

SECTION 4

NV11 MANUAL SET

MECHANICAL AND ELECTRICAL MANUAL

INTELLIGENCE IN VALIDATION

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

NV11 MANUAL SET – SECTION 4

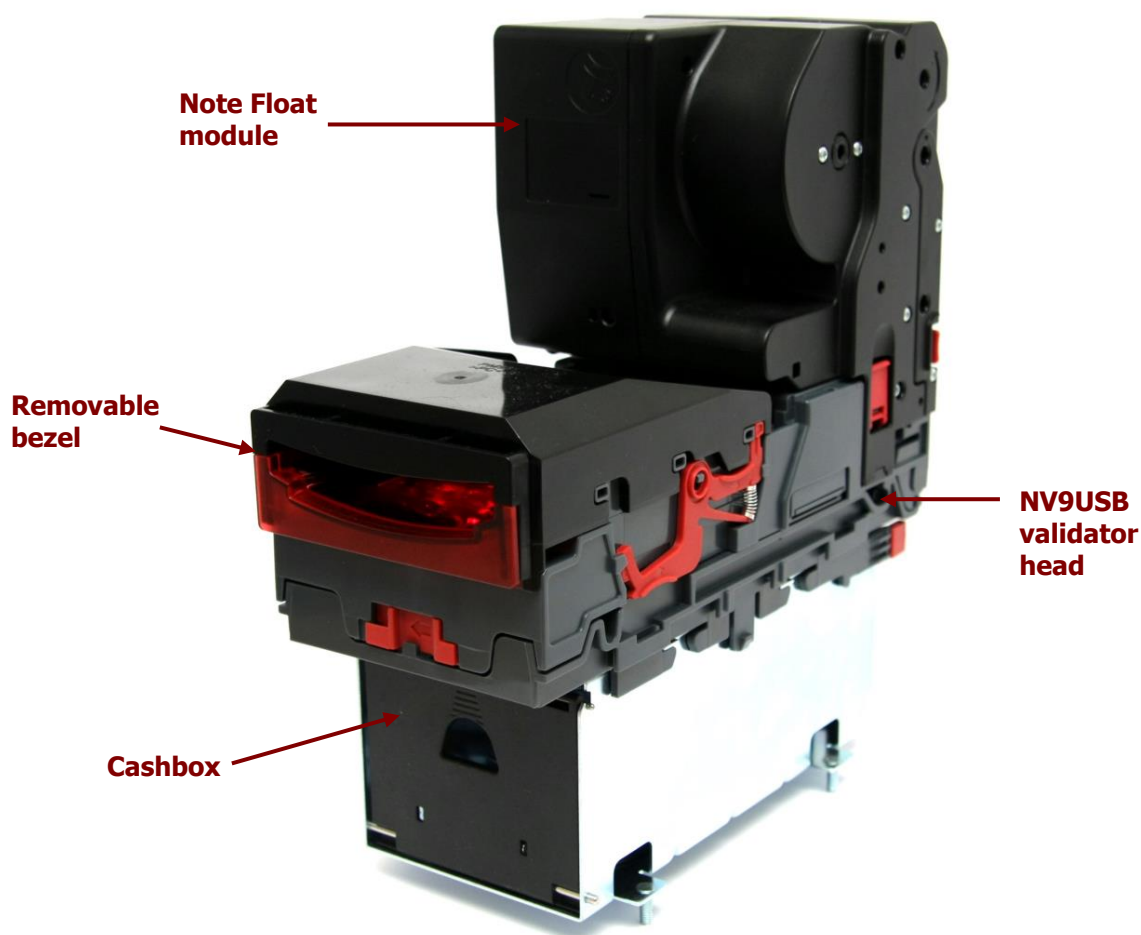
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4. MECHANICAL AND ELECTRICAL MANUAL

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

4.1 Introduction

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



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

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

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



NV11
Rear View



NV11
Side View



NV11
Front View



Information

Validator compatibility.

The NV11 validator is pin for pin compatible with the NV7 / NV8 / NV9 / NV10 series of validators, but **NOT** with earlier versions of the product (NV2 – NV5).

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

4.2 Assembly and Fitting Instructions

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



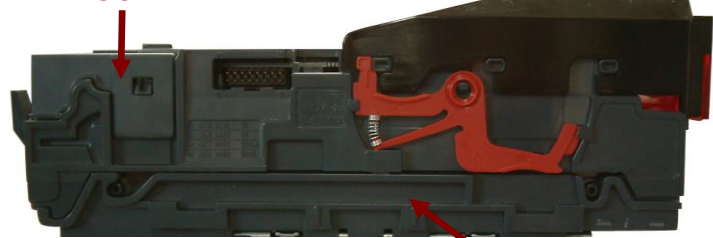
Information

Validator compatibility.

The NV11 validator is pin for pin compatible with the NV7 / NV8 / NV9 / NV10 series of validators, but **NOT** with earlier versions of the product (NV2 – NV5).

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

Blanking plate



Validator head



Release catch



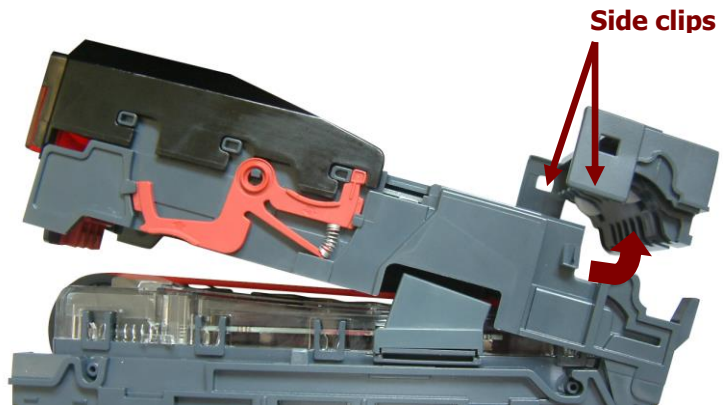
Caution!

Validator head **MUST** be opened.

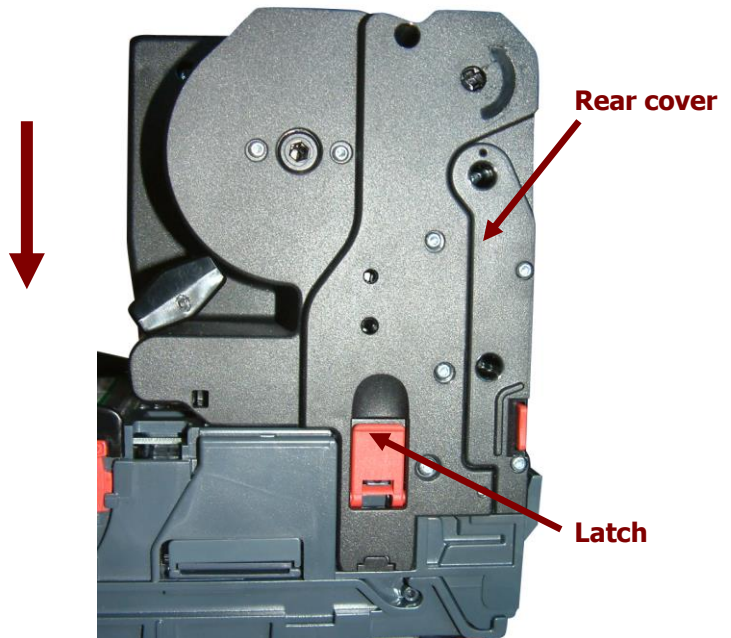
Always make sure the validator head has been opened **BEFORE** trying to remove the blanking plate – trying to remove the blanking plate with the validator head closed will cause unit damage.



