Disclaimer of Warranties:

This manual contains test procedures and test information obtained by an ASE Certified Master Technician with known good test equipment on real vehicles, your tests may vary due to your equipment or technician procedures.

No warranty can be made from the ideas presented due to personal testing procedures, nor does the author or anyone connected with him assume responsibilities or liabilities. The use of this manual is conditional on the acceptance of this claimer. If the terms of this disclaimer are not acceptable, please return this manual.

Automotive Video, Inc.
6280 Arc Way
Ft. Myers, FL 33912
1-800-71-TRAIN (1800-718-7246)
fax: 1-239-561-9111
www.auto-video.com

TABLE OF CONTENTS

COURSE OBJECTIVES

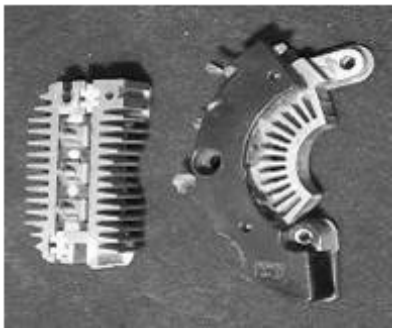
I. Charging System Review and Update
II. Load Shedding and RVC (Regulated Voltage Control)
III. Diagnostic Approach
IV. TSB's PI's and Case Studies

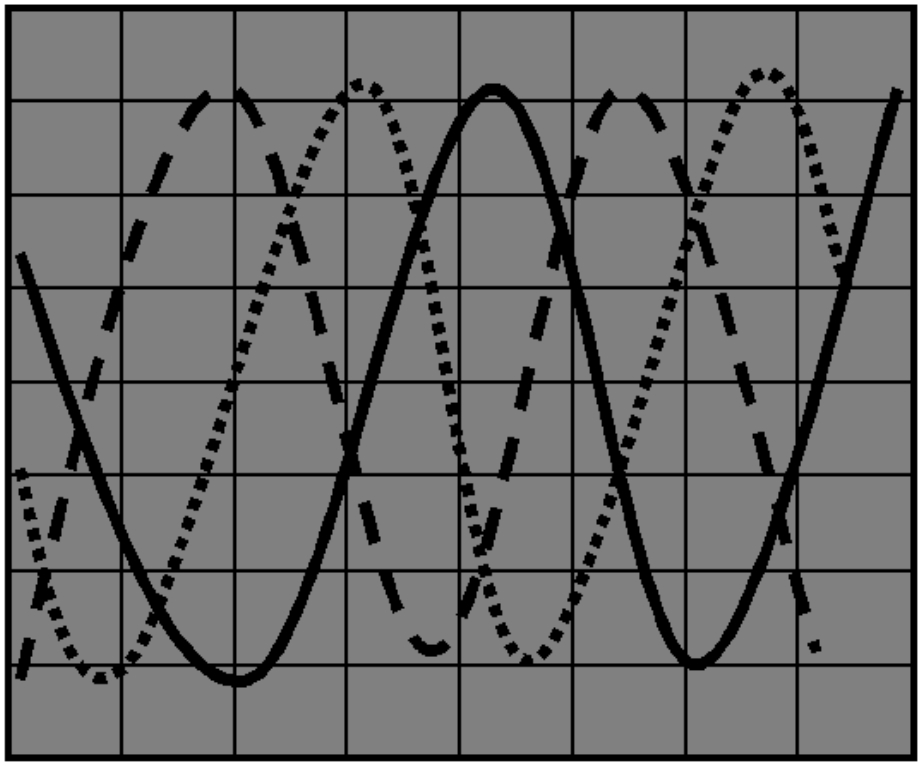
CHARGING SYSTEM REVIEW AND UPDATE

During the 1970's and thru the mid 1980's, There were very few changes in technology. Charging systems were relatively easy to diagnose, service and repair.

Beginning in the late 1980's and continuing today, charging systems have evolved from a Cluster to alternator relationship to a PCM, Alternator, Cluster and sometimes a BCM relationship.

CHARGING SYSTEM REVIEW AND UPDATE (CONTINUED)





Charging Systems 101: *Still using stators and still making 3 phase AC current that is rectified back to DC by diodes.*

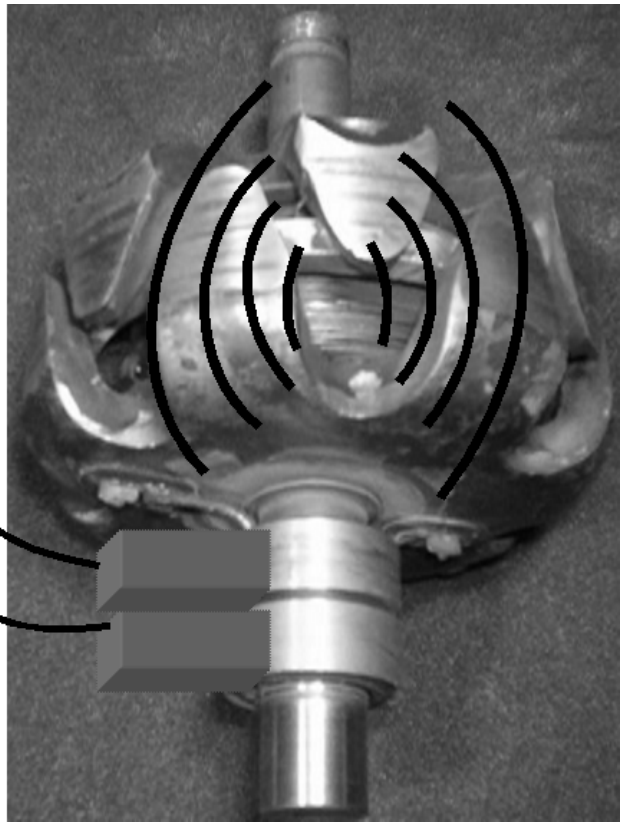
It always helps to review what we know before we add new information into our brains.

Look for diodes to become history pieces as IGBT (Isolated Gate Bipolar Transistor) becomes more powerful and less expensive to build.

We will just turn it on when the wave is positive and off when it is negative. We are already doing it on BAS. (Belt Alternator Starter)

CHARGING SYSTEM REVIEW AND UPDATE (CONTINUED)

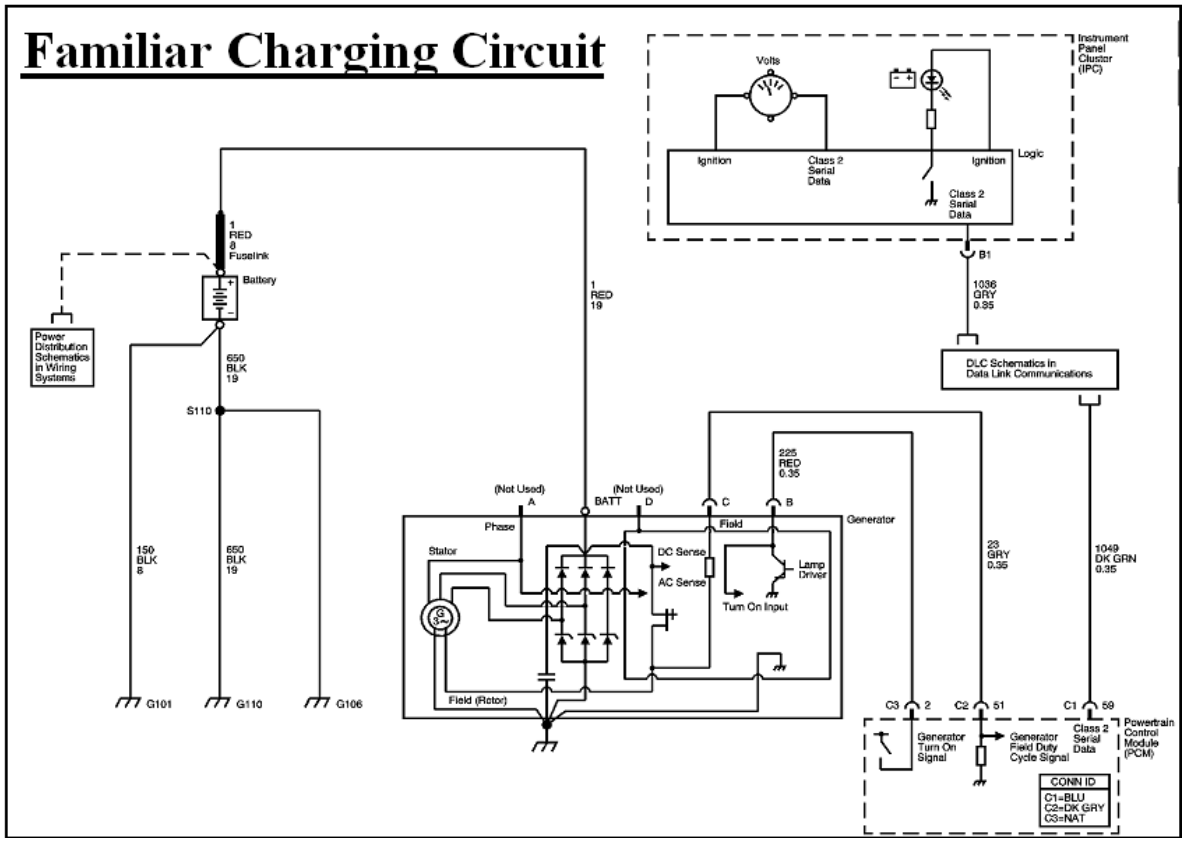
Voltage Regulator Location?



Charging Systems 101: Still controlling the magnetic field in the rotor with a solid state voltage regulator.

NOTES

CHARGING SYSTEM REVIEW AND UPDATE (CONTINUED)



NOTES

CHARGING SYSTEM REVIEW AND UPDATE (CONTINUED)

Regulator cold – higher charging set point.

Regulator hot – lower charging set point.

GM CS Series

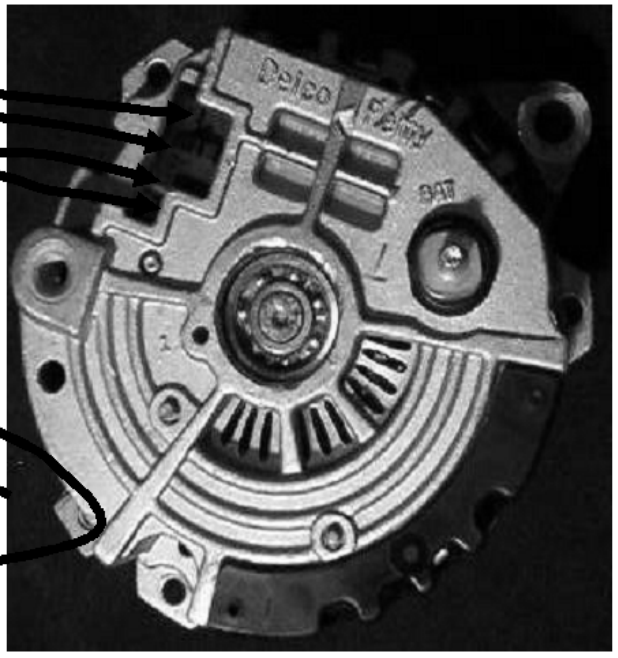
Regulator Terminals

A, 1 or P (Phase)

B, 2 or L (Lamp)

C, 3 or I/F (Ign or Field)

D, 4 or S (Sense)



Q. Are These alternators controlled by the PCM?

A. Not Really

Short trips battery tends to get under charged. Long trips battery tends to get over charged.

