NV9 USB MANUAL SET

INTRODUCTION

INTELLIGENCE IN VALIDATION

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MANUAL AMENDMENTS

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MAIN HEADQUARTERS

Innovative Technology Ltd
Derker Street – Oldham – England - OL1 4EQ
Tel: +44 161 626 9999 Fax: +44 161 620 2090
E-mail: support@innovative-technology.co.uk
Web site: www.innovative-technology.co.uk

Innovative Technology
INTELLIGENCE IN VALIDATION

Bellis Technology
INTELLIGENCE IN VALIDATION

BRAZIL
suporte@bellis-technology.com.br

CHINA
support@innovative-technology.co.uk

GERMANY
supportDE@innovative-technology.eu

SPAIN
supportES@innovative-technology.eu

UNITED KINGDOM
support@innovative-technology.co.uk

UNITED STATES OF AMERICA
supportusa@bellis-technology.com

REST OF THE WORLD
support@innovative-technology.co.uk

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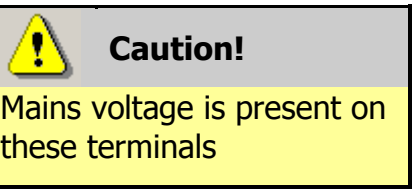
PRODUCT SAFETY INFORMATION

Throughout this manual set, we may draw your attention to key safety points that you should be aware of when using or maintaining the product.

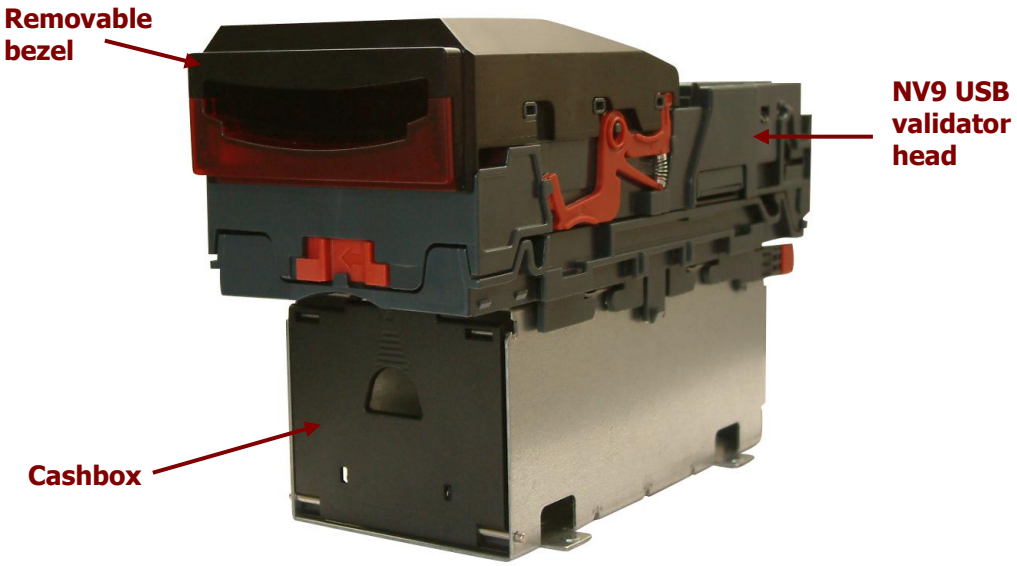
These safety points will be highlighted in a box, like this:



This manual set and the information it contains is only applicable to the model stated on the front cover, and must not be used with any other make or model.

INTRODUCTION

The NV9 USB validator is made up of three basic components: an NV9 USB validator head, removable bezel and a cashbox (as shown below):



The NV9 USB validator is a device that can accept, validate and store 300 or 600 bank notes of mixed denominations.

NV9 USB Rear View

NV9 USB Side View

NV9 USB Front View

The NV9 USB Validator leaves the factory preset to at least one currency and one firmware interface so that it is ready for immediate installation. The NV9 USB validator works with any NV9 USB currency dataset created by Innovative Technology Ltd - datasets can be downloaded from the Support section of the ITL website.

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FEATURES

The NV9 USB validator has many innovative features, including:

- 300 or 600 note capacity cashboxes available
- Accepts up to 15 different note denominations (in serial control mode)
- Accepts, validates and stores multiple denominations of bank notes in less than 3 seconds
- Secure encrypted protocol available for communication

TYPICAL APPLICATIONS

The NV9 USB validator can be used in a variety of situations where high security and high volume bank note acceptance and validation are needed. Some typical applications are:

- AWP and SWP applications
- Self-Serve and Retail
- Kiosks
- Casinos
- Parking and Ticketing
- Vending

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STRUCTURE OF THIS MANUAL SET

This manual set is made up of seven sections, each is supplied in a separate Portable Document Format (PDF) file, so you only need to download or print the section relevant to your requirements:

- Introduction
- Section 1 – Quick Start and Configuration Guide
- Section 2 – Field Service Manual
- Section 3 – ITL Software Support Guide
- Section 4 – Mechanical and Electrical Manual
- Section 5 – Software Implementation Guide
- Section 6 – Technical Appendices

WHICH SECTION IS RELEVANT TO ME?

- **Quick Start and Configuration Guide:**
  - Most users should use this section; typical users are software engineers looking at how to make it work, project engineers evaluating their first unit, or installation engineers installing the unit into a host machine.
  - This section contains the essential information that a user needs to quickly assemble and configure the NV9 USB validator ready for installation into the host machine.

- **Field Service Manual:**
  - Typically used by a field service engineer who is maintaining the product.
  - This section contains the essential information that the field service engineer needs to clean, maintain and fault find an NV9 USB validator that is installed in a host machine.

- **ITL Software Support Guide:**
  - Any user who wants to test the functionality of the unit, reprogram the firmware or dataset, or set up the encryption key, address or routing for the unit.
  - This section contains the information needed for a user to configure and program the NV9 USB validator, using a range of software tools.

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- **Mechanical and Electrical Manual:**
  - Design engineers who are designing a host machine cabinet, or looking to integrate the NV9 USB validator into an existing cabinet.
  - This section contains the all the mechanical and electrical information a designer needs to effectively integrate the NV9 USB validator into a host machine.

- **Software Implementation Guide:**
  - Software engineers looking at how to implement the NV9 USB validator in their host machine, or design engineers looking at including the unit in their host machine.
  - The information in this section details the communications protocols, specific commands and interfaces used including eSSP and ccTalk.

- **Technical Appendices:**
  - These appendices have no specific audience, but users can find relevant and useful information here.
  - This section includes information on product approvals, technical specifications and ordering information.

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SECTION 1

NV9 USB MANUAL SET

QUICK START AND CONFIGURATION GUIDE

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1. QUICK START AND CONFIGURATION GUIDE

This section is one part of a complete manual set: most users should use this section of the manual - typical users are software engineers looking at how to make it work, project engineers evaluating their first unit, or installation engineers installing the unit into a host machine.

This section contains the essential information that a user needs to quickly assemble and configure the NV9 USB validator ready for installation into the host machine.

Information

Validator compatibility.

The NV9 USB validator is pin for pin compatible with the NV7 / NV8 / NV9 / NV10 series of validators, but **NOT** with earlier versions of the product (NV2 – NV5).

1.1 Assembly

Installing the NV9 USB is a simple operation; the validator can be installed **vertically** or **horizontally**, depending on the type of cashbox fitted or orientation needed:

1. If the validator is fitted with a clip-on cashbox, then the validator will be mounted VERTICALLY

2. The validator is secured in the host machine using a suitable vertical bezel

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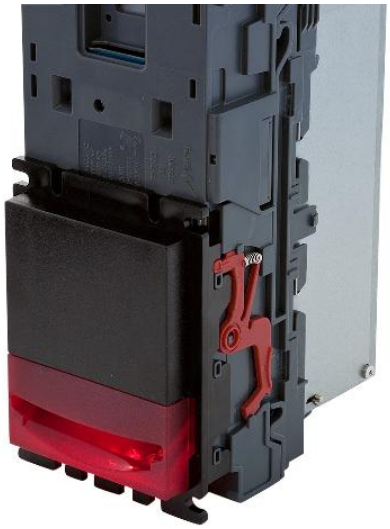
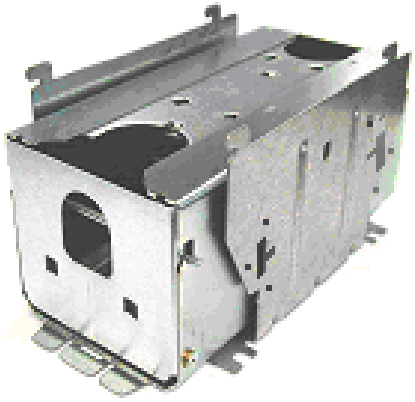
3. The cashbox is attached to the validator by locating and sliding until the cashbox is clipped securely



4. If the validator is fitted with a slide-on cashbox, then the validator can be mounted HORIZONTALLY or VERTICALLY



5. The validator will be fitted with a suitable horizontal or vertical bezel

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6. The cashbox housing is mounted in the host machine with the NV9 USB mounted on top. The cashbox is then slid into the housing until it is securely clipped.

