

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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**OPERATOR'S MANUAL**

**GRINDING KIT, VALVE SEAT,  
ELECTRIC, 35 DEGREE ANGLE  
CONCENTRIC DRIVE  
DRIVER, AC/DC, 115-VOLT  
7,500 RPM RATED NO LOAD  
SPEED**

**(ALBERTSON AND COMPANY MODEL 1712-M)  
(4910-060-9983)**

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

**HEADQUARTERS, DEPARTMENT OF THE ARMY  
JUNE 1965**

Change }  
No. 1 }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, DC, 16 Mail 1973

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TM 9-4910-453-10, 25 June 1965, is changed as follows:

*Page 12.* 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 directly to Commander, US Army

Weapons Command, ATTN: AMSWE-MAS-SP, 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 of the end item configuration are listed in the following table:

Table 1. Components of' the End Item

Components	Part No.	(PSCM)	Qty
ADAPTER, CONNECTOR:	5273L	(74545)	1
CASE, CARRYING:	8464	(00988)	1
DRIVER, ELECTRIC:	1712M	(00988)	1
NIB, DIAMOND:	23174	(00988)	1
PILOT. VALVE SEAT REFACING:	E437	(00988)	2
PILOT, VALVE SEAT REFACING:	E468	(00988)	2
PILOT, VALVE SEAT REFACING:	E500	(00988)	2
PILOT, VALVE SEAT REFACING:	E562	(00988)	2
SLEEVE, STONE HOLDING:	1702BB	(00988)	1
STAND, DRESSER:	1713B	(00988)	1
WHEEL, ABRASIVE:	K42WS	(00988)	2
WHEEL, ABRASIVE:	K46WS	(00988)	2
WHEEL, ABRASIVE:	K55WS	(00988)	2
WHEEL, ABRASIVE:	K102WS	(00988)	2
WHEEL, ABRASIVE:	K516WS	(00988)	2
WHEEL, ABRASIVE:	K106WS	(00988)	2
WHEEL, ABRASIVE:	K525WS	(00988)	2
WHEEL, ABRASIVE:	K115WS	(00988)	2
WRENCH, PILOT PIN:	P187	(00988)	1

**APPENDIX  
BASIC ISSUE ITEMS LIST  
AND  
ITEMS TROOP INSTALLED OR AUTHORIZED LIST**

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The basic issue items list and items troop installed or authorized list are not applicable.

By Order of the Secretary of the Army:

Official:

VERNE L. BOWERS  
*Major General, United States Army  
The Adjutant General*

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

Distribution:

*Active Army:*

DCSLOG (3)	WAMTMTS(1)
CNGB(1)	USAATC(2)
TSG(1)	ARMISH(1)
COE (5)	MAA G: Iran, Libya (1)
Dir of Trans(1)	USASA Fld Sta#12(1)
ACSC-E(1)	USASAFidSta#4(1)
AMC (12)	FA Msl Bn (Redstone Arsenal)(2)
WECOM(10I)	Arsenals(1)except
MUCOM (2)	Detroit(6)
AVSCOM (2)	Benicia (2)
CONARC(2)	Engr FLDMS(5)
ARADCOM (2)	QM FLDMS (5)
ARADCOM Rgn (2)	Units org under fol TOE:-2 ea.
OS Maj Comd (2)	29-1
LOGCOMD (2)	29-11
Armies (3) except	29-15
Seventh & Eighth (5)	29-16
Ft Eustis (5)	29-21
USAECFB (2)	29-25
Ft Monmouth (1)	29-26
WSMR(2)	29-35
DPG (1)	29-36
USAEPG(1)	29-55
AD (1) except	29-56
LEAD(2)	29-65
TEAD(16)	29-79
USMA (1)	37
Corps(2)	57
EAMTMTS(1)	

ARNG: State AG (3).

USAR: Same as Active Army except allowance is one (1) copy each.

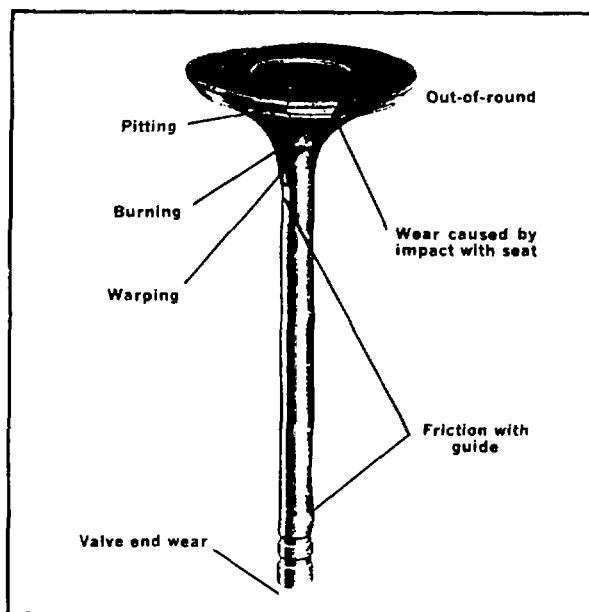
For explanation of abbreviations used. see A R 310-50.

