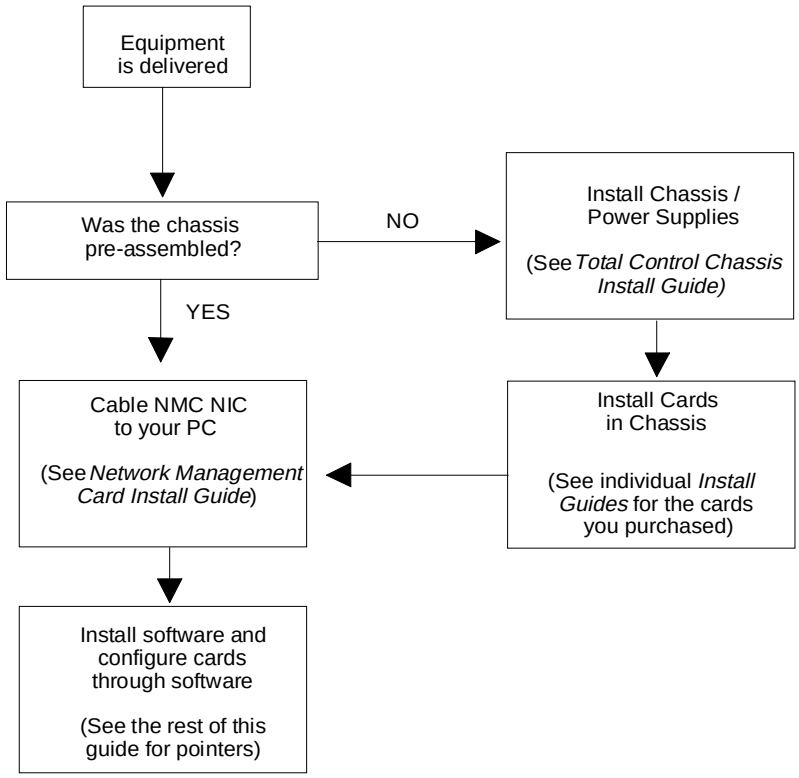
TOTAL CONTROL™

Total Control Manager/ SNMP for Windows

Version 4.0

INSTALLATION/CONFIGURATION ROADMAP



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Understanding the Network Management Card (NMC)

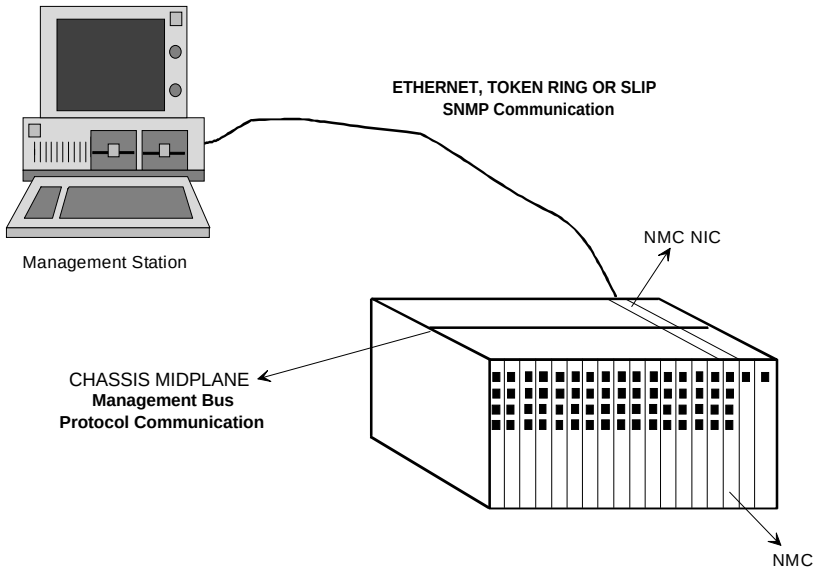

Figure 1. Chassis Management

The Network Management Card (NMC) manages all of the cards in the Total Control chassis. Commands are sent to the NMC from the PC running the console software (referred to as the Management Station). Two protocols are used to implement these management functions: one between the NMC and the Management Station, and a second between the NMC and the managed devices.

SNMP Communication

The NMC communicates to the Management Station (MS) by way of the Simple Network Management Protocol (SNMP). Since the individual Network Application Cards (NACs) in the chassis are not necessarily running SNMP agent software directly, the NMC performs as a proxy agent. This means that the NMC receives requests from the MS that are articulated using MIBs (Management Information Bases) that have been defined for each card in the chassis. The NMC then carries out the requests and obtains results using a proprietary U.S. Robotics protocol, and returns the results to the MS, again using SNMP. Standard SNMP traps can be enabled to send a trap message (or event notification) to one or more Management Stations. The Management Station uses these traps to create logs and trigger alarms. (See *Setting Traps* later on.)

Management Bus Protocol Communication

The NMC communicates to each of the installed cards using the U.S. Robotics proprietary Management Bus Protocol (MBP). The NMC provides configuration management for each of the Network Application Cards (NACs) in the chassis, which means it has the ability to set each of the parameters for a NAC to desired values. This includes a feature to allow automatic configuration of those parameters to predetermined values upon insertion of the NAC into the chassis. (See *Saving Configurations* later on.) As an aid to configuration management, the NMC can also query the current value of the parameters for each NAC, and download software for upgrades.

NMC IP Addresses

In order for *Total Control Manager/SNMP* to establish a connection with the NMC and discover the configuration of the chassis, you must enter an IP address in the software to identify the NMC. Default addresses are assigned to both the LAN (192.77.203.193) and WAN (192.77.203.65) ports on the NMC NIC. Although these defaults can be used for initial connection, we strongly suggest that these addresses be changed during your first session to match your local internetworking scheme. NMC IP addresses can be changed from either the local RS-232 User Interface or the management software. See the *Network Management Card Reference Manual* or the *Total Control Manager/SNMP Software Guide* for more information.

Ordering a T1 Line

The following are some features you should keep in mind when ordering a T1 line from the telephone company (TELCO).

T1 Service Type

You must order a switched (channelized) T1 service. With a switched service, each DS0 of the T1 span line carries the digital representation of an analog phone line.

Trunk Types / Start Supervision

Loop Start, Ground Start, and E&M trunk types are supported. Loop Start and Ground Start trunk types use the Dial Tone start method, and use only DTMF signaling.

> **NOTE:** Loop Start and Ground Start are supported only by Quad V.34 modems.

E&M trunks use either Wink Start or Immediate Start methods, and can use either MF (Multi-Frequency) or DTMF (Dual Tone Multi-Frequency) signaling.

The following table indicates the T1 line provisioning options that are currently supported.

Table 1. Supported Provisioning Options

Trunk Type	Start Method	Tone Signaling
E&M	Wink or Immediate	MF or DTMF
Loop Start	Dial Tone	DTMF
Ground Start	Dial Tone	DTMF

Because Loop Start and Ground Start trunks require DTMF signaling, they do not support receiving any address information (DNIS or ANI) that may be sent by the telephone company Central Office on dial-in calls. To remedy this, additional parameters must be set for the modem.

E&M Type II Signaling

E&M (Ear and Mouth) is the traditional type of TELCO call signaling for an analog call. It specifies the wires that provide the signaling paths between the TELCO and the customer's equipment. E&M Type II

signaling defines how the TELCO modulates the A andB signaling bits to convey call set-up and tear-down information.

Wink Start / Immediate Start

A wink is the transition from on hook to off hook, and back to the on hook state. The use of Wink Start Supervision avoids *glare*. Glare occurs when there is a simultaneous seizure on both ends of a two-way trunk.

With Immediate Start trunks, no wink is returned in response to trunk seizure. This leads to slightly faster call setup. However, since no trunk integrity checking is performed, Immediate Start is recommended only when Customer Premises Equipment (CPE) does not support Wink Start.

Loop Start

Loop Start was originally developed on analog lines, then converted to digital lines. It is the most common line type available, and is used in most residential lines to provide supervisory and start signals. In an analog Loop Start trunk, there are two conductors: tip and ring. All signaling involves current flow through these two conductors, which forms a current loop with the network. Once the network detects current flow in the loop, it sends a dial tone as a start signal.

Loop Start is translated to the digital T1 carrier by using the A and B signaling bits. The transmitted bits tell the network whether the loop is open or closed.

NOTE: Loop Start lines are very susceptible to glare. They should only be used as one-way lines (either dial-in or dial-out).

