

DEPARTMENT OF THE ARMY
TECHNICAL MANUAL

DEPARTMENT OF THE AIR
FORCE TECHNICAL ORDER

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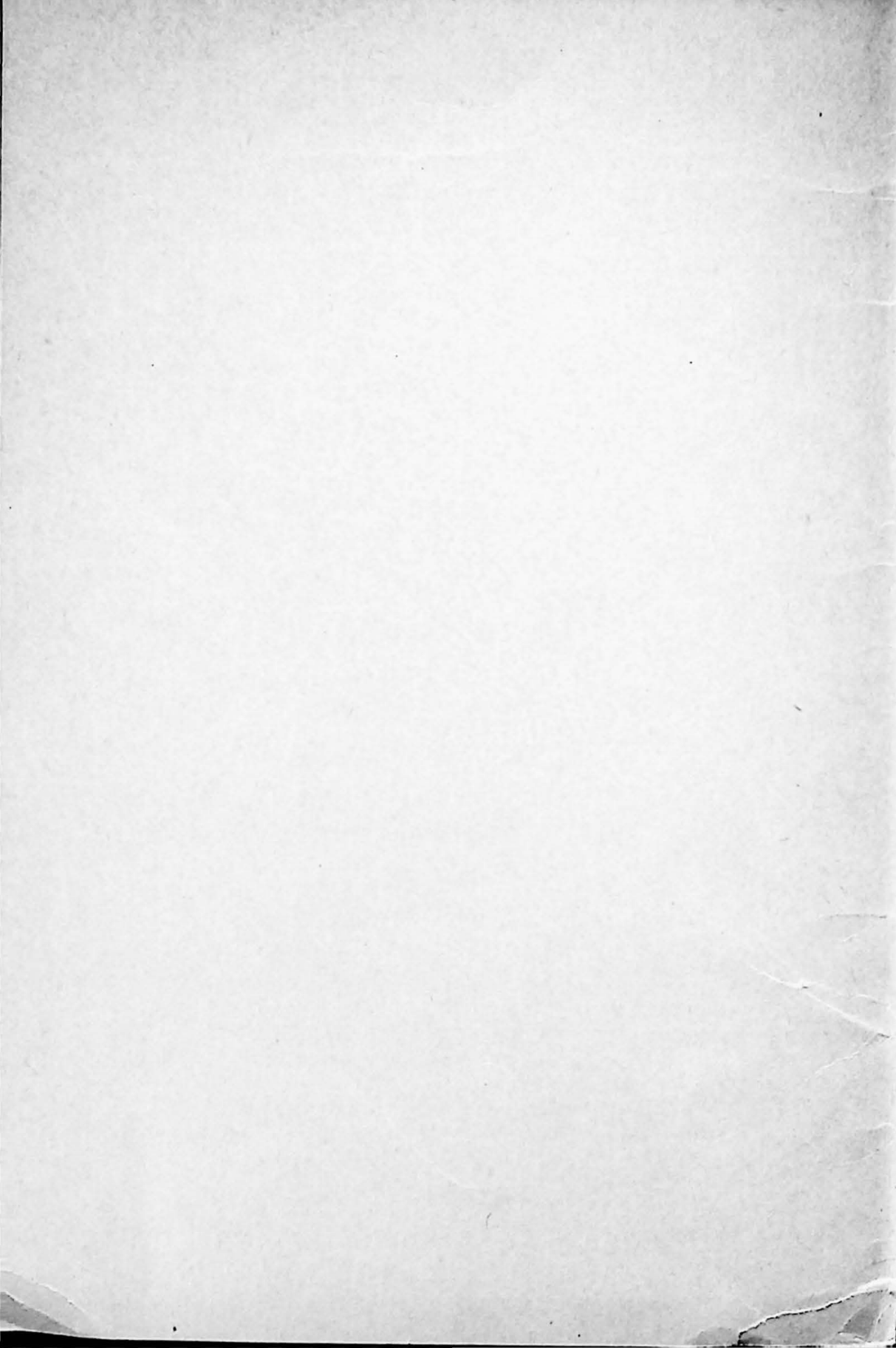
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OPERATION AND MAINTENANCE:
WHEEL SIZE 7 X 1 INCH
SINGLE-PHASE 60-CYCLE
110-VOLT 1/2-HORSEPOWER
BENCH GRINDER
(BALDOR ELECTRIC
MODELS S3984 AND S5493)
(40-G-142-5)



DEPARTMENTS OF THE ARMY AND THE AIR FORCE

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THE AIR FORCE

WASHINGTON 25, D. C., 7 January 1955

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual contains instructions for operation and organizational maintenance of the bench grinder and associated equipment, for operating personnel, and instructions for field maintenance of the bench grinder for ordnance maintenance personnel.

b. The appendix contains a list of current references, including supply manuals, technical manuals, and other available publications applicable to the bench grinder.

c. The following manufacturer's symbols are used preceding the manufacturer's part numbers when identifying items on illustrations and in tables and listings.

AH	Arrow-Hart and Hegerman Electric Co
BAL	Baldor Electric Co
CH	Cutler-Hammer, Inc
HBL	Harvey Hubbell, Inc
SKF	SKF Industries, Inc
SPT	Spencer Thermostat Division

d. This first edition is being published in advance of complete technical review by all concerned. Any errors or omissions will be brought to the attention of Chief of Ordnance, Department of the Army, Washington 25, D. C., ATTENTION: ORDFM-Pub.

2. Maintenance Allocation

a. *Organizational Maintenance Allocation.* In general, the prescribed organizational maintenance responsibilities will apply as reflected in the allocation of tools and maintenance parts in the appropriate column of Department of the Army Supply Manual ORD 7-8 SNL J-509 pertaining to this materiel and in accordance with the extent of disassembly prescribed in this manual for the purpose of cleaning, lubricating, or replacing authorized spare parts. In all cases, where the nature of the repair, modification, or adjustment is beyond the scope or facilities of the using organization, the supporting ordnance maintenance unit should be informed so that trained personnel with suitable tools and equipment may be provided or other proper instructions issued.

b. *Field Maintenance Allocation.* The publication herein of instructions for complete disassembly and repair is not to be construed as authority for the performance by field maintenance units of those functions which are restricted to depots and arsenals. In general, the pre-

scribed maintenance responsibilities will apply as reflected in the allocation of maintenance parts listed in the field maintenance columns of the ORD 7-8 supply manual pertaining to the bench grinder. Provision of parts listed in the depot stock guide column of the ORD 7-8 supply manual will be made to field maintenance only when the emergency nature of the maintenance to be performed has been certified by a responsible officer of the requisitioning organization.

3. Forms, Records, and Reports

a. General. Responsibility for the proper execution of forms, records, and reports rests upon the officers of all units maintaining this equipment. However, the value of accurate records must be fully appreciated by all persons responsible for their compilation, maintenance, and use. Records, reports, and authorized forms are normally utilized to indicate the type, quantity, and condition of materiel to be inspected, to be repaired, or to be used in repair. Properly executed forms convey authorization and serve as records for repair or replacement of materiel in the hands of troops and for delivery of materiel requiring further repair to ordnance shops in arsenals, depots, etc. The forms, records, and reports establish the work required, the progress of work within the shops, and the status of the materiel upon completion of its repair.

b. Authorized Forms. The forms generally applicable to units operating or maintaining this materiel are listed in the appendix. No forms other than those approved for the Department of the Army will be used. For a complete listing of all forms, see SR 310-20-6. For instructions on use of these forms, refer to FM 9-10.

c. Field Reports of Accidents. The reports necessary to comply with the requirements of the Army safety program are prescribed in detail in the SR 385-10-40 series of special regulations. These reports are required whenever accidents involving injury to personnel or damage to materiel occur.

d. Report of Unsatisfactory Equipment or Materiels. Any suggestions for improvement in design and maintenance of equipment and spare parts, safety and efficiency of operations or pertaining to the application of prescribed lubricants and/or preserving materials or technical inaccuracies noted in the Department of the Army publications will be reported through technical channels as prescribed in SR 700-45-5 to the Chief of Ordnance, Washington 25, D. C., ATTN: ORDFM, using DA Form 468, Unsatisfactory Equipment Report. Such suggestions are encouraged in order that other organizations may benefit.

Note. Do not report all failures or malfunctions that occur. Report only REPEATED or RECURRENT failures or malfunctions which indicate unsatisfactory design or materiel. See also SR 700-45-5 and printed instructions on DA Form 468.

Section II. DESCRIPTION AND DATA

4. Description

The bench grinder, Models S3984 and S5493 (fig. 1), is designed for miscellaneous grinding of metal objects, cutting tools, etc. The bench grinder consists of two grinding abrasive wheels 40-W-368-5 (D, fig. 1) and 40-W-368-10 (M). One grinding abrasive wheel is of a coarse grain and the other abrasive wheel is of a fine grain. An additional grinding abrasive wheel 40-W-368-20 is of a medium grain and is included in the equipment. To protect the operator from sparks and abrasive particles during grinding operations, two 4 x 6-inch shatterproof glass eyeshields with adjusting arms 40-S-1746-800 (B) are provided with the bench grinder. A tool rest is mounted in front of each grinding abrasive wheel to rest and guide the work during the grinding operations. The right- and left-hand wheel guards are provided to protect the operator from cracked or broken pieces from a defective grinding abrasive wheel. The motor armature shaft is mounted on permanently sealed ball bearings which do not require lubrication. To prevent damage to the motor from overloads, the bench grinder is equipped with a thermal cutout overload switch with reset button, mounted on the front of the bench grinder base (T), which breaks the internal electric circuit of the motor. This shuts down the motor in the event that the bench grinder is overloaded. The reset button, of the overload switch, permits resetting of the thermal cutout overload switch. The bench grinder consists of a single-phase 60-cycle 110-volt $\frac{1}{2}$ -horsepower motor.

5. Difference Between Models

The abrasive wheels, motor field, bench grinder base, tool rests, tool rest supports and guard covers are interchangeable on both models. The overall length of Model S3984 is smaller than the overall length of Model S5493. The end plates, right- and left-hand wheel guards, and motor armature are not interchangeable between models.

6. Nameplate

A nameplate is affixed to the top of the grinder. The nameplate gives the horsepower, power requirements, serial number, revolutions per minute, and the name of the manufacturer of the bench grinder.

