Bill-to-Bill

Currency Management System With Bulk Loader Validating Head Single width option

Operation and Service Manual

Part 1. Operation Manual

Table of Contents

GENERAL DESCRIPTION

The **Bill-to-Bill Currency Management System** is an automatic money-handling device that provides the following features:

1) Validating bills (any country, sizes as specified). Validated bills are distributed between three recycling cassettes and one lockable-removable drop cassette. A maximum of three denominations may be directed to the recycling cassettes, while the rest of the bill denominations will be directed to the drop cassette.
Bills may be presented to the device as single notes or as stacks of up to 25 bills at once.

2) Dispensing bills. Bills housed in the recycling cassettes can be bundled and dispensed as change to a customer (up to twenty bills at a time).

3) Unloading bills. Bills from the recycling cassettes can be moved into the drop cassette.

The Bill-to-Bill can be programmed to operate in different modes. For example, bill denominations may be designated for each recycling cassette; choice of escrow settings may be specified, etc. Those settings cn be changed from a host controller via interface.

For more information about updating the software of the Bill-to-Bill, please see the *OPERATING CONTROL* section in this Manual.

GENERAL SPECIFICATIONS

Acceptance:
Bills……stacks of up to 25 bills, lengthwise in 4 directions
Barcoded coupons……two ways, face up
Validation rate……96% or higher on first bill insertion
Width of bill, in mm*……from 62 to 82
Maximum length of bill, in mm……172
Minimum length of bill, in mm……124

*Bulk loader head does not support bill aligning. Only same width country(ies) allowed.

Barcoded Coupon Specifications:
Encoding standard……ANSI/AIM BC2-1995, Uniform Symbology Specification – Interleaved 2 of 5
Narrow bar width, in mm……0.5 to 0.6
Wide/Narrow bar ratio……3:1
Number of characters……6 to 18
PSC (Print Contrast Signal) value ……0.6 min

Bill storage:
Number of recycling cassettes……3
Number of drop cassettes……1
Recycling cassette capacity……80 to 110 bills depending on bill length
Drop cassette capacity (new bills)……1000 bills

Dispensing ability……bundles up to 20 bills at a time

Multi-escrow mode
Single dispensing……up to 20 bills
Several dispensing attempts……up to 80 - 110 bills depending on bill length

Processing time, in seconds:
Total processing time in flow mode (from stack into recycling cassette, best case scenario)……1.2
Total time to accept one bill to drop cassette…… 3.5 to 6
Total time to issue change of 1 bill……3
Total time to issue change of 20 bills …… 26

Dispensing speed……1.4 second per bill, max.

Firmware updates options:
Standard……Crane Payment Solutions Memory Stick
Network…….. Download mode in CCNET protocol

External Interfaces:
Standard……Bi-directional EIA-232C (RS232)
Protocol…….. CCNET

Power consumption:
Operating voltage…… 24 V DC
Current, standby……0.7 A
Current, operating mode……2.7 A (5 A peak)

Dimensions (W x H x D)……163 x 612 x 434 mm

Weight .....17.8 kg

Approvals:

Safety Standards
for Coin and Currency Changers and Actuators - Component.....UL 756
FCC Compliance
Radiated Emissions from Unintentional Radiators (digital devices)
FCC Part 15, Subpart B 15.109a Class B

CE Compliance.....Information Technology Equipment

Electromagnetic Compatibility (EMC)
Conformity to the Following Standards:

CISPR 22:2003 +A1:2004 / EN 55022:2003 Class A - Class A Limits for RF disturbance characteristics of Information Technology Equipment

CISPR 24:1997 / EN 55024:1998 +A1:2001 & + A2:2003 Immunity Characteristics – Limits and Methods of Measurements

Vibrations, Drop and Shock resistance:

Vibrations (sinusoidal) IEC 60068-2-6 Fc: 1995

vibration acceleration amplitude..... a= 12 m/sec^2
bandwidth..... F = 10...200 Hz
sweep rate..... one octave per minute

vibration acceleration amplitude ..... a= 19,8 m/sec^2
bandwidth..... F = 10... 500 Hz
sweep rate..... one octave per minute

Endurance at random vibration wide band testing within F = 10. . .200 Hz at 12 m/s^2 mean-square acceleration amplitude and number of loading cycles n = 10 e-7
Control method:
Bill-to-Bill^{TM} operation was continuously controlled by means of the bill loading and unloading. No malfunction or stoppages were registered in the Bill-to-Bill^{TM} operation.

Mechanical Shocks

Shock endurance at shock testing
(Shock: **IEC 60068-2-27 Ea: 1987**; Bump: **IEC 60068-2-29 Eb: 1987**):
shock repetition frequency..... F = 80 shock / min
acceleration amplitude .....30 m/s^2
duration .....T=10...12 msec
number of shocks.....2000
Control method:
Bill-to-Bill^{TM} operation was continuously controlled by means of the bill loading and unloading. No malfunction or stoppages were registered in the Bill-to-Bill^{TM} operation.

Free Fall IEC 60068-2-32 Ed: 1975

Test Conditions:

Bill to Bill Currency Management System tested as a whole unit.
Drop height ……..50 mm
Surface…….....……3 mm thick steel plate on wood bed at 20°C and 58% RH

The Bill-to-Bill™ survived the test free from any serious complications and preserved its full functionality.

Environment:
Operating environment…..…….....……..……Indoor or environmentally protected stationary applications
Operating Temperature for Bill-to-Bill unit…….....……..……..0°C to +50°C
Storage Temperature…….....……..…..-30°C to +60°C
Humidity (non-condensing)…….....……..……..30%-90%RH

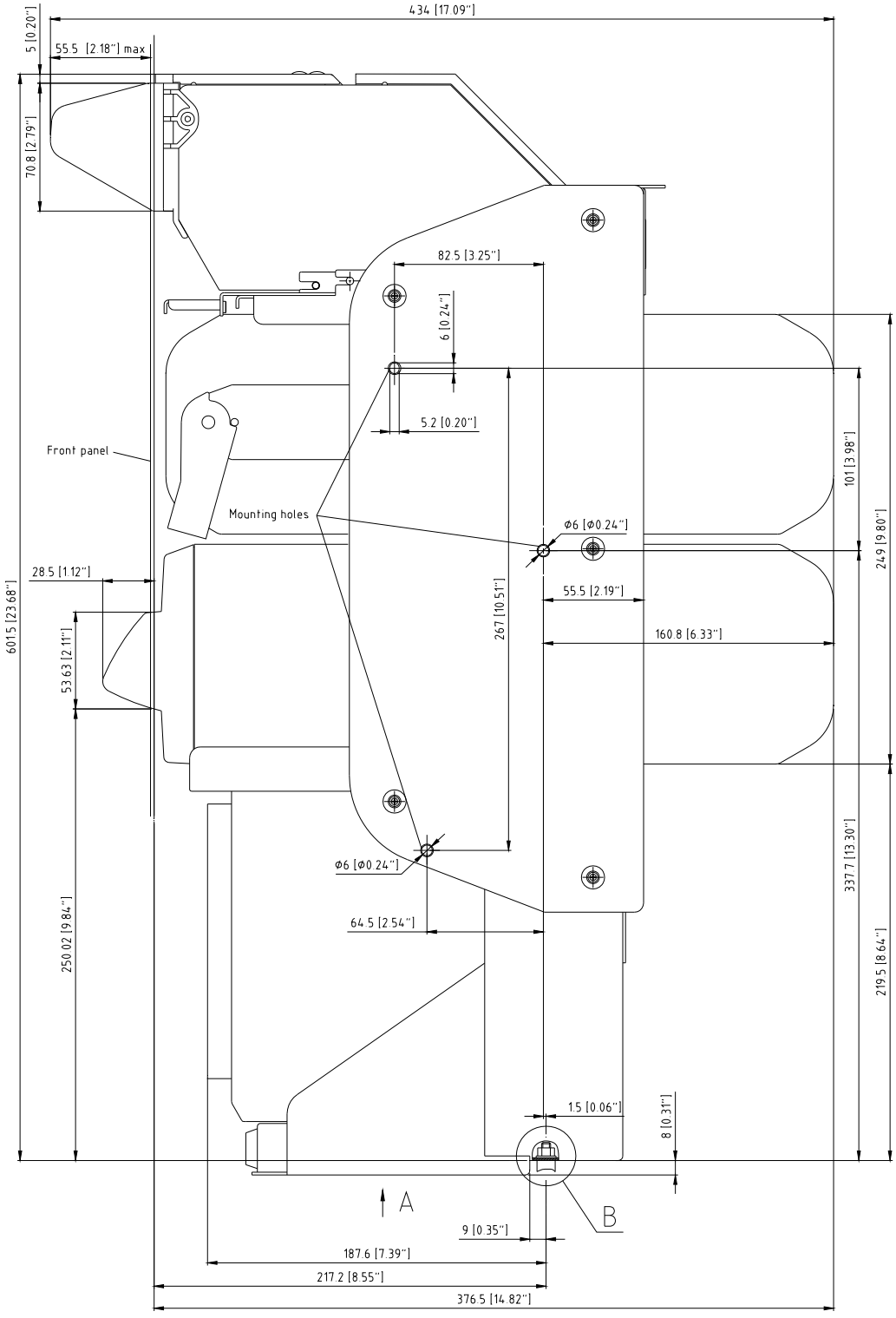
Optional security features:

Drop cassette…….....……one or two ¾" tubular locks
Housing…….....……one ¾" tubular lock for drop cassette
Housing…….....……2 security switches to signal alarm when drop cassette unlocked or removed; chassis unlocked and removed
Chassis…….....……..one ¾" tubular lock for locking chassis, recycling cassettes and dispensing cassette inside housing

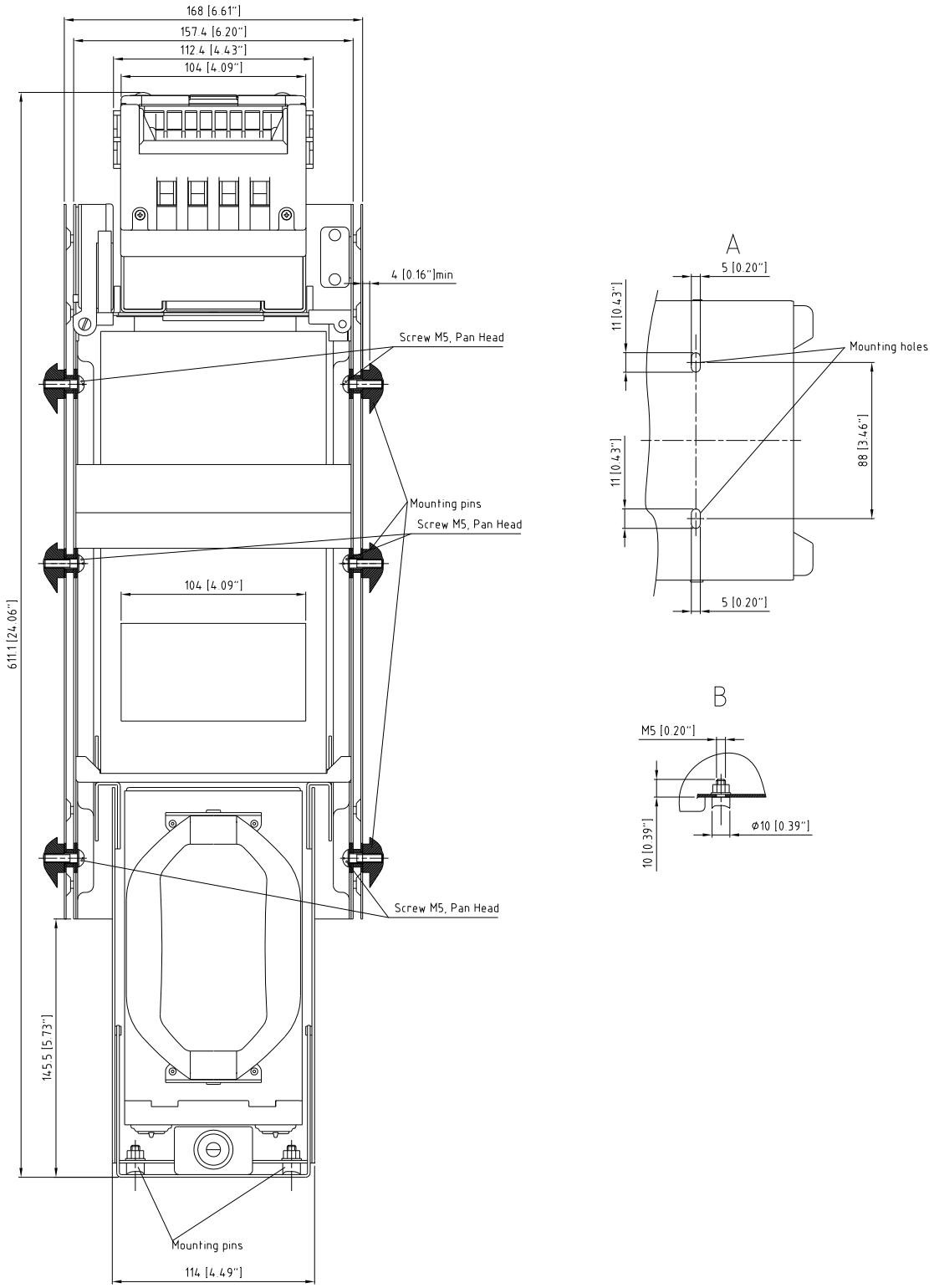
Optinal features:

- Drop cassette equipped with Cash Manager

OUTLINE DRAWINGS



Side view



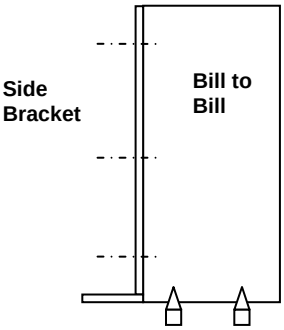
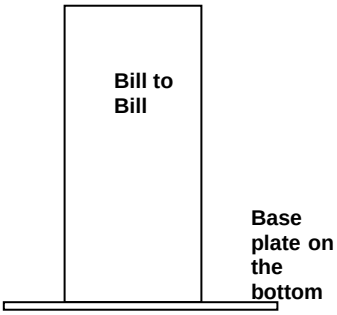
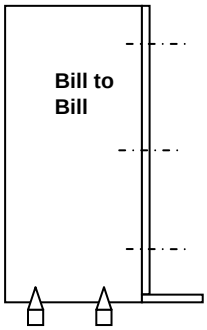
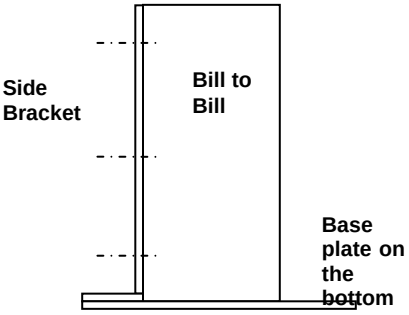
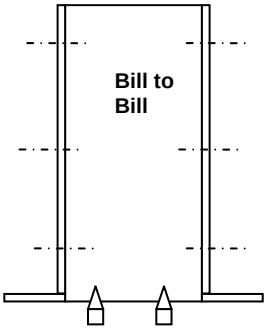
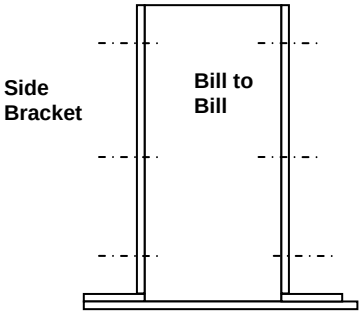
Front view

The recommended installation:

Bottom must be supported by mounting pin – qty 2

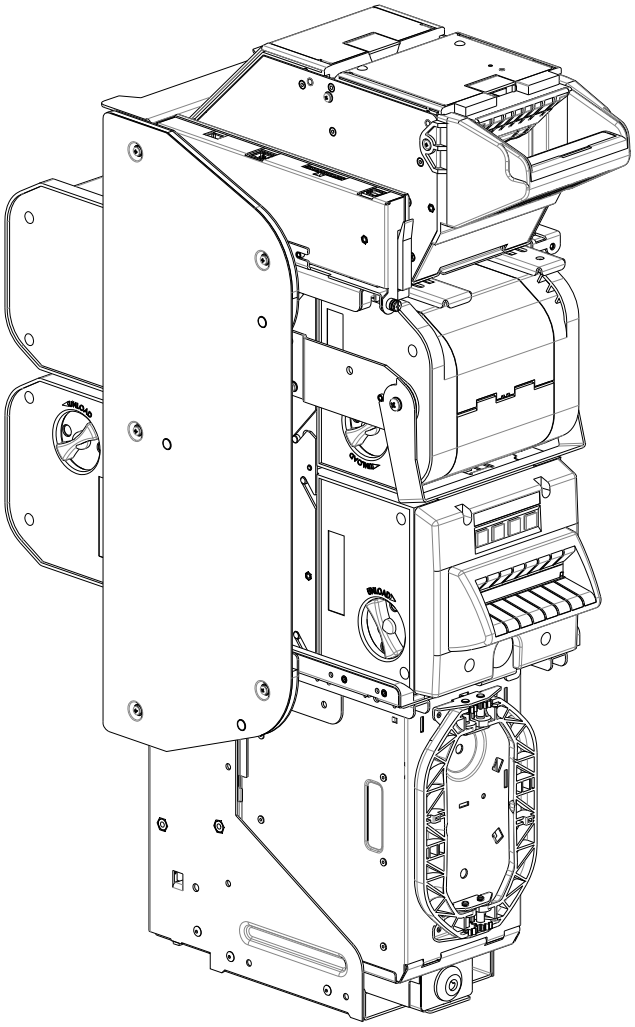
Side mounting by metal fasteners (M5 – Qty 3 each side) with your own version of bracket from left or right side

