TM 9-3413-222-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE MANUAL

DRILLING MACHINE, UPRIGHT, FLOOR MOUNTED, 2 INCH DRILLING CAPACITY IN CAST IRON, 1 SPINDLE, NO. 4 MORSE TAPER SOCKET, 7 1/2 INCH SPINDLE TRAVEL, 11 INCHES FROM COLUMN TO CENTER OF SPINDLE, 8 SPEEDS 65 TO 1350, 3 HORSEPOWER, 220-VOLTS, 60-CYCLE, 3-PHASE (BUFFALO FORGE COMPANY MODEL 22 RC) (3413-517-1061)

HEADQUARTERS, DEPARTMENT OF THE ARMY
APRIL 1965

TAGO 8131A

TM 9-3413-222-12
Change No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., *27 April 1973*

Organizational Maintenance Manual
DRILLING MACHINE, UPRIGHT:
FLOOR MOUNTED, 2 INCH DRILLING CAPACITY
IN CAST IRON, 1 SPINDLE, NO. 4 MORSE TAPER SOCKET,
7-1/2 INCH SPINDLE TRAVEL, 11 INCHES FROM COLUMN
TO CENTER OF SPINDLE, 8 SPEEDS 65 TO 1350,
3 HORSEPOWER, 220-VOLTS, 60-CYCLE,
3-PHASE
(BUFFALO FORGE COMPANY, MODEL 22 RC)
(3413-517-1061)

This change is current as of 19 March 1973.

TM 9-3413-222-12, 1 April 1965 is changed as follows:
Page 15. Add the following paragraph:

18. 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 Components of End Item

Component	Part number FSCM
ARBOR, DRILL, CHUCK: Screw type, No. 4 Morse Taper shank	# 4 series 42 75078
BELT, V: drive, rubberized fabric, 74 outside circ, 11/16 top w, 40 deg angle	MS 39243-50:96906
BELT, V: feed, rubberized fabric, 31 outside circ, 1/2 top w, 40 deg angle	MS 39242-14:96906
CHUCK, DRILL: 3-jaw key type, heavy duty 0 to 1/2 cap.	6A-75078
DRIFT, DRILL SLEEVE- for #2 Morse taper	#2:65400
DRIFT, DRILL SLEEVE' for #3 Morse taper	#3:65400
DRIFT, DRILL SLEEVE: for #4 Morse taper	#4:65400
KEY, DRILL CHUCK: Jacobs design, key No. 3, steel	K3:75078
SLEEVE, REDUCING #4 to #2 Morse taper	#4-#2:72151
SLEEVE, REDUCING #4 to #3 Morse taper	#4-#3:72151

Page 16. Appendix I (with the exception of figure 1) is superseded as follows:

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

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1. Scope

This appendix lists basic issue items and items troop installed or authorized.

a. Basic Issue Items List-Not applicable.

b. Items Troop Installed or Authorized List-Not applicable.

2. Recommending Improvements

You can improve this manual by calling attention to errors by recommending improvements using DA Form 2028 (Recommended Changes to Publications) or by a letter, and mail directly to: Commander, U.S. Army Weapons Command, ATTN: AMSWE-MAS, Rock Island, IL 61201. A reply will be furnished directly to you.

By Order of the Secretary of the Army:

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Chief of Staff

Official:

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

Distribution:

Active Army

DCSLOG (1)
CNGB (1)
TSG (1)
COE(2)
Dir of Trans (1)
ACSC-E (1)
CONARC (3)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (2)
LOGCOMD (3)
AMC (2)
WECOM (10)
NMECOM (2)
AVSCOM (3)
USAAESWBD (2)
USA Armor Bd (1)
Armies (3) except
7th & 8th USA (5)
Ft Story (1)
APG (1)
DPG (1)
JPG (1)
ATS (1)
WRAMC(1)
Engr Bde (1)
USMA (1)
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USAQMS (1)
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AD (2) except
GCAD (5) TEAD (5)
LEAD (5) ANAD (3)
Engr Sec, Gen Dep (1)
Arsenals (2)
Div Engr(1)
Engr Dist (1)
USADB (2)
ARMISH (1)
MAAG: Iran(l)
USACDCAVNA (1)
USACOMZEUR (1)
JUSMMAT(1)
JBUSMC (1)
USA Engr R&D Lab (2)
Trans Acft Maint Shop, Atlanta(1)
New Cumberland (1)
USAREUR Engr Proc Cen (2)
USAREUR Engr Sup Con Agcy (2)
Chicago Proc Ofc (1)
Engr FLDMS (2)
QM FLDMS (2)
4th USASA Fld Sta (1)
12th USASA Fld Sta (1)
Units org under fol TOE: - 2 ea.
5-36
5-127
5-216
7
7-100
17
17-100
29-1
29-11
29-15
29-16
29-21
29-25
29-26
29-35
29-36
29-41
29-51
29-55
29-56
29-65
29-75
29-79
29-85
29-86
29-105
29-109
37
37-100
57
57-100

ARANG. State AG (3), Units-Same as Active Army except allowance is one (1) copy to each unit
USAR Same as Active Army except allowance is one (1) copy each TOE 29-7: None
For explanation of abbreviations used, see AR 310-50.

☆**U S. GOVERNMENT PRINTING OFFICE: 1973-769618/728**

ORGANIZATIONAL MAINTENANCE MANUAL

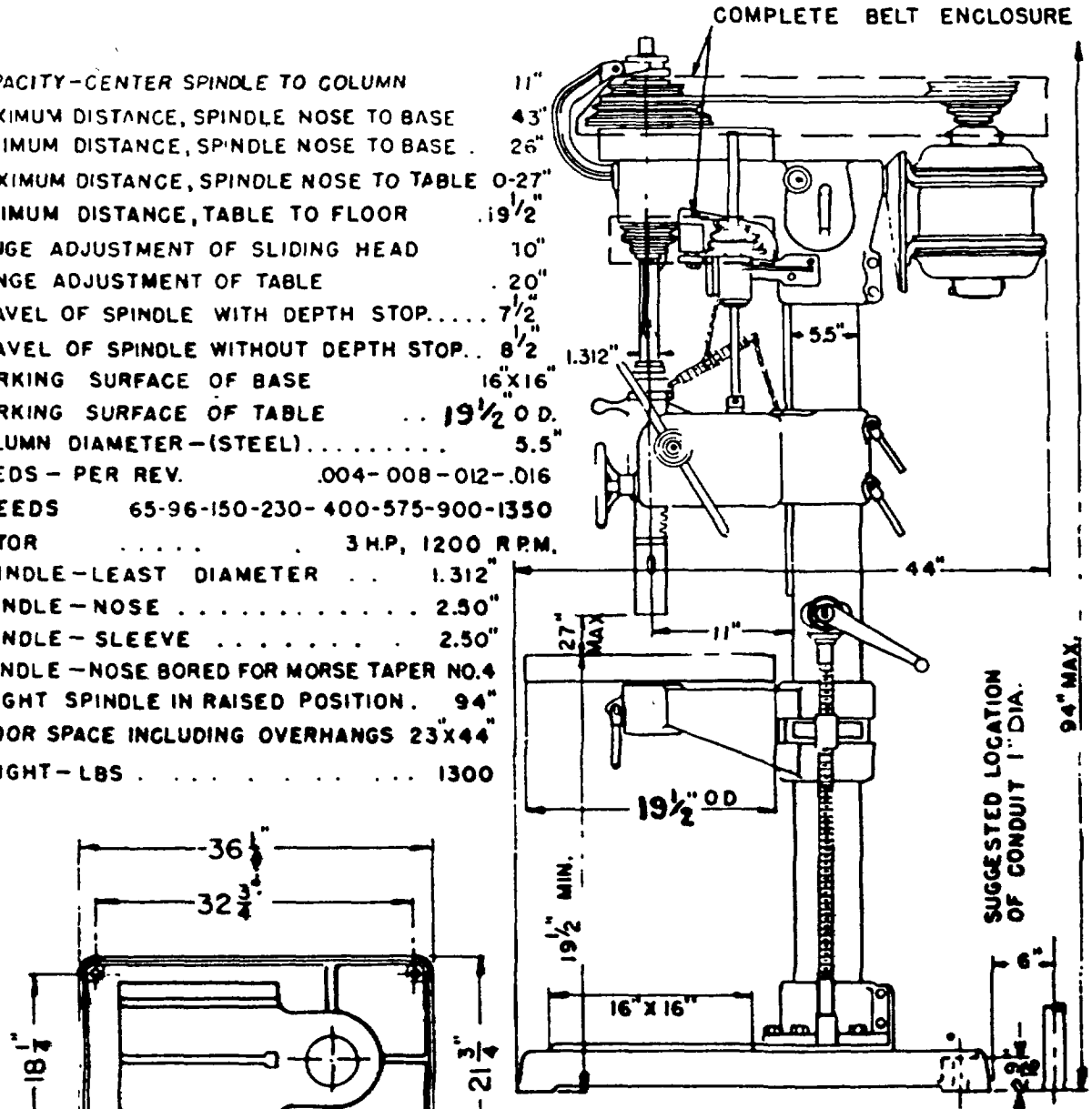
DRILLING MACHINE, UPRIGHT, FLOOR MOUNTED, 2 INCH DRILLING CAPACITY IN CAST IRON, 1 SPINDLE, NO. 4 MORSE TAPER SOCKET, 71/2 INCH SPINDLE TRAVEL, 11 INCHES FROM COLUMN TO CENTER OF SPINDLE, 8 SPEEDS 65 TO 1350, 3 HORSEPOWER, 220-VOLTS, 60-CYCLE, 3-PHASE (BUFFALO FORGE COMPANY MODEL 22 RC) (3413-517-1061)

