



**SMC<sup>®</sup>**

**CONFIGURATION GUIDE FOR THE  
ETHERNET  
SMC3016/MC &  
SMC3016TP/MC  
NETWORK CONTROLLER BOARDS**

**Pub. # 900.082  
March 1991**

It is the policy of Standard Microsystems Corporation to improve products as new technology, components, firmware and software become available. SMC<sup>®</sup>, therefore, reserves the right to change specifications without prior notice.

Copyright © 1991 by  
Standard Microsystems Corporation  
Hauppauge, New York.  
All rights reserved. Printed in U. S. A.

**Trademarks:**

SMC and Standard Microsystems are registered trademarks of Standard Microsystems Corporation. Other product names are registered trademarks and trademarks of their respective holders.

# TABLE OF CONTENTS

<b>Topic</b>	<b>Page</b>
<b>FCC/CSA COMPLIANCE</b> .....	<b>ii</b>
<b>INTRODUCTION</b> .....	<b>1</b>
<b>TECHNICAL FEATURES</b> .....	<b>3</b>
IEEE 802.3 Compatibility.....	3
Direct 10BASE-T Connectivity for the SMC3016TP/MC Board .....	3
Direct 10BASE2 Connectivity for the SMC3016/MC Board .....	3
Connectivity to Other Media Via AUI Port.....	4
Customized Drivers .....	4
Outstanding Performance .....	4
Diagnostic LEDs .....	5
Extended Distance Thin Ethernet Segments .....	6
Configurable Hardware.....	6
Optional Auto-Boot PROM for NetWare .....	6
Network Address .....	7
Confidence Test Utility .....	7
<b>PRODUCT SPECIFICATIONS</b> .....	<b>8</b>
<b>PIN ASSIGNMENTS FOR TWISTED PAIR WIRE</b> .....	<b>9</b>
<b>CONFIGURING THE BOARDS</b> .....	<b>11</b>
Selecting the Cable Connector.....	14
Running the Automatic Configuration Program.....	15
<b>SUMMARY OF CONNECTION RULES</b> .....	<b>22</b>
<b>WARRANTY AND SERVICE POLICY</b> .....	<b>24</b>
In-Warranty Service .....	24
Out-of-Warranty Service .....	24
Policy on Changes.....	25
Tech Support Hotline .....	25

# **FCC/CSA COMPLIANCE**

## **FCC Compliance**

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions in this guide, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

## **CSA Compliance**

**THIS DIGITAL APPARATUS DOES NOT EXCEED THE CLASS A LIMITS FOR RADIO NOISE EMISSIONS FROM DIGITAL APPARATUS AS SET OUT IN THE RADIO INTERFERENCE REGULATIONS OF THE CANADIAN DEPARTMENT OF COMMUNICATIONS.**

**LE PRÉSENT APPAREIL NUMÉRIQUE N'ÉMET PAS DE BRUITS RADIOÉLECTRIQUES DÉPASSANT LES LIMITES APPLICABLES AUX APPAREILS NUMÉRIQUES DE CLASSE A PRÉSCRITES DANS LE RÈGLEMENT SUR LE BROUILLAGE RADIOÉLECTRIQUE ÉDICTÉ PAR LE MINISTÈRE DES COMMUNICATIONS DU CANADA.**

## INTRODUCTION

Thank you for purchasing an SMC product. SMC is proud to bring to you the latest technologies and highest quality products.

The SMC3016/MC and SMC3016TP/MC Ethernet™ network controller boards offer exceptional throughput — performance in excess of one Megabyte per second.\* This is achieved by coupling SMC's own high-performance drivers with advanced hardware:

- EtherStar™ Controller Chip
- 16-bit wide Data Bus
- Separate transmit and receive multi-packet buffers
- 16K bytes of dual-ported Static RAM

The SMC3016/MC and SMC3016TP/MC also offer superior design features:

- Surface Mount Technology, a relatively new and inherently more reliable high-volume manufacturing process, offering higher component density due to the reduction of through-holes
- On-board transceiver for convenient, cost-effective connection to the network — an external transceiver or Media Access Unit (MAU) is not required but is optional for the AUI port
- Transmit and receive status LEDs to monitor both board and network activity
- Compatibility with other expansion cards
  - I/O mapped, so no computer memory space is required
  - Software configurable via the IBM® Programmable Option Select (POS), so there are no switches to set and resource allocation conflicts can be easily avoided

\* As measured by the Novell® PERFORM2 Utility. Network: NetWare® 386 v3.1 — PS/2™ Model 65SX File Server and only two PS/2 Workstations — Parameters: Read, Overlaid I/O, 4K Record Size, 1000 Iterations.

