Technical Note

ProSoft TECHNOLOGY

MNET server to Quantum IO Scanner Configuration Guide

All ProSoft MNET products

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MNET server to I/O Scanner

The information that follows is designed to assist a user in setting up an I/O scanner to a ProSoft/ProLinx MNET (Modbus TCP/IP) device.
Within the Quantum and Momentum Modbus TCP/IP devices, there is an option to setup the device as an Ethernet I/O scanner. This is an easy and effective way of reading data from and writing data to a MNET product. The sample below shows how to configure the I/O scanner to both read and write information, however this is not necessary. You can setup the I/O scanner to just read information from, or just write information to, the MNET module.

NOTE: No more than 5 scan tables can be setup to a single MNET device. Each scan table opens a socket connection to the MNET module, and the MNET module only has 5 server socket connections. Also keep in mind that if you setup multiple Quantum/Momentum processors, that no more than a total of 5 I/O Scan Tables can be setup in all processors. If your application requires more data to be transferred than will fit into 5 I/O Scan Tables, then you should implement MSTR instructions to obtain the data instead of using Scan Tables.

1. MNET settings:

The first step to setting up this type of configuration is to understand the operation of the MNET driver, and how the database addressed (address within the MNET module) correspond to the Modbus TCP/IP addressed, (addressed configured in the I/O scanner within Concept, ProWorx, or whatever Modicon Programming software you choose).

The chart below shows the Database addresses of the module, and each particular database address's virtual Modbus TCP/IP network address. Quantum and new Modicon programming software sets up the addressing using a 6 digit address fields. This is shown below:

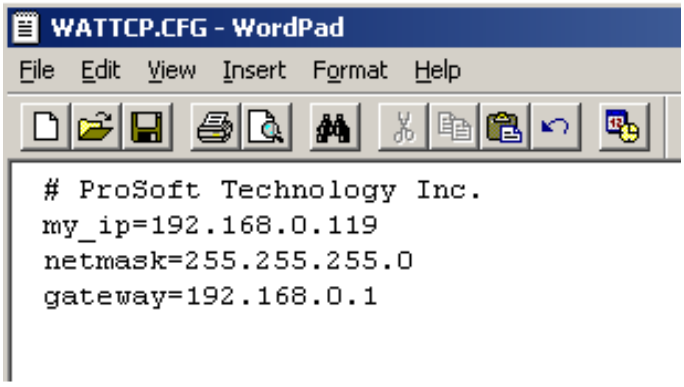
DB Address	Holding Register Address	Input Register Add0ress	Coil Addresses	Input Coil Addressed
0	400001	300001	000001-000016	100001-100016
1	400002	300002	000017-000032	100017-100032
2	400003	300003	000033-000048	100033-100048
3	400004	300004	000049-000064	100049-100064
4	400005	300005	000065-000080	100065-100080
100	400101	300101	001601-001616	101601-101616
200	400201	300201	003201-003216	103201-103216
300	400301	300301	004801-004816	104801-104816
500	400501	300501	008001-008016	108001-108016
1000	401001	301001	016001-016016	116001-116016

Other Modbus TCP/IP master devices utilize a 5 digit-addressing field. For those devices the MNET module's virtual Modbus addresses are as shown below:

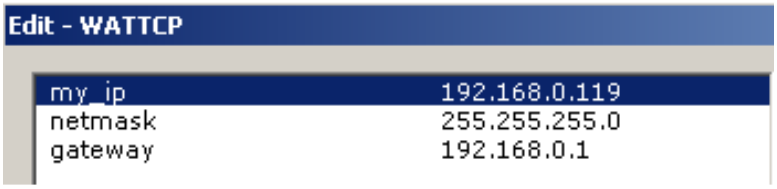
DB Address	Holding Register Address	Input Register Add0ress	Coil Addresses	Input Coil Addressed
0	40001	30001	0001-0016	10001-10016
1	40002	30002	0017-0032	100017-10032
2	40003	30003	0033-0048	10033-10048
3	40004	30004	0049-0064	10049-10064
4	40005	30005	0065-0080	10065-10080
100	40101	30101	1601-1616	11601-11616
200	40201	30201	3201-3216	13201-13216
300	40301	30301	4801-4816	14801-14816
500	40501	30501	8001-8016	18001-18016
1000	41001	31001		26001-26016

Understanding how the database addresses within the MNET module look to another Modbus TCP/IP device, we can begin to setup our message within the I/O scanner.

