motorsport electronics

EPAS Ultra User Manual
EPAS18

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1 Introduction

1.1 What is EPAS Desktop Pro?

The Program enables the operating parameters of the DC Electronics' EPAS Ultra ECU to be viewed in real time. EPAS Desktop Pro also provides facilities for configuring and re-programming the EPAS Ultra ECU via the serial port of the host PC.

With DCE's EPAS you can:

- View real-time data for:
  - Battery voltage
  - Current consumption
  - Applied steering torque
  - Steering motor duty
  - ECU box temperature
  - Steering angle
  - Control switch setting
  - Digital input and output states
- Read ECU serial number, firmware version and system type
- Configure the EPAS Ultra ECU via the serial port of the host PC
- View and alter the relationship between torque input and motor duty for each control switch position
- Update the firmware of the EPAS Ultra ECU via the serial port of the host PC

1.2 About This Manual

This User Manual is intended to complement the help files built into the EPAS Desktop Pro application. The chapters are presented in an order intended to help new users understand the program as quickly as possible. Be aware, however, that this manual and the program's help file assume that you are comfortable using the Microsoft Windows 98/2000/Me/NT4/XP/Vista operating system. If you are new to Windows you may find the Windows Online Help file useful. To access Microsoft Windows Help choose **Help** from the start menu on your Windows desktop.

1.3 Typographical Conventions

Please be aware of the following typographical conventions when reading this manual:

- Menu items that you are instructed to choose appear with an arrow (➡) symbol separating each menu level. For example, if you if you are instructed to choose the Parameters command in the Setup menu it will appear as **Setup ➡ Parameters**.
- Where a button or other control needs to be clicked the name of the button or control will be shown in **bold** text.

1.4 Getting Technical Support

For technical support with EPAS Desktop Pro please contact:

sales@dcemotorsport.com

The table below lists the ways to contact DC Electronics:

Contact Method	Address or Number
Website:	www.dcemotorsport.com
Email:	sales@dcemotorsport.com
Telephone:	+44 (0)1621 856451
Mail:	DC Electronics – Motorsport Specialist Ltd Units 1 & 2 Quayside Industrial Park Bates Road Maldon ESSEX CM9 5FA United Kingdom

2 Getting Started

EPAS Desktop Pro can be downloaded from our website:- www.dcemotorsport.com – go to the EPAS page.

2.1 System Requirements

Before attempting to install EPAS Desktop Pro, make sure that your computer meets the following minimum system requirements shown in the table below:

Component	Requirement
Processor	Pentium class processor or equivalent
Operating System	Microsoft Windows 98/Me/NT4/2000/XP/Vista
Hard Disk Space	10Mb
System Memory	32Mb (64Mb recommended)
Other Drives	CD-ROM
Monitor/Display	Super VGA (800 x 600) or higher resolution with 256 colours
Serial Port	One serial port or USB port with USB-serial adapter
Pointing Device	Microsoft Mouse or compatible pointing device

2.2 Installing EPAS Desktop Pro

Before you can run EPAS Desktop Pro you must install it on the hard disk of your computer.

Follow these steps to install the software:

- Switch on your computer and log on in the normal way.
- Go to www.dcemotorsport.com/EPAS
- Click on EPASDesktopPro_v0.1.0.zip
- Follow the on screen instructions.
- The installation process places shortcuts to EPAS Desktop Pro on the computer's desktop and Start menu.

2.3 Uninstalling EPAS Desktop Pro

EPAS Desktop Pro can be removed from your computer by selecting the **Add and Remove Programs** option within Windows **Control Panel**. Find EPAS Desktop Pro in the list of installed software, select it, and then click **Remove**.

This will remove the EPAS Desktop Pro software together with its shortcuts and configuration entries.

2.4 Using Online Help

Once EPAS Desktop Pro is running you can view items in the Help menu at any time. To display the online Help file press choose **Help ➡ Help Topics** from the main menu.

2.5 Starting EPAS Desktop Pro

Start EPAS Desktop Pro by either double clicking the shortcut on the computer's desktop or by selecting **Programs ➡ PolyLogic ➡ EPAS Desktop Pro** from the **Start** button on the desktop's toolbar.

2.6 Exiting EPAS Desktop Pro

You can exit EPAS Desktop Pro using any of the following methods:

- Choose **File ➡ Exit** from the main menu, or
- Click the close button ☒ in the upper right corner of the title bar, or
- Press the key combination Alt + F4.

3 Getting to Know EPAS Desktop Pro

This chapter provides an overview of the EPAS Desktop Pro user interface. It describes the main window, menu, and other important features. To help you better understand the program and become familiar with its features, please review this chapter thoroughly prior to connecting a PC to an EPAS Ultra ECU.

3.1 Tour of the EPAS Desktop Pro User Interface

When you start EPAS Desktop Pro the main program window appears as shown below.