**Additionally:**

- **The SMC3016TP/MC's link integrity LED can easily confirm that a valid connection is established between the board and an Ethernet concentrator**
- **The SMC3016/MC supports 1,000 foot (305m) Thin Ethernet segments (with cable meeting the specifications listed in this guide).**

**The result is unmatched reliability, quality and performance.**

## TECHNICAL FEATURES

SMC's Ethernet "MC" boards, the 3016/MC and 3016TP/MC, are 16-bit, high-performance network controller boards designed to operate with the IBM Personal System/2™ and compatible Micro Channel™ Architecture machines. These boards are suited for network file server, workstation and bridge applications.

### IEEE 802.3 Compatibility

These boards comply fully with the IEEE 802.3 specifications listed in the following table:

BOARD	SPECIFICATION
SMC3016TP/MC	10BASE-T (Twisted Pair) 10BASE5 (Thick Ethernet)
SMC3016/MC	10BASE2 (Thin Ethernet) 10BASE5 (Thick Ethernet)

The on-board EtherStar MB86950 Controller provides full CSMA/CD (Carrier Sense/Multiple Access with Collision Detection), 10 Mbps (Megabits per second) baseband operation for both boards.

#### *Direct 10BASE-T Connectivity for the SMC3016TP/MC Board*

The 3016TP/MC features an on-board transceiver and an RJ-45 connector for direct connection to unshielded twisted pair wiring in a star topology. The central component of an Ethernet twisted pair network is a 10BASE-T wiring concentrator, such as SMC's own Ethernet 3508TP.

#### *Direct 10BASE2 Connectivity for the SMC3016/MC Board*

The SMC3016/MC features an on-board transceiver and a BNC connector. These enable the board to be connected directly to Thin Ethernet cable (RG-58A/U or RG-58C/U) with a BNC T-Connector.

## *Connectivity to Other Media Via AUI Port*

Connection to Thick (10BASE5) or Thin (10BASE2) Ethernet cable, or to optical fiber or twisted pair wiring, is also provided through the Attachment Unit Interface or AUI port on both boards. An external transceiver with the appropriate cable tap is required for connection to this port.

## **Customized Drivers**

Each Ethernet "MC" board is shipped with an SMC driver diskette containing high-performance driver support for a variety of network operating systems and protocols. Also present is a copy of SMC's Adapter Descriptor File (ADF), which is required to properly configure the board's hardware options when the system is initialized.

If a supplement containing driver configuration information is enclosed, please refer to it prior to loading any software drivers. Also, follow the instructions in the README.EXE file on the diskette when loading these drivers.

## **Outstanding Performance**

Advanced hardware features — 16-bit wide Data Bus, EtherStar Controller, 16K byte Data Packet Buffer and Dual-ported RAM — in conjunction with SMC's high-performance drivers, enable the board to achieve significant throughput, even on large or heavily loaded networks.

The EtherStar Controller provides arbitration circuitry which allows dual port access by both the station and the network. Simultaneous access by the station and the network is a high-performance feature that eliminates CPU delays. For example, the station can extract data from the receive buffer while, at the same time, the Controller is loading a packet into the receive buffer from the cable.

16K bytes of buffer memory are used for transmitting and receiving network packets. Management of the buffer is provided by the EtherStar chip. 12K bytes are used for the receive buffer.



The remaining 4K bytes are always reserved as a transmit buffer. Since the maximum packet size allowed for Ethernet is 1,526 bytes (including preamble), a 4K transmit buffer ensures at least double buffering of transmit packets. This multi-packet feature further enhances the board's performance.

## Diagnostic LEDs

The SMC3016TP/MC has three green diagnostic LEDs: transmit (TX), receive (RX) and link integrity (LNK) status; and one yellow LED: collision (COL) status. The SMC3016/MC has two green diagnostic LEDs: transmit (TX) and receive (RX) status. The function of these LEDs is provided in the table below:

BOARD	LED	ON CONTINUOUSLY
3016TP/MC 3016/MC	TX	The board is transmitting.
3016TP/MC 3016/MC	RX	The board is receiving — even if the data is not intended for that station.
3016TP/MC	LNK	The link test pulse is good: the board is connected, and the wiring polarity is correct.
3016TP/MC	COL	There are collisions on the line. Note that it is normal for the yellow LED to blink.

