

Prodigy Advanced Cab Bus Hardware

Opening a wired Cab identifies the hardware communications for the Prodigy Cab Bus.

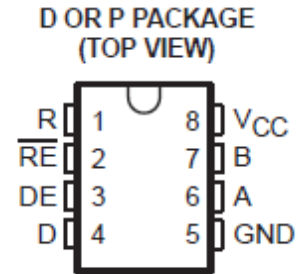
The communications is handled by a 75176B Differential Bus Transceiver. In order to identify the communications protocol I connected my logic analyzer as follow:

Gry=Pin 5 GND

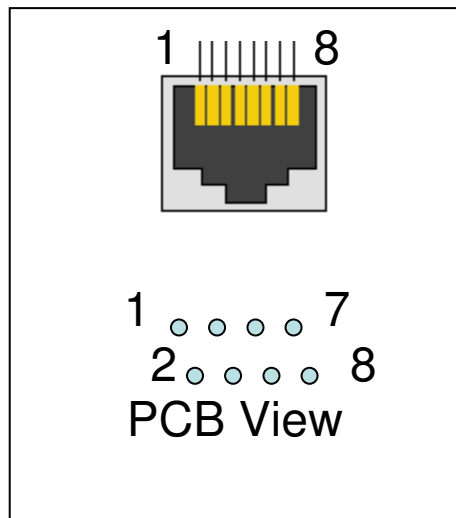
Red= Pin 1 R (data into Cab)

Blu= Pin 4 D (data from Cab)

Wht= Pin 3 and 2 DE/RE (Data Dir +out/-in)



Here is the wiring of the Cab Bus RJ45 connector:



1,8	Gnd
2,7	12v
3,6	Bus B
4,5	Bus A
Bus Signals	

The Wireless Cab has the same wired connector. Note the 12v is also how the rechargeable batteries are charged. Note you can make up a 12v source and tie it to pins 1,8 GND and 2,7 12v to charge the battery without the Command Station being on.

View of the Prodigy Advanced Cab Bus Communications

Prodigy set to Cabs 1-8.

Logic Analyzer connected to Cab 7 as follows: Data In (Bus Data), Data Out (from Cab 7), and Out/In (Bus Direction from Cab 7)

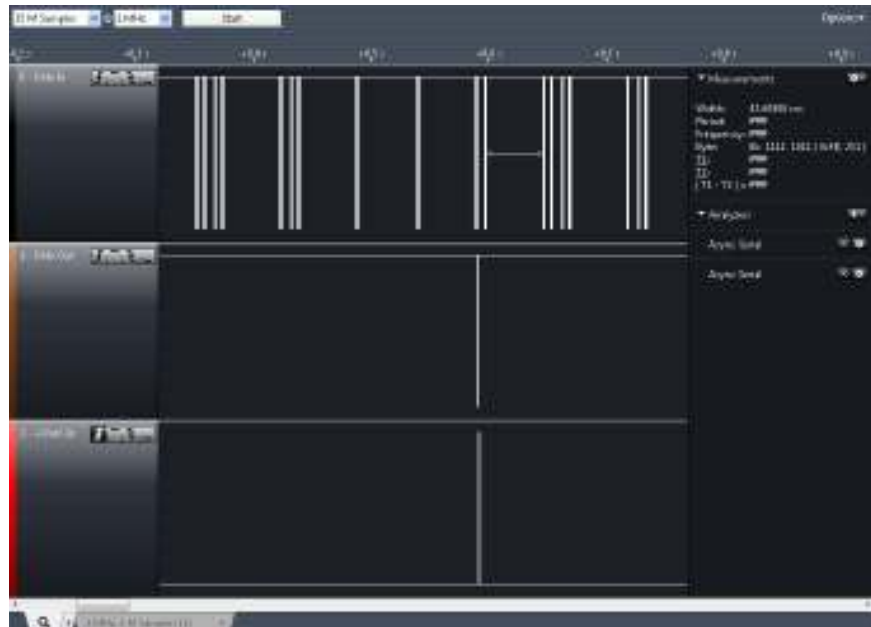
Display starts on Poll of Cab 0. Each Data Burst on Data In is the Polling of one Cab ID. So the sequence is Cab 0 (special), Cab 1 thru Cab 8, and then it repeats.

Notice normal waiting period is about 50ms.

