

Tru-Test Data Handler
Service Instructions



These instructions have been written to assist you with troubleshooting, maintenance and repair of the Tru-Test Data Handler.

It is assumed that you are familiar with the normal use and care of the Tru-Test Data Handler. For more information on using the Data Handler refer to one or more of the following documents:

MDD00001 Tru-Test Electronic Milk Meter Operating instructions

MDD00002 Tru-Test Electronic Milk Meter Quick Guide

Data Handler Hand Held Operating Instructions

Upgrading Meter and Data Handler Software

LinkTTEMM User Guide

LinkTTEMM Extra Details

Retrieving lost Data Handler data

The 'Operating instructions' provide information on proper operation, care and maintenance of the Electronic Milk Meter (EMM) and Data Handler. The document also includes a troubleshooting section. When any Data Handler is giving (or suspected to give) problems use the information given in the 'Operating instructions' as a first attempt to correct the problems. If problems persist, use the information in these 'Service instructions'.

© Tru-Test Limited, 2008.

No part of this document may be photocopied or reproduced without the prior written consent of Tru-Test Limited.

Note: These specifications are subject to change without notice.

Rev 1 09:07

Contents

Introduction	4
Data memory.....	5
The display.....	6
The battery and battery charging	7
The real-time clock	9
The radio communications system.....	10
Troubleshooting the Data Handler.	11
Other charging problems	13
Other faults and persistent faults.....	13
Downloading the log-file from a Data Handler.....	14
Disassembly of the Data Handler.	17
Re-assembly of the Data Handler.....	18
APPENDIX	20
Appendix Contents.....	20
Common SCP Commands	21
Example log file from a Data Handler.....	24
Description of RAW file output by Data Handler	25
Anti Lock up Upgrade	27
Anti Reset Upgrade.....	29
Battery Capacity Programming	30
Record of Changes	31

Introduction

The Data Handler is used as a device to conveniently enter information such as the animal's numbers into the system.

The Data Handler is used as a means of collecting the data from all the milk meters installed on a farm and transporting this information to a PC workstation. The Data Handler can also be used as a remote control device allowing the operator to read the status of each individual Tru-Test Electronic Milk Meter (EMM) on the farm and to control the milk meter's operation.

There are some functional differences between Data Handlers used with Tru-Test EMMs and Data Handlers used in Hand Held mode (with mechanical milk meters). The most obvious difference is that the RF communications system is not used for the DH Hand Held.

Data memory

The Data Handler stores all data in non-volatile 'flash memory'. This means that data will not be lost even when the battery inside the Data Handler is empty or becomes faulty or disconnected. Flash memory does not require back-up batteries to retain data.

The display

The Data Handler shows information on an alphanumerical display. The display can show two lines with sixteen characters per line. The display has a green/yellow backlight fitted, which makes it easy to read when ambient light is dim. The backlight automatically comes on when information is being entered into the Data Handler and also when the Data Handler receives information from a milk meter. The backlight automatically turns off when the Data Handler detects no activity for a time-out period of five seconds. This feature is to conserve battery energy while the Data Handler is not actively being used.

The battery and battery charging

The Data Handler has an internal rechargeable battery pack. The battery pack has five NiMH (nickel–metal–hydride) cells and produces a nominal voltage of 6 volts. The nominal battery capacity is sufficient to allow the Data Handler to operate for 10 to 20 hours before it is necessary to recharge the battery. It is recommended that the Data Handler battery is recharged daily.

The Data Handler also contains electronic circuits to control the recharging of the battery, to measure the voltage of the battery pack and the temperature of the battery pack. In addition the Data Handler is programmed with software that uses the battery voltage and temperature measurements to model the state of charge of the battery.

The recommended charging input voltage range is 12V to 14V. The charge control circuit inside the Data Handler can accept input voltages between 11V and 16V. The Data Handler is protected against accidental incorrect polarity of the charging input voltage. The charging input terminals of the Data Handler are also protected against electrostatic discharges and voltage spikes and surges of short duration (1 ms or less). There are no fuses inside the Data Handler, either in the charging input circuit or in the battery circuit.

The recommended ambient temperature for the Data Handler while charging is 10°C to 30°C. For temperatures between 0°C to 10°C and between 30°C to 40°C charging continues but at a slower rate. For temperatures below 0°C and above 40°C charging is reduced to the minimum (trickle) rate. This is to protect the battery from being damaged by being charged at extreme temperatures.

Under normal usage of the Data Handler and mild charging and operating temperatures, the internal battery pack is expected to last for at least 500 full charge/discharge cycles. If a Data Handler is used on a daily basis then it is recommended to replace the battery after two years of use. The Data Handler can be left on charge for longer than 24 hours without causing damage to the battery. However, this is not recommended for warm (30°C and higher) ambient temperatures.

If the Data Handler is to be stored for a period, charge it overnight before storage, and every three months during storage.

When the Data Handler is not in use for an extended period of time (say 2 weeks or longer) then the battery will partially self-discharge. Over very long times the battery will self-discharge completely. Self-discharging is very temperature dependent: high temperatures (30°C and higher) will cause much faster self-discharging of the battery than low temperatures (below 20°C). The state-of-charge model included in the software of the Data Handler does allow for self-discharge of the battery. Therefore a Data Handler that has not been used for some time may report a lower charge than expected, as the battery model has allowed for self-discharging.

