MNPR™ Programmer Manual

IM 7385-002 **January 4, 2000**

I. Introduction

Congratulations! You have purchased the ETI MNPR™ Microprocessor Network Protector Relay and Programmer. The MNPR™ is the most advanced microprocessor based relay on the market. It combines extensive programmability with advanced communications capability. In order to make proper use of your new MNPR™ you need to become familiar with the MNPR™ Programmer. This manual contains detailed instructions regarding operation of the Programmer, as well as some tips on effective MNPR™ programming.

The MNPR™ Programmer can display and modify the status and settings of the MNPR™. The Programmer also has the ability to store settings for sensitive (standard) mode, insensitive mode, time delay mode and watt-var mode operation. This feature allows field personnel to quickly program the MNPR™ to predetermined settings.

The MNPR™ Programmer is a simple, user friendly device. Its operation is similar to that of a vending machine. Specifically, there are letters along the bottom and numbers along the right side of the Programmer face. All of the features present on the Programmer's face have letter/number coordinates. In order to select a feature, simply line up the feature with the letter below it and the number on its right. Press the letter first and then the number. If you press a number first, the Programmer will remind you to *"Press A, B, C or D first then 1, 2, 3 or 4 to select an option"*.

II. Overview

A. Components

The MNPR™ Programmer has three components:

The programming unit, the optical cable and the power cable. A standard single-phase 120-volt AC outlet powers the Programmer. A programming card is included for quick reference.

B. MNPR™ Programming Summary

The following are the steps necessary to program the MNPR™. This manual describes each step in detail.

1. Power up the MNPR™ and then the Programmer.

2. Select the programmer's CT Ratio.

3. Use Relay Status to view all settings and compare them to your desired values.

4. Select the Operating Mode from the Programmer's top row.

5. Select the MNPR™ CT Ratio.

6. If necessary Change Settings using Relay Actual.

III. Basic Programming

A. Power Up

Before you can program the MNPR™, you must make sure that the MNPR™ and Programmer are powered properly. This is accomplished by following these steps:

1. Apply power to the ETI MNPR™. This can be done in one of three ways:

   a. Properly installing the MNPR™ on a network protector.

   b. Installing the MNPR™ on a three-phase test set.

   c. Connecting the MNPR™ to a 120-volt standard outlet using a MNPR™ Single Phase Power Block cord. A MNPR™ Single Phase Power Block is a cord that mounts onto the MNPR™ and applies power to one phase of the MNPR™ input. Because power is being applied to only one phase, the MNPR™ will scroll *"Network Voltage Too Low To Close"*. This does not prevent the MNPR™ from being programmed.

2. Connect the Programmer to the MNPR™ using the optical cable.
   Make sure the word TOP on the optical connector is facing up.

3. Apply power to the Programmer by plugging the power cable into a standard 120-volt AC outlet. The Programmer will scroll *"MNPR™ Programming Unit Version XX.XX"*. The MNPR™ will scroll *"Remote Login"*.

B. Programmer CT Ratio

Once the Programmer and MNPR™ are properly powered, the Programmer will scroll *"Press NEXT to view CT Ratio"*. Pressing the **NEXT** button to display *"800:5"* on the Programmer. Continue to press **NEXT** to select the appropriate CT ratio.

After you choose the correct CT ratio, press **ENTER**. The Programmer will scroll *"ETI _ _"*. It is from this message or from *"Press A, B, C or D first then 1, 2, 3, or 4 to select an option"* that all other commands are issued.

NOTE: This selection of the programmer CT ratio DOES NOT program the MNPR™. It adjusts the CT ratio of the Programmer in order to properly display network current.

C. Relay Status

To determine the MNPR™ current setting, simply press **C, 4** to select **RELAY STATUS**. Use **NEXT** to scroll though the current MNPR™ settings. **RELAY STATUS** will scroll the following information:

1. **Relay Status** – Displays if the MNPR™ is calling for the network protector to *"->Open"* or *"->Close"*. If the MNPR™ is calling for neither, the Programmer will display *"->Float"*.

2. **Serial Number** (#:) - Displays the MNPR™ original factory serial number for easy identification.

3. **Odometer** (OD:) – Displays the MNPR™ number of Open/Close operations.

4. **Software Version** (REV:) - Displays the version of the MNPR™ software.

5. **Mode** - Displays which of the four MNPR™ modes is currently active Sensitive (standard), Time Delay, Insensitive or Watt-Var.

6. **Reclose Voltage** (RV:) – Displays the present setting in volts.

7. **Reclose Angle** (RA:) – Displays the present setting in degrees.

