

SMART PAYOUT MANUAL SET

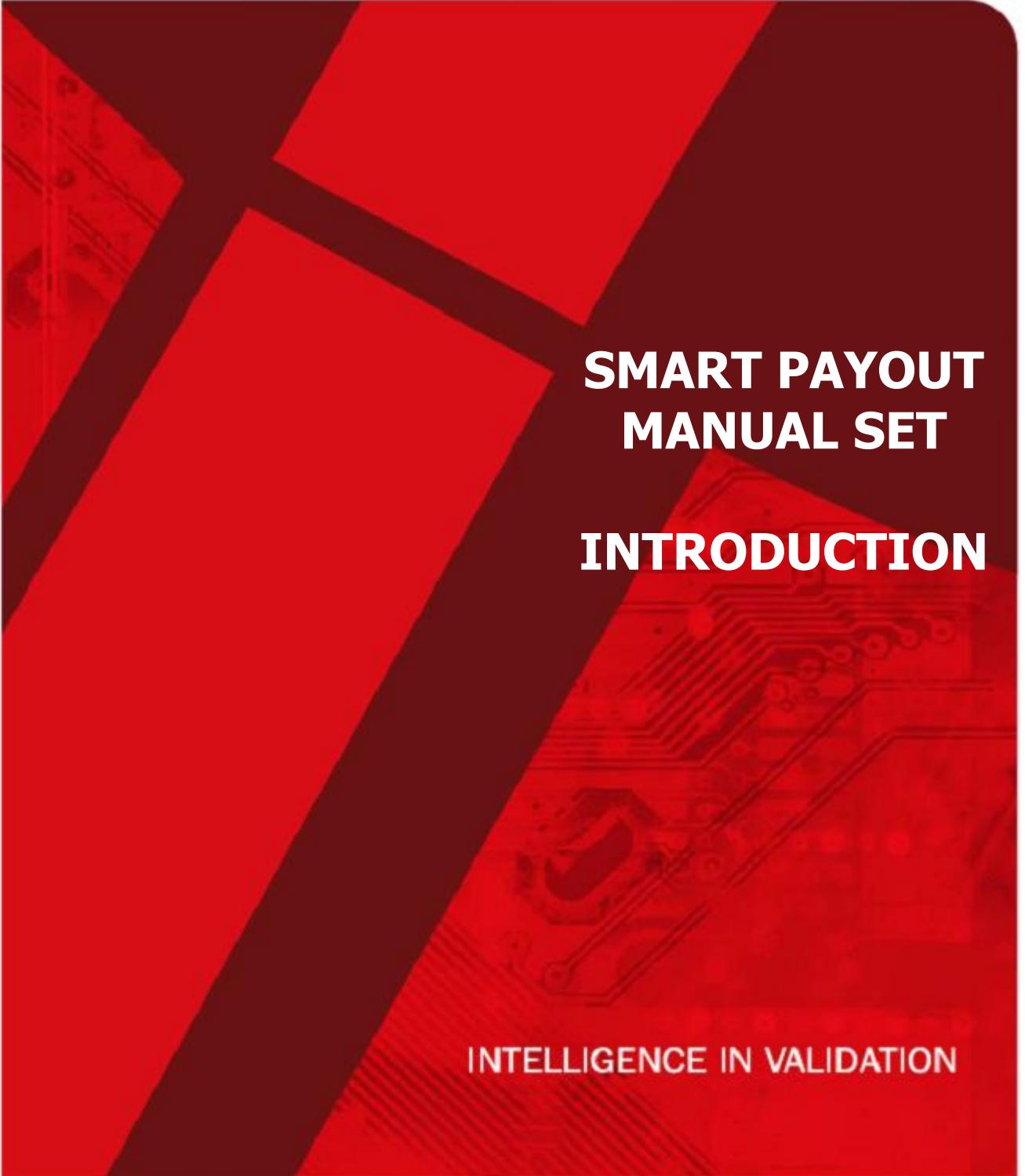
INTELLIGENCE IN VALIDATION



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SMART PAYOUT MANUAL SET

INTRODUCTION

INTELLIGENCE IN VALIDATION

MANUAL AMENDMENTS

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D	05/09/11	Added bezel securing information	EAM

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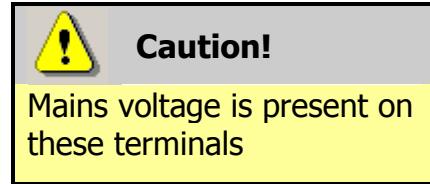
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PRODUCT SAFETY INFORMATION

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 SMART Payout unit is made up of three basic components: an NV200 Validator, a cashbox and a payout module (as shown below). The Payout module is an add-on designed to be fitted to the Innovative Technology NV200 bank note validator.



The SMART Payout unit is a device that can validate, store and later dispense 80 bank notes of mixed denominations.



**Payout Module
Side View**



**Payout Module
Top View**



**Payout Module
Front View**

Validated bank notes can be stored in the NV200's secure cashbox or travel into the payout module if needed for future payouts. The SMART Payout unit works with any SMART Payout currency dataset created by Innovative Technology Ltd.

FEATURES

The SMART Payout unit has many innovative features, including:

- Multiple denomination note payouts.
- Accepts, validates and stores multiple denominations of bank notes in less than 10 seconds
- Payout of multiple bank note denominations in around 10 seconds
- Payout function is automated
- Less frequent cash removal & float re-fill
- Uses a secure encrypted protocol for data transfer

TYPICAL APPLICATIONS

The SMART Payout unit can be used in a variety of situations where bank note acceptance, validation and payout are needed. Some typical applications are:

- Automated change transactions
- 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 SMART Payout unit 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 a SMART Payout unit 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 SMART Payout unit, using a range of software tools such as PiPS.

- **Mechanical and Electrical Manual:**

- Design engineers who are designing a host machine cabinet, or looking to integrate the SMART Payout unit into an existing cabinet.
- This section contains all the mechanical and electrical information a designer needs to effectively integrate the SMART Payout unit into a host machine.

- **Software Implementation Guide:**

- Software engineers looking at how to implement the SMART Payout unit 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 CC2.

- **Technical Appendices:**

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

SECTION 1

SMART PAYOUT MANUAL SET

QUICK START AND CONFIGURATION GUIDE

INTELLIGENCE IN VALIDATION

SMART PAYOUT 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 SMART Payout unit ready for installation into the host machine.

1.1 Assembly

The payout module is designed to be fitted to the Innovative Technology NV200 bank note validator. Connecting the payout module to an NV200 validator is a simple operation, described in the steps outlined here:

1. Remove the NV200 cash box from the metal chassis
2. 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.

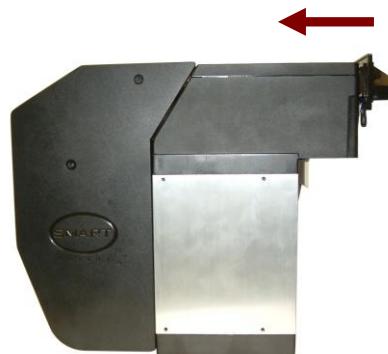
3. Unlock the NV200 cashbox and head release lock (if fitted)
4. Lift the silver head release catch located on the front of the NV200
5. Slide the head unit forward and lift up



6. Mount the payout module using the mounting brackets on the rear of the NV200 chassis
7. Replace the NV200 head unit taking care that the connectors on the payout module line up with the connectors on the rear of the NV200



8. Ensure the NV200 head unit is securely in place – check that the release catch is fully down



Information

Payout module removal.

The payout module cannot be removed until the head unit has been slid forwards.

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 SMART Payout unit is being installed and transported inside a host machine.



Information

Check bezel fixing screw length before installation.

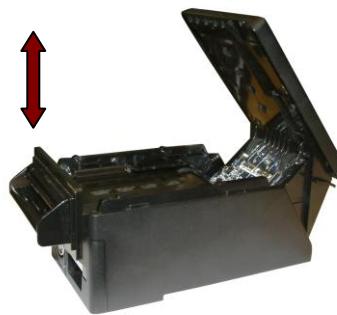
The length of the bezel fixing screws must be no more than 12 mm in length.

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

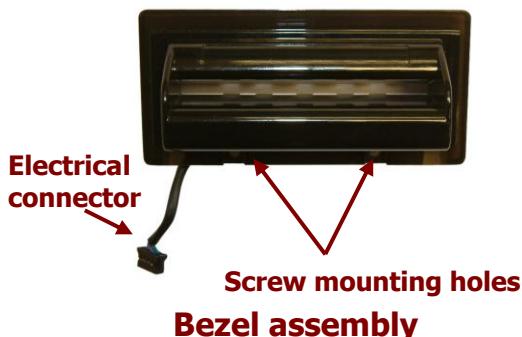
To remove or refit the bezel the top cover must be open fully to allow access to the bezel mounting area.



Validator note path cover



Bezel removal and fitting



Bezel assembly



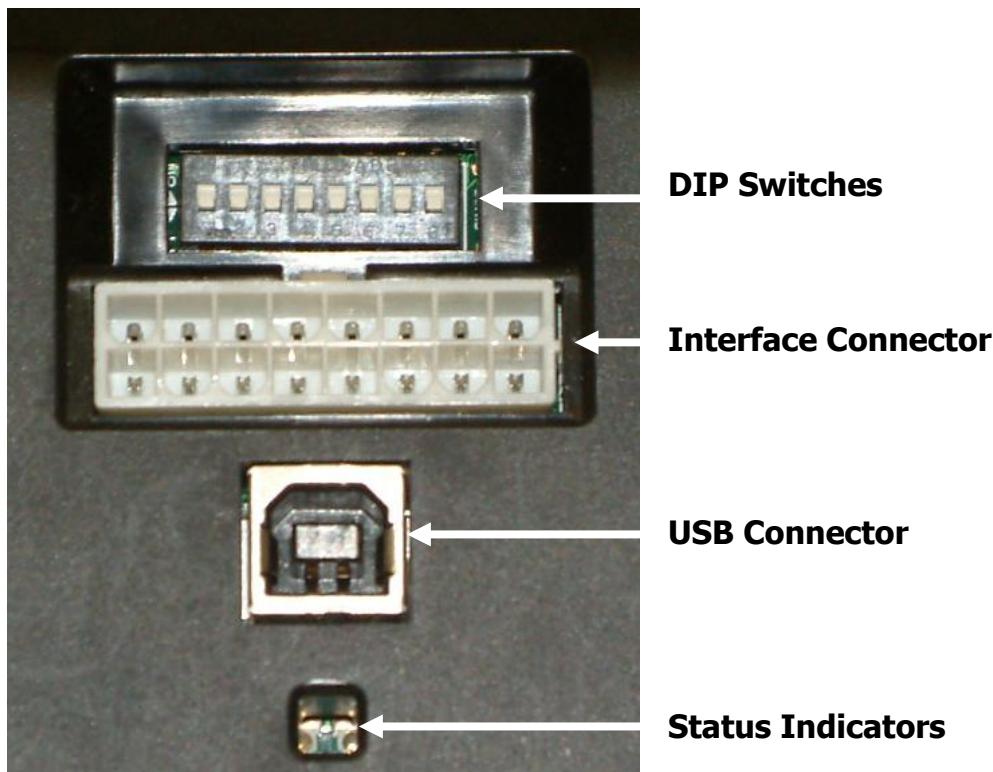
Bezel connector socket

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.

1.2 Panel Layout

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



1.3 Earth Bonding

It is **very** important that the cashbox chassis is bonded to earth, as lack of proper bonding can cause communication issues and failures with the SMART Payout unit.

The earth bond should be made to any of the 8 holes in the side of the cashbox and be bonded to mains earth, typically through the Power Supply Unit.



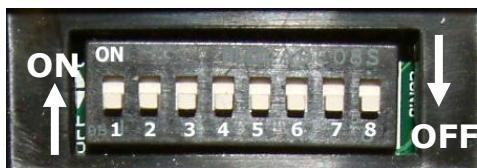
Information

Earth resistance.

The resistance between the cashbox and the Earth pin on the mains plug should be less than 0.7 ohms.

1.4 DIP Switch Settings

The SMART Payout unit 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	Default Setting
1	Not Used	OFF
2	Not Used	OFF
3	Not Used	OFF
4	Not Used	OFF
5	Not Used	OFF
6	Not Used	OFF
7	Stop update from NV200	OFF
8	Force diverter to close (unit must be powered up)	OFF

1.5 Connectors and Pinouts

The SMART Payout unit has two connectors that are used to allow interfacing and programming.

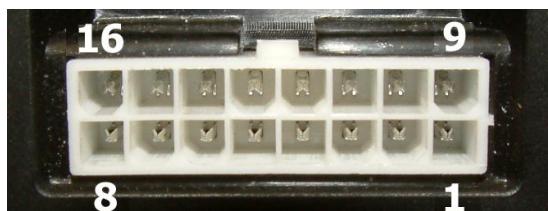


Information

Power always required regardless of connection type.

Power is always required on pins 1 and 9 of the 16 way connector.

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



Pin	Description
1	0V / Ground Connection
9	+12V DC
14	Serial Data In (Rx)
16	Serial Data Out (Tx)

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 SMART Payout unit – 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.

1.6 Status Indicators

The SMART Payout unit has two Light Emitting Diode (LED) indicators that are used to show the status of the unit (one Red, one Green) – these can be found on the back of the unit, below the USB connector. If the SMART Payout unit is operating normally, only the Green LED should be lit: when operating normally this LED will flash once every second.

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

1.7 Programming

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

1.8 Technical Specifications

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

DC Voltage	Minimum	Nominal	Maximum
Absolute limits	10.8 V	12 V	13.2 V
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz

Supply Current (when connected to an NV200):

Standby	400 mA
Running	3 A
Peak (motor stall)	5 A

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

We recommend that your power supply is capable of supplying 12V DC at 6.3 A.

1.9 SMART Payout Flash Codes

The SMART Payout unit has an inbuilt fault detection facility. If there is a configuration or other error, the Status Indicator LEDs will flash in a particular sequence; a summary of the Flash Codes for the SMART Payout unit is shown below:

Status Indicators		Flashes	Indicated Error	Comments
Red	Green			
		0	No LEDs lit	No power
		1	Motor / barcode error	Check tape in window
		2	Note sensor error	
		3	EEPROM error	Reprogram unit (see Section 3 of this manual set)
		4	Payout jammed	Remove trapped note (see Section 4 of this manual set)
		5	Diverter error	Switch DIP switch 8 on and off
		0	Both LEDs on (no flash)	Turn power on and off
		1	Power reset	For information only
		2	Wakeup from low power	For information only
		3	Software reset	For information only
		4	Software command	For information only
		5	User manual reset	For information only
		6	Power supply issue	Check power supply
		7	Unknown cause	For information only
		1 every second	None	All OK

1.10 NV200 Bezel Flash Codes

When the payout module is installed on an NV200 bank note validator additional fault finding help is available, as the NV200 has its own set of Flash Codes. These are displayed in the front bezel of the validator.

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

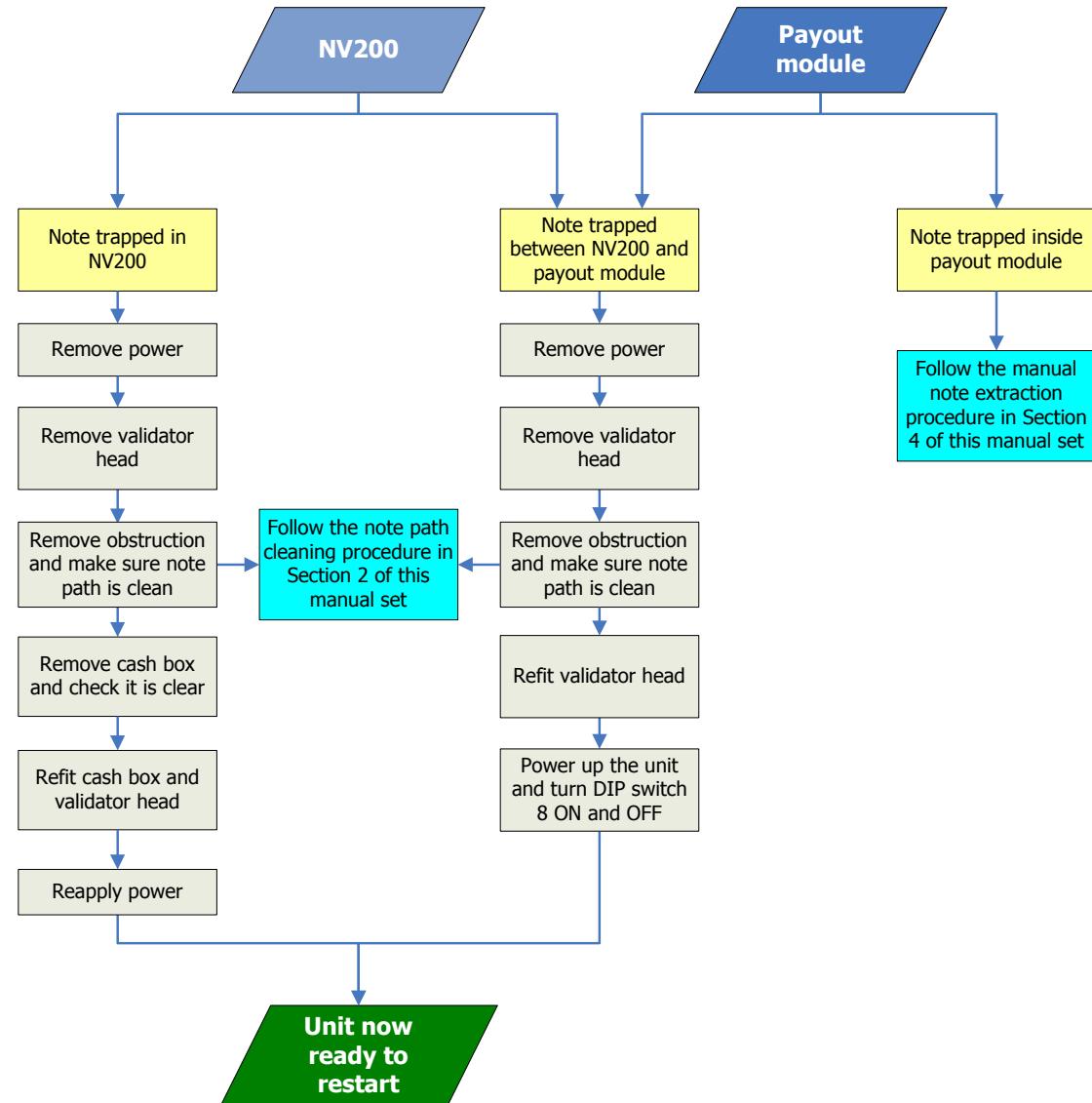
Flashes		Indicated Error	Comments
Red	Blue		
0	0	None	
1	1	Note path open	Close note path
	2	Note path jam	Remove obstruction and follow the cleaning procedure in Section 2 of this manual set
	3	Unit not initialised	Contact ITL technical support
	1	Cashbox removed	Refit cashbox
2	2	Cashbox jam	Remove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

1.11 Fault Finding

Please use this flow chart with the Flash Codes in the previous sub-sections as an aid to help resolve any configuration or start up problems you might have after installing the SMART Payout unit.

If you are unsure about the cause or how to resolve the problem, please contact ITL's technical support department.

Support contact details can be found on the ITL website (www.innovative-technology.co.uk), or on the last page of this section.



1.12 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 1.4

b. The payout unit does not securely lock on the back of the NV200

- Make sure the plastic mountings are fitted on the back of the cashbox.
- Ensure the payout module is correctly located on the mountings before the validator head is installed.

c. My notes are always stacked in the cashbox even though I have chosen for them to go into the payout module.

- Check that the Green LED on the rear of the SMART Payout unit is flashing – see the Flash Codes in subsection 1.9 if this is not the case.
- Make sure the diverter is in the correct position – with the unit powered up, turn DIP switch 8 ON and OFF to make sure (check the information in Section 2, subsection 2.2 of this manual set if you are unsure).
- The Payout module might be disabled in software - send an enable payout command.
- The Payout module might be full – check how many notes are stored using your host software.
- The notes might be detected as damaged or not straight – in this case they will be stacked in the cash box so that they will not jam the payout module.

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SECTION 2

SMART PAYOUT MANUAL SET

FIELD SERVICE MANUAL

INTELLIGENCE IN VALIDATION

SMART PAYOUT MANUAL SET – SECTION 2

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2. FIELD SERVICE MANUAL

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

This section contains the essential information that the field engineer needs to clean, maintain and fault find a SMART Payout unit that is installed in a host machine.

The SMART Payout unit 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 payout module is effectively a 'sealed' unit; as such there are no parts to clean other than the external case. 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 Payout or NV200 units.

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.

To clean the NV200 note path, you will need to remove the validator head from the assembly – you cannot open the note path cover when the payout unit is fitted.

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



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!**

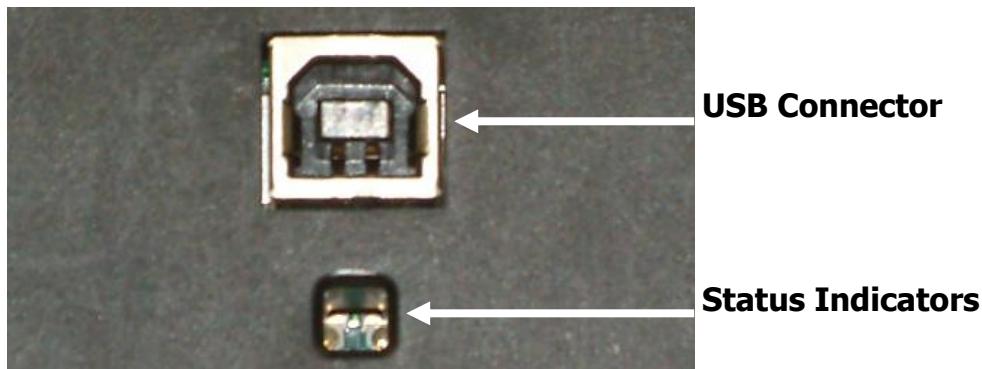
Do not try to disassemble

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

2.2 Fault Finding - Flash Codes

Both the payout module and the NV200 validator have inbuilt fault detection facilities. If there is a configuration or other error, the payout module status indicators or the NV200 front bezel will flash in a particular sequence.

