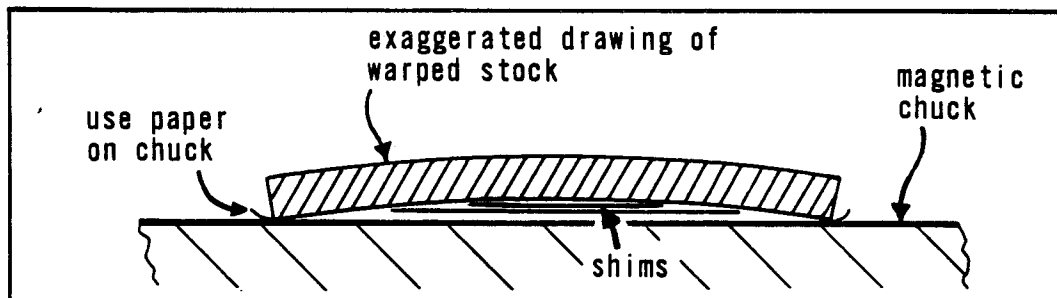
Non-magnetic parts can be held on the electromagnetic chuck by several means. One of the simplest methods for small parts is using double-sided tape between the work and chuck. The pressure of the grinding wheel on the work is so light that this method will work in many cases.

The DoALL Magnetically-actuated clamps will hold non-magnetic materials on the chuck.



DoALL magnetically-actuated clamps are designed to hold non-magnetic materials such as brass, copper, plastic, glass, hard rubber, aluminum, stainless steel, etc.

Work is placed on magnetic chuck surface between clamps so toothed edge of each clamp is in contact with work. A backing plate, against which back edge of one clamp should be placed, is available for most magnetic chucks. Each clamp is composed of two steel sections connected to each other by preset spring steel strip. Angle of spring is such that these sections will be 5° to each other. When chuck is energized, jaws of clamps are forcibly drawn to horizontal position by chuck, exerting a powerful lateral thrust against work piece. Wedging action of jaws against workpiece holds it securely in place against face of chuck.



GRINDING WARPED STOCK

Warped stock should be placed on the chuck with the bowed ends down as shown in drawing. If the bowed ends are up, the work will rock. Shim under the stock to prevent distorting it when applying holding power.

SURFACE FINISH PROBLEMS

(A) Irregular Scratches - Scratches of various lengths and widths, having no noticeable pattern, are considered irregular scratches. Sometimes they are called "fish tail" scratches.

Such scratches are commonly caused by loose particles of abrasive falling down onto the work from underneath the wheel guard, or carried by the coolant. The solution is obvious:

(1) Flush out the inside surfaces of the wheel guard when changing wheels.

(2) Clean the coolant tank, and keep level of liquid up.

It may, however, be that the grinding wheel is too soft and dislodged abrasive grains cause the irregular scratches, by rolling around between the wheel and the work piece. As the grit is in addition to wheel size, it must go somewhere. The metal is softer than the wheel, so the loose particles are dragged through the work piece surface, causing the scratches.

A wheel that is too coarse may also cause irregular scratches, caused by the random nature of the grains in the wheel. Dress the wheel "finer", using a diamond, and allow it to spark out carefully. If it still can't develop the desired surface finish, the wheel must be exchanged for one having finer grit.

(B) Patterned Scratches - If the scratch pattern seems to repeat itself, the wheel may not have been dressed properly, due to a defective diamond. Such "diamond marks" may have been caused by a diamond that was cracked, or whose mounting loosened. The amount of abrasive material cut off of the wheel depends on how much of the diamond bears into the wheel at any instant. So if the diamond wobbles for any reason, the wheel surface will also show such variations, and will then transfer them to the work piece.

Check the diamond mounting for tightness, and be sure the diamond is slanted about 15° toward the direction of wheel rotation. Turn the diamond 15° every few dressings. When using, pass the diamond across the wheel as slowly and evenly as you can, to clear up patterned "diamond mark" scratches. Side dress the wheel for better finish.

(C) Feed Lines - Feed lines may be caused by too deep a cut, too fast a crossfeed, or both. This can be minimized by rounding off the wheel edge with an abrasive stick.

(D) Vibration Marks - Vibration or "Chatter" marks may be caused by a "stick-slip" action between the grinding wheel and work piece.

SURFACE FINISH CONTINUED . . .

If the wheel becomes dull and glazed, it may then slip a section of a revolution without grinding. Then, because it doesn't load up while slipping, some of the loading dislodges, and it begins cutting once again. This can happen several times a second, leaving the stick-slip (grinding, then just rubbing) marks on the work piece.

The answer is to redress the glazed wheel with a sharp diamond, and to do the job in the least number of passes that will develop the surface finish and flatness required.

Conditions which may cause such vibration chatter marks are:

(1) Wheel far out of balance or not dressed "true" on the spindle, or soaked with coolant on one side.

(2) "Outside" vibrations, such as from a punch press or other impact machinery, or craneways, or railroad tracks.

(E) Discolored Surface - Discoloration, "checking" and burning are due to overheating. Even when plenty of coolant is used, it is possible to overheat a part if metal is being removed from a small area too fast. The solution is to use a softer cutting wheel, or to change the operating conditions of the wheel being used to make it act "softer". Try increasing table speed, dressing the wheel coarser, and taking lighter cuts. Use generous coolant flow, directed onto both the work piece and wheel.

(F) Burnished Surfaces - A "burnished" surface is one made smooth and shiny by rubbing. Broad surfaces that have been ground sometimes show an irregular, burnished "patchy" surface. What likely brought this about is that the wheel is glazed and requires dressing. Or, it may be too fine or too hard. Reducing downfeed may help. The answer here is to use a softer wheel that cuts freer.

(G) Slide Scratches - Sometimes a perfect grinding job is ruined while taking the workpiece off of the chuck. Never slide the work piece off of the magnetic chuck, or the work piece, and the chuck face may be scratched. Since the whole chuck is covered with particles or grit, sliding a work piece is very likely to develop long deep scratches.

Even when the chuck current is turned off, it may be difficult to immediately lift off the work piece, due to residual (remaining) magnetic force. Also coolant may hold the part down by suction.

(H) "Grinding Shift" Scratches - "Grinding shift" scratches are caused by the work sliding on the chuck during operation. If it isn't held tightly, or (if work is not magnetic) if firm ferrous (containing iron) blocks or clamps don't hold it securely "fore and aft", the work piece may shift slightly every time a pass is made in a different direction. "Grinding shift" scratches can be detected because all of the scratches are fairly broad, and of equal length.

CHAPTER 5

TROUBLE SHOOTING

MOTORS WILL NOT START

- (1) Check overload relays on magnetic starters. Press reset buttons, if they have been tripped.
- (2) Check main fuses.
- (3) Check line for incoming power.

SPINDLE ROTATES IN WRONG DIRECTION (COUNTERCLOCKWISE)

- (1) If machine is new or if wiring has been changed, reverse rotation by changing any two leads (3 phase only). Wheel rotation should be clockwise when viewed from front.

NO COOLANT FLOW (if coolant system is used)

- (1) Check coolant filter (if used) and lines for clogging.
- (2) Check coolant motor starter overload relays. Reset relay, if necessary, after discovering trouble.
- (3) Check rotation of motor. Looking down on motor, rotation is clockwise.
- (4) Check coolant pump for output. Pump to motor coupling may be broken or pump impeller may be jammed.

NO COOL GRIND FLOW FROM WHEEL

- (1) Coolant tubes inside wheel guard on each side of wheel may not be adjusted to deliver coolant into adapter flanges.
- (2) Coolant valves, tubing and hoses may be clogged. Holes in adapter may be clogged. Hard water may leave deposits causing clogging.
- (3) Wheel may be clogged from dirty coolant.

CANNOT GRIND CHUCK FLAT

- (1) Using wrong type wheel or coolant application incorrect.
- (2) Wheel not dressed correctly.
- (3) Not following correct "grinding-in" procedure, too much downfeed or crossfeed.
- (4) Burrs on chuck or foreign matter between chuck and table pad.
- (5) Table to saddle ways are dry and dirty, clean and check oil lines from lubricator.

MAGNETIC CHUCK DOES NOT HOLD WORK

- (1) Trouble may be either in chuck or SELECTRON. Call your local DoALL Serviceman for service.

IRREGULAR SCRATCHES ON WORK

- (1) Wheel too soft, dislodged abrasive grains scratch work.
- (2) Wheel guard dirty, grit drops onto work.
- (3) Wheel too coarse, not dressed correctly.
- (4) Dirty coolant.

WIDELY SPACED SPOTS ON WORK

- (1) Oil or glazed spots on wheel, dress wheel.
- (2) Incorrect coolant application.

FINE, EVEN SPIRAL LINES ON WORK

- (1) Wheel dressed too fast has diamond marks.
- (2) Check diamond for looseness, or damage.

UNEVEN, FINE LINES ON WORK, ISOLATED DEEP MARKS

- (1) Faulty wheel dressing.

WAVY TRAVERSE LINES ON WORK

- (1) Faulty wheel dressing leaves ragged wheel edges.
- (2) Wheel not balanced.

