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BATTERY DIAGNOSTIC #1

START HERE IF:

- You are experiencing slow labored cranking
- Your engine won't crank sometimes
- Won't start hot
- You think your starter is bad

You could have a problem with your battery.
To begin, visually inspect the battery for damage or corrosion. If everything appears OK, click next. If the battery appears damaged or corroded, you should replace it, then proceed if the problem still exists.

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Is the battery a sealed battery?

Yes

No

Check the water level in each cell of the battery.

Check the battery voltage using a voltmeter or multimeter (set to a 20V range). Place one of the probes on the positive (+) battery terminal and the other on the negative (-) battery terminal.

The water level is above the plates

The water level is below the plates

Add water so that the level rises to just above the plates, before continuing.

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The meter reads 12.4 volts or more

The meter reads less than 12.4 volts

Next, perform a Load Test using a battery load tester (please follow the manufacturer's directions for load testing), or take it to your nearest auto parts store to have them load test it for you. Most stores offer this service free of charge.

Your battery is under-charged. Charge your battery with an automatic self-adjusting charger to 12.6 volts using the lowest amp setting.

IMPORTANT: Do NOT use your alternator as a battery charger. If your battery is below 12 volts, it must be removed and charged, so as NOT to damage the battery or the alternator.

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It passes the load test

It fails the load test

You could have a problem with your starter.
Go to the Starter Diagnostic (page 3, step 1).

You're done!
Your problem lies with the battery. You should replace it as soon as possible.

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STARTER DIAGNOSTIC

STEP 1

START HERE IF:

- You think your starter is bad
- You were directed here from Battery Diagnostic #1 (pg 2).

You could have a problem with your starter.
To begin, you should determine what type of starter you have. Does your starter have a remote mounted solenoid?

Bench Test
With a remote mounted solenoid, you'll need to remove the starter and take it to your local auto parts retailer for an in-store bench test.

START HERE IF:

- You hear grinding or whirring during start up.

Attempt to start your vehicle as you normally would.

STEP 2

I hear a "clicking" sound from the solenoid

I do not hear a "clicking" sound

I hear grinding or other noises

Remove the positive (+) battery cable from your starter, then check the voltage from that cable end to ground (-) using a voltmeter or multimeter (set to a 20V range).

Remove the S-terminal lead (small lead) from the solenoid.
NOTE: If there are two small leads, one is the R terminal lead. If you are NOT sure which is which, remove the starter and take it to your local auto parts retailer for an in-store bench test.

Remove the starter, then visually inspect the drive gear and attempt to rotate it with your thumb. It should move in one direction, but not the other.

The meter reads 12.2 volts or higher

The meter reads 12.1 volts or less

The drive appears to be in good condition

The drive appears worn or damaged

Check all cables and connections between the starter and battery. Clean and replace as necessary. Re-install the cable, then attempt to start your vehicle. **NOTE:** When replacing cables, always use whole cables with crimped terminals.

With the key in the full start position, check the voltage from the terminal lead to the ground using a voltmeter or multimeter (set to a 20V range).

Perform a bench test to verify that the drive is extending and retracting fully.

STEP 3

Your starter may need to be replaced.
Click here for the MPA Online Catalog to find the correct part number.
NOTE: Always be sure to have your "failed" starter bench tested, before purchasing a replacement.

The vehicle starts

The vehicle does not start

The meter reads 12.2 volts or higher

The meter reads 12.1 volts or less

It passes the bench test

It fails the bench test

Check that the stater housing is well grounded then clean the block and mounting flange as necessary. Dirt, oil, corrosion and paint can prevent good ground.

Bench Test
Remove the starter and take it to your local auto parts retailer for an in-store bench test. Most stores offer this service free of charge.

Your problem is in the start circuit that runs through the ignition switch.
Check all fuses, fusible links, relays, neutral safety switches and easily accessible connections. Re-install the start terminal lead, then attempt to start the vehicle normally.

Inspect the flywheel, making sure you check ALL teeth for excessive or uneven wear. Replace the flywheel if necessary, then re-install your starter.

Your starter is damaged.
It will need to be replaced.
Refer to the Online Parts Catalog to find the part number for your make and model vehicle.

