



Remote Monitoring and Control

DNP-RTM™

SEL-351 Recloser Control Integration Guide

9941 W Emerald Street
Boise, ID 83704
208-658-1292 FAX 208-323-5575
support@telemetric.net

v. 1.3

Part No.: DNP/SEL 351 Manual1

Revision Log

Date	Revision	Changes
8/27/02	1.0	Initial version
11/13/02	1.1	Addition of instructions for antenna mounting on the bottom of the box.
2/10/03	1.2	Changed DNP Baud to 9600 to match factory default. Flipped order of RTM and SEL 351 programming.
3/25/03	1.3	Changed EZ to FZ settings in the SEL programming section.

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Introduction

Overview

The Telemetric DNP-Remote Telemetry Module (DNP-RTM™) is a cost-effective communications solution for remote monitoring and control of Intelligent Electronic Devices (IEDs) such as the SEL-351 Recloser Control. The DNP-RTM continuously polls the IED through a local serial connection. When a reportable change is detected, the DNP-RTM transmits an event report. This minimizes the cost of communication, yet provides near real-time information. Access to the IED with DNP-RTM can be gained from the utility's SCADA system by using the Telemetric SCADA-Xchange™.

Integrating the Telemetric DNP-RTM with the SEL-351 Recloser Control provides immediate control and status indication of operating conditions to improve system operation and protect investments.

This integration provides monitoring and control capability over many of the SEL-351 parameters. See Table 1, Table 2, and Table 3 for the monitor and control points provided in this integration.

Versions Supported

The DNP point list listed for this integration is compatible with the 351R, 351P and 351J. If you have a 351S, a 351R-2, or a 351P-2, this points list will NOT work. Contact Telemetric Technical Support to see about getting a different points list. The SEL-351 version can be found on a sticker on the back of the SEL-351 control. Use the DNP-RTM profile that matches your particular version.

NOTE - *The DNP-RTM point configuration for the SEL-351 integration requires that the SEL-351 DNP points remain in the factory default configuration. The default configuration is listed in the SEL-351 Instruction Manual in Table H.3: SEL351 Data Map in Appendix H. If points are remapped as described in Appendix H of the SEL-351 Instruction Manual, the sharing of DNP data with the DNP-RTM will not function properly.*

Features

Integrating the Telemetric DNP-RTM with the SEL-351 Recloser Control provides remote notification of recloser events and internal parameter status, as well as the ability to open or close the recloser remotely. Monitor and control points are listed in Table 1, Table 2 and Table 3.

Table 1 – Digital Input Points

Point Number	Point Name	Enabled on RTM	Report on Change	Report Interval	Trigger Time
1000	81	X	X	24	0
1001	High Current	X	X	24	0
1002	Fast Curve	X	X	24	0
1003	Trip	X	X	24	0
1004	Hot Line Tag	X	X	24	0
1005	Battery Problem	X	X	24	0
1006	AC Supply	X	X	24	0
1007	Control Enabled	X	X	24	0
1008	SEF	X	X	24	0
1009	G	X	X	24	0
1010	C	X	X	24	0
1011	B	X	X	24	0
1012	A	X	X	24	0
1013	79 Lockout	X	X	24	0
1014	Cycle	X	X	24	0
1015	Reset	X	X	24	0
1020	Relay Disabled	X	X	24	0
1021	Relay Diagnostic Failure	X	X	24	0
1023	New Event Available	X	X	24	0

Table 2 – Digital Output Points

Point Number	Point Name	Enabled on RTM
10	Reset Demands	X
11	Reset Demand Peaks	X
12	Reset Energies	X
20	Recloser Trip/Close	X