DEEP, IRREGULAR MARKS ON WORK

- (1) Caused by loose wheel.

CHATTER (VIBRATION) MARKS ON WORK

- (1) "Outside" vibrations from other machinery. Make sure mounting screws are adjusted properly.
- (2) Grinding wheel not balanced.
- (3) Grinding wheel not trued.
- (4) Glazed wheel has "stick-slip" action on work. Dress wheel.
- (5) Burned or cracked wheel-dressing diamond leaves marks on wheel.
- (6) Loose wheel adapter.

DISCOLORED SPOTS ON WORK FROM OVERHEATING

- (1) Table speed too slow.
- (2) Not enough coolant or coolant not applied properly.
- (3) Wheel too hard.
- (4) Wheel dressed too fine.
- (5) Downfeed excessive.
- (6) Wheel dressing diamond is dull.

"BURNISHED" WORK

- (1) Grinding wheel may be glazed, dress wheel.
- (2) Grinding wheel is too hard.
- (3) Grinding wheel is too fine.
- (4) Wheel dressed too fine.

RIPPLE OR WAVE PATTERN ON WORK

- (1) Grinding wheel not balanced or trued.
- (2) Vibration from outside machine.
- (3) Grinder is not bearing evenly on all foot pads.

MACHINE NOT GRINDING PARTS FLAT

- (1) Excessive heat expands work - adjust coolant application
Check for dirty coolant, clogged filter or lines.
- (2) Table speed too slow, allowing excessive heat build-up in
center and resulting in low spot.
- (3) Too much crossfeed and/or downfeed, causing wheel break-
down.
- (4) Wheel dressed too smooth, wheel loads up and does not
grind flat.
- (5) Chuck may not be flat. If not, it should be reground.
- (6) Wrong type of wheel.
- (7) Chuck may not be working properly. Check SELECTRON
controls and chuck.

THIN WORK CANNOT BE GROUND FLAT

- (1) Too much chuck holding power will distort work, try using
10% holding power.
- (2) Excessive heat will warp stock. Check wheel, coolant appli-
cation, table speed, depth of cut, etc.
- (3) Residual stresses may distort work.
- (4) Coolant, grit, chips or burrs between work and chuck.
- (5) Chuck may not be flat.
- (6) Chuck not working properly.

CHAPTER 6

LUBRICATION and MAINTENANCE

AUTOMATIC LUBRICATOR

The Lubricator operates automatically whenever the spindle is running. The lubricator pumps way oil to these critical locations: saddle ways, table ways, column ways, column elevating screw, and crossfeed screw and nut.

The proportion of lubricant delivered to each location is set at the factory by means of various sized orifices.

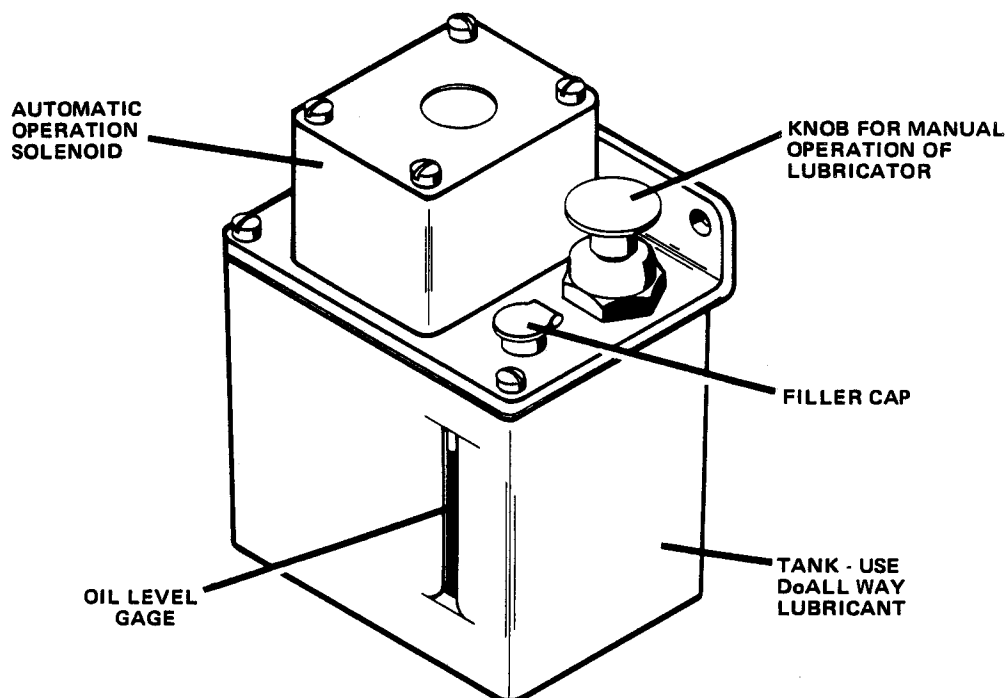
Keep the lubricator tank filled with DoALL Way Lubricant. An oil level gage is provided. If additional lubrication is desired, the hand knob can be used. To operate, pull up the knob, then release.

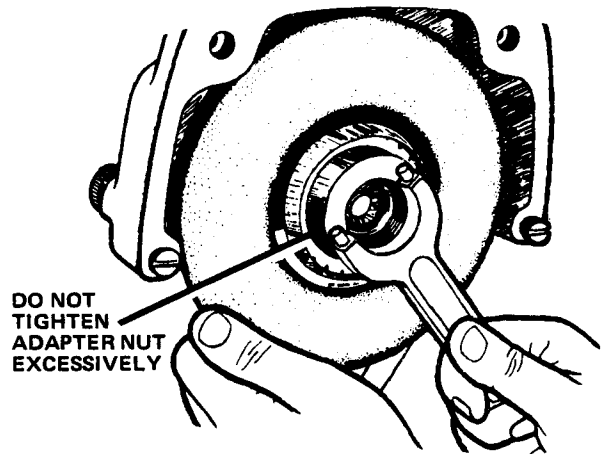
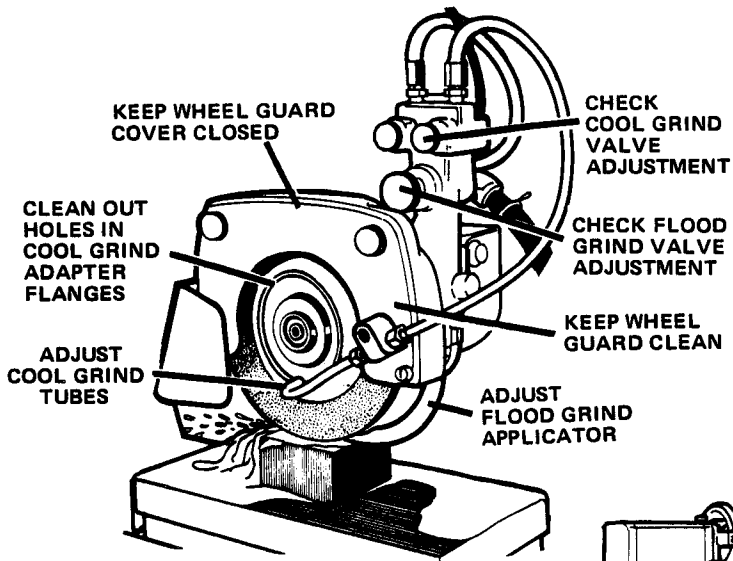
CAUTION