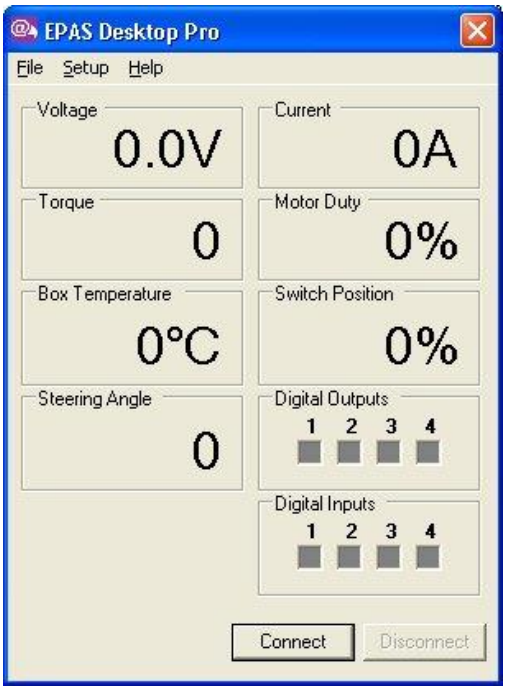


Figure 1 - EPAS Desktop Pro Main Screen (Inactive)

At the top of the main program window a menu provides access to a majority of the program's features.

3.2 Main Menu

Figure 2 –EPAS Desktop Pro Main Menu

The Main Menu (Figure 2), which is directly below the title bar, displays the menu headings. Click a menu heading to open the menu and choose a command.

Use either of the following methods to choose a menu command:

- Open the menu and click the command, or
- Open the menu, use the Up arrow or Down arrow key to highlight a command, and then press <Enter>.

In addition, each menu may be opened by pressing the <Alt> key and then pressing the key associated with the required menu. Section 3.3 lists all the available menu commands.

3.3 Command Reference

The following commands are available:

Menu Command	Keyboard Shortcut	Section
File Menu	**Alt + F**	
Exit	Alt + F, X	2.6
Setup Menu	**Alt + S**	
Serial Port	Alt + S, S	5.1
Firmware	Alt + S, F	5.2
Parameters	Alt + S, P	5.3
Maps	Alt + S, M	5.7
Help Menu	**Alt + H**	
Help Topics	Alt + H, H	-
About	Alt + H, A	-

4 Viewing EPAS Ultra ECU Status

This chapter describes how EPAS Desktop Pro allows you to connect to an EPAS Ultra ECU and view its status.

4.1 Connecting to EPAS Ultra ECU

The status of an active EPAS Ultra ECU can be viewed in the following way:

1. Connect the serial port connector on the PC to the serial port connector on the EPAS Ultra ECU using a suitable cable.
2. Click the **Connect** button on the main screen.
3. The current status of the EPAS Ultra ECU will be displayed in the various panels on the main screen and these will be updated every 500ms.

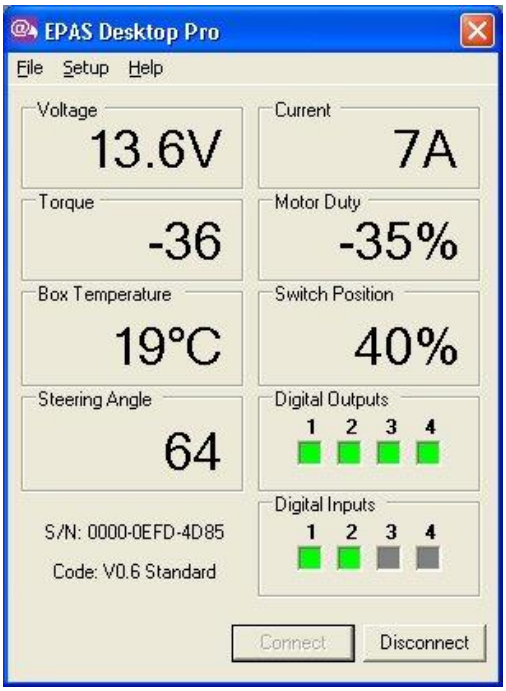


Figure 3 - EPAS Desktop Pro Main Screen (Active)

4.2 Main Screen Displays

The panels on the main screen display the following information:

Item	Description
Voltage	Displays instantaneous EPAS Ultra ECU supply voltage in Volt. Resolution is 0.1V and maximum reading is 25.5V.
Current	Displays instantaneous EPAS Ultra ECU current consumption in Amp. Resolution is 0.5A and maximum reading is 25.5A.
Torque	Displays instantaneous applied steering torque in bits. Resolution is 1 bit and maximum reading is 255 bits. This value is positive when the applied steering torque is in the clockwise direction.
Motor Duty	Displays instantaneous motor duty in %. Resolution is 1%. A value of 100% indicates that the motor is operating at full power.
Box Temperature	Displays instantaneous EPAS Ultra ECU box temperature in ºC. Resolution is 1ºC and the EPAS Ultra ECU will shutdown if the box temperature rises above a preset safe limit.
Switch Position	Displays instantaneous steering control position in %. Resolution is 1%. A value of 100% indicates that the control is at its maximum position, i.e. fully clockwise.
Steering Angle	Displays instantaneous steering angle in bits. Resolution is 1 bit and maximum reading is 255 bits.
Digital Outputs	Displays instantaneous status of the four digital outputs. The function of each output is determined by the system configuration.
Digital Inputs	Displays instantaneous status of the two digital inputs. The function of each input is determined by the system configuration.
S/N	Unique 64-bit serial number of EPAS Ultra ECU.
Code	Firmware version and system type.

4.3 Disconnecting from EPAS Ultra ECU

To stop viewing the status of an active EPAS Ultra ECU click the **Disconnect** button on the main screen.

