SERVICE DIAGNOSIS

POSSIBLE CAUSE	REMEDY
LOW OUTPUT VOLTAGE	
Low Speed	1. Check for overload on the engine or tractor. 2. Defective governor. Check governor spring tensions, tight or defective throttle levers and joints. 3. Defective engine (see engine check list).
High line loss. Indicated by lower voltage at load than at generator terminals.	Increase size of line wiring. Might also be the result of loose connection which will be indicated by excessive heating at the loose connections.
Shorted or grounded field coil. In some cases one coil only, that is shorted or grounded, will reduce voltage to approximately one half of rating.	See information for testing field circuits.
HIGH OUTPUT VOLTAGE	
Excessive Speed	Check governor linkage, spring tensions, etc. Governor linkage must be free from dirt and gum.
EXCESSIVE HEATING	
Clogged ventilating inlet and/or outlet.	Clean screens, make sure interior of generator is unobstructed.
NO OUTPUT VOLTAGE	
Poor brush contact: Brushes tight in holder.	Clean brush holder. Brush should move freely in holder.
Weak brush spring tension	Brush spring tension should snap brush into contact with ring when lifted and released.
Film on collector rings caused by corrosive or dirty atmosphere.	Clean rings with fine sandpaper during rotation of armature. Caution: Tape sandpaper to stiff cardboard for safety.
Defective rectifier bridge (see method of checking bridge)	Replace defective bridge assembly. Find assembly number under rectifier assembly in parts list.

NO OUTPUT VOLTAGE (Con't)

POSSIBLE CAUSE	REMEDY
Open field circuit (see illustration for method for checking, Figure 2, page 11)	Replace open coil(s) or repair if open connection is in the connecting leads.
Grounded or shorted field coil(s) (see illustration for method, page 11)	Replace grounded coil(s) and insulation or repair damage.
Loss of residual magnetism. This is a condition brought about by some unusual condition. It will usually occur after disassembly of the field frame.	See note under field assembly for procedure to restore magnetism, page

DEFECTIVE ARMATURE

Shorted winding. This can be identified by the use of a "growler" at a competent rewinding shop.	Replace the armature. (Include generator model and serial number on the order)
Grounded armature. Check winding by test lamp or high potential tester from collector rings to shaft.	Same as above
Open armature circuit. Measure circuit between rings with an ohmmeter. Should have a circuit between any pair of rings.	Same as above

VOLTAGE UNSTEADY

Loose connection, probably at rectifier	Tighten with pliers.

SLOW VOLTAGE BUILDUP

Slow voltage buildup, or no voltage buildup, unless load is applied.	See below.
Excessive air gap between armature and field poles.	Shim all poles est. .007
Not enough air gap in choke.	Remove top of choke and install thickness of this paper until voltage builds up in 3 to 5 seconds or 260 Volt no load on 120/240 Volt unit. Replace top of choke and tighten the bolt. Loose bolts will cause chatter and unstable voltage.

Testing of Rectifier Assembly.

Remove the lead from the positive (+) terminal and one of the leads going to A.C. terminal of the bridge.

I. Connect black lead of meter to positive (+) terminal of bridge and red lead to one of the A.C. terminals of bridge. Meter should read about 20 Ohm.

II. Now, reverse the lead on bridge terminals. Meter should read open circuit or infinite resistance.

III. Connect black lead of meter to (+) terminal and red lead to other A.C. terminal of bridge. Meter should read about 20 Ohm.

IV. Now reverse the leads on bridge terminals. Meter should read open circuit or infinite resistance.

V. Connect red lead of meter to (-) terminal of bridge and black lead to one of the A.C. terminals of the bridge. Meter should read about 20 Ohm.

VI. Reverse the leads and you should read infinite resistance.

VII. Connect red lead of meter to (-) terminal of the bridge and black lead of meter to other A.C. terminal of the bridge. Meter should read about 20 Ohm.

VIII. Now reverse the leads and you should observe infinite reading on your meter.

All eight steps are described for a good bridge.

A shorted diode will give zero resistance reading in both directions.

A low resistance reading of 2 Ohms or so will show leakage current and diode should be replaced.

An open diode will give a high resistance (infinite) reading in both directions.

Handling Procedure for Rectifiers (Diodes and Bridge Assemblies)

1. Rectifiers should be handled in a manner which avoids the possibility of sudden shocks being applied, such as those encountered in dropping from a work bench to a hard floor. Damage done to the rectifier by such shocks may not be detected by subsequent testing, yet may cause poor system reliability.