First, we must know the IP address of the MNET module. This is found within the WATTCP.CFG file downloaded to the module. A sample is shown below:



Or within the ProLinx Configuration Utility, the information appears as:



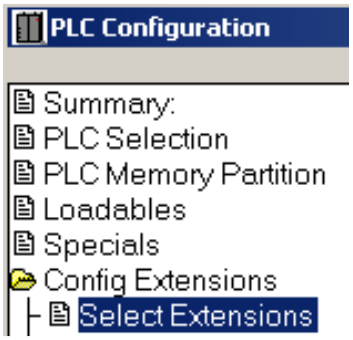
Knowing the virtual addressing of the MNET module and the module's IP address, we can now continue to setup the I/O Scan Table within the Modbus TCP/IP device.

2. Adding I/O Scanner to project using Concept

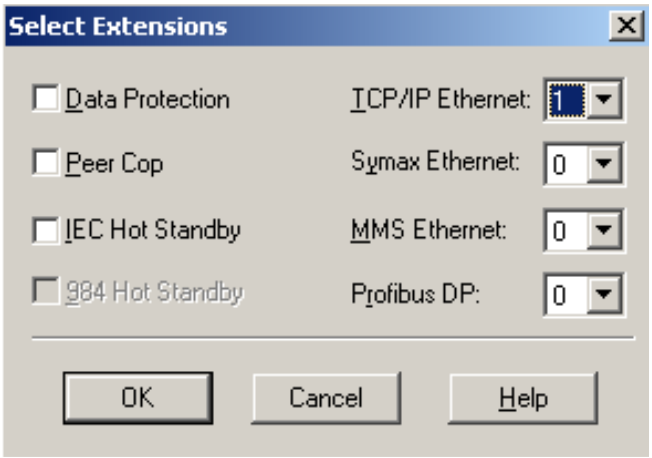
This section outlines how to configure a Modbus TCP/IP I/O scanner using Concept software. Although other programming software may offer this same configuration, the steps necessary may be a different.

We will assume that you already have a Concept program ready, and that you just need to setup the I/O scanner (or maybe just verify the settings of that I/O scanner).

First ,we will need to setup an Ethernet extension. From the PLC Selection menu go to Config Extensions -> Select Extensions, as shown:



Double click on the Select Extensions; and the following menu will appear:

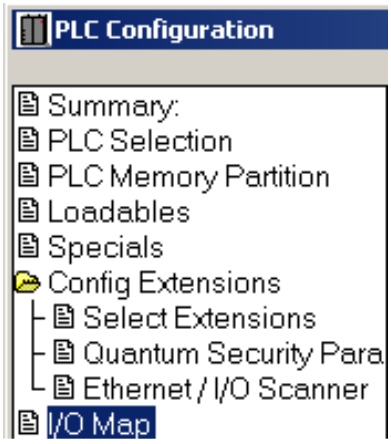


Here you will need to have a TCP/IP Ethernet extension setup, as shown above.