INITIAL LUBRICATION OF WAYS

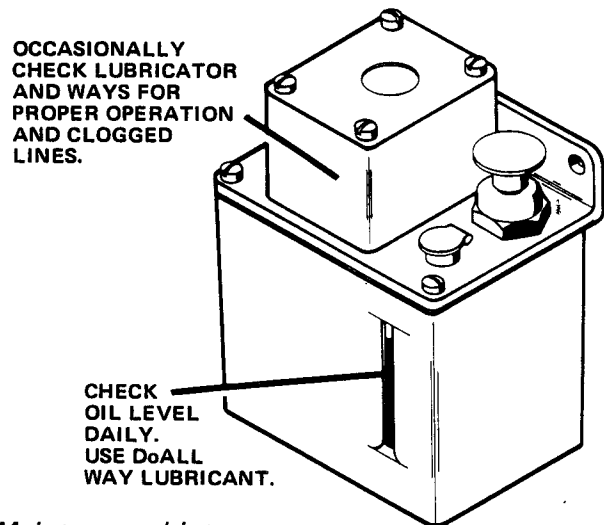
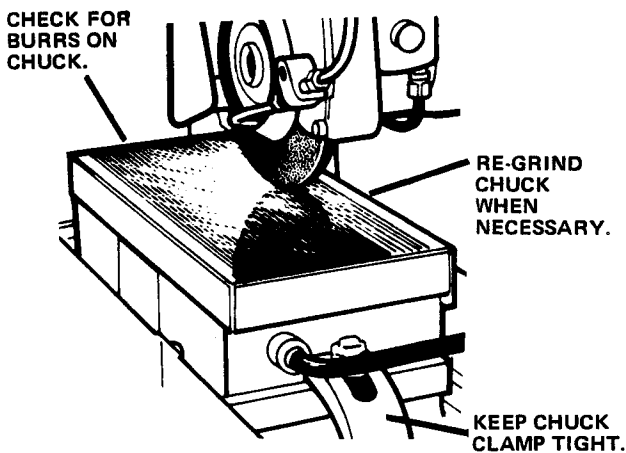
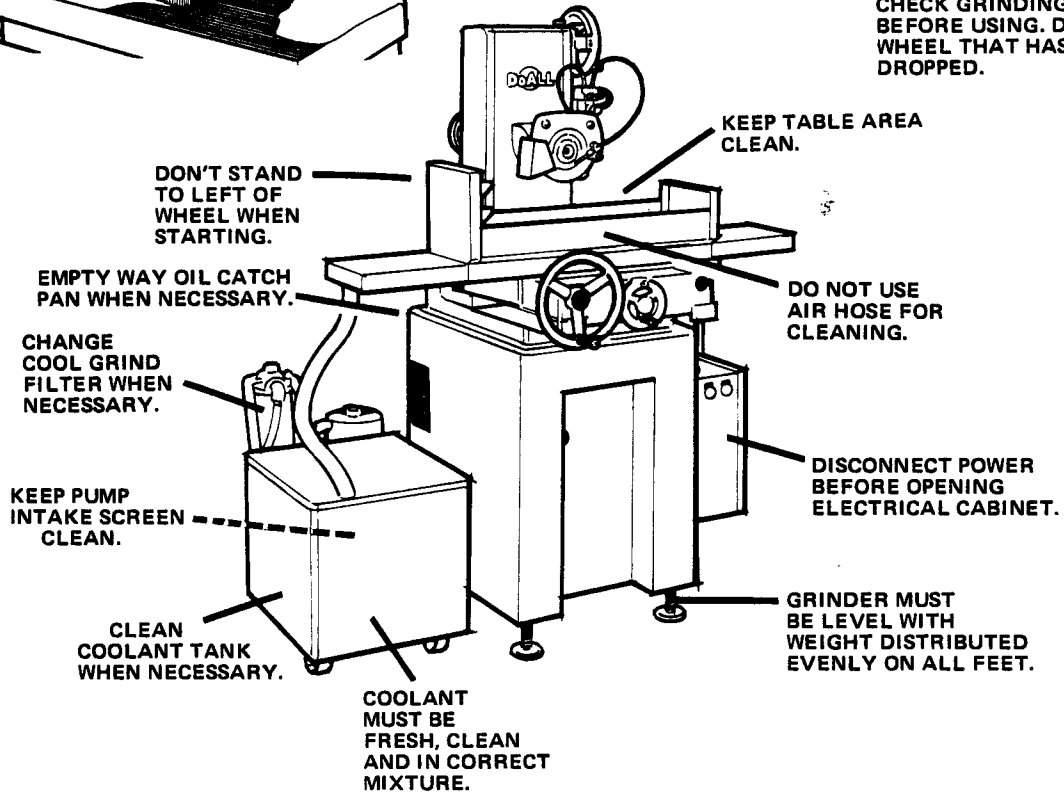
When setting up a new machine, or whenever the table has been removed, it is necessary to "charge" the system with oil. Charging the system will fill all lines and way grooves with oil and will prevent premature wear of the ways.

To charge the system, center the table on the ways, then allow the spindle to run for about 10 hours. The charging process is complete when way oil can be seen dripping off both ends of the two table ways. (Note: The charging process can also be accomplished by operating the manual knob on the lubricator about 30 times, but check to be sure that the lubricator automatic cam is in a position that allows a full stroke of the knob).





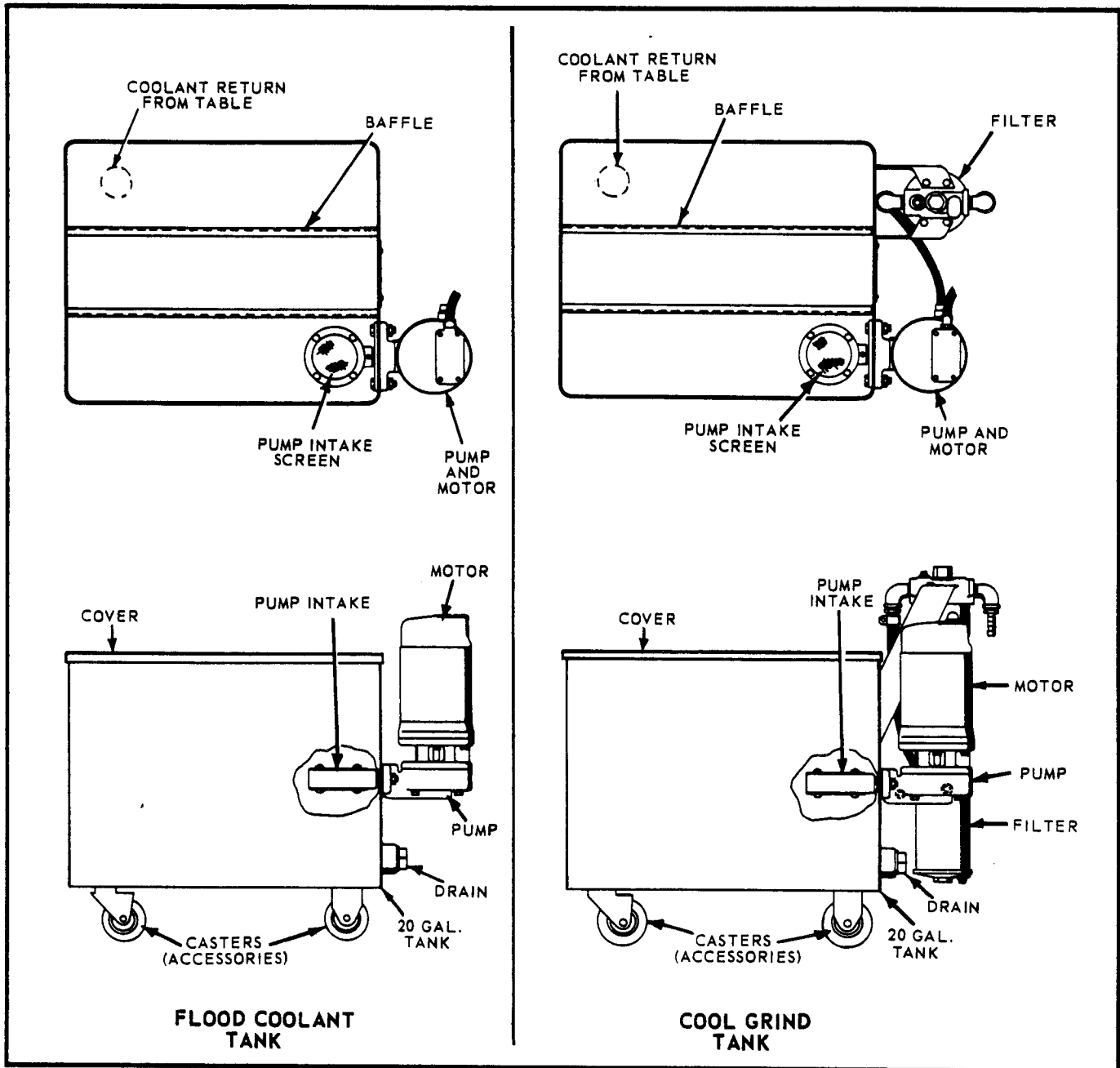
CHECK GRINDING WHEEL BEFORE USING. DON'T USE WHEEL THAT HAS BEEN DROPPED.



Grinder Operation and Maintenance hints.

CLEANING COOLANT SYSTEM

- (1) Capacity of the coolant tank is 20 gallons.
- (2) Drain, clean and refill the tank whenever the coolant becomes dirty. Change filter (if used) at this time, also.
- (3) To clean system, use Kleen Flush made by DoALL. Follow directions on the container label.

