K450B LOGIC ANALYZER

USER'S MANUAL ADDENDUM

TeleDiagnosis Option

BIOMATION CORPORATION

CONTENTS

Chapter 1

GENERAL

INTRODUCTION

This manual describes the K450B Logic Analyzer TeleDiagnosis communications feature. The TeleDiagnosis feature extends the capability of the standard communications firmware and provides special protocol for operation with the modem interface. The modem allows a K450B Logic Analyzer at a local site to communicate with another K450B at a remote site via telephone lines.

TeleDiagnosis COMPONENTS

The following components are used for the TeleDiagnosis feature:

Two TeleDiagnosis Diskettes and User's Manual

Modem Assembly (0117-0765-10) which consists of the following items:

1. Hayes-Compatible Modem (7500-0028):
   Modem System Owners Manual
   Modular Telephone Cable
   Plug-In Power Supply, With Attached Power
   Input Cable

2. RS-232 Cable (7100-0163-10)

Chapter 2

INSTALLATION

MODEM INSTALLATION

The Hayes-Compatible modem is connected to commercial telephone lines and the RS-232 Port at the rear of the Logic Analyzer as shown in Figure 2-1. Refer to the Modem System Owners Manual for additional information on connecting the modem.
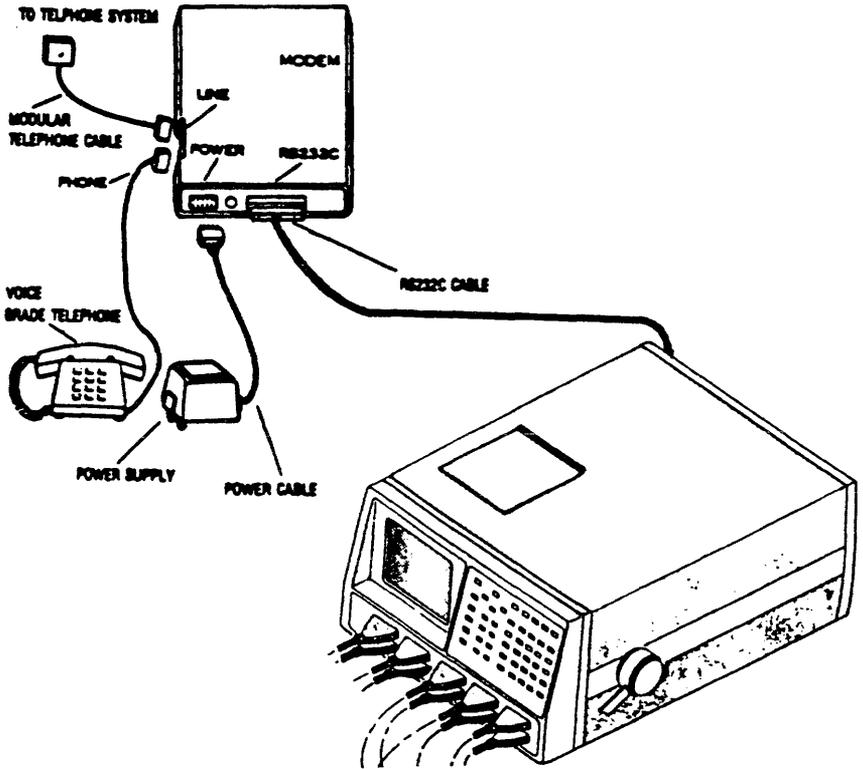
Figure 2-1. Modem Installation

TeleDiagnosis INSTALLATION

Use the following procedure for installing TeleDiagnosis:

1. Turn on power at the K450B; wait for the Configuration Screen to be displayed.

2. Press the I/O and 2 keys to select the I/O Screen (Figure 2-2). Use the Up/Down, Right/Left-Arrow cursor keys to select the RS-232 PORT. Configure the port as follows:

    Baud Rate = 1200,   Word Length = 8 Bits,

    Stop Bit(s) = 1,   Parity = None,   Protocol = XON/XOFF

```
                         I/O          06/24/87 01:42:19
              GPIB                       RS232
   GPIB MODE  = ▮▮▮▮▮▮▮▮  BAUD RATE   = ▮▮▮▮
                          WORD LENGTH = ▮ BITS
   TERMINATOR = ▮▮▮▮      STOP BIT(S) = ▮
   EOI OUTPUT = ▮▮▮       PARITY      = ▮▮▮▮
                          PROTOCOL    = ▮▮▮▮▮▮▮

   I/O  PORT       = ▮▮▮▮▮
   RECORD LENGTH = ▮▮▮▮▮▮▮▮▮▮▮

   I/O COMMAND    = ▮▮▮▮▮▮▮▮ ▮
      0 GouldDTD  * 408-988-6800


   ▮▮=GPIB/RS232  ▮▮→Command          ▮▮=Execute Command
                                           READY
```

Figure 2-2. I/O Screen

3. Make a backup copy of the TeleDiagnostic master diskette before loading. Refer to the Disk Storage System Operation section in the K450B User's Manual. (See Description of DOS Copy Command.)

4. Insert the Operating System diskette into disk drive. Press the I/O and the 1 keys to load the Operating System.

5. Remove the Operating System diskette from disk drive and insert the TeleDiagnosis diskette. Press the F3 key to display the new directory. Press the 1 key to select RECALL.

6. Use the Right- Arrow cursor key to enter the filename field. Use the Up/Down- Arrow cursor keys to select the TELCOM.EXE file.

7. Press the F4 key to load TeleDiagnosis. The Phone Directory (Figure 2-3) appears on the screen. Press any key to remove the Phone Directory from the I/O screen. Chapter 3 explains how to edit the Phone Directory.

8. Observe the message, "MODEM > OK", is displayed on the I/O screen if a Hayes-compatible modem is connected to the Logic Analyzer.

Chapter 3

OPERATION

INTRODUCTION

The "I/O COMMAND =" field on the I/O screen enables the local Logic Analyzer to send information to, and receive information from, another Logic Analyzer at a remote location. Pressing the F2 key moves the cursor to the Command Function field. All I/O commands may be selected from this field by pressing the NEXT and PREVIOUS keys. Pressing the F4 key initiates execution of the selected command.

K450B LIST OF I/O COMMANDS

The complete set of I/O Commands for the K450B are listed below. Commands without the asterisk are used for standard communication without TeleDiagnosis. Commands related to the Modem are tagged with a single asterisk (*). The commands, tagged with a double asterisk (**), are for TeleDiagnosis operation. Both, the Modem commands (*) and TeleDiagnosis commands (**) are not allowed for GPIB operation.

> NOTE: Refer to Cross-Reference Index at end of Chapter 4 in K450B User's Manual for a description of Mnemonics used for Command Functions.

COMMAND	FUNCTION
SEND SETUP	Sends Format/Trace/Clocks/Arm
SEND MEMORY (A/B)	A=MA/LA/PA B=MB/LB/PB/MX
SEND DISPLAY PARAMETERS	Sends WG/WL/WQ/WS/WT/WV/ ZC/CC/CR
SEND SEARCH	Sends ZR/ZT
SEND STATUS	Sends KT
SEND STRING	Sends output string
PROCESS INPUT STRING	Simulate input data
**GET SETUP (M/A/B)	Sends –, A–, B–
**GET MEMORY	Sends QA/QB
**GET DISPLAY PARAMETERS	Sends W–
**GET SEARCH	Sends ZT request

**GET STATUS	Sends KT request
**GET USERID	Sends SI request
**REMOTE STOP	Sends QQ=S
**REMOTE STOP w/XFR	Sends QQ=X

**REMOTE ADVANCE	Sends QQ=D
**REMOTE ARM w/CALLBACK	Sends QQ=A. DB=
SEND USERID	Sends SI
REMOTE ARM	Sends QQ=A

*AUTO DIAL	Sends dial sequence
*DISCONNECT MODEM	Sends disconnect sequence
*MANUAL ORIGINATE	Sends connect modem sequence
*MANUAL ANSWER	Sends connect modem answer
*SWITCH TO VOICE	Sends DC. Pickup phone message

