Operation Manual

Bill Validator

MSMv2 BackLoad

Tech Support Group,
Crane Payment Solutions, Toronto
Revision: 1.0

CRANE PAYMENT SOLUTIONS

2720 Steeles Avenue West • Concord, ON Canada L4K 4S3
Phone: 1 905 303-8874 • Fax: 1 905 303-8874 • www.craneps.com

Table of Contents

INTRODUCTION 4
PRODUCT OVERVIEW 5
GENERAL SPECIFICATIONS 8
DIMENSIONS 10
INSTALLATION 13
PANEL MOUNTING 13
GROUNDING 13
GENERAL WIRING DIAGRAM 14
CHOOSING MSMV2 PART NUMBERS 15
MSMv2 PART NUMBER 15
HARDWARE PART NUMBERS 15
SOFTWARE PART NUMBERS 16
MEMORY STICK PART NUMBERS 17
HOST INTERFACE OPTIONS 18
24V MDB VERSION 18
12V MDB SLEEP VERSION (MDBS) 18
12V TTL/RS 232 VERSION 19
INPUT/OUTPUT CIRCUITS 21
24V MDB VERSION 21
12V TTL/RS 232 VERSION 22
12V MDB SLEEP VERSION (MDBS) 23
MAINTENANCE AND SERVICE 24
CASHBOX REMOVAL 24
CASHBOX REINSTALLATION 24
CASH COLLECTION 25
HOLDER REMOVAL AND INSTALLATION 25
ACCESS TO DIP SWITCHES AND MEMORY STICK 27
DIP SWITCH SETTINGS 27
SOFTWARE UPDATES 28
SINGLE LOAD MEMORY STICK 28
MULTI LOAD MEMORY STICK 28
REMOTE UPDATE 29
DIAGNOSTICS 29
PERIODIC MAINTENANCE 30
TROUBLESHOOTING 31

INTRODUCTION

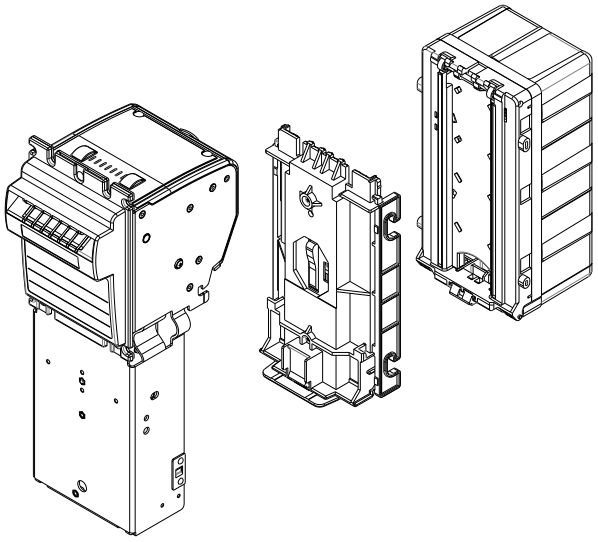
The scope of this document is to provide technical information related to:

- Installation and integration of MSMv2 in a new equipment/ kisok/ vending machine.
- Selection of the right MSMv2 configuration and related part number.
- Maintenance and service of MSMv2.

PRODUCT OVERVIEW

MSMv2 is a modified version of the BackLoad MSM product line. It has easy plastic removable cassette and is ideally suited for vending application.

The bill validator consists of three parts – validator, cassette holder and cassette.



The validator has a bill centering mechanism with a self-adjustable bill guides. These guides adjust the width of the path automatically to transport bills of varying widths.

The bill acceptance rate is a high 97% due to a set of advanced **sensors.** The advanced and intelligent software can precisely distinguish all authentic bills from known counterfeits.

Six multi-colour **optical sensors** scan color sensitive data from images on both sides of the bill.

Patented **inductive sensors** evaluate magnetic properties of specialized ink.

Patented **dielectric sensors** detect authenticity of bill paper and some advanced features of the bill.

All sensors are calibrated **automatically** and do not require any manual adjustment. As a result, the acceptance rate remains unaffected with passing of time. The MSMv2 bill validator **accepts bills all** four **directions** (any side forward, face up or face down).

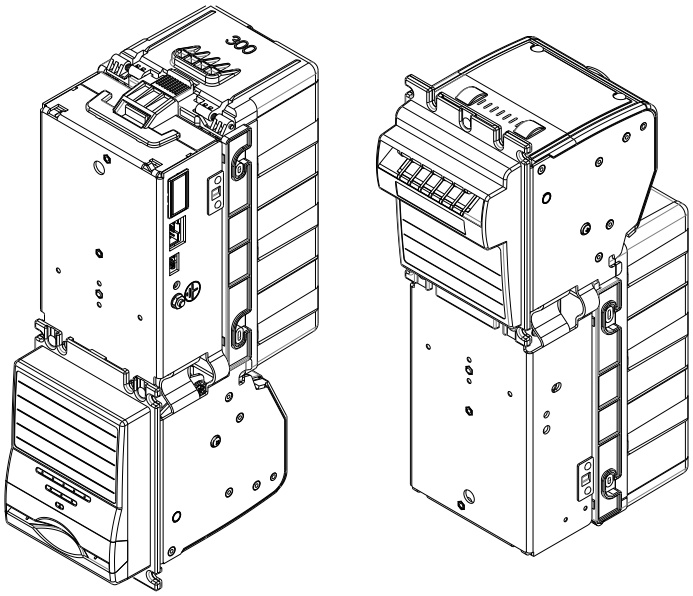
An additional **anti-stringing sensor** provides higher level of security against cheat attempts by detecting any sort of strings, threads or transparent films attached to the bill.

Beltless roller design minimizes maintenance of bill transport mechanism.

"**Clamshell**" design provides fast and easy access to complete bill path minimizing downtime in the unlikely event of a bill jam.

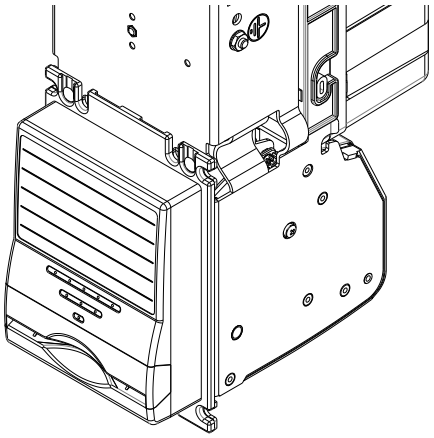
Software updates are quick and easy by means of BlueChip™ sim card. The process takes a few seconds and does not require technical personnel, tools or removing the unit from the installation.

The MSMv2 bill validator is well suited for a variety of applications. It can be installed either STACKER UP or STACKER DOWN position.

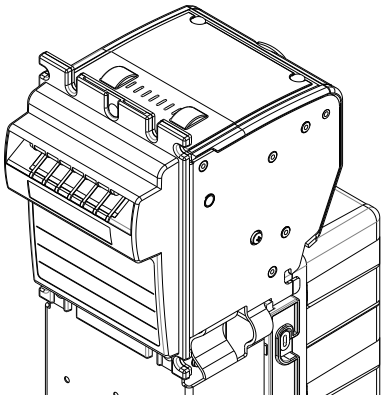


Different styles of bezels have been developed to meet variety of customers' needs.

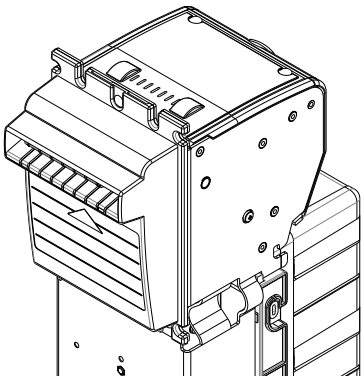
The blue running lights bezel is ideal for STACKER UP configuration, quite common in vending applications.



Blue running lights bezel

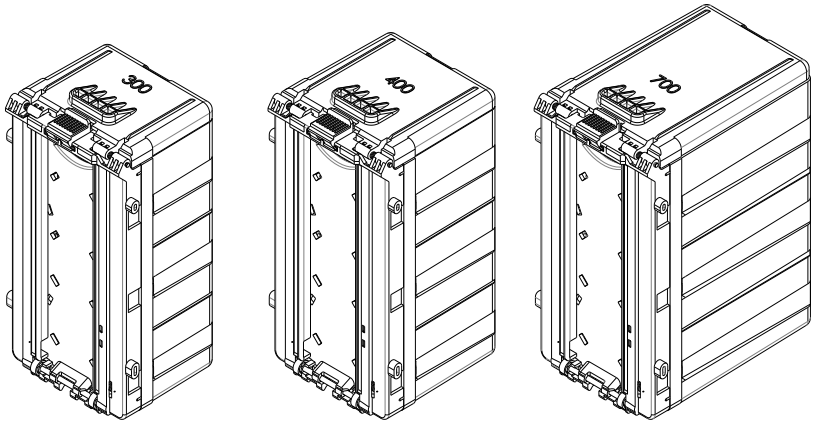


Green running lights bezel



Narrow bezel

The green running lights bezel and the narrow bezel are ideal for applications with universal STACKER UP/DOWN configurations.