## HOW WEAR ATTACKS VALVE FACE

Even in normal use the intake and the exhaust valves absorb a fantastic amount of punishment. During a quick fifteen minute trip to the shopping center, a single valve may open and close 10,000 times. Extreme temperatures scorch it many times each second. Violent explosions and powerful spring tension pound the red hot (1600°F.) valve head. Hot gases under tremendous pressure swirl past it. Carbon deposits form on the face, preventing the valve from seating properly or cooling efficiently. As a result, the valves-particularly the exhaust valves-become pitted, burned, warped and grooved. No longer concentric with the valve seat, they leak compression and fail to dissipate heat. Engine efficiency and economy nosedive.

### . . . . VALVE STEM

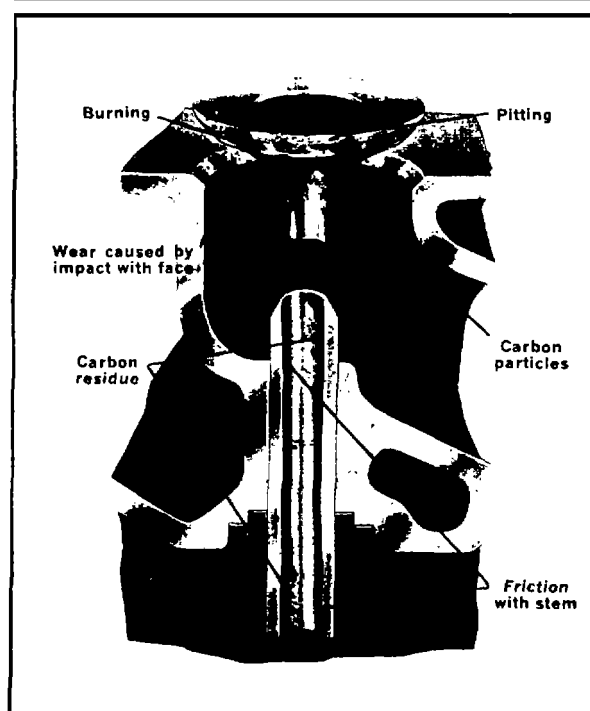
But it's not only the valve face that wears. The valve stems travel a mile or more in their guides during that short shopping trip. They wear at the top of the guides and at the bottom. Valve ends also wear and must be squared.



### . . . . VALVE SEAT

The valve seat also wears. Hot gases burn it. Carbon particles which retain heat pit it. The valve guide wears in a corresponding position to the valve stem. Between stem and guide, carbon residues form which cause the valves to stick. To insure top performance, both valve face, valve seat and valve guide must be reconditioned.

### . . . . and VALVE GUIDE



**ACTUAL STEPS  
TO RECONDITIONING  
VALVES AND  
VALVE SEATS**

1. Clean carbon
2. Dress wheel
3. Reface valves
4. Square tappets, stems, cut chamfer
5. Grind rocker arms (if necessary)
6. Reface valve seat
7. Test concentricity

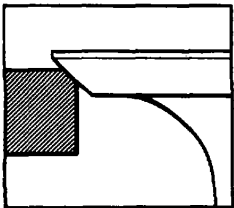
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## IMPORTANT POINTS TO REMEMBER



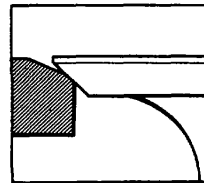
### MARGIN IS ESSENTIAL

As we stated emphatically before, every valve must have margin—that thickness of material measured from the angle of the face to the top of the valve. Margin gives the valve strength to withstand pressure and mass to control heat. If the valve has been ground to a knife edge, leaving no margin, it will heat up excessively. Chances are, it will retain that heat during the compression stroke and pro-ignite the mixture, causing loss of power and economy. A valve with no margin is extremely susceptible to warping and breakage.



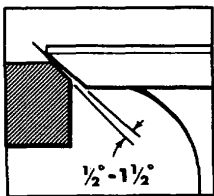
### PROPER SEAT CONTACT

The valve face should always be larger than the valve seat. The seat should be wide enough to assist the valve in dissipating heat but not wide enough to collect an abnormal amount of carbon. Follow the manufacturer's recommendations.



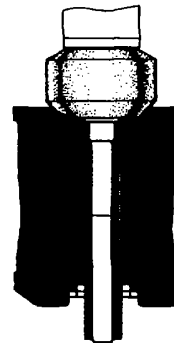
### NARROWING THE SEAT

Occasionally the valve seat must be narrowed for proper seat contact. Use a 15° or 20° grinding wheel to remove material at top of seat as shown in illustration.



