

TM 9-4910-436-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S MANUAL

**GRINDING KIT, VALVE SEAT,
ELECTRIC, CONCENTRIC DRIVE, 7500 RPM RATED NO LOAD SPEED,
115-VOLT, AC/DC, SHIELDED TO PREVENT RADIO INTERFERENCE
(ALBERTSON AND CO. MODEL 1712-S) (4910-473-6437)**



HEADQUARTERS, DEPARTMENT OF THE ARMY
16 DECEMBER 1964

TM 9-4910-436-10

Change No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 20 February 1973

**Operator's Manual
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RATED NO LOAD SPEED, 115-VOLT,
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RADIO INTERFERENCE
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This change is current as of 13 November 1972.

TM 9-4910-436-10, 16 December 1964, 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 (Albertson and Co. Model 1712-S).

| Part | Part No |
|--|----------------------------|
| ADAPTER, CONNECTOR: plastic dielectric, 2 fl parallel male contacts and grounding lead w/term, one end. 2 fl parallel and 1 U female contact other end, ac/dc, 125-V, 15 amp (74545:5273L) | 74545:5273L |
| CASE, CARRYING GRINDING KIT: INDICATOR DIAL: 1-11/16 rd dial face, graduations 0 to 100 in. 0.001 in increments, range 0 to 0.125 in | 00988:1757-SP 00988:266 |
| NIB, DIAMOND, WHEEL, DRESSING: 1-1/8 lg o/a, 5/8 dia knurled end, 5/16-24 NF thd | 00988:23174 |
| PILOT, VALVE SEAT REFACING expanding type, 0.375 in dia upper end | |
| 1/4 size, 1 1/4 lg lower end, 2-3/8 lg upper end | 00988:EP-250 |
| 9/32 size, 2 3/8 lg lower end, 2-3/8 lg upper end | 00988:EP-281 |
| 5/16 size, 2-7/8 lg lower end, 2-5/8 lg upper end | 00988:EP-312 |
| 11/32 size, 2-7/8 lg lower end, 1-7/8 lg upper end | 00988: EP-343 |
| 3/8 size, lg lower end, 3 lg upper end | 00988:EP-375 |
| 13/32 size, 3-1/4 lower end, 3 lg upper end | 00988:EP-406 |
| 7/16 size, 3-1/2 lg lower end, 3 lg upper end | 00988:EP-437 |
| 1/2 size, 3 1/2 lg lower end, 3 lg upper end | 00988:EP-500 |
| 9/16 size, 3 1/2 lg lower end, 3 lg upper end | 00988:EP-562 |
| 5/8 size, 3 1/2 lg lower end, 2-7/8 lg upper end | 00988:EP-625 |
| PILOT, VALVE SEAT GRINDING: solid type, 1-1/32 size, 1-1/2 lg lower end, 3 lg upper end | 00988: SP103125 |
| SHAFT ASSEMBLY, METAL: coupling, flex. 1/4 shk to fit 1/4 in. drill and 5/8 hex plug to fit stone sleeve, socket | 00988:22916FSDS |
| SLEEVE, STONE HOLDING: spline socket, ball brg, 11/16-16 thd for No. 2 hole stones | 00988:1702-BBS |
| WHEEL, ABRASIVE: valve seat grinding | |
| 15 deg angle, 1 1/2 od, for hard S and stellite | 07249:14107 |
| 15 deg angle, 1-5/8 od, for hard S and stellite | 07429:14108 |
| 15 deg angle, 1-3/4 od, for hard S and stellite | 07429:14109 |
| 15 deg angle, 2 od, for hard S and stellite | 07429:14111 |
| 15 deg angle, 2-1/4 od, for S and stellite | 07429:14113 |

| Part | Part No. |
|--|-------------|
| WHEEL, ABRASIVE: valve seat grinding - Continued | |
| 15 deg angle, 2-1/2 od, for hard S and stellite | 07429:14114 |
| 15 deg angle, 2-3/4 od, for hard S and stellite | 07429:14271 |
| 15 deg angle, 3 od, for hard S and stellite | 07429:14273 |
| 30 deg angle, 1-1/2 od, for CI | 07429:14198 |
| 30 deg angle, 1-1/2 od, for fin. | 07429:14370 |
| 30 deg angle, 1-1/2 od, for hard S and stellite | 07429:14219 |
| 30 deg angle, 1-5/8 od, for CI | 07429:14199 |
| 30 deg angle, 1-5/8 od, for fin. | 07429:14371 |
| 30 deg angle, 1-5/8 od for hard S and stellite | 07429:14287 |
| 30 deg angle, 1-3/4 od, for CI | 07429:14090 |
| 30 deg angle, 1-3/4 od for fin. | 07429:14372 |
| 30 deg angle, 1-3/4 od, for hard S and stellite | 07429:14105 |
| 30 deg angle, 2 od, for CI | 07429:14091 |
| 30 deg angle, 2 od, for fin | 07429:14374 |
| 30 deg angle, 2 od, for hard S and stellite | 07429:14106 |
| 30 deg angle, 2-1/4 od, for CI | 07429:14279 |
| 30 deg angle, 2-1/4 od, for fin. | 07429:14376 |
| 30 deg angle, 2-1/4 od, for hard S and stellite | 07429:14290 |
| 45 deg angle, 1-1/4 od, for CI (07429:14216) | 07429:14216 |
| 45 deg angle, 1-1/4 od, for fin. | 07429:14414 |
| 45 deg angle, 1-1/4 od, for hard S and stellite | 07429:14217 |
| 45 deg angle, 1-1/4 od, for CI (tapd to 3/4 in). | 07429:27117 |
| 45 deg angle, 1-1/4 od, for fin. (tapd to 3/4 in.) | 07429:27118 |
| 45 deg angle, 1-1/4 od, for hard S and stellite (tapd to 3/4 in) | 07424:27116 |
| 45 deg angle, 1-3/8 od, for CI | 07429:18541 |
| 45 deg angle, 1-3/8 od, for fin | 07429:18542 |
| 45 deg angle, 1-3/8 od, for hard S and stellite | 07429:18540 |
| 45 deg angle, 1-1/2 od, for CI | 07429:14084 |
| 45 deg angle, 1-1/2 od, for fin. | 07429:14382 |
| 45 deg angle, 1-1/2 od, for hard S and stellite | 07429:14056 |
| 45 deg angle, 1-5/8 od, for CI | 07429:14063 |
| 45 deg angle, 1-5/8 od, for fin. | 07429:14383 |
| 45 deg angle, 1-5/8 od, for hard S and stellite | 07429:14100 |
| 45 deg angle, 1-3/4 od, for CI | 07429:14085 |
| 45 deg angle, 1-3/4 od, for fin. | 07429:14384 |
| 45 deg angle, 1-3/4 od, for hard S and stellite | 07429:14049 |
| 45 deg angle, 2 od, for CI | 07429:14064 |
| 45 deg angle, 2 od, for fin. | 07429:14386 |
| 45 deg angle, 2 od, for hard S and stellite | 07429:14102 |

| Part | Part No. |
|--|-------------|
| WHEEL, ABRASIVE: valve seat grinding — Continued | |
| 45 deg angle, 2-1/4 od, for CI | 07429:14088 |
| 45 deg angle, 2-1/4 od, for fin | 07429:14388 |
| 45 deg angle, 2-1/4 od, for hard S and stellite | 07429:14104 |
| 45 deg angle, 2-1/2 od, for CI | 07429:14089 |
| 45 deg angle, 2-1/2 od, for fin. | 07429:14389 |
| 45 deg angle, 2-1/2 od, for hard S and stellite | 07429:14050 |
| 45 deg angle, 2-3/4 of, for CI | 07429:14153 |

| Part | Part No. |
|--|--------------|
| WHEEL, ABRASIVE: valve seat grinding — Continued | |
| 45 deg angle, 2-3/4 od, for fin. | 07429:14391 |
| 45 deg angle, 2-3/4 od, for hard S and stellite | 07429:14200 |
| 45 deg angle, 3 od, for CI | 07429:14154 |
| 45 deg angle, 3 od, for fin. | 07429:14393 |
| 45 deg angle, 3 od, for hard S and stellite | 07429:14243 |
| WRENCH, PILOT INSERTING AND REMOVING: 3/16 shk, 3 lg o/a | 00988:PW-187 |

Pages 15 through 18, Section II, APPENDIX, is rescinded in its entirety.