The payout module status indicators are on the rear of the payout module, just below the USB socket:



A summary of the Status Indicator Flash Codes for the payout module are shown here:

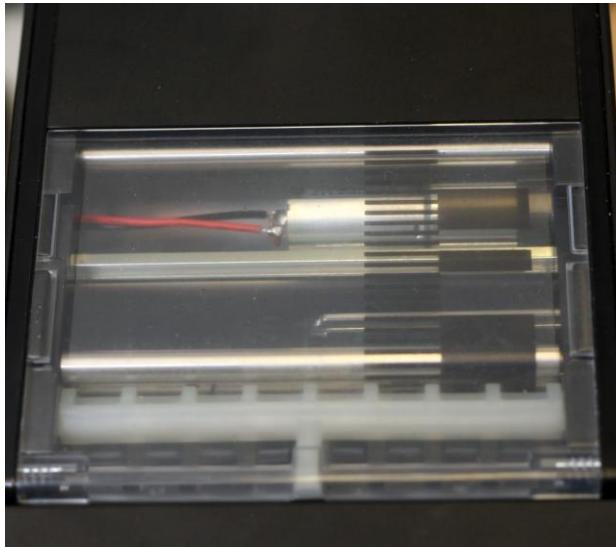
Status Indicators		Flashes	Indicated Error	Comments
Red	Green			
		0	No LEDs lit	No power
		1	Motor / barcode error	Check tape in window (see Subsection 2.3 of this manual)
		2	Note sensor error	
		3	EEPROM error	Reprogram unit (see Section 3 of this manual set)
		4	Payout jammed	Remove trapped note (see Section 4 of this manual set)
		5	Diverter error	Switch Payout module DIP switch 8 on and off with power on (diverter position shown in Subsection 2.3)
		0	Both LEDs on (no flash)	Turn power on and off
		1	Power reset	For information only
		2	Wakeup from low power	For information only
		3	Software reset	For information only
		4	Software command	For information only
		5	User manual reset	For information only
		6	Power supply issue	Check power supply
		7	Unknown cause	For information only
	●	1 every second	None	All OK

Summary of the Bezel Flash Codes for the NV200:

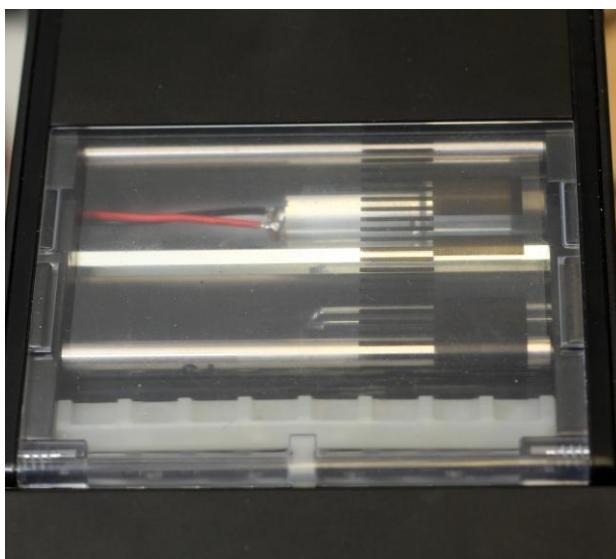
Flashes		Indicated Error	Comments
Red	Blue		
0	0	None	
1	1	Note path open	Close note path
	2	Note path jam	Remove obstruction and follow the cleaning procedure in Subsection 2.1 of this manual
	3	Unit not initialised	Contact ITL technical support
2	1	Cashbox removed	Refit cashbox
	2	Cashbox jam	Remove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

2.3 Tape and Diverter Positions

The images below show the barcode tape position with the diverter in the open and closed positions, and an indication of the diverter in the OPEN position:



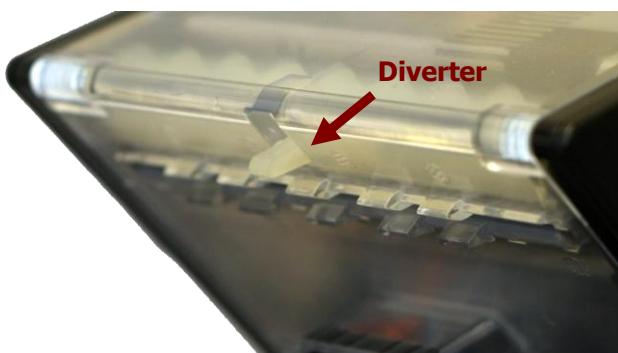
Normal tape position – diverter in
CLOSED position



Normal tape position – diverter in OPEN
position



Top view – diverter in OPEN position



Close up – diverter in OPEN position

2.4 Technical Specifications

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

DC Voltage	Minimum	Nominal	Maximum
Absolute limits	10.8 V	12 V	13.2 V
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
Supply Current (when connected to an NV200):			
Standby			400 mA
Running			3 A
Peak (motor stall)			5 A

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

We recommend that your power supply is capable of supplying 12V DC at 6.3 A.

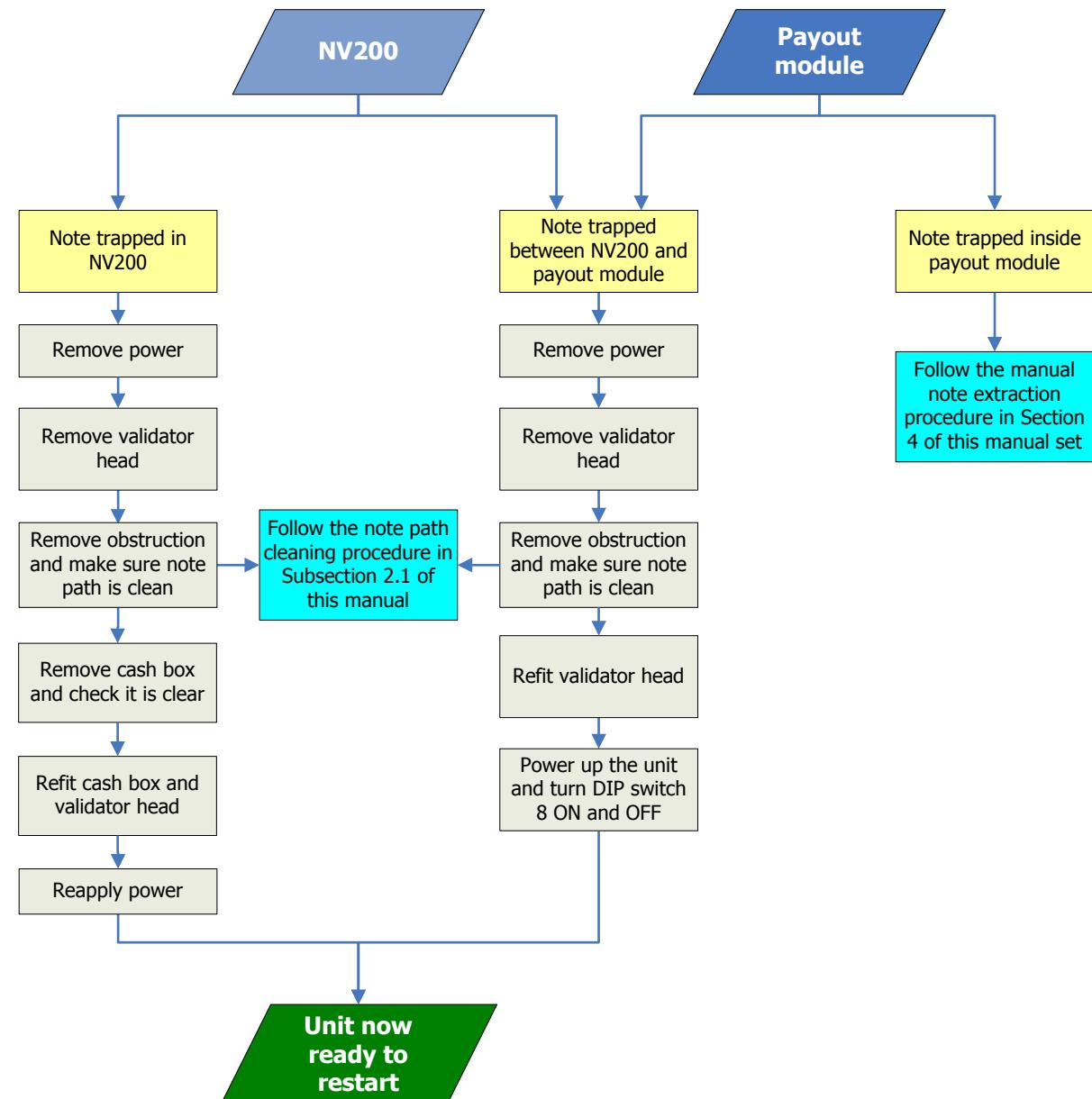
TDK Lambda produces a suitable power supply (model SWS75-12). This power supply is available from a variety of suppliers including Farnell (stock code 1184648) and RS (stock code 466-5904).

2.5 Fault Finding Flow Chart

Please use this flow chart with the Flash Codes in the previous sub-section as an aid to help resolve any configuration or start up problems you might have with the SMART Payout unit.

If you are unsure about the cause or how to resolve the problem, please contact ITL's technical support department.

Support contact details can be found on the ITL website (www.innovative-technology.co.uk), or on the last page of this section.



2.6 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 1.4). By default, all DIP switches are turned OFF.

b. The payout unit does not securely lock on the back of the NV200

- Make sure the plastic mountings are fitted on the back of the cashbox.
- Ensure the payout module is correctly located on the mountings before the validator head is installed.

c. My notes are always stacked in the cashbox even though I have chosen for them to go into the payout unit

- Check that the Green LED on the rear of the SMART Payout unit is flashing – see the Flash Codes in subsection 2.2 if this is not the case.
- Make sure the diverter is in the correct position – with the unit powered up turn DIP switch 8 ON and OFF to make sure (check the information in subsection 2.2 if you are unsure).
- The Payout module might be disabled in software - send an enable payout command.
- The Payout module might be full – check how many notes are stored using your host software.
- The notes might be detected as damaged or not straight – in this case they will be stacked in the cash box so that they will not jam the payout module.

d. My payout module has stopped functioning and I want to return it for repair - however it has bank notes inside

- All bank notes that are inside payout modules returned to ITL are handled with the highest security and carefully tracked internally until their return to the customer - if you do not want to ship the unit with the bank notes inside, please follow the instructions for manual payout in Section 4 of this manual set (subsection 4.10).
- If manual emptying is not possible please contact ITL technical support.

2.7 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.

Payout Module

The Payout Module is a ‘sealed’ unit and there are no user-replaceable spare parts. However, several cables designed to be used with the module are available, and these are listed below:

ITL Part Number	Description	Details
CN214	USB Cable	USB 2.0 Compliant Type A to Type B cable

The diagram illustrates a USB cable assembly with two connectors. The left connector is a Type A male, and the right connector is a Type B male. Key dimensions are labeled:

- Width of the Type A connector body: 8 MAX.
- Height of the Type A connector body: 16 MAX.
- Width of the Type B connector body: 10.5 MAX.
- Height of the Type B connector body: 11.5 MAX.
- Length of the cable between the connectors: 48±1.0
- Width of the Type A connector pins: 11.75 MIN.
- Width of the Type B connector pins: 11.75 MIN.
- Label 'PIN 1' points to the bottom-most pin on both connectors.
- Label 'PIN 4' points to the top-most pin on both connectors.

Notes: USB cable should be USB 2.0 compliant, electrically shielded and less than 5 metres long.

ITL Part Number	Description	Details
CN370	SMART Payout power cable	Provides 12V supply only to SMART Payout

CON1
(Top View)

1 9
8 16
(Front View)

1000mm

30 15 87 typ

15 25 5

Stripped (no tinning)

ITL Part Number	Description	Details
CN391	SMART Payout to SMART Hopper eSSP interface cable	Connects SMART payout to SMART hopper for eSSP communications. Also provides 12V supply to SMART Payout

The diagram illustrates the physical layout of the CN391 cable. It features a central flat ribbon cable with two 16-pin connectors, CON1 and CON2. CON1 is a top view of a vertical 16-pin connector, while CON2 is a front view of a similar vertical 16-pin connector. Two right-angle connectors, CON3 and CON4, are attached to the ends of the ribbon cable. CON3 is a top view of a horizontal right-angle connector, and CON4 is a front view of a similar horizontal right-angle connector. Various dimensions are marked: the total length of the cable is 1000, the distance from CON1 to the first connector is 40, the distance between the two main connectors is 890, and the distance from CON2 to the second connector is 920. Specific pins on the ribbon cable are labeled: 1, 9, 16, 15, 10, and 15.

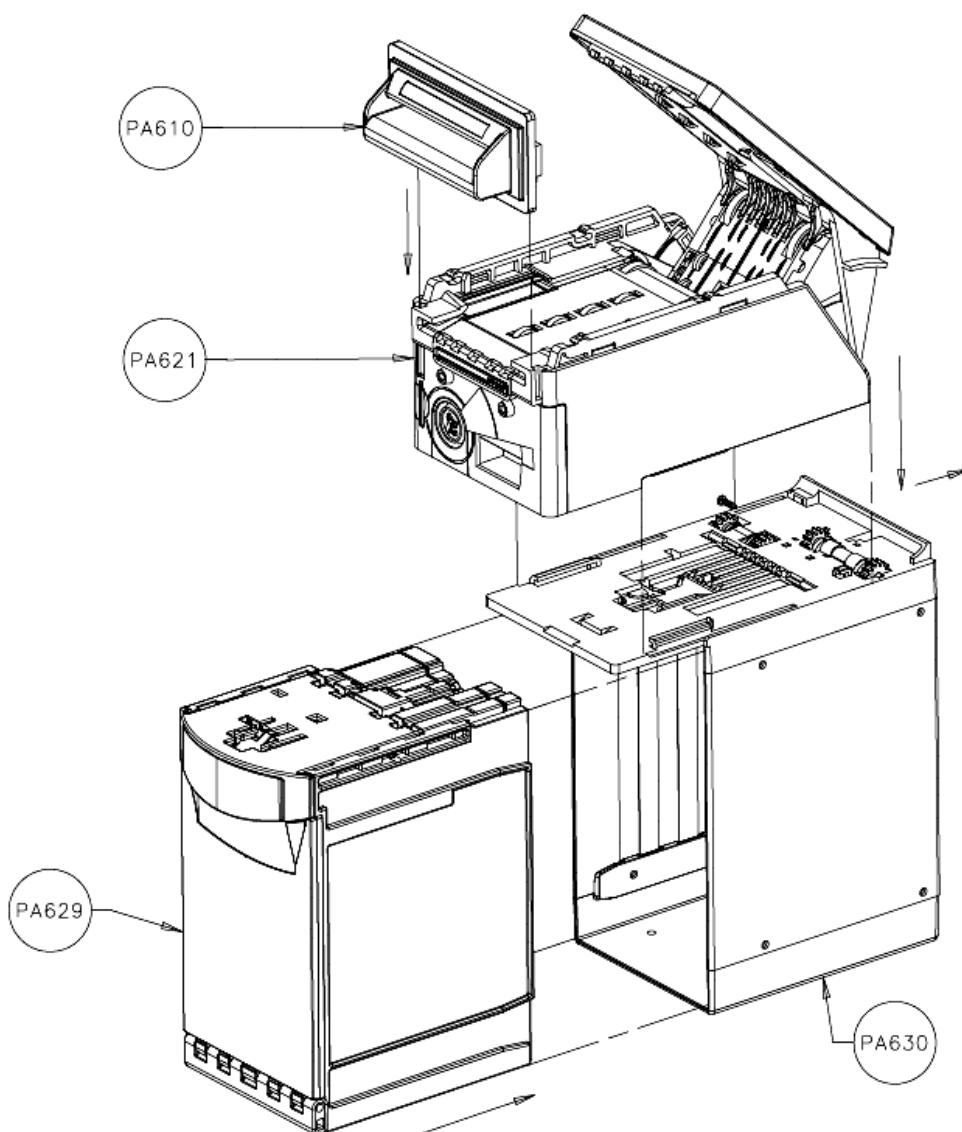
Part Number	Description	Details
CN397	SMART Payout eSSP interface cable	Provides 12V supply and eSSP communications to SMART Payout

The diagram illustrates the CN397 SMART Payout eSSP interface cable. It consists of four main components: CON1 (Top View), CON2 (Bottom View), CON3, and CON4. CON1 is a 16-pin connector with pins 1, 8, 9, and 16 labeled. CON2 is a 16-pin connector with pins 1, 2, 10, and 15 labeled. CON3 is a 16-pin connector with pins 1, 2, 10, and 15 labeled. CON4 is a 16-pin connector with pins 1, 2, 10, and 15 labeled. The cable has a total length of 1000 mm, with segments of 40 mm, 890 mm, and 920 mm. Pinouts for CON1, CON2, CON3, and CON4 are shown.

NV200

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

ITL Part Number	Description
PA610	Bezel Assembly
PA621	NV200 Validator Head Assembly
PA629	Cashbox Final Assembly
PA630	Chassis Assembly
PA650	Lock Assembly



MAIN HEADQUARTERS

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SECTION 3

SMART PAYOUT MANUAL SET

ITL SOFTWARE SUPPORT GUIDE

INTELLIGENCE IN VALIDATION

SMART PAYOUT MANUAL SET – SECTION 3

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3. ITL SOFTWARE SUPPORT GUIDE

3.1 PiPS Software

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

3.1.1 Preparing for Installation

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



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

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.

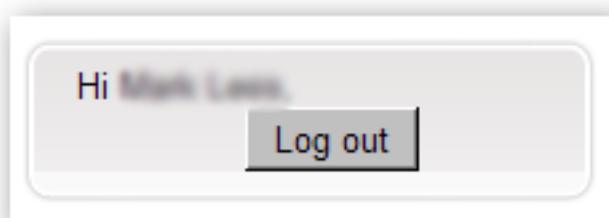
Title	Version File
VPS (Validator Programming System)	1.0.16
Bank Note Validator Currency Manager	3.3.11
Bank Note Validator Diagnostics Tools	1.0.4
SMART PIPS (Pay In Pay Out System)	1.4.5
DA2 Drivers - 32 bit	
DA2 Drivers - 64 bit	1
BV Interface Driver Install - 32 bit	2
BV Interface Driver Install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

Latest Datasets

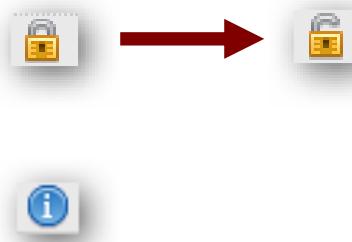
- TWD01204** (BV20)
- TWD02201** (BV20)
- VEF01B01** (NV9USB)
- E004610100** (NV10)
- E0046101** (NV10USB)
- AUD01004** (SMART Hopper)
- BAM01002** (SMART Hopper)
- CLP01002** (SMART Hopper)
- CNY01003** (SMART Hopper)
- CZK01003** (SMART Hopper)

After logging in, the download screen will change slightly:

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



The padlock icon for each file will change from locked to unlocked. To download a file, just click on the padlock icon opposite the file name. If you want to find more information about the file before you download it, you can click on the blue information icon.



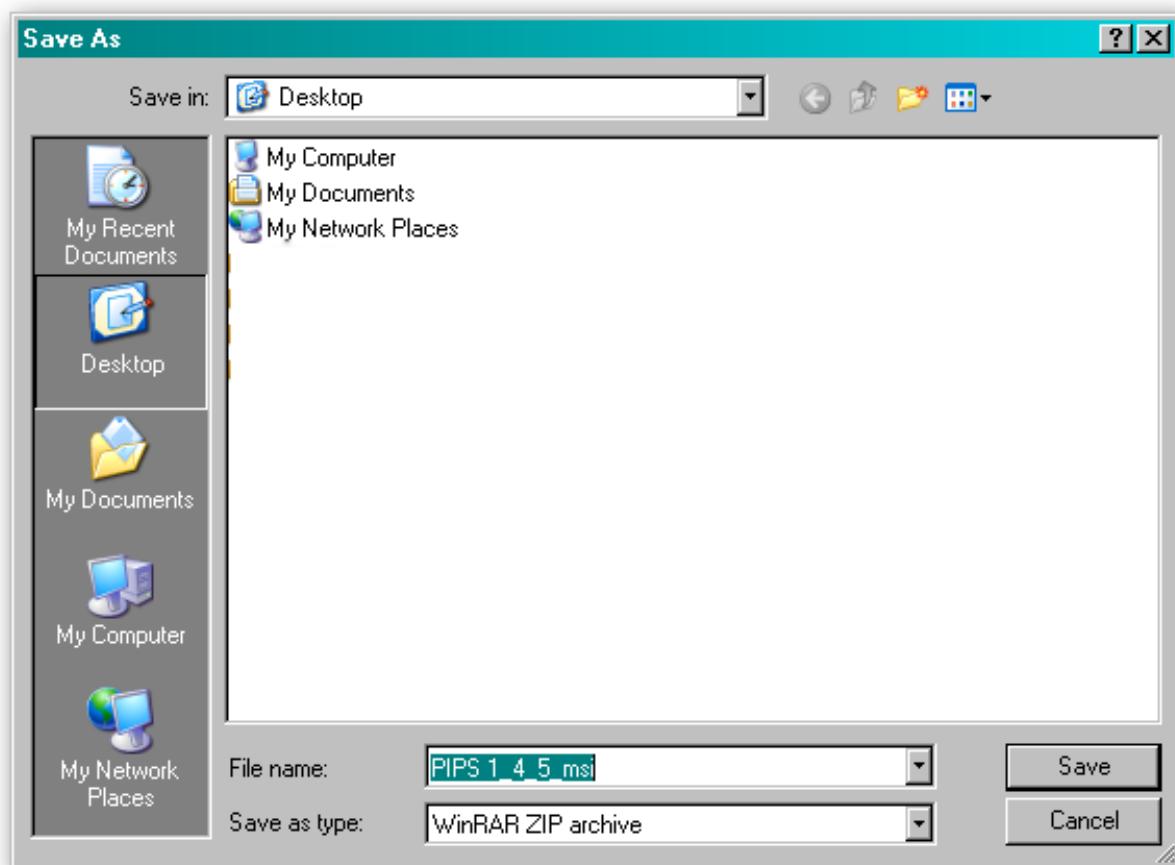
In this case, we want to download the PiPS software, so we click on the padlock icon opposite the 'SMART PIPS (Pay in Pay out System)' filename:

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

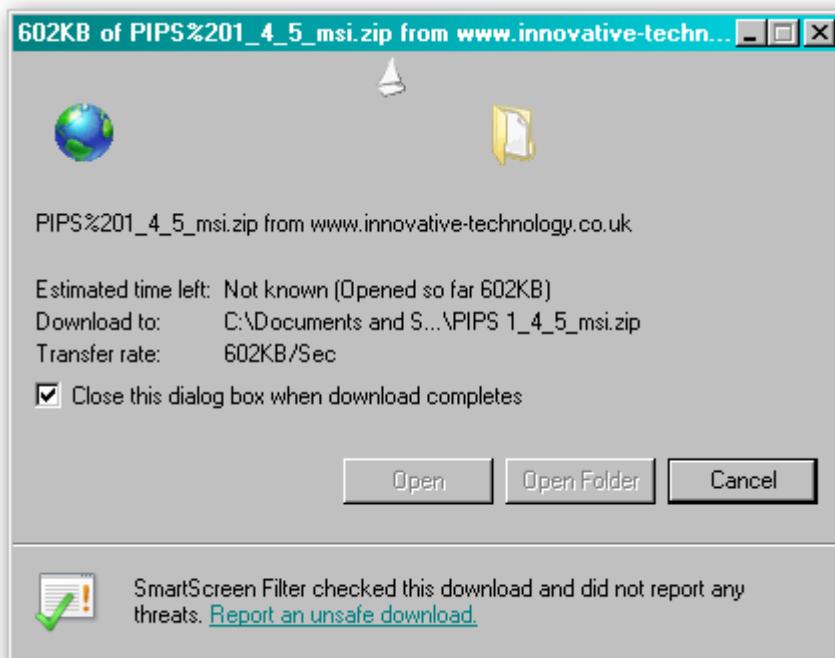
After clicking the link, a file download dialog box will appear – choose the option to **save** the file:



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



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

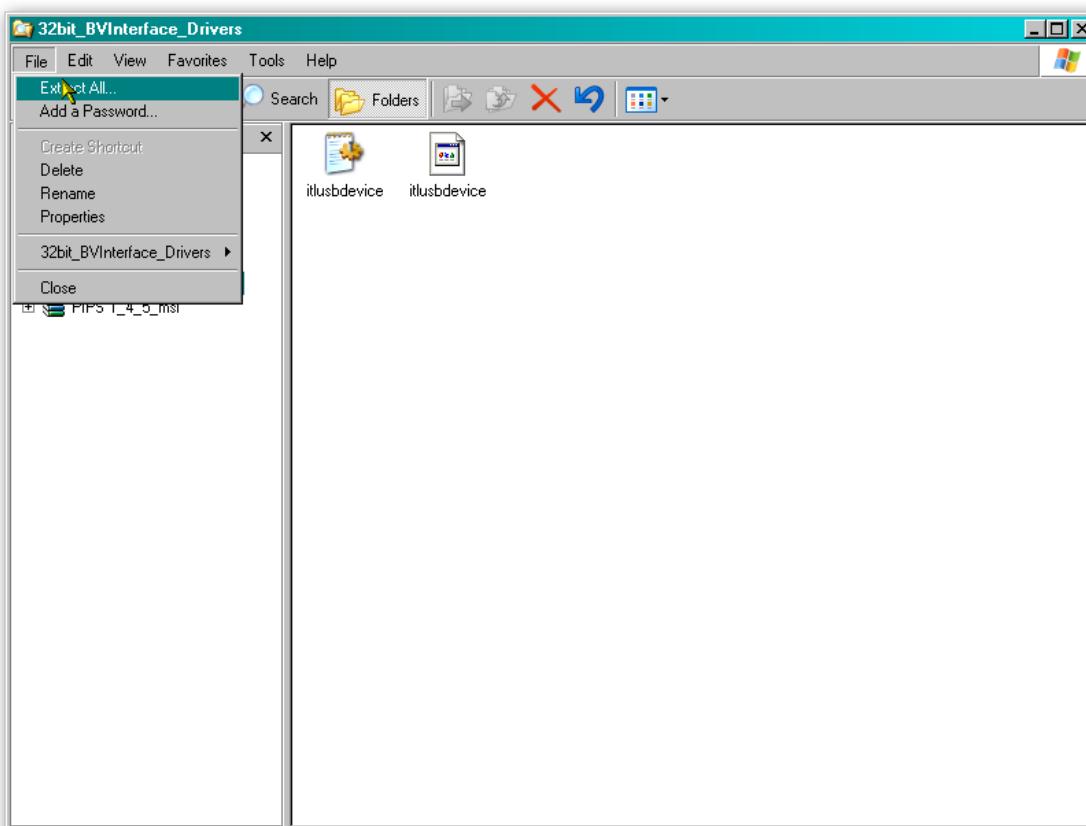


3.1.2 BV Interface Drivers

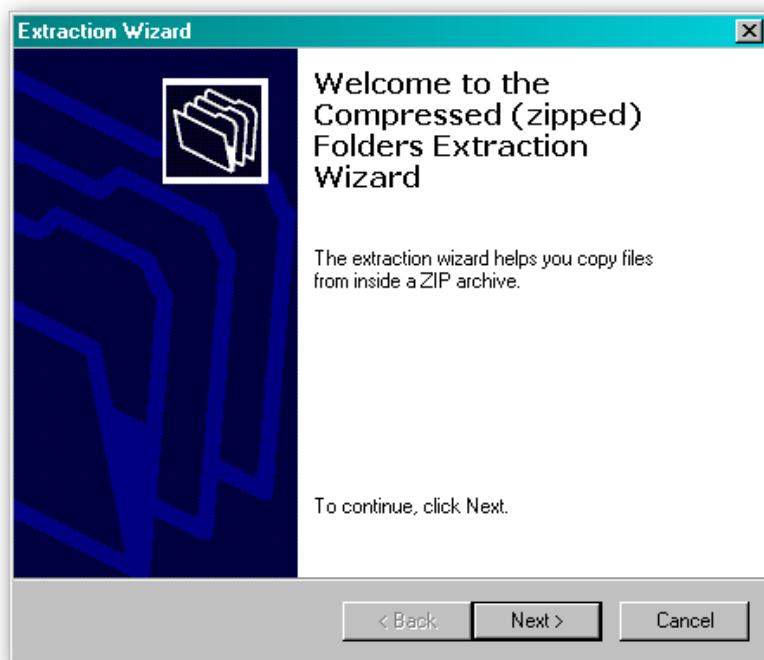
After downloading the PiPS software, you will also need to download the Banknote Validator (BV) Interface drivers – two versions are available (32 bit and 64 bit) so choose the correct type for your operating system. Again, remember where you saved the file.



