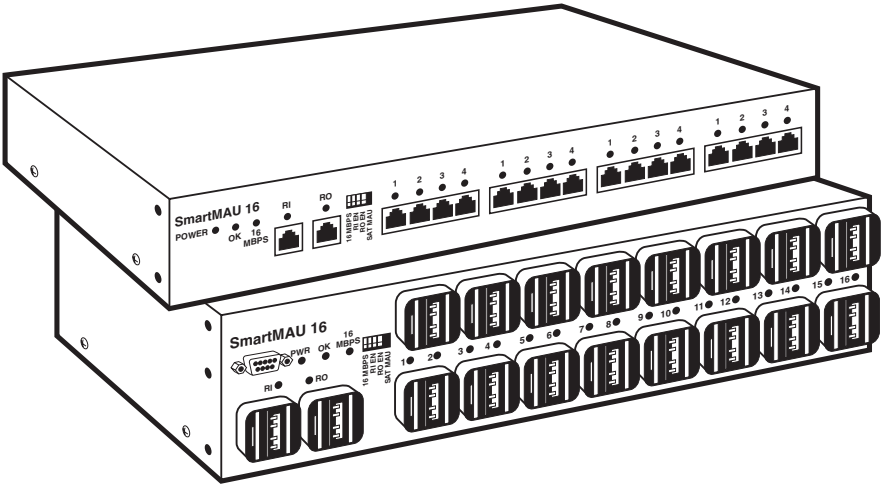


SmartMAU 16 DC SmartMAU 16 Type 3



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1.0 Specifications

Standards — IEEE 802.5

Speed — 16 Mbps (factory configuration) or 4 Mbps on the token ring

Temperature — Storage: -67 to 185° F (-55 to 85° C);
Operating: 32 to 122° F (0 to 50° C)

Connectors — LT1500A: (1) female RI data connector, (1) female DB9 RI connector, (1) female RO data connector, (16) female lobe data connectors; LT1501A: (2) female RJ-45 RI/RO connectors, 16 female RJ-45 lobe connectors

Fuse — 0.5 amp, 250 V slo-blo

Power — 115/230 VAC, 60/50 Hz

Size — LT1500A: 3.5"H x 17.2"W (8.9 x 43.6 cm); LT1501A: 1.7"H x 17.2"W (4.3 x 43.6 cm)

Weight — LT1500A: 5 lb. (2.3 kg); LT1501A: 3 lb. (1.4 kg)

2.0 Introduction

The SmartMAU 16 DC or SmartMAU 16 Type 3 provides 16 lobe ports for attaching token ring devices. Each lobe port has hardware speed-detection circuitry.

This means that if an attaching device attempts to connect to the token ring network at an incorrect ring speed, it will automatically be locked out before insertion onto the ring. This prevents any disruptions to the network caused by incorrect station speed settings.

The unit is available in two different models. The SmartMAU 16 Type 3 provides RJ-45 connectors for its Ring In, Ring Out, and lobe ports. The SmartMAU 16 DC provides a DB9 connector and a data connector for its Ring In port, and data connectors for its Ring Out and lobe ports. The MAU uses only one of the ring In connectors at a time. The DB9 Ring In connector allows this model to be connected in an intelligent configuration.

Both models provide rear-panel RJ-45 connectors that allow the units to be managed by the SmartMAU Utility Software.

The SmartMAU 16 units are shown in **Fig. 2-1**.

SMARTMAU 16 DC AND TYPE 3

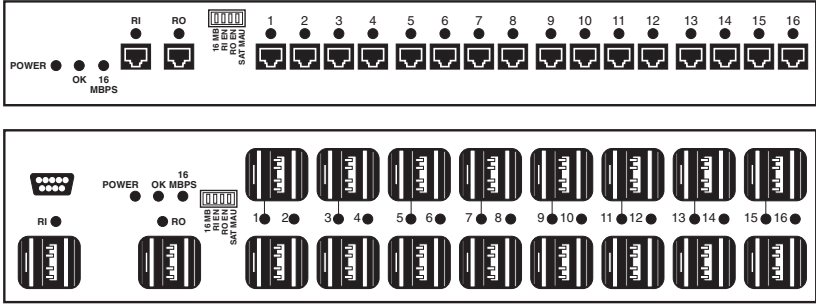


Fig. 2-1. SmartMAU 16 Models: Type 3 and DC.

3.0 Hardware Description

This chapter describes the SmartMAU 16 hardware components.

3.1 Front-Panel DIP-Switch Settings

A four-position DIP switch on the front panel of the SmartMAU 16 allows you to configure the unit. The DIP switch is shown in **Fig. 3-1**.



Fig. 3-1. Front-Panel DIP Switch Selections.

Switch 1: 16 MB (16 Mbps). This switch is used to manually select the MAU token ring speed. In the up position, the unit will operate at 4 Mbps. In the down position, the unit will operate at 16 Mbps. The factory-default setting is down (16 Mbps).

CAUTION

The SmartMAU 16 token ring speed changes immediately when Switch 1 is moved. This will cause stations currently inserted to be immediately locked out when speed detect is enabled.

Switch 2: RI EN (Ring In Autoloop). This switch determines whether the RI port automatically loops back when it detects a disconnected link on Ring In. The switch should be set to the enabled (down) position when RI is not connected or connected to a device that supports the autoloop feature. It should be disabled (up) when connected to any other device. The factory default is down (RI autoloop enabled).

Switch 3: RO EN (Ring Out Autoloop). This switch determines whether the RO port connector automatically loops back when it detects a disconnected link on Ring Out. The switch should be set to the enabled (down) position when RO is not connected or connected to a device that supports the autoloop feature. It should be disabled (up) when connected to any other device. The factory default is down (RO autoloop enabled).

Switch 4: SAT MAU (SmartMAU Management). Both SmartMAU 16 models can be managed by either a MAU Controller or the PC-based SmartMAU Utility Software software.

On the SmartMAU 16 Type 3, Switch 4 governs whether the management signals will be expected to be present on the front-panel RJ-45 Ring In port connector or on the rear-panel RJ-45 connectors (as in a SmartMAU Utility Software application). On Type 3 models, place Switch 4 in the down position to receive management signals at the front-panel RJ-45 Ring In connector, place it in the up position to receive them at the rear-panel RJ-45 connectors.

On the front panel of the SmartMAU 16, this switch governs whether the management signals will be expected to be present on the front-panel DB9 Ring In port connector or on the RJ-45 connectors on the rear of the unit. On these models, place Switch 4 in the down position to receive management signals at the front-panel DB9 Ring In connector; place it in the up position to receive them at the rear panel RJ-45 connectors.

The factory default for SW4 is up (rear panel RJ-45 communications enabled).

NOTE

The DC Ring In port is not used when this switch is placed in the down position.

CAUTION

When a SmartMAU 16 is set for satellite MAU applications, always verify the setting of the token-ring-speed switch (Switch 1) before insertion.

3.2 Front Panel LEDs

Figure 3-2 shows the front-panel LEDs on both SmartMAU 16 models. A description of each LED follows the illustration.

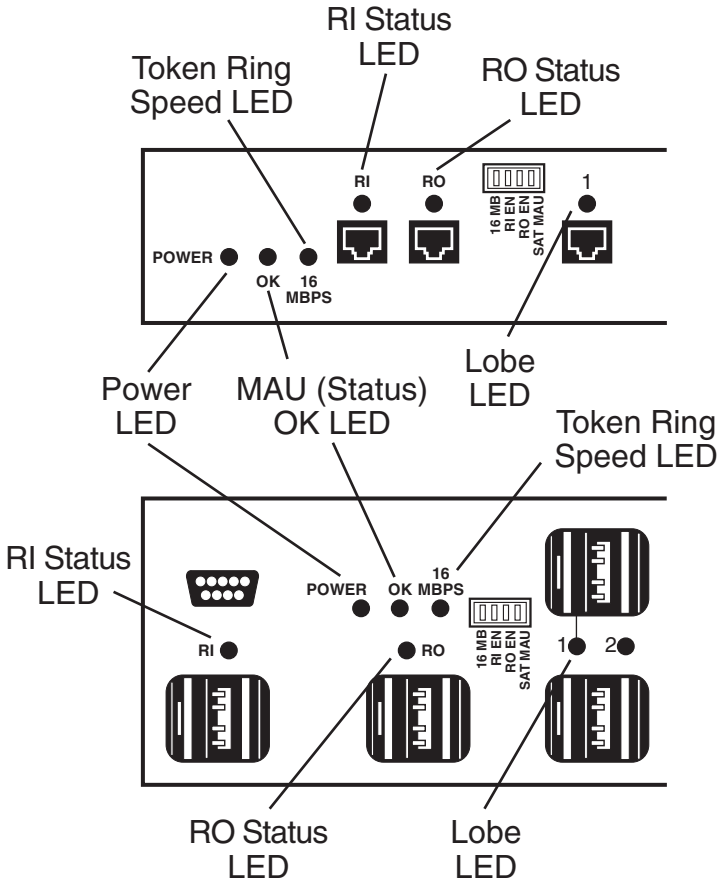


Fig. 3-2. Front-Panel LEDs.

- **POWER.** This LED lights when the unit is powered on.
- **OK.** The OK LED flashes green when the unit is powered on and the unit's CPU is operating normally. If the LED is illuminated solid or is not on at all, the unit's CPU has a malfunction. If the OK LED is flashing red, the unit has an internal hardware error. (Note: After one minute in the error loop, the unit will reset and then re-test the internal hardware.)
- **16 MBPS.** If this LED is illuminated, Switch 1 is set for 16-Mbps operation. If the LED is not illuminated, Switch 1 is set for 4-Mbps operation.
- **RI Normal Configurations:** The RI LED lights green when the RI port is active and is inserted onto the ring, and blinks green when speed detect has been disabled and the port is active and inserted onto the ring. A blinking red LED indicates that the port is looped back because an incorrect token ring speed has been detected. A solid red LED indicates that the port has been locked out by management software control (for example, the SmartMAU Utility Software software). When the RI LED is off, the port is internally looped back.
- **Partition Port Configurations:** When communicating with an MAU controller (through pins 1 and 8 of the partition cable), the RI LED will indicate the partition status on the controller the same way the TRS LED does on a satellite MAU. (The satellite MAU's TRS LED lights green if the ring to which the satellite MAU is attached is operational.)
- **RO. Normal Configurations:** The RO LED lights green when the RO port is active and is inserted onto the ring, and blinks green when speed detect has been disabled and the port is active and inserted onto the ring. A blinking red LED indicates that the port is looped back because an incorrect token ring speed is detected. A solid red LED indicates that the port has been locked out by management software control (for example, the SmartMAU Utility software). When the RO LED is off, the port is internally looped back.
- **Partition Port Configurations:** When communicating with a controller (through pins 1 and 8 of the partition cable), the RO LED will blink yellow when the partition port's ID button is pressed.

NOTE

The RI port is always used for connection to an MAU controller.

- Lobe. The individual Lobe LEDs (16 total) are used to indicate station status: insertion or lockout. An LED will be off when its respective station is not attached. If the station inserts onto the ring, the LED will light green. If speed detect has been disabled, then the LED will flash green. A blinking red LED indicates that its respective station is locked out by the hardware (incorrect speed), and a solid red LED indicates software lockout.

3.3 Hardware Speed Detect

The SmartMAU 16 includes hardware speed-detection circuitry. This feature monitors all connections to ensure that only devices at the correct token ring speed are allowed onto the ring. A device at the wrong speed will be automatically locked out. A blinking red port LED indicates this condition. After a port inserts onto the ring, this speed-detection hardware will continue to monitor all ports for valid data, with the exception of the RO port. If both RI and RO are active, the MAU no longer monitors the RO port because the backup path (the receive side of Ring Out) might be inactive.

CAUTION

When used in a satellite MAU application, the SmartMAU 16 should always have the hardware speed-detect feature enabled.

3.4 Ring In and Ring Out Hardware Autoloop

The Ring In and Ring Out automatic loopback feature consists of a phantom-current-detection circuit on both the RI and RO ports, as well as a phantom-current-generation circuit on the RI port. When the RI auto loopback switch is enabled, phantom current is generated by the RI port only when either the RO port or one of the lobe ports is active. (**Section 3.1**, describes the unit's switches.)