7. Tabulated Data

Models	S3984 and S5493
Weight (for Model S5493)	67 lb
Length (overall) (for Model S5493)	$19\frac{5}{16}$ in
Wheel size	$7 \times 1 \times \frac{5}{8}$ in
Horsepower	$\frac{1}{2}$

Speed-----3,450 rpm
Voltage (ac)-----110 v
Amperage-----4.8 amps
Phase-----sgle
Frequency-----60 c
Motor-----Capacitor-start, induction-run
Manufacturer-----Baldor Electric Co

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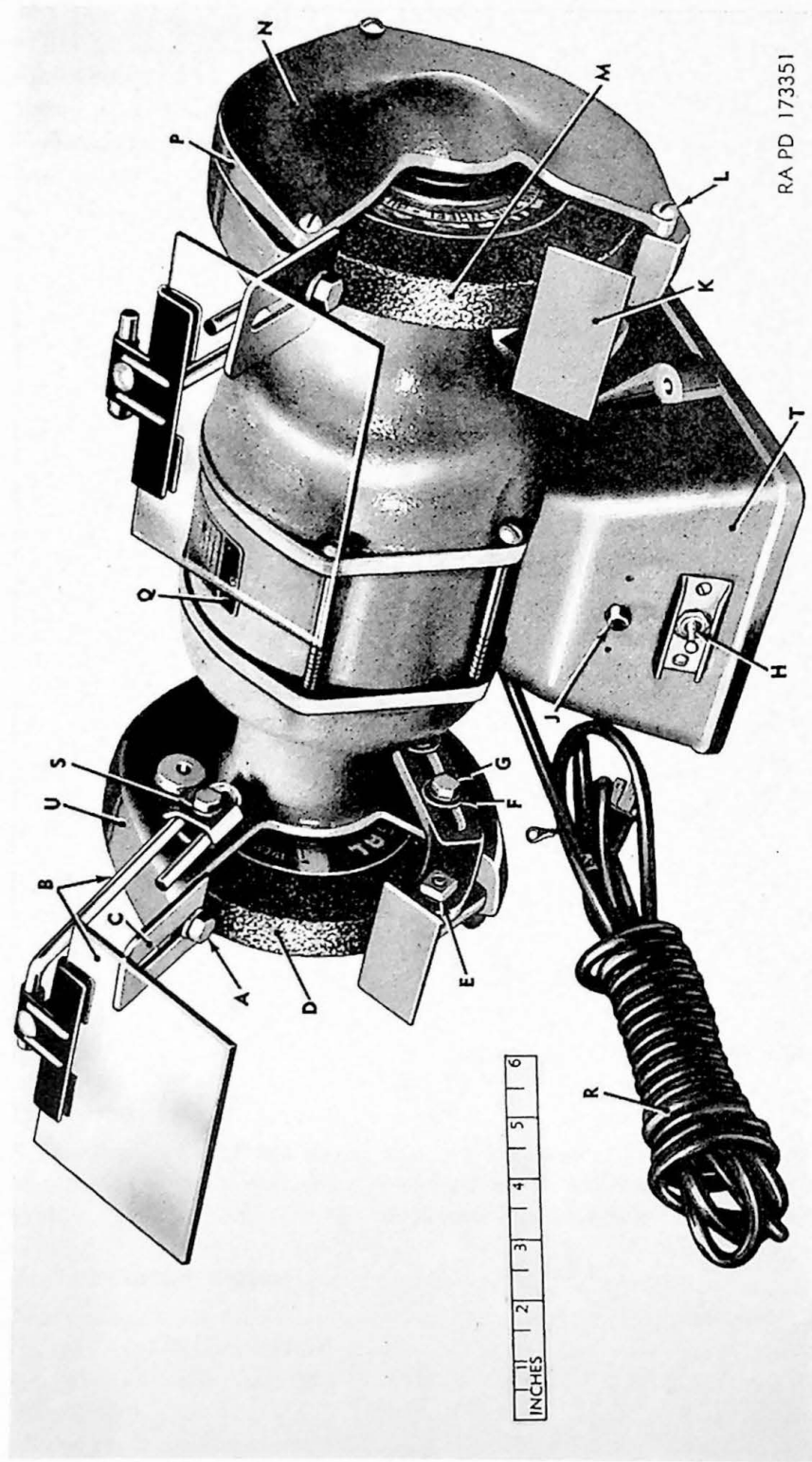


Figure 1. Three-quarter right-front view of bench grinder.

- A $\frac{3}{8}$ -16 x $\frac{3}{4}$ hex-hd cap screw—122119
- B 4 x 6 in shatterproof glass eyeshield w/adjusting arm—40-S-1746-800
- C Sliding tongue—40-T-222-125
- D Vitrified bond med grade coarse grain (14 to 24) $\frac{5}{8}$ -in arbor hole 1-in face 7-in diam stght al-oxide grinding abrasive wheel—40-W-368-5
- E $\frac{5}{16}$ -18 x 1 rd-hd sq-nk bolt w/nut—548019
- F tool rest support—40-S-3246-15
- G $\frac{5}{16}$ -18 x $\frac{3}{4}$ hex-hd cap screw—122007
- H 250 volt 1 hp, 125 volt 12 amp, 250 volt, 6 amp, sgle-throw, double pole, end connected, off and on, toggle switch—17-S-28223-45
- J Thermal cutout overload switch w/reset button (for model S5493)—17-S-25130-100
- K Tool rest—40-R-1890-95
- L $\frac{1}{4}$ -20 x $\frac{5}{8}$ rd-hd screw—118558
- M Vitrified bond med grade fine grain (70 to 120) $\frac{5}{8}$ -in arbor hole 1-in face 7-in diam stght al-oxide grinding abrasive wheel—40-W-368-10
- N Guard cover—40-C-1275-8
- P Rh wheel guard (for Model S3984)—40-G-189-602
(for Model S5493)—40-G-189-603
- Q Nameplate—DR-6677
- R Cond size AWG No. 16 stranded 3-cond 0 to 600-volt 40% rubber jacket rubber insulated hard service flex (NEC type) cord—15-C-56102
- S Adjusting arm clamp—BAL-DR-1569
- T Bench grinder base—BAL-DR-6615
- U LH wheel guard (for Model S3984)—40-G-189-560
(for Model (S5493)—40-G-189-565

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF BENCH GRINDER

8. General

a. When a new or reconditioned bench grinder is first received by the using organization, it is the responsibility of the officer in charge to determine whether the materiel has been properly prepared for service by the supplying organization, and to be sure they are properly assembled, secure, clean, correctly adjusted and/or lubricated. Check all equipment with the listing in the Department of the Army Supply Manual ORD 7-8 SNL J-509 to be sure every item is present and in good condition.

b. Make a record of any missing parts, equipment, and of any malfunctions. Correct any deficiencies as quickly as possible.

9. Services

a. *Uncrating and Checking.* The complete bench grinder is shipped in one crate. Care should be taken not to damage the bench grinder or equipment when opening the crate. Remove and check contents of crate with items listed in figure 1 to determine if all items are present.

b. *Unpacking Equipment.* Unpack the equipment and check equipment with the listings in table I to determine if all items are present.

c. *Cleaning.* Clean materiel in accordance with paragraph 28.

d. *Inspection Before Assembly.* Before assembling the bench grinder, the following checks must be made:

- (1) Inspect for cracked or broken parts.
- (2) Inspect for stripped threads, cracked or broken grinding abrasive wheels, damaged cord or connector, or cracked shatter-proof glass eyeshields. If such parts are damaged, they must be replaced.

e. *Installation.*

Note. The key letters noted in parentheses are in figure 1, unless otherwise indicated.

- (1) Position the bench grinder on a solid work bench and secure bench grinder to bench with two mounting bolts, two plain washers, and two nuts.
- (2) Remove three roundhead screws (L) from each guard cover (N) and remove guard covers.
- (3) Remove hex plain nut, outer wheel flange, and three balance weights from each end of the motor armature shaft.

Note. Do not remove inner wheel flange.

- (4) Install one grinding abrasive wheel on motor armature shaft.

- (5) Install the three balance weights. Position each balance weight so that they are evenly spaced.
- (6) Install outer wheel flange and tighten with a $\frac{5}{8}$ -11 x $1\frac{1}{16}$ wide x $\frac{23}{64}$ thick hex plain nut.
- (7) Mount the two 4 x 6-inch shatterproof glass eyeshields with adjusting arms 40-S-1746-800 (B) on the inner side of each wheel guard (P and U), and secure with one $\frac{5}{16}$ -18 x $\frac{3}{4}$ hex-head cap screw (G), and $\frac{5}{16}$ -inch internal-teeth lockwasher and one adjusting arm clamp (S).
- (8) Adjust sliding tongue (C), identical on both left- and right-hand wheel guards (P and U), by releasing pressure of hex-head cap screw (A) so that bottom edge of the tongue clears the grinding abrasive wheel at least one-eighth inch. Tighten hex-head cap screw (A).

f. Adjusting and Balancing. If the grinding abrasive wheel is in an unbalanced state, it will turn until the heavy portion is downward. When abrasive wheel stops at any position, as the result of counterbalancing, it is then in correct balance.

- (1) The first step in balancing the grinding abrasive wheel is to locate the heavy portion of the wheel as outlined in (2) below.
- (2) Rotate the grinding abrasive wheel by hand; when it has stopped rotating, chalk mark the bottom of the wheel. Repeat the operation several times. If the chalk mark is located at the bottom of the wheel each time the wheel stops, the wheel is unbalanced. For a correct balance, check (3) below.
- (3) Loosen hex plain nut and turn balance weights (nearest to chalk mark) upward, in either direction. Tighten hex plain nut.
- (4) Repeat operations (2) and (3) above until grinding abrasive wheel stops at any position on the motor armature shaft. The wheel is now in correct balance and properly adjusted.
- (5) Install guard cover (N) on wheel guard (P) and secure with three $\frac{1}{4}$ -20 x $\frac{5}{8}$ roundhead screws (L).

Note. Do not balance both grinding abrasive wheels at the same time. The above operation applies to one grinding abrasive wheel. When a correct balance for one grinding abrasive wheel has been accomplished, install the other grinding abrasive wheel and repeat adjusting and balancing as outlined in *e* and *f* above.

Caution: Draw up hex plain nuts tight, but do not use excessive pressure or a cracked grinding abrasive wheel may result. Stand to one side when performing the operations outlined in *g* below. New grinding abrasive wheels have a paper pad on each side which should not be removed. If the pad is missing, one can be made from a piece of blotter or similar paper.

g. Inspection. Connect the plug connector to a 110-volt power supply receptacle and connect ground connection (fig. 2). Operate the bench grinder by moving the toggle on the toggle switch (H, fig. 1) to

ON position. If the motor fails to operate and if the bench grinder develops any vibration or noise, refer to troubleshooting table III for correction.

Warning: It is particularly important that the ground cable be connected to ground when there is presence of water in the work area. Proper grounding of the bench grinder will prevent possible injury to the operator in the event that the internal wiring of the bench grinder becomes shorted to the motor housing.

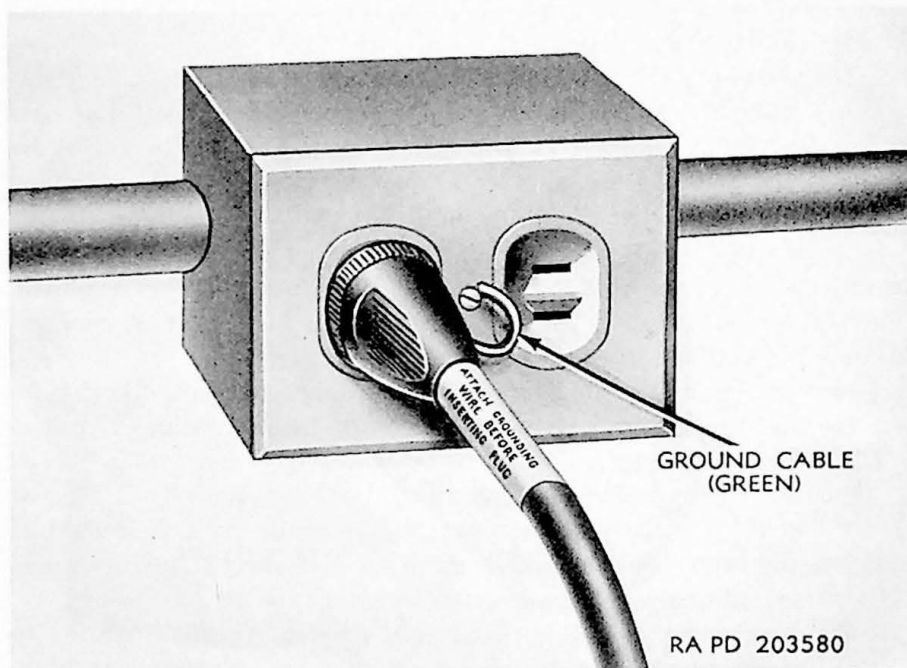


Figure 2. Connecting plug connector to 110-volt power receptacle.

Section II. CONTROLS

10. General

This section describes, locates, and furnishes the operator with sufficient information pertaining to the controls provided for proper operation of the bench grinder.

11. Toggle Switch

An off and on toggle switch (H, fig. 1), located on the front of the bench grinder base (T), controls the starting and stopping operations of the bench grinder.

12. Thermal Cutout Overload Switch With Reset Button

A thermal cutout overload switch with reset button (J, fig. 1), mounted on the front of the bench grinder base, just above the off and on toggle switch, is provided for the purpose of shutting down the

motor when the bench grinder is overloaded. If the overload mechanism of the thermal cutout switch has been actuated, the motor can be started by depressing the reset button, of overload switch, after the overload mechanism of the thermal cutout switch has been allowed to cool for a few minutes.

