SC100 ISOLATED RS-232 BAUD RATE CONVERTER INTERFACE INSTRUCTION MANUAL

REVISION: 8/96

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SC100 ISOLATED RS-232 BAUD RATE CONVERTER INTERFACE

The SC100 interface is an updated version of the SC7638 interface. The device has signal and power isolation and is powered by the datalogger. A male 9 pin D-type connector on one side connects to a CR10(X) or 21X, and a female 9 pin D-type connector connects to an RS232 device (computer or sensor (jumper configurable DTE or DCE)). Features programmed to this point include:

- Burst mode: (from datalogger to computer) In this mode the SC100 can receive burst data from the datalogger at 76.8k baud, then buffer the data and transmit to the computer at 38.4k baud.

- Instruction 15 mode: The SC100 can be configured to support the datalogger Instruction 15 as a transducer RS232 communication interface. The SC100 function is to insure data synchronization and to support baud rates other than 300 or 1200 baud. In this mode the SC100 has a configurable record structure which can be initialized by the datalogger. This configurable information is volatile and requires re-initialization if the SC100 is powered down. By default (without datalogger initializing the SC100) the SC100 simply buffers the data coming from a sensor or computer until a carriage return, then flags the datalogger that data is present. The SC100 then transmits the data to the datalogger when Instruction 15 asserts the DTR line. In a given record structure, the SC100 searches for a specified string then buffers all of the data following the string until it encounters a termination character (the search string and termination characters are user specified through the optional initialization sequence). Some data conversion (e.g., alpha characters to number equivalents) can also be performed.

Command sequences from the datalogger (CR10(X) only). This is the optional initialization sequence.

Command for initializing search/find & replace structure:

ctrl-Q(17), I (73), 1 (49)

Following these three command bytes the SC100 will expect:

Structure initialization information:

1) search byte 1 (range from 1-127; must be 0 if not used)
2) search byte 2 (range from 1-127; must be 0 if not used)
3) search byte 3 (range from 1-127; must be 0 if not used)
4) search byte 4 (range from 1-127; must be 0 if not used)
5) search byte 5 (range from 1-127; must be 0 if not used)
6) search byte 6 (range from 1-127; must be 0 if not used)
7) byte --> 0 (this location must always be 0)
8) find and replace with 0 (range from 1-126; must be 127 if not used)
9) find and replace with 1 (range from 1-126; must be 127 if not used)
10) find and replace with 2 (range from 1-126; must be 127 if not used)
11) find and replace with 3 (range from 1-126; must be 127 if not used)
12) termination character (range from 1-127)

NOTE: Within the CR10(X) Instruction 15 parameter 06 (number of locations to send) must be 15. Also parameter 03 (cts/delay before send) must be 1.

Command to enter transparent mode:

ctrl-Q(17), I (73), S (83)

Command to exit transparent mode:

either
1) change the baud rate, parity status
2) change the initialize structure

Command for changing the baud rate, parity, and error reporting:

ctrl-Q(17), I (73), B (66)

Following these three command bytes the SC100 will expect:

Structure initialization information:

byte 1) 1 byte COMPUTER/SENSOR Baud Rate:
16 - 38.4k baud
17 - 19.2k baud
18 - 9600 baud
19 - 4800 baud
20 - 2400 baud
21 - 1200 baud

Values other than these listed will result in non-standard baud rates.

Buffering in one direction only (appropriate delays should be programmed with baud rates under 1200 baud when the datalogger transmits character to the computer/sensors).

byte 2) 1 byte for parity (computer/sensor side), full or half duplex (datalogger side), error messages (computer/sensor side).

Example

01010100 binary --> 54 hex -->84 decimal --> send errors, even parity, full duplex

Bit6 (error/no error) - If set to 1 the SC100 will report any framing, overrun, or parity errors form the computer/sensor side. This information will be added to the end of the buffered data sent to the datalogger, and will either be zero (0) for no errors, or one through nine (1-9) for number of errors detected.

Bit4 (even/odd) - Even or odd parity if parity bit2 is set to one.

Bit3 (half/full) - There are two different versions of Instruction 15 for the CR10 datalogger. Half duplex, or full duplex. The PROM installed in the CR10 determines the version. The CR10X uses full duplex. Whenever the datalogger executes Instruction 15, the DTR line goes high. The DTR line remains high for transmitting and goes low for receiving. With the full duplex version, data can be received before the transmitting has been completed (data can not be received before the delay time entered in parameter 3).

The SC100 will delay 12 msec before transmitting the buffered data (parameter 3 must be 1 --> 10 msec).