Installation View

GOOD Installation	Poor Installation
 √ Side Mounting and Mounting Pin on the bottom	 ⊗ Flat base plate on the bottom. This is not all recommended
 √ Side Mounting and Mounting Pin on the bottom	 ⊗ Side Mounting and flat base plate on the bottom. This is not all recommended
 √ Side Mounting on Both Side and Mounting Pin on the bottom	 ⊗ Side Mounting and flat base plate on the bottom. This is not all recommended

DESCRIPTION OF MODULES

The **Bill-to-Bill** was built on modularity principles, just like other front load bill validator products. The **Bill-to-Bill** consist of the following modules:



Validating Head – accepts and validates legitimacy of bill

Power Interface Module - Only one variety may be used with the B2B

Drop Cassette - Secure Cashbox, it is referred to as a "cassette"

Memory Card - is universal for all Suzo-Happ products

Housing – 2 types

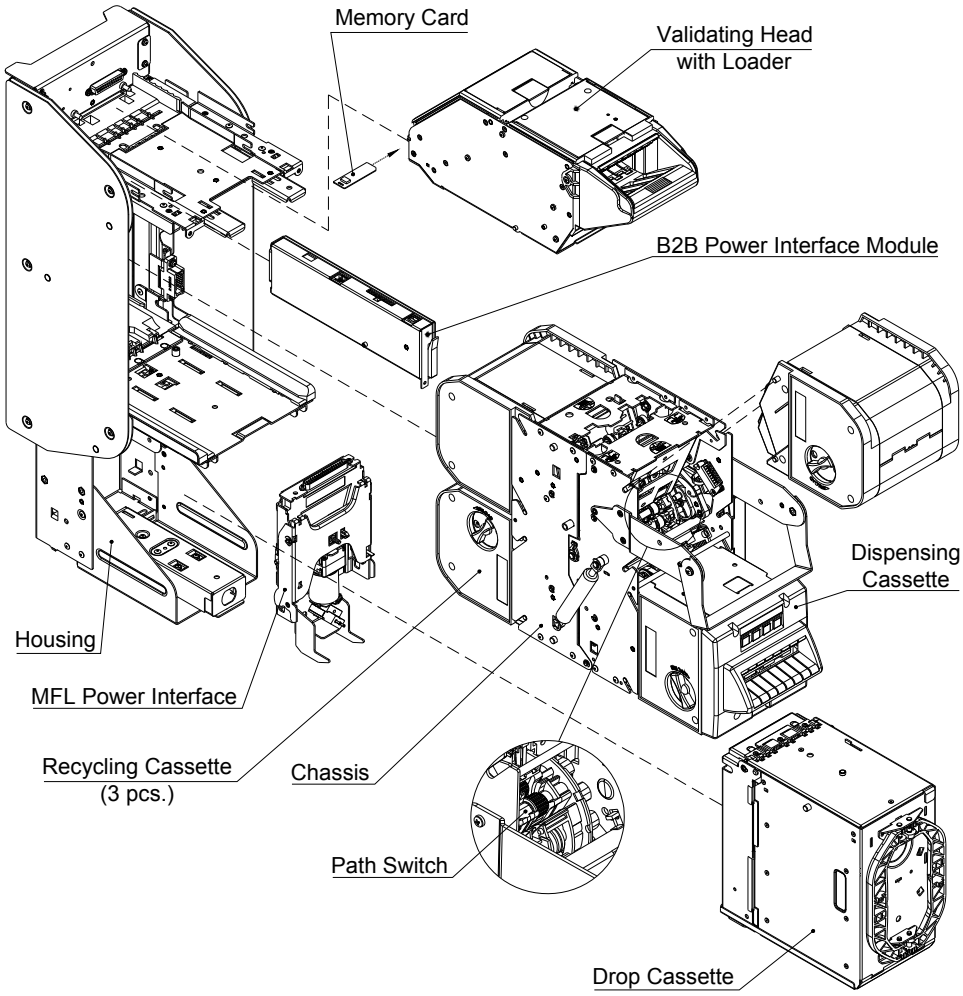
Chassis – 1 type

Recycling Module – Consists of a total of three recycling cassettes

Dispensing Cassette – 2 types

Path Switch – 1 type

Bill-to-Bill Power Interface Module – 1 type



All modules (except for the housing) can be easy removed and replaced if needed (i.e.: should a bill become jammed).

Fig. 1

Housing

The Bill-to-Bill **housing** carries all of the modules and cables necessary for interconnections. The housing is the only module in the Bill-to-Bill that is permanently installed inside a cabinet.

There are security switches in the housing:

1. “drop cassette removal”,
2. “drop cassette lock open”, (if the locking mechanism for the drop cassette is present),

For switch connection, please refer to the ***“INSTALLATION. SECURITY FEATURES”***. Depending on the supporting bracket for the drop cassette, the following implementations of the housing are available:

Part Number	Bezels	Drop Cassette size	Locking mechanism
BBHR3110	Plastic	1000	NO
BBHR3512	Plastic	1000	YES

Maintenance of the Housing.

There is no procedure designated for this module.

Chassis

The **chassis** carries 3 recycling cassettes, one dispensing cassette, and one path switch. It also has drive arrangements—for transporting bills, recycling cassettes, and positioning the path switch—as well as connection cables and a local controller.

Part Number	Number of Recycling Cassettes
BBCR0110	3

Removing the Chassis from the Housing

- Unlock the tubular lock at the front of the dispensing module (if present)
- Push the release bar under the validating head
- Pull out the chassis

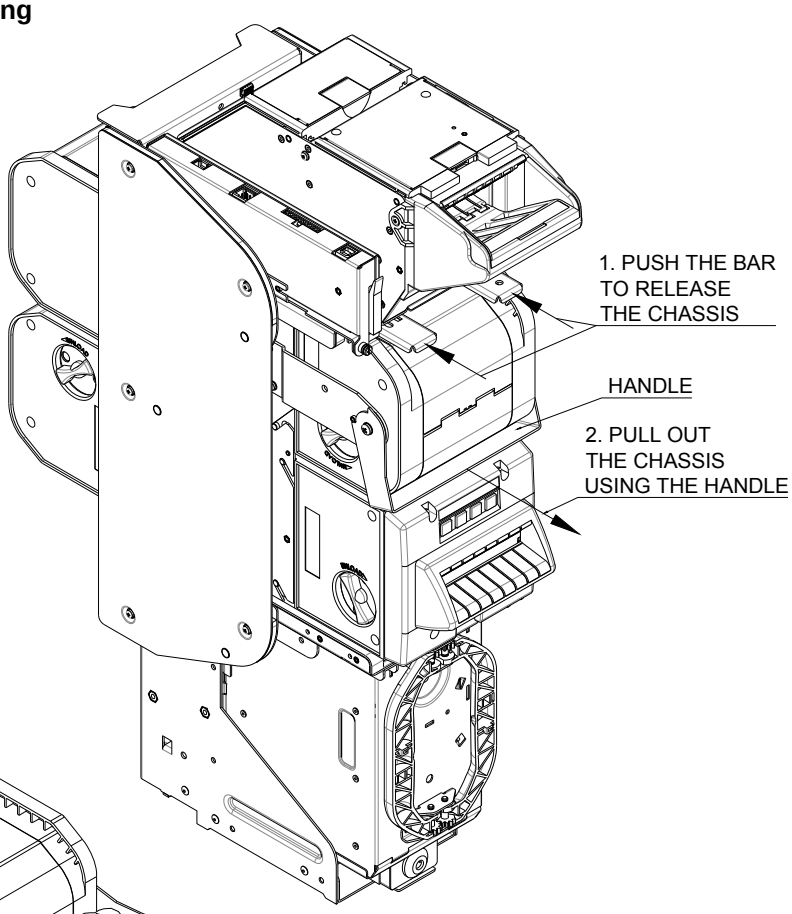


Fig. 2

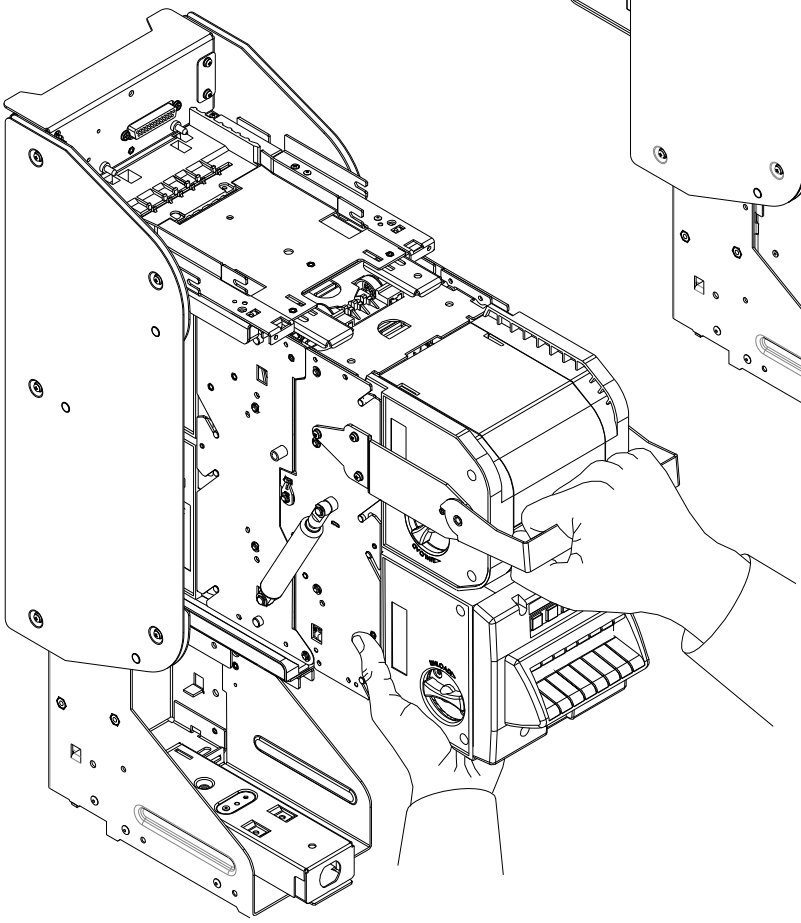


Fig. 3

Caution! The chassis may be heavy to handle! Support the module beneath the chassis with at least one hand.

Accessing the Bill Path:

Press either release button and pull open the machine. The gas spring supports the chassis in the opened position. The opened chassis also allows access to the path switch. The chassis can be opened with, or without, the recycling and dispensing cassettes present.

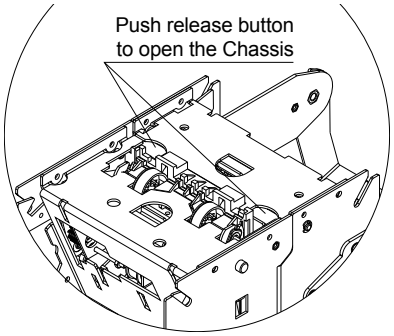


Fig. 4

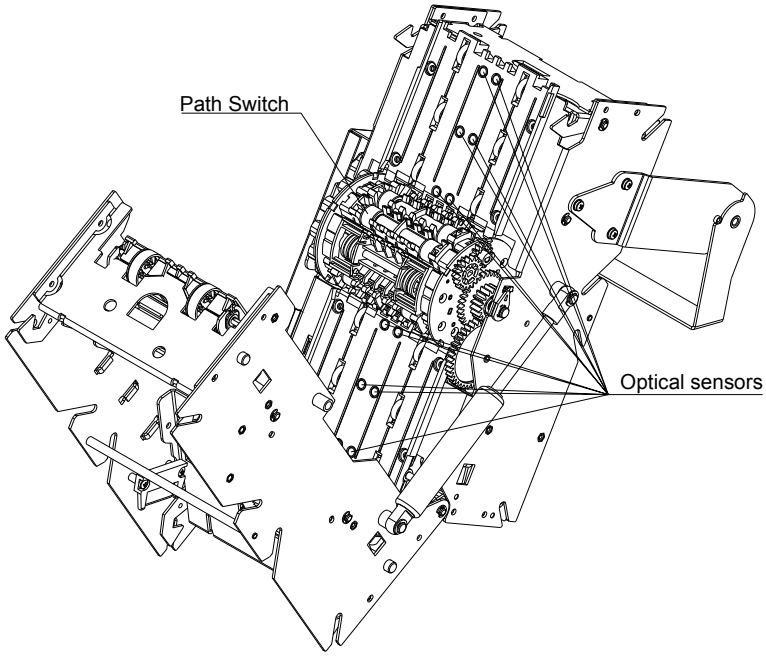


Fig. 5

Maintenance of the Chassis

The maintenance of the chassis is recommended approximately two times per year.
The preventative maintenance includes:

- visual inspection of timing belts
- visual inspection of gears
- visual inspection of optical sensors

There must not be any cracks on the surface of the four timing belts; no dust or dirt on the surface of the optical sensors (6 sensors at each guide, for a total of 24 sensors), and no visible damage of the gears. Optical sensors should be cleaned with a soft cloth and isopropyl alcohol.

Recycling Cassette

The Bill-to-Bill carries up to three **recycling cassettes**, which operate identically. Built with flexibility in mind, the user can program which bill denominations will be used in each of the recycling cassettes. (For Software update instructions, please read the chapter entitled "***SETTING BILL DENOMINATION FOR RECYCLING CASSETTE***", below.)

The maximum storage capacity of each cassette ranges from 80 to 110 bills. The exact number of bills that can be stored is dependent upon the bill length: the shorter the bill, the higher the number of bills that can be placed inside the cassette.

A flash memory inside each recycling cassette stores information on the number, and denomination of bills housed in the cassette. The flash memory prevents operation errors from occurring, i.e.: when a cassette is installed in a random position in the Bill-to-Bill.

Part Number	Bill storage capacity
BBRR0110	80 - 110

Removing the Cassette:

- Remove the chassis from the Bill-to-Bill housing first (see section entitled "chassis")
- Slide the latch on the chassis (each cassette has its own latch) and pull out the cassette

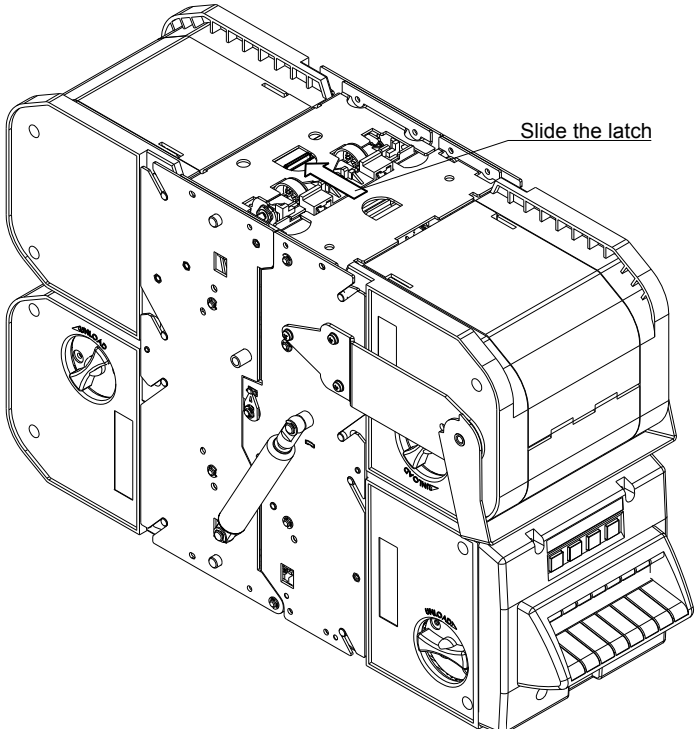


Fig. 6

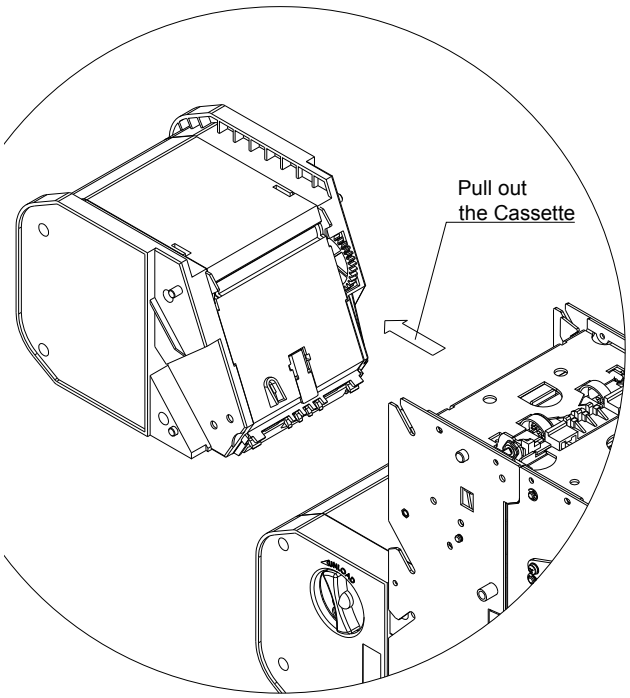


Fig. 7

Opening the Cassette:

Pull the metal latch, and open the front cover of the cassette.