Ground Start

Ground Start is a little more robust than Loop Start. It was also originally developed for analog lines and converted to digital. Ground Start trunks have the most complex signaling protocol of the trunks supported. The A and B signaling bits on the T1 line are used to mimic the tip and ground connectors in the analog world. Ground Start trunks are often preferred to Loop Start trunks because the network provides additional signals for alerting, starting and ringing.

Like a Loop Start line, Ground Start lines use both a ring and a tip conductor. However, the network can not only detect current flow through the ring and the tip, but also detect whether the tip or the ring has been grounded. This configuration allows Ground Start lines to convey more signaling information over the line. It also makes Ground Start supervision somewhat of a complex protocol.

Total Control performs Ground Start in the digital world by mimicking analog signals. The T1 Card uses the A and B signaling bits to send a busy-out pattern (0,0) to the TELCO. We believe that this busy-out

signaling pattern is appropriate for the majority of cases. However, not all Regional Bell Operating Company switches treat this pattern in the same manner. If your installation experiences any difficulty with this feature, contact U.S. Robotics Technical Support at (800) 231-8770, and we will work with you to find an appropriate solution.

NOTE: USR Ground Start and Loop Start support Station signaling only, not Office signaling.

Tone Signaling (Dialed Digits)

The T1 Card supports DNIS and ANI digits sent using standard Multi-Frequency (MF) tones. MF signaling provides 15 two-frequency combinations. MF signaling supports KP (Key Pulse) and ST (Stop) control signals, which facilitate the transmission of ANI and DNIS digits by indicating when the transmission of an ANI or DNIS number begins and ends. The modem decodes the MF tones and then acts on any ANI or DNIS digits embedded in the signaling.

DTMF Signaling

The T1 Card also supports Dual-Tone Multi-Frequency (DTMF) tones when operating with a properly configured compatible modem. DTMF signaling is the same as Touch Tone; it uses 12 distinct signals over the voice path to provide addressing information (0–9, *, #). This addressing method is slightly more limited than is possible with MF signaling, but is required for Loop Start and Ground Start trunk types.

Direct Inward Dialing (DID)

Direct Inward Dialing allows direct access to a PBX line from a line outside of the PBX. It requires the telephone company Central Office to transmit the address of the station being dialed (usually four digits).

On PBXs, when a DID call comes in it is routed to a PBX station corresponding to the number dialed. The T1 Card always routes the dial-in call to the Quad Modem assigned to the DS0 the call came in on. A user can assign any DS0 to any Quad Modem.

Most DID trunks are E&M trunk types, and use Wink Start with DTMF signaling. The Quad Modems support DTMF tones to enable this feature, and E&M and Wink Start can be selected as Call Parameter Configuration parameters for the T1 Card.

Answer Supervision

On receipt of the M-Lead Wink from the T1 Card, the TELCO begins sending *Multi-Frequency (MF) Tones*, which represent the dialed phone number. Once the T1 Card receives the MF Tones, it answers the call by going off hook (*M-Lead Off hook*).

Frame Type

The Super Frame (SF) format, also known as D4 framing, has 12 DS1 frames, each with 193 bit positions. The first bit is the frame overhead-bit position, which is used for frame and signaling phase alignment.

The Extended Super Frame (ESF) format has 24 DS1 frames: the ESF alignment signal and a Cyclic Redundancy Check (CRC) share the frame overhead-bit position.

Line Coding

A line coding scheme ensures a sufficient density of 1's in the bit stream, required by the T1 standard for clock synchronization. The T1 software supports Alternate Mark Inversion (AMI), Zero Code Suppression (ZCS), or Binary 8 Zero Substitution (B8ZS).

Feature Group B DNIS Support

The T1 Card can make use of the Feature Group B (FGB) DNIS (Dialed Number Identification Service) feature, which is offered by most TELCOs. The FGB DNIS requires a telephone number exchange of 950; the other four digits in the number can be linked with configuration information for a modem. At the beginning of an incoming call, if DNIS is enabled, the TELCO provides the phone number that was dialed. The Quad Modem cards can use this information to provide a specific configuration, or to route the call to a specific Gateway card. If your dial-up application could benefit from the use of DNIS numbers, order this service from the TELCO and select DNIS for the Dial-In Address.

Feature Group D ANI and DNIS Support

Feature Group D (FGD) supports an expanded DNIS feature, in which all seven digits of a phone number (or ten, including the area code) can be linked with configuration information. It also supports ANI (Automatic Number Identification), which identifies the calling number and uses it in a similar way. With FGD, you can select either DNIS, ANI, or ANI-DNIS for the Dial-In Address parameter.

CSU Interface

The T1 NIC's CSU interface supports a DS1 signal. This interface can recover T1 signals through a 6000 foot cable.

RECOMMENDED: Connect the T1 NIC's interface directly to the TELCO's Smart Jack interface.

Installing the Software

System Requirements

Hardware

The minimum hardware configuration **required** to run *Total Control Manager/SNMP* software is as follows:

- 80486-based IBM PC / AT or compatible, 33MHz
- 16 Mbytes RAM
- VGA graphics adapter and monitor
- 3.5-inch, 1.44-Mbyte floppy drive
- Mouse supported by Windows 3.1
- 40-Mbyte hard drive with 20 Mbytes free
- Serial communication adapter card with 16550 UART (required for port speeds above 19.2K bps)

The following is **recommended**:

- Dedicate one PC as your Management Station, and a different PC as your Security / Accounting server
- 80486-based IBM PC or compatible, 66MHz
- Super VGA graphics adapter and monitor
- Resolution setting of 800x600 with 256 colors

> **NOTE**: As with all other Windows programs, lower screen resolutions and certain screen fonts may slightly alter the appearance of the *Total Control Manager/SNMP* window, but the menu items remain completely functional.

- 120-Mbyte hard drive with 60 Mbytes free
- 16-bit Network Adapter (Token Ring only)
- RS-232 Serial Communications Port with 16550 UART

Software

The following software components are **required** to run the *Total Control Manager/SNMP* software:

- DOS 5.0 or higher
- Windows 3.1

> **NOTE:** *Total Control Manager/SNMP* is not supported by Windows NT and Windows 4.0.

- The Novell NetWare Management System (NMS) SNMP host software.

> **NOTE:** U.S. Robotics provides NMS 1.15B along with the TCM software and does not guarantee operation with any other version of NMS.

- ODI Device Driver

Preliminary Steps

Be prepared with the following information:

- The IP address for your workstation
- The IP subnet mask
- The IP address (default gateway) of an IP router (if any)
- The location of the NET.CFG file on your PC (if one exists)
- The type of network adapter installed in your system (if any)

DOS Preparation

1. The DOS program SHARE.EXE must be running on the PC that you intend to use as your management station. Either add it to your AUTOEXEC.BAT or type **SHARE** from the DOS prompt.
2. Start Windows.

Installing the NetWare Management System

1. Insert the NetWare Management System Setup disk in your Management Station's floppy drive and run **SETUP** from Windows.

2. You are initially prompted to indicate which NetWare components you want to install. Click on the box to include the NetWare Management Map *only*. Be sure that no other boxes are checked.

   NOTE: If you are connected to a NetWare server and are installing NMS for the first time, this prompt will also include four other installation options: TCP/IP, NetExplorer, NetExplorer Plus, and NetWare 3.11 SNMP update software. These four install options may appear with a checked box in front of them in the prompt window. Click on the boxes to remove the "X" before you proceed.

   If you leave these options checked, you will be prompted at the end of the installation for a Disk 5 that is not included with your software, and the installation will fail.

3. You are then prompted for network registration information. Enter the administrator name and company name.

4. If connected to a network, the next prompt is for the size of the network. Specify whether there are under 100 nodes, between 100 and 1000, or over 1000.

5. Continue the installation, replacing disks 1-4 in the floppy drive as requested.

6. After you insert disk 4, you are prompted for a Network Adapter name. Select the **Other** option at the bottom of the window. This is especially important if you intend to make a SLIP connection between the PC and the chassis.

7. The Install program then asks for the location of certain network files. You do not need to complete this information. Click on the **OK** button at the bottom of the window.

8. The Install program may encounter incompatible network files. Click on **OK** to continue past these messages.

9 You are prompted to select a time zone, and to indicate whether or not daylight savings time is in effect.

10 The Install program asks to modify your system files (SHELL.CFG, CONFIG.SYS, AUTOEXEC.BAT, SYSTEM.INI, and WIN.INI). Confirm these changes as you are prompted.

