Chrysler CCD/SCI Scanner UART protocol

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1. Frame format

Start of frame	Data length		Data description		Data	End of frame
SYNC	**LENGTH HB**	**LENGTH LB**	**DATA CODE**	**SUB-DATA CODE**	**PAYLOAD**	**CHECKSUM**
$3D	$00	$06	$05	$01	$00 $3D $14 $B0	$0D

Table 1. Frame format.

1.1 **SYNC** byte: fixed value at the beginning of every message ($3D).

1.2 **LENGTH** bytes: number of bytes following (not including these two) until CHECKSUM byte is reached. Maximum message length is limited to 1024 bytes. Size: 2 bytes.

1.3 **DATA CODE** byte: describes the source, target and command. Size: 1 byte.

1.4 **SUB-DATA CODE** byte: command extension if the command alone is not enough to describe the purpose of the message. Size: 1 byte

1.5 **PAYLOAD** byte(s): optional. Arbitrary data can be stored here. Size: limited to a maximum of 1024-6=1018 bytes.

1.6 **CHECKSUM** byte: all bytes, except SYNC, summed up, lower byte of the result is placed here for error detection. Size: 1 byte.

2. Frame bytes in detail

2.1 DATA CODE byte description

DATA CODE byte							
Source		Target		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 | source of the frame:
- 2b00: USB - 2b01: CCD
- 2b10: PCM - 2b11: TCM

Bit 5:4 | target of the frame:
- 2b00: USB - 2b01: CCD
- 2b10: PCM - 2b11: TCM

USB: the scanner/laptop itself
CCD: all modules on CCD-bus
PCM: engine controller on SCI-bus
TCM: transmission controller on a separate SCI-bus

Possible routes of frames:
USB>USB, USB>CCD, USB>PCM, USB>TCM,
CCD>USB, PCM>USB, TCM>USB

Bit 3:0 | command
- 4b0000 ($00): Reset
- 4b0001 ($01): Handshake
- 4b0010 ($02): Status
- 4b0011 ($03): Settings
- 4b0100 ($04): Request
- 4b0101 ($05): Response
- 4b0110 ($06): Message TX
- 4b1001 ($07): Message RX
- 4b1010-4b1101 ($08-$0D): RESERVED
- 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.

Individual bits have no special meaning. Different commands have different SUB-DATA CODE bytes.

Related command: $00 (Reset)
- $00-$FF: RESERVED

Related command: $01 (Handshake)
- $00: Request scanner to send handshake over USB connection
- $01: Send handshake and hardware/firmware information too
- $02-$FF: RESERVED

Related command: $02 (Status)
- $00-$FF: RESERVED

Related command: $03 (Settings)
- $00: Heartbeat and indicator LED on-time
- $01: Set CCD-bus transceiver chip on/off
- $02: Set SCI-bus speed and configuration
- $03-$FF: RESERVED

Related command: $04 (Request)
- $00: Hardware/Firmware information
- $01: Timestamp
- $02: Battery voltage
- $03: External EEPROM checksum byte
- $04-$FF: RESERVED

Related command: $05 (Response)
- $00-$FF: Same as $04 (Request)

Related command: $06 (Message TX)
- $00: Stop ongoing message transmission
- $01: Send single message
- $02: Send repeated messages
- $03-$FF: RESERVED

Related command: $07 (Message RX)
- $00-$FF: Same as $06 (Message TX)

Related command: $0E (Debug)
- $00-$FF: RESERVED

Related command: $0F (OK/ERROR)
- $00: OK: general acknowledgement
- $01: ERROR: LENGTH, invalid value
- $02: ERROR: DATA CODE, invalid command
- $03: ERROR: SUB-DATA CODE, invalid value
- $04: ERROR: PAYLOAD, invalid value
- $06: ERROR: PACKET, timeout occurred
- $07: ERROR: Buffer overflow
- $FA: ERROR: external EEPROM not found
- $FB: ERROR: external EEPROM invalid checksum
- $FC: ERROR: external EEPROM read error
- $FD: ERROR: external EEPROM write error
- $FE: ERROR: internal error
- $FF: ERROR: FATAL
- $08-$F9: RESERVED

3. Example packets

SYNC	LENGTH HB	LENGTH LB	DATA CODE	SUB-DATA CODE	PAYLOAD	CHECKSUM
$3D	$00	$02	$00	$00		$02

Table 4. Reboot scanner.

SYNC	LENGTH HB	LENGTH LB	DATA CODE	SUB-DATA CODE	PAYLOAD	CHECKSUM
$3D	$00	$02	$01	$00		$03

Table 5. Handshake request.

SYNC	LENGTH HB	LENGTH LB	DATA CODE	SUB-DATA CODE	PAYLOAD	CHECKSUM
$3D	$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
$3D	$00	$08	$16	$01	$B2 $20 $22 $00 $00 $F4	$07

Table 7. Send a DRB request message on the CCD-bus.

DRB request message: $B2 $20 $22 $00 $00 $F4
- $B2: ID byte for DRB request message
- $20: target module on the CCD-bus ($20 = Body Control Module, BCM)
- $22: command: read RAM/ROM/EEPROM value
- $00: RAM/ROM/EEPROM address (16-bit) high byte
- $00: RAM/ROM/EEPROM address (16-bit) low byte
- $F4: checksum

SYNC	LENGTH HB	LENGTH LB	DATA CODE	SUB-DATA CODE	PAYLOAD	CHECKSUM
$3D	$00	$0C	$47	$01	$00 $64 $FC $C9 $B2 $20 $22 $00 $00 $F4	$65

Table 8. Echo of the DRB request message on the CCD-bus.

Payload contains the timestamp of message reception:
- $00 $64 $FC $C9: timestamp in milliseconds: 6618313 ms = 6618.313 s
- $B2 $20 $22 $00 $00 $F4: DRB request message itself

SYNC	LENGTH HB	LENGTH LB	DATA CODE	SUB-DATA CODE	PAYLOAD	CHECKSUM
$3D	$00	$0C	$47	$01	$00 $64 $FC $E7 $F2 $20 $22 $15 $EA $33	$01

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

Payload contains the timestamp of message reception:
- $00 $64 $FC $E7: timestamp in milliseconds: 6618343 ms = 6618.343 s
- $F2 $20 $22 $15 $EA $33: DRB response message

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)
- $33: checksum

Request/response delay is extremely small, only 30 milliseconds.