

INSTRUCTIONS FOR ACD computer
mitsubishi Lancer EVO X





DESCRIPTION OF FUNCTIONS OF ACTIVE CENTRE DIFFERENTIAL (ACD) CONTROL COMPUTER FOR MITSUBISHI LANCER EVO 10

The Active control of centre differential (ACD) is very important for controlling vehicles at a high speed. The ACD computer was designed based on data collected from the cars of the PWRC. It complies with the FIA regulations and, at the same time, facilitates the work of the whole team during races.

MAIN ADVANTAGES

1. Storing capacity of up to 9 created maps right in the ACD computer. Switching over by the ACD button on the vehicle dashboard. Active maps are between 1-3.
2. A possibility to create your own map files with assistance of an expert.
3. Diagnostics – one of the most important assistants for quick identification of defects of the ACD system is the digital indication of error codes which are, in case of a defect, indicated right in the ACD computer. The vehicle crew may operatively inform the service team which may then get ready for the repair of the defect.
4. Active Dataloger which records the behaviour of individual elements of the ACD system in time and monitors the course of the ACD system control. Automatic activation is always before the start of the special stage – with start program function.

SETUP

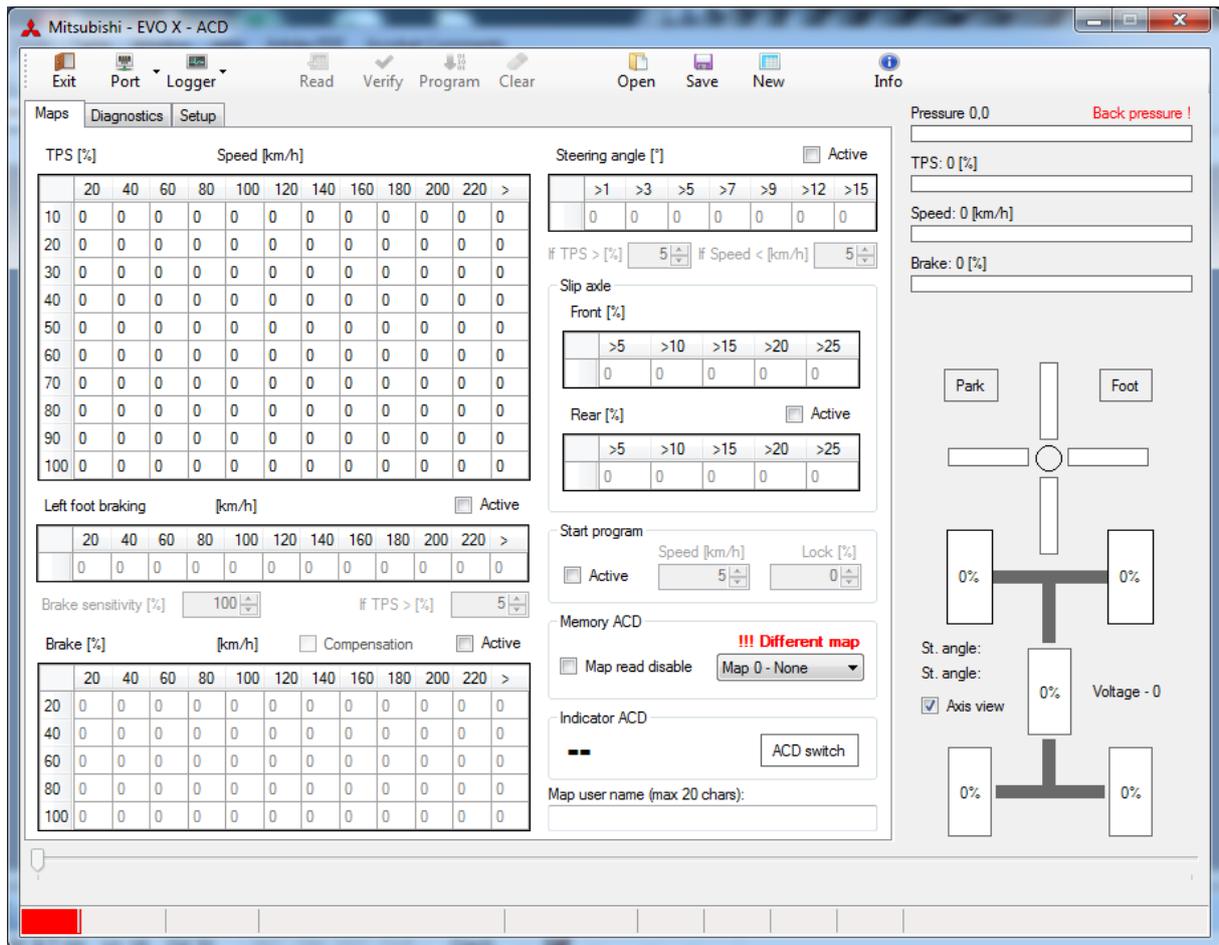
The Evo X ACD Computer does not require specialist setup. There is no setup procedure necessary for compatibility of the ACD unit. It is only necessary upon installation to ensure the engine is switched off.

Check correct functionality of all the sensors in the car by connecting the ACD Computer to your laptop and viewing live all system features before driving.

ACD Computer Evo X Contents

1. Map Tab explained
2. Creating a new map
3. Password protection of maps
4. Steering Angle parameters variable
5. Wheel vs Angle values
6. Diagnostics
7. Activation of the Datalogger record
8. Graphs active
9. Setup tab explained
10. Zero Map Active/Inactive
11. Brake Sensitivity
12. Memory ACD Maps
13. Upload of upgraded firmware

1. MAP TAB EXPLAINED



Top Left: Main mapping table *Speed kmph x TPS%*

This table is used to input the primary values for lock of the center differential

Middle Left: Left Foot braking *Speed kmph x Foot Brake x TPS*

This table is used as a replacement to the main mapping table if both the TPS and Foot Pedal sensor is active. The condition field can be toggled to adjust the point of activation

Bottom Left: Main brake table *Speed kmph x Foot Brake%*

This table is used as a replacement to the main mapping table and helps fine tune the adjustment of lock based on the pressure applied to the brake pedal

Top Right: Compensation tables *Steering Angle, Slip Axle*

These tables are used in addition to the main mapping table. Steering angle and slip axle help fine tune the lock on the center differential.

Bottom right: Start program and active map info

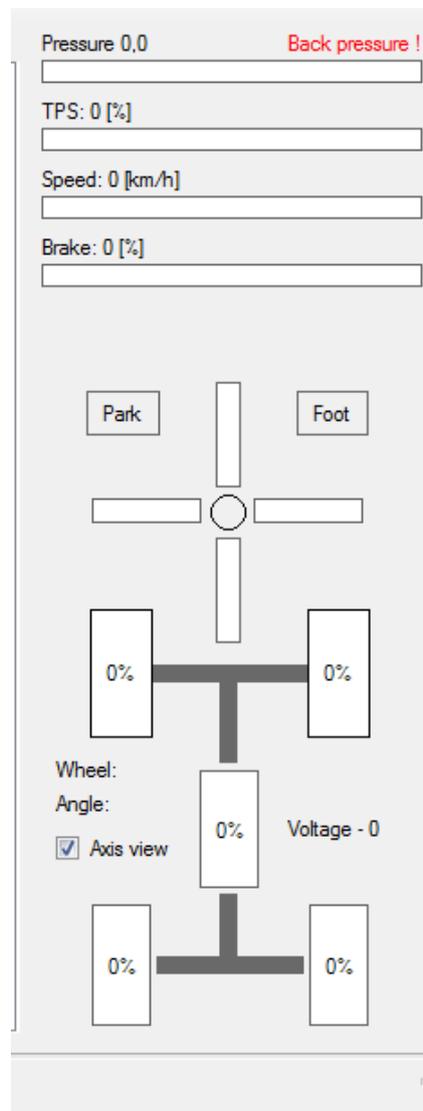
There is a start program feature for launching from a standing start.