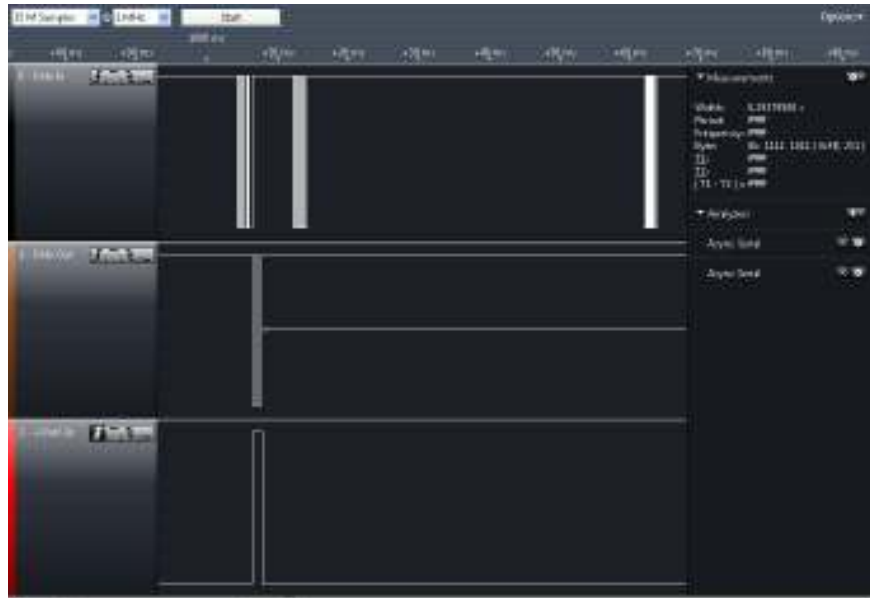
If a response happens then it only waits about 5ms after the response (shown at cab 7). Also, since Cab 0 is a broadcast and not a Poll it also only waits about 5ms.



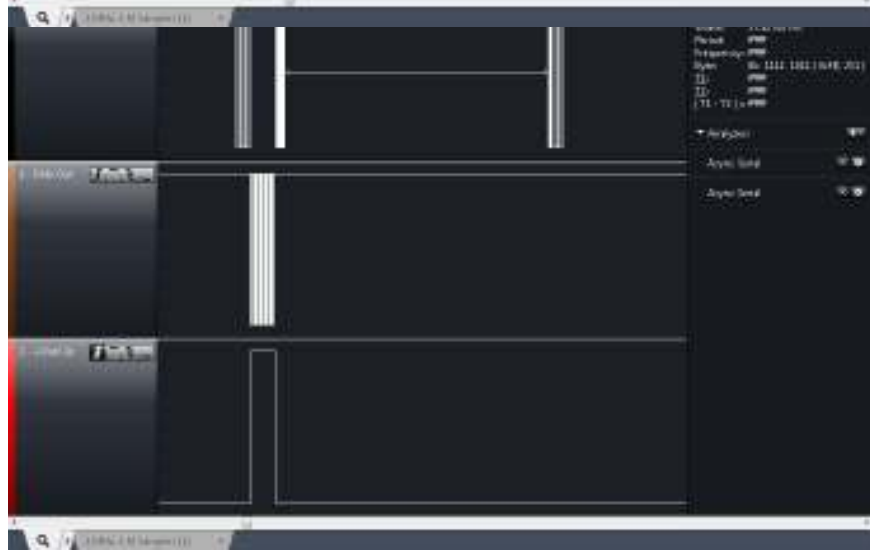
This is the same view with Cab 1 and 3 also turned on. Now Cab 0, Cab 1, Cab 3, and Cab 7 have short delays (5ms) while the others have about 50ms delays.



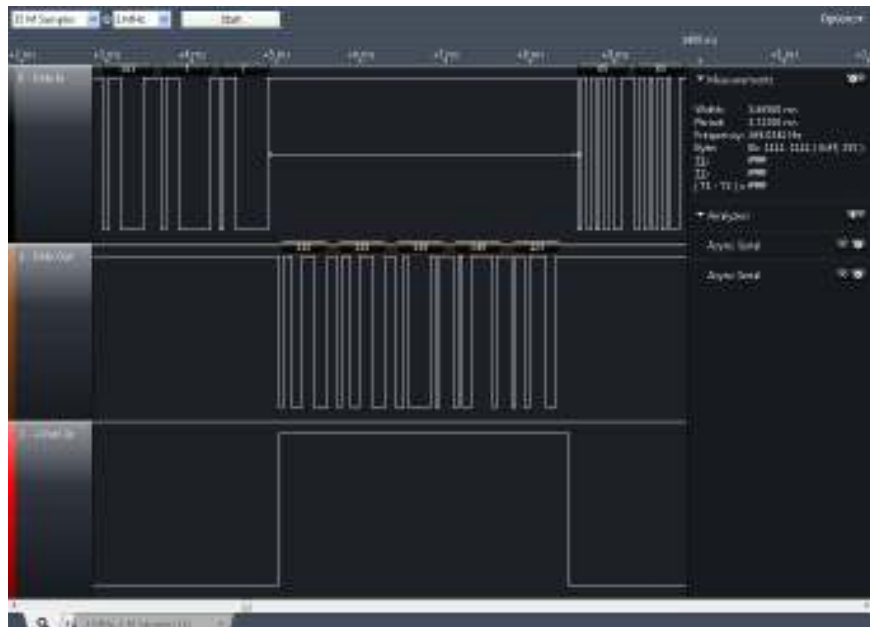
This is an expanded view of Cab 7's response. In this case the response is 0 and the next Data Burst on the top display is for Cab 8. The delay is fairly short (about 5ms).



