TM 9-3419-225-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S MANUAL

HONING MACHINE HORIZONTAL BENCH MOUNTING 0.480 TO 3.000 INCH WORKING CAPACITY RANGE, 1 SPINDLE, 1/3 HORSEPOWER AC, 115-VOLT 60 CYCLE SINGLE PHASE (AMMCO TOOLS INC. MODEL 2500) (3419-812-1591)

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

HEADQUARTERS, DEPARTMENT OF THE ARMY

MAY 1965

Changes in force: C1

CHANGE

No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *17 May 1973*

Operator's Manual

HONING MACHINE, HORIZONTAL, BENCH

MOUNTING, 0.480 TO 3.000 INCH WORKING CAPACITY RANGE,

1 SPINDLE, 1/3 HORSEPOWER, AC, 11S-VOLT, 60-CYCLE, SINGLE

PHASE (AMMCO TOOLS INC., MODEL 2500) (3419-812-1591)

TM 9-3419-225-10, 24 May 1965 is changed as follows:

Page 15 lower portion of page. Add the following paragraphs:

Recommendations for Maintenance Publications Improvements.

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 mailing direct to Commander US Army weapons Command, ATTN: AMSWE-MAS-SPM Rock Island IL 61201. A reply will be furnished directly to you.

Components of the End Item.

Parts included with the end item and considered as components as components of the end item configuration are listed in the following table:

Table 1. Components of the End Item.

Components	Part No.	(FSCM)
CONNECTING ROD FIXTURE ASSEMBLY	1197	(03297)
DIAMOND DRESSER	2525	(03297)
DIAMOND NIB	3229	(03297)
FINISHING STONES	1938	(03297)

Table 1. Components of the End Item -Continued.

Components	Part No.	(FSCM)
FINISHING STONES	1938	(03297)
FINISHING STONES	2488	(03297)
FINISHING STONES	2489	(03297)
FINISHING STONES	2490	(03297)
FINISHING STONES	1542	(03297)
FINISHING STONES	1543	(03297)
FINISHING STONES	1544	(03297)
FINISHING STONES	2784	(03297)
FINISHING STONES	2785	(03297)
HONING HEAD, RANGE:	1800	(03297)
HONING HEAD	2750	(03297)
HONING HEAD	2450	(03297)
HONING HEAD	1550	(03297)
PIN VISE:	1229	(03297)
RETAINING BANDS: (Set of 2 included in No. 1550 and No, 2450 stone sets)	2468	(03297)
ROUGHING STONES:	1852	(03297)
ROUGHING STONES:	1853	(03297)
ROUGHING STONES:	2485	(03297)
ROUGHING STONES:	2486	(03297)
ROUGHING STONES:	2487	(03297)
ROUGHING STONES:	1539	(03297)
ROUGHING STONES:	1540	(03297)
ROUGHING STONES:	1541	(03297)
ROUGHING STONES:	2768	(03297)
ROUGHING STONES:	2769	(03297)

Page 23. Appendix is added as follows:

APPENDIX I

BASIC ISSUE ITEMS LIST AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST

Section I. INTRODUCTION

1. Scope.
This appendix lists basic issue items troop installed or authorized required by the crew/operator for operation of the HONING MACHINE.

2. General.
This Basic Issue Items List and Items Troop Installed or Authorized List is divided into the following sections:

a. Basic Issue Items List. Not applicable.
b. Items Troop Installed or Authorized or Authorized List. Not applicable.

By Order of the Secretary of the Army:

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

Official:
VERNE L. BOWERS
Major General, United States Army
The adjutant General

Distribution:

Active Army

DCSLOG (3)
CNGB (1)
TSG (1)
COE (5)
Dir of Trans (1)
ACSC-E (1)
CONARC (2)
ARADCOM (2)
ARADCOM Rgn (2)
AMC (12)
WECOM (10)
MUCOM (2)
AVSCOM (2)
OS Maj Comd (2)
LOGCOMD (2)
Armies (3) except
Seventh & Eighth USA (5)
Corps (2)
Instl (2) except
USAECFB (4)
Ft Monmouth(5)
APG (1)
TEAD (1')
TOAD (8)
LBAD (2)
LEAD (2)
ANAD (1)
ERAD (1)
SLAD (1)
USA Elct Bd (1)
Detroit Arsenal (5)
Ft Knox FLDMS (10)
4th USASA Fld Sta (1)

ARNG & USAR: None
For explanation of abbreviations used, se AR 310-50.

AMMCO MODEL 2500 WET HONING MACHINE SET-UP, MAINTENANCE AND OPERATING INSTRUCTIONS

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MILITARY SPECIFICATION MIL-H-14253A
FSN 3419-812-1591

AMMCO 2500 HONING MACHINE
HORIZONTAL WET-DRY TYPE

SPECIFICATIONS

PHYSICAL CHARACTERISTICS

1. MACHINE ACCURACY:
   A. Rounds, -.0002 for Range of .480 to 1.000 in.
   B. Final Surface, -16(RMS) Micro-inches (on Grey Iron)

2. RANGE:
   A. Thru Holes..... 480 to 3.000 inches
   B. Blind or Step Cylinders..... 1.125 to 2.062 inches

3. SPINDLE SPEEDS (Infinitely Variable)..... 380 to 740 RPM

4. TYPE HONING..... Wet or Dry

5. COOLANT CAPACITY .....3 Gallons

6. SPINDLE DRIVE MOTOR .....1/3 H.P., 115 Volt, 60 Cycle, Single Phase

7. COOLANT PUMP MOTOR..... 115 Volt, 60 Cycle, Single Phase

8. MACHINE DIMENSIONS:
   Length .....36" Maximum
   Width.....32" Maximum
   Height..... 26" Above Bench

9. MACHINE WEIGHT..... 203 lbs.
   (not including spare parts and accessories)

HONING - WHAT IT IS

Honing in the sense we use it is not listed in the dictionary. As we know it, honing is the removal of stock from an inside diameter using an abrasive supported, rotated, and expanded by some mechanical device.

The "device" in this case is an Ammco Honing Machine. The abrasive, or the Stones, are mounted on metal carriers and are held by and have their expansion controlled by a Honing Head.

The Stones are made of abrasive particles held together by a bonding agent. The abrasive particles can vary in grit (size of abrasive particle) and in structure (number of abrasive particles in a given unit of space). The bonding agent can vary in hardness. Innumerable tests were made before the right combination of grit, structure, and hardness of bond was arrived at to allow the fastest stock removal with the least Stone wear consistent with a good finish. The Stone must also cut metals of varied types and hardness.

Each abrasive particle in the Stone performs just like the tool bit in a lathe and, if you look at honing waste under a microscope, you will see tiny strips of metal curled up like the cuttings from a lathe operation. The abrasive particles must be sharp. Inasmuch as they obviously cannot be sharpened like a lathe tool bit, the bonding agent must be soft enough so that dull abrasive particles can shear off, leaving fresh sharp ones. If the bond is too soft, the abrasive particles will shear off without cutting, causing excessive Stone wear without stock removal to show for it. A certain amount of Stone wear is necessary for continuance of rapid cutting speed.

If the honing waste was to adhere to the surface of the Stones, they would lose cutting efficiency and become "loaded." This condition is more apt to be found when honing the softer metals. Loading is prevented by the use of Ammco Honing Oil which washes the waste away and keeps the Stones clean. It also prevents excessive heating of the Stones and of the material being honed. If the Honing Oil is too thick, it will cause a slowing of cutting speed but will produce a finer finish. If the Honing Oil is too thin, it will produce faster cutting speeds but with a much faster rate of Stone wear and a coarser finish. Ammco Honing Oil provides the correct amount of Stone cleaning and heat dissipation with commensurate fast cutting speed, proper finish, and long Stone life.

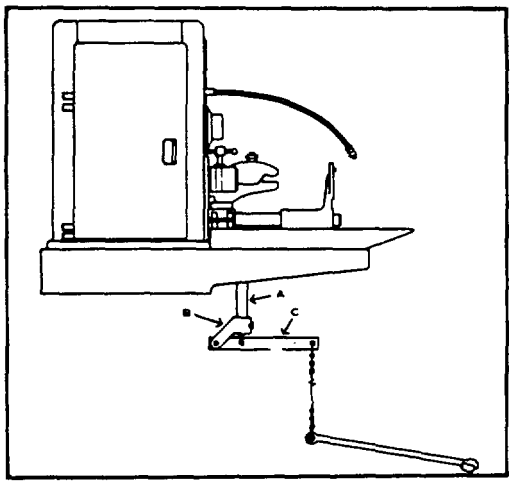
Read the following instructions through carefully. Keep them handy for future reference. The more you know about the Honing Machine, the more profitable will be its use.

SET-UP AND MAINTENANCE

Unpack your Model 2500 carefully, being sure that packages containing accessories are not discarded. Check to make sure that the three Drain Plugs in the bottom of the Wet Base are tight. Place Machine on a sturdy Bench approximately 801' high and bolt it down securely. Put Splash Pan in place.

