Innovative Technology Limited ®
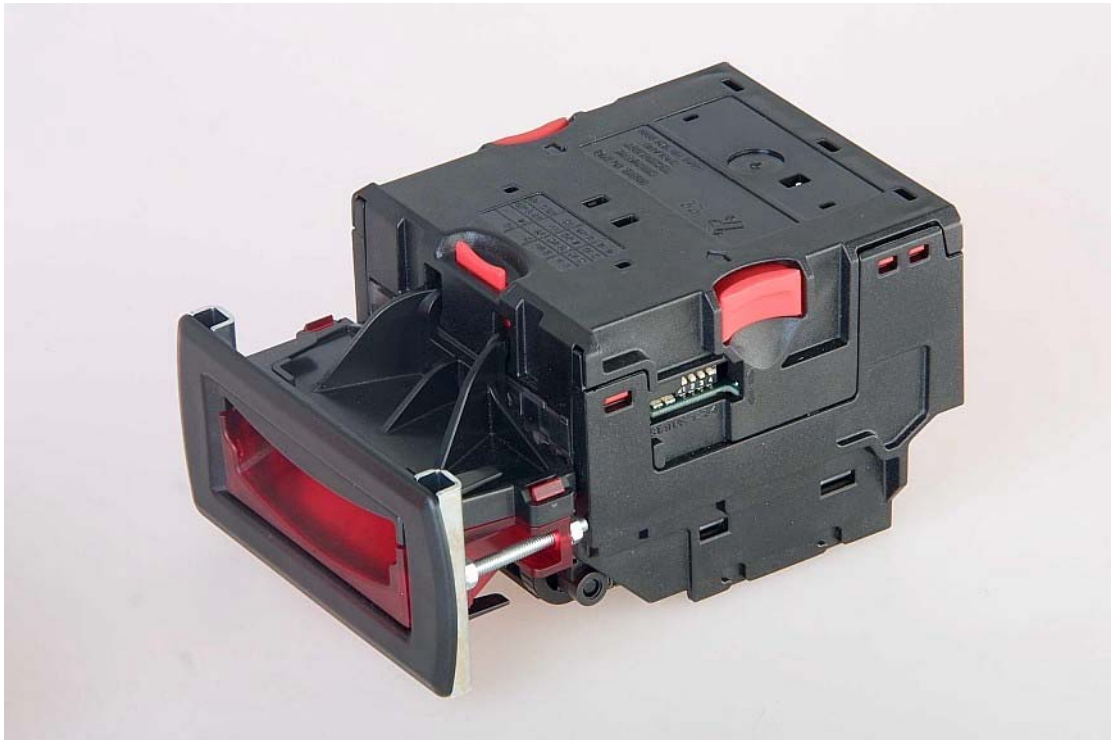
NV8 Bank Note Reader

The Future of Smiley® Bank Note Handling

Operations Manual

Issue 1

Change History.

Innovative Technology Ltd			
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Issue 1	18/6/2003	TJC	First release

Introduction

IMPORTANT   This Product must be fused with a 2 Amp fuse before use.

This manual describes the operation of the NV8 Bank note Validator as fitted with Firmware Version 1-00

Please note that the NV8 Validator is NOT pin for pin compatible with the NV2/3/4/4X or 5 series products. The NV8 Validator is pin for pin compatible with the NV7 Validator

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 the factory for assistance. In this way we may continue to improve our product.

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Innovative Technology has a number of European and International Patents and Patents Pending protecting this product. If you require further details please contact the factory.

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Scope of Document

This document is intended for those whose will:

        a) Design the NV8 into items of equipment.

        b) Build equipment using the NV8.

        c) Install equipment containing the NV8.

        d) Maintain equipment containing the NV8.

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

CAUTION:

Never exceed the recommended environmental and electrical limits.

Do not attempt to lubricate the mechanisms as this may affect the note transport.

Do not polish the lens as this may alter the optical characteristics.

If the NV8 Validator is disassembled the unit must be re-calibrated/re initialised. The re-calibration option is included in the NV7/NV8 Currency manager though not enabled at all times. This option can be temporarily enabled by contacting ITL for a password. In the unlikely event of a problem it is better to have the complete unit checked.

Innovative Technology Ltd has a policy of continual product improvement. As a result the products supplied may vary from the specification described here. Innovative Technology is not responsible for any loss, harm, or damage caused by the installation and use of this product. This does not affect your local statutory rights. If in doubt please contact Innovative Technology for details of any changes. Alternatively visit our web site at