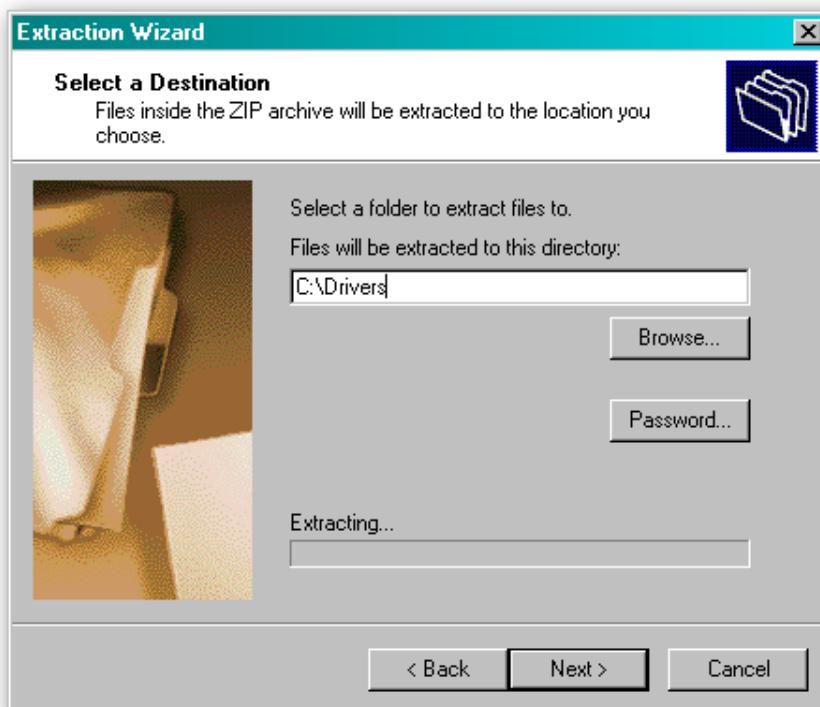
Both files are provided in a 'zipped' (compressed) form – you will need to extract the files from the zipped file before you can install the software or driver. Any version of Windows from Windows 98 onwards can open zipped files; or you may want to use a third party software tool such as Winzip or WinRAR.

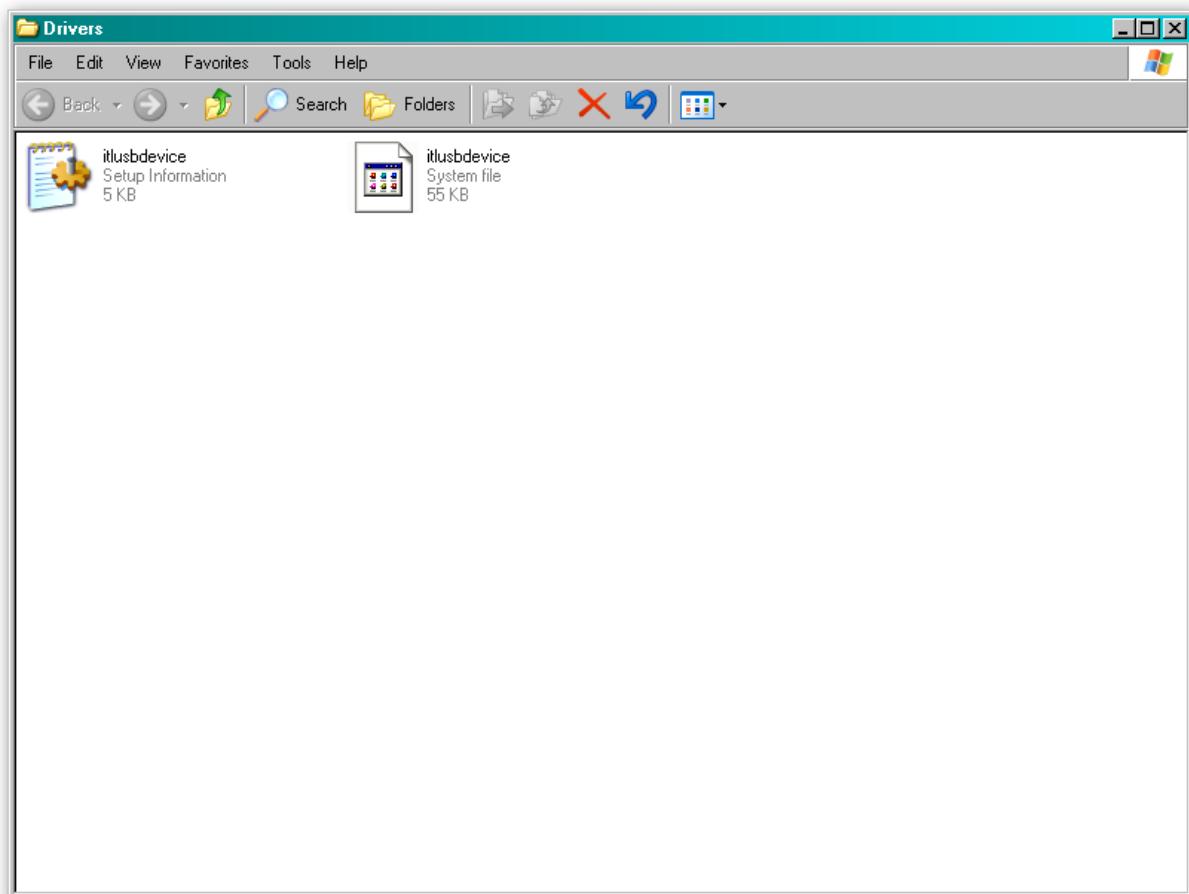
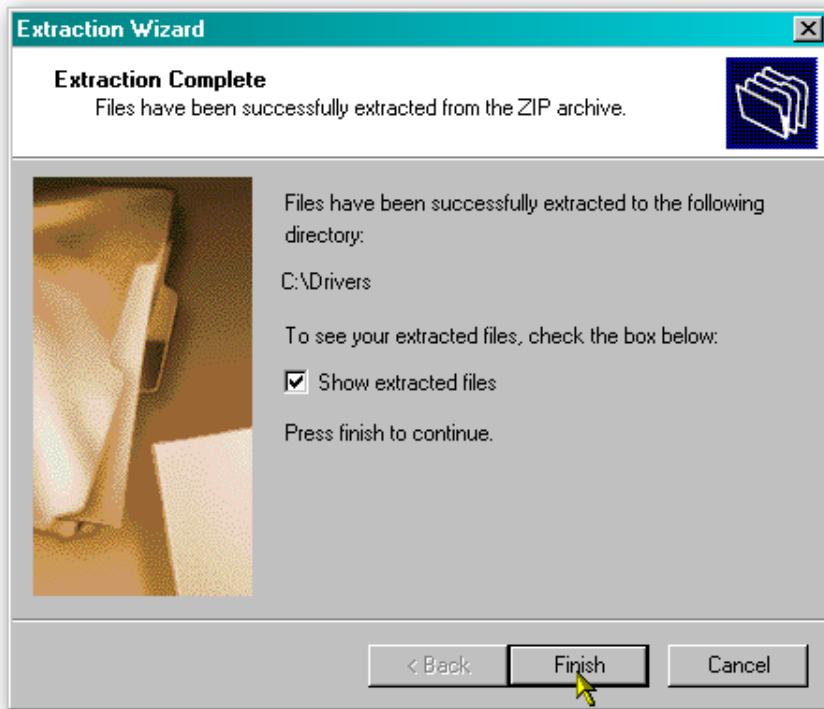


Extract the files to a convenient location – this might be an existing folder, or you may want to save them into a new folder.



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

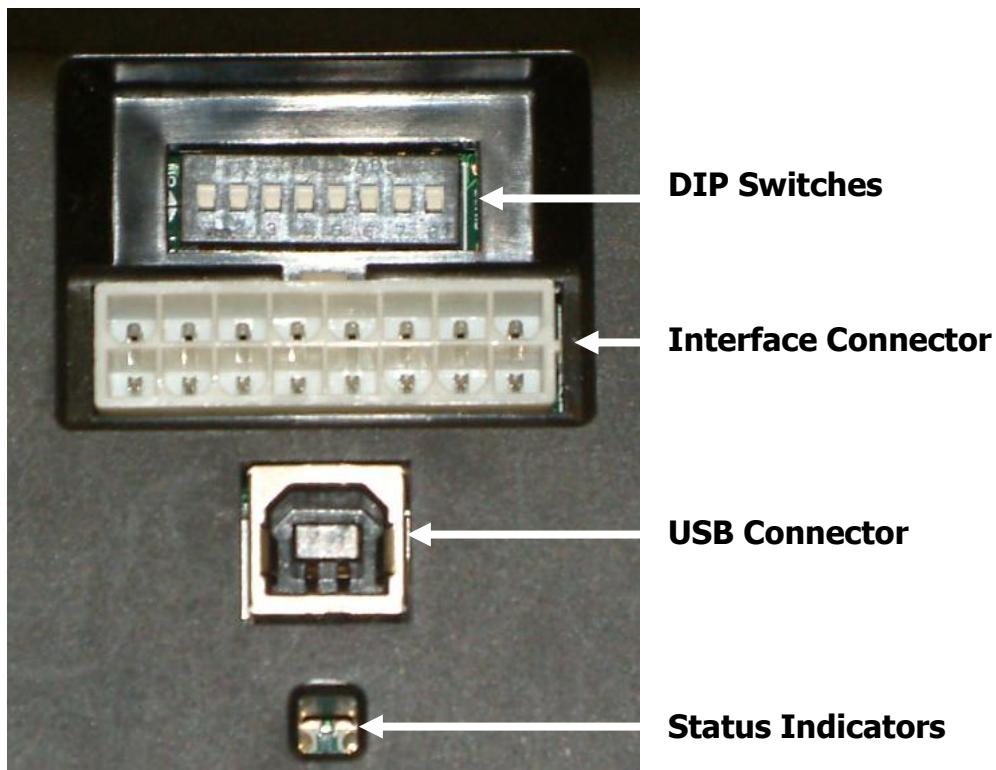




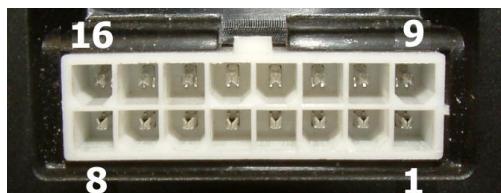
3.1.3 Installing the Drivers

There are several ways to communicate with the SMART Payout unit, which include using a direct connection from computer to SMART Payout unit 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 SMART Payout unit:



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



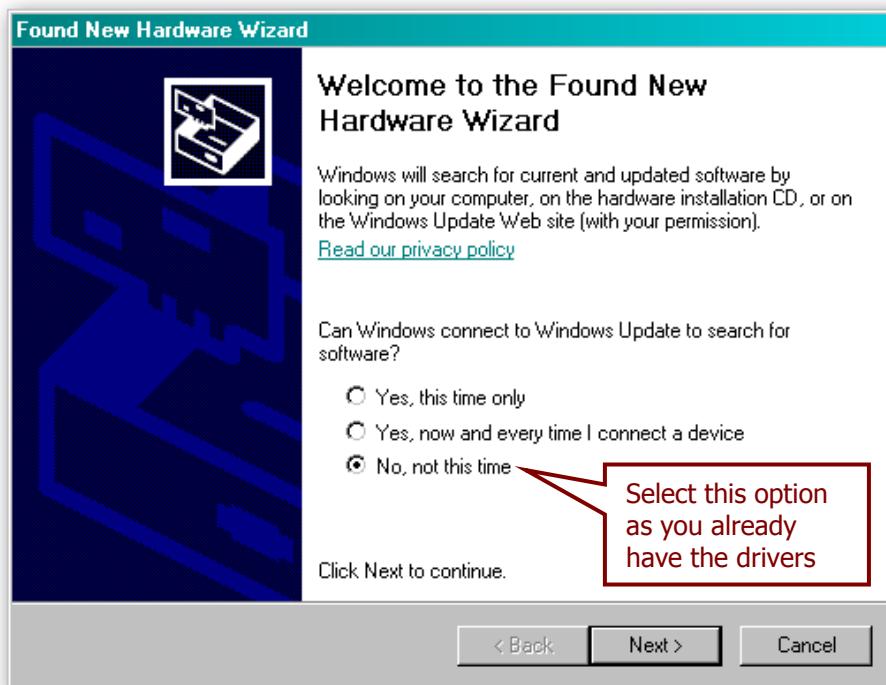
Pin	Description
1	0V / Ground Connection
9	+12V DC

Before connecting the USB cable, make sure that the unit is powered up and that only the GREEN Status Indicator is lit (it should be flashing about once every second). Once you have carried out these steps, plug the USB cable into the SMART Payout unit.

After connecting the USB cable, Windows should then detect the SMART Payout unit interface – a ‘Found New Hardware’ bubble or dialog box should appear.



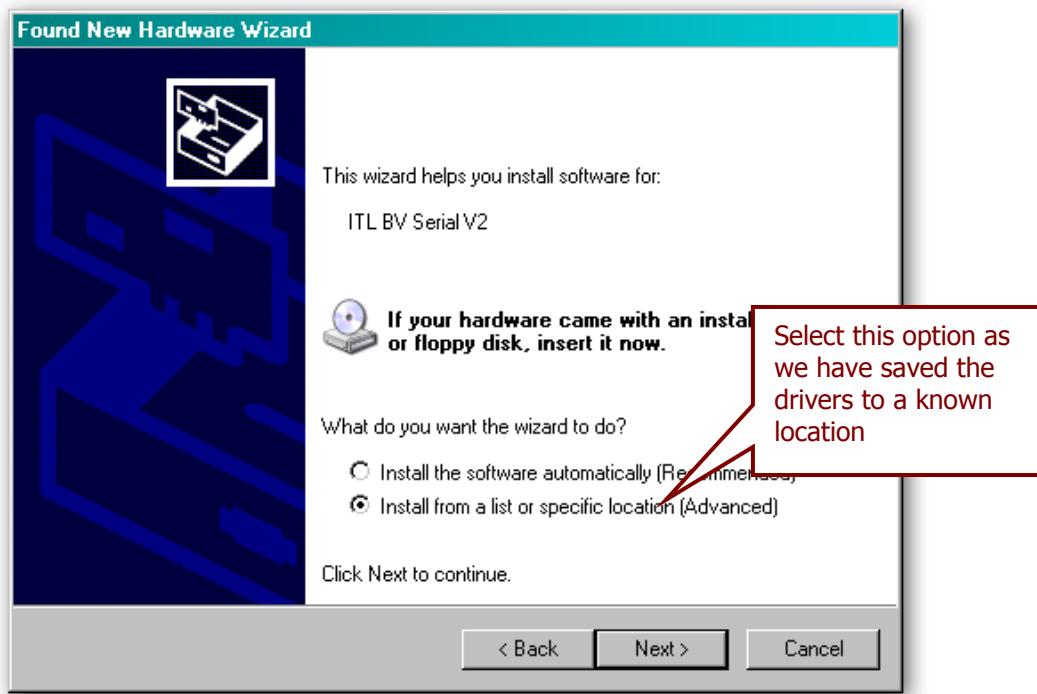
A ‘Found New Hardware’ wizard should then start to guide you through the installation process (this first screen is not always shown on some computers):



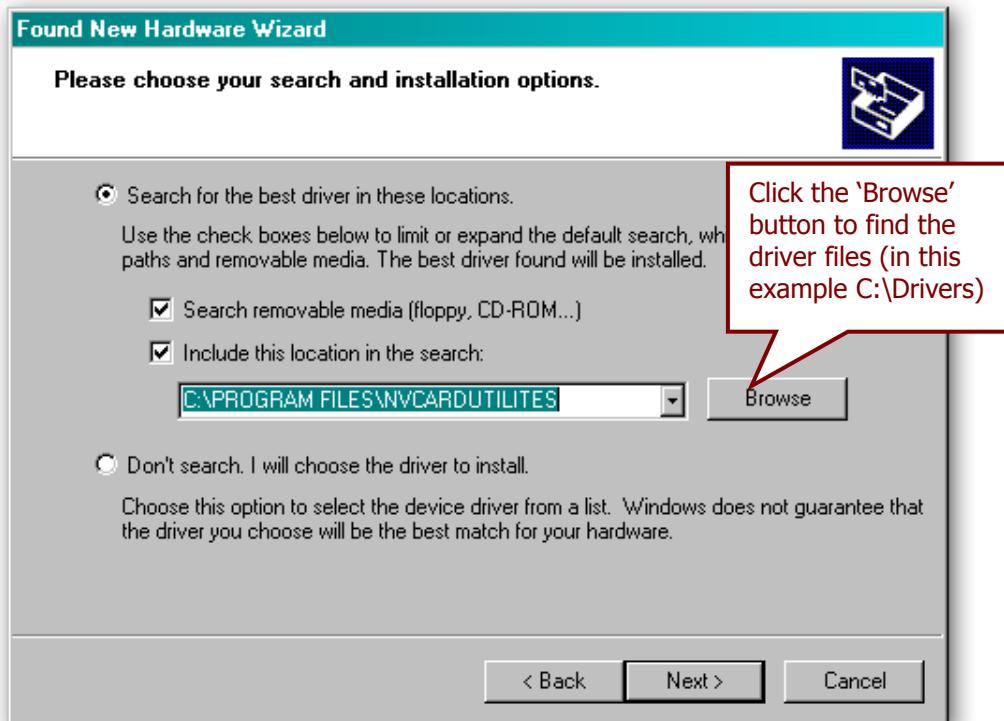
Information

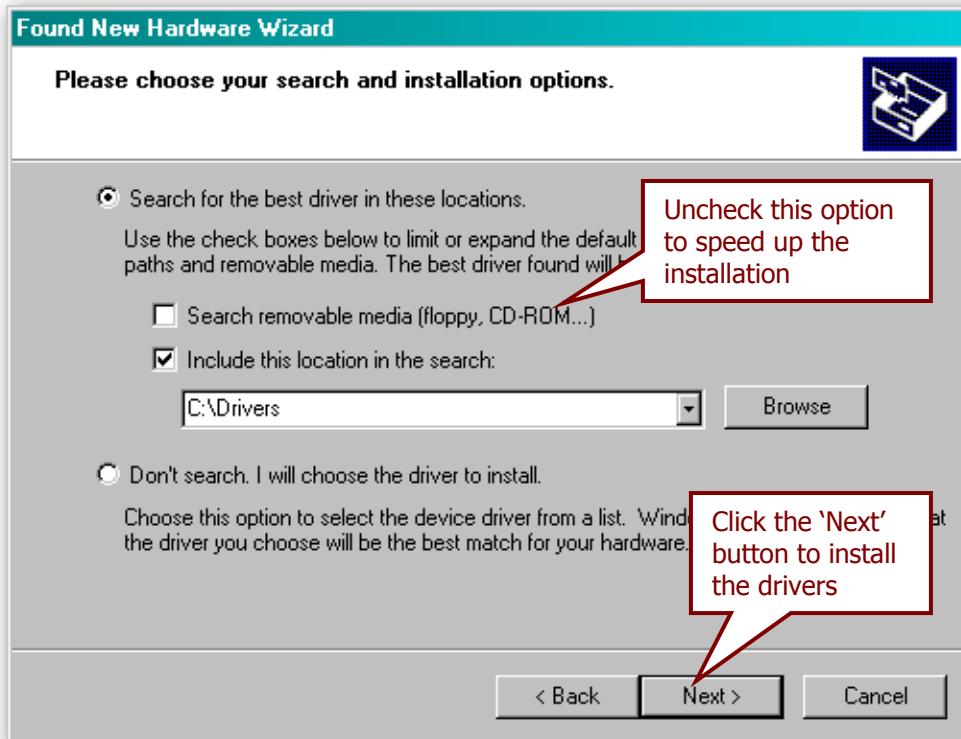
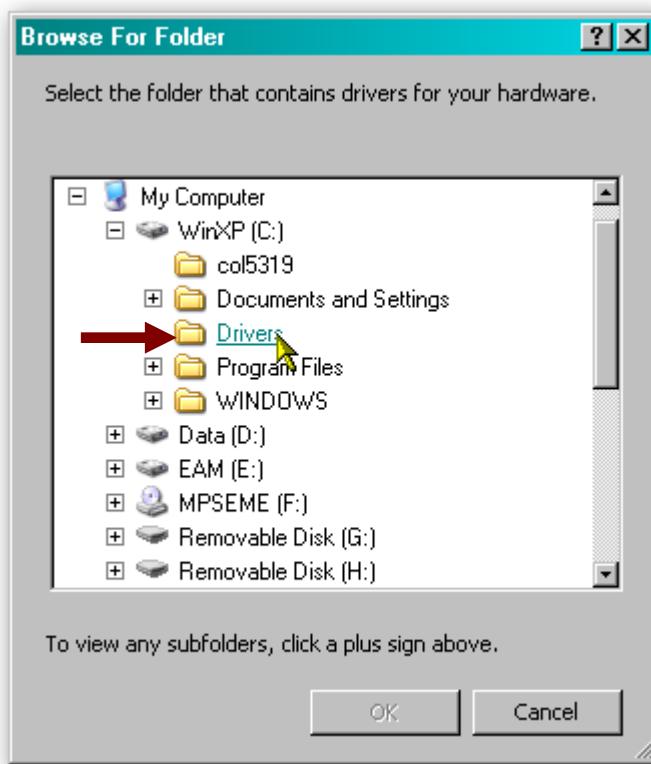
Only use V2 drivers

