

CORRECTED COPY

TM 9-4910-473-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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OPERATOR'S MANUAL

GRINDING MACHINE, VALVE FACE

(CEDAR RAPIDS ENG, CO.

KWIK-WAY MODEL VL)

FSN 4910-765-6358

This copy is a reprint which includes current pages from Change 1.

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HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 1966

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 11 July 1966

TM 9-4910-473-10 is published for the information and use of all concerned.

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NG: None

USAR: None

For explanation of abbreviations used, see AR 320-50.

CHANGE

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No. 1

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 29 December 1972

**Operator's Manual**

**GRINDING MACHINE, VALVE FACE  
(CEDAR RAPIDS ENG, CO,  
KWI-K-WAY MODEL VL)  
FSN 4910-252-1372**

**This Change is current as of 30 November 1972**

TM 9-4910-473-10, 11 July 1966, is changed as follows:

The title above is changed to read as above.

*Page 1:* Add following two paragraphs at the beginning of page 1.

**REPORTING OF ERRORS**

You can improve this manual by calling attention to errors and by recommending improvements, using DA Form 2028 (Recommended Changes to Publications), or by a letter, and mail direct to Commander, US Army Weapons Command, ATTN: AMSWE-MAS, Rock Island, IL 61201. A reply will be furnished directly to you.

**PARTS INCLUDED WITH END ITEM**

Parts included with end item and considered a component or part of item configuration are listed in the following table. The manufacturer's code (FSCM) listed before part number in table is described in 3c on page 14.

Part	FSCM: Part No.
BEARING ASSEMBLY, CHUCK: 1/4 in. chuck	11140: VL-305
BUSHING, ROCKER ARM:	11140:VL-841
GAGE, DEPTH: w/2 dummy valve stems	11140: GAGE, DEPTH
GRINDING WHEEL, SURFACE:	11140: VL-251
GRINDING WHEEL, VALVE FACING:	11140: VL-250
HOUSING ASSEMBLY, LOCK PIN:	11140: VL-381
LEVER:	11140: VL-308L
LOCK SCREW, GIB:	11140: VL-107
PIN, SPINDLE LOCK:	11140: VL-203
ROCKER ARM ATTACHMENT:	11140:VL-835
SCREW, CAP, HEXAGON HEAD: corr-res-S, 5/16-18TPI, 1 in. lg	96906: MBOES 120233
SCREW, CAP, SOCKET HEAD: S, cd-or zn-pltd w/ fin., 5/16-18TPI, 1-1/4 in. lg	96906: MS35457-52
SHAFT ASSEMBLY, CHUCK:	11140: VL-307C
VALVE, STOP:	11140:VL-387
WASHER, FLAT: corr-res-S, 5/16 in. id, 7/8 in. od	96906: MS 15795-813

Page 14, paragraph 3c. Under "Code" after "11140" add: "96906", and under "Explanation" after "Cedar Rapids, Iowa." add: "MILITARY STANDARDS PROMULGATED BY MILITARY DEPARTMENTS UNDER AUTHORITY OF DEFENSE STANDARDIZATION MANUAL 4120-3-M."

Page 14. Paragraph 5 is rescinded.

Pages 14 and 15. APPENDIX A, Section II is superseded as follows:

**SECTION II**  
**BASIC ISSUE ITEMS LIST**

(1) Source Maint. and Recov. Code			(2) Federal stock No.	(3) Description	(4) Unit of Issue	(5) Qty. Inc. in Unit Pack	(6) Illustration	
(a) Source	(b) Maint.	(c) Recov.					(a) Fig. No.	(b) Item No.
				BASIC ISSUE ITEMS LIST-SECTION II BILL is a list in alphabetical sequence of items which are furnished with, and which must be turned in with, the end item.				
C	O/C	--	5120-242-7410	KEY, SOCKET HEAD SCREW: 3/32 in. w across flats, 2 in. nom arm lg.	EA	1	2	11
C	O/C	--	5120-240-5292	KEY, SOCKET HEAD SCREW: 1/8 in. w across flats, 2-1/4 in. nom arm lg.	EA	1	2	12
C	O/C	--	5120-198-5392	KEY, SOCKET HEAD SCREW: 5/32 in. w across flats, 2-1/2 in. nom arm lg.	EA	1	2	13
C	O/C	--	5120-240-5300	KEY, SOCKET HEAD SCREW: 3/16 in. w across flats, 2-3/4 in. nom arm lg.	EA	1	2	14
C	O/C	--	5120-242-7411	KEY, SOCKET HEAD SCREW: 7/32 in. w across flats, 3 in. nom arm lg.	EA	1	2	16
C	O/C	--	NA	TOOL, CHUCK ASSEMBLY: (11140: VL-382).	EA	1	2	7
C	O/C	R	NA	WRENCH, SPANNER: (11140: VL-160).	EA	1	2	8
				Federal stock numbers are being assigned for items marked NA and then numbers will be published at a later date.				

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ARADCOM Rgn (2)  
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WECOM (10)  
OS Maj Comd (5)  
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Armies (3) except  
Seventh (5)  
Eighth (5)  
Corps (2)  
USACOMZEUR (2)  
USARYIS (1)  
ANAD (2)  
TOE 55-465 (2)

NG: None

USAR: None

For explanation of abbreviations used, see AR 310-50.

INSTRUCTIONS  
FOR SETTING UP AND OPERATING  
KWIK-WAY MODEL VL VALVE FACING MACHINE

CLEAN MACHINE

Clean machine thoroughly, removing all rust preventatives.

INSTALLATION OF BELTS

All belts have been removed for shipping and are tagged According to location. Install belts according to information given on tag attached to the bait.

OPERATING HANDLE

The hub of the operating handle on this machine is splined so the operating handle can be reset to the satisfaction of the operator. Normal position of the operating lever is to be vertical when the grinder spindle slide is in the middle of travel, but if the operator does decide to reset the handle, it is only necessary to remove the capscrew and washer, slide the hub off the spline and reset to the desired position.

VALVE CHUCKS

The machine as shipped from the factory is equipped with the standard lever-operated chuck that will be used in the capacity range from 9/32" to 5/8". Refer to special instructions for cleaning and installing chucks.

ASSEMBLING LIGHT BULB AND REFLECTOR

Use a standard bulb, 75 watts or less. Moisten the bulb neck before slipping it through the silicone grommet at the base of the reflector. After screwing the bulb in the socket, make sure the air space between the shade and receptacle is equal on all sides. To clean reflector, use mild soap solution and pat dry with a soft cloth.

