What's this COM system?

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Ever since there have been batteries in vehicles, there has been a need for accurate voltage control. When generators were anemic, electrical loads were low and accessories were few, a moveable third brush took care of hot and cold variations.

Anybody who has spent seat time on a Farmall H understands how the ECM (the farmer in the seat) controlled charging output with the headlight switch. When the switch was off, field current went to ground through a resistor. When ECM turned on the headlights the resistor was bypassed and the field was directly grounded for more generator output. As charging systems evolved, more controllable output was needed and things began to get more complicated.

Continuing with evolution the old Honda "C" type regulator control (or regulator override) was as simple as the computer (ECM, again) grounding the C terminal, dropping the regulator set point from 14.5 to 12.6 volts. The computer also monitored the field duty cycle at the FR terminal by simply reading the field voltage which told the computer how hard the alternator was working (low or high output at any given speed).

The next milestone for this discussion would be the Ford PCM-type regulators. In this system the regulator terminal called SIG or RC receives a simple on-off signal from the computer at a fixed frequency (how fast we switch on and off) and variable duty cycle (the time on versus off) which sets or adjusts the regulator voltage setting. Low duty cycle meant low voltage set point and high duty cycle meant high set point. The alternator duty cycle (or how hard it's working) is monitored by the FR or LI (load pin) terminal.

The Ford system was the first high volume production alternator that used a communication system, that is, "Do this," and the reply, "This is what I'm doing." The General Motors RVC system is nearly the same in function except that another measurement was added so the ECM (that farmer gets around) and can make a better decision. This was the addition of how much current the vehicle was using.

All of these applications required dedicated wires for controlling the set point and monitoring the alternator. With the COM system this is no longer needed. One wire communicates to the regulator and to other items in the car using a buss. How many feet of copper are saved in a car when done this way? Think of the COM system like your computer USB port. You can put lots of items on one wire (or buss) and the computer figures out how to talk to all of them. Another advantage is that actual data can be sent and received, not just an on-off signal. Think of data as an actual conversation and a Ford/GM signal as simply grunts between two people.

Another everyday example of this type of data transmission is your fax machine. When you fax something you hear that squealing which is your machine asking another, "Is that you?" and the other machine replying with, "Yes, send your message." The term used for all of this is a "handshake."

There are two different languages (interfaces) used in the COM system: BSS (Bit Synchronous Network) or LIN (Local Interconnect Network). The decision about which is used is made by the vehicle manufacturer.

Again, just like the computer on your desk, BSS/LIN are different interfaces in both the electrical signal levels and the information bits. What happens if a LIN regulator is installed in an alternator on a vehicle using a BSS regulator? Nothing. The LIN system regulator sees the BSS signal as random noise and does not respond. In the same way, a BSS system regulator sees the LIN signal as noise.

OK, now that we know a little of what this system does, how do we make the alternator work in our shop? The simple answer is just send the correct data to the alternator. The problem is that the OEMs have told the world a lot about what goes on. They just won't tell you what the data is that you need to send to the alternator to tell it to "wake up and go milk the cows." You have to figure it out yourself or buy it via a licensing agreement.

In the end, is this system more COMplicated? Yes and no. It's no more complex than when the Ford system came out in 1999. It's just the next logical step. I suggest you compare it to what you have seen before and then begin to understand the differences. That's my opinion, exchange yours.

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