## Extended Distance Thin Ethernet Segments

The IEEE 802.3 10BASE2 specification defines the maximum length of a Thin Ethernet segment as 607 feet (185m). However, the SMC3016/MC supports Thin Ethernet segments of up to 1,000 feet (305m) in length with 50 ohm RG-58 cabling meeting the following specifications:

# of Nodes	Nominal Attenuation at 10MHz	
	per 1,000 feet (305m)	per 100 feet (30m)
Maximum 10	13db or less	1.3db or less
Maximum 30	12db or less	1.2db or less

## Configurable Hardware

The boards are equipped with one jumper and a pulse transformer. They are used to select the cable connector, and are clearly labeled on the board. Instructions for configuring the hardware is provided in this guide.

## Optional Auto-Boot PROM for NetWare

A PROM socket, which can accommodate a device up to 16K by 8, is provided on the board for an optional auto-boot PROM. The PROM enables a diskless station to access the network, and also may be used as a convenience on any system with floppy and/or hard disk drives. The base address of the PROM is software-configurable.

SMC offers two 8K by 8 NetWare PROMs for this board: P/N SMC3016-NP (for IEEE 802.3 Ethernet), and P/N SMC3016-NP2 (for version 2.0 Standard Ethernet). Each PROM requires 8K bytes of PC memory address space. Once installed, the PROM can be enabled via the automatic configuration program. If the PROM is not enabled, the SMC3016TP/MC *does not* require any of the computer's memory address space.

## **Network Address**

A unique Ethernet Network Address is assigned to each Ethernet board. This network address, stored in an EEPROM on the board, is based on two component values: a unique vendor ID assigned by the IEEE, and a unique serial number assigned by SMC. If it is necessary to modify this address, contact SMC's Tech Support Department.

## **Confidence Test Utility**

A utility provided on the SMC driver diskette can be used to confirm that the board is functioning properly, either during network installation or when troubleshooting an existing network.

To use this utility, first check to be sure the board is connected to a properly terminated Ethernet cable segment. Then, type:

```
conf_tst
```

at the DOS prompt, and press the Enter key.

Appropriate pass/fail messages will be displayed in a window and the user will be prompted to return to DOS.

# PRODUCT SPECIFICATIONS

<b>MECHANICAL</b>	<b>SMC3016TP/MC</b>	<b>SMC3016/MC</b>
Size	11.5" x 3.5" (29.2cm x 8.9cm)	
On-board Memory	16K bytes of Static RAM	
Network Controller	EtherStar MB86950	
Bus Interface	16-bit Micro Channel Architecture	
Ethernet Interface	Twisted Pair, AUI (Thick)	Thin Ethernet, AUI (Thick)

<b>ETHERNET INTERFACE</b>			
<b>Type</b>	<b>Twisted Pair</b>	<b>Thin</b>	<b>AUI</b>
Cable	100 ohm, unshielded, 2 pairs *	RG-58A/U or RG-58C/U, 50 ohm coax	external transceiver drop
Connector	RJ-45	BNC, isolated ground	D-type, 15-pin female
Max. Length	328' (100m)	1,000' (305m)	165' (50m)

\* For example, IBM Type 3 or AT&T DIW.

<b>ENVIRONMENTAL</b>			<b>ELECTRICAL</b>
<b>Temperature</b>		<b>Relative Humidity, non-condensing</b>	<b>Max. Power</b>
<b>Operating</b>	<b>Storage</b>		
0° to 70°C	- 40° to + 70°C	10% to 80%	+ 5 volts DC @ 1.3 A

<b>RESOURCE REQUIREMENTS</b>				
<b>Memory Space</b>		<b>Interrupt Channel</b>	<b>DMA Channel</b>	<b>I/O Space</b>
<b>with Boot PROM</b>	<b>without Boot PROM</b>			
8K bytes	none	3, 4, 5, 9(2), 10, 11, 12, 15	none	32 bytes

## PIN ASSIGNMENTS FOR TWISTED PAIR WIRE

An Ethernet twisted pair cable segment requires two pairs of unshielded wires. Each wire pair is identified by two colors. For example, one wire might be red and the other, red with white stripes. Or the wire pair might be blue and white or green and white, etc.

