

Technical Bulletin, OMNI Serial/Ethernet-Modbus Mux Module Model 68-6209: Setup & Installation



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NOTE: User Manual Reference - This Technical Bulletin complements the information contained in the User Manual, applicable to all OMNI Flow Computer firmware revisions.
 OMNI Serial/Ethernet – Modbus Mux Module 68-6209. Setup & Installation – All OMNI 3000/6000 Flow Computers provide optional 10BaseT Ethernet capability via OMNI's proprietary communication module model 68-6209.

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Scope

This Technical Bulletin applies to all firmware revisions of OMNI 3000/6000 Flow Computers.

Abstract

OMNI Flow Computers manufactures a communications module that provides 10BaseT Ethernet capability to existing 3000/6000 Flow Computers. The module model currently produced is:

68-6209 Serial/Ethernet-Modbus Mux (SE) Module

The SE Module provides two (2) communications channels. One channel is an RS-232/RS-485 Serial channel and the other is a 10BaseT Ethernet channel.

Features and Specifications

NOTE: Ethernet Printing – Ethernet printing was introduced in v1.50 of the SE module firmware. To determine if your flow computer firmware supports Ethernet printing, press STATUS DISPLAY on the front panel of the flow computer. If the display shows an SE module address and in addition shows the firmware of the SE module (v1.50+), your flow computer firmware supports Ethernet printing. All reports are still sent to the local RS-232 serial port printer if one is configured. Refer to the OMNICOM for Windows v1.25+ program Help file content under the Configure/Ports menu setting for additional details on configuring Ethernet printing.

Ethernet/Serial Terminal Assignments – Ethernet and serial signals have fixed terminal assignments, even when the function of the two is swapped. Serial signals always correspond to terminals 1 through 6 and Ethernet signals always correspond to terminals 7 through 12 of the OMNI backpanel terminal strip.

The OMNI SE Module provides one RS-232/RS-485 port, one 10BaseT Ethernet port, one 2-wire RS-485 Repeater port and one (1) RS-232 Configuration Port. The board can be used with existing OMNI 3000/6000 Flow Computers with no additional firmware modifications required. Address selection for Serial Module #1 (S1), Serial Module #2 (S2) or Serial Module #3 (S3) is provided along with the ability to swap the Serial and Ethernet channels. For OMNI firmware versions less than vXX.74.10, this is achieved by the Ethernet port “emulating” a serial port.

The RS-232/RS-485 Serial port is hardware identical to one half the OMNI RS-232-C/RS-485 Serial I/O Module model #68-6205-B and maintains the same I/O connector pin-out and specifications. It can be configured for RS-232, 4-wire RS-485 or 2-wire RS-485 communications. The serial port signals always occupy contacts 1 through 6 of the back-panel terminal strip (Refer to OMNI Technical Bulletin 980503 (52-0001-0003) for additional information).

The Ethernet port supports encapsulated Modbus in ASCII or RTU format, Modbus/TCP and remote configuration via Telnet. Ethernet signals always occupy contacts 7 through 12 of the back-panel terminal strip. Up to eight (8) simultaneous connections are supported along with one (1) Telnet connection.

The Repeater port allows messages arriving via the Ethernet connections to be routed to additional flow computers or compatible Modbus devices, using a multi-dropped 2-wire RS-485 communication link. Messages are routed to the Repeater port when they are not addressed to the Host flow computer.

The flow computer containing the SE Module is referred to as the Host. All transactions containing the Modbus ID of the Host are routed internally to the hosting flow computer while all others are routed out the Repeater port. The Host and Repeater Ports can be accessed simultaneously with complete overlap of the I/O. The communication parameters, such as baud rate or protocol, do not need to be the same for the Host and Repeater ports.

The onboard RS-232 configuration port (DB9 connector) allows local configuration of the SE Module's parameters using Telnet protocol and a terminal emulator program such as Microsoft® HyperTerminal.

Modbus Support

NOTE: Modbus/TCP – More information about the enhanced Modbus protocol for TCP communications is available on the Web at: www.modbus.org.

Standard Modbus messages encapsulated in TCP/IP are supported in either RTU or ASCII format and they may be intermixed. The messages will be converted based upon configuration parameters in the SE module. Modbus IDs are used to determine how the messages are routed. If the address matches the one configured in the Host port parameters, it is routed to the Host port. Otherwise, it is routed out the Repeater port. The SE Module also supports Modbus/TCP, which is an enhanced Modbus protocol used specifically for TCP communications. The protocol you use depends on the driver supported in your application program.

Installation

You can install the SE Module in any slot in the flow computer. The slot in which you install the module determines which backpanel terminal strip is used for the signals.

Quick Installation Reference

Follow these steps to install and configure the SE module.

- Decide which OMNI “serial port” you wish the Ethernet module to occupy.
- Set the Address, channel selection, and IRQ jumpers on the SE module.
- Write down the six (6) hex digits on the white label on the small plug in card on the board. This is the last part of the MAC or hardware address of the Ethernet module. The first part of the MAC address is always 0090C2 and is not shown on the label.
- Set the termination resistors for the RS232/485 serial port for the desired mode.
- Install the Repeater port termination jumpers if it will be the first or last device on the 485 link.
- Install the module in the flow computer.
- Connect the supplied 10BaseT cable to the terminal strip on the back of the flow computer that matches the slot occupied by the SE module.
- Connect the 10BaseT cable to an active network and apply power to the flow computer. The green Ethernet LNK LED should go active. If there is network activity, the red Ethernet ACT LED will flash.
- Set the parameters for the Ethernet port in the flow computer to match the default Host parameters in the SE module. If you change the default Host parameters in the SE module config, you must also change the parameters for the Ethernet port of the flow computer to match the Host parameters set in the SE module's config.
- Configure the SE module using OMNICOM (SE Module firmware v1.50 and up and certain versions of OMNI firmware), a Telnet connection (we recommend OMNI's 'Network Utility' program which can be installed from the OMNI website or from the OMNICOM install CD) or by connecting a PC to the SE module using a nine-pin straight through serial cable plugged into the on-board configuration port (DB9 connector).
- Set the IP address, Subnet Mask and Gateway for the SE module. Make sure to save the parameters before proceeding.
- Go through the SE module's configuration menus and make any other parameter changes desired. All “Host” parameters must match the parameters of the associated Ethernet port of the flow computer.

Jumper Settings

Figure 1 is a drawing of the OMNI SE Module. The jumper and termination resistor pack locations are magnified

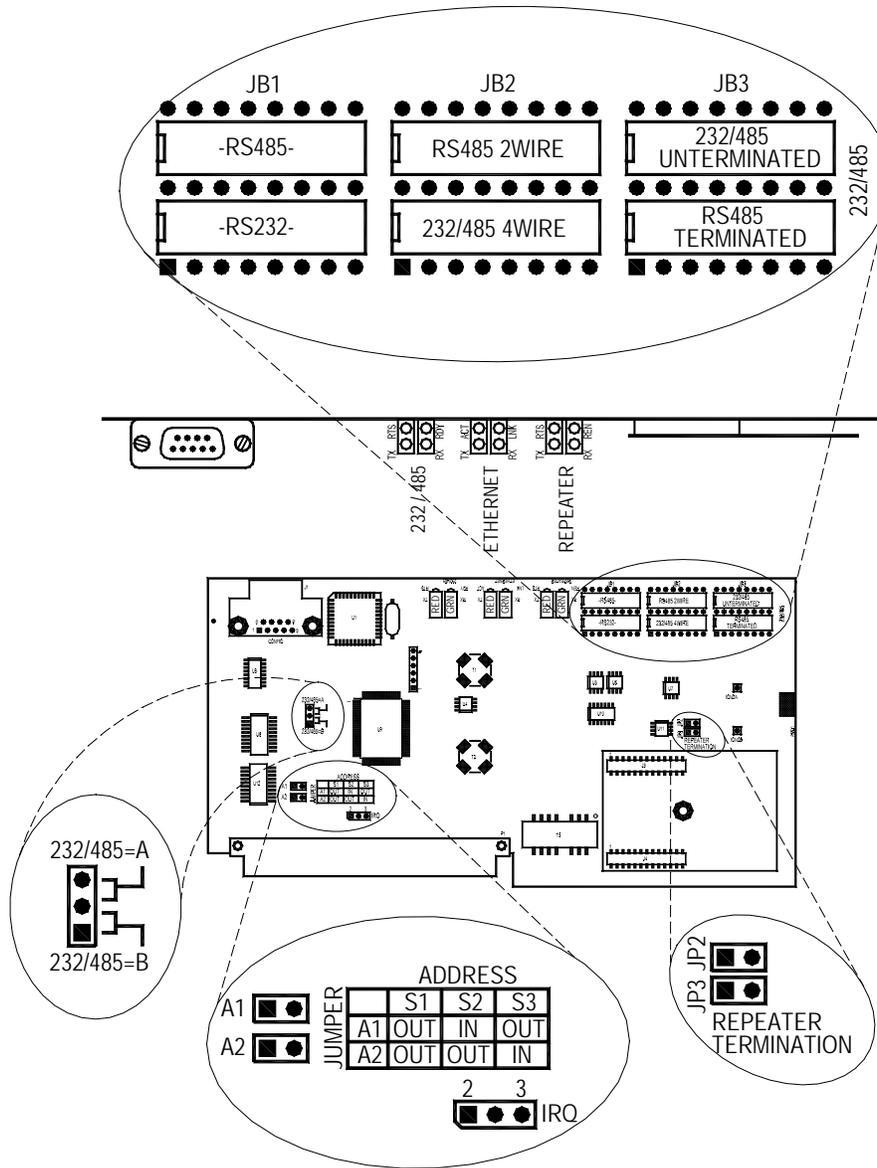


Figure 1. OMNI Serial/Ethernet-Modbus Mux (SE) Module Model 68-6209 Showing Jumper and Termination Resistor Pack Locations

Address Selection

Depending on the model and firmware revision, OMNI Flow Computers can have up to three (3) Serial I/O modules installed. Each Serial I/O module provides two (2) channels, for a maximum total of six (6) Serial I/O communication channels.