Open the Honing Machine Doors and remove two front Bolts and loosen rear Bolts that hold Body to Machine Wet Base. This will allow Body to be pivoted enough so that Pipe (A) can be installed. Center Body and retighten Bolts. Tighten Pipe in place using sealer to prevent leakage. Put Bracket (B) on Pipe, being sure bottom edge is flush with bottom of Pipe and secure with Set Screw. Put Hinge (C) on Bracket with Nut and Bolt provided ... do not overtighten. Support Hinge from Clutch Lever with section of Chain ... adjusting so that Hinge is level. Use balance of Chain to hang Foot Pedal comfortably from outside hole of Hinge. If desired, heel of Foot Pedal may be attached to floor in position comfortable to operator.

Adjust the belt tension by turning the knurled Bolt Head on the motor mount Bracket until the Honing Machine is running smoothly.



There should be no more than 3/4" of play in the belt measured halfway down the belt between the two pulleys.

Use Oleum or Kerosene to remove preservative from bare metal parts. Put the sliding Rod Guide in place on the Support Bar.

Plug in the Cord and turn Switch to 'Wet." Pour No. 1298 Honing Oil through the Splash Pan until it flows freely through the Flexible Metal Coolant Hose. Two and onehalf gallons or slightly more will be required. Flow of Honing Oil may be controlled by the Adjustable Nozzle at the end of the Coolant Hose.

There are three steps over which the Honing Oil flows between the Splash Pan and the reservoir at the rear of the Wet Base. These steps permit honing waste to settle and keep the Honing Oil clean. No. 1298 Honing Oil will last a long time. Never add Kerosene, Lubricating Oil or other Cutting Fluids to it. They will change the cutting characteristics of the Stones and the saving in Honing Oil will be far offset by loss of cutting efficiency.

When a change of Honing Oil is required, the sediment reservoir under the Splash Pan should be cleaned of all honing waste.

MODEL 2700

This machine is shipped with the Connecting Rod Guide Support Assembly not mounted. Mount as illustrated on page 19 using the Bolts provided. Be sure that all surfaces are absolutely clean.

When tightening the Bolts, lift up on the Support Bar so as to provide as much clearance as possible.

LUBRICATION

1. Oil Drive Motor every three months with a good grade electric motor oil.
2. Oil exposed threaded parts and clutch pivot points every thirty days.
3. Use a grease gun to apply a light grease through the Alemite grease fittings on the Main Drive Pulley every thirty days.
4. Use machine oil to keep the Sliding Rod Guide free on the Support Bar. Keep the Support Bar free of grit or dust. Oil bare metal parts periodically to prevent rust
5. MODELS 2500 AND 2700 Oil Pump Motor with electric motor oil every three months through the rubbercapped oil intake.
6. Oil Main Bearings through the capped oil cup at the left center of the Drive Shaft Housing with two or three drops of machine oil once a month.

STONE CARE

NOS. 2450, 1200, 1970, 3575, 2132, 1500, 1550 AND 1250 HONING HEADS

Dress the Stones for the above Heads with the No. 2525 Diamond Stone Truer as follows:

1. Clean shank of Honing Head and insert Honing Stones.

2. With Honing Machine turned off, depress Foot Pedal fully and adjust Honing Stones with Adjustment Dial so that they are only slightly expanded. (In this position the Stones are given maximum support by the Head. In no case, however, should they be trued when completely contracted.)

3. Place the No. 2525 Stone Truer in position on the Honing Head (see illustration opposite). Release the No. 3229 Diamond Nib by loosening Truer's Handle and adjust Diamond so that it will just touch Honing Stones with Foot Pedal depressed. Lock Diamond by tightening Handle.

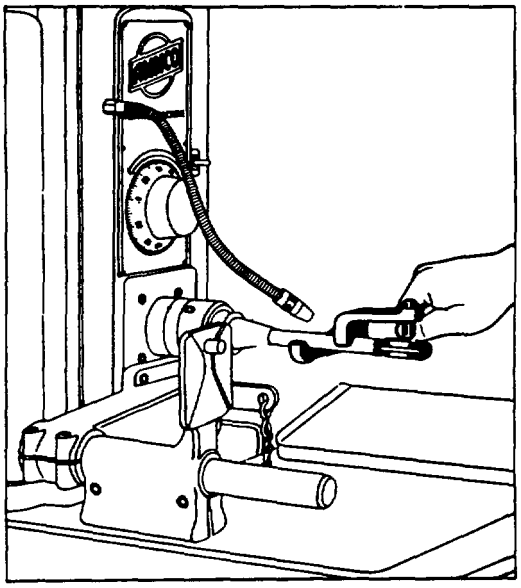
4. Retract Honing Stones, one turn of Adjustment Dial.

5. Turn Honing Machine on to WET. Adjust flow of Honing Oil so that it is from back of Honing Head, thereby washing grit away from Head's Shank. (The Body of the Stone Truer Is made of aluminum alloy to avoid scoring the Honing Head Shank and will show wear if grit is allowed to remain on Shank.)

6. With Foot Pedal depressed, expand Honing Stones slowly with Adjustment Dial until they contact No. 3229 Diamond Nib. Hold Truer firmly on Shank and use a slow back and forth motion the length of the Honing Stones. Continue expanding the Honing Stones slowly until the Diamond contacts the Honing Stones throughout their entire length. The Honing Stone will now be dressed perfectly straight, round, and concentric.

NOS. 1800, 2750 HONING HEADS

Use the No. 1257 Stone Dressing Stick to dress the Stones for these Heads.



LONG STONE HONING HEADS

Use the Truing Sleeves to dress the Stones for these Heads.

A Truing Sleeve is used whenever a new Honing Head is used, Stones are changed, or if the Stones are not cutting throughout their full length.

Stroke the Sleeve over the Honing Head until all high spots on the Stones and Shoes are gone.

Use a smooth, rapid, honing stroke with plenty of Honing Oil, letting the Truing Sleeve overlap the Stones about an inch at each end. To speed up the truing operation and prolong the life of the Truing Sleeve, the No. 1257 Dressing Stick can be used to work down any high spots on the Stones or Shoes indicated by the Truing Sleeve.

Truing or Dressing is very simple with the Long Stone Ammco Honing Heads as the entire length of the Honing surface passes over the entire length of the Stones and tends to true them as you hone.

BLIND HOLE STONE

Stones for Blind Hole work should be dressed straight and level throughout their whole lengths so that they will bottom completely.

OPEN END HOLES

Stones for Open End Hole Honing should be beveled slightly at each end (see illustration on next page).

HONING OIL

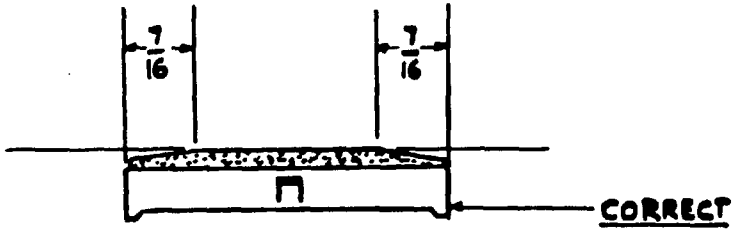
Use Honing Oil liberally to prevent Stone loading when honing the softer metals. If the Stones should load, clean them thoroughly with a wire brush. Loading may be recognized by a glaze or by metal building up on the Stone surface. Loading will cause decreased cutting speed, substandard finish, and possibly chatter.

GENERAL

Too great honing pressure will not give the cutting speed and accuracy that the correct moderate pressure will give. Excessive honing pressure will only result in unnecessarily fast Stone wear and may even cause Stone breakage.

Instructions covering the use of each Honing Head are packed with the Head and give additional Stone care details.

The Correct Way to Dress Stones For Open End Hole Honing

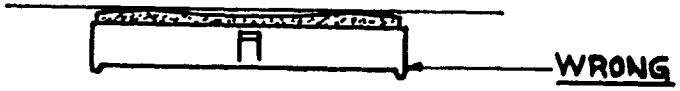


1

Keep the Honing Stone dressed down on each end about $\frac{1}{16}$" at a slight angle, so that when work is stroked over surface of Stone, it will automatically keep Stone straight.

2

Showing the Stone dressed the wrong way. This will tend to cause the bushing to be large in the center and small on the ends, known as a "barrel shaped" bore.



3.

Due to not dressing the ends of Stones as shown in sketch No. 1, the Stone has become worn in the center, this will cause the bushing to wear large at each end and small in the middle. Known as "bell mouthed" bore.

The Correct Way to Dress Stones For Blind End Hole Honing

1

Keep the Stones dressed straight and parallel through their whole length so that they will cut evenly to the very ends.

2.

Showing the Stone dressed incorrectly. This will cause the bore to be "barrel shaped" and undersize at its blind end.

3.

Due to not dressing the Stones at the end, the bore will become "bell mouthed" and oversized at the blind end.