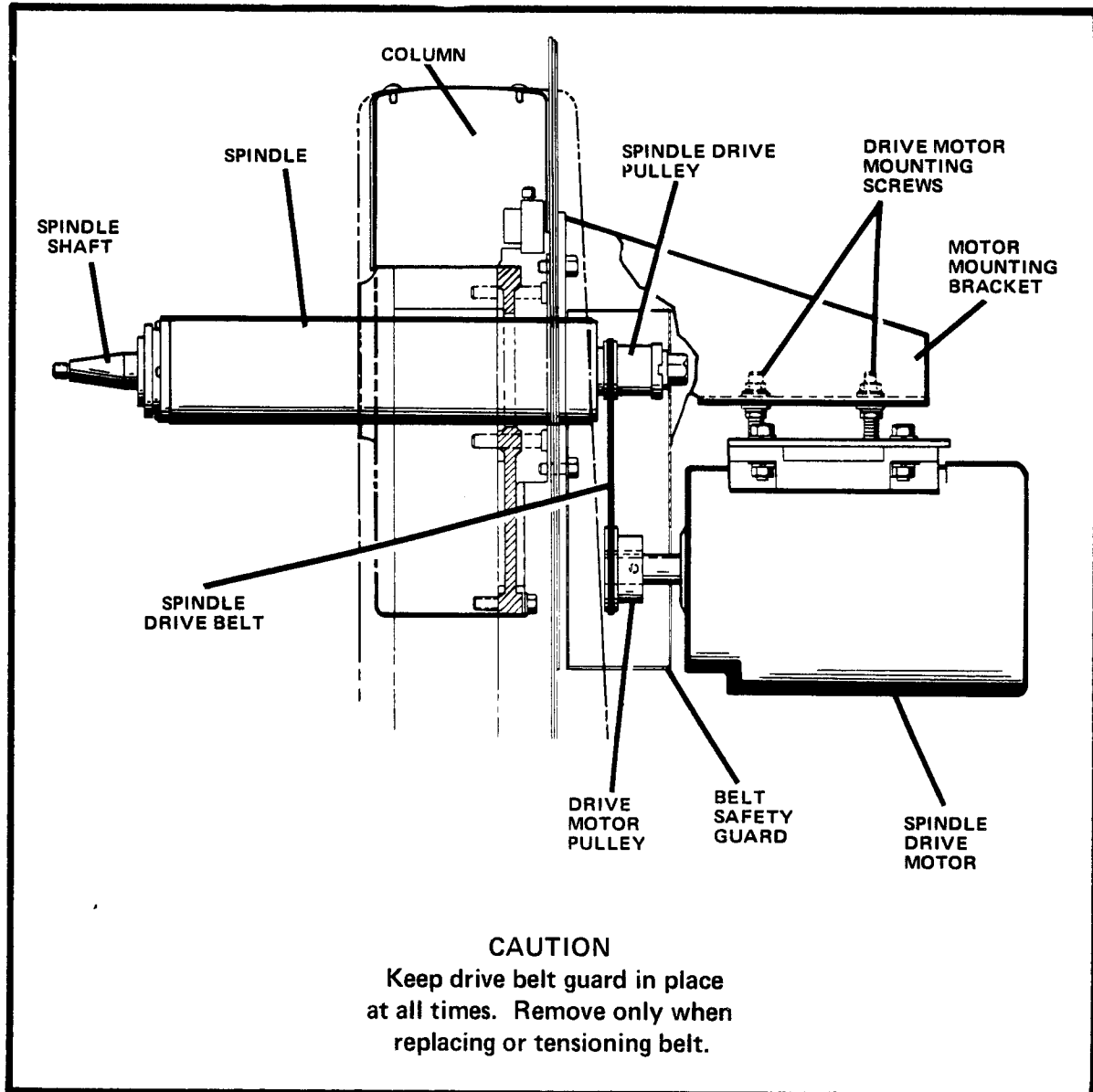


The Flood and Cool Grind type of coolant tanks.

SPINDLE DRIVE BELT TENSION (Belt-driven spindle accessory)

Spindle drive belt tension is adjusted by raising or lowering the drive motor on its four mounting plate screws.

Belt tension is correct when a one pound force applied at the midpoint between the pulleys will produce a deflection of $3/32$ inch in the belt. Do not attempt to install belt by forcing over pulley edge without adjusting motor position first. This will damage belt.



Side View of Spindle Belt Drive.

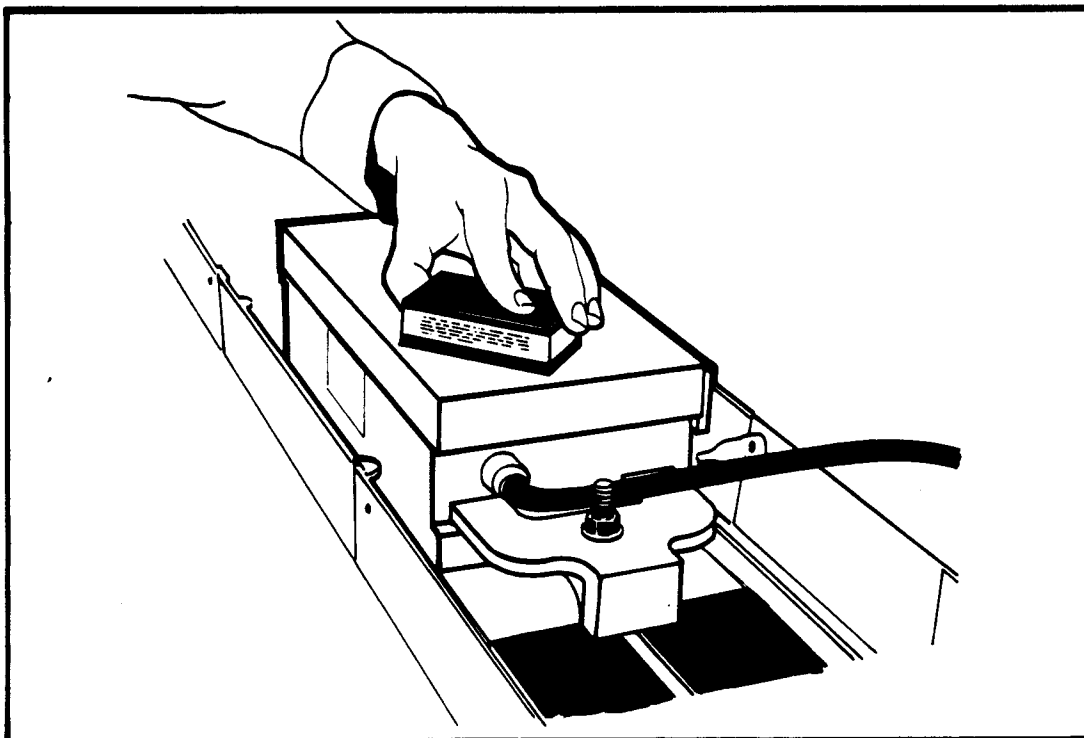
CHUCK MAINTENANCE

It is essential on a precision surface grinding machine that the surface of the chuck be parallel with the table and saddle ways. This is why top and bottom chuck surfaces, even though ground flat in the factory before shipment, must be "ground in" again after mounting on the table. In addition, the top surface of the chuck must be re-ground each time the chuck is removed from the machine and replaced. The correct procedure for grinding in the chuck is given in the "Preparation for Operation" Chapter.

It is important, if available, that coolant be plentifully used while grinding the chuck. This helps prevent heat and distortion. Light downfeeds, fast table speed and light crossfeeds are marks of good chuck grinding procedure. Don't remove any more stock than is necessary for a clean, true surface.

The magnetic chuck must be smooth and flat for accurate grinding. Some scratching, denting and wear of the chuck face, however, is inevitable. Light burrs may be removed by handstoning with a fine granite deburring stone or oilstone. When wear becomes serious, regrind the top surface of the chuck.

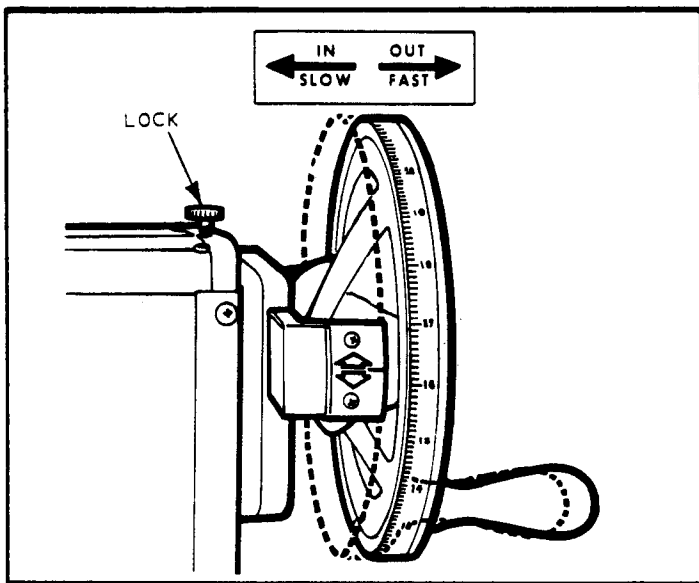
After each load, wipe off the chuck with the squeegee supplied, in order to remove grinding swarf (workpiece chips and abrasive grains) and grit. When the magnetic chuck is not in use, thoroughly clean and grease it.



A DoALL Black Granite Deburring Stone can be used to remove small burrs from the chuck.