NOTE: Although logical addressability exists for three (3) SE modules in the system, existing OMNI 6000 system power requirements mandate a maximum of two (2) SE modules. This still provides eight (8) virtual hosts per Ethernet port. Jumper settings on the SE Module select the module address as S1, S2 or S3 (Table 1).

Table 1. Jumper Settings for Serial Module Address Selection

Jumper	Module Address		
	S1	S2	S3
A1	OUT	IN	OUT
A2	OUT	OUT	IN

IRQ Selection

A jumper is provided for selecting the interrupt request (IRQ) level of the module. IRQ level 2 or 3 can be selected. The jumper should be configured to use IRQ level 2, unless an SV module is installed in the flow computer. Use IRQ level 3 if an SV combo card is installed.

Channel Selection

An onboard jumper determines which “position” the Serial and Ethernet channels occupy. If the Serial (RS-232/RS-485) is selected as port A the Ethernet will be port B. If the Serial channel is selected as port B, then the Ethernet channel will be port A. This allows the Ethernet channel to occupy any serial position and work with other communication requirements of the flow computer. If the module is selected as S1 and a printer is required on serial port 1, then RS-232/RS-485 should be selected for port A and Ethernet for port B.

The standard (default) port assignment for RS-232/RS-485 is PORT-A and Ethernet is Port-B. These can be swapped by moving the jumper from position RS-232/RS-485-A to RS-232/RS-485-B (Table 2).

Table 2. Port Numbers Assigned to SE Module Addresses and Channels

Module Address Section	Channel Selection	RS-232/RS-485 Serial Port #	Modbus Mux Port #
S1	RS-232/RS-485 = A	1	2
S1	RS-232/RS-485 = B	2	1
S2	RS-232/RS-485 = A	3	4
S2	RS-232/RS-485 = B	4	3
S3	RS-232/RS-485 = A	5	6
S3	RS-232/RS-485 = B	6	5

Termination Selection

Placement of resistor packs determines the serial wiring and termination of the serial port. These are set according to the Table 3. Jumpers JP2 and JP3 provide termination for the repeater port.

Table 3. Termination Resistor Pack Placement for Serial Port Configuration

Serial Port Configuration	Termination Resistor Packs		
	JB1 Position	JB2 Position	JB3 Position
RS-232	RS-232	RS-232/RS-485, 4 Wire	RS-232/RS-485 Unterminated
RS-485, 2-Wire, Terminated	RS-485	RS-485, 2-Wire	RS-485 Terminated
RS-485, 2-Wire, Unterminated	RS-485	RS-485, 2-Wire	RS-232/RS-485 Unterminated
RS-485, 4-Wire, Terminated	RS-485	RS-232/RS-485, 4-Wire	RS-485 Terminated
RS-485, 2-Wire, Unterminated	RS-485	RS-232/RS-485, 4-Wire	RS-232/RS-485 Unterminated

Wiring

NOTE: Ethernet/Serial Terminal Assignments – Ethernet and serial port connections have fixed terminal assignments, regardless of which serial port channel you select. Serial signals always correspond to terminals 1 through 6 and Ethernet signals always correspond to terminals 7 through 12 of the OMNI backpanel terminal strip.

The connections for the RS-232/RS-485 serial port always occupy contacts 1 through 6 of the appropriate OMNI back-panel terminal strip (Table 4). This is regardless of it being selected as port A or port B.

Table 4. OMNI Flow Computer Terminal Assignments for Serial Pinout

Terminal	RS-232	RS-485 4-Wire	RS-485 2-Wire
1	TX	TX-B	TX/RX-B
2	TERM	--	--
3	RX	RX-B	--
4	GND (Return)	GND (Return)	GND (Return)
5	RTS (Key Txmit)	TX-A	TX/RX-A
6	RDY (ReadY)	RX-A	--

The Ethernet (10BaseT) and repeater ports always use terminals 7 through 12 of the OMNI back-panel (Table 5). A 10BaseT Ethernet cable is provided for connection to the back-panel. One end is terminated for attaching to the 3000/6000 terminal blocks and the other end has an RJ45 jack. Care should be taken on the terminal end to keep the + and - wires for TX and RX twisted together as close to the terminal contacts as possible.

Table 5. OMNI Flow Computer Terminal Assignments for Ethernet Pinout

Terminal	Signal	10BaseT Cable Color
7	TX-	Orange (Orange/White)
8	TX+	White/Orange
9	TX/RX-B (Repeater)	--
10	TX/RX-A (Repeater)	--
11	RX-	Green (Green/White)
12	RX+	White/Green

LED Indicators

Figure 2 is a side view of the SE module showing the LED indicators.

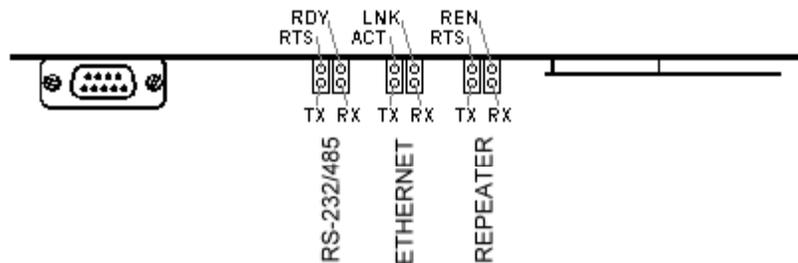


Figure 2. LED Indicators of the OMNI Serial/Ethernet-Modbus Mux (SE) Module Model 68-6209

RS-232/RS-485

- RTS (red):** **Request to Send.** Active when the serial port transmitter is enabled for sending data.
- TX (red):** **Transmit Data.** Active when data is being transmitted by the serial port.
- RDY (green):** **Ready.** Used for printers. Active when the device is ready.
- RX (green):** **Receive Data.** Active when data is being received.

Ethernet

- ACT (red):** **Activity.** Active when network activity is detected. Should flash intermittently as data packets are detected on the network. They do not have to be destined for the SE Module.
- TX (red):** **Transmit Data.** Active when the Host port is sending data back to a network connection.
- LNK (green):** **Link.** Active when a valid 10BaseT network is detected. This should always be on when connected to a network.
- RX (green):** **Receive Data.** Active when the Host port is receiving data from a network connection.

Repeater

RTS (red):	Request to Send. Active when the Repeater transmitter is enabled for sending data.
TX (red):	Transmit Data. Active when data is being transmitted by the Repeater port.
REN (green):	Receive Enable. Active when the Repeater's receiver is enabled.
RX (green):	Receive Data. Active when data is being received by the Repeater port.

Configuration

No flow computer firmware changes are necessary to use the SE Module in the OMNI 3000/6000. However, configuration entries are needed in the flow computer and in the Modbus Mux portion of the SE module. These configuration parameters must match for proper operation.

If you intend to install two (2) SE modules in a fully loaded 6000, you should consult with the factory to verify PSU requirements. Although logical addressability exists for three SE modules in the system, existing OMNI 6000 system power requirements mandate a maximum of two (2) SE modules. This still provides eight (8) virtual hosts per Ethernet port.

OMNI 3000/6000

In the OMNI 3000 or 6000 Flow Computer, configuration parameters should be entered for the serial ports that the module channels occupy. The serial port numbers depend upon the address and channel selections made on the SE Module (Table 6).

Table 6. Port Numbers Assigned to SE Module Addresses and Channels

Module Address Selection	Channel Selection	RS-232/RS-485 Serial Port #	Modbus Mux Port #
S1	RS-232/RS-485 = A	1	2
S1	RS-232/RS-485 = B	2	1
S2	RS-232/RS-485 = A	3	4
S2	RS-232/RS-485 = B	4	3
S3	RS-232/RS-485 = A	5	6
S3	RS-232/RS-485 = B	6	5

The parameters for the serial port where the RS-232/RS-485 port resides should be made according to the intended application for that port.

