

# NV200 MANUAL SET

INTELLIGENCE IN VALIDATION

# **NV200 MANUAL SET INTRODUCTION**

**INTELLIGENCE IN VALIDATION**

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## MANUAL AMENDMENTS

### Document Base Details

Spec. Used	Issue Date	Receipt Date	Comments
GA860-2	11/04/11	11/04/11	
GA620-2	30/09/08	22/01/11	
GA966	---	03/06/11	

### Amendment Details

Rev.	Date	Amendment Details	Issued by
--	21/06/11	First Issue	EAM
A	05/08/11	Added warning about securing bezel	EAM

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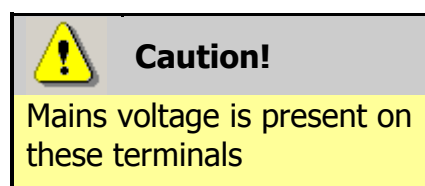
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## PRODUCT SAFETY INFORMATION

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 NV200 validator is made up of three basic components: an NV200 validator head, NV200 chassis and a cashbox (as shown below).



The NV200 validator is a device that can accept, validate and store 500 or 1000 bank notes of mixed denominations.



**NV200  
Rear View**



**NV200  
Front View**



**NV200  
Side View**

The NV200 validator works with any NV200 currency dataset created by Innovative Technology Ltd - datasets can be downloaded from the Support section of the ITL website.

## FEATURES

The NV200 validator has many innovative features, including:

- 500 or 1000 note capacity
- Accepts, validates and stores multiple denominations of bank notes in less than 3 seconds
- Uses a secure encrypted protocol for data transfer

## TYPICAL APPLICATIONS

The NV200 validator can be used in a variety of situations where high security and high volume bank note acceptance and validation are needed. Some typical applications are:

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

## 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 NV200 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 NV200 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 NV200 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 NV200 validator into an existing cabinet.
- This section contains the all the mechanical and electrical information a designer needs to effectively integrate the NV200 validator into a host machine.

- **Software Implementation Guide:**

- Software engineers looking at how to implement the NV200 validator in their host machine, or design engineers looking at including the unit in their host machine.
- The information in this section details the communications protocols, specific commands and interfaces used including eSSP and ccTalk.

- **Technical Appendices:**

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

# **NV200 MANUAL SET QUICK START AND CONFIGURATION GUIDE**

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## NV200 MANUAL SET – SECTION 1

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## 1. QUICK START AND CONFIGURATION GUIDE

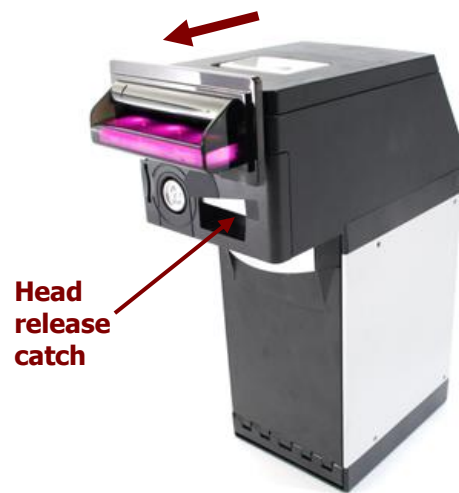
This section is one part of a complete manual set: most users should use this section of the manual - typical users are software engineers looking at how to make it work, project engineers evaluating their first unit, or installation engineers installing the unit into a host machine.

This section contains the essential information that a user needs to quickly assemble and configure the NV200 validator ready for installation into the host machine.

### 1.1 Assembly

Installing the NV200 is a simple operation, described in the steps outlined here:

1. To remove the NV200 head unit, first unlock the NV200 cashbox and head release lock (if fitted)
2. Then, lift the silver head release catch located on the front of the NV200
3. Finally, slide the head unit forward and lift it off the chassis
4. Remove the NV200 cash box from the metal chassis
5. If installing into a host machine, the NV200 chassis is then mounted by using the tapped holes on either side of the chassis using 4 x M4 fixing screws and a suitable mounting bracket



#### Information

Check fixing screw length before final installation to avoid damage to the cash box.

The length of the fixing screws fitted to either side of the chassis must be no longer than 6 mm plus the thickness of the mounting bracket.



## Bezel Removal and Replacement



### WARNING!

Ensure bezel is secured to validator

The front bezel should be secured to the validator head using screws if the NV200 is being installed and transported inside a host machine.



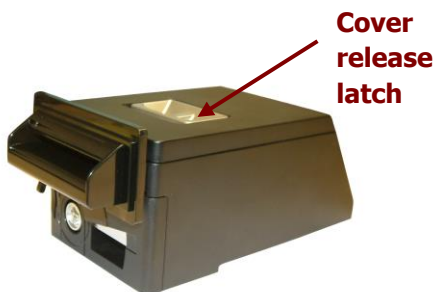
### Information

Check bezel fixing screw length before installation.

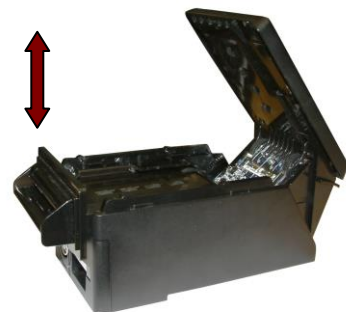
The length of the bezel fixing screws must be no more than 12 mm in length.

The bezel on the front of the NV200 validator has been designed to be removed and refitted very easily.

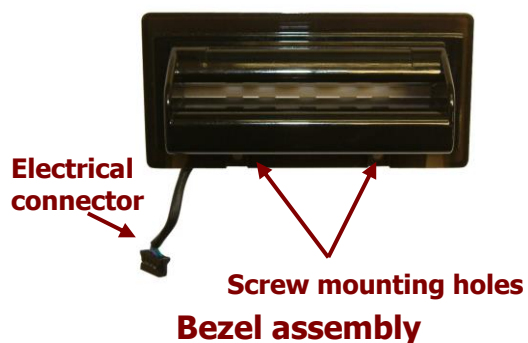
To remove or refit the bezel the top cover must be open fully to allow access to the bezel mounting area.



**Validator note path cover**



**Bezel removal and fitting**



**Bezel connector socket**

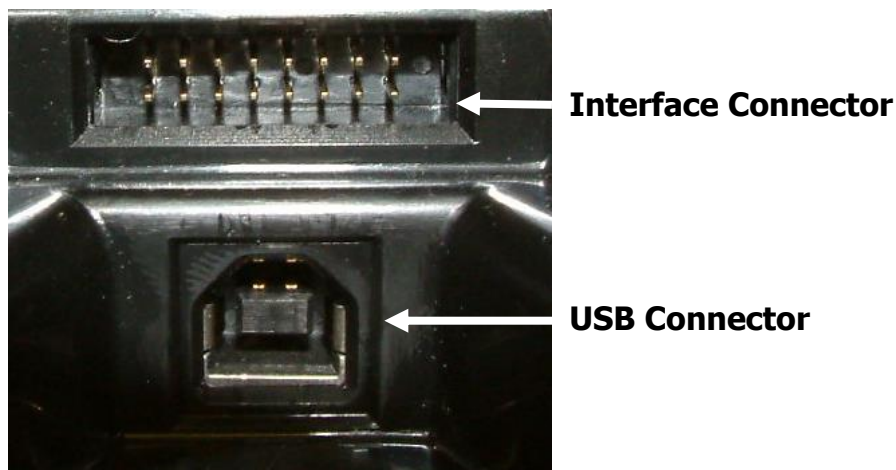


Removing the bezel: Lift the upper cover by pulling the top latch forward. If fitted, remove the two bezel securing screws and then slide the bezel assembly upwards. Finally unplug the cable from the socket on the front of the validator head.

Fitting the bezel: Lift the upper cover by pulling the latch forward. Connect the cable from the bezel assembly to the socket located on the front of the validator head and slide the assembly down into place and then close the note path upper cover. If required, the bezel can be secured in place with two M3 screws - these are fitted in the two holes at the bottom of the bezel.

## 1.2 Panel Layout

All the connectors and switches needed to set up and interface the NV200 Validator are easily accessible on the back of the unit:



## 1.3 DIP Switch Settings

The NV200 has a Dual Inline Package (DIP) switch bank that is used to set the various options for the unit. A summary of the switch options are shown below:



Switch	Option	Switch OFF (↓)	Switch ON (↑)	Default Setting
1	Disable Barcode	Read enabled	Read disabled	OFF
2	Channel 1 Inhibit	Channel enabled	Channel disabled	OFF
3	Channel 2 Inhibit	Channel enabled	Channel disabled	OFF
4	Channel 3 Inhibit	Channel enabled	Channel disabled	OFF
5	Channel 4 Inhibit	Channel enabled	Channel disabled	OFF
6	Channel 5 Inhibit	Channel enabled	Channel disabled	OFF
7	Channel 6 Inhibit	Channel enabled	Channel disabled	OFF
8	Programming Mode	*With power on, switch to ON then back to OFF to activate programming mode		OFF

\* When DIP switch 8 is turned on and off, the bezel LEDs will flash on and off quickly and then reset.

## 1.4 Connectors and Pinouts

The NV200 Validator has two connectors that are 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 first connector is a 16 pin socket used to interface the NV200 to the host machine. The pin numbering of the socket is shown below, as well as an overview of the socket connections:



Pin	Description
6	Serial Data Out (Tx)
7	Serial Data In (Rx)
15	+ V
16	0V / Ground Connection

The USB connector is a standard Type 'B' USB socket, and can be used for interfacing to the host machine – in this case, power must be provided through the 16 way connector. The USB socket can also be used for programming the NV200 – a USB 2.0 compliant Type 'A' to 'B' lead can be used to do this. USB cables should be electrically shielded and less than 5 metres long.

## 1.5 Status Indicators

The NV200 Validator has two coloured Light Emitting Diode (LED) indicators that are used to show the status of the unit (red and blue) – these are located within the front bezel.

If there is a fault or other issue with the unit, the bezel LEDs will flash as described in subsection 1.8.

## 1.6 Programming

Full details on programming the NV200 Validator can be found in Section 3 of this manual set (ITL Software Support Guide).



## 1.7 Technical Specifications

The full technical specifications for the NV200 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	24 V **
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
Supply Current			
Standby	400 mA		
Running	1.5 A		
Peak (motor stall)	3 A		

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



### WARNING!

Use correct supply voltage

**\*\* NOTE:** Only the later models of NV200 are capable of using a supply voltage up to 24 V DC. Earlier versions have a maximum voltage of 13.2 V DC.

See Section 1.10 of this manual (Frequently Asked Questions) for information on how to identify if your validator supports 24V DC operation.

We recommend that your power supply is capable of supplying 12V DC at 4.3 A, or 24V DC at 2.1 A.

## 1.8 NV200 Bezel Flash Codes

The NV200 Validator has inbuilt fault detection facilities. If there is a configuration or other error the NV200 front bezel will flash in a particular sequence; a summary of the Bezel Flash Codes for the NV200 is shown below:

Flashes		Indicated Error	Comments
Red	Blue		
<b>0</b>	<b>0</b>	None	
<b>1</b>	<b>1</b>	Note path open	Close note path
	<b>2</b>	Note path jam	Remove obstruction and follow the cleaning procedure in Section 2 of this manual set
	<b>3</b>	Unit not initialised	Contact ITL technical support
<b>2</b>	<b>1</b>	Cashbox removed	Refit cashbox
	<b>2</b>	Cashbox jam	Remove trapped notes
<b>3</b>	<b>1</b>	Firmware checksum error	Download new firmware
	<b>2</b>	Interface checksum error	
	<b>3</b>	EEPROM checksum error	Download new firmware
	<b>4</b>	Dataset checksum error	
<b>4</b>	<b>1</b>	Power supply too low	Check power supply
	<b>2</b>	Power supply too high	
	<b>3</b>	Card format	Reprogram programming card
	<b>4</b>	Payout reset	Turn power on and off
<b>5</b>	<b>1</b>	Firmware mismatch	Reprogram unit

## 1.9 Frequently Asked Questions

### a. What settings should I use on the DIP switches on the rear of the unit?

- Look at the DIP switch tables in subsection 1.3 of this manual.

### b. Will my NV200 validator support 24V DC operation?

- Early revisions of the NV200 did not support 24V DC operation. Check the following to ensure compatibility:

Open the NV200 validator lid and check the marking on the PCB where shown in this picture – the marking needs to read **PB266\_4**



If the PCB issue (the last digit) is lower than **4**, 24V DC operation is not supported and the NV200 validator can only be used with a 12V DC supply.

### c. NV200 will not update (I get a 'Header Fail' error)

- Make sure the correct NV200 dataset file is selected. If the problem persists, contact ITL Support for further assistance.

### d. NV200 will not update (I get a 'Data Transfer Fail' error)

- Make sure pin 9 is removed from the CN00215 ribbon cable (as shown in this image):



If the problem persists, contact ITL Support for further assistance.

e. NV200 will not update (I get a 'Non-ok' sync response)

- Check that the serial port is set up correctly and also check that the unit is using SSP with the Validator Manager software. If the problem persists, contact ITL Support for further assistance.

f. Some or all notes are not accepted

- Check that all the dipswitches on the rear of the NV200 are OFF (down), and that no inhibits are set in the Validator Manager software. If the problem persists, contact ITL Support for further assistance.

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# SECTION 2

## NV200 MANUAL SET

### FIELD SERVICE MANUAL

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2.5	Spare Parts	8



## 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 NV200 Validator that is installed in a host machine.

The NV200 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 NV200 Validator has been designed in a way to prevent damage and airborne contamination reaching the optical sensors; however, depending upon the environment the NV200 may require occasional cleaning.



#### Caution!

Do not use solvent based cleaners on any part of the NV200 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 units; only use a mild detergent solution as directed below.

You can clean the NV200 note path with the head unit still fitted to the chassis, although you may find it easier to remove the head from the chassis assembly.

To remove the NV200 head unit, first unlock the NV200 cashbox and head release lock (if fitted)

Then, lift the silver head release catch located on the front of the NV200

Finally, slide the head unit forward and lift it off the chassis





**WARNING!**

Disconnect power **BEFORE** any cleaning operation

You should disconnect the power **BEFORE** carrying out any cleaning operations to avoid the risk of causing damage to the validator.

After removing the head unit, to open the note path cover, pull the top cover release latch forward (towards the bezel) and lift the cover as shown here (it is recommended to also remove the front bezel to allow correct cleaning of the note path guides):



The note path is now visible and can be cleaned. Carefully wipe the surfaces with a soft lint free cloth that has been moistened with a water and mild detergent solution (e.g. 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.

**Caution!**

Do not use any lubricants.

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

**WARNING!**

Do not try to disassemble

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



## 2.2 Fault Finding - Flash Codes

The NV200 Validator has inbuilt fault detection facilities. If there is a configuration or other error, the NV200 front bezel will flash in a particular sequence, and a summary of the Bezel Flash Codes for the NV200 is shown below:

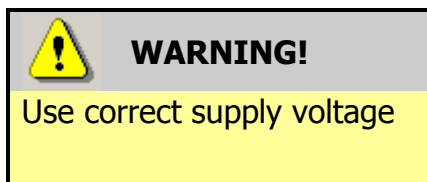
Flashes		Indicated Error	Comments
Red	Blue		
<b>0</b>	<b>0</b>	None	
<b>1</b>	<b>1</b>	Note path open	Close note path
	<b>2</b>	Note path jam	Remove obstruction and follow the cleaning procedure in Subsection 2.1 of this manual
	<b>3</b>	Unit not initialised	Contact ITL technical support
<b>2</b>	<b>1</b>	Cashbox removed	Refit cashbox
	<b>2</b>	Cashbox jam	Remove trapped notes
<b>3</b>	<b>1</b>	Firmware checksum error	Download new firmware
	<b>2</b>	Interface checksum error	
	<b>3</b>	EEPROM checksum error	Download new firmware
	<b>4</b>	Dataset checksum error	
<b>4</b>	<b>1</b>	Power supply too low	Check power supply
	<b>2</b>	Power supply too high	
	<b>3</b>	Card format	Reprogram programming card
	<b>4</b>	Payout reset	Turn power on and off
<b>5</b>	<b>1</b>	Firmware mismatch	Reprogram unit

## 2.3 Technical Specifications

The full technical specifications for the NV200 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	24 V **
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
<b>Supply Current</b>			
Standby	400 mA		
Running	1.5 A		
Peak (motor stall)	3 A		

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



**\*\* NOTE:** Only the later models of NV200 are capable of using a supply voltage up to 24 V DC. Earlier versions have a maximum voltage of 13.2 V DC.

See Section 6, Appendix E of this manual set for information on how to identify if your validator supports 24V DC operation.

We recommend that your power supply is capable of supplying 12V DC at 4.3 A, or 24V DC at 2.1 A.

## 2.4 Frequently Asked Questions

### a. What settings should I use on the DIP switches on the rear of the unit?

- Look at the DIP switch tables in Section 1 of this manual set (subsection 1.3). By default, all DIP switches are turned OFF.

### b. I am having problems programming the NV200 using a DA3 unit.

- There can be many reasons why you may be having problems using a DA3 unit to program the validator. Please check the following:
  - That the DA3 firmware is up to date
  - That the VPS is up to date
  - Make sure pin 9 is removed from the CN00215 ribbon cable (as shown here):



- If using override download, make sure the file is selected for override during the DA3 update
- Check the validator is using SSP interface - there is no visible indication as to which interface the NV200 is using, so toggle dipswitch 8 on the NV200 and retry the update procedure.

If the problem persists, contact ITL Support for further assistance.

### c. The cashbox is inserted but the bezel is flashing (2 red flashes and 1 blue flash - cashbox removed).

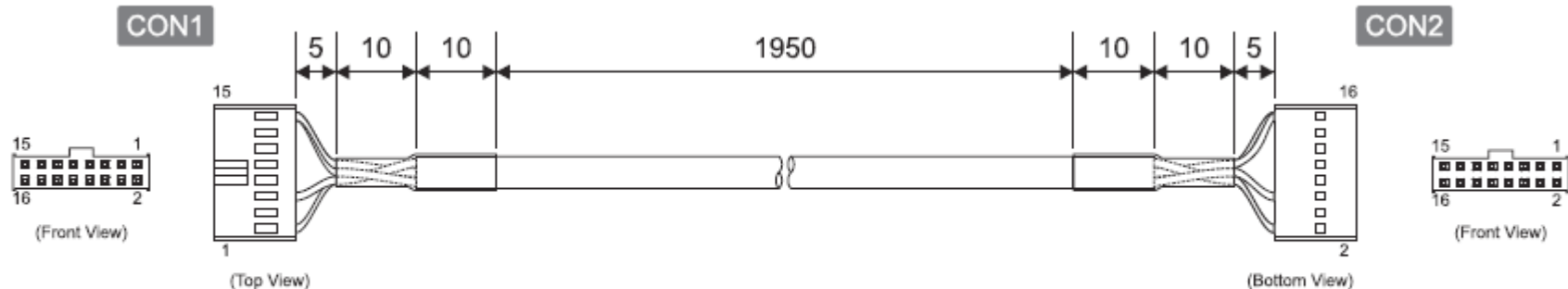
Make sure that the cashbox is fully inserted and latched. If the problem persists, contact ITL Support for further assistance.

## 2.5 Spare Parts

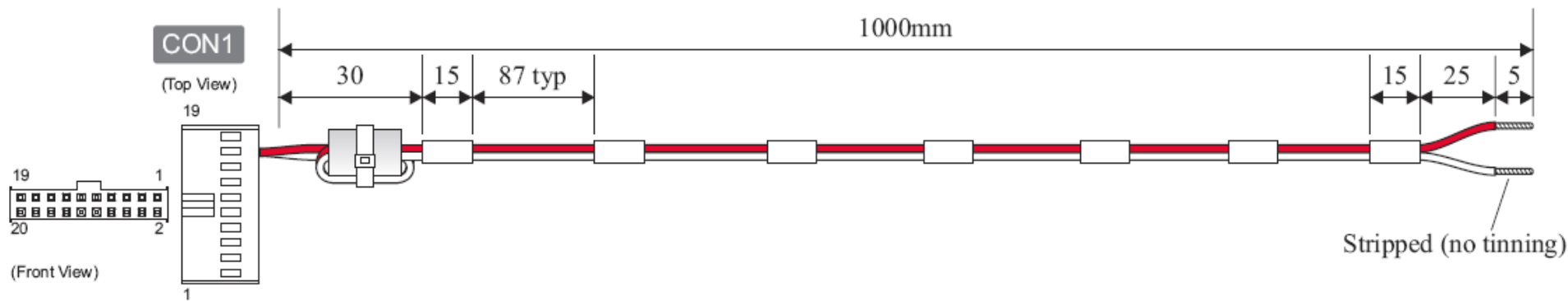
Full details of the interface cable connector pinouts, connector types / makes and other related information can be found in Section 4 of this manual set.

The user can obtain the following parts for the NV200 validator:

ITL Part Number	Description	Details
<b>CN00214</b>	USB Cable	USB 2.0 Compliant Type A to Type B cable
<p><b>Notes:</b> USB cable should be USB 2.0 compliant, electrically shielded and less than 5 metres long.</p>		

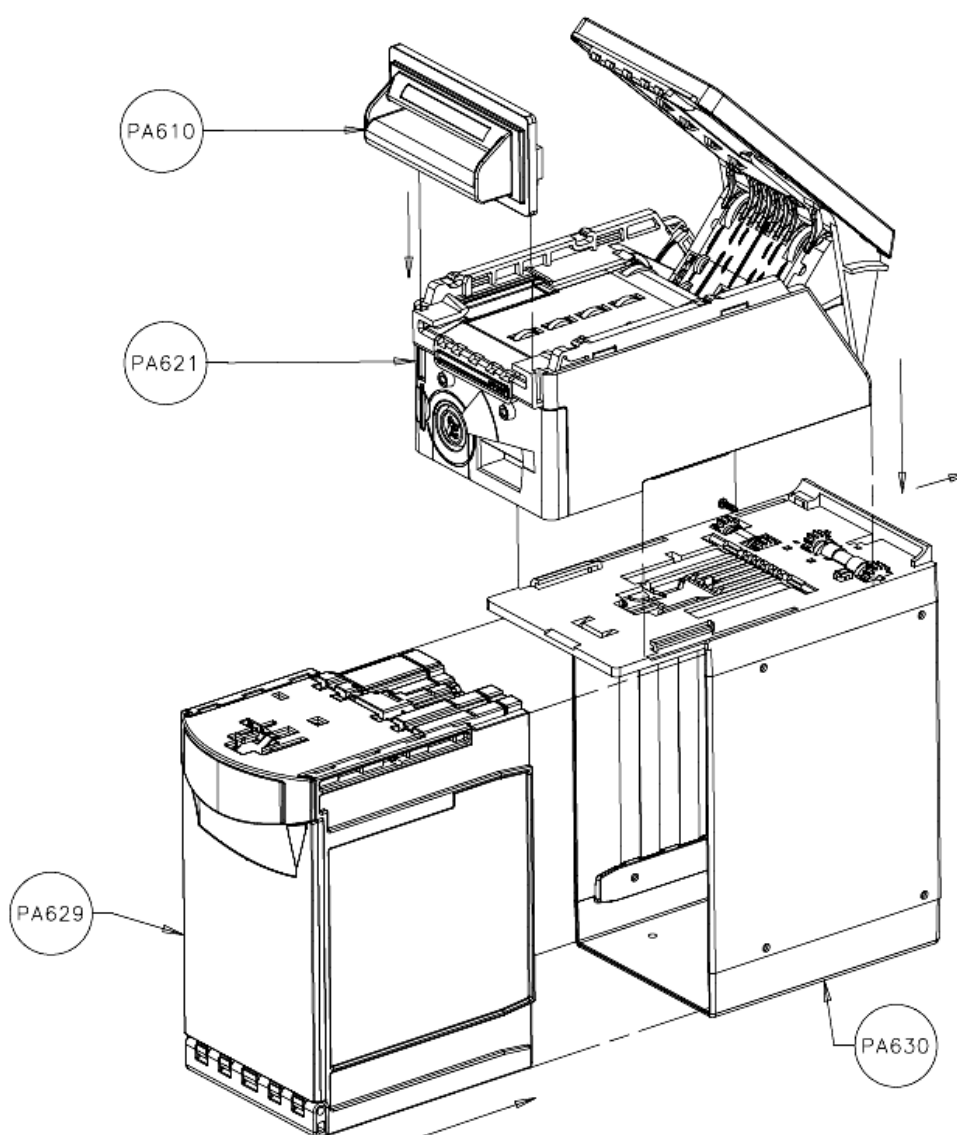
ITL Part Number	Description	Details
CN00292	IF10 – SSP to Binary interface cable	Provides connection between IF10 module and NV200
 <p>The diagram illustrates the IF10 – SSP to Binary interface cable (CN00292). The cable is 1950 units long. It features two 16-pin connectors, CON1 and CON2. CON1 is a 16-pin D-sub connector with pins numbered 1 to 16. CON2 is a 16-pin D-sub connector with pins numbered 1 to 16. The cable has a central section with a length of 1950 units. The connectors are shown in front, top, and bottom views. The top view of CON1 shows a 16-pin D-sub connector with pins numbered 1 to 16. The bottom view of CON2 shows a 16-pin D-sub connector with pins numbered 1 to 16. The front view of CON1 shows a 16-pin D-sub connector with pins numbered 1 to 16. The front view of CON2 shows a 16-pin D-sub connector with pins numbered 1 to 16.</p>		
<b>Notes:</b>		

ITL Part Number	Description	Details
<b>CN00414</b>	RS232 to NV200 interface cable	Provides 12V or 24V supply and RS232 communications to NV200
<p><b>CON1</b> (Top View)</p> <p><b>CON2</b> (Top View)</p> <p><b>CON4</b> <b>CON3</b> Optional Banana Plugs</p> <p><b>T1</b> Red +12V <b>T2</b> Black 0V</p> <p>1460</p> <p>20 20 20</p> <p>1425</p> <p>15 60</p> <p>1 2 15 16 (Front View)</p>		
<b>Notes:</b>		

ITL Part Number	Description	Details
CN00459	NV200 power cable	Provides 12V or 24V supply only to NV200
 <p>The diagram illustrates the NV200 power cable (CN00459). It is a 1000mm long cable with a red and black braided shield. On the left, it has a 19-pin connector labeled CON1. Two views of the connector are provided: a top view showing pins 1, 2, 19, and 20, and a front view showing pins 1, 2, 19, and 20. The cable has a ferrite core with dimensions 30, 15, and 87 typ. The right end of the cable is stripped (no tinning) with dimensions 15, 25, and 5.</p>		
<b>Notes:</b> Recommended ferrite core is Fair-Rite Part Number 0443166651.		



ITL Part Number	Description
<b>PA00610</b>	Bezel Assembly
<b>PA00621</b>	NV200 Validator Head Assembly
<b>PA00629</b>	Cashbox Final Assembly
<b>PA00630</b>	Chassis Assembly
<b>PA00650</b>	Lock Assembly



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# **SECTION 3**

## **NV200 MANUAL SET**

## **ITL SOFTWARE SUPPORT GUIDE**

**INTELLIGENCE IN VALIDATION**

Innovative Technology assume no responsibility for errors, omissions, or damages resulting from the use of information contained within this manual.

**NV200 MANUAL SET – SECTION 3**

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## 3. ITL SOFTWARE SUPPORT GUIDE

### 3.1 Validator Manager Software

Validator Manager (also called Bank Note Validator Currency Manager) is a software package developed by Innovative Technology Ltd to allow customers to carry out programming, setup and operational tasks on the NV200 bank note validator.

#### 3.1.1 Preparing for Installation

If you do not have the Validator Manager software on CD, you can easily download it from the Innovative Technology website. Visit [www.innovative-technology.co.uk](http://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.

To download a software file you must first login.  
NB: All users must re-register with the new site.

Enter your login details here, or create a new account

Always ensure you are using the most up-to-date software before altering any firmware or currency dataset files.

Username  
Password  
Remember Me ☐  
Login

- [Forgot your password?](#)
- [Forgot your username?](#)
- [Create an account](#)

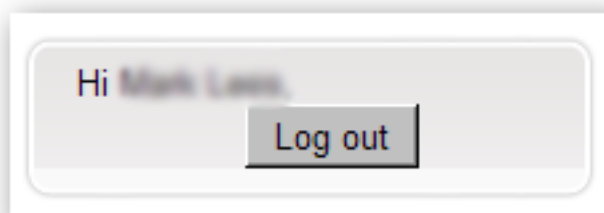
**Latest Datasets**

- UGX02602 (NV200)
- UGX01603 (NV200)
- CRC01602 (NV200)
- ISK0110100 (NV10)
- MYR01203 (BV20)
- IDR02602 (NV200)
- IDR01603 (NV200)
- THB01602 (NV200)
- KZT01602 (NV200)
- LV01603 (NV200)

Title	Version	File	Info	Download
Bank Note Validator Currency Manager	3.3.13			
VPS (Validator Programming System)	1.0.16			
SMART PIPS (Pay In Pay Out System)	1.4.5			
Bank Note Validator Diagnostics Tools	1.0.4			
DA2 Drivers - 32 bit				
DA2 Drivers - 64 bit	1			
BV Interface Driver Install - 32 bit	2			
BV Interface Driver Install - 64bit	1			
NV4 Currency Manager	2.5.3			

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.