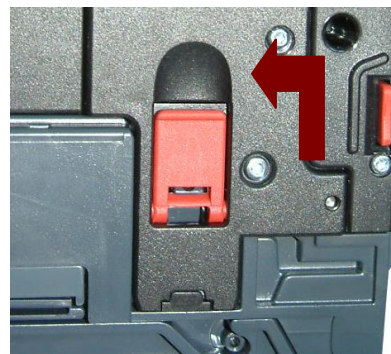
3. Remove the blanking plate by disengaging the two side clips and lifting the blanking plate upwards



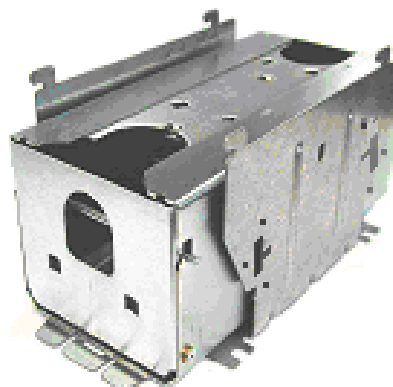
4. Close the validator head and then carefully fit the Note Float module onto the validator head, making sure the rear cover is securely closed and the latches are lined up correctly



5. Make sure both latches are engaged and closed



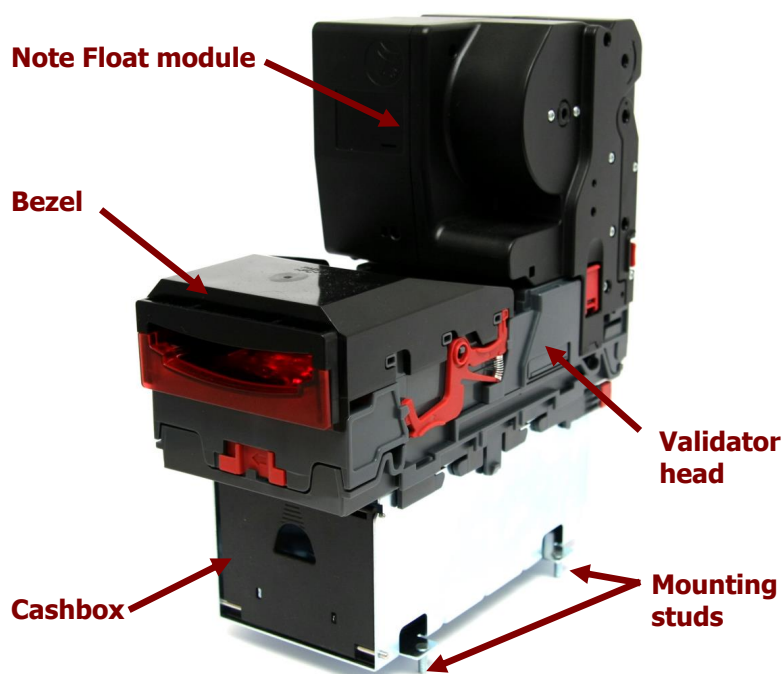
6. The validator can be fitted with a standard or slide-on cashbox of 300 or 600 note capacity



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



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





Information

Check website for options.

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

4.3 Bezel Removal and Refitting

- The bezel is removed by pushing the red locking arms on both sides of the validator upwards, and sliding the bezel away from the locking arms

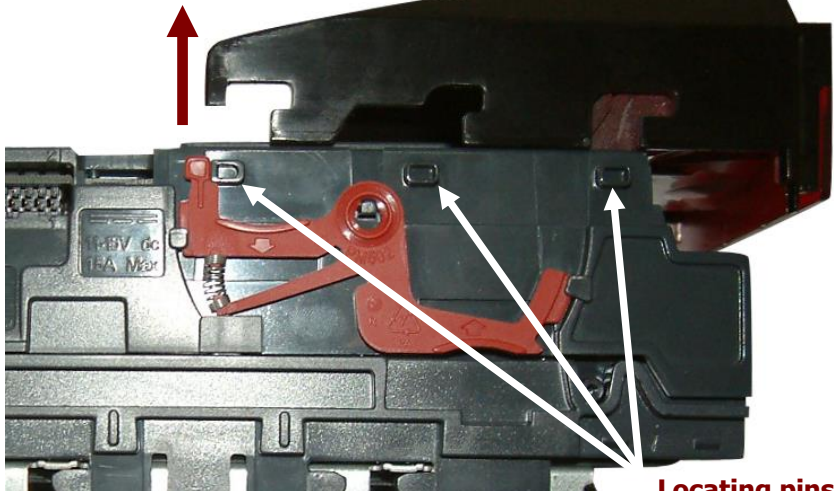
b. Slide bezel away from locking arms



a. Push locking arms upwards

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

Lift upwards to remove



Locating pins

The bezel is refitted by pushing the bezel back onto the locating pins and sliding backwards until all six pins are engaged in the slots. The locking arms will then spring back and locate into the bezel.



**Caution!**

Check locking arms.

Always make sure that **BOTH** locking arms are fully located in the bezel – trying to operate the validator if they are not correctly located can cause unit damage.

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

4.4 Technical Specifications

The full technical specifications for the NV11 validator can be found in Section 6, Appendix B of this manual set. A brief summary is given here:

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

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

**WARNING!**

Use suitable power supply

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

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

- For 12V operation, use TDK Lambda model SWS50-12. This power supply is available from a variety of suppliers including Farnell (stock code 1184645) and RS (stock code 466-5869).