On every 10th charge the Data Handler will ask if the user wishes to do a battery test.

Do bat. test? 1=yes 2=no

If the user chooses yes, the test will check the battery condition. This will take approximately 70 hours. If nothing is chosen, the Data Handler will default to begin charging after 10 seconds.

The battery test can be manually activated. Put the Data Handler on to the charging rack.

EMM DH

When the charging message appears press



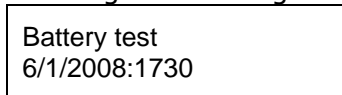
(or 9 9 7 2 **ENTER**).

DH Hand Held

When the charging message appears press **MENU** and choose **1: Battery test capacity**. The battery test option will display.

When the test is complete, use the diagnostics menu to check the battery status. See the 'Operating instructions' for information on accessing this menu.

The diagnostics will give a display similar to:



This shows the date of the last battery test (6/1/2008) and the capacity of the battery at that time, 1730 mA.hr in this case. Batteries with a capacity of less than 1620mA.hr should be replaced.



It is recommended that the battery state is checked once a month to minimise the likelihood of failures in use.

For a DH Hand Held there is a test to see if the battery is not able to hold a charge (discharges quickly). Choose **2: Battery test (discharge)** from the charging menu. This will activate a test to determine if the battery needs replacing. This test will last for approximately 40 hours. The results of this test are only available through the Data Handler log file. Usually, only service technicians would carry out this test as part of diagnosing problems.

The real-time clock

The Data Handler keeps time by means of a real-time clock and calendar. Once set, the Data Handler will automatically keep track of the time and the date. The calendar in the Data Handler also keeps track of leap years. The time and date information is added to the other information collected on the farm.

The clock and calendar rely on power from the internal rechargeable battery pack. The time and date will not be lost even when the Data Handler reports an empty battery, and even when the battery power is too low for the Data Handler to operate (ie. the Data Handler will not stay

on when the  /  button is pressed). However, should the battery voltage be allowed to discharge to below 2V (e.g. after a very long time in storage) or when the battery becomes faulty or disconnected then the clock and calendar will stop operating. A Data Handler that has lost the time and date will show a date of 1900 when it is turned back on (after recharging / reconnecting / replacing the battery). Follow the directions in the 'Operating instructions' to set the clock and calendar to the correct settings. Otherwise the clock will be set automatically, the next time a file is uploaded or downloaded using LinkTTEMM.

Daylight savings time is not automatically adjusted in the Data Handler. Either manually adjust the time within the Data Handler (following the 'Operating Instructions') or use LinkTTEMM to synchronize the Data Handler with a PC.

The radio communications system.

The Tru-Test EMM and the Data Handler exchange data via radio frequency transmitters and receivers (transceivers). The transmitters operate in ISM bands (Industrial Science Medical) and comply with international and national regulations regarding wireless radio communications in these ISM bands. It is permitted to operate the wireless radio transceivers without having to obtain a radio transmitter licence. The radio antenna of the Data Handler is positioned inside the case, near the top.

Two models of the transceivers exist: 2.45 GHz and 433.92 MHz. These are commonly abbreviated to 434MHz and 2.4GHz. The modulation used is amplitude modulation (AM), sometimes also called On-Off keying (OOK).

A red light in the top left corner of the Data Handler lights up whenever the Data Handler is communicating with a Tru-Test Electronic Milk Meter.

For best performance of the radio communications system between the milk meter and the Data Handler no metal parts should be held near to the antennae. A minimum distance of 10 to 15 mm is sufficient. Similarly, placing your hand or fingers on or near the antenna will reduce performance of the radio communication system. In most normal situations the radio communications systems will provide reliable performance over distances of three meters or more between the milk meter and the Data Handler.

Troubleshooting the Data Handler.

Problem	Possible cause	Solution
The Data Handler will not turn on.	The battery needs recharging.	Charge the battery.
	The battery is faulty.	Replace the battery.
	Flexible circuit from the keypad is not properly inserted into the connector.	Insert flexible circuit into the connector.
	Keypad is faulty.	Replace the case front assembly.
The Data Handler time and date are wrong.	The battery was completely discharged (e.g. after a long period of storage) or has been disconnected.	Re-charge the battery and follow the instructions in the 'Operating instructions' to set the date and time.
	The date on the PC used to upload or download files is not correct.	Correct the date on the PC used to interface with the Data Handler.
The Data Handler will not register a milk meter. (EMM DH only)	Distance to the milk meter is too great.	Hold the Data Handler closer to the milk meter. The optimum distance is 0.3m to 4m.
	The milk meter is still registered with another Data Handler.	Turn the milk meter off by holding the Select key down for 5 seconds. Wait for 1 minute for the EMM to power down and try again.
	Excessively strong interference signals (eg. a nearby radio transmitter, somebody arc-welding, an electric motor with carbon brushes, for example a vacuum cleaner or a power drill).	If possible, stop the source of interference. Otherwise try holding the Data Handler close to the milk meter (0.3m).
	The antenna wire inside the Data Handler is not connected to the antenna (434 MHz only).	Reconnect the wire to the antenna.
	The milk meter is faulty.	Use a different milk meter and repair the faulty one.
	The RF module in the Data Handler is faulty.	Replace with a new module.
	The main PCB in the Data Handler is faulty.	Replace the main PCB.

