

TM 9-4910-484-10

CHANGE NO. 1

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

Operator's Manual

**GRINDING MACHINE, VALVE FACE,
BENCH MOUNTING, 9/32 INCH TO 11/16 INCH CHUCK,
0 TO 45 DEGREE VALVE FACE ANGLE ADJUSTMENT,
115-VOLT, AC/DC, 60-CYCLE,
SINGLE PHASE
(CEDAR RAPIDS MODEL "KWIK-WAY" KK)
(4910-540-4679)**

This change is current as of 9 November 1972.

TM 9-4910-484-10, 6 October 1967 is changed as follows:

1. This change identifies the type of catalog maintenance action taken in connection with the updating of previously published data.
2. This change is separated by additions, deletions and changes and is a list of items added, deleted and or changed since the last previously published data.
3. All Federal stock numbers and reference numbers, additions, deletions, and changes should be made to the indexes.
4. PARTS INCLUDED WITH END ITEM: Parts included with end item and considered a component or part of the item configuration are listed on the following table. The part numbers listed are for (Cedar Rapids Model "KWIK-WAY" KK).

Part	Part No.
COLLET, MACHINE: flexible, rubber bonded, tapered, 0.200 to 0.300 in. cap.	75078:J502
COLLET, MACHINE: flexible, rubber bonded, tapered, 0.300 to 0.400 in. cap.	75078:J503
COLLET, MACHINE: flexible, rubber bonded, tapered, 0.400 to 0.500 in. cap.	75078:J504
COLLET, MACHINE: flexible, rubber bonded, tapered, 0.500 to 0.600 in. cap.	75078:J505
COLLET, MACHINE: flexible, rubber bonded, tapered, 0.600 to 0.700 in. cap.	75078:J506
GUARD, SPLASH: metal	11140:K-180
WHEEL, ABRASIVE: surface, 1 / 2 X 3	11140:3000
WHEEL, ABRASIVE: standard, valve facing, 1 ' 2 X 4-1/2	11140:4570

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.								
P	C		5935-552-4372	ADAPTER, CONNECTOR: 2 connector mating ends, stght shape, 5 contacts, 1 female, U-hollow, 2 female, fl at one end, 2 male, fl at other end, nonlocking, 1.078 lg X 1.438 dia (74545:5273L)	EA	1	A-1	4
C	C		NA	DRESSER, DIAMOND: hvy duty, non-resettable (11140:KK-123)	EA	1	A-1	3
C	C		NA	HEAD, VALVE: dummy (11140:KK-661)	EA	1	A-1	6
P	C		5120-240-5292	KEY, SOCKET HEAD SCREW: hex type, L-type hall, 1/8 w across fl, 2-1/4 nom arm lg	EA	1	A-1	12
P	C		5120-198-5392	KEY, SOCKET HEAD SCREW: hex type, L-type hall, 5/32 w across fl, 2-1/2 nom arm lg	EA	1	A-1	13
P	C		5120-240-5300	KEY, SOCKET HEAD SCREW: hex type, L-type hall, 3/16 w across fl, 2-3/4 nom arm lg	EA	1	A-1	14
P	C		5120-224-4659	KEY, SOCKET HEAD SCREW: hex type, L-type hall, 1/4 w across fl, 3-1/4 nom arm lg	EA	1	A-1	15
c	c		NA	STEM, VALVE: dummy (11140:KK-675)	EA	1	A-1	7
C	C		NA	WRENCH, SPANNER: w h e e 1 spindle (11140:KK-150)	EA	1	A-1	16
Federal stock numbers are being assigned for items marked NA and then numbers will be published at a later date.								

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:

VERNEL. BOWERS
Major General, United States Army
The Adjutant General

Distribution:

Active Army:

DCSLOG (1)	QM FLDMS (2)
CNGB (1)	Ft Knox FLDMS (2)
COE (3)	4th USASA Fld Sta (1)
Dir of Trans (1)	Units org under fol TOE: —2 ea.
CONARC (3)	5-278
ARADCOM (2)	7
ARADCOM Rgn (2)	7-100
OS Maj Cored (3)	9-7
USARSO (3)	9-9
USASETAF (1)	9-500 (AA-AC)
LOGCOMD (2)	10-445
AMC (2)	17
MUCOM (3)	17-100
MICOM (2)	29-1
WECOM (10)	29-11
AVSCOM (5)	29-15
USACDCEC (10)	29-16
Armies (3) except	29-21
Seventh (5)	29-25
Eighth (5)	29-26
corps (2)	29-35
USAC (2)	29-36
USAECFB (2)	29-51
USMA (2)	29-55
USAOC&S (3)	29-56
USATSCH (4)	29-75
USAES (1)	29-79
USATC (2)	29-105
Arsenals (2)	29-109
Army Dep (3) except	37
TEAD (6)	37-100
USACOMZEUR (14)	57
Engr FLDMS (2)	57-100

ARNG: State AG (3).

