Enabler Embedded

Service Guide

Revision 1.12

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Contents

Notes

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1 Introduction

This document is the Service Guide for technicians and support personnel maintaining and supporting the Enabler Embedded system.

It covers the Enabler Embedded hardware and an overview of the software.

Information in this document is based on Enabler Embedded Support Tools v1.3.0. The behaviour of other versions of the Enabler Embedded Support Tools may slightly vary.

1.1 Support contact information

For any questions or support email	support@integration.co.nz
Enabler Embedded support web site	https://integration.co.nz/support/
The Enabler main web site	https://integration.co.nz

2 Installation

Refer to the **ENABLER Embedded Site Installation Checklist** and the **ENABLER Embedded Getting Started Guide** documentation for details on installing Enabler Embedded.

3 Troubleshooting

This section describes the troubleshooting guide for the hardware.

3.1 Mainboard

The Mainboard comprises of two parts, the main CPU and the integrated EIC.

Most troubleshooting information is available in our website here:
https://integration.co.nz/support/faq/enabler-card-diagnostic-leds/

3.2 PDMs

The PDMs are used to interface Enabler Embedded to the particular interface used by the dispenser; also, they isolate the system from external electrical discharges like nearby lightning strikes.

The first diagnostic tool for a PDM is the LEDs on the PDM. Normally there is a send and receive data LED and sometimes a connection present led.

3.3 Battery

For information on battery maintenance and replacement, refer to Section 7 Service and Maintenance of this document.

3.3.1 Checking for Battery Faults

3.3.1.1 Option1: The LCD Service Display

The Enabler **Embedded LCD Service display** cycles though several lines of information, including the battery status. The **"Bat=xxxx"** line indicates the battery status.

Bat=Good - The battery is good, and it is safe to power down the system.

Bat=None - The battery is not properly connected. Check if the battery cable is plugged in.

Bat=Bad - The battery is bad and needs to be replaced.

3.3.1.2 Option2: Embedded Menu Keys

Access the **Power**-**Battery Status** sub-menu through the Embedded Keys. Clicking the **OK** button will run the Battery test and report the current status.

3.3.1.3 Option3: Events WebPage

The most recent Battery test result can also be viewed through the Enabler Events Web Page.
- Go to Reports / Events
- Set **Device** to **Monitor**
The list should now show the results of battery tests - the most recent test will be at the top. See the **Enabler Web Application Reference** for more details.

3.3.1.4 Option 4: Using a Multi-Meter

To check the battery manually with a multi-meter, perform the following:

- Set your meter to Volts, with a range of 0-20v or similar.

- Unplug the battery.

- Firmly place the '+' probe on the '+' battery terminal and the '-' probe on the '-' terminal. Read Voltage from meter.

- Battery voltage should be 11.0v or greater.

- Re-plug the battery.

- **WARNING**: **Do not short out the battery terminals while measuring battery voltage** as this may damage the battery or create a fire risk.

3.3.1.5 LEDs

There is a group of three LEDs above the LCD display labelled as follows:

- POWER: Light is on if mains power is present.

- CHARGE: Light is on if battery is charging.

- BATTERY POWER: Light is on if mains power is not present and Enabler Embedded is running from battery power.

3.3.1.6 Battery Failures

If the battery has indicated any failures, we suggest that you replace the battery immediately, while the system is still powered on.

3.3.2 Safe Enabler Embedded Shutdown

Check first if the battery is in good condition before disconnecting the main power.

3.3.2.1 Safe Shutdown with a Good Battery

Once the main power has been disconnected, the system will countdown before powering off. If you want to skip this countdown and power off immediately, use the Embedded keys to access the **Power**-**Power off UPS** sub-menu. Press **OK** to shutdown.

3.3.2.2 Safe Shutdown with a Flat Battery

Embedded does not currently have any shut-down or restart functions, but we are considering adding this in future. It is best that you get a replacement battery before powering off.

For situations where the battery is faulty and you really need to shut down, we recommend that you:

1. Put the system on idle.

2. No deliveries should be logged; no terminals should be connected; and no browsers should be accessing the Web pages.

3. Disconnect the power to the system after a couple of minutes of being idle.

4. Once the system is powered back on again, the system will undergo a database check (See next section).

3.3.3 "Integrity Check Database" and "Database check.." LCD Messages

When either of these messages appear on startup, the system is undergoing internal checks to ensure that the data is not corrupted. The system will eventually start, but you may need to wait for a few minutes or a couple of hours depending on the amount of data stored.

This will only happen if your system did not shutdown properly. This is an indication that your battery is no longer working properly. You may need to undergo the battery checks above to ensure your battery is still working.

3.3.4 "No System Start Battery missing/bad" Message Override

To bypass the "No System Start Battery missing/bad" message on startup and operate without a battery or with a faulty one, see **Section 4.1 Battery Bypass**.

We still recommended that you plug-in a good battery as soon as possible.

3.3.5 Software Updates & System Restart

Software installation will always restart the system.

After a software update the system will perform a battery check when restarting.

When restarting using the 'Restart Embedded' button, the battery and software update checks are bypassed.

When the system restarts after a Region Change, the battery and software update checks are bypassed.

3.3.6 System running on Battery

Enabler Embedded will not authorise a delivery when running on a battery with a low charge as it may have insufficient battery power remaining to complete the transaction.

For Australian customers, Enabler Embedded will not authorise at all if running from the battery.

4 Operation

4.1 Battery Bypass

The system is not intended to run without any battery or with a bad battery that cannot sustain the UPS, so on startup the battery will be checked.

If the battery is missing or the voltage is low, the system will display these messages, respectively.

```
No System start
Battery missing
```
```
No System start
Battery bad
```

The system will not continue until the battery is replaced and the unit re-powered.

WARNING: Bypassing the battery check should only be done in an emergency or in a test environment. If the power is lost when there is no working battery, then the database could be corrupted.

To bypass the battery check and proceed with startup, press the following buttons in sequence.

MENU - OK - DOWN - UP

The display will show:

```
Battery check
bypass – OK?
```

Press **OK** to continue system startup.

4.2 System Menu

This menu is used to reset the data on the system.

4.2.1 Activating System Menu.

- Shut down and restart Enabler Embedded.

- Wait for the message "**Starting Embedded**".

- Press **MENU + OK** keys together.

- Hold keys down until the "**Enabler Embedded System Men**u" appears. Press **OK**.

Once the System menu is displayed, there will be two options. Use the UP or DOWN keys to select the option you require and then press **OK**.

4.2.2 Data Reset

This will reset all the transaction data leaving the system in a clean state. This can be used after setting up the configuration; and testing it in a staging environment before installing at a site. The system remains activated once this completes.

