INSTRUCTION MANUAL

10164-L Sampler Control Cable for use with Isco and Sigma Autosamplers

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10164-L Sampler Control Cable for use with Isco and Sigma Autosamplers

1. General

The 10164-L sampler control cable enables a datalogger to trigger an Isco, American Sigma, or connector-compatible autosampler. Through this cable, the datalogger can inhibit the sampler from running its programmed sampling routine and sense and record when the sampler indicates that it has taken a sample. Each of these functions is independent of the others and may be combined as desired.

2. Specifications

Sampler Connection: mil-spec, 6-pin circular connector (shell size 14)

Datalogger Connection: pigtail with individual conductors

Current Drain: < 1 mA; consult the specifications of the connected sampler to determine its power considerations.

Cable Length: 50 ft standard; 1000 ft maximum (see Cable Length Considerations)

2.1 Cable Length Considerations

In most applications, the 10164 cable connects the datalogger to a sampler residing in the same instrumentation shack. Therefore, a cable length of 50 ft or less is typically used.

Cable lengths up to 1000 ft are possible if the sampler supports long event markers. For example, the Isco-brand sampler has a 3 second event marker, which is an adequate duration for a 1000 ft cable length.

CAUTION The 10164 does not include surge protection. Therefore, longer cables need to be protected from surges in order to safeguard the system from electrical transients. A recommended method of doing this is to place the cable in a metal conduit and then bury the conduit at a depth of at least one foot.

3. Wiring

3.1 General Wiring Information

FIGURE 3-1 shows a schematic of the 10164 and TABLE 3-1 shows pin connector and wire functions.

Sections 3.2 through 3.4 provide information about connecting the wires to a datalogger. The datalogger wiring depends on the function.

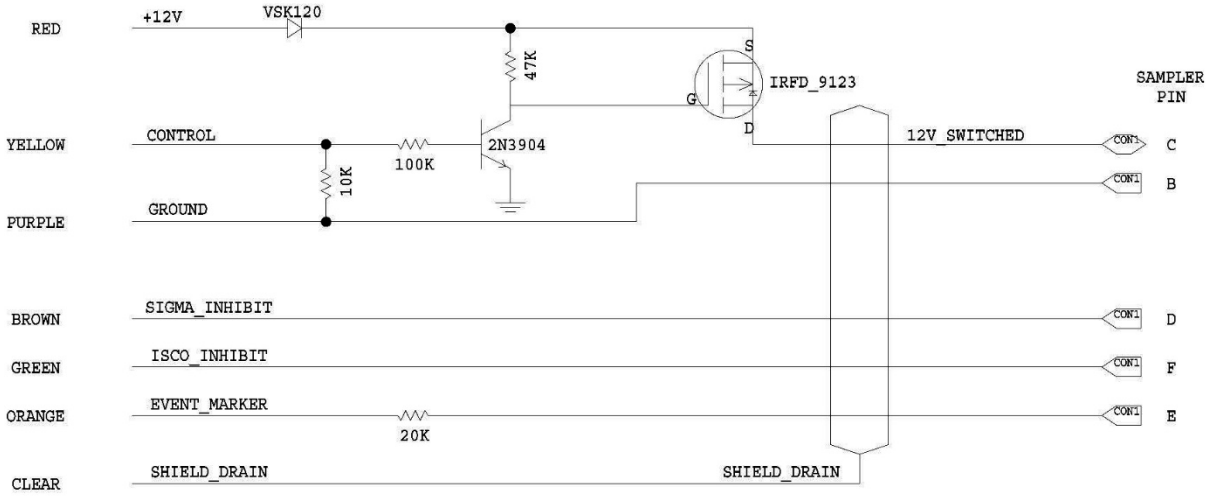

FIGURE 3-1. 10164 Sampler Control Cable Schematic

TABLE 3-1. Technical Details of Cable Design

Wire Color	Via	Connector Pin
Brown	Direct	D
Green	Direct	F
Purple	Direct	B
Yellow	Solid State Relay Circuit	None (controls C)
Red	Solid State Relay Circuit	C
Orange	20 kohm Resistor	E
Clear	Cable Shield	No Connection

3.2 Triggering Sampler

TABLE 3-2 shows the datalogger connections required to trigger the sampler.

TABLE 3-2. Datalogger Wiring for Triggering Sampler

Color	Description	CR800 CR850 CR1000 CR3000	CR500 CR510 CR10(X)	CR23X 21X
Purple	Ground	⏚	G	⏚
Yellow	Control Port	Control Port (C1, C2,…)	Control Port (C1, C2,…)	Control
Red	Power	12V	12V	+12
Clear	Shield	⏚	G	⏚

NOTE Insulate and tuck the unused wires out of the way.