4.0 Installation

4.1 Installation Background

This section gives general information on planning the network with MAUs.

Before installing your MAU(s) and attaching devices, carefully plan your network. The most important factors are:

- Main ring length and distance between MAUs.
- Length of the lobes attaching MAUs to devices.
- Verifying that the proper type of cable is used (see **Appendix A**, Connectors and Cables.)
- Safeguarding against electrical interference, especially when unshielded cabling is used.

A copy of the floor plans of the building that will use the token ring network will help greatly in planning the installation.

4.1.1 MAIN RING

When you use multiple MAUs in a token ring network, the main ring consists of the cable between the MAUs. The length of the main ring is critical to proper network operation. The main ring does not include the cable from MAUs to their attaching devices (these cables are called lobe cables).

If there is only one MAU for the entire ring, you can consider the main ring to have no length for installation purposes.

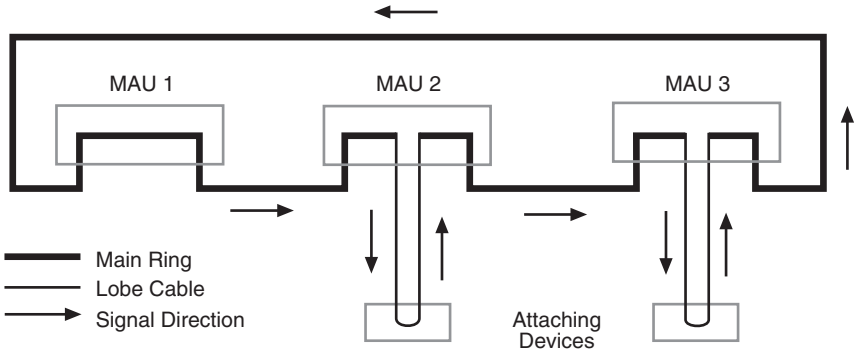


Fig. 4-1. Main Ring.

4.1.2 BACKUP PATH

In a normal configuration, there is an unused pair of wires in the twisted-pair cable used in the network. This extra pair of wires, used with a backup circuit inside the MAUs, is called the backup path.

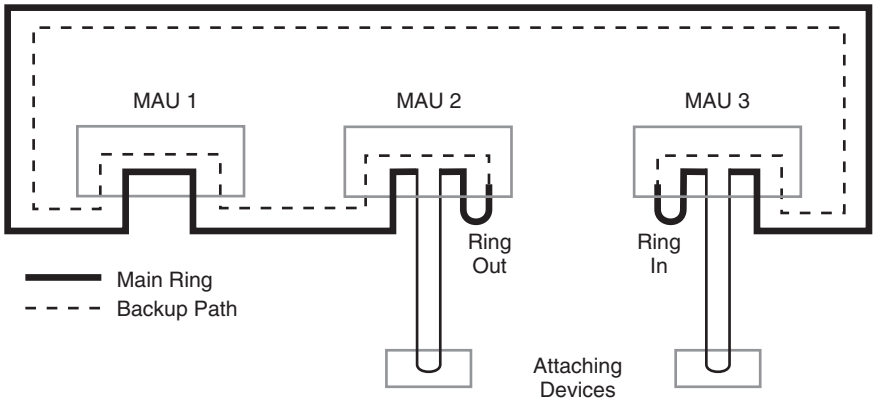


Fig. 4-2. Backup Path.

The backup path is designed to enable the network to continue to operate while a problem such as a faulty cable or MAU is being repaired.

For example, if a breakdown occurs in the cable between MAU 3 and MAU 2, the rest of the ring will remain in operation if the backup path is used. Note that when the backup path is used, it becomes part of the main ring and its length must be included in the main ring length. In most situations, the network should be designed to allow the backup path to be used. For more information, please see the Token Ring Network Planning Guide.

4.1.3 ADJUSTED RING LENGTH

In networks that use more than one MAU, adjusted ring length (ARL) is the total length of the cable connecting MAUs (the main ring) minus the shortest cable between MAUs. Patch cables less than three feet (0.9 m) in length are not included in this calculation. See the diagram below.

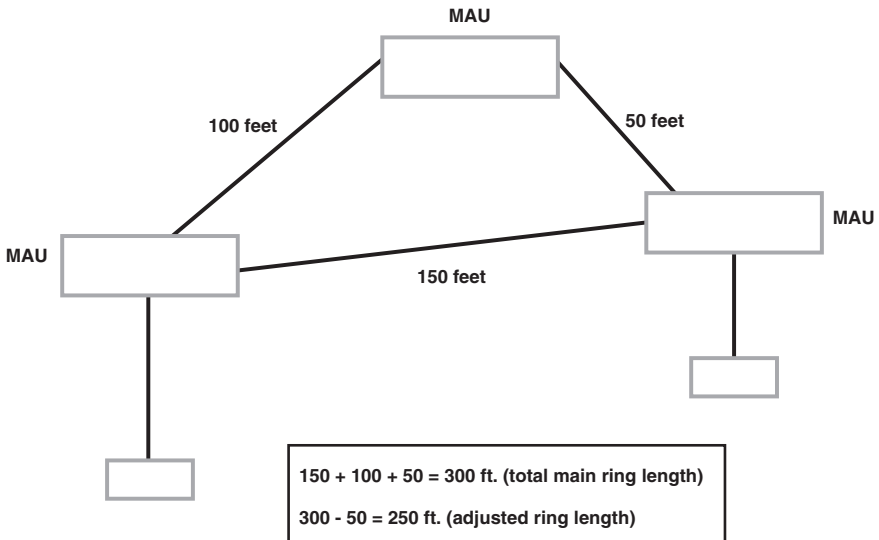


Fig. 4-3. Adjusted Ring Length.

Using ARL simplifies network planning. Compare the ARL to one of the tables in **Section 4.2** to determine the maximum ring size.

4.1.4 LOBE LENGTH

The distance between each attaching device and its MAU is very important in the planning of the network. Maximum lobe lengths are given in **Section 4.2, Installation of SmartMAU 16s**. These maximum lengths will vary depending on how the network is configured.

4.1.5 REPEATERS

Repeaters can vastly increase the distance of the network. If the SmartMAU 16s in the network will be located in more than one wiring closet, use repeaters between each wiring closet. If you use repeaters between each wiring closet, you can often disregard the length of the main ring. Some copper wire repeaters can transmit the network signal up to 1200 feet (366 m) on Type 3 cable.

4.1.6 BRIDGES

Bridges can help you organize the rings of a network and increase performance for network users.

Source-Routing Token Ring Bridges are made in local and remote versions. They let you extend your network to more offices around the world. They also provide better network control and management.

4.1.7 RINGS USING BOTH SMARTMAU 16S AND EXTENDED DISTANCE MAUS

If a ring uses both passive (“stackable” MAUs—like the SmartMAU) and extended distance MAUs, different calculations are required.

4.1.8 4- AND 16-MBPS TOKEN RINGS

SmartMAU 16s can be used in either 4- or 16-Mbps token rings using Type 3 and Category 5 (100-ohm) or Type 1 and 2 (150-ohm) cabling, respectively. The token ring speed is selected by a switch on the unit’s front panel.

4.2 Installation of SmartMAU 16s

This section covers installation of the SmartMAU 16.

SmartMAU 16s on the same token ring are connected Ring In to Ring Out. On RJ-45 SmartMAU 16s, Type 3 or Category 5 (100 ohm) cabling must be used to connect to the main ring and to connect devices to its lobe ports. On SmartMAU 16s, Type 1 or 2 (150 ohm) cabling must be used. The units can be used in either 4-Mbps or 16-Mbps token rings. Distances will be less in 16-Mbps rings.

4.2.1 REPEATERS

If the SmartMAU 16s in the network will be located in more than one wiring closet (separated by long distances), use repeaters between each wiring closet. This will usually remove the distance between the MAUs from the main ring length and ensure that maximum lobe lengths are possible, which makes installation easier.

If you use repeaters, they will affect the installation of MAUs. Follow the installation instructions given in the repeater User's Guide.

4.2.2 LOOPBACK CABLE

Loopback cables are not needed for the SmartMAU 16 if there is only one MAU for the entire ring. Simply move both the RI EN and RO EN switches on the front panel to the enable (down) position.

4.2.3 INSTALLATION METHOD

A simplified installation method based on maximum cable length follows:

The sum of the ARL (adjusted ring length, defined in **Section 4.1, Installation Background**) must be less than or equal to the distance given for your network's configuration in one of the tables in **Section 4.2.4** or **4.2.5**. Expressed as a formula, this is:

$ARL + \text{longest lobe} \leq \text{maximum distance for your configuration (in Section 4.2.4 or 4.2.5)}$.

Fig. 4-4 explains how to read the tables in **Sections 4.2.4** and **4.2.5**.

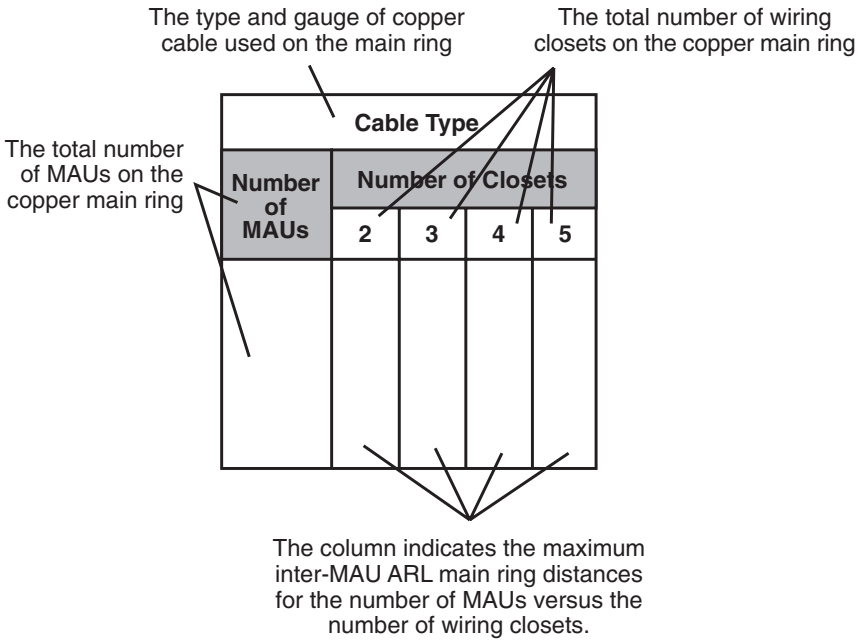


Fig. 4-4. How to Read the Distance Tables.

4.2.4 MAXIMUM DISTANCES FOR SMARTMAU 16s IN 4-MBPS RINGS**Table 4-1. Unshielded Twisted-Pair Category 5 Cable (feet/meters).**

Number of MAUs	Number of Wiring Closets				
	1	2	3	4	5
1	990 (300)				
2	964 (290)	944 (285)			
3	937 (280)	917 (275)	898 (270)		
4	911 (275)	891 (270)	871 (260)	851 (255)	
5	884 (265)	865 (260)	845 (255)	825 (250)	805 (240)
6	858 (260)	838 (250)	818 (245)	799 (240)	779 (235)
7	832 (250)	812 (245)	792 (240)	772 (230)	752 (225)
8	805 (240)	785 (235)	766 (230)	746 (225)	726 (220)

Table 4-2. Type 3 Level 3 Cable (feet/meters).

Number of MAUs	Number of Wiring Closets				
	1	2	3	4	5
1	500 (150)				
2	485 (145)	475 (143)			
3	470 (140)	460 (139)	450 (135)		
4	455 (135)	445 (134)	435 (130)	425 (128)	
5	440 (130)	430 (130)	420 (125)	410 (124)	400 (120)
6	425 (125)	415 (125)	405 (120)	395 (119)	385 (115)
7	410 (210)	400 (120)	390 (115)	380 (115)	370 (110)
8	395 (115)	385 (115)	375 (110)	365 (110)	355 (105)

Table 4-3. Type 1 and 2 Cable (feet/meters).