Problem	Possible cause	Solution
	DH does not have a valid serial number	Send {VS} command to the Data Handler. If there is no response or the response is a serial number that is different to the one on the DH case, assign a serial number to the PCA so that it matches the stamp/sticker on the DH case back. Use the command {VS1234,galumPhing}, where 1234 is the DH serial number.
The Data Handler will not charge the battery.	No power to the charging bracket.	<p>Check the power supply has mains power.</p> <p>Check connections between the power supply and the charging bracket.</p> <p>Check that the polarity is correct.</p> <p>Check the contacts on the Data Handler and the charging bracket are clean.</p> <p>Make sure the power supply is not overloaded.</p>
	Temperature outside limits.	<p>Ambient temperature should be between 0°C to 30°C.</p> <p>See Other Charging Problems below for more detail.</p>
	Data Handler battery capacity diminished.	<p>See page 7 for details on testing.</p> <p>Replace battery.</p>
The message "Return for Battery Service" is displayed.	<p>The battery capacity value stored in the Data Handler has an invalid value.</p> <p>Either the Flash has been corrupted or it was never set.</p>	<p>Send the following SCP command to the DH:</p> <p>{VBTn,galumPhing}</p> <p>where n must be 600, 1800 or 2200 to match the battery capacity. See page 30</p>

Other charging problems

Make sure the ambient temperature of the area the Data Handler is in while charging remains in the range between 0°C to 30°C. Temperatures outside this range can cause the Data Handler to charge at a very slow rate. This is necessary to ensure long service life of the battery. Make sure that while charging the Data Handler it is not exposed to full sunlight, especially behind a glass window. Also ensure that the Data Handler is not placed near or above a heater, or that the Data Handler temperature does not fall below freezing point (0°C) during the night or early morning.

Other faults and persistent faults.

Closely inspect the main PCB, the RF PCB and the display module for signs of corrosion and water damage. Tell-tale signs of water damage are black or dark areas under the green solder mask on the PCB's and/or white or blue powdery deposits on the soldering of the electronic components. If only a few small and isolated spots of white or blue corrosion products are found then it may be possible to dry and clean the PCB and re-use it in a Data Handler. If there are many such spots with corrosion and/or the dark areas are extensive then the PCB will be unreliable and must be discarded.

Possible ways for water to enter into the case are:

1. Cracked case front. Inspect the transparent case front closely, especially around the edges. If a crack is found then the case front must be replaced.
2. Loose or missing case screw(s). Check that all seven case screws are present and tight. Note that screw heads of the upper four screws are covered by white plastic caps. All seven screws **must** be set to the correct torque, in the correct order, to ensure proper sealing of the Data Handler case.

Downloading the log-file from a Data Handler.

In addition to keeping records of milk yield data, the Data Handler also stores a log-file in non-volatile memory. In the log file many different things are recorded. This includes such information as the date and time when a milk meter registered with a Data Handler, information about the state of charge of the battery and the battery voltage, the duration the Data Handler was turned on, the duration the Data Handler was being charged, error messages, etc.

The log-file can sometimes be used as an aid in troubleshooting because it contains information on what exactly the Data Handler was doing when the fault occurred as well as the history immediately prior to the fault.



If the Data Handler has run its battery flat, charge it for approximately 30 minutes before attempting to download the log-file.

To download the log-file place the Data Handler on the PC interface unit (the same one also used for uploading and downloading files with LinkTTEMM). Connect the bracket to a serial or USB port (usually COM1 or COM2) of a PC. Use one of the following programs to communicate with the Data Handler.

Information in the log-file is arranged in chronological order with the most recent events at the end of the file.

Hyperterminal.

Start a program called 'Hyperterminal' on the PC. This program comes free with Windows software. Find it by clicking on 'Start', 'Programs', 'Accessories', 'Communications', 'Hyperterminal'.

Once the Hyperterminal program has started select 'Direct to COM1' (or COM2 as appropriate). Click on 'File', 'Properties' to access the settings. The COM port settings should be: 19200 (or 9600) bits per second, 8 data bits, no parity, 1 stop bit, Xon / Xoff flow control. Also in the settings screen, click on the 'ASCII setup' button and check the box 'echo typed characters locally'. Click 'OK' to close the settings screens.

Turn on the Data Handler.

You should now be able to send and receive information to/from the Data Handler via the PC. Type {ZA1}, you should see a ^ character appear directly after the closing curly bracket. This is the acknowledge character from the Data Handler and shows that the PC and the Data Handler are able to communicate.

Click on 'Transfer', 'Capture text' and enter a suitable file name such as DH2301log311207.txt . Everything you type in and everything the Data Handler sends will now be saved on the PC in the file with the specified name.

Type {WFL}. The Data Handler will respond with downloading the contents of the entire log-file. Once transfer of the log-file is complete click on 'Transfer', 'Capture text', 'Stop' to end the process and close the file.