SPECIFICATIONS AND CAPACITIES

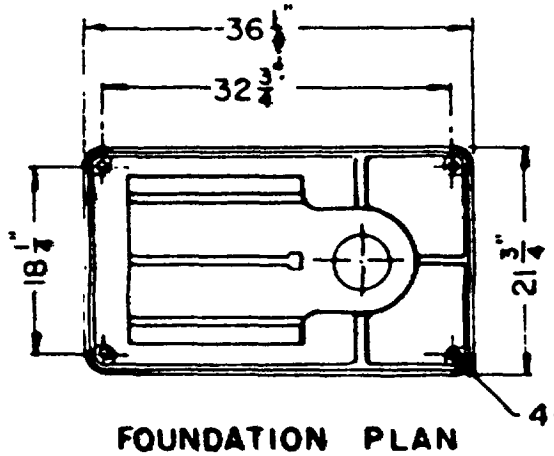
BUFFALO NO. 22 DRILL

WITH 4 STEP FEED

CAPACITY–CENTER SPINDLE TO COLUMN	11"
MAXIMUM DISTANCE, SPINDLE NOSE TO BASE	43"
MINIMUM DISTANCE, SPINDLE NOSE TO BASE	26"
MAXIMUM DISTANCE, SPINDLE NOSE TO TABLE	0-27"
MINIMUM DISTANCE, TABLE TO FLOOR	19½"
RANGE ADJUSTMENT OF SLIDING HEAD	10"
RANGE ADJUSTMENT OF TABLE	20"
TRAVEL OF SPINDLE WITH DEPTH STOP	7½"
TRAVEL OF SPINDLE WITHOUT DEPTH STOP	8½"
WORKING SURFACE OF BASE	16"X16"
WORKING SURFACE OF TABLE	19½" O.D.
COLUMN DIAMETER–(STEEL)	5.5"
FEEDS – PER REV.	.004-.008-.012-.016
SPEEDS	65-96-150-230-400-575-900-1350
MOTOR	3 H.P., 1200 R.P.M.
SPINDLE–LEAST DIAMETER	1.312"
SPINDLE–NOSE	2.50"
SPINDLE–SLEEVE	2.50"
SPINDLE–NOSE BORED FOR MORSE TAPER NO.4	
HEIGHT SPINDLE IN RAISED POSITION	94"
FLOOR SPACE INCLUDING OVERHANGS	23"X44"
WEIGHT–LBS	1300



OVERALL DIMENSIONS



FOUNDATION PLAN

ID-3677-2

AGO 8131A

2. Installation

The weight of the No. 22 Drill and dimensions of its base are such that a floor load of approximately 275 pounds is created. While this load is well within the prescribed limits of safety codes, it is well to consider that the load cannot be considered wholly as a dead load because of vibration. If the machine is set on a ground floor, the customary concrete foundation should be used. Dimensions of such a foundation are totally dependent on the nature of soil and climatic conditions. In general, a foundation whose upper dimension measures six to eight inches larger, on all sides, than the base is sufficient. It may have vertical sides but tapered sides are preferable, so that they act as an anchor. Generally speaking, the depth of foundation for this machine should be in the neighborhood of 2 feet and should be steel reinforced. The foundation bolts may be set securely when the concrete is poured.

Installations on concrete or composition floors should place machinery either directly over, or, as near to as possible, a steel supporting member so that the vibration will be minimized and stress imposed, will be direct. Lag screws and shields are sufficient to hold the machine securely.

Installation on wooden floors should, in general, follow the procedure outlined above as regards placing the machine. When not practical to do so, auxiliary members should be added to the floor structure so that the weight will be distributed over a larger number of floor beams.

The base has four 9/16-inch diameter holes for receiving 1/2-inch foundation bolts or lag screws.

When installing the machine, care should be taken that sufficient clearance is left all around for maintenance and repair. The machine should be set level and the foundation shimmed if necessary to assure equal pressure being applied to all 4 bolts.

After the machine is installed certain precaution should be taken to insure proper operation. The machine has been coated with a rust preventative which must be carefully and completely removed. Special care should be taken to clean the spindle splines thoroughly, and the Morse taper socket of the spindle nose. Have the electrical connections checked by a competent electrician. Make certain that all grease is removed from pulleys and belts, and that the drive belt is not too tight.

3. Starting and Stopping

A momentary contact push button station, which closes the magnetic control circuit, is mounted on the left hand side. Do not commence work until motor has come up to full speed.

The machine is stopped by pressing the STOP button on the push button station. Except in emergencies, the machine should not be stopped with the tool still in the work. A safety disconnect switch is provided for disconnecting machine from source of power supply.

4. Twist Drill Failures and Their Causes

a. Drill Breakage.

Caused by -Lack of lip clearance
Speed too slow
Dull drill
Back lash in work or machine
Flutes clogged (usually found in brass and wood)

b. Broken Tang.

Caused by -Imperfect fit of taper shank. May be caused by nicks, dirt, burrs, or worn-out socket.

c. Chipping of lip or Cutting Edge.

Caused by- Too much pressure
Too much lip clearance

d. Oversize Hole.

Caused by- Unequal angle of point
Unequal length of cutting edge
Loose spindle

c. Rough Hole.

Caused by -Dull drill
Improper grind on drill
Wrong or lack of lubricant
Too much pressure

5. Operation Under Abnormal Conditions

If the machine is operated under extremely dusty conditions, it should be run at lowest possible speed. This will prevent, to some ex tent, rapid abrasive wear on exposed parts. At frequent intervals it may be necessary to clean exposed parts thoroughly.

Operation under extreme cold conditions requires no other precautions than to start the machine on lowest speed and increase the speed as the operating parts become warmer and grease is "unfrozen". Care should be taken to prevent "shock loads" which might break extremely cold steel members.

Operation in extreme heat will not affect the machine, but extreme heat may cause the motor to overheat. The only remedy for this condition is to allow the motor to cool off whenever possible.

6. General Operating Details

The machine can be briefly described as follows: The motor, fitted with a 4-step pulley and mounted on an adjustable bracket, drives the spindle assembly through the medium of a V-belt. The spindle assembly can be either driven direct or through back gears. This change is made by the back gear shift lever which when disengaging the back gears, engages a direct drive clutch and vice versa.

The power feed takeoff pulley is mounted on the spindle pulley sleeve and through a V-belt drives a second pulley which in turn is direct connected to worm in tile sliding head gear case.

This worm drives the main worm shaft which in turn drives the main worm gear, attached to the feed pinion through a hardened steel clutch.

The main worm shaft worm gear (driven by the first mentioned worm) is fitted with a hardened steel-toothed clutch, actuated by the knockout lever on the left side of the sliding bead, and which is either actuated manually or can be tripped at a predetermined depth by the depth stop collar mounted on the spindle feed sleeve. The main feed worm revolves freely on the feed pinion shaft until engaged with the hardened steel clutch, which is moved into "clutching" position by feed handle. The handwheel at the front of the sliding head is used for "fine feed", spot facing, etc., and is operated with the feed engaged at the feed handle, but disengaged at the knock-out lever clutch.

Before drilling with the machine, care should be taken to make sure that the spindle is running at the proper speed and the feed is correct. Set the depth stop for the proper feed depth and engage the power feed by raising the knockout lever to its UP position. Advance the drill to the work and engage the feed clutch by "breaking" the feed handle to the OUT position. The feed will automatically "knock off" when the stop collar strikes the knockout lever or the feed can be interrupted at any part of its travel by disengaging the knockout lever.

7. Special or Specific Operating Instructions

The spindle nose is fitted with a No. 4 Morse taper socket. To use twist drills having a No. 3, No. 2 or No. 1 shank, a sleeve must first be inserted into the spindle nose. Be sure both sockets are clean and free from dirt or they will not "grip". When using straight shank drills, a chuck and arbor is used. Be especially careful that both spindle socket and arbor. are clean before using chuck. Place chuck and arbor in socket and with chuck jaws drawn down inside of chuck body, strike chuck a smart blow with wooden block or babbitt hammer.

Before drilling any material, check to make sure the drill is correctly ground, the proper speed is set, and the work to be drilled is securely fastened.