Number of MAUs	Number of Wiring Closets				
	1	2	3	4	5
1	1220 (369)				
2	1190 (360)	1170 (354)			
3	1160 (350)	1140 (345)	1120 (339)		
4	1130 (340)	1110 (335)	1090 (330)	1070 (324)	
5	1100 (330)	1080 (325)	1060 (320)	1040 (315)	1020 (305)
6	1070 (320)	1050 (315)	1030 (310)	1010 (305)	990 (300)
7	1040 (315)	1020 (305)	1000 (305)	980 (295)	960 (290)
8	1010 (305)	990 (300)	970 (290)	950 (285)	930 (280)

4.2.5 MAXIMUM DISTANCES FOR SMARTMAU 16s IN 16-MBPS RINGS

Table 4-4. Unshielded Twisted-Pair Category 5 Cable (feet/meters).

Number of MAUs	Number of Wiring Closets				
	1	2	3	4	5
1	429 (130)				
2	409 (120)	396 (120)			
3	389 (115)	376 (110)	363 (110)		
4	370 (110)	356 (105)	343 (100)	330 (100)	
5	350 (105)	337 (100)	323 (95)	310 (90)	297 (90)
6	330 (100)	317 (95)	304 (90)	290 (85)	277 (80)
7	310 (90)	297 (90)	284 (85)	271 (80)	257 (75)
8	290 (85)	277 (80)	264 (80)	251 (75)	238 (70)

Table 4-5. Type 3 Level 3 Cable (feet/meters).

Number of MAUs	Number of Wiring Closets				
	1	2	3	4	5
1	210 (63)				
2	205 (62)	202 (61)			
3	200 (60)	197 (59)	195 (59)		
4	195 (59)	193 (58)	190 (57)	187 (56)	
5	190 (57)	188 (56)	185 (56)	182 (55)	179 (54)
6	185 (56)	183 (55)	180 (54)	177 (53)	174 (52)
7	180 (54)	178 (53)	175 (53)	172 (52)	169 (51)
8	175 (53)	173 (52)	170 (51)	167 (50)	165 (50)

Table 4-6. Type 1 and 2 Cable (feet/meters).

Number of MAUs	Number of Wiring Closets				
	1	2	3	4	5
1	427 (129)				
2	416 (126)	410 (124)			
3	406 (123)	399 (120)	392 (118)		
4	396 (120)	389 (117)	382 (115)	375 (113)	
5	385 (116)	378 (114)	371 (112)	364 (110)	357 (108)
6	375 (113)	368 (111)	361 (109)	354 (107)	347 (105)
7	364 (110)	357 (108)	350 (103)	343 (103)	336 (101)
8	354 (107)	347 (105)	340 (100)	333 (100)	325 (98)

4.2.6 SMARTMAU 16 EXAMPLE

This example will help illustrate a proper network plan using SmartMAU 16s. All cable distances given assume that you use UTP Category 5 cable in the network.

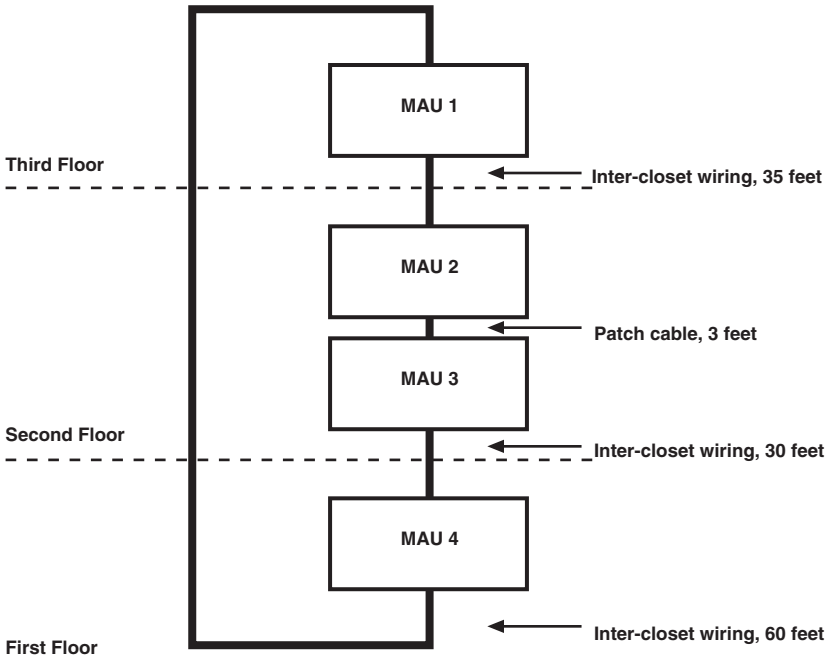


Fig. 4-5. SmartMAU 16 Example.

Assume that a network is desired with devices on three floors of a building, and four MAUs will be used. Using the cable lengths shown in the figure above, the total length of the main ring is 125 feet ($35 + 30 + 60$). The patch cable connecting MAUs 2 and 3 has been ignored. Its length is insignificant, and it is assumed that if it goes bad it will be replaced instead of looping the ring onto the backup path. The ARL is 95 feet (total main ring length minus the shortest segment: $125 - 30$).

The maximum distance for this network is 871 feet, as taken from the chart in **Fig. 4-5** (UTP Category 5 cable, four MAUs at 4 Mbps, and three wiring closets). Therefore, the maximum lobe cable length is 776 feet (chart distance ARL: $871 - 95$).

4.3 Completing the Installation

Once the network has been thoroughly planned and all wiring has been routed to the work areas where network devices will be located, use this procedure to finish the installation.

1. Be sure all of the front-panel DIP-switch settings are correct as explained in **Section 3.1**.
2. Plug all lobe cables into the appropriate lobe ports on the MAUs.

NOTE

Make sure that thorough documentation is kept on all network devices, their locations, their sequence on the ring, and their associated MAU ports.

3. If the ring is not running, connect the MAUs to the main ring using the Ring In and Ring Out connectors. (Ring In receives the cable from the previous MAU; Ring Out connects to the cable going to the next MAU.) Bring up the ring and make sure that the attaching devices are powered on and are set up to request network access.

If the ring is already operating, you may install the new MAUs by attaching Ring In and Ring Out cables to the appropriate MAU connectors, as long as the ring is not broken for more than five to ten seconds.

CAUTION

If the main ring is broken for more than five to ten seconds, the ring will be completely disabled and will have to be reinitialized. Data loss may occur.

- All lobe-port LEDs should light if the ports have devices attached and if the devices are powered on and are set up to request network access.

If the MAU does not seem to be operating properly, see **Chapter 6, Troubleshooting**.

4.4 SmartMAU Utility Software

Both models of the SmartMAU 16 can be managed locally or remotely by the SmartMAU Utility Software. This out-of-band software for Windows lets you monitor the unit's status and lock and unlock the unit's ports. Instructions on how to install and use this software are provided with the software. SmartMAU Utility Software can also manage a stack of SmartMAU 16s by cascading them together serially (RS-422) through the IN and OUT RJ-45 connectors on the rear of the units. Each MAU in the stack must have Switch 4 in the up position.

The PC running SmartMAU Utility Software must be connected to the rear-panel RJ-45 connector labeled IN (see **Fig. 4-6**). To attach other units, connect cables from the rear-panel RJ-45 OUT connector on one unit to the rear panel RJ-45 IN connector on the next unit. See **Fig. 4-7**. Also, be sure to set front-panel DIP Switch 4 to the up position on each unit as explained in **Section 3.1**.

Fig. 4-8 shows how you can connect SmartMAU 16s to be controlled by the SmartMAU Utility Software using modems.



Fig. 4-6. Rear Panel of the SmartMAU 16.

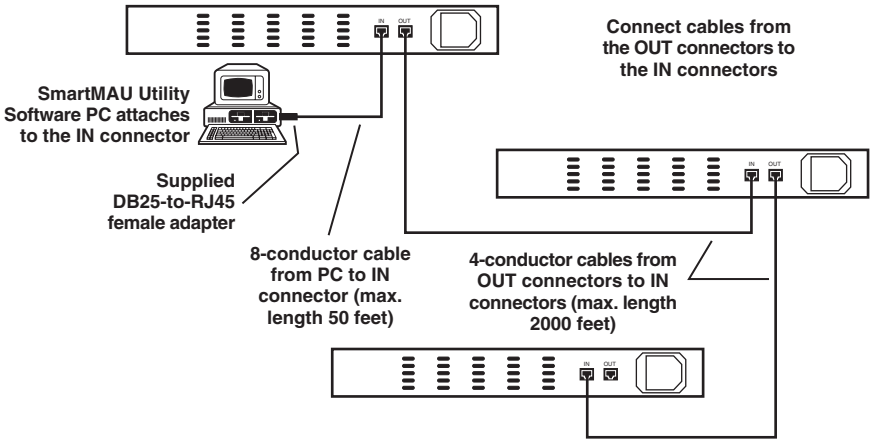


Fig. 4-7. Connecting Multiple SmartMAU 16s for SmartMAU Utility Software Control.

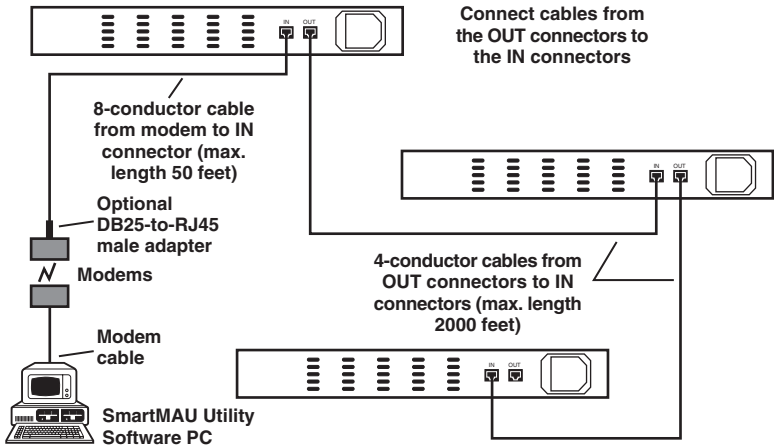


Fig. 4-8. Connecting Multiple SmartMAU 16s for SmartMAU Utility Software Remote Control.

5.0 SmartMAU Utility Software

5.1 Introduction

SmartMAU Utility Software is a Windows based proprietary token ring management package that adds serial, out-of-band management to hubs. The SmartMAU Utility management software includes front-panel displays of the equipment, as well as control and download capabilities.

NOTE

SmartMAU Utility Software manages SmartMAU 16s through their Data In/Data Out ports and can only manage them when they are used individually or when they are daisy-chained together.

SmartMAU 16s are 16-port, token ring hubs. Each lobe port contains hardware speed-detect circuitry to detect and lock out any token ring device attempting to insert at the wrong token ring speed. This feature prevents any disruptions to the network that are caused by incorrect station speed settings.

SmartMAU 16s can be interconnected through their Ring In/Ring Out ports or can be managed by MAU controllers. SmartMAU 16s also include serial Data In and Data Out ports in the back of each unit. When used as individual hubs, these rear ports can be interconnected to daisy-chain SmartMAU Utility Software management between a stack of SmartMAU 16s. A switch on the front of each SmartMAU 16 allows easy selection between SmartMAU Utility Software management and MAU connectivity and management.

5.1.1 SMARTMAU UTILITY SOFTWARE FEATURES

The SmartMAU Utility Software package provides several features to token ring networks using SmartMAU16s.

- Front-panel displays of the SmartMAU16. For SmartMAU 16s that are daisy-chained together, SmartMAU Utility Software will display the front panel of each SmartMAU 16 in the stack.
- Individual port status.
- Module and port software lock/unlock.
- Hardware resets.
- Hardware and software revision information, as well as the date of manufacture.

- Code download to any SmartMAU 16 in the stack for easy field-upgrade capability.
- ID signaling between SmartMAU Utility Software and SmartMAU 16s daisy-chained together through Data In/Data Out.
- Synchronization of LEDs (this feature synchronizes the LEDs of all the SmartMAU 16s daisy-chained together).
- Hardware speed detect enable/disable (by disabling hardware speed detect, you can use network diagnostic equipment that needs to insert onto the ring, but does not provide phantom voltage).
- Modem configuration.