11 You are then prompted for a server name. Leave the field blank and click on **OK**.

12 The Install program then prompts for Disk 4. This disk should already be in the floppy drive. However, a bug in the Install program proposes the directory name where the files are being installed instead of the floppy drive name. Delete the directory name and replace it with the floppy drive name where the disk is loaded, then press Enter.

This completes the Novell portion of the Install. Review the Novell readme file, then close it to proceed with the USR installation.

Installing *Total Control Manager/SNMP*

IMPORTANT: Before starting the installation of the USR software, be sure that all NetWare Management Map (NMM) components are closed.

1 Insert the *Total Control Manager/SNMP* Setup Disk in your Management Station's floppy drive and run **SETUP** from Windows.

2 When prompted, insert the second disk.

3 A prompt will ask if you want to add the *TCM* program icons to the NMS program group. Click on **Yes**.

4 The Install program finishes and places *TCM* executable and readme icons in the NMS program group. Review the readme file.

5 Exit Windows, then restart it.

Installing Extra Options

U.S. Robotics offers some added-cost options that may be installed along with *Total Control Manager/SNMP*: Auto Response, Security, and Cellular options. These extra options consist of two upgrade components: one for the NMC and one for *TCM*.

NOTE: All NMCs built since the NMC 3.1 release are enabled at the factory for the Auto Response feature. If you have an NMC at release level 3.1 or higher and want only to enable Auto Response, the *TCM* upgrade is all you require.

- Each NMC that is intended to support the extra option must have the feature enabled on it. If you are installing a new NMC with an added cost feature, it should have been enabled for you at the factory. If you wish to upgrade an existing NMC, see instructions for this under *Feature Enable* in the *Total Control Manager/SNMP Software Guide*.
- Each installation of *TCM* must also be upgraded. After finishing the *TCM* installation, insert any disks for extra options and run **SETUP** to enable them.

  The Security feature requires Microsoft Open Database Connectivity (ODBC) software. A second disk is provided with this software.

Security ODBC Installation

The second disk that comes with the Security feature contains Microsoft Open Database Connectivity (ODBC) software needed to maintain the security database.

1. Insert the floppy into the drive and type ***drive*:\SETUP** (substituting the letter of the drive). The ODBC Setup utility title screen appears.
2. Click on **Continue**. The Install Drivers window appears.

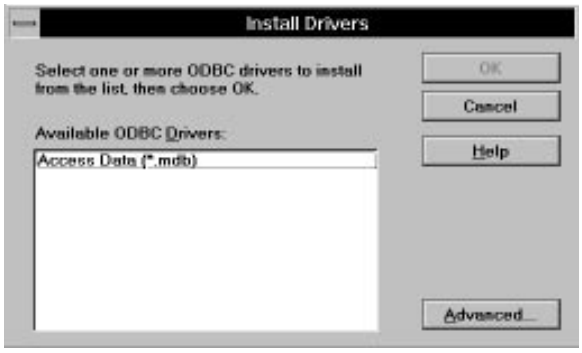

Figure 2. Install Drivers Window

As shown in the figure, there should be only one option in the list of Available ODBC Drivers: Access Data (*.mdb).

3. Select the **Access Data** option from the list of Available ODBC Drivers and click on **OK**. Files are copied to your \windows\system directory. Then the Data Sources window appears.

4. Click on **Add**. From the list of Installed OBDC Drivers, select the **Access Data (*.mdb)** option, then click on **OK.** You are returned to the Data Sources window, and the Setup window appears.

5. Click on **Cancel**, then click on **Close** in the Data Sources window. The utility will report a successful installation.

Installation Adjustments

Removing Novell Prompts

NMS installation initializes WIN.INI so that certain messages appear each time you start Windows: a prompt to start NetExplorer Manager, and a NetWare error if you are not connected to a server. You do not need NetExplorer to run *TCM* and both messages may become irritating if they occur each time you start Windows. Follow these steps to turn them off.

1. Open WIN.INI and find the LOAD= statement.

2. Leaving intact the LOAD= portion of the statement, delete the filenames NMSCRON.EXE and NWPOPUP.EXE.

3. Restart Windows. The messages will no longer appear.

Editing SYSTEM.INI

There are two adjustments to be made to the SYSTEM.INI file.

Port Reinitialization

To prevent Windows from reinitializing COM ports used for SLIP connections, we recommend editing the SYSTEM.INI file. All references to COM ports in the [386Enh] section should be remarked out using a semicolon, as shown below:

```
[386ENH]
;COM1BASE=03F8
;COM1IRQ=4
;COM1AUTOASSIGN=2
```

NOTE: Do not access the Advanced Settings in the Windows 3.1 Control Panel Ports application. Exiting the window automatically adds COMxBase= and COMxIrq= lines back into your SYSTEM.INI.

Novell Server Connection

If you do not plan to connect to a Novell server, remark out the Network=VIPX.386 statement from the [386ENH] section of the SYSTEM.INI file.

Compiling MIBs/Integrating Alarms

TCM does not automatically compile the MIBs that have been added for each new release of software when you install. You must perform the following steps to compile the MIBs.

1. After upgrading the *TCM* software, download the new NMC software, either via the pcsdl command or through *TCM* procedure described in the *Software Download Summary* accompanying the disks.
2. Copy all the files on the second NMC diskette (Enterprise MIB Extensions) **except for CHS_TRAP.MIB** into C:\NMS\SNMPMIBS\ALLMIBS.
3. Review the USRMIBS.TXT file. This file contains descriptions of the MIBs provided by U.S. Robotics.
4. Copy only those MIBs you require into C:\NMS\SNMPMIBS\CURRENT.
5. Copy CHS_TRAP.MIB into C:\NMS\SNMPMIBS\TRAPMIBS.

6 Open the Novell NMS. From the Tools menu, select **SNMP MIB Compiler**. A warning box will indicate that all the MIBs in the C:\NMS\SNMPMIBS\CURRENT directory are about to be compiled. Click on **Yes** to continue. You will now be able to use the NMS MIB Browser.

7 When the compile is done, select **SNMP Alarm Integrator** from the Tools menu. Change to the C:\NMS\SNMPMIBS\TRAPMIBS directory.

8 Select **CHS_TRAP.MIB**, and click **OK**. A prompt appears asking if you want to continue. Click on **Yes**. After performing integration, a message appears indicating that the trap definitions were integrated successfully. The SNMP Alarm Integration window appears. Click on **Cancel**.

NOTE: There are a limited number of MIBs that can be compiled in NMS at one time. If you encounter an error when compiling MIBs, delete all but the necessary MIBs from the C:\NMS...CURRENT directory and try again.

Change Required for Accounting/Event Logging

The Accounting/Event Logging feature is based on RADIUS, a public domain client-server protocol. The NMC runs the RADIUS client and forwards customizable data to a server whose location you specify. To function correctly, you must register this feature as a TCP/IP Service after the automated installation is complete. Registration is not automatically performed during installation because you may already have a SERVICES file, and its location on a Management Station may vary.

- If you already have a TCP/IP SERVICES file, add the following line to the file:

  RADACCT 1646/UDP

  Exit Windows and reboot your computer so that your system recognizes the new TCP/IP service. Remember to reload your protocol stack before starting Windows.

- If you do *not* already have a SERVICES file, we have provided a sample for you to use: \NMS\BIN\NET\SERVICES.SMP.

  1. Create a directory to hold the TCP configuration files, such as C:\NET\TCP.

2. Using the name of the directory you created, add the following line to your NET.CFG file:

   PATH TCP_CFG c:\net\tcp

3. Copy \NMS\BIN\NET\SERVICES.SMP to your TCP directory, giving it the name SERVICES (no extension).

4. Exit Windows and reboot your computer so that your system recognizes the new TCP/IP service. Remember to reload your protocol stack before starting Windows.

Change Required for Security

Security also uses the RADIUS-based client-server structure to store data. As with the Accounting/Event Logging feature, you must register the Security server in the TCP/IP SERVICES file. Follow the steps in the previous procedure, adding the following line to the SERVICES file:

RADIUS 1645/UDP

The Security feature restricts access to the server to certain *Clients*, which are allowed to use the authentication services. These Clients may be set in the *Security Manager* application, and are typically USR NMCs and/or NETServers. You may specify an authorized set of Clients, by either specific IP address or common name, as follows:

- If you already have a TCP/IP HOSTS file, add the following line to the file, using values that you have specified in the *Security Manager*:

  [IP ADDRESS] [COMMON NAME]

  Ensure the HOSTS file includes all USR NMC and NETServer IP addresses, and associated Common Names, for all Clients that will be authorized to use the authentication service.

