

HARVESTORE FARMSTEAD PRODUCTS
AUTOMATED FEEDING EQUIPMENT

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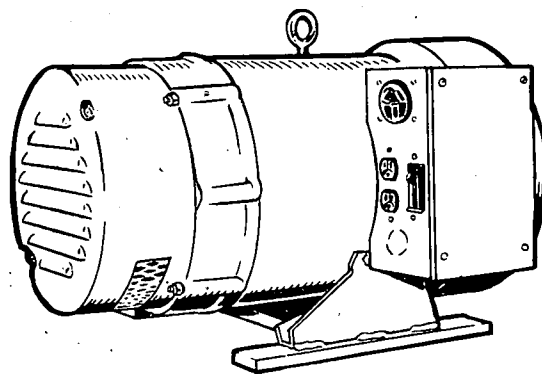
MODEL 25PTO- 1
MODEL 25PTO- 3
STANDBY POWER
ALTERNATOR

OPERATOR'S MANUAL

INSTALLATION

OPERATION

MAINTENANCE



pg. MMG 23069

ASmith HARVESTORE® PRODUCTS, INC.

550 WEST ALGONQUIN RD., ARLINGTON HEIGHTS, ILLINOIS 60005

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UR 971-1002 SECTION

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971-1001 12-78

SUPPLEMENTARY INSTRUCTIONS AND PARTS CATALOG

Add this information to the UR Series Tractor-Drive Alternators Operator's Manual and Parts Catalog 971-0007.

This information applies to the Terrell gear boxes (190-0538) on all 45.0 kW and 65.0 kW PTO Alternators beginning with Spec E. The oil capacity of these gear boxes is 1.25 pints (0.66 litre) of SAE 90 EP gear lubricant. The Terrell 1000 rpm gear boxes are similar in appearance and other details to the Apex 1000 rpm gear boxes (190-0327) in use prior to Spec E.

NOTE: Spare parts are still available for Apex gear boxes on units built prior to Spec E.

The Terrell gear boxes can not be used to replace the Apex gear boxes on units built prior to Spec E, unless the shoulder on the rotor shaft is machined to fit the Terrell gear box.

NOTE: The above information does not apply to any of the 80.0 kW UR PTO Alternators.

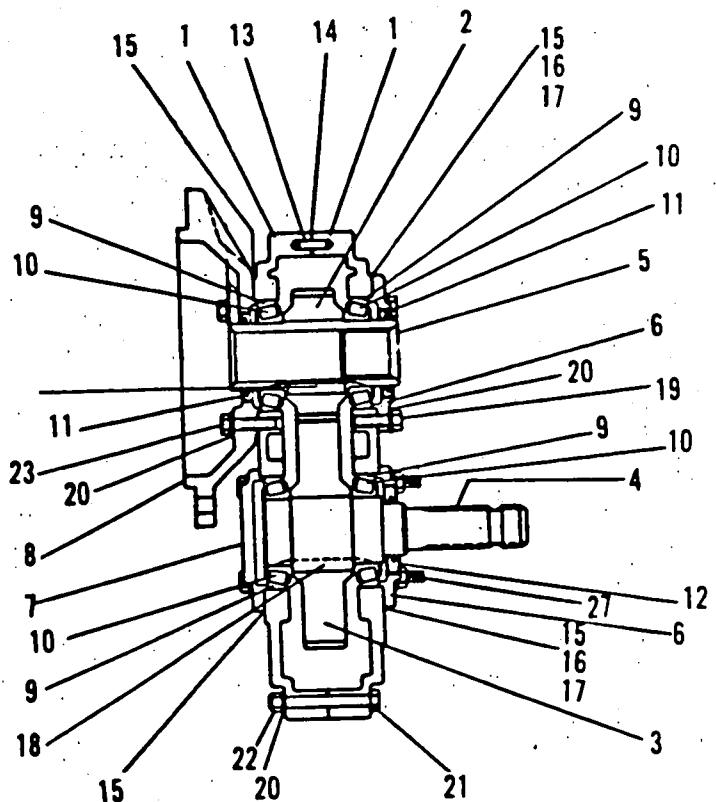
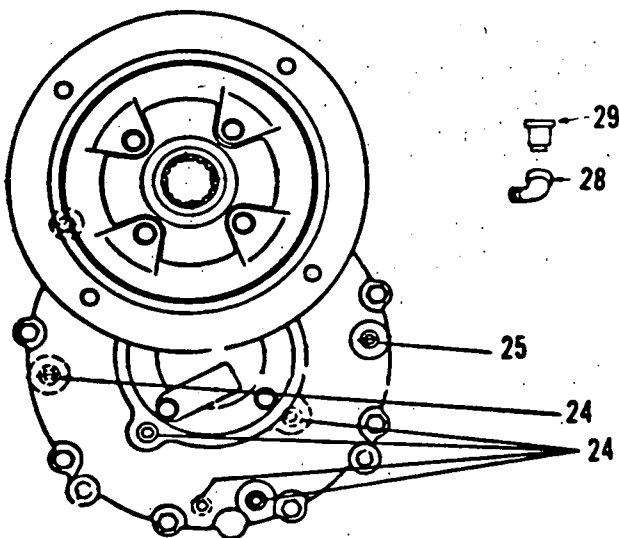
SUPPLEMENTARY PARTS LIST

These parts are applicable to the 45.0KW and 65.0KW PTO alternators beginning Spec E. Use these parts in place of or in addition to those listed in the main Installation - Operation - Maintenance - Parts List 971-0007. Parts similar in appearance are not illustrated.

CONTROL

<u>REF. NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>
19	332-1956	1	Board Assembly, Printed Circuit (See Separate Group For Components)

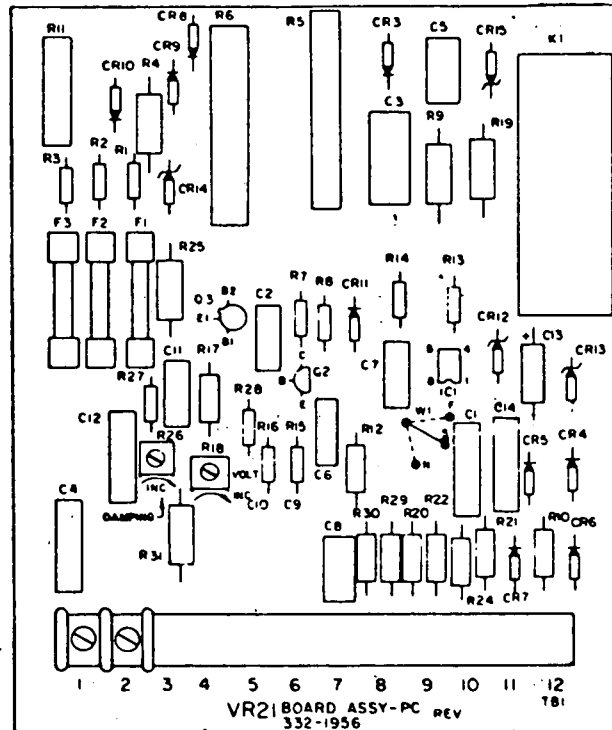
GEAR DRIVE BOX (1000 rpm)



GEAR DRIVE BOX (1000 rpm)

<u>REF. NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>
	190-0538	1	Gear Drive Box - Complete (terrell)
1	190-0548	2	Housing (Half)
2	190-0549	1	Gear (40 teeth)
3	190-0550	1	Gear (72 teeth)
4	190-0551	1	Shaft, Input - Splined
5	190-0552	1	Shaft, Output - Splined
6	190-0553	2	Cover
7	190-0554	1	Cover
8	190-0555	1	Flange, Generator
9	190-0556	4	Cup, Bearing
10	190-0557	4	Cone, Bearing
11	190-0558	2	Seal, Output Shaft
12	190-0559	1	Seal, Input Shaft
13	516-0024	2	Pin, Dowel (5/16 X 1")
14	190-0560	1	Gasket, Housing
15	190-0561	As Req.	Shim (.005")
16	190-0562	As Req.	Shim (.007")
17	190-0563	As Req.	Shim (.020")
18	190-0564	2	Key, Square (3/8 Square X 1-7/8")
19	800-0051	8	Screw, Cap - Hex Head (3/8-16 X 1 1/4")
20	850-0050	26	Washer, Lock - Spring (3/8")
21	800-0059	10	Screw, Cap - Hex Head (3/8-16 X 3/4")
22	862-0003	14	Nut, Hex (3/8-16)
23	800-0052	4	Screw, Cap - Hex Head (3/8-16 X 1 1/2")
24	190-0565	9	Plug, Pipe
25	190-0566	1	Plug, Plastic
27	190-0568	4	Stud (3/8 X 2")
28	505-0120	1	Elbow, Pipe - Street (3/8 X 90°)
29	518-0275	1	Vent, Gear Box

PRINTED CIRCUIT BOARD ASSEMBLY (332-1956)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	332-1956	1	Board Assembly, Printed - Complete	R11	352-0151	1	Resistor - Fixed 5 Watt, 15,000-Ohm
C1,14	355-0042	2	Capacitor - 47 Mfd, 250 Volt	R12	351-0909	1	Resistor - 1/2 Watt, 90,900-Ohm
C2, C7	355-0043	2	Capacitor - 22 Mfd, 250 Volt	R13	350-0411	1	Resistor - 1/2 Watt, 10,000-Ohm
C3	355-0047	1	Capacitor - 47 Mfd, 400 Volt	R14	350-0443	1	Resistor - 1/2 Watt, 220,000-Ohm
C4, C12	355-0044	2	Capacitor - 47 Mfd, 250 Volt	R15, R27	350-0435	2	Resistor - 1/2 Watt, 100,000-Ohm
C5, C8	355-0046	2	Capacitor - 1 Mfd, 100 Volt	R17	351-0521	1	Resistor, Metal Film - 1/4 Watt, 12,100-Ohm
C6	355-0056	1	Capacitor - .33 Mfd, 250 Volt	R18	303-0210	1	Potentiometer - 5,000-Ohm, 1/2 Watt
C11	355-0048	1	Capacitor - 1 Mfd, 400 Volt	R20, 22			
C13	356-0039	1	Capacitor - Electrolytic 100 Mfd, 10 Volt	29 & 30	351-0520	4	Resistor - 1/4 Watt, 28,000-Ohm
CR3				R21	351-0522	1	Resistor - Metal Film - 1/4 Watt, 5,110-Ohm
Thru 11	357-0014	9	Rectifier - Silicon	R24	351-0523	1	Resistor - Metal Film - 1/4 Watt, 8,870-Ohm
CR12	359-0036	1	Diode - Zener 5.6 Volt	R25, R31	350-1011	2	Resistor - 2 Watt, 10,000-Ohm
CR13	359-0025	1	Diode - Zener 20 Volt	R26	303-0211	1	Potentiometer - 1/2 Watt, 100,000-Ohm
CR14	359-0026	1	Diode - Zener 18 Volt	R28	350-0568	1	Resistor - 1/2 Watt .47 Meg-Ohm
F1, F2, F3	321-0204	3	Fuse 1/4 Amp	TB1	332-1252	1	Terminal Block
1C1	367-0005	1	Integrated Circuit	CR15	359-0015	1	Diode - Zener - 24 Volt
Q2	362-0017	1	Transistor - Silicon NPN		321-0163	6	Clip - Fuse
Q3	361-0004	1	Transistor - Unijunction	K1	307-1063	1	Relay, Magnetic Reed
R1	350-0355	1	Resistor - 1/2 Watt, 47-Ohm	R9	350-1014	1	Resistor - 2 Watt, 13,000-Ohm
R2, R3	350-0351	2	Resistor - 1/2 Watt, 33-Ohm	R19	350-1007	1	Resistor - 2 Watt, 6,800-Ohm
R4	350-1075	1	Resistor - 2 Watt, 4.7 Meg-Ohm				
R5	353-0040	1	Resistor - Fixed 10 Watt, 270-Ohm				
R6	353-0039	1	Resistor - Fixed 15 Watt, 5,000-Ohm				
R7	350-0398	1	Resistor - 1/2 Watt, 3,000-Ohm				
R8, R16	350-0447	2	Resistor - 1/2 Watt, 330,000-Ohm				
R10	351-0885	1	Resistor - 1/2 Watt, 51,100-Ohm				