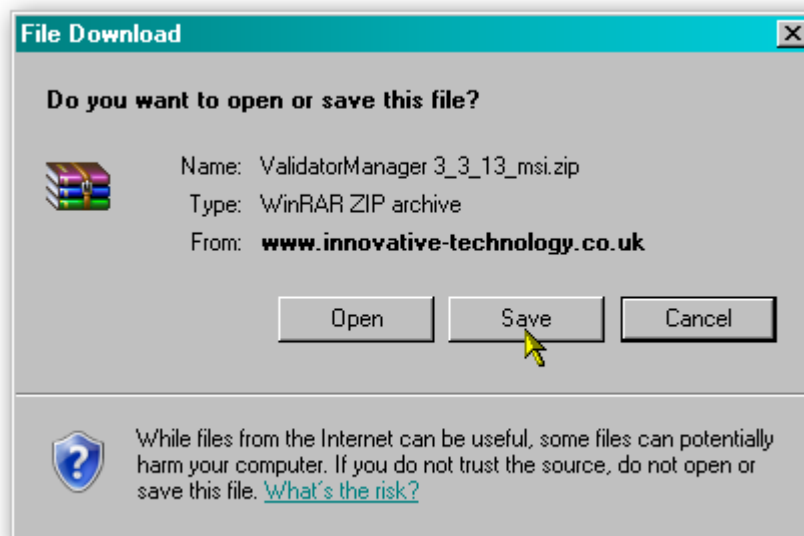


In this case, we want to download the Validator Manager software, so we click on the padlock icon opposite the 'Bank Note Validator Currency Manager' filename:

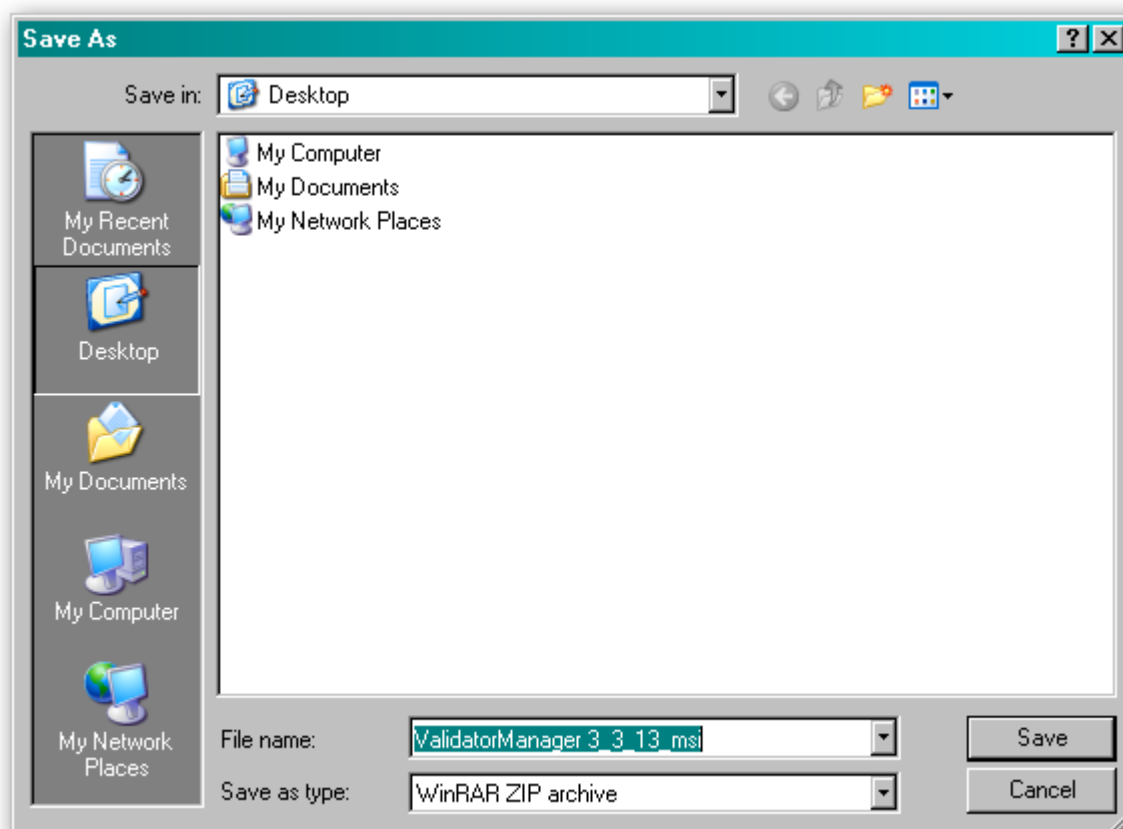


Title	Version	File		
Bank Note Validator Currency Manager	3.3.13			
VPS (Validator Programming System)	1.0.16			
SMART PIPS (Pay In Pay Out System)	1.4.5			
Bank Note Validator Diagnostics Tools	1.0.4			
DA2 Drivers - 32 bit				
DA2 Drivers - 64 bit	1			
BV Interface Driver Install - 32 bit	2			
BV Interface Driver Install - 64bit	1			
NV4 Currency Manager	2.5.3			

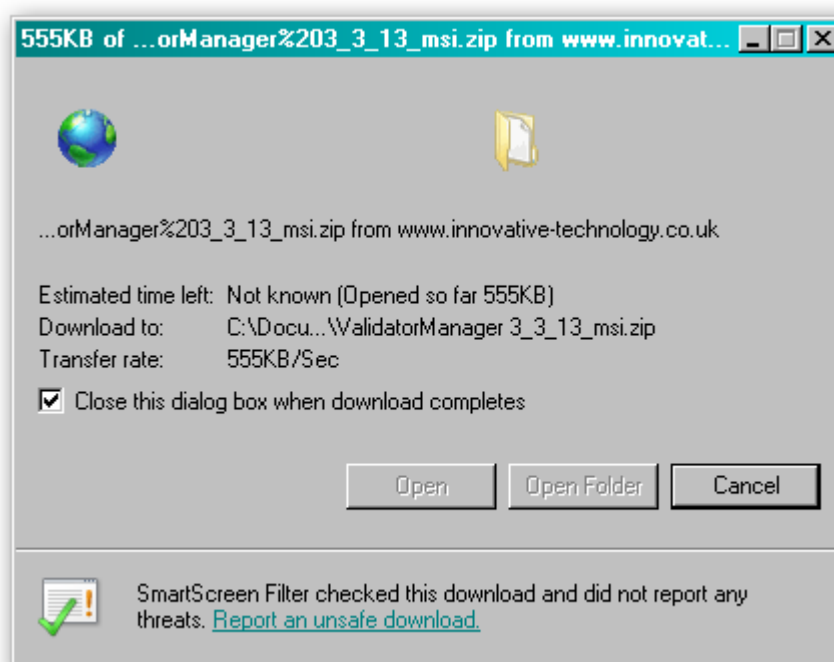
After clicking the link, a file download dialog box will appear – choose the option to **save** the file:



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.



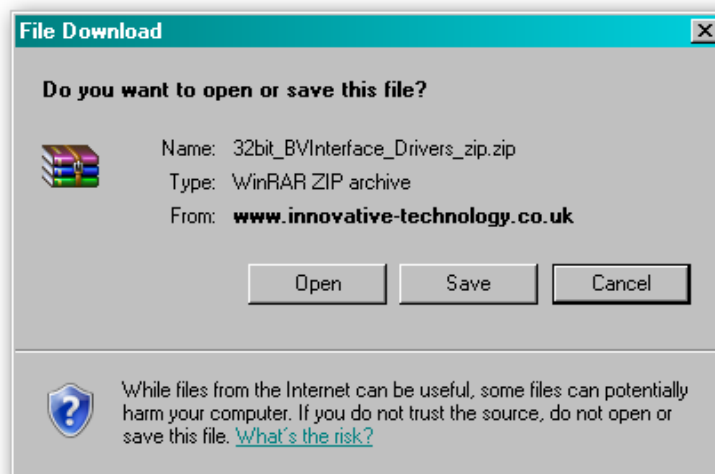
After choosing where to save the file, a file transfer dialog box will appear showing the progress of the file download:



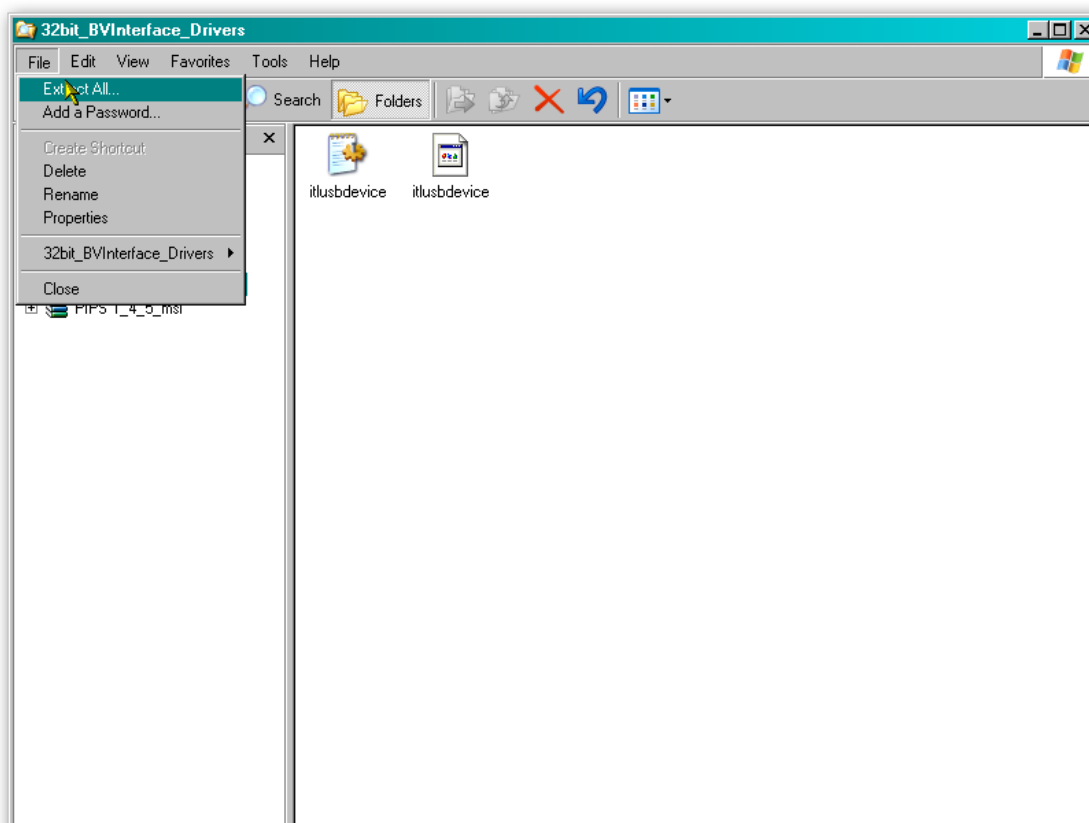


### 3.1.2 BV Interface Drivers

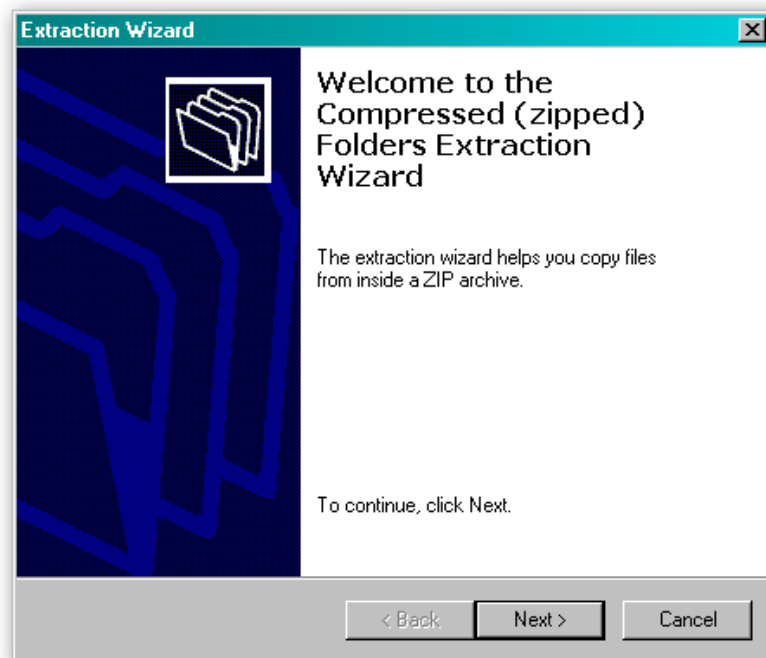
After downloading the Validator Manager software, you will also need to download the Banknote Validator (BV) Interface drivers – two versions are available (32 bit and 64 bit) so choose the correct type for your operating system. Again, remember where you saved the file.



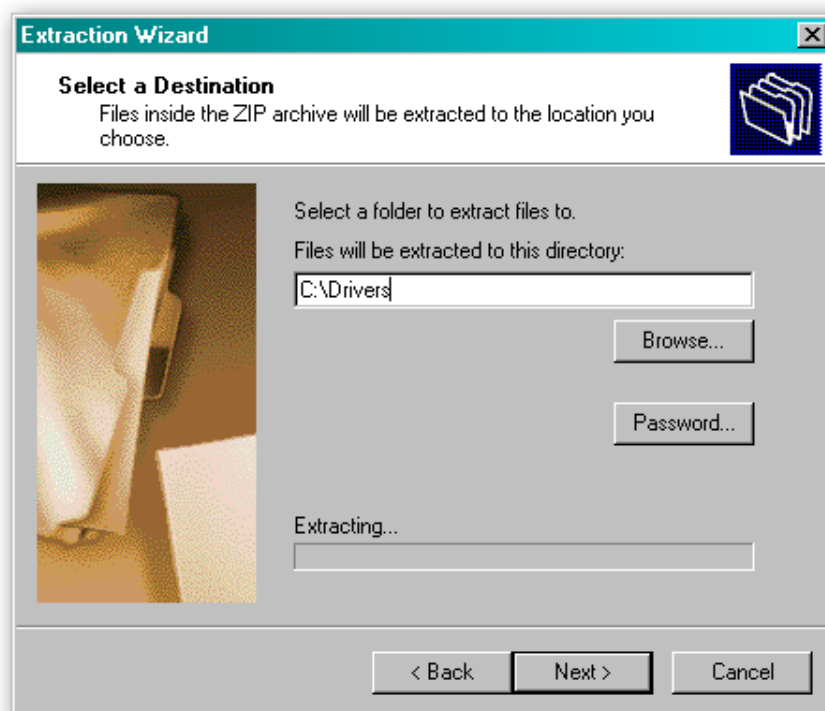
Both files are provided in a 'zipped' (compressed) form – you will need to extract the files from the zipped file before you can install the software or driver. Any version of Windows from Windows 98 onwards can open zipped files; or you may want to use a third party software tool such as Winzip or WinRAR.

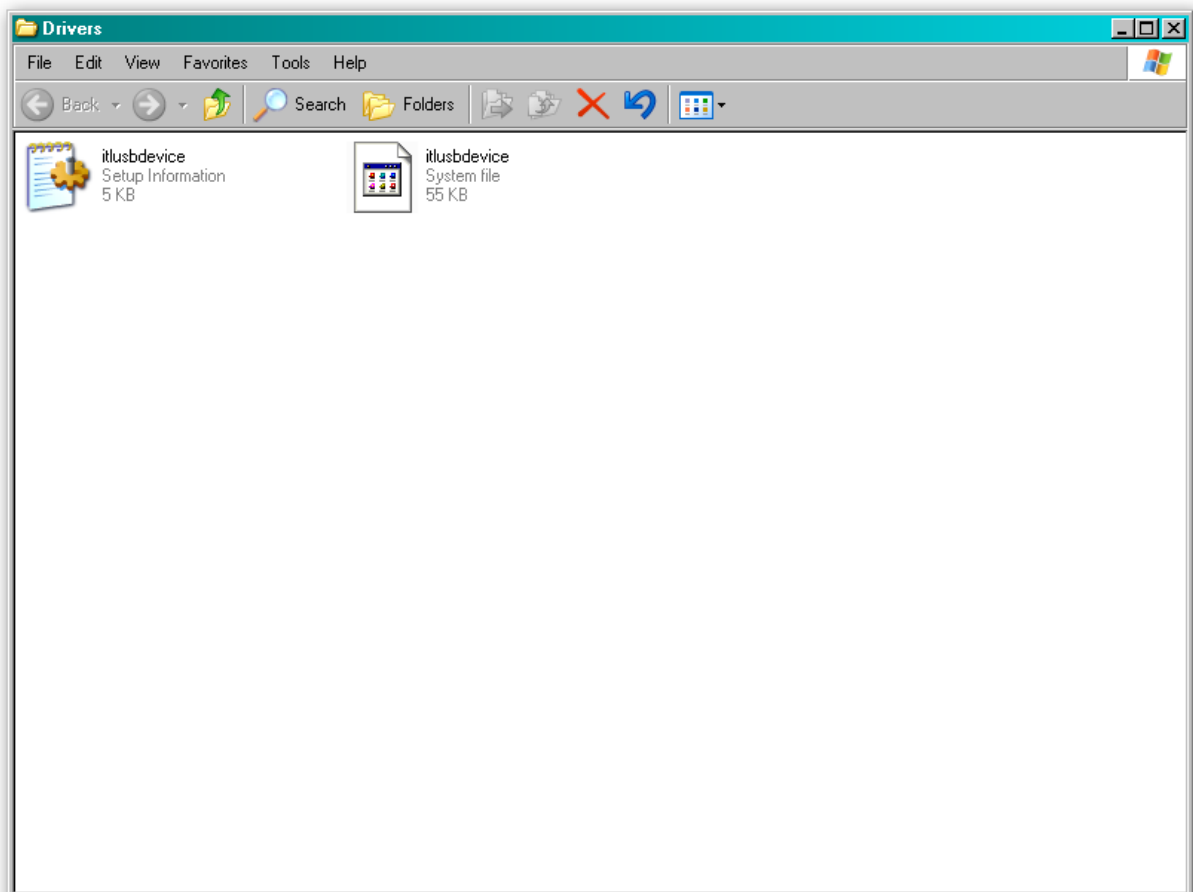
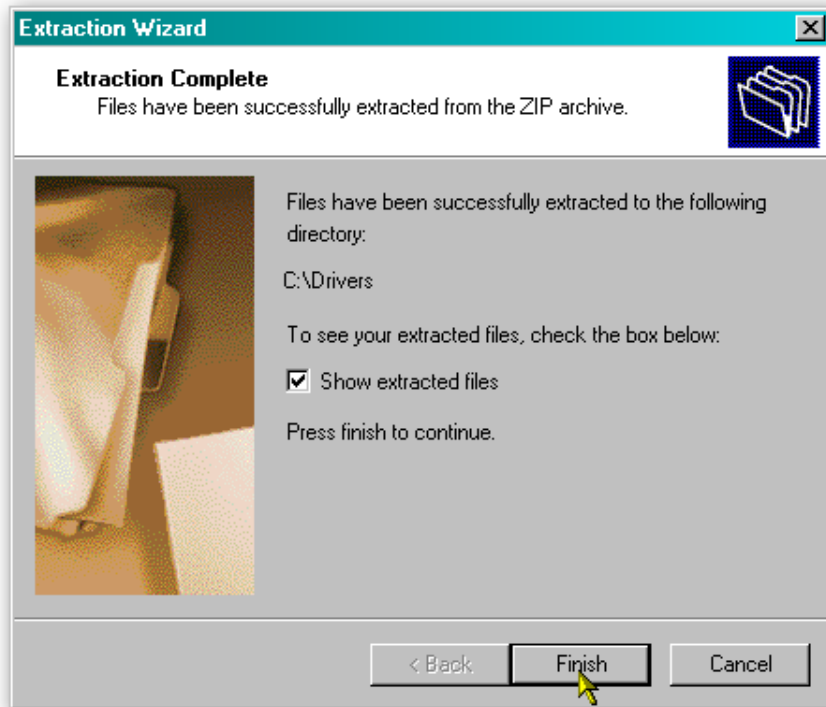


Extract the files to a convenient location – this might be an existing folder, or you may want to save them into a new folder.



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

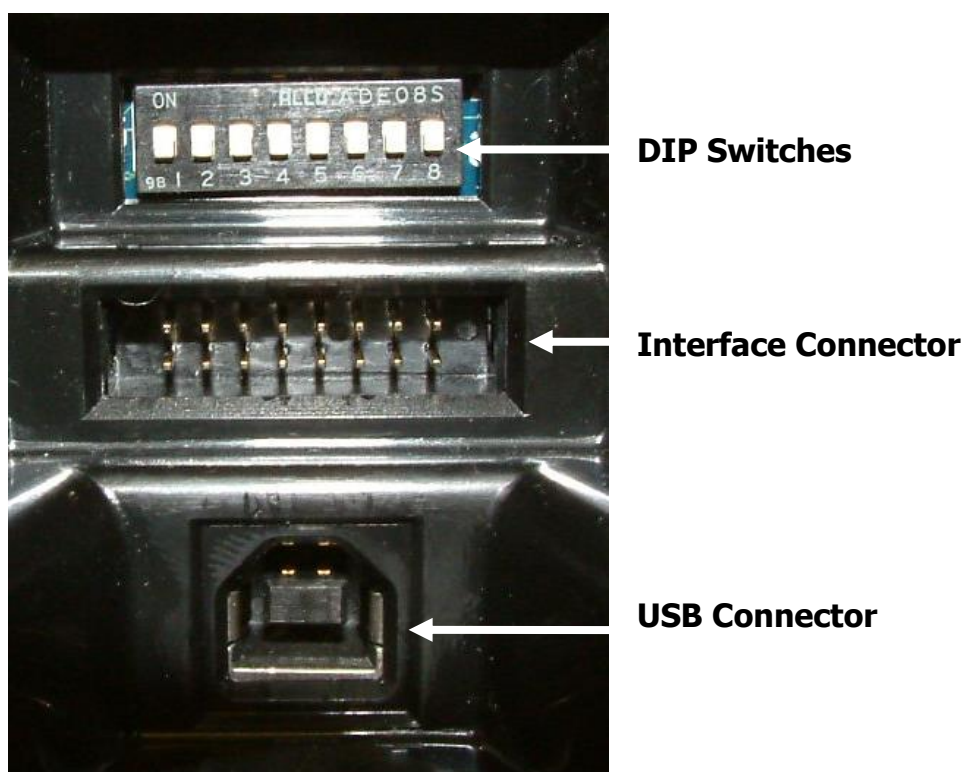




### 3.1.3 Installing the Drivers

There are several ways to communicate with the NV200 validator, which include using a direct connection from computer to validator with a 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 direct USB connection method.

To install the drivers, you need to connect a standard USB 2.0 compliant Type A to Type B cable from your computer to the USB interface socket on the rear of the NV200 validator:



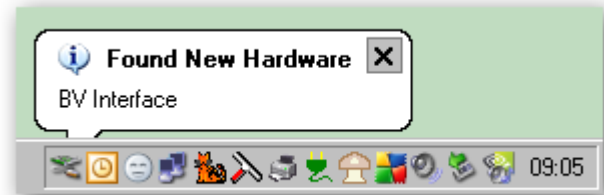
The NV200 validator must be powered up for the interface to be recognised by Windows. If the NV200 validator is not in the host machine, you will need to provide power to the 16 way interface connector first. The connection information and pin numbering is as follows:



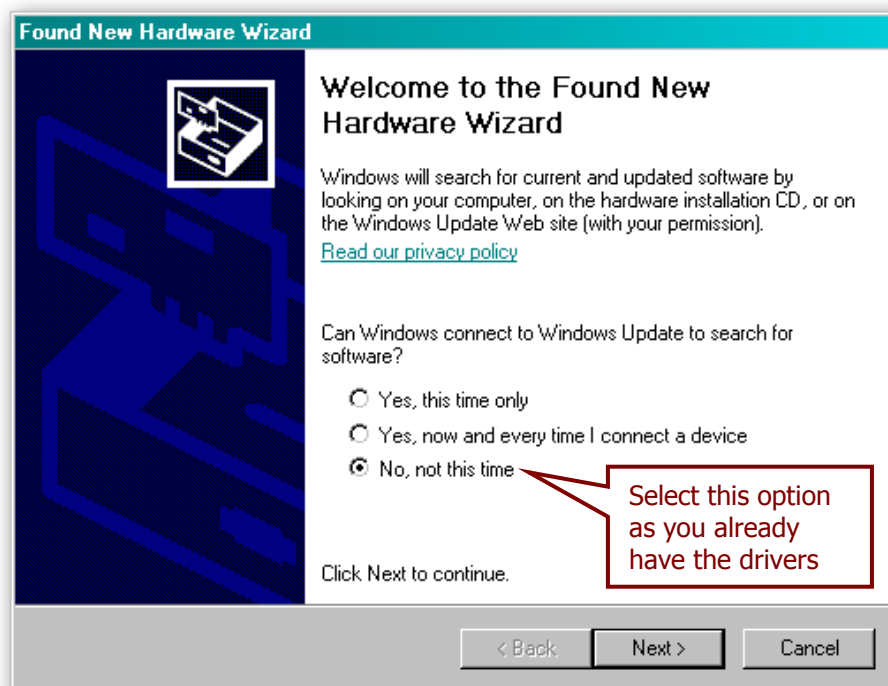
Pin	Description
15	+ V
16	0V / Ground Connection

Before connecting the USB cable, make sure that the unit is powered up. Once you have carried out these steps, plug the USB cable into the NV200 validator.

After connecting the USB cable, Windows should then detect the NV200 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):

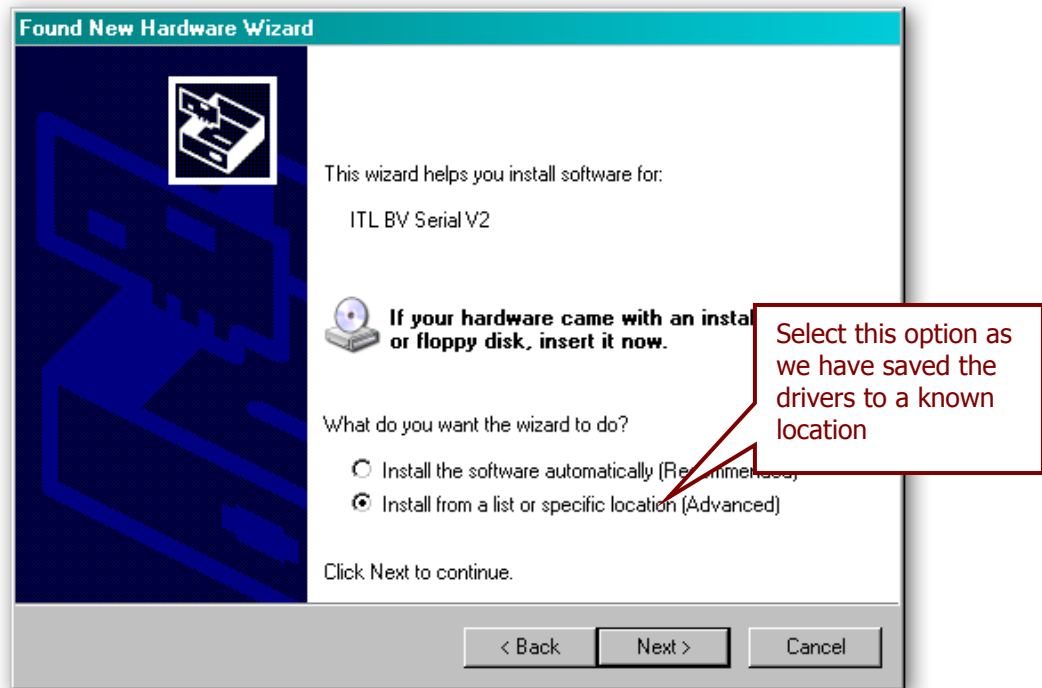


### Information

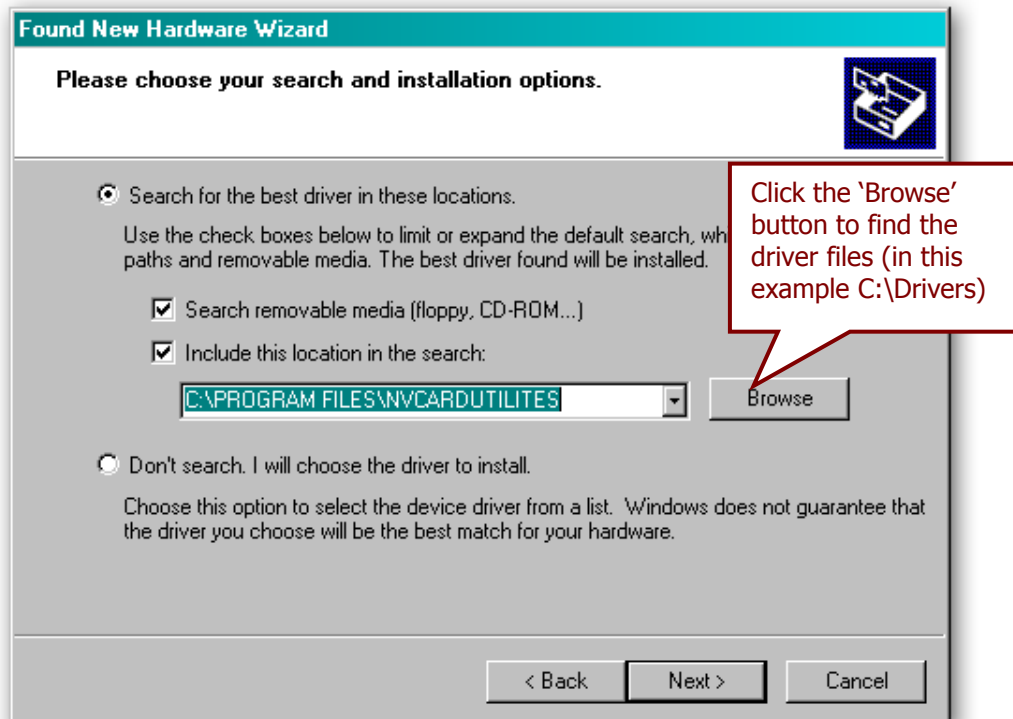
Only use V2 drivers

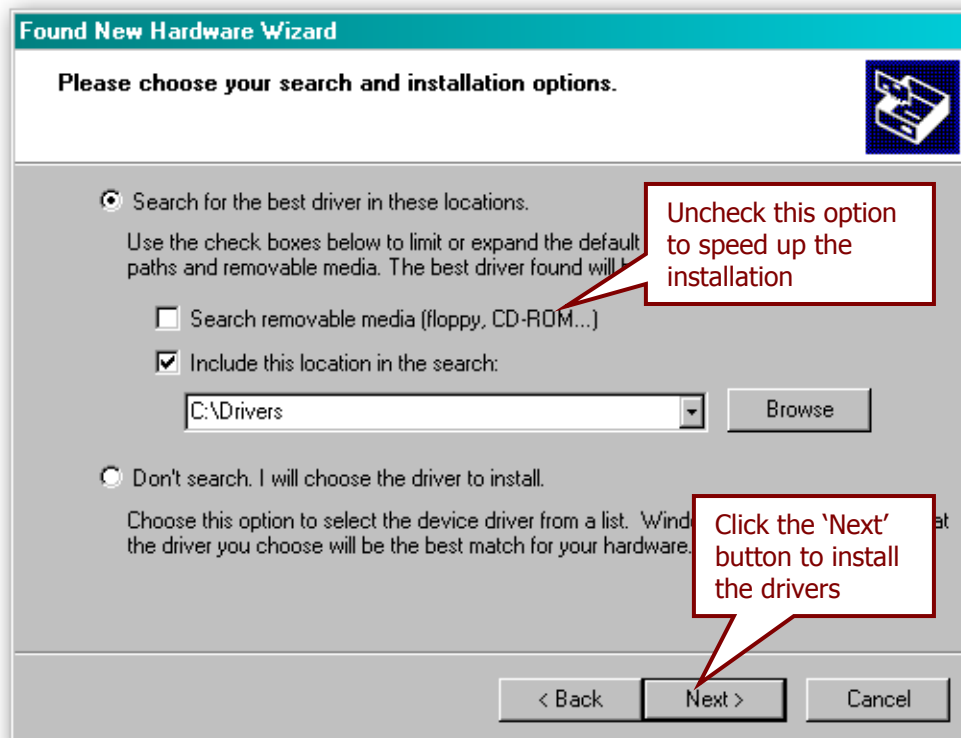
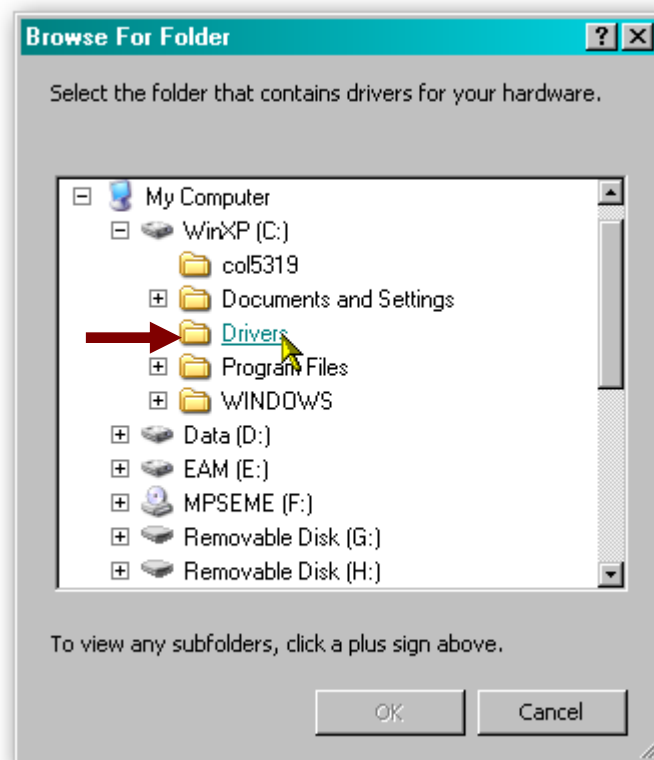
Please make sure that you are using the V2 drivers for the installation.