### INTERFERENCE ANGLE

Some manufacturers recommend refacing 45° valves to 44° and 30° valves to 29°. While grinding the seats to their original 45° or 30° specifications. When heated the valves will expand to form a compression-tight, fully seated seat. All SIOUX VFGM are marked for all of these angles.



### MORE VERSATILE SIOUX WHEELS

You get more versatility from SIOUX valve seat grinding wheels because you can dress each side to a different angle—for instance 45° end 30°. For emergency use you can dress the wheels smaller on the diameter.

## Valve Seat Grinding Instructions

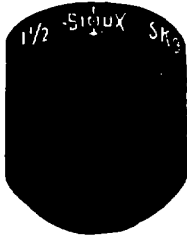
To properly grind valve seats it must be understood that two factors are to be taken into consideration; correct driver speed and the correct grade grinding wheel for driver speed and material to be ground.

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

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"

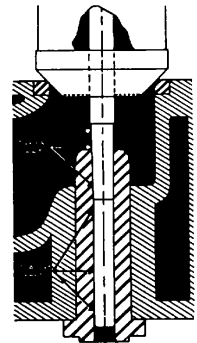
\*Degrees Given Are from Horizontal  
Grinding Wheels Not to be Operated Above 6500 S.F.P.M.



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



**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 gauges 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 where extreme accuracy is desired or required.
  
3. The seats 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)

No. 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.**

**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

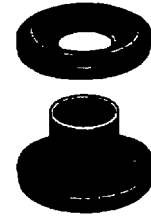


Fig. 2

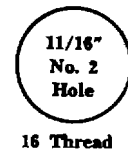


Fig. 3

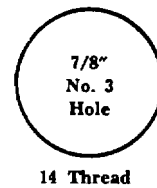
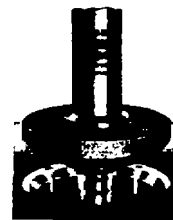
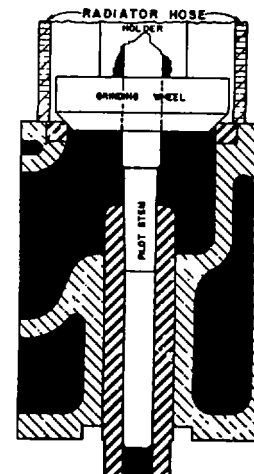


Fig. 4



Place the lifting spring on pilot and bring the wheel up to 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 Stiletto 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, move the diamond across the wheel faster than usual and dress the wheel rough and sharp for maximum cutting.

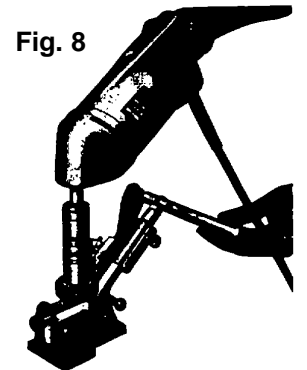
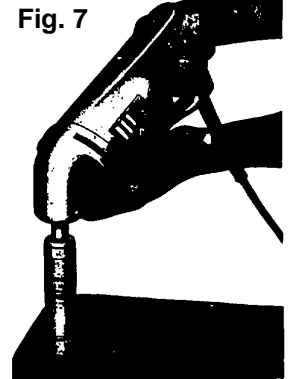
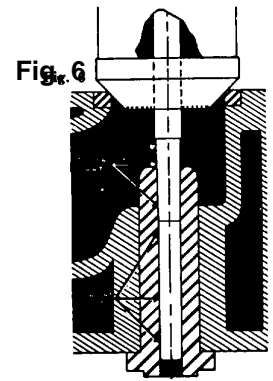
It usually requires about four (4) dressings of the roughing wheel to grind the seat inside of .001 and the finishing wheel should be dressed once for each seat.

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. 1713 and 1719

Set degree mark on dressing tool at desired angle.

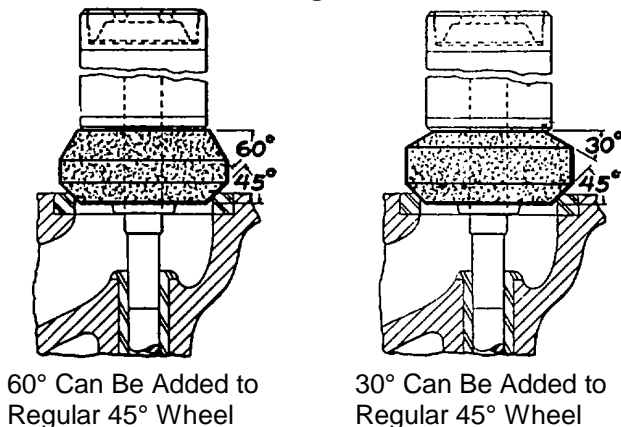
Ball Bearing Holder or Sleeve Bearing Holder. Put a little very light oil on the dressing pilot to prevent sticking and eliminate friction.

