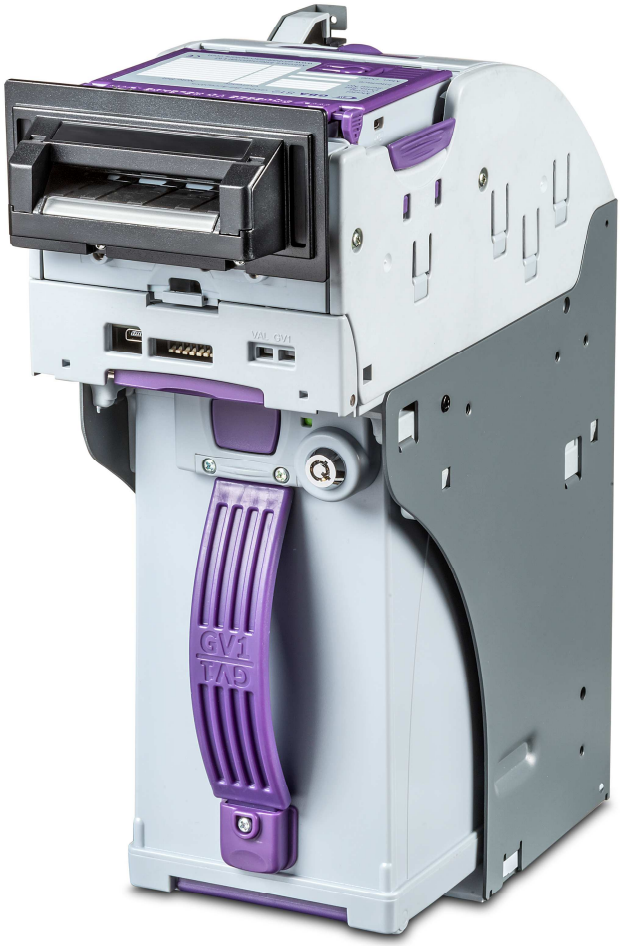
GVI
Operation Manual



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1.0 INTRODUCTION

This manual describes the operation and maintenance of the GBA GV1 integrated bill validator and stacker. It is intended to assist the user in the set-up, installation and operation of the product.

If, after reviewing this manual, you have any questions about this or any other Astrosys products then please visit our web sites at www.globalbillacceptors.com and www.microcoin.com, or contact your regional sales office for assistance (see contact details at the end of this manual).

The GBA GV1 note reader offers a secure, modular, front access vault solution, particularly designed for the kiosk and gaming industries. It is a global product, with snap-change note guides to accommodate varying currencies. Validated notes are stacked in a rugged Cashbox which is easily removed, has optional door locks and can also be locked into place within the housing. The following are some of the extensive GV1 features:

- A wide range of interfaces including: Parallel, Pulse, Serial, MDB, ccTalk®, SSP, SGI etc.
- Accepts up to 32 notes per configuration, in 4 directions (max. note width 85mm)
- Accepts note sizes from 62 to 85mm wide, 120 to 165mm long
- Secure 800-note capacity cashbox (new USD$1 notes)
- RFID Audit capable
- Illuminated, blue flashing note guide as standard
- Independent note validation module
- Optional magnetic feature and magnetic ink detection
- Integrated barcoded coupon reader
- USB Flash drive update for firmware and noteset configurations
- Comprehensive GV Talk software support package
- Range of stylish bezels to suit a variety of applications
- Modular construction for rapid tool-free servicing
- Removable upper housing assembly for access to internal note path
- On board individual note Enable / Disable
- Automatic sensor calibration
- On board tri-colour diagnostic LEDs
- CE, UL, C-Tick and RoHS compliant
- Manufactured to ISO 9001 standards

Please note that the terms "bill", "banknote" and "note" are used interchangeably in this document to imply a single piece of paper currency.

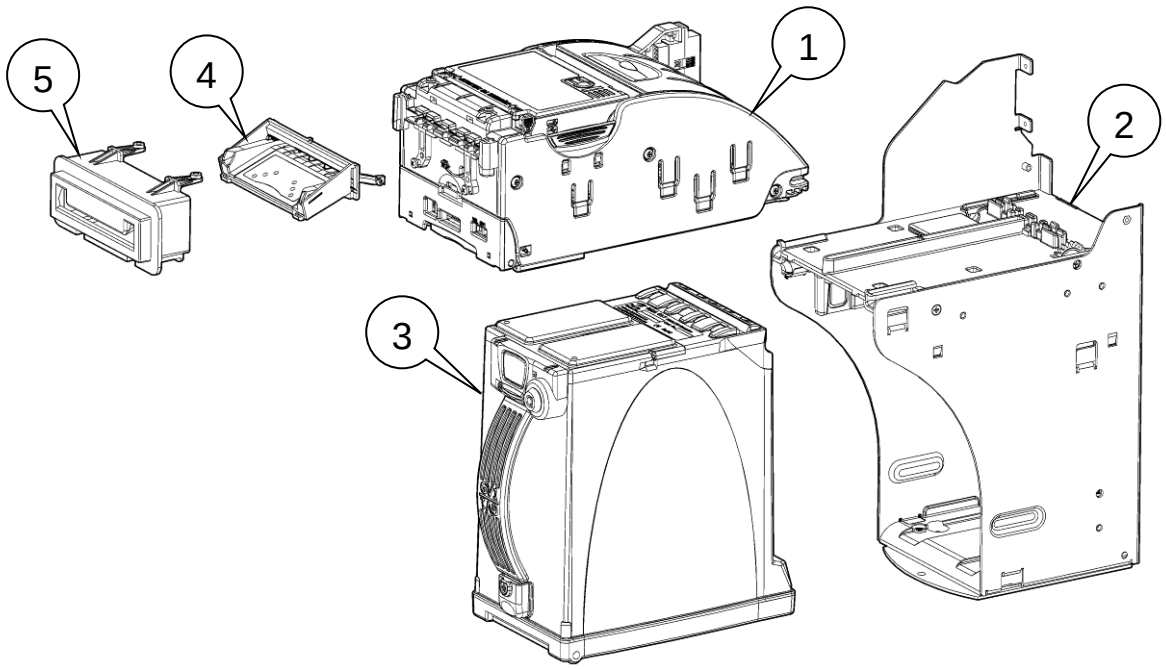
*References to **LHS** (Left Hand Side) & **RHS** (Right Hand Side) used in this manual are from the viewpoint of a user inserting notes into the GV1 unit.*

2.0 PRODUCT INFORMATION

2.1 General Specifications

Bill Insertion:	Up to 32 bill denominations with 4-way insertion
Bill Dimensions:	62 to 85mm wide; 120 to 165 mm long
Bill Acceptance Rate:	Greater than 95%
Cycle Time for Validation and Stack:	3 seconds (excluding authorisation from host)
Interface Protocols Supported:	Includes Pulse, Parallel, ccTalk®, Serial BSCP, Mars Serial A, SSP, SGI, GSA USB, NAMA MDB
Power Supply (nominal):	12-42Vdc @ 4A
Power Consumption (Idle/Standby):	450mA @ 12V typical
(Validating):	1.5A @ 12V typical
(Stacking):	1.5A @ 12V typical
(Peak/Inrush/Stalled):	3.5A @ 12V
Environmental Range (Operating Temp):	0° to 55°C
(Operating Hum):	Up to 90% R.H., non-condensing
(Storage Temp):	-10° to 65°C

2.2 Product Architecture



2.2.1 Image of GV1 product assembly

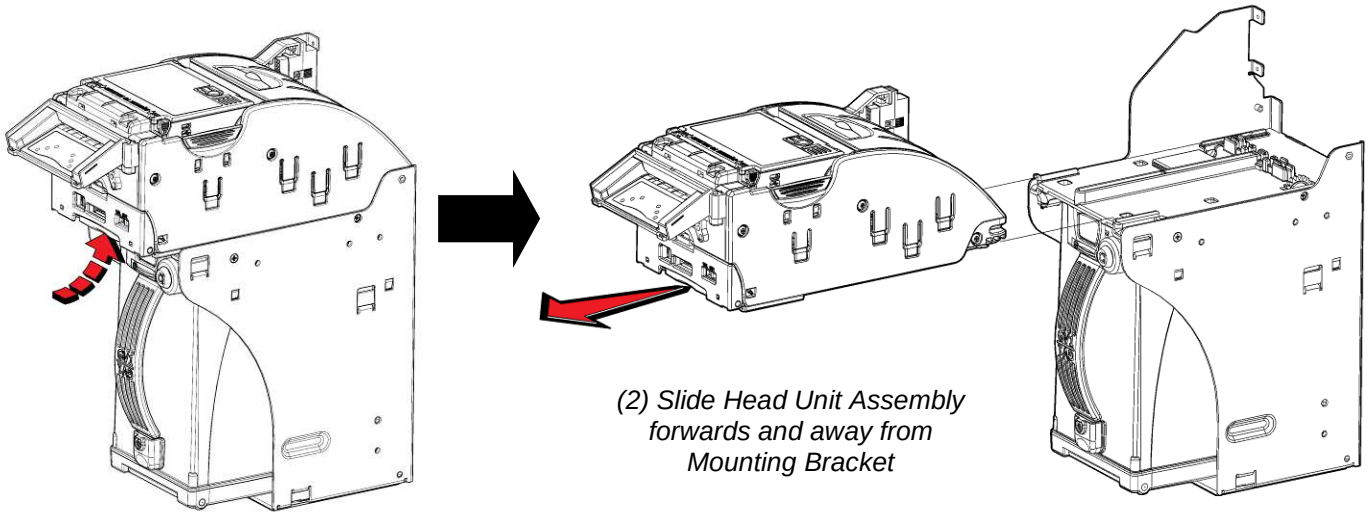
The GV1 unit consists of three major modules:

(1) Head Unit assembly, incorporating the 'ST2' currency validation module
(2) Mounting Bracket
(3) Cashbox

Units are typically completed by the addition of a (4) Noteguide Base with currency-specific noteguide inserts, and in some applications, the further addition of a (5) Bezel *(varying designs).*

The GV1 unit allows rapid access to the major modules and their component elements, as shown in the following sections.