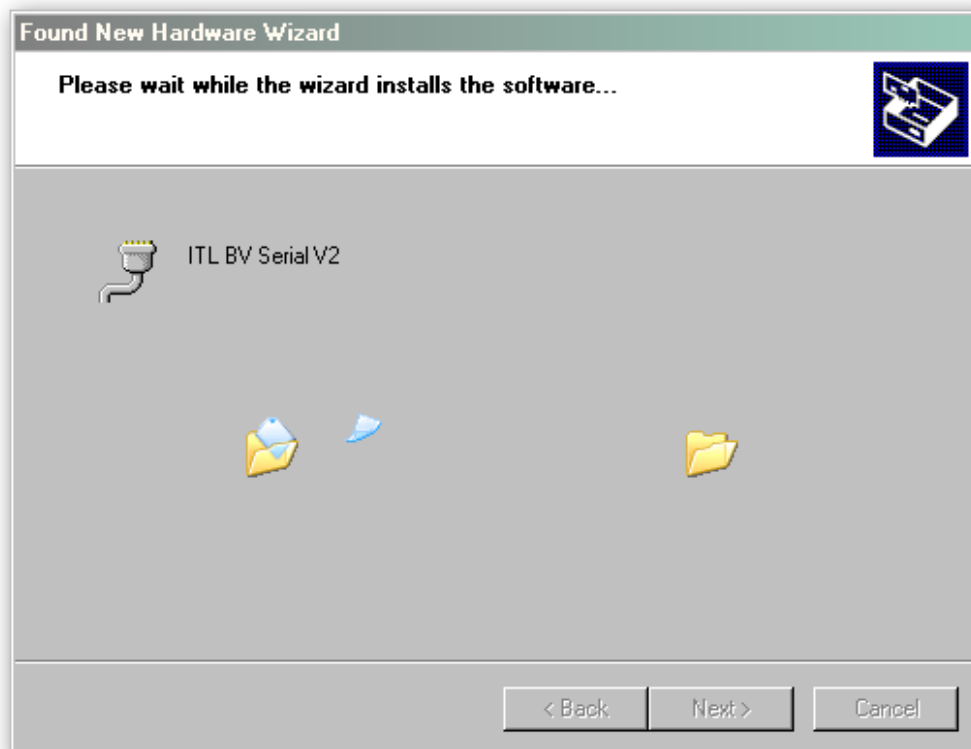
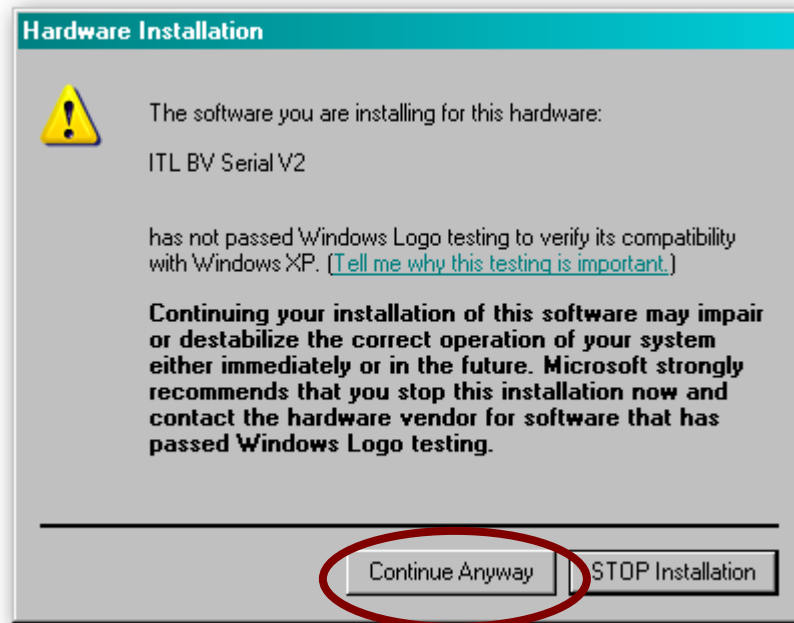


The next dialog box will ask you where to search for the drivers:

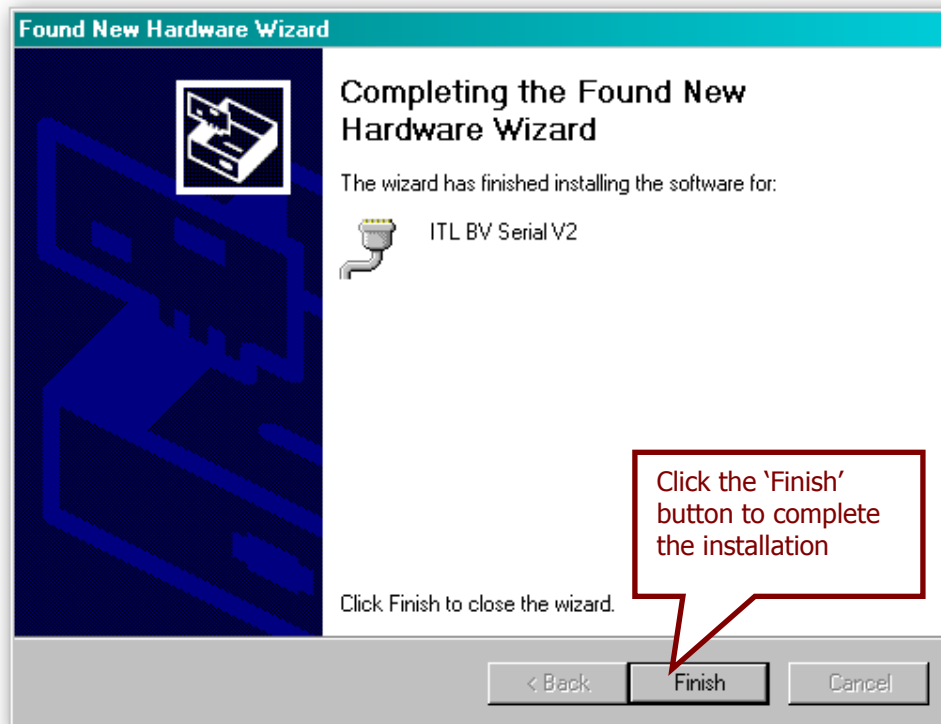




You may see a warning dialog saying that the drivers have not passed Windows logo testing – you can ignore this warning. Just click the 'Continue Anyway' button.

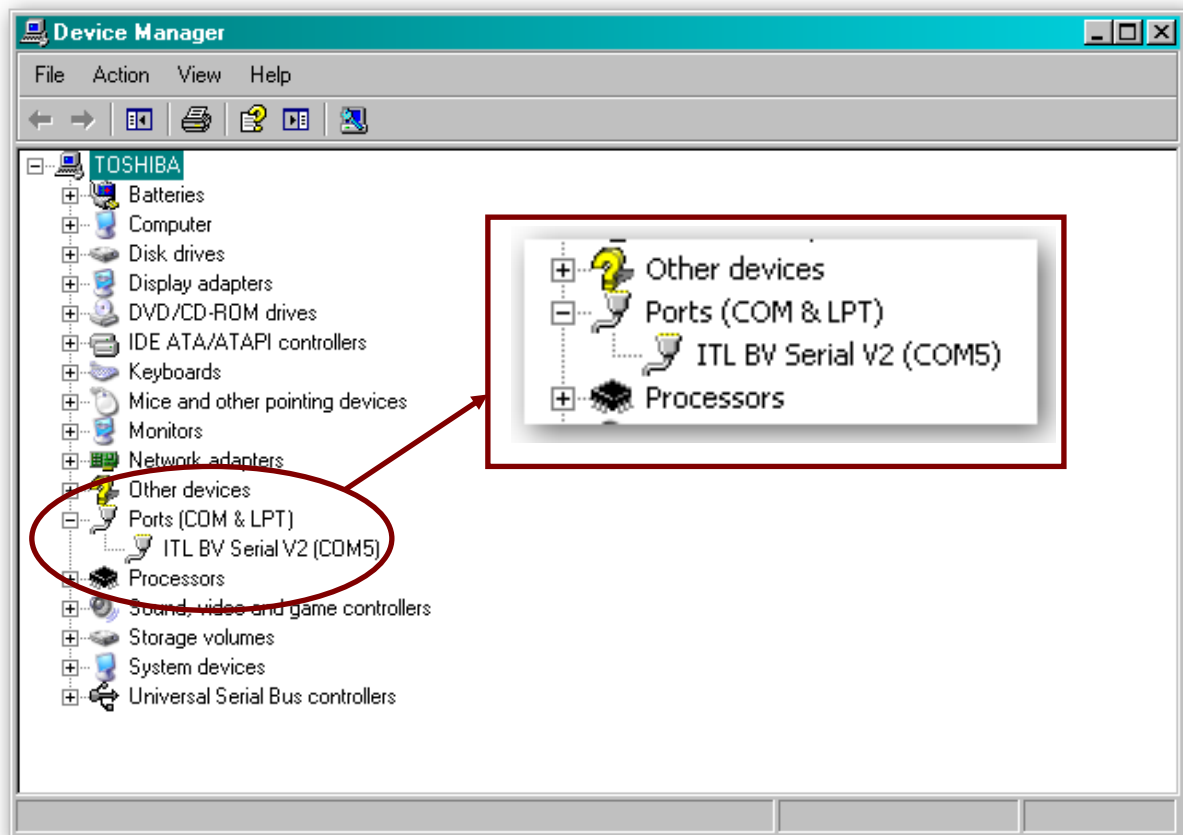






After completing the driver installation you can check that the communications port has been installed correctly.

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:

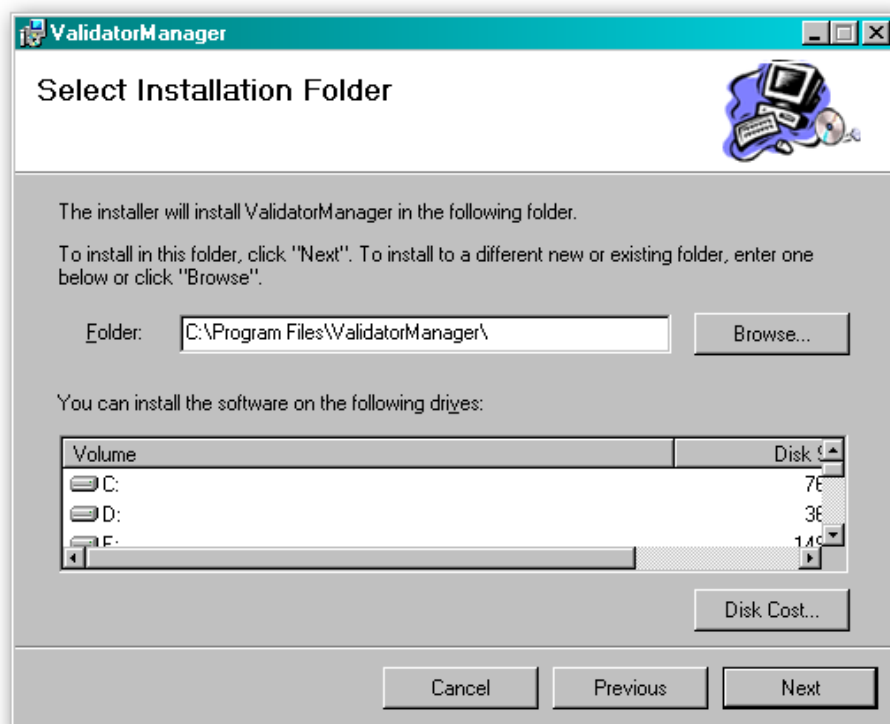


The actual communications port number (in our example COM5) may vary depending on your particular computer configuration.

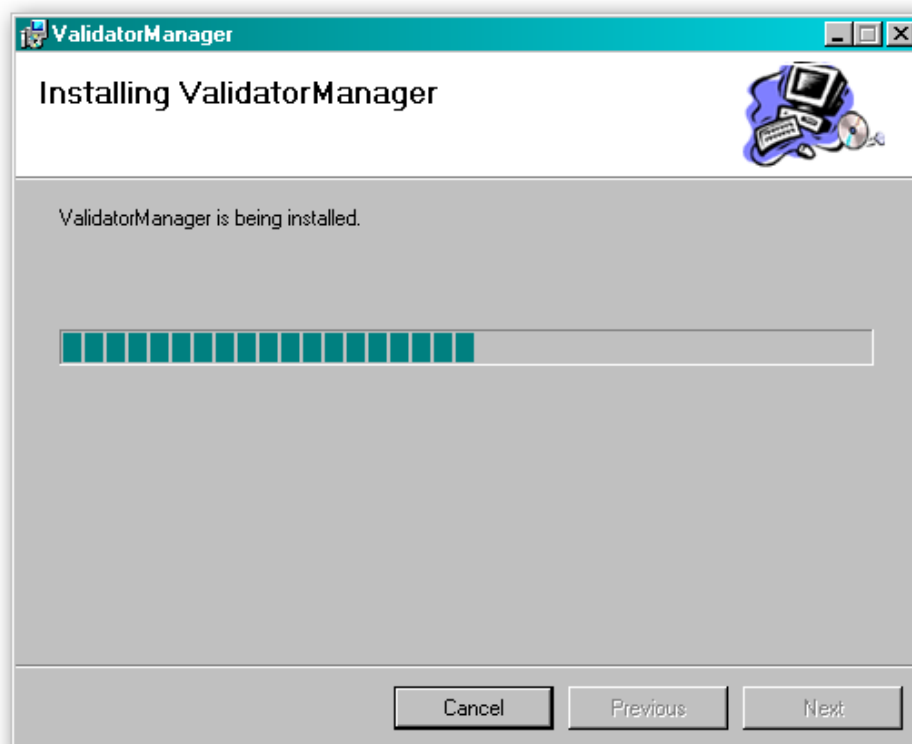
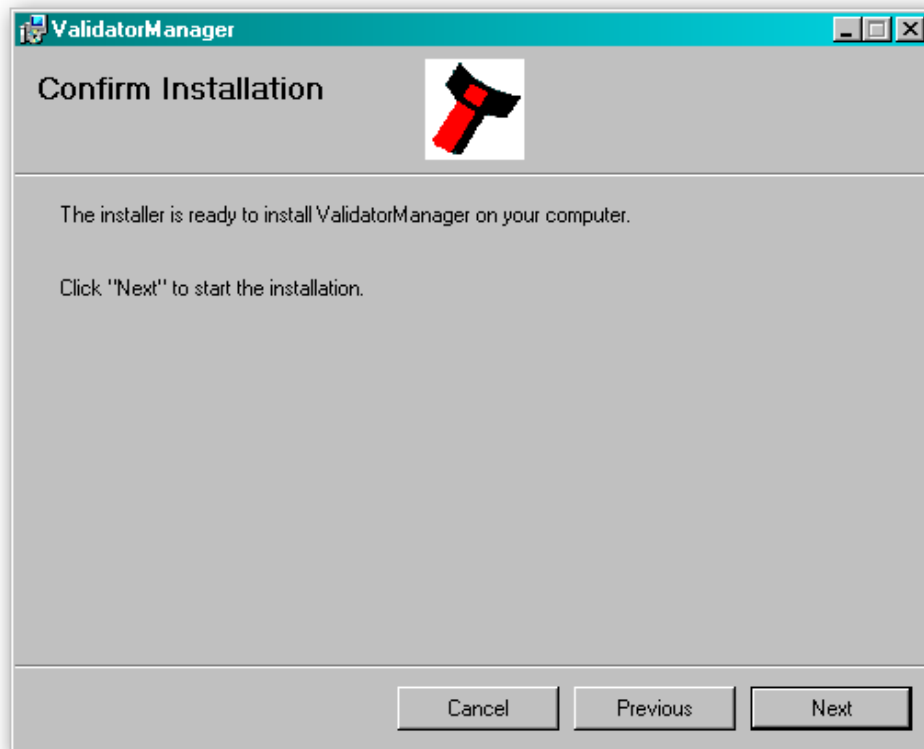
Now the drivers have been correctly installed you can install the Validator Manager software – this is covered next.

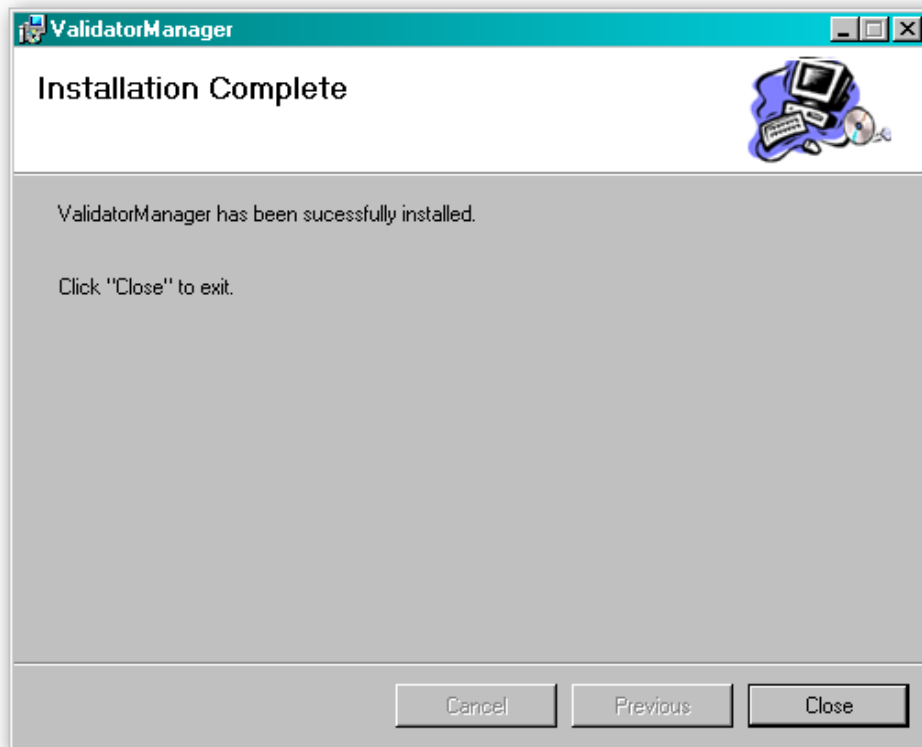
### 3.1.4 Installing the Validator Manager Software

Installing the Validator Manager software is very straightforward. Find the Validator Manager zipped file you downloaded earlier, 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:

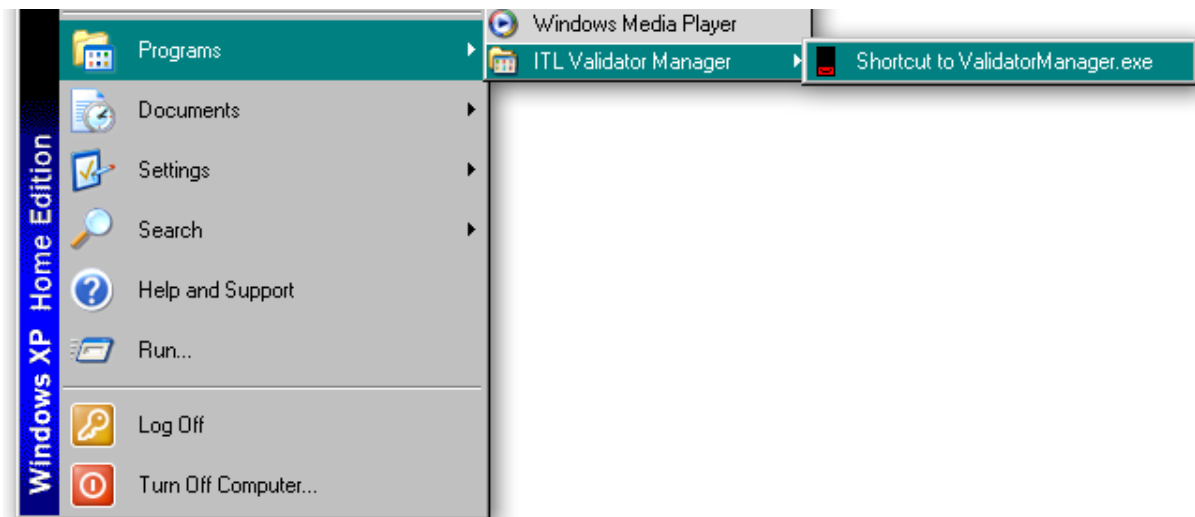


You can choose where you would like to install the software, or just accept the default location (as shown above). Clicking on the 'Next' button will then ask you to confirm the installation:





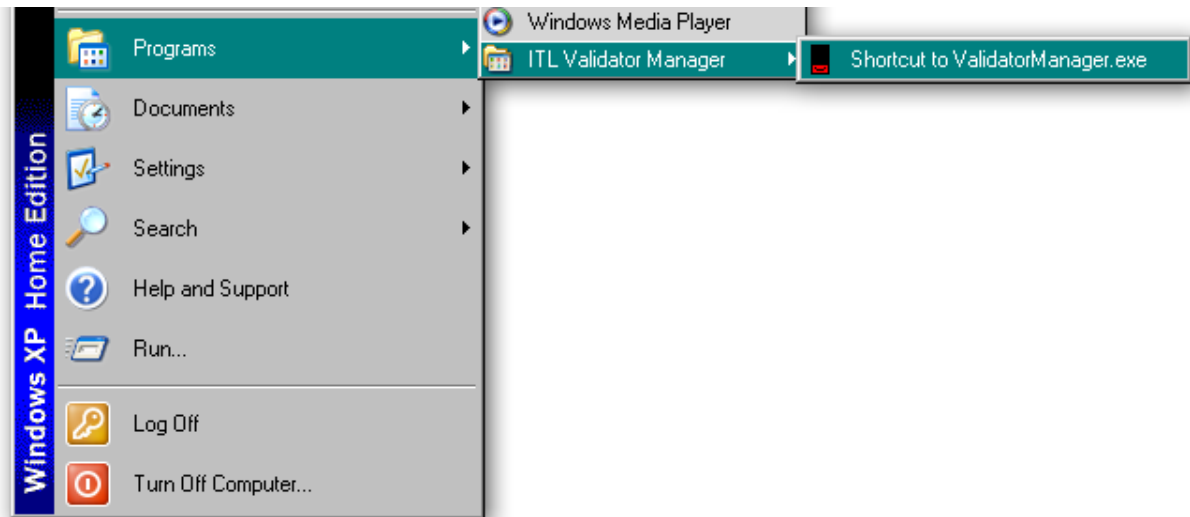
Once the installation is complete, you will have a new program group called 'ITL Validator Manager' in the Windows Start Menu, similar to the one shown here:



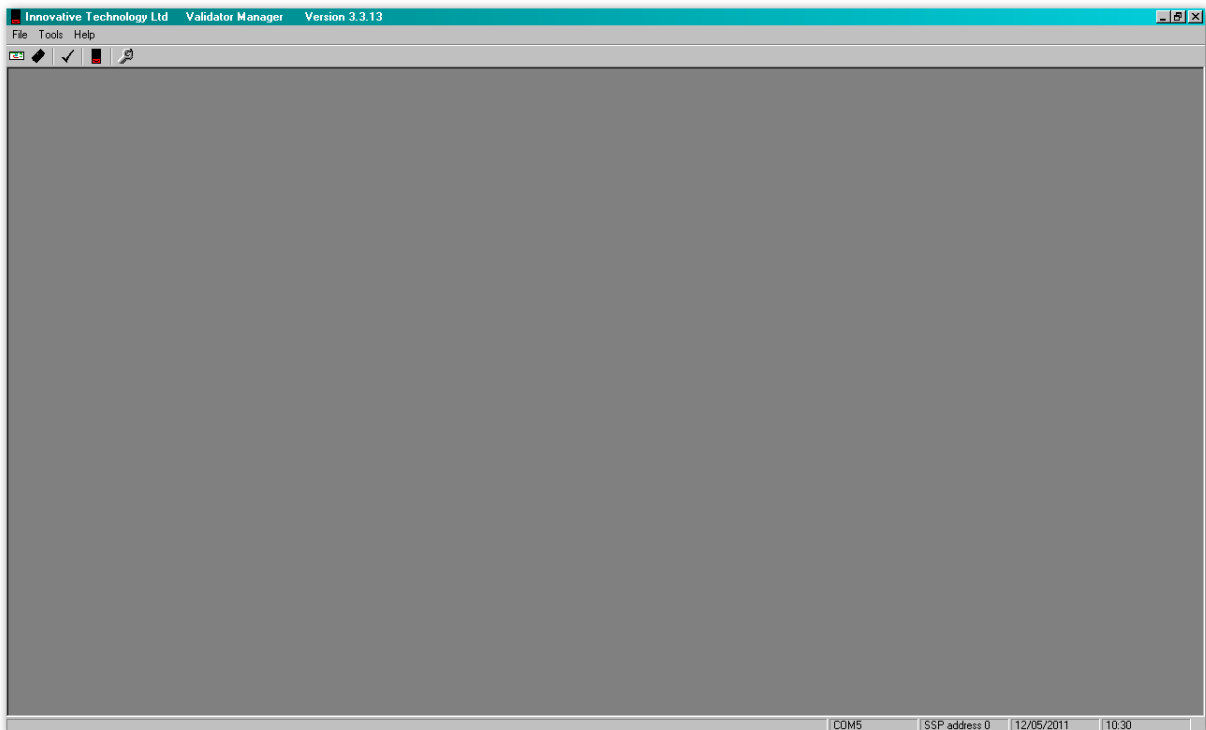
You can run the Validator Manager software by clicking the 'Shortcut to ValidatorManager.exe' menu entry; however, before you can use the Validator Manager software with an NV200 validator you will need to make sure that you have installed the BV interface drivers (as described earlier).

### 3.1.5 Starting the Validator Manager Software

The Validator Manager software is launched by clicking the 'Shortcut to ValidatorManager.exe' entry in the 'ITL Validator Manager' menu group.