  Exit Windows and reboot your computer so that your system recognizes the new TCP/IP SERVICES and HOSTS files. Remember to reload your protocol stack before starting Windows.

- If you do *not* already have a HOSTS file, we have provided a sample for you to use: \NMS\BIN\NET\HOSTS.SMP.

  1. Create a directory to hold the TCP configuration files, such as C:\NET\TCP.

  2. Copy \NMS\BIN\NET\HOSTS.SMP to your TCP directory, giving it the name HOSTS (no extension).

  3. Edit the sample file to reflect your IP addresses and names.

  4. Exit Windows and reboot your computer so that your system recognizes the new TCP/IP SERVICES and HOSTS files. Remember to reload your protocol stack before starting Windows.

Software Installation Tips and Troubleshooting

Problem	You are prompted for disk 5 during installation and there is no disk 5.
Solution	During step 4 of the Install instructions you left an X in the check boxes for NetExplorer, NetExplorer Plus, and NetWare 3.11 SNMP. Follow the Uninstall procedure in the next section and then reinstall, making sure all X's have been removed from these boxes before proceeding.
Problem	After the NMS is installed successfully, the USR installation fails.
Solution	Be sure that all NetWare components are closed before proceeding with the USR installation.
Problem	There is no "NEW USR DEVICE" option within the NMS File Menu after installation.
Solution	SHARE was not loaded when you installed *Total Control Manager/SNMP*. Load SHARE and reinstall the software.
Problem	You receive an error message when entering Windows*:* **VTCPIP NO TCPIP PROTOCOLS LOADED**
Solution	Exit Windows and load the drivers per the examples provided in the *Loading Network Drivers* section of this guide.
Problem	You receive an NWPOPUP error on starting Windows.
Solution	Edit the WIN.INI file and remove the filename NWPOPUP.EXE from the LOAD= line.
Problem	VIPX error on starting Windows.
Solution	This is generated when the IPXODI driver is not loaded and you try to connect to a Novell server. If you do not plan on connecting to a Novell server, you can remove VIPX.386 from SYSTEM.INI.
Problem	You want to re-install NMS and TCM.
Solution	First, follow the Uninstall procedure described in the next section; then re-install NMS and TCM using the instructions in this guide.

Uninstalling NMS and TCM

You have several opportunities during software installation to abort. If you complete the installation, recognize a problem, and decide to start over, you should uninstall the software before attempting to re-install it.

1. During installation, you allowed the software to overwrite system files (SHELL.CFG, CONFIG.SYS, AUTOECEC.BAT, SYSTEM.INI, and WIN.INI). The system saved the old files with the file extension .NMS (SHELL.NMS, CONFIG.NMS, etc.). Rename the .NMS system files so they overwrite the files loaded by NMS (e.g., rename CONFIG.NMS as CONFIG.SYS, etc.).

2. Locate the NMS directory (C:\NMS\, unless you specified another location during the installation procedure).

3. Delete the NMS directory and all its contents.

4. Delete the NMS group from the Windows Program Manager.

5. Exit your Windows session.

6. At the C:\ prompt, type the following command to locate any remaining NMS files:

   DIR /S NMS <ENTER>

7. Delete any NMS files located.

8. Reboot your computer.

Customizing the NET.CFG File

In order for a PC to send management data to the NMC in the Total Control chassis, a NET.CFG file must be customized to load the TCP/IP stack and set link parameters for the PC port that will communicate with the chassis. This connection may be via direct cabling, over a LAN, or by remote connection through a modem.

When *Total Control Manager/SNMP* is installed, two sample NET.CFG files are placed into the C:\NMS\BIN\NET directory. These files provide a sample structure for setting SLIP_PPP, link support, and TCP/IP protocol parameters.

The sample SLIP_C1.CFG file is for a connection made through COM1 of the Management Station, and SLIP_C2.CFG shows a COM2 connection. You may use either one of these files as a model and edit your own NET.CFG file, customizing it for your IP addressing strategy.

Regardless of which method you plan to use for connecting to the chassis, follow these instructions for editing the file.

1. Under the Link Driver section, be sure to insert the correct Management Station port information (baud rate, port address, interrupt).

2. Under the Protocol TCPIP section, edit the IP address, subnet mask, and router address (if applicable) to reflect the addressing at your installation.

3. Rename the file to NET.CFG. Either leave the file in C:\NMS\BIN\NET, or move it to another \NET directory you have created on the PC.

   If you move the NET.CFG file to another directory, remember also to move all the other files that are located in the C:\NMS\BIN\NET directory along with NET.CFG.

Sample NET.CFG Files

SLIP_C1.CFG

```
Link Driver SLIP_PPP
        DIRECT          YES
        BAUD            9600
        OPEN            ACTIVE
        TCPIPCOMP       VJ
        PCOMP           YES
        ACCOMP          YES
        PORT            3F8
        INT             4
        FRAME           SLIP
Link Support
        Buffers 8 1500
        MemPool 4096
Protocol TCPIP
#       ip_router       192.77.203.?
        ip_netmask      255.255.255.0
        ip_address      192.77.203.66
        tcp_sockets     8
        udp_sockets     8
        raw_sockets     1
        nb_sessions     0
        nb_commands     0
        nb_adapter      0
        nb_domain
```

SLIP_C2.CFG

```
Link Driver SLIP_PPP
        DIRECT          YES
        BAUD            9600
        OPEN            ACTIVE
        TCPIPCOMP       VJ
        PCOMP           YES
        ACCOMP          YES
        PORT            2F8
        INT             3
        FRAME           SLIP
Link Support
        Buffers 8 1500
        MemPool 4096
Protocol TCPIP
#       ip_router       192.77.203.?
        ip_netmask      255.255.255.0
        ip_address      192.77.203.66
        tcp_sockets     8
        udp_sockets     8
        raw_sockets     1
        nb_sessions     0
        nb_commands     0
        nb_adapter      0
        nb_domain
```

Ethernet NET.CFG

The following is an example of a NET.CFG file set up for Ethernet. You will need to customize this according to your installation.

```
Link Driver     SMC8000
                FRAME           ETHERNET_II
Link Support
                Buffers 8 1500
                MemPool 4096
Preferred Server=[Server Name]
Protocol TCPIP
                ip_router       192.77.204.61
                ip_netmask      255.255.255.0
                ip_address      192.77.204.65
                tcp_sockets     8
                udp_sockets     8
                raw_sockets     1
                nb_sessions     0
                nb_commands     0
                nb_adapter      0
                nb_domain
```

Token Ring NET.CFG

The following is an example of a NET.CFG file set up for Token Ring. You will need to customize this according to your installation.

```
Link Driver     TOKEN
                PORT            A20
                FRAME           TOKEN-RING MSB
                FRAME           TOKEN-RING_SNAP
Link Support
                Buffers 8 4094
                MemPool 4096
Protocol TCPIP
#               ip_router       192.77.203.
                ip_netmask      255.255.255.192
                ip_address      192.77.203.21
                tcp_sockets     8
                udp_sockets     8
                raw_sockets     1
                nb_sessions     0
                nb_commands     0
                nb_adapter      0
                nb_domain
```

Loading Network Drivers

The appropriate network drivers must be loaded in the correct sequence in order for *Total Control Manager/SNMP* to send SNMP data to the chassis. TCP/IP may be loaded with either SLIP, Ethernet, or Token Ring drivers. These drivers can be loaded manually from the DOS prompt, by creating a batch file, or, more conveniently, through AUTOEXEC.BAT.

All drivers are provided in the C:\NMS\BIN\NET directory, with the exception of the Ethernet and Token Ring drivers. Be sure to copy these drivers to whichever \NET directory you use.

SLIP Connection Example

Drivers must be loaded in the following order for a SLIP connection:

LSL
SLIP_PPP
TCPIP
DOSDIALR

Ethernet Connection Example

Drivers must be loaded in the following order for an Ethernet connection:

LSL
SMC8000
IPXODI*
TCPIP
NETX*

* Only required on a Novell network.

Token Ring Connection Example

Drivers must be loaded in the following order for a Token Ring connection:

LSL
TOKEN.COM
IPXODI*
TCPIP
NETX*

* Only required on a Novell network.