www.innovative-technology.co.uk

General Description

NV8 Validator - the next generation of Smiley® Bank Note validators
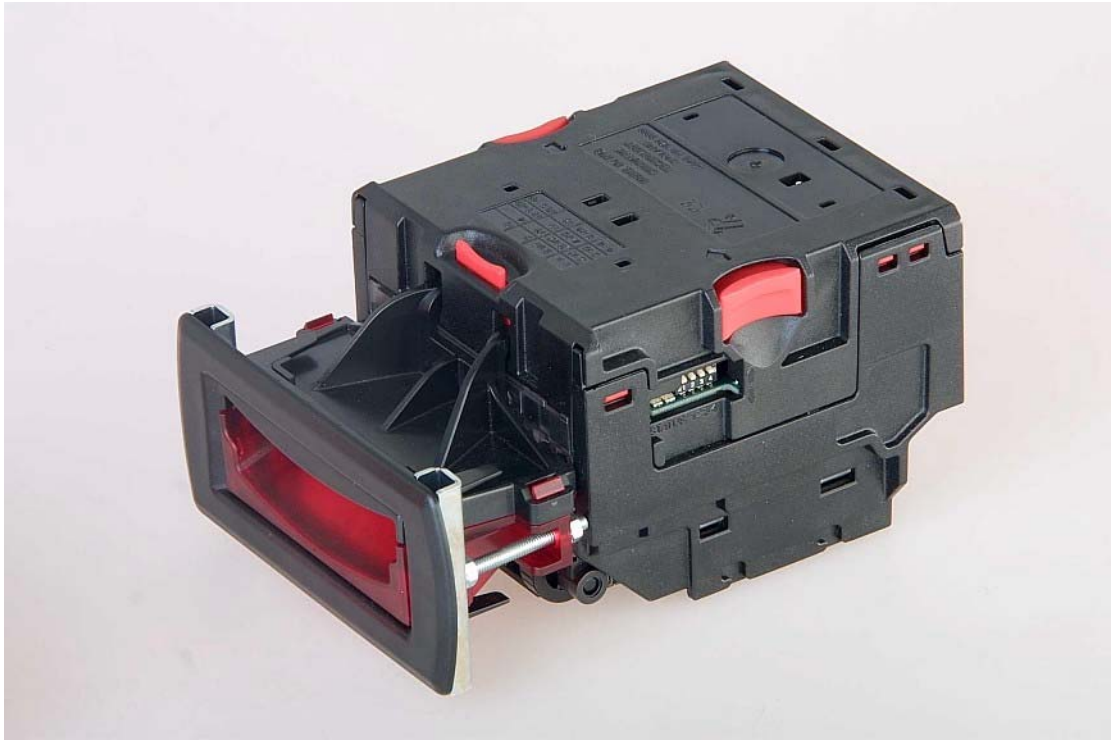
Figure 1 – The NV8 and bezel

The NV8 Bank Note Validator is a compact note validating machine, suitable for most money machines. It will accept up to 15 different denominations of notes in the serial control mode, pulse mode and binary mode and will cope with different designs of banknotes having the same value such as are found in the United Kingdom.

The NV8 Validator leaves the factory containing at least one currency data set so that it is ready for immediate installation. If it is desired to change the currency data set this may be done using either the NV8 to NV8 currency cloning system or the PC based Currency Management software. New currencies and applications are being tested all the time, so please refer to our web site or contact the factory for information concerning specific currencies if they are not already included on our approved list.

The NV8 has been designed for easy installation in most machines. The new stepped "smiling mouth" allows insertion of notes with one hand and simplifies the note handling mechanism.

Interfacing the Validator is very simple, with the choice of parallel open collector outputs, pulse stream output, SSP secure serial communications, binary or simple serial communications.

Other communication protocols will be available, see Appendices.

Environment and Power Requirements

Environment	Minimum	Maximum
Temperature	$+0^oC$	$+50^oC$
Humidity	5%	95% Non condensing

Electrical Supply	Minimum	Maximum	
Supply Voltage (V dc) Absolute Limits	11V	15V	
NOTE: If input voltage falls below 11v the NV8 may reject notes			
Supply Ripple Voltage		0.25V @100Hz	
Supply Currents			
Standby		350mA	
Validating		1000mA	

It is recommended that the power supply used can supply 1.5Amps.

User Interface.
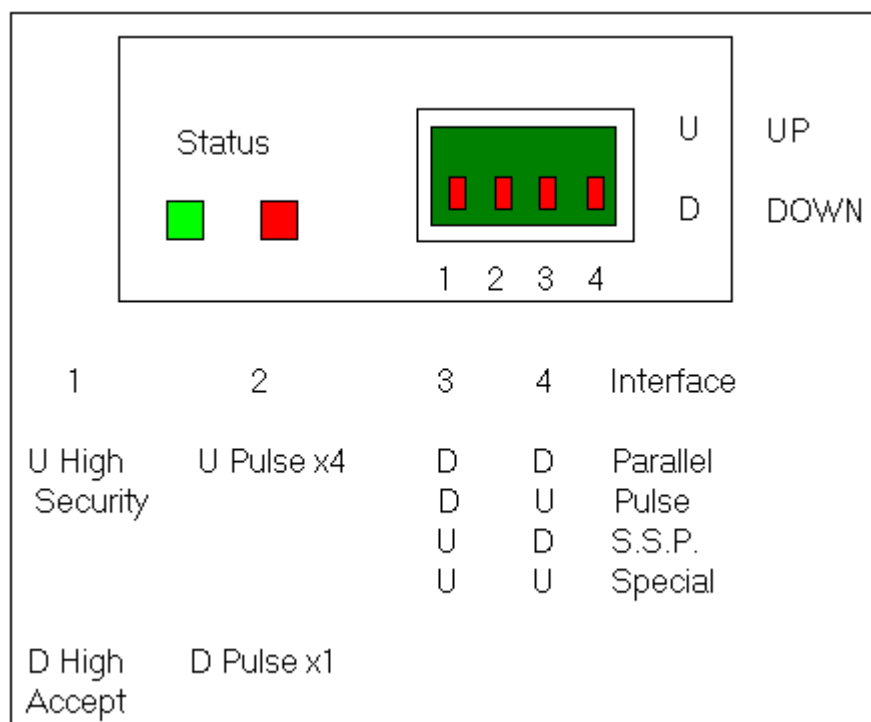
The user interface with the NV8 is shown above. It is simply a red and green LED and a set of four dipswitches. The LEDs indicate the operational status of the NV8, while the dipswitches set the basic operating mode of the unit.

LED status codes.

The meaning of the various status codes are described in the table below:

Slow flashing green led Heartbeat (slow = 1 second period)	In normal RUN operation, when the NV8 is ready to read a note, the green status led will flash slowly ("Heartbeat") to signal a "healthy" status.
Flashing red one second period	NV8 is jammed, somewhere in the note path
Fast flashing red (fast = half second period)	NV8 cannot calibrate, sensor(s) may be blocked

Dipswitch Settings.