Far Right: Live Graphical ACD interface

After the ACD computer is connected to a notebook, the data may be read when driving – graphic representation of the current state of the vehicle (very helpful for completing the notion of how individual sensors work and how they influence the clamp of the centre differential in percentage).

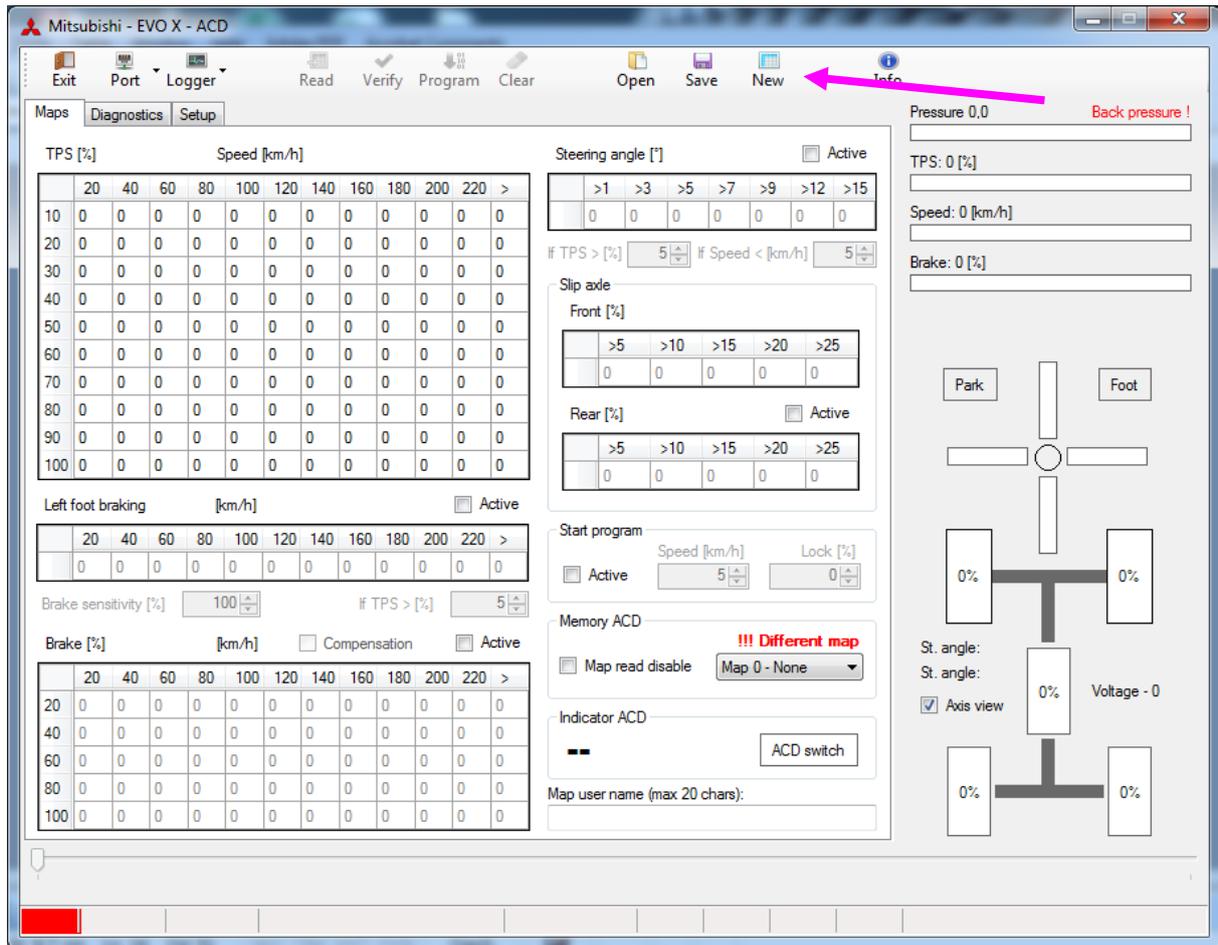
Live Graphical ACD interface

1. **PRESSURE** is an informative indication of switched oil pump in the hydraulic circuit.
2. **TPS** – indication of the gas pedal position in the range of 0-100%
3. **SPEED** – indication of the speed of the vehicle (in km/hour)
4. **BRAKE** – indication of the pressure on the brake
5. **PARK** – signals the hand brake engagement
6. **FOOT** – signals the use of brake pedal (brake light sensor)
7. **G- sensor** – shows the value of longitudinal and lateral overload
8. **SLIP indication** – shows the slip of individual wheels (0-100%). If you click the **AXIS view** field, the slip of the fore axle as against the rear axle will be graphically represented
9. **ACD indication** – shows the level of clamp of the centre differential in %



2. CREATING A NEW MAP

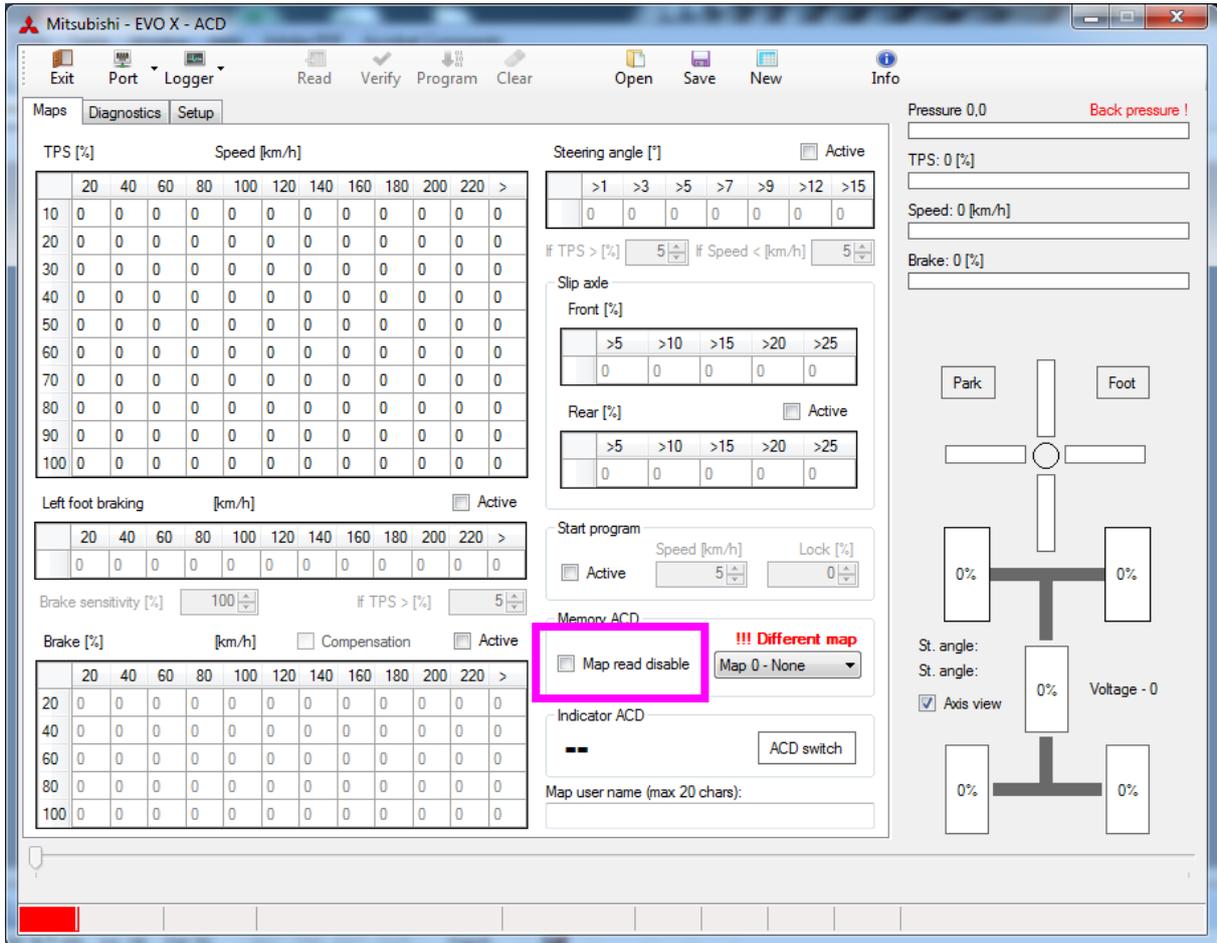
It is necessary to press NEW to create a new map.