2. Any lead trimming or forming operations should be done with care to avoid damaging the leads or the glass header seals.

3. Leads should never be bent or twisted. If lead forming is necessary the lead should be supported so that no bending occurs closer than 1/8 inch to the rectifier body, and that header seals are not fractured or broken. If this seal is broken, it removes mechanical support for the lead and allows entry of moisture into the rectifier, almost assuring early failure.

4. Care must be taken during all soldering operations. It is unsafe to exceed the general specification to which diodes are tested for solder ability. This is 10 ± 2 seconds at a temperature of 230°C + 5°C at a point 1/16 ± 1/32 inch from the diode body. This is not as restrictive as it may sound, since 230°C is 446°F and 60/40 solder melts at 375°F, and with proper procedure and soldering tools a solder joint can be made in 4 to 7 seconds. Also, solder joints are almost never made this close to the diode body. Heat sinks, such as a pair of needle nose pliers or alligator clips, can be attached to the lead between the solder joint and the diode body to further reduce the possibility of heat damage.

   Also, precautions should be taken to prevent solder or flux bridging which causes a conductive path across the case of the rectifiers. As a precaution all flux should be removed by using alcohol and a small brush. Pay particular attention to assure that glass header seals are free of all flux.

Sticky Brushes

Brushes must move freely in the brushholders to maintain contact to the slip rings. The field circuit begins at the brushholders. If the brush does not maintain contact to the ring, or if a film has developed on the ring from lack of use and maintenance, there will be no current in the field coils; consequently, the field strength will not increase from the low residual value resulting in lack of voltage buildup. The cause in both cases is usually lack of maintenance and improper storage.

Build Up of the Excitation Field

Occasionally an alternator will seem to be defective as there is no indication on the voltmeter on start up. This will sometimes be caused by a too careful increase in power takeoff speed. Rated speed isn't actually reached. The better procedure is to adjust to maximum, then back down to maintain the indication in the "green" portion of the color band.

Build Up of the Excitation Field (Con't)

When repairs have been made or the alternator has not been used for a long period it may be necessary to "flash the field". An inexpensive tool using a small step-down transformer is the best means for this purpose. It has a nominal input of 125 volts, 25 volts secondary and 2 ampere rating. Avoid the use of a variable transformer. Reversal of power line and alternator ground may cause damage. Winpower Part No. EE-376 can be suitable for this purpose.

With the alternator operating, plug the transformer into a wall outlet and insert the prods into the 125 volt outlet on the alternator panel. Remove at once when an indication is shown on the voltmeter.

Field Check of Armatures (Tractor Drives)

1. Instrument required--Volt-Ohm Meter. Set on Ohm X1 scale
2. Check Ohm Meter by touching leads together. Reading should be zero.
3. Lift all brushes from armature that is to be checked.
4. First check to find out if armature windings are grounded (most probable)
   a. Connect one lead of Ohm Meter to ground.
   b. Touch other lead to each ring. Meter should stay at infinite (not move)
   c. If reading is indicated, armature is grounded and should be replaced.
   d. If armature has commutator, it should not indicate ground.
5. Second check to find out if armature windings are open.

   Sympton when generator was running no voltage on one line to neutral, or on 115V unit no voltage. Lift all brushes.

   a. Armature 3 Rings, 1 Ø or 3Ø, 3 Wire

      Connect one ohm meter lead to Ring 1. Touch other lead to Ring 2. Meter should read Zero or very low. Then touch lead to Ring 3. Meter should read Zero. Winding is open if reading is infinite.

   b. Armature 4 Rings, 3 Ø, 4 Wire
      Connect one ohm meter lead to Ring 1
      Touch other lead to Ring 2 Reading should be near zero
      Touch other lead to Ring 3 Reading should be near zero
      Touch other lead to Ring 4 Reading should be near zero

c. Armature 4 Rings, 1 Ø
This armature has two windings
One starting on Ring 1 Ending on Ring 2
One starting on Ring 3 Ending on Ring 4

Connect ohmmeter one lead to Ring 1
Other lead to Ring 2 Meter should read near zero
Other lead to Ring 3 Meter should read infinite
Other lead to Ring 4 Meter should read infinite
Connect one lead to Ring 3
Other lead to Ring 4 Meter should read near zero
Other lead to Ring 1 Meter should read infinite
Other lead to Ring 2 Meter should read infinite