The parameters for the Ethernet/serial port where the Modbus Mux resides need to match parameters entered within the Modbus Mux module.

The recommended settings are per Table 7 and 8

Table 7. Recommended Modbus Mux Ethernet Port Settings for OMNI Firmware vXX.74.10 and up

SE Firmware >2.0 (may not be displayed)	No
Modbus ID	1
Modicon Compatible	Yes/No (according to your application)

Table 8. Recommended Modbus Mux Serial Port Settings for OMNI Firmware below vXX.74.10

Baud Rate	38400
Data Bits	8
Stop Bits	1
Parity	None
Xmit Key Delay	0
Modbus ID	1
Modbus Type	0 (RTU)
Modicon Compatible	Yes/No (according to your application)
CRC Enabled	Yes

Modbus Mux (Multiplexer)

The Modbus Mux is that part of the SE module that allows up to eight (8) Modbus Masters to communicate simultaneously to the flow computer using separate TCP socket connections. The Modbus Mux has a separate set of configuration parameters stored in Flash memory on the SE module. These parameters must be set before the module can operate properly.

The configuration parameters can be changed using OMNI's OMNICOM software v1.25 and up with SE Module firmware v1.50 and up and the OMNI Flow Computer firmware supports SE Module configuration. You may also configure remotely via Ethernet using any Telnet application (we recommend using OMNI's Network Utility which can be installed from the OMNI website or from the OMNICOM install CD) or a terminal emulator such as Microsoft® HyperTerminal through the on-board DB9 connector/serial port. An inactivity time out of five (5) minutes is imposed for both the Serial and Telnet connections. If no input is received over the time out period, any non-saved parameter changes will be discarded and the password prompt will be displayed.

The on board serial port is configured for 9600 baud, 8 bits, 1 stop bit and no parity. A standard RS-232, 9-pin serial cable can be connected directly from a PC to the board. A NULL Modem cable is not required.

A separate password may be configured for the serial port, and Ethernet Telnet access. The default password is "omni". Remote configuration access may be disabled by setting the Telnet port number to zero (0).

Before the Modbus Mux can be used, its IP address needs to be set to a value that is compatible with the network you are using. As shipped, the IP address defaults to 10.0.0.1. The IP address can be changed via the front panel of the OMNI flow computer for certain versions of the OMNI firmware, via Ethernet using the OMNI Network Utility program, or via the on-board serial port connection.

Setting an IP address

Determine your MAC address. The MAC address is a forty-eight (48) bit number made up of a three byte manufacturer ID and a three byte device ID. The manufacturer ID for the SE module is always 0090C2 and the device ID can be found on a white label on the SE module. To find the device ID, look for a small plug-in board on the bottom right of the SE Module (DIN connector bottom left). On this card is a small white label with bar codes and a six-digit hex number. This is the device ID. The MAC address is usually expressed by grouping the digits by two (2) and placing a dash between them. If the device ID is C02D3F, then the MAC address will be:

00-90-C2-C0-2D-3F

NOTE: The example shown is for Microsoft Windows. On a Unix system the MAC address is typed as 00:90:C2:C0:2D:3F.

NOTE: MAC and IP Addresses – The MAC address and IP address used here are for example purposes only. You must use the MAC address from your SE Module and the IP address you have selected for your network.

MAC Address for Unix System – The example shown is for Microsoft Windows. On a Unix system, the MAC address is typed as 00:90:C2:C0:2D:3F.

Figure 3 method uses the Network Utility program on a PC that is connected to the same network as the flow computer with the SE module installed. The MAC address you use will be the one from your module and the IP will be what you have selected for your network.

For additional information on Network Utility, see the help in PDF format or by pressing F1 when the program is running.

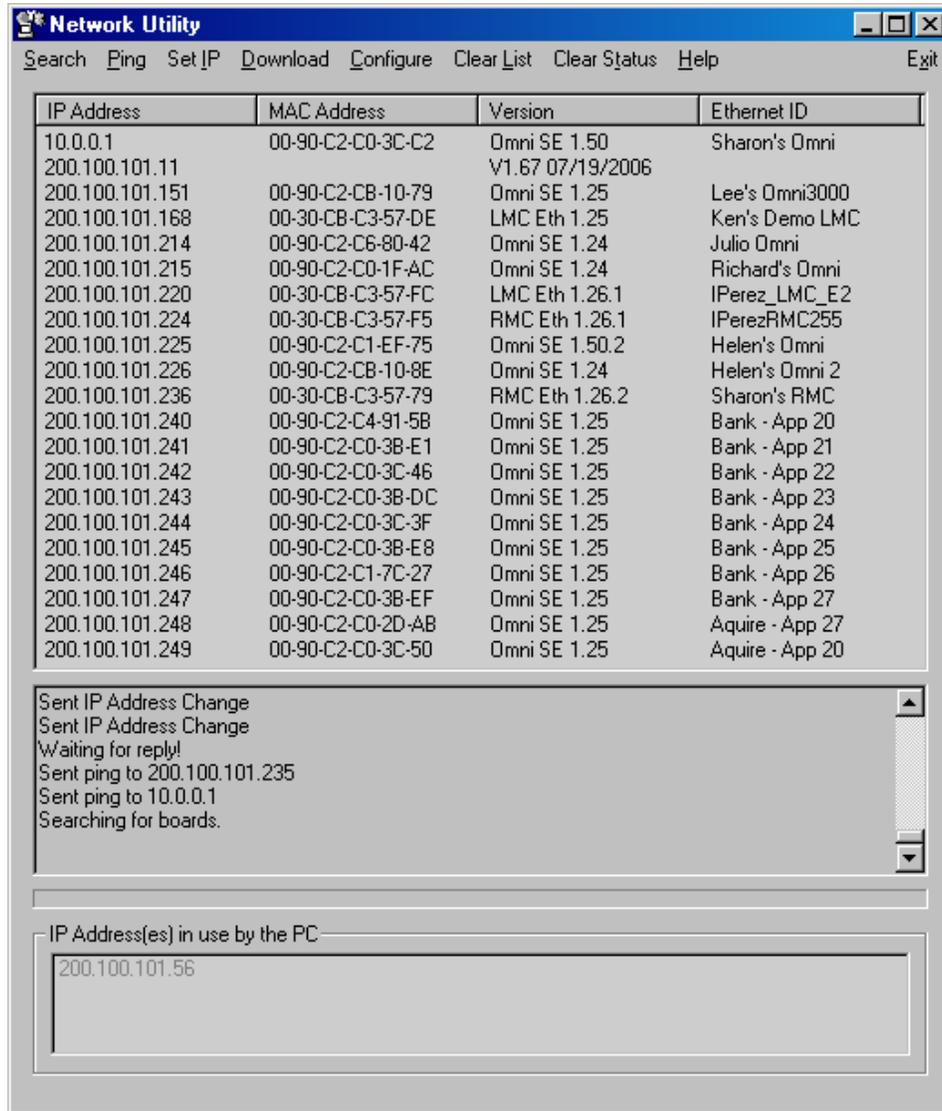


Figure 3. Network Utility Program

Start up the Network Utility. A list is shown of all the OMNI SE Ethernet modules installed on the network.

Find the MAC address from your module in the MAC Address column of the display. It should have IP Address 10.0.0.1 (factory default).

Select the row with your MAC address and select "Set IP" from the menu. Enter the IP Address you have selected for your network at the prompt (for example: 200.100.101.235).

Network Utility automatically pings the address entered to be sure it is not in use by another device. Figure 4 the list displays the status of the pings. There should be time outs received for the pings. If you receive any replies then that address is in use and another one should be chosen.

If the address is not in use, Network Utility prompts you for a password. Enter "omni" and press return.

The list of OMNI SE Ethernet Modules installed on the network is refreshed and you should see your MAC address with the new IP Address entered in the list.

Select the row with your module and select Configure from the menu. Set the Subnet Mask and Gateway. Save the parameters. Any other parameters may be changed and saved at this time.

Configuration Menus

The menus displayed are identical for serial or Telnet configuration (Figure 4). The menu is divided into two halves. The left hand pane shows the main Configuration Options and the right hand pane shows the current submenu. The submenu displayed will depend on which number is selected from the configuration options. Items in the submenu can be selected by entering one of the letters. The submenu selections are not case sensitive and will accept upper or lower case.

When entering a parameter, pressing escape will abort the entry and leave the parameter unchanged.

