

# RETRO GPS SPEEDOMETER

## Connection to Vehicle

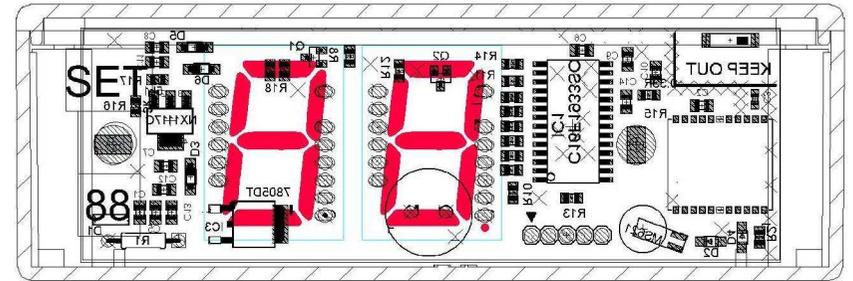
It is strongly recommended that the unit is connected to the vehicle through a **fused supply** using the supplied cable.

When using the supplied cable the positive connection is made to the core white wire. The negative (ground) connection is made to the outer core (screening). It is not possible to damage the unit through connecting the cable the wrong way around however the unit will only work when connected correctly.

## Specification

Supply Voltage	11-15VDC
Power Connector	2.1mm (5.5mmOD) +VE centre pin
GPS Chipset	SiRF Star III
Accuracy Max	0.1ms <sup>-1</sup>
Antenna	1575.42MHz Chip (L1C)

ELB 1985



We hope you enjoy using this product as much as we enjoyed developing it!

## 2-Digit GPS Speedometer with Speed Warning Alarm



Developed and Manufactured by  
Advent Controls Ltd, Liverpool, UK  
**Made in UK**



[www.firmtec.co.uk](http://www.firmtec.co.uk)

## EMC/EMI Compliance Statement: CE Mark Declaration of Conformance

This product conforms to the following specifications:

- EMC: EN55022
- Safety: EN60950
- Immunity: EN55024

**This product complies with European Directive 1995/5/EC.**

### Manufacturer's Disclaimer Statement

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## Contents

Introduction	3
Operation	3
Touch Switches	4
Menu Items	5
Display Modes	5
Display Units	6
Power Management	6
Touch Switch Sensitivity	7
Speed Limit Warning Alarm	7
Connection to Vehicle	8
Specification	8

## Touch Switch Sensitivity

The capacitive touch switches are more sensitive to large fingers than smaller ones. If the user finds the switches are too sensitive they can decrease the sensitivity of the switches by increasing the 'Sensor Adjust' value as shown in Table 1. Conversely if the user finds the sensor is too insensitive the 'Sensor Adjust' value can be decreased. Note sensitivity is the inverse of the sensor adjust value.

## Speed Limit Warning Alarm

The speedometer incorporates a speed limit warning alarm and pre-alarm. The user can set a speed limit between 1 and 99units (kph or mph). When the vehicle travels over this speed an alarm will sound. A pre-alarm can also be set to assist the driver in maintaining a constant speed below the limit. The pre-alarm can be set between 1 and 9units below the alarm speed. **The speed limit warning alarm is more accurate than the value on the display as it is not affected by rounding errors.**

To set the speed limit alarm the right hand 'DOWN' touch switch is pressed once. The speedometer will then display the current alarm speed setting. The user can then press the 'UP'/'DOWN' switches to vary the alarm speed. The amount either the 'UP' or 'DOWN' switch increments or decrements the speed is controlled by the 'Speed Limit Increment Value' set in the main menu. By default this is set to 10 (N.B. a value of 10 is shown as '0' in the menu).

The pre-alarm is a useful feature which warns the driver that he/she is approaching the alarm speed. The default tone is very discreet and can sound continuously without causing annoyance.

To change the pre-alarm and alarm tone the values of 'P' and 'A' in the main menu are set as per **Table 2**.

Value	Description
0	Bleep Pause
1	Alternating Tone
2	Melody
3	Infinite Tone

**Table 2:** Tone Selection

## Display Units

The speedometer can display speed in either kph or mph. To switch between kph and mph scroll through the menu by pressing the left hand side 'UP' touch switch until 'U' is displayed on the left hand (tens) display. Press the 'DOWN' touch switch to modify the value as per **Table 1**. The units selected also affect the speed limit alarm speed and the pre/alarm speed difference value. These are re-calculated automatically.

## Power Management

When stationary, the speedometer automatically shuts down after the 'Auto shutdown time' (see Table 1 for details). If this is undesirable the device can operate in 'Always on' mode. To switch between auto power management and always on modes scroll through the menu by pressing the left hand side 'UP' touch switch until 'E' is displayed on the left hand (tens) display. Press the 'DOWN' touch switch to modify the value as per **Table 1**.

The unit can be shutdown at any time by scrolling through the menu until 'On' is displayed and pressing the 'DOWN' touch switch. Please note that to restart the speedometer either the 'UP' or 'DOWN' touch switch must be pressed – the speedometer will not restart in response to movement if shutdown this way.

If the speedometer is operating in auto power management mode it automatically shuts down the display after the 'Auto shutdown time'. The GPS chipset will then enter trickle power mode to keep the internal clock synchronised with the GPS satellites. If the vehicle then travels at a speed greater than 5knots then the device wakes from sleep and resumes normal operation.

