



Application Note

**Subject: Changing Si™ Parameters “On The Fly” from a PC or PLC,
Using RS-232 communications**

Applies to: Si5580, Si3540, 3540i, 7080i, Si-100

Date: December 9, 1998

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Since the introduction of the "Si" family of drive-controllers, we have had numerous requests for a host PC, PLC or workstation to be able to make program changes "on the fly".

The Si drives were designed to be programmed from easy to use Window-based software that is provided with each control. An "on line mode", where a host CPU continuously sends commands to the controller, is currently not provided. However, it is possible for a user to change move distances, move speeds or repeat loop counts "on the fly" with existing software. Time delays can also be changed using a simple repeat loop. The same technique can also be used for conditional branching and triggering over the RS-232 line. With V1.40 and higher firmware, it is even possible to "jog" from a PC or other ASCII device. The "trick" is to put MMI Prompt instructions in the program, then program a PC to respond like an operator pressing buttons on the man machine interface.

This is what the user must do:

- 1) Provide a dedicated, 9 pin RS-232 port set for 9600 baud, 8 data bits, 1 stop bit and no parity. The Si drives do not use hardware handshaking. There is no connection to CTS or DTR. The RS-232 connection is a three wire type: TX, RX and GND.
- 2) If you are using a PC with 9 pin serial port, use the cable supplied with your drive.
- 3) Write a program for the Si (using the Si Programmer software that is supplied with every drive) that uses MMI Prompt instructions to request data over the RS-232 line.
- 4) Write a program for the PC, using whatever language the user prefers, to wait for prompts and supply data. Page 4 shows a sample Visual Basic program.

Example:

Let's say that the user wants to enter the move distance, in steps, for a Feed to Length instruction.

- Place an MMI Prompt instruction in the Si program before the Feed to Length. Set the scaling at 1. Choose one of the 8 MMI variables for storing the data that you'll be sending over the RS-232 when the MMI Prompt instruction executes.
- Set your Feed to Length program so that it gets its distance from the same MMI variable.

When the MMI Prompt executes, this is what will happen:

1. The Si drive will send ASCII control characters over the RS-232 to clear the MMI display and send the cursor home. The characters are escape (ASCII 27) and "E".
2. The Si drive will send the MMI prompt text over the RS-232. If you enter no text in the MMI Prompt instruction, the drive will send nothing but escape-E.
3. The Si drive will then move the cursor to row 4 of the MMI, by sending the ASCII chars ESCAPE, "Y", "#", " ". That's four characters. (Escape is ascii 27.)
4. Finally, the distance that is presently in the MMI variable will be displayed as the default. If scaling is turned off (by setting scale to 1 in the MMI Prompt dialog box when you write the program), then the distance will display as an integer (i.e. with no decimal places). Leading zeros are suppressed. So why am I telling you this? See step 5.
5. Before you can enter a new distance on the MMI, you must first hit the backspace key enough times to clear out the old value. Or as much of it as you don't want. For example, if the old distance is 6000 steps and you want to enter 6005, hit the backspace key once, then press 5, then press enter. When emulating the MMI from the PC, you must do something similar. If you want to enter a completely new value each time, send eight backspace chars (backspace is ASCII 8) over the RS-232. That will clear out even the largest possible distance, and extra backspaces don't hurt. Then send your new distance in ASCII. For example, if you want to enter 3000, send the string "3000" (no quotes, though) as if someone were pressing the actual keys. Then send ENTER (ASCII 13) to end the MMI Prompt instruction.

If in doubt, try this with the Windows terminal program Hyperterm and watch what happens. A separate application note describes the use of Hyperterm with the Si™ drives.

Note 1: Firmware 1.40 and higher does not require backspaces to clear out the old variable; any new numeric entry will automatically clear out the old value.

Note 2: Because the MMI data entry software in the Si™ drives was intended to interact with a person, it will not accept an uninterrupted string of characters at 9600 baud. Therefore, the computer program that you write must put a delay of at least 10 milliseconds between each character it sends to the Si™ drive. Please see the example program on page 4 for details.

Summary of MMI "emulation"

Entering a Distance using MMI Prompt

- Si drive sends ESCAPE,"E", followed by the prompt text you entered
- Si drive sends escape "Y# ", followed by distance that's already in MMI variable
- Send 8 backspace characters to Si drive (not required with V1.40+ firmware)
- Send your new distance to Si drive, followed by ASCII 13. Example: 35000 J

Entering a Speed using MMI Prompt

- Si drive sends ESCAPE,"E", followed by the prompt text you entered
- Si drive sends escape "Y# ", followed by speed that's already in MMI variable
- Send 8 backspace characters to Si drive (not required with V1.40+ firmware)
- Send your new speed to Si drive, in rev/sec, followed by ASCII 13. Example: 10.25 J

Entering a Repeat Loop Count using MMI Prompt

- Si drive sends ESCAPE,"E", followed by the prompt text you entered
- Si drive sends escape "Y# ", followed by count value that's already in MMI variable
- Send 5 backspace characters to Si drive (not required on V1.40+ firmware)
- Send your new count to Si drive, followed by ASCII 13. Example: 1230 J

Triggering and Jogging using MMI Prompt

- Si drive sends ESCAPE,"E", followed by the prompt text you entered
- Si drive is now paused.
- When you want the Si drive to proceed with the program, send ASCII 13.
- If "jogging on arrow keys" is enabled, send ASCII "D" to start jogging clockwise, and any key to stop.
- Send ASCII "C" to start jogging CCW, any key to stop.

Branching using MMI Prompt

- Si drive sends ESCAPE,"E", followed by the prompt text you entered
- Send "+" to drive if you want to branch to line number previously programmed.
- Send "-" to drive if you don't want to branch.

Changing a Dwell Time using MMI Prompt

- Program a routine to repeat a given dwell time a multiple of times as downloaded from the PC using the MMI variable. As an example the following commands allow the PC to vary the total dwell time in 1 second increments:

```
MMI(Count1): ENTER # 1 SECOND DWELLS
Repeat(Count1)
Wait 0.1 seconds
End Repeat Loop
```

Visual Basic Sample Code

Reads a distance from the text file "c:\dist.txt" and sends it to indexer-drive via COM1.

```
Sub SendDist
  On Error GoTo sayerror
  filename = "c:\dist.txt"
  Open filename For Input As #1
  Input #1, x
  Close #1
  MSComm1.CommPort = 1
  MSComm1.Settings = "9600,N,8,1"
  MSComm1.PortOpen = True
  For i = 1 To Len(x)
    MSComm1.Output = Mid$(x, i, 1)
    WaitTenth
  Next i
  MSComm1.Output = Chr(13)
  MSComm1.PortOpen = False
sayerror:
  If Err <> 0 Then MsgBox "Error: " & Err.Description, vbExclamation,
  "Error"
  EndEnd Sub

Sub WaitTenth() ' a 0.1 second time delay
  t0 = Timer
  Do
  Loop Until Timer - t0 > 0.1
End Sub
```