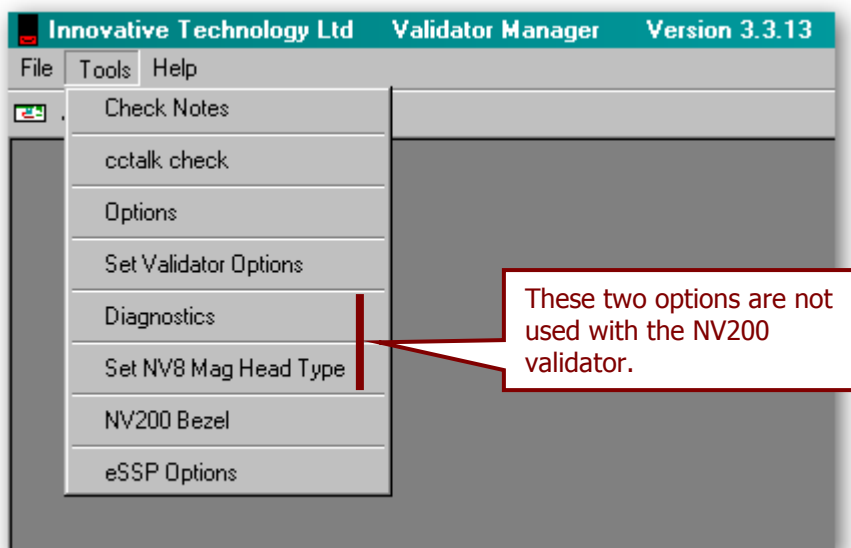


The initial program screen looks like this:



Make sure that the NV200 Validator is powered up and the USB cable is connected before going any further. All of the program options can be accessed from the menu bar at the top of the screen – some specific functions can also be accessed by clicking the relevant icon underneath the menu bar, and the function of each icon is indicated by a 'tooltip' indicator

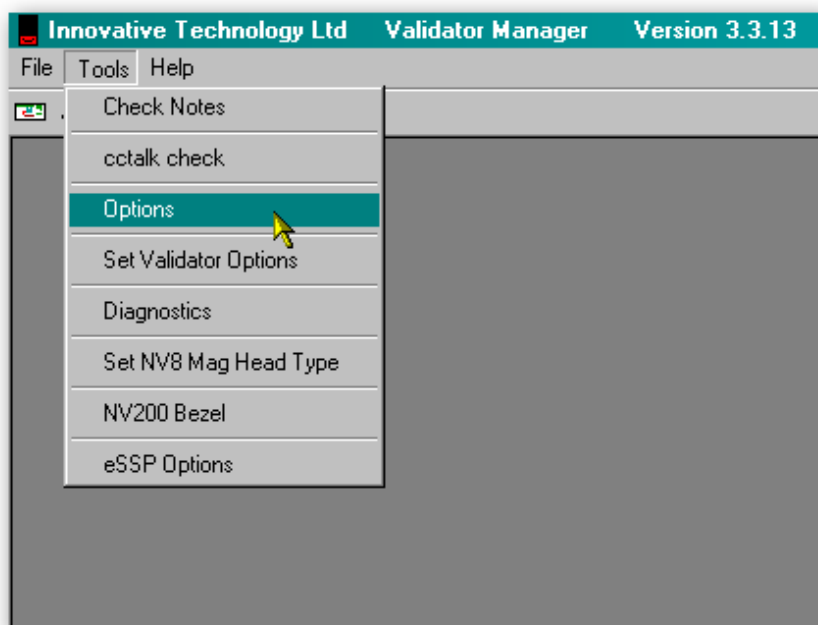
Please be aware that not all the program options are applicable to the NV200, as the Validator Manager software is designed to work with a range of ITL Technology validators.



Full details of all the Validator Manager software functions are detailed in the program help file (accessible from the 'Help' menu).

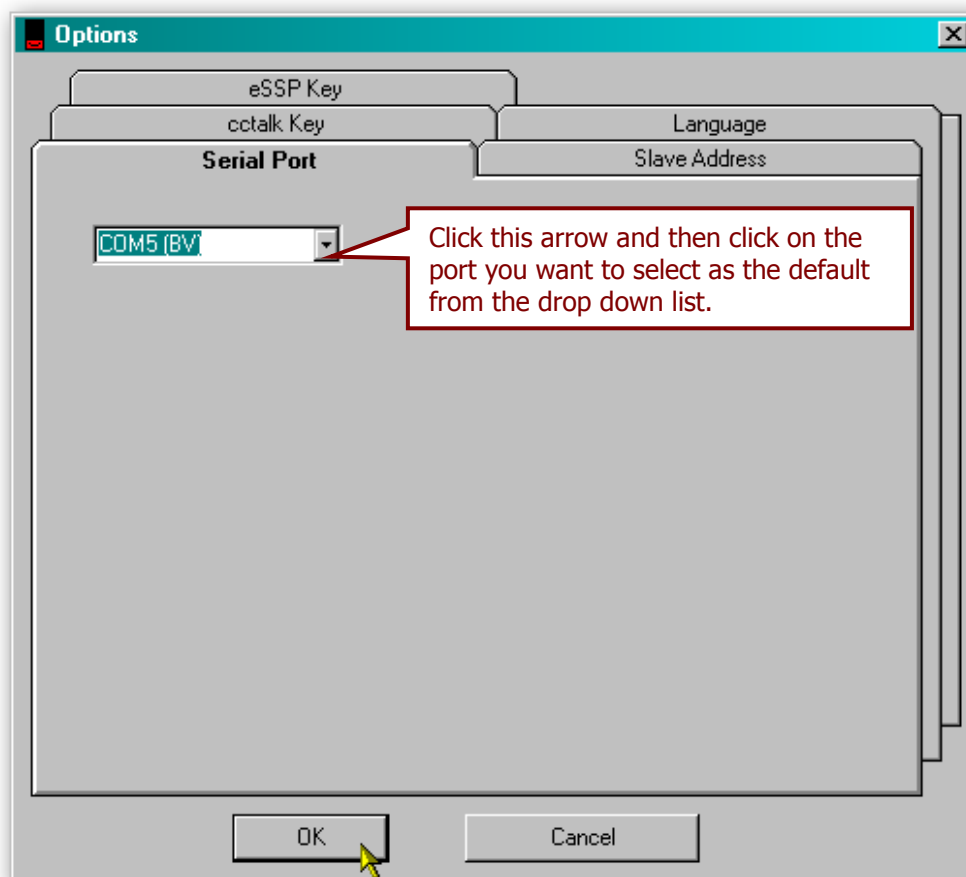
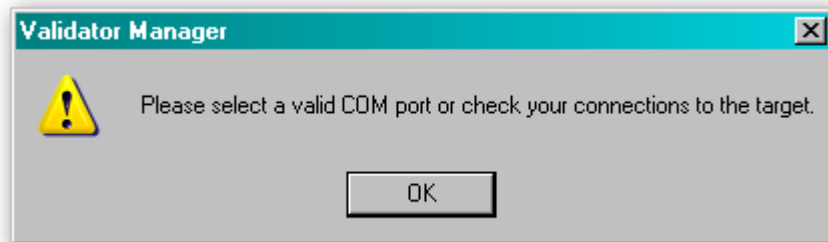
### Options:

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



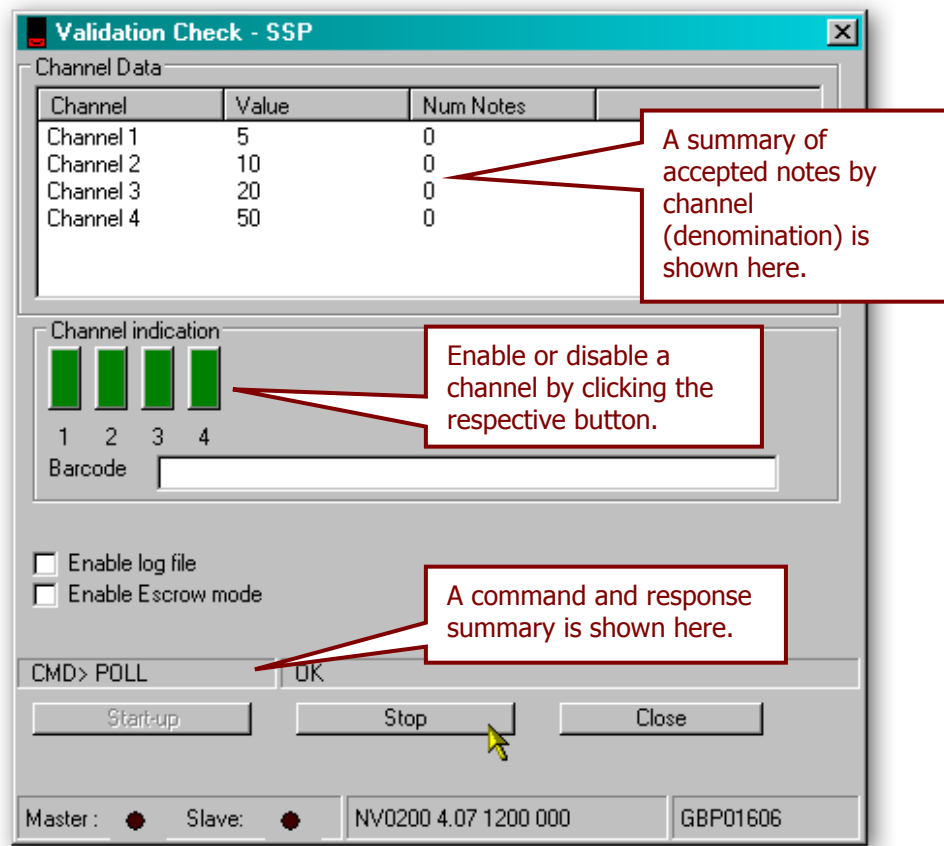
Selecting the 'Serial Port' tab from the 'Options' dialog and defining which serial port to use to connect to the NV200 validator should be one of the first things you do after installing the software.

The Validator Manager will not work if the serial port is not set or is set incorrectly (if the serial port has not been set a dialog box will appear when you run the program prompting you to enter or correct the port setting):



Select the correct serial port from the list and click the 'OK' button to confirm the setting.



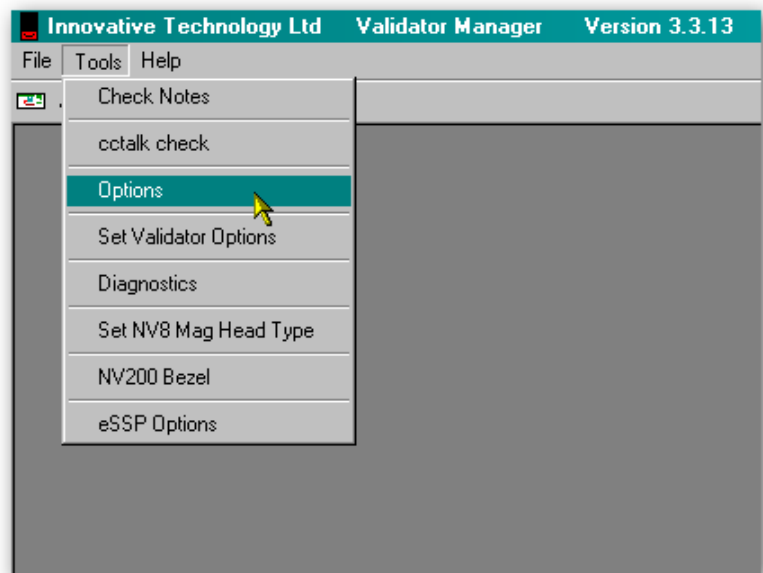
**Check Notes:**

The 'Check Notes' menu item provides a way to check the validator will correctly accept bank notes. Clicking the 'Start-up' button will initialise the NV200 validator and allow acceptance of bank notes. The validator is reset after clicking the 'Stop' button.

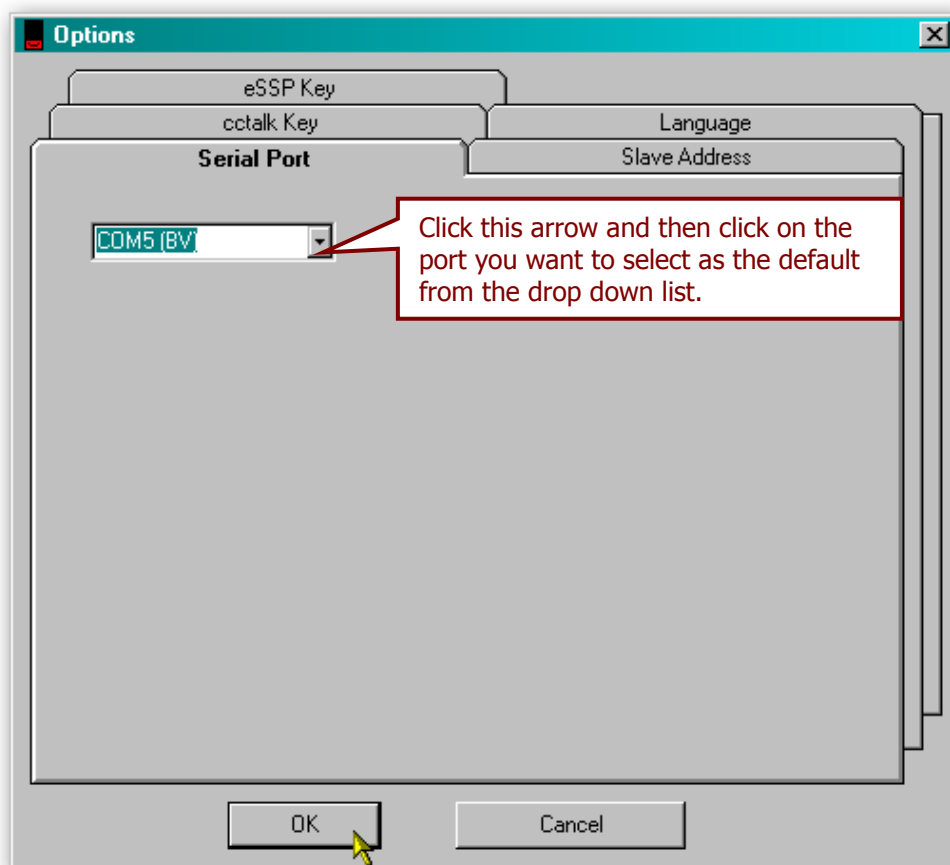
### 3.1.6 Preferences, Settings and Options

#### Options:

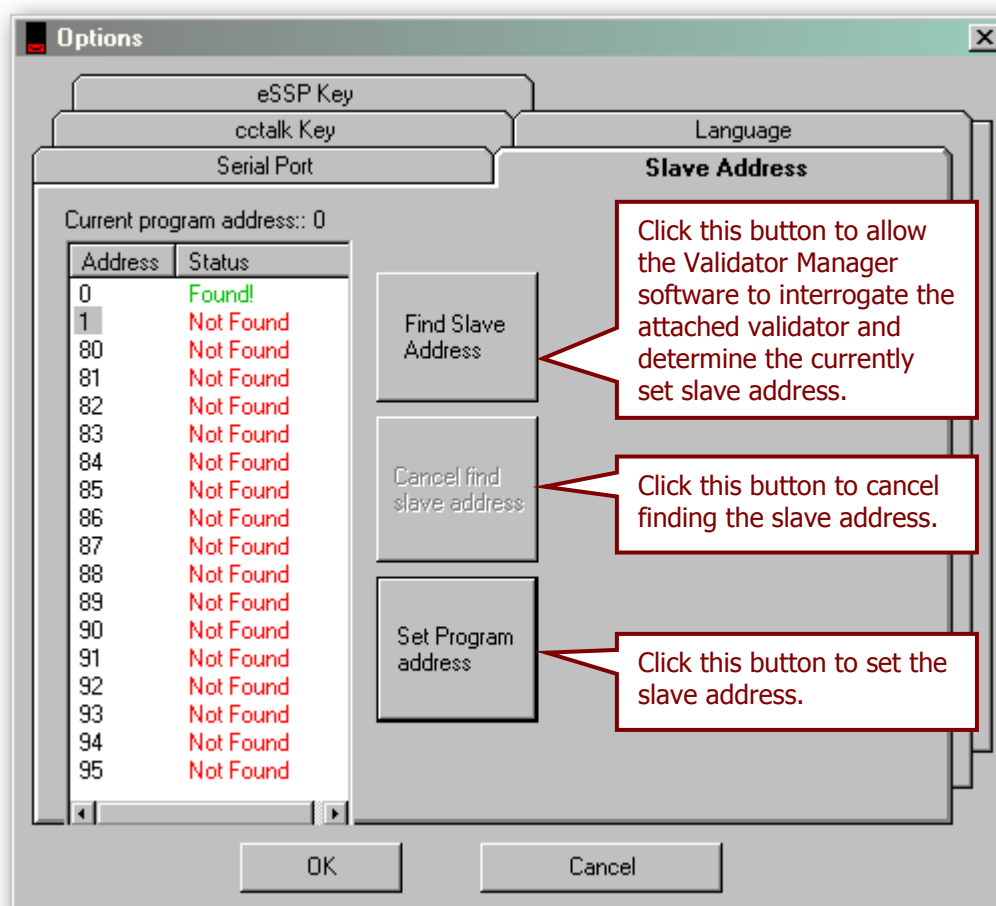
The general preferences for the Validator Manager software are accessible from the 'Tools' menu (as shown). Click the 'Options' entry to open a new dialog box:



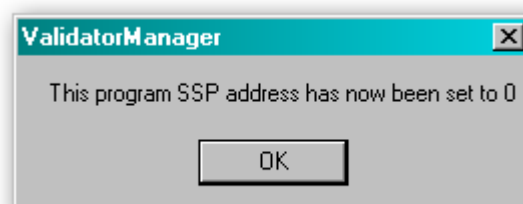
By selecting the 'Serial Port' tab from the 'Options' dialog you can define which serial port is being used to connect to the NV200 validator – click the 'OK' button to confirm the setting:



The Validator Manager software can detect the address used by the validator from the 'Slave Address' tab:



After clicking the 'Set Program Address' button, a dialog box will appear confirming the new setting - click the 'OK' button to confirm the change.



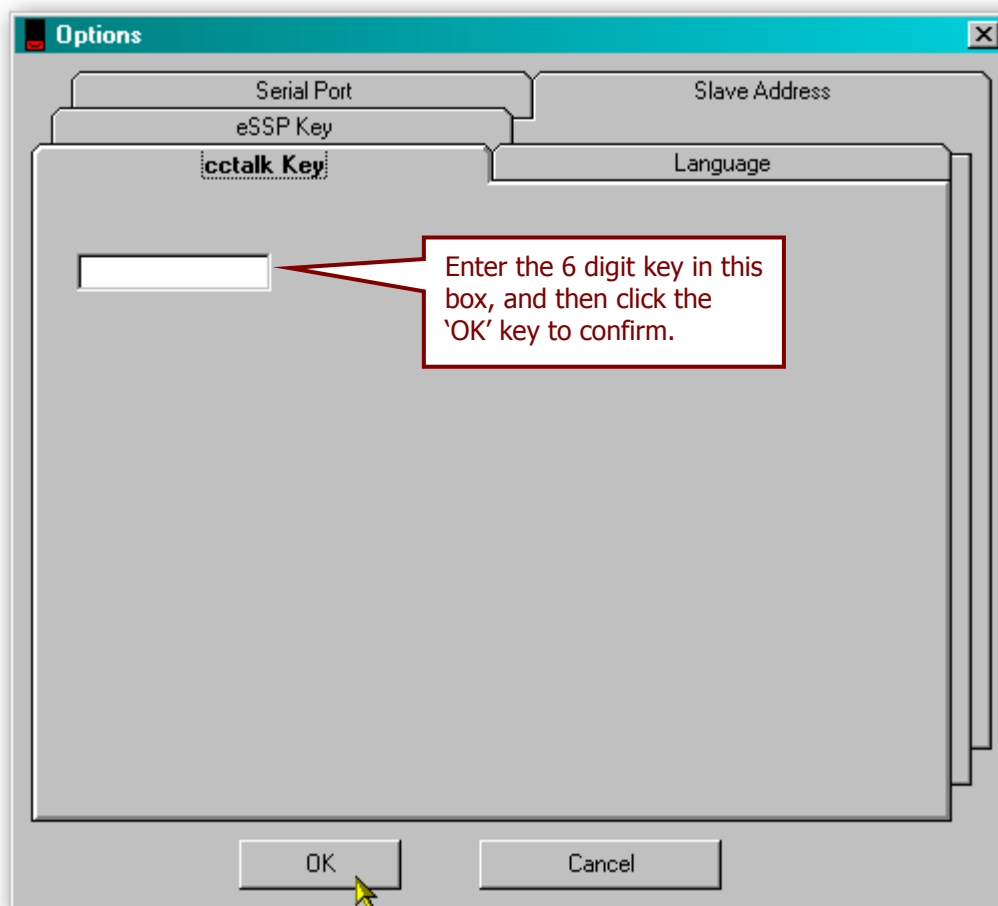
### CAUTION!

Limited slave address ranges

The Validator Manager software will only communicate with the validator if the slave address is set to 0, 1 or in the range 80-99.

The 'ccTalk Key' tab allows the user to enter a six digit security key for use when the validator is set for ccTalk operation.





The ccTalk key is the **HOST** key, and is used for the ccTalk check – the validator must be configured to use the same key.

**CAUTION!**

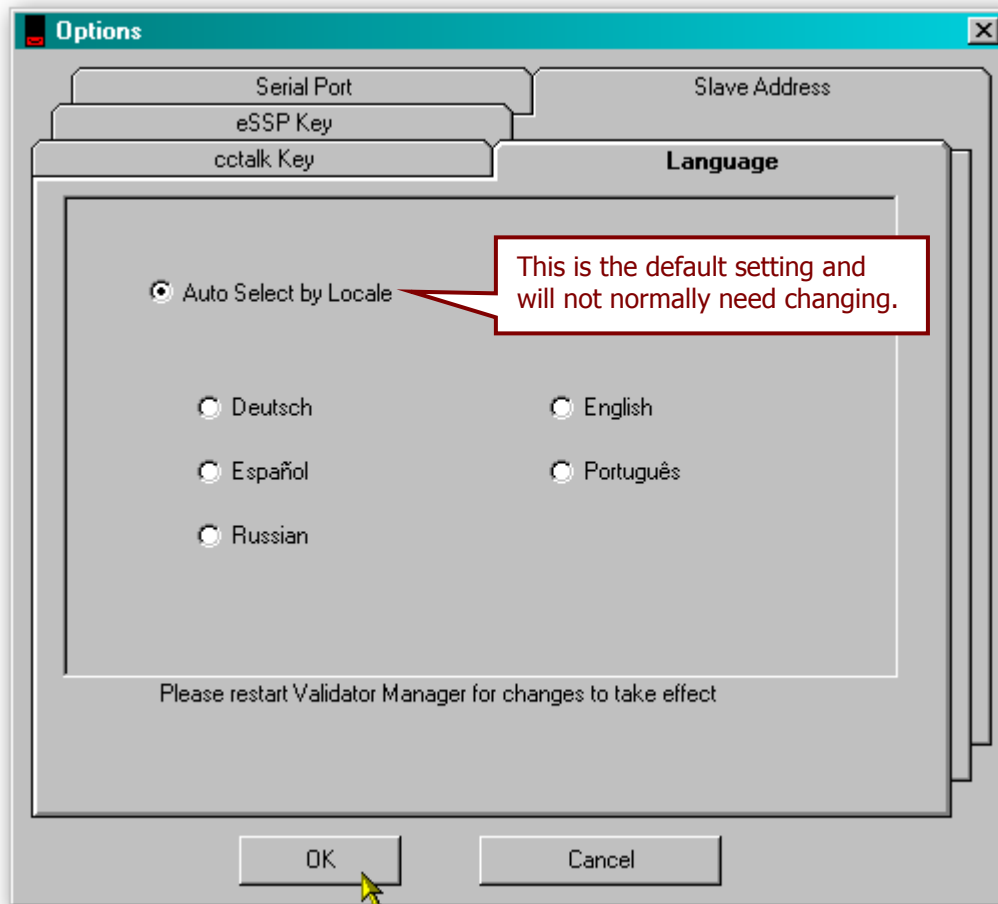
Take care when changing  
ccTalk key

The user should make a note of the new key and after any change. The default setting for the ccTalk security key is 123456.

Select the 'Language' tab to change the preferred language for the software. You shouldn't normally need to change the language setting, as this is determined automatically based on the Windows locale settings. You can if you wish select one of five specific languages (German, English, Spanish, Portuguese or Russian) if needed, as shown below.

Click the 'OK' button to confirm the change – you will have to close and reopen the software to allow the language change to take effect.





The final tab on the 'Options' dialog is the 'eSSP Key' tab. By selecting this tab you can set a new security key to use when the validator is operating in SSP mode.

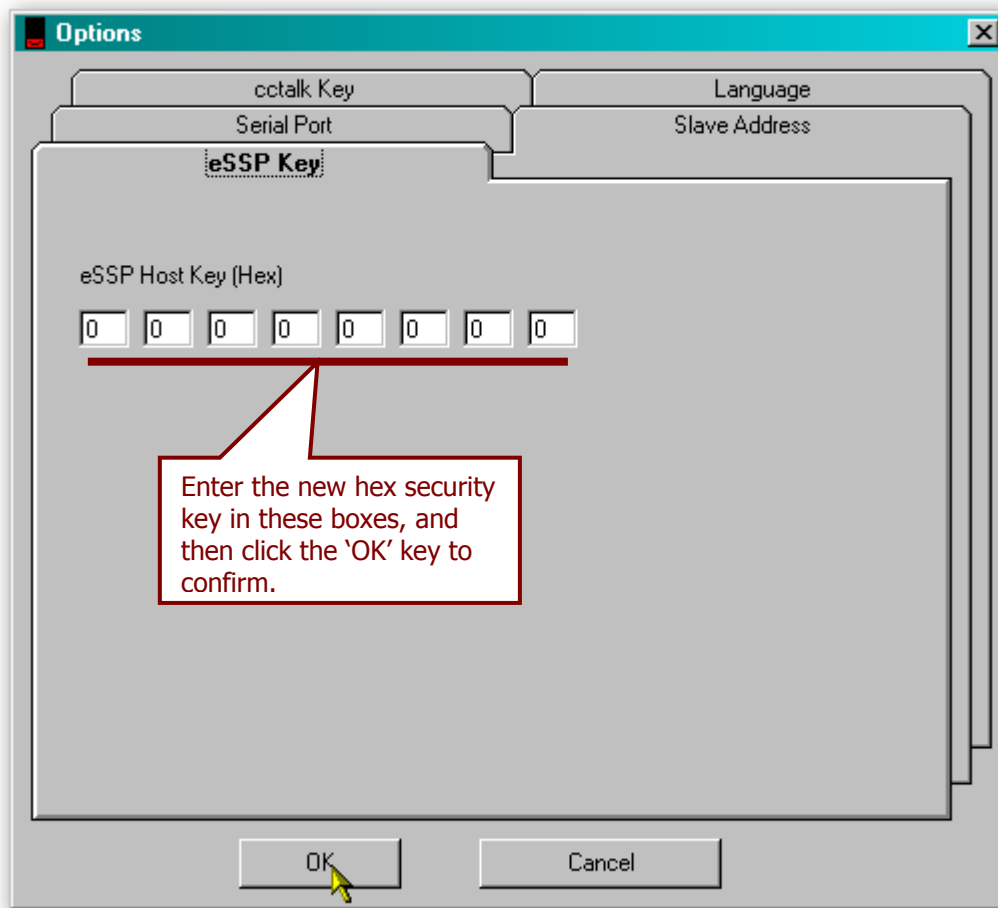


### CAUTION!

Take care when changing eSSP key

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.

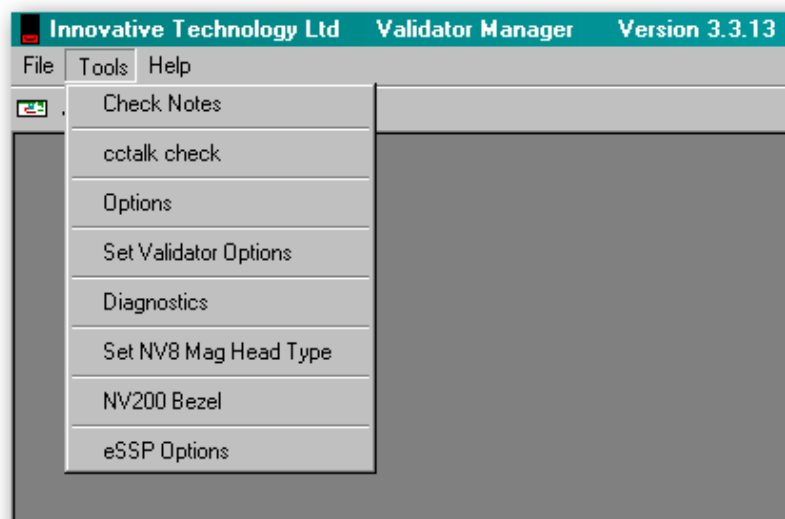




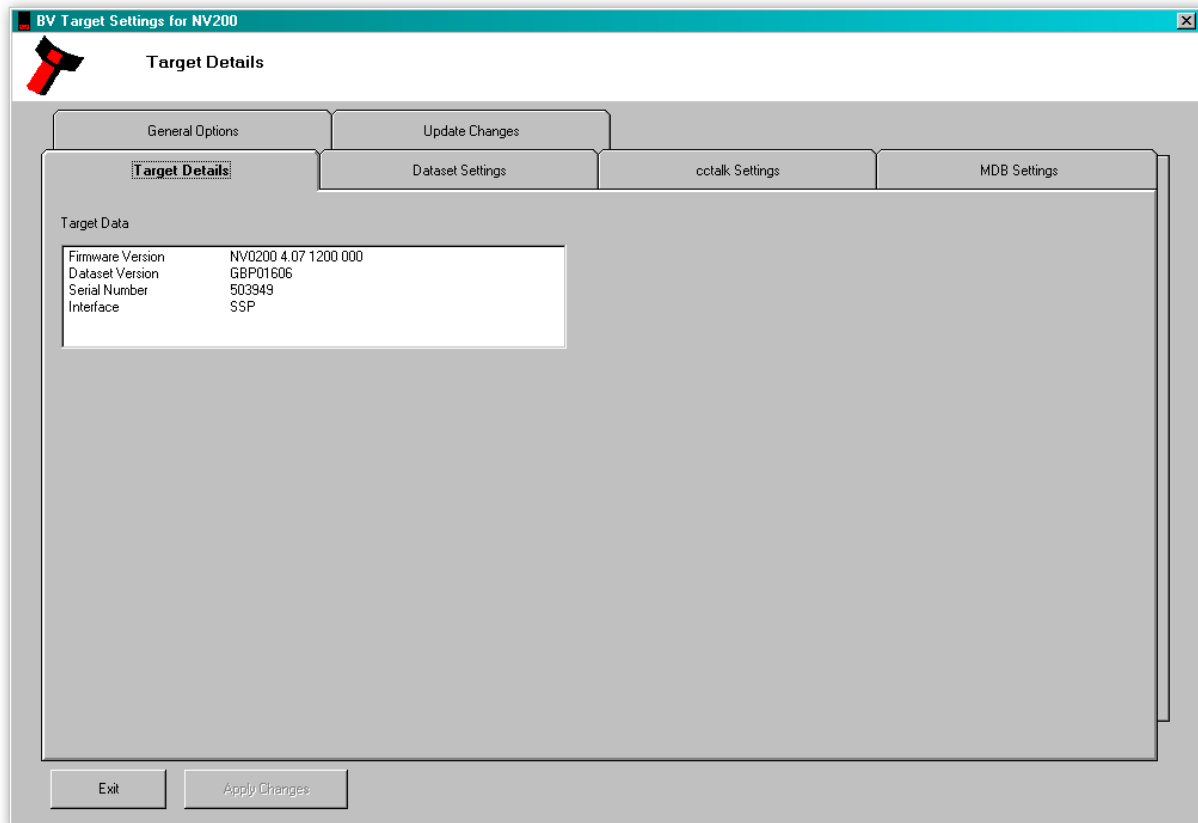
After entering a new key, press the 'OK' button to confirm the change.