K450B I/O COMMAND FIELDS

The command fields are as follows:

FIELD #1	FIELD #2	FIELD #3
Quick Key	Quick Key	Quick Key
(0) SEND	(0) SETUP	(0) M, (1) A, (2) B
(1) GET	(1) MEMORY	(0) M, (1) A, (2) B
	(2) DISPLAY PARM	
	(3)SEARCH	
	(4) STATUS	
	(5) USERID	
	(6) STRING	

(2) PROCESS INPUT STRING
(3) REMOTE ARM
(4) REMOTE ARM w/CALLBACK (0)- (8) Phone Select
(5) REMOTE STOP
(6) REMOTE STOP w/XFR
(7) REMOTE ADVANCE
(8) AUTO DIAL   (0)- (8) Phone Select
(9) DISCONNECT MODEM
(A) MANUAL ORIGINATE
(B) MANUAL ANSWER
(C)SWITCH TO VOICE
(D)SAVE PHONE DIRECTORY

3-2

EDITING THE PHONE DIRECTORY

The Phone Directory holds up to nine entries (0-8). Each entry consists of an 8-character Name, followed by a 30-character Phone Number. Phone numbers and names may be changed using Up/Down, Right/Left-Arrow cursor keys and Hex Pad keys. The HAYES SMARTMODEM Syntax is used for Phone Number entries, including the following special characters:

CHARACTER	FUNCTION
P (Pulse Dial)	Selects pulse dialing.
T (Tone Dial)	Selects tone dialing.
, (Pause)	Causes a 2-second delay in dialing.

The user Name and Phone Number selected are displayed below the I/O COMMAND field when CALLBACK or AUTODIAL commands are selected. Directory entry 0 is reserved for the local K450B; the entry 0 User Name is sent in response to the SI (User ID) command.

Perform the following steps to edit the Phone Directory screen (See Figure 3-1):

1. Press the Down- Arrow cursor key to enter the I/O COMMAND field.

2. Press Quick Key (8) to select AUTO DIAL Command. The blinking cursor will appear in the Phone Identifier field adjacent to the I/O COMMAND field.

3. Press the EDIT key to enter the Phone Directory window.

4. Use the Up/Down and Right/Left-Arrow cursor keys, along with the Hex Pad keys, to edit Phone Numbers and User Names.

5. Press the EDIT key to exit the Phone Directory window.

6. Press the F3 key to quit without saving changes to disk (any changes will remain in memory until TeleDiagnosis is reloaded), or press the F4 key to exit TeleDiagnosis and save changes to disk.

3-3

```
            TeleDiagnostics Phone Directory
 G 1  GouldDTD  408-988-6800
   2
 T
 E
   CTRL:    REF:    sh/CTRL:  +   sh/REF:           FF
   F1:  =   F2:  5     F3:  -
 I  Press EDIT to leave Phone Directory
```

RECORD LENGTH = [   ]

I/O COMMAND   = [   ]
 0 GouldDTD   * 408-988-6800

                                    READY

Figure 3-1. Phone Directory Screen

PROCESS INPUT/SEND STRING COMMANDS

The Send String command sends any character string specified by the user. The Process Input String command simulates the RS-232 Port. The local K450B assumes this string is received from the remote K450B and treats this input as a command line.

OPERATING K450B DURING TRANSMISSION

When transmission is active, all K450B display screens may be accessed without interrupting the transfer operation.

STOPPING DATA TRANSMISSION

To cancel an I/O operation that is in progress, press the SHIFT and I/O (CANCEL) keys. This action should be performed at the site location where transmitting occurs.

If data is being transmitted in ASCII format, the Cancel entry stops all transmission and sends a Control-C (EXT) character which informs the remote K450B to stop receiving data.

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If data is being transmitted in Binary format, the remote K450B can not receive an Acknowledge (ACK) response from the sender and will time-out to terminate receiving operations.

