HEWLETT-PACKARD

HP 4972A
LAN Protocol Analyzer

Getting Started
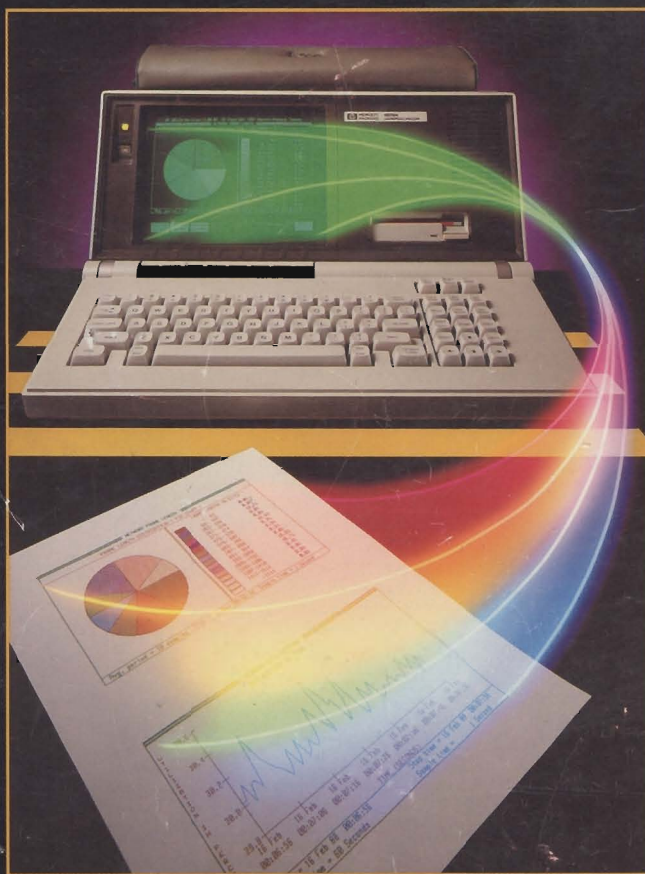
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HP 4972A LAN Protocol Analyzer

Computer Museum

Getting Started

HEWLETT PACKARD

Warranty

This Hewlett-Packard instrument product is warranted against defects in material and workmanship for a period of one year from the date of shipment. During the warranty period, HP will, at its options, either repair or replace products which prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by HP. Buyer shall prepay shipping charges to HP and HP shall pay shipping charges to return the product to the Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to HP from another country.

HP warrants that its software and firmware designated by HP for use with an instrument will execute its programming instructions when properly installed on that instrument. HP does not warrant that the operation of the instrument, or software, or firmware will be uninterrupted or error free.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance. No other warranty is expressed or implied. HP specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

Exclusive Remedies

The remedies provided herein are buyer's sole and exclusive remedies. HP shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Contents

1. Using the Manual Set

2. Product Information

3. Setting Up the HP 4972A

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Safety

Prior to operation of the equipment you must examine the instrument and review this document to ensure you are completely familiar with all the safety markings and the operating instructions.

Warnings

The following *WARNINGs* define operating procedures, practices, etc., which, if not correctly followed, could result in personal injury or loss of life.

WARNING

This product is a Safety Class 1 instrument with a protective earth terminal.

WARNING

For protection from electric shock hazard, power cord ground must not be defeated.

Safety

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings in this manual violates safety standards of design, manufacture, and intended use of this instrument. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements.

Grounding

To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical ground. The instrument is equipped with a three-conductor AC power cable compatible with an approved three-contact electrical outlet. The power jack and mating plug of the power cable must meet International Electrotechnical Commission (IEC) safety standards.

Environment

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Service and Adjustment

Dangerous voltages exist within this instrument. Service and adjustment of this instrument is to be performed only by trained service personnel. Operating personnel are not authorized to remove the instrument covers or to perform any internal service or adjustment procedure.

Do not replace components with the power cable connected. Dangerous voltages may be present even when the power cable is disconnected.

Do not perform internal servicing or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

CRT Handling

Rough handling or jarring of the instrument can break the CRT (cathode ray tube). The resulting implosion will scatter glass fragments at a high velocity. Removal or installation of the CRT is to be performed only by qualified maintenance personnel using approved safety mask and gloves.

Unauthorized Service

The installation of substitute parts or the installation of any instrument modification not authorized by Hewlett-Packard is specifically forbidden. The performance of such unauthorized service can negate the instrument warranty or any maintenance agreements.

Return the instrument to a Hewlett-Packard Sales and Service Office for authorized service and repair.

Manufacturer's Declaration

This certification is applicable to products shipped to Germany after June 1, 1985. This is to certify that the equipment

HP 4972A LAN Protocol Analyzer

is in accordance with the Radio Interference Requirements of Directive FTZ 1046/1984. The German Bundespost was notified that this equipment was put into circulation. The right to check this model type for compliance with these requirements was granted.

Additional Information for Test- and Measurement Equipment

Note: If Test and Measurement Equipment is operated with unscreened cables and/or used for measurements on open set-ups, the user has to assure that under operating conditions the Radio Interference Limits are still met at the border of his premises.

Herstellerbescheinigung

Hiermit wird bescheinigt, daß das Gerät/System

HP 4972A LAN Protocol Analyzer

in Übereinstimmung mit den Bestimmungen der Postverfügung 1046/84 funkentstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes/Systems angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Zusatzinformation für Meß- und Testgeräte

Werden Meß- und Testgeräte mit ungeschirmten Kabeln und/oder in offenen Meßaufbauten verwendet, so ist vom Betreiber sicherzustellen, daß die Funk-entstörbestimmungen unter Betriebsbedingungen an seiner Grundstücksgrenze eingehalten werden.

Printing History

New editions are complete revisions of the manual. Update packages (formerly known as "Manual Changes") are issued between editions. They contain additional and replacement pages to be merged into the manual by the customer. The dates on the title page change only when a new edition or a new update is published. No information is incorporated into a reprinting unless it appears as a prior update. The edition does not change when an update is incorporated.

Many product updates and fixes do not require manual changes and, conversely, manual corrections may be done without accompanying product changes. Therefore, do not expect a one-to-one correlation between product updates and manual updates.

Edition 1.. May 1988

Edition 2...November 1988

Conventions

Critical instructions within the text of this publication are preceded by one or more of the following labels.

WARNING
All operating procedures, practices, etc., that must be performed in the specified manner to preclude the possibility of personal injury or loss of life are preceded by a "Warning" label.

CAUTION
All operating procedures, practices, etc., that must be performed in the specified manner to preclude the possibility of damaging the instrument or destroying programs or software are preceded by a "Caution" label.

NOTE
Explanatory comments or supplementary instructions are preceded by a "Note" label.

Using the Manual Set

Introduction

This chapter is contains information about:

- How to use this manual
- How to use the manual set
- Manual set conventions
- Softkey conventions
- Using the keyboard

How to Use This Manual

This manual contains all the information you need to start using your HP 4972A LAN
Protocol Analyzer. It explains how to set up your system, how to connect peripheral devices,
and also introduces you to the most commonly used LAN Protocol Analyzer functions.

The Manual Set

This manual is part of a five manual and one quick reference card set to help you learn and operate the HP 4972A:

- Getting Started
- Lan Performance Analysis Reference Guide
- HP 4972A Reference Manual
- HP 4972A Appendixes
- HP 4972A LAN Utilities User's Guide
- HP 4972A Softkey Reference Card

The application programs that you buy for your HP 4972A are accompanied by their own manuals. Here's how you can use the materials supplied with the HP 4972A:

- Use **Getting Started** to install the HP 4972A. Follow the chapters in sequence to learn what accessories and options are available for the protocol analyzer, how to install any external devices, and how to begin operating the system. Then use Getting Started to learn the basic functions of the HP 4972A. It contains step-by-step procedures to help you understand the HP 4972A.

- Use the **HP 4972A Reference Manual** and the **LAN Performance Analysis Reference Manual** for easily accesible information about the softkeys available. Both cover the softkey guided menus used to control the operation of the protocol analyzer. Each chapter covers a major softkey function.

- The **Appendixes** Manual contains several chapters to help you use the HP 4972A more efficiently. The Appendixes include:

  Introduction to LANs
  Introduction to the HP 4972A
  Error Messages
  Keyboard and Character Codes
  50/60 Hz Adjustment
  Remote Operation
  Analyzer File Formats
  Stats File Formats
  Loading System Software
  Glossary of LAN Terms

- Use the **HP 4972A LAN Utilities User's Guide** to help you use the extensive utility programs included with the HP 4972A.

- Use the **HP 4972A Softkey Reference Card** to help you identify and access the softkeys and functions available in the HP 4972A and in the LAN Performance Analysis Application. The card is folded into a convenient pocket size so that you can carry it with you and refer to it any time to refresh your memory.

NOTE

The manuals refers to the HP 4972A LAN Protocol Analyzer as the HP 4972A, the protocol analyzer, and the analyzer.

The LAN Performance Analysis Application is also refered to as Stats throughout the manual sets.

Softkey Conventions

When you turn the system power on, the HP 4972A goes through a self test and then displays the Top Level Menu.

Figure 1-1. The HP 4972A Top Level Menu

The softkeys at the bottom of the display represent primary functions of the protocol analyzer. As you press one of these softkeys, the display changes to new softkeys specific to the function you chose.

Softkey Designations

This manual represents the softkeys in bold type and encloses the softkey text in brackets (< >). The list below shows examples:

< Setup Analyzer >   **< Monitor Network >**   **< Examine Data >**

Softkey Levels

When you press any softkey from the Top Level Menu, the analyzer branches to another menu containing softkeys specific to that function. Some of the menus branch to several levels. Pressing **< EXIT >** at lower level menus takes you back through all the levels to the the Top Level Menu.

To get from one primary menu to another, you must return to the Top Level Menu.

Choosing < Other Choices >

Sometimes a menu offers more softkey choices than the analyzer can display on one screen. Press **< Other Choices >** to display additional softkeys available in that menu.

Toggling Softkeys

Some softkeys have an on-off toggle capability. Softkeys marked by an asterisk (*) are on. Pressing the softkey turns the function off and removes the asterisk. Not all softkeys with an asterisk have an on-off toggle capability.

Active Softkeys

When you position the cursor in some fields, the analyzer displays softkey choices for that field. An asterisk (*) is displayed in one of the softkeys to show the current choice. When you select another softkey for that field, the asterisk moves to that softkey.

Examples of softkeys marked by an asterisk when active include:

<Show Node Names*>   <Show Hex Addresses>
<ASCII 7> <ASCII 8*>   <EBCDIC>
<Detailed Format *>   <Summary ' ormat>
<Filter Format>

Using the Keyboard

This manual represents the keyboard keys by brackets, as in the examples below:

[TAB]   [CAPS LOCK]   [RETURN]   [BACK SPACE]

The following pages contain descriptions of the keyboard keys on the HP 4972A.

Keyboard Key	Description
[HOME]	In general, this key moves the cursor to the field nearest the upper left corner of the display.
	In Edit Nodelist Menu: Moves the cursor to the beginning of the node list.
	In the Edit Programs Menu: Moves the cursor to the "Store:" command at the beginning of the program.
	In the Examine Data Menu: This key shows the first frame in the buffer at the top of the display.
	In Edit Messages Menu, Format As Filter Menu, Edit Filters Menu, and Edit All Fields Menu: This key moves the cursor to the first byte of the **Destination Address** Field.
	In Edit Messages Menu and Edit Datafield Menu: This key moves the cursor to the first byte of the **Data** Field.
[ARROW-DOWN]	This key moves the cursor down to the next available field.
[ARROW-LEFT]	This key moves the cursor to the left within a field. After reaching the left end of a field, the cursor moves to the next field if another field is available on the same line.
[ARROW-RIGHT]	This key moves the cursor to the right within a field. After reaching the right end of a field, the cursor moves to the next field if another field is available on the same line.
[ARROW-UP]	This key moves the cursor up to the next available field.
[CLR LINE]	This key clears the alphanumeric field currently marked by the cursor. It resets numeric fields to zero.
[DEL CHAR]	This key deletes the character marked by the cursor.

Keyboard Key	Description
[DEL LINE]	In some menus, this key deletes the current line marked by the cursor. The line immediately below the cursor moves up to the cursor position.
[INS CHAR]	In **Label** fields, this key inserts a space where the cursor is located. You can then enter a new character from the keyboard. [INSERT CHAR] must be pressed each time you add a character.
[INS LINE]	In the Edit Node List Menu: This key inserts a new node having the default protocol analyzer values. In the Edit Programs Menu: This key inserts a blank line before the current cursor position.
[NEXT]	In the Examine Data Menu: Similar to **< Next Frame >**. It advances the display to the next frame in the buffer memory. When you press **< Scroll Marked >**, the analyzer displays only marked frames. After the display stops scrolling, [NEXT] advances the display to the next marked frame. In Edit Node List Menu, Edit Messages Menu, Edit Programs Menu, Disc Functions Menu, and List Directory Menu: This key advances the display to the next page.
[PREV]	In the Examine Data Menu: Similar to **< Previous Frame >**. It moves the display down to display the previous frame. When you press **< Scroll Marked >**, the analyzer displays only marked frames. After the display stops scrolling, [PREV] advances the display to the previous marked frame. In Edit Node List Menu, Edit Messages Menu, Edit Programs Menu, Disc Functions Menu, and List Directory Menu: This key moves the display to the previous page.

Keyboard Key	Description
[RETURN]	After you complete an entry in a field, press this key and the cursor moves to the next field.
	You can also use [RETURN] to perform insertions at the end of messages, filter, and node lists.
[TAB]	This key moves the cursor to the first character in the next available field. It moves the cursor from the last field to the first field.
	Press [SHIFT] and [TAB] at the same time to move the cursor backwards through the fields. When the cursor is in the first field of a display, you use [SHIFT] and [TAB] to quickly move the cursor to the last field.

Repeating Keys

When you hold a key down, the protocol analyzer interprets this as a request to repeat the function. To quickly remove the buffered keyboard keys, press [BACKSPACE] until you remove the extra keys.

Text Entry Conventions

ALPHA and HEX Character Entry

For fields that require alpha or hex characters, use [TAB] to move the cursor to the field. The analyzer positions the cursor in the field and left justifies the characters you enter.

If you move the cursor to a field with an [ARROW] key and enter a character, the analyzer positions the character at the cursor.

Numeric Entry (Other Than HEX)

When you move the cursor to a field that requires numeric characters, the analyzer positions the cursor in the field and right justifies the characters you enter.

Spaces in Entry Fields

You can enter spaces in name fields such as node names, program names, disc file names, and filter names. The analyzer replaces spaces with an underscore (_) when you exit the field.