ELECTRIC MOTOR CONTROLS

The motors are clearly marked as to voltage, cycle, and phase. Check source of supply to be sure that power supply is satisfactory for motor specifications.

Facing the machine the operator will find the push button control for grinder spindle and pump motor on his right. The left hand control switch controls the chuck drive motor, which is not activated until the grinder spindle slide is moved to the left. A micro switch is wired in series with the chuck motor so chuck rotation can be stopped for loading and unloading.

LUBRICATION

The machine is thoroughly lubricated in the test department during run-in and testing, but we recommend the operator lubricate the machine again before

putting in service. Means have been provided for the convenient and generous lubrication of every moving part on the machine. If liberal amounts of the best grade of machine oil are used at regular intervals, the machine will stand up and give long, trouble-free service.

1. GRINDER SPINDLE SLIDE WAYS: Four snap-lid oil cups are provided for oiling the ways; two in front of the motor on top of the slide and the other two on the back side of the motor near the middle of the machine. Fill these cups at least once a week and more often if the machine is in continuous service.
2. CHUCK BEARINGS: There are two snap-lid oilers projecting through the chuck cover and located at either end of the chuck bearings. These should be filled weekly or in accordance with the grinder spindle slide ways lubrication procedure.

REMOVE CHUCK GUARD AND OIL FOLLOWING POINTS REGULARLY - #3 and #4.

3. CHUCK SLIDE FEEDSCREW: There are two snap-lid oilers at the rear center of the chuck slide. These two oilers will lubricate the feedscrew and feed nut. Move table to extreme forward position to lubricate these points. Lubricate on schedule suggested for chuck bearings.
4. GIB AND DOVETAIL WAYS ON CHUCK SLIDE: There are two snap-lid oilers at the left rear of the chuck feed slide and one on the right front and rear of the slide. Two more oil pockets are located under left front of swivel plate. Rotate swivel plate back to expose these oil pockets. Lubricate according to schedule recommended for grinder spindle slide ways.
5. SURFACE GRINDING ATTACHMENT: One snap-lid oiler is located next to the handle on the V-block holder casting. Fill with oil weekly.
6. MOTORS: Spindle drive motor and pump motors on this machine have sealed lubrication, so additional lubrication is not necessary. Refer to lubrication plate on chuck drive motor.

#### COOLANT

The wet grinding feature of this machine has a usable capacity of approximately five gallons of coolant. Soluble oil mixtures may be used, but grinding oils are recommended.

#### MOUNTING THE GRINDING WHEELS

Due to the possibility of wheels being damaged in shipment, they are removed from the machine and packed with the accessories. Both the valve grinding wheel and the surface grinding wheel are locked on the spindle with a special flanged nut and a spanner wrench for securing these nuts is included with the accessories. Immediately behind the valve grinding wheel you will find a hole in the grinder spindle slide casting. The grinder spindle is drilled through at this point and the special pin provided with the machine can be inserted in this hole to lock the grinder spindle for removing and installing grinder wheels. After the wheels have been mounted, remove the pin and lay it in the recess on the front of the machine just to the right of the operating handle.

#### TRUING UP THE WHEEL WITH A DIAMOND DRESSING TOOL

It is necessary, whenever installing a new wheel or re-installing a wheel that has been on the machine, to dress the wheel again after installation. The wheel must be dressed round after it is mounted on the spindle.



Move the diamond holder into position and lock securely with the handle of the lockscrew. You will notice there is a capscrew on the front of the diamond holder bracket which serves as a stop. This stop should be set so the diamond tool is quickly and easily positioned to dress the face of the wheel. As the wheel wears down, of course, it will be necessary to reset this stop. Adjust the diamond screw so the diamond will take a light cut. Move the grinding wheel across the diamond very slowly and with a uniform motion. Feed the diamond against the wheel by giving the diamond screw about 1/8 of a turn or less, then shift the wheel back across the diamond. Two passes will usually put the wheel face in first class condition, but additional passes will probably be necessary when a new wheel is installed because the slight off-center condition must be completely eliminated on the first dressing when installing a new wheel.

#### PRECAUTIONS WHEN USING THE DIAMOND:

1. TAKE VERY LIGHT CUTS - HEAVY CUTS MAY GRIND AWAY THE MOUNTING AND LOOSEN THE DIAMOND.
2. AVOID SHOCKS OR BLOWS TO THE DIAMOND TOOL.
3. THE DIAMOND AND TOOL MUST BE HELD FIRMLY AND THE WHEEL FED GRADUALLY ACROSS THE DIAMOND POINT.
4. BE CAREFUL NOT TO JAM THE WHEEL INTO THE DIAMOND.
5. DO NOT BURN THE DIAMOND BY TAKING HEAVY CUTS AND FORCING THE WHEEL.

#### SETTING THE SWIVEL PLATE FOR DIFFERENT VALVES

The swivel plate lockscrew is located on top of the chuck cover. The lock is released by turning the lever in a counter-clockwise direction. The index blade on the front of the swivel plate is used for setting the desired angle on the index plate. The index plate is calibrated in 1° marks and the angle settings of 15°, 30°, and 45° are plainly marked on the long lines for these settings. The short lines on either side of these set lines are 1° graduations for off-angle grinding.

#### INSTRUCTIONS FOR FACING VALVES

**IMPORTANT: ALWAYS MOVE THE GRINDER CARRIAGE TO THE EXTREME RIGHT BEFORE USING THE CHUCK LEVER BECAUSE THE CHUCK SHOULD BE OPENED ONLY WHILE THE CHUCK IS STOPPED.**

**FIRST:** After dressing the grinder wheel and setting the swivel plate for the proper angle insert a valve in the chuck. Then adjust the valve stop inside the chuck shaft so the valve stem will be gripped by the chuck on the worn portion; in other words, on that portion of the stem that operates in the valve guide. See that the outer set of balls grips within 1/8" to 1/4" of the upper end of the stem wear so the head of the valve will be as near the valve chuck as possible. Insert the handle of the wheel spanner wrench in the rear of the chuck and slide the valve stop forward until it contacts the end of the valve stem. This will set length for all other valves of this length.

**SECOND:** After chucking valve, adjust the stopscrew in the surface grinding wheel guard. This chrome plated adjustment screw is located in the wheel guard cover on the surface end of the machine and by turning it in or backing it off, you can limit the forward travel of the grinder spindle slide. The purpose of this stop is to prevent the grinding wheel from striking the valve stem or chuck.

THIRD: To start the motors, depress the switches on the front of the machine pedestal and move the grinder spindle carriage toward the valve.