### Validator Options:

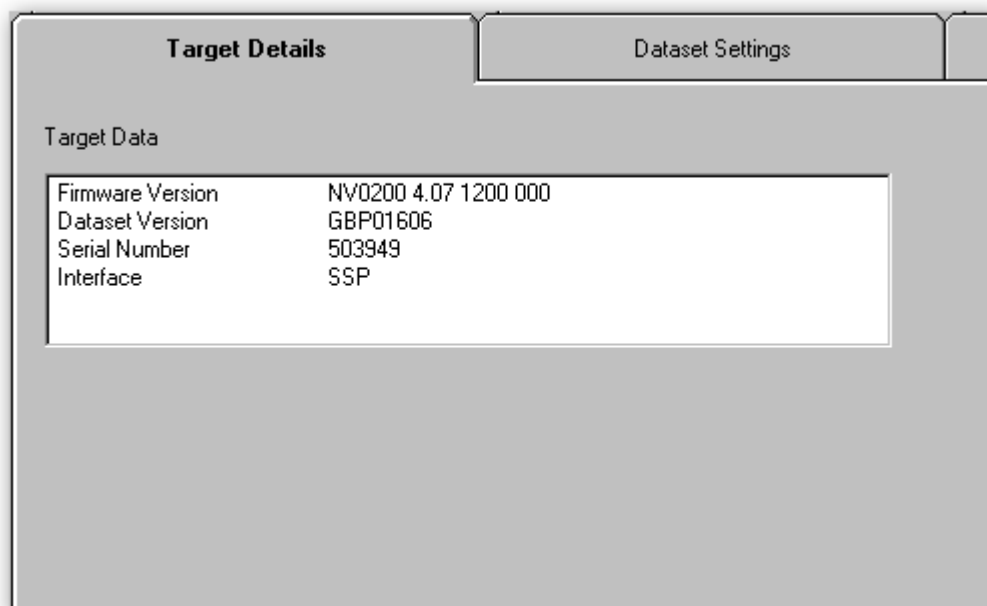
NV200 validator specific options are accessed from the 'Set Validator Options' item on the 'Tools' menu:



As with the 'Options' dialog, the 'Set Validator Options' dialog also has several tabs:

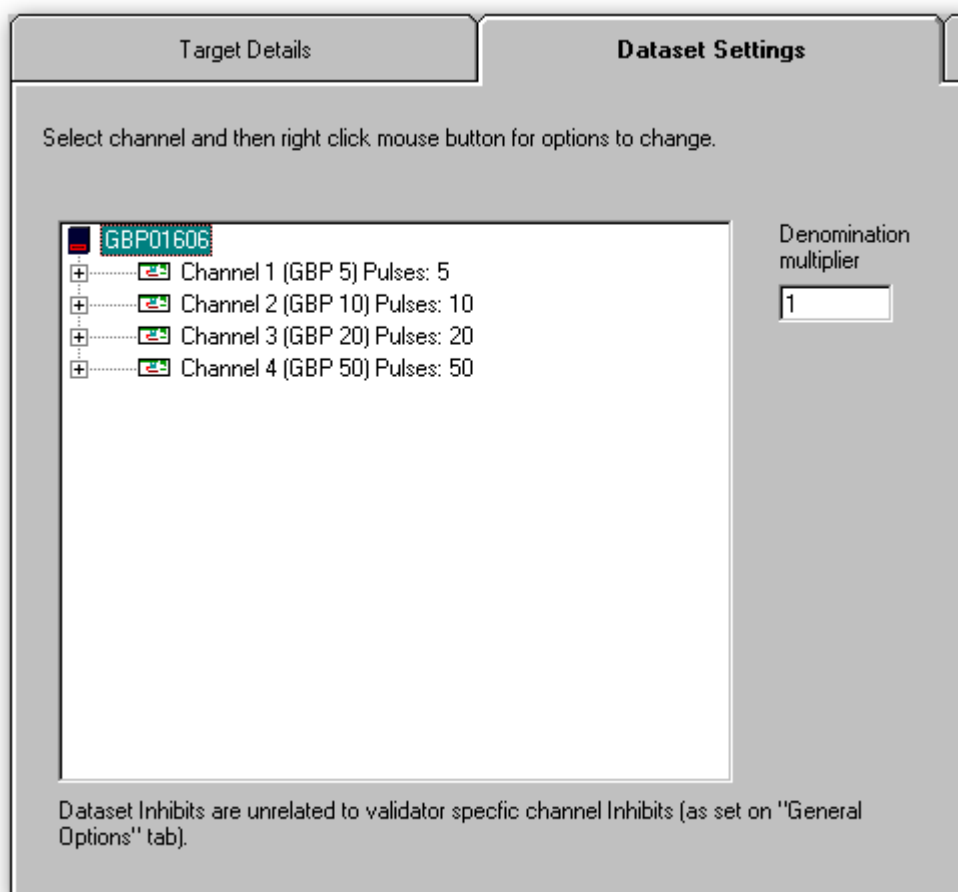


The first tab 'Target Details' allow you to see specific details about the validator, and provides a simple way of checking what version of firmware or dataset are currently installed:

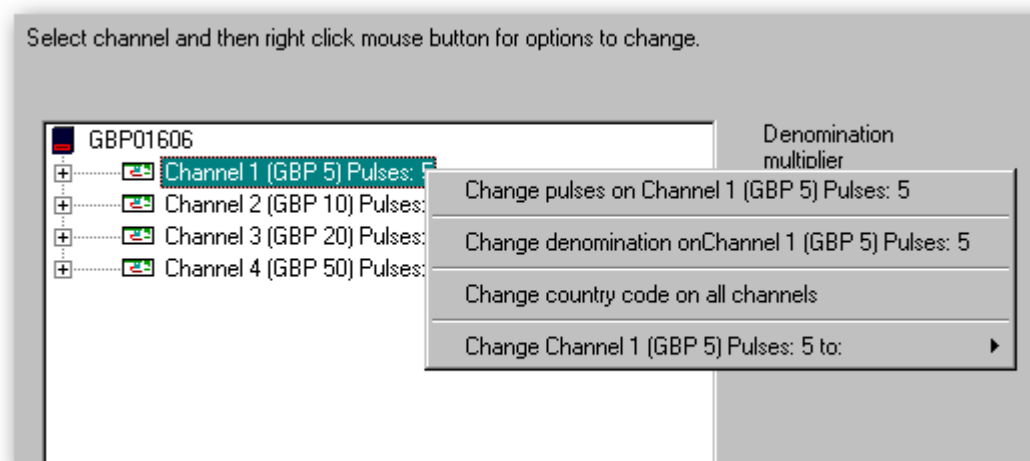


There are no user-changeable settings on this tab.

The second tab 'Dataset Settings' allows you to review and modify the settings of each installed channel:



Right clicking on a channel will open a further dialog allowing you to make specific changes:



Consult the Validator Manager software help file for more information on how to change channel settings.



The third tab 'ccTalk Settings' allows you to review and modify the ccTalk settings and also change the security key settings:

Channel	ID	Real Value
1	GB0005A	05.00
2	GB0010A	10.00
3	GB0020A	20.00
4	GB0050A	50.00

Country	Multiplier	Dec
GB	100	2

Click on multiplier or decimal point value to change.

cctalk Address (dec)

☐ Use user key

cctalk default key

cctalk user key

Check this box to allow setting of a new user key.

Enter the new 6 digit user key in this box.



### CAUTION!

Take care when changing ccTalk key

The user should make a note of the new key and after any change. The default setting for the ccTalk security key is 123456.

The fourth tab 'MDB Settings' allows you to review and modify specific settings if the validator is being used with the MDB protocol:

Parameter	Value
Country Code	1826
Value Multiplier	100
Dec Place	2

Click on parameter value to change.



The fifth tab 'General Options' allows you to review and modify a variety of validator specific settings, including interface mode:

**General Options**

☒ Strim Function Enabled

Click this box to enable or disable the Strim Function.

Pulse high (ms): 200  
Pulse low (ms): 100  
Pulse multiplier: 1  
Pulse low (ms) (Parallel): 0

These pulse timing settings are only used if the validator is set to operate in Pulse mode.

Interface:  
☒ SSP (Smiley Serial Protocol)  
☐ CCT (ccTalk)  
☐ SIO (Simple Serial)  
☐ MDB (Multi-Drop Bus)

Check the box next to the interface mode you want the validator to operate in.

SSP Address: 0

Specify the SSP address used by the validator in this box.

Validator Specific Channel Inhibits:  
 1 8  
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐  
 9 16  
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Specific channels (denominations) can be disabled by checking the appropriate box or boxes.

These inhibits are validator specific and are unrelated to the settings in the 'Dataset' tab. They will be preserved if a new BV file is downloaded to the validator.

☒ Card PIN Lock Set PIN

Click this box to enable or disable the PIN lock function for the memory card.

Note Read Retries: 0

☐ Disable PSU Monitor

The options shown in this area will vary depending on the interface type selected.



### WARNING!

Security risk

Disabling the Strim Function is not recommended because of the potential security risks.



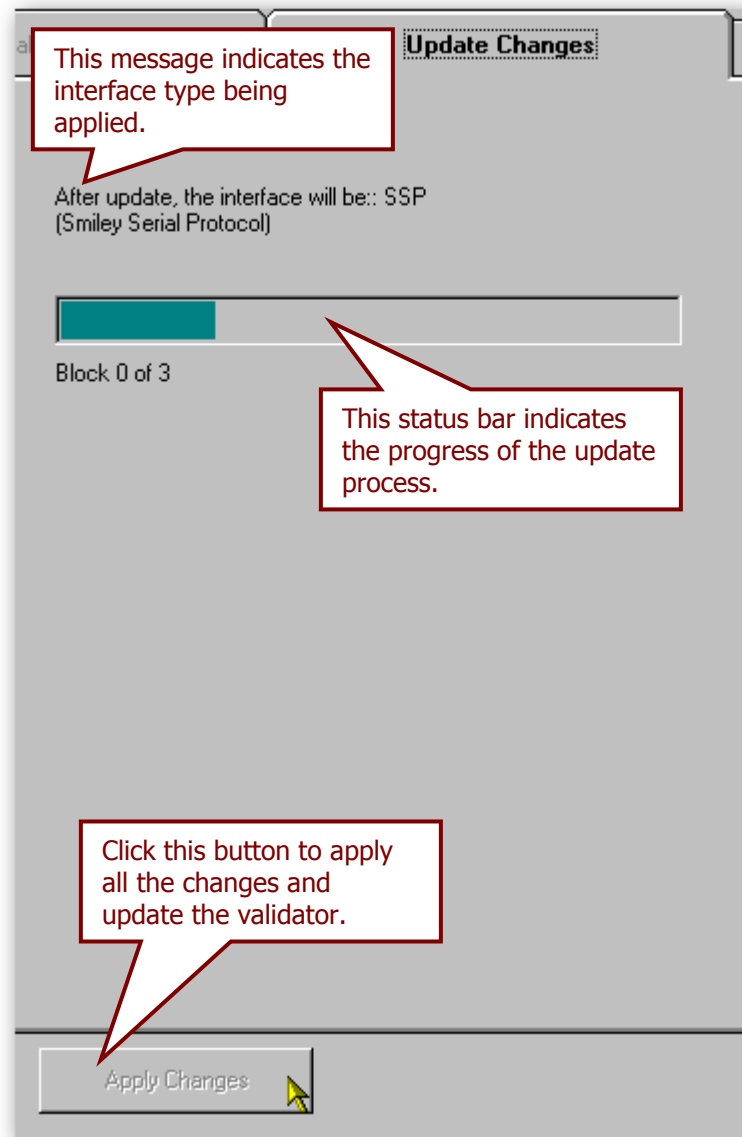
### Information

Limited SSP address ranges

The Validator Manager software will only communicate with the validator if the SSP address is set to 0, 1 or in the range 80-99.



The final tab, 'Update Changes' commits all the changes to the validator configuration and updates the validator accordingly:

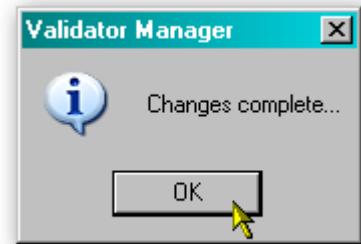
**Information**

Always apply changes

Please make sure that you click the 'Apply Changes' button, otherwise none of your configuration changes will be applied or saved.

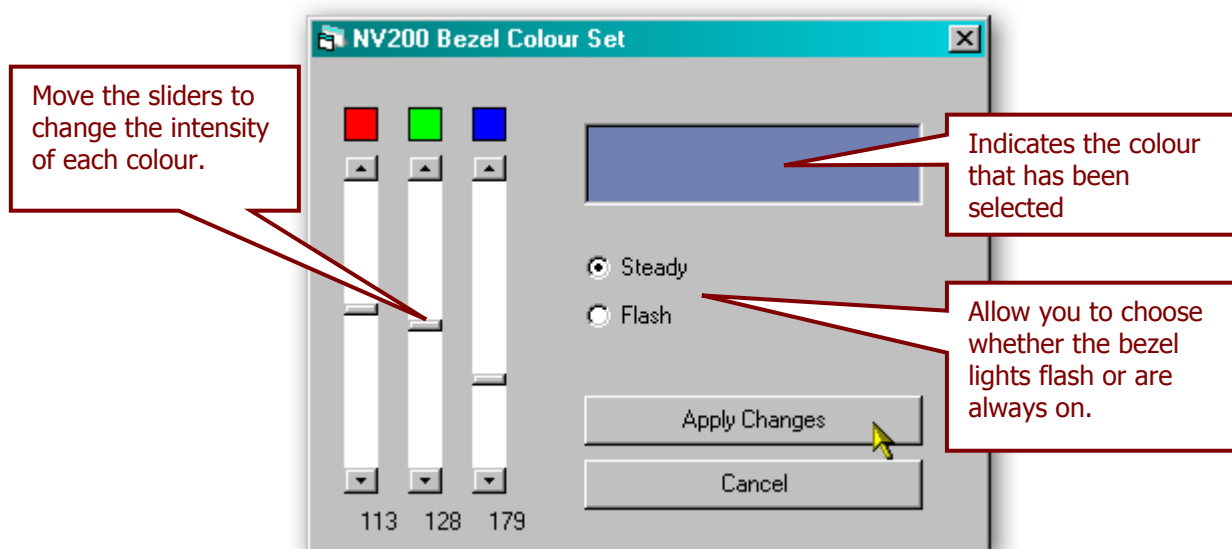


After applying the changes successfully, a dialog box will appear confirming the operation - click the 'OK' button to confirm this and close the dialog box. The validator will then be reset.

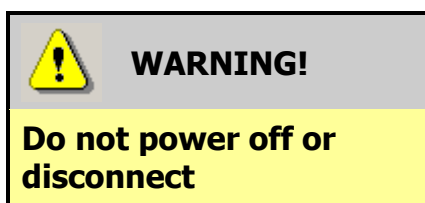


### NV200 Bezel:

The 'NV200 Bezel' menu item allows you to change the bezel illumination to suit your specific requirements:



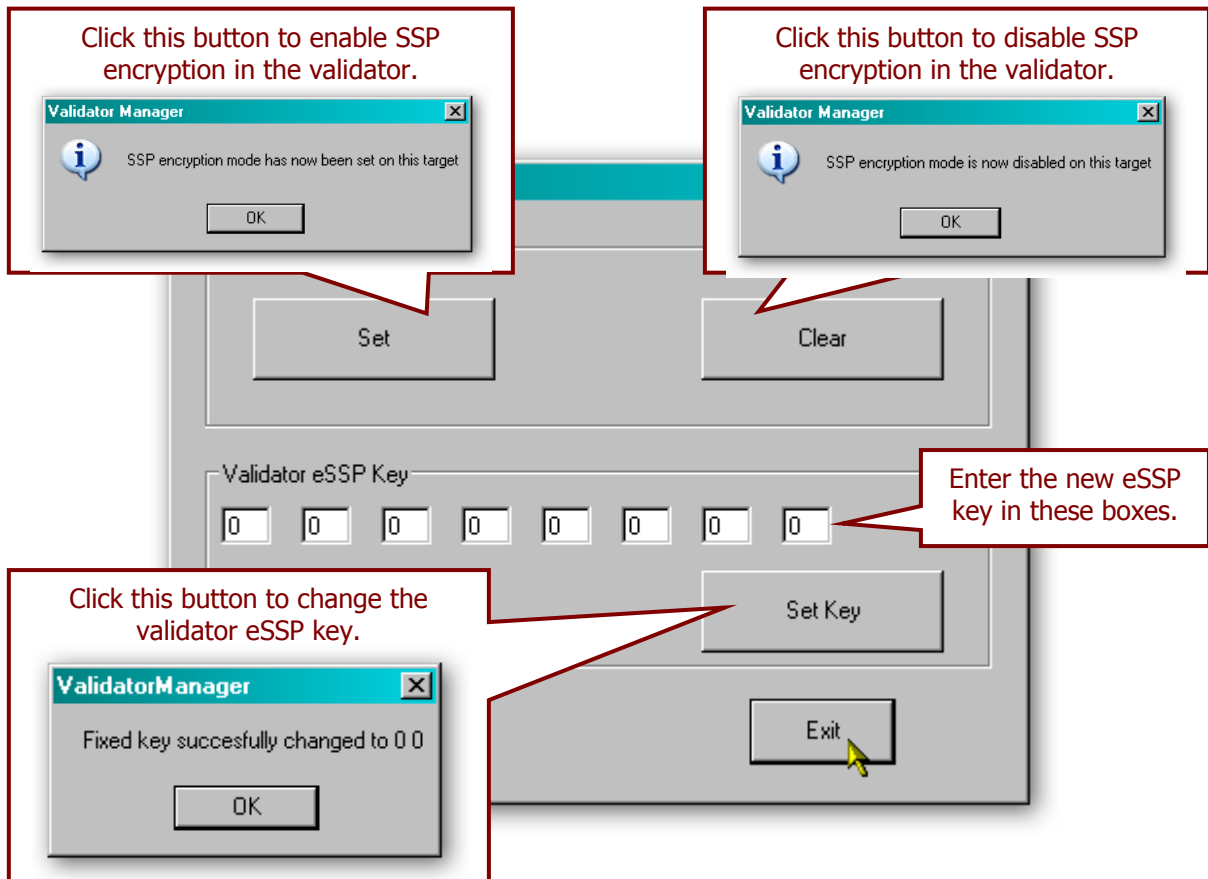
Click the 'Apply Changes' button to update the validator settings, or click the 'Cancel' button to exit without making changes.



Powering off the NV200 or disconnecting the USB cable when updating settings can cause the validator to stop working.

### eSSP Options:

The 'eSSP Options' menu item allows the user to change the fixed part of the SSP key and other functions. Selecting this menu option will open a dialog box like this:



After carrying out any of the operations on this dialog, the validator will be reset. Click the 'Exit' button to close the dialog.

### 3.2 Updating Firmware and Datasets



#### CAUTION!

**Do not power off**

Powering off the NV200 when updating the firmware or dataset can cause the validator to stop working.

The NV200 validator firmware and dataset can be updated very easily using the Validator Manager software. The dataset files can be downloaded from the Innovative Technology Ltd website:

Select Validator:  Select Currency:

Display #

Name	Code	Issue	Validator		
UK (5-10-20-50)	GBP01606	6	NV200		
UK- Gibraltar (5-10-20)	GBP05603	3	NV200		
UK- Guernsey (1-5-10-20)	GBP04603	3	NV200		
UK- Isle of Man (1-5-10-2)	GBP02604	4	NV200		
UK- Jersey (1-5-10-20)	GBP03604	4	NV200		
UK- Northern Ireland (5-1)	GBP09605	5	NV200		
UK- Scotland (5-10-20)	GBP06604	4	NV200		
UK- Scotland (B-B-5-10-20)	GBP10604	4	NV200		
UK-Jersey(1-5-10-20-50)	GBP13601	1	NV200		
UK-Northern Ireland(5-10-	GBP23601	1	NV200		
UK-Scotland(5-10-20-50)	GBP11603	3	NV200		



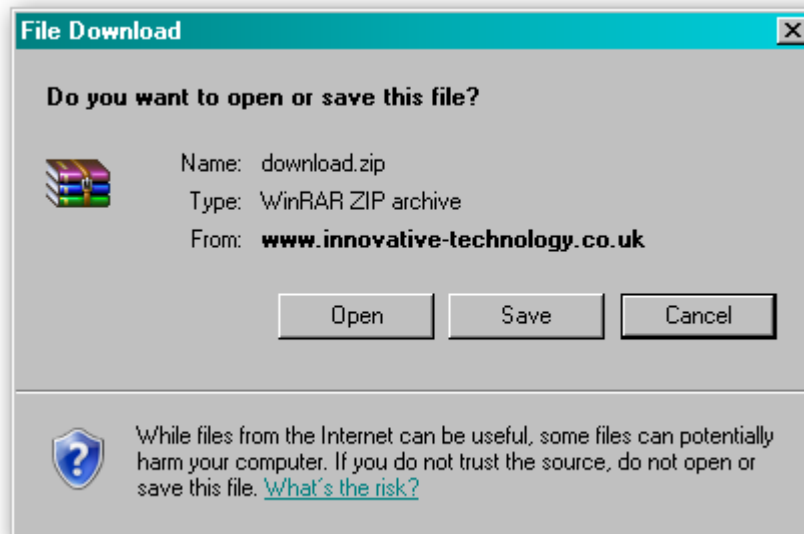
#### Information

Combined data files

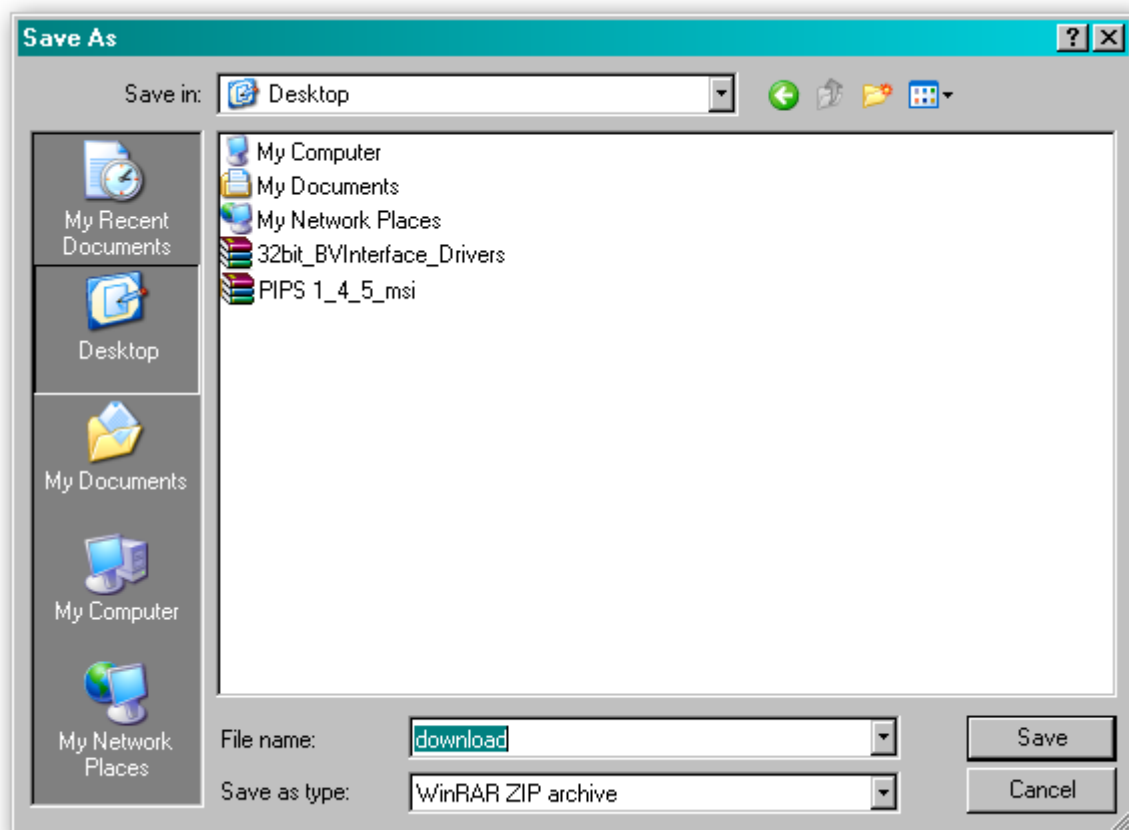
The firmware and dataset files for the NV200 validator are combined into a single file, so both will be updated when you carry out the update.



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

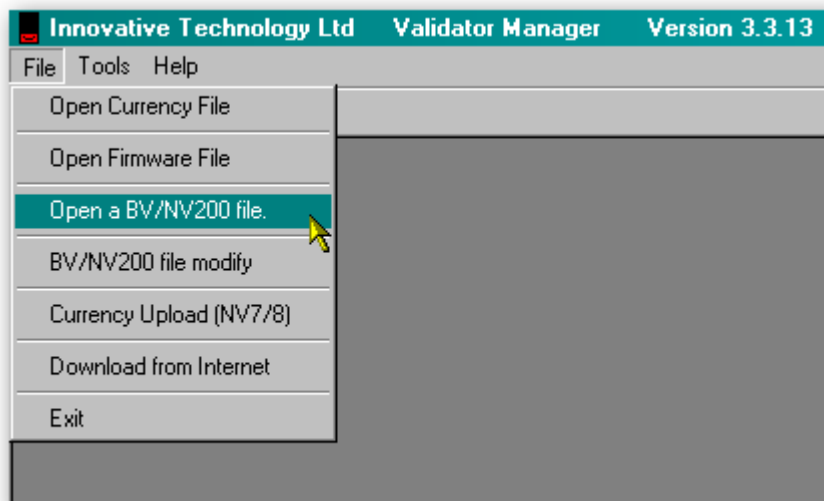


You can then choose where to save the file – choose a location that is convenient for you:

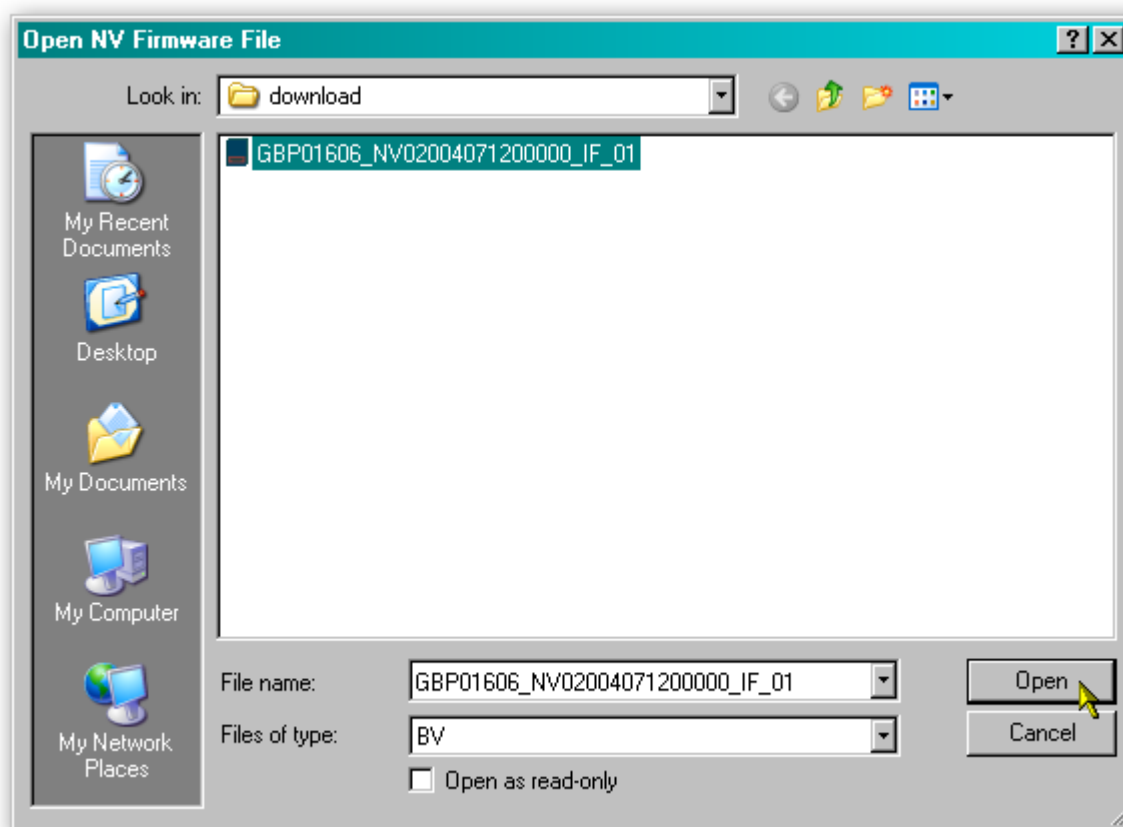


Once the dataset file is saved, unzip the file and you can then start the process to update the NV200 validator by connecting the USB cable and starting the Validator Manager software as described previously.

