Chevy Volt charger Forum

I'll just post a quick overview of the Lear charger used in the Chevrolet Volt.
We will post proper documentation after we have established some of the fields and their related values and ranges.
Jim Hanna used GVRET and GEVCU along with GVRET-PC to capture data from a charging Volt (Thanks, Jim!) from which I "replayed"
via GVRET-PC to a CANDue with GVRET loaded. That let me feed a Lear charger on the bench with the exact data used in a Volt while it was charging.
GVRET-PC allowed me to quickly remove and add specific message addresses from within the capture. In less than 10 minutes it was narrowed down to 2 message addresses with a total of 5 bytes of data needed to command the charger to charge and output aux12vdc at the apparent fixed value of 13.5vdc.
The Lear operates CAN A at 500Kbps.

Address	DLC	Data0	Data1	Data2	Data3	Data4	Data5	Data6	Data7	
0x30E	1	0x01								Turn on aux12vdc
0x30E	1	0x02								Turn on HV Charging
0x30E	1	0x03								Turn on aux12vdc and turn on HV Charging
0x304	4	0x40	0x96	0x7F	0x0A					Charge at 7.5amps to 389.0vdc

We know that for address 0x304 the first byte is an unknown value but tends to be a 40 or a 48 (all data quoted is a hex value) and Data1 byte is the current requested as "value /20". The Data2 byte is still being evaluated but is believed to be used in part to determine the target charging voltage. We know that varying Data3 value will raise and lower the target charging voltage. The Volt was using the value of 0x2A which results in the Lear charging to 405.0vdc

The cabling for the 12 pin data connector is connected such that pins A, F, and G are brought to 12vdc in relation to the case ground. Pins B and C are the CAN bus and the remainder are not presently needed. Do note that the Volt connects to CAN B on pins K and L.

The 2 pin Aux12vdc cable must be connected to a source of 12vdc to start the charger. Of course 120-240VAC input is required as are connections to the traction pack.

From Brian's notes on the General Lear Charger page, he gave a couple windows (300-420V with a possible min of 200V). But say it can be set to 200V, the second part to Eric's question is what is the DC output Ampere maximum (Brian noted 11 Amp). The AC input max is 15 amps, or 3.3kW. If the charger has a DC amp max output of 11 Amps, you would be de-rating the charger to 200V x 11 A = 2.2 kW.

We don't yet know what the low limit is that can be SET for the traction pack voltage termination.
That means that it can charge a lower voltage pack, but may not be able to have the "terminate charging" voltage set via CAN command.
Regardless, the traction pack voltage can be read and the charger commanded to halt charging.
Jack charged a ~185volt pack with the Volt version of the Lear charger and it charged at 11

amps, as I recall.
The theoretical limit to charging current is 12.75 amps (byte1:0xFF /20dec=12.75 decimal).

So, it can charge at the range that you are wanting to charge at, but the real control may need to be done in the CANDue charger controller.
To be honest, that is what it appears that GM is doing...They have the terminate voltage set to 406.1vdc in the Volt.
My expectation is that they do that to keep the current at full tilt boogey to the end. Otherwise it tapers the current down as it reaches the terminate voltage.

I am posting some of the CAN captures of a Volt Lear charger, both in the vehicle, and on the bench.
We are trying to find the measured traction pack voltage delivered from the charger to the battery.
Some things you will want to know first are which messages originate from the charger and at what intervals.
All of the address's and data are HEX values. The intervals are decimal.

FROM THE CHARGER:

Address	Interval
0x212	25 ms
0x266	100 ms
0x268	500 ms
0x308	25 ms
0x30A	25 ms

TO THE CHARGER:

0x30E	500 ms
0x304	500 ms

Some of these captures were done using GVRET on a CANDue and some were done on the bench using a Microchip CANAnalyzer.
The GVRET captures have 2 CAN ports and the ports are called 0 and 1.
It is probably best to sort based on the addresses shown above using your favorite sorting tool.
I like Notepad++ for these quick searches as it can isolate an address out quite nicely.
Spreadsheets work better when math shall need applied.
The J1772 files are from a Volt while charging at 240v and 120v done by Jim Hanna.
The LearVolt122114_391p7Charge395.CAN is on the bench with the traction pack starting at 391.7vdc and ending at 395.0vdc
There are other various captures, but again, we are looking for the MEASURED value, not the commanded value that will be found in address 0x304.

Edit: I had originally posted that we were looking for the measured traction pack voltage and current.
Jack has already found that the current measurement is in message 0x212 data byte0 and data byte1 as a 16 bit integer, then divide that by 158 to read actual output current.
That is an unusual division factor, being more common to divide by 10, 20, or 100 yet it

seems to be correct.

