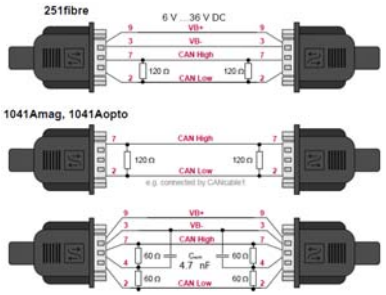
EMC LAB INFO

RI-114 EMC TEST CHAMBER, RF IMMUNITY REVERBERATION METHOD
CAN BUS FIBER OPTIC TEST SETUP USING VECTOR HW/SW



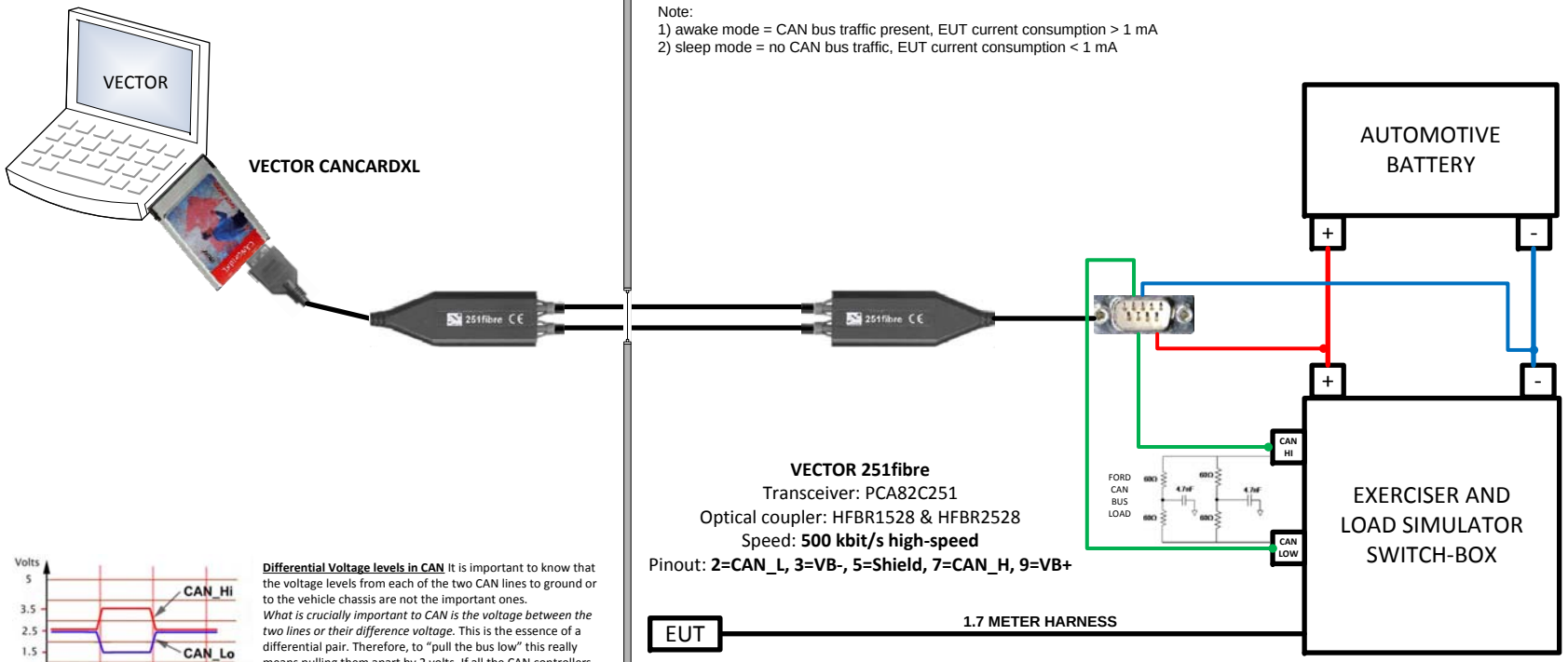
THE CAN BUS LOADING IMPOSED BY FORD APPLIES TO A DIFFERENT TYPE OF CAN BUS TRANSCEIVER TJA1041A (HIGH SPEED). VECTOR MANUAL INDICATES 120 OHMS (NO CAPACITOR) AS VALID CAN BUS LOADING FOR 251 FIBRE USING TRANSCEIVER PCA82C251 (HIGH SPEED).