5.1.2 COMPATIBILITY

SmartMAU Utility Software is based on Windows 3.1 and will run on a 386-33 PC or better with a 14-inch VGA color monitor, a free communications port, and a 3.5-inch, high density floppy drive. A mouse is recommended, but not absolutely necessary. The PC requires at least 4 MB free RAM and 1 MB of free disk space.

5.2 Network Management Planning

To use SmartMAU Utility Software, connect your PC to the “IN” port on the rear panel of a SmartMAU 16. To manage additional SmartMAU 16s with a single copy of SmartMAU Utility Software, daisy-chain each MAU’s “OUT” port to the next MAU’s “IN” port. These additional SmartMAU 16s do not need to be on the same token ring; they just need to be connected serially through their IN and OUT ports. See **Fig. 5-1**.

The cable that connects the PC to a SmartMAU 16 should not exceed 50 feet (15 m). Each cable that interconnects the SmartMAU 16s should not exceed 2000 feet (610 m).

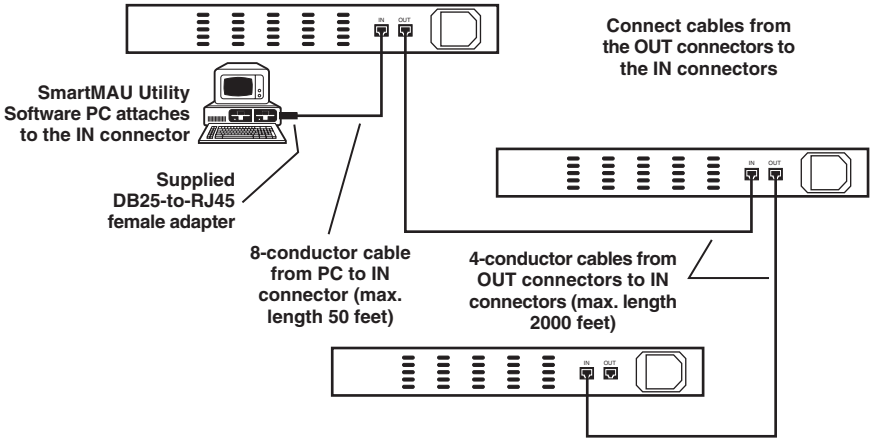


Fig. 5-1. Connecting SmartMAU 16s.

You can also manage SmartMAU 16s with SmartMAU Utility Software remotely through a modem. Since the SmartMAU has autobaud built-in, you do not need to configure its baud rate. The SmartMAU 16 operates at 2400, 4800, 9600, 19,200, and 38,400 bps, so you should set the modem and the line to one of these baud rates. **Fig. 5-2** shows the modem connections.

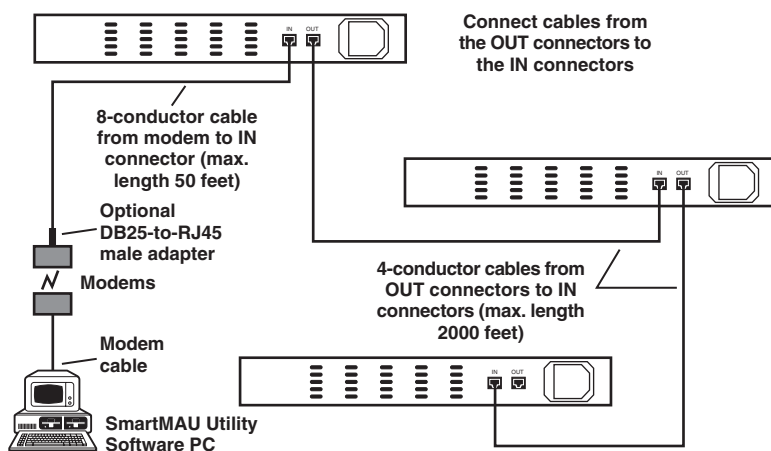


Fig. 5-2. SmartMAU 16 Modem Connections.

5.3 Installation

This section explains how to install SmartMAU Utility Software on your PC.

5.3.1 WHAT YOU NEED

SmartMAU Utility Software will run on a PC with a 14-inch color monitor that is running Windows 386 enhanced mode and has the following:

- an 80386 33 MHz or faster processor.
- 4 MB of free RAM.
- one 3.5-inch (1.44 MB), high-density floppy-disk drive.
- Microsoft® Windows™ version 3.1 or Windows for Workgroups version 3.11.
- a free communications port.
- a mouse (recommended).
- one hard (fixed) disk with at least 1 MB of free storage space.
- VGA color capability.

You will also need:

- RS-232 modems if your network requires remote management.
- SmartMAU 16 DC or SmartMAU 16 Type 3.

NOTE

When you use Windows for Workgroups, set the Disk Access and File Access for 32 bit to improve the performance of SmartMAU Utility Software.

5.3.2 BACKING UP YOUR MASTER DISKETTE

To prevent accidentally losing your software, make a copy of the master SmartMAU Utility Software diskette.

Use the Windows File Manager to copy the diskette. From the File Manager's Disk menu, choose **Copy Disk**. Then follow the instructions on the screen.

After copying the SmartMAU Utility Software diskette, place the master in a safe place.

Use the backup diskette to install SmartMAU Utility Software on your PC.

5.3.3 INSTALLING THE SOFTWARE

After you properly set up the PC on which SmartMAU Utility Software will run as described in **Section 3.1, What You Need**, follow the instructions below to install SmartMAU Utility Software.

1. Load Windows if it is not already running.
2. Insert the backup SmartMAU Utility Software diskette into a floppy drive.
3. From the Windows Program Manager File menu, choose **Run**.
4. At the Run command, type:

n:SETUP

where **n** is the floppy drive that contains the SmartMAU Utility Software diskette.

5. Click the Continue button on the Setup window.

The Setup window allows you to continue with the installation process or to cancel it. If you click the Continue button, a percentage complete information box appears which allows you to monitor the installation.

6. Click the OK button on the Installation Complete window.

The installation of SmartMAU Utility Software is now complete. The SmartMAU Utility Software program automatically creates the SmartMAU Utility Software icon, which is called “VMUTIL/WIN” (see **Fig.5-3**).

Fig. 5-3. SmartMAU Utility Software Icon.



NOTE

After you install and start SmartMAU Utility Software, you need to select the protocol. The option is SmartMAU for use with SmartMAU 16 DC and SmartMAU 16 Type 3.

5.3.4 CONFIGURING THE PC RUNNING SMARTMAU UTILITY SOFTWARE

Since SmartMAU Utility Software communicates with the SmartMAU 16 through serial communications, the maximum distance for a direct (non-modem) connection between the PC and the first SmartMAU 16 is the standard 50 feet (15 m) for an RS-232 interface.

The maximum length for the cables that interconnect SmartMAU 16s is 2000 feet (610 m). The maximum number of SmartMAU 16s that can be interconnected depends upon the baud rate and acceptable response delays.

NOTE

Interconnecting more than 16 SmartMAU 16s is not recommended.

Use the proper cable to connect the PC.

5.4 Program Description

Now you are ready to run the program. This section explains how to start the program, how to connect a modem to a PC communications port, and how to set up the modem. Then it describes the SmartMAU Utility Software program and how it pertains to SmartMAU 16 DC and SmartMAU 16 Type 3.

5.4.1 STARTING SMARTMAU UTILITY SOFTWARE

To run SmartMAU Utility Software, either double-click on the VMUTIL/WIN icon (see Fig. 5-4), or highlight the icon and press the Enter key.



Fig. 5-4. SmartMAU Utility Software Program Icon.

SmartMAU Utility Software uses several icons depending on how it is configured. There is one “VMUTIL/WIN” icon for SmartMAU Utility Software itself. This icon is generated during installation and is used to start the SmartMAU Utility Software program. There is also a separate icon for the SmartMAU 16.

5.4.2 SETTING THE BAUD RATE

SmartMAU 16 automatically recognizes and operates at either 2400, 4800, 9600, 19,200, or 38,400 bps.

5.4.3 MODEM CONFIGURATION

Set up, configure, and connect the modem as described in the modem’s owner’s manual. Use the COMM and Modem commands in the SmartMAU Utility Software Configuration menu to set up the software to work with a modem. You can also create phone lists using the SmartMAU Utility Software Communications menu commands (Dial, Port Open, and Hang Up). Refer to **Section 5.4.8, Configuration Menu** and **Section 5.4.10, Communications Menu**, for descriptions of these commands. Then refer to **Section 5.5.5, Creating and Using the Phone Book**, for instructions on how use the commands.

5.4.4 SMARTMAU UTILITY SOFTWARE WINDOW FEATURES

The SmartMAU Utility Software window, shown in **Fig. 5-5**, is completely consistent with Microsoft Windows 3.1 standards. If you are not familiar with Windows, take some time to read your Windows manual. The screen items are described in the following paragraphs.

NOTE

The SmartMAU window (depending on the active protocol) also automatically opens when SmartMAU Utility Software is started. These windows are explained in Section 5.5.2, Controlling SmartMAU 16s.

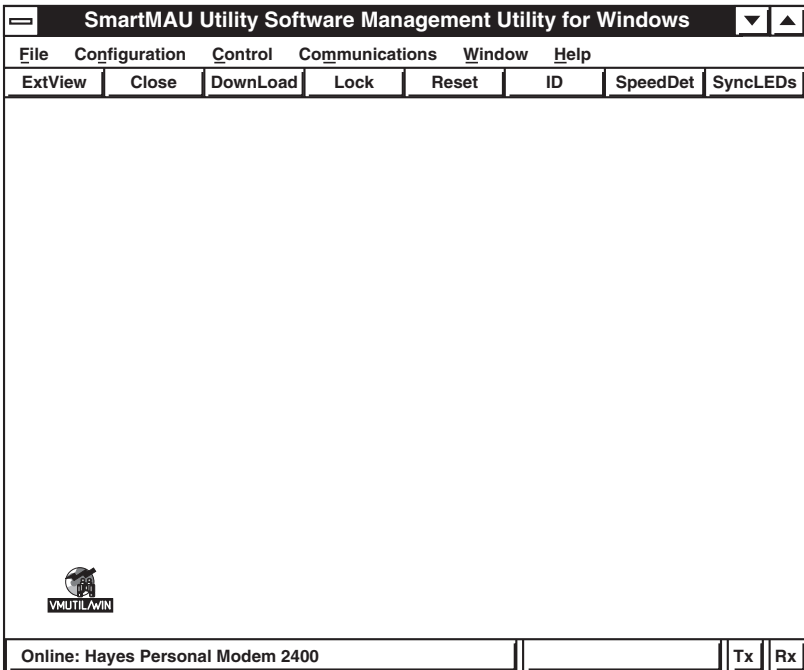


Fig. 5-5. SmartMAU Utility Software Screen.

5.4.5 CONTROL-BUTTON BAR

The control-button bar is at the top of the SmartMAU Utility Software window. The bar provides quick access to commonly used control functions. The names of the buttons are as follows:

- Exp(and)View
- Close
- DownLoad
- Lock
- Reset
- ID
- SpeedDet(ect)
- Sync(hronize)LEDs

The Control Buttons and the Control menu options perform exactly the same functions. (The buttons are for ease of use.) Refer to **Section 5.4.9, Control Menu**, for descriptions of the Control Buttons and the Control menu options.

NOTE

The control buttons will be grayed out when their function is not appropriate.

5.4.6 PULL-DOWN MENUS

There are six pull-down menus in the main SmartMAU Utility Software window:

- File
- Configuration
- Control
- Communications
- Window
- Help

Each pull-down menu contains several choices, which are grouped according to function. The following sections explain each menu function and command.

5.4.7 FILE MENU

Edit Names

The **Edit Names** command allows you to associate the SmartMAU 16's address to an alphanumeric name or change a current name to another name. For example, if a SmartMAU 16 has an address of 00000004 and is physically located on the first floor of your building, you can use the Edit Names command to name it "1st Floor Hub." When using the Edit Names command, be sure not to give two devices the same. **Section 5.5.4, Editing SmartMAU 16 Names**, explains how to use this command.

Exit

Use the **Exit** command to quit SmartMAU Utility Software.

