NV11
MANUAL SET

INTELLIGENCE IN VALIDATION

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MANUAL SET

INTRODUCTION

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NV11 MANUAL SET - INTRODUCTION

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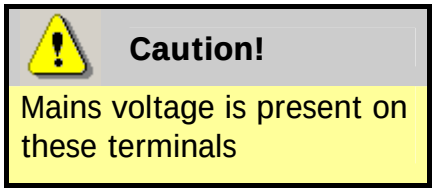
PRODUCT SAFETY INFORMATION

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.

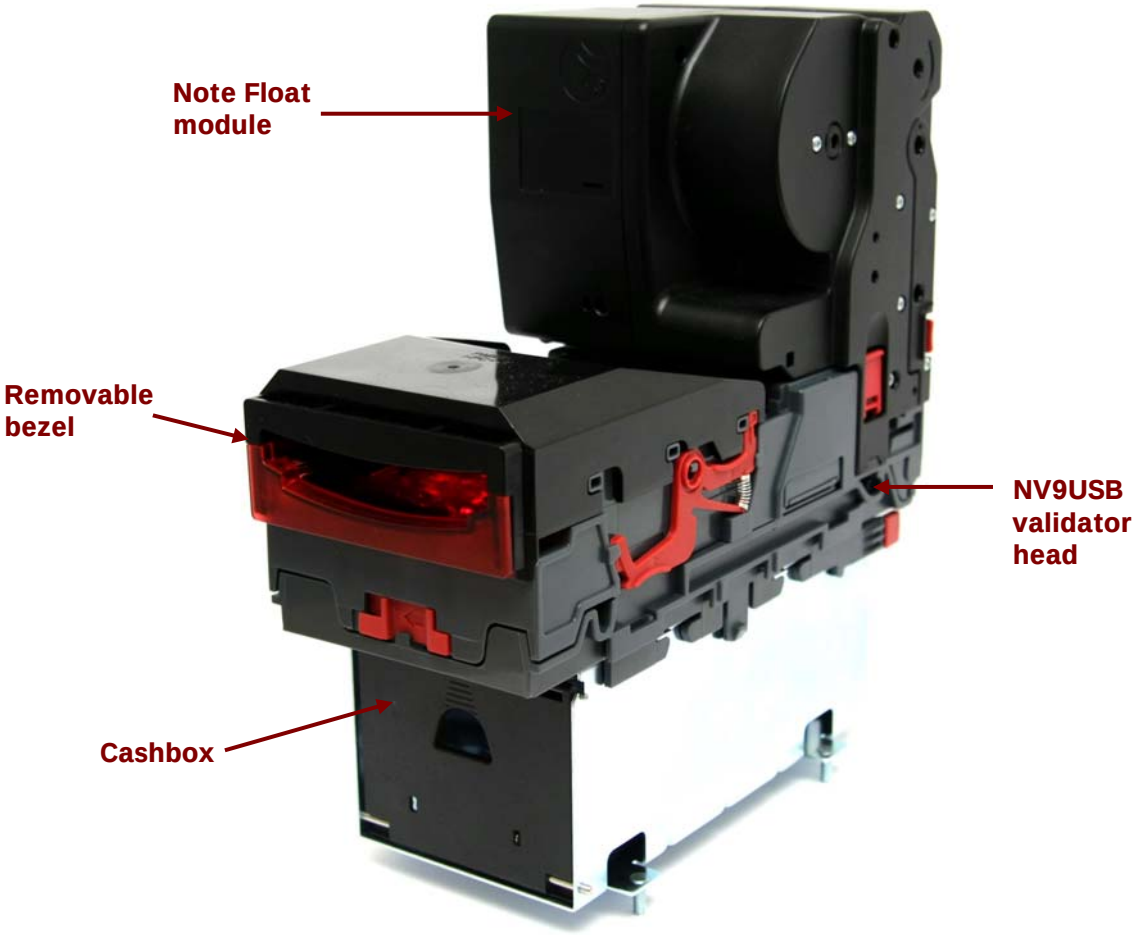
These safety points will be highlighted in a box, like this:



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 NV11 validator is made up of four basic components: an NV9USB validator head, Note Float module, removable bezel and a cashbox (as shown below):



The NV11 is a device that can accept, validate and store 300 or 600 bank notes of mixed denominations, and also has the capability of storing a further 30 notes in the Note Float module for future payout.

NV11 Rear View

NV11 Side View

NV11 Front View

Up to 16 different denominations of bank note can be accepted and stacked, and the Note Float module can be programmed to store and dispense 30 single denomination notes.

The NV11 validator leaves the factory preset to at least one currency and one firmware interface so that it is ready for immediate installation. The NV11 validator works with any NV9USB currency dataset created by Innovative Technology Ltd - datasets can be downloaded from the Support section of the ITL website.

FEATURES

The NV11 validator has many innovative features, including:

- 300 or 600 note storage capacity
- Note Float module has 30 note capacity (single denomination)
- Accepts, validates and stores bank notes in less than 3 seconds
- Uses a secure encrypted protocol for data transfer

TYPICAL APPLICATIONS

The NV11 validator can be used in a variety of situations where high security and high volume bank note acceptance, validation and payout are needed. Some typical applications are:

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

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 NV11 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 NV11 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 NV11 validator, using a range of software tools.

- **Mechanical and Electrical Manual:**
  - Design engineers who are designing a host machine cabinet, or looking to integrate the NV11 validator into an existing cabinet.
  - This section contains the all the mechanical and electrical information a designer needs to effectively integrate the NV11 validator into a host machine.

- **Software Implementation Guide:**
  - Software engineers looking at how to implement the NV11 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 (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.

SECTION 1

NV11 MANUAL SET

QUICK START AND CONFIGURATION GUIDE

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NV11 MANUAL SET – SECTION 1

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 NV11 validator ready for installation into the host machine.

Information

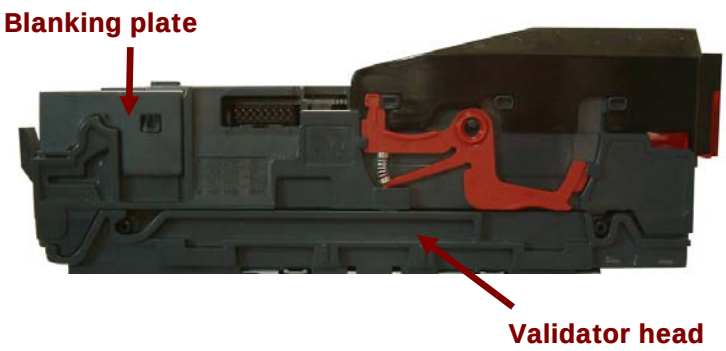
Validator compatibility.

The NV11 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).

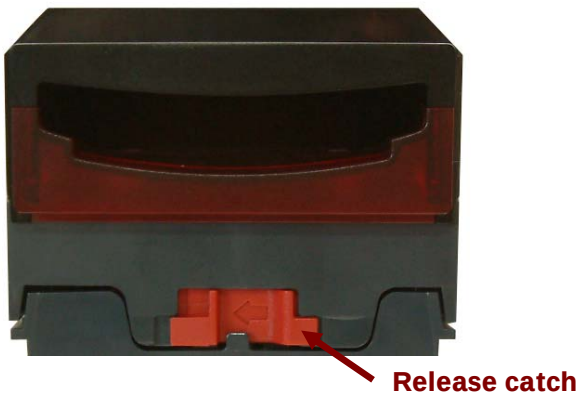
1.1 Assembly

Installing the NV11 is a simple operation, but note that the validator can only be installed **horizontally**:

1. If the validator head has a blanking plate fitted, you will need to remove this BEFORE attempting to fit the Note Float module. If the Note Float module is already fitted, please go to step 6



2. Open the validator head by sliding the red release catch on the front of the validator to the left (as indicated in the picture)

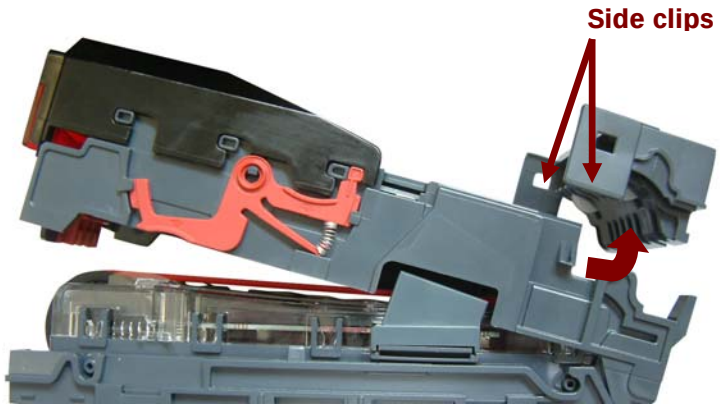


Caution!

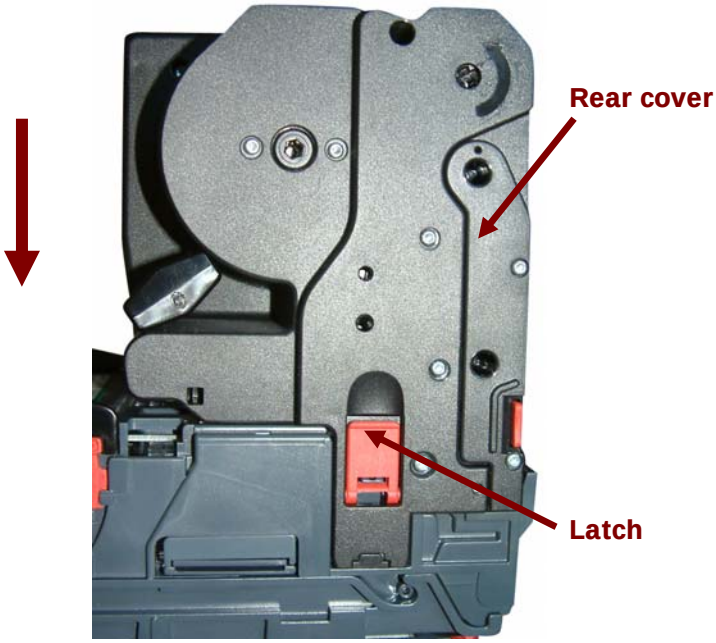
Validator head **MUST** be opened.

Always make sure the validator head has been opened **BEFORE** trying to remove the blanking plate – trying to remove the blanking plate with the validator head closed will cause unit damage.

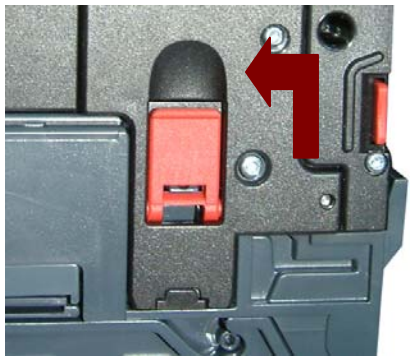
3. Remove the blanking plate by disengaging the two side clips and lifting the blanking plate upwards



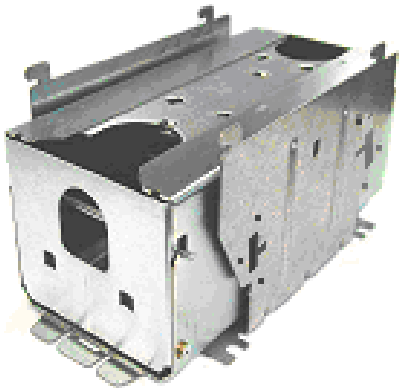
4. Close the validator head and then carefully fit the Note Float module onto the validator head, making sure the rear cover is securely closed and that both latches are lined up correctly



5. Make sure both latches are engaged and closed

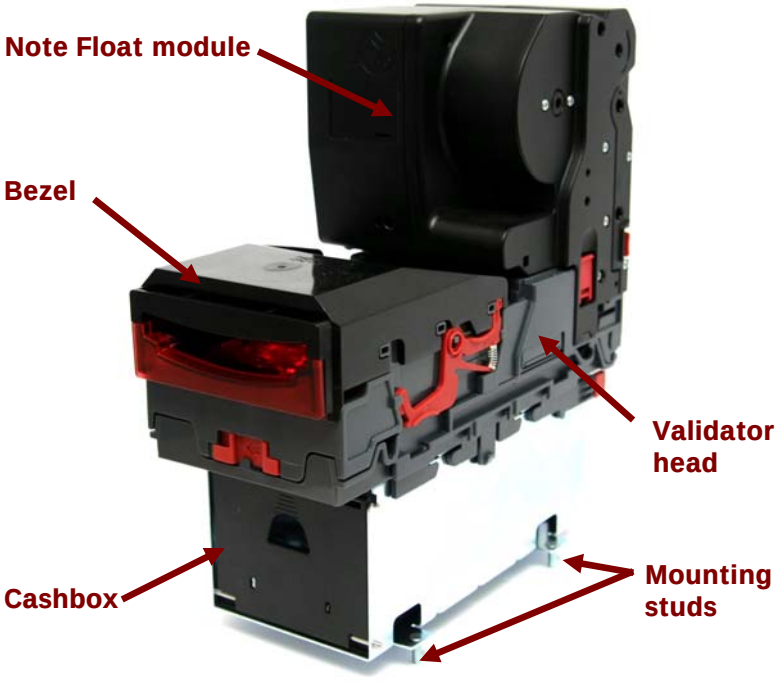


6. The validator can be fitted with a standard or slide-on cashbox of 300 or 600 note capacity



7. If not already attached, the validator can be fitted with a horizontal bezel of your choice.

8. The cashbox is attached to the validator by locating and sliding until the cashbox is clipped securely and secured in the host machine using the studs on the bottom of the cashbox



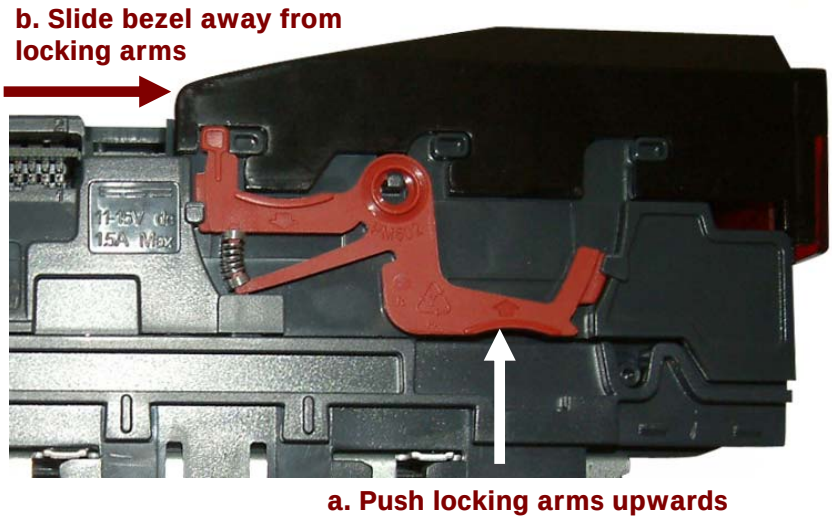
Information

Check website for options.

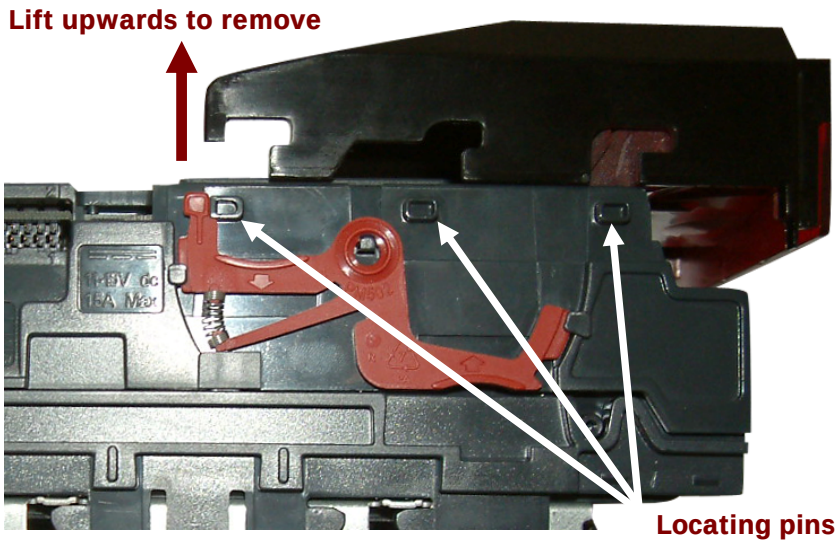
There are many variants of bezel and cashbox type available for the NV11 validator. Please check the ITL website (www.innovative-technology.co.uk) for up to date information on the options available.

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



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.

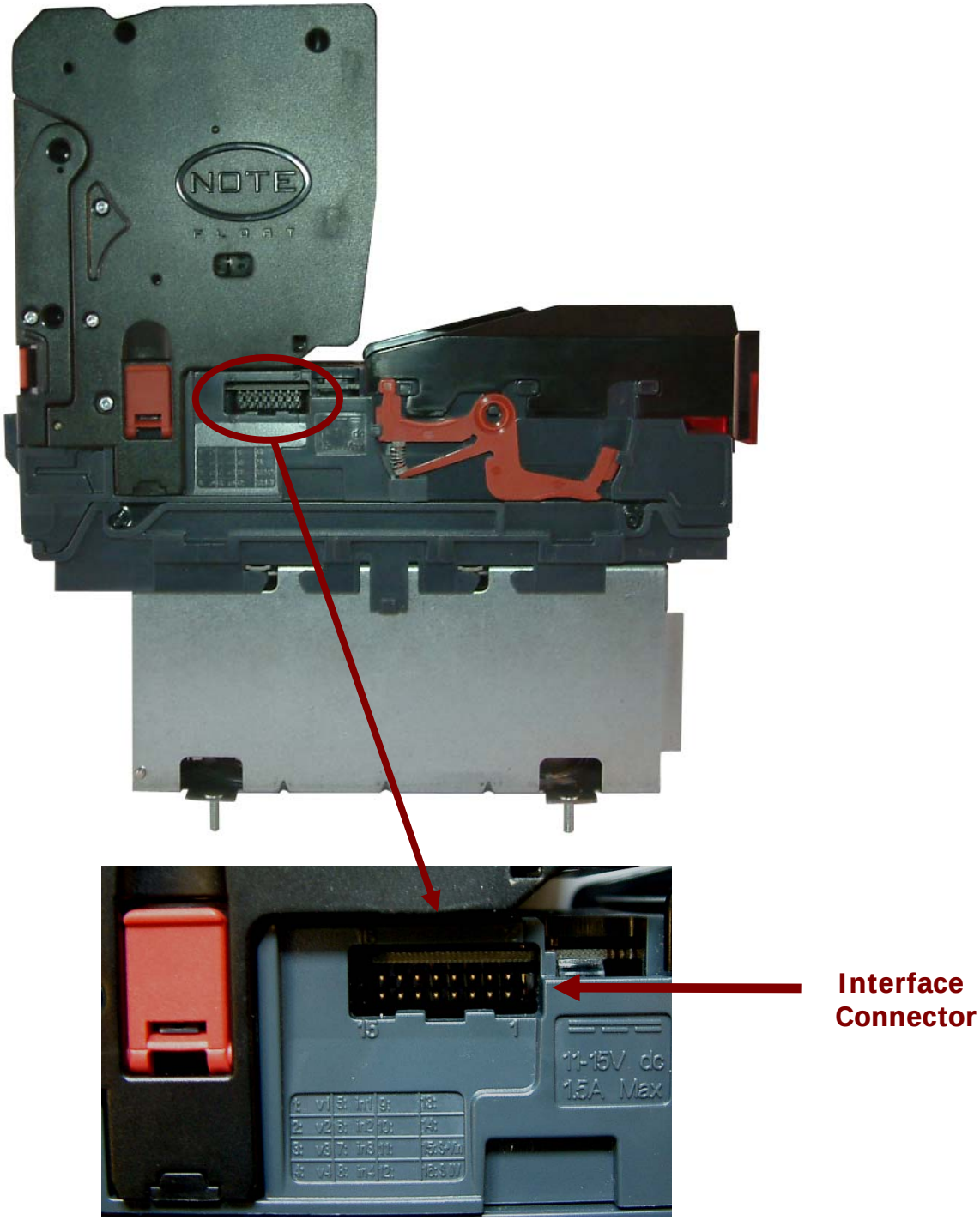
Caution!

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 with the NV11 validator is easily accessible on the side of the unit:



1.4 Connector and Pinouts

The NV11 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 NV11 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

To use a USB connection with the NV11, a USB cable fitted with a 16 way connector on one end (ITL Part Number CN392) should be used. The CN392 cable fits into the 16 way connector and allows high speed programming and serial communications when used in SSP and ccTalk modes.

When using the USB connection, power must be supplied to the NV11 using the CN392 cable.

1.5 Configuration

The NV11 does not use DIP switches to configure the unit – configuration and setting is carried out by using a Configuration Button mounted on the front of the Note Float module:

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

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 twice (within half a second)	Powered ON	Shows current interface type (see flash count table below)
Press once when Note Float module status LED is flashing (transport error)	Powered ON	Acknowledges that a note blockage has been cleared

Flash Count	Interface
1	SSP
6	ccTalk
6 , 1	ccTalk plain (16 bit)
6 , 1 , 2	ccTalk (8 bit)

The NV11 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 front of the Note Float unit.

1.6 Status Indicators

The NV11 validator has two separate coloured Light Emitting Diode (LED) indicators that are used to show the status of the unit – these are located next to the configuration button on the front of the Note Float module, and behind the front bezel of the NV9USB validator head.

If there is a fault or other issue with the unit, the LEDs will flash as described in subsection 1.9.

1.7 Programming

Full details on programming the NV11 validator can be found in Section 3 of this manual set (ITL Software Support Guide).

1.8 Technical Specifications

The full technical specifications for the NV11 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
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
Supply Current			
Standby			350 mA
Running			3 A
Peak (motor stall)			3.5 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 NV11 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 4 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).

1.9 NV11 Flash Codes

The NV11 validator has inbuilt fault detection facilities. If there is a configuration or other error either the Note Float module status LED, or the NV9USB validator head front bezel will flash in a particular sequence; a summary of the Flash Codes for both units is shown below:

NV9USB Bezel Flash Codes:

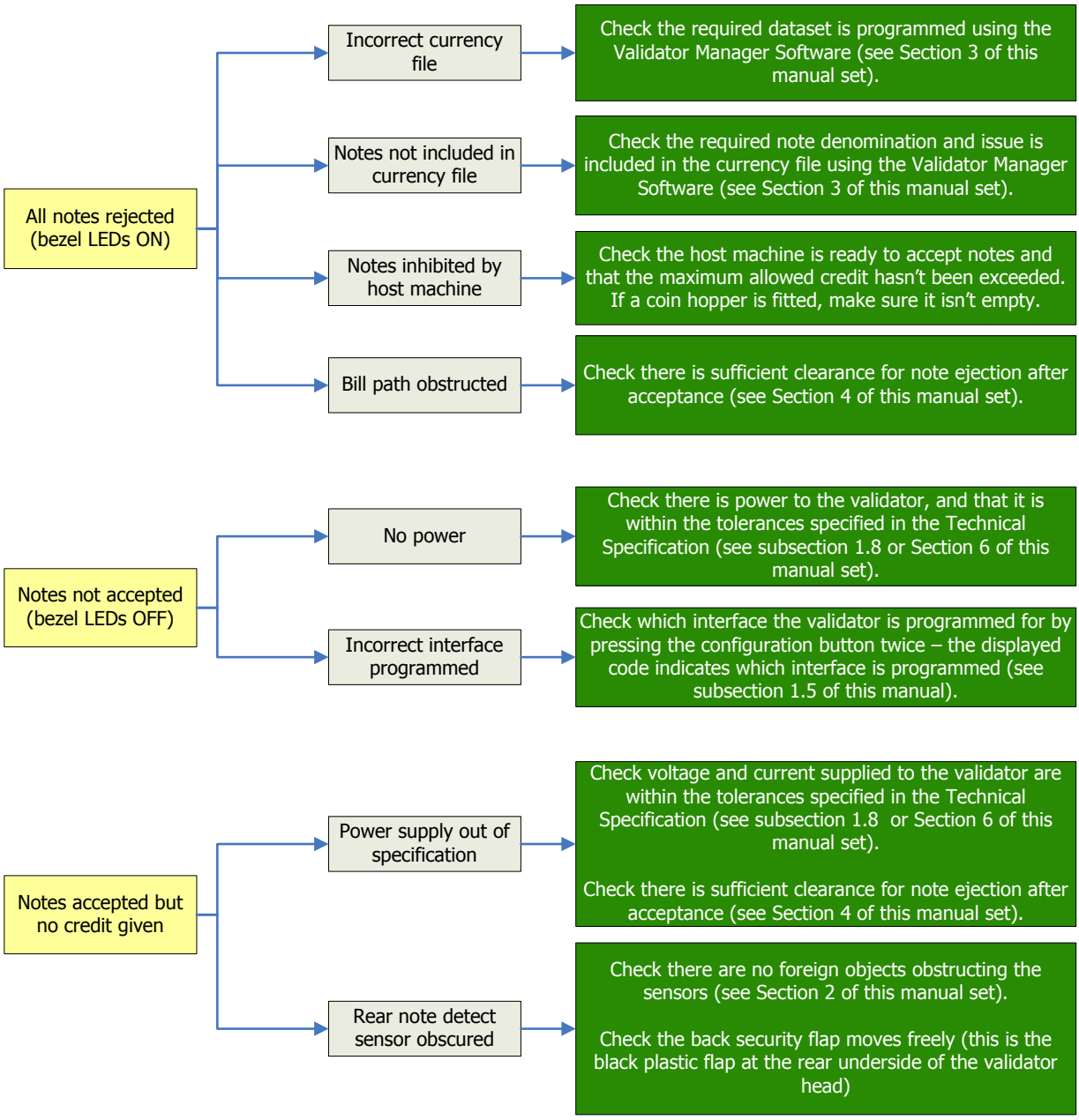
Flashes		Indicated Error	Comments
Long	Short		
0	0	None	
1	2	Note path obstructed	Remove obstruction and follow the cleaning procedure in Section 2 of this manual set
	3	Unit not initialised	Contact ITL technical support
2	2	Cash box problem	Check that the cash box note plate is free to move and the stacker mechanism is in the home position
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	
	5	Incompatible firmware	Check the validator firmware is compatible with the Note Float module
4	1	Power supply too low	Check power supply
	2	Power supply too high	

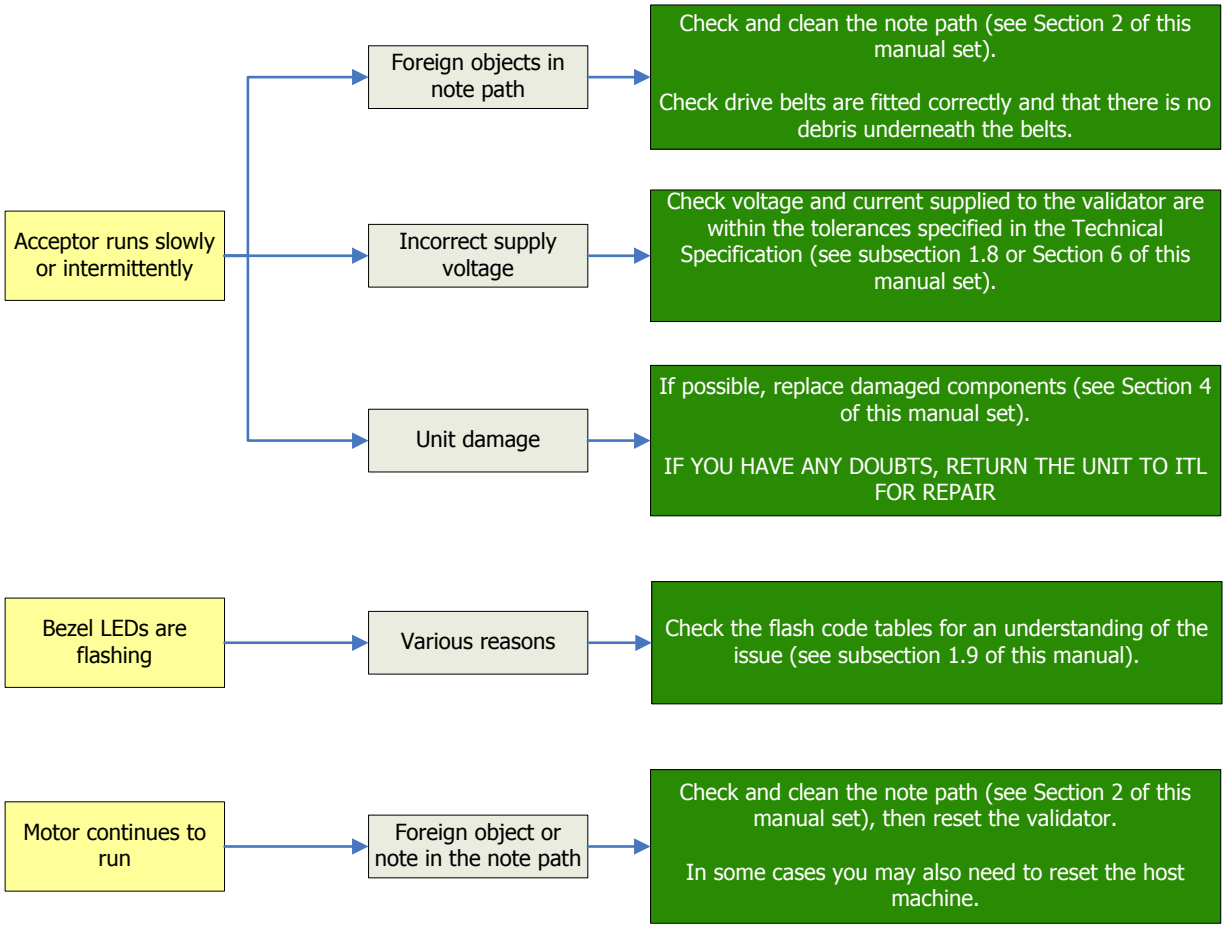
Note Float Module Flash Codes:

Flashes	Indicated Error	Comments
0	None	
Constant flash (1 every second)	Note transport error	Remove trapped note from the Note Float module and press the configuration button once
2	Software error	Download new dataset / firmware
3	Calibration error	Return to service centre for repair
4	Diverter error	Check for trapped notes stopping the diverter returning to the home position
5	Motor timeout	Check for trapped notes stopping the Note Float module tape from moving

1.10 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 NV11 validator





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.

1.11 Frequently Asked Questions

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

- The NV11 has no dipswitches. Configuring the unit is carried out by using the configuration button mounted on the front of the Note Float module – see subsection 1.5 of this manual for more information.

b. In what orientation can I use the NV11 validator?

- The NV11 can only be mounted horizontally - 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 the front of the Note Float module – 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 the front of the Note Float module – see subsection 1.5 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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SECTION 2

NV11 MANUAL SET

FIELD SERVICE MANUAL

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NV11 MANUAL SET – SECTION 2

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 NV11 validator that is installed in a host machine.

The NV11 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

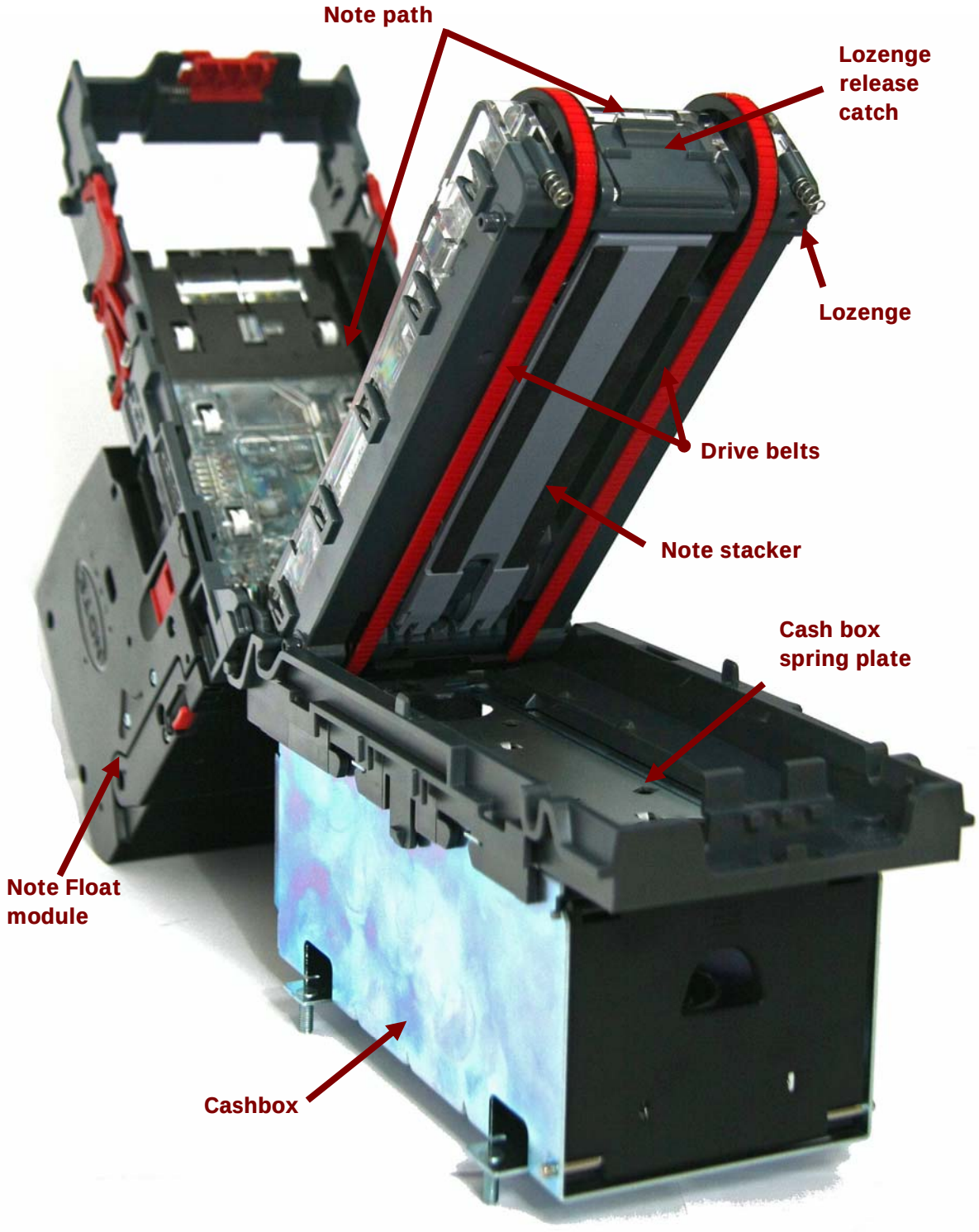
The NV11 validator has been designed in a way to prevent damage and airborne contamination reaching the optical sensors; however, depending upon the environment the NV11 may require occasional cleaning or belt changing.

Caution!

Do not use solvent based cleaners on any part of the NV11 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 NV11, 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



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.

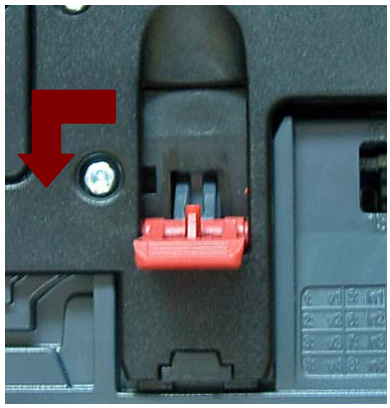
Ideally, you should also remove the Note Float module prior to cleaning the sensors. Removal is a very straightforward task:

WARNING!

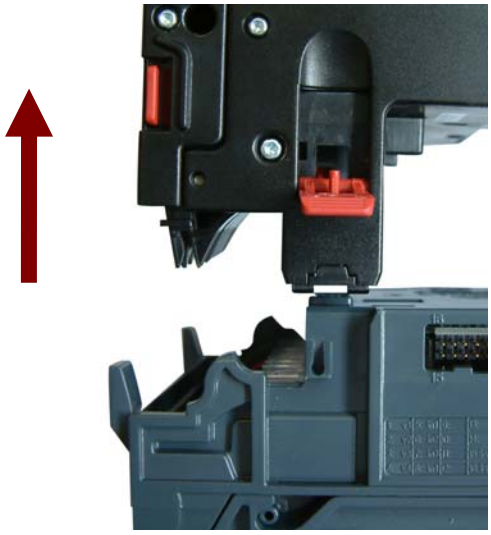
Do not try to disassemble

Do not attempt to disassemble the Note Float module – there are no user serviceable parts inside and trying to disassemble the module could cause personal injury and will also damage the unit beyond repair.