4.2.3 Factory Reset

This will remove ALL data, logs and packages from the system returning Embedded to its Factory state.

The system will then contain the default configuration and may require re-Activation for older versions of Enabler Embedded.

4.2.4 System Menu display

```
Enabler Embedded
System Menu
```

Pressing the **UP**/**DOWN** keys will cycle through the menu options.

```
Data reset                      Factory reset
```

Press the **OK** key to select the desired reset.

You will be asked to confirm the option by pressing the **UP** or **DOWN** key and pressing **OK** to the **Confirm Yes** option.

```
Confirm No                      Confirm Yes
Ok=Yes or Up/Dwn                Ok=Yes or Up/Dwn
```

After the confirm, the system will reboot.

Note: If the system is left in the System Menu for more than 30 seconds the system will reboot.

5 What are the Support Tools?

5.1 Purpose

The Support tools USB stick is a USB bootable system used to test and rebuild an Enabler Embedded system. It can be used to recover Logs, Backups and Data from the system. Also, it is a quicker way to update the Enabler Embedded software by installing directly from the USB stick.

If an Enabler Embedded system is not booting or faulty, then the Support tools can be used to recover data and then rebuild the Enabler Embedded disk to a working state.

5.2 Creating the Support Tools

The USB stick is created by writing a disk image to a USB stick using the PassMark imageUSB tool.

Note: Previously, this was done using the DiskPrepITL tool – however, this is only supported by Windows 7 or earlier.

1) Download the PassMark imageUSB tool from the PassMark website:
   https://www.osforensics.com/tools/write-usb-images.html

2) Download the latest Support Tools image from our website:
   https://integration.co.nz/download/EmbeddedSupportToolsImage.zip

3) Unzip the **SupportTools.bin** image file

4) Insert a USB stick of 2GB to 16GB capacity

5) Write the Support Tools image to the USB stick using the imageUSB tool:
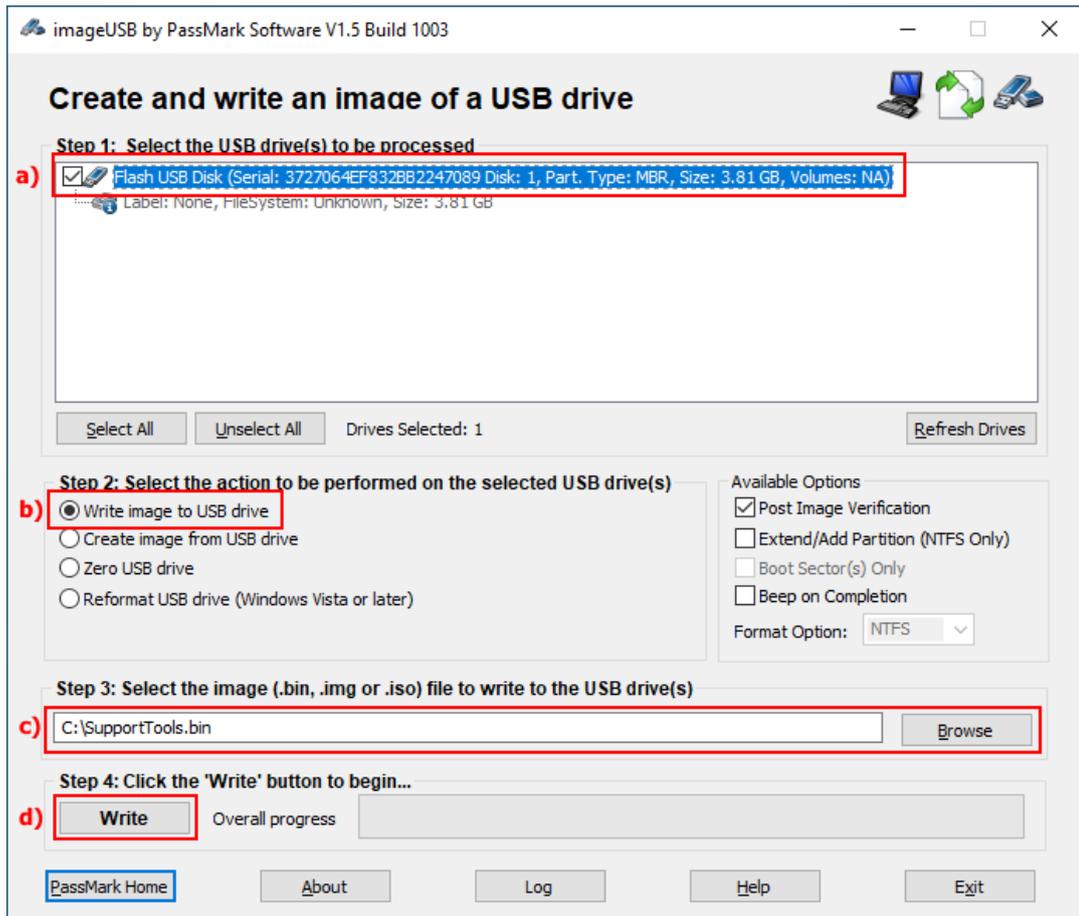
a. Select the desired USB stick from the list

b. Select **Write image to USB drive**

c. Select the downloaded Support Tools image file

d. Click **Write** to start writing the Support Tools image

6) After the tool displays **Imaging Complete**, the Support Tools USB stick is ready to use

7) Copy the latest Enabler Embedded CAB file into the **\Cabs** directory of the Support Tools USB stick

8) Rename the CAB file to the default name **EnablerEMBInstall.cab**

5.3 Contents of Support Tools

5.3.1 Cabs Directory

This contains the installation / Cabs files used to install/update software on the Enabler Embedded system. When the Embedded system is running normally it will always show the contents of the \Cabs directory on a USB stick in the Software Web Page.

When building a new Embedded system this directory must contain the release of software you wish to install and it must be called "EnablerEMBInstall.CAB". This can be downloaded from the ITL website.

5.3.2 Data Directory

This directory is used to save data from an Enabler Embedded system. The Data is saved with a directory named after the service number of the system. Under the service number directory the data is organized in directories of "Logs", "Backups" and "Database".

5.3.3 Service Directory

The Service directory contains all the programs and data used to run the support tools.

6 Using the Support Tools

Plug the Support Tools USB stick into the USB port on the Main EMB board and power up the system.