Unloading Drivers

It may be convenient to create a batch file that will allow you to unload all the drivers. Drivers must be unloaded in the exact reverse order from how they were loaded. The command line switch "-u" can be used to unload the drivers. For example, to unload the drivers for a SLIP connection, you might create a batch file named KILLSLIP.BAT that reads as follows:

DOSDIALR -u
TCPIP -u
SLIP_PPP -u
LSL -u

Testing Connectivity

One of the first operations you will want to perform is to make sure that you are communicating with the NMC. This can be done in two ways: from the DOS prompt, or from the NMS software.

From DOS

Installation of the software places the file PING.EXE in C:\NMS\BIN\NET. Type the following command from the DOS prompt at that directory:

PING [IP ADDRESS]

You may also use the command line switch "-nX", where X indicates the number of times you want to repeat the operation. The following example pings the NMC at IP address 192.77.203.65 five times:

PING -n5 192.77.203.65

From NMS

1. Installation of the software creates an NMS Program Group in Windows. Open this group and double click on the **NetWare Management System** icon. The NMS screen appears.

2. From the Fault Menu, select the **Test Connectivity** option. The Connectivity Test window appears.

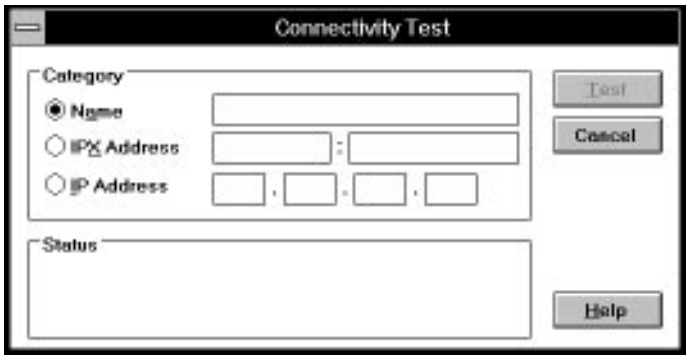

Figure 3. NMS Connectivity Test

3 Type in the IP Address that you have assigned to the NMC NIC port you are using.

4 Click on the **Test** button. This test is equivalent to performing a *ping* on a network device. If the software can communicate with the chassis, a confirmation message appears in the Status box.

Troubleshooting with the LEDs

If you do not receive a satisfactory response from either of the two ping methods, observe the LEDs on the NMC front panel. With a SLIP connection, you will need to observe the WAN RX and WAN TX LEDs; LAN connections will be reflected in the LAN RX and LAN TX LEDs.

No LEDs

- There may be a bad physical connection. Check the cabling, and make sure that the correct port is being used on the NMC (CH2 for SLIP, or a LAN port for Ethernet or Token Ring).
- The wrong PC COM port may be addressed physically, or specified incorrectly within the NET.CFG file. Check both the Port and the Interrupt specified in this file.
- If a network adapter card is being used, there may be a problem with the PC COM port addressing.

Only the RX LED Lights

- The ping may be reaching the NMC, but the wrong IP address is being used. Check that the IP address that you are typing is the one that is set within the NMC RS-232 User Interface. Unless you have already changed them, default addresses are assigned to both the LAN (192.77.203.193) and WAN (192.77.203.65) ports on the NMC NIC.
- The baud rate may be incompatible. Make sure that the baud rate specified in your NET.CFG file is the same as the rate set with the NMC DIP switches.

Switch	Factory Setting	Function		
3,4	OFF, OFF	NMC NIC Out-of-Band Management (WAN) Port Rate		
		DIP 3	**DIP 4**	**Selects**
		OFF	OFF	9600 bps
		OFF	ON	19200 bps
		ON	OFF	38400 bps
		ON	ON	57600 bps

- You may be trying to use a baud rate above 19.2 Kbps with a PC COM port that uses an 8250 UART. We recommend a 16550 UART for higher speed connections.

Loading Total Control Manager/SNMP

1. Load *TCM* from the NMS window by selecting **Total Control Manager** from the View menu.

2. From the File menu of *TCM*, select **New. . .**. The following window appears.

Figure 4. New Device Window

3. Assign a Device Name for the chassis. This name will identify the chassis in your management database.

4. Enter the IP address of the NMC NIC port (WAN or LAN) to which you are connecting. You should have set this address when you installed the NMC. If you set SNMP community strings when you installed the NMC, set them here to match.

5. If you are dialing into the chassis, click on the **Option** button to enter a phone number and set other Remote Communications options.

6. Click **OK** when you are satisfied with the information you have entered. The Virtual Front Panel Display (VFPD) of the chassis appears.

7 Once you have connected successfully to the chassis, select **Save** fron the File Menu. The device name and IP address are added to the NMS database.

The Virtual Front Panel Display Window

Once a device has been added to the network database, it can be opened from *TCM* by selecting **Open...** from the File menu. When you open a device, *TCM* discovers its configuration and opens the chassis display window, which contains an interactive graphic representation of the chassis you are connected with.

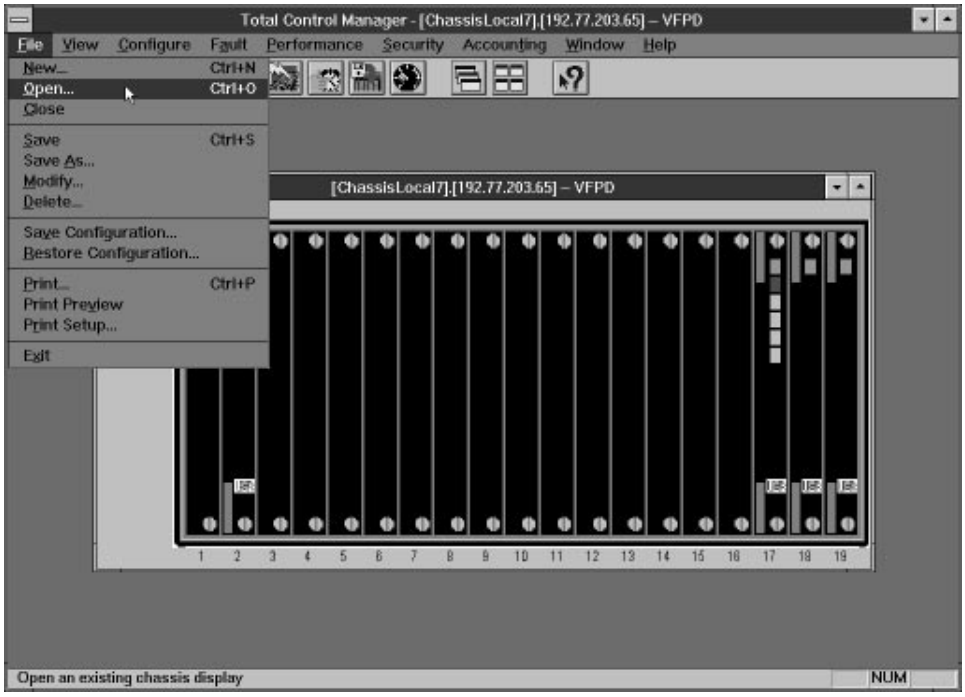

Figure 5. The VFPD Chassis Display Window

A separate Display window appears for each chassis that you open. However, only the active window displays updated LED information.

Selecting a Device

Before applying any kind of configuration change, you must first select the card(s) or channel(s) on which you want to take action.

The following graphic shows the "hot spots" on various cards for selecting individual channels, software entities, or the card as a whole.

