Technical Bulletin

We Secure the Future

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Issued by	Technical Team West	**Reference**	**Date**	**Pages**
		TB2015.062	19-10-2015	20
Product	Mach 6			
Affected Modules	Software			
Subject / Title	**Interface Specification**			**Deadline**
Summary / Remarks	This specification defines provisions for inter-connection of GGS MACH 6 Controls with other devices for the purpose of transferring processed data from the sorting equipment to such devices			

Information Type								
	Implementation							
	Mandatory	☐	Affected Units	☐	Optional	☐	Module Rotation	☐
	Level up in RC	☐	Other	☒				
	Technical Message							
	Recovery Advice	☐	Compatibility Information	☐				
	Upgrade	☐	Other	☐				

Work Type				
	Software	☒	Firmware	☐
	Module Replacement	☐	Part Replacement	☐
	Other	☐		

Required Parts / Modules	Mach6 (model 6930), Mach6 Wave (model 6980)	**Work Volume**

Affected Region	EU	☒	NA	☒	LATAM	☒	APAC	☒	CN	☒	EEMEA	☒	Other	☒

Scope of Affected Units / SN			
Compatibility		**Shipment Plan / Supplied Parts or Modules**	

Treatment of replaced parts				
	Send back to RC	☐	Send back to Parts hub	☐
	Scrapping	☐	Other	☐

Contacts	

Scope

- Specifies electrical interface and data exchange needed to implement a serial interface that is compatible with the current RS-232 serial interface.
- Specifies electrical interface and data exchange needed to implement an enhanced RS-232 serial interface for the MACH6 control. This mode is also used for bar code input.
- Specifies implementation for a currency counter interfaces.

Electrical

The communication interface for Port 1 and Port 2 conforms to a subset of electrical specifications of EIA standard RS-232C, interface between data terminal equipment employing serial binary data interchange, except as noted below and with any improvements which may subsequently be made to that standard, after publication of such improvements, provided Glory Global Solutions deems such improvements desirable or essential. The RS-232 ports can be connected directly to a computer or peripherals. If the computer does not use handshaking, it can be disabled through the set-up mode. The RS-232 ports are available via subminiature “D” 9 pin male connectors

EIA RS-232 REMOTE DTE INTERFACE (DEFAULT TWO PORTS)

Pin Number	Signal Designation	Function	Direction
1	----	-----	
2	BA	Received Data	Input
3	BB	Transmitted Data	Output
4	CD	Data Terminal Ready	Output
5	AB	Signal Ground	
6	CC	Data Set Ready	Input
7	CA	Request to Send	Output
8	CB	Clear to Send	Input

Printer Port

The communication interface for the Printer Port conforms to a subset of electrical specifications of EIA standard RS-232C, interface between data terminal equipment employing serial binary data interchange. The only signals used are Transmitted Data (pin 2), Clear to Send (pin 5), and Signal Ground (pin 1 and pin 6). The port is available is available via RJ-12 female connection.

USB Port

The communication interface for the USB port conforms to the specification for USB 2.0. The port is available via standard USB-B receptacle. To use the USB port, driver software must be installed. The drivers are included on the 6980/6930 User Guide/Driver CD. Select the folder for the operating system being used and run the MACH 6 USB Installer.exe program. For older units which did not include the 6980/6930 User Guide/Driver CD, a different driver is required. This driver may be downloaded from the following website:

http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx

Select the VCP Driver Kit item and run the installation program using the default settings.

When the Mach6 is connected it will be automatically detected by the PC and assigned a comm. port number when the connection is made. The port will then be available as a virtual comm. port.

Serial Port Configuration

The configuration of the serial ports is done through the front panel. The default is printer mode. This is compatible with current production serial ports. Default port settings are as follows:

Port	Baud	Parity	Data Bits	Format	ACK/NAK	DTR/DSR	RTS/CTS
1	9600	None	7	Print	Disabled	Disabled	Disabled
2	9600	None	7	Print	Disabled	Disabled	Disabled
Printer	9600	None	8	Print	Disabled	Disabled	Disabled
USB	9600	None	7	Print	Disabled	Disabled	Disabled

The following port formats are available:

Format	Name	Description
FORMAT_PRN	PRN	Print
FORMAT_CUR_1	CUR1	currency counter format #1 - DLR 2620
FORMAT_CUR_2	CUR2	currency counter format #2 - DLR 2800
FORMAT_CUR_3	CUR3	currency counter format #3 - 8672/8643
FORMAT_ENHANCED	ENHANCED	enhanced & bar code formats
FORMAT_DISPLAY	DISPLAY	DISPLAY
FORMAT_OPT_1	OPT1	DLR 2620 size detect interface
FORMAT_OPT_2	OPT2	DLR 2700 interface
FORMAT_OPT_3	OPT3	Citizen HD printer
FORMAT_OPT_4	OPT4	MACH7 FORMAT
FORMAT_OPT_5	OPT5	
FORMAT_OPT_6	OPT6	
FORMAT_OPT_8	OPT8	
FORMAT_OPT_9	OPT9	
FORMAT_OPT_A	OPT10	Glory pocket and a half
FORMAT_OPT_B	OPT11	MR 2227
FORMAT_MACH3	OSC-MACH3	Simulation of MACH 3 data interface

PRINTER MODE

Default mode is the current RS-232 mode of operation. This format is described below:

- Data transmission from the Control is asynchronous (Start/Stop).