The system will take about 15 seconds to load and then display the Version number of the Support Tools. This is displayed for a few seconds and then the support tools Welcome message is displayed.

| Version 1.3.0.0 | Version of Support Tools |

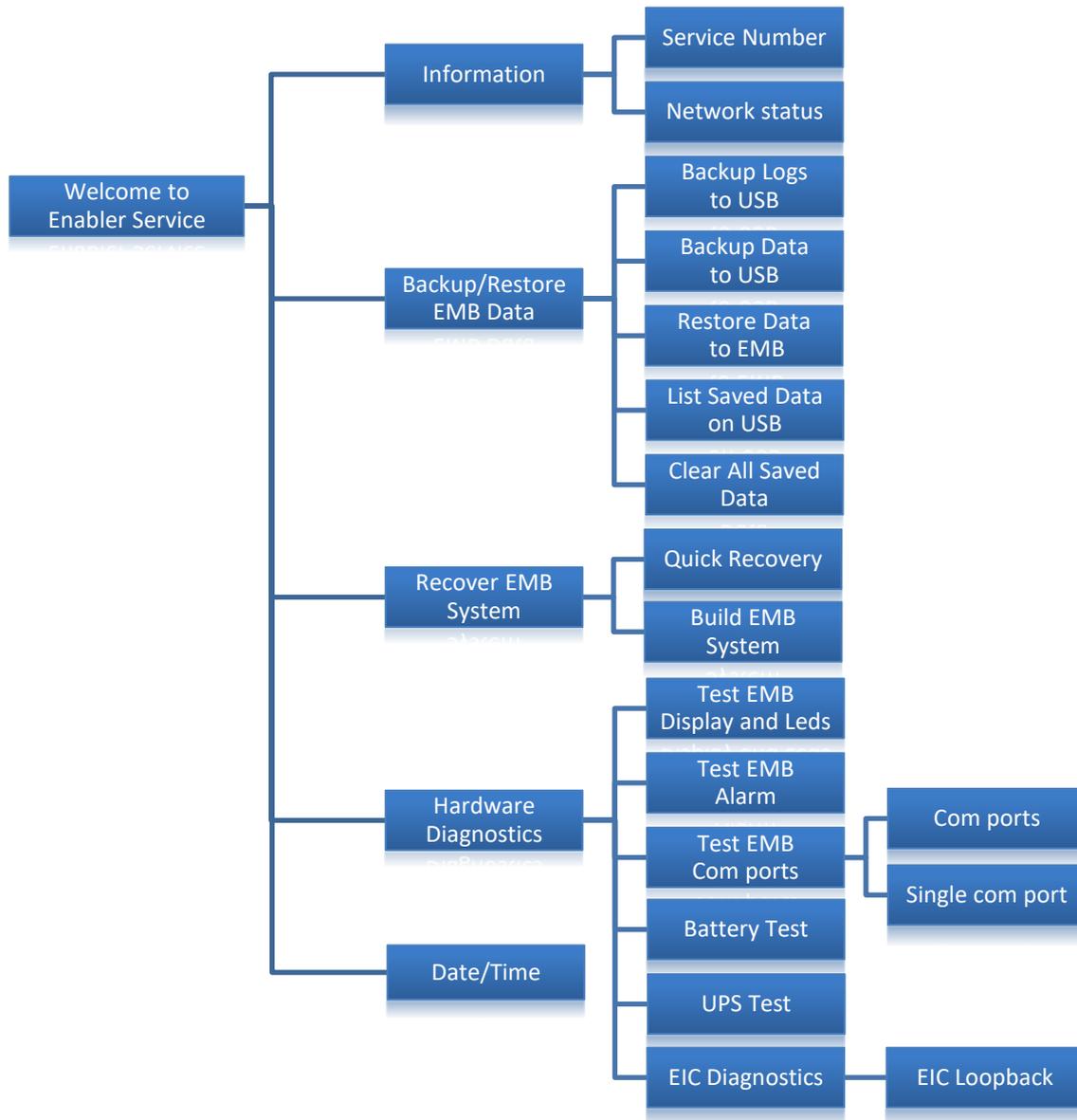| Welcome to Enabler Service | Welcome Message |

The Support tools use the keys on the mainboard to navigate the menus.

Ok   Accept the option or go down a Menu level.

Up   Move up in an option list or the current Menu level.

Down   Move down an option list or the current Menu level.

Menu   Move up to the previous menu level.

The menu options will timeout and move out of the current menu level.

```
                                           ┌─────────────────────┐
                                           │   Service Number    │
                         ┌──────────────┐  ├─────────────────────┤
                         │ Information   │──┤   Network status    │
                         └──────────────┘  └─────────────────────┘

                                           ┌─────────────────────┐
                                           │  Backup Logs to USB │
                                           ├─────────────────────┤
                                           │  Backup Data to USB │
  ┌──────────────┐       ┌──────────────┐  ├─────────────────────┤
  │ Welcome to   │       │Backup/Restore│──┤  Restore Data to EMB│
  │ Enabler      │───────│ EMB Data     │  ├─────────────────────┤
  │ Service      │       └──────────────┘  │ List Saved Data on  │
  └──────────────┘                         │ USB                 │
                                           ├─────────────────────┤
                                           │ Clear All Saved Data│
                                           └─────────────────────┘

                         ┌──────────────┐  ┌─────────────────────┐
                         │ Recover EMB  │  │   Quick Recovery    │
                         │ System       │──├─────────────────────┤
                         └──────────────┘  │  Build EMB System   │
                                           └─────────────────────┘

                                           ┌─────────────────────┐
                                           │   Test EMB Display  │
                                           │   and Leds          │
                                           ├─────────────────────┤
                                           │   Test EMB Alarm    │
                         ┌──────────────┐  ├─────────────────────┤  ┌────────────────────┐
                         │ Hardware     │  │   Test EMB Com ports│──│     Com ports      │
                         │ Diagnostics  │──├─────────────────────┤  ├────────────────────┤
                         └──────────────┘  │   Battery Test      │  │   Single com port  │
                                           ├─────────────────────┤  └────────────────────┘
                         ┌──────────────┐  │   UPS Test          │
                         │ Date/Time    │  ├─────────────────────┤  ┌────────────────────┐
                         └──────────────┘  │   EIC Diagnostics   │──│    EIC Loopback    │
                                           └─────────────────────┘  └────────────────────┘
```

For information on each menu item, refer to the following sections.

6.1 Information Menu

6.1.1 Service Number

Displays the service number of the current Enabler Embedded system.

6.1.2 Network Status

Displays the Link status and the IP address.

6.2 Backup/Restore EMB Data

6.2.1 Save Logs to USB

This option will zip up the available logs on Enabler Embedded system and save them in the \Data*Service Number*\Logs directory using the following filename pattern. The progress of the zipping is shown on the display.