8. **Sensitive Trip** (ST:) – Displays the present setting in relay milliamps or protector amps depending on mode of programmer.

9. **CT Ratio** (xxxx : 5) – Displays the present CT ratio setting.

If the MNPR™ is set for a mode other than Sensitive (standard), Relay Status will also display those variables unique to the present setting. Depending on the mode, Relay Status will also display:

10. **Time Delay Mode** – Displays the Time Delay (TD:), Instant Current (IC:), and Extended Delay (XD:).

11. **Insensitive Trip Mode** – Displays the Insensitive Trip Current (IT:) and Extended Delay (XD:).

12. **Watt-Var Mode** – Displays the Watt-Var Current (WC:) and Watt-Var Angle (WA:).

D. MNPR™ Operating Modes

The MNPR™ can operate in many different modes. The top row of the Programmer allows you to select the four common operation modes of the MNPR™. Selecting any position of the top row, and pressing **ENTER** will revert the MNPR™ to preset settings corresponding to each of the four modes.

1. **Sensitive** (standard) - Press **A, 1** - This is the most common mode. The MNPR™ will open the protector when reverse net power exceeds the Sensitive Trip setting. It will close the protector when the transformer voltage exceeds the network voltage by the Reclose Voltage setting, the phase angle of that differential voltage is greater than the Reclose Angle and within the close region.

2. **Time Delay** - Press **B, 1** - The MNPR™ closes the protector identically to Sensitive Mode. The open process is different. Once the specified reverse net power, the Sensitive Trip, is detected the MNPR™ will wait the Time Delay setting before opening the protector. If, during that period, the absolute value of current of any phase exceeds the Instant Current setting, the MNPR™ will immediately open the protector. The user can also program a delay for the Instant Current called the Extended Delay.

3. **Insensitive Trip** - Press **C, 1** - the MNPR™ closes the protector identically to Sensitive and Time Delay Mode. The MNPR™ will open the protector only when the net power flow of the sensitive mode is met and the absolute value of the current of any phase exceeds the Insensitive Trip Current setting. The user can also program a delay for the Insensitive Trip Current called the Extended Delay.

4. **Watt-Var** - Press **D, 1** - the MNPR™ closes the protector identically to the other three modes. The MNPR™ trip region is rotated counter-clockwise to ensure that the network protector will open under certain circumstances. The user can program the current at which the MNPR™ will rotate the trip region, the Watt-Var Current. In addition, the user can program the number of degrees to shift the MNPR™ trip region the Watt-Var Angle.

E. Programming the MNPR™ CT Ratio

The CT ratio allows the MNPR™ to properly display network currents during operation. For the MNPR™ to close a General Electric network protector properly, it must know the CT ratio of the network protector.

To program the MNPR™ CT Ratio, press **A, 2** at the *"ETI _ _"* scroll. The Programmer will instruct you to *"Press NEXT to View CT Ratios"*. When the proper CT Ratio appears on the display, press **ENTER** to program the MNPR™. To verify CT Ratio on relay use Relay Status.

F. Changing MNPR™ Settings

In addition to the preset modes located on the top row of the programmer, the user can use the Programmer to manually change the settings of an individual MNPR™. Press **D, 2** to select **RELAY ACTUAL**. Use **NEXT** to scroll through the MNPR™ variables then use **INC** and **DEC** to change the setting to the desired values.

When finished, press **ENTER** to download the new settings to the MNPR™. The MNPR™ will display *"Remote Login"* and then four dots to indicate that it has been programmed. The present MNPR™ mode will appear on the MNPR™ scrolling display. When ENTER is pressed, the Programmer will display *"Programming Westinghouse"* or *"Programming General Electric"* depending on the type of MNPR™ it is programming.

NOTE: Failure to press ENTER may not download the new settings. This depends on whether download mode is on or off.

Note: If you press RELAY ACTUAL and nothing happens, your programmer may be set with the Actual Mode turned off.

Note: Using Relay Actual to program the MNPR™ settings will not change the programmer's stored settings.

If the relay is set to operate in Sensitive (standard) mode, the user can program three different values.

1. **Reclose Voltage** - This value sets the minimum three phase average differential voltage necessary to close the protector.

   Note: The Reclose Voltage sets the minimum closing voltage at 10 degrees phase angle.

2. **Reclose Angle** - This value specifies the lower limit of the reclose region. The protector will not close if the phase angle is below this value regardless of the magnitude of the differential voltage.

3. **Sensitive Trip Current** - This value tells the MNPR™ the minimum reverse current necessary to open the protector. Depending on the setup of the Programmer, this value can be displayed as milliamperes into the MNPR™ or amperes into the protector. (e.g. 7.5 milliamperes through the MNPR™ is the same as 2.4 amperes through the network protector bus on a 1600 Amp Network Protector).

