

# SMART PAYOUT OPERATIONS MANUAL

INTELLIGENCE IN VALIDATION





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## 1 INTRODUCTION

This manual describes the operation of the SMART Payout. As a result of Innovative Technology Ltd continuous improvement policies, some functions mentioned in this manual may change and new functions may also be added.

This document is intended for those who will

- Install the SMART Payout
- Maintain the SMART Payout

Although information is included in this document that will allow a degree of fault diagnosis and repair, it is recommended that for all but simple mechanical repairs, the unit must be returned to an approved service centre for repair.

### CAUTIONS

- Never exceed the recommended environmental and electrical limits.
- Do not attempt to lubricate the mechanisms as this may affect the note transport.

### WARNING

- Only suitably trained personnel should carry out any work on this equipment in accordance with all current local, national and international health and safety regulations.

We recommend that you study this manual as there are many new features permitting new uses and more secure applications. If you do not understand any part of this manual please contact your local office for assistance, contact details are available from [www.innovative-technology.co.uk](http://www.innovative-technology.co.uk). In this way we may continue to improve our product.

Innovative Technology Ltd has a policy of continual product improvement. As a result the products supplied may vary from the specification described here.

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## 2 TECHNICAL SPECIFICATION

### ENVIRONMENT

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

**Table 1 – Environmental Requirements**

### POWER REQUIREMENTS

Total power requirements of the NV200 with the SMART Payout fitted

Electrical Supply	Minimum	Maximum
Supply Voltage (V DC) Absolute Limits	+11 V	+13 V
Supply Ripple Voltage	0 V	0.25 V @ 100 Hz
<b>Supply Currents: When connected to an NV200</b>		
Standby		400mA
Running		3A
Peak (Motor Stall)		5 A

**Table 2 – Power Requirements**

Interface Logic Levels	Logic Low	Logic High
Inputs	0 V to + 0.5 V	+3.7 V + 12 V
Outputs with 2K2Ω pull up	0.6 V	Pull up voltage of host interface
Maximum Current Sink	50mA per output	

**Table 3 – Interface Logic Levels**

### GENERAL SPECIFICATIONS

Note Sizes	Minimum	Maximum
Width	60mm	85mm
Length	115mm	170mm
<b>Capacity</b>		
Storage	80 Notes in SMART Payout, 500 Notes in NV200	
Payout	80 Notes	
<b>Weight</b>		
	SMART Payout 2.6Kg; NV200 2.9Kg; Combined 5.5Kg	
<b>Interface</b>		
	eSSP (Encrypted SSP)	

**Table 4 – General Specifications**

**It is recommended that the chassis of the NV200 be earthed when using the SMART Payout system**

### 3 GENERAL DESCRIPTION

The SMART Payout is an additional module for an NV200 that can store and later dispense multiple note denominations. It is capable of storing up to a maximum of 80 bank notes validated by the NV200 validator.

Notes can be stored in the NV200's secure cashbox or travel into the SMART Payout unit if needed for future payouts. The SMART Payout works with any single currency dataset created by ITL

Notes accepted by the SMART Payout system are not visible when in the SMART Payout and cannot be taken out manually.

The SMART Payout can be connected to the host machine directly or via a SMART Hopper, simplifying the host machine wiring. When connected via a SMART Hopper, all commands are sent to the SMART Hopper that will then communicate with the SMART Payout independently from the host machine

**The SMART Payout unit uses eSSP (encrypted SSP) protocol software.**

During installation a Diffie-Hellman key exchange is used to allow the host machine and SMART Payout to jointly establish a shared secret key over an insecure communications channel.

#### OPERATOR BENEFITS

- Multiple denomination note payouts.
- Solution to coin starvation – less demand on coin hoppers
- Accepts, validates and stores multiple denominations < 3 seconds
- Payout of multiple denominations in a similar time
- The SMART Payout unit can be fitted to all change-giving machines in any industry
- Payout function is automated
- Less frequent cash removal & float re-fill
- Secure unit
- 500 note secure cashbox on NV200 + 80 note storage within the SMART Payout
- Exceptional value vs competition
- Secure encrypted protocol



## 4 INSTALLATION

The SMART Payout can be simply connected to an NV200 as follows:

- Fix the 4 mounting brackets to the NV200 chassis
  - Remove the NV200 cash box
  - Secure the 4 mounting brackets to the rear of the NV200 chassis through the pre-drilled holes with the screws provided
- Remove the NV200 head unit
  - Unlock the NV200 cashbox and head release lock (if fitted)
  - Lift the silver head release catch located on the front of the NV200
  - Slide the head unit forward and lift up
- Mount the SMART Payout on the mounting brackets on the rear of the NV200 chassis
- Replace the NV200 head unit taking care that the connections between the SMART Payout line up with the connections on the rear of the NV200
- Ensure the NV200 head unit is securely in place



The SMART Payout system is mounted in the machine via the mounting holes on either side of the NV200 chassis using 4 x M4 fixing screws and a suitable mounting bracket. See Appendix B – Dimension Drawing for details of the positioning of the mounting holes.