By Order of the Secretary of the Army

CREIGHTON W. ABRAMS

*General, United States Army
Chief of Staff*

Official:

VERNE L. BOWERS

*Major General, United States Army
The Adjutant General*

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 9-65 11-157
 9-66 11-158
 9-127 17
 9-197 29-51
 9-217 29-55
 9-237 29-56
 9-357 29-57
 9-500 (CA,CC,CD)
 10-348

NG: State AG (3)

UASR: Units same as Army, except allowance is on (1) copy for each unit.

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

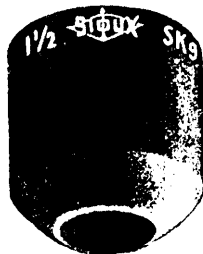
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Valve Seat Grinding Instructions

To properly grind valve seats it must be understood that two factors are to be taken into consideration: correct driver speed and the correct grade grinding wheel for driver speed and material to be ground.

Below is chart showing Sioux Drivers by catalog number and allowable diameter wheels for each driver to allow for grinding not over approximately 6500 surface feet per minute.

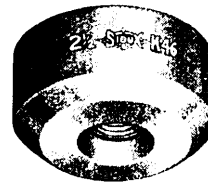
SPECIFICATIONS ON VALVE GRINDING DRIVERS



SK-Type Grinding Wheel - made up to 1 1/2" Diameter

| Unit No. | No. Load Speed | Angle of Drive* | Diameter Capacity |
|----------|----------------|-----------------|----------------------|
| 1700 | 12,000 | Straight | Wheels Up to 2" |
| 1705 | 8,000 | Straight | Wheels Up to 3" |
| 1710 | 12,000 | 15° | Wheels Up to 2" |
| 1712 | 8,000 | 15° | Wheels Up to 3" |
| 1770 | 4,000 | Straight | Wheels, Up to 6 1/4" |
| 1770A | 6,000 | Straight | Wheels Up to 4 1/4" |

*Degrees Given Are from Horizontal
Grinding Wheels Not to be Operated Above 6500 S.F.P.M.

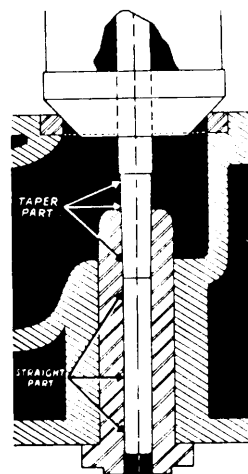


K-Type Grinding Wheel - up to 6 1/4" Diameter

GRINDING VALVE SEATS

1. See that valve guides are clean. Use suitable guide cleaner or reamer for this purpose.
2. Select pilot of correct size for guide hole. Place a drop of oil on pilot stem before inserting.
Top of pilot should be of length to allow a minimum of 2 1/2 inches to fit into holder.
SIoux Tapered Pilots are very accurate and are made up to .004 oversize. They also serve as plug guages for checking the wear in guides. If the .004 oversize pilot is loose, then new guides should be installed.
Sioux Tapered Solid Pilots are the most accurate centering device made. Often for ease in handling, customers prefer Expanding Pilots. Sioux Expanding Pilots, while very good, are not as accurate as the Solid Tapered Pilots, and should not be used when extreme accuracy is desired or required.
3. The seat must be clean and dry to prevent carbon from clogging the grinding wheel as this will slow up the grinding and require unnecessary dressing.

Wipe with a clean, dry cloth. Use a piece of abrasive cloth under one side of the wheel and turn the holder around several turns by hand and clean the carbon off the seats thoroughly.



By selecting largest Sioux Tapered Pilot which will enter valve guide, straight part aligns pilot correctly with center line of valve guide, assuring perfect accuracy.

4. Select grinding wheel of proper size and type.

FOR STEEL use a "K" roughing wheel for fast cutting and a "K" finishing wheel for finishing.

FOR CAST IRON MOTOR BLOCK SEATS use the "K" finishing wheel only, a roughing wheel is not needed.

Be sure grinding wheel is properly dressed. See Paragraph Nos. 12 and 13.

- .5. Screw wheel on holder.

In case of large wheels with 1" smooth center holes these may be used with regular No. 1703-BB Holder by using No. 1703-7 Flange. (Fig. 1)

INO. 3 hole grinding wheels may be used with No. 1702-BB Holder by using our No. 47 Reducing Bushing. (Fig 2 and 3.)

6. Be sure top of pilot has a drop of oil on it to eliminate friction.

Place holder over pilot. On large valves above 2 1/2" in diameter, the use of lifting springs is recommended. (Fig. 4.)

7. We suggest covering the top of motor with a cloth to prevent the grinding dust from getting into the motor.

8. A safety guard easily improvised from section of radiator hose, with oil applied on inside surface aids in catching abrasive and at the same time acts as safety guard. (Fig. 5)

Do not get oil on grinding wheel.

9. Select driver of recommended speed for the size of grinding wheel (page 1).

10. Insert driver spindle in holder. (Fig. 7.)

11. No pressure is required when grinding. Do not slow down the driver. Support the weight and let it run at high speed.

NOTICE: When grinding, sway the top of the driver gently from side to side (about 1/4" off center to each side), and note the "Dual Action" cutting ability, grinding speed and finish. Do not use pressure when grinding—let the wheel do the cutting.

Some valve seat material will grind slower than others, Frequent dressing of the wheels is essential for fast, accurate grinding, particularly on valve seats that are very hard and tough to grind.

12. Cars with rear cylinder against the dash often present a problem. To overcome this trouble use Short Holders (No. 1672-BB) and Short Pilots. You must also have No. 1718-C Short Pilot for dressing tool. See Set No. 1763-BB in catalog as auxiliary set.

No. 1710 Drivers with serial numbers over 600,000 have a 15° angle and with Short Holders and Pilots should get into the closest places. Some mechanics put a dent in cowl, or slide engine forward to overcome this trouble when an emergency arises,

Fig. 1

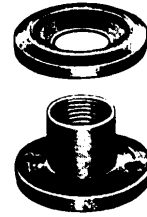


Fig. 2

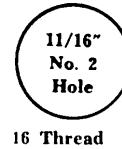


Fig. 3

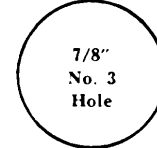
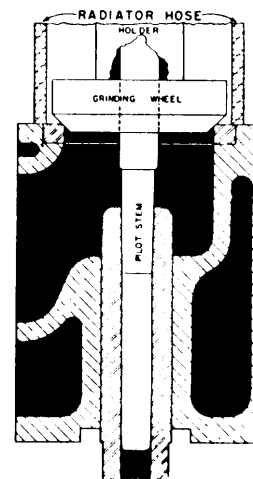


Fig. 4



Place the lifting spring on pilot and bring the wheel up speed before grinding.

Fig. 5



Many of these cars have engine set so close to fire wall that even with short pilots, short holder and our latest 15 degree, No. 1710 Driver, there is still not sufficient clearance to grind the last valve seat.

Dress off face of grinding wheel. This will lower 1/8 of an inch so enough additional clearance will be given that the job can be performed. (Fig. 6)

GRINDING STELLITE VALVE SEATS--do not confuse grinding Stellite with other kinds of valve seats. As the grinding wheels dull and will not cut after about one minute of actual grinding time. Therefore, the wheel should be dressed frequently. For faster grinding on hard seats, more the diamond across the wheel faster than usual and dress the wheel rough and sharp for maximum cutting. It usually requires about four (4) dressings of the roughing wheel to grind the seat inside of .001 and the finishing wheel should be dressed once for each seat.

Use "K" Grinding Wheel suffixed by WS which are the sharpest and best cutting wheels for Stellite. Much time can be saved if the operator knows just how long to grind before dressing the wheel. Grind about one full minute of continuous grinding, then dress the wheel, and keep on with this system until the seat is trued up, then use the finishing wheel which should be dressed once for each Stellite seat.

The average time is ten minutes, or one hour for all six Stellite exhaust seats. There will be no spark when grinding Stellite.

Your customer should be charged more for grinding Stellite Seats. There are many kinds of steel. A grinding wheel that grinds one material at a given speed perfectly may, not perform as well on other materials.