If the MNPR™ is operating in a mode other than Sensitive (standard), then the Programmer will display the variables unique to the present operating mode:

4. **Time Delay Mode** - In addition to RV, RA and ST, Relay Actual will allow the user to set the Time Delay, Instant Current and Extended Delay.

5. **Insensitive Mode** - In addition to RV, RA and ST, the user will be able to program the Insensitive Trip Current and Extended Delay.

6. **Watt-Var Mode** - In addition to RV, RA and ST, the user may program the Watt-Var Current as well as the Watt-Var Angle.

IV. Determining the Network's system Condition

In addition to programming the MNPR™, the Programmer can be used to gain valuable information about the status of the network. These functions are located on the third row from the top.

A. Network Volts (Va:, Vb:, Vc:) - Press **A, 3**. This will tell the user the voltage present on the network side of the network protector.

Note: On 480-volt network protectors, the MNPR™ maybe on the 120-volt side of the potential transformers. In this case, the display should be multiplied by 2.2 to calculate the actual network voltage.

B. Network Amps (Ia:, Ib:, Ic:) - Press **B, 3**. This will tell the user the current flowing through the network protector.

C. Reclose Volts (Da:, Db:, Dc:) - Press **C, 3**. This will tell the user the present differential voltage between the transformer and network sides of the network protector.

D. Relay Temp (Tf:, Tc:) - Press **D, 3**. This will tell the user the temperature inside the casing. In addition, pressing **NEXT** will change the display units from Celsius to Fahrenheit.

Note: This temperature will generally be higher than the ambient temperature because the MNPR™ does generate some internal heat.

V. Direct Orders to the MNPR™

The programmer is capable of ordering the MNPR™ to Open and of ordering the MNPR™ to Block the network protector from closing. From the *"ETI _ _"* Scroll:

A. Block Relay - Press **B, 4**. This will prevent the MNPR™ from closing the protector. If the protector is already closed, this feature will not cause it to open.

Once **B, 4** is pressed, the Programmer will display the current MNPR™ status *"BLOCKED"* or *"AUTO"*. Pressing **NEXT** will immediately tell the MNPR™ to switch to the other status.

Note: If the MNPR™ is removed from the network protector in the Blocked state, it will still be Blocked from closing when re-installed.

B. Open Relay - press **A, 4**. This will immediately cause the MNPR™ to issue a Open command to the network protector. Once the open signal is set, the MNPR™ will immediately return to normal operation.

Note: If the user wants the MNPR™ to open the protector and not allow it to close, it is necessary to use the Block command (see above) before an Open Relay command is issued.

VI. Advanced Programming

This manual has discussed every button combination on the Programmer except for **D, 4** - the Program command. This command does not program the MNPR™. It programs the Programmer.

A. Level 1 Programming

Pressing **D, 4** at the *"ETI_ _"* Scroll will cause the MNPR™ to display *"Enter Program Password"* to proceed. Because misuse of the Program command can result in damage to the MNPR™ and the network protector, the password is not distributed with the Programmer. The password can be obtained from the factory.

NOTE: If you pressed D, 4 and do not have the password, simply press any letter on the Programmer 8 times to return to the *"ETI _ _"* scroll.

Entering the correct password allows the user to program the preset variables for each of the modes present on the top row of the Programmer. As usual, pressing **NEXT** will toggle through individual variables; **INC** and **DEC** will adjust each variable. It is possible to adjust multiple variables before pressing **ENTER**.

Setting these variables and pressing **ENTER** does not Program the MNPR™. Selecting any of the top row from the *"ETI _ _"* scroll will program the MNPR™ to those settings. The variables appear in the following order:

1. **Reclose Volts** (RV:) - This variable programs the reclose voltage for all of the presets located on the top row Sensitive (standard), Time Delay, Insensitive and Watt-Var.

2. **Reclose Angle** (RA:) - This variable programs the lower limit of the reclose region for all of the presets located on the top row.

3. **Reclose Time** (RT:) - This variable programs the time between the detection of proper conditions for closing and the issuance of the close signal.

4. **Sensitive Trip** (ST:) - This variable programs the Sensitive Trip current for the Sensitive (standard), Time Delay, Insensitive and Watt-Var modes on the top row.

5. **Sensitive Trip Delay** (STD:) - This variable programs the time between the detection of proper conditions for tripping and the issuance of the open signal.

6. **Instant Current** (IC:) - This variable programs the instant current for the Time Delay modes.