### NOTES:

- It is recommended that the chassis of the NV200 be earthed when using the SMART Payout system
- The length of the screw must be no more than 6mm plus the thickness of the mounting bracket.
- It is not recommend mounting from the base of the NV200.

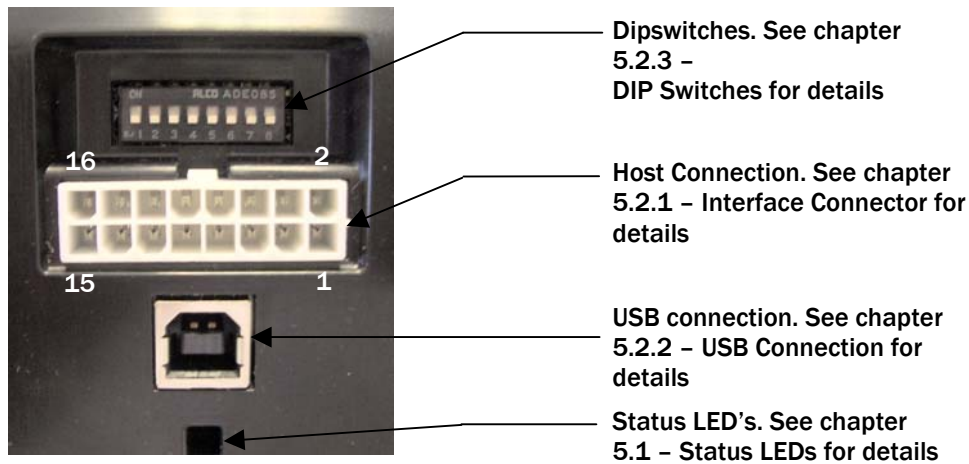
## 5 MACHINE INTERFACES

### 5.1 STATUS LEDS

There are two LED's located on the rear of the SMART Payout, one green, one red. These LED's are used to indicate the current status of the SMART Payout as indicated in the table below.

Green	Red	Status
Flashing (1Hz)	Off	Normal
Off	Flashing (1Hz)	System Error
Flashing (1Hz)	Flashing (1Hz)	Payout not initialised by NV200

### 5.2 HARDWARE



#### 5.2.1 INTERFACE CONNECTOR

Pin	Name	Type	Description
1	0V	Ground	0V Supply
2	+Vin	Power	12V supply
12	eSSP Receive	Input	Serial Data In (Rx)
16	eSSP Transmit	Output	Serial Data Out (Tx)

**Table 5 – Interface Connector Pin Description**

The connector is 2x8way, 4.2mm pitch with latch, 6A de-rated. Ensure that the wires in the harness used are a suitable specification.

#### 5.2.2 USB CONNECTION

The USB port can be used for serial communications with the NV200 SMART Payout system. Power must be provided via the 16 way host interface connector. Note: the USB connection cannot be used to reprogram the NV200 or the SMART Payout.

### 5.2.3 DIP SWITCHES

The DIP Switches have the following function:

Switch No	Function	Switch OFF (↓)	Switch ON (↑)
1	Disable Barcode	Barcode read enabled	Barcode read disabled
2	Channel 1 Inhibit	Channel 1 enabled	Channel 1 disabled
3	Channel 2 Inhibit	Channel 2 enabled	Channel 2 disabled
4	Channel 3 Inhibit	Channel 3 enabled	Channel 3 disabled
5	Channel 4 Inhibit	Channel 4 enabled	Channel 4 disabled
6	Channel 5 Inhibit	Channel 5 enabled	Channel 5 disabled
7	Channel 6 Inhibit	Channel 6 enabled	Channel 6 disabled
8	Programming Mode	Switch from OFF to ON and back to OFF to activate	

Table 6 – DIP Switch Functions

## 5.3 COMMUNICATION PROTOCOLS

### 5.3.4 ENCRYPTED SSP (eSSP)

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.

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. The integrity of data transfers is ensured through the use of 16 bit CRC checksums on all packets.

A Diffie-Hellman key exchange is used to allow the host machine and SMART Payout 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.

**IMPORTANT:** All credit/dispense transactions with the SMART Payout must be encrypted to prevent dispense commands being recorded and replayed by an external device.

For detailed information and full protocol specification please refer to SSP Interface Specification (ITL Drawing GA138), this is available from the ITL website [www.innovative-technology.co.uk](http://www.innovative-technology.co.uk).