13. Wheel Dressing No. 1713B and 1719 (see paragraph 15 for No. 1772 Heavy Duty Dresser).

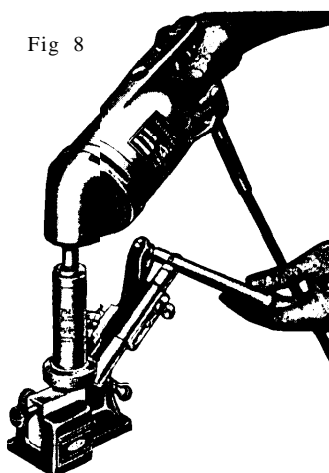
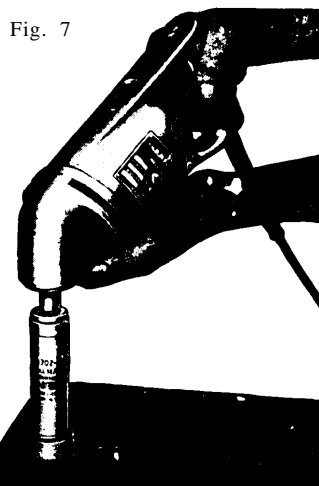
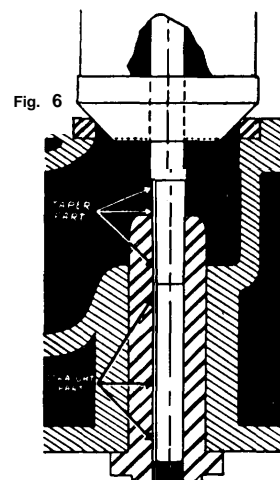
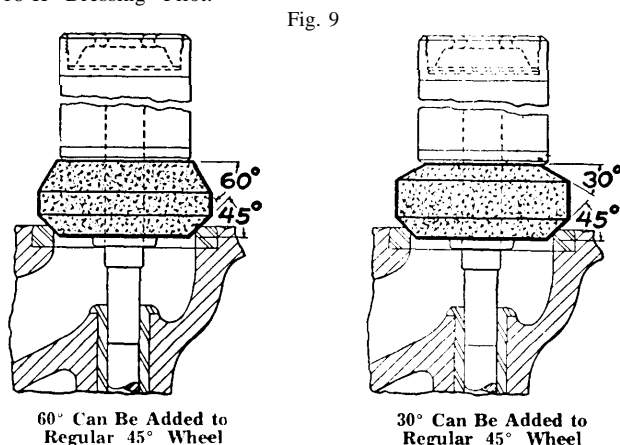
Set degree mark on dressing tool at desired angle.

Ball Bearing Holder or Sleeve Bearing Holder. Put a little very light oil on the dressing pilot to prevent sticking and eliminate friction. The adjusting block and pilot which raise and lower the grinding wheel are adjusted until the wheel just touches the diamond, holder and grinding wheel are then revolved with the high speed driver. Hold the driver straight as possible, Take light cuts with the diamond and move the diamond steadily across the wheel. The Diamond Holder is threaded for light cut adjustments. (Fig. 8)

Grinding wheels should be properly dressed. "Important"-Do not get oil on the grinding wheels, they must be kept clean to obtain the best results for fast grinding, accuracy, and finish.

For emergency cases the wheels can also be dressed down on the diameter. (Fig. 9)

NOTE: No. 1751—No. 1 Hole Holder for very small valve requires 1718-H Dressing Pilot.



14. **The correct method of using "Sioux Valve Seat Indicator".** Adjust the indicator over the pilot with sufficient pressure to move the gauge hand about half a turn. (Fig. 10.)

Set the dial at zero and rotate the "Valve Seat Indicator" slowly.

15. **Special Instructions for No. 1772 Dressing Tool.** (Fig 11 and 12.)

A-Set Pilot height to approximately 1 1/8" ("A" on sketch) above shoulder by adjusting screw "B".

B-Place holder with proper diameter grinding wheel on pilot.

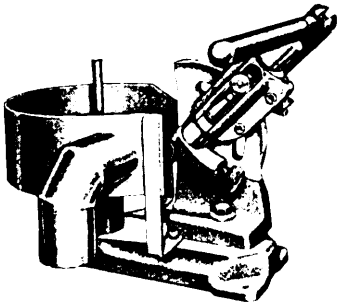
C-Place dressing tool in or out, according to diameter of grinding wheel used, by screw "C"

D-Place driver in fork.

F-Adjust column height by set screw "D" so that the weight of the driver in the dressing position will be carried by the Hexagon spindle resting in the grinding wheel holder.

F-Adjust for position so (enter line of hexagon spindle is in line with center line of holder, by screws "D" and "E".

16. **No. 1719 Dressing Tool is similar to No. 1772** so far as dressing of wheel.



No. 1719

Heavily built for extreme accuracy and ideal for production service, Capacity up to 6 In. Designed with complete adjustments for dressing ALL SIZES of Sioux valve seat grinding wheels, including angles from zero to 90° with degree synchronizing adjustments for perfectly accurate finish on valve seats, Equipped with Hex Diamond.

Fig. 10

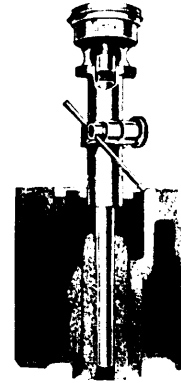


Fig. 11

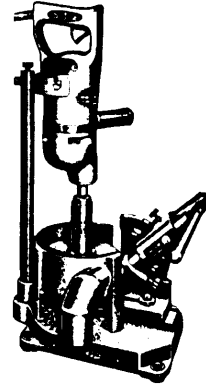
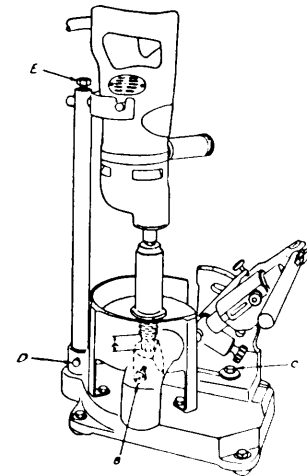
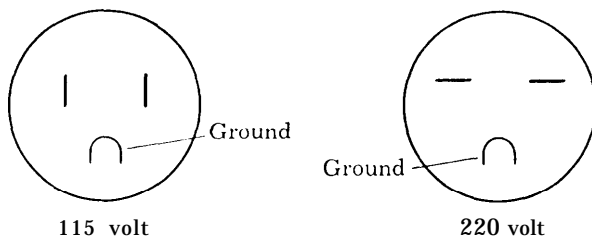


Fig. 12



General Information, Instruction and Care

PLUGS ON ELECTRIC TOOLS



115 volt

220 volt

115 Volt and 220 Volt Plugs Are Different

Since January 1, 1955, all electric tools shipped by us, in order to comply with the National

EQUIPPED with three prong plugs.

Adaptors which should be grounded to outlet are supplied with each electric tool so units may fit old style outlets.

The 115 Volt plug will fit present outlets with the exception of ground prong.

FOR YOUR PROTECTION AN ELECTRIC TOOL SHOULD ALWAYS BE GROUNDED IN ORDER TO PROTECT THE OPERATOR AGAINST ELECTRIC SHOCK. DO NOT USE IN WET PLACES.

The green color conductor is the ground wire and is attached to the frame inside the tool, and extends through the side of the adaptor plug on models prior to 1955. To ground the tool, this "green" ground wire must be connected to a permanent ground such as a grounded supply system, a water pipe or conduct which is properly grounded.

EXTENSION CORD

To avoid low voltage use No. 1254—25-ft. Heavy Duty No. 16 wire Extension Cord.

Never use a light, long extension cord, as the drop in voltage will affect the operation of the tool, and may cause motor failure.

MOTOR

Universal type motors will operate only on the voltage for which they are designed, as shown on the name plate. A 115 volt Universal motor will operate on either A.C. or D.C. 115 volt current, 60 cycle or less. Use unit of correct voltage for power supply.

Motors are air-cooled. Keep ventilating system clear, dust and dirt should be removed from the tool by blowing out with compressed air, applied through the ventilation slots on the brush end of the motor, with the tool running. Do not use air with excessive moisture. Under no conditions, close air vents.

OVERLOADING

Do not overload electric tools. A margin of safety is built into the tools to insure efficient operation and long life at rated capacity, and to take care of accidental or emergency overloads. Continuous overloading will result in serious and expensive damage.

Avoid turning the tool on or off under load, as this may cause serious damage to the switch.

LUBRICATION

All closed type grease-sealed ball bearings are "permanently lubricated" and have sufficient lubricant packed in them at the factory to last the life of the bearing. Never wash a sealed bearing in solvent.

All tools are properly lubricated before leaving the factory, and under normal, regular use this lubrication will last until the tool requires servicing, at which time the old grease must be washed from gear case, gears and open bearings with gasoline or kerosene before refilling with fresh lubricant.

Never fill gear case more than one-half full; too much grease is as bad as too little. Grease expands when warm, and the excess will be forced through the bearings into the motor, damaging the windings and clogging the ventilation slots. Use only the quantity and type specified.

Tools used constantly on production or other heavy-duty jobs will require periodic inspection and relubrication at intervals, depending on the use of the tool.

Long life depends upon good lubrication. Tools out of service for long periods should be cleaned and lubricated before being put to work.