Regulator PWM all about internal temperature and SOC.

PCM can inhibit charging momentarily on engine starts to enhance starting / initial idle stability.

NOTES

CHARGING SYSTEM REVIEW AND UPDATE (CONTINUED)

1, A, or P (Phase)

* Not needed for alternator to charge.
* Connects to 1 phase of the stator winding.
* Used in mechanical diesel engine applications where a tach signal is needed.
* Also, used for engine run detect in SBA equipped vehicles.

2, B or "L" (Lamp)

* Almost always needed to have power (through a resistance) applied for alternator to work.
* Often connects to charging indicator lamp in cluster. Regulator grounds the wire to turn light on, puts power on it to turn light off.

NOTES

CHARGING SYSTEM REVIEW AND UPDATE (CONTINUED)

3, C, "I" or "F" (Ignition or Field)

* Is connected to ignition power through a resistor. (often in the cluster) to activate regulator.
* Acts as a back up to the "L" terminal should the bulb in IP burn out.
* Is sometimes marked "Field" and used by PCM to monitor the duty cycle of regulator's control of field. (rotor current)

4, D, or "S" (Sense)

* Not needed for alternator to charge
* Usually connected to the starter solenoid or Bussed Electrical Center.
* Used to monitor available voltage throughout the harness to enhance regulator response.

Tech Tip

Electrical: GM On Car Test

This works on 95% of GM CS series alternators on the road today.

To test an alternator on the engine, perform the following steps.

1. Connect voltmeter/charging system analyzer to the battery cables.
2. Connect one end of a 12 volt test light to a jumper lead connected to the "L" terminal of the alternator.
3. Connect the other end of the 12 volt test light to battery positive while the engine is running.
4. Alternator should charge at normal rate if it is OK.

NOTES

LOAD SHEDDING

What Is Load Shedding?

The power mode master (PMM) calculates the battery temperature, voltage and charging rate at all times while the engine is running.

The PMM calculates the battery temperature by factoring in:

1. Current intake manifold air temp compared to last temp recorded on ignition turn OFF.
2. Current battery voltage compared to the last battery voltage. Recorded on ignition turn OFF.
3. Time since the last battery temp calculated.

Loads subject to shedding:

*** The A/C clutch**
*** The heated mirrors**
*** The heated seats**
*** The rear defog**
*** The HVAC blowers**

NOTES

LOAD SHEDDING (CONTINUED)

Function	Battery Temperature Calculation	Battery Voltage Calculation	Amp-hour Calculation	Action Taken
Idle Boost 1 Start	<-15°C (5°F)	N/A	N/A	First level Idle speed increase requested
Idle Boost 1 Start	N/A	N/A	Battery has a net loss of 0.6 AH	First level Idle speed increase requested
Idle Boost 1 End	>-15°C (5°F)	N/A	Battery has a net loss of less than 0.2 AH	First level Idle speed increase request cancelled
Idle Boost 1 End	N/A	14.0 V	Battery has a net loss of less than 0.2 AH	First level Idle speed increase request cancelled
Load Shed 1 Start	N/A	N/A	Battery has a net loss of 1.6 AH	Controlled outputs cycled OFF for 20% of their cycle
Load Shed 1 End	N/A	N/A	Battery has a net loss of less than	Clear Load Shed 1
Idle Boost 2 Start	N/A	N/A	Battery has a net loss of 5.0 AH	Second level Idle speed increase requested
Idle Boost 2 End	N/A	N/A	Battery has a net loss of less than 2.0 AH	Second level Idle speed increase request cancelled
Idle Boost 3 Start	N/A	N/A	Battery has a net loss of 10.0 AH	Third level Idle speed increase requested
Idle Boost 3 Start	N/A	<10.9 V	--	Third level Idle speed increase requested
Idle Boost 3 End	N/A	>13.0 V	Battery has a net loss of less than 6.0	Third level Idle speed increase request cancelled
Load Shed 2 Start	N/A	N/A	Battery has a net loss of 12.0 AH	Controlled outputs cycled OFF for 50% of their cycle and BATTERY SAVER ACTIVE message is displayed on the DIC
Load Shed 2 End	N/A	N/A	Battery has a net loss of less than 10.5 AH	Clear Load Shed 2

"SMART CHARGE" REGULATED VOLTAGE CONTROL (RVC)

The Latest…Regulated Voltage Control

"Smart Charge" Reasons Why

The optimum battery charging voltage is a variable:

13 - 16 volts, as a function of temperature & SOC.

The generator does not know the battery's temperature nor its state-of-charge (SOC):

They are thermally isolated, with a large difference.
Overcharging and undercharging is a problem.

The Body Controller has the knowledge to determine the optimum regulated voltage value for:

Improved charging and battery life.
Improved fuel economy and lamp life.

How Does It Work?

Regulates the alternator's output voltage, based mainly on estimated battery temperature and battery state-of-charge.

2 Types of RVC

Integrated

Logic built into BCM which monitors a battery current sensor
BCM communicates with PCM to control voltage via regulator

SARVC (Stand Alone RVC)

Uses generator battery control module mounted to the negative battery cable
Battery control module directly controls the generator L-terminal duty cycle instead of the ECM/PCM.

NOTES

"SMART CHARGE" REGULATED VOLTAGE CONTROL (RVC)

How It Works (BCM Functions)

*** Accurately senses the battery's voltage**

*** Estimates the battery's _____, based on existing information available through the serial data link,**

*** Estimates the battery's relative _____ ____ _____,**

*** Determines the best battery voltage for optimum battery charging, battery life, fuel economy, and lamp life,**

*** Determines the corresponding PWM percent duty cycle to be applied to the _____ _____ by the _____**

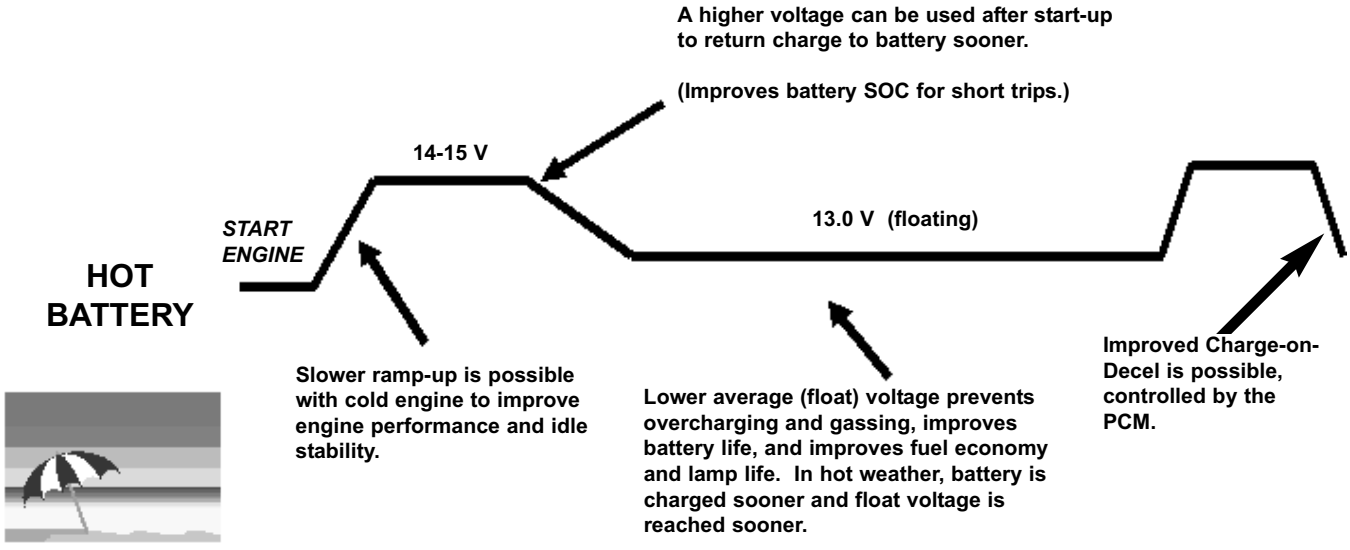
*** Sends that value of duty cycle to the PCM via serial data link.**

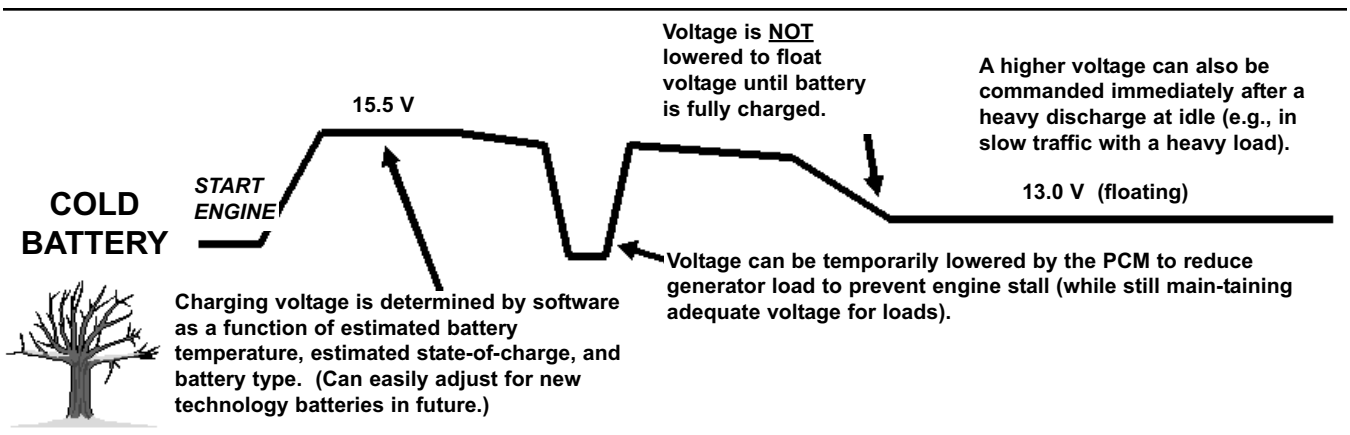
If the desired battery voltage is not achieved, then the duty cycle is adjusted accordingly, on a closed-loop basis. (It is advantageous to have "F" terminal status for this action.)

The closed loop eliminates the need for the Sense terminal. The closed loop can be very slow; it does not need to be fast.