CHAPTER 7

ACCESSORIES



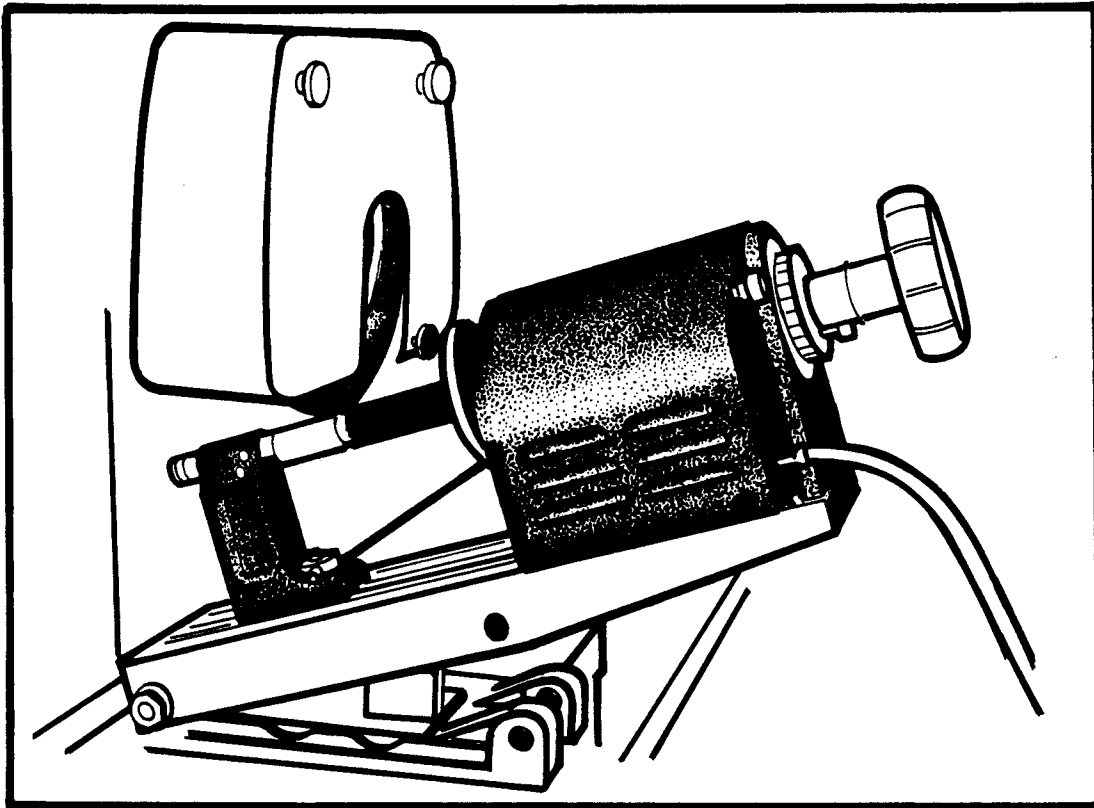
Illustrating the high and low speed positions of the dual-range downfeed handwheel. Push in or pull out the handwheel in order to shift from one speed to another.

DUAL-RANGE DOWNFEED HANDWHEEL (accessory)

This accessory is a two-speed vertical handwheel. The slow speed provides a .025 in. vertical travel per handwheel revolution for fine adjustments. The fast speed (.100 in. travel per handwheel revolution) is used for quick-positioning of the grinding wheel when doing work of varying heights. To change from one speed to the other it is necessary to pull out or push in the handwheel. A thumbscrew lock is provided on top of the column to prevent handwheel movement and accidental shifting.

PRECISION ACCESSORY GROUP

This group consists of: (1) zeroing slip ring on downfeed handwheel, (2) zeroing slip ring on crossfeed handwheel, and (3) adjustable table stops. These items are described in Chapter 2.



The Cylindrical Grinding Accessory has a separate motorized spindle.

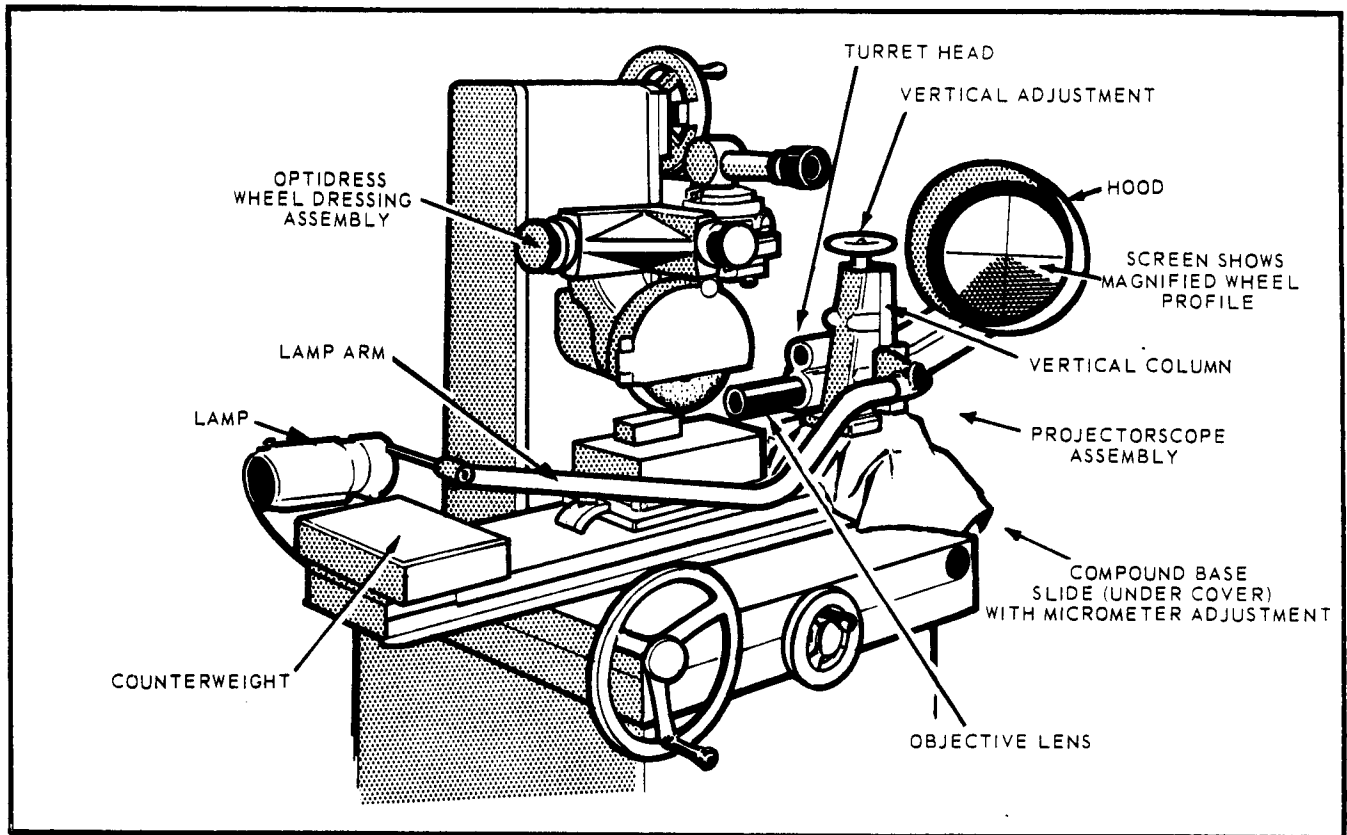
CYLINDRICAL GRINDING ACCESSORY

The cylindrical grinding accessory converts the surface grinder to a cylindrical grinder. The attachment is basically a workholder resembling the headstock and tailstock assembly of a lathe. The unit mounts crosswise on the chuck or table so that its traverse motion is the same as the chuck or table's crossfeed motion.

Centers in the attachment's headstock and tailstock support the workpiece, which is normally a rod or shaft. The workpiece revolves as does the grinding wheel. Each traverses in respect to the other. When mounted lengthwise on the table and not rotating, the attachment may be used for grinding slots in a shaft held between centers.

A step pulley provides spindle speeds of 200, 400 and 700 rpm. The unit has 24 index divisions and a two-way sine bar. Maximum part size capacity is 7-1/2 in. long by 6-1/2 in. diameter.

NOTE: SEE D_oALL CATALOG FOR MORE COMPLETE SPECIFICATIONS AND ACCESSORIES FOR THE CYLINDRICAL GRINDER.