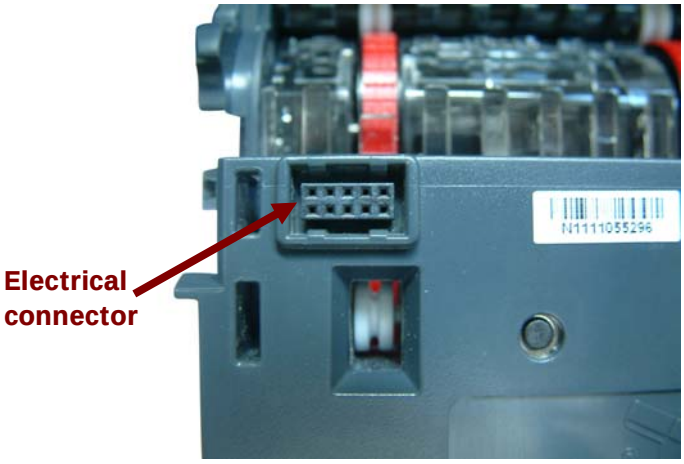
1. Open both the Note Float side latches as shown

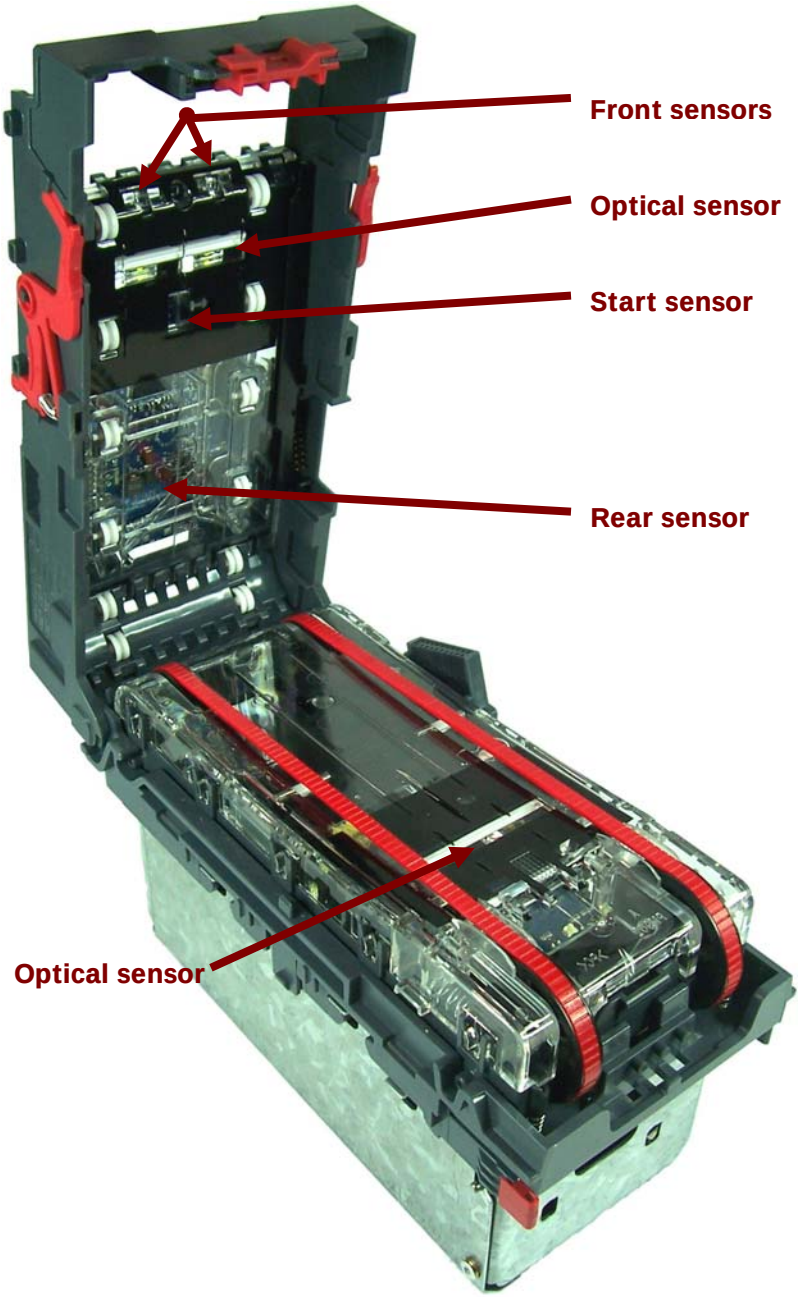


2. Carefully lift the Note Float module upwards and clear of the validator head



3. To refit the Note Float module, reverse the procedure – make sure that the electrical connectors and latches are lined up correctly





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.

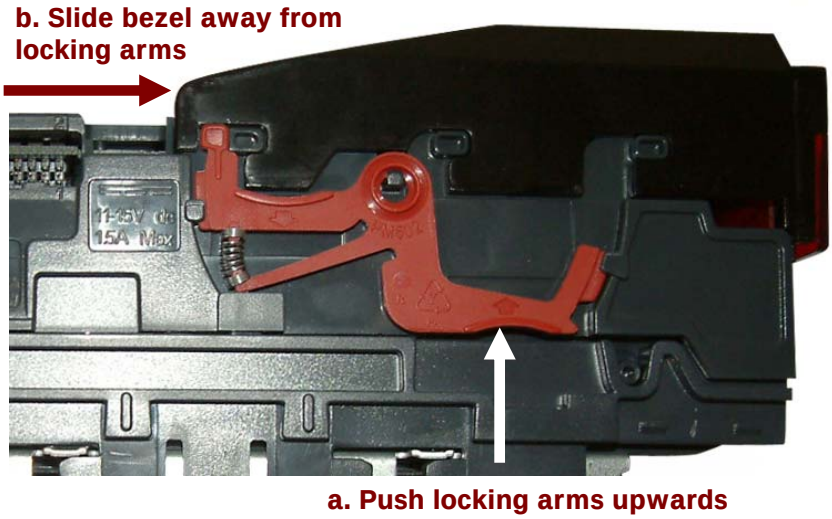
Caution!

Be careful cleaning sensors.

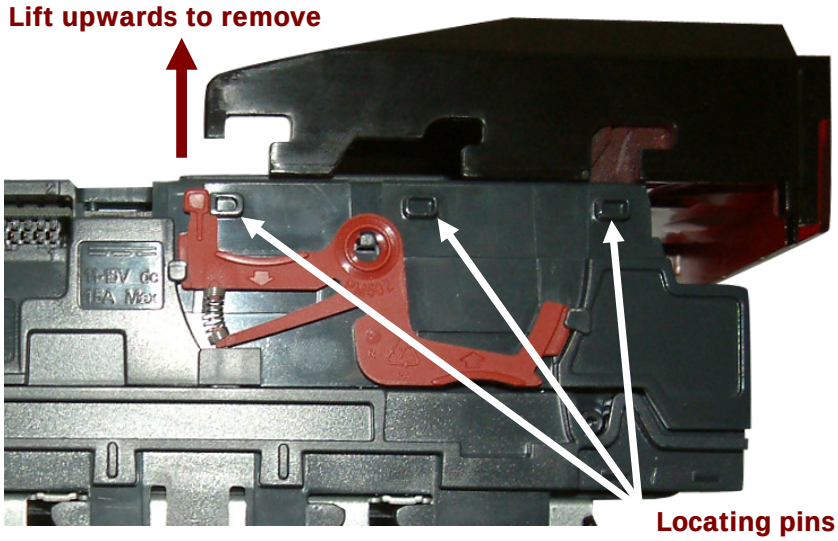
When cleaning the recessed front sensor, use a small soft brush or cotton bud – do not use anything sharp or abrasive.

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

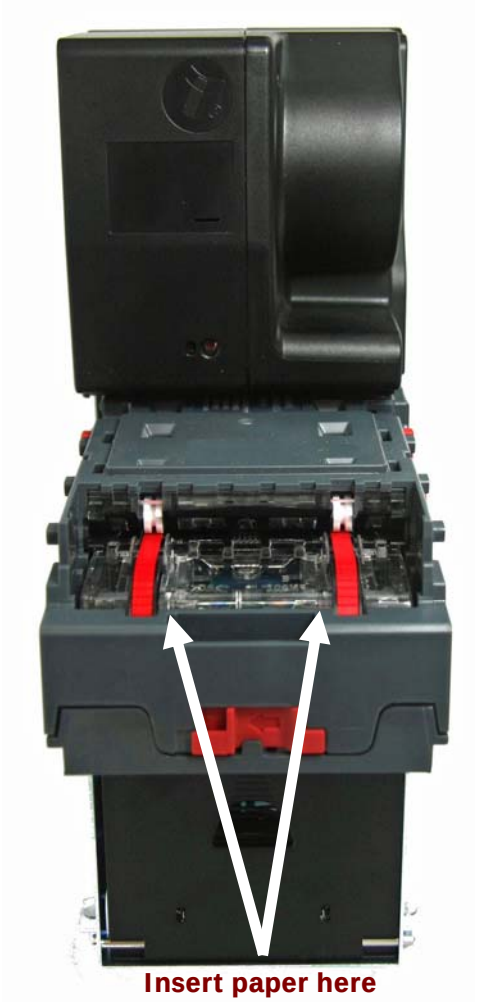


- Lift the bezel off once the bezel has been slid fully across and is clear of the locating pins



- 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 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.

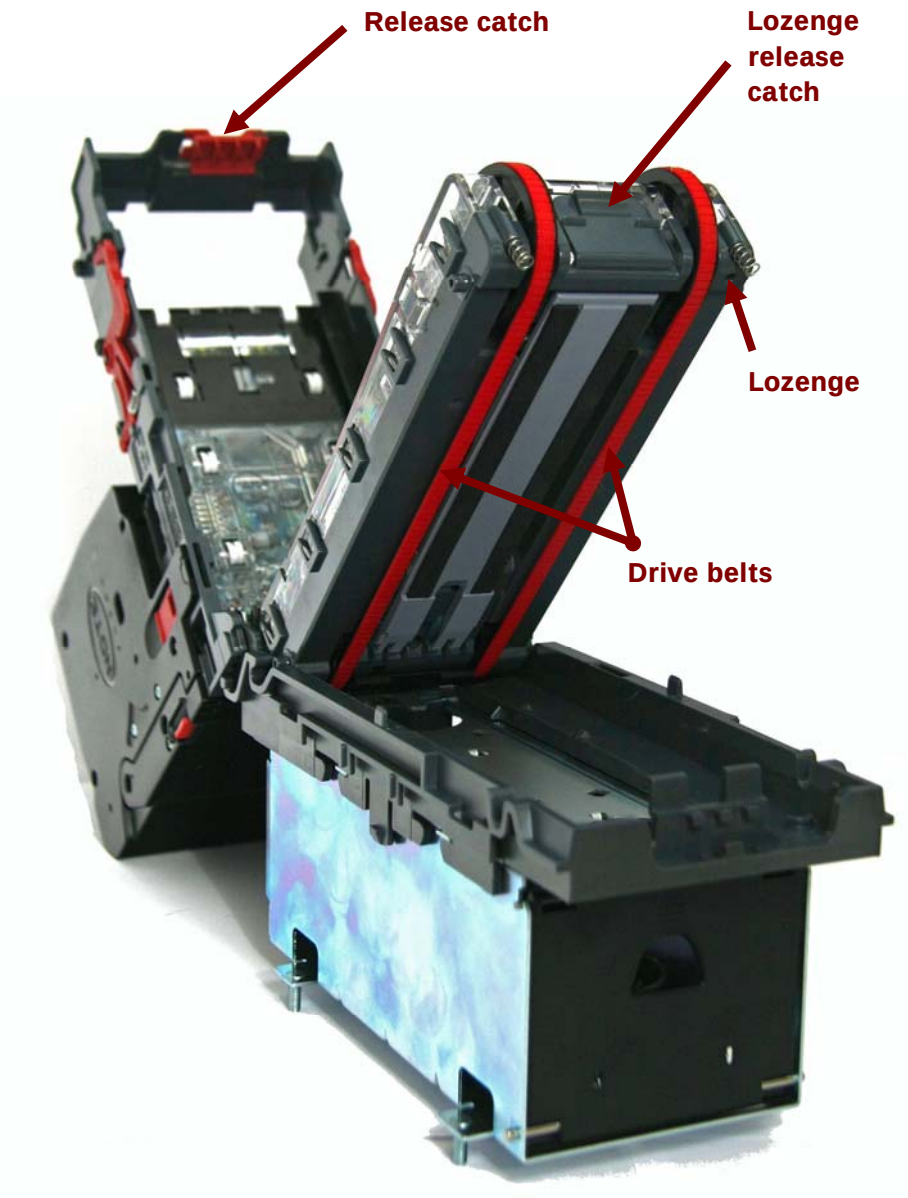
If the belts are worn or damaged, they should be replaced. This is a simple procedure, and is carried out as follows:

WARNING!

Do not try to disassemble

Do not attempt to disassemble the validator head or Note Float module – trying to do this could cause personal injury and will 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



2.2 Fault Finding - Flash Codes

The NV11 validator has inbuilt fault detection facilities. If there is a configuration or other error either the Note Float module status LED, or the NV9USB validator head front bezel will flash in a particular sequence; a summary of the Flash Codes for both units is shown below:

NV9USB Bezel Flash Codes:

Flashes		Indicated Error	Comments
Long	Short		
0	0	None	
1	2	Note path obstructed	Remove obstruction and follow the cleaning procedure in Section 2 of this manual set
	3	Unit not initialised	Contact ITL technical support
2	2	Cash box problem	Check that the cash box note plate is free to move and the stacker mechanism is in the home position
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	
	5	Incompatible firmware	Check the validator firmware is compatible with the Note Float module
4	1	Power supply too low	Check power supply
	2	Power supply too high	

Note Float Module Flash Codes:

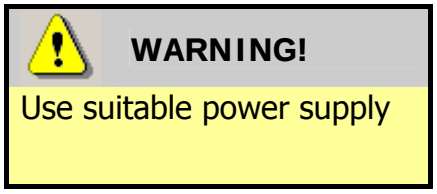
Flashes	Indicated Error	Comments
0	None	
Constant flash (1 every second)	Note transport error	Remove trapped note from the Note Float module and press the configuration button once
2	Software error	Download new dataset / firmware
3	Calibration error	Return to service centre for repair
4	Diverter error	Check for trapped notes stopping the diverter returning to the home position
5	Motor timeout	Check for trapped notes stopping the Note Float module tape from moving

2.3 Technical Specifications

The full technical specifications for the NV11 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
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
Supply Current			
Standby			350 mA
Running			3 A
Peak (motor stall)			3.5 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	



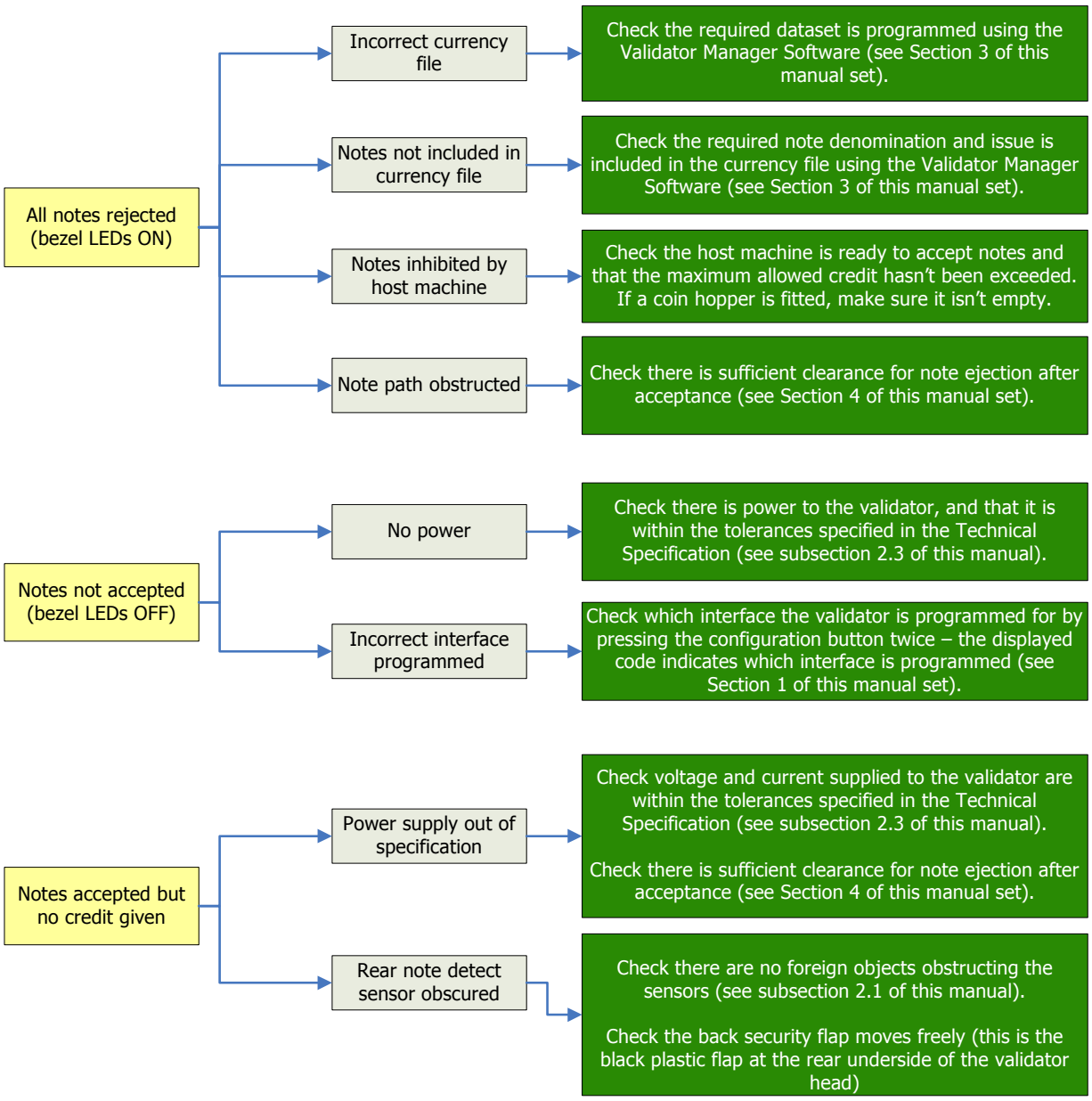
Ensure that the supply voltage to the NV11 is not lower than 10.8 V and that the power supply can provide sufficient current to avoid incorrect operation and excessive note rejects.

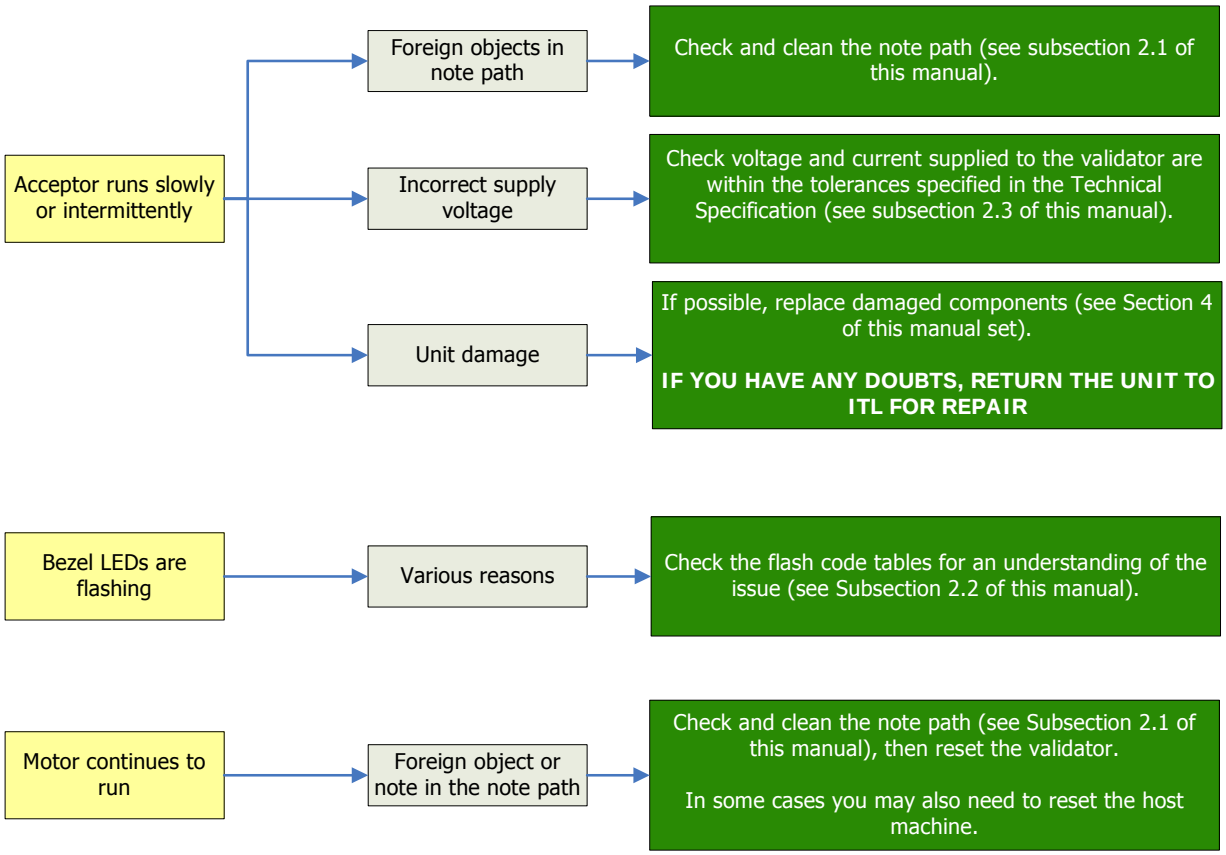
We recommend that your power supply is capable of supplying 12V DC at 4 A.

- 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).

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 NV11 validator





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.

2.5 Frequently Asked Questions

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

- The NV11 has no dipswitches. Configuring the unit is carried out using a configuration button mounted on the front of the Note Float module – see Section 1, subsection 1.5 of this manual set for more information.

b. In what orientation can I use the NV11 validator?

- The NV11 can only be mounted horizontally - see Section 1, subsection 1.1 of this manual for more information on mounting the validator. Please 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?

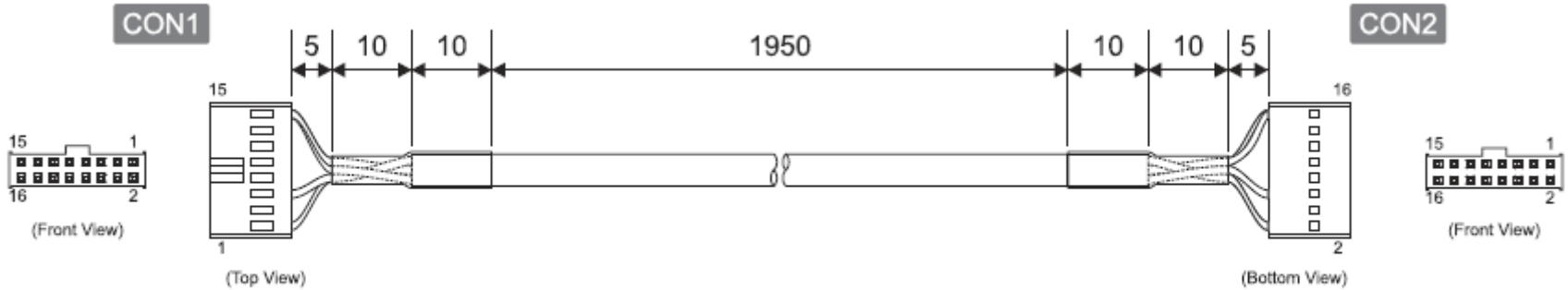
- Follow the instructions given in subsection 2.1 of this manual.

2.6 Spare Parts

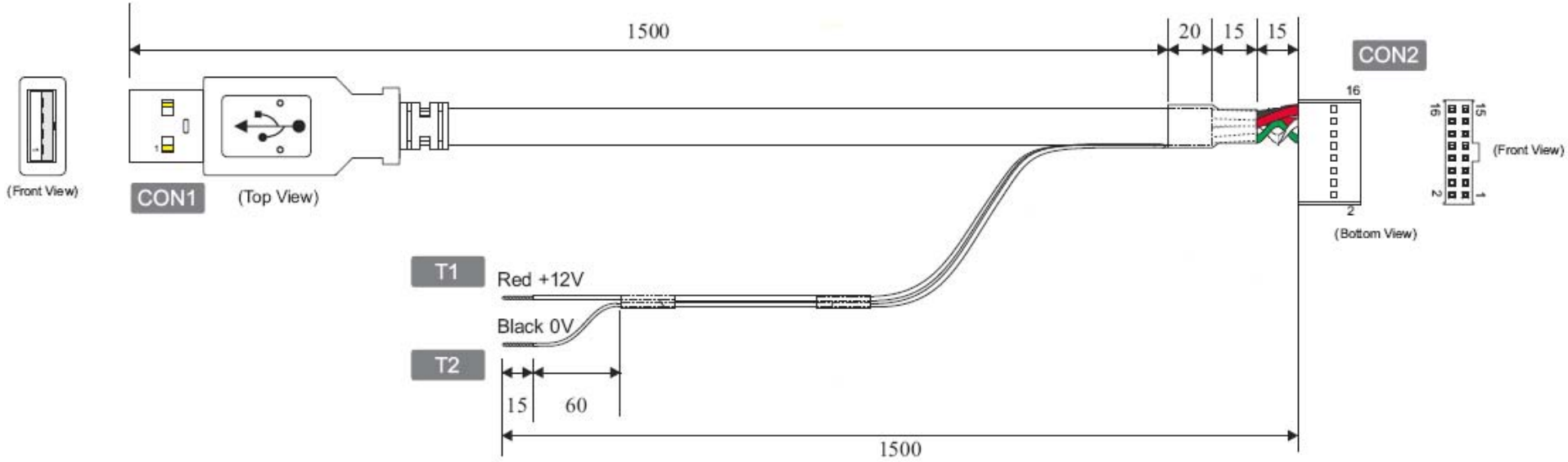
Full details of the interface cable connector pinouts, connector types / makes and other related information can be found in Section 4 of this manual set. The user can obtain the following parts for the NV11 validator:

ITL Part Number	Description	Details
CN215	Ribbon interface cable	Provides connection between DA2 and NV11

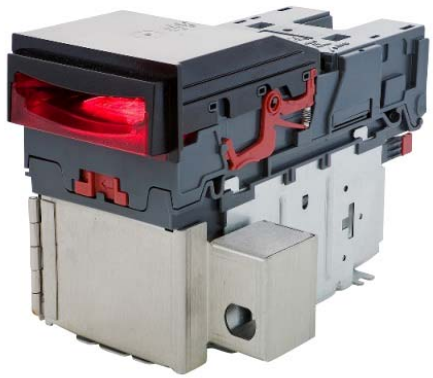
ITL Part Number	Description	Details
CN292	Interface cable	Provides connection between DA2 and NV11



ITL Part Number	Description	Details
CN392	Power and USB Communication Cable	USB 2.0 Compliant Type A to 16 way header cable



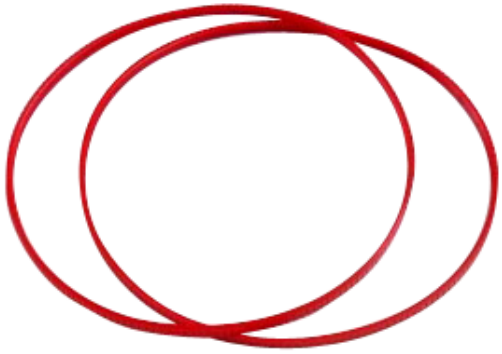
Bezels		
ITL Part Number	**Description**	
PA189	Horizontal Bezel Assembly	
PA268	69mm Fixed Width Horizontal Bezel	No image available
PA896	Horizontal Bezel Assembly	

Cashboxes		
PA186	Locking Cashbox Assembly (300L)	
PA192	Slide-on Cashbox Assembly (300S)	
PA898	Standard Cashbox Assembly	

Information

Check website for options.

There are many variants of bezel and cashbox type available for the NV11 validator. Please check the ITL website (www.innovative-technology.co.uk) for up to date information on the options available.

Drive Belts		
FD106	NV9USB Red Drive Belt	

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SECTION 3

NV11 MANUAL SET

ITL SOFTWARE SUPPORT GUIDE

INTELLIGENCE IN VALIDATION

Innovative Technology
INTELLIGENCE IN VALIDATION

Automated Transactions
INTELLIGENCE IN VALIDATION

Bellis Technology
INTELLIGENCE IN VALIDATION

NV11 MANUAL SET – SECTION 3

3. ITL SOFTWARE SUPPORT GUIDE

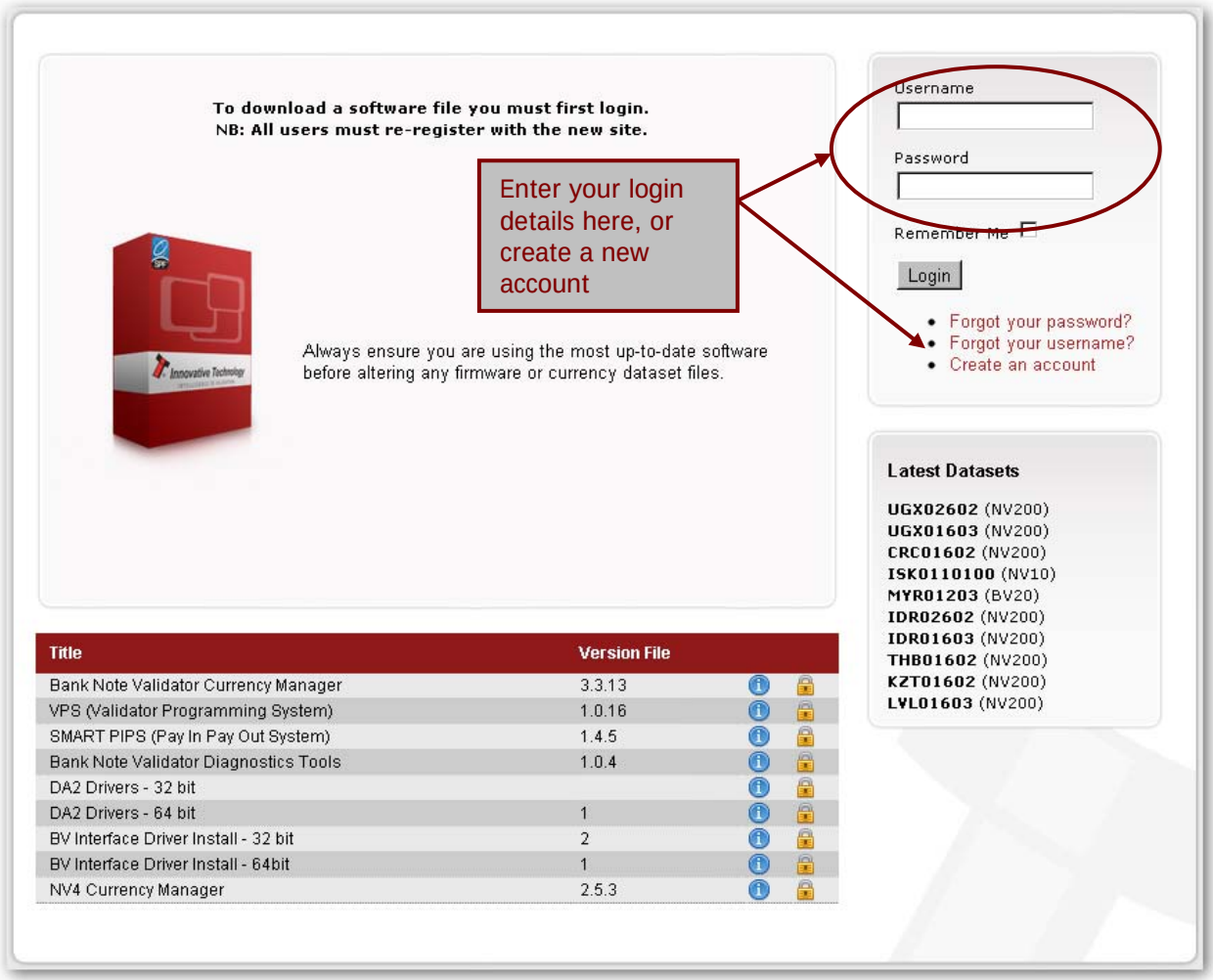
3.1 PiPS Software

PiPS (Pay in Pay out System) is a software package developed by Innovative Technology Ltd to allow customers to carry out programming, setup and operational tasks on the full range of NV11 devices.

3.1.1 Preparing for Installation

If you do not have the PiPS software on CD, you can easily download it from the Innovative Technology website. Visit www.innovative-technology.co.uk, and select 'Software Download' from the 'Support' tab:

Clicking this link will take you to the software download page. To download any files you must log in as a registered user – if you have not already registered this is a very quick process; just click the 'create an account' link and follow the on-screen instructions.



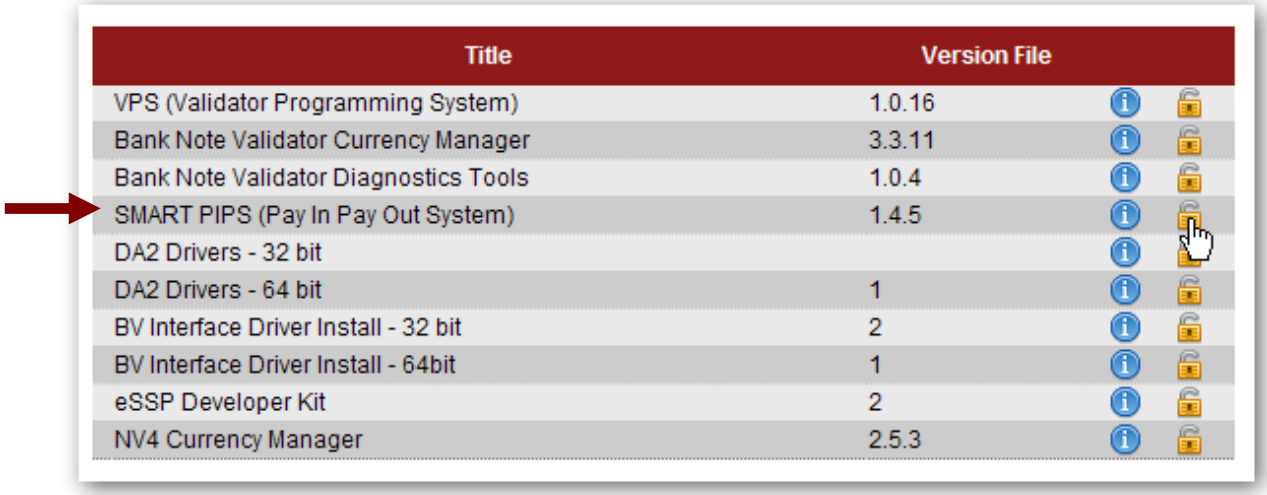
After logging in, the download screen will change slightly:

Your user name will be displayed in the top right hand corner of the screen

The padlock icon for each file will change from locked to unlocked. To download a file, just click on the padlock icon opposite the file name.

If you want to find more information about the file before you download it, you can click on the blue information icon.