HARVESTORE FARMSTEAD PRODUCTS -
POWER ALTERNATOR WARRANTY REGISTRATION CARD

CUT ALONG THIS LINE AND DETACH

The A. O. Smith Harvestore Products, Inc. warranty can only be applied if this form is properly filled out and mailed within 30 days from original installation and/or delivery date of the following Farmstead Products - Standby Power Alternator.

Consistent with the warranty on my Harvestore Standby Power Alternator, this is to apprise you of the following information: (PLEASE PRINT)

Purchaser or Original User's Name _____

Installation Address _____

City and State _____

Dealer's Name (Print) _____

Installation and/or Delivery Date _____ Model No. _____

I have read the Harvestore Farmstead Products - Standby Power Alternator Warranty and understand its terms and conditions and that these are the sole warranties expressed or implied that is provided by A. O. Smith Harvestore Products, Inc. and upon which I rely.

Date _____

Signed, Purchaser or Original User _____

CUT ALONG THIS LINE AND DETACH

IMPORTANT

Please return this Warranty Card



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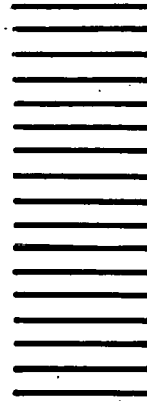
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HARVESTORE® PRODUCTS, INC.

550 W. ALGONQUIN ROAD
ARLINGTON HEIGHTS, ILLINOIS 60005



HARVESTORE[®] FARMSTEAD PRODUCTS

This certificate constitutes a warranty by and between A. O. SMITH HARVESTORE PRODUCTS, INC., and the purchaser and/or original user of the equipment herein referred to. No Harvestore warranty extends to any subsequent purchaser or any person, firm or corporation except as set forth herein.

If within one year after the installation of the Farmstead Products, any part thereof shall prove defective in material or workmanship upon examination by A. O. Smith Harvestore Products, Inc. (hereinafter referred to as the "Corporation"), the Corporation will supply an identical or substantially similar replacement part f.o.b. the Corporation's factory, or the Corporation, at its option, will repair or allow credit for such part. Where applicable, this warranty is subject to the following restrictions: (1) Electric motors and gas or diesel industrial engines are warranted by the motor manufacturer and must be serviced at an approved motor service station; (2) The Corporation does not consider as defects excessive depreciation or wear attributable to the installation and use of its equipment in areas having abnormally abrasive soil conditions. Except for repair or replacement parts, the warranty for the Harvestore Farmstead Products shall commence with the date of installation and/or delivery. In order to make this warranty effective, the Warranty Registration Card executed by the purchaser or original user, as the case may be, shall be received by the Corporation within thirty (30) days from original date of installation and/or delivery. Any repair or replacement part provided hereunder shall be warranted against defects in material or workmanship during the unexpired portion of the warranty period applicable to the Harvestore Farmstead Products.

This warranty shall be applicable only if the Harvestore Farmstead Products shall still be the property of the original purchaser and shall have been properly installed, used, operated and maintained in accordance with the Harvestore Farmstead Products installation and Operators Manual. This warranty shall not be applicable if the Harvestore Farmstead Products have been subject to any accident, misapplication, alteration, abuse or misuse.

No other warranty, either express or implied, has been or will be made by or in behalf of the Corporation or by operation of law with respect to the Harvestore Farmstead Products or its installation, use, operation, replacement or repair. The Corporation shall not be liable by virtue of this warranty or otherwise for any special or consequential loss or damage resulting from the use or loss of use of the Harvestore Farmstead Products and will make no allowance for repair or alterations made without its consent. The Corporation makes no warranty with respect to the installation of the Harvestore Farmstead Products, accessories or related equipment by the Harvestore Dealer, who is an independent contractor, or by any other independent contractor. The only obligation of the Corporation shall be the replacement or repair of a defective part, and the Corporation shall not be liable for drayage or labor costs, except as provided above.

A. O. SMITH HARVESTORE PRODUCTS, INC.
Arlington Heights, Illinois

7/7/70

TABLE OF CONTENTS

General Information	
Introduction	MMG 23067.0
Description	MMG 23067.0
Gear Box	MMG 23067.0
Control Box	MMG 23067.0
Optional Accessories	MMG 23067.0
Specifications	MMG 23067.0
Installation	
Location	MMG 23068.0
Mounting the Alternator	MMG 23068.0
Connecting the Alternator Wires	MMG 23069.0
Balancing the Load	MMG 23069.0
Installing the Load Transfer Switch	MMG 23069.0
Power Return Signal	MMG 23069.0
Operation	
Starting	MMG 23070.0
Operating	MMG 23070.0
Output Voltage	MMG 23070.0
Service and Maintenance	
Periodic Service and Inspection	MMG 23070.0
Gear Box Lubrication	MMG 23070.0
Power Take-Off Shaft	MMG 23070.0
Slip Rings	MMG 23070.0
Bearings	MMG 23070.0
Brushes	MMG 23070.0
Flashing the Field	MMG 23071.0
Checking Static Exciter	MMG 23071.0
Exciter Operational Guidelines	MMG 23071.0
Alternator Operational Guidelines	MMG 23073.0
Alternator Testing	MMG 23073.0
Alternator Disassembly	MMG 23073.0
Alternator Assembly	MMG 23073.0
Parts Catalog	MMG 23074.0

GENERAL INFORMATION

INTRODUCTION

This manual contains information for the proper installation, operation and maintenance of your alternator. We suggest you keep this book handy so it can be referred to when necessary.

If you wish to contact your dealer regarding this equipment, be sure to supply the complete MODEL NUMBER and the full SERIAL NUMBER of your equipment. This information is necessary to identify your equipment among the many units manufactured.

DESCRIPTION

Harvestore Models 25PTO-1 and 25PTO-3 are revolving field, two bearing alternators. AC output voltage is generated in the stator and controlled by a static exciter attached to the end bell. The static exciter produces DC for field excitation and regulates the AC output.

The rotor consists of four inter-connected coils spaced symmetrically on a steel shaft. Slip rings on the shaft transmit excitation voltage to the field coils. The shaft is supported at both ends by prelubricated ball bearings. A centrifugal blower on the drive end of the alternator draws air through the alternator for cooling.

The complete alternator includes a built-in exciter and voltage regulator, mounting feet, lifting eye, mounted gear box and stub drive shaft and control box.

GEAR BOX

The gear box is secured to the alternator's rear end bell and has two gears. A pinion gear is pressed on and keyed to the alternator rotor shaft. It meshes with a larger spur gear which is pressed on and keyed to the gear reduction shaft. This shaft is supported by two roller bearings. The gear box oil capacity is one half pint.

CONTROL BOX

The control box includes a voltmeter, a manual reset circuit breaker (alternator protection), one 120 volt, 15 amp duplex receptacle, one 50 amp, 240 volt range receptacle and main output terminal posts. The circuit breaker is in the exciter input circuit. It can be used as a line disconnect switch with a light load. However, a transfer switch is required for disconnecting loads exceeding 5000 watts and is also recommended for lighter loads.

CAUTION

This alternator cannot be belt driven.

OPTIONAL ACCESSORIES

Power Take-Off Shaft: Telescoping, shielded, heavy duty power take-off shafts, recommended for use with PTO powered, Harvestore gear drive alternators provide maximum safety for the operator. The splined universal joint with snap ring type shield and quick disconnect feature, fits a 1-3/8 inch tractor PTO drive. Telescoping power take-off shaft operating lengths are: minimum 45 inch, maximum 60 inch; weight 35 pounds. Six spline universal for 540 rpm PTO.

The information in the Operator's Manual is drawn from sources deemed to be reliable. It is necessary to use a qualified and/or licensed electrician for the installation of the system.

Application to a particular farming operation requires the advice of qualified experts and is subject to limitations of good management, weather and other conditions present at the individual locations.

SPECIFICATIONS

	MODEL 25PTO-1	MODEL 25PTO-3
Watts	25,000	25,000
Volts	120/240	240 *
Phase	1	3
Cycles	60	60
Current (Amperes)	104	60
Wire	4	4
Static Exciter	Yes	Yes
Alternator Speed (RPM)	1800	1800
Tractor Speed (RPM)	540	540
Minimum Horsepower Required, Driving Source	50-45	50-45
Gear Ratio	3.32 : 1	3.32 : 1
Gear Box Oil Capacity, Pints	1/2	1/2
Recommended Gear Lubricant	SAE 90	SAE 90
Weight	460	460

* Delta wound, one phase center tapped to deliver 120/240, single phase power in capacities to 20 KW (84 amperes).

INSTALLATION

LOCATION

Figure 1 shows dimensions of the alternator and bolt hole centers for installation. Select a site for the alternator with the following points in mind.

1. Ventilation: The alternator creates considerable heat when operating under load conditions. It is important that this heat be dissipated by proper ventilation. If the alternator is installed inside a small room or compartment, provide a vent for exhausting the air heated by the alternator. Locate the heated air exhaust vent above the inlet vent. Heated air is discharged from the drive-shaft end of the alternator.
2. Convenience to Driving Power: Locate the alternator for easy connection to the tractor. Align the power take-off to the alternator. Stay within the limits of the power take-off shaft.
3. Dusty or Damp Conditions: Avoid dusty or damp conditions as much as possible. Alternator should be mounted under cover or inside a building to protect it against the weather.
4. Servicing Convenience: Allow at least 24 inches of space on all sides of the alternator.
5. Wiring Convenience: Do not locate the alternator in a location difficult to service or which would

have poor ventilation, to save a few feet of wiring. Install the alternator as close to the load transfer switch as possible. Do not move the load transfer switch to the alternator. Refer to INSTALLING THE LOAD TRANSFER SWITCH.