2.2.1 Removing the Head Unit Assembly



(1) Press Latchplate upwards to release Head Unit Assembly

(2) Slide Head Unit Assembly forwards and away from Mounting Bracket

2.2.2 ST2 Currency Validation Module

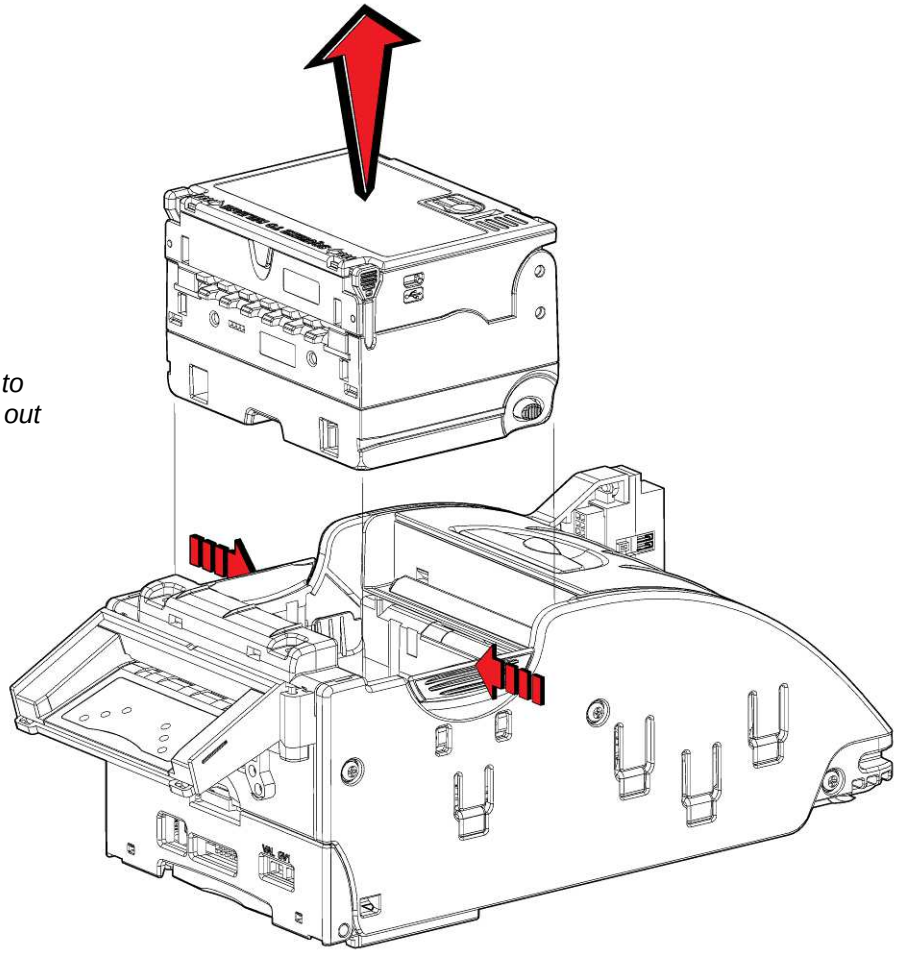
The ST2 Currency Validation Module is a core element of the GV1 design. The ST2 module performs the major processing of the banknote (or coupon etc) with optical sensing technology utilising Neural Network processing.

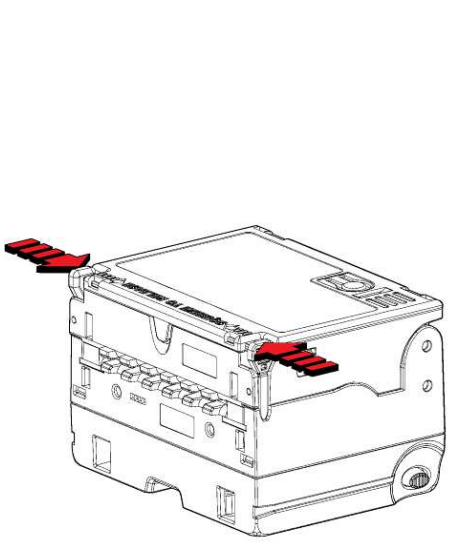
As a plug-in module of GV1, the ST2 provides a number of significant advantages. The top-half of the ST2 module can be rotated or removed altogether for rapid access to the notepath surface, in conjunction with the hinged Roller Housing assembly of the GV1. The entire ST2 module can be quickly removed from the GV1 unit to simplify in-field service and diagnosis of operational issues.

To remove the ST2 module, simply depress the side latches adjacent to the module and lift the module out of the GV1 unit. To replace, push the ST2 module firmly back into place (refer following illustration).

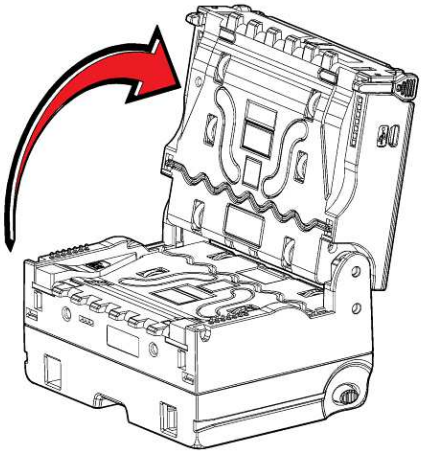
The ST2 module incorporates a pair of Inner Noteguides which are matched to the nominated currency at the time of manufacture.

Depress Side Latches to release ST2 module, lift out

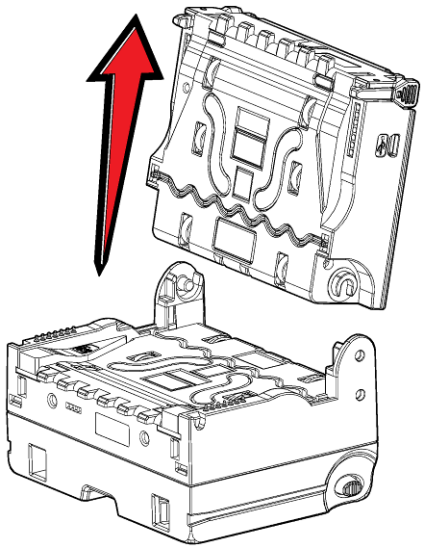




Squeeze ST2 top-release levers



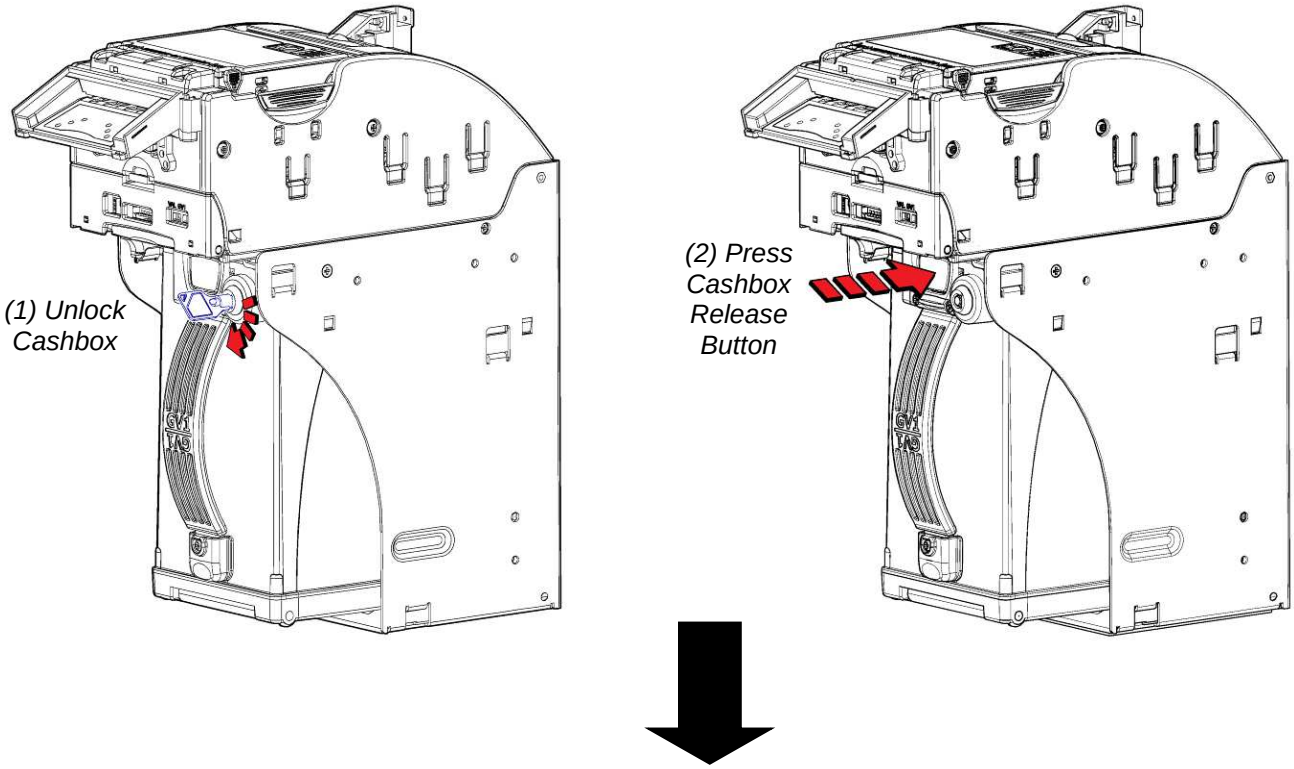
ST2 top rotates back…



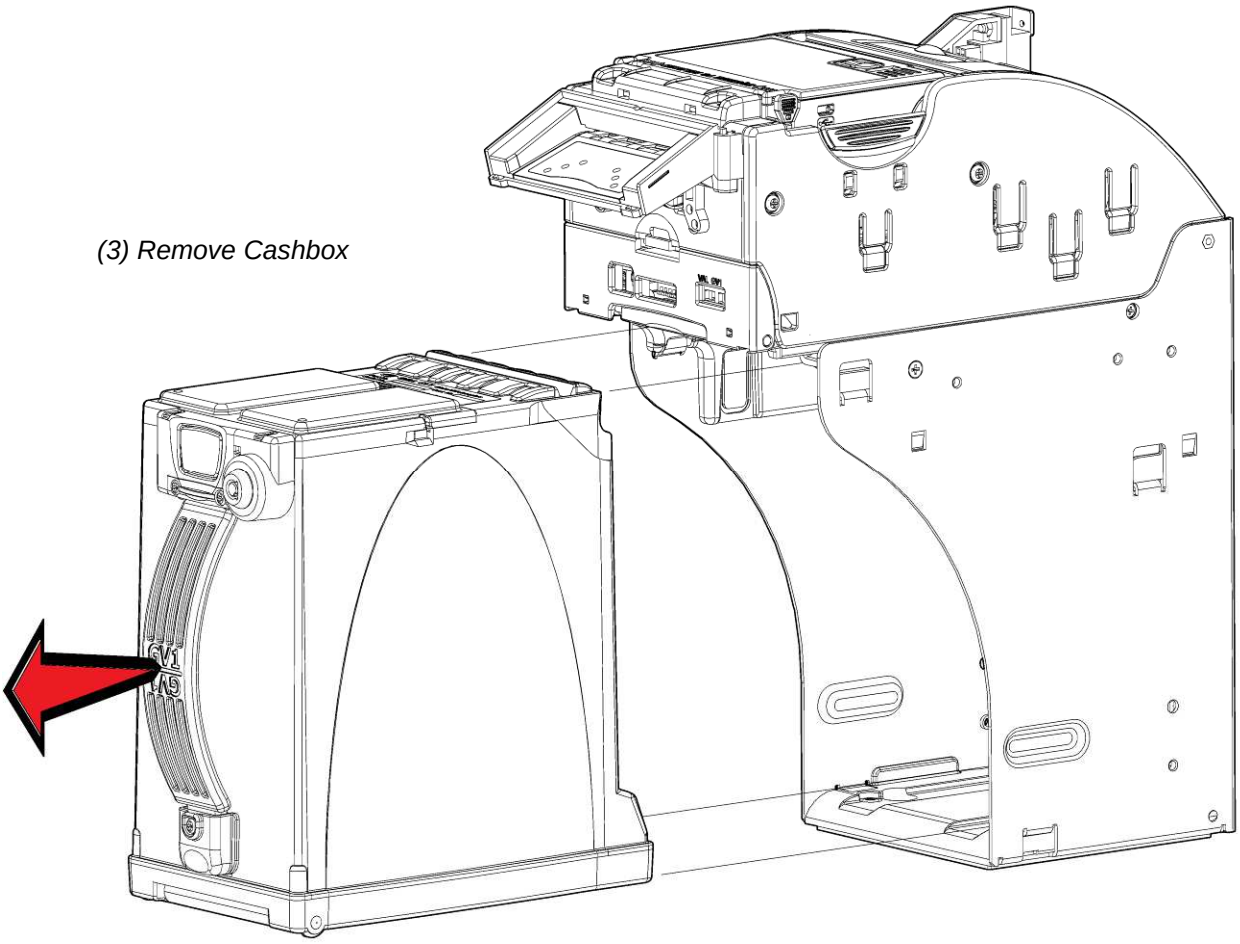
or can be removed

The above sequence can also be performed with the ST2 module in-place in the GV1 unit