ITL*yyyy-mm-hhMM*.zip

Where :

yyyy	=	Year
mm	=	Month
hh	=	Hour
MM	=	Minute

Multiple copies of the logs can be saved for use later.

Whenever you save logs you will be asked if you want to clear the existing Logs on USB stick for this Service Number. The default is to not clear logs. To clear the logs, use the Up/Down key to select the Clear option.

```
Don't clear logs          Clear saved logs
Ok=Yes or Up/Dwn          Ok=Yes or Up/Dwn
```

```
Saving Logs
to Stick : 55%
```

```
Save complete
OK to continue
```

6.2.2 Backup Data to USB

This option allows the data from the SSD to be saved to the USB stick for the purpose of backup or to try and recover the data from a broken system for later use. The Backup Data function is also called as part of Build EMB System, if Recover Data is selected.

```
Backing up data
Please wait…
```

If the backup is successful, the following messages will be displayed.

```
Backing up
parameters: 100%
```

```
Backing up
backups: 100%
```

```
Backing up
database: 100%
```

```
Backup success
OK to continue
```

If there is not enough space on the Support Tools USB stick, the following messages will be displayed.

```
Error backing up
database
```

```
Not enough space
OK to continue
```

If there is any other error with copying files, the following messages will be displayed.

```
Error backing up
database
```

```
Backup failed
OK to continue
```

6.2.3 Restore Data to EMB

This option allows backup data from the USB stick to be restored to the Enabler Embedded disk. The Restore Data function is also called as part of Build EMB System if Recover Data or Use Saved Data is selected.

```
Restoring data
Please wait…
```

If the backup is successful, the following messages will be displayed.

```
Restoring
parameters: 100%
```

```
Restoring
backups: 100%
```

```
Restoring
database: 100%
```

```
Restore success
OK to continue
```

Note: This will restore the database files without checking for any database corruption. The Enabler Embedded attempts to repair any database issues on startup.

If there is not enough space on the Enabler Embedded SSD disk, the following messages will be displayed.

```
Error restoring
database
```

```
Not enough space
OK to continue
```

If there is any other error with copying files, the following messages will be displayed.

```
Error restoring
database
```

```
Restore failed
OK to continue
```

6.2.4 List Saved Data

This function displays what data and the date saved for each saved Embedded system. The current system will be shown first. The 2nd line shows a letter for each type of data available; "D" for database, "B" for Backups and "L" for Logs followed by the date saved.

```
Exxxxxx(Current)
DBL:ddmmyy hhmm
```

Pressing OK will display the data for the next service number saved to the USB stick.

```
Exxxxxx
DBL:ddmmyy hhmm
```

If there is no more data available to list, Last saved data will be displayed.

```
Last saved data
OK to continue
```

6.2.5 Clear All Saved Data

This function will delete all saved data for the current Service Number from the USB stick. To clear the data, select Clear saved data using the Up or Down key then press OK.

```
Don't clear data          Clear saved data
Ok=Yes or Up/Dwn   ⟺    Ok=Yes or Up/Dwn
```

```
Clear complete
OK to continue
```

6.3 Recover EMB system

6.3.1 Quick Recovery

This option attempts to repair any boot or file system errors with the Enabler Embedded disk. This may be useful to get a non-booting site operational quickly, without having to do a full Embedded System rebuild.

Note: It is recommended that a full system rebuild is performed (see section 6.3.2 Build EMB System), as some disk errors will not be fixed by Quick Recovery.

If the boot sector rebuild is successful, the following message will be displayed.

```
Rebuilding disk          Rebuild success
Please wait...
```

If the boot sector rebuild fails, the following message will be displayed.

```
Rebuilding disk          Rebuild failed!          Recovery failed
Please wait...           WRITEBOOTSEC
```

If the Embedded disk cannot be found after boot sector rebuild, the following message will be displayed.

```
Rebuilding disk          No EMB disk!             Recovery failed
Please wait...           OK to continue
```

If the file system repair is a success, one of the following messages will be displayed.

```
Checking disk            No errors found
55%
```

```
Checking disk            5 errors
55%                      repaired
```

If the file system repair is not successful, the following message will be displayed.

```
Checking disk            Disk could not          Recovery failed
55%                      be repaired
```

If the Quick Recovery was successful, the following message will be displayed.

```
Recovery
successful
```

Remove the Support Tools and repower to check if Embedded can startup correctly.

If a quick recovery is not successful, check that the Embedded SSD is present and perform a full system rebuild (see section 6.3.2 Build EMB System).

6.3.2 Build EMB System

This option rebuilds the Enabler Embedded SSD with a new image of the system, optionally recovering data from the SSD or restoring data from a USB backup.

Note: If you do not restore data now, it is still possible to restore a backup at a later date. See section 6.2.3 Restore Data to EMB for more information.

You will be asked if you would like to recover the data currently on the SSD (see section 6.3.2 Backup Data to USB for more information).

```
Try recover data          Don't recover
Ok=Yes or Up/Dwn          Ok=Yes or Up/Dwn
```

If try recover data is selected and an issue with the disk is detected, a Quick Recovery (see section 6.3.1) will be performed before attempting to recover files.

If the Quick Recovery fails, you will be asked if you wish to continue with the installation.

```
Continue                  Don't continue
Ok=Yes or Up/Dwn          Ok=Yes or Up/Dwn
```

If data was not recovered from the Embedded and a backup for this Service Number is present on the USB stick, you will be given the choice of restoring from backup.

```
Restore from USB          Don't restore
Ok=Yes or Up/Dwn          Ok=Yes or Up/Dwn
```

```
Build EMB now
Press OK
```

Pressing Ok will now format the disk, install the operating system and the files needed to install Enabler Embedded on the first boot. At this point the EnablerEMBInstall.cab file will be copied to the SSD to be installed.

If Recover Data or Restore from USB was selected, that will occur now. See section 6.2.3 Restore Data to EMB for more information.

When the build is complete, the following message will be displayed.

```
Build EMB
completed OK
```

The system can now be powered down, the USB stick removed and powered up.

The system will automatically install the Enabler Embedded software and use the recovered database. If no database was recovered, it will create a new database and restore from the latest backup. If no backup was available, the database will have default data.

6.4 Diagnostics Tests

6.4.1 Test EMB Display and LEDs

This will run a display test of the LCD display module and switch on/off the main board LEDs. The display test will run until a key is pressed.

```
EEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEE
```

6.4.2 Test EMB Alarm

The test will activate the 2-tone alarm which will continue until a key is pressed.

6.4.3 Test EMB Com Ports

6.4.3.1 Test Com Ports

This diagnostic test is used to test the 2 x RS232 Communication ports on the main EMB board. These are the 2 x RJ45 connectors next to the main power connector. See EMB section for details and location.