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)

Fig. 9



60° Can Be Added to Regular 45° Wheel

30° Can Be Added to Regular 45° Wheel



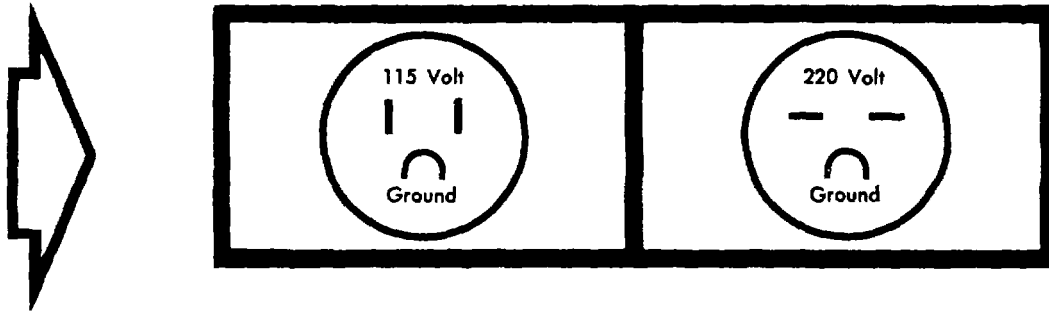
## GENERAL INFORMATION

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 pertinent ground such as a grounded supply system, a water pipe or conduct which is properly grounded.



## 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.



## REMEMBER...

### 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.

### 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.

Parts List for No. 1712 & 1712-M  
 Sioux Heavy Duty Driver  
 For Serial Number 25001 and Up

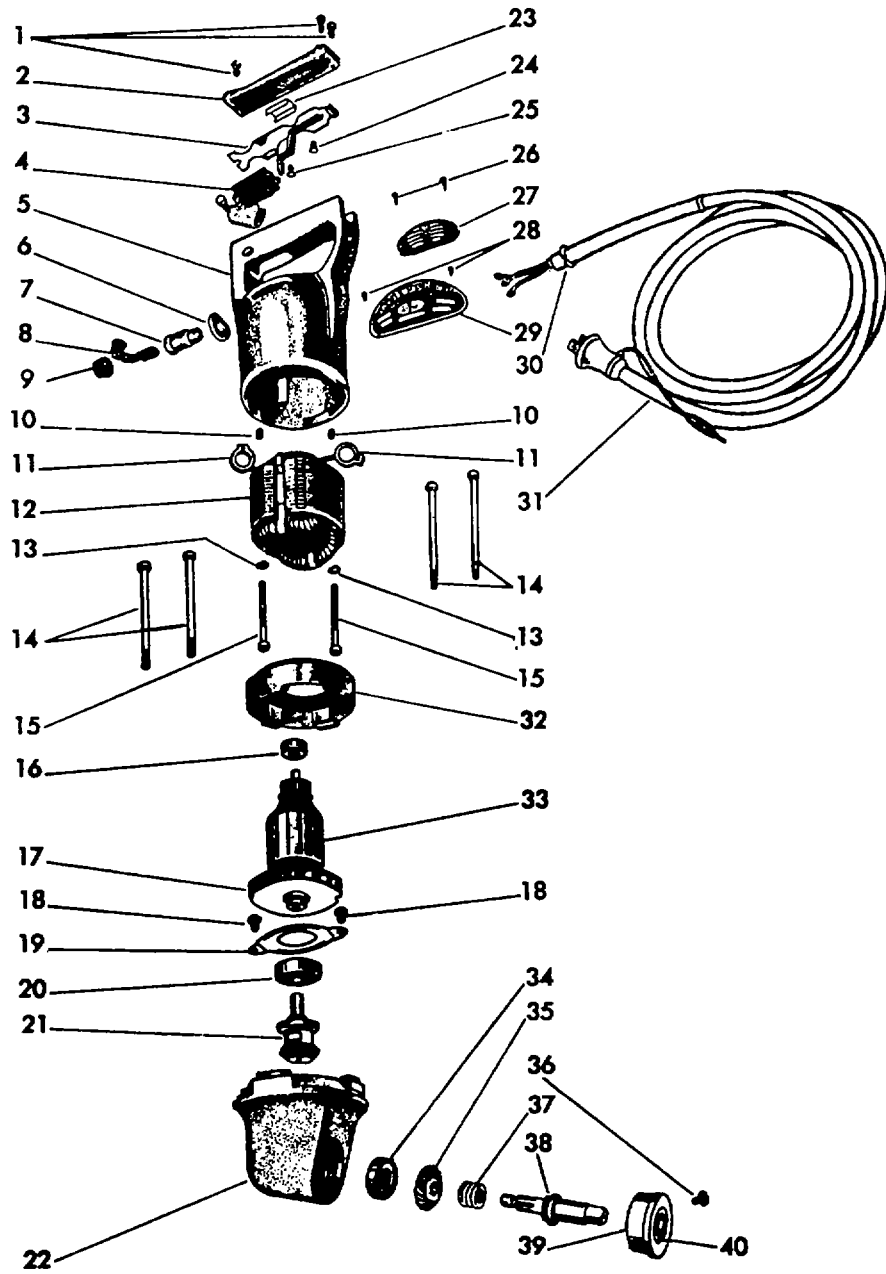


Figure 10.