NOTES

"SMART CHARGE" REGULATED VOLTAGE CONTROL (RVC)





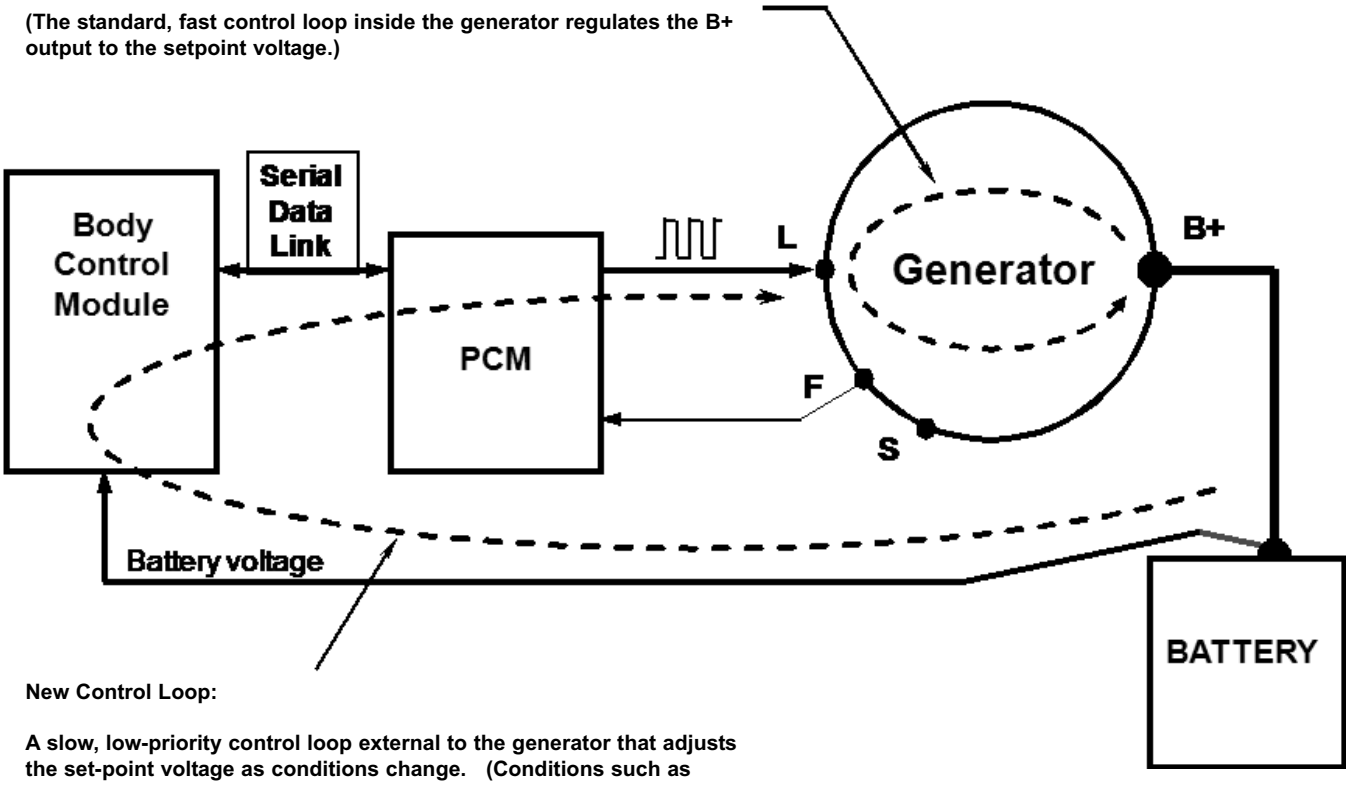
NOTES

"SMART CHARGE" REGULATED VOLTAGE CONTROL (RVC) (CONTINUED)

Simplified Regulated Voltage Control Loops

Existing control loop within generator is unchanged.

(The standard, fast control loop inside the generator regulates the B+ output to the setpoint voltage.)



New Control Loop:

A slow, low-priority control loop external to the generator that adjusts the set-point voltage as conditions change. (Conditions such as battery temperature, state-of-charge , and line drop between the generator and battery.)

NOTES

"SMART CHARGE" REGULATED VOLTAGE CONTROL (RVC) (CONTINUED)

INSIDE "FRED'S HEAD" FOR RVC

Charge Mode

The generator battery control module will enter Charge Mode when at least one of the following conditions is met:

- **Electric cooling fans are on high speed.**
- **Rear defogger ON.**
- **Battery SOC < 80 percent.**
- **Battery current is not between -8 and 15 amps.**
- **The estimated OAT < 0°C.**
- **DTC B1516 set.**

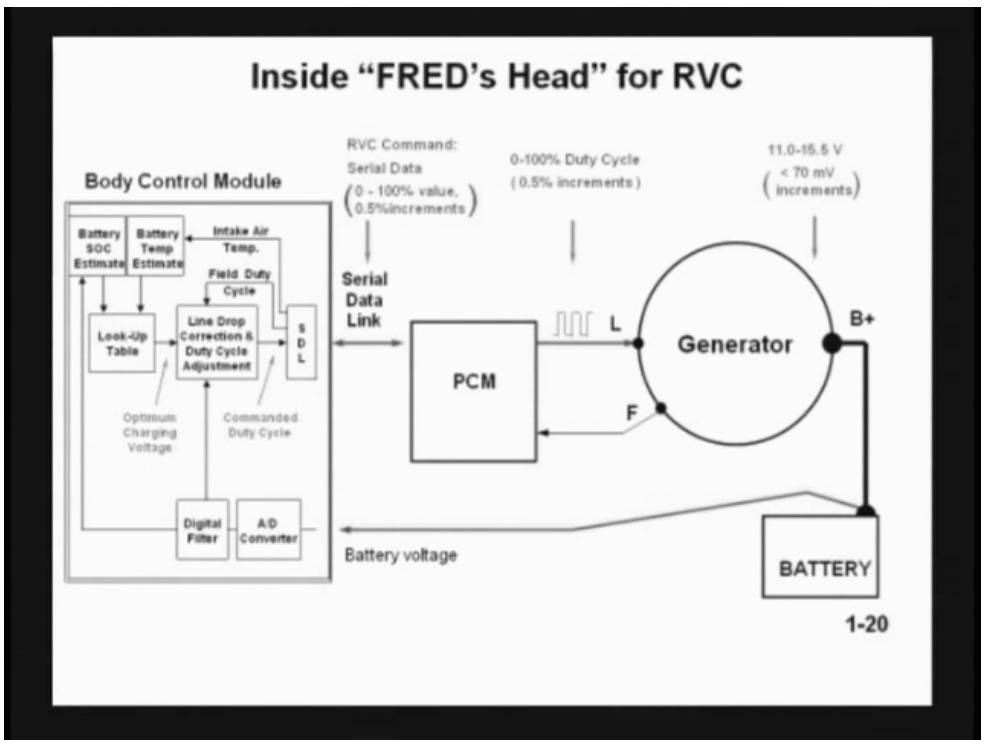
Once one of these conditions are met the generator battery control module will set the targeted generator output voltage to the nominal optimum battery voltage which is from 13.9-15.5 volts, the voltage set point is based on the batteries state of charge and estimated battery temperature. The battery voltage ramps up to the targeted set point at a rate of 20 mV per second.

Fuel Economy Mode

The generator battery control module will enter Fuel Economy Mode when all of the following conditions are true:

- **Estimated OAT > 0°C**
- **Calculated battery current < 15 amps and > than - 8 amps.**
- **SOC > 80 percent.**
- **Rear Defog OFF.**
- **Cooling Fans low speed or OFF.**

1-25



"SMART CHARGE" REGULATED VOLTAGE CONTROL (RVC) (CONTINUED)

2004 and Newer GM Cars & Trucks

Electrical Power Management Operation (Using RVC)

Components; Alternator
Battery Control Module
PCM, BCM and IPC

Regulator L Term. PWM vs Gen Output

Duty Cycle	Generator Voltage Set Point
10%	11.0V
20%	11.56V
30%	12.12V
40%	12.68V
50%	13.25V
60%	13.81V
70%	14.37V
80%	14.94V
90%	15.5V

Up to 9 Charging Modes

- Charge Mode
- Fuel Economy Mode
- Voltage Reduction Mode
- Start Up Mode
- Headlamp Mode
- Battery Sulfation Protection Mode
- Wiper Voltage Boost Mode
- Fuel Pump Voltage Boost Mode
- De-Ice Voltage Boost Mode

PWM signals to the regulator < 10% default to 13.8 volts commanded.

PWM signals to the regulator > 90% default to 13.8 volts commanded.

IF the alternator can work…it will work at 13.8 volts in default mode if there is a RVC problem

CHARGE MODE

The generator battery control module will enter Charge Mode when at least on of the following conditions is met:

Electric cooling fans are on high speed.
Rear defogger is ON.
Battery SOC< 80%.
Battery current is not between -8 and 15 amps.
The estimated OAT< 0 deg. C.
DTC B1516 is set.

"SMART CHARGE" REGULATED VOLTAGE CONTROL (RVC) (CONTINUED)

FUEL ECONOMY MODE

The generator battery control module will enter Fuel Economy Mode when all of the following conditions are true:

Estimated OAT >0 deg C.
Calculated battery current < 15 ampts and > than -8 amps.
SOC> 80 %.
Rear defogger is OFF.
Cooling Fans low speed or OFF.

VOLTAGE REDUCTION MODE

The generator battery control module will enter Voltage Reduction Mode when:

Calculated OAT> 0 deg. C.
Calculated battery current <2 amps and > -7 amps.
Field duty cycle < 99%.
Rear Defogger is OFF.
Electric cooling fans on low speed or OFF.

Its targeted generator output voltage is 87% of the Charge Mode set point but is limited to 12.9 volts. The generator battery control module will exit this mode once the criteria are met for Charge mode or it will boost voltage to a predetermined set point for the fuel pump, headlamps, or windshield wipers.