During RI-114 (Reverberation Method) radar pulses the DUT "awakes" (1) when tested in "sleep" mode (2). This "awake" condition may discharge the battery if the vehicle is parked for an extended period of time in the proximity of an airport. During RI-114 (Reverberation Method) the Vector fiber-optic satellite is susceptible to radar pulses.

Vector fiber-optic satellite does not awake the EUT from sleep during RF immunity ALSE with ground plane. The common path on the supply lines (Vector and DUT) is eliminated in ALSE method by placing on VBATT and GND lines a LISN (AN) between Battery and Exerciser, the Vector being powered from the Battery side of the LISN.

Vector fiber-optic satellite can be used for RI-112 (BCI) test method provided that it is powered from the Battery side of the LISN (AN) and is placed on a Styrofoam support 5 cm above the ground plane.

Note:
1) awake mode = CAN bus traffic present, EUT current consumption > 1 mA
2) sleep mode = no CAN bus traffic, EUT current consumption < 1 mA



VECTOR 251fibre
Transceiver: PCA82C251
Optical coupler: HFBR1528 & HFBR2528
Speed: **500 kbit/s high-speed**
Pinout: **2=CAN_L, 3=VB-, 5=Shield, 7=CAN_H, 9=VB+**

CAN Physical Layer Voltages

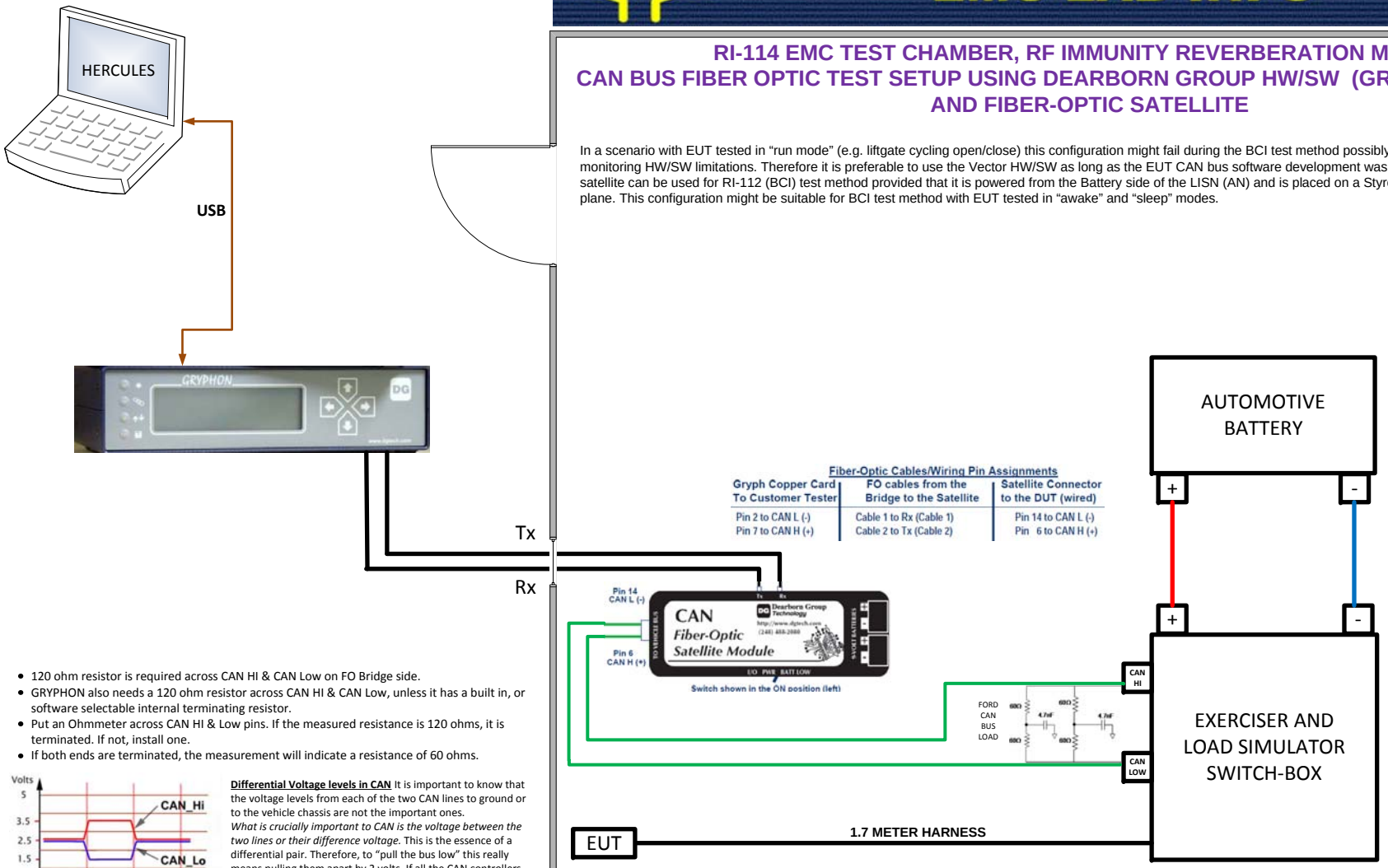
Differential Voltage levels in CAN It is important to know that the voltage levels from each of the two CAN lines to ground or to the vehicle chassis are not the important ones.
What is crucially important to CAN is the voltage between the two lines or their difference voltage. This is the essence of a differential pair. Therefore, to "pull the bus low" this really means pulling them apart by 2 volts. If all the CAN controllers do nothing, then the two bus lines come together with a difference of 0 volts. This is the idle state.