From the Validator Manager main screen, select the 'Open a BV/NV200 file' entry from the 'File' menu as shown here:

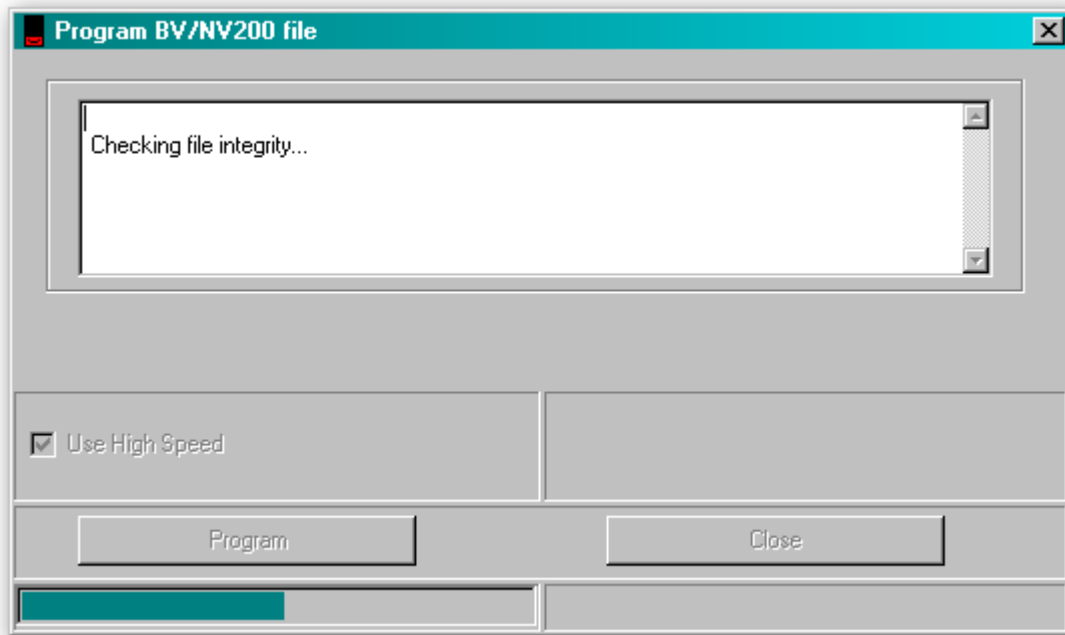


You will then be prompted to select the dataset file you downloaded and unzipped earlier – select the file and click the 'Open' button:

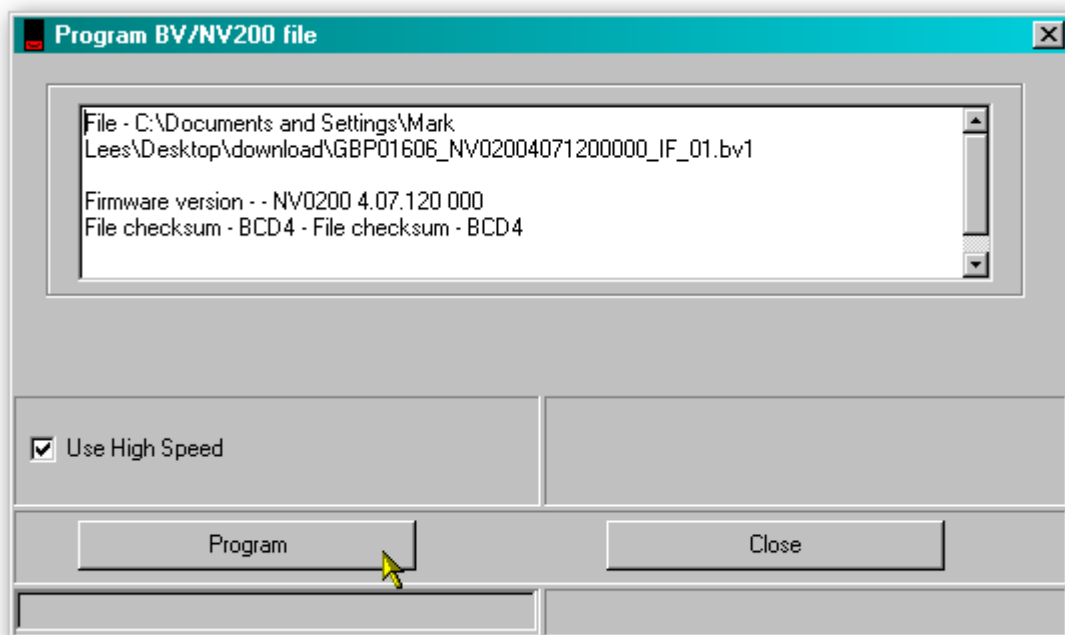




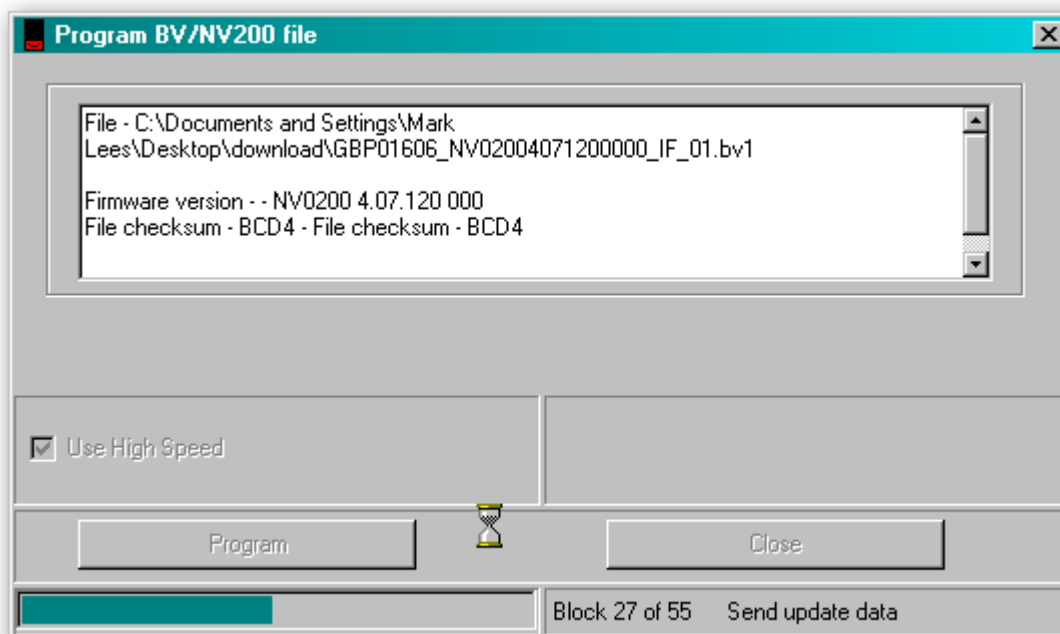
After clicking the 'Open' button, a new dialog box will appear. The status bar in the bottom left hand corner of the dialog box will show the progress in loading the dataset:



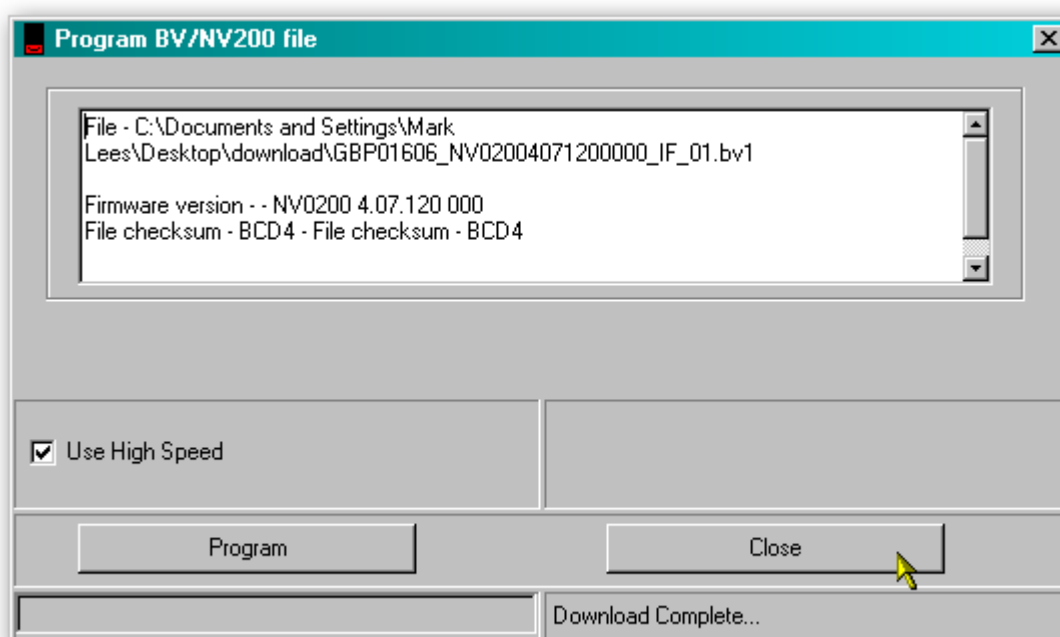
Once the dataset has been loaded, the file details will be shown in the status window, and the two buttons at the bottom of the dialog box will be active - **make sure that you do not disconnect the power to the NV200 or the USB cable until the programming operation has been completed**. Click the 'Program' button to start the update process:



During the update process, the progress of the update will be shown in the status bar at the bottom left of the dialog box, and the mouse cursor will change to an hourglass:

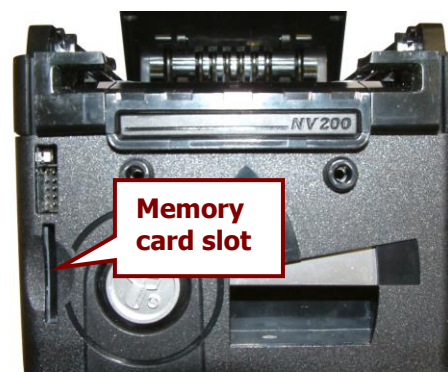


While the update process is being carried out, the NV200 bezel will turn blue and flash on and off until the update is completed. After the update, the NV200 will be reset, and the dialog box will then look like this:



After the reset is complete, the NV200 validator will then be ready for use with the new currency.

It is also possible to update the NV200 validator by using the memory card slot on the front of the validator (shown in the picture on the right):

**Information**

Only use 8mb Atmel Data Cards

Only Atmel 8MB DataFlash<sup>®</sup> cards can be used (ITL part number IC00237). **Standard SD memory cards will not function.**

The memory card will need preparing using a DA3 Programming Unit and the NV Memory Card Utilities software - this procedure is documented in ITL Document number GA00796 – NV Card Utilities.

**CAUTION!**

Check DA3 firmware version.

If using a DA3 and memory card to update the NV200 validator, the DA3 firmware should be up-to-date (check the ITL website for the latest version). Using older versions of the DA3 firmware can corrupt the validator.

Once the memory card has been programmed with the required information, the validator is re-programmed by simply inserting the card into the NV200's memory card slot – make sure that the NV200 validator is powered up before inserting the card.

**CAUTION!**

Do not disconnect power.

Do not disconnect the power or data connection from the NV200 at this point. Doing so could cause the unit to become un-usable.

Once the NV200 is successfully updated the validator will be reset and will then be ready for use with the new currency – at this point you can remove the memory card from the slot.

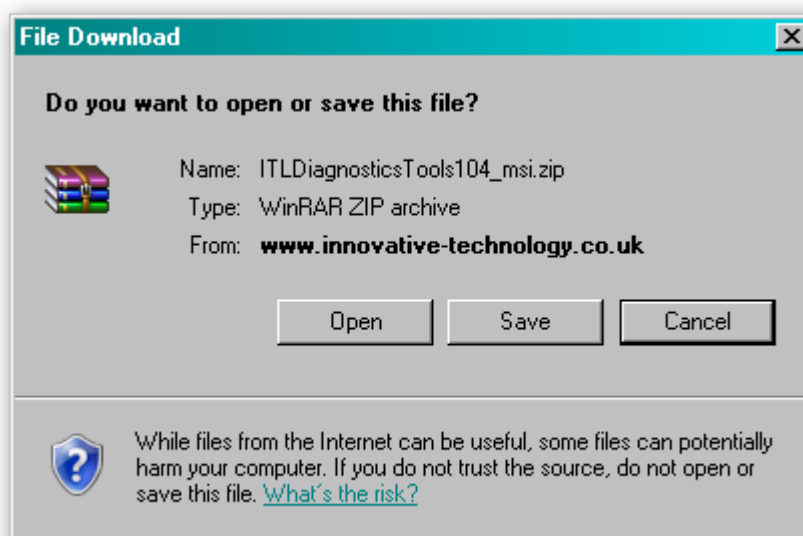
### 3.3 Tools

#### 3.3.1 Diagnostics

There is a dedicated software diagnostics tool for use with the NV200 validator called 'Bank Note Validator Diagnostics Tools', and this software can be downloaded from the Innovative Technology Ltd website:

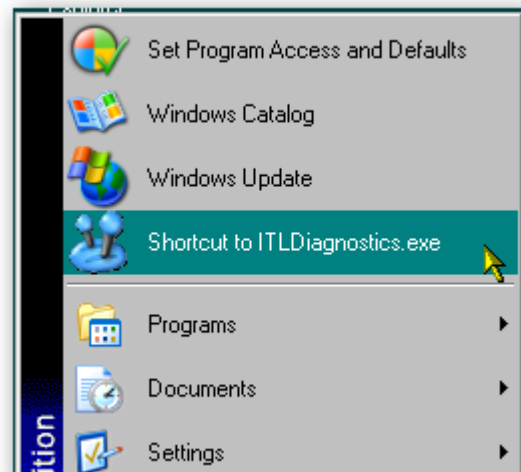
Title	Version	File		
Bank Note Validator Currency Manager	3.3.13			
VPS (Validator Programming System)	1.0.16			
SMART PIPS (Pay In Pay Out System)	1.4.5			
Bank Note Validator Diagnostics Tools	1.0.4			
DA2 Drivers - 32 bit				
DA2 Drivers - 64 bit	1			
BV Interface Driver Install - 32 bit	2			
BV Interface Driver Install - 64bit	1			
NV4 Currency Manager	2.5.3			

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

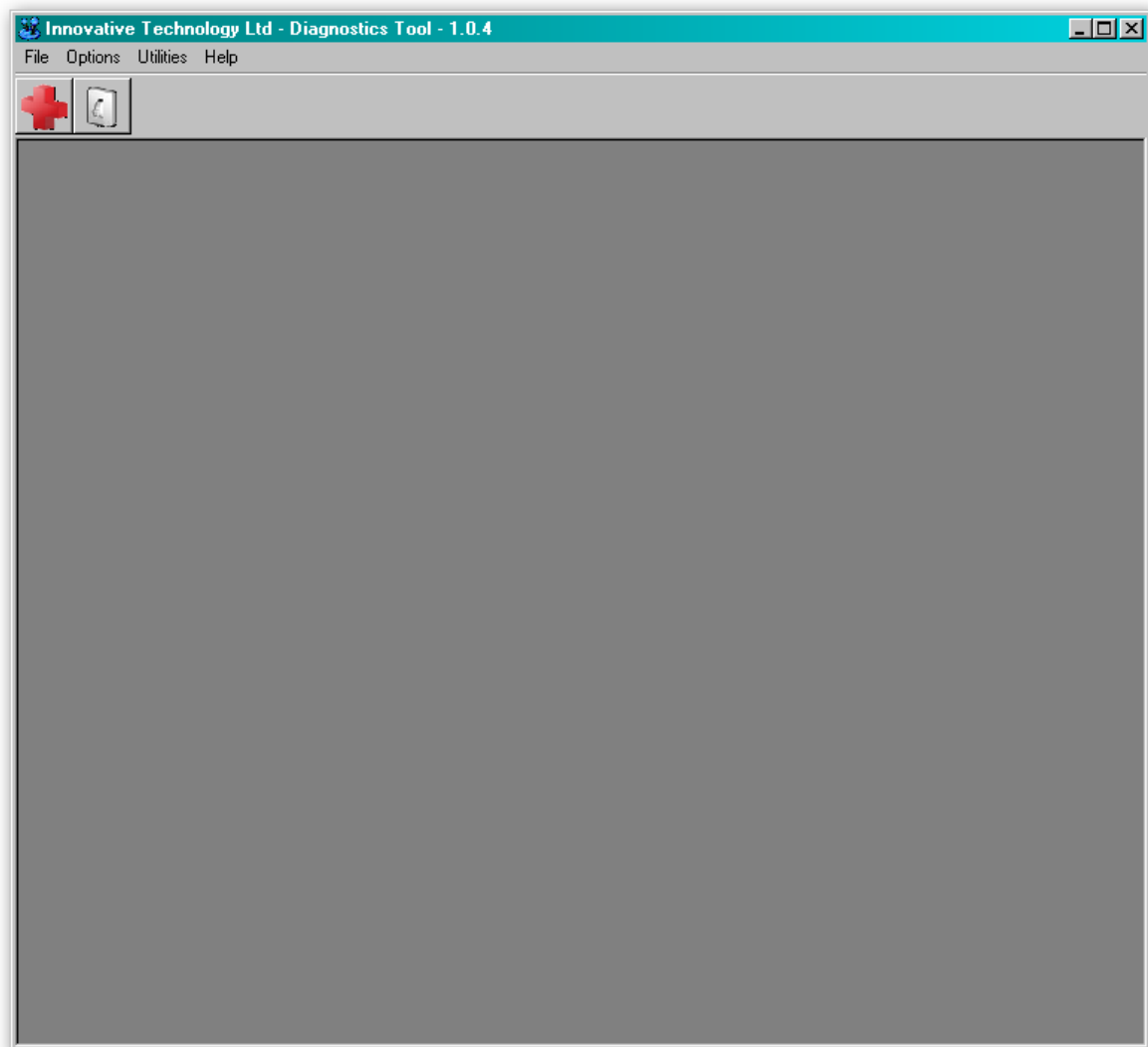


Installing the Diagnostics tools software is done in the same way as the Validator Manager software - Find the ITLDiagnosticsTools zipped file you just downloaded, extract the installation file from the zipped file and double click the extracted file (it has an .msi extension) – this will start the installation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

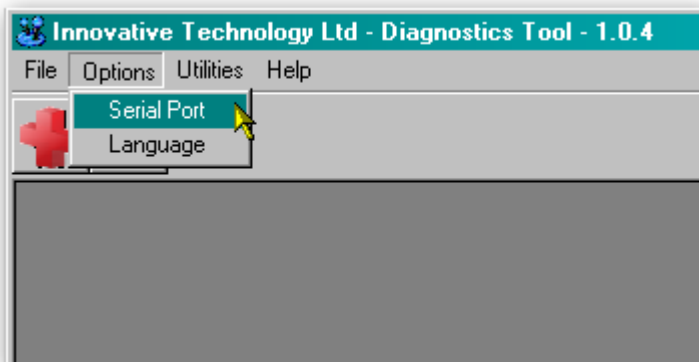
After installing the software, you can run the diagnostics software by selecting the 'Shortcut to ITL Diagnostics.exe' item near the top of the Windows Start menu. Make sure that the NV200 Validator is powered up and the USB cable is connected before starting the program.



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

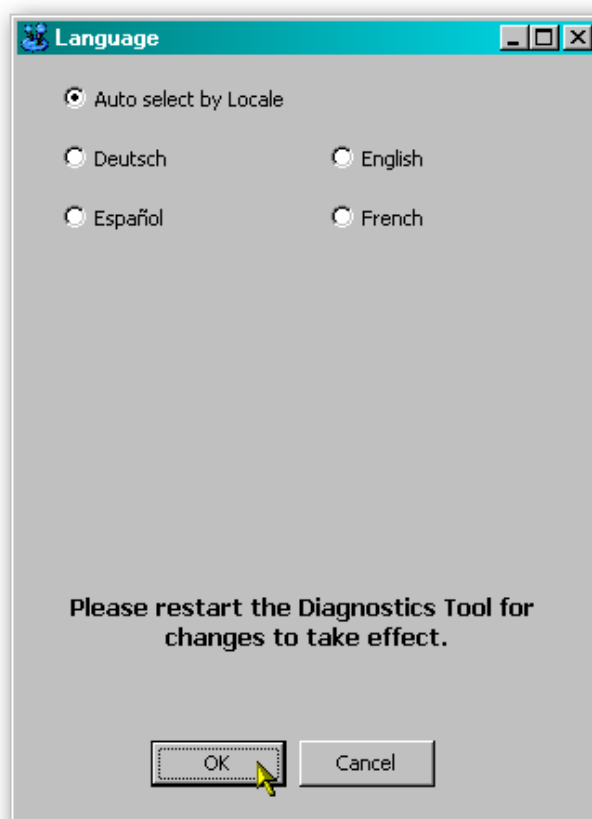


When running the software for the first time, you need to set a few options. These are accessed from the 'Options' menu:



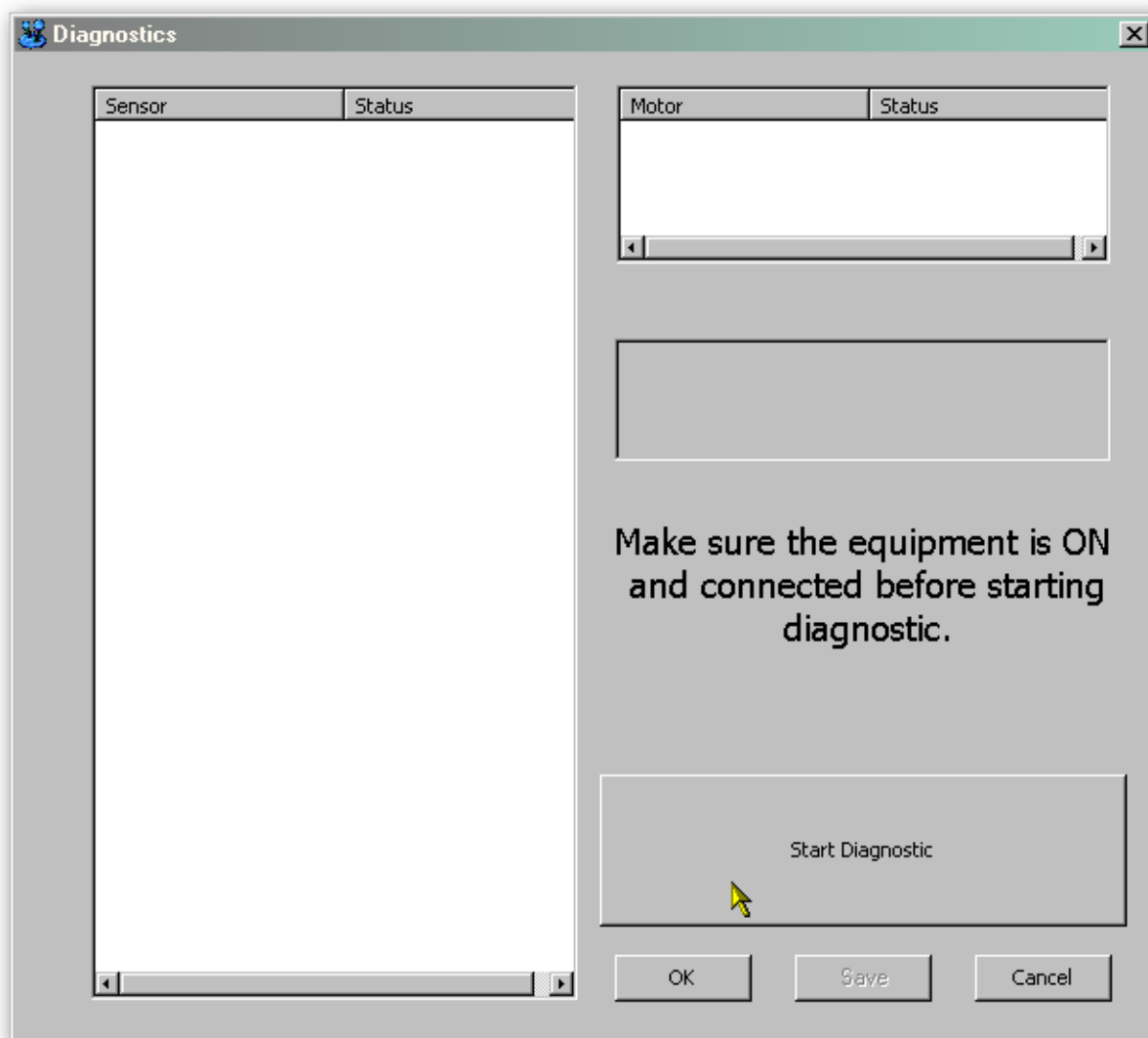
By selecting the 'Serial Port' item from the 'Options' menu you can define which serial port is being used to connect to the NV200 validator. After selecting this option, a new dialog box will open allowing you to choose the correct serial port.

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:



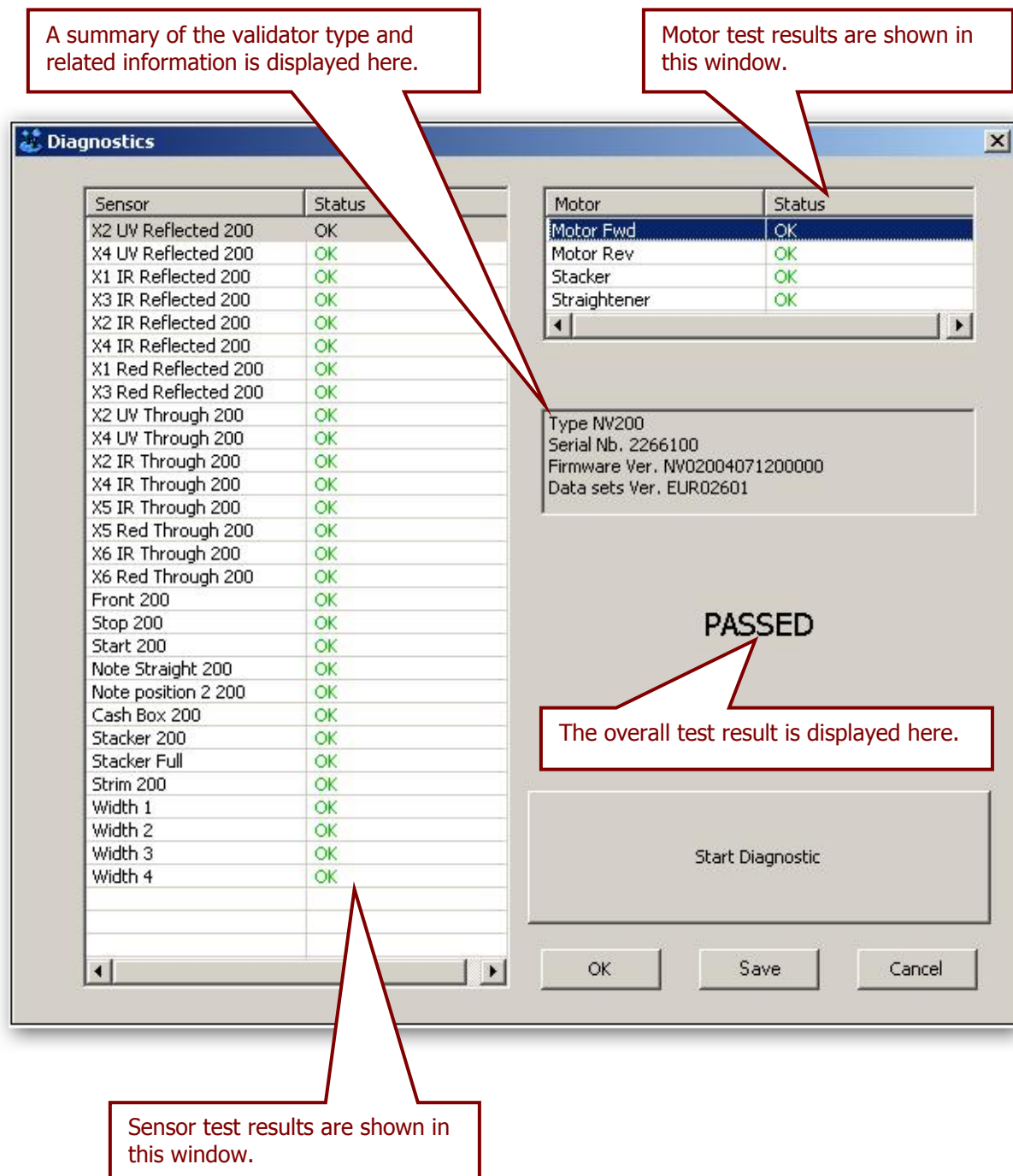


Select the 'Diagnostics' item from the 'Utilities' menu to start the diagnostics process (you can also start the diagnostics by clicking on the left hand icon below the menu bar) - this will open the Diagnostics screen:



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:

A summary of the validator type and related information is displayed here.

Motor test results are shown in this window – in this example all the motors have passed testing.

Motor

Motor	Status
Motor Fwd	OK
Motor Rev	OK
Stacker	OK
Straightener	OK

Type NV200  
Serial Nb. 2718708  
Firmware Ver. NV02004071200000  
Data sets Ver. GBP01606

**FAILED**

The overall test result is displayed here.

Sensor

Sensor	Status
X2 UV Reflected 200	OK
X4 UV Reflected 200	OK
X1 IR Reflected 200	OK
X3 IR Reflected 200	OK
X2 IR Reflected 200	OK
X4 IR Reflected 200	OK
X1 Red Reflected 200	OK
X3 Red Reflected 200	OK
X2 UV Through 200	OK
X4 UV Through 200	OK
X2 IR Through 200	OK
X4 IR Through 200	OK
X5 IR Through 200	OK
X5 Red Through 200	OK
X6 IR Through 200	OK
X6 Red Through 200	OK
Front 200	OK
Stop 200	OK
Start 200	OK
Note Straight 200	FAIL
Note position 2 200	OK
Cash Box 200	OK
Stacker 200	OK
Stacker Full	OK
Strim 200	OK
Width 1	OK
Width 2	OK
Width 3	OK
Width 4	OK

Sensor test results are shown in this window – in this example, all sensors have passed the testing except for the 'Note Straight 200' sensor which has failed.

Start Diagnostic

OK Save Cancel

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 NV200 validator has two connectors that are used to allow interfacing and programming; these connectors are easily accessible on the back of the validator.



#### Information

Power always required regardless of connection type.