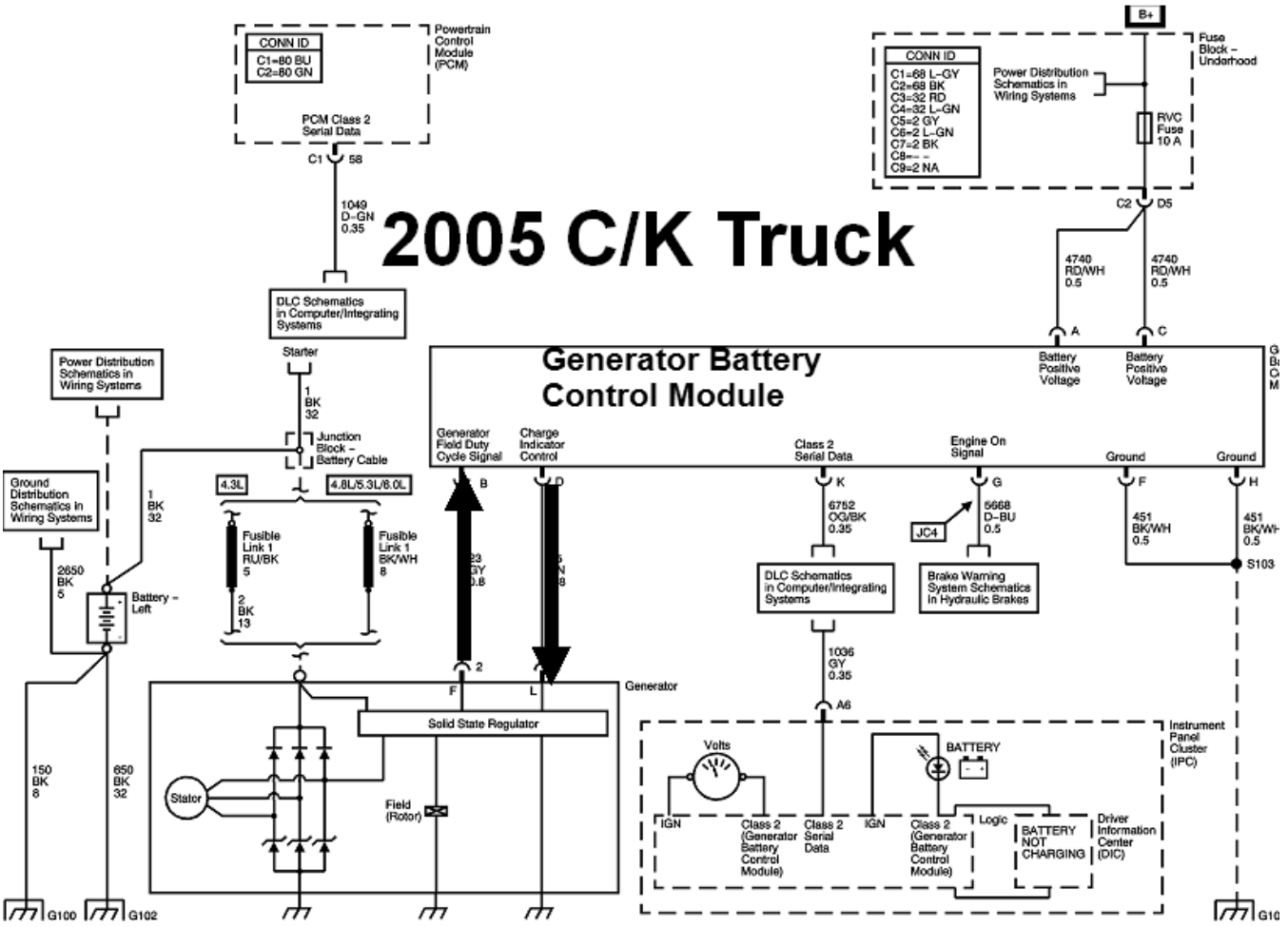
START UP MODE

After the engine has started the generator battery control module sets a targeted generator output voltage of 14.5 volts for 30 seconds.

HEADLAMP MODE

The generator battery control module will enter the Headlamp Mode when the headlamps, low or high beams, are turned ON. The voltage will ramp up or down to 14.5 volts at a rate of 10 mV/second. The module will exit this mode once the headlamps are turned OFF and enter Charge Mode, Fuel Economy Mode or Voltage Reduction mode.

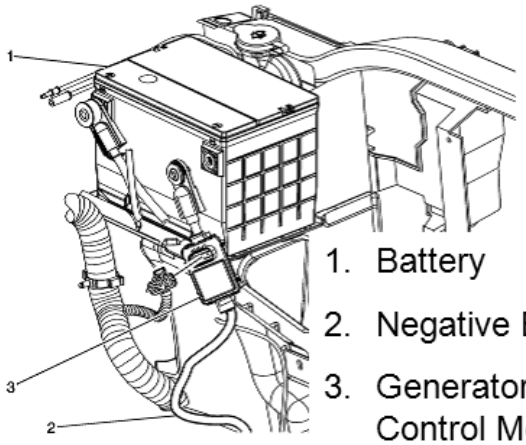
"SMART CHARGE" REGULATED VOLTAGE CONTROL (RVC) (CONTINUED)



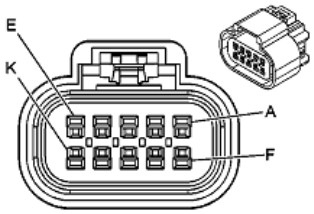
Here is a case where a stand alone GBCM takes information from and gives information to the PCM and the BCM. Who actually controls the alternator? The GBCM!

NOTES

"SMART CHARGE" REGULATED VOLTAGE CONTROL (RVC) (CONTINUED)



1. Battery
2. Negative Battery Cable
3. Generator Battery Control Module



A. B +	F. Ground
B. F Terminal	G. Engine On Signal
C. B +	H. Ground
D. Charge Light	J. Not Used
E. Not Used	K. Class 2

Generator Battery Control Module

- **Class 2**
- **Directly Controls L Terminal**
- **Monitors F Terminal**
- **Communicates with PCM and BCM for DPIDs Related To Charging System.**

U-Codes

If Battery Control Module doesn't see communications via Class 2 with PCM, it defaults to 13.8 volts and sets a U1016.

If Battery Control Module doesn't see communications via Class 2 with BCM, it defaults to 13.8 volts and sets a U1064.

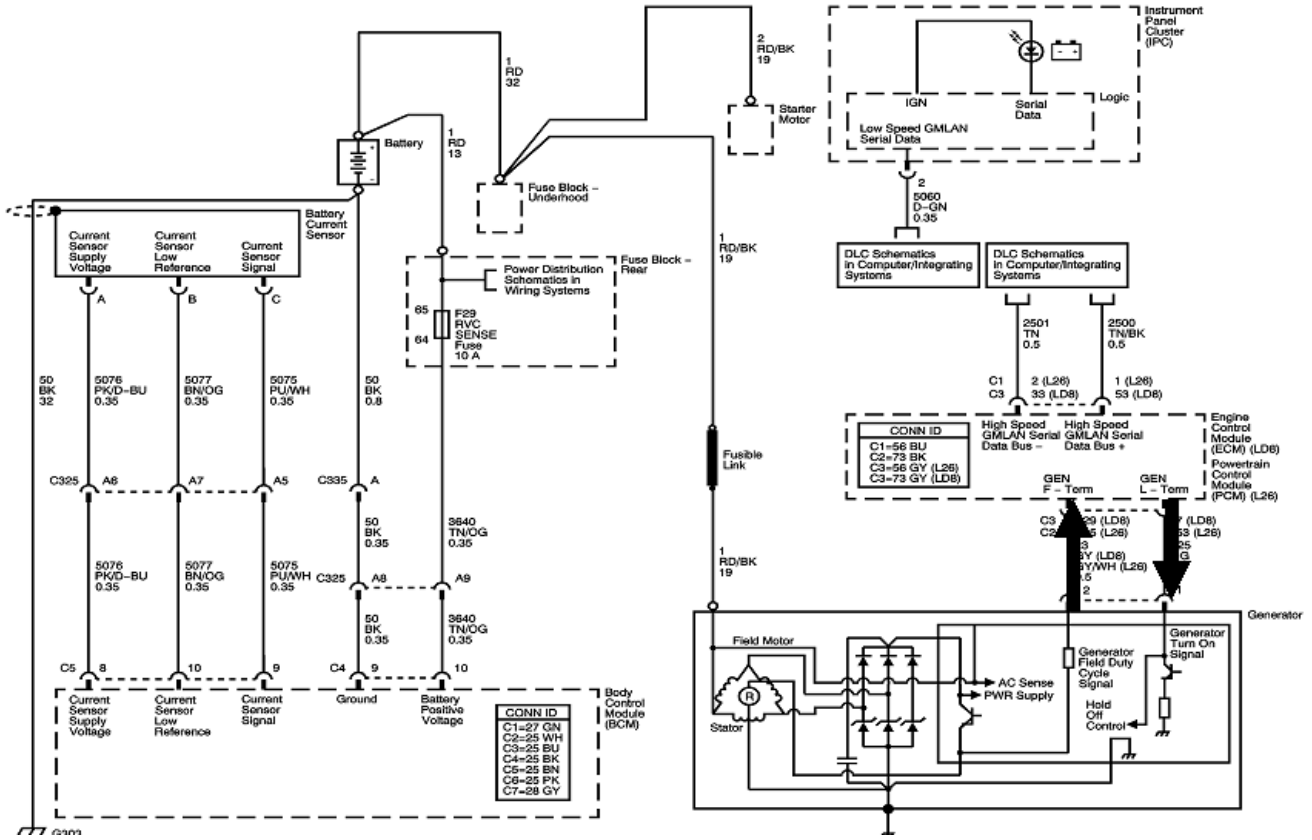
The U Codes are generic for these two modules.

Tech Tip:

1. Quick alternator test….The same we've done before
2. Disconnect GBCM
3. Probe terminal D of harness end of GBCM with test light.
4. Start engine and connect alligator clip of test light to 12 volts.
5. Watch voltmeter connected to battery to see if alternator charges default voltage of 13.8 volts.

"SMART CHARGE" REGULATED VOLTAGE CONTROL (RVC) (CONTINUED)

2006 Chevy Monte Carlo



Battery current sensor is a 3-wire hall effect current sensor that senses battery cable current. Sensor is a 5 volt PWM signal (128 Hz) with a normal duty cycle of 5-95 %. Sensor creates a 0-5 % or a 95-100 % for diagnostic purposes.

NOTES

"SMART CHARGE" REGULATED VOLTAGE CONTROL (RVC) (CONTINUED)

TECH 2 PID'S

Tech 2 DPIDs

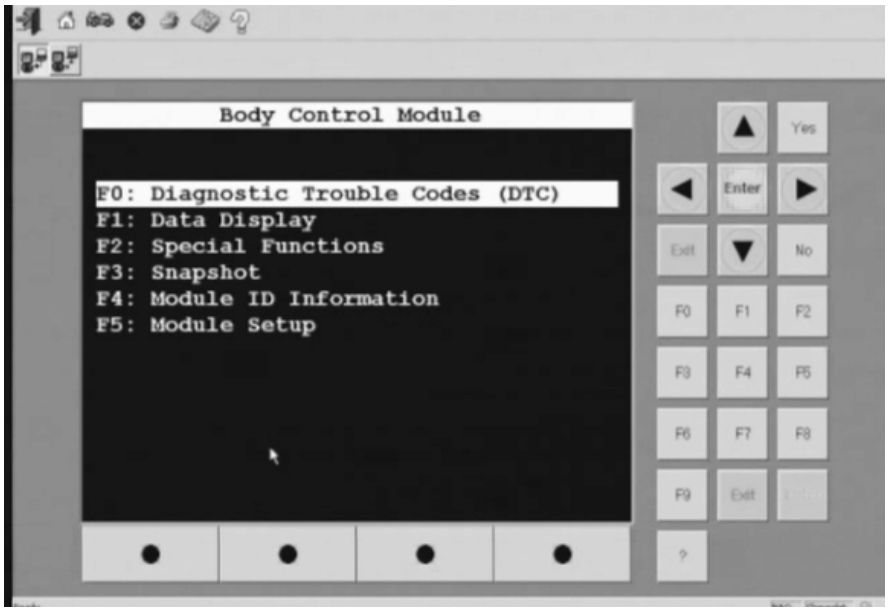
- ECM/PCM
- Generator L-Terminal
- Generator F-Terminal
- Battery Voltage
- BCM/DIM/IPM
- Battery Current Sensor
- Battery Voltage
- Ignition Voltage
- Load Shed Level
- Idle Boost Level

-The generator battery control module incorporates most of the scan tool parameters, except load shed and idle boost, as this system does not take corrective actions.