Parts List for No. 1712 & 1712-S Sioux Heavy Duty Driver

For Serial Number 25001 and Up

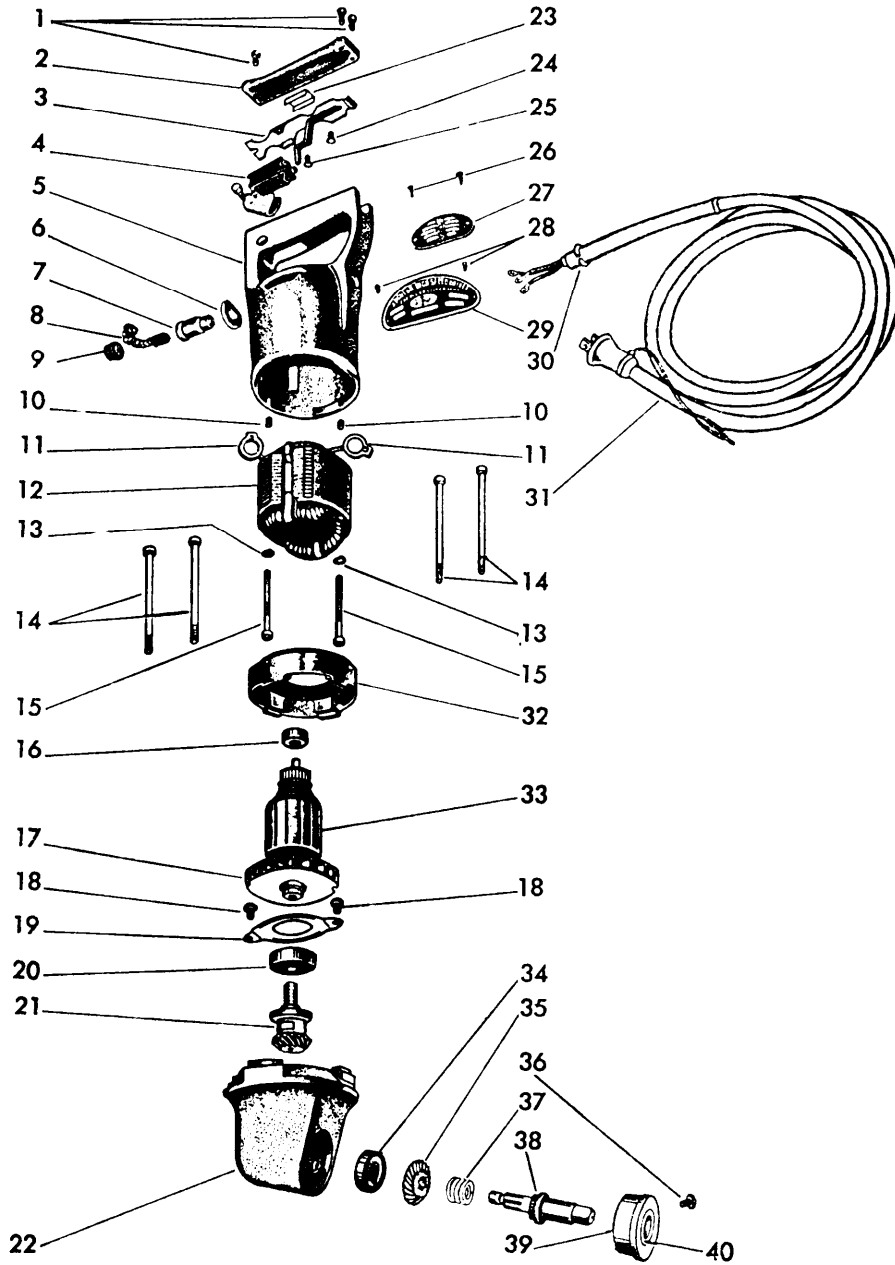


Figure 13.

Parts List for No. 1712 & 1712-S Sioux Heavy Duty Driver

For Serial Number 25001 and Up

| Part No. | Name | Part No. | Name |
|----------|---|----------|---|
| 1 | 06577 Screw—#8 (3) | 26 | 06093 Screw—#4 (4) |
| 2 | 12007 Cover—Handle | 27 | 23000 Cover—Inspection (2) |
| 3 | 23276 Bracket—Switch | 28 | 09954 Screw—#0 (2) |
| 4 | 18152 Switch | 29 | 20057 Plate—Name (1712-S) |
| 5 | 12102 Housing | | 20231 Plate—Name (1712) |
| 6 | 14602 Washer—Insulation (2) | 30 | 21456 Ring—Clinch |
| 7 | 18051 Holder—Brush (2) | 31 | 18573 Cord—Electric, with Terminals |
| 8 | 18004 Brush—Motor (Pair) | | 14266 Protector—Cord |
| 9 | 18101 Cap—Brush Holder (2) | | 18713 Plug—Attachment |
| 10 | 07000 Screw—#10 (2) | 32 | 12063 Extension—Housing |
| 11 | 21329 Brush Holder Spring (2) | 33 | 16520 Armature—With Fan |
| 12 | 17013 Field—Motor with Brush Holder Rings | | 16774 Armature—With Fan and Bearings |
| | 34228 Spacer—Field (2) | 34 | 10113 Bearing—Ball |
| 13 | 09724 Washer—Lock #10 (2) | 35 | 19705 Assembly—Pinion & Gear (Ser. 25001 to 32891) |
| 14 | 07126 Screw—#10 (4) | | 19058 Gear—Spiral Bevel (Ser. 32901 & up) |
| 15 | 07137 Screw—#10 (2) | 36 | 08279 Screw—1/4" |
| 16 | 10106 Bearing—Ball | 37 | 21214 Spring—Tension |
| 17 | 21586 Fan | 38 | 22540 Spindle—Tool (1712) |
| 18 | 07204 Screw—#10 (2) | | 22916 Spindle—Tool (1712-S) |
| 19 | 25027 Plate—Bearing Lock | 39 | 23259 Bearing Support—Complete (1712) |
| 20 | 10127 Bearing—Ball | | 23694 Bearing Support—Complete (1712-S) |
| 21 | 19705 Assembly—Pinion & Gear (Ser. 25001 to 32891) | 40 | 10362 Bearing—Tool Spindle (1712) |
| | 19607 Pinion—Complete | | 10388 Bearing—Tool Spindle (1712-S) |
| | 24440 Slinger—Grease | | 18756 Adaptor |
| 22 | 12002 Case—Gear | | |
| 23 | 14821 Strip—Insulation | | |
| 24 | 06224 Screw—#6 | | |
| 25 | 06076 Screw—#4 | | |

Figure 13 -- Continued.