STEP 4

The vehicle starts

The vehicle does not start

If the vehicle starts, you're done.
If the vehicle will NOT start, have the start circuit repaired by a qualified automotive electrician.

If you are still experiencing flywheel engagement problems, call the **Technical Hotline at 800-228-9672.**

Congratulations, you're done!

Please call the Tech Hotline at 800-228-9672

ALTERNATOR DIAGNOSTIC #1

STEP 1

STEP 2

STEP 3

STEP 4

START HERE IF:
• You were directed from the Cable Diagnostic #2 (pg 6)

You could have a problem with your alternator.
To test it, turn your vehicle off, then remove the battery surface charge by turning on the headlights for 10 seconds.
Next, check the battery voltage using a voltmeter or multimeter (set to a 20V range) by placing one of the probes on the positive (+) battery terminal and the other on the negative (-) battery terminal.

The meter reads less than 12.4 volts

The meter reads 12.4 volts or more

Your battery is undercharged.
Go to the Battery Diagnostic #2 (page 5, step 3)

Your battery is charged and your cables and connections are in good condition. Therefore, it is time to test your alternator. To begin, start your engine and run it at 2000 RPMs for 2 minutes. While it is running, check your system's charging voltage using the voltmeter or multimeter (set to a 20V range). Place the red (+) probe of the multimeter on the battery post of the alternator. Place the black (-) probe on the alternator's case.

The meter reads less than 13.5 volts

The meter reads between 13.5-15.5 volts

The meter reads more than 15.5 volts

Check the condition of the belt that drives the alternator.

Your alternator is charging correctly.
If you are still experiencing problems, call our Technical Assistance hotline at 800-228-9672.

Is your alternator internally regulated?
Yes No

The belt appears worn.
(Shows signs of cracking, appears glazed or worn, or you are NOT sure if it is in acceptable condition)

The belt appears in new or good condition

Replace your belt.

Does your vehicle have a fixed or automatic belt?

My vehicle has an fixed (manually loaded) belt tensioner.

My vehicle has an automatic (spring loaded) belt tensioner.

Your alternator is overcharging.
Remove the alternator from the vehicle for a bench test.

Your alternator is receiving incorrect information from another source.
This is causing it to over charge. Consult your vehicle manual for testing the external regulator or ECM charging signal. Or have your system checked by a qualified automotive electrician.

Check the belt tension. When the manufacturer's belt tension specifications are unavailable, check the deflection. This is done by applying about 20 lbs. of pressure to the belt, between the two pulleys that are furthest apart. A correctly adjusted belt will usually deflect about a 1/4" to 1/2".
IMPORTANT: This tension must be re-checked and adjusted (if necessary) after the engine has been running for 15 minutes.

Apply about 40 pounds of pressure to the belt and watch the tensioner to see how it moves.

The belt seizes, ratchets or does not keep taught

The belt moves smoothly

You must replace the tensioner before proceeding.

Continue this Alternator Diagnosis on page 8.

BATTERY DIAGNOSTIC #2

STEP 1

START HERE IF:

- Your battery, alternator, or check engine light comes on
- Your lights are dim at idle
- You're experiencing a low volt meter reading
- You think your alternator is bad

You could have a problem with your battery.

To begin, visually inspect the battery for damage or corrosion. If everything appears OK, you may continue. If the battery appears damaged or corroded, you should replace it, then proceed if the problem still exists.

Is the battery a sealed battery?

Yes

No

STEP 2

Check the water level in each cell of the battery.

Check the battery voltage using a voltmeter or multimeter (set to a 20V range). Place one of the probes on the positive (+) battery terminal and the other on the negative (-) battery terminal.

The water level is above the plates

The water level is below the plates

Add water so that the level comes just above the plates, then charge the battery.

The meter reads 12.4 volts or more

The meter reads less than 12.4 volts

STEP 3

You could have a problem with your alternator cables or cable connections.

Go to the Cable Diagnostic #1 (page 6, step 1.)

Your battery is under-charged. Charge your battery with an automatic self-adjusting charger to 12.6 volts using the lowest amp setting.