After this, you can enter new values to the mapping table.
If you wish to edit maps, only overtype the previous data to program.

3. PASSWORD PROTECTION OF MAPS

To protect a map file from being viewed, check the „MAP READ DISABLE“ box



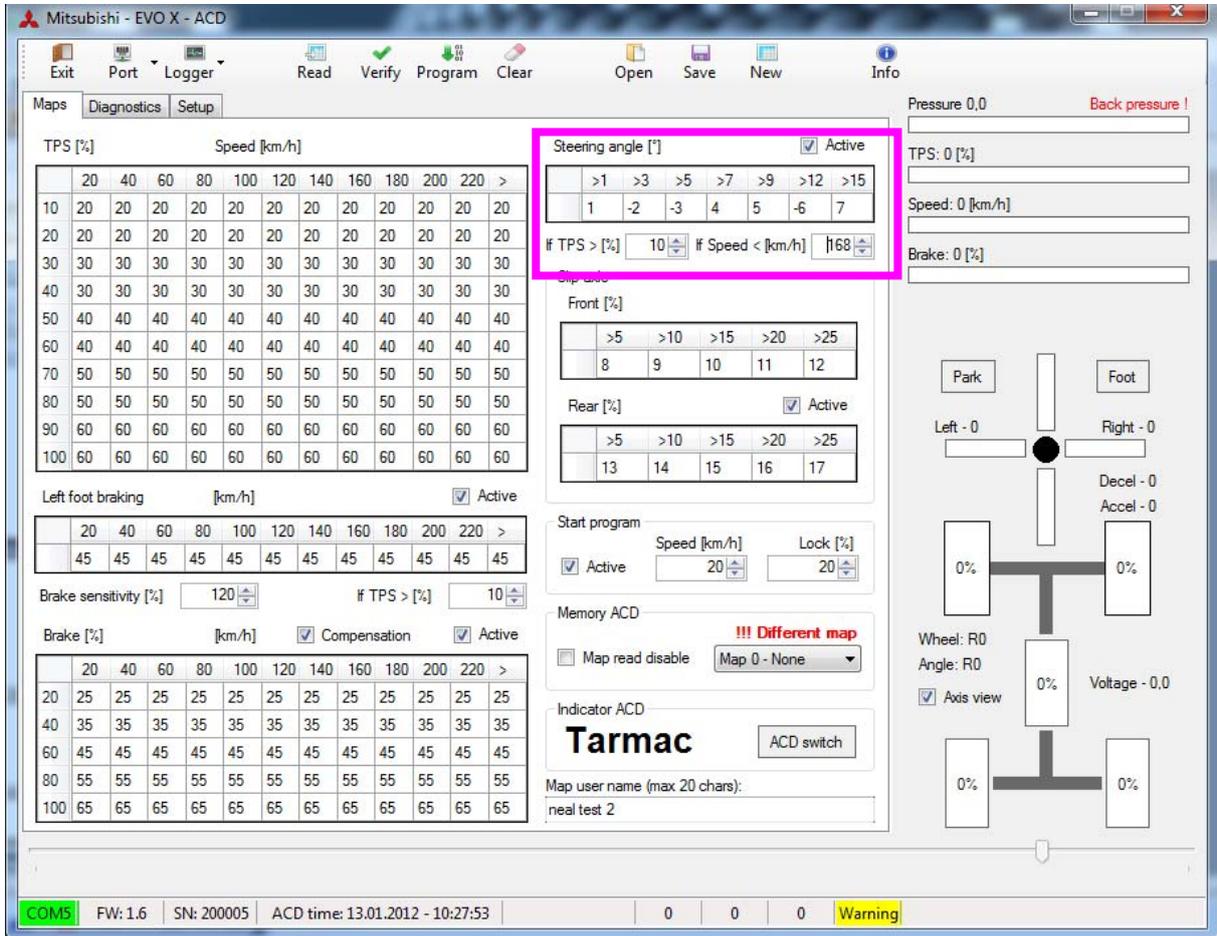
Password is of your choosing as a 4 digit pin code only.



NOTE: The password protection is associated to the map. To lock all maps, you must password protect each individually. Changes are saved only by the Program button.

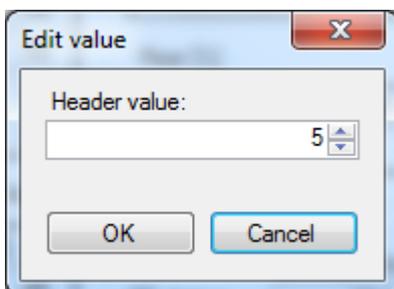
4. STEERING ANGLE PARAMATERS VARIABLE

When the steering angle compensation table is active, it is possible to amend the parameters so the mapping of the steering will become more condensed or more expanded. Minimum value is 1 and maximum value is 30. Default values are >1 >3 >5 >7 >9 >12 >15



Double click on the parameter cell to adjust values and the pop up box will appear.

NOTE: Any changes you make, you must press the PROGRAM button to save your changes to the ACD computer. If not, changes will be lost. Alternatively, pressing save will save the map file to an alternative medium.



NOTE: It is possible to give a value greater than the number to the right. For example:

>1 >3 >8 >7 >9 >12 >15. If this is to occur, the ACD computer will ignore parameters to the right of >8 that are less than 8.

In the example below, >7 will be ignored, but >9, >12 and >15 will still be used.

Steering angle [°]

Active

	>1	>3	>8	>7	>9	>12	>15
	0	0	0	0	0	0	0

If TPS > [%] If Speed < [km/h]

5. WHEEL vs ANGLE values

In the bottom right hand corner, of the main screen are 2 values: WHEEL and ANGLE.

WHEEL relates to the steering wheel turn and ANGLE relates to the angle (°) of the front tyres.

Parameters

WHEEL: max scores L420 : R420 (left and right)

ANGLE: max scores L30 : R30 (left and right)

Wheel max values determined from GEMS dash + / - 420.

The screenshot shows the Mitsubishi EVO X ACD diagnostic software interface. The main window is titled "Mitsubishi - EVO X - ACD" and contains several sections for monitoring and configuring vehicle parameters.