Product Information

Introduction

This chapter describes following about the HP 4972A:

- Product description
- Operating specifications
- Product characteristics
- Accessories available
- Recommended peripherals
- Accessories supplied
- Options available
- Support services available
- Site Preparation
- Initial inspection and shipping information

Product Description

The HP 4972A is a protocol analyzer for troubleshooting Local Area Networks (LANs) employing Ethernet or IEEE 802.3 protocols on a 10 Mbps baseband coaxial medium. You can monitor traffic on the network, generate data frames to test other nodes, and write programs to verify network performance. For testing remote LANs, an HP 4972A transfers programs via an RS-232C link to another HP 4972A for troubleshooting a LAN at a distant location. The HP 4972A provides a comprehensive, easy-to-use, troubleshooting tool for testing and maintaining a local area network. The following is a list of HP 4972A features:

- Analysis of IEEE 802.3 1BASE2 and Ethernet data frames
- Capability of analyzing 1 Mb StarLAN (with Option 005)
- Generation of data frames
- Softkey-guided programming for user created applications
- High level naming of node addresses
- Flexible display formats
- Up to 20 Mbyte of fixed disc storage
- Log network data directly to fixed disc storage
- Full remote operation
- Printer and plotter output
- Softkey guided measurements
- Tutorial for the HP 4972A
- LAN Performance Analysis
- LAN Utility Package includes:
  LAN Test Library
  Coaxial Cable Test Application Program
  PC Remote Software

HP 4972A Operating Specifications

The following specifications apply to the operation and testing capability of the HP 4972A LAN Protocol Analyzer.

Protocols	IEEE 802.3, Ethernet
Interfaces	IEEE 802.3, Ethernet, and other Ethernet compatible interfaces. The HP 4972A only supports media access units (MAUs) using receive-based collision detection conforming to IEEE 802.3 or Ethernet Rev. 2.0 standards for collision counting. Correct monitoring and testing on Ethernets using Revision 1.0 transceivers can be achieved by using a Revision 2.0 transceiver (MAU) for the HP 4972A.
	For accurate results, the HP 4972A requires direct connection to the network cable through an IEEE 802.3 or Ethernet Revision 2.0 MAU.
Data Transfer Rate	10 Mbps
Data Codes	U.S. ASCII 7,8; EBCDIC, JIS-8 (Katakana), EBCDIK
Data Formats	IEEE 802.2, IEEE 802.3, and Ethernet frame formats. User-modifiable frame formats for several popular ISO level 3 and 4 protocols are also provided.
Capture Buffer Memory	One Mbyte memory for incoming data that has passed the filtering process. Receives from 655 to over 2000 frames.
Mass Storage	Supports up to 20 Mbyte of internal Winchester disc, 600 Kbyte 3.5" floppy drive. Up to two additional external drives may be connected to HP-IB interface.
Logging to Disc	Streams network data directly to hard disc at a nominal rate of 400 Kbits per second.
Data File Processing	Post-processing and displaying of data files on disc.

Node Names	User definable names for up to 1000 network addresses.
Transmitter Performance	Define and transmit any of 16 messages from 5 to 2026 bytes including frame check sequence. Typically responds to an incoming frame within 10 milliseconds. Greater than 90% network loading can be achieved.
Preamble Selection	User-selectable preamble length: 16 bits, 32 bits, 64 bits, and 128 bits.
Receiver Performance	In monitor mode, captures and displays all frames within IEEE 802.3 specifications, i.e. 14,000 frames per second with 64 byte frames at full network loading. Receives and displays frames starting from a minimum of 14 bytes.
Automatic Testing	Executes user-specified programs on power-up.
Password Access	Separate user-definable passwords to restrict access to transmit and data-viewing functions.
Filters	Sixteen filters with 14 trigger bytes defined for addresses and type or length field and 47 additional non-contiguous user-definable trigger bytes.
Timers	Timestamping: Maximum 1.5 days.
	Event timing: Maximum 3 hours per interval, maximum accumulation 1.5 days.
Counters	Sixteen, each with a maximum count of 99,999,999.
Time Stamping	Timestamp for each incoming frame accurate to 32 microseconds. Displayed as time of day, time from start of monitor, time between frames, time from triggered event, and time from specified captured frame.

Video Output	High resolution composite-video output for 25 kHz external monochrome monitor is standard. Optional high-resolution RGB color video outputs for a 25 kHz external color monitor.
Printer Support	Supports HP 2225A ThinkJet Printer or HP 3630A PaintJet Printer via HP-IB interface.
Remote Interface	Optional RS-232C/V.24 interface for remote operation only. Supports data rates from 300 bps to 9600 bps in asynchronous mode.

Product Information

HP 4972A Product Characteristics

Listed below are the HP 4972A LAN Protocol Analyzer product characteristics.

Safety Classification

This is a Safety Class 1 instrument system (provided with terminal for protective grounding).

Dimensions

Model	Height	Width	Depth	Weight
4972A	19.7 cm	43.2 cm	55.9 cm	20.4 kg
	7.75 in	17.0 in	22.0 in	45.0 lb

Temperature

Operating	$+10^\circ$ C to	$+45^\circ$ C ($+50^\circ$ F to $+113^\circ$ F)
Non-operating	-20° C to	$+60^\circ$ C (-4° F to $+140^\circ$ F)

Humidity

Operating	8% to 80% (noncondensing)
	53o C maximum wet bulb temperature
Non-operating	5% to 95% (noncondensing)

NOTE

Non-operating temperature and non-operating humidity are specified for use without a disc.

Altitude

Operating	0 to 4572m	(0 to 15,000 ft)
Non-operating	0 to 15,240m	(0 to 50,000 ft)

Power Requirements

Model	Line Volts (Vac)	Line Freq (Hz) (Single Phase)	Power (W)
4972A	90-132 180-264	47-63	200 typical

Accessories Available

HP Model	Description
8120-4788	Audio Cable
92254A	6 meter AUI cable
92254B	12 meter AUI cable
92254C	24 meter AUI cable
92254D	48 meter AUI cable
30241A	Media Access Unit & Cable Tap
92256C	MAU Tap Installation Kit
10833D	1/2 meter HP-IB cable
10833A	1 meter HP-IB cable
10833B	2 meter HP-IB cable
10833C	4 meter HP-IB cable
92192A	Double sided Micro-floppy Discs Box of 10
92261A	ThinkJet print head ink cartridge
92261L	ThinkJet paper, 1000 sheets
92261S	ThinkJet printer stand
51606A	PaintJet black print cartridge
51606C	PaintJet color print cartridge
51630P	Z-Fold paper, 8 1/2 x 11 in., 250 sheets
51630R	Z-Fold paper, 210 x 304.8 mm, 250 sheets
51630Y	Cutsheet paper, 8 1/2 x 11 in., 250 sheets
51630Z	Cutsheet paper, 210 x 297 mm, 250 sheets
51630Q	Single sheet transparency film 8 1/2 x 11 in., 50 sheets (with plastic sleeves)
51630S	Single sheet transparency film 210 x 297 mm, 50 sheets (with plastic sleeves)
92261M	Ink Jet Paper, 2000 single sheets
92261N	Ink Jet Paper, 2500 fanfold sheets
1008A Opt.006	Cart
19500B	Disc Drive Rack Mount Adapter Kit HP 9122D, 9133H/L, 9153A/B

Recommended Peripherals

Hewlett-Packard recommends the following peripherals for the HP 4972A.

Display

The HP 4972A supports an external display. The HP 35741 display is 12-inch, RGB color with 640 X 400 resolution and built-in tilt and swivel. The HP 35731 display is 12-inch monochrome with built-in tilt and swivel.

The display models provide the appropriate power cord for the country indicated.

HP Model	Description
35741A	HP Color Monitor
35741B	HP Color Monitor (International)
35731BB	HP Monochrome Monitor (European continent)
35731BM	HP Monochrome Monitor (U.S./Canada)
35731BQ	HP Monochrome Monitor (Switzerland)
35731BU	HP Monochrome Monitor (United Kingdom)
35731BY	HP Monochrome Monitor (Denmark)
35731BK	HP Monochrome Monitor without power cord

Disc Drive

The HP 4972A can support up to two external disc drives via HP-IB interface.

HP Model	Description
9122D	Dual double sided 3 1/2 inch floppy disc drive
9153A	10 Mb Winchester with 3 1/2 inch floppy drive
9153B	20 Mb Winchester with 3 1/2 inch floppy drive
9133H	20 Mb Winchester with 3 1/2 inch floppy drive
9133L	40 Mb Winchester with 3 1/2 inch floppy drive

Printer

The HP 4972A can support a printer via HP-IB interface. The printers below do not include the interface cable. See "Accessories Available" in this chapter for HP-IB interface cable ordering information.

HP Model	Description
2225A	150 cps, ThinkJet Printer (HB-IB) (with out Katakana Keyboard)
2225AJ	150 cps, ThinkJet Printer (HP-IB) (with Katakana Keyboard)
3630A Opt. 002	PaintJet Printer (HP-IB)

Accessories Supplied

The standard HP 4972A con sists of the components listed below.

Model	Description
HP 4972A	LAN Proto :ol Analyzer Mainframe
	Power cord
	System soft vare discs
	Getting Sta ·ted Manual
	HP 4972A Reference Manual
	HP 4972A System Softkey Reference Card
	LAN Utiliti :s Disc
	LAN Utiliti :s Discs User's Guide
	PC Remote
	HP PaintJe Support
	On-Line Tutorial
	Coaxial Cat le Test
	LAN Perfoi mance Analysis Application (Stats) Software
	LAN Perfoi mance Analysis Application Reference Manual
	One internal 20 Mbyte hard disc drive
	One 3.5 microfloppy disc drive
	220 Vac fus : and bag

Options Available

Several options are available :or the HP 4972A. These options are listed below:

Opt. #	Description
001	RGB Color Output with cables
002	Remote Communications Interface (includes D" E male cable and requires one for each master and slave station)
003	Katakana Keyboard (JIS-8, EBCDIK)
005	StarLAN
908	HP 4972A Rack Mount Kit

Support Services Available

Software Support

Option	Description
HP 4972A + N00	**Software Notification Service (SNS)**
	SNS includes periodic distribution of the Software Status Bulletin (SSB), the Software Release Bulletin (SRB) and a protocol analyzer user's newsletter, Peer-to-Peer. The SSB reports on software bugs and documentation, with temporary work-arounds. The SRB is a listing of current software revisions available for the product. The newsletter contains new product information, application tips, and questions and answers from other users.
HP 4972A + S45	**Software Materials Subscription (SMS)**
	SMS includes the Software Notification Service. It also provides, via mail, all the material and information necessary for the customer to keep current on their protocol analyzer software.
HP 4972A + V45	**Additional System Coverage**
	Extends Response Center Support coverage on the HP 4972A to one additional system under the same system manager.
HP 4972A Q00	**Manual Update Service**
	Provides an extra copy of update to software reference material.
HP 4972A W45	**Extended Material Support (EMS)**
	Extends Software Material Subscription by providing the right to make one copy of all software material for use on one additional system.

Hardware Support

W30	Adds two additional years of return to HP service.

Site Preparation

The HP 4972A is easy to install. If you need assistance, contact your local HP Sales and Service office. This section contains site requirements and preparation needed to install the HP 4972A LAN Protocol Analyzer.

Space Requirements

HP 4972A
Position your HP 4972A so there is at least 6 cm (2.5 in) of clearance on each side. The fan draws cooling air into the back and exhausts the air through the sides. The analyzer needs an unrestricted supply of cool air to the intake holes.

Allow at least 15 cm (6 in) of clearance beyond the back cover of the HP 4972A for cable connections. Pressure against the instrument-end of these cables could cause damage to the connectors. The analyzer does not require top, bottom, or right side clearance.

Printer
The ThinkJet and PaintJet printers print on single sheet or fanfold paper. The PaintJet also prints on transparencies. If you use fanfold paper, provide space below or behind the printer for the paper supply. Also, provide space behind the printer for the printed paper output.

Initial Inspection

WARNING

To avoid hazardous electrical shock, do not perform
electrical tests when there are signs of shipping damage
to any portion of the instrument.

Inspect the shipping container for damage. If you find any damage to the shipping container
or packaging material, keep them until you check the shipment for completeness and until you
check the instrument mechanically and electrically. Check the contents of the shipment with
the list in the Accessories Supplied and Accessories Available portions of Section 2.

If you find the contents incomplete or if you find mechanical damage or defect, notify the
nearest Hewlett-Packard office. If you receive damaged shipping containers or if the
packaging materials show signs of stress, notify the carrier as well as the Hewlett-Packard
office.

Keep the shipping materials for the carrier's inspection. The HP office arranges for repair or
replacement without waiting for claim settlement.

Claims for Damage

If physical damage is evident or if the instrument does not meet specifications when received, notify the carrier and contact the nearest Hewlett-Packard Sales/Service Office. The sales/service office can arrange for repair or replacement of the unit without waiting for settlement of the claim again it the carrier.

Storage and Shipments

Ship and store the HP 4972A LAN Protocol Analyzer in environments that do not exceed the following limits:

Temperature   -20''C to +60°C (-40°F to +140°F)

Humidity   5% to 95% (noncondensing)

Altitude   Up to 15,240 meters (50,000 ft)

Protect the instrument from temperature extremes that cause condensation in the instrument. Do not ship or store the instrument with a disc in the disc drive.

Repackaging for Shipment

Original packaging (containers and materials identical to those used in factory packaging) is available from Hewlett-Packard. If you return the unit to Hewlett-Packard for service, attach a tag indicating the service required, return address, model number, and full serial number. Mark the container FRAGILE. In any correspondence, refer to the instrument by model number and full serial number.

If you use other packaging, follow these general instructions for repackaging with commercially available materials:

1. Wrap the instrument in heavy paper or plastic. If you ship the unit to a Hewlett-Packard office or service center attach a tag to the instrument indicating the type of service required, return address, model number and full serial number.

2. Use a strong shipping container. A double wall carton made of 2.4 MPa (350 psi) test material is adequate.

3. Use a layer of shock absorbing material 75 to 100 mm (3 to 4 in.) thick around all sides of the instrument to provide firm cushioning and prevent movement inside the container.

