

Ultra_Link



Quick-Start Manual

	Date	Revision
1	1/10/04	
2	5/12/06	Switch settings changed

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As part of our policy of continuous improvement we would welcome any suggestions for changes to the document.

Churchill Controls Ltd.
30 Wellington Business park
Dukes Ride
Crowthorne
Berkshire
RG45 6LS

Tel: 0118 9892200

Fax: 0118 9892007

e-mail: sales@churchill-controls.co.uk

website: www.churchill-controls.co.uk

Introduction

Ultra_Link is a partnered product between Churchill Controls and Pulsar Process Measurement. It offers non-contacting ultrasonic level measurement by combining a Pulsar Level CSO 136 and head with a Churchill Controls *Nano_Link* outstation.

Communication Options

Nano_Link can communicate via Low Power Radio, Leased Line or GSM to allow reporting to the outside world.

Low power radio and leased line can communicate with *Nano_Link* and *Micro_Link* base stations from Churchill. The base station can then route data into RTU's, SCADA, PLC's or Servers.

The GSM option can transfer data and settings to a mobile phone (using SMS messaging) and/or a PC running *PC_Link* software.

Real Time Communication & Local Log

Ultra_Link offers, effective 'real time' reporting of levels, high levels, overflows etc. via Low Power Radio or Leased Line, with local logging backup giving an invaluable source of uninterrupted data. The local log is adaptive, increasing its logging rate frequency during 'events/spills'. The GSM option offers further logging capacity based on its 'dial up' operation, and includes facilities to exception report 'events' such as 'high level alarms' or 'spills'.

Power Supply Options

Ultra_Link can be supplied with various power supply options including battery (alkaline D Cells) giving minimum 1 year operation based on a 15 minute sampling frequency basis.

Ultra_Link can be fitted with a variety of power supplies including mains with battery back-up, solar power and alkaline batteries. In the latter case the user can typically expect a life in excess of 12 months before the batteries need replacing (assuming a sample rate of 15 minutes). It uses standard alkaline batteries that are readily available.

Input/Output Capacity

In addition to monitoring the ultrasonic level, the *Nano_Link* module used in *Ultra_Link* has 4 digital inputs that can be used for monitoring alarm/status signals or for monitoring pulse counts from flowmeters. It also has a spare analogue input that can read a 4-20mA signal.

Connecting Ultra_Link

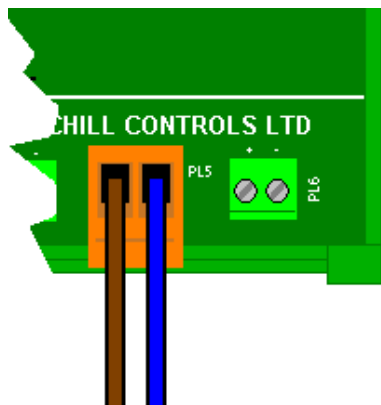
Power Supply

Ultra_Link has six power supply options as shown. The required option must be specified on order to ensure the unit is correctly configured.

Mains:

The internal power pack accepts an input in the range 85...265VAC.

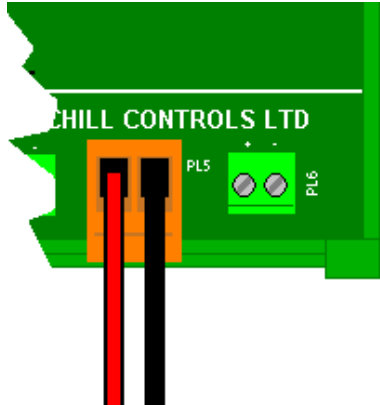
It includes rechargeable Ni-Cad batteries to support the unit in the event of a mains failure.



12V Supply:

The unit will operate from a supply in the range 8...16VDC.

This is intended for operation from 12V nominally.



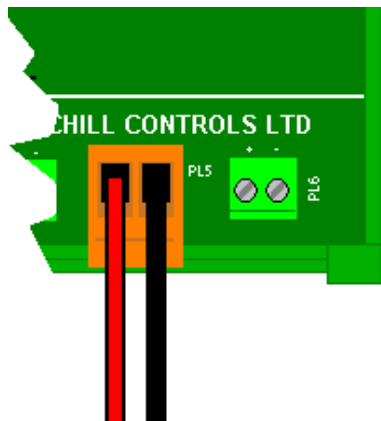
Internal Battery:

The internal battery pack holds nine D alkaline cells. Care should be taken to configure the unit to with settings which optimise battery life.