USAR: None.

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

OPERATOR'S MANUAL

**GRINDING MACHINE, VALVE FACE,
BENCH MOUNTING, 9/32 INCH TO 11/16 INCH CHUCK,
0 TO 45 DEGREE VALVE
FACE ANGLE ADJUSTMENT, 115-VOLT, AC/DC,
60-CYCLE, SINGLE PHASE
(CEDAR RAPIDS MODEL "KWIK-WAY" KK)
(4910-5404679)**

Headquarters, Department of the Army, Washington, D.C.
6 October 1967

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Section I. PREPARATION

1. Preparation of Valve Facing Machine

a. Cleaning. Clean machine thoroughly, removing all dust and grit collected in transit. See that motor is of the proper voltage and cycle for current available. Install 1/4" drain plug in base of coolant tank.

b. Valve Chuck. The chuck furnished as standard equipment with the machine has a capacity of .195" to .705" and each collet is

marked for its capacity range.

c. Assembly of Light Bulb and Reflector. Use a standard bulb, 75 watts or less. Moisten the bulb neck before slipping it through the grommet at the base of the reflector. After screwing the bulb in the socket, make sure that 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.

d. Electric Motor Control. The toggle switch to the right of the operating handle controls the spindle motor. The toggle switch on the chuck housing controls the chuck motor. When the spindle slide is moved to the extreme right, power to both motors is interrupted by a SNAP-SWITCH. See figure 1.

e. Lubrication. The machine is thoroughly lubricated in the test department but we recommend that the customer 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 grades of SAE-20 or 30 weight 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 oilers are provided for oiling the ways; two in front on top of the slide and two on the rear. Fill these cups at least once a week and more often if machine is used on continuous service.
- (2) **Chuck Slide Feedscrew.** There is a snap-lid oiler on the feedscrew hand-wheel bearing of the chuck slide. There is another snap-lid oiler in line with the screw at the rear of the chuck slide. These two oilers will lubricate the feedscrew nut and bearing (lubricate weekly).
- (3) **Chuck Slide.** There are two snap-lid oilers on the chuck feed slide which furnish lubrication to both sides of the ways. One is accessible when the chuck is rotated to flat or 0 position while the other one is clearly visible over the ways. Both of the snap-lid oilers carry oil to reservoirs in the ways and should be filled weekly or oftener depending upon usage.
- (4) **Surface Grinding Attachment.** Slide the rubber boot, on the surface grinder shaft, and place a few drops of oil on the shaft.
- (5) **Motors.** The spindle drive motor on this machine is ball bearing and lubricated for life so no additional lubrication is necessary. The chuck drive motor should be lubricated once every six months. One reservoir is located directly behind the fan on the motor and the

other on top of the drive housing just to the right of the chuck drive belt. Both of these oil holes are accessible by removing chuck housing cover.

- (6) **Chuck Bearing and Spindle Bearings.** The chuck bearings and spindle bearings on the machine are sealed and lubricated for life so additional lubrication is not necessary.

f. Coolant. The machine has an operating capacity of one gallon of coolant. A good grade of soluble oil is used, mixed to the manufacturer's specification. If honing oil is used cut about 25% with kerosene or high grade fuel oil.