4. Seal the shipping container securely.

5. Mark the shipping container FRAGILE to insure careful handling.

6. In any correspondence, refer to instrument by model number and full serial number.

3

Setting Up the HP 4972A

Introduction

This chapter describes following about the HP 4972A:

- Installation
- Standard devices
- Optional devices
- External devices
- Instrument turn-on
- Instrument verification
- Setting the date and time
- Preventative maintenance
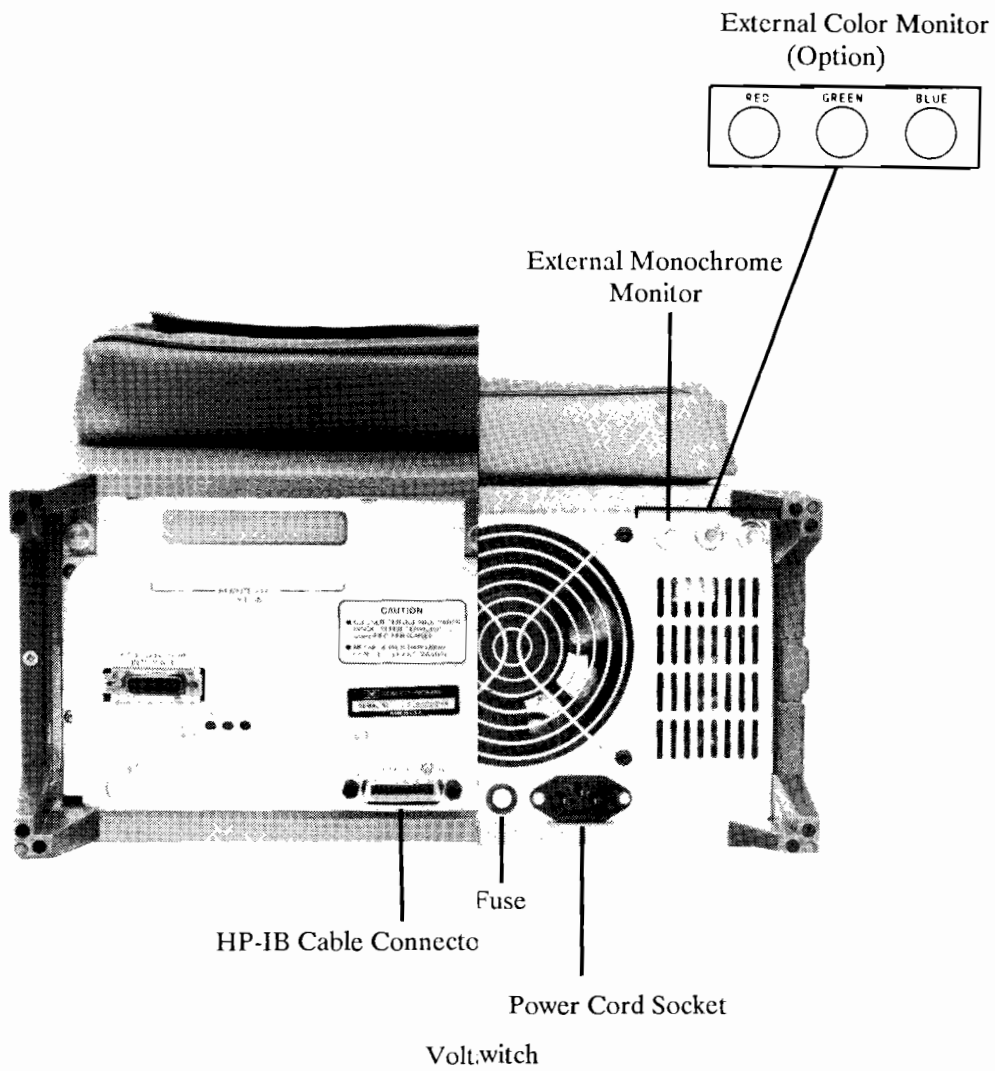
Figure 3-1. The HP 4972A Back (with StarLAN option)

Position the HP 4972A

The HP 4972A requires consideration for air flow for cooling and for operation. See Site Preparation in Chapter 2 for information on the clearance needed.

Check Line Voltage Select Switches

The line voltage select switch on your HP 4972A should be set to the correct voltage for your area. Check the instrument to verify the correct position of the switch. Always disconnect the power cord from the instrument before setting the line voltage select switch.

If you use the HP 4972A where the power line frequency is 50 Hz, sometimes a slight jitter may be detected on the display. If this is the case, see the HP 4972A Appendix Manual for the 50/60 Hz Adjustment for the procedure to eliminate the display jitter.

If you have a printer, disc drive, or any other external device, see the instructions to set the line voltage select switch position in that instrument manual. Refer to the installation section.

CAUTION

You can damage devices in your system if the setting is for the low voltage range and you plug it into a high voltage power outlet.

Voltage Select Switch Location

The HP 4972A line voltage select switch is on the rear panel near the power socket and below the fan. The setting depends on the line voltage in your country.

Check the Line Fuse

Check to make sure you have the correct fuse installed.

WARNING

Do not check or change any fuse unless power is
disconnected from that device.

Fuse Location

The HP 4972A fuse holder is located on the back panel. See figure 3-1 for its location. To
remove the fuse holder, press it in and turn counterclockwise. See the list below for the
correct fuse.

Model	Voltage Setting (Vac)	Voltage Range (Vac)	Required Fuse	Fuse Part Number
HP 4972A	115	90-125	5.0 Amp/250	2110-0010
	230	195-250	2.5 Amp/250	2110-0083

Connect the Power Cord

This section describes how to connect the power cord from your HP 4972A to a power outlet. The type of power cord shipped with the instrument depends on the country of destination. Table 3-1 lists the power cords and their applications.

WARNING
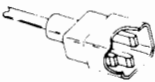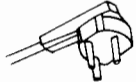
If you need a replacement power cord, make sure to order an HP power cord identical to the original. Otherwise, electrical shock or equipment damage may result. See Table 3-1 for a list of HP power cords.

CAUTION

Before applying power to an instrument, you must properly ground the chassis. This precaution is necessary to avoid the possibility of injury or death which may result if the protective ground is defeated. The HP 4972A is provided with a 3-wire power cord. When you connect this cord to an appropriate ac power receptacle, it provides a ground for the instrument cabinet.

Connect the power cord to the HP 4972A and then connect the other end to the power outlet. Figure 3-1 and Figure 3-2 show the location of the power cord socket on the HP 4972A.

Table 3-1. Hewlett-Packard Power Cords

Plug Type	Cable HP Part Number	C D	Plug Description	Cable Length (inches)	Cable Color	For Use In Country
250V	8120 1351 8120 1703	0 6	Straight *BS1363A 90	90 90	Mint Gray Mint Gray	United Kingdom, Cyprus, Nigeria, Rhodesia, Singapore
250V	8120 1369 8120 0696	0 4	Straight *NZSS198 ASC112 90	79 87	Gray Gray	Australia, New Zealand
250V	8120 1689 8120 1692	7 2	Straight *CEE7 Y11 90	79 79	Mint Gray Mint Gray	East and West Europe, Saudi Arabia, Egypt, So. Africa, India (unpolarized in many nations)
125V	8120 1348 8120 1398 8120 1754 8120 1378 8120 1521 8120 1676	5 5 7 1 6 2	Straight *NEMA5-15P 90 Straight *NEMA5 15P Straight *NEMA5-15P 90 Straight *NEMA5-15P	80 80 36 80 80 36	Black Black Black Jade Gray Jade Gray Jade Gray	United States Canada, Japan (100V or 200V), Mexico, Philippines Taiwan
250V	8120 2104	3	Straight *SEV1011 1959-24507 Type 12	79	Gray	Switzerland
250V	8120-0698	6	Straight *NEMA6-15P			United States Canada
220V	8120 1957 8120-2956	2 3	Straight *DHCK 107 90	79 79	Gray Gray	Denmark
250V	8120 1860	6	Straight *CEE22-VI Systems Cabinet use			
250V	8120-4600 8120-4211	8 7	Straight BS 546/SABS 164 90°	98 98	Black Black	So. Africa India

*Part number shown for plug is industry identifier for plug only. Number shown for cable is HP Part Number for complete cable including plug
E = Earth Ground, L = Line, N - Neutral

Install the HP-IB Cables

You can connect external devices to the HP 4972A via HP-IB cables. See figure 3-1 for the location of the HP-IB cable connector.

Disc Drive

The HP 4972A supports up to two external disc drives. Connect an HP-IB cable from the HP 4972A to each disc drive.

Printer

Connect the HP-IB cable from the HP 4972A connector to the HP-IB connector of the printer.

Set the Configuration Address Switches

If you connect an HP 9133H/L Winchester Disc Drive to your HP 4972A set the Configuration Address switch on the rear panel to 0.

The configuration switch on HP 9133H/L disc drives manually partitions the Winchester disc into multiple volumes. The HP 4972A uses software to segment the Winchester disc.

To change the configuration address switch, set the disc drive power switch to OFF, change the switch setting, and then set the power switch to ON. This initializes the new address.

HP MODEL	CONFIGURATION ADDRESS	
9133 H/L Disc Drive	Address = 0	

Figure 3-3. HP 9133H/L Configuration Address Setting

Set the HP-IB Address Switches

Set the HP-IB switch of each device to the address values shown below.

To change an HP-IB address switch setting, set the power switch to OFF on both the analyzer and the external device. Change the HP-IB address. First set the device power switch to on, then set the analyzer power switch to on to initialize the new address.

HP-IB Address	Device
2 *	Dual Floppy Disc Drive
6 *	Winchester Disc Drive
1	ThinkJet Printer
1	PrintJet Printer
5 **	Plotter

* You can use up to two external disc drives. If you use more than one disc drive, see the following pages for instructions to set the HP-IB address.

** See the plotter manual for instructions to change the address switch.
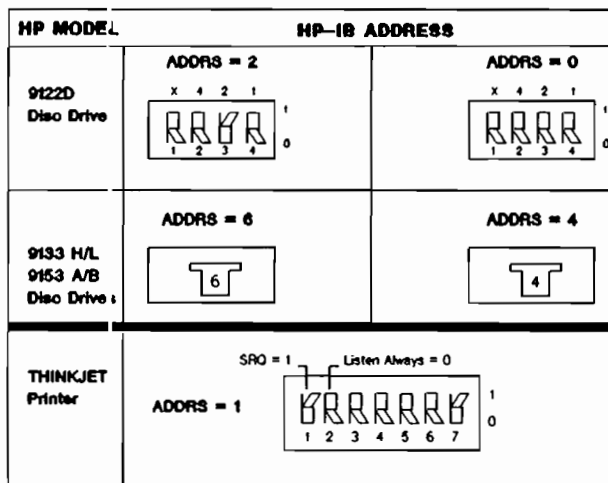
Figure 3-4. HP-IB Address Switches

Set the PaintJet Printer HP-IB Address Switch

To change the HP-IB address switch setting, set the power switch to OFF on both the analyzer and the PaintJet Printer. Change the HP-IB address of the printer to the address value shown below. First set the device power switch to ON, then set the analyzer power switch to ON to initialize the new address.

1	0	
x		A1
	x	A2
	x	A3
	x	NORM
	x	(blank)
x		PC8
	x	● ENG

x = Switch set in that position

**Figure 3-5. HP-IB Address Switch Setting
for the PaintJet Printer**

Setting Up
the HP 4972A

Using the Printer

You can choose between two printers to use with your HP 4972A LAN Protocol Analyzer: The Thinkjet Printer or the PaintJet Printer. See Table 3-2 for a summary of the features of both printers.

NOTE

You must have the following to use the PaintJet Printer with the HP 4972A:

- Operating System Software revision B.02.00 (or later)

- Performance Analysis Software Rev. A.01.00 (or later)

- HP PaintJet Printer with an HP-IB cable

- <u>HP 4972A color output requirements:</u>
  HP Option 001 Color Interface Option
  Color Monitor:
      HP 35741A **OR** HP 35741B (International)

Using Winchester and Dual Floppy Disc Drives

If you use a Winchester disc drive and a dual floppy disc drive, use the following instructions to set the HP-IB address switches.

<u>Disc Drive</u>

First   **Winchester Disc Drive**

If you use a Winchester disc drives with a dual floppy disc drive, you can choose how to format the Winchester disc drive.

Choose HP-IB address 6 for a single large volume numbered #14, or, HP-IB address 4 for ten equal sized volumes numbered #15 through #24.

Second   **Dual Floppy Disc Drive**

If you use one Winchester disc drive and one dual floppy disc drive, set the dual floppy disc drive to HP-IB address 3 for left floppy volume #7 and right floppy volume #8.

Using an External Monitor

The HP 4972A supports HP 35741 Color Monitor. The color output interface provides Red, Green, and Blue outputs to the monitor. Connect the red, green, and blue output from the monitor to the corresponding red, green, and blue connector on the rear panel of the HP 4972A. See figure 3-1 for output location.

The HP 4972A supports HP 35731 Monochrome Monitor. See figure 3-1 for the output connection.

Turn On the HP 4972A

Turn on your HP 4972A with the power switch. Verify that the power indicator light on the front panel is ON and the fan is operating. If the fan is running and the indicator light is on, you installed your HP 4972A correctly.

Problems?

If your system does not turn cn, check the following:

1. Is the power switch set to the ON position?
2. Is the power cord firmly plugged into the HP 4972A?
3. Is power present at the power outlet?

If you answered yes to all three questions, replace the fuse in the HP 4972A and turn on the system. If it still does not turn on, contact your HP Service Representative.

Setting Up
the HP 4972A

Connect the HP 4972A to Your Network Cable

In order to interface the analyzer with your local area network, you must connect the HP 4972A to the network cable. This method varies depending on what network type you use. With IEEE 802.3 and Ethernet systems, make the connection through an Access Unit Interface (AUI) cable to a Media Access Unit (MAU). The MAU provides a physical connection to the local area network cable. With a ThinLAN (10Base2 system), make the connection directly from the HP 4972A to a MAU adapter on the ThinLAN local area network cable. Use a cable with RJ-45 connectors for a StarLAN network.

The HP 4972A only supports media access units using receive-based detection conforming to IEEE 802.3 or Ethernet Revision 2.0 standards for collision counting. (Correct monitoring and testing on Ethernets using Revision 1.0 transceivers can be achieved by using a Revision 2.0 transceiver (MAU) for the HP 4972A.

You can use two kits to help you connect the HP 4972A to your network: the HP 30241A MAU & Cable Tap and the HP 92256C MAU & Tap Installation Kit.

Follow the instructions included with each of the kits. Remember to observe the following guidelines:

1. The cable must be properly terminated with N-series terminators.

2. The minimum distance between MAUs is 2.5 meters.

3. These environmental specifications should be met:

   temperature   0 - 50°C
   humidity   5 - 95% relative humidity

4. Do not connect the HP 4972A or the above mentioned installation kits to an ungrounded network coaxial cable.

5. Cover all N-series connectors with a rubber boot. Inadvertent grounding to building grounds such as an exposed metal building structure or metal cable tray can damage the network components or cause the network to fail (except the grounded end of the coaxial cable).