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

**For Serial Number 25001 and Up**

**WHEN ORDERING PARTS, SPECIFY CATALOG NUMBER AND SERIAL NUMBER**

<b>Fig- ure</b>	<b>Part No</b>	<b>Name</b>	<b>Fig- ure</b>	<b>Part No.</b>	<b>Name</b>
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"
15	07137	Screw #10 (2)	37	21214	Spring Tension
16	10106	Bearing Ball	38	22540A	Spindle Tool (1712) 9"
17	21586	Fan	39	23259	Bearing Support-Complete (1712)
18	07204	Screw #10 (2)		23694	Bearing Support-Complete (1712-S)
19	25027	Plate-Bearing Lock	40	10362	Bear-Tool Spindle (1712)
20	10127	Bearing-Ball		10388	Bear-Tool Spindle (1712-S)
21	19705	Assembly-Pinion & Gear..... (Ser. 25001 to 32891)		18756	Adaptor
	19607	Pinion-Complete			
	24440	Slinger Grease			
22	12002	Case-Gear			
23	14821	Strip-Insulation			
24	06224	Screw - #6			
25	06076	Screw - #4			

**Figure 10--Continued**

Parts List for No's. 1713A & 1713B  
SIOUX DRESSING TOOL

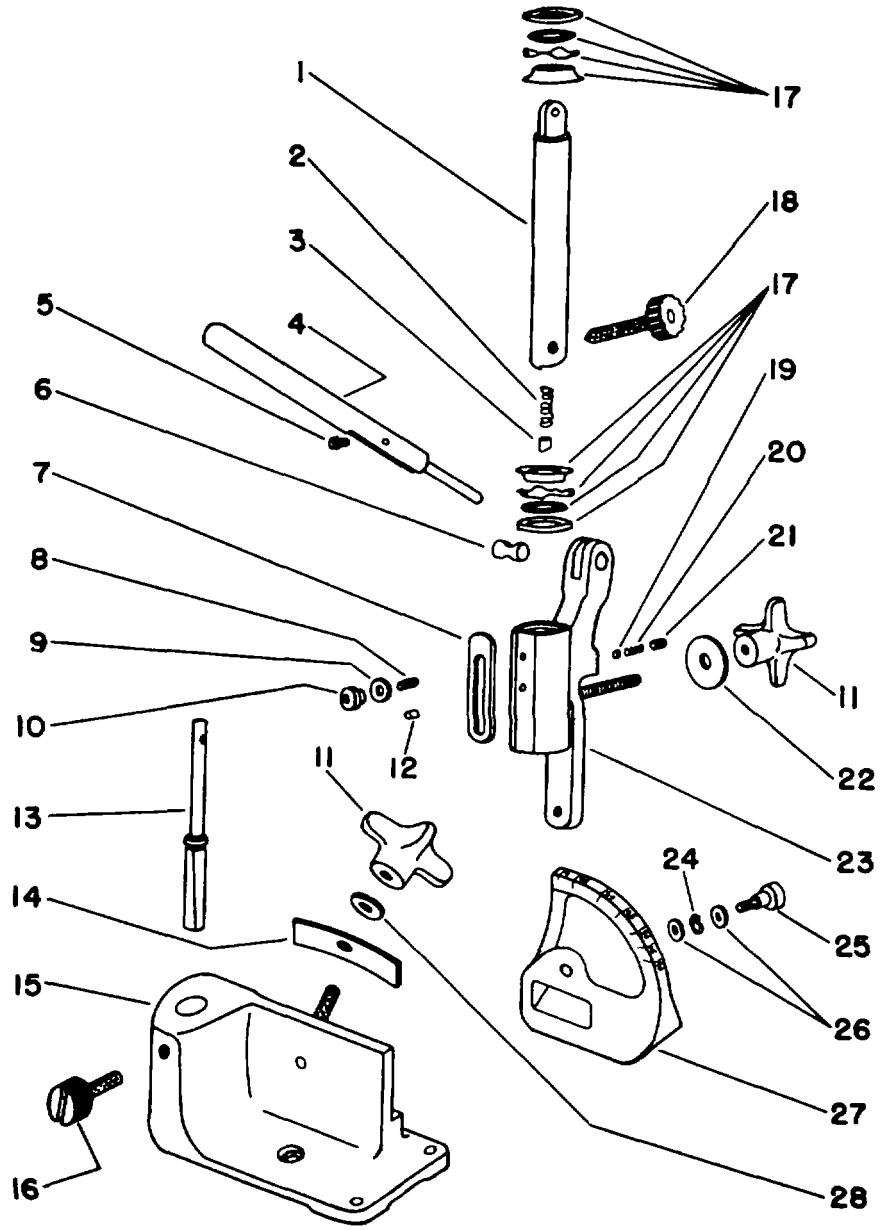


Figure 11.