Switch 1 – security setting.

Switch 1 allows the operator to alter the security sensitivity of the NV8. The NV8 can be configured for high acceptance (switch down), or for high security (switch up).

Switch 2 – pulse multiplier.

This switch is used to modify the behaviour of the selected machine interface. The details of the switches function is detailed in each of the interfaces' description in this manual. Currently the only interface to make use of this switch is the pulse mode. In this mode the switch can be used to multiply the number of pulses given by a factor of four. When the switch is down the multiplier is 1, when the switch is up the multiplier is four.

Switches 3 and 4 – Machine Interface selection.

These switches are used to select the machine interface to be used. The NV8 supports four interfaces, as shown in the table below:

Interface	Switch 3	Switch 4
Parralel	Down	Down
Pulse	Down	Up
SSP	Up	Down
Special	Up	Up

The details of the parallel, pulse, SSP and binary interfaces can be found in the machine interface appendices of this manual.

The special interface depends on the firmware that is used in the NV8, the firmware shipped as standard

is the binary interface. However there are several other options that can be downloaded by the user:

- CCTalk.
- ITL Simple serial I/O.
- Mars NIS

Information on each of these interfaces can be found in the appendices of this manual.

Machine Interface: Hardware.

The NV8 connector has sixteen pins, two are used for the 0v and +12v power supply, there are five outputs and five inputs, the remaining four pins are reserved for future use.
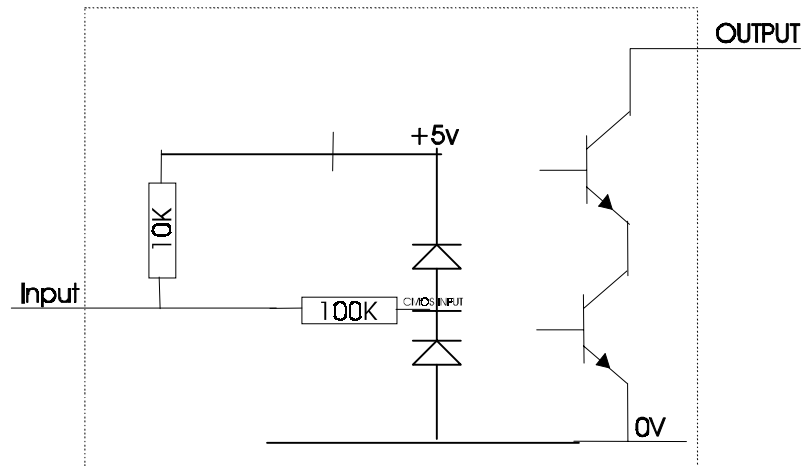
The input and output circuits are shown in the diagram above. All outputs are open collector transistors. All Inputs are held high to internal +5v via 10KΩ. The input structure is a CMOS gate with anti static protection fitted. Please ensure your signal LOW levels comply with the 74HC CMOS series specification for reliable operation.

Interface Logic levels	Logic Low	Logic High
Inputs	0V < Low < 0.5	+3.7V < High <12V
Outputs with 10KΩ pull up	0.6V	pull up voltage of host interface
Maximum Current Sink	50mA per output	

Note that the output low signal is affected by the value of the pull up resistor on the host interface.

Connector Details:

16 Pins, 0.1" pitch header, 2 rows by 8 pins.

Example mating connector: Molex Part No:39-51-2160
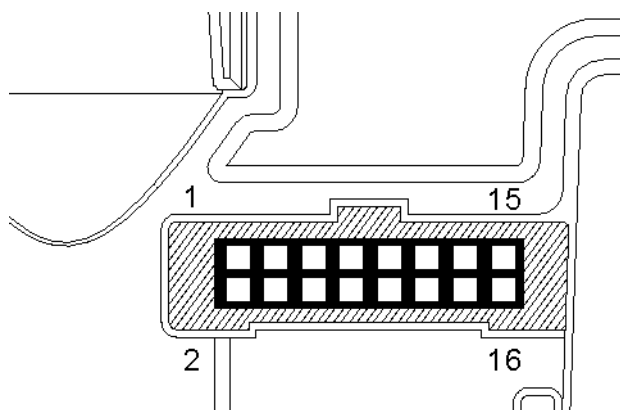
Connector Pinout.

Pin	Name:	Description:
1	Vend 1 **(binary bit 1)**	Note accepted on Channel 1, Also the Pulse Stream output Also the serial output pin in SSP and other serial modes
2	Vend 2 **(binary bit 2)**	Note accepted on Channel 2 pulse output
3	Vend 3 **(binary bit 4)**	Note accepted on Channel 3 pulse output
4	Vend 4 **(binary bit 8)**	Note accepted on Channel 4 pulse output
5	Inhibit 1	Inhibit channel 1 by holding this pin HIGH. To Enable a channel the inhibit must be held LOW. Also the Serial Input pin for SSP and other serial modes.
6	Inhibit 2	Inhibit channel 2 by holding this pin HIGH
7	Inhibit 3	Inhibit channel 3 by holding this pin HIGH
8	Inhibit 4	Inhibit channel 4 by holding this pin HIGH
9	Busy	NV8 is validating and stacking output. Active low while the NV8 is reading, transporting or stacking a note.
10	Escrow	Operate Escrow function by holding LOW, refer to Escrow section in parallel and binary modes for full details
11	No connection	Reserved
12	No connection	Reserved
13	No connection	Reserved
14	No connection	Reserved
15	+Vin	Nominal 12V DC supply
16	0V	0v Supply

Machine Interface: Protocols

Parallel input and output:

To use parallel outputs dip switch 3 and 4 must be down.

