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Micromech Interface

TITLE : Micromech Interface Specification

NUMBER : 30102-002982001-PT

ISSUE : R2

DATE : 25 May 1995 10:57

FILE : /proj/flex/carlsberg/docs/micromech_interface_spec/vsn_r02

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COPY : _____

APPROVAL : Engineering _____

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Change History

Issue	Date	Description
R1	12-DEC-94	Created from Spartan product specification and TRC6000 interface spec.
R2	25-MAY-95	Extra details on certain vmc's added

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1.0 Introduction

This document describes the micromech interface as used on U.S. products, such as changers and control boards.

This document details 24V,117V, 12 pin and 15 pin variants of the interface.

This document includes the \$1 coin message extension and dispense line details for a changer but does **not** include the debit card extensions or L+ extensions.

1.1 References

The following documents were used as a basis for generation of this specification:

- “MODEL TRC-6000 INTERFACE SPECIFICATION” MEI SP-1179
- “MODEL TRC-6010 INTERFACE SPECIFICATION” MEI SP-1180
- “CASHFLOW 510,520 Changer Product Specification” MEI 30102-001703001-PS

Other relevant specifications:

- “Standard for MC5000 interface for debit card systems” NAMA 18 April 1991
- “L+ Interface Specification” Oct 30, 1991

1.2 Glossary

- LED - Light Emitting Diode
- MEI - Mars Electronics International Ltd

2•0 Micromech Hardware

2•1 Schematic Of Input And Output Circuits

A schematic of the micromech interface is shown below:

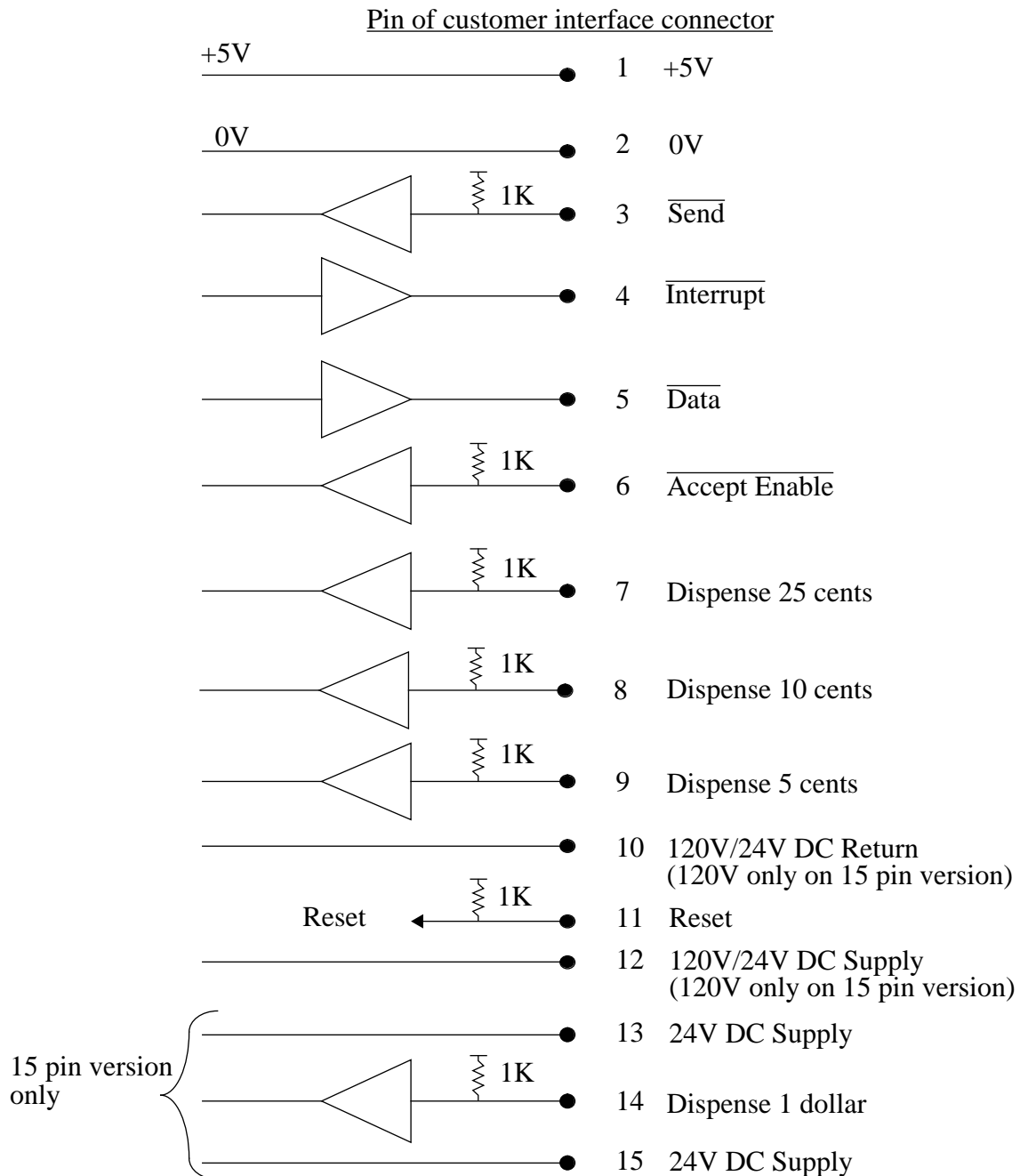


Fig 2.2 *Micro Mech Interface Connector*

2.3 Electrical Specifications

2.3.1 Input Lines

Logic zero $V_{in} = 0.0V$ to $0.4V$
 $I_{in} = 7mA$ MAX

Logic One $V_{in} = 4.6V$ to $5V$ (supply)
 $I_{in} = 500\text{ uA}$ MAX

2.3.2 Output Lines

Logic zero $V_{out} = 0.0V$ to $0.4V$
 $I_{out} = 15\text{ mA}$ MAX

Logic one $V_{out} =$ Open collector drivers
 $I_{out} = 100\text{ uA}$ MAX (leakage)

2•4 U.S. Micromech Connector

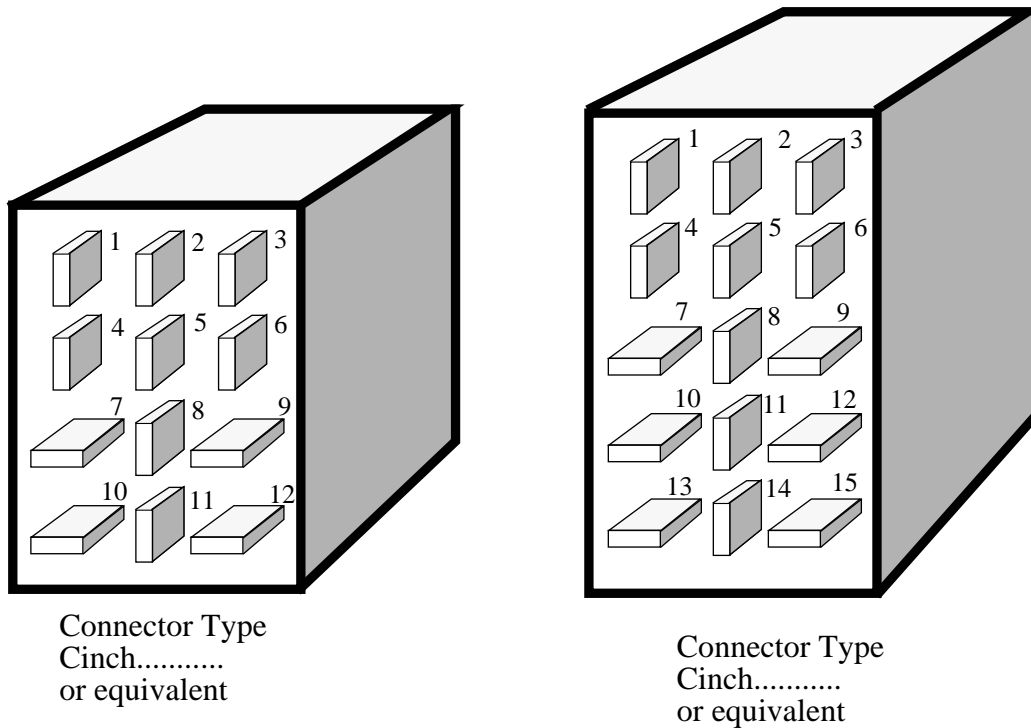


Fig 2.5 U.S. Micromech Connectors

2•6 U.S. Micromech Connector Pinout

Pin	Function
1	+5V
2	0V
3	SEND
4	INTERRUPT
5	DATA
6	ACCEPT ENABLE
7	DISPENSE 25C
8	DISPENSE 10C
9	DISPENSE 5C
10	120V/24V DC Return (120V only on 15 pin variant)
11	Reset
12	120V/24V DC Supply (120V only on 15 pin variant)
13	24V DC Return
14	DISPENSE 1 Dollar
15	24V DC Supply

2•7 U.S. Micromech Interface Specification

2.7.1 Input Specification:

- +5 Volts DC (+/- 5% at 100 mA maximum)
- 5 Volt return ground (Analog and digital)
- +24 Volts (+/- 10%) full wave rectified line voltage. This line must be non-filtered.
OR/
+117 Volts (+/- 10%) full wave rectified line voltage. This line must be non-filtered.
- +24 Volts return ground.
OR/
+117 Volts return ground.

NOTE: The 117V ground and the 5V ground must **NOT** be connected together. Damage to both the coin acceptor and the control system would occur under these conditions.

- **ACCEPT_ENABLE** - active low, controls coin acceptance.

When TRUE (0V) (zero) - Accepts coins

When FALSE (5V) (one) - Rejects coins

The acceptor will NOT immediately honor the signal if accept gate activation is in progress.

This signal is also used to request a Tube Status Message. The rising edge of this signal (0V to 5V transition) shall cause the Changer to send the Tube Status Message unless higher priority work takes precedence.

SEND - This active low input is part of the handshaking protocol used to send Coin and Non-Coin Messages. The **SEND** signal can be viewed as an "Interrupt Acknowledge" response to the changers "Interrupt" request (Described below). The **SEND** signal should not be active at any other time. Once the initial data message is received the control system can raise the **SEND** line for a small period and then assert the **SEND** line again to force retransmission of the message. The timing requirements for this are detailed in figures 4.7 and 4.8.

If the control system raise the SEND signal for longer than the re-transmit period the Changer assumes the communication session is ended. The Changer will then raise the INTERRUPT line to indicate communications is finished, then resumes normal operation in accordance with the ACCEPT_ENABLE line.

DISPENSE LINES - These active low input lines control the dispensing of coins from the Changers tubes. Each line is associated with a particular tube. The dispense waveforms are described in detail in the timing diagrams later in this section. Note the control system will need to request a Tube Status message from the Changer if the revised state of the tube inventory is desirable. A method for doing this is described in the Recommendations And Suggestions section.

RESET - This active high input line is designed to reset the Changer. RESET must be held in the high (5V) state for a minimum of 10 ms to insure a proper reset of the acceptor.

Once reset the acceptor shall perform internal housekeeping then report “ready” by sending the “power up” message to the control system. This should occur within 2 S from the falling edge (5V to 0V) of the RESET signal.

2.7.2 Output Specification:

- **DATA** - non-isolated 600 baud (+/- 1% max deviation) unidirectional serial interface, active low NRZ (non return to zero) format. The data is sent least significant bit first preceded by a start bit (0V), after the 8 data bits one stop bit (5V) is sent. An entire byte can be sent in 16.67 milliseconds (1.667 mS per bit). The START bit is a SPACE (0V) and the STOP bit a MARK (5V).
- **INTERRUPT**
This active low output is part of the handshaking protocol used to send messages to the control system. The INTERRUPT signal can be viewed as an “Interrupt Request” to the control system. Once INTERRUPT is activated the Changer will dedicate all processing to the communications link. The acceptor will not validate coins or service escrow return requests. When INTERRUPT is asserted the Changer waits for the control system to acknowledge the request by activating the SEND line. Once the Changer detects an active SEND line the message is transmitted to the control system over the DATA line. The Changer will retransmit the message if requested to do so by the control system. The timing diagrams for the transmission are detailed in a later section.

3.0 Description Of Message Classes

There are three classes of messages:

- Coin messages
 - **VALID COIN**
- Non coin messages
 - **POWER UP**
 - **ESCROW RETURN**
 - **COIN JAM**
 - **DEFECTIVE SENSOR**
 - **NO STROBE**
 - **SLUG**
 - **DOLLAR COIN NOT ACCEPTED**
 - **DOUBLE ARRIVAL**
- Tube status messages
 - **TUBE STATUS**

The coin messages and non coin messages have a different transmission mechanism to that of the tube status messages (see transmission description section for further details).

3.1 Valid Coin Message

This message defines the value of the validated coin, the status of the tubes and the destination of the validated coin.

The format of the message is:

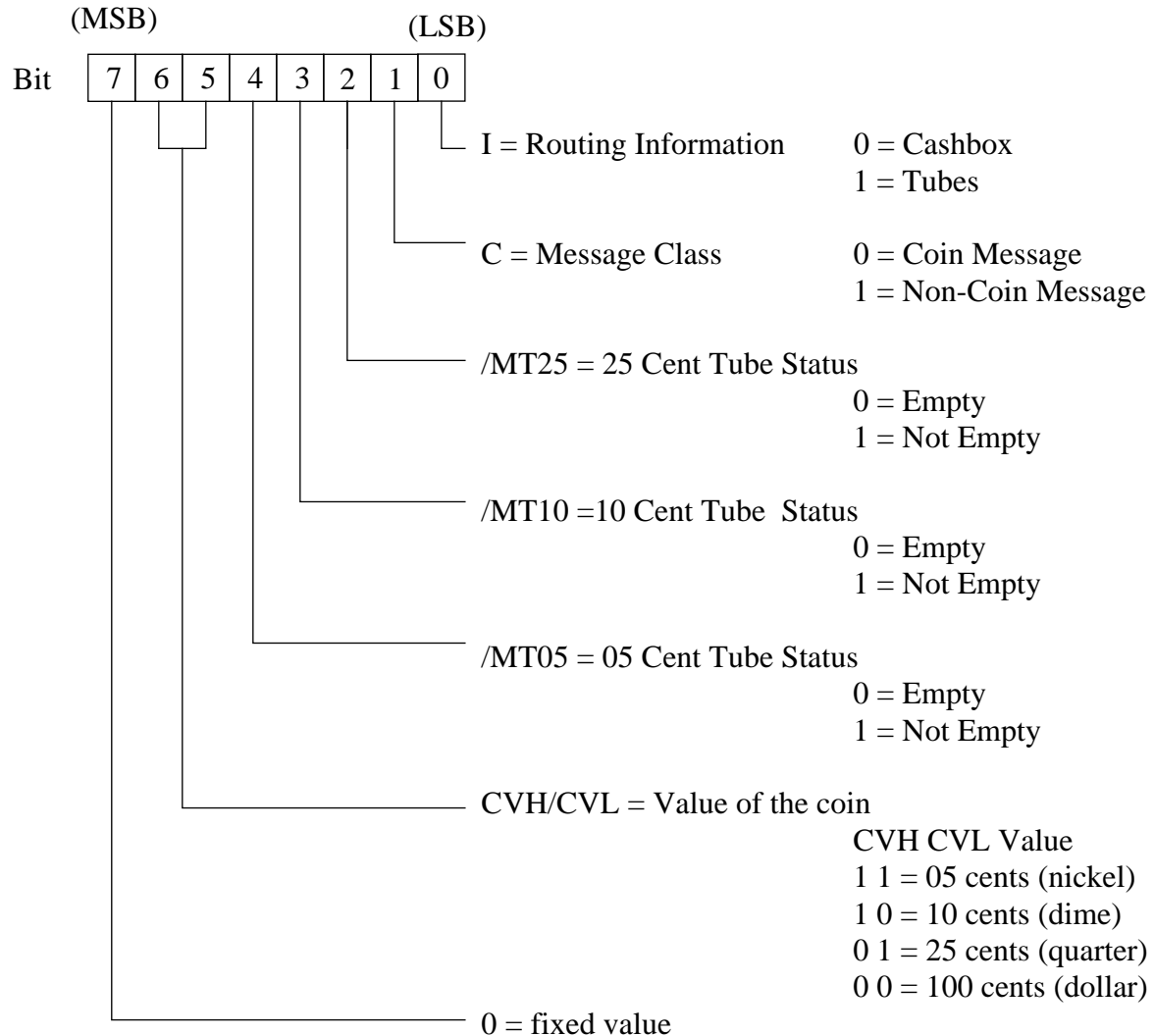


Fig 3.2 Coin Message Byte Structure

If a lower tube sensor is known to be defective the coin acceptor will report the status of this sensor to the control system as being empty

There is no system for distinguishing between US and Canadian coins.