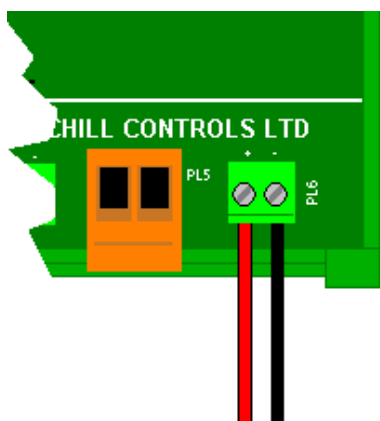
24V Supply:

The unit will operate from a supply in the range 16...32VDC.



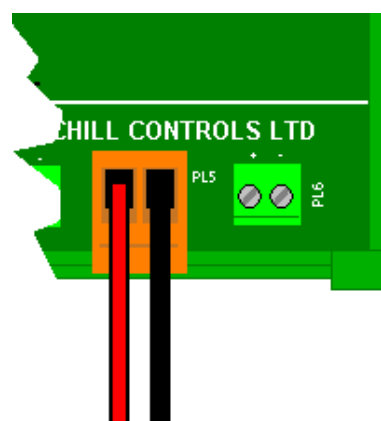
5V Supply:

The unit will operate from a supply in the range 3...5.5VDC.



Solar Supply:

Solar power requires a solar panel, solar controller and lead-acid battery. Refer to the Installation Manual for details.



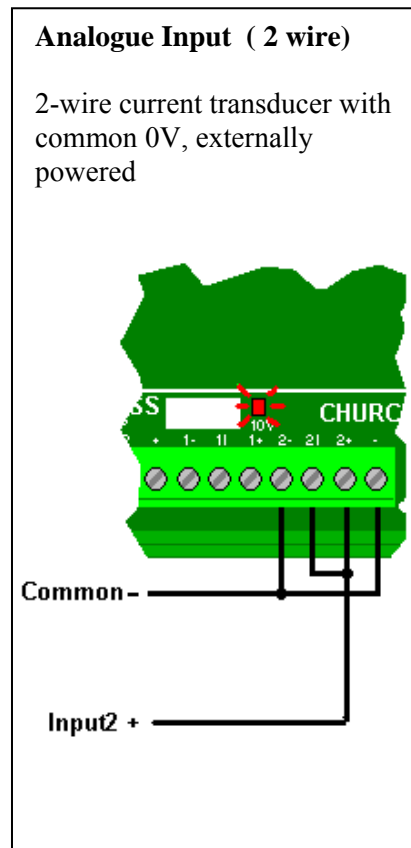
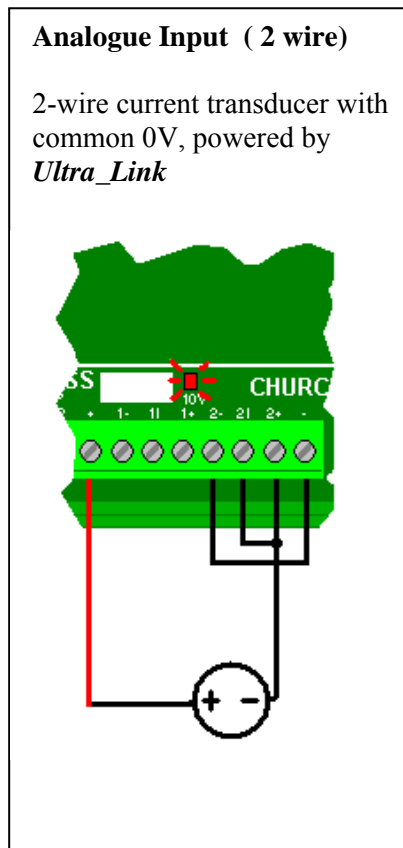
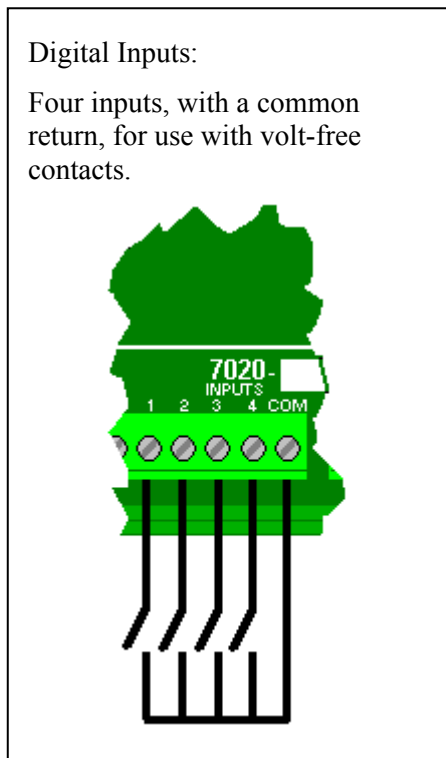
Inputs