Three out of the five different Input/Output Configurations for Instruction 15 can be used with the SC100 and they are 1, 2 and 4.

x	1=error 0=no error	x	1=even 0=odd	1=half 0= full	1=parity 0= none	x	x
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0

x-don't care

	Parameters				Port Function			
Configuration number	3	6	8		DTR	CTS	TX	RX
1. DTR, RX	1	0	NZ		C	NC	NC	C+1
2. DTR,TX	1	NZ	0		C	NC	C+1	NC
4. DTR, TX, RX	1	NZ	NZ		C	NC	C+1	C+2

NOTE: Configuration numbers 2 & 4 have transmit (Tx) on the same control port (c+1). This is useful if you plan to initialize the SC100 and receive data without having to change the control port functions.

Choosing value for bit3 (half/full):

1) If the half duplex version and configuration number 2 or/and 4 are used, then bit3 must be 1.

2) If the full duplex version and configuration number 2 or /and 4 are used, then bit3 must be 0.

3) If configuration number 1 is used, then bit3 must be 0 for either half or full duplex.

Bit2 (parity/none) when this bit is set to one, then either even or odd parity (depending on bit 4) will be enabled for the computer/sensor side.

Pig tail to DB 9 pin cable

Red	supply volts (jumper configurable to either +12 V or +5 V)
Black	Gnd
Blue	DTR input
Orange	TXD input
Brown	RXD output
Green	FLAG output (SC100's output that indicates buffered information ready)
Yellow	Power Down wire (+5 V will power down the SC100 if internal jumper is connected, connect to gnd if not used). There are three different power modes. 1) Yellow wire tied low (gnd) normal operation mode ~55ma. 2) Yellow wire high (+5 V), Red wire +12 V, power down mode ~ 2ma 3) Yellow wire high (+5 V), Red wire +5 V power down mode >50 Micro Amps

Examples of connecting Pig tail cable to datalogger

Instruction 15 input/output configurations Number 4 (refer to "15 control port serial" manual, table 1) DTR, TX, RX with first control port parameter 4 = 1

Red	+12 V or +5 V (check jumpers in the SC100)
Black	Gnd
Blue	C1
Orange	C2
Brown	C3
Green	C4
Yellow	GND

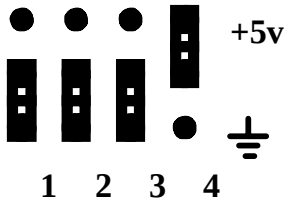
Instruction 15 input/output configurations Number 1 DTR, RX with first control port parameter 4 = 1

Red	+12 V or +5 V
Black	Gnd
Blue	C1
Orange	no connect
Brown	C2
Green	C3
Yellow	GND

On board jumper setting

4	3	2	1	Modes
0	0	0	0	Burst Mode
0	0	1	0	P15, 9600, Half, None
0	1	0	0	P15, 9600,Full,None
0	1	1	0	P15, 4800, Half, None
1	0	0	0	P15, 4800, Full, None
1	0	1	0	P15, 9600, Full, Even
1	1	0	0	P15, 9600, Full, Odd
1	1	1	0	P15, 1200, Full, None

Example of jumper setting p15,4800,full,none ----->



Computer/Sensor DB9 pin configuration:

jumpers located around the computer/sensor DB9 pin connector.

DCE mode to connect to computer

DTE mode to connect to sensor

Example of how to configure the SC100 to set up baud rate, parity and error detection

```
03:   P91          If Flag/Port
  01:      26      Do if flag 6 is low
  02:      30      Then Do

04:   P30          Z=F
  01:      17      F                    command character (ctrl Q)
  02:      00      Exponent of 10
  03:      10      Z Loc :

05:   P30          Z=F
  01:      73      F                    command character ( I )
  02:      00      Exponent of 10
  03:      11      Z Loc :

06:   P30          Z=F
  01:      66      F                    command character ( B )
  02:      00      Exponent of 10
  03:      12      Z Loc :

07:   P30          Z=F
  01:      18      F                    byte 1 ( baud rate --> 9600)
  02:      00      Exponent of 10
  03:      13      Z Loc :

08:   P30          Z=F
  01:      08      F                    byte 2 ( no error, no parity, half duplex)
  02:      00      Exponent of 10
  03:      14      Z Loc :

10:   P15          Port Serial I/O (Special)
  01:       1      Rep
  02:      01      Configuration code
  03:       1      CTS/Delay
  04:       1      First control port
  05:      10      Output Loc
  06:       5      No. of locs to send
  07:      13      Termination character
  08:       0      Maximum characters
  09:      20      CTS/Input wait
  10:       3      Loc :
  11:       1      Mult
  12:       0      Offset

11:   P86          Do
  01:      16      Set high Flag 6

12:   P95          End
```