NOTE: The parameters displayed are a copy of the actual System Parameters. No changes take place until the parameters are saved by selecting*.

```

-----
Omni Flow Computers      Modbus Mux      v1.50
-----
      Configuration Options      |      ** ETHERNET PARAMETERS **
-----+-----
1) Ethernet      6) Advanced      |      A) IP Address: 200.100.101.235
2) Host          |      B) Subnet Mask: 255.255.255.0
3) Repeater     8) Logging      |      C) Gateway:      0.0.0.0
4) Security     9) Debug        |      D) Eth ID:      Sharon's Omni
5) System Info  |
|      F) Encap. Modbus Port: 6000
*) Save Configuration |      G) Modbus/TCP Port: 502
*) Cancel Changes & Reload |      H) Telnet Port: 23
#) Set Factory Defaults |      J) Message Timeout (ms): 1000
$) Board Reset |      K) Inactivity (min): 15
?) Refresh Menu |
!) Exit |
-----

```

Figure 4. Configuration Menu of the OMNI Modbus Mux Module

Configuration Options Menu

NOTE: Version Numbers (v) – The version number (v) that appears in the top right of the configuration menus is the OMNI SE firmware version. The actual version number of your module may be more recent than the one that appears in the figures of this Technical Bulletin, which at the time of its release was v1.50.

Submenu Selection

Entering a number in the range of 1 through 5 will select one (1) of the submenus for display in the right hand pane of the configuration menu.

Save Configuration (*)

Saves the currently displayed parameters to the System Parameters and re-initializes the hardware and software affected by the changes. Some parameter changes may cause connections to be dropped including the current Telnet session. For example, if the IP address is changed all connections will be dropped and the new IP address made active. If connected via Telnet the connection will need to be re-established using the new IP address.

Cancel Changes & Reload (%)

Cancels any changes made and reloads the current active set of parameters. Any parameter changes made without saving will be lost. All submenu parameters will be reloaded, not just the submenu currently displayed.

Set Factory Defaults (#)

Reloads all parameters with the defaults set at the factory. All submenu parameters will be set to defaults, not just the submenu currently displayed.

Board Reset (\$)

Resets the OMNI SE module. It does not reset the OMNI 3000/6000.

Refresh Menu (?)

Re-displays the current selections.

Exit (!)

Disconnects and terminates the configuration session. If the parameters have been changed during the configuration session, but have not been saved, a reminder message is displayed.

Ethernet Parameters Menu

Selecting Configuration Option 1 displays the Ethernet Parameters Submenu (Figure 5). Entering one (1) of the option letters will allow the parameter to be changed.

TCP/IP destination endpoints are referred to as "ports" and are entered as decimal numbers.

Omni Flow Computers		Modbus Mux	v1.50
Configuration Options		** ETHERNET PARAMETERS **	
1) Ethernet	6) Advanced	A) IP Address:	200.100.101.235
2) Host		B) Subnet Mask:	255.255.255.0
3) Repeater	8) Logging	C) Gateway:	0.0.0.0
4) Security	9) Debug	D) Eth ID:	Sharon's Omni
5) System Info		F) Encap. Modbus Port:	6000
		G) Modbus/TCP Port:	502
*) Save Configuration		H) Telnet Port:	23
%) Cancel Changes & Reload		J) Message Timeout (ms):	1000
#) Set Factory Defaults		K) Inactivity (min):	15
\$) Board Reset			
?) Refresh Menu			
!) Exit			

Figure 5. Ethernet Parameters Submenu of the OMNI Modbus Mux Module

IP Address

All devices on a network require a unique IP address. This is the static IP address used for all network connections to the Modbus Mux. The IP address is entered in dotted decimal notation. The default is 10.0.0.1.

Subnet Mask

IP addresses contain a Network Identifier (netid), a Subnet Identifier (subnetid), and a Host Identifier (hostid). Subnet masks identify the portion of the address occupied by the netid and the subnetid. The Subnet Mask is entered in dotted decimal notation. The default is 255.0.0.0.

Gateway

If a gateway exists for accessing other subnets, it can be entered here. The Gateway is entered in dotted decimal notation. The default is 0.0.0.0 or disabled.

Eth ID

A fifteen (15) character ID that can be used to name or describe the SE Module in an OMNI.

Encap. Modbus Port

TCP/IP port number used to communicate with the flow computer using standard Modbus encapsulated by TCP/IP. It may be changed to meet any special needs of your network. Entering zero (0) for the port number will disable Modbus connections. This port number must be different from the Modbus/TCP port number. The default is 6000.

Modbus/TCP Port

TCP/IP port number used to communicate with the flow computer using Modbus/TCP. The default is the standard Modbus/TCP port of 502. It may be changed to meet any special needs of your network. Entering zero (0) for the port number will disable Modbus/TCP connections. This port number must be different from the Modbus port number.

Telnet Port

Port number used for Telnet connections. The default is the standard Telnet port of 23. It may be changed to meet any special needs of your network. Entering zero (0) for the Telnet port will disable Telnet connections and configuration changes can then only be made through the onboard DB9 serial port default or via Network Utility v1.07 and up which gives you a chance to reset the Telnet Port to the default of twenty-three (23).

Message Time Out

This is the time in milliseconds that the Modbus Mux will wait for a complete message on the TCP connection. It should be long enough to account for any network delays but shorter than the retry time out in any application software used for communications. The default is 1000 milliseconds (1 second).

Inactivity

This is the time in minutes that a connection to the Encapsulated Modbus and Modbus/TCP ports can remain idle before being disconnected. The default is fifteen (15) minutes. Entering zero (0) will disable the Inactivity time out.

NOTE: This setting does not apply to the time out for idle Telnet connections, which is fixed at five (5) minutes.

Host Parameters Menu

Selecting Configuration Option 2 displays the Host Parameters Submenu (Figure 6). Entering one (1) of the option letters will allow the parameter to be changed.

The Host refers to the flow computer in which the Modbus Mux is installed. These parameters should match the configuration parameters in the OMNI for the port the Ethernet channel occupies.

Omni Flow Computers		Modbus Mux		v1.50
Configuration Options		** HOST PARAMETERS **		
1) Ethernet	6) Advanced	A) Baud Rate:	38400	
2) Host		B) Data Bits:	8	
3) Repeater	8) Logging	C) Stop Bits:	1	
4) Security	9) Debug	D) Parity:	None	
5) System Info		F) Modbus ID:	1	
		G) Protocol:	Modbus RTU	
*) Save Configuration		H) Initial Delay:	200	
%) Cancel Changes & Reload		I) Char Delay:	20	
#) Set Factory Defaults				
\$) Board Reset				
?) Refresh Menu				
!) Exit				

Figure 6. Host Parameters Submenu of the OMNI Modbus Mux Module

Baud Rate

Baud rate configured for the serial port in the OMNI. It can be set to 19200 or 38400 depending on other system requirements. The Default is 38400 and is the recommended setting.

NOTE: The baud rates of 19200 and 38400 are mutually exclusive for the RS-232/RS-485 port and the Host port. If the Host is set to 38400 then 19200 cannot be used on the RS-232/RS-485 port.

For OMNI firmware vXX.74.10 and above, the baud rate is not configurable in the OMNI and is defaulted to 38400 baud for the Ethernet port. If your OMNI SE module is installed in an OMNI with this firmware, set the Host Baud Rate to 38400.

Data Bits

Data bits can be selected for seven (7) or eight (8) data bits. This must match the corresponding parameter in the OMNI. The default is eight (8) and is the recommended setting.

NOTE: For OMNI firmware vXX.74.10 and above, the data bits setting is not configurable in the OMNI and is defaulted to eight (8) for the Ethernet port. If your OMNI SE module is installed in an OMNI with this firmware, set the Data Bits to eight (8).

Stop Bits

The Stop Bits can be selected for one (1) or two (2). If two stop Bits are selected the parity will be set to none. This must match the corresponding parameter in the OMNI. The default is one (1) and is the recommended setting.

NOTE: For OMNI firmware vXX.74.10 and above, the stop bits setting is not configurable in the OMNI and is defaulted to one (1) for the Ethernet port. If your OMNI SE module is installed in an OMNI with this firmware, please set the Stop Bits to one (1).

Parity

The parity may be selected to be None, Even or Odd. Even and Odd Parity can be used only with one (1) Stop Bit. This must match the corresponding parameter in the OMNI. The default is None and is the recommended setting.

NOTE: For OMNI firmware vXX.74.10 and above, the parity is not configurable in the OMNI and is defaulted to None for the Ethernet port. If your OMNI SE module is installed in an OMNI with this firmware, set the Parity to None.

Modbus ID

Modbus ID of the Host serial port. It is used to determine if messages are sent to the Host or sent out the Repeater port. It must match the corresponding parameter in the OMNI for proper operation. The default is one (1). It can be changed to any valid Modbus ID. This address will not be accessible on the Repeater port.

Protocol

This is the protocol expected by the host serial port. It can be set to Modbus RTU or Modbus ASCII. It does not determine what protocol is used over TCP/IP. The messages will be converted if required. It must match the corresponding parameter in the OMNI. The default is Modbus RTU and it is the recommended setting.

Initial Delay

This is the time in milliseconds that will be waited for a response from the OMNI before freeing up the TCP port for other connections. The default is 200 ms and it is the recommended setting.

Char Delay

This is the time in milliseconds that will be waited between characters from the OMNI before freeing up the TCP port for other connections. The default is 20ms and it is the recommended setting.

Repeater Parameters Menu

Selecting Configuration Option 3 displays the Repeater Parameters Submenu (Figure 7). Entering one of the option letters will allow the parameter to be changed.