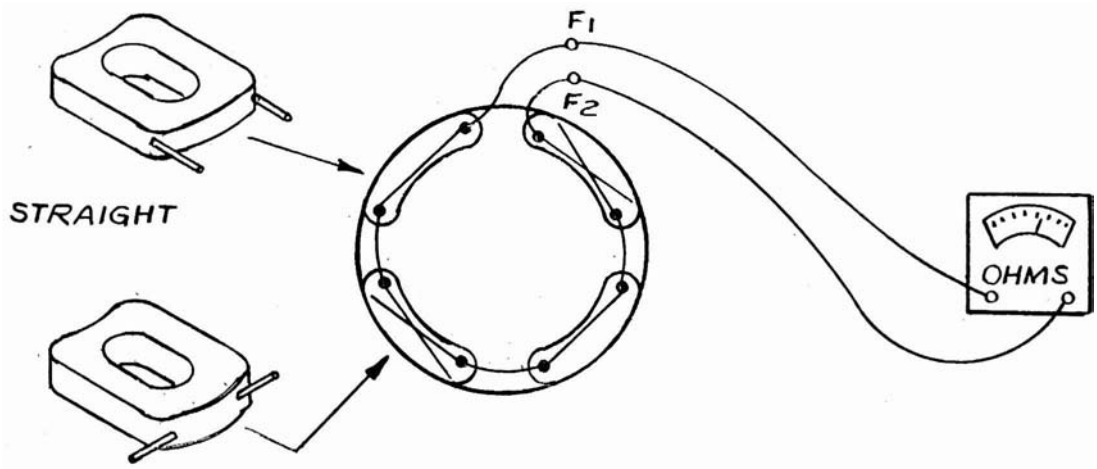

FIG. 2 NOTE: Fields alternate "straight" and "crossed" to provide proper polarity. When ordering replacement coils be sure to include Model, Type, and Serial Number.

Testing a Field Circuit Disconnect field leads F_1 and F_2

Measure resistance of entire field circuit as shown in Figure 2. A resistance of less than the range shown on the table indicates a shorted coil. The defective coil can be identified by measuring the resistance of the individual coils. A coil with an appreciable lower resistance has shorted turns.

A reading of no deflection or very little deflection of the meter pointer indicates a defective coil or broken interconnection. Inspect all interconnecting wires for tight and un-corroded connection. Each coil should measure approximately $\frac{1}{4}$ of the total specified resistance. A very high resistance indicates broken internal wires.

A grounded field can be identified by connecting one ohmmeter lead to one field lead and touching the other to an unpainted spot on the field ring. Make sure that none of the coil leads are in contact with the ring. A grounded field can usually be corrected by repairing the insulation once the grounded point or points are located.

NOTE: Whenever the field coils have been removed and/or replaced, the field must be re-energized.

TRACTOR DRIVE WINDING RESISTANCES

ROTATING ARMATURE TRACTOR DRIVE

	(COLD) RESISTANCE (OHMS)					
	FIELDS		ARMATURE			
MODEL	F1-F2	S1-S2	Ring 1&2	Ring 1&3	Ring 2&3	Ring 1&4
15/10PTCD	27/Coil 54/Set	.015/Coil .061/Set	.14, (Ring 3&4 =.13 Ohm)			
25/15PTCD & M	6.3/Coil 25/Set	2.4/Coil 9.5/Set	.065	.063	.125	
25/15PTJD & M	1.75/Coil 7/Set		.11	.15	.22	.25
30/20PTCD & M	2.5/Coil 10.2/Set		.11	.12	.20	
30/20PTJD & M	1.44/Coil 5.76/Set		.064	.064	.11	.145
45/25PTCD & M	2.1/Coil 8.4/Set		.039	.034	.065	
45/25PTJD & M	2.1/Coil 8.4/Set		.062	.06	.09	.11
50/30PTCD & M	2.1/Coil 8.5/Set		.031	.031	.062	
50/30PTJD & M	1.64/Coil 6.54/Set		.05	.05	.08	.10
80/40PTJD & M	2.3/Coil 2.3/Set		.040	.041	.056	.065
80/50PTCD & M	2.3/Coil 2.3/Set		.035	.025	.041	

REVOLVING FIELD TRACTOR DRIVE

	(COLD) RESISTANCE (OHMS)	
MODEL	FIELD	ARMATURE
100/60PT()	2.2 Total	.019 T7 to T10, etc., (resistance per leg)

REVOLVING FIELD TRACTOR DRIVE WITH EXCITER

	(COLD) RESISTANCE (OHMS)			
	EXCITER		MAIN GENERATOR	
MODEL	FIELD	ARMATURE	FIELD	ARMATURE
150/100PT()	55 Total	.23	5.2 Total	.0105 T1 to T4, Etc.