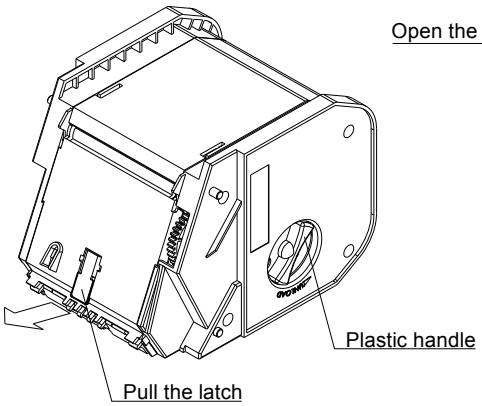


Fig. 8

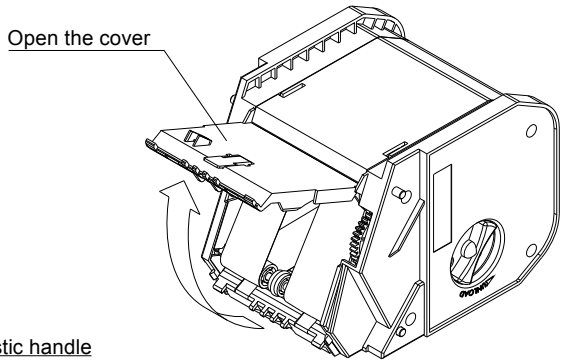


Fig. 9

Manually Unloading Cassettes:

Rotate the plastic knob in counter-clockwise direction. Bills are manually dispensed one bill at a time. Should a jammed bill be located in the entrance slot, this bill can be easily removed without adversely affecting the later operation of the cassette. Please note: manually unloading bills will reduce the number of bills in the cassette, without changing the number of bills in flash memory. It is strongly recommended to perform a complete unload operation, after the cassette is replaced in the Bill-to-Bill (please see the "Unloading Options" section). This will allow the Bill-to-Bill to readjust the flash memory when the cassette is operational again.

Caution. Do not attempt to pull out the white tapes present in the cassette! This could damage the cassette!

Maintenance of the Recycling Cassette

The maintenance is recommended approximately two times per year and includes:

- visual inspection of tapes
- visual inspection of input optical sensors

A mechanism within the cassette keeps the tapes tight at all times, which provides sufficient support for stored bills. Should any tape begin to sag, this can be easily corrected during service by simply rotating the plastic knob on the cassette in any direction. This action will cause the mechanism inside the cassette to retighten.

For optimal performance, there must not be any dust or dirt on the surface of the input optical sensors. (There are two sensors at each side of the entrance slot, for a total of four sensors.) Input optical sensors may be cleaned with a soft cloth and isopropyl alcohol once the front cover is open.

Dispensing Cassette

There is only one **dispensing cassette** in the Bill-to-Bill unit. In contrast to the three recycling cassettes, the dispensing cassette has a permanent position in the chassis. The dispensing cassette can form a bundle of up to 20 bills. Bills from all three recycling cassettes can be combined into one bundle. Should more than 20 bills need to be dispensed, then subsequent bundles will be delivered to the dispensing cassette once the previous bundle is removed.

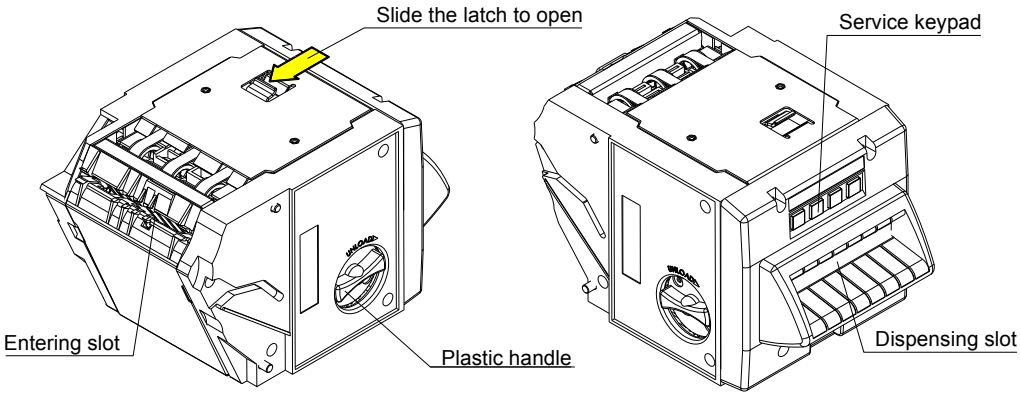


Fig. 10

A standard ¾" tubular lock can be installed in the dispensing cassette, which will allow the **chassis** to be secured to the **recycling cassette module**, and the **dispensing cassette** inside the housing. There is a placement for a lock under the dispensing slot.

Part Number	Maximal bundle size, bills	Bezels
BBDR0110	20	Plastic

Removing the Dispensing Cassette:

- Remove the chassis from the housing first (please see section above)
- Slide the latch on the chassis and pull out the cassette

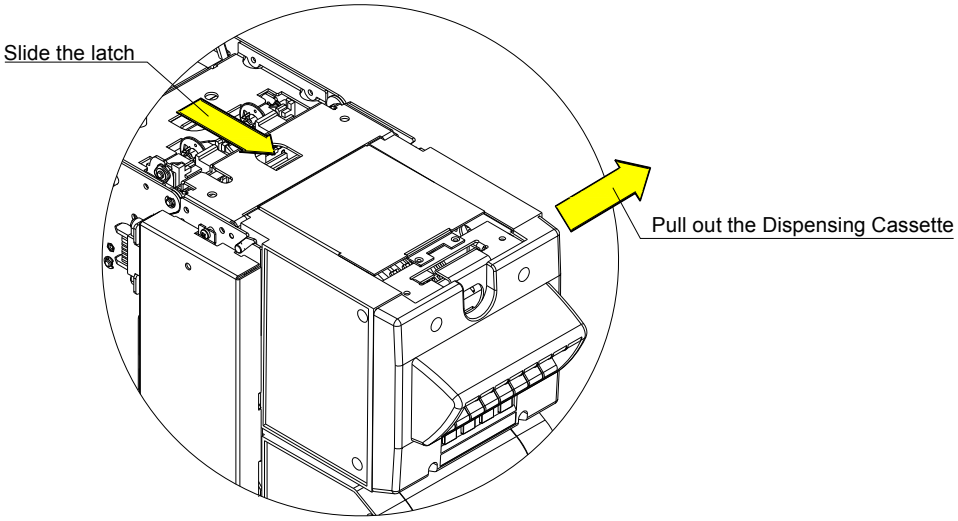


Fig. 11

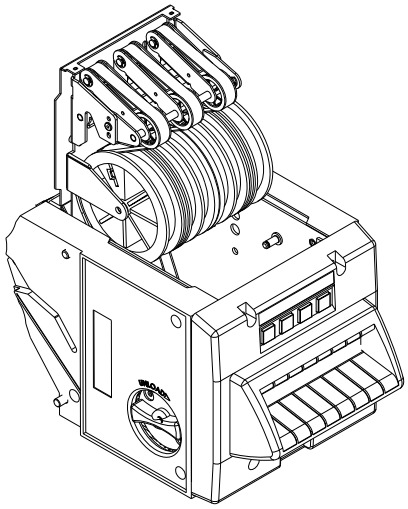


Fig. 12

Maintenance of the Dispensing Cassette:

Preventative Maintenance of the dispensing cassette is recommended approximately two times per year. Maintenance should include visual inspection of belts. Also, there must not be any cracks on the surface of any of the 8 timing belts, and no visible damage of any of the components.

Path Switch

The **path switch** organizes connections between modules via various bill paths.

Possible bill path directions are:

–from validating head to recycling cassette 1
–from validating head to recycling cassette 2
–from validating head to recycling cassette 3

–from validating head to drop cassette

–from recycling cassette 1 to dispensing cassette
–from recycling cassette 2 to dispensing cassette
–from recycling cassette 3 to dispensing cassette

–from recycling cassette 1 to drop cassette
–from recycling cassette 2 to drop cassette
–from recycling cassette 3 to drop cassette

–from recycling cassette 1 to recycling cassette 2
–from recycling cassette 1 to recycling cassette 3

–from recycling cassette 2 to recycling cassette 1
–from recycling cassette 2 to recycling cassette 3

–from recycling cassette 3 to recycling cassette 1
–from recycling cassette 3 to recycling cassette 2

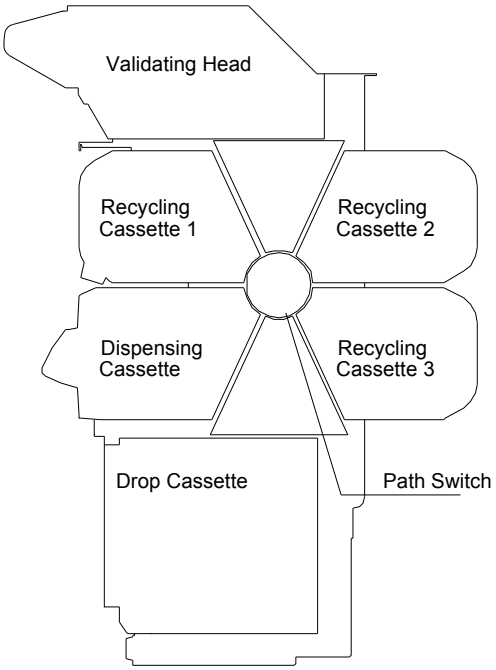


Fig. 13

Part Number	Number of connected paths
BBSR0110	6

Removing the Path Switch:

Remove the chassis from the housing first (please see section above)

- Open the chassis (please see Fig. 6)
- Pull the tab and rotate the bearing 90 degrees, as shown in Fig 15.
- Repeat the action with the second bearing at the opposite side of the chassis
- Once both bearings have been released, ***carefully*** pull out the path switch from the chassis

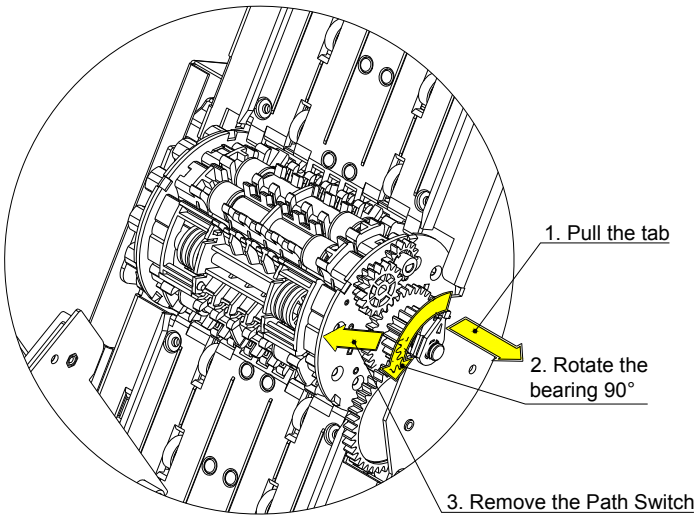


Fig. 14

Maintenance of the Path Switch:

The maintenance of the path switch is recommended approximately two times per year.
Preventative Maintenance includes visual inspection of belts.
There must be no cracks on the surface of the 8 timing belts, and no visible damage of the components.

Bill-to-Bill Power Interface Module

The **Bill-to-Bill power interface module** is placed in the housing at the left side of the validating head. It carries connectors for all external connections to the Bill-to-Bill.

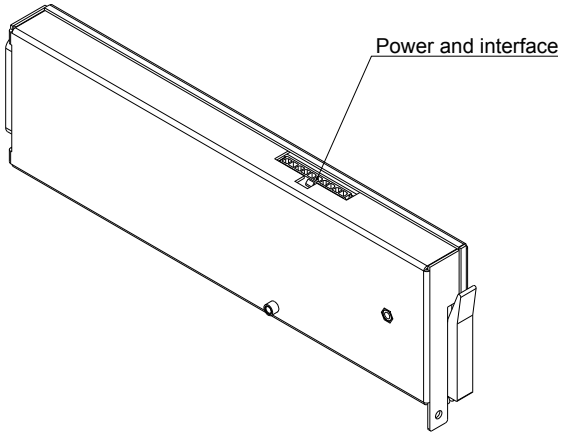


Fig. 15

Part Number	Interface	Power
BBPR5713	RS232	24V DC

Removing the Bill-to-Bill Power Interface Module:

- Remove the screw under the Bill-to-Bill power interface at the front side
- Pull the latch of the Bill-to-Bill power interface module to remove it from the housing

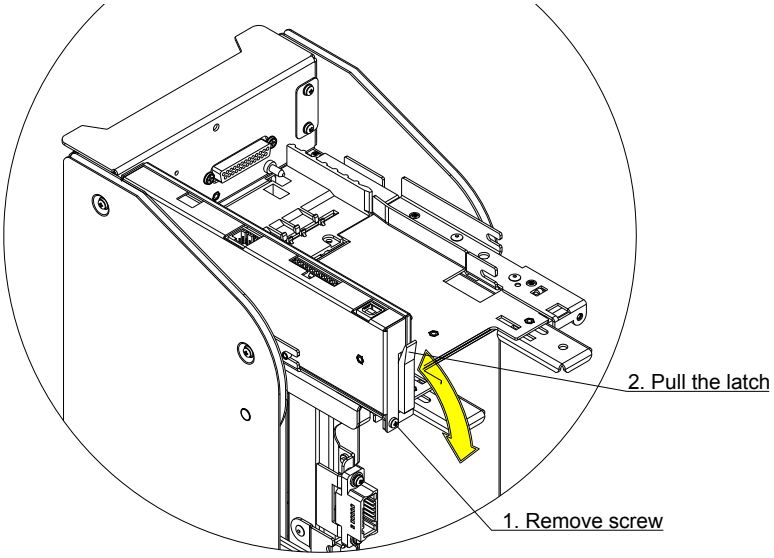


Fig. 16

Maintenance of the Bill-to-Bill Power Interface Module:

There is no maintenance procedure designated for this module.

Drop Cassette

The Bill-to-Bill can utilize one **drop cassette**; this is the same cassette used in other front load bill validator models.

The **drop cassette** stores validated bills and barcoded coupons and holds them in a stacked formation. The drop cassette has a stacking mechanism, and is typically equipped with a plastic lock. Users are encouraged to replace the plastic lock with a regular metal one. Users also have a choice between one lock—or two locks for added security. A locking mechanism allows for the installation of a user's security locks (specifically, one or two 3/4" tubular locks measuring $1^{1}/_{16}"\pm^{1}/_{16}"$ or $1^{1}/_{8}"\pm^{1}/_{16}"$).

The capacity of the drop cassette is 1000 bills. Street grade bills require more space and as a result, may lessen the overall capacity. The drop cassette is supplied with a foldable handle, but where space inside the machine is limited, a premium drop cassette may be ordered without a handle.

The drop cassette can store bills from 62 to 82 mm wide, and from 140 to 172 mm long. For bills from 125 to 150 mm in length, a modified drop cassette may be ordered. However, when accepted bill are 125 to 172 mm long, the drop cassette for 140-172 mm range must be chosen.

The drop cassette may be ordered with mounting parts for installation of a Touch Memory (Dallas Chip) option. The Dallas Chip is located in the cassette housing. The proper type of power interface module must be ordered in order to communicate with the Dallas Chip. Drop cassette selection is dependent on which housing is present in the unit.

⚠ ***The Drop Cassette is not included with the Bill-to-Bill and must be ordered separately.***

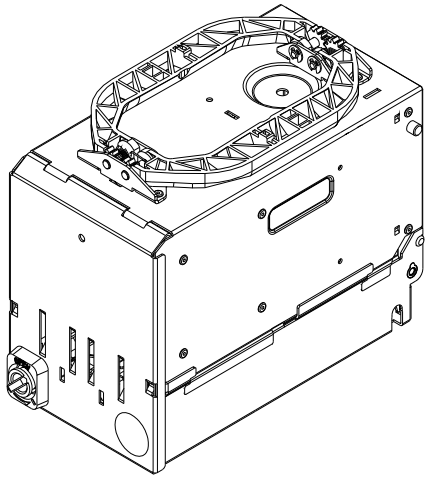


Fig. 17

Drop Cassette with foldable handle

Part Number	Cassette capacity, bills	Bill length, mm	Handle	Dallas Chip
FLCR603	1000	140 to 172	Foldable	No

For other drop cassettes please contact the Suzo-Happ Customer Service department.