There is currently no method for reporting the status of the upper level tube sensors. A control system can infer that an upper sensor is full if subsequent coins for that tube are routed to the cashbox. The control system can also determine if an upper sensor is defective if coins for that tube are routed to cashbox yet the lower sensor status shows empty.

3.3 Non-Coin Messages

There are two values for every non-coin message as bit D4 is used to indicate whether the 25C tube is being filled to its high or low level.

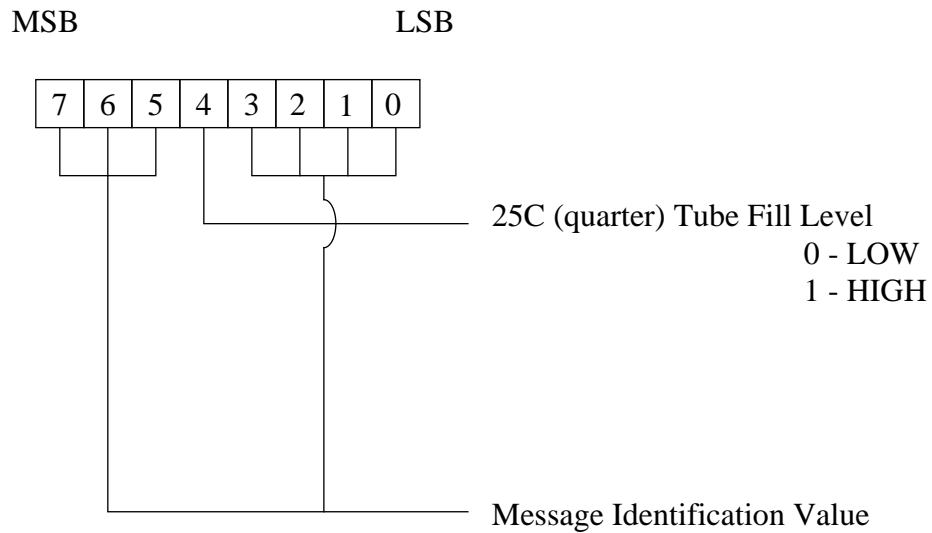


Fig 3.4 *Non-Coin Message Byte Structure*

3.5 Tube Status Messages

This message is sent after the rising edge of the ACCEPT_ENABLE line.

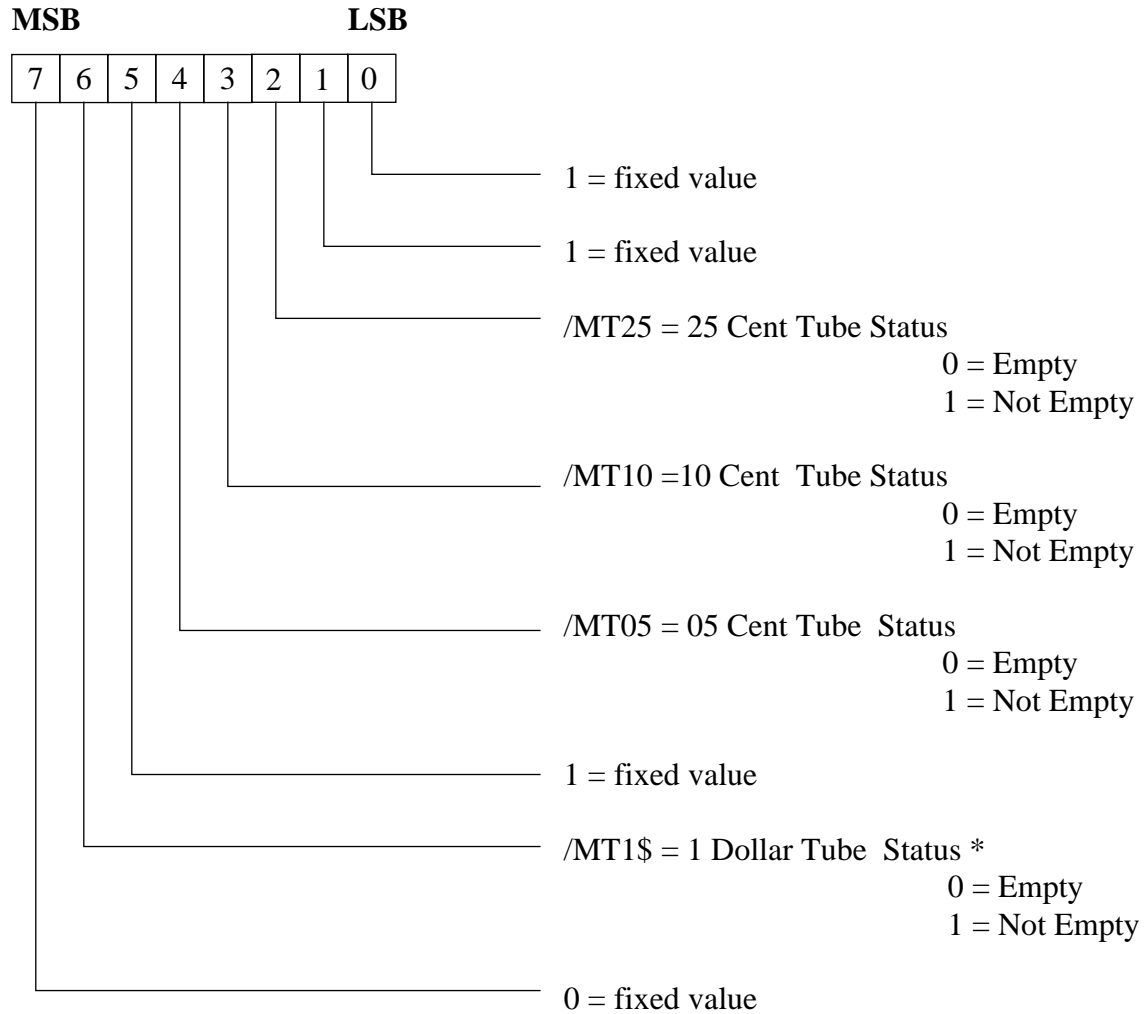


Fig 3.6 Tube Status Message Structure

* new to most VMCs

3.7 Power Up Message

This message is sent on power up.

Table 1: Power Up Message

Message byte (HEX)	Message byte (BIN)	Message description
63	0110 0011	Power up, quarter tube fill = low
73	0111 0011	Power up, quarter tube fill = high

3.8 Escrow Return Status Message

This message is sent when the Escrow Return (ER) is pressed.

Table 2: ER Status Message

Message byte (HEX)	Message byte (BIN)	Message description
6E	0110 1110	Escrow return pressed, quarter tube fill = low
7E	0111 1110	Escrow return pressed, quarter tube fill = high

3.9 Coin Jam Message

This message is sent when a coin is detected as being lodged in the accept gate.

Table 3: Coin Jam Message

Message byte (HEX)	Message byte (BIN)	Message Description
27	0010 0111	coin jam detected, 25 Cent tube fill = low
37	0011 0111	coin jam detected, 25 Cent tube fill = high

3•10 Defective Sensor Message

This message is sent once following power up if the acceptor has sensed a failed coin tube sensor (low or high).

Table 4: Defective Sensor Message

Message byte (HEX)	Message byte (BIN)	Message Description
67	0110 0111	sensor defective, 25 Cent tube fill = low
77	0111 0111	sensor defective, 25 Cent tube fill = high

3•11 No Strobe Message

This message is sent when a valid coin has been recognised but not detected passing through the strobes correctly.

Table 5: No Strobe Message

Message byte (HEX)	Message byte (BIN)	Message Description
6F	0110 1111	coin has not passed strobes, 25 Cent tube fill = low
7F	0111 1111	coin has not passed strobes, 25 Cent tube fill = high

3•12 Slug Message

This message is sent when an invalid coin has been detected and returned to the customer.

Table 6: Slug Message

Message byte (HEX)	Message byte (BIN)	Message Description
6B	0110 1011	slug rejected, 25 Cent tube fill = low
7B	0110 1011	slug rejected, 25 Cent tube fill = high

3•13 Dollar Not Accepted Message

This message is sent when a dollar (\$1) was detected but rejected because of prevailing conditions in the Changer. The dollar will not be accepted if the “dollar acceptance” switch is set to inhibit or the “reject dollar on low quarter” switch is set and the quarter tube is low.

Table 7: Dollar Not Accepted

Message byte (HEX)	Message byte (BIN)	Message Description
03	0000 0011	dollar not accepted, 25 Cent fill = low
13	0001 0011	dollar not accepted, 25 Cent fill = high

3•14 Double Arrival Message

This message is sent when two coins are present in the acceptor in rapid succession. The acceptor is unable to accept either coin due to validation and acceptance limitations.

Table 8: Double Arrival Message

Message Byte (HEX)	Message byte (BIN)	Message Description
23	0010 0011	double arrival detected, 25 Cent fill = low
33	0011 0011	double arrival detected, 25 Cent fill = high

3.15 Transmission Of Coin and Non-Coin Messages

The message is sent using a simple control line handshake.

- changer activates $\overline{\text{INTERRUPT}}$ line to indicate it has a message to send
- host activates $\overline{\text{SEND}}$ line to indicate it is ready to receive
- changer sends message byte (least significant bit first)

The Changer ignores the state of the $\overline{\text{ACCEPT_ENABLE}}$ line while it is communicating to the vending machine.

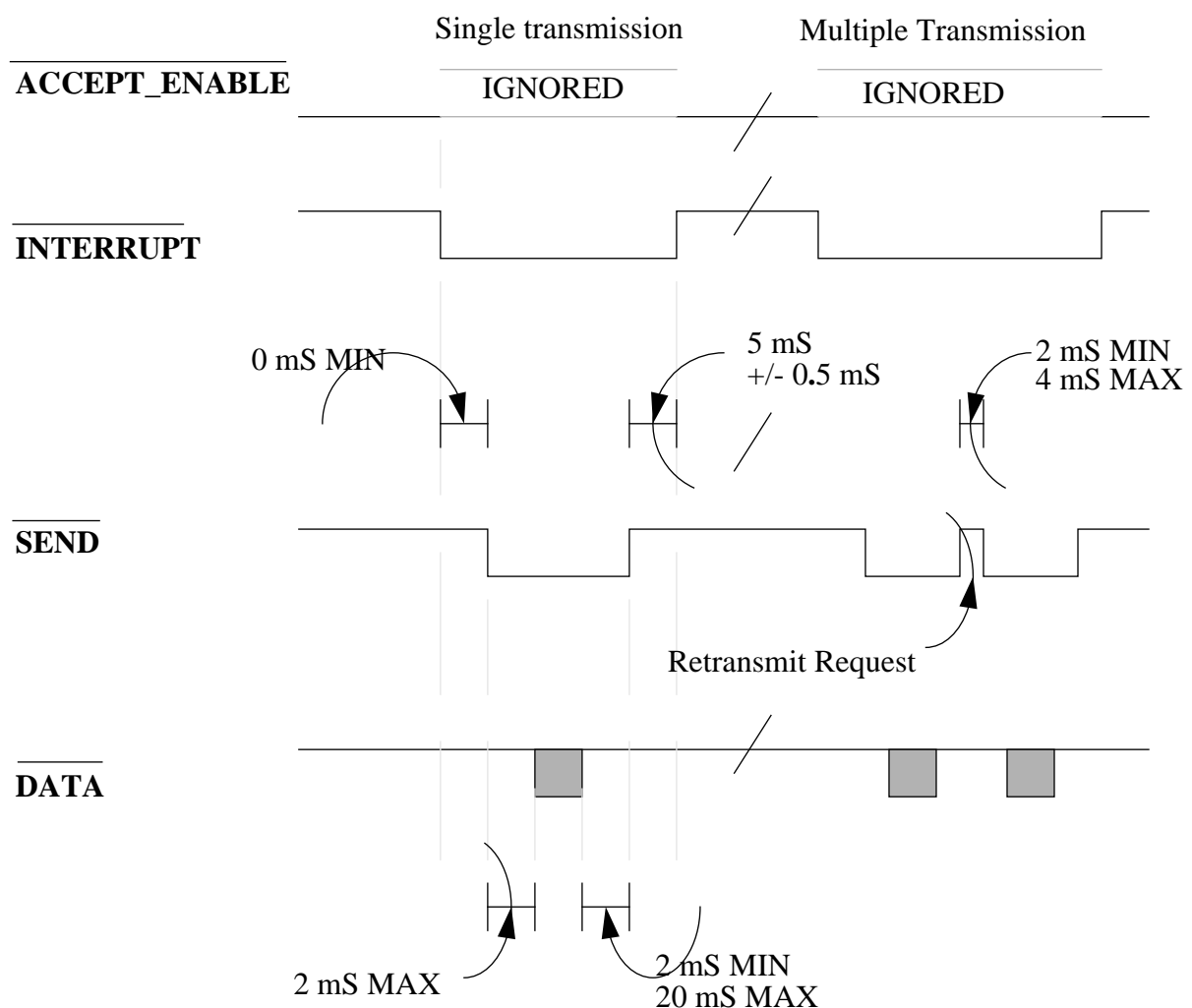
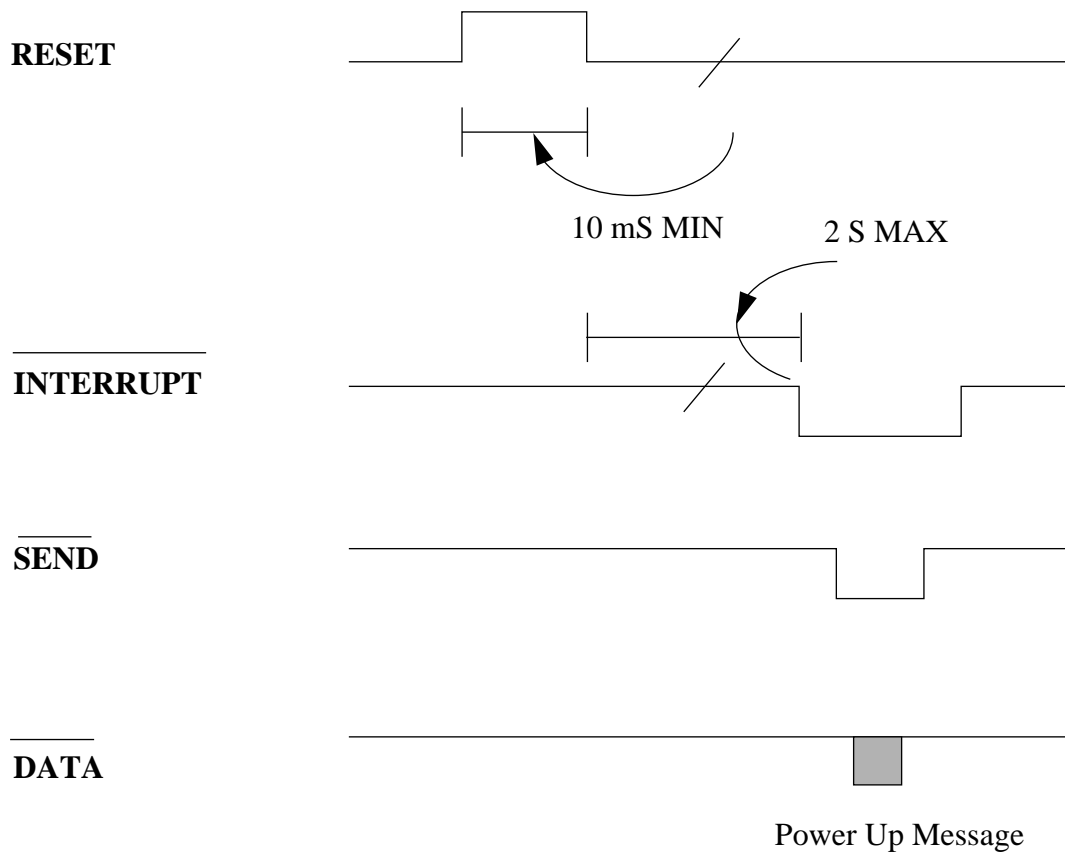


