The following applies to Powerbase version 1.2 & 1.3

1.3 Fixes the resetting of all of the data when Powerbase is Overloaded . No other changes known of.

No other versions known of.

The connections to the Aux Port are looking from left to right into the socket.

5v
Rx (It is connected but Adrian Norman says Aux is Tx only)
Tx (data out)
0v

Also note that the Powerbase is confirmed as NOT upgradeable either via Aux port or via other means.

Signal level is 0 to 5V and needs conversion to RS232 levels for reliable operation (MAX232 or MAX233, no caps, etc)

Data rate is 38400 Baud, 1 start bit, No parity, 1 stop bit.

Most of the time a 41 Byte stream is sent, followed by a pause of approx 97ms. (The repetition rat of the packets is 104ms)

The first Block of five Bytes seem to define the Mode. Race Run, Stop etc. I do not think that all modes are uniquely defined.

The next 6 Blocks of 6 Bytes define the False Start, Run time for each car and controller position.

The following is a description of the first 5 Bytes. "Mode Bytes"

On power up A2 01 02 00 00 is sent

(Byte 5 = 00, All controllers enabled even if not plugged in)

I propose calling the Mode the unit powers up in, and returns to after a Race is complete and Reset is pressed. "Free Practice" (FP)

The following applies to GRP and most Race modes, but not QLY. (Have not checked all modes yet)

When Start is pressed a single A2 01 01 05 00 00 is sent (Only these 6 Bytes, not the usual 41)

The unit then beeps 5 times with no data being sent.

Then during race A2 01 02 04 XX (See below for XX Byte 5)

At end of the race a single A2 01 01 09 00 00 is sent. (Only these 6 Bytes, not the usual 41)

Then no data until (unit is displaying Race result) Reset is pressed again when unit reverts to A2 01 02 00 00

If Reset is pressed during the race a single A2 01 01 09 00 00 is sent (Only these 6 Bytes, not the usual 41)

And then back to a continuous A2 01 02 00 00

If QLY is selected data is as above except.

No single packet sent after Start is pressed.

During QLY A2 01 02 04 00

(Byte 5 = 00, All controllers enabled even if not plugged in)

Summary of Mode Bytes Byte 1 Always A2 (Ident for start of Data?)

Byte2 Always 01 (Further Ident?)

Byte 3 Power Byte 01 = Off, 02 = On(Set regardless of whether power cut is selected)

Byte 4 Race Byte 00 = FP 05 = Start, 04 = Race, 09 = StopNote 05 & 09 are only sent once. 00 & 04 are continuous

Byte 5 Car Disable Byte

In "Free Practice" FP or QLY mode, Byte5 is set to 00

All controllers enabled even if not plugged in. i.e. not checked.

During a race mode it is used to keep a track of which cars are enabled.

All cars enabled: 00
Car 1 disabled: 01 bit 0 set
Car 2 disabled: 02 bit 1 set
Car 3 disabled: 04 bit 2 set
Car 4 disabled: 08 bit 4 set
Car 5 disabled: 10 bit 5 set
Car 6 disabled: 20 bit 6 set

When in Program mode no data is transmitted.

Bytes 6 to 41 "Car Bytes"

The remaining 36 Bytes, are allocated 6 per car.Car 1 is Bytes 6 to 11

Byte 6 is the False Start Byte normally 00 but 01 for the duration of the False Start.

Bytes 7 to 10 are the time since the start of the race in thousandths of a second, Byte 7 being the least significant.

Bytes 7 to 10 are updated for 1 burst as the car crosses the start finish, they then revert to 00 until the car crosses again.

Byte 11 is the hand controller position Hex 00 to 37 for full throttle. Hex 40 for lane change and 80 for Brake.

Max throttle seems to vary with different Controllers & Bases and results between 35 & 3A have been seen. (Presumably anything up to 3F is a valid Controller value)

Car 2 Bytes 12 to 17
Car 3 Bytes 18 to 23
Car 4 Bytes 24 to 29
Car 5 Bytes 30 to 35
Car 6 Bytes 36 to 41

Potential problems

The modes do not seem to be uniquely defined.

When the last car crosses the line in a race mode only 6 bytes are sent with no update to its time, hence some "last car" code is needed to update its lap count and last lap time.

I suggest counting A2's with the count being reset each time a car crosses the line. Then when Byte 4 =09 (end of race) the count in 0.1 of a seconds (1.04 to be precise) can be added to the penultimate cars time to give a last car time.

You cannot see how many laps are set or Race length.

This may mean that these and some other parameters need to be set on the base and the PC, or it may be that we define a different mode of operation when a PC is connected.

The throttle position data makes for some interesting possibilities. Time at max throttle, Time on the brakes. Perhaps an F1 style display? Could probably approximate some speed data from what we have?

We could also log the data for later analysis for performance comparison and improvement.

Do not be tempted to us Byte 5 to identify when the Powerbase is in QLY Mode this works fine with up to 5 cars but then fails with 6 as it is now 00 the same as in FP & GRP!

QualifyIn working with Bernd have come to the conclusion that it is best to leave the Powerbase in FP / GRP mode.

If you want a Qualify mode best to not use QLY on the Powerbase but define your parameters on the computer (Number of laps, amount of time etc) then press a key on the computer, while in Free Practice to start Qualification.

Then display the Qualifying information, followed by the Grid positions at the end of the defined Qualifying parameters.

This saves messing with the set-up of the Powerbase and enables multi car simultaneous QLY if that is what you want.

It would also be neat if on going from a Qualify session to Race that the start order was shown in the Qualify order.