FOURTH: With the machine running, bring the valve in contact with the grinder wheel by means of the chuck feed handwheel. The secret of good grinding is to take very light cuts and to pass the wheel back and forth across the work many times. **IMPORTANT:** It is advisable to move the wheel back and forth slowly past the valve rather than oscillate the slide rapidly. A very rapid movement of the slide back and forth does not increase the speed of grinding and will increase the wear on the grinder spindle slide because so many more strokes will be required for each valve ground. Never take heavy cuts, or a deep cut, across the face of the valve with one corner of the grinding wheel. The number of valves that can be around with one dressing of the wheel is entirely up to the operator of the machine. When the last low spot on the valve has been removed, stop feeding with the chuck handwheel and move the wheel across the valve very slowly two or three times to put the finish on the valve.

**CAUTION: BEFORE REMOVING THE VALVE, ALWAYS MAKE CERTAIN TO MOVE THE GRINDER SPINDLE SLIDE TO THE EXTREME RIGHT SO THE MICRO-SWITCH WILL STOP THE CHUCK MOTOR.**

#### VALVE GRINDING WHEEL

The valve grinding wheel used on this machine is a KWIK-WAY No. 8100.

#### ADJUSTING BELT TENSION

The belt on the chuck drive motor can be adjusted by elevating the jack screw immediately under the speed reducer housing. Do not over tighten the belt as extreme tension on the belt causes excessive belt wear. The grinder spindle motor belt tension will seldom, if ever, require adjustment; but if it is necessary to increase the tension on the belt, remove the two capscrews at the back of the motor that hold the resilient mounting to the grinder spindle slide and insert a wrought iron washer under the mounting. **IMPORTANT:** Over-tightening the V-Belt on the grinder spindle slide will produce vibrations which will be evident on the ground face of the valve. **DO NOT OVER TIGHTEN**

#### CARE OF THE GRINDING WHEEL

As stated before, it is always necessary to true the wheel with the diamond tool before attempting to use it. The same is true if the wheel has been loosened or removed from the shaft.

If a heavy feed is used, or a deep cut is taken, when facing a valve, the face of the wheel will break down or "roughen". It will then be necessary to dress or true the wheel face with a diamond before a smooth finish on the valve can be obtained.

As the wheel is used and wears down, particles of the abrasive are loosened from the wheel bonding material and fly out. In breaking away, these particles leave a "hole" or "pocket" below the surface of the wheel which will cause it to do rough work. Dressing the wheel with a diamond tool will correct the trouble.

An oil-soaked slipping V-belt may allow the wheel to run below speed and will cause the wheel to break down rapidly as well as produce a rough finish on the valve.

All carbon should be removed from the valve before grinding, because the fine particles of carbon will embed the wheel and require excessive dressing.

## CARE OF THE VALVE CHUCK

The care of the valve chuck is of such vital importance that special instructions have been prep-red concerning it. Please refer to the following pages under the heading INSTRUCTIONS FOR CLEANING VALVE CHUCK. It is impossible to do precision grinding work on the valves without setting up a preventative maintenance cleaning schedule for the chuck. The operator using this machine should be familiar with the procedure for cleaning and should maintain a clean chuck at all times. The accuracy of grinding is so dependent on cleanliness in the chuck, it should be the operator's responsibility to clean the chuck regularly and see that it is maintained.

## GENERAL PRECAUTIONS

The machine must not be used for grinding anything but valves, valve lifters, tappets, rockerarms, etc. Do not sharpen chisels or other tools on the grinding wheels.

## ADJUSTING GRINDER SPINDLE SLIDE AND CHUCK SLIDE

Both the grinder spindle slide carriage and the chuck slide carriage should shift freely in the ways, but should not be loose. It is advisable to adjust the grinder spindle slide with a slight drag when the machine is new as this will prolong the service life of the slide. It is also advisable to readjust the gibs on the slide when it becomes loose, because the loose slide will allow it to wear unevenly. This machine was adjusted in the inspection department, but vibrations and rough handling in shipment do affect the setting so the grinder spindle carriage slide in particular, should be readjusted before the machine is put in service. The gib screws for this adjustment are located on the front side of the machine just below the grinder spindle slide. The socket head setscrews that make this adjustment are a patented self-locking screw which turns with a noticeable drag, but will not move after being set. Starting with the adjustment screw just behind the valve grinder wheel, turn in on this screw while moving the grinder spindle back and forth until you find a noticeable drag in the movement of the grinder spindle slide. Back off on the screw slightly until there is still a slight drag on the slide. Move back to the screw just ahead of the grinding wheel on the opposite end of the machine and while moving the slide back and forth with the operating handle, readjust this in a similar manner. Repeat the operation by adjusting the other screws.

The gib on the chuck bearing slide should be adjusted in a similar manner.

## THE SURFACE GRINDING ATTACHMENT FOR VALVE STEM CUTOFF

The surface grinding attachment on this machine has been pre-set at the factory. If additional adjustment or correction is necessary after the machine has been in service for some time, you will note there are four adjustment screws provided in the outboard bearing of the surface grinding attachment.

When the grinding wheel on the surface grinding end of the machine is installed, it should be dressed true with the diamond that is mounted in the lower end of the V-block carrier casting.

## CUTTING OFF VALVE AND SQUARING STEM ENDS

1. Move the grinder spindle slide to the righthand position so the grinding wheel is positioned in approximately the right location for the length of valve to be ground.

2. Place the valve on the V-Block, lock in place and bring the wheel over so it is just contacting the end of the valve stem.
3. Lock the grinder spindle slide in position by turning in on the knurl thumbscrew on the front side of the grinder spindle slide.
4. Turn the motor on and take a light cut across the end of the valve stem. Before removing the valve, move the V-block back into the rest position and adjust the plated valve stop screw and jam nut, located just below the grinder wheel guard, until it contacts the end of the valve stem. This sets the stopscrew, even with the front edge of the wheel and all other valve stems can be set in the V-Block against this stop. When the wheel is redressed, reset valve stopscrew so it is flush with the front of the wheel. By setting the moveable ring on the feed dial to zero position, it is then possible to feed off any desired amount.