3.3 Sense Sampler Event Markers

TABLE 3-3 shows the datalogger connections required to sense the sampler events.

TABLE 3-3. Datalogger Wiring for Sampler Event Marker

Color	Description	CR800 CR850 CR1000 CR3000	CR500 CR510 CR10(X)	CR23X 21X
Purple	Ground	G	G	⏚
Orange	Pulse	Pulse Channel (P1, P2,…)	Pulse Channel (P1, P2,…)	Pulse
Clear	Shield	⏚	G	⏚

NOTE Insulate and tuck the unused wires out of the way.

3.4 Inhibit Sampler's Program

Some samplers run their own program that you might want to inhibit. The wiring for inhibiting the sampler's onboard program depends on the program's logic. TABLE 3-4 shows the wiring for Sigma samplers that require a control port to be set high to inhibit their onboard program. TABLE 3-5 shows the wiring for Isco samplers that require a control port to be set low to inhibit their onboard program.

TABLE 3-4. Datalogger Wiring to Inhibit a Sigma Sampler Program

Color	Description	CR800 CR850 CR1000 CR3000	CR500 CR510 CR10(X)	CR23X 21X
Purple	Ground	⏚	G	⏚
Brown	Control Port	Control Port (C1, C2,…)	Control Port (C1, C2,…)	Control
Clear	Shield	⏚	G	⏚

TABLE 3-5. Datalogger Wiring to Inhibit an Isco Sampler Program

Color	Description	CR800 CR850 CR1000 CR3000	CR500 CR510 CR10(X)	CR23X 21X
Purple	Ground	⏚	G	⏚
Green	Control Port	Control Port (C1, C2,…)	Control Port (C1, C2,…)	Control
Clear	Shield	⏚	G	⏚

NOTE Insulate and tuck the unused wires out of the way.

4. Programming

The datalogger is programmed using either CRBasic or Edlog. Dataloggers that use CRBasic include the CR800, CR850, CR1000, and CR3000. Dataloggers that use Edlog include the CR10(X), CR510, CR500, CR23X, and 21X.

With this cable, the datalogger can be programmed to:

- Trigger the sampler
- Sense and record when the sampler has taken a sample
- Inhibit the sampler from running its onboard sampling routine

Each of these functions is independent of the others and may be combined as desired.

4.1 CRBasic Programming

4.1.1 Trigger Sampler

To trigger the sampler, the datalogger program must set the port high, delay for at least 0.5 seconds, and then set the port low.

TABLE 4-1. Wiring for CRBasic Triggering Sampler Example

Color	Description	CR800, CR850, CR1000, or CR3000
Purple	Ground	⏚
Yellow	Control Port	C2
Red	Power	12V
Clear	Shield	⏚

For example, if control port 2 is used (see TABLE 4-1), a datalogger program that includes the following CRBasic instructions will trigger the sampler:

```
PortSet(2,1)
Delay(0,50,mSec)
PortSet(2,0)
```

NOTE Above is only a portion of the CRBasic program.

4.1.2 Sense Sampler Event

To sense the sampler event, use the **PulseCount()** instruction with the *PConfig* parameter set to high frequency (code 0). The value stored in the variable should be totalized.

The following example program will sense the sampler events when the cable is wired to pulse channel 1 (see TABLE 4-2).

TABLE 4-2. Wiring for CRBasic Sampler Event Marker Example

Color	Description	CR1000
Purple	Ground	G
Orange	Pulse	P1
Clear	Shield	⏚

```
'CR1000 Series Datalogger

'Declare Public Variables
Public Events

'Define Data Tables
DataTable (Sampler,1,1000)
  Totalize (1,Events,FP2,False)
EndTable

'Main Program
BeginProg
  Scan (1,Sec,0,0)
    PulseCount (Events,1,1,0,0,1.0,0)
    'Call Output Tables
    CallTable Sampler
  NextScan
EndProg
```

4.1.3 Inhibit Sampler's Program

To inhibit a sampler's onboard program, use the **PortSet()** instruction. Whether the port should be set low or high depends on the onboard program's logic. For samplers such as the products manufactured by Isco, the onboard program is inhibited by setting the control port low.

TABLE 4-3. Wiring for Example of Inhibiting an Isco Onboard Program

Color	Description	CR800, CR850, CR1000, or CR3000
Purple	Ground	⏚
Green	Control Port	C1
Clear	Shield	⏚

For example, if the cable is wired as shown in TABLE 4-3, a datalogger program that includes the following CRBasic instruction will inhibit an Isco sampler's onboard program:

PortSet(*1,0***)**

NOTE Above is only a portion of the CRBasic program.