Fig 3.16 *Timing Diagram For Coin And Non-Coin Messages*

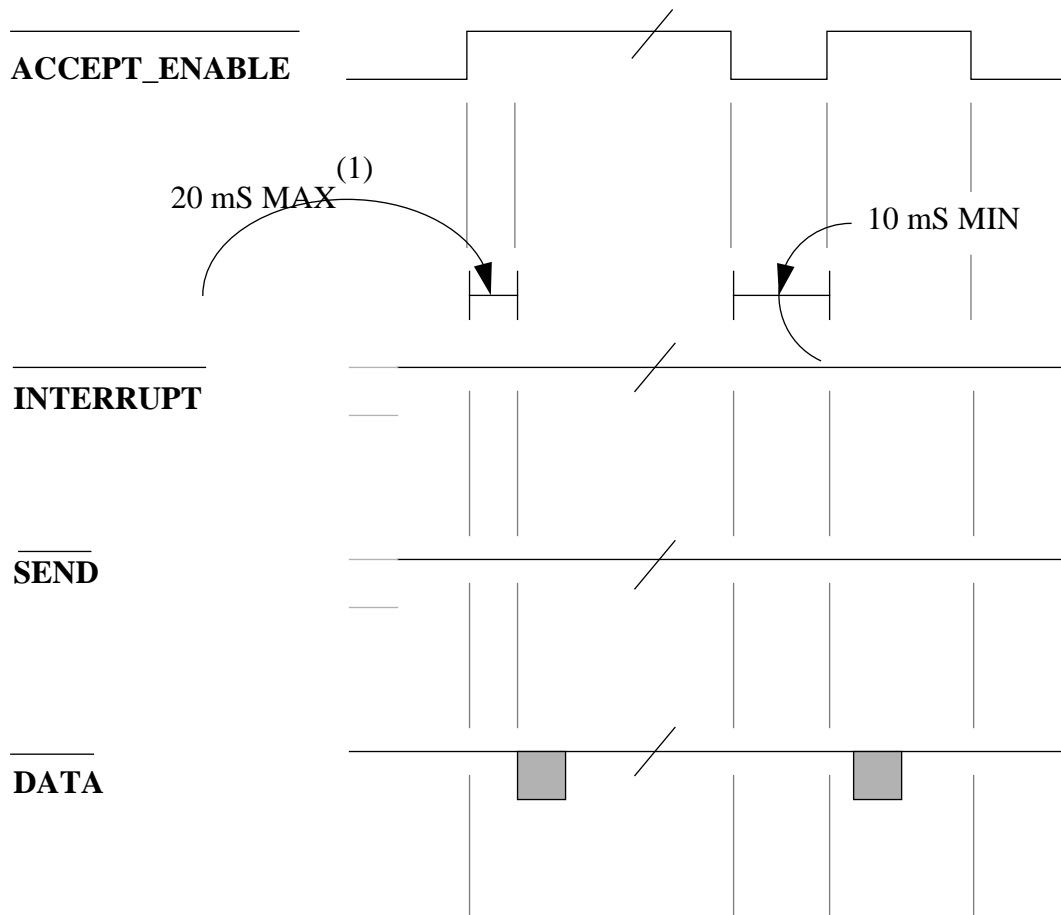
3•17 Transmission of Power Up Message

This transmission is made when the Changer has powered up or been RESET. It must occur within 2 seconds from the falling edge of a RESET signal.



3•18 Transmission Of Tube Status Message

This transmission is a result of disabling acceptance via the ACCEPT_ENABLE line. The rising edge of this signal causes the Changer to “immediately” send a message of this class.



(1) - See recommendations section concerning this timing

Fig 3.19 *Timing Diagram For Tube Status Messages*

4.0 **Dispense Line Timing Details**

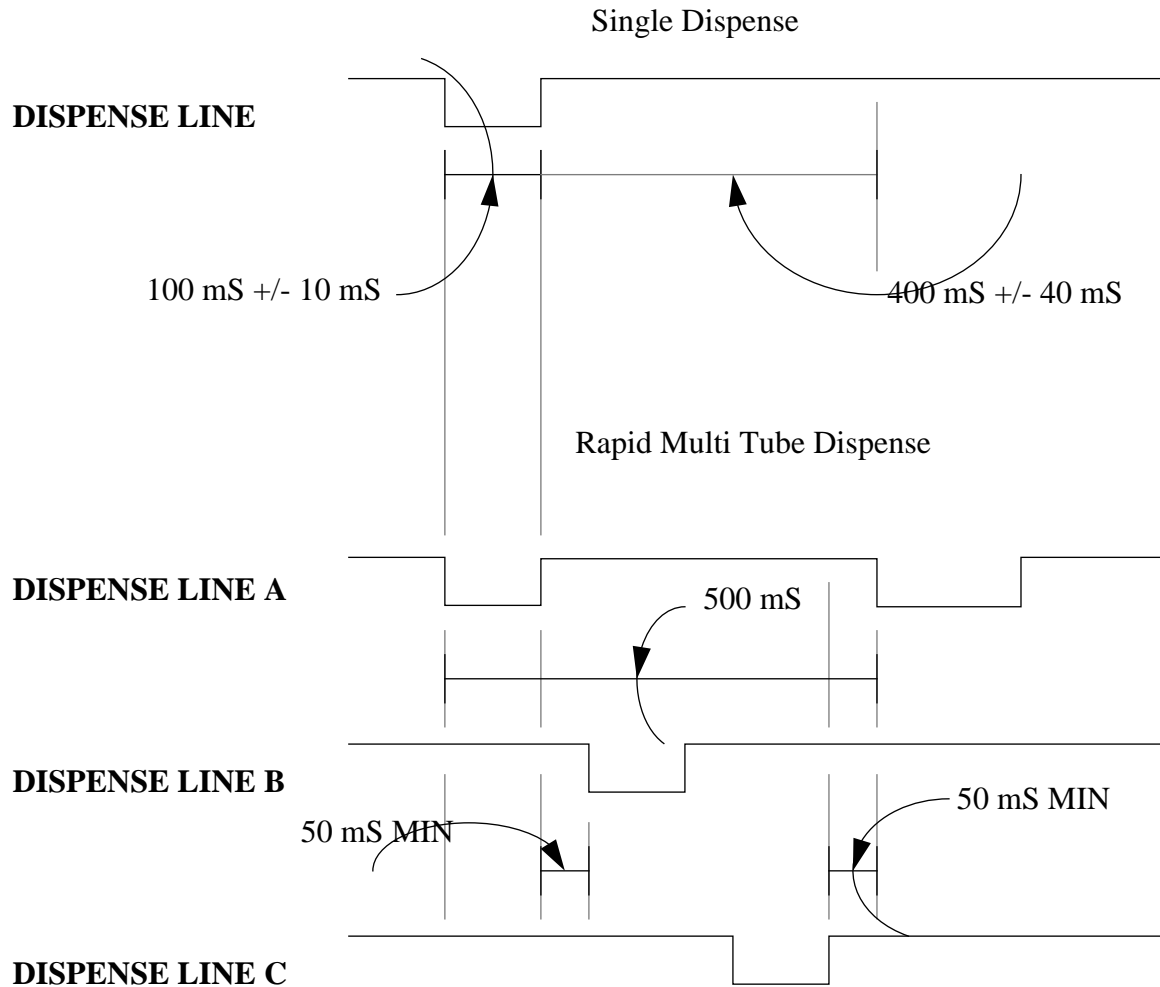


Fig 4.1 *Timing Diagram For Dispense Lines*

5.0 Micromech Recommendations And Assumptions

5.1 Accept Enable Processing

ACCEPT_ENABLE - This is used to inform the Changer that coins shall (or shall not) be evaluated at this time. As such the signal has a long term or persistent attribute with respect to acceptor operations. This signal is assumed to be in a particular state for rather long periods (greater than 1/2 second) of time. This signal is NOT considered “high” priority. Certain operations such as accept gate activation can cannot be immediately stopped by activation of the **ACCEPT_ENABLE** line. This line is ignored during communication handshaking (and coins are not accepted during this operation). It is recommended that a control system understand that the use of the **ACCEPT_ENABLE** must be considered a conditional signal that can fail on occasion. A secondary function of **ACCEPT_ENABLE** is to request a Tube Status Message from the Changer. For the same reasons as above this can sometimes fail.

5.2 Tube Status Request Logic

Tube Status Request logic - This is based on the rising edge of **ACCEPT_ENABLE** (0V to 5V)

- A Tube Status Message that starts in the range of 1 to 20 milliseconds after **ACCEPT_ENABLE** rises is considered a successful operation.
- A Tube Status Message not received within 20 milliseconds by the control system should be considered as a failed operation. The acceptor was too busy with high priority work to service the request.
- The Tube Status Message can be used as an “is the acceptor attached and functional” operation. If used in such a manner it should occur at long intervals so as not to adversely affect the acceptance of coins. A recommended “alive” check should have a period in minutes (e.g. check every 7 minutes). It is strongly recommended that a single Tube Status Message failure should NOT result in a RESET operation. A count of 3 or more successive tries is suggested. This counter should be cleared if ANY messages are received from the acceptor

5.3 Rapid Coin Dispense

Rapid Dispense of Coins - The rapid dispense scheme involves activating the dispense line in sequence with at least a 50 mS gap between deactivation of one dispense line and activation of a different one. The timing diagrams for this are described earlier in this section. This was designed to permit a consistent power loading on the control system when connected to a TRC Changer.

Dispense Line Drive Driver Circuit - Each dispense line shall appear to the control system as a 1K ohm load referenced to 5V. It is strongly recommended that this line employ EMI and RFI shielding to prevent false triggering of the dispense circuits.

5.4 Power Up Sequence

Power Up Sequence - The minimum time for requesting the first Tube Status message is 100 milliseconds from the end of the POWER_UP message (referenced to the rising edge of INTERRUPT).

It is suggested the ACCEPT_ENABLE line be in the inhibit state when the acceptor is powered on (or RESET). Once the POWER_UP message is received and the minimum wait time shown above is satisfied the control system can activate the ACCEPT_ENABLE for a short time and then perform a Tube Status Message Request.

A Appendix A - Product Specific Details

This section lists details about certain changers and VMC's with respect to differences from this generic specification. This may be used as a guide to designing compatible equipment.

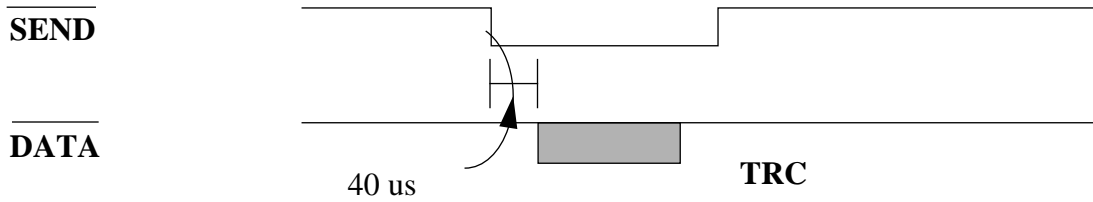
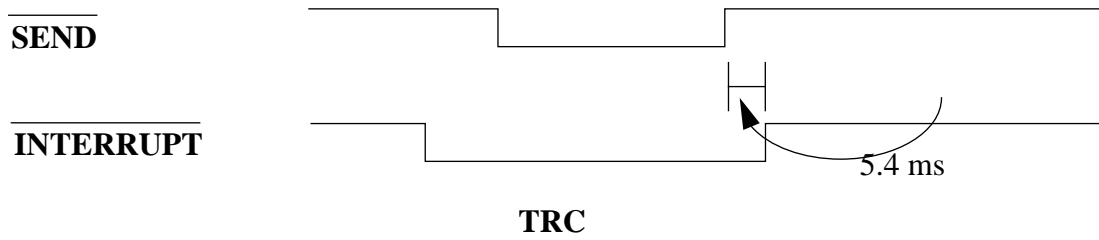
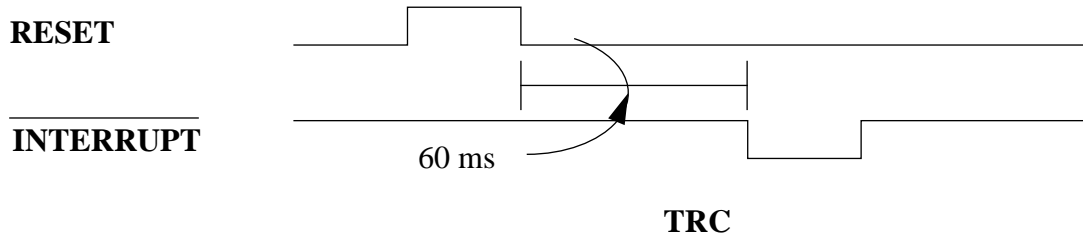
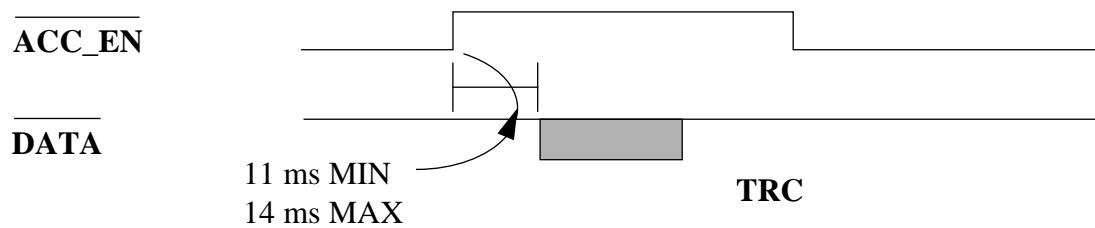
A.1 Changers

A.1.1 TRC 6000

- 117 V interface
- 12 or 15 pin plug variants
- 3 Tubes (5C,10C,25C)
- Dispense lines drive solenoid dispensers directly
- The following messages are supported:
 - valid coin
 - power up
 - defective sensor
 - escrow return
 - slug
 - no strobe
 - double arrival
 - coin jam
 - dollar coin not accepted
 - tube status
- Time from power on to transmission of initial power up message = ??
-