Using the Top Level Menu

You access all the functions o`the analyzer from the Top Level Menu. The Top Level Menu appears after the power-on se.f-test. You can return to the Top Level Menu from lower level menus by pressing <EXIT>.

```
                            HEWLETT - PACKARD

                *     *****    *******   *****    ***
               **     *    *   *     *   *   *   *   *
              *  *     *   *   *        *     *  *    *
             *   *     *   *   *       *      *  *    *
            *    *     *****   *      *       **  ******
           *******     *   *   *     *     *     *     *
                *      *   *   *     *    *      *     *
                *      *    *  *     *   *       *     *
                *       *****  *     ******* *      *

                       LAN PROTOCOL ANALYZER

                            Revision:
               Copyright 1987 Hewlett-Packard Company

                        5 May 87   01:27:37



  Setup     Execute    Mon.tor              Disc      Examine    OTHER
  Analyzer   Program    Network             Functions  Data      CHOICES
```
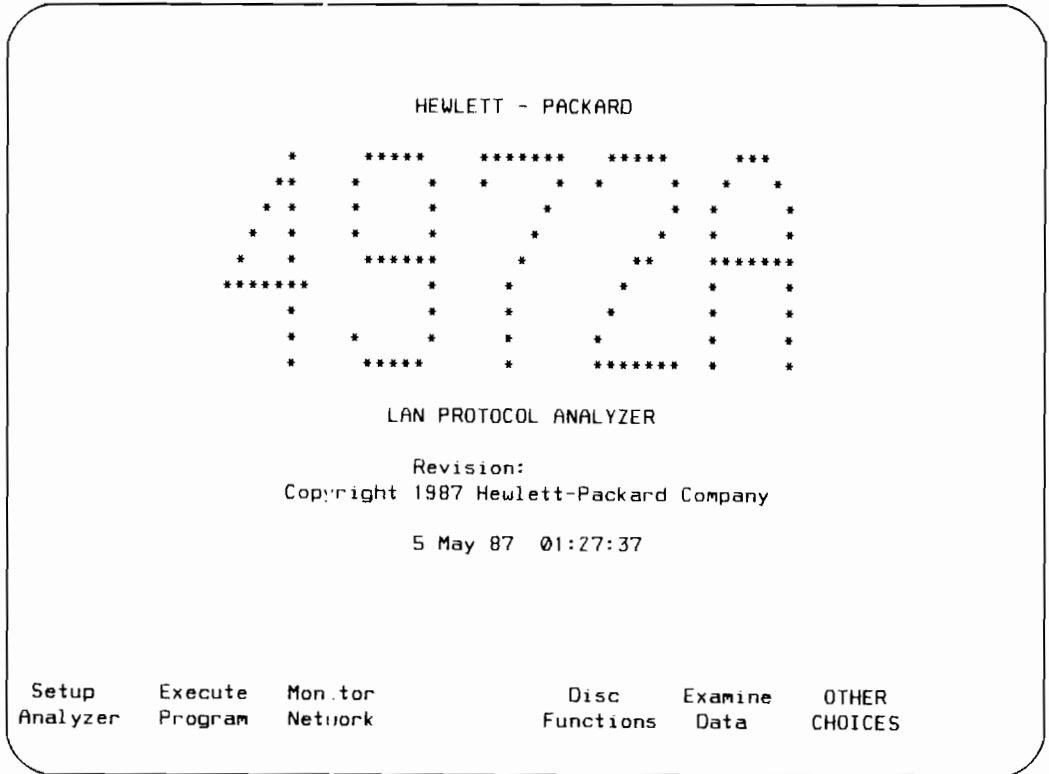
Pressing <OTHER CHOICES> lts you view the following softkeys:

```
  Printer   Hardware   Passwords   Set       Set                OTHER
  Functions Functions             Date      Time               CHOICES
```

Figure 3-6. The HP 4972A Top Level Menu Softkey Selections

Softkey Selections

The softkeys shown at the bottom of the display let you select the different protocol analyzer functions and then edit or control the functions.

Getting Started Chapter 1 discusses the softkey conventions. It also describes conventions used by the manual set.

The Setup Menu

You can configure or "setup" the HP 4972A to perform several functions. Appendix B of the Appendix Manual discusses these functions and the chapters in the HP 4972A Reference Manual present them in more detail.

The HP 4972A integrates the primary functions so you can view and reference them from several locations. For example, you can reference specific messages and filters specified in programs you create.

After you set up the HP 4972A for a particular application, you can save the setup information to a disc drive. You can recall this setup later from the disc drive and quickly load it into the HP 4972A. This feature makes it very convenient for you to store several setups for different applications and then quickly load the file for your current application.

From the Top Level Menu, press < Setup Analyzer > to display softkeys used to set up the protocol analyzer. The following chapters present each of the softkeys separately.

```
EDIT NODE LIST: This menu lets you define or edit  NODE NAMES  to be used
                in place of the 48-bit SOURCE or DESTINATION ADDRESSES in
                other menus or when viewing network traffic.

EDIT FILTERS:   This menu lets you define or edit  FILTERS  which you can
                use in a PROGRAM to control the gathering and the display
                of network traffic.

EDIT MESSAGES:  This menu lets you define or edit MESSAGES  which you can
                use in a PROGRAM to generate network traffic.

EDIT PROGRAMS:  This menu lets you define or edit PROGRAMS  which you can
                use to control  monitoring  the network  and  generating
                network traffic.   You can also use  PROGRAMS  to analyze
                previously-gathered data.

DISC FUNCTIONS: This menu lets you access the mass storage.

I/O FUNCTIONS:  This menu lets you control  another analyzer remotely  by
                setting up a serial data link between the two units.


  Edit      Edit      Edit      Edit      Disc      I/O             EXIT
Node List  Filters  Messages  Programs  Functions Functions
```

Figure 3-7. The Setup Menu

Setting Date and Time

Set the date and time at power up, or after any interruptions to the HP 4972A power, for these reasons:

- The analyzer attaches date and time stamps to frames as the buffer captures and stores them.

- When you store network or data files on a disc, the analyzer notes the time of the event.

Setting the Date

1. From the Top Level Menu, press <**Set Date**>.

2. Enter the date from the keyboard in the following format:

    day month year

    For example: Enter **28 Sep 88**   for September 28, 1988

    Separate each entry with a space and use the first three letters for the month. Enter values between and including 1 and 31 for the day. Enter values between and including 0 and 99 for the year. The analyzer displays the following error message if you enter a value outside of these ranges:

    VALUE TOO LARGE

3. Press [RETURN] to complete the entry.

Setting the Time

1. From the Top Level Menu, press < Set Time >.

2. The time entry must follow this format:

    hour minute second

    Separate each entry with a colon. You should use 24 hour entry to denote AM and PM. You can use 12 hour entry, if you prefer.

    For example: 9:30:00 = 9:30 AM
                        21:30:00 = 9:30 PM

    Enter the value for the hours, minutes, and seconds within the range of a 24-hour clock or the following error message appears on the display:

    VALUE TOO LARGE

3. Press [RETURN] to complete the entry.

Preventative Maintenance

In general, the HP 4972A does not require periodic maintenance. Use the following suggestions for general cleaning.

WARNING

Always disconnect power from the HP 4972A and any peripheral devices before cleaning them with a liquid solution.

The HP 4972A

To remove dirt and smudges from the HP 4972A, use a mild solution of dish washing detergent and water. Never use harsh chemicals to clean the device.

Printer

Periodically clean paper dust out of the printer. See the printer manual for details about maintenance of the print head cartridge.

Disc Drive

Make sure the shutter on the floppy disc is closed when any discs are not in use. Store the discs in a clean environment. Protect the discs from dust, fingerprints, and scratches.

Understanding Filters

Introduction

Use this chapter to help you understand what filters are and how the HP 4972A uses filters to enhance the power of the analyzer. This chapter contains:

- A description of filters
- A description of filtering capability in the HP 4972A
- A description of the HP 4972A filter construction
- Five filter applications to help you see the advantages of using filters in the analyzer

An Overview of Filters

This section contains a brief overview of filters and a description of the filtering capability in the HP 4972A. Filters greatly enhance the power of the protocol analyzer. The Edit Filters Menu lets you use this capability. Filtering frames on a LAN provides these benefits:

- more effectively uses buffer memory
- makes decisions in program flow
- interacts with network in real-time program execution
- filters on higher level protocol formats

Use filters to qualify which frames you want the analyzer to store in memory. The HP 4972A contains a large storage capacity; however, at a LAN transmission rate of 10 Mbits/second, the buffer memory will fill in a few seconds of heavy traffic. Filters let you store only the information that interests you. This expands the time the protocol analyzer can monitor the network.

Filtering offers more convenience than just providing more effective memory space. Without filters, each time the analyzer fills the memory you would have to scroll through the equivalent of many typewritten pages of information to find the specific message you want.

You can use filters with WAIT and IF commands to control the program flow in programs you create. These commands let you make branching decisions depending on filters matching or not matching conditions that occur in frames on the network.

Filters let you control the timers and counters available in programs you create. You can start, stop, and reset counters and timers by decisions made on filter conditions.

Filters let you choose what messages to store from specific stations and choose what response message to transmit in reply to specific stations. Frames received from an IEEE 802.3 or Ethernet LAN conform to a protocol standard. The standard assigns elements in the message to a particular byte or octet location. The elements and their assigned position within a frame are shown below.

```
Frame Element              Byte Location
Destination Address        1-6
Source Address             7-12
Type or Length field       13-14
Data field                 15-1515
        802.2 Header        15: DSAP field
        User selected--optional  16: SSAP field
                           17: 17-18 Control field
FCS (CRC error check)      Last 4 bytes in frame
```

```
Bytes -->
      6          6          2              46-1500              4

 |_____|_____|___|_._._._._____    ____|____|
    Dest       Source  Type/     .        Data            FCS
    Addrs      Addrs   Length    .
                         . 802.2.
                         . info .
```
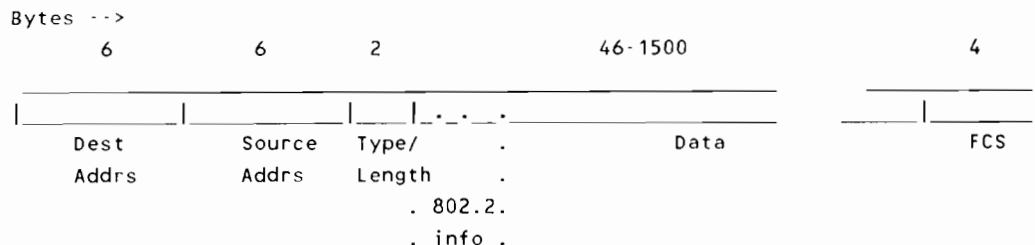
The HP 4972A Protocol Analyzer identifies bytes in frames from any station using Ethernet, IEEE 802.2, and IEEE 802.3 protocols and tests them for some particular content. Depending on whether the contents of a byte pass or fail a comparison test in the protocol analyzer, you can decide to keep or ignore the frame.

You can view the analyzer filter function as a set of 62 individual byte comparators. The analyzer assigns each comparator to a byte position within a frame. Each comparator can examine the contents of its assigned byte position within any frame received from the network.

The analyzer permanently reserves fourteen of the available 62 filter comparators to the **Destination Address, Source Address**, and **Type/Length** fields. It reserves two additional comparators: one for byte 15, the first byte in the **Data** field, and one to detect when the maximum frame length exceeds 2022 bytes.

Byte 15 can be a single byte filter field or it may be included as part of a larger filter field. In contrast, the length of the **Addresses** and **Type/Length** filter fields can not be changed.

```
62   Filter Comparator bytes available
16   Reserved filter bytes
     6     Destination Address
     6     Source Address
     2     Type/Length
     1     Data Byte 15
     1     Max length (byte 2023)
     ─────────────────────────
     16    Total

─────
46   Filter Comparator bytes available for user assignment
```

Filter Construction

I. Filter Definitions

A. You can define up to 16 filters.

B. Each filter includes **Address** fields, the **Type/Length** field and at least one **Data** field byte.

C. A filter can include 32 separate filter fields. Up to 29 of the 32 separate fields can be defined in the **Data** field.

```
 1    Destination Address field
 1    Source Address field
 1    Type/Length field
29    Data field

32    Separate filter fields
```

II. Filter Field Definitions

A.

Filter field length in bytes	Location
6 fixed	Destination Address
6 fixed	Source Address
2 fixed	Type/Length field
1-15 variable	Anywhere in Data field or in byte locations 1515--2022

B. Filter fields within a filter cannot share or overlap bytes.

C. Filter fields in different filters can share a byte comparator location.

1. The first time a different filter shares a byte comparator location, the analyzer reduces the "Filter bytes available" counter by one. As additional filters share the same byte comparator location, the "Filter bytes available" count will not decrease again.

Filter_0

```
         Dest    Source  Type                                        FCS
         Addrs   Addrs                           Data Field         (CRC)
         _____          _____
        |AAAAAA|AAAAAA|AA|A._.__._____          _____|___|
         1      7      1  1
                          3  5
```
If only the default 15 filter bytes are being used,
46 "Trapmachine Bytes Are Available"

Filter_1

```
         _____          _____
        |BBBBBB|BBBBBB|BB|3._.__._____          _____|___|
         1      7      1  1
                          3  5
```
FILTER_1 uses exactly the same filter byte locations as defined in
FILTER_0 except that new byte contents are entered.
46 "Trapmachine Bytes Are Still Available"

Filter_2

```
         _____          _____
        |CCCCCC|CCCCCC|CC|C._.__._____XXXXX_____          _____|___|
         1      7      1  1                     5    5
                          3  5                  1    5
```
FILTER_2 uses the same filter byte locations as defined in FILTER_0,
and 5 new filter bytes are assigned at byte locations 51-55.
41 "Trapmachine Bytes Are Available"

Filter_3

```
         _____          _____
        |DDDDDD|DDDDDD|DD|D._.__._____YYYYY_____          _____|___|
         1      7      1  1                     5    5
                          3  5                  4    8
```
If FILTER_3 uses the same filter byte locations as defined in FILTER_2
except that the 5 Data Field bytes are at locations 54-58,
then only 3 filter bytes are new locations.
38 "Trapmachine Bytes Are Available"

Figure 4-1. Example for "Filter Bytes Available"

Filter Applications

This section contains several filter applications for high level protocol analyzers.

The analyzer automatically enters the first three **FIELD LABELs** in the Edit All Fields Menu. You can enter **FIELD LABELS** to identify additional fields.