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

The first connector is a 16 pin socket used to interface the NV200 to the machine it is being installed in. The pin numbering of the socket is shown here, as well as an overview of the socket connections:



Pin	Description
6	Serial Data Out (Tx)
7	Serial Data In (Rx)
15	+ V
16	0V / Ground Connection

The USB connector is a standard Type 'B' USB socket, and can be used for interfacing to the host machine; in this case, power must be provided from the 16 way connector. This socket can also be used for programming and serial communications – a USB 2.0 compliant Type 'A' to 'B' lead can be used to do this. USB cables should be electrically shielded and less than 5 metres long.



The function of pins 1 - 9 can change depending on which machine interface is being used with the NV200. Typically, the validator will be using SSP, ccTalk or SIO interfaces. MDB, Parallel, Binary and Pulse interfaces are only supported with the use of an external interface, so there are no connection tables shown here – please contact ITL Sales or Support for further details.

The socket connections for the SSP and ccTalk interfaces are shown in the tables below, as is a summary of the interface units needed for other types of operation:

**NV 200 SSP Interface:**

Pin	Name	Type	Description
1	TxD	Output	TTL TxD
2	TxD Opto Emitter	Output	Opto isolated TxD Emitter
3	RxD Opto +	Input	Opto RxD +
4	RxD Opto -	Input	Opto RxD -
5	RxD	Input	TTL RxD
6	TxD RS232	Output	RS232 TxD
7	RxD RS232	Input	RS232 RxD
8	Factory use only		<b>Do not connect</b>
9	TxD Opto Collector	Output	Opto Isolated TxD Collector
10	Factory use only		<b>Do not connect</b>
11			
12			
13			
14			
15	V In	Input	+V
16	GND	Input	GND

**NV200 ccTalk Interface:**

Pin	Name	Type	Description
1	TxD	Output	TTL TxD – connect to pin 5
2	Factory use only		<b>Do not connect</b>
3			
4			
5	RxD	Input	TTL RxD – connect to pin 1
6	Factory use only		<b>Do not connect</b>
7			
8			
9			
10			
11			
12			
13			
14			
15	V In	Input	+V
16	GND	Input	GND

**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.



### Multi Drop Bus (MDB) Interface:

MDB is a serial bus interface commonly used in electrically controlled vending machines. This is a 9600 Baud Master – Slave system where the NV200 validator is a slave to master controller.

To use the NV200 with MDB protocol, an **IF5** external interface is required. The IF5 regulates the power supply and opto-isolates the communication lines. The NV200 validator supports the MDB Protocol Version 1, Level 1.

### Parallel Interface:

To use the NV200 in Parallel mode, an **IF10** external interface is required. When operating in Parallel mode the NV200 will issue a 100ms active LOW pulse on the relevant vend line, and a maximum of 4 channels can be used.

### Binary Interface:

To use the NV200 in Binary mode, an **IF9** external interface is required. When operating in Binary mode the NV200 will issue a binary pattern on vend lines 1 to 4, and a maximum of 15 channels can be used.

### Pulse Interface:

To use the NV200 in Pulse mode, an **IF15** external interface is required. When operating in Pulse mode the NV200 outputs a number of pulses on Vend 1. The number of pulses for each channel is different and set to default values within the dataset. The number of pulses and the pulse duration can be modified using the Bank Note Validator Currency Manager Software, and a maximum of 16 channels can be used.

Opto-isolation and RS232 communications is only available on validators with an issue number of 4 or greater. You can check the issue number on the validator as shown here:

Open the NV200 validator lid and check the marking on the PCB where shown in this picture – the marking needs to read **PB00266\_4**

If the issue number is less than 4 or not visible, contact ITL Support for connection options and information.



### 3.4 Frequently Asked Questions

a. What settings should I use on the DIP switches on the rear of the unit?

- Look at the DIP switch tables in Section 1 of this manual set (subsection 1.3)

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.

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# SECTION 4

## NV200 MANUAL SET

### MECHANICAL AND ELECTRICAL MANUAL

INTELLIGENCE IN VALIDATION

Innovative Technology assume no responsibility for errors, omissions, or damages resulting from the use of information contained within this manual.

**NV200 MANUAL SET – SECTION 4**

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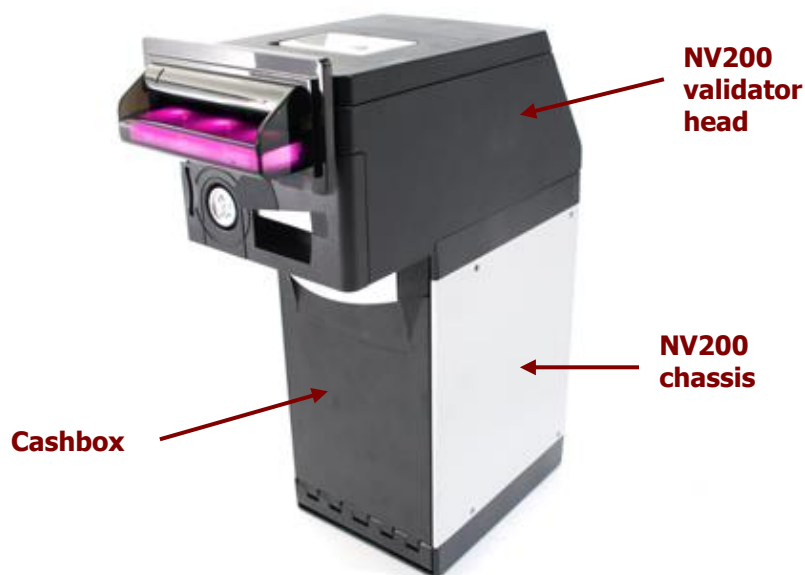


## 4. MECHANICAL AND ELECTRICAL MANUAL

This section is one part of a complete manual set: Design Engineers who are designing a host machine cabinet, or looking to integrate the NV200 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 NV200 Validator into a host machine.

### 4.1 Introduction

The NV200 validator is made up of three basic components: an NV200 validator head, NV200 chassis and a cashbox (as shown below).



The NV200 validator is a device that can accept, validate and store 500 or 1000 bank notes of mixed denominations, and works with any NV200 currency dataset created by Innovative Technology Ltd.



**NV200  
Rear View**



**NV200  
Front View**



**NV200  
Side View**

## 4.2 Assembly and Fitting Instructions

Installing the NV200 is a simple operation, described in the steps outlined here:

1. To remove the NV200 head unit, first unlock the NV200 cashbox and head release lock (if fitted)
2. Then, lift the silver head release catch located on the front of the NV200
3. Finally, slide the head unit forward and lift it off the chassis
4. Remove the NV200 cash box from the metal chassis
5. If installing into a host machine, the NV200 chassis is then mounted by using the tapped holes on either side of the chassis using 4 x M4 fixing screws and a suitable mounting bracket



### Information

Check fixing screw length before final installation to avoid damage to the cash box.

The length of the fixing screws fitted to either side of the chassis must be no longer than 6 mm plus the thickness of the mounting bracket.

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

The NV200 has the provision of fitting three locks for extra security. One lock can be added to the front of the NV200 that locks the validator head and cash box into position without the need of external brackets, and another two locks can be added to the cash box itself.



The cams required for the locks are supplied with the NV200 and can be found in the cash box. Details of how to fit the locks can be found on the drawings at the end of this section.

**WARNING!**

Do not attempt disassembly

Do not attempt to disassemble the NV200 validator head – trying to do this could cause personal injury and will damage the unit beyond repair.

### 4.3 Technical Specifications

The full technical specifications for the NV200 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	24 V **
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
Supply Current			
Standby	400 mA		
Running	1.5 A		
Peak (motor stall)	3 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 correct supply voltage

**\*\* NOTE:** Only the later models of NV200 are capable of using a supply voltage up to 24 V DC. Earlier versions have a maximum voltage of 13.2 V DC.

See Section 6, Appendix E of this manual set for information on how to identify if your validator supports 24V DC operation.

We recommend that your power supply is capable of supplying 12V DC at 4.3 A, or 24V DC at 2.1 A - TDK Lambda produces a range of suitable power supplies:

- 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).
- For 24V operation, use TDK Lambda model SWS50-24. This power supply is also available from a variety of suppliers including Farnell (stock code 1184646) and RS (stock code 466-5875).



## 4.4 Cable Specifications

The **minimum** specification for wire used in power cables for the NV200 validator is given here:

<b>Minimum AWG</b>	<b>Nominal current rating</b>	<b>Peak current rating</b>	<b>Cable rating</b>	<b>Insulation rating</b>
26	1.5 A	3 A	4 A	80 °C

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

## 4.5 Electrical Interfaces

The NV200 validator has two connectors that are used to allow interfacing and programming; these connectors are easily accessible at the back of the validator.



### Information

Power always required regardless of connection type.

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

The first connector is a 16 pin socket used to interface the NV200 to the host machine. The pin numbering of the socket is shown below, as well as an overview of the socket connections:



<b>Pin</b>	<b>Description</b>
6	Serial Data Out (Tx)
7	Serial Data In (Rx)
15	+ V
16	0V / Ground Connection

The USB connector is a standard Type 'B' USB socket, and can be used for interfacing to the host machine – in this case, power must be provided through the 16 way connector. The USB socket can also be used for programming the NV200 – a USB 2.0 compliant Type 'A' to 'B' lead can be used to do this. USB cables should be electrically shielded and less than 5 metres long.

The function of pins 1 to 9 can change depending on which machine interface is being used with the NV200. Typically, the validator will be using SSP, ccTalk or SIO interfaces. MDB, Parallel, Binary and Pulse interfaces are only supported with the use of an external interface, so there are no connection tables shown here.



The socket connections for the SSP and ccTalk interfaces are shown in the tables below, as is a summary of the interface units needed for other types of operation:

### NV 200 SSP Interface:

Pin	Name	Type	Description
1	TxD	Output	TTL TxD
2	TxD Opto Emitter	Output	Opto isolated TxD Emitter
3	RxD Opto +	Input	Opto RxD +
4	RxD Opto -	Input	Opto RxD -
5	RxD	Input	TTL RxD
6	TxD RS232	Output	RS232 TxD
7	RxD RS232	Input	RS232 RxD
8	Factory use only		<b>Do not connect</b>
9	TxD Opto Collector	Output	Opto Isolated TxD Collector
10	Factory use only		<b>Do not connect</b>
11			
12			
13			
14			
15	V In	Input	+V
16	GND	Input	GND

### NV200 ccTalk Interface:

Pin	Name	Type	Description
1	TxD	Output	TTL TxD – connect to pin 5
2	Factory use only		<b>Do not connect</b>
3			
4			
5	RxD	Input	TTL RxD – connect to pin 1
6	Factory use only		<b>Do not connect</b>
7			
8			
9			
10			
11			
12			
13			
14			
15	V In	Input	+V
16	GND	Input	GND



#### 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.



### Multi Drop Bus (MDB) Interface:

MDB is a serial bus interface commonly used in electrically controlled vending machines. This is a 9600 Baud Master – Slave system where the NV200 validator is a slave to master controller.

To use the NV200 with MDB protocol, an **IF5** external interface is required. The IF5 regulates the power supply and opto-isolates the communication lines. The NV200 validator supports the MDB Protocol Version 1, Level 1.

### Parallel Interface:

To use the NV200 in Parallel mode, an **IF10** external interface is required. When operating in Parallel mode the NV200 will issue a 100ms active LOW pulse on the relevant vend line, and a maximum of 4 channels can be used.

### Binary Interface:

To use the NV200 in Binary mode, an **IF9** external interface is required. When operating in Binary mode the NV200 will issue a binary pattern on vend lines 1 to 4, and a maximum of 15 channels can be used.

### Pulse Interface:

To use the NV200 in Pulse mode, an **IF15** external interface is required. When operating in Pulse mode the NV200 outputs a number of pulses on Vend 1. The number of pulses for each channel is different and set to default values within the dataset. The number of pulses and the pulse duration can be modified using the Bank Note Validator Currency Manager Software, and a maximum of 16 channels can be used.

Opto-isolation and RS232 communications is only available on validators with an issue number of 4 or greater. You can check the issue number on the validator as shown here:

Open the NV200 validator lid and check the marking on the PCB where shown in this picture – the marking needs to read **PB00266\_4**

If the issue number is less than 4 or not visible, contact ITL Support for connection options and information.



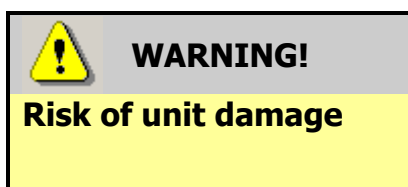
## 4.6 DIP Switches

The NV200 has a Dual Inline Package (DIP) switch bank that is used to set the various options for the unit. A summary of the switch options are shown below:



Switch	Option	Switch OFF (↓)	Switch ON (↑)	Default Setting
1	Disable Barcode	Read enabled	Read disabled	OFF
2	Channel 1 Inhibit	Channel enabled	Channel disabled	OFF
3	Channel 2 Inhibit	Channel enabled	Channel disabled	OFF
4	Channel 3 Inhibit	Channel enabled	Channel disabled	OFF
5	Channel 4 Inhibit	Channel enabled	Channel disabled	OFF
6	Channel 5 Inhibit	Channel enabled	Channel disabled	OFF
7	Channel 6 Inhibit	Channel enabled	Channel disabled	OFF
8	Programming Mode	*With power on, switch to ON then back to OFF to activate programming mode		OFF

\* When DIP switch 8 is turned on and off, the bezel LEDs will flash on and off quickly and then reset.



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

## 4.7 Basic Operation

The NV200 validator is a device that can accept, validate and store 500 or 1000 bank notes of mixed denominations, and works with any NV200 currency dataset created by Innovative Technology Ltd.

Validated bank notes are stored in the NV200's secure 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 operational colour of the bezel illumination can be set to a user definable colour by using the Bank Note Validator (BNV) Currency Manager Software. Each of the three colours of LED in the bezel can be set to a different brightness level (0-255) to achieve the desired colour.

The NV200 Validator has inbuilt fault detection facilities. If there is a configuration or other error, the NV200 front bezel will flash in a particular sequence.

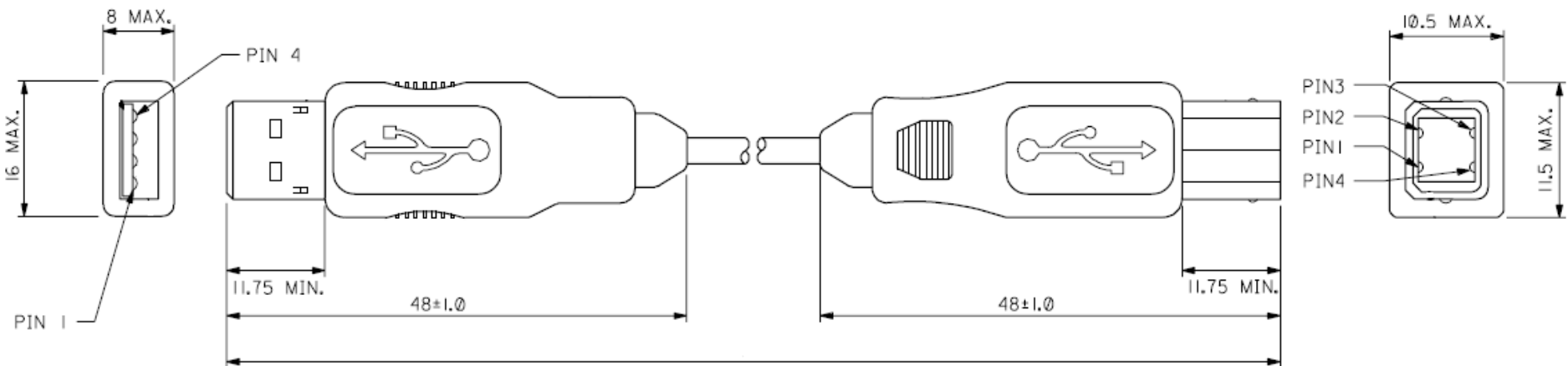


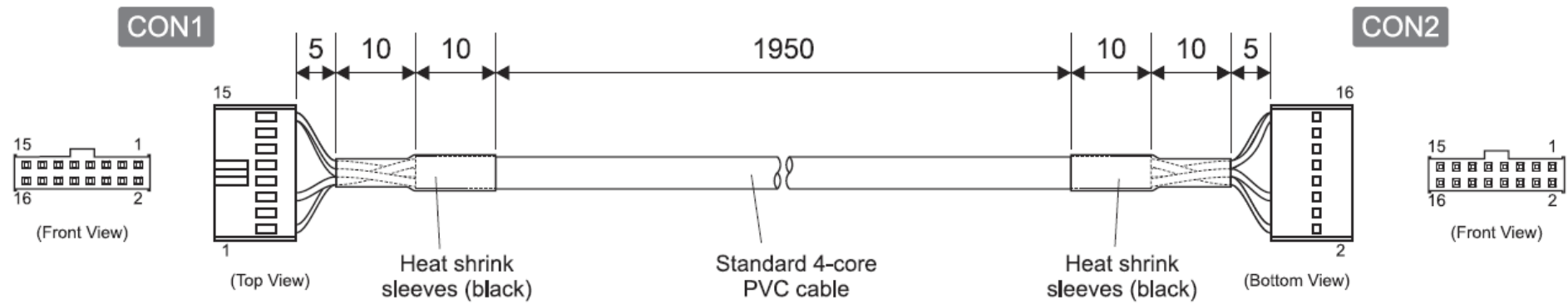
A summary of the Bezel Flash Codes for the NV200 is shown below:

<b>Flashes</b>		<b>Indicated Error</b>	<b>Comments</b>
<b>Red</b>	<b>Blue</b>		
<b>0</b>	<b>0</b>	None	
<b>1</b>	<b>1</b>	Note path open	Close note path
	<b>2</b>	Note path jam	Remove obstruction and follow the cleaning procedure in Subsection 4.9 of this manual
	<b>3</b>	Unit not initialised	Contact ITL technical support
<b>2</b>	<b>1</b>	Cashbox removed	Refit cashbox
	<b>2</b>	Cashbox jam	Remove trapped notes
<b>3</b>	<b>1</b>	Firmware checksum error	Download new firmware
	<b>2</b>	Interface checksum error	
	<b>3</b>	EEPROM checksum error	Download new firmware
	<b>4</b>	Dataset checksum error	
<b>4</b>	<b>1</b>	Power supply too low	Check power supply
	<b>2</b>	Power supply too high	
	<b>3</b>	Card format	Reprogram programming card
	<b>4</b>	Payout reset	Turn power on and off
<b>5</b>	<b>1</b>	Firmware mismatch	Reprogram unit



## 4.8 Spare Parts

ITL Part Number	Description	Details
CN00214	USB Cable	USB 2.0 Compliant Type A to Type B cable
 <p>Technical drawing of a USB 2.0 Compliant Type A to Type B cable. The drawing shows the cable with dimensions and pin labels. The Type A connector on the left has a width of 8 MAX. and a height of 16 MAX. The Type B connector on the right has a width of 10.5 MAX. and a height of 11.5 MAX. The cable length is 48 ± 1.0. The distance from the connector to the cable body is 11.75 MIN. The pin labels are PIN 1, PIN 4, PIN 3, PIN 2, PIN 1, and PIN 4.</p>		
<p><b>COMMENTS:</b></p> <p>Any commercially available USB 2.0 compliant Type A to Type B cable is suitable – these are available from many different sources. The cable should be electrically shielded and less than 5 metres long.</p>		

ITL Part Number	Description	Details
<b>CN00292</b>	IF10 – SSP to Binary interface cable	Provides connection between IF10 module and NV200
 <p>The diagram illustrates the IF10 – SSP to Binary interface cable (CN00292). It is a 1950-unit long cable connecting two 16-pin connectors, CON1 and CON2. The cable consists of a standard 4-core PVC cable with black heat shrink sleeves at each end. Dimensions are specified: 5 units for the connector housing, 10 units for the heat shrink sleeve, and 10 units for the cable length. The connectors are labeled with pin numbers 1 to 16. A front view of the connector is also shown on the left and right.</p>		
<p><b>Comments:</b> Please consult the tables on the next page for pin out and connector information.</p>		

**CN00292 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	---	---

**CN00292 Connectivity**

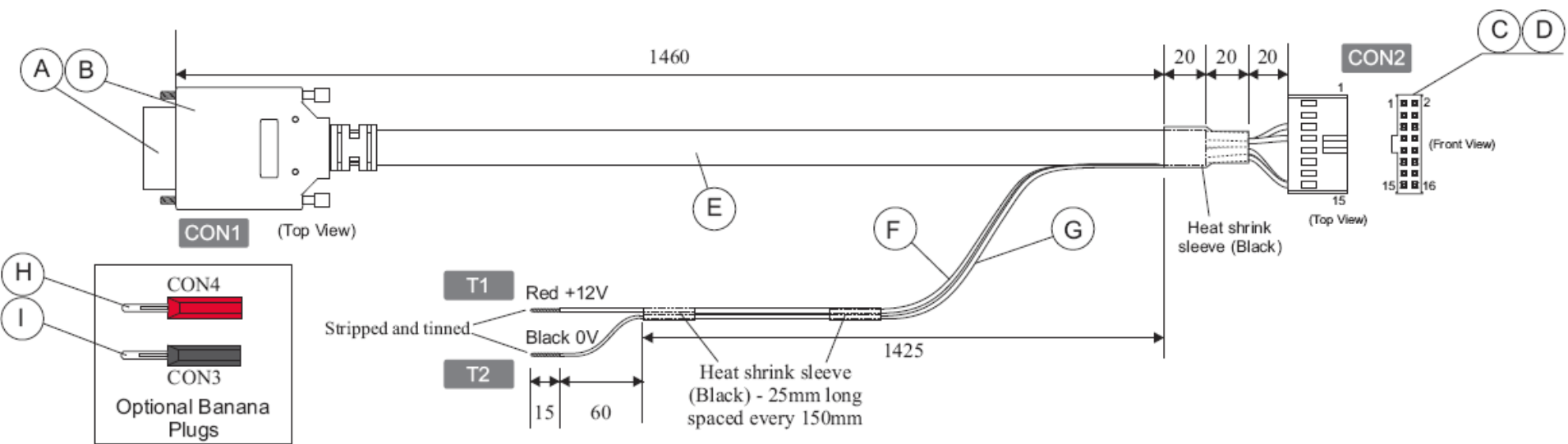
CON1	CON2	Gauge	Colour	Comments
Pin				
1	1	24 AWG	Orange	
5	5	24 AWG	Brown	
15	15	24 AWG	Red	V IN
16	16	24 AWG	Black	GND
<b>Notes:</b> Pins 3, 4, 7, 8, 9, 10, 13 and 14 have no crimps fitted Pins 2, 6, 11 and 12 have crimps fitted but these are not connected.				

**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 CN00292 cable is **24 AWG**, with **22 AWG** being recommended.



ITL Part Number	Description	Details
<b>CN00414</b>	RS232 to NV200 interface cable	Provides 12V or 24V supply and RS232 communications to NV200
 <p><b>Comments:</b> Please consult the tables on the next page for pin out and connector information.</p>		

**CN00414 Parts List**

Item	Qty	Description	Supplier	Alternative
A	1	9 way solder 'D' socket	Multicomp 5501-09SA-02-F1	Farnell 1084678
B	1	9 way 'D' socket shell	MH Connectors DPPK9-BLACK-K	RS 469-889
C	5	Tin plated crimp	Molex 90119-2110	Farnell 9733272
D	1	2 x 8 way 2.54mm pitch housing with key	Molex 90142-0016	Farnell 3291613
E	1	3 core 24 AWG stranded cable, AWM type 2464	---	---
F	1	Red 22 AWG stranded wire, PVC insulated, UL1007	---	---
G	1	Black 22 AWG stranded wire, PVC insulated, UL1007	---	---
H	1	Stackable red 4mm banana plug	Deltron 553-0500-01	Farnell 1101199
I	1	Stackable black 4mm banana plug	Deltron 553-0100-01	Farnell 1101106
---	10	Black heat shrink sleeving	---	---

**CN00414 Connectivity**

CON1	CON2	CON3	CON4	Gauge	Colour	Comments
<b>Pin</b>						
2	6	---	---	24 AWG	Brown	Rx (DTE - DCE)
5	16	---	---	24 AWG	Black	GND
3	7	---	---	24 AWG	Orange	Tx (DTE - DCE)
---	16	1	---	22 AWG	Black	GND
---	15	---	1	22 AWG	Red	V IN



**Notes:**

CON2 Pin 16 has two wires crimped together.

CON1 connects to host.

CON2 connects to validator.

T1 (CON4) connects to +V of power supply.

T2 (CON3) connects to 0V (GND) of power supply.

**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 CN00414 cable is **24 AWG**, with **22 AWG** being recommended.



ITL Part Number	Description	Details
CN00459	NV200 power cable	Provides 12V or 24V supply only to NV200
<p><b>CON1</b> (Top View) 19</p> <p>1000mm</p> <p>30 15 87 typ 15 25 5</p> <p>(Front View) 19 1 20 2</p> <p>1 19</p> <p>(A) (B) (C) (D) (E)</p> <p>Stripped (no tinning)</p>		
<p><b>Comments:</b> Please consult the tables on the next page for pin out and connector information.</p>		

**CN00459 Parts List**

Item	Qty	Description	Supplier	Alternative
A	1	20 way 2 row 2.54mm pitch friction lock housing	Molex 90142-0020	Farnell 3291637
B	4	Gold plated crimp socket 22-24 AWG	Molex 90119-2110	Farnell 9733272
C	1	Type 'T' toroidal core, 16.5 x 8.2 x 16mm	Paddiford 10-13-165082160-0	RS 261-8928
D	10	Black heat shrink sleeving	---	---
E	2	22 AWG stranded wire, PVC insulated	---	---

**CN00459 Connectivity**

Connector	Pin	Gauge	Colour	Comments
CON1	17	22 AWG	Red	V IN
	18	22 AWG	Black	GND
<b>Notes:</b> CON1 Pins 3, 6, 15 and 16 have crimps fitted but these are not connected.				

**WARNING!**

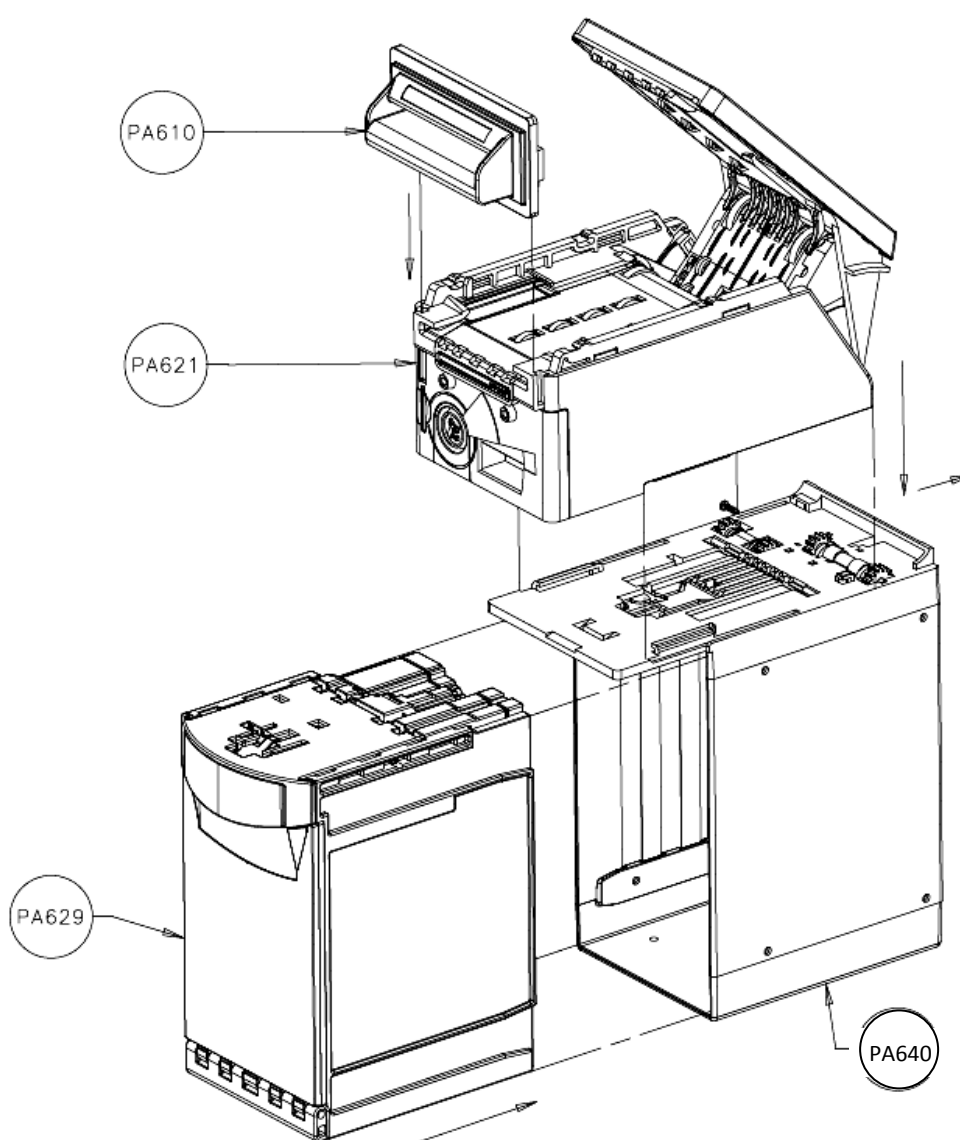
**Use correct wire gauges**

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 CN00459 cable is **26 AWG**, with **22 AWG** being recommended.





<b>ITL Part Number</b>	<b>Alternative Part Number</b>	<b>Description</b>
<b>PA00610</b>	---	Bezel Assembly
<b>PA00621</b>	---	NV200 Validator Head Assembly
<b>PA00629</b>	---	Cashbox Final Assembly
<b>PA00640</b>	---	Chassis Assembly
<b>PA00650</b>	Camlock 28D181CPA	Lock Assembly (see subsection 4.9 of this manual for lock fitting instructions)



## 4.9 Guidance Notes

### Cleaning

**WARNING!**

**Do not attempt  
disassembly**

Do not attempt to disassemble the NV200 validator head – trying to do this could cause personal injury and will damage the unit beyond repair.

The NV200 Validator has been designed in a way to prevent damage and airborne contamination reaching the optical sensors; however, depending upon the environment the NV200 may require occasional cleaning.