MOUNTING THE ALTERNATOR

Provide a substantial mounting base of concrete, wood or steel and use large bolts. The surface of the mounting base should be flat so that the alternator mounting brackets will not be sprung when tightening into place. It should be possible to turn the shaft by hand after the alternator is bolted down.

CAUTION To develop 25 KW requires 50 to 55 horsepower at the power takeoff. The torque will flip the alternator over unless secured to a strong substructure. A narrow (30 inch) trailer is not suitable for operation. Forty inch hub-to-hub minimum measurement is required.

Be sure that the alternator is properly aligned with the driving mechanism and that it will stay in alignment.

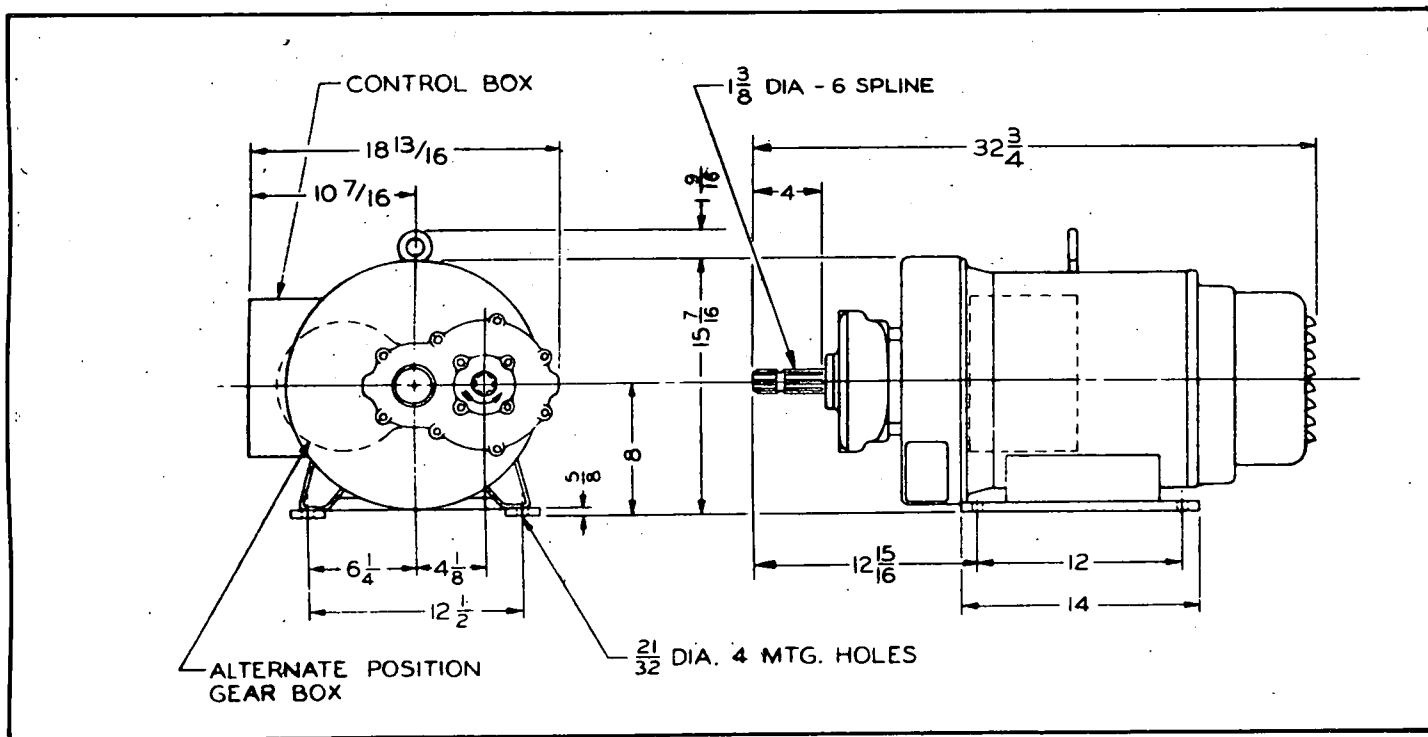


FIGURE 1. INSTALLATION OUTLINE

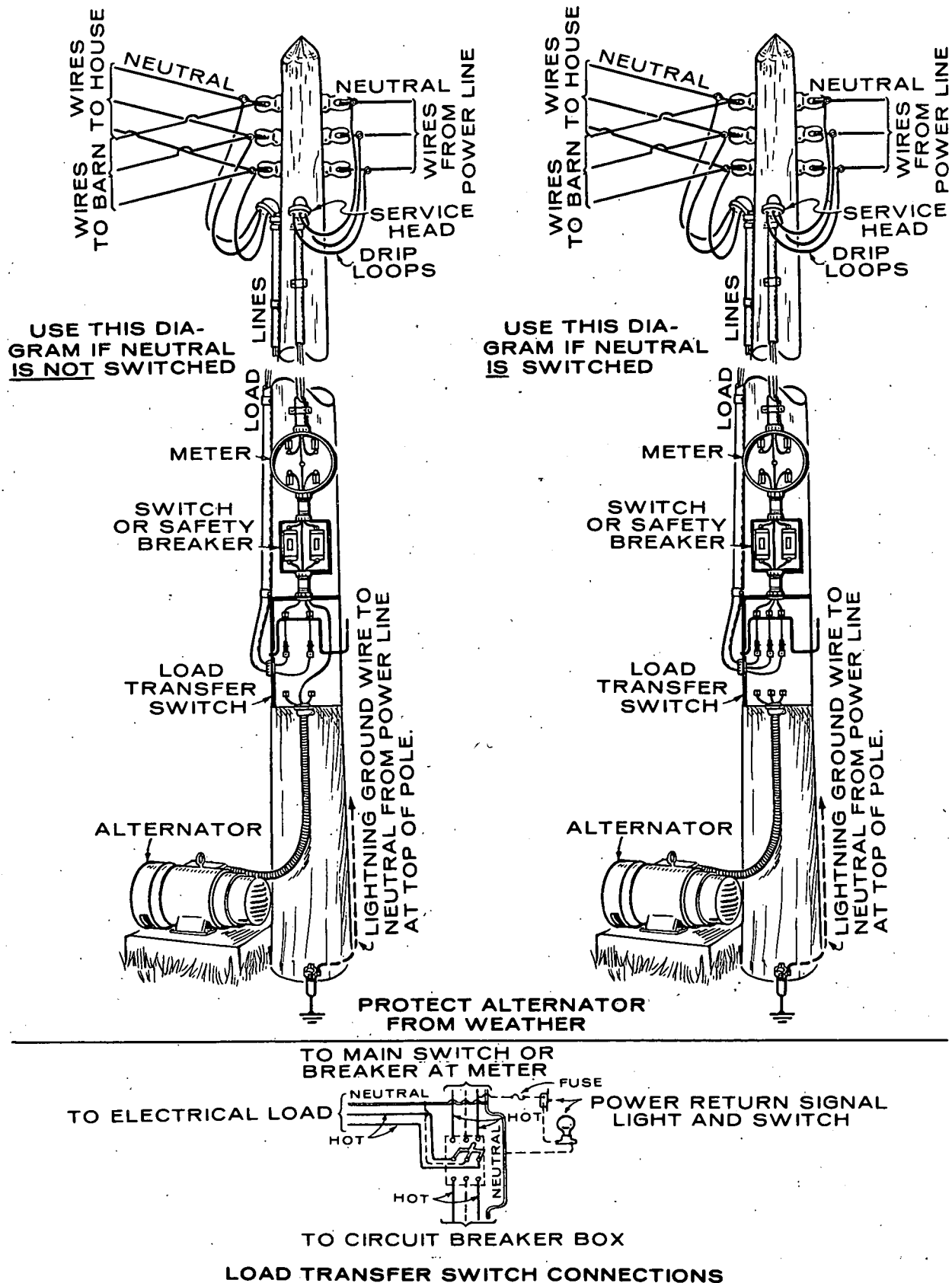


FIGURE 2. TYPICAL FARM STANDBY

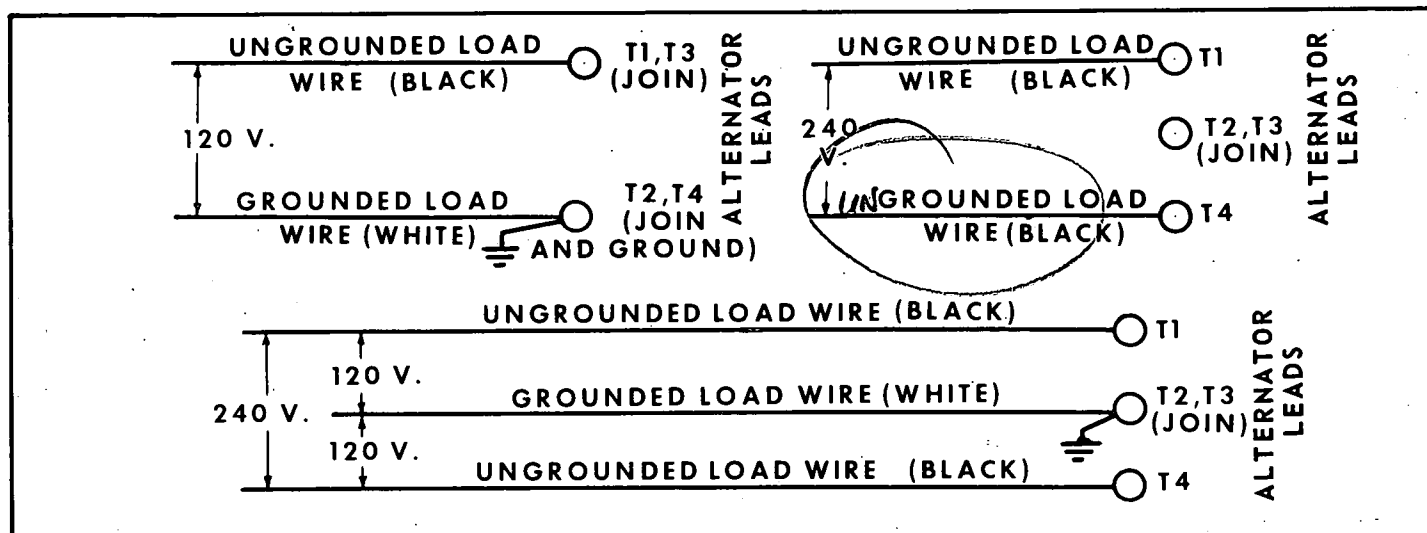


FIGURE 3. WIRING CONNECTIONS, SINGLE PHASE

CONNECTING THE ALTERNATOR WIRES (FIGURES 3 AND 4)

Connect the alternator leads inside the control box before putting the alternator into operation. See wiring diagram and also connection sketches. Connect the lower circuit breaker terminals to the load transfer switch with a flexible conduit, cable, or some other type of flexible lead wire.