7. If the validator is fitted with an NV11 standard cashbox, then the validator will be mounted HORIZONTALLY

8. The validator will be fitted with a suitable horizontal bezel

9. The cashbox is attached to the validator by locating and sliding until the cashbox is clipped securely

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Information

Check website for options.

There are many variants of bezel and cashbox type available for the NV9 USB validator. Please check the ITL website (www.innovative-technology.co.uk) for up to date information on the options available.

The technical drawings which can be found at the end of this section show all the dimensional information needed to mount the unit.

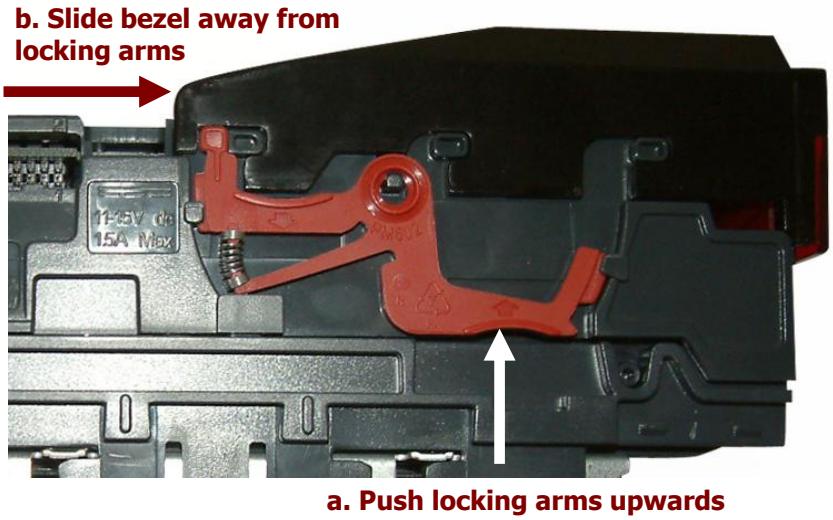
WARNING!

Do not attempt disassembly

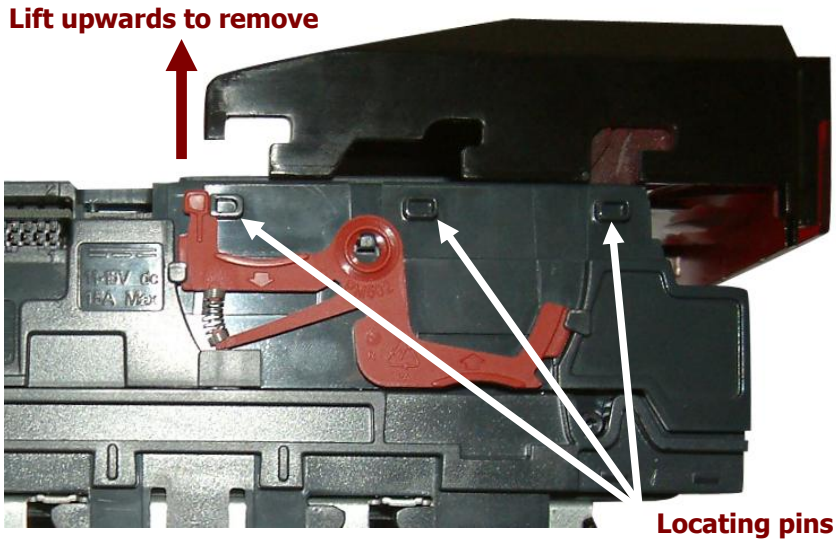
Do not attempt to disassemble the NV9 USB validator head – trying to do this could cause personal injury and will damage the unit beyond repair.

1.2 Bezel Removal and Refitting:

- The bezel is removed by pushing the red locking arms on both sides of the validator upwards, and sliding the bezel away from the locking arms



- Lift the bezel off once the bezel has been slid fully across and is clear of the locating pins



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The bezel is refitted by pushing the bezel back onto the locating pins and sliding backwards until all six pins are engaged in the slots. The locking arms will then spring back and locate into the bezel.

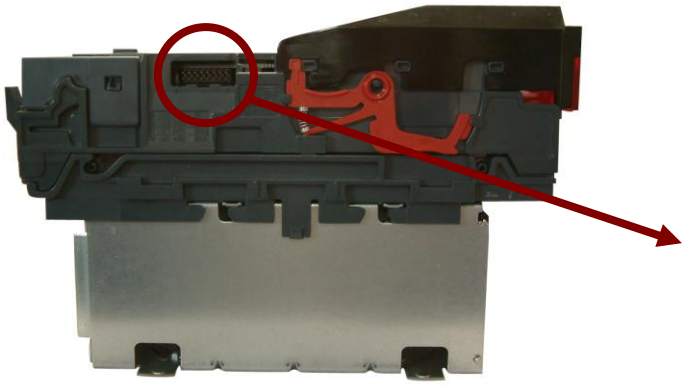
Caution!

Check locking arms.

Always make sure that **BOTH** locking arms are fully located in the bezel – trying to operate the validator if they are not correctly located can cause unit damage.

1.3 Interfacing

The connector needed to set up and interface the NV9 USB Validator is easily accessible on the side of the unit:



Interface Socket

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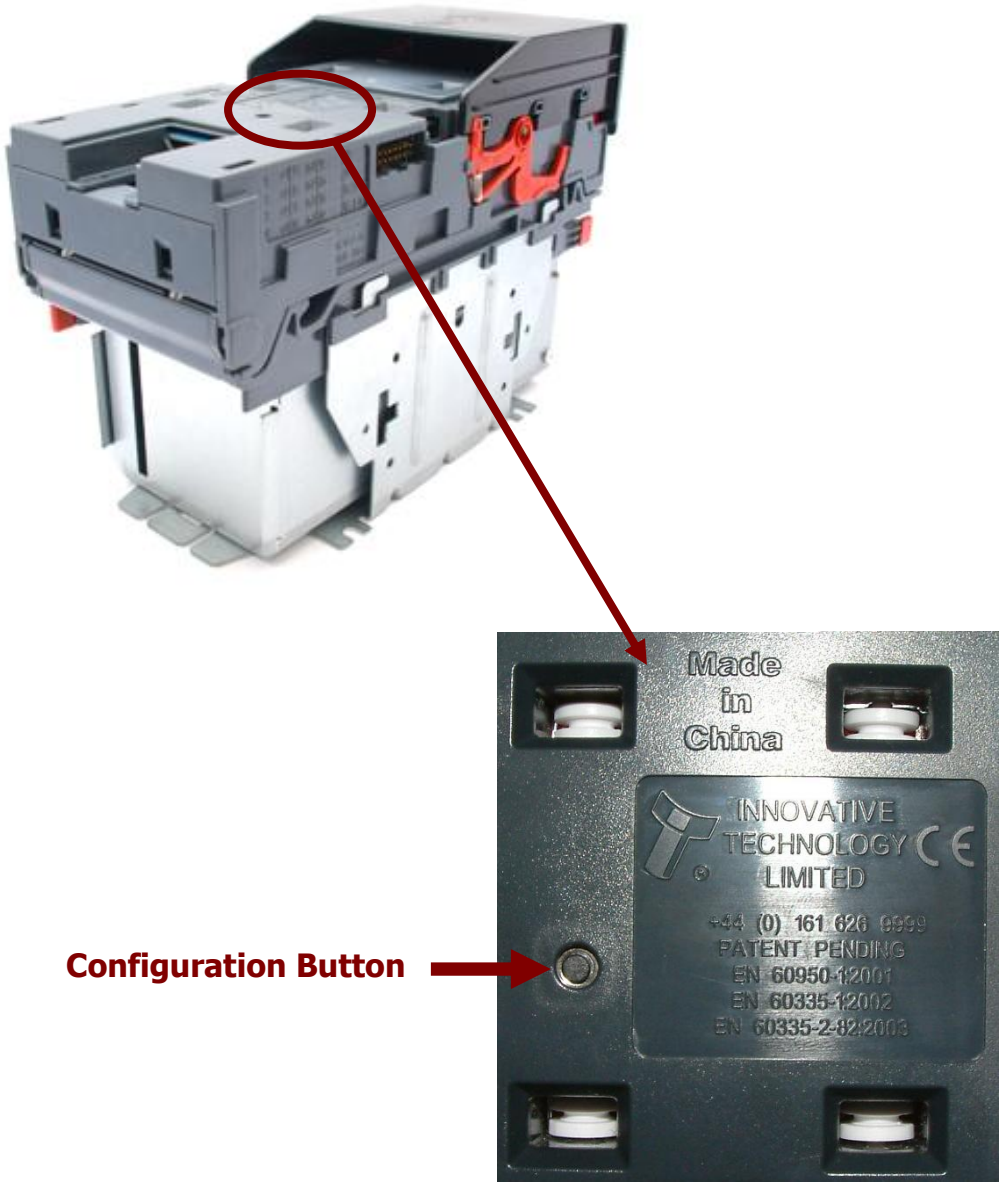
1.4 Configuration