Removing the Drop Cassette (Fig. 19):

1. Open the lock in the housing (if equipped)
2. Push the release button
3. Grasp handle and pull out the drop cassette

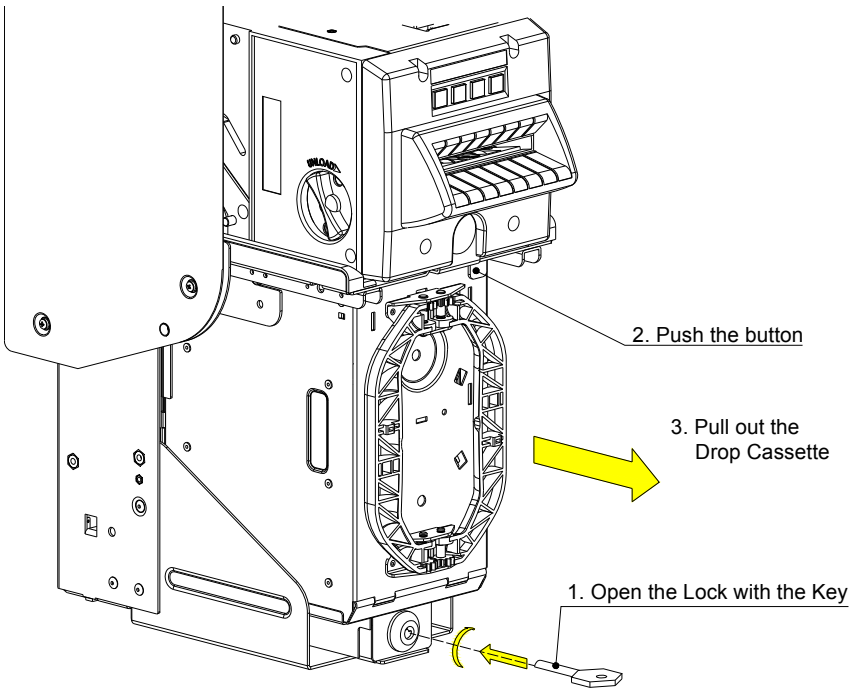


Fig. 19

Collecting bills:

1. Unlock 1 (or 2 locks) and open the cover

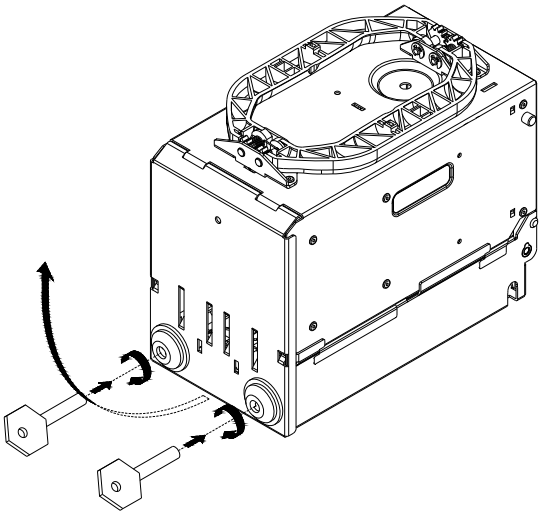


Fig. 20

2. Remove bills

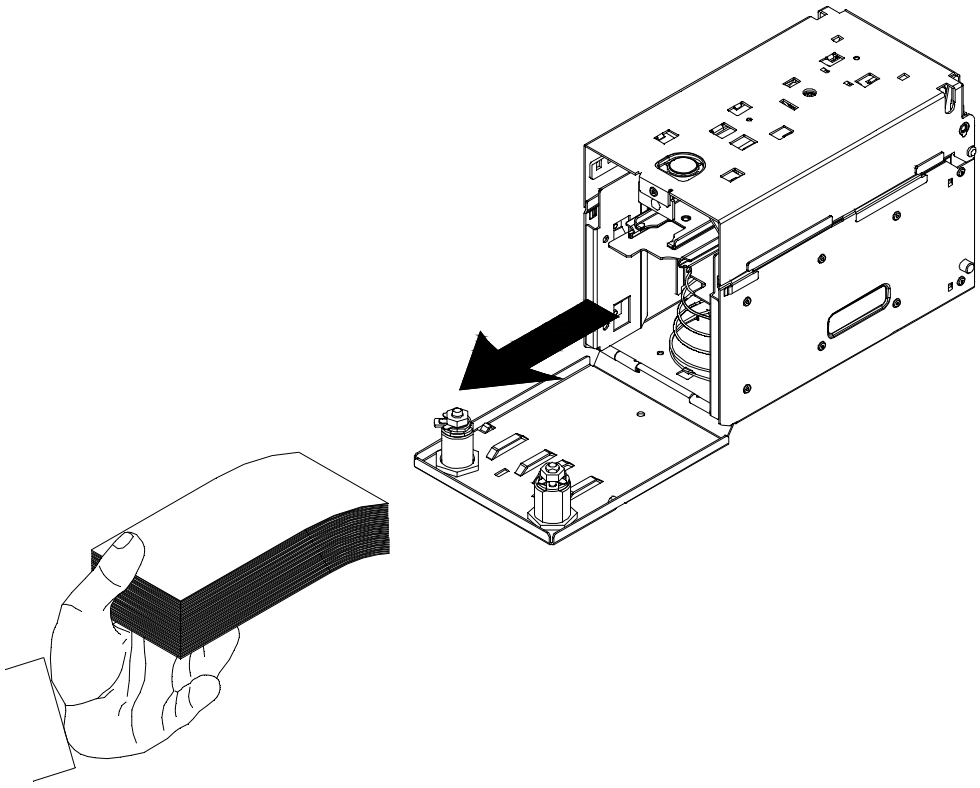


Fig. 21

Maintenance of the Drop Cassette:

There is no maintenance procedure designated for the drop cassette.

Power Interface Module

The **Power Interface module** for the Bill-to-Bill is adopted from other front load bill validator units.

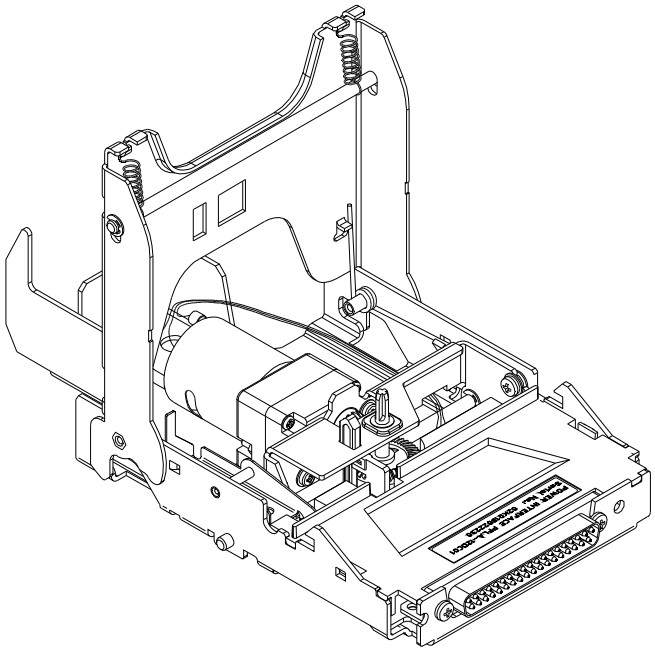


Fig. 22

Part Number	Power	Interface
FLPR5711	24 VDC	CCNET (single slave mode)

Maintenance of the Power Interface Module:

There is no maintenance procedure designated for the Power Interface module.

Validating head

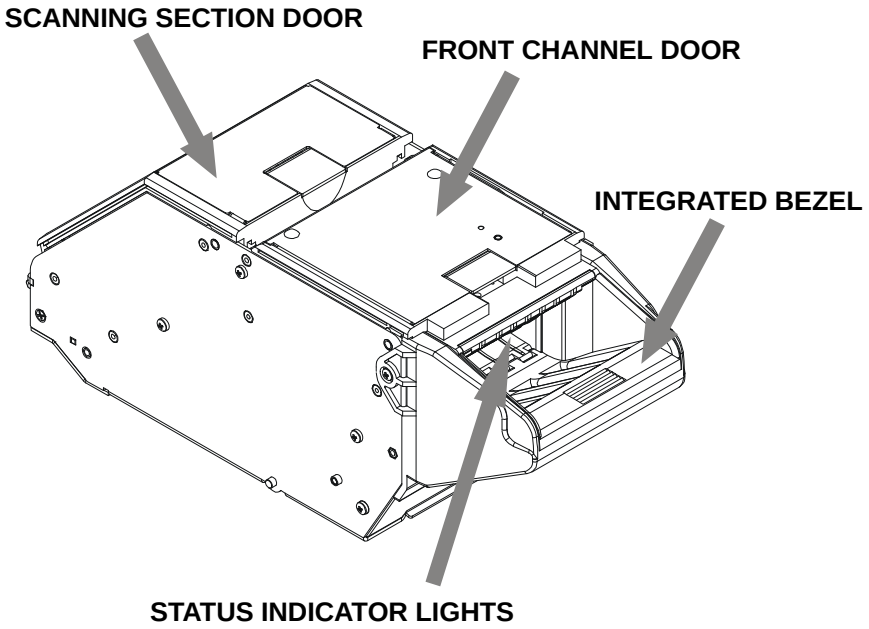


Fig. 23. The Bulk Loader Head*

* - minor features are omitted for clarity

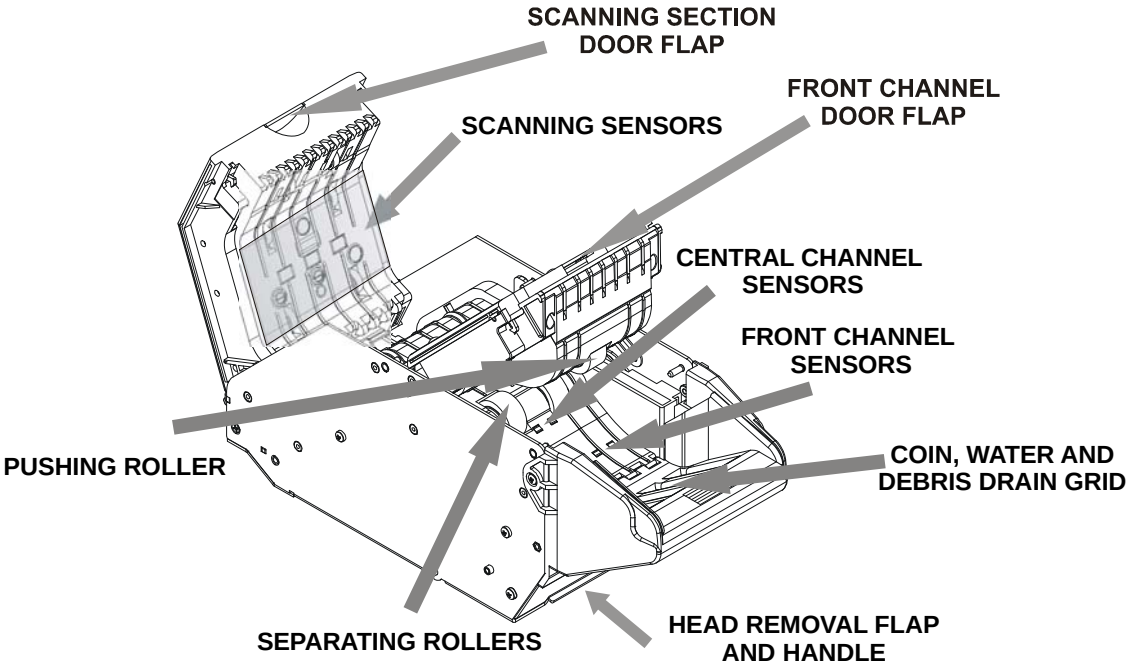


Fig. 24. Bulk Loader Head detailed view*

* - minor features are omitted for clarity

DEVICE OPERATION - GENERAL PRINCIPLE

The **Bulk Loader Head** is intended to provide performance gains compared to standard bill validating heads when processing multi-bill transactions.

Separation of bills from stack is based on friction difference, as shown in Figure 25.

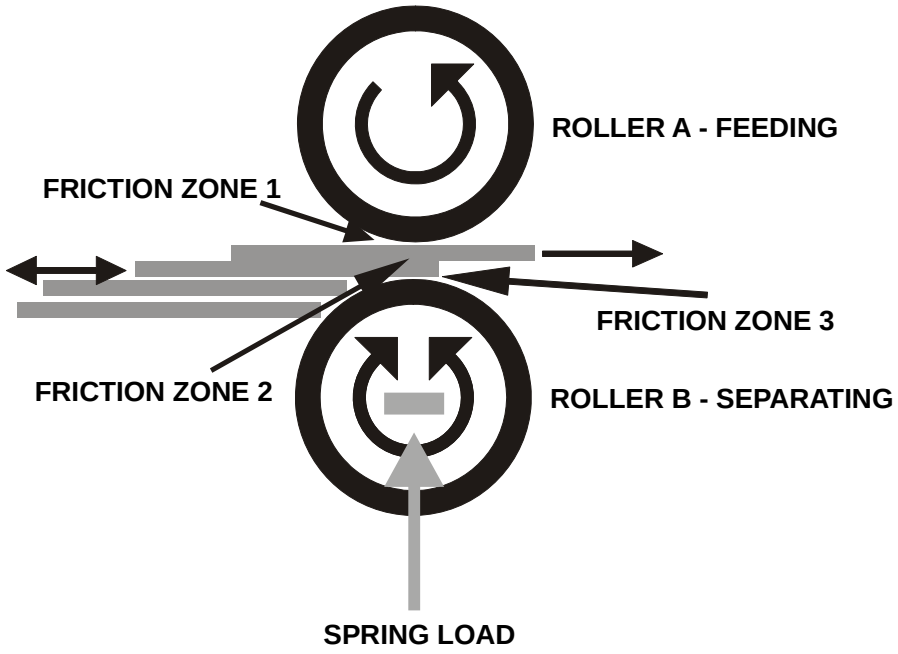


Fig. 25. The separation principle

According to Figure 25 the stack of notes is fed into the separation group of rollers A and B. The A rollers are always rotating in one direction, with the torque staying relatively the same. The friction in zone 1 (roller A and a note) is selected to be greater than friction in zone 2 (between notes). This is guaranteed by roller A material choice. The friction in zone 3 is also grater than friction in zone 2, but normally less than friction in zone 1. Under ideal conditions, the whole system is maintained in quasi-equilibrium with roller B stalled, allowing only one note to propagate through the separation group. In real world, many factors add and the separation may become unreliable. To compensate for that, two approaches are utilized:

- roller B torque control;
- sensors to detect multiple notes exiting the separation group.

Roller B torque is not only controlled at time of separation, but also calibrated periodically, e.g. at system startup, to compensate for dirt accumulation, roller wear and material degradation. Calibration is achieved with roller A rotating with constant speed and torque, while roller B torque is gradually increased. When the torque becomes strong enough to disrupt even rotation of the roller B by roller A, the torque value is saved.

The saved value is later used in conjunction with the double-note sensor output. If the sensor indicates a double take, torque is increased, and vice versa.

Device operation – STACK HANDLING

The generalized stack processing is illustrated in Figure 26. There's no try limit shown in the flowchart, but it is present in a real system and is normally set to 3 full attempts.

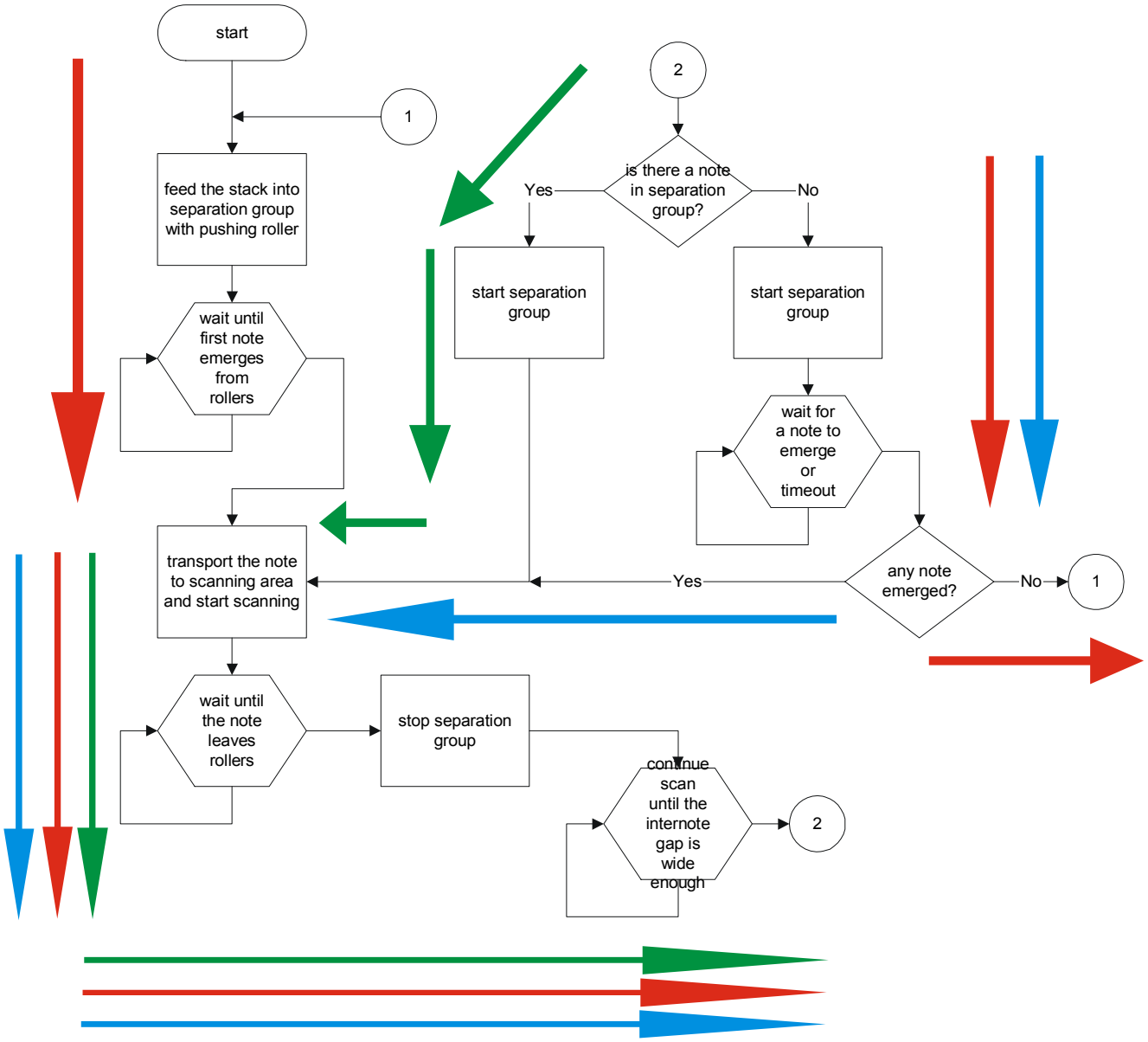


Fig. 26. Generalized stack processing

The arrows illustrate 3 distinct routes the stack processing can take:
GREEN route – the fast flow, can only occur after the first note is taken;
BLUE route – the partial take, can only occur after the first note is taken, take in case a following note failed to enter the rollers;
RED route – the full take, occurs on a first note in a stack and also in case the partial take has failed.

