AMERICAN CHANGER & HOFFMAN MINT

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Universal to PC Protocol

Here is a description of the interface hardware and the software communication protocol between American Changer's Universal interface board (Changer) and a computer:

1. Hardware:
    1. Electrical:
        An interface board must be used between the Universal board and the PC. It is built into the harness inside the cabinet. Standard RS-232 signals are used with the computer acting as DTE and the Changer acting as DCE. Only the Tx and Rx data lines are used although the DSR, CTS & CD are permanently "high" to avoid having to use custom RS-232 cables.
    2. Data configuration:
        Baud rate = 2400, 8 bits, 1 start bit, 1 stop bit, no parity

2. Software:
    There is a basic relationship between the two units: The PC acts as the master and the Changer as a slave. The Changer will never initialize a communication sequence, it will only respond to commands from the PC.

    The commands are of two types: "Do" and Status Request. The Changer will respond with an "ACK" for a "Do" command and with the Changer's status if the command was a status request. There should be no more than 10ms delay for the ACK from the board. On power-up, allow 5 seconds before starting communication.

    There is a 100ms maximum interval between bytes sent to the Changer. *Manually typing commands in HyperTerminal is too slow and will not work.* Dispense commands and dump commands cannot be sent while the unit is "Busy." A status command should be sent first to determine the hopper's status. All hoppers must be polled with a status request individually.

    Also note that there often will be several four-byte responses to a status request. For example, the opto could be blocked and the hopper could be low. All the responses will be delivered as one sequence. <u>All commands must be sent twice for validation and the Changer will also send all its frames twice.</u>

    It is up the PC to check the status of a device before issuing a command and to check the success of the command after a suitable time interval.

Status Requests

1. General: The PC sends $hSR (h = 1,2,3,4,5,6,7,8 = hopper number)

2. Changer responds:
> 1. $hNC = Hopper not communicating
> 2. $hOB = Hopper opto blocked
> 3. $hMC = Hopper max current exceeded
> 4. $hFD = Hopper fraud
> 5. $hTO = Hopper timed out during payout
> 6. $hLC = Hopper low coins
> 7. $hOK = Hopper ok, ready to dispense.
> 8. $hBS = Hopper busy dispensing.
> 9. $hCS = Hopper checksum error
> 10. $CNF = Controller board failure
> 11. $END = End of frame

Example: PC sends: $3SR$3SR to request the status from hopper 3.

Note: To indicate that the last status string has been sent, a $END will be sent.
For example, if there is a fraud and a low condition on hopper 3:
$3FD$3LCEND3FD$3LC$END = 24 bytes,
All OK hopper 2: $2OK$END$2OK$END = 16 bytes

Commands to the Changer

3. General: The PC sends #h(command)
> 1. Dispense Coins: #hnn, (nn = 01 to 99) (h = 1,2,3,4,5,6,7,8 = hopper number)
> 2. Dump Start: #hDS
> 3. Dump End: #hDE

4. Changer responds: $ACK

Example: PC sends: #313#313 to dispense 13 coins from hopper 3. Changer responds:
ACKACK.

To test using a PC:

In Notepad create a file containing #313#313 and save as C:\Junk.txt
From DOS C:-prompt type: Copy Junk.txt to COM1 (your current port with proper configuration)
From HyperTerminal: Copy command string from Junk.txt file, and then Paste it into
HyperTerminal window (select option "Echo typed characters locally", to see the commands as
they are Pasted).