SPINDLE SPEED ADJUSTMENT

On Honing Machines equipped with the variable speed pulley, SP2178, the spindle speed can be adjusted from 380 RPM to 740 RPM. This is done by rotating the knurled adjusting knob on motor plate inside the housing clockwise to decrease the spindle speed.

The slowest spindle speed should be used for the larger diameters up to 3" and the fastest speed should be used for the smaller diameters around 1/2" diameter.

The correct speeds for intermediate diameters are dependent on the material being honed and can best be determined by experimentation.

For best results follow the honing instructions included in this manual.

GENERAL OPERATING INSTRUCTIONS

Expansion of the Honing Heads with Stones is attained through the use of the No. 1132 Adjustment Dial and the No. 534 Foot Pedal. Maximum Stone expansion is set with the Dial, and the Foot Pedal brings them to size as you hone.

The machine can be used "WET' or "DRY" but wet honing is almost always preferable. Flow of oil is controlled with the Adjustable Nozzle at the end of the Coolant Hose. Be sure as much Honing Oil as practicable flows over Stones and into bore being honed.

HONING WITH SHORT STONE HONING HEADS

These are general instructions covering the following Models of Honing Heads. For more detailed information on specific jobs, see sections covering the type of work to be honed.

Model 1800 Honing Head.....	Range 480"	to .720"
Model 2450 Honing Head.....	Range 720"	to 1.125"
Model 1250 Honing Head.....	Range 1.093"	to 2.062"
Model 2750 Honing Head.....	Range 2"	to 3"
Model 1500 Blind Hole Honing Head.....	Range 720"	to 1.125"
Model 1550 Blind Hole Honing Head.....	Range 1.125"	to 2.062"

1. Determine diameter of bore to be honed.

2. Select correct Honing Head and Stone Set to fit work. With Honing Machine turned off and with Foot Pedal released, insert Stones in slots at end of Honing Head. Be sure that bevels on metal Stone Carriers match expansion bevels in Honing Head Stone slots.

3. True Stones as indicated in the Stone Care Section.

4. Turn Adjustment Dial on Honing Machine (with Foot Pedal depressed and Machine turned off) until work will fit over Stones in Honing Head. Depressing Foot Pedal engages clutch and also expands Stones to limit set on Adjustment Dial. With Foot Pedal still down move work back and forth radially and turn Adjustment Dial clockwise until Stones contact work. Turn Adjustment Dial about 1/4 further or enough to set moderate honing pressure.

5. Release Foot Pedal and switch Honing Machine on to "WET." Use Adjustable Nozzle at end of Coolant Hose to adjust Honing Oil Flow. Be sure as much Honing Oil as practicable flows over Stones and into bore.

6. Press Foot Pedal down to engage clutch and expand Stones and stroke work back and forth at an even rate over face of Stones. USE SHORT, RAPID, EVEN, STROKES. If the bore being honed is shorter than the Stones, use strokes that allow not more than 1/3 of the bore to extend beyond the Stones at either end. If the bore being honed is longer than the Stones, use strokes that allow not more than 1/3 of the Stones to extend out of either end of the bore.

Do not hone with too much pressure. A moderate pressure will give the fastest stock removal with the least stone wear. Excessive pressure slows the cutting speed and is apt to damage stones and even Honing Head.

Hone with rapid back and forth strokes. After you have honed a few strokes you will note the fine crosshatching in the bore. The lines in the crosshatching should intersect at least 45 degrees. If they do not, you are not stroking fast enough for rapid, accurate stock removal.

7. After honing a few strokes, check hole for size. If hole is still too small continue honing with periodic checks until correct fit or size is obtained. Stock removal may eventually cause the honing pressure to drop off. For continued efficient stock removal, adjust for added honing pressure with Adjustment Dial.

8. If a finer finish than that obtained with the Standard Stones is required, use the Special Fine Stones to remove the last .0005" to .001".

9. If more than one hole is to be honed to the same size (such as when honing a set of rods or pistons or the second bore in a piston or spindle) the following timesaving method may be used.

A. Hone the first hole to the desired size or fit.

B. Using the first hole as a guide, and with the machine turned off and Foot Pedal depressed, retract the Stones with the Adjustment Dial until they only just barely bear against the wall of the bore.

C. Without changing the Adjustment Dial setting, hone the remaining bores until the honing pressure drops off to the same very slight pressure set using the first bore as a guide.

D. The size now obtained will be close to perfect and a couple of further honing strokes to allow for Stone wear will give the desired size. After a little experience, the operator can fit to size almost without checking. In case of slight pin variation, be sure that every rod or piston is fit to the wrist pin with which it will be used.

10. True Stones after honing excessively tapered bores, or if there is any doubt as to the Stones' straightness.

REMEMBER-Moderate honing pressure, short strokes with fast back-and-forth stroking

HONING WITH LONG STONE HONING HEADS

These are general instructions covering the following Models of Honing Heads. For more detailed information on specific jobs see sections covering the type of work to be honed.

No. 7025 HONING HEAD	Range .720" to 780"
No. 7027 Truing Sleeve	Range .720" to 780"
No. 70830 HONING HEAD	Range .780" to 840"
No. 7032 Truing Sleeve	Range .780" to 840"
No. 7035 HONING HEAD	Range .840" to 900"
No. 7087 Truing Sleeve	Range .840" to 900"
No. 7040 HONING HEAD	Range .900" to 960"
No. 7042 Truing Sleeve	Range .900" to 960"
No. 7045 HONING HEAD	Range .960" to 1.020"
No. 7047 Truing Sleeve	Range .960" to 1.020"

For maximum accuracy and efficiency, it is recommended that separate Honing Heads of each range be used for roughing and finishing.

1. Determine diameter of bore to be honed.

2. Select correct honing head to be used and insert stones as follows:

A. Depress Expander with thumb of right hand.

B. Insert one Stone at the Drive Adaptor end of the Honing Head lining up its Bevels with the Expander Bevels and pushing down on it.

C. Insert the second Stone; pushing the first Stone toward the Drive Adaptor with the second one.

D. Push the second Stone down into place engaging its Bevels. Release the Expander.

3. True Stones as indicated in the Stone Care Section.

4. With the Honing Machine motor off, push down on the Foot Pedal, and expand Stones until they firmly contact the work to be honed.

5. Back off Stones until work is just free. Remove foot from Pedal.

6. Turn on Honing Machine and adjust Honing Oil so there will be a generous flow on work.

7. Depress Foot Pedal all the way down and begin long, even, rapid strokes (about 100 per minute) Stroke so that about 1/3 the length of the Pin Boss comes off each end of the Stone at every stroke. Adjust the Stone pressure until you get good smooth cutting action without grab.

8. Turn the work frequently end to end on the Honing Head. Check size frequently against wrist pin to be used.

9. Be extremely careful not to hone oversize. If you are using Roughing Stones and want to finish with Finishing Stones, stop well short of pin size before changing to Finishing Stones.

REMEMBER- Moderate honing pressure long, even, rapid strokes.

HONING CONNECTING RODS

It is commended that Short Stone Honing Heads be used for Connecting Rod Honing.

1. Place piston pin to which rod is to be fitted in Pin Vise. The piston pin may then be used as a gage. Tighten the Pin Vise just enough to hold the pin. Too much clamping pressure may cause distortion of the pin and inaccurate results.

2. Be sure rod cap nuts are tight. Select correct size Honing Head and Stones for bushing and place Honing Head in chuck. Use Adjustment Dial to expand Stones to correct honing pressure against bushing.

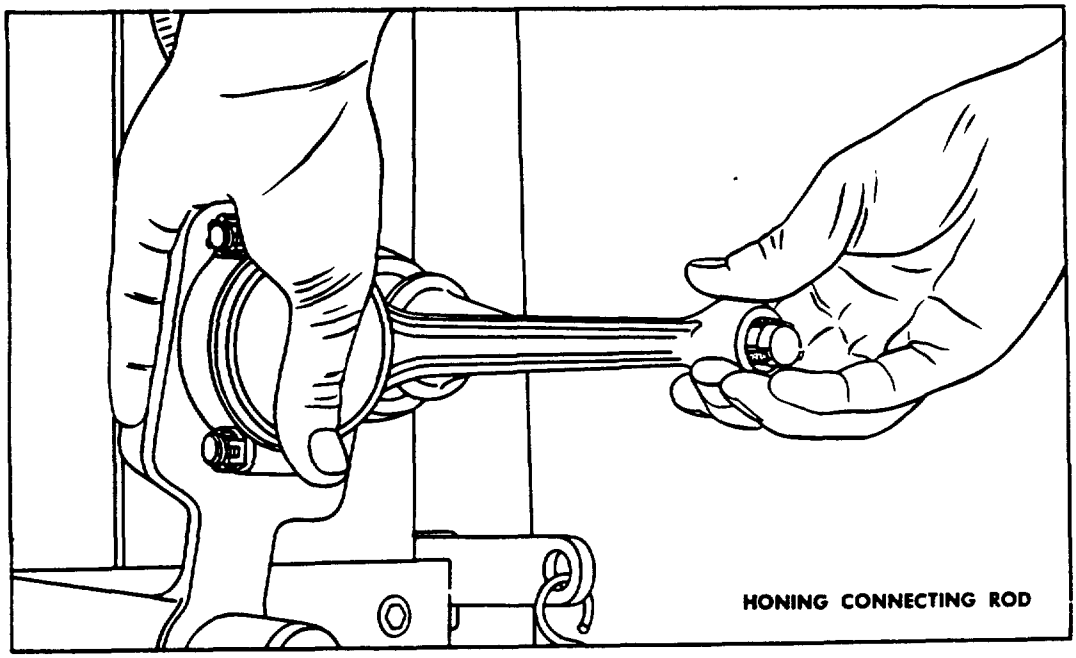
3. Select face of journal end of rod which has the flattest surface. Place this face of rod against face plate of Sliding Rod Guide and hold securely with left hand. Hold bushing end of rod between thumb and forefinger of right hand and place over Stones.