Each Ethernet twisted pair cable segment must have an RJ-45 connector attached to both ends. The two wire pairs must be connected to pins 1, 2, 3 and 6 on the RJ-45 connector. In addition, the 10BASE-T specification defines the function of these pins. Pins one and two are used for transmitting data; pins three and six are used for receiving data, as shown below:

RJ-45 Pin	Assignment*
1	Tx+
2	Tx-
3	Rx+
6	Rx-

\* The "+" and "-" signs are used to represent the polarity of the two individual wires that make up each wire pair.

The pins must be connected in a certain orientation. This orientation is dependent upon the presence or absence of a wiring crossover. For 10BASE-T Ethernet, every connection between an adapter, such as the 3016TP/MC, and a concentrator must have a wiring crossover for transmit and receive data. The 10BASE-T specification recommends that the crossover be implemented in the concentrator. The wiring crossover actually takes place in the internal transceiver associated with each concentrator port, and the specification requires that each port supporting the crossover function be marked with an "X."

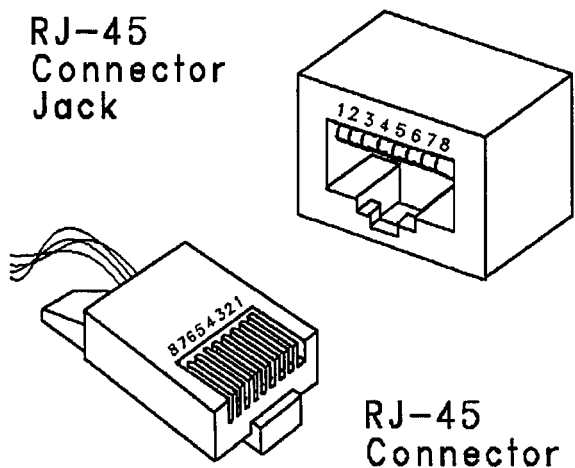
If the wiring crossover is implemented in the concentrator, as it is in SMC's 10BASE-T concentrators, the two pairs of unshielded twisted pair wires must be straight-through, as shown on the next page:

<b>Non-Crossover Pin Assignments</b>	
<b>Concentrator</b>	<b>Board</b>
1	1
2	2
3	3
6	6

If, however, the wiring crossover is not implemented in the concentrator, it must be implemented in the wiring, as shown below:

<b>Crossover Pin Assignments</b>	
<b>Concentrator</b>	<b>Board</b>
1	3
2	6
3	1
6	2

An illustration of both the RJ-45 connector and the RJ-45 connector jack on the board appears below. Note how the pins are numbered. Remember to hold the connectors in the same orientation when connecting the wires to the pins.



