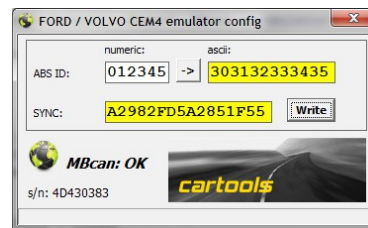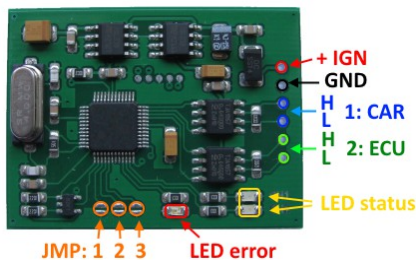# Volvo

CEM - 4

immo emulator

2009 up, CAN, 500 kB

Usage: VOLVO cars from 2009 and up to ~2012 (before SENSUS): **P2/P3 Platform**, after facelift (new type door handles) – S80, V70, XC70, XC60, Land Rover Freelander. 500 kB CAN, short ID, ABS_ID. Acts as a **CAN filter** between ECU and original CEM. Must store 8 bytes SYNC and 6 bytes ABS_ID into emulator AND / OR modify ECU EEPROM.

Installation: install emulator in CAN wiring between CEM and ECU (cut CAN wires), CAN 1: CAR (CEM) side, CAN 2: ECU side, power from main relay output. If you install emulator inside ECU it is good idea to install it in place of CAN EMI supressor.

Configuration and jumpers (JMP):

- JMP1: open to allow SYNC update, if short update is prohibited;
- JMP2: open for standalone mode (emulator acts as a CEM for ECU), short for standard mode;
- JMP3: open for default SYNC: **6666666666666666** , ABS_ID: **999999**; if short – use custom SYNC and ABS_ID stored into emulator EEPROM.

Common alignment methods:

- method 1 – modify default SYNC and ABS_ID into ECU EEPROM. Jumpers (solder bridges) must be: JMP1 short, JMP2 short, JMP3 open. Install emulator inside ECU and enjoy;
- method 2 – store necessary SYNC and ABS_ID into emulator. JMP1 must be open to allow EEPROM updates, JMP3 shorted (to use custom SYNC and ABS_ID stored into emulator EEPROM), MBcan or any suitable CAN logger must be attached to emulator CAN 1 (CEM / car) side:
  - Using MBcan: simply store necessary SYNC and ABS_ID;
  - Using CAN logger: speed 500kB, 11bit (short) id. To store necessary SYNC (ex: 0102030405060708) and ABS_ID (ex: 123456 = 313233343536 to ASCII) must send 2 frames:
    ```
    0x7FC 8 00 00 31 32 33 34 35 36
    0x7FE 8 01 02 03 04 85 06 07 08
    ```
  Must use least significant 6 characters of ABS hardware serial number, in ASCII. Example: full ABS_ID 000075123456, use only 123456, converted to ASCII character codes: 313233343536.
  Emulator must respond with same data (ID's are 7FD for ABS_ID and 7FF for SYNC):
    ```
    0x7FF 7 01 02 03 04 05 06 07 08
    0x7FD 8 00 00 31 32 33 34 35 36
    ```
  - Short JMP1 to prohibit SYNC updates. All configuration changes become active at next power-ON,

- If JMP2 is open, original messages from CEM are completely dropped and own ones are sent (standalone mode, "no CEM"). If JMP2 is shorted, original messages issued by CEM are modified to comply with ECU demands.

LEDs on emulator board:

- **LEDstatus** – two leds, CAN1, CAN2 activity
- **LEDerror** – CAN exchange error / ECU request received. If everything is OK, there must be a short blink at startup (all 3 LEDs together), then another short blink when ECU request is received. If there is a long blink instead, most likely ECU is NOT authorized (continuous requests – wrong SYNC?).