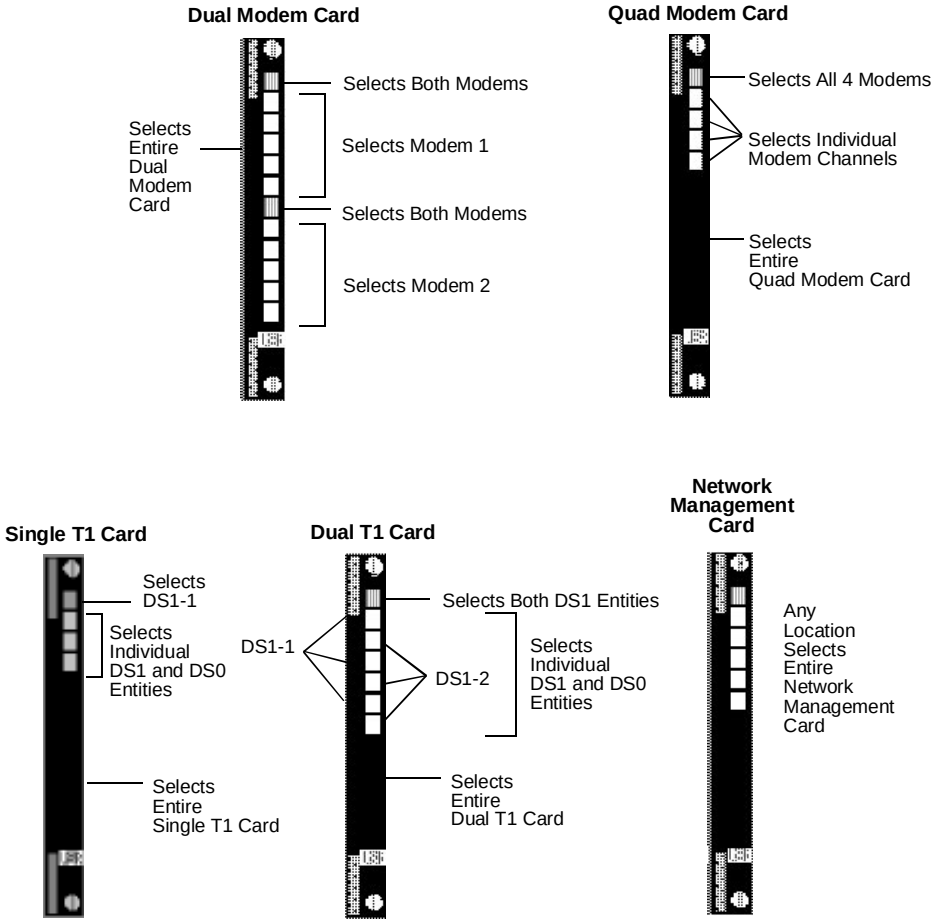

Figure 6. Hotspots

- To select a single channel on a card (for instance, one modem on a Quad Modem Card), click directly on the LED that represents the status of that channel with the left mouse button. The LED changes color to indicate that it has been selected.

- To select all channels on a card (for instance, all four modems on a Quad Modem Card), click with the left mouse button on the RN/FL LED (the top LED on all cards). All the LEDs change color to indicate that the channels are selected.
- To select an entire card, in order to perform an action on the card as a whole, click with the left mouse button anywhere on the black area of the card. The whole card (all the LEDs and the background in that slot) changes color.
- To select a range of objects across multiple cards, for example, Modem 2 on four adjacent Quad Modem Cards, hold down the CTRL button and click on each object with the left mouse button until you have selected all that you want to include.
- To select all objects of the same type as a currently selected object, choose the Select All option from the View Menu. For instance, if you currently have one channel of a Quad Modem Card selected and you then choose the Select All option, all modem channels in that chassis will be selected.

Using the Configuration Window

The Configuration window lets you set or query parameter settings for the card you selected from the Display window. Access the Configuration window by selecting a card or LED hotspot from the VFPD chassis display and choosing the **Programmed Settings** option from the Configure menu, or click on the Configuration icon, which shows a finger pointing at a chassis.

NOTE: Faults are also configured from this window. See *Setting Traps* later in this guide.

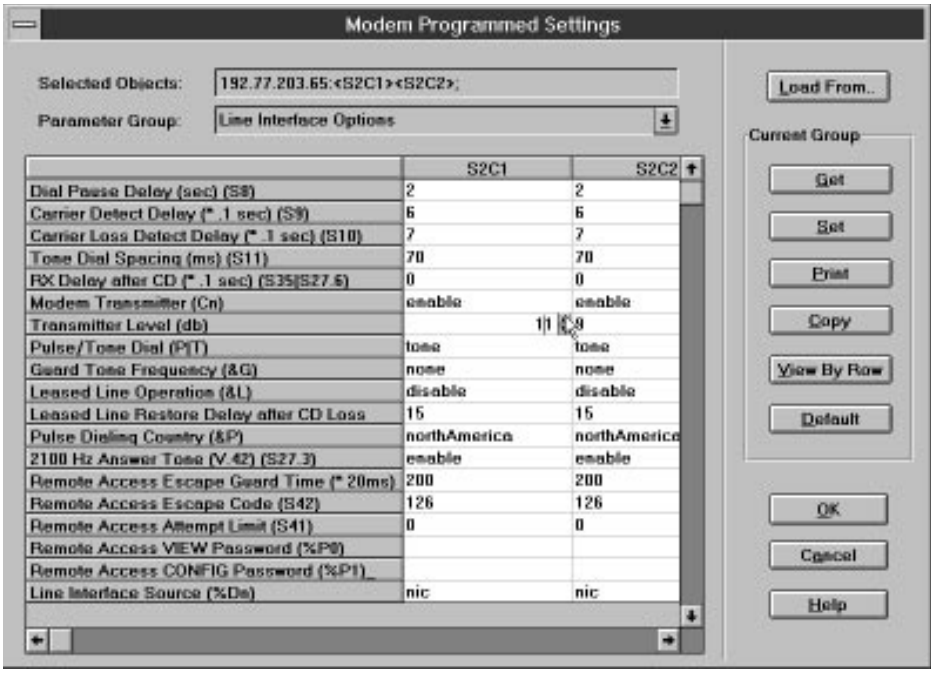

Figure 7. The Configuration Window

The Selected Objects box displays the IP address of the chassis you are configuring and the slot and channel of the card(s) you selected. A separate column for each card (the slot and channel number is displayed in the column heading) allows you to change or view settings.

Different parameter groups can be selected from the Parameter Group drop-down box. The *Total Control Manager/SNMP Software Guide* provides definitions for all the configurable parameters.

NOTE: The Configuration window is a new feature as of release 3.1. For more details on the Configuration window, see the *Total Control Manager/SNMP Software Guide* or click on the window's Help button.

Using the Commands Window

The Commands window lets you send commands such as *Software Reset* and *Store to NVRAM* to a any card in the chassis. The range of commands varies on the card.

Use the following steps to send a command to a modem or group of modems:

1. Select the modems to which you wish to send commands from the chassis display (see *Selecting Modems* at the beginning of this section).

2. Select the **Actions/Commands** option from the Configure menu, or click on the Action button on the toolbar (represented as a bolt of lightning striking a card).

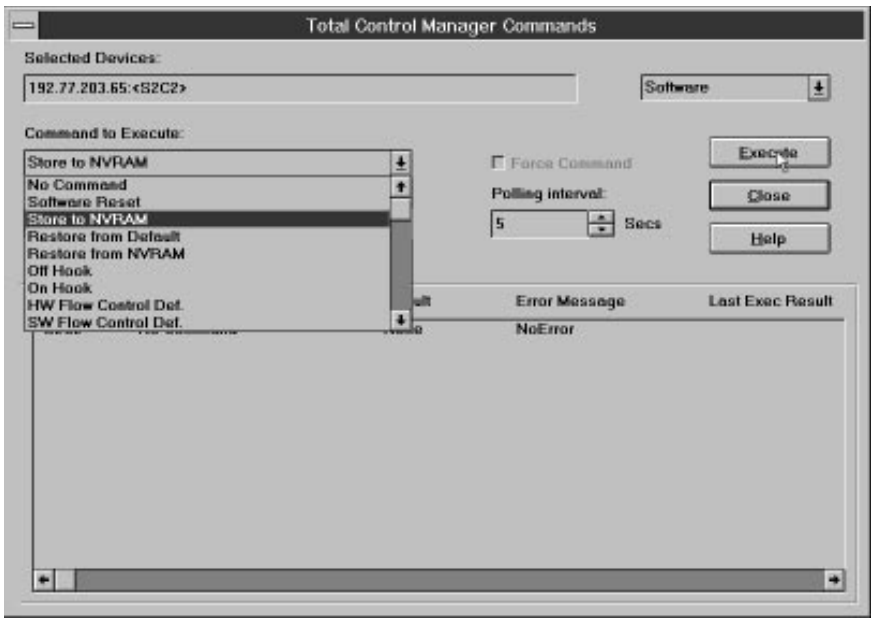

Figure 8. Total Control Manager Commands Window

3. Choose a command from the Command to Execute drop-down box. The Command Status window displays the selected device(s) that the command will be sent to. Click on the **Execute** button to send the commands to the device(s). Wait for the Last Exec Result field to return the Complete message and the Result field to return the Success message.

See *Commands* in the *Total Control Manager/SNMP Software Guide* for more detail on the Commands window.

Configuring Modems

Instead of sending AT commands to each modem, you can use *Total Control Manager/SNMP* to configure one, several, or all of the modems in a chassis. The following description outlines how to set a chassis full of modems to your desired settings.