2.2.3 Removing the Cashbox



(3) Remove Cashbox



2.3 Model Number Chart

No.	GV a - x x x x - y y y - z z 3 4 5 6 7 8 9 10 11 12
3	Head 0. None (ST2 module not fitted) 1. ST2 fitted
4	Magnetic Head 0. N/A 1. Mag - (fitted in the ST2 module)
5	Hardware Setting 0. Default 1. *reserved* 2. True RS-232
6	Note Guide LED Colour 0. Nil 1. Blue (std.) 2. Red 3. Green 4. Yellow
7	Connector 0. None 1. GBA 20-pin 2. Gaming 20-pin 3. GBA + USB 4. Gaming + USB 5. MDB
8	Bezel / Fascia - Type 0. None 1. Bezel - External (Metal) 2. Runway Gaming 3. Bezel - Concealed (Metal) 4. Bezel – Universal 5. Note Entry Adaptor
9	Note Guide 0. None 1. US up to 66mm 3. EU stepped, up to 82mm 5. Canada up to 72mm 6. GB stepped, up to 85mm 7. India up to 75mm
10	Cashbox 0. None 1. 800 *(note capacity)* 2. 800 + Cashbox Locks 3. 800 + Cashbox Locks + Audit 4. 800 + Audit only
11	Accessories Harness: 0. None 1. 20-pin (GBA) 2. 20-pin RS-232 (GBA) 3. MDB 'Y' 4. ccTalk®
12	Accessories Other: 0. None 1. Square Base 2. 19mm Security Lock Assy 3. Security Switch & Loom not fitted

Example:

GV1-0015-131-30

1 = supplied with ST2 Currency Validation Module
0 = no magnetic sensor head
0 = Default Hardware Setting
1 = Blue (std.) Note Guide colour
5 = MDB Connector
1 = Bezel - External (metal)
3 = EU Note Guide
1 = 800-note Cashbox
3 = MDB 'Y' harness
0 = no other accessories

3.0 NOTE ENTRY OPTIONS

3.1 Note Entries

GV1 can be fitted with two key styles of Noteguide Entry:

- ***Universal Note Guide*** - typically for gaming applications

- ***Elite Gaming Bezel Entry*** - specifically for Elite Gaming cabinets

Elite bezel requires internal note guides to be fitted to the GBA ST2 note head

3.2 Noteguide Inserts

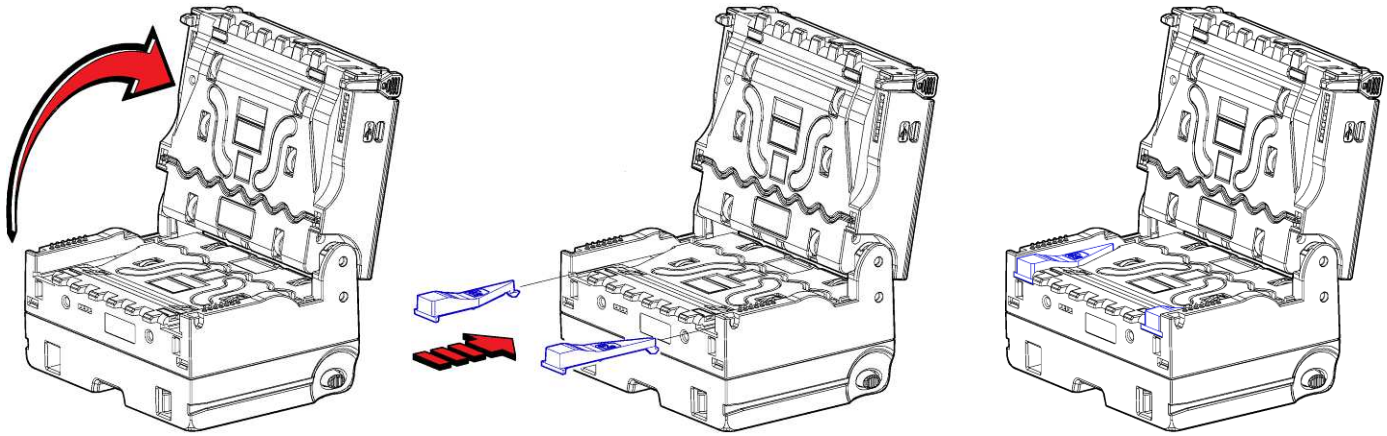
The GV1 unit must be configured with specific Outer & Inner Noteguide Inserts to handle the currency requirement at hand. These Inserts are generally fitted to suit customer requirements at the time of GV1 manufacture, but this section provides information should it be necessary to reconfigure the Note Entry area.

An important point is that the Outer Noteguide Inserts are fitted to the Noteguide Base, whereas the Inner Noteguide Inserts must be installed into the ST2 currency validation module. Outer & Inner Noteguide Inserts must be of the same currency type to avoid note-handling issues. Outer Noteguide Inserts differ between Runway & Bezel types and are not interchangeable between the two types. The Inner Noteguide Inserts fitted to the ST2 module are common between the two types.

The 'country' marked on the Noteguide Inserts is generally not the exclusive application for a particular Insert -for example, 'US'-marked Inserts also suit Australian and some other currencies. Refer to your local sales office for the correct Insert type for a selected currency.

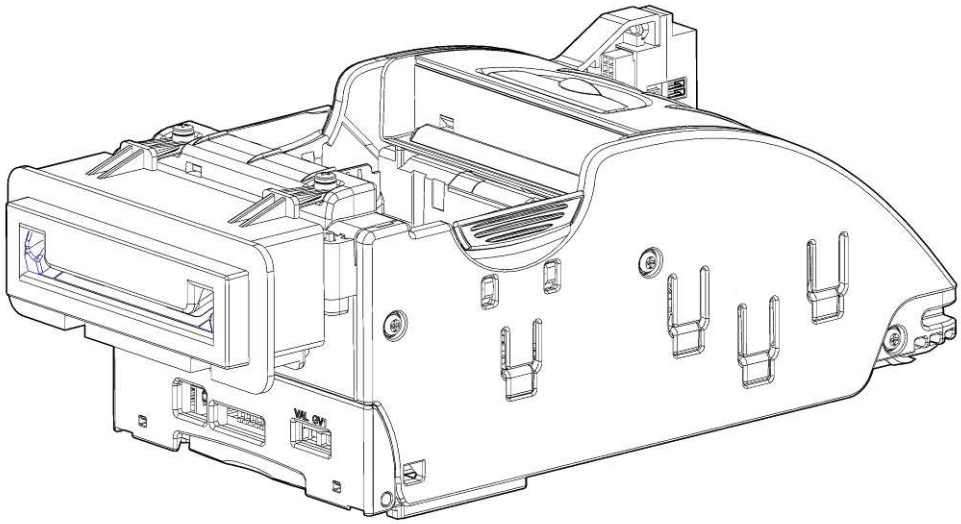
3.2.1 Fitting Inner Noteguide Inserts

- Remove the ST2 module from the GV1 unit
- Squeeze the release levers and pivot the top half of ST2 module back
- Slide Inner Noteguides into place (first removing 'old' parts if required)
- Close top of ST2 module and re-install ST2 into GV1 unit

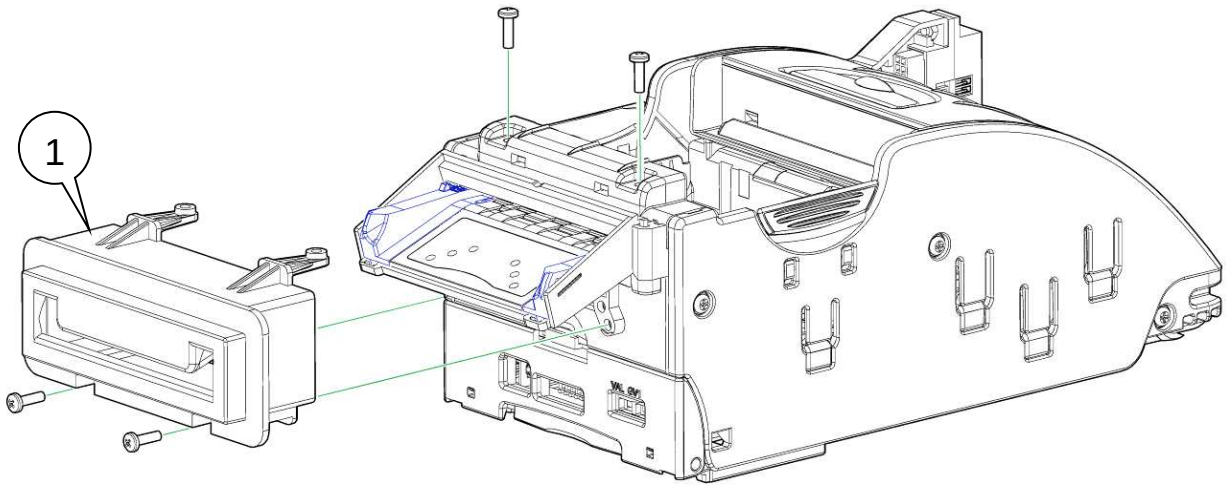


3.2.2 Fitting Outer Noteguides

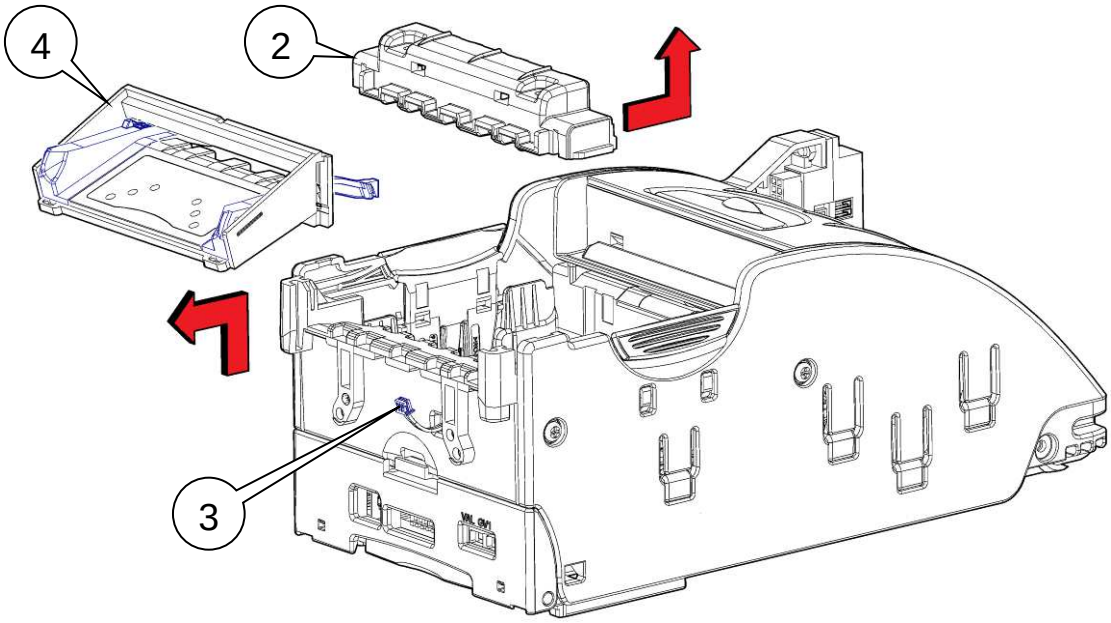
The following sequence looks at taking a GV1 unit and disassembling the Note Entry area, for example, if the area needed to be reconfigured. Reassembly is essentially the reverse process, substituting different parts as required to achieve the desired arrangement.