Device operation – THE NOTE FLOW

In case of fast flow, there is more than one note traveling the bill path at the same time, as illustrated in Figure 27. This is a substantial difference from the standard validating head.

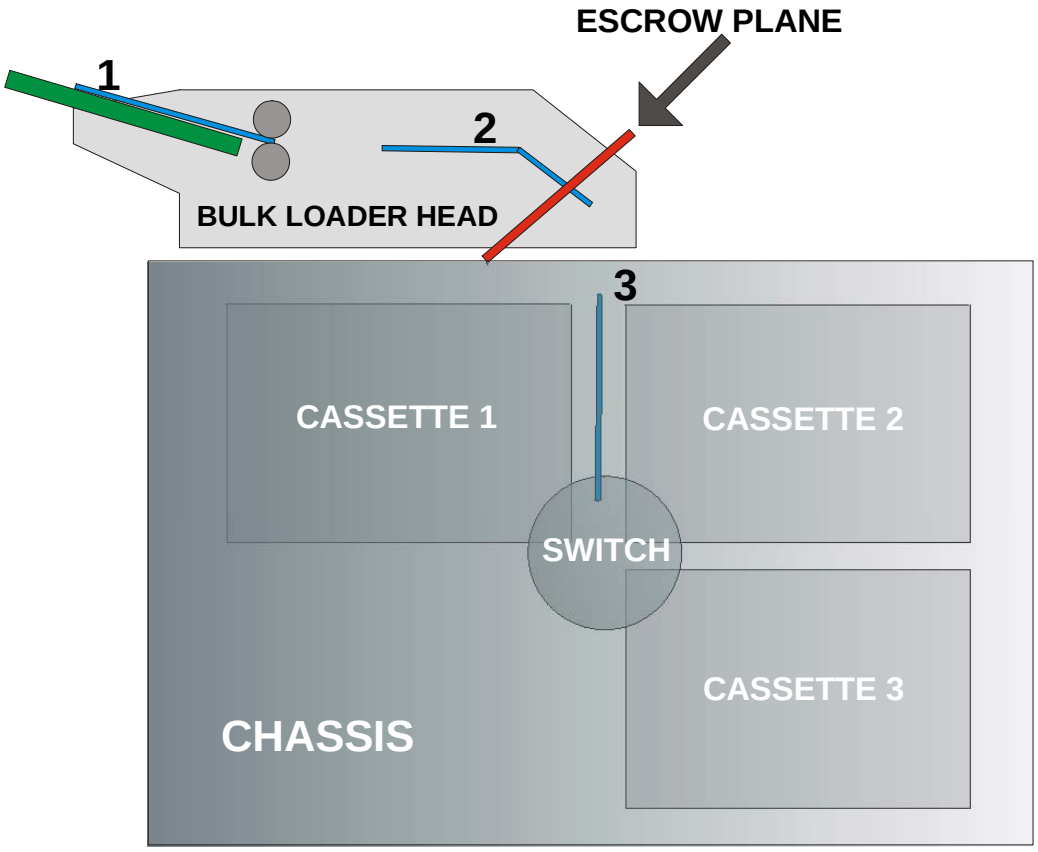


Fig. 27. The note flow

The notes, shown in blue, all share the same path. While note 1 is separated from the stack note 2 is scanned and note 3 is stacked. The whole flow stops when note 2 *trailing edge* reaches the **escrow plane**. To prevent jams, note 3 *trailing edge* must be at least in the **switch** at this point. In case of a fast flow, the note 1 *leading edge* will be entering the **scanning area** at the same time.

If the fast flow conditions are not met, the gap between notes 1 and 2 increases, bringing down the device performance. In most cases this happens with poorly aligned stack or poor note condition.

While processing notes, the **Bulk Loader Head** is running a state machine. The state machine flowchart is shown Fig. 28.

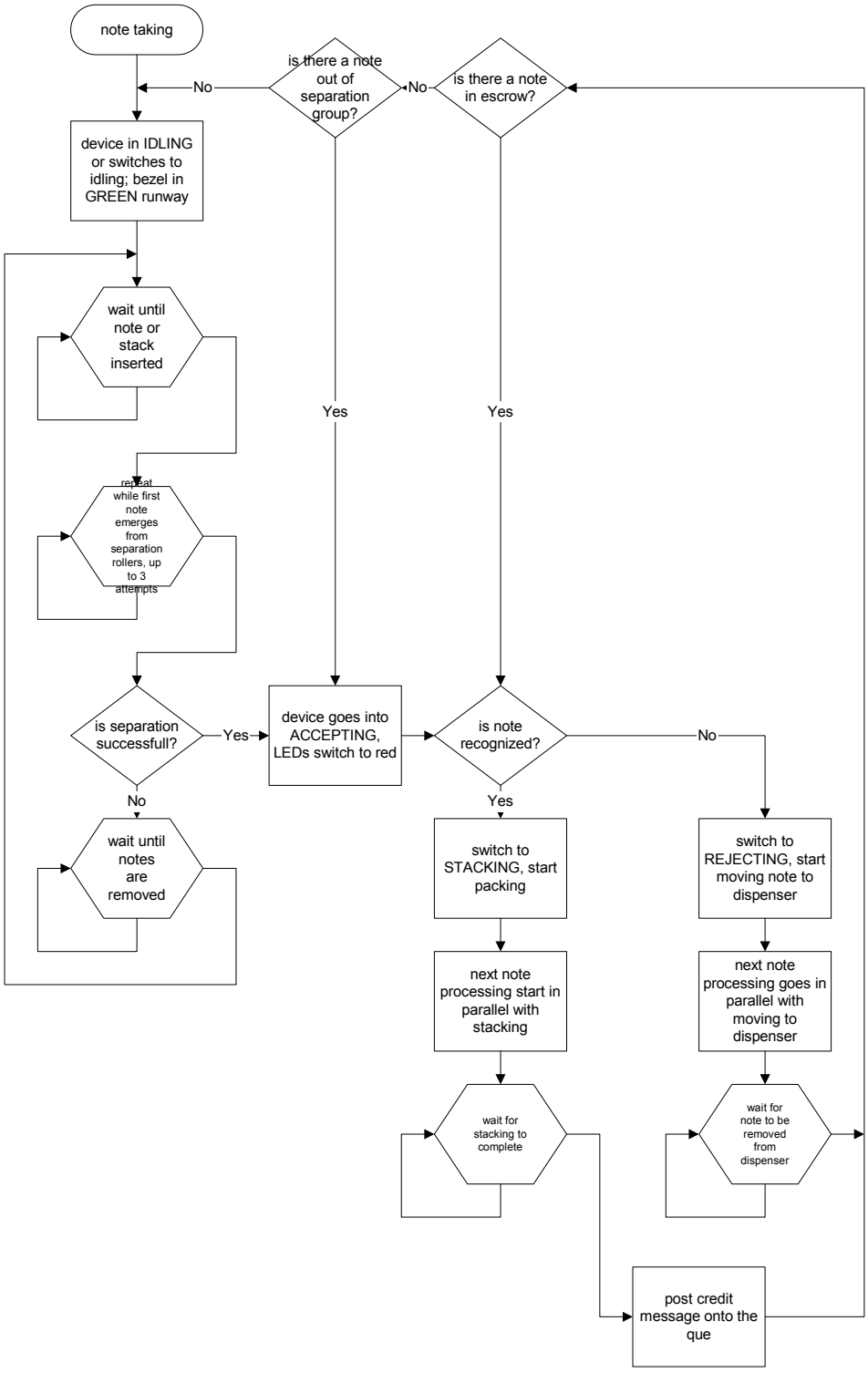


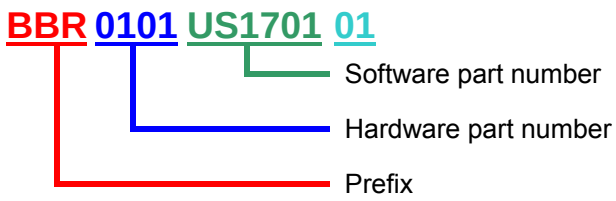
Fig. 28. Note processing state machine.

The device state names in Figure 28 (e.g. IDLING) are internal states and may or may not correspond to the states reported over the communication protocol. Many similarities can be observed between Figures 8 and 6.

NUMBERING SYSTEM

Depending on currency, interface and available features, Users can choose the Bill-to-Bill that best matches their needs.

Complete part numbers for the Bill-to-Bill consist of two parts: a hardware part number and a software part number. The part number looks like this:



The **prefix** defines the device class. In this instance, “BB” means Bill-to-Bill Currency Management System.

The **hardware part number** reflects the contents of the Bill-to-Bill (ie. the particular combination of modules).

The **software part number** reflects the country (currency), communication protocol and Chassis’ software version.

INSTALLATION

Mechanical installation

Only the Housing of the Bill-to-Bill Currency Management System must be permanently secured in a cabinet. All the other modules are connected to the housing. The housing has three mounting holes at each of the sidewalls, and two mounting holes at the bottom. For exact locations of these holes, please refer to the *OUTLINE DRAWINGS* in this manual.

It is recommended to use three holes at any of the sidewalls, and two holes at the bottom (Fig. 29 and Fig. 30).

M5 fasteners (metric) or 10-24 (imperial) should be used.

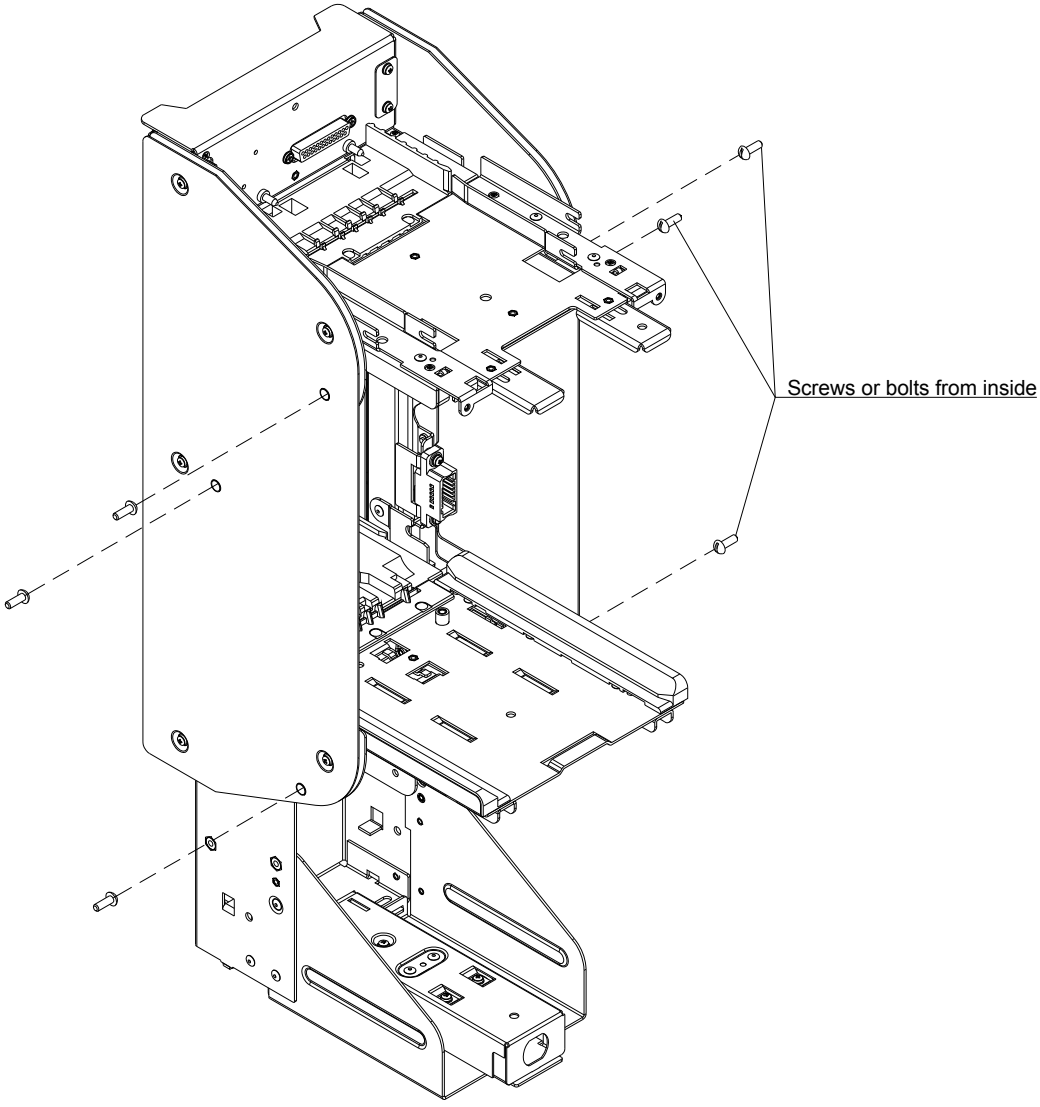


Fig. 29

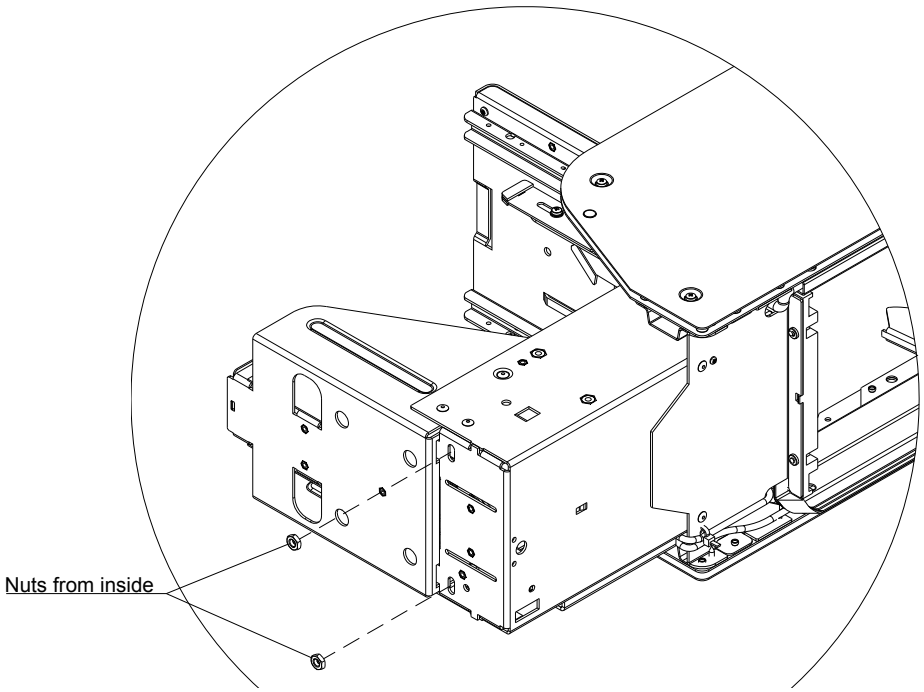
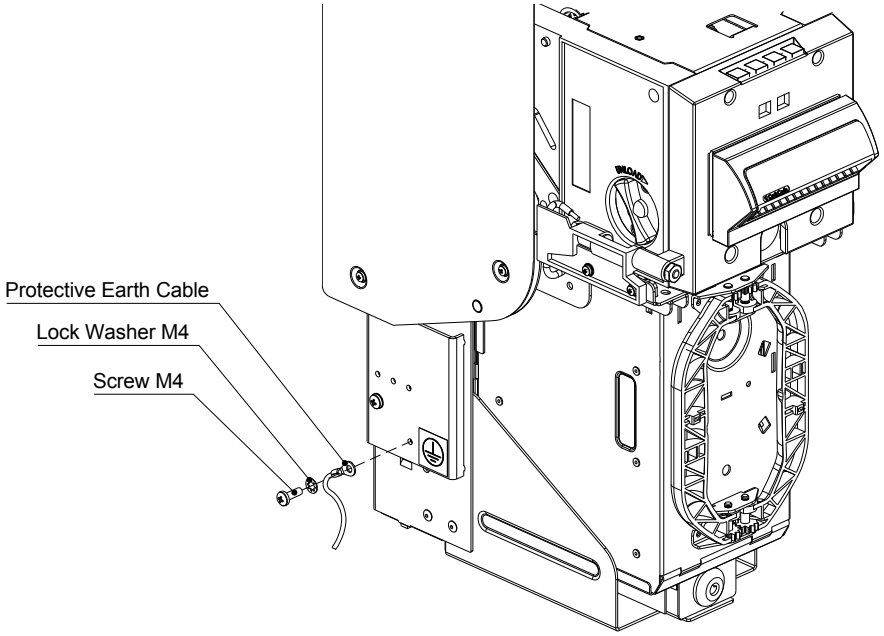


Fig. 30

Grounding of BBHR3513

Protective-earth ground terminal must be connected to the automat grounding bus or terminal. Protective earth connection must be made by cable OPT-MKSM-GND or another cooper wire cable with wire gage 14…12 AWG. Use the shortest, practical wire length but no more than 1.5 meters. Refer to local codes and regulations for grounding requirements.