Note if the vehicle is parked in a covered area, such as a garage, the GPS chipset will remain at full power in an attempt to reacquire a lock with the satellites. It would take approximately 2 months for the device to discharge a typical car battery in this mode and is likely not to be the greatest drain on the vehicle battery when not in use. However, if the vehicle is regularly parked up for several days we recommend disconnecting the speedometer.

## Introduction

The Firmtec Retro GPS speedometer uses the GPS satellite cluster to calculate the speed of the vehicle and requires only a simple power connection. It is able to display speeds of up to 199mph and can display vehicle speed in miles per hour (mph) or kilometres per hour (kph).

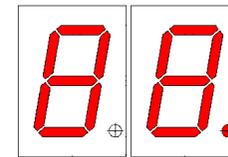
The speedometer is based around the best-in-class SiRF Start III GPS chipset which features low power consumption, high sensitivity and accurate doppler-corrected velocity measurements.

The speedometer also incorporates a speed limit warning alarm and pre-alarm and a menu accessed by capacitive touch sensitive switches. The user can set a speed limit between 1 and 99units (kph or mph). When the vehicle travels over this speed an alarm will sound. A pre-alarm can also be set to assist the driver in maintaining a constant speed below the limit. The pre-alarm can be set between 1 and 9units below the alarm speed.

## Operation

The unit will only operate in full view of the sky when oriented the right way up. GPS signals will pass through thin non-metallic surfaces, such as a car windscreen, but it is not able to operate indoors.

If the unit has been disconnected for over two hours then it will need to update almanac and ephemeris data from the GPS satellites. This may take up to 3 minutes depending on the strength of the GPS signal. If the unit receives a momentary disconnection of power then valid data should be ready within 8 seconds.

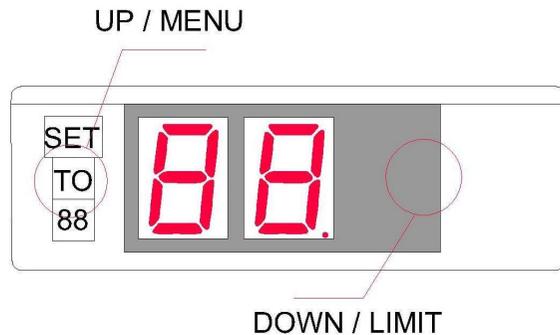


The decimal point will illuminate only when sufficient satellites have been acquired and they are supplying valid data. On certain models a reading will only be displayed when valid data is present and at least 4 satellites have been acquired.

The accuracy of the unit will increase as more satellites are acquired. This will take several minutes from a cold start. Please note the GPS module has an internal battery to store ephemeris data which is used to perform a warm start. When shipped this battery will be discharged and may take several hours of normal operation to charge.

## Touch Switches

The menu functions and speed limit alarm speed are accessed using the capacitive touch sensitive switches on the front of the speedometer. Capacitive touch sensors were used to add a lot of functionality without affecting the overall appearance of the speedometer. The sensors are located behind the 'TO' legend and in the far right centre of the bezel as shown in **Figure 2**.



**Figure 2:** Touch Switch Locations

During the initial splash screen which displays 'ELb' the capacitive touch sensors are undergoing rapid calibration and **must not be touched** during this time. If the switches are pressed during this time they may remain un-responsive to touch for up to a minute whilst slow recalibration occurs in normal operation.

The left hand 'UP' touch switch is used to access the main menu, scroll through the menu items and increment the value on display. The menu item is shown on the left hand display and the value is shown on the right hand display. To select a menu item the right hand 'DOWN' switch is pressed. The 'UP' and 'DOWN' switches are then used to modify the value of the menu item. Once the value has been selected the user waits for the menu to close saving the modified value.

In normal operation the right hand 'DOWN' switch is used to enter the speed limit warning set speed menu. See 'Speed Limit Warning Alarm' for more information.

## Menu Items

Item	Range	Description	Default
L	0-3	Brightness	3
0		Shutdown	
b	0-2	Buzzer Volume	2
S	0-1	Scroll Mode (en=1, dis=0)	1
d	0-9	Pre/Alarm Difference	3
U	0-1	Units (mph=0, kph=1)	0
P	0-3	Pre-alarm Tone	0
A	0-3	Alarm Tone	2
t	0-9	Auto shutdown time	3
E	A/n	Auto (A)/Always on (n)	A
r		Reset Defaults	
o	1-10	Speed Limit Increment Value	0 (10)
l-	0-9	Left Sensor Adjust	5
-l	0-9	Right Sensor Adjust	5
u		Display Firmware Version	
@		Display Satellite Data	

**Table 1:** Menu Items

## Display Modes

The unit can operate in two display modes; scroll and step. In scroll mode, if the vehicle acceleration is less than 10units per second, the display will scroll incrementally through every number up (or down) to a steady state speed. In step mode the display is updated every second with the current vehicle speed. Lag is reduced in step mode and is hence more accurate. To switch between scroll and step modes scroll through the menu by pressing the left hand side 'UP' touch switch until '5' is displayed on the left hand (tens) display. Press the 'DOWN' touch switch to modify the value as per **Table 1**.