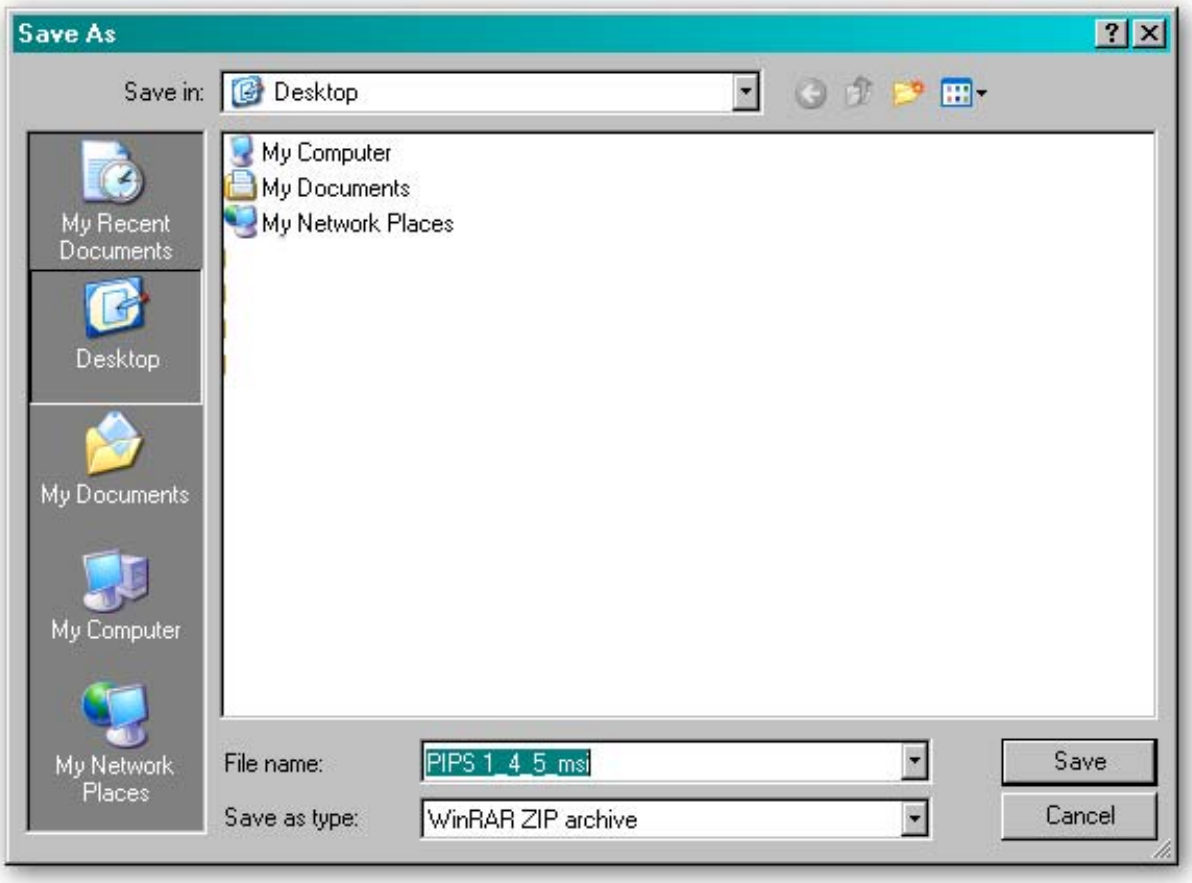
In this case, we want to download the PiPS software, so we click on the padlock icon opposite the 'SMART PIPS (Pay In Pay Out System)' filename:



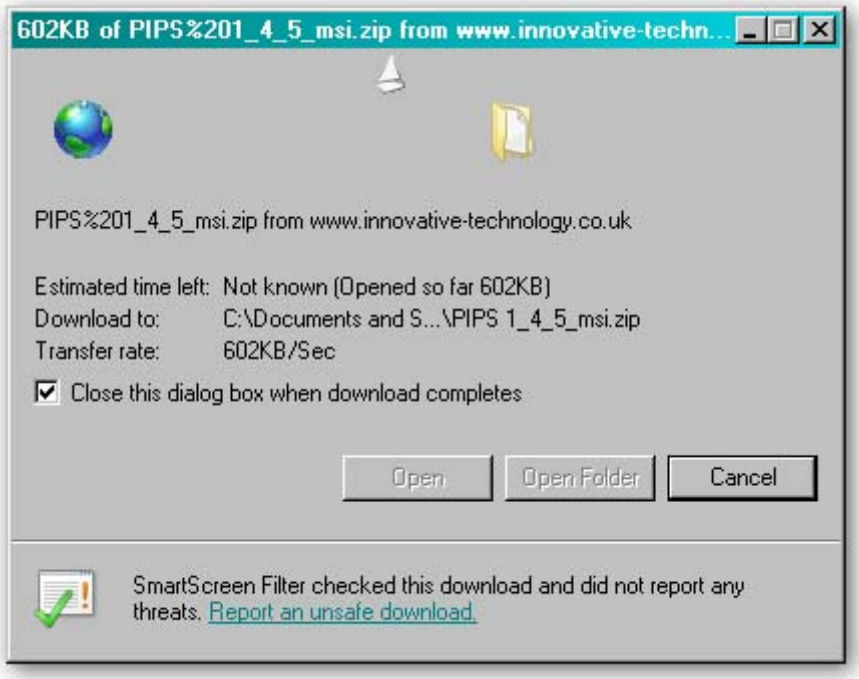
Title	Version File
VPS (Validator Programming System)	1.0.16
Bank Note Validator Currency Manager	3.3.11
Bank Note Validator Diagnostics Tools	1.0.4
SMART PIPS (Pay In Pay Out System)	1.4.5
DA2 Drivers - 32 bit	
DA2 Drivers - 64 bit	1
BV Interface Driver Install - 32 bit	2
BV Interface Driver Install - 64bit	1
eSSP Developer Kit	2
NV4 Currency Manager	2.5.3

After clicking the link, a file download dialog box will appear – choose the option to **save** the file:

You can save the file anywhere that is convenient, as long as you can remember where it is when you want to install the software.



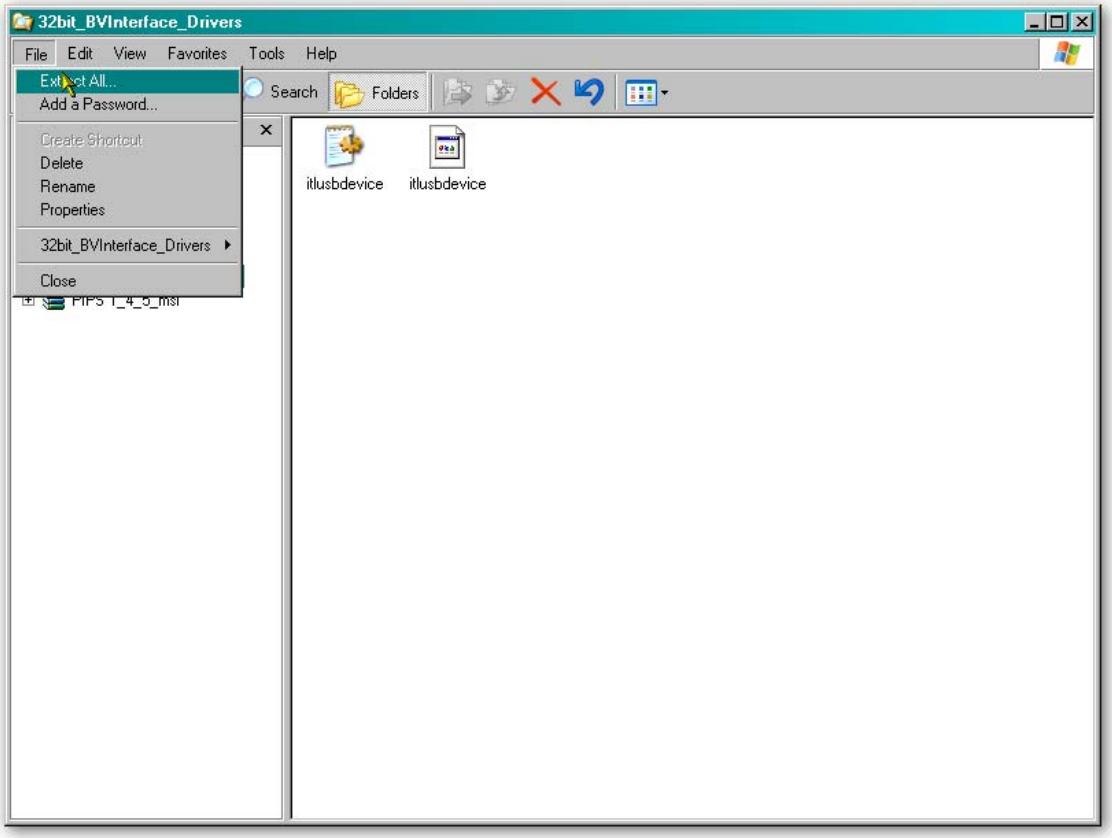
After choosing where to save the file, a file transfer dialog box will appear showing the progress of the file download:



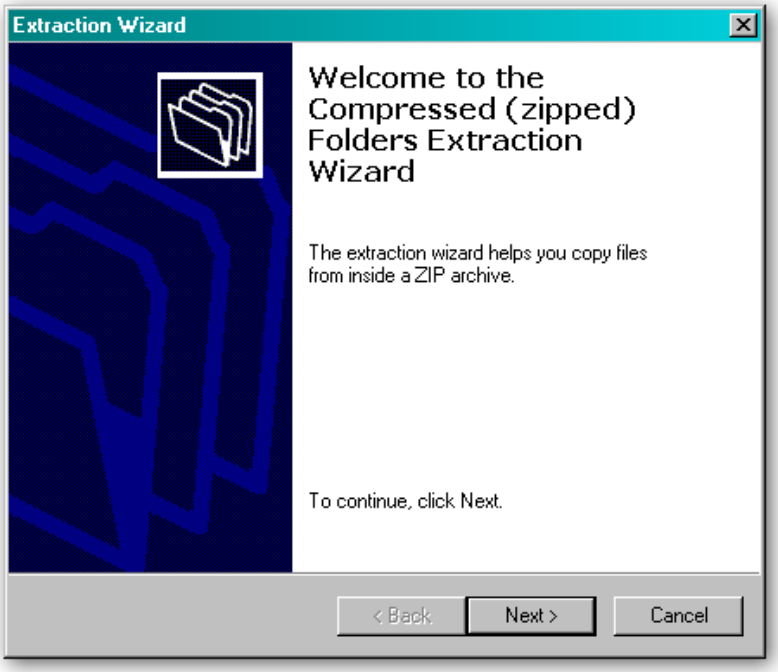
3.1.2 BV Interface Drivers

After downloading the Validator Manager software, you will also need to download the Banknote Validator (BV) Interface drivers – two versions are available (32 bit and 64 bit) so choose the correct type for your operating system. Again, remember where you saved the file.

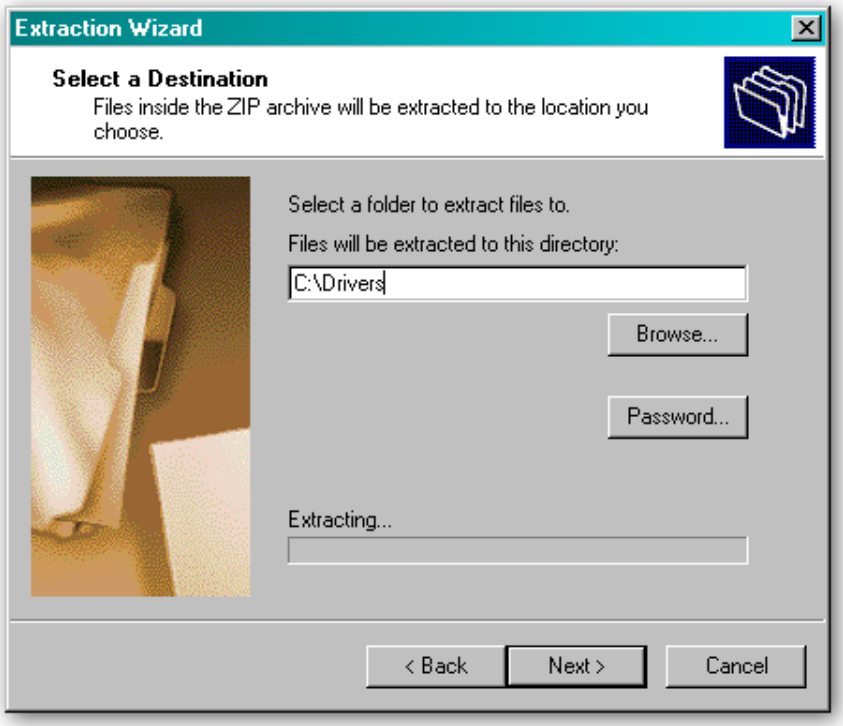
Both files are provided in a 'zipped' (compressed) form – you will need to extract the files from the zipped file before you can install the software or driver. Any version of Windows from Windows 98 onwards can open zipped files; or you may want to use a third party software tool such as Winzip or WinRAR.

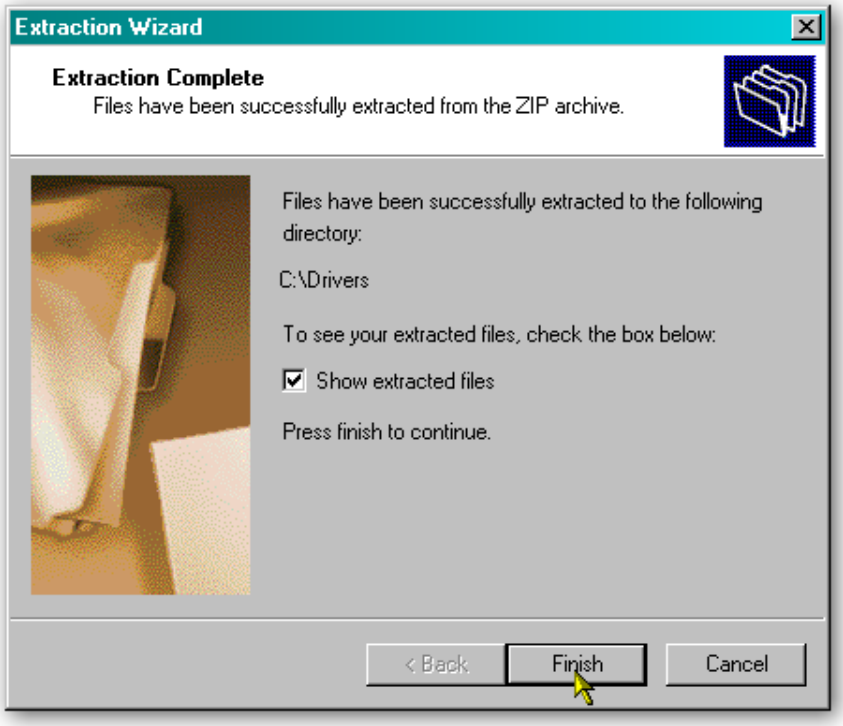


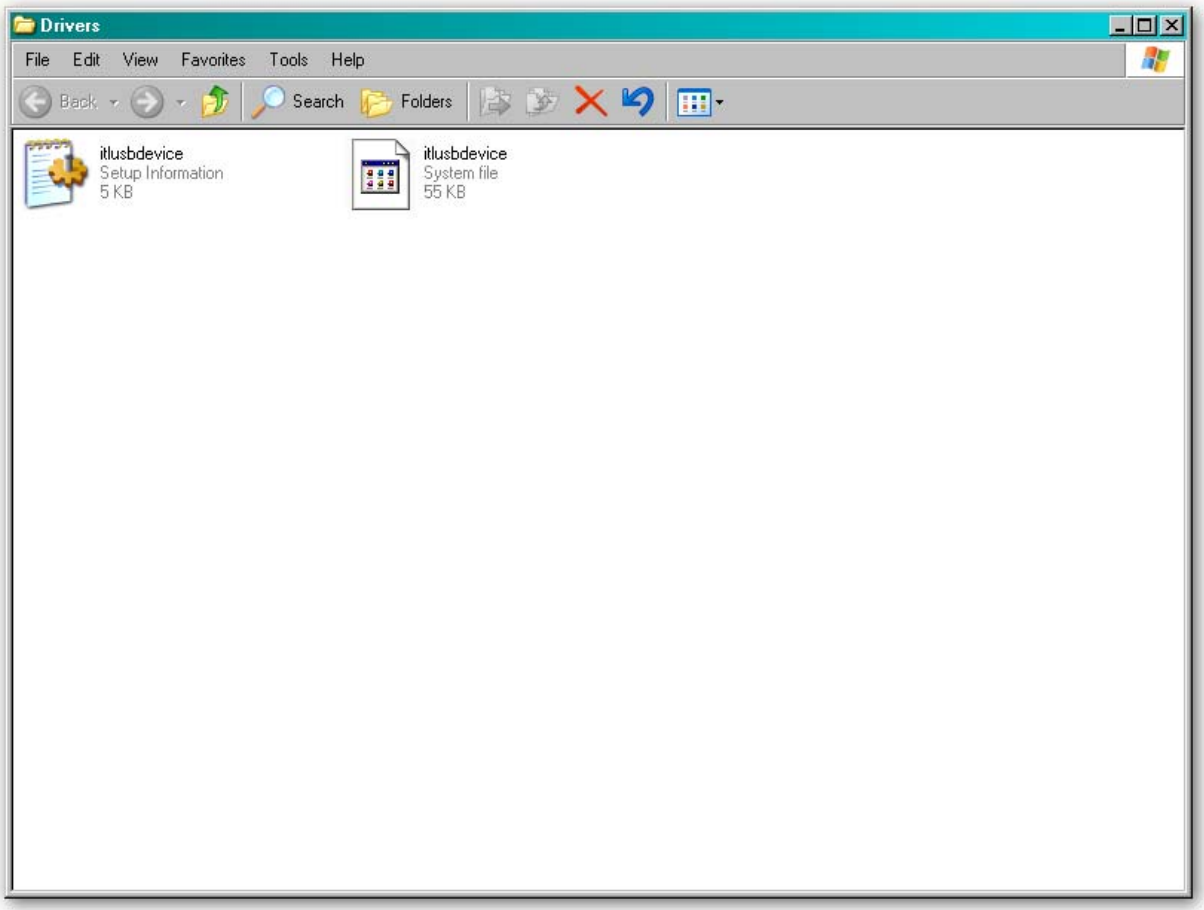
Extract the files to a convenient location – this might be an existing folder, or you may want to save them into a new folder.



In this example, the BV Interface driver files are being saved into a folder called ‘Drivers’ on the computers C: drive.

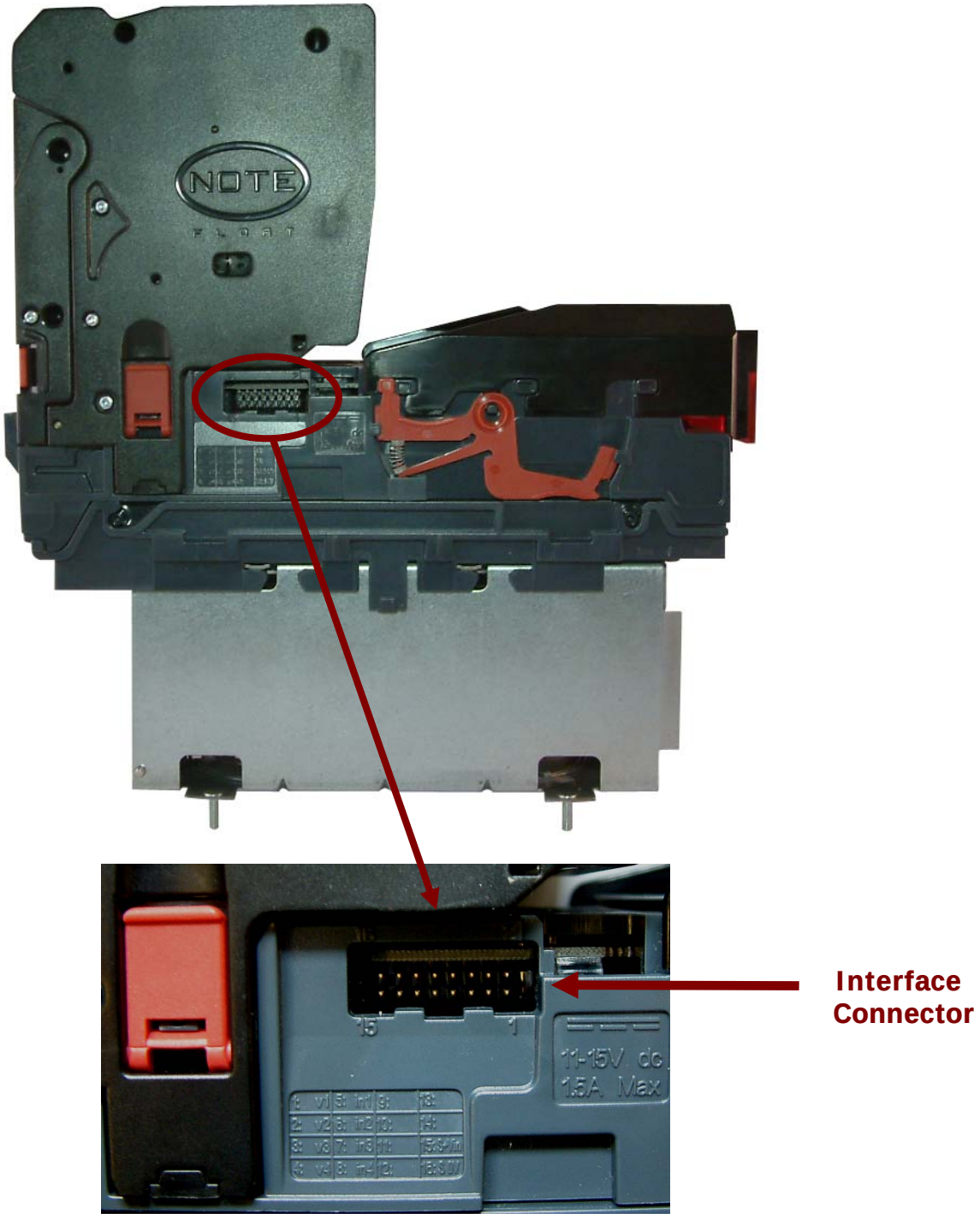






3.1.3 Installing the Drivers

There are several ways to communicate with the NV11 validator, which include using a direct connection from computer to validator with a CN392 validator to USB cable, or by using a special interface unit called a DA2. Use of the DA2 is not covered here – please refer to ITL Document number GA338-2 for more information. In this manual we will be using the USB connection method. The connector needed to set up and interface the NV11 validator is easily accessible on the side of the unit:



To use a USB connection with the NV11, a USB cable fitted with a 16 way connector on one end (ITL Part Number CN392) should be used. The CN392 cable fits into the 16 way connector and allows high speed programming and serial communications when used in SSP and ccTalk modes. When using the USB connection, power must be supplied to the NV11 using the red and black power leads on the CN392 cable.

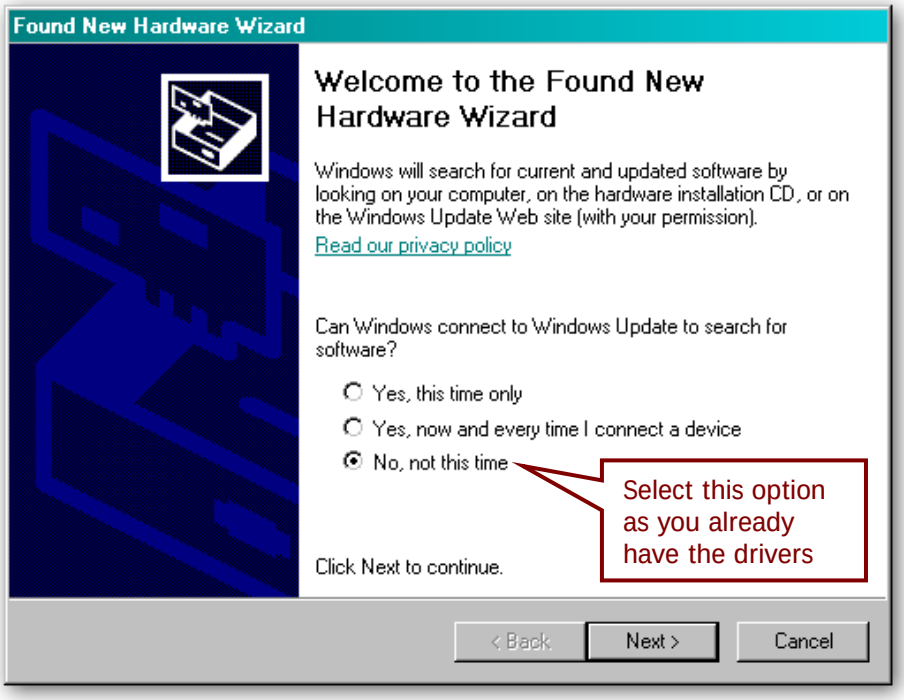
The NV11 validator must be powered up for the interface to be recognised by Windows. If the validator is not in the host machine, you will need to provide power to the 16 way interface connector first. The connection information and pin numbering is as follows:

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

Before connecting the USB cable to the computer, make sure that the CN392 cable is connected to the validator and that the unit is powered up. Once you have carried out these steps, plug the USB cable into the computer.

After connecting the USB cable, Windows should then detect the NV11 validator interface – a 'Found New Hardware' bubble or dialog box should appear.

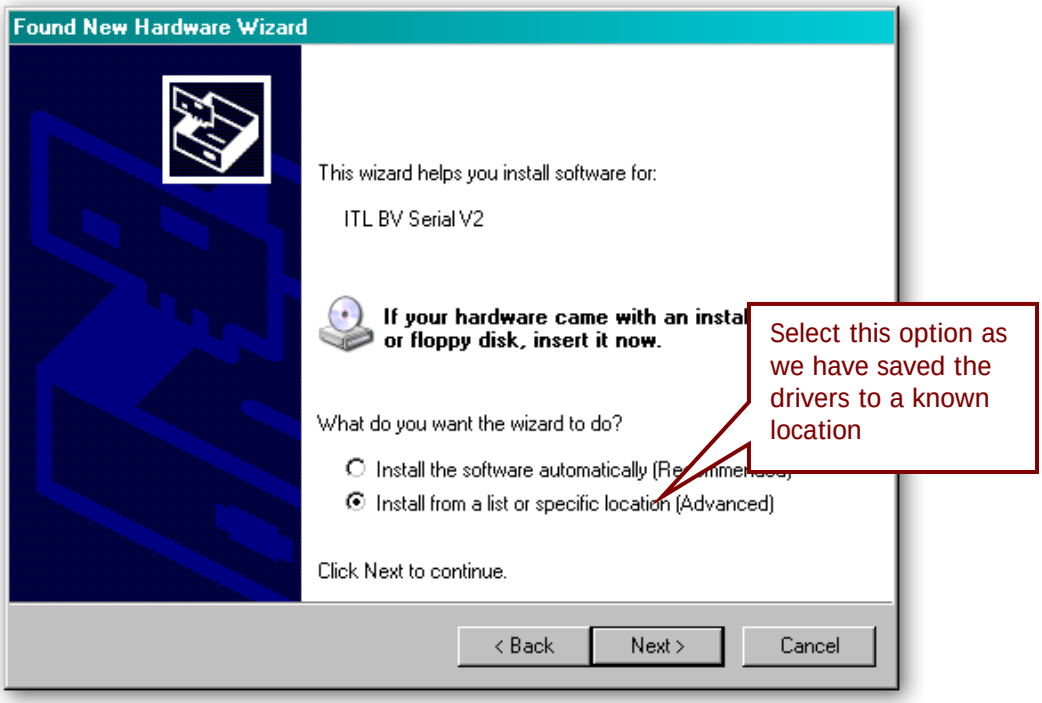
A 'Found New Hardware' wizard should then start to guide you through the installation process (this first screen is not always shown on some computers):



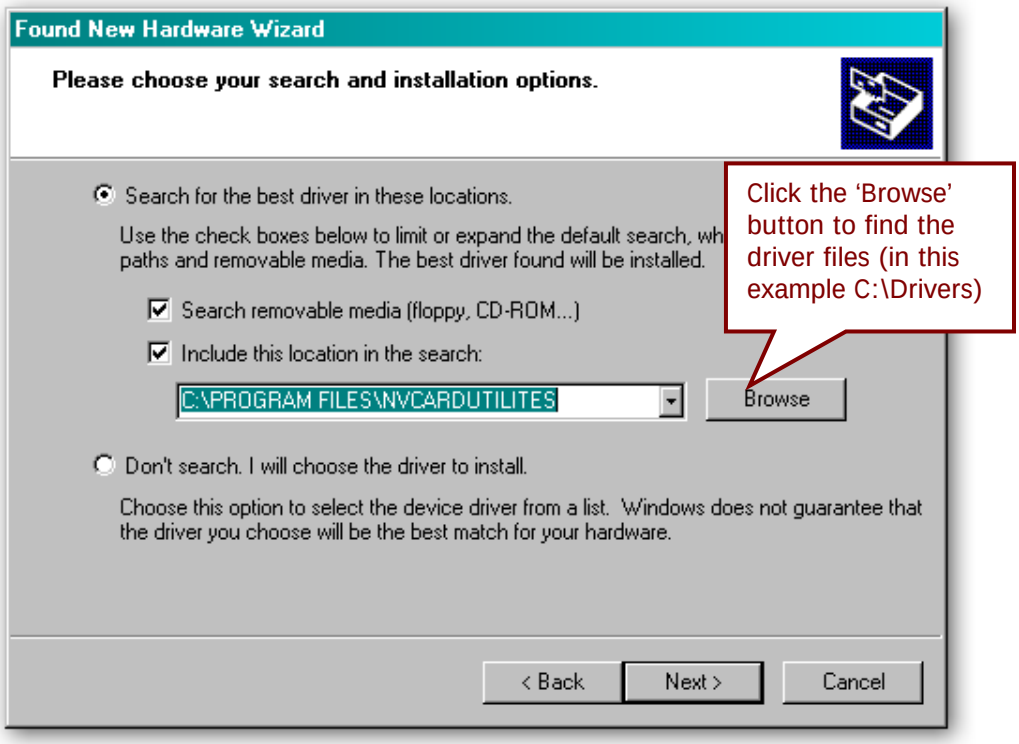
Information

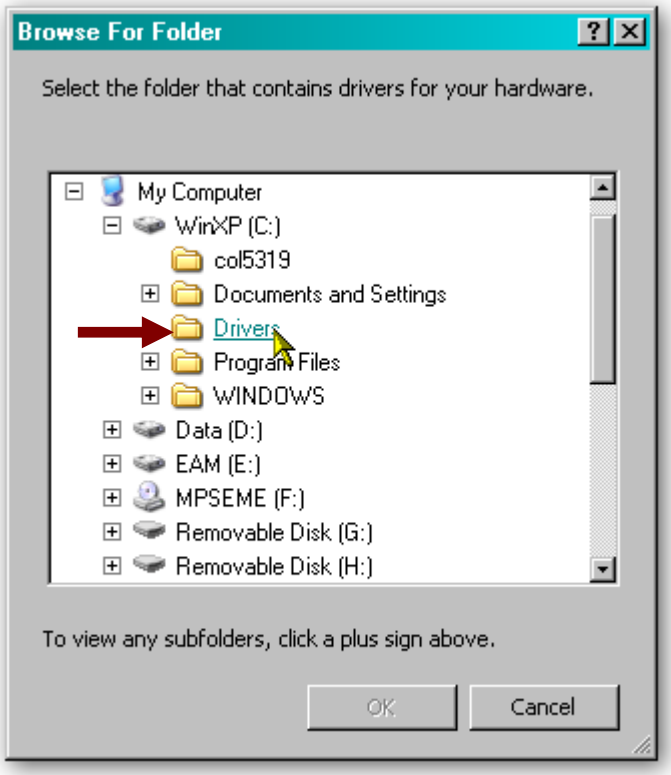
Only use V2 drivers

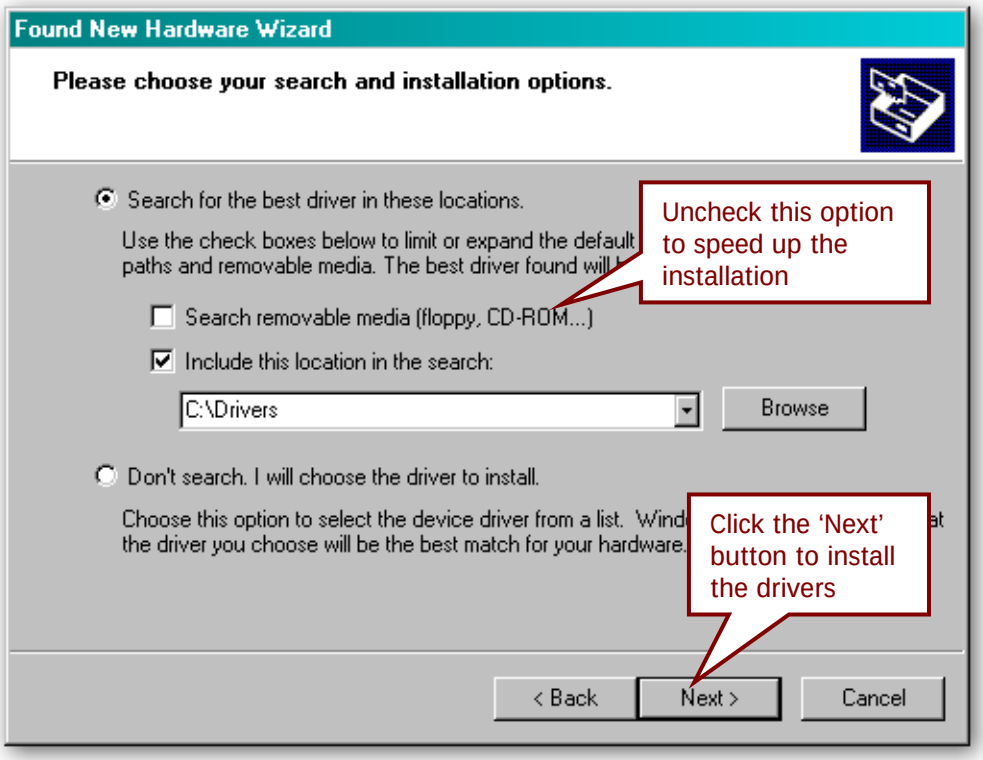
Please make sure that you are using the V2 drivers for the installation.



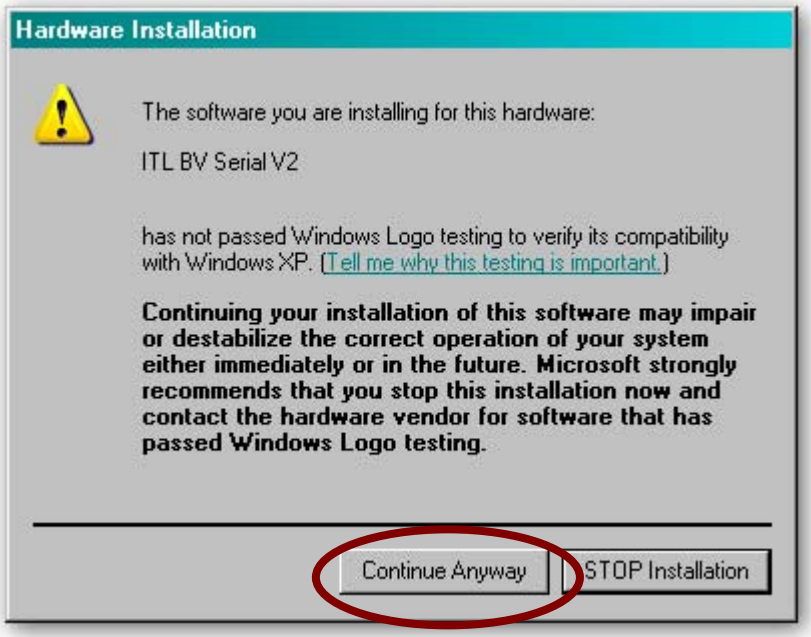
The next dialog box will ask you where to search for the drivers:

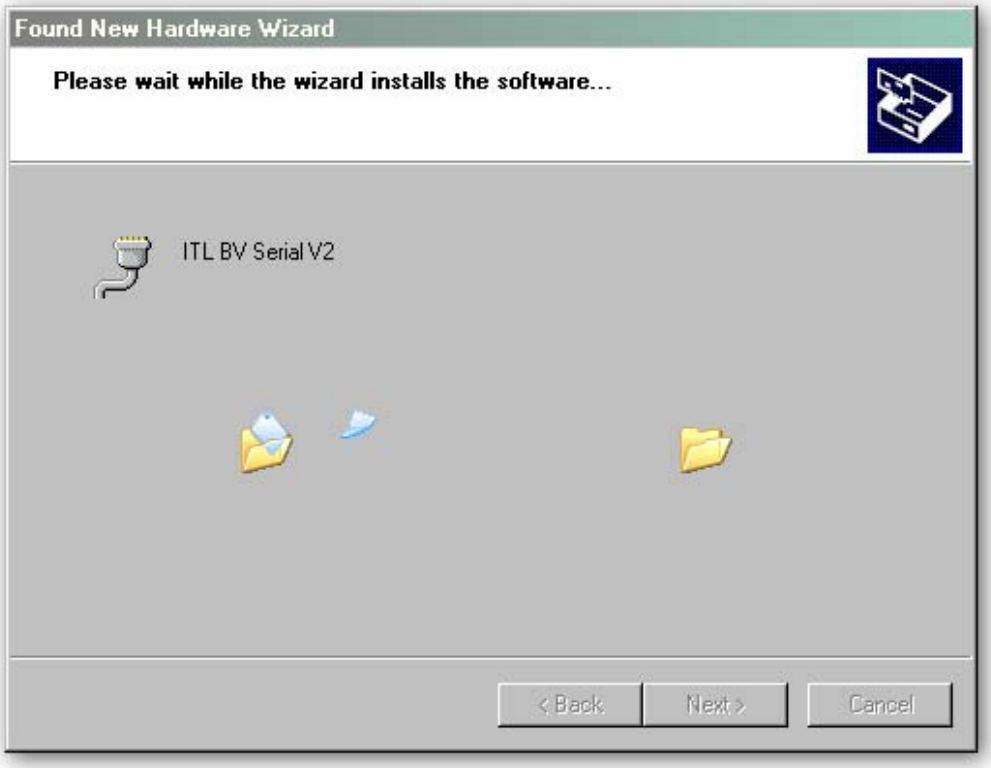


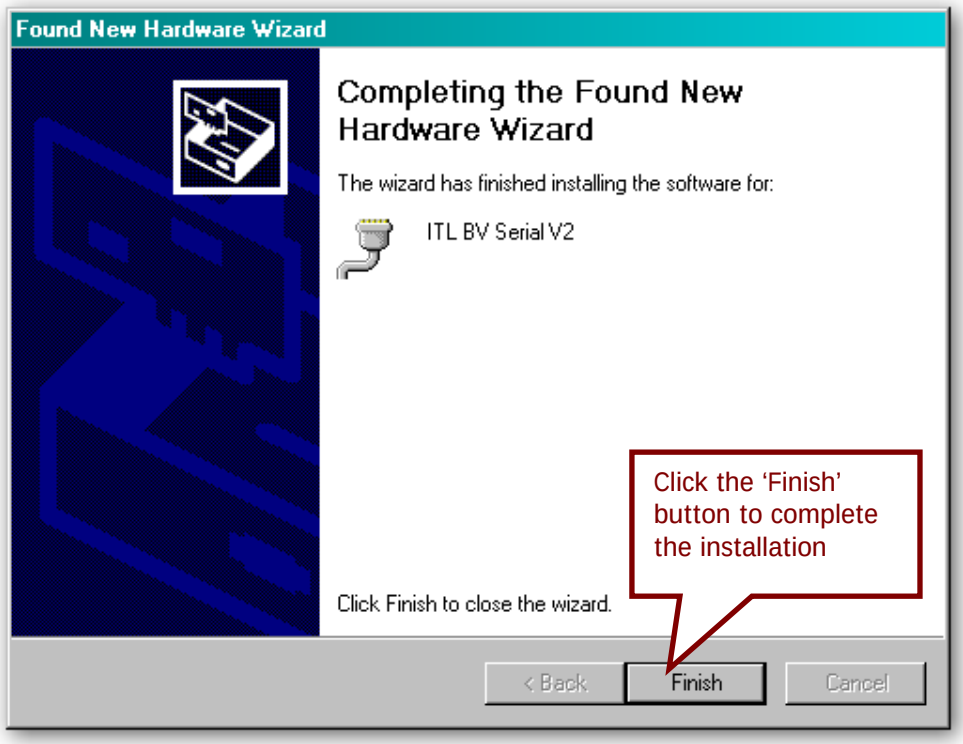




You may see a warning dialog saying that the drivers have not passed Windows logo testing – you can ignore this warning. Just click the 'Continue Anyway' button.

