

# Ample Power Company

## Troubleshooting the Next Step Regulator

### Introduction

Most installations that fail to operate from the start are due to some wiring problem or an incompatible alternator. Read the ERROR INDICATOR section below to determine if the NEXT identified an error. Then proceed to the Troubleshooting Steps section to isolate and remedy the problem. If the problem cannot be remedied, consult the Troubleshooting Assistance section for last resort options.

### Error Indicator

Abnormal conditions are reported with the Red LED, and the external lamp/alarm, if wired. Errors are identified by On and Off times of the Red LED as shown below.

**Table 2. Red Error LED**

Error	On	Off
Can't turn field off	1	1
Can't turn field on	1	3
Bat. Volts disconnected	3	1
Over Temperature	3	3
Voltage Runaway	6	3
Bad Temperature Sensor	6	6

**NOTE: The ERROR INDICATOR** comes on when the regulator is first powered up. This tests the LAMP to verify that the ERROR INDICATOR, error lamps and/or alarms operate.

### Description of ERROR INDICATOR Codes

**Cannot Turn Off the Field Output:** When the regulator cannot turn off the field output, the alternator charges at its maximum rate. Obviously, this can destroy batteries if not corrected. The signal for this condition is easy to determine since it is 1 second on and 1 second off. There are two causes for this error: one, a shorted driver in the NEXT, that is, the driver no longer goes off when commanded; and two, the FLD wire is not connected to the alternator's Field, which is more likely to be the case.

**Cannot Turn On the Field Output:** When the regulator cannot turn on the field output, it turns off the output drivers and delays for about one minute before attempting to regulate again. It will display an error code of 1 second on and 3 seconds off. The regulator will repeat this procedure indefinitely. There are three main causes for this: one, if there is no power supplied to the power input (B+); two, if the alternator field is shorted to ground; and three, if the field wire is shorted to ground by rubbing through insulation or loosening from the field terminal. The engine should be shut off and

the problem solved.

**No Battery Sense:** When the battery voltage is not sensed by the NEXT, it can not regulate. After a short delay, the regulator will shut down and display an error code of 3 seconds on and 1 second off.

**Battery Over Temperature:** If temperature sensing is utilized, an over temperature condition may arise if the battery temperature should exceed 140° F/60° C, signaled by an error code of 3 seconds on and 3 seconds off. In this case, the regulator will shut down after a short delay period.

**Battery Voltage Runaway:** The voltage runaway condition is raised when the battery voltage exceeds (by greater than 0.5 volt) the desired voltage determined by the regulator. The ERROR INDICATOR will turn on for 6 seconds and off for 3 seconds. This can be caused by other charger sources that do not follow the NEXT charge sequence (such as shore power battery chargers), in which case it is best to turn the other charge sources off while the NEXT is running.

**Abnormal Temperature Sensor:** This condition will shut down the regulator indicated by an error code of 6 seconds on and 6 seconds off. There are two possible causes for this: one, a shorted or reverse wired temperature sensor; or two, a temperature less than -103° F / -75° C detected.

### Troubleshooting Steps

**First, Take some measurements.**

Fill in Table 9 completely. Fill in Column A first, Column B second, and Column C last. These measurements can catch 99% of all wiring errors if done meticulously. Leave the o checkbox empty until you have gone through the analysis in Table 10.

1. Connect the negative probe of a digital voltmeter to only the battery negative. Use a separate long jumper wire if necessary, but do not use any other wires in the system.
2. Connect the positive to the locations listed in Table 9.

**Table 9 . . . Your Voltage Measurements.**

Test #	Signal	Col. A	Col. B	Col. C
		Ignition Off	Ignition On	Engine Running
1	House Battery +			
2	Parallel			
3	On/Off			
4	Ground			
5	B+			
6	Field			
7	Alt. GND			
8	Lock			
9	Bat. Volts			
10	T-			
11	T+			
12	ABS			
13	Lamp			

charging is detected, then turn off the engine. Temporarily connect NEXT end of the field wire to the battery positive for P-Type or ground for N-Type. Measure the voltage on the battery. Unplug the field wire from the alternator end. Measure the voltage on the field wire at the alternator end. The voltage should correspond to the voltage on the battery. If there is no voltage then the wire is open-circuit. Check the connector and wire. Also give the connectors a tug to check that they are properly crimped.