The Repeater port is used to 'extend' the Ethernet connections to other OMNI Flow Computers or compatible Modbus devices using a 2-wire multi-dropped RS-485 connection.

Any transaction that is destined for a Modbus ID that does not match the Host flow computer configuration is routed out the Repeater port.

Omni Flow Computers		Modbus Mux		v1.50	
Configuration Options			** REPEATER PARAMETERS **		
1) Ethernet	6) Advanced	A) Baud Rate:	38400		
2) Host		B) Data Bits:	8		
3) Repeater	8) Logging	C) Stop Bits:	1		
4) Security	9) Debug	D) Parity:	None		
5) System Info					
		G) Protocol:	Modbus RTU		
*) Save Configuration		H) Initial Delay:	200		
%) Cancel Changes & Reload		I) Char Delay:	20		
#) Set Factory Defaults					
⌘) Board Reset					
?) Refresh Menu					
!) Exit					

Figure 7. Repeater Parameters Submenu of the OMNI Modbus Mux Module

Baud Rate

Baud rate used by the repeater port. The choices are 9600, 19200, 38400 and 57600. It should be set as high as possible. The default is 38400.

Data Bits

The Repeater port can be selected for seven (7) or eight (8) data bits. The default is eight (8).

Stop Bits

The Stop Bits can be selected for one (1) or two (2). If two (2) stop Bits are selected the Parity will be set to none. The default is one (1).

Parity

The parity may be selected to be None, Even or Odd. Even and Odd Parity can be used only with one (1) Stop Bit. The default is "None".

Protocol

This is the protocol used over the Repeater Port. It can be set to Modbus RTU, Modbus ASCII or Modbus Mixed. It does not determine what protocol is used over TCP/IP. The messages will be converted if required. When set to Modbus Mixed, the messages are sent as received with no RTU/ASCII conversion. The default is Modbus RTU.

Initial Delay

This is the time in milliseconds that will be waited for a response before freeing the repeater port for other connections. The default is 200 ms.

Char Delay

This is the time in milliseconds that will be waited between characters on the Repeater Port before freeing it for other connections. The default is 20ms.

Security Parameters Menu

Selecting Configuration Option 4 displays the Security Parameters Submenu (Figure 8). Entering one of the option letters will allow the parameter to be changed

This submenu allows parameter changes that determine who has access via the network.

Passwords are case sensitive. When changing a password parameter, the password can be cleared by entering 'return' at the Password: and Verify: prompt.

Omni Flow Computers		Modbus Mux		vl. 50
Configuration Options		** SECURITY PARAMETERS **		
1) Ethernet	6) Advanced	A) Serial Password:	*****	
2) Host		B) Telnet Password:	*****	
3) Repeater	8) Logging	C) Tcp/Ip Password:	Disabled	
4) Security	9) Debug	D) Respond to Ping:	Enabled	
5) System Info		E) IP Filter:	0.0.0.0	
		F) Filter Mask:	255.0.0.0	
		G) MAC 1:	00-00-00-00-00-00	
		H) MAC 2:	00-00-00-00-00-00	
*) Save Configuration		I) MAC 3:	00-00-00-00-00-00	
%) Cancel Changes & Reload		J) MAC 4:	00-00-00-00-00-00	
#) Set Factory Defaults		K) MAC 5:	00-00-00-00-00-00	
\$/) Board Reset		L) MAC 6:	00-00-00-00-00-00	
?) Refresh Menu		M) MAC 7:	00-00-00-00-00-00	
!) Exit		N) MAC 8:	00-00-00-00-00-00	

Figure 8. Security Parameters Submenu of the OMNI Modbus Mux Module

Serial Password

If a password is entered here, it will be required when using the on-board serial DB-9 connector configuration port. (It may be cleared by hitting return for the password and later verification). If cleared, no passwords will be required. The default password is omni (lower case). The passwords are case sensitive. If you have forgotten your password, contact OMNI Technical Support for the procedure to recover it.

Telnet Password

This is the Password required when performing remote configuration of this module using Telnet. The password can be cleared and if cleared, no password will be required. The default password is omni (lower case). The passwords are case sensitive. To disable Telnet access set the Telnet port to zero (0) instead of the standard default of twenty-three (23).

TCP/IP Password

This is a password required for any connection to the Modbus or Modbus/TCP port numbers. An OMNI "Password Needed" exception code five (5) will be returned for any transaction until the password is written to data location 4850. If cleared, no password will be required. The password is cleared by default.

Respond to Ping

Responses to ICMP Echo Requests or Pings can be enabled or disabled for added security. The default value is Enabled.

Modicon Compatible

Shows if the Ethernet Host port is enabled for Modicon compatibility. This field is display only. Modicon compatibility must be set in the OMNI configuration from either OMNICOM or the OMNI front panel.

OMNI Firmware Ver

Shows the version of the OMNI firmware. This field is display only.

Advanced Parameters Menu

Selecting Configuration Option 6 displays the Advanced Parameters Submenu (Figure 10). Entering one (1) of the option letters will allow the parameter to be changed.

This submenu allows parameter changes that determine how data is sent over the network.

WARNING: Use Caution when changing these parameters!

```

| Omni Flow Computers      Modbus Mux      v1.56
|-----|-----|
| Configuration Options  | ** ADVANCED PARAMETERS **
|-----|-----|
| 1) Ethernet           6) Advanced    | ***** Warning *****
| 2) Host               |               | Change with caution
| 3) Repeater           8) Logging     |
| 4) Security           9) Debug       |
| 5) System Info        |               | A) ReXmit Min (ms):      10
|                         |               | B) ReXmit Max (ms):    10000
|                         |               | C) Nagle Algorithm:    Enabled
|                         |               | E) Socket Close T0(s):  120
| * ) Save Configuration |
| * ) Cancel Changes & Reload
| # ) Set Factory Defaults
| $ ) Board Reset
| ? ) Refresh Menu
| ! ) Exit
|-----|-----|

```

Figure 10. Advanced Parameters Submenu of the OMNI Serial/Ethernet-Modbus Mux (SE) Module

ReXmit Min

This field may be useful for VSAT communications. A time in milliseconds that represents a lower boundary for a retransmit time out. The default is 10ms.

NOTE: Beware of reducing this, since modern hosts try to ack only every second segment. If the time out is too small, the SE module will unnecessarily retransmit if it doesn't get the ack for the first of the two (2) segments (especially on a fast LAN, where the RTT measurement will tempt you to set a small time out).

ReXmit Max

This field may be useful for VSAT communications. A time in milliseconds that represents an overall upper boundary for the retransmit time out. The default is 10000 ms.

Nagle Algorithm

Nagle's algorithm is a means of improving the efficiency of TCP/IP networks by reducing the number of packets that need to be sent over the network. The default is Enabled.

Socket Close TO

The amount of time the host waits before closing the socket connection after the client device has powered down during active communication. The value ranges from 10 to 240 seconds with the default at 120 seconds.

Logging Parameters Menu

Selecting Configuration Option 8 displays the Logging Parameters Submenu (Figure 11). Entering one (1) of the option letters will allow the parameter to be changed.

This submenu is used to enable System Logging which is the UDP transmission of event notification messages across networks to event message collectors. Examples of Syslog notification messages sent by the OMNI SE Module are listed in Appendix B.

```

+-----+-----+-----+
| Omni Flow Computers | Modbus Mux | v1.50 |
+-----+-----+-----+
| Configuration Options | ** LOGGING PARAMETERS ** | | |
| 1) Ethernet          | 6) Advanced | A) Syslog IP: 0.0.0.0 |
| 2) Host              | 7) Security | B) View System Log |
| 3) Repeater          | 8) Logging  | |
| 4) Security          | 9) Debug    | |
| 5) System Info      | | |
| | | | |
| *) Save Configuration | | |
| %) Cancel Changes & Reload | | |
| #) Set Factory Defaults | | |
| $) Board Reset       | | |
| ?) Refresh Menu     | | |
| !) Exit              | | |
+-----+-----+-----+

```

Figure 11. Logging Parameters Submenu of the OMNI Serial/Ethernet-Modbus Mux (SE) Module

Syslog IP

The Logging page is used to enable the logging of system information and alerts called the "Syslog". The syslog protocol provides a transport for the transmission of event notification messages across networks to event message collectors, or syslog servers, using UDP via port 514. The OMNI SE firmware follows the syslog protocol outlined in RFC 3164. Refer Appendix B for a list of example syslog messages.

NOTE: It is recommended to use a static IP address for the Syslog PC/Server instead of an address obtained using DHCP.

View System Log

Displays up to 250 Syslog event messages stored in RAM. These messages are only stored if the Syslog is enabled and is cleared when the SE module is reset.

Debug Options Menu

Selecting Configuration Option 9 displays the Debug Options Submenu (Figure 12).

NOTE : The Debug Option is not available with the Serial port connection.

Debugging will degrade communications performance. Entering one (1) of the option letters will show different debug displays.