Section III. OPERATION UNDER USUAL CONDITIONS

13. General

This section contains instructions for the operation of the bench grinder under conditions of moderate temperature and humidity. Every organization equipped with this bench grinder must thoroughly train its personnel in the procedures for operating this bench grinder. For operations under unusual conditions, refer to paragraphs 16 through 20.

14. Preparation for Operation of Bench Grinder

Note. The key letters noted in parentheses are in figure 1, unless otherwise indicated.

a. Remove three roundhead screws (L) from each guard cover (N). Remove guard covers and check the hex plain nuts, which secure the grinding abrasive wheels on the motor armature shaft, for tightness. Install each guard cover and secure with three $\frac{1}{4}$ -20 x $\frac{5}{8}$ roundhead screws (L).

b. Check the vertical position of each tool rest (K) in reference to the grinding abrasive wheels to make sure that they do not touch the wheels. Loosen the square-neck bolt with nut (E) and adjust each tool rest so that the tool rest clears the grinding abrasive wheel by one-eighth inch. Tighten square-neck bolts with nuts.

c. Adjust tool rest supports (F), identical on both left- and right-hand wheel guards (P and U), by loosening hex-head cap screw (G) so that clearance between grinding abrasive wheels and tool rests are about one-eighth inch. Tighten hex-head cap screw.

d. Position the 4 x 6-inch shatterproof glass eyeshields with adjusting arms 40-S-1746-800 (B) so that abrasive particles will be deflected from the eyes of the operator.

Caution: Always wear goggles when using the bench grinder.

e. Loosen hex-head cap screw (A) and position the sliding tongue (C), identical on both left- and right-hand wheel guards (P and U), so that the lower end of the tongue has at least one-eighth inch clearance from the grinding abrasive wheels. Tighten hex-head cap screw.

f. Check to insure that the power source is correct (par. 9) and the ground connection is secure.

15. Operation

a. *Precautions When Grinding.* Connect the plug connector to a

110-volt power supply receptable (par. 9) and secure ground connections (fig. 2). Move the toggle on the toggle switch to the ON position, and hold the workpiece to be ground firmly on the tool rest and against the grinding abrasive wheel. Slowly move workpiece back and forth on the grinding abrasive wheel with a steady even pressure. Do not hold the workpiece in one position on the grinding abrasive wheel or apply excessive pressure. Keeping the workpiece in one position on the grinding abrasive wheel will cause the grinding abrasive wheel to be worn down unevenly. Applying the workpiece to the grinding abrasive wheel with excessive pressure will result in the workpiece being burnt and discolored.

b. Selecting Grinding Abrasive Wheels. Use a coarse grain grinding abrasive wheel 40-W-368-5 (D, fig. 1) for coarse grinding, which is required for removal of a considerable amount of metal. Use a fine grain grinding abrasive wheel 40-W-368-10 (M) for fine grinding and when a smooth finish is required. For medium grinding, use a medium grain grinding abrasive wheel 40-W-368-22.

c. Forced Grinding. Do not force workpiece against grinding abrasive wheel. This will cause grinding load to be so heavy that the speed drops appreciably.

d. Dressing grinding abrasive wheels. Keep grinding abrasive wheels sharp and pores open by frequent light dressing with a wheel dresser (par. 33).

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

16. General

In addition to the normal operating procedures described in paragraphs 13 through 15 above for usual conditions, special instructions for operating under unusual conditions are contained herein. In addition to the normal preventive maintenance services (ch. 3), special care in cleaning must be observed where extremes of temperature, humidity, and atmospheric conditions are present. Proper cleaning, not only insure proper operation and functioning, but also guards against excessive wear of the working parts and deterioration of the materiel.

17. Operation in Extreme Heat

The bench grinder will function normally in conditions of extreme heat, but care should be taken not to overload (forcing the feed too fast through work) the bench grinder since this may overheat the motor.

18. Operation in Extreme Cold

The bench grinder will function in such temperatures and atmospheric conditions as will permit the flow of full voltage from the power source. When the bench grinder is placed in heated inclosure after use, condensation will form on all surfaces. Wipe all exposed surfaces dry.

19. Operation Under Dusty or Sandy Conditions

The bench grinder will function normally in dusty conditions. However, the external surfaces of the bench grinder should be wiped clean with a dry cloth before and after use, taking care to keep the crevices around the toggle switch and reset button as clean as possible. With bench grinder running, frequently blow dry compressed air on all surface parts. This will eliminate accumulation of dust and abrasive particles on the motor housing and moving parts, which if not removed may cause electrical groundings and/or extreme wear to parts. Keep covered when not in use.

20. Operation Under High Humidity

The bench grinder will function normally in high humidity. However, prior to operations in humid weather, a warmup period of from 4 to 5 minutes should be undertaken to dispel condensed moisture.

Warning: When placed in operation, condensation within the motor can result in internal short circuits, which can transmit a severe shock to the operator. Therefore, check ground connection (par. 9) prior to operation.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. EQUIPMENT AND SPARE PARTS FOR OPERATION AND ORGANIZATIONAL MAINTENANCE

21. General

Equipment is issued to the using organization for operating and maintaining the bench grinder. Equipment should not be used for purposes other than prescribed and, when not in use, should be properly stored. Spare parts are supplied to the using organization for replacement of those parts most likely to become worn, broken, or otherwise unserviceable when such operations are within the scope of organizational maintenance functions. Organizational spare parts and equipment supplied for the bench grinder are listed in Department of the Army Supply Manual ORD 7-8 SNL J-509 which is the authority for requisitioning replacements.

22. Common Tools and Equipment

Standard and commonly used tools and equipment having general application to this materiel are authorized by TOE.

23. Equipment

Certain equipment designed for operation of the materiel is listed in table I for information only. This list is not to be used for requisitioning replacements.

Table I. *Equipment for Operation*

Item	Identifying number	References		Use
		Fig.	Par.	
WHEEL, abrasive, grinding, al-oxide, stght, 7 in diam, 1 in face, $\frac{5}{8}$ in arbor hole, coarse grain (14 to 24) med grade, vitrified bond.	40-W-368-5	1	4, 15	For rough grinding.
WHEEL, abrasive, grinding, al-oxide, stght, 7 in diam, 1 in face, $\frac{5}{8}$ in arbor hole, fine grain (70 to 120) med grade, vitrified bond.	40-W-368-22		4, 15	For medium grinding.
WHEEL, abrasive, grinding, al-oxide, stght, 7 in diam, 1 in face, $\frac{5}{8}$ in arbor hole, med grain (30 to 60) med grade, vitrified bond.	40-W-368-10	1	4, 15	For finish grinding.
SHIELD, eye, shatterproof glass, size 4 x 6 inch, complete, with adjusting arm.	40-S-1746-800	1	9	To protect operator from dust and chips.

24. Organizational Maintenance Responsibility

Organizational maintenance is limited by the issue of tools and equipment. Maintenance operations beyond the scope or facilities of the using organization are the responsibility of the supporting ordnance maintenance unit (par. 2).

Section II. LUBRICATION AND PAINTING

25. Lubrication

a. Lubrication. No lubrication is required. Ball bearings are pre-lubricated, seal type and do not require additional lubrication.

b. Reports and Records. Report unsatisfactory performance of materiel or effect of prescribed lubricants and preserving materials, using DA Form 468.

26. Painting

Instructions for the preparation of the materiel for painting, methods of painting, and materials to be used are contained in TM 9-2851. Materials for painting are listed in Department of the Army Supply Manual ORD 7-8 SNL J-509.

Section III. PREVENTIVE MAINTENANCE SERVICES

27. General

a. Responsibility and Intervals. The primary function of preventive maintenance is to prevent breakdowns and, therefore, the need for repair. Preventive maintenance services are the responsibility of the using organization. These services consist generally of before-operation, during-operation, and after-operation services performed by the operator and the scheduled services to be performed at designated intervals by the organization mechanic. Intervals are based on normal operations. Reduce intervals for abnormal operation or severe conditions. Intervals during inactive periods may be extended accordingly.

b. Definition of Terms. The general inspection of each item applies also to any supporting member or connection and is generally a check to see whether the item is in good condition, correctly assembled, secure, and not excessively worn.

- (1) The inspection for "good condition" is usually an external visual inspection to determine whether the unit is damaged beyond serviceable limits. The term "good condition" is explained further by the following: not bent or twisted, not chafed or burred, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut, not deteriorated.
- (2) The inspection of a unit to see that it is "correctly assembled"

is usually an external visual inspection to see whether it is in its normal assembled position.

- (3) Inspection of a unit to determine if it is "secure" is usually an external visual examination or a check by hand or wrench for looseness. Such an examination must include any brackets, lockwashers, locknuts, locking wires, or cotter pins used.
- (4) By "excessively worn" is meant worn beyond serviceable limits or to a point likely to result in failure if the unit is not replaced before the next scheduled inspection.

28. Cleaning

a. General. Any special cleaning instructions required for specific mechanisms or parts are contained in the pertinent section. General cleaning instructions are as outlined in (1) through (5) below.

- (1) Use volatile mineral spirits paint thinner or dry-cleaning solvent to clean or wash grease or oil from all metal parts of the bench grinder.
- (2) Use carbon tetrachloride for cleaning all electrical parts.
- (3) Use clean water, or a soap solution of one-quarter pound of soap chips to a gallon of hot water, for all rubber parts and overall general cleaning of painted surfaces.
- (4) After the parts are cleaned, rinse and dry them thoroughly. Apply a light grade of special preservative lubricating oil to all parts having a polished surface to prevent rust.
- (5) Before installing new parts, remove any preservative materials such as rust-preventive compound, protective grease, etc. Prepare new parts as required.

b. General Precautions in Cleaning.

- (1) Provide adequate ventilation both during and after use of carbon tetrachloride. Work rooms must not be closed in. Avoid prolonged inhalation of vapor; headache and nausea may result. On contact with skin, it may cause irritation.
- (2) Volatile mineral spirits paint thinner and dry-cleaning solvent are inflammable and should not be used near an open flame. Fire extinguishers should be provided when these materials are used. Use only in well-ventilated places. These cleaners evaporate quickly and have a drying effect on the skin. If used without gloves, they may cause cracks in the skin and, in the case of some individuals, a mild irritation or inflammation.
- (3) Avoid getting petroleum products such as dry-cleaning solvent, volatile mineral spirits paint thinner, engine fuels, or lubricant on rubber parts, as they will deteriorate the rubber.
- (4) The use of gasoline, Diesel fuel oil, or benzene (benzol) for cleaning is prohibited.

29. Organizational Preventive Maintenance Services

a. *Purpose.* To insure efficient operation, it is necessary that the bench grinder be systematically inspected at intervals each day it is operated and weekly, so defects may be discovered and corrected before they result in serious damage or failure. Certain scheduled maintenance services will be performed at these designated intervals. Any defect or unsatisfactory operating characteristics beyond the scope of the operator or organizational mechanic to correct, must be reported at the earliest opportunity to the supporting ordnance unit for correction. See paragraph 2.

b. *Services.* Operator's and organizational mechanic's preventive maintenance services are listed in table II. Every organization equipped with the bench grinder must thoroughly train its personnel in performing the maintenance procedures for this materiel.