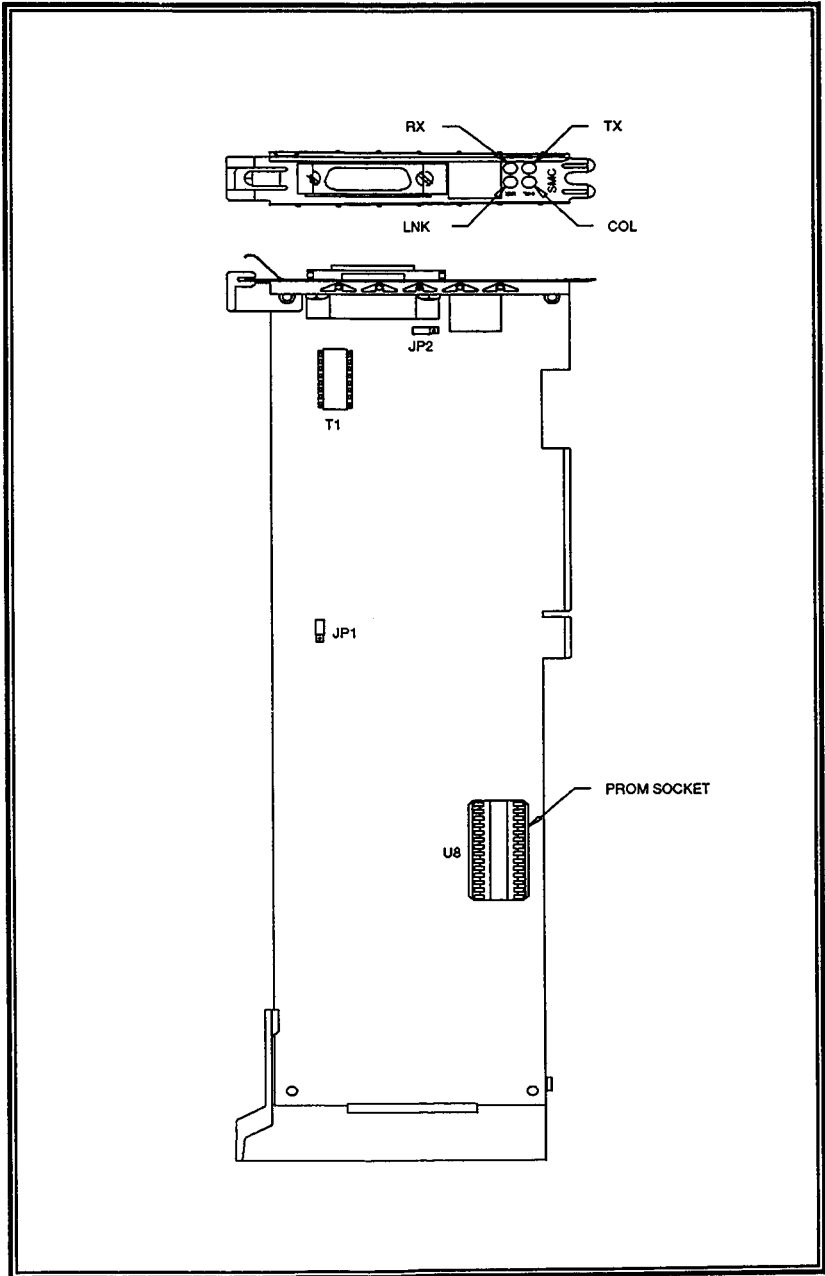
## **CONFIGURING THE BOARDS**

With the exception of one jumper, JP1, and a pulse transformer, T1 (see the block diagram on the following page), both boards are software-configurable.

The jumper and the pulse transformer are used to select the appropriate cable connector (RJ-45 or AUI for the 3016TP/MC and BNC or AUI for the 3016/MC). Before a board is installed in a Micro Channel Architecture machine, a cable connector must be selected. Once a board has been installed, a configuration program must be run to configure the board to the default settings and to enable some of these settings to be changed.

Instructions for selecting the cable connector and for running the configuration program are provided on the following pages.

Please refer to the manufacturers' instructions for installing expansion cards in each Micro Channel Architecture machine.



SMC3016TP/MC and SMC3016/MC Block Diagram



**Legend:**

JP1 } Cable Connector Select  
T1 }

JP2 Not Installed - Mandatory

**Status LEDs:**

TX Transmit  
RX Receive  
COL Collision (3016TP/MC only)  
LNK Link Integrity (3016TP/MC only)

## Selecting the Cable Connector

The SMC3016TP/MC contains an RJ-45 connector for unshielded twisted pair wiring. The SMC3016/MC contains a BNC connector for Thin Ethernet cabling. Both boards utilize their own on-board transceiver. Additionally, both boards contain an AUI port for connection to a wide variety of media.

With the AUI port, the board may be connected to Thick or Thin Ethernet cable, or to optical fiber or twisted pair wiring. The AUI port requires an external transceiver (MAU) with the appropriate cable tap. In addition, for Thick Ethernet cabling, an AUI cable (external transceiver drop) must be used.

Jumper JP1 and the pulse transformer at location T1 are used to select the cable connector, as shown in the table below:

Board	Ethernet		Jumper JP1	Pulse Transformer T1
	Connector	Cable		
3016TP/MC	RJ-45*	Twisted Pair	OUT	IN
	AUI	Thick	IN	OUT
3016/MC	BNC*	Thin	OUT	IN
	AUI	Thick	IN	OUT

\* The default configuration of these boards as they are shipped from the factory.

## Running the Automatic Configuration Program

The 3016TP/MC and 3016/MC boards are software-configurable. To configure a board you will use backup copies of the Reference Diskette, the diskette shipped with your machine, and the SMC driver diskette, the diskette supplied with your board. If you have not already made a copy of both of these diskettes, please do so now by following the instructions in the guide that was shipped with your machine.

Next, referring to the instructions in the appropriate guide for installing adapters, install a board in each machine. The board may be installed in any open slot. Once the boards have been installed, refer to the guide for your particular PS/2 machine for exact instructions. The instructions provided below are specific to the Model 50.

1. Insert the copy of the Reference Diskette in drive A, metal-shutter end first, label side up. The diskette should click into place.
2. Power up the machine. The computer will perform a memory test and display the amount of RAM in the system, followed by an "OK" message.

Then the number 165 will appear in the upper left-hand corner, and the computer will beep twice to indicate an error. This error code indicates that the system has not yet been configured for the Ethernet board.