The light weight plastic MSMv2 cassettes are capable of handing bills from 62 to 78 mm width and upto 160mm in length.

Cassettes with 300, 400 and 700 bill capacities are presently available to accomodate different space requirements in a host machine. Cassette capacity is based on number of brand new bills. Street grade bills require more space and as a result cassette capacity for such bills may be less than specified.

The MSMv2 is designed to support a wide variety of interfaces - MDB, CC serial, RS232 and TTL.

Protocol supported presently include MDB, MDB Sleep mode and CCNET.

Operating modes, protocols or acceptance of different denominations can all be quickly configured with the help of DIP switches located on the control board.

The MSMv2 bill validator is installed normally onto a front door or front panel of the host machine. The mounting requirements and cut out dimensions are common with industry's standard bill validators.

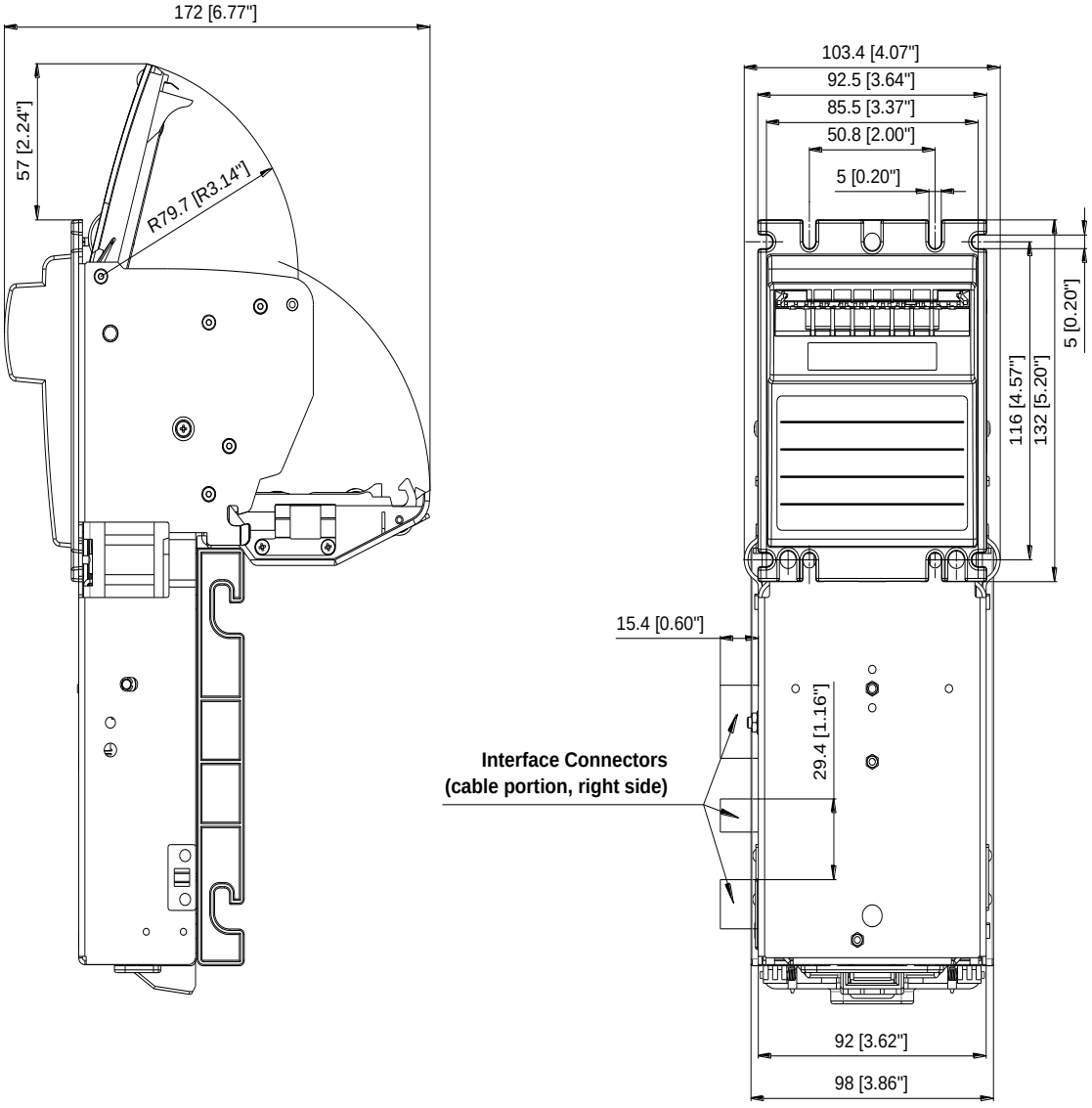
GENERAL SPECIFICATIONS

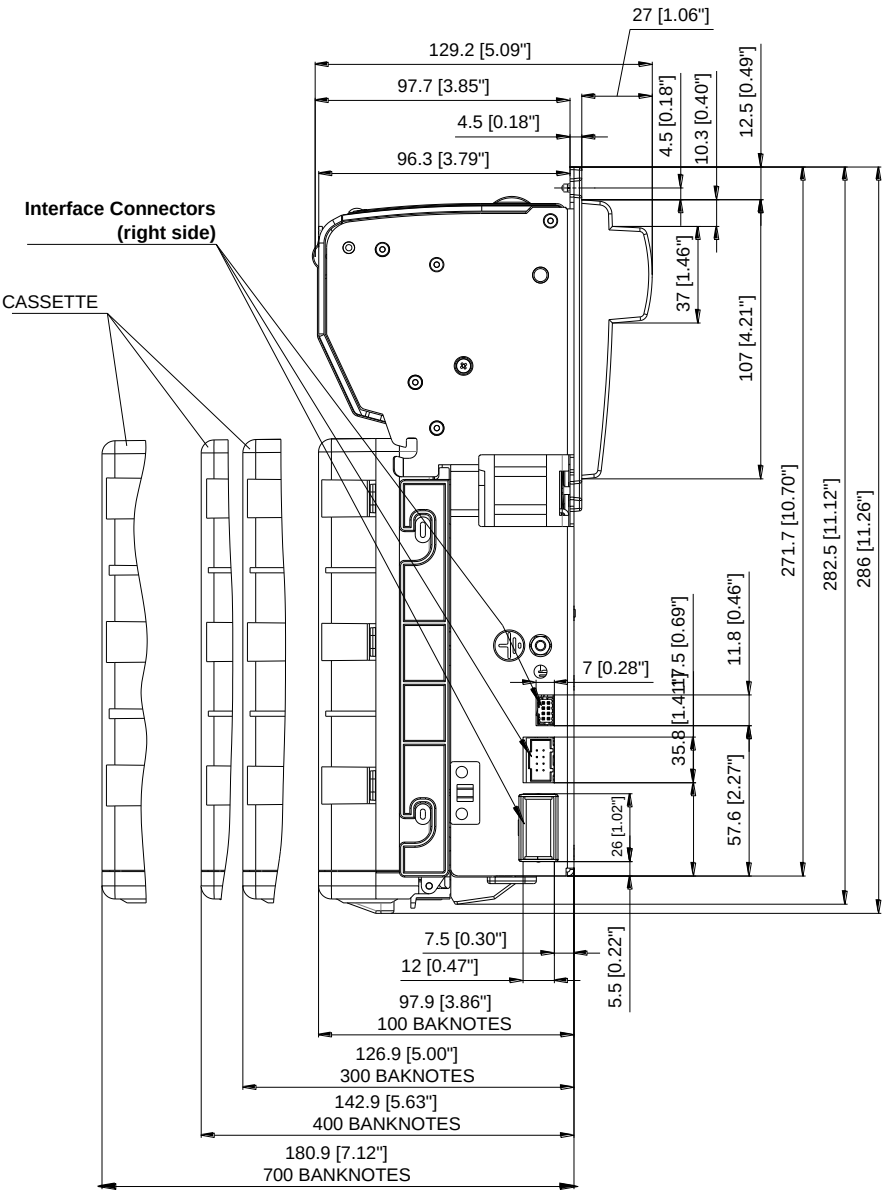
Bills:	
Acceptance of bills	lengthwise 4 ways
Acceptance rate on first insertion	> 97%
Width of accepted bills, in mm	62 to 78
Maximum length of bill, in mm	160
Minimum length of bill, in mm	120
Bill escrow	one bill
Complete transport cycle, in seconds	1.7
External Interfaces:	
24V	MDB
12V	MDB Sleep Pulse, Opto-isolated CCS (serial, TTL) RS232
Cassette capacity (new bills)	300, 400, 700
Firmware Upgrades	Memory Stick Host controller (CCNET)
Power supply voltage	
24V	24V AC or 15-42.5 V DC
12V	12V ± 1V
Current consumption	
12 V DC operating mode, max	2 A
12 V DC standby	0.2 A
24 V AC or 15-42.5 V DC, operating mode (max)	1 A
24 V AC or 15-42.5 V DC, standby	0.1 A
Power consumption, W	
Idle mode	2
Validation mode	12
Environmental data	
Operating temperature	
12 V DC	0ºC to +50ºC
24 V AC or 15-42.5 V DC	-18ºC to +60ºC
Storage temperature	-30ºC to +60ºC
Humidity (non-condensing)	30%-90%RH
Validation M.T.B.F (cycles)	750,000