TPS [%] Speed [km/h]

	20	40	60	80	100	120	140	160	180	200	220	>
10	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0

Steering angle [°] Active

	>1	>3	>5	>7	>9	>12	>15
	0	0	0	0	0	0	0

If TPS > [%] If Speed < [km/h]

Slip axle

Front [%]

	>5	>10	>15	>20	>25
	0	0	0	0	0

Rear [%] Active

	>5	>10	>15	>20	>25
	0	0	0	0	0

Left foot braking [km/h] Active

	20	40	60	80	100	120	140	160	180	200	220	>
	0	0	0	0	0	0	0	0	0	0	0	0

Brake sensitivity [%] If TPS > [%]

Brake [%] [km/h] Compensation Active

	20	40	60	80	100	120	140	160	180	200	220	>
20	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0

Start program Active Speed [km/h] Lock [%]

Memory ACD Map read disable **!!! Different map** Map 1 - Tarmac

Indicator ACD ACD switch

Map user name (max 20 chars):

Pressure 0,0 **Back pressure !**

TPS: 0 [%]

Speed: 0 [km/h]

Brake: 0 [%]

Axis view

St. angle: 0%
St. angle: 0%

Voltage - 0

Park Foot

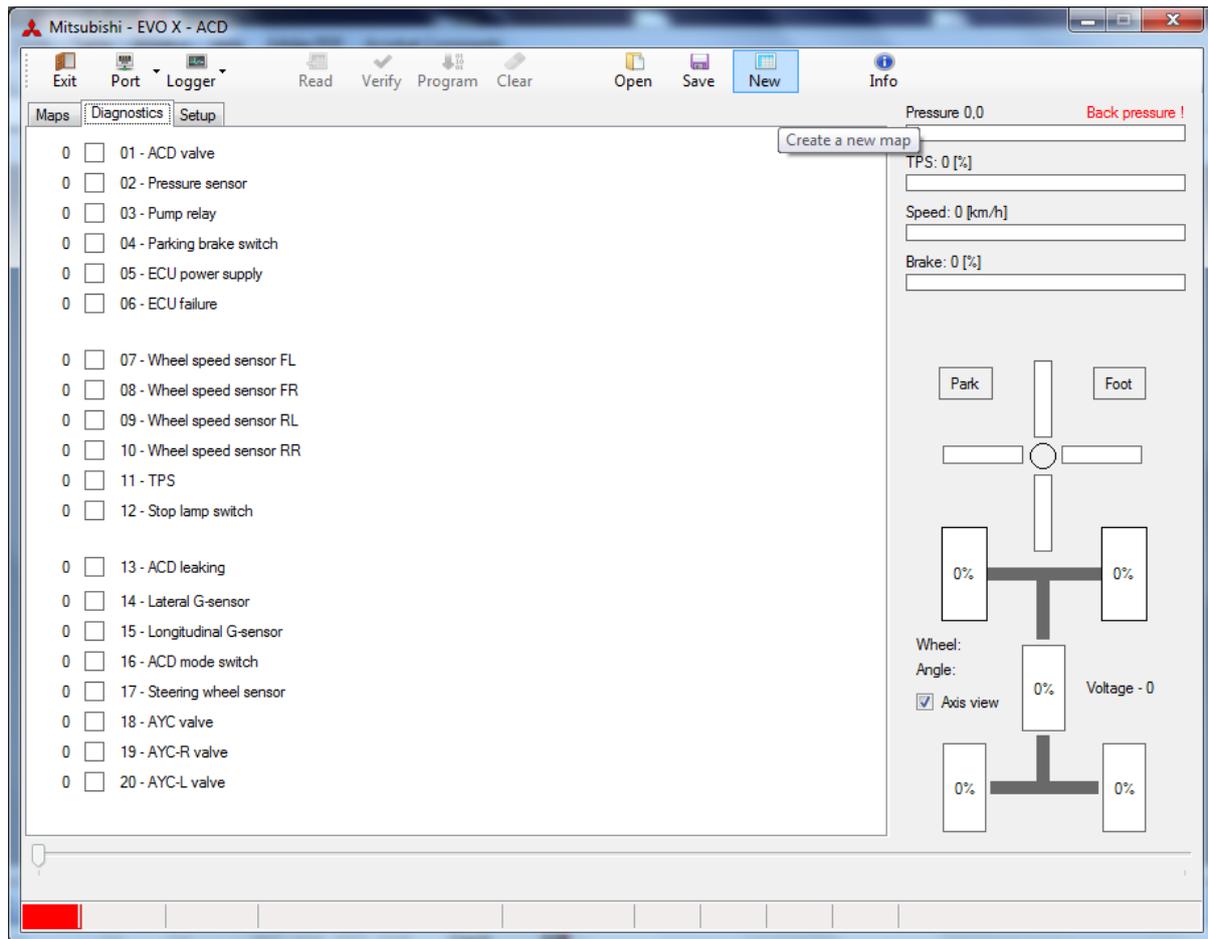
6. DIAGNOSTICS

Error codes are divided into 3 sections.

The first section includes the most serious defects which significantly influence the function of the centre differential. The detected defects need to be repaired immediately.

The second and third sections include less serious defects.

The error code is indicated on the display of the control unit by red colour.



Section 1

01. ACD valve
02. Accumulator pressure sensor
03. Hydraulic pump relay
04. Hand brake sensor
05. Control unit supply
06. Defective control unit

Section 2

07. Front left wheel sensor
08. Front right wheel sensor
09. Rear left wheel sensor
10. Rear right wheel sensor
11. Throttle valve position sensor
12. Brake light sensor

Section 3

- 13. Oil leak in pressure section of the hydraulic system
- 14. G1 overload sensor
- 15. G2 overload sensor
- 16. ACD button
- 17. Steering wheel sensor
- 18. AYC sensor
- 19. AYC Right valve
- 20. AYC Left valve

Error codes may be deleted right in the vehicle.

The deletion is carried out as follows:

1. Switch off the ignition.
2. Press the ACD button on the dashboard and turn the ignition key to position I.

Error codes may also be deleted by connecting a notebook to the control unit.

7. ACTIVATION OF THE DATALOGGER RECORD

The datalogger record will automatically start with the activation of the START program mode. (it is enabled by a quick and short depressing of the gas pedal/throttle above the value of 85% and having the switch off speed =>20kmph)

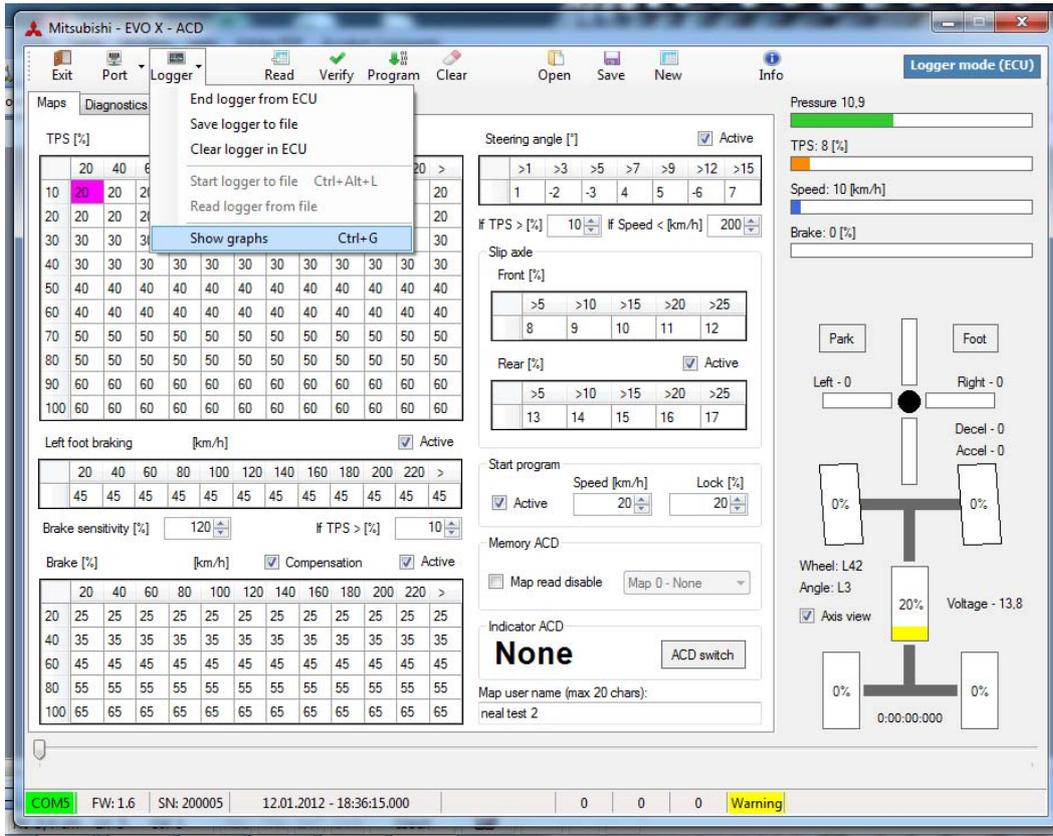
Note: If the vehicle does not move within 10 seconds after the START program has been activated, the program will be disabled automatically

