



# **DT100**

**DIGITAL DASH**

**OPERATING**

**INSTRUCTIONS**

29-10-13

## How it Works

The Otto Racing **DT100** Digital Dash consists of a display and separate electronics module and contains all the essential functions in one instrument i.e.:-

- \* Infra-Red Lap Timer with 100 Lap Memory
- \* Digital Tacho with Maximum RPM recall and Tell-Tale display mode
- \* 8 Shift Light LEDs fully programmable to operate within any RPM range
- \* Separate Shift Light Settings for Race Starts
- \* Digital Readout of Oil Pressure and Water Temperature
- \* Over Temperature and Under Pressure Alarms
- \* Output to Separate Rev-Limiter Module

## The DISPLAY

Two display options are available, one with 8 Shift Light LEDs and a smaller version with 3 LEDs. Both displays have an LCD screen to display Lap Time, RPM, Oil Pressure and Water Temperature. An external button is provided to scroll through the display. The same button is also used to recall the Maximum RPM & Lap Times, as well as setup the system.

The LEDs can be configured to start and stop at any RPM allowing it to operate within a very narrow or wide RPM band. This is done by setting the RPM for the first LED and then setting the step between LEDs. For example the first LED could be set to 5000 rpm and the step size could be set to 200 rpm. The first LED would then come on at 5000 rpm, and subsequent LED's would come on at 5200, 5400, 5600, 5800, 6000, 6200, and 6400 rpm.

A separate setting for the Shift LEDs is available for the start of a race to help the driver keep within a lower RPM band. The normal settings are automatically loaded once the RPM increases above a certain RPM.

Alarms can be set to warn the driver of Low Oil Pressure or High Water Temperature. When either is triggered, the display and LEDs flash and an output to an external lamp/LED is also turned on. Pressing the button cancels the flashing and the current reading is displayed. Irrespective of which channel is displayed, all of the alarms are constantly being tested.

## The ELECTRONICS MODULE

The Electronics Module also acts as a junction box into which all the elements of the system are wired. These include the Display, Infra-Red Pickup for Lap Timing, Push Button, Sensors and Rev-Limiter Box. The module can be opened up and re-wired if necessary.

## LAP TIMING

The Infra-Red pick-up has a small round window which should be positioned to point at an infra-red beacon on the pit wall. With the display in Lap Timer mode, and before the first trigger, the display shows 4 dashes "----". As the receiver passes the beacon for the first time, all zeros "00.00" will be displayed. On the next pass, the lap number is first displayed in the format "L 1" for lap one. This is displayed for two seconds before the Lap Time is shown. Every time the Lap Timer is triggered, the display automatically goes into Lap Timer display mode.

The pick-up is not coded and will trigger by any infra-red beacon it sees. To prevent the timer being triggered multiple times on a lap, a feature called "blanking" is included.

Once the receiver is triggered, no other triggers are accepted for the next 5 to 115 seconds, depending upon the "blanking" time set. Ideally the blanking time should be set to be 5 seconds below the fastest lap expected. What will then happen is the timer will be triggered by the first beacon on the pit wall and ignore any other beacons on the circuit.

To remind the driver of the current blanking time, when the display is switched on, the blanking time is displayed for two seconds before the display goes into RPM display mode. When going to a new circuit, remember to set the correct blanking time and reposition the pick-up, if the pit wall is on the other side of the track.

All the circuits in the UK have a beacon permanently installed at the start of the pit wall. This should be switched on for race and test days, but off for track days. It is therefore not usually necessary to purchase your own beacon. However, a beacon powered by 4 AA batteries is available.

The display has a 4 and a half digit display i.e. it can display up to "1.59.99". The half digit being the "1". If the lap time is 2 minutes or greater, only the seconds and hundredths are displayed.

## Lap Times and Maximum RPM Recall

To recall the Lap Times and Maximum RPM press the button until 'rEC' is displayed, then release. The Maximum RPM will then be displayed. Each press of the button will scroll through the Lap Times.

The Maximum RPM and Lap Times are retained in memory when power is removed. The Maximum RPM is cleared when system is powered up **AND** the engine started. The Lap Times are cleared when system is powered up **AND** a new trigger is received by the Infra-Red pickup. Hence, after a race, the system can be powered down and up again without losing the Lap Times. They are only automatically deleted when out on the track again.

## Race Start Mode

To enter **Race Start Mode** press the button until the message 'St.' is displayed, then release the button. In this mode the Shift LEDs come on at a lower than normal RPM, to help the driver keep the ideal RPM for a race start. To indicate to the driver that the display is in this mode, the RPM is only displayed to the nearest 100 RPM and the two right hand digits are smaller than normal i.e. "4500" instead of "4500". After the start of the race and the RPM increases to 2,000 RPM above the first LED, the LEDs and display automatically revert to the normal settings.

## Setting Up

Setting up is very simple using the button. To setup proceed as follows:-

- 1, Press and hold in the button until the name of the parameter to be changed is displayed. (Note that the display will first display 'St.' then 'rEC' before the parameters).
- 2, Release the button when the parameter you wish to change is displayed.
- 3, Press and hold in the button, the parameter value will increase.
- 4, Release the button when the required value is displayed. The new value will then be saved in memory.