Table A.1 : Number of Coins Required to Cover TRC Sensors

Tube	Number of coins covering TRC high sensor	Number of coins covering TRC low sensor
5C	66	4 to 8
10C	96	6 to 12
25C	64	4 to 8
\$1	n/a	n/a

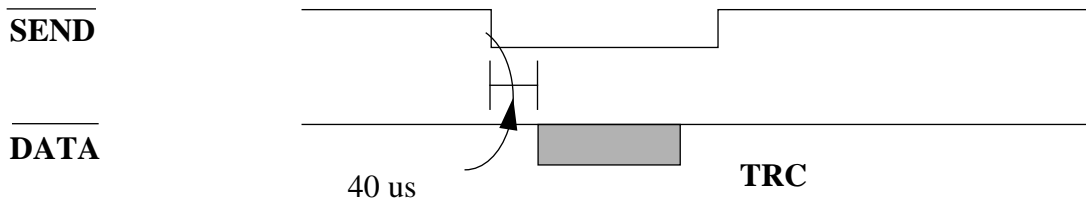
**Fig A.1** TRC6000 Data transmission timing**Fig A.2** TRC6000 SEND to INTERRUPT timing**Fig A.3** TRC6000 response to RESET pulse timing**Fig A.4** TRC6000 tube status request timing

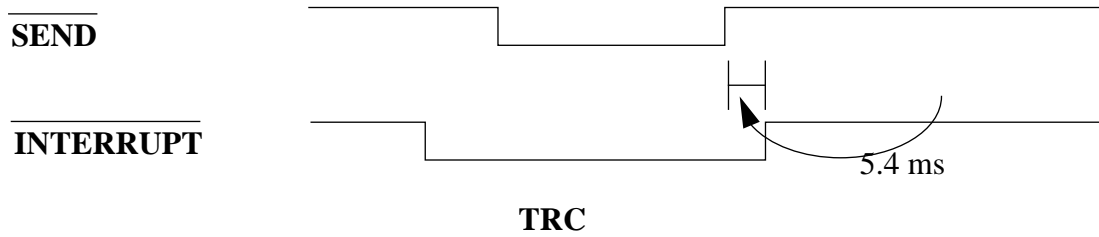
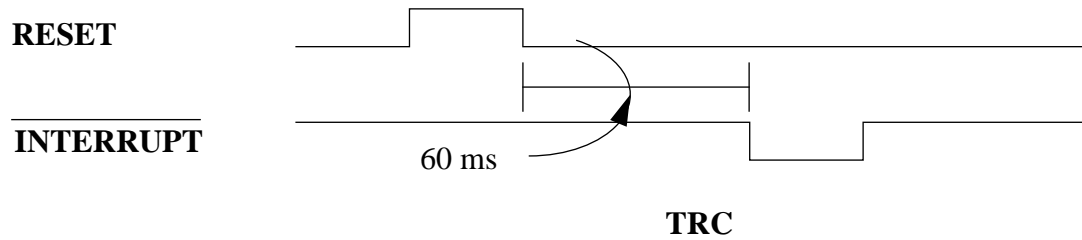
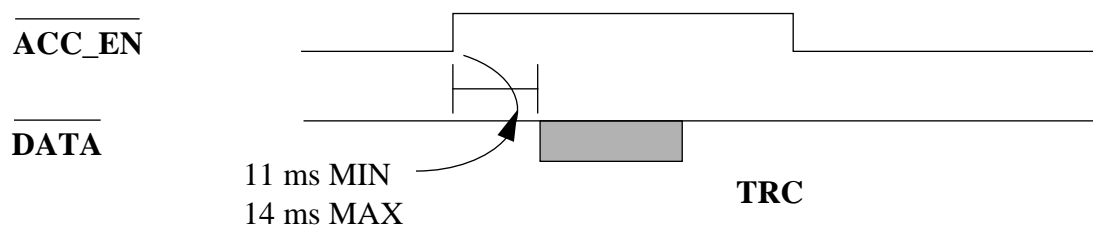
A.1.2 TRC 6010

- 24 V interface
- 12 or 15 pin plug variants
- 3 Tubes (5C,10C,25C)
- Dispense lines drive solenoid dispensers directly
- Time from power on to transmission of initial power up message = ??
- The following messages are supported:
 - valid coin
 - power up
 - defective sensor
 - escrow return
 - slug
 - no strobe
 - double arrival
 - coin jam
 - dollar coin not accepted
 - tube status

Table A.2 : Number of Coins Required to Cover TRC Sensors

Tube	Number of coins covering TRC high sensor	Number of coins covering TRC low sensor
5C	66	4 to 8
10C	96	6 to 12
25C	64	4 to 8
\$1	n/a	n/a

**Fig A.5 TRC6010 Data transmission timing**

**Fig A.6** TRC6010 SEND to INTERRUPT timing**Fig A.7** TRC6010 response to RESET pulse timing**Fig A.8** TRC6010 tube status request timing

A.1.3 TRC6510

- Not currently in production
- 3 Tubes (5C,10C,25C)
- Dispense lines drive solenoid dispensers directly

A.1.4 MS 1400 KLIX Dumb Mech

- The following messages are supported:
 - valid coin,
 - escrow return,
 - power up,
 - slug,
 - no strobe,
 - defective sensor,
 - tube status

A.1.5 Cashflow 500,510 (Spartan)

- 24 and 117V variants
- 12 and 15 pin variants
- 3 or 4 tubes (including \$ tube)
- Dispense lines are monitored by microprocessor which control motor driven dispensers
- Dispense pulse lengths must be in the range XX ms to XX ms, and only one line can be active at a time (attempt to distinguish water/salt fraud on the dispense lines)
- Time from power on to transmission of initial power up message = ??
- The following messages are supported :
 - valid coin
 - escrow return
 - power up
 - tube status
- Tube low sensor covered/uncovered is determined by tube counts rather than state of actual sensor. When there are 6 coins in the tube (4 available for change as it is undesirable to dispense the last 2) the sensor is reported as covered.
- A RESET signal will not cause a hardware reset on Spartan as it does on TRC. Spartan will simply send a Power Up message
- Rapid dispense of coins - The Cashflow 510,520 Changer will accept a dispense input signal of this format however it will dispense asynchronously to this input due to design limitations of the dispenser. The Cashflow 510,520 Changer can dispense from two tubes at once (A,C or B,D) It is suggested that a revised tube status be obtained at the end of each dispense “group” to avoid the possibility of dispensing from an empty tube, however **it is not guaranteed the Cashflow 510,520 Changer will respond with a correct indication** of tube status due to the vagueness in the specification as to when this request for tube status can be made after a “group” dispense.
-

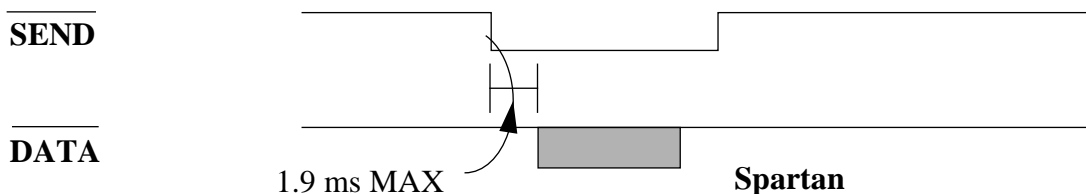
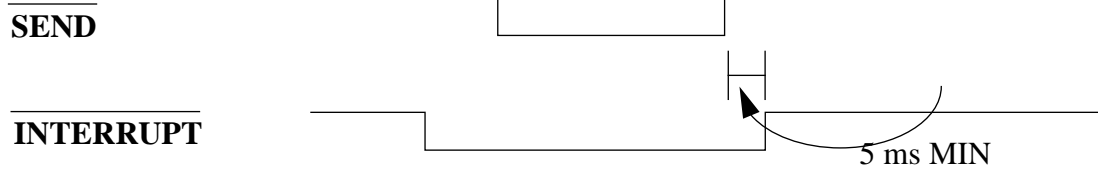
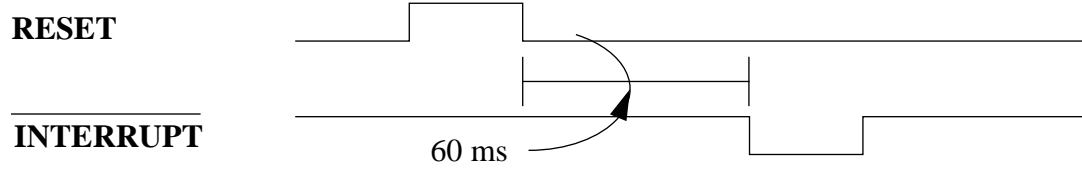
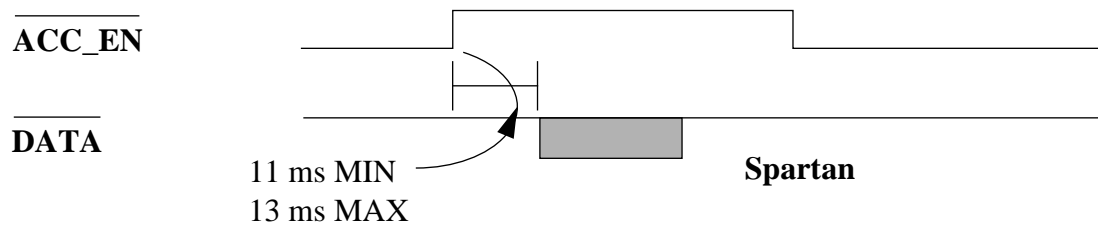


Fig A.9 *Spartan data transmission timing*

**Spartan****Fig A.10** *Spartan release of SEND timing***Spartan****Fig A.11** *Spartan response to RESET pulse timing***Fig A.12** *Spartan tube status request*

A.1.6 Coinco 9300L (110V)

- 3 tube (5C,10C,25C)
- 110V (9302 = 24V variant 15 pin plug)
- 12 pin plug

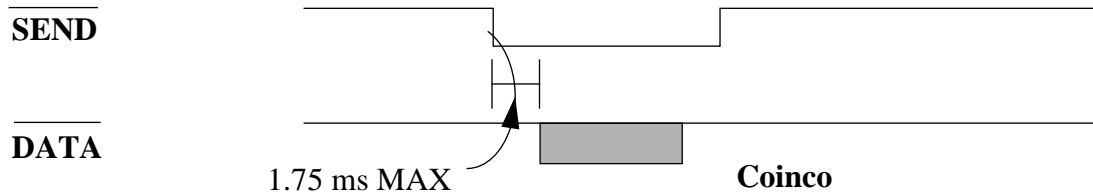


Fig A.13 COINCO Data transmission timing

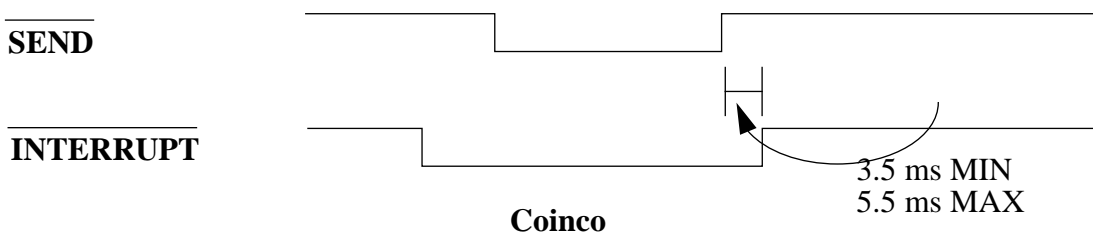


Fig A.14 COINCO Release of INTERRUPT timing

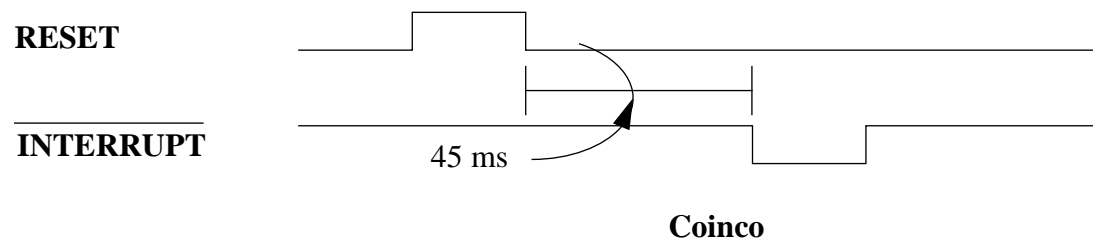


Fig A.15 COINCO Response to RESET pulse timing

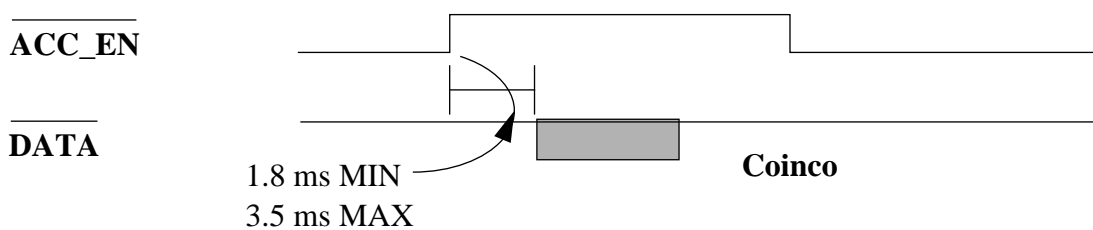


Fig A.16 COINCO Tube status request

A•2 Vending Machines/Control Boards

A.2.1 MEI MCB430 (Vendo VEC5.1)

- Control board for VENDO Univendor made by MEI
- Time from receiving power up message to requesting tube status message = 262 ms
- Tube counts are recalibrated to 4 when the low sensor is reported as becoming covered
- Tube counts are recalibrated to the following values when coins are routed to box when the tubes are full
 - 5C 66 coins
 - 10C 96 coins
 - 25C 64 coins
 - 1\$ 40 coins