The datalogger record is carried out for the entire driving time of the vehicle in the speed test.

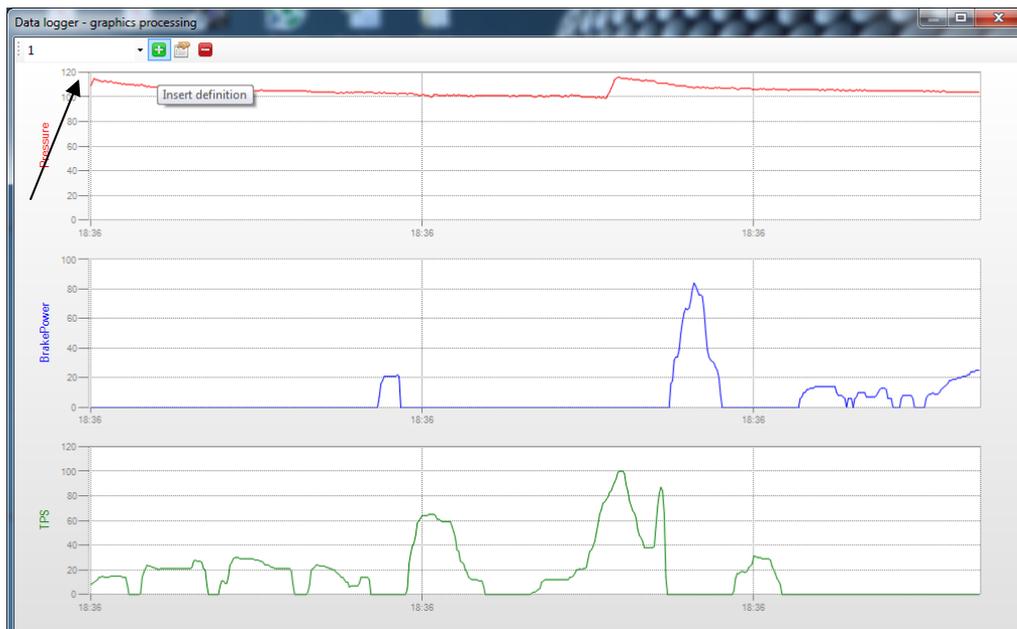
The record is completed whenever the vehicle remains standing for more than 5 seconds (or if it moves at a speed lower than 5km/h for a period of 5 seconds)

8. GRAPHS ACTIVE

When a logger file is opened, you can view the graphs of the log.

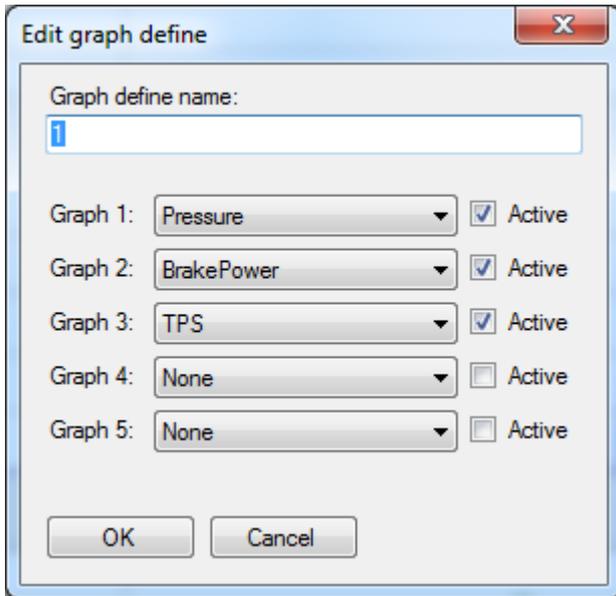


Click the small plus button to insert new definition. This will be a new saved graph file.

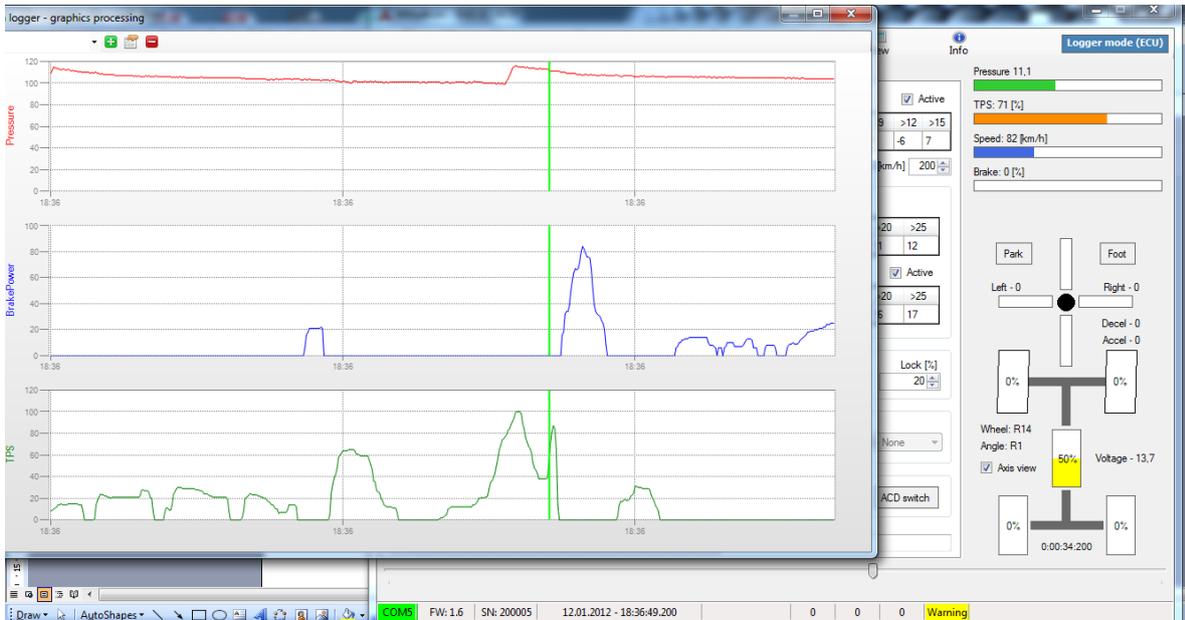


Select the parameters you wish to see in the graph. Maximum 5 parameters.

