

## **Section 5**

### ***Coin Acceptor/Changer***

### ***VMC/Peripheral Communication Specifications***

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#### **5.1 Introduction**

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This section defines the communication bytes sent and received by a coin accepting device (“Changer”). As defined in Section 2.3, the changer’s address is 00001xxxB (08H).

Unless stated otherwise, all information is assumed to be in a binary format.

There are currently two levels of support defined for the coin mechanism interface, Level 2 and Level 3. The level of coin mechanism operation is sent to the VMC in the response to the STATUS command (defined later in this section). The following paragraphs will define how a VMC should differentiate between each level.

##### **Level 2 Changers**

For level 2 changers, VMC operation consists of monitoring inputs from the coin mechanism, accumulating credit, issuing a coin acceptance disable command when appropriate, and issuing appropriate payout commands based on the VMC resident payout algorithms and escrow rules.

##### **Level 3 Changers**

For level 3 changers, VMC operation is the same as defined above for level 2, with the addition of the EXPANSION command and its implications (defined later in this section). The VMC has the option of sending the EXPANSION command to the coin mechanism to determine the coin mechanism’s manufacturer code, serial number, model/tuning revision, software version, and optional features. Based on the optional feature information the VMC will determine the appropriate operating mode (in other words, modes that both the coin mechanism and the VMC can support), enable any appropriate coin mechanism features by sending an appropriate feature enable command back to the coin mechanism, and enter the proper operating mode. This technique allows all VMCs and peripherals to accommodate existing feature capabilities and provides a means for upgrading Level 3 equipment.

## 5.2 VMC Commands

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<u>Command</u>	<u>Hex Code</u>	<u>Description</u>
RESET	08H	Command for changer to self-reset
SETUP *	09H	Request for changer setup information.
TUBE STATUS	0AH	Request for changer tube status.
POLL	0BH	Request for changer activity status.
COIN TYPE	0CH	Signifies coin types accepted and allowable coin dispensing. This command is followed by setup data. See command format section.
DISPENSE	0DH	Command to dispense a coin type. Followed by coin type to dispense. See command format section.
EXPANSION COMMAND	0FH	Command to allow addition of features and future enhancements. Changers at feature level 2 do not support this command.

**NOTE:** An EXPANSION command is always followed by a “sub-command.” This command allows for feature additions.

\* In Version 1.0 & 2.0, **SETUP** was called **STATUS**.

### 5.3 VMC Command Format

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<u>VMC Command</u>	<u>Code</u>	<u>VMC Data</u>
RESET	08H	No data bytes

This command is the vehicle that the VMC should use to tell the changer that it should return to its default operating mode. With the exception of the ACK response, it should abort all communication and disable all acceptance until otherwise instructed by the VMC.

The following initialization sequence is recommended for all new VMCs designed after July, 2000. It should be used after “power up”, after issuing the RESET command, or after issuing the Bus Reset (pulling the transmit line “active” for a minimum of 100 mS).

**POLL – 0Bh**

To obtain “JUST RESET” response

**SETUP – 09h**

To obtain changer level and configuration information

**EXPANSION IDENTIFICATION – 0F 00h (Level 03+ only)**

To obtain additional changer information and options

**EXPANSION FEATURE ENABLE – 0F 01h (Level 03+ only)**

To enable desired options

**EXPANSION SEND DIAG STATUS – 0F 05h (Level 03+ & option b1 only)**

To request the changer to report its current state of operation

**TUBE STATUS – 0Ah (Note 1)**

To obtain tube status / change information

**COIN TYPE – 0Ch**

To enable desired coin acceptance and disable manual coin payout if desired

Note 1 – A minimum 500 msec delay is required between a reset (regardless of type) and the first **TUBE STATUS** command for certain models of the existing MDB coin changer field base.

<u>VMC Command</u>	<u>Code</u>	<u>Changer Response Data</u>
SETUP	09H	23 bytes: Z1 - Z23

Z1 = Changer Feature Level - 1 byte

Indicates the feature level of the changer. This will distinguish the changers feature level to the VMC. Current defined levels:

Level 2: Supports "core" command set. These are: RESET, STATUS, TUBE STATUS, POLL, COIN TYPE, and DISPENSE. (Z1 = 02h)

Level 3: Supports level two and the EXPANSION command addition changer model number, manufacturer code, turning revision, etc. See the details of EXPANSION command later in this document. (Z1=03h)

Z2 - Z3 = Country / Currency Code - 2 bytes

The packed BCD country / currency code of the changer can be sent in two different forms depending on the value of the left most BCD digit.