GV1 head assembly fitted with Concealed Bezel.
ST2 module has been removed



Unscrew 4 screws to remove Bezel (1)
[ignore this step if no Bezel fitted]

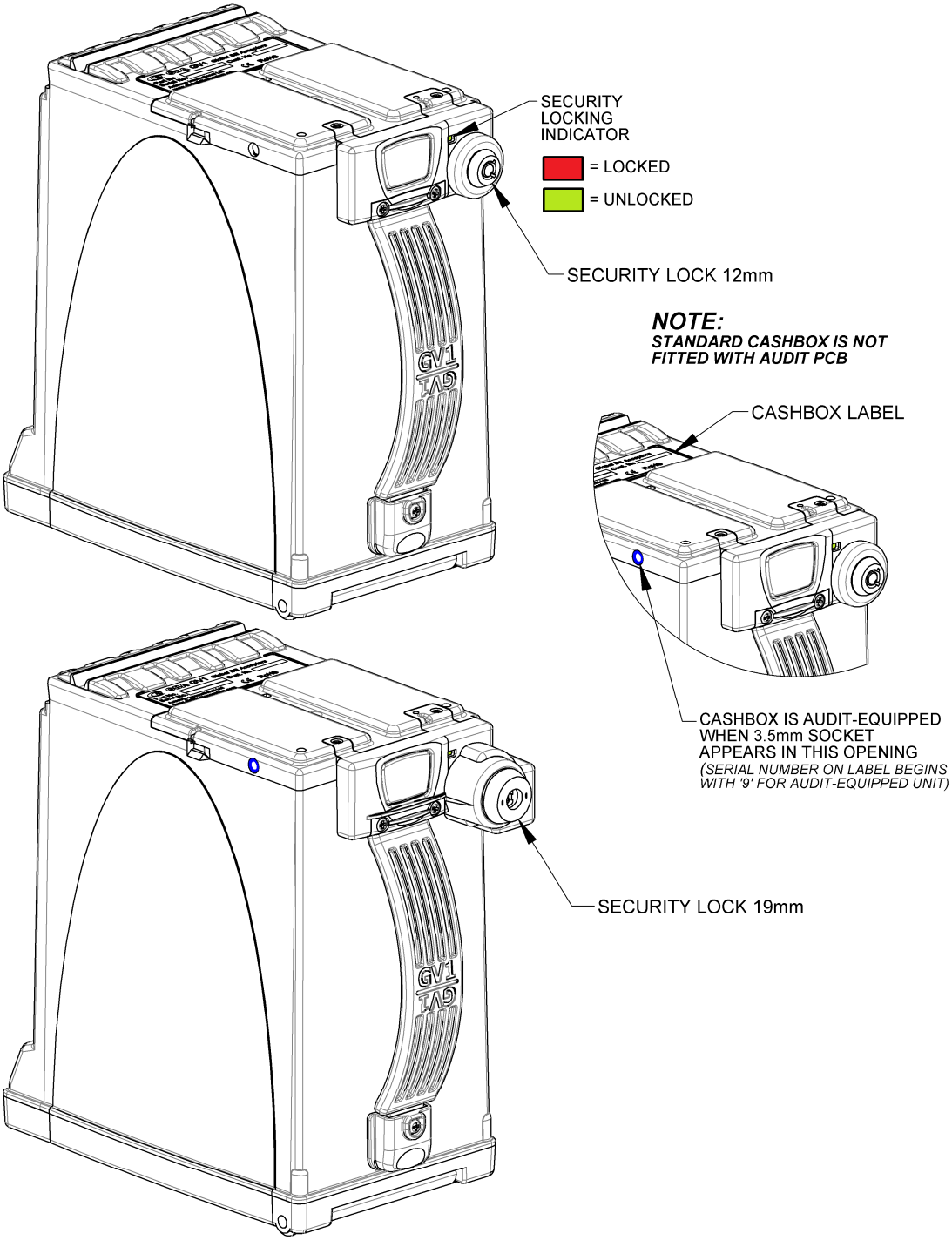


Slide Clamp moulding (2) back & out.
Unplug PCB loom (3), lift Noteguide Base (4) out

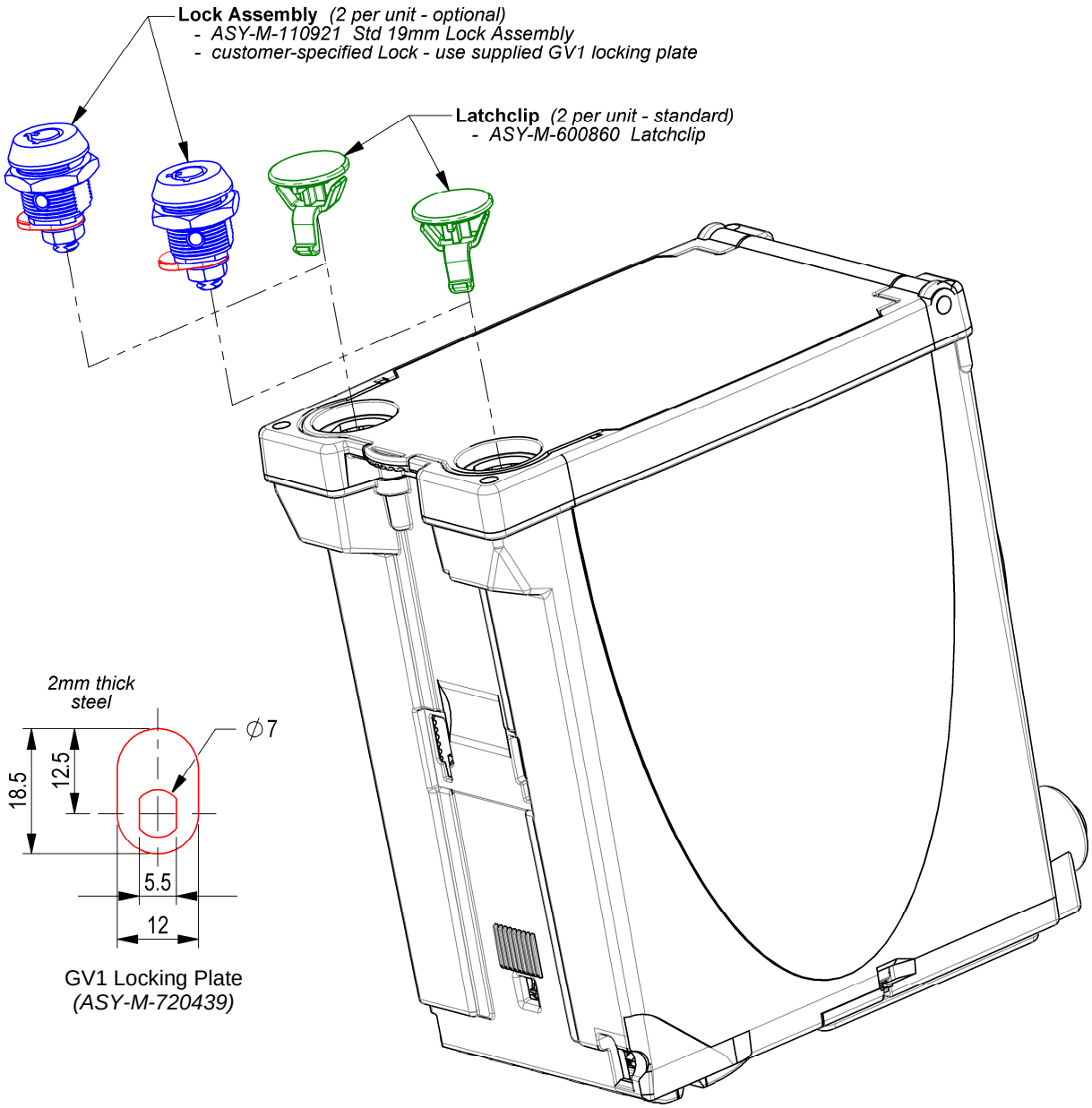
4.0 CASHBOX

The GV1 Cashbox has a number of configuration options. In brief summary:

- Audit facility - if specified, an Audit PCB is installed inside the Cashbox cap
- Security Lock - for locking the Cashbox to the GV1 unit. 12mm Lock fitted as default or Cashbox configured to accept customer-supplied 19mm Lock
- Cashbox Locks - Latchclips (default) or optional 19mm Locks to secure Cashbox Door. The 19mm Locks can be supplied ex-factory or fitted by customer. Locking plates are supplied for incorporation into customer-fitted locks.



The following illustration shows the Cashbox Lock options



GV1 Locking Plate
(ASY-M-720439)

5.0 MECHANICAL INSTALLATION

The GV1 unit should be mounted in an upright and vertical manner, i.e. with the ST2 validation module at the top of the unit. Please contact your Astrosys office for advice on any variation to this arrangement.

Threaded holes (metric M4 x 0.7) are provided on the steel sideplates for mounting into cages & framework. Care should be taken that the screw length used is appropriate - screws that are excessively long may interfere with functionality such as insertion/removal of the Cashbox. Other non-threaded holes are provided to allow other attachment options, particularly on the rear & bottom faces of the unit. Again, care should be taken to ensure that screw heads or other fastener features do not interfere with the unit's functionality.

Details of product dimensions can be found in Section 11 of this document.

This section will be expanded in future releases

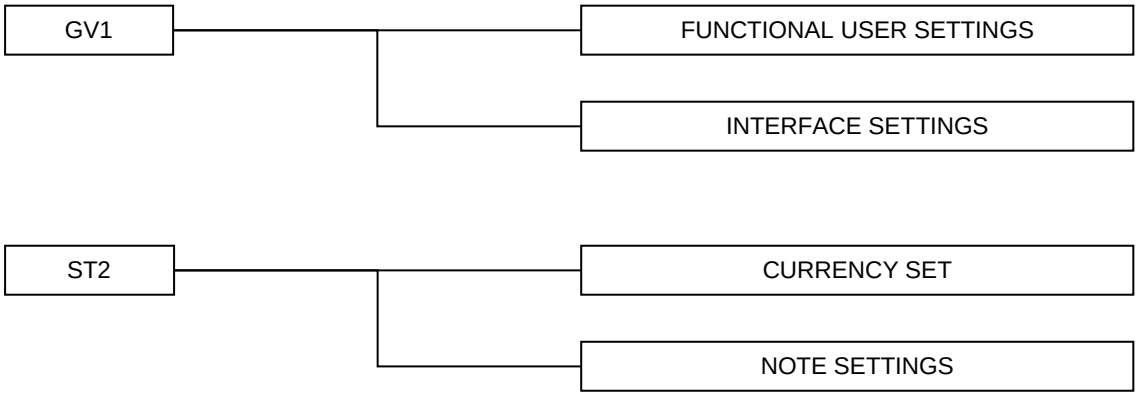
6.0 PROGRAMMING GV1

6.1 Programming

The GV1 unit has a number of easy-to-use features to facilitate initial programming and simplifying in-service updates and maintenance.

