

HP 4972A
LAN Protocol Analyzer
Reference Manual

HP 4972A LAN Protocol Analyzer

Reference Manual



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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.

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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 unshielded 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
Edition 3.....	September 1989
Edition 4.....	June 1990

Problems? Call for Help

If you have problems operating your HP protocol analyzer or any of the applications, call the CTD Customer HelpLine or use your fax machine to send your questions.

HelpLine - (719) 531-4567

Fax - (719) 531-4505

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.

The Softkeys

Introduction

This chapter contains:

- An overview of the Top Level Menu softkeys
- An overview of the Setup Menu softkeys
- A fold-out softkey tree (There is also a separate HP 4972A System Softkey Reference Guide which includes Protocol Analyzer and Stats softkeys)

The Top Level Menu is important because it lets you access all the features of the protocol analyzer. The Setup Menu is important because it contains all the softkeys used to set up or configure the different HP 4972A LAN Protocol Analyzer functions.

Refer to the fold-out softkey tree as you go on and learn about the individual softkeys and their functions in the following chapters.

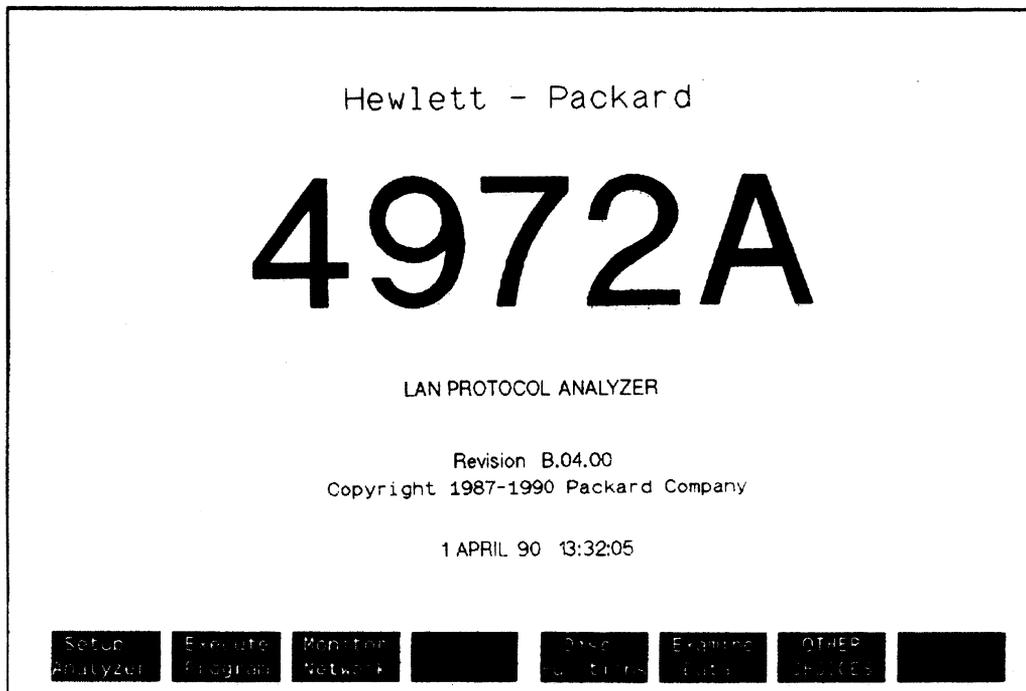
Note

This manual refers to the HP 4972A LAN Protocol Analyzer as the HP 4972A, the protocol analyzer, and the analyzer.

This manual has been revised to include the HP 4972A system software Revision B.04.00.

Top Level Menu

The Top Level Menu lets you gain access to all the features of the protocol analyzer. It appears whenever you complete the power on for the protocol analyzer. Also, from lower level displays, you can return to the Top Level Menu by pressing <EXIT>. You need to use this menu often, so briefly experiment going to lower levels of softkeys and returning to the Top Level Menu.



Pressing <Other Choices> accesses these softkeys:



Figure 1-1. Top Level Menu 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 HP 4972A and Manual Set.

The Setup Menu

You can configure or "setup" the HP 4972A to perform several functions. Chapter 5 of Getting Started discusses these functions and the chapters that follow in this 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.

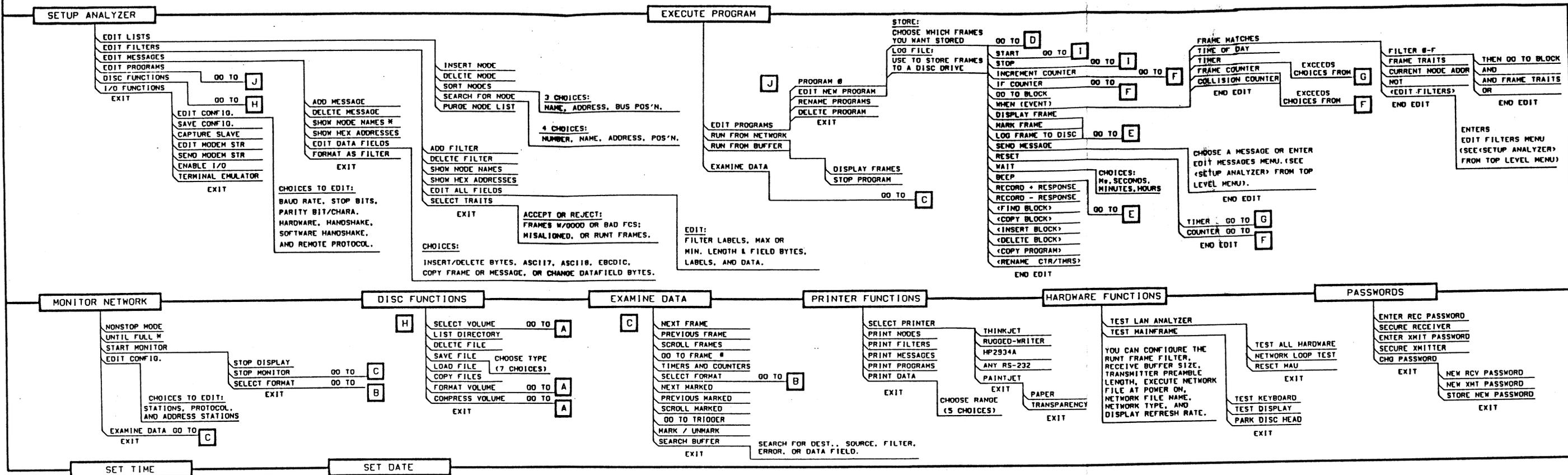
From the Top Level Menu, press <Setup Analyzer> to display softkeys used to set up the protocol analyzer. The following chapters present each of the softkeys separately.

EDIT LISTS:	This menu lets you define or edit USER LISTS of labels to be used in place of the hexadecimal values of various fields 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 Lists	Edit Filters	Edit Messages	Edit Programs	Disc Functions	I/O Functions	EXIT
-------------------	---------------------	----------------------	----------------------	-----------------------	----------------------	-------------

Figure 1-2. The Setup Menu

TOP LEVEL MENU



NOTE
* INDICATES ANALYZER DEFAULT

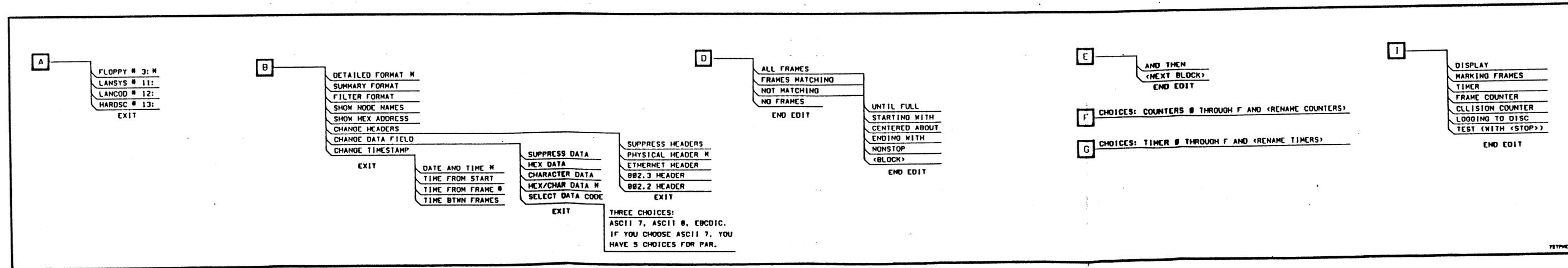


Figure 1-3. A Softkey Tree for the HP 4972A

Creating a Node List

Introduction

This chapter describes the softkeys you use to create a list of the nodes connected to your LAN. You can create labels that identify nodes on the network by a user's name or by the function of the device. The LAN Performance Analysis Application has tools to help create or add nodes to this list (see Chapter 17 of the LAN Performance Analysis Application Reference Manual).

This chapter contains:

- Assigning a network name
- Assigning the network type
- Adding stations to the node list
- Deleting stations from the node list
- Sorting the node list
- Searching for a node

The Edit 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 | BarbB |
| ■ 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.

Edit List Menu

Pressing <Edit Lists>, formerly known as <Edit Node List>, from the Setup Analyzer Menu lets you access the following menu:

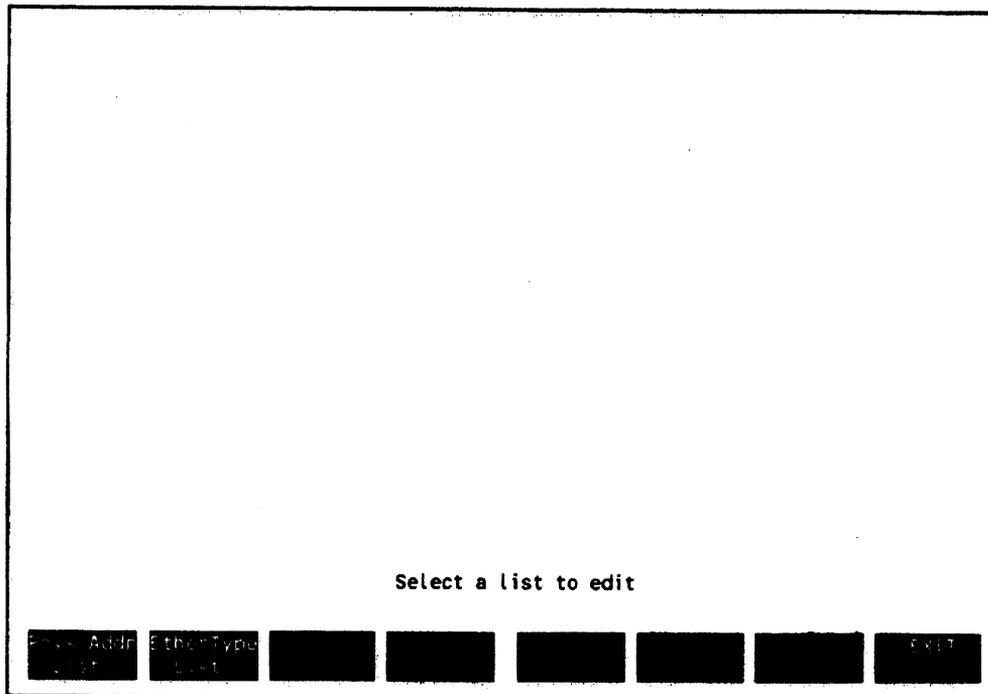


Figure 2-1. Edit Lists Menu

The softkeys in this menu let you select a user-definable list to edit. A description of these softkeys and the extended menus you reach by pressing each softkey follows.

Editing the Physical Address List

Pressing <Phys Addr List>, formerly known as <Node List>, from the Edit Lists Menu lets you access the following menu:

NETWORK NAME :		NETWORK TYPE :		
NODE #	NODE NAME	NODE ADDRESS	BUS POSITION	RESPONSE
-----	-----	-----	----	-----
1	HP LAA ANALYZER	8 00-09-00 8A-96	0	UNTESTED

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

Insert Node	Delete Node	Sort Nodes	Search for Node				EXIT
-------------	-------------	------------	-----------------	--	--	--	------

Figure 2-2. Editing the Physical Address List

This menu lets you edit the physical addresses of the nodes. The above softkeys are described on the following pages.

From this menu, you can assign the **Network Name** and the **Network Type**. You can add stations to (up to 1000) and delete stations from the node list. You can sort the node list and search for a particular node. And you can use the **Response** field to record if a node on the list responds to messages by a program from the Edit Programs Menu (see Chapter 5 of the HP 4972A Reference Manual for details).

Editing the Ethernet Type List

Pressing <Ether Type List> accesses the following menu:

LIST NAME :	Ethernet List 1	
TYPE #	TYPE NAME	TYPE VALUE
1	PEREX PUP	0000
2	ARCADY TRANS	0001
3	AXX IDP	0002
4	OOD IP	0003
5	X75 IP	0004
6	NBS IP	0005
7	EDMA IP	0006
8	CHAOSNET	0007
9	X.25 LEVEL 3	0008
10	RRP	0009
11	XNS COMPATIBLE	0010
12	SYMBOLICS PRIV	0011
13	XYPLEX	0012
14	UB NET DEBUG	0013
15	XEROX PUP	0014

Only first entry of default type will be saved.

Insert Type	Delete Type	Scroll Types	Search For Type		Default Type		EXIT
-------------	-------------	--------------	-----------------	--	--------------	--	------

Figure 2-3. Editing the Ethernet Type List

You can edit the Ethernet list for your particular network. The above screen shows part of the default list. Use [NEXT] or [PREV] to page through the list. Up to 250 items are possible in the list.

The analyzer uses this list to decode the Ethernet type field of Ethernet frames. The Type field in Ethernet frames indicate what kind of data follows. During frame decoding, the Type field is extracted from the frames and the type list is searched for a matching entry. If a matching type is found the frame is identified as containing that type of data. The label for the type is substituted in place of the hexadecimal bytes if the Substitute Labels field is enabled in the Select Format Menu. If a decode module for that type of data is currently loaded in the analyzer, decoding of the frame continues.

If a type is not found during decoding, the decoding comes to a stop. You can force the HP 4972A to decode an unknown type (a type not found in the Ethernet Type List) in the Select Format Menu. See the Select Format Menu description in this supplement on using the Protocol field to:

- override the analyzer default protocol
- choose an alternate type of protocol to decode

The Ethernet Type List is now saved as part of network files. Old network files are still compatible and may still be loaded into the HP 4972A.

Use the softkeys to customize the Ethernet Type List to your network. The softkeys and fields of this menu are described on the following pages.

The Fields and Softkeys in the Ethernet Type List Menu

<u>Softkey or Field</u>	<u>Description</u>
LIST NAME	Use this field to name your Ethernet list. Up to 17 characters may be used. The analyzer replaces blank spaces with the underline character (<u> </u>). The default name in the field is Ethernet_List_1.
TYPE NAME	Use this field to name the Ethernet type. Up to fifteen characters may be used. The analyzer replaces blank spaces with the underline character (<u> </u>). The analyzer uses the list to interpret the Ethernet type field in the Ethernet frames. If the type is found in the list, the analyzer knows to decode the data in the frame as that type. Decoding stops if the type is not found in the list. You can force the analyzer to decode data frames of a type not found in the list by using the Protocol field in the Select Format Menu. Placing the cursor in this field enables the following softkeys: <Insert Type> Press this softkey to insert a new type to the list. The analyzer inserts the new type directly above the field where the cursor is placed. The default field name comes up DOD_IP. Use the keyboard keys to name the new Ethernet type and assign the type value.

< Delete Type > Press this softkey to delete a type. Place the cursor in the field you want to delete and press this softkey.

< Sort Types > Press this softkey to sort the Ethernet Types by name or by type value. Pressing this softkey enables the following softkeys:

< Sort By Name > **< Sort by Type >**

If you sort by name, the names are sorted alphabetically and displayed on the menu.

If you sort by type, the type values are sorted in numerical order, with the lowest numeric value first, and displayed on the menu.

< Search For Type > Press this softkey to search for a type in the Ethernet List. Pressing this softkey enables the following softkeys:

< Search For Type# > Press this softkey to search for a type via the type #. Enter the type number you are searching for in the field provided, using the keyboard keys.

< Search For Name > Press this softkey to search for a type via the Type Name. Enter the type name, using the keyboard keys, in the field provided on the screen.

< Search For Type > Press this softkey to search for a type via the Type Value. Pressing this softkey enables the following softkeys that let you search for the type value in one of three ways:

< Hex > **< Bin LSB Right >** **< Bin LSB Left >**

Hex--Hexadecimal

Bin LSB Right--Binary Least Significant Bit to the Right

Bin LSB Left--Binary Least Significant Bit to the Left

"Don't Cares" are allowed in this type field.

<Reset Type List>

Press this softkey to reset the Type List. Pressing this softkey restores the original analyzer Default Type List.

Once pressed, the analyzer displays the following message:

Are you sure you want to reset the list?

Press <Yes> if you want to reset the list.

Press <No> if you do not want to reset the list.

Assigning a Network Name

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 label field for **NETWORK NAME** at the top of the Edit 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                08-00-09-00-8A-96      0             UNTESTED
```

Procedure:

1. Use [UP-ARROW] to move the cursor to the **NETWORK NAME** field.
2. Use the keyboard keys to enter the network name you want.

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

3. Press [RETURN] or [TAB] to move the cursor to the **NETWORK TYPE** field or press [DOWN-ARROW] to move the cursor to the first node name.

Assigning the Network Type

Use the **NETWORK TYPE** field displayed at the top of the <Edit 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  08-00-09-00-8A-96      0      UNTESTED
```

Procedure

1. From the Edit List Menu, use [UP-ARROW] to move the cursor to the **Network Type** field.

If the cursor is in the **Network Name** field, use [TAB] or [RETURN] to move the cursor to the **Network Type** field.

2. Select either <ETHERNET>, <10 MHz 802.3>, or <1 MHz 802.3> protocol.

Select <ETHERNET> for 10BASE2 networks.

Adding Stations to the Node List

You can add up to 1000 stations to the node list by using **<Insert Node>**. Use the following softkeys and definitions to add stations.

<u>Softkey or Field</u>	<u>Description</u>
<Insert Node>	You can add another field and insert additional nodes at any point in the node list. The analyzer inserts each node immediately above the line containing the cursor.
Node #	The analyzer generates this number to provide an easy reference when you view the node name list.
Node Name	You can enter a name that allows easier recognition of a specific station. Use up to 17 keyboard characters. The analyzer deletes leading spaces and replaces spaces between characters with an underscore (_). Press [TAB] or [RETURN] to complete the entry.
Node Address	Use hexadecimal characters for this field. The address entry needs six bytes.
Bus Position	You can use up to the 4 numeric characters for this field. The Bus Position resembles the Node Name in that it is user defined. You use the Bus Position field for documentation purposes to help you identify your network.

Duplicate entries

When you press **<EXIT>** to leave the Edit List Menu, the analyzer deletes duplicate entries from the list. You can duplicate the default node name, HP_LAN_Analyzer, and the Source Address unique to the analyzer while you edit the node list.

However, when you press **<EXIT>** to leave the menu, the analyzer deletes all duplicate names and addresses. The first entry for duplicate names or addresses remains on the list.

When you enter duplicate names, other than HP_LAN_Analyzer and the Source Address unique to the analyzer, and leave the name or address field, the analyzer returns the previously entered name or address.

Deleting Stations from the Node List

You can remove stations from the node list one at a time or delete the entire list at once.

Softkey

Description

<Delete Node>

You can remove work stations one station at a time from the Node List. Position the cursor to either the **Node Name**, **Node Address**, or **Bus Position** field of the station you want to delete and press this softkey.

The analyzer moves stations remaining on the node list up one line to fill the space. The **Node #** field updates to fill in the deleted node so the numbers are always in sequence.

<Reset Node List>

You can remove all the stations from the node list at one time. When you press this softkey, the analyzer displays the following message:

Are you sure you want to reset the node list?

<YES>

This softkey deletes the entire node list. The node name list starts again at the default node (HP_LAN_Analyzer).

<NO>

This softkey saves the existing node list and returns the display to the previous softkey choices.

Sorting the Node List

The analyzer displays the node list in a variety of sequences to make it easy to find stations in the list.

<u>Softkey</u>	<u>Description</u>
< Sort Nodes >	Pressing this softkey changes the display to include softkeys that let you sort by name, address, or bus position.
< Sort By Name >	The analyzer sorts the node list by the names in the Node Name field. It generally sorts in the standard ASCII collating sequence. For example, CTRL-X characters precede alphabet characters, which precede numbers. The analyzer does not differentiate upper and lower case alphabet characters.
< Sort By Address >	The analyzer sorts the node list using entries in the Node Address field. It sorts in the order of 0 through F and then Xs (don't cares) last: 0 < 9 < F < X.
< Sort By using the Bus Pos'n >	The analyzer sorts the node list entries in the Bus Position field. The sorting arranges the node list in an increasing bus position sequence.

Searching for a Node

Softkeys on the protocol analyzer make it easy to look through the node list to find stations by using their assigned identities.

<u>Softkey</u>	<u>Description</u>
< Search for Node >	You can search the node list by searching through node number, name, address, or position on the bus.
< Search for Node # >	<p>You can search the node list for a node number you specify. Enter the node number in numeric characters in the displayed field. Press [RETURN] to execute the search.</p> <p>When the analyzer finds the specified node number, it displays that station at the top of the node list.</p>
< Search For Name >	<p>You can search the node list for a node name you specify. Enter the node name exactly like the node list displays it. The analyzer recognizes letter case. Press [RETURN] to execute the search.</p> <p>When the analyzer finds the node name you want, it displays that node at the top of the node list.</p>

Softkey

Description

< Search for Addr >

You can search the node list for a specified node address. When the analyzer finds the node address you want, it displays that node at the top of the node display. Enter the address in one of three formats offered by the following softkeys:

< Hex >

Enter the address in hex characters 0 - F or X (don't care). You can use don't cares to view all nodes with a common prefix. For example:

08-09-00-0A-XX-XX

Press [RETURN] to execute the search.

< Binary LSB Right >

Enter each address character byte in binary with the least significant bit on the right side. Only the byte marked by the cursor displays in binary. Enter the address in binary 1's and 0's or X (don't care). After you complete the entry, press [RETURN] to execute the search.

When you complete a binary entry using a don't care, the part of the byte having the don't care displays as ◀ . For example:

1010001X = A ▶ XX111010 = ▶ A

Softkey**Description****< Binary LSB Left >**

Enter each address character byte in binary with the least significant bit on the left side. Only the byte marked by the cursor displays in binary. Enter the address in binary 1's and 0's or X's (don't cares). After you complete the entry, press [RETURN] to execute the search. See the preceding description in < Binary LSB Right > for don't care operation.

< Search For Pos'n >

The analyzer searches via the Bus Position column. Enter the bus position in the displayed field. Press [Return] to execute the search.

Recording Node List Response to Messages

You can use the **RESPONSE** field to record if a node on the node list responds to messages by a program from the Edit Programs Menu.

In Edit Programs, the address of a node on the node list is inserted in the **Destination Address** field of a message to be sent to the network. The FCS characters are recomputed before the message is sent out.

In Edit Programs Menu, the following program commands are used to send messages to nodes and record the response. For a more complete description, see the chapter on Editing the Programs.

<u>Softkey</u>	<u>Description</u>
<To Currnt Node>	These program commands let you increment through the <To Next Node> node list and send a message to all the nodes on the list.
<When (event)>	Using these two commands together detects when a received <Currnt Node Addr> message has a Source address that matches the current node on the node list.
<Record + Response >	If your program detects a desired response, these <Record-Response> commands can be used to record the response in the Edit List Menu.

Ethernet Addresses

Ethernet addresses are assigned in blocks with the first three bytes assigned to a manufacture. For example, the Hewlett Packard Company has been assigned the 08-00-09-XX-XX-XX block of addresses. You may load and use the physical address file "Manfc" from your utility disc for a list of addresses that are currently known. This file is listed on the following pages.

Ethernet Address List

NETWORK NAME : Network_0		NETWORK TYPE : ETHERNET		
NODE #	NODE NAME	NODE ADDRESS	BUS POSITION	RESPONSE
----	-----	-----	----	-----
1	Cisco	00-00-0C-XX-XX-XX	1000	UNTESTED
2	MeXT	00-00-0F-XX-XX-XX	1000	UNTESTED
3	Sytek	00-00-10-XX-XX-XX	1000	UNTESTED
4	DIAB	00-00-20-XX-XX-XX	1000	UNTESTED
5	Visual Technology	00-00-22-XX-XX-XX	1000	UNTESTED
6	TRW	00-00-2A-XX-XX-XX	1000	UNTESTED
7	S & Koch	00-00-5A-XX-XX-XX	1000	UNTESTED
8	U.S. DoD	00-00-5E-XX-XX-XX	1000	UNTESTED
9	Network_General	00-00-65-XX-XX-XX	1000	UNTESTED
10	MIPS	00-00-6B-XX-XX-XX	1000	UNTESTED
11	Ardent	00-00-7A-XX-XX-XX	1000	UNTESTED
12	Cayman Systems	00-00-89-XX-XX-XX	1000	UNTESTED
13	Proteon	00-00-93-XX-XX-XX	1000	UNTESTED
14	Ameristar Tech	00-00-9F-XX-XX-XX	1000	UNTESTED
15	Wellfleet	00-00-A2-XX-XX-XX	1000	UNTESTED
16	Network Appli Tech	00-00-A3-XX-XX-XX	1000	UNTESTED
17	Network Systems	00-00-A9-XX-XX-XX	1000	UNTESTED
18	Xerox	00-00-AA-XX-XX-XX	1000	UNTESTED
19	CIMLinc	00-00-B3-XX-XX-XX	1000	UNTESTED
20	Allan Bradley	00-00-BC-XX-XX-XX	1000	UNTESTED
21	Western Digital	00-00-C0-XX-XX-XX	1000	UNTESTED
22	BOM Systems	00-00-C6-XX-XX-XX	1000	UNTESTED
23	Altos	00-00-C8-XX-XX-XX	1000	UNTESTED
24	Dartmouth College	00-00-D7-XX-XX-XX	1000	UNTESTED
25	3Com? Novell? PS2	00-00-D8-XX-XX-XX	1000	UNTESTED
26	Gould	00-00-DD-XX-XX-XX	1000	UNTESTED
27	BBN Internal	00-01-02-XX-XX-XX	1000	UNTESTED
28	Kabel	00-17-00-XX-XX-XX	1000	UNTESTED
29	Xylogics (Encore)	00-80-2D-XX-XX-XX	1000	UNTESTED
30	Frontier_s/w	00-80-8C-XX-XX-XX	1000	UNTESTED
31	Intel	00-AA-00-XX-XX-XX	1000	UNTESTED
32	Ungerma--Bass	00-DD-00-XX-XX-XX	1000	UNTESTED
33	Ungerma--Bass	00-DD-01-XX-XX-XX	1000	UNTESTED
34	DoD Multicast	01-00-5E-XX-XX-XX	999	UNTESTED
35	DoD reserved	01-00-5E-XX-XX-XX	999	UNTESTED
36	BBN Internal	02-04-06-XX-XX-XX	1000	UNTESTED
37	Micom/Interlan	02-07-01-XX-XX-XX	1000	UNTESTED
38	Satelcom_MegaPac	02-60-86-XX-XX-XX	1000	UNTESTED
39	3COM	02-60-8C-XX-XX-XX	1000	UNTESTED
40	CNC	02-CF-1F-XX-XX-XX	1000	UNTESTED
41	Bridge	08-00-02-XX-XX-XX	1000	UNTESTED
42	Advd Comp Comm	08-00-03-XX-XX-XX	1000	UNTESTED
43	SynbOlics	08-00-05-XX-XX-XX	1000	UNTESTED
44	BBN	08-00-08-XX-XX-XX	1000	UNTESTED
45	Hewlett Packard	08-00-09-XX-XX-XX	1000	UNTESTED
46	Nestar Systems	08-00-0A-XX-XX-XX	1000	UNTESTED
47	Unisys	08-00-0B-XX-XX-XX	1000	UNTESTED
48	AT&T	08-00-10-XX-XX-XX	1000	UNTESTED
49	Tektronix	08-00-11-XX-XX-XX	1000	UNTESTED
50	Excelan	08-00-14-XX-XX-XX	1000	UNTESTED
51	NSC	08-00-17-XX-XX-XX	1000	UNTESTED
52	Data_General	08-00-1A-XX-XX-XX	1000	UNTESTED
53	Data_General	08-00-1B-XX-XX-XX	1000	UNTESTED
54	Apollo_2	08-00-1E-XX-XX-XX	1000	UNTESTED
55	Sun	08-00-20-XX-XX-XX	1000	UNTESTED
56	NBI	08-00-22-XX-XX-XX	1000	UNTESTED
57	CDC	08-00-25-XX-XX-XX	1000	UNTESTED
58	TI	08-00-28-XX-XX-XX	1000	UNTESTED
59	Digital Equipment	08-00-2B-XX-XX-XX	1000	UNTESTED
60	Metaphor	08-00-2E-XX-XX-XX	1000	UNTESTED
61	Prime Computer	08-00-2F-XX-XX-XX	1000	UNTESTED
62	Intergraph	08-00-36-XX-XX-XX	1000	UNTESTED

