BATTERY CHARGING

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Special Tools

	GR8-1220KIT-CHRY - AGM Battery Tester/Charger Station Originally Shipped In Kit Number(s) *GR8-1220KIT-CHRY*.

Battery charging is the means by which the battery can be restored to its full voltage potential. A battery is fully-charged when:

- The Midtronics GR8-1220KIT-CHRY tester indicates battery is GOOD.
- All of the battery cells are gassing freely during battery charging.
- An Open-circuit voltage of the battery is 12.65 volts or above.

WARNING: Never exceed twenty amperes when charging a cold (-1° C [30° F] or lower) battery. The battery may arc internally and explode. Personal injury or vehicle damage may result.

WARNING: If the battery shows signs of freezing, leaking, loose posts, do not test, assist-boost, or charge. The battery may arc internally and explode. Personal injury or vehicle damage may result.

WARNING: EXPLOSIVE HYDROGEN GAS FORMS IN AND AROUND THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR THE BATTERY. PERSONAL INJURY OR VEHICLE DAMAGE MAY RESULT.

WARNING: THE BATTERY CONTAINS SULFURIC ACID, WHICH IS POISONOUS AND CAUSTIC. AVOID CONTACT WITH THE SKIN, EYES, OR CLOTHING. IN THE EVENT OF CONTACT, FLUSH WITH WATER AND CALL A PHYSICIAN IMMEDIATELY. KEEP OUT OF THE REACH OF CHILDREN.

CAUTION: Always disconnect and isolate the battery negative cable before charging a battery. Do not exceed sixteen volts while charging a battery. Damage to the vehicle electrical system components may result.

CAUTION: Battery electrolyte will bubble inside the battery case during normal battery charging. Electrolyte boiling or being discharged from the battery vents indicates a battery overcharging condition. Immediately reduce the charging rate or turn off the charger to evaluate the battery condition. Damage to the battery may result from overcharging.

CAUTION: The battery should not be hot to the touch. If the battery feels hot to the touch, turn off the charger and let the battery cool before continuing the charging operation. Damage to the battery may result.

After the battery has been charged to 12.65 volts or greater, perform a load test to determine the battery cranking capacity, (Refer to 08 - Electrical/8F - Engine Systems/Battery System/BATTERY - Standard Procedure) for the proper battery load test procedures. If the battery will endure a load test, return the battery to service. If the battery

will not endure a load test, it is inoperative and must be replaced.

CHARGING A COMPLETELY DISCHARGED BATTERY

The following procedure should be used to recharge a completely discharged battery. Unless this procedure is properly followed, a good battery may be needlessly replaced.

1. Measure the voltage at the battery posts with a voltmeter, accurate to 0.10 volt. If the reading is below 10 volts, the battery charging current will be low. It could take some time before the battery accepts a current greater than a few milliamperes. Such low current may not be detectable on the ammeters built into many battery chargers.
2. Disconnect and isolate the negative battery cable. If equipped with an Intelligent Battery Sensor (IBS), disconnect the IBS connector first before disconnecting the negative battery cable. Connect the Midtronics GR8-1220KIT-CHRY .
   NOTE:
   Some battery chargers are equipped with polarity-sensing circuitry. This circuitry protects the battery charger and the battery from being damaged if they are improperly connected. If the battery state-of-charge is too low for the polarity-sensing circuitry to detect, the battery charger will not operate. This makes it appear that the battery will not accept charging current. See the instructions provided by the manufacturer of the battery charger for details on how to bypass the polarity-sensing circuitry.
3. Battery chargers vary in the amount of voltage and current they provide. The amount of time required for a battery to accept measurable charging current at various voltages is shown in the Charge Rate Table. If the charging current is still not measurable at the end of the charging time, the battery is inoperative and must be replaced. If the charging current is measurable during the charging time, the battery may be good and the charging should be completed in the normal manner.

CHARGE RATE TABLE	
Voltage	**Hours**
14.4 volts maximum for Advanced Glass Mat (AGM) battery	up to 4 hours
14.0 to 15.9 volts	up to 8 hours
13.9 volts or less	up to 16 hours

CHARGING TIME REQUIRED

The time required to charge a battery will vary, depending upon the following factors:

- **Battery Capacity** - A completely discharged heavy-duty battery requires twice the charging time of a small capacity battery.
- **Temperature** - A longer time will be needed to charge a battery at -18°C (0°F) than at 27°C (80°F). When a fast battery charger is connected to a cold battery, the current accepted by the battery will be very low at first. As the battery warms, it will accept a higher charging current rate (amperage).

- **Charger Capacity** - A battery charger that supplies only five amperes will require a longer charging time. A battery charger that supplies 20 amperes or more will require a shorter charging time.
- **State Of Charge** - A completely discharged battery requires more charging time than a partially discharged battery. Electrolyte is nearly pure water in a completely discharged battery. At first, the charging current (amperage) will be low. As the battery charges, the specific gravity of the electrolyte will gradually rise.

The Battery Charging Time Table gives an indication of the time required to charge a typical battery at room temperature based upon the battery state of charge and the charger capacity.

BATTERY CHARGING TIME TABLE			
Charging Amperage	**5 Amps**	**10 Amps**	**20 Amps**
Open Circuit Voltage	**Hours Charging @ 21°C (70°F)**		
12.25 to 12.49	6 hours	3 hours	1.5 hours
12.00 to 12.24	10 hours	5 hours	2.5 hours
10.00 to 11.99	14 hours	7 hours	3.5 hours
Below 10.00	18 hours	9 hours	4.5 hours