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Application Bulletin

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Retrieving Tap Change Indication Data from an INCON1250B via an SEL 2020 or 2030 Communications Processor

Introduction

This application guide provides information and settings required to extract Tap Position Indication from an INCON 1250B Programmable Position Monitor via an SEL 2020 / 2030 Communication Processor. To use this application guide, the INCON 1250B must be fitted with the "RS232 SERIAL PORT" option. Refer to INCON 1250B manual for details.

INCON 1250B Programmable Position Monitor

The INCON 1250B measures the absolute position of a synchro transmitter, commonly known as a Selsyn®. It provides both a user definable visual panel indication and optional analog and digital signal outputs suitable for a variety of monitoring and control applications. It is used for Tap Change Position Indication on power transformers in electrical power systems.

INCON1250B Serial Port Modes

The Serial RS232 (DCE) option on the Model 1250B can be used to program or to retrieve position data from the instrument. There are seven operating modes for the serial RS-232 port. In this application we shall use only the Sampled Mode. This application bulletin assumes that all programming will be done through the front panel buttons. Serial port command line programming of the 1250B is possible, but is not beneficial to this application.

- **Sampled Mode** When this mode is selected, the 1250B can be interrogated at any time via the RS-232 port for current position by transmitting a question mark (?) to the 1250B. When the 1250B receives a question mark, it responds by latching the current position and transmitting the value on the display in ASCII form. To select this mode use the front panel menu command **OP 51, RS232, SERIAL** command to choose mode **"3"**.

Setting 1250B Communication Port Parameters

Selecting **OP80, POrt** provides access to the settings for the serial port parameters: (press the UP or Down key to select a value, press the enter key to advance to the next parameter),

The communication port settings: baud rate, word length, parity, stop bits, and address are programmable using the front panel menu or via the serial port itself once communication is established.
The serial port parameters are shown below.

Baud Rate: Default 9600, Valid Selections 2400, 4800, 9600, 14400, 19200, 28800,38400, 57600, 76800
Word Length: Default 8, Valid Selections 7, 8
Parity: Default n, Valid Selections n, E, O
Stop Bits: Default 1, Valid Selections 1 or 2
Address (for RS-485 Multi-drop only): Default 128, Valid Selections 0 to 255

Setting up the INCON 1250B

Ensure that the INCON 1250B is connected to a suitable source of supply, powered up, has completed its power up sequence, and is connected to a suitable synchro transmitter.
Using the front panel menu as outlined above:

Set the RS232 mode (OP 51) to **mode 3 (Sampled Mode)**.

Set the INCON 1250B serial port (OP 80) to the **default parameters (9600, 8, n, 1, 128)**.

Connections

Once the INCON 1250B has been programmed, connect the INCON 1250B serial port to the desired SEL 2020 / 2030 port, via an SEL C223A (9 pin male to 25 pin male DTE-DCE) cable. With this connection in place, once the SEL 2020 / 2030 programming is complete, data retrieval will begin automatically.

Note that the INCON1250B RS232 port does not have drive capability to power an SEL 2800 fiber optic transceiver.

Setting Up the SEL 2020 / 2030

Ensure that the SEL 2020 / 2030 is connected to a suitable source of supply; powered up and completed its power up sequence.

Connect the SEL 2020 / 2030 front port to a PC using an SEL 234A cable and establish communication using HyperTerminal or other appropriate software. Using ACC, and 2AC commands, and appropriate passwords (OTTER & TAIL are default) get to level-2 access on the SEL 2020 /2030.

Set the port on the SEL 2020 / 2030 as shown below (user entries in bold, hints in italics, press the (Enter) key at end of line. If the prompt at any given SEL 2020 / 2030 setting shows that setting is already what you want, just press (Enter). This guide assumes port 5 but any other rear port can be used.

*>>**set p 5**
Port communications settings for Port 5

Device Type (U=Unused, S=SEL IED, O=Other IED, P=Printer, M=Master)
DEVICE = O ? **O**

Modem Settings
Modem Control (Y/N) MODEM = N ? **(Enter)**

Attempt to detect port baud rate (Y/N) AUTO_BAUD= N ? **(Enter)**

Communications Type (A=ASCII, B=Binary) PROTOCOL= INVALID ? **A(Enter)**

Port Identification String
PORTID ="rx data" ? **INCON1250B(Enter)**

Communications Settings
Baud Rate (300, 600, 1200, 2400, 4800, 9600, 19200) BAUD = 2400 ? **9600(Enter)**
Number data bits (7,8) DATABIT = 8 ? **8(Enter)**
Stop Bits (1,2) STOPBIT = 1 ? **1(Enter)**
Parity (N,O,E,1,0) PARITY = N ? **N(Enter)**
Enable RTS/CTS handshaking (Y/N) RTS_CTS = N ? **N(Enter)**
Enable XON/XOFF flow control (Y/N) XON_XOFF= Y ? **Y(Enter)**

Port Timeout in minutes (0.0-120.0) TIMEOUT = 0 ? **10(Enter)**

PORT:5
DEVICE = O
MODEM = N
AUTO_BAUD= N
PROTOCOL= A
PORTID ="INCON1250B"
BAUD = 9600
DATABIT = 8 STOPBIT = 1 PARITY = N
RTS_CTS = N XON_XOFF= Y
TIMEOUT = 10.0

Save changes (Y/N) ? **y(Enter)**

Set up automatic messaging on the appropriate port to send the INCON 1250B sample mode interrogation character "?" every 5 seconds as shown below.