63	Fujitsu-Xerox	08-00-37-XX-XX-XX	1000	UNTESTED
64	Spider Systems	08-00-39-XX-XX-XX	1000	UNTESTED
65	Digital Comm Ass.	08-00-41-XX-XX-XX	1000	UNTESTED
66	Xylogics	08-00-43-XX-XX-XX	1000	UNTESTED
67	Sony	08-00-46-XX-XX-XX	1000	UNTESTED
68	Sequent	08-00-47-XX-XX-XX	1000	UNTESTED
69	Univation	08-00-49-XX-XX-XX	1000	UNTESTED
70	Engore	08-00-4C-XX-XX-XX	1000	UNTESTED
71	BICC	08-00-4E-XX-XX-XX	1000	UNTESTED
72	Stanford Univ.	08-00-56-XX-XX-XX	1000	UNTESTED
73	DEC_system20_???	08-00-58-XX-XX-XX	1000	UNTESTED
74	IBM	08-00-5A-XX-XX-XX	1000	UNTESTED
75	Motorola	08-00-60-XX-XX-XX	1000	UNTESTED
76	Comdesign	08-00-67-XX-XX-XX	1000	UNTESTED
77	Ridge	08-00-68-XX-XX-XX	1000	UNTESTED
78	Silicon Graphics	08-00-69-XX-XX-XX	1000	UNTESTED
79	Excelan_2	08-00-6E-XX-XX-XX	1000	UNTESTED
80	DDE (Danish_Data)	08-00-75-XX-XX-XX	1000	UNTESTED
81	Vitalink	08-00-7C-XX-XX-XX	1000	UNTESTED
82	XIOS	08-00-80-XX-XX-XX	1000	UNTESTED
83	????	08-00-87-XX-XX-XX	1000	UNTESTED
84	Kinetics	08-00-89-XX-XX-XX	1000	UNTESTED
85	Pyramid	08-00-8B-XX-XX-XX	1000	UNTESTED
86	Kyvision	08-00-8D-XX-XX-XX	1000	UNTESTED
87	Retix Inc.	08-00-90-XX-XX-XX	1000	UNTESTED
88	Vitalink Printer	09-00-02-04-00-01	999	UNTESTED
89	Vitalink Managemt	09-00-02-04-00-02	999	UNTESTED
90	HP Probe	09-00-09-00-00-01	999	UNTESTED
91	HP multicast	09-00-09-00-00-02	999	UNTESTED
92	HP DTC	09-00-09-00-00-04	999	UNTESTED
93	HP Broadcast	09-00-09-XX-XX-XX	1000	UNTESTED
94	Apollo Domain	09-00-1E-00-00-00	999	UNTESTED
95	DEC MUMPS	09-00-2B-00-00-00	999	UNTESTED
96	DEC DSM/DTP	09-00-2B-00-00-01	999	UNTESTED
97	DEC VAXELN	09-00-2B-00-00-02	999	UNTESTED
98	DEC LTK	09-00-2B-00-00-03	999	UNTESTED
99	DEC MAP ES hello	09-00-2B-00-00-04	999	UNTESTED
100	DEC MAP IS hello	09-00-2B-00-00-05	999	UNTESTED
101	DEC encrypt	09-00-2B-00-00-06	999	UNTESTED
102	DEC Netbios	09-00-2B-00-00-07	0	UNTESTED
103	DEC LAT	09-00-2B-00-00-0F	999	UNTESTED
104	DEC LanBridge Copy	09-00-2B-01-00-00	999	UNTESTED
105	DEC LanBrdg Hello	09-00-2B-01-00-01	999	UNTESTED
106	DEC DNA router	09-00-2B-02-00-00	999	UNTESTED
107	DEC DNA name adv	09-00-2B-02-01-00	999	UNTESTED
108	DEC name solicit	09-00-2B-02-01-01	999	UNTESTED
109	DEC DNA Time	09-00-2B-02-01-02	999	UNTESTED
110	DEC default_filttr	09-00-2B-03-XX-XX	999	UNTESTED
111	DEC LAST	09-00-2B-04-00-00	999	UNTESTED
112	DEC Argonaut_Cnsl	09-00-2B-23-00-00	999	UNTESTED
113	Novell IPX	09-00-4E-00-00-02	999	UNTESTED
114	Stanford reserved	09-00-56-XX-XX-XX	999	UNTESTED
115	Stanford v kernal	09-00-56-FF-XX-XX	999	UNTESTED
116	Vitalink_Diagnstc	09-00-7C-02-00-05	999	UNTESTED
117	Vitalink_Gateway	09-00-7C-05-00-01	999	UNTESTED
118	HP	0D-1E-15-BA-DD-06	999	UNTESTED
119	Apollo	70-00-70-XX-XX-XX	1000	UNTESTED
120	DEC 0	AA-00-00-XX-XX-XX	1000	UNTESTED
121	DEC_1	AA-00-01-XX-XX-XX	1000	UNTESTED
122	DEC_2	AA-00-02-XX-XX-XX	1000	UNTESTED
123	DEC_3	AA-00-03-XX-XX-XX	1000	UNTESTED
124	DEC DECnet	AA-00-04-XX-XX-XX	1000	UNTESTED
125	DEC MOP Dump/Load	AB-00-00-01-00-00	999	UNTESTED
126	DEC MOP Remote Cn	AB-00-00-02-00-00	999	UNTESTED
127	DECNet Ps4 Hello	AB-00-00-03-00-00	999	UNTESTED
128	DECNet_Ps4_RHello	AB-00-00-04-00-00	999	UNTESTED

129	DEC resvd	AB-00-00-XX-XX-XX	1000	UNTESTED
130	DEC_LAT (old)	AB-00-03-00-00-00	999	UNTESTED
131	DEC_customer_priv	AB-00-04-00-XX-XX	1000	UNTESTED
132	DEC_VAX cluster	AB-00-04-01-XX-XX	1000	UNTESTED
133	DECnet Broadcast	AB-00-04-XX-XX-XX	1000	UNTESTED
134	Ethernet CTF	CF-00-00-00-00-00	999	UNTESTED
135	Broadcast	FF-FF-FF-FF-FF-FF	999	UNTESTED

8

Edit Filters Menu

Introduction

Filters greatly enhance the power of the protocol analyzer. The Edit Filters Menu lets you use this capability. This chapter contains information about:

- Add, delete, and label filters
- Add, delete, and label filters fields
- Select character types
- Select network protocol display format
- Edit filters copy functions
- Select frame traits
- Edit filter length

Editing Filters

The Edit Filters Menu displays an overview of the filters defined and available for programming the protocol analyzer. A given filter can test or compare only on messages received from the Source Address specified for that filter and/or messages transmitted to the Destination Address specified for that filter.

The foldout Softkey Tree in Chapter 1, The Softkeys, shows the choices available as you move through the menus. Fold out the softkey tree to see which softkeys you can access as you move to different displays and different fields.

To get to the Edit Filters Menu:

1. From the Top Level Menu, press <Setup Analyzer>.
2. Press <Edit Filters>.

The figure below shows a summary of defined filters. Line 4 shows the default display for an undefined filter. Line 5 contains a filter with addresses displayed in hexadecimal code. Line 6 shows an example of a filter with user defined filter label and equivalent names displayed for the addresses. You can also specify minimum and maximum frames lengths to filter frames by their length.

1	FILTER	FILTER	DESTINATION	SOURCE	LENGTH OF FRAME:	
2	#	LABEL	ADDRESS	ADDRESS	MINIMUM	MAXIMUM
3	-	-----	-----	-----	----	----
4	0	Filter_0	XX-XX-XX-XX-XX-XX	XX-XX-XX-XX-XX-XX	15	2022
5	1	Filter_1	08-00-71-AB-CD-EF	08-11-34-A1-23-10	15	2022
6	2	PRINT_FILTER	PRINTER_4	CPU_1	15	2022

46 Filter hardware bytes available

21
22
23
24

Add Filter	Delete Filter	Show Node Names *	Show Hex Addresses		Edit All Fields	OTHER CHOICES	EXIT
------------	---------------	-------------------	--------------------	--	-----------------	---------------	------

Figure 3-1. Edit Filters Display

Add, Delete, and Label Filters

Softkeys let you quickly add or delete filters to the summary filter display. You can create up to 16 filters.

Softkey

Description

< Add Filter >

Adds up to sixteen filters to the displayed filter list. The analyzer labels the filter numbers in hexadecimal sequence: 0...9, A...F. If all the filter numbers displayed are in sequence, the analyzer adds the next available filter number to the bottom of the list. The analyzer inserts filters missing in the list by this algorithm:

1. It inserts the closest missing frame number above the cursor location.
2. If there is no room above the cursor location, it inserts the closest missing frame number below the cursor location.

Filter Names

The analyzer lets you change the filter name to a descriptive label that identifies the filter function. You can use up to 17 keyboard characters. The analyzer deletes leading spaces and replaces spaces between characters with an underscore (_). Press [RETURN] or [TAB] to complete the name entry.

< Delete Filter >

You can remove filters from the displayed filter list. Use [TAB] or [ARROWS] to position the cursor to the filter to be removed.

The analyzer moves filters below the deleted field up to fill the deleted position. Remaining filters retain their filter number and label.

< Show Node Name >

The Destination and Source addresses convert from hexadecimal code to the equivalent node name defined in the Physical Address List Menu.

< Show Hex Addresses >

The Destination and Source Address fields display on the screen in hexadecimal code.

NOTE

In the Edit Filters Menu, the softkey selections change when you move the cursor from the **FILTER LABEL** Field to an address field. Use [TAB] or [ARROWS] to move the cursor to a **Destination** or **Source Address** field. Notice the softkey fields change.

<Enter Node Name>

You can define the **Destination** and **Source Address** fields using node names. The analyzer displays this softkey only when the cursor is in an address field.

The analyzer assigns the node names you specified in the Edit Lists Menu to softkeys. You may use a softkey to enter a valid node name for its equivalent Destination or Source address. If you define more than 6 node names, use <OTHER CHOICES> to see the additional node names. You can also type the node name from the keyboard.

Add, Delete, and Label Filter Fields

The analyzer displays and makes available details of the filter fields for editing. The softkey selections change as you move the cursor to **Address** fields, **Type/Length** Field, or **Data** Field.

Softkey

Description

<Edit all Fields>

The analyzer displays details of filter fields for the filter presently marked by the cursor. You can edit the following frame fields:

- **Address fields**
- **Type field**
- **Data field**

The Softkey Tree shows all the softkey choices available while in the Edit All Fields Menu. Move the cursor to the different frame filter fields to change the softkey selection. The analyzer provides descriptions on the display when the cursor is in a **Data** field. Since you use the same softkeys in the address and **Type/Length** Fields, the descriptions are given only once.

Edit Filter Fields

You can insert and/or delete filter fields or bytes of filter fields in this menu.

Softkey

Description

<Insert Field>

The analyzer adds an additional filter field in the **Data** field immediately below the cursor. The newly inserted **BYTE** field gets loaded automatically with the next byte location available after the previous filter field. If you want to assign the new filter field to a different byte location, enter the new location number from the keyboard.

Guidelines for inserting filter fields:

1. You can't insert fields between consecutive numbered bytes. Filter fields can not overlap. If you need to insert a data field filter that would overlap existing filter fields, you must change the length and position of existing filter fields before the new filter field may be inserted.
2. Up to 32 filter fields can be defined for each filter.

With IEEE 802.2 Formats

In addition to DSAP, SSAP, and CONTROL filters, up to 26 additional data filter fields can be defined.

Not IEEE 802.2 Formats

Up to 29 data filter fields can be defined. Use up to 17 alphanumeric characters in the **FIELD LABEL** for each data field filter. Spaces between characters are replaced by underscores ().

Softkey**Description****<Delete Field>**

The analyzer removes the filter field you mark by the cursor. Position the cursor in any part of the filter field being deleted.

<Insert Bytes>

The analyzer adds or inserts bytes in the filter field you mark by the cursor.

You can define up to 15 byte locations in a filter field. If you place the cursor in the **FIELD DATA** field, the analyzer inserts new bytes immediately before the byte marked by the cursor. If you place the cursor in the **BYTE** field, **FIELD LABEL** field, or at the last character position of a field displayed in hex, the analyzer adds new bytes at the end of the **FIELD DATA** field.

<Delete Bytes>

The analyzer removes bytes from the filter field you mark by the cursor. Leave at least one byte in each filter field. If you want to delete all bytes in a filter field, use **<Delete Field>**.

If the cursor is in the **FIELD DATA** field, deleted bytes include the byte marked by the cursor and the bytes following the cursor. If you try to delete more bytes than follow the cursor, the analyzer removes the remaining bytes from the front of the cursor. If the cursor is not in the **FIELD DATA** Field, the analyzer deletes the rightmost bytes.

Select Character Type

Use the softkeys to display the characters in the **Addresses**, **Type/Length**, and **Data** fields in several different formats for easier bit or byte pattern entry as you edit the filter contents. See **Keyboard and Character Codes** in the **Appendix Manual** for more information about character formats.

<u>Softkey</u>	<u>Description</u>
Undefined Characters	Displayed as _ . The Appendix Manual shows keys that you can use to enter control characters such as S_V and E_Q .
Don't Care	Displayed as X in hex or binary character types and as "↑↓" in other character types.
<'NOT' Byte>	Enables a filter to match any character except the character entered. Blinking characters represent 'NOT' bytes.
< Bin LSB Left >	Characters are entered in binary with the least significant bit at the left for each character. Only the byte marked by the cursor is displayed in the binary format.
< Bin LSB Right >	Characters are entered in binary with the least significant bit at the right for each character. Only the byte marked by the cursor is displayed in the binary format.
< Hex Entry >	Characters are entered in hexadecimal.
< ASCII 7 >	Characters are entered in ASCII 7. The analyzer displays different parity checking softkeys.
< ASCII 8 Roman 8 >	Characters are entered in ASCII 8 or Roman 8, depending on what keyboard you use.
< EBCDIC Entry >	Characters are entered in EBCDIC.

Select Network Protocol Display Format

Use softkeys to change the network protocol for the displayed filter.

Softkey

Description

<802.3 Format>

The protocol header for the filter appears in IEEE 802.3 protocol. This choice displays the third filter field as a Length field.

```
FIELDS of FILTER #0  Label: Filter_0          MINIMUM Frame Length = 15
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  LENGTH (TYPE)   XX-XX
 15  DATA           XX
```

<Ethernet Format>

The protocol header for the filter appears in Ethernet protocol. This choice displays the third filter field as a Type field.

```
FIELDS of FILTER #0  Label: Filter_0          MINIMUM Frame Length = 15
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  DATA           XX
```

Softkey

Description

<802.2 Format>

The analyzer inserts the 802.2 fields (DSAP, SSAP, and CONTROL) below the Length/Type field. It inserts a one-byte CONTROL field. The analyzer expands the CONTROL field to 2 bytes if you use <Insert Byte(s)>.

FIELDS of FILTER #0		Label: Filter_0	MINIMUM Frame Length = 17
44 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)	XX-XX	
15	DSAP	XX	
16	SSAP	XX	
17	CONTROL	XX	

Copy Functions

Use softkeys to copy the contents of a filter or frame.

Softkey

Description

< Copy Filter >

The analyzer copies the contents of a specified filter to the currently displayed filter. The analyzer prompts you with:

Select softkey OR enter valid name: _____

Select a filter to copy by using the displayed softkeys or enter a filter name using the keyboard. Press [RETURN] to execute the copy function.

< Copy Frame >

The analyzer copies an existing frame from the receive buffer to the fields of a filter. The byte locations of the frame in the receive buffer fill the same byte locations of the filter.

Select Frame Traits

In addition to filtering on specific byte comparator locations in a frame and minimum and maximum frame lengths, the HP 4972A LAN Protocol Analyzer can filter on different types of frame errors.

Softkey

Description

<Select Traits>

You can choose to view good frames and/or frames with different error types.

If you enable "Runt Frame Filter" in the Hardware Functions Menu, the analyzer displays the **RUNT FRAME FILTER** paragraph shown below.

<u>Accept</u> Frame with GOOD FCS							
<u>Accept</u> Frame with BAD FCS							
<u>Accept</u> MISALIGNED Frame	(A frame with a bad FCS and with 1 to 7 residual bits following the final byte of the FCS.)						
<u>Accept</u> RUNT Frame	(A frame which contains fewer than 60 bytes, not including the FCS.)						
The Frame TRAITS selected in this menu will apply to all Filters.							
The RUNT FRAME FILTER is installed, therefore Frames containing less than 512 bits including the preamble and FCS (equivalent to a length of approximately 53 bytes), will not be recognized.							
Accept	Reject						EXIT

Figure 3-3. Frame Traits Menu

<u>Field</u>	<u>Description</u>
Frame with GOOD FCS Frame with BAD FCS	These fields let you accept or reject frames received with good or bad FCS values. The majority of frames normally arrive with good FCS values. To filter out unwanted frames, you may want to capture only the frames with FCS errors. You can examine just the problem frames without having to sort through all the good frames.
MISALIGNED Frame	A misaligned frame contains a total number of bits not divisible by eight and an FCS error.
RUNT Frame	Runt frames consist of frames having less than 60 bytes in the Address , Type/Length and Data fields. Runt frames may occur as a result of frame collisions on the network.

Figure 3-3 shows the display with the Runt Frame Filter enabled in the Hardware Functions Menu. With the Runt Frame Filter enabled, the analyzer discards frames with less than 512 bits. With the Runt Frame Filter disabled in the Hardware Functions Menu, the analyzer stores frames with as few as one byte in the **Data** field.

See Chapter 10 of this manual for more information about frame errors.

Edit Filter Length

In addition to filtering on particular bytes in a frame, you can filter on frame lengths.

To conserve buffer memory, you can exclude frames exceeding a maximum length or include only jabbering frames (frames with more than 1514 bytes). You control the frame length for particular filters by positioning the cursor in the **MINIMUM** or **MAXIMUM Frame Length** Fields in the Edit all Fields Menu.

The default values are:

MINIMUM Frame Length = 15

MAXIMUM Frame Length = 2022

You can manually set these values to your filter needs. The protocol analyzer will not let you enter a minimum value that exceeds the maximum value.

Minimum Filter Length

The **MINIMUM Filter Length** field uses the following rules:

1. The minimum entry for the **MINIMUM Filter Length** field is 15 bytes.
2. The **MINIMUM Filter Length** field entry must be an odd number.
3. When you specify additional filter fields in the **DATA** field which occupy byte positions greater than the minimum value, the **MINIMUM Frame Length** field automatically increases to be the largest odd numbered byte occurring in the filter field.

Maximum Filter Length

The **MAXIMUM Filter Length** field uses the following rules:

1. The maximum entry for the **MAXIMUM Filter Length** field is 2022 bytes.
2. The **MAXIMUM Filter Length** field entry must be an even number.
3. You can specify a maximum filter length less than 2022 bytes. However, if you add a filter field which occupies byte positions greater than the new maximum filter length, the **MAXIMUM Frame Length** field automatically increases to be the next largest even value which can contain all the bytes in the filter.

Editing Messages Menu

Introduction

This chapter describes the Edit Messages function of the HP 4972A. You can use the messages you create with the Edit Programs Menu to simulate stations on the Local Area Network. Messages can simulate a request or initiate a transfer of information. The messages can also acknowledge transmissions from other stations.

This chapter contains:

- Edit messages display description
- Edit messages softkey description
- Copying the data length field
- Selecting an FCS value

Edit Messages Display

To reach the Edit Messages Menu:

1. From the Top Level Menu, press <Setup Analyzer>.
2. Press <Edit Messages>.

The foldout Softkey Tree in Chapter 1 of this manual shows the choices available as you move through the menus. Fold out the Softkey Tree to see which softkeys appear as you move to different displays and fields.

The Edit Messages Menu shows a directory of the messages you create.

MESSAGE #	MESSAGE LABEL	DESTINATION ADDRESS	SOURCE ADDRESS	FRAME TYPE	FRAME LENGTH	FCS VALUE
0	Message_0	00-00-00-00-00-00	HP_LAN_Analyzer	00-00	60	Good
1	Message_1	00-00-00-00-00-00	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	EDIT	OTHER CHOICES	EXIT
-----	--------	------	---------------	------

Figure 4-1. The Edit Messages Menu

The analyzer generates the **MESSAGE #**. You can create and store up to 16 messages, which the analyzer numbers in hex characters 0 through F. Store your created messages along with the other setup functions on the system disc drive so that when you need to, you can quickly load them back into the protocol analyzer to solve a particular application.

The analyzer defaults the **MESSAGE LABEL** to **MESSAGE_0**. For your convenience, you can assign functional labels that describe the message function.

The same six byte address fields seen in the Edit Lists and Edit Filters Menus make up the **DESTINATION** and **SOURCE ADDRESS**. You can also describe these address fields with functional name labels in place of the six byte hex code. Remember to define the equivalent node names in the Edit Lists Menu before using them in other menus.

The **FRAME TYPE** field contains the contents of bytes 13 and 14 of each frame.

The analyzer defaults the **FRAME LENGTH** for each message to 60 bytes. This includes the **Destination** and **Source Addresses**, the **Type** field, and **Data** field. Frame length does not include the preamble field or FCS characters.

FCS VALUE field lets you generate either good or bad FCS characters for the message. For example, you may want to transmit a frame with bad FCS characters to see if the receiving station detects the error. Also, you can enter an FCS value in HEX characters.

Softkey Descriptions

The Edit Messages Menu offers the following softkey choices:

<u>Softkey</u>	<u>Description</u>
<Add Message>	<p>A new message appears in the message list. The analyzer adds the new message to an existing list first at the closest available position above the cursor and then at the closest available position below the cursor. The cursor may be in any field of a message when you press this softkey.</p> <p>Naming The Message Assign message names that identify the function of the message. Use up to 17 characters for the name field. The analyzer deletes leading spaces and replaces spaces between characters with an underscore (_). Press [RETURN] or [TAB] to complete the entry.</p>
<Delete Message>	<p>The analyzer deletes the message that contains the cursor. Place the cursor in any field of the message you want to delete.</p>
<Show Node Names>	<p>The analyzer displays the Destination and Source Address fields as the equivalent Node Names assigned in the Edit Lists Menu.</p>
<Show Hex Addresses>	<p>The Destination and Source Address fields will be displayed in hexadecimal code.</p>
<Enter Node Name>	<p>The analyzer displays this softkey when you place the cursor in an address field. It will cause the names of nodes defined in Edit Nodes Menu to display as softkeys. Press the softkey whose node name you want to assign to either the Destination Address field or the Source Address field. You can also type a node name from the keyboard and press [RETURN] to complete the command.</p>

Softkey

Description

<Edit Datafield>

The analyzer displays a default 60 byte data field for editing messages.

DATA Field of MESSAGE #1		MESSAGE Label: <u>Message 1</u>	
LINE	BYTES	HEX DATA	CHARACTER DATA
1	15....29	00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00	????????????????
2	30....44	00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00	????????????????
3	45....59	00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00	????????????????
4	60....60	00	?

FRAME Length: 60 Bytes

ASCII 8 (Roman 8) character data entry

ASCII 7 ASCII 8 EBCDIC 6 to OTHER EXIT
Byte(s) Roman 8* Byte # CHOICES

Figure 4-2. Edit Datafield Menu

Softkey

Description

<Insert Byte(s)>

The analyzer prompts you to enter how many bytes you want to enter. Enter the number you want and press [RETURN]. The analyzer inserts the new bytes before the position marked by the cursor.

<Delete Byte(s)>

The analyzer prompts you to enter how many bytes to delete. Enter the number and press [RETURN]. The analyzer deletes the byte marked by the cursor and the following bytes, depending on the number you specify.

Changing Message Length

You can change the **Message Data** field by inserting or deleting bytes.

Another method to change the length of the message field is to move the cursor to the **FRAME Length** field in the upper right corner and enter how many bytes you want the field length to be. Press [RETURN] to complete the entry.

A third method to change the length is to press **<Edit Datafield>** and type characters at the end of the data field. The analyzer adds new byte locations as you type new characters. Up to 2022 byte positions may be entered.

Softkey

Description

<ASCII 7>
<ASCII8>
<EBCDIC>

Depending on which of these softkeys you select, the protocol analyzer converts characters in the **HEX DATA** field into the equivalent ASCII or EBCDIC characters for the **Character Data** field. See **Keyboard and Character Codes** in the **HP 4972A Appendix Manual** for the different character code sets available.

Unknown character:

When you enter a hex character that does not have an equivalent character, the character appears as "◀" in the **CHARACTER DATA** field.

You can move the cursor to the **CHARACTER DATA** field and enter characters directly from the keyboard. The equivalent hex code for each character is automatically entered in the **HEX DATA** field.

<ASCII 7 Par = 0>

The analyzer creates messages in ASCII 7 with the parity bit always set to zero.

<ASCII 7 Par = 1>

The analyzer creates messages in ASCII 7 with the parity bit always set to one.

<ASCII 7 Odd Par>

The analyzer creates messages in ASCII 7 so that the character byte always has an odd number of bits.

<ASCII 7 Even Par>

The analyzer creates messages in ASCII 7 so that the character byte always has an even number of bits.

Softkey

Description

<Go To Byte#>

The analyzer moves the cursor and the message with the byte you select to the top of the display. It lets you move quickly through large messages.

Press this softkey to display the following message:

Go to which byte number?

Enter the byte number you want to view and press [RETURN] to execute the command.

<Copy Frame>

You can create a message using a frame stored in the receive buffer. The analyzer copies all of the contents of the frame you select from the receive buffer. This includes: **Address** fields, **Type/Length** field, **Data** field, and **Frame Check Sequence (FCS)**. The analyzer updates the length of the frame and copies it into your message with a good FCS value.

Press this softkey to display the following message:

Copy which frame number? 0

Enter the frame number you want to copy from the receive buffer. Press [RETURN] to execute the command.

Frame number 0 is the default value. Since no frame 0 exists in the protocol analyzer memory, you have to enter a valid frame number for a copy to occur. This prevents you from unintentionally overwriting a message which could happen if the default value was a real frame number.

Softkey

Description

< Copy Message >

You can copy a previously defined message. The analyzer copies the entire message, including **Address** fields, **Type/Length** field, **Data** field, and **FCS** field. The FCS value for the copied frame automatically resets to a good value.

Press this softkey to display the following message:

Select softkey OR enter valid name: _____

Enter the message number you want to copy and press [RETURN] to execute the command.

< Datafield = 00000.. >

Fills the entire data field with all 0s.

< Datafield = 01010.. >

Fills the entire data field with all 5s (alternating 0s and 1s).

< Datafield = 10101.. >

Fills the entire data field with all As (alternating 1s and 0s).

< Datafield = 11111.. >

Fills the entire data field with all Fs (all 1s).

< Random Datafield >

Uses an HP 4972A internal random generator to fill the entire data field with random characters.

Softkey

<Format as Filter #>

Description

The analyzer formats the message marked by the cursor according to a specific protocol. This lets you more easily recognize if control or protocol characters are correctly placed in specific byte locations in the data field.

The display includes the following frame header information:

- **Message Label**
- **Source Address**
- **Frame Length**
- **Equivalent Node Names**
- **Destination Address**
- **Type/Length Field**

In addition, this softkey displays byte locations in the data field that have been declared as filter bytes. The data field characters display in hex code with the equivalent characters on the right side of the screen in the selected character format.

The **FIELD LABEL** field lets you assign names to filter fields you create in the data field. The name can reflect byte position or a protocol function. The **Data** field displays only the data bytes defined in the filter you chose.

Press <Format As Filter #> to display:

Select softkey OR enter valid name _____.

Press a displayed softkey or type the filter name whose format you want to copy and press [RETURN] to execute the command.

FIELD LABEL	HEX DATA	CHARACTER DATA
MESSAGE #0 in format of Filter_0		MESSAGE Label: <u>Message_0</u>
		FRAME Length: <u>60</u> Bytes
DESTINATION	00-00-00-00-00-00	Node Name: -- Not Defined --
SOURCE	08-00-09-00-2A-D6	Node Name: HP_LAN_Analyzer
TYPE	00-00	
DATA	00	␣

ASCII 7, parity = 0 character data entry

ASCII 7 Even Par	ASCII 7 Odd Par	ASCII 7 Even Par	ASCII 8 Roman 8*	ASCII 8 Even Par	EXIT
---------------------	--------------------	---------------------	---------------------	---------------------	------

Figure 4-3. Format as Filter# Display

Copying the Data Length Field

Some protocols require that the **Frame Type** field show the length of the data field. When you position the cursor to the **Frame Type** field in the Edit Messages Menu, the analyzer displays **<Copy Data Length>**.

Softkey

<Copy Data Length>

Description

The protocol analyzer enters the length of the **Data** field for the current message in the **FRAME TYPE** field. The **Data** field length displays in Hex code. For example, if the data field contains 46 bytes, the **FRAME TYPE** field would display: **00-2E**

00-2E is the hex code for ⁴⁶10.

Don't confuse data field length with frame length. Frame length contains the **Destination** and **Source Address** fields, the **Type/Length** field, and the **Data** field.

Selecting an FCS Value

When you transmit a message, IEEE 802.3 uses a Cyclic Redundancy Check (CRC) technique to generate Frame Check Sequence (FCS) characters for determining if the message is received correctly. The receiving station generates its own FCS value and compares it to the received FCS value. If the values match, the receiving station knows it has a good frame. The algorithm used for the error checking sequence is CRC-32. The HP 4972A displays the FCS field in the Edit Messages Menu.

To view the softkeys available for FCS values, use [TAB] to move the cursor to the FCS VALUE field. The analyzer displays the following softkeys:

<u>Softkeys</u>	<u>Description</u>
<Select Good FCS>	This is the default selection. It causes the analyzer to transmit a good FCS sequence with the message you create.
<Select Bad FCS>	The analyzer creates and purposely sends a bad FCS value with the message. You may occasionally want to send a message with a bad FCS sequence to see if another station detects and responds to bad FCS values.
<Select Hex FCS>	You can type the FCS value in hex format from the keyboard. This lets you have complete control of generating an FCS test value.

Edit Programs Menu

Introduction

This chapter describes the softkeys used to program the HP 4972A Protocol Analyzer. You write programs to control the operation of the protocol analyzer in both monitor and simulate operation.

This chapter contains:

- Selecting a program to edit
- Store function softkey selections
- Store function softkey descriptions
- Selecting the log to disc file
- Program commands softkey selections
- Overview of programming
- Conditional program statements
- Program commands softkey descriptions
- Display functions in Edit Programs Menu

You can create up to five programs in the HP 4972A at a time. The programs operate one at a time, letting you quickly access programs for different applications.

Monitor

The monitor function captures and views frames as they occur on the network or displays frames previously stored in the receive buffer.

The HP 4972A LAN Protocol Analyzer provides monitoring in the Monitor Network Menu; however, programming the protocol analyzer offers a much more powerful tool. Additional functions available when monitoring with programming include:

- Filters
- Counters
- Timers
- Conditional actions for data collection
- Logging to a disc for mass storage

When monitoring messages on the network, the filtering controls what messages the analyzer stores. When monitoring frames previously stored in the receive buffer, the filtering can display only messages that meet conditions you specify.