4. The face of the Sliding Rod Guide and the Honing Head are at perfect right angles to assure absolutely true alignment between journal and pin end. Hone the rod bushing with short rapid back-and-forth strokes. Be sure that the journal end of the rod is held securely against the Sliding Rod Guide. Do not reverse rod.

5. Be sure that you hone with fast enough back-and-forth strokes to attain the desired 45 degree crosshatching.

Hone the rod a few strokes and try it on the piston pin. Continue honing until you can feel the rod starting on the pin. Try both ends of bushing on pin but be sure to always place the same face of the rod against the Sliding Rod Guide. When the rod bushing will start on the pin you need hone only a few strokes more for the desired fit. (See "Rod Fits and Finishes" below.) If you desire a finer finish than that obtained with the Standard Stones you should remove about the last .0005"' to .001" using Special Fine Stones.

6. Be sure that the rods and pins are cleaned thoroughly with soap and hot water to remove any abrasive particles that may adhere to them. If soap and hot water are not available, wipe rods off carefully with a rag soaked in S.A.E. 10 oil.



ROD FITS AND FINISHES

The rod should be fit to the piston pin with clearance according to the manufacturer's specifications, your experience, and the needs in the individual case. It is strongly recommended that new bushings be used in every case. The bushings in the average rod ready for pinfitting have been worn considerably, out-of-round, and in many cases large enough oversize pins are not available to allow enough stock to be removed to obtain a round hole.

Therefore, using new bushings, you save on labor, get a correct bearing fit, and assure customer satisfaction.

Relative expansion of metals involved is the usual basis for pin fit recommendations by the manufacturer. These recommendations vary from .0003" clearance to a "push fit" or "thumb fit." It is apparent that a "thumb fit" to one operator may be a "push fit" to another. Therefore, the operator's experience must be the deciding factor in getting a correct fit. For Pressfit Rods, see the section headed Pressfit Rods. There are two points that must be taken into consideration when honing, however. One is friction and the other is surface finish.

When a rod is honed to a tight fit on the pin it will be noted that the farther it is pushed onto the pin the tighter the fit seems. This is not an indication that the rod bushing has been honed with a taper or bellmouth. It is the natural result of friction. The more surface of the rod bushing that bears on the pin, the more friction and the tighter the fit seems. DO NOT MISTAKE FRICTION FOR BELLMOUTH OR TAPER AND TRY TO CORRECT FOR A CONDITION THAT DOES NOT EXIST.

You cannot check for the correctness of your fit without pin being at least halfway through the rod bushing. Any looseness that is felt with less than 1/2 of the pin inserted will be natural looseness caused by clearance. A clearance of .0002" can be felt as looseness if the pin is only inserted 1/8" into the bushing.

The 45 degree crosshatched lines that result from the correct fast back-and-forth honing motion are necessary to obtain the desired degree of oil-retaining quality in the bushing. Too fine a finish is as bad as too coarse a finish. (You can remove all the oil from a glass window with a squeegee but you cannot from a cement floor.) If you are using the Standard Stones for a finish fit, the pin must be a little tighter than when the Special Fine Stones are used. The coarser finish obtained with the Standard Stones will seat quickly in use, giving the desired clearance. (An experiment that shows how important finish is to fit can be made by fitting a pin using Special Fine Stones. Then hone a couple of strokes using Standard Stones and the pin will hardly go in, if at all.)

A dry piston pin in a dry rod bushing will feel considerably looser than it would if oiled. All the various finish factors must be taken into consideration when deciding on the correct fit.

HONING PISTSONS

It is recommended that Long Stone Honing Heads be used for Piston Honing in the .720" to 1.020" Range.

1. Place piston pin in Pin Vise. Use pin as a gage. Do not distort the pin by overtightening.

2. Select the correct size Honing Head and Stones for piston pin holes. Place Honing Head in Chuck of Honing Machine.

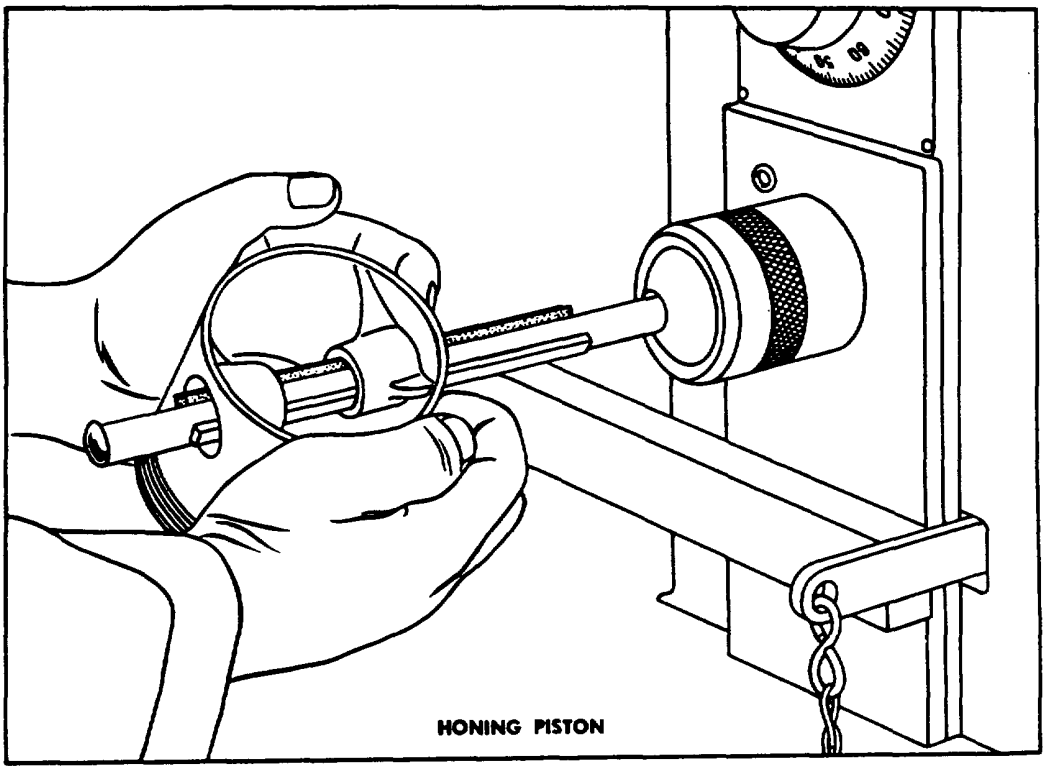
3. Place piston with Centering Cone on Honing Head held firmly in place. The Centering Cone assures absolutely accurate alignment of holes when both are honed to size. When honing with Long Stone Honing Heads disregard instructions on the Centering Cone.

4. Hone one hole with several strokes to remove possible burrs that might cause the Centering Cone to locate inaccurately.

5. Reverse piston and place Centering Cone in cleanup hole. Hold Centering Cone firmly in place while honing other hole to size. Be sure to use short rapid strokes and plenty of Honing Oil. Remember the 45 degree crosshatching.

6. Reverse piston and hone other hole to size being sure to use Centering Cone. Both holes will now be in perfect alignment.

7. Be sure to wash piston and pin with soap and hot water or wipe carefully with a rag soaked in S.A.E. 10 oil.



PISTON FITS AND FINISHES

As in fitting rods, the manufacturer's .recommendations and the operator's experience are the determining factors. One car manufacturer recommends 200 to 300 pounds pressure to install the pin in the piston while another specifies that the pin should drop through. The operator should be careful not to get into the habit of fitting pins too tightly unless there is a definite reason for doing so. Most manufacturers say that one of the reasons for a majority of scored pistons is too tight pin fitting. (The other major cause is misaligned rods.)

The same finish, friction, and lubrication factors that apply to rods, apply to pistons. Be sure to keep them in mind.