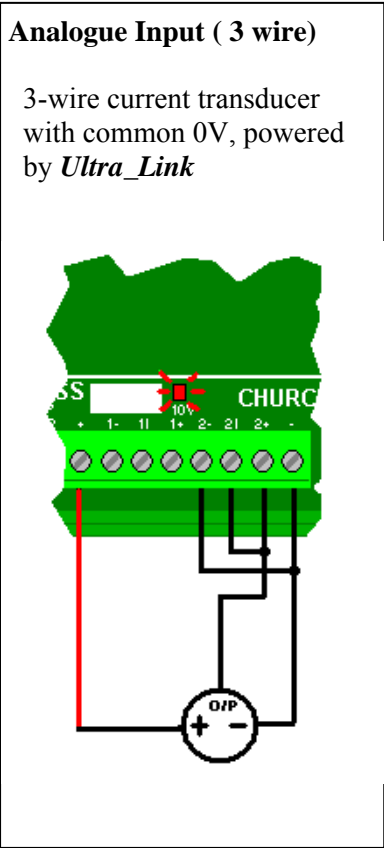
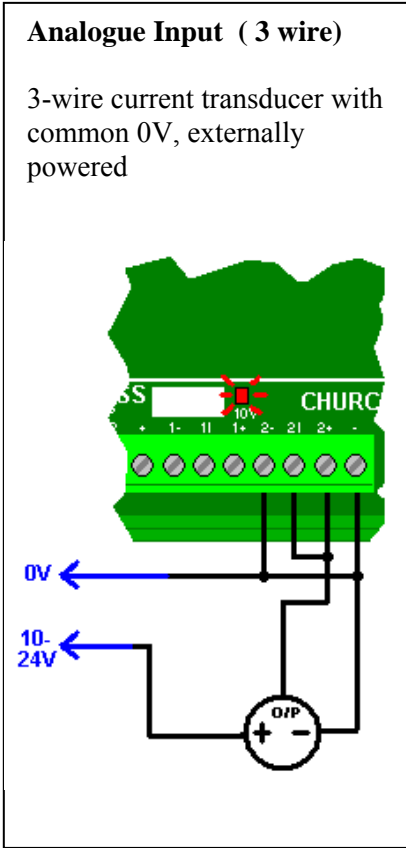
If *Ultra_Link* is to be used solely for Ultrasonic Level Measurement, no further connections need be made. The Ultrasonic head is internally wired to the *Ultra_Link*'s first analogue input.

Should further inputs be required, *Ultra_Link* can accept 4 digital inputs and a further analogue input.

The basic connection requirements for the digital inputs are detailed below. Each input is assumed to be a volt-free contact (which can represent a status or alarm) or a pulse output from a meter. For more detailed information, refer to the *Nano_Link* Technical Manual.

Connection diagrams for the additional analogue input are shown below. *Ultra_Link* also provides a switched 12V supply output, which can be used to power transducers. Connections from this are shown in **red**. Alternatively, transducers may be externally powered - these connections are shown in **blue**. The LED adjacent to the connector lights whenever 12V is available.