#### USING DUMMY VALVE EQUIPMENT FOR STEM CUT-OFF ON L-HEAD ENGINES

1. Select the proper Dummy Valve Stem and assemble the Dummy Valve Head over the **ROUNDED END** of the stem.
2. Make certain the valve lifter for the valve being measured is at the low position and insert the Dummy Valve in the guide. Push the stem down against the valve lifter and the head down against the valve seat and tighten the thumbscrew. In doing this, an actual measurement is being made from the lifter to the valve seat.
3. Remove the dummy valve from the guide and clamp the stem in the V-block of the attachment. Adjust the beveled valve stop carefully out against the face of the dummy valve head and lock in place. Then bring the grinder wheel up close to the end of the dummy stem and lock the position of the grinder spindle slide by tightening the knurled thumbscrew on the front side of the machine.
4. With the machine running, adjust the V-block holder assembly by means of the knurled handwheel which carries the graduated sleeve until the end of the dummy stem just touches the wheel. Set the graduated sleeve at zero and lock with the thumbscrew.
5. When this has been done, the measurement made when the dummy valve was inserted in the valve guide has been transferred to the machine. The distance from the grinder wheel to the beveled valve stop is the same as from the valve lifter to the valve seat. Remove the dummy valve, place the valve to be ground in the V-block, push it against the valve stop and clamp tightly.
6. When the dummy valve was in the V-Block with its end against the wheel, the graduated sleeve was set at zero. Therefore, if a clearance of .013" is wanted, it is only necessary to feed in .013" while grinding the end of the valve stem. Direct the flow of coolant on the valve stem - **NOT ON THE WHEEL**. Rock the V-block back and forth and feed in slowly so not more than .031" or .002" is ground at one pass. When properly done, the valve stem is kept cool and expansion is eliminated.

The knurled stopscrew with jam nut is located in the grinder wheel guard just below the surface grinding wheel. This stopscrew is useful when a number of valves lifters, or tappets are merely to be "cleaned up". Adjust the stopscrew until it is even with the wheel, clamp the valve or tappet in the V-block, using the screw as a stop and then a feed of a few thousandths will "clean up" the piece being ground.

## CUT-OFF OR SURFACING GRINDING WHEEL

The surfacing grinding wheel used on this machine is a KWIK-WAY No. 6100.

### OPERATING INSTRUCTIONS FOR ROCKERARM GRINDING ATTACHMENT

It is not necessary to remove the surface grinding attachment to grind rockerarms on the machine. In most cases the grinder spindle slide can be moved forward far enough to clear the V-block assembly, but on extremely large rockerarms it may be necessary to remove the operating handle and clamp screw from the V-block attachment, and then roll the V-block assembly forward until it lays on the front of the surface drain pan. The surfacing grinding attachment will be completely out of the way for rockerarm grinding.

The rockerarm grinding attachment is mounted on the boss at the front of the surface drain pan. Loosen the hex head capscrew and position the attachment.

Select the correct bushing for the rockerarm to be ground and put the bushing on the post.

Four bushings are furnished as standard equipment and extra bushings are available to fit any rockerarm that can be accommodated.

Move the grinder spindle slide to the right, and shut off the grinder spindle motor as the following set-up can be more easily accomplished with a dead wheel. Mount the rockerarm on the attachment and set the collar and thumbscrew on the post so a line drawn through the center of the spindle will pass through the centerline of the rockerarm. Adjust the attachment so the heel of the rockerarm is in contact with the outer edge of the grinding wheel. In this position the slide will be at the end of travel to the right. Move the grinder spindle slide to the left while applying a light pressure on the rockerarm so the contour of the rockerarm will follow the face of the wheel as it moves to the left. Check the position of the rockerarm as the tip rolls on to the wheel. Be sure the rockerarm is in contact with the wheel during the complete travel in both directions. Relocate the attachment if necessary. After the adjustment and alignment of the attachment have been made with a dead wheel, rotate the rockerarm so it is clear of the wheel and turn on the spindle motor.

Turn on a slight amount of coolant and direct the nozzle so the coolant is flowing on the rockerarm (NOT ON THE WHEEL). If the coolant splashes or mists excessively while grinding, cut down on the flow of the coolant or relocate the nozzle.

Grinding the rockerarm by moving the grinder spindle slide back and forth with a constant motion while applying a light pressure on the rockerarm against the face of the wheel. Do not stop the movement of the slide while the rockerarm is in contact with the wheel as this will produce a flat spot on the rockerarm. A steady movement of the grinder spindle slide will produce a new surface with original contour.

The elevation adjustment (collar and thumbscrew on the post) makes it possible to raise or lower the centerline of the rockerarm so the entire face to be ground will contact the wheel. This elevation adjustment makes it possible to set the height of the rockerarm so a line drawn through the center of the spindle will always pass through the centerline of the rockerarm. On extremely large or wide rockerarm, it may be necessary to omit the collar and place the rockerarm bushing directly on the casting. Lowering the rockerarm by this amount -fill bring the centerline of the rockerarm close enough to the centerline of the wheel spindle to maintain wheel contact with the entire face of the rockerarm.

After completing the rockerarms, release the attachment and pivot it out of the way so the next operator using the machine to grind valves will not bring the wheel back into the attachments.