8. Feed and Speeds for Drills of Hi-Speed Steel

The following table covers speeds for most materials and in sizes within the capacity of the machine. The ratings are based on the use of "hi-speed" drills. For carbon drills use speeds about one-half those listed.

Size of drill, inches	Feed per revolution, inches	Cast steel	Alloy-steel drop-forgings	Tool and carbon-steel drop-forgings	Hard cast iron	Malleable iron	Mild steel	Cast iron	Bronze brass
		Feet per minute							
		Revolutions per Minute							
		40	60	60	80	90	100	110	200
1/16	0.003	2,445	3,056	3,667	4,889	5,500	6,112	6,724	12,224
3/32	0.0035	1,628	2,038	2,442	3,258	3,666	4,584	5,043	9,168
1/8	0.004	1,222	1,528	1,833	2,445	2,750	3,056	3,362	6,112
5/32	0.0045	976	1,221	1,465	1,954	2,198	2,546	2,802	5,092
3/16	0.005	815	1,019	1,222	1,630	1,833	2,036	2,242	4,072
7/32	0.0055	698	872	1,047	1,396	1,570	1,781	1,962	3,564
1/4	0.006	611	764	917	1,222	1,375	1,528	1,681	3,056
9/32	0.0065	542	678	814	1,084	1,222	1,375	1,513	2,750
5/16	0.007	489	611	733	978	1,100	1,222	1,344	2,444
11/32	0.0075	444	555	666	888	1,000	1,120	1,233	2,290
3/8	0.008	407	509	611	815	917	1,018	1,121	2,036
11/32	0.0085	376	469	563	752	846	946	971	1,892
7/16	0.009	349	437	524	698	786	874	921	1,748
15/32	0.0095	326	407	488	652	732	819	881	1,638
1/2	0.010	306	382	458	611	688	764	840	1,528
9/16	0.0105	271	339	407	543	611	679	747	1,358
5/8	0.011	244	306	367	489	550	612	673	1,224
11/16	0.0115	222	277	333	444	500	555	611	1,110
3/4	0.012	204	255	306	407	458	508	559	1,016
13/16	0.0125	188	234	281	376	423	474	521	948
7/8	0.013	175	218	262	349	393	438	482	876
15/16	0.0135	163	203	244	326	366	407	448	814
1	0.014	153	191	229	306	344	382	420	764

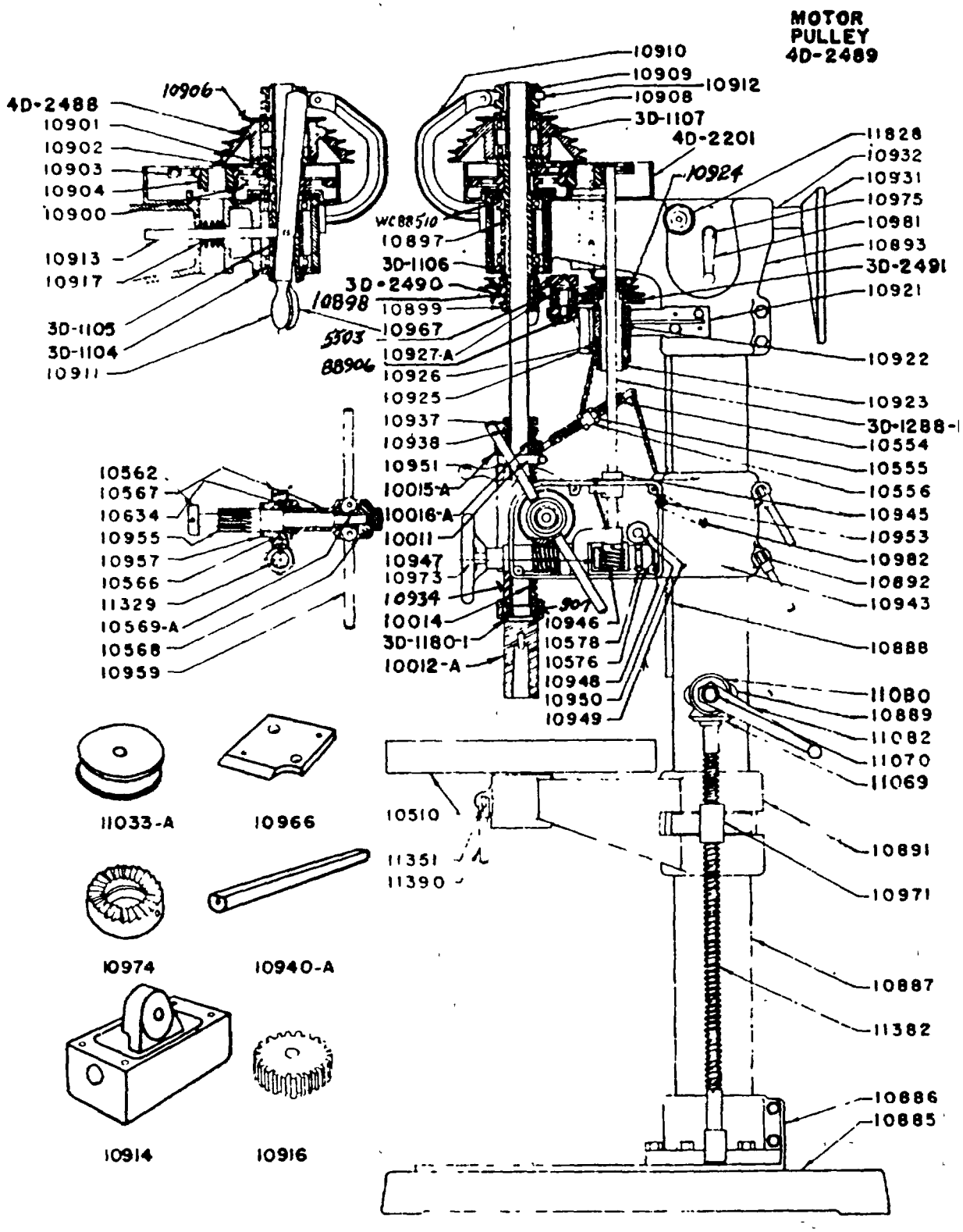
9. Drill Disassembly

a. Disclssemble Back Gear Clutch. Loosen #10890 on each side of yoke of lever #10911 that hold the bronze shoes #10912 in place. The clutch spool #10909 can now be lifted off the spindle pulley sleeve #10897-A. Remove clutch bracket #10910 from front of frame and rack housing #10914 from left side of frame. Remove the two keys #10972-A from spindle sleeve.

b. Remove Drive Belt and Spindle Pulley. Remove back gear clutch per paragraph a above. Loosen locking screw 3D-1410 and rack motor bracket back to frame by turning crank #10981. Remove drive belt from pulleys. Raise spindle pulley #10906 and #10902 spindle sleeve #10897-A1 and remove drive gear #10901 and #10902 from bottom of pulley which is fastened with 4-1/4-inch fillister head cap screws. The ball bearings and ball bearing spacer 3D-1107-2 can now be pressed out of the spindle pulley.

c. Remove Back Gears. Remove back gear clutch per paragraph a and spindle pulley per paragraph b above. Remove cover plate 10920. Remove gear and pinion #10903-1 and 10904-1 from eccentric shaft #10917. Press bronze bushing #10905 out of pinion #109031. Remove engaging rack housing from left side of frame. Lift eccentric shaft #10917 out of frame. Remove gear #10900 from spindle pulley sleeve #10897-A. Back gear guard 4D-2201 can now be removed from top of frame.