The GV1 unit can be partly configured using the on-board controls or more thoroughly via Windows-based software packages (GBA Talk & GV Talk). Configuration changes can also be made by downloading a new configuration file from a suitable USB device.

It is worthwhile to understand that the overall functionality of GV1 is split between the ST2 validation module and the GV1 unit itself. The ST2 validation module is primarily concerned with the currency settings & currency configuration, whereas the GV1 unit handles functional user settings and the settings for interfacing to the host machine.

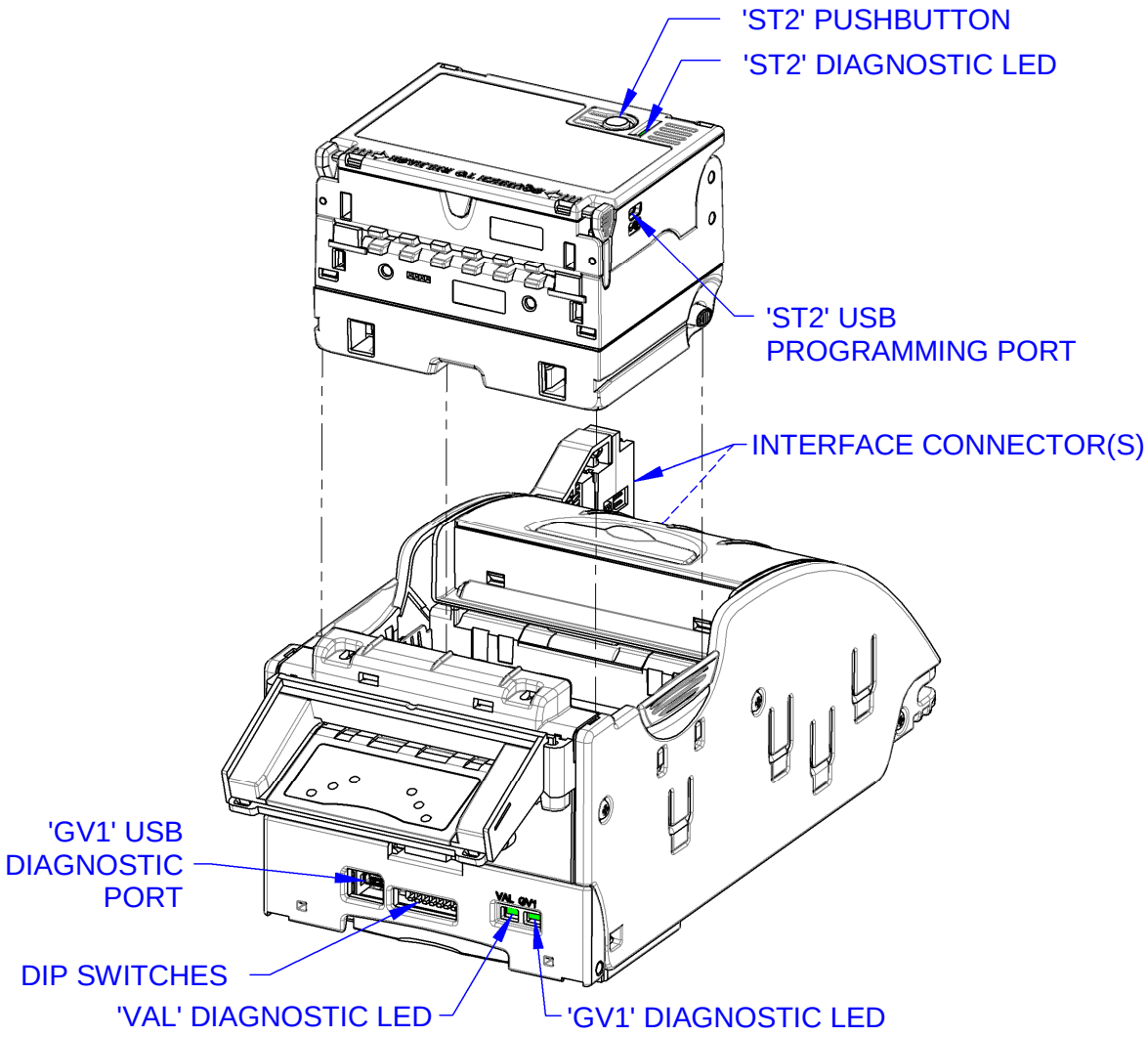


Given this split-functionality, programming is generally directed at the appropriate area. For example, to make changes to the currency set or note set, the ST2 validation module is directly addressed.

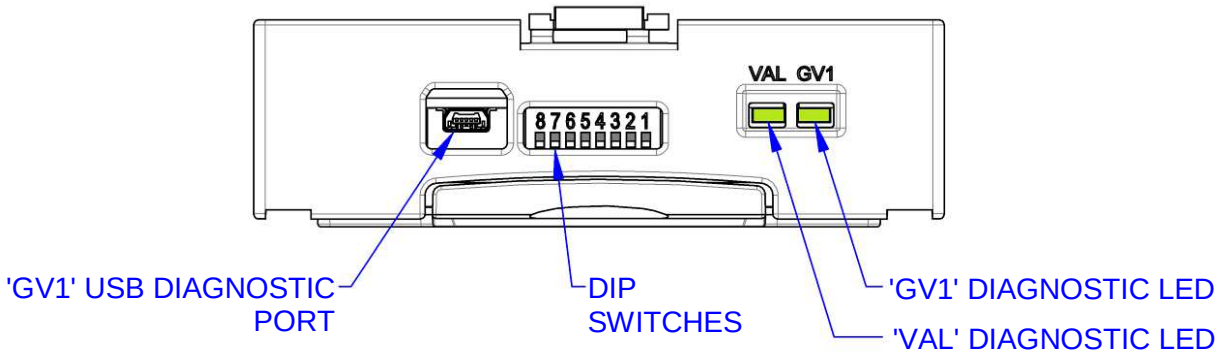
GV1 programming is reserved for Service and Support technical staff and is explained in the comprehensive GV1 Reference Manual

6.2 Programming Ports & Switches

The use of the ports & switches is explained in the comprehensive GV1 Reference Manual



6.2.1 - Image illustrating Indicator LEDs and programming features



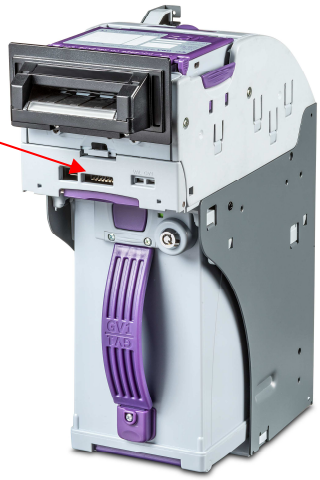
6.2.2 - Image illustrating Front Door control area

6.3 On-board Controls

6.3.1 GV1 DIP switches

An 8-way DIP switch block is located in the front door area of the GV1 Head Unit assembly. The switches can be accessed through the aperture in the door or the door can be swung-down for improved access. The switches are numbered 8 to 1 reading left to right. The 'Enabled' position is with the switch actuator Down ('flat') when viewing the PCB from the front of the GV1.

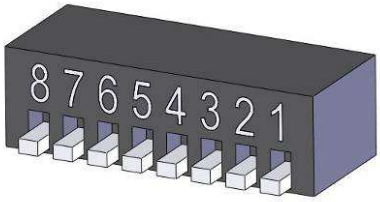
DIP switch location



To disable a note, locate the appropriate DIP switch and flick to the Up (angled) position with the GV1 in normal operating condition (all LEDs green). To enable the note, flick the switch to the Enabled (flat) position

Three note categories can be enabled/disabled

Four interface settings can be selected – only one ON at any one time



DIP switches shown in 'Enabled' position

DIP 1 - $100 enable/disable
DIP 2 - $50 enable/disable
DIP 3 - $20 enable/disable
DIP 4 - ccTalk
DIP 5 - BSCP
DIP 6 - SGI
DIP 7 - ccNet
DIP 8 - reserved for special functions and should be left in the 'flat' position

.

7.0 ELECTRICAL INTERFACE SPECIFICATION

7.1 Power

7.1.1 Power Supply - absolute limits

Voltage:	10.8-42VDC @ 4A
Current:	3.5A

7.1.2 Recommended Power Supply

Voltage:	12VDC ± 5%, Regulated
Current, Peak:	4A

Note: *if at any time during operation, the voltage falls below 10.8V, note acceptance and operation speed may be significantly impaired. Low voltage at power-up will also inhibit the GV1 unit from completing its self-checking sequence.*

7.2 Signal Interface

7.2.1 General Purpose

Open Collector outputs;

Maximum Open Voltage:	40V
Maximum Sink Current:	50mA
Maximum Output Low Voltage:	0.4VDC

Input low level voltage:	0…. 1V
Input high level voltage:	3…..12V (typically 3… 5V)
Pull-up resistors on inputs:	internal, 22kΩ

7.2.2 Serial Gaming / Loop Interface

Nominal interface voltage:	12V ± 10%
Maximum output low voltage:	1V @ 20mA
Maximum input idle level current:	0.5mA
Pull-up resistor on TX:	internal, 4.7kΩ
Limiting resistor on RX:	internal, 2.2kΩ
Limiting resistor on "Master Reset":	internal, 2.2kΩ

7.2.3 MDB

Maximum output low voltage:	1V @ 20mA
Maximum input idle level current:	0.5mA
Minimum input active level current:	5mA
Pull-up resistor on TX:	none
Limiting resistor on RX:	internal, 560Ω

