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# Chrysler CCD/SCI Scanner UART protocol

Last update: 2019.11.24

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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
- 4b0111 (\$07): Message RX
- 4b1000-4b1101 (\$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.