5.4.8 CONFIGURATION MENU

Auto Open

When enabled (checked), the **Auto Open** command automatically opens the selected communication channel when you first start the SmartMAU Utility Software. When the communication channel is open, the SmartMAU 16 device names are displayed in the Chassis window. If Auto Open is disabled (unchecked), the channel has to be opened manually using the **Open Port** command in the Communications menu. Also see **Section 5.5.1, Opening the Communications Channel**, for more information.

Save Configuration Now

This command saves the presently configured setup as soon as the command is selected. The configuration can also be saved when you exit from SmartMAU Utility Software if the Save **Configuration on Exit** command in the Configuration menu is selected.

COMM

Selecting the **COMM** command causes the COMM Port Setup window to appear (see Fig. 5-6). This window allows you to select a communication port and change its baud-rate setting (2400, 4800, 9600, 19200, or 38400) and its connection type (modem or direct).

NOTE

Before you can operate SmartMAU Utility Software with a modem, you must use the COMM command and the Modem command to set up the communications port to which the modem will connect.

Comm Port Setup		
<p>Comm Port:</p> <p><input checked="" type="radio"/> Comm 1</p> <p><input type="radio"/> Comm 2</p> <p><input type="radio"/> Comm 3</p> <p><input type="radio"/> Comm 4</p>	<p>Data Rate:</p> <p><input type="radio"/> 2400</p> <p><input type="radio"/> 4800</p> <p><input checked="" type="radio"/> 9600</p> <p><input type="radio"/> 19200</p> <p><input type="radio"/> 38400</p>	<p>Connection:</p> <p><input checked="" type="radio"/> Direct</p> <p><input type="radio"/> Modem</p>
<p><input type="button" value="OK"/> <input type="button" value="Cancel"/></p>		

Fig. 5-6. COMM Port Setup Window.

Modem Command

The Modem command causes the Modem Database window to appear (see Fig. 5-7). This window allows you to select a modem model, a modem type, and the communications port to which it will connect.

NOTE

Before you can operate SmartMAU Utility Software with a modem, you must use the COMM command and the Modem command to set up the communications port to which the modem will connect.

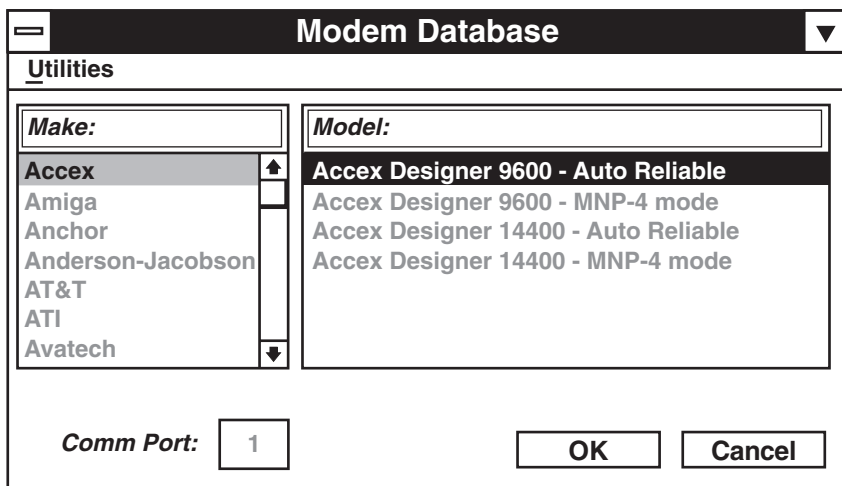


Fig. 5-7. Modem Database Window.

The Modem Database window also provides a Utilities menu, which allows you to edit the modem database. In the Utilities menu, **Edit Setting**, **Add Modem**, and **Delete Modem** allow you to modify the modem models and their settings in the database. The **Pack Database** option allows you to purge deleted entries from the database.

Protocol

The **Protocol** command allows you to select the SmartMAU 16's protocol. The original default is for the SmartMAU 16 protocol.

Download File Spec

The Download File Spec command allows you to select which files will be used for a code download to a SmartMAU 16. Refer to **Section 5.5.3, Code Downloads**, for instructions.

NOTE

The download code files have .DLC extensions.

Save Configuration on Exit

When this option is enabled (checked), changes to the configuration will be automatically saved when you exit the program. If the option is not selected and changes have been made, then a dialog box will appear when you exit the program to warn that the configuration information will be lost upon exit. The dialog box includes Continue and Cancel options; Cancel is the default.

5.4.9 CONTROL MENU

NOTE

The Control menu options and the control buttons on the control button bar have exactly the same functions. (The control buttons are for ease of use.) Therefore, use the descriptions in this section for both.

The Control menu provides control options to an individual SmartMAU 16.

All Control menu options are grayed out when a SmartMAU 16 has not been selected.

Expanded View

If a SmartMAU 16 is selected, the **Expanded View** command opens a window that details the module's components. See **Section 5.5.2, Controlling SmartMAU 16s**, for instructions on how to use this command.

NOTE

Double-clicking on the device will also expand the view.

Close

The **Close** command closes an Expanded View window.

Download

The **Download** command initiates code download operations to the presently selected device. Refer to **Section 5.5.3, Code Downloads**, for instructions on how to download code to SmartMAU 16s.

Lock

The **Lock** command locks and unlocks the presently selected SmartMAU 16. Refer to **Section 5.5.2, Controlling SmartMAU 16s**, for instructions on how to use the **Lock** command.

Reset

The **Reset** command resets the presently selected SmartMAU 16. Refer to **Section 5.5.2, Controlling SmartMAU 16s**, for instructions on how to reset this device.

NOTE

Resetting a SmartMAU 16 will cause it to lose any new download code.

ID

In a SmartMAU 16 network, the **ID** command issues an identification signal to a specific SmartMAU 16 in the SmartMAU 16 network.

The **ID** command is out-of-band and does not affect network operation. It only allows a technician to easily locate the device in a closet. It also verifies that intelligent communication is possible between the selected SmartMAU 16 or Satellite MAU and Partition Module port, or between SmartMAU Utility Software and individual SmartMAU 16s in a SmartMAU 16 network.

Speed Det(ect)

The **Speed Det** command enables and disables the hardware speed-detect circuitry at the selected port connector. Refer to **Section 5.5.2, Controlling SmartMAU 16s**, for instructions on how to enable and disable speed detection.

Sync(hronize) LEDs

This command synchronizes all blinking LEDs in a SmartMAU 16 stack. This command is helpful when a technician is working in a closet that contains many SmartMAU 16s. Selecting this command has no effect on the operation of the network. Note that the synchronization of the LEDs will eventually fade and the command will have to be reissued. This is because phases vary slightly in each SmartMAU 16 unit.

5.4.10 COMMUNICATIONS MENU

Dial (Phone Book)

The **Dial (Phone Book)** command causes the Phone Book window to appear. In this window, you can add names and phone numbers to a modem phone book. The phone book can also be edited. **Section 5.5.5, Creating and Using the Phone Book**, explains how to use this command.

Open Port

The **Open Port** command opens (or closes) the communication channel to the connected devices. It displays the devices in the SmartMAU 16 window.

The communication channel can be automatically opened when you first start SmartMAU Utility Software if the **Auto Open** command in the Configuration menu is enabled (checked). **Section 5.5.1, Opening the Communications Channel**, provides detailed instructions for initiating communications.

Hang Up

The **Hang Up** command disconnects a modem connection. The command is disabled when direct communications is selected. **Section 5.5.5, Creating and Using the Phone Book**, explains how to use this command.

5.4.11 WINDOW MENU

Cascade

The **Cascade** command arranges all open windows in a cascading order.

Arrange Icons

The **Arrange Icons** command places all icons in the presently selected window side by side.

5.4.12 HELP MENU

The Help menu commands provide Windows on-line help information for you.

Contents

The **Contents** command provides the Help contents listing.

Search for Help On...

If this command is selected, a Search for Help list appears.

SmartMAU Utility Software Overview Command

The SmartMAU Utility Software Overview command provides general information about the SmartMAU Utility Software program.

How to Use Help

The **How to Use Help** command provides general instructions on how to use the Windows on-line help program.

5.4.13 BOTTOM STATUS BAR

The Status bar along the bottom of the SmartMAU Utility Software window provides status information about the program's functions.

On the left side of the bar is a display area that SmartMAU Utility Software uses to inform you of its internal activities. For example, "Saving..." is displayed when SmartMAU Utility Software is saving configuration setup data.

On the right side of the bar are two indicators labeled Tx and Rx. These indicators flash when SmartMAU Utility Software is transmitting (Tx) or receiving (Rx) communications data to or from the selected device. Each indicator should alternate during normal communications. If only one indicator flashes, then either the program or the device is not transmitting or receiving communications data.

5.5 Operation

This section explains the following operating procedures:

- Opening the Communications Channel
- Controlling SmartMAU16s
- Code Downloads
- Editing SmartMAU16 Names
- Creating and Using the Phone Book
- Editing the VMUTIL.INI File

5.5.1 OPENING THE COMMUNICATIONS CHANNEL

NOTE

Before you can control or monitor any SmartMAU 16, you must first open the communications channel. After reading this section, refer to Section 5.5.2, **Controlling SmartMAU 16s** for instructions on how to manage those products.

The communications channel can be opened in two ways:

- manually by using the **Open Port** command in the Communications menu, or
- automatically (upon SmartMAU Utility Software startup) by enabling (checking) the **Auto Open** command in the Configuration menu.

If the SmartMAU 16 protocol is active, the names of the SmartMAU 16 devices and their global status are displayed in the SmartMAU 16 Chassis (Global Status) window after the communications channel is opened. This window is explained in Section 5.5.2.

5.5.2 CONTROLLING SMARTMAU 16s

To monitor and control a SmartMAU 16:

1. Be sure the SmartMAU 16 protocol is selected.
2. Open the communications channel to the SmartMAU 16 (or stack) as explained in **Section 5.5.1, Opening the Communications Channel**.

Opening the communications channel causes the SmartMAU Chassis (Global Status) window to appear (see **Fig. 5-8**).

Global Status:						
Name	Unit	SpeedDet	RI Loop	RO Loop	T/R	Exceptions

Fig. 5-8. SmartMAU Chassis (Global Status) Window.

The SmartMAU Chassis (Global Status) window provides the following information:

- **Name.** The Name column lists the names of the SmartMAU 16 units in the stack. The names may be the unit's address or a name that was assigned using the **Edit Names** command in the File menu.
- **Unit.** This column always defines the unit as the term "SmartMAU 16."
- **SpeedDet(ect).** The Speed Detect column indicates if the unit's speed detection is enabled or disabled.
- **RI Loop.** The RI Loop column indicates if auto loopback is enabled or disabled on Ring In.

- **RO Loop.** The RO Loop column indicates if auto loopback is enabled or disabled on Ring Out.
 - **T/R.** The present token ring speed (4 or 16 Mbps) of the unit is displayed in this column.
 - **Exceptions.** The columns listed above describe the selected SmartMAU 16 chassis. This column describes port exceptions on that chassis, if any. If the selected chassis has any ports that are locked out or has a port detecting a station at the wrong speed, the exception listing is displayed in this column.
3. Expand the view of a SmartMAU 16 listed in the SmartMAU Utility Software window.

To expand the view of a SmartMAU 16, either double-click on its name, or highlight it and then click the **Exp View** button or select the **Expand View** command in the Control menu.

4. Expanding the view of a SmartMAU 16 causes the Expanded Chassis window to appear (see **Fig. 5-9**).

The Expanded Chassis window provides a graphical representation of the selected SmartMAU, as well as status information and control functions as explained in the following paragraphs.

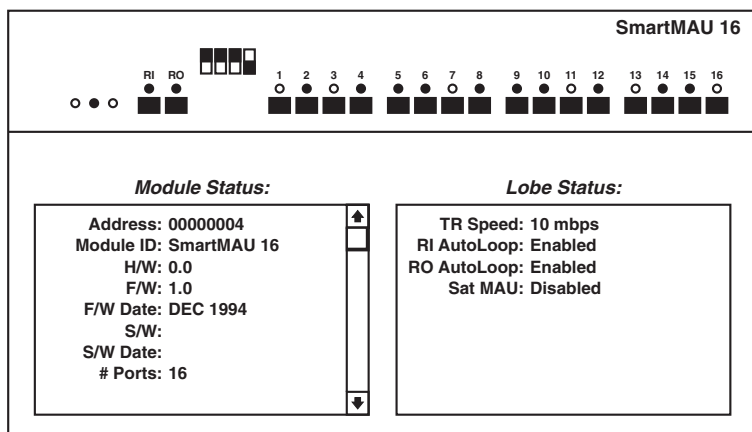


Fig. 5-9. Expanded Chassis Window.