**Parts List for No's. 1713A & 1713B  
SIOUX DRESSING TOOL**

<b>Fig- ure</b>	<b>Part No.</b>	<b>Name</b>	<b>Fig- ure</b>	<b>Part NO.</b>	<b>Name</b>
1	24647	Bar-Slide	17	30456	Seal-Oil (2)
2	21280	Spring-Tension	18	1715	Diamond-Dressing
3	13092	Slug-Brass	19	13052	Slug-Brass
4	23435	Handle-Dressing	20	21324	Spring
5	24651	Screw-Handle	21	08021	Screw-1/4"
6	24650	Pin-Swivel	22	25958	Washer
7	25634	Stop-Depth Adjustment	23	33310	Ass'm.-Slide Casting
8	24926	Stud	24	09770	Washer-Lock 5/16"
9	25069	Washer	25	08103	Screw-Pilot
10	24917	Nut-Knurled	26	25549	Washer (2)
11	11351	Knob (2)	27	11343	Quadrant (1713A)
12	24925	Pin-Guide		11367	Quadrant (1713H)
13	1718-A	Pilot-Dressing	28	25127	Washer
14	21368	Spring-Leaf		20241	Plate-Name (1713A)
15	33311	Base (1713A)		20285	Plate-Name (1713B)
	33708	Base (1713B)		09954	Screw-Drive (2)
16	24931	Screw-Lock			