The NV9 USB does not use DIP switches to configure the unit – configuration and setting is carried out by using a Configuration Button mounted on top of the unit:



There are several functions available when using the Configuration Button, and these are listed in the next table:

WARNING!
Risk of unit damage

When in programming mode, do not turn off the power before the operation is complete as this will make the unit unusable.

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Action	Power Status	Function
Press and hold (more than 2 seconds) until the bezel illuminates, then release	Powered ON	Sets validator to Programming mode (SSP)
Press once (less than 1 second)	Powered ON	Enables Configuration Card programming – press again to cancel this mode
Press twice (within half a second)	Powered ON	Shows current interface type (see flash count table below)
Press and hold as validator is powered up	Powered OFF / ON	Resets to factory settings

Flash Count	Interface
1	SSP
2	Pulse
3	MDB
6	ccTalk
7	SIO
8	Parallel

The NV9 USB Validator leaves the factory preset to at least one currency and one interface so that it is ready for immediate installation. The dataset and interface used are shown on the label fixed to the top of the validator head.

1.5 Connector and Pinouts

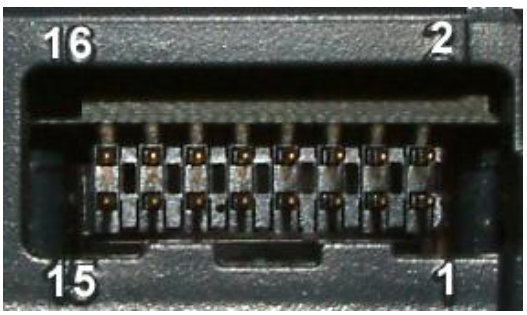
The NV9 USB Validator has a single connector that is used to allow interfacing and programming.

Information

Power always required regardless of connection type.

Power is always required on pins 15 and 16 of the 16 way connector.

The connector is a 16 pin socket used to interface the NV9 USB to the host machine. The pin numbering of the socket is shown below, as well as an overview of the socket connections:



Pin	Description
1	Serial Data Out (Tx)
5	Serial Data In (Rx)
11	USB Data +
12	USB Data -
13	USB Power (+5V)
15	+ V
16	0V / Ground Connection

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To use a USB connection with the NV9 USB, a USB cable fitted with a 16 way connector on one end (ITL Part Number CN00392) should be used. The CN00392 cable fits into the 16 way connector and allows high speed programming and serial communications when used in SSP, ccTalk and SIO modes.

When using the USB connection, power must be supplied to the NV9 USB using the CN00392 cable.

1.6 Programming

Full details on programming the NV9 USB Validator can be found in Section 3 of this manual set (ITL Software Support Guide).

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1.7 Technical Specifications

The full technical specifications for the NV9 USB Validator can be found in Section 6, Appendix B of this manual set. A brief summary is given here:

DC Voltage	Minimum	Nominal	Maximum
Absolute limits	10.8 V	12 V	13.2 V
Absolute limits (when fitted with IF5 interface)	18 V	---	48 V DC or 34 V AC
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
Supply Current			
Standby			200 mA
Running			1 A
Peak (motor stall)			1.5 A

Interface Logic Levels	Logic Low	Logic High
Inputs	0 V to +0.5 V	+3.7 V to +12 V
Outputs (2.2 kΩ pull-up)	+0.6 V	Pull-up voltage of host interface
Maximum current sink	50 mA per output	

WARNING!

Use suitable power supply

Ensure that the supply voltage to the NV9 USB is not lower than 10.8 V and that the power supply can provide sufficient current to avoid incorrect operation and excessive note rejects.

We recommend that your power supply is capable of supplying 12V DC at 3 A.

- For 12V operation, use TDK Lambda model SWS50-12. This power supply is available from a variety of suppliers including Farnell (stock code 1184645) and RS (stock code 466-5869).

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1.8 NV9 USB Bezel Flash Codes

The NV9 USB Validator has inbuilt fault detection facilities. If there is a configuration or other error the NV9 USB front bezel will flash in a particular sequence; a summary of the Bezel Flash Codes for the NV9 USB is shown below:

Flashes		Indicated Error	Comments
Long	Short		
0	0	None	
1	2	Note path jam	Remove obstruction and follow the cleaning procedure in Section 2 of this manual set
	3	Unit not initialised	Contact ITL technical support
3	1	Firmware checksum error	Download new firmware
	2	Interface checksum error or unable to set programmed interface	
	3	EEPROM checksum error	
	4	Dataset checksum error	
4	1	Power supply too low	Check power supply
	2	Power supply too high	

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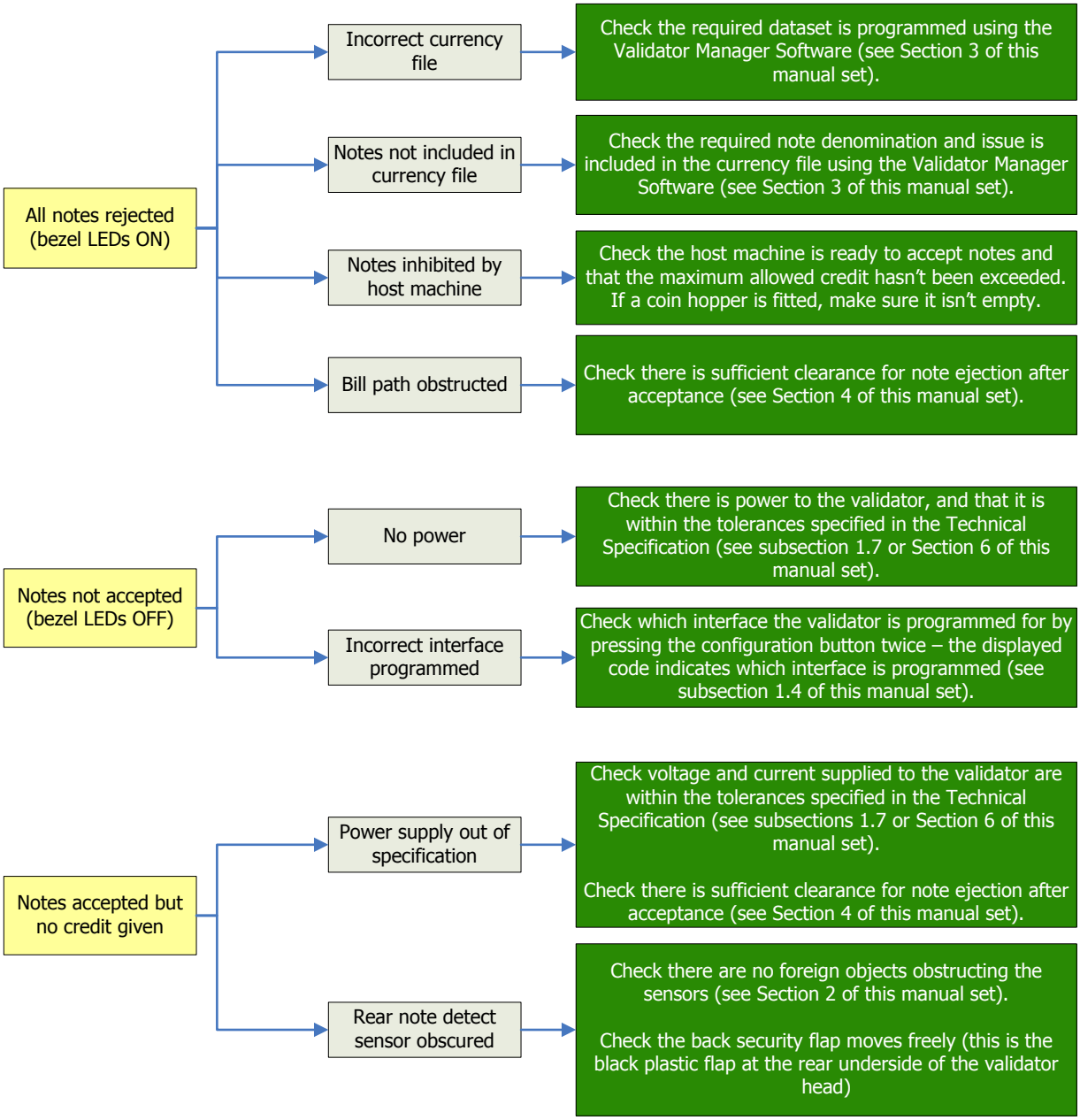
1.9 Fault Finding