2. Setting up the Valve Facing Machine

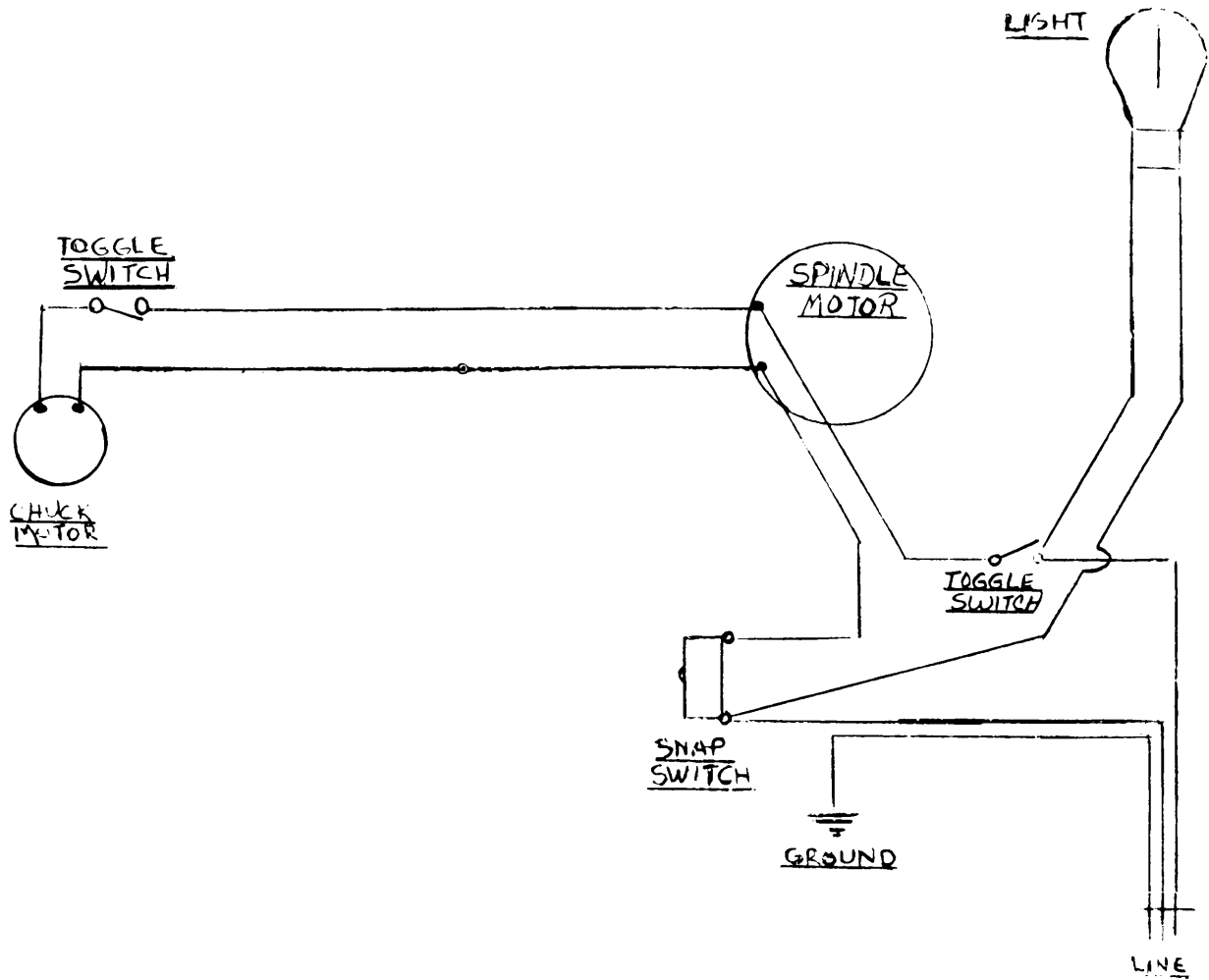
a. The valve grinding wheel. Is locked on the spindle with a special spanner nut (left hand thread) and a wrench for securing this nut is included with the accessories. Immediately behind and under the valve grinding wheel you will find a hole in the grinder spindle slide casting. The grinder spindle is drilled through at this point and the hex key provided with the machine can be inserted in this hole to lock the grinder spindle for removing and installing grinding wheels. A hex key is provided for removal of retaining screw for the surface grinding wheel (right hand thread).

b. Turning the Wheel. 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 lock screw. 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 1/16 of a turn; then pass the wheel across the diamond. Two passes will usually put the wheel face in first-class condition, but the 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.

c. Precautions. When Using the Diamond Dresser.

- (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 dnd 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.
- d. Setting the Swivel Plate for Different

Angles. The swivel plate lockscrew is located directly under the chuck. Loosen this screw and place the Stop Plug in the desired position, with the flat of the Stop against the Stop Screw. With the Stop Plug in this position the chuck is set at the angles designated by the marking. For 1 degree off-angle grinding rotate the Stop Plug so that the screw is not bearing on the flat. Lock the pivot screw while holding a light pressure of the swivel plate against the plug.