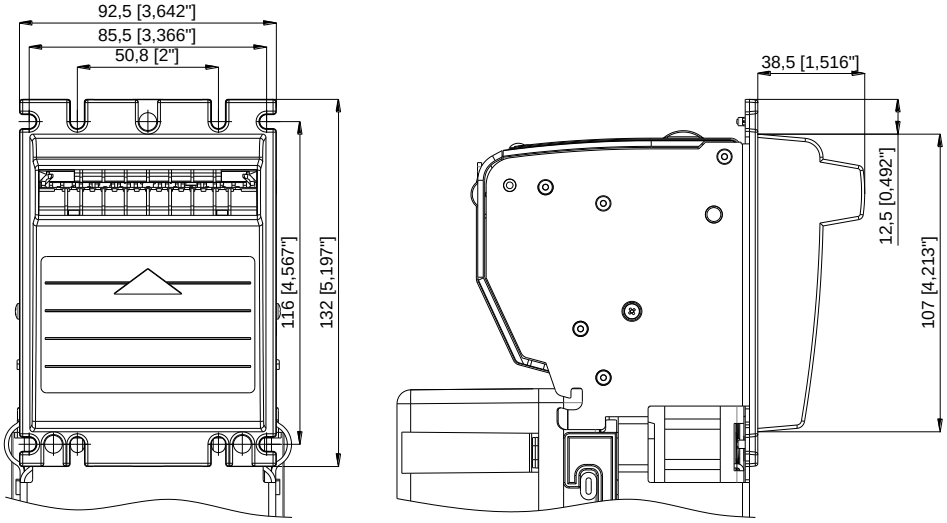
Weight

With cassette 300 bills	2.0 Kg
With cassette 400 bills	2.0 Kg
With cassette 700 bills	2.1 Kg

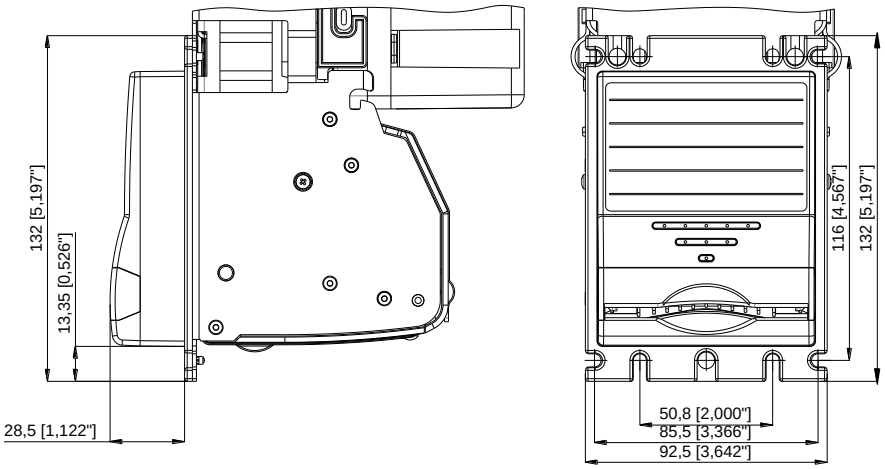
DIMENSIONS


172 [6.77"]
57 [2.24"]
R79.7 [R3.14"]
103.4 [4.07"]
92.5 [3.64"]
85.5 [3.37"]
50.8 [2.00"]
5 [0.20"]
5 [0.20"]
116 [4.57"]
132 [5.20"]
15.4 [0.60"]
29.4 [1.16"]
Interface Connectors
(cable portion, right side)
92 [3.62"]
98 [3.86"]


27 [1.06"]
129.2 [5.09"]
97.7 [3.85"]
4.5 [0.18"]
96.3 [3.79"]
Interface Connectors
(right side)
CASSETTE
4.5 [0.18"]
10.3 [0.40"]
12.5 [0.49"]
37 [1.46"]
107 [4.21"]
271.7 [10.70"]
282.5 [11.12"]
286 [11.26"]
7 [0.28"]
17.5 [0.69"]
11.8 [0.46"]
35.8 [1.41"]
57.6 [2.27"]
26 [1.02"]
7.5 [0.30"]
12 [0.47"]
5.5 [0.22"]
97.9 [3.86"]
100 BAKNOTES
126.9 [5.00"]
300 BAKNOTES
142.9 [5.63"]
400 BANKNOTES
180.9 [7.12"]
700 BANKNOTES



Green running lights bezel

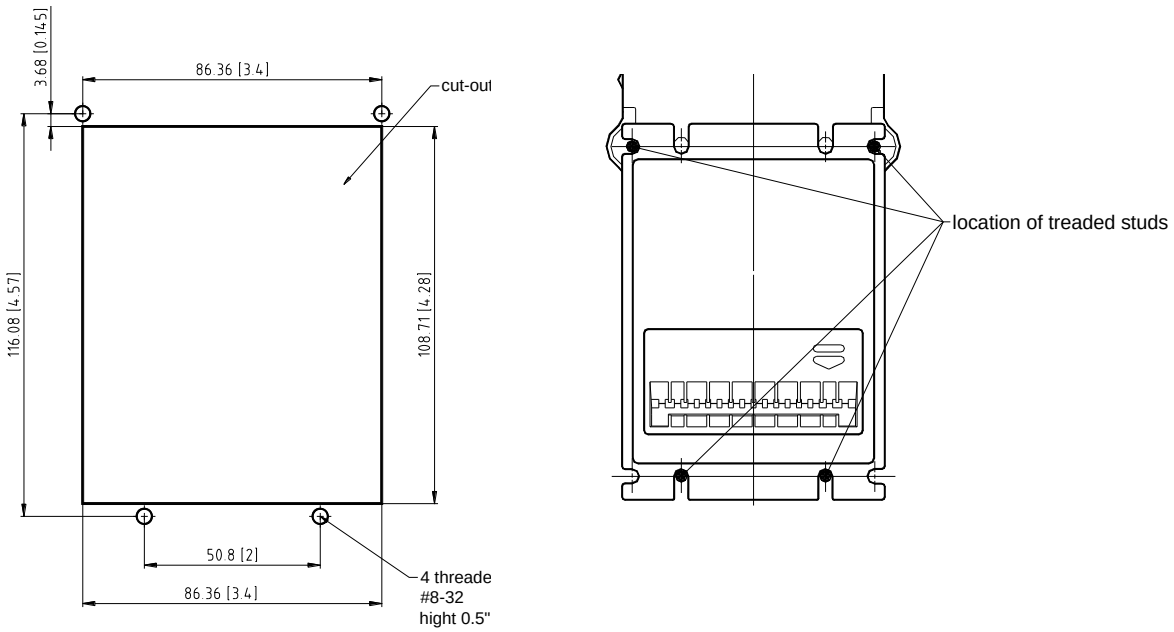


Blue running lights bezel

INSTALLATION

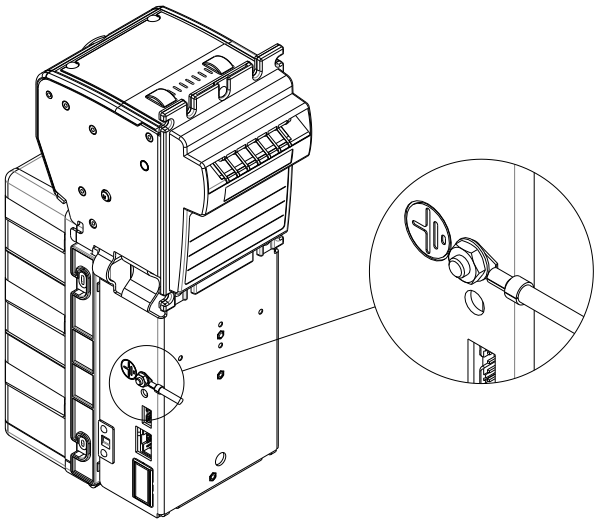
PANEL MOUNTING

The MSMv2 bill validator is installed from the inside of a front door (or panel) of the host machine. The mounting surface must have a rectangular cut-out and four threaded studs as per picture below.