SmartMAU 16 Graphical Representation

As shown in **Fig. 5-9**, SmartMAU Utility Software displays a working representation of the MAU front panel that reflects the actual chassis LED conditions and lobe status.

If a lobe-port LED is green, then a token ring station is inserted on the ring. If a cable is not inserted or if phantom voltage is not present (such as the station is powered off), the port LED is off.

These LEDs also change to color red and sometimes blink red, depending on their status. These conditions are discussed later in this section.

You can use the cursor to select Ring In/Ring Out and lobe ports, either individually or as a group. The entire chassis can also be selected. When an item is selected, it is highlighted with a white border. A selected item can then be controlled, for example locked out or reset, and its status displayed in the window. To select a port, move the cursor to the port connector, and then click on it. To select all of the lobe ports, move the cursor between either lobe ports 4 and 5, 8 and 9, or 12 and 13, and then click it. To get the status of the front-panel DIP switch, click on it. To select the entire chassis, click anywhere else on the front-panel face plate.

When the entire chassis is selected, its status is displayed in the Chassis Status column in the window. The information displayed is listed below.

- Address. This field displays the chassis address.
- H/W. The unit's hardware revision is displayed in this field.
- F/W. The unit's firmware revision is displayed here.
- S/W. The revision of the software is displayed here.
- Module Lock. (The options are "active" and "inactive.") This field displays whether a module's lock function is active or inactive.
- Detect. (The options are "enabled" and "disabled.") This field displays whether speed detection is enabled or disabled at the chassis level.
- T/R Speed. (The options are 4 and 16 Mbps.) The chassis' token ring operating speed is displayed here.

When a lobe port is selected, its status is displayed in the Lobe Status column in the window. The information displayed is listed below.

- Port Lock. (The options are "enabled" and "disabled.") The selected lobe's operating status is displayed here. If it is unlocked, then the status is "enabled." If the lobe is locked out, the status will be "disabled."
- Media. (The options are "UTP" and "STP.") This field displays the type of cable that is connected to the lobe connector.
- Speed Detect. (The options are "enabled" and "disabled"). This field displays whether speed detection is enabled or disabled at the selected lobe.

- **Port Speed.** (The options are “4 Mbps” and “16 Mbps.”) The port’s token ring operating speed is displayed here.
- **Phantom Drive.** (The options are “detected” and “not detected.”) This field displays whether or not phantom voltage is detected on the Ring In port.

Locking Out or Unlocking SmartMAU 16s and Ports

This section explains how to lock and unlock either the entire SmartMAU 16 or its lobe ports, individually or as a group.

To lock or unlock an entire SmartMAU 16, an individual lobe port, or a group of lobe ports:

1. Open the Expanded Chassis window as described in the **Section 5.5.2**.
2. Select the entire unit, an individual lobe port, or the lobe ports as a group.

Select the entire hub chassis by moving the cursor anywhere on the front panel of the SmartMAU 16, and then clicking it. A white border will surround the chassis when it is selected.

Select an individual lobe port by clicking the cursor on it. A white border will appear around a selected lobe port.

Select all 16 lobe ports as a group by moving the cursor between either lobe ports 4 and 5, 8 and 9, or 12 and 13, and then clicking. A white border will appear around all 16 ports when they are selected as a group.

3. Lock or unlock the chassis, lobe port, or group of lobe ports.

Click the **Lock** button on the Control button bar or select the **Lock** command in the Control menu. The button and command toggle between lock and unlock. Confirmation boxes appear in which you can cancel the operation or proceed. When a lobe is locked, its LED turns red. The LED on an unlocked lobe is green when a station can properly insert. The LED is off when a station is not present. This LED will also blink red when the hardware speed-detect feature locks out a token ring station operating at an incorrect speed.

Enabling and Disabling Speed Detection on SmartMAU 16s and Ports

This section explains how to enable and disable the speed detection on either the entire SmartMAU 16 or its lobe ports, individually or as a group.

To enable or disable the speed detection of an entire SmartMAU 16, an individual lobe port, or a group of lobe ports:

1. Open the Expanded Chassis window as described in **Section 5.5.2**.
2. Select the entire unit, an individual lobe port, or the lobe ports as a group.

Select the entire chassis by moving the cursor anywhere on the front panel of the SmartMAU 16, and then clicking on it. A white border will surround the chassis when it is selected.

Select an individual lobe port by clicking the cursor on it. A white border will appear around a selected lobe port.

Select all 16 lobe ports as a group by moving the cursor between either lobe ports 4 and 5, 8 and 9, or 12 and 13, and then clicking. A white border will appear around all 16 ports when they are selected as a group.

3. Enable or disable the speed detection of the chassis, lobe port, or group of lobe ports.

Click the **Speed Det** button on the Control button bar or select the **Speed Det** command in the Control menu. The button and command toggle between enable and disable. Confirmation boxes appear in which you can cancel the operation or proceed.

Resetting SmartMAU 16s

This section explains how to reset a SmartMAU 16 to its factory default settings.

To reset a SmartMAU 16:

1. Open the Expanded Chassis window as described **Section 5.5.2**.
2. Select the entire unit.

Select the entire chassis by moving the cursor anywhere on the front panel of the SmartMAU 16, and then clicking on it. A white border will surround the chassis when it is selected.

3. Reset the chassis.

Either click the **Reset** button on the control bar or select the **Reset** command in the Control pull-down menu. A confirmation box appears in which you can cancel the operation or proceed.

5.5.3 CODE DOWNLOADS

The **Download** command (and control button) and the **Download File Spec** command are available for the SmartMAU 16.

When used with a SmartMAU 16, a specific SmartMAU 16 unit must be selected. The commands will then send the appropriate files to the specified SmartMAU 16.

NOTE

The download code files have .DLC extensions.

NOTE

SmartMAU 16s are unable to permanently store download code. If power is lost to a SmartMAU 16, then the download code must be resent to the hub.

In all cases, the status bar at the bottom of the screen will indicate the progress of the download, including the percentage complete, until the download function is finished.

To download code to a SmartMAU 16:

1. Select the correct protocol using the **Protocol** command in the Configuration menu.

SmartMAU Utility Software must be operating in the appropriate SmartMAU protocol to download code to the respective device.

2. Select the device that will receive the download code.

If you are downloading to a SmartMAU 16, expand the view of the desired SmartMAU 16 as explained in **Section 5.5.2, Controlling SmartMAU 16s**, and select it by clicking on its front panel. (A white border will surround the unit when it is selected.)

3. Select the download file.

Selecting the **Download Code Spec** command in the Configuration pull-down menu causes the Download Code Module window to appear (see **Fig. 5-10**).

This window allows you to specify the drive, directory, and file name of the download code that you wish to send to the selected device. After selecting the download file, click the OK button to close the window.

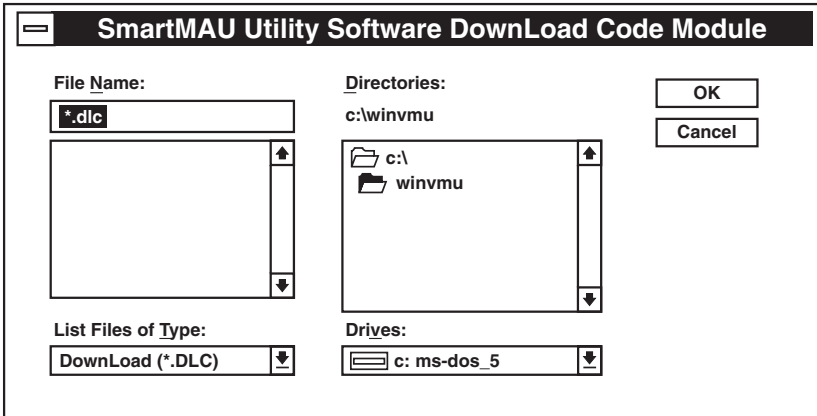


Fig. 5-10. Download Code Module Window.

4. Start the download.

To start the download, click the **Download** control button or select the **Download** command in the Control menu. (The download percentage complete is displayed in the bottom left status bar area.)

5. Verify the download revision.

The new download revision number can be verified by selecting the device and viewing its revision number in either the Chassis Status or Module Status information area in the appropriate Chassis window (see **Section 5.5.2, Controlling SmartMAU 16s**, for instructions on how to view the Chassis window).

5.5.4 EDITING SMARTMAU 16 NAMES

This section provides instructions on how to associate a SmartMAU 16's address to an alphanumeric name or change a pre-defined name to another name. This is useful when you have multiple SmartMAU 16s in a building and you want to identify them by location rather than address.

NOTE

The alphanumeric name can be up to 32 characters.

CAUTION

Be sure not to use the same name for two or more SmartMAU 16s. Otherwise, the operation of the network will be disrupted.

1. Select the **Edit Names** command in the File menu.

Selecting the **Edit Names** command causes the Edit SmartMAU 16 Module Names window to appear. See

Fig. 5-11.

The Address field in the Edit SmartMAU 16 Module Names window always displays the original (globally administered) internal address.

The Name field displays the name of the SmartMAU 16 that you assign.

Any comment you add (see the next step) are displayed in the Comments field.

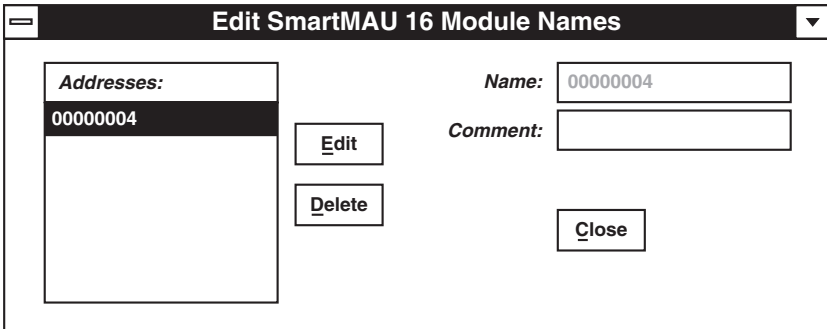


Fig. 5-11. Edit SmartMAU 16 Module Names Window.

2. To change a name, highlight the desired SmartMAU 16 in the Address field, and then click the **Edit** button.

Clicking the **Edit** button causes an Edit dialog box to appear. The dialog box provides a new name and a comment field. After changing the name or comment, click the OK button. The SmartMAU 16's new name will now appear in the SmartMAU Utility Software program whenever it is referenced.

3. To delete a name and return the unit to its original address, highlight the name of the hub, and then click the **Delete** button.
4. Click the **Close** button to close the Edit SmartMAU 16 Module Names window.

5.5.5 CREATING AND USING THE PHONE BOOK

This section explains how to build, edit, and use the SmartMAU Utility Software Phone Book.

Building and Editing the Phone Book

SmartMAU Utility Software allows you to build and edit a phone book of modem numbers. The following paragraphs explain how.

1. Pull down the Communications menu and select the **Dial (Phone Book)** command.

Selecting the **Dial (Phone Book)** command causes the Phone Book window, shown in **Fig. 5-12**, to appear.

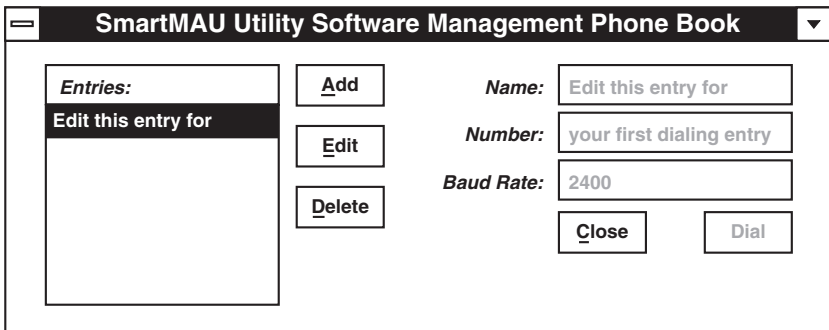


Fig. 5-12. Phone Book Window.