The examples do not show specific bytes in the filter fields. Instead, only the number of bytes in the field is shown. You can enter any specific byte you need to filter on.

Filter Example 1

Requirement: To define a filter that decodes level 3 Internet Protocol (IP) for ARPANET implementation.

```
FIELDS of FILTER #1   Label: Filter_IP_header      MINIMUM Frame Length =   33
        27 Filter hardware bytes available         MAXIMUM Frame Length = 2022
   BYTE        FIELD LABEL                     FIELD DATA
   ----        -----------------        ----------------------------------------
      1        DESTINATION              XX-XX-XX-XX-XX-XX     Node Name: -- Not Defined --
      7        SOURCE                   XX-XX-XX-XX-XX-XX     Node Name: -- Not Defined --
     13        TYPE                     XX-XX
     15        IP_Ver_Hdr_length        XX
     16        IP_Type_of_servic        XX
     17        IP_Total_Length          XX-XX
     19        IP_Identification        XX-XX
     21        IP_Flg_Frgmt_Ofst        XX-XX
     23        IP_Time_to_live          XX
     24        IP_Protocol              XX
     25        IP_Checksum              XX-XX
     27        IP_Source_address        XX-XX-XX-XX
     31        IP_Dest_address          XX-XX-XX-XX
```

Filter Example 2

Requirement: To define a filter that decodes level 4
                                                      Transmission Control Protocol (TCP)
                                                      commonly found in local area network
                                                      implementation.

```
FIELDS of FILTER #0   Label: Filter_TCP_header      MINIMUM Frame Length =   53
      26 Filter hardware bytes available            MAXIMUM Frame Length = 2022
   BYTE        FIELD LABEL                    FIELD DATA
   ....     ----------------      ----------------------------------------
     1      DESTINATION           XX·XX·XX·XX·XX·XX      Node Name: ·· Not Defined ··
     7      SOURCE                XX·XX·XX·XX·XX·XX      Node Name: ·· Not Defined ··
    13      TYPE                  XX·XX
    35      TCP_Source_port       XX·XX
    37      TCP_Dest_port         XX·XX
    39      TCP_Seq_number        XX·XX·XX·XX
    43      TCP_Dest_addr         XX·XX·XX·XX
    47      TCP_Flg_Ofst_Cflg     XX·XX
    49      TCP_Window            XX·XX
    51      TCP_CHECKSUM          XX·XX
    53      TCP_Urg_pointer       XX·XX
```

Understanding Filters   **4-7**

Filter Example 3

Requirement: To define a filter format that decodes a
                                                 combined level 4 Transmission Control
                                                 Protocol (TCP) and level 3 Internet
                                                 Protocol (IP).

```
FIELDS of FILTER #0    Label: Filter_TCP/IP_Hdr      MINIMUM Frame Length =   53
        7 Filter hardware bytes available            MAXIMUM Frame Length = 2022
BYTE        FIELD LABEL                        FIELD DATA
....        ..................    .................................................
   1        DESTINATION           XX-XX-XX-XX-XX-XX      Node Name: -- Not Defined --
   7        SOURCE                XX-XX-XX-XX-XX-XX      Node Name: -- Not Defined --
  13        TYPE                  XX-XX
  15        IP_Ver_Hdrlg_Type     XX-XX
  17        IP_Total_Length       XX-XX
  19        IP_Identification     XX-XX
  21        IP_Flgs_Ofst          XX-XX
  23        IP_T_live             XX-XX
  25        IP_Checksum           XX-XX
  27        IP_Srce_Dest_addr     XX-XX-XX-XX-XX-XX-XX-XX
  35        TCP_Srce_Des_addr     XX-XX-XX-XX
  39        TCP_Seq_number        XX-XX-XX-XX
  43        TCP_Dest_addr         XX-XX-XX-XX
  47        TCP_Data_Ofst_Cfg     XX-XX
  49        TCP_Window_Chksum     XX-XX-XX-XX
  53        TCP_Urg_pointer       XX-XX-
```

Filter Example 4

Requirement: To define a filter that decodes level 3
                                                      protocol for Xerox Network System
                                                      (XNS).

```
FIELDS of FILTER #0    Label: INTERNET_DATAGRAM      MINIMUM Frame Length =   43
        17 Filter hardware bytes available           MAXIMUM Frame Length =  800
    BYTE        FIELD LABEL                    FIELD DATA
    ----        ---------------      ------------------------------------------
      1      DESTINATION          XX-XX-XX-XX-XX-XX    Node Name: -- Not Defined --
      7      SOURCE               XX-XX-XX-XX-XX-XX    Node Name: -- Not Defined --
     13      TYPE                 06-00
     15      IDP_Checksum         XX-XX
     17      IDP_Length           XX-XX
     19      IDP_Transport_Cnt    XX
     20      IDP_Packet_Type      XX
     21      IDP_Dest_Net         XX-XX-XX-XX
     25      IDP_Dest_Host        XX-XX-XX-XX-XX-XX
     31      IDP_Dest_Socket      XX-XX
     33      IDP_Source_Net       XX-XX-XX-XX
     37      IDP_Source_Host      XX-XX-XX-XX-XX-XX
     43      IDP_Source_Socket    XX-XX
```

Filter Example 5

Requirement:

To define a filter that decodes a combined level 3 and level 4 protocol for Xerox Network System (XNS).

```
FIELDS of FILTER #0   Label: Sequenced_Packet     MINIMUM Frame Length =   55
      5 Filter hardware bytes available           MAXIMUM Frame Length = 2022
BYTE        FIELD LABEL                     FIELD DATA
----        ----------------      ------------------------------------------
  1     DESTINATION            XX-XX-XX-XX-XX-XX        Node Name: -- Not Defined --
  7     SOURCE                 XX-XX-XX-XX-XX-XX        Node Name: -- Not Defined --
 13     LENGTH (TYPE)          06-00
 15     Seq_Packet_Chksum      XX-XX
 17     IDP_Length             XX-XX
 19     IDP_Transport_Cnt      XX
 20     IDP_Packet_Type        05
 21     IDP_Destination        XX-XX-XX-XX-XX-XX-XX-XX-XX-XX-XX-XX
 33     IDP_Source             XX-XX-XX-XX-XX-XX-XX-XX-XX-XX-XX-XX
 45     SP_Connection_Cnt      XX
 46     SP_Datastream_Type     XX
 47     SP_Source_Conn_ID      XX-XX
 49     SP_Dest_Conn_ID        XX-XX
 51     SP_Sequence_Numb       XX-XX
 53     SP_Ack_Number          XX-XX
 55     SP_Allocation_Num      XX_XX
```

5

Creating and Sending a Message

Introduction

Use this chapter to learn how to create a message and send it to stations on the network. This chapter contains:

- Assign the network names
- Assign the network type
- Save the network type to the Config file
- Create a node list
- Assign the message labels
- Create the message
- Edit the filters
- Verify the message

The simplest way to send a message is to use all default menus and send Message_0. Creating a message may require coordination with other edit function menus. You may need to define node names and a filter before you create a message.

In the following example, you create a message for a station named **CPU1** to send to a station named **PRINT_SERVER**.

Entering the Edit Node List Menu

Use the following procedure to enter the Edit Node List Menu.

Procedure

1.   From the Top Level Menu, press <**Setup Analyzer**>.

2.   Press <**Edit Node List**>.   The HP 4972A displays:

```
NETWORK NAME : Network_0                    NETWORK TYPE :   ETHERNET

NODE #        NODE NAME            NODE ADDRESS        BUS POSITION      RESPONSE
- - - -     - - - - - - - - - - - - -     - - - - - - - - - - - - -          - - - -         - - - - - - - -
   1        HP_LAN_Analyzer      08-00-09-00-2A-D6          0          UNTESTED
```

```
Only first entry of default name and/or address will be saved.

Insert      Delete      Sort      Search                Purge              EXIT
 Node        Node       Nodes     For Node             Node List
```
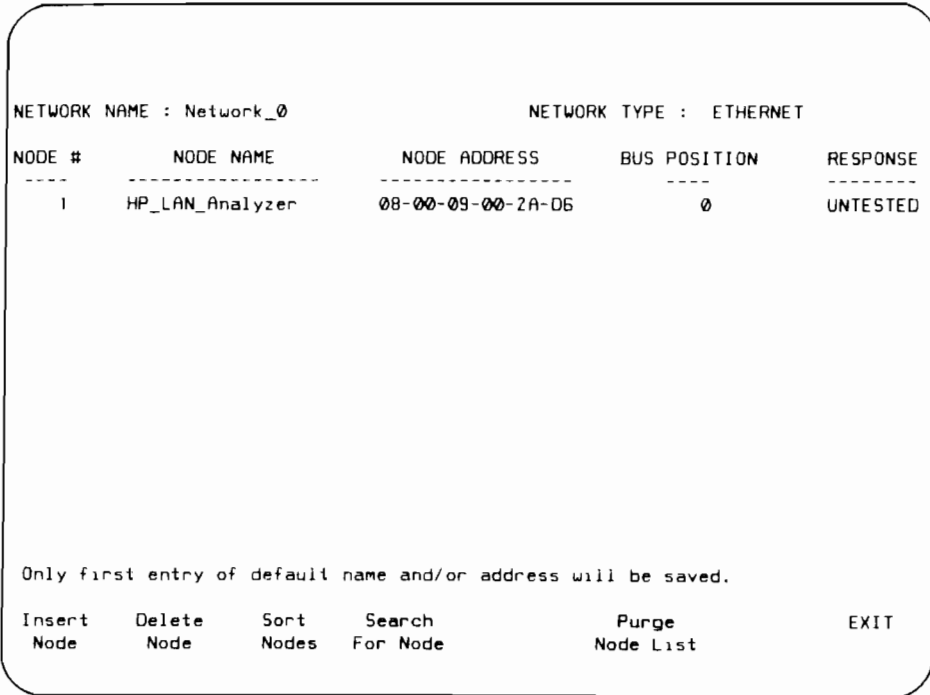
Figure 5-1. The Edit Node List Menu

3.   Use [UP-ARROW] and [DOWN-ARROW] to move the cursor to up and down between the fields.

Use [LEFT-ARROW] and [RIGHT-ARROW] to move the cursor character by character in the fields.

Use [TAB] or [RETURN] to jump from field to field. [RETURN] also creates new nodes if you press it when the cursor is in the last field of the last node.

4.   Press <**EXIT**> twice to get back to the HP 4972A Top Level Menu.

Naming the Network

Since a Local Area Network can communicate with other Local Area Networks, you may find it convenient to show the station names with the network name they are grouped under.

The analyzer displays a **NETWORK NAME** field at the top of the Edit Node List Menu. You can assign the network name any functional name that you want. The analyzer assigns it Network_0 as default network name.

The protocol analyzer cannot access or store files by the network name. The name is displayed for documentation purposes only.

```
NETWORK NAME : Network_0                    NETWORK TYPE :  ETHERNET

NODE #        NODE NAME           NODE ADDRESS          BUS POSITION      RESPONSE
----          -----------------   ------------------    ----              --------
  1           HP_LAN_Analyzer     08-00-09-00-2A-D6          0            UNTESTED
```

Procedure:

1. In the Edit Node List Menu, use [UP-ARROW] to move the cursor to the **NETWORK NAME** field.

2. Use the keyboard keys to enter the network name. You can use up to 17 characters for the network names. The analyzer deletes leading spaces and replaces spaces between characters with an underscore (_).

    For this example, type in **My network**.

3. Press [RETURN] or [TAB] to move the cursor to the **NETWORK TYPE** field.

    In the following task, you assign the Network type.

Assigning the Network Type

Use the **NETWORK TYPE** field displayed at the top of the < Edit Node List> Menu for
documentation purposes only.

```
NETWORK NAME : Network_0                    NETWORK TYPE :   ETHERNET

NODE #        NODE NAME            NODE ADDRESS         BUS POSITION      RESPONSE
----          ------------------   ------------------   ----              --------
  1           HP_LAN_Analyzer      08-00-09-00-2A-D6          0           UNTESTED
```

Procedure

1.   In the Edit Node List Menu, move the cursor to the Network Type field.

2.   For this example, use < ETHERNET>, the default condition for the HP 4972A.

      You can select either < ETHERNET>, < 10 MHz 802.3>, or < 1MHz 802.3> protocol.
      Select < ETHERNET> for 10BASE2 networks. Use < 1MHz 802.3> for 10BASE5
      networks.

Now you need to save the Network Type to the Configuration file so that you don't have to
rename it at each power cycle.

Save the Network Type to the Config File

The configuration file contains set-up information for several menus. It lets you save your modified HP 4972A set-up so that each time you cycle the power, you don't need to make the modifications again.

The network type is one example of set-up information that returns to the default state after you cycle the power unless you save it to the configuration file. Use the following procedure to save the set-up to the configuration file.

Procedure

1.   From the Edit Node List Menu, press <**EXIT**> twice to get to the Top Level Menu.

2.   Press <**Disc Functions**>.

3.   Press <**Save File**>.

4.   Press <**Other Choices**>.

5.   Press <**Config File**>.

      The analyzer saves the configuration file and returns to the Save File Menu.

6.   To get back to the Edit Nodes List Menu:

      - Press <**Exit**> twice.
      - Press <**Setup Analyzer**>.
      - Press <**Edit Node List**>.

For more information about saving the configuration file, see Disc Functions in the HP 4972A Reference Manual.

Edit Nodes

The Edit Node List Menu lets you create a node list that displays all the stations on your Local Area Network. The analyzer identifies nodes on the network by 6 byte hexadecimal numbers. This menu lets you assign a more readable name to each node. The names can be grouped by descriptive names such as:

- **Functional Description**   Print_server   Main_CPU
- **User Name**   CherylJ   JoeO
- **Group/Area Identity**   Finance123   EngLab1

The node names feature offers a real convenience in recognizing the identification of a node in the Examine Data Menu or while you view frames while monitoring the network. You can recognize station identities easier in filter summary or message summary displays where one display presents many nodes.

This step is optional to sending a message, however using labels for the Name, the Destination Address, and the Source Address make messages easier to recognize when you sort through a large list of messages. Define the labels in the Edit Nodes Menu.

In this example, assign the nodes the following names and addresses:

Node Names	Node Addresses
CPU1	08-00-09-0A-11-04
PRINT_SERVER	08-00-09-B1-00-12

Procedure

1. Position the cursor in **Node Name** field labeled Node #1 in the Edit Node List Menu.

    The **Node #** field is generated by the analyzer for easy reference when you view the node name list.

2. Press **< Insert Node >** .

    Notice that the analyzer inserts the new node immediately above the line containing the cursor. The analyzer automatically renumbers the Node Numbers.

