

BATTERIES CHECK		DMM (Digital Multimeter):	Rec Value	Accept Value
1. Check battery pack voltage to determine state of charge.		POS and NEG batt pack.	12.68	12.8V AGM
Charge pack to 100%. If unable, go to 3, "Break pack."				12.6V Flood
2. Remove surface charge: HVAC blower, lights on, 5 min.				
3. Break pack into individual batteries and test each with an approved battery tester.  (Remove NEG cables first!)  Replace batteries if instructed by the tester.  All batteries must pass the battery tester evaluation before troubleshooting continues.			Batt 1: PASS or FAIL	
			Batt 2: PASS or FAIL	
			Batt 3: PASS or FAIL	
			Batt 4: PASS or FAIL	

PATH CHECK - CABLE VOLTAGE DROP TEST			
Alternator Path Check		Rec Value	Accept Value
Carbon Pile:	DMM:		
4a. POS alternator, GND alternator. Load at alternator-rated amps.	POS alternator, POS batt pack	+ .2	Total less than 0.7 V
4b. POS alternator, GND alternator. Load at alternator-rated amps.	Loading... NEG alternator, NEG batt pack	+ .2	
Combine the voltage from the positive and negative cable drop tests.		= .4	

**IMPORTANT:** EPA10/EPA04 and EPA07 vehicles require different starter path checks because of differences in cable routing.

**IMPORTANT:** If the positive alternator cable is smaller than 2/0 AWG, use "Starter Path Check - EPA07."

**NOTE:** EPA07 vehicles with jump start posts connected to the starter can be tested using the EPA10/EPA04 check by placing the carbon pile clamps on the jump start posts instead of the alternator in 5a and 5b.

Starter Path Check — EPA10, EPA04 Engines		Rec Value	Accept Value
Carbon Pile:	DMM:		
5a. POS alternator, GND alternator. Load at 500 amps.	POS starter, POS batt pack	+ .3	Total less than 0.7 V
5b. POS alternator, GND alternator. Load at 500 amps.	NEG starter, NEG batt pack	+ .2	
Combine the voltage from the positive and negative cable voltage drop tests.		= .5	
6. Check all cable connections for corrosion and torque. Repair or replace if needed, then test again.			

Starter Path Check — EPA07 Engines		Rec Value	Accept Value
Amp Clamp and DMM Location:	Engine:		
5a. Amp clamp around POS starter cable for starter draw.	Crank engine, under 30 sec.		N/A
5b. DMM on POS battery pack cable and POS starter post.	Crank engine, under 30 sec.	+ .1	Less than max V drop in Table 5.
5c. DMM on NEG battery pack cable and NEG starter post.	Crank engine, under 30 sec.	+ .1	
Combine the voltage from the positive and negative cable voltage drop tests.		= .2	
6. Check all cable connections for corrosion and torque. Repair or replace if needed, then test again.			


Amps	Max. Acceptable Combined V Drop
375-449	0.6
450-549	0.7
550-624	0.8 Loading...
625-724	0.9
725-799	1.0
800-874	1.1
875-974	1.2
975-1025	1.3

Table 5, for Check 5, Max. Acceptable Combined V Drop by Amperage

ADDITIONAL BATTERY LOADS CHECK		
Key-off Loads	Rec Value	Accept Value

<p>7. Key off, Load Disconnect Switch set to "Off" (if equipped). Wait 10 minutes for all loads to stop.</p> <p>Set amp clamp to a lower range setting. Zero amp clamp away from the vehicle.</p> <p>For each POS cable leaving batt pack, clamp the cable and record the amperage.</p> <p>If more than 1.0 amp, find sources of drain and remedy as needed.</p>	<p>+ .1</p> <p>+ .2</p> <p>+ .2</p> <p>= .5</p>	<p>Add amps. Total must be less than 1 amp.</p>
<p><b>Key-on Loads</b></p>		
<p>8. Amp clamp on POS alt cable. ENG at IDLE, turn on driver's normal use loads.</p> <p>If load is more than 80% rated amps, find sources of draw and/or upgrade alternator.</p> <p>Retest after remedying.</p>	<p>50%</p>	<p>Total less than 80% rated amps.</p>

CHARGING SYSTEM CHECK - ALTERNATOR		Engine Throttle	Key Position	Carbon Pile	Rec Value	Accept Value
9a.	DMM on POS and NEG of batt pack. (Undercharge check)	IDLE	Load Key ON	NO LOAD	14.4	13.2-14.8 V
9b.	DMM on POS and NEG of batt pack. (Overcharge check)	PARTIAL	KEY ON	NO LOAD	14.5	13.2-14.8 V
9c.	DMM on POS and NEG of batt pack. (Overcharge check)	WIDE OPEN	KEY ON	NO LOAD	14.6	13.2-14.8 V
<p><b>Carbon Pile:</b>                      <b>DMM:</b></p>						
10a.	POS and NEG of batt pack.      POS and NEG of batt pack.	PARTIAL	KEY ON	70% of alt rated	14.4	Within .2 V of Check 9
10b.	POS and NEG of batt pack.      POS and NEG of batt pack.	WIDE OPEN	KEY ON	70% of alt rated	14.6	Within .2 V of Check 9
<p>If value is outside acceptable range, replace alternator and retest system.</p>						
<p><b>Remote Sense Check</b></p>						

11a.	DMM on Rem Sense post, NEG on alt GND.	ENG OFF	KEY OFF	NO LOAD	12.64	 Less than .05 V diff
11b.	DMM on POS of alternator, NEG on alt GND.	ENG OFF	KEY OFF	NO LOAD	12.62	
If remote sense voltage is outside range, but the remote sense fuse and circuit are ok, replace alternator.						
12.	Check alternator mounting, pulley, and belt for proper condition and operation.					

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