Judd Telemetry

TELEMETRY IN CONTROL

Features

- Up to 8 Outstations per Base Station

- Up to 4 Base Stations per system

- IP67 Enclosures

- 433MHz Low Power Radio (ETS300-220-2)

- Selectable TX interval, 1 minute to 12 hours

Brief Description

The MiniNet system has been designed to provide a simple low cost wireless remote pulse counter. The Out Station can operate from an external supply or from batteries. Battery life is approximately three years, depending on duty cycle.

Up to 4 Base Stations may be used in close proximity (within radio coverage), using the same radio frequency, but having unique Base Station addresses. Up to 8 Out Stations can be used with each Base Station, each one having a unique Out Station address. (See DIP Switch settings)

In order to reduce power consumption, the Out Station is transmit only. Pulses are counted, stored in memory and then transmitted at a preset time interval, selectable between 1 minute and 12 hours by DIP switches (see DIP Switch settings). Each count is actually transmitted 3 times at about 1 second intervals to help overcome possible clashes or interference, providing greater reliability.

Operation

The pulse input to the Out Station is a volt free contact. It can handle a maximum rate of 100Hz and requires a minimum pulse width of 5mS. There is internal de-bounce circuitry to avoid double counting but care should be taken to avoid particularly noisy inputs.

The Base Station outputs are NPN open collector, rated at 500mA, 50V dc maximum.

Since up to 4 Base Stations can be used in a system, each Base Station should be set to one of four possible addresses. Each outstation must be set to match this address. In addition, each outstation must have a unique Out Station address, one of eight.

The Out Station must be set for the desired transmission interval.

On power up, it is best to switch the Base Station on first. When the Out Station is powered, it immediately sends its current count (zero) to the Base, which then sets its counter accordingly. The two counters are now synchronised. The Out Station begins counting pulses and will store them for the

duration of the transmission interval. It then sends the count to the Base (three times at 1 second intervals). The Base Station updates its counter and outputs the pulses.

On subsequent counts, the Out Station continually updates its counter storing a cumulative count. At each transmission, it sends the latest cumulative count. The Base Station, which also stores a cumulative count, compares the new count with its current count and then outputs the difference (the additional pulses since the last transmission). Because only the difference is output, the additional 2 transmissions will have no effect (assuming all 3 are received).

If either of the two units loses power or is powered down, synchronisation of the two counters will be lost. In this case the system operates as follows:

If the transmitter (Out Station) loses power, on power up, it acts exactly as described above. A zero count is sent to reset the counter in the receiver.

If the receiver loses power, on power up, it sets its counter to zero. It uses the first count it receives to set (synchronise) its counter but does not output any pulses. Note: if it did output pulses it would in fact output the total cumulative count sent by the transmitter.

The maximum count that can be stored is 65,536, but after this, the counter automatically rolls over and the correct number of pulses are output. This maximum figure therefore has no effect on the operation. Note: It could have an effect if more than 65,536 pulses occur within one transmit interval. Make sure that the transmit interval is not set too long if the pulse rate is high i.e. max 10 minute interval at 100Hz.

Battery Powered Out Station

The Out Station is available in two versions; MN3700E requires an external power supply of 5 to 28V dc and the MN3700EB has internal batteries (4 x AA). In order to reduce power consumption, the battery version is not fitted with a power on indicator LED. There is however a transmit LED. During bench testing or initial power on, make sure SW3, DIP 1 is 'on', then the TX LED can be used to indicate correct operation. After testing, turn off the LED to save power, SW3, DIP1 'off'.

The battery life is dependant on duty cycle; the number of transmissions per day. As a guide, for a system transmitting every 30 minutes, the batteries should last about 3 years (assuming 2700mAh AA cells).

Test Mode

Before installing the units, it is advisable to carry out a bench test to check the set up and RF communications. On the Out Station, set the TX LED to 'on', SW3, DIP1. Turn SW1, DIP4 'on' and the Out Station will transmit approximately every 6 seconds (irrespective of the status of the other DIP switches). The TX LED will flash at each transmission.

To check the radio link, input some pulses (momentarily connect pins 5 and 6 of the terminal block) and these will be output at the receiver. The corresponding output LED will flash on the receiver as the pulses are output.

This same technique can be used to check the radio link operation during installation. Obviously you will require a colleague to observe the receiver output LED's.