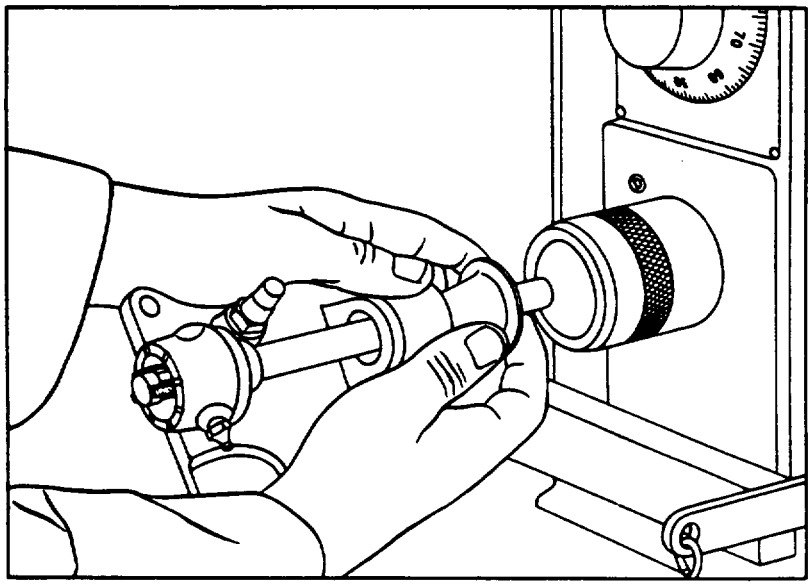
HONING SPINDLES AND OTHER IN-UNE HOLES

1. Place king pin in Pin Vise. Use king pin as a gage.

2. Place Honing Head with correct size Stones installed in Chuck of Honing Machine.

3. Hold Spindle as shown in illustration.

4. Hone Spindle using Centering Cone as described under "Honing Pistons." Be sure that the Centering Cone is held firmly. Use short rapid strokes and plenty of Honing Oil.



HONING SPINDLE

HONING BLIND END HOLES

1. Blind end holes are ones which have only one opening or have a shoulder or other obstruction limiting the length of stroke. Most master brake cylinders and many types of wheel cylinders have blind holes.

2. When honing blind holes, rapid back-and-forth honing strokes and moderate honing pressure should be used just as in honing open end holes. It is very important to get as much Honing Oil into the hole and over the Stones as possible, as in a blind hole the honing waste may easily be trapped, causing Stone loading.

3. Be sure to keep the Stones dressed square at the ends and level as described under "Stone Care." It is a good idea to reverse the Stones in the Honing Head from time to time to keep them from wearing tapered.

4. Use the Standard Stones for fast stock removal and the Special Fine Stones to remove the last .0005" to .001" if a finer finish is required.

PRESS-FIT RODS

Some car manufacturers specify that Piston Pins be pressfit into the rod. In such cases the Piston Pin cannot be used as a gage to hone the rods to size, because the rod must be smaller than the Piston Pin. Instead of the Piston Pin as a gage, a Plug Gage, which is a predetermined undersize in relation to the size of the Piston Pin, is used.

By honing the rod to the size of the Plug Gage for the Piston Pin to be fitted, the rod will be the proper size to pressfit the Piston Pin at the correct pressure.

he Plug Gage can also be used as a guide to center the rod in the Piston and as an adjustable stop to center the Piston Pin in the Piston.

An Adaptor Bushing should be used to sup port the Piston, while the Pin is being pressed in so the Piston Skirt will not be damaged.

A driving plug must be inserted between the Arbor Pressed Head to protect the end of the Piston Pin from marring.

Plug Gages come in sets corresponding to make of automobile they are to be used on. Each Precision Plug Gage and Pilot Set consists of one Adaptor Bushing, one Driver, and one each Plug Gages with adjustable stops in sizes: Standard, .0015, .003, and .005 oversize. An Arbor Press Fixture Base is available for use with these sets. It is designed to give the proper support to the Piston in conjunction with the Adaptor Bushing .

The following is a list of part numbers of AMMCO tools available for pressfitting pins.

4800 Arbor Press Fixture Base

Precision Plug Gage and Pilot Sets:
4820 1957-61 Buick
1959-64 Cadillac
4840 1954-63 Cadillac
4860 1955-64 Corvette and Chevrolet-
265, 283, 327 cu. In.
1962-64 Chevy II
1964 Chevelle
1964 Tempest, 6 cylin.
4870 1956 Buick-322 cu. In.
4880 1958-64 Chevrolet-348, 409 cu. In.
4900 1956-57 Hudson
1956-57 Nash-250, 252, 327 cu. In.
1956-64 Rambler-327 cu. In.
4920 1956 Nash
1956-64 Rambler-196 cu. In.
1960 Rambler-250 cu. In.
4940 1958-64 Pontiac and Tempest
4960 1958-60 Edsel
1958-64 Lincoln
1958-61 Mercury
4980 1958-61 Dodge and Plymouth-
350, 361, 383 cu. In.
1958-60 DeSoto-350, 361 cu, in.
1959-61 Chrysler, Imperial

PRECISION PLUG GAGE AND PILOT SET INSTRUCTIONS

DISASSEMBLY OF ROD, PISTON AND PIN

1. Select ADAPTOR BUSHING from the PLUG GAGE set which corresponds to the make of car, and insert it in ARBOR PRESS FIXTURE BASE with fiats up.
2. Align the piston pin with the hole in the ADAPTOR BUSHING and flats on the BUSHING to clear the steps of the piston.
3. Using standard size PLUG GAGE, place the solid end against the pin and KNURLED HANDLE against the ram of the press.
4. Press out piston pin into ARBOR PRESS FIXTURE BASE.

HONING ROD TO CORRECT SIZE

1. Select PLUG GAGE set corresponding to make of car.
2. Select PLUG GAGE to correspond with size piston pin to be used.

For ease of selection, each PLUG GAGE is colorcoded as to pin size as follows:

Standard Plain
.0015"--Green .003"--Blue .005"--Red

3. Hone the connecting rod using PLUG GAGE to check size of hole. Hole will have proper pressfit allowance when PLUG GAGE fits hole with a palm push fit.

ASSEMBLING ROD, PISTON AND PIN

1. Insert ADAPTOR BUSHING into ARBOR PRESS FIXTURE BASE with flats up.
2. Lubricate pin holes in rod and piston.
3. Position connecting rod in piston and insert PLUG GAGE to act as a pilot.
4. Insert piston pin through one side of piston, pushing PLUG GAGE out of other side until the piston pin is against the connecting rod.
5. Place piston, rod and pin assembly on ARBOR PRESS FIXTURE BASE with the KNURLED HANDLE of the PLUG GAGE extending into the ADAPTOR. Make certain that fiats on ADAPTOR BUSHING are positioned to provide clearance for the steps on the piston.
6. Insert DRIVER PLUG in pin and position entire assembly under press ram.
7. Press pin into assembly as far as it will go. Check so pin is properly centered in rod. If not, it will be necessary to make an adjustment on the STOP. See instructions for "ADJUSTING STOP."

ADJUSTING STOP

The KNURLED HANDLE on the PLUG GAGE also serves as an ADJUSTABLE STOP to properly center the piston pin in the rod. Adjust length of PLUG GAGE as follows:

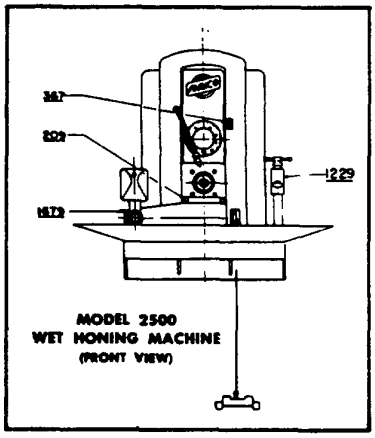
1. Loosen setscrew in HANDLE with hexagon wrench.
2. Turn the KNURLED HANDLE to either lengthen or shorten the PLUG GAGE.
3. Tighten SETSCREW to lock at required length.