Table 3 – Analog Input Points

Point Number	Point Name	Enabled On RTM	Report Interval	Low Limit	Mid Limit	High Limit
0	IA	X	24	N	N	N
2	IB	X	24	N	N	N
4	IC	X	24	N	N	N
8	VA (kV)	X	24	N	N	N
10	VB (kV)	X	24	N	N	N
12	VC (kV)	X	24	N	N	N
31	3-phase MW	X	24	N	N	N
35	3-phase MVAR	X	24	N	N	N
39	3-phase power factor	X	24	N	N	N
40	Frequency	X	24	N	N	N
48	3-phase MWhr in	X	24	N	N	N
49	3-phase MWhr out	X	24	N	N	N
56	3-phase MVARhr in	X	24	N	N	N
57	3-phase MVARhr out	X	24	N	N	N
58	Demand IA	X	24	N	N	N
59	Demand IB	X	24	N	N	N
60	Demand IC	X	24	N	N	N
80	Peak Demand IA		24	N	N	N
81	Peak Demand IB		24	N	N	N
82	Peak Demand IC		24	N	N	N
105	Fault Type		0	N	N	N
106	Fault Location		0	N	N	N
107	Fault Current		0	N	N	N
108	Fault Frequency		0	N	N	N
110	Fault Recloser Shot Counter		0	N	N	N
111	Fault Time		0	N	N	N
112	Fault Time		0	N	N	N
113	Fault Time		0	N	N	N

Points can be enabled or disabled using the Telemetric web site interface or the Telemetric local configuration program provided with the DNP-RTM. The other settings for the DNP points, such as report interval or trigger time, can be changed only by using the local configuration program. See Appendix A in the DNP-RTM Users' Guide for complete instructions on using the local configuration program.

Safety Information

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians who are familiar with this equipment should install, operate, and service it. We strongly urge that you follow all locally approved safety procedures and safety instructions when working around high voltage lines and equipment.

A competent technician has these qualifications:

- *Is thoroughly familiar with these instructions.*
- *Is trained in industry-accepted high-voltage and low-voltage safe operating practices and procedures.*
- *Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.*
- *Is trained in the care and use of protective equipment such as flash clothing, safety glasses, face shield, hard hat, rubber gloves, hotstick, etc.*

The following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

The following are general caution and warning statements that apply to this equipment.

WARNING: *This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury and equipment damage.*

DANGER: *Hazardous voltage. Contact with hazardous voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high and low voltage lines and equipment.*

WARNING: *Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage.*

WARNING: *Power distribution equipment must be selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install, or maintain this equipment can result in death, severe personal injury, and equipment damage.*

Integration Parts List

Please verify that all the parts pictured in Figure 1 and listed in Table 4 are provided in the Integration Kit.

Table 4 - Integration kit parts list. Telemetric part number DNP/351INTKIT.

<i>Description</i>	<i>Quantity</i>
Plate, 351/DNP	1
Size 4 kepnut	4
10-32 nut	2
#10 lockwasher	2
Antenex Antenna	1
Mobile Mark 24" Antenna Cable	1
9-pin serial cable, AE1018	1
Power cable, DNPPWRCBL	1
1-3/4 Reducing Washer (for mounting antenna on the bottom of the enclosure only)	2

