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# **ST8100 ECU Display System**

## **User's Guide Addendum**



## Preface

### Congratulations

Congratulations on choosing the Stack ST8100 ECU Display System. This system will give you a wealth of information to enable you to obtain the maximum safe performance from your vehicle.

### Purpose of this addendum

In conjunction with the ST8100 User's Guide, this addendum will help you install and use the Stack ST8100 ECU Display System. It explains how to set up and configure the system for your vehicle.

### Edition Notice

This edition is for all versions of the ST8100 ECU Display System distributed to customers world wide. The units of measurement used to illustrate the use of the Display System in this edition are for the UK version. Units used in the various versions are shown in the following table.

Parameter Type	UK Version	US Version	EC Version
Speed	mph	mph	km/h
Temperature	Degrees C	Degrees F	Degrees C
Pressure	psi	psi	Bar
Fuel Usage	litres	gallons	litres

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## **Chapter 1. Introducing the Display System**

The Stack ST8100 ECU Display System, in conjunction with the car's Engine Control Unit (ECU), monitors and displays a range of values, known as performance parameters, needed for effective car and driver management in most competitive situations.

The system combines an analog tachometer with a digital display for the following performance parameters:

1. Engine speed (RPM)
2. Wheel speed
3. Oil pressure
4. Oil temperature
5. Water temperature
6. Fuel pressure
7. Battery voltage
8. Fuel usage (optional)
9. Lap times (optional)

You can view the peak values (tell-tales) for all the parameters.

The system provides a range of warning messages based on preset alarm values for the following performance parameters:

1. Oil pressure
2. Oil temperature
3. Fuel pressure
4. Water temperature
5. Battery voltage
6. Fuel usage (warning lamp only)

You can enable or disable the warning system for each parameter individually.

You can redefine the preset alarm value for each parameter to a value that is more suitable for your vehicle.

The system provides a gear shift warning light that is based on an RPM value that you define for your vehicle.

## How to Use this Manual

Stack recommends that you unpack and connect the components in the system **before** you install it in your vehicle. This will enable you to familiarize yourself with operating the display and configuring it for the vehicle in which you intend to install it.

Please use the ST8100 User's Guide to install the system, referring to the corresponding section in this addendum to see whether there are special requirements for the ST8100 ECU system.

## Chapter 2. Getting Started

**Note that if the ST8100 ECU Display System is powered up without being connected to an operating ECU, it will normally display the values it was displaying when last turned off. These values will stay until the ECU connection is operating correctly.**

### Standard ST8100 ECU Display System Items

The ST8100 ECU Display System is supplied with the following standard components:

Quantity	Description
1	Display Module (ST867 ) with 2 mounting brackets
1	Wiring Harness (ST872)
4	Switches (supplied with and to be connected to the wiring harness)

### Optional ST8100 ECU Display System Items

The ST8100 ECU Display System can be used with the following optional components:

Quantity	Description
1	ECU Adapter Harness
1	Wheel Speed Sensor (ST670 or ST671)
1	Oil Pressure Sensor (ST744, ST745, ST746) (Supplied if ECU does not provide an oil pressure reading)
1	Oil Temperature Sensor (ST760, ST761, ST762, ST763, ST764) (Supplied if ECU does not provide an oil temperature reading)
1	Infra-red Lap Time Receiver (ST543)
1	Infra-red Lap Time Beacon (ST544)
1	External Fuel Warning Lamp
1	External Alarm Warning Lamp

Note that the external shift lamp is not available on the ST8100 ECU Display System when Fuel Usage is displayed, as this lamp is used as a Low Fuel warning.

## ECU Feature Table

The following table shows which channels are provided by the different types of ECU. Most ECUs provide additional channels which are not displayed on the ST8100.