Next a logo may be displayed, along with the system model number and the version number of the Reference Diskette. A prompt similar to the one shown below will be displayed in the lower left-hand corner:

**Press Enter (↵) to continue:**

3. Press the Enter key. A two-page screen containing an explanation of error code 165 will appear, as shown on the next page.

Adapter Configuration Error - 00165	Page 1 of 2
<p>The computer's internal self-tests found an option adapter that is different from the option adapters indicated in the computer's configuration.</p> <p>This error occurs if option adapters are added, removed, or are not working properly.</p> <p>If you have added or removed an adapter, run automatic configuration. To view or change the results of automatic configuration, go to the Main Menu of this diskette and select "Set configuration."</p>	
PageDown	

Error Message, Page 1

- To read the second page of this message, press the Pg Dn key.

Adapter Configuration Error - 00165	Page 2 of 2
<p>Select "View configuration" or "Change configuration" from the Set configuration menu.</p> <p>If you have not added or removed an adapter, do not run automatic configuration. Go to the Main Menu of this diskette. Select "Test the computer" to determine the cause of the error and what action to take.</p>	
<p>Automatically configure the system? (Y/N)</p> <p>PageUp</p>	

Error Message, Page 2

5. After reading the message, press N in response to the prompt shown at the bottom of the screen:

**Automatically configure the system (Y/N)?**

The Main Menu will appear on the screen. Note that the menu selections may be different for your machine.

Main Menu	
1	Learn about the computer
2	Backup the Reference Diskette
3	Set configuration
4	Set features
5	Copy an option diskette
6	Move the computer
7	Test the computer

Use ↑ or ↓ to select. Press Enter.  
Esc=Quit F1=Help

Main Menu

6. Use the ↑ and ↓ keys to move the selection bar to the fifth entry, "Copy an option diskette," and press Enter. This menu selection updates the Reference Diskette with SMC's configuration information for the Ethernet board.

Follow the instructions in each "Information" window. When you are asked to insert your "New Option Diskette," use the copy of the SMC driver diskette.

7. Press Enter after this process has been completed. The Main Menu will be redisplayed on the screen.
8. Select the third entry from the Main Menu, "Set configuration," and press Enter. The Set Configuration Menu will appear, as shown on the next page.

Set Configuration
1. View configuration 2. Change configuration 3. Backup configuration 4. Restore configuration 5. Run automatic configuration
Press a number to select. Esc=Quit    F1=Help

### Set Configuration Menu

9. Select the second entry on this menu, "Change configuration," and press Enter. The Change Configuration Menu will appear. This menu enables you to modify the configuration stored in the computer's memory.

A sample Change Configuration Menu for the Model 50 is shown on the next page. Note that the Model 50 has four slots; Models 60, 70 and 80 have additional slots. This menu indicates that the Ethernet board (either the 3016TP/MC or the 3016/MC) is located in slot 1.

10. Using the ↑ and ↓ keys and the Pg Up and Pg Dn keys, scroll through the menu. Note that help is available by pressing the F1 key. Then, position the selection bar on the first field for the board, "I/O Address Range."
11. Using the F5 and F6 keys, scroll through the selections for this field. An address has been selected when it appears in the field. The seven possible 32-byte ranges are listed below:

0300—031F	2000—201F
0340—035F	5680—569F
0360—037F	5900—591F
1980—199F	

If you select an address that is being used by another adapter card, an asterisk will appear to the right of the selection and the message "\*\*Conflicts" will be displayed at the top of the menu. In this case, just select another address.

Change Configuration	
<b>Total System Memory</b>	
Installed Memory .....	1024 KB (1.0 MB)
Usable Memory .....	1024 KB (1.0 MB)
<b>Built In Features</b>	
Installed Memory .....	1024 KB (1.0MB)
Diskette Drive A Type .....	[1.44MB 3.5" ]
Diskette Drive B Type .....	[Not Installed ]
Math Coprocessor .....	Not Installed
Serial Port.....	[SERIAL_1]
Parallel Port.....	[PARALLEL_1]
<b>Slot1 - Standard Microsystems 3016/MC Ethernet Controller</b>	
I/O Address Range.....	[0300-031F]
Boot PROM Address Range .....	[PROM not used]
Interrupt Level Selection .....	[IRQ 3 ]
Slot2 - Empty	
Slot3 - Empty	
<b>Slot4 - IBM Fixed Disk Adapter</b>	
Type of Drive.....	[ 30]
Arbitration Level .....	[Level_3]
Esc=Quit    F5= Previous    F10-Save    ↑ Home	
F1=Help    F6=Next    ↓ End    PageDown	