Parts Price List for Nos. 1713A & 1713B
Sioux DRESSING TOOL

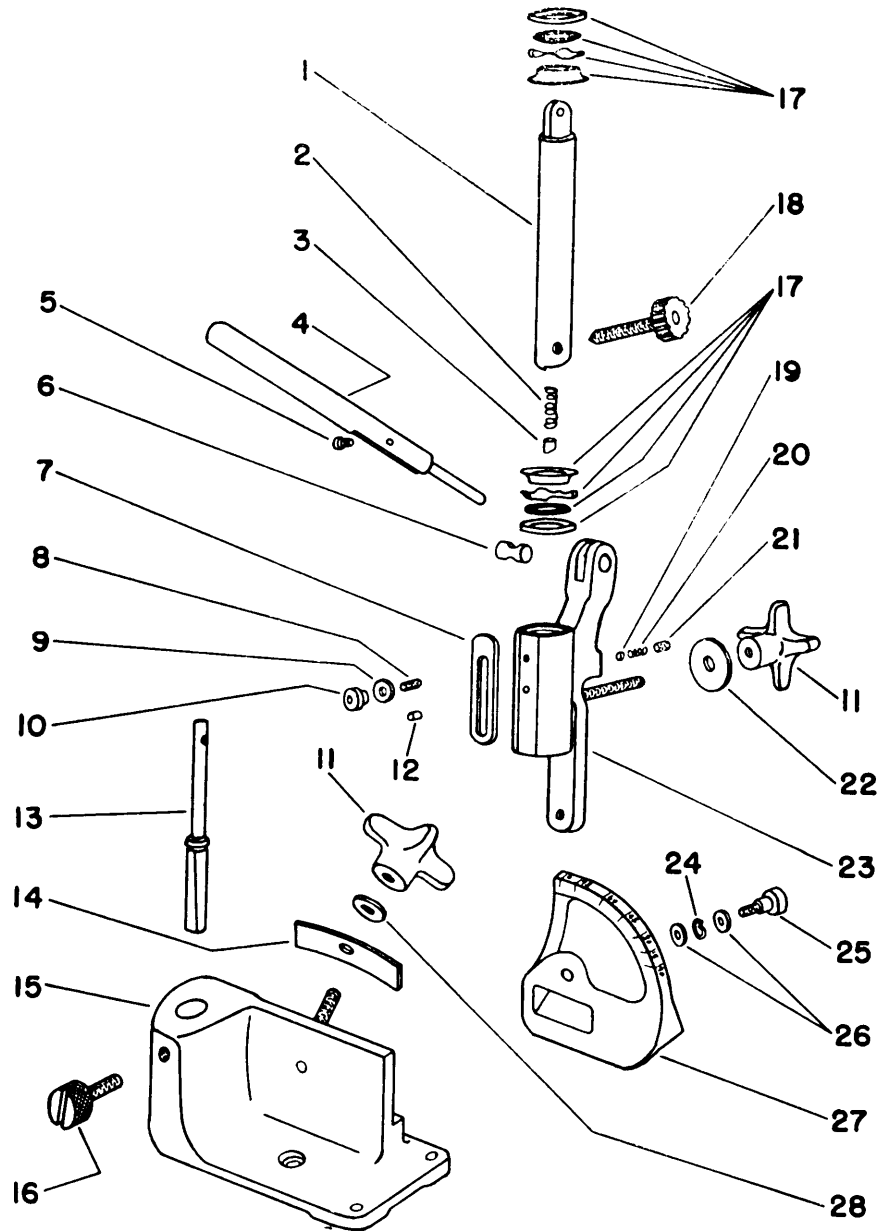


Figure 14.

SIOUX DRESSING TOOL

| Part No. | Name | Price Each |
|-------------|--|---------------|
| 1 | 24647 Bar—Slide | \$2.60 |
| 2 | 21280 Spring—Tension | .15 |
| 3 | 13092 Slug—Brass | .35 |
| 4 | 23435 Handle—Dressing | 1.80 |
| 5 | 24651 Screw—Handle | .20 |
| 6 | 24650 Pin—Swivel | .45 |
| 7 | 25634 Stop—Depth Adjustment | .35 |
| 8 | 24926 Stud | .15 |
| 9 | 25069 Washer | .05 |
| 10 | 24917 Nut—Knurled | .35 |
| 11 | 11351 Knob (2) | .70 |
| 12 | 24925 Pin—Guide | .20 |
| 13 | 27506 Pilot—Dressing | 2.50 |
| 14 | 21368 Spring—Leaf | .15 |
| 15 | 33311 Base (1713A) | 5.05 |
| | 33708 Base (1713B) | 5.35 |
| 16 | 24931 Screw—Lock | .85 |
| 17 | 30258 Seal—Oil (2) | .95 |
| 18 | 23174 Diamond—Dressing | 8.00 |
| 19 | 13052 Slug—Brass | .05 |
| 20 | 21324 Spring | .05 |
| 21 | 08021 Screw— $\frac{1}{4}$ " | .15 |
| 22 | 25958 Washer | .10 |
| 23 | 33310 Ass'm.—Slide Casting | 7.50 |
| 24 | 09770 Washer—Lock $\frac{5}{16}$ " | .05 |
| 25 | 08103 Screw—Pilot | .25 |
| 26 | 25549 Washer (2) | .05 |
| 27 | 11343 Quadrant (1713A) | 4.20 |
| | 11367 Quadrant (1713B) | 5.00 |
| 28 | 25127 Washer | .05 |
| | 20241 Plate—Name (1713A) | .55 |
| | 20285 Plate—Name (1713B) | .55 |
| | 09954 Screw—Drive (2) | .05 |

Figure 14 - Continued.

MOTOR BRUSHES

Brushes should be inspected frequently, kept free from dirt and dust, and should always operate freely in their guides without sticking and with proper spring tension. Worn brushes should be immediately replaced. Do not allow the brushes to wear shorter than 1/4 inch, as they may turn in the brush holder and ruin the commutator.

Always inspect the commutator when installing new brushes and be sure to use the correct brush for each tool.

FAILURE TO OPERATE

May be due to any of the following causes:

1. Supply line dead-check for blown fuses, or broken cord.
2. Receptacle and plug not making good contact-check for bent prongs and loose connections.
3. Brushes must be in contact with commutator-check for dirt or dust between commutator and brushes.
4. If after checking as above, unit does not operate properly, send to nearest authorized service station or to factory for repairs.

Don't drag a portable electric unit around by the cable. Keep cable off the floor and out of oil and grease, which ruin insulation. When not in use, hang with cable coiled loosely.

Almost as much equipment is damaged out of service as in use. Have spot to store your unit and see that it is kept there when not working.

Treat an overheating electric unit like a man with a fever. Don't work it until you find out what's wrong. Overheating may indicate low voltage, or overloading. Be sure your power source conforms to power requirements shown on tool.

BALL BEARING GRINDING WHEEL HOLDERS -- No. 1702BB-S SPLINE SOCKET

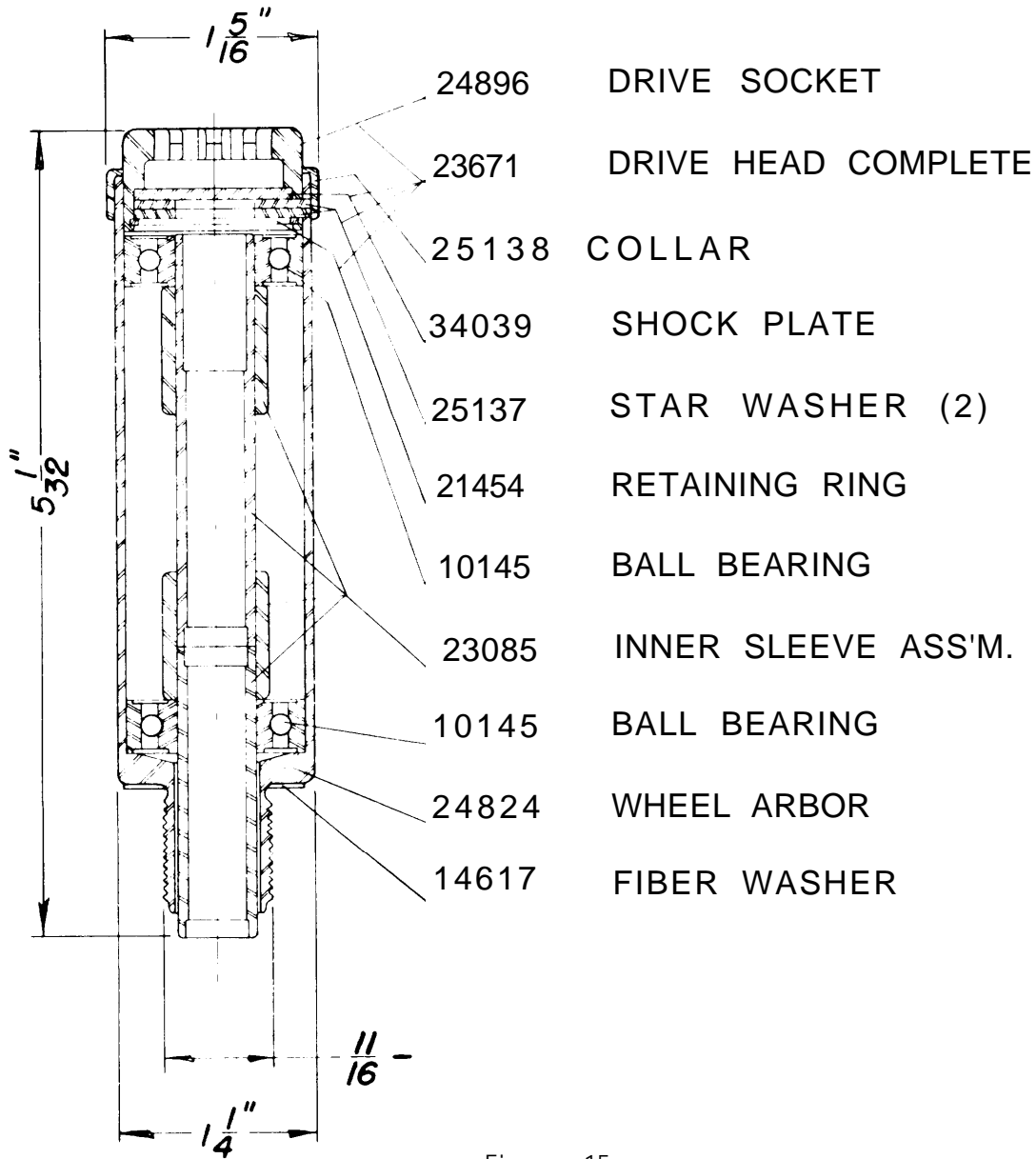


Figure 15.