3. Use the [ARROW] key to move the cursor to node #2 **Node Name** field.

    Use node names that help you recognize the specific station at a glance. Use up to 17 keyboard characters. The analyzer deletes leading spaces and replaces spaces between characters with an underscore (_).

    For this example, type in **CPU1**. Use the [SPACE] bar to eliminate the remainder of the letters from **HP_LAN Analyzer**, the analyzer default node name, in the node name field.

4. Press [TAB] or [RETURN] to complete the entry in that field.

    The cursor enters the **Node Address** field.

5. The **Node Address** field is the destination or source address used specifically for that node on the network. The address entry needs six bytes. Use hexadecimal characters.

    For this example, type in **08-00-09-0A-11-04**.

6.   Press [TAB] or [RETURN] to complete the entry in that field.

      The cursor enters the **Bus Position** field.

7.   The **Bus Position** field is for documentation purposes to help you identify your network. You can use up to four numeric characters.

      For this example, leave the Bus Position in the default condition which is **0**.

8.   Press [RETURN] and create a node in the Node #3 position named **PRINT_SERVER** with node address **08-00-09-B1-00-12**.

Your HP 4972A Edit Node List Menu looks like this:

```
NETWORK NAME  :  NETWORK_0                        NETWORK TYPE : ETHERNET
NODE #     NODE NAME         NODE ADDRESS         BUS POSITION      RESPONSE
   1       HP_LAN_Analyzer   08-00-09-00-8A-96         0           UNTESTED
   2       CPU1              08-00-09-0A-11-04         0           UNTESTED
   3       PRINT_SERVER      08-00-09-B1-00-12         0           UNTESTED
```

For more information on creating, editing, deleting, sorting, and searching the Node List, see Creating a Node List in the HP 4972A Reference Manual.

Entering the Edit Messages Menu

Use the following procedure to enter the Edit Messages Menu.

1. From the Top Level Menu, press <Setup Analyzer>.

2. Press <Edit Messages>. The HP 4972A displays:

```
MESSAGE   MESSAGE            DESTINATION         SOURCE        FRAME  FRAME       FCS
  #       LABEL              ADDRESS             ADDRESS       TYPE   LENGTH    VALUE
  -     ----------------   ------------------  ------------------  -----  ----  -----------
  0    Message_0          (X0-00-00-00-00-00  HP_LAN_Analyzer    00-00    60  Good
  1    Message_1          (X0-00-00-00-00-00  HP_LAN_Analyzer    00-00    60  Good
  2    POLL_CPU           COMPUTER_1          HP_LAN_Analyzer    00-00    60  Good
  3    PRINT_TEST         PRINT_SERVER        HP_LAN_Analyzer    00-00    60  Good




    Add       Delete    Show Node  Show Hex              Edit      OTHER      EXIT
  Message    Message    Names • Addresses             Datafield  CHOICES
```

Figure 5-2. The Edit Messages Menu

3. Use [UP-ARROW] and [DOWN-ARROW] to move the cursor to up and down between the fields.

   Use [LEFT-ARROW] and [RIGHT-ARROW] to move the cursor character by character in the fields.

   Use [TAB] or [RETURN] to jump from field to field. [RETURN] also adds new message labels if you press it when the cursor is in the last field of the last message.

4. Press <EXIT> twice to get back to the HP 4972A Top Level Menu.

Assign the Message Labels

In the Edit Messages Menu, you can assign a **Message Label** to describe the contents or the purpose of your message.

The **Destination Address** is the network address of the node receiving your message. You assigned the node address of the receiving station in the preceding step:

Node Name	Node Address
PRINT_SERVER	08-00-09-B1-00-12

The **Source Address** is the network address of the transmitter of the message. You assigned the node address of the transmitting station in the preceding step:

Node Name	Node Address
CPU1	08-00-09-0A-11-04

Use the following procedure to assign the message label for this example:

Procedure

1. Place the cursor in the **Message Label** field.

2. Use the keyboard to type your Message label. For this example, type **ALPHABET**.

3. Use [TAB] to move the cursor to the **Destination Address** field. Type the address for Print_Server, which is **08-00-09-B1-00-12**.

4. Use [TAB] to move the cursor to the **Source Address** field. Type the address for CPU1, which is **08-00-09-0A-11-04**.

The display looks like this:

MESSAGE #	MESSAGE LABEL	DESTINATION ADDRESS	SOURCE ADDRESS	FRAME TYPE	FRAME LENGTH	FCS VALUE
0	ALPHABET	08-00-09-B1-00-12	08-00-09-0A-11-04	00-00	60	GOOD

5.   Press <Show Node Names>.

The Destination and Source Addresses convert to their equivalent labels as shown below.

The display looks like this:

MESSAGE #	MESSAGE LABEL	DESTINATION ADDRESS	SOURCE ADDRESS	FRAME TYPE	FRAME LENGTH	FCS VALUE
0	ALPHABET	PRINT_SERVER	CPU1	00-00	60	GOOD

Create the Message Data Field

In the Edit Messages Menu, use < Edit Datafield > to create the data field.

When you create a message, be aware that it's easier to move the cursor to the equivalent CHARACTER DATA field and type your message from the keyboard. However, if you have memorized the hex values for ASCII or EBCDIC characters, you can enter your text directly in hex code in the HEX DATA Field.

When you enter characters in the CHARACTER DATA Field, the equivalent HEX DATA Field display updates after you press [RETURN] or [TAB].

Use the following procedure to edit the datafield.

Procedure

1. While the cursor is in Message # 0 (Your message labeled Alphabet), press < Edit Datafield >.

2. Use [TAB] to move the cursor to the Character Data field.

3. Type the following data:

    ▪ The alphabet (a-z) in lower case
    ▪ The numerals 0 through 9
    ▪ The alphabet in upper case
      (A through J only)

Example message for Edit Datafield:

```
DATA FIELD of MESSAGE 0                              MESSAGE Label: ALPHABET
                                                     FRAME Length:   60 Bytes
LINE    BYTES                     HEX DATA           CHARACTER DATA
 1      15....29    61-62-63-64-65-66-67-78-79-6A-6B-6C-6D-6E-6F    abcdefghijklmno
 2      30....44    70-71-72-73-74-75-76-77-78-79-7A-30-31-32-33    pqrstuvwxyz0123
 3      45....59    34-35-36-37-38-39-41-42-43-44-45-46-47-48-49    456789ABCDEFGHI
 4      60....60    4A                                              J
```

Notice that the default data field length is 60 bytes. You can increase or decrease the data field to meet your message length by using **FRAME LENGTH** field, **< Insert Bytes >**, or **< Delete Bytes >**.

Edit the Filters

You do not have to do this step to get your message transmitted. However, the filters function does provide a convenient feature for you.

In some messages, you may want the data field to contain control or protocol information at specific byte locations. By specifying a filter to contain the byte locations you are interested in, you easily verify if your message meets your protocol.

In this example, a computer sends a message on the network to a print server. Usually some protocol or formatting control information accompanies messages to a print server.

The protocol or control information has to occur at specific locations in the data field. In the following example for Edit Filters, the analyzer displays the bytes at byte locations **15, 25,** and **50** in the data field.

Procedure

1.   From the Edit Message Menu, press < EXIT > to get to the Setup Analyzer Menu.

2.   Press < Edit Filters >.

3.   Press < Edit all Fields >.

4.   Move the cursor to the **MINIMUM Frame Length** field. You need to increase the minimum frame length for this example.

     Type **53** from the keyboard.

5.   Use [TAB] to enter the **Data Field Label**.

6.   For this example, type **Byte 15**.

7.   Press [RETURN] twice to create a new byte field.

8.   Type **25** into the **Byte** field and **Byte 25** into the **Field Label** field.

9.   Press [RETURN] twice to create a new byte field.

10. Type **50** into the **Byte** field and **Byte 50** into the **Field Label** field.

The display looks like this:

```
FIELDS of FILTER #0              Label: Filter 0         MINIMUM Frame Length =   53
      46 Filter hardware bytes available                 MAXIMUM Frame Length = 2022
BYTE       FIELD LABEL                            FIELD DATA
  1     DESTINATION              XX-XX-XX-XX-XX-XX        Node Name:  Not Defined
  7     SOURCE                   XX-XX-XX-XX-XX-XX        Node Name:  Not Defined
 13     TYPE                     XX-XX
 15     Byte 15                  XX
 25     Byte 25                  XX
 50     Byte 50                  XX
```

For now, the contents of the filter don't need to match your specific message. You are primarily interested in identifying the data field byte locations.

Press <EXIT> twice to get back to the Setup Analyzer Menu.

Compare Message Data Field to Filter Format

This step compares the message to your filter pattern. You can easily verify the header labels of the message and also see if your protocol and format characters are correct in the data field.

1. Press < Edit Messages >.

2. Position the cursor in any field of the your message.

3. Press <OTHER CHOICES>.

4. Press <Format As Filter >.

5. Select the softkey that identifies the filter you want for your message pattern. In this case, Filter_0.

Example of Message in Format as Filter mode:

```
MESSAGE #0 in format of FILTER_0                    MESSAGE Label:  alphabet
                                                    FRAME Length:  60 Bytes
FIELD LABEL                    HEX DATA                     CHARACTER DATA
─────────────────────────────────────────────────────────────────────────
DESTINATION    08-00-09-B1-00-12   Node Name:  PRINT SERVER
SOURCE         08-00-09-0A-11-04   Node Name:  CPU1
TYPE           00-00
Byte 15        61                                              a
Byte 25        6B                                              k
Byte 50        39                                              9
```

Define the filter pattern with a FRAME Length long enough to show all the characters in the message data field.

Summary

The outline below shows the steps you used to create a message.

1. **Edit Nodes**

    Name the network

    Assign the network type

    Assign user labels to the stations assigned HEX code address.

2. **Edit Messages Menu**

    Name the message and identify the Destination and Source Addresses.

    Enter the data field contents.

3. **Edit the Filters**

    This menu lets you edit your message in a particular filter format.

    In some messages, you may want the data field to contain specific information at specific byte locations. By defining a filter to conveniently display the byte locations you are interested in, you can easily verify that your message meets your protocol.

4. **Edit Messages Menu**

    The filter format from step 3 let you verify that your new message meets your filter specifications.

6

Programming Examples

Introduction

This section demonstrates using timers, counters, messages, and filters in programs. Program Example 1 gives you step-by-step instructions on how to enter the program. Program Examples 2 through 5 list the requirements and conditions for the program so that you can experiment entering the programs yourself. After each example the program is listed.

This chapter contains programming edits using:

- Timers
- Counters
- Frame traits
- Filters
- Messages

Program Example 1

Requirement: You want to know how many network collisions and frames with bad FCS occur in a five minute period. You also want to mark all frames occurring with a bad FCS.

Conditions: You need to define the following items:

- A timer named DURATION
- A counter named CNT_FCS

When the program ends, the protocol analyzer displays the Timers & Counters Menu.

Procedures

Use the following procedures to enter your program. If you are not connected to a network, the program is just a lesson in entering a program. If you are connected to a network, the program runs and gives you the number of network collisions and frames with bad FCS, as well as mark all frames occurring with a bad FCS, in a five minute period.

Select Frame Traits

1. From the Top Level Menu, press:

   - < Setup Analyzer >
   - < Edit Filters >
   - < Other Choices >
   - < Select Traits >

2. For this example, you want to mark all frames with a bad FCS. Use the softkeys to get the following frame traits on the HP 4972A display:

   ```
   Reject      Frame with GOOD FCS
   Accept      Frame with BAD FCS
   Reject      MISALIGNED Frame

   Reject      RUNT Frame
   ```

3. Press < Exit > twice to get to the Setup Analyzer Menu.

Starting Program 1

1. From the Setup Analyzer Menu, press:

   - < Edit Programs >
   - < Program_0 >

   The display looks like this:

   ```
   Store:  all frames
           nonstop
   Log file:  not usec

   Block 1:
   ```

2. Use the [UP-ARROW] key to highlight **until full** on the screen. Press < **Nonstop** >.

   The buffer continues to receive frames nonstop for the time specified in the program rather than to stop when it is full.

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Block 1

1. Use the [DOWN-ARROW] key to move the cursor to the comment field next to **Block 1**. Enter the following comment:

   `# of network collisions & frames w/bad FCS in 5 minute period`

   Comments are for documentation purposes only. Comments are explanatory notes to help you understand what the program is doing. They are critical in making the program understandable but not necessary to make the program run.

2. Press:

   < End Comment >
   < Start >
   < Timer >

3.   Define a timer named DURATION:

      ■ Press <OTHER CHOICES> twice.
      ■ Press <Rename Timers>.
      ■ Type Duration in the Timer_0 field.
      ■ Press <Return to Program>.

4.   The analyzer displays the new timer as a softkey on the display. Press <Duration>.
      The display looks like this:

```
Store:  all frames
        until full

Log file:  not used

Block 1:  #_of_network_collisions_&_frames_w/bad_FCS_in_5_minute_period
```

5.   Press:

      ■ <And Then>
      ■ <Start>
      ■ <Collision Counter>

6.   Define a collision counter named Collision:

      ■ Press <Other Choices> twice.
      ■ Press <Rename Counters>.
      ■ Type Collision in the Counter_0 field.
      ■ Press <Return to Program>.

7.   The analyzer displays the new counter as a softkey on the display. Press <Collision>.
      The display looks like this:

```
Store:  all frames
        nonstop

Log file:  not used

Block 1:  #_of_network_collisions_&_frames_w/bad_FCS_in_5_minute_period
   Start timer DURATION
      and then
   Start collision cntr COLLISION
```

8.   Press <Next Block>.

Block 2

1. For this example, bypass the comment field. The program is short and the comment in Block 1 adequately describes what the program does.

    Press < End Comment >.

2. Press:

    - < When (event) >
    - < Timer >
    - < Duration exceeds >

3. Type in 300 and press < seconds >. The analyzer displays the following:

    When timer duration exceeds 300 seconds then go the block 3

4. Change block 3 to block 4 by typing a 4 into the field and press < Return >.

5. Press:

    - < Else When >
    - < Frame Matches >
    - < Frame Traits >
    - < Then Go to Bloc <>

    The analyzer automatically inserts the next block (Block 3) in the **Then Go to Block** Statement.

6. Block 2 looks like this:

    Block 2:
        When timer DURATION exceeds 300 seconds then go to block 4
        else when frame matches Frame Traits then go to block 3

7. Press:

    - [RETURN]
    - < Next Block >

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Block 3

1. Press:

   - <End Comment>
   - <Increment Counter>

2. Define a collision counter named CNT_FCS:

   - Press <Other Choices> twice.
   - Press <Rename Counters>.
   - Type CNT_FCS in the Counter_1 field.
   - Eliminate the excess letters in the field with the [SPACE] bar.
   - Press <Return to Program>.