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

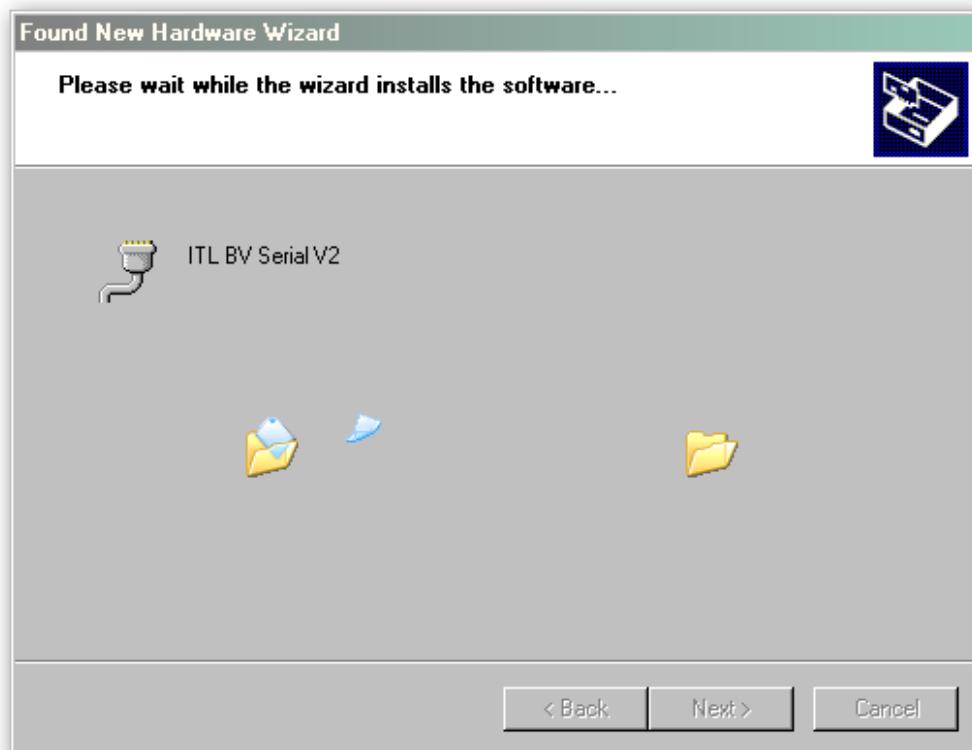
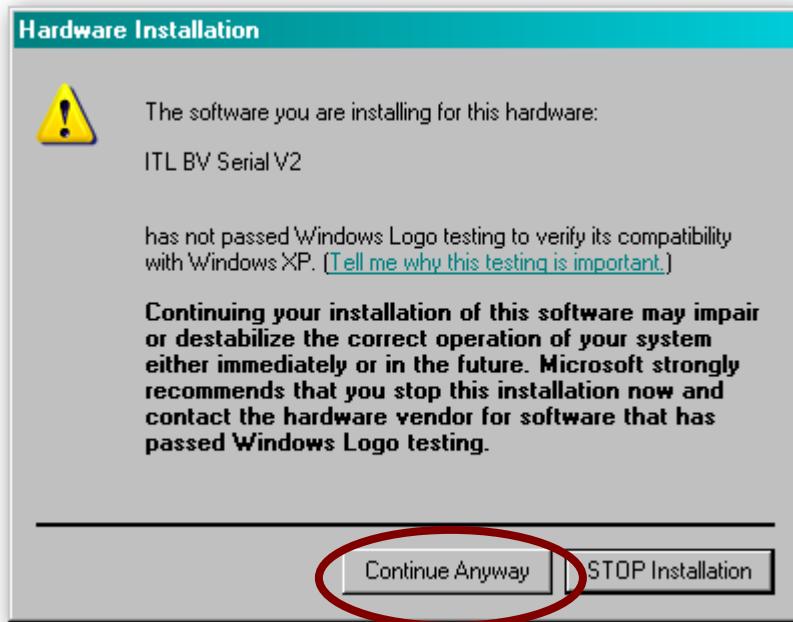


The next dialog box will ask you where to search for the drivers:





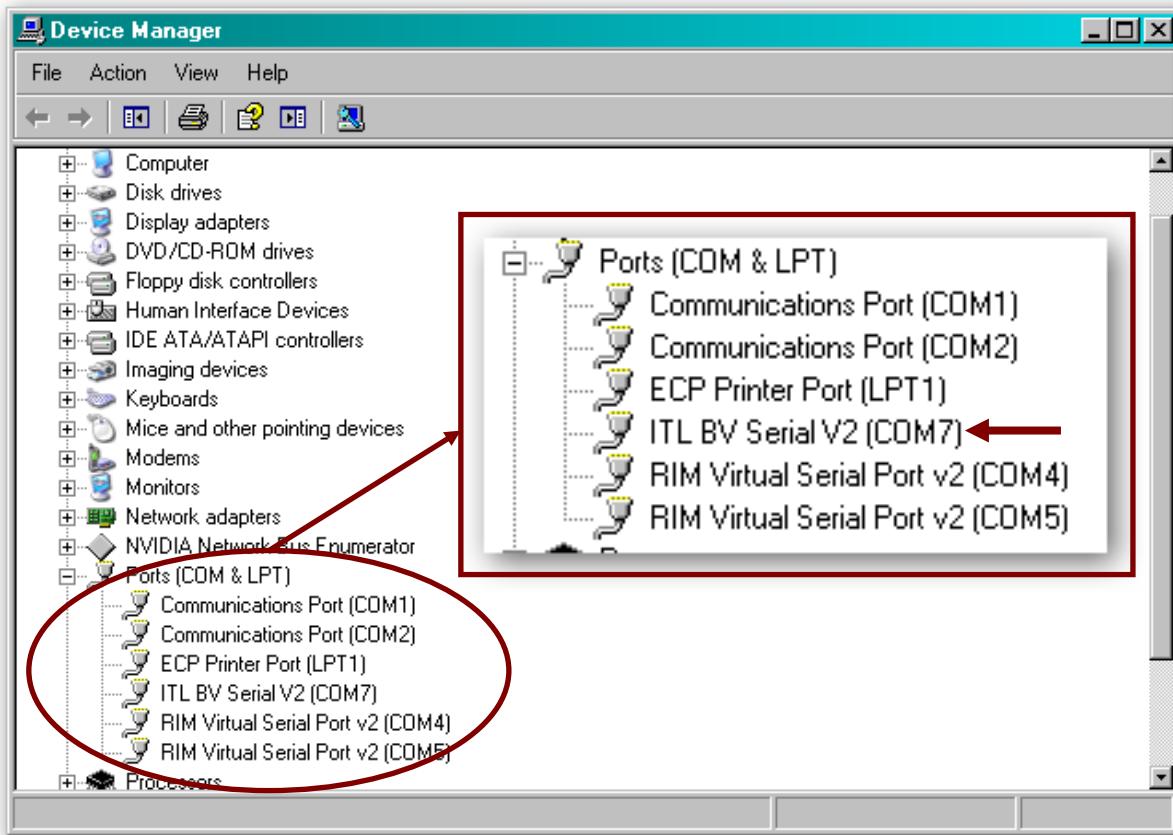
You may see a warning dialog saying that the drivers have not passed Windows logo testing – you can ignore this warning. Just click the 'Continue Anyway' button.





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:

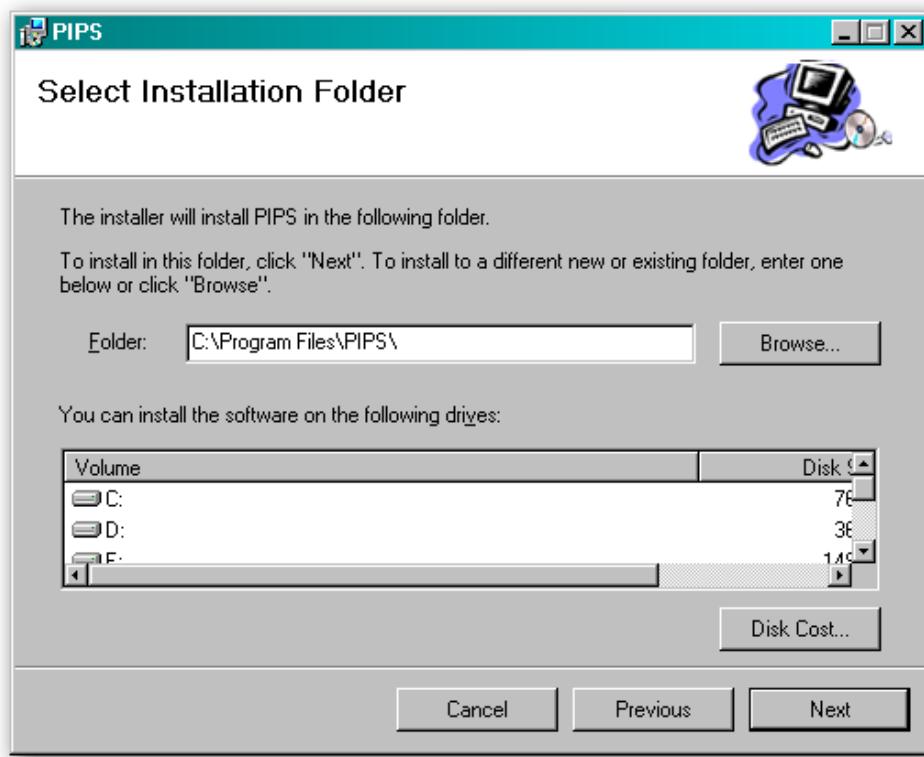


The actual communications port number (in our example COM7) may vary depending on your particular computer configuration.

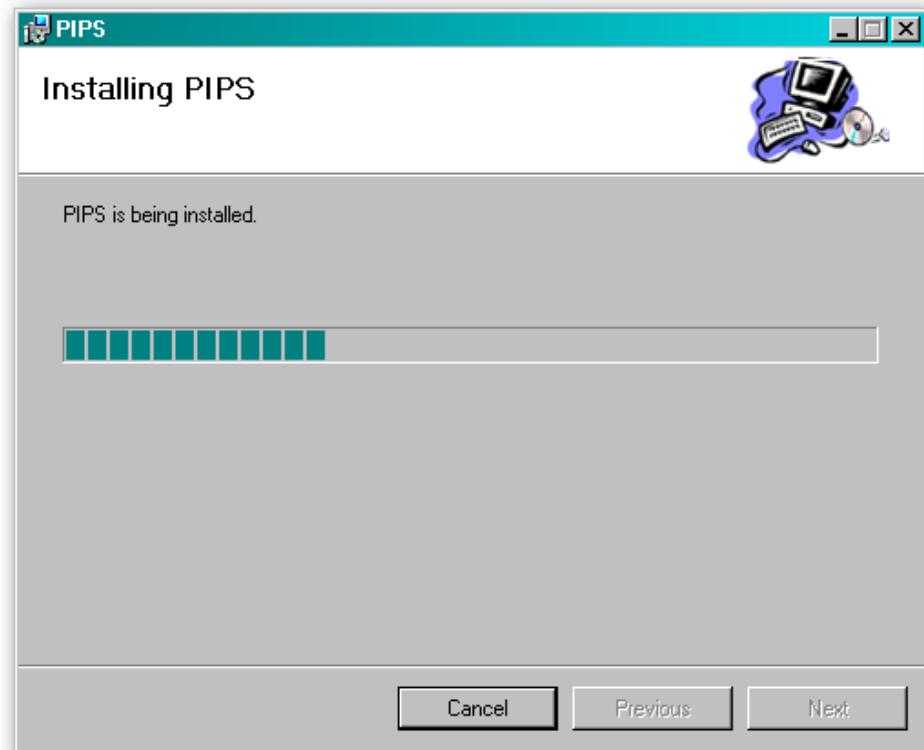
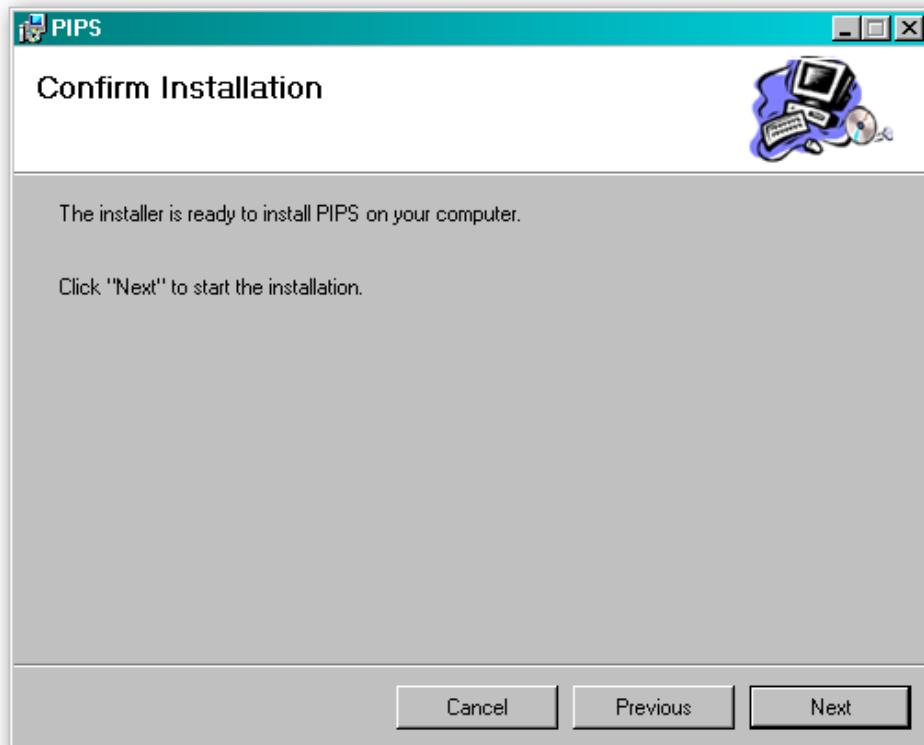
Now the drivers have been correctly installed you can install the PiPS software – this is covered next.

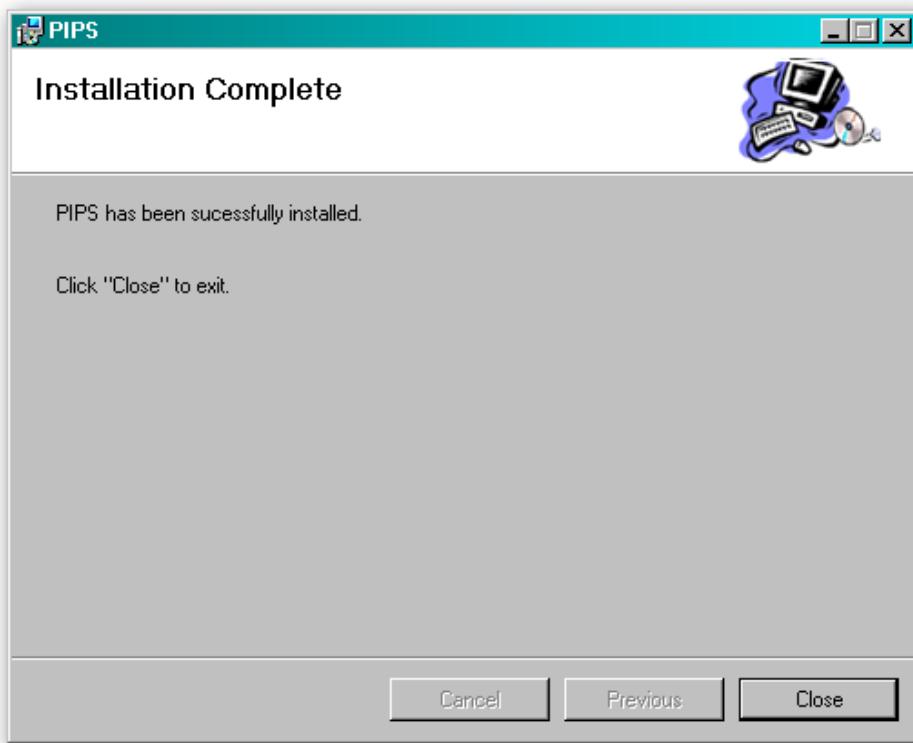
3.1.4 Installing the PiPS Software

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

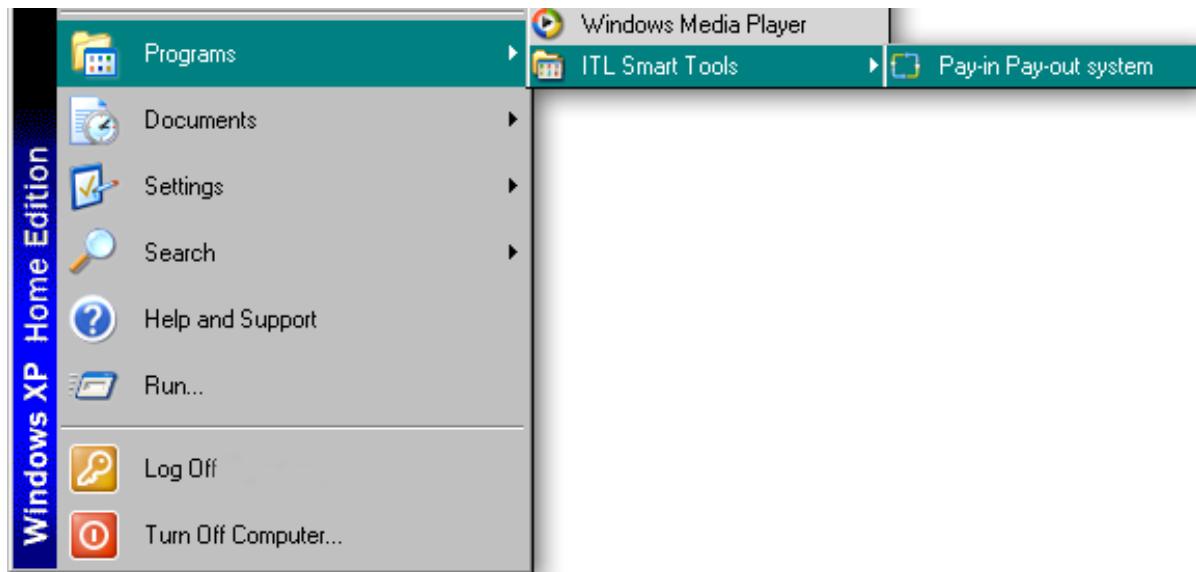


You can choose where you would like to install the software, or just accept the default location (as shown above). Clicking on the 'Next' button will then ask you to confirm the installation:





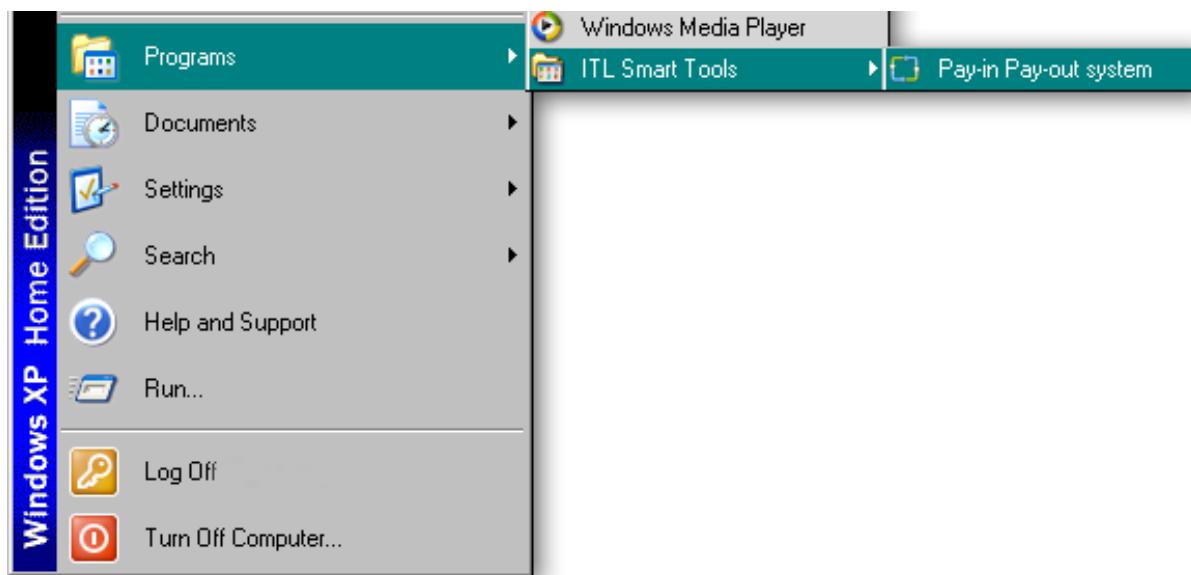
Once the installation is complete, you will have a new program group called 'ITL Smart Tools' in the Windows Start Menu, similar to the one shown here:



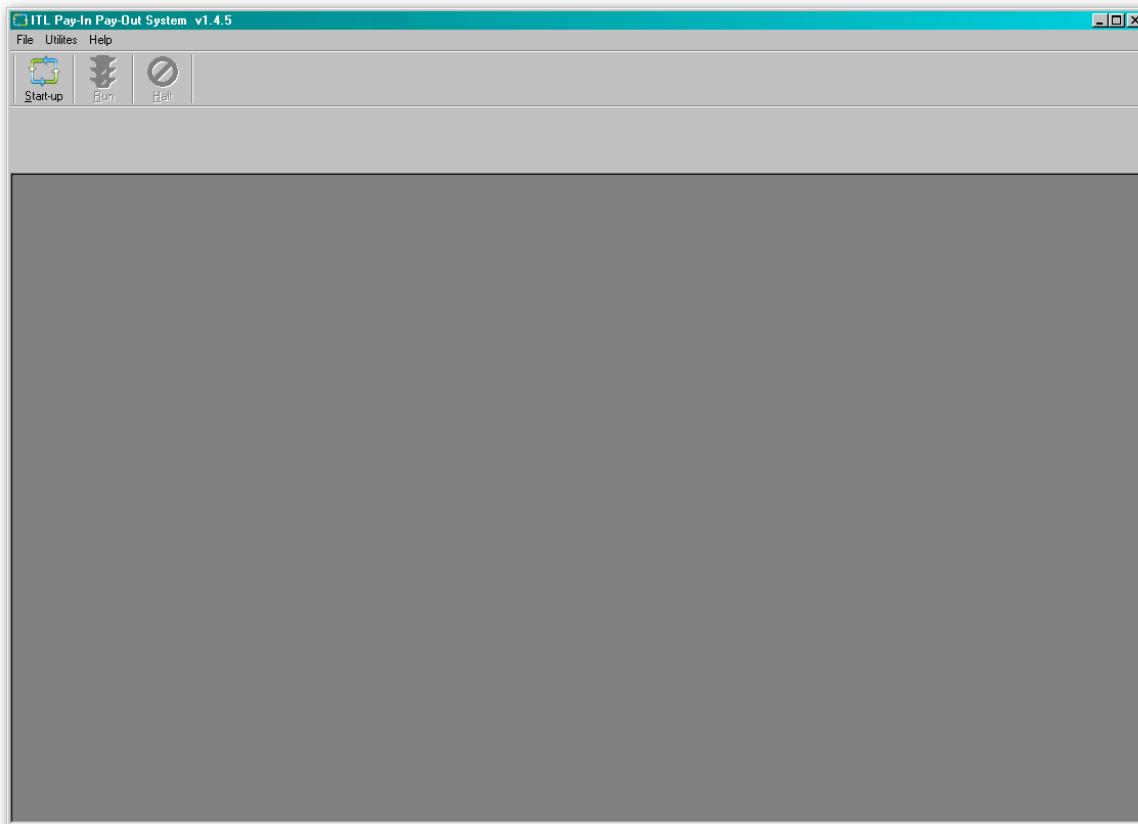
You can run the PiPS software by clicking the 'Pay-in Pay-Out system' menu entry; however, before you can use the PiPS software with a SMART Payout unit you will need to make sure that you have installed the BV interface drivers (as described earlier).