7.2.4 USB

Compliant as a USB 2.0 full-speed device

7.2.5 RS-232

Compliant

8.0 CONNECTION OPTIONS

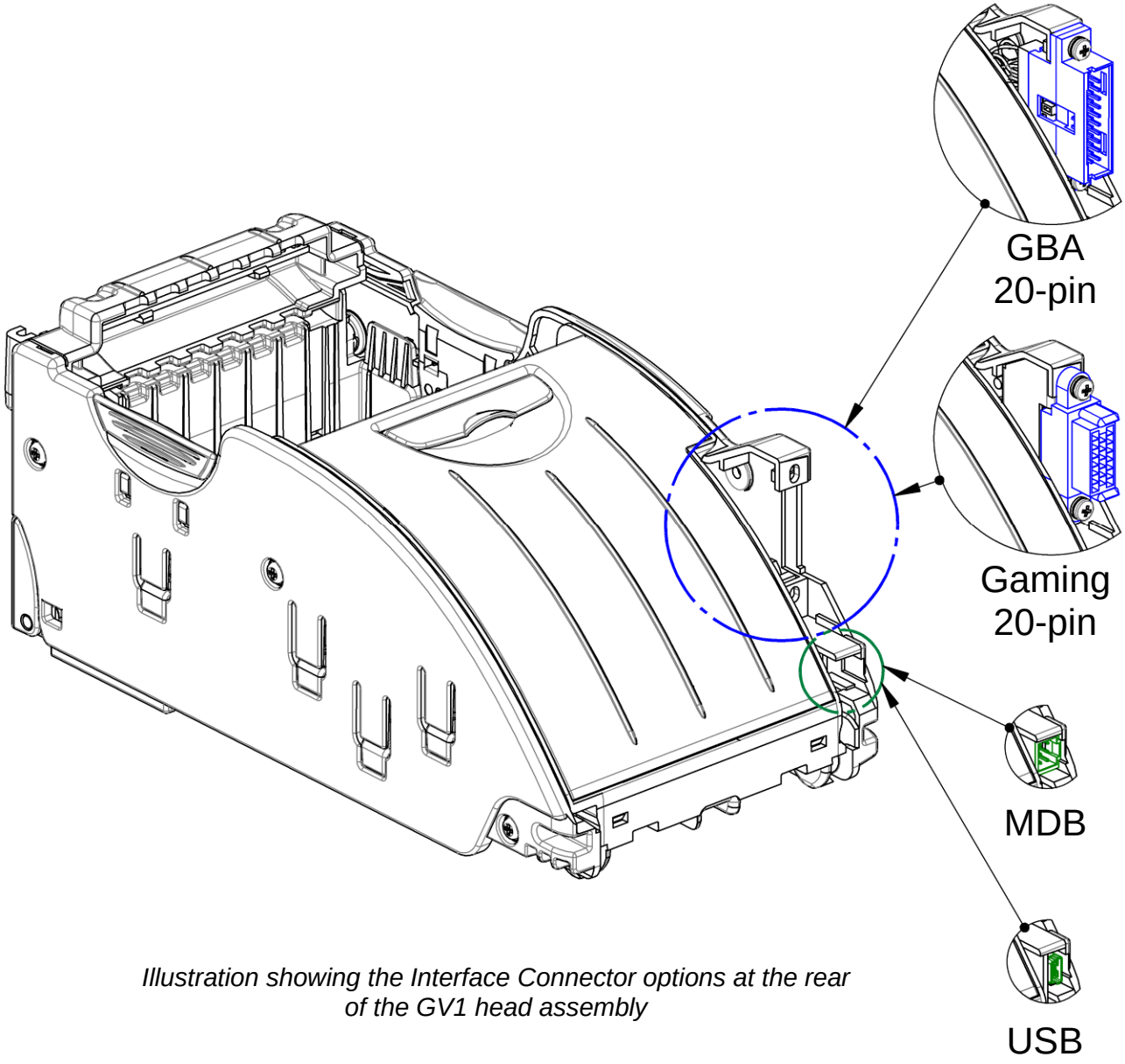


Illustration showing the Interface Connector options at the rear of the GV1 head assembly

8.1 Introduction - Connection Options

The GV1 integrated bill validator and stacker can be configured across a wide range of interface and protocol requirements.

In brief summary, GV1 supports the list of Hardware Interfaces and Protocols shown below. The hardware interface is factory-installed according to the customer's ordering requirement.

The listing has the following format:

- Connection Option
  - *Interface*

……

- GBA 20-pin
  - *Pulse*
  - *Parallel*
  - *ccTalk®*
  - *GBA BSCP*
  - *Mars Serial A*
  - *SSP*
- Gaming 20-pin
  - *Serial Gaming Interface (Loop)*
  - *Serial Gaming Interface (True RS-232)*
- MDB Connector
  - *MDB/NAMA*
- USB Connector *(with power via 20-pin Connector)*
  - *ccTalk®*
  - *Serial BSCP*
  - *GSA*

Interface Description documents are available upon request from your regional sales office. Any special Interface/Protocol/Connector requirements should be discussed with your regional sales office, please refer to the contact details at www.globalbillacceptors.com or www.microcoin.com or at the end of this document.

9.0 MAINTENANCE

9.1 Cleaning the Validator Note Path

Equipment Required

Cotton swab or lint-free cloth.

Cleaning solution - a mix of water and up to 50% Iso-Propyl Alcohol (IPA) is recommended. **DO NOT** use more than 50% IPA. **NEVER** use solvent-based cleaning agents (such as pure alcohol, citrus cleaner, petrol, methylated spirit and white spirit) on this product as the unit may be severely damaged and the warranty will be voided.

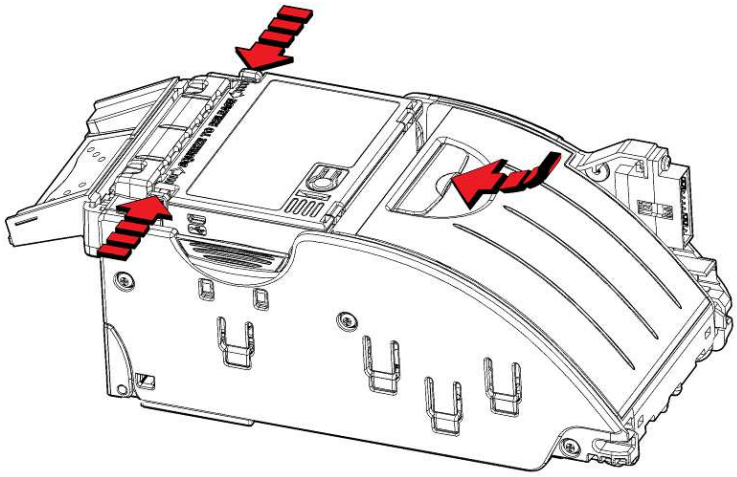
Anti-Static precautions should always be observed when cleaning the GBA GV1 unit.

1. Ensure the power supply to the GBA GV1 unit is switched OFF
2. Remove the Head Unit assembly from the GV1 unit if the host enclosure does not allow access to the ST2 validation module and opening Rear Housing
3. Squeeze the release levers for the top-half of the ST2 validation module and swing it open (see pics 1 & 2)
4. Lift the release lever for the Rear Housing and swing the Housing open (see pics 1 & 2)
5. The ST2 top-half and Rear Housing can both be fully removed if desired (see pic 3)
6. Pick-off and discard any large items of debris from the note path (top & bottom)
7. Using the cotton swab, or lint-free cloth, dampened with cleaning solution and applying light force only, carefully clean all sensor windows in the note path. Note that the ST2 top-half and Rear Housing both include sensor windows. If a sensor window has become badly scratched do not attempt to polish it, contact your local regional office for further advice
8. Continue with the swab, or lint-free cloth, to clean the rest of the note path, including the sprung rollers in the ST2 top-half and Rear Housing
9. Visible parts of the belts can be cleaned by wiping with a cleaning solution-soaked cotton swab or wipe. The module carrying the belts can be removed for full access to the belts (see pics 4 & 5)
10. Use an additional swab or cloth to dry the cleaned area, if required. Liquid must be prevented from entering any internal area of the GV1 unit
11. Replace the ST2 top-half and Rear Housing (if removed), and latch them into place
12. Slide the Head Unit assembly back onto the GV1 unit main chassis (if required)
13. The supply to the unit can now be switched ON

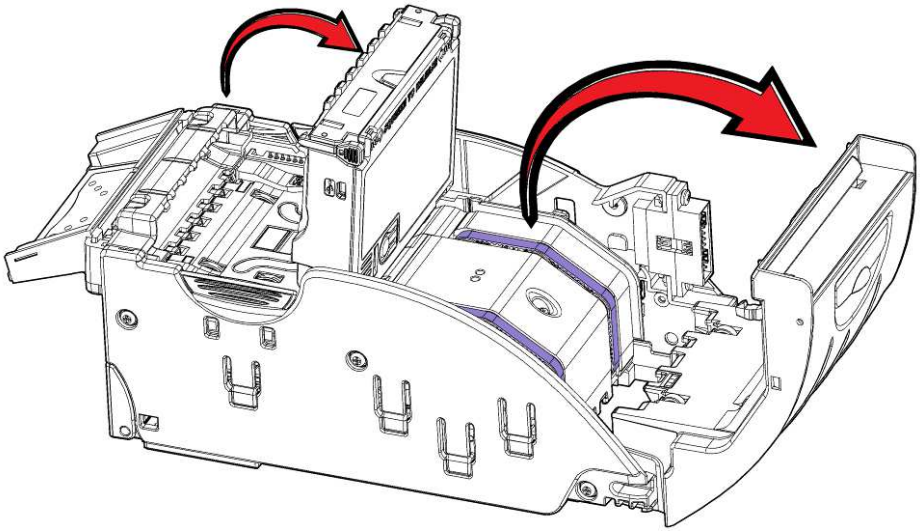
9.2 Clearing a Note Jam

The design of the GBA GV1 allows rapid access to the note path for the clearance of jams occurring after the insertion of damaged notes & foreign material.

1. Ensure the power supply to the GBA GV1 unit is switched OFF
2. Remove the Head Unit assembly from the GV1 unit if the host enclosure does not allow access to the ST2 validation module and opening Rear Housing
3. Squeeze the release levers for the top-half of the ST2 validation module and swing it open (see pics 1 & 2)
4. Lift the release lever for the Rear Housing and swing the Housing open (see pics 1 & 2)
5. The ST2 top-half and Rear Housing can both be fully removed if desired (see pic 3)
6. Clear the jammed note(s) from the note path
7. If necessary, remove the Cashbox, open and clear any jams inside the Cashbox
8. Re-assemble unit and switch the power supply back ON



1



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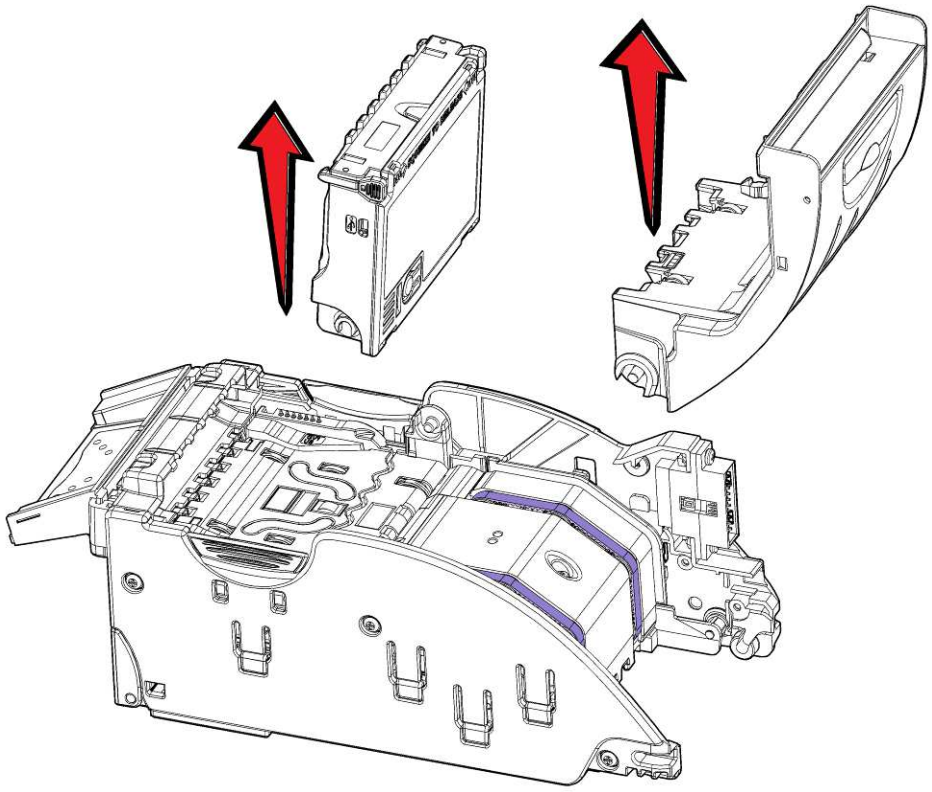