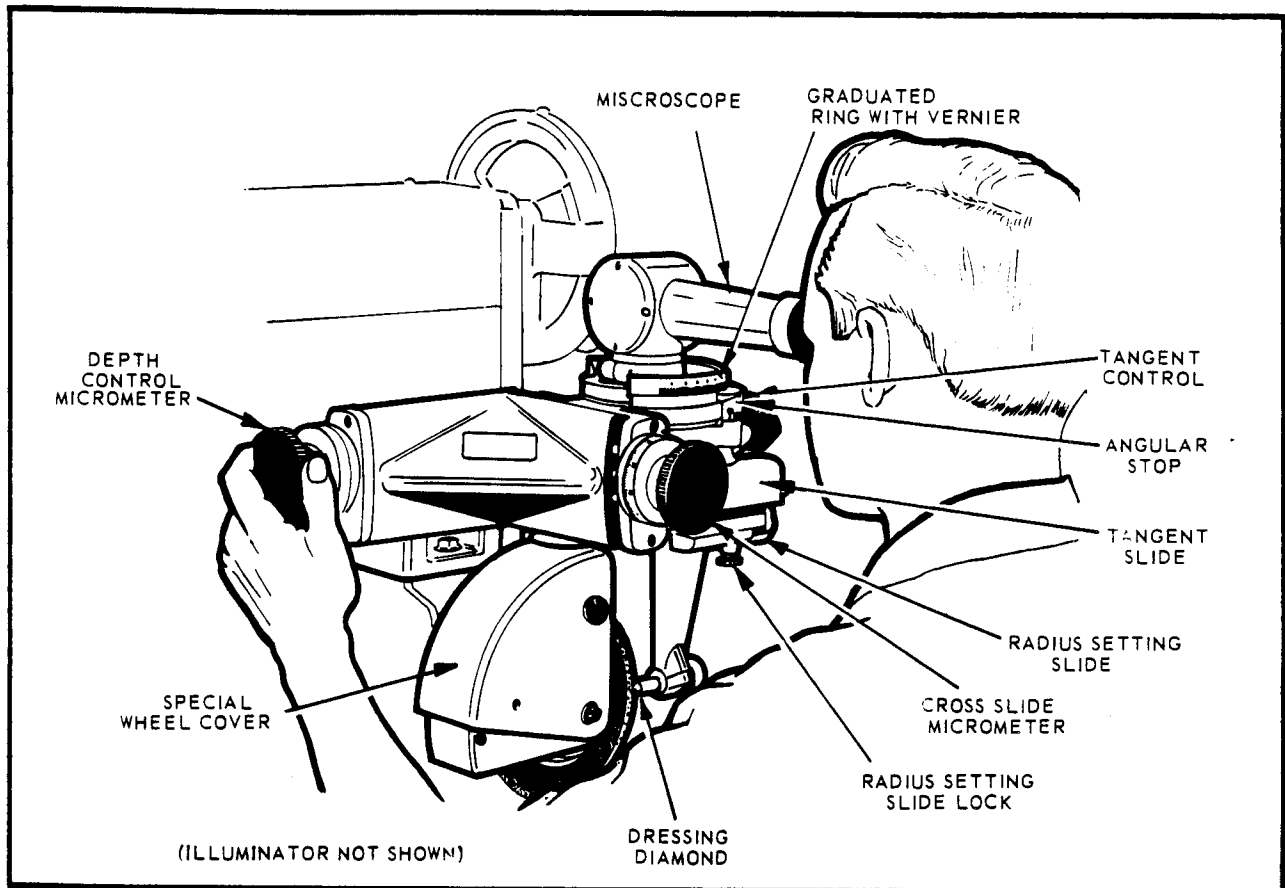
The Projectorscope in use. Note the magnified workpiece profile projected on the screen. The Optidress is used to form the wheel.

THE PROJECTORSCOPE

The Projectorscope is a precision optical inspection device. The Projectorscope converts the Grinder with Optidress into a precision visual form grinding machine. A special subplate and counterweight are provided for mounting the Projectorscope on the grinder table.

The Projectorscope provides continuous optical control for inspection of workpiece and wheel profile through all stages of intricate form grinding. The wheel and work is projected for rapid control right on the machine. Essentially, the Projectorscope consists of a screen to project the grinding wheel profile and workpiece which can be magnified 10, 20, 25, or 50 times. Six standard reticles are contained in a rotating turret head showing male and female radii, angles and standard thread forms which can be projected on the screen. In order to perform visual grinding, overlay drawings can be held onto the screen for generating complex forms in the workpiece with standard diamond wheels.

Complete operating instructions for the Projectorscope are furnished with the unit.



Using the Optidress unit to form-dress the grinding wheel.

OPTIDRESS

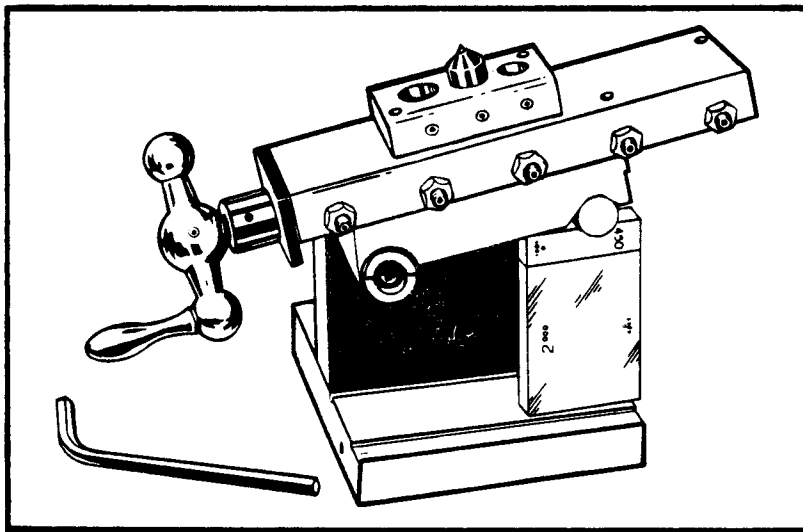
The Optidress is an optical grinding wheel form dresser, which utilizes the operator's sight rather than mechanical linkages to control the movement of the dressing diamond.

The contact point between the diamond and the grinding wheel is viewed on a reticle through a microscope. The reticle is calibrated to permit measuring face form directly.

The calibrated reticle thus provides the operator with visual control over the diamond-forming operation. Many types of concave and convex radii, angles or radii and tangent angles are formed by this type of optical control.

With the Optidress it is possible to maintain radius angles and tolerance without removing the workpiece from the chuck. The Optidress assures the accuracy of the radius set to gage block tolerances and angles dressed to the exact tangent of the convex or concave radius.

Complete operating instructions for the Optidress are included in a separate manual furnished with the unit. The special wheel guard used with the Optidress cannot be tilted.



The Sine Wheel Dresser. Gage blocks are used for an accurate angle adjustment.

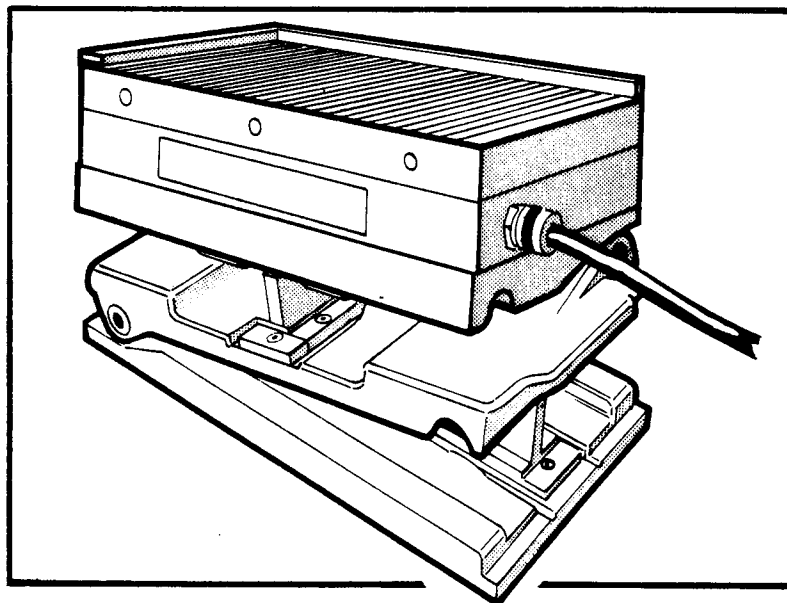
SINE WHEEL DRESSER

The sine dresser is used to produce a flat, angular surface on the grinding face of a wheel. The dresser inclines, permitting the diamond tool mounted on it to cut across the wheel face at an angle to the side of the wheel. Standard gage blocks are placed between the base and top plate of the dresser to provide the desired angle. The wheel-dressing diamond and case are included with the unit.

SINE CHUCKS

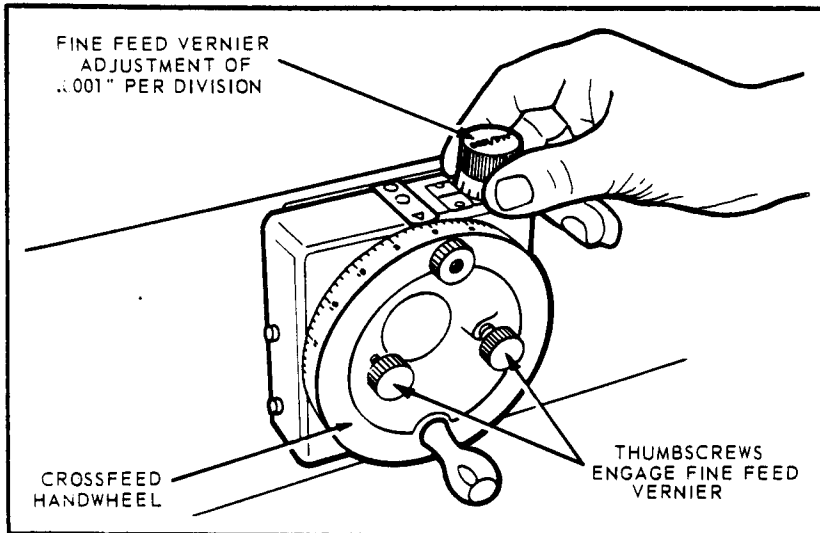
Like the standard machine chucks, the sine chucks are available in either the permanent magnet type or the electromagnetic type which requires a rectifier control unit. Two models are available: the single angle type or the compound angle type. The sine chuck makes possible single or compound angle grinding set-ups, using standard gage blocks between the base plate and top plate to provide the desired angle.

