

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S MANUAL

BLACK DIAMOND

PRECISION DRILL GRINDERS

This reprint includes all changes in effect at the time of publication; change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY
DECEMBER 1966

CHANGE

No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 7 May 1973

**Operator's Manual
BLACK DIAMOND
PRECISION DRILL GRINDERS**

TM 9-3415-227-10, 21 December 1966, is changed as follows:
Preceding Appendix A, add the following paragraphs:

Reporting of Equipment Publication Improvements

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commander, US Army Weapons Command, ATTN: AMSWE-MAS-SP, Rock Island IL 61201.

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

BUSHING, DRILL HOLDER:
3C51(07448).
BUSHING, DRILL HOLDER:
3C52(07448).
BUSHING, DRILL HOLDER:
3C53(07448).
COLLET MACHINE:
3C29-3-4(07448).
HOLDER, DRILL:
1(07448).
NIB, DIAMOND, WHEEL DRESSING:
3223(07448).
PLUG GRINDING:
48(07448).
WHEEL, ABRASIVE:
MIL-W-16714(81349).

Page A-1. Appendix A is superseded as follows:

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

Section I. INTRODUCTION

1. Scope

This appendix lists basic issue items and items troop installed or authorized required by the crew/operator for operation of the Black Diamond Precision Drill Grinders.

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-Section II.* A list in alphabetical sequence of items which are furnished with, and must be turned in with, the end item.
- b. *Items Troop Installed or Authorized List.* Not applicable.

3. Explanation of Columns

The following provides an explanation of columns found in the tabular listings:

- a. *Federal Stock Number.* This column indicates the Federal stock number assigned to the item which will be used for requisitioning purposes.
- b. *Description.* This column indicates the Federal item name and a minimum description required to identify the item.
- c. *Unit of Measure (U/M).* This column indicates the standard or basic quantity by which the listed item is used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation; e.g., ea, in., pr; etc., and is the basis used to indicate quantities. When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.
- d. *Quantity Furnished with Equipment.* This column indicates the quantity of the item furnished with the equipment.
- e. *Illustration.* This column is divided as follows:
 - (1) *Figure Number.* This column indicates the figure number of the illustration in which the item is shown.
 - (2) *Item Number.* This column indicates the item number used to identify each item called out in the illustration.

Section II. Basic Issue Items List

(1) <i>Federal stock No.</i>	(2) <i>Description</i>	(3) <i>Unit of meas</i>	(4) <i>Qty furn with equip</i>	(5) <i>Illustration</i>	
				<i>(a) Figs No.</i>	<i>(b) Item No.</i>
5120-184-8620	WRENCH, OPEN END FIXED: Dble hd type, 15 deg angle of hd, 7/16 and 1/2 opng 3/16 thk, 7 o/a lg.	ea	1		

By Order of the Secretary of the Army:

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

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CNGB (1)	APG (1)
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ACSC-E (1)	USAAVNS (2)
USA Armor Bd (1)	AD (2)
CONARC (2)	Utah Gen Dep (1)
ARADCOM (2)	LGH (1)
ARADCOM Rgn (2)	USDB (1)
AMC (5)	Arsenals (2)
WECOM (10)	Tng Aid Cen (2)
OS Maj Comd (2)	USAATC (1)
LOGCOMD (2)	USAAPSA (1)
Armies (3) except	USA Human Engr Lab
Seventh USA (5);	APG (1)
Eighth USA (5)	USA Ballistic Rsch Lab (1)

ARNG & USAR: None.

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

TM 9-3415-227-10

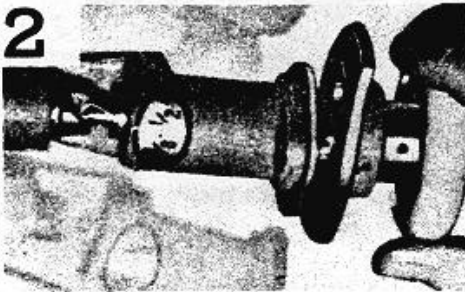
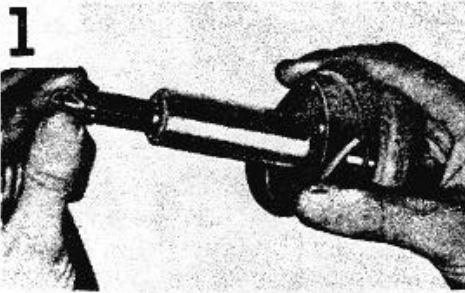
HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D. C., *21 December 1966*

TM 9-3415-227-10, is published for the use of all concerned.