NOTE: It is important to disconnect in this way, rather than just closing the EPAS Desktop Pro application, as otherwise the connection to the EPAS Ultra ECU will remain active and any attempt to reconnect will fail unless the EPAS Ultra ECU is reset first.

5 Configuration

EPAS Desktop Pro provides facilities for the EPAS Ultra ECU to be configured via the serial port.

This chapter describes how this configuration is carried out.

NOTE: Configuration changes can only be made whilst EPAS Desktop Pro is not actively communicating with an EPAS Ultra ECU. Disconnect any active connection, by clicking the **Disconnect** button on the main screen, before attempting to make changes to the configuration.

5.1 Serial Port

To alter the serial port that EPAS Desktop Pro uses to communicate with the EPAS Ultra ECU do the following:

1. Choose **Setup ➡ Serial Port** from the main menu. The Setup Serial Port Dialog (Figure 4) appears.

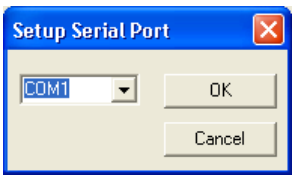


Figure 4 - Setup Serial Port Dialog

2. Select the new serial port from the list.

3. Click **OK** to update the serial port or **Cancel** to leave it unchanged.

5.2 Firmware

The firmware of the EPAS Ultra ECU can be re-programmed via the serial port.

The **Setup ➡ Firmware** option from the main menu has been provided to enable this.

IMPORTANT: Do not attempt to upload new firmware to the EPAS ECU without first contacting DC Electronics and obtaining the correct file for your system and application.

Procedure
Do the following to update the firmware:

1. Connect the PC to the EPAS ECU via the serial lead.
2. Start EPAS Desktop or EPAS Desktop Pro.
3. Ensure that the EPAS ECU is not powered up.
4. Select **Setup ➡ Firmware** from the main menu, the File Open dialog will be displayed.
5. Locate the required .hex file and click **Open**, the Upload Hex File dialog (Figure 1) will be displayed.

6. Check the connection between the PC and the EPAS ECU and click **OK** or **Cancel** to abandon the firmware update process.
7. The Upload Hex File dialog shows that EPAS Desktop is attempting to communicate with the EPAS ECU (Figure 5).

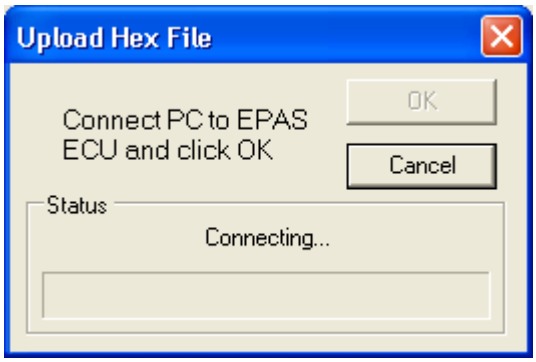


Figure 5 - Upload Hex File Dialog (Connecting)

8. Switch on the EPAS ECU, the Upload Hex File dialog shows that the selected hex file is being uploaded to the EPAS ECU (Figure 6).

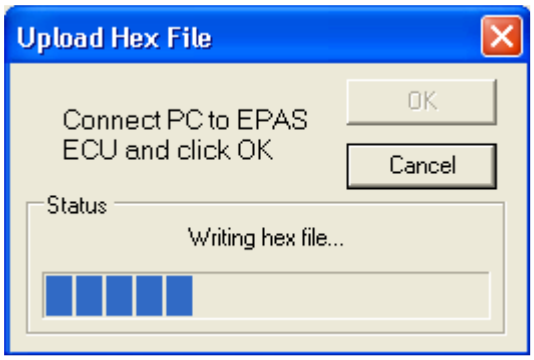


Figure 6 - Upload Hex File Dialog (Writing)

9. Once the entire hex file has been written the EPAS ECU will reset and run with the new firmware.

5.3 Changing Parameters & CAN Message IDs

The operating parameters of the EPAS Ultra ECU can be viewed and altered via the serial port in the following way:

1. Select the **Setup ➡ Parameters** option from the main menu. The Setup Parameters dialog (Figure 7) is displayed.

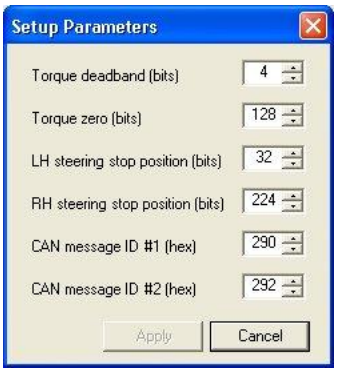


Figure 7 - Setup Parameters Dialog

2. The Setup Parameters dialog displays the current values of all the user configurable parameters of the EPAS Ultra ECU.

3. Make any changes that are required and click **Apply** or **Cancel** to leave the parameters unchanged.

WARNING: Care must be observed when changing EPAS Ultra ECU parameters. Using the wrong values could damage both the EPAS Ultra ECU and the steering unit.

Currently, the following four parameters are defined:

- Torque deadband
- Torque zero
- LH steering stop position
- RH steering stop position
- CAN message ID #1
- CAN message ID #2

These will be described in detail in the following sections.