In this case the Cab 7 response is an actual command. The short Data Burst on the top display is and acknowledgement followed by a 37ms delay (total around 50ms). The the burst to the right is for Cab 8. Evidently if there is a command the delay gives the Master bus time to process the command onto the DCC bus.

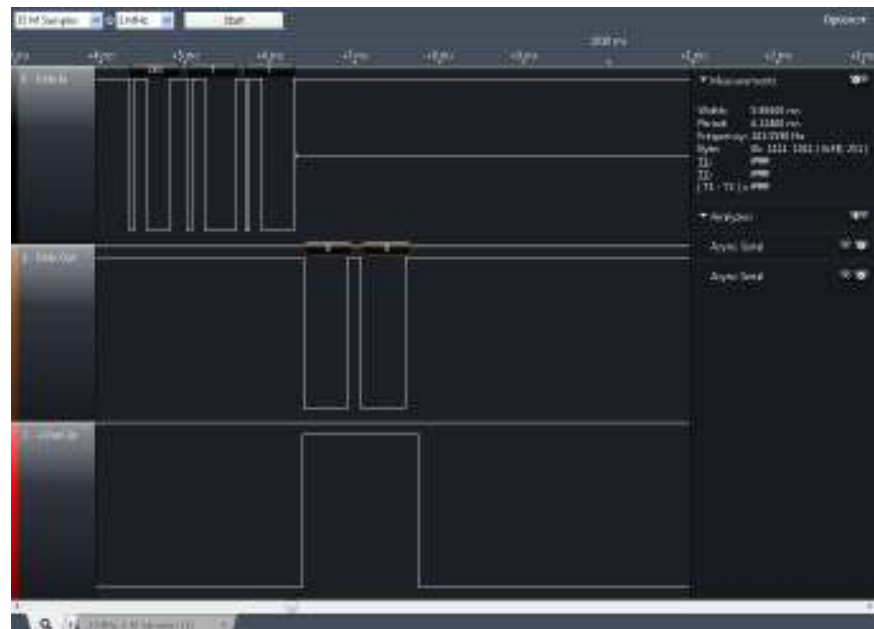


This is an expanded View of the Poll, followed by a command from Cab 7 and then an Acknowledgement from the Master Cab. Notice the first byte of the Poll for Cab 7 is 263. This is because the cab bus is set as 9bit data and the first Poll byte always has the most significant bit set to 1. While this is used on the hardwired bus it is not used on the Computer interface.

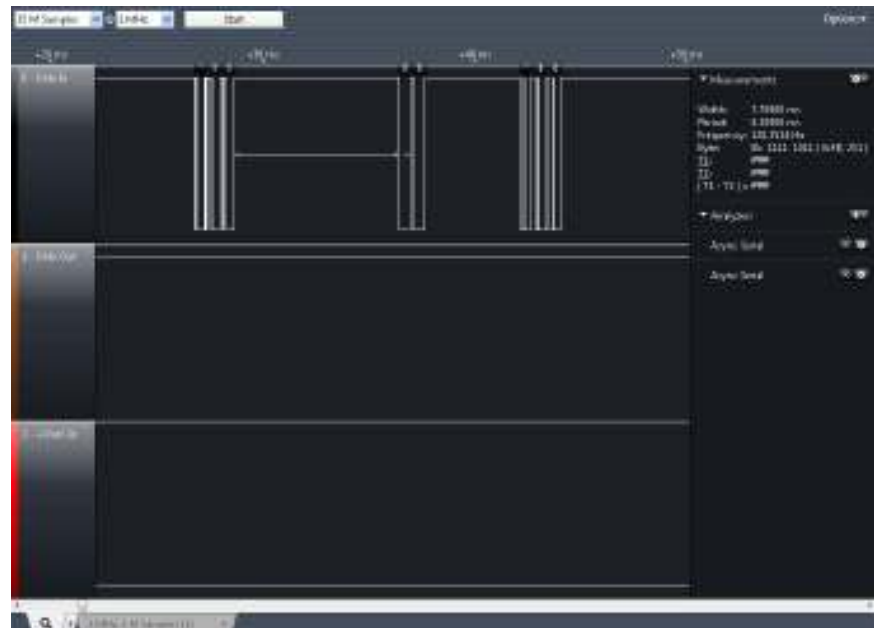


In this case the Cab 7 responds with two 0 bytes indicating it is there but has no command.