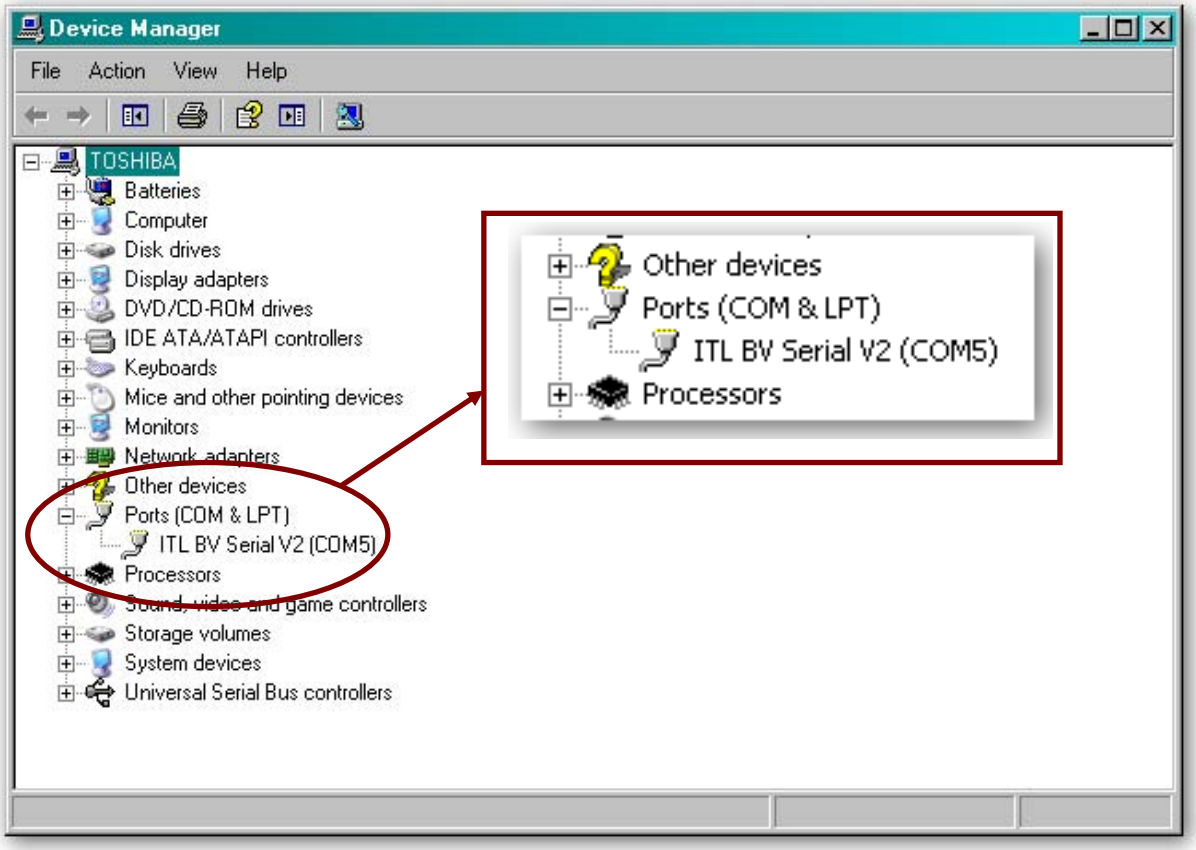






After completing the driver installation you can check that the communications port has been installed correctly.

Open Windows Device Manager, and click on the Plus symbol (+) next to the 'Ports' entry. This will expand the list of installed communications ports. You should see an entry for an '**ITL BV Serial V2'** port as shown here:

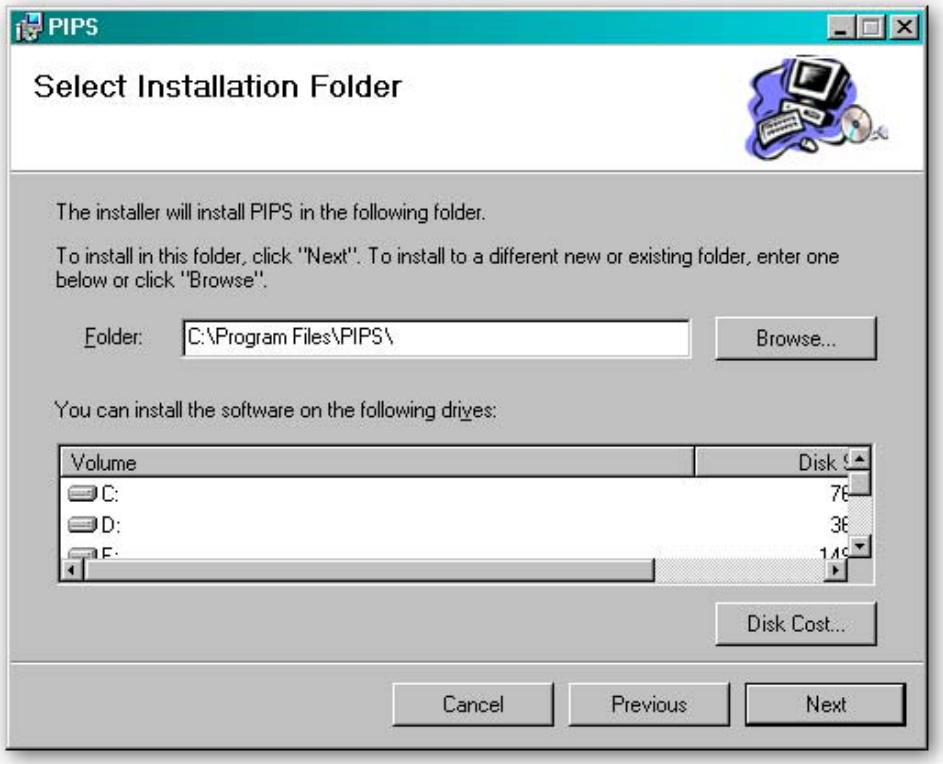


The actual communications port number (in our example COM5) may vary depending on your particular computer configuration.

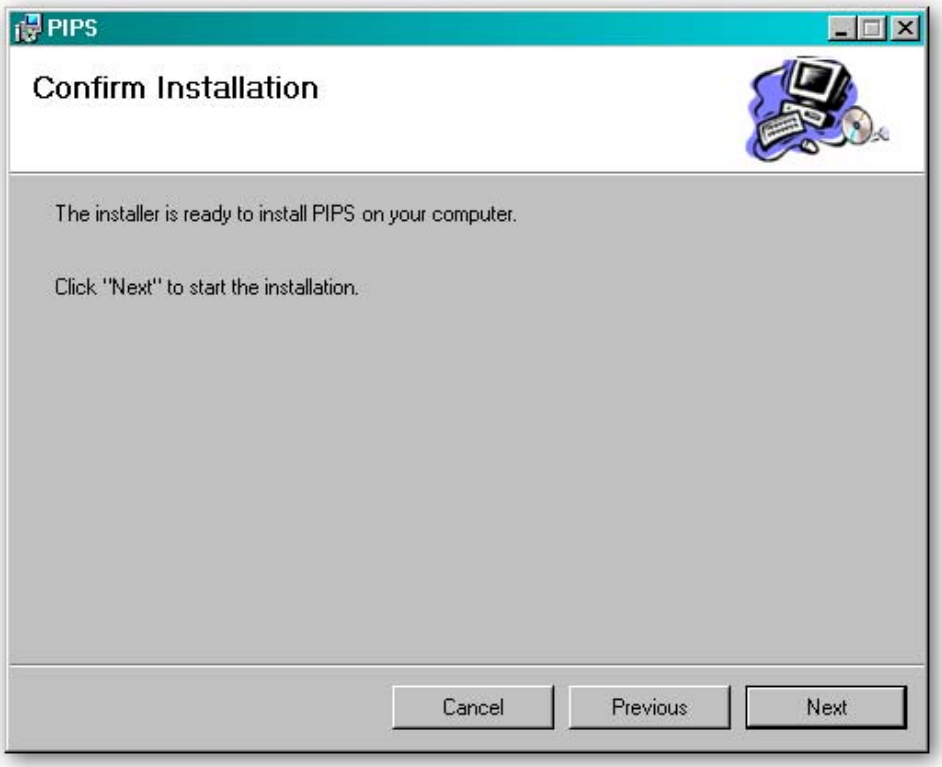
Now the drivers have been correctly installed you can install the Validator Manager software – this is covered next.

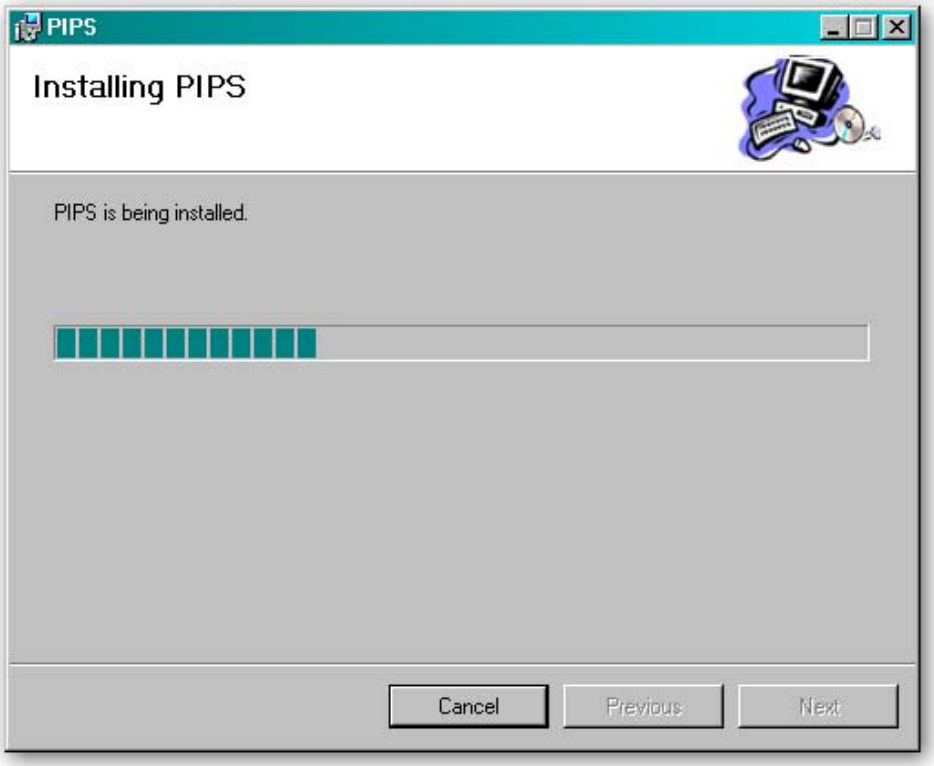
3.1.4 Installing the PiPS Software

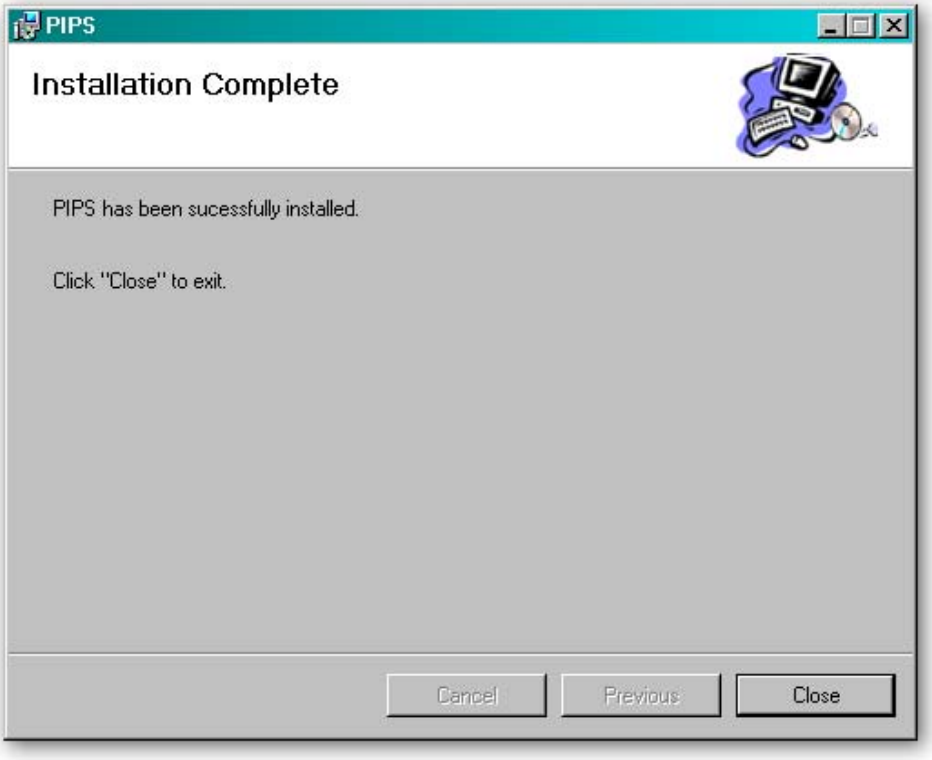
Installing the PiPS software is very straightforward. Find the PiPS installation file you downloaded earlier, extract the installation file from the zipped file and double click the file (it has an .msi extension) – this will start the installation process:



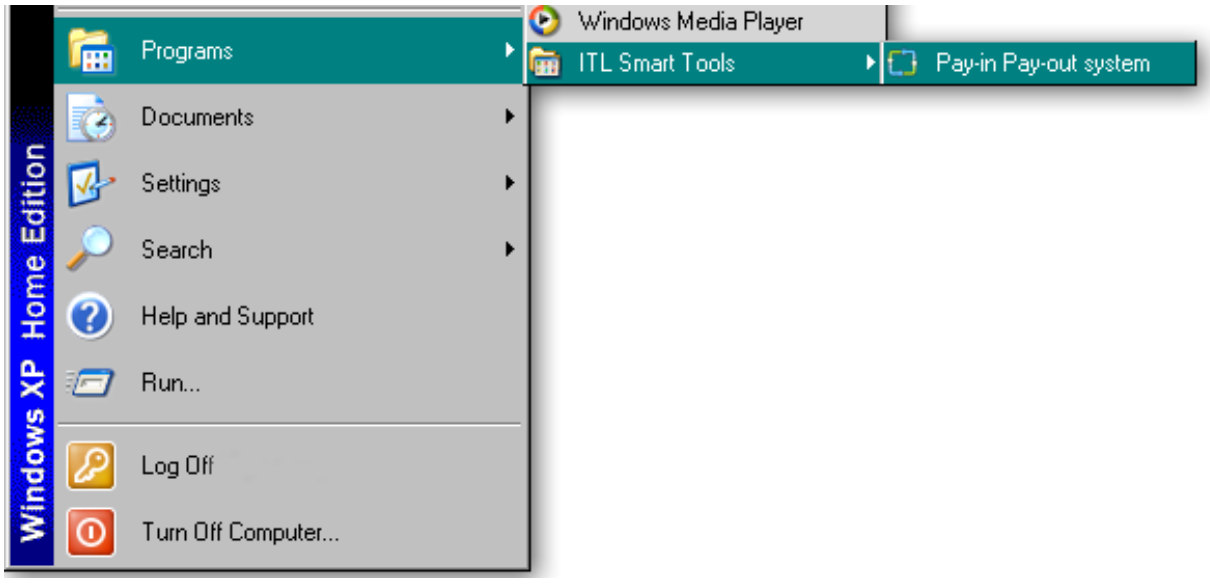
You can choose where you would like to install the software, or just accept the default location (as shown above). Clicking on the ‘Next’ button will then ask you to confirm the installation:







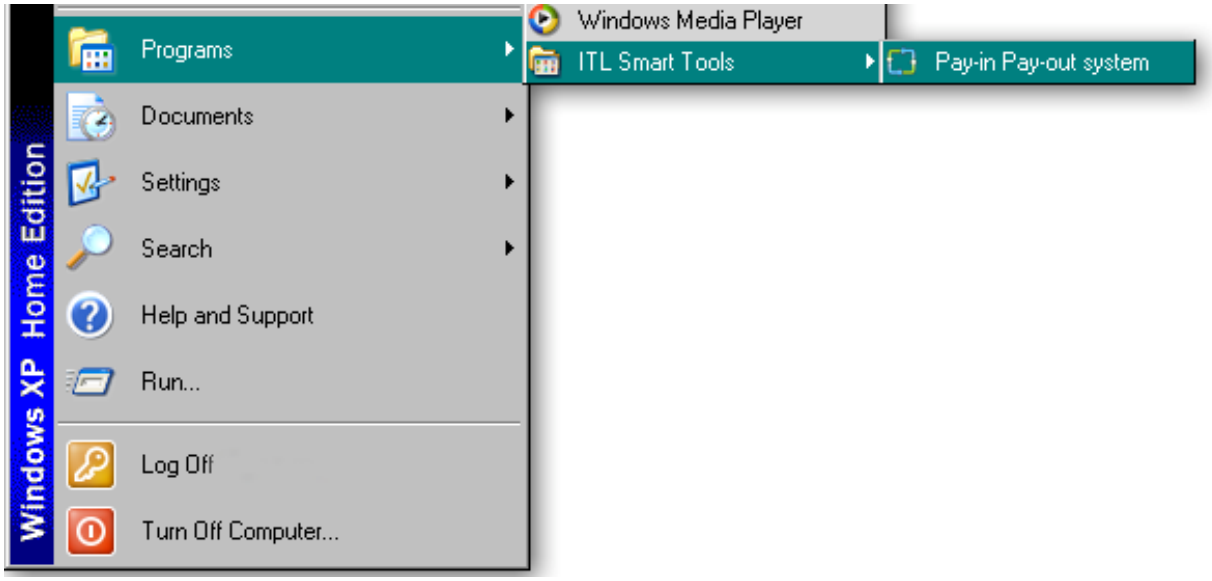
Once the installation is complete, you will have a new program group called 'ITL Smart Tools' in the Windows Start Menu, similar to the one shown here:



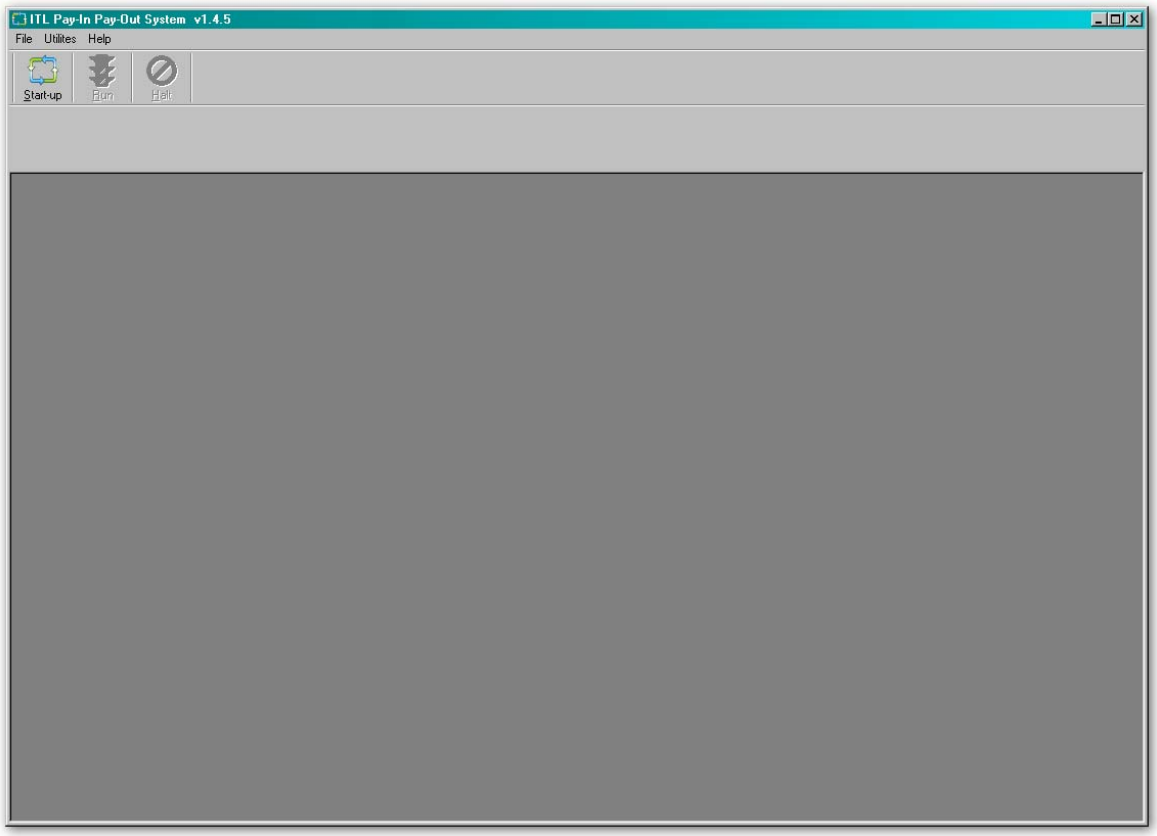
You can run the PiPS software by clicking the 'Pay-in Pay-Out system' menu entry; however, before you can use the PiPS software with an NV11 you will need to make sure that you have installed the BV interface drivers (as described earlier).

3.1.5 Starting the PiPS Software

The PiPS software is launched by clicking the 'Pay-in Pay-out system' entry in the 'ITL Smart Tools' menu group.

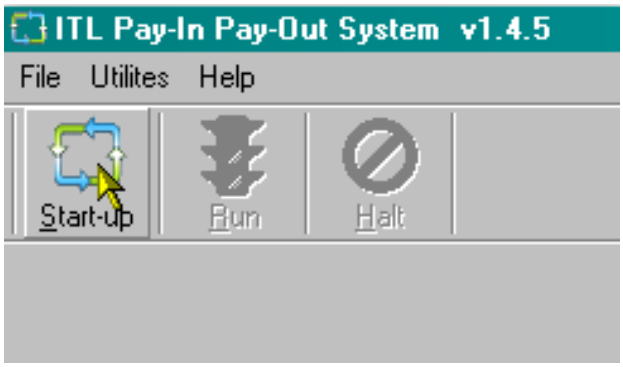


The initial program screen looks like this:

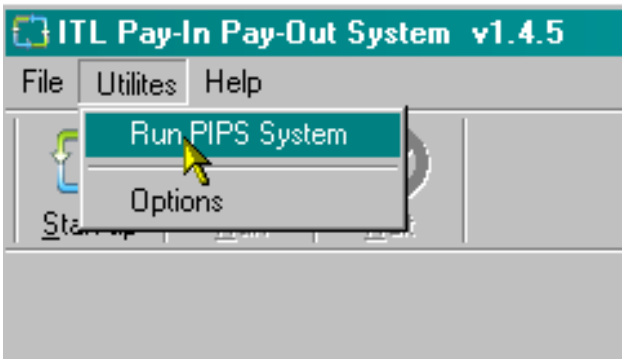


Make sure that the NV11 is powered up and the USB cable is connected before going any further.

Once the NV11 is connected, there are two ways to start the program operation:

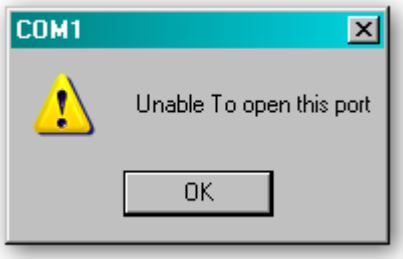


Click the 'Start-up' icon

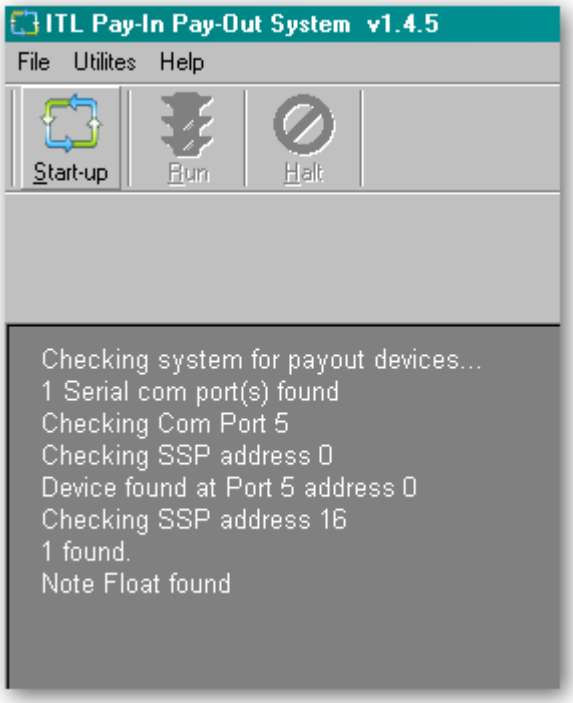


Click 'Utilities', then 'Run PIPS System'

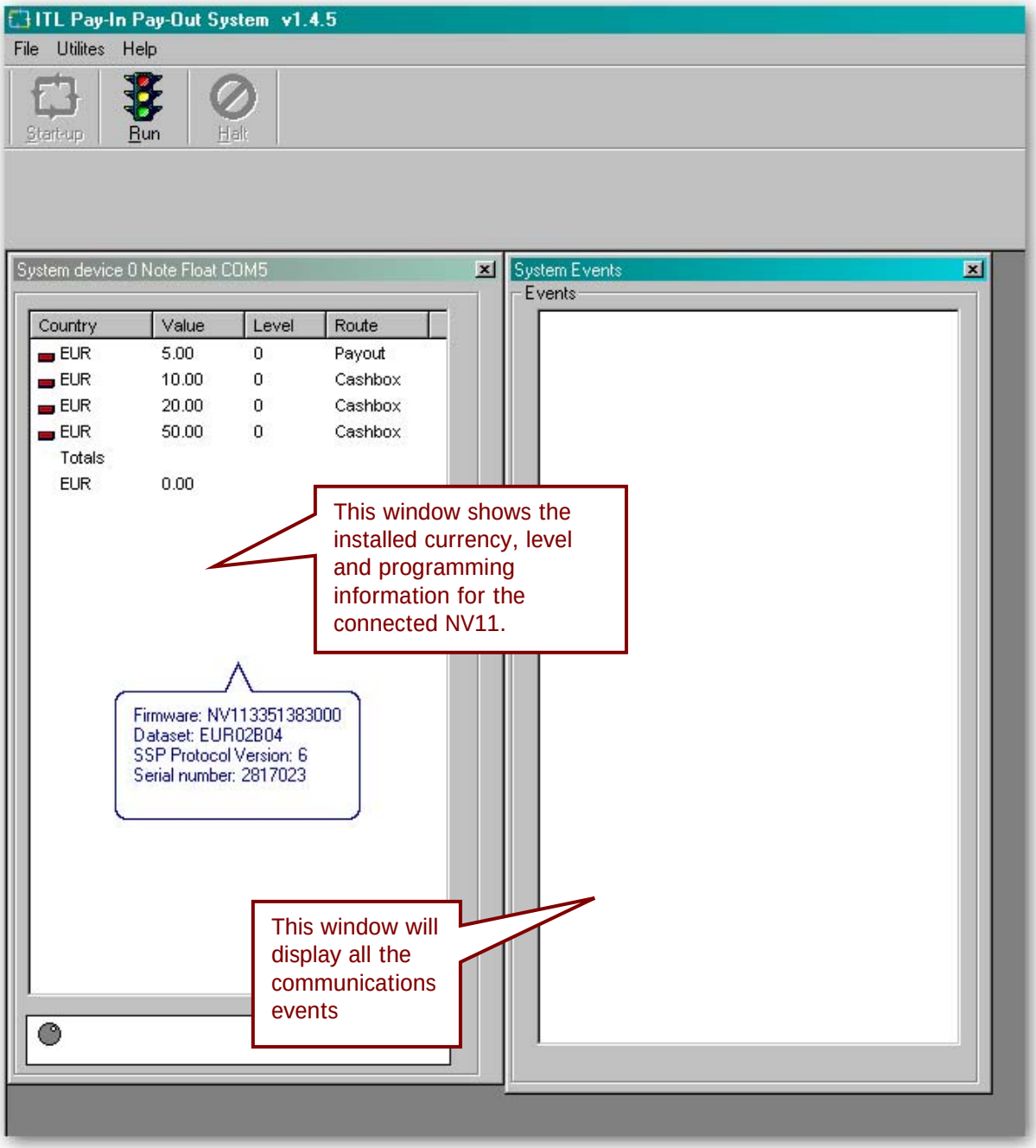
The PiPS software will then start to connect to the NV11. Depending on the number and types of communications ports on your computer, you may get an error message similar to the one shown on the right saying 'Unable to open this port' – this isn't a problem, just click the 'OK' button.



You will see some text in the PiPS program window as the software checks the communications ports for the NV11 (similar to what is shown here) – this text may vary depending on your particular computer configuration.



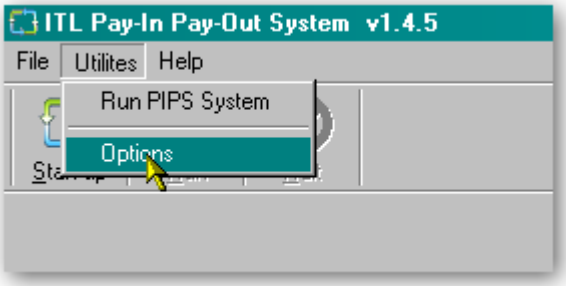
Once the NV11 unit has been found, two windows will appear on the screen:

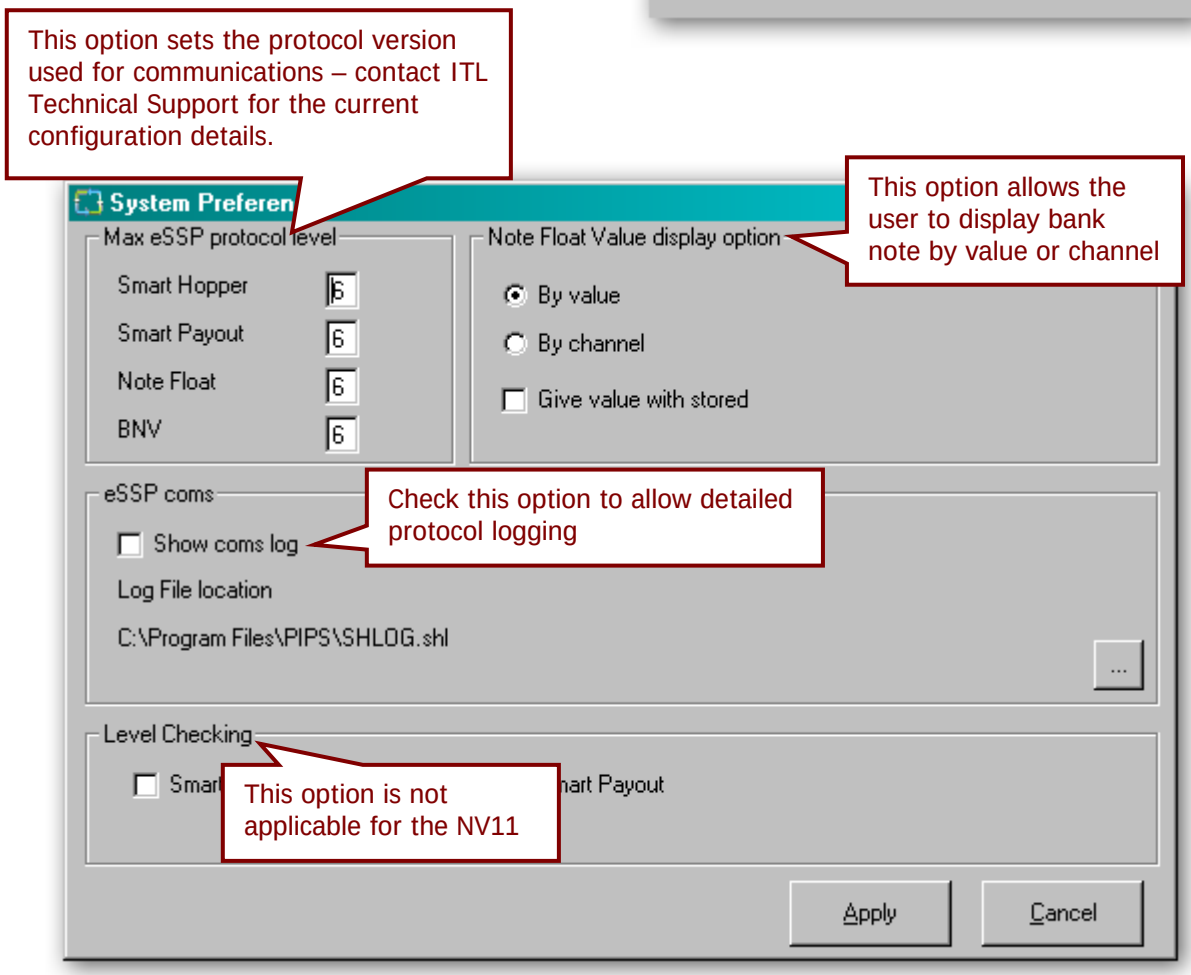


More details of the program options and operations that can be carried out will be covered in the next subsection.

