
Docking Station Operation Manual

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TABLE OF CONTENTS	PAGE
1. Introduction.....	3
2. Connections	3
2.1 Power connection	3
2.2 Memory Module connection	3
2.3 Communications connections.....	3
3. Setting up the Terminal program	3
3.1 Using a direct connection to a desktop or laptop computer	3
3.2 Step by step instructions to setup Windows to talk to the logger.....	4
3.3 Talking to the Docking Station.....	4
4. Sending commands.....	5
5. Notes on menu items	5
5.1 Press 1 to see a list of sensors connected	5
5.2 Press 3 to download the stored data	5
5.2.1 A typical single day's download	7
5.3 Press 4 to change the Docking Station settings.....	7
5.3.1 Changing the Docking Station time or date	7
5.3.2 Changing the Docking Station's baud speed.....	8
5.3.3 Changing the option registers	8
5.3.4 The function of each element.....	9
5.4 Press 5 to see the current page.....	9
5.5 Press 6 to see any page in memory.....	10
6. Specifications.....	11

1. Introduction

The Docking Station (DS1) offers a simple means to download the data from the Smart Logger without the need to carry a laptop to the site. The system uses a fully automatic download procedure where the docking module (DM1) is plugged into the Docking Module download port on the front of the Smart Logger. The data logger then downloads the entire memory in the data logger into the module and when finished the module is removed.

To recover the data, the module is plugged into the Docking Station that is connected to the PC via the RS232 communications port. The Docking Station operates using embedded software and has the same functions and menu system as the data logger. On installing the docking module into the station, the LED on the module flashes rapidly several times to signify that communication with the module has been established. The information is then available through the Docking Station and is downloaded normally using Windows HyperTerminal. The module also contains additional information on the sensors not available to the user. This information can be used to carry out fault finding on the system and can be forwarded to ICT International for examination and fault finding if problems are seen on the station.

2. Connections

The Docking Station is connected to the power, memory module and computer to download the data from memory module.

2.1 Power connection

The Docking Station is normally powered from the mains powered plug pack supplied with the unit. The supply voltage should be in the range 8 to 30 volts DC and the demand not exceeding 500 mA.

2.2 Memory Module connection

The ICT International Memory Module (DM1) is plugged into the matching 9 pin D connector on the front panel of the Docking Station. This may be done before or after connecting the power supply to the Docking Station. If the Docking Station is powered without a memory module in position, it will prompt and wait for a memory module to be plugged in.

2.3 Communications connections

The communications cable supplied with the Docking Station has a 25 pin female D plug for connection to a computer's serial port. The Docking Station uses software flow control, so only three wires are actually used in this cable.

3. Setting up the Terminal program

3.1 Using a direct connection to a desktop or laptop computer

The Docking Station has been designed to talk to any computer that can send and receive simple text messages through its RS232C communications port, without the need for any special software. The software "HyperTerminal" is already resident in accessories folder of the operating system of IBM compatible computers running Windows.

The first time Windows HyperTerminal is used to talk to the Docking Station, the setup details will need to be checked. The computer needs to be told to which of its ports the Docking Station has been connected. This is usually Comms 2. Other vital settings, which can prevent communications if wrong, are listed below.

Baud speed	9600 baud
Parity	None
Number of data bits	8
Number of stop bits	1
Flow Control	Xon/Xoff

Once these parameters are set, communications with the Docking Station should be possible. There are usually many other options which can be fine tuned later e.g. column width, fonts, echo and line wrap.

3.2 Step by step instructions to setup Windows HyperTerminal to talk to the logger

1. Click the Windows start button.
2. Move pointer to "Programs".
3. Move pointer to "Accessories" and then to communications folder.
4. Click "HyperTerminal" folder.
5. Double click "Hypertrm.exe" icon.
6. The "connection description" dialogue box appears. Type in a name for the Docking Station connection. e.g. Docking Station.
7. The "phone number" dialogue box appears with the cursor flashing in the "phone number" box. Ignore this, and click the down arrow button at the end of the next line, which is the "connect using" line.
8. This drops a short menu box. Select the "direct to com 2" option, or whichever com port the Docking Station is connected to. Then click "OK".
9. The "com2 properties" dialogue box appears. In the "bits per second" line, select the 9600 option.
10. "data bits" should already read 8, and "parity" none, and "stop bits" 1. In the "flow control box" select the Xon/Xoff option. Then click "OK".