Table II. Organizational Preventive Maintenance Services

Intervals			Procedure
Before-Operation	After-Operation	Weekly	
			USUAL CONDITIONS
X	-----	-----	<i>Grinding abrasive wheels.</i> Inspect grinding abrasive wheels carefully. Check for chips, cracks, fractures, and any defects or damage. Replace if damaged (par. 9). Check grinding abrasive wheels for proper balance (par. 9).
X	-----	-----	<i>Hex nuts.</i> Check for tightness (par. 9).
X	-----	-----	<i>Tool rests.</i> Inspect tool rests to see if they are properly positioned and secure (par. 14).
X	-----	-----	<i>Sliding tongues and shatterproof glass eyeshields with adjusting arms 40-S-1746-800.</i> Inspect to see that they are properly located and secure (par. 14).
X	-----	-----	<i>Ground connection.</i> Check for proper installation (par. 9).
X	-----	X	<i>Visual inspection.</i> Check the bench grinder for exterior damage (par. 9). Tighten all loose nuts and bolts.
-----	-----	X	<i>Paint.</i> Check materiel for chipped paint; touchup paint as required (par. 26).
-----	-----	X	<i>Clean.</i> Clean all exterior surfaces of bench grinder in accordance with paragraph 28. Clean abrasive dust, etc., from around the motor armature shaft at inner sides of grinding abrasive wheels with compressed air.

Table II. Organizational Preventive Maintenance Services—Contd.

Intervals			Procedure
Before-Operation	After-Operation	Weekly	
			UNUSUAL CONDITIONS
X	X	X	<i>Extreme cold conditions.</i> When operating in below freezing temperature. remove any moisture to prevent freezing.
X	X	-----	<i>Dusty and sandy regions.</i> Remove dust and sand from external surface.
-----	X	X	<i>High humidity.</i> Wipe external surfaces with preservative lubricating oil.

Section IV. TROUBLESHOOTING

30. Scope

Troubleshooting is a systematic isolation of defective components by means of reported malfunctions, causes, plus corrections. The causes and corrections provided in this section are governed by the scope of the organizational level of maintenance.

31. Procedure

The procedure to follow in correcting the malfunction is to systematically isolate the cause and correct the malfunction in accordance with the instructions contained in table III below. If the correction is beyond the repair scope of the organization maintenance functions, refer the malfunction to ordnance maintenance personnel as indicated in the table.

Table III. Troubleshooting

Malfunction	Cause	Correction
Motor fails to start.	Plug connector not properly connected to power supply receptacle.	Spreads prongs of plug connector for tight connection.
	Defective off and on toggle switch.	Notify ordnance maintenance personnel.
	Cause beyond the repair scope of the using organization.	Notify ordnance maintenance personnel.
Excessive vibration of bench grinder.	Hex nuts loose.	Tighten hex nuts (par. 9).

Table III. Troubleshooting—Contd.

Malfunction	Cause	Correction
Excessive vibration of bench grinder—Contd.	Cracked or chipped grinding abrasive wheel.	Replace grinding abrasive wheel (par. 9).
	Mounting bolts or nuts on grinder base loose.	Tighten mounting bolts or nuts (par. 9).
	Grinding abrasive wheel off balance.	Balance grinding abrasive wheel (par. 9).
	Cause beyond the repair scope of the using organization.	Notify ordnance maintenance personnel.
Motor slows down then picks up speed.	Overloading of bench grinder.	Do not force feed (par. 15).
	Loose plug connector at power supply receptacle.	Spread prongs of plug connector for tight connection.
	Thermal cutout overload switch with reset button not functioning properly.	Permit bench grinder to cool for a few minutes and start by depressing the reset button (par. 12).
	Cause beyond the repair scope of the using organization.	Notify ordnance maintenance personnel.

Section V. GRINDING ABRASIVE WHEEL MAINTENANCE

32. General

Organizational maintenance of the grinding abrasive wheels consists of balancing, dressing, and replacement of the grinding abrasive wheels.

33. Maintenance

a. Removal of LH and RH Grinding Abrasive Wheels. Remove the three roundhead screws (L, fig. 1), which secure the wheel guard cover to the wheel guard, and remove the guard cover. Remove the hex plain nut (K, fig. 4), outer wheel flange (J), three balance weights (H), and grinding abrasive wheel from the motor armature shaft.

b. Inspection. Inspect the grinding abrasive wheels for chips, cracks, or fractures. Replace if damaged. Check for damaged threads on nuts and screws. Replace if necessary (par. 9).

c. Balancing and Installing LH and RH Grinding Abrasive Wheels. Install grinding abrasive wheels (par. 9). Install three balance weights (H, fig. 4), outer wheel flange (J), and $\frac{5}{8}$ -11 x $1\frac{1}{16}$ wide x $\frac{23}{64}$ thick plain nut (K). Adjust and balance the grinding abrasive wheels (par.

9) and secure guard covers (N, fig. 1) to wheel guard (par. 9) with three $\frac{1}{4}$ -20 x $\frac{5}{8}$ roundhead screws (L) on each guard cover.

d. Dressing of the Grinding Abrasive Wheels. Using an emery wheel dresser, dress the wheels until the working faces are trued.

Section VI. SHATTERPROOF GLASS EYESHIELDS WITH ADJUSTING ARMS, TOOL RESTS, AND TOOL REST SUPPORTS MAINTENANCE

34. General

Organizational maintenance of the shatterproof glass eyeshield with adjusting arms, 40-S-1746-800 tool rest, and tool rest supports consist of removal, inspection, and installation. These items are interchangeable on either side of the bench grinder.

35. Shatterproof Glass Eyeshields With Adjusting Arms

Note. The key letters noted in parentheses are in figure 3. The shatterproof glass eyeshields with adjusting arms 40-S-1746-800 is identical for both left- and right-hand wheel guards.

a. Removal. Remove hex-head cap screw (N), internal-teeth lockwasher (F), and adjusting arm clamp (E), and remove shatterproof glass eyeshield with adjusting arm.

b. In-Process Inspection. Inspect for cracked or broken parts (par. 9). Inspect shatterproof glass for chipped, cracked, or broken glass. Inspect for stripped threads.

c. Installation. Install shatterproof glass eyeshield with adjusting arm on the wheel guard and secure with one $\frac{5}{16}$ -18 x $\frac{3}{4}$ hex-head cap screw (N), 40-S-1746-800 (A, fig. 3) one $\frac{5}{16}$ -inch bolt size internal-teeth lockwasher (F), and one adjusting arm clamp (E).

36. Tool Rest and Tool Rest Support

Note. The key letters noted in parentheses are in figure 3. The tool rest and tool rest support are identical for the left- and right-hand wheel guards.

a. Removal. Remove the square-neck roundhead bolt (J) and square plain nut (L) which secures the tool rest (H) to tool rest support (K). Remove two hex-head cap screws (N), two internal-teeth lockwashers (F), and two plain washers (M), and remove tool rest support (K) from wheel guard.

b. Inspection. Inspect for cracked or broken parts. Inspect for stripped threads. Replace if necessary.

c. Installation. Install tool rest support (K) on the wheel guard and secure with two $\frac{5}{16}$ -18 x $\frac{3}{4}$ hex-head cap screws (N), two $\frac{5}{16}$ -inch bolt size internal-teeth lockwashers (F), and two $\frac{3}{8}$ ID x $\frac{7}{8}$ OD x $\frac{1}{16}$ thick washers (M). Install and secure tool rest (H) on the tool rest support (K) with one $\frac{5}{16}$ -18 x 1 square-neck roundhead bolt (J) and one $\frac{5}{16}$ -18 x $\frac{1}{16}$ -in. width x $1\frac{7}{64}$ thick square plain nut (L).

Section VII. WHEEL GUARD MAINTENANCE

37. General

Organizational maintenance for the LH and RH wheel guards consist of removal, inspection, and assembly. The wheel guards are not interchangeable to either models.

38. Removal and Disassembly

Note. The key letters noted in parentheses are in figure 4, unless otherwise indicated.

a. Refer to paragraphs 35 and 36 for the removal of the shatterproof glass eyeshield with adjusting arm tool rest, and tool rest support. Remove wheel guard cover (L), hex plain nut (K), outer wheel flange (J), balance weights (H), grinding abrasive wheel, inner wheel flange (F), and felt washer (C). See paragraph 33.

b. Remove hex-head cap screw (Q) and lockwasher (P) which secures the sliding tongue (N) to wheel guard (B). Remove sliding tongue.

c. Remove four roundhead screws (E) and four lockwashers (D), which secure wheel guard to motor assembly. Remove wheel guard (B). Remove the two felt washers (A) from the motor armature.

39. In-Process Inspection

Inspect felt washers for wear or tear. Replace if necessary. Inspect for stripped threads. Replace if necessary. Inspect sliding tongues and wheel guards for cracked, bent, or broken parts. Replace if necessary.

40. Assembly and Installation

Note. The key letters noted in parentheses are in figure 4.

a. Install two felt washers (A) on motor armature shaft. Install wheel guard (B) on motor assembly and secure with four $\frac{1}{4}$ -20 x $\frac{3}{4}$ roundhead screws (E) and four $\frac{1}{4}$ -inch bolt size split lockwashers (D). Install tight sleeve and felt washer (C), inner wheel flange (F), grinding abrasive wheel, balance weights (H), outer wheel flange (J), hex plain nut, and wheel guard cover as described in paragraph 33.

b. Install and secure sliding tongue (N) to wheel guard with one $\frac{3}{8}$ -16 x $\frac{3}{4}$ hex-head cap screw (Q) and one $\frac{3}{8}$ -inch bolt size lockwasher (P). Refer to paragraphs 35 and 36 for installation of shatterproof glass eyeshields with adjusting arms, tool rest, and tool rest support.