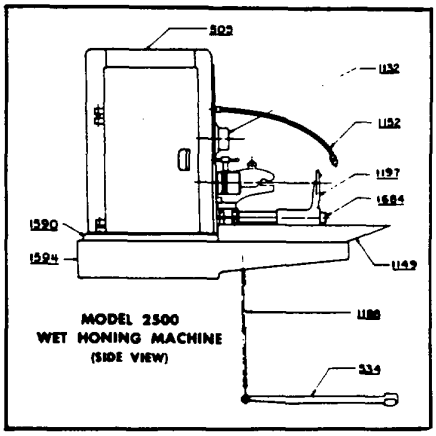
MODEL 2500 WET HONING MACHINE PARTS LIST

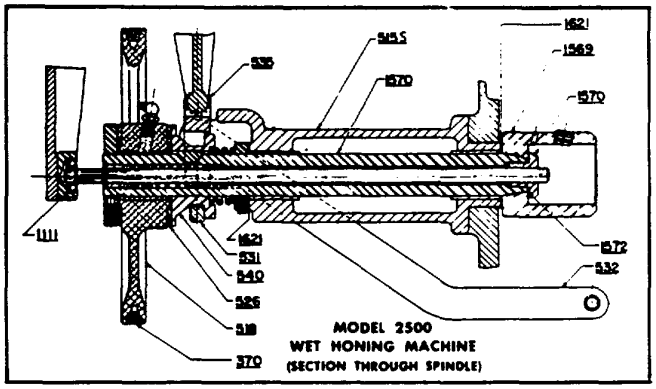
PART NO.	DESCRIPTION
*515-S	Drive Shaft Housing
518	Pulley Assembly
526	Clutch Lining (2 per set)
*1570	Spindle
*1569	Drive Socket
*1571	Screw
*1572	Washer
531	Clutch Yoke
532	Operating Lever
585	Clutch Throw-out Lever
540	Clutch Disc
*1621	Wear Washer (large)
1132	Dial
867	Motor Switch, 10 Amp.
584	Foot Pedal
1188	Clutch Chain (with 2 hooks)
1111	Push Rod-Bearing
2388	Drive Belt
1149	Coolant Base Splash Pan
1152	Flexible Metal Coolant Hose, complete

PART NO.	DESCRIPTION
1181	Coolant Tube
1705	Coolant Pump Assembly (110 Volt, 60 Cycle, 1 Phase)
1813	Coolant Pump Motor (110 Volt, 60 Cycle, 1 Phase)
1197	-Sliding Rod Guide
1679	Bracket (New Style Aluminum)
1684	Support Bar
209	5/16" - 18 x 3/4 lg. Socket Head Cap Screw
1229	Pin Vise Assembly
505-S	Main Housing Assembly
1219-S	Expanding Screw Assembly

If wear is indicated in the Drive Shaft Housing Assembly or Drive Shaft a No. 515-A Drive Shaft Housing Assembly consisting of the parts marked with an * should be ordered. These parts are mated and assembled to close tolerances at the factory.







LONG STONE HONING HEAD PARTS LIST

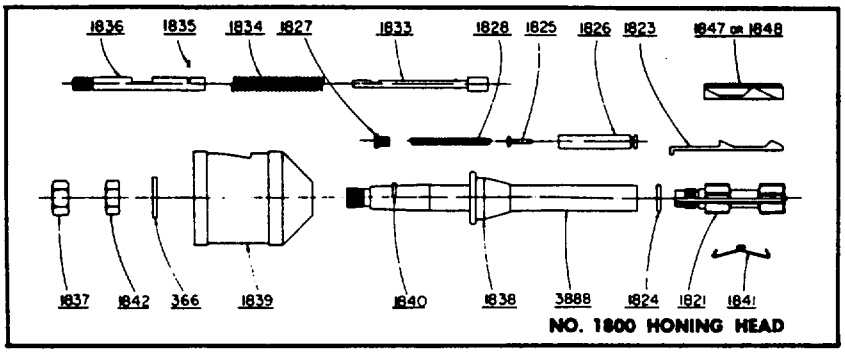
PART No.	DESCRIPTION
7028	Body for No. 7025 Head
7033	Body for No. 7030 Head
7088	Body for No. 7035 Head
7043	Body for No. 7040 Head
7048	Body for No. 7045 Head

The following parts are the same for all of the Long Stone Honing Heads:

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
8781	Grove Pin 1/2" Long	3729	Return Spring
3782	Grove Pin 1" Long	3739	Thrust Block
3728	Load Spring	3744	Expander

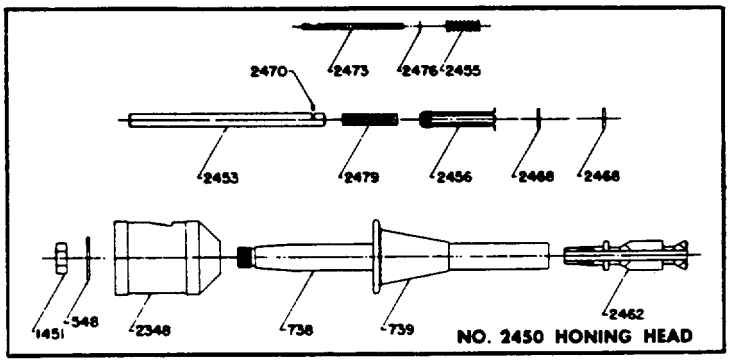
NO, 1800 HONING HEAD PARTS LIST

PART NO,	DESCRIPTION	PART NO,	DESCRIPTION
1823	Expander Blade	1821	Body Assembly
1826	Expander Blade Pusher	1824	Hold Down Washer
1825	Pusher Return Pin	3888	Drive Shank
1828	Expander Blade Return Spring	1838	Centering Cone
1833	Push Rod Assembly	1839	Drive Adaptor
1884	Push Rod Spring	1842	Jam Nut 5/16- 24 NF 2
1885	Drive Shank Woodruff Key	1837	Push Rod Knob
1836	Rear Push Rod	366	1/4 Wrought Iron Washers
1841	Carrier Retaining Spring	1827	Spring Retaining Cap



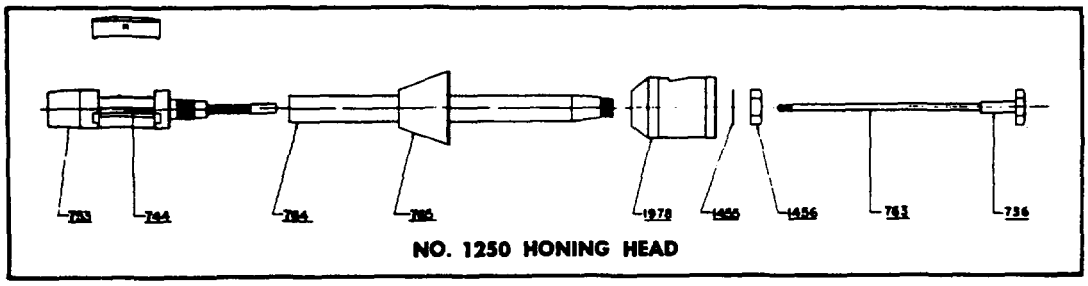
NO. 2450 HONING HEAD PARTS LIST

PART NO.	DESCRIPTON	PART NO,	DESCRIPTION	PART NO.	DESCRIPTION
1451	Nut	2462	Body	2473	Stop Pin
548	Washer	2453	Push Rod	2476	Waldes Clip Type E
2348	Drive Adaptor	2470	Key	2455	Return Spring
738	Drive Shank	2479	Overload Spring	2468	Neoprene Bands
739	Centering Cone	2456	Pusher Finger		



NO. 1250 HONING HEAD PARTS LIST

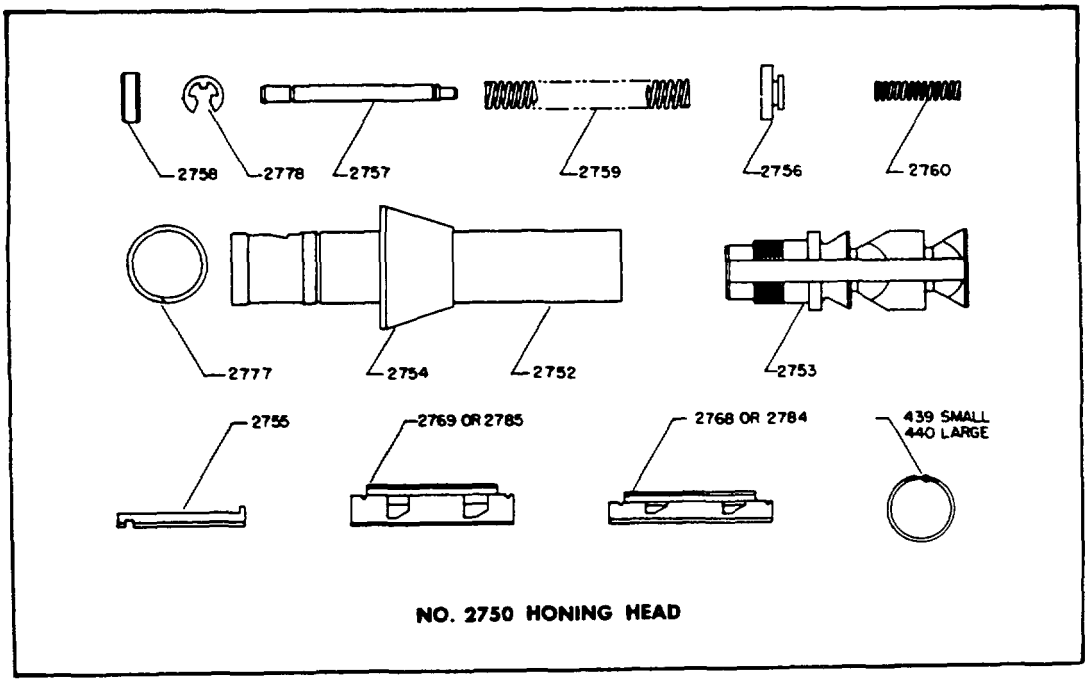
PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
753	Body Assembly	763	Push Rod
764	Drive Shank	1455	Washer
765	Centering Cone	1978	Drive Adaptor
744	Stone Retainer Springs	1456	9/16-18 Jam Nut
736	Push Rod Head		