If the left most digit is a 0, the International Telephone Code is used to indicate the country that the changer is set-up for. For example, the USA code is 00 01H (Z2 = 00 and Z3 = 01).

If the left most digit is a 1, the latest version of the ISO 4217 numeric currency code is used (see Appendix A1). For example, the code for the US dollar is 18 40H (Z2 = 18 and Z3 = 40) and for the Euro is 19 78 (Z2 = 19 and Z3 = 78).

**All new designs after July, 2000 must use the ISO 4217 numeric currency codes as listed in Appendix A1.**

Z4 = Coin Scaling Factor - 1 byte

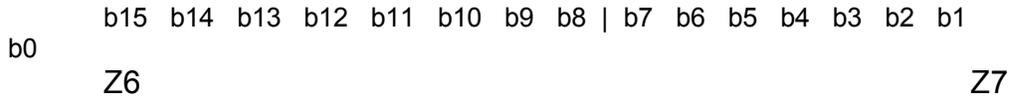
All accepted coin values must be evenly divisible by this number. For example, this could be set to 05H for the USA nickel.

Z5 = Decimal Places - 1 byte

Indicates the number of decimal places on a credit display. For example, this could be set to 02H in the USA.

Z6 - Z7 = Coin Type Routing - 2 bytes

Indicates what coin types can be routed to the Changer's tubes.



Bit is set to indicate a coin type can be routed to the tube. Valid coin types are 0 to 15.

Z8 - Z23 = Coin Type Credit - 16 bytes

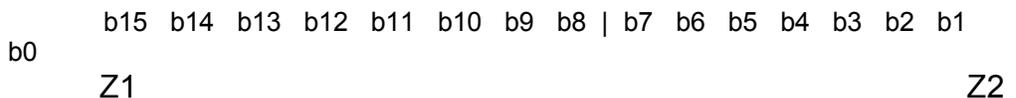
Indicates the value of coin types 0 to 15. Values must be sent in ascending order. This number is the coin's monetary value divided by the coin scaling factor. Unused coin types are sent as 00H. Unsent coin types are assumed to be zero. It is not necessary to send all coin types. Coin type credits sent as FFH are assumed to be vend tokens. That is, their value is assumed to worth one vend.

The bytes position in the 16 byte string indicates the coin type(s). For example, the first byte sent would indicate the value of coin type 0, the second byte sent would indicate the value of coin type 1, and so on. For example, the USA coin types may be; Coin type 0 = nickel, Coin type 1 = dime, Coin type 2 = quarter, Coin type 3 = dollar.

<u>VMC Command</u>	<u>Code</u>	<u>Changer Response Data</u>
TUBE STATUS	0AH	18 bytes: Z1 - Z18

Z1 - Z2 = Tube Full Status - 2 bytes

Indicates status of coin tube for coin types 0 to 15.



A bit is set to indicate a full tube. For example, bit 7 = set would indicate the tube for coin type 7 is full.

Z3 - Z18 = Tube Status - 16 bytes

Indicates the greatest number of coins that the changer "knows" definitely are present in the coin tubes. A bytes position in the 16 byte string indicates the number of coins in a tube for a particular coin type. For example, the first byte sent indicates the number of coins in a tube for coin type 0. Unsent bytes are assumed to be zero. For tube counts greater than 255, counts should remain at 255.

**NOTE:** If a changer can detect a tube jam, defective tube sensor, or other malfunction, it will indicate the tube is "bad" by sending a tube full status and a count of zero for the malfunctioning coin type.

<u>VMC Command</u>	<u>Code</u>	<u>Changer Response Data</u>
POLL	0BH	16 bytes: Z1 - Z16

Z1 - Z16 = Changer Activity - 16 bytes

Indicates the changer activity. If there is nothing to report, the changer should send only an ACK. Otherwise, the only valid responses are:

**Coins Dispensed Manually:**

<u>Z1</u>	<u>Z2</u>
(1yyyxxxx)	(zzzzzzzz)

yyy	=	The number of coins dispensed.
xxxx	=	The coin type dispensed (0 to 15)
zzzzzzzz	=	The number of coins in the tube.