Example of how to configure the SC100 to transparent mode

```
13:   P91          If Flag/Port
  01:      11      Do if flag 1 is high
  02:      30      Then Do
```

14:	P30		Z=F	
01:		17	F	**command character (ctrl Q)**
02:		00	Exponent of 10	
03:		10	Z Loc :	
15:	P30		Z=F	
01:		73	F	**command character (I)**
02:		00	Exponent of 10	
03:		11	Z Loc :	
16:	P30		Z=F	
01:		83	F	**command character (S)**
02:		00	Exponent of 10	
03:		12	Z Loc :	
17:	P15		Port Serial I/O (Special)	
01:		1	Rep	
02:		01	Configuration code	
03:		1	CTS/Delay	
04:		1	First control port	
05:		10	Output Loc	
06:		3	No. of locs to send	
07:		13	Termination character	
08:		0	Maximum characters	
09:		1	CTS/Input wait	
10:		2	Loc :	
11:		1	Mult	
12:		0	Offset	
18:	P86		Do	
01:		21	Set low Flag 1	
19:	P95		End	

Example of how to initialize the SC100's search/find & replace structure

20:	P91		If Flag/Port	
01:		13	Do if flag 3 is high	
02:		30	Then Do	
21:	P30		Z=F	
01:		17	F	**command character (ctrl Q)**
02:		00	Exponent of 10	
03:		10	Z Loc :	
22:	P30		Z=F	
01:		73	F	**command character (I)**
02:		00	Exponent of 10	
03:		11	Z Loc :	
23:	P30		Z=F	
01:		49	F	**command character (1)**
02:		00	Exponent of 10	
03:		12	Z Loc :	
24:	P30		Z=F	
01:		66	F	**search byte 1 (B)**

02:		00	Exponent of 10	
03:		13	Z Loc :	
25:	P30		Z=F	
01:		69	F	**search byte 2 (E)**
02:		00	Exponent of 10	
03:		14	Z Loc :	
26:	P30		Z=F	
01:		78	F	**search byte 3 (N)**
02:		00	Exponent of 10	
03:		15	Z Loc :	
27:	P30		Z=F	
01:		00	F	**search byte 4 (00 terminates search)**
02:		00	Exponent of 10	
03:		16	Z Loc :	
28:	P30		Z=F	
01:		00	F	**search byte 5 (00 terminates search)**
02:		00	Exponent of 10	
03:		17	Z Loc :	
29:	P30		Z=F	
01:		00	F	**search byte 6 (00 terminates search)**
02:		00	Exponent of 10	
03:		18	Z Loc :	
30:	P30		Z=F	
01:		00	F	**search byte 7 (must always be 00)**
02:		00	Exponent of 10	
03:		19	Z Loc :	
31:	P30		Z=F	
01:		127	F	**find & replace 0 (127 --> not used)**
02:		00	Exponent of 10	
03:		20	Z Loc :	
32:	P30		Z=F	
01:		69	F	**find & replace 1 (E is replaced with 1)**
02:		00	Exponent of 10	
03:		21	Z Loc :	
33:	P30		Z=F	
01:		87	F	**find & replace 2 (W is replaced with 2)**
02:		00	Exponent of 10	
03:		22	Z Loc :	
34:	P30		Z=F	
01:		127	F	**find & replace 3 (127 --> not used)**
02:		00	Exponent of 10	
03:		23	Z Loc :	

```
35:   P30              Z=F
  01:      13          F                    termination character ( carriage return)
  02:      00          Exponent of 10
  03:      24          Z Loc :

37:   P15              Port Serial I/O (Special)
  01:       1          Rep
  02:      01          Configuration code
  03:       1          CTS/Delay
  04:       1          First control port
  05:      10          Output Loc
  06:      15          No. of locs to send
  07:      13          Termination character
  08:       0          Maximum characters
  09:     100          CTS/Input wait
  10:       3          Loc :
  11:       1          Mult
  12:       0          Offset

38:   P86              Do
  01:      23          Set low Flag 3

39:   P95              End
```

Example of how to receive buffered information

```
40:   P91              If Flag/Port
  01:      44          Do if port 4 is high
  02:      30          Then Do

41:   P15              Port Serial I/O (Special)
  01:       1          Rep
  02:      01          Configuration code
  03:       1          CTS/Delay
  04:       1          First control port
  05:       9          Output Loc
  06:       1          No. of locs to send
  07:      13          Termination character
  08:     100          Maximum characters
  09:    1000          CTS/Input wait
  10:       1          Loc :
  11:       1          Mult
  12:       0          Offset

42:   P95              End
```