HCCM-protocol.

The HCCM-system consist of acCentral-card, to control max. 4 racks each having 16 slots, so max 64 cards which either control one or two blocks or provides output-lines for signals or points.

There are 3 different versions of the central-card, having either a DB9 or USB connector, their protocol however is the same.

SCK = first generation of serial card
MCK = second generation of serial card both have opto-couplers to isolate the sisgnals.
TCK = third generation of serial card, with MX232-isolation

The serial port of the control-card requires :

- either 9600 or 19200 baud
- 8 databits
- no parity
- 1 stopbit

3 Optocouplers are being used to isolate the Central (SCK/MCK) -card from the PC: (seen at the card)

- The RTS-signal (pin 4) is used to drive an optocoupler which resets the 8031-cpu.
- The RX-signal (pin 3) drive the data-in-signal for the 8031.
- The data-out-signal of the 8031 is send to TX (pin 2)
    - The positive level of RTS (pin 4) and RX (pin 3) provide positive power for TX
    - The negative level of DTR (pin 7) and RX (pin3) provide negative power for TX
    - Zener diodes are used to limit the TX-power to +/- 6.8V

A rack-slot can hold different type of cards:

- Block-control card, to provide power to a block, with current detection circuits for the sections or segments of the block.
- Data-output-card, LKK, to provide connection to 4 latch-cards, EVL
    - Each EVL latch-card has 64 output-lines
    - So an LKK can provide access to 4*64 = 256 output-lines.
- I-O-card, 16 input and 16 output-lines

The central-card provides a 4-bit clock for the PWM-circuitry of the block-control-cards, to have their output in sync.

There are 4 types of block-control-cards:

- 2BK only has an A-side, which provides power to the block,
  - with detection for 4 segments: 1 , 2 , 3 , 4
- ABK has an A and B-part of the card, to provide power to 2 different blocks
  - side A has detection for 3 segments : 1, 2+3, 4
  - side B has detection for 2 segments : 1 , 2
- DBK has an A and B-part, each provides power to a block, with detection for 4 segments
- TBK is similar to a 2BK, but can be used for train-controlled systems too.

The 8 data-bits are used for:

- D7 = address-strobe
- D6 = data-strobe
- D5 = selects either side A or B
- D4-0= address or data

Command	Action	Response, after 100 uSec
Bit7 = 1 + Bit6 = 0 + address =>10xx.yyyy xx => select the rack yyyy => select the slot in the rack	Slot selection	128 + address
Bit7 = 0 + Bit6 = 1 + ab.cccc	a selects either A or B-part b selects the direction c selects the speed 0 – F	64 + f,(s1)(s2)(s3)(s4) f = overcurrent s1 = segment1 s2 = segment2 s3 = segment3 s4 = segment4

A block-control-card uses PWM to provide power to the block.
The used output can range from 12-20 Volt, in 16 steps forward and 16 steps backward.

I would like to extend the range to 32 or 64 steps if possible….

The data-output-card, LKK, connects to max. 4 EVL-cards, which has a different protocol:

The 8 data-bits are used for:

- D7 = address-strobe
- D6 = data-strobe
- D5 = latch-strobe
- D4-0= address or data

Each EVL-card has 8x double 4-bit latches, which provide 64 output-lines.

Command	Action	Response, after 100 uSec
Bit7 = 1 + Bit6 = 0 + address =>100x.yyyy X => select the rack yyyy => select the slot in the rack	Slot selection	128 + address
Bit7 = 1 + Bit6 = 1 + Bit5 = 0 + decoder-address=>110a.bbbb	a = decoder-select b = decoder-output	Undefined
Bit7 = 0 + Bit6 = 0 + Bit5 = 1 + latch-address =>001a.dddd	a = latch-select d = nibble-select	Undefined

3 bytes need to be send to change 1 of the 64 output-lines.

The I-O-card has 16 input- and 16 output-lines, using 4 nibbles:

Command	Action	Response, after 100 uSec
Bit7 = 1 + Bit6 = 0 + address =>100x.yyyy X => select the rack yyyy => select the slot in the rack	Slot selection	128 + address
Bit7 = 0 + Bit6 = 1 + nn.dddd	n = nibble-select d = nibble (output)	128 + nibble (input)

1 nibble can be changed at a time, so 5 bytes need to be send to

- change all output-lines –or-
- read all input-lines.

This card is less common used…