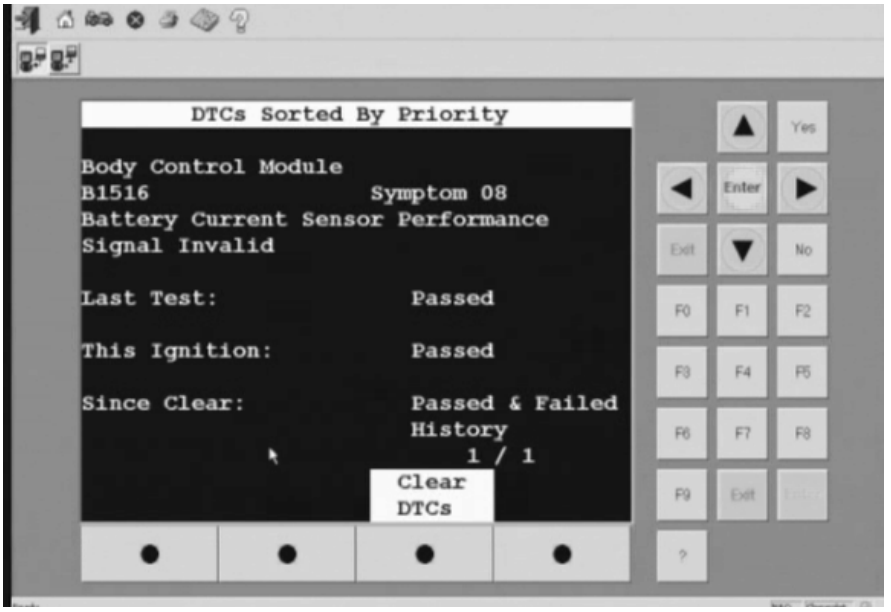
NOTES

DIAGNOSTIC APPROACH

BCM PIDS



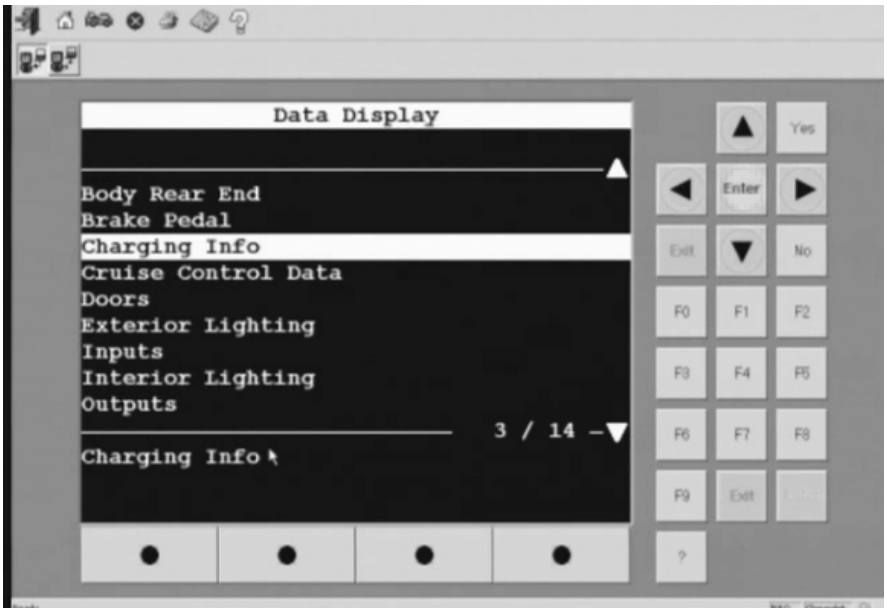
In this screen capture, you can see that we have entered all of our preliminary vehicle id data and entered into the Body Control Module (BCM) Screen and selected Diagnostic Trouble Codes (DTC).



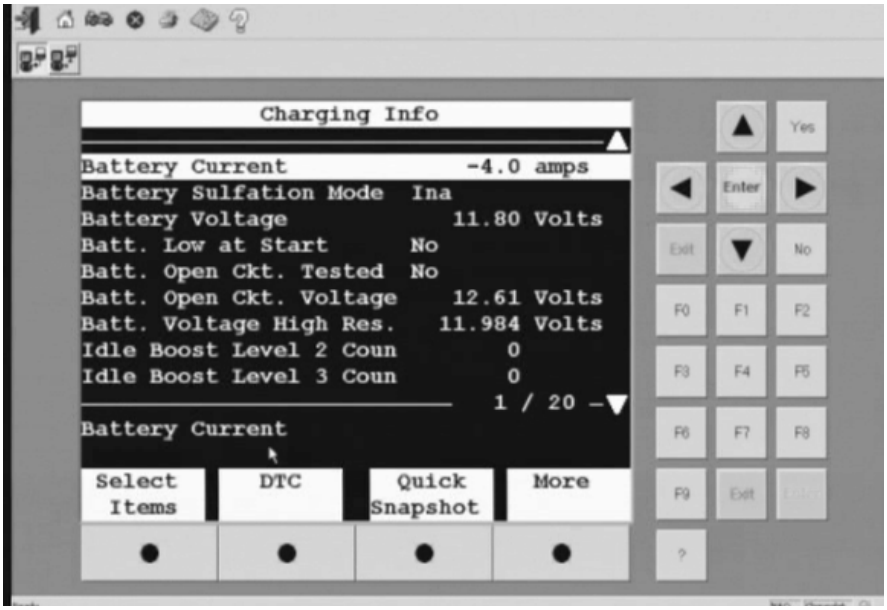
We do have one DTC B1516 indicating Battery Current Sensor Performance Signal Invalid.

DIAGNOSTIC APPROACH (CONTINUED)

BCM PIDS (CONTINUED)



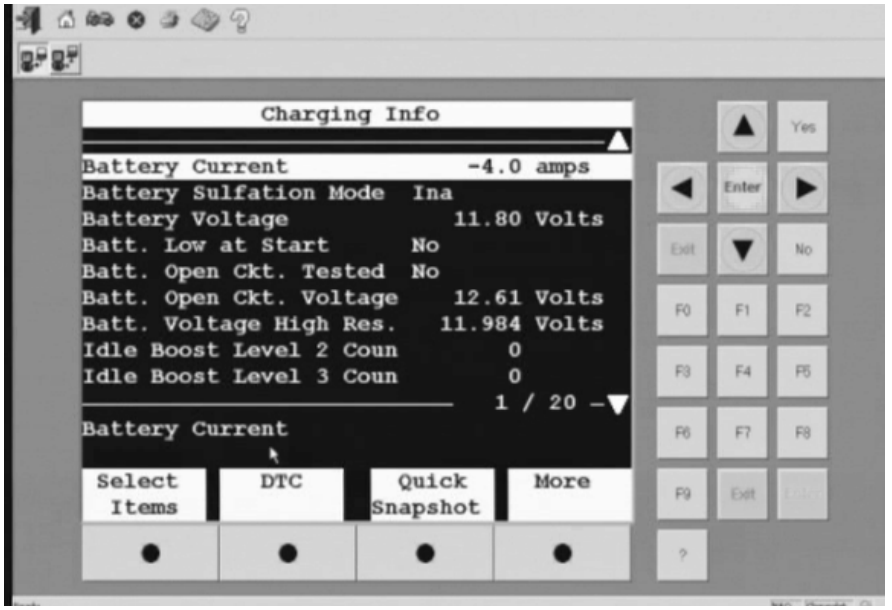
We have now backed out of the BCM DTC display and have entered into the Data Display screen to view the Charging Info BCM PIDS.



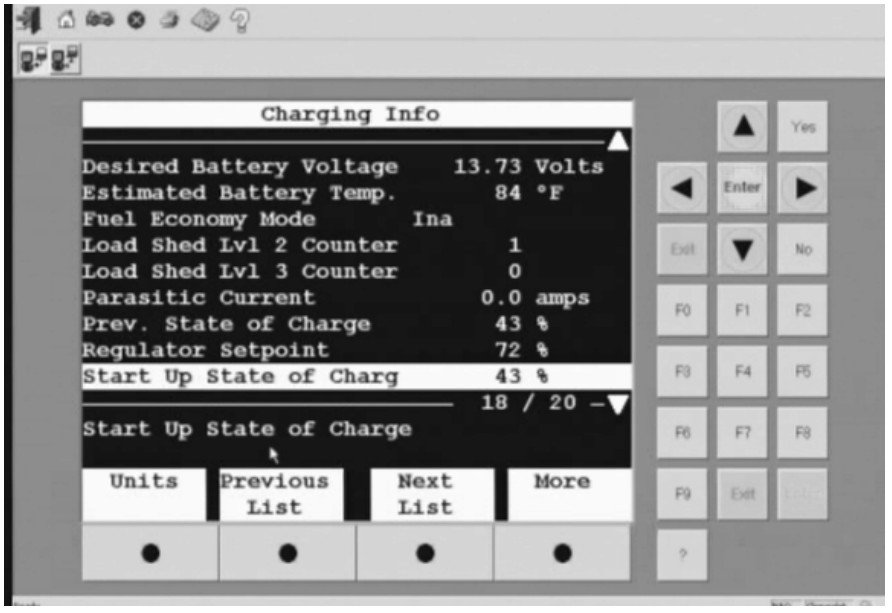
Here you can see that we have entered into charging info selection.

DIAGNOSTIC APPROACH (CONTINUED)

BCM PIDS (CONTINUED)



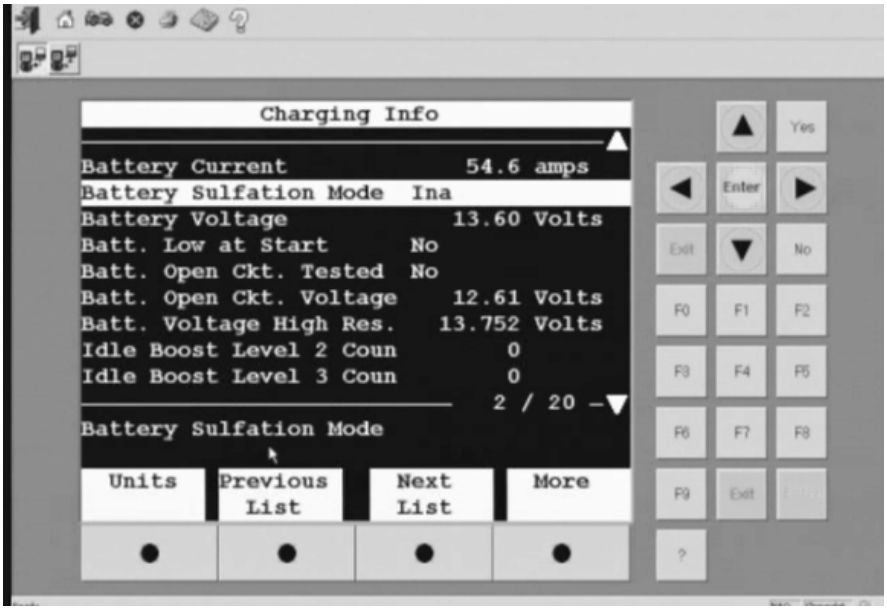
Here you can see that we have entered into charging info selection.