APPENDIX

BASIC ISSUE ITEMS LIST

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

a. Repair Part Identified by Federal Stock Number.

- (1) If the item requisitioned is not furnished, or if other action is necessary, the nature of the action taken by the commodity command will be indicated by standard symbols on prescribed forms.
- (2) When requisitioning an item, the requesting agency will order the *listed item*. However, the commodity command will take necessary action to issue the exhaust stock item until stock is exhausted, whether it be an individual item, kit, set, or assembly.
- (3) Requisition for replacement of items that are the responsibility of commodity commands will be submitted to the commodity command indicated in column 1a, Materiel Code Number.

b. 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:

- (1) Manufacturer's code number (5 digit number preceding the colon in the descriptive column).
- (2) Manufacturer's part number (the number, and sometimes letters, fol-

lowing the colon, (1) above). Dashes, commas, or other marks must be included exactly as listed.

- (3) Nomenclature exactly as listed herein, including dimensions if necessary.
- (4) Name of manufacturer of end item (from cover of TM or manufacturer's name plate).
- (5) Federal stock number of end item (from TM).
- (6) Manufacturer's model number (from TM or name/data plate, preferably name/data plate).
- (7) Manufacturer's serial number (from name/data plate).
- (8) Any other information such as type, frame number, and electrical characteristics, if applicable.
- (9) 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:
 - (a) In blocks 4, 5, and 6, list manufacturer's code, and manufacturer's part number (as listed in description column).
 - (b) 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 codes (col. 1a).*

This column indicates the responsible commodity command for the materiel. The commodity commands responsible for supply of items in this list are:

| <i>Code</i> | <i>Type materiel</i> |
|-------------|------------------------|
| 5 | Engineer Materiel |
| 9 | Ordnance Materiel |
| 10 | Quartermaster Materiel |

- (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> |
|-------------|----------------------------|
| 0 | Organizational 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). This column indicates the Federal stock number which has been assigned by the Cataloging Division, Defense Logistics Services Center.

c. *Description* (Col. 3). This column indicates the Federal item name (shown in capital letters) and any additional description required for supply operations. The manufacturer's code and part number are also included for reference.

| <i>Code</i> | <i>Explanation</i> |
|-------------|-------------------------------|
| 00988: | Albertson and Company, Inc. |
| 07429: | Black and Decker Mfg. Company |
| 74546: | Harvey Hubbell, Inc. |

d. *Unit of issue* (Col. 4). This column indicates the quantity to be requisitioned.

e. *Quantity Authorized* (Col. 5). This column indicates the quantity of the listed item authorized for stockage to constitute the prescribed load.

4. Abbreviations.

| | |
|-------|-------------------------------|
| ac | alternating current |
| amp | ampere(s) |
| brg | bearing |
| CI | cast iron |
| dc | direct current |
| deg | degree(s) |
| dia | diameter |
| fin. | finish(ing) |
| fl | flat |
| flex. | flexible |
| h | high (height) |
| hex | hexagon(al) |
| hdl | handle |
| in. | inch(es) |
| lg | long (length) |
| mtl | metal |
| NF | American National Fine Thread |
| No. | number(s) |
| o/a | overall |
| od | outside diameter |
| rd | round |
| rpm | revolutions per minute |
| S | steel |
| shk | shank |
| tapd | tapered |
| thd | thread(s) |
| v | volt(s) |
| w | wide (width) |
| w/ | with |

5. Suggestions and Recommendations

The direct reporting by the individual user, of errors, omissions, and recommendations for improving this manual, is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Publications) will be used for reporting these improvements. This form will be completed using pencil, pen, or typewriter. DA Form 2028 will be completed by the individual using the manual and forwarded direct to: Commanding General, Headquarters, U.S. Army Weapons Command, ATTN: AMSWE-SMM-P, Rock Island Arsenal, Rock Island, 111. 61202.

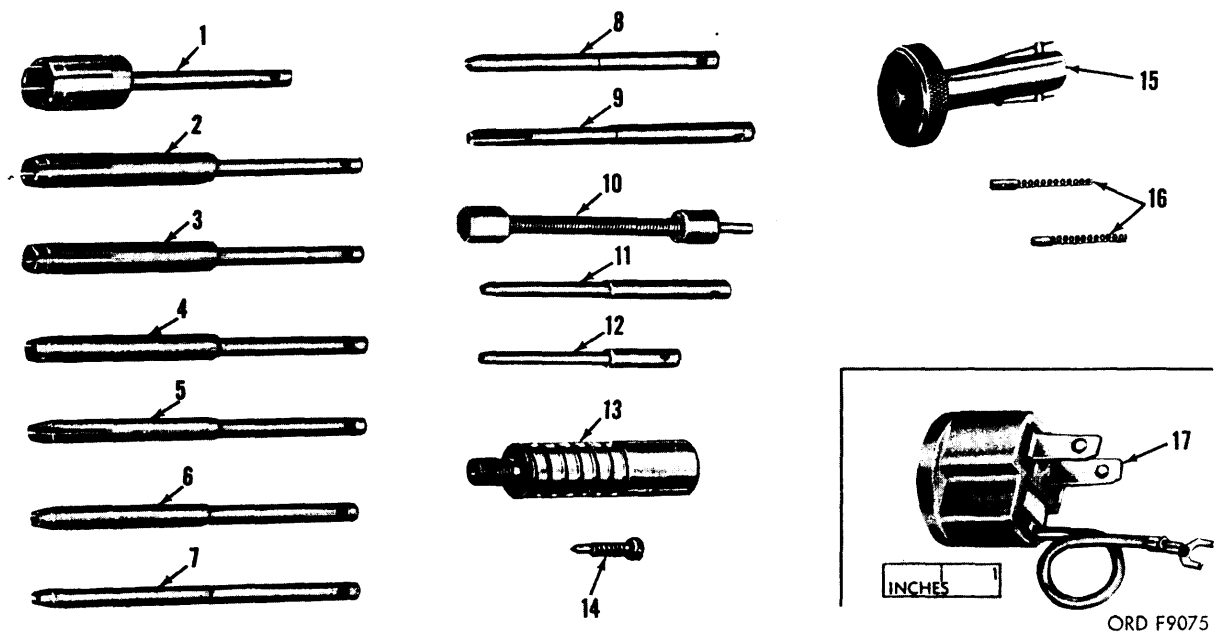
Section II. BASIC ISSUE ITEMS LIST

| (1) Source maintenance, and recoverability | | | (2) | (8) | (5) | (6) Illus- tration | | |
|---|---------------|-----------------------------|-------------------|---|---------------|--------------------------|-----------------|----|
| (a) Material code | (b) Source | (c) Maintenance level | Federal stock No. | Description | Unit of issue | (a) Figure No. | (b) Item No. | |
| 9 | ---- | ---- | 4910-473-6437 | <p>MAJOR COMBINATION</p> <p>The following item is to be requisitioned for initial issue only.</p> <p>GRINDING KIT, VALVE SEAT, ELECTRICAL: concentric drive, 7500 rpm rated no load speed, 115-v, ac/dc, shielded to prevent radio interference (00988:1712-S) .</p> <p>COMPONENTS OF MAJOR COMBINATION None authorized.</p> <p>REPAIR PARTS</p> <p>NIB, DIAMOND, WHEEL DRESSING: 1 7/8 lg o/a, 5/8 dia knurled end, 5/16-24 NF thd (00988:23174).</p> <p>SPARE PARTS</p> <p>BRUSH, ELECTRICAL CONTACT: carb w/spring (00988: 292-2).</p> <p>TOOLS AND EQUIPMENT FOR: GRINDING KIT, VALVE SEAT, ELECTRICAL (00988:1712-S)</p> <p>ADAPTER, CONNECTOR: plastic dielectric, 2 fl parallel male contacts and grounding lead w/term one end, 2 fl parallel and i U female contacts other end, ac/dc, 125-v, 15 amp (74545: 5273L) .</p> <p>CASE, CARRYING, GRINDING KIT : mtl, 14 1/2 lg, 11 1/4 w, 16 1/2 h, top locking storage compartment w/mtl locking clips, 1 door and 2 draws, mtl rack for pilots (00988:1757-SP).</p> <p>INDICATOR, DIAL: 1 11/16 rd dial face, graduations 0 to 100 in 0.001 in. increments, range 0 to 0.125 in. (00988:266).</p> <p>NIB, DIAMOND, WHEEL DRESSING: 1 7/8 lg o/a, 5/8 dia knurled end, 5/16-24 NF thd (00988 :23174).</p> <p>PILOT, VALVE SEAT REFACING ; expanding type, 0.375 in. dia upper end. 1/4 size, 1 1/4 lg lower end, 2 3/8 lg upper end (00988: EP-250).</p> <p>9/32 size, 2 3/8 lg lower end, 2 3/8 lg upper end (00988:EP-281).</p> <p>A size, 2 7/8 lg lower end, 2 5/8 lg upper end (00988:EP-312).</p> | | | | |
| 9 | C | 0 | | | 1 | 1 | 16 | 14 |
| 9 | C | 0 | | | 2 | 2 | 16 | 16 |
| 5 | C | 0 | 5935-545-3886 | | 1 | 1 | 16 | 17 |
| 9 | C | 0 | | | 1 | 1 | | |
| 9 | C | 0 | | | 1 | 1 | 16 | 14 |
| 9 | C | 0 | | | 1 | 1 | 16 | 12 |
| 9 | C | 0 | | | 1 | 1 | 16 | 11 |
| 9 | C | 0 | | | 1 | 2 | 16 | 9 |