NOTE: Any combination of 1 phase and 3 phase loading can be used at the same time as long as the current for any one lead does not exceed the nameplate rating of the alternator. *If no 3-phase output is used, usable 1 phase output is 2/3 of 3-phase KVA.*

BALANCING THE LOAD
Serious overloading can damage the alternator windings! When two or more single phase circuits are available, do not overload any one circuit – divide the load equally between them. To determine the amount of current available on each single phase circuit, subtract the higher voltage load or 3 phase load (whichever applies) from the rated output and divide the remainder

by the quantity of single phase circuits. **EXAMPLE:** On a 10,000 watt, 3 phase, 4 wire plant, if 4,000 watts of 3 phase are used, a remainder of 6,000 watts are available to be equally divided among the three single phase circuits. Thus, only 2,000 watts would be available on each of the three single phase circuits.

INSTALLING THE LOAD TRANSFER SWITCH

Before the alternator can be used for emergency purposes, a DOUBLE THROW LOAD TRANSFER SWITCH must be installed. The switch must have an ampere rating large enough to carry the total load when the main source of power is in use. Follow the local electrical code. The load transfer switch should always be installed close to the main line switch, and between the main line switch and the load. When properly installed, the load transfer switch in one position will connect the electrical load to the highline. When the load transfer switch is thrown to the other position, the load is first disconnected from the main source of power, and then connected to the standby alternator. Using the load transfer switch makes it impossible

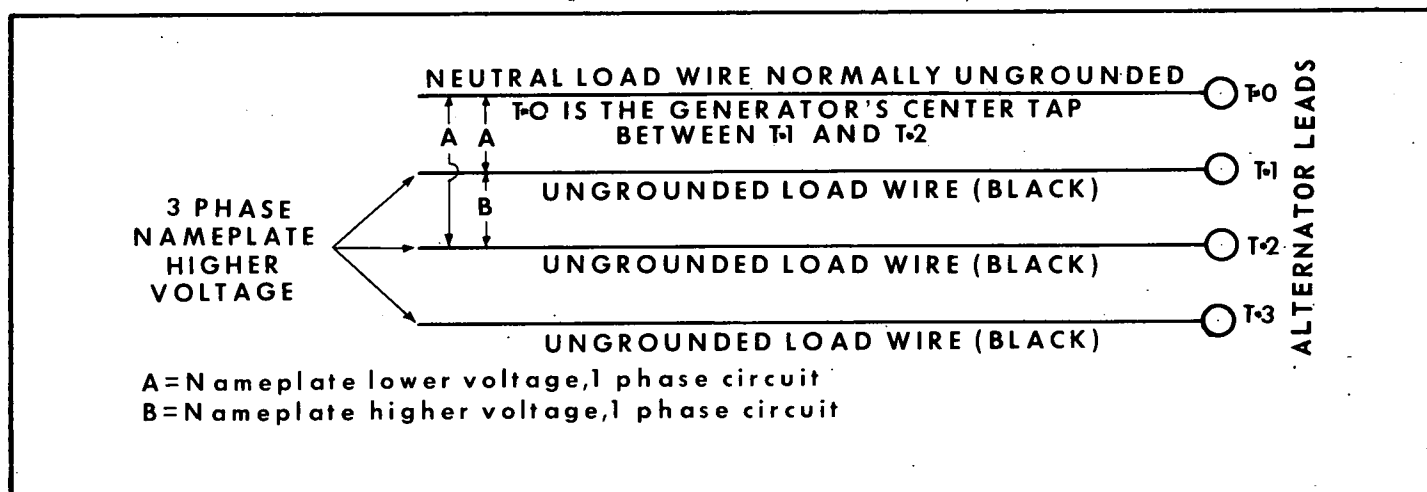


FIGURE 4. WIRING CONNECTIONS, THREE PHASE

to connect the alternator to the main source of power. The load lines must connect to the center terminals of the transfer switch. The alternator leads and the main power source leads must be connected at OPPOSITE ends of the switch.

POWER RETURN SIGNAL (FIGURES 2 AND 5)

When the alternator is used for emergency applications, a pilot light or alarm signal should be installed to indicate when the power is restored and the alternator can be disconnected. Connect a signal light across the regular power line, just ahead of the load transfer switch. Install an on-off switch and a fuse for the signal light. When a power failure occurs, snap the signal switch to the ON position before putting the alternator into operation. When the normal power returns, the signal will operate and the alternator can then be disconnected.

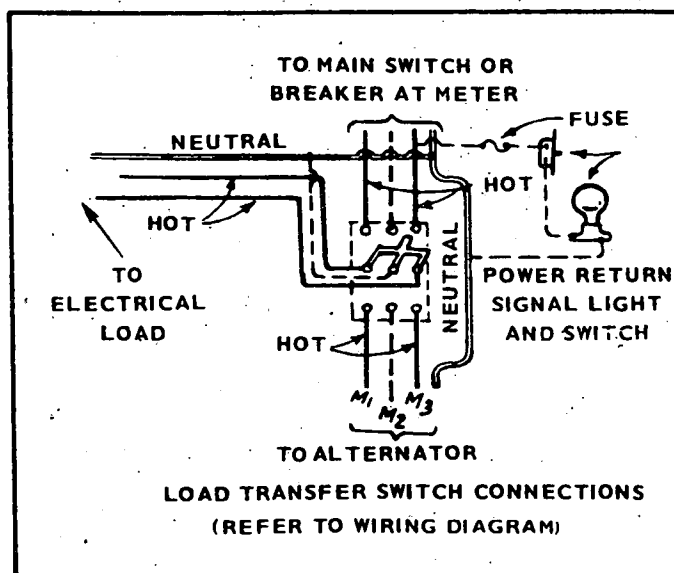


FIGURE 5. LOAD TRANSFER SWITCH

OPERATION

STARTING

When a power failure occurs, the alternator should be ready to run and to take over the load. Set up the tractor and properly install the power take-off shaft. Before engaging power take-off, proceed as follows in the order shown.

1. Alternator circuit breaker must be in the OFF position.
2. Connect power leads between the alternator and load transfer switch.
3. Throw transfer switch to connect load to alternator.
4. Turn power return signal ON if one has been installed.
5. Engage power take-off and bring PTO shaft speed to 542 rpm. The alternator speed at this time will be 1800 rpm (60 cycle). The voltmeter on the alternator control box will read approximately 250 volts.

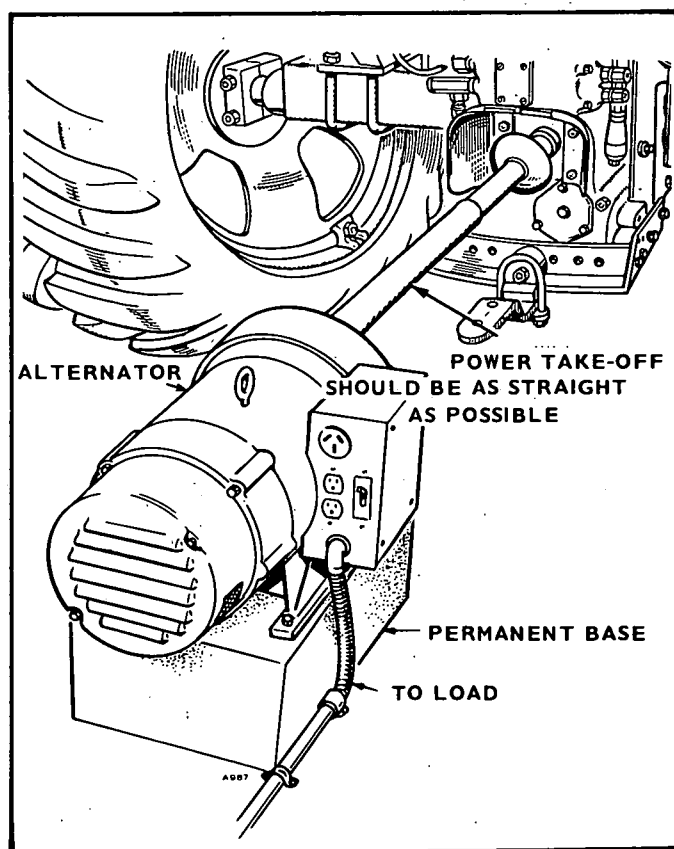


FIGURE 6. TRACTOR CONNECTION

OPERATING

With alternator running, throw the alternator line disconnect switch to the ON position. The various electrical loads can then be connected. When motor loads are connected, connect one at a time, allowing each to reach running speed before connecting the next one. Motors require four to five times more current for starting than for running at normal speed. If several motors are started at the same instant, the total electrical load may overload the alternator, causing the circuit breaker to operate.

If the alternator voltage is not at the proper value, it may be necessary to advance or retard the engine throttle control. In some cases, it may be necessary to change the engine throttle setting when large changes in the electrical load are made.

Keep the alternator load within its nameplate rating. If the alternator is seriously overloaded the circuit breaker will automatically trip, disconnecting the entire electrical load. Reduce the load before throwing the circuit breaker back to the ON position.

If the tractor engine has very little reserve power, use care when operating the alternator. For example, if a 50 or 55 horsepower (at the power take-off) engine is used to drive a 25,000 watt alternator, the engine throttle will be wide open at full alternator load. If most of the electrical load is suddenly removed, the governor cannot act quickly and smoothly enough to prevent a surge of speed and high voltage. Any electrical equipment left connected may be damaged by the resulting high voltage.

When disconnecting large portions of the load, disconnect one piece of equipment at a time, or first disconnect that part of the load which will be left on. Then remove the rest of the load. Wait until the alternator voltage has stabilized and then reconnect that part of the load which will be left on. The alternator voltage will remain relatively stable, and the tractor engine speed will not change or surge enough to cause any damage if this procedure is followed.

OUTPUT VOLTAGE

Output voltage can be adjusted over a range of 5% by changing the location of the slide clip on the control resistor in the exciter. Be sure speed and frequency are correct before making an adjustment.

SERVICE AND MAINTENANCE

PERIODIC SERVICE AND INSPECTION

Follow a definite schedule of inspection and servicing. Make a good visual check before, while, and after alternator is operating; look for loose or broken leads and bad connections.

GEAR BOX LUBRICATION

Use only SAE 90 multi-purpose gear lubricant.