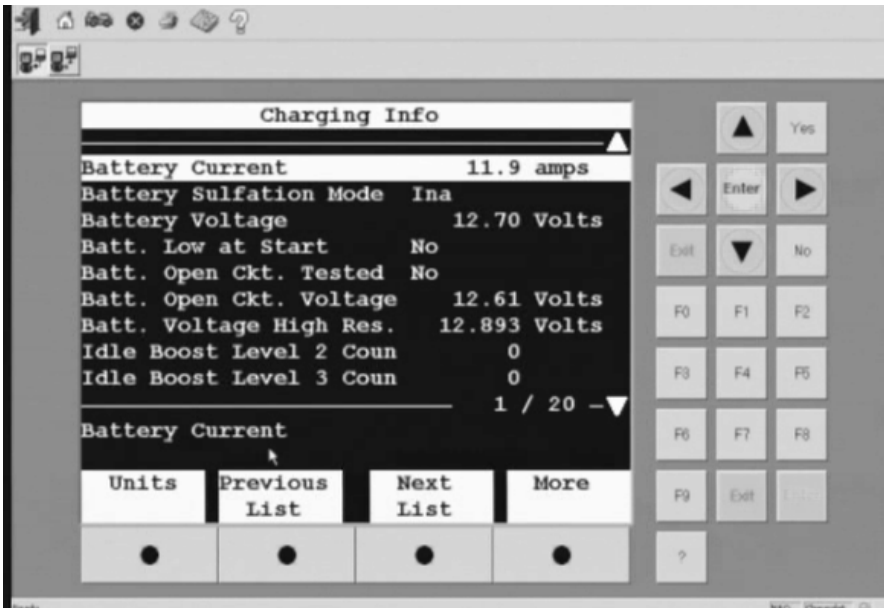
And here you can see that we have entered into the second page of the BCM charging info section. As you can see, you can monitor items such as Desired Battery Voltage, Estimated Battery Temp. and so on.

DIAGNOSTIC APPROACH (CONTINUED)

BCM PIDS (CONTINUED)



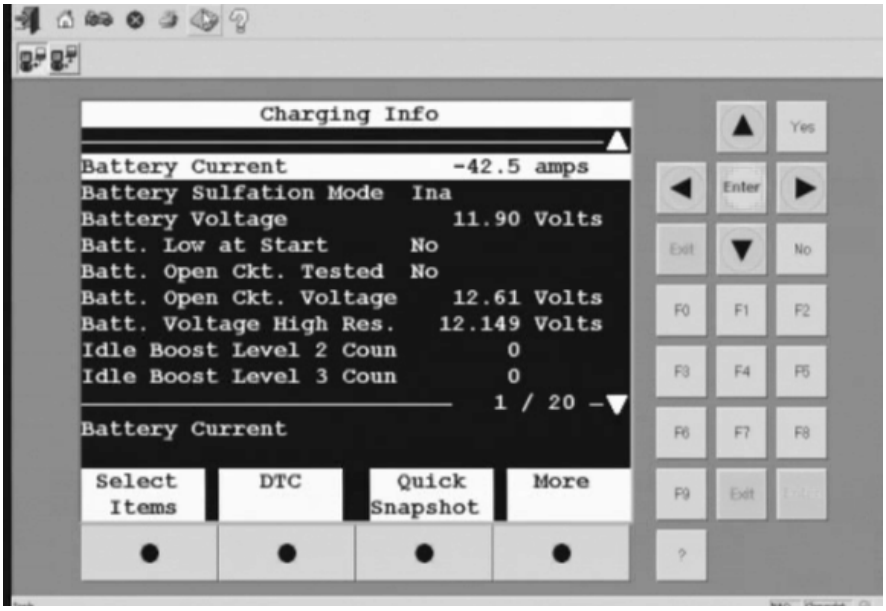
In the above screen capture the battery current is 54.6 amps going into a battery that is 42% charged without any load.



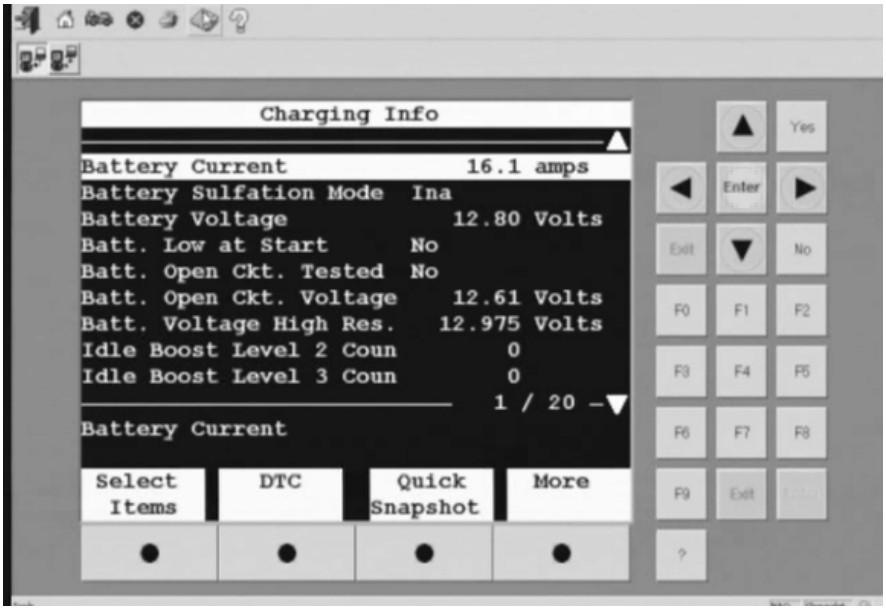
With loads from such items as the Rear Defogger, Blower Motor on HIGH, Headlamps on HIGH beam and blowing the horn, the battery current drops to below 12.0 amps and voltage decreases to 12.7 volts.

DIAGNOSTIC APPROACH (CONTINUED)

BCM PIDS (CONTINUED)



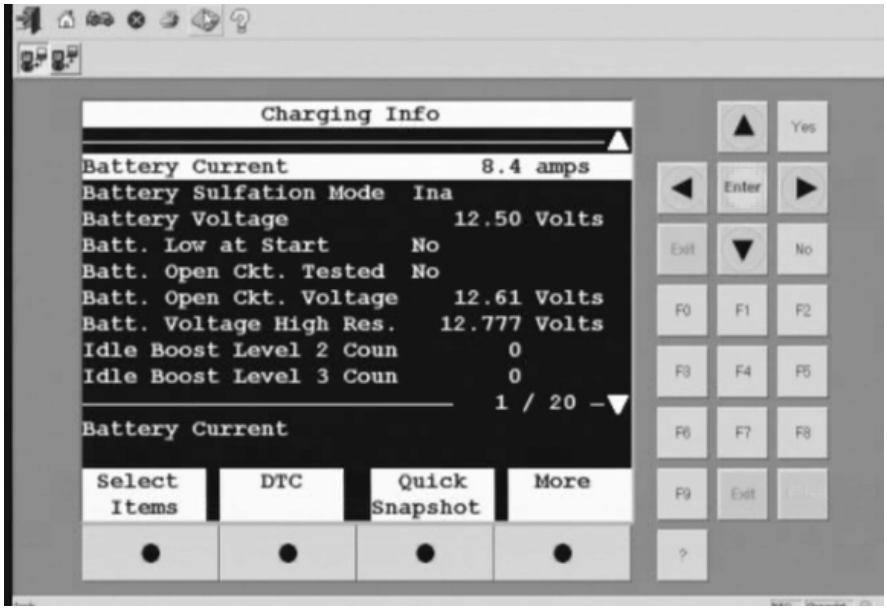
In the above screen capture we can see the differences in Battery Current between the Midtronics Charging Systems Tester and the Tech 2. The data appears to be filtered or slowed from the sensor to the PCM.



Here we have connected the amp clamp to the battery cable close to where the sensor is located. The Tech 2 is reading a 16.1 and the Midtronics Tester is giving a real time reading between 15.0 - 17.0. The readings indicate that the sensor is functioning properly and whatever caused the B1516 is an intermittent problem.

DIAGNOSTIC APPROACH (CONTINUED)

BCM PIDS (CONTINUED)



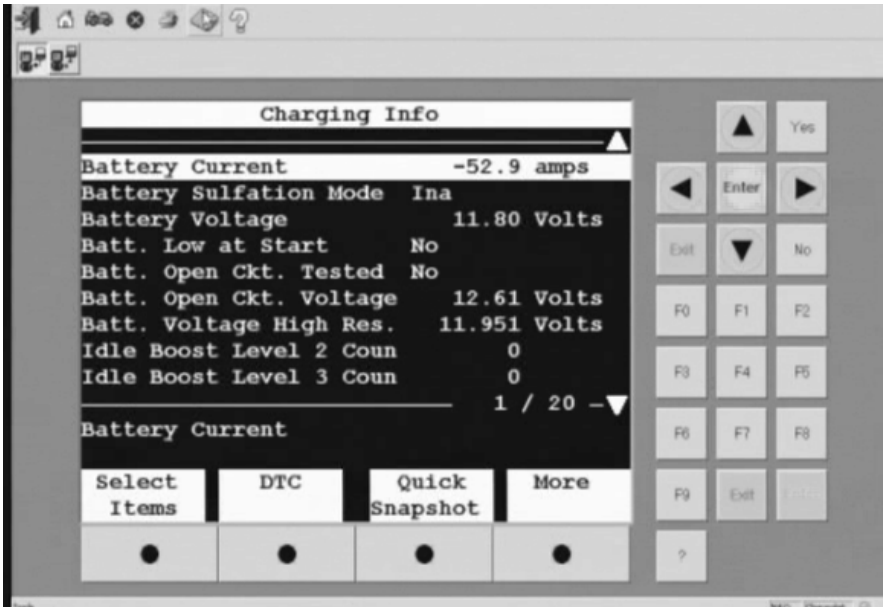
In the above screen capture we have reconnected the Midtronics tester to the vehicle and are in the stand alone inductive amp probe mode. We have also connected the probe next to the factory BCM input current sensor on the Positive battery cable. Notice that the Tech 2 PID and the Midtronics are almost identical.

This set of data indicates that the charging system is in fact charging the battery.

NOTES

DIAGNOSTIC APPROACH (CONTINUED)

BCM PIDS (CONTINUED)



After shutting the engine off but leaving all of the accessories on, you can see that in a KOEO state with a full discharge load that the Midtronics tester is reading a -62.73 and the Tech 2 is reading a -52.9 and is climbing.