IMPORTANT: Do NOT use your alternator as a battery charger. If your battery is below 12 volts, it must be removed and charged, so as NOT to damage the battery or the alternator.

START HERE IF:

- You were directed from the Alternator Diagnostic #1 (pg 4)

Once your battery is charged, perform a Load Test using a battery load tester (please follow the manufacturer's directions for load testing), or take it to your nearest auto parts store to have them load test it for you. Most stores offer this service free of charge.

It passes the load test

It fails the load test

STEP 4

You could have a problem with your alternator cables or cable connections.

Go to the Cable Diagnostic #1 (page 6, step 1.)

Your problem lies with the battery.

You should replace it as soon as possible.

CABLE DIAGNOSTIC

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START HERE IF:

- You were directed from the Battery Diagnostic (pg 5)

You could have a problem with your alternator cables or cable connections.

To begin, run a Positive Side Voltage Drop Test by running the engine at 2000 RPMs while applying all possible constant electrical loads (fan, headlights, defroster, radio, etc.)

Next, check the voltage drop using a voltmeter or multimeter (set to a 20V range). Place one of the probes on the positive (+) battery terminal and the other on the positive (+) post of the alternator.

The meter reads 0.5 volts or less

A meter reading of 0.5 volts or less means the positive (+) battery cable and all connections are in acceptable condition. Therefore, it will be necessary to perform a Negative Side Voltage Drop Test.

Begin by running the engine at 2000 RPMs while applying all possible constant electrical loads (fan, headlights, defroster, radio, etc.)

Next, check the voltage using a voltmeter or multimeter (set to a 20V range) by placing one of the probes on the negative (-) battery terminal and the other probe on the alternator housing.

The meter reads 0.6 volts or more

Check and clean all positive (+) cable connections to ensure they are clean and tight. Also, check for loose or damaged wiring, fuses and fusible links in this circuit, as well as soft or swollen spots in the wiring. Replace cables or parts as necessary.

NOTE: When replacing cables, always use whole cables with crimped terminals.

To verify that the problem was corrected, repeat the Positive Side Voltage Drop Test.

Run the engine at 2000 RPM while applying all possible constant electrical loads (fan, headlights, defroster, radio, etc.), then check the voltage drop using a voltmeter or multimeter (set to a 20V range) by placing one of the probes on the positive (+) battery terminal and the other on the positive (+) post of the alternator.

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The meter reads 0.4 volts or more

Check and clean all negative (-) cable connections to insure they are clean and tight. If this cable is questionable, replace it.

NOTE: When replacing cables, always use whole cables with crimped terminals.

To verify that the problem was corrected, repeat the Negative Side Voltage Drop Test.

The meter reads 0.3 volts or less

The ground cable and all connections are in acceptable condition. Therefore, you might have an alternator problem.

You could have a problem with your alternator.

Go to the Alternator Diagnostic #1 (page 4, step 1).

The meter reads 0.5 volts or less

The meter reads 0.6 volts or more

You're likely experiencing problems with your electrical system.

Have your electrical system checked by a qualified automotive electrician.

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ALTERNATOR DIAGNOSTIC #2

START HERE IF:

- You have a high volt reading.
- You have bright or burned out lights.

You likely have a problem with your alternator.

Remove the alternator and take it to your local auto parts retailer for a bench test (most stores offer this free of charge).

If it fails the bench test, refer to the Parts Catalog to find the replacement part number.

ALTERNATOR DIAGNOSTIC #1

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START HERE IF:
You were directed from the
Alternator Diagnostic #1 (pg
4)

Re-test the alternator. Start your engine and run it at 2000 RPMs for 2 minutes. While it's running, check your system's charging voltage using the voltmeter or multimeter (set to a 20V range).

Is your alternator internally regulated?

Yes

No

Your alternator is undercharging.
It will need to be replaced.
Refer to the Online Parts Catalog
to find the replacement part
number.

Your alternator is receiving
incorrect information from
another source.
This is causing it to
undercharge. Consult your
vehicle manual for testing
the external regulator or
ECM charging signal. Or
have your system checked
by a qualified electrical
specialist.

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