Vend Signals (Pins 1 to 4). The four channels have their own individual outputs. If a note is recognised then the relevant channel line is pulled low for 100 ± 3 milliseconds. It is recommended that pulses outside these limits be rejected as a precaution against false triggering due to noise.

Busy Output: (Pin 9). This is a general-purpose busy signal. It is active low while the NV8 is in operation.
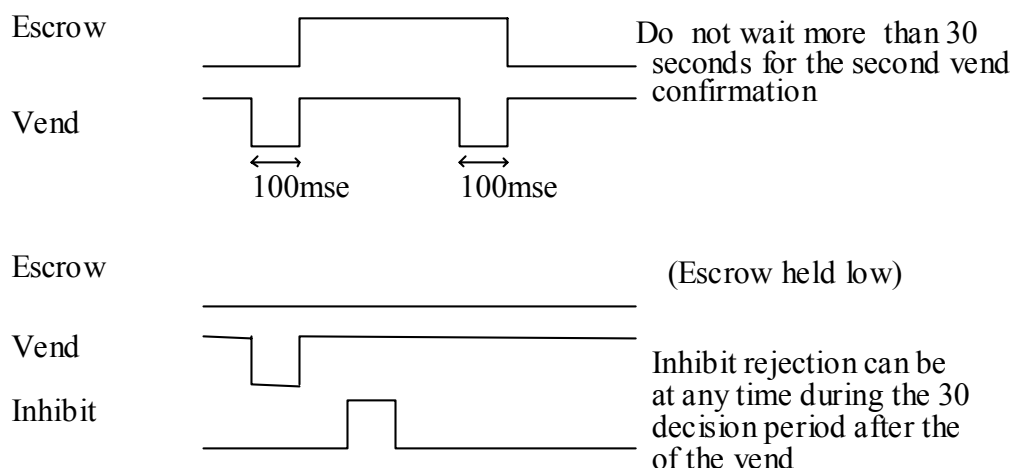
Escrow Control: (pin 10). The NV8 has a single note escrow facility. This allows the Validator to hold onto the note once accepted, and then only stack the note in the cash box when the host machine confirms that the Vend operation has been completed. If no confirmation of the Vend is received then the note will be returned to the customer after 30 seconds. If the host machine itself aborts the transaction by raising the corresponding inhibit input high, the note is returned immediately. The sequence of operations is as follows:

1. Pin 10 held low awaiting note insertion.

2. Note inserted. Validator issues a 100ms pulse on the appropriate channel.

3. The host machine initiates vend process.

4. The host machine raises pin 10 high to indicate that it wants the note. If this is not done within 30 seconds the Validator will return the note.

5. The Validator issues a 100ms pulse on the appropriate channel after pin 10 going high to indicate final acceptance of the note. (If the signal has not been received within 30 seconds it indicates the customer has forcibly retrieved the note and the vend should be aborted.)

6. The vend process is completed.

7. The host machine makes pin 10 low in expectation of the next vend.

The host can force the return of the note to the customer by raising the inhibit line high, at any time before the end of the 30 second time-out. For channels above 4, taking all the inhibits high will cause a note reject.

In the event of a note being forcibly removed from the mouth of the NV8 during the 30 second interval, the NV8 will go out of service for 45 seconds.

Escrow Timing Diagram for Parallel Vends:-

Inhibit Operation

Each channel (1 to 4) has its own inhibit input to allow the host machine to refuse specified values of notes. To inhibit a channel, the relevant inhibit input must be held high. To enable a channel the corresponding inhibit must be latched low so that notes may be accepted.

If all four inhibits are high simultaneously then the NV8 will not read in any notes. All four inhibits may be connected together to create a 'global' inhibit. In this way the NV8 may be brought in and out of operation by the host machine.

Pulse Stream Output:

To use pulse stream output dip switch 3 must be down, switch 4 must be up.

Vend Signal (Pins 1): When a note is recognised vend 1 will pulse a pre set number times, the number of pulses and the timing is set in the NV8 currency manager program (and set to default values with supplied dataset).

The number of pulses can be multiplied by a factor of four depending on the position of switch 2. If the switch is down then the number of pulses set in the dataset is output, if the switch is up then four times this number of pulses is output.

Busy Output: (Pin 9). This is a general-purpose busy signal. It is active low while the NV8 is in operation.

Escrow Control: (pin 10). It is recommended that escrow is not used in this mode, the pin should be held high or not connected.

Inhibit Operation: Each channel (1 to 4) has its own inhibit input to allow the host machine to refuse specified values of notes. To inhibit a channel, the relevant inhibit input must be held high. To enable a channel the corresponding inhibit must be latched low so that notes may be accepted.

If all four inhibits are high simultaneously then the NV8 will not read in any notes. All four inhibits may be connected together to create a 'global' inhibit. In this way the NV8 may be brought in and out of operation by the host machine.

SSP Smiley Secure Protocol

To use SSP dip switch 3 must be up, switch 4 must be down.

SSP is a secure interface specifically designed to address the problems experienced by cash handling systems in gaming machines. Problems such as acceptor swapping, reprogramming acceptors and line tapping are all addressed. This interface is recommended for all new designs.

 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. 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. Commands are currently provided for coin acceptors, note acceptors and coin hoppers. All current features of these devices are supported.

Features:

- Serial control of Note / Coin Validators and Hoppers

- 4 wire (Tx, Rx, +V, Gnd) system

- RS232 (like) - open collector driver

- High Speed 9600 Baud Rate

- 16 bit CRC error checking

- Data Transfer Mode

- Proven in the field

Benefits:

- Simple and low cost interfacing of transaction peripherals.

- High security control of payout peripherals.

- Defence against surrogate validator fraud.