Normally, you would think that with a B1516 DTC and after performing the recommended diagnostic procedures that the Sensor would be at fault for the slow update of data. However, typically, slow updates are a matter of software. Software for this application resides in the BCM.

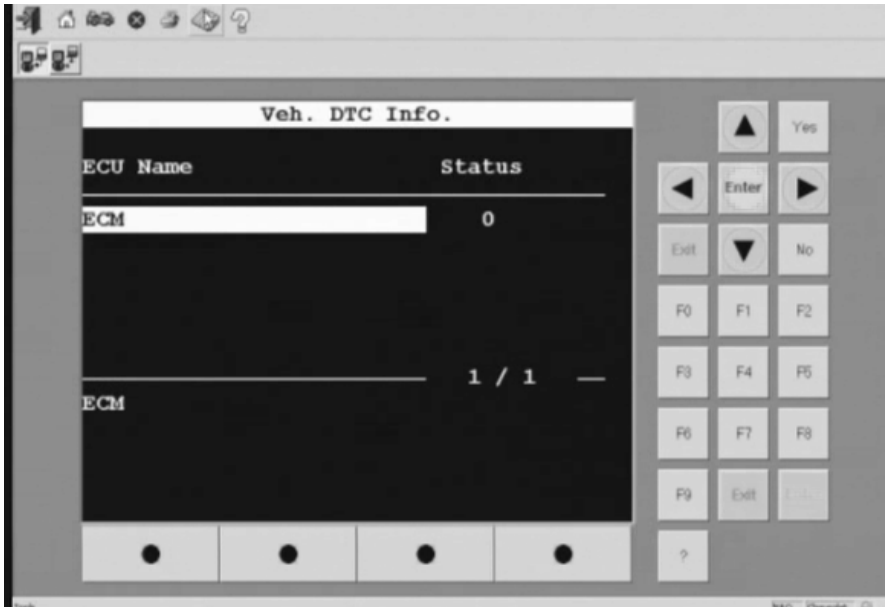
<u>REMEMBER. THE BCM IS THE BRAINS FOR THE GM SMART CHARGE SYSTEM</u>

Earlier we saw in the demonstration that the Tech 2 was reading about 59.9 amps and the Midtronics tester was reading about 62.0 amps. We discovered that is not reported in the Factory Service manual. The sensor has a limitation on what it can read. The sensor can only read up to 59.9 amps which is also the default reading as well. The maximum value that the sensor can read (positive or negative) is 59.9. And the default value the BCM makes up is also 59.9.

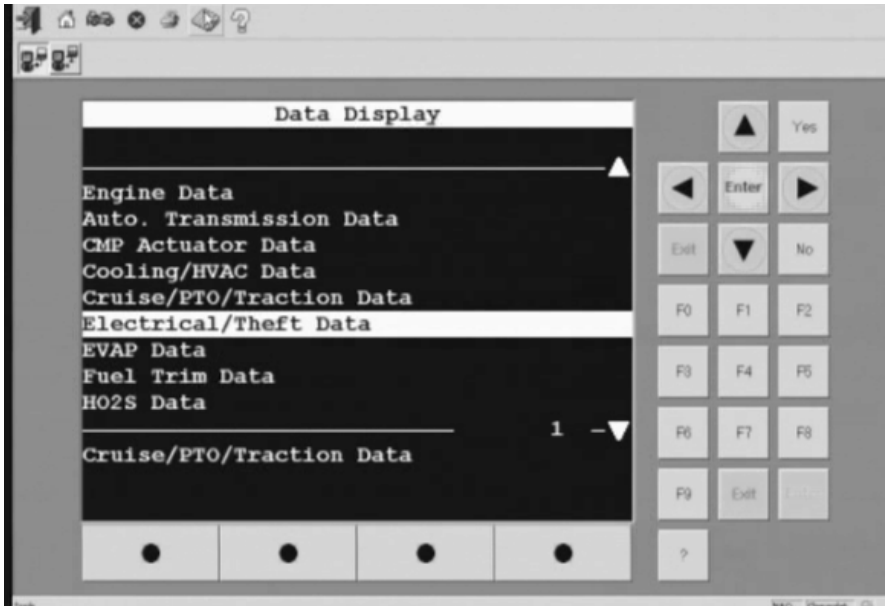
The point to remember in this is: When working on any Smart Charge vehicles that have battery sensors and you see a 59.9 reading, you may indeed have a problem. That 59.9 value is either a “Maxed Out” or default value and you may need to do some comparisons between the “real” current using a relieable charging system tester, and the PIDs on the Tech 2.

DIAGNOSTIC APPROACH (CONTINUED)

ECM PIDS



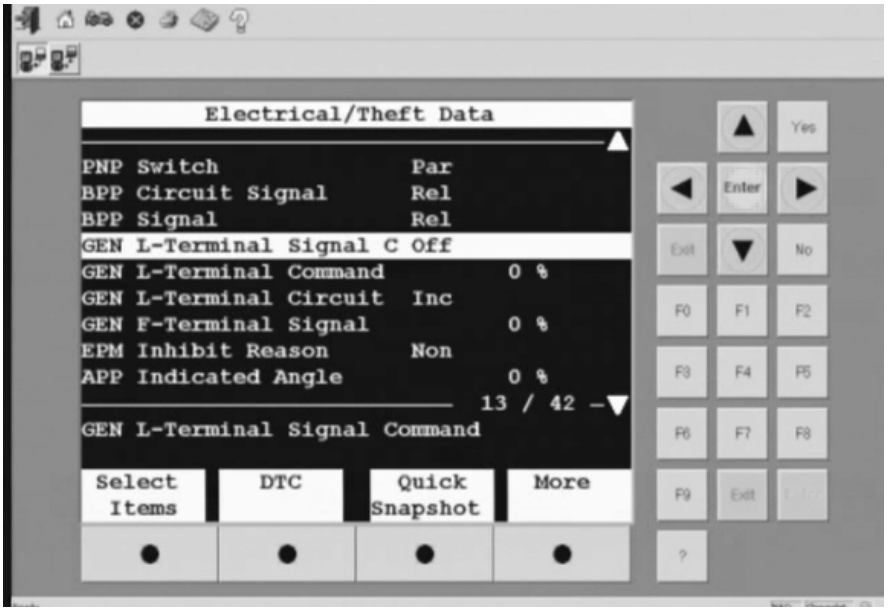
Here we have switched over to view the ECM. Notice that there are NO DTC's.



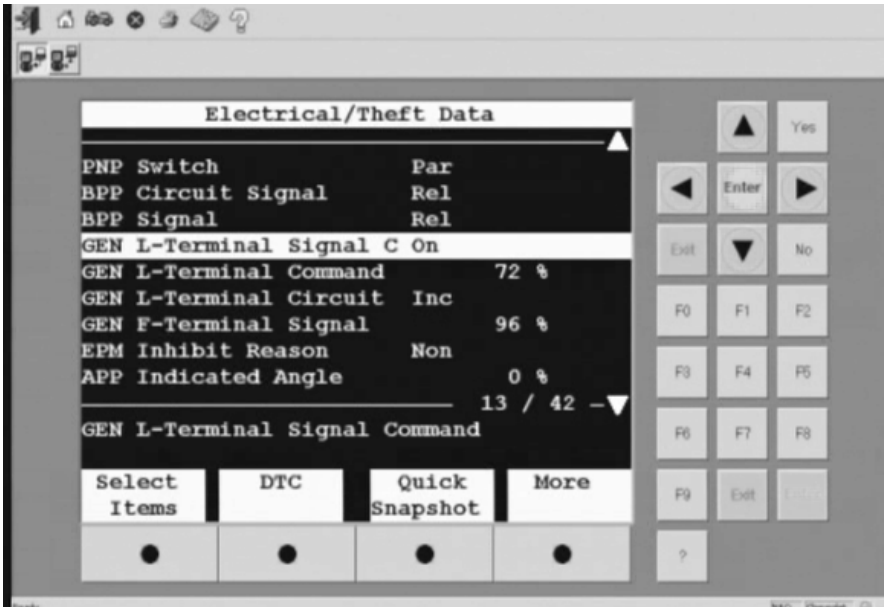
Although the BCM is the "Heart" of the charging system, PIDs in the ECM may be viewed using the Electrical/Theft Data menu.

DIAGNOSTIC APPROACH (CONTINUED)

ECM PIDS (CONTINUED)



As you can see in the above screen capture, GEN L-Terminal PIDs are available for view.



Here we have started the engine and compared to the previous screen capture we can see that the GEN L-Terminal Signal has gone from OFF to ON, The GEN L-terminal Command has moved from 0% to 72%, the GEN L-Terminal Circuit still reads INCOMPLETE, and the GEN F-Terminal Circuit has moved from 0% to 96%.

DIAGNOSTIC APPROACH (CONTINUED)

GENERATIONS OF SMART CHARGE SYSTEMS

Vehicles	System Generation	Modes of Operation	Key Components
2004 Cadillac CTS	Generation II	RVC Mode	DIM, PCM
2004 Cadillac SRX	Generation II	RVC Mode	DIM, ECM
2005 Cadillac STS	Generation III	Charge Mode and Voltage Reduction Mode	Battery Current Sensor, IPM, ECM
2005 Full Size Pick and Utilities under 8600 GVW	Generation IV	Charge Mode, Fuel Economy Mode, Voltage Reduction Mode, Start Up Mode, Battery Sulfation Mode	Generator Battery Control Module, ECM/PCM
2005 Chevrolet Cobalt	Generation IV	Charge Mode, Fuel Economy Mode, Voltage Reduction Mode, Start Up Mode, Battery Sulfation Mode	Battery Current Sensor, BCM, ECM/PCM
2005 Buick LaCrosse	Generation IV	Charge Mode, Fuel Economy Mode, Voltage Reduction Mode, Start Up Mode, Battery Sulfation Mode	Battery Current Sensor, BCM, ECM/PCM
2005 Pontiac Grand Prix and Grand Prix GXP	Generation IV	Charge Mode, Fuel Economy Mode, Voltage Reduction Mode, Start Up Mode, Battery Sulfation Mode	Battery Current Sensor, BCM, PCM
2005 Chevrolet Uplander, Pontiac Montana, Buick Terazza	Generation IV	Charge Mode, Fuel Economy Mode, Voltage Reduction Mode, Start Up Mode, Battery Sulfation Mode	Battery Current Sensor, BCM, PCM

Application Specific Info

Note: DIM is simple 1/3 of a BCM…Dash Integration Module. **(See AVI's "FRED Buses The Body" for more on GM BCMs)**

NOTES

TSB'S PI'S AND CASE STUDIES

TSB 08-49-010A (RVC Equip)

Vehicles: ***2005 Full size P/U's and SUVs***

Problem: ***Replaced / Flashed PCM and now charge light is on***

Background: The cluster (IPC) receives a battery light request from the RVC module, not the PCM. The PCM for these trucks for 2005 may contain old PCM software that sends a Class2 message (Alternator Lamp) to the IPC. If the IPC receives a message, the IPC learns that the PCM sent the message and expects the PCM to always send the message. If the IPC does not receive the message from the PCM, the battery light will illuminate. Once the service PCM is programmed with latest model year 2005 software, the PCM will never send this Class 2 message again.