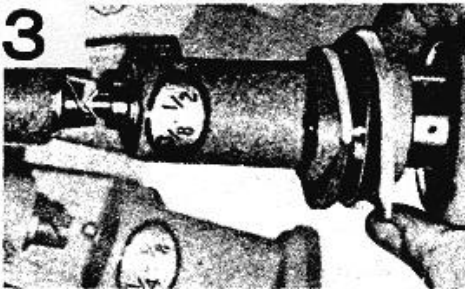
TAGO 6595B

Four Simple Steps

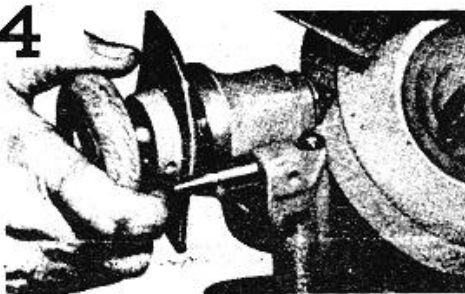
Insert drill in the proper size BUSHING. (All BUSHINGS are clearly marked for size.) Place BUSHING with drill in DRILL HOLDER so that numbers on the BUSHING and COLLET are together and slots on each are aligned. With drill point projecting about 1/2 inch beyond BUSHING, tighten HAND WHEEL to grip drill with a slight tension.



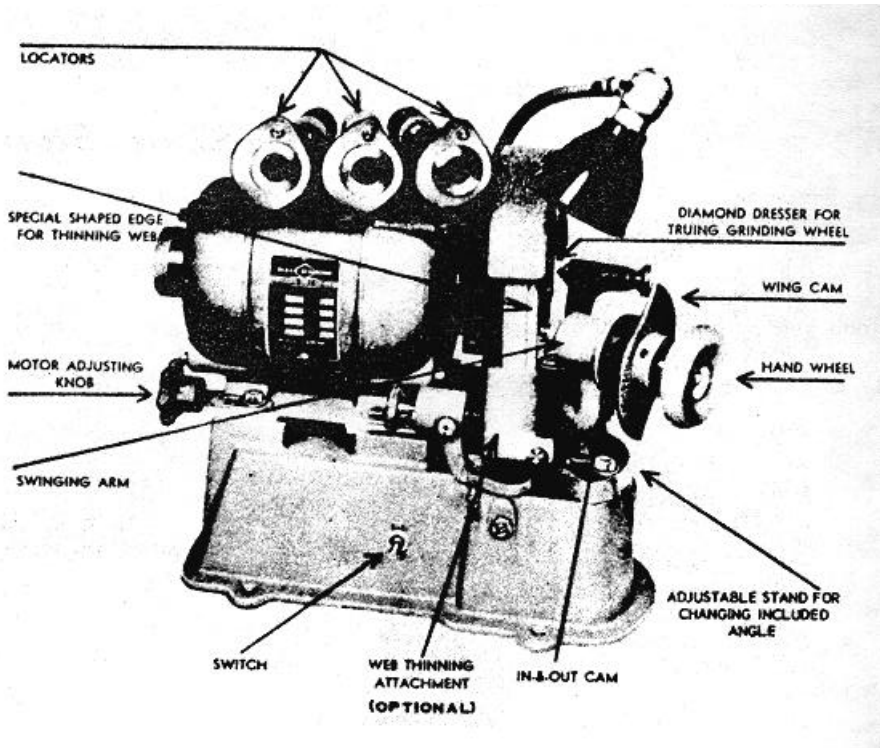
Insert DRILL HOLDER in LOCATOR until point of drill seats in LOCATOR BIT.



Then, push DRILL HOLDER in until pins hit FACE PLATE of LOCATOR. Now turn DRILL HOLDER in clockwise motion as far as it will go and tighten HAND WHEEL.



Remove DRILL HOLDER from LOCATOR and insert in the SWINGING ARM with the points of the WING CAM in a vertical position. Push HOLDER in until pins rest against IN-AND-OUT CAM. Then, with a gentle forward pressure, rotate DRILL HOLDER clockwise until both lips are ground.



Service Hints

KEEP GRINDER CLEAN

As with all precision machines, accuracy depends largely on how clean the working surfaces are kept. The master collet should frequently be removed and cleaned. Plugs are provided for the Swinging Arm and for the Web Thinner to use when the wheel is being dressed. The Swinging Arm plug may also be used to clean the locator tubes after dressing the wheel. A soft cloth should also be used to wipe the abrasive dust from those parts which depend upon bearing surfaces for performance.