Configure Modems with Desired Settings

1. Select *one* modem channel on the VFPD chassis display window. Bring up the Configuration window using the Configuration icon or by selecting **Programmed Settings** from the Configure menu. The modem identification information for that modem is displayed in worksheet form. *Note the slot and channel number displayed in the column heading* (for example, S1C1).
2. Configure the modem with the desired settings.
3. After the desired configuration is complete, click on the **Set** button. This loads the settings you selected from the Configuration window to the modem.
4. Exit the Configuration window by clicking **OK**. This returns you to the chassis display. The configured modem is still selected.
5. Select all the modems you wish to configure, using your left mouse button and the CTRL key. If you want to configure all modems in the chassis, choose the **Select All** option from the View Menu.
6. Bring up the Configuration window again. Click on the **Load From** button. Enter the slot and channel number of the modem you configured in step 2.
7. Click on **OK**. All the selected modems are programmed with the settings of the modem you configured, and you are returned to the Configuration window. All the modems you just configured should still be selected in the chassis display. Keep them selected for the next step.

8 *Optional.* Save configurations to NVRAM by executing the **Store to NVRAM** command from the Commands window (see *Using the Commands Window*). *If you do not complete this step, modems will return to NVRAM defaults on power-on or reset.*

Return the Modems to Default Values

1 Select one modem channel from the VFPD chassis display window.

2 From the View menu, choose **Select All**.

3 Either select **Actions/Commands** from the Configure Menu, or click on the **Action** icon in the Toolbar (represented as a bolt of lightening striking a card). The Total Control Manager Commands window appears.

Figure 9. Commands Window

4 In the Command to Execute field, select the Command option **Restore to Default**.

5 Click on the **Execute** button to send the command to all of the selected modems.

Saving Configurations

The Network Management Card has the power to save and restore all the configurations of cards installed in the chassis. Follow these steps.

1. Be sure that you have configured all installed cards to your desired settings.

   NOTE: At this time, do not configure the NMC.

2. After the cards have been configured, save the card configurations to NVRAM using the Action / Commands window (as described earlier).

3. Select the NMC from the chassis display by clicking your left mouse button anywhere on the card. Select **Programmed Settings** from the Configure Menu, or click on the icon in the Toolbar. The Configuration window appears.

4. Select the **Configuration Group**. Change the setting of the parameter Auto Config on Card Initialization from Disable to **Enable**. Click on the **SET** button and exit the Configuration window.

5. With the NMC still selected, bring up the Action / Commands window again and send the **Save Chassis to NVRAM** command to the NMC.

The NMC now has stored in its NVRAM a snapshot of all the card configurations. Whenever a card is removed and then reinserted, or when the chassis is powered off and then on again, these values are used to configure the cards. If a new card has been inserted into the chassis that does not match what the NMC has stored and expects to find in a particular slot, default values are used to configure the card.

Monitoring Performance

Total Control Manager/SNMP allows you to query the status of cards installed in the chassis. This can be accomplished in the following ways:

- Viewing the LEDs that represent the card on the VFPD chassis display.
- Selecting the **LED Polling Information** option from the View Menu. This window gives you an idea of the frequency of LED polling, as well as the number and nature of errors encountered.
- Launching the session monitor for a selected card or cards.

The Session Monitor

Once you have selected one or more cards, you can launch the session monitor in two ways:

- Click on the **Performance** button at the far right of the Toolbar (represented as a gauge, like a tachometer).
- From the Performance Menu, select **Session Monitor**.

The Functional Group Monitor Setup screen appears.

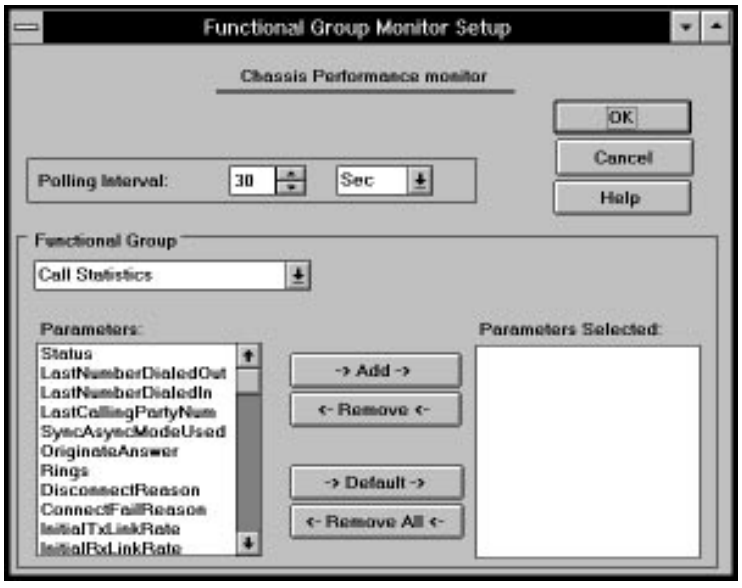

Figure 10. Functional Group Monitor Setup

Choose parameters from the Parameters list and **Add** them to the Parameters Selected box. You can add up to ten parameters at one time. Select the desired polling interval, and click on **OK** to start the query operation. The Performance Table appears with the statistics you have requested.

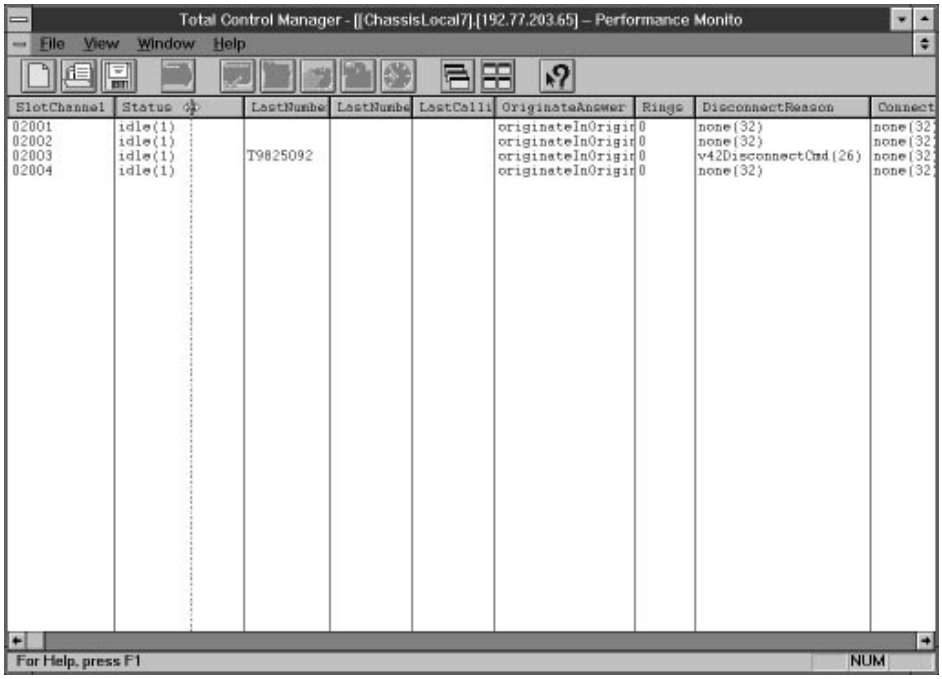

Figure 11. Performance Table

Columns can be adjusted by clicking on the spaces between column headings, as illustrated in the above figure. The order of the columns can also be adjusted by clicking and dragging column headers.

Setting Traps

A *trap* is an SNMP message sent from a device to a Management Station to signal that a specific event or fault has occurred in that device. You can set traps for a network device to trigger *alarms* in the Management Station, or for *Event Logging.*

Traps may be configured (enabled / disabled) through *Total Control Manager/SNMP*. They allow the operator to detect, isolate, and correct problems or events that occur with an object.

Configuring a Trap

1. Select the card(s) for which you want to set traps from the chassis display window.
2. Select **Trap Settings** from the Fault Menu or click on the Fault icon in the Toolbar (represented as a hand setting an alarm clock). The Configuration window appears.