Please use this flow chart with the Flash Codes in the previous sub-section as an aid to help resolve any configuration or start up problems you might have after installing the NV9 USB validator



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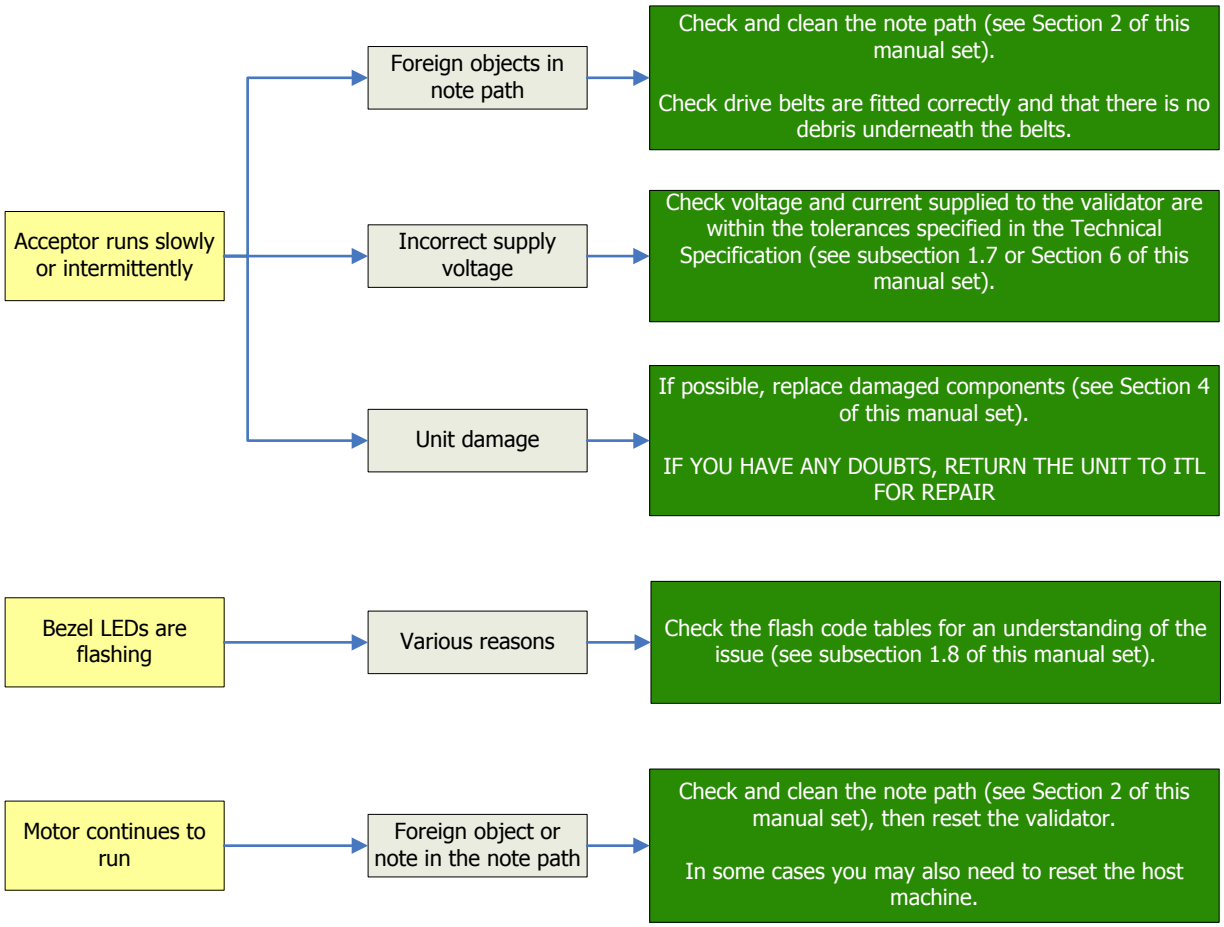

If you are unsure about the cause or how to resolve the problem, please contact ITL's technical support department. Support contact details can be found on the ITL website (www.innovative-technology.co.uk), or on the last page of this section.

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1.10 Frequently Asked Questions

a. Why are there no DIP switches on the unit?

- The NV9 USB has no dipswitches. Configuring the unit is carried out using a configuration button mounted on top of the unit – see subsection 1.3 of this manual for more information.

b. In what orientation can I use the NV9 USB validator?

- The NV9 USB can be mounted horizontally or vertically, depending on the type of bezel and cashbox selected. See subsection 1.1 of this manual for more information on mounting the validator – check the ITL website to see the currently available range of cashboxes and bezels.

c. How do I check which interface has been set?

- You can check which interface has been selected by using the configuration button mounted on top of the unit – see subsection 1.3 of this manual for more information.

d. How do I change the interface type?

- You can change the interface type by using the configuration button mounted on top of the unit – see subsection 1.4 of this manual for more information.

e. Some or all notes are not accepted

- Check that no inhibits are set in the Validator Manager software (see Section 3 of this manual set). If the problem persists, contact ITL Support for further assistance.

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MAIN HEADQUARTERS

Innovative Technology Ltd
Derker Street – Oldham – England - OL1 4EQ
Tel: +44 161 626 9999 Fax: +44 161 620 2090
E-mail: support@innovative-technology.co.uk
Web site: www.innovative-technology.co.uk

Innovative Technology
INTELLIGENCE IN VALIDATION

Bellis Technology
INTELLIGENCE IN VALIDATION

BRAZIL
suporte@bellis-technology.com.br

CHINA
support@innovative-technology.co.uk

GERMANY
supportDE@innovative-technology.eu

SPAIN
supportES@innovative-technology.eu

UNITED KINGDOM
support@innovative-technology.co.uk

UNITED STATES OF AMERICA
supportusa@bellis-technology.com

REST OF THE WORLD
support@innovative-technology.co.uk

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SECTION 2

NV9 USB MANUAL SET

FIELD SERVICE MANUAL

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NV9 USB MANUAL SET – SECTION 2

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2. FIELD SERVICE MANUAL

This section is one part of a complete manual set: typically, a field service engineer who is maintaining the product would use this section.

This section contains the essential information that the field engineer needs to clean, maintain and fault find an NV9 USB Validator that is installed in a host machine.

The NV9 USB Validator has been designed to minimise any problems or performance variations over time. This has been achieved by careful hardware and software design; this attention to the design means there is very little user maintenance required.

2.1 Cleaning

The NV9 USB Validator has been designed in a way to prevent damage and airborne contamination reaching the optical sensors; however, depending upon the environment the NV9 USB may require occasional cleaning or belt changing.

Caution!

Do not use solvent based cleaners on any part of the NV9 USB unit.

Do not use solvent based cleaners such as alcohol, petrol, methylated spirits, white spirit or PCB cleaner. Using these solvents can cause permanent damage to the unit; only use a mild detergent solution as directed below.