This submenu provides for a display of messages being received from and transmitted to the OMNI SE and Host.

```

    Omni Flow Computers      Modbus Mux      v1.50
    -----
    Configuration Options   |   ** DEBUG OPTIONS **
    1) Ethernet             |   A) Debug All
    2) Host                 |   B) Debug Host
    3) Repeater             |   C) Debug Ethernet
    4) Security             |   D) Debug Repeater
    5) System Info         |
    |                       |   ** Modbus Data Will Display **
    |                       |   ** Press Any Key to Quit **
    *) Save Configuration  |
    %) Cancel Changes & Reload
    #) Set Factory Defaults
    $) Board Reset
    ?) Refresh Menu
    !) Exit
    
```

Figure 12. Debug Options Submenu of the OMNI Serial/Ethernet-Modbus Mux (SE) Module

Debug All

Communication messages are displayed which represent Modbus messages going to (>) and from (<) the Host (H) and the internal messages going to (>) and from (<) the Ethernet Module (E) relative to the Host (Figures 13 and 14).

```

00004 4 >H 01 03 0C 96 00 0D 67 73
00069 4 <H 01 03 1A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00006 4 >E 01 03 1A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

00021 4 <E 01 03 0C 1D 00 12 56 91
00004 4 >H 01 03 0C 1D 00 12 56 91
00070 4 <H 01 03 24 00 02 00 01 00 42 00 42 00 42 00 01 00 00 00 00 00
      00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 BC
      88
00007 4 >E 01 03 24 00 02 00 01 00 42 00 42 00 42 00 01 00 00 00 00 00
      00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00 00 00 00 BC
      88

00020 4 <E 01 03 0C 32 00 0D 26 90
00004 4 >H 01 03 0C 32 00 0D 26 90
00067 4 <H 01 03 1A 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00006 4 >E 01 03 1A 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
      00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
    
```

Figure 13. Debug All (9A) Sample of Debug Submenu for Non-Network Printing Versions

```

00016 8 <E 01 03 0C 54 00 02 86 8B
00005 8 >H AA 02 07 06 01 03 0C 54 00 02 55
00012 8 <H AA 02 87 07 01 03 04 00 00 00 00 55
00006 8 >E 01 03 04 00 00 00 00 FA 33

00016 8 <E 01 03 45 95 00 07 01 28
00005 8 >H AA 02 07 06 01 03 45 95 00 07 55
00022 8 <H AA 02 87 1F 01 03 1C 00 00 00 00 00 00 00 00 00 00 00 00 55
00008 8 >E 01 03 1C 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00000 8 >E 01 03 1C 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00016 8 <E 01 03 45 31 00 07 40 CB
00005 8 >H AA 02 07 06 01 03 45 31 00 07 55
00031 8 <H AA 02 87 1F 01 03 1C 00 00 00 00 00 00 00 00 00 00 00 00 55
00008 8 >E 01 03 1C 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00000 8 >E 01 03 1C 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

```

Figure 14. Debug All (9A) Sample of Debug Submenu for Network Printing Versions

The first set of numbers represent the relative timings in milliseconds between messages. For example: In Figure 13, the time on the second message line is sixty-nine (69) so there were sixty-nine (69) ms between the completion of the execution of the messages on line 1 and line 2.

The next number (1 - 8) is the connection number. (There are up to eight (8) simultaneous connections per SE Module at any time.)

The "<E" indicates messages going to the Ethernet from the outside world.

The ">H" indicates messages going to the OMNI from the Ethernet.

The "<H" indicates messages going from the OMNI to the Ethernet.

The ">E" indicates messages going from the Ethernet to the outside world.

The last set of numbers represent the Modbus messages. Figure 14 shows some messages with an additional 4 bytes beginning with 'AA', the Modbus message without a CRC, and an additional byte at the end of the message '55'. These are specifically for messages going between the Ethernet and the OMNI.

Debug Host

Communication messages are displayed which represent Modbus messages coming into (>) and going from (<) the Host (H). The Host is the OMNI Flow Computer CPU module.

Debug Ethernet

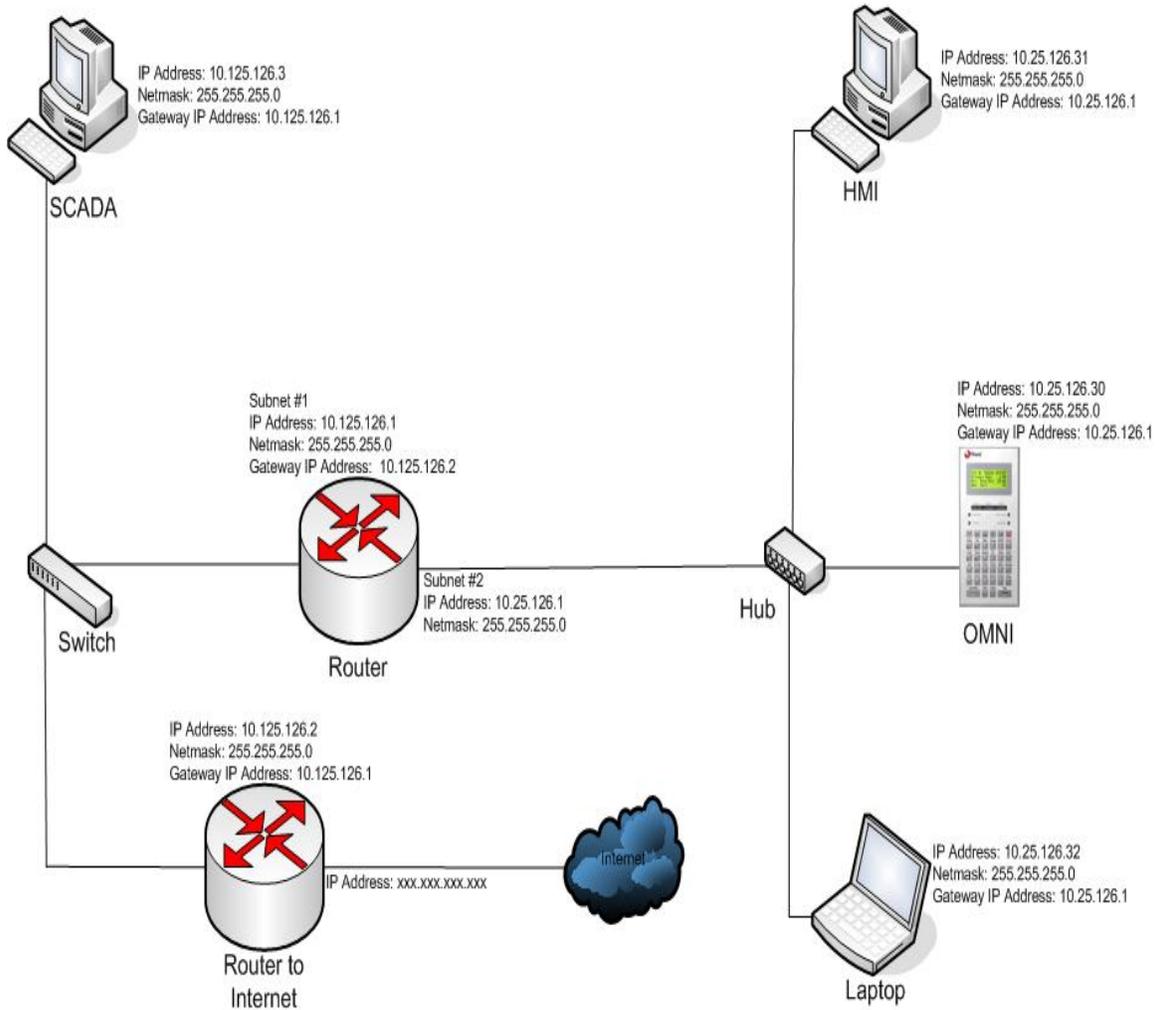
Communication messages are displayed which represent Modbus messages coming into (<) and going from (>) the Ethernet (E). The Ethernet is the OMNI SE Module's Ethernet port.

Debug Repeater

Communication messages are displayed which represent Modbus messages coming into (>) and going from (<) the Repeater Port (R). The Repeater is the OMNI SE Module's Repeater port.

Appendix A: Communicating Across Subnets

Communicating Across Subnets



In this example, note that the second octet of Subnet #1 IP address (125) differs from the second octet of Subnet #2 IP address (25).