You can use timers to measure time intervals between events you specify. Counters provide a count of certain events. Conditional statements let you display, time, and count only the messages that meet filter conditions you specify.

The analyzer lets you save monitored network messages to a floppy disc and recall them to the receive buffer for viewing or processing in a programmed monitor mode. You can use the increased storage capacity of disc drives to log messages directly to disc as they occur on the network.

Simulation

The same filters, timers, counters, and conditional actions in monitor apply in simulation. Simulation also transmits messages to the Local Area Network.

You can program the protocol analyzer to simulate a station or stations on the network. The protocol analyzer can transmit in response to a particular transmission received from another station on the network. This provides the capability to artificially increase network loading to test performance under higher traffic conditions.

Selecting a Program

When you press **<Edit Programs>** the HP 4972A displays the following:

Edit Which Program? _____

From this point you can choose one of up to five programs to edit. The names of created programs become softkey selections. Press the softkey for the program you want to edit or enter the name from the keyboard and press [RETURN].

A default program, **Program_0**, is in the protocol analyzer at power-on and consists of a Store command. This program lets the protocol analyzer perform simple monitor functions with only a few softkey entries.

The following softkeys are available in this menu.

Softkey

Description

<Edit New Program?>

You can create a new program with this softkey. The protocol analyzer displays:

New Program Name? _____

Enter the new name from the keyboard. Enter up to nine keyboard characters. The analyzer deletes leading spaces. An underscore () replaces spaces between characters. Press [RETURN] or [TAB] to complete the entry. After you create five programs, the analyzer suppresses this softkey until you delete an existing program.

Softkey

Description

< Rename Programs >

You can assign new names for existing programs. The analyzer displays:

Rename which program? _____

The analyzer displays existing programs as softkeys. Press the softkey that identifies the program you want to rename.

Rename program (Program Name) to _____

Enter up to nine keyboard characters for the program name. The analyzer deletes leading spaces and replaces spaces between characters with an underscore (). Press [RETURN] to complete the entry.

< Delete Program >

You can delete programs from the protocol analyzer. The analyzer displays:

Delete which program? _____

Press a softkey label or enter the program name from the keyboard and press [RETURN]. The protocol analyzer displays:

Are you sure you want to delete (Program Name)?

Press <YES> to delete the program. Press <NO> to exit the menu. If you try to delete all programs, a default program remains as Program_0. This program contains only the "Store all frames until full" command which lets the protocol analyzer acquire frames in monitor modes. The default Program_0 stores all frames until the receive buffer is full.

Store Function Softkey Descriptions

The analyzer presents the following command at the top of each program:

```
Store: all frames  
      until full
```

The analyzer does not use the Store command as part of the program but uses it to set up internal circuitry that stores frames in the receive buffer when the program run starts.

The program sees only those frames which meet the requirements of the store statement. The frame counter function counts only the frames going into the receive buffer. The frame counter does not count frames not stored in the receive buffer.

The store function sets up the hardware when you execute a program using **<Run From Network>**.

Log File

You find this field beneath the Store command. Use it to store frames to a disc drive. A disc drive allows you to create much larger files than the receive buffer.

The receive buffer stores only frames that pass filter and trigger conditions. First the receive buffer, and then the disc file, stores the frames in Log File mode. The following pages have descriptions of the receive buffer and log-data disc file interactions. To view softkey selections for the store command, position the cursor in the Store command line.

Use the following softkeys to choose the frames you want to store.

<u>Softkey</u>	<u>Description</u>
< All Frames >	The receive buffer stores all incoming frames that pass the Runt Frame Filter, which you enable in the Hardware Functions Menu.
< Frames Matching >	The analyzer stores only frames matching filter or frame traits. ANDing and ORing frames stored by the protocol analyzer further qualifies them with frame traits. A frame must match the filters AND/OR meet the frame traits you specify in the Edit Filters Menu before the analyzer stores it.
< Not Matching >	The analyzer stores only frames that do not match filters or frame traits you specify. You can also use the AND or OR functions to make combinations of filters and frame traits that you want. The NOT condition applies to all the filter and frame trait elements that follow the this command in the store field.
< No Frames >	The protocol analyzer ignores incoming frames and transmits messages at the fastest rate. Use this softkey when you want to load the network.

After you have chosen which frames to store, you have to choose how you want the frames organized in memory.

Softkey

Description

<Until Full>

Storing to receive buffer

The analyzer initiates the receive buffer and stores frames until the buffer is full.

Storing to log-data file

If the program logs data to a disc, the designated disc file stores data until it is full. Since the log-data file is normally much larger than the receive buffer, the receive buffer overwrites data until the log-data file is full.

<Starting With>

The receive buffer or log-data file begins storing after a particular filter or combination of filters. It stores all frames matching your filter conditions after a specified starting event. For example:

```
Store: all frames
      starting with FILTER_0
.....
----frame 1-  first frame matching FILTER_0
----frame 2-
----frame 3-
.....
.....
```

After FILTER_0 occurs, the analyzer starts to store all the frames on the network in memory until the memory is full. When you view the frames in the Examine Data Menu, starting with FILTER_0 displays with a blinking frame number.

Softkey

Description

<Centered about>

The protocol analyzer fills the receive buffer or log-data disc file in a circular manner. If the buffer fills up before the trigger event occurs, the analyzer stores new frames over previously stored frames. This process continues until the filter condition you specified occurs. It notes the location of the starting frame and stores more incoming frames until the buffer is filled from the calculated starting point. You can see frames that came before and after the specified frame. For example:

```
---frame 1-                Store: all frames
---frame 2-                centered about FILTER_0
.....
-----frame matching FILTER_0
-----
-----
----last frame
```

This softkey relates more to the number of bytes of data in the buffer than to the number of frames in the buffer. For example, if long frames precede the filter and short frames follow the filter, the buffer stores more frames after the filter than before the filter. However, the buffer centers the frame matching your filter condition into the total quantity of bytes stored.

If the program logs data to disc, the buffer still centers the trigger. The log-data file is typically much larger than the receive buffer so the trigger event may not occur at the center of the log-data file. In the Examine Data Menu, use <Go to Trigger> to display the trigger event with a blinking frame number.

Softkey

Description

<Ending With>

The protocol analyzer stores frames into the receive buffer or log-data file and stops when a filter condition you specify occurs. Similar to **<Centered About>**, this softkey uses a circular mode to fill the buffer and log-data file. The analyzer writes new frames over existing frames when the buffer is full. This continues until the analyzer finds the trigger you specified.

Example:

```
Store: all frames ending with FILTER_0
----frame 1-
----frame 2-
----frame 3-
.....
.....
.....
.....
.....
.....
----frame matching FILTER_0
* .....
```

When you view the stored frames in the Examine Data Menu, frame matching **FILTER_X** displays with the frame number in blinking half-bright inverse video. The frame number displays in blinking full-bright inverse video if the program marked the same frame.

* After the protocol analyzer matches a filter and stops frame acquisition, sometimes it stores additional frames due to the speed of the data acquisition circuits.

Softkey

Description

<Nonstop>

The analyzer stores frames in the buffer or log-data file in a circular buffer mode. After the memory is full, it continues to write new frames over the previously stored frames.

Example:

```
Store: all frames
       nonstop
----frame 1-
----frame 2-
.....
..... After the buffer is
..... filled once, new frames
..... are written over
..... previously stored
..... frames.
.....
```

Softkey**Description****<End Edit>**

The analyzer exits the lower level program editing and goes to the Edit Programs Menu.

<And Frame Traits >

The analyzer enables the frame error traits you selected in the Edit Filters Menu. The selection includes:

Accept/Reject Frame with GOOD FCS

Accept/Reject Frame with BAD FCS

Accept/Reject MISALIGNED Frame

Accept/Reject RUNT Frame

This softkey ANDs the selected frame traits with all the filters in store command line. Go to Displaying Frame Errors, in Chapter 10, for more information about frame errors.

<Or>

You can combine filters used to specify the store operation.

Example:

```
Store: all frames
starting with FILTER_0
      or FILTER_1
```

In this example, the memory starts storing frames when it finds either FILTER_0 or FILTER_1.

<Block 1 >

The cursor moves to the starting position in program block 1. Use this softkey for program editing.

The Log to Disc File

To log data to disc the program must have a log file definition.

Store: Frames Matching

Log file:

```
New File ----->|-----(select  -----(select  ----(select  -->|
                   |      volume number)   file name)   file size)   |
Existing File -->|
                   |
Not Used ----->|----->|

Disc functions
```

You need to supply the volume number, volume file name, and file size (in bytes) when you store the frames on the network to a disc drive.

Block 1: Start Disc

The data will not be logged until the "Start Disc" of "Log Frame to Disc" command is encountered. This allows the user to selectively store frames in the buffer.

Due to the 400 Kbytes/s maximum Log to Disc File storage rate, during high traffic it may be useful to use filtering and Partial Packet Store to limit the quantity of bytes to be stored. Partial Packet Store is discussed further in chapter 12, Hardware Functions Menu.

Softkey

Description

< New File >

You can assign a name to a new file.

Select Volume

After you select **< New File >**, the protocol analyzer displays a choice of disc volumes available for logging. Enter the volume number from softkeys. Press a softkey for the volume used for logging.

Name File

Enter a file name. The name can't exceed seven keyboard characters. The analyzer deletes leading spaces and replaces spaces between names with an underscore (_). You can't use the following reserved characters in log-data file names:

@	:	. (period)
#	"	CTRL-X (control characters)
\$	/	

Press [RETURN] to complete the file name entry.

Choose File Size

You can control how much disc space allocated to the file. Use **< Maximum Size >** to show the maximum continuous file space available for the chosen volume. If you need less than the maximum available space, enter the file size you want. The minimum file size is 32,768 bytes. Press **< EXIT >** to return to the Log File Menu. Enter the file size you want.

Default File Size

If you don't enter a file size, the protocol analyzer automatically assigns the maximum contiguous space available on the selected volume.

Softkey

Description

< Existing File >

The analyzer displays the names of files already existing on the volume selected to logging. Logging to an existing file overwrites information previously stored on the disc.

< Not Used >

When a program does not use the log to disc function, you do not have to enter a disc volume and file name. However, if you enter a log to disc command in the following program and execute the program, the analyzer stops and displays the message:

LOG FILE NOT DECLARED FOR "Log frame" STATEMENT IN BLOCK X.

Pressing **<Continue Compiling>** causes the protocol analyzer to ignore the log statement and continue to compile; however, the program will not run.

< Disc Functions >

This softkey provides quick access to the Disc Functions Menu. When you go to the Disc Functions Menu, you can press **<EXIT>** to return to the Edit Programs Menu.

Overview of Programming

Softkey Programming

When you press a softkey in the Edit Programs Menu, new softkeys appear to lead you through a program step. For example, when you press **<Start>**, only the program functions that can be "started" appear as new softkey choices.

Block Structure

The analyzer organizes programs into consecutively numbered blocks. You can have up to 999 blocks in a program. Block numbers provide labels for program looping or jumping operations. When you add or delete blocks in a program, the protocol analyzer automatically renumbers the program blocks. Comment fields are available for each program block.

Editing Programs

You can use editing softkeys such as **<Insert Block>**, **<Delete Block>**, and **<Copy Block>** to edit programs. In addition, you can use [TAB], [ARROWS], and the other keyboard keys to edit programs.

Running Programs

After you develop your program, return to the Top Level Menu and press **<Execute Program>**. Select the data source you want to test with the program. Select either **<Run From Network>** or **<Run From Buffer>**.

Conditional Program Statements

The HP 4972A Protocol Analyzer uses the conditional programming statements **If** and **When** to allow more flexible programs to be written.

If

The "If" command compares the contents of a counter to a Boolean condition to see if the condition is true or false. Regardless of whether the comparison is true or false, the program moves to another program step.

A true <If Counter> comparison lets you branch to another program block. When the <If Counter> comparison is false, the program increments to the next program step even if the next step is in another program block.

When

The "When" command also compares events in the protocol analyzer to see if particular Boolean conditions are true or false. Unlike the "If" command, the "When" command waits at a program step until it is true. If the protocol analyzer finds a <When (event)> condition false, the analyzer waits at that program step until the condition becomes true.

Use <Else When> immediately after the <When (Event)> step to escape from a "when" command. The program uses the following logic:

1. If <Else When> immediately follows a false <When (event)> condition, the program continues to <Else When>.
2. If the <Else When> condition is true, the program observes the <Else When> command.
3. If the <Else When> condition is false, the program loops back to the preceding <When (events)> step.

Program Block Comment Field

When you move to a block label using [ARROWS], a field opens for you to make descriptive comments about the function or purpose of a block. You can enter up to 66 keyboard characters in the block comment field.

Block 1: `Example_of_a_program_block_comment_field.`

Press <End Comment>, [ARROWS], or [RETURN] to exit the block label field.

Program Commands Softkey Descriptions

Softkey

Description

<Start>

Six functions can be "started" in a program. Press this softkey to see the following softkeys:

<Display>

<Marking Frames>

<Timer>

<Frame Counter>

<Collision Counter>

<Logging to Disc>

A description of these softkeys follows.

<Display>

The HP 4972A default program mode starts a program run with the display blank. This softkey displays timers and counters while the program is executing.

While viewing timers and counters, you can select **<Display Frames>** to display frames during program execution. That softkey will change to **<Timers&Counters>** while you display frames. Pressing **<Timers&Counters>** will return the display to showing the contents of the timers and counters.

For more details about this softkey, see Display Functions in Edit Programs Menu in this chapter.

NOTE

Displaying frames or counters/timers slows the operation of the analyzer. In circular mode (Nonstop, Centered About, or Ending With), the receive buffer stores frames faster than the analyzer displays them. The receive buffer fills up before the contents are displayed and the analyzer will not write over data that has not been displayed. If this happens, the protocol analyzer stops the program and displays the message:

```
Program_X aborted by buffer overflow  
PROGRAM TOO COMPLEX FOR CURRENT TRAFFIC LEVEL
```

To prevent this error message, do not display frames, counters/timers, or use the beeper when storing frames in circular modes.

Softkey

Description

<Marking Frames>

The protocol analyzer adds a frame marker to frames that match your specified conditions.

In <Run From Buffer>: The analyzer adds the marker to frames matching your conditions existing in the buffer and displays them as marked frames.

In <Run From Network>: The analyzer adds the marker to frames matching your conditions as they enter the buffer and displays the frame mark on the screen with the Frame Number Field in inverse video.

Softkey**Description****<Timer>**

You can select one of up to sixteen timers to clock as the program is executing. All timers reset to zero at the beginning of program execution. If you halt the timer during the program and then start the timer again, the timer continues from its previous count. Use **<Reset>** if you want to reset the timer to zero during the program.

<Frame Counter>

In **<Run From Buffer>**: The frame counter will be incremented sequentially by frames existing in the buffer.

In **<Run From Network>**: The frame counter will be incremented only by the frames that pass the filter and are stored in the receive buffer, not by all frames occurring on the network.

<Collision Counter>

You can assign a specific counter to count collisions on the network. The designated collision counter will not be displayed as a softkey choice when you press **<Increment Counter>**.

When you view counters and timers, the counter you designate for collision counting will display:

```
counter_x = nnn collisions
```

You can rename the collision counter to a functional name.

Softkey

Description

<Logging To Disc>

The protocol analyzer logs frames from the network to the disc drive and file name you assigned in the Log File field above Block 1.

The logging to disc function follows the operation of the Store command. Store commands used to control logging to disc include:

**Until Full
Centered About**

**Starting With
Ending With Nonstop**

Filters used to control or limit the frames stored in the protocol analyzer also control which frames are logged to the disc.

After the program statement for start logging to disc, use a **When Frame Matches Filter_X** to cause logging to occur.

The analyzer stores frames in the receive buffer first then transfers them to the disc file. If new frames are stored in the receive buffer faster than the analyzer can transfer them to the disc file, the analyzer skips storing frames to the disc file and displays the error message:

Receive buffer overflow detected. Frames skipped!

The Examine Data Menu indicates skipped frames with a dashed line.

Softkey**Description**

<Stop>	The analyzer will end any of the functions began by <Start> .
<Test>	The analyzer stops the program execution.
<And Then>	Multiple program actions can occur within a single block. After the first program step is finished, the second program step will begin.
<Next Block>	The current program block will end and the cursor moves to the next block. The analyzer generates up to 999 blocks.
<END EDIT>	Programming will end for the current program. The softkey selection returns to the previous level.
<Increment Counter>	<p>A particular counter is incremented. It is an unconditional command (doesn't depend on other events). The softkeys will change to display counter labels. Select the counter by using a softkey or by entering a counter label from the keyboard. If you enter the name from the keyboard, press [RETURN] to complete the program step.</p> <p>Press <Rename Counters> if you want to assign a counter name that will identify its function.</p> <p>Don't confuse event counters with frame counters. Frame counters increment automatically as frames load into the receive buffer; you can't increment them manually since this causes the count to differ from the actual number of frames seen.</p>

Softkey

Description

<If Counter>

Use the 'IF' construct with this conditional statement. The analyzer compares the contents of a counter to Boolean conditions using relational comparator combinations of equal to, greater than, or less than. The program jumps to another program block if the comparison is true. The program increments to the next program step if the comparison is false.

Comparison states that may be used include:

= > <=
<> < >=

<> comparison is true when the counter is not equal to the entered count.

Example:

If counter Counter_1 <> 10 Then Go To Block 4

If Counter_1 is any number except 10, the program goes to program block 4. If the counter is at 10, the program goes to the following program step.

The analyzer has sixteen counters available. You can assign labels to the counters to more easily identify their function. Use <Rename Counters> to label the counters.

<Then Go To Block>

You can specify the block for the program to branch to when the 'IF' comparison is true. Enter a block number and press [RETURN] to finish that program step.

Softkey**Description****<Else If>**

You can select an alternative 'IF' statement.

<Else When>

You can select an alternative 'When (event)' statement.

See the **<When (event)>** command descriptions.

<Next Block>

The analyzer will end the current program block and moves the cursor to the first position in the next block.

<END EDIT>

The analyzer will end programming for the current program. The softkey selection is returned to the previous softkey level. You can select a new program to edit or exit the programming menu.

<Go To Block>

You can jump to another block in the program. It is an unconditional command and does not use a preceding If or When command. When the program steps to that line, the command begins. Enter the block number you wish the program to go to at the prompt and press [RETURN].

Softkey

Description

<When (event)>

This is a conditional statement using the 'when' construct. It causes the program to wait at that point until the test condition is true. Conditions that may be tested by this command include frame matches, time of day, timer, frame counter, and collision counter.

When a comparison is true for the function you specify, the program branches to the program block you select. For example:

Block 6:

When frame matches FILTER_0 then go to Block 7

Block 7:

Start timer TIMER_1

Block 8:

When frame matches FILTER_1 then go to Block 9

Block 9:

Stop timer TIMER_1

In this example, **TIMER_1** measures the time between filter events, **FILTER_0** and **FILTER_1**. The program waits at Block 6 until **FILTER_0** occurs. After the timer starts, the program waits at Block 8 until **FILTER_1** occurs.

Softkey

Description

<Frame Matches>

The analyzer compares a filter you created in the Edit Filters Menu to incoming frames. When an incoming frame matches the filter you specified, the "Then Go To Block __ " instruction begins. The program waits at a 'When Frame Matches' command until a true condition occurs.

Events to describe <Frame Matches> can be grouped in logical combinations to make even more powerful filtering choices. The combinations can be grouped with Not filter, And, And Frame Traits, and OR commands.

<Not>

The analyzer satisfies the 'When' program step when any frame occurs that does not match the specified filter or specified frame traits.

<Edit Filters>

The analyzer branches to the display of a summary of filters. This lets you review the filters available for selection. Press <EXIT> to return to <Edit Programs>.

<Frame Traits>

The analyzer checks if incoming frames match frame traits selected in the Edit Filters Menu.

<And>

Use this command to require that more than one filter match before the program continues. The following example requires a single frame to match both FILTER_0 AND FILTER_1 before the program moves to Block 2.

```
Block 1:  
When frame matches FILTER_0  
and FILTER_1 then go to block 2
```

Softkey

Description

<And Frame Traits>

The analyzer finds a frame matching the <Frame Matches> conditions AND the frame traits identified in the Edit Filters Menu. Frame Traits selections include:

Accept / Reject	Frame with GOOD FCS
Accept / Reject	Frame with BAD FCS
Accept / Reject	MISALIGNED Frame
Accept / Reject	Runt Frame

<Or>

One or more of several filters causes a program step to start. The following example requires a frame to match one or more of FILTERS_0, or 1, or 2 before the program moves to Block 2. For example:

Block 1:

```
When frame matches FILTER_0
or FILTER_1
or FILTER_2 then go to Block 2
```

<Currnt Node Addr>

You can filter on frames to see if the Source Address in a received message is the same as the current node address in the Physical Address List Menu.

Frame Match Operation Precedence

The analyzer precedence for Frame Match operation:

1. Not
2. And
3. Or
4. And Frame Traits

Softkey

Description

<Time Of Day>

The analyzer detects when the system clock exceeds a time-of-day value that you entered. It uses the time you set in the Set Time Menu at power on for this comparison.

<Timer>

The analyzer compares the state of a specific timer to a number you entered. When the timer exceeds the time you entered, the program goes to the program block you specify. The program waits at this command until the analyzer finds a true condition.

You have access to sixteen timers for this command. You can assign labels that relate to the function being checked to each timer. Use <Rename Timer> to enter the menu for naming timers.

In Run From Network mode, the timer completes the time interval you enter even if the analyzer detects no frames on the network. In Run From Buffer mode, the analyzer automatically halts the timer when it detects an empty buffer. The following example program counts how many frames the analyzer stores in one second.

Store: all frames

until buffer full

Block 1:

Start timer Timer_1

Block 2:

Start frame counter Counter_1

and then

When timer Timer_1 exceeds 1 Seconds then go to block 3

Block 3:

Stop frame counter Counter_1

Softkey

Description

<Frame Counter>

The analyzer assigns the task of counting frames to one of sixteen available counters. Use <When> and <Frame Counter> to detect when the number of frames meeting your criteria exceeds some quantity.

An example follows for <When> <Frame Counter> used to measure the time while the analyzer waits for the buffer to store 100 frames. The analyzer performs the following functions in the example below:

- loads frames into the buffer until buffer is full or until the program stops operation
- starts a timer
- enables a frame counter to start counting frames
- stores frames in the buffer until the counter reaches 100 and then stops the timer

Store: all frames
until buffer full

Block 1:
Start timer Timer_1

Block 2:
Start frame counter Counter_1
and then
When frame counter Counter_1 exceeds 99 then goto block 3

Block 3:
Stop timer Timer_1
and then
Stop Test

Softkey

<Collision Counter>

Description

The analyzer assigns the task of counting collisions to one of the 16 available counters. The assigned counter exclusively counts collisions. You can't increment the collision counter by a program command and it does not display as a softkey choice when you press <Increment Counter>.

You can use <When> and <Collision Counter> in combination to detect when the number of collisions exceeds some quantity. In the example below, the analyzer detects how many collisions occur in 10 seconds.

Store: all frames
nonstop

Block 1:
Start timer Timer_0

Block 2:
Start collision counter counter_3

Block 3:
When timer Timer_0 exceeds 10 seconds then goto Block 4

Block 4:
Stop timer Timer_0
and then
Stop Test

Softkey

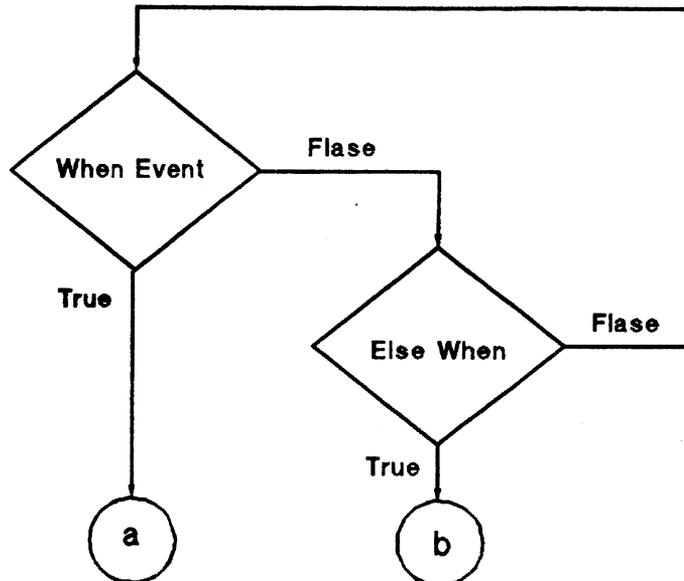
Description

<Then Go To Block>

You can specify the block to branch to if the 'When' comparison is true. Enter a block number from the keyboard and press [RETURN] to complete the step.

<Else When>

You can select an alternative 'When' statement. It follows a <When (event)> command. The tree below shows the <Else When> logic.



WHENMENU

a = where When (event) command directs program
b = where Else When command directs program

Softkey

Description

For example:

Block 6:

When frame counter COUNT_FR exceeds 100 then go to block 7
else when timer TIMER_0 exceeds 5 seconds then goto Block 10

In this example, the program first checks to see if the frame counter exceeds 100. If the counter exceeds 100, the program jumps to Block 7. If the counter does not exceed 100, the program looks at the **<Else When>** command on the following line. If the timer exceeds 5 seconds, the program goes to Block 10. If the counter does not exceed 5 seconds, the program returns to the previous program line.

<Display Frame>

If you use this softkey to begin the display, only one frame displays. When the program executes the **<Start> <Display>** command, timers and counters display. When this command follows a **<Start> <Display>** command, the analyzer displays changes to show incrementing frames.

NOTE

Like the **<Start> <Display>** commands, **<Display Frame>** halts the analyzer if the rate of storing frames exceeds the rate of displaying them. This condition only happens in circular modes of frame acquisition (Nonstop, Centered About, and Ending With). To prevent halting the run, don't display frames, counters/timers, or use the beeper while you store frames.

Softkey**Description****<Mark Frame>**

The analyzer marks the frame currently in process in the receive buffer. Use this softkey with filters to indicate when a frame matches a filter condition. The Examine Data Menu displays marked frames with the frame number in inverse video. In the following example, the protocol analyzer marks all frames matching Filter_0.

Block 1:

When frame matches FILTER_0 then go to Block 2

Block 2:

Mark Frame

Block 3:

Go to Block 1

Softkey**Description****<Log Frame To Disc>**

This command logs one frame to the log-data file. When a filter condition you specify occurs, the program will store that particular frame to the log-data file. Don't confuse this command with the <Start> <Logging To Disc> commands, which will let you store frames continuously.

<Send Message>

The protocol analyzer transmits messages to the local area network. Up to 16 messages can be created in the Edit Messages Menu and then transmitted under your program control. Use the IF, WHEN, and ELSE commands to determine what message to transmit and when it should be sent. Also, you can transmit messages repeatedly or in combination with other messages by using:

<Repeated> **<Followed by>**
<To Currnt> **<To Next Node>**

<Repeated>

You can repeat a message up to 9999 times without interruption.

No repeat--transmits the message once.

Repeat 1 time--transmits the message once and then repeats once.

Repeat 2 times--transmits the message once and then repeats twice.

Softkey**Description****< Followed by >**

A series of different messages will be transmitted in a particular sequence. You can simulate transmitting to and from different stations by assigning different Destination and Source Addresses to each message. The following example sends message_0 ten times, then message_1 one time, and then message_2 one time.

Block 1:

Send message MESSAGE_0 repeated 9 times
followed by MESSAGE_1
followed by MESSAGE_2

< To Currnt Node >

This command uses nodes in the Physical Address List Menu. The node address will be substituted into the Destination Address field of the message and the FCS is recomputed before the message is sent out.

If there is no "current node", the first node in the list becomes the current one.

Softkey**Description****<To Next Node>**

The program moves to the next node in the node list. The node address will be substituted into the Destination Address field of the message and the FCS is recomputed before the message is sent out.

If there is no "next node", the analyzer resets the current node to the beginning of the node list so that the node list can be used more than once.

Sixteen messages may be used in these statements. A node with don't cares (X's) in the address will be skipped.

<Reset>

Either a specific timer or counter will be reset to its zero state. Press <Reset> to display a choice of <Timers> and <Counters>. Choose a softkey for the function you need to reset and to display the counters or timers you have defined. Press the softkey for the counter or timer you want to reset.

You can start or stop counters or timers in the program. If you start them again, they continue from their previous count. Use <Reset> to reset to zero before beginning to count again. In the example below, whenever Filter_0 occurs, Timer_1 resets to zero and immediately starts again.

Block 8:

When frame matches FILTER_0 then go to block 9

Block 9:

Reset timer Timer_1

and then

Start timer Timer_1

Softkey

Description

<Wait>

You can create "waits" or pauses in your program using Ms, minutes, seconds, and hours. The minimum time for a wait period is 1.0 Ms. The maximum time for a wait period is 9999 hours.

<Beep>

The analyzer will produce an audible beep to note a condition or status point. In the example below, when filters match or a timer/counter reaches a particular event, the analyzer will beep.

Block 2:

When timer Timer_1 exceeds 10 Ms then go to Block 3

Block 3:

Beep

and then

Go to block 4

Note

Using <Beep> slows the operation of the analyzer. In circular mode (Nonstop, Centered About, Ending With) when frames fill the receive buffer faster than the Beep command can operate, the buffer can fill up before the analyzer beeps. The analyzer can't write over previously stored data while waiting for the Beep command. If this happens, the protocol analyzer stops the program and displays:

```
Program_X aborted by buffer overflow.  
PROGRAM TOO COMPLEX FOR CURRENT TRAFFIC LEVEL.
```

If this message occurs, delete the beep command.

Softkey

Description

<Record+Response>

You can record if a node responds to a message by using **<Send Message>** to send a message to "Current Node" or to "Next Node" on the Physical Address List Menu. The response is recorded in the Physical Address List Menu under the **RESPONSE** column.

If the addresses match, the comment **POSITIVE** is entered in the **RESPONSE** field of the Physical Address List Menu.