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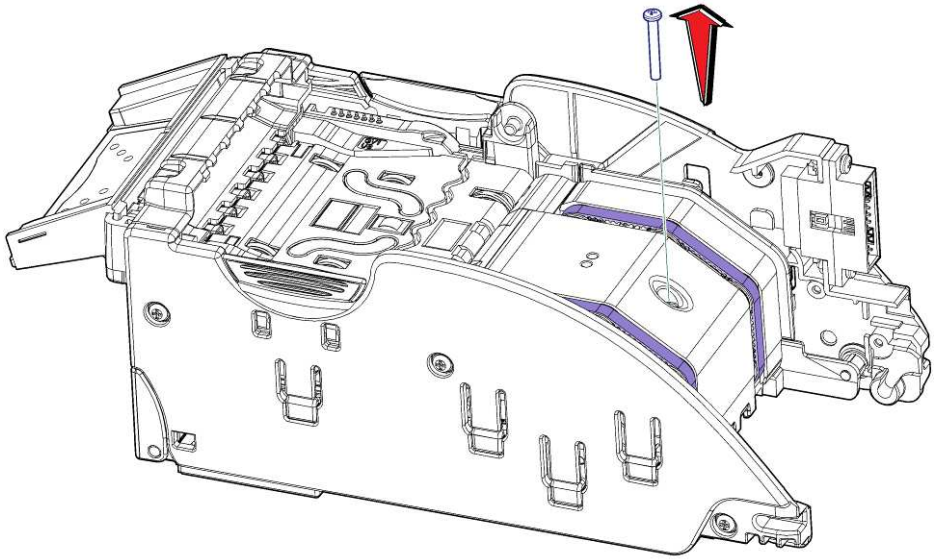

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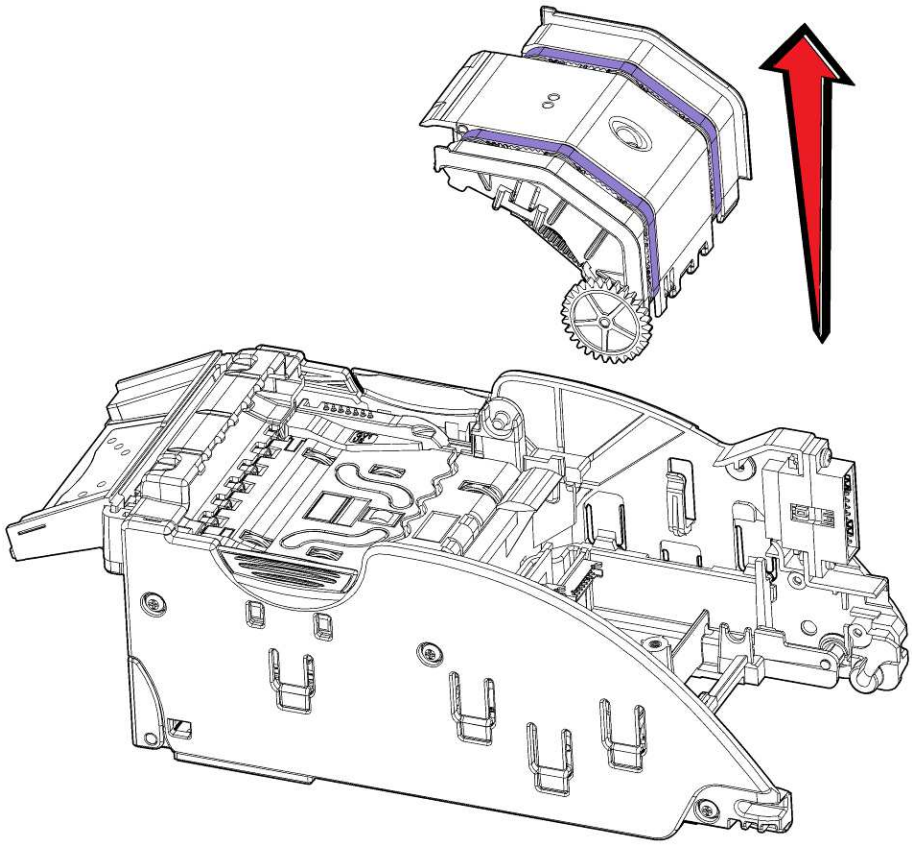
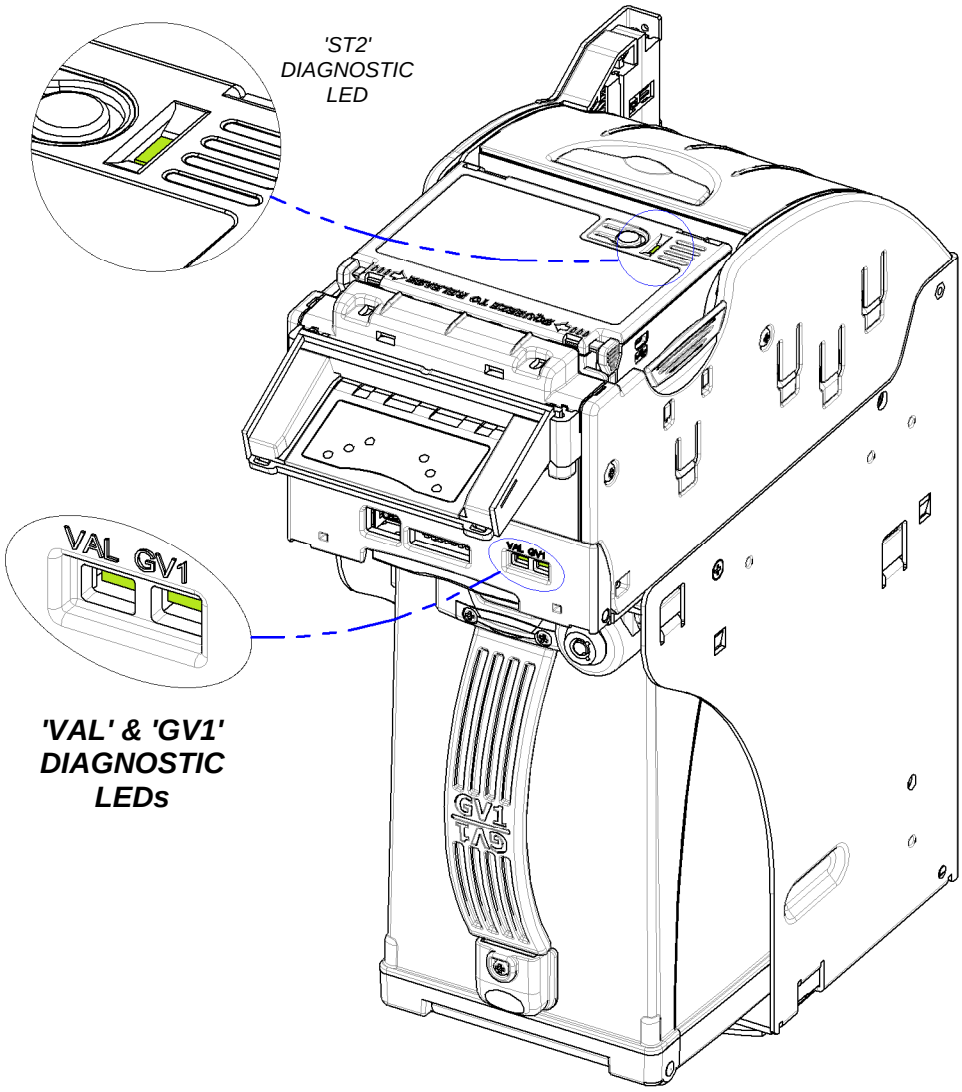


5

10.0 DIAGNOSTICS & TROUBLESHOOTING

10.1 Diagnostics



10.1 Image showing location of diagnostic LED Indicators on GV1 unit

10.1.1 Diagnostic LED Indicators

All diagnostic functions are displayed on the 'VAL' & 'GV1' Diagnostic LED indicators. These indicators are tri-colour, capable of glowing Red, Green or Orange. The indicators enable enhanced diagnostics for the user and for Astrosys personnel when assisting customers from a remote location. The ST2 validation module is also equipped with a diagnostic LED but this indicator is not referenced in this manual.

The 'GV1' diagnostic LED reflects the operational status of the complete GV1 unit and displays any overall error conditions. The 'VAL' diagnostic LED displays the specific operational status of the ST2 validation module.

10.1.2 'GV1' Diagnostic LED

Refer to this table for codes displayed by the 'GV1' Diagnostic LED indicator.

Mode	Status/Description	Flashing	Steady	Pattern - Four fast-flashes			
				Flash 1	Flash 2	Flash 3	Flash 4
Standby Modes	Unit OK/Idle		Green				
	Unit Disabled/Inhibited		Orange				
	Unit out of order - Hard Fault		Red				
Active Modes	Unit Busy	Green					
	Soft Fault - Check Unit (e.g. Cashbox full)	Red					
	Sensors Read Low - clean sensor lenses	Orange					
Program Modes	Note Enable - Programming Mode	Green - **Fast**					
	Note Disable - Programming Mode	Red - **Fast**					
	Primary Calibration - Programming Mode	Orange - **Fast**					
Note Reject Codes	Unrecognised Note	Red x **1**					
	OASG* Reject	Red x **2**					
	MASG** Reject	Orange x **2**					
	Returned (note inhibited in config settings)	Red x **3**					
	Returned (note inhibited by host)***	Orange x **3**					
	Transport during note scanning	Red x **4**					
	Transport problem as the note hits the MASG	Orange x **4**					
	Note entered with excess skew	Red x **5**					
	More than one note inserted	Red x **6**					
Error Codes	Eeprom fault			Red	Red	Green	Green
	ST2 Firmware Rev too low			Red	Red	Green	Orange
	ST2 not detected			Red	Red	Green	Red
	RFI Controller not detected (for Audit feature)			Red	Red	Orange	Green
	ST2 Transport Init Failed			Red	Red	Orange	Orange
	ST2 Powerup Timeout			Red	Red	Orange	Red
	Cashbox is Missing			Red	Red	Red	Green
	Required IFace PCB Missing			Red	Red	Red	Orange
	Queue Overflow Int Com			Red	Orange	Green	Green
	Queue Overflow State M			Red	Orange	Green	Red
	Queue Overflow Audit			Red	Orange	Green	Orange
	Internal Comms Buffer Size Error			Red	Orange	Orange	Green

Mode	Status/Description	[illegible]	[illegible]	Pattern - Four fast-flashes			
	ST2 is not the one locked to this ST2			Red	Orange	Orange	Red
	Supply Voltage Low (<10.5Volts)			Red	Orange	Orange	Orange
	Real Time Clock Battery Fault (no charge left)			Red	Orange	Red	Red
	Bill stacker is jammed			Red	Orange	Red	Orange
	Printing Dispute Resolution Report			Green	Green	Green	Orange
	Printing Audit Report			Green	Green	Green	Red
	Checking a new Smart Cassette			Green	Orange	Green	Orange

***** *OASG = Optical Anti-Stringing Gate*

****** *MASG = Mechanical Anti-Stringing Gate*

******* *This condition only occurs in serial interfaces, e.g. GBA RS-232, MDB, ccTalk®*

Note: The 'GV1' LED Indicator is also utilised when the GV1 unit is flash-programmed from a USB memory device. The process & error codes generated during this type of operation are shown in section 6.3.6.