This completes the setup procedure. When closing HyperTerminal, the final dialogue box will ask if you wish to save session "Docking Station". Be sure to answer "yes" as this will save having to go through this setup procedure again. HyperTerminal will add a new icon labelled "Docking Station". It will only be necessary to double click this icon, to move directly to the Docking Station communications screen.

Type any key. The main Docking Station menu should appear.

3.3 Talking to the Docking Station

ICT Internationals' Smart Loggers employ a Databus wiring system in which the logger and all the sensors (up to 250) share a common cable. Each sensor no longer has its own cable, but instead is given a unique name or "address". This address usually consists of just a single number or letter. To accommodate more sensors the upper case and lower case letters are considered as separate addresses. This permits the use of up to 62 sensors (numbers 0-9, A-Z, and a-z) using only a single character address. The address of a sensor is so important that the logger always gives this information whenever reference is made to any sensor. Whenever the Docking Station downloads data or sends a list of sensors, it always does so in strict order according to the addresses of the sensors, i.e. numbers 0-9, A-Z, and a-z.

Every sensor is assigned a “schedule” which is identified by a single code letter. The schedule tells the logger when to collect and store data from a sensor. For example “schedule m” tells the logger to collect data every hour. Whenever a new sensor is added to the system, the logger will automatically assign a schedule based upon the type of sensor. This may be changed at any time to a schedule more suited to the user’s purpose.

4 Sending commands

Commands are sent by typing numbers in response to the on screen directions. Pressing the escape key will cancel the current task and return to the main menu. :-

```
20/01/1999 05:58
```

```
Welcome to ICT International Docking Station DS100001
```

```
Press 1 to see a list of sensors connected
Press 3 to download the stored data
Press 4 to change the Docking Station settings
Press 5 to see the current page
Press 6 to see any page in memory
Press 9 to exit
```

5. Notes on menu items

5.1 Press 1 to see a list of sensors connected

This item will produce a screen similar to :-

No.	address	schedule	Type of sensor	Serial No.	Last cal
1	1	s	Temperature air	TA100013	12 May 98
2	2	t	Photoactive radiation	PR100004	14 July 98
3	3	s	Barometric pressure	BP100004	29 May 98
4	4	m	Wind direction	WD100001	12 Jan 99
5	5	m	Wind speed	AN100004	12 Jan 99
6	6	s	Humidity	HU100034	18 Sept 98

Press any key to start again

5.2 Press 3 to download the stored data

This item is the custom download option. The next screen will ask if the download should be data from all the current sensors connected or from a list of sensors whose addresses must be entered. If the first option is required, press the enter key. Otherwise, type the address of each sensor from which data is required. It does not matter in which order the addresses are entered, as the logger always outputs the data in strict order, starting from the lowest address. The Docking Station will not accept addresses of sensors that have never been connected to the logger from which the memory module has come. The addresses are not limited to those of sensors that are currently connected. Historical data from sensors that are no longer connected may be downloaded at any time, provided that not more than 120,000 readings have been made since the required data. After 120,000 readings the old data will be overwritten by the latest readings.

Having selected the sensors, press enter to accept the list or escape to cancel. The next screen will request the start date for the download. Pressing the enter key at this point is equivalent to entering the current date. Any other date should be entered daydate first, then month, then year. The first of the month is normally entered as 01, in which case the logger will insert the forward slash. If the zero is omitted, a forward slash will be understood as the completion of the daydate. Similarly with the month. Only 2 digits are required for the year. 99 will be understood as 1999 and 00 as 2000 etc. The end date entry is identical.

A page number may be entered in place of the start or end date or both if required. To do this simply press p and a three digit page number then “enter” or press p and a four digit page number.

The download is now ready to start on the press of 1. This gives the opportunity to open a file to receive the data under the file transfer facility included with the terminal program. There is usually a facility to append the data to an existing file. See your terminal program’s help index for further information. If using HyperTerminal, use the “capture text” item on the “transfer” menu. The download will begin immediately on pressing 1. Any other key will cancel the operation and return to the main menu. Once the download has commenced it can only be aborted by pressing the escape key. The download may appear at times to be irregular in speed. This maybe because the Docking Station is skipping over unwanted data or it maybe because the software flow control has been activated by the receiving computer to prevent its buffers overflowing whilst it attends to other tasks. The download has finished when the flashing cursor is at the end of a line of data for ten or more seconds. The transfer file should now be closed before proceeding. Pressing any key will now return the logger to the main menu. If the downloads are taking too long, see the section on changing the Docking Station’s baud speed. The downloads are available in various different formats e.g. with or without headings, with or without maximums, minimums, averages etc. See the section on changing the option registers for details.