3.1.5 Starting the PiPS Software

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



The initial program screen looks like this:

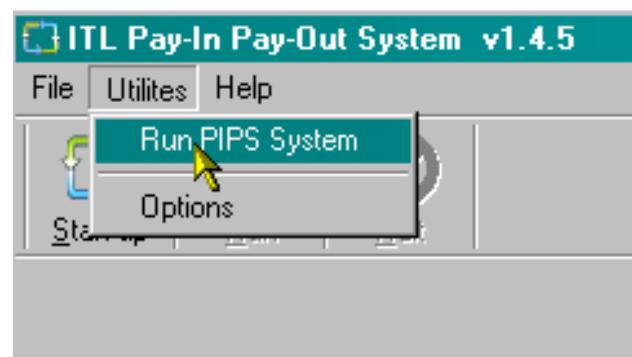


Make sure that the SMART Payout unit is powered up and the USB cable is connected before going any further.

Once the SMART Payout unit is connected, there are two ways to start the program operation:

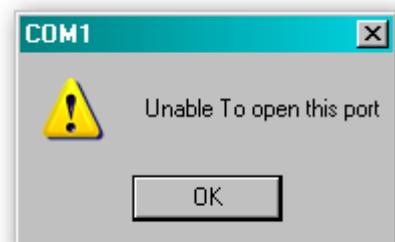


Click the 'Start-up' icon

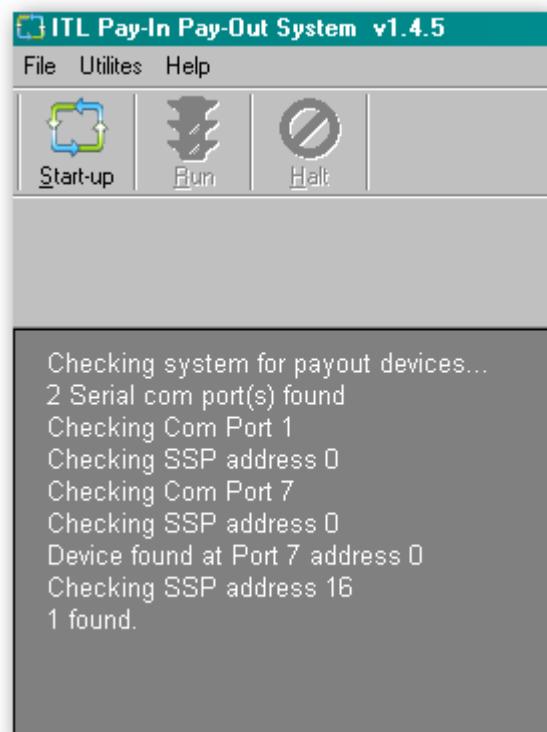


Click 'Utilities', then 'Run PiPS System'

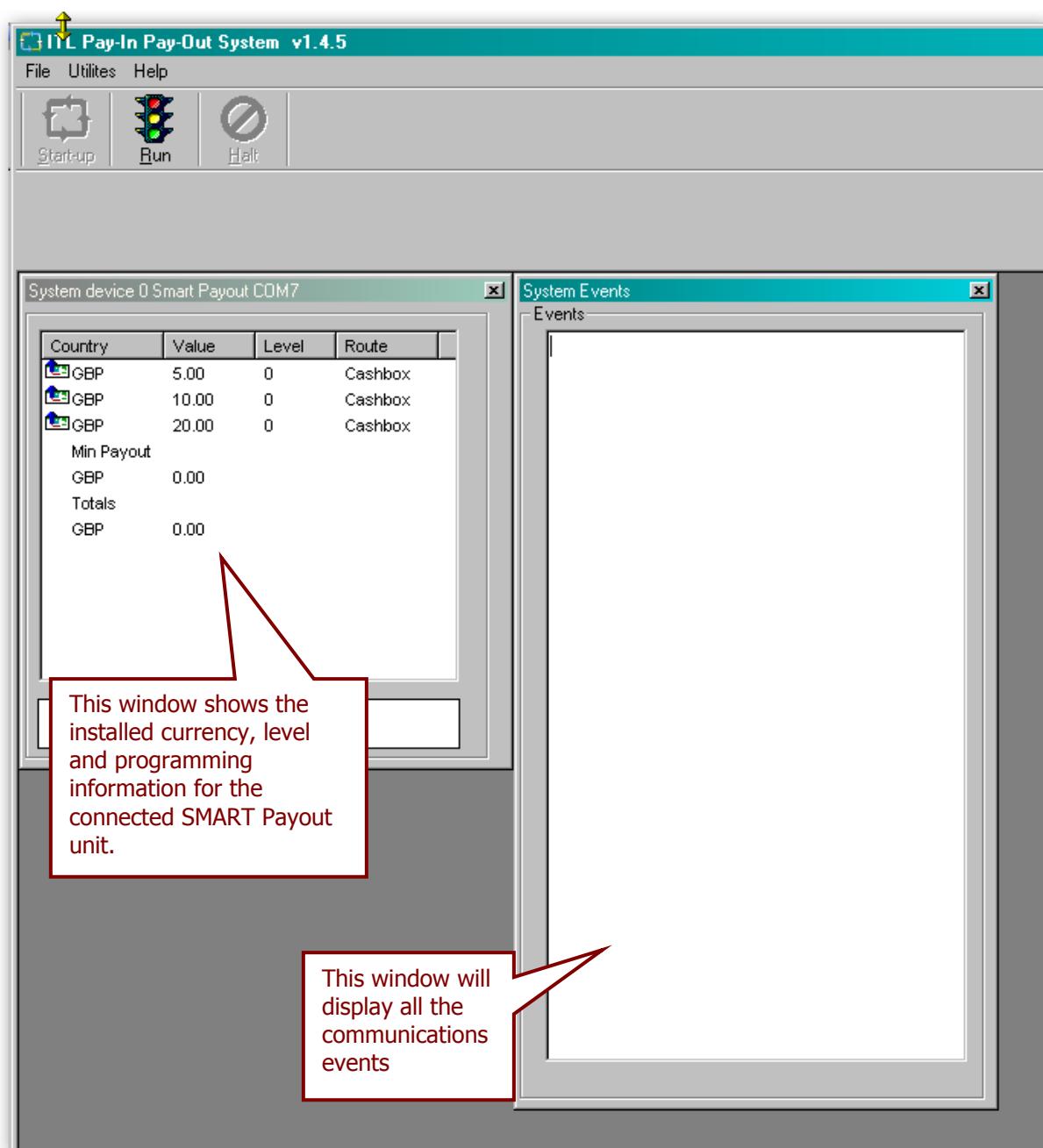
The PiPS software will then start to connect to the SMART Payout unit. Depending on the number and types of communications ports on your computer, you may get an error message similar to the one shown on the right saying 'Unable to open this port' – this isn't a problem, just click the 'OK' button.



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



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

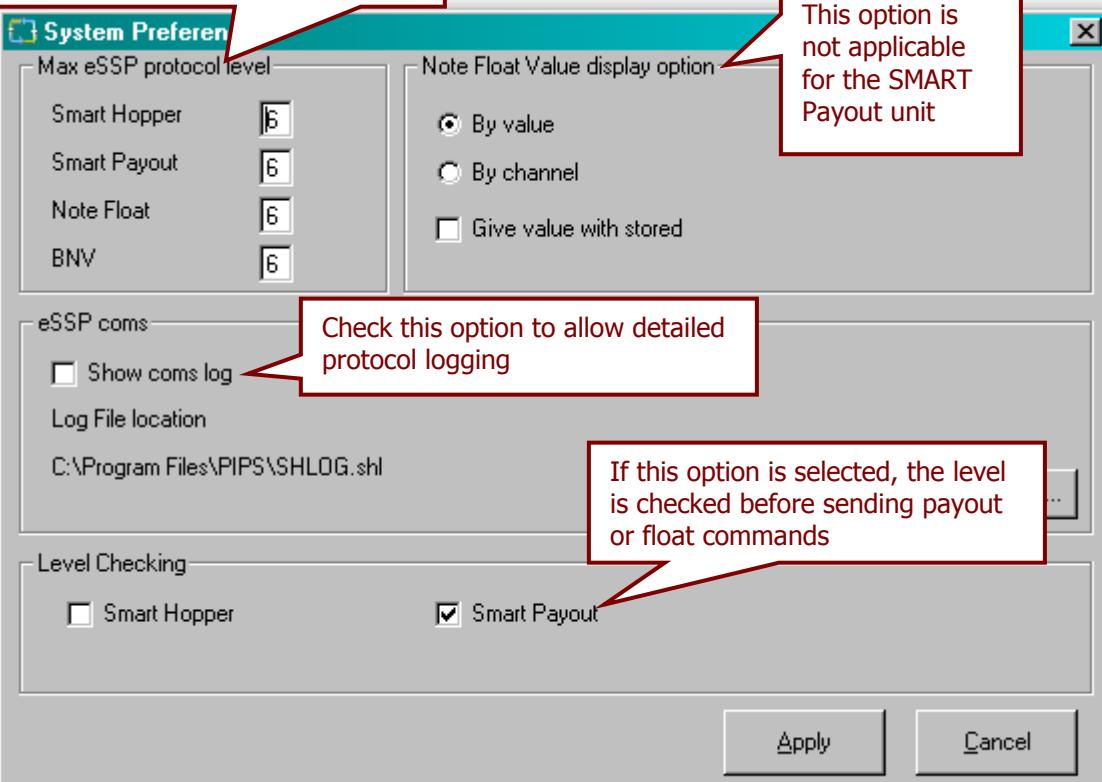
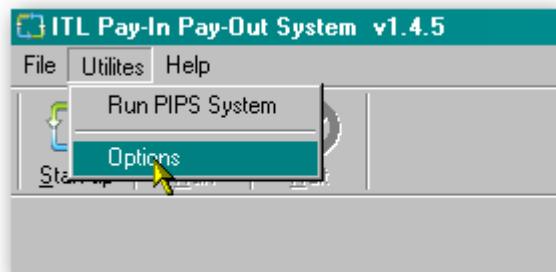


More details of the program options and operations that can be carried out will be covered in the next subsection.

3.1.6 Preferences, Settings and Options

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

This option sets the protocol version used for communications – contact ITL Technical Support for the current configuration details.



Normally, these preferences should not need changing.

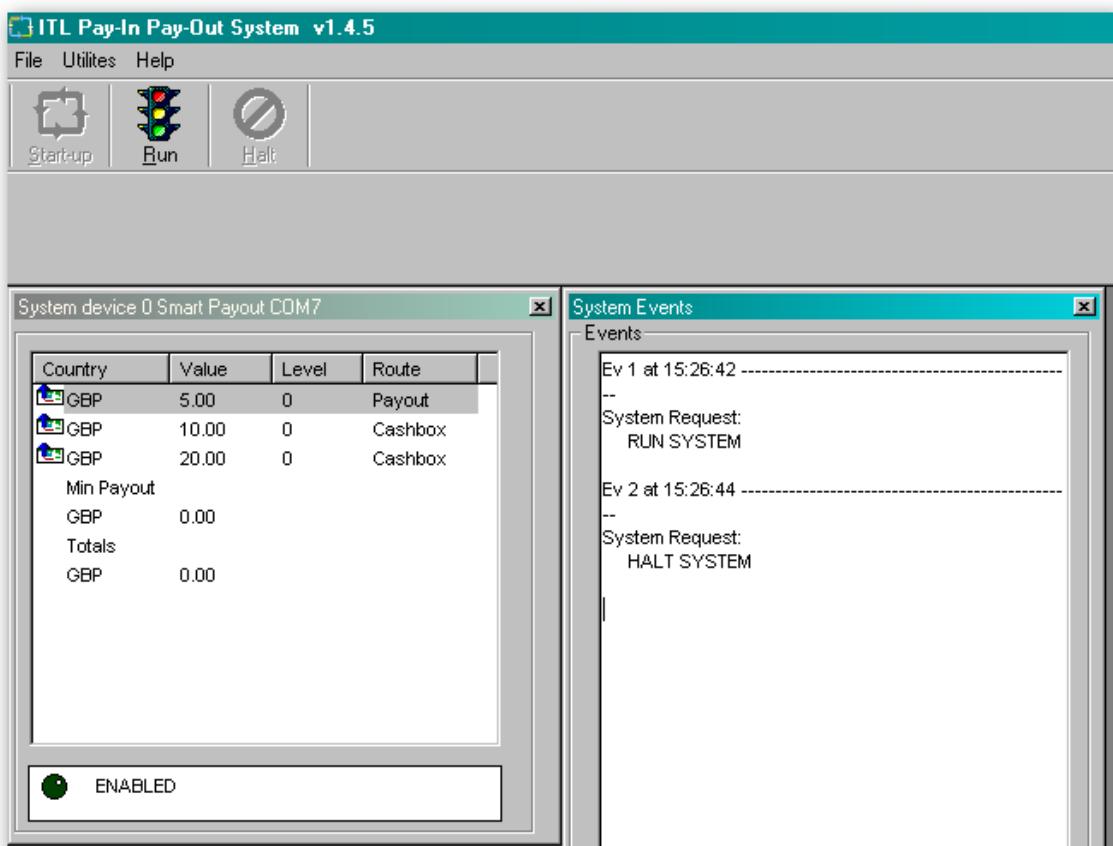
The settings and options for the SMART Payout unit vary depending whether the system is in the 'Run' or the 'Halt' state – generally the system will need to be halted before any changes to setup options can be made. Pay in/pay out operations are only available when in 'Run' state.

Halt State

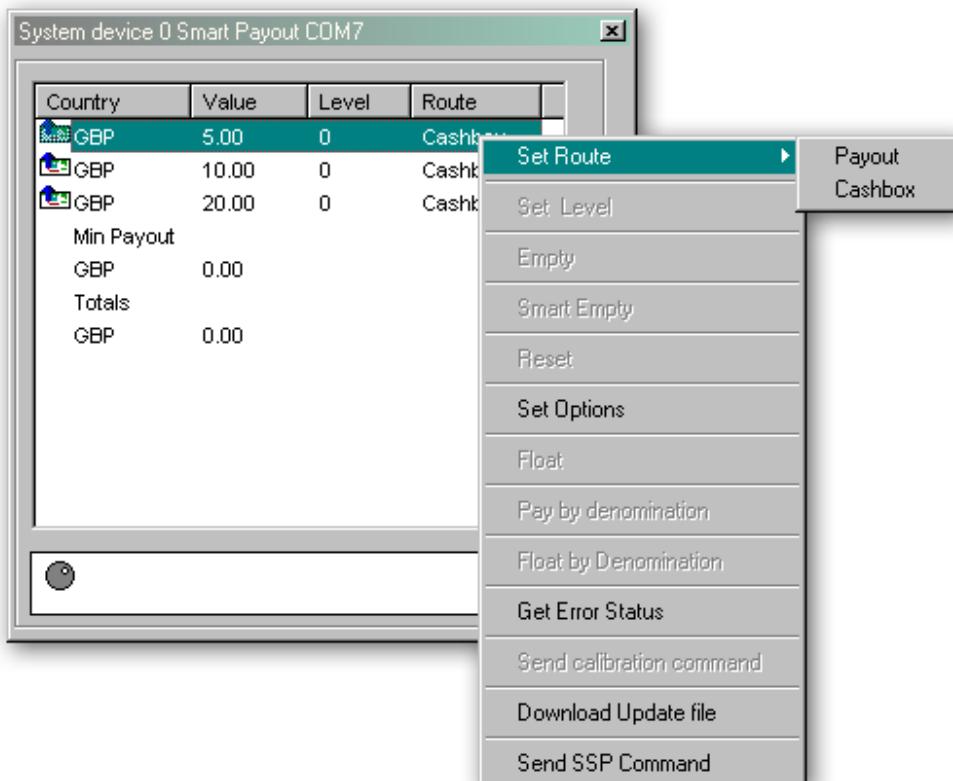
If the system is in 'Halt' state, the user will either have just started the PiPS software, or clicked on the 'Halt' button. The menu bar will look like this:



The main screen should look something like this:



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



Halt State Options

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



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.

Run State

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



Run State Options

Set Route	To set the pay in route for inserted bank notes to either Cashbox or Payout module, select the desired domination(s) and click the required route. The system will send the commands to the device and store these preferences so that they will be set again on the next start-up.
Empty	This command will empty all the stored notes in the connected Payout module into the device cashbox. After emptying the notes, counters on the device will be reset to zero.
Reset	This command will reset the connected payout device. After reset, the system will re-initialise the device for use.
Float	This option allows the user to run the device Float command - this command will tell the payout unit to leave a certain value of notes in the unit, with a requested minimum possible payout level. Clicking the option will bring up the Float dialog box.
Pay by denomination	If the connected device is running with SSP protocol version 6 or greater then this option will be enabled. This will bring up a 'pay by denomination' dialog which allows the user to select the notes required for payout.
Float by denomination	If the connected device is running with SSP protocol version 6 or greater then this option will be enabled. This will bring up a 'float by denomination' dialog which allows the user to select the notes to leave in the Payout module.

3.2 Updating Firmware and Datasets



CAUTION!

Do not power off

If an NV200 validator is connected to a payout module with the wrong version of firmware, the NV200 bezel will flash blue and green for about 10 seconds on start-up. This is the NV200 updating the payout module, and powering off the unit during this time can cause the payout module to stop working.

The SMART Payout unit firmware and dataset can be updated very easily using the PiPS software. The dataset files can be downloaded from the Innovative Technology Ltd website:

Select Validator:	NV200	Select Currency:	GBP - (United Kingdom)	<input type="button" value="Search"/>
Display #:	20			
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

Check update file version.

Only update files from v4.08 and above will automatically update the payout module. Earlier versions require the payout module to be updated separately.



Information

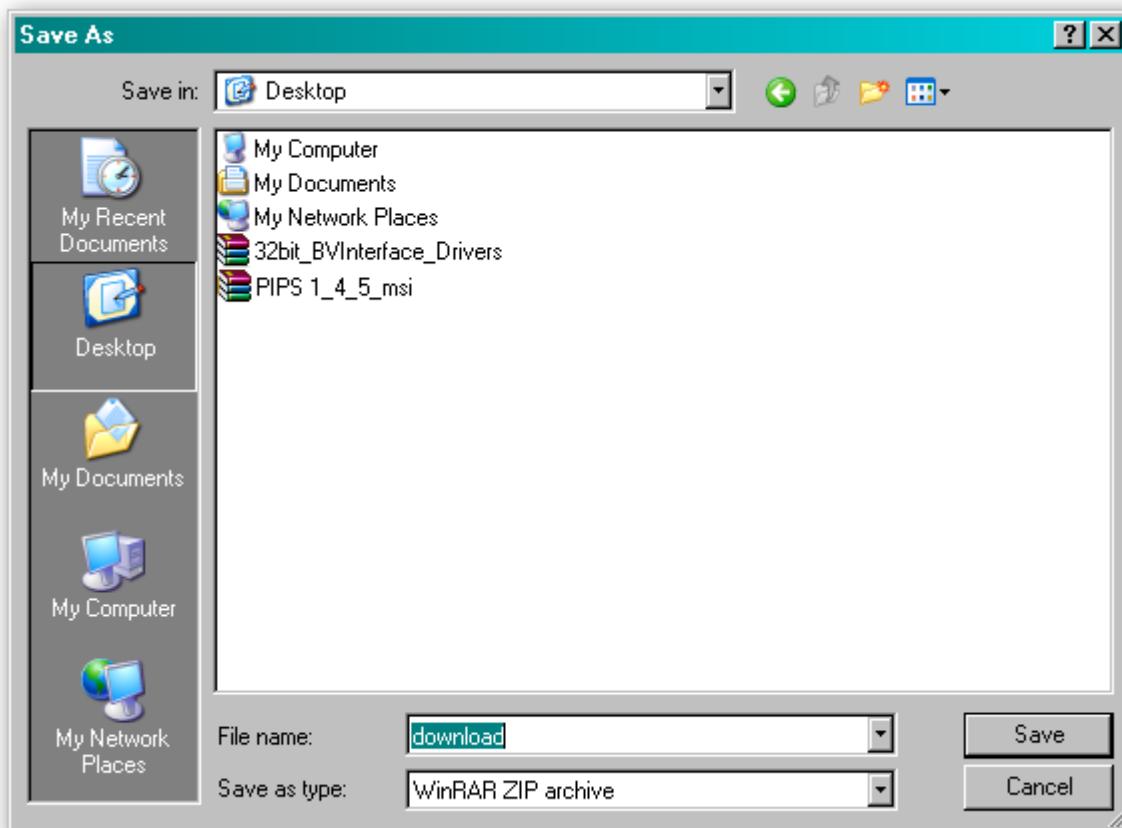
Combined data files

The firmware and dataset files for the SMART Payout unit 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

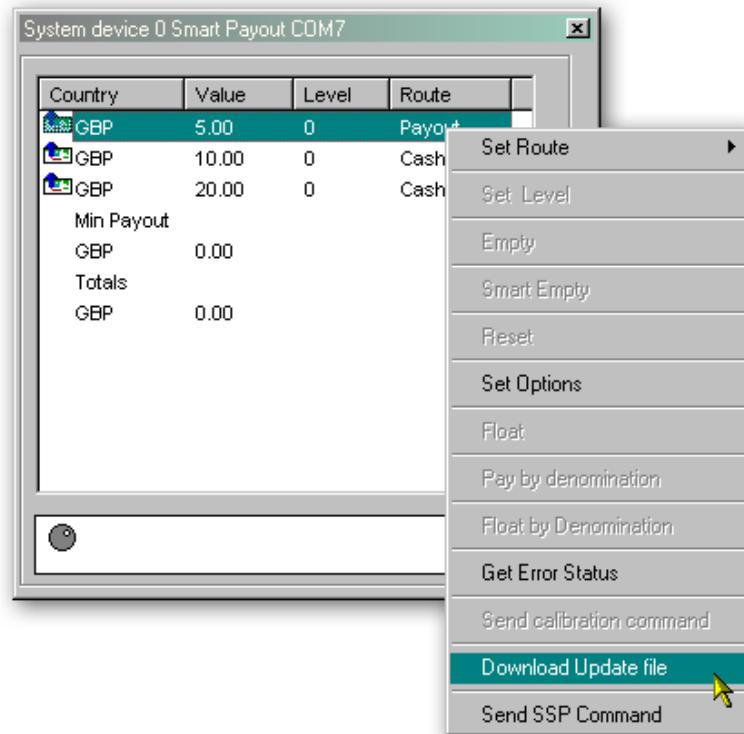


You can then choose where to save the file – choose a location that is convenient for you:

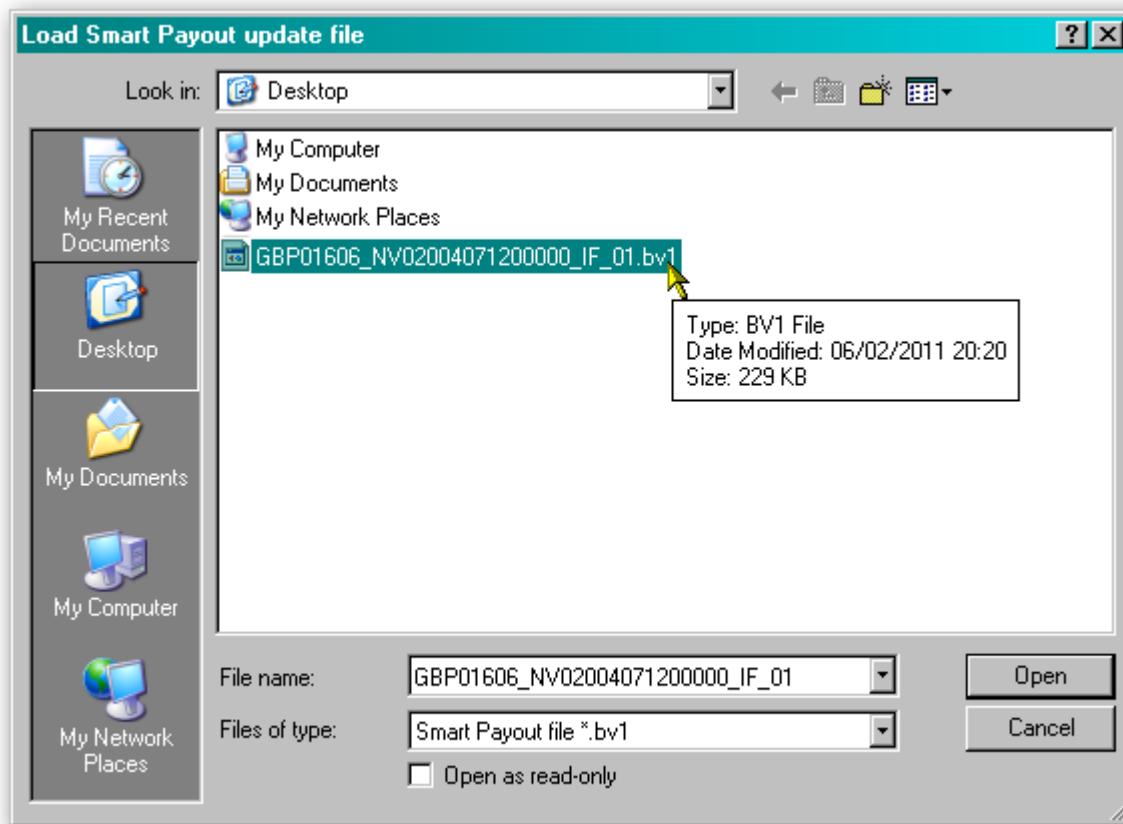


Once the dataset file is saved, unzip the file and you can then start the process to update the SMART Payout unit by connecting the USB cable and starting the PiPS software as described previously.