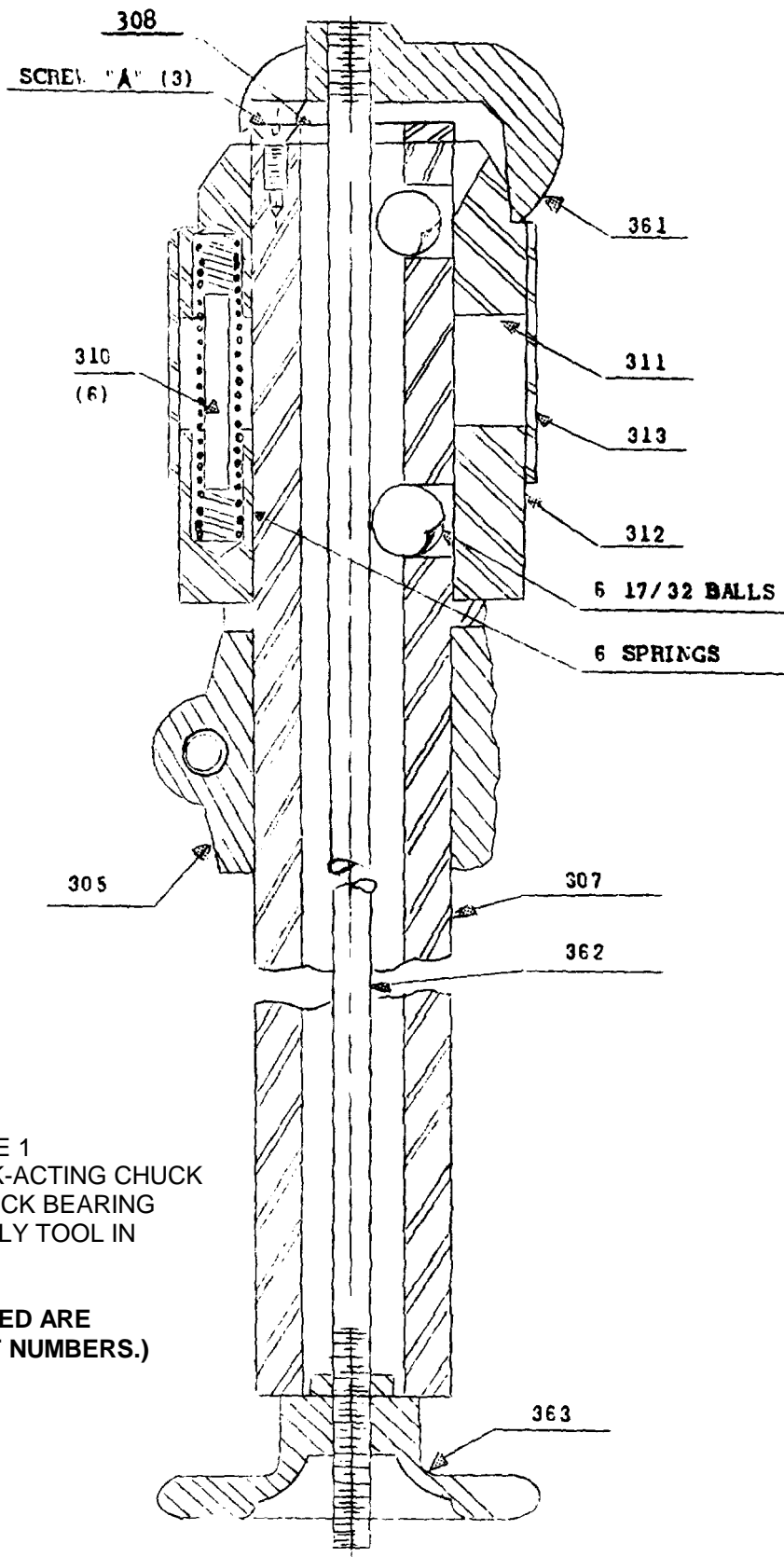


FIGURE 1  
 SHOWING THE QUICK-ACTING CHUCK  
 FRONT PART OF CHUCK BEARING  
 AND CHUCK ASSEMBLY TOOL IN  
 POSITION FOR USE.

(NOTE: NUMBERS USED ARE  
 ACTUAL PART NUMBERS.)

## INSTRUCTIONS FOR CLEANING LEVER-OPERATED CHUCK

(Refer to sketch on opposite page)

It is well to take the chuck apart at regular intervals and wash thoroughly with gasoline. If the chuck is not chucking the valve stems accurately, it is well to dismantle it and clean it, because a very slight amount of dirt or grit in the chuck will give variations in concentricity.

The chuck assembly tool, shown in position for use in Figure 1, and designated as Parts 361, 362 and 363, is standard equipment with the machine. Be sure to keep this tool in a convenient place, as it is necessary for taking the chuck apart and for reassembling.

### TAKING THE CHUCK APART

1. Remove Sleeve No. 313 by taking out the one screw that fastens it to the sliding collar No- 311.
2. Next, install the chuck assembly tool by proceeding as follows: Remove the Star Wheel No. 363 from the end of Rod No 362, then insert the rod through the Chuck Shaft No. 307 (valve stop must, of course, be pushed out). Now locate the three legs of Spider No. 361 midway between the three screws "A" in Chuck End Plate No. 308. Then tighten Handwheel No. 363 until the spider pushes against the Outer Chuck Collar No. 311 and slides it in far enough to take all pressure off the End Plate No. 308.
3. Now remove the three screws "A" that hold the plate to the end of the chuck shaft.
4. Loosen the handwheel slowly and all the chuck parts can then be slid off the shaft.
5. Thoroughly clean all the parts including the balls and ball holes with clean gasoline. Then take a cloth dampened with clean oil and wipe the parts before reassembling.

### REASSEMBLING THE CHUCK

1. Turn the chuck shaft until the two ball holes, which are farthest from the chuck keys, are directly at the bottom.
2. Next, put the three balls in the three rear holes in the chuck shaft and hold the lower one in place while sliding the rear chuck collar No. 312 into position.
3. Put in the two upper front balls.
4. Place the Front Chuck Collar in a vertical position on the bench, with the spring holes up, and put the six springs and pins in these holes. Then put this collar onto the end of the chuck shaft, and enter the spring ends in the holes of the rear collar. Make sure that the keyway in the collar lines up approximately with the key in the shaft.
5. Put the Plate No. 308 on the rod of the assembling tool, and then put the assembling tool in place, and begin tightening it slowly. Now put the sixth ball in place and hold it there until after the collar has been pulled over it. Then turn the collar, if necessary, to line the keyway with the key and continue pulling the collar into place.
6. After tightening the handwheel (No. 363) to the position illustrated,

replace and tighten screws "A"; then replace the Sleeve 313 and Yoke 348.

7. Before assembling the chuck cover - lubricate freely at all snap-lid oilers. Adjust the chuck bearings and when the chuck pulley handwheel is put in place, hold back on the nose of the chuck to insure no end play in the chuck bearing.

### **CAUTION**

**In the event any chuck balls are lost, be very careful in replacing the balls and install balls that are 17/32" (within .0002" at least) and perfectly spherical to within the same limits of accuracy. Standard 17/32" steel balls are not accurate enough for satisfactory use in the chuck.**

### INSTALLING THE STANDARD CHUCK

The machine shipped from the factory is equipped with the standard chuck which is a lever-operated chuck that can be opened and closed by merely moving the lever on the top of the chuck cover.

When changing from the standard chuck to the intermediate chuck, it is only necessary to remove the standard chuck and chuck operating mechanism and install the intermediate chuck with the pin lock mechanism. Instructions covering the change are covered under the heading of "Pin Lock Chuck".

If you are changing from the standard chuck to the large chuck, it will be necessary to remove the chuck bearing, chuck operating mechanism and chuck handwheel. Instructions for this changeover are covered under the heading "LARGE CHUCK".

The normal operating range on the standard chuck is from 9/32" to 5/8" and this chuck has been checked for accuracy in this range. The chuck however will chuck valve stems as small as 7/32". The range of capacity for the intermediate chuck is 5/8" to 13/16" and the range of capacity for the large chuck is 13/16" to 1-1/4".