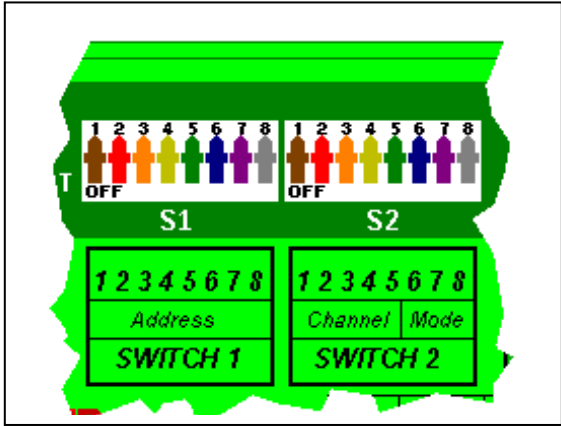




DIP Switch Configuration

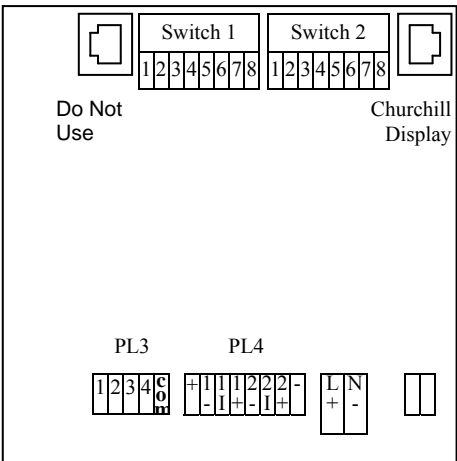
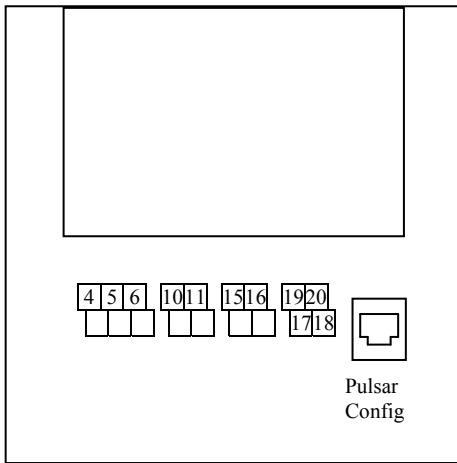
The DIP switches within the *Ultra_Link* unit are used to set its mode of operation.

If all poles of Switch 1 are in the UP position, *Ultra_Link* will enter a sleep condition to minimise power consumption. The switch setting required for normal operation depend on the hardware version, and are described later.



The following diagram details the connection available within *Ultra_Link*.

It should be used in conjunction with the schematic connection diagrams previously shown to allow the user to connect other inputs to *Ultra_Link* in addition to the inherent Pulsar Ultrasonics.



Transducer:

Wire Colour	Pulsar Terminal
Screen	17
Black	18
Red	19
White	20

Internal Wiring:

Wire Colour	Pulsar Terminal	Churchill Terminal
Red	4	PL4 +
Blue	6	PL4 1-
Black	6	PL4 -
Yellow	16	PL4 1+

Power (if not using internal batteries):

Mains Operation: (Double insulated)	Solar Power:	Churchill Terminal
L	+12VDC	PL5 L+
N	0V	PL5 N-

Spare Input Capacity

Digital Inputs	Churchill Terminal	4 – 20mA Transducer	Churchill Terminal
1	PL3 1	+12V supply	PL4 +
2	PL3 2	0V	PL4 -
3	PL3 3	+ Output	PL4 2+
4	PL3 4	- Output	PL4 2-
Common	PL3 COM	Link PL4 21 to PL4 2+	

Churchill Switch Settings

Switch	Powerdown	Mains Powered	Battery Powered
1	11111111	_____	_____
2	11111111	_____001	_____101
1 = UP, 0 = DOWN			

Churchill Controls Ltd

Unit 2, Station Industrial Estate, Wokingham, Berkshire, RG41 2YQ
Tel: +44(0)118-9892200 www.churchill-controls.co.uk

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This diagram also appears as a label on the inside of the *Ultra_Link* lid.

Note that the Churchill Switch Settings will depend on the type of communications used (see the following sections).

Using Ultra_Link with Low-Power Radio, Leased-Line or Private Wire

If *Ultra_Link* is configured with any of these options it will communicate with a base-station equipped with the same communications option. The overall system will need to be configured as any other *Data_Link 2000*, so it is assumed that the user is familiar with the method of configuration, as described in the *Data_Link 2000* Quickstart instructions and/or the *Data_Link 2000* Technical Manual.

The Churchill Switch Settings (see diagram above) will need to be configured as required. Switch 1 defines the outstation address, and the first five poles of switch 2 define the radio channel. The last 3 poles of switch 2 define the operating mode, and should be set to 001 for mains-powered applications and 101 for battery operation.

Using Ultra_Link with GSM

If *Ultra_Link* is configured for GSM use it will communicate with a mobile telephone and/or a host PC equipped with a GSM modem. The overall system will need to be configured as any other *GSM_Link* system, so it is assumed that the user is familiar with the method of configuration, as described in the *GSM_Link* Quickstart instructions.

The user can then refer to the *GSM_Link* Quickstart Manual for more detailed information.