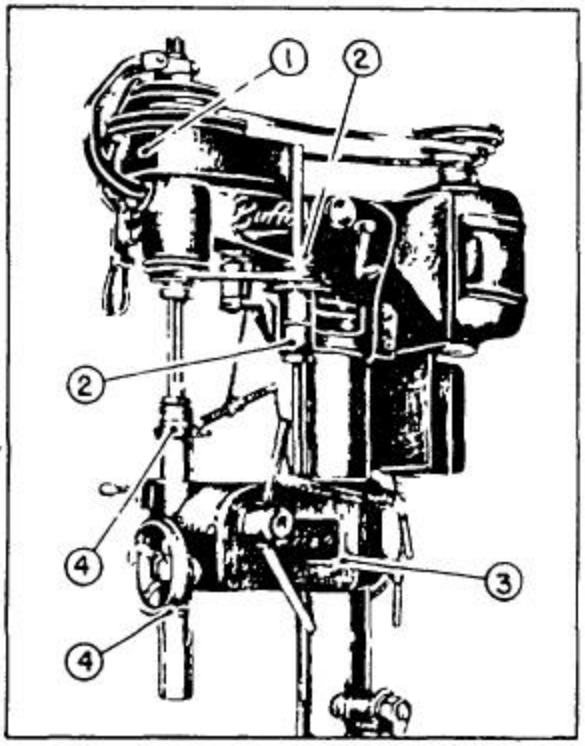
BALL BEARING SPINDLE



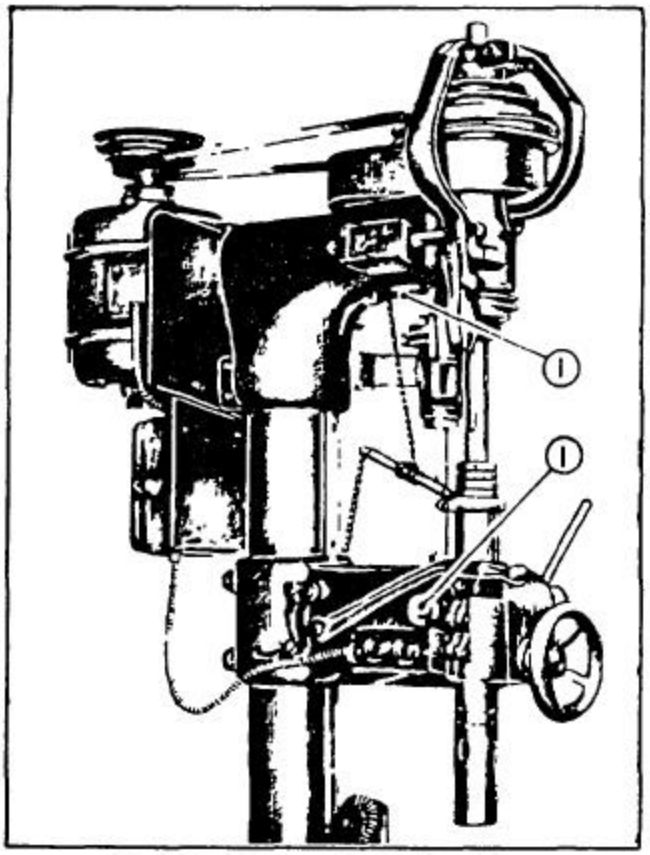
LUBRICATION CHART

FOR

NO. 22 DRILL



RIGHT SIDE



LEFT SIDE

DESCRIPTION

NO	TYPE OF FITTING	SPECIFICATION OF LUBRICANT
1	ALEMITE HYDRAULIC	SOFT GREASE
2	OIL HOLE	SAE NO. 30
3	OIL CUP	SAE NO. 70
4	OIL HOLE	SAE NO. 10

d. Remove Spindle. Raise sliding head to its highest position. Swing table #10510 to left to clear spindle. Loosen set screw in collar 3D3681, holding spindle to prevent it from falling when set screw is loosened. Spindle may now be lowered out of the spindle pulley sleeve #10897-A and out of spindle sleeve #10934.

e. Remove Spindle Pulley Sleeve and Bearings. Remove back gear clutch per paragraph *a*, spindle pulley per paragraph *b*, back gears per paragraph *c* and spindle per paragraph *d* above. Remove power feed belt. Remove #10899 and pulley #10898 from end of sleeve. Take off spacer 3D-1106-2. Take off bearing cap 3D-1104-P1 from top of frame. The spindle pulley sleeve #10897-A and ball bearings can now be removed from frame.

f. Disassemble Power Feed Take-Off Mechanism. Remove spindle as per paragraph *d* above. Lower sliding head to its lowest position. Remove feed belt from step pulleys. Remove nut #10899, pulley #10898 and spacer 3D-1106-2 from lower end of spindle pulley sleeve #10897-A1. Remove pulley bracket #10921-P1 from frame and lift over feed shaft 3D-1288-1. Remove idler pulley #10928-B by taking off nut from stud #10928-A and removing stud bracket #10925. Remove washer #10929-A. Take out wire ring #10962 and remove ball bearing and stud from pulley #10927-B. Take off collar #10922-1 from bracket. Take out wire ring #10962 from pulley #10924-P1 and remove sleeve and bearing from pulley. Idler pulley bracket #10925 can now be taken off of the main bracket #10921-P1.

g. Remove Spindle Sleeve. Lower sliding head to its lowest position and insert a 3/16 inch drill rod pin through the counter weight chain to prevent the counter weight from dropping. Remove pin from counter balance bar #10554-1. Remove hook #10939 from sleeve. Remove depth stop collar #10941. Remove collar #10562 from feed pinion #10955. Hold sleeve to prevent it from dropping and remove feed pinion assembly from right hand side of sliding head. Ball bearing can now be removed from spindle sleeve if necessary.

h. Remote Feed Pinion and Disassemble Power Feed Clutch (Without removing spindle or spindle sleeve). Remove nut #10571 from right hand side of feed pinion #10955. Lever block #10568 can now be removed from shaft. Lever #10959-A can be removed from block by driving out the 2-5/16 inch pins on each side of block. Remove cover #10960 from gear case. Remove clutch spool #10567-A, spring #10634, worm gear #10957-B1 and washer #10958 from shaft. Insert a 3/16 inch drill rod through counter weight chain close to underside of frame. Remove collar #10562-1 from left side of feed pinion and remove feed pinion from right hand side.

i. Remove Power Feed Gearing. Remove nut #10571 from feed pinion on right side of sliding head. Remove block #10568 and spool #10567-A from feed pinion. Remove cover #10960 from sliding head, and cover #10954 from back of sliding head. Remove spring #10634, worm wheel #10957-B1 and washer #10956 from feed pinion shaft. Loosen setscrew on lever #10949 then remove knockout lever #10951 and shaft #10950-1 from left side of sliding head. Take out pin #10952 and spring #10649 from hold under knockout plate. Remove small worm #10946 by loosening setscrew in worm and raising feed shaft 3D-1288-1. Loosen setscrews in worm gear #10947 and worm #11329-1 then remove hand wheel #10973 and shaft #10948 from front of sliding head.

10. Inspection of Parts

Part No	*Name of Part*	*Inspect for*
10566-1	Clutch disc	Worn or broken clutch teeth
10567-A	Clutch spool	Worn or broken clutch teeth
10568	Clutch block	Excessive wear in bushings #10959-A
10576	Feed clutch	Excessive wear on fingers
10649	Spring	Broken or lost compression
10890	Screws	Good fit of dog point in bronze shoes #10912
10897-A1	Spindle pulley sleeve	Worn or broken edges of internal spline
10900	Spindle gear	Worn or broken teeth

Part No	*Name of Part*	*Inspect for*
10902-1	Drive gear	Worn or broken teeth
10903-1	Combination gear	Worn or broken teeth
10904-1	Pinion	Worn or broken teeth
10905	Bushing	Good running fit on 1-1/4" shaft
10908-1	Clutch	Broken edges on clutch teeth
10909	Clutch spool	Broken edges on clutch teeth
10912	Bronze shoes	Worn less than 9/16" thick
10913-1	Engaging rack	Worn or broken rack teeth
10914	Rack housing	Excessive wear in holes for rack #10913
10916	Gear	Worn or broken teeth
10917	Eccentric	Worn or broken gear teeth, scored or excessive wear on 1.248" dia.
10918	Fiber washer	Excessive wear beyond 1/8” thick
10921-P1	Bracket	Excessive wear in 1.5625" bored hole
10922-1	Sleeve	Wear on 1.561", 1.563" or 1.1807" dia.
10926 '	Spring	Broken ends
10927-B	Idler pulley	Worn or loose ball bearing fit
10932	Rack for motor	Broken rack teeth
10933-B	Spindle	Straightness, worn splines, scored Morse Taper socket
10946	Worm	Worn threads
10947	Worm wheel	Worn or broken teeth
10949	Lever for fork	Excessive wear in 500' hole
10952	Pin	Worn dog point
10953	Pinion	Worn or broken teeth
10955	Feed pinion	Worn or broken teeth, worn spline, excessive wear on 998" diameter
10957-B1	Worm wheel	Worn or broken teeth
10964	Centralizer	Loose ball bearing fit
10951	Knockout lever	Broken knife edge
10968	Locking pin	Worn edges on dog point
10969	Spring	Broken or lost compression
10974	Clutch disc	Worn or broken clutch teeth
10975	Pinion	Worn or broken teeth
11069-1	Gear	Worn or broken teeth
11080-1	Miter gear	Worn or broken teeth
11329-1	Worm	Worn threads
3D-1259	Loading spring	40 lbs. compression

11. Drill Assembly

a. Assemble Power Feed Gearing. Insert spring #10649-A and pin #10952 in hole in left side of sliding head. Insert knockout lever shaft #10951 through hole from left side of sliding head, with lever in its low position.

Insert worm gear shaft #10948 through hole in front of sliding head holding worm gear #10947, worm #11329-1 and keys in place. Fasten hand wheel #10973 on shaft in' front of sliding head. Fasten small worm wheel #10947 in place on shaft, assemble lever #10949 on shaft #10950-1 with clutch #10576 and fork #10578 in place. Fasten lever #10949 on shaft #10950-1 and tighten set screw, replace cover #10954 over hole in back of sliding head using a new gasket. Hold worm #10946 in place, with Bantam thrust bearing between worm and arm of sliding head, lower shaft #3D-1288-1 through worm and tighten set screw. Adjust collar #10945 on top of sliding head so that shaft will turn freely.