**Figure 11--Continued**

# NO. 1702 BB

## BALL BEARING GRINDING WHEEL HOLDERS

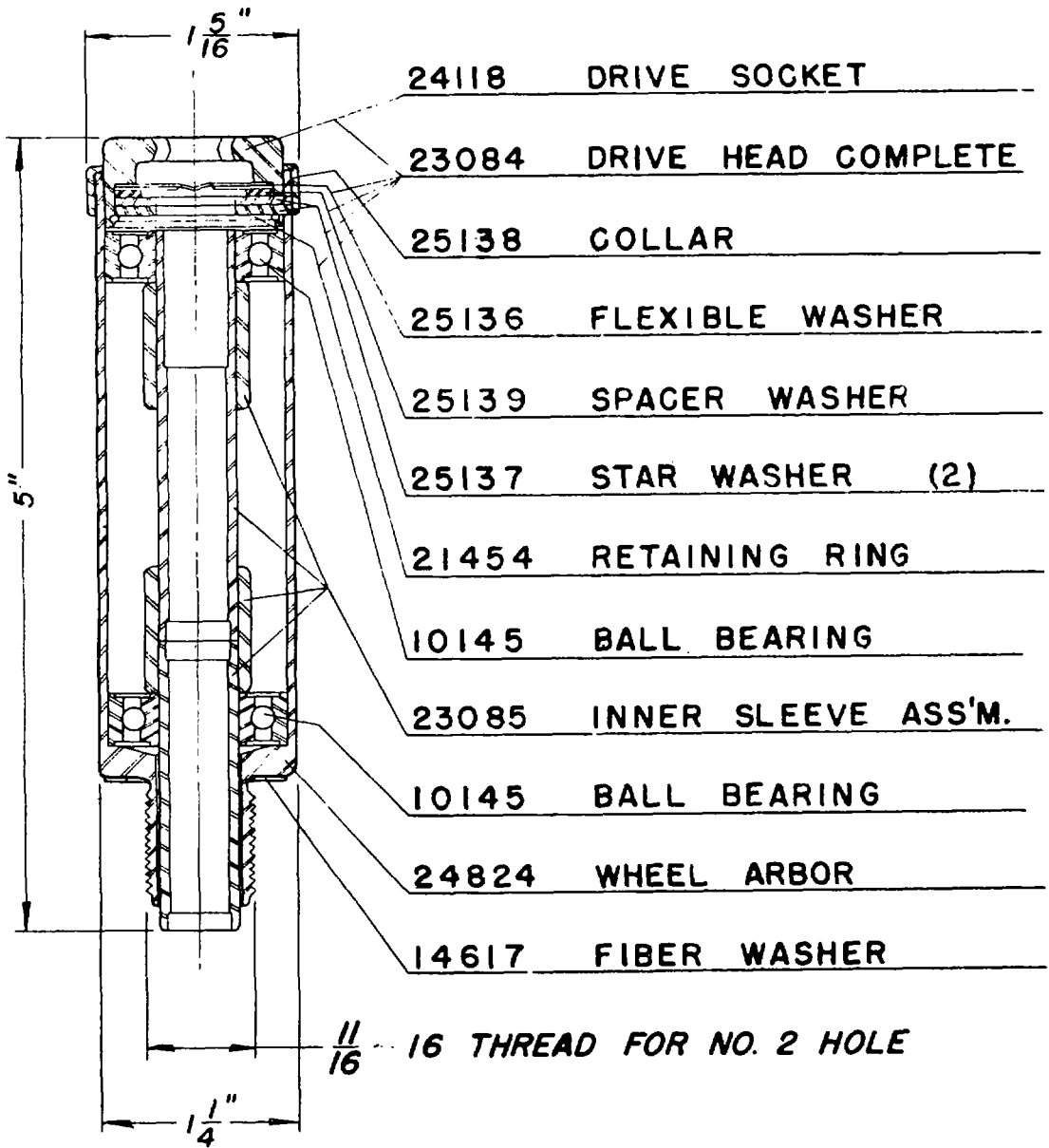


Figure 12

APPENDIX

BASIC ITEMS ISSUE 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. Requisitioning a Part to Which FSN Has Not Been Assigned

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

- a. Manufacturer's code number (5-digit No. preceding the colon in the descriptive colm).
- b. Manufacturer's part number (the No., and sometimes letters, following the colon, ( 1) above). Dashes, commas, or other marks must be included exactly as listed.
- c. Nomenclature exactly as listed herein, including dimensions if necessary.
- d. Name of manufacturer of end item (from cover of TM or manufacturer's nameplate).
- e. Federal stock number of end item (from TM).
- f. Manufacturer's model number (from TM or name/data plate, preferably name/data plate).
- g. Manufacture's serial number (from name/ data plate).
- h. Any other information such as type, frame number, and electrical characteristics, if applicable.
- i. If DD Form 1348 is used, fill in all blocks except 4, 5, 6, and Remarks field, in accordance with AR 72550. Complete form as follows:

- (1) In blocks 4, 5, and 6, list manufacturer's code and manufacturer's part number (as listed in description colm).
- (2) In Remarks field, list noun name (repair part), end item application (FSN of end item), manufacturer, model number (end item), serial number (end item), and any other pertinent information such as frame number, type, etc.

3. Explanation of Columns

a. Source, Maintenance, and Recoverability Code (colm 1).

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

Code	Explanation
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 (colm 1c). This column indicates the category of maintenance authorized to install the listed item. Maintenance level code used in this list is

Code	Explanation
O/C.....	Operator or crew maintenance
(4)	Recoverability (colm 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

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

b. Federal Stock Number (colm 2). Self explanatory.

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.

Code 00988 74545	<i>Explanation</i> Albertson & Co., Inc. Harvey-Hubbell, Inc.
------------------------	---

d. *Unit of Issue (col 4), Quantity Authorized (col 5), and Illustrations (col 6)*. Self explanatory.

**4. Abbreviations**

<i>Abbreviations</i>	<i>Explanation</i>
amp .....	ampere(s)
brg .....	bearing
CI .....	cast iron
deg .....	degree(s)
fin .....	finish(ing)
fl .....	flat
flex.....	flexible

h .....	high(height)
hdl .....	handle
mtl .....	metal
NF .....	American National Fine Thread
nom .....	nominal
o/a .....	overall
rd .....	round
S .....	steel
shk .....	shank
tapd .....	tapered
v .....	volt(s)
w .....	wide(width)
w/.....	with

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

Reports by the individual user, of errors, comments, and/or suggestions are encouraged. They will be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, Headquarters, U.S. Army Weapons Command, ATTN: AMSWESMM-P, Rock Island Arsenal, Rock Island, Ill. 61202.

**Section II. BASIC ISSUE ITEMS LIST**

Source, maintenance, and recoverability codes				Federal Stock No.	Description	Unit of issue	Quantity authorized	Illustrations	
Material	Source	Maintenance	Recoverability					Fig.	Item
			R	4910460-9983	<p style="text-align: center;">MAJOR COMBINATION</p> <p>The following item is to be requisitioned for initial use only.</p> <p>GRINDING KIT, VALVE SEAT, ELECTRIC: 35 deg angle concentric drive driver, ac/dc, 115-v, 7,500 rpm rated no load speed (00988-1712-M).</p> <p style="text-align: center;">COMPONENTS OF MAJOR COMBINATION</p> <p style="text-align: center;">None authorized</p> <p style="text-align: center;">REPAIR PARTS</p> <p>NIB, DIAMOND, WHEEL DRESSING: 1 7/8 lg o/a, / dia knurled end, 5fi-24 NF thd (00988:23174).</p> <p style="text-align: center;">SPARE PARTS</p> <p>BRUSH, ELECTRICAL CONTACT: carbon w/spring (00988:292).</p>	ea	1	13	
	C	O/C							
	C	O/C				set	2	13	



