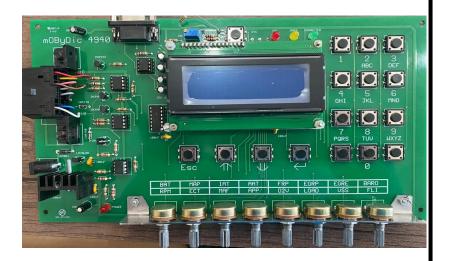## Features

- Simulates an OBD complient ECU
- Selectable protocolin setup menu
- Selectable gasoline / diesel PIDs
- Advanced Monitoring / Readiness funtions
- Generates DTC for each service separately
- Variable PID with 8 Potentiometers
- Programmable VIN value
- Simulates ISO9141-2 , KWP2000 , J1850PWM , J1850 VPWM , CAN
- SAE-J1979 / ISO15031-5 compatible
- Multiframe / multimessages operation

ÖZEN ELEKTRONIK

Multiple protocol OBD ECU simulator according to SAE j1979 and to ISO 15031-5

MOByDic 4940

PCM = powertrain control modul

1. General

After power on a LED test sequence is running then the LED Ready lits on and the simulator is ready. The LED connect lits on when a connection with selected protocol is done succesfully. The MIL LED blinks when no protocol is selected. The yellow data LED indicates the communication between the simulator and the OBD tester. By pressing the DTC button the MIL LED is on and the DTCs are generated. The DTC button is checked every time when a request message comes from OBD thr external OBD tester.

2. Setup menu

Once the LED test sequence is finished , the program goes into the Service menu where user can select the parameters. After this selection the menu point save and run must be selected. These parameters are saved in the onboard EEPROM memory. The setup menu has 2 pages. With pageup and page down keys user can can change these 2 pages.

SETUP   <1/2>

1. Protocol   : ISO9141
2. Fuel type   : Gasoline
3. 3.Monitoring

On this page everytime user press key 1 protocol changes. Also press key 1 till you select the desired protocol.
Pressing key 2 user can select gasoline / diesel
İf user press key 3 program goes to

1. MIS_SUP   : YES   <1/6>
2. MIS_RDY   : NO
3. FUEL_SUP   : NO
4. FUEL_RDY   : YES

Pressing on the key 1 changes MIS_SUP to YES or NO and pressing on key 2 changes MIS_RDY YES / NO and so on
With page up and page down key user can select one of these. 6 pages and set all the monitoring status

1. CCM_SUP   : YES   <2/6>
2. CCM_RDY   : NO
3. CAT_SUP   : NO
4. CAT_RDY   : YES

```
    1. HCAT_SUP : YES   <3/6>
    2. HCT_RDY   : NO
    3. EVAP_SUP  : NO
    4. EVAP_RDY  : YES




    1. AIR_SUP   : YES   <4/6>
    2. AIR_RDY   : NO
    3. ACRF_SUP  : NO
    4. ACRF_RDY  : YES




    1. O2S_SUP   : YES   <5/6>
    2. O2S_RDY   : NO
    3. HTR_SUP   : NO
    4. HTR_RDY   : YES




    1. EGR_SUP   : YES   <6/6>
    2. EGR_RDY   : NO
```

Now with ESC or Enter key user can finish the monitoring setting.

SETUP   <2/2>

```
    1. DTC1:P0100
    2. DTC2:P0101
    3. #xxxxxxxxxxxxxxxxx
    4. SAVE AND RUN
```

By pressing the key 1 the cursor is on under the first char of DTC1. As firsh char only P,B,C and U accepted as second char onşy 0..3 are accepted.press enter if you want to terminate the input. By pressing key 2 user can enter DTC2 similar to DTC1.
Pressing key 3 activates VIN entry. The cursor is on under the first char of VIN. Page up and page down key places the cursor under the desired char. And with alphanumeric keys user can enter a VIN. Finished wirh enter key

Finally press save and Run. Now is the simulator ready for connection with selected protocol (indicated on the 4. Line of the signon text.

3. Services

In the 4940 services 1 , 2 , 3 , 4, 7 ,9 and 10 are implemented.

3.1 Service 1

The purpose of this service is to allow access to current emission-related data values, including analogue inputs and outputs, digital inputs and outputs, and system status information. The request for information includes a parameter identification (PID) value that indicates to the on-board system the specific information requested
PID $00 is a bit-encoded PID that indicates, for each ECU, which PIDs that ECU supports. PID $00 is supported by all ECUs that respond to a service $01 request, because the external test equipment that conforms to ISO 15031-4 use the presence of a response message by the vehicle to this request message to determine which protocol is supported for diagnostic communications.