Hold spindle sleeve #10934 in place and insert feed pinion through right side of sliding head. Adjust collar #10562-1 on feed pinion to prevent end play of shaft. Washer #10958, large worm gear #10957-B1, spring #10634 and clutch spool #10967-A should then be put on feed pinion shaft in the order written. Replace gear case cover #10960 using a new gasket with shellac. Put lever block #10568 on shaft and adjust with nut #10571 so that clutch teeth do not strike when levers #10959-A are in their natural position (90° from shaft). After assembling and testing, fill gear case to level of hole in cover #10960 with the correct grade of grease. (Refer to lubrication.)

b. Assemble Spindle Pulley Sleeve and Bearings. Fasten bearing retainer #3D-1104-P1 to bottom of frame. Assemble (2) #WC-88510

ball bearings and spacer #3D-1105-2 on threaded end of spindle sleeve and insert through top of frame having a loading spring #3D-1259 between lower bearing retainer and bearing. Fasten back gear case #4D-2201 to top of frame having a loading spring between bearing and case.

c. Install Power Feed Take-Off Mechanism. Place bearing spacer #3D-1106-2 over spindle sleeve having the tapered end of spacer next to the bearing. With the key in place put takeoff pulley #10988, with the large step up on sleeve, tighten nut #10899 on end of sleeve #10897-A1. Press ball bearing #88506 into pulley #10924-P1 and insert snap ring #10962 in place. Press sleeve #10922-1 into bracket #10921-P1 and press pulley and bearing on top of sleeve.

With the sliding head in its lowest position slide the bracket and sleeve over the feed shaft. Fasten bracket #10921-P1 to frame.

Insert ends of spring #10926 into holes provided in brackets #10921-P1 and #10925. Assemble brackets together and fasten Collar #10923 on end of sleeve. Press bearing #5503 on stud #10928-A, then press bearing into pulley #10927-B, pack pulley with grease, and insert snap ring in pulley. Place washer #10929-A on stud with the small diameter next to the bearing and fasten stud in bracket #10925. Place takeoff belt on pulleys so that the idler pulley is on the left hand side of drive.

d. Install Spindle. Raise sliding head to its highest position and have table swung to the left of the column. Press ball bearing #907 with guard #10999 on spindle and insert spindle through sleeve #10934. Slide spindle and sleeve up through sliding head and place upper bearing guard #10936 with ball bearing #2907 over end of spindle. Place washer 3D-3479 and collar 3D-3681 on spindle, and slide spindle and sleeve the remaining distance through the sliding head. Insert feed pinion #10955, meshing teeth with the rack on the sleeve and lock feed pinion collar #10562-1 into place with setscrews. Push collar 3D-3681 into position to eliminate end play and lock with setscrew. Assemble depth stop collar #10941 and hook #10939 on sleeve and attach counter balance bar. Remove pin that has been inserted in chain to prevent counterweight from dropping.

e. Assemble Back Gear. Insert eccentric #10917 through top frame. Fasten gear case 4D-2201 to top of frame. Key gear #10900 to spindle sleeve #10897-A, being sure that hub of gear is down on shoulder of sleeve. Assemble gear #10903-1 and pinion #10904-1 on bushing #10915. Press in place on eccentric #10917 having thrust washer #10918 between pinion and shoulder of eccentric. Fasten cover #10920 to top of gear case.

f. Assemble Spindle Pulley. Fasten and dowel clutch #10908-1 to top of spindle pulley #10906. Press two ball bearings #88509 into pulley with spacer 3D-1107-2 between them. Fasten gear and adapter #10901-1 and #10902-1 on bottom of pulley and dowel. Press assembled pulley over spindle pulley sleeve #10897-A1 until inner race of ball bearing is against the shoulder on the sleeve. Place drive belt over motor and spindle pulleys.

g. Install Back Gear Clutch. Fasten bracket #10901-1 to front of frame. Press pin #10915 in housing #10914. Insert rack #10913-1 through hole in housing and place gear #10916 on pin. Fasten rack #10913-1 to lever #10911-1 with screw #10890. Adjust eccentric #10917 so back gears are in mesh and fasten housing #10914 to frame so that lever #10911-1 is in the back position. Insert locking pin #10968 and spring #10969 into hole in lever #10911-1, then faster lever #10967 to lever #10911-1. Place clutch spool #10909 over spindle pulley sleeve #10897-Al having the keys #10972-A fastened to sleeve. Fasten the two bronze shoes #10912, around clutch spool #10909 to lever #10911-1 with screws #10890 and adjust screws so that spool turns freely in the shoes, then tighten lock nuts on screws #10890.

12. Drill Adjustment

a. Drive Belt. Loosen knob #11828-1 on right side of frame and rack motor bracket out with crank #10981 to take up slack in belt. (DO NOT RUN V-BELT TIGHT.)

b. Spindle Return to Normal Position After Drilling. Loosen nuts #10555 on counterbalance bar #10554 and move hook #10556-1 nearer to spindle for faster return or farther from spindle for slower return of spindle.

c. End Play of Spindle in Spindle Sleeve. Loosen setscrew in nut #10938 and take up end play but be sure spindle turns freely in spindle sleeve.

d. Wear of Spindle Sleeve in Sliding Head. On the left side of the sliding head a split is provided in the spindle sleeve bearing for taking up wear. Loosen the two 3/8 inch setscrews, and tighten the two 3/8 inch fillister head capscrews. Spindle sleeve must slide freely with a minimum amount of shake. After adjusting lightly tighten the two 3/8 inch screws.

e. End Play in Feed Pinion Shaft. Tighten collar #10562-1 on left side of sliding head.

f. Adjust Power Feed Clutch. Engage clutch by pulling out on levers #10959-A. Tighten adjusting nut #10571. After releasing the clutch levers #10959-A, the nut #10571 should then be backed off if necessary to provide clearance between the clutch teeth. Lock collar in place with setscrew. Refer to "OPERATION SECTION" for lubrication.

13. Assembling Tolerances and Clearances

Spindle sleeve in sliding head	.0005" to .0015" sliding fit.
Feed pinion in sliding head	.001" to .003" running fit.
Sliding head in column	.001" to .003" sliding fit.
Shaft #10948 in sliding head	.001" to .003" running fit.
Shaft #10950-1 in sliding head	.001" to .003" running fit.
Bearings #WC-88510 in frame	.0007" to .001" loose fit.
Spindle pulley sleeve in bearings WC-88510	.0003" tight to .0004" loose.
Bearings #88509 in spindle pulley	.0002" to .0003" loose.
Spindle sleeve in bearings #88509	.0003" tight to .0004" loose.
Eccentric shaft #10917 in frame	.002" to .004" loose.
Bearing #5503 in pulley #10927-B	.003" tight to .0007" loose.
Bearing #5503 on stud #10928-A	.0002" tight to .0004" loose.
Bearing #88506 in pulley #10924	.0003" tight to .0004" loose.
Sleeve #10922-1 in bearing #88506	.0003" tight to .0004" loose.

14. Detailed Specifications

a. Drive. A vertical motor is mounted on an adjustable bracket at the rear of the machine and drives the spindle pulley through the V-Belt in one of four steps with ample overload capacity at even the lowest speed.

The spindle pulley, is mounted on ball bearings and drives through a clutch direct to the sleeve or through 6 to 1 ratio hardened steel back gearing.

Back gears are engaged after the direct clutch is disengaged by a single motion of the handle at the left side of the head. In reversing the shift, the gears are disengaged before the direct drive clutch engages.

The eight speeds are in geometrical progression from 55 to 2,100 rpm.

The speed range provides for efficient use of drills from 3/16 inch to 2 inch and for spot facing. The quick shift from direct to back gear speeds is most convenient for tapping and reaming.

b. Spindle Assembly. The spindle is high carbon alloy steel, heat treated and ground. Least diameter 1.312 inch. It runs in bronze bushings and is mounted between two ball thrust bearings. Rack teeth are cut integral in the sleeve.

c. Sliding Head. Sliding head is a single rigid casting. Quick, easy adjustment is assured by the rack in the column. The bearing of the rack sleeve is unusually long to reduce wear and also give accurate long life.

d. Feeding Mechanism and Control. Feed power is taken off the spindle by a V-belt drive, providing four rates of feed. Feed is automatically released at proper depth by the lever on the left side of the head. Hand advance or return is accomplished by the swing levers at right side which also engage power feed in one motion. Clutches are positive, multiple tooth, guarded by an overload shear pin. Slow advance for spot facing is produced by the hand wheel at the front. All feed gearing is in constant mesh, sient, and inclosed in the head. Gearing

runs in a bath of oil. The rack and pinion ration is such that for small drills, a direct hand feed by the swing lever makes this machine as convenient as a sensitive drill. The spindle is counter-balanced and may be adjusted to return after the feed is released.

d. Column. The column is steel, ideal for high strength and small deflection, ground to high finish and accuracy.

e. Table and Base. Tables are heavily ribbed, provided with T-slots and carefully fitted and scraped to fine bearing on supporting members.