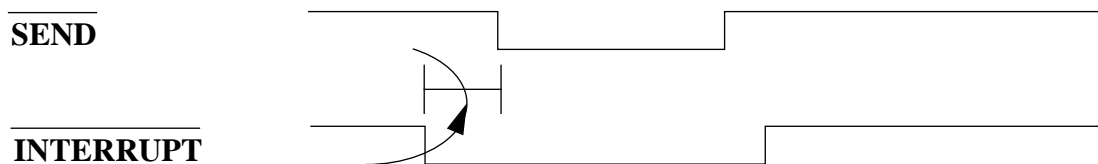


Fig A.17 MEI VEC 5.1 activation of SEND timing

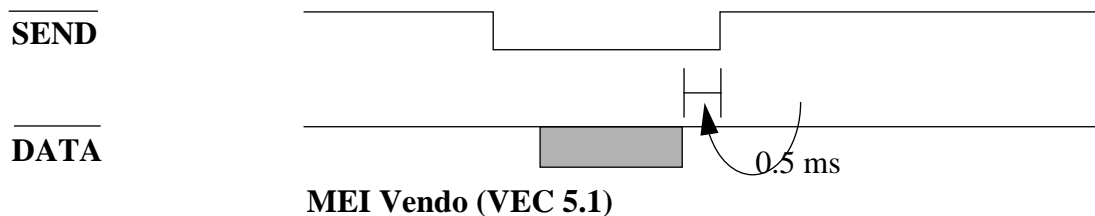


Fig A.18 MEI VEC 5.1 deactivation of SEND timing

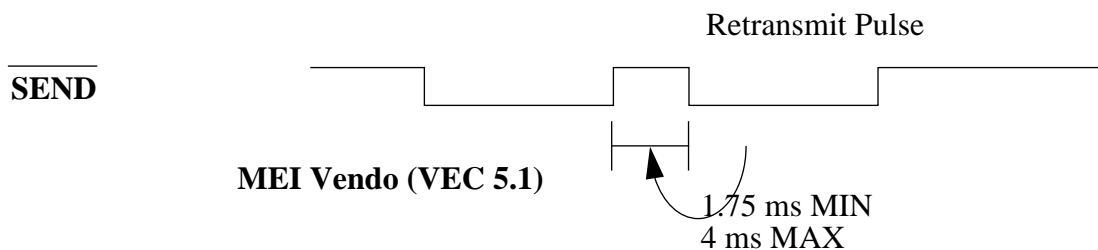
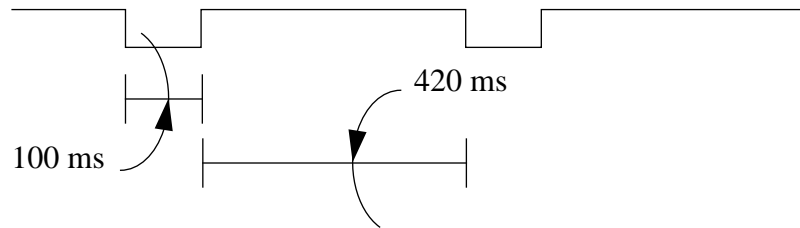
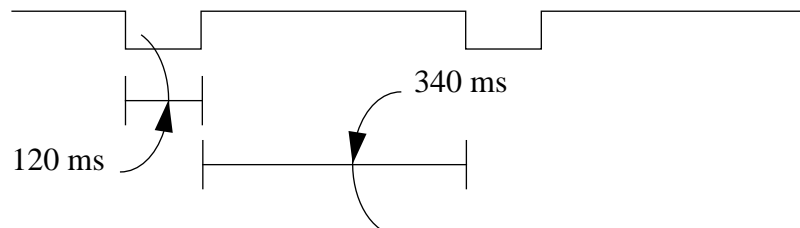
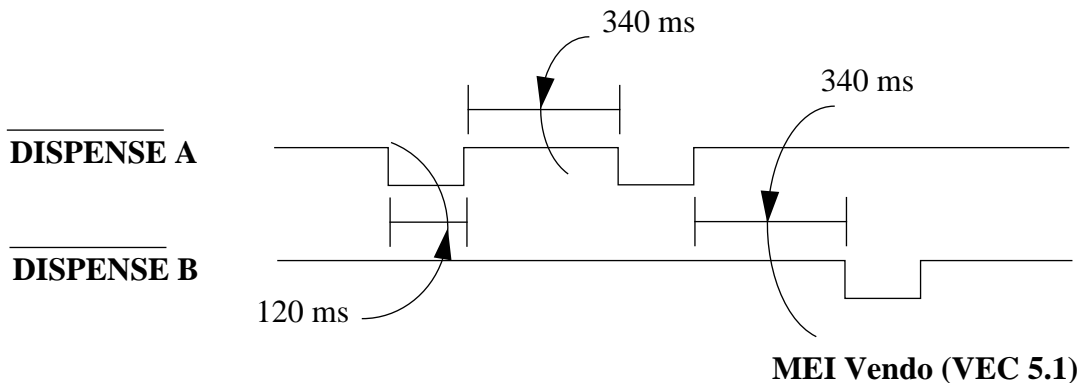
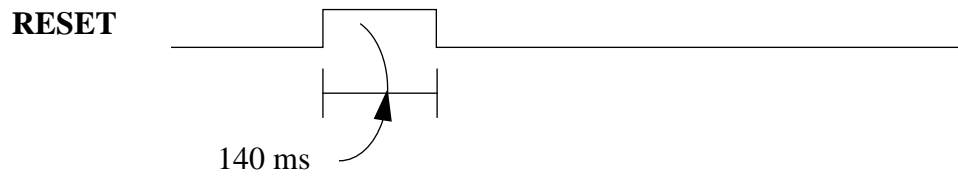


Fig A.19 MEI VEC 5.1 retransmission timing

DISPENSE**MEI Vendo (VEC 5.1)****Fig A.20** *MEI VEC 5.1 manual coin invent dispense timing***DISPENSE****MEI Vendo (VEC 5.1) - Majority of dispenses****DISPENSE****MEI Vendo (VEC 5.1) - Dispense while vending****Fig A.21** *MEI VEC 5.1 ER/Change return of one coin type dispense timing***Fig A.22** *MEI VEC 5.1 Change return of different coin type dispense timing*

**MEI Vendo (VEC 5.1)****Fig A.23** *MEI VEC 5.1 RESET pulse timing*

RESET pulse generated when door closed

A.2.2 Versatile (VEC 6.1)

Control board for VENDO univendor made by Versatile.

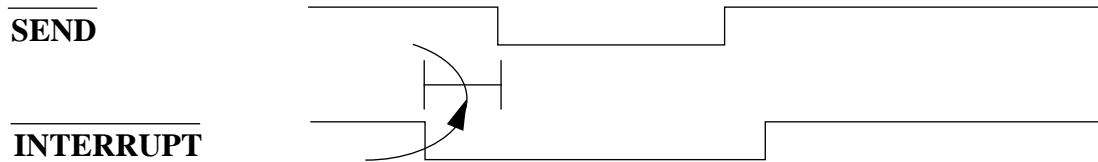


Fig A.24 Versatile VEC 6.1 activation of *SEND* timing

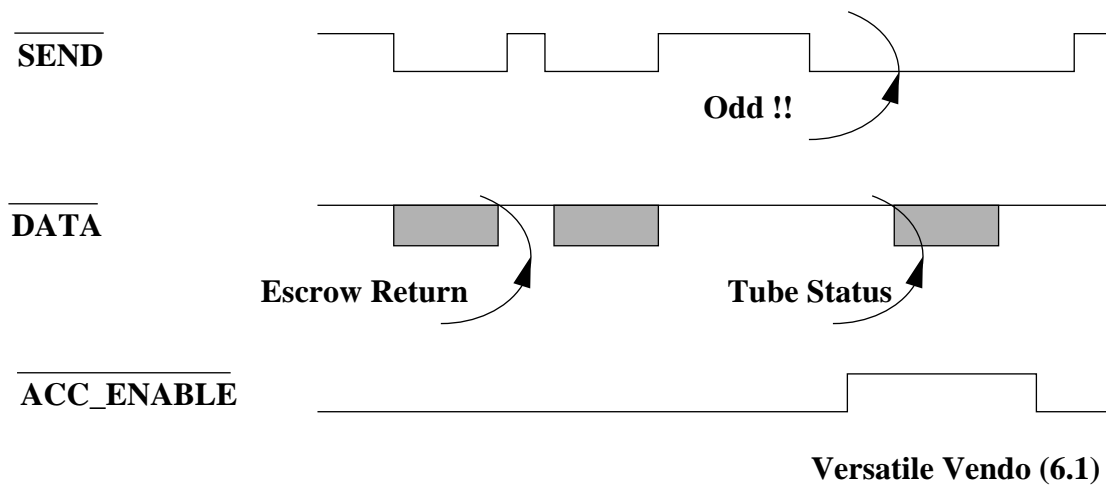


Fig A.25 Versatile VEC 6.1 activation of *SEND* during tube request timing

The Versatile Vendo VMC (VEC 6.1) activates SEND when it is requesting the tube status during dispensing following a vend or ER. This is outside of the specification and unnecessary

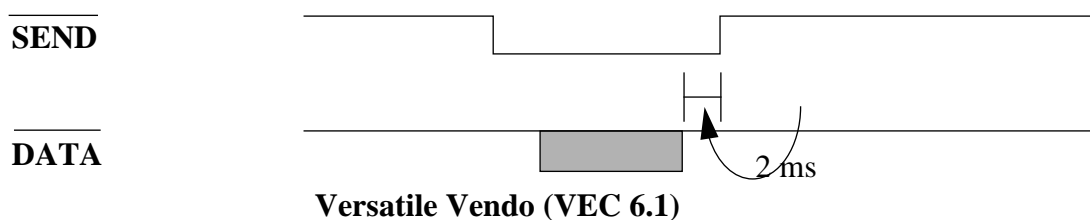
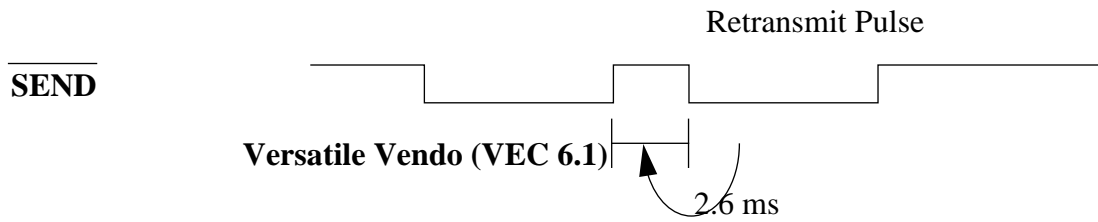
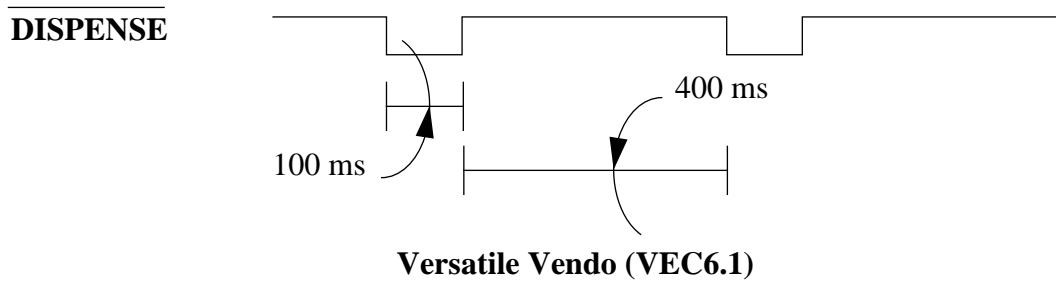
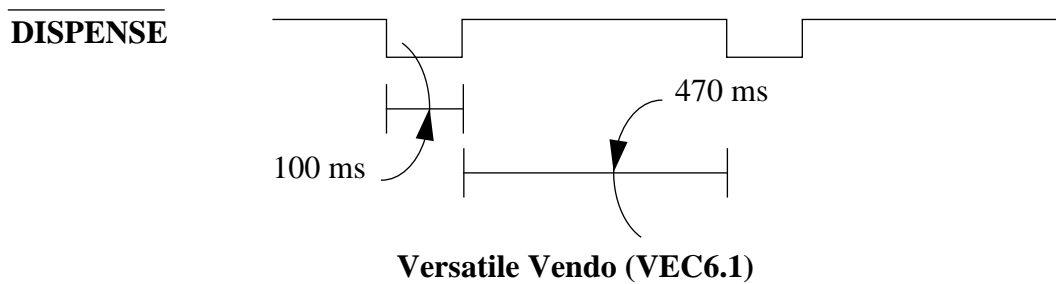
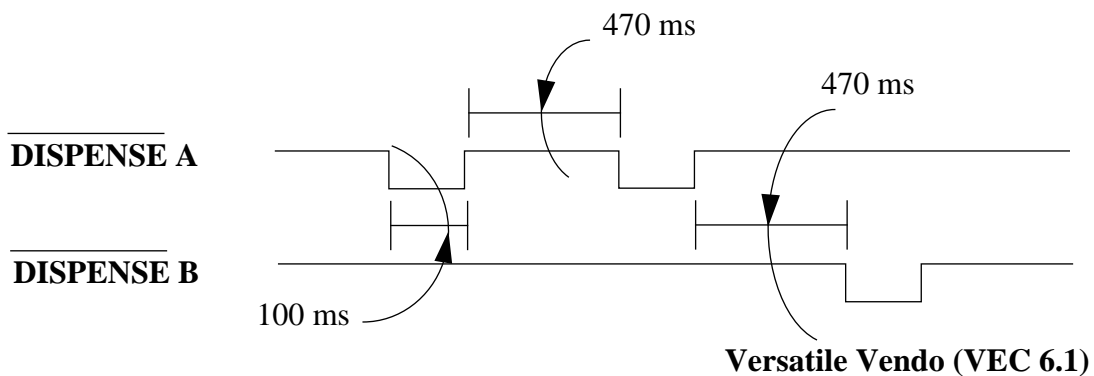


Fig A.26 Versatile VEC 6.1 deactivation of *SEND* timing

**Fig A.27** Versatile VEC 6.1 retransmission timing**Fig A.28** Versatile VEC 6.1 manual dispense of one coin type dispense timing**Fig A.29** Versatile VEC 6.1 ER/Change return of one coin type dispense timing**Fig A.30** Versatile VEC 6.1 ER/Change return of different coin type dispense timing

A.2.3 MEI MCB110 (AP 110 Snack Machine)

- Time from receiving power up message to requesting tube status = 262 ms
- Tube counts are recalibrated to 4 when the low sensor is reported as becoming covered
- Tube counts are recalibrated to the following values when coins are routed to box when the tubes are full
 - 5C 66 coins
 - 10C 96 coins
 - 25C 64 coins
 - 1\$ 40 coins
- No RESET pulse is generated when the door is opened or closed
- No AE (tube status request) pulse is generated when the door is opened or closed
- AE pulse when SERVICE mode entered via MODE switch
- RESET pulse sent after 11 minutes of no activity