7. **Time Delay** (TD:) - This variable programs the Time Delay used in Time Delay Mode. If the MNPR™ senses reverse current that exceeds the Sensitive Trip (ST:) setting, it will wait this amount of time before issuing a open command.

8. **Extended Delay** (XD:) - This variable programs the Extended Delay used in Time Delay Mode and Insensitive Mode. When the MNPR™ senses a trip condition, it will wait this amount of time before issuing an open command.

9. **Insensitive Trip** (IT:) - This variable sets the trip current to be used in Insensitive Mode.

10. **Watt-Var Current** (WC:) - This variable sets the Watt-Var Current. **Note - This variable will only appear if Watt-Var is active - See Level 2 Programming**.

11. **Watt-Var Angle** (WA:) - This variable sets the Watt-Var Angle. **Note - This variable will only appear if Watt-Var is active - See Level 2 Programming**.

B. Level 2 Programming

Pressing **D, 4** again after the first level password has been entered the Programmer asks for *"Enter Supervisory Password"*. Again, this password can be acquired from the factory.

The second level of programming involves further adjustment to the operation of the Programmer. Once again, **NEXT** can be used to scroll through the different variables; **INC** and **DEC** can be used to adjust the variables; and **ENTER** is used to program the Programmer. The following variables are adjustable using the second level of programming:

1. **Display Units** (DU:) - This setting determines whether the Programmer displays currents as Milliamps through the MNPR™ or as Amps through the network protector bus. This setting does not affect the operation of the MNPR™, and is determined entirely by the preference of the user.

2. **Network Voltage** (NV:) - This variable sets a three-phase average network voltage below which, the network protector will not close. This value is usually set to 60 volts. This feature prevents the network protector from closing when there is a severe, low impedance fault on the network. If the MNPR™ sees an average network voltage below this setting, the MNPR™ will scroll *"Network Voltage Too Low to Close"*.

3. **Voltage Constant** (VC:) - This feature allows the user to set the MNPR™ to ignore the actual voltage on the network side and operate as if a constant voltage of 125-volts was applied to the network side.

4. **Odometer Reset** (OD:) - Pressing **ENTER** at this point will reset the MNPR™ cycle counter. The Programmer will ask you to *"Press Enter to Confirm"* that you want to reset the cycle counter. Upon pressing **ENTER**, the programmer will proceed to the next variable.

5. **Relay Fault** (FLT:) - This feature allows the user to choose what action the MNPR™ will take if it malfunctions. When the MNPR™ identifies an internal error it can either hold its current status or issue and immediate open command.

6. **Actual Mode** (ACT:) - This security feature allows the user to prevent the manual alteration of the settings of a MNPR™. If this variable is changed to off, the Relay Actual feature will not operate. The user will only be able to choose from the preset buttons on the top row of the Programmer.

7. **Download Mode** (DWN:) - This security feature only matters when Actual Mode is on. It will program the MNPR™ as soon as one of the Relay Actual settings is incremented or decremented without the Enter button being pressed.

8. **ASCII Mode** (ASC:) - This feature allows the user to use ASCII protocol to program a MNPR™. If you are interested in utilizing this feature, information can be obtained from the factory.

9. **Watt-Var** (WV:) - This variable enables the Watt-Var mode of the MNPR™.

10. **Brightness** (LED:) - This variable controls the brightness of the Programmer LED display. The brightness can range from 0-7. Zero is the brightest.

VII.Programming Tips/Trouble shooting

The Programmer Displays *"Programming Error"* If the Programmer and MNPR™ are powered improperly or if the optical cable is mounted improperly, the Programmer will display, *"Programming Error"*. If you see this message make sure the Programmer and MNPR™ are powered in the proper sequence. In addition, make sure the optical connector is securely mounted on front of the MNPR™ with the word Top facing up.

Pressing buttons **1, 4** at the same time will reset the Programmer. If the Programmer and MNPR™ were powered out of order and the *"Programming Error"* message appears, try resetting the Programmer to see if that clears the error.

VIII.Technical Support

The ETI MNPR™ and Programmer are rugged units meant to be used in harsh conditions. Nonetheless, they are not indestructible. Do not drop, throw or submerge the Programmer (the MNPR™ is fully submersible). With a minimum of care, the Programmer should have a long life span.

Technical help for both the ETI MNPR™ and the MNPR™ Programmer is available from the following sources:

Richards Manufacturing Co. Sales, Inc.
517 Lyons Avenue
Irvington, NJ 07111
(973) 371-1771
FAX (973) 371-4304
Sales@richards-mfg.com

Electronic Technology Inc,
511 Lyons Avenue
Irvington, NJ 07111
(973) 371-5160
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