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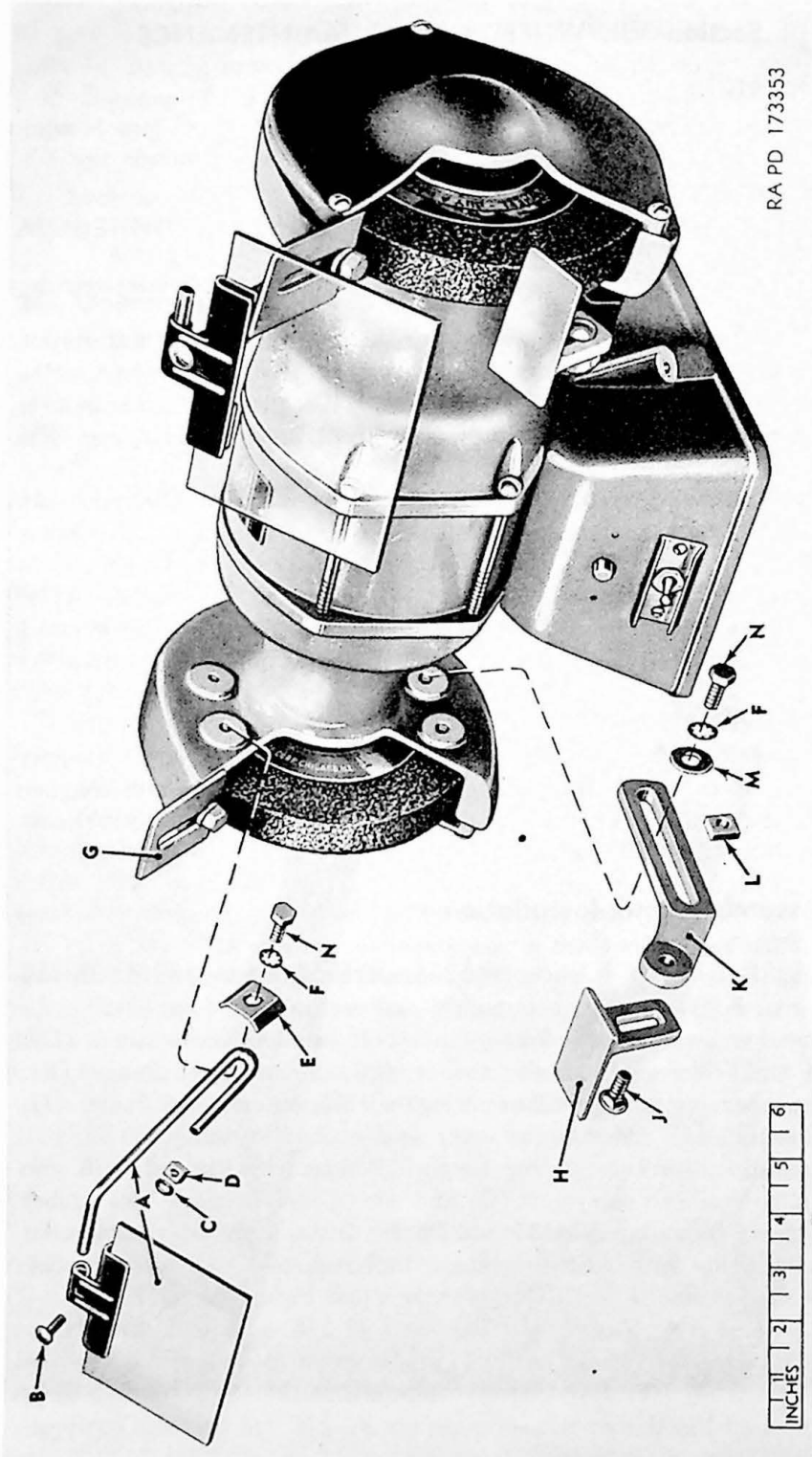
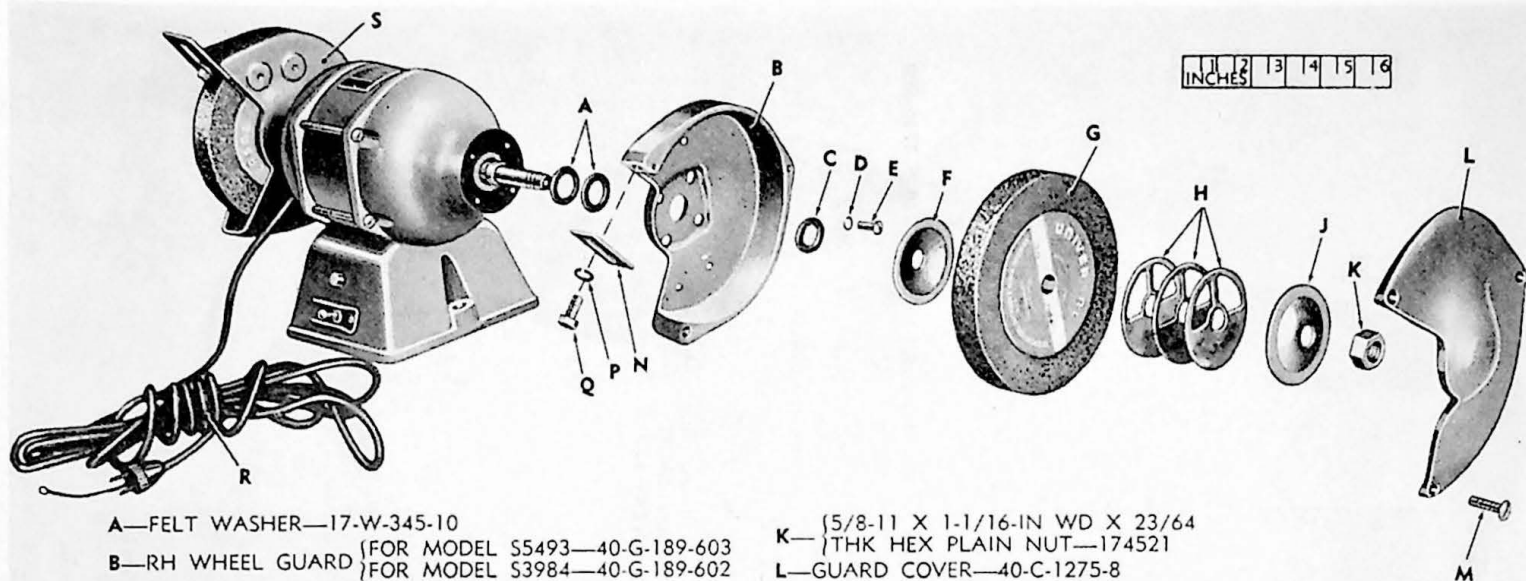


Figure 3. Shatterproof glass eyeshield with adjusting arm—40-S-17.46-800, tool rest, and tool rest support—exploded view.

- A 4 x 6 inch shatterproof glass eyeshield w/adjusting arm—40-S-1746-800
- B $\frac{1}{4}$ -20 x $\frac{3}{4}$ sq-nk rd-hd bolt—109740
- C $\frac{1}{4}$ in lockwasher—120380
- D $\frac{1}{4}$ -20 x $\frac{7}{16}$ in width x $\frac{7}{32}$ in thk reg sq plain nut—120372
- E adjusting arm clamp—BAL-DR-1569
- F $\frac{5}{16}$ in bolt size internal-teeth lockwasher—138538
- G Sliding tongue—40-T-222-125
- H Tool rest—40-R-1890-95
- J $\frac{5}{16}$ -18 x 1 sq-nk rd-hd bolt—109101
- K Tool rest support—40-S-3246-15
- L $\frac{5}{16}$ -18 x $\frac{9}{16}$ in width x $\frac{17}{64}$ thk sq plain nut—120373
- M $\frac{3}{8}$ id x $\frac{7}{8}$ od x $\frac{1}{16}$ thk washer—120387
- N $\frac{5}{16}$ -18 x $\frac{3}{4}$ hex-hd cap screw—122007



A—FELT WASHER—17-W-345-10

B—RH WHEEL GUARD { FOR MODEL S5493—40-G-189-603
FOR MODEL S3984—40-G-189-602

C—TIGHT SLEEVE AND FELT WASHER—40-W-68

D—1/4-IN BOLT SIZE SPLIT LOCK WASHER—120380

E—1/4-20 X 3/4 RD-HD SCREW—133043

F—INNER WHEEL FLANGE—40-F-18-20

G—{ VITRIFIED BOND MED GRADE COARSE GRAIN
(14 TO 24) 5/8-IN ARBOR HOLE 1-IN
FACE 7-IN DIAM STGHT AL-OXIDE GRINDING
ABRASIVE WHEEL—40-W-368-5

H—BALANCE WEIGHT—BAL-DR-3414

J—OUTER WHEEL FLANGE—40-F-18-22

K—{ 5/8-11 X 1-1/16-IN WD X 23/64
THK HEX PLAIN NUT—174521

L—GUARD COVER—40-C-1275-8

M—1/4-20 X 5/8 RD-HD SCREW—120583

N—SLIDING TONGUE—40-T-222-125

P—3/8-IN BOLT SIZE LOCK WASHER—103321

Q—3/8-16 X 3/4 HEX-HD CAP SCREW—122119

R—{ COND SIZE AWG NO 16 STRANDED 3 COND 0 TO
600 V 40% RUBBER JACKET RUBBER
INSULATED HARD SERVICE FLEX
(NEC TYPE) CORD—15-C-56102

S—LH WHEEL GUARD { FOR MODEL S5493—40-G-189-565
FOR MODEL S3984—40-G-189-560

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Figure 4. Wheel guards, balance weights, and grinding abrasive wheels.

CHAPTER 4

FIELD MAINTENANCE INSTRUCTIONS

Section I. GENERAL

41. General

The instructions in this chapter are for the information and use of personnel responsible for field maintenance. These instructions contain information on maintenance which is beyond the scope of the equipment or supplies normally available to using organizations. This chapter does not contain information for the using organization, since such information is available in the other chapters of this manual.

42. Procedure

This chapter contains procedures for inspection, disassembly, repair, and assembly of the bench grinder. The inspection procedures prescribed in this chapter consist of two types; i.e., in-process inspection for each component and final inspection for the complete bench grinder. Troubleshooting information is included in paragraphs 46 and 47 as a normal phase of inspection. In-process inspections are performed during the process of repairing components. Final inspection is performed after all repair has been completed and the item assembled.

Section II. PARTS AND EQUIPMENT FOR FIELD MAINTENANCE

43. General

Equipment and additional spare parts over and above those available to the using organization will be supplied to ordnance field maintenance units for repairing the materiel.

44. Parts

Parts are listed in Department of the Army Supply Manual ORD 7-8 SNL J-509 which is the authority for requisitioning replacements.

45. Equipment

The equipment tabulated in table I is necessary to perform the operations described in this manual. This tabulation is included for information only and is not to be used as a basis for requisition.

Section III. TROUBLESHOOTING

46. Scope

Troubleshooting is a systematic isolation of defective components by means of reported malfunctions, causes, plus corrections. Through the

use of the troubleshooting table, the specific defect or cause for the reported malfunction of a component can often be determined without having to perform a complete series of general tests and inspections.

47. Procedure

The procedure to follow in correcting the reported malfunction is to systematically isolate the cause and correct the malfunction in accordance with the instructions contained in tables III and IV. Information given in this paragraph supplements that contained in paragraphs 30 and 31, troubleshooting performed at the organizational level.

Table IV. Troubleshooting

Malfunction	Probable cause	Correction
Motor fails to start.	Defective motor capacitor.	Inspect motor capacitor and if necessary replace (pars. 49 through 53).
	Defective off and on toggle switch.	Inspect toggle switch and if necessary replace (pars. 49 through 53).
	Loose or broken flexible cord.	Inspect flexible cord and if necessary replace (pars. 49 through 53).
	Defective motor field.	Inspect motor field (par. 57) and if necessary replace (pars. 55 and 58).
	Defective thermal cutout overload switch with reset button.	Inspect thermal cutout switch with reset button and if necessary replace (pars. 49 through 53).
	Defective motor armature.	Inspect motor armature (par. 57) and if necessary replace (pars. 55 and 58).
	Seized ball bearings.	Inspect ball bearings and if necessary replace (pars. 55 through 58).
Motor slows down, then picks up speed.	Defective motor field.	Remove motor assembly, inspect motor field, and replace if necessary (pars. 55 through 58).

Table IV. Troubleshooting—Contd.

Malfunction	Probable cause	Correction
Motor overheats during operation.	Defective motor armature.	Remove motor assembly, inspect, and replace if necessary (pars. 55 through 58).
	Loose wiring connections or improper hook-up.	Check cable connection against wiring diagram (fig. 7).
	Short circuit in motor field.	Check motor field and replace if necessary (pars. 55 through 58).
Bench grinder vibrates excessively.	Defective motor armature.	Inspect armature and if necessary replace (pars. 55 through 58).
	Defective ball bearing on motor armature.	Inspect ball bearing and replace if necessary (pars. 55 through 58).
Toggle switch does not snap ON or OFF.	Bent motor armature shaft.	Replace motor armature (pars. 55 through 58).
	Defective off and on toggle switch.	Replace toggle switch (pars. 49 through 53).
Excessive vibration and play of motor armature shaft	Defective ball bearings.	Inspect ball bearings and if necessary replace (pars. 55 through 58).
	Bent motor armature shaft.	Replace motor armature (pars. 55 through 58).

Section IV. BENCH GRINDER BASE

48. General

The bench grinder base consists of an off and on toggle switch, thermal cutout overload switch with reset button, motor capacitor, and cover and mounts the motor assembly.

49. Removal

Note. The key letters noted in parentheses are in figure 5.

a. Place the bench grinder on its side and remove the grinder base cover (M) by removing four flathead screws (P) and the rubber foot (Q) from each corner of the cover.

b. Remove four roundhead screws (J) and four lockwashers (H),

which secure the motor assembly (A) to the bench grinder base, and remove bench grinder base (F).

50. Disassembly

Note. The key letters noted in parentheses are in figure 5.

a. Remove two roundhead screws (N) and two hex plain nuts (R), which secure the capacitor clamp (K) to the base cover, and remove capacitor clamp (K) and motor capacitor (L).

b. Unsolder two electrical cables from the terminals of the motor capacitor (L). Loosen the four contact screws on the off and on toggle switch (G) and remove the two cables of the flexible cord. Remove the cable which leads to the thermal cutout overload switch with reset button, the cable previously connected to the motor capacitor, and remove the cable leading to the motor. Unsolder the two cables from the terminals of the thermal cutout overload switch with reset button (one leading from the motor field and one previously connected to the toggle switch). Disconnect the ground cable from the interior of the bench grinder base by removing one roundhead screw (C). Remove flexible cord and cables by pulling the cord through the hole in the base.