5.2.1 A typical single day's download is shown below

date	time	AN100002,	BP100008,	SR100026,	TA100069,	TA100068,
dd/mm/yy,	hh:mm:ss,	a km/h	b hPa	c W/m2	d °C	w °C
16/01/99,	00:00:00,	11.60,	1016.01,	0.00,	24.890,	19.840,
16/01/99,	01:00:00,	11.30,	1015.09,	0.00,	24.408,	19.588,
16/01/99,	02:00:00,	12.40,	1014.56,	0.00,	24.006,	19.170,
16/01/99,	03:00:00,	12.11,	1014.08,	0.00,	23.596,	18.898,
16/01/99,	04:00:00,	11.73,	1014.04,	0.00,	23.860,	18.822,
16/01/99,	05:00:00,	11.50,	1014.29,	0.00,	23.326,	18.596,
16/01/99,	06:00:00,	11.65,	1014.95,	0.00,	23.922,	19.012,
16/01/99,	07:00:00,	12.67,	1015.63,	0.94,	25.696,	19.920,
16/01/99,	08:00:00,	11.89,	1015.71,	2.60,	26.528,	20.426,
16/01/99,	24h Rain,	0.2,				
16/01/99,	09:00:00,	11.81,	1015.78,	4.32,	27.746,	21.502,
16/01/99,	10:00:00,	11.18,	1015.94,	5.68,	29.162,	22.524,
16/01/99,	11:00:00,	12.12,	1015.78,	6.84,	30.366,	23.396,
16/01/99,	12:00:00,	10.96,	1015.43,	6.42,	30.800,	23.898,
16/01/99,	13:00:00,	12.72,	1014.83,	7.28,	31.400,	23.800,
16/01/99,	14:00:00,	11.24,	1014.62,	7.38,	32.336,	24.134,
16/01/99,	15:00:00,	10.67,	1014.11,	5.18,	32.712,	24.138,
16/01/99,	16:00:00,	11.25,	1013.72,	2.02,	32.170,	23.774,
16/01/99,	17:00:00,	12.20,	1013.50,	0.04,	31.204,	23.092,
16/01/99,	18:00:00,	11.90,	1013.99,	0.00,	29.510,	22.384,
16/01/99,	19:00:00,	10.91,	1014.12,	0.00,	28.022,	21.792,
16/01/99,	20:00:00,	11.23,	1014.35,	0.00,	27.746,	21.570,
16/01/99,	21:00:00,	11.80,	1014.27,	0.00,	27.398,	21.366,
16/01/99,	22:00:00,	11.31,	1014.21,	0.00,	27.024,	21.066,
16/01/99,	23:00:00,	10.99,	1013.64,	0.00,	26.074,	20.606,
16/01/99,	maximum,	14.04,	1016.00,	7.72,	33.086,	24.678,
16/01/99,	minimum,	8.92,	1012.89,	0.00,	23.242,	18.566,
16/01/99,	average,	11.53,	1014.63,	1.54,	27.684,	21.400,

5.3 Press 4 to change the Docking Station settings.

This item will open the settings submenu:-

- Press 1 to change Docking Station's time
- Press 2 to change Docking Station's date
- Press 3 to change Docking Station's baud speed
- Press 6 to change the option registers
- Press 7 to start again

5.3.1 Changing the Docking Station time or date

This facility is straight forward. The seconds cannot be entered directly but when accepting the hours and minutes, the seconds are set to 00, enabling the Docking Station's clock to be precisely synchronised to an external clock. The Docking Station's clock battery should be changed every ten years (see the section changing the clock battery).