Section II. INSTRUCTIONS FOR FACING VALVES

3. Preparation

Important: Always move the grinder carriage to the extreme right before using the chuck.

a. After dressing the grinder wheel and setting the swivel plate for the proper angle, insert a valve in the chuck and lock in the collet by rotating the knurled collar.

b. To start the motors, move both toggle switches to the on position and then move the grinder spindle carriage toward the valve.

c. With the machine running, bring the valve in contact with the grinder wheel by means of chuck feed handwheel. The secret of good grinding is to take very light cuts and to pass 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 ground with one dressing of the wheel is entirely up to the operator of the machine. When the last low spot in the valve has been removed, stop feeding with the chuck feed handwheel and move the wheel across the valve very slowly two or three times to put the final dress on the valve.

Caution: Before removing the valve, always make certain to move the grinder spindle slide to the extreme right so the snap-switch will stop both motors,

d. The belt on the chuck drive motor can be adjusted by loosening the two machine screws that fasten the motor bracket to the chuck bearing housing. These two screws are mounted in the face of the housing immediately under the chuck. The grinder spindle motor belt tension is maintained by lasticity of the belt and additional adjusting is not necessary. If the belt becomes too loose to drive properly, replacement is required.

4. Care of the Grinding Wheel

a. 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.

b. If a heavy feed is used, or a deep cut is taken when facing a valve, the face of the wheel will break down. 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.

c. 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.

d. An oil soaked slipping 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.

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

5. Changing Collets

When it is necessary to change the collets to accommodate the valve stem for grinding, rotate the knurled chuck collar counterclockwise to remove and replace the collet. Remember in performing this operation that an accurate chuck must be cleaned and the chuck should be thoroughly cleaned whenever collets are replaced or excessive chuck runout is indicated.

6. General Precautions

a. Always move the guide carriage to the extreme right before using the chuck.

b. The machine should never be bolted down tight to a bench. To anchor it, use headless screws.

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

7. 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 when it becomes loose, because the

loose slide will allow it to wear unevenly. This machine was adjusted before shipment, but vibrations and rough handling in shipment do affect the setting so the grinder spindle slide, in particular, should be readjusted before the machine is put in service. The gib services for this adjustment arc Located on the' front side of the machine just below the grinder spindle slide. The socket set-screws for this adjustment are patented self-locking screws which turn with noticeable drag, but will not move after being set. Starting with the adjustments 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.

8. Surface Grinding Attachment for Valve Stem cutoff

a. The surface grinding attachment on this machine has been preset at the factory. If additional adjustment or correction is necessary after the machine has been in service for some time, adjust the grinding attachment by use of the four adjustment screws provided in the boss of the machine base holding the grinding attachment.

b. When the grinding wheel on the surface grinding end of the machine was installed it was dressed with a diamond tool. When redressing of the wheel is necessary, remove the diamond and diamond bracket from the front of the machine, turn the diamond into the bracket so that when placing the diamond and bracket assembly in the V-Block, the diamond will extend beyond the V-Block enough to dress the surface grinding wheel. The diamond can be held firmly in the V-Block with the thumb or end forefinger or can be clamped, Feed the diamond into the wheel using knurled feed collar on the surface attachment.

9. Cutting Off Valve and Squaring Stem Ends

a. Turn off the chuck drive motor, using the toggle switch mounted on the chuck housing, move the grinder spindle carriage to the extreme right and then move the toggle switch for the grinding wheel to the on position. Move the grinder spindle slide to the left until the drive

motor comes on. Leave the slide in this position and shut the motor off at the toggle switch.

b. Lock the grinder spindle slide in this position by turning in on the capscrew on the front side of the grinder spindle slide way.

c. Place the valve on the V-Block, bring it over the face of the wheel and lock it down in the V-Block with the stem just contacting the wheel. Turn the motor on, note the reading on the surface grinding feed dial. Take light cuts across the valve stem by alternately turning in on the dial and moving the valve across the face of the wheel until the desired amount has been removed. It is advisable to rotate the coolant nozzle assembly and direct the coolant on the end of the valve stem, not on the wheel.

10. Using Dummy Valve Equipment for Stem Cut-Off on L-Head Engines

a. 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.

b. 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. Bring the wheel up 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. Note the reading on the feed dial with the dummy valve in place.

c. Back off On the feed dial, remove the dummy valve and insert the Valve to be ground in the V-Block. Feed in slowly using the valve stem cut off procedure (para 8) and once you have passed the pre-set reading on the feed dial, feed in the desired amount for clearance.