15. Drill Parts Assembly

Part No.	Description	No. for assembly
	SPINDLE ASSEMBLY	
10933-B	Spindle 44 Morse Taper	1
907	Bearing ball, spindle lower	1
2907	Bearing ball, spindle upper.	1
10941	Stop, depth	1
10934	Sleeve, spindle	1
3D-3681	Collar	1
10939	Hook, spindle rack sleeve	1
10942	Screw, depth stop	1
10936	Bearing Guard, upper	1
10999	Bearing Guard, lower	1
10935	Bushing	2
	POWER FEED TAKE-OFF MECHANISM	
5503	Bearing, ball, idler pulley	1
10898	Pulley, feed	1
10899	Nut, spindle sleeve	1
10921-P1	Bracket, feed shaft	1
10922-1	Sleeve for feed pulley bracket	1
10923	Collar for feed sleeve	1
10924	Pulley, take-off spindle	1
10925	Bracket for idler pulley	1
10926	Spring for idler pulley bracket	1
10927-B	Pulley, idler	1
10928-A	Stud for idler pulley	1
10929-A	Washer and ring for idler pulley	1
10944	Shaft, feed	1
10962	Ring, wire for holding bearing	1
10963	Key for feed pulley	1
88506	Bearing, ball for feed pulley	1
	BACK GEAR ASSEMBLY	
10849	Washer for back gear	1
10890	Screw and nut for clutch shoes	2
10900	Gear spindle	1
10902-1	Gear, 27 tooth on spindle pulley	1
10903-1	Gear, 66 tooth combination	1
10904-1	Pinion, 27 tooth for combination gear	1
10905	Bushing for back gear	1
10910-1	Bracket for clutch	1
Part No.	Description	No. for assembly
10911-1	Lever, clutch operating	1
10912	Shoes, bronze for clutch spool	2
10913-1	Rack, engaging for back gears	1
10915	Pin for gear in housing	1
10916	Gear for rack	1
10917	Eccentric for back gear	1
10919	Guard for back gears	1
10920	Cover for guard	1
10965	Screw for rack	1
10967	Lever for locking pin	1
10968	Pin, locking for lever	1
10969	Spring for locking pin	1
10918	Washer for back gear	1

16. Sliding Head Assembly'

(Including power feed gearing, power feed clutch and power feed knockout clutch)

Part No.	Description	No. for assembly
OAK	Bearing, thrust for feed worm	1
10562-1	Collar for feed pinion	1
10566-1	Disc, clutch for worm wheel	1
10567-A	Spool for power feed clutch	1
10568	Block, clutch, power feed	1
10569-A	Centralizer, power feed clutch block	1
10571	Nut, adjusting, power feed clutch	1
10576	Clutch, power feed knockout	1
10578	Fork for shifting clutch	1
10634	Spring for clutch	1
10649	Spring for pin	1
10892	Screw, locking	2
10943-B	Sliding head	1
10944	Shaft, feed	1
10945	Collar for feed shaft	1
10946	Worm for feed shaft	1
10947	Wheel, small worm	1
10948	Shaft for feed worm	1
10949	Lever, shifting for fork	1
10950-1	Shaft, shifting	1
10951	Lever, knockout	1
10952	Pin for knockout lever	1
10953	Pinoon, raising sliding head	1
10954	Cover for hole in sliding head	1
10955	Pinion, feed	1
10956	Washer, spacer for feed pinion	1
10957-B1	Wheel, large worm	1
10959-A	Lever, hand feed	2
10960	Cover for sliding head	1
10961	Washer for locking screws	2
10966	Plate for knockout lever	1
10970	Screw for worm wheel	2
10973	Wheel, hand	1
10974	Disc, feed clutch	1
10982	Crank for sliding head pinion	1
11329	Worm, main feed	1

Part No.	Description	No. for assembly
	TABLE RAISING SCREW	
10889	Support for table raising screw	1
11069	Gear, table raising ----------	1
11080	Gear, miter, table raising ----------	1
11082	Crank for raising table ----------	1
11382-1	Screw table raising ----------	1
	SPINDLE PULLEY AND SLEEVE	
3D-1105-2	Spacer, bearing for frame----------	1
3D-1107-2	Spacer, bearing for ---------- spindle pulley----------	1

Part No.	Description	No. for assembly
3D-1259	Spring, bearing loading for frame----------	2
10897-A	Sleeve, spindle pulley ----------	1
10901-1	Adapter for 27 tooth gear ----------	1
10908-1	Clutch, spindle pulley driving-------	1
10972-A	Key for spindle sleeve ----------	2
88509	Bearing, ball, spindle pulley --------	2
WC-88510	Spindle Pulley----------	2
10906	Spindle Pulley----------	1

17. Parts List

No. 22 Floor type power feed drill. When ordering parts, specify part number, name of part and serial number.

Part No.	No. of pieces	Name of part
10941	1	Stop
10933-B	1	#4 Morse Taper Spindle
10934	1	Spindle Sleeve
10936	1	Upper Ball Bearing Guard
3D-3681	1	Collar
10999	1	Upper Ball Bearing Guard
10935	2	Bushings for Sleeve
10510	1	Table
10554-1	1	Counter Balance Bar for Sleeve
10555	2	Hex. Half Nuts
10556-1	1	Chain Hook for Counter Balance Bar
10562-1	1	Collar for Feed Pinion
10566-1	1	Clutch Disc for Worm Wheel
10567-A	1	Clutch Spool
10568	1	Clutch Block
10569-A	1	Centralizer (tool steel)
10576	1	Feed Clutch
10578	1	Shifter Fork
7D-3426	1	Guard for Drive Belt
7D-3416	1	Guard for Feed Belt
10634	1	Main Feed Clutch Spring
10885	1	Base
10886	1	Adapter
10887-1	1	Column
10888	1	Rack for Column
10889	1	Support for Table Raising Screw
10891	1	Table Fork
10892	4	Locking Screw for Fork
10893-1	1	Frame
10897-A-1	1	Spindle Pulley Sleeve
10898	1	Feed Pulley on Spindle
10899	1	Nut for Sleeve
10900	1	Spindle Gear
10901-1	1	Adapter for 27 Tooth Gear
10902-1	1	Spindle Pulley Drive Gear
10903-1	1	Combination Gear
10904-1	1	Pinion for Combination Gear
10905	1	Bushing for Back Gear
10906	1	Spindle Pulley

Part No.	No. of pieces	Name of part
10908-1	1	Driving Clutch
10909	1	Spool for Driving Clutch
10910-1	1	Clutch Bracket
10911-1	1	Clutch Operating Lever
10912	2	Bronze Shoes for Lever
10913-1	1	Engaging Rack for Back Gear
10914	1	Housing for Rack
10916	1	Gear for Rack
10917	1	Eccentric
10921-P1	1	Feed pulley bracket
10923	1	Collar for sleeve
10924	1	Feed pulley for feed shaft
10925	1	Idler pulley bracket
10926	1	Spring for bracket
10927-B	1	Idler pulley assembly
10930	1	Motor pulley
10931	1	Motor bracket
10932	1	Rack for motor bracket
10939	1	Hook
10940-B	1	Counter balance weight
10943-B	1	Sliding head
10945	1	Collar for feed shaft
10946	1	Worm for feed shaft
10947	1	Small worm wheel
10948	1	Feed worm shaft and washer
10949	1	Shifting lever for fork
10951-1	1	Shifting shaft
10951	1	Knockout lever
10953	1	Pinion for raising head
10955	1	Feed pinion
10957-B1	1	Large worm wheel
10959-A	2	Hand feed lever assemblies
10966	1	Plate for knockout lever
10967	1	Lever for locking pin
10971	1	Nut for table raising screw
10973	1	Hand wheel
10974	1	Feed clutch disc
10975	1	Pinion for rack
10981	1	Crank handle
10982	1	Vulcan crank handle
10999	1	Guard
11033-A	2	Counterweight pulleys
11069-1	1	Table raising gear
11070-2	1	Stud for table raising gear
11080-1	1	Miter gear for table raising screw
11082	1	Handle for raising table
11329	1	Feed worm
11351	1	Table fork screw
11382	1	Table raising screw
3D-1410	1	Locking screw assembly
3D-1104-P1	1	Lower bearing cap
3D-1105-2	2	Bearing spacers
3D-1107-2	1	Spacer for spindle pulley
3D-1288-1	1	Feed shaft
3D-3429	1	Washer
4D-2201	1	Gear case for back gear
	1	907 N.D. ball bearing for spindle
	1	2907 N.D. ball bearing for spindle

Part No.	No. of pieces	Name of part
	1	5503 N.D. ball bearing for idler pulley
	1	88506 N.D. ball bearing for feed pulley
	2	88509 N.D. ball bearing for spindle pulley
	2	WC 88510 N.D. ball bearing for frame
	1	Oak bearing, thrust for feed worm
	1	2340 v-belt feed
	1	3780 v-belt drive

APPENDIX I

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 from stockage. For a list of repair parts for the equipment see appendix III.