Appendix B: Example Syslog Messages

<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet card restart
<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Network up
<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet board reset - IP: 192.168.157.216
<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet board reset - Serial
<180>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet Flash download - IP: 192.168.157.216
<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet set to factory defaults - IP: 192.168.157.216
<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet set to factory defaults – Serial
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet configuration change - IP: 192.168.157.216
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ethernet configuration change - Serial
<180>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Serial password changed - IP: 192.168.157.216
<180>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Serial password changed - Serial
<180>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Telnet password changed - IP: 192.168.157.216
<180>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Telnet password changed - Serial
<180>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: TCP password changed - IP: 192.168.157.216
<180>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: TCP password changed - Serial
<180>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Invalid Serial password attempts
<180>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Invalid Telnet password attempts - IP: 192.168.157.216
<180>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Invalid TCP password attempts - IP: 192.168.157.216 Port: 502
<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Lost password sequence entered - Serial
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Ping request - IP: 192.168.157.216
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Syslog enabled - IP: 192.168.157.216
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Syslog enabled - Serial
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Syslog disabled - IP: 192.168.157.216
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Syslog disabled - Serial
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Debug on - IP: 192.168.157.216
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Debug off - IP: 192.168.157.216
<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: IP address change - IP: 192.168.157.14, New IP: 192.168.157.17
<181>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: IP address change – Serial, New IP: 192.168.157.17
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Port blocked - IP: 192.168.157.216 Port: 502
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: IP filter rejection- IP: 192.168.157.216 Port: 502
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: MAC filter rejection- IP: 192.168.157.216 Port: 502
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Modbus timeout - IP: 192.168.157.216 Port: 502
<182>Jan 20 10:46:03 192.168.157.14 OmniSE[6C159D]: Modbus exception - IP: 192.168.157.216 Port: 502 Code: 05
<182>Jan 20 10:46:03 192.168.157.14 OmniSE [6C159D]: Printer 1 IP address change – Flow Computer, New Printer IP: 192.168.157.200

Appendix C: Network Printing Error Codes

These codes are shown in the “value” column in the OMNI flow computer’s Alarm report:

0	Error cleared
1	Printer socket open error or error establishing socket
2	Receive Job Command error
3	Receive Control File Command error
4	Control File error
5	Receive Data File Command error
6	Error while sending report
7	Error while sending nulls
8	Job Done Character error
9	Last Record not Required
255	Network parameter change (SE Module IP Address or Printer IP address changed)

Appendix D: Setting a Temporary IP Address for older Versions of OMNI SE Firmware

For OMNI SE firmware v1.21 and below, you may set a temporary IP Address using the following method. This method uses two (2) utility programs (ARP and PING) on a PC that is connected to the same network as the flow computer with the SE module installed. This example uses the MAC address of 00-90-C2-C0-2D-3F and sets a desired IP address of 200.100.101.13. The MAC address you use will be the one from your module and the IP will be what you have selected for your network.

All computers use a table to map IP addresses to hardware addresses for the network. The values in the table are filled in using an "Address Resolution Protocol". The table is referred to as the ARP table. This method sets an entry in the ARP table and then uses ping to propagate this entry to the SE module.

- Type **cmd** from MS Windows desktop Start/Run menu or bring up a DOS box on the PC.
- Ping the address you intend to use to be sure it is not in use by another device by typing: **ping 200.100.101.13** (substitute your desired IP address) you should receive time outs for the pings. If you receive any replies then that address is in use and another one should be chosen.

A problem may be encountered when replacing an SE module with a new module already set to the same IP address or when attempting to set the new module to the same IP address that was previously in use.

The ARP table in the PCs, routers, switches and other network devices may already contain a mapping of the IP address to the previous hardware MAC ID. All TCP traffic for that IP address will be directed to the hardware MAC ID of the previous board and will not be seen by the new module. The solution is to ensure that the IP address is cleared out of the ARP tables. To do so, bring up a DOS session and type: **arp -d IP address in use**. Example: If the IP address is 200.100.101.13 then the command line would be: **arp -d 200.100.101.13**

NOTE: MAC and IP Addresses – The MAC address and IP address used here are for example purposes only. You must use the MAC address from your SE Module and the IP address you have selected for your network.

MAC Address for Unix Systems – The example shown is for Microsoft Windows. On a Unix system, the MAC address is typed as 00:90:C2:C0:2D:3F.

- Type: **arp -s 200.100.101.13 00-90-C2-C0-2D-3F**. This sets up the ARP table on the computer and associates the IP address with the hardware address of the SE module.
- Type **arp -a** to verify the entry was accepted.
- Type: **ping 200.100.101.13**. The first attempt will produce a time out while the SE module reconfigures its address. The subsequent attempts should receive a reply.
- If the ping is unsuccessful, especially where routers or switches are involved, allow sufficient time for the new IP address and MAC ID to be propagated into the ARP tables of the various routers and switches on the network and then attempt to ping the IP address again.
- Use Telnet to access the configuration menus by typing: **telnet 200.100.101.13**. Set the IP address, Netmask, and Default Gateway. Save the parameters. Any other parameters may be changed and saved at this time.
- Remove the entry in the ARP table by typing: **arp -d 200.100.101.13**.

Once you start getting replies from the ping, the IP address has been accepted by the SE Module. This IP address is temporary and the SE module will revert to its previous IP address after five (5) minutes unless the IP address is changed and saved while in a telnet session.

NOTE: The example shown is for Microsoft Windows. On a Unix system the MAC address is typed as 00:90:C2:C0:2D:3F.

Appendix E: Using OMNICOM for DOS over TCP/IP

NOTE: OMNI discovered a problem in Serial/IP Version 2.3.1, which was corrected by Tactical Software. An updated version is available on the Tactical Software Web site. You must download and install Version 2.4 or above.

OmniCom for DOS does not support TCP/IP directly but it can be used with "Serial Port Redirector" software to communicate with the Modbus Mux. The redirector will "capture" serial port communications and route them over TCP/IP to a defined IP address and TCP port.

NOTE: OMNICOM for Windows fully supports TCP/IP directly and does not require this redirector.

The suggested software to use is Serial/IP from Tactical Software. The software may be downloaded for trial and purchased at www.tacticalsoftware.com.

Windows NT/2000

Under Windows NT and Windows 2000, any version of OMNICOM for DOS is compatible with Serial/IP. OMNICOM is selectable for serial ports 1-4. Use Serial /IP to redirect a serial port in that range, configure with the IP address and TCP Port assigned to the Modbus Mux and set for "Raw TCP Connection".

Windows 95/98

Under Windows 95 or 98, Serial/IP can only redirect communications when the serial port is opened with an INT/14 driver. This requires a revision XX.73.15 or above OMNICOM for DOS. The latest version can be downloaded from www.omniflow.com. To activate the INT 14 driver, select "TCP/IP 98" for "Comm Media" on the OMNICOM "Start Comm" menu.

SE Firmware Revision History

- v1.58** Performs an automatic password log off on disconnect for OMNI firmware versions 75.10 and higher.
- v1.57** A configurable response timeout for each network printer was added. It ranges from five (5) seconds to 300 seconds (5 minutes) with the default set to ten (10) seconds.
The code now rotates through the LPR ports (721-731) searching for an open one as another printer may have that one locked if there are multiple OMNIs printing to the same printer. The SE module waits five (5) seconds to establish the socket connection for each port attempt.
The OMNI firmware version has been appended to the response to the Network Utility query.
- v1.56** The Ethernet ID configured in the Ethernet Parameters screen is now used for the user name when sending files to a printer. If the Ethernet ID is blank, the default is "User".
A 16-byte queue name was added to the configuration for each printer. It can be configured in the Ethernet Printing screen using OMNICOM v1.38 and up. The queue name is used when sending the job control to the printer. If the queue name is blank, the default is "LPT1".
A socket close timeout was added to the Advanced screen. It can be configured via Network Utility or OMNICOM. This is the amount of time in seconds to wait to close a connection after the client has powered down during active communication.
- v1.55** The number of simultaneous Modbus connections per SE Module was increased from four (4) to eight (8).
Corrected a problem when the Modbus ID was changed at the OMNI front panel, the SE Module configuration was not updated in the OMNI. When the OMNI was reset, the configuration in the OMNI would override the Modbus ID changed at the front panel. The problem was introduced in v1.50.
- v1.54** The Ethernet now only allows valid Modbus IDs between 1 and 247 from the OMNI. If the OMNI sends an invalid Modbus ID and the Modbus ID in the Ethernet is valid, The Ethernet sends it to the OMNI.
The Modicon Compatible indication is now shown as enabled if the value sent from the OMNI is equal to one (1) instead when the value is non-zero. This is in line with how the OMNI evaluates the setting.
In prior versions, if the SE Module IP Address changed, an Ethernet Printer Error alarm was sent to the OMNI for both printers regardless of whether they were configured or not. Now alarms are only sent if the printer has an IP Address configured.
If a printer IP address is changed, any outstanding errors at the OMNI are now cleared for that printer.
- v1.53** Corrected a problem where the Ethernet would sometimes misinterpret the response from the Repeater and log it as a Modbus exception to the Syslog – the problem was introduced in v1.50.
Corrected a problem when the Syslog was enabled and the 2nd printer IP Address was changed, the IP address logged in the Syslog for the OMNI became the changed Printer IP - problem was introduced in v1.50.
- v1.52** Corrected a problem where the Ethernet was not processing the response from the Repeater port correctly - problem was introduced in v1.50.
- v1.51** The TCP Password entry was never accepted when the port was configured as Modicon compatible.
The Ethernet was not communicating with the OMNI if the Ethernet cable was not connected on power up. Once the cable was connected, the Ethernet would continue but features such as Network Printing and Ethernet configuration via OMNICOM would not be enabled.

v1.50

Systems Menu – added the OMNI flow computer firmware version display.