10.1.3 'VAL' Diagnostic LED

Refer to this table for codes displayed by the 'VAL' Diagnostic LED indicator, reflecting the specific operational status of the ST2 validation module.

Mode	Status/Description	Flashing	Steady	Flash 1	Flash 2
Standby Modes	Unit OK/Idle		Green		
	Unit Disabled/Inhibited		Orange		
	Unit out of order - Hard Fault		Red		
Active Modes	Unit Busy	Green			
	Auto Calibration			Orange	Orange

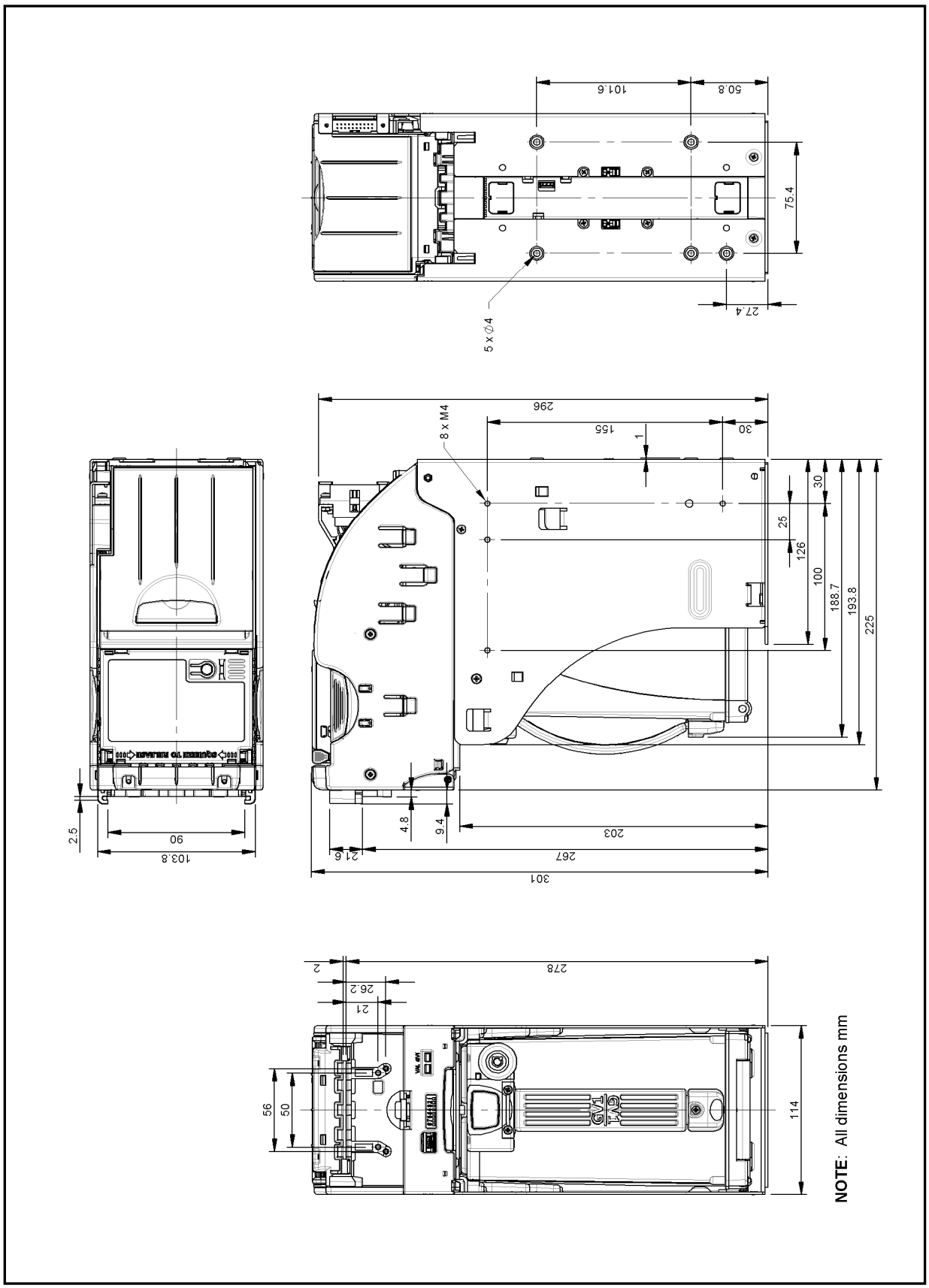
10.2 Troubleshooting

The following information is presented as guidance to customers in identifying service problems with the GV1 unit. It does not necessarily cover every possible situation. Reference to the Diagnostic LED fault tables (see 10.1.2 & 10.1.3) will help identify many problem conditions.

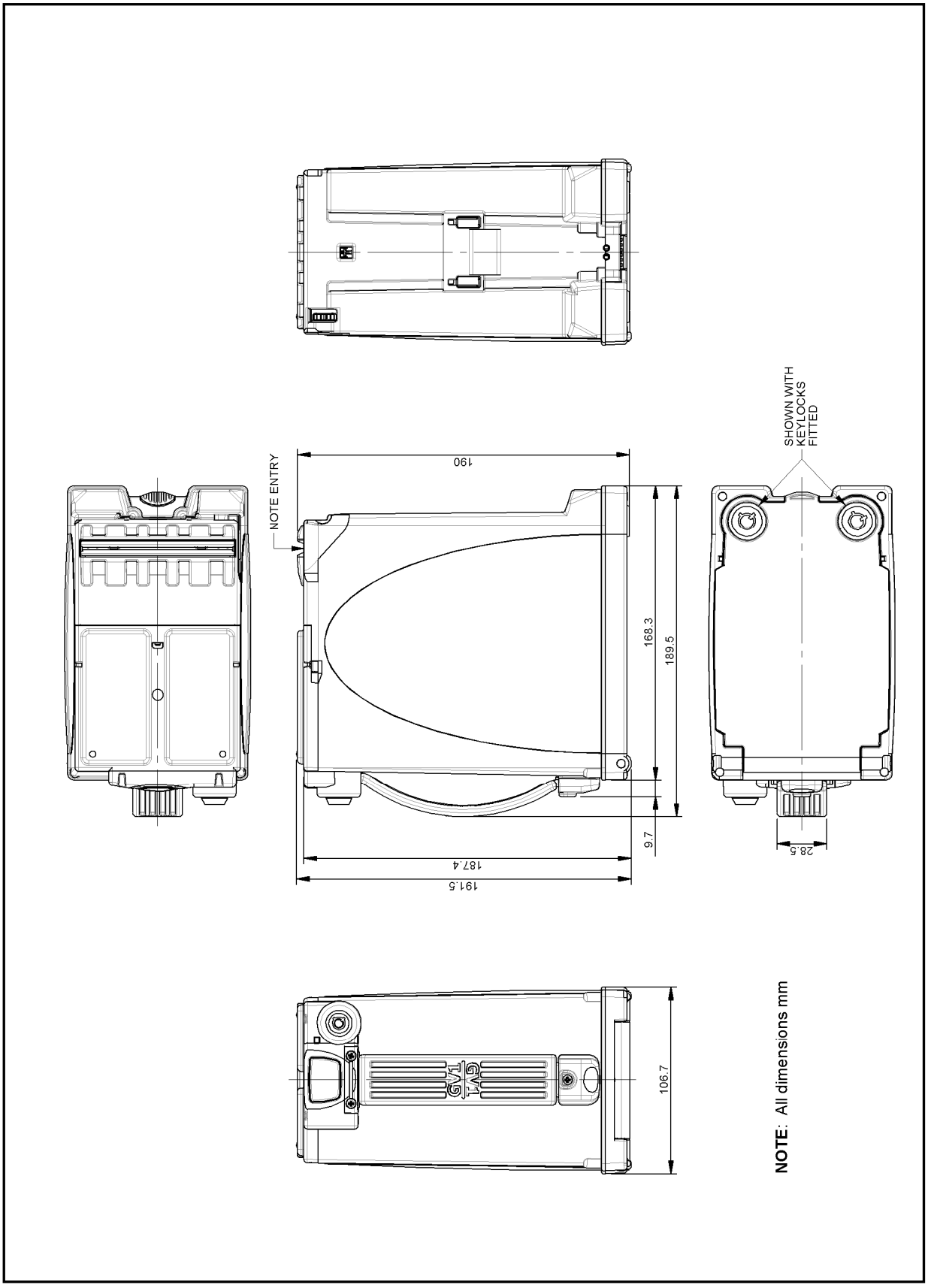
Problem Symptoms	Possible Cause	Investigate	Possible Solution
Unit does not work - belt motor does not run, no LED illumination	1. Power supply not switched on 2. Power supply not connected 3. Poor electrical connections 4. Unit carrying out self-test 5. PSU failure	1. Power supply and power cable 2. Diagnostics indicator ('GV1' LED) 3. Interface Cable assembly(s)	1. Ensure power to validator is connected and turned-on 2. Ensure Interface cable(s) are connected firmly & correctly
All programmed notes are rejected	1. Acceptance inhibited for all notes 2. ST2 module mechanical gate (MASG) not working 3. Escrow sensor not working	1. Software configuration	1. Use on-board button or GV Talk to enable required note *(On-board button applicable to Pulse & Parallel modes only)*
Poor or no acceptance of one or more programmed notes	1. Note acceptance inhibited 2. Poor sensor readings 3. Insufficient power supply capacity	1. Note Inhibit settings 2. Note path cleanliness	1. Use on-board button or GV Talk to enable required notes 2. Use GV Talk to check sensor levels and recalibrate if necessary 3. Clean validator note path
Notes fail to stack correctly	1. Ready-to-Punch sensor not working 2. Stacker motor not working 3. Stacker mechanism damaged	1. Stacker motor cable connections 2. Stacker jams 3. Damaged/distorted note in Cashbox	1. Ensure all cables are connected properly 2. Enusre cashbox is correctly located and free from damage
Unit does not communicate with host machine	1. Incorrect interface selected 2. Poor electrical connections	1. Configuration of validator 2. Interface cable assembly(s)	1. Use on-board button or GV Talk to select required interface 2. Ensure Interface cable(s) are connected firmly & correctly
Unit does not provide credit for accepted note	1. Incorrect Interface selected 2. Poor electrical connections	1. Configuration of validator 2. Interface cable assembly(s)	1. Use on-board button or GV Talk to select required interface 2. Ensure Interface cable(s) are connected firmly & correctly
MAKE REFERENCE TO 'GV1' & 'VAL' DIAGNOSTIC LED TABLES (10.1.2 & 10.1.3)			

11.0 DIMENSIONAL DRAWINGS

11.1 - Unit without Noteguide



11.2 – Cashbox


NOTE ENTRY
190
168.3
189.5
9.7
187.4
191.5
SHOWN WITH KEYLOCKS FITTED
28.5
106.7
GV1
NOTE: All dimensions mm

Revision History

Revision	Date	Created	Approved	Comments
1.00	4 October 2018	RB		Initial issue for comments

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