*>>**SET A 5**
Automatic message settings for Port 5

Save Unsolicited Messages (Y/N) AUTOBUF = N ?**(Enter)**
Port Startup String
STARTUP = ? **setup\nserial 3\nrun\nexit\n(Enter)**

Block external connections to this port
NOCONN = NA ?**(Enter)**

Auto-message Settings
How many auto-message sequences (0-12) MSG_CNT = 0 ? **1(Enter)**
Item 1 trigger D1
ISSUE1 = NA ?**P00:00:05.0(Enter)**

Item 1 message
MESG1 = NA ? **?(Enter)** *(Enter ? character for prompt)*

Item 1 response parsing method (0=IGNORE, 1=ASCII_INT,
2=ASCII_FLOAT, 3=CHAR_STRING, 4=INT_STRING, 5=INT_STRX,
6=FLEX) PARSE1 = 0 ? **1(Enter)**

Item 1 number of data items NUM1 = 0 ? **1(Enter)**

Time delay to allow response to complete (OFF, ON)DELAY1 = OFF ?**(Enter)**

Size of user-defined data space in registers USER = 41 ?**(Enter)**

AUTOBUF = N
STARTUP ="setup\nserial 3\nrun\nexit\n"
NOCONN = NA
MSG_CNT = 1
ISSUE1 = P00:00:05.0
MESG1 = "?"
PARSE1 = 1
NUM1 = 1 DELAY1 = OFF
USER = 41

Save changes (Y/N) ? **Y(Enter)**

Notes

- The STARTUP string is provided just in case the INCON 1250B has been left in the SERIAL Command Mode. If so, the startup string will set it into the Sample Mode ready to respond to the "?" prompt from the SEL 2020 / 2030. If the INCON 1250B is in any other mode, the startup string will have no effect.
- If this precaution is not considered necessary, STARTUP can be set to the "?" character.
- The INCON 1250B can be set to detect several neutral positions; 0-1, 0-2, 0-3; 17-1, 17-2 17-3, etc. The number of neutral taps and their numbered position is programmed, depending on the tap changer design. So the query response from the unit is one number most of the time, but two numbers when the LTC is on a neutral tap. This guide assumes that normal operation does not care which neutral tap the LTC is in, and so gathers only the first number. The data will show "0" for any neutral tap on which the INCON 1250B response is "0-*n*, where *n* is any other number. The data will show "17" for any neutral tap on which the INCON 1250B response is "17-*n*, where *n* is any other number.

Checking the data sampling

Wait until about 10 seconds after the SEL 2020 / 2030 has completed saving settings and is enabled. Depending on lighting conditions, activity may be observed on the Port 5 Tx and Rx LED. Enter the view command to check the system response as shown below.

```
*>>view 5 d1

Port 5,  Data Region INTEGER   Data

_YEAR = 2004  DAY_OF_YEAR = 237 (08/24)  TIME = 17:30:15.093
INTEGER = 14
```

The response is shown as "INTEGER = ", and in this example assumes the INCON 1250B is measuring tap position 14. The value should match the number displayed on the front panel of the INCON 1250B

If the SEL 2020 / 2030 responds with "Data Region Invalid", the SEL 2020 / 2030 did not receive a valid response from the INCON1250B. Check connections cables and check all settings.

If still no response, check response of INCON 1250B to manual query by connecting transparently to the INCON 1250B via the SEL 2020 / 2030 as follows.
Note that the INCON 1250B will not echo your entries, so the "?" and "Cntrl-D" shown below will not be visible on your PC screen.

```
*>>port 5

Transparent Communications to Port 5 established
? 14 (you type question mark ?, and the INCON1250B responds with tap number)
? 14
Cntrl-D (hold CTRL key down and press "D" once)

Transparent Communications to Port 5 terminated.
```

If the manual query works, but the "View" command still shows invalid, check the port settings and the automatic message settings.

If the manual query does not work, check the INCON 1250B port settings, and the cable.

Transferring the data to a SCADA system master

Once the correct data is shown in the data region of the port, the data can be moved and manipulated via SEL 2020 / 2030 SET M equations to the desired position in the database of a Master port for retrieval by a SCADA master via MODBUS, DNP, or other means. Refer to the SEL 2020 / 2030 instruction manual for SEL 2020 / 2030 specific setting instructions.

For assistance with this or any other SEL device issue please call 509-332-1890 and ask for technical assistance from an application engineer.

For assistance with this or any other INCON device issue please call 800-984-6266 and ask for technical assistance from an application engineer.