3.1.6 Preferences, Settings and Options

The preferences for the PiPS software are accessible from the Utilities menu (as shown). Click the 'Options' entry to open a new dialog box:





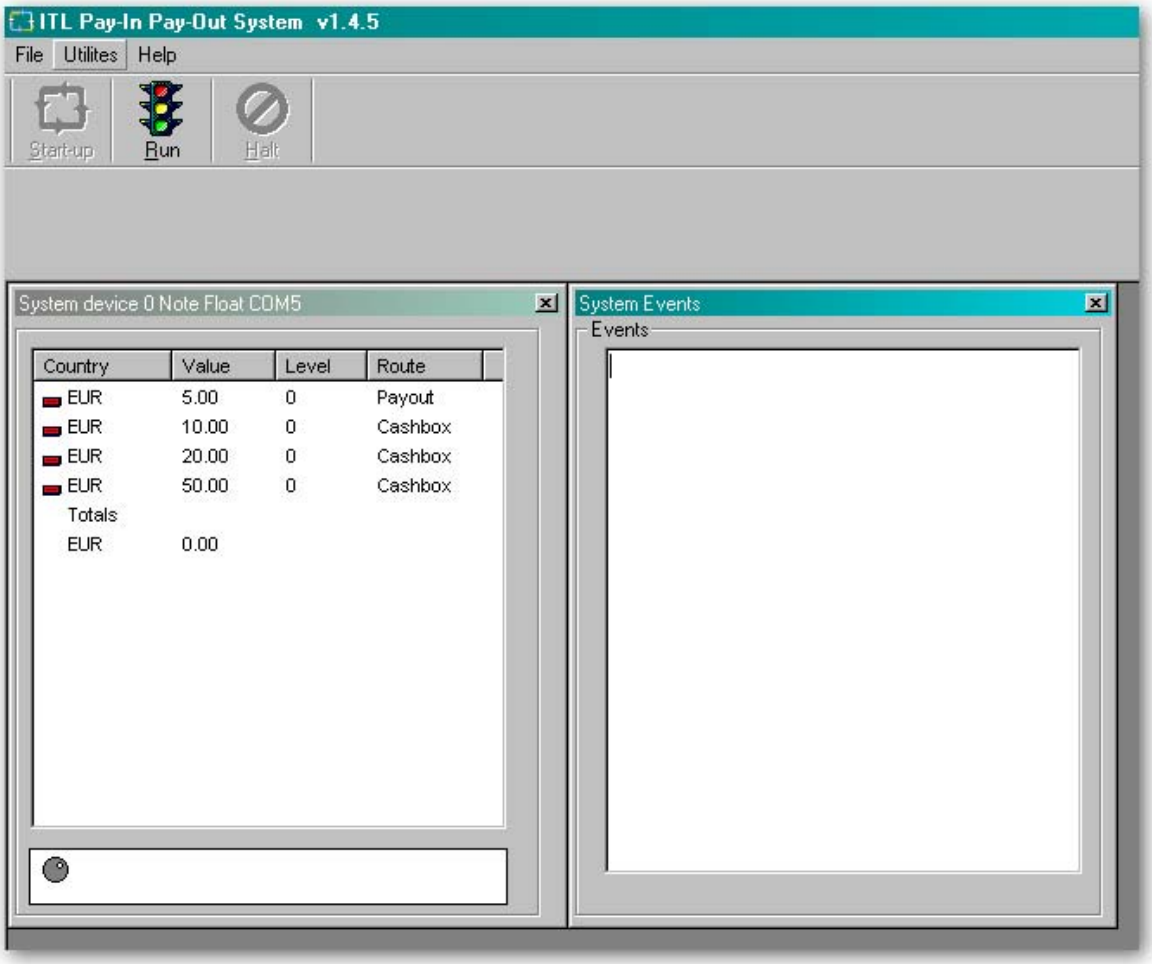
Normally, these preferences should not need changing.

The settings and options for the NV11 vary depending whether the system is in the 'Run' or the 'Halt' state – generally the system will need to be halted before any changes to setup options can be made. Pay in/pay out operations are only available when in 'Run' state.

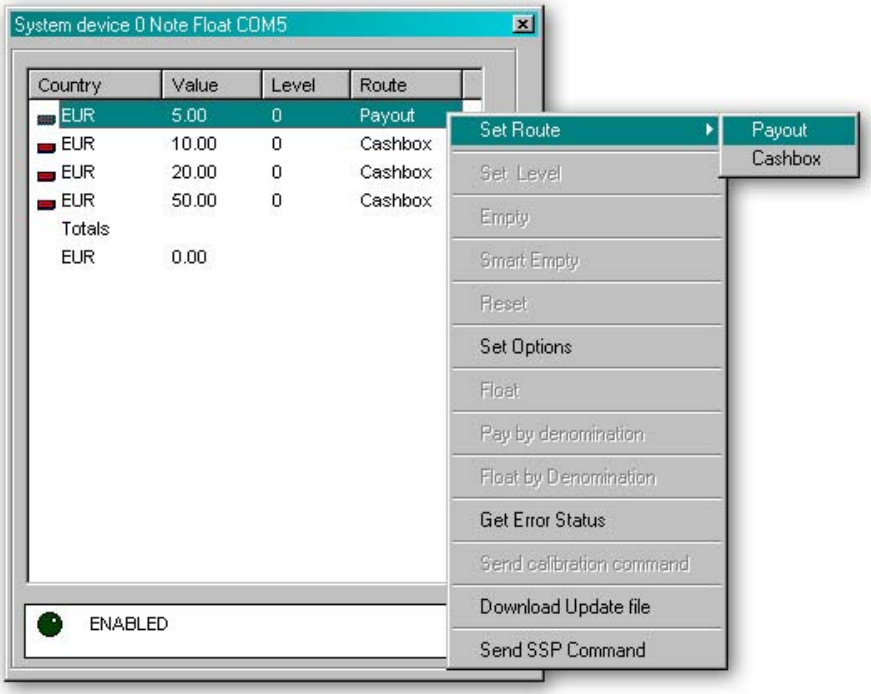
Halt State

If the system is in 'Halt' state, the user will either have just started the PiPS software, or clicked on the 'Halt' button. The menu bar will look like this:

The main screen should look something like this:

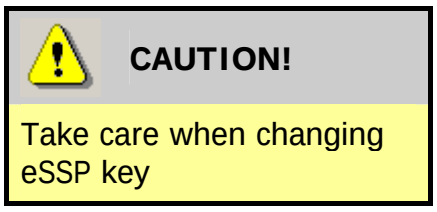


The various settings and options can be accessed from a right click when the mouse cursor is over any of the system device entries:



Halt State Options

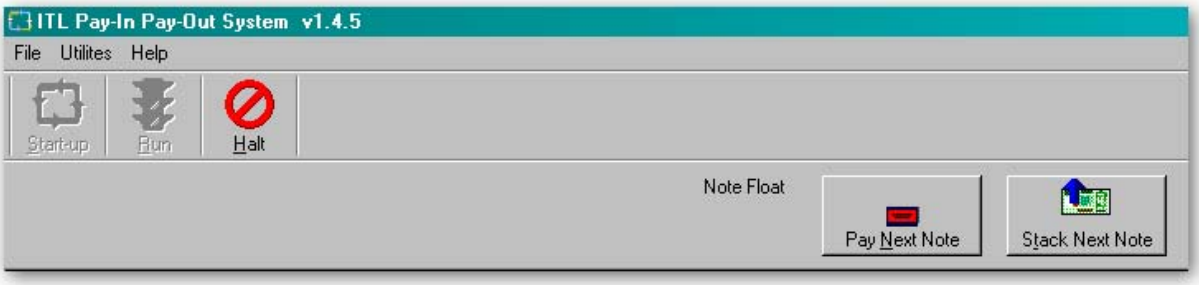
Set Route	To set the pay in route for inserted bank notes to either Cashbox or Note Float module, select the desired denomination(s) and click the required route. The system will send the commands to the device and store these preferences so that they will be set again on the next start-up.
Set Options	Using this dialog, the user can setup the device SSP address and eSSP keys by double clicking on the required option.
Get Error Status	This option displays any device error messages in the 'System Events' window.
Download Update File	This option allows the user to download an ITL update file to the connected device.
Send SSP Command	This option brings up the SSP communications dialog which allows the user to send individual commands to the connected device.



Exercise care when changing the device eSSP key. The user must make a note of the new key and change the host key to match. If the key is not known then device must be returned to ITL for key reset.

Run State

If the system is in 'Run' state, the user will have clicked on the 'Run' button and the menu bar will look like this:



Run State Options

Set Route	To set the pay in route for inserted bank notes to either Cashbox or Note Float module, select the desired domination(s) and click the required route. The system will send the commands to the device and store these preferences so that they will be set again on the next start-up.
Empty	This command will empty all the stored notes in the connected Note Float module into the device cashbox. After emptying the notes, counters on the device will be reset to zero.
Reset	This command will reset the connected payout device. After reset, the system will re-initialise the device for use.

3.2 Updating Firmware and Datasets

CAUTION!

Do not power off

Powering off the NV11 when updating the firmware or dataset can cause the validator to stop working.

The NV11 validator firmware and dataset can be updated very easily using the PiPS software. The process uses NV9USB dataset files which can be downloaded from the Innovative Technology Ltd website:

Select Validator: NV9USB Select Currency: EUR - (Euro)

Search

Display # 20

<< Start < Prev 1 2 Next > End >>

Page 1 of 2

Name	Code	Issue	Validator
Euro (20-50)	EUR71B02	2	NV9USB
Euro (5-10-20) MDB Multip	EUR52B02	2	NV9USB
Euro (5-10-20-50)	EUR02B04	4	NV9USB
Euro (5-10-20-50)	EUR56B03	3	NV9USB
Euro (5-10-20-50)	EUR58B03	3	NV9USB
Euro (5-10-20-50-100-200-	EUR45B15	15	NV9USB
Euro (5-10-20-50-B-100)	EUR69B03	3	NV9USB
Euro (B-B-5-10-20-50)	EUR60B03	3	NV9USB
Euro(10-20-50)	EUR67B03	3	NV9USB
Euro(5(i)-10(i)-20-50)	EUR74B02	2	NV9USB
Euro(5(i)-10-20-50)	EUR72B02	2	NV9USB
Euro(5-10)	EUR04B04	4	NV9USB
Euro(5-10-20)	EUR70B02	2	NV9USB
Euro(5-10-20)	EUR10B04	4	NV9USB
Euro(5-10-20-50)	EUR73B02	2	NV9USB
Euro(5-10-20-50)	EUR59B03	3	NV9USB
Euro(5-10-20-50-100)	EUR63B03	3	NV9USB
Euro(5-10-20-50-100)	EUR61B03	3	NV9USB
Euro(5-10-20-50-100)	EUR03B03	3	NV9USB
Euro(5-10-20-50-100-200)	EUR54B03	3	NV9USB

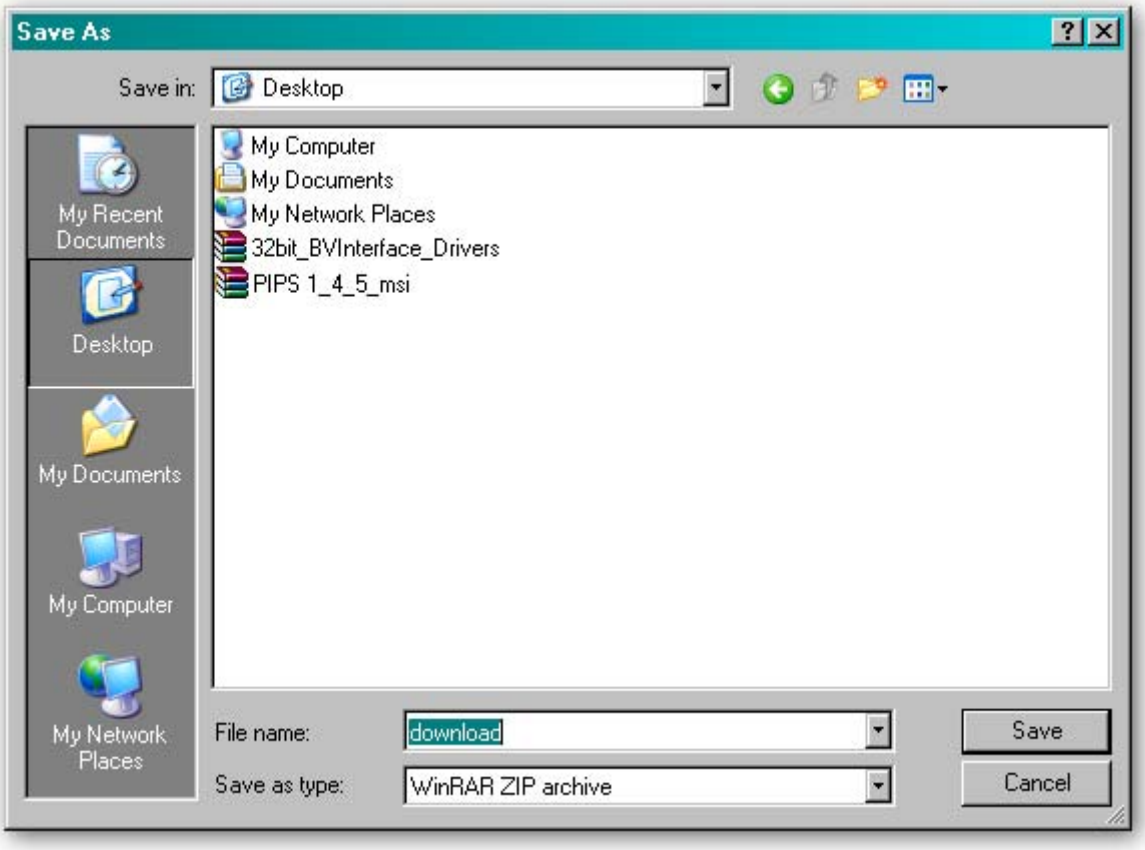
Information

Combined data files

The firmware and dataset files for the NV11 validator are combined into a single file, so both will be updated when you carry out the update.

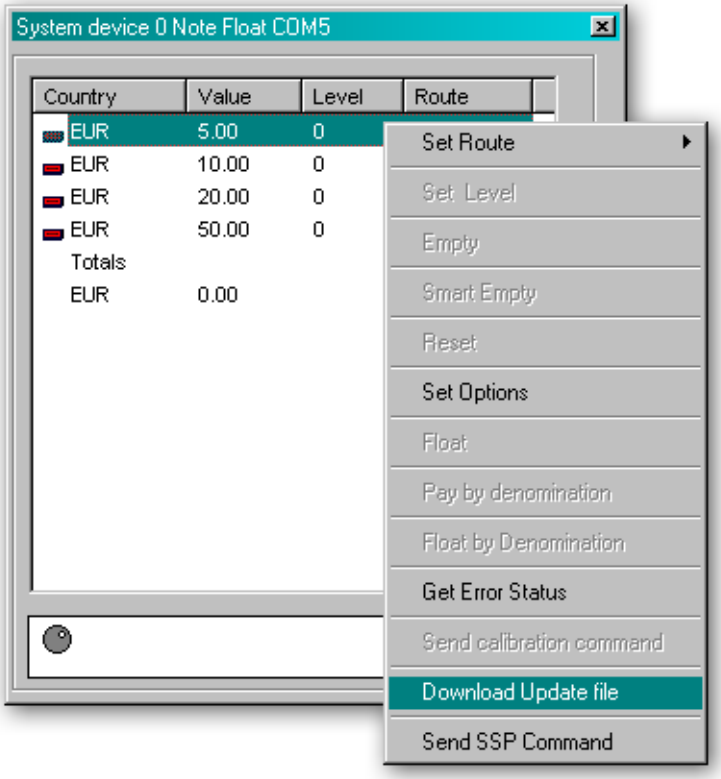
After selecting the dataset, a dialog will prompt you to save or open the file: select the **Save** option

You can then choose where to save the file – choose a location that is convenient for you:

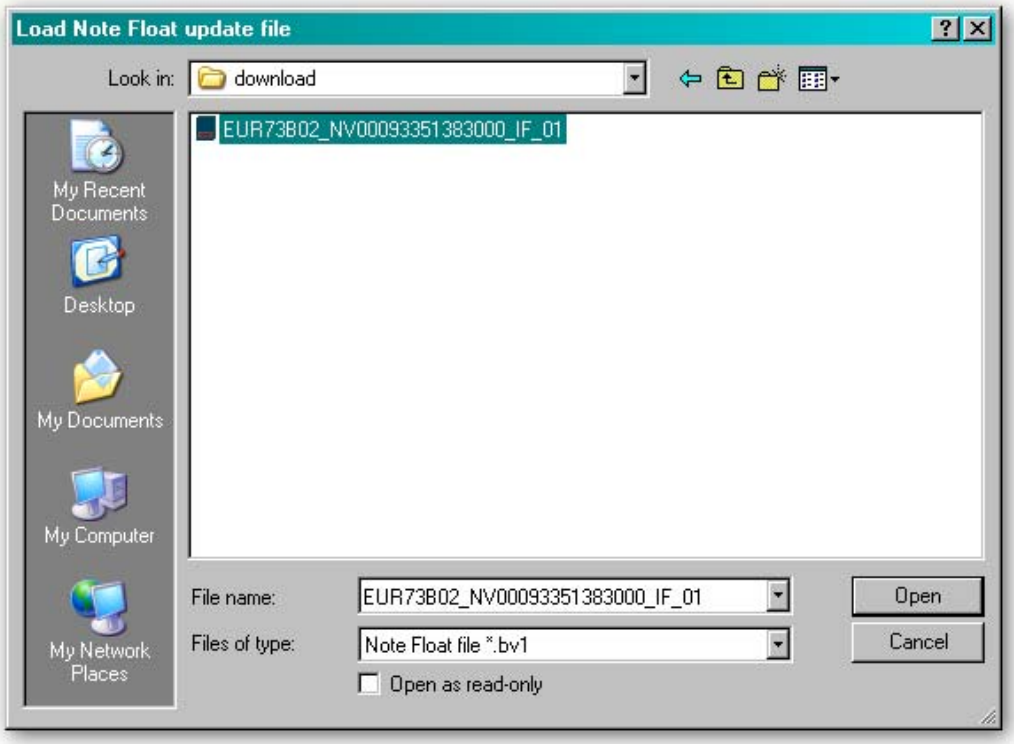


Once the dataset file is saved, unzip the file and you can then start the process to update the NV11 validator by connecting the USB cable and starting the PiPS software as described previously.

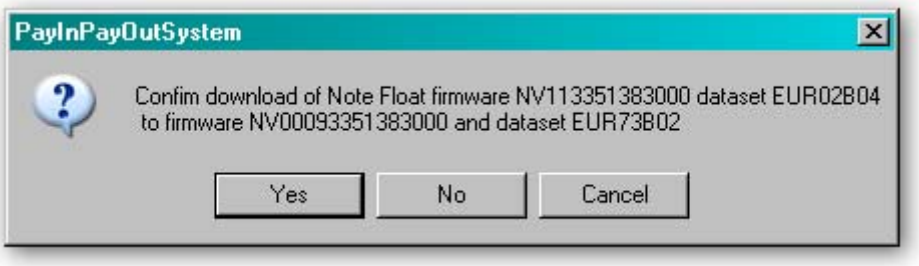
With the PiPS software in 'Halt' mode, right click on one of the currency entries and select 'Download Update File' from the dialog as shown here:



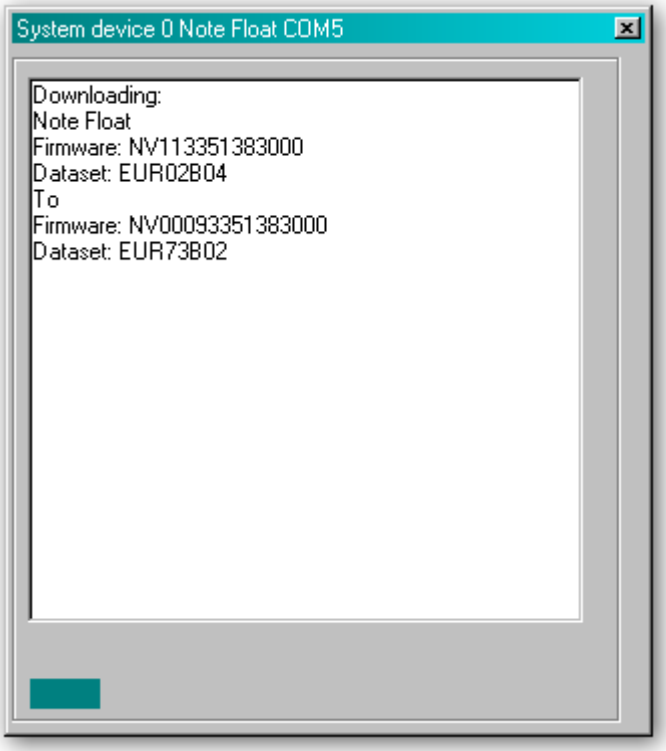
You will then be prompted to select the dataset file you downloaded and unzipped earlier – select the file and click the 'Open' button:



The PiPS software will then ask you to confirm that this is file you want to use to update the NV11 unit with – click the 'Yes' button to continue:



A new dialog will then appear showing the update status:



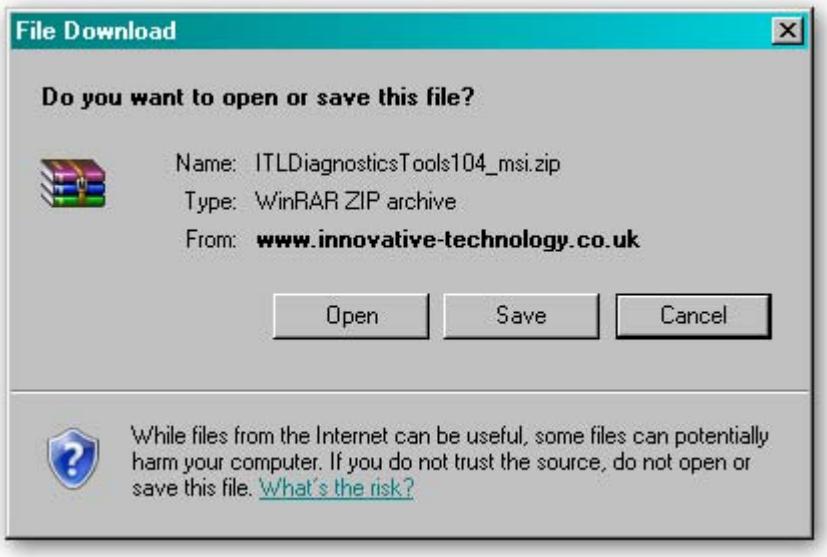
After the reset is complete, the NV11 validator will then be ready for use with the new currency.

3.3 Tools

3.3.1 Diagnostics

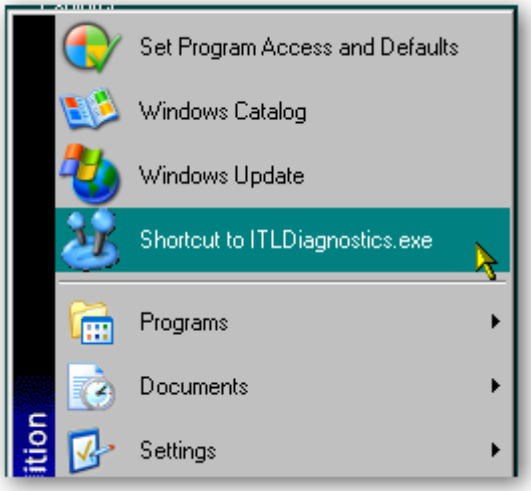
There is a dedicated software diagnostics tool for use with the NV11 validator called 'Bank Note Validator Diagnostics Tools', and this software can be downloaded from the Innovative Technology Ltd website:

When the file download dialog box appears, click the 'Save' button and select a suitable location to save the file in:

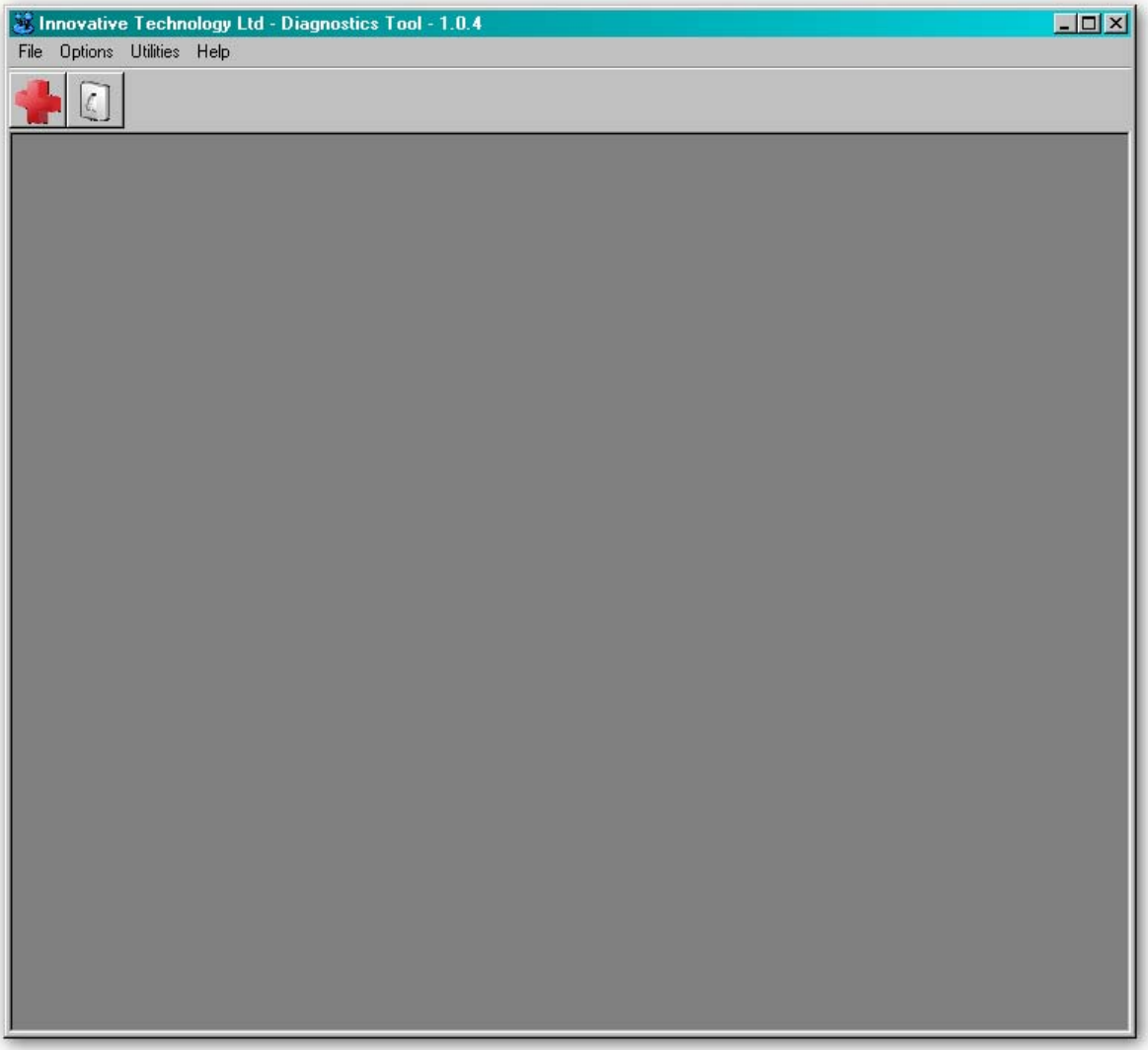


Installing the Diagnostics tools software is done in the same way as the PiPS software - Find the ITLDiagnosticsTools zipped file you just downloaded, extract the installation file from the zipped file and double click the extracted file (it has an .msi extension) – this will start the installation process.

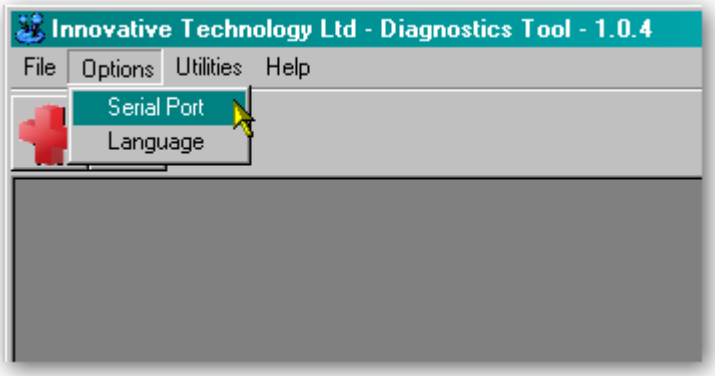
After installing the software, you can run the diagnostics software by selecting the 'Shortcut to ITL Diagnostics.exe' item near the top of the Windows Start menu. Make sure that the NV11 Validator is powered up and the USB cable is connected before starting the program.



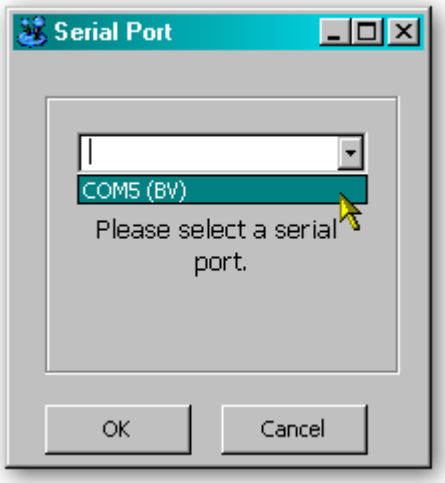
The main screen of the diagnostics tools software looks like this:



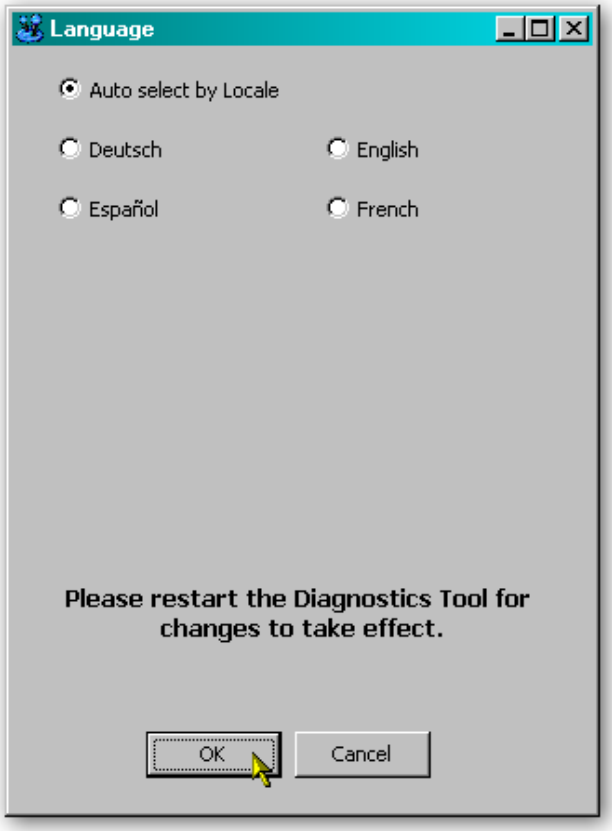
When running the software for the first time, you need to set a few options. These are accessed from the 'Options' menu:

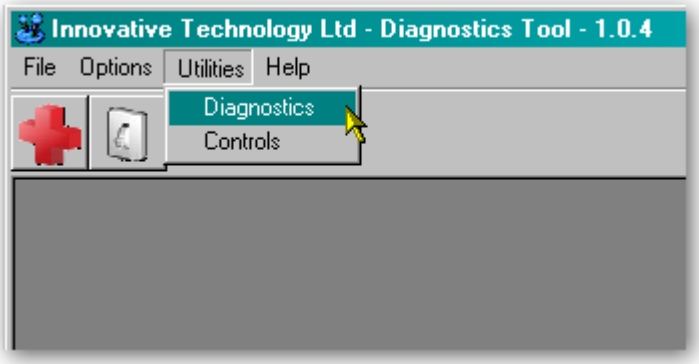


By selecting the 'Serial Port' item from the 'Options' menu you can define which serial port is being used to connect to the NV11 validator. After selecting this option, a new dialog box will open allowing you to choose the correct serial port.

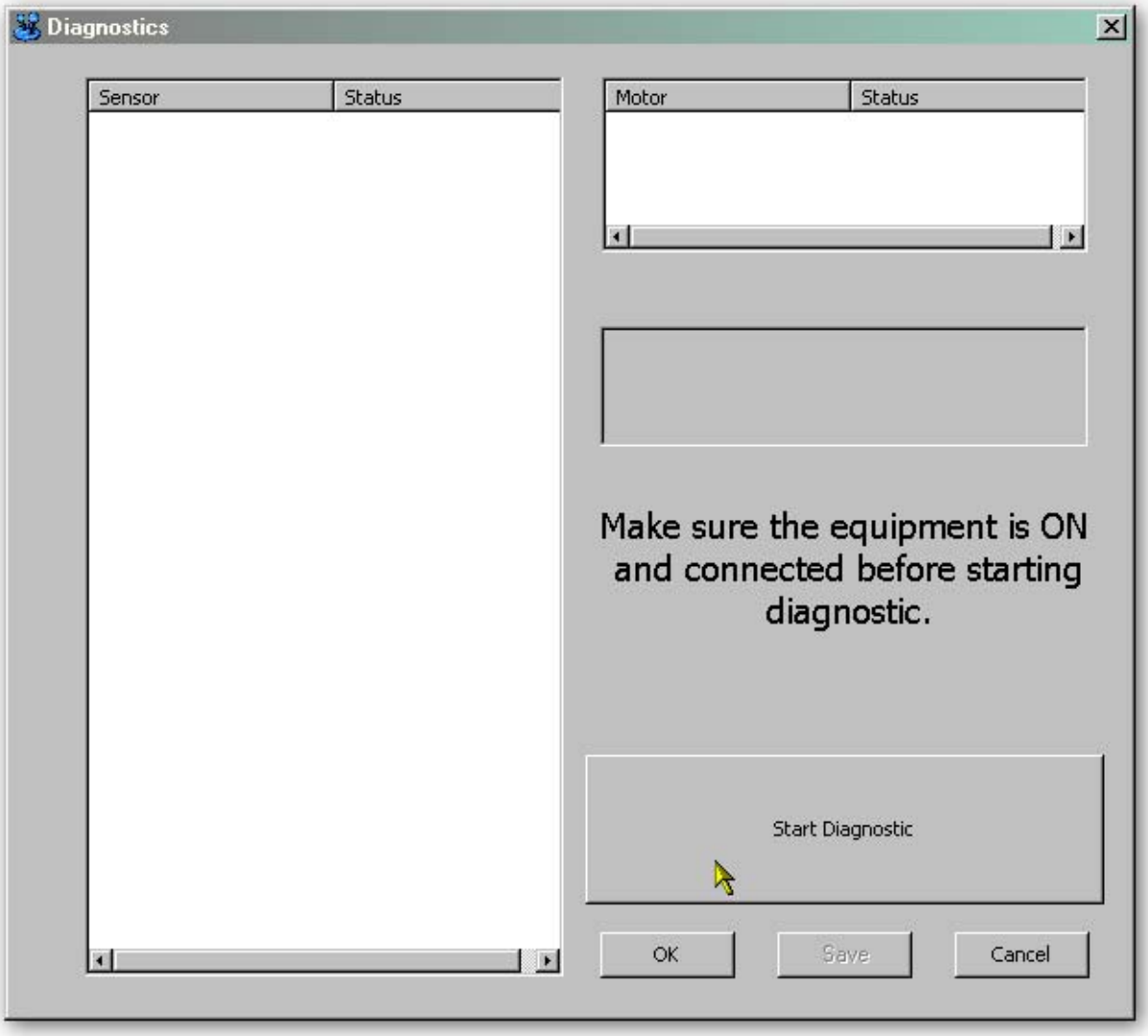


Select the required port from the dropdown list, and then click the 'OK' button to confirm your selection. This will close the dialog box and allow you to select another option from the menu. You shouldn't normally need to change the language setting, as this is determined by the Windows locale settings. You can if you wish select one of four specific languages if needed, as shown below:



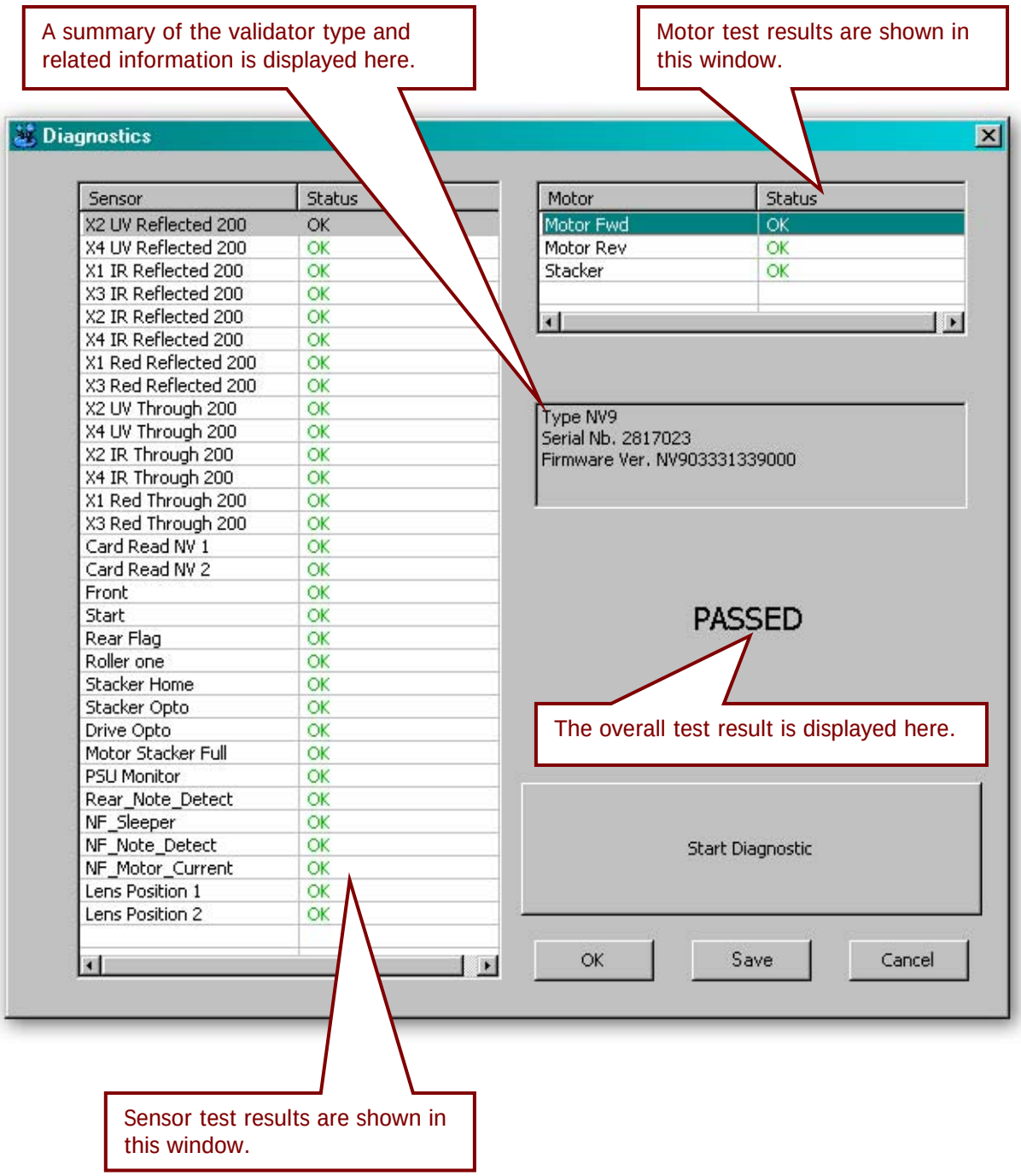


Select the 'Diagnostics' item from the 'Utilities' menu to start the diagnostics process (you can also start the diagnostics by clicking on the left hand icon below the menu bar) - this will open the Diagnostics screen:

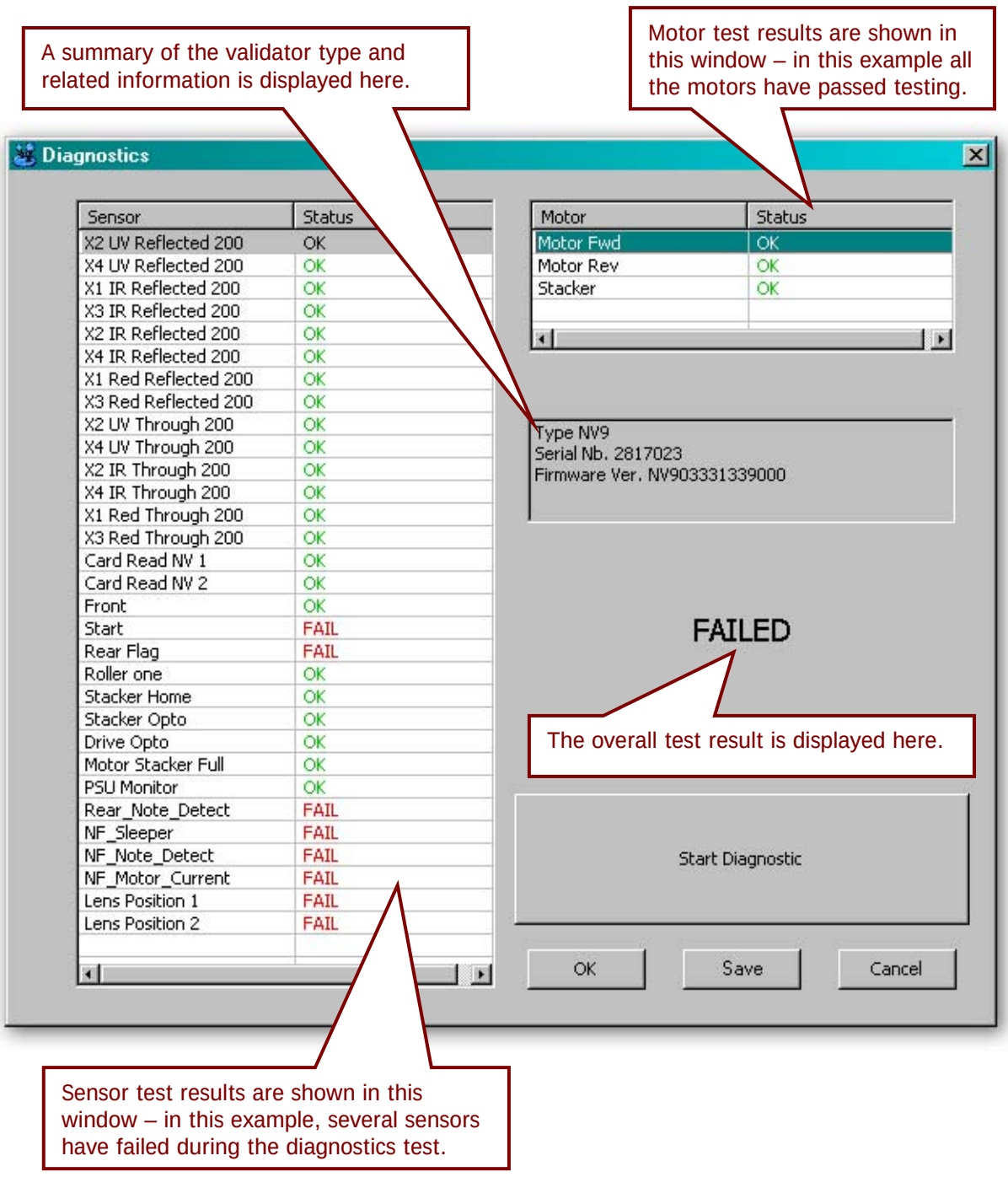


Click the 'Start Diagnostic' button to start the diagnostic process. The software will then prompt you to insert a special piece of green diagnostics paper (ITL part number LB149). Insert the paper in the same way you would with a bank note – at the end of the diagnostics test the paper will be ejected.

Diagnostics Pass:



Diagnostics Fail:



Further details on how to use the diagnostics tools and interpret the results can be found in the program help file.

3.3.2 Connections

The NV11 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 NV11 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

To use a USB connection with the NV11, a USB cable fitted with a 16 way connector on one end (ITL Part Number CN392) should be used. The CN392 cable fits into the 16 way connector and allows high speed programming and serial communications when used in SSP and ccTalk modes. When using the USB connection, power must be supplied to the NV11 using the red and black power leads on the CN392 cable.

The socket connections for the natively supported protocols are shown in the tables below, as is a summary of the interface units needed for other types of operation:

WARNING!

Risk of unit damage

Do not make any connections to the interface socket pins marked '**Do not connect**' – making connections to these pins could cause severe damage to the unit.

NV11 SSP Interface:

Pin	Name	Type	Description
1	TxD	Output	Serial data out (Tx)
2	Factory use only		**Do not connect**
3			
4			
5	RxD	Input	Serial data in (Rx)
6	Factory use only		**Do not connect**
7			
8			
9			
10			
11	USB D+	Data	USB Data +
12	USB D-	Data	USB Data -
13	USB Vcc	Power	USB +V (+5V)
14	Factory use only		**Do not connect**
15	V In	Power	+V
16	GND	Ground	GND

NV11 ccTalk Interface:

Pin	Name	Type	Description
1	TxD	Output	ccTalk data – must also be connected to pin 5
2	Factory use only		**Do not connect**
3			
4			
5	RxD	Input	ccTalk data – must also be connected to pin 1
6	Factory use only		**Do not connect**
7			
8			
9			
10			
11	USB D+	Data	USB Data +
12	USB D-	Data	USB Data -
13	USB Vcc	Power	USB +V (+5V)
14	Factory use only		**Do not connect**
15	V In	Power	+V
16	GND	Ground	GND

3.4 Frequently Asked Questions

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

- The NV11 has no dipswitches. Configuring the unit is carried out using a configuration button mounted on the front of the Note Float module – see Section 1, subsection 1.5 of this manual set for more information.

b. Are 64 bit drivers available?

- Both 32 and 64 bit drivers can be downloaded from the 'Support' section of the ITL website – please make sure that you are using the correct type of driver for your Operating System.

c. Some or all notes are not accepted

- Check that no inhibits are set in the PiPS software. If the problem persists, contact ITL Support for further assistance.

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SECTION 4

NV11 MANUAL SET

MECHANICAL AND ELECTRICAL MANUAL

INTELLIGENCE IN VALIDATION

Innovative Technology
INTELLIGENCE IN VALIDATION

Automated Transactions
INTELLIGENCE IN VALIDATION

Bellis Technology
INTELLIGENCE IN VALIDATION

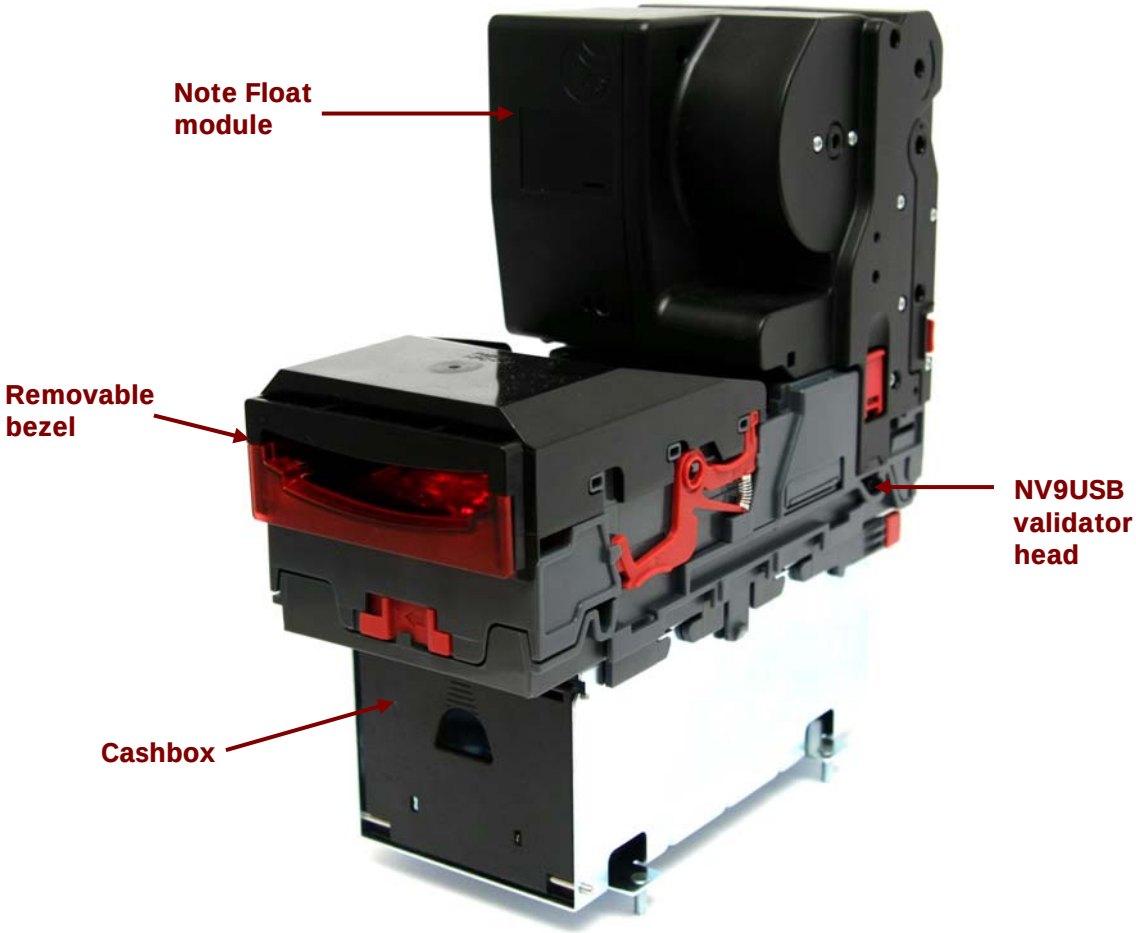
NV11 MANUAL SET – SECTION 4

4. MECHANICAL AND ELECTRICAL MANUAL

This section is one part of a complete manual set: Design Engineers who are designing a host machine cabinet, or looking to integrate the NV11 validator into an existing cabinet would need to read this section. This section contains the all the mechanical and electrical information a designer needs to effectively integrate the NV11 validator into a host machine.

4.1 Introduction

The NV11 validator is made up of four basic components: an NV9USB validator head, Note Float module, removable bezel and a cashbox (as shown below):



The NV11 is a device that can accept, validate and store 300 or 600 bank notes of mixed denominations, and also has the capability of storing a further 30 notes in the Note Float module for future payout.

Up to 16 different denominations of bank note can be accepted and stacked, and the Note Float module can be programmed to store and dispense 30 single denomination notes.

The NV11 is a LIFO (Last In First Out) system. This means that only the last note in the Note Float module is available to be paid out or moved to the stacker. Any value note can be routed into the Note Float module using the 'Set Routing' command. It is recommended that only one denomination of the chosen currency is stored in the Note Float module.

NV11
Rear View

NV11
Side View

NV11
Front View

Information

Validator compatibility.

The NV11 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).

The NV11 validator leaves the factory preset to at least one currency and dataset so that it is ready for immediate installation. The NV11 validator works with any NV9USB currency dataset created by Innovative Technology Ltd - datasets can be downloaded from the Support section of the ITL website.

4.2 Assembly and Fitting Instructions

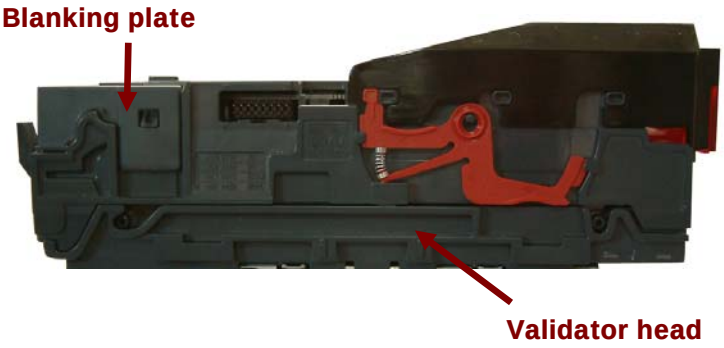
Installing the NV11 is a simple operation, but note that the validator can only be installed **horizontally**:

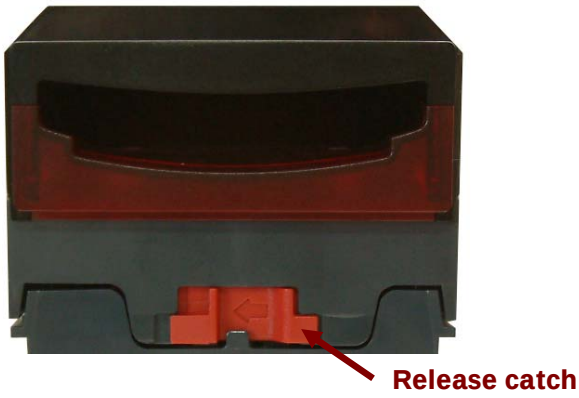
Information

Validator compatibility.

The NV11 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. If the validator head has a blanking plate fitted, you will need to remove this BEFORE attempting to fit the Note Float module. If the Note Float module is already fitted, please go to step 6
2. Open the validator head by sliding the red release catch on the front of the validator to the left (as indicated in the picture)



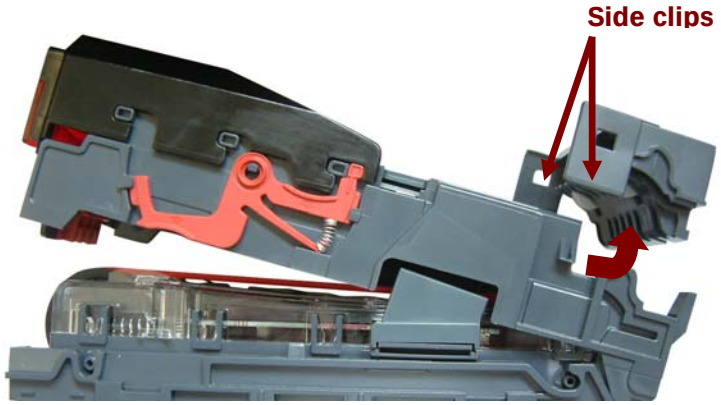


Caution!

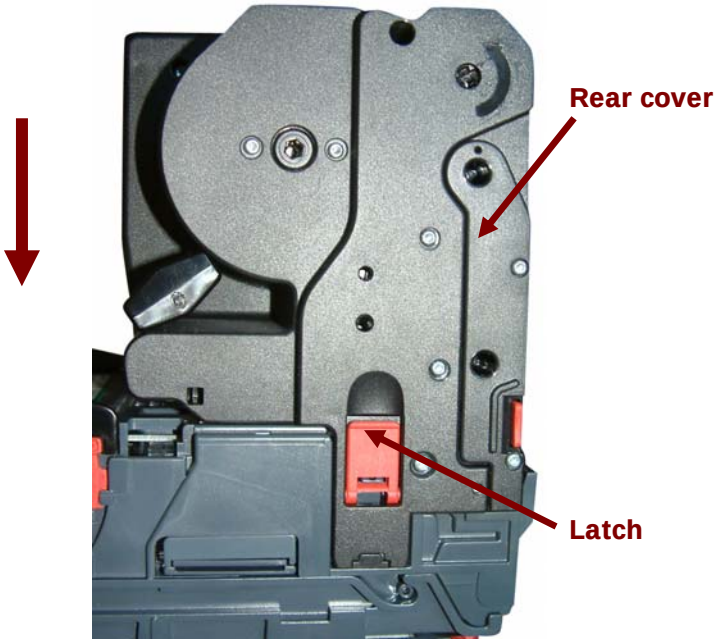
Validator head **MUST** be opened.

Always make sure the validator head has been opened **BEFORE** trying to remove the blanking plate – trying to remove the blanking plate with the validator head closed will cause unit damage.

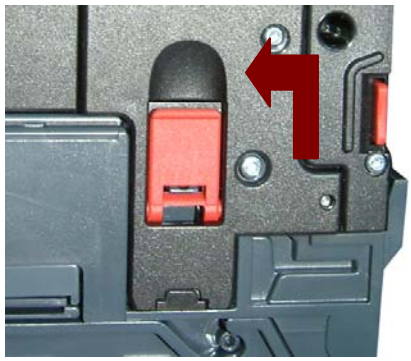
3. Remove the blanking plate by disengaging the two side clips and lifting the blanking plate upwards



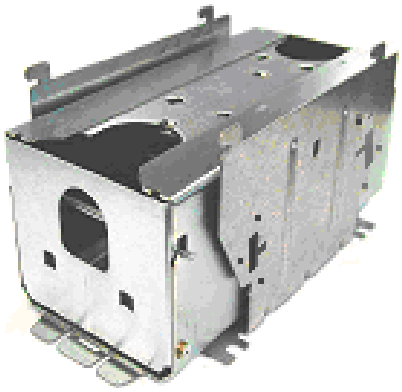
4. Close the validator head and then carefully fit the Note Float module onto the validator head, making sure the rear cover is securely closed and the latches are lined up correctly



5. Make sure both latches are engaged and closed

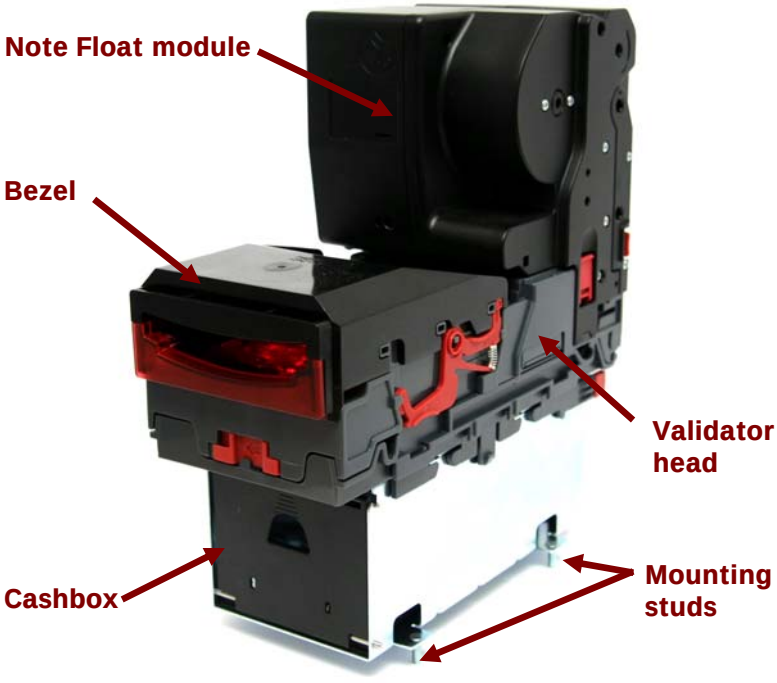


6. The validator can be fitted with a standard or slide-on cashbox of 300 or 600 note capacity



7. If not already attached, the validator can be fitted with a horizontal bezel of your choice.

8. The cashbox is attached to the validator by locating and sliding until the cashbox is clipped securely and secured in the host machine using the studs on the bottom of the cashbox



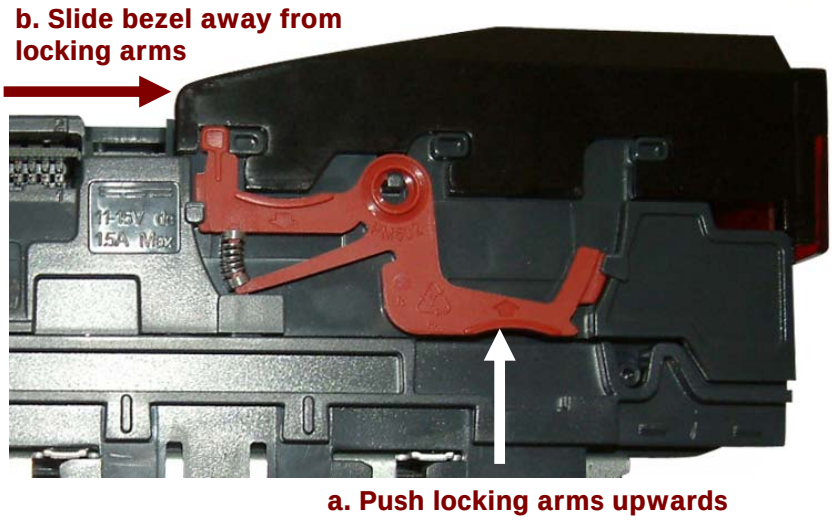
Information

Check website for options.

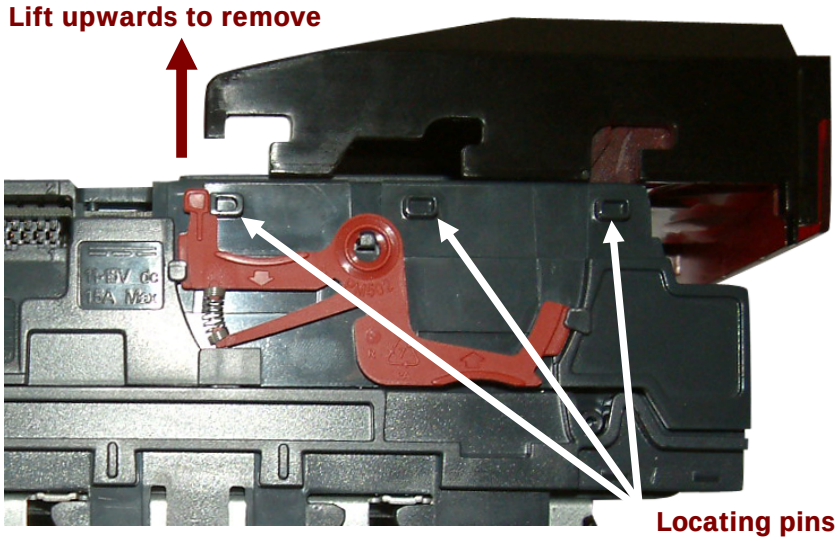
There are many variants of bezel and cashbox type available for the NV11 validator. Please check the ITL website (www.innovative-technology.co.uk) for up to date information on the options available.

4.3 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



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.

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

4.4 Technical Specifications

The full technical specifications for the NV11 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
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
Supply Current			
Standby			350 mA
Running			3 A
Peak (motor stall)			3.5 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 NV11 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 4 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).

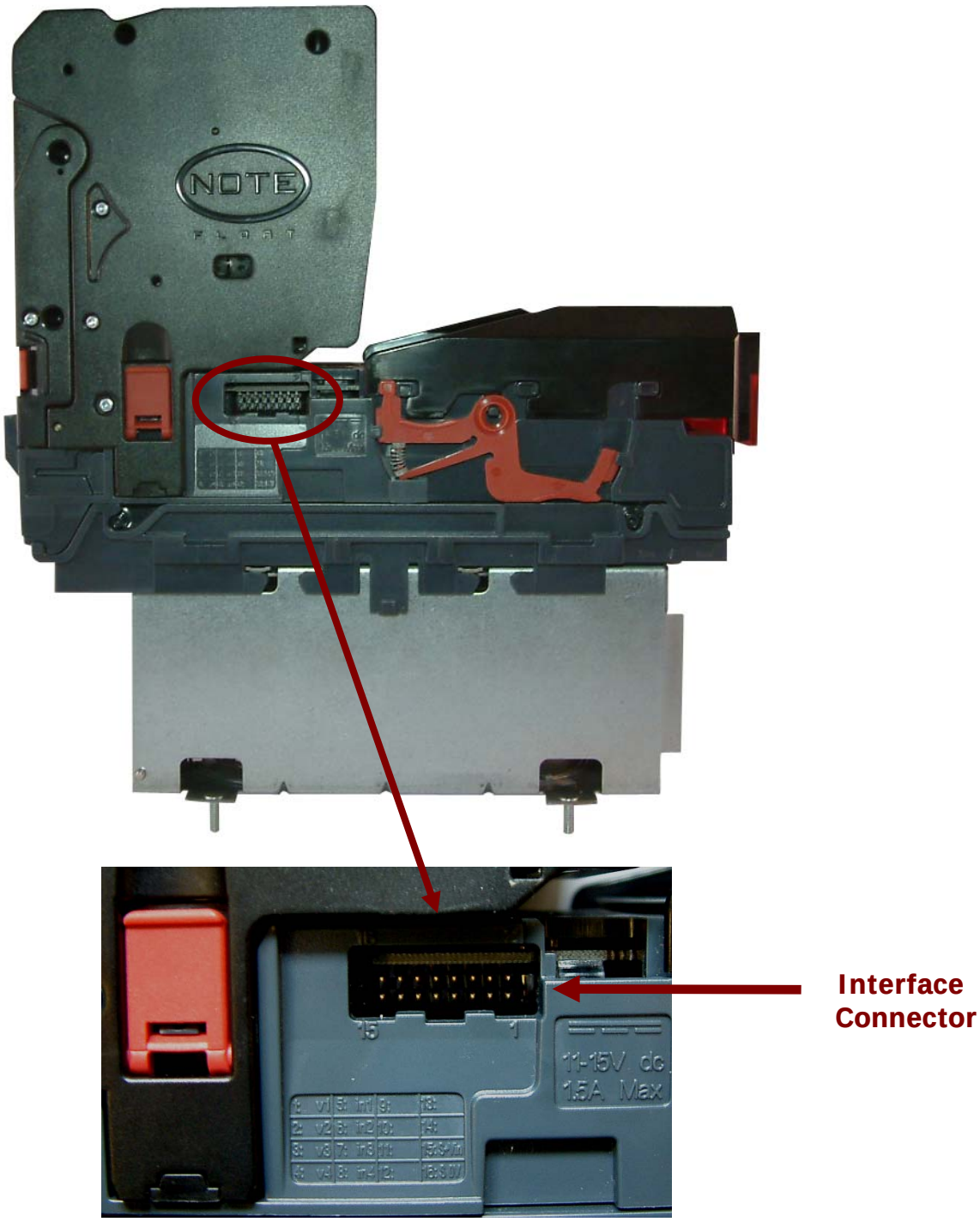
4.5 Cable Specifications

The **minimum** specification for wire used in power cables for the NV11 validator is given here:

Minimum AWG	Nominal current rating	Peak current rating	Cable rating	Insulation rating
26	3.0 A	3.5 A	4 A	80 °C

Do not use wire of an inferior specification, as this can cause operating problems with the validator.

4.6 Electrical Interfaces



The connector needed to set up and interface the NV11 validator is easily accessible on the side of the unit:

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 NV11 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

To use a USB connection with the NV11, a USB cable fitted with a 16 way connector on one end (ITL Part Number CN392) should be used. The CN392 cable fits into the 16 way connector and allows high speed programming and serial communications when used in SSP and ccTalk modes.

When using the USB connection, power must be supplied to the NV11 using the CN392 cable. The socket connections for the natively supported protocols are shown in the tables below:

WARNING!

Risk of unit damage

Do not make any connections to the interface socket pins marked '**Do not connect**' – making connections to these pins could cause severe damage to the unit.

NV11 SSP Interface:

Pin	Name	Type	Description
1	TxD	Output	Serial data out (Tx)
2	Factory use only		**Do not connect**
3			
4			
5	RxD	Input	Serial data in (Rx)
6	Factory use only		**Do not connect**
7			
8			
9			
10			
11	USB D+	Data	USB Data +
12	USB D-	Data	USB Data -
13	USB Vcc	Power	USB +V (+5V)
14	Factory use only		**Do not connect**
15	V In	Power	+V
16	GND	Ground	GND

NV11 ccTalk Interface:

Pin	Name	Type	Description
1	TxD	Output	ccTalk data – must also be connected to pin 5
2	Factory use only		**Do not connect**
3			
4			
5	RxD	Input	ccTalk data – must also be connected to pin 1
6	Factory use only		**Do not connect**
7			
8			
9			
10			
11	USB D+	Data	USB Data +
12	USB D-	Data	USB Data -
13	USB Vcc	Power	USB +V (+5V)
14	Factory use only		**Do not connect**
15	V In	Power	+V
16	GND	Ground	GND

4.7 Configuration Button

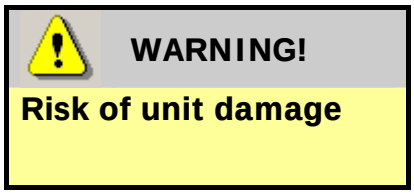
The NV11 does not use DIP switches to configure the unit – configuration and setting is carried out by using a Configuration Button mounted on the front of the Note Float module:

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

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 twice (within half a second)	Powered ON	Shows current interface type (see flash count table below)
Press once when Note Float module status LED is flashing (transport error)	Powered ON	Acknowledges that a note blockage has been cleared

Flash Count	Interface
1	SSP
6	ccTalk
6 , 1	ccTalk plain (16 bit)
6 , 1 , 2	ccTalk (8 bit)

The NV11 validator leaves the factory preset to at least one currency and one firmware interface so that it is ready for immediate installation.



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

4.8 Programming

Full details on programming the NV11 validator using software can be found in Section 3 of this manual set (ITL Software Support Guide).

It is not possible to program the NV11 by the use of a configuration card as this method of programming is not yet implemented.

4.9 Basic Operation

The NV11 validator is a device that can accept, validate and store 300 or 600 bank notes of mixed denominations, and works with any NV9USB currency dataset created by Innovative Technology Ltd.

Validated bank notes are stored in the NV11's cashbox, and bank notes accepted by the validator are not visible once inside the unit and can only be taken out of the cashbox manually.

The NV11 validator has inbuilt fault detection facilities. If there is a configuration or other error either the Note Float module status LED, or the NV9USB validator head front bezel will flash in a particular sequence; a summary of the Flash Codes for both units is shown below:

NV9USB Bezel Flash Codes:

Flashes		Indicated Error	Comments
Long	Short		
0	0	None	
1	2	Note path obstructed	Remove obstruction and follow the cleaning procedure in Section 2 of this manual set
	3	Unit not initialised	Contact ITL technical support
2	2	Cash box problem	Check that the cash box note plate is free to move and the stacker mechanism is in the home position
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	
	5	Incompatible firmware	Check the validator firmware is compatible with the Note Float module
4	1	Power supply too low	Check power supply
	2	Power supply too high	

Note Float Module Flash Codes:

Flashes	Indicated Error	Comments
0	None	
Constant flash (1 every second)	Note transport error	Remove trapped note from the Note Float module and press the configuration button once
2	Software error	Download new dataset / firmware
3	Calibration error	Return to service centre for repair
4	Diverter error	Check for trapped notes stopping the diverter returning to the home position
5	Motor timeout	Check for trapped notes stopping the Note Float module tape from moving

4.10 Spare Parts

ITL Part Number	Description	Details
CN215	Ribbon interface cable	Provides connection between DA2 and NV11
Comments: Please consult the tables on the next page for pin out and connector information.		

CN215 Parts List

Qty	Description	Supplier	Alternative
2	8 way 2 row 2.54mm pitch friction lock housing	Leotronics 2652-2161	Molex 90142-0016
8	Tin plated crimp socket 22-24 AWG	Leotronics 2653-2000	Molex 90119-0110
2	Black heat shrink sleeving	---	---
1	22 AWG stranded 4 core cable, PVC insulated	---	---

CN215 Connectivity

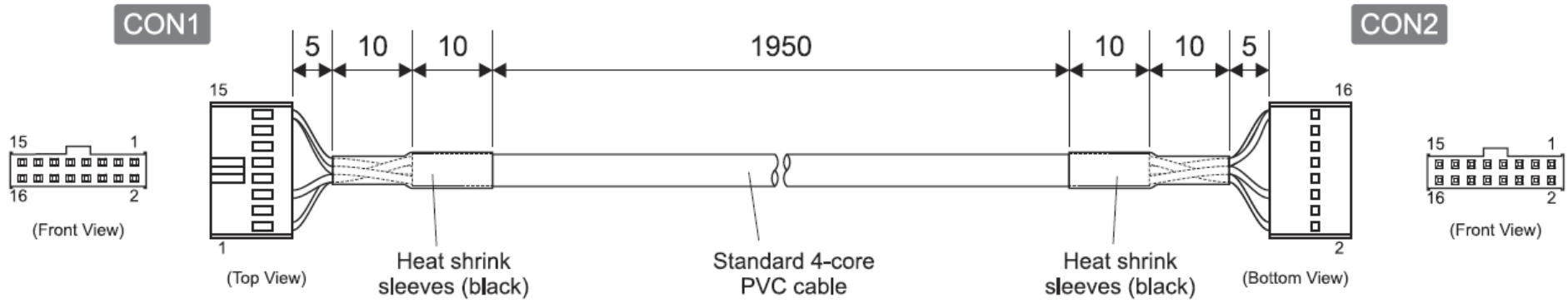
CON1	CON2	Gauge	Colour	Comments
Pin				
1	1	24 AWG	Orange	
5	5	24 AWG	Brown	
15	15	24 AWG	Red	V IN
16	16	24 AWG	Black	GND

Notes:
Pins 3, 4, 7, 8, 9, 10, 13 and 14 have no crimps fitted
Pins 2, 6, 11 and 12 have crimps fitted but these are not connected.

WARNING!
Use correct wire gauges

If you choose to make your own cables, you must make sure that the wire gauges are suitable for use with the validator. The minimum wire gauge for the CN292 cable is **24 AWG**, with **22 AWG** being recommended.

ITL Part Number	Description	Details
CN292	Interface cable	Provides connection between DA2 and NV11



Comments:

Please consult the tables on the next page for pin out and connector information.