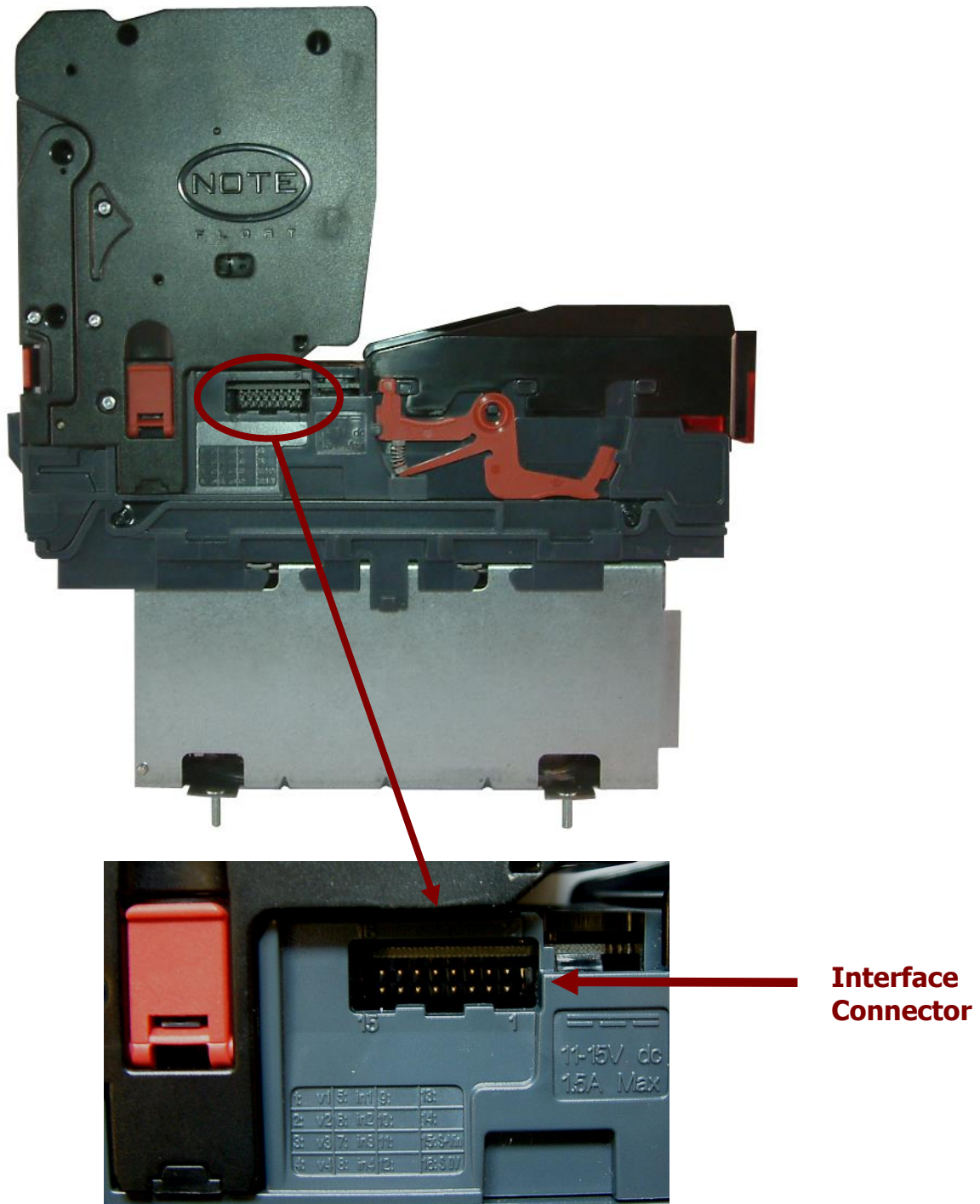
4.5 Cable Specifications

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

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

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

4.6 Electrical Interfaces



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

**Information**

Power always required regardless of connection type.

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

The connector is a 16 pin socket used to interface the NV11 to the host machine. The pin numbering of the socket is shown below, as well as an overview of the socket connections:



Pin	Description
1	Serial Data Out (Tx)
5	Serial Data In (Rx)
11	USB Data +
12	USB Data -
13	USB Power (+5V)
15	+ V
16	0V / Ground Connection

To use a USB connection with the NV11, a USB cable fitted with a 16 way connector on one end (ITL Part Number CN00392) should be used. The CN00392 cable fits into the 16 way connector and allows high speed programming and serial communications when used in SSP and ccTalk modes.

When using the USB connection, power must be supplied to the NV11 using the CN00392 cable. The socket connections for the natively supported protocols are shown in the tables below:

**WARNING!**

Risk of unit damage

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



NV11 SSP Interface:

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

NV11 ccTalk Interface:

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



4.7 Configuration Button

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

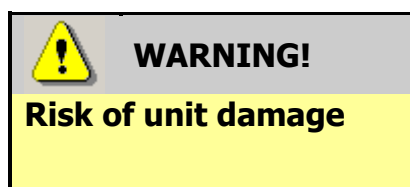


There are several functions available when using the Configuration Button, and these are listed in this table:

Action	Power Status	Function
Press and hold (more than 2 seconds) until the bezel illuminates, then release	Powered ON	Sets validator to Programming mode (SSP)
Press twice (within half a second)	Powered ON	Shows current interface type (see flash count table below)
Press once when Note Float module status LED is flashing (transport error)	Powered ON	Acknowledges that a note blockage has been cleared

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

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



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

4.8 Programming

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

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

4.9 Basic Operation

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

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

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

NV9USB Bezel Flash Codes:

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



Note Float Module Flash Codes:

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

4.10 Spare Parts

ITL Part Number	Description	Details
CN00215	Ribbon interface cable	Provides connection between DA2 and NV11
Comments: Please consult the tables on the next page for pin out and connector information.		

CN00215 Parts List

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

CN215 Connectivity

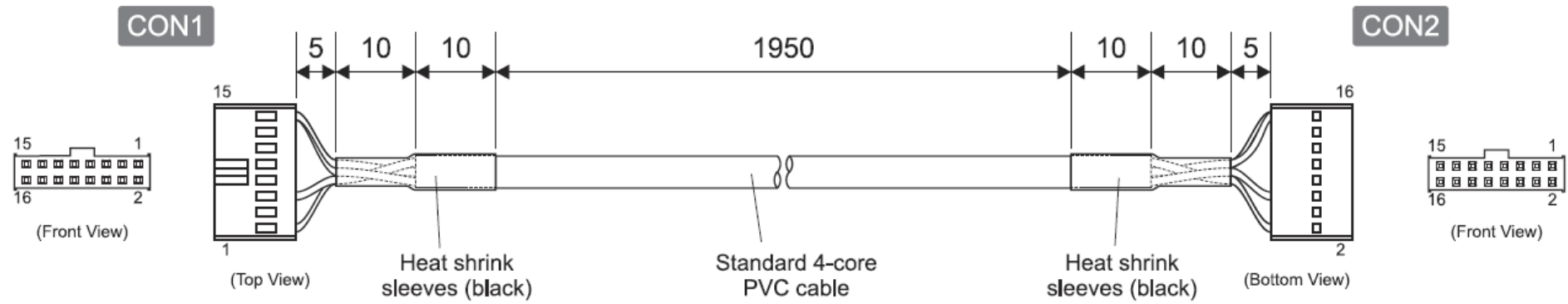
CON1	CON2	Gauge	Colour	Comments
Pin				
1	1	24 AWG	Orange	
5	5	24 AWG	Brown	
15	15	24 AWG	Red	V IN
16	16	24 AWG	Black	GND
Notes: Pins 3, 4, 7, 8, 9, 10, 13 and 14 have no crimps fitted Pins 2, 6, 11 and 12 have crimps fitted but these are not connected.				