To do this test you will need a special loop back cable. See Serial port wiring section.

```
Loop back cable
Installed ?
```

After the loop back cable has been installed, make sure the interfaces are enabled using the fly lead by touching it on the +12v of the battery momentary.

Press OK to acknowledge or Menu to go back.

With OK the test will run.

```
Testing Signals
```

This tests the connectivity of the RTS->CTS, DTR->DSR signals between the 2 ports. If there is a failure in the loop back cable or the Com port hardware the following error will be shown.

```
Signal error
Ok-Continue
```

Next the serial data is tested in both directions between the 2 ports at various speeds.

```
Testing Data
```

While it is running you should see the TX/RX lights flashing next to the ports.

```
Data test OK
OK to continue
```

Displayed if the data is sent and received correctly.

```
Data test error
OK to continue
```

Displayed if the test fails.

Loop back cable.

6.4.3.2 Test Single Com Port

The single com port test only tests the data connection by doing a loopback to itself. To run the test, you will need a loopback cable or a jumper for Com3.

You will be given the choice of the Com port to test.

```
Com1
Ok=Yes or Up/Dwn
```
↔
```
Com2
Ok=Yes or Up/Dwn
```
↔
```
Com3
Ok=Yes or Up/Dwn
```

To do this test you will need a special loop back cable. See Serial port wiring section.

```
Loop back cable
Installed ?
```

Press OK to start test.

```
Testing Data
```

While it is running you should see the TX/RX lights flashing next to the com port.

This is displayed if the data is sent and received correctly.

```
Data test OK
OK to continue
```

If it fails, you will see the following.

```
Data test error
OK to continue
```

6.4.4 Battery Test

The Battery test will disconnect the battery from the charging circuit and measure the voltages at the start of applying a small load and after to see if the battery can hold a charge. The test will fail if the voltage has dropped too much. The battery test runs daily in the normal running of the system, if it fails a critical journal event is made.

Make sure the battery has been charged for a few hours before running test.

```
Battery Test
Ok=Start
```

Press OK to start the test or Menu to go back.

The battery will run for a few seconds and the results will be shown.

```
Battery=13.43V
Ok=Next
```

The first result display shows the end voltage of battery. Press next to show state display.

```
Battery=Good
Ok=Continue
```

This will show the state of the battery (Good, Low, Bad, Missing).

Press OK to exit test and return to Hardware diagnostic menu.

6.4.5 Test UPS

This test has two functions, to test that the UPS hardware is operating correctly and to do a real-life test on the Battery. The UPS function in Enabler Embedded allows the system to continue with minor power interruptions. It will hold the system running for up to 90 seconds while a generator starts and if power is not returned then to will allow the system to shutdown cleanly, saving all current data to permanent storage.

This test should be run with a fully charged battery.

```
UPS test
Ok=Start
```

Press OK to start the test or Menu to go back.

```
Disconnect Power
Ok=Stop Test
```

Once the test has started it will prompt you to disconnect the power.

Disconnect the power and the following will be shown.

```
Running on UPS
```

```
UPS Bat=12.45V
Time: 45   Rem:45
```

Then while the test is running the current battery voltage will be shown with the number of seconds the test has been running and the number of seconds remaining.

The test will run for 90 seconds or until the battery is failing. If the test stops early, it means the battery can no longer hold a charge and should be replaced.

If the battery is dead or there is a problem in the UPS circuit then it is possible the system will just switch off.

If the OK button is pressed the test will be interrupted and end.

```
Reconnect power
now
```

When the test has completed you must quickly reconnect the power to allow the test results to be shown.

```
Test UPS OK
Ok=Continue
```

Displayed if UPS test completed with no errors.

```
Test UPS FAILED!
Ok=Continue
```

Displayed if UPS test failed and battery needs replacing.

```
Test stopped
Ok=Continue
```

Displayed if the test was stopped using the OK key during test.

6.4.6 PDM Socket (EIC) Diagnostics

The "EIC Loopback" test will test all the individual channels on the PDM sockets by running a loopback between channels. To run this test, you will need to insert loopback plugs into the PDM channels. The 1st and 2nd and the 3rd and 4th channels of a PDM will be connected to each other to provide the loopback. See end of this section for wiring of PDM plugs depending on PDM type.

```
EIC Loopback
```

Select the EIC to test. The EIC built into the Enabler Embedded main board or 1 of the EIC extension boards. Use the Up / Down key to select and Ok to confirm choice.

Press menu to go back.

```
Test EMB EIC          Test EIC 1            Test EIC 2
OK=YES or Up/Dwn  <→  OK=YES or Up/Dwn  <→  OK=YES or Up/Dwn
```

Test all channels on the EIC or an individual PDM. Use the Up / Down key to select the PDM choice.
Press menu key to go back.

```
Test All PDM          PDM 1                 PDM 2
OK=YES or Up/Dwn  <→  OK=YES or Up/Dwn  <→  OK=YES or Up/Dwn

                                            PDM 3
                                            OK=YES or Up/Dwn
```

Press OK to start test or menu key to go back.

```
Start Test
Ok=Start
```

The test will start by connecting to the slave (or EIC) and checking the installed firmware version. If there is no firmware already installed, or the firmware is different to the firmware provided on the support tools USB stick then firmware will be downloaded before the tests are run.

Once the EIC is operating the test will begin.

For each run of the test the current result will be displayed. The 1234 represents the each PDM channel and the letter underneath the channel is the result of the test for that channel.

```
1234 1234 1234
GGGG GGGG GGGG
```

G=Good, working correctly
T=Timeout, no data received
B=Bad, incorrect data received or data received from wrong channel.
. =Not being tested

Display when testing 3rd PDM

```
1234 1234 1234
.... .... GGGG
```

The test will run continuously until ok key is pressed. Then the number of test iterations that failed will be displayed.

```
Test result
Run errors 0
```

Pressing the Ok key or waiting 10 seconds a new choice of test PDM will be shown.

6.4.6.1 PDM loopback plug wiring

The loopback is installed between channels 1 & 2 and channels 3 & 4 of the test PDM. Not all types of PDM can be used.

Here is a list of PDMs that can be used for the loopback test.

PDM type	Pin and signal names to connect between plugs
PDM192 RS485	Pins 2(B) to 2(B), 3(A) to 3(A)
PDM247 RS232	Pins 1(TX) to 2(RX), 2(RX) to 1(TX), 3(GND) to 3(GND)
PDM203 RS422	Pins 1(GND) to 1(GND), 2(RX-) to 4(TX-), 3(RX+) to 5(TX+), 4(TX-) to 2(RX-), 5(TX+) to 3(RX+)

Picture of RS485 PDM with loopback plugs installed.