Baud Rate	9600 bps
Parity	Off
Word length	7 Bits

Handshaking	Busy and X-ON/X-OFF
Stop bit	1

NOTE: All parameters are user configurable.

- Handshaking with Data Terminal equipment can be done with software XON/XOFF:

X-ON	ASCII DC1 (Ctrl Q)	X-OFF	ASCII DC3 (Ctrl S)

- Battery back-up is provided for one “ACCEPT” message. If another message is to be sent while one is in the buffer a printer busy message will occur.
- Data Communication utilizes an RS-232C interface with the following characteristics:

The ASCII data code is used. (See Fig. 1)

Bi-directional communication is implemented. The Control transmits control and detail data and is capable of accepting acknowledge characters from a data set.

The communication channels operate in full duplex mode and will expect to receive only acknowledge and configuration characters. Equipment connected to the Control must not echo data characters.

The format for both transmit and receive data is asynchronous. Each character consists of a START bit, 7 o 8 data bits and a STOP bit. The data transfer is initiated by the operator of the MICS Control.

When the "ACCEPT" key is depressed, the coin totals are sent out to the serial ports. If the ACK/NAK is enabled, the Control will wait for the "ACK" to be returned before the BATCH total is cleared from the memory. If the control receives a "NAK", the total is then retransmitted and NOT cleared from memory. If ACK/NAK is disabled, the total is transferred and the total is cleared.

If the Control receives three (3) NAK's in a row or 30 seconds pass without an ACK/NAK, the Control will display "COMMUNICATIONS “ERROR" on the display. This display indicates that the computer is not responding. This can be cleared by pressing the "HOME" key.

- Communication control is accomplished using the data terminal ready, data set ready, request to send and clear to send lines of the RS-232C interface standard. Before transmission commences, the data terminal ready line will be activated. Clear to send must respond to activation of the request to send line. The active level of the clear to send will be verified before transmission of each character.
- DATA FORMATS

The order of data output coin value can vary depending upon what is programmed into the control. Following are typical printout examples:

- BATCH OUTPUT

```
(CN)(SO)BATCH ACCEPT(D4)
(NU)(NU)(NU)(NU)(NU)
(NU)(NU)(NU)(NU)(NU)
```

SEE THE BATCH OUTPUT PRINTOUT BODY ON ANNEX 1

```
(CR) (CR) (CR) (CR) (CR)
```

- SUB TOTAL OUTPUT

```
(CN)(NU)(NU)(NU)(NU)(NU)(SO)
^SUB ACCEPT(CR)(NU)(NU)(NU)
```

SEE THE SUB TOTAL OUTPUT PRINTOUT BODY ON ANNEX 2

```
(CR) (CR) (CR) (CR) (CR)
```

- GRAND TOTAL OUTPUT

```
(CN)(SO)GRAND ACCEPT(D4)(NU)(NU)
(NU)(NU)(NU)(NU)(NU)(NU)(NU)(NU)
```

SEE THE GRAND TOTAL OUTPUT PRINTOUT BODY ON ANNEX 3

```
(CR) (CR) (CR) (CR) (CR)
```

Additional notes Annex 4

Enhanced Serial Port Mode (Bar code Input)

The enhanced serial port mode allows the serial ports to use any of the key functions that appear on the front panel. This allows complete remote control of the MACH6 Control. This mode runs in HALF DUPLEX. Commands are not buffered and you must wait for the response before sending the next command (MAXIMUM character string = 50 characters).

Reference to station numbers is backward compatible with older MACH coin sorters. A new format is also available. This new format allows you to access a station by its station number instead of its coin value (example of 3 byte message; s#x, x = station number). A new command has been added so the computer can download the station values.

Following is a listing of abbreviations used in the enhanced mode of operation:

- DEFINITIONS

ACK	Acknowledged		NAK	Not acknowledged
STX	Start of text		ETX	End of text
CMD	Command field (two bytes). Tells MACH6 Control or computer what the following information contains.			
MES	Message field. Contains coin/token totals or other information. This field also can contain special characters to indicate right (R) or left (L) bag on dual bag units.			
STS	Status bytes. Five (5) bytes containing information telling computer results of a command or machine status. Format = Set up + Action field. Set up = Two bytes indicating dollars (“$0”) or units (“U0”). Action field= Three (3) byte ASCII field indicating status of machine.			

- COMMUNICATION PARAMETERS

  Port parameters are user configurable through the front panel (See Operators Manual).