NO. 1250 HONING HEAD

NO. 2750 HONING HEAD PARTS LIST

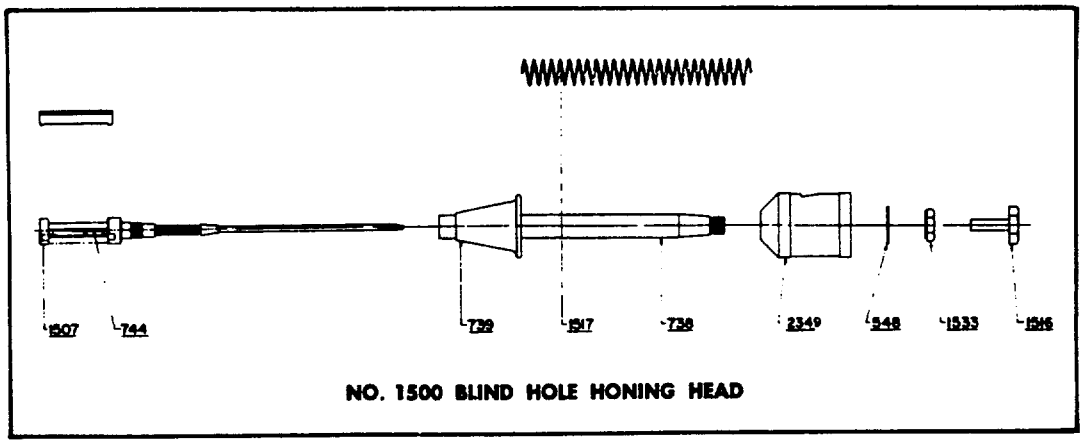
PART NO.	DESCRIPTION	PART NO.	DESCRTION
2760	Pusher Return Spring	2752	Drive Shank
2756	Pusher Finger Bushing	2754	Centering Cone
2759	Overload Spring	2777	Retainer Ring
2757	Expander Rod	2755	Pusher Finger
2778	Retainer Ring	439	Small Range Stone Retainer Springs
2758	Expander Rod Guide	440	Large Range Stone Retainer Springs
2753	Body		



NO. 2750 HONING HEAD

NO. 1500 BLIND HOLE HONING HEAD PARTS LIST

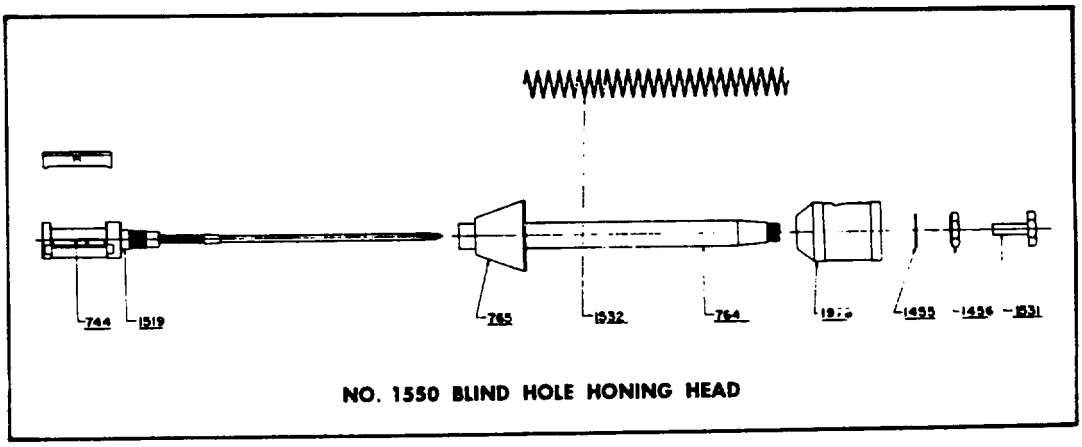
PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
1507	Body Assembly	1533	3/4" Hexagon Nut
788	Drive Shank	1516	Push Rod Head
739	Centering Cone	2349	Drive Adaptor
744	Stone Retainer Springs	1517	Spring
548	Washer		



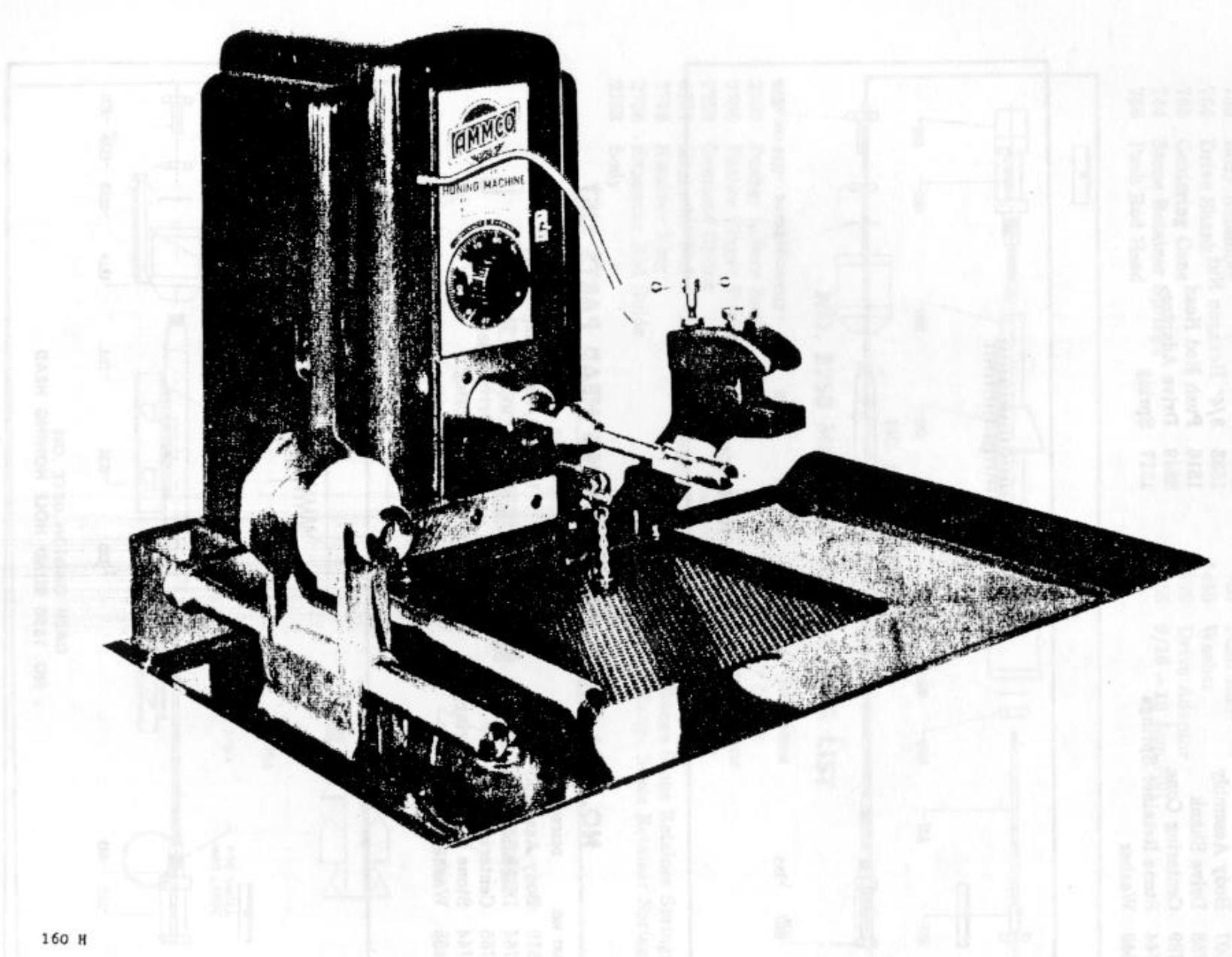
NO. 1500 BLIND HOLE HONING HEAD

NO. 1550 BLIND HOLE HONING HEAD PARTS LIST

PART NO.	DESCRIPTION	PART NO	DESCRIPTION
1519	Body Assembly	1456	9/16" Hexagon Nut
764	Drive Shank	1531	Push Rod Head
765	Centering Cone	1978	Drive Adaptor
744	Stone Retainer Springs	1532	Spring
1455	Washer		