6.5 Date and Time setting

This option allows the real clock date and time to be set on CPU. The date and time will be reset if the lithium cell battery is removed or CPU module is removed. The Logs are saved using the current Date and Time so it should be correct.

Use the Up / Down keys to change the numbers and Ok to move to next number.

When complete press Menu to save Date or Time.

6.6 Serial port wiring

The Enabler Embedded RJ45 is wired to the EIA/TIA-561 specification

The following table lists commonly used RS-232 signals and the pin assignments for the normal DB9, DB25 and the Enabler Embedded RJ45 connectors

Signal		DB-9	DB-25	Embedded RJ45
Name	Abbreviation			EIA/TIA-561
Transmitted Data	TxD	3	2	6
Received Data	RxD	2	3	5
Data Terminal Ready	DTR	4	20	3
Data Carrier Detect	DCD	1	8	2
Data Set Ready	DSR	6	6	1
Request To Send	RTS	7	4	8
Clear To Send	CTS	8	5	7
Common Ground	G	5	7	4
Protective Ground	PG	N/A	1	N/A

The easiest way to wire the RJ45 port to a device such as a tank gauge is to use a RJ45 to DB9 or DB25 modular adapter kit and a CAT5 patch cable.

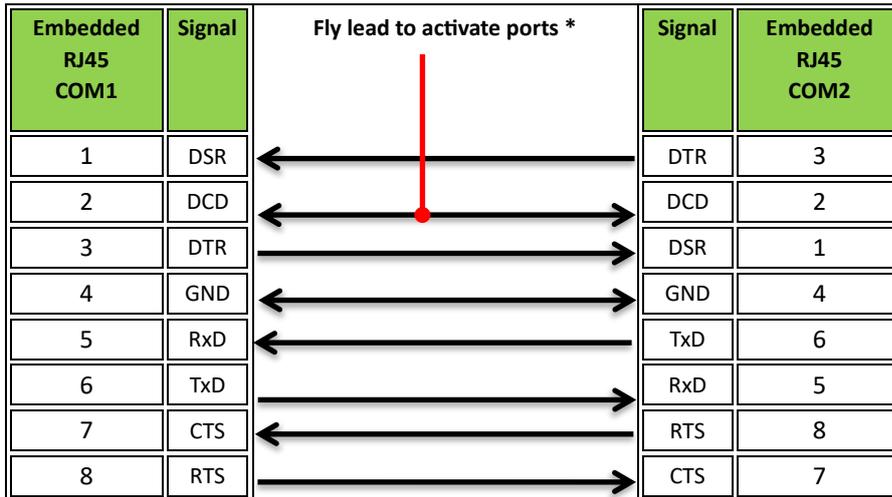**Picture of a typical RJ45 to DB9 modular adapter kit**

Wiring a RJ45 to DBx modular adapter kit.

| Embedded RJ45	Signal		Signal	DB9	DB25
1	DSR	←	DTR	4	20
2	DCD		DCD	1	8
3	DTR	→	DSR	6	6
4	GND	←	GND	5	7
5	RxD	←	TxD	3	2
6	TxD	→	RxD	2	3
7	CTS	←	RTS	7	4
8	RTS	→	CTS	8	5

6.6.1 Wiring for Loop Back cables for Support Tools testing

For the Com Ports test where the 2 ports are looped together

Embedded RJ45 COM1	Signal	Fly lead to activate ports *	Signal	Embedded RJ45 COM2
1	DSR	←	DTR	3
2	DCD	↔	DCD	2
3	DTR	→	DSR	1
4	GND	↔	GND	4
5	RxD	←	TxD	6
6	TxD	→	RxD	5
7	CTS	←	RTS	8
8	RTS	→	CTS	7

* Because the Com ports power down until they see a valid interface signal, we need to enable them by a separate fly lead when used in a loop back configuration. We have connected this to the CD signal which is not used in the testing. After connecting the loop back cable to the Enabler Embedded Com ports touch the fly lead on the +12v of the battery which will switch on both interfaces until cable is disconnected.
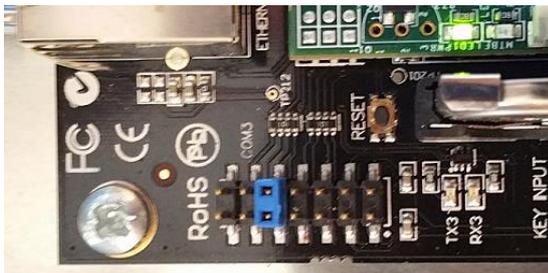
Example Loop Back cable
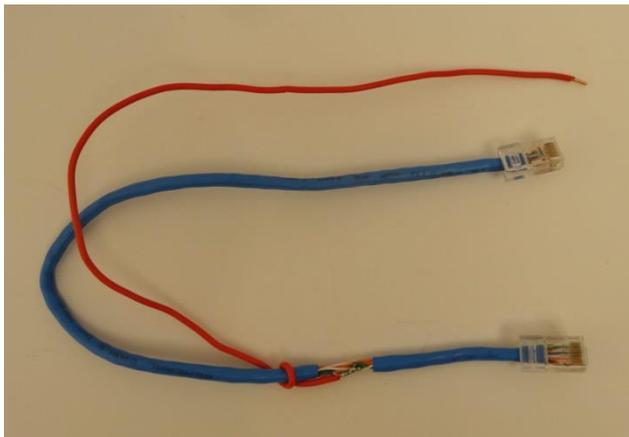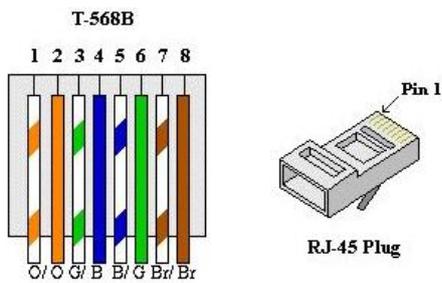
Single Com port tests

For the single port test you will need a single RJ45 connector with a link between the RxD and TxD pins(5 and 6) when testing ports Com1 and Com2 and fly lead to activate the port from DCD(pin 2) .
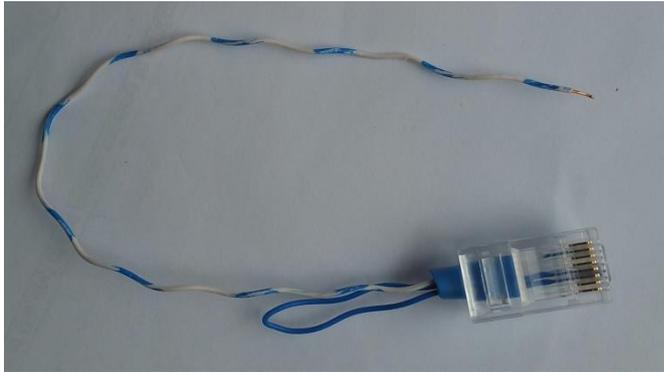
For the Com3 port only a jumper is required on the Com3 connector, see picture below.