Security features (locks and security switches)

The Bill-to-Bill Currency Management System has several security features.

The **drop cassette** can be locked with one or two ¾" tubular locks. The **drop cassette** can be also locked to the **housing** with a ¾" tubular lock. There can be two **security switches**: one detects the presence of the drop cassette in the housing, and another detects that the housing lock is secured in "locked" position.

The **chassis** within the recycling and dispensing cassettes can be locked in the housing with a ¾" tubular lock, positioned 5/8" from the mounting surface to a latch. The provision for the lock is located in the dispensing cassette. Neither recycling cassettes nor dispensing cassettes can be removed from the chassis, until the cassis is not removed from the housing.

Lock Installation in the Housing:

Step #1. Remove the screw and lock washer from the lock cover. DO NOT DISCARD! (Please see FIG. 31.)
Step #2. Remove and discard the washer and spacer (Fig. 31).
Step #3. Install the lock and parts, as shown in Fig. 32.
Step #4. Install the cover, screw and lock washer that were removed in Step #1 (please see Fig.33)

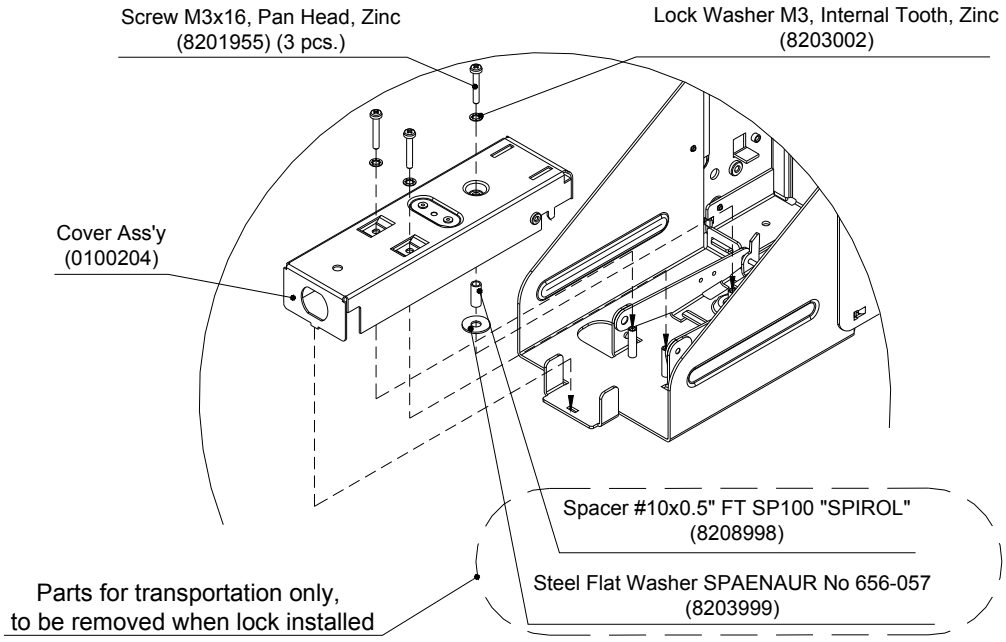
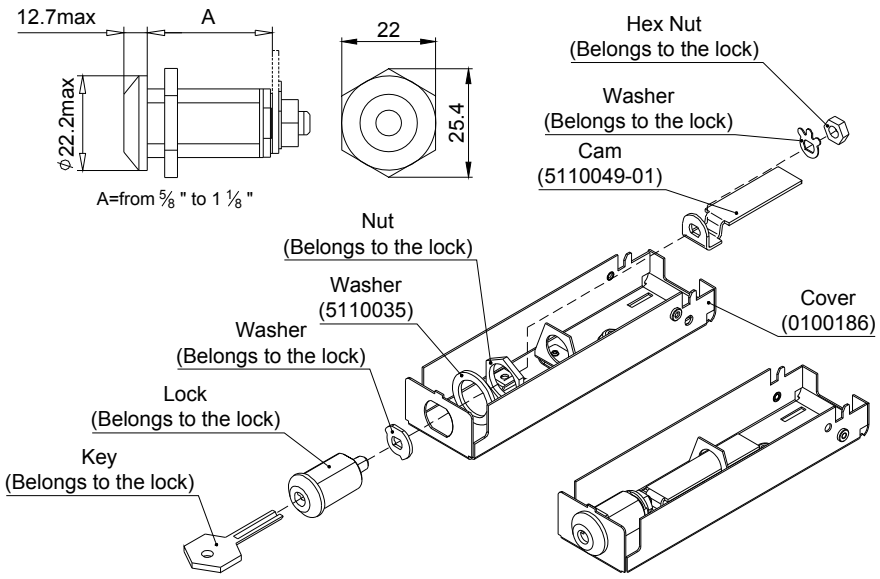


Fig. 31

INSTALLATION

Variant 1



Variant 2
Mounting kit
OPT-MKFL-FLH2,
that includes :
Cam 5110099;
Nut 5310021;
Plug 5206036,
should be ordered
separately.

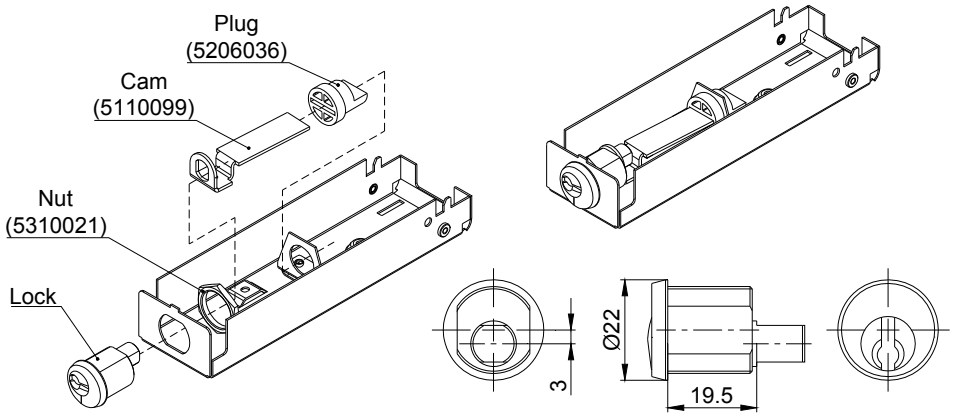


Fig. 32

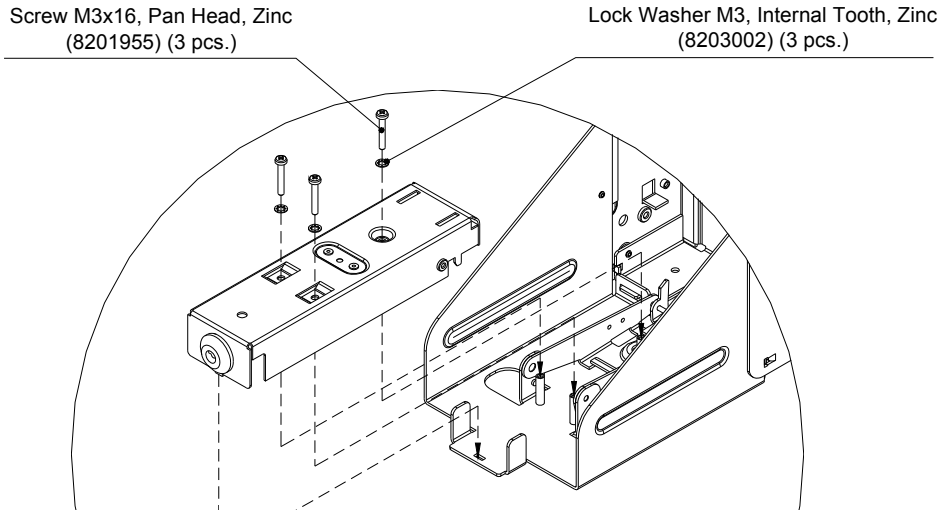


Fig. 33

INSTALLATION

Security Switch Connection (Fig. 34):

In order to connect to security switches, .110 Quick Connect Terminals will be needed, as specified in Fig. 34.

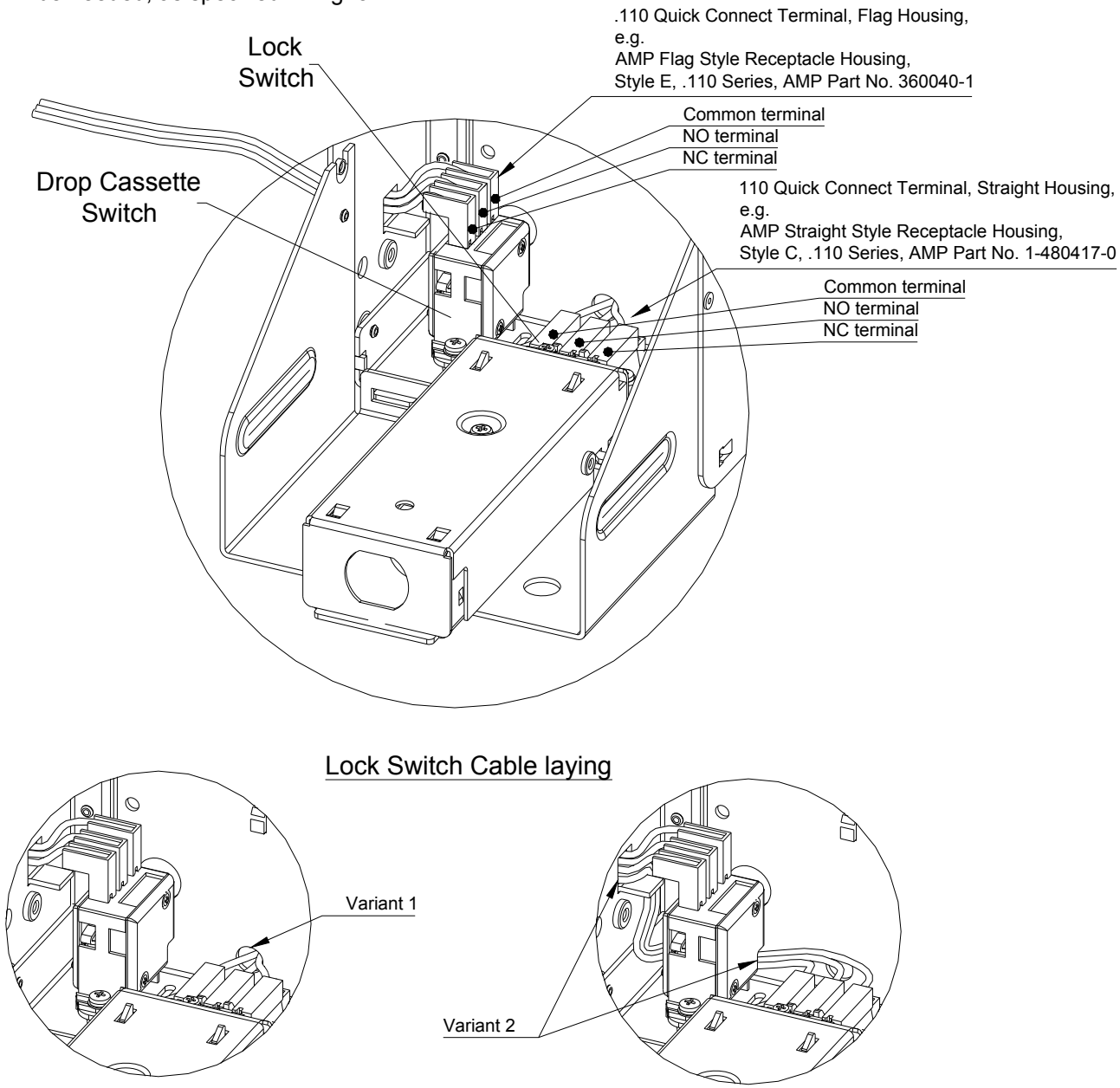


Fig. 34

Lock Installation in Chassis:

Step #1. Remove the chassis from the housing
Step #2. Remove the dispensing cassette from the chassis
Step #3. Unscrew two screws and remove the lock bracket from the dispensing cassette (Fig. 35)
Step #4. Install the lock into the lock bracket (Fig. 36)
Step #5. Install the lock bracket into the dispensing cassette (Fig. 37)
Step #6. Install the dispensing cassette into the chassis
Step #7. Install the chassis into the housing

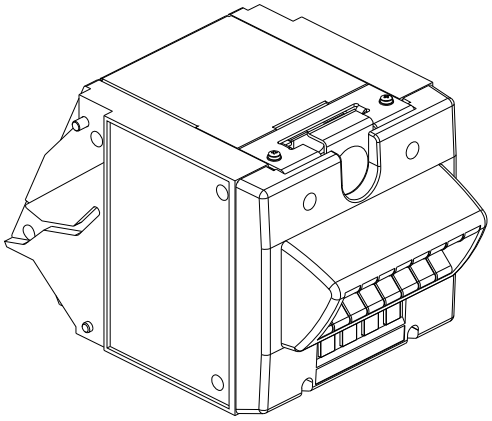


Fig. 35

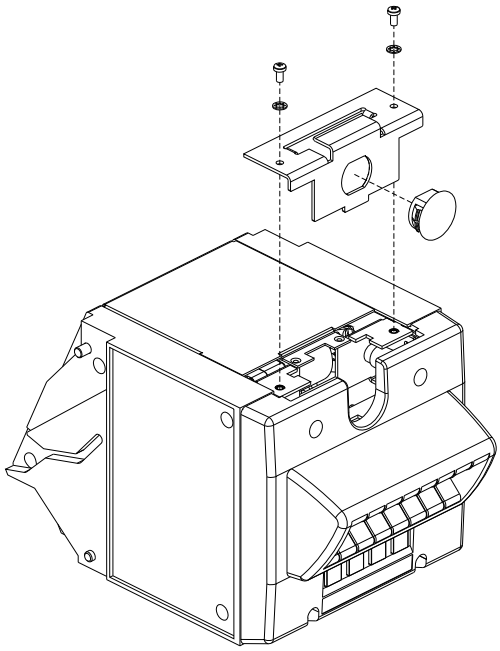
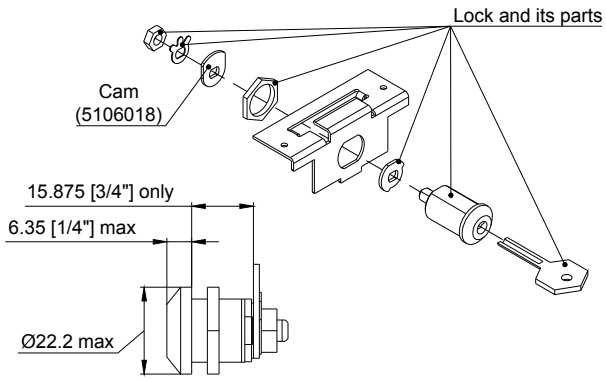


Fig. 36

Variant 1



Variant 2
Mounting kit
OPT-MK-BBD1,
that includes :
Lock Washer 8203012;
Cam 5106033;
Nut 5310021;
Washer 5310022,
should be ordered
separately.