NOTE

Initially there is a single phone entry, which can be edited to create a usable entry.

2. Add a phone number to the list.

Clicking the Add button in the Phone Book window causes the Phone Book-Add window to appear (see **Fig. 5-13**). This window provides three fields in which you can name the phone entry, add the phone number, and specify the baud rate at which you would like to dial out.

Enter digits in the Name and Number fields by clicking on them and adding letters and numbers using the keyboard. Select baud rates by scrolling through the Baud Rate dialog box. Clicking the **Save** button saves your phone information and returns you to the Phone Book window. Clicking the **Cancel** button returns you to the Phone Book window, but does not save the information. Repeat this procedure until you have completed your phone-book entries.

SmartMAU Utility Software Management Phone Book-Add

Name:

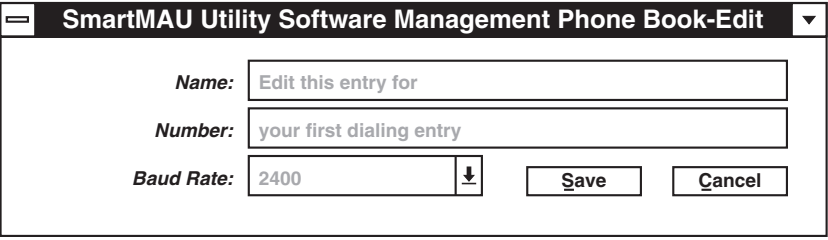
Number:

Baud Rate: 2400

Fig. 5-13. Phone Book-Add Window.

3. Edit a phone-book entry, if desired.

Clicking the Edit button in the Phone Book window causes the Phone Book-Edit window, shown in **Fig. 5-14**, to appear. (The entry to be edited should be selected before clicking the Edit button.) This window displays the present information about the selected entry and allows you to modify it using the mouse and the keyboard. After editing an entry, click the **Save** button, and the new information will appear in the Phone Book. Clicking the **Cancel** button will not save the new information and will leave the entry as it was.



SmartMAU Utility Software Management Phone Book-Edit	
Name:	<input type="text" value="Edit this entry for"/>
Number:	<input type="text" value="your first dialing entry"/>
Baud Rate:	<input type="text" value="2400"/> ↓
<input type="button" value="Save"/> <input type="button" value="Cancel"/>	

Fig. 5-14. Phone Book-Edit Window.

4. Delete a phone number, if desired.

To delete a phone-number entry, highlight the name of the number in the Entries field of the Phone Book window, and then click the Delete button. A confirmation box will appear in which you can proceed with the operation or cancel it.

Using the Phone Book

Before using the Phone Book, be sure the modems are connected and the COM and Modem command settings are correct. This is explained in **Section 5.4, Program Description**.

To use the Phone Book, select the **Dial (Phone Book)** command in the Communications pull-down menu. The Dial (Phone Book) window will appear. Use the cursor to highlight the desired phone number name, and then click the Dial button. To disconnect, select the Hang Up command in the Communications menu.

5.5.6 EDITING THE VMUTIL.INI FILE

NOTE

This section is included for reference only. We do not recommend changing the VMUTIL.INI file parameters by editing this file. All modifications to the parameter values should be made using the SmartMAU Utility Software menu options within the SmartMAU Utility Software program.

The VMUTIL.INI file is the configuration file for the SmartMAU Utility Software program. With it you can define parameters such as:

- The protocol type.
- Auto Open the communications channel.
- Configure the communications channel.
- Configure the modem.

To edit the file in Windows, first open the Windows Notepad application, and then open the SmartMAU Utility Software VMUTIL.INI file. The contents of the file will then be displayed in the Notepad window.

To edit the file in DOS, you must be at the DOS prompt of the hard drive containing the SmartMAU Utility Software program. Change to the directory containing the VMUTIL.INI configuration file by typing:

CD \WINDOWS <Enter>

To edit the VMUTIL.INI file, use an ASCII text editor. The entries in the VMUTIL.INI file are listed below, along with user-definable parameters, a short description, and the default setting for each.

[Application]

- Protocol=*n*—Selects the protocol. If *n*=SmartMAU, the SmartMAU protocol is active (this is the default).
- AutoOpen=*n*—Enables the SmartMAU Auto Open communications. If *n*=True, Auto Open is enabled. If *n*=False, Auto Open is disabled. Default=True.

[Port]

- CommType=*n*—Selects the communications type. If *n*=Direct, direct communication is active. If *n*=Modem, modem communication is active. Default=Direct.
- CommRate=*n*—Selects a baud rate. If *n*=2400, 4800, 9600, or 19200, the respective baud rate is selected. No default.
- CommPort=*n*—Selects the COMM port, where *n*=1, 2, 3, or 4. No default.

[Files]

- SmartMAU 16 Master DLC=*n*—Select the download code (DLC) revision number *n* for the SmartMAU protocol. No default.

[Modem]

CAUTION

The following Modem parameters are listed for reference only. They must not be changed through the VMUTIL.INI file. Change these modem parameters using the menu options from within the SmartMAU Utility Software program.

BUSY

Dial

Answer

Reset

Hangup

Attention

Connect

InitString

HighestBaud

ModemName

ModemNumber

When you finish editing, save your changes to the VMUTIL.INI file and exit from the text editor. The next time the SmartMAU Utility Software program is started, the new configuration parameters will be in effect.

6.0 Troubleshooting

The SmartMAU 16s are designed for ease of use. By using the following guide, you can quickly isolate and correct most problems.

- **Power LED is off**—AC power is not connected or there is a blown fuse. Connect power cord or check fuse.
- **OK LED is off or on solid**—Internal CPU has stopped. Power cycle the unit. If symptom remains, replace unit.
- **OK LED blinks red**—Internal hardware failure. Wait 1 minute until unit resets and re-tests. If symptom remains, replace unit.
- **Blinking red lobe port LED**—
 - a) Station trying to connect at the wrong speed. Set the station's adapter card to the correct speed.
 - b) MAU is set for wrong speed. Change the speed setting on the MAU (switch 1).
- **Lobe-port LED will not light**—
 - a) Lobe cable not connected properly. Check all connections between the MAU and the station.
 - b) Station not inserted.
 - c) Station's adapter drivers not properly loaded. Check the station's drivers.
- **Blinking red RI or RO port LED**—The MAU and ring have different speed settings. Change the speed setting of the MAU or the stations on the ring.
- **Solid red port status LED**—The port has been disabled by network management. Use SmartMAU Utility Software to enable the port or cycle power.
- **RI port LED fails to illuminate when a cable is connected**—There are no active stations on ring segments. Bring up a workstation on the ring.
- **Blinking red RI port LED when connected to a valid speed ring segment**—When connecting the cable, the RI failed the initial speed test. Wait 20 seconds for RI to re-test for valid speed.
- **RO LED is solid green with no cable connected, causing ring to crash.** RO auto loopback is disabled and the cable has been removed. Re-connect the cable or enable auto loopback on the RO port.

Appendix A: Connectors and Cables

A.1 Connectors

The SmartMAU 16 Type 3 has two RI/RO RJ-45 female connectors and 16 shielded female RJ-45 lobe connectors. The SmartMAU 16 DC has two front-panel RI/RO shielded data connectors, one front-panel shielded RI DB9 connector, and 16 shielded lobe data connectors.

Both models have two rear-panel RJ-45 connectors that allow the units to be managed by the SmartMAU Utility Software, as explained in **Section 5**. The rear-panel RJ-45 IN connector is RS-232/422; the rear-panel RJ-45 OUT connector is RS-422 only. The following paragraphs describe the different connectors.

RJ-45 Ring In, Ring Out, and Lobe Connectors

Figure A-1 shows the pinouts of the RI RJ-45 connectors. Pins 3 and 6 transmit token ring data and pins 4 and 5 receive. Pins 1 and 8 are for serial communications to an MAU controller when the SmartMAU 16 is used as a satellite MAU.

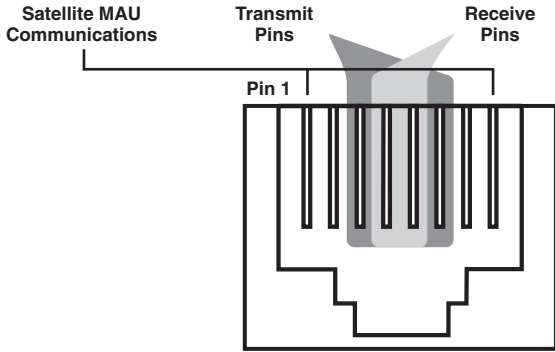


Fig. A-1. Ring In RJ-45 Connector Pinouts.

Figure A-2 shows the pinouts of the RO and lobe RJ-45 connectors. Pins 3 and 6 receive token ring data, and pins 4 and 5 transmit.

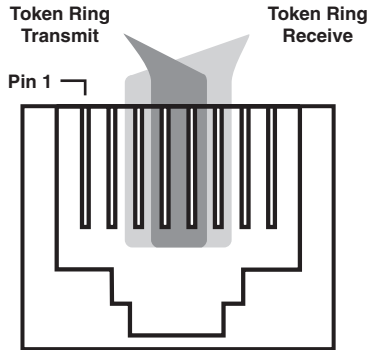


Fig. A-2. Ring Out and Lobe RJ-45 Connector Pinouts.

DC Ring In, Ring Out, and Lobe Connectors

The SmartMAU 16 DC has two Ring In connectors. One RI connector is a DB9, and the other is a data connector. The 4-pin RI data connector allows the SmartMAU 16 DC to be used only as a conventional MAU, because it does not provide the additional two pins for satellite MAU communications. However, to use the SmartMAU 16 DC as an intelligent MAU, connect to the front-panel DB9 Ring In connector, which supports the Satellite MAU communications. (See the following section for the front-panel Ring In DB9 connector pinouts.)

Figure A-3 shows the RI, RO, and lobe data connector pinouts.

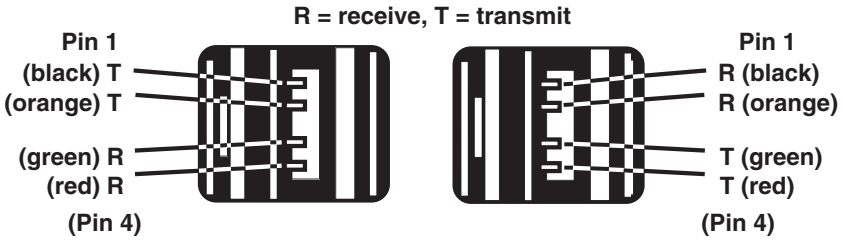


Fig. A-3. RI, RO, and Lobe Data Connector Pinouts.

NOTE

Do not connect cables to both the front-panel DC and DB9 Ring In connectors at the same time.

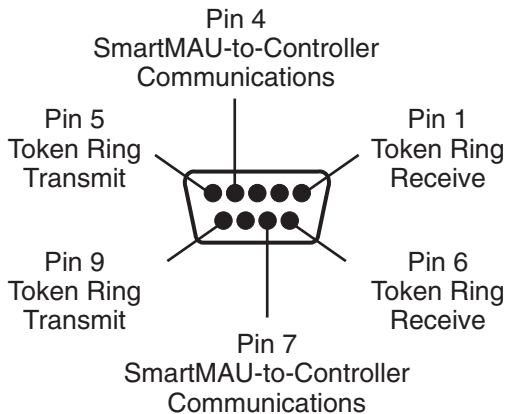
DB9 Ring In Connector

As mentioned in the previous section, the SmartMAU16 DC provides two front-panel Ring In connectors. The DB9 RI connector allows the SmartMAU 16 to communicate as an intelligent Satellite MAU. Use the front-panel DB9 RI connector to operate the MAU in an intelligent configuration. The front-panel RI data connector allows the SmartMAU 16 to be used only in a conventional configuration.

Figure A-4 shows the front-panel DB9 Ring In connector pinouts.

NOTE

Do not connect cables to both the front-panel DC and DB9 Ring In connectors at the same time.



Note: Pins 2 and 8 are jumpered

Fig. A-4. Front-Panel DB9 Ring In Connector Pinouts.

