Chrysler CCD/SCI Scanner UART Protocol

Preliminary documentation, not complete! **Last update: 2018.07.26**

1. UART Frame Format

Start of Frame	Used for checksum calculation					End of Frame
SOF	Data length		Data description		Data	EOF
SYNC	**LENGTH HB**	**LENGTH LB**	**DATA CODE**	**SUB-DATA CODE**	**PAYLOAD**	**CHECKSUM**
$33	$00	$04	$45	$01	$00 $22	$9F

Table 1. Serial Frame Format.

1.1 **SYNC** byte: fixed value ($33) at the beginning of every packet.

1.2 **LENGTH** bytes: number of bytes following until the CHECKSUM byte is reached. Size: 2 bytes (High Byte + Low Byte).

1.3 **DATA CODE** byte: contains the source/target of the packet and broadly describes what's inside the packet. Size: 1 byte.

1.4 **SUB-DATA CODE** byte: describes the packet further if needed. Reads $00 if the DATA CODE byte is enough to explain the packet's meaning. Size: 1 byte

1.5 **PAYLOAD** byte(s): optional. Arbitrary data can be stored here (e.g. CCD/SCI-bus messages) and sent later to the laptop when connected. Size: 0-1018 bytes (max. 1024-6 bytes)

1.6 **CHECKSUM** byte: every byte after the SYNC byte is summed and the lower byte of the result is kept as error detection. Size: 1 byte.

2. UART Frames in detail

2.1 DATA CODE byte description

DATA CODE byte							
High nibble				Low nibble			
Source		Target		DC command			
bit 7	**bit 6**	**bit 5**	**bit 4**	**bit 3**	**bit 2**	**bit 1**	**bit 0**
0	0	1	0	0	1	1	0

Table 2. DATA CODE byte description.

Bit 7:6 describe the source of the packet:
- 2b00: USB - 2b01: CCD-bus
- 2b10: SCI-bus (PCM) - 2b11: SCI-bus (TCM)

Bit 5:4 describe the target of the packet:
- 2b00: USB - 2b01: CCD-bus
- 2b10: SCI-bus (PCM) - 2b11: SCI-bus (TCM)

Bit 3:0 contain the actual DC (Data Code) command ($00-$0F) that broadly describes what this packet means:
- 4b0000 ($00): Reboot scanner
- 4b0001 ($01): Handshake request (for USB-connection)
- 4b0010 ($02): Status report request
- 4b0011 ($03): Change scanner settings
- 4b0100 ($04): General request to the scanner
- 4b0101 ($05): General response from the scanner
- 4b0110 ($06): Send message to the CCD/SCI-bus
- 4b0111 ($07): Send message(s) repeatedly to the CCD/SCI-bus
- 4b1000 ($08): Stop message flow to the CCD/SCI-bus
- 4b1001 ($09): Message forwarded from the CCD/SCI-bus
- 4b1010 ($0A): Run self-diagnostics
- 4b1011 ($0B): Create scanner settings backup
- 4b1100 ($0C): Restore scanner settings
- 4b1101 ($0D): Restore default scanner settings
- 4b1110 ($0E): Debug
- 4b1111 ($0F): OK/ERROR

2.2 SUB-DATA CODE byte description

SUB-DATA CODE byte							
bit 7	**bit 6**	**bit 5**	**bit 4**	**bit 3**	**bit 2**	**bit 1**	**bit 0**
0	1	0	0	1	1	0	0

Table 3. SUB-DATA CODE byte description.

Related DC command: $03 (Change scanner settings)
- $00: NOT USED
- $01-$FF: RESERVED

Related DC command: $04 (General request from the scanner)
- $00: NOT USED
- $01-$FF: RESERVED

Related DC command: $05 (General response from the scanner)
- $00: NOT USED
- $01-$FF: RESERVED

Related DC command: $06 (Send message to the CCD/SCI-bus)
- $00-$FF: RESERVED
  PAYLOAD contains the message

Related DC command: $07 (Send message(s) repeatedly to the CCD/SCI-bus)
- $00: Same message over and over again
- $01: Variable message (explained in PAYLOAD)
- $02-$FF: RESERVED
  PAYLOAD contains the message (described later on)

Related DC command: $09 (Message forwarded from the CCD/SCI-bus)
- $00: NOT USED
- $01-$FF: RESERVED
  PAYLOAD contains the message