NO. 1550 BLIND HOLE HONING HEAD



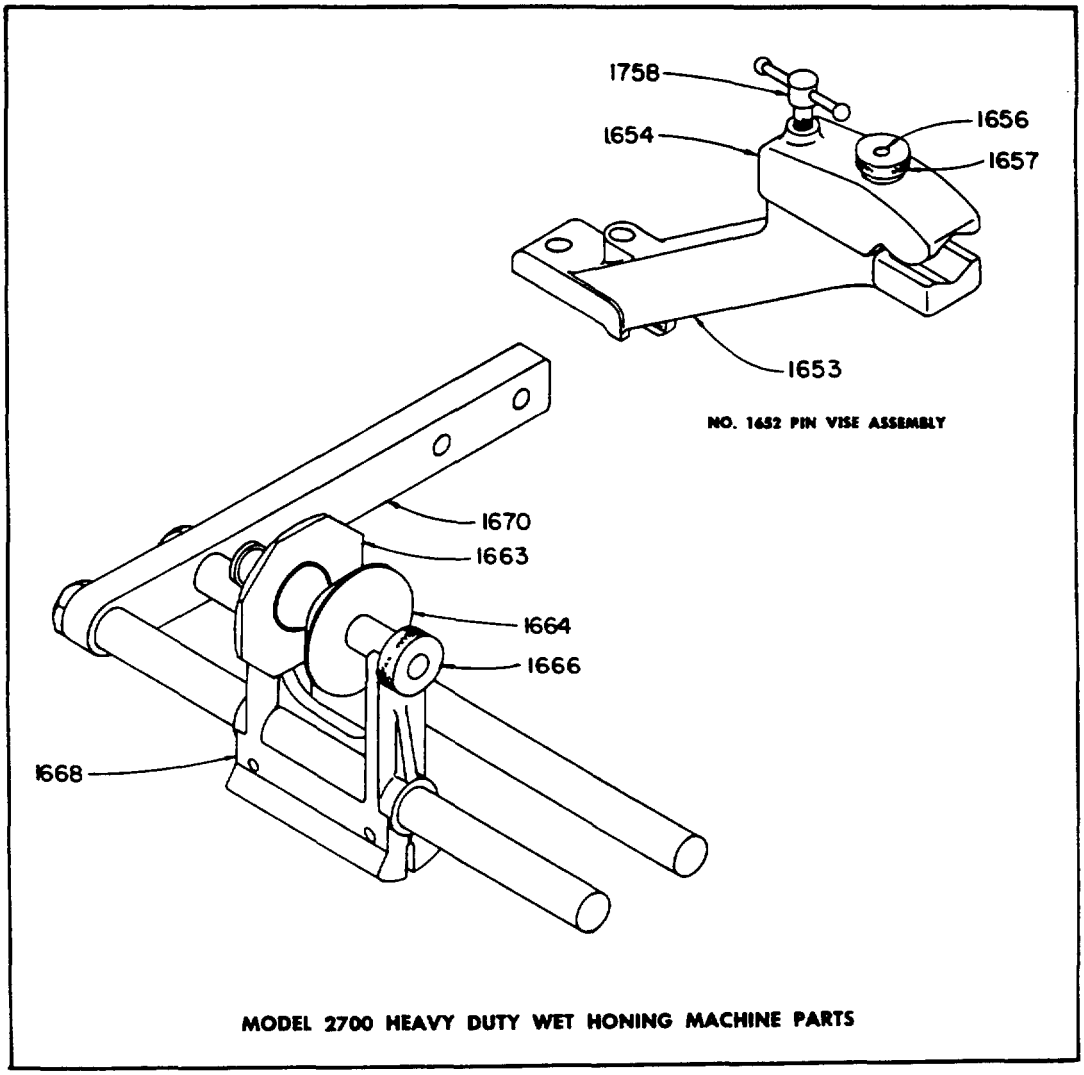
AMMCO MODEL 2700 HEAVY DUTY WET HONING MACHINE

MODEL 2700 HEAVY DUTY WET HONING MACHINE PARTS LIST

Parts and Assemblies that are different from those on Model 2500 Wet Honing Machine.

PART NO	DESCRIPTION
1652	PIN VISE ASSEMBLY
	1 No 1653 Body
	1 No 1654 Top Plate
	1 No 1656 Stud
	1 No 1657 Nut
	1 No 1758 Clamping Screw
1668	ARBOR SUPPORT ASSEMBLY
	COMPLETE WITH-
	2 No 1127 Adjusting Screws
1660	SPLASH PAN

PART NO	DESCRIPTION
1670	SUPPORT ASSEMBLY
	1 No 1662 Support Bar
	2 No 1665 Round Slide Support Bars
	2 No 1205 7/8"- 14 Jam Nuts
	2 No 1206 3/8" - 16 x 1 1/4" Setscrews
1669	CLAMPING ARBOR ASSEMBLY
	1 No 1663 Clamping Arbor
	1 No 1664 Clamping Cone
	1 No 1666 Locking Nut



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AMMCO MODEL 2500 HONING MACHINE

FSN 3419-812-1591 **MIL-H-14253A**

Equipment Consists of

1	2500	Honing Machine with No 1229 Pin Vise; No 1149 Splash Pan; No 1197 Connecting Rod Fixture Assembly; No 1298, 5 Gal Honing Oil; No 2525 Diamond Dresser with No 3229 Diamond Nib.
1	624	Dressing Stick and 1 No 229 - 7/32" Allen Wrench.
2	2166	Manual of Instructions.

Accessories

1	1800	Honing Head, Range .480" to .720".
1	1852	Roughing Stones (Set of 3), Range .480" to .600".
1	1853	Roughing Stones (Set of 3), Range .600" to .720".
1	1938	Finishing Stones (Set of 3), Range .480" to .600".
1	1939	Finishing Stones (Set of 3), Range .600" to .720".
1	2450	Honing Head, Range .720" to 1.125".
1	2485	Roughing Stones (Set of 4), Range .720" to .855".
1	2486	Roughing Stones (Set of 4), Range .855" to .990".
1	2487	Roughing Stones (Set of 4), Range .990" to 1.125".
1	2488	Finishing Stones (Set of 4), Range .720" to .855".
1	2489	Finishing Stones (Set of 4), Range .855" to .990".
1	2490	Finishing Stones (Set of 4), Range .990" to 1.125".
1	Set of 2 No 2468 Retaining Bands included in No 1550 and No 2450 Stone Sets.	
1	1550	Honing Head, Range 1.125" to 2.062".
1	1539	Roughing Stones (Set of 3), Range 1.125" to 1.437"
1	1540	Roughing Stones (Set of 3), Range 1.437" to 1.750"
1	1541	Roughing Stones (Set of 3), Range 1.750" to 2.062"
1	1542	Finishing Stones (Set of 3), Range 1.125" to 1.437"
1	1543	Finishing Stones (Set of 3), Range 1.437" to 1.750"
1	1544	Finishing Stones (Set of 3), Range 1.750" to 2.062"
1	2750	Honing Head, Range 2.062" to 3.000".
1	2768	Roughing Stones (Set of 4), Range 2.062" to 2.500"
1	2769	Roughing Stones (Set of 4), Range 2.500" to 3.000"
1	2784	Finishing Stones (Set of 4), Range 2.062" to 2.500"
1	2785	Finishing Stones (Set of 4), Range 2.500" to 3.000"
1	Set of 2 No 439.Small Range Retaining Bands included in No 2768 and No. 2784 Stone Sets.	
1	Set of 2 No 440Large Range Retaining Bands included in No 2769 and No. 2785 Stone Sets.	

Spare Parts

1	Set each of Stone Sets as listed above.
1	SP-2338 "V" Belt Gates No 2390.

INSTRUCTIONS FOR REQUISITIONING PARTS NOT IDENTIFIED BY FSN

When Requisitioning parts not identified by Federal Stock Number, it is mandatory that the following information be furnished the supply officer:

1. Manufacturer's Federal Supply Code Number. (03297)

2. Manufacturer's Part Number exactly as listed herein.

3. Nomenclature exactly as listed herein, including dimensions if necessary.

4. Manufacturer's Model Number (2500).

5. Manufacturer's Serial Number (_____).

6. Any other information such as type, frame number, and electrical characteristics, if applicable.

7. If DD Form 1348 is used, fill in all blocks except 4, 5, 6, and Remarks field in accordance with AR 72550. Complete form as follows:

    a. In blocks 4, 5, and 6, list manufacturer's Federal Supply Code Number (03297) followed by a colon and manufacturer's Part Number for the repair part.

    b. Complete Remarks field as follows:

    Noun: (Nomenclature of repair part).

    For: (3419-812-1591).

    Mfr: (AMMCO TOOLS, INC.).

    Model: (2500)

    Serial No.: (_____).

    (Any other pertinent information such as frame number, type, dimensions, etc.)

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *24, MAY 1965*

TM 9-3419-225-10 is published for the information and use of all concerned,

Distribution:

Active Army:

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Ft Monmouth (3)
USAECFB (2)
APG (1)
USA Elct PG (1)
Units org under fol TOE:
5-278 (2)
11-58 (2)

NG: None.
USAR: None.
For explanation of abbreviations used, see AR 320-50

U.S. GOVERNMENT PRINTING OFFICE: 1995 - 165-132

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DATE SENT

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IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER	SIGN HERE:

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ▸ ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

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