<Record-Response>

You can record if a node does not respond to a message by using **<Send Message>** to send a message to "Current Node" or to "Next Node" on the node list. The response is recorded in the Physical Address List Menu under the **RESPONSE** column.

If no message is received from the "Current Node" or the "Next Node", **NEGATIVE** is entered in the **RESPONSE** field of the Physical Address List Menu.

<Find Block>

You can move to another program block in the program during editing. Press this softkey, enter a program block number, and press [RETURN]. The cursor moves to the program block entered.

<Copy Block>

You can duplicate an existing program block and insert it anywhere in the program during program editing. The block will be copied immediately below the block containing the cursor. The analyzer automatically renumbers the program blocks and all block references in the program.

To copy an existing block, position the cursor to the program block you want the new block to follow. Press **<Copy Block>**. Enter the program block number to be copied. Press [RETURN].

Softkey**Description**

< Insert Block >	You can add a new program block between existing program blocks. The analyzer will insert the new block immediately above the block that currently contains the cursor and will automatically renumber the blocks, including all block location references.
< Delete Block >	You can delete a block. The analyzer will delete the block currently marked by the cursor and will renumber the remaining program blocks and block location references.
< Copy Program >	You can copy another program already existing in the protocol analyzer. The analyzer will sound a beeper and display a warning message to alert you that the program you try to copy will overwrite the existing program.
< Rename Ctr/Tmrs >	You can change the name of a counter or timer. The name can be changed to describe the event or function you are monitoring. The analyzer allows up to nine keyboard characters for the names, deletes leading spaces, and replaces spaces between characters with an underscore (_). Press [TAB] or [RETURN] to complete the entry.

Display Functions in Edit Programs Menu

This section provides a summary for viewing data during a program run. The previous section, Program Command Descriptions, describes each of the program commands discussed in the following text.

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. As described earlier in this chapter, 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.

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, whereas the continuous display mode will update the display continuously under program control.

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.

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.

Executing the Program

Introduction

This chapter describes the softkeys used for the Execute Program Menu. From this menu, you can select the source of frames for the program you want to execute. Your choice of frames are frames stored in the receive buffer or frames occurring on your Local Area Network.

In addition, in this menu you can access the Edit Programs Menu and the Examine Data Menu.

This chapter contains:

- Execute program operation considerations
- Running programs from the network
- Running programs from the buffer
- Examine data after program run
- Edit functions in Execute Program Menu
- Execute program soft LED indicators

Operating Considerations

You access **<Execute Program>** from the Top Level Menu. See the fold-out softkey tree in Chapter One of this manual to follow the softkey descriptions in this chapter.

The following paragraphs give general considerations for program execution.

Frame Acquisition Versus Display Speed

The protocol analyzer operating software performs two functions. First, it looks for frames matching filter conditions and stores all qualified frames in the receive buffer. Second, it runs your program.

Looking at all frames for filter matches and then storing the selected frames in the receive buffer happens in real time at 10 Mbits/sec. The analyzer can't display the frames in real time. The last frame in the receive buffer displays first each time the analyzer updates the display.

At the same time the analyzer stores frames in real time, it also executes your program. Routines such as updating the display, controlling the counters and timers, and beeping seem to operate slowly compared to the realtime data acquisition rate.

Sometimes in a circular mode of memory storage (Nonstop, Centered About, and Ending With), the analyzer fills the receive buffer before it completes display, counter, timer, and/or beeper routines. The protocol analyzer can't write new frames over the old frames previously stored in memory.

If network traffic loading is heavy, the program may cause the protocol analyzer to stop acquiring frames and display a message stating that a buffer overflow has occurred.

Recommendation

In order to reduce processor time spent displaying frames, counters, timers, and controlling the beeper, try to minimize using these programmable functions while storing frames.

An alternative is to capture the frames first, without displaying information, and then run your program from the buffer.

In **< Run From Buffer >** mode, no conflict occurs between storing frames and displaying information since the frames are already captured.

Running Programs from the Network

If you have not created a program, the protocol analyzer goes to a default **PROGRAM_0**. This program contains the default Store command, **Store all frames until buffer full**.

This lets the protocol analyzer monitor the network or receive buffer in the absence of a user created program in **<Run From Network>** or **<Run From Buffer>**.

Run from Network

The protocol analyzer executes a selected program using frames presently occurring on the Local Area Network. The analyzer will display the following message:

Run which program? ____

Press the softkey whose label contains the program you want to execute. Pressing the softkey causes the program to begin executing immediately.

If only one program is defined, the analyzer runs it automatically without going through the **Run which program?** question. You can create up to five programs that the analyzer displays as softkey selections.

Running Programs from the Buffer

The protocol analyzer executes a selected program using data previously stored in the receive buffer or in log-data disc files. Use **<Run from Buffer>** to access this function. You can choose from the receive buffer and the log-data disc files as your data source.

Receive Buffer

To execute a program from the receive buffer, you can load the buffer with frames directly from the network. This manual also refers to the receive buffer as the buffer.

Log-data Disc Files

To execute a program from a log-data file, use the Disc Functions Menu to load a log-data file to the receive buffer. The analyzer then automatically uses the log-data file as the frame source while executing the program.

Procedure to Choose the Program to Execute

1. Press **<Run From Buffer>**. The analyzer displays:

Run Which Program From Buffer? __

2. Press the softkey that contains the label of the program you want to execute.

When you press the softkey, the program begins execution. If only one program is defined, the analyzer runs that one automatically without displaying the **Run which program?** message. You can create up to five programs. The displayed as softkey selections.

Run from Receive Buffer

When you use the receive buffer as the source of the frames used for executing a program, the Store command shown in the top line of your program display is ignored in Run From Buffer operation since the frames are already stored in the receive buffer. The frames in the receive buffer are not changed by executing the program.

When you execute the program, the **Filters** field updates to show what filters match in each frame. The analyzer updates trigger events specified by the Store statement of the program. Trigger events are frames that match the statements: **Starting With**, **Centered About** and **Ending With**.

Executing **<Run From Buffer>** automatically clears the Mark Frame condition from frames in the receive buffer. The analyzer resets timers & counters and retains the timestamp for when each frame occurred on the network.

Run from Log-data Disc File

If the receive buffer has been filled from a log-data file, the analyzer executes **<Run From Buffer>** using frames in the log-data disc file.

The analyzer writes only frames from the log-data file that match the Store command of the selected program, filters and trigger events to the receive buffer or output file. The original timestamp for when each frame occurred on the network is kept. The contents of the log-data file on the disc are not disturbed.

Examining the Data

The protocol analyzer automatically goes to **Examine Data Menu** after it completes a program run. See Chapter 10 of this manual for a description of the softkeys available in the **Examine Data Menu**.

If a program uses the **Log file** command, the **Examine Data Menu** shows the file that is logged after the analyzer completes the program run.

When you execute a program from the receive buffer and do not use logging, the analyzer displays the contents of the receive buffer. Pressing **<Examine Data>** lets you view data stored in the receive buffer. The protocol analyzer branches to the **Examine Data Menu**. You can use all the normal **Examine Data** softkeys to view the frames. However, when you press **<EXIT>**, you return to the **Execute Program Menu**.

Editing in the Execute Programs Menu

While in the **Edit Programs Menu**, you have access to the **Edit Programs Menu** by pressing **<Edit Programs>**. A detailed description of the **Edit Programs Menu** is given in Chapter 5 of this manual. When you branch to the **Edit Programs Menu** and finish editing a program, press **<EXIT>** to return to the **Execute Program Menu**.

Soft LED Indicators

While executing your program, characters indicate when the analyzer transmits a frame, detects a collision, or receives a frame. The soft LEDs shown below the softkeys at the lower right corner of the display indicate the activities.



Each character is displayed in normal video when there is no activity, that is, when the function is **Off**. Characters are displayed inverse video when their function is active or **On**.

T indicates the protocol analyzer is transmitting on the network.

C indicates collisions are occurring on the network. Hardware for the collision counter detection circuit has detected a collision.

R indicates the protocol analyzer is receiving a frame. This soft LED turns on when a frame passes through the Runt frame filter.

When Are the Soft LEDs Displayed?

The soft LEDs are displayed during the following program execution:

1. When a program running from the network specifies any Store operation that stores frames in the receive buffer.
2. Only the T soft LED appears when a program running from the network specifies storing no frames and also specifies sending messages. The T does not appear until the first message is sent in the execution of this program.

Display Time

Since the frames on a LAN are being transmitted at 10 Mbits/sec, there are times when the soft LEDs will be on too briefly to notice. This is most likely to happen when the network traffic load is very light.

In contrast, there are times when the soft LEDs will be on longer than the duration of an event.

For the Collision and Receive soft LEDs, the "On" duration can last from five milliseconds to one second. The time depends on the amount of traffic on the network and the contents of the program for the Collision and Receive soft LEDs.

For the Transmit soft LED, the duration depends on the length of the message to be transmitted, the frequency of transmission, and how often other traffic on the network permits the frame to be transmitted.

Distortion

Transmit (T) can be distorted because frames are transmitted at 10 Mbits/sec and the duration of frames is very short. This soft LED appears to not be on if your program uses Store no frames and short frames are sent in small groupings.

Collision (C) and Receive (R) do not display in real time. When a collision or received frame occurs, the soft LED indication occurs some time later. This time lag can vary from one millisecond to one second. Maximum time lag occurs when:

- The network is lightly loaded
(less than 64 frames/second)
and
- A ~~When~~ statement is not being executed in the program.

Master/Slave Feature

Introduction

This section describes the Input/Output (I/O) feature of the HP 4972A LAN Protocol Analyzer in master/slave (remote/local) applications.

This chapter contains:

- Editing the I/O configuration
- Saving the I/O configuration
- Capturing a slave LAN protocol analyzer
- Editing and sending a modem string
- Enabling I/O operation
- I/O status messages
- Terminal Emulator description

The master/slave feature 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 Protocol Analyzer operations on a LAN from a remote location requires two HP 4972A instruments or one HP 4972A and an IBM PC compatible using the PC remote software included on the utility disc (see Chapter 5 in the Utility Discs User's Guide). 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 a 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.

It is also possible to use [CTRL-BREAK] on the master to break the remote link without disturbing the slave unit. This allows you to run long tests remotely without maintaining the physical link.

When an HP 4972A is linked for remote operation it communicates with another station with DDCMP protocol. This protocol allows stations to 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.

Follow the Fold-out Softkey Tree in Chapter 1 of this manual as the Master/Slave softkeys are described.

Editing 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.>**.

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 7-1. 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.

The Softkeys

Use the following softkeys and their fields to change the power on configuration that controls the RS-232 link.

Softkey or Field

Description

< Edit Config. >

You can edit the HP 4972A I/O configuration table to meet your system configuration. The fields that you can change are shown in inverse video. To change a field, use [TAB] or [ARROWS] to move the cursor to the field you want to edit. The analyzer displays softkey selections for you to edit the fields.

Baud rate

This field displays the selected transmission rate. Use it to select how fast the transmission occurs on the RS-232 link between the protocol analyzers.

The default transmission rate is 1200. To select a different baud rate, move the cursor to the Baud Rate field. Press one of the displayed softkeys to choose a new transmission speed. The choices are:

< 300 >

< 600 >

< 1200 >

< 2400 >

< 4800 >

< 9600 >

Stop bits

The analyzer supplies stop bits after each transmitted character as part of the system for maintaining synchronization between transmitting and receiving stations.

The default stop bit length is 1. To choose a different stop bit length, move the cursor to the Stop Bits field. Press one of the displayed softkeys to choose a new stop bit length. The choices are:

< 1 Bkt >

< 1.5 Bits >

< 2 Bits >

Softkey or Field

Description

Parity bit

You can only edit this field when Encoded DDCMP protocol has been selected. It lets you choose what parity format is used with each transmitted character. The HP 4972A transmits the parity bit(s) with each character for error checking by other computer systems. The HP 4972A does not use the parity bit(s) itself; it uses CRC error checking.

In standard DDCMP, the parity bit is not selectable and the default state is None.

In Encoded DDCMP, the parity bit is used and the default selection is Odd. To choose a different parity bit condition, move the cursor to the Parity Bit field. Press a displayed softkey to choose a new parity bit format. The choices are:

<None> <Odd Parity> <Even Parity>

Bits/character

You can only edit the Bits/character field when Encoded DDCMP protocol is selected. This field enables the RS-232 link to group the transmission in character lengths of 7 bits or 8 bits. The analyzer default selection is 8. To choose a different character length, move the cursor to the Bits/character field. Press a displayed softkey to choose a new character bit length. The choices are:

<7 Bits/char> <8 Bits/char>

Hardware handshake

This field lets you choose how your modem handles messages between the modem and the protocol analyzer. Hardware hand shaking involves the control lines between the protocol analyzer and the modem such as: Request To Send (RTS), Clear To Send (CTS), and Carrier Detect (CD).

To choose a different hand shaking method, move the cursor to the Hardware Handshake field. Press a displayed softkey to enable the new hand hake function. The softkey choices are:

<Disabled> <Modem Hf-Duplex> <Modem FI-Duplex>

Softkey or Field

Description

< Disabled >

You can disable hand shaking when two HP 4972A protocol analyzers are hard wired together. In this application, modems are not used and hand shaking is not required.

< Modem HF-Duplex >

Either modem can transmit but not both simultaneously.

< Modem FL-Duplex >

Both modems can transmit simultaneously.

Software Handshake

This field lets you choose different methods of hand shaking between protocol analyzers and other computers to control message flow. Software hand shaking may be selected only in the Encoded DDCMP mode. With standard DDCMP, only hardware hand shaking may be used. Some systems using Encoded DDCMP may use a combination of hardware and software hand shaking.

To choose a software hand shaking function, move the cursor to the Software Handshake Field. Press a displayed softkey to choose the mode you want. The choices are:

< Disabled >

< ENQ/ACK Host >

< ENQ/ACK Terminal >

< DC1/DC3 Host >

< DC1/DC3 Terminal >

< DC1/DC3 both >

Remote Protocol

This field shows your selection for the RS-232 link protocol. The default selection is DDCMP. To choose a different protocol, move the cursor to the Protocol Field. Press one of the displayed softkeys to choose a new protocol. The choices are:

< DDCMP >

< Encoded DDCMP >

Softkey or Field

Description

<DDCMP>

The analyzer defaults to this choice. It is a byte count oriented protocol that breaks its messages into two parts:

- header containing the control information
- text body containing the data portion of the message

<Encoded DDCMP>

The analyzer groups the DDCMP frames of the protocol analyzer communications into printable ASCII characters. This allows characters in the communication of the protocol analyzer to pass through data communication equipment or a host computer with none of the characters recognized as control, transparent, or escape characters.

DDCMP timeout

You can select how long the protocol analyzers wait for responses to queries or commands. If the response does not come in the required time, the protocol analyzer goes to its next decision point to decide what action to take.

The default timeout is 3 seconds. To select another timeout, move the cursor to the time out field and press a displayed softkey. The choices are:

<1 Second>	<2 Seconds>	<3 Seconds>
<10 Seconds>	<30 Seconds>	<60 Seconds>

When using two HP 4972As in half duplex, it may be helpful to enter different times for the timeout. In half duplex, if a fault occurs and both units back off, they may wait the same time and then try to establish contact again at the same time. It may be better to have the master station slightly faster than the slave station.

DDCMP Buffer Size

You can vary the size of the messages being sent between stations. If you send messages to a station other than an HP 4972A, the buffer of the receiving station may not be able to receive 512 bytes at a time. If this happens, a buffer overrun may occur. The default choice for buffer size is 512 bytes. Softkey choices for buffer size are:

<32 Bytes>	<64 Bytes>	<80 Bytes>
<128 Bytes>	<256 Bytes>	<512 Bytes>

Saving the I/O Configuration

Softkey

<Save Config.>

Description

You can save a a copy of the configuration table to the Configuration File, CNFG. The Configuration file is located in the LANCOD file on the system disc. When you save the configuration, the protocol analyzer looks for the LANCOD volume.

After you finish editing the I/O configuration, press **<Save Config.>**. The analyzer displays the following message:

'CNFG' saved on 'LANCOD' (#12:) volume.

Capturing a Slave LAN Protocol Analyzer

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

Softkey

Description

<Capture Slave>

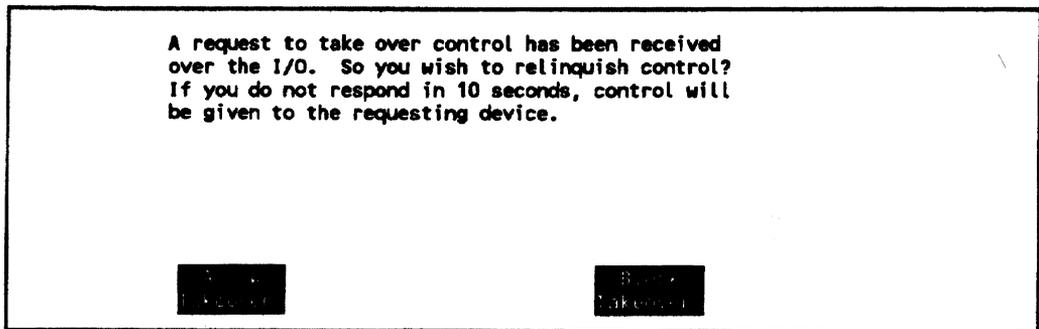
This softkey starts the process of combining two HP 4972A systems into a master/slave operation. The protocol analyzer where this softkey is pressed becomes the master or controlling device. The other HP 4972A then becomes the slave or measuring device.

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

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

Waiting for permission to take control. 10: :

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



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: :

Also 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 this section for how to read the status message.

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

Editing and Sending a Modem String

Modem Strings may be used with modems whose functions you can program via a message string from the device the modem supports.

In default mode, a modem string is not defined. If you want to define a modem string, press <Edit Modem String>. The softkeys you can use to send a modem string are described on the following pages.

The modem string can consist of up to 80 characters. If the string needs a return character, press [CTRL] while you type in M or press [RETURN].

When you use <Save Config.>, you also save the modem string.

Modem Substrings

The modem string can be divided into segments with a user defined amount of delay between sending each segment.

The character sequence "/N" (N = 0..9) can be used to divide the modem string. If "/N" is used, characters to the left of the "/N" will be sent first followed by a delay of "N" seconds, then followed by the characters to the right of the "/N". More than one "/N" may appear in the Modem String. For example:

/2+++ /2ATZ^CR /1ATD404^CR

2+++

After the string is enabled to be sent, the analyzer waits 2 seconds and sends "+++".

2ATZ^CR

The analyzer waits 2 seconds and sends "ATZ" and a carriage return.

1ATD404^CR

The analyzer waits 1 second and sends "ATD404" and a carriage return.

//

The sequence "//" or a single "/" followed by any character other than "0..9" is treated as a "/" character in an undivided string.

Softkey

Description

<Send At Power On>

The analyzer automatically sends the message to your modem each time the power switch is cycled on.

To do this, you must first define a string, enable this softkey, and then use **<Save Config.>** to save the modem string in the configuration file. You must save the configuration file before you turn power off or it is lost.

This softkey acts as a toggle switch. When the softkey is active, an asterisk (*) is displayed in the softkey field and the modem string is sent at power on. Press the softkey again; the asterisk is removed from the softkey field and the modem string is not sent at power on.

<ASCII 7>

<ASCII 8 Roman 8>

<EBCDIC>

These softkeys let you choose the character code used in the modem string. Choose the character code required by your modem.

<Send Modem Str>

You can manually send a modem string without having to cycle the protocol analyzer power. Check that you have created the string you want before pressing this softkey.

<Enable I/O> must be off in order to send the modem string.

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>**.

I/O Status Messages

The HP 4972A shows I/O status messages at the lower right corner of the display, just above <EXT>. Each protocol analyzer displays what it is doing or seeing. For example, if Station 1 is transmitting a message to Station 2, the display on each terminal would be:

Station 1	Station 2
IO: t ____: ____	IO: ____: r ____
This unit is transferring a frame to the RS-232 buffer.	This unit is receiving a frame.

I/O status messages can be grouped in the following functions:

Normal Status

This group of status characters reports the normal operation of our master/slave systems in remote operation.

Persistent Errors

This group of status words and characters reports persistent problems that occur.

Modem Not Ready Errors

The modem attached to your protocol analyzer is not ready for establishing communications between the stations.

Run Time Errors

This group of error messages reports hardware failures.

Normal Status

The following tables describe status characters that may be displayed in the Normal Status fields. These fields report the activity of the remote communications of your system.

```

          I/O:  _____ : _____
                |         |         |
Protocol State____|         |         |___Receive Information
Transmit Information____|         |

```

Transmit Information Field

**Character(s)
Displayed**

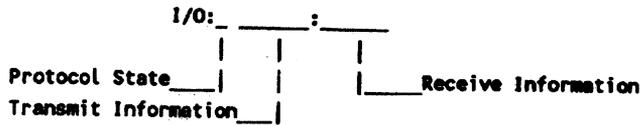
Description

Protocol State

A	Unit is attempting to acknowledge the start of communication by other unit.
H	Unit is halted.
I	Unit is attempting to start communication with other unit.

Frame Transmission Information

B	Other unit has received a good data frame but was unable to accept it because there was no message buffer available.
C	Other unit has received a frame with an FCS error.
O	Other unit has had a receiver overrun error.
t	This unit is transferring a frame to the RS-232 buffer.
w	Unit is constructing one or more data frames for transmission of message.



Receive Information Field

**Character(s)
Displayed**

Description

B	Unit has received a good data frame but was unable to accept it because there was no message buffer available.
C	Unit has received a frame with an FCS error.
O	Unit has had a receiver overrun error.
P	Unit is processing a received message.
r	Unit is receiving a frame.

Persistent Errors

If persistent errors occur on the I/O interface, each protocol analyzer displays, in inverse video, one of the following messages.

Persistent error messages are displayed in the following groups:

- START
- START ACK
- ACK__
- RCV__

```
IO: START
      |
Persistent Error__|
```

IO: START

This unit is having difficulty starting communication.

IO: START ACK

This unit is having difficulty acknowledging the start of communication.

IO: ACK _____
 |
 |
 | _____ Status Character(s)

IO: ACK **This unit is having difficulty sending a frame to the other unit.**

**Character(s)
 Displayed**

Description

B	Other unit received a good data frame one or more times but was unable to accept it because there was no message buffer available.
D	Other unit received one or more frames with an FCS error in the Data Field.
F	Other unit has received one or more frame headers with a format error.
H	Other unit received one or more frame headers with an FCS error.
L	Other unit has received one or more data frames that are too long.
O	Other unit has had one or more receiver overrun errors.
T	Other unit has failed to respond for some period of time.

IO: RCV _____
 |
 |
 | _____ Status Character(s)

IO: RCV This unit is having a difficulty receiving a frame from the other unit.

**Character(s)
 Displayed**

Description

- | | |
|----------|---|
| B | This unit received a good data frame one or more times but was unable to accept it because there was no message buffer available. |
| D | This unit received one or more frames with an FCS error in the data field. |
| F | This unit has received one or more frame headers with a format error. |
| H | This unit received one or more frame headers with an FCS error. |
| L | This unit has received one or more data frames that are too long. |
| O | This unit has had one or more receiver overrun errors. |

Modem Not Ready Errors

The modem at the station displaying Modem Not Ready is not ready. Possible causes are listed below:

Half Duplex Mode: Data Set Ready line is false.

Full Duplex Mode: Data Set Ready or Carrier Detect lines are false.

Run Time Errors

IO: Error

"ESCAPECODE" FIELD

"IOE_RESULT" or "IORESULT" FIELD

Example:

IO: Error	<u>-12</u>		CPU bus error
	<u>-26</u>	<u>12</u>	No driver for this card
	<u>-26</u>	<u>17</u>	A time out has occurred
	<u>-26</u>	<u>19</u>	Bad status or control
	<u>-26</u>	<u>21</u>	Interface card is not operating
	<u>-26</u>	<u>306</u>	Datacomm interface failure

If other Run Time Errors occur, contact your HP Response Center.

Terminal Emulator

<Terminal Emulator> provides access to configuration menus of intelligent modems. It lets you interactively configure modem parameters.

Using convenient keyboard entry, you can send and receive on a character basis to the modem. The terminal transmits each character as it is typed. Modem responses are shown on the terminal display.

Using the HP 4972A in terminal emulator mode requires detailed knowledge about the operation of your modem. Refer to the manual for the modem guidelines when sending commands to the modem and decoding modem responses.

Configuring the Terminal

Use **<I/O Functions>** and **<Edit Config.>** to set the terminal to be compatible with your modem. The I/O configuration menu is described earlier in this chapter.

Choosing Terminal Functions

Softkey

Description

< Local Echo >

This softkey causes each key selection to be shown on the display. When the receiving modem does not provide echo printing back to the display, this softkey lets you see your entry as you type each character.

If you select this softkey and the receiving modem also provides echo printing, double characters are displayed.

< Auto Linefeed >

This softkey causes the terminal to automatically send a line feed character to the display after a carriage return character is sent to the display.

< Show Non-printing >

This softkey shows non-printing characters on the display. Characters are displayed if they are entered from the keyboard or received from the modem.

For example: in ASCII-7 character code, pressing [CTRL] and [D] displays the character E_T only when this softkey is enabled.

< ASCII 7 >

< ASCII 8 >

Roman 8 >

< EBCDIC >

These softkeys let you select the character set for the display and transmitted characters. Optional keyboards let other character codes be displayed. See the Appendix Manual, Keyboard and Character Codes, for descriptions.

Monitor

Introduction

This chapter describes the softkeys used to monitor network traffic. Monitoring the network lets you look at frames on your Local Area Network. It provides an easy-to-use method for capturing and viewing network messages with the protocol analyzer.

This chapter contains:

- Monitor network softkey and field descriptions
- Monitor Configuration
- Monitor network soft LED indicators
- Monitor network anomalies

You can capture all messages appearing on a local area network. The messages are captured exactly as they appear on the network or they can be filtered, by the use of Monitor Configuration, prior to being captured. The display updates with the most recently stored frame in the receive buffer. Monitoring is done in a transparent mode with the protocol analyzer generating no signals back to the network.

Monitor Network Softkey and Field Descriptions

<u>Softkey or Field</u>	<u>Description</u>
< Monitor Network >	<p>This softkey uses the Store command:</p> <p>Store: all frames</p> <p>This will capture frames occurring on the Local Area Network. The following two softkeys determine how the protocol analyzer will fill the receive buffer.</p>
< Nonstop Mode >	<p>The analyzer continuously fills the receive buffer.</p> <p>This mode is sometimes referred to as a circular memory. The captured information increments from the beginning of the buffer to the end of the buffer. As information continues to be received, the protocol analyzer moves back to the beginning of the memory buffer and starts writing over information previously stored. This process of writing over previously stored information continues until you press <Stop Monitor>.</p>
< Until Full >	<p>The receive buffer stores network information until it is full and the protocol analyzer stops acquiring data.</p> <p>This mode is sometimes referred to as linear memory. The captured information increments from the beginning of the buffer to the end of the buffer. In contrast to the nonstop mode, this mode does not continuously write over previously stored information. When the receive buffer is full, the protocol analyzer halts the monitor function and automatically goes to the Examine Data Menu.</p>
< Start Monitor >	<p>This softkey provides one of two functions. One is to initialize the receive buffer and cause the protocol analyzer to start storing information in the same order that it appears on the local area network. This is when <All> stations and <All> protocols have been selected in Monitor Configuration.</p>

Softkey or Field

Description

Caution

All existing filters will be overwritten after pressing **<Start Monitor>**. The only exception to this is when **<All>** stations and **<All>** protocols have been selected in Monitor Configuration. To keep any filters that already exist, save them prior to pressing the **<Start Monitor>** softkey.

The second function for this softkey is executed after accessing the Monitor Configuration Menu by pressing the **<Monitor Network>** and **<Edit Config.>** softkeys. This function allows for the selection of information for the later loading of filter hardware. In this case, filter hardware is loaded and the network is monitored when the **<Start Monitor>** softkey is pressed. These new filters apply to frames before they are captured in the HP 4972A receive buffer.

Several messages are displayed at the beginning, for either function, to show the status of the protocol analyzer during the acquisition cycle:

Loading filter hardware
Initializing Receive Buffers
Acquiring data. Waiting for incoming frames

The task of storing the frames in the receive buffer is happening in realtime at 10 Mbits/sec. The frames can not be displayed in real time. As the display is updated, the last frame stored in the receive buffer is displayed next.

When the monitor operation ends, frames are displayed in the consecutive sequence they occurred on the network.

Softkey or Field

Description

<Stop Display>	<p>The analyzer stops displaying new frames as they are stored into the receive buffer. Additional frames continue to be stored in the Nonstop Mode or until the memory is full in Until Full Mode.</p> <p>A reason to stop the display might be when acquisition is occurring slowly, you can examine some frame in detail without having to wait until the buffer is full or without having to disrupt the frame acquisition.</p> <p>Changing the format at this point allows you to display the frame in another format.</p>
<Start Display>	<p>The analyzer restarts displaying new frames as they are being loaded into the receive buffer.</p>
<Stop Monitor>	<p>The analyzer stops loading new frames into the receive buffer and displays the frames in the Examine Data Menu.</p> <p>In the Nonstop Mode, the following status message is momentarily displayed:</p> <p>Run Suspended</p> <p>Then the analyzer goes to the Examine Data Menu to display frames in the receive buffer. Press <EXIT> to display these choices: <Start Monitor>, which reinitializes the receive buffer and throws away the contents previously stored, or <Continue Monitor>, which retains previously stored information and starts filling memory from where it left off.</p>
<Continue Monitor>	<p>The analyzer resumes loading new frames into the receive buffer and displays frames in the Examine Data Menu.</p>
<Edit Config.>	<p>This softkey provides access to Monitor Configuration. You can easily define filters to capture frames by specifying addresses or a protocol. Any filters you have previously defined should be saved before monitoring, as they will be overwritten by the Monitor Configuration filter definition process.</p>
Station:	<p>This field identifies the station configuration for monitoring.</p>

<u>Softkey or Field</u>	<u>Description</u>
<All>	This softkey defines a filter(s) to monitor all stations.
<Single>	This softkey defines a filter(s) to monitor traffic going to and coming from a single, user defined, station.
<Two>	This softkey defines a filter(s) to monitor traffic between two, user defined, stations.
Protocol:	This field identifies the protocol for monitoring. All of the options are always available. They are not limited to the applications currently loaded in the HP 4972A.
<All>	This softkey defines a filter(s) to monitor all protocols.
<DEC>	This softkey provides access to DEC protocols and the DEC used Configuration Testing Protocol for selection.
DECNET Address Station 1:	This field identifies the DECNET address of station number one when Protocol is set to <DECNET_PHASE_IV>.
DECNET Address Station 2:	This field identifies the DECNET address of station number two when Protocol is set to <DECNET_PHASE_IV>.
<DECNET_PHASE_IV>	This softkey defines a filter(s) to monitor DECNET Phase IV messages.
<DEC_LAT>	This softkey defines a filter(s) to monitor DEC Local Area Transport (LAT) messages.
<DECMOP_DUMPLOAD>	This softkey defines a filter(s) to monitor DEC Dump/Load messages.
<DECMOP_REM_CONS>	This softkey defines a filter(s) to monitor DEC Remote Console messages.
<CTP_LOOPBACK>	This softkey defines a filter(s) to monitor the DEC used Ethernet Configuration Testing Protocol (CTP) Loop Test.
<IP/ARPA>	This softkey provides access to all Internet protocols (IP) and ARPA Services (TELNET, FTP, and SMTP) for selection.