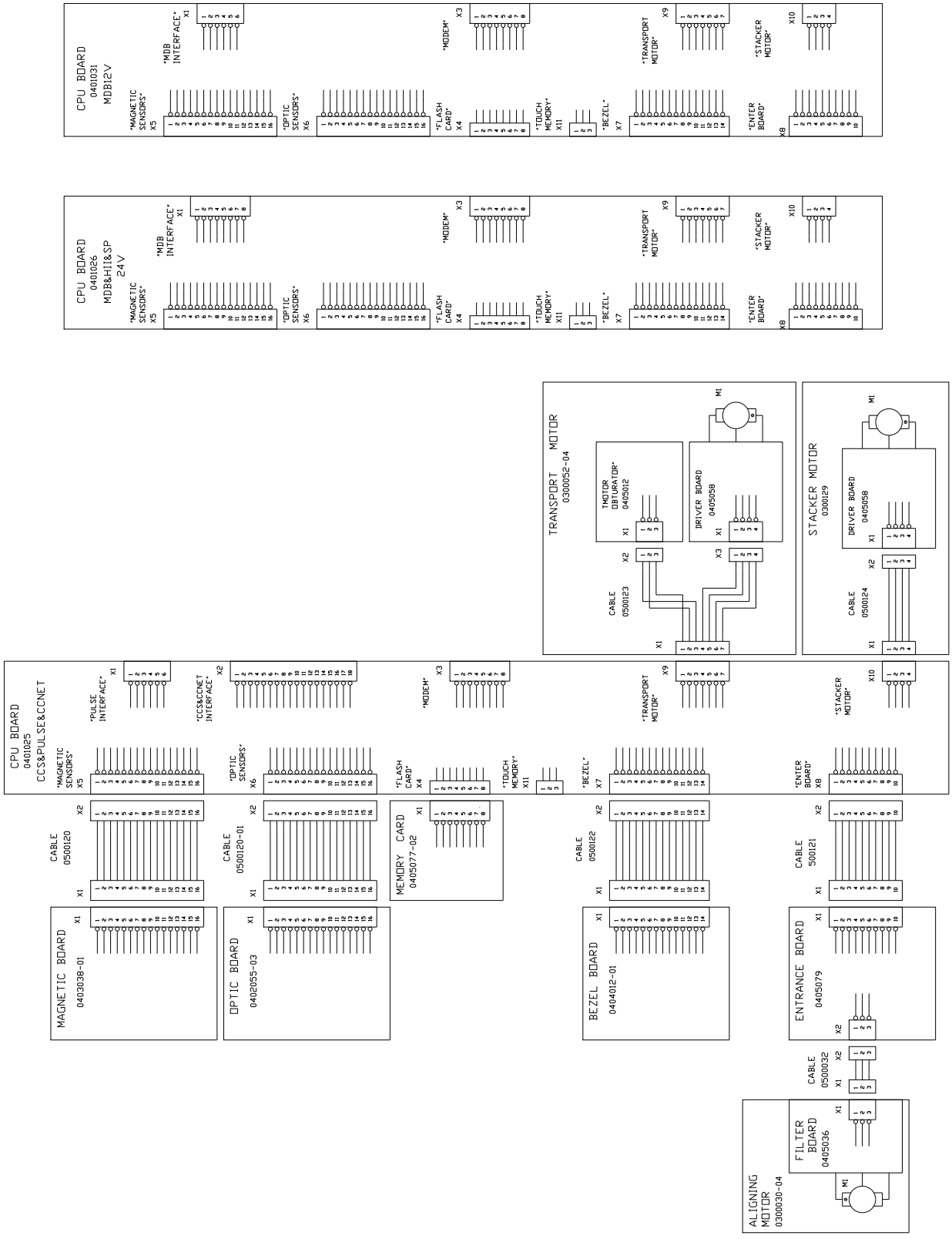
Panel cutout and mounting stud dimensions

GROUNDING



The MSMv2 bill validator's body must be grounded as indicated above.

GENERAL WIRING DIAGRAM



CHOOSING MSMv2 PART NUMBERS

MSMv2 PART NUMBER

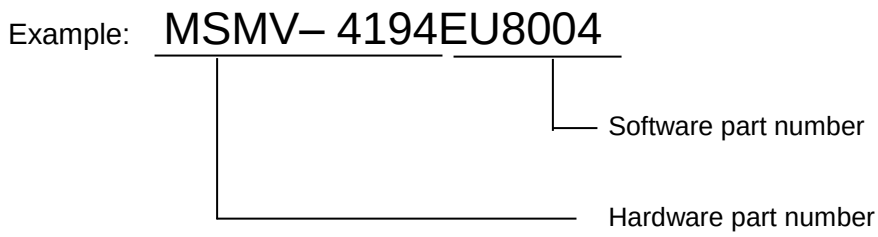
Following details are required to choose an existing MSMv2 part number or assign a new part number.

- type of bezel
- capacity of the cashbox
- hardware/ interface type
- currency (country)
- protocol

Physical attributes like, bezles, cashbox size, interface, operating voltage determine the hardware part number.

Programmble features like country (currency) and communication protocol detrmine the software part number.

Here below is an example of the MSMv2 part number.



HARDWARE PART NUMBERS

Currently available hardware options are listed below. An updated list is available at http://support.cashcode.com on the BackLoad Multiwidth product page under the section user guides.

Part Number	Description	Interface
MSMV-4002	12V, Green running lights, 300 bills	MDBS
MSMV-4003	12V, Green running lights, 300 bills	MDBS
MSMV-4017	24V, Green running lights, 300 bills	MDB
MSMV-4091	12V, Narrow bezel, 300 bills	MDBS
MSMV-4094	24V, Blue running lights, 300 bills	MDB
MSMV-4095	24V, Narrow bezel, 300 bills	MDB

Part Number	Description	Interface
MSMV-4102	12V, Green running lights, 400 bills	MDBS
MSMV-4105	12V, Green running lights, 400 bills	RS232/TTL
MSMV-4117	24V, Green running lights, 400 bills	MDB
MSMV-4191	12V, Narrow bezel, 400 bills	MDBS
MSMV-4192	12V, Narrow bezel, 400 bills	MDBS
MSMV-4194	24V, Blue running lights, 400 bills	MDB
MSMV-4217	24V, Green running lights, 700 bills	MDB

** MDBS – MDB with sleep function.

The 24 V validators are primarily suited for MDB applications used in vending machines. The 12 V MDBS validators are suited for low power battery applications. The 12V RS232/TTL validators are used in all other applications like retail, transportation and amusement.

SOFTWARE PART NUMBERS

Currently available software options are listed below. An updated list is available at http://support.cashcode.com on the BackLoad Multiwidth product page under the section software descriptions.

Part Number	Country	Protocol
MSMV-BG8002	Bulgaria	MDB
MSMV-CN8002	China	MDB
MSMV-HR8001	Croatia	MDB
MSMV-CZ8003	Czech Republic	MDB
MSMV-GBN8001	England+Northern Ireland	MDB
MSMV-GBSEU8001	England+Scotland+Euro	MDB
MSMV-GBSUS8001	England+Scotland+USA	MDB
MSMV-EU1001	Euro	CCNET
MSMV-EU8004		MDB
MSMV-EU8208		MDBS
MSMV-EUCH8007	Euro + Switzerland	MDB
MSMV-GH8001	Ghana	MDB
MSMV-HU8004	Hungary	MDB
MSMV-IN8001	India	MDB

Part Number	Country	Protocol
MSMV-IL8001	Israel	MDB
MSMV-MA8001	Morocco	MDB
MSMV-NZ8001	New Zealand	MDB
MSMV-QA8001	Qatar	MDB
MSMV-SG8001	Singapore	MDB
MSMV-LK8001	Sri Lanka	MDB
MSMV-TH8001	Thailand	MDB
MSMV-TREU8001	Turkey + Euro	MDB
MSMV-USCA8001	USA + Canada	MDB

MEMORY STICK PART NUMBERS

MSMv2 Bill Validators are configured with firmware, as per the part number. Newer firmware versions (updates) are released to add new bills, to improve security against counterfeits or to change operating behavior as required.

One way to update MSMv2 devices is through memory sticks. Two memory stick options are available

1) Single-load Memory stick.

This memory stick updates a validators firmware when it is first installed on the device. However it must always remain in the validator for it to function. This stick always retains the firmware so it can be used to update another validator if the need arises.

Part number for such a memory stick is **MSVM-31ccnnnn**, cc being country code and nnnn the version number. Typical example is **MSVM-31EU8004.**

2) Multi-load Memory stick.

This memory stick allows for updates of number of validators depending on the number of licenses ordered.

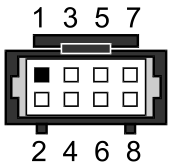
Part number for such a memory stick is **MSVM-40ccnnnn-xx**, cc being country code, nnnn the version number and xx the number of loads. Typical example is **MSVM-40EU8004-50**.

HOST INTERFACE OPTIONS

This section describes available interface options based on hardware platform and the terminal pin outs for connecting to host machines.

24V MDB VERSION

These validators are supplied with a harness OPT-HS-MDB.
The external mating connector utilizes the below MOLEX parts.



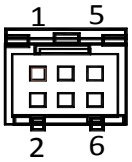
Dual Row Interim Clip #15-04-5084 - 1
Single Row Crimp Housing #50-57-9304 - 2
Fem. Box, Crimp Terminals #16-02-0086 - 8

The signal descriptions for the 8 pins are as below:

TERMINAL	SIGNAL
1	DC - /AC
2	DC + / AC
3	Ground
4	Additional output
5	Master receive
6	Additional input
7	Common
8	Master transmit

12V MDB SLEEP VERSION (MDBS)

These units are supplied with a harness OPT-HS-MDB-12V.
The external mating connector utilizes the below MOLEX parts.