NOTE: If no graph name is defined, then the graph parameters will not save when closed

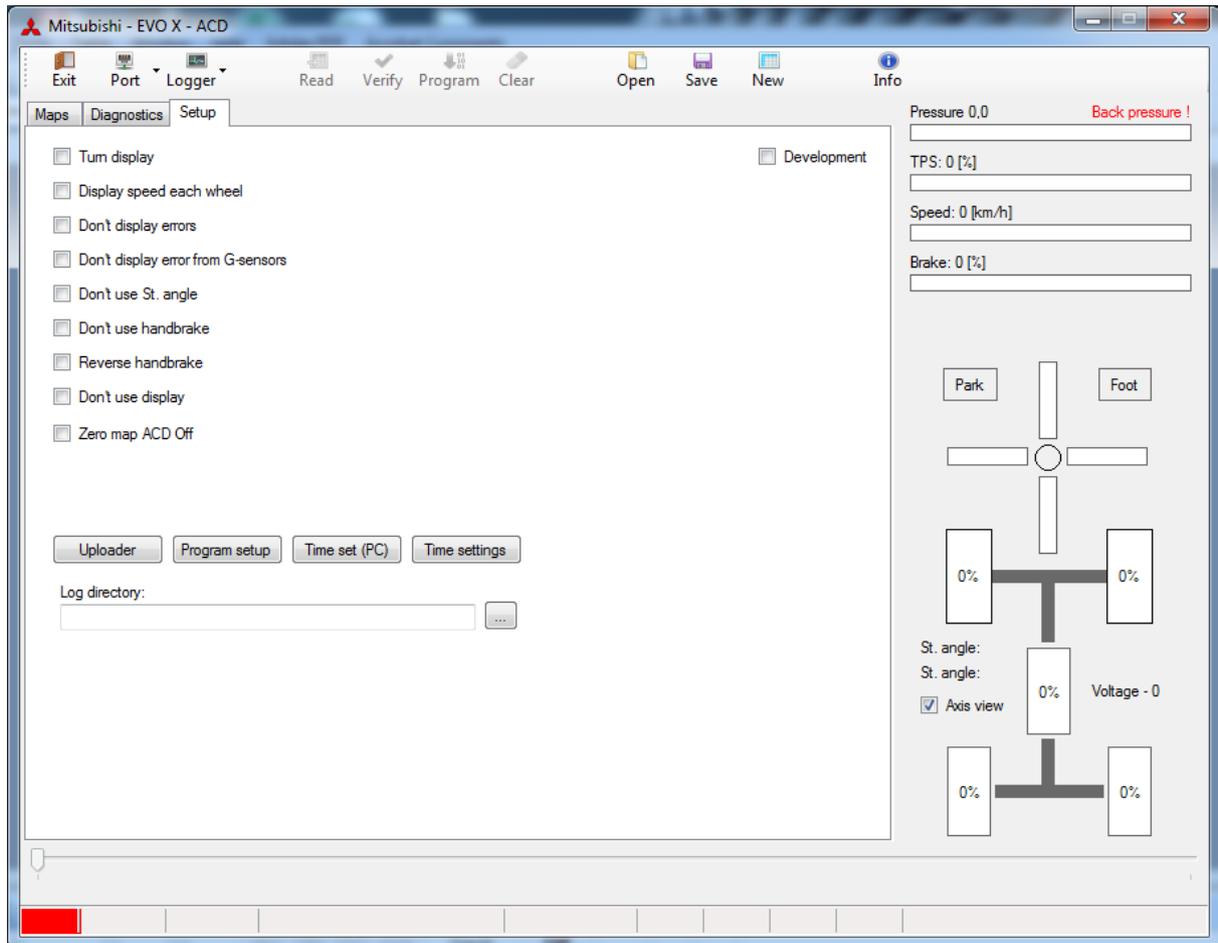


If you click the graph, you can scroll left and right and view the values with the main ACD mapping page in combination.



9. SETUP TAB EXPLAINED

Setup tab has been simplified.



Setup check boxes explained:

Turn display: Check to turn the display digits on the ACD computer upside down

Display speed each wheel: Check to change the slip % display to wheel speed. This function should be used for testing wheel sensors. If you select this box, the logger will record wheel speed and not slip % of wheels.

Dont display errors: Inactive tick box

Dont display errors from G sensor: Check to ignore faulty G sensor

Dont use steering angle: Check to ignore faulty steering sensor

Dont use handbrake: Check to ignore faulty handbrake sensor

Reverse handbrake: Check to reverse signal from handbrake (ground or 12v)

Dont use display: Check to turn off the display on ACD computer

Zero map ACD off: Check to turn ACD pump off. See section Zero Map functionality for more details

Do not use the development box for any reason. Changes can only be made there if advised by KAPS Transmissions.

Uploader button

This is used to upload inside the ACD computer new versions of firmware.

Program Setup

Any changes to the setup tab must be confirmed by pressing the Program setup button. If not, changes will not be saved.

Time Set (PC)

This will set the date and time inside the ACD computer to the current time on your PC

Time Settings

This will allow you to set the time inside the ACD computer to what you want.

Log Directory:

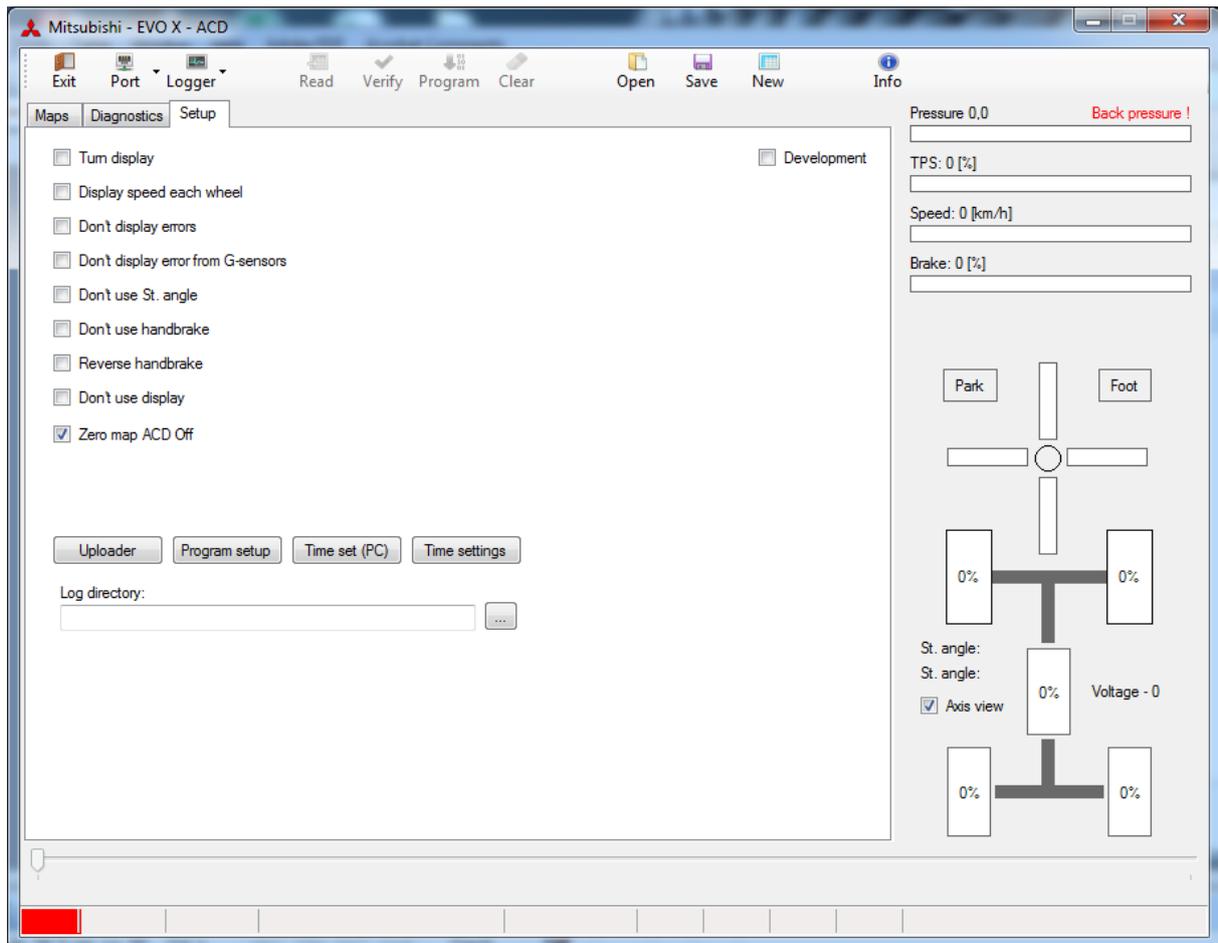
You can set a filepath in this field that will be a quicklink to your saved log files.