You can view the log-file using any text editor such as Notepad, Wordpad or Word.

MacroTerm

MacroTerm is available from Tru-Test.

Start MacroTerm. Type the following commands into the text fields on the left hand side of the window.

button 1 {ZA1}

button 2 {ZE1}

button 3

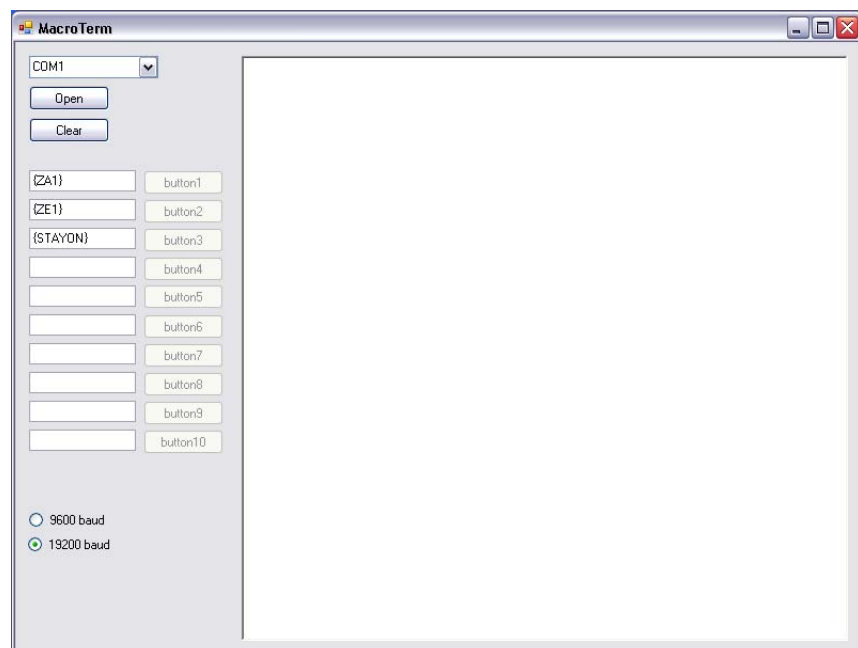
button 4 {VS}

button 5 {WFL}

button 6

Press the buttons in sequence to send the commands to the Data Handler. Be sure to press buttons 1 and 2 within 2 seconds of opening the COM port.

When the log-file download is complete, select all of the text in the main window and copy it to a text editor such as Notepad, Wordpad or Word. Save the file before exiting the program.



Downloading the log-file from a Data Handler.

See Common SCP Commands, page 20 for other commands that may be useful.

There is an Example log file from a Data Handler on page 24 which gives some explanation of the fields likely to be seen.

The RAW file as downloaded by LinkTTEMM is also useful as a trouble shooting tool. For an explanation of some of the fields seen in the RAW file see page 25.

Disassembly of the Data Handler.

- 1 Use a sharp thin tool or small screwdriver to push through the four white plastic caps that cover the upper four case screws and pry the white caps out of the cavities.
- 2 Undo the seven case screws.
- 3 Turn the Data Handler over so that you are facing the front.
- 4 Lift the case front up a little so that it separates from the case back. Note that the case front is connected to the main PCB by the flexible circuit from the keypad and by the battery wires.
- 5 Carefully pull the keypad flexible circuit out of the connector on the main PCB.
- 6 Disconnect the battery connector and place the case front to the side. Note that the date and time settings of the Data Handler are lost when the battery is disconnected.
- 7 If the battery is to be replaced then pull the battery off the self adhesive foam that attaches the battery to the case front.
- 8 Take the desiccant sachet out.
- 9 Disconnect the connector from PL4 on the main PCB assembly.
- 10 Lift the main PCB assembly upwards at the bottom end, then lift it out of the case back.
- 11 Use a small flat blade screwdriver and small pliers to undo the four screws and nuts that attach the display module to the main PCB assembly.

Note: There are two sizes of spacers. Make a note of the location of the spacers for reassembly.



- 12 Collect the nuts, screws and eight plastic spacers.
- 13 Disconnect the display module from the main PCB by pulling it upwards.
- 14 Disconnect the RF PCB assembly from the main PCB by pulling it upwards.

The Data Handler is now fully disassembled.

Re-assembly of the Data Handler.