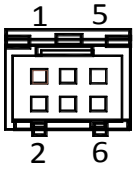
Dual Row Interim Clip #15-04-5064 - 1
Single Row Crimp Housing #50-57-9303 - 2
Fem. Box, Crimp Terminals #16-02-0096 - 6

The signal descriptions for the 6 pins are as below:

TERMINAL	SIGNAL
1	+ 12 V
2	Ground
3	Wake up
4	Master Receive
5	Master Transmit
6	Common

12V TTL/RS 232 VERSION

These units are supplied with a harness OPT-HS-12V-06P.
The external mating connector utilizes the below MOLEX parts.

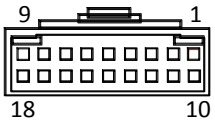


Dual Row Interim Clip #15-04-5064 - 1
Single Row Crimp Housing #50-57-9303 - 2
Fem. Box, Crimp Terminals #16-02-0096 - 6

The signal descriptions for the 6 pins are as below:

TERMINAL	SIGNAL
1	+ 12 V DC
2	Ground
3	Pulse Output 1
4	Pulse Output 2
5	Inhibit Line (+)
6	Inhibit Line (-)

Additional TTL/RS232 communications are performed through the 18 pin connector.
The external mating connector uses the below AMP parts



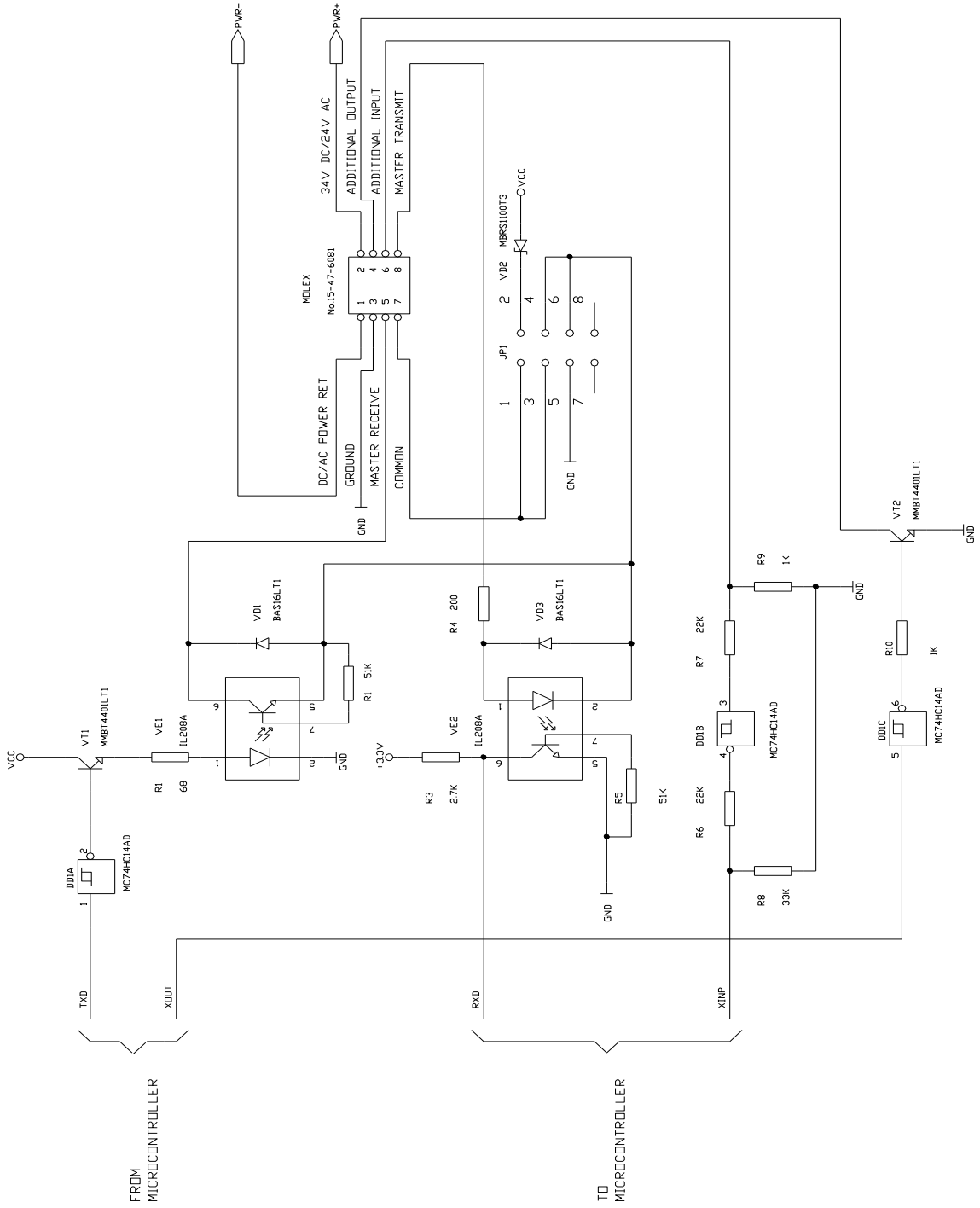
Header 2 x9 # 102398-7 - 1
Cover 2 x 9 # 102681-4 - 1
Cover 2 x 9 # 102536-7 - 1

The signal descriptions for the 18 pins are as below.

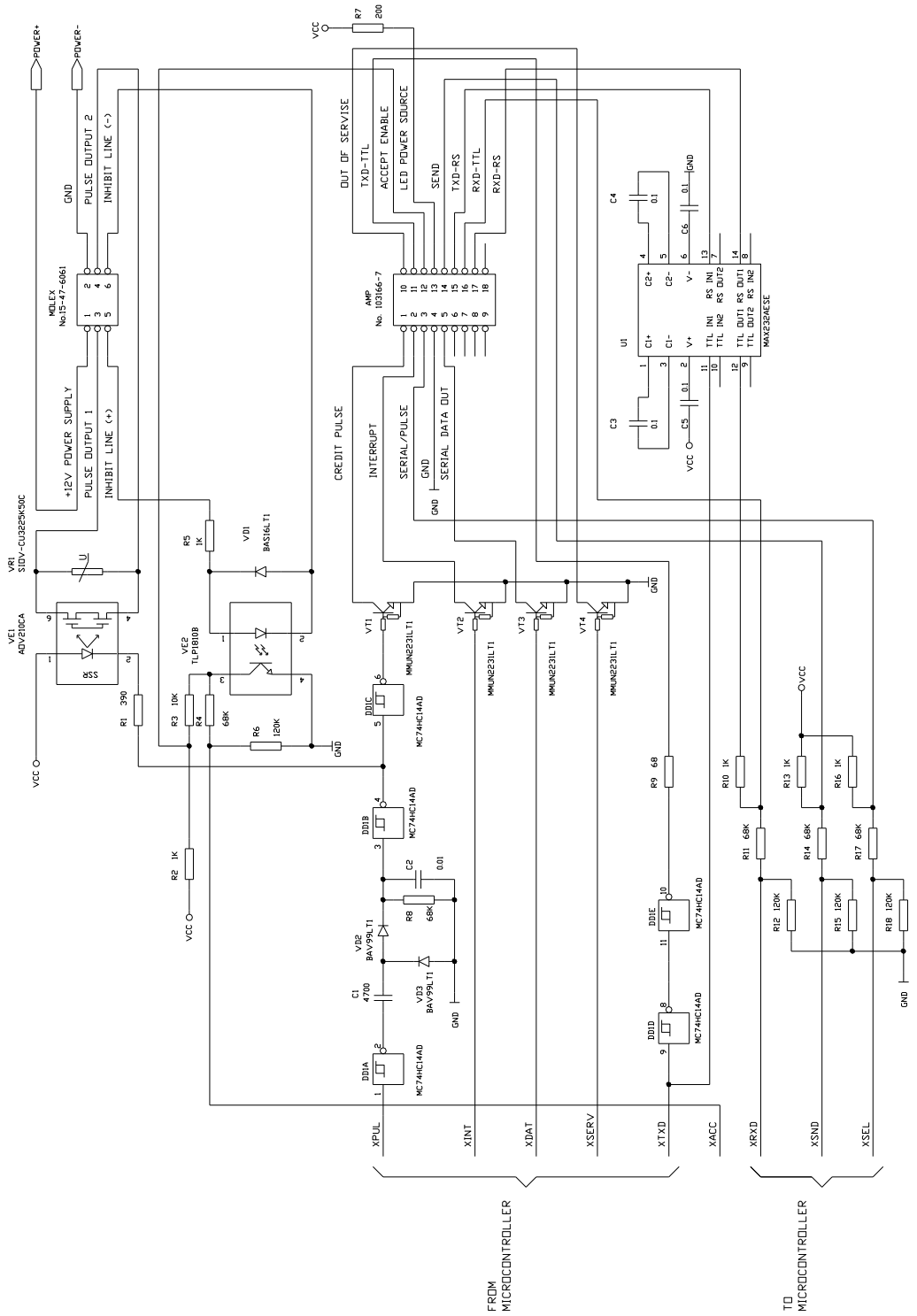
TERMINAL	SIGNAL
1	TTL pulse out
2	Interrupt
3	Serial/pulse select
4	Signal ground
5	Serial data out
6	-----
7	-----
8	-----
9	-----
10	Out of service
11	TTL transmit
12	Accept enable
13	LED power source
14	Send
15	RS232 Receive
16	TTL receive
17	RS232 transmit
18	------