- COMMAND SUMMARY

SS	Status command	CC	Clear Partial Counts
CB	Clear Batch	CS	Clear Subtotals
CG	Clear Grand Totals	GD	Get Partial Count Data
GT	Get Batch Data	GS	Get Subtotal Data
GG	Get Grand Total Data	GT+MES1	Get Batch Counts Of Den
GI+MES1	Get Product Totals	SV	Set Bag Stop
MG	Start Motor (Motor Go)	MS	Stop Motor (Motor Stop)
BB	Beep	AB	Accept Batch Total
AS	Accept Sub Total	AG	Accept Grand Total
PC	Set Partial Count	ID	Set Batch ID Number
IS	Set Subtotal ID Number	IG	Set Grand ID Number

- Status Command

  The status command is received on the port the MACH6 Control will respond in one of the following ways.

A status word (three (3) bytes) will be returned indicating the status of the machine. The definitions are as follows:

OK	Message was received and command has been completed. Three bytes the OK is followed by a space.
E??	Message was received, but command cannot be completed because of a functional error. Examples are blocked sensor, ring up, etc.?? = 01 to 99 and correspond to error codes on the MACH6 Control. See Operator's Manual for full listing
COM	Communication error. Examples are parity error, wrong "BCC".
BAG	Bag stop has occurred. This is followed by three (3) bytes of data containing the bag location. Example: A bag stop on quarters looks like this: "BAG025".
RUN	Tells host device that the MACH6 Control is running and counting coin.

The Status command format is as follows:

Direction	Format message	Action
Computer→Mach6	<STX>SS<ETX>.	get status
Mach6→Computer	<STX>STstatus<ETX>	Response

Examples of status sends.

EXAMPLE 1	MACH6 Control with no errors. Set for dollar counts.
	MACH6 Control SENDS - <STX>ST$0OK <ETX>

EXAMPLE 2	Machine with a blocked sensor. Set for units.
	MACH6 Control SENDS - <STX>STU0E05<ETX>

EXAMPLE 3	MACH6 Control w/bag stop on quarter bag set for dollar counts.
	MACH6 Control SENDS - <STX>ST$0BAG025<ETX>

EXAMPLE 4	Machine running. Set for units.
	MACH6 Control SENDS - <STX>STU0RUN<ETX>

- CLEAR COMMAND

The clear command will clear the total specified in the message (MES) portion of the command. The MACH6 Control will respond with its status. The Clear command is as follows:

Direction	Format message	Action
Computer→Mach6	<STX>CCstring<ETX> <STX>CB<ETX> <STX>CS<ETX> <STX>CG<ETX>	partial counts batch sub grand
Mach6→Computer	<STX>STstatus<ETX>	normal response

EXAMPLE 1	Machine with a blocked sensor. Set for units.
	<STX>CC005<ETX>

EXAMPLE 2	Clear BATCH total from a machine.
	<STX>CB<ETX>

- GET DATA COMMAND

The Get command will prompt the MACH6 Control to send a coin total out to the serial port. The message (MES2) field from the MACH6 Control contains eight (8) bytes of data. The eight bytes of data contain the count information for the bag (MES1), batch, sub or grand total that was requested.

This data can be extracted while the machine is running.

The Get Data command format is as follows:

Direction	Format message	Action
Computer→Mach6	<STX>GDstringMES1<ETX>	partial counts
	<STX>GT<ETX>	batch
	<STX>GS<ETX>	sub
	<STX>GG<ETX>	grand
	<STX>GTstringMES1<ETX>	batch counts of den
	<STX>GIstringMES1<ETX>	product totals
Mach6→Computer	<STX>BDstringMES2<ETX>	partial count
	<STX>BTstringMES2<ETX>	batch
	<STX>BSstringMES2<ETX>	sub
	<STX>BGstringMES2<ETX>	grand
	<STX>stringMES2<ETX>	variable ID field

EXAMPLE 1	Get $0.05 bag total (PARTIAL) ($123.05) from the MACH6 Control
Computer→Mach6	<STX>GD005<ETX>
Mach6→Computer	<STX>BD00012305<ETX>

EXAMPLE 2	Get Grand total from MACH6 Control ($123.05)
Computer→Mach6	<STX>GG<ETX>
Mach6→Computer	<STX>BG00012305<ETX>

EXAMPLE 3	Get $0.05 bag total (BATCH) ($123.05) from the MACH6 Control
Computer→Mach6	<STX>GT005<ETX>
Mach6→Computer	<STX>BT00012305<ETX>

EXAMPLE 4	Get ID totals from control (if no totals only STX,ETX are returned)
Computer→Mach6	<STX>GI<ETX>
Mach6→Computer	<STX>ID # 0001 1.23<CR> ID # 0025 34594.54<CR> ID # 0425 600.56<CR> <ETX>

The field is variable, depending on the number of product totals in the machines memory. Each "ID" field is 24 characters including the carriage return. If there are not any codes in the machine memory the output will be STX and ETX.

EXAMPLE 5	Get station value table from control	
Computer→Mach6	<STX>GV<ETX>	
Mach6→Computer	<STX>1i^^^^.11 <CR> 2^^^^^.10 <CR> 3^^^^^.01 <CR> 4^^^^^.05 <CR> 5^^^^^.25 <CR> 6^^^^1.00 <CR> 7^^^^^.50 <CR> 8i^^^^.08 <CR> 9i^^^^.00 <CR> <ETX>	"i" - inactive. "#" - token. "^" - space.