RJ45 connector standard pinout

7 Service and Maintenance

This section provides service and maintenance information for the Enabler Embedded.

7.1 Battery Lifespan

The SLA (Sealed Lead Acid) Battery used with the Enabler Embedded have a life cycle of **three to five (3-5) years only**, with storage and extreme temperatures reducing the life of the battery.

Therefore, we recommend that the battery is **closely monitored after one to two (1-2) years of operation** and **replaced after three (3) years** of if the battery voltage drops below 12V.

7.2 Battery Specification

A replacement Enabler Embedded battery must meet the following specifications:

- Sealed Lead Acid (SLA) chemistry

- 12V

- 3.82" L x 1.69" W x 2.28" H (97.0mm x 43.0mm x 58.0mm)
  Note: *An SLA battery with these dimensions has a capacity of around 1.2Ah. If the battery has more capacity than this, it is likely too large for the Enabler Embedded case.*

These SLA Batteries are considered consumer electronic components. They can easily be sourced from your local electronics store or online. Please refer to the links below from known online stores.

- https://www.amazon.com/CA1212-Casil-Rechargeable-Sealed-Battery/dp/B07TD9LKTH/ref=sr_1_2?dchild=1&keywords=12V+SLA+1.2A&qid=1622582317&rnid=2528832011&s=industrial&sr=1-2

- https://www.digikey.co.nz/product-detail/en/b-b-battery/BP1-2-12-T1/522-1007-ND/653328

- https://export.rsdelivers.com/product/yuasa/np12-12/yuasa-12v-np12-12-sealed-lead-acid-battery-12ah/0597807

- https://www.electusdistribution.com.au/store/product/sb2480.aspx

Please make sure that you purchase from a reputable electronics store.

7.3 Battery Storage

This section covers information on how to extend the Battery life when Enabler Embedded is not in use.

7.3.1 Cable

The Enabler Embedded once shipped is assumed to be deployed to a site **within the next three (3) months**. If the Enabler Embedded Unit is to be kept in storage, ensure that **the battery cable is disconnected** from the Enabler Embedded board. If left connected for long durations, the battery will discharge and expire sooner.

If the Enabler Embedded unit is to be transported, ensure that the battery cable is also disconnected for safety concerns.

7.3.2 Temperature

Ensure that the Enabler Embedded is stored in a cool dry place. The ideal environment temperature for storage should be 0 - 20°C. Hotter climates and conditions will reduce the battery life.

7.3.3 Charging

While in storage, periodically **recharge the battery at least every two to three (2 - 3) months**.

If the battery is left uncharged for an extended period, **it will still self-discharge. The battery cell chemistry will degrade losing capacity and reducing its life**. It can become permanently damaged and will need to be replaced.

To recharge, just reconnect the battery cable to the Enabler Embedded board; power ON and then leave it charging for several hours. Check that the battery charge is above 12.4v DC before powering OFF again.
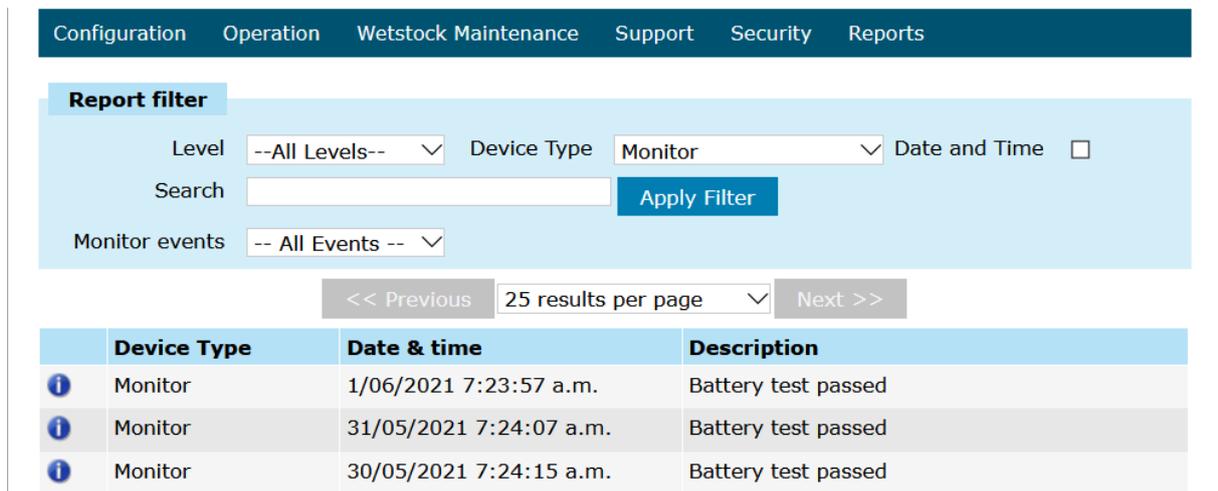
If the battery charge is below 12.4v DC after several hours of charging, replace the battery before deploying to a site.

7.4 Battery Status

Section 3.3.2 Checking for Battery Faults covers the manual steps to check for the Battery status and health.

Enabler Embedded also performs an automatic daily health check of the Battery while in operation.

The result of this can be viewed through the **Events Report Page**. Below is a snippet of a healthy battery:

Configuration	Operation	Wetstock Maintenance	Support	Security	Reports

Report filter

Level	--All Levels--	Device Type	Monitor	Date and Time	☐
Search			Apply Filter		
Monitor events	-- All Events --				

<< Previous	25 results per page	Next >>

	Device Type	Date & time	Description
ⓘ	Monitor	1/06/2021 7:23:57 a.m.	Battery test passed
ⓘ	Monitor	31/05/2021 7:24:07 a.m.	Battery test passed
ⓘ	Monitor	30/05/2021 7:24:15 a.m.	Battery test passed

If the battery test fails, you will instead see the following events:

	Device Type	Date & time	Description
✖	Monitor	29/08/2022 1:35:06 p.m.	Battery test failed, voltage 10.54
✖	Monitor	28/08/2022 1:35:13 p.m.	Battery test failed, voltage 10.79
✖	Monitor	27/08/2022 1:35:20 p.m.	Battery test failed, voltage 11.27

If you want to be notified of Battery failures, then please configure the **Remote Alerts** functionality. Please refer to the **Enabler Web Reference Manual** for more details.