Jack has sussed out the command voltage and current values.
The commanded voltage is a 10 bit value that is divided by 2.
It shares bits with the third byte of data at 0x304, and we have not determined what those other bits do.
We also do not know what the value in Data0 represents but find it to be 0x40 or 0x48 in the Volt.
Jack has charged a pack at ~48-56vdc and it followed the commanded current limit within the range available.
We currently believe those values to be:

3.3Kw total power limit (thus max Kw output is at voltages above ~300vdc)
~11 amp max (it accepts commands to 12.75amp)
200-420vdc charging voltage (it accepts commands to 512vdc but output does not rise above ~420vdc)
13.5vdc at ~30amps (this is while plugged into AC only

Let's look at an example of a charging command for 200vdc with a current limit of 7.5amp and the 13.5vdc aux output turned on (values below in HEX):

Address	Data0	Data1	Data2	Data3
0x30A	03			
0x304	40	96	01	90

Address 0x30A is setting bits 1 and 2 of Data0 high which enable charging and the 13.5vdc output.
Address 0x304 Data0 is an unknown at present, but seem to be 40 or 48 in the Volt.
Address 0x304 Data1 is the current commanded, convert to decimal and divide by 20.
Address 0x304 Data2 first 2 bits are MSB of the voltage command.
Address 0x304 Data3 byte is the LSB of the voltage command. Then MSB LSB is divided by 2.
So, Data1 is 96(hex) which is 150 decimal. Divided by 20 is 7.5 and that is the commanded current.
Data2 is 01(hex) and Data3 is 90(hex) which is 0190(hex) equals 400(decimal) divide by 2 is 200vdc.
We are still looking for the DC voltages and currents as MEASURED by the Lear charger.
AC input voltage and current to come as well.

The Lear charger utilizes common (meaning the same) connectors and pin assignments between the Coda version and the Chevy Volt version with one exception.
The 12 pin data connector uses different names for some of the pins, and the CAN data is different as the firmware (the internal software in the charger) is different.
So, the High Voltage connector is the same and the AC input is the same. Thus you can refer to the Coda documentation for that information for the time being.
I expect that Brian Couchene will post a very nice document but he never posts partially completed bits like I do...He'll do it when he has every last piece of data verified.
As goes the 12 pin connector. Pins A, F, and G are connected to aux12vdc to turn it on and enable all of the required parameters.
Pins B and C are CAN A the same as the Coda version.

CAN B is brought out and to pins K and L in the Volt but I have not yet discovered exactly why.
I never see data coming from the charger on CAN B and I have not yet seen it respond to any data on CAN B.
That doesn't mean that neither occur, it just means that I have yet to observe it. They must have connected it for a reason...

So, now on to Apples and Oranges.
You bring up PID and "requesting data" from the charger. I have seen no evidence of the charger responding to a PID request on either CAN bus though I have tested with the posted PID requests that I have found.
My suspicion is that PID requests are responded to by the VCU but I have no firm knowledge either way.

You should also be aware that if we don't garner the output voltage readings from the charger, there will need to be another device to read the voltage and make a decision as to when the battery is at the proper voltage to end the charge.
JLD505 comes to mind, but that is not yet available. Perhaps one of the JLD404's or another of the lightobject meters if you already have one.

"Okay, so my Charger is working rather nicely now. I'll answer my own question - HV pack is not necessary for testing out the 12V charging "

So, did you turn on the bits in the can message to tell it to charge both or just the aux battery? If you used both bits, did you get any current to the traction pack even if it wasn't connected?

Just a little bit more information would answer a bunch of questions.

Thanks for the work you are doing. I appreciate it. I have my volt charger at my feet and my 'charging controller' being built in front of me.
I have two arduinos with can bus shields, 5 relays (4 low voltage, one high voltage), a 20X4 character display and a circuit to measure the pack voltage.
The pack measure circuit is isolated from the low voltage. I am using cat6 cabling to allow the display to be separated from the control box. And using cat6 to power and communicate with each charger (I will be adding a second charger shortly). There are two separate can bus's because the ID issued by the charger is fixed and is the same for each charger so they can't be on the same bus. The two arduinos communicate with each other with a serial connection. My enclosure will be guarded from EMI with aluminum top/bottom and aluminum tape on the sides. Interior walls are all plastic. Input to box is HV (+), HV(-), 12v(+) and 12v(-). Output is three cat6 connections as described above and one 5 volt line that powers my motor controller (the motor controller will be powered off when charging).
That's what I have so far as I continue my construction.