The field is fixed.

- BAG STOPS

Allows the host to set the bag stop values on the MACH6 Control via the RS-232 port. MES contains eleven 11) bytes (of data; the first three (3) bytes contain the denomination that is to be set; the following eight (8) bytes contain the value for which it is to be set. The number of bagstops per setting can also be set by using the "v" command (maximum number for this setting is 99).

Direction	Format message	Action
Computer→Mach6	<STX>SVstring<ETX>	set new bag stop
Mach6→Computer	<STX>STstatus<ETX>	normal response

EXAMPLE 1	Set $.05 bag stop to $50.00 on the MACH6 Control
Computer→Mach6	<STX>SV00500005000<ETX>
Mach6→Computer	<STX>ST$0OK <ETX>

EXAMPLE 2	Set $.25 number of bagstops to 15
Computer→Mach6	<STX>SV00500000015<EXT>
Mach6→Computer	<STX>ST$0OK <EXT>

- MOTOR CONTROL

Starts and stops the motor and runs coin until a bag stop occurs or coins run out. Motor control commands are as follows:

Direction	Format message	Action
Computer→Mach6	<STX>MG<ETX> <STX>MS<ETX>	Start motor Stop motor
Mach6→Computer	<STX>STstatus<ETX>	status

EXAMPLE 1	Start motor
Computer→Mach6	<STX>MG<ETX>
Mach6→Computer	<STX>ST$0RUN<ETX>

EXAMPLE 2	Stop motor
Computer→Mach6	<STX>MS<ETX>
Mach6→Computer	<STX>ST$0OK<ETX>

- BEEPER COMMAND

The beeper command will beep the beeper and return status:

Direction	Format message	Action
Computer→Mach6	<STX>BB<ETX>	Beep
Mach6→Computer	<STX>ST$0OK <ETX>	status

- ACCEPT COMMAND

Operates as the accept key operates on the MACH6 Control. Sends totals to printer and serial port. The Accept Data command format is as follows:

Direction	Format message	Action
Computer→Mach6	<STX>AB<ETX> <STX>Ab<ETX> <STX>AS<ETX> <STX>As<ETX> <STX>AG<ETX> <STX>Ag<ETX>	Batch Batch extended Sub Sub extended Grand Grand extended
Mach6→Computer	<STX>BTstring<ETX> <STX>BSstring<ETX> <STX>BGstring<ETX>	Batch Sub Grand

EXTENDED = 9 character returned message field including decimal, and no leading zeros.

EXAMPLE 1	Accept Batch total from MACH6 Control ($123.05)
Computer→Mach6	<STX>AB<ETX>
Mach6→Computer	<STX>BT00012305<ETX>

EXAMPLE 2	Accept Sub Total ($123.05) from the MACH6 Control	
Computer→Mach6	<STX>AS<ETX>	
Mach6→Computer	<STX>BS00012305<ETX> <STX>BS^^^123.05<EXT> (Extended)	”^” – space (20 hex)

- PARTIAL COUNT COMMAND

Allows the host to set partial count values on the MACH6 Control via the RS-232 port. MES contains eleven (11) bytes of data the first three (3) bytes contain the station number that is to be set, the following eight (8) bytes contain the value for which it is to be set.

Direction	Format message	Action
Computer→Mach6	<STX>PCstringMES<ETX>	Set new bag stop
Mach6→Computer	<STX>ST$OK <ETX>	normal response

EXAMPLE 1	Set $.05 partial count to $50.00 on the MACH6 Control
Computer→Mach6	<STX>PC00500005000<ETX>
Mach6→Computer	<STX>ST$0OK <ETX>

EXAMPLE 2	Set MEDIA count to $500.00 on the MACH6 Control
Computer→Mach6	<STX>PCM++00050000<ETX>
Mach6→Computer	<STX>ST$0OK <ETX>

EXAMPLE 3	Set $10.00 Currency count to $500.00 on the MACH6 Control
Computer→Mach6	<STX>PCC+400050000<ETX>
Mach6→Computer	<STX>ST$0OK <ETX>

- I.D. NUMBER COMMAND

Allows the host to set I.D. numbers on the MACH6 Control via the RS-232 port. MES contains twelve (12) bytes of data of the I.D. number.

Set I.D. number command format is as follows:

Direction	Format message	Action
Computer→Mach6	<STX>IDnumber<ETX> <STX>ISnumber<ETX> <STX>IGnumber<ETX>	Set Batch I.D. number Set Sub I.D. number Set Grand I.D. number
Mach6→Computer	<STX>ST$0OK<ETX>	normal response

EXAMPLE 1	Set Product code to 123-01 on the MACH6 Control
Computer→Mach6	<STX>ID000000123-01<ETX>
Mach6→Computer	<STX>ST$0OK <ETX>

EXAMPLE 2	Set I.D. number to 1234560 on the MACH6 Control
Computer→Mach6	<STX>ID000001234560<ETX>
Mach6→Computer	<STX>ST$0OK <ETX>

CURRENCY COUNTER INPUT

The currency mode allows the MICS Control to operate as the host device with a currency counter with an RS-232C interface. The following steps are followed for currency applications. Ports 1 and 2 are the only ports configurable for this mode (SEE OPERATORS MANUAL FOR SETUP.)