Softkey or Field**Description**

IP Address Station 1:	This field identifies the IP address of station number one when Protocol is set to any of the IP or ARPA selectable protocols.
IP Address Station 2:	This field identifies the IP address of station number two when Protocol is set to any of the IP or ARPA selectable protocols.
<All IP Frames>	This softkey defines a filter(s) to monitor all Internet Protocol (IP) and ARPA Services frames. This excludes the ARP and RARP protocols.
<ARP>	This softkey defines a filter(s) to monitor the Address Resolution Protocol (ARP) frames.
<RARP>	This softkey defines a filter(s) to monitor the Reverse Address Resolution Protocol (RARP) frames.
<ICMP>	This softkey defines a filter(s) to monitor the IP Internet Control Message Protocol (ICMP) frames.
<UDP>	This softkey defines a filter(s) to monitor the IP User Datagram Protocol (UDP) frames.
<TCP>	This softkey defines a filter(s) to monitor the IP Transmission Control Protocol (TCP) frames.
<FTP (CONTROL)>	This softkey defines a filter(s) to monitor the ARPA File Transfer Protocol (FTP) control frames.
<FTP DATA>	This softkey defines a filter(s) to monitor the ARPA File Transfer Protocol (FTP) data frames.
<SMTP>	This softkey defines a filter(s) to monitor the ARPA Simple Mail Transfer Protocol (SMTP) frames.
<TELNET>	This softkey defines a filter(s) to monitor the ARPA remote terminal connection services (TELNET) frames.
<ISO>	This softkey defines a filter(s) to monitor all International Standards Organization (ISO) Protocols.
<XNS>	This softkey provides access to all of the Xerox Network Systems (XNS) protocols for selection.

<u>Softkey or Field</u>	<u>Description</u>
<All XNS Frames>	This softkey defines a filter(s) to monitor all XNS frames.
<XNS_RIP>	This softkey defines a filter(s) to monitor XNS Routing Information Protocol (RIP) frames.
<XNS_ERR>	This softkey defines a filter(s) to monitor XNS Error Protocol (ERR) frames.
<XNS_ECHO>	This softkey defines a filter(s) to monitor XNS ECHO Protocol frames.
<XNS_SPP>	This softkey defines a filter(s) to monitor XNS Sequenced Packet Protocol (SPP) frames.
<XNS_PEP>	This softkey defines a filter(s) to monitor XNS Packet Exchange Protocol (PEP) frames.
Physical Address Station 1:	<p>This field identifies the physical address of station number one when Station is set to <Single> or <Two>.</p> <p>Loading the Physical Address File from your Utility Disc, Revision A.00.01 or greater, or editing the Physical Address List to add stations will enhance the softkey options for the Physical Address Stations 1.</p>
Physical Address Station 2:	<p>This field identifies the physical address of station number two when Station is set to <Two>.</p> <p>Loading the Physical Address File from your Utility Disc, Revision A.00.01 or greater, or editing the Physical Address List to add stations will enhance the softkey options for the Physical Address Station 2.</p>
<Show Node Names>	This softkey displays the station, or stations, as a node name, or names, if there is a name corresponding to the address in the appropriate list.
<Show Node Addresses>	This softkey displays the station, or stations, as a node address, or addresses.

Softkey or Field**Description**

< Select Format >	This softkey allows selection of the display format for Physical or IP station addresses.
< Decimal >	This softkey selects decimal representation for station addresses for IP addresses only.
< Hex >	This softkey selects Hexadecimal representation for station addresses.
< Bin LSB Right >	This softkey selects Binary representation, with the Least Significant Bit to the Right, for station addresses.
< Bin LSB Left >	This softkey selects Binary representation, with the Least Significant Bit to the Left, for station addresses.
< Enter Node Name >	This softkey allows selection of a node name from those available in the HP 4972A. The DECNET and IP Node lists will be available only if an appropriate application is loaded. The default physical address option is <HP_LAN_Analyzer> and others are available after defined by the user.
< Examine Data >	<p>You may also select this softkey from the Top Level Menu. It lets you view the network frames stored in the receive buffer.</p> <p>The softkeys in this menu are explained in detail in Chapter 10 of this manual.</p>
< Select Format >	<p>This is a softkey from the Examine Data Menu. In the monitor mode, it lets you change the display format of information stored in the receive buffer. By changing the display format, you can exclude unwanted information and identify more easily information that is important to you.</p> <p>Softkey choices available on the menu after pressing this softkey are explained in detail in Chapter 10 of this manual.</p>

Monitor Configuration

Access to the Monitor Configuration Menu is provided from the HP 4972A LAN Protocol Analyzer's top level menu by pressing the <Monitor Network> and <Edit Config.> softkeys. After pressing the <Monitor Network> softkey, the following is displayed.

NONSTOP MODE:	The receive buffer will never overflow. The oldest frames will be discarded in order to make room for new frames.
UNTIL FULL:	No frame in the receive buffer will be discarded. If the buffer overflows, the acquisition of frames will cease.
START MONITOR:	All frames are erased from the buffer, then unfiltered traffic from the network is stored in chronological order.
CONTINUE MONITOR:	The storing of network traffic is continued. Frames previously stored in the buffer are not erased.
EDIT CONFIG.:	This menu lets you edit the Monitor Configuration. You can capture frames by specifying addresses or a protocol. Any filters you have defined should be saved before monitoring.
EXAMINE DATA:	You may use this menu to alter the FORMAT of the frames displayed by this menu or (when in the NONSTOP MODE) for more control over the viewing of frames.

Monitor Config. = Station: All Protocol: All

Nonstop Mode	Until Full	Start Monitor		Edit Config.	Examine Data		Exit
--------------	------------	---------------	--	--------------	--------------	--	------

Figure 8-1. Monitor Network Menu

After pressing the <Edit Config.> softkey, the following is displayed.

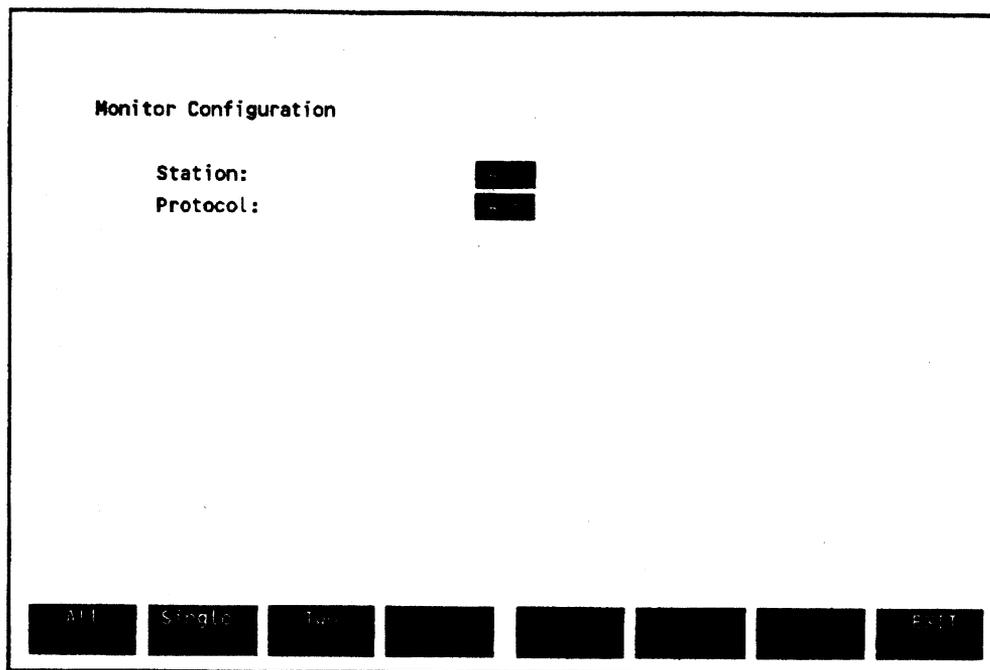


Figure 8-2. Monitor Configuration Screen

The default settings are both **Station** and **Protocol** set to <All>. As the Monitor Configuration Menu options are selected, information for loading filters is identified for later loading into the filter hardware. The filter hardware is loaded and the network is monitored when the <Start Monitor> softkey is pressed. These new filters apply to frames before they are captured in the HP 4972A receive buffer.

Filters created by the Monitor Configuration Menu can be viewed or enhanced further through the Edit Filters Menu. Filters written, or enhanced, by the use of <Edit Filters> will not apply to the network prior to loading the HP4972A receive buffer unless the user writes a program. Refer to the chapters titled *Edit Filters Menu* and *Edit Programs Menu*, for further information.

The following screen shows the fields provided by the selection of <Two> stations and the <DEC> protocol. These selections provide the opportunity to select a DEC protocol, physical addresses, and DECNET addresses to be monitored. Loading the Physical Address File from your Utility Disc, Revision A.00.01 or greater, or editing the Physical Address List to add stations will enhance the softkey options for the **Physical Address Stations 1 and 2**. After all of the field options are specified you can press <EXIT> twice and <Start Monitor> to load the filter hardware with the options that you selected in Monitor Configuration and to begin capturing filtered frames from the network.

```

Monitor Configuration

Station:          Two
Protocol:        DECNET PHASE IV

Physical Address Station 1: HP LAN Analyzer
DECNET Address Station 1:  1. 1

Physical Address Station 2: HP LAN Analyzer
DECNET Address Station 2:  1. 1

Existing filters will be overwritten when monitoring begins.

DECNET PHASE IV  [ ]  [ ]  [ ]  [ ]  [ ]  [ ]  [ ]  [ ]
  
```

Figure 8-3. DEC Protocol Screen

To obtain filtering that captures traffic between two specified stations, select <Two> stations. Selecting <Single> is the option that captures traffic going to and coming from the specified station.

A complete description of the options available are listed in the section titled *Monitor Network Softkey and Field Descriptions*.

Soft LED Indicators

In Monitor Network operation, there are characters on the display that indicate whether the analyzer detects or receives a frame.

These activities are indicated by characters referred to as soft LEDs. They are shown below the softkeys at the lower right corner of the display, beneath <EXIT>.



Each character is displayed in normal video when there is no activity, that is, when the function is Off. Characters are displayed in inverse video when their function is active or On.

Soft LED

Description

- | | |
|---|--|
| T | This indicates the protocol analyzer is transmitting on the network. Monitor operation is an unobtrusive or passive operation; the analyzer will never be transmitting during monitor operation. This soft LED is only used during an Execute Program operation. |
| C | This indicates collisions are occurring on the network. Hardware for the collision counter detection circuit has detected a collision. |
| R | This indicates the protocol analyzer is receiving a frame. The soft LED turns on whenever a frame passes through the Run frame filter, which you can enable in the Hardware Functions Menu. Only frames greater than 512 bits will turn this soft LED on. |

Soft LED Display Time

The soft LEDs are displayed when the Monitor Network mode is running or when the Monitor Network mode has run and has been manually stopped with no frames received after monitoring has stopped.

Short Display

Since the frames on a LAN are being transmitted at 10 Mbits/sec, there are times when the soft LEDs will be ON too briefly to notice.

Long Display

In contrast, there are times when the soft LEDs will be on longer than the duration of an event. For the Collision and Receive LEDs, the duration depends on the amount of traffic on the network.

LED on continuously occurs when the network load is receiving more than one frame/second and less than 64 frames/second.

LED on continuously with low blink rate occurs when the network load is greater than 64 frames/second and some inter-frame spacing is greater than 200 ms.

LED on continuously with occasional flicker Occurs when the network load is greater than 64 frames/second and all inter-frame spacing is less than 200 ms.

LED always off or blinks at one second rate occurs when the network load is less than one frame/second.

Soft LED Distortion

Transmit (T)

(Not active in monitor mode.)

Collision (C) & Receive (R)

The soft LEDs do not operate in real time; a collision can occur or a frame can be received but the indication is not displayed until some time later.

The time lag can range from one millisecond to one second. The maximum time lag occurs when the network is very lightly loaded (less than 64 frames/second).

Repeating Displays

The HP 4972A does not display all frames while monitoring the network. Since frames are transmitted at 10 Mbits/sec, the display skips some frames and updates with the most recently stored frame in the receive buffer.

If you monitor in the nonstop mode and you monitor a repeating group of frames on the network, the analyzer may appear to be displaying only a few of the frames. This may happen when the display cycle of the protocol analyzer synchronizes with the frames appearing on the network.

To assure yourself that all the frames are being received, you may want to stop the monitor function and use **<Examine Data>** to verify that other frames are indeed being captured.

No Frame Number Displayed

Frame numbers are not displayed when you monitor the network in nonstop mode. After you stop the monitor, the frames will be numbered with the oldest frame in the buffer starting as number 1.

Disc Functions Menu

Introduction

This chapter describes the disc functions and the softkeys used to control the mass storage operations.

This chapter contains:

- Disc functions introduction
- Selecting a volume
- Listing the directory
- Deleting a file
- Saving a file
- Loading a file
- Copying a file
- Copy file introduction
- Copying analyzer files
- Copying all files
- Copying unique files
- Formatting a volume
- Compressing a volume
- Disc functions in remote mode

Disc Functions Introduction

The disc functions provide mass storage capability for the HP 4972A Protocol Analyzer, as well as many conveniences for analyzing a Local Area Network. Programs, messages, node lists and filters can be created for application on your particular system and saved to a disc drive.

The Log Frames To Disc program command in the Edit Programs Menu lets the HP 4972A log frames directly to the disc drive as the frames are occurring on the network. This lets you take advantage of the larger storage capacity of the disc drives.

In non-logging modes, *after* the HP 4972A Protocol Analyzer captures frames occurring on the Local Area Network, you can manually transfer the frames to the larger storage capacity of a disc drive.

Equally as important as the increased data storage is the easy storage and recall of previously defined setup information that you can create to control the HP 4972A operation. Examples of functions desirable to store on a disc are:

- User defined node name list
- User created programs
- User defined filters
- User created messages

The Disc Functions Menu lets the HP 4972A Protocol Analyzer perform the following data storage and transfer functions:

- Initialize discs or volumes
- Save files from the protocol analyzer onto discs or volumes
- Load files from volumes into the protocol analyzer
- Copy files from one volume to another disc volume
- Delete files from volumes

The Disc Functions Menu has a brief description of each of the functions available. Use the softkey tree in Chapter One of this manual as the softkeys are described in this chapter.

Discs Supplied with the System

Several discs are provided with the HP 4972A Protocol Analyzer.

These disc are:

<u>Disc Label</u>	<u>Description</u>
LANSYS	Includes the operating system software and some operating tables.
LANCOD	Includes code unique to protocol analyzer functions.
Utility Library	Contains pre-programmed setups for the analyzer and the Coax Cable Test.
LAN Performance Analysis	Contains the Stats Application.
PC Remote	Contains on 5 1/4 inch floppy disc the software to run PC Remote.

LANSYS, LANCOD and LAN Performance Analysis are installed on the hard disc of the HP 4972A. The software on these discs is provided as a back-up for your system. See Restoring System Software in the Appendix Manual if you ever have to load the software onto the hard disc.

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 the Getting Started Manual, Setting Up the HP 4972A, for directions to select the volume. That chapter also describes the options for setting the address switch settings for any external disc drives.

Listing the Directory

This section contains a description of the softkeys and the fields that let you list the directory.

Softkey or Field

Description

<List Directory>

This softkey displays a directory list of files contained in the selected volume. It recognizes and displays Pascal TEXT and CODE files. If another type of file is found, the file is labeled as **OTHER** in the **Type** field.

Printing the Directory

If your system has an HP ThinkJet Printer or a PaintJet Printer, press [SHIFT] and [PRINT] to print the complete directory.

VOLUME SIZE

This field displays the total size in bytes of the selected volume.

LARGEST AVAILABLE SPACE

This field lists the largest contiguous space available. This may be space between existing files or space at the end of the files. The HP 4972A does not fragment files when performing a save file or copy file operation.

You can use this number to see if you have enough room to save or copy an additional file to the current volume.

If files have been deleted, use <Compress Volume> to move all free file space to the end of the volume.

<u>Field</u>	<u>Description</u>								
TYPE	<p>This field indicates the type of file. Analyzer files can be:</p> <table border="0" style="margin-left: 40px;"> <tr> <td>Application</td> <td>Filter</td> </tr> <tr> <td>Configuration</td> <td>Message</td> </tr> <tr> <td>Data (frames)</td> <td>Network</td> </tr> <tr> <td>Data (log-to-disc)</td> <td>Node</td> </tr> </table> <p>TEXT, CODE, or OTHER files are not HP 4972A user defined protocol analyzer files.</p>	Application	Filter	Configuration	Message	Data (frames)	Network	Data (log-to-disc)	Node
Application	Filter								
Configuration	Message								
Data (frames)	Network								
Data (log-to-disc)	Node								
SEQUENCE	<p>This number is used only for files saved from the protocol analyzer. OTHER, TEXT, and CODE files have an asterisk (*) in the sequence column.</p> <p>When large files are saved to a disc, there may not be enough room to save all of a file on one disc. Insert a new disc when the current disc capacity has been filled. The HP 4972A automatically assigns sequence number one to the first disc and then increments the sequence number for the remainder of the file created on the next disc(s).</p>								
DATE	<p>This is the day, month, and year the file was saved in the protocol analyzer. If the date is not set in the Set Date Menu when the protocol analyzer power is turned on, the DATE field defaults to the HP 4972A software revision date.</p>								
TIME	<p>This is the hour, minute, and second the file was saved in the protocol analyzer. If the time is not set in the Set Time Menu when the protocol analyzer power is turned on, the TIME clock starts from zero and that time is not relevant to the actual time of day the file was stored on disc.</p>								

Deleting a File

This section contains a description of the softkeys and fields that let you delete a file.

Softkey

Description

<Delete File>

This softkey lets you remove an unwanted file from a selected volume. A list of the types of files on the selected volume is displayed when you press this softkey.

After you press the type of file softkey, a prompt is displayed to enter the file name to be deleted. All of the files that match the file type you select are displayed as softkey choices. Press a softkey or type the file name from the keyboard. If you enter the file name from the keyboard, press [RETURN] to complete the entry.

After you enter a file name you want to delete, the following message is displayed:

Are You Sure?

Make sure you have identified the correct file and really want to delete the information. Press **<YES>** to execute the delete command; Press **<No>** to cancel.

For safety, only one file may be deleted at a time. A wild card can not be used to delete multiple files in one operating.

Saving a File

This section describes the softkeys and the related fields that you use to save a file to disc.

Softkey

Description

<Save File>

You can copy a file from the protocol analyzer to a selected volume. The original information is left intact in the protocol analyzer. The following softkeys are displayed for you to choose the type of file to save:

<Network File>

<Data File>

<EtherType File>

<Phys Addr File>

<Filter File>

<Message File>

<Program File>

<Config File>

<Config File>

You can copy the current HP 4972A configuration into a file. The configuration file contains data rate, hand shaking and protocol information for communicating over the RS-232 port as well as set-up information for several menus.

Set-up items included in the configuration file include:

Passwords

Autostart file

Default volume

Examine Data Menu data formats

Softkey

Description

<Network File>

This softkey lets you copy the following information from the protocol analyzer onto the disc:

User defined node name list
User defined filters
User defined messages
User defined programs

If no network file exists on the selected volume, the display prompts you to enter a file name. If network files already exist, this softkey requires you to choose between creating a new file or re-writing the file to an existing file name.

<Re-write Existing>

This softkey displays the names of the network files existing on the selected volume. Press a displayed softkey representing the file to be replaced to immediately execute storing the current network files in the protocol analyzer to that disc file, or enter the name of an existing disc file from the keyboard and press [RETURN] to execute saving the network file.

<Create New File>

This softkey prompts you to enter a new file name. Volume file names can be up to seven keyboard characters. Leading spaces are deleted. Spaces between characters are replaced with an underscore (). Characters not valid for volume file names are the following:

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

After a name is entered, press [RETURN] to execute storing the network setups from the protocol analyzer to the new file.

Softkey**Description****<Data File>**

You can copy data files from the receive buffer onto a selected volume.

If no data file exists on the selected volume, the display prompts you to enter a file name. If data files already exist, this softkey requires you to choose between creating a new file and re-writing the file to an existing file name. The new file is then written to the new file name.

<Re-write Existing> removes information from an existing file and writes the new information in its place.

To save network frames from the receiver buffer to a data file on the volume, you have to decide what portion of the receive buffer you want to copy.

Up to 15 combinations of network message frame groups can be stored in one volume file. Softkey choices let you select frames to copy.

<Range Of Frames>**<Marked Frame>****<Save The List>****<Single Frame>****<All Frames>**

Frames are saved with the same frame number they have in the receive buffer. If a frame is saved more than one time, it is shown with the same frame number each time it is displayed.

An example is shown below of <Save File> with all 15 available elements defined with frames to be saved from the receive buffer data file. Notice that several frames are copied in more than one element.

FRAMES IN THE LIST (15 elements maximum) :

-
1. RANGE OF FRAMES FROM # 4 TO # 9
 2. SINGLE FRAME # 2
 3. RANGE OF FRAMES FROM # 14 TO # 20
 4. RANGE OF FRAMES FROM # 31 TO # 40
 5. SINGLE FRAME # 23
 6. MARKED FRAMES
 7. RANGE OF FRAMES FROM # 234 TO # 300
 8. RANGE OF FRAMES FROM # 400 TO # 500
 9. RANGE OF FRAMES FROM # 500 TO # 600
 10. SINGLE FRAME # 450
 11. SINGLE FRAME # 1
 12. SINGLE FRAME # 250
 13. RANGE OF FRAMES FROM # 500 TO # 600
 14. RANGE OF FRAMES FROM # 10 TO # 35
 15. SINGLE FRAME # 625

Softkey**Description****<Range Of Frames>**

You can choose a group of consecutive frames to be copied from the receive buffer Data File to a selected disc. The prompt for choosing the range of frames is:

RANGE OF FRAMES FROM # TO #

The frame numbers refer to the numbers assigned to each frame as it is viewed in the Examine Data Menu. To specify a number range, use numeric keys from the keyboard for -From # _____ and press [RETURN]. Enter the -To # _____ frame number and press [RETURN].

If you want to know the last frame number, enter a number you know is greater than the last stored frame number such as 999999 and press [RETURN]. The last frame number in the receive buffer is displayed in the field. Frame numbers can overlap or be duplicated in different combinations or data files.

<Single Frame>

You can choose one specific frame number to be copied from the receive buffer data file. This choice may be duplicated in other frame selections to be saved to the disc. Enter the single frame number and then press [RETURN] to complete the entry.

If no more frames need to be saved, press <Save The List>.

Softkey

Description

< Marked Frames >

This softkey stores all frames from the receive buffer that you have identified by **<Mark Frame>** in **Examine Data**.

< All Frames >

You can save all frames in the receive buffer. It can be used by itself to save the entire group of frames in the Receive Buffer or it may be used in combination with the other softkeys for saving frames.

< Save The List >

This softkey saves the frames identified in the list by the following softkeys:

< Range Of Frames >

< Single Frame >

< All Frames >

< Marked Frames >

If you press **< Save The List >** and no frames have been identified to be stored, an empty file is generated.

After you press this softkey, the protocol analyzer asks:

Save Timers And Counters?

If you want to save the Timers and Counters with the current data file to be saved, press **<YES>**. Press **<NO>** to save only the previously defined data list.

Softkey

<EtherType File>
<Phys Addr File>
<Filter File>
<Message File>
<Program File>

Description

You can save each of these individual files that you create in the Setup Analyzer Menu to a volume you select. After one of the above menus is created, go to the Disc Functions Menu. Press **<Save File>** and choose the type of file by pressing one of the file type softkeys. The protocol analyzer prompts you to choose between saving the file to a new file name or re-writing an existing file.

Press **<Create New File>** to save the file to a new file name.

Press **<Re-write Existing>** to save the menu or information to an existing file name. Re-write removes the old file information and then writes the new information.

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 descriptions of the softkey choices available when you copy a file.

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
Network File
Data File
Node File
Filter File

Message File
Program File
Log-to-disc File
Application 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 only the analyzer type 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 softkey choices 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>**.

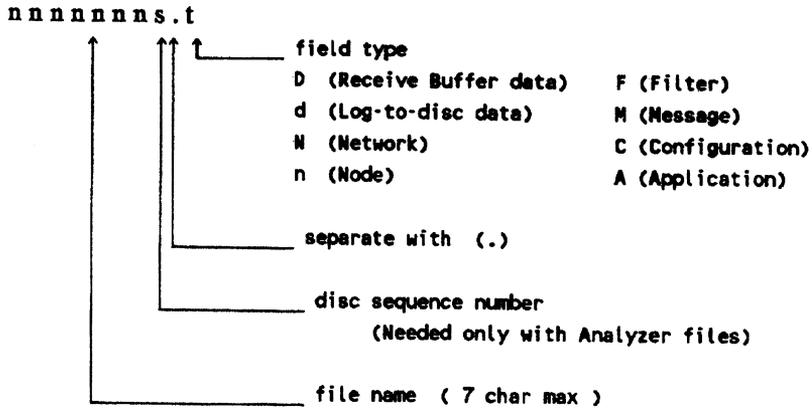
7. HP 4972A displays a data entry field and the prompt:

Enter the file name you wish to copy.

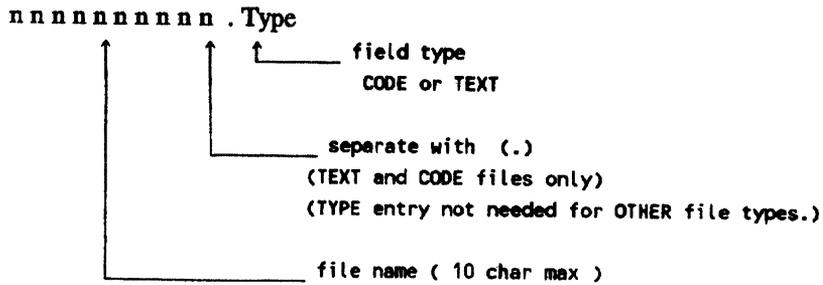
8. Enter a file name and press [RETURN].

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

"Analyzer" File Name Syntax



"Unique" File Name Syntax



<u>Copy File Syntax</u>	<u>File Name</u>	<u>Sequence</u>	<u>File Type</u>
msgA1.M	= msgA	1	M (Message)
setup10.C	= setup1	0	C (Config)
Rona0.n	= Rona	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:

a	=	.	(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 from receive buffer)	F (Filter)
d (log-to-disc data)	M (Message)
N (Network)	C (Configuration)
n (node)	A (Application)

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.

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

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

Volume formatting in progress.

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

7. 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.

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

9. 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:

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

10. 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.

Disc Functions in Remote Mode

When two protocol analyzers are connected for remote operation, the slave protocol analyzer, at the remote site, makes all the measurements on the Local Area Network (LAN) it is connected to and the slave also executes the disc function commands.

Selecting A Volume In Remote Mode

When a remote link is established and you press any Disc Function softkey, the display prompts you to choose either <Master> or <Slave>. Select the station that has the mass storage devices you want to use. Softkeys then display the choice of volumes available at the selected station.

Copy Functions in Remote

In remote mode, you can perform the following copy functions:

- Slave volume to slave volume
- Slave volume to master volume
- Master volume to slave volume
- Master volume to master volume

Exceptions for Disc Functions in Remote Mode

Remote operation does not allow two primary functions normally available in the Disc Functions Menu. These functions are:

Log-to-disc

If you try to use <Execute Program> and the program has a log-to-disc command, the command is ignored. The rest of the program executes normally.

Format volumes

During remote operation, you can not format volumes at either the master or the slave protocol analyzer. Volumes can be formatted only when a station is in local control.

Examining the Data

Introduction

The Examine Data Menu lets you easily control the format of displayed network traffic for quicker recognition of frames that interest you.

This chapter contains:

- Examine Data Menu
- Examine data softkey descriptions
- Finding Frames
- Select Format Menu
- Selecting Frame Header Formats
- Selecting Datafield Character Formats
- Displaying Data in Filter Formats
- Selecting Timestamp Measurements
- Selecting Timers and Counters
- Displaying Frame Errors

Several software applications are available from Hewlett Packard Company to enhance the display of protocol information. Refer to the appropriate manual provided with each protocol interpreter application.