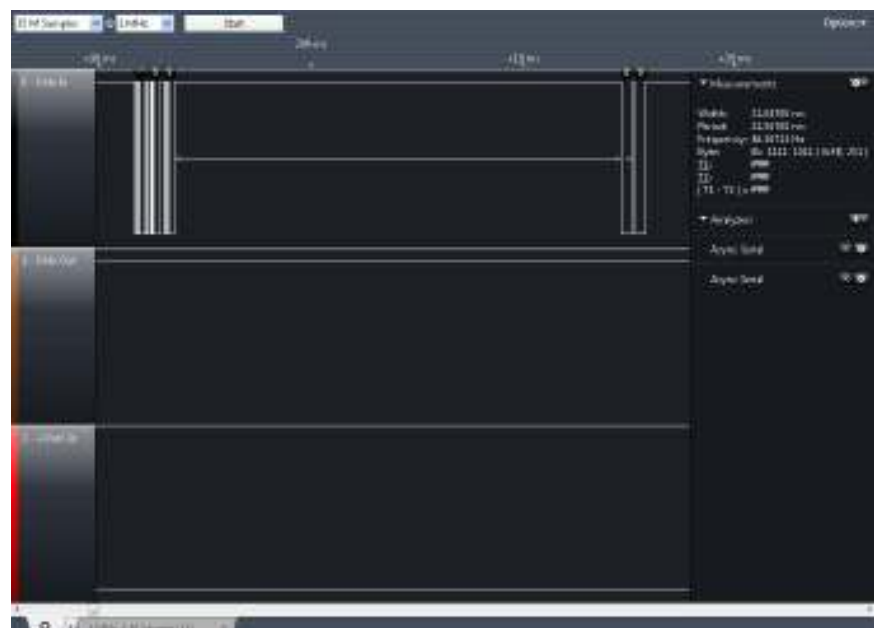
In both cases Cab 7 is a wired Cab and the response time is very quick.



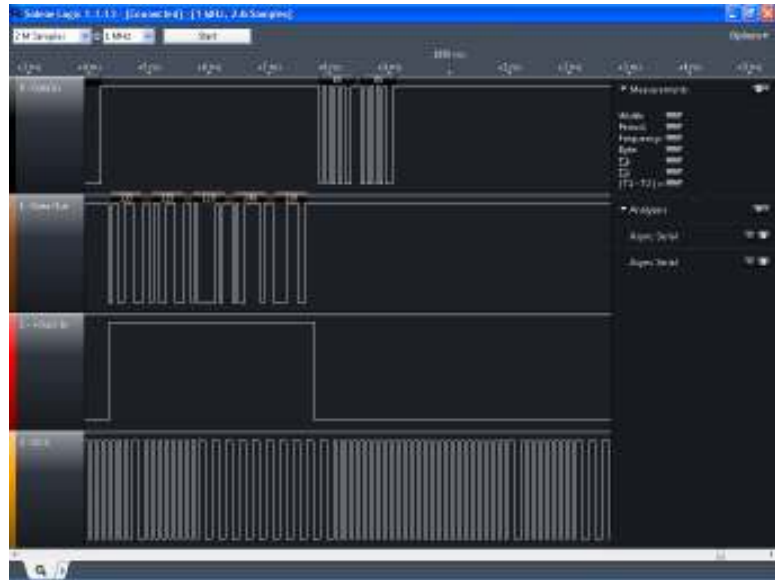
Here is an example of a Wireless Cab response. This scale is twice as long as the wired Cab and still you can see it is significantly longer (about 7ms.).



And here is the response time for the PC interface (about 21ms). If your PC or USB bus is slow you could run into trouble here. Remember the wait time was about 50ms.



Accy Command entered on Cab.
This is shown on second graph.
Bottom graph is current DCC bus
at this time. Pattern is preamble of
14 1s then standard byte of 8bits of
1, 8bits of 0, 8bits of 1 and then
repeats with next Preamble. Time
at end of Cab command is 1888ms.



Time at start of DCC command is
1898ms or about 10ms latter.
Command shown is 129 249 120
which is Accy command as was
entered on Cab.
(Not Shown). This command
repeats 5 times on DCC bus.