A. Operating sequence: Select, Count, "ENTER".
B. Currency value MUST be entered from front panel before counting.
C. Press "CURRENCY" key to select the currency value.
D. Run the documents.
E. The count value will be transferred to the control after all documents are run. The count value will be displayed until a new value or the "ENTER" key has been pressed.
F. Pressing the "ENTER" key converts the counts to a dollar total. It is added to the batch total.
G. The documents will appear on the printout with the designated value and total.
H. Once the "CURRENCY" value has been selected the motor can be started and coin processing can operate while currency is being counted.

See Operator's Manual for setup parameters. 9600 BAUD, DCE, RTS, 7 DATA BITS, NO PARITY, CUR MODE based on currency counter.

BAR CODE READER INPUT (SEE ENHANCED MODE)

This mode allows the user to connect a bar code reader as a data input device to the MICS Control. Commands can be strung together by using the format:

STX: "COMMAND1" + "COMMAND2": ETX

Commands are those described in Enhanced Serial Port Mode (Bar code Input) section of this spec without the STX/ETX. The commands in this format have no response.

When using the Bar Code input you SHOULD USE RTS/CTS handshaking to prevent buffer overrun when sending long commands. The maximum number of characters input is 24.

BATCH DISPLAY OUTPUT (PORT 3 ONLY)

The control outputs Batch Total data to port 3 in the format specified by ES00252. This is the GGS Remote Batch Display (#0033002).

GALA OUTPUT MODE (OPTION – 8)

ACK/NAK must not be enabled when Option –8 format is selected.

- DATA FORMATS

  The order of data output coin value can vary depending upon what is programmed into the control. Following are typical printout examples:

  - BATCH OUTPUT

```
^^BATCH ACCEPT^(SEQ)(CR)
```

SEE THE BATCH OUTPUT PRINTOUT BODY ON ANNEX 1

```
(CR) (CR) (CR) (CR) (CR) (LEN) (BCC)
```

  - SUB TOTAL OUTPUT

```
(CN)(NU)(NU)(NU)(NU)(NU)(SO)
^SUB ACCEPT(CR)(NU)(NU)(NU)
```

SEE THE SUB TOTAL OUTPUT PRINTOUT BODY ON ANNEX 2

```
(CR)(CR)(CR)(CR)(CR)(LEN BCC)
```

  - GRAND TOTAL OUTPUT

```
(CN)(SO)GRAND ACCEPT(D4)(NU)(NU)
(NU)(NU)(NU)(NU)(NU)(NU)(NU)(NU)
```

SEE THE GRAND TOTAL OUTPUT PRINTOUT BODY ON ANNEX 3

```
(CR)(CR)(CR)(CR)(CR)(LEN)(BCC)
```

  Additional notes Annex 4

- FEEDBACK

  When the "ACCEPT" key is pressed (BATCH, SUB and GRAND), the coin totals are sent out to the serial ports that are configured for that interface. The Control will wait for the "ACK" to be returned before the total is cleared from the memory. If the Control receives a "NAK" (or 3 second timeout), the total is then retransmitted and NOT cleared from memory.

  If the Control receives more than two (2) NAK's in a row without an ACK, the Control will display "COMMUNICATIONS ERROR" on the display. This display indicates that the computer is not responding. This error can be cleared by pressing the "CLEAR" key.

- DEFAULTS

  All ports default to Printer mode 9600 baud, 7 data bits, no parity, no handshaking. To enable this protocol select the Option 8 format (ports 1, 2 and 3).

MACH UTILITIES INTERFACE MODE (MACH6 WAVE ONLY)

The Mach6 Wave interfaces with the Mach Utilities program to allow for easy adjustment of wave sensor calibration values. All commands are initiated by the Mach Utilities.

- TRANSER FILE TO THE PC COMMAND

  This command transfers the configuration data and calibration data to the host via the RS-232 port. The data is approximately 20,100 bytes.

Direction	Format message
Computer→Mach6	<STX>u<CR>
Mach6→Computer	[DDDDDDD…DDDDDDD] (“D” – ASCII HEX data byte)

- TRANSFER FILE TO THE M6 COMMAND

This command transfers a file from the host to the MACH6 via the RS-232 port. The file is expected to contain configuration data and calibration data of the same format that is transferred to the PC. There are about 20,100 data bytes in the transfer.

Direction	Format message
Computer→Mach6	<STX>U<CR>[DDDDD…DDDDD] (“D” – ASCII HEX data byte)
Mach6→Computer	<ACK><CR> (NAK if transmitted instead of the ACK if the checksum of the data doesn’t match the checksum transmitted with the data.)

- SINGLE COIN READ

This command initiates a single coin read by the MACH6 and then transfers the data from the MACH6 to the host via the RS-232 port. The string is identical to the initial power up string on shown on the top line of the display, with the addition of ‘.01’ appended to it. The ‘.01’ (or ‘.02’, ‘.03’ etc.) serves as a minor version number to identify different builds of software. There are 45 data bytes in the transfer.