Sample Change Configuration Menu for Model 50

12. Move the selection bar to the next field, "Boot PROM Address Range." Again, scroll through the selections using the F5 and F6 keys. **Do not select an address range unless you have installed an Ethernet Boot PROM for NetWare.** The 15 possible 8K byte ranges are listed below. With "PROM not used," there are a total of 16 choices:

PROM not used	0D0000—0D1FFF
0C2000—0C3FFF	0D2000—0D3FFF
0C4000—0C5FFF	0D4000—0D5FFF
0C6000—0C7FFF	0D6000—0D7FFF
0C8000—0C9FFF	0D8000—0D9FFF
0CA000—0CBFFF	0DA000—0DBFFF
0CC000—0CDFFF	0DC000—0DDFFF
0CE000—0CFFFF	0DE000—0DFFFF

If you select an address range that is being used by another adapter card, an asterisk will appear to the right of the selection and the message "\*Conflicts" will be displayed at the top of the menu. In this case, just select another address range.

13. Move the cursor to the next field, "Interrupt Level Selection." The eight possible selections are listed below:

IRQ 3	IRQ 10
IRQ 4	IRQ 11
IRQ 5	IRQ 12
IRQ 9 (IRQ 2)	IRQ 15

Interrupt 3 or 4 is recommended for SMC's "MC" boards. If you select an interrupt that is being used by another adapter card, an asterisk will appear to the right of the selection and the message "\*Conflicts" will be displayed at the top of the menu. In this case, just select another interrupt.

14. Check the Change Configuration Menu to be sure all the settings for the board are correct. If any additional changes are necessary, first move the selection bar to the appropriate field using the ↑ and ↓ keys, and then use the F5 and F6 keys to scroll through the selections.



15. Be sure to make note of all the board settings. You may be required to provide this information when installing certain network operating systems, such as Novell's NetWare.
16. Press F10 to save the settings in the computer's memory. This information will remain in memory until the computer's battery is removed or replaced.

An "Information" window will appear and, when the changes have been saved, you will be instructed to press Enter to continue.

17. Press Enter to return to the Change Configuration Menu.
18. Press Esc to exit this menu and return to the Set Configuration Menu. Note that for some PS/2 machines, you must press the F3 key.
19. With the Set Configuration Menu on the screen, select entry number three, "Backup configuration," and press Enter. This menu entry copies the configuration onto the backup copy of the Reference Diskette. If, at a later date, the computer's battery needs replacement, the configuration information can be restored from the Reference Diskette.

An "Information" window will appear and, when the changes have been saved on disk, you will be instructed to press Enter to continue.

20. Press Enter to return to the Set Configuration Menu.
21. Press Esc to exit the Set Configuration Menu. An "Information" window will appear and you will be instructed to press Enter to restart the computer and activate the changes, or press Esc to return to the Main Menu.
22. Press Enter. The configuration process for the Ethernet board is now complete.

## SUMMARY OF CONNECTION RULES

A summary of connection rules for unshielded twisted pair wiring, and both Thick and Thin Ethernet cable, follows.

**Note ...** Each length of unshielded twisted pair wire must have RJ-45 connectors at both ends. Similarly, each length of Thin Ethernet cable must have BNC connectors at both ends, and each length of Thick Ethernet cable must have N-Series connectors at both ends.

### *The 5 - 4 - 3 Rule for Configuring Ethernet Networks*

Between any two stations on the network, there may be:

- up to **five** segments in series,
- up to **four** dual- or multi-port repeaters or concentrators, and
- up to **three** populated segments (segments connected to PCs) — the remaining two segments must be inter-repeater links (unpopulated segments). Note that this applies only to Ethernet 10BASE5 and 10BASE2 networks.

#### *Unshielded Twisted Pair Wiring Rules:*

- Stations must be connected point-to-point to a 10BASE-T multi-port wiring concentrator in a star topology.
- Each cable segment joining the station to the concentrator may be a maximum of 328 feet (100m) in length.
- Every connection must have a wiring crossover for transmit and receive data — this crossover function is typically implemented in the concentrator. (Note that SMC's 10BASE-T wiring concentrators do provide an internal crossover and the SMC3016TP/MC board does not.)