**Coins Deposited:**

<u>Z1</u>	<u>Z2</u>
(01yyxxxx)	(zzzzzzzz)

yy	=	Coin routing. 00: CASH BOX 01: TUBES 10: NOT USED 11: REJECT
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xxxx	=	Coin type deposited (0 to 15).
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zzzzzzzz	=	The number of coins in the tube for the coin type accepted.
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**Status:**

(00000001) =	Escrow request <sup>1</sup> - An escrow lever activation has been detected.
(00000010) =	Changer Payout Busy <sup>2</sup> - The changer is busy activating payout devices.
(00000011) =	No Credit <sup>1</sup> - A coin was validated but did not get to the place in the system when credit is given.
(00000100) =	Defective Tube Sensor <sup>1</sup> - The changer has detected one of the tube sensors behaving abnormally.
(00000101) =	Double Arrival <sup>1</sup> - Two coins were detected too close together to validate either one.
(00000110) =	Acceptor Unplugged <sup>2</sup> - The changer has detected that the acceptor has been removed.
(00000111) =	Tube Jam <sup>1</sup> - A tube payout attempt has resulted in jammed condition.
(00001000) =	ROM checksum error <sup>1</sup> - The changers internal checksum does not match the calculated checksum.
(00001001) =	Coin Routing Error <sup>1</sup> - A coin has been validated, but did not follow the intended routing.
(00001010) =	Changer Busy <sup>2</sup> - The changer is busy and can not answer a detailed command right now.
(00001011) =	Changer was Reset <sup>1</sup> - The changer has detected an Reset condition and has returned to its power-on idle condition.
(00001100) =	Coin Jam <sup>1</sup> - A coin(s) has jammed in the acceptance path.
(00001101) =	Possible Credited Coin Removal <sup>1</sup> - There has been an attempt to remove a credited coin.

## Note:

- changers must have a means to disable this code due to potential older VMC issues.
- virtually all VMCs designed prior to this code's introduction (10/16/02) will not support it.
- It is a vending machine system issue as to what is done when this code is received.

**Slug:**

(001xxxxx) =	xxxxx is the number of slugs since the last activity.
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**NOTES:** The Changer may send several of one type activity, up to 16 bytes total. This will permit zeroing counters such as slug, inventory, and status.

- 1 Sent once each occurrence.
- 2 Sent once each POLL

**File Transport Layer POLLED responses:**

Note that all FTL responses are defined in Section 2.6. For the coin changer, the source address will always be the changer (08H) as defined in Section 2.3.

Z1

1B	REQ TO RCV	The coin changer is requesting to receive data from a device or VMC.
		Z2 = Destination address of response Z3 = Source address of response (08H) Z4 = File ID Z5 = Maximum length Z6 = Control
1C	RETRY/DENY	The coin changer is requesting a device or VMC to retry or deny the last FTL command.
		Z2 = Destination address of response Z3 = Source address of response (08H) Z4 = Retry delay
1D	SEND BLOCK	The coin changer is sending a block of data (maximum of 31 bytes) to a device or VMC.
		Z2 = Destination address of data Z3 = Block # Z4-Z34 = Data (maximum of 31 bytes)
1E	OK TO SEND	The coin changer is indicating that it is OK for a device or VMC to send it data.
		Z2 = Destination address of response Z3 = Source address of response (08H)
1F	REQ TO SEND	The coin changer is requesting to send data to a device or VMC.
		Z2 = Destination address of response Z3 = Source address of response (08H) Z4 = File ID Z5 = Maximum length

Z6 = Control

<u>VMC Command</u>	<u>Code</u>	<u>VMC Data</u>
COIN TYPE	0CH	4 bytes: Y1 - Y4

Y1 - Y2 = Coin Enable - 2 bytes

b15	b14	b13	b12	b11	b10	b9	b8		b7	b6	b5	b4	b3	b2	b1	b0
															Y1	Y2

A bit is set to indicate a coin type is accepted. For example, bit 6 is set to indicate coin type 6, bit 15 is set to indicate coin type 15, and so on. To disable the changer, disable all coin types by sending a data block containing 0000H. All coins are automatically disabled upon reset.

Y3 - Y4 = Manual Dispense Enable - 2 bytes

b15	b14	b13	b12	b11	b10	b9	b8		b7	b6	b5	b4	b3	b2	b1	b0
															Y3	Y4

A bit is set to indicate dispense enable. For example, bit 2 is set to enable dispensing of coin type 2. This command enables/disables manual dispensing using optional inventory switches. All manual dispensing switches are automatically enabled upon reset.