- 1 Insert four M2.5 x 16 screws through the four holes on the main PCB assembly. Insert the screws from the bottom side of the PCB.
- 2 While holding the four screws with one hand, so they can not fall out, turn the main PCB over and place it on a flat surface.
- 3 Fit four 5 mm tall plastic spacers over the screws.
- 4 Place the RF PCB assembly on the screws, with the components facing downwards, and carefully insert the 6 header pins into the connector on the main PCB assembly. For 434MHz Data Handlers, the antenna wire with screw lug should come out towards the upper edge of the PCB.
- 5 Fit four 3 mm tall plastic spacers over the screws.
- 6 Place the display module on the screws and insert the connector into the 16 header pins on the main PCB assembly. The antenna wire with solder lug should pass the 16 way connector directly to the right hand side.
- 7 Apply a small amount of thread locking compound (removable type) to the ends of the four screws. Then place four M2.5 hex nuts on the screws and do up handtight.
- 8 Hold the four wires and 7 way connector of the case back to the left side of the case to make room for the PCB assembly to fit into the case back. Slide the top edge of the PCB assembly underneath the end of the antenna and place the PCB assembly properly in the case.
- 9 Connect the 7 way connector to PL4 on the main PCB assembly.
- 10 Connect the battery wires to PL5 on the main PCB assembly and place the battery onto the four plastic support ribs. Make sure the battery wires are well clear from all of the case bosses. . If replacing the battery, note its capacity as this will need to be programmed into the Data Handler. See page 30.
- 11 Place the coil antenna (if fitted) in the top right pocket of the case back.
- 12 Place a new sachet with desiccant on the PCB assembly, between the battery and the display module.
- 13 Fit (or replace, if necessary) the piece of double sided self adhesive foam on the inside of the case front. Fit the foam centrally in the square clear area where the membrane keypad is visible.
- 14 Carefully insert the flexible circuit from the keypad into connector SK1 on the main PCB. The flexible circuit should not have any twists.
- 15 Bring the case front and case back together. Make sure the flexible circuit and all wires are well clear from the case bosses.

16 At this point, before inserting the seven case screws, it is advised to test if the Data Handler functions correctly. It is a good idea to use a rubber band to temporarily hold the two case halves of the Data Handler together.

17 Press the  /  button to turn the Data Handler on. The red light should illuminate and normal messages should be shown on the display. The display backlight should be operating.

18 If this Data Handler is to be used with a Tru-Test EMM, place a known good milk meter between 2 to 4 m away from the Data Handler and press the Select key to turn the milk meter on. The milk meter should register with the Data Handler and operate the rotary valve. If the Data Handler is operating correctly, use the Data Handler to turn the milk meter off. The Data Handler should show the message

All meters
are off

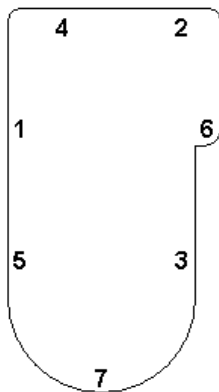
19 Turn the Data Handler off.

20 Place the Data Handler on a charging bracket and ensure power is supplied to the bracket. The Data Handler should enter the charging mode.

21 If the Data Handler successfully passes all the tests described above, then proceed with the assembly procedure. If the Data Handler fails any of the tests the fault must be corrected first.

22 Insert the seven case screws. The correct order for tightening the case screws is shown below:

Note: To ensure the case seal is water tight, the screws **must** be set to a torque of 0.9 Nm.



23 If the battery has been disconnected, then the date and time must be set to the correct values. Follow the procedure in the 'Operating instructions' to set the date and the time.

24 If a new battery or pcb has been fitted to the Data Handler then the battery information inside the Data Handler must be updated. See Battery Capacity Programming, page 30.

Appendix Contents

Page	21	Common SCP Commands
	24	Example log file from a Data Handler
	25	Description of RAW file output by Data Handler
	27	Anti Lock up Upgrade
	29	Anti Reset Upgrade
	30	Battery Capacity Programming

Common SCP Commands

Data Handler	{ZA1}	Turn acknowledgments on
	{ZE1}	Turn error codes on
	{ZC1}	Turn carriage return, linefeeds on
Data Handler Diagnostics	{WFL}	Write full log
	{WFLF}	Write last farm log
	{WEFL}	Write whole error flash log
	{ZN}	Device name
	{VS}	Serial number
	{VE}	Manufactured date
	{VW}	Software Version
	{VD}	Software date
	{VT}	Software time
	{VE}	Manufacture date
	{VP}	PCB revision
	{VQ}	PCB serial number
	{VC}	Communications version
	{VBT}	Battery capacity
	{NORDICVER}	Nordic device s.w. version.
	{PROGAVR}	Programme AVR firmware
	{FLASHLOC}	Flash locations
	{MEMSIZE}	Returns amount of SRAM and Flash memory fitted [s,f]
	{SEBA}	Beep test
	{TTLD}	LED test
Data Handler Settings	{DIALECT}	Recall dialect (market) flags
	{DIALECTX}	Recall extended dialect (market) flags
	{HWFLAGS}	Market herd wide flags
	{HWXFLAGS}	Market herd wide flags

{HWYFLAGS}	Market herd wide flags
{UKIDS}	Unknown id entry enabled
{SAMPLEVOL}	Sample volume
{SAMPLEVOLAM}	AM Sample volume
{SAMPLEVOLPM}	PM Sample volume
{IDORDER}	ID sort order
{PRF}	Market print report flags
{PRFX}	Market print report flags
{WASHDURATION}	Market wash duration
{EZI}	Ezi-Handler mode flags
{DHHH}	Hand Held mode flags
{UNITS}	Market units
{COMPANY}	Market company
{AMPM}	Market am/pm clock format
{DATEFMT}	Market date format
{LANGUAGE}	Language
{DIALECT}	Dialect flags
{DIALECTX}	eXtended dialect flags
{KEYLAYOUT}	Keyboard layout
{GROUPS}	Groups enable/disable
{RECALL}	List entry enable and mode flags
{IDTXSTATE}	IDT mode
{VIALCODE}	Vial barcode format
{VRP}	Vial rack position mode
{BULKTANK}	Bulk tank enable/disable
{AFIELDS}	Animal id fields and prompts