Examine Data Menu

From the Top Level Menu, press <Examine Data> to reach the following menu:

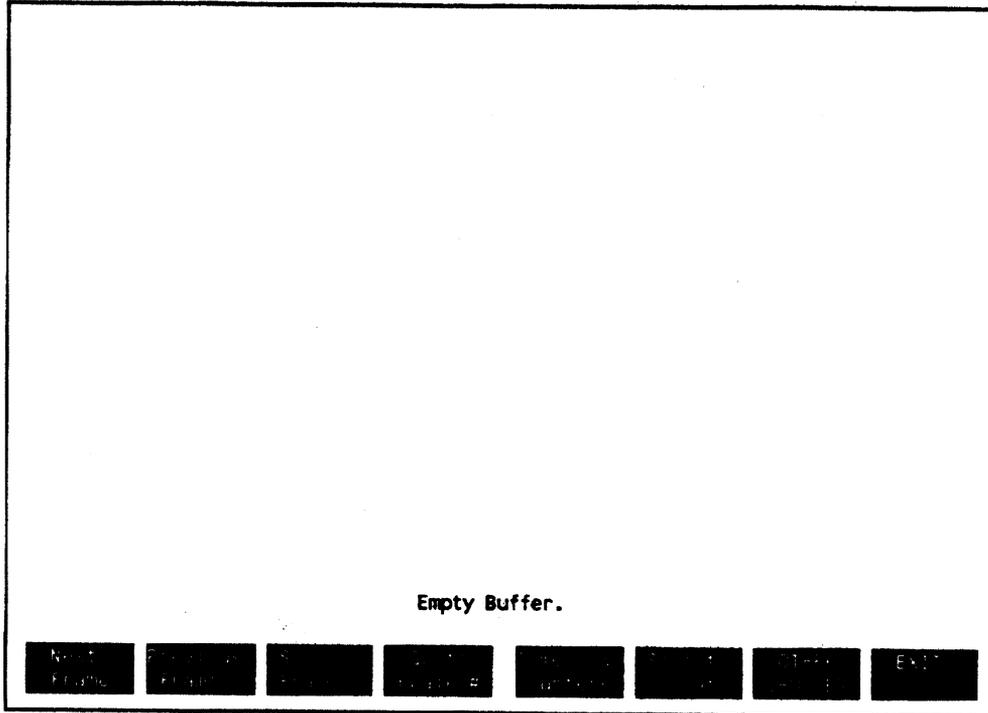


Figure 10-1. Examine Data Menu

```

1  #1    Mar 9 @ 6:10:34.55533 Len 61 Filters -0..... No error
2      Destination 01-23-45-67-89-AB Source FE-DC-BA-99-76-54 Type 0A-0B
3  15  54-68-69-73-20-69-73-20-46-72-61-6D-65-20-4E-75-6D This is Frame Num
4  32  62-65-72-20-30-30-30-31-27-73-20-44-41-54-41-20-46 ber 0001's Data F
5  49  49-45-4C-44-20-63-6F-6E-74-65-6E-74-2E field content.
6
7  #2    Mar 9 @ 6:10:34.66893 Len 61 Filters 0..... No error
8      Destination 01-23-45-67-89-AB.....
9  15  54-68-69-73-..... This.....
10 32  62-65-72-..... ber.....
11 49  49-45-4C-44-20-..... field.....
12
13 #3    Mar 9 @ 6:10:35.01446 Len 61 Filters 0..... No error
14      Destination
15 15  54-68-69-73-..... This.....
16 32  62-65-72-..... ber.....
17 49  49-45-4C-44-2E..... field.....
18
19 #4    Mar 9 @ 6:10:35.12345 Len 61 Filters: 0..... No error
20
21      STATUS MESSAGE FIELD
22      ERROR MESSAGE FIELD
23 [Next] [Marked] [Set] [Go to] [Mark] [Set] [OTHER] [EXIT]
24 [Frame] [Frame] [Frame] [Frame #] [Counters] [Filter] [CHOICES]

```

Pressing <OTHER CHOICES> accesses the following softkeys:



Figure 10-2. Default Examine Data Display

Examine Data Display

In the default Examine Data display, messages are displayed in detailed format. The protocol analyzer displays a physical header with each frame to give additional information about the frame. In addition, an Ethernet header is displayed. The data field is displayed in a hex and ASCII 8 format.

Figure 10-1 shows a default display for network messages. The numbers on the left edge of the display are for explanation use and are not part of the display.

Line 1

Line 1 is the physical header included with each frame by the protocol analyzer. It contains the following details:

Frame Number	The #1 in line 1 indicates that this is the first message stored in the protocol analyzer memory. Following messages are counted in the sequence they were stored in the receive buffer. The frame number is always shown in Examine Data Menus. The frame number is not shown while Monitor Network Menu is operated in <Nonstop Mode>.
Time Stamp	Mar 9 @ 6:10:34.55533 is the month, day, hour, minute, and second the message was stored in memory. The seconds are displayed in microseconds. The default time stamp display mode is <Date/Time>. This references all frames stored to the time when each frame occurred on the network.
Message Length	The calculated length of the message in bytes is displayed in the Len field of line 1. The frame length is calculated by the analyzer and includes all the information fields, which are: Destination Address, Source Address, Length (Length in Ethernet, Type in IEEE 802.3), and Data fields. Preamble and FCS fields are not included in the message length.

Line 1 (cont.)

Filters

This field is a display showing currently defined filters and if a filter match occurred when the frame was captured.

Filters 0.....

Indicates the first filter defined is matched by this message.

Filters 0123456789ABCDEF

Up to 16 filters can be defined using **<Edt Filters>**. This example indicates all 16 available filters are defined and have been matched by the current message.

Filters 0x.....

Indicates Filter 0 was defined and matched in a message. Filter 1 was defined but did not find a match. No filter match is indicated by the "x" character. Only filters 0 and 1 are defined. All the other filters that are undefined are indicated by the "." character.

The **Filters** field uses the filters defined when the data was captured. Because of this, if you edit an existing filter to no longer match a frame and again look at the same data in the receive buffer, the Examine Data Menu still indicates a match. If you delete a filter that matched a frame, that filter position is displayed as undefined.

If you create a new filter and return to examine the previously captured data, the Examine Data Menu shows an X to indicate the new filter exists. It does not show if a match occurred with the new filter.

To update the filters-matched field with frames already stored in the receive buffer: press **<Execute Programs>** with **<Run From Buffer>** selected.

Line 1 (cont.)

Error

Frame errors are discussed in more detail in the **Displaying Frame Errors** section later in this chapter. **No Error** indicates the frame was stored in the receive buffer with no errors detected. Possible errors that can be detected are indicated by the error messages:

Runt Frame	Corrupt Data
Jabbering	Bad FCS
Misaligned	

The HP 4972A can also detect combinations of these possible frame errors. The possible error combinations are listed below:

Runt-Bad FCS	Jabr-Bad FCS
Runt-Alignmt	Jabr-Alignmt

Line 2

In default **Examine Data Menu**, the protocol analyzer defaults to the **Ethernet Header** and displays the following information in line 2:

Destination Address

The **Destination Address** consists of six bytes that identify where the message is being sent. **Destination addresses** are displayed in hexadecimal.

The **Destination Address** field can be displayed as a functional node name by using **<Show Node Names>**.

Line 2 (cont.)

Source Address

The **Source Address** consists of six bytes to identify where the message originated. **Source Addresses** are displayed in hexadecimal.

The **Source Address** field can be displayed as a functional node name by using **<Show Node Names>**.

Type

The **Type** Field is displayed as two hexadecimal bytes. **Type:** is used in the Ethernet protocol to indicate the higher level protocol being used. The contents displayed in the **Type** field will be bytes 13 and 14 of the frame contents.

Line 2 can be changed to display the IEEE 802.3 header by pressing **<Select Format>**, **<Change Headers>**, and then **<802.3 Header>**. The IEEE 802.3 header changes the **Type:** field to **Length:** field. The **Length:** field also displays the contents of bytes 13 and 14.

Line 3

In the default display, line 3 of the Examine Data Menu contains the first line of text or data for the frame. In addition, the byte position for the first character on the line is shown at the left side of the display.

Byte position

The **15** identifies that the first byte on line 3 is the 15th byte in the frame. Following lines use this column to indicate the location of the first byte on each line in the frame.

Data

The power on, or default Examine Data mode, displays characters in the message in hexadecimal and ASCII formats. The frame data is first displayed in Hexadecimal with up to 17 bytes per line. Each line is then interpreted on the right side of the display in ASCII format.

Line 21

Line 21 displays status messages. Examples of status messages are:

No next frame

Empty buffer

Line 22

Line 22 displays error messages. The Appendix Manual has error message information.

Lines 23, 24

The softkey selections that may be used to control operation of the HP 4972A are displayed on lines 23 and 24.

The softkeys in the Examine Data Menu are described in the following pages. Use the fold-out softkey tree in Chapter 1 of this manual to follow as the softkeys are described.

Finding Frames

You can use softkeys in the **Examine Data Menu** to quickly and easily move through frames stored in the receive buffer to locate specific frames of interest to you.

Remember that in addition to the softkeys for controlling frame display, you can use keys on the keyboard. These keys are discussed in **Editing With the Keyboard Keys, Chapter 1, of Getting Started**.

Softkey

Description

<Next Frame>

The analyzer will move the displayed frames up one frame. What was the second frame being shown is now displayed at the top of the display. The next frame stored in the receive buffer memory is added to the bottom of the displayed frames.

If this softkey is pressed while the last frame in memory being displayed, the following status message is displayed above the softkey selections:

No next frame

<Previous Frame>

The analyzer will move the display down with a new frame added at the top. The new frame now seen at the top of the display is the frame in the receive buffer that precedes the previously displayed top frame.

If this softkey is pressed while the first frame in memory is being displayed, the following status message is displayed above the softkey selections:

No previous frame

<Scroll Frames>

The analyzer starts to increment the display through the frames stored in the receive buffer. Press <Stop Scrolling> or <EXIT> to end the scroll function, or let the protocol analyzer automatically stop incrementing the display when the last frame in the receive buffer is displayed. No reverse scroll function is available.

Softkey

Description

<Go To Frame #>

You can place a particular frame at the top of the display. Enter the frame number as an integer value such as 3, 15, or 455 and press [RETURN]. Non-integer entries will cause an error message to be displayed.

To quickly find and show the last frame in the receive buffer, enter a number you know is greater than the last frame number in the receive buffer and press [RETURN].

Go to what frame #? 999999

<Next Marked>

You can update the display with the next following frame identified by a **Mark** to be displayed at the top of the screen. Frames can be marked manually by softkey selection as you scroll the frames or they can be marked by your program. Frames are marked to indicate a special filter condition or that they are of some particular interest to you. Using marked frames provides a quick method to scroll through the memory buffer to find only frames of interest to you.

<Previous Marked>

You can update the display so that the closest previous frame identified with a **Mark** is displayed at the top of the screen.

<Scroll Marked>

This softkey provides a method to get non-consecutive frames grouped together on the screen. Only marked frames are displayed. Unmarked frames occurring between marked frames are not displayed. After this softkey is selected, **<Previous Marked>** and **<Next Marked>** maintain the function of only displaying marked frames. [PREV] and [NEXT] can be used in the same way.

Softkey**Description****<Go To Trigger>**

The analyzer causes the display to show the trigger frame identified in the Edit Programs Menu for controlling the Store function:

<Starting With> <Centered About> <Ending With>

When one of these functions controls the Store function, that trigger frame is displayed when you press **<Go To Trigger>**.

<Mark/Unmark>

The analyzer toggles the mark condition either on or off. If no mark exists, the softkey marks the frame. If the frame is marked, press this softkey to remove the mark condition.

<Mark>

The analyzer puts a transparent mark on a single frame in the receiver buffer. When later examined in the buffer, marked frames can be selectively located and displayed. The frame currently at the top of the display is marked when you press the this softkey. The frame number field is changed to inverse video to indicate a marked frame.

<Unmark>

The analyzer removes the frame **Mark** from the frame currently at the top of the display.

Softkey**Description****<Search Buffer>**

You can look through the buffer for a particular element(s) you have specified. Frame elements you may search for include:

Destination Address Source Address
Frames with Errors Matched Filters
Data Field Patterns (up to 6 bytes)

<Search Next>

The analyzer looks for the next frame in the buffer that contains the search elements you have defined.

<Search Previous>

The analyzer looks for a frame stored previous to the currently displayed frame. The analyzer looks for the search elements you have defined.

<Define Search>

You can identify or define the different frame elements you want to look for in the buffer.

<Dest Address>

You can specify any message addressed to a specific node on the network. Enter the Hex code for the **Destination Address** you want to search for. Press [RETURN] to complete the entry.

Softkey**Description****<Source Address>**

You can specify any message addressed from a specific node on the network. Enter the Hex code for the **Source Address** you want to search for. Press [RETURN] to complete the entry.

<Filter Matched>

You can see if a filter defined in the Edit Filters Menu can be matched to a frame stored in the receive buffer. Press this softkey and then press the softkey that identifies the filter you want to use the next time you search the buffer.

Press **<EXIT>** to complete the entry. Choose a softkey to search forward (next) or backward (previous) in the buffer.

<Error Frame>

You can search the buffer for frames that have a frame error. Press this softkey and choose the error type you want to search for from the displayed softkeys. The frame error choices are:

No Error	Runt
Bad FCS	Jabber
Misalign	Any Error

You can look for frames with a specific error, frames without any error, or only frames that have some type of error.

Types of frame errors are described at the end of this chapter in the section, "Displaying Frame Errors."

Softkey**Description****<Datafield Pattern>**

You can search through the buffer for a frame with a specific data field pattern that starts at a byte offset you define.

Press this softkey and enter the pattern you want. The data field entry must be in Hex code. You can enter up to 6 characters. Don't care characters (XX) may be used in any of the positions.

You must specify at what byte location in the frame you want to look for the characters. You can specify patterns starting from byte position 1.

Examples:

1A-6E-XX-XX-XX-XX at offset 13

Look for pattern 1A-6E in the **TYPE/LENGTH** field.

54-68-69-73-20-69 at offset 15

Look for pattern 54-68-69-73-20-69 starting at the first of the data field.

16-16-16-XX-XX-XX at offset 214

Look for pattern 16-16-16-XX-XX-XX starting at the 200th byte in the **Data** field.

Select Format Menu

The menus and softkey structure for setting the Examine Data frame display format has been simplified with a Select Format Menu, accessible by pressing <Select Format> in the Examine Data Menu. The choices you make in this menu determine how the analyzer displays the information when you examine the data in the Examine Data Menu. The Select Format Menu is shown below:

HEADER	DISPLAY	DETAILED/SUMMARY	PROTOCOL	SHOW HEX BYTES
1	On	Detailed	10 Mbps	Off
2	On	Detailed	DEFAULT	Off
3	On	Detailed	DEFAULT	Off
4	On	Detailed	DEFAULT	Off
5	Off	Detailed	DEFAULT	Off
6	Off	Summary	NONE	Off
7	Off	Summary	NONE	Off
SUBSTITUTE LABELS		Open Labels		
TIMESTAMP FORMAT		Date and Time		
FILTER	DISPLAY	FORMAT		
	Off	Use first matched		
DATAFIELD	DISPLAY	FORMAT	DATA CODE	START POSITION
	On	Hex and Char	ASCII 7	no parity
	After headers			
Off	On			
				EXIT

Figure 10-3. The Select Format Menu

Move the cursor to the various format selection fields, all of which now appear on one screen. The softkeys change as you move the cursor to a new field. Having all the format selections on one menu gives you a much clearer view of what is currently selected and an easier interface to change the selection.

This menu is described in detail on the following pages.

The Fields and Softkeys in the Select Format Menu

DISPLAY	Use this field to control the display of the protocol headers when you examine the data.
<Off>	Press this softkey to suppress the header display at a given layer in the Examine Data Menu. The header is still decoded but not displayed.
<On>	Press this softkey so that the header at a given layer is displayed when you examine the data in the Examine Data Menu.
DETAILED/SUMMARY	Use this field to choose a detailed display or a summarized display of the protocol header information. You can toggle between the Detailed and Summary mode while in the Examine Data Menu by pressing the [SPACE] bar on the keyboard.
<Detailed Display>	Press this softkey to display the header information in detail. In this mode, the header information takes up more display space on the menu, yet offers more information about the header.
<Summar Display>	Press this softkey to display a summary of the header information. The analyzer summarizes significant header information for scanning purposes only. The information displayed varies depending on the protocol being decoded and takes up one line on the menu.

Note

You can now toggle between detailed or summarized display while in <Examine Data> by pressing the [SPACE] bar on the keyboard.

Be aware that the Select Format Menu field selections change as you toggle the [SPACE] bar. If you want to keep your original setting (detail or summary), press [SPACE] bar to return the Select Format Menu field to its original setting.

PROTOCOL	Use this field to select the protocol. If decode applications are loaded, the analyzer displays additional softkeys for the extra protocols. Header level 1 is not selectable.
----------	--

< Show n Bytes >	Press this key and enter a number between 1 and 80. The analyzer displays the fixed number of bytes you enter for a given level. This function is useful for protocols that are not decoded by the HP 4972A because data will still be displayed and decoding can continue at the next level.
< NONE >	Press this softkey to indicate to the analyzer a protocol level not present in the stack.
< DEFAULT >	Press this softkey when you want the HP 4972A to figure out the protocol interpretation.
< ETHERNET >	Press this softkey to choose Ethernet protocol and override what the HP 4972A interprets the protocol to be.
< IEEE802.3 >	Press this softkey to choose IEEE 802.3 protocol and override what the HP 4972A interprets the protocol to be.
< IEEE802.2 >	Press this softkey to choose IEEE 802.2 protocol and override what the HP 4972A interprets the protocol to be.
< SNAP >	Press this softkey to choose Sub-network Access Protocol (SNAP) and override what the HP 4972A interprets the protocol to be.
SHOW HEX BYTES	Use this field to view the raw hex bytes for the header. You can see which bytes in the frame are used for a particular header in addition to the decoded presentation of the bytes.
< Off >	Press this softkey if you do not want the raw hex bytes of the header displayed.
< On >	Press this softkey if you want the hex raw bytes of the header displayed. The bytes are displayed immediately before the decoded bytes of the header.
SUBSTITUTE LABELS	Use this field to choose to see labels displayed for the fields within the headers. Labels are supplied from the lists you set up using the Edit Lists Menu.
< User Labels >	Press this softkey to have the user names displayed. It applies to all the name fields (physical addresses, Types, SAP, etc.). This is the default softkey for this field.

- <Data Values>** Press this softkey to have the byte value displayed. The label is displayed in either hex or decimal, depending on the type of protocol being decoded.
- TIMESTAMP FORMAT** Softkeys for this field are identical to the previous Change Timestamp function in the Examine Data Menu. The selection determines how the timestamp in the physical (level 1) header is displayed.
- <Date/Time>** This is the default softkey for the Timestamp Format field. In this mode, the timestamp field in each of the physical headers display the date and time in which each frame occurs on the network. The timestamp in the physical header is referenced to the date and time you enter at power on. The clock is reset each time a run is started and is stopped when the run is stopped.
- <Time from Start>** Press this softkey to have the timestamp field in each physical header contain the elapsed time measured from the run start in which each frame was received.
- <Time from Frame #>** Press this softkey to identify a particular frame number. The timestamp is set to zero for that frame time. The timestamp field in each physical header of the frame displays the elapsed time from the start of the reference frame to the start of the displayed frame. Frames received before the reference frame have a minus (-) sign preceding the number to show negative time.
- <Time from Trigger>** Press this softkey to mark as the trigger reference point a frame matching a filter or combination of filters. The timestamp field in each physical header displays the elapsed time from the start of the trigger frame to the start of the displayed frame. A trigger frame is the frame identified in Edit Programs Menu to control the Store function.
- <Time btwn Frames>** Press this softkey to display the elapsed time from the end of the previous frame to the start of the next frame in the timestamp field of each physical header. The end of the previous frame is after the last byte of the fcs field. In this mode, the timestamp in the first frame contains the time from the start of the run to the start of the first frame.

FILTER DISPLAY	Use this field to display frames in the format of filters you can define in the Edit Filters Menu. Use the Filter Format field, described below, to select the filter used to display frames.
<Off>	Press this softkey if you do not want the frames displayed in the format of defined filters. This softkey is the HP 4972A default for this function.
<On>	Press this softkey if you do want the frames displayed in the format of defined filters.
FILTER FORMAT	Use this field to set the filter format. Softkey choices for this field are the set of currently active filters, along with Use First Matched. This is identical to the previous Change Filters Menu. It is useful for additional formatting of the frame display.
<Use first Matched>	If you have several filters defined, press this softkey to display a frame in the filter format of the first filter to be matched by that frame. This softkey is the default filter format.
<Filter_0>	Press this softkey to manually change the frame display format to that of another filter, even if the filter does not specifically match that data frame.
<Filter 1...>	Softkeys are displayed for each of the filters defined in the Edit Filters Menu. You can display any frame in the format of a defined filter
DATAFIELD DISPLAY	Use this field to turn the data display on or off. The data field can be suppressed from the display but is still available in the receive buffer. Also, the format of the data characters may be selected from a variety of choices in the Datafield Format field.
<Off>	Press this softkey to suppress the data field from the display. Only the physical header and the frame header are displayed.
<On>	Press this softkey to display the data field on the display. This softkey is the default condition for the Datafield Display field.
DATAFIELD FORMAT	This field is similar to previous Change Datafield Menu. The information in the data fields can be presented in several formats. The analyzer changes the softkey selections to let you select the following formats for characters in the data field.

<Hex Data>	Press this softkey to display the data in hex format. Hex data format displays 24 characters per line.
<Character Data>	Press this softkey to display the data in character format. Character data format displays 73 characters per line.
<Hex/Char Data>	In the default Examine Data Menu, the data field is displayed below the header fields in two formats. The data is displayed in hexadecimal format on the left side of the line with the interpreted data displayed on the right side of the same line.
DATAFIELD DATA CODE	Use this field to choose the character code of the data.
<ASCII 8>	Press this softkey to display the data in ASCII. Seventeen characters are displayed in each line.
<EBCDIC>	Press this softkey to display the data in ASCII. Seventeen characters are displayed in each line.
<ASCII 7>	Pressing this softkey enables the following softkeys:
<ASCII 7 No par>	The parity bit is ignored.
<ASCII 7 Par = 0>	The parity bit is always 0.
<ASCII 7 Par = 1>	The parity bit is always 1.
<ASCII 7 Odd par>	The parity bit is set to always provide an odd number of bits in the byte.
<ASCII 7 Even par>	The parity bit is set to always provide an even number of bits in the byte.
Datafield Start Position	Use this field to determine when the analyzer starts displaying the datafield. You have the following softkey choices:
<Start At Byte>	Press this softkey to choose a byte in which you want the datafield to begin displaying. Use the keyboard keys to enter the decimal byte number at which you want the data display to begin.
<Start Aft Hdrs>	Press this softkey to start the datafield display at the first byte following the <i>last displayed header</i> (not the last decoded header).

FRAME NUMBER	DESTINATION ADDRESS	SOURCE ADDRESS	FRAME LENGTH	FILTERS MATCHED	ERRORS
1	01-23-45-67-89-AB	FE-DC-BA-98-76-54	1267	0xxx.....	No error
2	08-00-09-FF-FF-FF	08-00-09-00-0A-08	342	01xx.....	No error
3	00-DD-00-0D-08-00	08-00-09-00-0A-08	655	012x.....	No error
4	08-00-09-00-0A-08	08-00-09-FF-FF-FF	1400	0123.....	No error
5	01-23-45-67-89-AB	FE-DC-BA-98-76-54	67	0xxx.....	Bad FCS
6	01-23-45-67-89-AB	FE-DC-BA-98-76-54	67	0xxx.....	No error
7	print_server	CPU1	854	01xx.....	No error
8	mass_store	MAINCPU	1514	0123.....	No error

Detailed Format
Show Node Names
Print Format
Show Node Names
Print Format
Show Node Names
OTHER CHOICES
EXIT

Figure 10-4. Summary Format Display

In the Summary Format Display above, the **Destination** and **Source Addresses** are shown in hexadecimal format. If a node has been assigned a node name in the Edit Lists Menu, the assigned name is displayed. Frames #7 and #8 show the addresses displayed in functional node names which make it much easier to recognize address patterns in **Destination** and **Source Addresses**.

Frame lengths for the stored frames are displayed. The frame length field lets you recognize:

- If only long frames are being transmitted.
- If any short frames are transmitted.
- If there is a mixture of long and short frames transmitted.

The **FILTERS MATCHED** field makes it is easy to see what filters are being matched. This field shows currently defined filters and if a filter match occurs. In programs using several filters to trap or store the frames into memory, this display makes it easy to see what filters have been matched in a group of captured frames.

The filter field function is described earlier in this chapter in the **Default Display Description** section.

Different types of frames errors can occur during transmission. Having all the frames error status listed in a column makes it convenient to scroll the frames to look for frame errors. Types of frame errors that can be displayed are described in "Default Display Description" in this section.

<Filter Format>

This softkey displays the headers you have selected, the fields of the filter you select, followed by the data field of that frame. The default filter format is the first filter matched. To select the filter for examining frames, press the following softkeys in this order:

1. <Select Format>
2. <Filter Format>
3. <OTHER CHOICES>
4. <Change Filter>

Filter fields of the filter you select are displayed above the Data field. The first three fields of each filter are not displayed again since they are always Address and Type/Length fields. The first three filter field contents can be seen by selecting <Ethernet> or <IEEE 802.3> header softkeys.

```
#59      Jul 10 @ 0:13:00.33989 Len  60 Filters .....xx...C..F      No error
Ether: Dst 08-00-09-02-6A-77 Src 08-00-09-01-4B-FC      Type      DOD_IP
TCP/IP_Ack_Fld_Sig  45      E
IP_Type_Service     00      \
IP_Identification   88-38   η8
IP_Flags_Frgt_Ofst  00-00   \
IP_Ttlive_Protocol  3C-06   <
IP_Checksum         47-88   Gη
IP_Src_Dest_addr    0F-06-48-73-0F-06-48-90  \ H \ H η
TCP_Src_Dest_addr   02-01-03-FE \ \ η
TCP_Seq_number      00-DD-C3-07 \ \ |
TCP_Ack_number      00-D9-97-03 \ \ η
TCP_Data_Offset_Cfg 50-10    E
TCP_Window_Chksum   10-00-80-04 \ \ η
TCP_Urg_pointer     00-00    \
  15 : 45-00-00-29-88-38-00-00-3C-06-47-88-0F-06-48-73 E \ ) η 8 \ < G η \ H 8
  31 : 0F-06-48-90-02-01-03-FE-00-DD-C3-07-00-D9-97-03 \ \ H η \ \ η \ \ | \ \ η \
  47 : 50-10-10-00-80-04-00-00-0F-10-4E-B9-00-00 E \ \ η \ \ \ \ H \ \
```

Next Frame Previous Frame Scroll Frames Go to Frame # Filter & Counters Select Format OTHER CHOICES EXIT

Figure 10-5. Filter Format Display

In the example above, notice in line 1 that field Filters:C..F indicates two filters have been defined and have been matched by frame #59.

The details of the first filter matched in the frame are displayed below the header.

If the frame does not match any defined filter, the message `No filter matched` is displayed below the header lines. The example below illustrates a frame with `<Filter Format>` selected. In addition, other display format softkeys are selected.

```

#36      Jul 10 @ 0:12:58.38117 Len  60 Filters .....XX...X..X   No error
802.3:  Dst 08-00-09-03-16-C9  Src 08-00-09-01-83-94      Length      46
802.2:  DSAP HP_EXTENDED_SAP  SSAP HP_EXTENDED_SAP      Control UI    P/F=False
No filter matched
 18 : 00-00-00-16-4F-16-4F-00-3C-00-92-00-01-5C-54-00      .....O.O.<.....\T.
 34 : 00-00-0C-00-00-00-0C-00-00-00-00-00-00-0B-00-00-00      .....
 50 : 00-00-0C-00-00-00-00-00-00-00-01                      .....

#37      Jul 10 @ 0:12:58.38232 Len  60 Filters .....XX...X..X   No error
802.3:  Dst 08-00-09-01-83-94  Src 08-00-09-03-16-C9      Length      46
802.2:  DSAP HP_EXTENDED_SAP  SSAP HP_EXTENDED_SAP      Control UI    P/F=False
No filter matched
 18 : 00-00-00-16-4F-16-4F-00-3C-00-04-00-01-5C-54-00      .....O.O.<.....\T.
 34 : 00-00-00-00-00-00-00-00-00-00-00-00-00-01-00-00-00      .....
 50 : 00-00-0C-00-00-00-00-00-00-36-00-2E                      .....6..

#38      Jul 10 @ 0:12:59.08488 Len  60 Filters .....XX...X..X   No error
Ether:  Dst 00-00-C6-00-00-82  Src 00-00-C6-00-00-82      Type        88-88
No filter matched

```

Next Filter Filter Go to Filter Filter Filter Filter

Figure 10-6. Filter Format with No Filters Matched

The previous example shows 3 frames that did not match a current filter.

In each of the frame display formats, the **Destination** and **Source Addresses** can be displayed in either hexadecimal or as a functional node name.

Softkey

Description

< Show Node Name >

The analyzer displays any node address as a functional node name. The node name must be defined in the Edit Lists Menu. This softkey is available in the Setup Menu. If the node name is not defined, the name is displayed in hex. An example of node names versus the hexadecimal address is shown below:

Hexadecimal Address	Node Name
08-AB-00-23-01-02	Print_Server1
66-CD-21-43-01-01	CherylJ
08-AB-00-XX-XX-XX	all_printers

Notice that the node name can identify a device, the principal user at a node, or, by using a common prefix and don't cares (XX-XX), it can group nodes with common prefixes.

< Show Hex Names >

The analyzer displays the node station as a six byte hexadecimal address.

Selecting Frame Header Formats

Each frame is displayed with up to three headers. The first header is a physical header created by the protocol analyzer. The second header is the IEEE 802.3 or Ethernet header. The third header is for IEEE 802.2 protocol. The format used to display frame headers can be changed by the following softkeys.

<u>Softkey</u>	<u>Description</u>
<Change Headers>	The analyzer presents a softkey selection that is used to control the header display.
<Suppress Headers>	With this softkey selected, all physical headers and protocol headers are removed from each frame in the display.

The example below shows a frame with all the headers removed. Lines 1 and 2 now contain the frame number and **Data** field contents. The **Destination Address**, **Source Address**, **Length/Type**, and **Error** fields are not displayed.