<u>VMC Command</u>	<u>Code</u>	<u>VMC Data</u>
DISPENSE	0DH	1 byte: Y1
	b7 b6 b5 b4 b3 b2 b1 b0	
		Y1

Bits b3, b2, b1, b0 indicate coin type to be dispensed. Valid codes are 0H to FH to indicate coin types 0 to 15.

Bits b7, b6, b5, b4 indicate the number of coins to be dispensed.

**NOTE 1:** If two coin types have the same value, the highest coin type should be paid out first.

**NOTE 2:** There is no defined limit on how long the actual dispense takes since the command allows for up to 15 coins to be paid out. The payout cycle begins when the changer ACKs the VMC's DISPENSE (0DH) command. This cycle typically lasts a minimum of 100 mS and ends when the changer stops dispensing the desired number of coins. VMCs should monitor the Changer Payout Busy response to the POLL command to determine when the entire payout cycle is completed.

**However**, it must be noted that other than ACKing the DISPENSE (0DH) command, the changer does not have to respond during the payout cycle provided the payout cycle is less than the changer's non-response time and the changer starts responding again prior to the end of the non-response time. Thus, it is acceptable for the changer to never report Changer Payout Busy, but simply start ACKing the POLL commands upon completion of a payout cycle provided the non-response time has not been exceeded.

**LEVEL THREE CAPABILITIES - EXPANSION COMMAND**

The following describes the currently defined expansion commands.

Sub-command 00H is used for a changer that has the capability of reporting model number, serial number, and so on.

<u>VMC Command</u>	<u>Code</u>	<u>Sub-Command</u>	<u>Changer Response Data</u>
EXPANSION	0FH	00H	33 bytes: Z1 - Z33
COMMAND		IDENTIFICATION	

Z1 - Z3 = Manufacturer Code - 3 bytes  
 Identification code for the equipment supplier. Sent as ASCII characters. Currently defined codes are listed in the **EVA** document entitled "**European Vending Association Data Transfer Standard**" (**EVA-DTS**), the Audit Data Lists section, sub-section 2, "Manufacturer Codes".

Z4 - Z15 = Serial Number - 12 bytes  
 Factory assigned serial number. All bytes must be sent as ASCII characters, zeros (30H) and blanks (20H) are acceptable.

Z16 - Z27 = Model #/Tuning Revision - 12 bytes  
 Manufacturer assigned model number and tuning number. All bytes must be sent as ASCII characters, zeros (30H) and blanks (20H) are acceptable. Each manufacturer should include information concerning the changer tuning revision.

Z28 - Z29 = Software Version - 2 bytes  
 Current software version. Must be sent in packed BCD.

Z30 - Z33 = Optional Features - 4 bytes  
 Each of the 32 bits indicate an optional features availability. If the bit is set the feature is available. Bits should be sent in descending order, i.e. bit 31 is sent first and bit 0 is sent last. Currently defined options are:

b0 - Alternative Payout method. This method allows changer designs that determine change payout.

That is, the payout algorithm may reside in the changer instead of the VMC.

- b1 - Extended Diagnostic command supported. This command allows the VMC to request diagnostic status of the coin changer.
- b2 - Controlled Manual Fill and Payout commands supported. These commands allows the VMC to request the number of coin inserted or dispensed while the changer was in a controlled manual fill or payback mode.
- b3 - File Transport Layer (FTL) supported as defined in Section 2.6.
- b4 - b31 Available for future use

<u>VMC Command</u>	<u>Code</u>	<u>Sub-Command</u>	<u>VMC Data</u>
EXPANSION COMMAND	0FH	01H FEATURE ENABLE	4 bytes: Y1 - Y4

This command is used to enable each of the optional features defined in Z30-Z33 above. To enable a feature a bit is set to one. **All optional features are disabled after reset.**

<u>VMC Command</u>	<u>Code</u>	<u>Sub-command</u>	<u>VMC Data</u>	<u>Changer Response</u>
EXPANSION COMMAND (Alternative Payout)	0FH	02H PAYOUT	Y1	None

Y1 = Value of coins to be paid out - 1 byte

This value is expressed as the number of coin scaling factors that would sum to the value. For example, in a USA system using a scaling factor of 05, if the change to be paid out is 75 cents, then Y1 will equal fifteen. That is, the sum of fifteen nickels equal 75 cents. The coin changer will determine which actual denominations of coins will be paid out. In the 75 cent example, the coins may be 3 quarters; or, 7 dimes & 1 nickel; or, 2 quarters & 2 dimes & 1 nickel, etc.

