



To: Star Mazda Series Competitors

From: Star Race Cars

Date: 22.January.2010

RE: ECU Update 2010

Introduction:

Star Race Cars and Motec Systems USA have released a new mandatory ECU update aimed at extending engine life. The new update will include, as announced in the 2010 Technical Review in November, a cold start map, increased fuel trim range and parameters for an optional cooling fan. As part of the update Star Race Cars will also be increasing the logging memory of the ECU for the purpose of obtaining more data on engine performance. The mandatory map (part number 080-564) is free of charge to all competitors. The mandatory ECU memory (part number 080-565) increase is free of charge for those competitors entered in the this year's Championship.

CONSIDERATION: When the ECU map receives an update, the calibration numbers (In ECU Manager v3.5 software: *Utilities* → *Direct Calibration*) used for Lambda and Tire Calibration default. The Tire Calibration number used in ECU Wheel Speed defaults to a number very similar to the one calculated using our current tire diameter. Recall that the Tire Calibration can be calculated using the following equation:

$$\text{Tire Calibration Number} = 12 \div \{(Circumference \times 25.4) / 1000000\} \div 10$$

Lambda Calibration (ECU Lambda only) is done by measuring the resistance in ohms between the two farthest pins (1 and 6) on the plug side of the sensor. Multiply the resistance by 10 and that will serve as your calibration number (example: 155.4 ohm will result in a calibration number of 1554). The calibration can be done with the sensor in the exhaust pipe for a quick fix but the most accurate way to calibrate the sensor is to measure the resistance between the pins while the sensor has been removed from the pipe and has been exposed to atmosphere for approximately 5 minutes. Remember that you should always check the calibration of your Lambda sensor at least once a race weekend and always when you buy a new sensor!

Cost: The mandatory ECU map upgrade is free to all Star Mazda Championship presented by Goodyear registered competitors. The mandatory ECU memory increase will be free of cost to those individuals who are registered for the Series Championship. Competitors who are not registered for the championship will be invoiced the ECU memory cost of \$150.00. Those individuals who are planning on registering later for the Series Championship will be credited the cost of the memory upgrade when they choose to register for the Championship.





Cold Start Map

Star Race Cars has designed a cold start map to prevent the engine from unnecessary abuse during start up. The map is aimed at controlling start up procedure and is designed not to have influence on track performance. The parameters for the cold start map are:
 If Oil Temperature is less than 150F AND the engine has been running for under 300 seconds (5 minutes), the cold start map will limit the engine RPM to 5000.

Both conditions, oil temperature less than 150F and running time less than 300 seconds, must be true in order for the cold start map to take effect. If one or both of those conditions are false, the ECU will return to the limit of 8600 RPM.

Fuel Trim Range

Star Race Cars has requested that the fuel trim map be changed to allow the competitors to experiment with richer trim settings. The increased range will be controlled with a new 11-position fuel trim switch. The expanded trim settings are:

P1 (-2%)	P2(-1%)	P3(0%)	P4(+1%)	P5(+2%)	P6(+3%)	P7(+4%)
P8(+5%)	P9(+6%)	P10(+7%)	P11(+8%)			

The original 4 position switch can still be used however, the range will be limited to:

P1(0%)	P2(+2%)	P3(+4%)	P4(+6%)
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Auto Fan Parameters

Star Race Cars will introduce an optional cooling fan designed to mount to the back of the water radiator. The fan application is still under development but the parameters have been chosen to be:

If the Water Temperature is greater than 190F AND Ground Speed is less than 18 miles per hour, the fan will turn on and will turn off when the Water Temperature reached 180F. Both conditions, Water Temperature greater than 190F and Ground Speed less than 18 miles per hour, must be true in order for the fan to turn on.

Star Race Car's goal in introducing a cooling fan is to prevent the engines from overheating during standing starts. Once the car is on the track, the fan will not turn on for overheating conditions unless the above parameters are true.

Increased Logging Memory

Logging memory has been changed from 512kb to 1mb. The upgrade is done using a password created by Motec specific to the competitors ECU. The memory upgrade will be under Star Race Cars part number 080-565.