Torque Deadband
The torque deadband, measured in bits, defines the amount that the steering torque sensor value needs to move from the zero value before any steering power assistance is delivered.

The default value for the torque deadband is 4 bits. Decreasing the torque deadband value can make the steering more responsive but can also lead to 'hunting' where the control unit constantly attempts to counteract a very small steering torque offset.

Increasing the torque deadband value will make the steering less responsive but can compensate for a drifting or noisy torque sensor.

Torque Zero
The torque zero, measured in bits, defines the steady state torque reading where no steering torque is applied. All the steering torque sensors encountered so far have a zero of 128 ±10 bits. The default value for the torque zero is 128 bits.

The torque zero parameter value is normally altered using the zeroing procedure built into the firmware of the unit which does not need a computer to be connected. In this procedure the power to the unit is switched on and then off (before the fault LED has gone out) three times in succession. The next time power is applied the fault LED will flash while the torque zero parameter is updated. It is important that, during this procedure, no steering torque is applied otherwise a false zero value will be set.

If the torque zero parameter is incorrect then the steering will tend to be more responsive, or lighter, in one direction than the other.

Steering Stop Settings
A steering angle sensor can be used to limit the motor power when the steering reaches either end stop. This sensor must be fitted so that its output voltage is at its lowest point when the steering is against the left-hand steering stop and at its highest when the steering is against the right-hand steering stop.
When the steering reaches either end stop the motor power is progressively reduced over a 1.5 second period.

LH Steering Stop Position
The LH steering stop position, measured in bits, is the position of the left-hand steering stop as indicated by the steering angle sensor.
Motor power reduction will occur when the measured steering angle is less EPAS Ultra Parameters 3 than the LH steering stop position setting.

RH Steering Stop Position
The RH steering stop position, measured in bits, is the position of the right-hand steering stop as indicated by the steering angle sensor.
Motor power reduction will occur when the measured steering angle is greater than the RH steering stop position setting.

CAN Message IDs
The EPAS Ultra ECU has a CAN interface through which instantaneous sensor values and operating status are transmitted. Standard Baud rate is 1Mbit/s.

This information is grouped into three 8 byte messages each with their own ID. The CAN interface employs 11-bit message IDs so valid CAN message ID values lie in the range 0x001 to 0x7FF (1 to 2047).

CAN Message ID #1
Sets the ID for the first CAN message.

CAN Message ID #2
Sets the ID for second CAN message.

5.4 Transmitted CAN Messages

Two CAN messages are currently defined.

The 11-bit ID for each CAN message can be set by the user but the format of the payload of each message is fixed and is described in the following sections.

5.5 CAN Message #1

Message ID: 0x290 (default)

Update rate: 100ms

Message Byte	Description
D0	Torque (bits)
D1	Motor duty (%)
D2	Current (A)
D3	Supply voltage (1 bit = 100mV)
D4	Switch position (0 to 15)
D5	Box temperature (ºC)
D6	Torque A (raw value in bits)
D7	Torque B (raw value in bits)

5.6 CAN Message #2

Message ID: 0x292 (default)

Update rate: 100ms

Message Byte	Description
D0	Steering angle (bits)
D1	Analogue channel #1 (bits)
D2	Analogue channel #2 (bits)
D3	Selected map (0 to 5)
D4	Error Messages
D5	Bit field of digital I/O values
D6	Bit field of status flags: b0 – Program paused b1 – Motor moving forwards b2 – Motor moving in reverse b3 – Host mode active b4 – Fault light status b5 - Reserved b6 - Reserved b7 – Reserved
D7	Bit field of limit flags: b0 – Steering at LH stop b1 – Steering at RH stop b2 – Over-temperature condition b3 – Not used b4 – Not used b5 – Not used b6 – Not used b7 – Remote mode active

Error Messages
The error code resides in byte d4 of CAN Message #2.

Defined error codes are as follows:

100	Low battery voltage
101	Torque sensor not connected
102	Torque sensor fault
103	Current sensor fault
104	Motor power fault
105	Motor not connected
106	Motor is stalled or shorted
107	Clutch not connected
108	Clutch is stalled or shorted
109	Over current
110	Over temperature
111	Internal error

Not all error codes can be produced by all systems, e.g. EPAS01 Motorsport assembly does not have a clutch so error codes 107 and 108 cannot occur.

5.7 Maps

The relationship between steering torque input and motor duty output for each control switch setting can be altered via the serial port in the following way:

1. Select the **Setup ➡ Maps** option from the main menu. The Setup Maps dialog (Figure 8) is displayed.

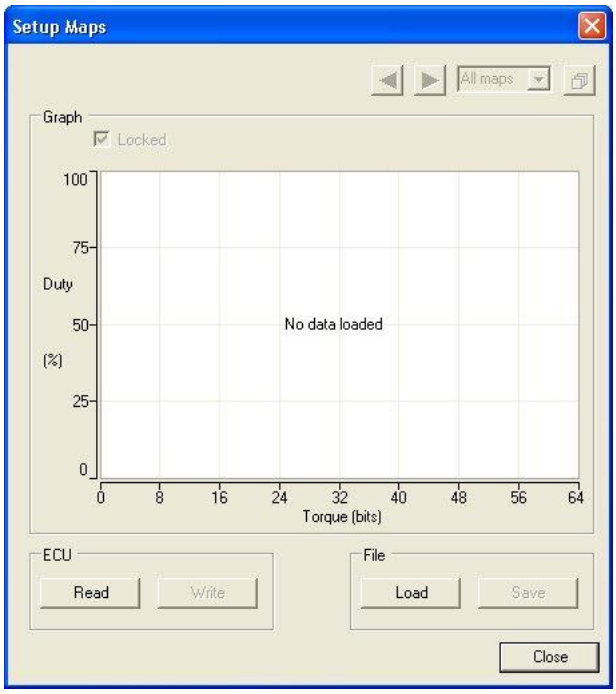


Figure 8 - Setup Maps Dialog (No Maps)