Note. To facilitate connection of the electric cables in the assembly operation, tag all cables in the removal operation.

c. Remove the thermal cutout switch clamp (S) and thermal cutout overload switch with reset button (T) from the bench grinder base (F) by removing two roundhead screws (C).

(1) Remove the switch guard (E) from the front of the bench grinder base (F) by removing two roundhead screws (C). Remove toggle switch nut (D), which secures the toggle switch to the base, and remove the off and on toggle switch (G).

(2) Remove the bushing (V) from the hole where the flexible cord enters the bench grinder base (F).

51. In-Process Inspections and Repair

a. *Motor Capacitor.* If after assembly, the motor does not start and all parts through in-process inspection were found to be in good condition, replace the motor capacitor.

b. *Off and On Toggle Switch.* Apply test probes of an ohmmeter across the two cable terminals and a jumper cable across the other two switch terminals. To test for continuity, place the toggle switch in the ON position; the ohmmeter should read zero. To test for shorts, place the toggle switch in the OFF position; the ohmmeter should give an infinite reading. Replace toggle switch, if defective.

c. *Flexible Cord.* Visually inspect conductor size AWG No. 16 0 to 600 volt flexible cord for defective insulation, loose terminals, or defective connector. To check for open circuits, apply the ohmmeter test probes to opposite ends of each cable. The ohmmeter should read zero. If ohmmeter does not read zero, the flexible cord or plug connector

is defective and must be replaced. Inspect flexible cord for broken strands. Replace flexible cord if found defective. Inspect plug connector for broken contact blades. Replace flexible cord.

d. Thermal Cutout Overload Switch With Reset Button. Set the thermal cutout switch with reset button on a hotplate and heat it until the button snaps. Allow the overload switch to cool for a few moments and press the button, note if the button remains in a depressed position. If the button snaps back when depressed, allow to cool a little longer and repeat the above operation. If the button will not remain depressed after it has cooled, the thermal cutout overload switch with reset button must be replaced.

e. Bench Grinder Base. Check whether bench grinder base is cracked or broken. Inspect all screws for stripped threads. Replace, if found defective.

52. Assembly

Note. The key letters noted in parentheses are in figure 5.

a. Install the bushing (V) in the opening of the bench grinder base, where the flexible cord enters, and insert the conductor size AWG No. 16 0 to 600-volt flexible cord through the bushing. Secure the green ground cable terminal of the flexible cord to the interior of the grinder base (F) with one 8-32 x $\frac{3}{8}$ roundhead screw (C). Connect one of the remaining two cables of the flexible cord to a contact screw on the off and on toggle switch (G) and tighten the contact screw. Connect the remaining cable of the flexible cord to the second contact screw on the same end of the off and on toggle switch and tighten the contact screw. To one of the terminals at the opposite end of the off and on toggle switch connect the black field cable from the motor and a short piece of No. 14 insulated cable and tighten contact screws. To the remaining terminal of the toggle switch connect a short piece of No. 14 insulated cable and tighten contact screws. Solder the free end of the cable leading from terminal on the toggle switch, to which the black motor cable is connected, to one of the terminals on the capacitor. Solder the red motor cable to the second terminal of the capacitor. Solder the green motor cable to terminal No. 14 of the thermal cutout overload switch with reset button. Solder the free end of the remaining cable leading from toggle switch to terminal No. 3 of the thermal cutout overload switch with reset button. See wiring diagram figure 7.

b. Install the thermal cutout overload switch with reset button (T) and thermal cutout switch clamp (S) in the bench grinder base (F) and secure with two No. 8-32 x $\frac{3}{8}$ roundhead screws (C).

c. Install the switch guard (E) on the front of the bench grinder base and secure two No. 8-32 x $\frac{3}{8}$ roundhead screws (C). Install the off and on toggle switch (G) through the opening in bench grinder base and secure with toggle switch nut (D).

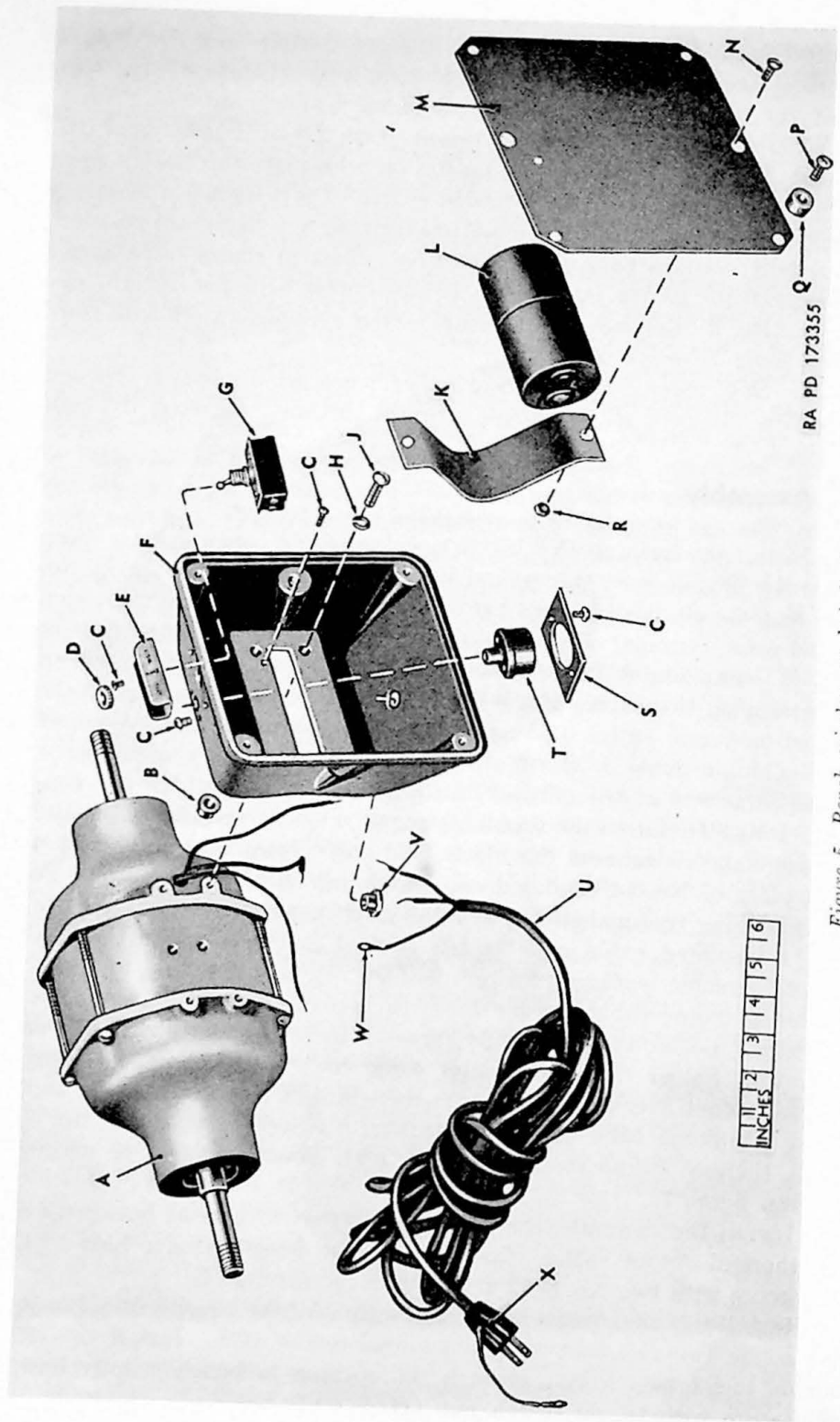


Figure 5. Bench grinder—exploded view.

- A Motor assy
- B Fiber bushing—BAL-DR-2561
- C No. 8-32 x $\frac{3}{8}$ rd-hd screw—121832
- D Toggle switch nut
- E Switch guard—17-G-8950
- F Bench grinder base—BAL-DR-6615
- G 250 v 1 hp, 125 v 12 amp, 250 v 6 amp, sgle-throw, double-pole, end connected, off and on toggle switch—17-S-28223-45
- H $\frac{1}{4}$ -inch bolt size split lockwasher—120380
- J $\frac{1}{4}$ -20 x 1 rd-hd screw—133049
- K Capacitor (condenser) clamp—BAL-DR-6133
- L 6-MFD 330-v ac motor capacitor (condenser)—17-C-16832
- M Grinder base cover—BAL-DR-172
- N No. 10-32 x $\frac{1}{2}$ rd-hd screw—100764
- P No. 10-32 x $\frac{1}{4}$ fl-hd screw—133615
- Q Rubber foot—BAL-BH-209
- R No. 10-32 x $\frac{3}{8}$ wd x $\frac{1}{8}$ thk hex plain nut—103088
- S Thermal cutout switch clamp—BAL-DR-6674
- T Thermal cutout overload switch w/reset button (for Model S5493 only)—17-S-25130-100
- U Cond size AWG No. 16 stranded 3 cond 0 to 600 v 40% rubber jacket rubber insulated hard service flex (NEC type) cord—15-C-56102
- V Bushing
- W Ground cable
- X 10-amp 250-volt 15-amp 125-volt ($1\frac{1}{2}$ to $\frac{5}{8}$ in diam cord capacity) cord grip parallel blades 2 male contacts elec plug connector—543802

d. Position the 6-MFD 330-volt motor capacitor (L) on the grinder base cover (M), place capacitor clamp (K) over the motor capacitor and secure with two No. 10-32 x $\frac{1}{2}$ roundhead screws (N) and two No. 10-32 x $\frac{3}{8}$ wd x $\frac{1}{8}$ thick hex plain nuts (R).

53. Installation

a. Install the bench grinder base (F, fig. 5) on the motor assembly (A) and secure with four $\frac{1}{4}$ -20 x 1 roundhead screws (J) and four $\frac{1}{4}$ -inch bolt size split lock washers (H).

b. Install the grinder base cover on the bench grinder base, and secure the cover to the base with four rubber feet (Q), one on each corner of the cover, and four No. 10-32 x $\frac{1}{4}$ flathead screws (P).

Section V. MOTOR ASSEMBLY

54. General

The motor assembly consists of a single-phase 60-cycle 110-volt $\frac{1}{2}$ -horsepower motor. The motor armature and end plates are not interchangeable with either model.

55. Removal

a. Remove the grinding abrasive wheels as described in paragraph 33. Remove the wheel guards as described in paragraph 38.

b. Remove the bench grinder base from the motor assembly as described in paragraph 49. Disconnect the electrical cables from capacitor and toggle switch as described in paragraph 50.

56. Disassembly

Note. The key letters noted in parentheses are in figure 6, except where otherwise indicated.

a. Remove four through bolts (K) and four lockwashers (J), which secure the right and left end plates to the motor assembly, and remove the end plates from the motor field by tapping with a mallet. Scribe correlation marks across the left and right end plates and the motor field (G) at their points of junction. Remove bushing (B, fig. 5) from underside of right end plate.

b. Remove motor armature (F) from the motor field (G). Remove bearing guards (B) from the bearing cavities in the end plates.

c. Pry open the tight sleeves (C) with a small chisel and remove the sleeves from the motor armature shaft.

Note. The tight sleeves are tightly pressed onto the motor armature shaft and can only be removed by prying them open. An indentation is provided on the sleeves to facilitate the operation.

d. Remove ball bearing (D) from each end of the motor armature shaft with a bearing puller.

Note. Do not remove the armature cooling fans (E) from the motor armature shaft unless it is absolutely necessary.