INPUT/OUTPUT CIRCUITS

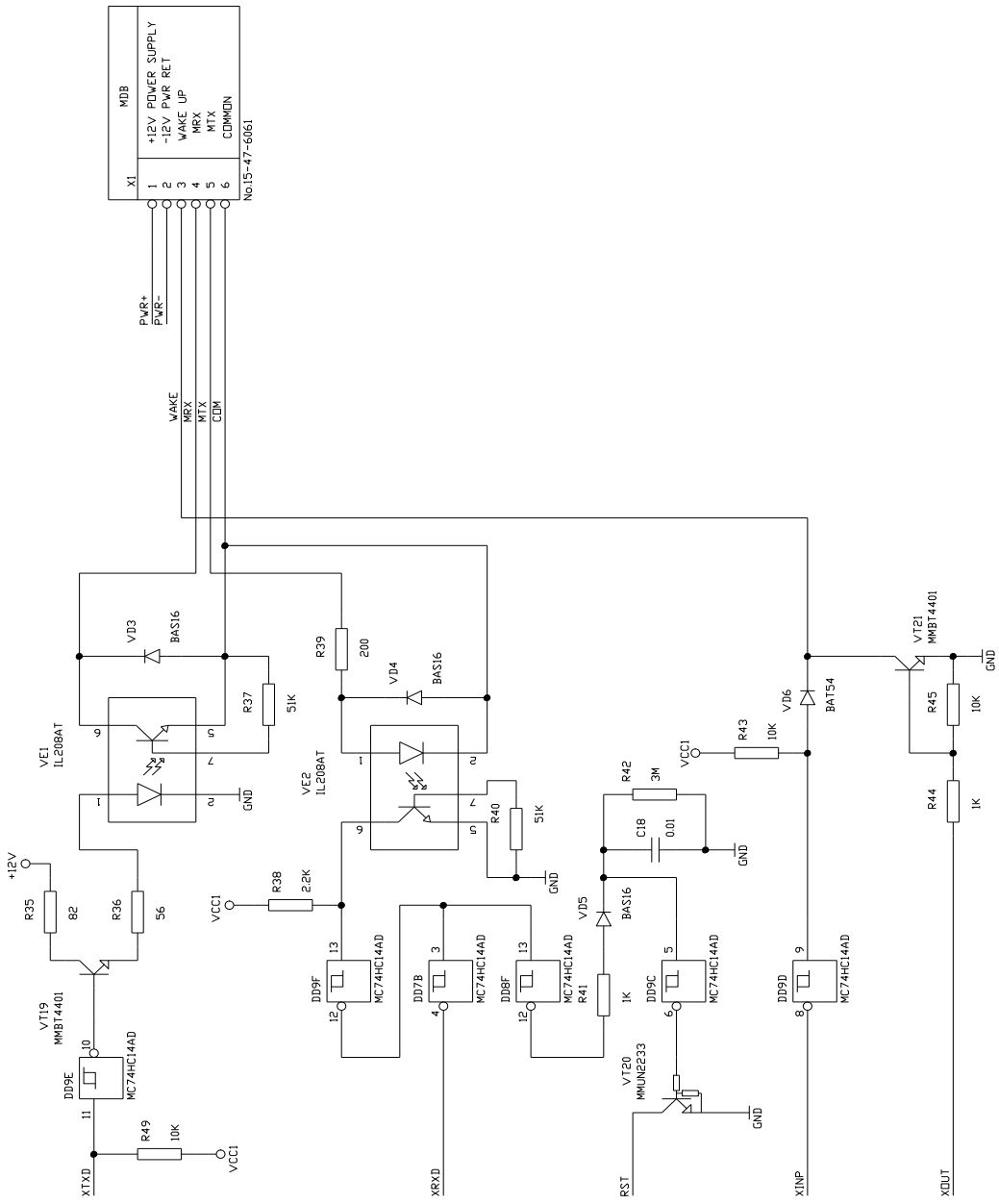
24V MDB VERSION



12V TTL/RS 232 VERSION



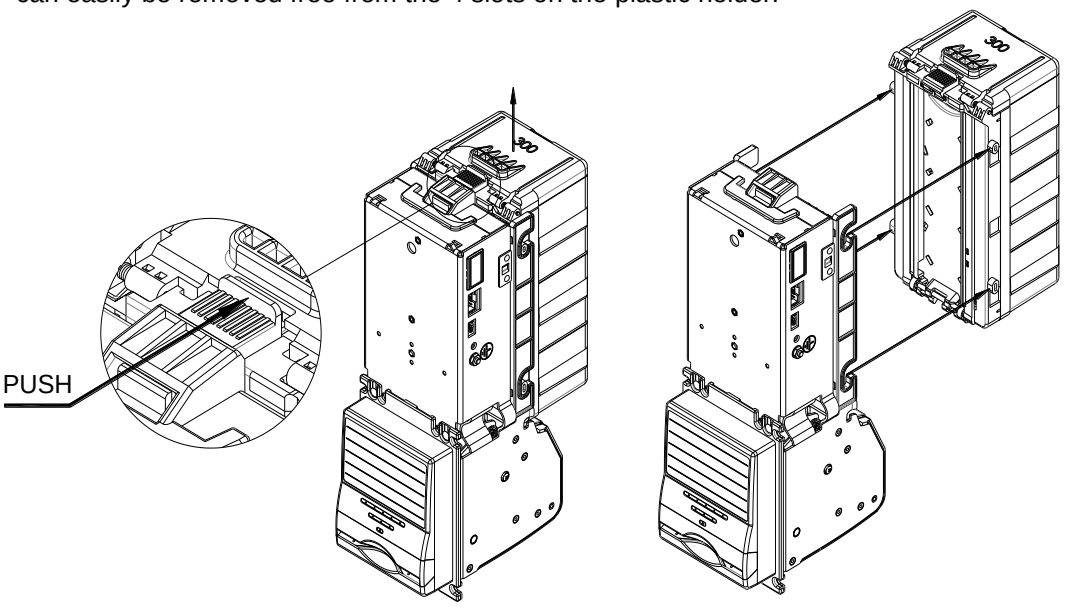
12V MDB SLEEP VERSION (MDBS)



MAINTENANCE AND SERVICE

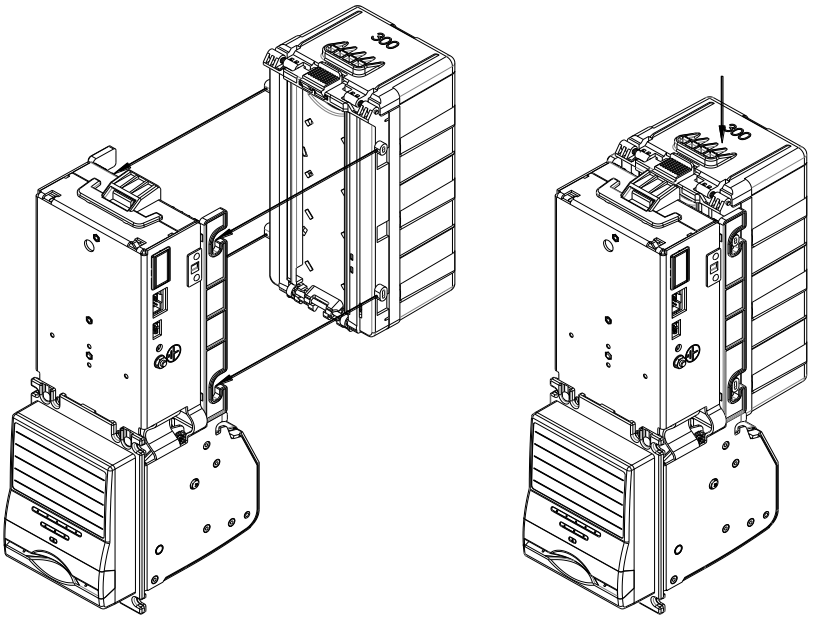
CASHBOX REMOVAL

To remove the cashbox, push the unlock lever as shown and slide the cashbox in the direction shown. For the cassette UP installation it must be slid UP and vice versa. Once it is unlocked it can easily be removed free from the 4 slots on the plastic holder.