3. The analyzer displays the new counter as a softkey on the display.

   Press <CNT_FCS>.

4. Press:

   - <And Then>
   - <OTHER CHOICES>
   - <Mark Frame>
   - <And Then>
   - <Go to Block>

5. Type a **2** into the Block field.

6. Press:

   - [RETURN]
   - <Next Block>

   Block 3 looks like this:

   ```
   Block 3:
      Increment Counter CNT_FCS
          and then
      Mark Frame
          and then
   Go to Block 2
   ```

Block 4

1.   Press:

- <End Comment:>
- <Start>
- <Display>
- <And Then>
- <Stop>
- <OTHER CHOICES>
- <Test>

Below is a listing of the complete program:

Program 1:

```
Store: all frames
        nonstop

Log File:  not used

Block 1:  #_of_netwcrk_collisions_&_frames_w/bad_FCS_in_5_minute_period
        Start timer DURATION
                and then
        Start collision cntr COLLISION

Block 2:
        When timer DURATION exceeds 300 seconds then go to block 4
        else when frame matches Frame Traits then go to block 3

Block 3:
        Increment counter CNT_FCS
                and then
        Mark frame
                and then
        Go to block 2

Block 4:
        Start display
                and then
        Stop test
```

When the program ends, the protocol analyzer displays the Timers & Counters Menu.

Program Example 2

Requirement: You want to view your network for 60 seconds. During that time, you want to count how many times three different types of addresses occur in the frames seen. In addition, you want to count the total number of frames received during the 60 second period.

Conditions: You need to define the following items:

A timer named DURATION

A counter named TOT_FRAME
A counter named CT_GLOBAL
A counter named CT_LOCAL
A counter named CT_BROAD

A filter named GLOBAL
A filter named LOCAL
A filter named BROADCAST

The three filters test the address fields in each frame to see how they are administered. The address tests are: Local, Global, and Broadcast.

The filters you define use the Destination and Source Address Fields to determine what type of frame the buffer receives.

Program 2:

```
Store: all frames
        nonstop

Block 1:
        Start timer DURATION
                and then
        Start frame counter TOT_FRAME

Block 2:
        When timer DURATION exceeds 60 seconds then go to block 6
        else when frame matches GLOBAL then go to block 3
        else when frame matches LOCAL then go to block 4
        else when frame matches BROADCAST then go to block 5

Block 3:
        Increment counter CT_GLOBAL
                and then
        Go to block 2

Block 4:
        Increment counter CT_LOCAL
                and then
        Go to block 2
Block 5:
        Increment counter CT_BROADCAST
                and then
        Go to block 2

Block 6:
        Start Display
                and then
        Stop test
```

Program Example 3

Requirement: You want to know how often a particular frame with Ethernet
                 Type 06-00 occurs. You also want to know when a frame with a
                 length of 500 bytes occurs. When either of these frames occur,
                 you want to mark the frame. You need to know how many
                 times these two events occur in a 60 second period.

Conditions: You need to define the following items:

                 A timer named DURATION

                 A counter named CT_TYPE
                 A counter named CT_LENGTH

                 A filter named TYPE_06_00
                 A filter named LENGTH_500

This program tests for two different conditions both detected by filters.

Program 3:

```
Store:all frames
        nonstop
and then

Block 1
        Start timer DURATION
                and then
        Start frame counter TOT_FRAME

Block 2:
        When timer DURATION exceeds 60 seconds then go to block 6
        else when frame matches TYPE_06_00
        and LENGTH_500 then go to block 3
        else when frame matches TYPE_06_00 then go to block 4
        else when frame matches LENGTH_500 then go to block 5

Block 3:
        Increment counter CT_TYPE
                and then
        Increment counter CT_LENGTH
                and then
        Mark Frame
                and then
        Go to Block 2

Block 4:
        Increment counter CT_TYPE
                and then
        Mark frame
                and then
        Go to block 2

Block 5:                                Block 6:
        Increment counter CT_LENGTH             Stop timer DURATION
                and then                                and then
        Mark frame                              Start display
                and then                                and then
Go to block 2                           Stop test
```

Program Example 4

Requirement: You want to know the length of frames occurring on the
                 network. You need to know the distribution of frames within
                 several ranges of frame length.

                 You want to use the following ranges:

                 51-100 bytes
                 101-500 bytes
                 501-2022 bytes

Conditions: You need to define the following items:

                 A timer named DURATION

                 A frame counter named TOT_FRAME

                 A counter named 51_100
                 A counter named 101-500
                 A counter named 501_2022

                 A filter named FILTER_51_100
                 A filter named FILTER_101_500
                 A filter named FILTER_501_2022

The filters look for frame lengths within certain ranges. As the filters match, the analyzer
increments a corresponding counter.

Program 4:

```
Store: all frames
       nonstop

Block 1:
       Start frame counter TOT_FRAME
               and then
       Start timer DURATION

Block 2:
       When timer DURATION exceeds 30 seconds then go to block 6
       else when frame matches FILTER_51_100 then go to block 3
       else when frame matches FILTER_101_500 then go to block 4
       else when frame matches FILTER_501_2022 then go to block 5

Block 3:
       Increment counter 51_100
               and then
       Go to block 2

Block 4:
       Increment counter 101_500
               and then
       Go to block 2

Block 5:
       Increment counter 501-2022
               and then
       Go to block 2

Block 6:
       Stop timer DURATION
               and then
       Start display
               and then
       Stop test
```

Program Example 5

Requirement: You want to send messages to all nodes on the Edit Node List
                            and record the response. You want to know if each node had a
                            positive or negative response.

Conditions: You need to define the following items:

                            A filter named Response_Filter

                            A timer named Timeout_1

                            A message named Test_Msg_1

                            A node list with nodes existing on your network.

The program sends messages to nodes on the node list and looks for a response. If a node
responds within 50 ms, the analyzer enters a POSITIVE response in the Node List Menu. If a
node does not respond within 50 ms, the analyzer enters a NEGATIVE response in the Edit
Node List Menu.

Program 5:

```
Store:frames matching Response_Filter
        nonstop

Log file: not used

Block 1:
        Reset timer Timeout_1
                and then
        Start Timer Timeout_1
                and then
        Send message Test_Msg_1 to next node: if all sent go to block 4
                and then
        When frame matches Response_Filter
                and current node address then go to block 2
        else when timer Timeout_1 exceeds 50 ms then go to block 3

Block 2:
        Record positive response
                and then
        Go to Block 1

Block 3:
        Record negative response
                and then
        Go to block 1

Block 4:
Stop Test
```

Summary

This chapter helped you get acquainted with the programming function available in the HP 4972A. For more information about the softkeys available in the programming function, see Programming the HP 4972A in the HP 4972A LAN Protocol Analyzer Reference Manual.

7

Displaying the Data

Introduction

This section provides a summary for viewing data during a program run. There are two modes of display available in programs:

- Selective Display
- Continuous Display

The selective display mode can be used to selectively display frames under program control. The continuous display mode will update the display continuously under program control.

The **HP 4972A** default mode during a program run does not display data. This lets the protocol analyzer more easily keep up with traffic on the network during heavy network loads. Displaying frames or timers and counters slows the processor operation and may cause it to get behind in its task of capturing frames occurring on the network. When the processor gets behind, it halts the program run. For this reason, the analyzer lets you choose the display mode.

Selective Display Mode

< Display Frames > activates the selective display mode. This command causes a single frame (the last frame processed by the program) to be displayed in the format you chose in the Examine Data Menu. Use this selective display mode when it is desirable to have rarely occurring frames displayed while storing more frequently occurring ones.

When you use selective display, the dashed line between frames indicates they are not necessarily adjacent in the buffer.

Example: Display Selected Frames

Problem:

You run a protocol containing acknowledgments frame. You suspect an acknowledgment occasionally gets lost because of a bad FCS or alignment error. To test this, use the Edit Filters Menu to define an acknowledgment frame filter. Name the filter "ack_frame" and press < Select Traits >. Frame Traits should be selected to Accept Frame with BAD FCS and Misaligned frames. You will Reject Frames with GOOD FCS and RUNT frames. With these frame traits selected, write the following program.

Program:

```
Store: frames matching ack_frame
       nonstop

Block 1:
       When frame matches ack_frame
           as well as Frame Traits then go to Block 2

Block 2:
       Display frame
           and then
       Go to Block 1
```

Summary:

This program stores all "ack_frames" but displays only the frames containing a frame error.

Continuous Display Mode

You can access two different formats in the continuous display mode:

- Counters & Timers
- Frames

Counters & Timers

The analyzer updates the counters and timers much quicker than it can display frames in this display mode. To access the continuous mode, press <Start> and <Display>. The command remains in effect until the analyzer encounters a <Stop> <Display> command. Use this mode for viewing data on a lightly loaded or heavily filtered network.

The continuous display mode defaults to the Counters & Timers Display at the start of a run. When you execute <Start> <Display> (with one exception, described below) the analyzer displays Counter & Timer data and continually updates the data. With Counters & Timers display active, <Display Frames> appears and you can use it to switch the display to Frames.

Frames

The continuous frame display shows all frames stored as the "Store" line receives them. The analyzer displays adjacent frames, so dashed lines do not appear between them. This form can be accessed in one of two ways: either by pressing <Display Frames> in the Counters & Timers display or by using <Display Frame>. When you press <Display Frame> in between <Start> <Display> and <Stop> <Display>, the display starts off in the Counters & Timers format and then switches to the display frames format. When operating in the continuous frames display, the analyzer displays <Counters & Timers> and you can use it to return to the continuous Counter & Timers display.

The <Stop> <Display> command automatically switches the continuous display form back to Counters & Timers. Therefore, to switch back from the frame display mode to the Counters & Timers mode, you need only stop the display and then start it again.

Displaying the Data

Example: Count Frames and Display
Counters & Timers Continuously

Program:

```
Store: all frames
        nonstop

Block 1:
        Start display
          and then
        Start frame counter all_frame
```

Example: Display all Frames Continuously

Program:

```
Store: all frames
        nonstop

Block 1:
        Display frame
          and then
        Start Display
```

Displaying
the Data

Example: Alternate Displaying Counters and
              Timers with Frames

Problem: To count frames, display Counters & Timers for five seconds,
                        switch to displaying Frames for five seconds, and then switch
                        back to Counters & Timers.

Program:

```
Store: all frames
       nonstop

Block 1:
       Start timer 5_secs
           and then
       Start frame counter all_frames

Block 2:
       Start display   (begins Counter & Timer display)
           and then
       When timer 5_secs exceeds 5 seconds then go to Block 3

Block 3:
       Reset timer 5_secs
           and then
       Display frame   (switches display to frames)
           and then
       When timer 5_secs exceeds 5 seconds then go to Block 4

Block 4:
       Stop display
           and then
       Reset timer 5_secs
           and then
       Go to Block 2
```

Displaying
the Data

Displaying
the Data

8

Using Master/Slave

Introduction

The Remote operation (master/slave) lets you view the operation of a Local Area Network (LAN) or LAN segment from a site not directly adjacent to the LAN. For example, you could view all the LANs in your company from one remote location.

Performing HP 4972A logic analyzer operations on a LAN from a remote location requires two HP 4972A instruments. Primary capabilities or features offered by using two HP 4972As in master/slave operation are:

- Testing a LAN from a remote location
- Selecting a printer located at the master or slave location
- Selecting a mass storage located at the master or slave location

You must connect your two HP 4972A systems by an RS-232C link. Option 002 provides an RS-232C Remote Communications Interface package which includes an interface board and cables. Each station requires an Opt. 002 to be installed in the HP 4972A.

In remote operation, the master protocol analyzer shows the same screen display that the slave protocol analyzer would display if it were under local control.

The keyboard of the master unit is the controlling keyboard. Press [BREAK] to regain local keyboard control at either the master or slave location. [BREAK] disconnects the RS-232 link and returns both units to local operation.

When an HP 4972A is linked for remote operation it communicates with another station with DDCMP protocol. This protocol lets stations send and receive data or command information with the protocol handling the problems of framing, error control, sequence control, and message transparency.

The protocol makes sure that one station receives information and the other station transmits information at the right time. The protocol automatically handles retransmission in case of errors.

Edit the I/O Configuration

Communication between the master and the slave protocol analyzers occurs over an RS-232 link. At power on, the protocol analyzer automatically loads your configuration.

To change the power-on configuration:

1. From the Top Level Menu, press <Setup Analyzer>.

2. Press <I/O Functions>.

3. Press <Edit Config.>. The HP 4972A display looks like this:

```
RS-232 Configuration
     Baud rate:              1200
     Stop bits:              1
     Parity bit:             None        (Defaulted by protocol selection)
     Bits/character          8           (Defaulted by protocol selection)
     Hardware handshake      Disabled
     Software handshake      Disabled     (Defaulted by protocol selection)



Remote protocol:  DDCMP

     DDCMP timeout:          3 seconds
     DDCMP buffer size:      512 bytes
```

Figure 8-1. Editing I/O Functions

4. After you define a new configuration, use <Save Config> to rewrite the configuration to the disc volume currently selected in the Disc Functions Menu.

Capturing a Slave LAN Protocol Analyzer

The following procedure describes how you can designate an analyzer as the slave in the Master/Slave operation.

Procedure

1. From the Top Level Menu, press:

    - < Setup Analyzer >
    - < I/O Functions >

2. Press < Capture Slave >.

    < Capture Slave > starts the process of combining two HP 4972A systems into a master/slave operation. The protocol analyzer where this softkey is pressed becomes the master or controlling device. The other HP 4972A then becomes the slave or measuring device.

    After you press < Capture Slave >, the master analyzer displays:

    ```
    To terminate Master - Slave mode, hit the "BREAK" key.

    Waiting for permission to take control.  IO:            :
    ```

3. The master analyzer then establishes contact with the slave. After contact is established, the slave displays the following message and softkeys:

```
A request to take over control has been received
over the I/O. So you wish to relinquish control?
If you do not respond in 10 seconds, control will
be given to the requesting device.
```

```
     Allow                              Block
    Takeover                          Takeover
```

If you do not want to loose control at the slave unit, you must press < Block Takeover> within 10 seconds. If you do not, the slave defers control to the master device.

After the master captures control of the slave protocol analyzer, the master displays the Top Level Menu and the message:

```
You are now controlling the remote analyzer. IO:    :
```

After capture, the slave displays the message:

```
This instrument is being remotely controlled.
```

```
Hit "BREAK" key and wait to regain control.
```

If no RS-232 link up occurs, the master cannot capture control of the slave protocol analyzer and the master displays:

```
Slave is not responding
```

Troubleshooting Capture Slave

If the master HP 4972A can not capture control of the slave HP 4972A, follow the steps below.