Make sure the Out Station is returned to operating mode after testing; SW1, DIP4 'off' and for a battery operated Out Station, turn off the TX LED, SW3, DIP1 'off'.

Alarm Relay

The Base Station is fitted with a power fail alarm. The relay output is on pins 11 and 12 of the terminal block. These terminals are closed when power is applied and open on power fail.

Set Up

Before using the system, the Base and Out Stations must be set to the correct addresses, using the on board DIP switches. Firstly, set a Base Station address (see table 1), although this is only relevant if more than one Base Station is being operated within radio coverage. The Out Stations should then be set to the same Base address (table 2).

Each Out Station should then be set to a unique Out Station address, 1 of 8, (table 3). Finally select the required TX Interval (table 4)

NOTE: After setting DIP switches or subsequently changing settings, the unit must be powered down. The DIP switch settings are only read on power up.

Base Station Set up

Because up to 4 Base Stations can be used in a system (i.e. within the same radio coverage area), each of the 4 must be set to a different Base address.

Table 1 **SW1 Base Station Address**

DIP1	DIP2	DIP3	DIP4	Base address
off	off	-	-	1
on	off	-	-	2
off	**on**	-	-	3
on	**on**	-	-	4

Note: DIP3 and 4 not used

Out Station Set Up

The Out Station must be set to the same Base address as the Base Station it is working with.

Table 2 **SW2 Base Station Address**

DIP1	DIP2	Base address
off	off	1
on	off	2
off	**on**	3
on	**on**	4

Up to 8 Out Stations can operate with each Base Station. Each of the Out Stations must have a unique Out Station address.

Table 3 **SW3 Out Station Address**

DIP1	DIP2	DIP3	DIP4	Out Station Address
-	**on**	**on**	**on**	1
-	off	**on**	**on**	2
-	**on**	off	**on**	3
-	off	off	**on**	4
-	**on**	**on**	off	5
-	off	**on**	off	6
-	**on**	off	off	7
-	off	off	off	8

Note: DIP 1 is used to turn off the TX LED in low power (battery) mode.

The Out Station can be set to transmit at pre-set time intervals from 1 minute to 12 hours as follows:
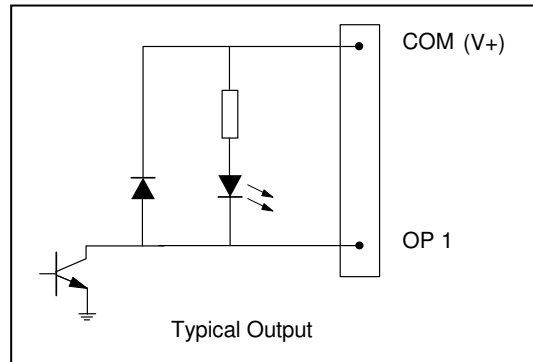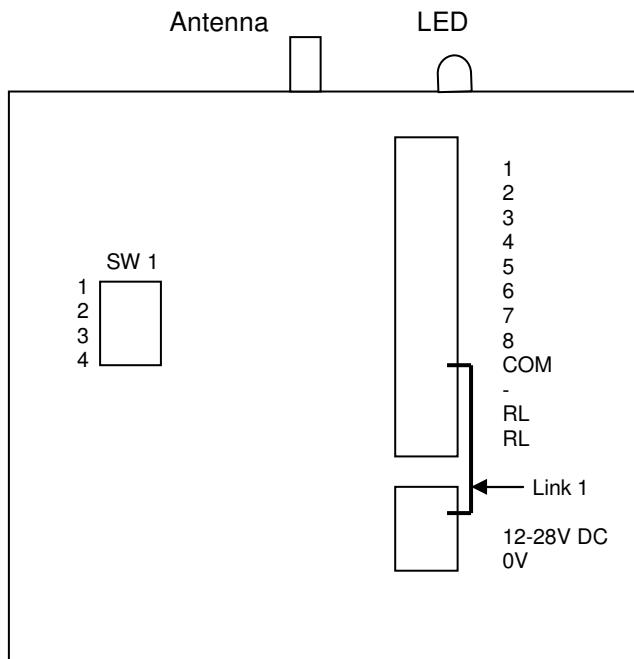
Table 4 **SW1 Transmit Interval**

DIP1	DIP2	DIP3	DIP4	TX Interval
off	off	off	-	1 Minute
on	off	off	-	5 Minutes
off	**on**	off	-	15 Minutes
on	**on**	off	-	30 Minutes
off	off	**on**	-	1 Hour
on	off	**on**	-	3 Hours
off	**on**	**on**	-	6 Hours
on	**on**	**on**	-	12 Hours

Note: DIP 4 switches on the test mode (6 second transmission).