After an Isco sampler's program has been inhibited, it can be allowed to run by setting the port high.

TABLE 4-4. Wiring for Example of Inhibiting a Sigma Sampler Onboard Program		
Color	**Description**	**CR800, CR850, CR1000, or CR3000**
Purple	Ground	⏚
Brown	Control Port	C1
Clear	Shield	⏚

For samplers such as the products manufactured by Sigma, the onboard program is inhibited by setting the control port high.

For example, if the cable is wired as shown in TABLE 4-4, a datalogger program that includes the following CRBasic instruction will inhibit a Sigma sampler's onboard program:

PortSet(*1,1***)**

NOTE Above is only a portion of the CRBasic program.

After a Sigma sampler's program has been inhibited, it can be allowed to run by setting the port low.

4.2 Edlog Programming

4.2.1 Trigger Sampler

Wire Color	**CR10(X)**
Purple	G
Yellow	C2
Red	12V
Clear	G

To trigger the sampler, pulse port 2 using a set of instructions such as follows:

```
Do (P86)
  1:   42         Set Port 2 High

; Note: The 50 in the third parameter keeps the
; port high for 0.5 seconds. Some users have
; reported using a delay of 1 sec (100 in
; parameter 3) to ensure reliable triggering of
; the sampler.

Excitation with Delay (P22)
  1:   1          Ex Channel
  2:   0          Delay W/Ex (units = 0.01 sec)
  3:   50         Delay After Ex (units = 0.01 sec)
  4:   0          mV Excitation

Do (P86)
  1:   52         Set Port 2 Low
```

You can also supply the trigger signal from switched excitation if no control ports are available. In this case, connect the yellow cable to the desired excitation channel (say E3) and pulse the channel using Instruction 22 as follows:

```
Excitation with Delay (P22)
  1:   3          EX Chan (or the channel you select)
  2:   50         Delay w/EX (units=0.01sec)
  3:   0          Delay after EX (units=0.01sec)
  4:   2500       mV Excitation
```

4.2.2 Sense Sampler Event Markers

4.2.2.1 Pulse Port Method

Wire Color	CR10(X)
Purple	G
Orange	P1
Clear	G

To sense sampler events, use Instruction 3 with a configuration code of 0.

```
Pulse (P3)
  1:   1          Reps
  2:   1          Pulse Input Chan
  3:   0          High frequency (configuration code)
  4:   2          Loc [:EVENTS]
  5:   1          Mult
  6:   0          Offset
```

To record the events in the datalogger's final storage area, remember to totalize the events temporarily stored in Input Location 2 in this example.

4.2.2.2 CR10(X) Control Port Interrupt Method

For the CR10(X), there is another useful method for sensing and recording sampler events. This method uses the control port 8/subroutine 98 interrupt feature of the CR10(X). Each time the sampler reports an event, the CR10(X) records the sample number with a time stamp in final storage. In this example, sampler events will show up as output arrays with an array ID of 400.

Wire Color	CR10(X)
Purple	G
Orange	C8
Clear	G

```
CR10(X) Program (Subroutine 98 in Program Table 3)
  *    3          Table 3 Subroutines

1:  Beginning of Subroutine (P85)
  1:   98         Subroutine Number

2:  Z=Z+1 (P32)
  1:   10         Z Loc [ Sample_No ]
```

```
3:  Do (P86)
  1:   10         Set high Flag 0 (output flag)

4:  Set Active Storage Area (P80)
  1:   1          Final Storage Area 1
  2:   400        Array ID or location

5:  Real Time  (P77)
  1:   1110       Year,Day,Hour-Minute

6:  Sample (P70)
  1:   1          Reps
  2:   10         Loc [ Sample_No ]

7:  End (P95)                          ;of Subroutine Number 98

End Table 3
```

4.2.3 Inhibit Sampler's Program

Wire Color	**CR10(X)**
Purple	G
(Isco) Green	C1
(Sigma) Brown	C1
Clear	G

To *inhibit* an Isco sampler from running its own program, set control port 1 low using a program control instruction such as Instruction 86. To allow the sampler to run its program, set it high.

NOTE The logic for Sigma samplers is just the opposite. A high signal inhibits the sampler.

Example for inhibiting an Isco sampler's program:

```
Do (P86)
  1:   51         Set Port 1 low         ; (41 would set it high)
```

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