- Straightforward integration into host machines.

- Remote programming of transaction peripherals

- Open standard for universal use.

For detailed information and full protocol specification please refer to SSP Specification ITL Drawing GA 138, this is available from the ITL website (www.innovative-technology.co.uk).

To help in the software implementation of the SSP protocol, Innovative Technology can provide, C Code, DLL controls and Visual Basic applications on request. Please contact the factory for assistance.

Binary Output:

To use binary output dip switches 3 & 4 must both be up and the BIN option of the interface firmware must be loaded into the NV8.

In the event that the machine needs more than 4 notes to be recognised, but the host machine cannot take advantage of the serial communication methods then the NV8 can be set to give a binary pattern output on the four parallel output pins.

If the NV8 is set to binary mode it will issue the vend signals as a binary pattern on the parallel outputs for 100 milliseconds. In this way a maximum of 15 different notes can be accepted.

Vend Signals (Pins 1 to 4). The four channels have their own individual outputs. If a note is recognised then the binary representation of the channel number will be pulled low for 100 ± 3 milliseconds. It is recommended that pulses outside these limits be rejected as a precaution against false triggering due to noise.

Busy Output: (Pin 9). This is a general-purpose busy signal. It is active low while the NV8 is in operation.

Escrow Control: (pin 10). The NV8 has a single note escrow facility. This allows the Validator to hold onto the note once accepted, and then only stack the note in the cash box when the host machine confirms that the Vend operation has been completed. If no confirmation of the Vend is received then the note will be returned to the customer after 30 seconds. If the host machine itself aborts the transaction by raising the corresponding inhibit input high, the note is returned immediately. The sequence of operations is as follows:

1. Pin 10 held low awaiting note insertion.

2. Note inserted. Validator issues a 100ms binary representation of the channel number

3. The host machine initiates vend process.

4. The host machine raises pin 10 high to indicate that it wants the note. If this is not done within 30 seconds the Validator will return the note.

5. The Validator issues a 100ms binary representation of the channel number after pin 10 going high to indicate final acceptance of the note. (If the signal has not been received within 30 seconds it indicates the customer has forcibly retrieved the note and the vend should be aborted.)

6. The vend process is completed.

7. The host machine makes pin 10 low in expectation of the next vend.

The host can force the return of the note to the customer by raising the inhibit line high, at any time before the end of the 30 second time-out. For channels above 4, taking all the inhibits high will cause a note reject.

In the event of a note being forcibly removed from the mouth of the NV8 during the 30 second interval, the NV8 will go out of service for 45 seconds.

Escrow Timing Diagram for Parallel Vends:-

Escrow ⎍ Do not wait more than 30 seconds for the second vend confirmation

Vend ⎍ ⎍

←→ 100mse   ←→ 100mse

Escrow _____ (Escrow held low)

Vend ⎍

Inhibit ⎍ Inhibit rejection can be at any time during the 30 decision period after the of the vend

Inhibit Operation: Each channel (1 to 4) has its own inhibit input to allow the host machine to refuse specified values of notes. To inhibit a channel, the relevant inhibit input must be held high. To enable a channel the corresponding inhibit must be latched low so that notes may be accepted. Note that channels higher than four can not be individually inhibited, but will be globally inhibited if inhibits 1 to 4 are inhibited.

If all four inhibits are high simultaneously then the NV8 will not read in any notes. All four inhibits may be connected together to create a 'global' inhibit. In this way the NV8 may be brought in and out of operation by the host machine.

Updating Currency and Firmware.

Validators are normally supplied ready taught from the factory. This section may be skipped unless the validators need to be re-taught with a new note or currency.

The NV8 Validator may only be programmed using the NV8 currency download manager or by cloning from a master unit:

Currency manager.

Use the NV8 Currency Manager Software, which is supplied with a range of currencies. To use this system you will require a PC running Windows 95/98/NT/XP™, Pentium™ 100MHz or faster with a serial port, and a 12volt dc power supply to power the validator. (© Microsoft and Intel). A list of currently supported currencies is maintained on our web site, and new releases can be downloaded from there. Further details are available from Sales at Innovative Technology Ltd.

NV8 – NV8 Copy (Cloning)

Overview

The facility exists for using an NV8 Bank Note Validator to copy its programme and settings to another NV8 The 'Master' validator will transmit the currency data and upgrade the slave's firmware if necessary.

Requirements

- Master to have firmware 1.08 or greater
- NV8 copy cable assembly.
- 12V supply.