### INTERMEDIATE CHUCK OR PIN LOCK CHUCK

#### INSTALLING THE INTERMEDIATE OR PIN LOCK CHUCK:

1. Remove the chuck cover, front chuck yoke, and chuck drive sheave and belt.
2. Loosen the chuck bearing and remove the standard leveroperated chuck from the bearing.
3. Remove the three hex head capscrews that hold the chuck operating casting and remove this casting.
4. Install the pin lock casting using only two of the hex head capscrews and these screws should be put in the slotted holes of the casting.
5. Insert the intermediate chuck in the chuck bearing and install the handwheel and belt drive sheave. Holding back on the nose of the chuck, lock the handwheel drive sheave so all end play is removed from the chuck shaft. Rotate the chuck shaft by hand and adjust chuck bearings so there is a uniform drag on both bearings.



6. Insert a valve stem or rod in the chuck and rotate the chuck body by hand to lock the valve stem or rod in the chuck.
7. Position the lock pin casting so the lock pin engages and disengages freely in the hole located in the relieved portion of the chuck body. Secure the lock casting with the two hex head capscrews. Check the locking mechanism by rotating, locking and unlocking on the rod to be certain the mechanism is properly located.
8. Install the chuck drive belt, lubricate the chuck bearings and install chuck cover.

#### USING THE INTERMEDIATE PIN LOCK CHUCK:

1. Move the grinder spindle slide to the extreme righthand position to stop the rotation of the chuck drive motor. To open the pin lock chuck, apply a light pressure on the pin lock lever and turn the chuck shaft by hand until the pin lock engages with the hole in the chuck body. Turn the chuck shaft in a direction opposite to normal rotation to open the chuck, insert the valve, and turn the chuck shaft in the direction of rotation until the valve stem is locked securely in the chuck. Release the pin lock handle and move the grinder spindle slide toward the valve.

#### DISMANTLING AND CLEANING INTERMEDIATE PIN LOCK CHUCK

To dismantle the intermediate and large chucks, turn the knurled chuck body until the hole in the center is directly over the centering pin which can then be removed. Turn the chuck body until the collars are nearly together and then slide the assembly of the body and two collars to the rear until the front balls can be removed from the shaft. With the front balls out of the shaft, the collars and body may be pulled off. Wash all parts thoroughly in gasoline, making sure the ball holes in the chuck shaft are completely clean of all dirt and grit and reassemble.

Use dry powdered or flake graphite in the threads of the chuck body and collars. Screw the collars into the body evenly and line up the half hole in each collar with the hole in the body. Start the assembly on the shaft with the end of the body having the lefthand thread on it going on the shaft first.

Place the balls in the rear holes and slide the collars back until the front balls can be installed. Slide the collars to the center, put in the centering pin and the chuck is assembled. Do not oil the chuck with an oil can. Use graphite in the threads and wipe the shaft with an oily rag before replacing the collars. No other lubrication is necessary.

#### LARGE CHUCK

The large chuck is complete with its own chuck guard, bearing and belts. Because of this it is necessary then to remove the operating mechanism and chuck bearing that is on the machine at the present time. The chuck operating mechanism can be removed by releasing the hex head capscrews that hold this casting in place, and the chuck bearing is removed by releasing the four socket head setscrews.

Replace the single sheave drive on the speed reducer with the double sheave drive.

Mount the large chuck bearing on the table by sliding it over the key and locking it in place with the four socket head capscrews provided.

Remove the belt guard from the chuck and install the V-belt on the double sheave drive of the speed reducer, adjust the jack screw under the speed reducer until the belts are set to proper driving tension. Install the belt guard and lubricate the chuck bearings.

#### USING THE LARGE CHUCK:

There are two wrench pins furnished with the large chuck that are used in opening and closing the chuck. You will notice the handwheel at the rear of the chuck shaft has been drilled to accommodate one of the pins, and the chuck body is drilled to accommodate the other.

To open the chuck, insert a pin in the body and one in the handwheel and holding the chuck body in place, rotate the chuck shaft opposite to direction of normal rotation. To close the chuck on the valve stem, rotate the chuck shaft in the direction of rotation until the valve is locked securely in the chuck.

#### CLEANING THE LARGE CHUCK

Remove the chuck belt guard, belts, and handwheel. Remove the two chuck bearing caps being very careful to keep them positioned so they will be replaced in their original position. You should not interchange the caps from one bearing to the other.

Instructions for dismantling and cleaning this chuck are the same as those given for the Pin Lock or Intermediate Chuck.

#### GENERAL INSTRUCTIONS ON CHUCKS

1. The accuracy of chucking the valve stem is dependent upon a clean chuck, and it is very important that the operator keep the chucks clean at all times.
2. Whenever removing the chuck from the chuck bearing, or whenever installing a new chuck it is important that all end play be removed from the chuck shaft and this can best be accomplished by holding back on the nose of the chuck while tightening the handwheel against the back bearing.
3. When readjusting chuck bearing, turn chuck shaft by hand so a uniform drag can be assured on each bearing.
4. Whenever the lever operating mechanism for the standard chuck has been removed, it is necessary, when reinstalling it, to position the lever operating mechanism so maximum capacity can be obtained from the chuck. Mount the lever-operated mechanism on the machine and then open the chuck, testing the capacity of the chuck with a 5/8" arbor. If the front collar does not open far enough to allow you to insert the 5/8" arbor, shift the operating mechanism back slightly so the front collar will be moved further when the lever is in the open position. Centering the locking mechanism so both the front and back collars will open to the full 5/8" capacity is a simple adjustment.

**APPENDIX A  
BASIC ISSUE ITEM LIST**

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**Section I. INTRODUCTION**

**1. General**

This appendix is a list of basic issue items. It is composed of those items which make up the major end item of equipment and the operator's tools and equipment that are issued with the equipment, and are required for stockage.

**2. Requisition Notes**

When requisitioning a C source (local procurement) item identified only by a manufacturer's part number, it is mandatory that the following information be furnished the supply officer.