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 exact 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) Requisitioning for replacement of items that are the responsibility of commodity commands will be submitted to the commodity command indicated in column la, 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, following 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 nameplate).

(5) Federal stock number of end item (from TM).

(6) Manufacturer's model number (from TM or name/date plate, preferably name/data plate).

(7) Manufacturer's serial number (from 'J 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 1*a*).

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

Code	*Type materiel*
5	Engineer Materiel
9	Ordnance Materiel

(2) *Source* (col. 1*b*). .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 (col. 1*c*). This column indicates the category of maintenance authorized to install the listed item. Maintenance level code used in this list is:

Code	*Explanation*
0	Organizational maintenance

(4) *Recoverability* (col. 1*d*). 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 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.

Code	*Explanation*
09519:	Buffalo Forge Company
24161:	Gates Rubber Company
31558:	Jacobs Manufacturing Company.
65400:	Whitman-Barnes Div. of United Greenfield.
72151:	Collis Company

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

c	cycle
cap.	capacity
circ	circumference
deg	degree(s)
ea	each
mtd	mounted
ph	phase
spdl	spindle
v	volt (s)
w	wide, width

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 may be completed using pencil, pen, or typewriter. DA Form 2028 will be completed and forwarded direct to: Commanding General, Headquarters, U.S. Army Weapons Command, ATTN: AMSWE-SMIM-P, Rock Island Arsenal, Rock Island, Ill. 61202.

Section II. BASIC ISSUE ITEMS LIST

(1) Source. maintenance, and recoverability code				(2)	(3)	(4)	(5)	(6) Illustration	
(a) Materiel code	(b) Source	(c) Maintenance level	(d) Recoverability	Federal stock no.	Description	Unit of issue	Quantity Authorized	(a) Figure No.	(b) Item No.
					MAJOR COMBINATION				
					The following item is to be requisitioned for initial use only.				
9	—	—	R	3413-517-1061	DRILLING MACHINE, UPRIGHT: floor mtd, 2 in. drilling cap. In CI, 1 spdl, No. 4 Morse taper socket, 7-1/2 spdl travel, 11 in. from column to center of spdl, 8 speeds 65 to 1350, 3-hp, 220-v, 60-c, 3-ph (09519:22RC)	—	—	1	—
					COMPONENTS OF MAJOR COMBINATION				
					None authorized.				
					SPARE PARTS				
5	C	O	—	---	BELT, V: drive, rubberized fabric, 74 outside circ, 11/16 top w, 40 deg angle (24161:3740).	1	1	1	7
5	C	O	—	3030-180-2117	BELT, V: feed, rubberized fabric, 31 outside circ, 1/2 top w, 40 deg angle (24161:2310).	1	1	1	13
					TOOLS AND EQUIPMENT FOR: DRILLING MACHINE UPRIGHT (09519:22RC)				
9	C	O	—	---	ARBOR, DRILL CHUCK: screw type, No. 4 Morse taper shank (31558: #4 series #2).	1	1	1	8
5	C	O	—	---	BELT, V: drive, rubberized fabric, 74 outside circ 11/16 top w, 40 deg angle (24161:3740).	1	1	1	7
5	C	O	—	3030-180-2117	BELT, V: feed, rubberized fabric, 31 outside circ 1/2 top w, 40 deg angle (24161:2310).	1	1	1	13
9	C	O	R	---	CHUCK, DRILL: 3-jaw key type, heavy duty 0 to 1/2 cap. (31558:6A).	1	—	1	6
9	C	O	—		DRIFT, DRILL SLEEVE: for #2 Morse taper (65400: #2).	1	1	1	12

9	C	O	—	---	DRIFT, DRILL SLEEVE: for #3 Morse taper (65400: #3).	1	1	1	11
9	C	O	—	---	DRIFT, DRILL SLEEVE: for #4 Morse taper (65400: 4).	1	1	1	10
9	C	O	—	3460-264-5580	KEY, DRILL CHUCK: Jacobs design, key No. 3, steel (31588:K3).	1	1	1	9
9	C	O	—	---	SLEEVE, REDUCING: #4 to #2 Morse taper (72151: #4 - #2).	1	1	1	5
9	C	O	—	---	SLEEVE, REDUCING: #4 to #3 Morse taper (72151: #4 - #3).	1	1	1	4

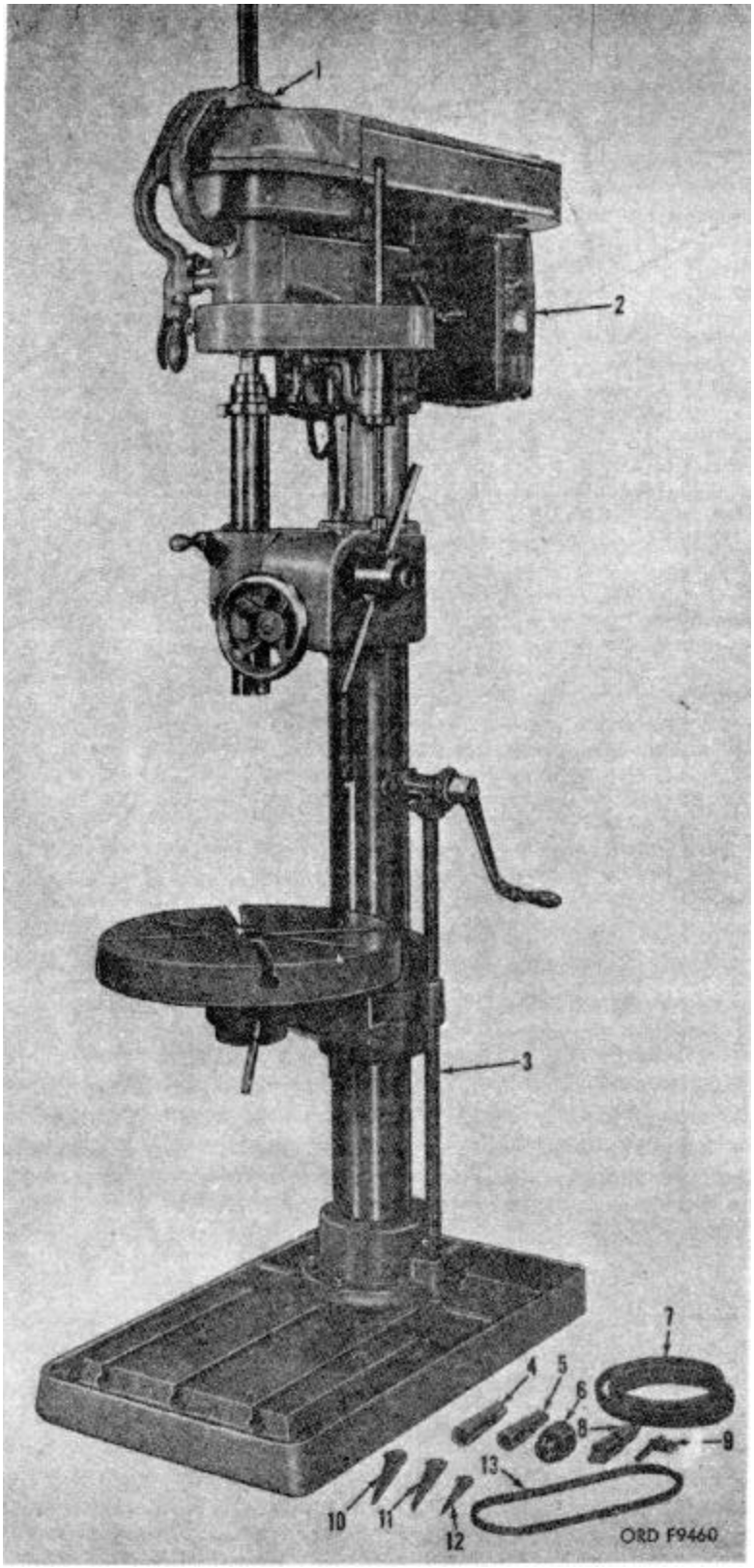


Figure 1. Tools and equipment.

APPENDIX II

MAINTENANCE ALLOCATION CHART

1. General

The maintenance allocation chart allocates maintenance operations to the proper category of maintenance. Allocations of maintenance operations is made on the basis of time, tools, and skills normally available to the various categories of maintenance in combat situation and influenced by maintenance policy and sound maintenance practices, as outlined in AR 750-5.