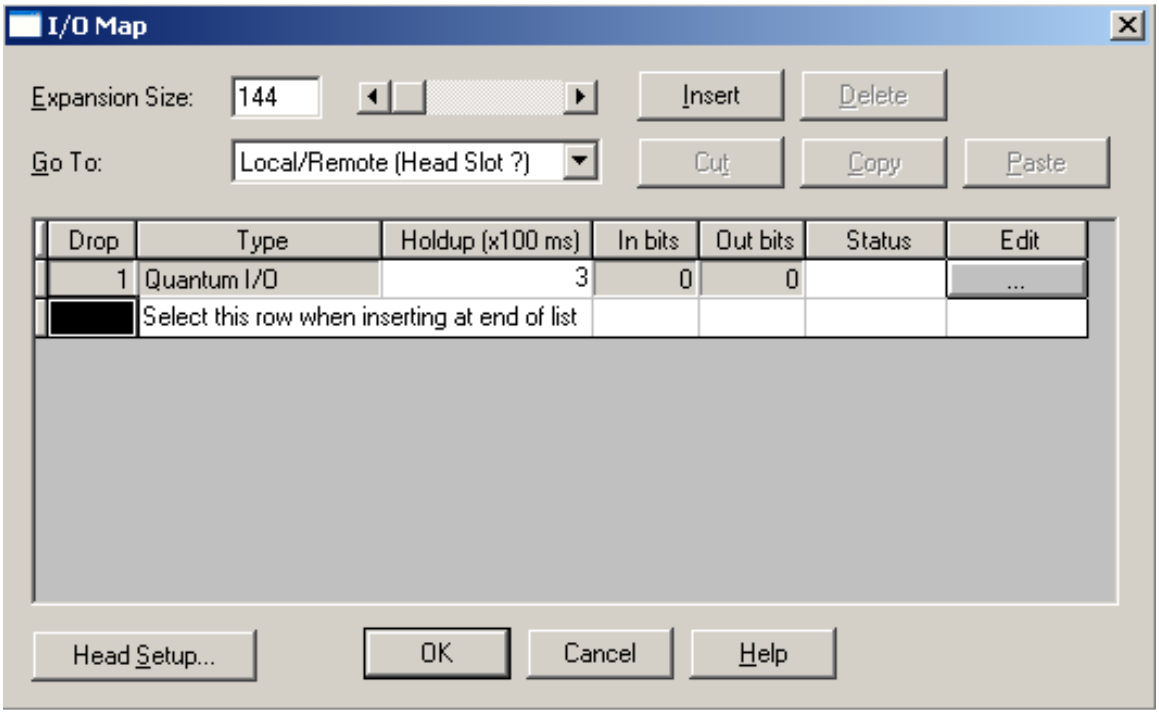
Once this is setup, click 

This creates a new option under your Config Extensions menu, the Ethernet/I/O Scanner option:

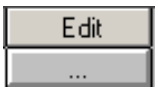
Next, we must define our module within the I/O table. From the PLC Configuration, select the I/O Map option:



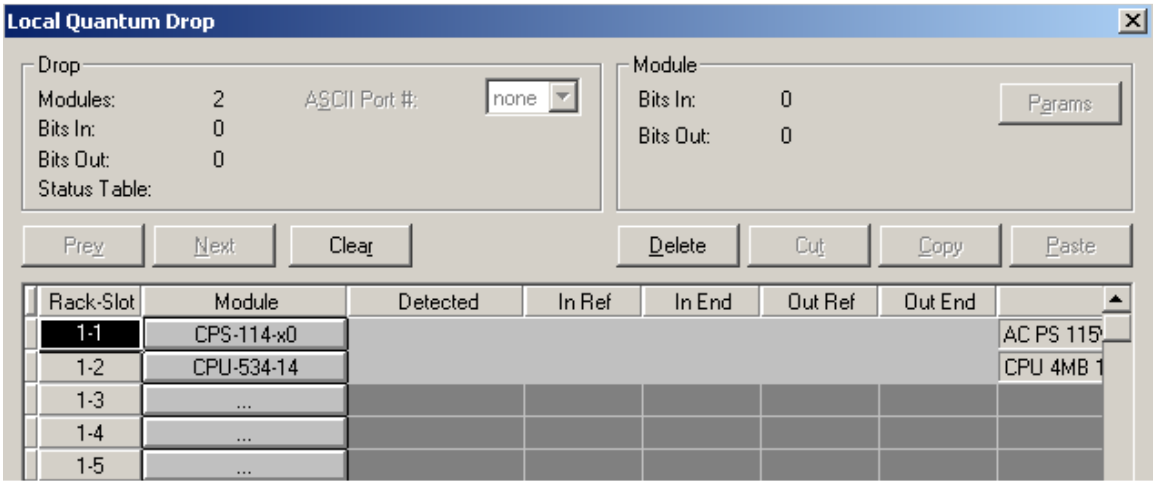
Double-click on the I/O Map icon to display the following dialog box:



To define the I/O scanner within the rack, you will need to click on the grey box, the Edit option.