- a. Manufacturer's code number (the five digit number preceding the colon in the description column).
- b. Manufacturer's part number (the number and sometimes letters, following the colon (¶ above)). Dashes, commas, or other marks must be included exactly as listed.
- c. Nomenclature exactly as listed herein, including dimensions, if necessary.
- d. Name of manufacturer of end item (from cover of TM).
- e. Federal Stock Number of end item (from TM).
- f. Manufacturer's model number (from TM or name/data plate), preferably name/data plate.
- g. Manufacturer's serial number (from name/data plate).
- h. Any other information such as type, frame number, and electrical characteristics, if applicable.
- i. If DD Form 1348 (DOD Single Line Item Requisition System Document (Manual)) is used, fill in all blocks except 4, 5, 6, and Remarks field in accordance with AR 725-5. Complete form as follows:
  - (1) In block 4, 5, and 6, list manufacturer's code and manufacturer's part number (as listed in the description column).
  - (2) In Remarks field, list noun name (repair part), end item application (FSN of end item), manufacturer, model number (end item), serial number (end item), and any other pertinent information such as frame number, type, etc.

**3. Explanation of Columns**

a. *Source, Maintenance, and Recoverability Code (Col. 1).*

- (1) *Materiel numerical code (col. 1a).* This column not required.
- (2) *Source (col. 1b).* This column indicates the selection status and source for the listed item. Source code used in this list is:

<i>Code</i>	<i>Explanation</i>
C	Obtain through local procurement. If not obtainable from local procurement, requisition through normal supply channels with a supporting statement of nonavailability from local procurement.

- (3) *Maintenance level (col. 1c).* This column indicates the category of maintenance authorized to install the listed item. Maintenance level code used in this list is:

<i>Code</i>	<i>Explanation</i>
O/C	Operator or crew maintenance.

- (4) *Recoverability (col. 1d).* This column indicates whether unserviceable items should be returned for recovery or salvage. When no code is indicated, the item will be considered expendable. Recoverability code used in this list is:

<i>Code</i>	<i>Explanation</i>
R	Items which are economically repairable at direct and general support maintenance activities and are normally furnished by supply on an exchange basis.

- b. *Federal Stock Number (Col. 2).* Self explanatory.

c. *Description (Col. 3).* The following manufacturer's code is included in this column:

nom..... nominal  
 S ..... steel  
 TPI ..... threads per inch  
 w ..... wide, width  
 w/ ..... with

*Code Explanation*  
 11140 Cedar Rapids Engineering Company  
 902 17th Street Northeast  
 Cedar Rapids, Iowa

**5. Errors, Comments, and/or Suggestions**

Reports by the individual user, of errors, comments and/or suggestions are encouraged. This should be reported on DA Form 2028 (Recommended Changes to DA Publications) and forwarded directly to the Commanding General, Headquarters, U.S. Army Weapons Command, ATTN: AMSWF SMM-P, Rock Island Arsenal, Rock Island, Ill. 61201.

**4. Abbreviations**

cd-or zn- ..... cadmium-or zinc-plated  
 pltd.  
 corr-res-S ..... corrosion-resistant steel  
 elec ..... electric(al)  
 fin ..... finish(ing)

**Section II. BASIC ISSUE ITEMS**

(1) Source, Maintenance, and Recoverability Code				(2)	(3)	(4)	(5)	(6) Illustration	
(a)	(b)	(c)	(d)	Federal stock No.	Description	Unit of issue	Quantity Incorporated in unit	(a)	(b)
Material Code	Source	Mainten- ance level	Recover- ability					Figure Number	Item Number
			R	4910-765-6358	<p align="center"><b>MAJOR COMBINATION</b></p> <p>The following item is to be requisitioned for initial issue only.</p> <p>GRINDING MACHINE, VALVE FACE: floor mtd, 2 chuck, 0.230 to 0.687 range, 0.562 to 1.250 range, wet grinder, elec-driven (11 140:VL).</p> <p align="center"><b>COMPONENTS OF MAJOR COMBINATION</b></p> <p align="center">None authorized.</p> <p align="center"><b>REPAIR PARTS</b></p> <p align="center">None authorized.</p> <p align="center"><b>TOOLS AND EQUIPMENT FOR: GRINDING MACHINE, VALVE FACE: (11140:VL).</b></p>	ea	2		
C	O/C	R	.....	.....	BEARING ASSEMBLY, CHUCK: '1/4 in. chuck (11140:VL-305).	ea	1	2	1
C	O/C	.....	.....	.....	BUSHING, ROCKERARM: (11140:VL-841)	ea	4	2	15
C	O/C	.....	.....	.....	GAGE, DEPTH: w/2 dummy valve stems (11140:.....)	ea	1	2	9
C	O/C	.....	.....	.....	GAGE, DEPTH).				and
C	O/C	.....	.....	.....	GRINDING WHEEL, SURFACE: 6100 (11140:VL-251).	ea	1	2	23
C	O/C	.....	.....	.....	GRINDING WHEEL, VALVE FACING: 8100 (11140:VL-250).	ea	1	2	22
C	O/C	.....	.....	.....	HOUSING ASSEMBLY, LOCK PIN: (11140:VL-381).	ea	1	2	4
C	O/C	.....	.....	.....	LEVER: (11140:VL-308L)	ea	2	2	3

**Section II. BASIC ISSUE ITEMS**

(1) Source, Maintenance, and Recoverability Code				(2)	(3)	(4)	(5)	(6) Illustration	
(a)	(b)	(c)	(d)	Federal stock No.	Description	Unit of issue	Quantity Incorporated in unit	(a) Figure Number	(b) Item Number
					GRINDING MACHINE, VALVE FACE (11140 :VL)-Continued:				
	C	O/C	.....		LOCKSCREW, GIB: (11140:VL-107)	ea	1	2	5
	C	O/C	.....	5120-242-7410	KEY, SOCKET HEAD SCREW: 3/32 in. w across flats, 2 in. nom arm lg.	ea	1	2	11
	C	O/C	.....	5120-240-5292	KEY, SOCKET HEAD SCREW: 1/8 in. w across flats, 2 1/4 in. nom arm lg.	ea	1	2	12
	C	O/C	.....	5120-198-5392	KEY, SOCKET HEAD SCREW: 5/32 in. w across flats, 2 1/2 in. nom arm lg.	ea	1	2	13
	C	O/C	.....	5120-240-5300	KEY, SOCKET HEAD SCREW: 3/16 in. w across flats, 2 3/4 in. nom arm lg.	ea	1	2	14
	C	O/C	.....	5120-242-7411	KEY, SOCKET HEAD SCREW: 7/32 in. w across flats, 3 in. nom arm lg.	ea	1	2	18
	C	O/C	.....		PIN, SPINDLE LOCK: (11140: VL-203)	ea	1	2	17
	C	O/C	R		ROCKERARM ATTACHMENT: (11140:VL-835)	ea	1	2	21
	C	O/C	.....	5305-875-6354	SCREW, CAP, HEXAGON HEAD: corr-res-S, 5/16 18TPI, 1 in. lg.	ea	1	2	20
	C	O/C	.....	5305-579-4156	SCREW, CAP, SOCKET HEAD: S, cd-or zn-pltd w/chromate fin., 5/16-18TPI, 1 1/4 in. lg.	ea	1	2	18
	C	O/C	.....		SHAFT ASSEMBLY, CHUCK: (11140:VL-307C)	ea	1	2	2
	C	O/C	.....		TOOL, CHUCK ASSEMBLY: (11140:VL-382)	ea	1	2	7
	C	O/C	.....		VALVE, STOP: (11140:VL-387)	ea	1	2	6
	C	O/C	.....	5310-825-3740	WASHER, FLAT: corr-res-S, 5/16 in. id, 7/8 in. od	ea	1	2	19
	C	O/C	R		WRENCH, SPANNER: (11140:VL-160)	ea	1	2	8