An electromagnetic Sine Chuck. This is the compound-angle type which can be adjusted in two planes.

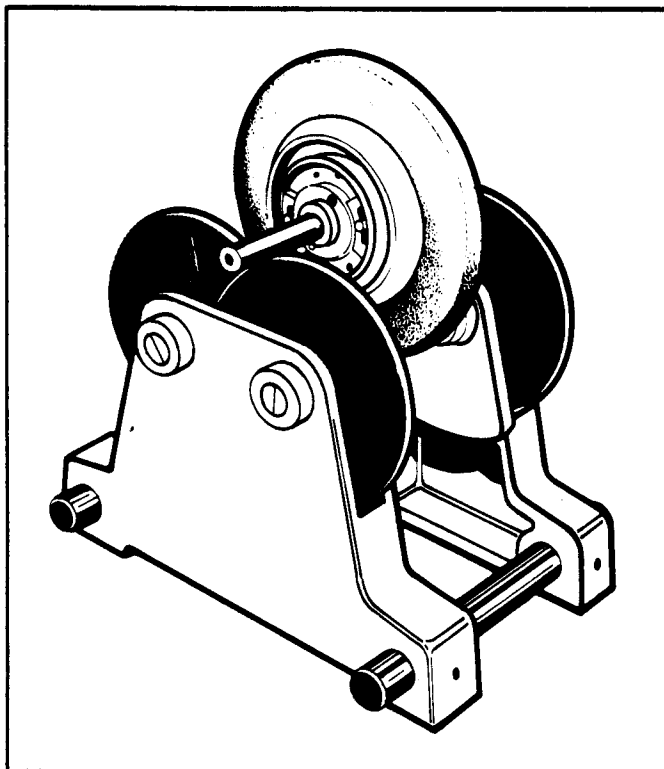


FINE FEED CROSSFEED CONTROL

This accessory, which replaces the standard crossfeed handwheel, consists of a handwheel and a fine-feed control knob graduated in .0001 inch increments. To use the fine-feed control, turn in the two thumbscrews located on the front of the handwheel. Then make the fine crossfeed adjustments with the control knob. If the operator wishes to use the crossfeed handwheel in the normal manner, he should loosen the two thumbscrews, which will disconnect the fine feed mechanism.



The Fine Feed Crossfeed Accessory.



WHEEL BALANCING STAND AND ARBOR

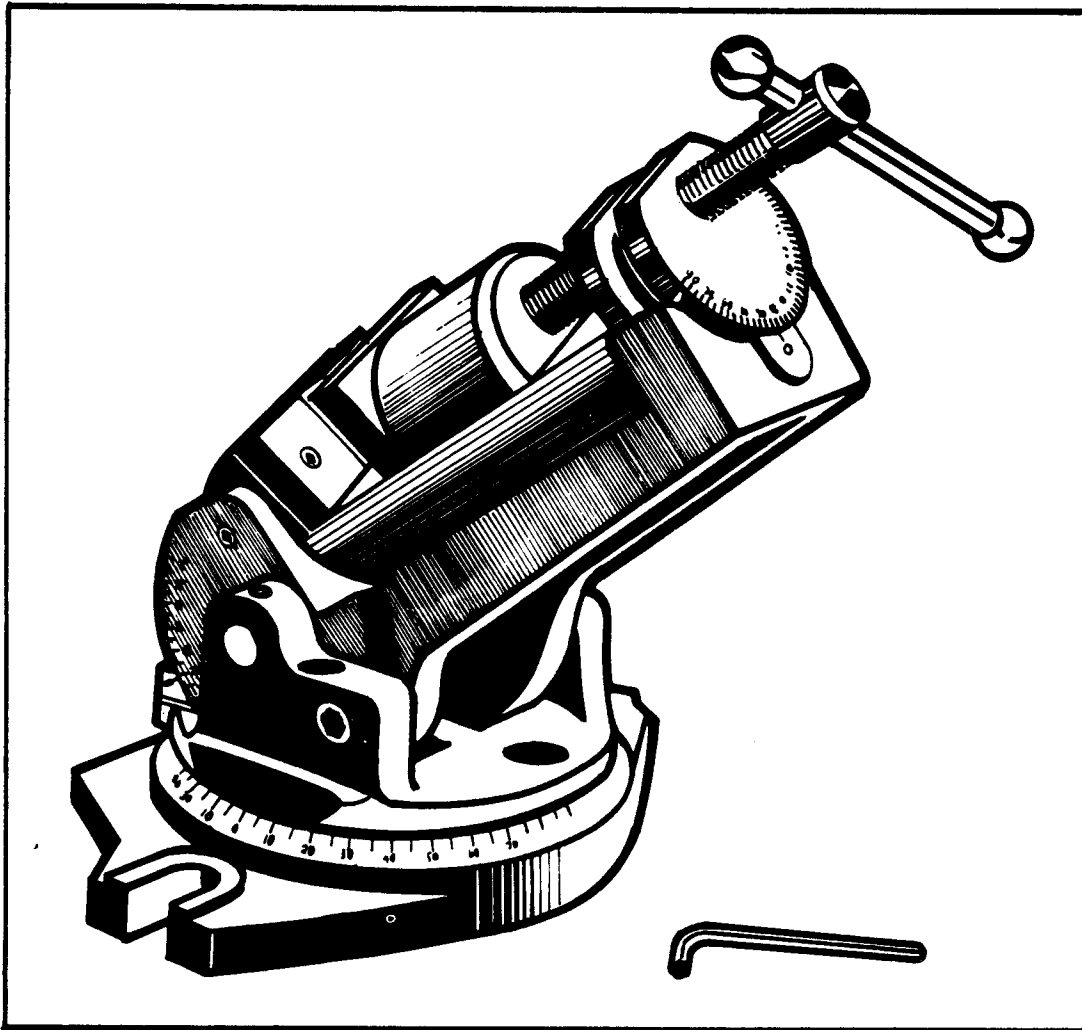
The balancing arbor and stand consist of an arbor shaft which supports the wheel and adapter upon two V's formed by overlapping disks. Special grinding wheel adapters with balancing weights are required for balancing the wheel. Wheel balancing procedure is described in the "Preparation for Operation" chapter.

The DoALL Balancing Arbor and Stand.

THE "OMNI-VISE"

The Model No. 2 "Omni-Vise" is a precision vise, adjustable in three different planes, and designed for mounting on the grinder table T-slots. The vise is 4-3/4 inches high, and is mounted on a base 7-1/4 by 5 inches. The jaws are 2-1/8 by 1-1/8 inches and open to 2-1/8 inches.

Fast set-ups can be made for complex angle grinding by referring to precise calibrations for each of the three planes. Each scale has clear, easily read, cut-in graduations in single-degree increments. Two clamping surfaces give positive holding force for each angular setting. An Allen wrench is used to lock each adjustment.

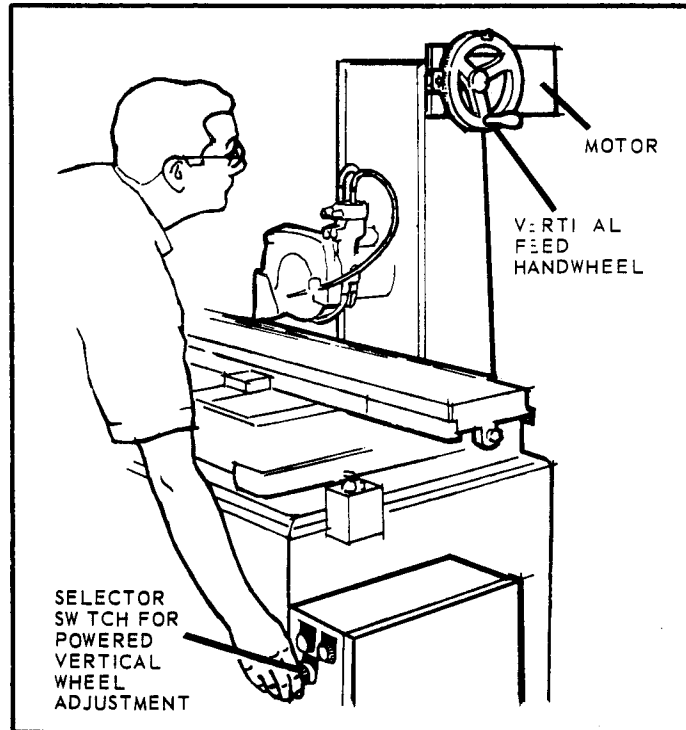


The "Omni-vise" Accessory.

MOTORIZED WHEEL ELEVATION

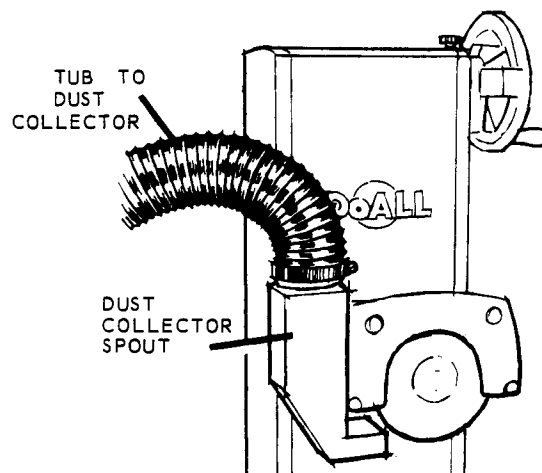
This accessory consists of a standard vertical feed handwheel belt-driven by an electric motor mounted on the column. A selector switch is provided for control of the vertical wheel travel. Use the switch to position the wheel roughly, then use the manual vertical handwheel to make fine adjustments.