Drain the gear box after the first 100 hours of operation and refill with fresh lubricant of the recommended grade. Repeat this procedure every six months thereafter, or every 100 hours.

Maintain the proper oil level between changes. Overfilling will cause foaming, which can lead to an oil leak due to overheating. Remove the filler plug on top of the case and the oil level plug from the face of the gear case. Fill the case until the oil just begins to flow from the oil level plug hole. Gear box holds 1/2 pint U.S. Measure. Replace both plugs. See Figure 7.

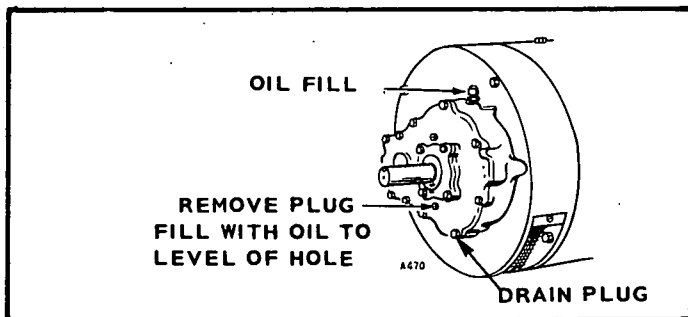


FIGURE 7. GEAR BOX LUBRICATION

POWER TAKE-OFF SHAFT

Grease the universal joints at least every 25 operating hours. Under adverse conditions, grease the joints as required, possibly every 4 to 8 hours. Never operate the alternator with the shield removed from the power take-off shaft.

SLIP RINGS

Slip rings must be clean and free of scratches and burrs (do not remove the dark brown film). If necessary to use an abrasive on the slip rings, use No. 00 sandpaper, never emery cloth or other conducting abrasives.

If rings are grooved, out of round, pitted, or rough so brushes seat poorly, remove rotor and refinish rings in a lathe. Remove or shield the bearing during refinishing.

BEARINGS

The ball bearings are double sealed and lubricated for life. If the ball bearings become noisy, worn, or otherwise defective, replace them. Remove the old ball bearings with a gear puller and drive or press new ones into place.

BRUSHES

To examine the brushes, brush springs and slip rings, remove the exciter cover from the alternator. Remove the screws from the right side of the exciter plate and swing the exciter assembly outward. To remove the brushholders, unscrew the four machine screws from the end bell, Figure 8. Do this every 500 hours.

Replace the brushes when they wear to about 5/16 inch in length. Order replacement brushes by part number, never by description; similar brushes may have different electrical characteristics.

WARNING Be careful when working on an alternator that is running. Electric shock hazard is present. We suggest that only a qualified mechanic or electrician perform these tests.

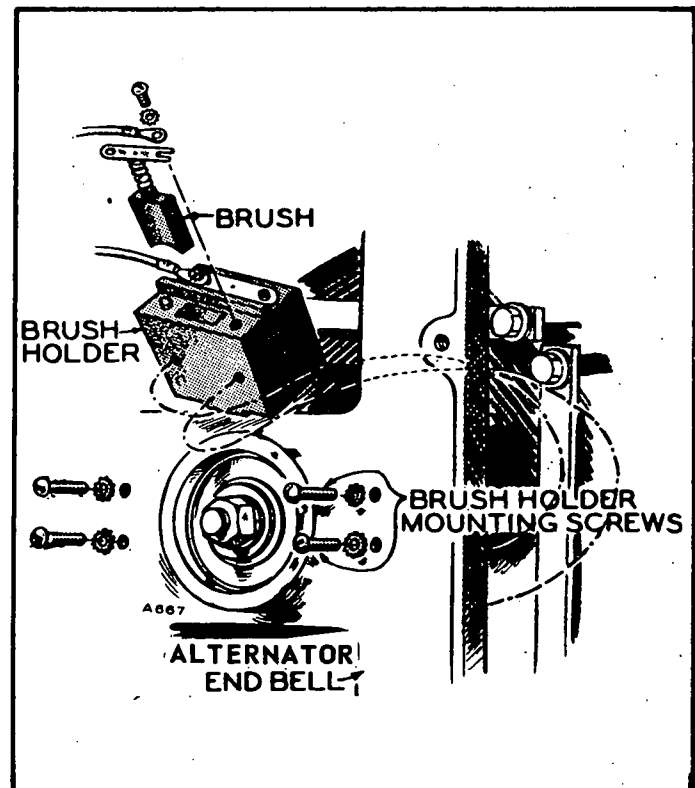


FIGURE 8. BRUSH REMOVAL

FLASHING THE FIELD

If there is no voltage buildup, remove the exciter cover, and with the alternator running, press the residual reset button. If there still is no voltage buildup, flash the alternator field. Proceed as follows:

1. Using a 6 volt dry cell battery, connect leads as shown in Figure 9 (positive to F1 and negative to F2).
2. Connect voltmeter leads to E1 and E2.
3. With the alternator running, close the switch momentarily to energize the buildup circuit. Watching the voltmeter:
 - A. If voltage now builds up normally, the trouble was due to a residual voltage loss in the field.
 - B. If voltmeter indicates low voltage, the exciter is at fault (refer to Exciter Operational Guidelines).
 - C. If there is too much voltage, and the alternator is running at correct speed, the trouble is in the exciter.
 - D. If there is no voltage buildup, the alternator is probably at fault (refer to Alternator Operational Guidelines).

CHECKING STATIC EXCITER (SEE FIGURE 10 AND EXCITER OPERATIONAL GUIDELINES)

Troubles are listed in advancing order, from no output voltage to rated but fluctuating output voltage. The relationship between trouble and cause is not always consistent from model to model, so the following information must be used as a guide, not an absolute rule. The numbers that appear in the column headed "PROCEDURE" refer to the procedure number for testing particular components. The testing procedures are located at the end of the chart. When the word "NONE" appears in that column, all the information needed to complete the check is provided in the column headed "CORRECTIVE ACTION". Use a multimeter to check continuity, voltage and resistance as indicated in the tests.

NOTE: It is imperative that the testing procedures are completely understood by the serviceman before attempting to perform corrective maintenance.

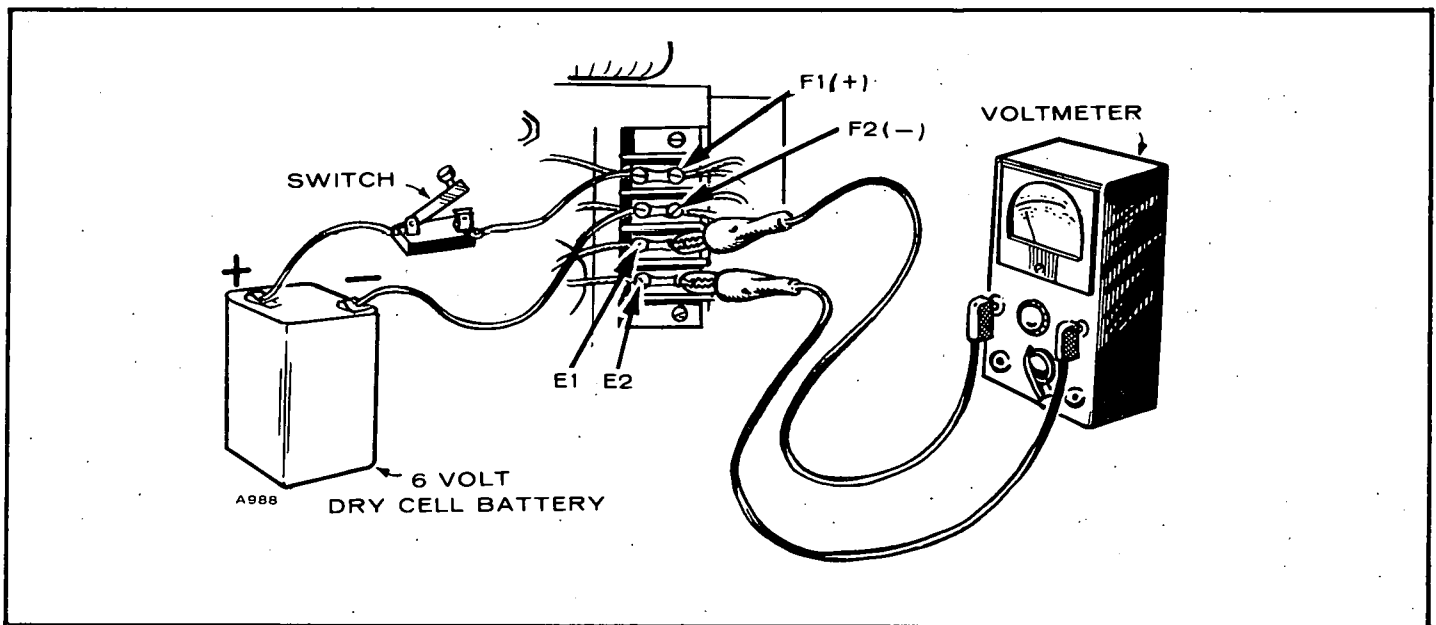


FIGURE 9. FLASHING THE FIELD

EXCITER OPERATIONAL GUIDELINES

NATURE OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION	PROCEDURE
Alternator will not build up voltage.	Circuit breaker in "off" or "tripped" position.	Reset and close breaker.	None
	Open in circuit breaker.	Stop alternator and check breaker continuity.	None
	No AC power to Static Exciter.	Check AC voltage at E ₁ -E ₂ with the alternator operating. Voltage should be five percent of the rated voltage. If not, check continuity from E ₁ -E ₂ back to alternator.	None
	Partial loss of residual in rotor.	With alternator operating, jumper from E ₂ to heat sink of field rectifier Z until voltage begins to build-up. Then remove.	None
	Pair of field rectifiers open (either W & Z or X & Y).	Test rectifiers and replace if defective.	(1)
	Both field rectifiers X and Y shorted.	Test rectifiers and replace if defective.	(1)
Output voltage slow to build up. Circuit breaker opens in about five seconds.	Either field rectifier X or Y shorted.	Test rectifiers and replace if defective.	(1)
Output voltage slow to build up and five percent below rated voltage after build up. Voltage regulation poor.	Either field rectifier W or Z shorted.	Test rectifiers and replace if defective.	(1)
Output voltage slow to build up and higher than rated voltage after build up.	Open circuit in one or more control rectifier.	Test rectifiers and replace if defective. Check soldered connections to rectifiers.	(1)
Output voltage slow to build up and ten to twenty percent above rated voltage after build up.	Open in one field rectifier.	Test rectifiers and replace if defective.	(1)
	Open circuit in gate winding G ₁ -G ₂ of reactor A or B.	If field rectifiers Y and Z check okay, check continuities of gate windings G ₁ -G ₂ .	(2)
Output voltage builds up normally but less than rated voltage after build up.	Shorted winding in control reactor.	Test control reactor and replace if defective.	(3)
Output voltage builds up normally with slightly less than rated voltage at no load and low voltage at full load.	Compound winding S ₁ -S ₂ installed backward or has open circuit.	Check wiring diagram for polarity of compound windings through reactors A and B and test for continuity.	None
Output voltage builds up normally but 20 percent above rated voltage after build up. Voltage regulation poor.	Compound winding S ₁ -S ₂ installed backward through one reactor (A or B).	Check wiring diagram for polarity of compound winding through reactor A or B.	None
Output voltage builds up normally but is twenty five percent above rated voltage after build up.	Open circuit in control rectifier bridge.	Check continuity from the junction of control rectifiers Z and Y to the junction of control rectifiers X and W.	None
Output voltage builds up normally but 125 to 150 percent above rated voltage after build up.	Shorted turn in gate winding G ₁ -G ₂ of reactor A or B.	Test reactors A and B for shorted turns and replace if defective.	(2)