2. Click **Read** to read the maps from the EPAS Ultra ECU or **Load** to load map data from a disk file.

3. Once map data is available the Setup Maps dialog displays all five maps on the same set of axes (Figure 9).

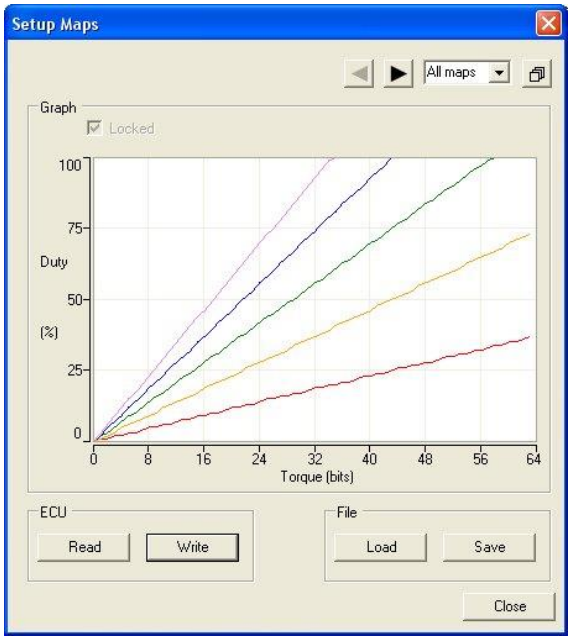


Figure 9 - Setup Maps Dialog (All Maps)

4. Use the arrow buttons or the drop-down box in the top right-hand corner of the dialog to select the map to be edited (Figure 10).

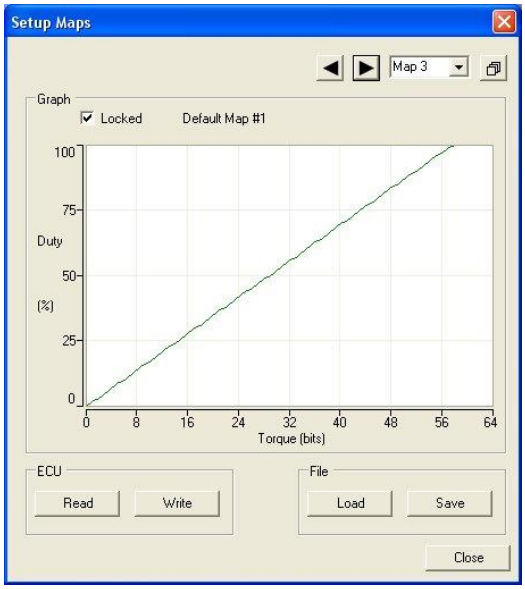


Figure 10 - Setup Maps Dialog (One Map)

5. When the **Locked** checkbox is not checked edit markers are displayed at 16 places along the map (Figure 11). Use the mouse to drag each of the markers until the required map shape is obtained. Note that each marker is constrained by the markers either side of it.

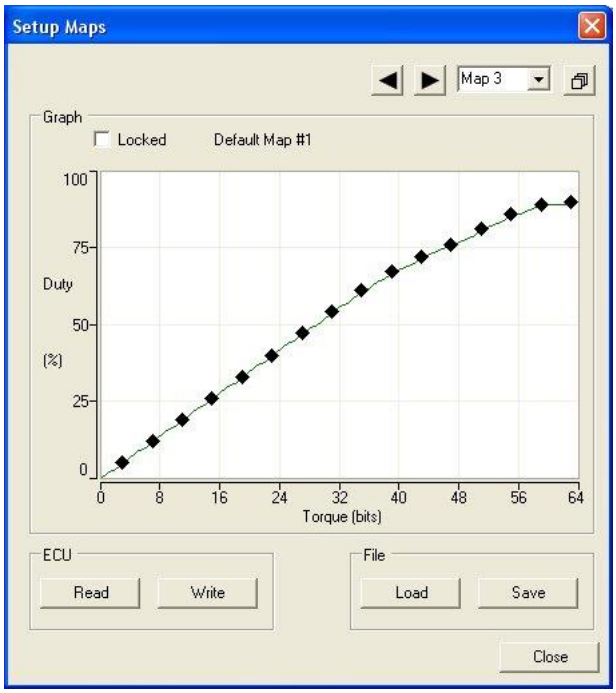


Figure 11 - Setup Maps Dialog (Map Edit)

6. When the map changes are complete click **Write** to write the map data to the EPAS Ultra ECU or **Save** to save the map data to a disk file.