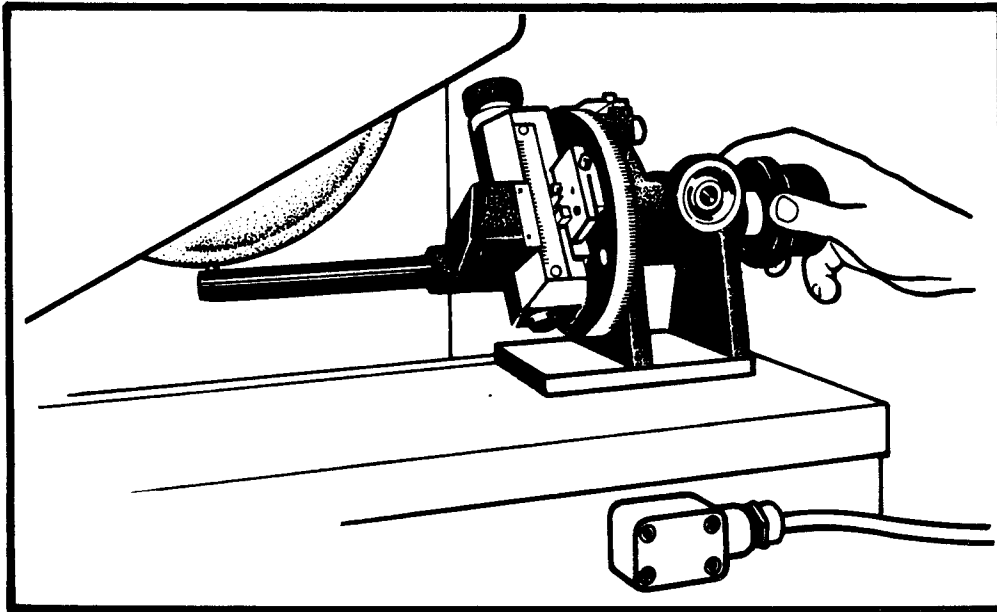
Drive belt tension is adjusted by loosening the motor mounting screws and shifting the motor position. The belt is correctly tensioned when it will deflect 1/8 inch from an 11-1/2 ounce load applied at midpoint between pulleys.



DUST COLLECTOR SPOUT

The Dust Collector Spout is designed to mount on the grinder wheel guard without interfering with grinding or table travel. The spout can be adjusted vertically. The spout is connected to the suction tube of any cabinet-type, cloth filter dust collector available for the grinder.





The "Tangi-matic" Wheel Dresser.

TANGI-MATIC WHEEL DRESSER

The "Tangi-matic" unit is a radius and angle wheel dresser which produces a convex or concave form on the periphery of a grinding wheel. The diamond pivots in an arc or radius to form the shape on the grinding wheel face. Angles may also be dressed by means of the cross slide action in this dresser.

All wearing surfaces are hardened, ground and lapped. The unit is equipped with the following: micrometer radius adjustment screw, setting master, small radii attachment, two diamonds, arm for dressing up to 10 in. diameter wheel, wrenches and carrying case.

OVER-THE-WHEEL DRESSER

The over-the-wheel dresser is mounted on top of the wheel guard and permits dressing of the wheel without removing the work from the chuck. This device is very useful on production grinding applications.

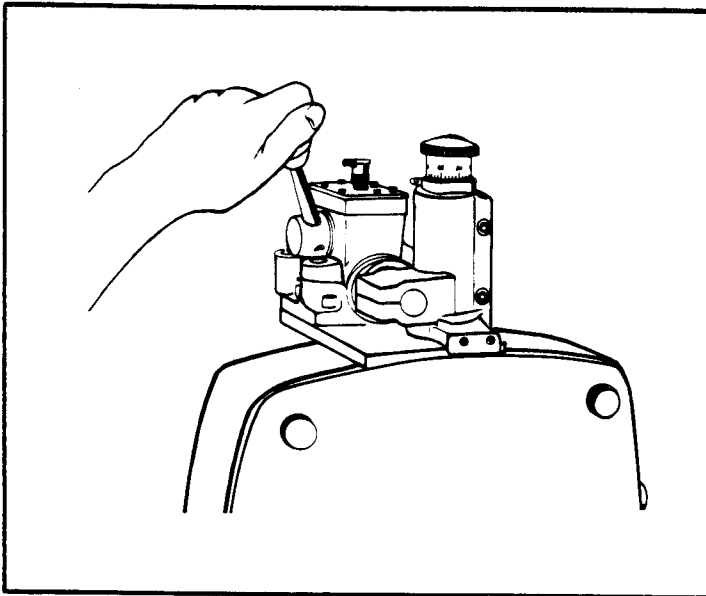
The diamond is fed down vertically by means of a knob graduated in thousandths so that wheel loss can be controlled and relative wheel-to-work position maintained by adjusting the grinder down-feed handwheel. A handle operating a shielded rack and pinion produces a 1-1/4 in. traverse across the wheel. Total vertical feed of 1-1/4 in. makes the dresser useful throughout life of the grinding wheel. As the diamond wears, it can be rotated in its holder to present a sharp face.

(CONTINUED ON NEXT PAGE) . . .

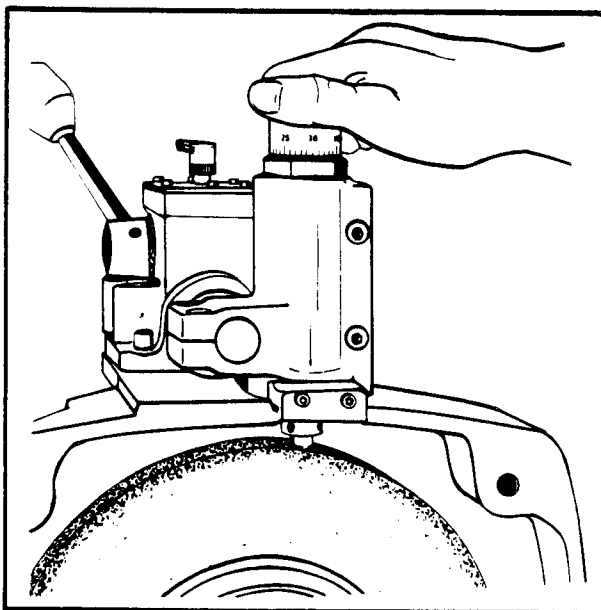
"OVER-THE WHEEL" DRESSER (Continued) . .

HOW TO USE THE "OVER-THE-WHEEL" DRESSER.

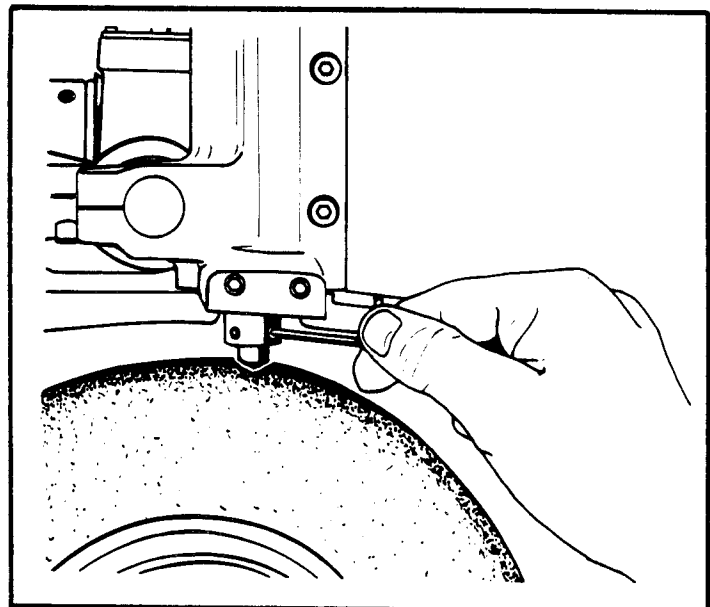
Feed the diamond across the wheel face by moving the hand lever. It is not necessary to remove the wheel guard cover. The same general instructions regarding depth of cut given for the chuck-mounted wheel dresser apply to the over-the-wheel dresser. The vertical feed adjusting knob is calibrated in .001 increments. The diamond can be rotated or removed by loosening the set screws as shown in the photo. NOTE: The special wheel guard used with the dresser cannot be tilted.



The "Over-the-Wheel" Dresser Accessory. Use the hand lever to feed the diamond across the top edge of the wheel.



The vertical feed adjusting knob is calibrated in .001 inch increments (wheel guard cover removed).



To rotate or replace the dressing diamond, loosen the set screws with an Allen wrench.