5.3.2 Changing the Docking Station's baud speed

Requires caution. The sub menu is shown below:-

```
Press 1 for    600 baud
Press 2 for   1200 baud
Press 3 for   2400 baud
Press 4 for   4800 baud
Press 5 for   9600 baud
Press 6 for  19200 baud
Press 7 for  38400 baud
Press 8 for  57600 baud
Press 9 for 115200 baud
```

Press any other key to start again

Whenever a key from 1 to 9 is pressed, the Docking Station will change baud speed immediately to the new speed. Communications will be temporarily lost. The terminal program should be set to the new speed before sending again to the Docking Station. Any key pressed at the new speed should result in the appearance of the main menu. The main menu will be headed by a warning that the new baud speed needs confirming. If for any reason communications cannot be reinstated, it will be necessary for the power connector to be removed from the Docking Station for a few seconds, this will restore the previous baud speed. If however the new speed is operating without error and it is desired to keep this new speed, it will be necessary to confirm the new speed by once again selecting this speed through the sub menu. The Docking Station will confirm the new speed has been accepted as the working speed. The warning heading will be removed from the main menu and the new speed will become the speed to which the Docking Station will revert if future speed changes are unsuccessful.

The logger can produce download files of several Mbytes in some cases, therefore we recommend using the highest baud speed possible. The Docking Station's maximum speed of 115.2 kbaud should be possible with a pentium computer and HyperTerminal. Ensure Xon/Xoff flow control is selected, buffer size is increased, and other applications are closed for maximum transfer rates.

5.3.3 Changing the option registers

There are eight elements in each register and five registers, making a total of forty options which can be selected. When the Docking Station leaves the factory, none of these are selected and this is the normal operating condition. This position is represented by the following screen :-

```
Refer to the handbook for the meaning of the elements
The option registers are at present :-
```

```
                                12345678
option register a  _____
option register b  _____
option register c  _____
option register d  _____
option register e  _____
```

Press the letter of the register you wish to change

5.3.4 The function of each element is as below

Option Register	Element	Use
a	1	Date in download is displayed as mm/dd/yy (normally dd/mm/yy)
a	2	Date in download is displayed as yy/mm/dd (normally dd/mm/yy)
a	5	User ID sent in preamble (normally omitted)
b	1	No flow control (normally Xon/Xoff)
b	3	Omit first line in download heading (normally send)
b	4	Omit second line in download heading (normally send)
b	7	Delineation character = spaces (normally commas)
b	8	Delineation character = semicolons (normally commas)
Note: If b7 and b8 are both selected, delineation character = tabs		
c	1	Omit time group in page display (normally send)
c	2	Omit address in page display (normally send)
c	3	Omit type in page display (normally send)
c	4	Omit units in page display (normally send)
c	5	Send full units (normally send abbreviated units)
c	6	Send address in hex (normally send address in ASCII)
c	7	Time display is hh:mm (normally hh:mm:ss)
c	8	Readings are low resolution (normally high resolution)
d	1	Send only max/min/ave/totals in download (normally send all)
d	2	Omit max/min/ave/totals in download (normally send all)
d	3	Omit 9:00 to 9:00 rainfall totals in download (normally sent)

Other options are reserved for future use

5.4 Press 5 to see the current page

This will show the current page as it was when the memory module was last recorded.

The logger has a memory of 2048 pages and each page can store up to 62 readings. Some pages are reserved for information about the sensors and logging starts on page 128 and continues until page 2047 is full. Then new readings will overwrite the oldest readings on page 128. The example below shows a typical page :

The current page 134 reads

```

26/01/99,15:29:24,
26/01/99,15:30:17,15:30:20, TA 4 27.344 °C
15:30:25, TA 4 27.338 °C 15:30:30, TA 4 27.326 °C 15:30:35, TA 4 27.316 °C
15:30:40, TA 4 27.312 °C 15:30:45, TA 4 27.312 °C 15:30:50, TA 4 27.316 °C
15:30:55, TA 4 27.316 °C 15:31:00, TA 4 27.326 °C 15:31:05, TA 4 27.340 °C
15:31:10, TA 4 27.348 °C 15:31:15, TA 4 27.356 °C 15:31:20, TA 4 27.362 °C
15:31:25, TA 4 27.370 °C 15:31:30, TA 4 27.378 °C 15:31:35, TA 4 27.384 °C
15:31:40, TA 4 27.402 °C 15:31:45, TA 4 27.414 °C 15:31:50, TA 4 27.420 °C
    < back next >
    
```

The number of the current page is given in the first line. The date and time when the page was started always comes next. The logger also inserts a date time stamp whenever its clock is changed or whenever the schedule of a sensor is changed. Each entry in the log consists of the time of the reading, the type code of the sensor (in this example TA = temperature, air), the address of the sensor, the full resolution reading, and the abbreviated units. The options in the option registers enable variations of this basic format, but the normal settings are designed to allow the full 62 readings to fit into a standard page of text as used by most terminals, without the need to use scrollbars. Pressing < key will display the previous page, and pressing > key will display the next page. These keys are not the same as the arrow keys. The < key is also the comma key, and the > key is also the fullstop key. It does not matter if the shift key is used when changing pages. Further presses of the < or comma key will display the previous pages etc. To thumb through the pages more quickly use the [key or] key to skip ten pages backwards or forward respectively. To move directly to any specified page press 6. This is also the same position which is reached when 6 is pressed from the main menu.