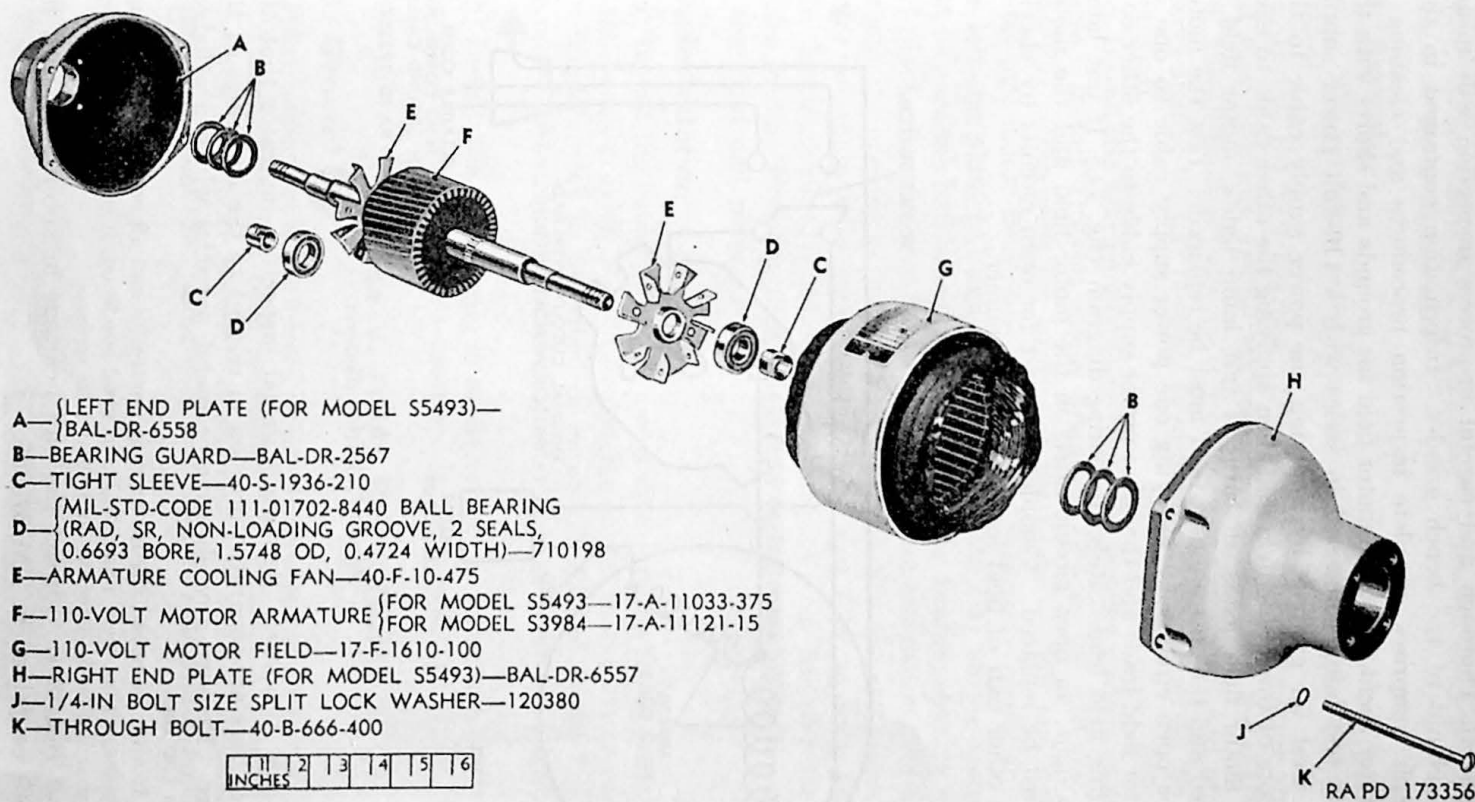


Figure 6. Motor assembly—exploded view.

57. In-Process Inspection and Repair

a. *General.* Thorough and careful in-process inspection will insure proper rebuild of the bench grinder. Information contained in this paragraph comprises complete inspection procedures and cleaning.

b. *Motor Field.* Test the motor field for grounds and shorts with the use of a test lamp connected in series with a 110-volt power supply cable. Test for grounds by applying one power supply cable to the metal core of the motor field and then applying the other cable to each of the motor field leads, in turn; if test lamp lights, motor field is grounded and the entire motor field must be replaced. Test the motor field for open circuits by applying one power supply cable to one of the motor field leads and the other power supply cable to the other corresponding field lead. Refer to wiring diagram (fig. 7). If test lamp fails to light, an open circuit exists in the motor field and the motor field must be replaced. Complete the test for open circuits by checking the other pair of field leads in a like manner.

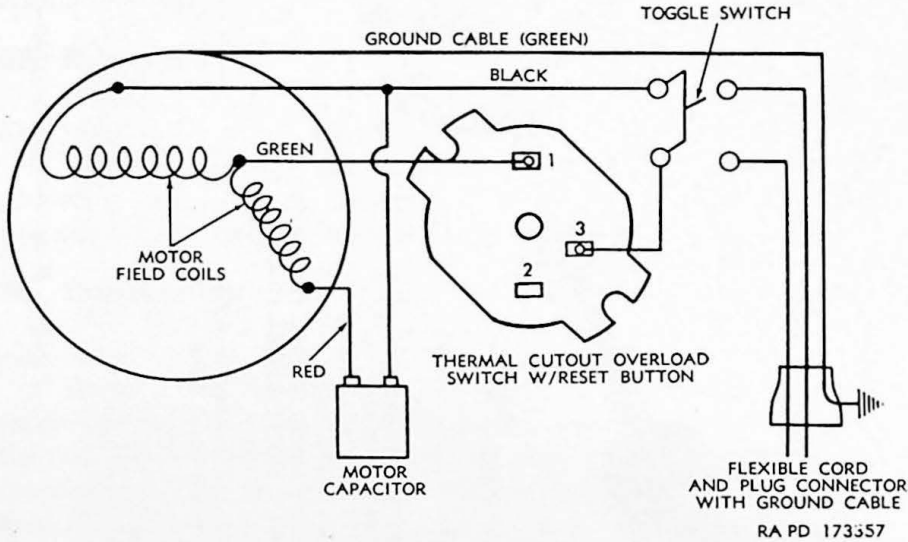


Figure 7. Wiring diagram.

c. *Motor Armature.* Replace if visual inspection indicates that the armature bars are separated or open in respect to the end rings of the armature. Remove any abrasive or metal particles which are lodged between the bars.

Note. If after assembly, the motor runs erratically and all components, through in-process inspection, were found to be in good condition, it can be assumed that the motor armature is defective and should be replaced.

d. *Ball Bearings.* Inspect the ball bearings in accordance with instructions contained in TM 37-265.

e. Armature Cooling Fan. Inspect the armature cooling fan for bent or broken blades.

Note. Do not remove the armature cooling fan from the motor armature shaft, unless it is absolutely necessary.

58. Assembly

Note. The key letters noted in parentheses are in figure 6, unless otherwise indicated.

a. Install the ball bearings (D) onto the motor armature shaft so that they fit firmly against the respective shoulders of the shaft.

b. Install the tight sleeves (C) on the armature shaft and press the sleeves against the ball bearings to secure the ball bearings on the armature shaft.

c. Install the bearing guards (B) into the bearing cavities in the end plates. Install 110-volt motor armature (F) in the 110-volt motor field (G). Observing the correlation marks on the left and right end plates and motor field made during the disassembly operation, install the left end plate (A) and the right end plate (H) on the motor field and be sure the ball bearings are seated in the bearing opening of each end plate. Be sure that the three cables from the motor field are put through the opening in the right end plate. Secure the end plates to the motor assembly with four through bolts and four $\frac{1}{4}$ -inch bolt size split lockwashers (J). Slide the bushing (V, fig. 5) over the three cables leading from the motor field and install bushing in the opening of the right end plate.

59. Installation

a. Install the cables from the motor field through the opening in top of the bench grinder base. Connect the cables to the motor capacitor and toggle switch as described in paragraph 52 and figure 7. Install the motor assembly on the bench grinder base as described in paragraph 53.

b. Install the wheel guards as described in paragraph 40. Install grinding abrasive wheels as described in paragraph 33.

Section V. FINAL INSPECTION

60. General

Final inspection is performed after all repairs have been completed and the materiel has been assembled. It includes a general visual inspection for proper assembly of the materiel, and a functional check to make sure that the grinder is in working condition and is functioning properly.

61. Inspection

a. Check to see that the bench grinder is correctly assembled and that all parts are secure.

b. Place toggle switch in the ON position; if the grinder fails to start, runs erratically, or overheats, refer to tables III and IV for possible causes and corrections.

58. Assembly

59. Installation

Section V. FINAL INSPECTION

60. General

61. Inspection

CHAPTER 5

SHIPMENT AND STORAGE AND DESTRUCTION OF MATERIEL TO PREVENT ENEMY USE

Section I. SHIPMENT AND STORAGE

62. Shipping Instructions

a. Domestic Shipping Instructions.

- (1) *Preparation.* When shipping the bench grinder interstate or within the continental United States, the officer in charge of preparing the shipment *will be responsible* for furnishing the grinders to the carriers for transport in a *serviceable* condition, properly preserved, packaged, and packed (par. 64).

Note. Personnel withdrawing grinders from limited storage for domestic shipment must not open boxes that have been previously inspected and packed. If it is determined that boxes have been opened, grinders must be inspected to insure that they are complete and serviceable and processed, packaged, and packed in accordance with paragraph 64.

- (2) *Army shipping documents.* Prepare all Army shipping documents accompanying freight in accordance with TM 38-705.

b. Oversea Shipping Instructions.

- (1) *Inspection.* Normally, it is not necessary to inspect grinders in sealed boxes, if they have been inspected before packaging and during storage. However, if there is doubt regarding the condition of the grinders and packaging, thorough inspection should be made prior to shipment.
- (2) *Preparation for shipment to ports.* Prepare grinder destined to ports of embarkation for oversea shipment the same as prescribed for domestic shipment (*a* above).

63. Storage Instructions

a. Limited Storage Instructions.

(1) *Receiving inspections.*

- (a) Report on DD Form 6 Report of Damaged or Improper Shipment all grinders received in a damaged condition or improperly prepared for shipment, in accordance with SR 745-45-5. Report of grinders received in an unsatisfactory condition (chronic failure or malfunction) will be reported on DA Form 468, in accordance with SR 700-45-5.

- (b) Immediately upon receipt, grinders that have not yet been inspected and prepared for limited storage must be given a limited technical inspection and processed, packaged, and

packed as prescribed in paragraph 60. The results and classification will be recorded and packed with the grinders.

- (c) Perform a systematic inspection and replace or repair all missing or broken parts. If repairs are beyond the scope of the unit, causing the grinders to be out of service for an appreciable length of time, store them in a limited-storage status and attach tags specifying the repairs needed. The report of these conditions will be submitted by the unit commander for action by an ordnance maintenance unit.
- (2) *Inspections during storage.* Perform a visual inspection periodically to determine general conditions. If corrosion is found on any part, clean and treat with the prescribed preservatives.
- (3) *Storage site.*
 - (a) Personnel must carefully note the storage location to determine whether the location is adequate for the grinders.
 - (b) Whenever possible, store all grinders in a room where the moisture content of the air is kept to a low relative humidity (40% or less) and at an even temperature. When it is found necessary to store grinders outdoors, cover and protect them against the elements as prescribed in TB ORD 379.
- (4) *Removal from limited storage.*
 - (a) If the grinders are not shipped or issued upon expiration of the limited-storage period, they must be further inspected and treated for standby or long-term storage as prescribed in *b* below.
 - (b) If the grinders to be shipped will reach their destination within the limited-storage period, they need not be processed upon removal from storage, unless inspection reveals it to be necessary according to anticipated in-transit weather conditions.
 - (c) Service grinders in accordance with paragraph 9, when it has been ascertained that they are to be placed into immediate service. Lubricate as prescribed in paragraph 25.
 - (d) Repair and/or replace all items tagged in accordance with (1) (c) above.

b. Standby and Long-Term Storage.