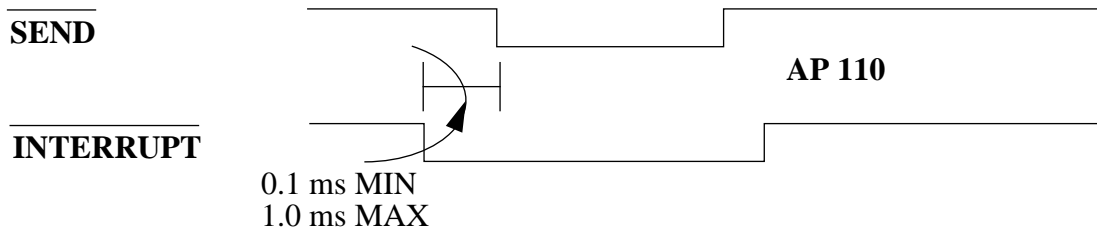


Fig A.31 AP 110 activation of SEND timing

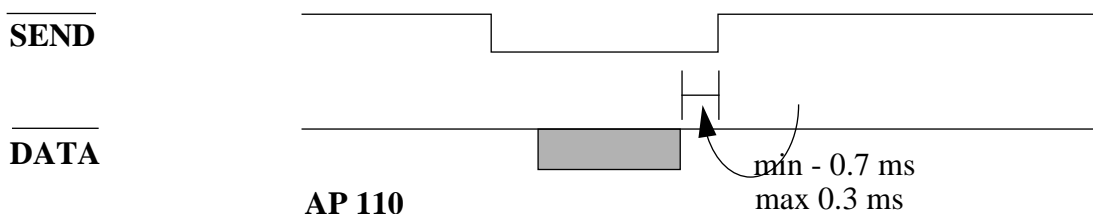


Fig A.32 AP 110 deactivation of SEND

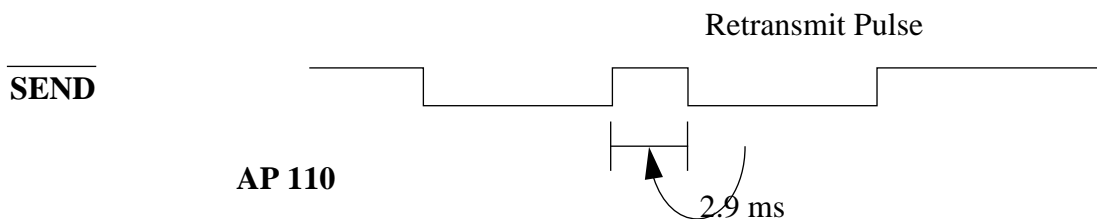
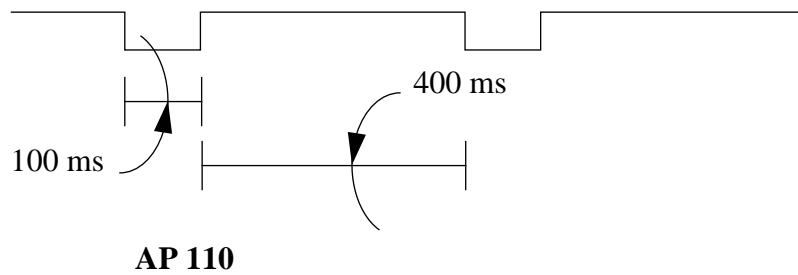
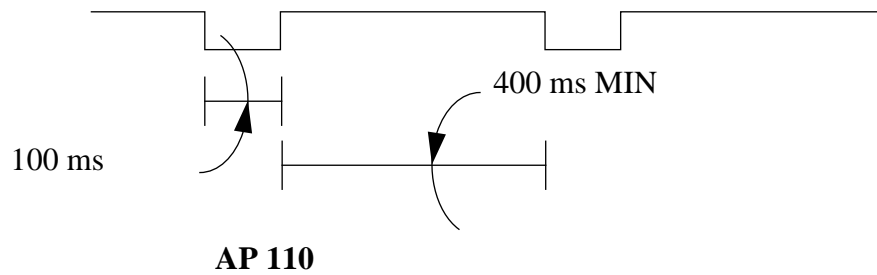
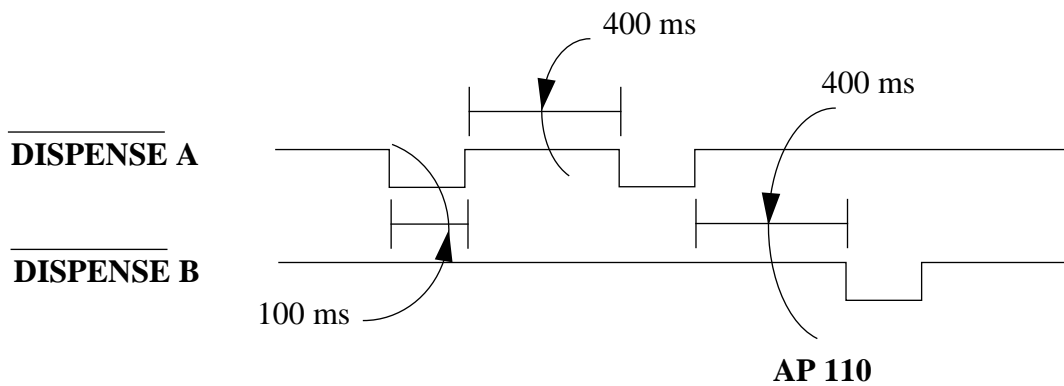


Fig A.33 AP 110 retransmission timing

DISPENSE**Fig A.34** *AP 110 manual dispense of one coin type dispense timing***DISPENSE****Fig A.35** *AP 110 ER/Change return of one coin type dispense timing***Fig A.36** *AP 110 ER/Change return of different coin types dispense timing*

A.2.4 Dixie SII

- Known bugs - vmc copes with \$ coin and payout of \$ coin, but if a \$ coin is routed to tube, the escrow return pressed, no coins are paid back. If the coin is routed to cashbox and escrow return pressed then coins are paid out.

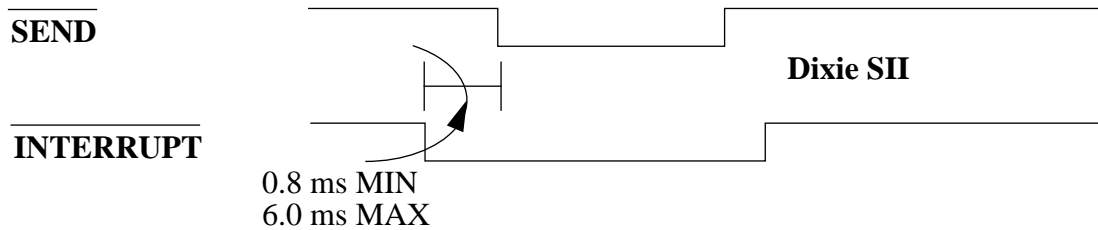


Fig A.37 DIXIE SII activation of SEND timing

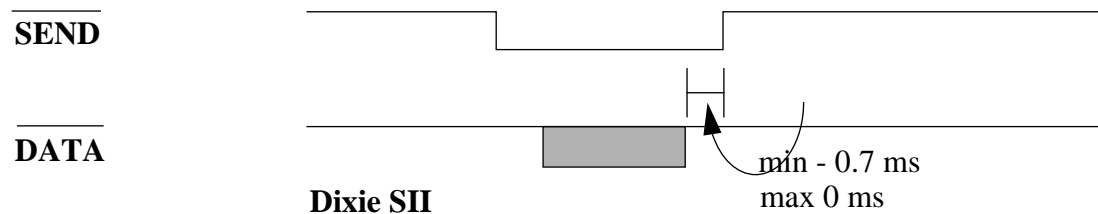


Fig A.38 DIXIE SII deactivation of SEND timing

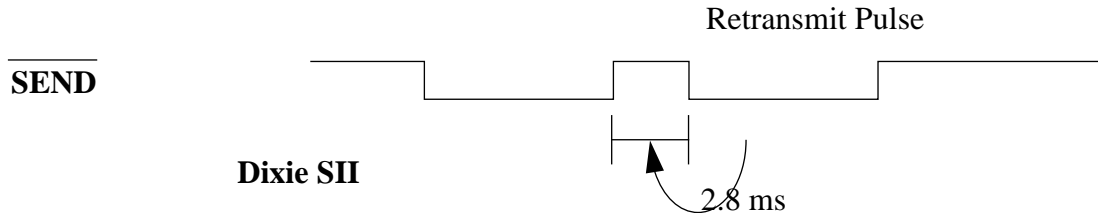


Fig A.39 DIXIE SII retransmission timing

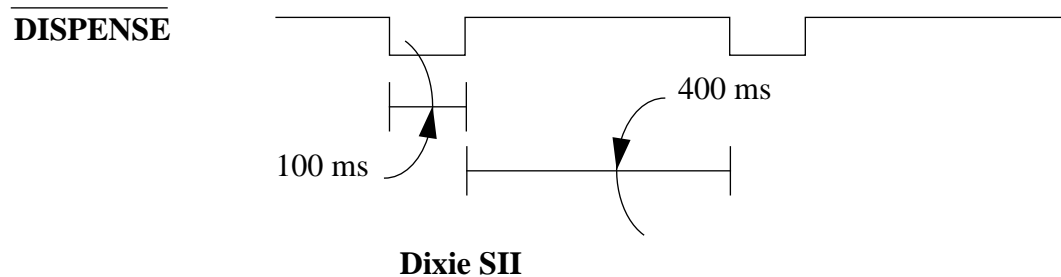


Fig A.40 DIXIE SII manual invent of one coin type dispense timing

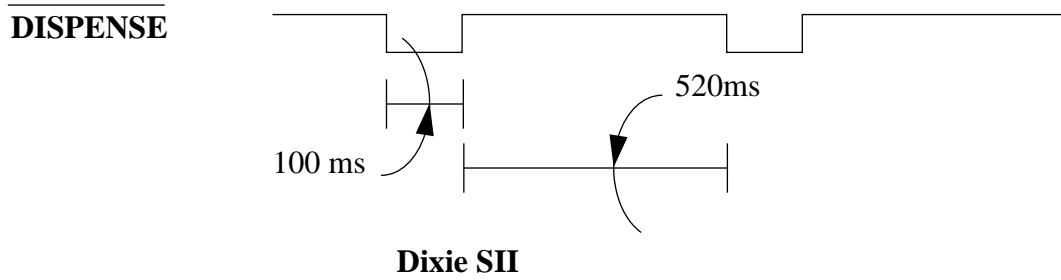


Fig A.41 *DIXIE SII ER/Change return of one coin type dispense timing*

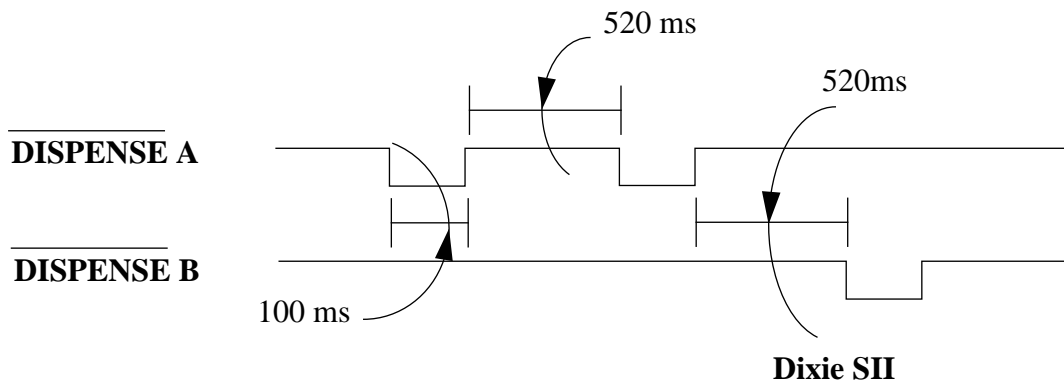
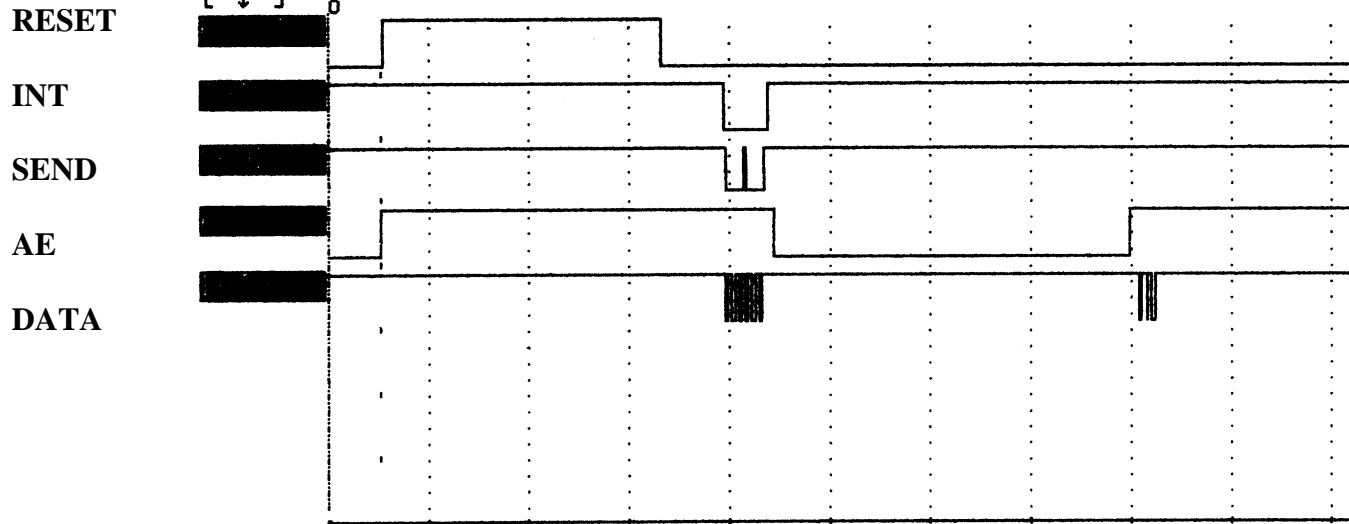


Fig A.42 *DIXIE SII ER/Change return of different coin types dispense timing*

Timing Waveform Diagram

Sample Period
Magnification
Magnify About
Cursor Moves
[↓] ×
0

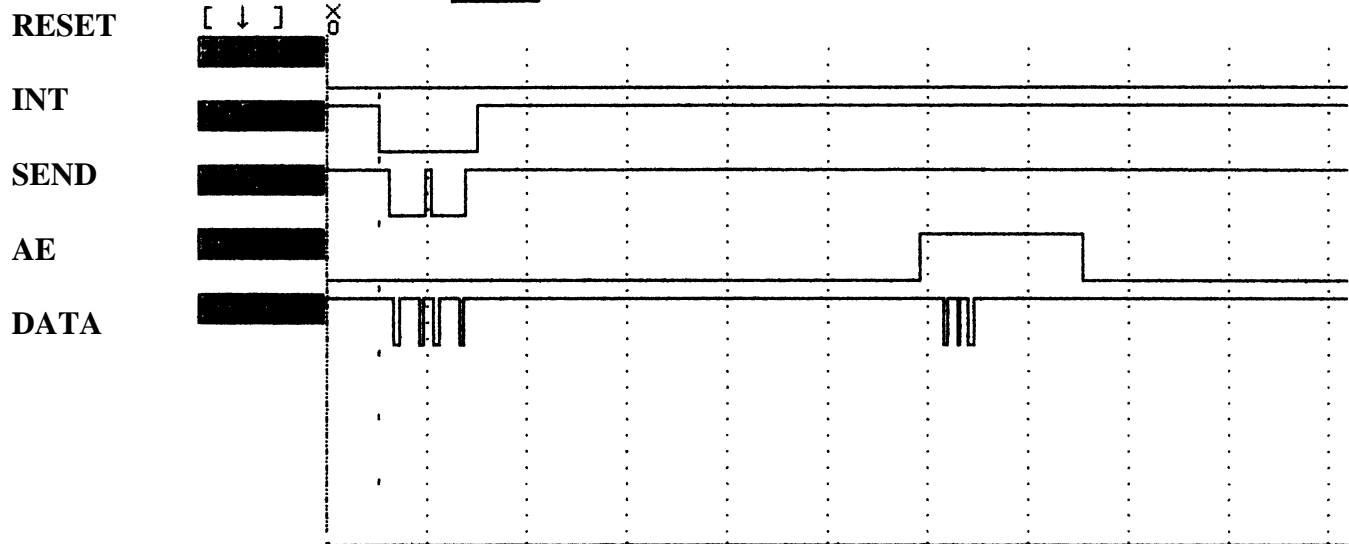
100.0 ms/div
1.000 ms/sample
0.0 μs 0 to x