**Caution!**

**Do not use solvent based  
cleaners on any part of the  
NV200 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 units; only use a mild detergent solution as directed below.

You can clean the NV200 note path with the head unit still fitted to the chassis, although you may find it easier to remove the head from the chassis assembly.

To remove the NV200 head unit, first unlock the NV200 cashbox and head release lock (if fitted)

Then, lift the silver head release catch located on the front of the NV200

Finally, slide the head unit forward and lift it off the chassis

**WARNING!**

**Disconnect power BEFORE  
any cleaning operation**

You should disconnect the power BEFORE carrying out any cleaning operations to avoid the risk of causing damage to the validator.



After removing the head unit, to open the note path cover, pull the top cover release latch forward (towards the bezel) and lift the cover as shown here (it is recommended to also remove the front bezel to allow correct cleaning of the note path guides):



The note path is now visible and can be cleaned. Carefully wipe the surfaces with a soft lint free cloth that has been moistened with a water and mild detergent solution (e.g. 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.

**Caution!**

Do not use solvent based cleaners on any part of the NV200 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 units; only use a mild detergent solution as directed below.

**Caution!**

Do not use any lubricants.

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

**WARNING!**

Do not try to disassemble

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

## Re-Initialisation

The NV200 validator has an in-built self-calibration system that keeps the optical sensors in optimum operating condition. However if the NV200 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.

## Bezel Removal and Replacement



### WARNING!

Ensure bezel is secured to validator

The front bezel should be secured to the validator head using screws if the NV200 is being installed and transported inside a host machine.



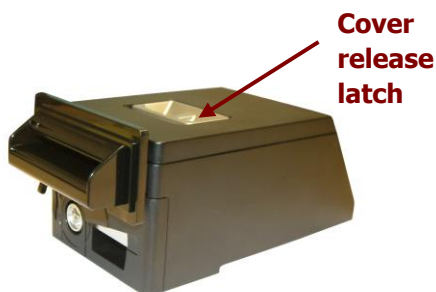
### Information

Check bezel fixing screw length before installation.

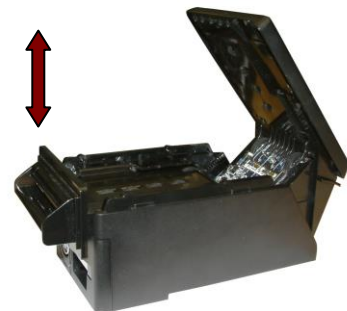
The length of the bezel fixing screws must be no more than 12 mm in length.

The bezel on the front of the NV200 validator has been designed to be removed and refitted very easily.

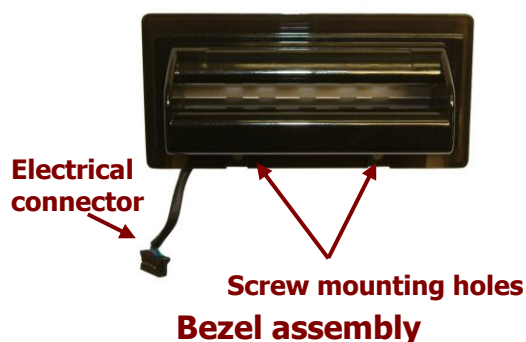
To remove or refit the bezel, access to the note path is required as described earlier in this section – the top cover must be open fully to allow access to the bezel mounting area.



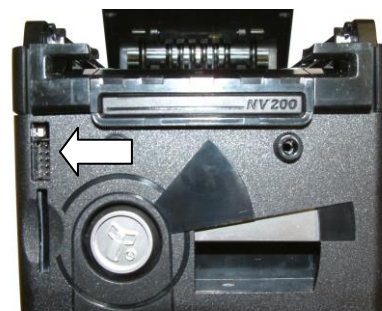
**Validator note path cover**



**Bezel removal and fitting**



**Bezel assembly**



**Bezel connector socket**

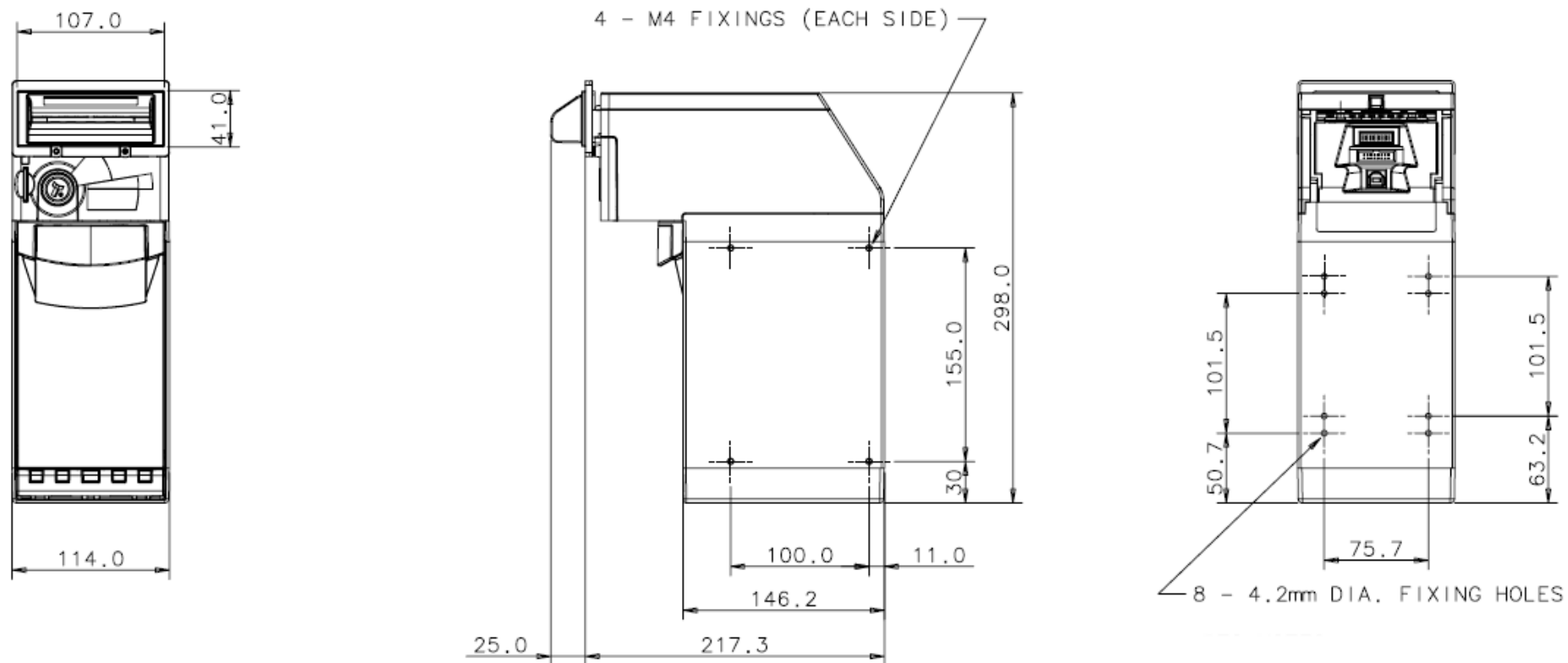


Removing the bezel: Lift the upper cover by pulling the top latch forward. If fitted, remove the two bezel securing screws and then slide the bezel assembly upwards. Finally unplug the cable from the socket on the front of the validator head.

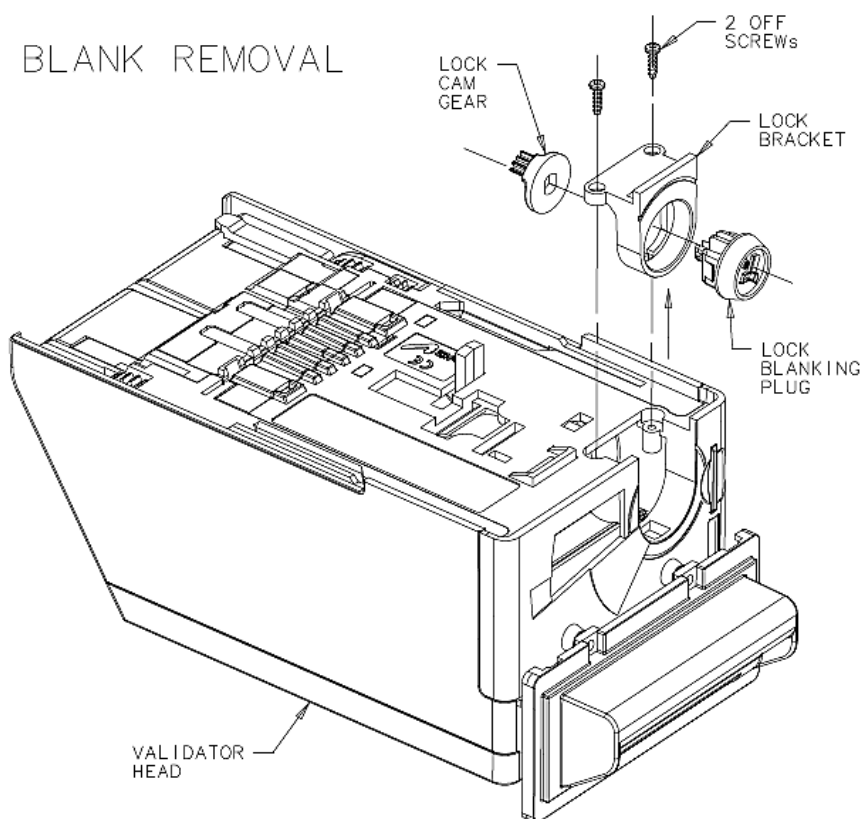
Fitting the bezel: Lift the upper cover by pulling the latch forward. Connect the cable from the bezel assembly to the socket located on the front of the validator head and slide the assembly down into place and then close the note path upper cover. If required, the bezel can be secured in place with two M3 screws - these are fitted in the two holes at the bottom of the bezel.

## 4.10 Drawings and Schematics

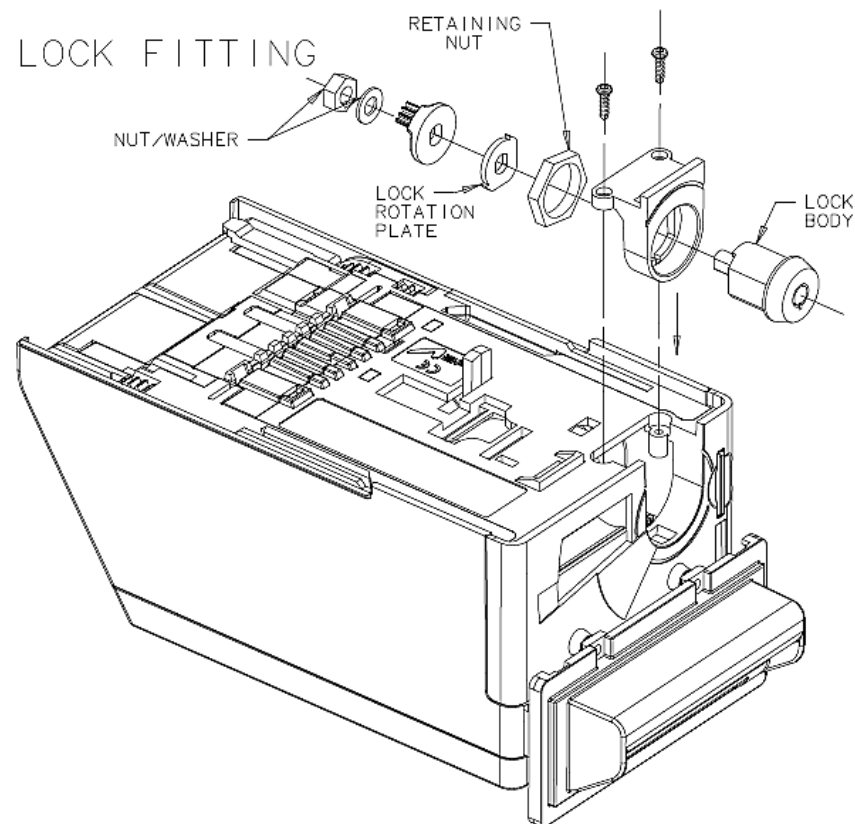
**NOTE:** If required, IGES 3D models are available on request from ITL technical support.



## NV200 Validator Lock Fitting:



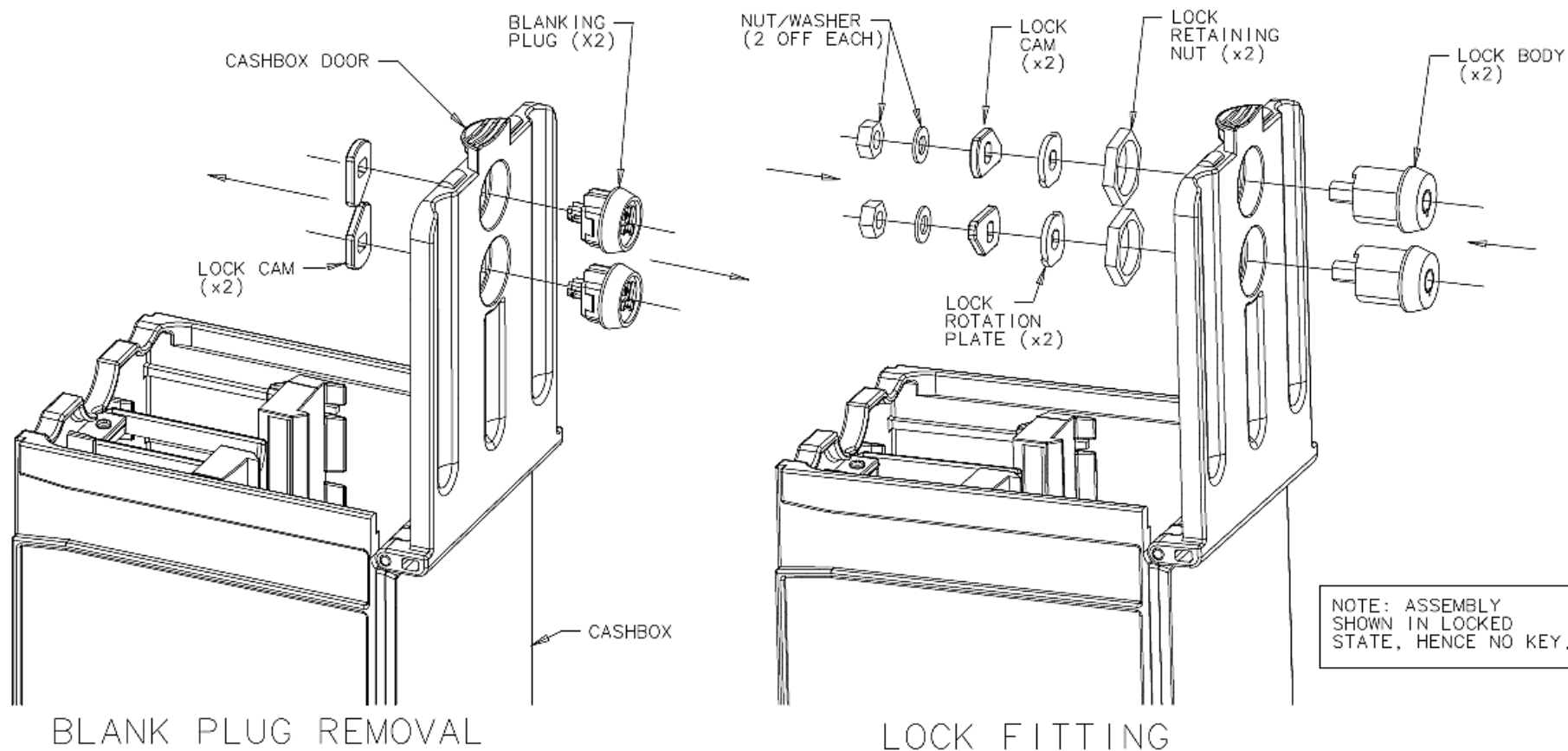
1. Unscrew the two screws (indicated) with a T8 Torx screwdriver
2. Remove the lock bracket from the validator head
3. Unclip the lock blanking plug and cam gear (keep these for use later)
4. Fit the lock into the bracket (as shown), and fix in place with the lock retaining nut



5. Place the lock rotation plate over the lock stub as shown
6. Place the lock gear cam on the lock stub and fasten with a washer and nut
7. Insert the lock key and rotate clockwise; place the assembly back into validator head and fit the screws. (finger tight)
8. When the validator is fitted to the chassis, turn the lock key anticlockwise and remove



## NV200 Cashbox Lock Fitting:



1. Open the cashbox door
2. Unclip the lock cams from the blanking plugs (keep these for use later)
3. Unclip the two blanking plugs from the cashbox door
4. Fit the two lock bodies into the door recesses as shown

5. Fix the locks in place with the two retaining nuts
6. Fit the lock rotation plates in place
7. Fit the lock cams to the lock stubs as shown
8. Secure the cams with the retaining washers and nuts



## MAIN HEADQUARTERS

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# SECTION 5

## NV200 MANUAL SET

### SOFTWARE IMPLEMENTATION GUIDE

INTELLIGENCE IN VALIDATION

Innovative Technology assume no responsibility for errors, omissions, or damages resulting from the use of information contained within this manual.

## NV200 MANUAL SET – SECTION 5

5.	SOFTWARE IMPLEMENTATION GUIDE	3
5.1	Communication Protocols	3
5.2	SSP and eSSP	6
5.3	ccTalk	12
5.4	Connection Options	15



## 5. SOFTWARE IMPLEMENTATION GUIDE

### 5.1 Communication Protocols

The NV200 validator can use several different communication protocols, including eSSP, SIO, ccTalk, MDB, Parallel, Binary and Pulse. Only eSSP, SIO and ccTalk are supported natively – use of the other protocols requires the use of an external interface unit.

Smiley<sup>®</sup> 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.

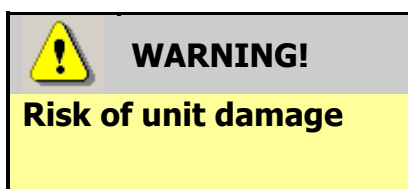
Encrypted Smiley<sup>®</sup> Secure Protocol (eSSP) is an enhancement of SSP. eSSP uses the same 16 bit CRC checksums on all packets as SSP, but also uses a Diffie-Hellman key exchange to allow the host machine and validator to jointly establish a shared secret key over an insecure communications channel. 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 NV200 validator is eSSP, as this provides the highest level of data transfer security. A ccTalk interface protocol is also available.

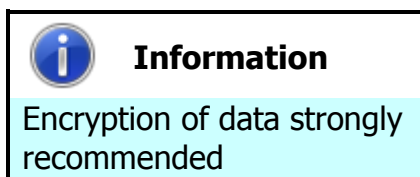
For detailed information and the full protocol specifications please read the following documents, which can be downloaded from the Innovative Technology Ltd website ([www.innovative-technology.co.uk](http://www.innovative-technology.co.uk)):

- SSP Interface Specification (ITL Document number GA00138)
- ITL Bank Note Reader ccTalk Specification (ITL Document number GA00966)

Summaries of the NV200 validator socket connections for the SSP and ccTalk 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 NV200 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.

**NV200 SSP Interface:**

Pin	Name	Type	Description
1	TxD	Output	TTL TxD
2	TxD Opto Emitter	Output	Opto isolated TxD Emitter
3	RxD Opto +	Input	Opto RxD +
4	RxD Opto -	Input	Opto RxD -
5	RxD	Input	TTL RxD
6	TxD RS232	Output	RS232 TxD
7	RxD RS232	Input	RS232 RxD
8	Factory use only		<b>Do not connect</b>
9	TxD Opto Collector	Output	Opto Isolated TxD Collector
10	Factory use only		<b>Do not connect</b>
11			
12			
13			
14			
15	V In	Input	+V
16	GND	Input	GND

**NV200 ccTalk Interface:**

Pin	Name	Type	Description
1	TxD	Output	TTL TxD – connect to pin 5
2	Factory use only		<b>Do not connect</b>
3			
4			
5	RxD	Input	TTL RxD – connect to pin 1
6	Factory use only		<b>Do not connect</b>
7			
8			
9			
10			
11			
12			
13			
14			
15	V In	Input	+V
16	GND	Input	GND

## Other Protocols:

**Multi Drop Bus (MDB) Interface:** MDB is a serial bus interface commonly used in electrically controlled vending machines. This is a 9600 Baud Master-Slave system where the NV200 validator is a slave to a master controller.

To use the NV200 with MDB protocol, an **IF5** external interface is required. The IF5 regulates the power supply and opto-isolates the communication lines. The NV200 validator supports the MDB Protocol Version 1, Level 1.

**Parallel Interface:** To use the NV200 in Parallel mode, an **IF10** external interface is required. When operating in Parallel mode the NV200 will issue a 100ms active LOW pulse on the relevant vend line, and a maximum of 4 channels can be used.

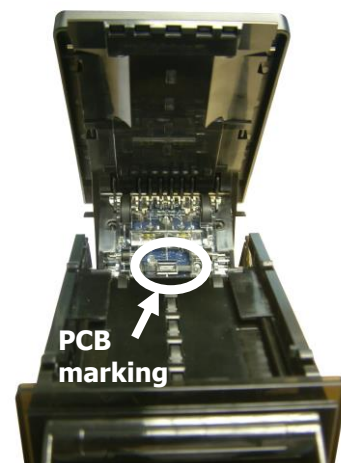
**Binary Interface:** To use the NV200 in Binary mode, an **IF9** external interface is required. When operating in Binary mode the NV200 will issue a binary pattern on vend lines 1 to 4, and a maximum of 15 channels can be used.

**Pulse Interface:** To use the NV200 in Pulse mode, an **IF15** external interface is required. When operating in Pulse mode the NV200 outputs a number of pulses on Vend 1. The number of pulses for each channel is different and set to default values within the dataset. The number of pulses and the pulse duration can be modified using the Bank Note Validator Currency Manager Software, and a maximum of 16 channels can be used.

Opto-isolation and RS232 communications is only available on validators with an issue number of 4 or greater. You can check the issue number on the validator as shown here:

Open the NV200 validator lid and check the marking on the PCB where shown in this picture – the marking needs to read **PB00266\_4**

If the issue number is less than **4** or is not visible, please contact ITL Support for connection options and information.



## 5.2 SSP and eSSP

Smiley<sup>®</sup> 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<sup>®</sup> 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 NV200 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	

**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



**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	

**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.



## 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]	NV200 Serial Number
> SETUP_REQUEST	< OK < [SETUP INFORMATION]	NV200 Setup
> SET_ROUTING, 01 14 00 00 00	< OK	Route notes of value 0020 to the NV200 Cashbox
> SET_INHIBIT > 07 > 00	< OK	Enable channels 1,2 and 3
> ENABLE	< OK	Enable NV200
> POLL	< OK < DISABLED	
> POLL	< OK	
> POLL	< OK < NOTE READ < 00	NV200 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.

### 5.3 ccTalk

This section should be read in conjunction with the full ccTalk specification, which can be downloaded from the internet ([www.cctalk.org](http://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 NV200 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
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
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	100000000000
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



Command	Header	Parameters	Example
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	'NV200'
Request Equipment Category	245	None	'Bill Validator'
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]



## 5.4 Connection Options

The NV200 validator has two connectors that are used to allow interfacing and programming; these connectors are easily accessible at the back of the validator.



### Information

Power always required regardless of connection type.

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



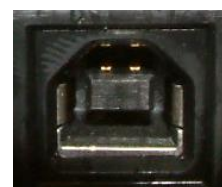
The first connector is a 16 pin socket used to interface the NV200 to the host machine. The pin numbering of the socket is shown below, as well as an overview of the socket connections:



Pin	Description
6	Serial Data Out (Tx)
7	Serial Data In (Rx)
15	+ V
16	0V / Ground Connection

The function of pins 1 to 9 can change depending on which machine interface is being used with the NV200. Typically, the validator will be using SSP, ccTalk or SIO interfaces. MDB, Parallel, Binary and Pulse interfaces are only supported with the use of an external interface.

The USB connector is a standard Type 'B' USB socket, and can be used for interfacing to the host machine – in this case, power must be provided through the 16 way connector. The USB socket can also be used for programming the NV200 – a USB 2.0 compliant Type 'A' to 'B' lead can be used to do this. USB cables should be electrically shielded and less than 5 metres long.



Further details of the cables needed to interface and program the NV200 validator can be found in Section 4 of this manual set (subsection 4.7).



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# **SECTION 6**

## **NV200 MANUAL SET**

## **TECHNICAL APPENDICES**

**INTELLIGENCE IN VALIDATION**

Innovative Technology assume no responsibility for errors, omissions, or damages resulting from the use of information contained within this manual.

**NV200 MANUAL SET – SECTION 6**

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## 6. TECHNICAL APPENDICES

### APPENDIX A – PRODUCT APPROVALS

#### CE Marking

The NV200 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
NV200	Bank Note Acceptor Assembly	All NV200

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

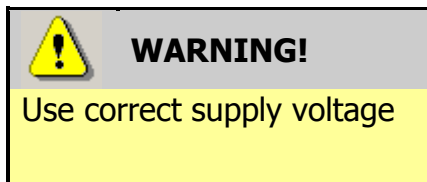
The information contained here does not form part of a contract and is subject to change without notice. Innovative Technology Ltd operates a policy of continual product development; as such specifications may change from time to time.

### 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	24 V **
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
<b>Supply Current</b>			
Standby			400 mA
Running			1.5 A
Peak (motor stall)			3 A



**\*\* NOTE:** Only the later models of NV200 are capable of using a supply voltage up to 24 V DC. Earlier versions have a maximum voltage of 13.2 V DC.

See Appendix E of this manual (Identifying The NV200 Issue Number) for information on how to identify if your validator supports 24V DC operation.

We recommend that your power supply is capable of supplying 12V DC at 3 A, or 24V DC at 1.5 A - TDK Lambda produces a range of suitable power supplies:

- 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).
- For 24V operation, use TDK Lambda model SWS50-24. This power supply is also available from a variety of suppliers including Farnell (stock code 1184646) and RS (stock code 466-5875).

It is recommended that a ferrite cable clamp be used on the cable to the NV200, with the cable having a single turn around the ferrite. The suggested ferrite is as follows:

- Manufacturer: Fair-Rite
- Manufacturer Part Number: 0443166651
- Impedance (100MHz @ 1 turn): 225 Ohms



**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 k $\Omega$ 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	85 mm
Length	115 mm	170 mm

Capacity	
Storage	500 or 1000 notes

Weight	
NV200	2.9 kg

Interface Protocol	
	eSSP; ccTalk; SIO ** MDB; Parallel; Pulse; Binary

\*\* NOTE: Using the NV200 with any of the following protocols will require an additional external interface unit:

**Information**

Additional interface required.

**MDB; Binary; Parallel; Pulse**

See the table below for details of the external interface unit required.

Interface Protocol	External Interface
eSSP	---
ccTalk	---
SIO	---
MDB	IF5
Binary	IF9
Parallel	IF10
Pulse	IF15



## APPENDIX C – GLOSSARY OF TERMS

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





<b>Term</b>	<b>Meaning</b>
<b>LED</b>	Light Emitting Diode
<b>mA</b>	milliampere
<b>max</b>	maximum
<b>MDB</b>	Multi Drop Bus
<b>min</b>	minimum
<b>mm</b>	millimetre
<b>ms</b>	millisecond
<b>MOD</b>	Modified (or Modification)
<b>NV</b>	Note Validator
<b>PCB</b>	Printed Circuit Board
<b>PDF</b>	Portable Document Format
<b>PiPS</b>	Pay-in Pay-out System
<b>PROM</b>	Programmable Read Only Memory
<b>PSU</b>	Power Supply Unit
<b>QTY</b>	Quantity
<b>RAM</b>	Random Access Memory
<b>ROM</b>	Read Only Memory
<b>Rx</b>	Receive
<b>RoHS</b>	Restriction of the use of certain Hazardous Substances
<b>SIO</b>	Serial Input Output
<b>SSP</b>	Smiley <sup>®</sup> Secure Protocol
<b>SWG</b>	Standard Wire Gauge
<b>SWP</b>	Skill With Prizes
<b>SYNC</b>	Synchronize



<b>Term</b>	<b>Meaning</b>
<b>TTL</b>	Transistor Transistor Logic
<b>Tx</b>	Transmit
<b>USB</b>	Universal Serial Bus
<b>V</b>	Volt
<b>V_In</b>	Voltage In
<b>WEEE</b>	Waste Electrical and Electronic Equipment



## APPENDIX D – ORDERING INFORMATION

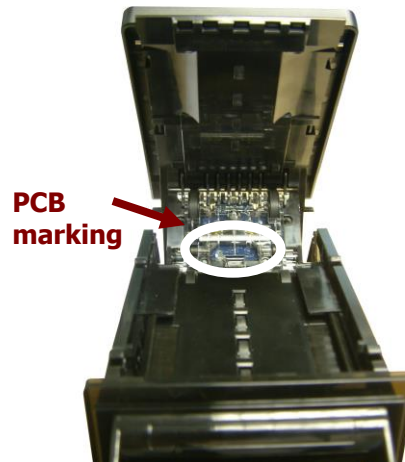
The following information is required to order an NV200 validator:

<b>Product</b>	NV200	Consists of NV200 validator and cash box chassis
<b>Dataset</b>	Country code and variant	Alternatively supply details of the currency and note types you wish to use
<b>Bezel Size</b>	82mm; 85 mm	These are the only bezel sizes available
<b>Bezel Colour</b>	RGB code or text description	
<b>Cash Box</b>	500 or 1000 note capacity	
<b>Interface</b>	eSSP; ccTalk; SIO; MDB; Parallel; Pulse; Binary	Using the NV200 with any of the following protocols will require an additional external interface unit:  <b>MDB; Parallel; Pulse; Binary</b>

## APPENDIX E – IDENTIFYING THE NV200 ISSUE NUMBER

Early revisions of the NV200 did not allow the use of a 24V DC supply. You need to check the NV200 issue number to see if the validator has 24V compatibility:

Open the NV200 validator lid and check the marking on the PCB where shown in this picture – the marking needs to read **PB00266\_4** or higher



If the PCB issue (the last digit) is lower than **4**, the NV200 validator can only be used with a 12V DC supply.

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