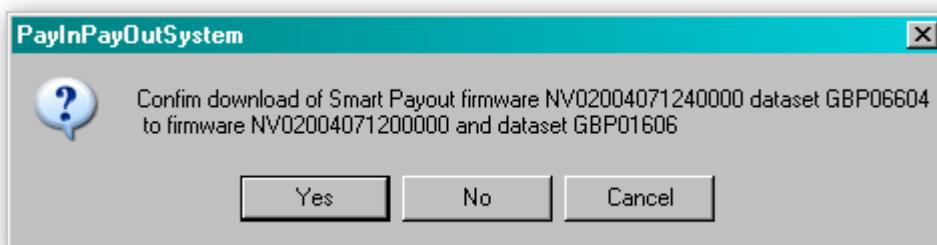
With the PiPS software in 'Halt' mode, right click on one of the currency entries and select 'Download Update File' from the dialog as shown here:



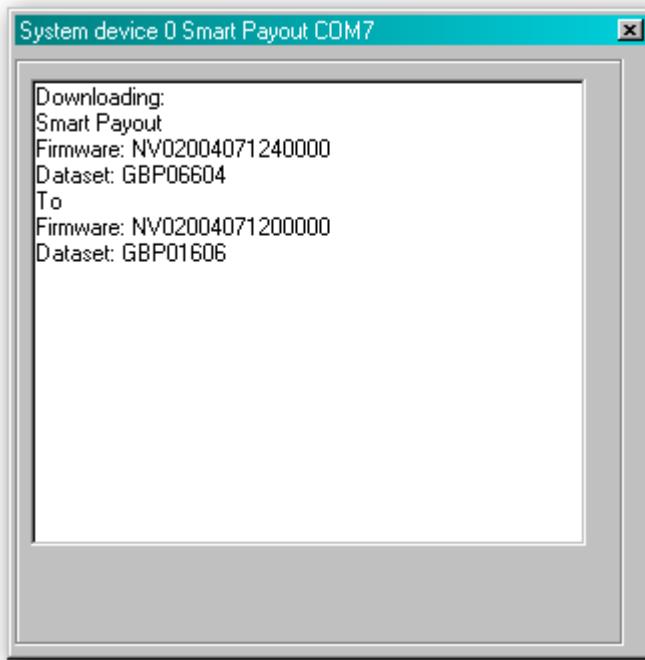
You will then be prompted to select the dataset file you downloaded and unzipped earlier – select the file and click the 'Open' button:



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

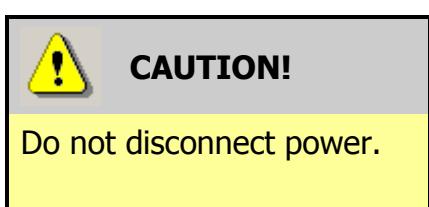


A new dialog will then appear showing the update status:



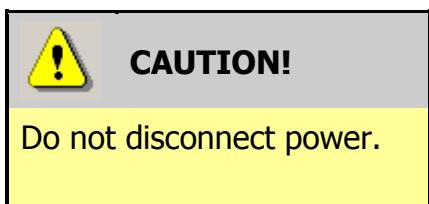
During the update, the Validator head bezel will display 3 states:

1. Blue Flash [] – this indicates the NV200 validator is being updated with the firmware.
2. Green [] - there is about a 5 second pause before the payout module is updated.



Do not disconnect the power or data connection, or separate the NV200 head from payout module at this point. Doing so could cause the unit to become un-useable.

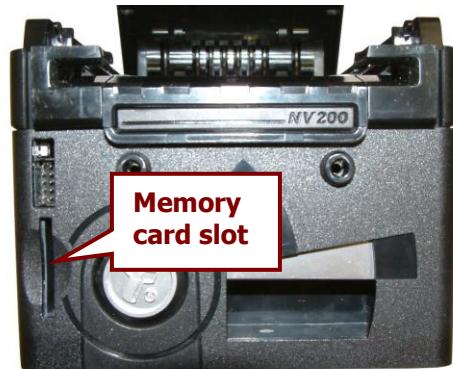
3. Green/Blue [/] – the NV200 is transferring and installing the update in the payout module.



Do not disconnect the power or data connection, or separate the NV200 head from payout module at this point. Any interruption in this process could result in an un-useable unit.

Once the payout module is successfully updated the SMART Payout unit will be reset and will then be ready for use with the new currency.

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



Information

Only use 8mb Atmel Data Cards

Only Atmel 8MB DataFlash® cards can be used (ITL part number IC237). **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 GA796 – NV Card Utilities.



CAUTION!

Check DA3 firmware version.

If using a DA3 and memory card to update the SMART Payout unit, 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 SMART Payout unit is re-programmed by simply inserting the card into the NV200's memory card slot – make sure that the SMART Payout unit is powered up before inserting the card.

During the update, the Validator head bezel will display 3 states:

1. Blue Flash [] – this indicates the NV200 validator is being updated with the firmware.
2. Green [] – there is about a 5 second pause before the payout module is updated.

**CAUTION!**

Do not disconnect power.

Do not disconnect the power or data connection, or separate the NV200 head from payout module at this point. Doing so could cause the unit to become un-useable.

3. Green/Blue [/] – the NV200 is transferring and installing the update in the payout module.

**CAUTION!**

Do not disconnect power.

Do not disconnect the power or data connection, or separate the NV200 head from payout module at this point. Any interruption in this process could result in an un-useable unit.

Once the payout module is successfully updated the SMART Payout unit will be reset and will then be ready for use with the new currency. After the update is complete, remove the memory card from the slot.

**Information**

Only use 8mb Atmel Data Cards

Only Atmel 8MB DataFlash® cards can be used (ITL part number IC237). Standard SD memory cards will **not** function.

3.3 Tools

3.3.1 Diagnostics

There are several software packages available for download from the Innovative Technology Ltd website that can be used to provide diagnostics and troubleshooting information.

These software tools include:

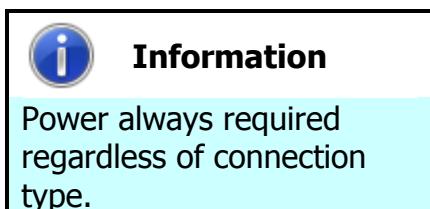
- NV Memory Card Utilities
- Bank Note Validator Diagnostics Tools
- PiPS

Use of the PiPS software has been covered earlier in this manual, but all the software packages have help files to assist you with the use of the particular program.

3.3.2 Connections

a. SMART Payout

The SMART Payout unit has two connectors that are used to allow interfacing and programming; these connectors are easily accessible on the top of the unit.



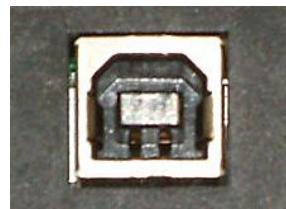
Power is always required on pins 1 and 9 of the 16 way connector.

The pin numbering of the socket is shown below, as well as an overview of the socket connections:



Pin	Description
1	0V / Ground Connection
9	+12V DC
14	Serial Data In (Rx)
16	Serial Data Out (Tx)

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 the SMART Payout unit – 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.



SMART Payout SSP Interface:

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

SMART Payout ccTalk (CC2) Interface:

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

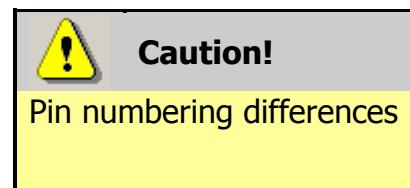
**WARNING!****Risk of unit damage**

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.

b. NV200

As with the payout module, 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 – be aware that these connectors will not be accessible if the payout module is fitted.

The first connector is a 16 pin socket used to interface the NV200 either to the machine it is being installed in or the payout module. The pin numbering of the socket is shown here:



The pin numbering sequences on the NV200 and the payout module are different – bear this in mind if making your own cables.

The second connector is a USB connector – this is a standard Type 'B' USB socket, and is used for interfacing to the payout module; it can also be used for programming and serial communications. The function of pins 1 to 9 can change depending on which machine interface is being used with the NV200. When used with the payout unit, the validator will be using either SSP or ccTalk (CC2) interfaces; the socket connections for each of these interfaces are shown in the tables below:

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		Do not connect
9	TxD Opto Collector	Output	Opto Isolated TxD Collector
10			
11			
12	Factory use only		Do not connect
13			
14			
15	V In	Input	+12 V DC
16	GND	Input	GND

NV200 ccTalk (CC2) Interface:

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

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 1.4)

b. How do I use the encryption key?

- The encryption key is made up of two parts – this is explained in Section 5 of this manual set. The two parts of the encryption key are:
 - a) A variable key (one that is exchanged at start up by the host machine – read Section 5, subsection 5.2 for more information)
 - b) A fixed key (which can be set using the PiPS software as described in this manual). The default key value is 0x0123456701234567

c. My notes are always stacked in the cashbox even though I have chosen for them to go into the payout unit

- Check that the Green LED on the rear of the SMART Payout unit is flashing – see the Flash Codes in Section 1 of this manual set (subsection 1.9) if this is not the case.
- Make sure the diverter is in the correct position – with the unit powered up turn DIP switch 8 ON and OFF to make sure.
- The Payout module might be disabled in software - send an enable payout command.
- The Payout module might be full – check how many notes are stored using your host software.
- The notes might be detected as damaged or not straight – in this case they will be stacked in the cash box so that they will not jam the payout module.

d. My payout module is communicating in ccTalk but I want to update it. How can I do this?

- To do this, the validator head needs to be removed – you can find out how to do this by following the procedure in Section 1 of this manual set (subsection 1.1).
 - a) Provide power to the NV200 validator. Don't worry that the bezel lights are flashing as this is normal.
 - b) Turn DIP switch 8 on the rear of the validator up then down. The bezel will quickly flash then the unit will reset.
 - c) Remove the power and refit the validator to the payout module.
 - d) Update the unit using the PiPS software (as shown in subsection 3.2 of this manual).

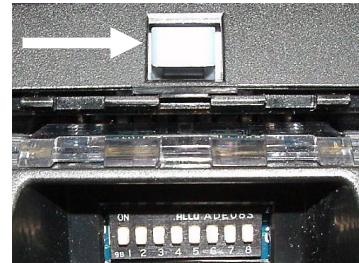
e. My payout module has stopped functioning and I want to return it for repair - however it has bank notes inside

- All bank notes that are inside payout modules returned to ITL are handled with the highest security and carefully tracked internally until their return to the customer - if you do not want to ship the unit with the bank notes inside, please follow the instructions for manual payout in Section 4 of this manual set (subsection 4.10).
- If manual payout is not possible please contact ITL technical support.

f. Is my NV200 validator compatible with the payout module?

- Early revisions of the NV200 did not support the payout module. Check for all of the following features to ensure compatibility:

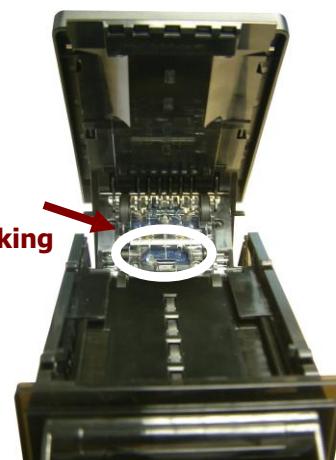
A grey diverter plunger on the rear of the NV200 validator head (just above the DIP switches)



Mounting brackets on the rear of the cash box housing



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 any one of these features is not present, a new NV200 validator will be needed.

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SECTION 4

SMART PAYOUT MANUAL SET

MECHANICAL AND ELECTRICAL MANUAL

INTELLIGENCE IN VALIDATION



Innovative Technology
INTELLIGENCE IN VALIDATION



Bellis Technology
INTELLIGENCE IN VALIDATION

SMART PAYOUT 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 SMART Payout unit into an existing cabinet would need to read this section.

This section contains all the mechanical and electrical information a designer needs to effectively integrate the SMART Payout unit into a host machine.

4.1 Introduction

The SMART Payout unit is made up of three basic components: an NV200 Validator, a cashbox and a payout module (as shown below). The Payout module is an add-on designed to be fitted to the Innovative Technology NV200 bank note validator.



The SMART Payout unit is a device that can validate, store and later dispense 80 bank notes of mixed denominations.

**Side View****Payout Module****Top View****Front View**

Validated bank notes can be stored in the NV200's secure cashbox or travel into the payout module if needed for future payouts. The SMART Payout unit works with any SMART Payout currency dataset created by Innovative Technology Ltd.

4.2 Assembly and Fitting Instructions

Connecting the payout module to an NV200 validator is a simple operation, described in the steps outlined here:

1. Remove the NV200 cash box from the metal chassis
2. 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.

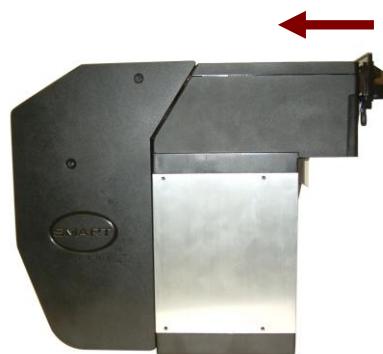
3. Unlock the NV200 cashbox and head release lock (if fitted)
4. Lift the silver head release catch located on the front of the NV200
5. Slide the head unit forward and lift up



6. Mount the payout module using the mounting brackets on the rear of the NV200 chassis
7. Replace the NV200 head unit taking care that the connectors on the payout module line up with the connectors on the rear of the NV200



8. Ensure the NV200 head unit is securely in place – **check that the head release catch is fully down**



Information

Payout module removal.

The payout module cannot be removed until the head unit has been slid forwards.

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 payout module or 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 SMART Payout unit can be found in Section 6, Appendix B of this manual set. A brief summary is given here:

DC Voltage	Minimum	Nominal	Maximum
Absolute limits	10.8 V	12 V	13.2 V
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
Supply Current (when connected to an NV200):			
Standby			400 mA
Running			3 A
Peak (motor stall)			5 A

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

We recommend that your power supply is capable of supplying 12V DC at 6.3 A.

TDK Lambda produces a suitable power supply (model SWS75-12). This power supply is available from a variety of suppliers including Farnell (stock code 1184648) and RS (stock code 466-5904).

4.4 Earth Bonding

It is **very** important that the cashbox chassis is bonded to earth, as lack of proper bonding can cause communication issues and failures with the SMART Payout unit.

The earth bond should be made to any of the 8 holes in the side of the cashbox and be bonded to mains earth, typically through the Power Supply Unit.



Information

Earth resistance.

The resistance between the cashbox and the Earth pin on the mains plug should be less than 0.7 ohms.

4.5 Cable Specifications

The **minimum** specification for wire used in power cables for the SMART Payout unit is given here:

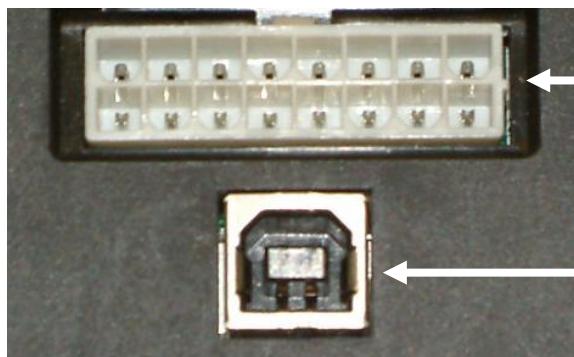
Minimum AWG	Nominal current rating	Peak current rating	Cable rating	Insulation rating
24	3 A	5 A	6 A	80 °C

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

4.6 Electrical Interfaces

SMART Payout

All the connectors needed to set up the SMART Payout unit are easily accessible on the top of the casing: there are two connectors that are used to allow interfacing and programming:



Interface Connector

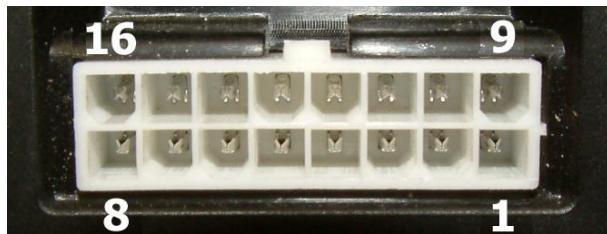
USB Connector

**Information**

Power always required regardless of connection type.

Power is always required on pins 1 and 9 of the 16 way connector.

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



Pin	Description
1	0V / Ground Connection
9	+12V DC
14	Serial Data In (Rx)
16	Serial Data Out (Tx)

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 SMART Payout unit – 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.

SMART Payout SSP Interface:

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

SMART Payout ccTalk (CC2) Interface:

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



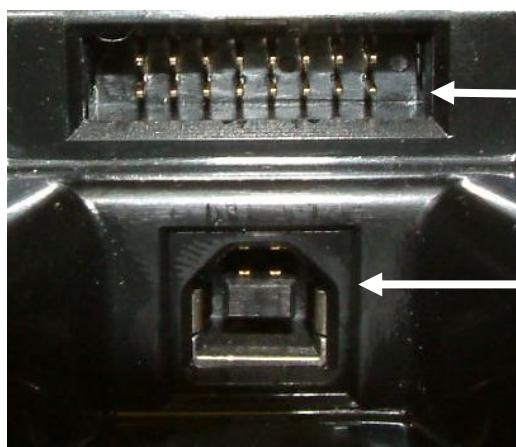
WARNING!

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.

NV200

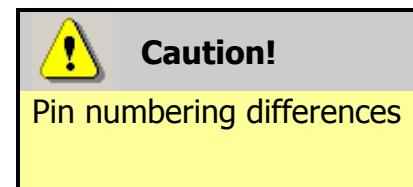
As with the payout module, the NV200 validator has two connectors that are used to allow interfacing and programming; these connectors are easily accessible at the back of the validator – be aware that these connectors will not be accessible if the payout module is fitted.



Interface Connector

USB Connector

The first connector is a 16 pin socket used to interface the NV200 either to the host machine or the payout module. The pin numbering of the socket is shown here:



The pin numbering sequences on the NV200 and the payout module are different – bear this in mind if making your own cables.

The second connector is a USB connector – this is a standard Type 'B' USB socket, and is used for interfacing to the payout module; it can also be used for programming and serial communications. The function of pins 1 to 9 can change depending on which machine interface is being used with the NV200. When used with the payout unit, the validator will be using either SSP or ccTalk (CC2) interfaces; the socket connections for each of these interfaces are shown in the tables below:

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		Do not connect
9	TxD Opto Collector	Output	Opto Isolated TxD Collector
10			
11			
12	Factory use only		Do not connect
13			
14			
15	V In	Input	+12 V DC
16	GND	Input	GND

NV200 ccTalk (CC2) Interface:

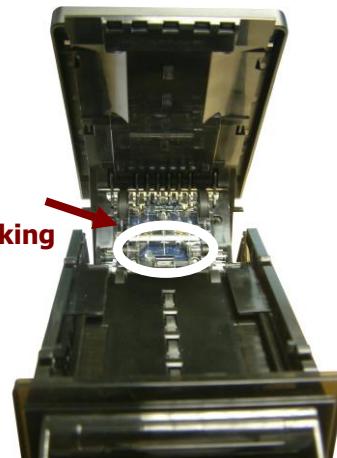
Pin	Name	Type	Description
1	TxD	Output	TTL TxD – connect to pin 5
2			
3	Factory use only		Do not connect
4			
5	RxD	Input	TTL RxD – connect to pin 1
6			
7			
8			
9			
10	Factory use only		Do not connect
11			
12			
13			
14			
15	V In	Input	+12 V DC
16	GND	Input	GND

**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.

Opto-isolation and RS232 communications is only available on units 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 **PB266_4**

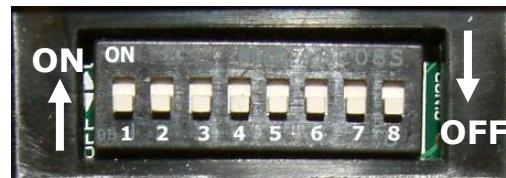


If the issue number is less than 4, TTL is the only electrical communication type possible without the use of additional hardware.

4.7 DIP Switches

SMART Payout

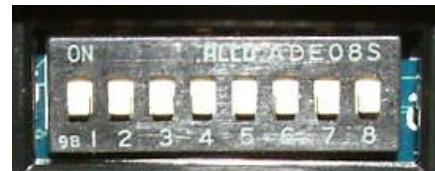
The SMART Payout unit has a Dual Inline Package (DIP) switch bank that is used to set the various options for the unit. A summary of the switch options are shown below:



Switch	Option	Default Setting
1	Not Used	OFF
2	Not Used	OFF
3	Not Used	OFF
4	Not Used	OFF
5	Not Used	OFF
6	Not Used	OFF
7	Stop update from NV200	OFF
8	Force diverter to close (unit must be powered up)	OFF

NV200

The NV200 validator also 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.



Risk of unit damage

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

4.8 Basic Operation

The SMART Payout unit is a device that can validate, store and later dispense 80 bank notes of mixed denominations. The payout module is an add-on designed to be fitted to the Innovative Technology NV200 bank note validator.

Validated bank notes can be stored in the NV200's secure cashbox or travel into the payout module if needed for future payouts. The SMART Payout unit works with any SMART Payout currency dataset created by Innovative Technology Ltd.

Bank notes accepted by the payout module are not visible once inside the unit and they cannot normally be taken out manually.

The SMART Payout unit has two Light Emitting Diode (LED) indicators that are used to show the status of the unit (one Red, one Green) – these can be found on the back of the unit, below the USB connector. If the SMART Payout unit is operating normally, only the Green LED should be lit: when operating normally this LED will flash once every second.

The SMART Payout unit has an inbuilt fault detection facility. If there is a configuration or other error, the Status Indicator LEDs will flash in a particular sequence.

A summary of the Flash Codes for the SMART Payout unit is shown below:

Status Indicators		Flashes	Indicated Error	Comments
Red	Green			
		0	No LEDs lit	No power
●	●	1	Motor / barcode error	Check tape in window
		2	Note sensor error	
		3	EEPROM error	Reprogram unit (see Section 3 of this manual set)
		4	Payout jammed	Remove trapped note (see Section 4 of this manual set)
		5	Diverter error	Switch DIP switch 8 on and off
●	●	0	Both LEDs on (no flash)	Turn power on and off
		1	Power reset	For information only
		2	Wakeup from low power	For information only
		3	Software reset	For information only
		4	Software command	For information only
		5	User manual reset	For information only
		6	Power supply issue	Check power supply
		7	Unknown cause	For information only
	●	1 every second	None	All OK

When the payout module is installed on an NV200 bank note validator additional fault finding help is available, as the NV200 has its own set of Flash Codes. These are displayed by the LEDs in the front bezel of the validator.