To clean the NV9 USB, open the note path by sliding the red release catch on the front of the validator to the left (as indicated in the picture) - this will allow access to the lozenge and note path

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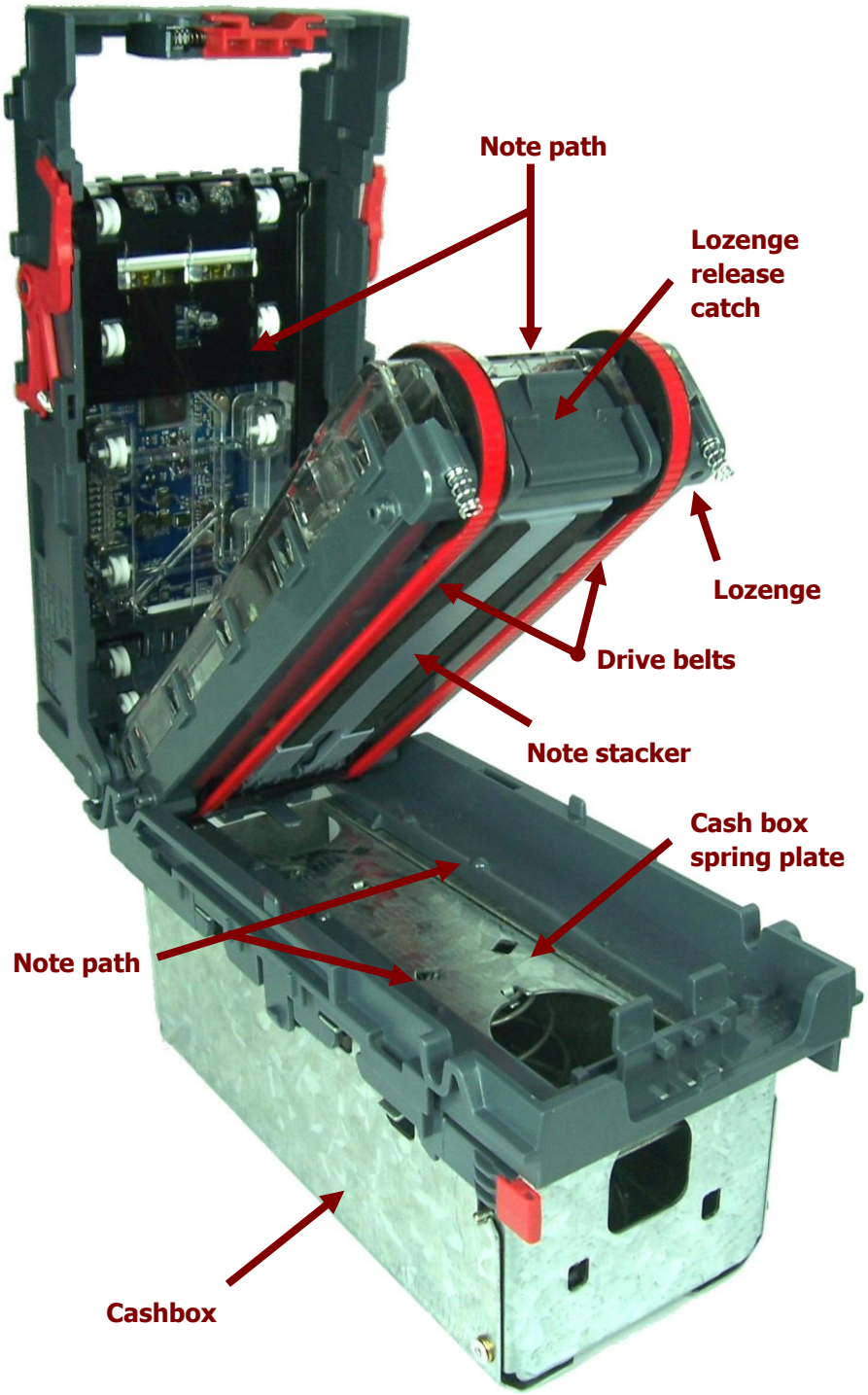

WARNING!

Disconnect power BEFORE any cleaning operation

Unless stated otherwise, you should disconnect the power BEFORE carrying out any cleaning operations to avoid the risk of causing damage to the validator.

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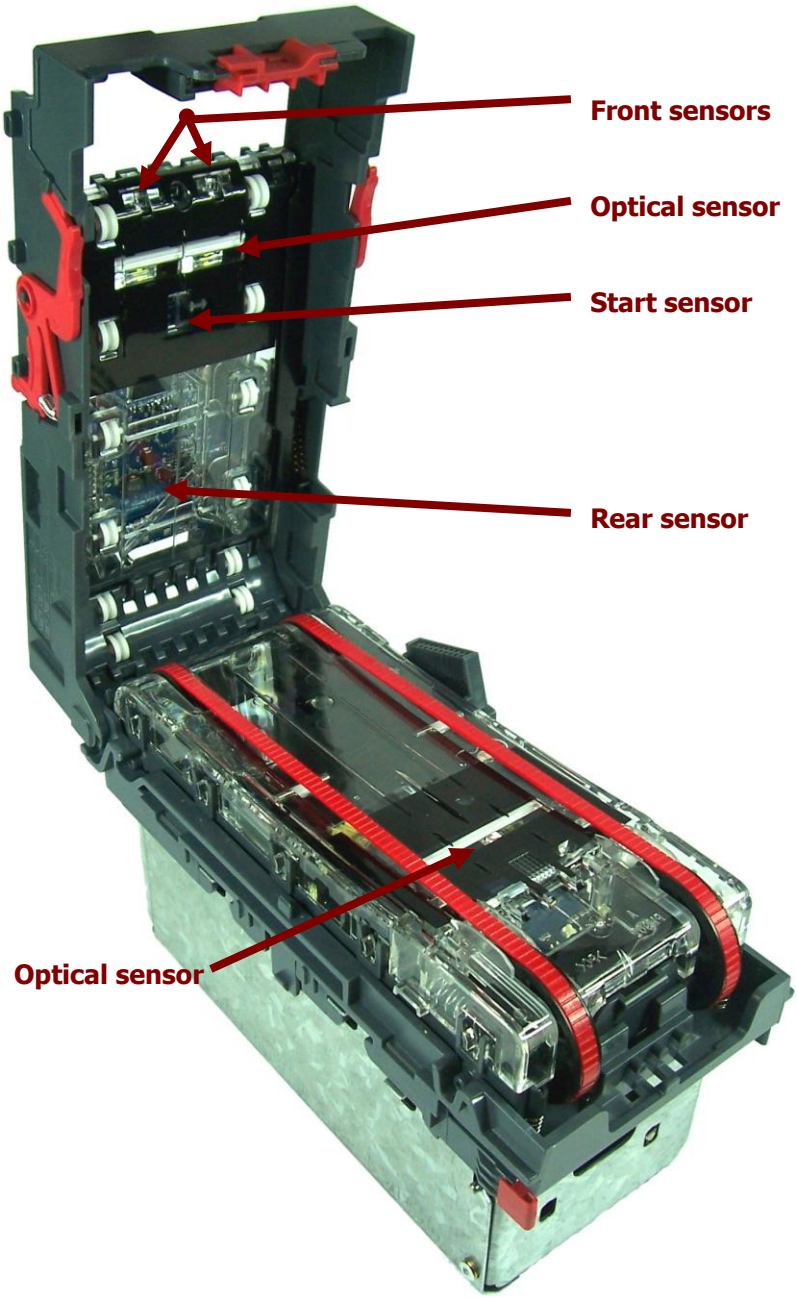

Examine the note paths, lozenge and note stacker for any dirt or debris, and carefully clear and wipe the surfaces of the note paths and lozenge with a soft lint free cloth that has been dampened with a water and mild detergent solution (i.e. household washing up liquid.) - be very careful when cleaning around the sensor lenses and make sure they are clean and dry before closing the cover and restarting the unit. Do not try to polish the sensor lenses – if a lens is badly scratched, contact ITL technical support for advice.

Also check that the note stacker and cash box spring plate are not jammed.

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Caution!

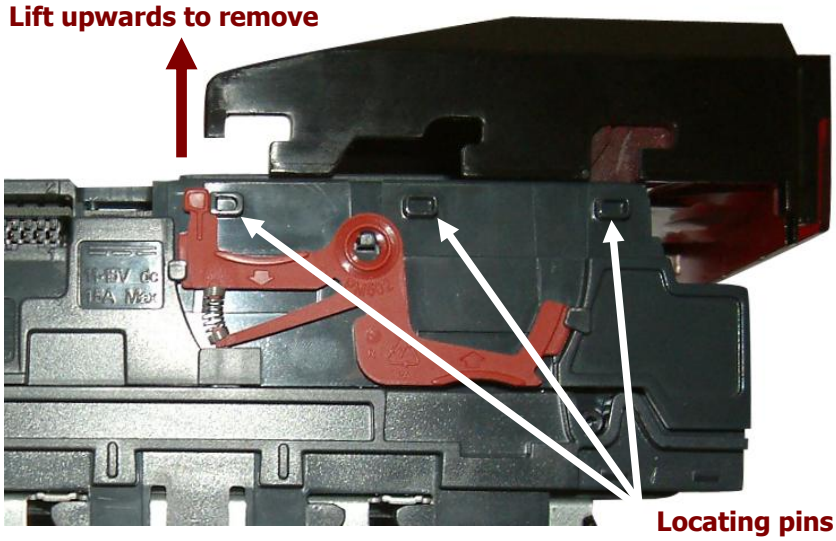
Be careful cleaning sensors.