11. Operating Instructions for Rockerarm Grinding Attachment

a. It is not necessary to remove the surface grinding attachment to grind rockerarms on the machine. Roll the V-Block assembly back until it lays on the back of the machine. The surface grinding attachment will be completely out of the way for rockerarm grinding.

b. The rockerarm grinding attachment is mounted on the boss at the front of the surface

drain pan. Loosen the socket head cap screw and position the attachment so the rocker arm will touch the wheel face approximately parallel. Mount the rocker arm between the two cones on the post.

c. Move the grinder spindle slide to the right until the snap-switch shuts off the motor. Move the slide back to the left, just far enough to start the grinder spindle motor. Leave the slide in this position and shut the motor off at the toggle switch. Adjust the attachment so the heel of the rocker arm 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 rocker arm so the contour of the rocker arm will follow the face of the wheel as it moves to the left. Be sure that the rocker arm is in contact with the wheel during the complete travel in both directions. Relocate the attachment if necessary. After the adjustments and alignment of the attachment have been made with a dead wheel, rotate the rocker arm so it is just clear of the wheel and turn on the motor by moving the toggle switch. This will run the grinder spindle only.

d. Turn on a slight amount of coolant and direct the nozzle so the coolant is flowing on the rocker arm (not on the wheel). If the coolant splashes or mists excessively while grinding, cut down on the flow of coolant or relocate the nozzle.

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

f. After finishing the rocker arm grinding, release the attachment and pivot it out of the way so the next operator who uses the machine to grind valves will not bring the wheel back into the attachment.

g. It is also advisable to move the coolant nozzle to the valve wheel immediately after finishing work on the surface end of the machine.

12. Service Tips

a. Grinding Wheel. The 4570 Valve Grinding Wheel furnished as standard equipment with the

machine works equally well on standard automotive valves of Stellite and non-magnetic valve materials such as Eatonite. If the grinding wheel becomes impregnated with lubricating oil or grease it will "load up" rapidly and produce a poor finish. Should this occur, the wheel should be removed from the machine and soaked in solvent overnight. Install the wheel on the machine immediately after it is removed from the solvent and turn on the motor. The solvent will dilute the oil or grease and it will be thrown out of the wheel by centrifugal force. Dress the wheel again before starting to reface valves.

h. Adjusting Chuck Shaft. The chuck shaft should always turn freely but have no end play. There is a threaded collar located just ahead of the chuck handwheel. Release the setscrew in this collar and with the wrench as a handle, turn the chuck collar up against the rear chuck bearing, while holding the chuck handwheel. This is a right-hand thread. This adjustment will preload the chuck bearing. Make it with care as over-tightening will damage the ball bearings on the chuck shaft.

c. Dressing the Grinding Wheel. The diamond tool used to dress the grinding wheel should have a sharp, clean-cutting point. A flat, worn diamond will not dress the wheel properly, and may cause unsatisfactory finish on the valve face. **COOLANT SHOULD ALWAYS BE USED WHEN DRESSING THE GRINDING WHEEL.** Dressing the wheel "wet" will reduce the amount of dust and prevent this fine grit from getting into the chuck or the grinder spindle slide ways.

d. Replacing the Grinder Spindle Belt.

- (1) Remove the belt guard.
- (2) Remove the surface grinding wheel.
- (3) Remove the wheel guard for surface grinding wheel.
- (4) Release the pump bracket.
- (5) Install the #8429 round drive belt and reassemble.

e. Adjusting the Pump Drive.

- (1) Remove the belt guard.
- (2) Loosen the pump bracket screw.
- (3) Rotate the pump into the motor drive pulley until the drive ring flattens on the face of the motor pulley no more than 3/16" long. Keep the pressure to a minimum required to drive the pump.

f. Replacing the Chuck Drive Belt.

- (1) Remove the chuck shaft handwheel.

- (2) Remove the chuck shaft pre-load collar (watch the brass slug under the set screw).
- (3) Release the two machine screws that hold the chuck drive motor on the face of the chuck housing.
- (4) Tap the Chuck shaft forward, out of the bearing, using a block of wood or a soft hammer.
- (5) When the end of the chuck shaft is free of the rear bearing, install the #3M190 belt and reassemble.
- (6) After installing, refer to the instructions on belt and pre-load adjustment.
- (7) Grinding wheel loose on shaft.
- (8) Grinding wheel worn down and too small in diameter (install new grinding wheel).
- (9) Line voltage not correct for motor, Check motor specifications and be sure that the current available is correct.
- (10) Improper coolant. (Drain the machine, clean thoroughly, and refill with clean solvent).

i. Squaring the Surface Grinding Attachment.