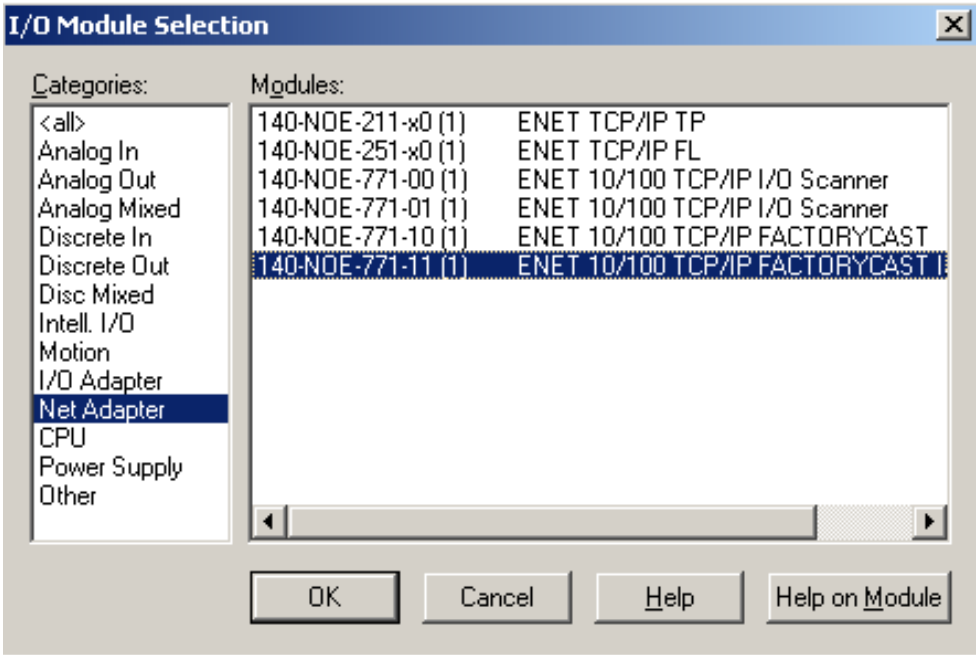
It looks like this 

The following window will appear:



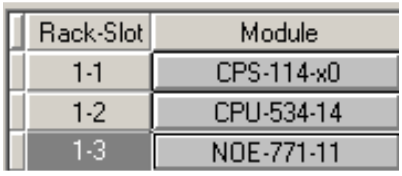
Select the slot into which you have installed your Ethernet module. For this example, we will have an NOE module in Slot 3 of the rack. To define this, we will click on the grey box shown next to the Rack-Slot Description, "1-3", as shown:

Doing so will display the Module Selection dialog box:



For this example, we will be using a NOE-771-11. Once you have selected your appropriate module, press the 

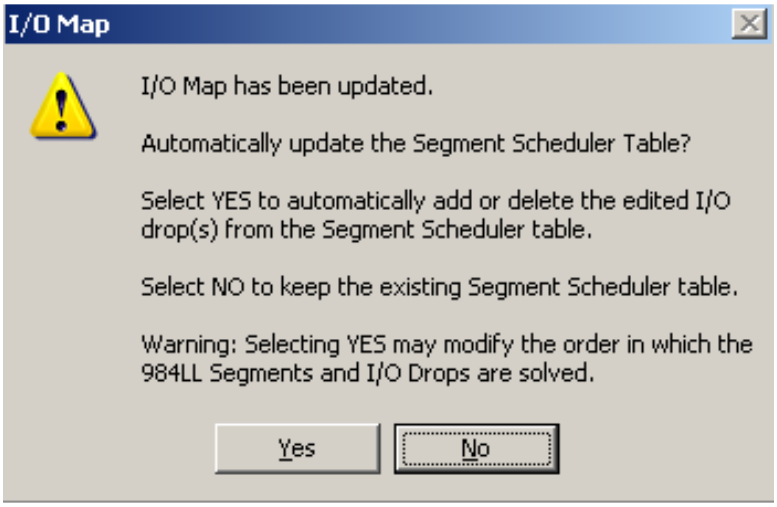
button. You should now see that module in the I/O table, as shown here:



Now that you have defined the module within the Quantum rack, press the 

button once again. This takes you back a menu, and then press OK one more time.

You may get this message:

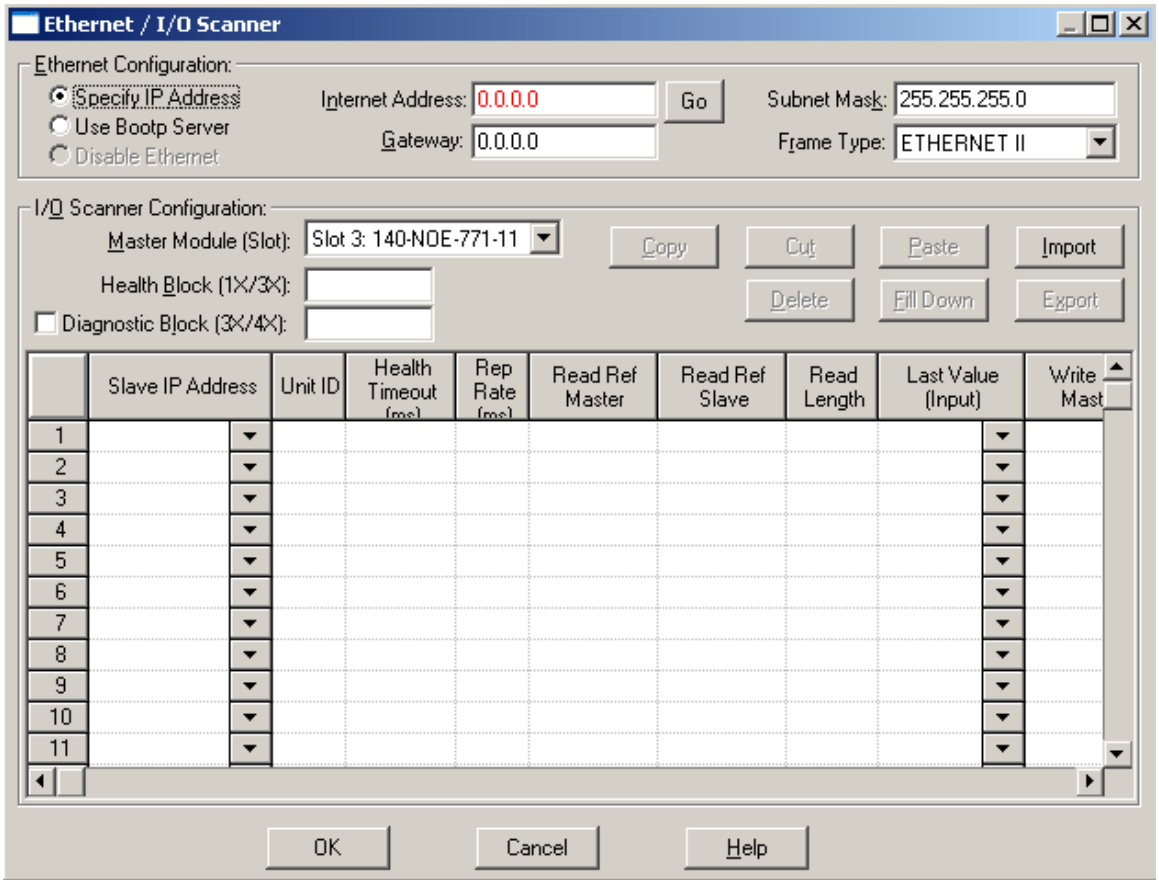


If so, select what best fits your application.

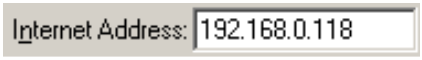
3. Configuration of Ethernet I/O Scanner

From the PLC Configuration menu, you will need to select the Ethernet/I/O Scanner menu, as shown below:

Double click on this Icon, and the following menu will appear:



If you have previously setup this Ethernet module, you may already have an address defined for the module. If this is the first time you have set up the Ethernet I/O module, then you will want to configure an IP address that can communicate to our MNET module, like below:



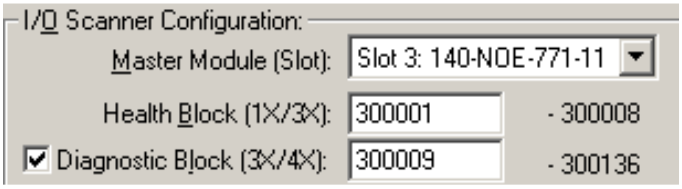
You will also need to verify the settings shown below:

The subnet mask must be setup to allow communications with the IP address of the MNET module, and the Frame Type must be set to ETHERNET II otherwise communications will not work. Improperly assigned IP addresses or improperly configured Subnet Masks can block Ethernet transmissions or allow access to other Ethernet subnets, unnecessarily increasing overall traffic on the target subnet.

As an example, an IP address of 192.168.0.118 and a subnet mask of 255.255.255.0 would allow the I/O scanner to communicate to any devices with IP addresses in the range 192.168.0.0 – 192.168.0.255.