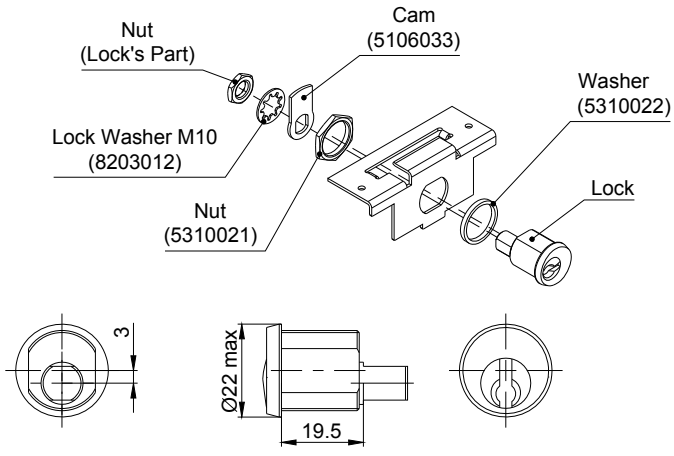


Fig. 37

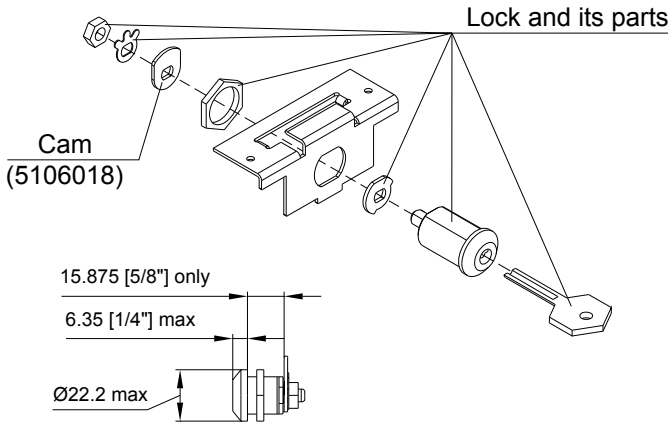

Lock and its parts
Cam
(5106018)
15.875 [5/8"] only
6.35 [1/4"] max
Ø22.2 max

Fig. 38

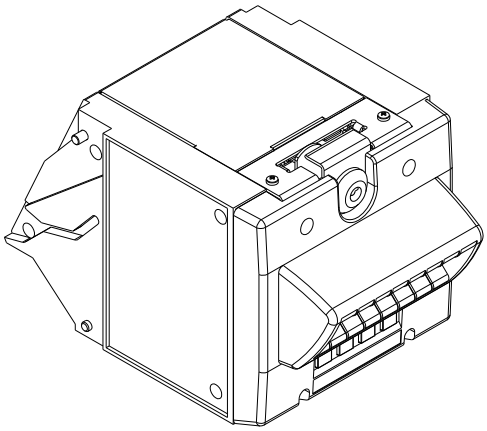
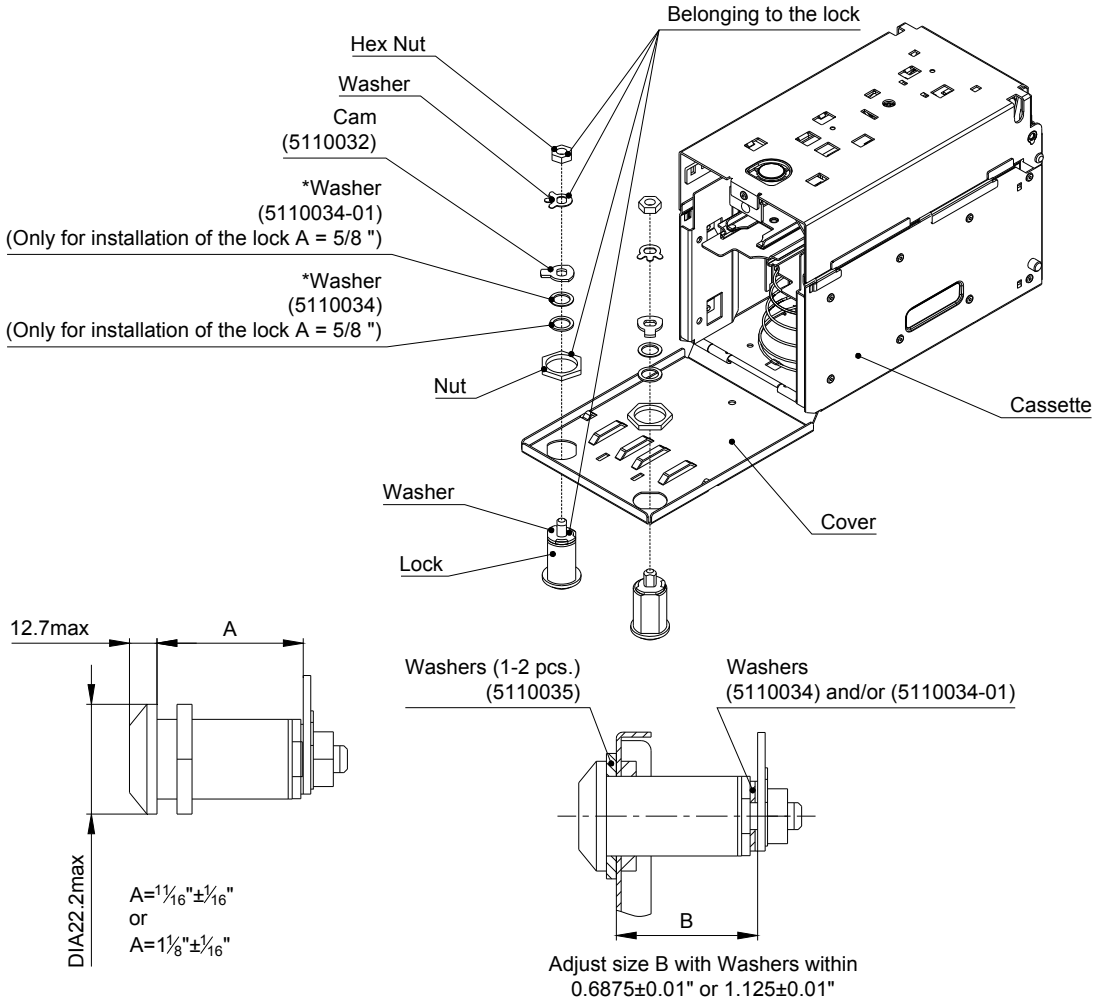


Fig. 39

Lock Installation in Drop Cassette

In order to install the security locks in the drop cassette, open the drop cassette cover, remove the plastic lock and plug, and follow the diagrams as below.

Variant 1



Variant 2
Mounting kits (**for each lock***)
OPT-MK-FLC1, that includes :
Cam 5106034;
Nut 5310021;
Washer 5310022,
should be ordered separately.

* Cassette may be used with one or two locks.

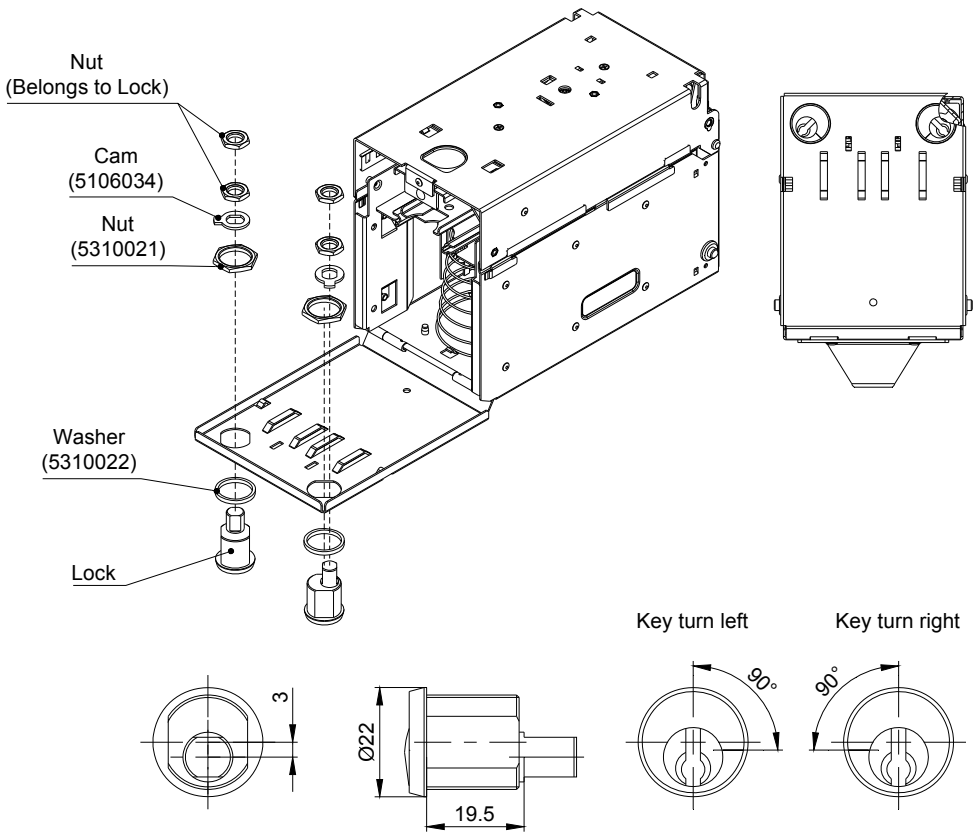


Fig. 40

POWER AND INTERFACE CONNECTION

The Bill-to-Bill power interface module has the following external connections:

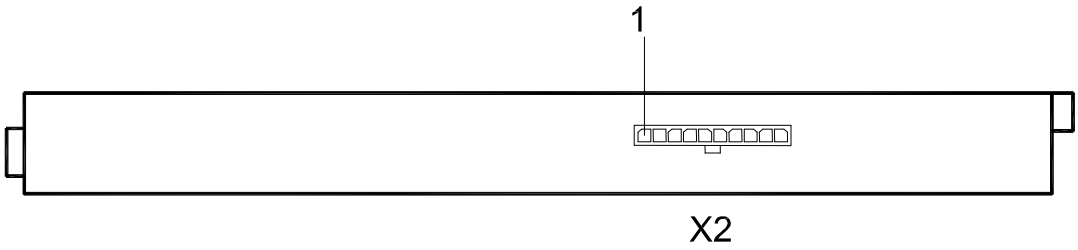


Fig. 41

X2, Molex p/n 43650-1000 (module portion)

TERMINAL	SIGNAL	FUNCTION
1	POWER + (24 V DC)	POWER
2	POWER + (24 V DC)	POWER
3	POWER - (0 V)	POWER
4	POWER - (0 V)	POWER
5	CHASSIS	Functional Earth
6	CHASSIS	Functional Earth
7	RXD	Host serial receive
8	TXD	Host serial transmit
9	M-RES	Master reset
10	GND	Interface common

Interface description

The Bill-to-Bill interface operates with RS232 levels and under CCNET protocol. A detailed description of the CCNET protocol can be found in the “Crane Payment Solutions NET Interface Manual”.

Power and Interface cables specification

The lengths of power and interface cables should not exceed 10 meters

Power and interface cables do not connect to outdoor communication links and to outdoor DC current lines.

As interface cable to use the shielded cable. The shield is connected to pin 6 of connector X2. The shield of another cable end is connected either to the case of Host or to the grounding bus or terminal of the automat near to Host Controller.

As power cable to use fourth core cable connected to pins 1, 2, 3 and 4 of connector X2. Each wire section should be not less AWG22. From the direction of the power supply the wires are connected in pairs.

OPERATING CONTROL

Switch settings

Device configuration is implemented with array of DIP switches, divided into SW1 and SW2 banks. DIP switch banks location is shown in Fig. 42.

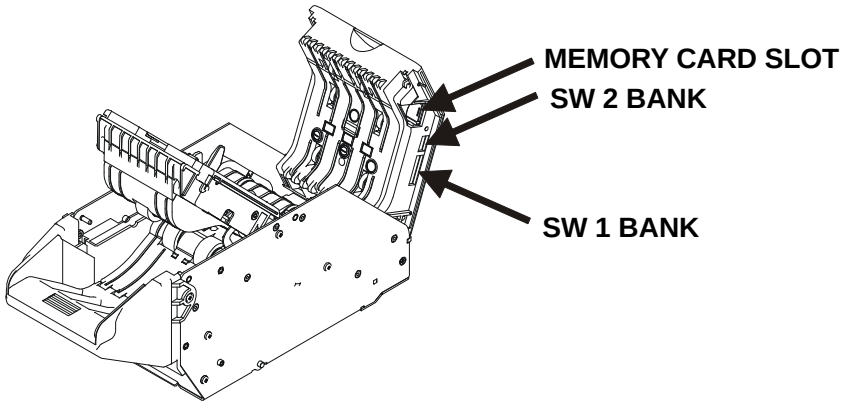


Fig. 42. DIP switch array and Memory Card slot

Every DIP switch bank is a piano-type switch component on the main control board with switches accessible through the compartment windows. Every bank, if viewed through the window will look similar to what is shown in Figures 43 and 44. The default setting for all switches is “OFF” position.

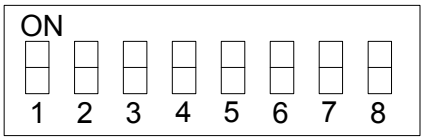


Fig. 43. SW1 bank simplified view

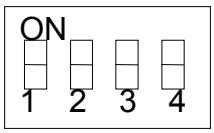


Fig. 44. SW2 bank simplified view

The DIP switch banks SW1 and SW2 functions are summarized in the tables below:

Switch #	ON	OFF
SW1.1	Bill type 0 acceptance disabled	Bill type 0 acceptance controlled by host
SW1.2	Bill type 1 acceptance disabled	Bill type 1 acceptance controlled by host
SW1.3	Bill type 2 acceptance disabled	Bill type 2 acceptance controlled by host
SW1.4	Bill type 3 acceptance disabled	Bill type 3 acceptance controlled by host
SW1.5	Bill type 4 acceptance disabled	Bill type 4 acceptance controlled by host
SW1.6	Bill type 5 acceptance disabled	Bill type 5 acceptance controlled by host
SW1.7	Bill type 6 acceptance disabled	Bill type 6 acceptance controlled by host
SW1.8	Bill type 7 acceptance disabled	Bill type 7 acceptance controlled by host

SW1 DIP switch bank functions*

The DIP switch bank SW1 is always assigned for bill acceptance control. If the bill table for a particular firmware release is shorter than 8 entries, only the relevant switches can be used; other switches from SW1 bank are not used and their setting has no effect. *NOTE: If switch setting disables a bill it cannot be enabled over CCNET. If a bill is enabled by switch setting then CCNET has full control of that bill enabled status.*

* - TBD – to be defined;

Switch #	ON	OFF
SW2.1	Acceptance one way face up only	Four way acceptance
SW2.2	High security mode enabled	High security mode disabled
SW2.3	CCNET 19200 bps data rate	CCNET 9600 bps data rate
SW2.4	TBD	TBD

SW2 DIP switch bank functions*

NOTE: CCNET security control is disabled if a switch disables High security mode – setting security bits from CCNET will have no effect in this case. High security mode must be enabled to allow security level control from CCNET.

* - TBD – to be defined;

ERRORS AND TROUBLESHOOTING

Any error a device encounters is reported, both over the communication protocol and visually with colored blinks on the indicator lights. Under normal operation when a device is ready to accept notes, the indicator lights are in green "runway" mode. Any error will drive the lights either into red or into a series of red or green blinks either on dark or red background

The application level blink codes are generated in red on black background. They are summarized in the following table:

Status of diagnostic light	Error description	Corrective action
1 red flashes on black bkgrd	Box is removed or Box sensor failure	– verify the Drop Box is fully inserted; – if the error persists the Power Interface module may need replacement;
2 red flashes on black bkgrd	Boot operation error	– verify the card is in secured in place; – take the card out and clean the contact pads with soft cloth; reinstall the card;
3 red flashes on black bkgrd	Box is full or Box pusher plated drive is too tight, but not stuck	– check the Drop Box if it is full and empty it if needed; – if error persists the Drop Box may need replacement;
4 red flashes on black bkgrd	Box pusher plate is stuck or sensor error	– verify the Drop Box is fully inserted; – if error persists, the Drop Box and/or Power Interface module may need replacement;
6 red flashes on black bkgrd	Optical sensor failures of any nature	– if error persists the Bulk Loader Head may need service;
7 red flashes on black bkgrd	Magnetic sensors cannot be tuned into resonance frequency	– wait 30 seconds; – if error persists or reappears frequently the Bulk Loader Head may need service;
11 red flashes on black bkgrd	Bills in channel or channel sensors failure	– verify there're no bills or bill fragments in the channel; – if error persists the Bulk Loader Head may need service;
14 red flashes on black bkgrd	Verification Software (VS) integrity problem	– the VS update was not performed – update the VS firmware to a correct version; – the main firmware or was upgraded and it is no longer compatible by interface with VS – update the VS firmware to a correct version; – if error persists the Bulk Loader Head may need service;

* - other values to be defined;

Apart from the blink codes, there are many errors reported over the communication protocol. For the **Bill-to-Bill** chassis errors, please refer to the Bill-to-Bill Currency Management System – Operation and Service Manual *Appendix 1* for error definitions.

Due to the complex nature of the **Bill-to-Bill** system, and with the **Bulk Loader Head** installed in particular, bill jam removal sequences may be far from obvious. The sample decision flowchart in shown in Fig. 45. Please note that manually pulling the notes out of a jam location is risky and the note may be easily torn into pieces.