The Churchill Switch Settings (see diagram above) will need to be configured. Switch 1 should be set to 10000000 and switch 2 to 00000101.

Configuring the Pulsar Ultrasonics

The ultrasonic module is a Pulsar Level CSO 136 controller and typically a Pulsar dB3 head. There are numerous configurable parameters in the Level CSO 136, which are factory preset for correct operation. However, the user can change the configuration via either a Pulsar handheld terminal or a PC running appropriate software. In both cases the configuration unit needs to be plugged into the Pulsar Config socket (see diagram above) via a serial cable. The handheld terminal and/or the interconnecting cable are available as optional extras, and are not included as standard.

The Pulsar Level CSO 136 manual describes the configurable parameters that can be changed by the user. However, it should be noted that some parameters should not be changed, since they would affect the correct interaction between the Level CSO 136 and the *Nano_Link*:

1. The Wake Interval (Parameter 160) should be set to 0 if the system is mains powered, or 1 if it is battery powered
2. Ensure link JP2 is fitted

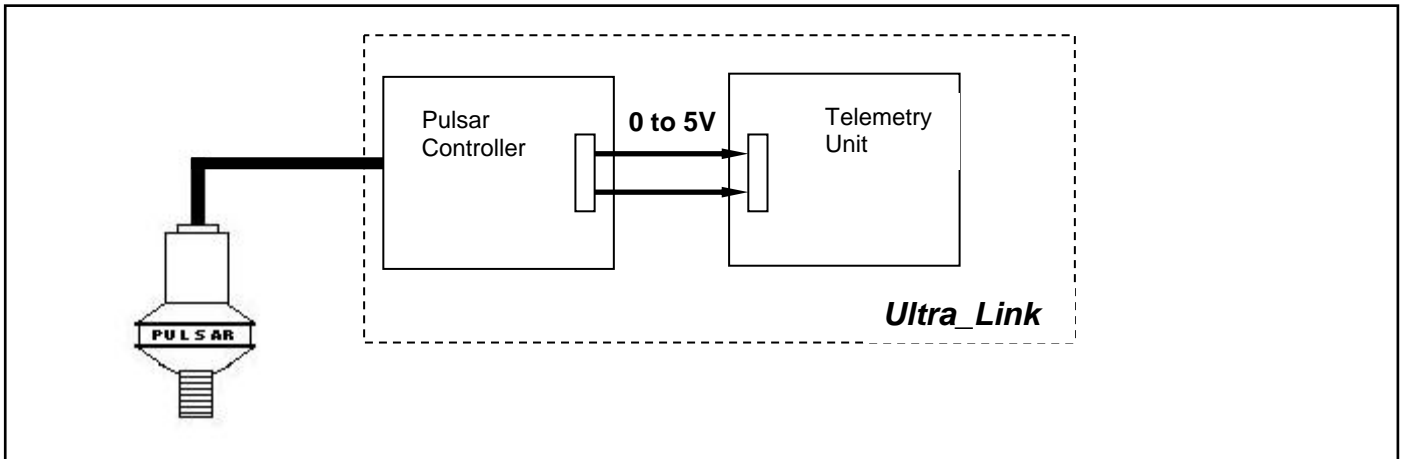
Calibrating *Ultra_Link*

As standard, *Ultra_Link* is supplied fitted with a Pulsar dB3 Ultrasonic head and controller.

This has a nominal operating range of 125mm to 3m, over which it returns a 0-5V input into the telemetry.

- i.e. If the target is 3m from the head, the *Pulsar Controller* has a 0V output.
- If the target is 0.125m from the head, the *Pulsar Controller* has a 5V output.

This 0-5V signal is then internally fed into the first Analogue input of the integral Churchill Telemetry Unit.



If the system is working over radio or leased-line, no further calibration is necessary. The basestation at the other end of the telemetry link will reproduce the 0-5V signal at the relevant analogue output, for connection to instrumentation as desired.

If the system is working over GSM, the telemetry converts the signal into real-world units to send SMS and Data messages to a mobile phone, PC basestation etc. The user must therefore calibrate the telemetry as required.