CN292 Parts List

Qty	Description	Supplier	Alternative
2	8 way 2 row 2.54mm pitch friction lock housing	Leotronics 2652-2161	Molex 90142-0016
8	Tin plated crimp socket 22-24 AWG	Leotronics 2653-2000	Molex 90119-0110
2	Black heat shrink sleeving	---	---
1	22 AWG stranded 4 core cable, PVC insulated	---	---

CN292 Connectivity

CON1	CON2	Gauge	Colour	Comments
Pin				
1	1	24 AWG	Orange	
5	5	24 AWG	Brown	
15	15	24 AWG	Red	V IN
16	16	24 AWG	Black	GND

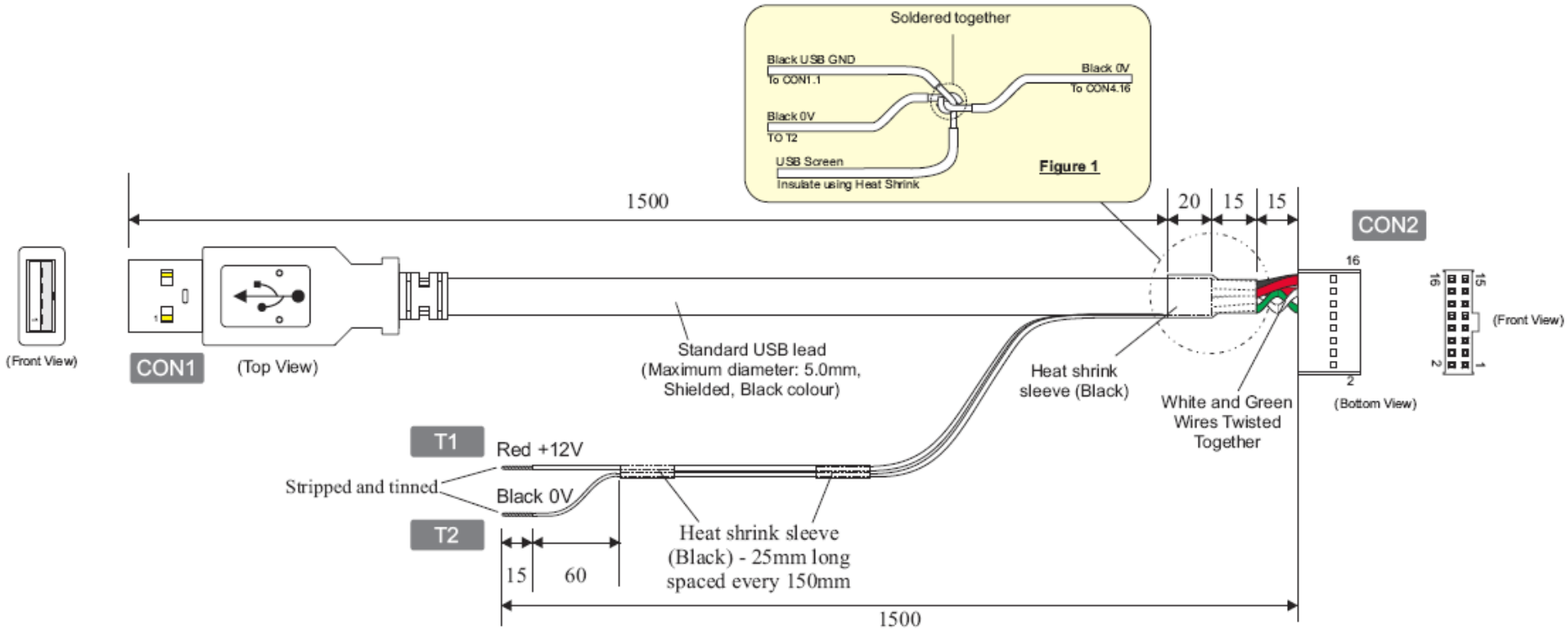
Notes:
Pins 3, 4, 7, 8, 9, 10, 13 and 14 have no crimps fitted
Pins 2, 6, 11 and 12 have crimps fitted but these are not connected.

WARNING!

Use correct wire gauges

If you choose to make your own cables, you must make sure that the wire gauges are suitable for use with the validator. The minimum wire gauge for the CN292 cable is **24 AWG**, with **22 AWG** being recommended.

ITL Part Number	Description	Details
CN392	Power and USB Communication Cable	USB 2.0 Compliant Type A to 16 way header cable



Comments:

Please consult the tables on the next page for pin out and connector information.

CN392 Parts List

Qty	Description	Supplier	Alternative
1	USB 2.0 lead with type A plug	Molex 88728-3400	RS 324-8362
2	8 way 2 row 2.54mm pitch friction lock housing	Molex 90142-0016	Leotronics 2652-2161
9	Gold plated crimp socket 22-24 AWG	Molex 90119-2110	Leotronics 2653-2000
2	Black heat shrink sleeving	---	---
2	26 AWG stranded single core cable, PVC insulated	---	---

CN392 Connectivity

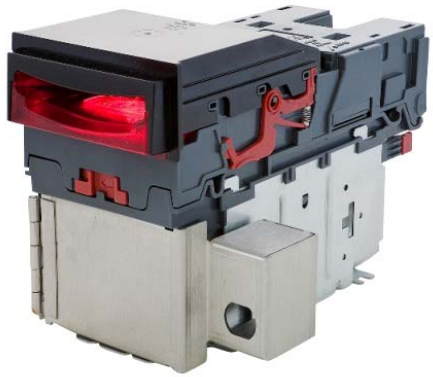
CON1	CON2	Gauge	Colour	Comments
Pin				
1	13		Red	USB +V (+5V)
2	12		White	USB Data – (twist together with Data +)
3	11		Green	USB Data + (twist together with Data -)
4	16		Black	USB GND - see figure 1 for connection detail
Screen	16		Black	See figure 1 for connection detail
---	16	26 AWG	Black	0V - see figure 1 for connection detail
---	15	26 AWG	Red	+12V - see figure 1 for connection detail
Notes: CON2 pins 1 - 4 have crimps fitted but these are not connected. CON2 pins 5 -10 and 14 have no crimps fitted				

WARNING!

Use correct wire gauges

If you choose to make your own cables, you must make sure that the wire gauges are suitable for use with the validator. The minimum wire gauge for the CN392 cable is **26 AWG**, with **24 AWG** being recommended.

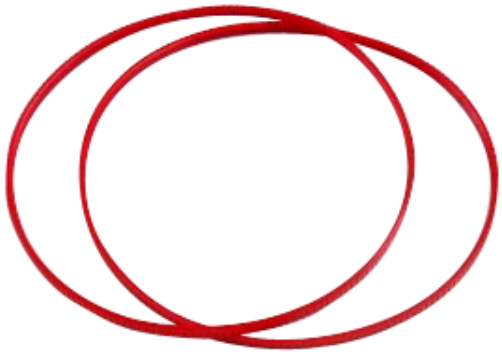
Bezels		
ITL Part Number	**Description**	
PA189	Horizontal Bezel Assembly	
PA268	69mm Fixed Width Horizontal Bezel	No image available
PA896	Horizontal Bezel Assembly	

Cashboxes		
PA186	Locking Cashbox Assembly (300L)	
PA192	Slide-on Cashbox Assembly (300S)	
PA898	Standard Cashbox Assembly	

Information

Check website for options.

There are many variants of bezel and cashbox type available for the NV11 validator. Please check the ITL website (www.innovative-technology.co.uk) for up to date information on the options available.

Drive Belts		
FD106	NV9USB Red Drive Belt	

4.11 Guidance Notes

Cleaning

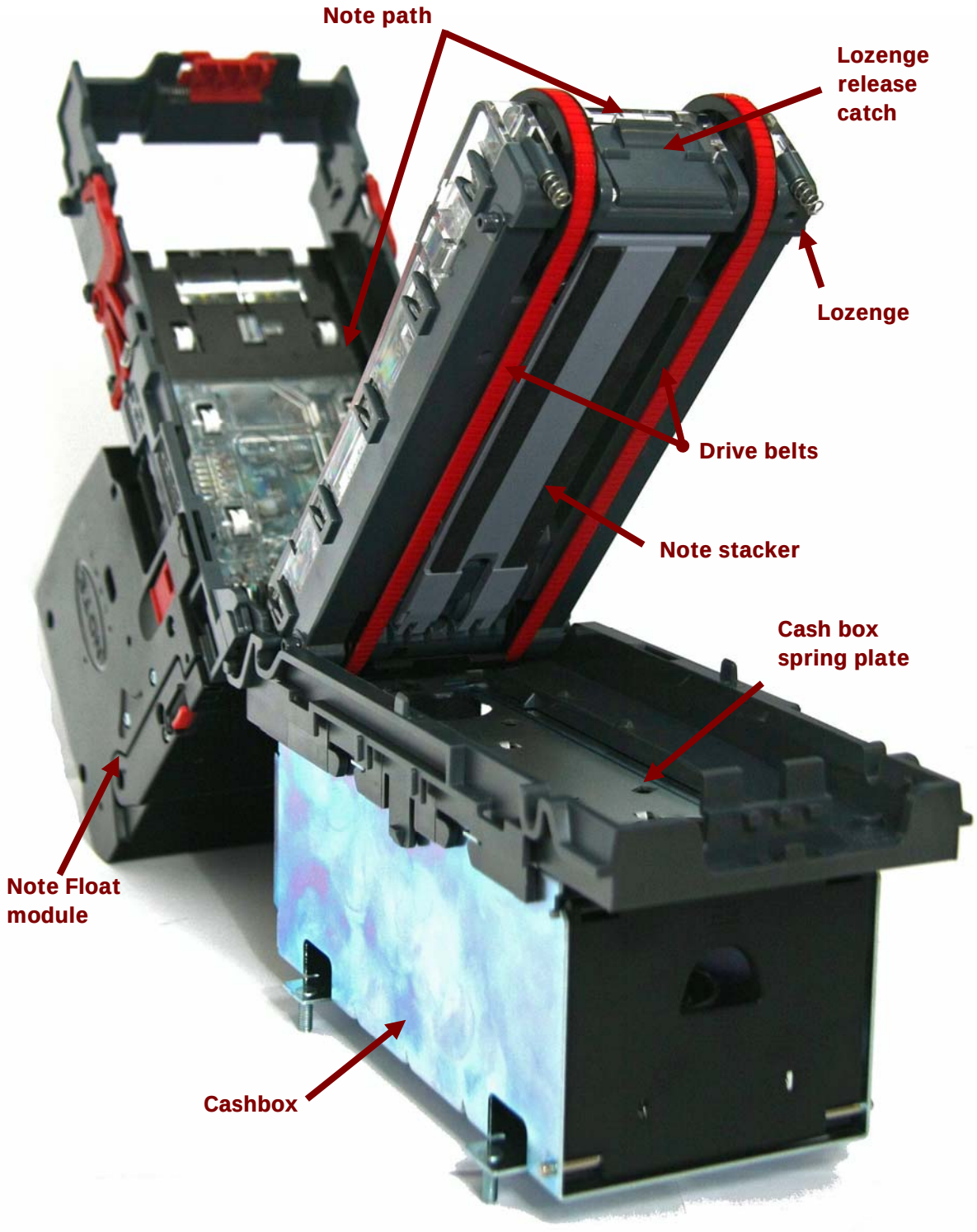
The NV11 validator has been designed in a way to prevent damage and airborne contamination reaching the optical sensors; however, depending upon the environment the NV11 may require occasional cleaning or belt changing.

Caution!

Do not use solvent based cleaners on any part of the NV11 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 NV11, 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



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.

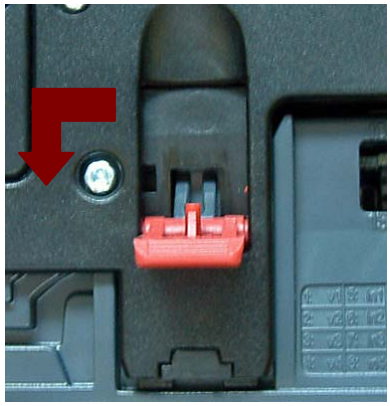
Ideally, you should also remove the Note Float module prior to cleaning the sensors - removal is a very straightforward task:

WARNING!

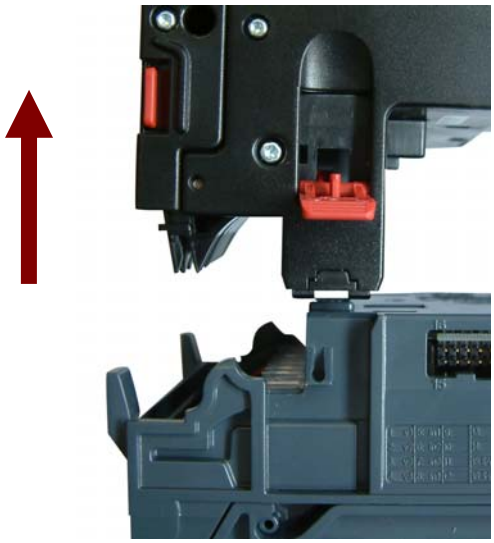
Do not try to disassemble

Do not attempt to disassemble the Note Float module – there are no user serviceable parts inside and trying to disassemble the module could cause personal injury and will also damage the unit beyond repair.

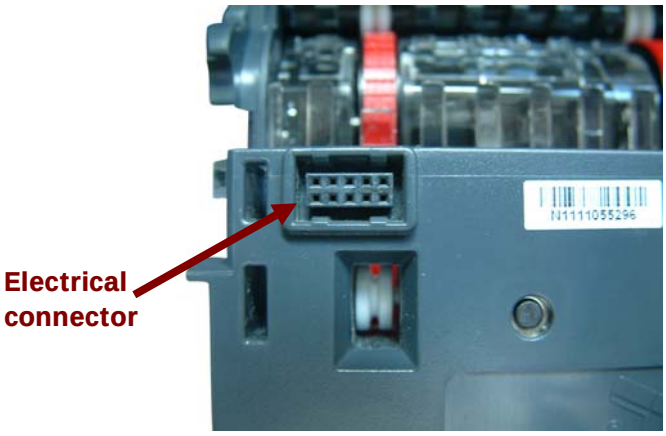
1. Open both the Note Float side latches as shown

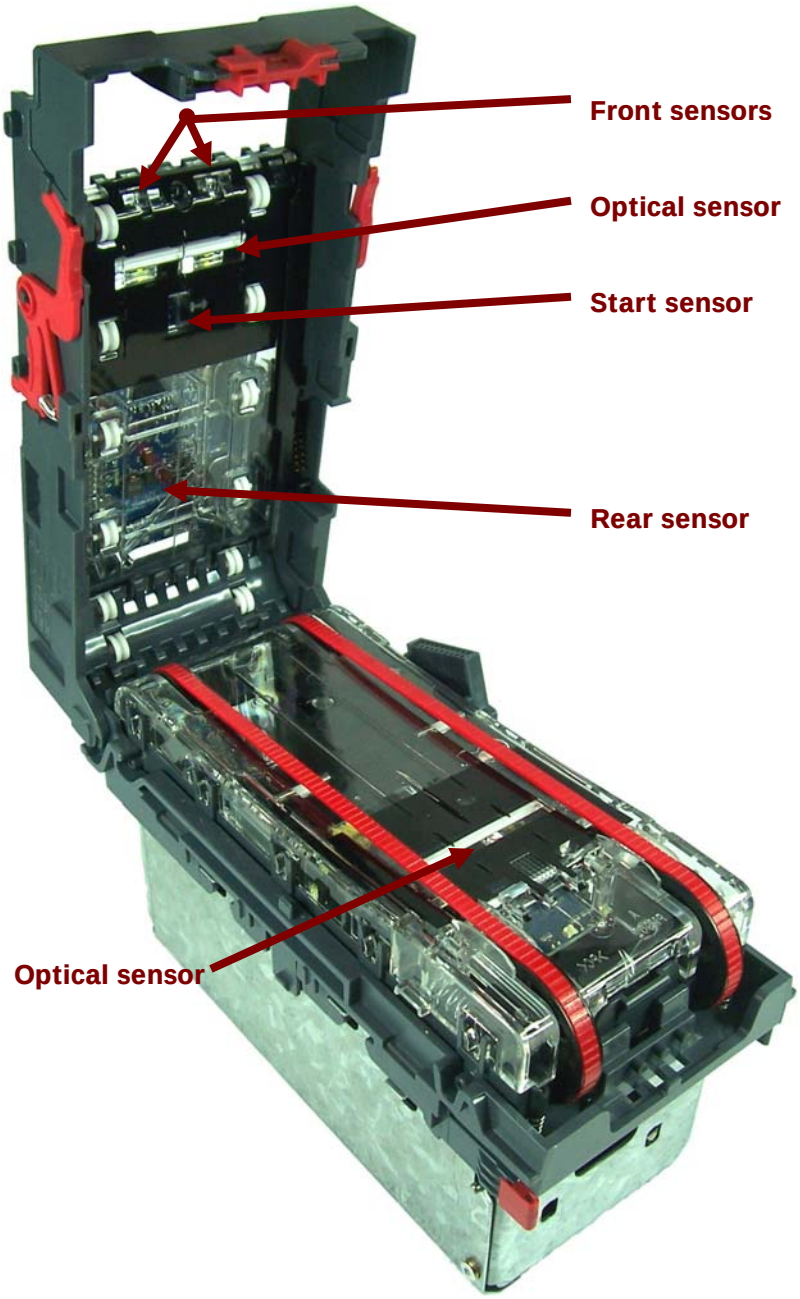


2. Carefully lift the Note Float module upwards and clear of the validator head



3. To refit the Note Float module, reverse the procedure – make sure that the electrical connectors and latches are lined up correctly





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.

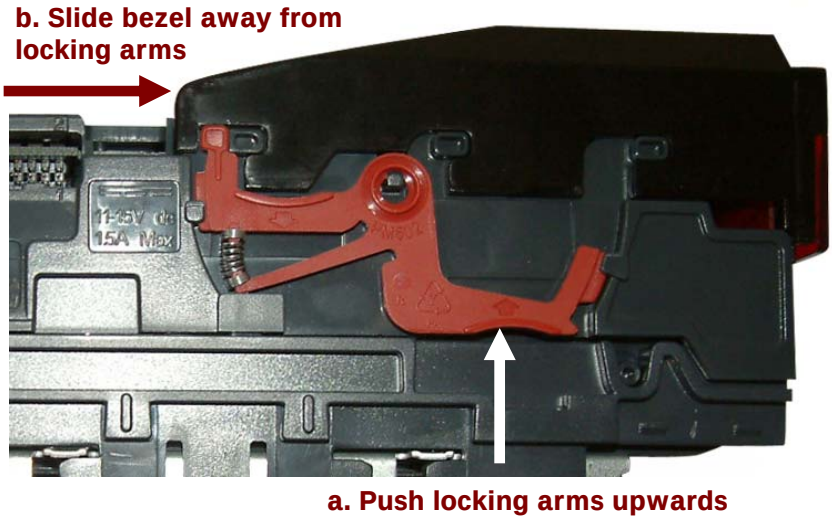
Caution!

Be careful cleaning sensors.

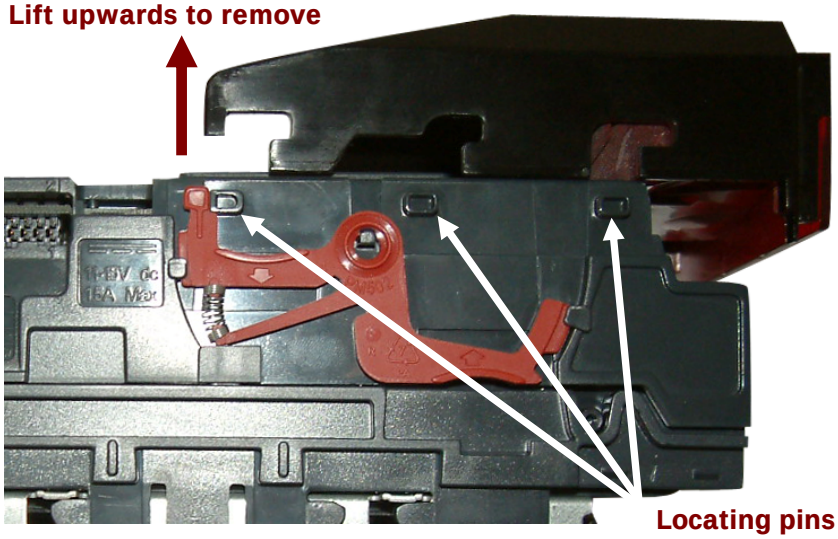
When cleaning the recessed front sensor, use a small soft brush or cotton bud – do not use anything sharp or abrasive.

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

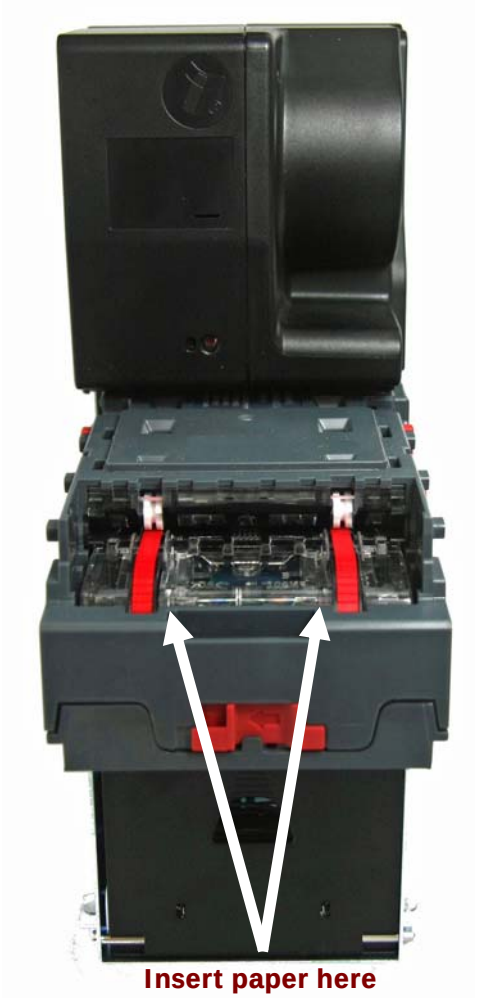


- Lift the bezel off once the bezel has been slid fully across and is clear of the locating pins



- 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 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.

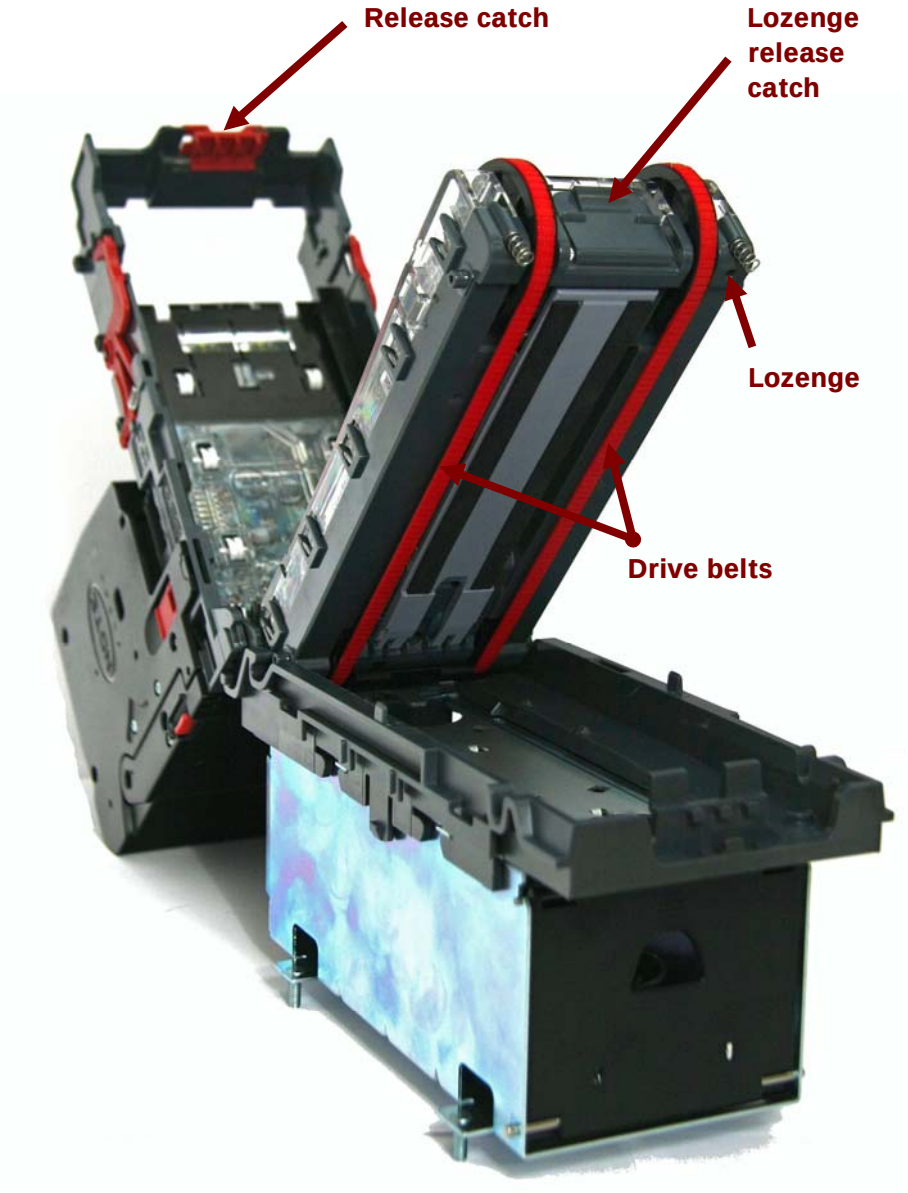
If the belts are worn or damaged, they should be replaced. This is a simple procedure, and is carried out as follows:

WARNING!

Do not try to disassemble

Do not attempt to disassemble the validator head or Note Float module – trying to do this could cause personal injury and will 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



Manual Note Removal

It is unlikely that you will need to manually remove notes from the Note Float module, but there may be occasions where this needs to be done. Depending on the situation, there are two methods that can be used.

Transport Error:

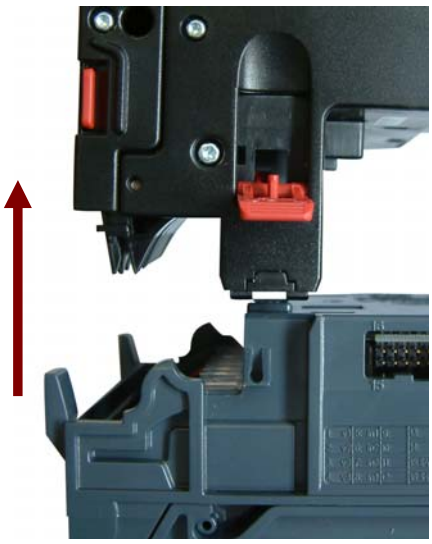
If the Note Float module status LED is flashing once every second, this indicates a note transport error. To correct the problem, follow the following steps.

Caution!

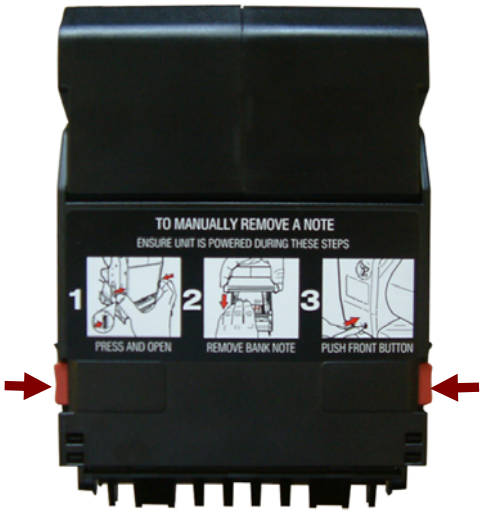
Risk of damage

If you need to follow this procedure, the NV11 should be powered off and the Note Float module removed from the validator. The rear cover of the Note Float module is mechanically interlocked with the validator head – if you try to force the cover open the module and validator could be damaged beyond repair.

1. Remove the Note Float module from the validator head by opening the two side latches and lifting the module upwards

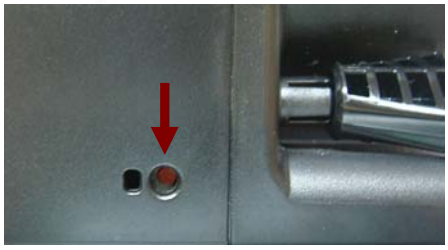


2. Open the Note Float module rear cover by pressing in the two red buttons, then lift the cover



3. Carefully remove the bank note, then close the cover firmly and refit the module onto the validator head

Press the Configuration Button once after powering up the NV11 to decrease the note count by 1



Manual Emptying:

In the unlikely event that you need to remove all the bank notes from the Note Float module, this can be done following the steps below (after removing the Note Float module from the validator head as detailed previously). There is a special cross point tool (ITL part number **PM979**) used to manually operate the module's transport mechanism – please do not use any other tool as you may damage the mechanism.

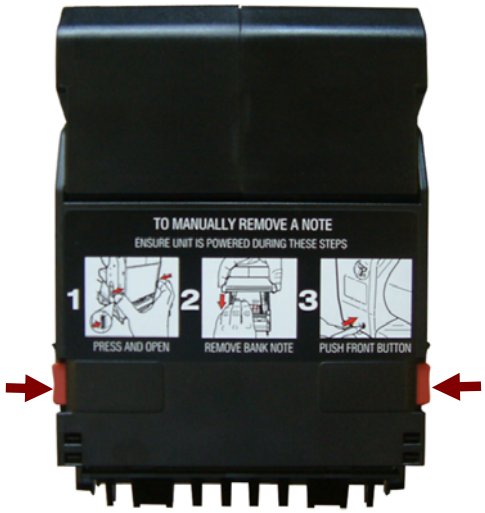
Caution!

Risk of serious damage to Note Float module internal mechanism

If you need to follow this procedure, only use the PM979 cross point tool and take great care not to over wind the mechanism or force past the dead stops – if you do the module will be damaged beyond repair.

1. Remove the PM979 cross point tool from the stowage location on the side of the Note Float module by pulling the tool away from the module

2. Open the Note Float module rear cover by pressing in the two red buttons, then lift the cover



3. Insert the cross head tool into the top drive roller as shown here

4. Turn the roller with the cross point tool **ANTICLOCKWISE** (as indicated by the arrow) until all the bank notes have been removed

After removing all the bank notes, close the rear cover firmly, place the cross point tool back in the stowage position and refit the module onto the validator.

WARNING!

Do not attempt disassembly

Do not attempt to disassemble the Note Float module or remove the side covers to try and remove any notes inside, as the module will be damaged beyond repair. Always follow the procedure given above.

After removing bank notes manually, an 'EMPTY' command should be run when the unit is powered back up.

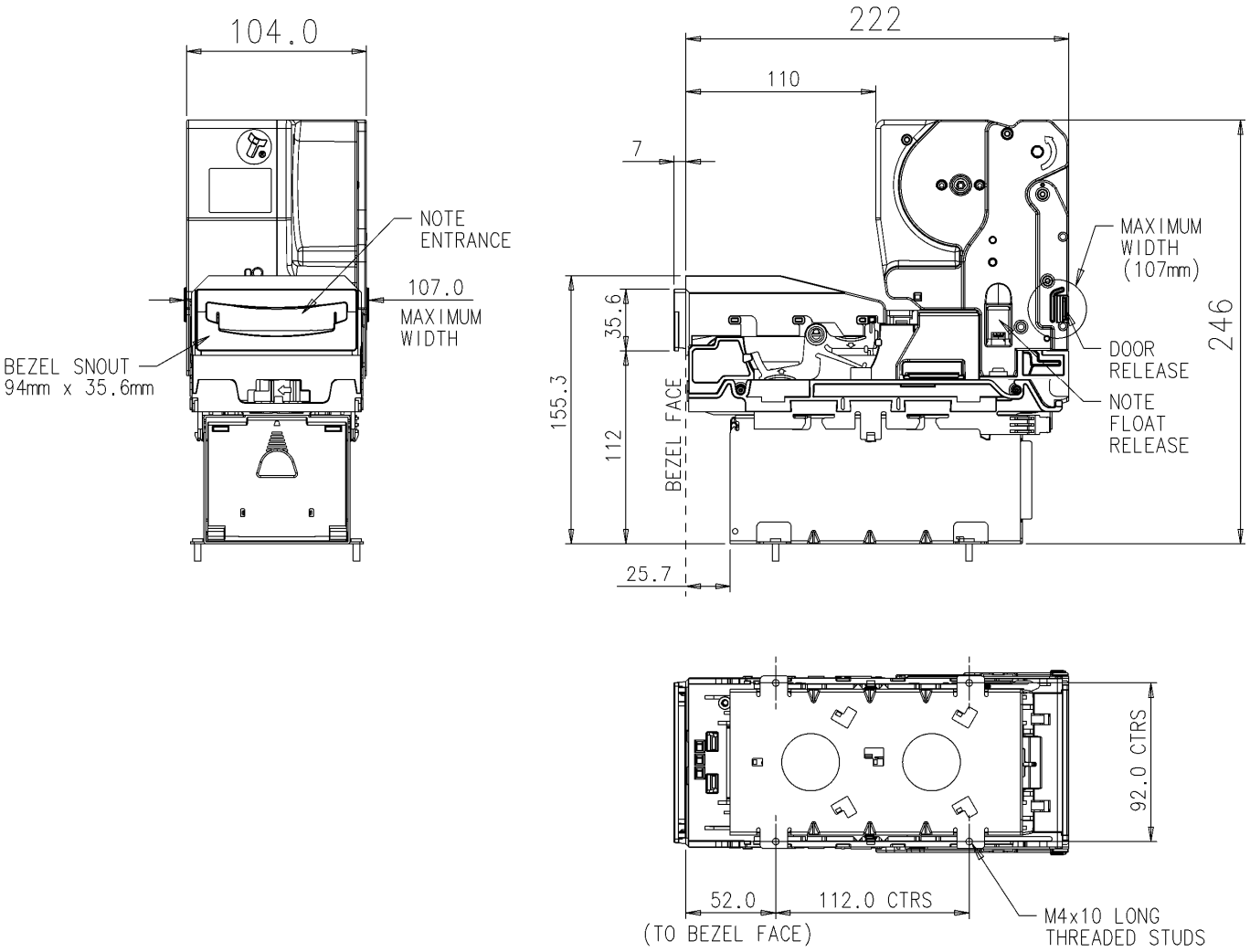
Re-Initialisation

The NV11 validator has an in-built self-calibration system that keeps the optical sensors in optimum operating condition. However if the NV11 is disassembled for any reason it also will need to be re-initialised - re-initialisation can only be carried out by ITL's technical support team.

4.12 Drawings and Schematics

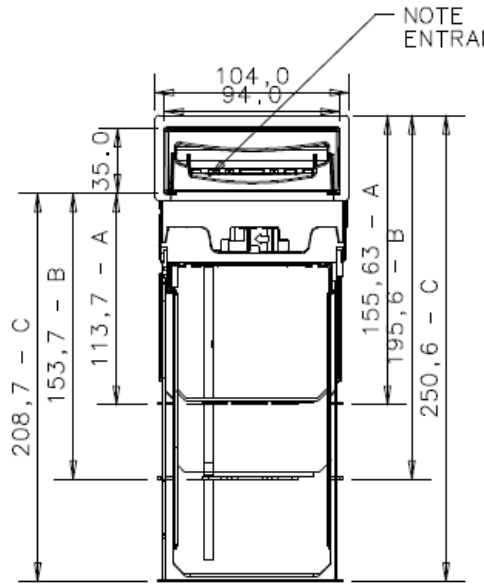
NOTE: If required, IGES 3D models are available on request from ITL technical support.