2. Explanation of Format

Purpose and use of the maintenance allocation chart format are as follows:

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.

b. Column 2, Functional Group. Column 2 lists the noun names of components, assemblies, subassemblies and modules on which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the category of maintenance.

d. Column 4, Tools and Equipment. This column will be used to specify, by code, those tools and test equipment required to perform the designated function.

e. Column 5, Remarks. Self-explanatory.

3. Maintenance Functions

Maintenance functions will be limited to and defined as follows:

INSPECT	To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.
TEST	To verify serviceability and to detect electrical or mechanical failure by use of test equipment.
SERVICE	To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air.
ADJUST	To rectify to the extent necessary to bring into proper operating range.
ALIGN	To adjust specified variable elements of an item to bring to optimum performance.
CALIBRATE	To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.
INSTALL	To set up for use in an operational environment such as an emplacement, site, or vehicle.
REPLACE	To replace unserviceable items with serviceable assemblies, subassemblies, or parts
REPAIR	To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.
OVERHAUL	To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards.
REBUILD	To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.
MAINTENANCE LEVEL	The arabic numeral placed in the appropriate column indicates the level responsible for performing that particular maintenance function.

(1)	(2)	(3) Maintenance Function											(4)	(5)
Group No.	Functional group	Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild	Tools and equipment	Remarks
1	Drilling machine	1	—	1	2	3	—	3	—	—	4	5		
2	Head (Gear case)	1	—	1	—	2	—	—	4	4	4	—		
	Gears	1	—	1	—	—	—	—	3	—	—	—		
	Lever shoes	1	—	1	—	—	—	—	2	—	—	—		
	Pulley & bearings	1	—	1	—	—	—	—	2	—	—	—		
3	Sliding head & Feed mechanism	1	—	1	—	—	—	—	4	4	4	—		
	Idler bearing	2	—	1	—	—	—	—	2	—	—	—		
	Feed bearing	2	—	1	—	—	—	—	2	—	—	—		
	Feed belt	1	—	—	2	—	—	—	2	—	—	—		
4	Spindle	1	—	1	—	—	—	—	3	—	4	—		
	Bearings	2	—	1	—	—	—	—	2	—	—	—		
	Drive belt	1	—	—	2	—	—	—	2	—	—	—		
5	Table	1	—	1	—	—	—	—	4	4	4	—		
	Raising Screw	1	—	1	—	—	—	—	2	—	—	—		
6	Column	1	—	1	—	—	—	—	4	—	4	—		
7	Base	1	—	1	—	—	—	—	4	—	—	—		
8	Motor	1	—	1	—	—	—	—	2	4	4	—		
	Pulley	2	—	—	—	—	—	—	2	—	—	—		

APPENDIX III

REPAIR PARTS AND SPECIAL TOOL LISTS

Section I. PREFACE

1. General

a. This appendix is a list of repair parts which may be required by the using organization for performing organizational maintenance but are not authorized to be stocked. These items are to be requisitioned as required for immediate use only.

b. For prices of items listed herein, see the appropriate supply manual of the 9-2-series. Prices of items in this manual are listed in the supply manuals for those commands.

c. Additional applications of items in this manual are listed in the supply manuals of the 9-3-series.

2. Requisition Notes

See appendix I, paragraph 2a.

3. Explanation of Columns

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

(1) *Materiel numerical codes* (col. 1a). This column indicates responsibility commodity commands for the materiel. The commodity commands responsible for supply of items in this list are:

Code	*Type materiel*
5	Engineer Materiel
9	Ordnance Materiel

(2) *Source* (col. 1*b*). 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* (col. 1*c*). This column indicates the category of maintenance authorized to install the listed item. Maintenance level code used, in this list is:

Code	*Explanation*
O	Organizational maintenance

(4) *Recoverability* (col. 1*d*). 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 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 is also included for reference.

Code	*Explanation*
09519:	Buffalo Forge Company
24161:	Gates Rubber Company
43334:	New Departure Div., General Motors Corporation
88109:	Westinghouse Electric Corporation

d. Unit of Issue (col. 4). This column indicates the quantity to be requisitioned.

e. Quantity Incorporated in Unit (col. 5). This column indicates the total number of times the listed item is used in the end item (major item) or major combination. Where no quantity is shown, reference should be made to the first appearance of the item as indicated in the "description" column.

f. 15-Day Maintenance Allowance (col. 6). This column indicates the quantitative allowance for the organization maintenance category of the listed items. These allowances represent one prescribed load, for a 15-day period, for the number of major items supported. They must be on hand or on order at all times. Major commanders will determine the number of prescribed loads organizational units will carry. Units and organizations authorized additional prescribed loads will multiply the number of equipments supported by the number of prescribed loads. Additional repair parts which may be required for performing authorized maintenance, but are not authorized for stockage in the prescribed load, are indicated by an asterisk (*). These items are to be requisitioned, as required, for immediate use only. Where no quantity is shown, reference should be made to the first appearance of the item as indicated in the "description" column.

4. Special Information

Basic issue items are listed in appendix I of this manual.

5. Abbreviations

c----------cycle(s)
circ ----------circumference
deg ----------degree(s)
gnd ----------ground
h----------high, height
ph ----------phase
spdl----------spindle
v----------volt(s)
w ----------wide, width
w/ ----------with

6. 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 may be completed using pencil, pen, or typewriter. DA Form 2028 will be completed and forwarded direct to: Commanding General, Headquarters, U.S. Army Weapons Command, ATTN: AMSWE-SMM-P, Rock Island Arsenal, Rock Island, Ill. 61202.

Section II. REPAIR PARTS AND SPECIAL TOOLS

(1) Source. maintenance, and recoverability code				(2)	(3)	(4)	(5)	(6)	(7) Illustration	
(a) Materiel code	(b) Source	(c) Maintenance level	(d) Recoverability	Federal stock no.	Description	Unit of issue	Quantity incorporated in unit	15 day maintenance allowance per 5 equipments	(a) Figure No.	(b) Item No.
					REPAIR PARTS FOR: DRILLING MACHINE, UPRIGHT (09519:22RC)					
9	C	O	—	3110-156-3597	BEARING, BALL, ANNULAR: gnd, sgle row, radial, non-loading groove, self-contained, retainer type, 1.7717 bore, 3.465 od, 1.0630 h (43334:88509).	1	2	*	—	—
9	C	O	—	3110-156-3568	BEARING, BALL, ANNULAR: gnd, sgle row, radial, non-loading groove, self-contained, retainer type, 1.1811 bore, 2.4409 od, 09449 h (43334:88506).	1	1	*	—	—
9	C	O	—	---	BEARING, BALL: frame and spdl (43334:WC88510).	1	2	*	—	—
9	C	O	—	---	BEARING, BALL: idler pulley (43334:5503).	1	1	*	—	—
9	C	O	—	3110-156-1870	BEARING, BALL, THRUST: gnd, sgle direction, grooved race surface, rigid, sgle row, retainer type, 1.3780 bore, 2.4409 od, 0.7087 h (43334:907).	1	1	*	—	—
9	C	O	—	3110-156-1868	BEARING, BALL, THRUST: gnd, sgle direction, grooved race surface, rigid, sgle row, retainer type, 1.3780 bore, 2.1250 od, 0.5620 h (43334:2907)	1	1	*	—	—
5	C	O	—	---	BELT, V: drive, rubberized fabric, 74 outside circ, 11/16 top w, 40 deg angle (24161:3740).	1	1	1	1	7
5	C	O	—	3030-180-2117	BELT, V: feed, rubberized fabric, 31 outside circ, ; top w, 40 deg angle (24161:2310).	1	1	1	1	13
9	C	O	R	---	MOTOR, ELECTRIC: 3-hp, 1150 rpm, 3 ph, 60-c, 220/440-v, 9.2/4.6 amp (88109:A DP).	1	1	1	1	2
9	C	O	—	---	PULLEY, MOTOR: 4 step, v-grooved 4D-2489).	1	1	*	—	—
9	C	O	—	---	PULLEY, SPINDLE: 4 step, v-grooved spdl drive (09519:10906).	1	1	*	—	—
9	C	O	—	--	SCREW, RISING: table (09519:11382) ----------	1	1	*	1	3
9	C	O	—	---	SHOE, LEVER, CLUTCH: bronze (09519:10912).	1	2	*	1	1

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Units org under fol TOE: (2 each)

5-16	9-75	29-41
5-36	9-127	29-51
5-48	9-197	29-55
5-127	9-227	29-56
5-192	9-357	29-65
5-216	9-500	29-66
5-266	CA, CC, DA	29-75
5-412	10-445	29-79
5-416	10-448	29-85
5-600	17	29-86
5-605	17-100	29-105
5-607	29-1	29-109
6-630	29-7	29-311
6-635	29-11	37
7	29-15	37-100
7-100	29-16	39-61
9-9	29-21	47
9-25	29-25	57
9-26	29-26	57-100
9-65	29-35	
9-66	29-36	

NG: State AG (3) Units same as active Army except allowance is one copy to each unit.
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For explanation of abbreviations used see AR 320-50.

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