The SMART Payout is an extension of a banknote validator, all commands are sent to the validator using its address (0x00). Information on the types of note that can be handled is obtained from the standard note validator commands.

For a list of SMART Payout specific commands see Appendix C – SSP Commands and Responses. Examples of communications between host machine and SMART Payout are shown in Appendix D – Example SSP Communications

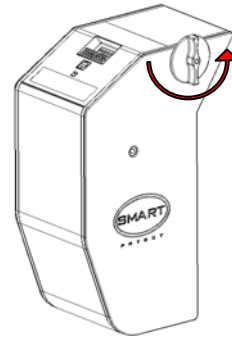
## 6 MANUALLY PAYING OUT NOTES

On occasion, there may be a need to manually payout notes from the SMART Payout. This is done following the steps below with the SMART Payout removed from the NV200. An M5 Allen key is required to perform this operation.

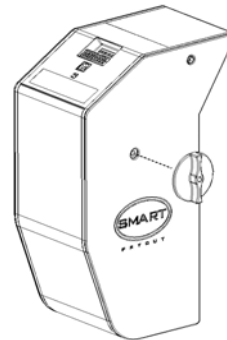
1. Locate the Allen key into the hexagonal Diverter driver.



2. Move the Diverter into the transfer position by turning the handle anti-clockwise until dead stop.

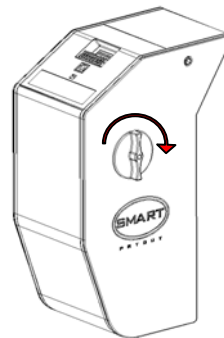


3. Locate the handle into the hexagonal Motor Drum driver.

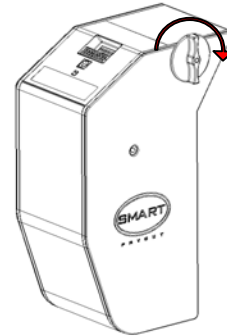


4. Transfer all the stored notes onto the Transaction Drum by turning the handle clockwise.

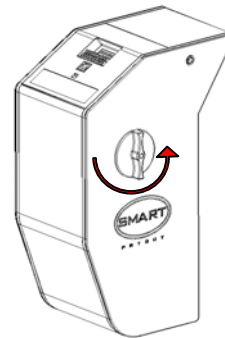
You will see the barcode travelling towards the note exit, and the banknotes travelling inwards.



5. Once all the notes have been transferred to the Transaction Drum move the Diverter into the payout position by turning the handle clockwise until dead stop.



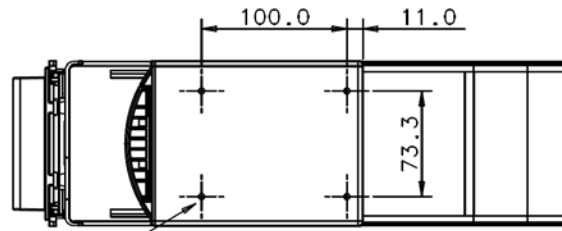
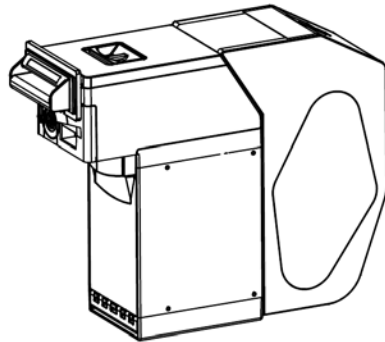
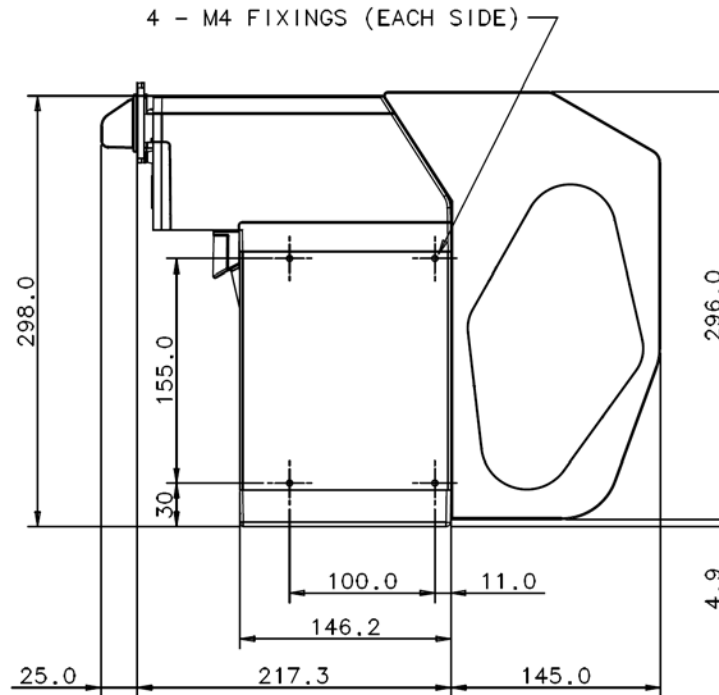
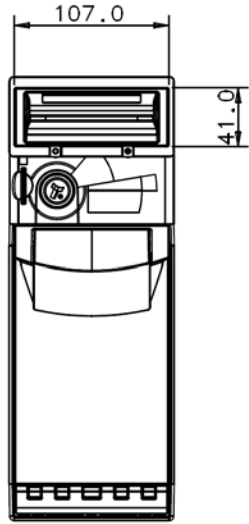
6. Payout the stored Banknotes by turning the handle anti-clockwise. You will see the barcode travelling into the SMART Payout and the banknotes will be paid out through the note exit.