**WARNING!**

Use correct wire gauges

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



ITL Part Number	Description	Details
CN00292	Interface cable	Provides connection between DA2 and NV11
 The diagram illustrates the CN00292 interface cable assembly. It consists of a central 'Standard 4-core PVC cable' with a total length of 1950 units. At each end, there is a 16-pin connector, labeled CON1 and CON2. Each connector is shown from both a top and bottom perspective. The cable is terminated with 'Heat shrink sleeves (black)'. The dimensions for these sleeves are specified as 5 units for the inner sleeve and 10 units for the outer sleeve. The cable is labeled 'Standard 4-core PVC cable'.		
Comments: Please consult the tables on the next page for pin out and connector information.		

CN00292 Parts List

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

CN00292 Connectivity

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

**WARNING!**

Use correct wire gauges

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



ITL Part Number	Description	Details
CN00392	Power and USB Communication Cable	USB 2.0 Compliant Type A to 16 way header cable

Figure 1: Soldered together connections

- Black USB GND to CON1.1
- Black 0V to CON2.16
- Black 0V to T2
- USB Screen Insulate using Heat Shrink

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

CN00392 Parts List

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

CN00392 Connectivity

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

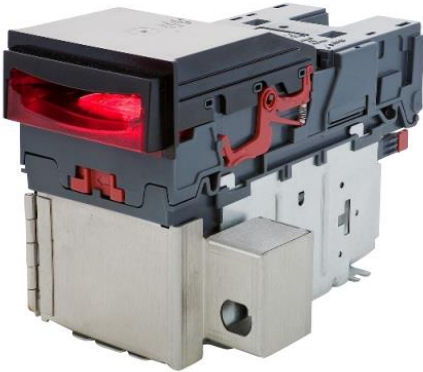
**WARNING!**

Use correct wire gauges

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



Bezels		
ITL Part Number	Description	
PA00189	Horizontal Bezel Assembly	
PA00268	69mm Fixed Width Horizontal Bezel	No image available
PA00896	Horizontal Bezel Assembly	

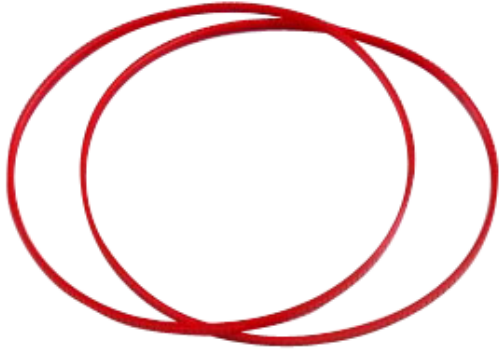
Cashboxes		
PA00186	Locking Cashbox Assembly (300L)	
PA00192	Slide-on Cashbox Assembly (300S)	
PA00898	Standard Cashbox Assembly	

**Information**

Check website for options.

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

Drive Belts

FD00106	NV9USB Red Drive Belt	
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4.11 Guidance Notes

Cleaning

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



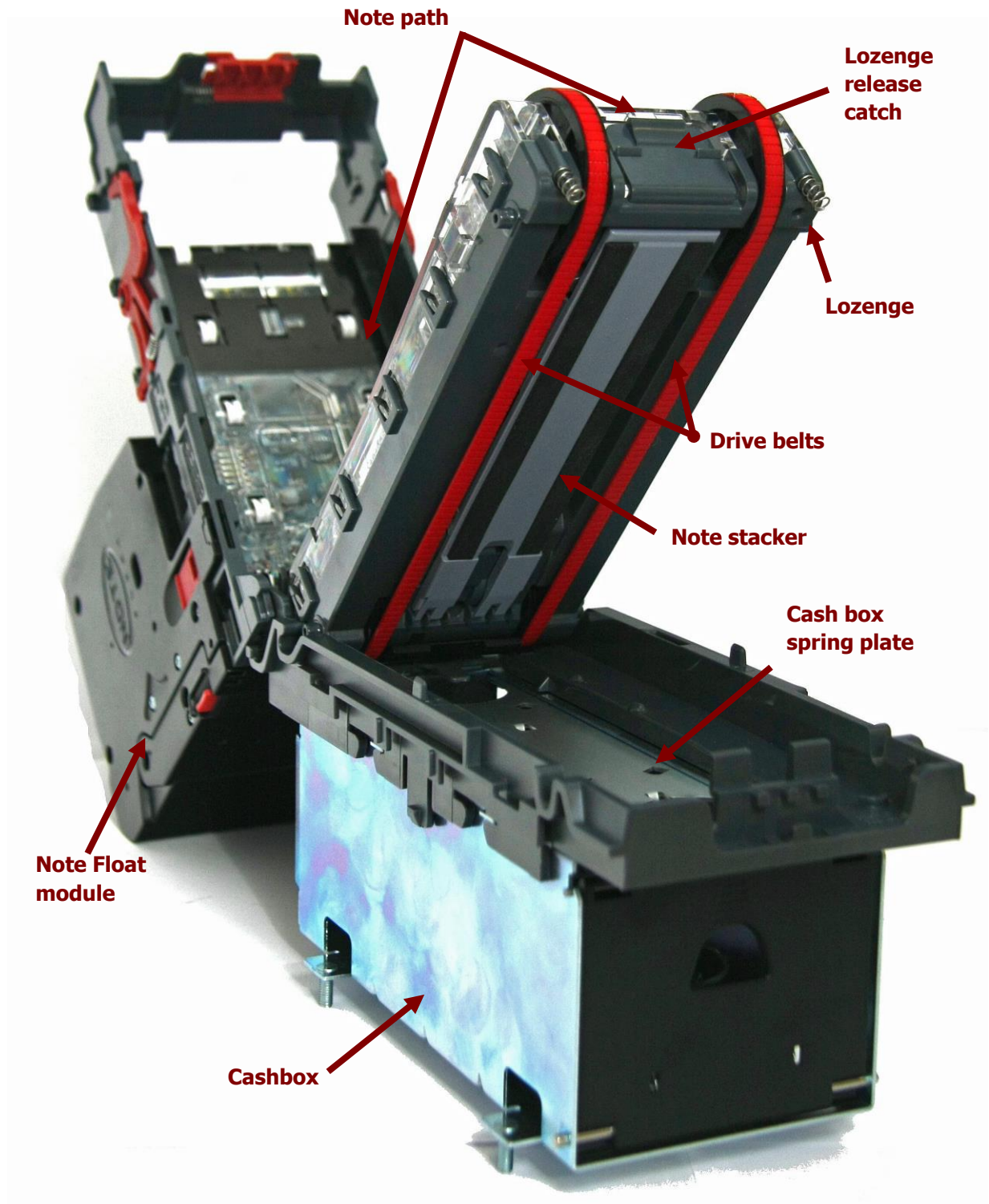
Caution!

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

Do not use solvent based cleaners such as alcohol, petrol, methylated spirits, white spirit or PCB cleaner. Using these solvents can cause permanent damage to the unit; only use a mild detergent solution as directed below.