Direction	Format message
Computer→Mach6	<STX>y<CR>
Mach6→Computer	<STX>DDDDD…DDDDD<CR> (“D” – ASCII HEX data byte)

MACH3 PC CASH SIMULATION MODE

DATA COMMUNICATION utilizes an RS-232C interface with the following characteristics:

Baud Rate	9600 bps (Default) or 19200 bps	Handshaking	RTS/CTS enabled
Parity	Off	Stop bit	1
Word length	8 Bits	ACK/NAK	Disabled

NOTE: All parameters are automatically set when selecting the FORMAT MACH3 item in the FORMAT section of the PROGRAM PORTS item of the SUPERVISOR menu with the exception of the baud rate. The baud rate may be set up individually and may be set to either 9600 BPS or 19200 BPS. If the baud rate is a value other than 9600 BPS or 19200 BPS when selecting the FORMAT MACH3 item it will be set to the default value of 9600 BPS.

Bi-directional communication is implemented. The Control transmits control and detail data and is capable of accepting characters from a data set.

When the “ACCEPT” command is received via the serial port, the coin totals are sent out to the serial ports. The Control will wait for the “ACK” to be returned before the BATCH total is cleared from the memory. If the Control receives a “NAK”, the total is then retransmitted and NOT cleared from memory. The continuous run mode can not be used with PC-CASH. At this point if a status command is received the response is “PRN”.

If the Control receives three (3) NAK’s in a row or 30 seconds pass without an ACK/NAK, the Control will display “COMMUNICATIONS ERROR” on the display. This display indicates that the computer is not responding. This can be cleared by pressing the “CLEAR” key.

- STATUS COMMAND

If the status command is received on the port the Control will respond in one of the following ways.

A status word (three (3) bytes) will be returned indicating the status of the machine. The definitions are as follows:

OK1	Message was received and command has been completed. Three bytes the OK is followed by a 1 or 0 1 = The motor has been run. A 2 second delay must be made after this response and the time an "AB" (Accept Batch) command is sent. 0 = The motor has not been run. OK= Keys locked = "OU"; Unlocked = "OK".
PRN	Indicates a message is in the buffer. The proper response is an ACK or NAK.
E??	Message was received, but command cannot be completed because of a functional error. Examples are blocked sensor, ring up, etc.?? = 01 to 99 and correspond to error codes on the MACH6 Control. See Operator's Manual for full listing
COM	Communication error. Examples are parity error, wrong "BCC".
BAG	Bag stop has occurred. This is followed by three (3) bytes of data containing the bag location. Example: A bag stop on quarters looks like this: "BAG025".
RUN	Tells host device that the MACH6 Control is running and counting coin.

The Status command format is as follows:

Direction	Format message	Action
Computer→Mach6	STX : "SS" : ETX	get status
Mach6→Computer	STX : "ST" : STS : ETX	Response

Example of status sends:

EXAMPLE 1	Machine with no errors. The motor has not been run.
	Control sends - 02(HEX) : "ST" : "$0OK0" : 03(HEX)

EXAMPLE 2	Machine with a blocked sensor.
	Control SENDS - 02 (HEX) : "ST" : "$0E05" : 03 (HEX)

EXAMPLE 3	Machine with bag stop on quarter bag. Set for dollar counts.
	Control SENDS - 02(HEX) : "ST" : "$0BAG025" : 03(HEX)

EXAMPLE 4	Machine running.
	Control SENDS - 02 (HEX) : "ST" : "$0RUN" : 03 (HEX)

EXAMPLE 5	Machine okay with keys locked. The motor has been run.
	Control SENDS - 02 (HEX) : "ST" : "$0OU1": 03 (HEX)

- ACCEPT COMMAND

Operates as the accept key operates. If no error occurs the Control sends the totals to PC_CASH port. If an error occurs the Control responds with the status word indicating the

error. If the totals are sent to the port the MACH 6 ignores any incoming message until the ACCEPTED data has been ACK'ed. The Accept Data command format is as follows:

Direction	Format message	Action
Computer→Mach6	STX : "AB" : ETX	Batch
Mach6→Computer	B, 000000000003, batch number 000000000000, sub(0's) 000000000000, grand (0's) .10, 1,, coin 1 .01, 0,, coin 2 .05, 1,, coin 3 .25, 1,, coin 4 1.00, 1,, coin 5 .50, 1,, coin 6 , ,, coin 7 , ,, coin 8 , ,, coin 9 , ,, coin 10 , ,, coin 11 , ,, coin 12 , ,, note 1 , ,, note 2 , ,, note 3 , ,, note 4 , ,, note 5 , ,, note 6 , ,, note 7 , ,, note 8 ,, media 1.90(CR) batch total	Batch
Computer→Mach6	ACK/NAK.	

If power is lost to the machine during data transmission (Message not completely sent) when power is restored the controlling device must ACK or NAK (for a retransmit of data) WITHIN 30 SECONDS OR DATA WILL BE LOST. At this point the MACH 6 will generate a Communications Error. The response to a status is "PRN".