7. When editing a map clicking the right mouse button in the graph area brings up a context menu that allows the comment associated with the map to be edited. When this menu option is selected the Edit Map Comment dialog (Figure 12) is displayed. Make any changes that are required and then click **OK** or **Cancel** to leave the comment unchanged. Note that these comments are only stored in the disk file and are not read from or written to the EPAS Ultra ECU.

Figure 12 - Edit Map Comment Dialog

6 AUTONOMOUS EPAS OPERATION

6.1 Introduction

This section describes how the modified EPAS Ultra Electronic Power Assisted Steering Controller can be operated by an external system for autonomous applications. Specific Firmware needs to be purchased for this function.

6.2 Operation

The EPAS Ultra Controller uses a CAN interface to provide sensor and status information (e.g. motor duty, steering angle, etc) to external systems.

Modified versions of the EPAS Ultra Controller also allow an external system to use this CAN interface to specify the steering map and applied torque thus overriding the map switch and torque sensor physically connected to the controller.

All transmitted CAN messages used are described in Section 5.4. An external system uses CAN Message #3 to periodically provide control information to the EPAS Ultra Controller.

In 'local' mode, where the steering map selected via CAN Message #3 is zero, the EPAS Ultra Controller operates as normal using the map switch and torque sensor connected to it. An external system can activate 'remote' mode by specifying a steering map (in the range 1 to 5) via CAN Message #3 together with a torque demand for bytes D1 and D2.
Torque demands are signed 8-bit values that treat 128 bits (80h) as the zero point. Two torque demand values are required and these values should mirror each other, i.e. the sum of the two torque demand values should equal 255.

Practical Example
To turn to the right slowly send:-

MAP value between 1 and 5 (the higher the map value, the faster the motor will move)
Torque A = 143
Torque B = 112

To turn to the right more quickly send:-

Map value between 1 and 5 (the higher the map value, the faster the motor will move)
Torque A = 158
Torque B = 97
The maximum torque value you can enter is 64 bits +/- either side of 128.

6.3 Manual Override Of Remote Mode

If the system is to be used in remote mode where the driver may want to take control of the system then an external control system should be used to monitor the transmitted internal torque sensor signals In CAN message 1, byte D6 and D7.

During remote operation these values should remain fairly static. Should the steering wheel then be subjected to an external force (a driver taking the wheel) these values will spike and this should be used to trigger a response where CAN message #3 now transmits a MAP request of Zero.

6.4 CAN Messages

The CAN bus interface for the modified EPAS Ultra Controller operates at 500kb/s and uses 11-bit IDs. Other bus rates are available by request.

The external system needs to transmit CAN Message #3 at a fairly high rate; between 50Hz and 200Hz is ideal. If the EPAS Ultra Controller does not receive this message for 200ms it will revert to 'local' mode.

Received CAN Messages

For modified controllers a third CAN message has been defined to allow an external system to set the steering map and torque demand remotely.

CAN Message #3

Message ID: 0x296 (fixed)

Update rate: 5ms

Message Byte	Description
D0	Steering map: 0 – Local mode 1 to 5 – Steering map
D1	Torque A (raw value in bits)
D2	Torque B (raw value in bits)
D3	Not used
D4	Not used
D5	Not used
D6	Not used
D7	Not used

7 Troubleshooting

Problem	**I can't connect to the EPAS Ultra ECU or read/write its parameters.**
Cause	The EPAS Ultra ECU is not powered up.
Action	Turn on the Master switch, and the ignition switch (if necessary).
Cause	The serial lead is not connected.
Action	Connect the EPAS Ultra ECU to the serial port of the host computer using the correct cable and try again.
Cause	The lead is not making a good connection.
Action	Ensure both connectors are fully home and that the lead is not damaged in any way.
Cause	The serial port is not configured correctly.
Action	Choose **Setup ➡ Serial Port** from the main menu and select the correct serial port. If you are using a USB to serial adapter use Windows Device Manager to determine the COM port number.
Cause	A previous connection was not disconnected correctly.
Action	Reset EPAS Ultra ECU and try again.

8 Error Messages

One of the following error messages will be displayed whilst trying to connect to an EPAS Ultra ECU using EPAS Desktop Pro when the EPAS Ultra ECU fault light is lit:

Message Error 100 : Low battery voltage

Meaning The battery supply voltage has fallen below a preset threshold and the EPAS Ultra ECU cannot continue to operate safely.

Message Error 101 : Torque sensor not connected

Meaning The torque sensor is not responding either because it is faulty or because it is not connected correctly.

Message Error 102 : Torque sensor fault

Meaning The reading from the torque sensor is incorrect either because it is faulty or because it is not connected correctly.

Message Error 103 : Current sensor fault

Meaning The reading from the internal current sensor is incorrect.

Message Error 104 : Motor power fault

Meaning The power drawn when the motor power relay is energised is higher than expected.

Message Error 105 : Motor not connected

Meaning The power steering motor is not drawing enough current indicating that it may not be connected.