The V-Block on the surface grinding attachment was set and checked during the test at the factory but if field adjustment is necessary in the future, proceed as follows:

g. Adjusting the Snap-Switch. After the machine has had considerable use, you may find that the motor shuts off before the grinder spindle slide reaches the extreme right hand end of its travel, or the motor may continue to run with the grinder spindle slide to the right as far as it will go. If this occurs, the screw, mounted in the wheel guard just under the front wheel, may be adjusted to correct the shut-off position.

h. Causes of Poor Finish on Valves.

- (1) Slipping belts.
- (2) Blunt diamond tool (needs resetting or replacement).
- (3) Oil-soaked wheel (loading of metal in wheel),
- (4) Grinder spindle slide needs adjustment.
- (5) Grinder spindle bearings badly worn (need replacement).
- (6) Chuck bearings need adjustment for end play.

Mount a large diameter Valve stem, or a piece of round stock, in the V-Block of the surface grinding attachment. Feed the work into the wheel and take a course cut across the end of the round piece of stock. Release the round stock, rotate it 180 in the V-Block, clamp in place and then take a very light cut across the end of the round stock. In checking the end of the stock you should have a light cross hatch pattern across the face. If not, adjustments is necessary and this adjustment can be made by correct re-adjustment of the four screws holding the grinding attachment. See paragraph 8a.

**APPENDIX
BASIC ISSUE ITEMS**

Section I. INTRODUCTION

1. Scope

This appendix lists items which accompany the Valve Face Grinding Machine or are required for installation, operation, or operator's maintenance.

2. Requisitioning a part to which FSN has not been assigned

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 (5 digit number preceding the colon in the description column).
- b. Manufacturer's part number (the number and sometimes letters, following the colon, (a) 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 TNT or manufacturer's name plate).
- 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 is used, fill in all blocks except 4, 5, 6, and Remarks field, in accordance with AR 725-50. Complete form as follows:

- (1) In blocks 4, 5, and 6, list manufacturer's code and manufacturer's part number (as listed in 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

The following provides an explanation of columns in the tabular list in section II.

a. Source, Maintenance, and Recoverability Codes, column 1a, are as follows:

- (1) Source Code column 1a, indicates the selection status and source for the listed item. Source codes are:

<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 non availability from local procurement.
P.....	Applied to repair parts which are stocked in or supplied from GSA/DSA, or Army supply system, and are authorized for use at indicated maintenance categories.

- (2) Maintenance Code, Column 1b, indicates the lowest category of maintenance authorized to install the listed items. The maintenance level is.

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

- (3) Recoverability Code, column 1c, indicates whether unserviceable items should be returned for recoverability or salvage. Items not coded are expendable. Recovery code 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, column 2, indicates the Federal stock number for the item,

c. Description, column 3, indicates the Federal item name and any additional description required. A five digit manufacturer's code and part number is included in parentheses for reference.

d. Unit of Issue, column 4, indicates the unit used as a basis for issue, e.g., ea, pr, ft, etc.

e. Quantity Incorporated in Unit Pack, column 5, indicate's the actual quantity contained

in the unit pack.

f. Quantity Incorporated in Unit, column 6, indicates the total quantity of the item used on the equipment.

g. Quantity Authorized, column 7, indicates the total quantity of an item to be on hand and necessary for operation and maintenance of the equipment.

h. Illustration, column 8, is divided as follows:

- (1) Figure Number, column 8a, indicates the figure number of the illustration in which the item is shown.
- (2) Item Number, column 8b, indicates the callout number used to reference the item in the illustration.

4. Abbreviations

<i>Abbreviation</i>	<i>Explanation</i>
fl.....	flat(s)
hdl.....	handle (d) (s)
hvy-duty.....	heavy duty

nom..... nominal
 stght..... straight
 w..... wide, width

5. Federal Supply Code

<i>Federal Supply Code</i>	<i>Manufacturer</i>
11140	Cedar Rapids Engineering Co.
74545	Hubbel Harvey Inc.
75078	Jacobs Mfg. Co.