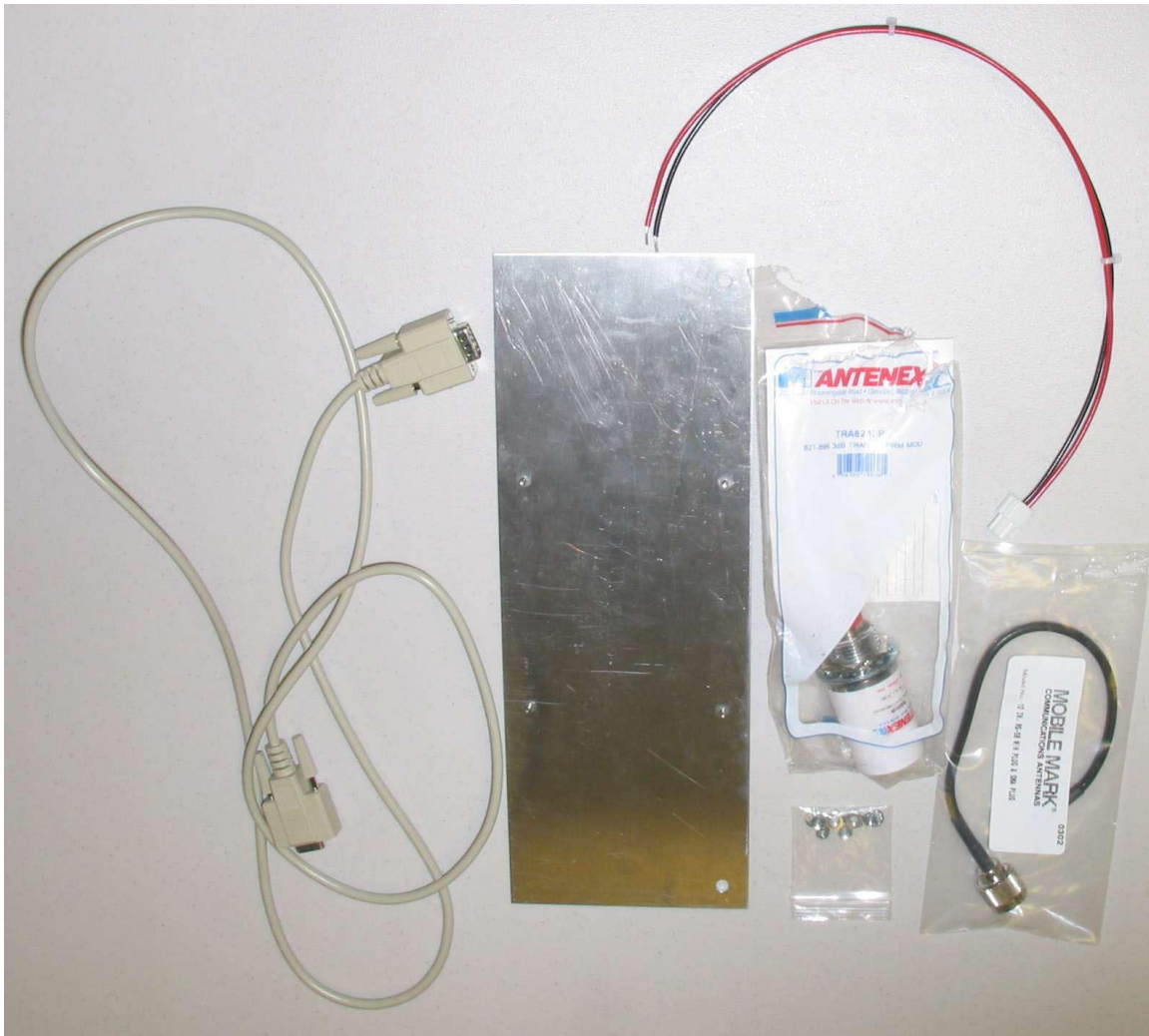


Figure 1 – Integration Kit Contents

Installation

Required tools: Phillips screwdriver, nut driver, ¼-inch socket, and 3/8-inch socket.

Use existing 1-3/8 inch hole on the bottom of the enclosure to mount the antenna on the bottom of the enclosure. The 1-3/4 reducing washer is included to properly reduce the 1-3/8 inch knockout to 1-inch for the antenna.

The DNP-RTM comes with a mounting plate, ready for installation within the SEL-351. Follow the instructions below to install the DNP-RTM.