WHEN TO DRESS WHEEL

When grinder is unpacked and ready for use. When wheel surface becomes filled and has a tendency to burn drills. When continued grinding of smaller drills causes a groove in the wheel which must be dressed out to maintain proper shape of grind.

Service Hints (CONTINUED)

HOW TO DRESS WHEEL

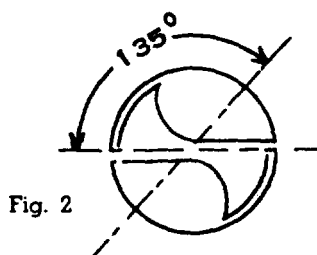
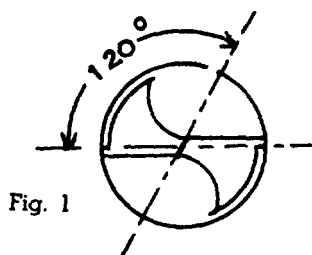
Loosen cap screws in motor base and move motor slightly forward (about 005) by turning the motor adjusting knob. Tighten cap screws and pass diamond slowly back and forth across face of wheel. Repeat if necessary.

LOCATORS

These are preset at factory and should not be disturbed except when it is necessary to vary angle of grind or when new bits are to be inserted. The locator does two things: first, it locates drill for proper grinding of clearance angle, and secondly, it determines the amount to be ground off drill.

HOW TO SET AND ADJUST LOCATOR BITS

Take the largest drill indicated by decal on top of the locator. Using a new drill if possible, grind it and measure the angle. To be correct, the angle on the largest drill should be 120° across the top as in Figure 1. Next, take the smallest drill for that locator, grind it, and measure angle. To be correct, this angle should be 135° as in Figure 2.



To INCREASE angle, turn locator steel in clockwise direction looking at front of locator.

To DECREASE angle, move in opposite direction. A large screw driver will do this nicely after the hollow set screw has been loosened.

Drills with more than 135° angle will not cut accurate holes and are liable to break. Drills that have become short will have a thick web. This web must be thinned in order to get the proper angle when grinding. This can be done on the BLACK DIAMOND WEB THINNING ATTACHMENT.

MORE OR LESS CLEARANCE

Grinder is set for 12° clearance. Variations may be obtained by changing the locator settings as described above or by use of clearance cams for 7° and 16° which are available as optional parts.

DIAMOND DRESSER

The diamond dresser is preset at factory and this adjustment should not be changed unless the diamond point becomes worn or a new diamond bit is to be inserted. The proper diamond setting, as measured from tip of the diamond to the end of diamond bit holder, is stamped on the holder and this distance should always be kept constant.

Service Hints (CONTINUED)

WING CAM PINS

When replacing wing cam or wing cam pins, the pins must be stoned to insure the lips of the drill being ground equal. First, stone one pin lightly, then locate a drill in the regular manner. Lay drill holder with drill in Vee Block with a stop at end of drill. With indicator fastened to side of Vee Block, indicate stoned pin, then turn drill holder and indicate other pin. Stone until pins read alike.

UNEVEN LIPS ON DRILLS

If machine is not grinding lips equal, check wing cam pins as described above. Also check bushings for wear. A worn bushing cannot be expected to hold a drill centrally.

BURNING DRILLS

If drills have tendency to burn, check the following:

1. Wheel may be filled or glazed over. Dressing will correct this.
2. Grind may be removing too much stock of drill. Grinder is preset to remove not more than .010 per grind. Locators may have been moved out of adjustment. Also check diamond distance as described above.
3. Operator may be forcing drill too hard against wheel. A normal forward thrust is ample to grind the drill in several revolutions. Do not expect to clean the drill point in one revolution of the drill holder.
4. Wheel may not be the correct one for a particular job. The wheel as furnished is for the average grind. We stock a variety of specially balanced wheels to meet your particular requirements. Check list on page 7.

DRILL HOLDER WON'T GRIP DRILLS

If drill holder won't close tight on drill:

1. Clean and lubricate draw-in spindle of drill holder.
2. Check drill for undersize.
3. Check bushing for wear.
4. Check collet and draw-in spindle for wear.

TAPER PIN ON DRILL STAND

When signs of wear appear on taper pin, rotate slightly to new surface. Repeating this when necessary will give maximum use of pin.