- DEVICE ID COMMAND

The response to this command tells the host what model and prom number is at the receiving end of the cable.

The Device ID command format is as follows:

Direction	Format message	Action
Computer→Mach6	"DI"	Device ID

Mach6→Computer	STX : MODEL #, PROM #, OTHER SETUP : ETX	Response

EXAMPLE RESPONSE	STX : “6980042,0032050-04 d” : ETX

- DISABLE KEYPAD COMMAND

This command disables the MACH 6 front keypad for user control. The unit will only respond to commands via the RS-232 port. On power up the keypad will always be enabled.

The Disable command format is as follows:

Direction	Format message	Action
Computer→Mach6	STX : “DK” : ETX	disable keypad
Mach6→Computer	ACK/NAK	

- ENABLE KEYPAD COMMAND

This command enables the MACH 6 front keypad for user control. All keys will be active.

The enable command format is as follows:

Direction	Format message	Action
Computer→Mach6	STX : “EK” : ETX	enable keypad
Mach6→Computer	ACK/NAK	

- START MOTOR COMMAND

This command starts the sorter motor.

The Start command format is as follows:

Direction	Format message	Action
Computer→Mach6	STX : “MG” : ETX	Start motor.
Mach6→Computer	status	response

- STOP MOTOR COMMAND

This command stops the sorter motor.

The Stop command format is as follows:

Direction	Format message	Action
Computer→Mach6	STX : “MS” : ETX	Stop motor
Mach6→Computer	status response	

- DATA FORMAT COMMAND

The format is automatically set to data format when the FORMAT MACH3 format is selected, so this command merely returns the device ID format.The Format command is as follows:

Direction	Format message	Action
Computer→Mach6	STX :“x?”: ETX	Data format
Mach6→Computer	STX : MODEL #, PROM #, OTHER SETUP : ETX	

EXAMPLE RESPONSE	STX : “6980042,0032050-04 d” : ETX

ANNEX 1:

```
                TIME^^12:48^^09/25/1998(CR)     TIME LINE  **
                BATCH^^^^XXXXXXXXXXXXX(CR)      BATCH ID
                SUB^^^^^^XXXXXXXXXXXXX(CR)      SUBTOTAL NUMBER
                GRAND^^^^XXXXXXXXXXXXX(CR)      DATE (MO-DAY-YR)
                ^^^^^^.50^^^^^XXXXXX.XX(CR)     50¢  TOTAL
                ^^^^^1.00^^^^^XXXXXX.XX(CR)     $1   TOTAL
                ^^^^^^.25^^^^^XXXXXX.XX(CR)     25¢  TOTAL
                ^^^^^^.05^^^^^XXXXXX.XX(CR)     5¢   TOTAL
                ^^^^^^.01^^^^^XXXXXX.XX(CR)     1¢   TOTAL
                ^^^^^^.10^^^^^XXXXXX.XX(CR)     10¢  TOTAL
                TOTAL COIN^^^^XXXXXX.XX(CR)
                ^^^^^1.00^^^^^XXXXXX.XX(CR)     $1   TOTAL
                ^^^^^2.00^^^^^XXXXXX.XX(CR)     $2   TOTAL
                ^^^^^5.00^^^^^XXXXXX.XX(CR)     $5   TOTAL
                ^^^^10.00^^^^^XXXXXX.XX(CR)     $10  TOTAL
                ^^^^20.00^^^^^XXXXXX.XX(CR)     $20  TOTAL
                ^^^^50.00^^^^^XXXXXX.XX(CR)     $50  TOTAL
                ^^^100.00^^^^^XXXXXX.XX(CR)     $100 TOTAL
                TOTAL CURR.^^^XXXXXX.XX(CR)
                ^^^^MEDIA^^^^^XXXXXX.XX(CR)     TOTAL MEDIA INPUT
                ^^^^^^^^^^^^^---------(CR)
                TOTAL^^^^^^^^^XXXXXX.XX         TOTAL
```