ECU Type	RPM	Water Temp	Oil Temp	Fuel Pres.	Oil Pres.	Batt. Volts	Fuel Usage	Wheel Speed
Delco	✓	✓	✓	✓	✓	✓	✓	②
EFI	✓	✓	✓	✓	✓	✓	✓	②
MBE	✓	✓	✓	✓	✓	①	✗	②
Motec	✓	✓	②	✓	②	✓	✓	②
Zytek	✓	✓	✓	✓	✓	✓	✓	②

✓ Displayed value supplied by ECU

✗ Not available

① Displayed value is the voltage applied to the ST8100 rather than the voltage applied to the ECU

② External sensor required



## Wiring Harness

The harness is identical to that of the ST8100, but as most readings are obtained from the ECU, many sensor connections are not used. Unused harness lines can be cut back, taking care to avoid short circuits in the cables.

Labels on short cables	Connection To
S1 to S4	Switches 1 to 4
WS	Wheel speed sensor
LAP	Lap timing sensor
SL	Fuel warning light
AL	Alarm warning light
NET	Data logging expansion pack

Labels on Long Cables:	Connection To
ES	Engine Speed (RPM) *
OT	Oil temperature sensor **
WT	Water temperature sensor *
OP	Oil pressure sensor **
F	Fuel pressure sensor *
A	Lateral Acceleration sensor
B+	Battery
B-	Earth

\* Never used

\*\* Only used for some ECU types (refer to the ECU Feature Table)

## Chapter 3. Operating the Display System

The operation of the ST8100 ECU Display is basically the same as that of the standard ST8100. This section highlights any differences.

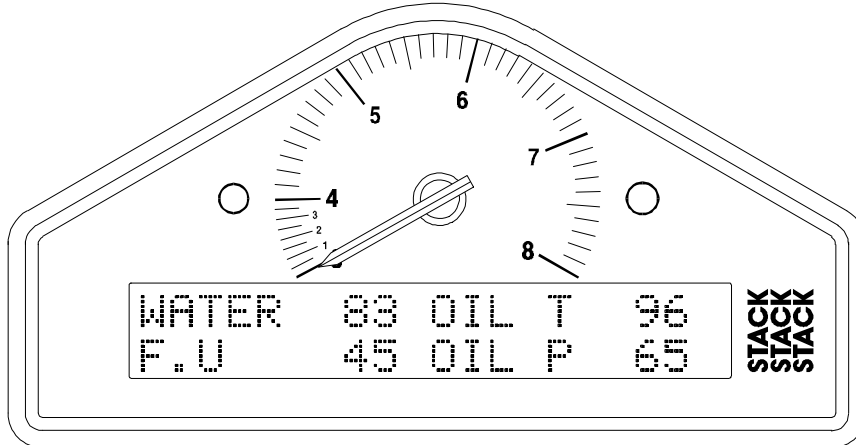
### Changing the display layers

The first display layer differs in that it contains the Fuel Usage quantity in place of the speed (where this is available from the ECU). The speed display is still available on layer 3. If Fuel Usage is not available, the first layer is identical to that of the standard ST8100.

The fuel usage is shown in litres or gallons, and is the usage since the last resetting of the peak values. Most ECU types also reset the fuel usage when they are turned on.

⇒ **The format of the values in these displays will vary for systems supplied outside the UK, as the parameters are displayed in different units.**

### Display Layer 1



Display layer 1 shows:

- Water Temperature (WATER)

- Oil Temperature (OIL T)
- Fuel Usage (F.U)
- Oil Pressure (OIL P)

Press Switch 3 to see display layer 2.

### **Display Layer 2 - 3**

These are the same as those on the standard ST8100.

### **Display Layer 4**

This layer is omitted on ST8100 ECU Display Systems.

## **Peak Values (Tell Tales)**

The peak values for ST8100 ECU systems operate in the same manner as those for the standard system.

Resetting the peak values zeroes the Fuel Usage display.

## Alarms

The ST8100 ECU Display System has the following built-in alarms:

<b>Parameter</b>	<b>Alarm is triggered when the:</b>	<b>Gated to RPM</b>
Oil Temperature	current value exceeds the preset value	Yes
Water Temperature	current value exceeds the preset value	Yes
Oil Pressure	current value drops below the preset value	No
Fuel Pressure	current value drops below the preset value	Yes
Battery Voltage	current value drops below the preset value	No
Low Fuel	Fuel Usage value exceeds the preset value	No

## Chapter 4. Configuring the Display System

### Configuration mode

The list of configurable parameters has changed from that of the standard ST8100.