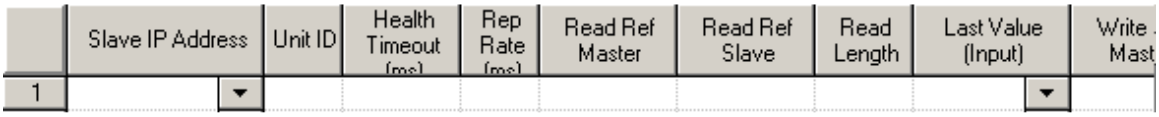
These IP layer rules apply equally to all devices attached to the same Ethernet network. If you have questions about how to properly assign IP addresses and sub-net masks, please contact your systems administrator or consult one of the many generic TCP/IP protocol reference books.

You may also choose to setup diagnostic information:



4. Configuration of I/O Scanner table

Now that the MNET module is setup correctly and we have a valid I/O scanner defined and setup, we can begin to setup the I/O Scanner table shown below:



First, we setup the Slave IP Address. This will be the IP address that was defined in the WATTCP.CFG file of the MNET module (this configuration was defined in section 1):

	Slave IP Address	Unit ID	Health Timeout (ms)	Rep Rate (ms)
1	192.168.0.119	1	1000	50

The Unit ID field should always be set to a value of 1 for the MNET driver.

The Health Timeout should be adjusted, as needed, for your network

Rep Rate is the number of milliseconds (ms) between I/O scanner data request cycles.

The next set of parameters configures the I/O Scanner to read information from the MNET module and place this information into the Quantum processor memory. A maximum of 125 words can be read with this setup. Below are some example values:

Read Ref Master	Read Ref Slave	Read Length	Last Value (Input)
401001	400201	125	Set to 0

The Quantum processor and Concept version 2.6 defaults to 6 digit Modicon addressing, so you will notice that even if you enter a value of 40201 in the “Read Ref Slave” field, the address will be changed to 400201. Don’t worry… 40201 and 400201 are the same address to the MNET module.

The above settings will read 125 words of data from address 40201 (or DB address 200 of the MNET module), and place this information into the Quantum processor at address 401001. Valid values for the “Read Length” field are 1-125 words of information.

The “Last Value” parameter determines what happens to the data in case of communications loss.

Within the same I/O configuration you may also select a Write message setup:

Write Ref Master	Write Ref Slave	Write Length
401501	400001	100

The above configuration will take 100 words from address 401501 of the Quantum processor and push that information out to the MNET module at address 400001 (DB Address 0 of the module). Maximum length for this message is 125 words.

You have now setup communications to the MNET module.

Download this program to your processor, and you can begin to verify data transfer.

5. Verifying Data Transfer

To verify data transfer to and from the module, you will want to create a RDE Template within the Concept software. Below is an example RDE setup for the above I/O configuration command:

RDE Template (untitled) - Animation ON

	Variable Name	Data Type	Address	Value	Set Value	Format
1			401501	2		Dec
2			401502	0		Dec
3			401503	0		Dec
4			401504	3		Dec
5			401505	19789		Dec
6			401506	13		Dec
7			401507	0		Dec
8			401508	24919		Dec
9			401509	29801		Dec
10			401510	28265		Dec
11						
12			401001	1		Dec
13			401002	255		Dec
14			401003	58		Dec
15			401004	0		Dec
16			401005	0		Dec
17			401006	0		Dec
18			401007	0		Dec
19			401008	0		Dec
20			401009	0		Dec
21			401010	4352		Dec

Remember, the Write configuration within the I/O scanner table was:

Write Ref Master	Write Ref Slave	Write Length
401501	400001	100

If the data transfer is correct, you can also verify data transfer by connecting to the debug port of the MNET module and using option 'D' for Database view.

In this section, we said that the module's virtual Modbus address of 400001 is tied to Database Address 0. So, as long as you are showing values in address 401501 within the Quantum processor, that information will appear in MNET module address 0, virtual Modbus address 400001.

```
DATABASE DISPLAY 0 TO 99 (DECIMAL)

      2      0      0      3  19789     13      0  24919  29801  28265
```

If everything is setup correctly, you should see that the information at these Module Database locations match the values shown in the RDE in Concept:

Address	Value
401501	2
401502	0
401503	0
401504	3
401505	19789
401506	13
401507	0
401508	24919
401509	29801
401510	28265

You can then change values at these locations, press 'S' (Show Again) menu option in debug port of the MNET module, and verify that the new values as entered in the RDE are now in the MNET module.

Once you are able to do this, you have verified that you have properly configured your system to transfer data. At this point, you may use this setup example as a pattern for how to configure the Quantum PLC Ethernet I/O Scanner and the MNET module for your specific application.