To clean the NV11, open the note path by sliding the red release catch on the front of the validator to the left (as indicated in the picture) - this will allow access to the lozenge and note path



**WARNING!**

Disconnect power **BEFORE**
any cleaning operation

Unless stated otherwise, you should disconnect the power **BEFORE** carrying out any cleaning operations to avoid the risk of causing damage to the validator.



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

**WARNING!**

Do not try to disassemble

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

1. Open both the Note Float side latches as shown

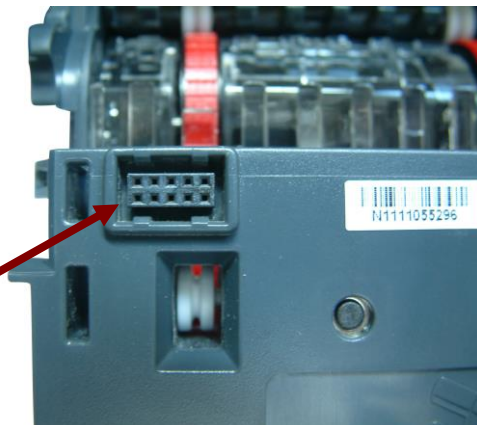


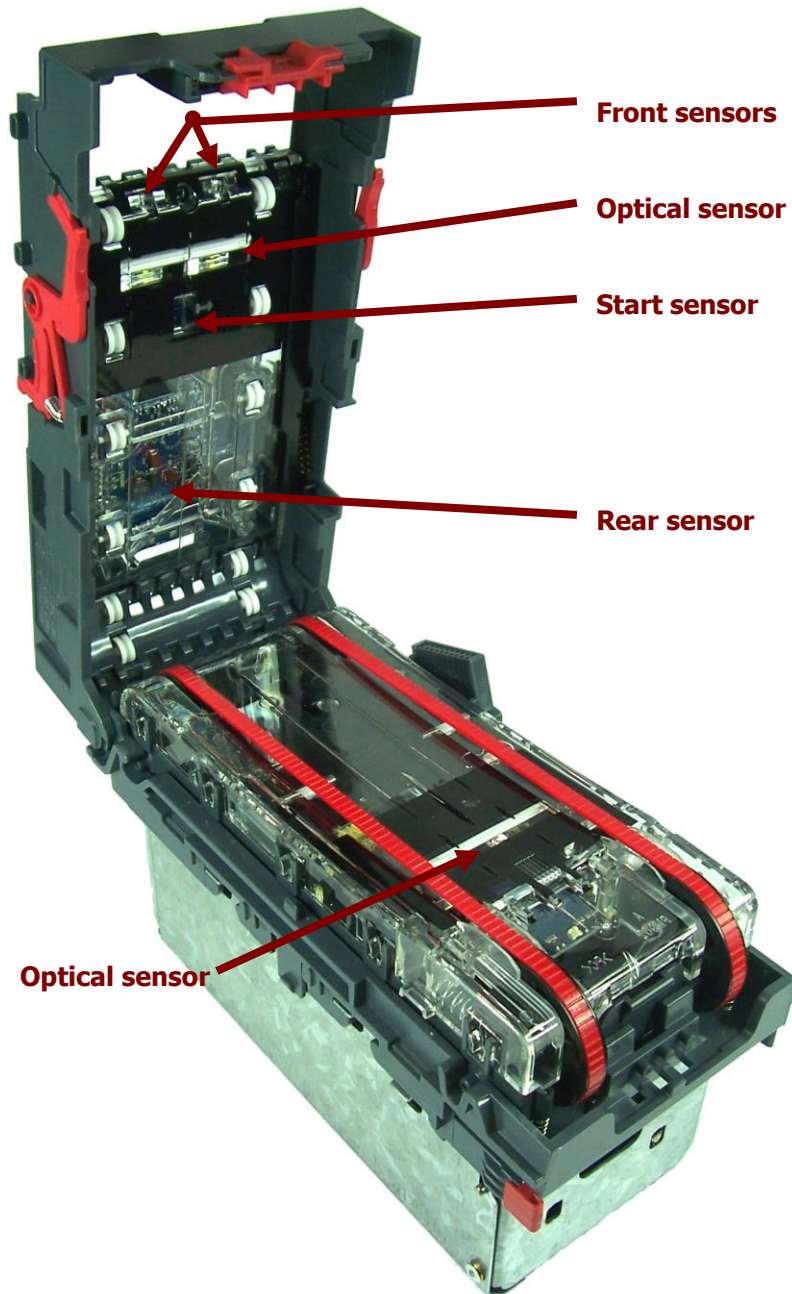
2. Carefully lift the Note Float module upwards and clear of the validator head



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

Electrical connector





Examine the note paths, lozenge and note stacker for any dirt or debris, and carefully clear and wipe the surfaces of the note paths and lozenge with a soft lint free cloth that has been dampened with a water and mild detergent solution (i.e. household washing up liquid.) - be very careful when cleaning around the sensor lenses and make sure they are clean and dry before closing the cover and restarting the unit. Do not try to polish the sensor lenses – if a lens is badly scratched, contact ITL technical support for advice.

Also check that the note stacker and cash box spring plate are not jammed.

**Caution!**

Be careful cleaning sensors.

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

Cleaning the belts is a simple operation. Ensure the validator is enabled (i.e. bezel lights are illuminated), then remove the bezel:

- The bezel is removed by pushing the red locking arms on both sides of the validator upwards, and sliding the bezel away from the locking arms