5.5 Press 6 to see any page in memory

The Docking Station will ask for the page number which must be in the range 128 to 2047. If the page required is less than 1000, enter the three digits and then the enter key. The enter key is not required for page numbers over 1000. Pressing only the enter key will display the last completed page. A completely blank page indicates that no data has been written to that page since the logger left the factory. A typical page is shown below.

```
Logger page 132 starts on 15/01/99, at 08:58:00,
09:00:00, AN a    9.76 km 09:00:00, BP b 1016.64 hP 09:00:00, SR c    50.08 W/
09:00:00, TA d   30.302 °C 09:00:00, TA w   23.580 °C 10:00:00, AN a    9.23 km
10:00:00, BP b 1016.85 hP 10:00:00, SR c    41.60 W/ 10:00:00, TA d   31.208 °C
10:00:00, TA w   23.960 °C 11:00:00, AN a   10.79 km 11:00:00, BP b 1017.30 hP
11:00:00, SR c    54.48 W/ 11:00:00, TA d   31.970 °C 11:00:00, TA w   23.990 °C
12:00:00, AN a    6.59 km 12:00:00, BP b 1016.71 hP 12:00:00, SR c    86.54 W/
12:00:00, TA d   31.656 °C 12:00:00, TA w   23.576 °C 13:00:00, AN a    3.83 km
13:00:00, BP b 1016.17 hP 13:00:00, SR c    87.72 W/ 13:00:00, TA d   30.486 °C
13:00:00, TA w   23.492 °C 14:00:00, AN a   12.39 km 14:00:00, BP b 1015.84 hP
14:00:00, SR c   103.24 W/ 14:00:00, TA d   30.278 °C 14:00:00, TA w   24.006 °C
15:00:00, AN a    5.13 km 15:00:00, BP b 1016.39 hP 15:00:00, SR c   609.12 W/
15:00:00, TA d   38.428 °C 15:00:00, TA w   24.266 °C 16:00:00, AN a   10.39 km
16:00:00, BP b 1015.79 hP 16:00:00, SR c    48.10 W/ 16:00:00, TA d   31.252 °C
16:00:00, TA w   22.722 °C 17:00:00, AN a   11.79 km 17:00:00, BP b 1015.97 hP
17:00:00, SR c    0.14 W/ 17:00:00, TA d   30.978 °C 17:00:00, TA w   23.140 °C
18:00:00, AN a   11.27 km 18:00:00, BP b 1016.36 hP 18:00:00, SR c    0.00 W/
18:00:00, TA d   28.594 °C 18:00:00, TA w   22.240 °C 19:00:00, AN a   11.53 km
19:00:00, BP b 1016.43 hP 19:00:00, SR c    0.00 W/ 19:00:00, TA d   27.830 °C
19:00:00, TA w   21.718 °C 20:00:00, AN a   10.53 km 20:00:00, BP b 1016.60 hP
20:00:00, SR c    0.00 W/ 20:00:00, TA d   27.388 °C 20:00:00, TA w   21.184 °C
21:00:00, AN a   11.71 km 21:00:00, BP b 1016.93 hP
```

This page completed on 15/01/99, at 21:00:00, < back next >

The < key, > key, [key and the] key maybe used to navigate to other pages as explained in the previous section. Pressing 5 will go to the current page, and pressing 6 will allow further pages to be specified. Any other key will return to the main menu.

5. Specifications

- Power:** 8–40 volts unregulated DC
- Environmental:** -30°C to +70°C. (Both operational and storage)
- DS1 Memory:** Flash Ram, 512 k. Automatically overwrites previous data.
- Output:** RS232 600 to 115200 baud
8 data bits
0 parity
1 stop bit
- Embedded software:** ASCII output. The logger will communicate with any type of PC that uses a communications programme.
- Menus:** Pre-programmed, single keystroke selectable menus for parameter changes.
- Down-loading:** One touch or custom downloading available.

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