When cleaning the recessed front sensor, use a small soft brush or cotton bud – do not use anything sharp or abrasive.

Cleaning the belts is a simple operation. Ensure the validator is enabled (i.e. bezel lights are illuminated), then remove the bezel:

- The bezel is removed by pushing the red locking arms on both sides of the validator upwards, and sliding the bezel away from the locking arms

- Lift the bezel off once the bezel has been slid fully across and is clear of the locating pins



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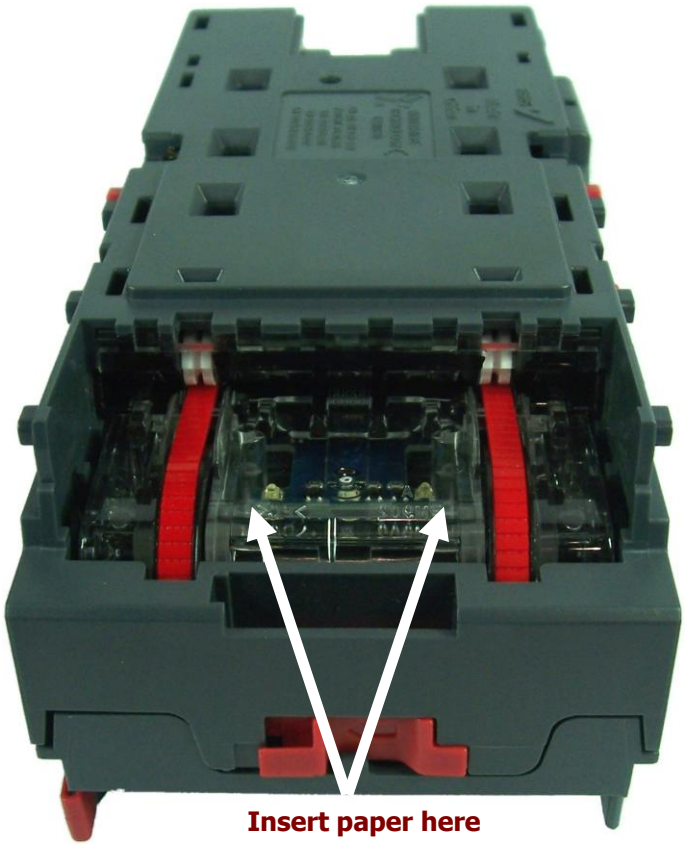
- Insert a piece of paper, which is narrower than the width between the two belts, in the centre of the note path to activate the drive motor

- Use a lint free cloth dampened with water and containing a mild detergent (such as dish detergent) and hold against each drive belt as is turns.



Repeat this procedure until all dust and debris has been removed from both belts. Finally, use a DRY lint free cloth to remove any excess moisture and refit the bezel. The bezel is refitted by pushing the bezel back onto the locating pins and sliding backwards until all six pins are engaged in the slots. The locking arms will then spring back and locate into the bezel.

Caution!

Check locking arms.

Always make sure that **BOTH** locking arms are fully located in the bezel – trying to operate the validator if they are not correctly located can cause transport issues or unit damage

Caution!

Do not use any lubricants.

Do not lubricate any of the note transport mechanism, belts or any part of the note path, as this can affect the operation of the validator.

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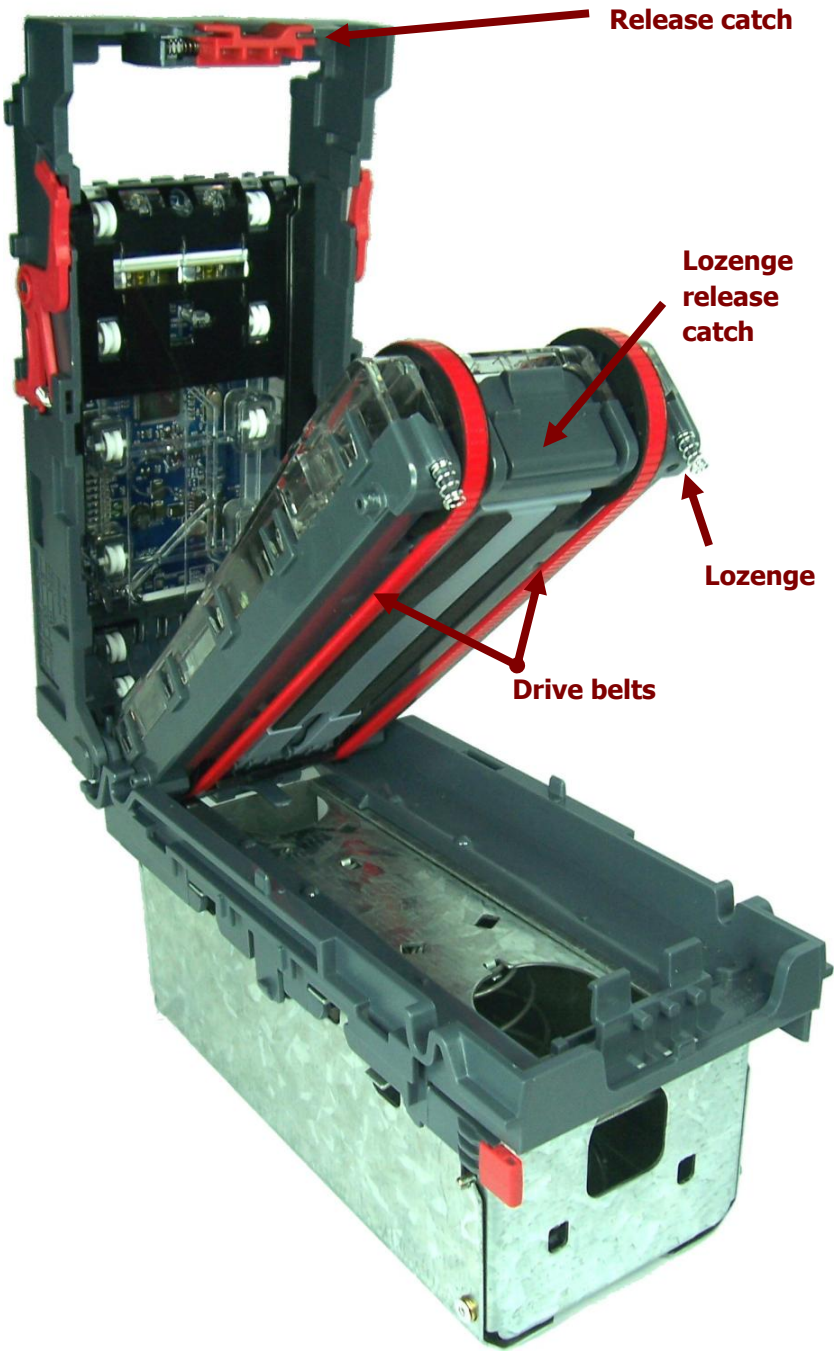
If the belts are worn or damaged, they should be replaced (ITL part number FD00106). This is a simple procedure, and is carried out as follows:

WARNING!

Do not try to disassemble

Do not attempt to disassemble the validator head – trying to do this could result in the validator needing reinitialisation, cause personal injury or could damage the unit beyond repair.

