WTS HANDHELD DISPLAY
USER MANUAL

Revision History				
Date	Issue	Author	Comments	Approved by
25/08/11	A	JRK	First Issue	MAB
11/10/11	B	JRK	Minor errors corrected	MAB

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1 WTS-HA HANDHELD DISPLAY

1.1 Introduction / Overview

The WTS-HS is a simple handheld display. This allows wireless remote viewing of the output from single WTS Inclinometer using 2.4GHz radio.
The WTS Inclinometer measures its input value and periodically transmits it.
The WTS-HS captures this data and displays it. The WTS-HS also performs the function of waking the WTS Inclinometer when it is turned on and sending it to deep sleep mode when it is turned off. The WTS Inclinometer will automatically enter deep sleep mode after 1 minute (default) if a WTS-HS is not present.
If no buttons are pressed on the WTS-HS it too will turn off after 5 minutes.

1.2 Quick Start

The WTS-HA handheld display and WTS Inclinometer will already be ‘paired’ together when delivered from the factory. Turning the WTS-HS on by holding the power key until the display shows **BUSY** then releasing it will waken the WTS Inclinometer and begin to display readings.

1.3 Keys

Press and hold the power key until the display shows BUSY then release the key.
Can also be used, by giving a quick press, to reset the Auto-Sleep delay.

Press the TARE key. This will toggle between gross and zeroed net mode. I.e. If the display shows gross then pressing the key will zero the display. Pressing the key when in net mode will return the display to gross mode. The Gross and Net modes are indicated as described below. Gross and Net are retained through power off.

1.4 Indicators

G	The display is showing Gross output.
NET	The display is showing Net output.
SIG LOW	The radio signal from the WTS Inclinometer is low. The device is still functioning but the limit of the range may be near. Communications may start to deteriorate when this indicator is visible. Until ------ is displayed the communications is still OK and the display can be relied on for accuracy. **Note**: Even with a degraded signal the display value will always be correct.
BATT LOW	The batteries in the handheld are low and need to be replaced.
REMOTE ERROR	The WTS Inclinometer has an error that the handheld does not recognise.
REMOTE BATT LOW	The battery or supply to the WTS Inclinometer is low.

2 WTS-HA HANDHELD DISPLAY

2.1 Introduction / Overview

The WTS-HA is a advanced handheld display. This allows wireless remote viewing of the output from between 1 and 12 WTS Inclinometer(s) using 2.4GHz radio.
The WTS Inclinometer measure its input value and periodically transmits it.
The WTS-HA captures this data and displays it. The WTS-HA also performs the function of waking the WTS Inclinometer when it is turned on and sending it to deep sleep mode when it is turned off. The WTS Inclinometer will automatically enter deep sleep mode after 1 minute (default) if a WTS-HA is not present.
If no buttons are pressed on the WTS-HA it too will turn off after 5 minutes.

2.2 Quick Start

The WTS-HA handheld display and WTS Inclinometer(s) will already be 'paired' together when delivered from the factory. Turning the WTS-HA on by holding the power key until the display shows **BUSY** then releasing it will waken the WTS Inclinometer(s) and begin to display readings.
Each WTS Inclinometer is treated as a separate reading and the handheld is used to cycle through the available items and the value of each can be viewed.

2.3 Communications Overview

The WTS range of telemetry devices each have a factory set unique **ID**.
Data is shared between devices using **Data Provider** messages. A device generates these messages that can then be used by many other devices simultaneously.
These messages (or packets) of information contain a single value of data and each is identified by a **Data Tag**.
The **Data Tag** should be unique for each message.

ID — **Identifies each device**
Each device has a unique **ID** that is factory set. This is represented as a 6 character hexadecimal number consisting of the digits 0 to 9 and the letters A to F. I.e. **`FFD3BE`**

Data Tag — **Identifies each Data Provider message**
A **Data Tag** consists of a 4 character hexadecimal number consisting of the digits 0 to 9 and the letters A to F. The **Data Tag** can be changed by the user but the factory default is to match the last 4 characters of the device **ID**.
I.e. An acquisition device of **ID** **`FFC12B`** would have a default **Data Tag** of **`C12B`**.

When a device consumes data (i.e. a handheld displaying data from a WTS Inclinometer) all it is doing is listening to all of the **Data Provider** messages and selecting the one it wants to use. It then extracts the data and displays it.