Network Printing was added allowing for two (2) network printers per SE Module (in addition to the existing local RS-232 printer supported by the flow computer). Refer to Appendix C for Network Printing error codes.

NOTE: The flow computer firmware must be a version that supports network printing.

SE Module configuration exchange with OMNI Flow Computer allows configuration via OMNICOM v1.25 and up (SE Module firmware v1.50 and up).

NOTE: The flow computer firmware must be a version that supports configuration of the Ethernet.

The IP Address, Netmask, Gateway, Host Modbus ID, and Modicon Compatibility are now synchronized between the SE Module and the OMNI Flow Computer. If the IP address sent to the SE Module from the OMNI is zeros, the SE Module sends its IP address, Netmask, and Gateway to the OMNI (SE Module firmware v1.50 and up).

If the downloader fails during a firmware upgrade due to not enough extended memory it will free the memory used for both the Syslog and for Network Printing.

v1.26

Security Menu – Four (4) more MAC address filters were added for a total of eight (8).

Ethernet Menu - the Ethernet ID is now used to store information when configuration is set to defaults:

- 1) If the user has restored the configuration to factory defaults, the Ethernet ID is set to "FD111222333444" where the numbers represent the configured IP address (in decimal notation without the dots) before the reset occurred.
- 2) On startup, after the configuration has been read from FLASH memory, if the CRC check fails and has to be set to defaults (this may happen when a user downloads an older version of SE firmware than what is currently in the SE Module) the Ethernet ID is set to "CRC111222333444".
- 3) If there is an error reading the FLASH memory for the configuration block, the Ethernet ID is set to "-XR111222333444" where "-X" is the error code returned from the read:
 - "-1" = invalid address or range
 - "-2" = no valid ID block found
- 4) If there is an error writing to the FLASH memory for the configuration block, the Ethernet ID is set to "-XW111222333444" where "-X" is the error code returned from the write:
 - "-1" = invalid address or range
 - "-2" = no valid ID block found
 - "-3" = flash writing error
- 5) The configuration is verified after a save. If the read fails on the save, the Ethernet ID is set to "SVR111222333444". If the CRC check fails on the save, the Ethernet ID is set to "SVC111222333444" using the IP in the system parameters. If the IP address does not verify, the Ethernet ID is set to "SVI111222333444" using the IP in the system parameters.
- 6) If the IP Address is all zeros on startup, the 4th byte of the Ethernet ID is set to 'Z'.

Debug Menu - Changed the order of the debug menu to (A) Debug All, (B) Debug Host, (C) Debug Ethernet and (D) Debug Repeater.

Modbus communications - support for broadcast messages was added.

Re-added the five (5) second time delay after restart to allow the OMNI to initialize.

If an IP Address of all zeros is sent to the SE Module from Telnet or onboard DB9 serial port configuration, it will not be saved in the configuration.

If the IP Address is all zeros on start up, the address is set to the default of "10.0.0.1".

After three (3) invalid password attempts in Telnet configuration, a one (1) minute lockout is imposed.

When configuring the OMNI from the onboard DB9 serial port and using the backspace key, data was not displayed properly on the input line.

- v1.25** Ethernet Menu - Allow escape key when entering the Ethernet ID. Changed the text from "Modbus Port" to "Encap. Modbus Port".
- Security Menu - Allow escape key when entering MAC addresses.
- Debug Menu - Added "Debug Ethernet" and "Debug Repeater" selections.
- All menus - Backspace displayed garbage on the screen.
- Added the ability to obtain and reset the Telnet Port via UDP before a Configuration session (available with Network Utility v1.07 and up).
- Added an "Inactivity" message when in the Debug mode if the Modbus communication's socket is closed due to Modbus inactivity time out.
- The 5-minute Telnet time out timer is refreshed every time a debug message is printed during Modbus communications. This change allows continuous debug data to be captured without timing out. After five (5) minutes of Modbus inactivity, the Telnet session will time out.
- Preset Single Register (function code 06) was not properly handling 32-bit long integers and floats writes and resulted in a short message sent to the flow computer and thus incorrect values written.
- Added a refresh of the configured Netmask and Gateway when the IP address is changed.
- Removed the setting of the Netmask based on class when the IP address was changed via the "Set IP Address" feature in Network Utility.
- Removed the ping of the IP address configured in the SE module in order to update ARP tables on network devices when replacing an SE module using the same IP address as the previous SE module. It now pings the configured Gateway IP address instead of the local IP address.
- The ARP table entries for the Ethernet devices on the local subnet are already updated automatically when a new session is initiated with the SE module.
- Removed the five (5) second time delay at start up before being able to establish communications after power up or Board Reset and now it just waits for the sockets to initialize before communications is allowed.
- If the downloader fails during a firmware upgrade due to not enough extended memory it will free the memory used for the Syslog.
- v1.24** Ethernet Menu - Added a fifteen (15) character "Eth ID". The ID can be used to name or describe the Ethernet Module. Removed the "Set IP via Ping" flag.
- Host Menu - Baud Rate - 57600 was removed from the Host choices.
- Remote Menu - Baud Rate - 57600 was listed as a choice but when selected gave an "Invalid Parameter" message. 57600 was enabled as a valid selection.
- Security Menu - Added a "Respond to Ping" flag. The choices are (0) Disabled (1) Enabled. The default is Enabled. Allow MAC addresses to be entered with corresponding hyphens between numbers.
- System Info Menu - Modicon compatibility is auto-detected on start up and the status is displayed as Enabled or Disabled.
- Logging Menu - Added the System Logging menu and functionality (Syslog).
- Added an ICMP Handler to handle pings.
- The IP Address can no longer be configured using the "arp -s" command.
- Added a five (5) second time delay after restart to allow the OMNI to initialize.
- If the physical connection to the OMNI was broken, the connections were remaining open. Now all connections are closed when the physical link is detected broken. When the link is re-established, it is logged to the System Log (if enabled).
- SE Module responded to a ping if the MAC address matched but was not checking that the IP address matched as well.
- The check for the TCP password is now skipped on messages going through the repeater port.

Connections via the serial port at the same time as a Telnet connection was causing the configuration menu display to lock up and time out at the PC side.

Configuration menu display was stopping before end of menu when using Telnet.

Debug All not keeping up on long (255 bytes) messages.

Display a message to the user if Debug mode is selected when on a serial connection.

- v1.23** Added 'Advanced' and 'Debug' entries to the menu. Added new parameters in the Advanced menu to help with TCP/IP over VSAT. Minimum and Maximum retry on packets retransmission as well as the ability to turn the Nagle Algorithm on or off was added. Debug was placed on menu instead of typing 'X' or 'Z'.
- v1.22** Removed ICMP handler - use library instead. IP change via ping is permanent.
- v1.21** Added disable of ICMP (Ping) and further checks in the ICMP handler.
- v1.20** Changed tasks to speed up. Added debug through Telnet with 'X' and 'Z'. Added Flash download support.
- v1.10** Corrected a problem with Modbus/TCP queued requests getting ignored.
- v1.09** Added keepalive to detect dropped connections when the inactivity time out is set to zero. Added a 'Reset' on the serial and telnet menus to reset the Ethernet board via telnet.
- v1.08** Added ICMP Handler and fixed the handling of unknown Modbus function codes so they fall through untouched. Added tcp_tick in handlers to detect if a socket is closed in the middle of a transaction. Added 'exit' on the serial and telnet menus.
- v1.07** Removed Modbus Delay parameter. Added the ability to set a Temporary IP address using arp and ping on a PC so serial connection is not required. Change the default Subnet Mask to Class A 255.0.0.0.
- v1.06** Corrected an issue when changing TCP Port where it didn't take effect until the SE Module was reset.
- v1.05** Added ping to clear up arp tables.
- v1.04** Padded connection buffers.
- v1.03** Minor Menu Changes.
- v1.02** Enabled the gateway parameter.
- v1.01** Initial Version

DOCUMENT REVISION HISTORY

DOCUMENT INITIAL RELEASE DATE..... 31-October-2002

<u>REVISION</u>	<u>DATE</u>	<u>PURPOSE / CHANGE REQUEST</u>
A	31-October-2002	Maintained on the Web - Initial release
B	19-April-2006	Maintained on the Web
C	06-July-2006	Maintained on the Web
D	04-April-2007	Maintained on the Web
E	11-May-2007	Maintained on the Web
F	08-August-2007	Maintained on the Web
G	06-September-2007	Maintained on the Web
H	04-December-2007	Maintained on the Web
I	13-March-2008	Maintained on the Web
J	07-April-2008	Maintained on the Web
K	08-April-2008	Maintained on the Web
L	08-April-2008	Maintained on the Web
M	05-March-2009	DCR 090027
N	08-September-2011	DCR 110161
O	07-March-2014	DCR 120287