EXCITER OPERATIONAL GUIDELINES (CONTINUED)

NATURE OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION	PROCEDURE
Output voltage builds up normally but 150 to 200 percent above rated voltage after build up. No regulation possible.	Control winding C ₁ -C ₂ of reactor A or B polarized incorrectly.	Check circuit connections of both reactors A and B.	None
	Shorted turn in control winding C ₁ -C ₂ or reactor A or B.	Test reactors A and B for shorted turn and replace if defective.	(2)
	Open in control circuit.	Check continuity from E ₁ to E ₂ through control circuit.	None

PROCEDURE 1 - CHECKING RECTIFIERS

Disconnect one lead from, or remove, each rectifier for its individual test.

CAUTION Note carefully the direction of mounting of any rectifier removed. It must be remounted in its original direction.

- Connect an ohmmeter across the rectifier contacts and observe the meter reading.
- Reverse the connections and compare the new reading with the first reading.
- If one reading is considerably higher than the other reading, the rectifier can be considered satisfactory. However, if both readings are low, or if both are high which indicates an "OPEN" circuit, replace the rectifier with a new identical part.

PROCEDURE 2 - CHECKING REACTORS "A" and "B"

CAUTION Use an accurate ohmmeter when checking resistance values. Resistance readings between "G1" and "G2" cannot be read with accuracy on a multimeter.

- Set the resistance range selector on the ohmmeter to the proper range.
- Isolate one gate winding by disconnecting either end of gate winding G1-G2 from its point of connection. Measure the resistance in the gate winding across G1-G2. Reading should be 0.66 ohms.
- Isolate one control winding by disconnecting either lead C1 or C2 from its point of connection. Measure the resistance in the control winding across C1-C2. Reading should be 5.5 ohms.
- Connect one meter lead to the disconnected gate winding lead and the other meter lead to the disconnected control winding lead and check for continuity.

Results:

- REACTOR IS SERVICEABLE if resistance is

within 20 percent either way of the value listed and there is no continuity between the control and gate windings.

- REACTOR IS DEFECTIVE if there is an open circuit in either the gate or the control windings. Continuity between the gate and the control windings is also an indication of a defective reactor. In either case, the reactor should be replaced.

PROCEDURE 3 - CHECKING CONTROL REACTOR

- Isolate the control reactor by disconnecting common lead "C" from its point of connection and carefully measure the resistance from this lead to the numbered lead on the control reactor. Reading should be 12.5 ohms.

Results:

- CONTROL REACTOR IS SERVICEABLE if resistance is within 10 percent of the value specified.
- CONTROL REACTOR IS DEFECTIVE if no continuity is indicated between the common lead "C" and the numbered lead, indicating the presence of an open circuit.

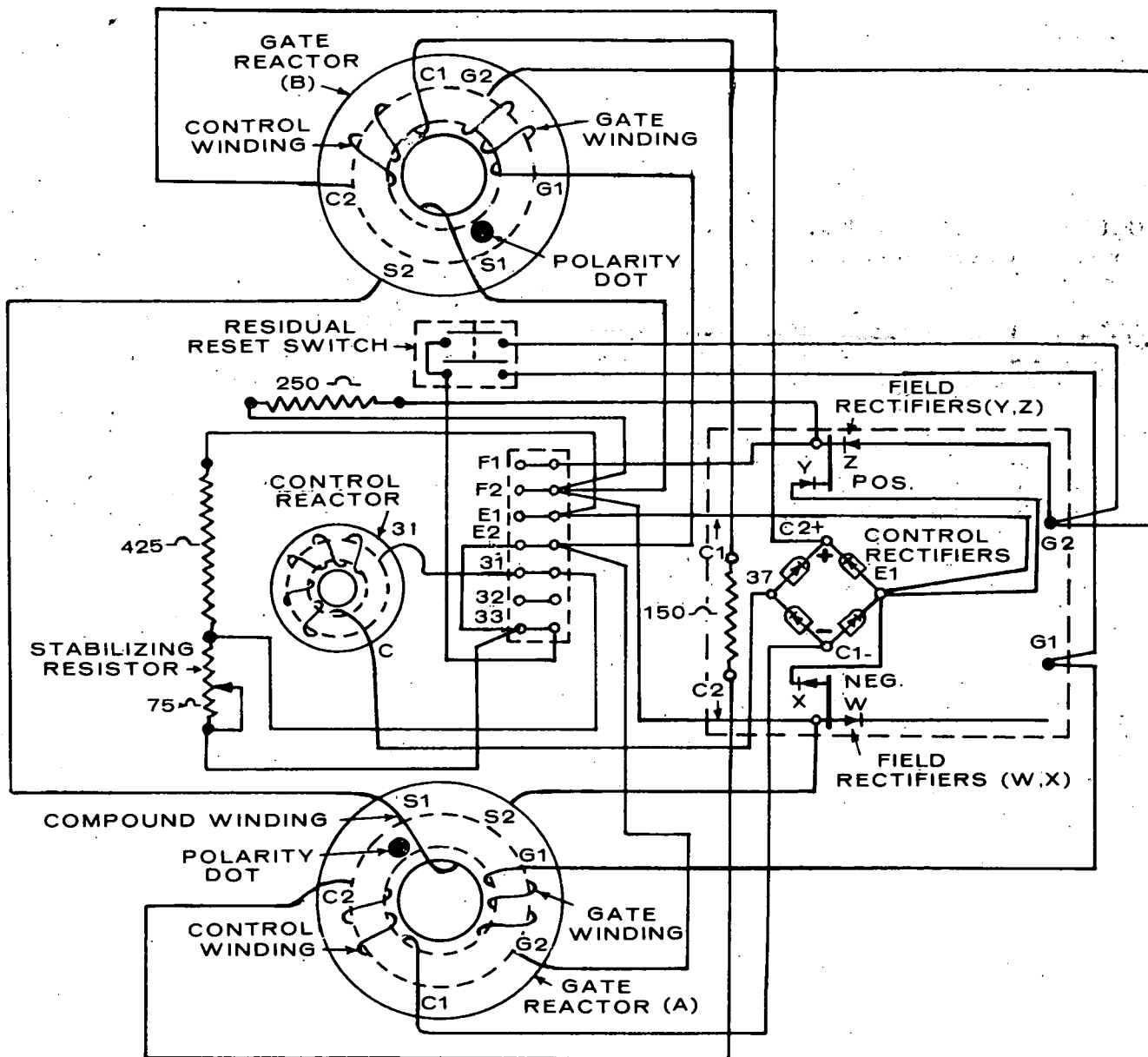
PROCEDURE 4 - CHECKING RESISTORS

The resistors must be checked with a multimeter adjusted to appropriate range of resistances. See Figure 10 for correct values.

- Isolate the resistor by disconnecting one end from its point of connection and carefully measure the resistance.

Results:

- RESISTOR IS SERVICEABLE if the measured resistance falls within 20 percent of the value specified in the wiring diagram.
- RESISTOR IS DEFECTIVE if there is no continuity through the resistor which indicates an open resistor. If the measured resistance exceeds the percent limits either way, the stabilizing resistor can be adjusted to bring the resistance within the required limits.



NOTE: WHEN GATE REACTORS ARE MOUNTED ON ALTERNATOR
THE POLARITY DOTS WILL BE ON TOP OF EACH REACTOR:

FIGURE 10. STATIC EXCITER WIRING DIAGRAM

ALTERNATOR OPERATIONAL GUIDELINES

NATURE OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Alternator voltage will not build up.	Residual magnetism gone. Dead short in load. Exciter defective. Open circuit, ground or short in revolving field. Open circuit, ground or short in stator.	See paragraph on Flashing the Field. Inspect load and correct. See Exciter Operational Guidelines. Refer to Alternator Testing. Refer to Alternator Testing.
Current unsteady but engine speed not fluctuating.	Loose connection. Poor brush contact.	Clean and tighten connections. Reseat or replace brushes. Clean slip rings.
Frequency drops under heavy load.	Low engine power.	Use adequate source of engine power.
Voltage drops under heavy load, little frequency change.	Defective exciter.	See Exciter Operational Guidelines.
Alternator won't deliver rated current.	Unbalanced load on lines. Defective exciter. Defective field windings.	Adjust load. See Exciter Operational Guidelines. Test and replace if defective.
Alternator overheats.	Overloaded. Partial short in load. Poor ventilation.	Reduce load. Correct short. Increase ventilation.
Incorrect output voltage.	Voltage output control resistor adjusted incorrectly. Engine governor set wrong speed. Defective exciter	Adjust slide tap for proper output. Check engine speed, adjust governor. See Exciter Operational Guidelines.
Noise in generator.	Defective bearing. Collector rings out of round.	Replace. Turn down in lathe.

ALTERNATOR TESTING

Most alternator tests can be performed with either an AC test lamp (Figure 11) or an ohmmeter.

1. **Rotor Continuity**—Remove the brushes so none touch the slip rings. Using an ohmmeter, test for grounding between each slip ring and the rotor shaft. Test for a short circuit in the rotor winding by measuring resistance in the winding. It should measure between 2.0 and 2.5 ohms at 70°F. Replace the rotor if it is grounded, or has an open or short circuit.
2. **Stator Continuity**—Disconnect the alternator leads to the load in the control box. Use the wiring diagram (Figures 3 and 4) to determine the output lead coding. Using an ohmmeter, check each winding of the stator for grounding to the laminations or frame. Using an accurate ohmmeter, test the resistance of each stator winding. Compare the resistances obtained. All windings of equal output voltage should indicate about the same resistance. An unusually low reading indicates a short, a high reading an open circuit. If the ohmmeter required for this test isn't available, check for open circuits with the test lamp.

If any windings are shorted, open-circuited or grounded, replace the stator assembly. Before replacing the assembly, check the leads for broken wires or insulation. Replace any defective lead. If this doesn't correct the fault, replace the assembly. It isn't practical to attempt to rewind a defective stator except at a competent rewinding shop.