1	#1		
2	15	54-68-69-73-20-69-73-20-46-72-61-60-65-20-4E-75-60	This is Frame Num
3	32	62-65-72-20-30-30-30-31-27-73-20-44-41-54-41-20-46	ber 0001's Data F
4	49	49-45-4C-44-20-63-6F-6E-74-65-6E-74-2E	ield content.
5			
20			
21			
22			
23			
24			

Suppress Headers

Ethernet Header

IEEE 802.3 Header

IEEE 802.2 Header

802.3 Header

802.2 Header

Error

EXIT

Figure 10-7. <Suppress Headers> Selection

Softkey

Description

<Physical Header>

The physical header contains information generated by the HP 4972A about each frame stored in the receive buffer. Included in the physical header are:

- Time Stamp**
- Calculated Frame Length**
- Filters**
- Errors**

1	#1	Mar 9 @ 6:10:34.55533 Len 61 Filters 0.....	No error
2	15	54-68-69-73-20-69-73-20-46-72-61-6D-65-20-4E-75-6D	This is Frame Num
3	32	62-65-72-20-30-30-30-31-27-73-20-44-41-54-41-20-46	ber 0001's Data F
4	49	49-45-4C-44-20-63-6F-6E-74-65-6E-74-2E	ield content.
5			
6			
21			
22			
23			
24			

Subnet Header	Physical Header *	Ethernet Header	802.3 Header	802.2 Header			EXIT
------------------	----------------------	--------------------	-----------------	-----------------	--	--	------

Figure 10-8. <Physical Header> Selected

With only the physical header selected, only the information added by the protocol analyzer is displayed. This header includes the physical description of the frame. Elements displayed are: Timestamp, calculated length of information fields, filters status, and error status.

Softkey

Description

< Ethernet Header >

This softkey selects the Ethernet header for the display. It is illustrated in figure 10-1. Ethernet displays use a **Type** field for bytes 13 and 14. Ethernet displays also include the **Destination Address** and **Source Address** fields.

< 802.3 Header >

IEEE 802.3 header is similar to Ethernet header, however, IEEE 802.3 uses a **Length** field for bytes 13 and 14.

< Ethernet Header >, **< 802.3 Header >** and **< 802.3 Header >** toggle with each other. Only one of these headers may be displayed at a time. Pressing the softkey that is active turns that function off and if the other header softkey is not pressed, neither header is displayed.

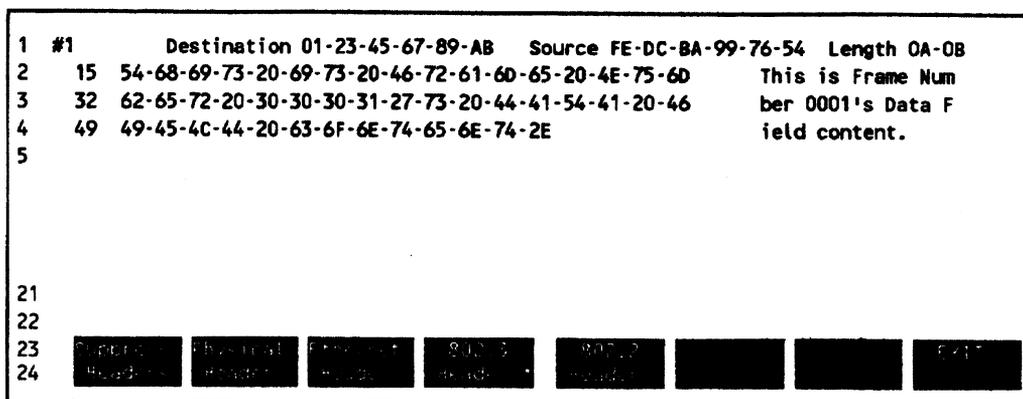


Figure 10-9. < 802.3 Header > Softkey Selection

Softkey

Description

<802.2 Header>

This information is positioned in the first 3-4 bytes of the **Data** field. It contains the following information:

DSAP

Byte 15 in the **Data** field is labeled **Destination Service Access Point address**. This address references a specific protocol used within the device identified by the **Destination Address**. The **DSAP** field is displayed in hex.

SSAP

Byte 16 in the **Data** field is labeled **Source Service Access Point address**. Similar to **DSAP**, this address references a specific protocol used within the device identified by the **Source Address**. The **SSAP** field is displayed in hex.

Control

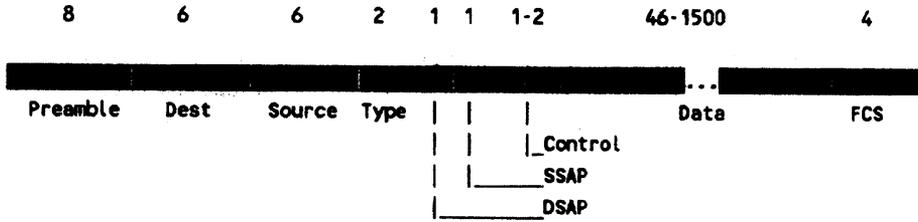
The **Control** field, as its name implies, is used to control the communications between the processes or applications contained at the **Destination** and **Source addresses**. The **Control** field is displayed in hex and may be either 1 or 2 bytes. The 2 least significant bits of byte 17 determine if the protocol analyzer will display 1 or 2 bytes in the **Control** field.

<u>Byte 17</u>		<u>Byte 18</u>	
MSB	LSB	MSB	LSB
xxxx	xx11	xxxx	xxxx

When the two least significant bits of byte 17 are 1's, the protocol analyzer displays one byte for the **Control** field. This determines whether the **Data** field begins with byte 18 or 19.

Examples of control field contents are:

- Connection requested
- Connection accepted
- Connection denied
- Connection busy
- Confirmation of messages sent or received



The following example uses only the 802.2 header. Notice in the example below that the Control Field is two bytes and the Data Field starts at byte 19.

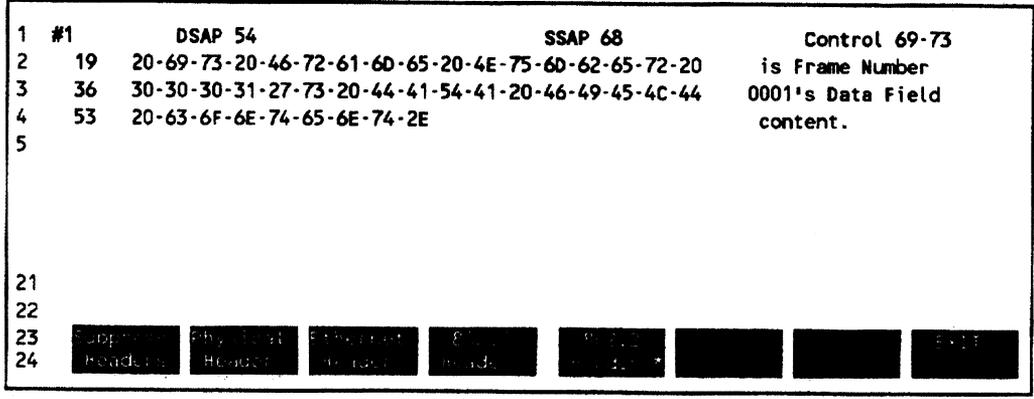


Figure 10-10. <802.2 Header> Selection

Selecting Datafield Character Formats

The information in the data fields can be presented in several formats. The data field can be suppressed from the display but is still available in the receive buffer. Also, the format of the data characters may be selected from a variety of choices.

<u>Softkey</u>	<u>Description</u>
<Change Datafield>	The analyzer changes the softkey selections to let you select different formats for characters in the data field.
<Suppress Data>	The entire data field can be suppressed or deleted from the display by pressing this softkey. If physical header, frame header, and data fields are displayed, press this softkey to display only the physical header and frame header.

In the example below, notice that only selected header information is displayed.

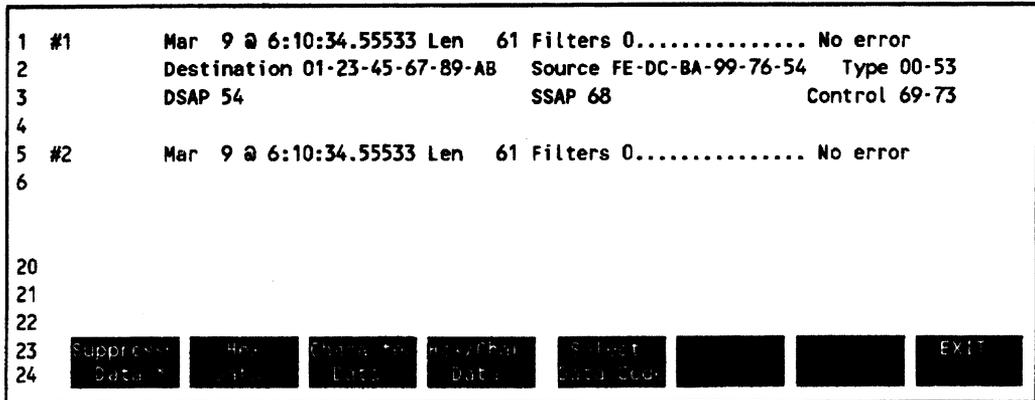


Figure 10-11. <Suppress Data> Selected

Softkey

Description

<Hex/Char Data >

In the default Examine Data Menu, the data field is displayed below the header fields in two formats. The data is displayed in hexadecimal format on the left side of the line with the interpreted data displayed on the right side of the same line.

<Hex Data >

<Character Data >

When one of these softkeys is pressed the data is displayed only in that selected format. The equivalent data field is not displayed.

These character formats are convenient since longer lines can be used to display the Data Field contents. <Character Data > formats display 73 characters per line while <Hex Data > format displays 24 characters per line.

The example below shows the display with <Character Data > selected. The data is presented only in the equivalent character format with no hexadecimal equivalent display.

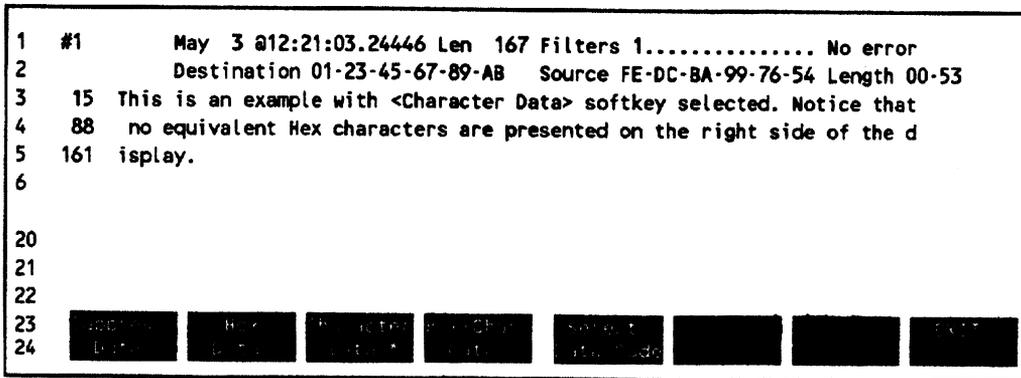


Figure 10-12. <Character Data > Selection

Softkey

Description

<Select Data Code>

This softkey lets you choose the character code. The choices are:

<ASCII 7> <ASCII 8> <EBCDIC>

The default display described in the section Examine Data Display section at the first of this chapter is an example of the two column data format. The data is first presented in hexadecimal code and then in the equivalent selected code of ASCII or EBCDIC. Seventeen characters are displayed in each line with either of these selections.

<ASCII 7>

**<ASCII 7
No Par>**

The parity bit is ignored.

**<ASCII 7
Par = 0>**

The parity bit is always 0.

**<ASCII 7
Par = 1>**

The parity bit is always 1.

**<ASCII 7
Odd Par>**

The parity bit is set to always provide an odd number of bits in the byte.

**<ASCII 7
Even Par>**

The parity bit is set to always provide an even number of bits in the byte.

Displaying Data in Filter Formats

You can display frames in the format of filters you have defined in the **Edit Filters Menu**. Use the following softkeys to select the filter used to display frames:

<u>Softkey</u>	<u>Description</u>
<Change Filter>	<p>The analyzer displays softkey choices for the filters you have defined in Edit Filters Menu.</p> <p>The default filter format is the first filter matched. To select the filter format, press any displayed softkey containing a filter name.</p>
<Use first Matched>	<p>If you have several filters defined, use this softkey to display a frame in the filter format of the first filter to be matched by that frame.</p>
<Filter_0>	<p>You can manually change the frame display format to that of another filter even if the filter did not specifically match that data frame.</p>
<Filter 1>...	<p>Softkeys are displayed for each of the filters defined in the Edit Filters Menu. You can display any frame in the format of a defined filter.</p>

Selecting Timestamp Measurements

The HP 4972A can perform measurements that reference the time when frames were received into the protocol analyzer. When each frame is received into the HP 4972A, each frame is tagged with the date and time. Measurements using this timestamp function can be made with 32 microsecond accuracy.

The timestamp softkey functions detect the start and stop points of frames. Timestamp softkey descriptions use the following conventions for start and stop points of frames:

Start of Frame refers to the beginning of the **Destination Address** field in a frame.

End of Frame refers to the end of the **FCS** field in a frame.

Examples of timing measurements that you can measure include:

- What date/time the message occurs on the network.
- How much time occurs from when the run is started to when each frame is received.
- How much time occurred between two specific frames being received.
- With a frame identified as a reference point, what the time relationship is of all the frames received before or after the reference frame.

The softkeys for Timestamp Measurements are described on the following pages.

Softkey

Description

<Change Timestamp>

The analyzer changes the selection to display softkeys used for timestamp measurements. The analyzer causes the date and time of day to be transparently added to each frame as it is received. This timestamp enables the following measurements:

<Date/Time>

This is the default softkey for Examine Data Menu. It causes the timestamp field in each of the physical headers of the frame to display the date and time that each frame occurred on the network. The timestamp displayed in the physical header is referenced to the date and time you enter via the <Set Date> and <Set Time> at power on. The display format for this softkey is month, day, hour, minute, second.

Sept 28 @ 6:10:34.55533

In a free run or continuous store application, the timestamp functions for approximately 1.5 days. After 1.5 days of continuous storage, the protocol analyzer stops and displays:

**** Timestamp Overflow ****

A new run must be started in order to start the timestamp function again. The clock is reset each time a run is started and is stopped when the run is stopped.

<Time from Start>

The analyzer causes the timestamp field in each physical header of the frame to contain the elapsed time measured from the run start to when each frame was received. Frames have an elapsed time entered in the field:

Elapsed 00:00:01.67543

Softkey

Description

<Time From Frame #>

You can identify a particular frame number and the timestamp is set to zero for that frame time. The timestamp field in each physical header of the frame displays the elapsed time from the start of the reference frame to the start of the displayed frame. Frames received before the reference frame have a (-) sign preceding the number to show negative time. In the following example, frame #3 has been selected as the reference frame:

```
#1 Elapsed - 0:00:01.99978
#2 Elapsed - 0:00:00.99987
#3 Elapsed  0:00:00.00000
#4 Elapsed  0.00.00.87241
```

<Time From Trigger>

This softkey lets a frame matching a filter or combination of filters be specified as a trigger reference point. It causes the timestamp field in each physical header of the frame to display the elapsed time from the start of the trigger frame to the start of the displayed frame. A trigger frame is the frame identified in Edit Programs Menu to control the Store function:

<Starting With> <Centered About> <Ending With>

Only one of these functions can be used in each program. Whichever function is used, that frame is referenced to zero for the Time From Trigger measurements.

<Time btwn Frames>

The analyzer causes the timestamp field in each physical header of the frame to display the elapsed time from the end of the previous frame to the start of the next frame. The end of the previous frame is after the last byte of the FCS field. In this mode, the timestamp in the first frame contains the time from the start of the run to the start of the first frame.

Selecting Timers and Counters

In addition to displaying the contents of the captured frames, **<Examine Data>** lets you view the timers and counters available in programs you can create.

<Timers & Counters>

This softkey displays the labels and contents of all 16 counters and all 16 timers. This display shows the contents of the counters and timers that existed when a program run was halted. To update or refresh the display, repeat **<Run From Network>** or **<Run From Buffer>**.

When names have been assigned to either the timers or counters in Edit Programs Menu, the assigned names are also displayed in the Examine Data Menu.

COUNTERS		TIMERS	
Counter_0 =	0	Timer_0 =	0.00 ms
Counter_1 =	0	Timer_1 =	0.00 ms
Counter_2 =	0	Timer_2 =	0.00 ms
Counter_3 =	0	Timer_3 =	0.00 ms
Counter_4 =	0	Timer_4 =	0.00 ms
Counter_5 =	0	Timer_5 =	0.00 ms
Counter_6 =	0	Timer_6 =	0.00 ms
Counter_7 =	0	Timer_7 =	0.00 ms
Counter_8 =	0	Timer_8 =	0.00 ms
Counter_9 =	0	Timer_9 =	0.00 ms
Counter_A =	0	Timer_A =	0.00 ms
Counter_B =	0	Timer_B =	0.00 ms
Counter_C =	0	Timer_C =	0.00 ms
Counter_D =	0	Timer_D =	0.00 ms
Counter_E =	0	Timer_E =	0.00 ms
Counter_F =	0	Timer_F =	0.00 ms

Return to Data EXIT

Figure 10-13. Timers & Counters Display

Displaying Frame Errors

The HP 4972A LAN Protocol Analyzer displays several types of frame errors that may occur. This section reviews the IEEE 802.3 frame format and also describes the possible causes of frame errors that can be displayed.

Frame Error Field

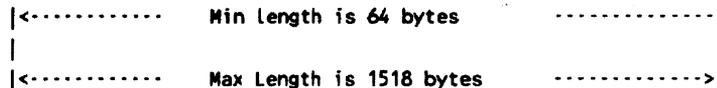
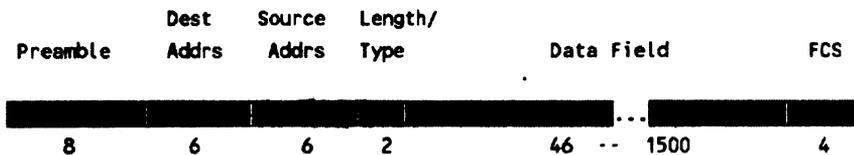


```

1 #1      Mar 9 @ 6.10.34.55533 Len 61 Filters 0..... No error
2      Destination 01-23-45-67-89-AB Source FE-DC-BA-99-76-54 Type 0A-0B
3      15 54-68-69-73-20-69-73-20-46-72-61-60-65-20-4E-75-60 This is Frame Num
  
```

IEEE 802.3 Frame Protocol

The IEEE 802.3 standard specifies a message frame as:



Minimum IEEE 802.3 Length		Maximum IEEE 802.3 Length
6	Dest Addr	6
6	Source Addr	6
2	Length/Type	2
46	Data field	1500
4	FCS field	4
-----		-----
64	bytes	1518
		bytes

IEEE 802.3 Preamble

IEEE 802.3 specifies that the **Preamble** have a 64 bit synchronization pattern of alternating 1's and 0's ending with two consecutive 1's. The information immediately following the last synchronizing byte is grouped into the frame elements: **Destination Address**, **Source Address**, **Length/Type** field, **Data** field, and **FCS**.

In actual practice, preamble length can vary between different network systems. The Hardware Functions Menu lets you choose different preamble lengths of 16, 32, 64, or 128 bits for HP 4972A transmissions.

Types Of Frame Errors

Several errors can be detected by the HP 4972A and displayed in the Examine Data Menu. Definitions and possible causes of frame errors are listed on the following pages.

Runt Frames

Definition A frame that is too short. It has less than the 60 bytes required by IEEE 802.3 for the **Destination Address** through **Data** fields. "Runt" frame label is displayed in the **Error** field of the Examine Data Menu when frames have less than 60 bytes for **Destination Address** through **Data** fields.

Possible Causes

1. Frame collisions can cause Runt Frames. Normally, frame collisions occur very early in the frame transmission, well before the 512 bits needed before the protocol analyzer can receive the frame.
2. The transmit station sent a **Data** field with less than 46 bytes.
3. Runt frames can also be caused by late collisions either because a node is not transmitting according to IEEE 802.3 format or the network is physically too large.

Jabber Frames

Definition

A frame that is too long; it has more than 1514 bytes in the information fields. The **Destination Address** through **Data** fields are the information fields.

Possible Causes

1. The transmitting station is not transmitting within specs.
2. A MAU on the network has failed and is putting out garbage.

Corrupt Data

Definition

Displayed when a possible error occurred in the message inside the protocol analyzer due to heavy network traffic conditions with frequent jabber frames occurring.

Possible Causes

1. Excessive number of jabber frames
2. Interframe spacing (9.6 micro-seconds) violated: Check the network operation.
3. Hardware failure in the HP 4972A. Execute the Hardware Self-Test located in the Hardware Functions Menu.

Bad FCS

Definition

Displayed when the FCS error check generated inside the HP 4972A does not match the **FCS** field transmitted by the **Source Address**.

Possible Causes

1. Ringing on end of message for exactly eight bits.
2. Frame disturbed during transmission.
3. The transmitter may be defective or have a bad MAU.
4. System noise due to improper grounding of network cable.

Printer Functions Menu

Introduction

This chapter describes the softkeys used to control printer functions with the HP 4972A system. The Printer Functions Menu lets you have printed copies of received frames, the setup configuration and the current screen contents of the protocol analyzer.

This chapter contains:

- Getting top of forms
- Stopping the printer
- Selecting the printer
- Printing the node list
- Printing filters
- Printing messages
- Printing programs
- Printing data
- Printing the screen
- Printer functions in remote mode
- Information about the PaintJet Printer

You can print frames stored in the buffer of the protocol analyzer memory. You are able to select and print only the frames that interest you. You can also print the protocol analyzer setup configuration. Finally, you can print the screen, which includes all the characters shown on the HP 4972A display.

The HP 2934A, ThinkJet, Rugged Writer and RS-232 type printers outputs on paper only and the PaintJet Printer outputs on paper or transparencies.

Use the Fold-out Softkey Tree in Chapter 1 of this chapter to follow along with the softkey descriptions in this chapter.

Getting to the Top of Z-Fold Paper

The HP 4972A is intended to work with the HP 2225A ThinkJet Printer or the HP 3630A PaintJet Printer. The protocol analyzer controls the printer for Z-fold paper so that it prints 60 lines of text and then spaces 6 lines. If you position the top of the form correctly, you have 3 blank lines at the top of the form and 3 blank lines at the bottom of the form.

Position the Form

You should set the top of the form to the fourth line on the page, to leave a top margin of 3 lines or 1/2 inch. To set the top of the form to the fourth line:

1. Use the Line Feed (LF) button to position the paper so that the page perforation is just above the pinch rollers.
2. After the top of form is positioned, press the blue button on the control panel to reinitialize the printer.

Experiment with positioning the paper for several printouts to determine the correct position for your application.

The protocol analyzer does not sense the perforations on the forms; it continues to print 60 lines and space 6 lines. If you use the line feed button to advance the page, the text is not centered on the page. If you want to advance the page and maintain text centering, use the Form Feed (FF) button on the control panel.

Stopping the Printer

As copies are being printed, the following message is displayed:

Printing

The print operation may take several minutes if long lists of frames, programs, filters, messages, or node lists are printed.

You can stop the printer if you decide the list being printed is not what you want or it will take too long to print by pressing **<Abort Operation>**. This softkey stops the printing operation after the current file in the printer buffer is printed. The protocol analyzer displays the message:

Printer operation aborted by the user.

The printer does not stop printing immediately after the softkey is pressed. Printing continues until current data stored in the printer buffer has been printed. The printer buffer can hold approximately one page of printed text.

Selecting the Printer

Use the following procedure to select the printer and to select either paper or transparency (for PaintJet) output. If you want the analyzer to default to the new setup, save the setup in the configuration file (CONFIG File) in the Disc Functions Menu. Both the printer selection and the output type are stored on the configuration file.

Procedure

1. From the analyzer Top Level Menu, press **<Other Choices>**.
2. Press **<Printer Functions>** and **<Select Printer>**.
3. The menu lets you choose the printer type. This field defaults to the configure file printer type. If no configure file is found, the analyzer defaults to the Thinkjet. To change it to the desired printer, use the [ARROW] keys or [TAB] to move the cursor to the **Select Printer** field and press **<PaintJet>**, **<Rugged Writer>**, **<HP 2934A>**, or **<Any RS-232>**.
4. If you chose PaintJet, move to the **Output Type** field to choose either paper or transparency. If the Thinkjet Printer is selected, the output type is automatically set to paper.

When you exit the field, one of the following status messages appears on the screen just above the softkeys that informs you of the selections that were made:

ThinkJet is Selected.

OR:

PaintJet is Selected with Paper (or Transparency) Output.

If the printer is not on or not connected, the following error message appears:

THERE IS NO COMMUNICATION WITH THE PRINTER.

If this occurs, check the following:

- 1. Is the HP-IB cable connected?**
- 2. Is the switch for the printer set to address 1?**
- 3. Is the Sys Req switch set to 1?**

If either switch has to be changed to 1, cycle the printer power switch off and back on.

For information about Select Printer functions in Master/Slave operation, see Master/Slave Feature, Chapter 7.

Printing a Node List

In the Printer Functions, pressing <Print Lists> accesses the following menu:

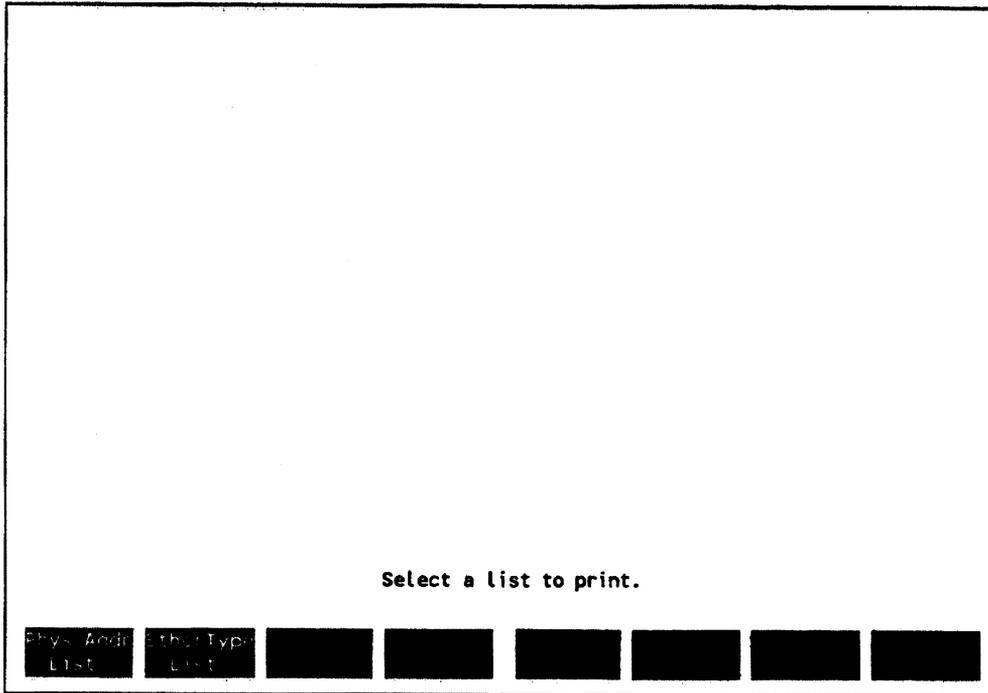


Figure 11-1. Print Lists Menu

The softkeys in this menu accommodate any lists you have stored in the Edit Lists Menu. If you have additional decode applications loaded into the HP 4972A, the softkeys in this menu represent those protocol lists, as well.

Press the softkey containing the list you want to print.

Printing Filters

Use the following softkey from the Printer Functions Menu to print a listing of the filters.

Softkey

Description

<Print Filters>

The printer will print a listing of the filters defined in the Edit Filters menu which can be reached from the Setup Analyzer Menu. All the details of that filter are printed when this softkey is pressed. All of the 16 possible filters you create are printed.

An example of a printed listing of filters is shown below:

```
FILTER #0      Label: Filter_0      MINIMUM Frame Length = 17
              Frame Traits: ACCEPT Frame with GOOD FCS  MAXIMUM Frame Length = 2022
                   ACCEPT Frame with BAD FCS
                   ACCEPT MISALIGNED Frame
                   ACCEPT RUNT Frame

  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  DATA            XX
```

The printer inserts a ~ symbol before and after characters declared as "Not" characters in your filter definition.

Printing Programs

Use the following softkey from the Printer Functions Menu to print a program.

<Print Programs>

You can print a selected program created in Edit Programs Menu, located in the Setup Menu. Up to five programs can be created in the Edit Programs Menu. Press this softkey to display softkey choices for existing programs. Press a softkey for the program you want printed.

The example below shows the default Program_0 that is printed when you do not have a program of your own created:

Listing of program "Program_0" :

Store: all frames
 until full

Log file: not used

Block 1:

Printing Data

Use the following softkey from the Printer Functions Menu to print frames that are captured in the analyzer memory.

Softkey

Description

<Print Data>

You can get printouts of frames you have captured in the protocol analyzer memory. You do not have to print all frames in the memory. In order to print only the frames you want, the analyzer provides softkeys to choose which frames you want to print. Pressing this softkey displays the following softkey choices (described on the pages that follow) for printing frames:

<Range of Frames>

<Single Frame>

<Marked Frames>

<All Frames>

<Print the List>

Each frame chosen is printed in the format you have selected in the Examine Data Menu. Pressing <Print Data> displays the table shown below for choosing which frames to print. You can select up to 15 combinations of All Frames, Range of Frames, Marked Frames, and Single Frames to be printed. The same frame(s) may be printed in different groupings of frames.

FRAMES IN THE LIST (15 elements maximum) :

-
- 1.
 - 2.
 - 3.
 - 4.
 - 5.
 - 6.
 - 7.
 - 8.
 - 9.
 - 10.
 - 11.
 - 12.
 - 13.
 - 14.
 - 15.

After you have selected all of the combinations that you want, press <Print the List>.