10. ZERO MAP ACTIVE/INACTIVE

The zero map inside the ACD Computer is not to be used as a race map, but it is possible to program a map inside.

If a map is programmed, the system will read the mapping values as normal but with lower pressure inside the system. The zero map should be used as a power saving technique for the elements of the ACD system.

If on the setup page, the „Zero map ACD off“ is checked, the ACD pump will be off. The programmed map values on the zero map will not be used.



11. BRAKE SENSITIVITY

It is possible to change the sensitivity of the brake pedal to suit your car. The brake sensitivity feature is only associated with the main brake table. The level of 100% is the base value for changes to be calculated. Base value of 100% is determined from the maximum stopping power of the Evo X on dry tarmac conditions during testing.

The brake sensitivity has a value range from 50%-150%. Should your car have a higher or lower level of grip, then you can adjust the sensitivity accordingly.

For example: Any changes to the setting of the brake sensitivity, the system will recalculate so it will be max 100% brake percentage on the brake mapping table.

NOTE: The TPS % toggle box is related to the left foot brake table, not the main brake map table.

NOTE: Brake sensitivity is programmed to the selected map only. Each map can have different brake sensitivity.

The screenshot shows the Mitsubishi Evo X ACD software interface. The 'Brake sensitivity [%]' is set to 100% and is highlighted with a pink box. The interface includes several tables and settings:

- TPS [%] vs Speed [km/h] table:**

TPS [%]	20	40	60	80	100	120	140	160	180	200	220
10	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0
- Left foot braking [km/h] table:**

Speed [km/h]	20	40	60	80	100	120	140	160	180	200	220
Brake [%]	0	0	0	0	0	0	0	0	0	0	0
- Brake sensitivity [%]:** 100% (highlighted with a pink box)
- Brake [%] table:**

Speed [km/h]	20	40	60	80	100	120	140	160	180	200	220
Brake [%]	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0
- Steering angle [°] table:**

Steering angle [°]	>1	>3	>5	>7	>9	>12	>15
Value	0	0	0	0	0	0	0
- Slip axle Front [%] table:**

Slip axle Front [%]	>5	>10	>15	>20	>25
Value	0	0	0	0	0
- Slip axle Rear [%] table:**

Slip axle Rear [%]	>5	>10	>15	>20	>25
Value	0	0	0	0	0
- Start program:** Active, Speed [km/h]: 20, Lock [%]: 20
- Memory ACD:** Map read disable, Map 1 - Tarmac
- Indicator ACD:** ACD switch
- Map user name:** (max 20 chars)

Compensation Check Box

The „Compensation“ check box associated with the main brake table when ticked, will calculate into the diff lock the rear axle slippage % mapping values.

TPS [%]	Speed [km/h]											
	20	40	60	80	100	120	140	160	180	200	220	>
10	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0

Steering angle [°]						
>1	>3	>5	>7	>9	>12	>15
0	0	0	0	0	0	0

If TPS > [%] 5 If Speed < [km/h] 5

Slip axle Front [%]				
>5	>10	>15	>20	>25
0	0	0	0	0

Rear [%]				
>5	>10	>15	>20	>25
0	0	0	0	0

Left foot braking [km/h]											
20	40	60	80	100	120	140	160	180	200	220	>
0	0	0	0	0	0	0	0	0	0	0	0

Brake sensitivity [%] 100 If TPS > [%] 5

Brake [%]	[km/h]											
	20	40	60	80	100	120	140	160	180	200	220	>
20	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0

Start program Active Speed [km/h] 5 Lock [%] 0

Memory ACD Map read disable Map 0 - None

Indicator ACD ACD switch

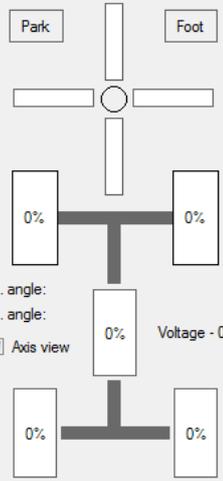
Map user name (max 20 chars):

Pressure 0.0 Back pressure !

TPS: 0 [%]

Speed: 0 [km/h]

Brake: 0 [%]



12. MEMORY ACD MAPS

The Evo X only has a possibility to run with 3 maps TARMAC, GRAVEL, SNOW + the ZERO map.

Programming a map to the zero map position „None“ has been explained in section Zero map active/inactive.

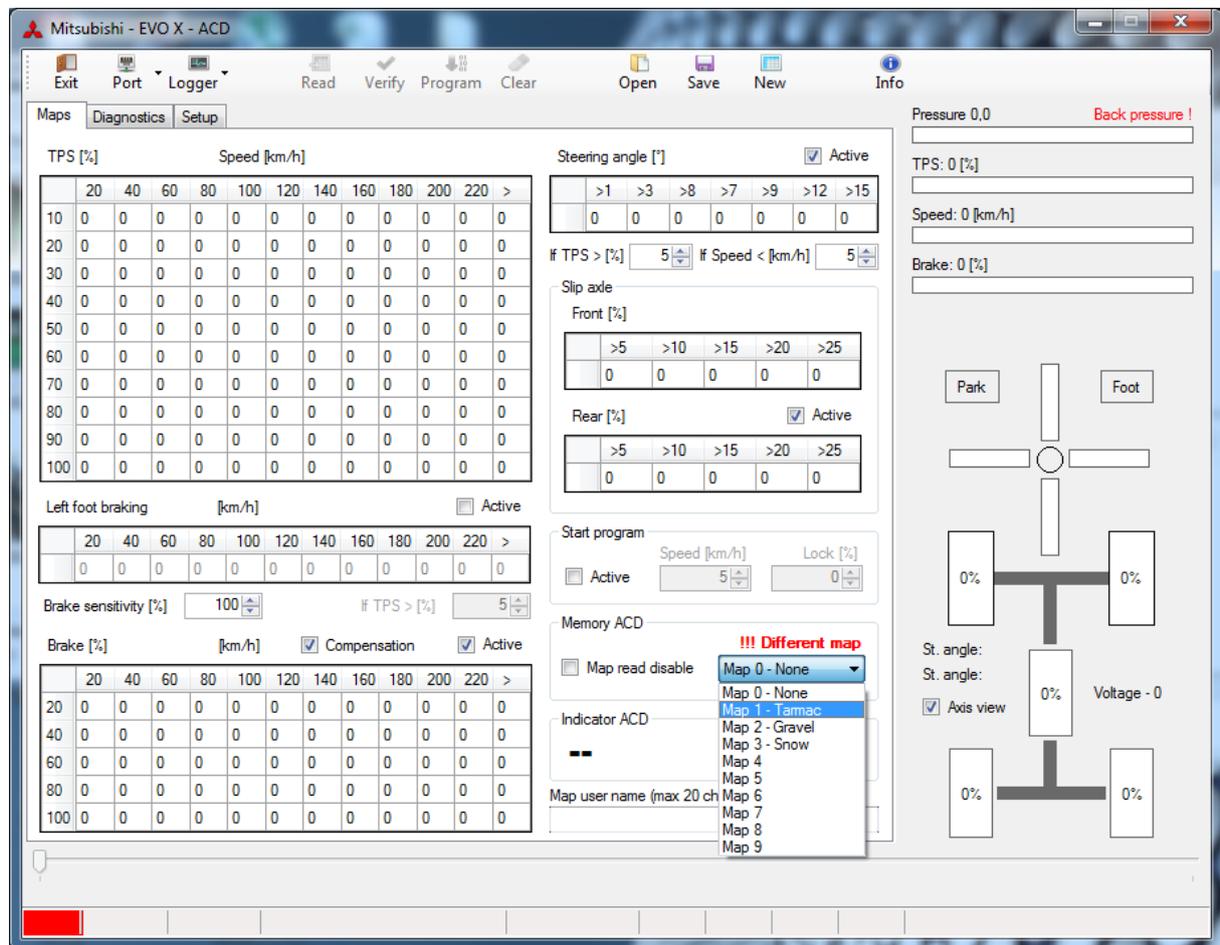
The programming of maps to TARMAC, GRAVEL, SNOW will be the 3 available maps when racing.