#### *Thin Ethernet Cable Rules:*

- Up to 30 stations may be connected directly to a single cable segment with BNC T-Connectors.
- Each cable segment may be a maximum of 607 feet (185m) in length and must be terminated at both ends by a 50 ohm BNC terminator. One of the terminators must be grounded. See "Technical Features" for extended distance (1,000 feet / 305m) cable specifications.

See "Technical Features" for extended distance (1,000 feet / 305m) cable specifications.

- Pairs of cable segments may be linked by a repeater; however, each repeater reduces by one the number of stations allowed on both cable segments. A repeater is connected to a cable segment with a BNC T-Connector.
- The stations and repeaters must be separated by a minimum of 1.5 feet (.5m) of cable.

*Thick Ethernet Cable Rules:*

- Up to 100 stations may be connected to a single cable segment with transceivers and transceiver (AUI) cables.
- The maximum length of the AUI cable is 165 feet (50m).
- Each cable segment may be a maximum of 1,640 feet (500m) in length and must be terminated at both ends by a 50 ohm N-Series terminator. One of the terminators must be grounded.
- Pairs of cable segments may be linked by a repeater; however, each repeater reduces by one the number of stations allowed on both cable segments. A repeater is connected to a cable segment with a transceiver and a transceiver cable.
- The stations and repeaters must be separated by a minimum of 8.2 feet (2.5m) of cable.

*The Ethernet 3016TP/MC board can be connected to:*

- a 10BASE-T multi-port wiring concentrator, using up to 328 feet (100m) of unshielded twisted pair wiring.
- any transmission media (Thick or Thin Ethernet, twisted pair or fiber), by attaching the board to the appropriate transceiver and connecting the transceiver to the cable segment.\*

*The Ethernet 3016MC board can be connected to:*

- a Thin Ethernet cable segment, by attaching the board directly to the cable with a BNC T-Connector.
- any transmission media (Thick or Thin Ethernet, twisted pair or fiber), by attaching the board to the appropriate transceiver and connecting the transceiver to the cable segment.\*

\* If the transceiver does not allow for direct connection to the board, it may be connected to the board with a transceiver (AUI) cable (maximum 165 feet / 50m).

## **WARRANTY AND SERVICE POLICY**

Should you experience difficulty with your SMC Ethernet Network Systems Product and be unable to diagnose or correct the problem, you may return the product to your place of purchase for repair. Please be certain that your product is properly packed before shipment. If possible, use the original packaging.

**Note ...** All SMC products are warranted only when configured in accordance with the specifications listed in the appropriate guides.

### **In-Warranty Service**

All SMC Ethernet Network Systems Products are warranted by Standard Microsystems Corporation against defects in workmanship and materials for a period of two (2) years from date of delivery. During the warranty period, Standard Microsystems Corporation will repair or, if necessary, replace defective components at no charge. Consult your Authorized SMC Dealer or Distributor for In-Warranty Service.

This warranty does not apply if the product has been damaged by accident or misuse, or as a result of repairs or modifications made by unauthorized personnel.

No other warranty is expressed or implied. Standard Microsystems Corporation is not liable for consequential damages.

### **Out-of-Warranty Service**

Beyond the two (2) year warranty period, Standard Microsystems Corporation will repair or replace defective components for a reasonable fee. All service work is warranted by Standard Microsystems Corporation for an additional one (1) year period from date of shipment of the repaired product. Consult your Authorized SMC Dealer or Distributor for service repairs.

## **Policy on Changes**

All SMC Ethernet Network Systems Products are sold on the basis of descriptive specifications in effect at the time of sale. Standard Microsystems Corporation reserves the right to make periodic changes or improvements to any SMC product, but has no obligation to modify or update products once sold.

## **Tech Support Hotline**

For technical support, please contact your place of purchase. Then, if further assistance is required, call our Tech Support Department, toll-free, between 8:30 AM and 6:00 PM, E.S.T., Monday through Friday:

800-992-4762 (U.S.A.)

800-433-5345 (Canada)

Or, you may prefer to contact us through our CompuServe® bulletin board.

If you are a CompuServe subscriber, just type "GO SMC" at the CompuServe prompt (!) and follow the instructions to become an SMC Forum member. If not, you can obtain an access number and personal password by contacting our Tech Support Department and requesting an SMC Forum Kit.

## NOTES

**STANDARD MICROSYSTEMS  
CORPORATION**



35 Marcus Blvd., Hauppauge, NY 11788 Fax (516) 273-7935  
(516) 273-3100