Source, maintenance, and recoverability codes				Federal Stock No.	Description	Unit of issue	Quantity authorized	Illustrations	
Material	Source	Maintenance	Recoverability					Fig.	Item
					TOOLS AND EQUIPMENT FOR:				
	C	O/C		5935-545-3886	GRINDING KIT, VALVE SEAT ELECTRIC: (00988:1712-M) ADAPTER, CONNECTOR: plastic dielectric, fl parallel male contacts and grounding lead w/term. one end, 2 fl parallel and 1 U female contacts other end, ac/dc, 125-v, 15 amp (74545 :5273L).	2	ea	1	
	C	O/C			CASE, CARRYING: mtl, 16 x 14 x 6 (00988:8464).	ea	1	13	
	C	O/C			NIB, DIAMOND, WHEEL DRESSING: 1 7/8 lg o/a, 5/8 dia knurled end, 56-24 NF thd (00988:23174).	ea	1	13	
	C	O/C		4910-428-3312	PILOT, VALVE SEAT REFACING: expanding type 76 in. nom size, 0.4355 to 0.4550 expansion range, 0.375 in. dia upper end, 6 1/4 lg (00988 :E437).	ea	2	13	
	C	O/C			PILOT, VALVE SEAT REFACING: expanding type, 15/32, in. nom size (00988:E468).	ea	2	13	
	C	O/C		4910-428-3313	PILOT, VALVE SEAT REFACING: expanding type, 1/2 in. nom size, 0.498 to 0.508 expansion range, 0.375 in. dia upper end, 7 1/2 lg (00988 :E500).	ea	2	13	
	C	O/C		4910-357-2352	PILOT, VALVE SEAT REFACING: expanding type, 546 in. nom size, 0.5605 to 0.5725 expansion range, 0.375 in. dia upper end, 8 1/4 lg (00988 :E562).	ea	2	13	
	C	O/C			SLEEVE, STONE HOLDING: hex drive (00988 :1702BB).	ea	1	13	
	C	O/C	R		STAND, DRESSER: abrasive wheel (00988:1713-B).	ea	1	13	
	C	O/C		4910-611-3088	WHEEL, ABRASIVE: valve seat grinding, 45 deg angle, finishing type, 2 1/4 od (00988 :K-42-WS).	ea	2	13	
	C	O/C		4910-611-3090	WHEEL, ABRASIVE: valve seat grinding, 45 deg angle, finishing type, 2 1/2 od (00988:K-46-WS).	ea	2	13	
	C	O/C		4910-612-3063	WHEEL, ABRASIVE: valve seat grinding, 45 deg angle, finishing type, 3 od (00988:K-55-WS).	ea	2	13	
	C	O/C		4910-611-3122	WHEEL, ABRASIVE: valve seat grinding, 45 deg angle, roughing type, 2 1/4, od (00988:K-102-WS).	ea	2	13	
	C	O/C		4910-611-3107	WHEEL, ABRASIVE: valve seat grinding, 30 deg angle, roughing type, 2 1/2 od (00988 :K-516-WS).	ea	2	13	
	C	O/C		4910-611-3124	WHEEL, ABRASIVE: valve seat grinding, 45 deg angle, roughing type, 2 1/2 od (00988 :K-106-WS).	ea	2	13	

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Source, maintenance, and recoverability codes				Federal Stock No.	Description	Unit of issue	Quantity authorized	Illustrations	
Material	Source	Maintenance	Recoverability					Fig.	Item
	C	O/C		4910-611-3111	TOOLS AND EQUIPMENT FOR-Continued WHEEL, ABRASIVE: valve seat grinding, 30 deg angle, roughing type, 3 od (00988:K-525-WS) . WHEEL, ABRASIVE: valve seat grinding, 45 deg angle, roughing type, 3 od (009880:K-1 1WS) . WRENCH , PILOT PIN: 3/16 dia by 3 1/4 lg (00988:PW87).	ea	2	13	
	C	O/C		4910-611-3128		ea	2	13	
	C	O/C				ea	1	13	



Figure 13. Tools and equipment WE30014

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 25 June 1965

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NG: State AG (3).

USAR: Same as active Army except allowance is one copy to each unit.

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 decagram = 10 grams = .35 ounce  
 1 hectogram = 10 decagrams = 3.52 ounces  
 1 kilogram = 10 hectograms = 2.2 pounds  
 1 quintal = 100 kilograms = 220.46 pounds  
 1 metric ton = 10 quintals = 1.1 short tons

### *Liquid Measure*

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

### *Square Measure*

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

### *Cubic Measure*

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

## Approximate Conversion Factors

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

## Temperature (Exact)

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