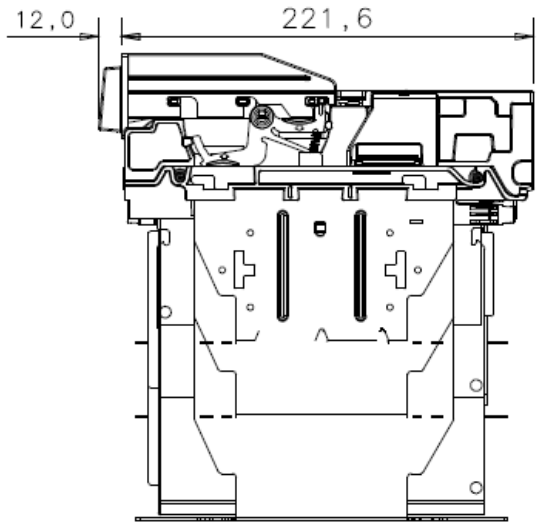
NV11:



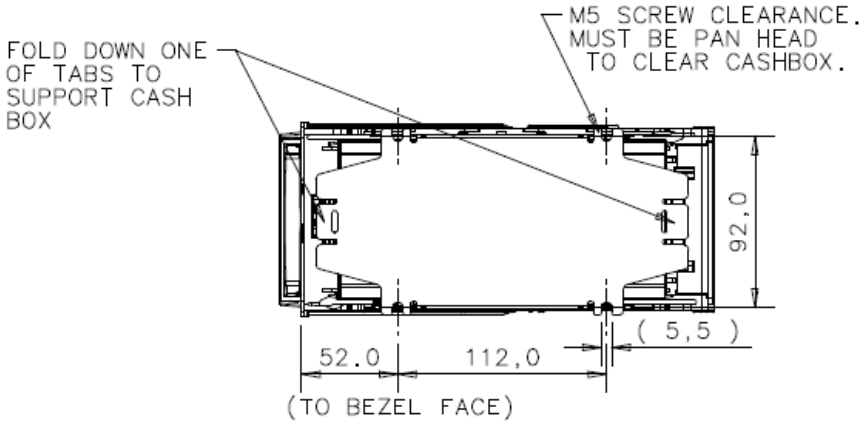
Cashbox Options:

A	300 SLIDE-IN CASH BOX
B	600 SLIDE-IN CASH BOX
C	1000 SLIDE-IN CASH BOX

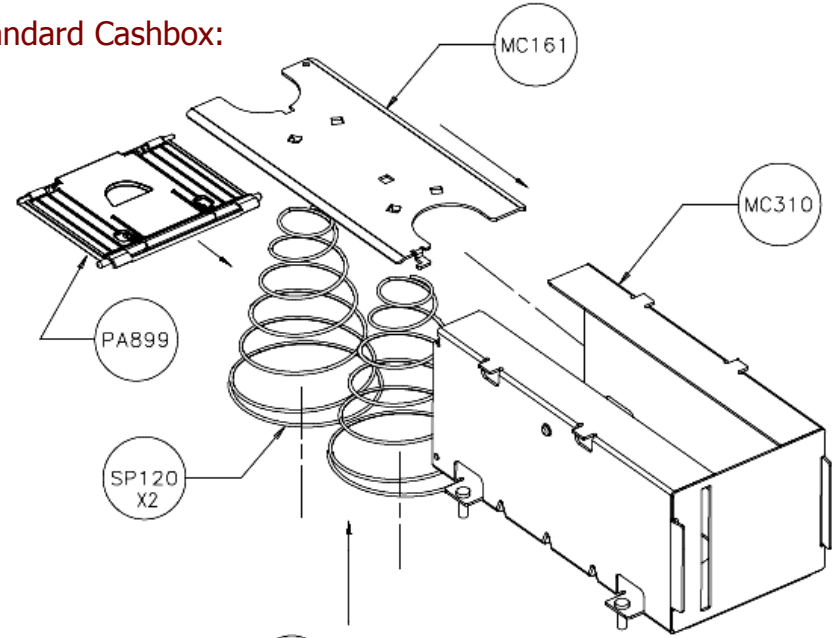


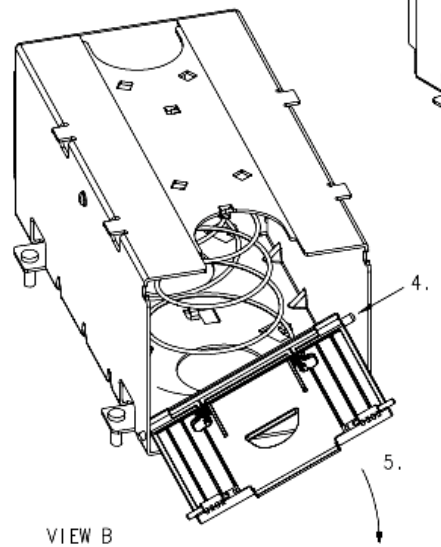


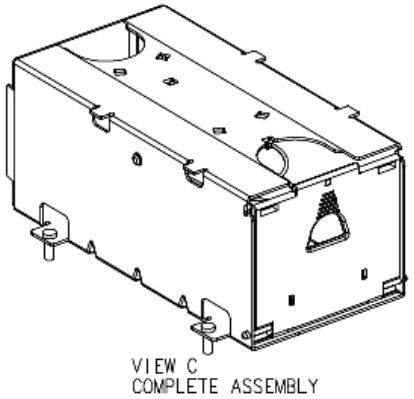
ACCEPTS NOTES UP TO 82mm x 160mm LONG

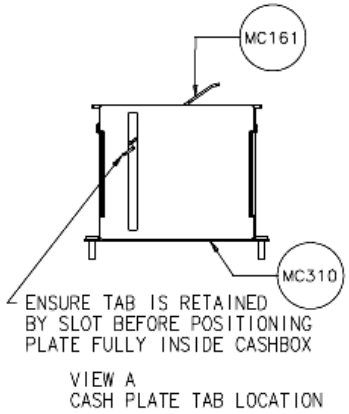


Standard Cashbox:









Assembly instructions:	
1. Clip two springs (SP120) to the cash plate (MC161), then slide the assembly into the cash box (MC310) making sure the cash plate is above the cash box slot	4. Fit the cash box door (PA899) to the cash box by pushing the door shaft flush to the door edge at one end and inserting the extended part of the shaft into the pivot hole in the cash box (see View 'B')
2. Secure the springs to the cash box floor using the 6 tabs in the base of the cash box	5. Twist the cash box door so the free end of the shaft slides into the other cash box pivot hole (see View 'B')
3. Twist the cash plate and insert the end tab into the cash box slot (see View 'A'), then push the plate fully into the cash box (see View 'C')	6. Push the cash box door closed (see View 'C')

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SECTION 5

NV11 MANUAL SET

SOFTWARE IMPLEMENTATION GUIDE

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NV11 MANUAL SET – SECTION 5

5. SOFTWARE IMPLEMENTATION GUIDE

5.1 Communication Protocols

The NV11 validator can use two different communication protocols - SSP/eSSP and ccTalk.

Smiley® Secure Protocol (SSP) is a secure serial interface specifically designed to address the problems experienced by cash systems in gaming machines. Problems such as acceptor swapping, reprogramming acceptors and line tapping are all addressed.

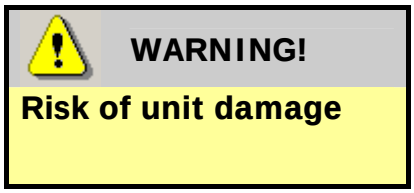
Encrypted Smiley® Secure Protocol (eSSP) is an enhancement of SSP. eSSP uses the same 16 bit CRC checksums on all packets as SSP, but also uses a Diffie-Hellman key exchange to allow the host machine and validator to jointly establish a shared secret key over an insecure communications channel. The encryption algorithm used is AES with a 128-bit key; this provides a very high level of security.

The recommended communication protocol for the NV11 validator is eSSP, as this provides the highest level of data transfer security. A ccTalk interface protocol is also available.

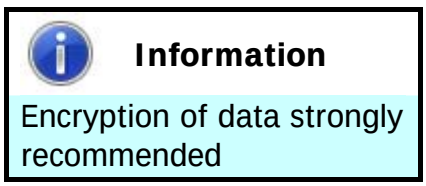
For detailed information and the full protocol specifications please read the following documents, which can be downloaded from the Innovative Technology Ltd website (www.innovative-technology.co.uk):

- SSP Interface Specification (ITL Document number GA138)
- ccTalk Communications Protocol Specification [additional commands] (ITL Document number GA964)
- ITL Bank Note Reader ccTalk Specification (ITL Document number GA966)

Summaries of the NV11 validator socket connections for the supported interfaces are shown below:



Do not make any connections to the interface socket pins marked '**Do not connect**' – making connections to these pins could cause severe damage to the unit.



It is recommended that all transactions with the NV11 validator be encrypted to prevent commands being recorded and replayed by an external device. If this is not possible, then other (mechanical) measures should be used to prevent physical bus tapping.

NV11 SSP Interface:

Pin	Name	Type	Description
1	TxD	Output	Serial data out (Tx)
2	Factory use only		**Do not connect**
3			
4			
5	RxD	Input	Serial data in (Rx)
6	Factory use only		**Do not connect**
7			
8			
9			
10			
11	USB D+	Data	USB Data +
12	USB D-	Data	USB Data -
13	USB Vcc	Power	USB +V (+5V)
14	Factory use only		**Do not connect**
15	V In	Power	+V
16	GND	Ground	GND

NV11 ccTalk Interface:

Pin	Name	Type	Description
1	TxD	Output	ccTalk data – must also be connected to pin 5
2	Factory use only		**Do not connect**
3			
4			
5	RxD	Input	ccTalk data – must also be connected to pin 1
6	Factory use only		**Do not connect**
7			
8			
9			
10			
11	USB D+	Data	USB Data +
12	USB D-	Data	USB Data -
13	USB Vcc	Power	USB +V (+5V)
14	Factory use only		**Do not connect**
15	V In	Power	+V
16	GND	Ground	GND

5.2 Configuration Card Programming

It is not possible to program the NV11 by the use of a configuration card as this method of programming is not yet implemented. Full details on programming the NV11 validator using software can be found in Section 3 of this manual set (ITL Software Support Guide).

5.3 SSP and eSSP

Smiley® Secure Protocol (SSP) is a secure serial interface specifically designed to address the problems experienced by cash systems in gaming machines. Problems such as acceptor swapping, reprogramming acceptors and line tapping are all addressed.

Encrypted Smiley® Secure Protocol (eSSP) is an enhancement of SSP. eSSP uses the same 16 bit CRC checksums on all packets as SSP, but also uses a Diffie-Hellman key exchange to allow the host machine and validator to jointly establish a shared secret key over an insecure communications channel. The encryption algorithm used is AES with a 128-bit key; this provides a very high level of security.

The encryption of the SSP protocol ensures superior protection and reliability of the data, which is transferred between validator and host machine. The encryption key is divided into two parts:

- The lower 64 bits are fixed and specified by the machine manufacturer allowing control of which devices are used in their machines.
- The higher 64 bits are securely negotiated by the slave and host at power up, ensuring each machine and each session are using different keys.

The interface uses a master-slave model; the host machine is the master and the peripherals (note acceptor, coin acceptor or coin hopper) are the slaves. Data transfer is over a multi-drop bus using clock asynchronous serial transmission with simple open collector drivers. Each SSP device of a particular type has a unique serial number; this number is used to validate each device in the direction of credit transfer before transactions can take place.

Information

200 ms command spacing

When communicating with the NV11 validator, poll commands should be sent **at least** 200 ms apart.

SSP Commands and Responses

a. Commands

Action	Command Code (Hex)	Command Set
Reset	0x01	Generic
Host Protocol Version	0x06	
Poll	0x07	
Get Serial Number	0x0C	
Synchronisation command	0x11	
Disable	0x09	
Enable	0x0A	
Program Firmware / currency	0x0B (Programming Type)	
Manufacturers Extension	0x30 (Command, Data)	
Set inhibits	0x02	Validator
Display On	0x03	
Display Off	0x04	
Set-up Request	0x05	
Reject	0x08	
Unit data	0x0D	
Channel Value data	0x0E	
Channel Security data	0x0F	
Channel Re-teach data	0x10	
Last Reject Code	0x17	
Hold	0x18	

Action	Command Code (Hex)	Command Set
Enable Protocol Version Events	0x19 (made obsolete in protocol version 6)	Validator
Get Bar Code Reader Configuration	0x23	
Set Bar Code Reader Configuration	0x24	
Get Bar Code Inhibit	0x25	
Set Bar Code Inhibit	0x26	
Get Bar Code Data	0x27	
Enable Payout Device *	0x5C, Options	Note Float
Disable Payout Device	0x5B	
Set Routing *	0x3B (route, value/channel (Country code))	
Get Routing *	0x3C (value/channel (Country code))	
Empty	0x3F	
Get Note Positions *	0x41	
Payout Note	0x42	
Stack Note	0x43	
Set Value Reporting Type *	0x45 (type)	
SMART empty	0x52	
Cashbox Payout Operation Data	0x53	

The commands marked with * will respond with the generic response 'Command cannot be processed' and an error code of 'Invalid Currency' if there are notes inside the Note Float module that do not match the dataset that is installed in the validator.

Notes:

Action	Comments
Reset:	Single byte command, causes the slave to reset
Host Protocol Version:	Dual byte command, the first byte is the command; the second byte is the version of the protocol that is implemented on the host.
Poll:	Single byte command, no action taken except to report latest events.
Get Serial Number:	Single byte command, used to request the slave serial number. Returns 4-byte long integer.
Sync:	Single byte command, which will reset the validator to expect the next sequence ID to be 0.
Disable:	Single byte command, the peripheral will switch to its disabled state, it will not execute any more commands or perform any actions until enabled, any poll commands will report disabled.
Enable:	Single byte command, the peripheral will return to service.
Manufacturers Extension:	This command allows the manufacturer of a peripheral to send commands specific to their unit
Enable Payout Device:	Two-byte command, the first byte is the command and the second enables several different options. Unused bits should be 0.
Disable Payout Device:	Single-byte command. All accepted notes will be routed to the stacker and payout commands will not be accepted.
Set Routing:	The first byte is the command. The second byte is the selected route, and the remaining bytes are the four-byte value or single byte channel number (depending on the reporting type selected) of the note that the route should be applied to. By default all note values are stacked. For protocol version 6, three extra country code bytes are sent
Empty:	Single byte command, this will cause all notes to be sent to the stacker for removal.
Get Note Positions:	Single byte command, this will return the number of notes in the Note Float module and the value in each position. The first note in the table is the first note that was paid into the Note Float module - the Note Float module is a LIFO system, so the note that is last in the table is the only one that is available to be paid out or moved into the stacker.

Action	Comments
Payout Note:	This is a single byte command. The Note Float module will pay out the last note that was stored. This is the note that is in the highest position in the table returned by the Get Note Positions Command. If the payout is possible the Note Float will reply with the generic response 'OK'.
Stack Note:	This is a single byte command. The Note Float module will stack the last note that was stored. This is the note that is in the highest position in the table returned by the Get Note Positions Command. If the stack operation is possible the Note Float will reply with the generic response 'OK'.
Set Value Reporting Type:	Two-byte command. This will set the method of reporting values of notes. There are two options, by a four-byte value of the note or by the channel number of the value from the banknote validator. If the channel number is used then the actual value must be determined using the data from the Validator command Unit Data. The default operation is by 4-byte value.
SMART empty:	Empties the Note Float module of notes, maintaining a count of value emptied. The note counters will be set to 0 after running this command. Use 'cashbox payout operation data' command to retrieve a breakdown of the denominations routed to the cashbox through this operation.
Cashbox Payout Operation Data:	This command can be sent at the end of a SMART Empty, float or dispense operation. Returns the amount emptied to cashbox from the Note Float in the last dispense, float or empty command. The quantity of denominations in the response is sent as a 2 byte little endian array; the note values as 4-byte little endian array and the country code as a 3-byte ASCII array. Each denomination in the dataset will be reported, even if 0 notes of that denomination are emptied.

b. Responses

Action	Command Code (Hex)	Command Set
OK	0xF0	Generic
Command not known	0xF2	
Wrong number of parameters	0xF3	
Parameter out of range	0xF4	
Command cannot be processed	0xF5	
Software Error	0xF6	
FAIL	0xF8	
Key Not Set	0xFA	
Slave Reset	0xF1	Validator
Read, n	0xEF, Channel Number	
Credit, n	0xEE, Channel Number	
Rejecting	0xED	
Rejected	0xEC	
Stacking	0xCC	
Stacked	0xEB	
Safe Jam	0xEA	
Unsafe Jam	0xE9	
Disabled	0xE8	
Fraud Attempt, n	0xE6, Channel Number	
Stacker Full	0xE7	
Note cleared from front at reset	0xE1, Channel Number	

Action	Command Code (Hex)	Command Set
Note cleared into cash box at reset	0xE2, Channel Number	Validator
Cash Box Removed	0xE3	
Cash Box Replaced	0xE4	
Bar Code Ticket Validated	0xE5	
Bar Code Ticket Acknowledge	0xD1	
Note Path Open	0xE0	
Channel Disable	0xB5	
Dispensing	0xDA, value/channel dispensing	Note Float
Dispensed	0xD2, value/channel dispensed	
Jammed	0xD5, value/channel dispensing	
Halted	0xD6	
Incomplete Payout	0xDD, value/channel dispensed, value/channel requested	
Emptying	0xC2	
Empty	0xC3	
Note Stored in Payout *	0xDB, value/channel of note	
Note Transferred to Stacker	0xC9, value/channel of note	
Payout Out of Service	0xC6	
Note Paid into Stacker at Power Up	0xCA, value/channel of note	
Note Paid into Store at Power Up	0xCB, value/channel of note	

Action	Command Code (Hex)	Command Set
Note Dispensed at Power Up	0xCD, value/channel of note	Note Float
Note Float Removed	0xC7	
Note Float Attached	0xC8	
Note in Bezel Hold	0xCE, value/channel of note	
Device Full	0xCF	
SMART Emptying	0xB3	
SMART Emptied	0xB4	
Channel Disable	0xB5	

***** When enabled using option flag.

Notes:

Action	Comments
Command Not Known:	Returned when an invalid command is received by a peripheral.
Wrong Number Of Parameters:	A command was received by a peripheral, but an incorrect number of parameters were received.
Parameter Out Of Range:	One of the parameters sent with a command is out of range.
Command Cannot Be Processed:	A command sent could not be processed at that time.
Software Error:	Reported for errors in the execution of software e.g. Divide by zero. This may also be reported if there is a problem resulting from a failed remote firmware upgrade, in this case the firmware upgrade should be redone
Key Not Set:	The slave is in encrypted communication mode but the encryption keys have not been negotiated
Jammed:	Five-byte response that indicates that the validator is jammed; this is reported until it is un-jammed or reset. It will also become disabled.

Action	Comments
Dispensing:	Single-byte response indicating that a dispense operation is in progress. The four-byte value of the note or the single byte channel number is reported, depending on the reporting type set. This value will be 0 until the note has passed out of the Note Float module and into a payable position in the validator.
Dispensed:	Response that indicates when the payout has finished a dispense operation; The four-byte value of the note or the single byte channel number is reported, depending on the reporting type set.
Jammed:	Five byte response that indicates that the payout is jammed; this is reported until it is un-jammed or reset. It will also become disabled. The value or channel number of the note being dispensed is also reported.
Incomplete Payout:	This event is given when the payout starts up if a payout or float operation was in progress when the power was removed. The first four bytes after the event code are the value that was dispensed; the next four are the value that was originally requested.
Emptying:	This event is given while the payout is being emptied of notes into the cashbox by the EMPTY command.
Empty:	This event is given at the end of the empty process.
Note Stored in Payout:	This event is given when notes paid in to the payout system are routed to the payout store. For compatibility with the SMART Payout the value of the note is not reported. However if the Note Float is enabled with the option flag VALUE_ON_STORED set, then the value of the note will be reported (see enable payout device command).
Note Transferred to Stacker:	This event is given when a note has successfully been moved from the Note Float and stacked in the cash box. During the process the Stacking event will be given.
Note Float Removed:	This event is reported when the Note Float module is physically disconnected from the validator while the power is on.
Note Float Attached:	This event is reported when the Note Float module is physically attached to the validator while the power is on. The validator and Note Float module will then reset.
Note In Bezel Hold:	This event is reported when the Dispensing note is held in the bezel waiting for the user to remove it.

Action	Comments
Device Full:	This event is reported when the Note Float has reached its limit of stored notes. This event will be reported until a note is paid out or stacked.
Channel Disable:	Indicates all note channels have been inhibited and as such, the unit is disabled. Only reported if using protocol version 7 and above.

Example SSP Communications

Here is an example of the communication between host and slave. Both the typical commands from the host and responses from the validator are detailed.

Host	Slave	Comments
> SYNC	< OK	Synchronisation command
> SET_GENERATOR, *[64 bit prime number]*	< OK	Set the encryption key generator
> SET_MODULUS, *[64 bit prime number]*	< OK	Set the encryption key modulus
> REQUEST_KEY_EXCHANGE *[64 bit host intermediate key]*	< OK, *[64bit slave intermediate key]*	Host sends the host intermediate key, slave responds with the slave intermediate key. The encryption key is then calculated independently by both host and slave.
> GET_SERIAL	< OK < [*SERIAL NUMBER*]	NV11 Serial Number
> SETUP_REQUEST	< OK < [*SETUP INFORMATION*]	NV11 Setup
> SET_ROUTING, 01 14 00 00 00	< OK	Route notes of value 0020 to the NV11 Cashbox
> SET_INHIBIT > 07 > 00	< OK	Enable channels 1,2 and 3
> ENABLE	< OK	Enable NV11
> POLL	< OK < DISABLED	
> POLL	< OK	
> POLL	< OK < NOTE READ < 00	NV11 currently reading a note
> POLL	< OK < NOTE READ < 03	Note has been recognised as channel 3 (€20)
> HOLD	< OK	Hold the note in escrow
> POLL	< OK < STACKING	Stack the note
> POLL	< OK < CREDIT < 03 < STACKING < STACKED	Credit given for channel 3 (€20), note stacked
> POLL	< OK	

Full support is available from ITL and local support offices for implementing eSSP - this support includes libraries and example applications. When requesting this information, please specify your preferred language(s) and operating system.

5.4 ccTalk

This section should be read in conjunction with the full ccTalk specification, which can be downloaded from the internet (www.cctalk.org).

ccTalk is a serial communications protocol in widespread use throughout the money transaction industry. Peripherals such as coin acceptors, note validators and hoppers found in a diverse range of automatic payment equipment use ccTalk to communicate with the host controller.

The protocol uses an asynchronous transfer of character frames in a similar manner to RS232. The main difference is that it uses a single two-way communication data line for half-duplex communication rather than separate transmit and receives lines. It operates at TTL voltages and is 'multi-drop' (peripherals can be connected to a common bus and are logically separated by a device address) - each peripheral on the ccTalk bus must have a unique address.

Each communication sequence (a command or request for information) consists of 2 message packets structured in one of the formats detailed below. The first packet will go from the master device to the slave device and then a reply will be sent from the slave device to the master device.

Commands can have 3 primary formats:

- 8 Bit Checksum – No Encryption
- 16 Bit CRC – No Encryption
- 16 Bit CRC – BNV Encryption

As it is possible to use the ccTalk protocol without encryption, suitable physical security should be employed to protect the ccTalk bus.

Information

200 ms command spacing

When communicating with the NV11 validator, Read Buffered Bill events (command 159) should be sent **at least** 200 ms apart.

ccTalk Command Summary

Command	Header	Parameters	Example
Reset Device	001	None	ACK
Request Comms Revision	004	None	X.Y
Force Empty NV11 Store to Cash Box	019	SEL	EVENT
Request Expanded NV11 status	020	SEL	FLAG, EVENT, REMAIN, PAID, UNPAID, STORED, STORE, FLAG2
Clear Total Count	021	SEL	ACK / NAK
Pump RNG	022	R1-R8	ACK
Request Cipher Key	023	None	KEY1 – KEY8
Request Variable Set	024	SEL	KEY, MC
Modify Variable Set	025	SEL, KEY	ACK
Request Total Count	026	SEL	IN1-IN3, OUT1-OUT3, STR1-STR3
Enable Payout	027	KEY	ACK / NAK
Dispense NV11 Notes	028	SEL, SEC1-SEC8, BILL CNT	EVENT / NAK
Request NV11 Status	029	SEL	FLAG, EVENT, REMAIN, PAID, UNPAID, STORED, STORE
Emergency Stop	030	SEL, FUNC	REMAIN
Empty NV11 Store to Cash Box	031	SEL	EVENT
Modify Variable MC Set	032	SEL, MC	ACK / NAK
Request RC Version	033	SEL	VERSION
Request RC Count	034	SEL	COUNT
Modify RC Count	035	SEL, COUNT	ACK / NAK
Request Current Count	036	SEL	COUNT
Read Barcode Data	129	None	ACK
Store Encryption Code	136	None	ACK
Switch Encryption Code	137	3 bytes Encryption key	ACK
Request Currency Revision	145	None or Country Code (2 digit)	‘GBP02113’
Operate Bi-directional Motors	146	None	ACK
Stacker Cycle	147	None	ACK
Request Bill Operating Mode	152	None	3

Command	Header	Parameters	Example
Modify Bill Operating Table	153	Escrow & Stacker	ACK
Route Bill	154	0/1	ACK/254
Request Bill Position	155	Country Code (2 digit)	00000111 00000000
Request Country Scaling	156	Country Code (2 digit)	100
Request Bill ID	157	None	'GB0010A'
Read Buffered Bill Events	159	None	10000000000
Request Address Mode	169	None	1
Request Base Year	170	None	2006
Request Build Code	192	None	161209
Request Last Mod Date	195	None	00
Calculate ROM Checksum	197	None	4 byte checksum
Request Option Flags	213	None	3 (stacker & escrow)
Request Data Storage Av.	216	None	00000
Enter Pin	218	Pin1, Pin2, Pin3, Pin4	ACK
Enter New Pin	219	Pin1, Pin2, Pin3, Pin4	ACK
Request Accept Count	225	None	3
Request Insertion Count	226	None	7
Request Master Inhibit	227	None	1
Set Master Inhibit	228	Bit Mask	ACK
Request Inhibits	230	None	Inhibit Low, Inhibit High
Set Inhibits	231	Channels	ACK
Perform Self Check	232	None	0
Request Software Version	241	None	XX.YY
Request Serial Number	242	None	3 byte serial number
Request Product Code	244	None	'NV11'
Request Equipment Category	245	None	'Bill Validator'

Command	Header	Parameters	Example
Request manufacturer ID	246	None	'ITL'
Request Polling Priority	249	None	200
Simple Poll	254	None	ACK

Monetary Values

Values are represented as 32 bit unsigned integers (4 bytes) and in the lowest value of currency. For example:

€50.00 would be 0x00001388

When sending or receiving a value the least significant byte is sent first. So in this example [0x88] [0x13] [0x00] [0x00] will be sent.

Each type of note is identified by its value and represented using the standard format outlined above. As an example, the values for Euro notes are:

Note (€)	Hex value	Data to Send
5.00	0x000001F4	[0xF4] [0x01] [0x00] [0x00]
10.00	0x000003E8	[0xE8] [0x03] [0x00] [0x00]
20.00	0x000007D0	[0xD0] [0x07] [0x00] [0x00]
50.00	0x00001388	[0x88] [0x13] [0x00] [0x00]
100.00	0x00002710	[0x10] [0x27] [0x00] [0x00]
200.00	0x00004E20	[0x20] [0x4E] [0x00] [0x00]
500.00	0x0000C350	[0x50] [0xC3] [0x00] [0x00]

Communications Format

ccTalk communication is carried out using the following settings:

Baud rate= 9600bps, Data= 8 bit, No parity, Stop bit= 1bit

Command Format from Host to NV11

[Dst] [Len] [CRC (LSB)] [Header] [Data1] ... [DataN] [CRC (MSB)]

Field	Description
Dst	Destination Address (for a note validator, 40 [0x28])
Len	Number of data bytes in the message
Header	Command
Data	Data attached to Header, specified by Len (1-N)
CRC	[Dst] + [Len] + [Header] + [Data1] + ... + calculated value of CRC16 against Data N

Response Format from the NV11 to Host

ACK message:

[Dst] [00] [CRC (LSB)] [00] [CRC (MSB)]

NAK message:

[Dst] [00] [CRC (LSB)] [05] [CRC (MSB)]

BUSY message:

[Dst] [00] [CRC (LSB)] [06] [CRC (MSB)]

Response:

[Dst] [Len] [CRC (LSB)] [00] [Data1] ... [DataN] [CRC (MSB)]

Field	Description
Dst	Destination Address (for a note validator, 40 [0x28])
Len	Number of data bytes in the message
Header	Reply message [00]
Data	Data attached to Header, specified by Len (1-N)
CRC	[Dst] + [Len] + [Header] + [Data1] + ... + calculated value of CRC16 against Data N. If encryption setting is enabled, encryption is carried out against: [CRC (LSB)] + [Header] + [Data1] + ... + [DataN] + [CRC (MSB)]

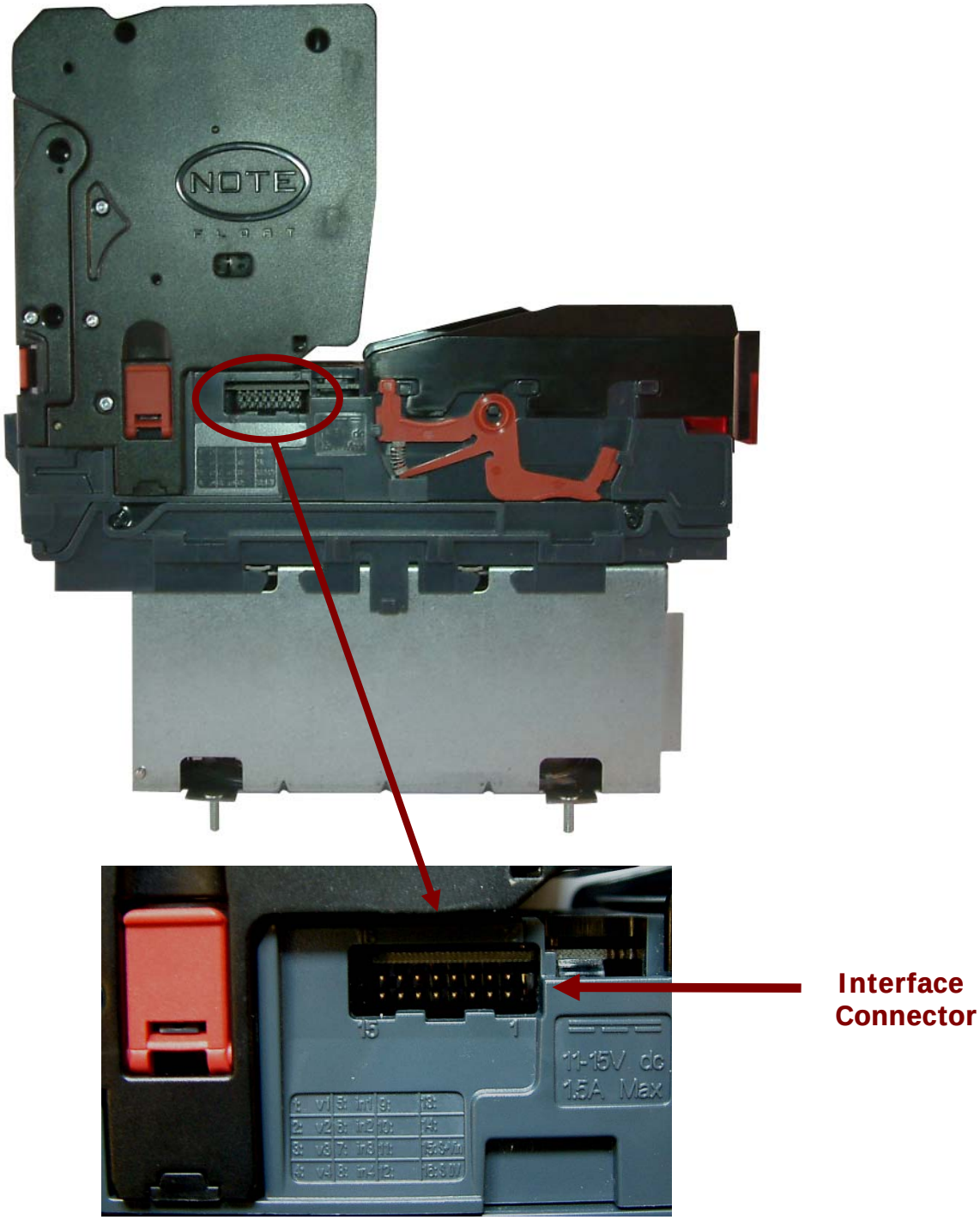
5.5 SSP Escrow Function

To hold a note in the escrow position when using SSP, the POLL command should be replaced with the HOLD command after NOTE READ > 0 for as long as the note is to be held in escrow.

A POLL command will then accept the note; the REJECT command will return the note to the customer

5.6 Connection Options

The NV11 validator has a single connector that is used to allow interfacing and programming:

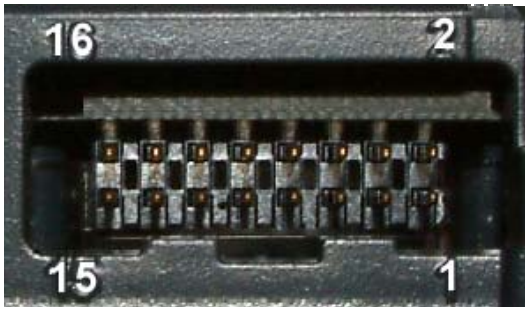


Information

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 NV11 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

To use a USB connection with the NV11, a USB cable fitted with a 16 way connector on one end (ITL Part Number CN392) should be used. The CN392 cable fits into the 16 way connector and allows high speed programming and serial communications when used in SSP and ccTalk modes.

Further details of the cable needed to interface and program the NV11 validator can be found in Section 4 of this manual set (subsection 4.9). When using the USB connection, power must be supplied to the NV11 using the CN392 cable.

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SECTION 6

NV11 MANUAL SET

TECHNICAL APPENDICES

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NV11 MANUAL SET – SECTION 6

6. TECHNICAL APPENDICES

APPENDIX A – PRODUCT APPROVALS

CE Marking

The NV11 unit described in this manual set has been designed to comply with the relevant sections of the following Harmonised European Standards:

- EN60950-1:2001
- EN60335-1:2002
- EN60335-2-82:2003

The unit complies with all the applicable essential requirements of the Standards.

RoHS

The following products, identified by the part numbers listed in the table below, are compliant with the European Union Directive 2002/95/EC of the Restriction of the use of certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment.

Product	Description	Lead free date
NV11	Bank Note Acceptor Assembly	All NV11

We hereby declare that lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr4-6), polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE), are not intentionally added to our products in amounts exceeding the maximum concentration values as defined by RoHS regulations (except where the application of any of those substances comes within the scope of the RoHS regulations exempted applications).

All compliant products are clearly marked on the product and/or packaging.

All the information provided in this statement of compliance is accurate to the best of our knowledge, as of the date of this publication being issued.

WEEE

The European Union's directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) was adopted by the European Council and Parliament in 2003 with a view to improving the collection and recycling of Waste Electrical and Electronic Equipment throughout the EU, and to reduce the level of non-recycled waste. The directive was implemented into law by many EU member states during 2005 and 2006.

Products and packaging that display the symbol (shown left) indicates that this product must NOT be disposed of with other waste. Instead it is the user's responsibility to dispose of their Waste Electrical and Electronic Equipment by handing it over to an approved reprocessor, or by returning it to the original equipment manufacturer for reprocessing.

APPENDIX B – TECHNICAL SPECIFICATIONS

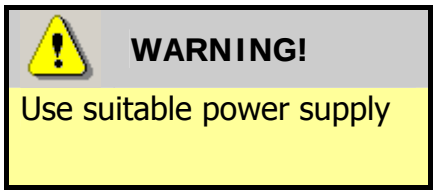
The information contained here does not form part of a contract and is subject to change without notice. Innovative Technology Ltd operates a policy of continual product development; as such specifications may change from time to time.

Environment:

	Minimum	Maximum
Temperature	+3 °C	+50 °C
Humidity	5 %	95 % non condensing

Power Requirements:

DC Voltage	Minimum	Nominal	Maximum
Absolute limits	10.8 V	12 V	13.2 V
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
Supply Current			
Standby			350 mA
Running			3 A
Peak (motor stall)			3.5 A



Ensure that the supply voltage to the NV11 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 4 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).

Logic Levels:

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

General Specifications:

Note Sizes	Minimum	Maximum
Width	60 mm	82 mm in cashbox 80mm in Note Float module
Length	115 mm	150 mm

Capacity	
Storage	300 or 600 notes
Note Float module	30 notes

Weight	
NV11	2.2 kg

Interface Protocol	
	eSSP; ccTalk (CC1, CC4)

APPENDIX C – GLOSSARY OF TERMS

Term	Meaning
A	Ampere
AC	Alternating Current
ACK	Acknowledge
AES	Advanced Encryption Standard
ASSY	Assembly
AV	Average
AWG	American Wire Gauge
AWP	Amusement With Prizes
BNV	Bank Note Validator
ccTalk	Coin Controls Talk
COMMS	Communications
CRC	Cyclic Redundancy Check
DC	Direct Current
DIA	Diameter
DIP	Dual Inline Package
ECB	Electronic Code Book
EEPROM	Electrically Erasable Programmable Read Only Memory
eSSP	Encrypted Smiley® Secure Protocol
FAQ	Frequently Asked Questions
FIFO	First In, First Out
GA	General Assembly
GND	Ground
Hz	Hertz

Term	Meaning
IF	Interface
ITL	Innovative Technology Ltd
LED	Light Emitting Diode
LIFO	Last In, First Out
mA	milliampere
max	maximum
MDB	Multi Drop Bus
min	minimum
mm	millimetre
ms	millisecond
MOD	Modified (or Modification)
NV	Note Validator
PCB	Printed Circuit Board
PDF	Portable Document Format
PiPS	Pay-in Pay-out System
PROM	Programmable Read Only Memory
PSU	Power Supply Unit
QTY	Quantity
RAM	Random Access Memory
ROM	Read Only Memory
Rx	Receive
RoHS	Restriction of the use of certain Hazardous Substances
SIO	Serial Input Output
SSP	Smiley® Secure Protocol
SWG	Standard Wire Gauge

Term	Meaning
SWP	Skill With Prizes
SYNC	Synchronize
TTL	Transistor Transistor Logic
Tx	Transmit
USB	Universal Serial Bus
V	Volt
V_In	Voltage In
WEEE	Waste Electrical and Electronic Equipment

APPENDIX D – ORDERING INFORMATION

The following information is required to order an NV11 validator:

Product	NV11	Consists of NV9USB validator, Note Float module, bezel and cash box
Dataset	Country code and variant	Alternatively supply details of the currency and note types you wish to use
Bezel Size	66 - 85 mm	Please check the NV11 product page on the ITL website for details of the bezels available
Cash Box	300 or 600 note capacity	Please check the NV11 product page on the ITL website for details of the range of available cashboxes
Interface	eSSP; ccTalk	The NV11 can be used with CC1 or CC4 variants of ccTalk

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