<u>VMC Command</u>	<u>Code Sub-command</u>	<u>VMC Data</u>	<u>Changer Response</u>
EXPANSION COMMAND (Alternative Payout)	0FH 03H PAYOUT STATUS	None	16 bytes: Z1-Z16

Z1 - Z16 = Number of each coin type paid out - 16 bytes

This is the changer's response to the last VMC Alternative PAYOUT command (0FH-02H). Bytes are sent in ascending order of coin types. A bytes position in the string indicates the coin type. That is, byte one is the number of coins for coin type 1, byte two is the number of coins for coin type two, and so on. Unsent bytes are assumed to be zero.

The changer clears payout data after an ACK response from the VMC.

The VMC should compare the value of the coins paid out to the (0FH-02H) Alternative PAYOUT command's Y1.

- NOTES:**
- 1) If the changer's payout is busy it will respond to the Alternative PAYOUT STATUS command with an ACK only.
  - 2) If no coins have been paid out, at least one zero valued data byte must be sent.
  - 3) There is no defined limit on how long the actual payout takes. See Note 2 under the DISPENSE (0DH) command.

<u>VMC Command</u>	<u>Code Sub-command</u>	<u>Changer Response Data</u>
EXPANSION COMMAND (Alternative Payout)	0FH 04H PAYOUT VALUE POLL	1 byte: Z1

Z1 = Changer Payout Activity - 1 byte

An interval value (scaled) which indicates the amount of paid out change since the previous PAYOUT VALUE POLL (or between the initial Alternative PAYOUT command (0FH-02H) and the first PAYOUT VALUE POLL).

An 00H response indicates no coins were paid out since the previous PAYOUT VALUE POLL (or the initial Alternative PAYOUT command (0FH-02H)).

An ACK only indicates that the change payout is finished. This should be followed by the PAYOUT STATUS command (0FH-03H) to obtain the complete payout data.

**NOTE:** The initial intent of this command is to determine the amount of change paid out so that the credit display can be decremented as coins are dispensed.

<u>VMC Command</u>	<u>Code</u>	<u>Sub-Command</u>	<u>Changer Response Data</u>
EXPANSION COMMAND	0FH	05H SEND DIAGNOSTIC STATUS	16 bytes: Z1-Z16

**Send Current Diagnostic Status** - This command requests the changer to report its current state of operation. The VMC should periodically transmit the command approximately every 1 to 10 seconds.

**Z1-Z2** = Current changer diagnostic information

The changer reports its current state of operation in a 2 byte code. Z1 is the main code and Z2 is the sub-code. The code is reported as long as the condition exists and stops being reported as soon as the condition does not exist. Multiple 2 byte codes may be sent in response to a single command which could result in a maximum of eight 2 byte codes (16 bytes total).

The following tables identify the currently defined extended diagnostic codes:

<b>Z1 / Z2</b>	<b>Status</b>	<b>Cause(s) of Status / Error</b>
01 / 00	Powering up	Changer powering up / initialization
02 / 00	Powering down	Changer powering down
03 / 00	OK	Changer fully operational and ready to accept coins
04 / 00	Keypad shifted	MODE key pressed and held so that LED flashes indicating keypad in shifted state. Reverts to normal mode if no key pressed for 15 seconds
05 / 10	Manual Fill / Payout active	Manual Fill or Manual Payout mode of operation in progress (under control of the changer). This response must be reported at least once to allow the VMC to request a manual fill or manual payout report.
05 / 20	New Inventory Information Available	Changer not in Manual inventory mode, but new inventory information available.
06 / 00	Inhibited by VMC	All coin acceptance inhibited at request of VMC, possibly due to product dispenser jams, completely sold out, etc.
10 / Z2	General changer error	Z2 defined as: <b>00</b> Non specific error. <b>01</b> Check sum error #1. A check sum error over a particular data range of configuration field detected. <b>02</b> Check sum error #2. A check sum error over a secondary data range or configuration field detected. <b>03</b> Low line voltage detected. The changer has disabled acceptance or payout due to a low voltage condition.