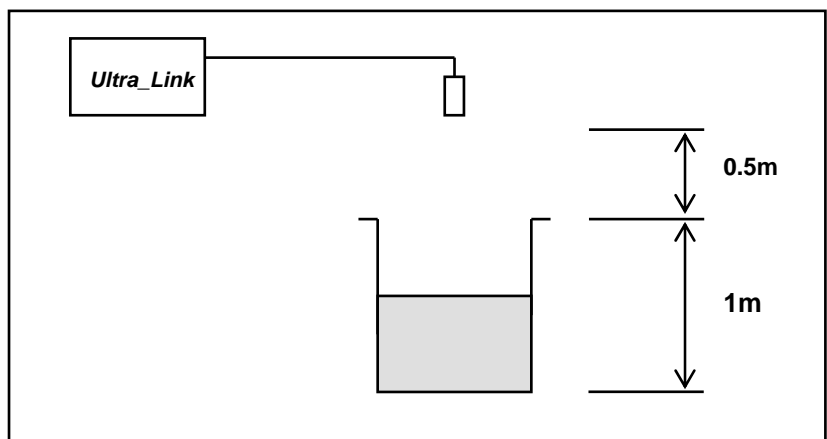
To calibrate the output from a GSM based *Ultra_Link*, set 0% to (n-3) and set 100% to (n-0.125) where 'n' is the distance from the Ultrasonic head to the target (i.e bottom of the tank when measuring depth).

- e.g.
- Measuring level in a 1m tank, with the head 0.5m above the tank.

$$n = 1.5\text{m}$$

$$0\% = (n-3) = -1.5\text{m}$$

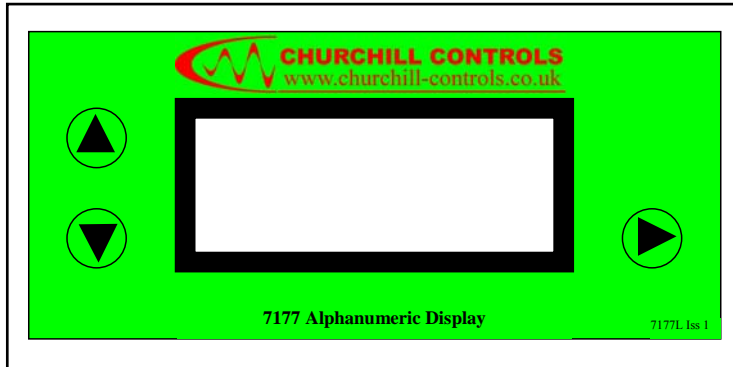
$$100\% = (n - 0.125) = 1.375\text{m}$$



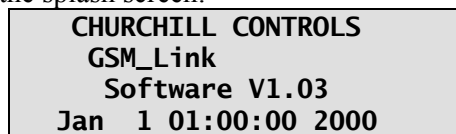
It can be seen that in this example, both the 0% and 100% values are outside the limits of the tank. The 0% value is higher than the top of the tank, and the 100% is lower than the bottom. This is due to the fact that here we are using the middle 1 metre of a 3 metre range transducer.

Refer to the *GSM_Link* Quickstart Manual for the format of SMS message to send in order to calibrate the input – or the *PC_Link* Quickstart manual to do this from a PC Basestation.

Alphanumeric Display



The 7177 Alphanumeric Display is a useful diagnostic tool that can be used with *Ultra_Link*. When the display is first plugged in it displays the splash screen:



The user can select different display modes using the ▲ and ▼ buttons. In some modes the display will automatically scroll through various formats. In these modes the scroll can be frozen and unfrozen by pressing the ► button. In other modes the user can change values using the ► button. For example, the user can set the time in the splash screen. The first time the ► button is pressed in this mode the first adjustable parameter will be highlighted (i.e. **J**an). The ▲ and ▼ buttons can be used to adjust the value. Subsequent presses of the ► button allow successive parameters to be set. (Note, however, that the time and date are only used by a *PC_Link* base-station, which will set the time itself, so manual adjustment of the clock is not generally needed).

The **DISPLAY CONFIG** mode allows the user to configure the display itself:

- If the display mode is set to Always On, it will keep *GSM_Link* awake all the time, even if it is set for battery operation (by setting DIPswitch 2.8 down). However, if the display is set to Low Power it will allow *GSM_Link* to go to sleep. Pressing any button on the display will wake up *GSM_Link*, and it will stay awake until 30 seconds have lapsed since the last button press.
- The backlight can be switched off if required to conserve battery life.
- Analogues can be displayed in a variety of formats. If a format is selected that does not have a zero offset, any display mode that shows an analogue value will have the symbol **I** appended. If the format includes a zero offset (e.g. 4-20mA) the lower bar of the symbol will be raised.