**Fig A.43** DIXIE SII - Response to closing the door (with Spartan)

Timing Waveform Diagram

Sample Period
Magnification
Magnify About
Cursor Moves
[↓] ×
0

50.00 ms/div
500.0 μs/sample
0.0 μs 0 to x

**Fig A.44** DIXIE SII - ER press (with Spartan)

Timing Waveform Diagram

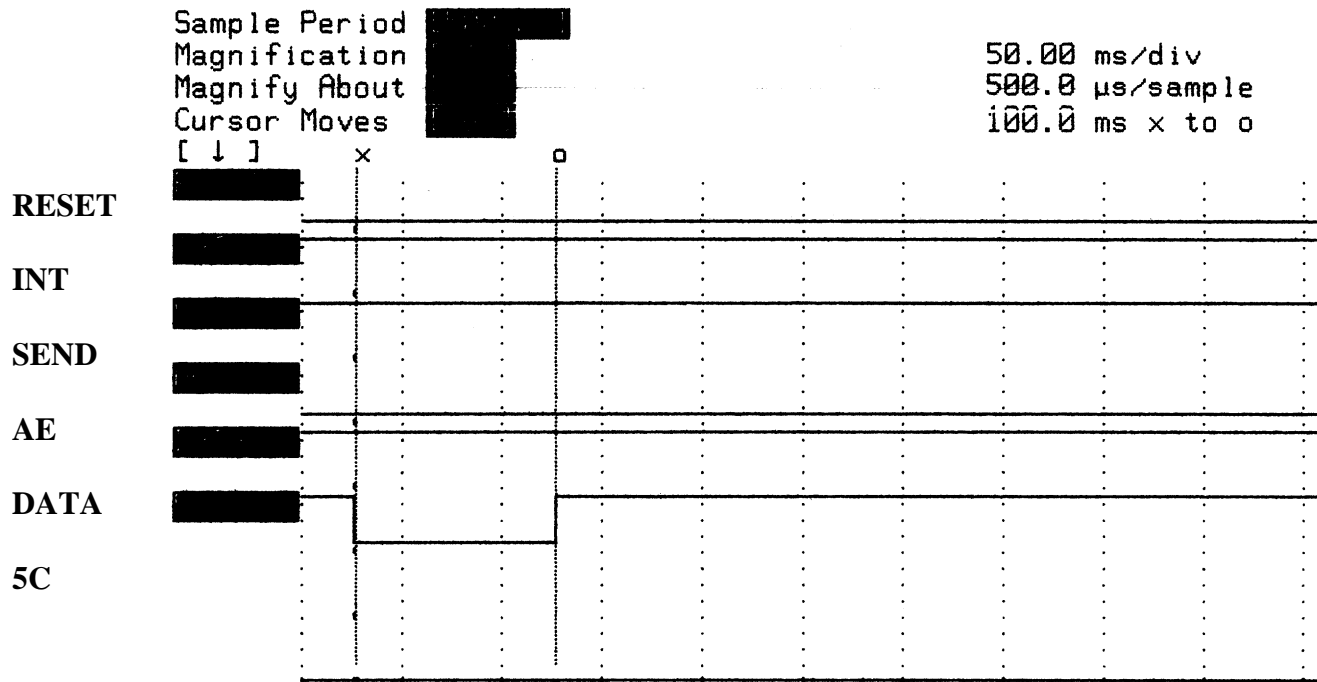


Fig A.45 DIXIE SII - manual invent of 5C (with Spartan)

Timing Waveform Diagram

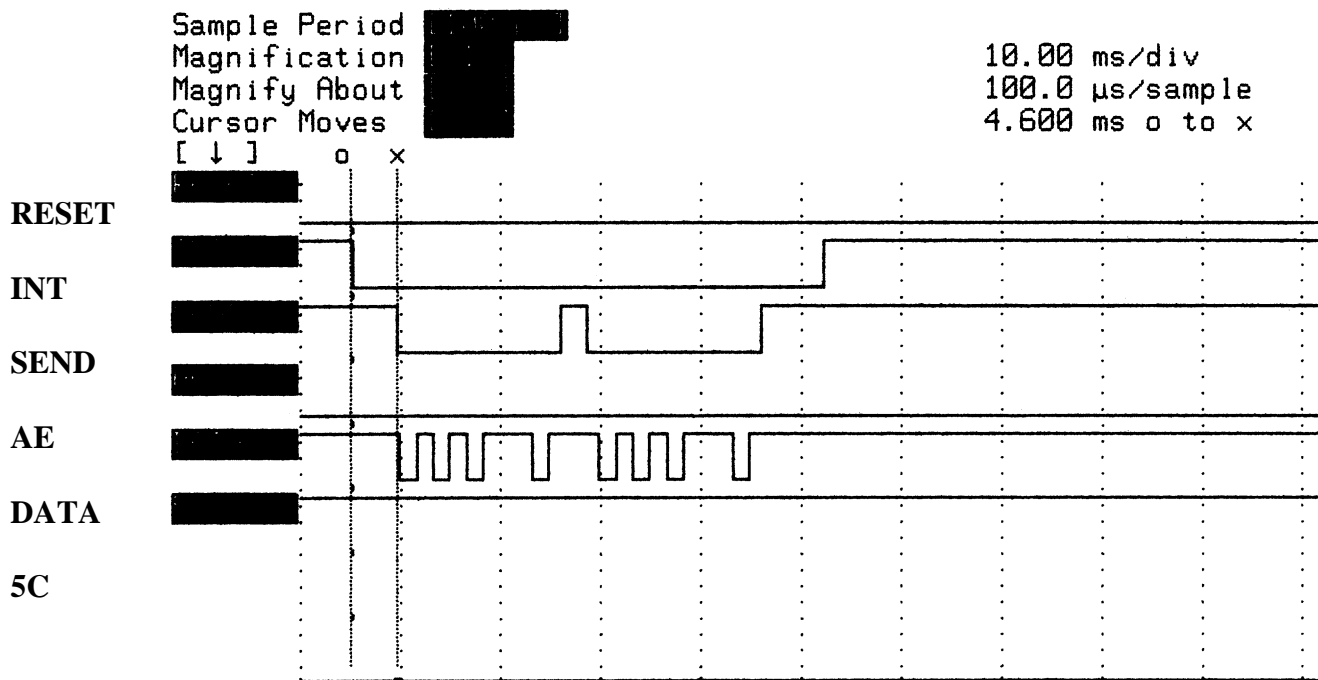


Fig A.46 DIXIE SII - Coin Acceptance (with Spartan)

Timing Waveform Diagram

Sample Period
Magnification
Magnify About
Cursor Moves
[↓]

100.0 ms/div
1.000 ms/sample
600.0 ms x to 0

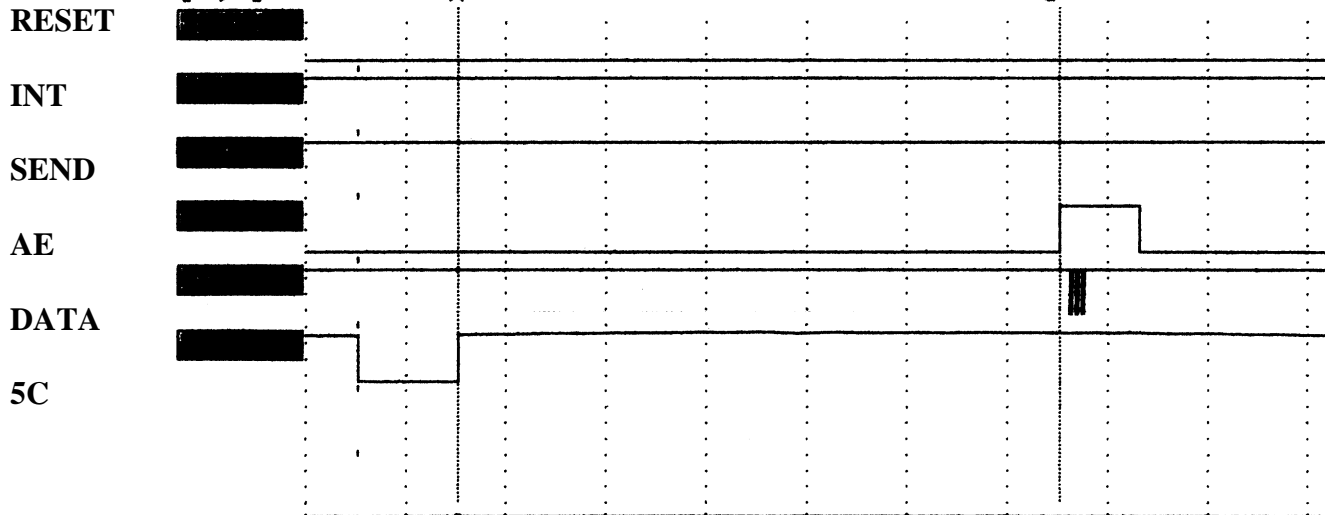


Fig A.47 DIXIE SII - Change return of 5C (with Spartan)

Timing Waveform Diagram

Sample Period
Magnification
Magnify About
Cursor Moves
[↓]

200.0 ms/div
2.000 ms/sample
500.0 ms x to 0

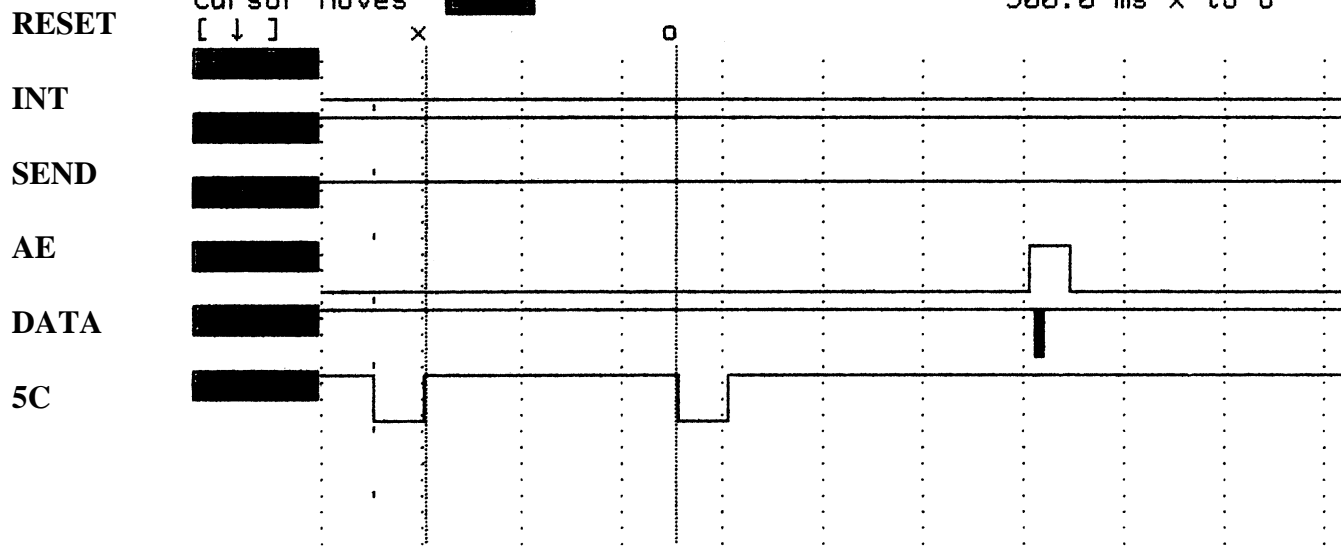


Fig A.48 DIXIE SII - change return of 2x5C (with Spartan)

Timing Waveform Diagram

Sample Period
Magnification
Magnify About
Cursor Moves
[↓]

100.0 ms/div
1.000 ms/sample
60.00 ms x to o

RESET

INT

SEND

AE

DATA

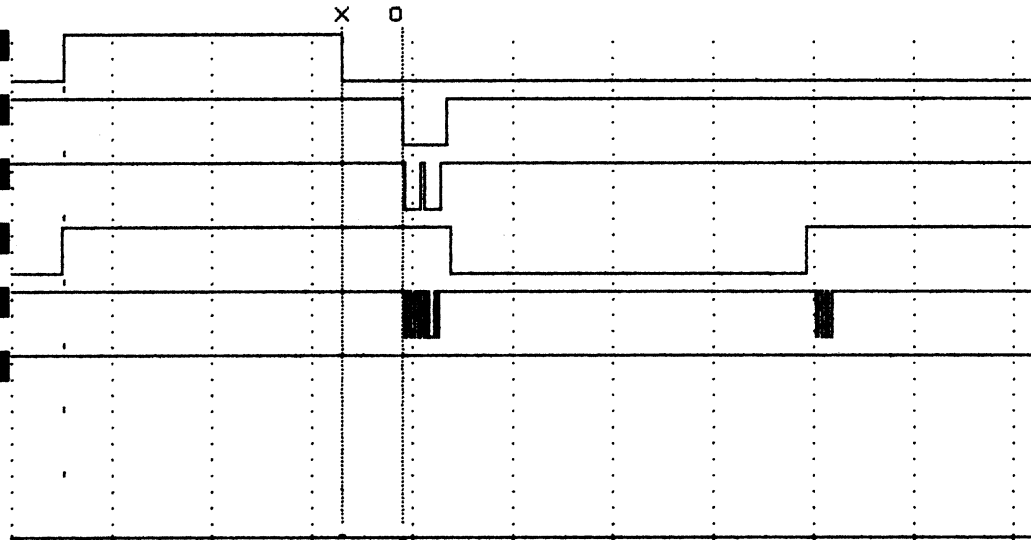


Fig A.49 DIXIE SII response to door close (TRC6010)

Timing Waveform Diagram

Sample Period
Magnification
Magnify About
Cursor Moves
[↓]

50.00 ms/div
500.0 μ s/sample
2.500 ms o to x

RESET

INT

SEND

AE

DATA

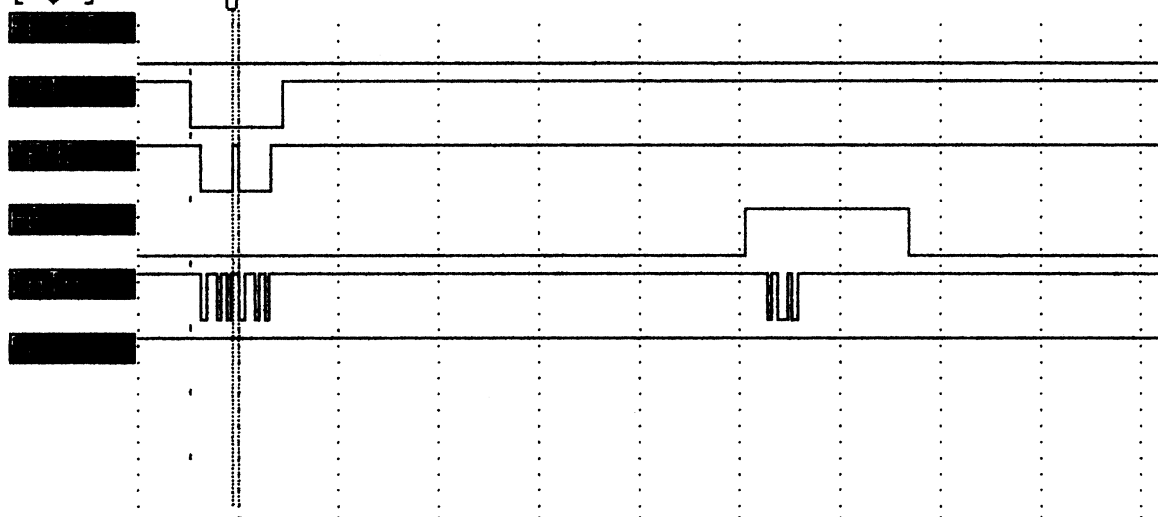


Fig A.50 DIXIE SII - response to ER press (TRC6010)