1. Press <I/O Functions> at each device. Verify that the configuration table is the same for each device.

2. Verify that <Enable I/O*> is active at each protocol analyzer. (*) is displayed when it is enabled.

    If an IO message is displayed in the lower right corner of the screen, see the IO STATUS tables in the Master/Slave section of the HP 4972A Reference Manual for how to read the status message.

3. Verify that the connections from the protocol analyzers to each modem are secure.

Example: Usirg the HP Support Link Modem

1. Sct the HP 4972A Configuration Menu parameters as follows:

Baud Rate:	1200
Stop Bits:	1
Parity Bit:	None
Bits/Char:	8
Hardware Handshake:	Full Duplex; modem connection
Software handshake:	Disabled

2. Use the following modem strings (ASCII 7-bit or 8-bit data code):

    Caller:

    ```
    [CTRL-E]CR/10CR/11CR/13CR/1CR/1DCR/1//number/CR/1CR/1
                |
                |_ letter 'O'
    ```

    Unit to be called:

    ```
    [CTRL-E]CR/10CR/13CR/1CR/1ICR/1
                |            |
                |            |_ letter 'I'
                |_ letter 'O'
    ```

[CTRL-E]	=	[CTRL] plus [E]
CR	=	[RETURN]
number	=	Telephone number (1 or more digits)

3. Before pressing **< Save Config. >** to save the configuration, check that the following softkeys are enabled:

    < Send At Power On* >   **< I/O Enabled* >**

Example: Using the Hayes Smartmodem 1200

1. Set the configuration switches for the Hayes "Smartmodem 1200" as follows (switches are behind the front panel):

S1 Down	S5 Up
S2 Up	S6 Up
S3 Down	S7 Up
S4 Up	S8 Down

2. Set the HP 4972A configuration menu parameters as follows:

Baud Rate:	1200
Stop bits:	1
Parity Bit:	None
Bits/Char:	8
Hardware Handshake:	Full duplex; modem connection
Software Handshake:	Disabled

3. Use the following modem strings:

Caller:	/2+++/2ATZ^{C}R/1ATD//#/^{C}R/1
Unit to be called:	/2+++/2ATZ^{C}R/1

    ^{C}R = [RETURN]

    \# = TELEPHONE NUMBER (1 or more digits)

4. Before pressing < Save Config. > to save the configuration, check that the following softkeys are enabled:

< Send At Power On* >	< I/O Enabled* >

Enabling I/O Operation

<Enable I/O> enables the HP 4972A LAN Protocol Analyzer to communicate with another HP 4972A. It acts as a toggle switch. An asterisk (*) is displayed when the function is on. Press the softkey again to remove the (*) and disable the function.

This softkey also enables a status message field to help you know what activity is occurring on the master/slave link. This status field is located at the lower right corner of the display, just above <EXIT>. IO status messages are discussed on the following pages. This softkey must be off in order to <Send Modem Str*> manually or to <Edit Config>.

Using the Discs

Introduction

This chapter describes following about the HP 4972A disc functions:

- Selecting a volume
- Copying files
- File name syntax
- Formatting a volume
- Compressing a volume

For more extensive information about the disc functions, see Disc Functions in the HP 4972A Reference Manual.

Selecting a Volume

You can select the disc volume by using < Select Volume >. Up to two external disc drives can be supported by the HP 4972A. The HP-IB switch address settings on a disc drive determines the volume unit numbers displayed by the analyzer when you press < Select Volume >.

See Installing the HP 4972A in this manual for directions to select the volume. That chapter also describes the options for setting the address switch settings for any external disc drives.

Copying Files

The HP 4972A can copy a file from one volume into another volume. The copy function is softkey controlled. Softkey selections copy a single file or all files from one volume to another. You can use a wild card to copy files with common characters from one volume to another. You can copy non HP 4972A files.

In any of the copy file modes, when a file to be copied already exists on the **TO** volume, the file is over written.

NOTE

Floppy discs must be initialized by the HP 4972A system before you can copy to the disc.

Press < **Copy Files** > from the Disc Functions Menu and select a volume to copy from. The following pages have procedures to copy files.

Copying Analyzer Files

<Analyzer Files> lets you copy any of the files for protocol analyzer operation. You can copy one file at a time. Softkeys let you move through the copy operation quickly.

The different types of files used for protocol analyzer operation include:

Configuration File   Message File
Network File   Program File
Data File   Log-to-disc File
Node File   Application File
Filter File

Procedure

1. Press <Copy Files>.

2. HP 4972A prompts: Copy file FROM which volume?

3. Press a softkey for the number of the FROM volume.

4. HP 4972A displays: FROM:#(volume number:),(name of volume)
                                         TO:

    For example: FROM: #3, SAVE1   TO:

    Copies a file from volume #3. Volume #3 is named SAVE1.

5. The protocol analyzer reads the directory of the FROM volume and displays the following softkeys:

    <Analyzer Files>   <All Files>   <Unique Files>

6. Press <Analyzer Files>.

7. HP 4972A displays the analyzer files that are currently on the selected volume.

8. HP 4972A prompts: Choose a file type to copy.

9.   Press a softkey for the file type you want to copy.

10.   HP 4972A displays softkeys for the files currently existing on the selected volume.

11.   HP 4972A prompts: Select softkey or enter valid name :

12.   Press a softkey for the file you want to copy.

13.   HP 4972A lists the file name and file type you just selected and prompts:

                              Copy file TO which volume?

14.   HP 4972A displays softkey choices for the volumes available on your system.

15.   Press a softkey for the volume destination you want.

16.   HP 4972A displays the name, type, and size of the file you have selected.

17.   HP 4972A displays softkeys to let you rename the file on the TO volume or to begin
      copying to the current file name.

      <Begin Copy> causes the protocol analyzer to begin the copy operation.

      <Change Name> lets you change the name of the file in the TO volume. Press this
      softkey and enter the new name.

      Volume file names can be up to seven characters. Leading spaces are deleted.
      Spaces between characters are replaced with an underscore (_). Press [RETURN]
      to complete the entry. Characters not valid for volume file names are:

      @   =   . (period)
      #   /   CTRL·X (CONTROL characters)
      $:

      Press <Begin Copy> to start the copy function.

Copying All Files

You may need to copy the entire contents of a volume. This can be done in one operation and is easier than copying a volume file by file. When you need to copy all the files from hard disc to floppy disc(s), you may not have enough room on the floppy disc. The protocol analyzer prompts you when to install a new floppy disc.

Procedure:

1. From the Disc Functions Menu, press < Copy Files >.

2. HP 4972A prompts: Copy file FROM which volume?

3. HP 4972A displays softkeys for you to select which group of files to copy.

4. Press < All Files >.

5. HP 4972A prompts: Copy file TO which volume?

6. Press a softkey for the volume you want to copy files TO.

7. The protocol analyzer displays the copy FROM volume, the copy TO volume, and a list of the files to be copied.

    You can scroll the file list with the [ARROWS].

8. HP 4972A displays:

    < Begin Copy >   executes the copy function
    < Abort Copy >   stops the copy function

9. Press < Begin Copy > to start the copy function.
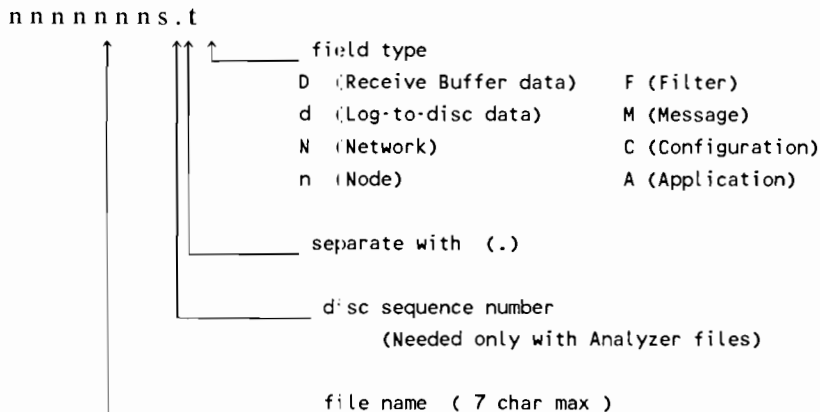
Copying Unique Files

< Unique Files > lets you copy files used for protocol analyzer operation and other system files. System files are labeled OTHER, TEXT, or CODE in the TYPE field of directory listings. You can copy one file at a time or use a wild card to copy multiple files.

Procedure

1. Press < Copy Files >.

2. HP 4972A prompts: Copy file FROM which volume?

3. Press a softkey for the FROM volume you want to copy from.

4. HP 4972A displays: FROM: #(volume number:),(volume name) TO:

    For example: FROM: #3, SAVE1   TO:
    Copies a file from volume number 3. Volume #3: is named SAVE1.

5. The protocol analyzer reads the FROM volume directory and displays:

    <Analyzer Files>   <All Files>   <Unique Files>

6. Press < Unique Files >.

7. HP 4972A displays a data entry field and the prompt:

    Enter the file name you wish to copy.

8. Enter a file name and press [RETURN].

    File name syntax and wild cards are described on the following pages.

"Analyzer" File Name Syntax

```
n n n n n n n s . t
                        field type
                        D  (Receive Buffer data)    F (Filter)
                        d  (Log-to-disc data)       M (Message)
                        N  (Network)                C (Configuration)
                        n  (Node)                   A (Application)

                        separate with  (.)

                        disc sequence number
                              (Needed only with Analyzer files)

                        file name  ( 7 char max )
```

"Unique" File Name Syntax

```
n n n n n n n n n n . Type
                        field type
                           CODE or TEXT

                        separate with  (.)
                        (TEXT and CODE files only)
                        (TYPE entry not needed for OTHER file types.)

                        file name ( 10 char max )
```
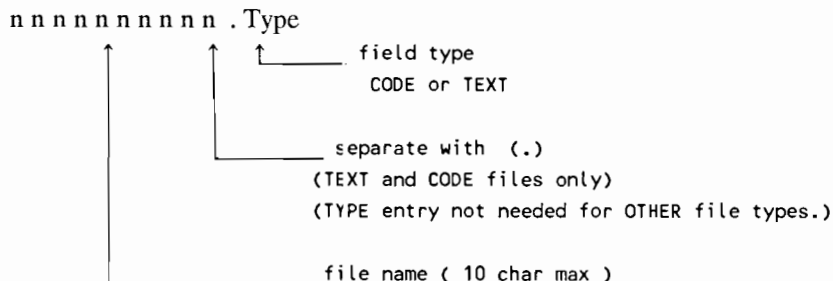
Copy File Syntax		File Name	Sequence	File Type	
msgA1.M	=	msgA	1	M	(Message)
setup10.C	=	setup1	0	C	(Config)
Cheryl0.n	=	Cheryl	0	n	(node)
BADDAT0.D	=	BADDAT	0	D	(Data)
Rectangle.TEXT	=	Rectangle	*	TEXT	
JOB_SUMRY	=	JOB_SUMRY	*	OTHER	

File Names

Analyzer files names are limited to 7 keyboard characters and must be followed by the disc sequence number and TYPE character.

Unique files names are limited to 15 characters. If file is TEXT or CODE, enter file name and .TEXT or .CODE. If file is OTHER, enter the file name and press [RETURN].

Leading spaces in file names are deleted. Spaces between characters are replaced with an underscore (_). Characters not valid for volume file names are:

```
@          =          . (period)
#          /          CTRL-X (control characters)
$          :
```

Sequence Number

When large files are copied to discs, there may not be enough room to save all the file on one disc. The HP 4972A prompts you to insert a new disc when the current disc capacity has been filled.

Type

Analyzer files use these letter cases to indicate the type of file:

```
D  (Data saved            F  (Filter)
   from receive buffer)    M  (Message)
d  (log-to-disc data)      C  (Configuration)
N  (Network)               A  (Application)
n  (node)
```

Unique files use the following names to show type of file:

```
TEXT                       CODE
```

Wild Cards

The wild card character (@) lets you copy more than one file at a time. If several files have names that share common characters in sequence, you can copy all the files in one operation. Wild cards can be used with Analyzer Files or with Unique Files. The file is copied with the same sequence and type information as the original file.

Here are some examples:

DAT@   Copies all files beginning with DAT
@CODE   Copies all .CODE files.
@DEF@   Copies all files with the consecutive letters DEF any where
                    in the name.
@0.D   Copies all Data files with sequence number 0.

Formatting a Volume

<Format Volume> lets you format (initialize) a volume on the discs used with the HP 4972A.
Use the following procedure to format a volume.

WARNING

Formatting a used volume erases the current files.
Back up files you need to keep.

Procedure:

1. Press <Format Volume>.

2. HP 4972A describes the Format Volume Operations.

3. Softkeys are displayed for the volumes:

   <FLOPPY-W #3>   <LANSYS #11>
   <LANCOD #12>   <HARDSC #13>

   Press the softkey for the volume you want to format.

WARNING

If you have more than one volume on the hard disc and
select any one of the volumes to format, all volumes on
the hard disc are formatted.

---

4.   HP 4972A displays volume number, the current logical volume name, and how many
      files are currently on the volume.

7.   HP 4972A prompts: Do you want to proceed with the formatting?

8.   Pressing <YES> causes the HP 4972A to display:

                          Volume formatting in progress.

      Press <No> or <EXIT> if you do not want to proceed.

9.   After the volume is formatted, the HP 4972A prompts:

                          Volume name for #X :   .

      If the volume has been formatted previously, the old name is displayed in the
      prompt. If the volume is new, the name field is blank.

10.   If you want the old name, press [RETURN].

11.   If you want a new name, enter the new name and press [RETURN].

      Volume names may be up to six keyboard characters. Leading spaces in volume
      names are deleted. Spaces between characters are replaced with an underscore (_).
      Characters not valid for volume file names are:

      a $ /   . (period)
      #   =   :   CTRL-X (control characters)

12.   After a volume is formatted, the HP 4972A displays:

                          Formatting successful.

      The name you give to a volume is displayed when you do a directory of the volume.

Compressing a Volume

<Compress Volume> lets you compress or compact the files stored in a volume. The directory is checked for current files. Valid existing files are relocated to recover space previously occupied by deleted files. After a volume is compressed, all free space is contiguous at the end of the compressed volume.

Compressing a volume lets you have access to all the free space on the volume. You now have the maximum space available displayed when you see the LARGEST AVAILABLE SPACE (BYTES) field of a volume directory list.

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PACKARD