- Open the top of the unit using the Release catch
- Release the lozenge by gently pressing the Lozenge release catch
- Remove and place the lozenge on a clean dry surface
- Press in the large wheels to release the belt tension and then remove the belts, sliding them off the smallest wheels first
- Replace the belts by fitting them over the lozenge, largest wheels first
- Reassemble and close the unit



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2.2 Fault Finding - Flash Codes

The NV9 USB Validator has inbuilt fault detection facilities. If there is a configuration or other error the NV9 USB front bezel will flash in a particular sequence; a summary of the Bezel Flash Codes for the NV9 USB is shown below:

Flashes		Indicated Error	Comments
Long	Short		
0	0	None	
1	2	Note path jam	Remove obstruction and follow the cleaning procedure in subsection 2.1 of this manual
	3	Unit not initialised	Contact ITL technical support
	4	Internal sensor unable to calibrate	Ensure note path is firmly closed, then cycle the power to the unit. If the problem persists contact ITL technical support
3	1	Firmware checksum error	Download new firmware
	2	Interface checksum error or unable to set programmed interface	
	3	EEPROM checksum error	
	4	Dataset checksum error	
4	1	Power supply too low	Check power supply
	2	Power supply too high	

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2.3 Technical Specifications

The full technical specifications for the NV9 USB Validator can be found in Section 6, Appendix B of this manual set. A brief summary is given here:

DC Voltage	Minimum	Nominal	Maximum
Absolute limits	10.8 V	12 V	13.2 V
Absolute limits (when fitted with IF5 interface)	18 V	---	48 V DC or 34 V AC
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
Supply Current			
Standby			200 mA
Running			1 A
Peak (motor stall)			1.5 A

Interface Logic Levels	Logic Low	Logic High
Inputs	+0 V to +0.5 V	+3.7 V to +12 V
Outputs (2.2 kΩ pull-up)	+0.6 V	Pull-up voltage of host interface
Maximum current sink	50 mA per output	

WARNING!

Use suitable power supply

Ensure that the supply voltage to the NV9 USB is not lower than 10.8 V and that the power supply can provide sufficient current to avoid incorrect operation and excessive note rejects.

We recommend that your power supply is capable of supplying 12V DC at 3 A.

- For 12V operation, use TDK Lambda model SWS50-12. This power supply is available from a variety of suppliers including Farnell (stock code 1184645) and RS (stock code 466-5869).

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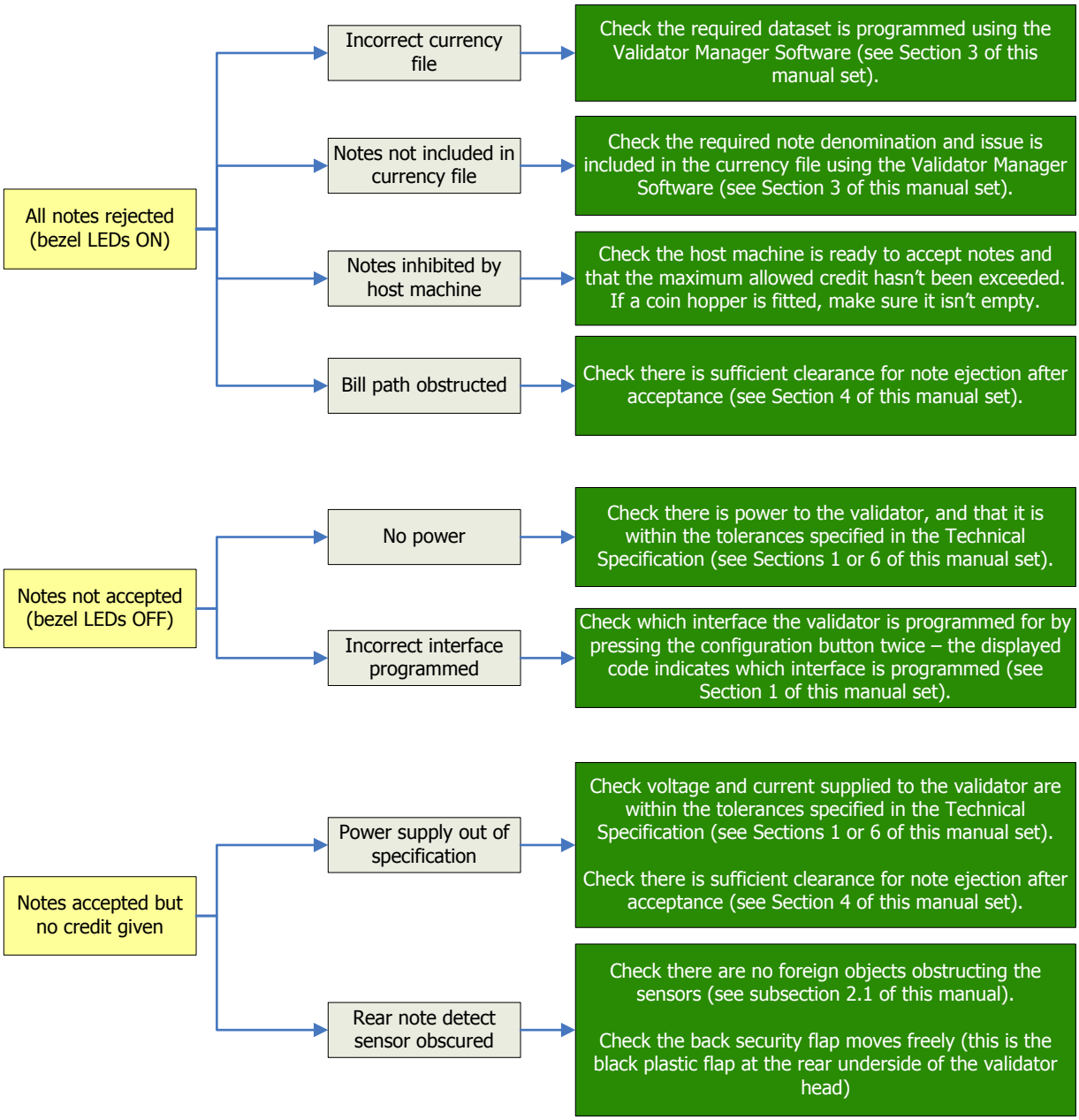
2.4 Fault Finding Flow Chart

Please use this flow chart with the Flash Codes in subsection 2.2 as an aid to help resolve any configuration or start up problems you might have after installing the NV9 USB validator



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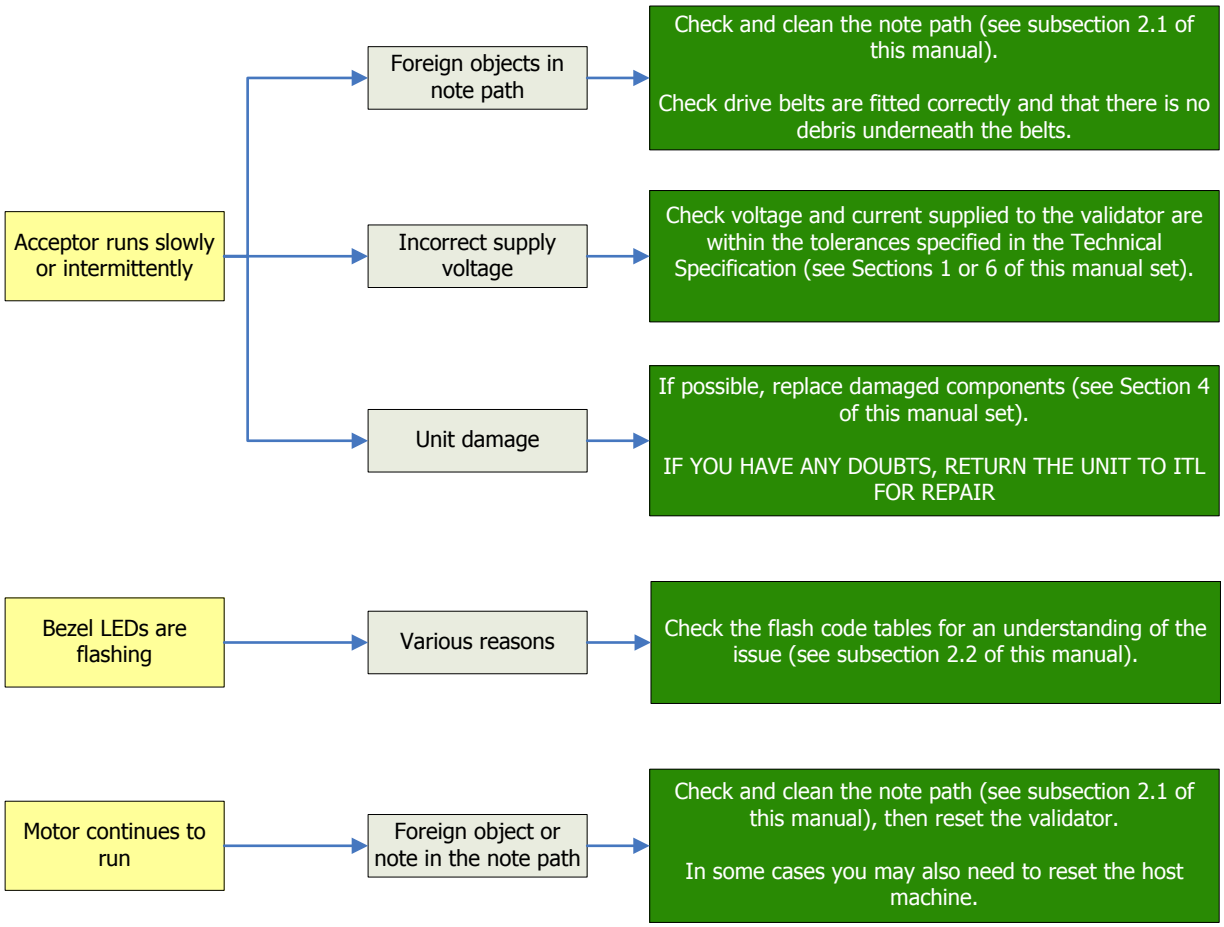

If you are unsure about the cause or how to resolve the problem, please contact ITL's technical support department. Support contact details can be found on the ITL website (www.innovative-technology.co.uk), or on the last page of this section.