The parameters in the order in which they are displayed are:-

- 'bln' - Lap Timer Blanking Time
- 't. t.' - RPM Tell-Tale Mode
- 'Strt' - The RPM at which the first LED is illuminated in "RACE START MODE"
- 'LEd1' - The RPM at which the first LED is illuminated
- 'StEP' - The increment at which subsequent LEDs are illuminated
- 'r. l.' - Rev-Limiter Setting
- 'AL P' - Oil Pressure Alarm Threshold
- 'AL t' - Water Temperature Alarm Threshold
- 'OIL' - Oil Pressure Input Enable
- 'H2O' - Water Temperature Input Enable
- 'CYL' - The number of cylinders on the vehicle

### RPM Tell-Tale Mode (t. t.)

When set to 'On' the display displays the Maximum RPM. Pressing the button clears the maximum and the display shows a new maximum. Pressing the button does not clear the overall Maximum RPM, which can be recalled when the button is kept pressed until the display shows 'rEC'.

When in Tell-Tale mode, the alarms still operate in the background. If an alarm is triggered, the display flashes the appropriate message to alert the driver. Pressing the button then clears the flashing and the display shows the reading of the channel that triggered the alarm. Pressing the button again makes the display go back into RPM Tell-Tale mode.

### Race Start Mode LEDs (Strt)

In Race Start Mode the first LED comes on at the RPM set by the 'Strt' value. Each subsequent LED comes 100 RPM higher. If 'Strt' is set to 3000 the last LED will come on at 3700. The display will revert to normal mode at 5000 RPM i.e. 'Strt' + 2000.

## RPM LED's (LEd1 & StEP)

The LEDs can be programmed to start and stop within any RPM band. This is done by setting the RPM that the first LED comes on and setting the increment (StEP) between subsequent LEDs. The first LED can be programmed to come on between 3,000 RPM and 14,000 RPM in increments of 100 RPM. The size of the step between LEDs can be selected between 50 RPM and 800 RPM in increments of 50 RPM.

As there are 8 LEDs (i.e. 7 increments between LEDs) the RPM at which the last LED will be illuminated will be “LEd1 + 7 x StEP”.

## Alarms (AL P & AL t)

The alarms can be turned off even if the input is turned on. However, the input must be turned on for the alarm to work. When setting the alarm parameter, the alarm threshold will increment with the button held in. After the highest value is displayed “OFF” will be shown. Release the button when the threshold required is displayed, or “OFF”.

When an alarm is triggered, the display will flash a message to indicate which alarm is triggered i.e. “OIL” or “H2O” The LED’s will also flash and the output to

Momentarily pressing the button will cancel the flashing and the display show the present reading (not the reading that triggered the alarm). That alarm will then be disabled until the dash is reset by powering down the dash.

The Oil Pressure alarm will accept values between 10 and 50 PSI and is triggered when the pressure reaches this, or below. To stop the alarm being triggered at tickover, this alarm is not tested below 3000 RPM.

The Water Temperature alarm will accept values between 90 and 125 degrees centigrade and is triggered when the temperature reaches this, or above.

## Enabling Pressure and Temperature Inputs (OIL & H2O)

Inputs for Oil Pressure and Water Temperature can be turned on or off as desired. The input has to be turned on for the alarm function to work.

The Oil Pressure channel will display pressures between 0 and 150 PSI. If no sensor is fitted the display will show ‘no C’ to indicate that no connection is made. The Water Temperature channel will display temperature between 60 and 125 degrees centigrade. If the temperature is below 60 degree the display will show ‘Lo t’ to indicate that the temperature is low.

**The dash is calibrated only for the sensors supplied and should be the only ones used. If other sensors are used the reading will probably not be accurate.**

## Configuring for Different Engines (CYL)

The instrument will operate on most 4 stroke engines with a normal inductive ignition coil and 2,4,5,6 or 8 cylinders. Set the ‘CYL’ parameter to the number of cylinders. However on some engines, especially motorcycle engines with twin coils, or vehicles which operate a wasted spark system, this setting may be different from the actual number of cylinders.

# INSTALLATION

The **DT100** is supplied with the display and button wired into the electronics module. However, the module can be opened and re-wired. From the left hand side, the PCB markings, cable colour code and connections are as follows:-

<b>IGN</b>	<b>PURPLE</b>	<b>RPM Input.</b> Connect to -Ve terminal on Ignition Coil
<b>0V</b>	<b>GREEN</b>	<b>Supply Earth (0v)</b>
<b>12V</b>	<b>RED</b>	<b>+ 12 Volts Supply</b>
<b>AUX</b>	<b>YELLOW</b>	<b>Output to Alarm Lamp or LED</b>
<b>R/L</b>	<b>BROWN</b>	<b>Output to Rev-Limiter Module</b>
<b>OIL</b>	<b>BLACK</b>	<b>Oil Pressure Sensor.</b> Connect the other terminal of the sensor to earth
<b>H2O</b>	<b>WHITE</b>	<b>Water Temperature Sensor</b> (make sure that the body of the sensor is earthed)
<b>5V</b>	<b>RED</b>	<b>5 volts Power to Lap Timer Pickup</b>
<b>0V</b>	<b>GREEN</b>	<b>0 Volts to Lap Timer Pickup</b>
<b>LAP</b>	<b>BLUE</b>	<b>Lap Timer Pickup Trigger Input</b>
<b>Sw</b>	<b>RED</b>	<b>Switch Input</b>
<b>0V</b>	<b>BLUE</b>	<b>Switch Earth (0v)</b>
<b>0V</b>	<b>GREEN</b>	<b>Display Earth (0v)</b>
<b>+V</b>	<b>RED</b>	<b>Display Power (+12v)</b>
<b>O/P</b>	<b>BLUE</b>	<b>Display Data Output</b>

**It is recommended that the +12 volts supply and earth are not taken directly from the ignition coil as this could introduce an unacceptable quantity of electrical interference.**