- (1) *Maintenance in-storage inspection.*
 - (a) Maintenance in-storage inspection must be performed by qualified ordnance maintenance personnel.
 - (b) Inspection of grinders will preferably be performed in an area expressly set aside for that purpose or in a maintenance shop, when such facilities are available at the installation.

Note. Electric motors and components that have been packed by Method II must not be removed from the pack for percentage inspection. However, a visual inspection should be made and if the pack

has been damaged or broken, material must be removed, processed, packaged, and packed as prescribed in paragraph 64.

- (c) Inspect at least 1-percent of units in storage semiannually. If results of the 1-percent inspection reveal defective grinders, then inspect 10-percent of the grinders. If additional defective grinders are discovered, then inspect the entire lot and process in accordance with paragraph 64.
 - (d) When a 1-percent or 10-percent inspection proves satisfactory, select grinders not previously inspected for the next inspection.
- (2) *Packaging.* Inspectors must carefully examine selected grinders, observing the basic points listed in (a) through (c) below.
- (a) Condition of containers.
 - (b) Legibility and *accuracy* of package markings.
 - (c) Method of packaging.

64. Processing, Packaging, and Packing Instructions

a. Cleaning. Remove shop dirt and all other foreign matter from all metal surfaces by scrubbing with cloths soaked in dry-cleaning solvent or volatile mineral spirits, followed by wiping with clean, solvent-soaked cloths. Dry thoroughly by wiping with clean, lint-free dry cloths.

Note. Cloth or synthetic rubber gloves must be worn while handling items. Do not apply solvent to any part of the motor assembly, cable, abrasive parts of the grinding abrasive wheels, or rubber items of any kind.

b. Packaging.

- (1) Cushion wheels and all sharp or projecting parts of grinder with cellulosic cushioning material.
- (2) Place grinder in a corrugated or a solid fiberboard container and cushion to prevent free movement. Locate bags of desiccant around grinder and seal carton with tape. Round off all sharp corners of the carton with a mallet. Form water-vaporproof barrier-material around carton and heat-seal all seams except a small opening. Exhaust air with a vacuum pump and heat-seal openings.

Note. To determine amount of desiccant required, refer to TM 38-230. Separate the metal parts from the bags of desiccant by adequate barrier-material.

- (3) Apply marking label specifying nomenclature, stock number, and "Method II Pack."
- (4) Locate the packaged grinder within the exterior shipping container (c below).

c. Packing.

- (1) *Domestic.* Pack the carton containing the grinder in a nailed wood or fiberboard-lined wood box constructed in accordance with TM 9-1005.

- (2) *Oversea.* Pack the carton containing the grinder in a nailed wood or fiberboard-lined wood box constructed in accordance with TM 9-1005.

d. Marking.

- (1) *Domestic.*

- (a) After the grinder has been packed, the standard marking information required to identify and mark containers for domestic shipment will be printed or stenciled directly onto the shipping container, with the standard nomenclature, stock number or other identifying number, quantity and size, weight (WT), package number (where required), domestic address label, caution labels, and markings (where required), date packed (month and year), and identification symbol of installation performing packaging.

Note. Grinders packaged for immediate use or limited storage will be clearly marked "Packaged for Immediate Use" or "Packaged for Limited Storage," as applicable. When the set markings, packing lists, special and technical data markings are necessary, they will be used and applied in accordance with specific instructions from the officer in charge.

- (b) Do not apply labels or mark containers unless the contents have been actually inspected and processed.

- (2) *Oversea.*

- (a) For shipment to ports of embarkation for oversea shipment, the container will be labeled or stenciled as prescribed for domestic shipment ((1) above), and, in addition, will include the cubage (CU), oversea address, and service color marking (see SR 746-30-5).
- (b) Each container shipped to a port in less than carload lot (LCL) or less than truckload lot (LTL) will also bear a domestic address. Old addresses and irrelevant data will be effectively removed or obliterated prior to shipment. A label not exceeding 28 square inches (yellow corners not required) will be used for domestic address. Label will be securely attached to container and covered with water-resistant label adhesive. Stenciling of domestic addresses on container is not permitted.

65. Loading and Blocking Instructions

For general loading rules and methods and procedures for loading and blocking boxed items in boxcars, refer to TM 9-1005 and SB 9-OSSC-J.

Section II. DESTRUCTION OF MATERIEL TO PREVENT ENEMY USE

66. General

- a.* Destruction of the bench grinder, when subject to capture or

abandonment in the combat zone, will be undertaken by the using army only when, in the judgment of the unit commander concerned, such action is necessary in accordance with orders of, or policy established by, the army commander. When in the hands of ordnance maintenance personnel or in storage, destruction will be in accordance with FM 9-5 and the information below as applicable.

b. The information which follows is for guidance only. Certain of the procedures outlined require the use of explosives and incendiary grenades which normally may not be authorized items of issue to the using organization. The issue of these and related materials, and the conditions under which destruction will be effected, are command decisions in each case, according to the tactical situation. Of the several means of destruction, those most generally applicable are—

- Mechanical—Requires axe, pick mattock, sledge, crowbar, or similar implement.
- Burning —Requires gasoline, oil, incendiary grenades, or other flammables, or welding, or cutting torch.
- Demolition¹—Requires suitable explosives or ammunition.
- Gunfire¹ —Includes artillery, machine guns, rifles using rifle grenades, and launchers using antitank rockets. Under some circumstances hand grenades may be used.
- Disposal —Requires burying in the ground, dumping in streams or marshes, or scattering so widely as to preclude recovery of essential parts.

In general, destruction of essential parts, followed by burning will usually be sufficient to render the materiel useless. However, selection of the particular method of destruction requires imagination and resourcefulness in the utilization of the facilities at hand under the existing conditions. Time is usually critical.

c. If destruction to prevent enemy use is resorted to, the materiel must be so badly damaged that it cannot be restored to a usable condition in the combat zone either by repair or cannibalization. Adequate destruction requires that all parts essential to the operation of the materiel, including essential spare parts, be destroyed or damaged beyond repair. However, when lack of time and personnel prevents destruction of all parts, priority is given to the destruction of those parts most difficult to replace. Equally important, the same essential parts must be destroyed on all like materiel so that the enemy cannot construct one complete unit from several damaged ones.

d. If destruction by demolition or gunfire is directed, due consideration should be given to the observance of appropriate safety precautions.

¹ Generally applicable only when the bench grinder is to be destroyed in conjunction with other equipment.

67. Destruction of the Bench Grinder

a. Method No. 1—by Mechanical Means.

- (1) Disconnect the bench grinder from its source of electricity.
- (2) Cut off the electric cord close to the bench grinder. Destroy the cord by cutting it into short lengths.
- (3) Using an axe, pick mattock, sledge, or other heavy implement, destroy the grinder by smashing the grinding wheels and guards, toggle switch and base, motor housing and wiring. Elapsed time: about 3 minutes.

b. Method No. 2—by Burning.

- (1) Disconnect the bench grinder from its source of electricity.
- (2) Using a welding or cutting torch, burn through the toggle switch and base, motor housing, and destroy the wiring. Elapsed time: about 3 minutes.
- (3) In the absence of a welding or cutting torch, place combustible around and on top of the grinder. Pour gasoline over the combustible and grinder. Ignite and take cover. A very hot fire is required to render the materiel useless.

Caution: When igniting the gasoline, due consideration should be given to the highly flammable nature of gasoline and its vapor. Carelessness in its use may result in painful burns.

Elapsed time: about 3 minutes.

c. Method No. 3—by Disposal. Bury the bench grinder in a suitable hole or drop it into a stream. Elapsed time: about 3 minutes.

APPENDIX

REFERENCES

1. Publications Indexes

Special regulations in the 310-20 series; DA Pam 108-1; and FM 21-8 should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to materiel covered in this manual.

2. Supply Manuals

The following manuals of the Department of the Army Supply Manual pertain to this materiel:

Cleaners, Preservatives, Lubricants, Recoil Fluids,
Special Oils, and Related Maintenance Materials-- ORD 3 SNL K-1
Grinder, Bench, 1/2 Hp, 110 V, 60 C, sgle-ph,
Wheel Size 7 x 1 Inch (Baldor Electric
Models S 3984 and S5493)----- ORD 7-8 SNL J-509
Land Mines and Components; Demolition Explosives and
Related Items; and Ammunition for Simulated Artillery,
Booby Trap, Hand Grenade, and Land Mine Fire-- ORD 3 SNL R-7
Introduction and Index¹-----ORD 1

3. Forms

The following forms pertain to this materiel:

DA Form 9-71, Locator and Inventory Control Card
DA Form 9-72, Ordnance Stock Record Card
DA Form 9-77, Job Order Register
DA Form 9-78, Job Order
DA Form 9-79, Parts Requisition
DA Form 9-80, Job Order File
DA Form 9-81, Exchange Part or Unit Identification Tag
DA Form 468, Unsatisfactory Equipment Report
DA Form 811, Work Request and Job Order
DA Form 865, Work Order
DA Form 866, Consolidation of Parts
DA Form 867, Status of Modification Work Order
DD Form 6, Report of Damaged or Improper Shipment

4. Other Publications

The following explanatory publications contain information pertinent to this materiel and associated equipment:

a. *Camouflage.*

Camouflage, Basic Principles----- FM 5-20

¹ SR 310-20-29 has superseded the index portion of ORD 1.

b. Decontamination.

Decontamination ----- TM 3-220
Defense Against CBR Attack ----- FM 21-40

c. Destruction of Materiel to Prevent Enemy Use.

Explosives and Demolitions ----- FM 5-25
Ordnance Service in the Field ----- FM 9-5
Regulations for Firing Ammunition for Training, Target
Practice, and Combat ----- SR 385-310-1
AFR 50-13

d. General.

Accident Reporting ----- SR 385-10-40
Accounting for Lost, Damaged, or Destroyed Property -- SR 735-150-1
Inspection of Ordnance Materiel in the Hands of Troops -- TM 9-1100
Unsatisfactory Equipment Report
(Reports Control Symbol CSGLD-247 (R)) ----- SR 700-45-5

e. Maintenance and repair.

Abrasive, Cleaning, Preserving, Sealing, Adhesive, and
Related Materials Issued for Ordnance Materiel ----- TM 9-850
Instruction Guide: Care and Maintenance of Ball
and Roller Bearings ----- TM 37-265
Lubrication ----- TM 9-2835
Maintenance and Care of Hand Tools ----- TM 9-867
Maintenance Responsibilities and Shop Operation ----- AR 750-5
Ordnance Maintenance and General Supply in the Field -- FM 9-10
Painting Instructions for Field Use ----- TM 9-2851

f. Shipment and Limited, Standby and Long-Term Storage.

Army Shipping Document ----- TM 38-705
Instruction Guide: Ordnance Preservation, Packaging,
Packing, Storage, and Shipping ----- TM 9-1005
Ordnance Storage and Shipment Chart—Group J:
Machine Tools and Related Equipment ----- SB 9-OSSC-J
Preservation, Packaging, and Packing of Military
Supplies and Equipment ----- TM 38-230
Protection of Ordnance General Supplies in Open Storage -- TB ORD 379
Report of Damaged or Improper Shipment (Reports Control
Symbols CSGLD-66 (Army), BuSandA 4600-6 (Navy),
and AF-S9 (Air Force)) ----- SR 745-45-5
Navy Shipping Guide, Article 1850-4 ----- AFR 71-4

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[AG 413.8 (17 Dec 54)]

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POE (2)	

NG: Same as Active Army except allowance is one copy for each unit.

USAR: None.

Unless otherwise noted, distribution applies to CONUS and overseas.

For explanation of abbreviations used, see SR 320-50-1.



TM 9-9036-2/TO 34F2-2-1-174

OPERATION AND MAINTENANCE: WHEEL SIZE 7 X 1 INCH SINGLE-PHASE 60-CYCLE 110-VOLT
1/2-HORSEPOWER BENCH GRINDER (BALDOR ELECTRIC MODELS S3984 AND S5493) (40-6-142-5)—1955