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2.5 Frequently Asked Questions

a. Why are there no DIP switches on the unit?

- The NV9 USB has no dipswitches. Configuring the unit is carried out using a configuration button mounted on top of the unit – see Section 1, subsection 1.3 of this manual set for more information.

b. In what orientation can I use the NV9 USB validator?

- The NV9 USB can be mounted horizontally or vertically, depending on the type of bezel and cashbox selected. See Section 1, subsection 1.1 of this manual for more information on mounting the validator – check the ITL website to see the currently available range of cashboxes and bezels.

c. Some or all notes are not accepted

- Check that no inhibits are set in the Validator Manager software (see Section 3 of this manual set). If the problem persists, contact ITL Support for further assistance.

d. How do I clean the validator?

- Follow the instructions given in subsection 2.1 of this manual.

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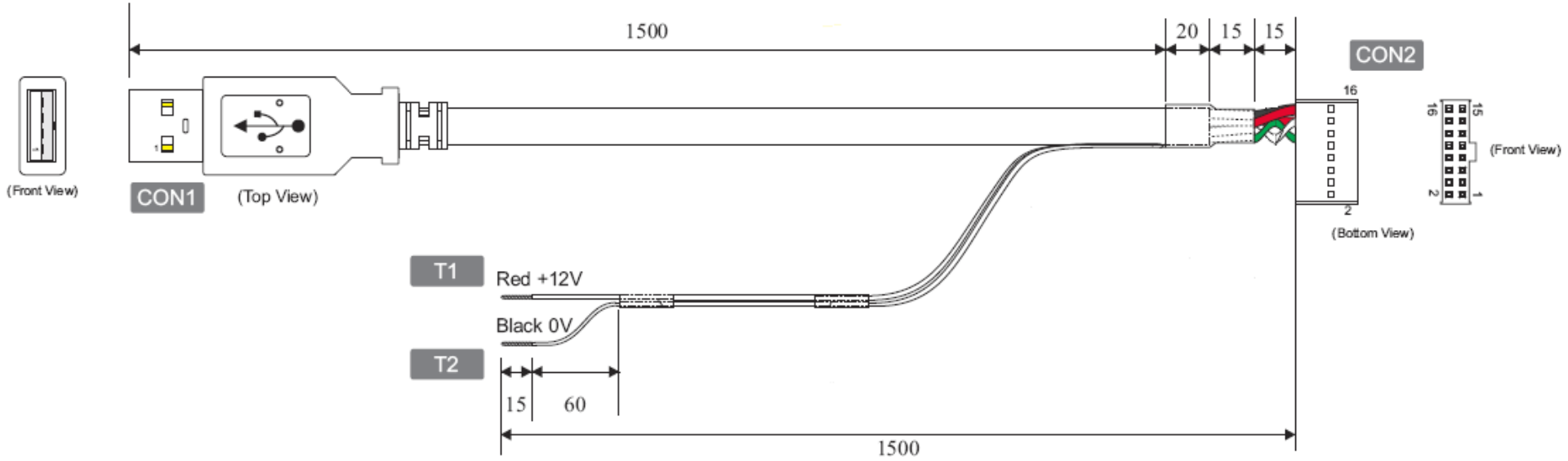
2.6 Spare Parts

Full details of the interface cable connector pinouts, connector types / makes and other related information can be found in Section 4 of this manual set. The user can obtain the following parts for the NV9 USB validator:

ITL Part Number	Description	Details
CN00392	Power and USB Communication Cable	USB 2.0 Compliant Type A to 16 way header cable



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Bezels		
ITL Part Number	**Description**	
PA00188	Vertical Upstack Bezel Assembly	
PA00189	Horizontal Bezel Assembly	
PA00190	Vertical Upstack Extended Snout Bezel Assembly	
PA00191	Vertical Downstack Extended Snout Bezel Assembly	
PA00256	66mm Vertical Upstack Bezel	No image available
PA00268	69mm Fixed Width Horizontal Bezel	No image available
PA00296	Vertical Up/Down Flat 66mm Bezel Assembly	No image available

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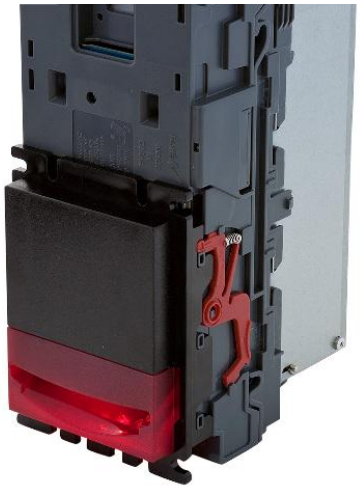
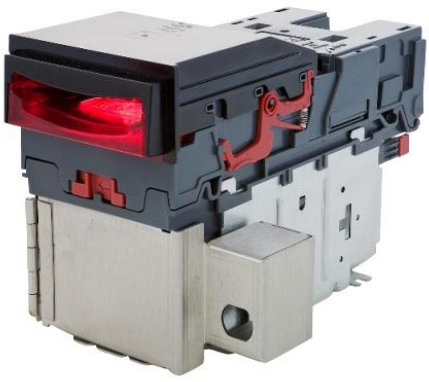
PA00896	Horizontal Bezel Assembly (NV11)	

Cashboxes		
PA00185	Clip-on Cashbox Assembly (300C)	
PA00186	Locking Cashbox Assembly (300L)	

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PA00192	Slide-on Cashbox Assembly (300S)	
PA00193	Clip-on Cashbox Assembly (600C)	
PA00194	Slide-on Cashbox Assembly (600S)	

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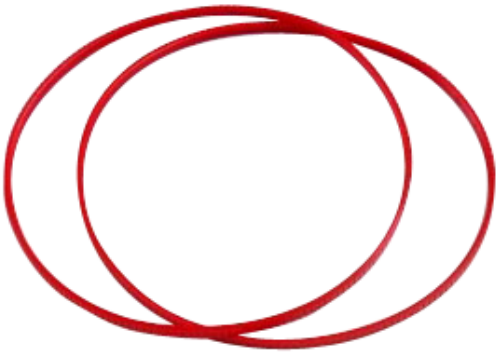
PA00898	Standard Cashbox Assembly (NV11)	

Information

Check website for options.

There are many variants of bezel and cashbox type available for the NV9 USB validator. Please check the ITL website (www.innovative-technology.co.uk) for up to date information on the options available.

Drive Belts		
FD00106	NV9 USB Red Drive Belt	

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MAIN HEADQUARTERS

Innovative Technology Ltd
Derker Street – Oldham – England - OL1 4EQ
Tel: +44 161 626 9999 Fax: +44 161 620 2090
E-mail: support@innovative-technology.co.uk
Web site: www.innovative-technology.co.uk

Innovative Technology
INTELLIGENCE IN VALIDATION

Bellis Technology
INTELLIGENCE IN VALIDATION

BRAZIL
suporte@bellis-technology.com.br

CHINA
support@innovative-technology.co.uk

GERMANY
supportDE@innovative-technology.eu

SPAIN
supportES@innovative-technology.eu

UNITED KINGDOM
support@innovative-technology.co.uk

UNITED STATES OF AMERICA
supportusa@bellis-technology.com

REST OF THE WORLD
support@innovative-technology.co.uk

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