Ford Smart Charge Diagnose

FORD SMART CHARGE SYSTEM

First things first, check the battery, not just condition, but correct type. A lead acid battery will not work properly with smart charge, it must be Silver Calcium! Easy to overlook.

Next, put a meter across the battery. Remember when you remove the smart charge 3 pin plug from the back of the alternator, it reverts to a conventional alternator! If you do not have about 13.8 volts, carry out basic charging system checks and suspect the alternator, it's not a smart charge fault!

Correct charge voltage from the alternator, then it's time to start on the smart charge system, and you will need a scope.

Pin 1 = Alternator Feedback

Pin 2 = Alternator Load Request

Pin 3 = Reference Voltage

Now, pin3, must MATCH battery voltage ! Its fed from a fuse in the CJB, and a high resistance on the fuse contacts causes a volt drop, and the smart charge drops out !

Next pin 1 & 2 needs checking back to the PCM for resistance, isolation from ground and each other. If ok, it's out with the scope.

Pin 2 is the request from the PCM to the alternator. This will be a square wave pattern that will change with load request. So lights, screens etc. on and monitor for a change in the pattern. (Obviously back probing with the plug connected)

No change in the pattern means NOT request from the PCM, you should now suspect a PCM fault. Correct pattern and move on.

Pin 1 is the feedback from the alternator and MUST remain a constant square wave pattern. If this pattern mirrors the one on pin 2, the smart charge part of the alternator is faulty, and a new unit is required.

With these simple checks, you should always be able to diagnose a smart charge fault.

Another point to add is, never, ever, jump start a Smart Charge vehicle with a flat battery.

The system can produce up to 18 volts, which can fry major modules.

The theory behind smart charge, is a battery will take a charges at its most efficient when it's cold. Following start up, the PCM checks the Engine coolant temp, and intake air temp, and calculates a cold engine. It will then boost the battery charge, pulling it back as it calculates the under bonnet temp coming up. It's not there to compensate high demand as is the common misconception.

The problem comes on a jump start, when the PCM sees a cold engine, and then a poor battery condition, and can then instantly zap out about 18 volts because it's trying to recover the battery. Unfortunately this sudden surge can cook modules.