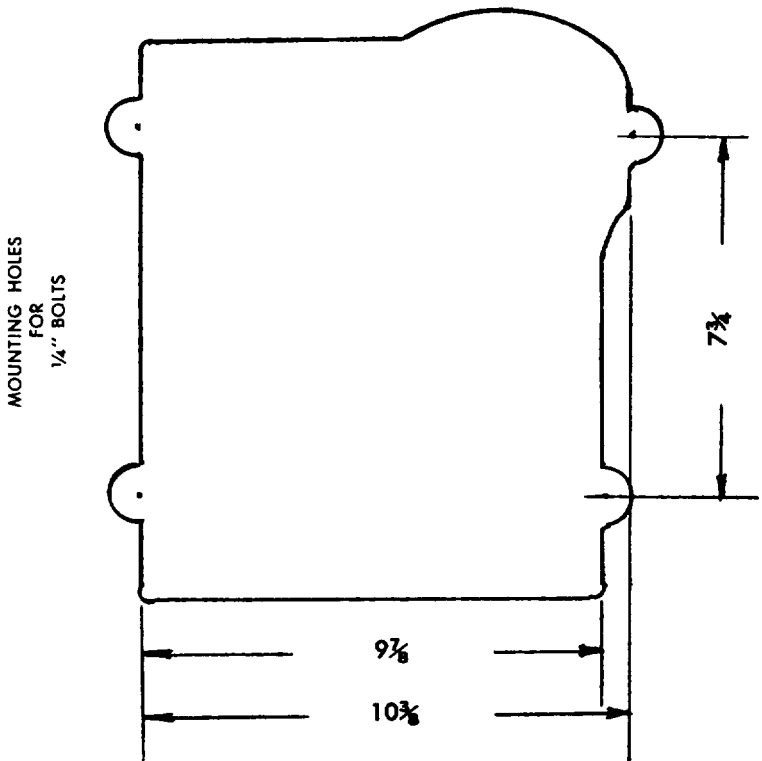
TAPER SCREWS

Taper screws for the stand and for the dresser arm (parts #26 and #46), should be lubricated and checked for tightness occasionally. Any sloppiness will affect the accuracy of the grinder.

CHECKING FOR WEAR

To maintain the accuracy possible with the Black Diamond drill grinder, the following points should be checked for wear from time to time:

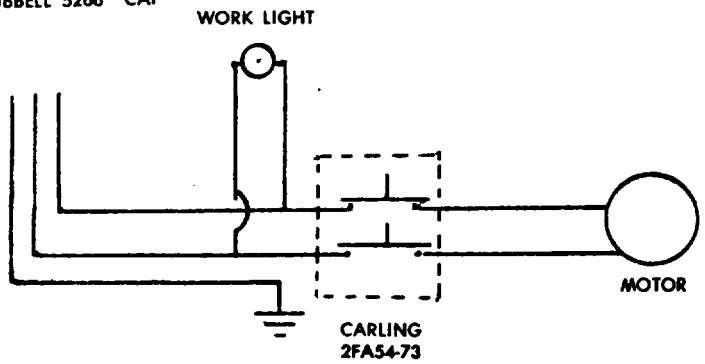
1. Bushings
 2. Swinging arm tube
 3. Wing cam pins
 4. Taper pin
 5. Drill holder. (When ordering new collets, check threads of draw-in spindle for wear. Worn threads on the draw-in spindle will likely damage a new collet.)
-



FOUNDATION PLAN

WIRING DIAGRAM

HUBBELL 5273L ADAPTER
 HUBBELL 5266 CAP



WORK LIGHT

MOTOR

CARLING
 2FA54-73

APPENDIX A

BASIC ISSUE ITEMS LIST

Section I. PREFACE

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 number preceding the colon in the descriptive column).

b. Manufacturer's part number (the number, and sometimes letters, following the colon, (a) above). Dashes, commas, or other marks must be included exactly as listed.

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

d. Name of manufacturer of end item (from cover of 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. Manufacturer's serial number (from name/data plate).

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

i. If DD Form 1348 is used, fill in all blocks except 4, 5, 6, and Remarks field, in accordance with AR 725-50. Complete form as follows:

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

3. Explanation of Columns

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

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

<i>Code</i>	<i>Explanation</i>
C	Obtain through local procurement. If not obtainable from local procurement, requisition through normal supply channels with a supporting statement of non-availability from local procurement.
P	Applied to repair parts which are stocked in or supplied from GSA/DSA, or Army supply system, and are authorized for use at indicated maintenance categories.