Related DC command: $0E (Debug)
- $00: NOT USED
- $01-$FF: RESERVED

Related DC command: $0F (OK/ERROR)
- $00: OK: general acknowledgement
- $01: ERROR: SYNC, invalid value
- $02: ERROR: LENGTH, invalid value
- $03: ERROR: DATA CODE, packet source and target cannot be the same

- $04: ERROR: DATA CODE, packet source and target conflict
- $05: ERROR: DATA CODE, invalid target
- $06: ERROR: DATA CODE, invalid DC command
- $07: ERROR: SUB-DATA CODE, invalid value
- $08: ERROR: SUB-DATA CODE, not enough information
- $09: ERROR: PAYLOAD, missing value(s)
- $0A: ERROR: PAYLOAD, invalid value(s)
- $0B: ERROR: CHECKSUM, invalid value
- $0C: ERROR: PACKET, invalid frame format
- $0D: ERROR: PACKET, timeout occurred
- $0E: ERROR: PACKET, unknown source
- $0F: ERROR: SCANNER, internal error
- $FF: ERROR: FATAL
- $10-$FE: RESERVED

3. Example packets (don't use these yet)

3.1 Sent from laptop:

SYNC	LENGTH HB	LENGTH LB	DATA CODE	SUB-DATA CODE	PAYLOAD	CHECKSUM
$33	$00	$02	$00	$00		$02

Table 4. Reboot scanner (simplest packet there is).

SYNC	LENGTH HB	LENGTH LB	DATA CODE	SUB-DATA CODE	PAYLOAD	CHECKSUM
$33	$00	$02	$01	$00		$03

Table 5. Handshake request (another simple packet).

SYNC	LENGTH HB	LENGTH LB	DATA CODE	SUB-DATA CODE	PAYLOAD	CHECKSUM
$33	$00	$17	$01	$00	$43 $48 $52 $59 $53 $4C $45 $52 $43 $43 $44 $53 $43 $49 $53 $43 $41 $4E $4E $45 $52	$37

Table 6. Handshake response.

In the PAYLOAD section the scanner responds with an ASCII encoded text:

$43 $48 $52 $59 $53 $4C $45 $52 $43 $43 $44 $53 $43 $49 $53 $43 $41 $4E $4E $45 $52 = CHRYSLERCCDSCISCANNER

SYNC	LENGTH HB	LENGTH LB	DATA CODE	SUB-DATA CODE	PAYLOAD	CHECKSUM
$33	$00	$02	$02	$00		$04

Table 7. Scanner status report request.

SYNC	LENGTH HB	LENGTH LB	DATA CODE	SUB-DATA CODE	PAYLOAD	CHECKSUM
$33	$00	$XX	$02	$00	$XX $XX $XX $XX $XX $XX $XX $XX	$CS

Table 8. Scanner status report response.

$XX $XX = some bytes describing something...
$XX $XX = same
$XX $XX = same
$XX $XX = same

SYNC	LENGTH HB	LENGTH LB	DATA CODE	SUB-DATA CODE	PAYLOAD	CHECKSUM
$33	$00	$08	$16	$00	$B2 $20 $22 $00 $00 $F4	$06

Table 9. Send a DRB request message to the CCD-bus.

DRB request message: $B2 $20 $22 $00 $00 $F4
- $B2: DRB request message ID byte
- $20: target module on the CCD-bus (Body Control Module, BCM)
- $22: command: read RAM/ROM/EEPROM value
- $00: RAM/ROM/EEPROM address high byte
- $00: RAM/ROM/EEPROM address low byte
- $F4: checksum

SYNC	LENGTH HB	LENGTH LB	DATA CODE	SUB-DATA CODE	PAYLOAD	CHECKSUM
$33	$00	$08	$49	$00	$F2 $20 $22 $15 $EA $33	$B7

Table 10. Response to a DRB request message from the CCD-bus.

DRB response message: $F2 $20 $22 $15 $EA $33
- $F2: DRB response message ID byte
- $20: responding module on the CCD-bus (Body Control Module, BCM)
- $22: responding to this command: read RAM/ROM/EEPROM
- $15: RAM/ROM/EEPROM value at the previously given 16-bit address ($0000)
- $EA: RAM/ROM/EEPROM value at the next 16-bit address ($0001)
- $F7: checksum

Convert DATA CODE byte from hexadecimal to binary and refer to Table 2. to figure out the source, target and command bits.