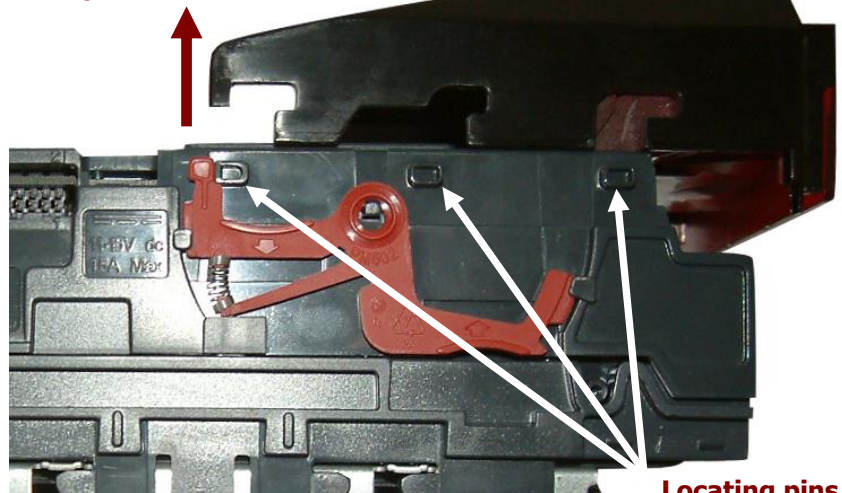
b. Slide bezel away from locking arms



a. Push locking arms upwards

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

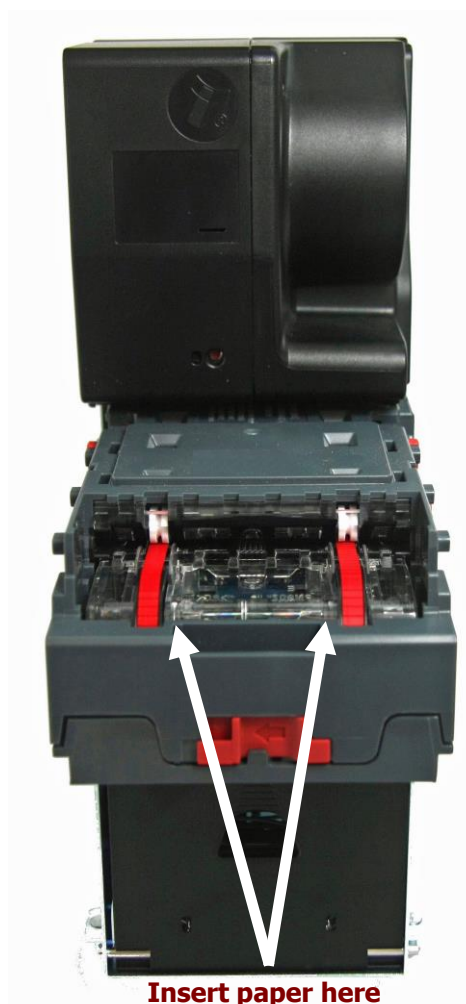
Lift upwards to remove



Locating pins



- Insert a piece of paper (which is narrower than the width between the two belts) in the centre of the note path to activate the drive motor
- Use a lint free cloth dampened with water and containing a mild detergent (such as dish detergent) and hold against each drive belt as it turns.



Repeat this procedure until all dust and debris has been removed from both belts. Finally, use a DRY lint free cloth to remove any excess moisture and refit the bezel. The bezel is refitted by pushing the bezel back onto the locating pins and sliding backwards until all six pins are engaged in the slots. The locking arms will then spring back and locate into the bezel.

**Caution!**

Check locking arms.

Always make sure that **BOTH** locking arms are fully located in the bezel – trying to operate the validator if they are not correctly located can cause unit damage.

**Caution!**

Do not use any lubricants.

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

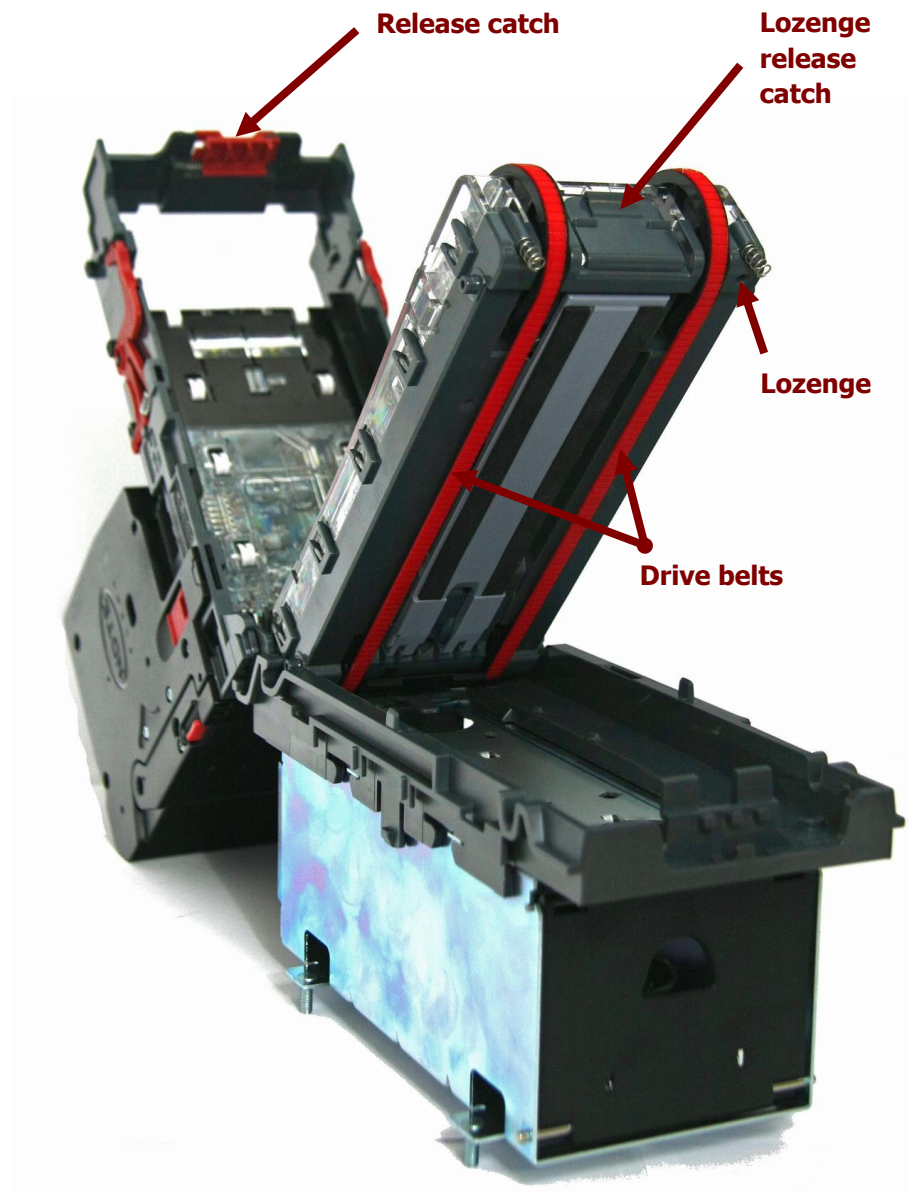
If the belts are worn or damaged, they should be replaced. This is a simple procedure, and is carried out as follows:

**WARNING!**

Do not try to disassemble

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

- Open the top of the unit using the Release catch
- Release the lozenge by gently pressing the Lozenge release catch
- Remove and place the lozenge on a clean dry surface
- Press in the large wheels to release the belt tension and then remove the belts, sliding them off the smallest wheels first
- Replace the belts by fitting them over the lozenge, largest wheels first
- Reassemble and close the unit

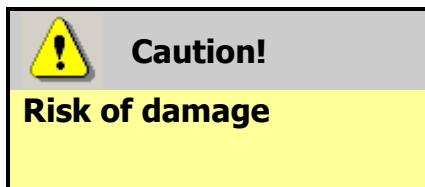


Manual Note Removal

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

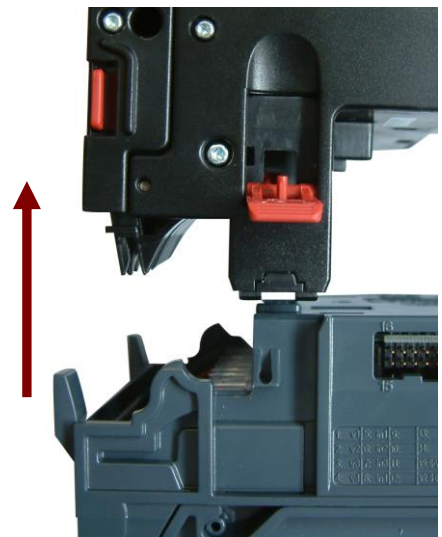
Transport Error:

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



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

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



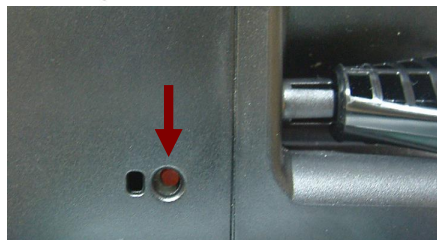
2. Open the Note Float module rear cover by pressing in the two red buttons, then lift the cover



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



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



Manual Emptying:

In the unlikely event that you need to remove all the bank notes from the Note Float module, this can be done following the steps below (after removing the Note Float module from the validator head as detailed previously). There is a special cross point tool (ITL part number **PM00979**) used to manually operate the module's transport mechanism – please do not use any other tool as you may damage the mechanism.



Caution!

**Risk of serious damage
to Note Float module
internal mechanism**

If you need to follow this procedure, only use the PM00979 cross point tool and take great care not to over wind the mechanism or force past the dead stops – if you do the module will be damaged beyond repair.

1. Remove the PM00979 cross point tool from the stowage location on the side of the Note Float module by pulling the tool away from the module



PM00979 cross point tool



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



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



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



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

**WARNING!**
Do not attempt disassembly

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

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

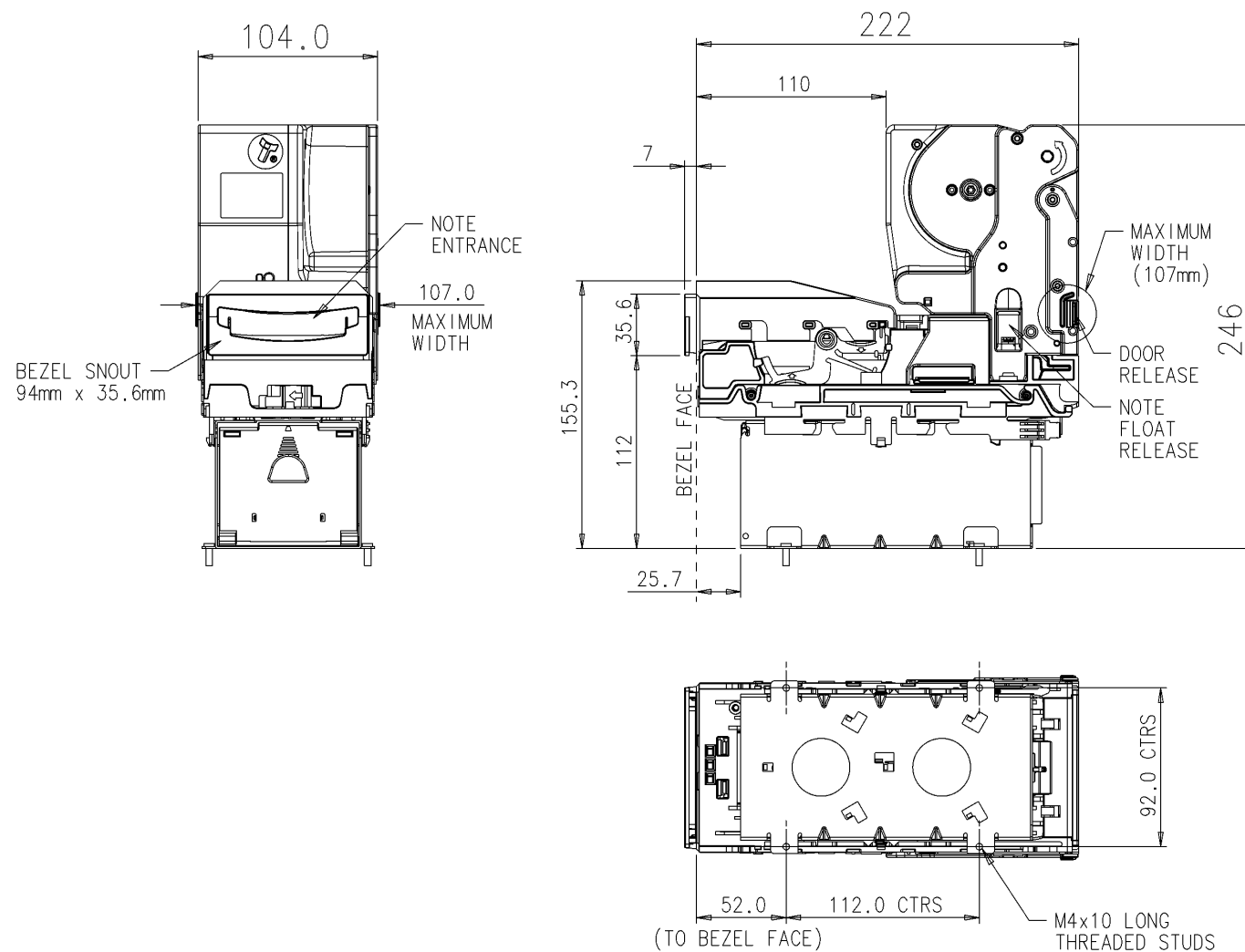
Re-Initialisation

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

4.12 Drawings and Schematics

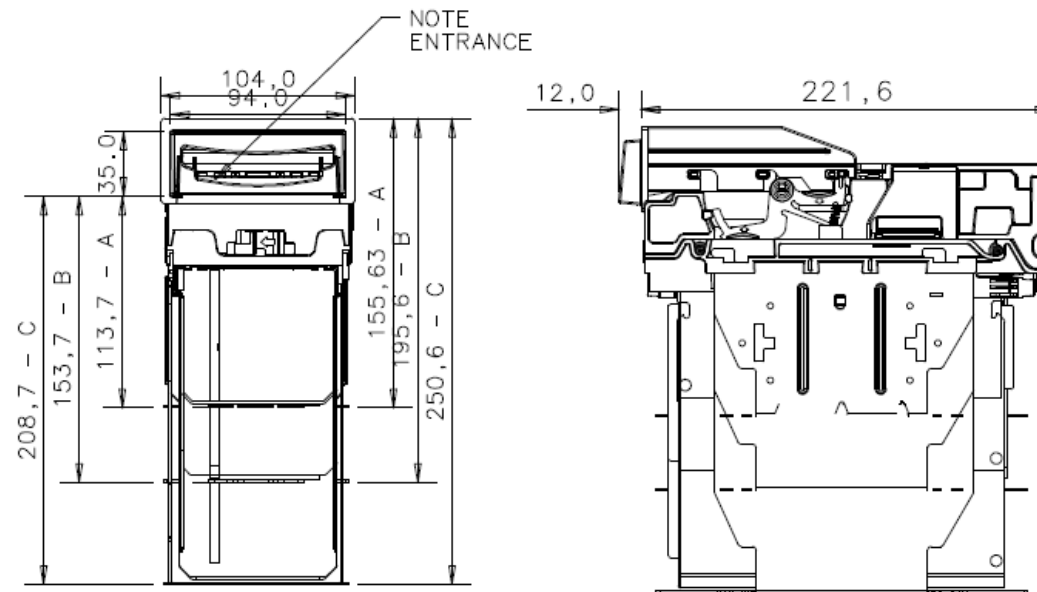
NOTE: If required, IGES 3D models are available on request from ITL technical support.