Error codes

No error messages are returned unless the {ZE1} command is switched on

- (FF) Invalid checksum or CRC
- (FD) Command unknown (by this device)
- (FC) Improperly formatted address
- (FB) Improperly formatted command
- (FA) General syntax error
- (F9) Out of range parameters
- (10) Parameter mismatch
- (11) Parameter string too long
- (12) Parameter expected
- (13) Too many parameters
- (14) Command could not be executed at this time
- (15) No "Other Device" response

Example log file from a Data Handler

Data Handler Log	Explanation
LOG(219): *****	
LOG(220): SW:4.1c,Aug 21 2005,13:07:52, Turned on:20070430,194942	Software version 4.1c, software built on 21/08/2005 @ 1:07:52p.m.. DH turned on 30/04/2007, 7:49:42 p.m.
LOG(222): Max:6432944,Min:0,Vb:6.5,Ve:12.2,T=16C	Max – Min is the likely battery capacity e.g. 90%-70%. The number represents mAh x 3600. In this case the Max is 6432944/3600 = 1789mAh. Min = 0 essentially means that the DH doesn't know what the Min is likely to be i.e. Min=unknown. DH battery voltage 6.5V, External voltage 12.2V, Temperature 16°C
LOG(224): Charge at 20070502,084341:	Logged charge on 02/05/2007 at 08:43:41 (date & time)
LOG(225): bklt:132830,Bpr:0,LED:0,RFTx:0,RFRx:0,RS232:0,Actv:0,AlID:0,Chrg:30720,Run:132840,	Status of various current consumption components when the log was done Bklt = Backlight, Bpr = Beeper , LED = DH LED, RFTx = RF transmitter, RFRx = RF receiver, RS232 = RS232 connection, Actv = Micro, AlID = all devices, Chrg = Charge, Run = Turned on/running. The numbers indicate time (seconds on)
LOG(228): Max:6480000,Min:0,Crct:0,Ovr:0,Vb:7.0,Ve:0.0,T:22C	Max 1800mAh, Min unknown, Charge correction:0, Over charge battery:0, DH battery voltage 7.0V, External voltage 0.0V, Temperature 22°C
LOG(230): Fast 0, Slow 0, Trickle 132841 seconds	Fast charge 0 s, slow charge 0 s, trickle charge 132841 seconds (36.9 hours)
LOG(232): Taking off 5 days (518400 MilliCoulombs) self-discharge	Was turned off for 5 days so allowing (518400 MilliCoulombs) self-discharge
LOG(234): *****	*****
LOG(235): SW:4.1c,Aug 21 2005,13:07:52, Turned on:20070507,185605	Software version 4.1c, software built on 21/08/2005 @ 1:07:52p.m.. DH turned on 07/05/2007, 6:56:05 p.m.
LOG(237): Max:6480000,Min:0,Vb:6.6,Ve:0.0,T=23C	Max 1800mAh, Min unknown, DH battery voltage 6.6V, External voltage 0.0V, Temperature 23°C
LOG(239): Charge at 20070507,185610:	Logged charge on 07/05/2007 at 18:56:10

Description of RAW file output by Data Handler

FD,60752,0,,20031103,0,0

FD Farm data line
60752 Account code
0 Region
 Herd code
20030911 Scheduled date of test 11/09/2003
0 Expected vacuum level on day of test (not used)
0 Not applicable for DH downloads (Meter ID)

SD,20030911,155032,76,00,181200,57,05,1,8000,8,0,0

SD Session data line
20030911 Date the session actually started 11/09/2003
155032 Time that session started 15:50:32
76 Charge at the start of the session 76%
00 Start status
181200 Time that session ended 18:12:00
57 Charge at the end of the session 57%
05 End status
1 Session number
8000 Herd wide flags (16 bits hex encoded))
8 Milking period (not used)
0 Number of assistants (not used)
0 Not applicable for DH downloads (position)

LM,Charge at 20030911,154407:

LM Log message line
Charge at xxxx Log was done at the date and time shown

LM,bk1t:0,Bpr:0,LED:0,RFTx:0,RFRx:0,RS232:0,Actv:0,Al1D:0,Chrg:0,Run:0

Status of various current consumption components when the log was done

LM,Max:1826127,Min:1316250,Crct:0,Ovr:0,Vb:6.4,Ve:0.0,T:16C

Max:1826127, Min:1316250, Crct:0, Ovr:0 Battery model state
Vb:6.4 Battery voltage 6.4V
Ve:0.0 External voltage 0.0V
T:16C Temperature 16°C

LM,

LM,Fast 0, Slow 0, Trickle 0 seconds

Time spent charging at the three charge levels since last turned on

LM,*****

***** Whenever the DH is turned on it will print this line to the log

LM,SW:1.4r,Feb 5 2003,15:37:37

SW:1.4r Software version in DH
Feb 5 2003, 15:37:37 Compile date and time for the software