If any battery errors or faults are detected, **service or replace the battery as soon as possible**. A faulty battery may not be able to sustain site operations if power to the Embedded is interrupted.

7.5 Software Update

Enabler Embedded Full Software Releases or Patches are published in ITL's downloads page here:

https://integration.co.nz/support/enabler-software-updates/

These Software Releases and Patches may include any of the following:

- Fixes and Workarounds for Site and Internal Issues
- New Features and Functionality
- New Forecourt Device Support (i.e. Pump, Tank Gauge, Tags, etc.)

It is recommended that sites should have the latest Enabler Embedded release or at least an update is applied once a year. All Patches are rolled up into a Full Software Release in a later date.

Periodically applying updates to Enabler Embedded ensures that your site operations will not be hindered **by any known but already resolved issue**. This also makes sure that your version of Enabler Embedded is supported. See here for more details.

https://integration.co.nz/support/roadmap/support-lifecycle/

Although Software updates can be applied remotely, it is recommended that a support personnel be on site for Full Software Releases. So that any fallback steps can easily be executed if the Software update fails.

To know more about the detailed information of each software release, refer to the Release Notes available in the Downloads page.

To be informed on any available major Full Software Release, please subscribe to ITL's newsletter here:

https://integration.co.nz/register/

7.6 Unit Placement

The Enabler Embedded Unit can be vertically mounted on wall or horizontally flat on a bench or counter. The case lid should be fitted to prevent any dust or unwanted debris falling on the Enabler Embedded board.

The Enabler Embedded is rated to run on operating environments with temperature from 0 - 50ºC. However, it should be placed in a non-hazardous environment. Preferably, it should be inside a back office or an electrical room wherein the other Site System equipment is located.

Running the Enabler Embedded in high temperature environments (above 30ºC) and frequent power-cuts will have significant decrease in the battery lifespan. If you have an external UPS (Uninterruptible Power Supply) on site, it is advised that you plug the Enabler Embedded to it.

7.7 Spare Parts

It is recommended that a minimum of 5% of Enabler Embedded spare parts be kept in inventory. This figure is based on the number of actual site deployments running. This is to ensure equipment availability and reduce downtime. The following should spare parts should be kept:

- Enabler Embedded
- PDMs (Pump Distribution Modules)
- Battery (12v DC 1.AH)

As noted in **Section 7.1 Battery Lifespan**, the Battery can be sourced locally.

7.8 Site Checks

If a support personnel is to be deployed to a site to perform any maintenance or troubleshooting (i.e., Upgrade of Site System or Enabler Embedded, Tests on any other Site System software or hardware equipment, etc.), it is recommended that the following checks should be done on Enabler Embedded.

- Check the Battery Status (see **Section 7.3 Battery Status**).
- Check if the Battery can still hold power. Power OFF the Enabler Embedded and let it run through the normal shutdown countdown sequence. Wait for approximately 60 to 90 seconds. Afterwards, go through the Enabler Embedded menus to shut it down. Power ON the Enabler Embedded again for normal operation.
- Do a visual inspection on the Enabler Embedded case or board. Check if there are any corrosion on any of the board connectors or if there are any residual leaks caused by a defective SLA Battery. If some form of corrosion is found, consider relocating the Enabler Embedded in a less humid environment. Both battery leaks and corrosion can cause damage on the Enabler Embedded.
- Check if the Power Supply Adapter is still supplying +12v DC.
- Check if the Enabler Embedded LEDs and LCD are operating normally. See here: https://integration.co.nz/support/faq/enabler-card-diagnostic-leds/

8 Case and Bill of Materials

For customers who want to fabricate their own case we can provide the design drawings for our customised case design. This will allow you to have a case made locally to your own requirements.

If you build cases using our design, you will require the following fittings to complete assembly of a working system:

Description	Part	Qty
SLA Battery	NP1.2-12 element 14 Part#147472	1
M4 x 8mm posidrive pan head screws	BHPAM008Z	14
M4 star lock washers		14
M3 x 6mm posidrive pan head screws	AHPAM006Z	2
M3 ZP spring washers		2
Battery cable	See section 8.1	1
Internal (case) Earth cable	See section 8.2	1
External Earth cable	See section 8.3	
Mains-12VDC Power supply	AMTEX AEB70US12	1
M25 Gland (cable entry for power and Ethernet)	PV516A	1
2-way Euro plug (power)	element14 Part# 4540025	1
2-way 6.3mm Faston tab with screw terminal	element14 Part # 2311702 or element14 Part # 1346440 or 2 x elemenet14 Part#2311723	1
Cable tie mount	HC-1S	1
Cable ties (200mm x 7-8mm)		10[1]

---

[1] Depending on the number and type of pumps connected.

8.1 Battery Cable

JST-VH 2pin plug to two 4.8x0.8mm crimp Faston receptacle, insulated (plastic shell). Red plastic shell on the negative connector should be covered with black heatshrink.

Orientation: Pin 1 is positive (red). Pin 2 is negative (black). See picture.

JST-VH Shell: element14 Part #630470

JST crimp socket to fit shell: element14 Part #630500

JST-VH header element14 Part #9492003
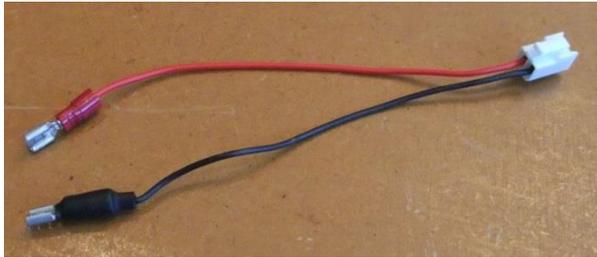
8.2 Internal Earth Connector Cable

This connector is required to connect the EMB board to the Case Chassis ensuring

Cable: Green/yellow stripe, multistrand, 1.5mm² area

Connectors: 6.3mm crimp Faston receptacle, insulated (plastic shell) on each end.

Length: 100mm

8.3 External Earth Connector Cable

This provides external earth connection – **when installed at site Enabler Embedded must be earthed**. We recommend you ensure this cable meets your installation requirements - this cable length and connectors is included a guide.

Connectors: One end: 6.3mm Faston receptacle, insulated (plastic shell) on ONE end.

(picture below shows alternative Utilux H1954/D25 screw fit connector).

Other end: 10mm bare wire, twisted (or soldered) to be connected to suitable earth (e.g. mains plug)

Length: 3 metres (or to suit installation)