NV11:

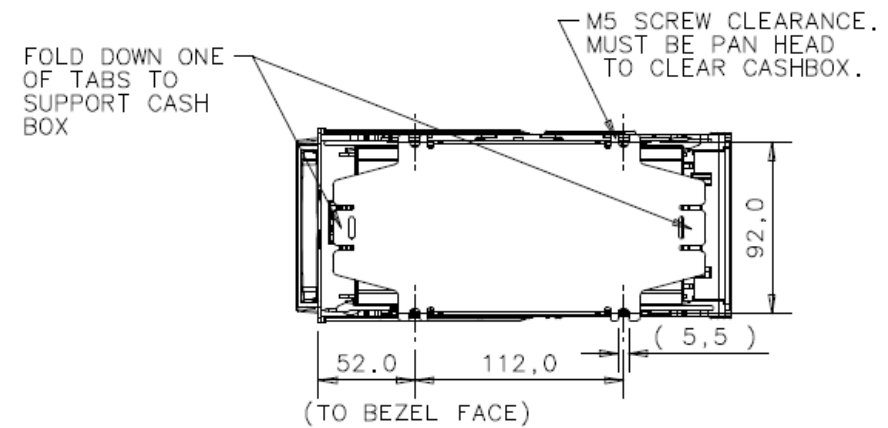


Cashbox Options:

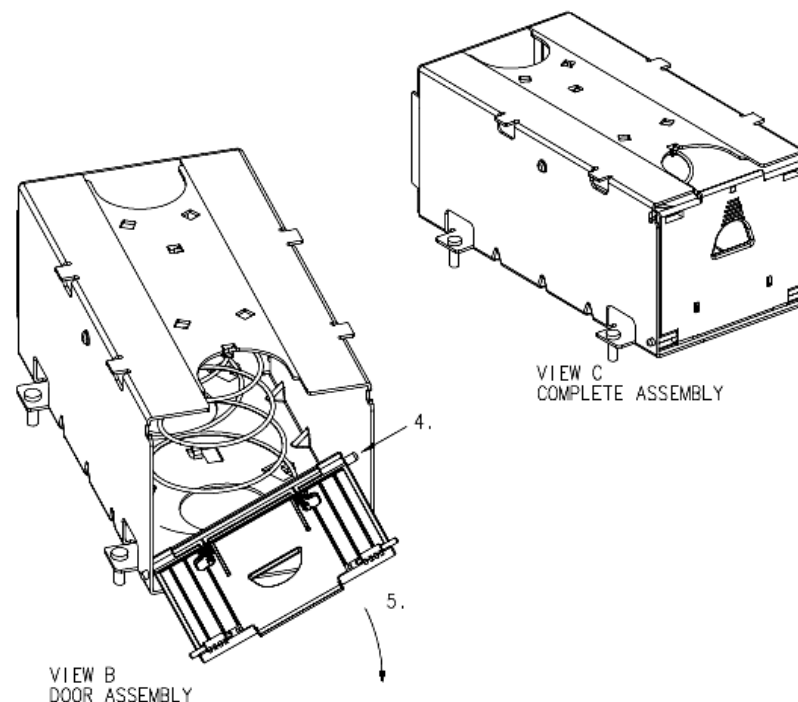
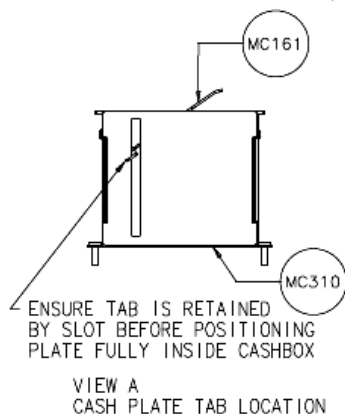
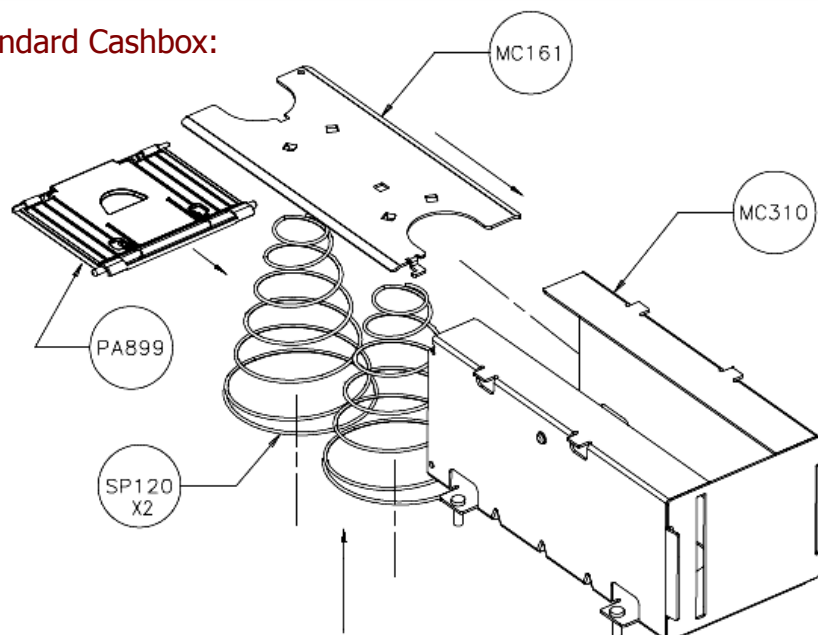
A	300 SLIDE-IN CASH BOX
B	600 SLIDE-IN CASH BOX
C	1000 SLIDE-IN CASH BOX



ACCEPTS NOTES UP TO 82mm x 160mm LONG



Standard Cashbox:



VIEW C
COMPLETE ASSEMBLY

Assembly instructions:

1. Clip two springs (SP00120) to the cash plate (MC00161), then slide the assembly into the cash box (MC00310) making sure the cash plate is above the cash box slot
2. Secure the springs to the cash box floor using the 6 tabs in the base of the cash box
3. Twist the cash plate and insert the end tab into the cash box slot (see View 'A'), then push the plate fully into the cash box (see View 'C')
4. Fit the cash box door (PA00899) to the cash box by pushing the door shaft flush to the door edge at one end and inserting the extended part of the shaft into the pivot hole in the cash box (see View 'B')
5. Twist the cash box door so the free end of the shaft slides into the other cash box pivot hole (see View 'B')
6. Push the cash box door closed (see View 'C')

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