Map 1 – Tarmac

Map 2 – Gravel

Map 3 – Snow

Map positions 4-9 in the ACD Computer software are available positions that maps can be saved to. Generally use the spare positions when developing new maps and saving maps to file.

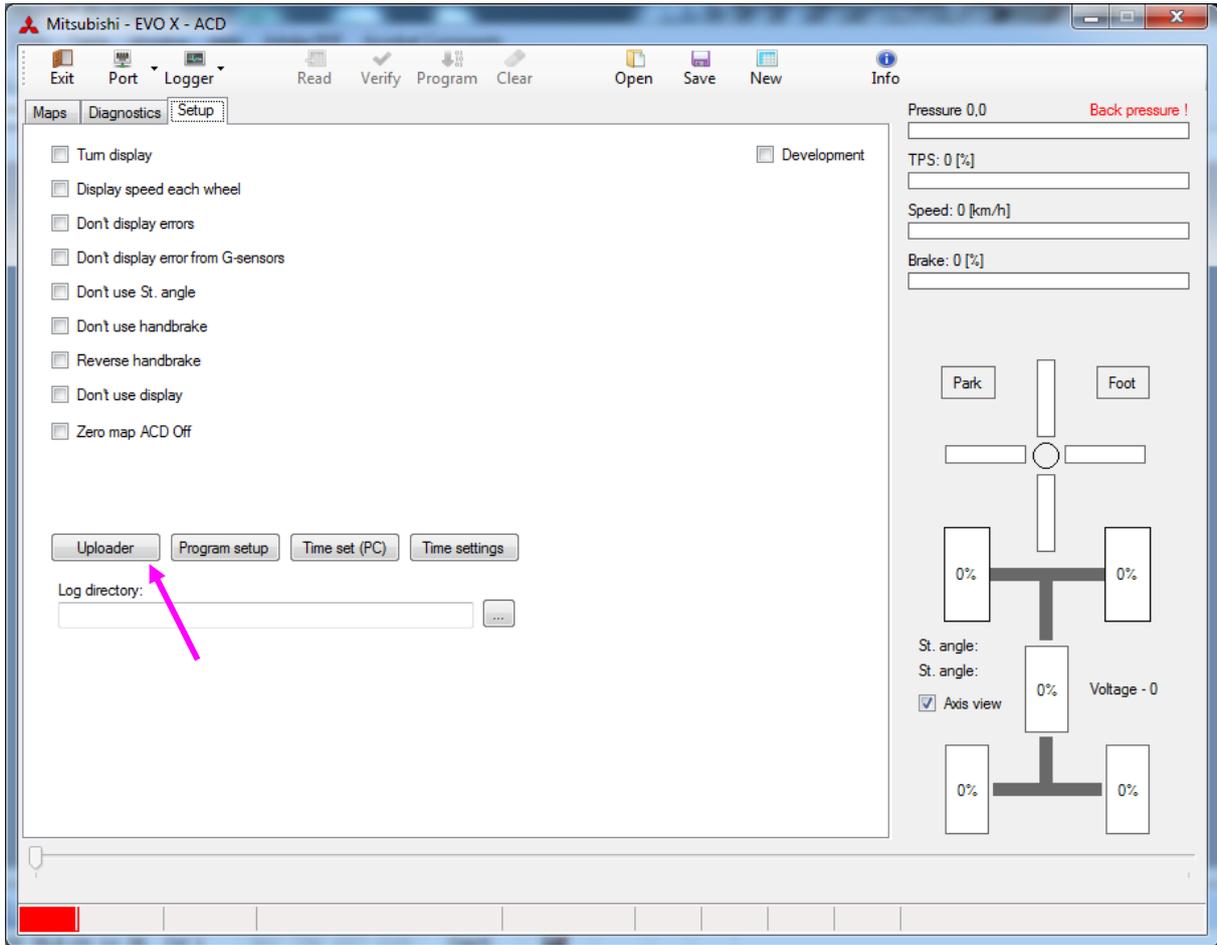


EMERGENCY CLAMPING OF THE ACD DIFFERENTIAL TO 100%

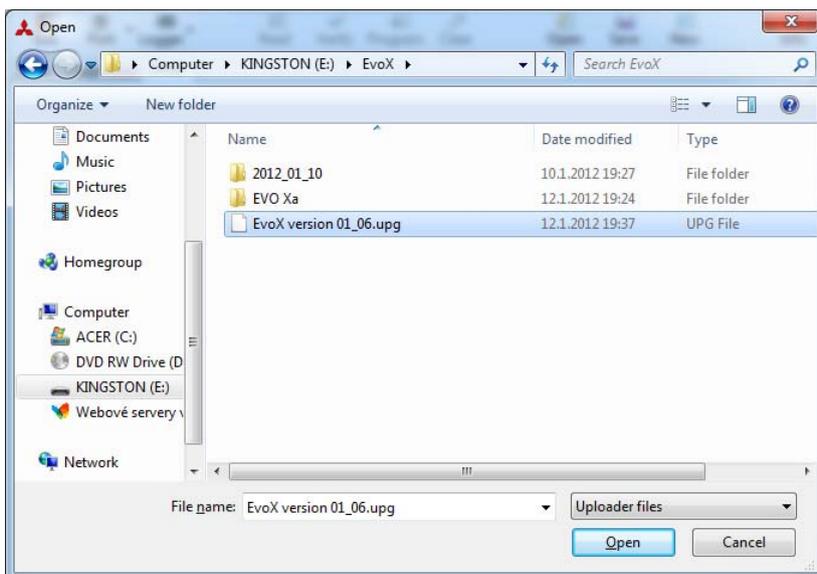
If the axle or driveshaft breaks, you may lock the system and slowly proceed to the service park. Do so by pressing the ACD SWITCH on the dashboard and hold it for 3 seconds. You may unclamp the ACD differential by pressing the ACD SWITCH again.

13. UPLOAD OF UPGRADED FIRMWARE

On the setup tab, click the „Uploader“ button.



Select the file sent by KAPS TRANSMISSIONS .upg



ACD
computer

 **KAPS**
TRANSMISSIONS