Solution: Remove fuse to IPC or battery cable for 30 seconds to reset battery light. IPC will no longer look for PCM alternator lamp message.

Note: when replacing the GBCM, remember it is a Class 2 module that must be flashed.

NOTES

TSB'S PI'S AND CASE STUDIES (CONTINUED)

TSB 06-06-03-006

Subject: Charging System Light On, Service Battery Charging System Message Displayed, DTC B1405 and/or B1516 Set (Reprogram BCM)

Models: 2006 Buick Lucerne, 2006 Cadillac DTS, 2006 Chevrolet Impala & Monte Carlo

Make / Model / VIN Breakpoint:
Buick Lucerne & Cadillac DTS 6U245893
Chevrolet Impala & Monte Carlo 69416551

Condition: Charging system light on in IPC and "Service Battery Charging System" message displayed on DIC. Possible DTC B1405 and/or B1516 set.

Cause: The BCM may reset while cranking engine under low voltage conditions. Battery current sensor may draw excessive current during BCM reset. B1405 and/or B1516 will set during this condition.

Correction: DO NOT replace the battery current sensor or the BCM.
A new service calibration has been developed to correct this condition. Reprogram the BCM with the software available in in TIS releases after July 2006.

NOTES

TSB'S PI'S AND CASE STUDIES (CONTINUED)

TSB 06-06-03-006

Complaint: Charging System Light On / Service Battery Charging System Message intermittent

Observation: B1405 & B1516 History
These DTCs are for battery current sensor duty cycle being under 5 % or over 95 % for more than 30 seconds.

Tests Performed:
1/ Made sure sensor connector firmly plugged in. It wasn't fully seated. Inspected and reseated sensor connector. Checked battery sensor PWM signal wire for shorts to power and ground. None present. Cleared codes, checked current sensor PIDs (duty cycle looks good) and road tested…no further problems.

Note: B1516 is actually 2 codes in one using the new Functional Based Diagnostic system with a 2 digit suffix

DTC B1516 08 : Battery Current Sensor Signal Invalid
DTC B1516 66 : Battery Current Sensor Wrong Mounting Position

Vehicle Returns 2 weeks later –

2 - Same complaint and same history codes.

3 - Replaced battery current sensor. Cleared codes, checked current sensor PIDs (duty cycle looks good) and road tested…no further problems.

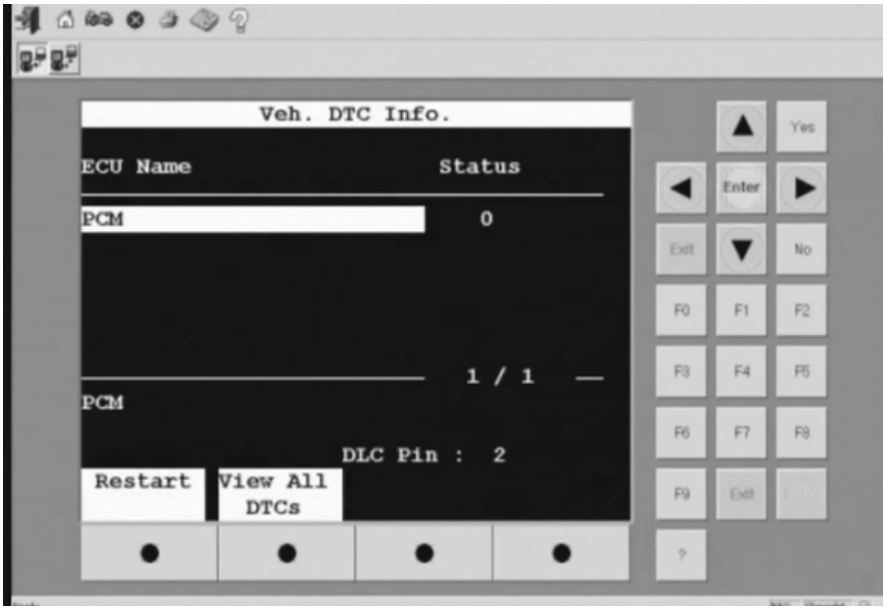
4 - Checked for new TSBs. Found TSB 06-06-03-006 / DTC sets during low crank voltage conditions. Reflash BCM is recommended fix.

5 - Checked battery…border line load test, fails Midtronics

6 - Replaced battery, reflashed BCM per TSB.

TSB'S PI'S AND CASE STUDIES (CONTINUED)

2007 BUICK RAINIER



We have disconnected the GBCM and have entered the PCM menu. Note that NO DTC's have been set. Therefore a Check Engine light will NOT be illuminated. Check the Instrument cluster to see if there are any indications of a Smart Charge problem.

After checking the IC we noticed that there was a "Charging" indicator light illuminated. In the above screen capture you can see that we have entered the Body Control Module and there are STILL NO DTC's.

TSB'S PI'S AND CASE STUDIES (CONTINUED)

2007 BUICK RAINIER (Continued)

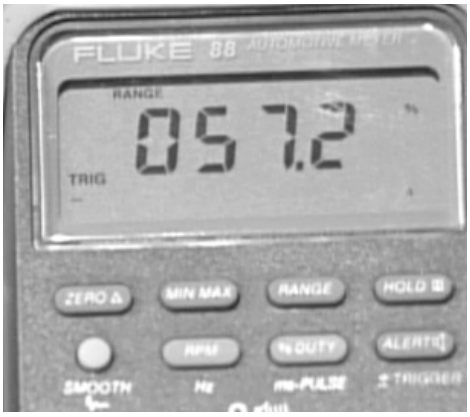
Since we have an IC light on, lets enter the Instrument Cluster and check for DTC's. Here we have a U1022 Lost Communications With Generator Battery Control Module (GBCM). This is the "Magic Code" if the GBCM is off the BUS.

NOTES

TSB'S PI'S AND CASE STUDIES (CONTINUED)

BACKPROBING FOR DUTY CYCLES

After backprobing we can see that the current Duty Cycle is at @ 57%. This is telling us that the rotor is approximately half the time turned on and half the time turned off.

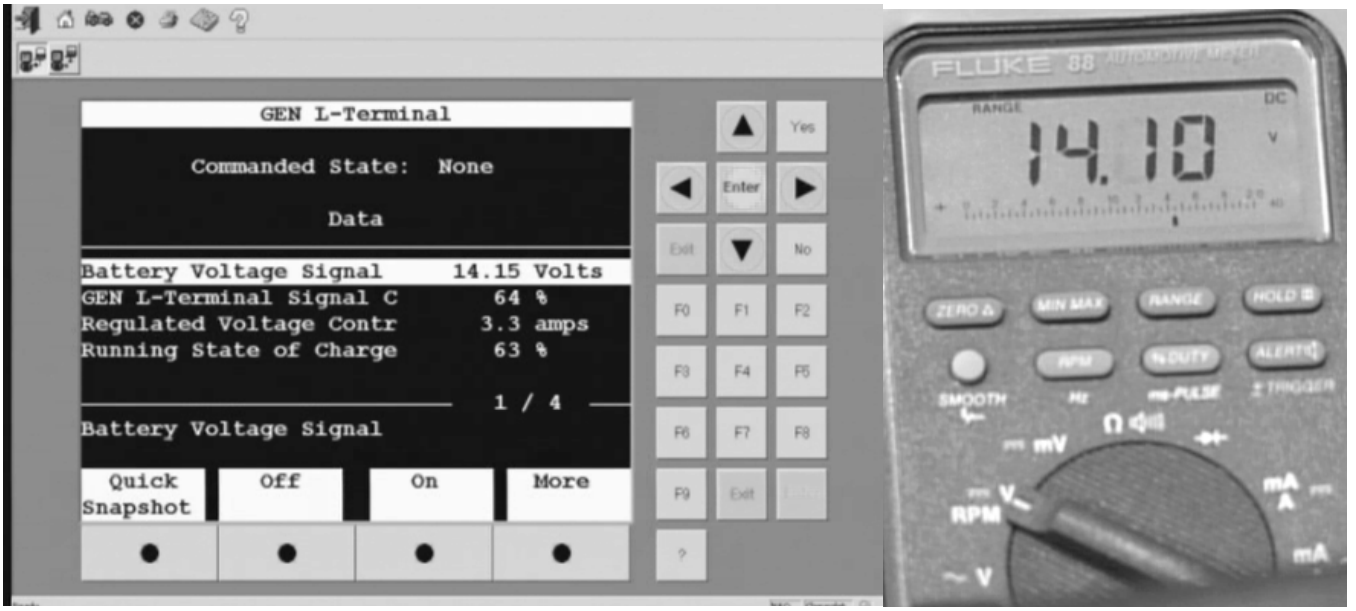


After activating several electrical loads the Duty Cycle has moved to @ 23.0 %. This indicates that the rotor is on less and off more.

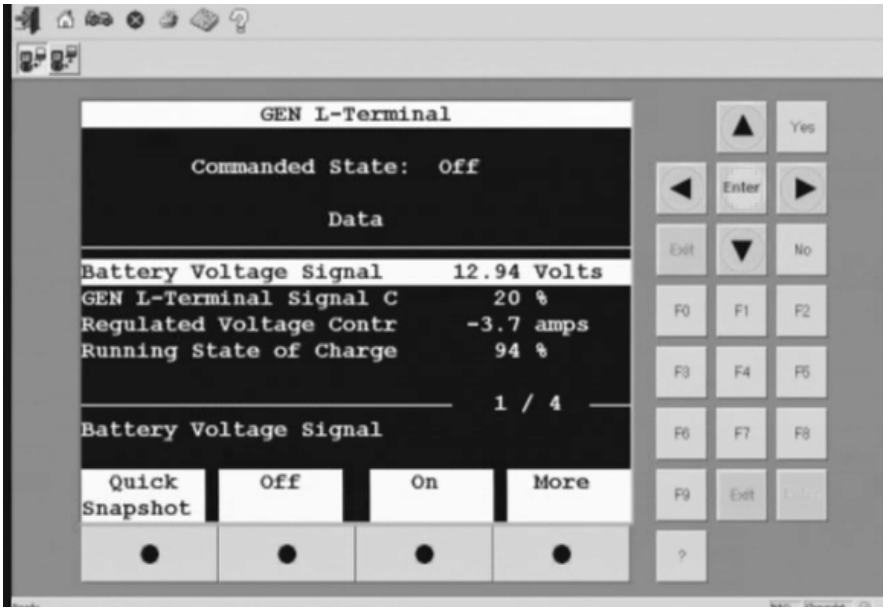
NOTES

TSB'S PI'S AND CASE STUDIES (CONTINUED)

SPECIAL FUNCTION TESTING



We have entered the Special Function Testing Mode and selected the GEN L-Terminal. Also, the Fluke meter is still connected.



Here we have used the Soft Key to command the state to OFF and the Battery Voltage Signal has dropped to below 13.0 volts.

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