Configurable Parameter	Setting Required
Wheel Circumference	Set a value in the units of measurement indicated
W.S. Pulses/Rev	Number of targets per wheel revolution
LOW FUEL	Fuel Consumption Limit
FUEL CAL	Fuel Consumption Calibration Factor
GATE RPM	Minimum RPM for the Fuel Pressure, Oil Temperature and Water Temperature warnings to operate.
LOG RPM	RPM at which the logging option is started.
SHIFT RPM	RPM at which gear shift light is to come on
HIGH WATER	Maximum water temperature alarm
HIGH OIL T	Maximum oil temperature alarm
LOW FUEL P	Minimum fuel pressure alarm
LOW OIL P	Minimum oil pressure alarm
LOW BATT	Minimum battery voltage alarm

The Engine Cylinders setting is eliminated.

The two additional settings are:

### Fuel Consumption Limit

Once the Fuel Usage display exceeds this setting, the Fuel Warning lamp (SL) will be lit. This lamp will stay lit until the Fuel Usage is reset,

either using the Reset Peaks switches or by repowering the ECU (where applicable).

It is intended that this limit be set to the tank capacity. To disable this warning permanently, user Switch 1 and 2 simultaneously as shown in the ST8100 manual.

## **Fuel Calibration Factor**

If the ECU has not been calibrated to produce the correct fuel consumption figures, this factor can be used to adjust the displayed value. The factor is normally 1.00, so that the displayed value is equal to that provided by the ECU. To double the displayed value, set the factor to 2.00. To halve the displayed value, set the factor to 0.50.

## Chapter 5. Installing the Display System

Installation is simplified by the reduced number of sensors required. The lamp connected to the SL harness connection is used for Low Fuel indication where Fuel Usage display is available.

A major change from the standard ST8100 installation is that the RS232 serial connection must be connected to the ECU. Refer to Appendix B of the ST8100 manual for harness details.

Where the harness has been supplied with the ST8100 ECU Display System, the ECU connection on the harness will normally be terminated with a suitable connector. The Stack harnesses use as standard Cannon 4-pin Mini Sure Seal (MSS) connectors. The harness is fitted with a plug (Cannon PN 120-8552-102), the ECU should be fitted with a receptacle (PN 120-8551-102). Use of the MSS connector allows a standard Stack extender cable to be used.

Where a harness is purchased separately, it will be necessary to extract the ECU connection from under the heatshrink and fit a connector.

Some types of ECU require an electronic adapter which will be supplied along with the harness.

Even though the link is used solely for transmitting from an ECU to the Stack unit there may be data present on the Stack unit's Tx (output) line. If this can disrupt the ECU's operation then care must be taken to ensure that the Tx signal is not connected through to the ECU.

MSS Pin Connections	
Pin	Signal
1	Tx (unused)
2	Ground
3	Power (from ST8100)
4	Rx (from ECU to ST8100)

The power feed is commoned to the main external power connection (B+) on the harness. It is not regulated or fused.

## Chapter 6. Troubleshooting

Use this table in conjunction with the ST8100 manual.

No.	Symptom	Possible Cause	Remedy	Notes
1	Display shows fixed values for RPM, Fuel Pressure etc.	ECU link not operating correctly	Check RS232 connection	
		ECU not configured for communication with ST8100	Confirm configuration with ECU vendor	
		ECU not switched on	Power up ECU	
2	ST8100 LCD characters are dim	RS232 link incorrectly made	Check RS232 connection	The RS232 output (not used) is shorted
3	Fuel Usage stays at 0 or is incorrect	ECU not calibrated for correct reading	Calibrate ECU	or adjust Fuel Calibration Factor in ST8100
		Fuel Calibration Factor in ST8100 wrong	Change factor up or down as required	Factor is normally 1.00
4	RPM correct but another reading is wrong	ECU sensor faulty or not fitted	Replace sensor	Ensure applicable sensor <b>is</b> fitted to the ECU!
		ECU not configured correctly	Reconfigure ECU	



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