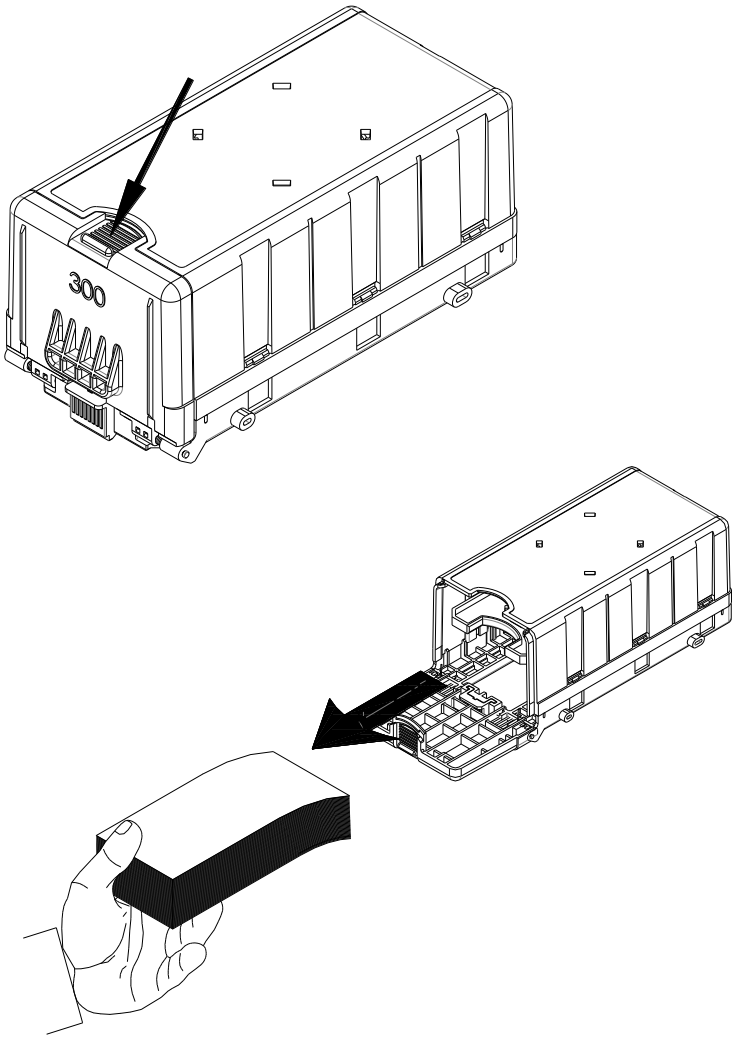
CASHBOX REINSTALLATION

To install the cassette into the bill validator, align the four cassette bosses onto the 4 slots on the plastic holder. Once they cashbox is in the slots, pushed it in the direction shown. For the cassette UP installation it must be slid DOWN and vice versa.



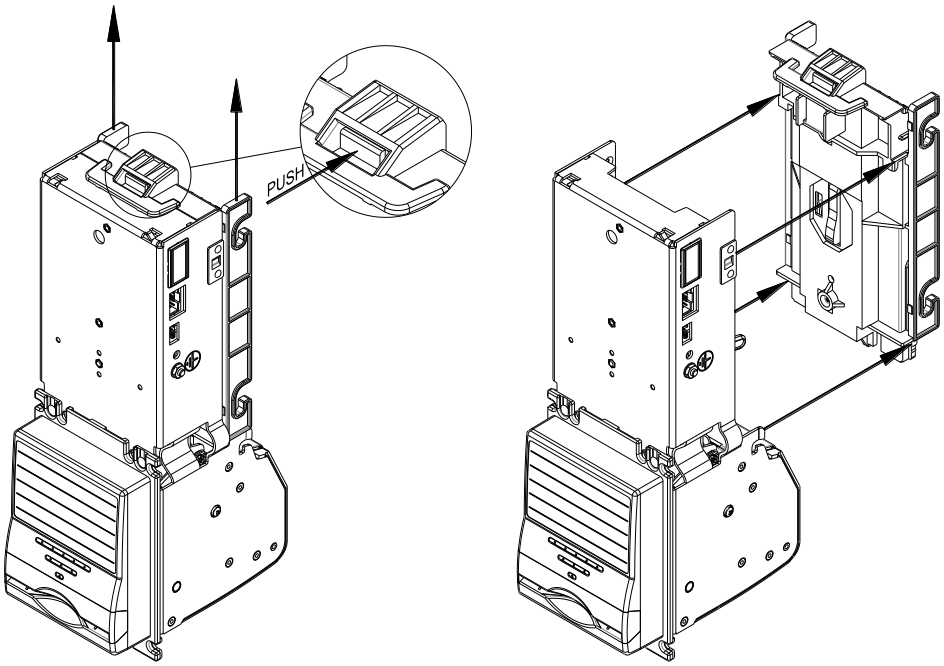
CASH COLLECTION

To collect cash from the cassette gently press on the unlock latch and open the cover. Remove cash and close the cover.

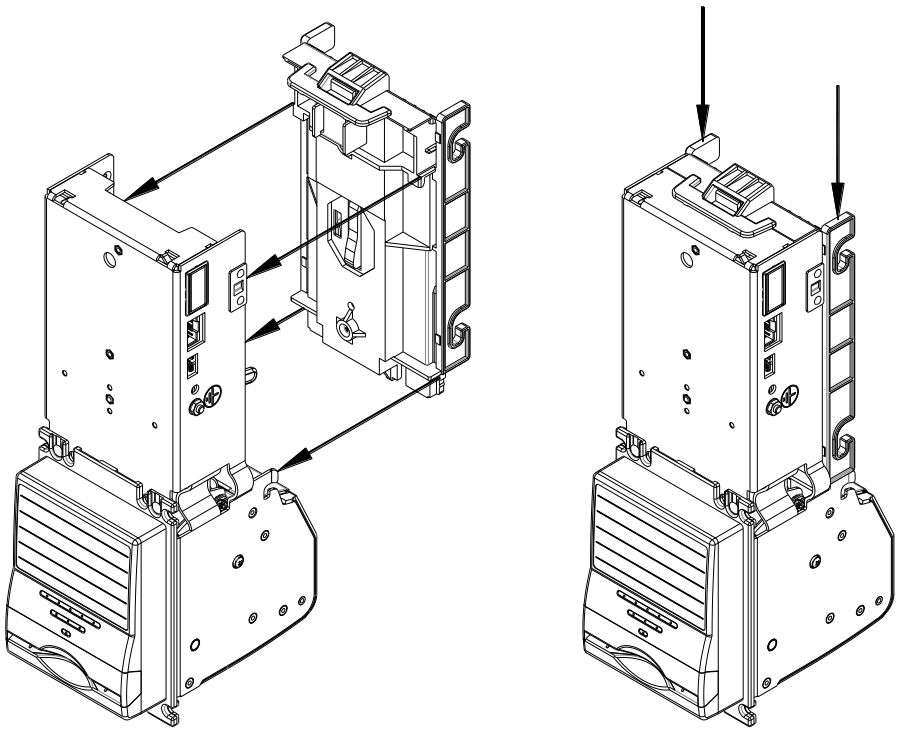


HOLDER REMOVAL AND INSTALLATION

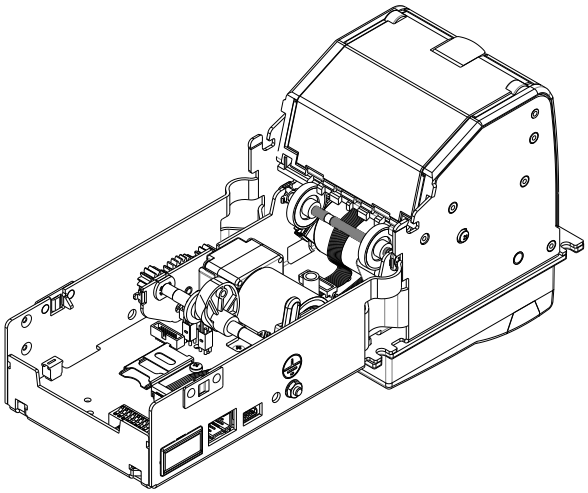
Remove the cassetee as described earlier. Push on the holder release latch and slide the holder in the direction shown. For cassette UP installation the holder must be slid UP and vice versa.



To install the holder in position, align two bosses on the holder to two slots on the bill validator body. Once the holder is in place, push it in the direction shown until the lock cliks. For cassette UP installation the holder must be slid DOWN and vice versa.



ACCESS TO DIP SWITCHES AND MEMORY STICK



The memory stick is located on the control board and is easily seen once the plastic holder is removed. Slide the lock to release and remove the memory stick. Take adequate care and use proper grounding to avoid electrostatic discharge which may damage the memory stick.

DIP switches are located on the control board close to the power connector. The switches are ON when pushed towards the number markings and OFF when away from the number markings.

DIP SWITCH SETTINGS

The function of the DIP switches is decided by the validator's software. The group of 8 switches generally allows enabling/disabling of selected denominations. The group of 4 allows changing communication speeds, acceptance by direction and switching the validator to SERVICE mode.

The software description documents describe the functional details of the DIP switches in greater detail. These documents are available on the support website at http://support.cashcode.com on the BackLoad Multiwidth product page under the section software descriptions.

SERVICE mode is quite useful to test the validator's basic functionality when a host machine is not available or there are communication issues.

It is a good practice to verify DIP switch assignments when a validator is updated with a new software version.