USE THIS CAN BUS CONFIGURATION FOR ALL TEST METHODS EXCEPT RI-114 (REVERBERATION METHOD).

THE ABOVE SCENARIO IS SUITABLE FOR ALL TEST METHODS EXCEPT RI-114 (REVERBERATION METHOD). BOTH THE VECTOR FIBER-OPTIC SATELLITE AND THE EUT (INCLUDING 1.7 METER HARNESS) ARE SUBJECTED TO THE SAME LEVEL OF RF STRESS. THEREFORE BOTH MIGHT BE RESPONSIBLE FOR CAN BUS WAKE-UP WHILE TESTED IN SLEEP MODE. VECTOR SATELLITE IS NOT RF BULLET PROOF AND HAVING A COMMON PATH FOR VBATT & GND WITH THE EUT IS A BAD CONFIGURATION.

RI-114 EMC TEST CHAMBER, RF IMMUNITY REVERBERATION METHOD
CAN BUS FIBER OPTIC TEST SETUP USING DEARBORN GROUP HW/SW (GRYPHON/HERCULES) AND FIBER-OPTIC SATELLITE

In a scenario with EUT tested in "run mode" (e.g. liftgate cycling open/close) this configuration might fail during the BCI test method possibly due to some Gryphon/Hercules monitoring HW/SW limitations. Therefore it is preferable to use the Vector HW/SW as long as the EUT CAN bus software development was done under Vector. Vector fiber-optic satellite can be used for RI-112 (BCI) test method provided that it is powered from the Battery side of the LISN (AN) and is placed on a Styrofoam support 5 cm above the ground plane. This configuration might be suitable for BCI test method with EUT tested in "awake" and "sleep" modes.



- 120 ohm resistor is required across CAN HI & CAN Low on FO Bridge side.
- GRYPHON also needs a 120 ohm resistor across CAN HI & CAN Low, unless it has a built in, or software selectable internal terminating resistor.
- Put an Ohmmeter across CAN HI & Low pins. If the measured resistance is 120 ohms, it is terminated. If not, install one.
- If both ends are terminated, the measurement will indicate a resistance of 60 ohms.

