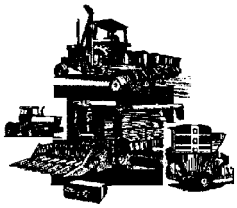

# TRACTOR ELECTRICAL SYSTEM

**Farm Machinery Fact Sheet FM-29**

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When electrical trouble is experienced in any circuit it is advisable to start with the battery.

**Battery**

1. A visual inspection and a few quick electrical checks with a voltmeter, ampmeter, ohmmeter and hydrometer will reveal the condition of the power source.

2. The battery posts and cables must be clean and free of deposits.

3. The use of undersize batteries will result in poor performance or early failure. A new battery should be at least of equal ampere-hour rating to the original battery.

4. A 12-volt dry charged battery needs to be activated with electrolytes at a temperature under 60 degrees F for a 10-minute period at warm up charge of 15 amperes.

5. Always install a battery with the same positive and negative posts in proper position. Hold down bolts should be tight to prevent movement and damage to the battery case.

6. The ground strap should be connected last to prevent arcing. A coating of spray-on battery corrosion preventative, petroleum jelly or grease should be applied to post and cable clamps.

7. For batteries which have discharged and require charging, a slow charge is best. (Example, 4-amps for 24 hours is better than 50 amps for 1 ½ hours.) This is for a 100 amp/hour capacity battery.

8. When checking a battery with a hydrometer the temperature of the electrolyte should be considered.

9. When reading a hydrometer the barrel must be held vertically and just the right amount of acid be drawn up into the barrel to float the tube freely.

10. The following table illustrates the specific gravity for a cell in various stages of charge to crank an engine at 80 degrees F.

| | | |
|---|---|---|
| 1.280 | Specific Gravity | 100% charged |
| 1.220 | " " | 50% charged |
| 1.190 | " " | 25% charged |
| 1.160 | " " | very little good |
| 1.130 | " " | discharged |

11. Pouring acid into a discharged battery will cause early failure.

**Generator**

The generator supplies electricity when driven mechanically by the engine. It should supply current to the battery, to keep it in a charged condition and to any connected electrical load. However, the regulator and the wiring has its part to play in the system. If the ampmeter gauge is working properly on the tractor it should indicate the charging rate.

1. A system that has an overcharge will require excessive water usage and a high ampmeter indication.

2. Check visually the wiring connections and make sure they are clean and tight. Repair or replace wires that are faulty or bare on insulation.

3. Periodically check the fan belt for wear, glazing, or bottoming on the pulley.

4. Hold generator pulley with fingers and feel for side play and freeness of rotation to determine condition of bearings.

5. Each bearing has grease supply which eliminates the need for periodic lubrication.

6. If in doubt of proper operation the alternator may be taken off and put on a test stand to check diodes, starter and rotor.

7. When connecting a booster battery, connect negative posts together and positive posts together. If leads are hooked wrong the diodes can be damaged. When you have sparks and high flow current there is danger of the wiring harness being burned.

8. Do not short across or ground any of the terminals on the regulator. An attempt to polarize an alternator can cause damage to the diodes, wiring harness and other components.

9. Complaints or troubles involving the charging circuit are either overcharging or undercharging of the battery.

10. An undercharged battery or one that “runs down” is the fault of a short, heavy usage, or faulty battery.

**Voltage Regulator**

1. The regulator has a battery, generator, and field terminal. The operation or rate of charge is controlled by the cutout relay. The cutout is a magnetically operated switch that controls the flow or current.

2. Care must be exercised when cleaning points. Some points are soft and some very hard, requiring different methods. All oxides should be removed so the pure metal is exposed, although it is not necessary to file the surface perfectly flat.

3. Contact points may be cleaned with a strip of 400 silicon carbide paper and then cleaned with a strip of trichlorethylene paper to remove foreign material.

4. Never use emery cloth or sandpaper to clean contact points.

**Cranking Circuits**

The cranking motor converts electrical energy from the battery into mechanical energy which is used to crank the tractor engine for starting.

1. The cranking circuit consists of a battery, cranking motor, wiring and control switches.

2. The solenoid switch engages the pinion gear to mesh with the engine flywheel and reverse the process after the engine has started.

3. No periodic lubrication is needed and the cranking motor will have to be disassembled to inspect brushes and bearings.

4. The wiring circuit to the starting motor must have tight fittings and proper size wire to carry current due to high energy demands during cranking.

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