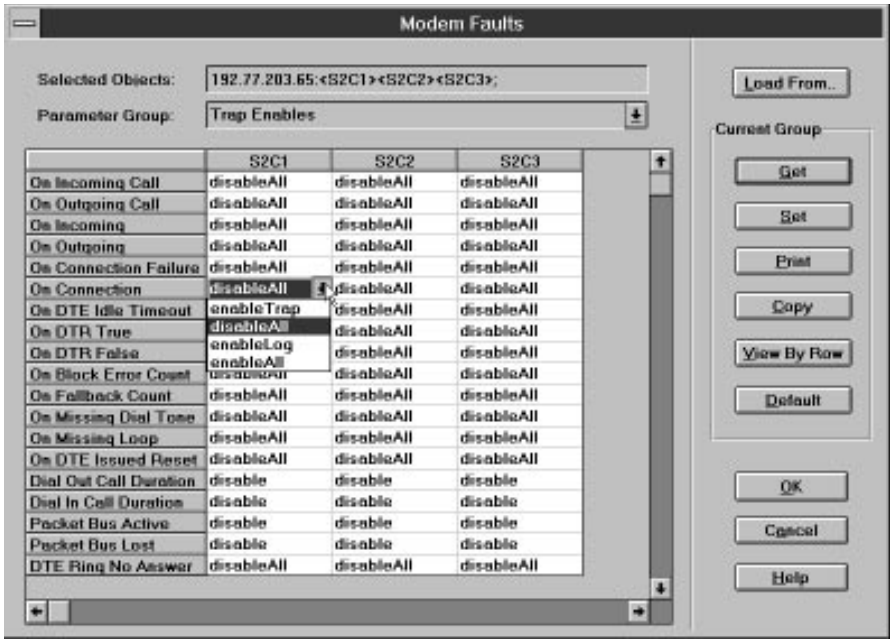

Figure 12. Modem Faults Configuration Window

3 Enable traps. Some parameters do not have the *enableLog* option. These parameters can *not* produce traps for Account Logging.

> **Important:** Some fault parameters require that you set thresholds. Use the context-sensitive online help to see if the parameter you selected requires a threshold setting (with the parameter selected, click with the right mouse button). For instance, the Modem Event Thresholds parameter group is used to set modem trap thresholds.

4 Click on the **SET** button and exit the Configuration window.

Configuring a Trap Destination

After you have configured *Total Control* Manager/*SNMP* to generate traps, you can choose to send these traps to one or more Management Stations.

1 From the Fault Menu, select **Trap Destinations**. The Trap Destination Table window appears.

Figure 13. Trap Destination Table Window

2 Click on the **Add** button at the right side of the window. The Add Trap Destination window appears.

Figure 14. Add Trap Destination Window

3 Enter the following information:

- IP address of the trap destination
- SNMP Community String
- Annotation (any additional informative text)

4 Click on **OK** to accept the trap destination information.

Configuring Alarms

Alarm is a generic term that refers to how a Management Station reacts when it receives an SNMP trap. Alarms are configured in NMS.

Before you can use alarms, you must do the following:

- Set traps for your devices.
- Integrate alarms into NMS. The alarm integration procedure is described earlier in this guide under *Installation Adjustments.*

Additionally, the Alarm Manager portion of the NMS must be running; this software is launched automatically when you start the NMS.

Configuring Alarm Notification

Once you have enabled a trap for an event, you can configure the type of notification(s) that will be generated for that trap within NMS.

1 From the Fault Menu, select **Alarm Disposition**. The Configure Alarm Disposition window appears.

2 For the Family of alarms, select **SNMP**. Then select the type of alarm from the drop-down list box.

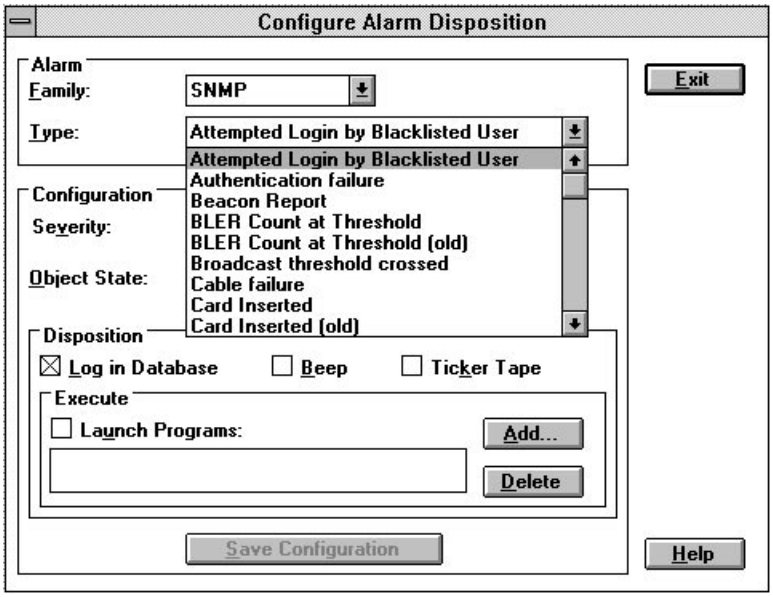

Figure 15. Alarm Disposition

3 Under Configuration, choose settings from the drop-down list boxes for the alarm severity and the object state for the affected object (such as **Operational** or **Degraded**). The object state is the condition you expect the object to be in as a result of the condition that triggers the alarm. This in turn affects the displayed icon for the device. For instance, if you set the object state to Non-operational, the icon will become “grayed out” to indicate a severe condition, but it can still be selected.

4 Select an action for the alarm disposition. When an alarm occurs, you may choose to log the alarm in the database, create an audible beep, display a "ticker tape" message across the status line of the NMS, or execute a program of your choice (such as USRBEEP.EXE, located in the NMS\BIN directory). When you have selected the appropriate disposition(s), click the **Save Configuration** button at the bottom of the window.

Monitoring Alarms

The Alarm Monitor is a real-time display of all alarms that have occurred since you launched NMS, or since the last time the Alarm Manager was restarted.

From the Fault Menu, select **Alarm Monitor**.

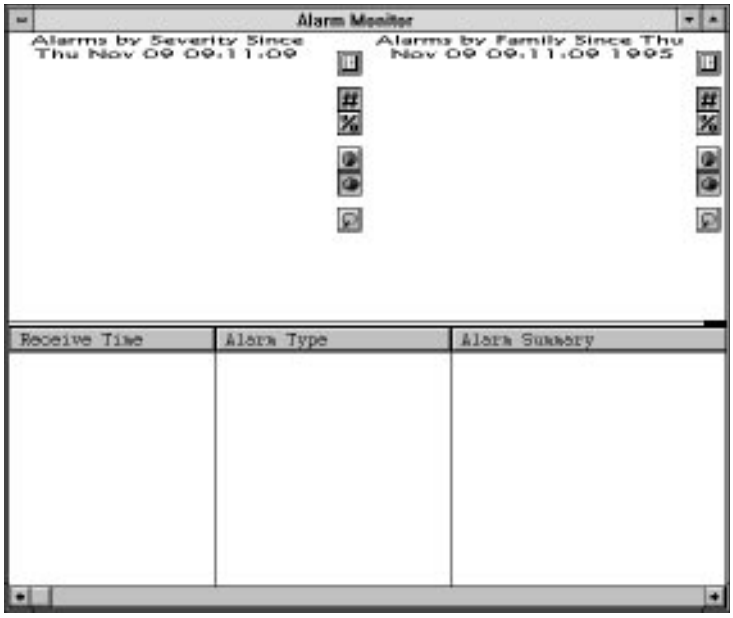

Figure 16. Alarm Monitor

The Alarm Monitor fills the NMS screen, and is divided into the following sections:

- The top pane contains pie charts representing the severity and family of alarms generated. All Total Control alarms are part of the SNMP family. This pane is updated every two minutes.
- The bottom pane contains nine columns of alarm information; the most recent alarm is displayed in the top row of the table. These

columns contain the time that the alarm was received, the type of alarm, the affected station, the alarm severity, the operational state of the affected device, the network address of the affected device, the station type of the affected device, the time that the alarm was sent to the NMS, and an alarm summary. Use the scroll bar at the bottom of the table to view all of this information.

Generating Alarm Reports

The Alarm Report displays information about alarms that are logged to the database. This option is enabled in the Alarm Disposition window, described earlier.

If no icons are selected in an internet map, the Alarm Report displays all alarms. If an icon is selected, the Alarm Report shows only those alarms generated by the chassis represented by that icon.

The Alarm Report contains all the information presented in the Alarm Monitor table, including the following fields: a note that you have entered about the alarm, an indication of whether or not the alarm has been acknowledged, and the date and time that the alarm was acknowledged.

The Alarm Report can be used for the following purposes:

- Acknowledge alarms.
- Delete alarms from the database.
- Print alarm information.
- Add a note to an alarm for a coworker.
- Find and display a device specified by a selected alarm on the Internet Map.