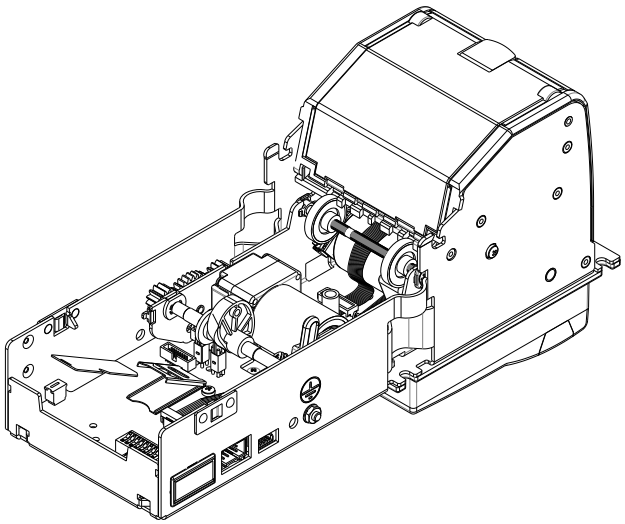
SOFTWARE UPDATES

SINGLE LOAD MEMORY STICK

Follow the procedure below to update MSMv2 with single load memory stick.

1. Turn Power OFF.
2. Remove the cassette and plastic holder.
3. Slide the memory stick holder lock to release position. Remove the memory stick or dummy card from the card slot.
4. Insert the new memory stick in the slot and slide the lock back to locked position.
5. Install the plastic holder and the cassette.
6. Turn Power ON and watch the status lights blink red - green or red – blue during the update process.
7. Once the download is complete the light will return to running green or running blue. If the light is steady red you may need to establish communication with the host.

The single load memory stick must be left in the MSMv2 for continued operation.



MULTI LOAD MEMORY STICK

Follow the procedure below to update MSMv2 with multi load memory stick.

1. Turn Power OFF.
2. Remove the cassette and plastic holder.
3. Slide the memory stick holder lock to release position. Remove the memory stick or dummy card from the card slot.
4. Insert the new memory stick in the slot and slide the lock back to locked position.
5. Install the plastic holder and the cassette.
6. Turn Power ON and watch the status lights blink red - green or red – blue during the update process.
7. Once the download is complete the light will return to running green or running blue. If the light is steady red you may need to establish communication with the host.
8. Turn the power OFF.
9. Repeat steps 2, 3 and 5.

The multi load memory stick is capable of updating a number of MSMv2 devices as indicated on the label.

REMOTE UPDATE

This process involves updating the device through the host machine, or by connecting to a hand held device or a PC with an adapter.

DIAGNOSTICS

In the unlikely event of an unsuccessful download, the status light will flash number of short green or blue flashes followed by a long red flash.

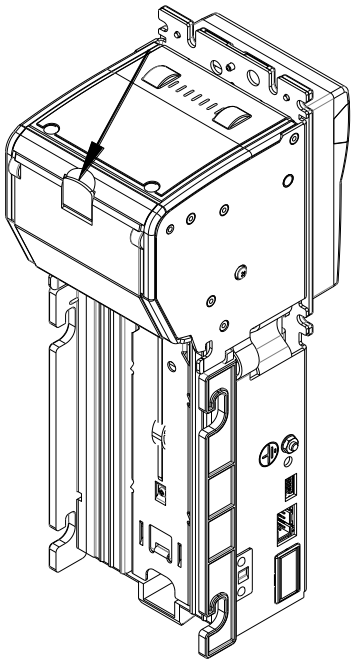
The following table lists the error conditions indicated by these diagnostic flashes.

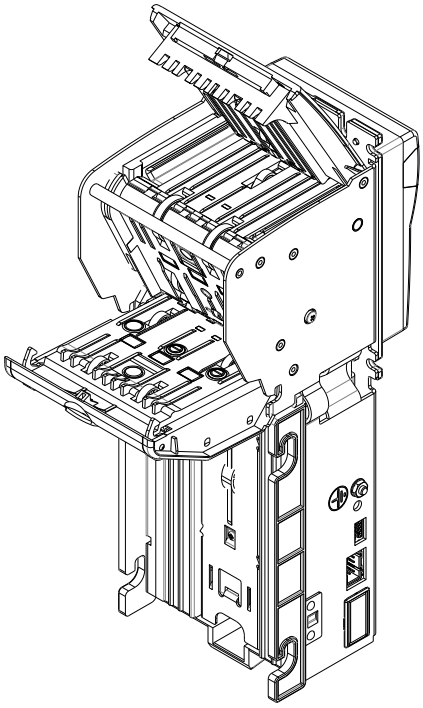
No of Flashes	Error Description	Corrective Action
1	External interface error in CCNET Download mode	Verify that software is suitable for CCNET download. Repeat process.
2	Memory stick CRC error	Power off and on. Repeat download. Replace memory stick if error persists.
3	Incorrect data in Memory stick	Verify if software is compatible with MSMv2. Replace memory stick if error persists.
4	Memory stick is not inserted	Properly insert the memory stick. Check if it is seated firm.
5	Wrong type of Memory stick	Perform download with correct type of memory stick.
6	Failure during download	Power off and on. Repeat download. Replace memory stick if error persists.
7	Error in memory stick Interface	Power off and on. Repeat download. Replace memory stick if error persists.

PERIODIC MAINTENANCE

During normal operation dust and dirt accumulate on the optical sensors and the rollers. This could result in reduced acceptance rate. It is recommended to clean the bill path as explained below every 6 months or 60,000 bills whichever comes first.

Remove the cassette. Open the clamshell by pushing the button as shown below.





Ensure:

No scratches present on the guides and optical sensors.
No dirt or cracks present on the surface of the transport rollers
No dirt on the surface of the optical sensors.
The entire bill path is clean of paper debris or residue.

All dirt must be cleaned with soft moistened cloth. Isopropyl Alcohol is recommended for cleaning excessively dirty rollers.

DO NOT USE ACETONE OR PETROLEUM BASED PRODUCTS AS THEY COULD CAUSE DAMAGE TO PLASTIC PARTS.

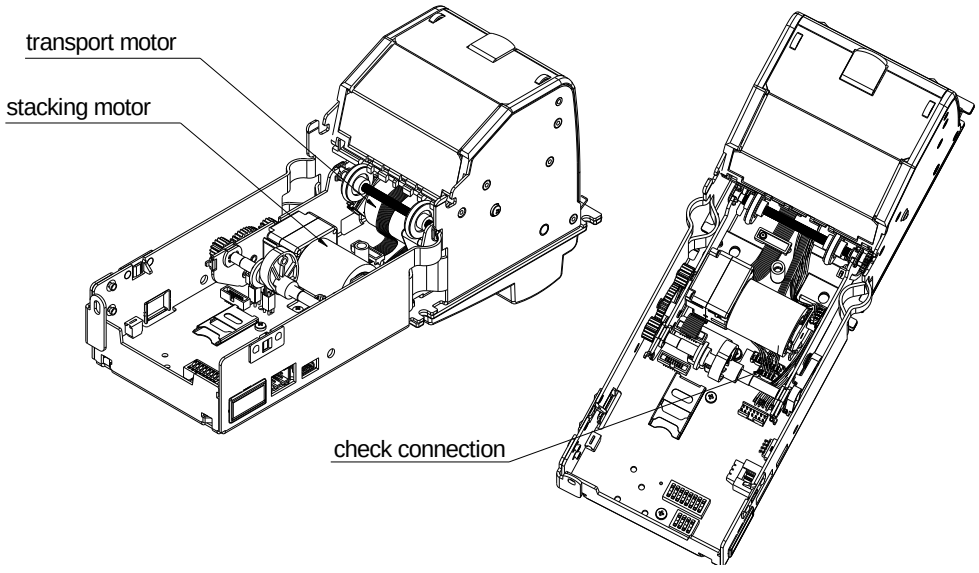
Inspect the cassette chamber to see no bill fragments or paper residue is left behind. This may be blown away with the use of compressed air.

A detailed maintenance manual is available on the support website at http://support.cashcode.com on the BackLoad Multiwidth product page under the section maintenance manual.

TROUBLESHOOTING

MSMv2 Bill Validator is equipped with a self-diagnostic feature to aid in repair and maintenance. The bezel light would start to will blink red in case of a malfunction. The number of red flashes indicates a specific error condition. A detailed list of these errors and corrective actions is below**.**

No of Flashes	Error Description	Corrective Action
1	Cassette is not attached	Check if cassette is installed correctly.
2	No communication with sensors	Check for proper connection between sensor and processor boards.
3	Cassette is full	Empty the cassette.
4	Jam in cassette Stacker motor failure	Clear bill jam. Check stacker motor operation.
5	Failure of dielectric sensors	
6	Failure of optical sensors	Check for blocked optic sensors.
7	Failure of inductive sensors	
8	Failure of transport motor	Check for motor connections.
11	Bill pathway is not empty	Open the clamshell and ensure bill path is clear.
12	Bill jam in entry slot of the cassette.	Clear bill jam.



For additional information please visit http://support.cashcode.com

This manual is intended only to assist the reader in the use of this product and therefore Crane Payment Solutions shall not be liable for any loss or damage whatsoever arising form the use of any information or particulars in, or any incorrect use of the product. Crane Payment Solutions reserve the right to change product specifications on any item without prior notice.