<b>Z1 / Z2</b>	<b>Status</b>	<b>Cause(s) of Status / Error</b>
11 / Z2	Discriminator module error	Z2 defined as: <b>00</b> Non specific discriminator error. <b>10</b> Flight deck open. <b>11</b> Escrow Return stuck open. <b>30</b> Coin jam in sensor. <b>41</b> Discrimination below specified standard. <b>50</b> Validation sensor A out of range. The acceptor detects a problem with sensor A. <b>51</b> Validation sensor B out of range. The acceptor detects a problem with sensor B. <b>52</b> Validation sensor C out of range. The acceptor detects a problem with sensor C. <b>53</b> Operating temperature exceeded. The acceptor detects the ambient temperature has exceeded the changer's operating range, thus possibly affecting the acceptance rate. <b>54</b> Sizing optics failure. The acceptor detects an error in the sizing optics.
12 / Z2	Accept gate module error	Z2 defined as: <b>00</b> Non specific accept gate error. <b>30</b> Coins entered gate, but did not exit. <b>31</b> Accept gate alarm active. <b>40</b> Accept gate open, but no coin detected. <b>50</b> Post gate sensor covered before gate opened.
13 / Z2	Separator module error	Z2 defined as: <b>00</b> Non specific separator error <b>10</b> Sort sensor error. The acceptor detects an error in the sorting sensor.
14 / Z2	Dispenser module error	Z2 defined as: <b>00</b> Non specific dispenser error.
15 / Z2	Coin Cassette / tube module error	Z2 defined as: <b>00</b> Non specific cassette error. <b>02</b> Cassette removed. <b>03</b> Cash box sensor error. The changer detects an error in a cash box sensor. <b>04</b> Sunlight on tube sensors. The changer detects too much ambient light on one or more of the tube sensors.

## Diagnostic Status EVA-DTS Correlation

The Extended Diagnostic information reported may be used by the vending machine controller as desired (i.e., service mode displays); however, **EVA-DTS** data elements could also be used for reporting to a host system. Examples are:

- o Via a translation of the Z1/Z2 code to one of the **Fault Lists** as described in Section 10 of the **EVA-DTS**.
- o Via the EA201 Event Identification element with the format **EAxxyy** where xx = Z1 and yy = Z2.
- o Via a customer / manufacture specific coding scheme using the **MA5xx** fields.

<b>VMC Command</b>	<b>Code</b>	<b>Sub-Command</b>	<b>Changer Response Data</b>
EXPANSION	0FH	06H	16 bytes Z1-Z16
COMMAND	SEND CONTROLLED MANUAL FILL REPORT		

**Send Controlled Manual Fill Report** - This command requests the changer to report the number of coins inserted during a changer controlled manual fill (controlled bulk fill) mode. While in this mode, the changer must not report coins inserted in response to the **POLL** command.

**Z1-Z16** = number of controlled manual mode filled coins (by coin type)

A single byte is reported for each coin type, 0 to 15. For example, Z1 = number of coins of coin type 0 added in a controlled manual fill mode. Any amount above 255 will be reported as 255, i.e. it will reach a maximum limit.

Only coin types *supported* are required to be reported. Counts for unspent coins types will be assumed to be unchanged.

**Notes:** After power on, changer reset, closing of the machine door, or a change in controlled manual fill status in the changer (changer indicated it was in controlled manual fill mode via CM0510 then changed to any other state) the machine should request the controlled manual coin fill data from the changer using the above command.

See EVA-DTS correlation at end of **SEND CONTROLLED MANUAL PAYOUT REPORT** (0F-07H) command.

<b>VMC Command</b>	<b>Code</b>	<b>Sub-Command</b>	<b>Changer Response Data</b>
EXPANSION COMMAND	0FH	07H	16 bytes Z1-Z16
		SEND CONTROLLED MANUAL PAYOUT REPORT	

**Send Controlled Manual Payout Report** - This command requests the changer to report the number of coins dispensed during a changer controlled manual payout (controlled bulk dispense) mode. Note that this does not include the coins dispensed via the individual dispense switches.

If the new Controlled Manual Fill / Payout command is implemented in the coin mech **and** enabled by the VMC (0Fh, 01h, bit 2 of Y1 to Y4), while in a controlled manual payout (dispense) mode, the changer **must not** report the coins paid out in response to the **POLL** command. Conversely, if the changer does not support the new command or the VMC does not enable it, the changer **should** report the coins paid out in response to the **POLL** command.

**Z1-Z16** = number of controlled manual mode dispensed coins (by coin type)

A single byte is reported for each coin type 0 to 15. For example, Z1 = number of coins of coin type 0 dispensed in a controlled manual payout mode. Any amount above 255 will be reported as 255, i.e. it will reach a maximum limit.

Only coin types supported are required to be reported. Counts for unspent coin types will be assumed to be unchanged.