NV8 Copy Cable Diagram

Master   **Slave**

Vend 4

Inhibit 4

Inhibit 1 ————————————————————————————— Vend 1

Vend 1 ————————————————————————————— Inhibit 1

0v ————————————————————————————— 0v

12v ————————————————————————————— 12v

+12V SUPPLY
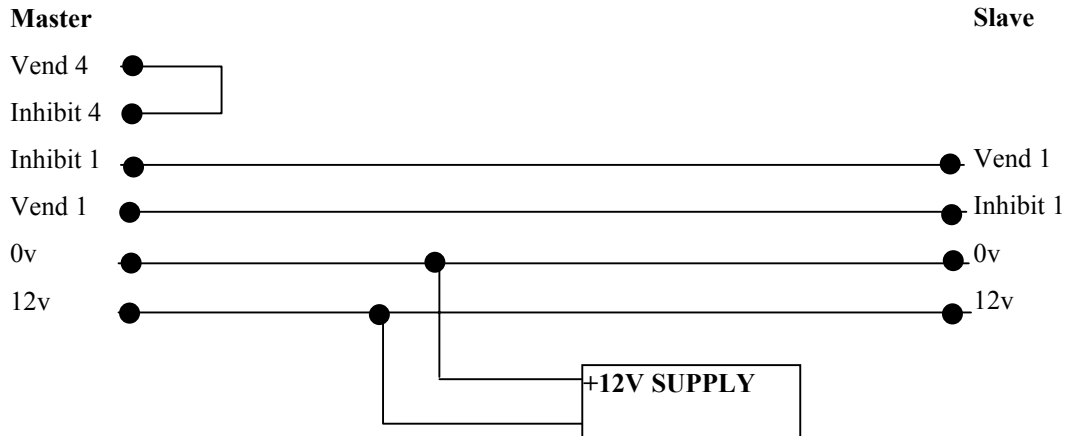
Start-up configuration

- Remove power from slave and master units.
- Set dip switches 3 UP and 4 DOWN to select SSP interface mode on both NV8s.
- Connect the two units together as above. Make sure Vend 4 is connected to Inhibit 4 on the master unit.
- Turn on the 12V supply.
- The Master unit will update the slave firmware if the version of the master is greater than the slave.If the master firmware is less than the slave, then the copy process is aborted.

NV8 – NV8 copy process.

- Connect NV8 master to slave using copy adaptor and apply power
- Master unit will flash RED and GREEN LED if the connector is configured correctly.
  - RED and GREEN on master flash together – attempting to communicate with slave.

- RED and GREEN on master flash alternately - communication established, master waiting for slave to reset.

- If communication has been established and slave has reset then the master will read slave firmware version and decide on next action.

- If the master is not compatible with the slave master RED and GREEN LED's will flash alternately at 1-second rate. No further copy action will take place.

- If slave firmware version is greater than master: Master RED and GREEN LED's will flash alternately at 1-second rate. No further copy action will take place.

- If slave firmware version is same as master then master will start to copy currency data to slave.

- If slave firmware version is less than master then master will start to copy firmware data to slave.

Firmware copy:

- Master RED LED will blink rapidly during firmware copy (the LED will pause from time to time).

- If master RED LED changed to slow blink (1 per second) then communication has been lost and copying should be restarted from beginning.

- When firmware copy is complete, slave will reset and Master unit will wait to re-establish communications. (LED flashes as at first stage power-up).

- When slave is ready, master will initiate currency data copy.

Currency copy:

- Master GREEN LED will blink rapidly during the currency copy process (the LED will pause from time to time).

- If master RED LED changed to slow blink (1 per second) then communication has been lost and copying should be restarted from beginning.

- When currency copy is complete, Master will show GREEN and RED LEDs continuously and slave will reset.

- NV8 – NV8 copy is now complete.

Mechanical Installation

The NV8 validator will be supplied with the universal Bezel (PA231)

Fitting the bezel into a machine.

Remove the four nuts from the bolts on each side of the bezel. Remove the two metal clamps and star washers from the bolts also. Place PM391 through the aperture in the door of the machine from the front. Fit the two metal clamps and star washers and tighten the nuts onto the bolts (recommended torque 25cN per metre). Fit the main bezel assembly onto the bolts with the black part to the top. Fit the star washers and tighten the nuts onto the bolts (recommended torque 25cN per metre).

Precautions in fitting the NV8 into a machine.

It is necessary to have clearance around the initial exit (see drawing GA130 in Appendix A) so that there is no obstruction to the banknotes as they are being read by the NV8.

It is necessary to have suitable cash box so that the notes are securely stored away from the note exit (see drawing GA130 in Appendix A), to prevent the possibility of notes accumulating at the note exit.

The cash box should form a physical barrier between the initial exit and the note exit.

For help on installing the NV8 into a new design please contact Innovative Technology.

Changing or removing the bezels:

Push the red button at the centre on the top of the NV8. The NV8 may then be unhooked from the 4 locating points. To refit hook the NV8 onto the bottom two locating points and now lift to fit onto the top two locating points. The NV8 will 'click' home into the bezel when fitted correctly.

Routine Maintenance

The NV8 Validator has been designed to minimise any performance variation over time. Much of this is achieved by careful hardware and software design. However, depending upon the environment the NV8 may at some time require cleaning or even re-calibration.

Cleaning:

Slide the red catch on the end of the NV8 Validator to open the note path. The note path and lozenge may now be exposed for cleaning. Wipe the surfaces with a soft lint free cloth that has been dampened with a water and detergent solution (such as a household washing up liquid) **NEVER** use a solvent based cleaner such as alcohol, petrol, methylated spirits, white spirit, or PCB cleaner. This will result in permanent damage to the validator. Take particular care around the lenses. If a lens has become badly scratched do not attempt to polish it as this may damage the optical properties.

Re-Calibration:

The NV8 has an in-built self-calibration system that maintains the optical sensors at their best operating point In normal operation manual re calibration of the NV8 is not necessary.

Fault Finding

Problem	Check:	Solution
Validator will not take notes:	Is the Bezel Illuminated?	Check power supply, Check interface system
Validator runs slowly or intermittently:	Make sure there are no foreign objects in the note path	Clean the note path
	Check voltage level of supply	Ensure correct supply and sufficient current.
	Check for damage	Replace Path components
	Ensure there is no grease on drive belts	Replace belts
Notes pass through the validator but do not give a vend signal	Is the power supply inside specification. Which interface have you selected	Ensure correct supply and sufficient current. Check dip switch settings Check Interface system
Unit rejects genuine notes	Check that the unit has been programmed for this note.	Check Currency on label
	Check the security setting	Adjust security setting

Support Tools

The following support tools are available for use with the NV8 Bank Note Validator:

1. PC Currency Manager Software.

2. Downloads from the Innovative Technology Ltd website: **www.innovative-technology.co.uk**

PC Currency Programming Software.