**APPENDIX A – ORDERING INFORMATION**

There is no information that requires specifying at the time of ordering.  
The SMART Payout has no available options.

APPENDIX B - DIMENSION DRAWING



4 - 4.2mm DIA. FIXING HOLES

## APPENDIX C – SSP COMMANDS AND RESPONSES

The SMART Payout is an extension of a banknote validator, all commands are sent to the validator using its address (0x00). Information on the types of note that can be handled is obtained from the standard note validator commands.

Table 7 – SMART Payout eSSP commands shows the eSSP commands for the SMART Payout. These commands are in addition to the Generic SSP commands and the BNV commands. See document number GA138 for the full specification. Commands marked with an asterisk (\*) **must** be encrypted.

The note values are in terms of the currencies sub-denomination. For example €5.00 = 500c

Action	Command Code (HEX)
Enable Payout Device	0x5C
Disable Payout Device	0x5B
Set Routing(*)	0x3B, route, value
Payout Amount(*)	0x33, value
Get Note Amount	0x35, value
Halt Payout(*)	0x38
Float(*)	0x3D, min payout, float value
Get Minimum Payout	0x3E
Empty(*)	0x3F

**Table 7 – SMART Payout eSSP commands**

**Enable Payout Device:** single byte command to enable the SMART Payout.

**Disable Payout Device:** Single byte command to disable the SMART Payout. 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 cash box, or to the SMART Payout 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 SMART Payout.

**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.

Table 8 – SMART Payout response to POLLS shows the responses of the SMART Payout, which are in addition to the NV200 responses. Events marked with an asterisk (\*) are encrypted

Event/ State	Event Code
Dispensing (*)	0xDA, Current value dispensed
Dispensed (*)	0xD2, value dispensed
Jammed	0xD5, value dispensed
Halted	0xD6, value dispensed
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

**Table 8 – SMART Payout response to POLLS**

**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.

## APPENDIX D – EXAMPLE SSP COMMUNICATIONS

For more details on generating the encryption key, refer to the SSP Protocol specification, document number GA138

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, the slave responds with the slave intermediate key. The encryption key is then calculated independently by both the host and the slave.
> GET_SERIAL	< OK < [SERIAL NUMBER]	NV200 Serial Number
> SETUP_REQUEST	< OK < [SETUP INFORMATION]	NV200 Setup
> SET_ROUTING, 00 F4 01 00 00	< OK	Route notes of value 0500 to the SMART Payout
> SET_ROUTING, 00 3E 08 00 00	< OK	Route notes of value 1000 to the SMART Payout
> SET_ROUTING, 01 D0 07 00 00	< OK	Route notes of value 2000 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 DC 05 00 00	< OK	Payout £15
> POLL	< OK < DISPENSING 00 00 00 00	Dispensing, £0 dispensed so far
> POLL	< OK < DISPENSING 3E 08 00 00	Dispensing, £10 dispensed so far
> POLL	< OK < DISPENSED DC 05 00 00	Dispensed £15
> POLL	< OK	

### Note:

The note values are expressed in terms of the currencies sub-denomination. For example  
€5 = 500c

## APPENDIX E – PARTS LIST

The following cables are available for the SMART Payout

Part Number	Description	Details
CN370	SMART Payout power cable	Provides 12V supply only to SMART Payout
CN397	SMART Payout eSSP interface cable	Provides 12V supply and eSSP communications to SMART Payout
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
CN214	USB Cable	Standard USB Type A to Type B cable

There are no user serviceable parts within the SMART Payout.

**REVISION HISTORY****INNOVATIVE TECHNOLOGY LTD**

<b>TITLE</b>
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2	25/02/10	RJS	Added grounding advise, LED codes, revised eSSP example