LM,, Turned on:20030911,155032

DH was turned on at 15:50:32 on 09/11/2003

RM,8390385,1,20030911,155033,60,00,181113,52,83,3,1,a,7764

RM Meter detail line
 8390385 Meter serial # (8390385 - 2²³ = meter serial #)
 1 Session number
 20030911 Date of the session 09/11/2003
 155033 Time the meter was turned on 15:50:33
 60 Charge at the start of the session 60%
 00 Start status of meter
 181113 Time the meter was turned off 18:11:13
 52 Charge at the end of the session 52%
 83 End status of the meter
 3,1,a Software version 3.1a
 7764 Calibration factor in the EMM

AD,10,64,109427,656,0000,0000,f0,00,172844,173254,8390437

AD Animal detail line
 10 Row 10 (i.e. 10th animal through this meter)
 64 Animal ID 64
 109427 Vial ID 109427
 656 Yield in millilitres = 6.56 litres (note this is always in millilitres in the RAW file)
 0000 Preloaded state and tests (16 bits hex encoded)
 0000 Entered state of animal during the milking (16 bits hex encoded)
 f0 End animal state (8 bits hex encoded)
 00 End meter state for this animal (8 bits hex encoded)
 172844 Time this animal started milking 17:28:44
 173254 Time this animal stopped milking 17:32:54
 8390437 Meter serial #

FP,9,0,19,94,-33,0,6,13,14,13,16,13,12,9,6,6,5,8,5,6,3,6,8390437

FP,9,1,19,5,3,3,2,1,0,0,0,2,0,0,0,0,1,0,-1,1,0,2,8390437

FP,9,2,139,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,8390437

FP Flow profile line
 9 Row 9
 0 line 0 of flow profile
 19 # of data points on this line (max 19)
 94 flow (multiply x 10 to get ml flow between now and last 5 seconds)
 -33 "
 0 "
 6 "
 ...
 8390437 Meter serial #
 Last line # of data points = 139 - 128 = 11 data points on this line

WP,1,4,0,0,23,0,0,15,3,23,250,0,15,3,24,248,92,15,3,24,312,248,8390385

WP,2,4,15,3,24,298,222,15,3,24,274,258,15,3,24,312,216,15,4,24,312,286,8390385

WP,3,4,15,5,24,302,194,15,7,25,312,280,15,7,25,294,208,15,7,25,210,204,8390385

WP,4,130,15,7,25,204,178,15,7,25,178,178,0,0,0,0,0,0,0,0,0,0,8390385

WP Wash profile line
 1 Line 1 of wash profile
 4 # of data points on this line (data is logged once a minute)
 0 conductivity measurement, works in with next line.
 0 the higher this number, the more conductive the liquid
 23 Temperature inside EMM
 0 max level in flask since last data point (ml of water)
 0 min level in flask since last data point (ml of water)
 15 conductivity measurement If this is non-zero the next line will mean something
 3 the higher this number, the more conductive the liquid
 23 Temperature inside EMM
 250 max level in flask since last data point, 250 = near full (ml of water)
 0 min level in flask since last data point (ml of water)

 8390385 Meter serial #

Anti Lock up Upgrade

Note: For Issue 7X PCAs only.

If a unit does lock up or freeze in operation the only way around this is to open up the unit and disconnect the battery pack.

The lock up is suspected to occur in some occasions when the unit powers up. The H8/3002 microcontroller I/O lines can enter and switch between states before the system has fully powered up. This affects the HWR line pin 71 of U6 causing spurious writes to random addresses (depending what is present on the address and data bus).

This circuit uses an I/O line controlled via the firmware to initiate writes to flash ram. Both inputs to the OR gate must be held low to be able to write to flash ram.

To perform anti lockup upgrade:

1. Upgrade firmware to latest release.
2. Send the SCP command {UPGRBOOT}. This will upgrade the bootloader necessary for this upgrade. This takes about 2 minutes. Wait until the stream of information stops.
3. Remove R87 (27 Ω)
4. Add U14 - 74HC1G32 SOT23-5. The Data Handler now will not function unless steps 1 & 2 have been both carried out.

Recommended Component for U14

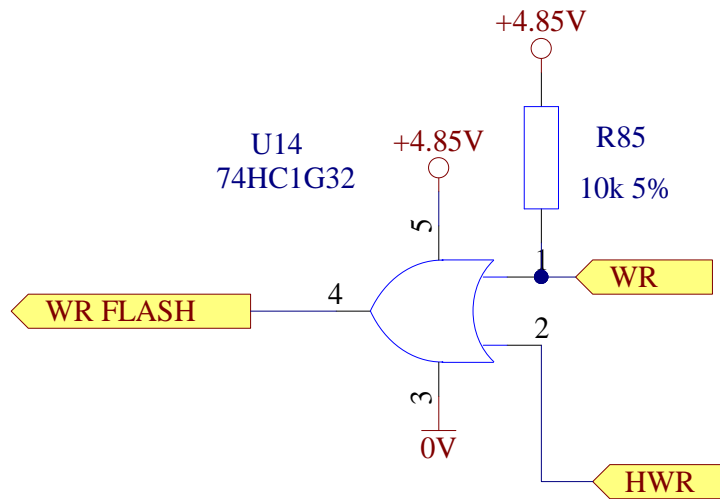
- FAIRCHILD SEMICONDUCTOR NC7S32M5 Farnell P/N: 1014137

Other possible options for U14

- Texas Instruments - SN74AHC1G32DBVR Farnell P/N: 3558198
- Texas Instruments - SN74AHCT1G32DBVR Farnell P/N: 3558253

This is a recommended upgrade that should be carried out. This will prevent lock up situations arising when turning on the Data Handler.