- (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>
C	Operator or crew maintenance

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

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

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

c. *Description (Col. 3).* 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>
07448:.....	Black Diamond Saw and Machine Works
81349:.....	Military Specifications DSA

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

4. Abbreviations

al-oxide.....	aluminum oxide
assy.....	assembly(ies)
c.....	cycle(s)
cap.....	capacity
deg.....	degree(s)
gr.....	grade
hd.....	head
max.....	maximum
med.....	medium
mtg.....	mounting
o/a.....	overall
rd.....	round
S.....	steel
shk.....	shank
std.....	standard
v.....	volt(s)
w.....	wide, width

5. Errors, Comments, and/or Suggestions

Reports of errors, comments, and/or suggestions are encouraged. They should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, Headquarters, U.S. Army Weapons Command, ATTN: AMSWE-SMM-P, Rock Island Arsenal, Rock Island, Ill. 61201.

6. Special Information

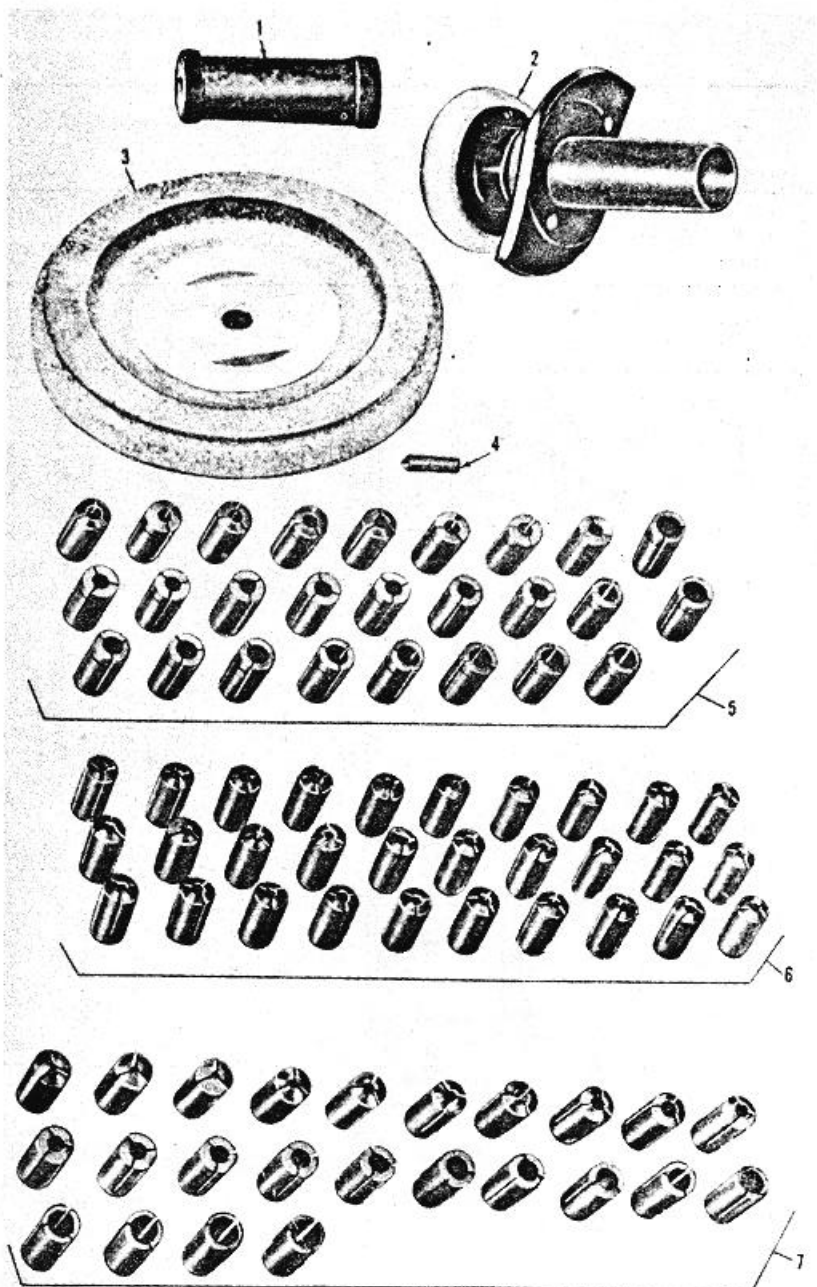
Individual sizes of "Bushing, Drill Holder", are identified by adding the inside diameter size, number, or letter to the group identifying number of that bushing. Example-the proper identification number for a 7/16 inch fractional size bushing would be 3C51-7/16, H letter size 3C52-H, etc.