Message Error 106 : Motor is shorted or stalled

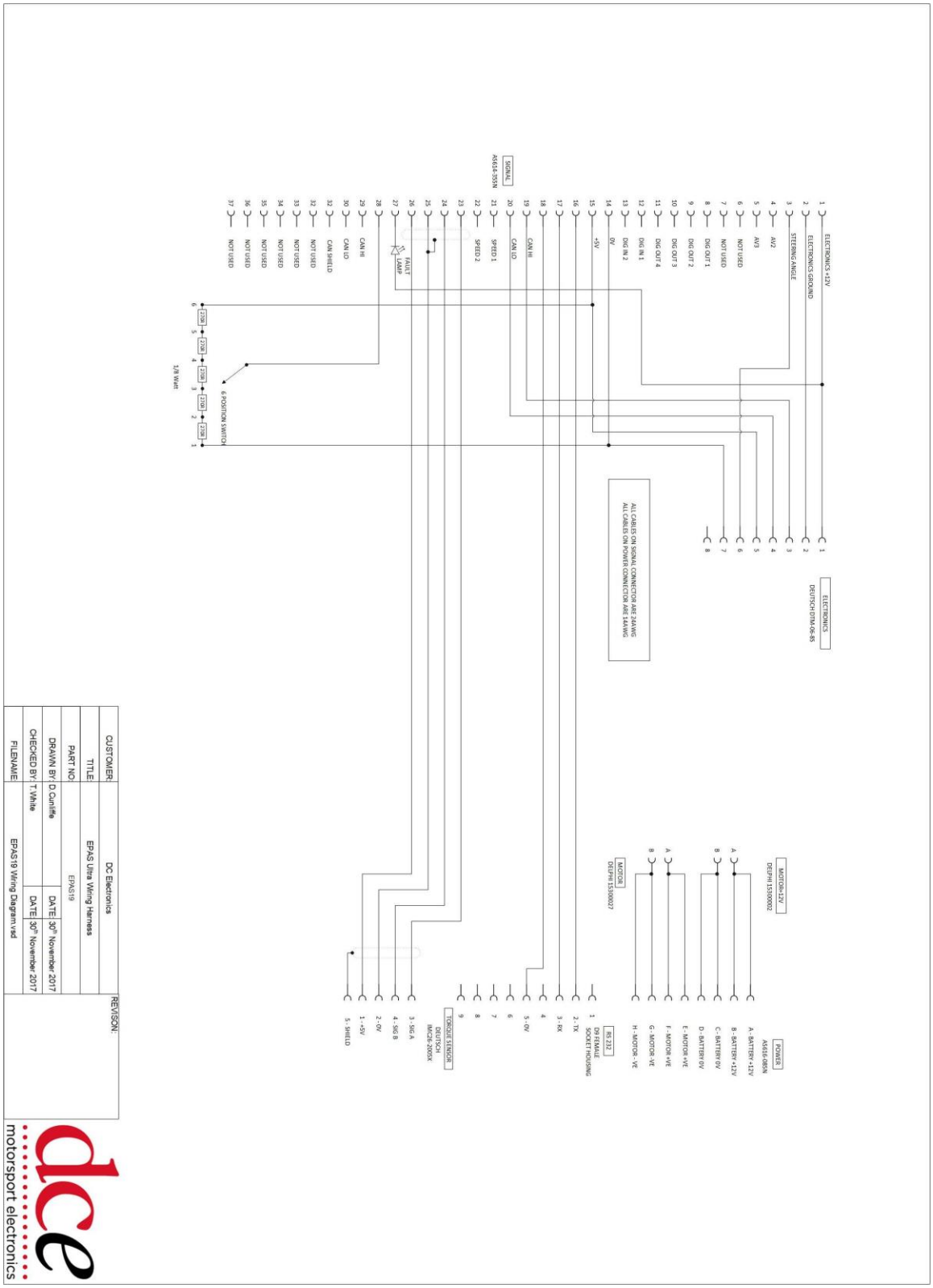
Meaning The power steering motor is drawing too much current indicating that it is either shorted or stalled.

Message	Error 107 : Clutch not connected
Meaning	The motor clutch is not drawing enough current when energised indicating that it may not be connected.

Message	Error 108 : Clutch is shorted or stalled
Meaning	The motor clutch is drawing too much current when energised indicating that it is either shorted or stalled.

Message	Error 109 : Over current condition detected
Meaning	The internal current limit has been exceeded.

Message	Error 110 : Maximum safe temperature exceeded
Meaning	The box temperature has exceeded the maximum safe value.


ELECTRONICS +12V
ELECTRONICS GROUND
STEERING ANGLE
AV2
AV3
NOT USED
NOT USED
DIG OUT 1
DIG OUT 2
DIG OUT 3
DIG OUT 4
DIG IN 1
DIG IN 2
0V
+5V
CAN HI
CAN LO
SPEED 1
SPEED 2
FAULT LAMP
CAN HI
CAN LO
CAN SHIELD
NOT USED
NOT USED
NOT USED
NOT USED
NOT USED
NOT USED
ELECTRONICS
DEUTSCH DTM-06-8S
MOTOR+12V
DELPHI 15300002
POWER
AS616-08SN
A - BATTERY +12V
B - BATTERY +12V
C - BATTERY 0V
D - BATTERY 0V
E - MOTOR +VE
F - MOTOR +VE
G - MOTOR -VE
H - MOTOR -VE
MOTOR
DELPHI 15300027
RS 232
D9 FEMALE
SOCKET HOUSING
1 -
2 - TX
3 - RX
4 -
5 - 0V
6 -
7 -
8 -
9 -
TORQUE SENSOR
DEUTSCH
IMC06-2005X
1 - +5V
2 - 0V
3 - SIG A
4 - SIG B
5 - SHIELD
ALL CABLES ON SIGNAL CONNECTOR ARE 24AWG
ALL CABLES ON POWER CONNECTOR ARE 16AWG
SIGNAL
AS616-35SN
6 POSITION SWITCH
1/8 Watt
Z38
Z39
Z40
Z41
Z42
Z43
CUSTOMER:
DC Electronics
REVISON:
TITLE:
EPAS Ultra Wiring Harness
PART NO:
EPAS19
DRAWN BY: D.Cunliffe
DATE: 30th November 2017
CHECKED BY: T.White
DATE: 30th November 2017
FILENAME:
EPAS19 Wiring Diagram.vsd
motorsport electronics