**Note:** After power on, changer reset, closing of the machine door, or a change in controlled manual payout status in the changer (changer indicated it was in controlled manual payout mode via CM0510 then changed to any other state) the machine should request the controlled manual coin payout data from the changer using the above command.

### **Controlled Manual Fill / Payout EVA-DTS Correlation**

The controlled manual fill and payout coin information may be used by the vending machine controller as desired (i.e., service mode displays); however, **EVA-DTS** data elements could be used for reporting to a host system. Examples are:

	CA3XX	CA4XX	CA1704	CA1705
Controlled Manual Fill	0F06	n/a	0F06	n/a
VMC Tube Fill	VMC	n/a	VMC	n/a
Controlled Manual Payout	n/a	0F07*	n/a	0F07*
VMC Coin Payout	n/a	VMC	n/a	VMC
Manual Dispense Switches	n/a	0B	n/a	0B

\*If extended **0F06** & **0F07** commands are implemented.

If extended **0F06** & **0F07** commands are not implemented in the coin mech or not enabled by the VMC, the coin mech will respond to the **POLL** command with the controlled manual payout coins.

With the above, the **CA3XX** & **CA4XX** fields can continue to be the primary fields for cash audit and the **CA1704** & **CA1705** fields can be used for indicating controlled manually filled / dispensed coins.

### Coin Tube Audit Fields

As a reference, below are the agreed **CA17XX** data elements that provide detailed coin tube count information and controlled-manual coin tube insertion / dispense information. These were approved by the **EVA - DTS** Technical Sub Committee on January 27, 1997.

Block Identifier Reference	Data Contents	Characteristic	Length		Element
			Min	Max	
CA17	Coin Type Number (per MDB coin type)	N	01	03	CA1701
	Value of Coin	N	01	08	CA1702
	Number of Coins in Tube	N	01	08	CA1703
	Number of Coins Inserted during Controlled-Manual Fill	N	01	08	CA1704
	Number of Coins Dispensed during	N	01	08	CA1705

## Controlled-Manual Payout

### Definitions:

**CA1701** The coin type number as referred to in the MDB Interface Specification. If not an MDB system, the number represents the coin's position in the coin set starting with the lowest value coin accepted. Note if two or more vintage of the same coin is accepted, the oldest one is first.

For example, the Canadian coin types may be:

0 Old Nickel	3 Quarter
1 New Nickel	4 \$1 Dollar
2 Dime	5 \$2 Dollar

**CA1702** The cash value of the coin (units base).

For example, the Canadian coin types would be:

Nickel	5	\$1 Dollar	100
Dime	10	\$2 Dollar	200
Quarter	25		

**CA1703** The number of coins in the coin tube (or tubes if multiple tubes per coin) that are reported by the coin mech during normal vending operations. Note that this is the "best known tube count" and may be inaccurate if coins were manually added or removed by hand.

**CA1704** The number of coins inserted while the changer was in a Controlled manual fill mode. Controlled manual fill indicates that the coins are being inserted under the control of the coin mech or VMC. Coins are not being loaded by hand through the tops of the tubes.

**CA1705** The number of coins dispensed while the changer was in a controlled manual payout mode. Controlled manual payout indicates that the coins are being dispensed under the control of the coin mech or VMC. Coins are not being removed by hand by "dumping" the tubes.

<u>VMC Command</u>	<u>Code</u>	<u>Sub-command</u>	<u>VMC Data</u>	<u>Changer Response</u>
EXPANSION COMMAND	0FH	FAH FTL REQ TO RCV	Y1-Y5	Z1 - Zn (immediate or POLLED)

The VMC is requesting to receive data from the changer whose destination address will always be (08H). Note that all FTL Commands / Responses are defined in Section 2.6.

Y1 = Destination address of command (08H)  
 Y2 = Source address of command  
 Y3 = File ID  
 Y4 = Maximum length  
 Y5 = Control

Z1 = 1DH which indicates SEND BLOCK  
 Z2 = Destination address of data  
 Z3 = Block #  
 Z4 - Z34 = Data (maximum of 31 bytes)  
 or

Z1 = 1CH which indicates RETRY / DENY  
 Z2 = Destination address of response  
 Z3 = Source address of response (08H)  
 Z4 = Retry delay

<u>VMC Command</u>	<u>Code</u>	<u>Sub-command</u>	<u>VMC Data</u>	<u>Changer Response</u>
EXPANSION COMMAND	0FH	FBH FTL RETRY / DENY	Y1-Y3	None

The VMC is retrying, denying, or aborting a data transfer to/from the changer whose destination address will always be (08H). Note that all FTL Commands / Responses are defined in Section 2.6.