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

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

4.9 Spare Parts

Payout module

The Payout module is a 'sealed' unit and there are no user-replaceable spare parts. However, several cables designed to be used with the module are available, and these are shown below:

ITL Part Number	Description	Details
CN214	USB Cable	USB 2.0 Compliant Type A to Type B cable

COMMENTS:

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.

ITL Part Number	Description	Details
CN370	SMART Payout power cable	Provides 12V supply only to SMART Payout

CON1
 (Top View) (Front View)

1000mm
 15
 87 typ
 15 25 5
 Stripped (no tinning)

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


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 SMART Payout unit. The minimum wire gauge for the CN370 power cables is **24 AWG**, with **22 AWG** being recommended.

CN370 Parts List

Item	Qty	Description	Supplier	Alternative
A	1	2 x 8 way 4.2mm pitch latched housing, 6A derated	Molex 3901-2165	Farnell 1632113
B	4	Tin plated female crimp	Molex 39-00-0038	Farnell 1462545
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	---	---

CN370 Connectivity

Connector	Pin	Gauge	Colour	Comments
CON1	1	22 AWG	Black	GND
	9	22 AWG	Red	V IN

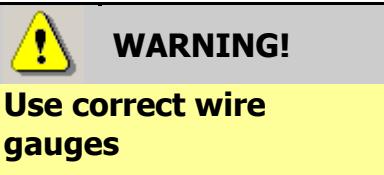
Notes:
CON1 Pins 8 and 16 have crimps fitted but these are not connected.

ITL Part Number	Description	Details
CN391	SMART Payout to SMART Hopper eSSP interface cable	Connects SMART payout to SMART hopper for eSSP communications. Also provides 12V supply to SMART Payout

CON1 (Top View)

CON2 (Front View)

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



If you choose to make your own cables, you must make sure that the wire gauges are suitable for use with the SMART Payout unit. The minimum wire gauge for the CN391 power cables is **24 AWG**, with **22 AWG** being recommended.

CN391 Parts List

Item	Qty	Description	Supplier	Alternative
A	1	2 x 8 way 4.2mm pitch latched housing, 6A derated	Molex 3901-2165	Farnell 1632113
B	4	Tin plated female crimp	Molex 39-00-0038	Farnell 1462545
C	1	Type 'T' toroidal core, 16.5 x 8.2 x 16mm	Paddiford 10-13-165082160-0	RS 261-8928
D	2	Black heat shrink sleeving	---	---
E	1	3 core 24 AWG stranded cable, AWM type 2464	---	---
F	10	Black heat shrink sleeving	---	---
G	2	22 AWG stranded wire, PVC insulated	---	---
H	1	Stackable black 4mm banana plug	Deltron 553-0100-01	Farnell 1101106
I	1	Stackable red 4mm banana plug	Deltron 553-0500-01	Farnell 1101199
J	1	2 x 4 way 2.54mm pitch housing with key	Molex 90142-0008	Farnell 3291571
K	4	Tin plated crimp	Molex 90119-2110	Farnell 9733272

CN391 Connectivity

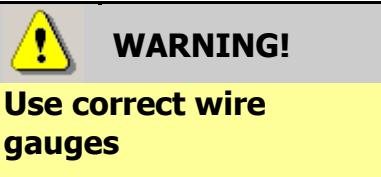
CON1	CON2	CON3	CON4	Gauge	Colour	Comments
Pin						
16	8	---	---	24 AWG	Brown	SSP Rx on hopper < > SSP_Txd on payout
14	7	---	---	24 AWG	Orange	SSP Tx on hopper < > SSP_Rxd on payout
9	---	---	1	22 AWG	Red	V IN
1	2	1	---	24/22 AWG	Black	GND

Notes:
CON1 Pin 1 has two wires crimped together. CON2 Pin 1 has a crimp fitted but this is not connected.

Part Number	Description	Details
CN397	SMART Payout eSSP interface cable	Provides 12V supply and eSSP communications to SMART Payout

CON1 (Top View)

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



If you choose to make your own cables, you must make sure that the wire gauges are suitable for use with the SMART Payout unit. The minimum wire gauge for the CN397 power cables is **24 AWG**, with **22 AWG** being recommended.

CN397 Parts List

Item	Qty	Description	Supplier	Alternative
A	1	2 x 8 way 4.2mm pitch latched housing, 6A derated	Molex 3901-2165	Farnell 1632113
B	4	Tin plated female crimp	Molex 39-00-0038	Farnell 1462545
C	1	Type 'T' toroidal core, 16.5 x 8.2 x 16mm	Paddiford 10-13-165082160-0	RS 261-8928
D	2	Black heat shrink sleeving	---	---
E	1	3 core 24 AWG stranded cable, AWM type 2464	---	---
F	10	Black heat shrink sleeving	---	---
G	2	22 AWG stranded wire, PVC insulated	---	---
H	1	Stackable black 4mm banana plug	Deltron 553-0100-01	Farnell 1101106
I	1	Stackable red 4mm banana plug	Deltron 553-0500-01	Farnell 1101199
J	1	2 x 8 way 2.54mm pitch housing with key	Molex 90142-0016	Farnell 3291613
K	4	Tin plated crimp	Molex 90119-2110	Farnell 9733272

CN397 Connectivity

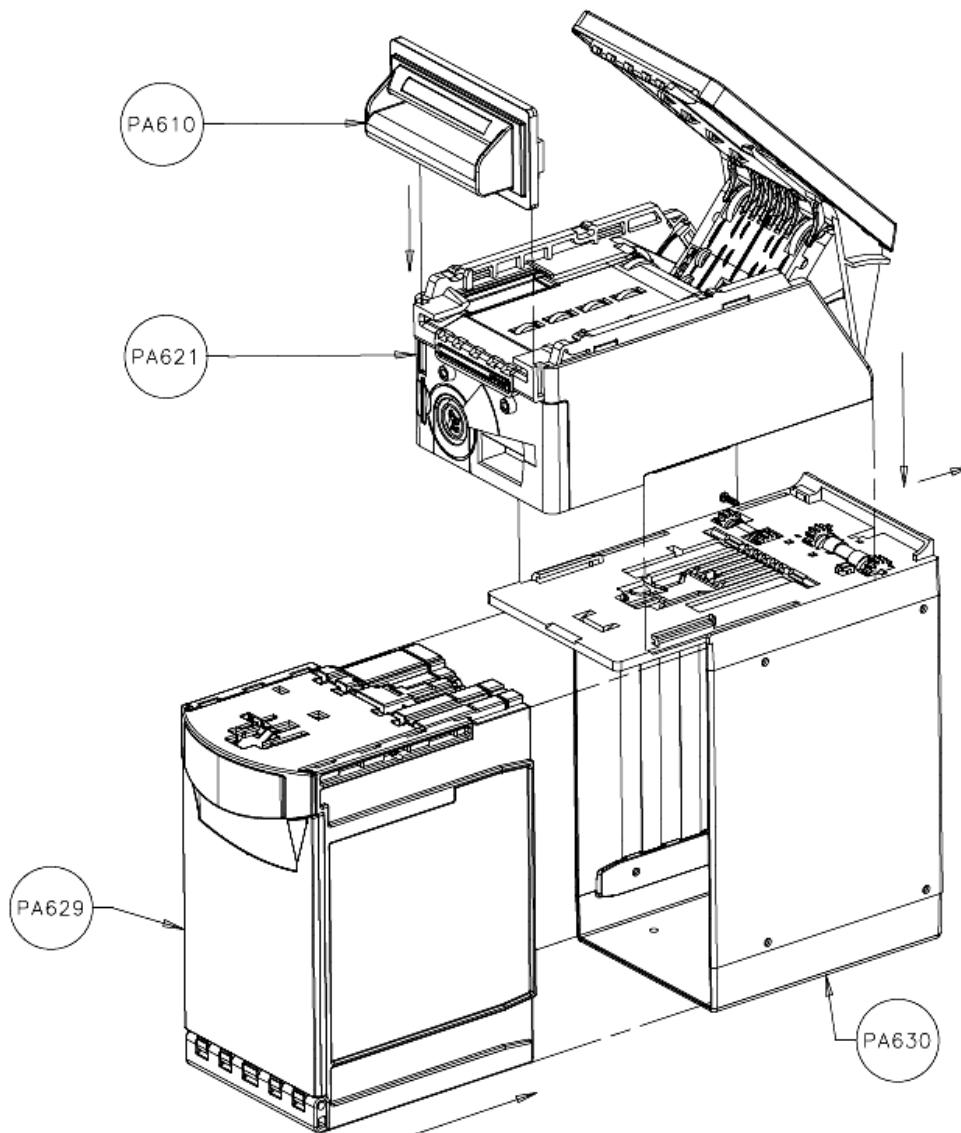
CON1	CON2	CON3	CON4	Gauge	Colour	Comments
Pin						
16	1	---	---	24 AWG	Orange	SSP_Txd
14	5	---	---	24 AWG	Brown	SSP_Rxd
9	---	---	1	22 AWG	Red	V IN
1	16	1	---	24/22 AWG	Black	GND

Notes:
CON1 Pin 1 has two wires crimped together. CON2 Pin 15 has a crimp fitted but this is not connected.

NV200

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

ITL Part Number	Alternative Part Number	Description
PA610	---	Bezel Assembly
PA621	---	NV200 Validator Head Assembly
PA629	---	Cashbox Final Assembly
PA630	---	Chassis Assembly
PA650	Camlock 28D181CPA	Lock Assembly (see subsection 4.9 of this manual for lock fitting instructions)



4.10 Guidance Notes

Cleaning



WARNING!

Do not attempt disassembly

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

The payout module is effectively a ‘sealed’ unit; as such there are no parts to clean other than the external case. 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 Payout or NV200 units.

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.

To clean the NV200 note path, you will need to remove the validator head from the assembly – you cannot open the note path cover when the payout unit is fitted.

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



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.

Manual Note Drive

It is unlikely that you will need to manually pay out notes from the payout module, but this can be done following the steps below (after removing the payout module from the NV200 cash box chassis). The only tool needed to carry out this process is a 5 mm Allen key.

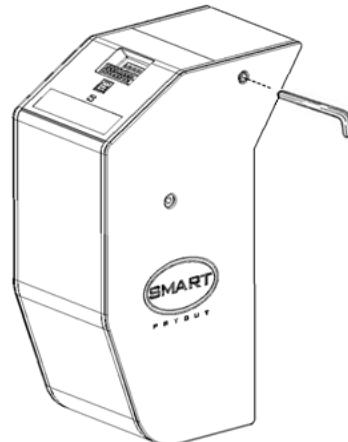


Caution!

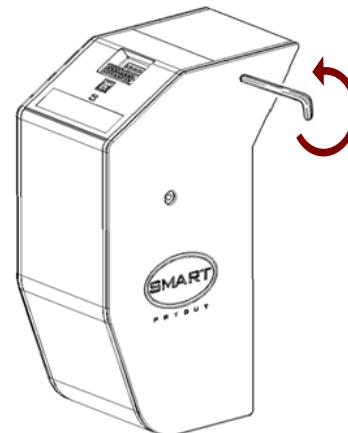
Risk of serious damage to payout module internal mechanism

If you need to follow this procedure, take great care not to over wind the mechanism or force past the dead stops – if you do the payout unit will be damaged beyond repair.

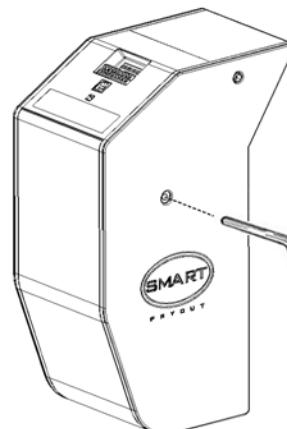
1. Locate the Allen key into the hexagonal Diverter driver



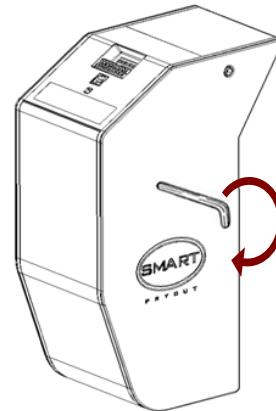
2. Move the Diverter into the transfer position by turning the Allen key anti-clockwise until it reaches the dead stop



3. Locate the Allen key into the hexagonal Motor Drum driver



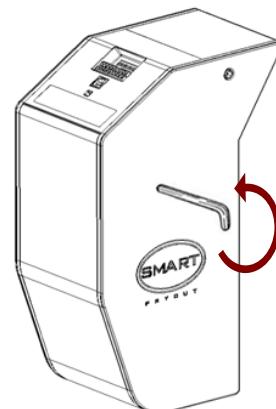
4. Transfer all the stored bank notes onto the Transaction Drum by turning the Allen key clockwise (look through the barcode window and you will see the barcode travelling towards the note exit, and the bank notes travelling into the module)



5. Once all the bank notes have been transferred to the Transaction Drum move the Diverter into the payout position by turning the Allen key clockwise until it reaches the dead stop



6. Pay out the stored bank notes by turning the Allen key anti-clockwise. You will see the barcode travelling into the Payout module and the bank notes will be paid out through the note exit



WARNING!

Do not attempt disassembly

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

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

Re-Initialisation

The 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 SMART Payout unit is being installed and transported inside a host machine.



Information

Check bezel fixing screw length before installation.

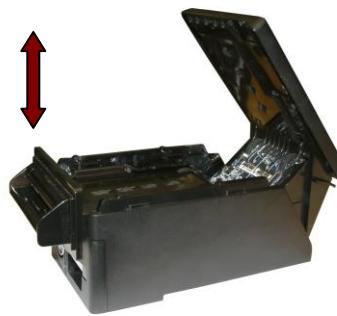
The length of the bezel fixing screws must be no more than 12 mm in length.

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

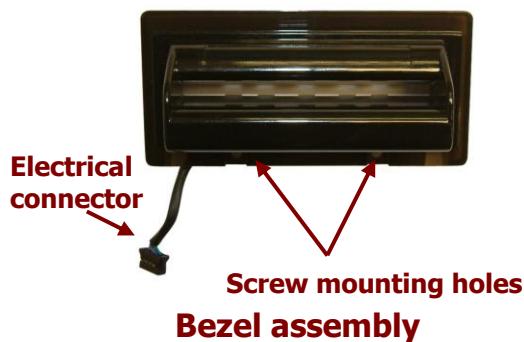
To remove or refit the bezel, access to the note path is required as described earlier in this section – the top cover must be open fully to allow access to the bezel mounting area.



Validator note path cover



Bezel removal and fitting



Bezel connector socket

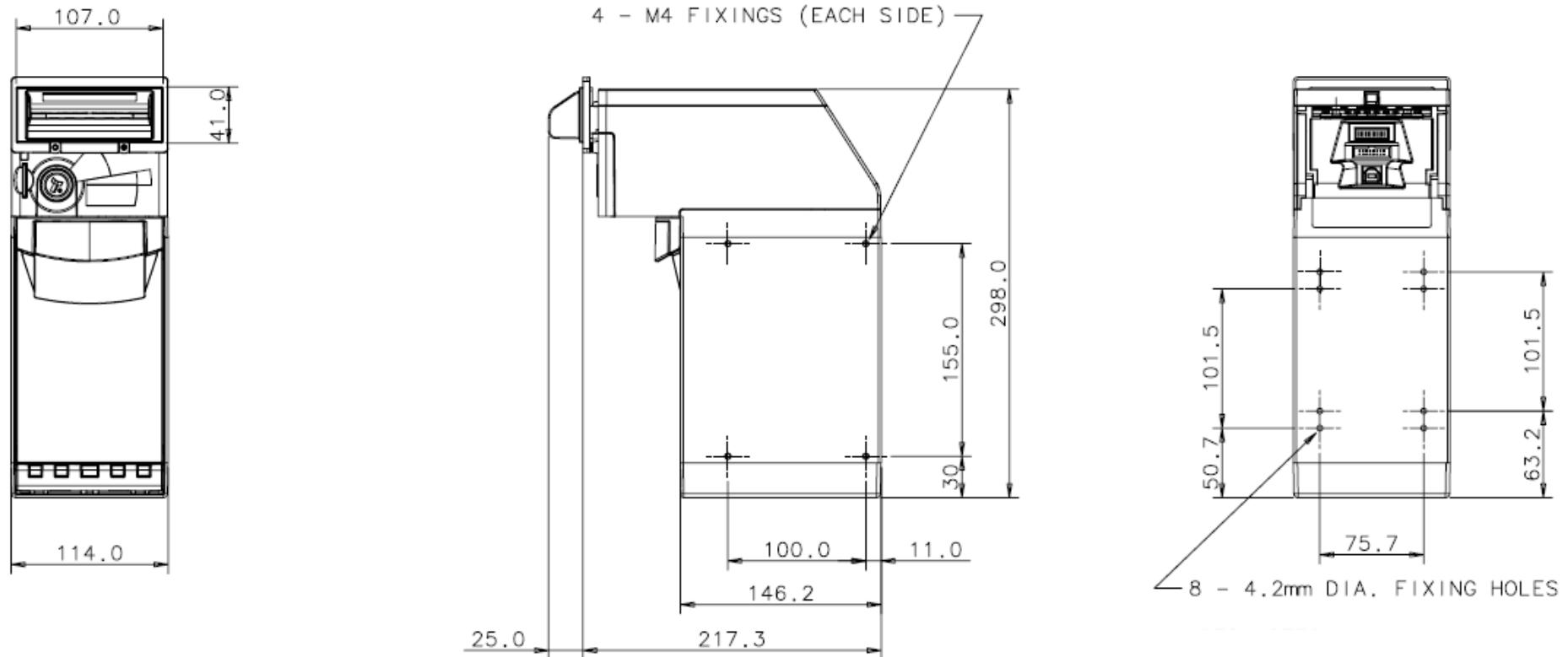
Removing the bezel: Lift the upper cover by pulling the top latch forward. If fitted, remove the two bezel securing screws and then slide the bezel assembly upwards. Finally unplug the cable from the socket on the front of the validator head.

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.

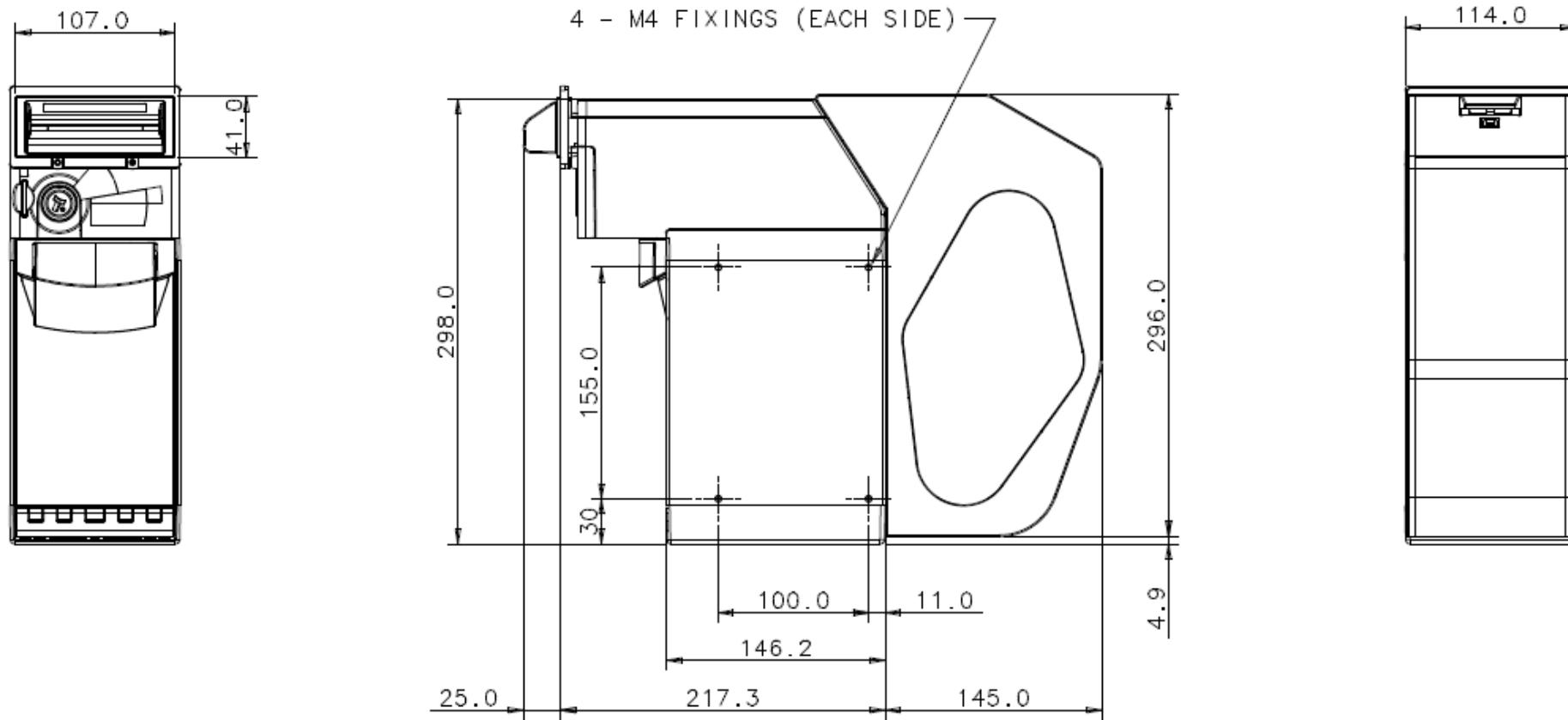
4.11 Drawings and Schematics

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

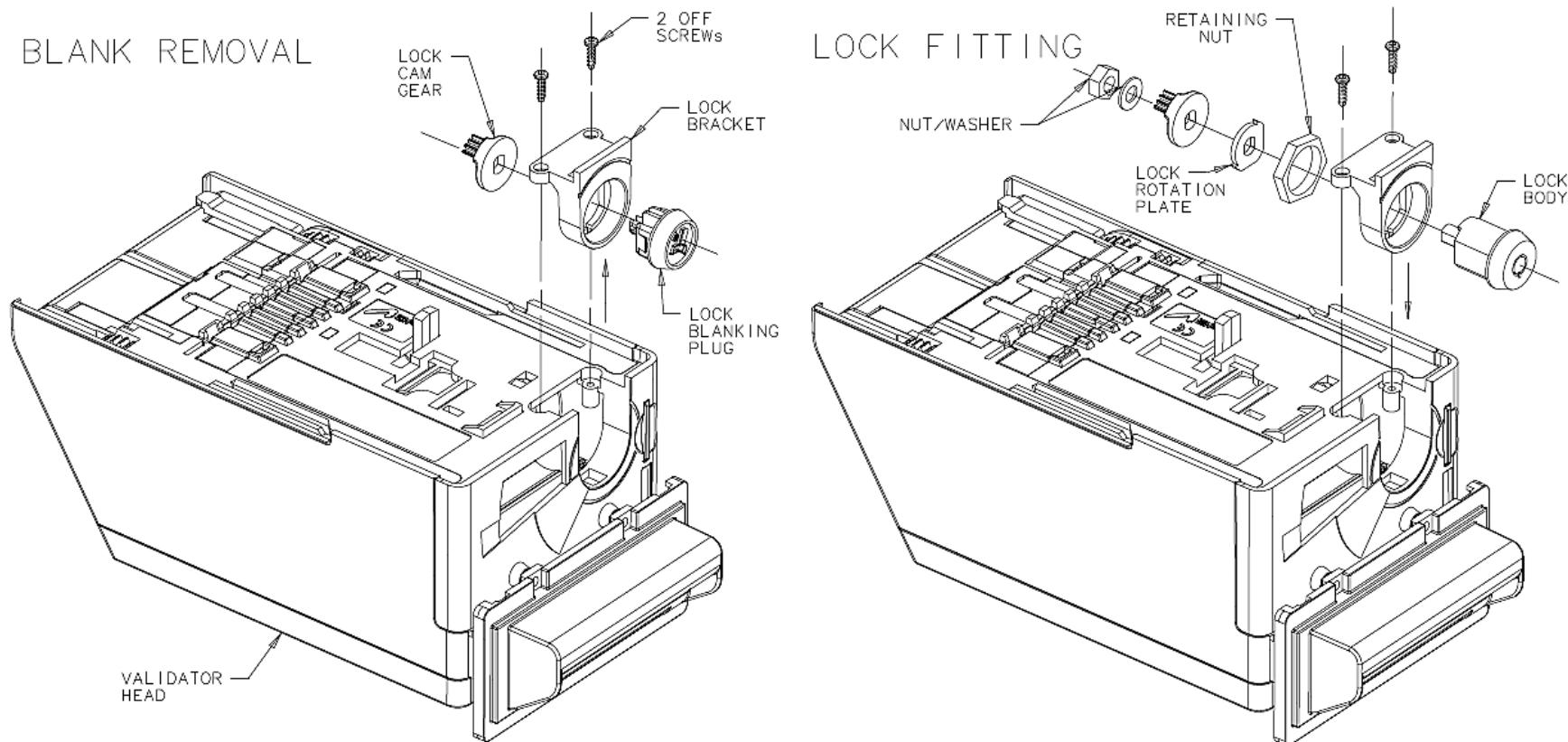
NV200 Validator:



NV200 Validator with Payout Module Fitted:

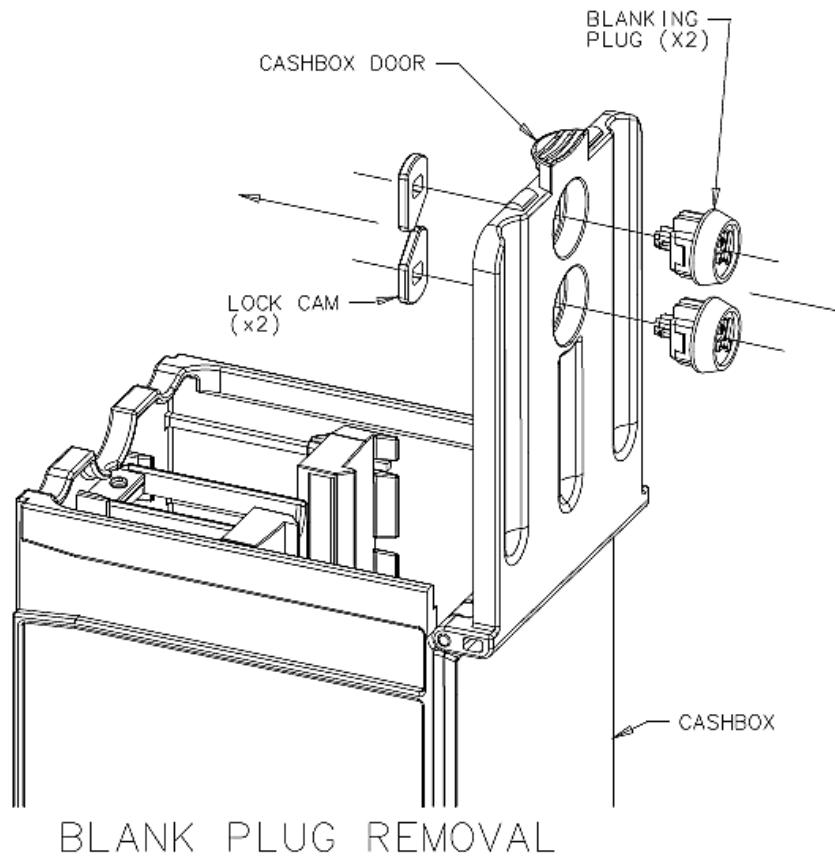


NV200 Validator Lock Fitting:



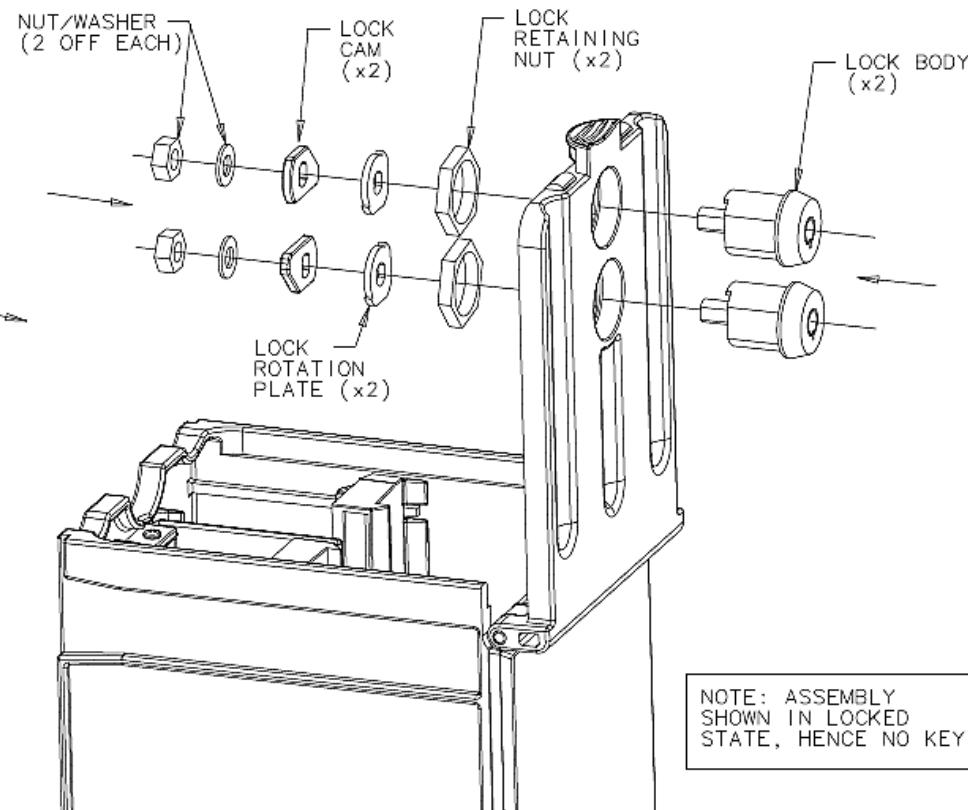
1. Unscrew the two screws (indicated) with a T8 Torx screwdriver
2. Remove the lock bracket from the validator head
3. Unclip the lock blanking plug and cam gear (keep these for use later)
4. Fit the lock into the bracket (as shown), and fix in place with the lock retaining nut
5. Place the lock rotation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



BLANK PLUG REMOVAL

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



LOCK FITTING

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

4.12 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 4.7

b. The payout module does not securely lock on the back of the NV200

- Make sure the plastic mountings are fitted on the back of the cashbox.
- Ensure the payout module is correctly located on the mountings before the validator head is installed.

c. My notes are always stacked in the cashbox even though I have chosen for them to go into the payout module

- Check that the Green LED on the rear of the SMART Payout unit is flashing – see the Flash Codes in subsection 4.8 if this is not the case.
- Make sure the diverter is in correct position – with the unit powered up, turn DIP switch 8 ON and OFF to make sure (check the information in Section 2, subsection 2.2 of this manual set if you are unsure).
- The Payout module might be disabled in software - send an enable payout command.
- The Payout module might be full – check how many notes are stored using your host software.
- The notes might be detected as damaged or not straight – in this case they will be stacked in the cash box so that they will not jam the payout module.

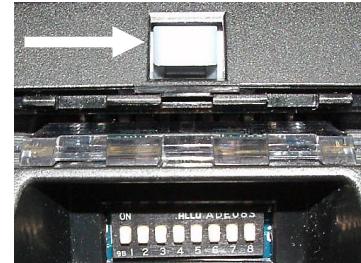
d. My payout module has stopped functioning and I want to return it for repair - however it has bank notes inside

- All bank notes that are inside payout modules returned to ITL are handled with the highest security and carefully tracked internally until their return to the customer - if you do not want to ship the unit with the bank notes inside, please follow the instructions for manual payout in subsection 4.10.
- If manual payout is not possible please contact ITL technical support.

e. Is my NV200 validator compatible with the payout module?

- Early revisions of the NV200 did not support the payout module. Check for all of the following features to ensure compatibility:

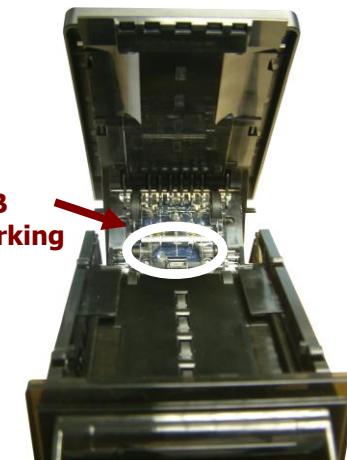
A grey diverter plunger on the rear of the NV200 validator head (just above the DIP switches)



Mounting brackets on the rear of the cash box housing



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 any one of these features is not present, a new NV200 validator unit will need to be purchased.

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SECTION 5

SMART PAYOUT MANUAL SET

SOFTWARE IMPLEMENTATION GUIDE

INTELLIGENCE IN VALIDATION

SMART PAYOUT MANUAL SET – SECTION 5

5.	SOFTWARE IMPLEMENTATION GUIDE	3
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5.2	SSP and eSSP	5
5.3	ccTalk (CC2)	15
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5.5	Frequently Asked Questions	19

5. SOFTWARE IMPLEMENTATION GUIDE

5.1 Communication Protocols

The SMART Payout unit can use two different communication protocols – eSSP and ccTalk (CC2).

The recommended communication protocol for the SMART Payout unit is eSSP, as this provides the highest level of data transfer security. A ccTalk (CC2) interface protocol is also available – CC2 builds on the existing ccTalk standard and uses the standard ccTalk packet construction and encryption, but to use the payout features has a different flow of information.

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

- SSP Interface Specification (ITL Document number GA138)
- eSSP – ccTalk Converter Specification (ITL Document number GA863)
- ITL Bank Note Reader ccTalk Specification (ITL Document number GA966)

Summaries of the SMART Payout unit socket connections for each of the interfaces are shown below:

SMART Payout SSP Interface:

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

SMART Payout ccTalk (CC2) Interface:

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



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.



Information

Encryption of data strongly recommended

It is recommended that all credit/dispense transactions with the SMART Payout unit be encrypted to prevent dispense 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.

5.2 SSP and eSSP

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

Encrypted Smiley® Secure Protocol (eSSP) is an enhancement of SSP. eSSP uses the same 16 bit CRC checksums on all packets as SSP, but also uses a Diffie-Hellman key exchange to allow the host machine and SMART Payout unit 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 SMART Payout unit, poll commands should be sent **at least** 200 ms apart.

SSP Commands and Responses

a. Commands

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

Action	Command Code (Hex)	Command Set
Enable Protocol Version Events	0x19 (made obsolete in protocol version 6)	Validator
Get Bar Code Reader Configuration	0x23	
Set Bar Code Reader Configuration	0x24	
Get Bar Code Inhibit	0x25	
Set Bar Code Inhibit	0x26	
Get Bar Code Data	0x27	
Enable Payout Device	0x5C	Payout
Disable Payout Device	0x5B	
Set Routing	0x3B	
Get Routing	0x3C	
Payout Amount	0x33	
Get Note amount	0x35	
Halt Payout	0x38	
Float Amount	0x3D	
Get Minimum Payout	0x3E	
Payout by denomination	0x46	
Float by denomination	0x44	
Empty All	0x3F	
SMART empty	0x52	
Cashbox Payout Operation Data	0x53	

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.
Manufactures Extension:	This command allows the manufacturer of a peripheral to send commands specific to their unit
Enable Payout Device:	Single byte command to enable the Payout module.
Disable Payout Device:	Single byte command to disable the Payout module. All notes accepted will be routed to the NV200 cashbox and payout commands will not be accepted.
Set Routing:	Six-byte command to set the routing of each note value. Notes can either be routed to the NV200 cashbox, or to the Payout module and used for payouts. By default all note values are stacked.
Payout Amount:	Five-byte command to set the value to payout.
Get Note Amount:	Five-byte command that will return the note counter for a given value in the Payout module.
Float:	Nine-byte command to set the minimum payout and the value to float to.
Get Minimum Payout:	Single byte command that returns the minimum payout value.
Empty:	Single byte command that will cause all notes to be sent to the stacker for removal.

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	
Read, n	0xEF, Channel Number	
Credit, n	0xEE, Channel Number	Validator
Rejecting	0xED	
Rejected	0xEC	
Stacking	0xCC	
Stacked	0xEB	
Safe Jam	0xEA	
Unsafe Jam	0xE9	
Disabled	0xE8	
Fraud Attempt, n	0xE6, Channel Number	
Stacker Full	0xE7	
Note cleared from front at reset	0xE1, Channel Number	

Action	Command Code (Hex)	Command Set
Note cleared into cash box at reset	0xE2, Channel Number	Validator
Cash Box Removed	0xE3	
Cash Box Replaced	0xE4	
Bar Code Ticket Validated	0xE5	
Bar Code Ticket Acknowledge	0xD1	
Note path open	0xE0	
Channel Disable	0xB5	
Dispensing	0xDA, Current value dispensed	
Dispensed	0xD2, value dispensed	
Jammed	0xD5, value dispensed	
Halted	0xD6, value dispensed	Payout
Floating	0xD7, value to cashbox	
Floated	0xD8, value to cashbox	
Time Out	0xD9, value dispensed	
Incomplete Payout	0xDC, value dispensed, value requested	
Incomplete Float	0xDD, value to cashbox, value requested	
Emptying	0xC2	
Empty	0xC3	
Note stored in payout	0xDB	
SMART Emptying	0xB3	
SMART Emptied	0xB4	

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
Dispensing:	Five-byte response reporting the value of notes that have been dispensed at the point when the poll was received.
Dispensed:	Five-byte response that indicates when the payout has finished a dispense operation; also reports the value of notes that have been dispensed.
Jammed:	Five-byte response that indicates that the payout is jammed; this is reported until it is un-jammed or reset. It will also become disabled. Also reports the value of notes that have been dispensed before the jam.
Time Out:	This is given if a search for a note in the payout store fails after a time-out period and there is no way to pay that value with any others - the event will be given along with the value paid out up to the time out point.
Incomplete Payout / Float:	This event is given when the payout starts up if a payout or float operation was in progress when the power was removed. Reports the value that was dispensed and the value that was originally requested.
Note stored in payout:	This event is given when notes paid in to the payout system are routed to the payout store.
Emptying:	This event is given while the payout is being emptied of notes into the cashbox by the EMPTY command.
Empty:	This event is given at the end of the empty process.

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 payout 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, 00 05 00 00 00	< OK	Route notes of value 0005 to the SMART Payout
> SET_ROUTING, 00 0A 00 00 00	< OK	Route notes of value 0010 to the SMART Payout
> SET_ROUTING, 01 14 00 00 00	< OK	Route notes of value 0020 to the NV200 Cashbox
> ENABLE_PAYOUT_DEVICE	< OK	Enable SMART Payout
> 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
> 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	
> PAYOUT_AMOUNT > 0F > 00 > 00 > 00	< OK	Payout £15

Host	Slave	Comments
> POLL	< OK < DISPENSING < 00 < 00	Dispensing, £0 dispensed so far
> POLL	< OK < DISPENSING < 0A < 00	Dispensing, £10 dispensed so far
> POLL	< OK < DISPENSED < 0F < 00	Dispensed £15
> 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 (CC2)

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

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

The protocol uses an asynchronous transfer of character frames in a similar manner to RS232. The main difference is that it uses a single two-way communication data line for half-duplex communication rather than separate transmit and receive 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.

CC2 is Innovative Technology Ltd's extended version of ccTalk, and is used with the SMART Payout unit - the note validator commands conform to the standard specification, and the SMART Payout commands are an extension to this device on the same address.

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 SMART Payout unit, Read Buffered Bill events (command 159) should be sent **at least** 200 ms apart.

CC2 Command Summary

Command	Header	Parameters	Example
Simple Poll	254	None	ACK
Request Equipment Category	245	None	'SMART_PAYOUT'
Request Product Code	244	None	'SP1'
Request manufacturer ID	246	None	'ITL'
Request Software Version	241	None	XX.YY
Request Comms Revision	004	None	X.Y
Reset Device	001	None	ACK
Request Serial Number	242	None	3 byte serial No
Enter New Pin	219	Pin1, Pin2, Pin3, Pin4	ACK
Enter Pin	218	Pin1, Pin2, Pin3, Pin4	ACK
Request Data Storage Av.	216	None	00000
Request Option Flags	213	None	3 (stacker & escrow)
Modify Bill Operating Table	153	Escrow & Stacker	ACK
Request Inhibits	230	None	Inhibit Low, Inhibit High
Request Build Code	192	None	161209
Request Last Mod Date	195	None	00
Request Address Mode	169	None	1
Read Buffered Bill Events	159	None	100000000000
Route Bill	154	0/1	ACK/254
Switch Encryption Code	137	3 bytes Encryption key	ACK
Set Routing	020	Route, Value	ACK
Get Routing	021	Value	Route for value.
Payout Amount	022	Value	ACK
Float	023	Min Payout, Value	ACK
Empty	024	None	ACK
Get Minimum Payout	025	None	Min Payout Value
Get Note Amount	026	Value	Count of note
Request Status	029	None	Status

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

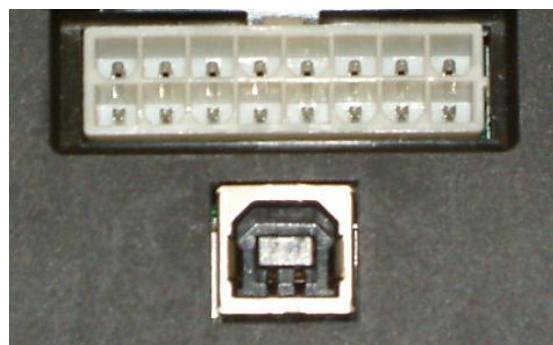
When sending or receiving a value the least significant byte is sent first. So in this example [0x88] [0x13] [0x00] [0x00] will be sent.

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 SMART Payout unit has two connectors that are used to allow interfacing and programming. The first connector is a 16 pin socket used to interface the SMART Payout unit to the host machine.

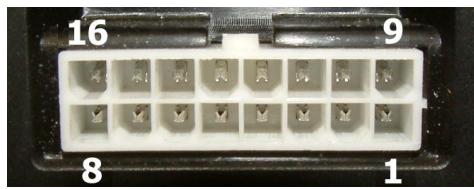


Information

Power always required regardless of connection type.

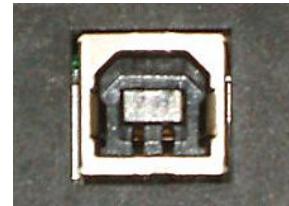
Power is always required on pins 1 and 9 of the 16 way connector.

The pin numbering of the socket is shown below, as well as an overview of the socket connections:



Pin	Description
1	0V / Ground Connection
9	+12V DC
14	Serial Data In (Rx)
16	Serial Data Out (Tx)

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 the SMART Payout unit – 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 SMART Payout unit can be found in Section 4 of this manual set (subsection 4.7).

5.5 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 1.4)

b. How do I use the encryption key?

- The encryption key is made up of two parts – this is explained in subsection 5.2. The two parts of the encryption key are:
 - a) A variable key (one that is exchanged at start up by the host machine – read subsection 5.2 for more information)
 - b) A fixed key (which can be set using the PiPS software as described in Section 3 of this manual set). The default key value is 0x0123456701234567

c. My notes are always stacked in the cashbox even though I have chosen for them to go into the payout unit

- Check that the Green LED on the rear of the SMART Payout unit is flashing – see the Flash Codes in Section 1 of this manual set (subsection 1.9) if this is not the case.
- Make sure the diverter is in the correct position – with the unit powered up turn DIP switch 8 ON and OFF to make sure.
- The Payout module might be disabled in software - send an enable payout command.
- The Payout module might be full – check how many notes are stored.
- The notes might be detected as damaged or not straight – in this case they will be stacked in the cash box so that they will not jam the payout module.

d. My payout module is communicating in ccTalk but I want to update it. How can I do this?

- To do this, the validator head needs to be removed – you can find out how to do this by following the procedure in Section 1 of this manual set (subsection 1.1).
 - a) Provide power to the NV200 validator. Don't worry that the bezel lights are flashing as this is normal.
 - b) Turn DIP switch 8 on the rear of the validator up then down. The bezel will quickly flash then the unit will reset.
 - c) Remove the power and refit the validator to the payout module.
 - d) Update the unit using the PiPS software as described in Section 3 of this manual set.

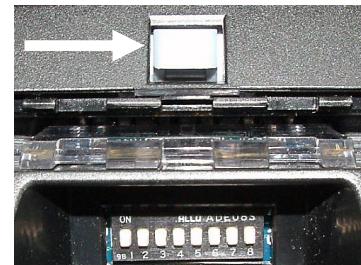
e. My payout module has stopped functioning and I want to return it for repair - however it has bank notes inside

- All bank notes that are inside payout modules returned to ITL are handled with the highest security and carefully tracked internally until their return to the customer - if you do not want to ship the unit with the bank notes inside, please follow the instructions for manual payout in Section 4 of this manual set (subsection 4.10).
- If manual payout is not possible please contact ITL technical support.

f. Is my NV200 validator compatible with the payout module?

- Early revisions of the NV200 did not support the payout module. Check for all of the following features to ensure compatibility:

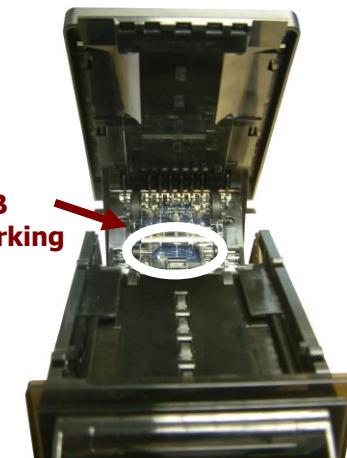
A grey diverter plunger on the rear of the NV200 validator head (just above the DIP switches)



Mounting brackets on the rear of the cash box housing



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 any one of these features is not present, a new NV200 validator will be needed

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SECTION 6

SMART PAYOUT MANUAL SET

TECHNICAL APPENDICES

INTELLIGENCE IN VALIDATION

SMART PAYOUT MANUAL SET – SECTION 6

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6. TECHNICAL APPENDICES

APPENDIX A – PRODUCT APPROVALS

CE Marking

The SMART Payout 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
SMART Payout	Note Payout Assembly	All SMART Payout

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:

(Total power requirements of the NV200 with the SMART Payout unit fitted)

DC Voltage	Minimum	Nominal	Maximum
Absolute limits	10.8 V	12 V	13.2 V
Supply ripple voltage	0 V	0V	0.25 V @ 100 Hz
Supply Current (when connected to an NV200):			
Standby		400 mA	
Running		3 A	
Peak (motor stall)		5 A	

We recommend that your power supply is capable of supplying 12V DC at 6.3 A.

TDK Lambda produces a suitable power supply (model SWS75-12). This power supply is available from a variety of suppliers including Farnell (stock code 1184648) and RS (stock code 466-5904).

Logic Levels:

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

General Specifications:

Note Sizes	Minimum	Maximum
Width	60 mm	85 mm
Length	115 mm	170 mm

Capacity	
Storage	80 notes in Payout Module; 500 or 1000 notes in NV200
Payout	80 notes

Weight	
Payout Module	2.6 kg
NV200	2.9 kg
Combined	5.5 kg

Interface Protocol
eSSP; ccTalk (CC2)

Earth Bonding:

It is **very** important that the cashbox chassis is bonded to earth, as lack of proper bonding can cause communication issues and failures with the SMART Payout unit.

The earth bond should be made to any of the 8 holes in the side of the cashbox and be bonded to mains earth, typically through the Power Supply Unit.



Information

Earth resistance.

The resistance between the cashbox and the Earth pin on the mains plug should be less than 0.7 ohms.

APPENDIX C – GLOSSARY OF TERMS

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

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

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

APPENDIX D – ORDERING INFORMATION

The following information is required to order a SMART Payout unit:

Product	SMART Payout	Consists of NV200 validator, cash box chassis and payout module
Dataset	Country code and variant	Alternatively supply details of the currency and note types you wish to use
Bezel Size	85 mm	This is the only bezel size available for SMART Payout
Bezel Colour	RGB code or text description	
Cash Box	500 or 1000 note capacity	
Interface	eSSP or ccTalk	

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