3.1.1 PCM (Powertrain ECU)

Implemented PIDs are :

If gasoline is selected

RPM , LOAD , VSS , FLI , ECT , MAF , APP , O2V

If diesel is selected

BAT , MAP , IAT , AAT , FRP , EGRP , EGRE , BARO

Common PIDs for both selection

RUNTM   =   time since simulator started
MIL_distance = Distance with MIL is ON. The distance is calculated according to Vss potentiometer position. If diesel car is selected . Vss is set to 90 km/h

OBDSUP = EOBD
Lambda is set to 1.03
MIL_Time = time with MIL on
CLR_time = time since DTC are cleared

3.2 Service 2

The purpose of this service is to allow access to emission-related data values in a freeze frame. This allows expansion to meet manufacturer specific requirements not necessarily related to the required freeze frame, and not necessarily containing the same data values as the required freeze frame. The request message includes a parameter identification (PID) value that indicates to the on-board system the specific information requested. PID specifications, scaling information, and display formats for the freeze frame are same as in Service 1. The ECU(s) will respond to this message by transmitting the requested data value stored by the system. All data values returned for sensor readings will be actual stored readings, not default or substitute values used by the system because of a fault with that sensor.

Not all PIDs are applicable or supported by all systems. PID $00 is a bit-encoded PID that indicates, for each ECU, which PIDs that ECU supports. Therefore, PID $00 is supported by all ECUs that respond to a service $02 request as specified even if the ECU does not have a freeze frame stored at the time of the request. PID $02 indicates the DTC that caused the freeze frame data to be storedThe frame number byte will indicate $00 for the mandated freeze frame data..

3.2.1 PCM (Powertrain ECU)

if the DTC button is pressed P0100 cause a freeze frame storage as follow :

Diesel Car

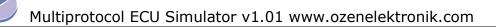| PID	Description	Stored Value
05	Engine coolant temp.	25
0C	Engine RPM	2000 1/min
0D	Vehicle speed sensor	90

Gasoline car

RPM , ECT and VSS are the actual potentiometer values.

not implemented for this ECU

3.3 Service 3

The purpose of this service is to enable the external test equipment to obtain emission-related DTCs. This is a two step process for the external test equipment.

Step 1 - Send a service $01, PID $01 request to get the number of emission-related DTCs from all ECUs that have this available. Each ECU that has a DTC(s) stored will respond with a message that includes the number of stored codes to be reported. If an ECU is capable of storing emission-related DTCs does not have stored DTCs, then that ECU responds with a message indicating zero DTCs are stored.

Step 2 - Send a service $03 request for all emission-related DTCs. Each ECU that has DTCs will respond with one or more messages, each containing up to three (3) DTCs. If no emission-related DTCs are stored in the ECU, then the ECU may not respond to this request.

DTCs are transmitted in two (2) bytes of information for each DTC. The first two (2) bits (high order) of the first (1) byte for each DTC indicate whether the DTCis a Powertrain, Chassis, Body, or Network DTC. The second two (2) bits will indicate the first (1)digit of the DTC (0 through 3). The second (2) nibble of the first (1) byte and theentire second (2) byte are the next three (3) hexadecimal characters of the actual DTC reported hexadecimal

If less than three (3) DTCs are reported, the response message used to report DTCs shall have their unused bytes set to zero to maintain the required fixed message length for all messages. If there are no DTCs to report, a response message is allowed, but not required for SAE J1850 and ISO 9141-2 interfaces. For ISO 14230-4 interfaces, the ECU will respond with a report containing no DTCs (DTC#1, DTC#2, and DTC#3 shall be all set to $00).

3.3.1 PCM (PowertrainCU)

Generates P0100 , P0101 default (programmable in setup menu)

3.4 Service 4

The purpose of this service is to provide a means for the external test equipment to command ECUs to clear all emission-related diagnostic information. This includes:

— Number of diagnostic trouble codes (can be read with Service $01, PID $01)
— Diagnostic trouble codes (can be read with Service $03)
— Trouble code for freeze frame data (can be read with Service $02, PID $02)
— Freeze frame data (can be read with Service $02)
— Oxygen sensor test data (can be read with Service $05)
— Status of system monitoring tests (can be read with Service $01, PID $01)
— On-board monitoring test results (can be read with Services $06 and $07)
— Distance travelled while MIL is activated(can be read with Service $01, PID $21

3.5 Service 9

The purpose of this service is to enable the external test equipment to request vehicle specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs. Some of this information may be required by regulations and some may be desirable to be reported in a standard format if supported by the vehicle manufacturer.
An optional feature of this service is for the ECU to indicate which INFOTYPEs are supported INFOTYPE $00 is a bit-encoded value that indicates support for INFOTYPEs from $01 to $20. INFOTYPE $20 indicates support for INFOTYPEs $21 through $40, etc. This is the same concept as used for PID support in services $01 and $02

3.1.1 PCM (Powertrain ECU)

VIN = Programmable

Service 7 generates 2 DTC P0100 and P0101 once at power on. If deleted with service 4 they are activated again only at power on

Service 10 generates 2 permanant DTC U0100 and U0101 they can not deleted.