Schematic of Anti Lockup Circuit



R87 & U14 component locations



Anti Reset Upgrade

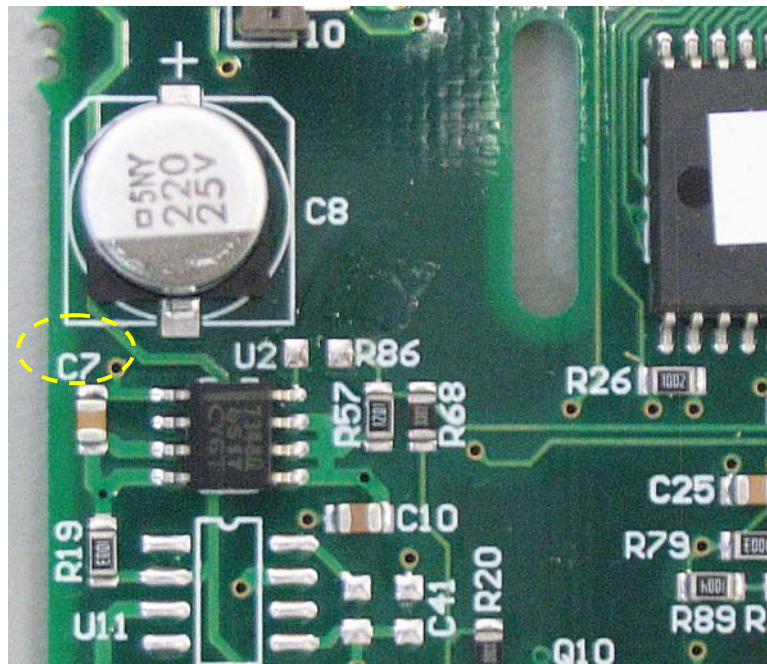
Note: For Issue 7X PCAs only.

This is a recommended upgrade. This will make the Data Handler more immune to resetting under the following conditions:

Transient line noise ie sliding ON & OFF a charging bracket

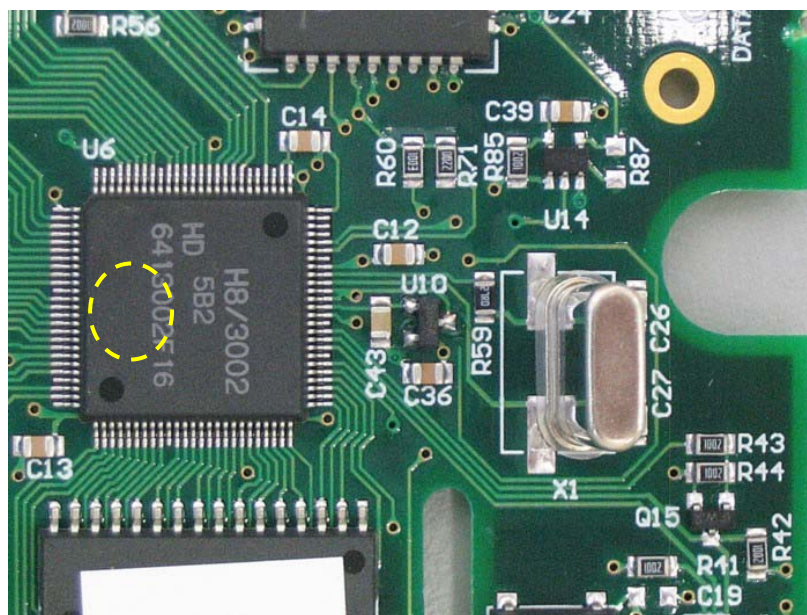
Static discharges on the keypad and on charging contacts

1: Remove R86 (27Ω)



2: Add U10. Part MCP120T475I/TT

Farnell part number:
3021026



Battery Capacity Programming

If replacing the battery or pcb in a Data Handler, note the capacity of the battery.

To check the programmed battery capacity, send the following command to the Data Handler.

```
{VBT}
```

The response should be either [-1], [600], [1800] or [2200]. (-1 means that it has never been set.)

To change the programmed capacity, send the following command to the Data Handler.

```
{VBT2200,galumPhing}
```

 where 2200 is the new battery capacity (2200mAHrs).

NOTE: Only do this if you are sure of the capacity. Setting this level above that actual battery level could cause long term harm to the Data Handler.

The value chosen must be one of either [600], [1800] or [2200]. If the battery nominal capacity does not equal one of these, choose the next lowest value e.g. [2200] for a 2300mAHr battery.

The Data Handler will have to be recharged before it will report the charge accurately.

Record of Changes

Rev 1 0907: Reference to Battery Capacity Programming added.

Reference to programming serial number added in Troubleshooting.