6. Errors, Comments, and/or Suggestions

Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Change to DA Publications) and forwarded direct to Commanding General, Headquarters, U.S. Army Weapons Command, ATTN: AMSWE-SMM-P, Rock Island Arsenal, Rock Island, Ill. 61201.

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) Qty. inc. in unit	(7) Qty. furn. with equip.	(8) ILLUSTRATION	
(a) Source	(b) Maint.	(c) Recov.							(a) Fig. No.	(b) Item No.
				TOOLS AND EQUIPMENT FOR GRINDING MACHINE, VALVE FACE (11140 KK)						
P	C	.....	5935 552-4372	ADAPTER, CONNECTOR: 2 connector mating ends, stght shape, 5 contacts, 1 female, U-hollow, 2 female, fl at one end, 2 male, fl at other end, nonlocking, 1.078 lg x 1.438 dia (74545:5273L).	EA	1	1	1	A-1	4
C	C	.....	.....	COLLET, MACHINE: flexible, rubber bonded, tapered, 0.200 to 0.300 in. cap. (75078:J502).	EA	1	1	1	A-1	1
C	C	.....	.....	COLLET, MACHINE: flexible, rubber bonded, tapered, 0.300 to 0.400 in. cap. (75078:J503).	EA	1	1	1	A-1	8
C	C	.....	.....	COLLET, MACHINE: flexible, rubber bonded, tapered, 0.400 to 0.500 in. cap. (75078:J504).	EA	1	1	1	A-1	9
C	C	.....	.....	COLLET, MACHINE: flexible, rubber bonded, tapered, 0.500 to 0.600 in. cap. (75078:J505).	EA	1	1	1	A-1	10
C	C	.....	.....	COLLET, MACHINE: flexible, rubber bonded, tapered, 0.600 to 0.700 in. cap. (75078:J506).	EA	1	1	1	A-1	11
C	C	.....	.....	DRESSER, DIAMOND: hvy-duty, non-resettable (11140:KK-123).	EA	1	1	1	A-1	3
C	C	R	.....	GUARD, SPLASH: metal (11140:K-180).	EA	1	1	1	A-1	5
C	C	.....	.....	HEAD, VALVE: dummy (11140:KK-661).	EA	1	1	1	A-1	6
P	C	.....	5120-240 5292	KEY, SOCKET HEAD SCREW: hex type, L-type hdl, 1/8 w across fl, 2-1/4 nom arm lg.	EA	1	1	1	A-1	12
P	C	.....	5120 198-5392	KEY, SOCKET HEAD SCREW: hex type, L-type hdl, 5/32 w across fl, 2-1/2 nom arm lg.	EA	1	1	1	A-1	13
P	C	.....	5120-240 5300	KEY, SOCKET HEAD SCREW: hex type, L-type hdl, 3/16 w across fl, 2-3/4 nom arm lg.	EA	1	1	1	A-1	14
P	C	.....	5120 224-4659	KEY, SOCKET HEAD SCREW: hex type, L-type hdl, 1/4 w across fl, 3-1/4 nom arm lg.	EA	1	1	1	A-1	15
C	C	.....	.....	STEM, VALVE: dummy (11140:KK 675).	1	1	1	1	A-1	7
C	C	.....	.....	WHEEL, ABRASIVE: surface, 1/2 x 3 (11140:3000).	1	1	1	2	.....	.....
C	C	.....	.....	WHEEL, ABRASIVE: standard, valve facing, 1/2 x 4-1/2 (11140:4570).	1	1	1	2	A-1	2
C	C	.....	.....	WRENCH, SPANNER: wheel spindle (11140:KK-150).	1	1	1	1	A-1	16