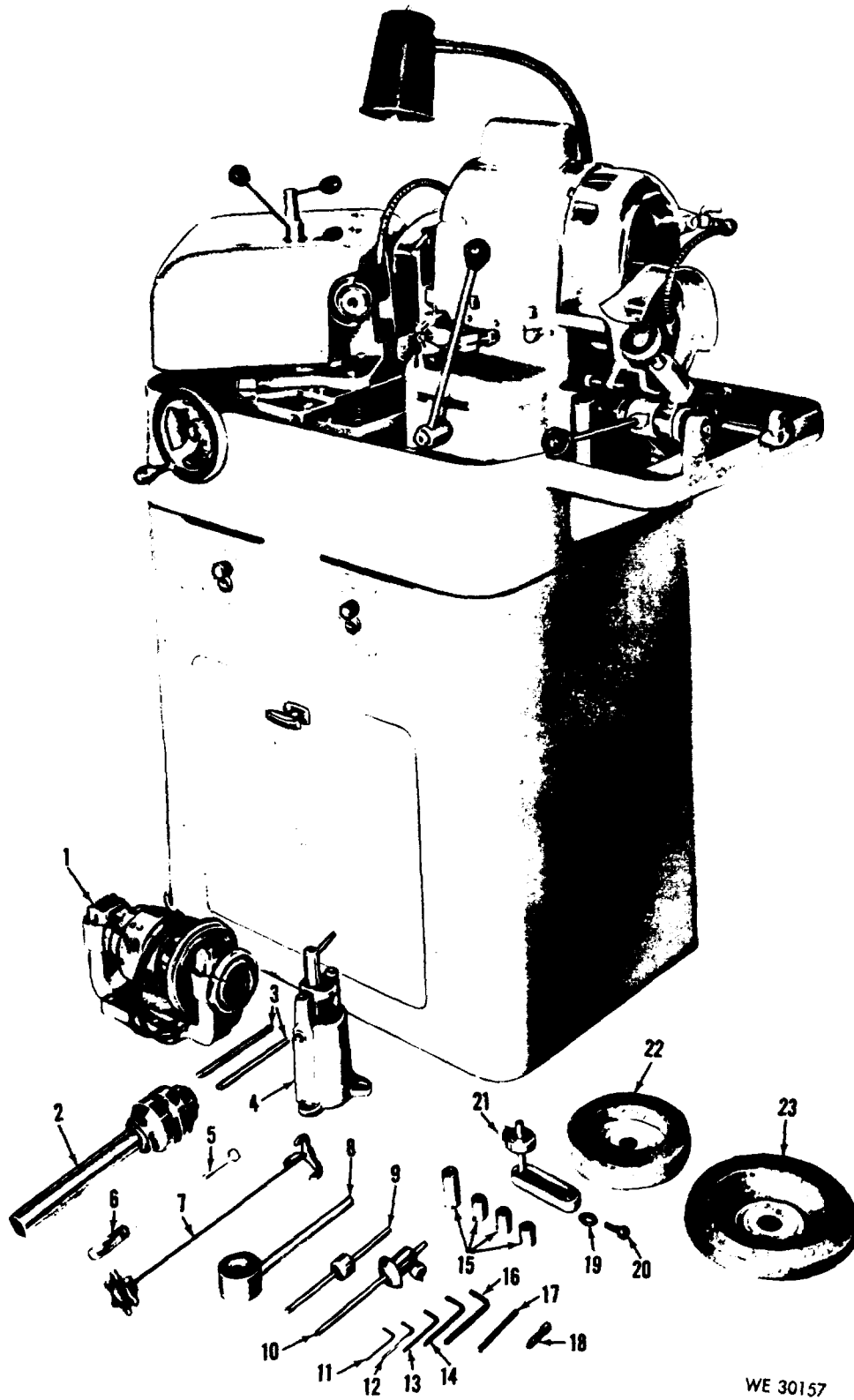


Figure 2. Tools and equipment.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



*THEN...JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.*

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**IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT.**

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## The Metric System and Equivalents

### *Linear Measure*

1 centimeter = 10 millimeters = .39 inch  
 1 decimeter = 10 centimeters = 3.94 inches  
 1 meter = 10 decimeters = 39.37 inches  
 1 dekameter = 10 meters = 32.8 feet  
 1 hectometer = 10 dekameters = 328.08 feet  
 1 kilometer = 10 hectometers = 3,280.8 feet

### *Weights*

1 centigram = 10 milligrams = .15 grain  
 1 decigram = 10 centigrams = 1.54 grains  
 1 gram = 10 decigrams = .035 ounce  
 1 decagram = 10 grams = .35 ounce  
 1 hectogram = 10 decagrams = 3.52 ounces  
 1 kilogram = 10 hectograms = 2.2 pounds  
 1 quintal = 100 kilograms = 220.46 pounds  
 1 metric ton = 10 quintals = 1.1 short tons

### *Liquid Measure*

1 centiliter = 10 milliliters = .34 fl. ounce  
 1 deciliter = 10 centiliters = 3.38 fl. ounces  
 1 liter = 10 deciliters = 33.81 fl. ounces  
 1 dekaliter = 10 liters = 2.64 gallons  
 1 hectoliter = 10 dekaliters = 26.42 gallons  
 1 kiloliter = 10 hectoliters = 264.18 gallons

### *Square Measure*

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch  
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches  
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet  
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet  
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres  
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

### *Cubic Measure*

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch  
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches  
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

## Approximate Conversion Factors

<i>To change</i>	<i>To</i>	<i>Multiply by</i>	<i>To change</i>	<i>To</i>	<i>Multiply by</i>
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

### Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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