** = Lines not sent when set to format option 4 (MACH 5/7 format).
See notes Annex 4

ANNEX 2:

```
TIME^^12:48^^09/25/1998(CR)          TIME LINE  **
SUB^^^^^^XXXXXXXXXXXXX(CR)           SUBTOTAL NUMBER
GRAND^^^^XXXXXXXXXXXXX(CR)           DATE(MO-DAY-YR)
^^^^^^.50^^^^^XXXXXX.XX(CR)          50¢  TOTAL
^^^^^1.00^^^^^XXXXXX.XX(CR)          $1   TOTAL
^^^^^^.25^^^^^XXXXXX.XX(CR)          25¢  TOTAL
^^^^^^.05^^^^^XXXXXX.XX(CR)          5¢   TOTAL
^^^^^^.01^^^^^XXXXXX.XX(CR)          1¢   TOTAL
^^^^^^.10^^^^^XXXXXX.XX(CR)          10¢  TOTAL
TOTAL COIN^^^^XXXXXX.XX(CR)
^^^^^1.00^^^^^XXXXXX.XX(CR)          $1   TOTAL
^^^^^2.00^^^^^XXXXXX.XX(CR)          $2   TOTAL
^^^^^5.00^^^^^XXXXXX.XX(CR)          $5   TOTAL
^^^^10.00^^^^^XXXXXX.XX(CR)          $10  TOTAL
^^^^20.00^^^^^XXXXXX.XX(CR)          $20  TOTAL
^^^^50.00^^^^^XXXXXX.XX(CR)          $50  TOTAL
^^^100.00^^^^^XXXXXX.XX(CR)          $100 TOTAL
TOTAL CURR.^^^XXXXXX.XX(CR)
^^^^MEDIA^^^^^XXXXXX.XX(CR)          TOTAL MEDIA INPUT
^^^^^^^^^^^^^^---------(CR)
TOTAL^^^^^^^^^XXXXXX.XX(CR)          TOTAL
PC CNT^^^^^^^^^XXXXXXXX(CR)
SORT CNT^^^^^^^XXXXXXXX(CR)
(CR)
ID TOTALS(CR)
PROD XX^^^^^^^XXXXXX.XX(CR)
PROD XX^^^^^^^XXXXXX.XX(CR)
```

** = Lines not sent when set to format option 4 (MACH 5/7 format).
See notes Annex 4

ANNEX 3:

```
                TIME^^12:48^^09/25/1998(CR)        TIME LINE
                GRAND^^^^XXXXXXXXXXXXX(CR)         DATE(MO-DAY-YR) **
                PARTIAL BAG TOTALS(CR)
                (NU)(NU)(NU)(NU)(NU)
                ^^^^^^.01^^^^^XXXXXX.XX(CR)        $0.01  TOTAL
                ^^^^^^.05^^^^^XXXXXX.XX(CR)        $0.05  TOTAL
                ^^^^^^.10^^^^^XXXXXX.XX(CR)        $0.10  TOTAL
                ^^^^^^.25^^^^^XXXXXX.XX(CR)        $0.25  TOTAL
                ^^^^^^.50^^^^^XXXXXX.XX(CR)        $0.50  TOTAL
                ^^^^^1.00^^^^^XXXXXX.XX(CR)        $1.00  TOTAL
                ^^^^^^^^^^^^^^---------(CR)
                TOTAL^^^^^^^^^XXXXXX.XX(CR)
                (CR)
                GRAND TOTALS(CR)(NU)(NU)(NU)
                (NU)(NU)(NU)(NU)(NU)(NU)(NU)(NU)
                ^^^^^^.50^^^^^XXXXXX.XX(CR)        50¢  TOTAL
                ^^^^^1.00^^^^^XXXXXX.XX(CR)        $1   TOTAL
                ^^^^^^.25^^^^^XXXXXX.XX(CR)        25¢  TOTAL
                ^^^^^^.05^^^^^XXXXXX.XX(CR)        5¢   TOTAL
                ^^^^^^.01^^^^^XXXXXX.XX(CR)        1¢   TOTAL
                ^^^^^^.10^^^^^XXXXXX.XX(CR)        10¢  TOTAL
                TOTAL COIN^^^^XXXXXX.XX(CR)
                ^^^^^1.00^^^^^XXXXXX.XX(CR)        $1   TOTAL
                ^^^^^2.00^^^^^XXXXXX.XX(CR)        $2   TOTAL
                ^^^^^5.00^^^^^XXXXXX.XX(CR)        $5   TOTAL
                ^^^^10.00^^^^^XXXXXX.XX(CR)        $10  TOTAL
                ^^^^20.00^^^^^XXXXXX.XX(CR)        $20  TOTAL
                ^^^^50.00^^^^^XXXXXX.XX(CR)        $50  TOTAL
                ^^^100.00^^^^^XXXXXX.XX(CR)        $100 TOTAL
                TOTAL CURR.^^^XXXXXX.XX(CR)
                ^^^^MEDIA^^^^^XXXXXX.XX(CR)        TOTAL MEDIA INPUT
                ^^^^^^^^^^^^^^---------(CR)
                TOTAL^^^^^^^^^XXXXXX.XX(CR)        TOTAL
                PC CNT^^^^^^^^^XXXXXXXX(CR)
                SORT CNT^^^^^^^XXXXXXXX(CR)
                (CR)
                ID TOTALS(CR)
                PROD XX^^^^^^^XXXXXX.XX(CR)
                PROD XX^^^^^^^XXXXXX.XX(CR)

** = Lines not sent when set to format option 4(MACH 5/7 format).
See notes Annex 4
```

ANNEX 4:

- If a field has no value, it is not sent.
- Leading zeros are filled by spaces.
- All outputs end with 5 carriage returns.

"^"	space (ASCII-20 HEX)
"X"	any number
batch	ASCII "-" = 2D HEX
"(CR)"	carriage return
"(CN)"	ASCII control character = 18 HEX (CTRL X)
"(SO)"	ASCII control character = 0E HEX (CTRL N)
"(D4)"	ASCII control character = 14 HEX (CTRL T)
"(NU)"	ASCII null character = 00 HEX (PAUSE)