| (1) Source maintenance, and recoverability code | | | | (2) | (3) | (4) | (5) | (6) Illus- tration | |
|---|---------------|-----------------------------|-----------------------|-------------------|---|---------------|---------------------|--------------------------|-----------------|
| (a) Material code | (b) Source | (c) Maintenance level | (d) Recoverability | Federal stock No. | Description | Unit of issue | Quantity authorized | (a) Figure No. | (b) Item No. |
| 9 | c | o | | ----- | PILOT, VALVE SEAT REFACING— Continued 11/32 size, 2 7/8 lg lower end, 1 7/8 lg upper end (00988:EP-343). | 1 | 2 | 16 | 8 |
| 9 | c | 0 | | ----- | 3/8 size, lg lower end, 3 lg upper end (00988 : EP-375) . | 1 | 2 | 16 | 7 |
| 9 | c | 0 | | ----- | 13/32 size, 3 1/4 lg lower end, 3 lg upper end (00988:EP-406). | 1 | 1 | 16 | 6 |
| 9 | c | 0 | | ----- | 7/16 size, 3 1/2 lg lower end, 3 lg upper end (00988:EP-437). | 1 | 1 | 16 | 5 |
| 9 | c | 0 | | ----- | 1/2 size, 3 1/2 lg lower end, 3 lg upper end (00988:EP-500). | 1 | 1 | 16 | 4 |
| 9 | c | 0 | | ----- | 9/16 size, 3 1/2 lg lower end, 3 lg upper end (00988:EP-562). | 1 | 1 | 16 | 3 |
| 9 | c | 0 | | ----- | 5/8 size, 3 1/2 lg lower end, 2 7/8 lg upper end (00988 :EP-625) . | 1 | 1 | 16 | 2 |
| 9 | c | 0 | | ----- | PILOT, VALVE SEAT GRINDING: solid type, 1 1/32 size, 1 1/2 lg lower end, 3 lg upper end (00988 :SP103125). | 1 | 1 | 16 | 1 |
| 9 | c | 0 | | ----- | SHAFT ASSEMBLY, METAL: coupling, flex., 1/4 shk to fit 1/4 in. drill and 5/8 hex plug to fit stone sleeve socket (00988: 22916FSDS). | 1 | 1 | 16 | 10 |
| 9 | c | 0 | | ----- | SLEEVE, STONE HOLDING: spline socket, ball brg, 11/16-16 thd for No. 2 hole stones (00988:1702-BBS). | 1 | 1 | 16 | 13 |
| 9 | c | 0 | | 4910-775-6477 | WHEEL, ABRASIVE: valve seat grind- ing, 15 deg angle, 1 1/2 od for hard S and stellite (07429 :14107). | 1 | 1 | 17 | 36 |
| 9 | c | 0 | | 4910-221-3724 | 15 deg angle, 1 5/8 od, for hard S and stellite (07429 :14108). | 1 | 1 | 17 | 37 |
| 9 | c | 0 | | 4910-228-9840 | 15 deg angle, 1 3/4 od, for hard S and stellite (07429 :14109). | 1 | 1 | 17 | 38 |
| 9 | c | 0 | | 4910-228-9841 | 15 deg angle, 2 od, for hard S and stellite (07429 :14111). | 1 | 1 | 17 | 39 |
| 9 | c | 0 | | 4910-228-9832 | 15 deg angle, 2 1/4 od, for S and stellite (07429:14113). | 1 | 1 | 17 | 40 |
| 9 | c | 0 | | 4910-228-9833 | 15 deg angle, 2 1/2 od, for hard S and stellite (07429:14114). | 1 | 1 | 17 | 41 |
| 9 | c | 0 | | 4910-228-9834 | 15 deg angle, 2% od, for hard S and stellite (07429:14271). | 1 | 1 | 17 | 42 |
| 9 | c | 0 | | 4910-228-9835 | 15 deg angle, 3 od, for hard S and stellite (07429 :14273). | 1 | 1 | 17 | 43 |
| 9 | c | 0 | | 4910-369-4748 | 30 deg angle, 1 1/2 od, for CI (07429: 14198). | 1 | 1 | 17 | 56 |
| 9 | c | 0 | | 4910-369-4750 | 30 deg angle, 1% od, for fin. (07429: 14370). | 1 | 1 | 17 | 53 |
| 9 | c | 0 | | 4910-713-9836 | 30 deg angle, 1 1/2 od, for hard S and stellite (07429:14219). | 1 | 1 | 17 | 48 |