Timing Waveform Diagram

Sample Period
Magnification
Magnify About
Cursor Moves

10.00 ms/div
100.0 μ s/sample
12.70 ms x to 0

RESET

INT

SEND

AE

DATA

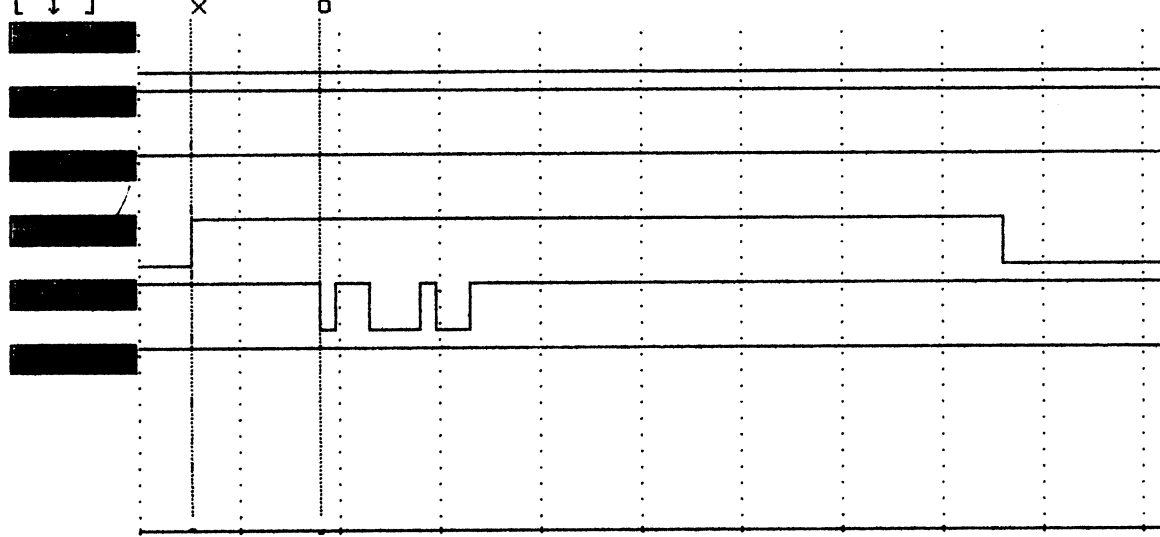


Fig A.51 DIXIE SII - zoom in on tube status request (with TRC6010)

A.2.5 MCB500 (Mars Confectionary)

- Time from receiving power up message to requesting tube status = 260 ms
- Tube counts are recalibrated to 4 when the low sensor is reported as becoming covered
- Tube counts are recalibrated to the following values when coins are routed to box when the tubes are full
 - 5C 66 coins
 - 10C 96 coins
 - 25C 64 coins
 - 1\$ 40 coins

A.2.6 AP217 Coffee Machine Mars MCB300 Controller

- MEI Part number 07-08-230
- Software 00-31
- 5C,10C,25C dispense lines (no \$ line)
- 24V micromech changer support only
- Coin for coin escrow return
- Time from power up message received to tube status request sent = 205 ms
- No reset pulse generated when MODE pressed to enter or exit service mode
- Reset line is pulsed periodically (every ...)

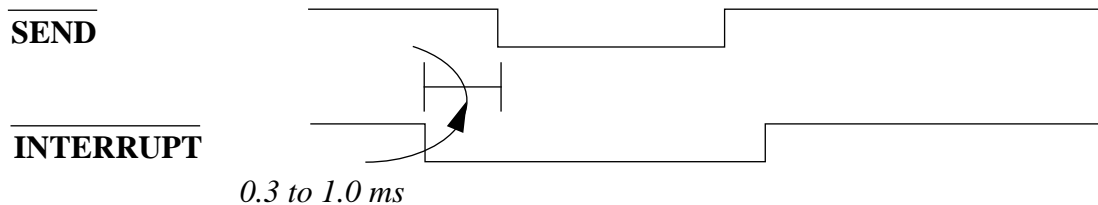


Fig A.52 AP217 activation of SEND timing

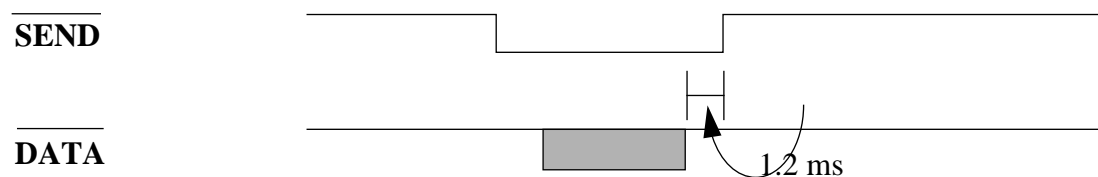


Fig A.53 AP217 deactivation of SEND timing

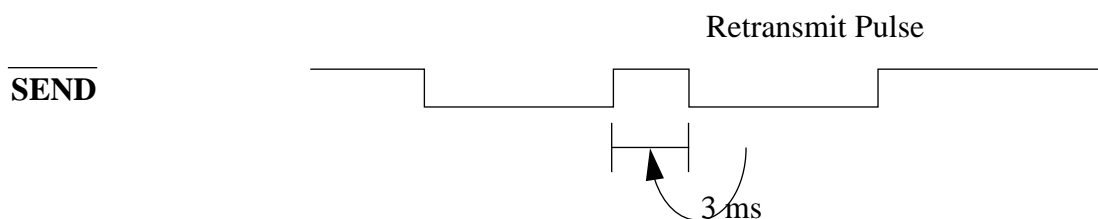


Fig A.54 AP217 retransission timing

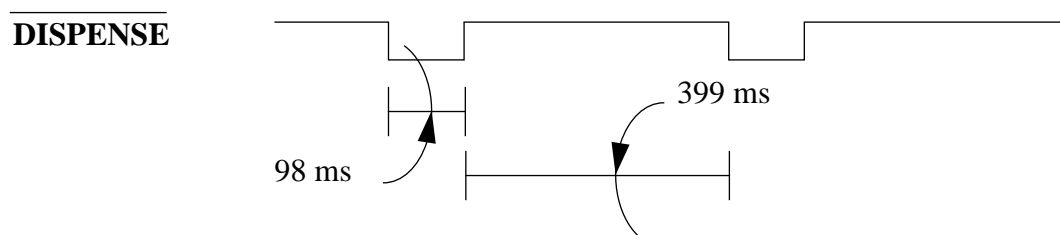


Fig A.55 AP217 manual coin invent dispense

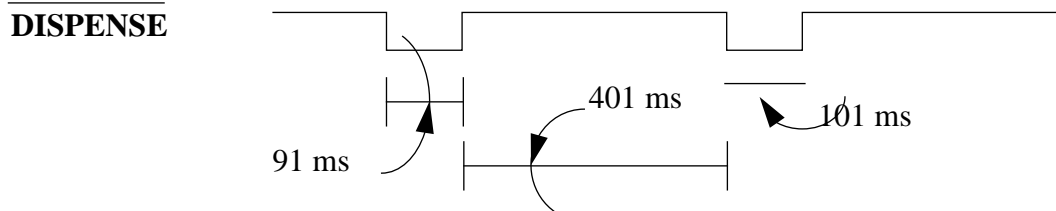


Fig A.56 AP217 ER/Change return of one coin type dispense timing

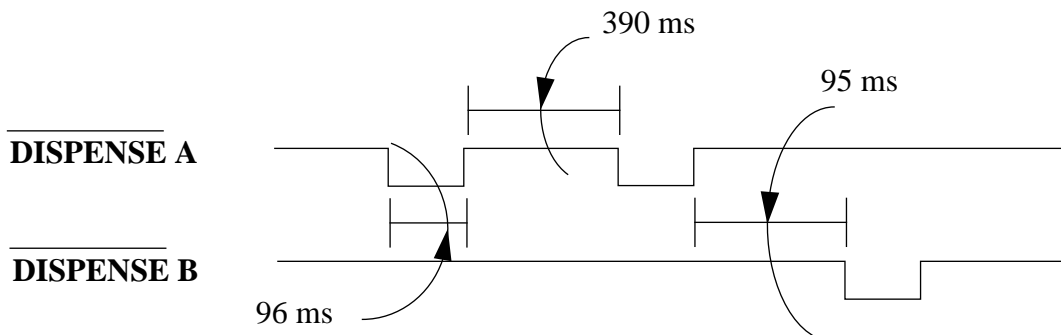


Fig A.57 AP217 Change return of different coin type dispense timing

- Tested with Spartan 24V Micromech R1.6 software
- Check coin accepted and credited
 - 5C accepted to tube and credited - OK
 - 10C accepted to tube and credited - OK
 - 25C accepted to tube and credited - OK
 - \$1 accepted to tube and credited - OK
- Check coin credited and vends, vend price set to 50C (\$ dispense emulation disabled on changer)
 - 10 x 5C accepted and credited, vended OK
 - 5 x 10C accepted and credited, vended OK
 - 2 x 25C accepted and credited, vended OK
 - 1 x \$1 accepted and credited, vended, 2 x 25C change - OK
 - 1 x \$1 accepted and credited, vended, 4 x 10C, 2 x 5C change OK
- Enable \$ dispense emulation for 4x25C pulses on changer, vend price set to 50C
 - 10 x 5C accepted and credited, vended OK
 - 5 x 10C accepted and credited, vended OK
 - 2 x 25C accepted and credited, vended OK
 - 2 x 25C accepted and credited, vended OK
 - 2 x 25C accepted and credited, vended OK
 - 1 x \$1 accepted and credited, vended, 2 x 25C change OK
 - 2 x 25C accepted and credited, vended OK

- Check escrow return of coins
 - 1 x 5C accepted and credited, press escrow return, 1 x 5C returned OK
 - 1 x 10C accepted and credited, press escrow return, 1 x 10C returned OK
 - 1 x 25C accepted and credited, press escrow return, 1 x 25C returned OK
 - 2 x 5C accepted and credited, press escrow return, 2 x 5C returned OK
 - 2 x 10C accepted and credited, press escrow return, 2 x 10C returned OK
 - 2 x 25C accepted and credited, press escrow return, 2 x 25C returned OK
- Check escrow return of dollar (\$ dispense emulation enabled)
 - 1 x \$1 accepted and credited, press escrow return, 1 x \$1 dispensed (ie controller requested 4 x 25C converted into a dollar in changer) OK

Fig A.58 *AP217 trace of handshake signals during ER press*

Fig A.59 *AP217 trace of handshake signals for coin accept message*

Fig A.60 *AP217 trace showing dispense pulse after escrow return pressed*

Fig A.61 *AP217 trace showing power up sequence*

Fig A.62 *AP217 Trace showing multiple coin dispense of differing types*

A.3 Test Boxes

A.3.1 MEI Micromech Testbox

- 3 dispense switches for 5C,10C,25C coins
- 110V changer supported
- 12 pin socket for changer

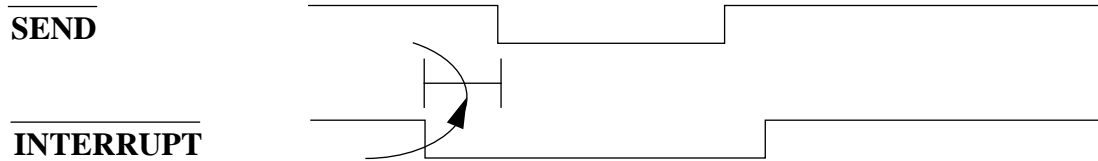


Fig A.63 *MEI testbox activation of SEND timing*

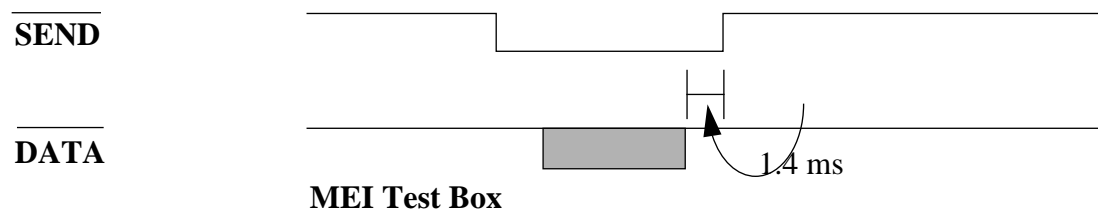


Fig A.64 *MEI testbox deactivation of SEND timing*

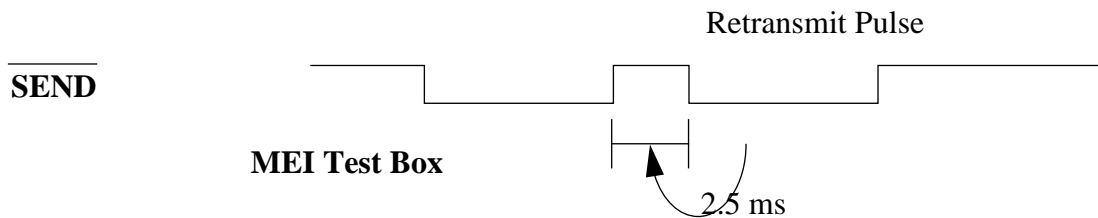


Fig A.65 *MEI testbox retransmission timing*

A.3.2 Kobetron MMT-700 Tester (Micromech/One Price/MDB)

- 4 dispense switches, only the 5C,10C,25C switches work
- 24V or 110V changers supported
- 15 pin socket

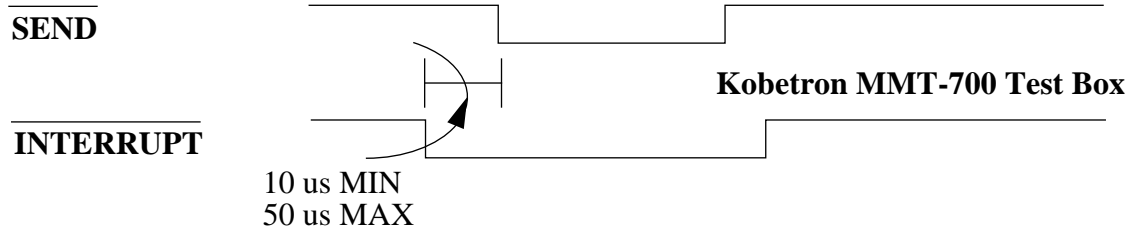


Fig A.66 *Kobetron MMT-700 activation of SEND timing*

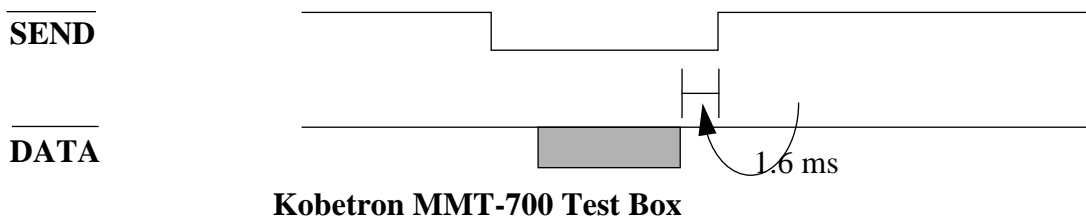


Fig A.67 *Kobetron MMT-700 deactivation of SEND timing*

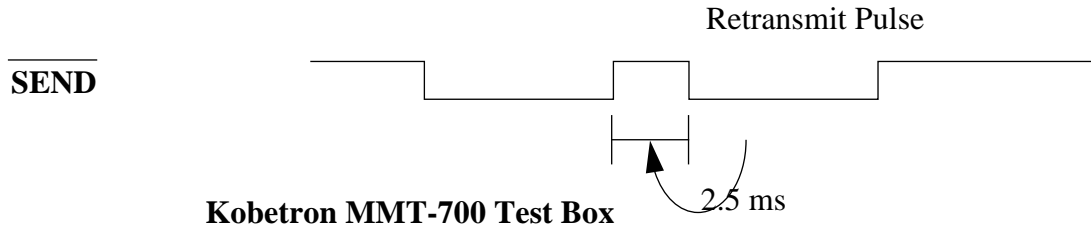


Fig A.68 *Kobetron MMT-700 retransmission timing*