Some devices that use **Data Provider** messages also need to know the **ID** of the device providing the data. This is necessary if that device needs to specifically wake the data

providing device as opposed to using a broadcast wake that will wake all devices on the same channel and using the same encryption key.

Pairing (factory procedure) offers an automated method of hooking a provider and consumer of data together. However, some devices may require you to manually enter **Data Tag** and **ID** information so it would be beneficial to the user to understand the above mechanism.

2.4 Modes

The handheld can operate in two modes and the button operation is dependant on these modes.

2.4.1 Item Mode

Up to 12 individual devices can be connected to and the user can step through each one in sequence.
The handheld will wake all devices when turned on and send them all to sleep again when turned off. NOTE: When the handheld wakes devices this achieved through the transmission of a broadcast wake. I.e. all devices on the same channel and with the same encryption key will wake.

2.4.2 Keys when in ITEM MODE

Send the currently selected device to sleep.

Will attempt to wake the currently selected device.

Press the TARE key. This will toggle between gross and zeroed net mode. I.e. If the display shows gross then pressing the key will zero the display. Pressing the key when in net mode will return the display to gross mode. The Gross and Net modes are indicated as described below. Gross and Net are retained through power off.

Step to the next device.

If motion detection is activated then the reading must be steady to enable this key. Pressing this key with an unstable reading will do nothing.
This transmits a Data Provider packet marked with a Data Tag held in **F1DataTag** and can also contain data as defined by **F1Data**. This can be used to trigger external actions such as a printout.

Press and hold the power key until the display shows BUSY then release the key.
Can also be used, by giving a quick press, to reset the Auto-Sleep delay.

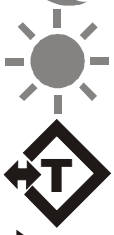
2.4.3 Result Mode

Up to 12 individual devices can be summed and the result displayed.
The handheld will wake all devices when turned on and send them to sleep again when turned off. NOTE: When the handheld wakes devices this achieved through the transmission of a broadcast wake. I.e. all devices on the same channel and with the same encryption key will wake.

In this mode there is an option of retrieving a system zero value from an external source. This is activated by supplying the Data Tag to the **ExtZeroDataTag** parameter. When activated the value supplied by the Data Provider packet marked with this tag will be used as the system zero and will be subtracted from the sum of all contributing inputs.
Usually in this mode only the result is displayed (sum) but by holding the **Next** key for a configurable number of seconds will activate the ability to step through each contributing input using the **Next** key.

2.4.4 Keys when viewing results

No effect.



Will attempt to wake any sleeping devices.
NOTE: This uses a broadcast wake so any devices on the same channel with the same encryption key will wake.
Toggle between displaying gross sum or tared sum.

No effect unless held for a number of seconds to activate individual item view. This can be disabled. See Later

If motion detection is activated then the reading must be steady to enable this key. Pressing this key with an unstable reading will do nothing.
This transmits a Data Provider packet marked with a Data Tag held in **F1DataTag** and can also contain data as defined by **F1Data**. This can be used to trigger external actions such as a printout.

Toggles between on and off. Hold for 2 seconds to activate.

2.4.5 Keys when viewing an individual item

No effect.

Will attempt to wake the currently selected device.

If sum was currently tared then this key will toggle between displaying gross or tared value of current device. If sum view was displaying gross then this key has no effect.
If an external system zero is used then only gross values actually supplied to the handheld can be displayed.

Selects next device to view.

If motion detection is activated then the reading must be steady to enable this key. Pressing this key with an unstable reading will do nothing.
This transmits a Data Provider packet marked with a Data Tag held in **F1DataTag** and can also contain data as defined by **F1Data**. This can be used to trigger external actions such as a printout.

Toggles between on and off. Hold for 2 seconds to activate.

2.5 Indicators in All Modes

G	The display is showing Gross output.
NET	The display is showing Net output.
SIG LOW	The radio signal from the WTS Inclinometer is low. The device is still functioning but the limit of the range may be near. Communications may start to deteriorate when this indicator is visible. Until ------ is displayed the communications is still OK and the display can be relied on for accuracy.. **Note**: Even with a degraded signal the display value will always be correct.
BATT LOW	The batteries in the handheld are low and need to be replaced.
REMOTE ERROR	The WTS Inclinometer has an error that the handheld does not recognise.
REMOTE BATT LOW	The battery or supply to the WTS Inclinometer is low.