10 Electrical Connections and Calibration Guide

Before Installation is undertaken please read the following notes.

NOTE 1: WELDING

Electronic components situated within the motor assembly and control unit could be damaged if welding takes place upon the vehicle chassis or frame.

If welding is to take place it is advisable to remove both the motor assembly and the control unit from the vehicle.
If only the control unit can be removed, ensure both electrical connections to the motor assembly are disconnected and the vehicles battery is removed.

UNDER **NO** CIRCUMSTANCES SHOULD ANYTHING BE WELDED TO THE CASING OF THE MOTOR ASSEMBLY.

NOTE 2: ELECTRICAL CONNECTIONS

The electronic power assisted steering system should be connected using the EPAS Ultra interface loom (available separately) or by following the DC Electronics supplied wiring diagram.

FAILURE TO CORRECTLY CONNECT VEHICLE POWER SUPPLY WILL DAMAGE THE CONTROL UNIT.

EPAS ULTRA ELECTRICAL CONNECTION & SET UP GUIDE

1. Make all electrical connections as per the DC Electronics wiring diagram or if using the EPAS Ultra interface loom (available separately) follow steps 2 to 9.
2. Connect 2 pin connector marked “MOTOR” to the motor assembly.
3. Connect 5 pin connector marked ”TORQUE” to the motor assembly.
4. Find a suitable location for the ECU (within cabin, away from heat and moisture), fix using suitable cradle with anti-vibration mounts and connect to both Autosport connectors on the loom.
5. Find suitable location for rotary switch and mount.
6. Fit LED to loom (Red cable to Gold pin, White cable to Silver pin).
7. Connect 2 pin connector marked “POWER” to Vehicle power supply , A to +12v and B to ground

8. Connect 8 pin connector marked ”ELECTRONICS” as follows:-

Pin No.	Description		Destination
1	+12v	(Input)	Switched +12v
2	Ground	(Input)	Chassis Ground
3	CAN Hi		Data Logger CAN Hi
4	CAN Lo		Data Logger CAN Lo
5	+5v	(Output)	Steering Sensor +5v
6	Steering Angle	(Input)	Steering Sensor Signal
7	0v	(Output)	Steering Sensor 0v
8	Not Used		

No CAN termination resistor is fitted within the ECU.

9. If no steering angle sensor is fitted, the over current protection for rack end stops will not be present. Holding the steering against the stops will ***SEVERLY DAMAGE THE CONTROLLER!*** We strongly recommend connecting a steering angle sensor.

FAILURE TO COMPLY WITH THE ABOVE INSTRUCTIONS WILL DAMAGE THE CONTROL UNIT AND WILL VOID ANY WARRANTY.

CALIBRATION OF COLUMN

It is normal for the steering wheel to move on initial power up and during calibration. Do not attempt to hold the wheel at this time or the settings may become corrupted.

- Set rotary switch fully counter clockwise.
- Switch on “Electronics +12v” until LED lights up. Immediately switch off and then back on until LED lights again.
- Continue to do this 3 more times until on the 4th time the LED lights and flashes, this is the calibration phase.
- The LED will extinguish at the end of calibration when you can now use the system.

Calibration only needs to be carried out once at installation as the settings will be retained even when power is removed.

CALIBRATION OF STEERING ANGLE SENSOR

- Attach a Steering Angle sensor to the specified pins in section 8.
- Calibrate column using the procedures above.
- Keep the rotary switch turned fully anticlockwise.
- Connect to the EPAS system using a suitable serial lead.
- Open EPAS Desktop Pro software and click ‘connect’ (the latest version can be downloaded from our website).
- Turn the Steering wheel fully anticlockwise until the stop is reached, release the wheel and note the steering angle value shown on the desktop.
- Repeat for fully clockwise stop.
- **NOTE:** The LH value must be lower than the RH value. If this is not true, the +5v and 0v wires need to be reversed in the Steering Angle sensor.
- Keeping the power on, click on ‘disconnect’ on the Desktop Pro software screen.
- Go to the ‘Setup’ menu and scroll to ‘Parameters’, pick ‘LH stop’
- Scroll to the value that had been noted for anticlockwise stop.
- Next pick ‘RH stop’ and put in the value noted for clockwise stop.
- Click on ‘apply’.
- Test calibration by setting rotary switch to position 1, turn steering fully anticlockwise and check if motor duty switches to 0% on the Desktop Pro when the preset angle is reached, repeat for clockwise steering.