Softkey

Description

< Range of Frames >

You can choose a range of consecutively numbered frames to be printed. Press this softkey to display:

FRAMES IN THE LIST (15 elements maximum) :

-
1. RANGE OF FRAMES FROM # _____ 0 TO # _____
 - 2.
 - .
 - .
 - .

From the keyboard, enter the first number of a range of frames you want printed. If you decide your range of frames entry is wrong, press [CLEAR LINE] or [DELETE CHAR] to clear the field. Enter the new number and press [RETURN] to complete the entry. If you decide not to enter a range of frames, press <EXIT> to delete that current element from the list. The protocol analyzer displays:

Enter last frame number

Again from the keyboard, enter the last number for the range of frames you want printed. Press [RETURN] to complete the entry.

To quickly find the last frame number in the protocol analyzer memory, enter 9999999 and press [RETURN]. The protocol analyzer displays the last available frame. You may enter up to 15 different ranges of frames to be printed. After you have selected all the combinations that you want, press <Print the List> to start printing.

Softkey

Description

<Single Frame>

You can print a single frame that is stored in the analyzer receive buffer. Press this softkey to display:

FRAMES IN THE LIST (15 elements maximum) :

-
1. SINGLE FRAME # _____ 0
 - 2.
 - .
 - .
 - .

From the keyboard, enter the frame number of the single frame you want printed. If you decide the single frame entry is wrong, press [CLEAR LINE] or [DELETE CHAR] to clear the field. Enter a new number and press [RETURN] to complete the entry.

Up to 15 separate frames can be printed using this softkey. After you have selected all the frame combinations you want, press <Print The List> to start the printing.

Softkey

Description

<Marked Frames>

You will print only the frames you have marked in the protocol analyzer memory. In the Examine Data Menu, you can manually mark frames that are of interest to you. Also, in Edit Programs Menu, you can create a program to mark particular frames as they are stored in the receive buffer.

Press this softkey to display:

FRAMES IN THE LIST (15 elements maximum) :

1. MARKED FRAMES
2.
.
.
.

Press <Print the List> to begin printing marked frames in the receive buffer.

If you enter <Marked Frames> more than once, you repeat printing a marked frame list as many times as you entered the softkey.

If no frames have been marked in the receive buffer, the protocol analyzer returns to the Print Data Menu and displays the message:

NO MARKED FRAMES IN BUFFER

Softkey

Description

<All Frames>

You can print all frames currently stored in the protocol analyzer memory. Press this softkey to display:

FRAMES IN THE LIST

After you have selected all the frame combinations you want, press <Print The List>.

<Print The List>

This softkey is the execute key for printing the data. Press this softkey to begin printing whatever group of frames you have selected. The protocol analyzer prompts:

Would you like to print the timers and counters also?

Press <YES> if you want to print the data list and the timers and counters list.

Press <NO> if you only want to print the data list.

<EXIT>

This softkey lets you delete a current element you are defining in the list.

When <Range of Frames> or <Single Frame> are currently selected, you can press <EXIT> to delete that element from the list and then make another softkey selection to add another frame combination to the list.

WARNING

If you press <EXIT> with no range of frames or single frame entry field currently active for entry, the protocol analyzer deletes the entire frame list.

Print the Screen

The HP 4972A has an additional important printer function. You can print the current screen display simply by pressing [SHIFT] and [PRT] at the same time. These keys can be used whenever you are in any menu except the Printer Functions Menu.

This function lets you conveniently print a hard copy of whatever function you are editing or frames you may be viewing at that moment.

Remote Operation

When two protocol analyzers are used for remote operation and each location has a printer, you can get printouts at either the slave location or the master location.

Selecting the Printer in Remote Mode

After the remote link is established, use the following procedure to select the printer location.

1. Press **<Select Printer>**.
2. HP 4972A prompts: **Select the MASTER or SLAVE.**
3. Press either **<MASTER>** or **<SLAVE>** for the printer location you want to use.

If a printer location is not specified, the system defaults to the slave printer when the remote link is established.

4. HP 4972A displays: **_____ printer is selected.**

Information about the PaintJet Printer

This section covers additional information that may help when you use the PaintJet Printer.

Display Functions Mode

The printer is in the Display Functions mode when you print any displays *other* than tabular or graphical. The analyzer software automatically turns the Display Functions mode OFF when you print a graphical or tabular display. If this sequence occurs while you are printing, an [ESC] and [Z] automatically prints out, followed by a form feed. The printer then continues to output your selection for printing.

When the Display Functions mode is ON:

- $\text{^}D$ prints instead of $\text{^}R$ (Carriage Return)
- $\text{^}B$ prints instead of $\text{^}C$ (Escape)

Initializing the Printer

The printer is initialized when:

- The first screen is printed
- <Select Printer> is entered
- If a printer or output type is changed as a result of loading a configuration file
- The first screen is printed after exiting Performance Analysis
- When the first screen is printed in Performance Analysis

If you want to re-initialize the printer manually, go to the Printer Functions Top Level Menu to do so. When you want to re-initialize during the Performance Analysis Application, exit out of the application and then re-enter. This causes the printer to be initialized before the next print-out.

If you cycle power, perform a form feed, or any other changes on the printer itself, you need to realign the page in the paper feed. Any external changes you make to the PaintJet Printer are transparent to the HP 4972A. Always re-initialize the printer from the analyzer after cycling the power to the printer.

Remote

To print during remote, the master and slave printers must be selected *before* the slave is captured. If you do not choose the printer and capture the slave, the Thinkjet Printer is the analyzer default selection.

The printer selection must be done separately for each printer. Once in remote mode, if you press <Printer Functions> and <Select Printer>, the menu lets you choose <Master> or <Slave>. This selects the master or the slave printer. If each location in remote operation has a printer, you can get printouts at either the slave location or the master location.

Performance Analysis (Stats)

It is during Performance Analysis (Stats) that the PaintJet Printer is the most useful. You can print the graphical screens in color, if you have a color monitor attached to your analyzer. All the colors that print from the PaintJet Printer correspond to the colors on the color monitor, with two exceptions: yellow on the screen prints brown on the printer output and black on the screen prints white on the printer output. Tabular screens always print in monochrome.

The PaintJet prints two graphs per page and then executes a form feed. If you exit the Performance Analysis Application with only one graph on the page, the printer executes a form feed.

Hardware Functions Menu

Introduction

This chapter describes the menus and softkeys used to display the hardware configuration of the HP 4972A and to test hardware circuitry in the HP 4972A.

A self test is performed automatically at power on. The power-on self test is a subset of the self tests available in the Test LAN Analyzer Menu.

<Test LAN Analyzer> lets you run the more extensive self tests.

This chapter contains:

- Hardware functions description
- Test LAN analyzer self tests
- Running the self tests

The Hardware Functions Menu

From the Top Level menu, press <Hardware Functions> to display the menu shown below.

LAN Analyzer Address:	08-00-09-00-8A-96	Memory bytes available:	210052
LAN Receiver hardware:	Installed		
LAN Transmitter hardware:	Installed		
Dual Port RAM hardware:	Installed		
Deep Trapmachine hardware:	Installed		
Shallow Trapmachine hardware:	Installed		
1 Mbps Interface hardware:	Installed		
Cable test hardware:	Installed		
Runt Frame filter:	<input type="checkbox"/>		
Receiver Buffer size:	<input type="checkbox"/>		
Partial packet store to Disc:	<input type="checkbox"/>	Store <input type="checkbox"/> bytes during logging	
Transmitter preamble length:	<input type="checkbox"/>		
Executive measurement at power-on:	<input type="checkbox"/>	File name:	<input type="checkbox"/>
Network type:	<input type="checkbox"/>		
Display refresh rate:	<input type="checkbox"/>		
Permanent changes to this menu may be saved in a CONFIG FILE.			
<input type="checkbox"/> Test LAN Analyzer	<input type="checkbox"/> Test	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Test	<input type="checkbox"/> Test	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Test	<input type="checkbox"/> Test	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Test	<input type="checkbox"/> Test	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Test	<input type="checkbox"/> Test	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Test	<input type="checkbox"/> Test	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Test	<input type="checkbox"/> Test	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Test	<input type="checkbox"/> Test	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Test	<input type="checkbox"/> Test	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Test	<input type="checkbox"/> Test	<input type="checkbox"/>	<input type="checkbox"/>

Figure 12-1. Hardware Functions Menu

Hardware Functions Menu Description

LAN Address of this Analyzer displays the IEEE 802.3 address unique to your HP 4972A. This is the six byte address used in default Source and Destination Address fields of IEEE 802.3 and Ethernet protocols.

Memory bytes available shows how many bytes of RAM memory are available for use by the HP 4972A. This is the memory space used for protocol analyzer functions such as editing the node list and programs. The available memory display is updated dynamically during operation of the analyzer.

LAN Receiver hardware

LAN Transmitter hardware

Dual Port RAM hardware

Deep Trapmachine hardware

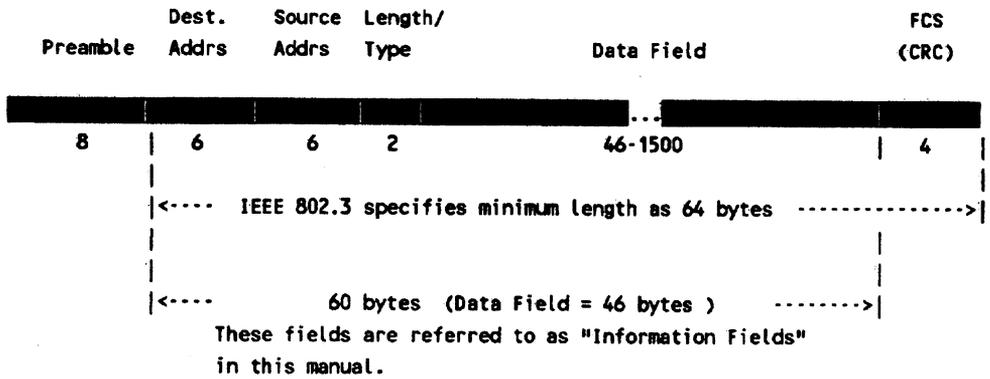
Shallow Trapmachine hardware

These are the hardware printed circuit boards that are used to perform the protocol analyzer functions of the HP 4972A. All of these boards must be installed for the protocol analyzer self test to pass and for the protocol analyzer to function.

Runt Frame filter lets you choose the minimum frame length for the protocol analyzer to accept. It is common for frames shorter than the IEEE 802.3 requirement to occur on the network due to collisions. The HP 4972A can capture frames shorter than the IEEE 802.3 minimum length. You can choose between two minimum sizes of Runt frames to be captured. You can store frames with information fields as short as:

- Runt Frame filter enabled: Approx. 52 bytes (38 bytes in the data field)
- Runt Frame filter disabled: 15 bytes (1 byte in data field)

IEEE 802.3 specifies that the minimum frame length should be 64 bytes from **Destination Address** through the **FCS** field (60 bytes in **Dest. Addr.**, **Source Addr.**, **Type/Length**, and **Data** fields).



Runt Frame Filter: Enabled

In default mode, the Runt frame filter is Enabled. The protocol analyzer discards frames with less than approx. 52 bytes in the information fields (at least 38 bytes in the data field). Very short frames can cause problems in HP 4972A hardware used to capture frames. In Enabled mode, the HP 4972A avoids the hardware problems by discarding the frames with less than 52 bytes in the information fields.

Runt Frame Filter: Disabled

The Disabled mode is provided for unique or specific applications when you need to capture and view very short frame fragments. You should return to the Enabled mode when you are finished with your special measurement. Enabled mode provides complete integrity for received data. In Disabled mode, the protocol analyzer can store frames with as few as 15 bytes in the information fields (at least one byte in the Data Field).

WARNING

In Disabled mode, hardware filters and data frames stored in the HP 4972A can be corrupted. Data frames can also be missed. Use Runt Frame Filter Enabled mode for normal operation.

The error message, **CORRUPT DATA**, is displayed in the Examine Data Menu if an error occurs in a frame while it is being received inside the analyzer. When short frames occur, HP 4972A filters start being loaded, however, if the frame is discarded, the filter is not reset until the next complete frame is received. Until the next complete frame is received, received data frames can be corrupted, frame fragments can be missed without an error message displayed.

Partial Packet Store to Disc

Enabling this function lets you store a fixed number of bytes from each frame when you log to the disc. You can store a minimum of 14 bytes. The maximum number of you can store is the number of bytes set in the Receiver Buffer Size (the field directly above the Partial Packet Store to Disc in the Hardware Functions Menu) plus 14. Attempting to store a number of bytes outside this range creates an error message in the Hardware Functions Menu.

Storing a fixed amount of the frames to disc instead of the whole frame lets you store more frames to disc. It also lets you store only the header information to disc, if that is specifically what you want to analyze.

When you examine the data in the Examine Data Menu, the analyzer displays the Actual Packet Length and the Packet Bytes Stored.

Execute Measurement at Power On

This field causes the analyzer to load any setup file or application at power on.

Enabling this function causes the analyzer to search the default volume for any file named the same as the File Name: field when the instrument is first powered on. Matching files are loaded in the following order:

1. Application File
2. Application Config File
3. Network File
4. List File
5. Filter File
6. Message File
7. Program File

Once all matching files are loaded, the analyzer executes a measurement as follows:

1. If both an application and an application config file are loaded, the automatic sequence of the application starts.
2. If an application is loaded without its config file, the top level application measurement is started.
3. If a network or program file is loaded, the program is executed.
4. If none of the above conditions are met, the analyzer displays the HP 4972A Top Level Menu.

Example:

Requirement: Make the analyzer auto-load the LAN Performance Analysis (Stats) Application and auto-execute an automatic sequence. Use the following procedure:

1. Create the Automatic Sequence and store it in a Stats Config File named **STATS**.
2. In the Hardware Functions Menu, select the following:

Execute measurement at power on: **YES** Filename: **STATS**

3. Save the Config File in the Disc Functions Menu.

Results: The next time you power up the HP 4972A, it loads the Stats Application File and the STATS Config File, and then starts the Automatic Sequence.

Receive Buffer size lets you select the length of buffer used to store frames received from the network.

1500 bytes is the Receive Buffer default length. Use this buffer size when you do not want to risk missing a frame in the protocol analyzer. 1500 byte buffer length lets all frames passing the runt frame filter be stored without the risk of corrupt buffers.

480 bytes mode is provided for unique or specific applications when you need to capture more than 655 frames in the HP 4972A receive buffer. We recommend you return to the 1500 bytes mode when you are finished with your special measurement.

During normal, low traffic (less than 10-20%) monitoring, if your network generally transmits shorter length frames, you can store more frames in memory by setting the buffer length to 480 bytes.

WARNING

When operated in **480 bytes** mode, data integrity problems can occur under high network loads. The following list shows the two possible conditions when data integrity problems can occur.

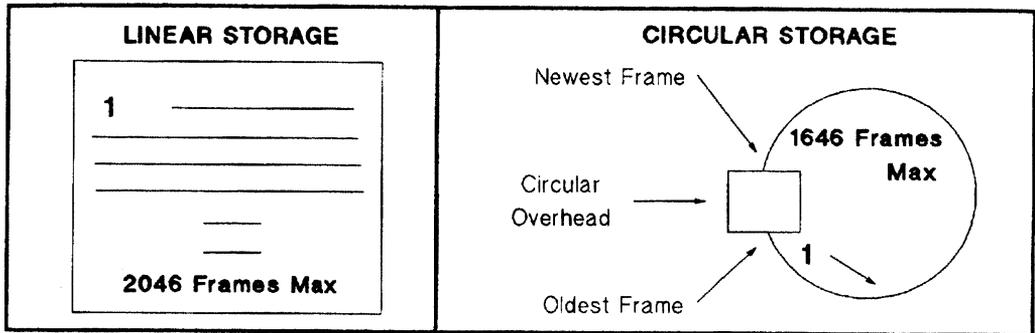
During heavy network loads, when frame lengths slightly greater than 480 bytes occur, an extra character may be added to the frame by the protocol analyzer. When this happens, the frame is marked as **CORRUPT DATA** in the Examine Data Menu.

When frames are received with minimum interframe spacing, (9.6 us), there is a slight possibility that one of the frames or both frames may be corrupted by the protocol analyzer. If a frame is corrupted, it is marked as **CORRUPT DATA**.

The number of frames that can be stored in the HP 4972A receive buffer depends on two conditions:

<u>Store Method Used</u>		<u>Receive Buffer Length</u>
Linear Storage	Circular Storage	480 byte buffer
Until Full	Centered About	1500 byte buffer
Starting With	Ending With	
	Nonstop	

480 BYTE BUFFER LENGTH



1500 BYTE BUFFER LENGTH

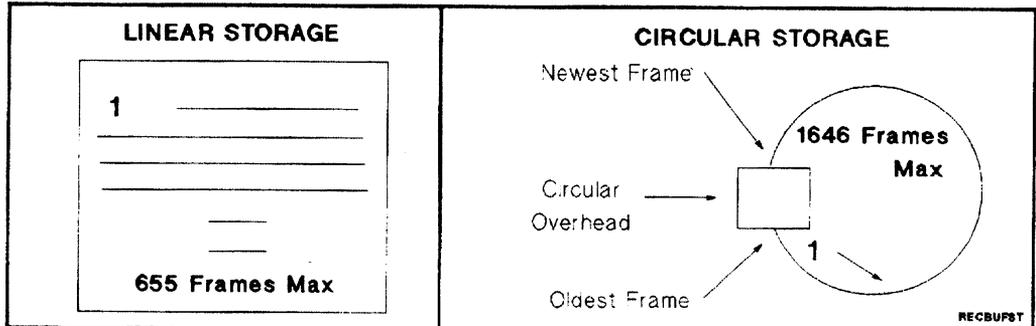


Figure 12-2. Receive Buffer Storage

Transmitter preamble length lets you change the length of the preamble for messages transmitted by the HP 4972A. Using different preamble lengths lets you test receive functions of stations on your network. Choices for preamble length are:

<16 bits> <32 bits> <64 bits> <128 bits>

The HP 4972A can not receive frames with only 16 bits in the preamble. The default setting is 64 bits.

Execute Network File at power-on lets you choose whether or not you want to automatically execute a network file when the protocol analyzer is turned on. You can create network files that automatically load a program and menus to perform tests you specify. See Chapter 9, Using the Disc, for more information about creating and saving network files.

Network file name lets you choose the network file that is to be automatically loaded at power on. A default network file name, AUTOEX (AUTO EXecute), is used by the HP 4972A. If you want to automatically load a file name other than AUTOEX, enter the new file name and then press [RETURN] to complete the entry.

Network Type lets you choose between IEEE 802.3 (1 MHz), IEEE 802.3 (10 MHz), and Ethernet network protocols. This selection is for documentation purposes only. The analyzer does not use this field.

IEEE 802.3 1MHz is the HP Option 005 StarLAN network.

Display refresh rate lets you change the frequency for the display monitor refresh rate. The selection is between 50 and 60 Hz. Set the field to the line voltage frequency used in your country. The display may roll if the line frequency is incorrect. See the Appendix Manual, 50/60 Hz Adjustment, to correct the problem.

Display Type is displayed only when you have the HP 98627A Color Output Interface installed as an external device. The analyzer can display either a color or monochrome display. Move the cursor to this field to select the display for your operation. The "color" softkey sets up the proper interleaf signals for color monitor operation.

Self Tests

A brief description of tests performed by **<Test LAN Analyzer>** is listed on the following pages. This section gives you an overview of the self tests performed on the HP 4972A instrument. A more detailed description is given in the HP 4972A Hardware Support Manual.

Hardware Boards Test Status

The hardware list displayed for Hardware Functions Menu shows the status of boards after the power-on self test or Test All Hardware Test is completed. If any board fails, the display indicates which board(s) failed.

LAN receiver hardware:	INSTALLED
LAN Transmitter hardware:	INSTALLED
Dual Port RAM hardware:	INSTALLED <-- FAILED HARDWARE TEST
Deep Trapmachine hardware:	INSTALLED
Shallow Trapmachine hardware:	INSTALLED

Loss of Stored Messages and Data

After you select **<Test Hardware>**, a message is displayed to warn you that when the self test is performed, any setup menu information, and transmit and receive buffer data is lost. Internal memory is used during the hardware tests and any stored information is written over. The hardware tests give a high degree of assurance that the hardware of the protocol analyzer, the Access Unit Interface (AUI) cable, and the Media Access Unit (MAU) are working correctly.

When you run the **<Test All Hardware>** and **<Network Loop Test>**, you have run a very extensive test of the protocol analyzer and the link to the local area network (LAN).

Softkey**Description****<Test All Hardware>**

The analyzer runs a self test without having to go through the power-on software loading routine. It tests the buffer memory more extensively than the power-on test.

Functions tested by this softkey include:

LAN Receiver	Deep Trap Machine
LAN Transmitter	Shallow Trap Machine
Dual Port RAM	Internal Loopback

After running the self test, if your system is connected to a LAN, you may want to perform the following test to verify that the AUI cable, MAU, and the network are functioning.

<Network Loop Test>

This softkey causes the protocol analyzer to transmit two frames on the network. The frames pass through the AUI cable, through the MAU, onto the network cable, and then back to the protocol analyzer.

If the received frames are the same as the transmitted frames, you have verified operation of the transmit/receive circuitry in the protocol analyzer, the AUI cable, the MAU and the fact that the network cable is functioning.

If the message NETWORK LOOPBACK TEST FAILED appears on the HP 4972A display after this test is run, the problem may be a faulty MAU. See the Appendix Manual in the Error Messages section.

<Reset MAU>

The protocol analyzer resets or initializes the MAU by disconnecting the MAU's power for about one second.

Running the Self Tests

When you elect to run the self tests, the protocol analyzer displays status messages during the test and at the end of the test.

During the test, the protocol analyzer displays:

Testing (test name).

Depending on whether the test passes or fails, the protocol analyzer displays one of the messages:

Pass (Name of hardware board:) INSTALLED

Failed (Name of hardware board:) INSTALLED <- FAILED HARDWARE TEST

If the Test Fails

If any test fails, first check the error messages located in the Appendix Manual. If the problem persists, contact your nearest HP Service Office.

Passwords Menu

Introduction

This chapter describes the password features used to control access to HP 4972A Receiver and Transmitter functions. This chapter contains:

- Changing the passwords
- Storing the passwords
- Securing receiver or transmitter functions
- Unsecuring receiver or transmitter functions
- Passwords in other menus

WARNING

The Passwords feature works. There is no procedure to recover a forgotten password from the protocol analyzer. If you forget your password, you must reboot your system using the software supplied with your protocol analyzer.

When a password is saved to the Configuration File, no procedure exists to recover the password from the file.

Keep a copy of the original software (without passwords) in a secure place. Store passwords only on working copies of your system software. Another suggestion is to record your password on paper and store the paper in a secure location.

Password Menu

Password Menu lets you disable or block certain features of the HP 4972A. Two primary functions of the protocol analyzer that are disabled by passwords are:

- Displaying the data field portion of captured frames
- Sending messages from the protocol analyzer

Passwords can suppress displaying the data field portion of captured frames. IEEE 802.3/Ethernet headers as well as the HP 4972A physical headers containing frame length and error information can be viewed for network trouble shooting. With the password feature enabled, only authorized operators may view confidential messages.

Passwords can prevent the HP 4972A from transmitting messages onto the network. Only authorized operators may send frames with the password function enabled.

To reach the Password Menu, press <Passwords> from the Top Level Menu.

This menu lets you:

ENTER passwords to obtain access to password-protected functions.

SECURE functions by revoking previously-obtained access.

CHANGE your current passwords to NEW passwords.

STORE your new passwords on disc.

RECEIVE PASSWORDS prevent the unauthorized viewing of any portion of the data field of a received frame.

TRANSMIT PASSWORDS prevent the unauthorized sending of any traffic on the network.

NULL passwords (all < SPACE > characters) allow full access to password-protected functions.

Receiver: No password required (NULL password)

Transmitter: No password required (NULL password)

Enter Recv password	Secure Receiver	Enter Xmt Password	Secure Xmitter	Change password			EXIT
------------------------	--------------------	-----------------------	-------------------	--------------------	--	--	------

Figure 13-1. The Passwords Menu

NULL Password

In default mode no user password has yet been entered, the Receiver and Transmitter passwords are both NULL passwords, (all BLANK characters). The NULL password lets you have full access to reading frame data fields and sending messages on the network.

Secured Operation

To secure (disable) either the Receive or Transmit functions, you must define and enter a password into the protocol analyzer. You can use different passwords to secure the Transmit and Receive functions separately or, if the Receive and Transmit passwords are the same, your password needs to be entered only once. A password can be saved to the Configuration File to cause the analyzer to power up in a secured mode each time the power is cycled to ON.

Practice Using Passwords

You should practice using the password softkeys until you are sure you understand the password menu. Use a single character such as 1 or A for the password entry. As you change or edit the passwords, increment the character to the next value 2 or B.

If you forget the password or get confused, it is much quicker and easier to enter single characters until you find the password.

When you are comfortable with the procedures for passwords, then enter longer and more complex passwords (up to eight keyboard characters).

Changing the Password

In default mode, the Receiver and Transmitter passwords are both NULL (all SPACE characters). To secure the Receiver and/or Transmitter functions, use **<Change Password>**. If another password has been entered, this softkey also lets you revoke the previous password and enter a new password.

<u>Softkey</u>	<u>Description</u>
<Change Password>	This softkey presents a display to let you enter new passwords. The new password can replace the NULL password or it can replace a previously defined password. Pressing this softkey displays <New Rcv Password> , <New Xmt Password> , <Store New Password> .
<New Rcv Password>	This softkey opens the protocol analyzer to accept a new password for Receiver functions.
<New Xmt Password>	This softkey opens the protocol analyzer to accept a new password for Transmitter functions.
<Store New Password>	This softkey is described in the Storing the Password section in this chapter.

Procedure to Change the Password

1. From the Passwords Menu, press **<Change Password>**.

This softkey presents a display to let you enter new passwords. The new password can replace the NULL password or it can replace a previously defined password. Pressing this softkey displays **<New Rcv Password>**, **<New Xmt Password>**, **<Store New Password>**.

2. Press **<New Rcv Password>** to change the Receiver password.

This softkey opens the protocol analyzer to accept a new password for Receiver functions.

Press **<New Xmt Password>** to change the Transmitter password.

This softkey opens the protocol analyzer to accept a new password for Transmitter functions.

Current Password Is NULL

1. The HP 4972A prompts:

Enter your NEW password. (0..8 characters)

Enter up to 8 keyboard characters and press [RETURN].

2. The HP 4972A prompts:

Please verify your new password by retyping it.

Enter the new password again and press [RETURN].

3. The HP 4972A displays:

Secured (Enter password for access)

Password changed.

Current password is not NULL

1. The HP 4972A prompts:

Enter your **CURRENT** password. (0..8 characters)

Enter your current password and press [RETURN]. If you enter the wrong password, the HP 4972A prompts:

INCORRECT PASSWORD

2. When you correctly enter the **CURRENT** password, the HP 4972A prompts:

Enter your **NEW** password. (0..8 characters)

Enter up to 8 keyboard characters and press [RETURN].

3. The HP 4972A prompts:

Please verify your new password by retyping it.

Enter the new password again and press [RETURN]. The HP 4972A displays:

Password changed

Storing the Password

After a password is changed, you can use the new password to secure Receiver and Transmitter functions temporarily or until the power is turned off. In order to automatically restore the same password when the power is turned on again, you must store or save the password to the Configuration File, CNFG.

Softkey

Description

**<Store New
Password>**

This softkey overwrites the new password over the current password on the Configuration File, CNFG. This softkey overwrites a new password over a previously defined password without disturbing any other elements on the configuration file.

After storing your new password, the HP 4972A displays:

Passwords saved in file (name of CONF file).

WARNING

If you define a new password and use **<Save Config.>**, you overwrite the entire configuration file not just the old password.

Use **<Store New Password>** when you want to change only the password on the configuration file.

Securing Receiver or Transmitter Functions

You can cause the Receiver and/or Transmitter function to become secured by changing to a new password. You can also use the current password and secure the Receiver and/or Transmitter functions with the following softkeys.

Softkey

Description

< Secure Receiver >

This softkey lets you disable the Receiver function. You can not view data fields in any frames received from the network.

To unsecure or enable the Receiver function, you must press **<Enter Rcv Password>** and enter the current password or change the password with **<Change Password>**.

< Secure Xmitter >

This softkey lets you disable the Transmitter function. You can not transmit frames from the protocol analyzer onto the network.

To unsecure or enable the Transmitter function, you must press **<Enter Xmt Password>** and enter the current password or change the password with **<Change Password>**.

Unsecuring Receiver or Transmitter Functions

There are two methods to unsecure or remove a password from the Receiver or Transmitter functions while you are in the Passwords Menu.

1. Change an existing password to a new name by using **<Change Password>**. See the section **Changing the Password** in this chapter.
2. Use **<Enter Rcv Password>** or **<Enter Xmt Password>** to enter the current password.

Softkey

Description

<Enter Rcv Password>

Press this softkey and then enter the current Receiver password. Press [Return].

If you correctly enter the password, the HP 4972A displays:

Unsecured (Password has been entered)

<Enter Xmt Password>

Press this softkey and then enter the current Transmitter password. Press [RETURN].

If you correctly entered the password, the HP 4972A displays:

Unsecured (Password has been entered)

Passwords in Other Analyzer Menus

If a password is used to secure Receive or Transmit functions, the following analyzer menus display an error message when you try to view the data field of a frame or send a message.

- Edit Filters Menu
- Edit Messages Menu
- Edit Programs Menu
- Examine Data Menu
- Printer Functions Menu

Receiver Functions

When a Receiver password is active, the data field portion of received frames is not displayed in any analyzer menu. Only the physical header generated by the analyzer and the IEEE 802.3/Ethernet headers can be displayed.

The data field information for each frame is in the protocol analyzer receive buffer. To view the data fields, you must unsecure the Receiver function password.

Transmitter Functions

In Execute Programs Menu, when a Transmitter password is active and you try to send a message with **<Send Message>**, no message is sent.

An error message is displayed to alert you that the protocol analyzer can not send messages until the Transmitter function password is unsecured.

Index for the Manual Set

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< > Words inside < > indicate HP 4972A softkeys.

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