Section II. BASIC ISSUE ITEMS LIST

(1) Source, maintenance, and recoverability code				(2)	(3)	(4)	(5)	(6) Illustration	
(a) Material Code	(b) Source	(c) Main- ten- ance level	(d) Reco- ver- ability	Federal stock No.	Description	Unit of issue	Quantity authorized	(a) Figure No.	(b) Item No.
	-	-		3415-242-789	<p align="center">MAJOR COMBINATION</p> <p>The following item is to be requisitioned for initial use only.</p> <p>GRINDING MACHINE, DRILL: bench mtg, 3/32 to 3/4 dia range, 2 flute, 80 to 14 deg angle, 1 cup grinding wheel; 7 max dia, 3/8 face w, 1/2 mtg hole, dry grinding, 1/4 hp, 110-v, 60-c, sgle-ph (Black Diamond Saw & Machine Works Model 2A) (3415-242-5789).</p> <p align="center">COMPONENTS OF MAJOR COMBINATION</p> <p align="center">None authorized.</p> <p align="center">SPARE PARTS</p> <p align="center">None authorized.</p>				

**TOOLS AND EQUIPMENT FOR:
GRINDING MACHINE, DRILL
(07448:2A).**

C	C	-	-	BUSHING, DRILL HOLDER: fractional size, 1/8 thru 1/2 by 64ths, set of 25 (07448:3C51).	set	1	A-1	7
P	C	-	3450-356-9467	BUSHING, DRILL HOLDER: letter size, A thru Z, set of 26 (07448:3C52).	set	1	A-1	5
C	C	-	-	BUSHING, DRILL HOLDER: number set size, #1 thru 30, set of 30 (07448:3C53).		1	A-1	6
P	C	-	3460-390-8576	COLLET, MACHINE: spring draw-in type, rd hole grip, S, 0.8380-26NS thd size, 0.862 body dia, 3 lg, 3/4 cap. (07448:3C29-3-4).	ea	1	-	-
P	C	-	3460-373-1362	HOLDER, DRILL: assy (07448:1)	ea		A-1	2
P	C	-	3470-357-0385	NIB, DIAMOND, WHEEL DRESSING: 1/4 shk dia, 15/16 lg, chip diamond (07448 :3C23).	ea	1	A-1	4
C	C	-	-	PLUG GRINDING: wooden (07448:48)	ea	1	A-1	1
P	C	-	3460-357-4990	WHEEL, ABRASIVE: recessed one side, face std wheel, al-oxide, 60 grain size, med gr spacing. No. 5 vitrified bond, gr K, 7 o/a dia, 7/8 thk, 1/2 arbor hole (81349: MIL-W-16714).	ea	1	A-1	3
P	C	-	5120-184-8620	WRENCH, OPEN END FIXED: dble hd type, 15 deg angle of hd. 7/16 and 1/2 opng, 3/16 thk, 7 o/a lg.	ea	1	-	-



WE 30236

Figure A-1. Tools and equipment.

By Order of the Secretary of the Army:

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

Official:

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

Distribution:

Active Army:

DCSLOG (1)
CNGB (1)
TSG (1)
CofEngrs (2)
CofSptS (2)
Dir of Trans (2)
CC-E (1)
USA Armor Bd (1)
USCONARC (3)
USAMC (2)
USAWECOM (75)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (2)
LOGCOMD (3)
Armies (3) except
 Seventh USA (5)
 Eighth USA (5)
Corps (1)
USAC (1)
USAQMCENFL (2)
APG (1)
WSMR (1)
USAES (1)
USAAVNS (2)
Army Dep (2)
Utah Gen Dep (1)
LGH (1)
Arsenals (2)
Tng Aid Cen (2)
USDB (1)
USAATC (1)
USAAPSA (1)
USA Human Engr Lab APG (1)
USA Ballistic Rsch Lab (1)
Units org under fol TOE:
55-457 (1)
 55-458 (1)

NG: None.

USAR: None.

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

☆GPO : 1989 O - 242-451 (6007)

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



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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

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 decigram = .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	5/9 (after	Celsius
	°C	subtracting 32)	temperature
	temperature		temperature

PIN: 018476-000