Connection Details and DIP Switches

Base Station

Antenna   LED

SW 1

1
2
3
4

1
2
3
4
5
6
7
8
COM
-
RL
RL

Link 1

12-28V DC
0V

COM (V+)

OP 1

Typical Output

Note: 'COM' terminal is the common for all 8 outputs. It should be connected to the units +ve supply (5-28V dc) or to the users equipment +ve supply (max 50V dc). If using the equipment's supply, remove link 1.

Out Station

Antenna

TX LED

SW3

1 2 3 4

+

0V

INPUT

Battery 6V

12-28V DC

0V

SW1   SW2

1 2 3 4   1 2

ON LED
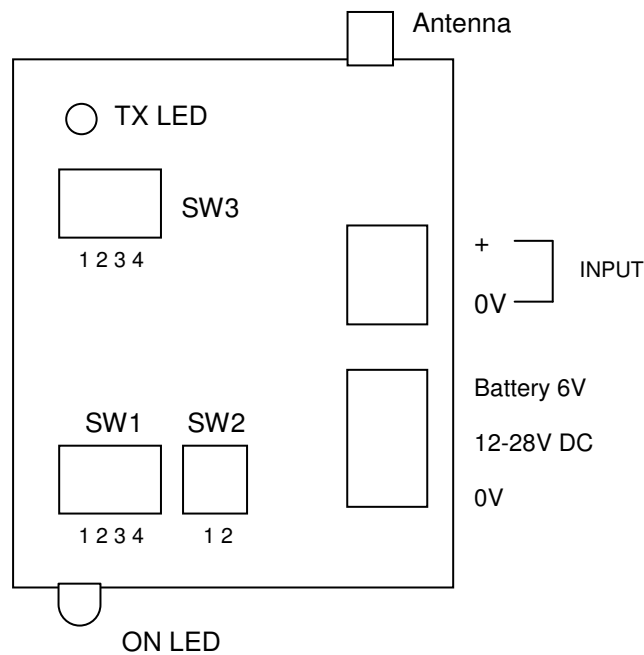
Technical Specification

Base Station

RF Module (receiver)	To EN 300 220-3
Antenna connection	SMA
Frequency	433.32MHz
Supply input	12 to 28V DC
Outputs	8 x NPN open collector, max 500mA, 50V dc
Power fail alarm relay	n/c contacts (open on power fail)
Current consumption	30mA
Operating temperature	-10 to +50 degrees C
Size	130h x 130w x 80dp (mm)

Out Station

RF Module (transmitter)	To EN 300 220-3
RF Output	10mW
Frequency	433.32MHz
Input	1 x pulse, max rate 100Hz, minimum width 5mS
Operating temperature	-10 to +50 degrees C

Standard unit

Supply input	12 to 28V DC
Current consumption	20mA
Size	100h x 64w x 38dp (mm)

Battery version

Supply input	4 x AA battery
Current consumption – standby	35uA
- transmit	7.5mA
- Average duty cycle	80uA
Battery life	Approx 3 years (based on average duty cycle)
Size	130h x 80w x 60dp (mm)

Range / Antennas

The MiniNet units are supplied with ¼ Wave Whip antennas. These will typically give a range of about 750Mtrs outside, with a clear line of sight.
Using a remotely mounted Dipole at about 3 to 5 Mtrs height, distances of over 2Km can be achieved.

VersaNet 2 Application

In addition to operating as a stand-alone short-range telemetry system, the MiniNet can be used in conjunction with the RDT VersaNet system to provide an extension to a VersaNet Node. The MiniNet Base Station is connected to a VersaNet Node using one of the standard digital expansion cards. The MiniNet can then be used to offer up to 8 outstations in a local area around the main VersaNet node. For more information, see the VersaNet 2 documentation.

Judd Ltd
Lower Voakes, West Chiltington, Pulborough, Sussex RH20 2LU
Tel 01798 815046 email juddtelemetry@gmail.com