Y1 = Destination address of command (08H)  
 Y2 = Source address of command  
 Y3 = Retry delay

<u>VMC Command</u>	<u>Code</u>	<u>Sub-command</u>	<u>VMC Data</u>	<u>Changer Response</u>
EXPANSION COMMAND	0FH	FCH	Y1-Y33	None
		<b>FTL SEND BLOCK</b>		

The VMC is sending data to the changer whose destination address will always be (08H). Note that all FTL Commands / Responses are defined in Section 2.6.

Y1 = Destination address of command & data (08H)  
 Y2 = Block #  
 Y3 - Y33 = Data (maximum of 31 bytes)

<u>VMC Command</u>	<u>Code</u>	<u>Sub-command</u>	<u>VMC Data</u>	<u>Changer Response</u>
EXPANSION COMMAND	0FH	FDH	Y1-Y2	Z1-Z34 (immediate or POLLed)
		<b>FTL OK TO SEND</b>		

The VMC is indicating that it is OK for the changer to transfer data. The destination address will always be the changer (08H). Note that all FTL Commands / Responses are defined in Section 2.6.

Y1 = Destination address of command (08H)  
 Y2 = Source address of command  
  
 Z1 = 1DH which indicates SEND BLOCK  
 Z2 = Destination address of data  
 Z3 = Source address of data  
 Z4 - Z34 = Data (maximum of 31 bytes)

<u>VMC Command</u>	<u>Code</u>	<u>Sub-command</u>	<u>VMC Data</u>	<u>Changer Response</u>
EXPANSION COMMAND	0FH	FEH FTL REQ TO SEND	Y1-Y5	Z1 (immediate or POLLed)

The VMC is requesting to send data to the changer whose destination address will always be (08H). Note that all FTL Commands / Responses are defined in Section 2.6.

Y1 = Destination address of command (08H)  
 Y2 = Source address of command  
 Y3 = File ID  
 Y4 = Maximum length  
 Y5 = Control

Z1 = 1EH which indicates OK TO SEND  
 Z2 = Destination address of response  
 Z3 = Source address of response (08H)

or

Z1 = 1CH which indicates RETRY / DENY  
 Z2 = Destination address of response  
 Z3 = Source address of response (08H)  
 Z4 = Retry delay

<u>VMC Command</u>	<u>Code</u>	<u>Sub-command</u>	<u>VMC Data</u>	<u>Changer Response</u>
EXPANSION COMMAND	0FH	FFH DIAGNOSTICS	Y1-Yn	Z1-Zn

Y1 - Yn = Device manufacturer specific instruction for implementing various manufacturing or test modes. Y1 - Yn implies that any number of bytes can be used for the VMC data to the peripheral.

Z1 - Zn = Device manufacturer specific responses after receiving manufacturing or test instructions. Z1 - Zn implies that any number of bytes can be used for the changer response data from the peripheral.

## 5.4 Changer Non-Response Time

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The maximum non-response time for the changer is two seconds.

## 5.5 Changer Power Requirements

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The current draw for any changer must fall within the following limits. All measurements are at the minimum VMC Voltage Output.

Idle mode	=	200 mA. (max.) continuous
Coin acceptance	=	1.8 A. (max.) for up to 2 seconds (For coin changers using solenoid based payout mechanisms - typical of 3 tube changers sold in the US market. Vending machines sold into the US market are required to supply this power.)
		1.0A. (max.) for up to 2 seconds (For coin changers using motorized payout mechanisms - typical of 4 tube changers.)
Coin payout	=	3.6 A. (max.) for 100 mS. with 400 mS. idle current between pulses during the coin payout cycle. (For coin changers using solenoid based payout mechanisms - typical of 3 tube changers sold in the US market. Vending machines sold into the US market are required to supply this power.)
		1.8 A. (max.) during the coin payout cycle. (For coin changers using motorized payout mechanisms - typical of 4 tube changers.)

**See Note 2 under the DISPENSE (0DH) command for further information on the coin payout cycles.)**

Note: If both peripherals are supported, vending machines should be able to provide sufficient power to simultaneously supply the above power requirements for both the coin changer **Coin Acceptance** and bill validator **Bill Transport** as specified in Section 6.5.