The NV7 Currency Manager software will also work with the NV8 and offers the following functions:

- Teach the NV8 Validator by downloading pre-prepared currency data via the serial communications link.

- Check the firmware version and currency set already loaded on an NV8 unit

- Adjust the channel and pulse configuration on a pre-programmed NV8 to your own requirements

- Download a new version of firmware onto the NV8

- Use diagnostic functions to check validator operation (firmware version 1.04 and greater only)

The software will run on an IBM compatible Personal Computer with Pentium™ processor or equivalent and requires a DA1 which must be fitted to the PC serial port. This program runs under the Windows 95/98/NT™/XP operating system, and requires one free serial port to connect to the NV8. (© Microsoft and Intel).

Internet Website support.

The Innovative Technology Ltd website provides the means to download new and updated currency sets and new versions of firmware for the NV8. Visit **www.innovative-technology.co.uk** for further details. Technical bulletins are also made available. Note the files are password protected to prevent abuse. Periodically the passwords are changed. Please contact sales at Innovative Technology for password updates.

Email Support.

If the data you require is not available over the Internet Innovative Technology supports an email system to help customers with unusual requirements. The address is **sales@innovative-technology.co.uk**

Appendix A. - Parts List and Drawing

NV8 EXPLODED VIEW

No	PART No	DESCRIPTION	QTY
2	PM253	UPPER NOTE PATH	1
3	PM254	DRIVE NOTE PATH (MAG)	1*
4	PM255	DRIVE NOTE PATH	1*
5	PM304	ROLLER WHEEL	10
6	PM332	GEAR 28t 11t 0.635m	1
7	PM333	GEAR 38t 0.5m 11t 0.635m	1
8	PM337	NOTE PRESSURE WHEEL	1
9	PM370	UPPER BODY	1
10	PM372	DRIVE UNIT BODY	1
11	PM374	FLAG	1
12	PM375	DRIVE WHEEL, GEARED	1
13	PM376	DRIVE WHEEL	1
14	PM377	PRESSURE WHEELS	1
15	PM378	WHEEL CARRIER	4
16	PM379	REAR SEPARATOR	1
17	PM380	BARREL WHEEL	1
18	PM381	BARREL WHEEL TYRE	2
19	PM382	DRIVE BELT	1
20	PM383	NV8 BEZEL LOWER PATH	1
21	PM384	NV8 BEZEL UPPER PATH	1
22	PM385	LOCKING PLATE	1
23	PM386	BEARING BLOCK	2
24	PM387	FLANGED ROLLER WHEEL	1
25	PM389	GEAR COVER	1
26	PM390	LIGHTPIPE	1
27	PM391	NV8 BEZEL FACIA PLATE	1
28	PM392	LOWER COVER PLATE	1
29	PM395	THIN WHEEL CARRIER	2
30	PM397	B.O.D. LIGHT SHIELD	1
31			
32	PA240	BELT DRIVE SUB-ASSY	1
33			
34	PB156	NV8 CPU PCB	1
35	PB157	NV8 MOTOR PCB	1
36			
37	MC157	RATIO SHAFT	1
38	MC189	BEZEL FACIA CLAMP	2
39			
40	SC109	FACIA BOLT	2
41			
42	SP108	CARRIER SPRING	8
43	SP117	BELT TENSION SPRING	2
44	SP123	NV8 TORSION SPRING	2
45	SP124	NV8 FLAG SPRING	1
46	SP127	NV8 SPRING FOR PM379	2
47			
48	WS102	DIA 4 SHOCKPROOF WASHER	4
49	WS107	M4 HEX NUT	4

No	PART No	DESCRIPTION	QTY
50	LB138	NV8 PRODUCT LABEL	1
51			1

MAGNETIC SENSOR UNIT (REPLACE PM255)

DRAWN MWS DATE 12-6-03
CHECKED JEB DATE 13-6-03
TITLE: NV8 EXPLODED VIEW
MATERIAL
SCALE NTS
FINISH
DRG No. GA311
ISSUE A
TOOL No.

REFERENCE ONLY.
DESTROY AFTER USE.
ALWAYS REFER TO LATEST ISSUE.

ALL DIMENSIONS SHOWN ARE NOMINAL SIZES.

DO NOT SCALE   IF IN DOUBT - ASK !!!

3rd ANGLE PROJECTION

INNOVATIVE TECHNOLOGY LIMITED
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Appendix B: Extended Interface – ITL Simple Serial.

Existing Smiley® NV4 users may already be using the serial input/output facility. The NV8 Validator also supports this system. However this interface is not recommended for new designs, the SSP interface is recommended. The NV8 does not support the Simple serial data out only mode as available on NV4. It only supports the serial data Input/Output mode.

To use simple serial mode dip switches 3 & 4 must both be up and the SIO option of the interface firmware must be loaded into the NV8. The NV8 serial output and input **Do Not** operate at true RS232 voltage levels.

Commands are provided to fully control the operation of the validator. The notes to be accepted and rejected can be set, a single escrow mode can be enabled. In simple serial mode single byte commands are transmitted to the Validator, the Validator echoes each valid command it receives. Note that the host should not echo messages back to the Validator.

The serial I/O mode supports two baud rates; 300 baud when Inhibit 2 is pulled high or left floating at power up; and 9600 Baud rate when Inhibit 2 line is held low at power up. The data is formatted as follows:

- 1 start bits

- 8 data bits.

- 2 stop bits.

The NV8 will not be enabled in serial I/O mode if Inhibit 3 line is held low when the unit is powered up.