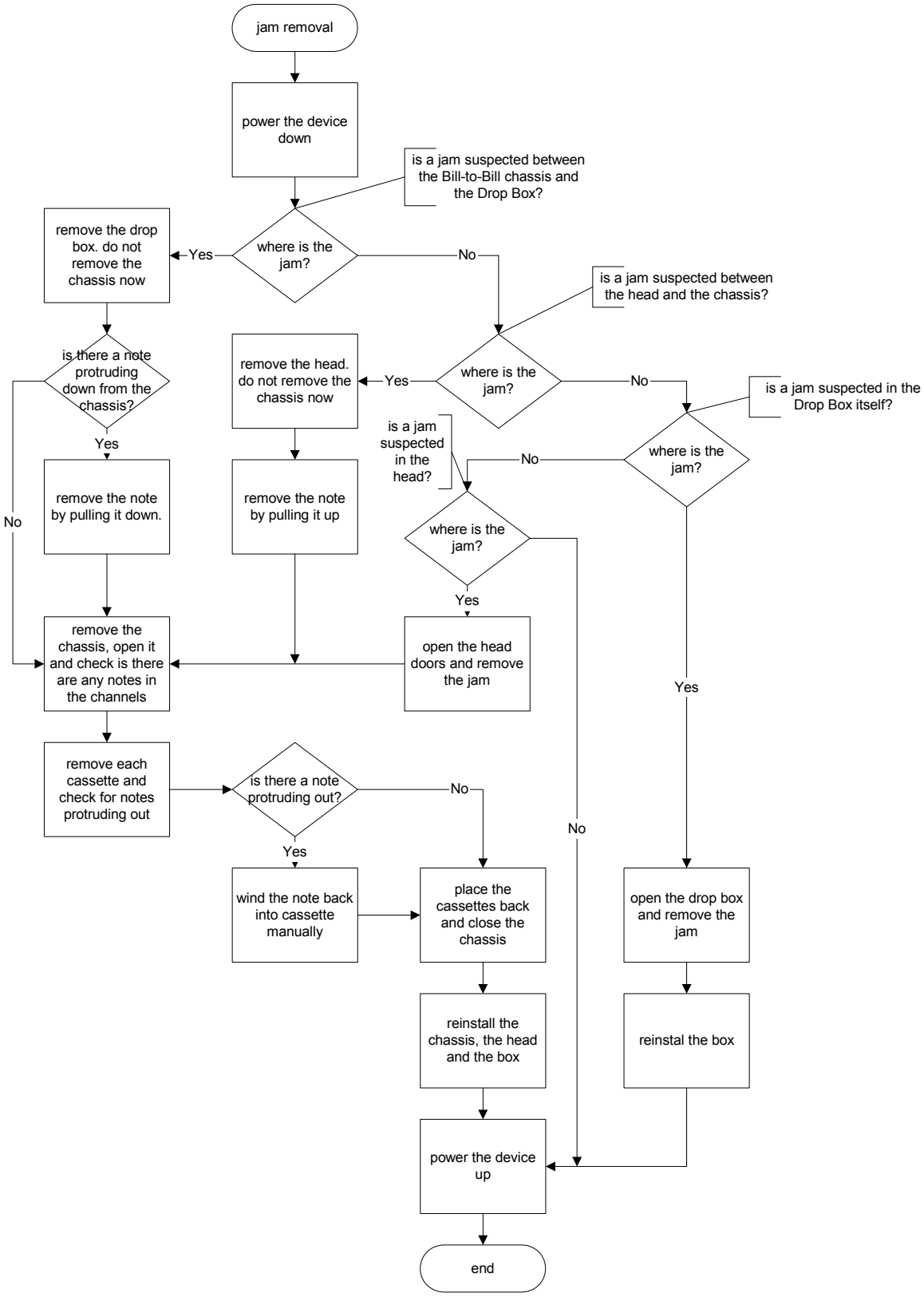


Fig. 45. Jam removal procedure

Application settings

The Bill-to-Bill has several internal **settings** that can be programmed.

The settings can be programmed via interface by the host controller only.

The following **options** can be programmed and/or reprogrammed:

Designation of **bill denomination** for each of the recycling cassettes. This setting will be saved in the internal memory of the recycling cassette. Once programmed, the recycling cassette can be placed in any position in the Bill-to-Bill—and will operate with the designated denomination only.

The recycling cassette can be programmed for a **multi-escrow** application. This means that all validated bills will be directed from the validating head into the recycling cassette. This option is useful when more than one bill is inserted during one transaction. Should the User cancel the transaction, all of the same bills will be returned through the dispensing cassette. Should the transaction complete successfully, all bills from the multi-escrow recycling cassette will be reloaded into the drop cassette and/or the other recycling cassettes. This operation will be completed automatically, during the period of time before the next User starts a transaction. When the next User inserts a bill, the reload process will be temporarily paused, and the Bill-to-Bill will promptly serve the new User. The reload process will recommence between Users.

Unloading options. Bills from the recycling cassettes can be reloaded into the drop cassette. This mode can be initiated from the host controller only.

Unloading can be done until the recycling cassette is empty, or until the designated number of bills is left in the cassette ("**unload level**").
Setting up unloading options may be different for each of the recycling cassettes.

Upper load limit of bills in recycling cassettes. The Bill-to-Bill will try to replenish all of its recycling cassettes with validated bills. All validated bills will be directed to a recycling cassette with its corresponding denomination. Extra bills will be directed to the drop cassette. The upper load limit for each recycling cassette can be designated and programmed.

Software updates

The Bill-to-Bill Software consists of Validating Head control software, Validating Head Validation software and Chassis software. Chassis software includes central processor software, cassette software and dispenser software.

Validating Head software updates:

The Bill-to-Bill Currency Management System is supplied with pre-installed software, according to a User's order. A "dummy card" is normally placed in the slot indicating the software version. Software updates are recommended whenever new currency is issued, or whenever counterfeit bills appear on the market.

Software updates are offered in three options:
1) New software can be ordered with a single-download memory card. The software from the new memory card is downloaded as soon as it is inserted into the slot, and the validating head is powered on. The memory card must be present at all times for the Bill-to-Bill to operate.
2) New software can be ordered with a multi-download memory card. The software supplied through the multi-download memory card allows the Bill-to-Bill to operate even after it is removed from the slot. The memory card can be used for updating the next Bill-to-Bill unit, depending on the number of licenses ordered. Typically a multi-download memory card is issued for a specified number of downloads, and therefore the number of downloads required must be defined in the User's order.
3) A special memory card can be ordered, which allows the download of new software through the interface connector. This memory card must be present in the validating head at all times. The download can be done via the host controller (and local network). Downloads can also be accomplished with any personal computer. The Bill-to-Bill must be temporarily disconnected from the host controller for this purpose.

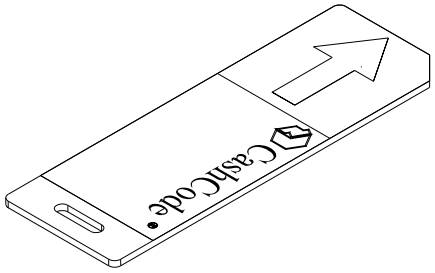


Fig. 46

VALIDATING HEAD SOFTWARE UPDATE PROCEDURES

Download Procedure for a Single-download Memory Card:

Step 1. Turn Power OFF.

Step 2. Lift up the latch under the validating head; and remove the validating head from the housing.

Step 3. Remove the card from the slot. (please see Fig. 42).

Step 4. Insert the new memory card. (please see Fig. 42), contact pads facing up and away from user.

Step 5. Insert the validating head into the housing.

Step 6. Turn power ON and wait until the download process is completed. During the download, the status indicator will flash RED-GREEN. Once the download is completed, the unit will initialize and the status light will turn green. If there were no communication with the controller the light would stay RED.

Download Procedure for the Multi-download Memory Card:

Please follow the instructions for the single-download memory card. Follow steps 1 through 6. After the successful completion of step 6, remove the card from the slot. (Follow steps 1,2,3 and 5).

Turn power ON. The Bill-to-Bill will initialize and the status light will turn GREEN. If there is no communication with the controller the light would stay RED.

The memory card can be used to download other Bill-to-Bill units, until the number of preordered downloads is reached.

Download Procedure via Interface Connector:

In order to properly complete an interface download, a network download memory card must be present in the slot at all times—before and during the download.

1. The software download can be accomplished via the host controller (please refer to CCNET protocol description).
2. For a direct download via the interface connector, please follow the instructions below:

Step 1. Turn power OFF.

Step 2. Disconnect the interface connector from the Bill-to-Bill.

Step 3. Connect the personal computer to the Bill-to-Bill.

Step 4. Perform update.

Step 5. Disconnect the computer.

Step 6. Connect the interface connector to the Bill-to-Bill.

Step 7. Turn power ON.

Chassis software updates:

New software can be ordered with a memory card. The software supplied through the memory card allows the Bill-to-Bill to operate after it is removed from the slot. The memory card can be used for updating others Bill-to-Bill units.

Download Procedure for Memory Card

Please follow the instructions for the memory card. Follow steps 1 through 6. After the successful completion of step 6, remove the card from the slot. (Follow steps 1,2,3 and 5).

Turn power ON. The Bill-to-Bill will initialize and the status light will turn GREEN. If there is no communication with the controller the light would stay RED.

Download Procedure via Interface Connector:

In order to properly complete an interface download, a network download memory card must be present in the slot at all times—before and during the download.

1. The software download can be accomplished via the host controller (please refer to CCNET protocol description).
2. For a direct download via the interface connector, please follow the instructions below:

Step 1. Turn power OFF.

Step 2. Disconnect the interface connector from the Bill-to-Bill.

Step 3. Connect the personal computer to the Bill-to-Bill.

Step 4. Perform update.

Step 5. Disconnect the computer.

Step 6. Connect the interface connector to the Bill-to-Bill.

Step 7. Turn power ON.

Software Update Diagnostics

Normally, the download process will be accompanied by a blinking red-green status light lasting for less than 3 minutes (worst case). If the download has competed successfully the device will self-reset. In case of errors they are indicated by green flashes on red background (boot level flashes).

The following table lists possible errors that may take place during a download:

Status of diagnostic light	Error description	Corrective action
1 green flashes on red bkgrd	Write error	– Check the card and it's contact pads – clean if necessary. – Repeat procedure.
2 green flashes on red bkgrd	A firmware component is missing	– Please install a component missing– either a slave boot or main firmware or both.
3 green flashes on red bkgrd	A required card is missing	– Please insert the required card and reset/repower the device. Ex.: no valid main firmware is detected and there is no card to update it from or the card does not contain a record with main firmware.
4 green flashes on red bkgrd	Update policy violation	– Please install the required card. If the firmware was upgraded with ONE UPDATE card, please make sure this card is present at reset. If the firmware was downloaded remotely with NDEG rights, please make sure the NDEG card with your client code is present at reset.
5 green flashes on red bkgrd	Generic error	– A boot-originated error which is not user-fixable.

MAINTENANCE & SERVICE

Front Channel' Optical Sensors Cleaning

Open the Front Channel Door;
Clean the Channel Surface in Sensors' Areas.

Clean this Sensors' Surfaces after every 20 000 Bills Accepted. The laser transmitter is the sensor that requires the best possible cleaning.

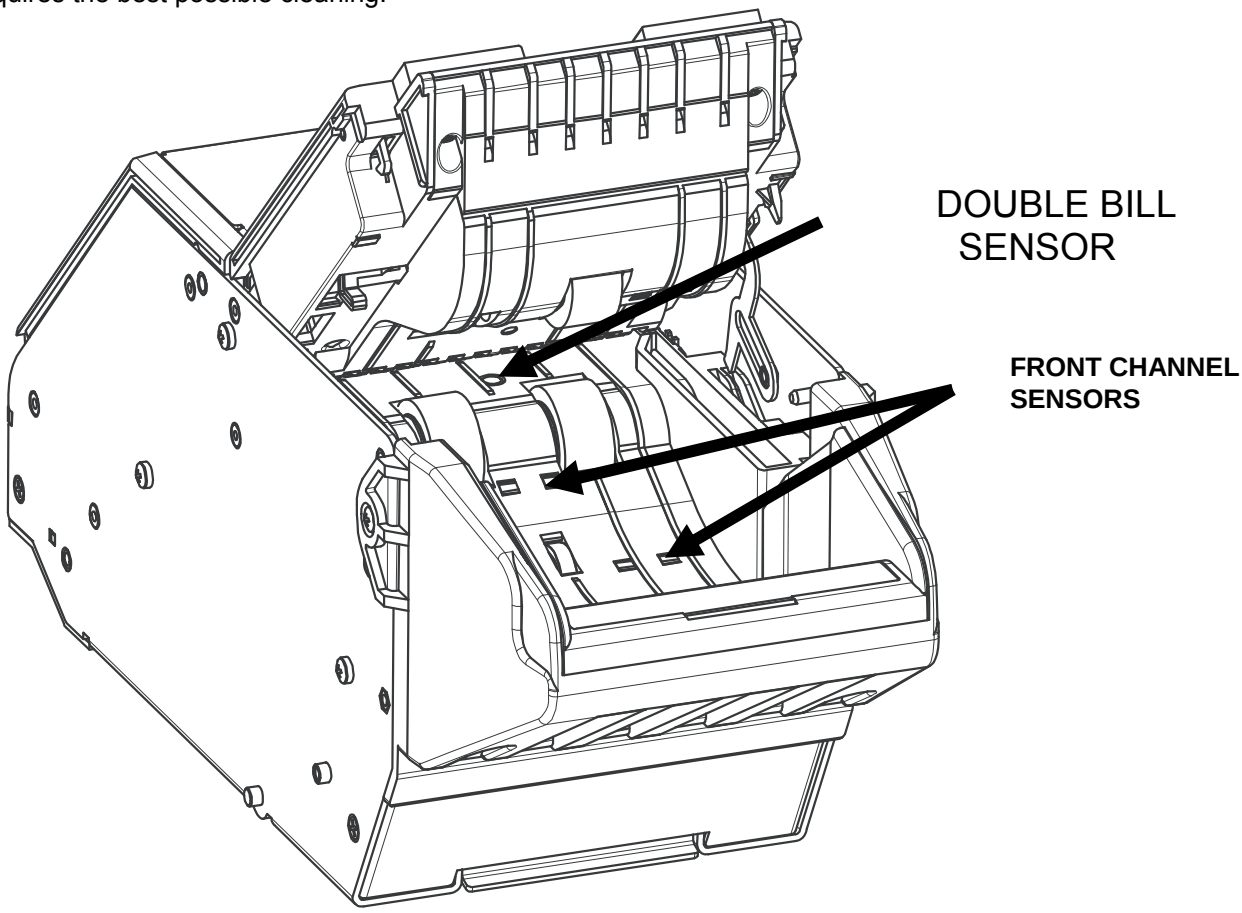


Figure 47. Optical Sensors in Front Channel

NOTE: despite the sensors are located on the bottom of the channel only, loopback light guides matching the sensors on the channel lid should be cleaned too.

Scanning Section' Optical Sensors Cleaning

Open the Scanning Section Door;
Clean the Channel Surface in Sensors' Areas.

Clean this Sensors' Surfaces after the Acceptance of every 60 000 Bills.

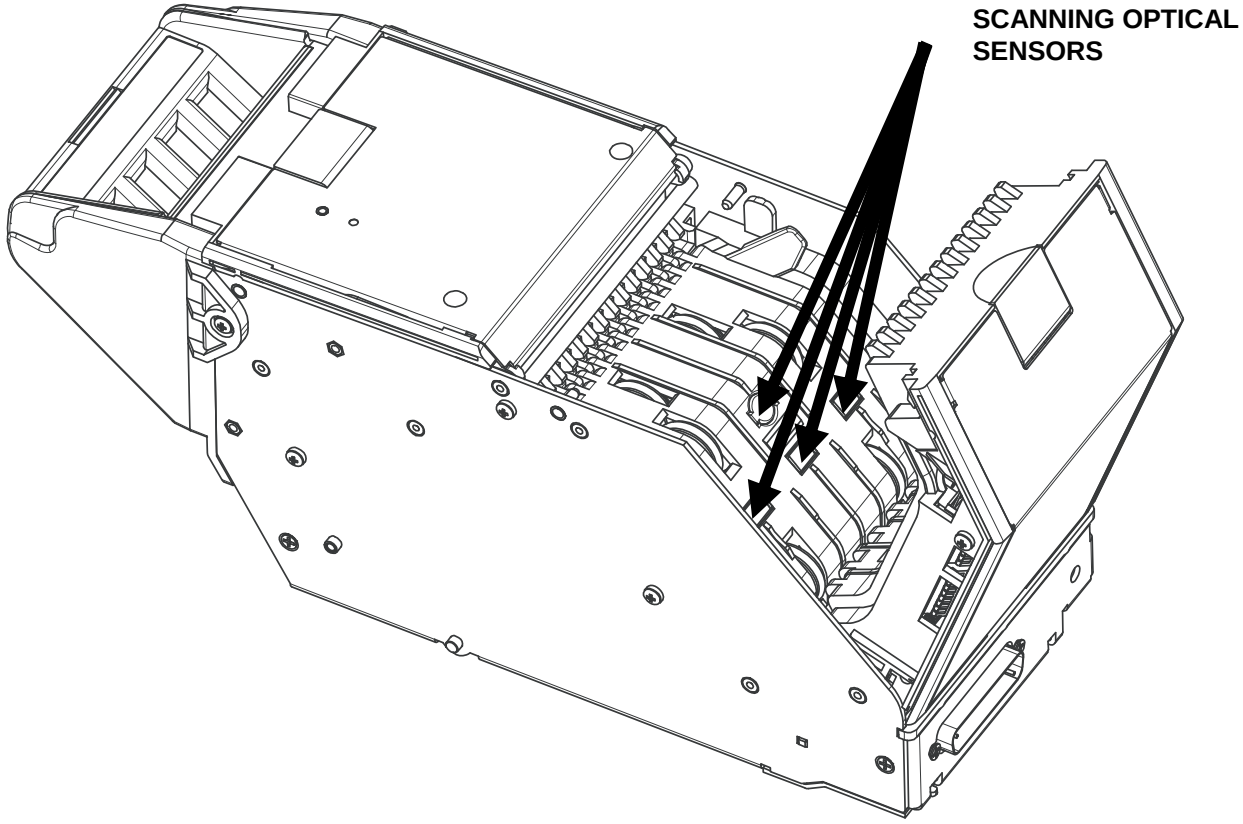


Figure 48. Optical Sensors in Scanning Section

NOTE: Both the channel bottom and the channel lid sensors should be cleaned.

Contact Information:

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Website: suzohapp.com/Bill-to-Bill

Service Centers:

To locate your nearest service center, please check our website: suzohapp.com/Bill-to-Bill

APPROVAL OF CHANGES

Revision	Description	Approval	Date
2	Bill-to-Bill -> Suzo-Happ		