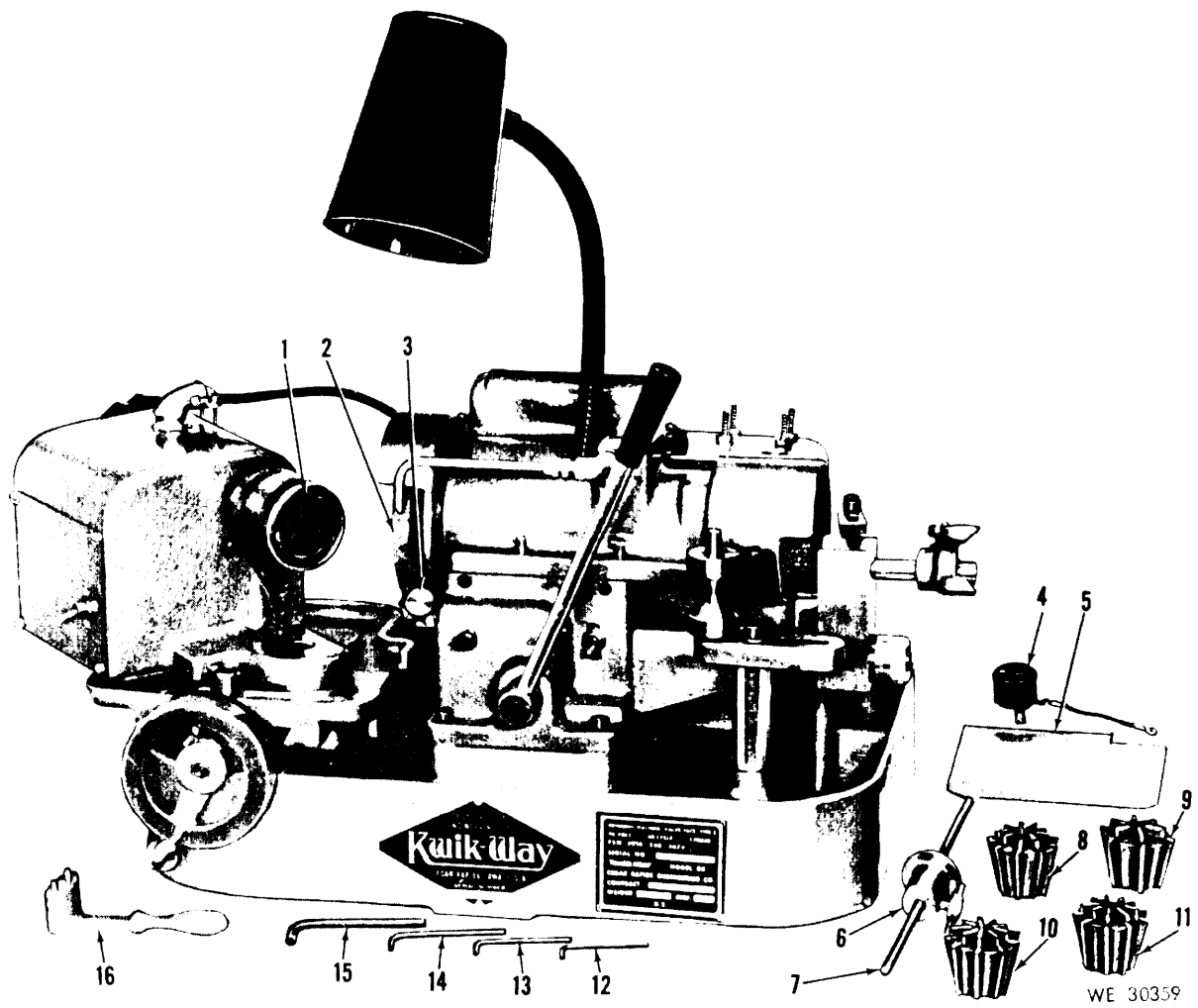


Figure A-1. Tools and equipment

By order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff

Official:

KENNETH G. WICKHAM.
Major General, United States Army,
The Adjutant General.

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USAOC&S (3)
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TEAD (6)
PG (1)
USACOMZEUR (14)
Engr FLDMS (2)
QM FLDMS (2)
Ft Knox FLDMS (10)
USAADMAC (1)
4th USASA Fld St (1)

Units org under fol TOE: -2 ea.

5 278
7
7-100
9-7
9-9
9-500(AA-AC)
10-445
17
17-100
29-1
29-11
29-15
29-16
29-21
29-25
29-26
29-35
29-36
29-51
29-55
29-56
29-75
29-79
29-105
29-109
37
37-100
57
57-100

NG: State AG (3)

USAR : None

For explanation of abbreviations used, see AR 320-50

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



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DOPE ABOUT IT ON THIS FORM.
CAREFULLY TEAR IT OUT, FOLD IT
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IN THIS SPACE, TELL WHAT IS WRONG
AND WHAT SHOULD BE DONE ABOUT IT.

TEAR ALONG PERFORATED LINE

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SIGN HERE

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 dekagram = 10 grams = .35 ounce
 1 hectogram = 10 dekagrams = 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

To change	To	Multiply by	To change	To	Multiply by
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