- 1) Ensure both the SEL-351 and DNP-RTM do not have power connected and disconnect the batteries on the SEL-351.
- 2) Swing the panel door open to expose the back of the SEL-351 enclosure. Orient the mounting plate with the holes on the right side. Install mounting plate over the #10 bolts on the back right side of the enclosure. See Figure 3 to locate plate position and orientation.
- 3) Attach the mounting plate to the back of the enclosure using the provided #10 nuts and lock washers.
- 4) To mount the antenna on the bottom of the enclosure:
 - a) Use one of the existing 1-3/8 inch knockouts on the bottom of the enclosure.
 - b) Use the provided 1-3/4 reducing washers to reduce the knockout to the appropriate 1-inch hole size when attaching the antenna.
 - c) Remove the large lock-washer and nut from the antenna that came with the integration kit.
 - d) Insert the antenna into the hole, keeping the rubber seal on the outside of the enclosure and placing one reducing washer between the rubber seal on the antenna and the enclosure wall on the outside of the enclosure.
 - e) Place the other reducing washer on the inside of the enclosure, directly against the enclosure wall.
 - f) Secure the antenna by screwing the lock-washer and nut onto the antenna from the inside of the enclosure.
- 5) Plug the antenna cable into the antenna. Screw the other end onto the DNP-RTM radio where it protrudes through the DNP-RTM enclosure as shown in Figure 3.
- 6) Attach the 12-volt power wires into terminals 23 and 24 on the SEL-351 terminal block. Make sure the polarity is correct, with the black ground wire on terminal 24 and the red +12-volt wire on terminal 23.
- 7) Plug the power connector into the power jack on the DNP-RTM, and plug the serial connector into the bottom IED serial port on the DNP-RTM as shown in Figure 2.
- 8) Insert the communication cable into Serial Port 2 on the SEL-351. Reference Figure 3 for the completed installation.
- 9) Make sure you change the 12-volt power parameters in the SEL-351 as directed in the SEL-351 Programming section of this document.



Figure 2 – DNP-RTM Connections



Figure 3 – Finished Integration

SEL-351 Programming

Two internal SEL-351 parameters will need to be changed to enable 12-volt power. Changes can be made by using the SEL-351 front panel, or by using a serial connection and serial communications program such as Windows HyperTerminal. Consult the SEL-351 Quick-Start Installation and User's Guide for directions on the front panel interface or serial communications.

The easiest method is through the front panel. Log in as a valid user and make the following changes to the Global FZ settings:

- "Turn on the 12 V power (Y,N)" = Y
- "Keep the 12 V power on while asleep (Y,N)" = Y

In addition, the SEL-351 serial port will need to be configured for DNP communication. Program the port values from the SEL-351 front panel by logging in as a valid user and selecting SET, then PORT, and then the port that is to be configured for DNP (Port 2 is recommended). Reference the DNP default values in the SEL-351 User's Guide on page H-1 and ensure the following parameters have the listed values:

- SPEED = 9600
- DNPADR=3
- DECPLA=1
- DECPLV=1
- DECPLM=1
- PREDLY=OFF
- REPADR=3

If there are multiple slave devices, or different master/slave addresses are necessary, make these changes to DNPADR (slave address) and REPADR (master address) on the SEL-351. After making these changes, use the Telemetric DNP-RTM Configuration program to set the same DNP addresses and Baud rate in the Configuration screen. Upload the modified configuration to the RTM device and save the new profile.

DNP-RTM Programming

The DNP-RTM should already be factory programmed with the default configuration necessary for the SEL-351. If changes from the factory default configuration are necessary, consult the DNP-RTM Users' Guide for directions on customizing the configuration.

You will need to use the local programming utility to properly set the device baud rate and the DNP master/slave addresses. The local programming utility is included on the Telemetric CD provided with the DNP-RTM device. Reference the DNP-RTM Users' Guide for instructions on interfacing to a device locally.

After completing the SEL-351 programming, as detailed above, use the DNP-RTM local programming utility to make sure the Baud rate and Master/Slave addresses match the values programmed in the SEL-351.

Additional Information

Product manuals, installation manuals, application notes, application guides and technical specifications are available for download at the Telemetric web site.

http://www.telemetric.net/front_end/documentation.htm

For more information, questions or feedback, please feel free to contact Telemetric technical support.

Telemetric
9941 W. Emerald Street
Boise, ID 83704
208-658-1292 x21 FAX 208-323-5575
support@telemetric.net