DISASSEMBLY

The rotor weighs over 100 pounds, so use care when sliding it in the stator. Disassemble only as much as is required to repair the alternator. Almost all tests can be accomplished without disassembling the alternator. If tests indicate that the rotor or stator is defective, disassemble the alternator as follows:

1. Disconnect the power take-off shaft.
2. Remove the exciter cover and exciter screws.

Swing out exciter. Remove brushholder screws (Figure 8) and lift the brushholders so they are fully clear of the slip rings.

3. Remove the rear end bell screws.
4. Carefully slide the gear box, rear end bell and rotor out from the stator. Support the rotor when the field coils are just about clear of the stator.
5. To remove the gear box from the rear end bell, first drain the oil. Remove the gear box cover to gain access to the gear box mounting screws.
6. Remove the six socket-head screws which secure the gear box.
7. To remove the rear end bell from the rotor, pull the pinion gear with a gear puller.
8. Remove the oil seal and adapter assembly from the rear end bell.
9. Remove the bearing retaining ring.
10. Pull the rear end bell from the rotor.
11. If necessary to pull the bearings, first remove the retaining ring, and then use a gear puller.

ALTERNATOR ASSEMBLY

Be sure all bearing surfaces and oil sealing surfaces are clean. Best balance is achieved by assembling the rotor, rear end bell and gear box before sliding the rotor back into the stator.

1. With bearing retaining plate on the rotor shaft, press the bearing back into place. Install the retaining ring.
2. Position the rear end bell on the bearing.
3. Secure the oil seal and adapter in place.
4. Press the pinion gear onto the rotor shaft so the end of the rotor shaft is flush with the outside face of the gear.
5. With the "O" in place on the oil seal and adapter assembly, install the gear box. Secure with the socket-head screw.
6. Install the gear box cover.
7. Oil capacity of the gear box is about 1/2 pint. Do not overfill. Remove the filler plug on top of the gear case and the oil level plug on the front of the gear case. Fill the case until the oil just begins to flow from the oil level plug hole.

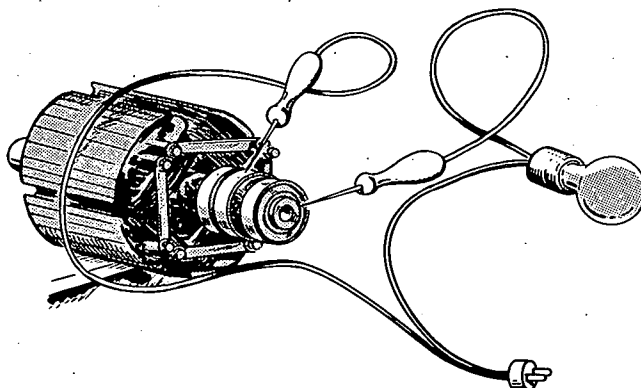


FIGURE 11. AC TEST LAMP

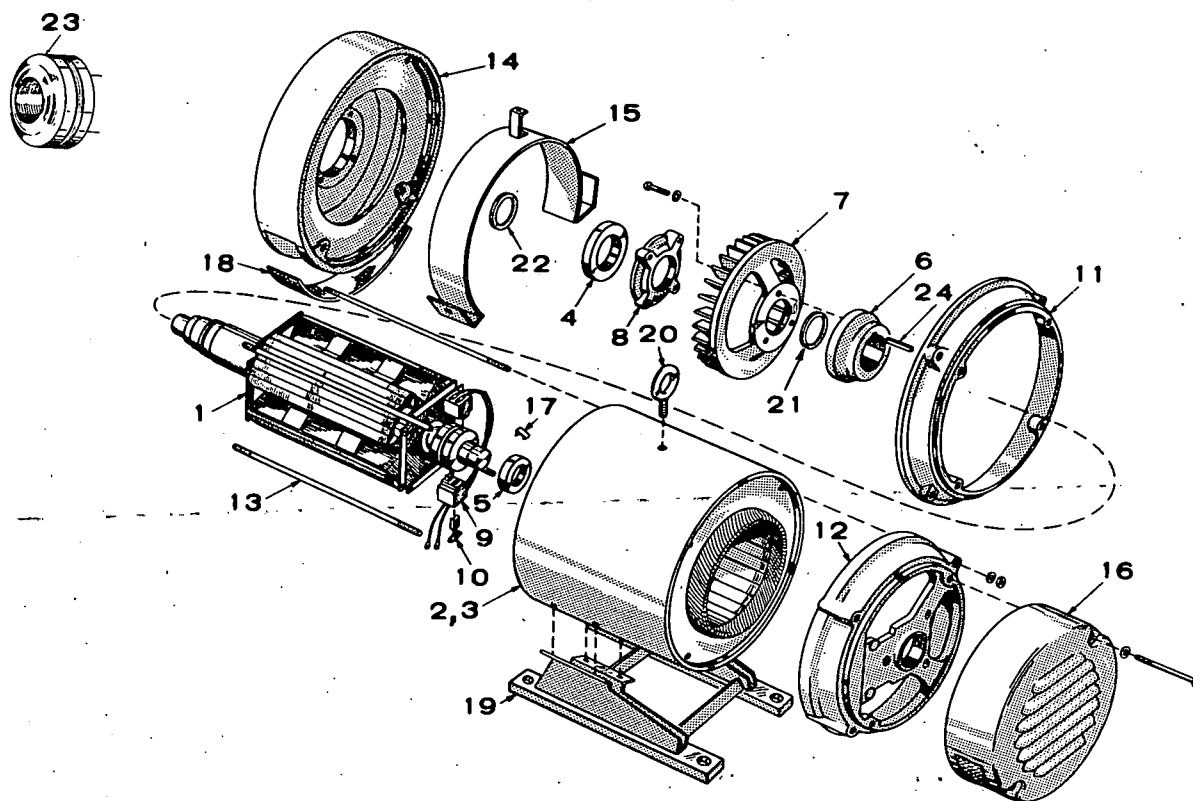
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To avoid errors or delay in filling your parts order, please furnish all information requested.

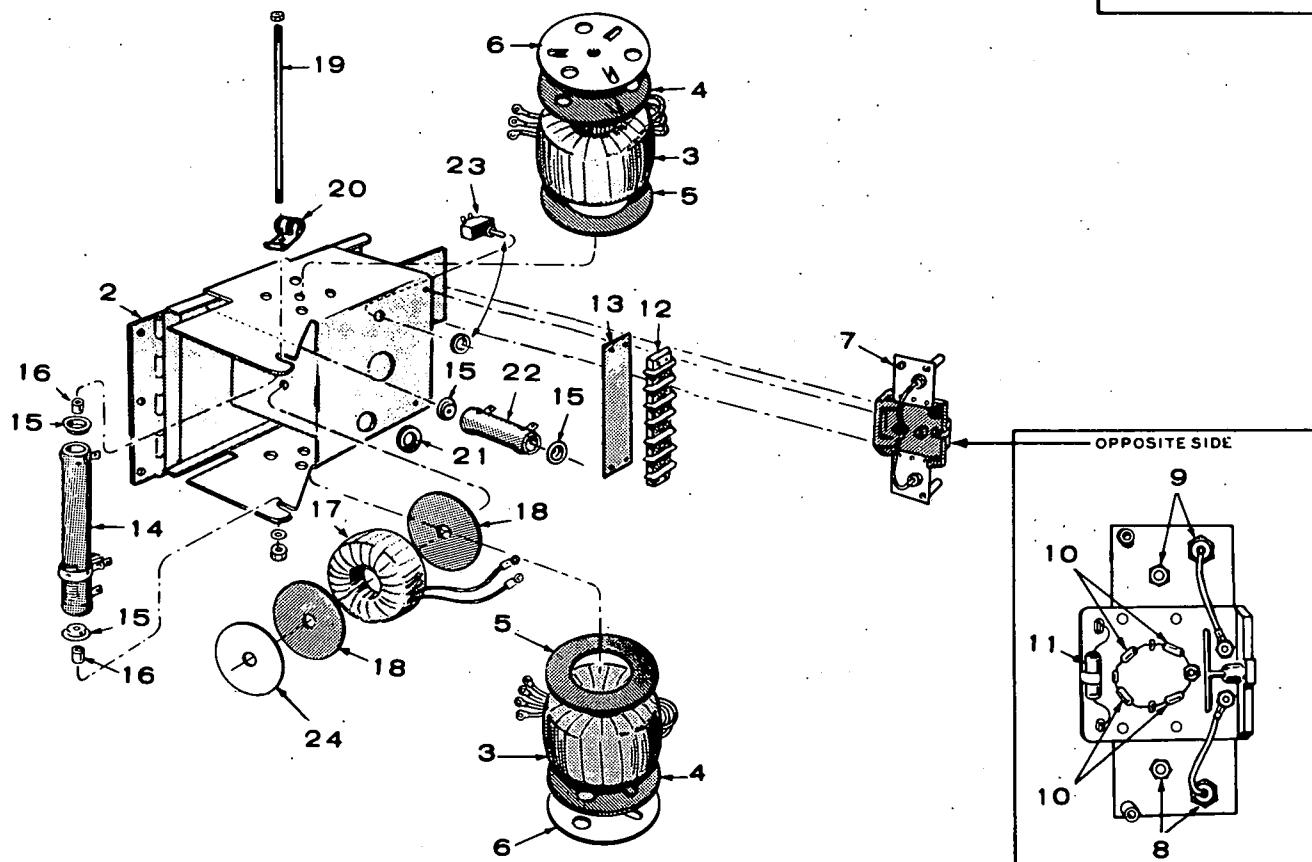
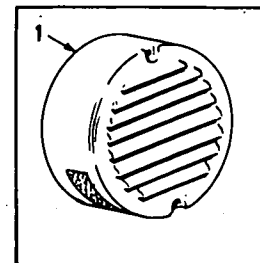
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EXCITER DC VOLTS <input type="text"/>		AMPS <input type="text"/>	
ASmith HARVESTORE PRODUCTS, INC. Arlington Heights - Illinois			
SERIAL <input type="text"/>		(SA)	



ALTERNATOR GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	82128-1	1	Rotor Assembly, Wound
2	82128-2	1	Stator, Wound 120/240 V, 3 Ph.
3	82128-3	1	Stator, Wound 120/240 V, 1 Ph.
4	82128-4	1	Bearing, Drive End
5	82125-5	1	Bearing, Exciter End
6	82128-6	1	Hub, Generator Blower
7	82128-7	1	Blower
8	82128-8	1	Plate, Bearing Retaining
9	82128-9	2	Block, Brush
10	82128-10	4	Brush, Collector Ring
11	82128-11	1	Adapter