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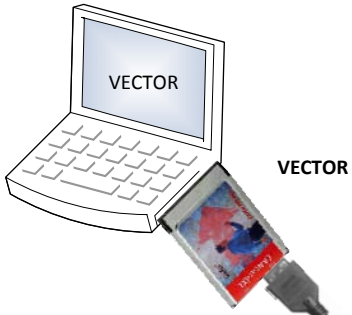
USE THIS CAN BUS CONFIGURATION FOR RI-114 (REVERBERATION METHOD) ONLY.

USING THE CONFIGURATION WITH DEARBORN GROUP FIBER-OPTIC GRYPHON OUTSIDE AND SATELLITE INSIDE THE CHAMBER WE EXPOSE TO RF A SHIEDED CAN BUS SYSTEM HAVING ITS OWN POWER SUPPLY. ENSURE THAT THE TWO CAN BUS WIRES PART OF THE 1.7 METER EUT HARNESS AS WELL AS THE TWO CAN BUS WIRES BETWEEN FIBER OPTIC SATELLITE AND THE EXERCISER SWITCH-BOX ARE TWISTED TIGHT.

RI-114 EMC TEST CHAMBER, RF IMMUNITY REVERBERATION METHOD
CAN BUS FIBER OPTIC TEST SETUP USING VECTOR HW/SW
VIA DEARBORN GROUP FIBER-OPTIC BRIDGE AND FIBER-OPTIC SATELLITE

This configuration might be suitable for BCI test method with EUT tested in "run", "awake", and "sleep" modes.



VECTOR CANCARDXL

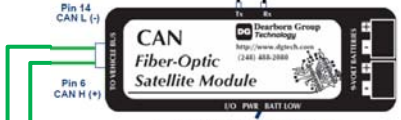
VECTOR 1050
Transceiver: TJA1050
Speed: **1 Mbit/s high-speed**
Pinout: **2=CAN_L, 3=GND, 5=Shield, 7=CAN_H**

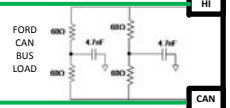
Tx

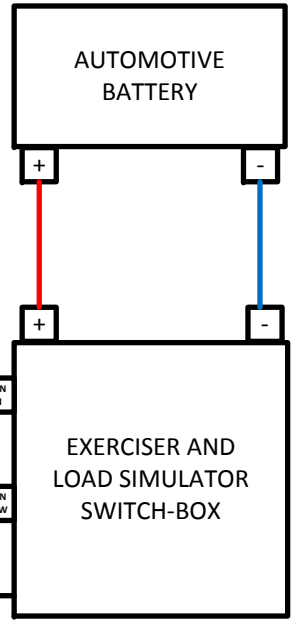
Rx

Fiber-Optic Cables/Wiring Pin Assignments

Gryph Copper Card To Customer Tester	FO cables from the Bridge to the Satellite	Satellite Connector to the DUT (wired)
Pin 2 to CAN L (-)	Cable 1 to Rx (Cable 1)	Pin 14 to CAN L (-)
Pin 7 to CAN H (+)	Cable 2 to Tx (Cable 2)	Pin 6 to CAN H (+)







EUT

1.7 METER HARNESS

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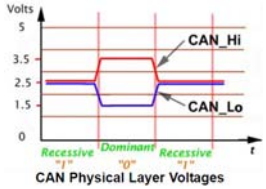

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FOR REFERENCE ONLY: *USE THIS CAN BUS CONFIGURATION FOR ALL TEST METHODS.*

USING THE CONFIGURATION WITH DEARBORN GROUP FIBER OPTIC BRIDGE OUTSIDE AND SATELLTE INSIDE THE CHAMBER WE EXPOSE TO RF A SHIELDED CAN BUS TRANSCEIVER POWERED FROM ITS OWN 2 x 9V BATTERY (NO COMMON PATH WITH DUT SUPPLY LINES WHILE APPLYING THE RF STRESS). FOR CAN HI-SPEED ENSURE THAT THE TWO CAN BUS WIRES PART OF THE 1.7 METER DUT HARNESS AS WELL AS THE TWO CAN BUS WIRES BETWEEN FIBER OPTIC SATELLITE AND THE SWITCH-BOX ARE TWISTED TIGHT.