The NV8 will transmit the following event codes:

MESSAGE	DECIMAL VALUE
Accept on C1	1
Accept on C2	2
Accept on C3	3
Accept on C4	4
Accept on C5	5
Accept on C6	6
Accept on C7	7
Accept on C8	8
Accept on C9	9
Accept on C10	10
Accept on C11	11
Accept on C12	12
Accept on C13	13
Accept on C14	14
Accept on C15	15
Accept on C16	16
Note Not Recognised	20
Mechanism running slow	30
Strimming attempted	40
Channel 5 Note Rejected (fraud channel)	50
STACKER Full or Jammed	60
Abort During Escrow	70
Note may have been taken to clear jam	80
Validator Busy	120
Validator Not Busy	121
Command Error	255

The NV8 will accept the following commands from the host machine:

MESSAGE	DECIMAL VALUE
Inhibit C1	131

Inhibit C2	132
Inhibit C3	133
Inhibit C4	134
Inhibit C5	135
Inhibit C6	136
Inhibit C7	137
Inhibit C8	138
Inhibit C9	139
Inhibit C10	140
Inhibit C11	141
Inhibit C12	142
Inhibit C13	143
Inhibit C14	144
Inhibit C15	145
Inhibit C16	146
Uninhibit C1	151
Uninhibit C2	152
Uninhibit C3	153
Uninhibit C4	154
Uninhibit C5	155
Uninhibit C6	156
Uninhibit C7	157
Uninhibit C8	158
Uninhibit C9	159
Uninhibit C10	160
Uninhibit C11	161
Uninhibit C12	162
Uninhibit C13	163
Uninhibit C14	164
Uninhibit C15	165
Uninhibit C16	166
Enable serial escrow mode	170
Disable serial escrow mode	171
Accept Escrow	172
Reject Escrow	173
Status	182
Enable all channels	184
Disable all channels	185
Disable escrow timeout	190
Enable escrow timeout	191

Example transactions are shown in the tables below:

Event	Validator		Host
Note entered into validator Note Accepted Channel 2	Validator Busy Validator Ready Accept on Channel 2	120 ➔ 121 ➔ 2 ➔	
Note entered into validator Note not recognised Validator has returned note	Validator Busy Validator Ready Note not recognised Validator Ready	120 ➔ 121 ➔ 20 ➔ 121 ➔	
Software Inhibit Channel 4	Inhibit C4 Channel 4 Inhibited	⬅ 134 134 ➔	Inhibit C4
Software Enable Channel 4	Uninhibit C4 Channel 4 Inhibited	⬅ 154 154 ➔	Uninhibit C4
Status Report 3 byte status message	Inhibit status Channels 1-8 Inhibit status Channels 9-16 Escrow On (=1) / Off (=0)	⬅ 182 byte 1➔ byte 2➔ byte 3➔	Status Request
Turn on Escrow Mode	Escrow Mode Enabled	⬅ 170 170 ➔	Enable Escrow Mode
Note accept in Escrow Mode Note entered into validator Note Accepted Channel 2	Validator Busy Validator Ready Accept on Channel 2 Accept Escrow Accept on Channel 2	120 ➔ 121 ➔ 2 ➔ ⬅ 172 172 ➔ 2 ➔	Accept Note in Escrow

Appendix C: Extended Interface – USA Serial.

The USA Serial interface is a non isolated interface serial communications protocol. There is a single output DATA line from the NV8. There are three control lines, two from the controller ACCEPT ENABLE, SEND and one from the validator INTERRUPT. The NV8 ground must be connected to the ground of the control system.

 Connection Details

Signal	NV8
0v	16
Enable	6
Send	7
IRQ	2
DATA	1
OUT_OF_SERVICE	3

 Please note that the NV8 works on a +12volt DC power supply.
For further details on this protocol please refer to the Series 2000 Interface manual Reference number 20105-002850046-PS

Appendix D: Extended Interface – CCTalk.

The NV8 supports the CCTalk serial protocol for easy interfacing with host machines that support this protocol. The Dipswitch settings must select Special mode, switches 3 and 4 both in the Up position. The NV8 must have the CCTalk software loaded using the Advanced option on the Currency manager program.

Pin out connections on NV8 for CCTalk shown looking at the connection pins on the NV8.
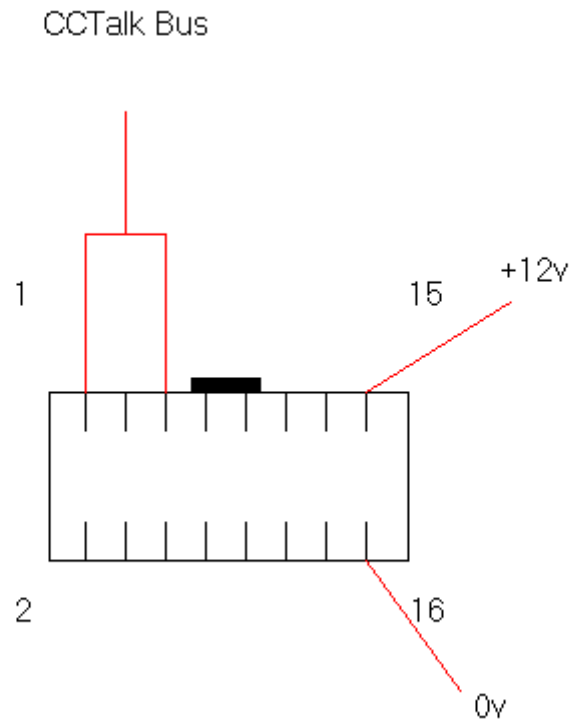
The default encryption key has been set to the key code printed on the label on the NV8. If the key is changed to a new stored key, the key can be reset to the default by the following.

1. Power off NV8,

2. Switch all 4 Dip switches to the Up position,

3. Apply power (no CCTalk comms),

4. Red led will now be flashing,

5. Click down switches 1 then 2.

The code is now reset.