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
12	82128-12	1	Bell, End
13	82128-13	4	Stud, Thru-Stator
14	82128-14	1	Bell, End-Rear
15	82128-15	1	Scroll, Air
16	82128-16	1	Cover, End Bell
17	82125-19	1	Clip, Bearing Stop
18	82128-18	1	Screen, End Bell
19	82128-19	1	Base Assembly, Mounting
20	82128-20	1	Eye, Lifting - 1/2
21	82128-21	1	Ring, Retaining - Hub
22	82128-22	1	Ring, Retaining - Bearing
23	82128-23	1	Ring, Collector
24	82128-24	1	Key, Blower Hub

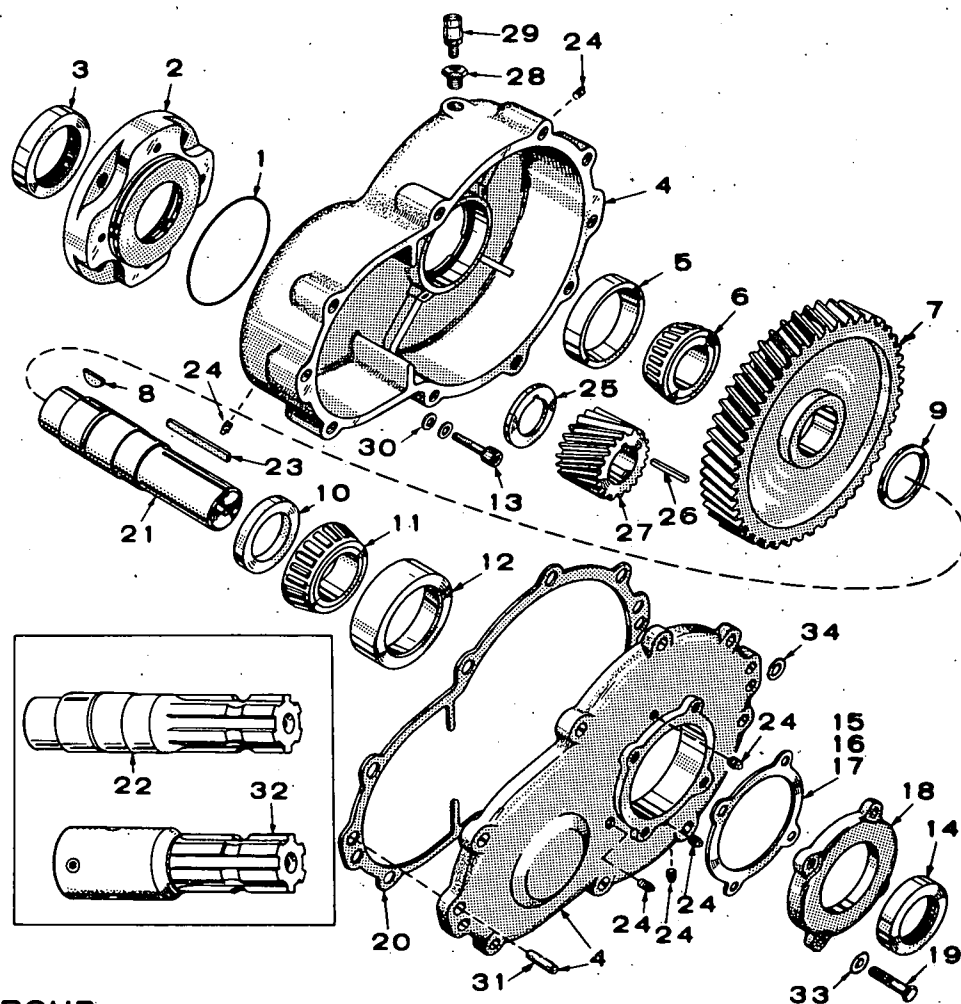


STATIC-EXCITER GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	82129-A	1	Exciter Complete (Less Cover)
1	82129-1	1	Cover, Exciter
2	82129-2	1	Panel Only, Exciter
3	82129-3	2	Reactor, Gate
4	82129-4	2	Gasket, Gate Reactor Mounting, Outer
5	82129-5	2	Gasket, Gate Reactor Mounting, Inner
6	82129-6	2	Retainer, Gate Reactor
7	82129-7	1	Rectifier Assembly, Resistor & (Includes Parts Marked *)
8	82129-8	2	*Rectifier Only, Power Field, Negative
9	82129-9	2	*Rectifier Only, Power Field, Positive
10	82127-13	4	*Rectifier, Voltage Control
11	82129-11	1	*Resistor (150-Ohm, 5Watt)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
12	82129-12	1	Block, Terminal
13	82129-13	1	Strip, Block Marker
14	82129-14	1	Resistor, Tapped, 500-Ohm (425 Fixed, 75 Adjustable)
15	82129-15	4	Washer, Resistor Centering
16	82129-16	2	Spacer, Resistor Mounting
17	82129-17	1	Reactor, Voltage Control
18	82129-18	2	Gasket, Voltage Control Reactor
19	82129-19	1	Stud, Tapped Resistor Mounting
20	82129-20	1	Clip, Tinnerman
21	82129-21	1	Grommet, Rubber, For 7/8" Hole
22	82129-22	1	Resistor, Fixed (250-Ohm, 25Watt)
23	82129-23	1	Switch, Residual Reset
24	82129-24	1	Washer, Retainer, Voltage Control Reactor

* Included in 82129-7 Resistor and Rectifier Assembly.

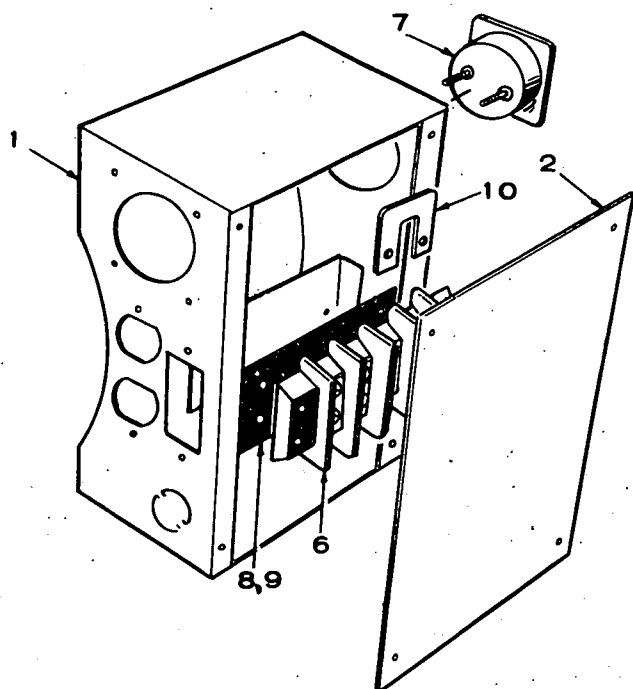


GEAR BOX GROUP

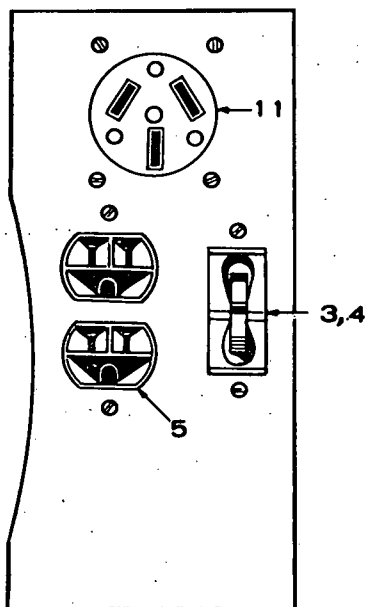
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	82130-A	1	Gear Box Complete-Splined Shaft
	82130-B	1	Gear Box Complete-Round Shaft (Keyed)
1	82130-1	1	Seal, "O" Ring
2	82130-2	1	Adapter & Oil Seal Assembly, Gear Box
3	82130-3	1	Seal, Oil-Included in 82130-2 Adapter Assembly
4	82130-4	1	Housing Assembly, Gear- Includes Cover & Dowel Pins
5	82130-5	1	Cup, Roller Bearing-Inside Bearing
6	82130-6	1	Cone, Roller Bearing-Inside Bearing
7	82130-7	1	Gear, Driven (3.32 to 1 Ratio)
8	82130-8	1	Key, Woodruff-Driven Gear
9	82130-9	1	Ring, Retainer-Driven Gear
10	82130-10	1	Spacer, Gear-Between Driven Gear & Bearing Cone
11	82130-11	1	Cone, Roller Bearing-Outside Bearing
12	82130-12	1	Cup, Roller Bearing-Outside Bearing
13	82130-13	6	Screw, 5/16-18 x 1 Socket Head-Gear Box to Rear End Bell

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
14	82130-14	1	Seal, Oil-Drive Shaft
15	82130-15	As Req.	Shim-.009" Thick
16	82130-16	As Req.	Shim-.012" Thick
17	82130-17	As Req.	Shim-.016" Thick
18	82130-18	1	Plate, Bearing Retaining
19	82130-19	4	Screw, 1/4-20 x 1-1/4 H.H.C.
20	82130-20	1	Gasket, Gear Cover
21	82130-21	1	Shaft, Input-Round (Keyed)
22	82130-22	1	Shaft, Input-Splined
23	82126-24	1	Key, 1/4 x 2, Gear Reduction Shaft to PTO Shaft- Note: Models Using Round Shaft Only
24	82130-24	6	Plug, 1/4 Pipe-Gear Cover
25	82130-25	1	Washer, Pinion Gear
26	82130-26	1	Key-Pinion Gear
27	82130-27	1	Gear, Pinion (3.32 to 1 Ratio)
28	82130-28	1	Bushing, 1/4 x 1/8 Reducer
29	82130-29	1	Fitting, Vent
30	82130-30	6	Washer (Copper), Flat, 5/16"
31	82130-31	2	Pin, Dowel-Included in 82130-4 Housing Assembly
32	82126-25	1	Adapter, Round Shaft (1-1/4 Round Shaft to 1-3/8" Spline)
33	82130-33	4	Washer (Copper), Flat, 1/4"
34	82130-30	8	Washer (Copper), Flat, 5/16"

CONTROL GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	82131-1	1	Box, Control
2	82131-2	1	Cover, Control Box
3	82131-3	1	Breaker, Circuit 120/240 V, 3 Ph.
4	82131-4	1	Breaker, Circuit 120/240 V, 1 Ph.
5	82127-12	1	Receptacle, 120 Volt Duplex
6	82131-6	1	Block, Terminal
7	82127-7	1	Meter, Volt - 0-300
8	82131-8	1	Strip, Marker 120/240 V, 3 Ph.
9	82131-9	1	Strip, Marker 120/240 V, 1 Ph.
10	82131-10	2	Jumper, Terminal - 120/240 Volt, 1 Phase
11	82127-14	1	Receptacle, 50 Amp.



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