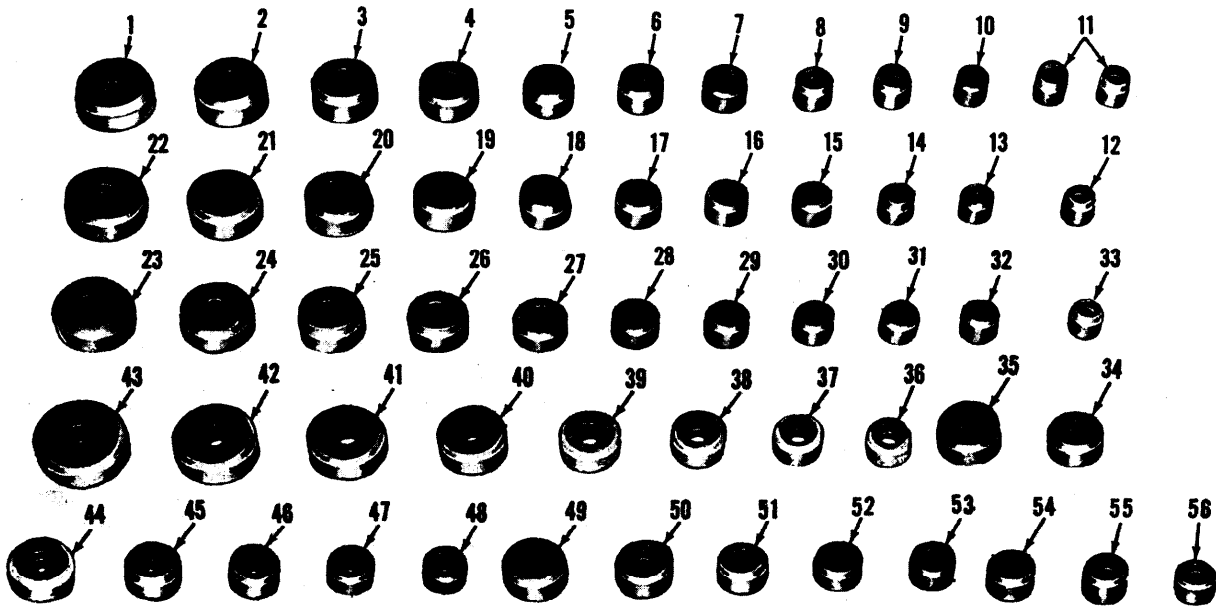
| (1) Source maintenance and recoverability code | | | (2) Federal stock No. | (8) Description | (4) Unit of issue | (5) Quantity authorized | (6) Illustration | | |
|--|-------------------|---------------------------------|------------------------------|--|--------------------------|--------------------------------|-------------------------|---------------------|--|
| (a) Material code | (b) Source | (c) Maintenance level | | | | | (a) Figure No. | (b) Item No. | |
| | | | | WHEEL, ABRASIVE—Continued | | | | | |
| 9 | C | 0 | 4910-369-4754 | 30 deg angle, 1 5/8 od, for CI (07429:14199). | 1 | 1 | 17 | 55 | |
| 9 | C | 0 | 4910-369-4755 | 30 deg angle, 1 5/8 od, for fin. (07429:14371). | 1 | 1 | 17 | 52 | |
| 9 | C | 0 | 4910-369-4756 | 30 deg angle, 1 5/8 od, for hard S and stellite (07429:14287). | 1 | 1 | 17 | 47 | |
| 10 | P1 | 0 | 5130-230-7520 | 30 deg angle, 1 5/8 od, for CI (07429:14090). | 1 | 1 | 17 | 54 | |
| 9 | c | 0 | 4910-369-4764 | 30 deg angle, 1 3/4 od, for fin. (07429:14372). | 1 | 1 | 17 | 51 | |
| 9 | c | 0 | 4910-369-4763 | 30 deg angle, 1 3/4 od, for hard S and stellite (07429:14105). | 1 | 1 | 17 | 46 | |
| 9 | c | 0 | 4910-369-4774 | 30 deg angle, 2 od, for CI (07429:14091). | 1 | 1 | 17 | 34 | |
| 9 | c | 0 | 4910-369-4775 | 30 deg angle, 2 od, for fin. (07429:14374). | 1 | 1 | 17 | 50 | |
| 9 | c | 0 | 4910-369-4776 | 30 deg angle, 2 od, for hard S and stellite (07429:14106). | 1 | 1 | 17 | 45 | |
| 9 | c | 0 | 4910-422-8927 | 30 deg angle, 2 1/4 od, for CI (07429:14279). | 1 | 1 | 17 | 35 | |
| 9 | c | 0 | 4910-369-4781 | 30 deg angle, 2 1/4 od, for fin. (07429:14376). | 1 | 1 | 17 | 49 | |
| 9 | c | 0 | 4910-369-4782 | 30 deg angle, 2 1/4 od, for hard S and stellite (07429:14290). | 1 | 1 | 17 | 44 | |
| 9 | c | 0 | 4910-369-4807 | 45 deg angle, 1 1/4 od, for CI (07429:14216). | 1 | 1 | 17 | 10 | |
| 9 | c | 0 | 4910-W9-4808 | 45 deg angle, 1 1/4 od, for fin. (07429:14414). | 1 | 1 | 17 | 13 | |
| 9 | c | 0 | 4910-369-4809 | 45 deg angle, 1 1/4 od, for hard S and and stellite (07429:14217). | 1 | 2 | 17 | 32 | |
| 10 | c | 0 | 5130-474-8907 | 45 deg angle, 1 1/4 od, for CI (tapd to 3/4 in.) (07429:27117). | 1 | 1 | 17 | 12 | |
| 10 | c | 0 | 5130-474-8906 | 45 deg angle, 1 1/4 od, for fin. (tapd to 3/4 in.) (07429:27118). | 1 | 1 | 17 | 33 | |
| 10 | c | 0 | 5130-474-8906 | 45 deg angle, 1 1/4 od, for hard S and stellite (tapd to 3/4 in.) (07429:27116). | 1 | 2 | 17 | 11 | |
| 9 | c | 0 | 4910-369-4813 | 45 deg angle, 1 3/4 od, for CI (07429:18541). | 1 | 1 | 17 | 9 | |
| 9 | c | 0 | 4910-392-2941 | 45 deg angle, 1 3/8 od, for fin. (07429:18542). | 1 | 1 | 17 | 14 | |
| 9 | c | 0 | 4910-369-4814 | 45 deg angle, 1 3/8 od, for hard S and stellite (07429:18540). | 1 | 1 | 17 | 31 | |
| 9 | c | 0 | 4910-369-4818 | 45 deg angle, 1 1/2 od, for CI (07429:14084). | 1 | 1 | 17 | 8 | |
| 9 | c | 0 | 4910-228-2075 | 45 deg angle, 1 1/2 od, for fin. (07429:14382). | 1 | 1 | 17 | 15 | |
| 10 | c | 0 | 5130-230-7514 | 45 deg angle, 1 1/2 od, for hard S and stellite (07429:14056). | 1 | 1 | 17 | 30 | |

| (1) Source maintenance and recoverability code | | | | (2) | (3) | (4) | (5) | (6) Illus- tration | |
|--|---------------|-----------------------------|-----------------------|-------------------|---|---------------|---------------------|--------------------------|-----------------|
| (a) Material code | (b) Source | (c) Maintenance level | (d) Recoverability | Federal stock No. | Description | Unit of issue | Quantity authorized | (a) Figure No. | (b) Item No. |
| 9 | C | O | ----- | 4910-369-4824 | WHEEL, ABRASIVE—Continued 45 deg angle, 1 5/8 od, for CI (07429: 14063). | 1 | 2 | 17 | 7 |
| 9 | C | O | ----- | 4910-3694826 | 45 deg angle, 1 5/8 od, for fin. (07429: 14383). | 1 | 1 | 17 | 16 |
| 9 | C | O | ----- | 4910-369-4828 | 45 deg angle, 1 5/8 od, for hard S and stellite (07429:14100). | 1 | 1 | 17 | 29 |
| 9 | C | O | ----- | 4910-369-4830 | 46 deg angle, 1 3/4 od, for CI (07429: 14085). | 1 | 1 | 17 | 6 |
| 9 | C | O | ----- | 4910-369-4832 | 45 deg angle, 1 3/4 od, for fin. (07429: 14384). | 1 | 1 | 17 | 17 |
| 9 | C | O | ----- | 4910-228-2060 | 45 deg angle, 1 3/4 od, for hard S and stellite (07429:14049). | 1 | 1 | 17 | 28 |
| 9 | C | O | ----- | 4910-369-4844 | 45 deg angle, 2 od, for CI (07429: 14064). | 1 | 1 | 17 | 5 |
| 9 | C | O | ----- | 4910-369-4845 | 45 deg angle, 2 od, for fin. (07429: 14386). | 1 | 1 | 17 | 18 |
| 9 | C | O | ----- | 4910-369-4846 | 45 deg angle, 2 od, for hard S and stellite (07429:14102). | 1 | 1 | 17 | 27 |
| 9 | C | O | ----- | 4910-369-4851 | 45 deg angle, 2 1/4 od, for CI (07429: 14088). | 1 | 1 | 17 | 4 |
| 9 | C | O | ----- | 4910-369-4852 | 45 deg angle, 2 1/4 od, for fin. (07429: 14388). | 1 | 1 | 17 | 19 |
| 10 | C | O | ----- | 6130-230-4117 | 45 deg angle, 2 1/4 od, for hard S and stellite (07429:14104). | 1 | 1 | 17 | 26 |
| 9 | C | O | ----- | 4910-392-2942 | 45 deg angle, 2 1/2 od, for CI (07429: 14089). | 1 | 1 | 17 | 3 |
| 9 | C | O | ----- | 4910-369-4860 | 45 deg angle, 2 1/2 od, for fin. (07429: 14389). | 1 | 1 | 17 | 20 |
| 10 | C | O | ----- | 5130-230-7513 | 45 deg angle, 2 1/2 od, for hard S and stellite (07429:14050). | 1 | 1 | 17 | 25 |
| 9 | C | O | ----- | 4910-228-2050 | 45 deg angle, 2 3/4 od, for CI (07429: 14153). | 1 | 1 | 17 | 2 |
| 9 | C | O | ----- | 4910-369-4867 | 45 deg angle, 2 3/4 od, for fin. (07429: 14391). | 1 | 1 | 17 | 21 |
| 9 | C | O | ----- | 5130-230-7500 | 45 deg angle, 2 3/4 od, for hard S and stellite (07429:14200). | 1 | 1 | 17 | 24 |
| 9 | C | O | ----- | 4910-369-4872 | 45 deg angle, 3 od, for CI (07429: 14154). | 1 | 1 | 17 | 1 |
| 9 | C | O | ----- | 4910-369-4874 | 45 deg angle, 3 od, for fin. (07429: 14393). | 1 | 1 | 17 | 22 |
| 9 | C | O | ----- | 4910-369-4876 | 45 deg angle, 3 od, for hard S and stellite (07429:14243). | 1 | 1 | 17 | 23 |
| 10 | C | O | ----- | ----- | WRENCH, PILOT INSERTING AND REMOVING: 3/16 shk, 3 lg o/a (00988: PW-187). | 1 | 1 | 16 | 15 |



ORD F9075

Figure 16. Tools and equipment



ORD F9076

Figure 17. Abrasive wheels.

HEADQUARTERS
DEPARTMENT OF THE ARMY
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By Order of the Secretary of the Army:

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General, United States Army,
Chief of Staff.

Official:

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Major General, United States Army,
The Adjutant General

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

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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 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

PIN: 006035-001