• If everything checks out fine then reinsert the NEXT in-line fuses and proceed below.

**Absorption Voltage does not adjust**

**Second, Analyze the Results.**

**Table 10**, below, contains general information about valid results. Refer to the sub-sections following the table for the descriptions of problems. Check the valid values here in Table 10 against your measurements in Table 9. Keep in mind that measurements are approximate.

Table 10 Valid Voltage Measurements.

Test #	Signal	Col. A	Col. B	Col. C
		Ignition Off	Ignition On	Engine Running
1	House Battery +	Battery Volts	Battery Volts	Battery Volts
2	Parallel	Battery Volts	Battery Volts	0 after 30+ seconds
3	On/Off	0	Battery Volts	Battery Volts
4	Ground	0	0	0
5	B+	Battery Volts	Battery Volts	Battery Volts
6	Field	0	Battery Volts	Battery Volts or less
7	Alt. GND	0	0	0
8	Lock			
9	Bat. Volts	Battery Volts	Battery Volts	Battery Volts
10	T-	0	0	0
11	T+	0	3	3
12	ABS			
13	Lamp			

If the voltage does not adjust, do the following: turn off the ignition, turn it back on; and follow the absorption voltage instructions. NOTE: the adjustments are multi-turn (20 turn) and may need to be turned many times if altered from factory settings.

**Tachometer Drive Problems (Oscillates)**

Some tachometers operate from a terminal on the alternator. The alternator signal is a half sine wave where its frequency is related to the engine RPM. The magnitude of the tachometer signal is dependent on the amount of current in the alternator field. Output current is also proportional to the field current, resulting in a conflict when field current needs to be low to regulate properly.

When the batteries are fully charged (especially gel batteries), little field current is necessary to maintain the float voltage at a proper level. Under these conditions, the NEXT reduces field current to a level consistent with the output demand, so that the batteries will not be overcharged. The NEXT is designed to be kind to the batteries first, and kind to the tachometer second. While special software in the regulator attempts to both regulate and still supply enough field current to keep the tachometer operating, the tachometer may still become erratic or even stop. This situation can be avoided by turning on a minimum load of a few Amps such as the running lights. This will load the alternator and result in more field current. (Be sure to turn off the load when it is no longer needed.)

**Next Check the Alternator Wiring**

- To operate properly, the NEXT must be connected exactly as shown by the wiring diagram.
- Remove the in-line fuse to the NEXT
- B+ tab. Test the alternator in place by momentarily connecting the field terminal to the battery positive, after first having removed the push-tab connected to the NEXT
- FLD. The alternator should charge at its maximum output. Do not full field the alternator for more than a few seconds.

At the end of the absorption cycle the alternator steps down to the float voltage over approximately 5 minutes. The tachometer may "pulse" at the time of the step about every 30 seconds. Do not be alarmed by this, as it is normal after the absorption stage. The minimum load mentioned above will alleviate any tachometer instabilities.

This can also happen when there is improper grounding of the alternator and/or wiring of the NEXT B+ and GROUND connections. Check that everything is physically wired as

specified.

### Fuses Blow

- If any of the fuses are blown, then there is a short-circuit somewhere and it should be found and corrected.
- If the fuse on the NEXT blows twice in a row when the engine is not running, then remove all connections to the NEXT except the
- GROUND and the B+. If the fuse blows again, then the NEXT is damaged. If the fuse does not blow then

proceed. In the following steps, if the fuse blows then the NEXT may be damaged. In this order connect

- IGNITION, BAT.VOLTS, and FLD. If the fuse only blows when the NEXT is properly wired and the field connection is made, then check to make sure that there is a resistance (of 1.2 Ohms or greater) between the field wire and the alternator ground wire, ALT GND.

### Getting Assistance

Free online support is available.