Rear Panel RJ-45 Connectors

The two rear-panel RJ-45 connectors allow the units to be managed out-of-band by the SmartMAU Utility software. The two connectors are labeled IN and OUT. The rear panel RJ-45 IN connector is RS-232/422; the rear panel RJ-45 OUT connector is RS-422 only. The pinouts for the connectors appear in **Fig. A-5**. **Section 4.4** explains how to connect cables to the connectors.

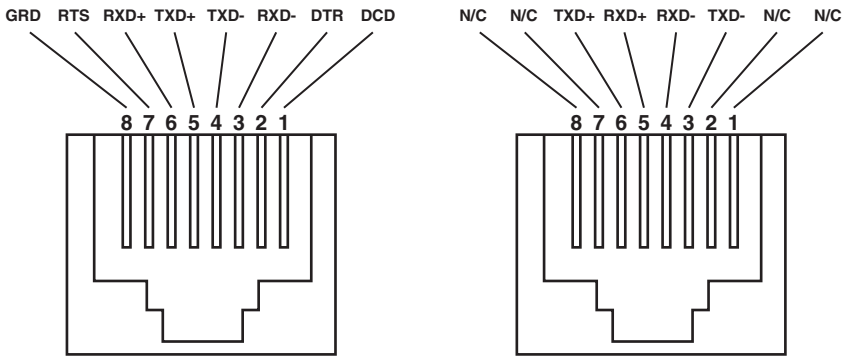


Fig. A-5. Rear-Panel RJ-45 Connector Pinouts.

SMART MAU 16 DC AND SMARTMAU 16 TYPE 3

If the PC on which the SmartMAU Utility software will run is equipped with a serial-port DB9 connector, the Out-of-Band PC Serial Port Adapter must be used to connect the PC to the rear-panel RJ-45 IN connector. Figure A-6 provides the internal wiring scheme of that adapter.

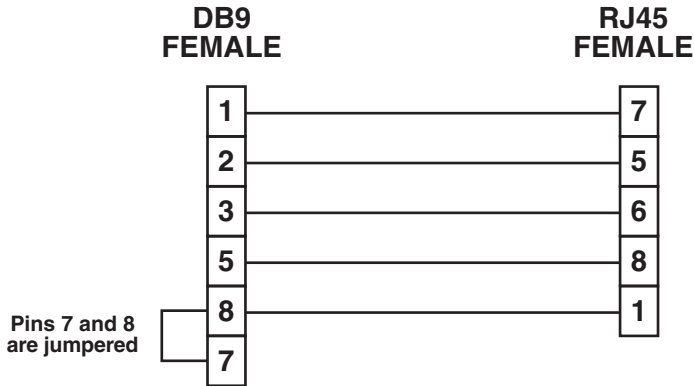


Fig. A-6. SmartMAU Out-of-Band PC Serial Port Adapter's Internal Wiring Scheme.

A.2 Cables

Type 3 and Category 5 Cable. The cables that attach to the SmartMAU 16's RJ-45 connectors must be either Type 3 (levels 3 and 4) or Category 5. In general, this UTP cable is the same as the standard twisted-pair telephone building wire. The recommended gauge is 24 or 22 AWG Belden 9562 for Type 3, and 24 or 22 AWG AT&T® 1061 or 2061 for Category 5, or the equivalent. The following requirements should be met: solid copper twisted pairs, with at least two twists per foot.

- A maximum DC resistance of 28.6 ohms per 1000 feet for Type 3 level 3 and Category 5, and 27 ohms per 1000 feet for Type 3 level 4.
- Characteristic impedance for Type 3 level 3 and Category 5:
 - 90 to 120 ohms at 256 KHz
 - 87 to 117.5 ohms at 512 KHz
 - 85 to 114 ohms at 772 KHz
 - 84 to 113 ohms at 1000 KHz.
- Characteristic impedance for Type 3 level 4 is 100 ohms at 1 to 16 MHz.
- Maximum attenuation per 1000 feet for Type 3 level 3:
 - 4 dB at 256 KHz
 - 5.66 dB at 512 KHz
 - 6.73 dB at 772 KHz
 - 8 dB at 1000 KHz.
- Maximum attenuation per 1000 feet for Type 3 level 4:
 - 5 dB at 1 MHz
 - 2 = 22 dB at 16 MHz.
- Maximum attenuation per 1000 feet for Category 5:
 - 6 dB at 1 MHz
 - 12 dB at 4 MHz
 - 20 dB at 10 MHz
 - 25 dB at 16 MHz.

NOTE

Do not use commonly available consumer telephone cable, sometimes called flat cable or silver satin. This type of cable will prevent reliable network performance and can drastically reduce the cable lengths possible in your network.

Electrical Interference

Because both Type 3 and Category 5 cables are unshielded, care must be taken to avoid areas of electrical disturbance. Some examples of sources of electrical disturbance are:

- Fluorescent lights
- Power cables
- Electric motors
- Radio transmitters

The RJ-45 connector Type 3 cable used with your SmartMAU 16 must have two twisted pairs of wire for the token ring data. The cable must be wired straight through, as shown in Fig. A-7. Do not mix transmit and receive wires in the same twisted pair of wires; **Fig. A-7** shows how to avoid this.

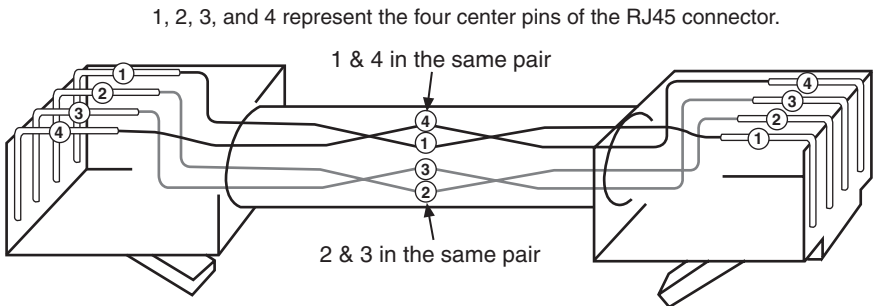


Fig. A-7. Straight-Through Wiring.

Type 1 and Type 2 Cable. Standard non-plenum and plenum IBM® Type 1 and 2 cables should be used to attach to the SmartMAU 16 front panel DB9 Ring In connector. Recommended wire gauge is 22 AWG. The following requirements should be met:

- Solid copper in two pairs.
- A maximum DC resistance of 17.4 ohms per 1000 feet.
- Characteristic impedance of 150 ohms at 3 to 20 MHz.
- Maximum attenuation per 1000 feet:
 - 7 dB at 4 MHz.
 - 14 dB at 16 MHz.
- Maximum continuous current per conductor at 2.3 amp.
- UL® specification:
 - UL® Type CM (non-plenum).
 - UL® Type CMP (plenum).
- Beldfoil shield type at 100% coverage.

Appendix B: Rack-Mounted Equipment Safety Guidelines

This device is designed to be operated as either a table-top or a rack-mounted unit. If this device is to be placed in a rack, be sure to take the following precautions before operating the equipment.

- If the device is placed in a closed or multi-unit rack assembly, the operating temperature of the rack environment may be greater than room temperature. Be sure not to operate the device in an area that exceeds the following maximum ambient ranges:

Operating temperature: 32° to 122° F (0° to 47° C).

Relative humidity: 0% to 90% (non-condensing)

- Rack-mounted equipment is cooled by air flow. Some devices are equipped with a chassis ventilation fan while other devices allow heat to escape through chassis vents. Never restrict the air flow through the device's fans or vents.
- When installing equipment in a rack, distribute the units evenly. Otherwise, hazardous conditions are created by an uneven weight distribution.
- Connect the equipment only to a properly rated power supply circuit. Each device has electrical ratings listed on its rear panel that must not be exceeded. Connection of the equipment to an under- or over-rated power supply circuit may cause damage to the equipment's overcurrent protection circuitry or to the supply wiring.
- Reliable earthing (grounding) of rack-mounted equipment should be maintained. If the equipment is indirectly connected to the branch (for example, the use of power strips), all connections must accommodate three-prong plugs that are properly grounded.

Appendix C: Beacon and Soft Error Types and Definitions

This appendix describes the various Media Access Control (MAC) errors that can occur from a PC station on a token ring network.

In the descriptions below, the term “Nearest Active Upstream Neighbor,” or NAUN, is used. In a token ring network, data flows only in one direction. NAUN defines the last active station on the token ring to receive the network data and transmit it to the error-reporting station. The sequential lobe-to-lobe data flow in MAUs is from lobe port 1 to lobe port 8 or 16 (depending on the MAU model). Therefore, if the reporting station is attached to lobe port 5, and lobe port 4’s station is inactive, but lobe port 3’s station is active, the NAUN to lobe port 5 is lobe port 3.

Also, some of the following descriptions recommend that you check the station’s token ring adapter card. The most convenient method to do so is to swap the station’s adapter card with a known working one. Inspecting a reporting station’s cabling involves checking for broken or cold solder connections at the connectors and broken wires in the cable.

C.1 Beacon Types and Definitions

The following paragraphs describe the four beacon types and their implications.

- Type 1: Set Recovery Mode (highest)

This beacon type essentially means that the adapter card recognizes that something is wrong with it and that it is no longer capable of forwarding frames. (T.I. token ring adapter chip sets do not produce this type of beacon.)

- Type 2: Signal Loss

The beaconing adapter card detects no incoming signal. It implies that the wire is broken somewhere between the beaconing station and its NAUN.

- Type 3: Bit Streaming

The beaconing adapter card detects some type of signal coming in, but cannot recognize any data. This implies a signal degradation because of incorrect wiring specifications.

- Type 4: Contention Streaming (lowest)

The beaconing adapter card detects a signal and an occasional Claim Token MAC, but does not receive quite enough to get the ring started. This indicates a marginal ring which will likely recover from this situation. It is an indicator that the ring is not quite stable, but will likely run for a while.

C.2 Soft Error Types and Definitions

- **MAC Abort.** This error is caused by an internal error in a PC station or from a corrupted token on the ring. It can also be caused by stations inserting onto or removing from the ring. If no stations are inserting/removing, check the cabling between the reporting station and the NAUN, and then check the reporting station's adapter card.
- **MAC AC.** The most probable cause of this error is noise on the line. Check the cabling between the reporting station and the NAUN.
- **MAC Burst.** When a PC station inserts onto or removes from the ring, the relay on the adapter card causes a "burst" on the ring when the relay opens or closes. MAC bursts represent a problem when there are no station ring insertions or removals. Check the adapter cards in the reporting station and the NAUN. Cabling between the two stations may also be faulty.
- **MAC Congestion.** The most probable causes of this error is that the reporting station does not have enough buffer space to receive data or it does not have its drivers properly installed. Occasional MAC Congestion errors from PC stations are not serious. However, if a server, a router, or a bridge is the reporting device, it should have its buffer size increased to improve overall network throughput and performance.
- **MAC Copied.** This error occurs when duplicate device MAC addresses are detected on the ring. This condition should be corrected immediately. It occurs only when duplicate locally-administered addresses, or names, have been assigned to two or more devices or stations on the network (for example, two PCs named "John's PC"). This condition will not occur if all of the devices on the token ring network are using their IEEE globally-administered MAC addresses.
- **MAC Error.** When a station detects an invalid character in a frame or token, it transmits this error. This condition can be caused by stations inserting onto or removing from the ring, network line noise, faulty cabling at the reporting station, or a faulty adapter card inside the reporting station.

- **MAC Frequency.** This error occurs when a station receives data signals of the wrong frequency. This condition should be corrected immediately by replacing the adapter card in the reporting station or in the NAUN.
- **MAC Lost Frame.** A lost-frame error occurs when a station transmits on the ring and its token is returned with a missing frame. Lost frames can be caused by stations inserting onto or removing from the ring, or by faulty cabling at the reporting station. Network line noise or a faulty adapter card inside the reporting station can also cause this error.
- **MAC Internal.** A station transmits this error when it detects a recoverable internal error condition. If this error occurs, replace the reporting station's adapter card.
- **MAC Token.** This error is caused when a station detects that a token has been lost from the ring. This condition can be caused by stations inserting onto or removing from the ring, network line noise, faulty cabling at the reporting station, or a faulty adapter card inside the reporting station.



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