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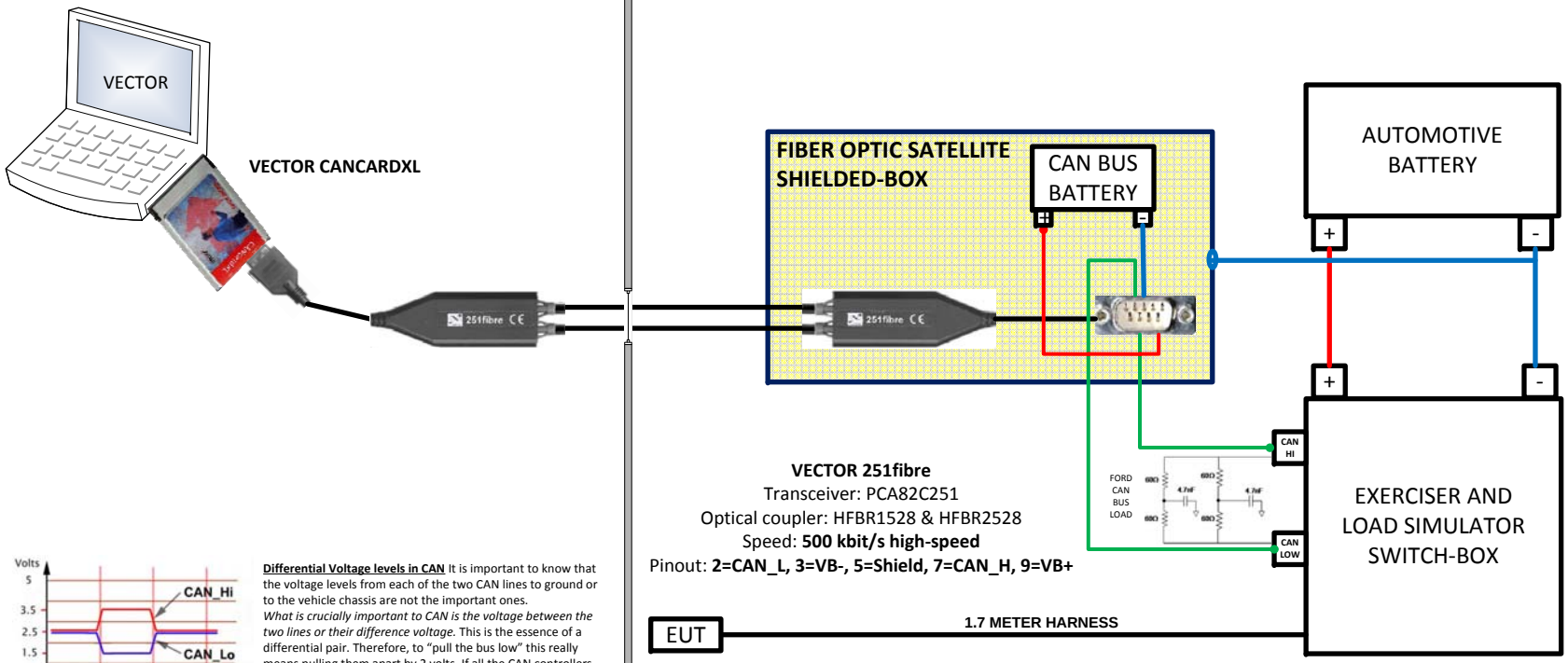

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CONNECT THE VECTOR SATTELITE TO SEPARATE BATTERY. PLACE BOTH VECTOR SATELLITE AND THE 12V BATTERY IN A SHIELDED-BOX. CONNECT THE SHIELDED-BOX AND SATELLITE GND PIN TO THE PLGM AUTOMOTIVE BATTERY (NOT THE SWITCH-BOX GND INPUT). LEAVE THE EXISTENT CAN BUS LOADING AS IS. THIS WAY THE VECTOR SATELLITE SHOULD BE LESS SUSCEPTIBLE TO RF NOISE. FOR CAN HI-SPEED ENSURE THAT ONLY TWO WIRES (CAN-HI &CAN-LO) ARE CONNECTED BETWEEN SATELITE AND SWITCH-BOX.