ERROR CHECKING

The ERROR CHECKING protocol is useful when communicating over phone lines under conditions where line noise may distort data transmission.

Press Quick key 2 in the Record Length field to enable error checking. When error checking is enabled, the data is packed with headers as shown in the following example:

DATA PACKAGE

ASCII CHARS.	SYN	SYN	STX	DATA	SYN	SYN	EOT	# OF CHARS	CHK SUM	ENQ
CHAR LENGTH	1	1	1	<VAR>	1	1	1	3	5	1

Where:

SYN = Synchronizing character between record (16 Hex).

STX = Start of text. First character in a record (02 Hex).

EOT = End of text. Last character in a record (04 Hex).

ENQ = Enquire. Next to checksum to enquire ACK/NAK (05 Hex).

ACK = Acknowledge. Receiver response for ACK (06 Hex).

NAK = Not Acknowledge. Receiver response for error (15 Hex).

The protocol is as follows:

The SYN bits ensure the record is started without data loss.

The STX character indicates data transmission follows.

3-5

The EOT character indicates end of data transmission.

The CHKSUM and number of data characters are calculated by adding all characters in the variable record data portion.

The ENQ character requests a ACK/NAK response from the receiver. Receipt of a ACK sends the next record. Receipt of a NAK indicates an error is present.

A delay period of approximately 3 seconds, without receiving a ACK/NAK response after the ENQ is issued, assumes the data was not received and the record is re-transmitted. An unsuccessful re-transmission is repeated for a maximum of five times before the following message is displayed to prompt the user:

TRANSMISSION ERROR. . . DISCONNECT AND REDIAL

The receiver translates all incoming data and sends a Bell character (07 Hex) to the sender if an INVALID RECORD is detected.

MODEM RESPONSE DISPLAY

A response message is displayed on line 23, following the MODEM> indicator, whenever the K450B detects a command response from the Modem. The following response messages are issued:

"OK" means the Modem is in Command Mode and/or has accepted a command.

"CONNECT" means the Modem has established a Data Link with another Modem.

"NO CARRIER" means the Modem did not detect the presence of a remote Modem following a DIAL Command.

"ERROR" means the Modem received an Illegal Command from the K450B.

"RING" means the Modem has detected an Incoming call and will attempt to answer the call.

MODEM RELATED COMMAND DESCRIPTION

When the AUTO DIAL Command is executed, the Modem will attempt to dial the selected number and establish a data link with a remote Modem. The message, "CONNECT", or "NO CARRIER" will be displayed within 30 seconds to indicate a Success or Failure occurred.

When the DISCONNECT MODEM Command is executed, the Modem is disconnected. The STATUS line displays the message, NO CARRIER.

The SWITCH TO VOICE Command notifies the remote K450B that voice communication is desired. When this command is executed, the remote K450B screen becomes blank and the following message is displayed:

VOICE MODE REQUESTED, PICKUP HANDSET AND PRESS F1 WHEN READY

The same message is displayed when the remote K450B requests voice communication.

When the F1 key is pressed, the K450B goes on-hook (hangs-up), so the user should pick up the handset to maintain connection before pressing the F1 key. The K450B beeps at 3-second intervals while waiting for the F1 key to be pressed. If the F1 key is not pressed within 2 minutes, the K450B is automatically disconnected.

The MANUAL ORIGINATE/ANSWER Commands are used if two parties have established voice communications and desire to exchange data between two K450B Logic Analyzers. One party executes the MANUAL ORIGINATE Command, while the other party executes the MANUAL ANSWER Command before hanging up the phone. When the Modems establish the Link, a message, CONNECT, is displayed on the STATUS line of each K450B. Both parties can then hang-up their phones.

When the REMOTE ARM w/CALLBACK Command is executed, the remote K450B is armed and both K450B Logic Analyzers are disconnected. The remote K450B is in CALLBACK Mode while the acquisition is in process. The message, PRESS F1 TO CANCEL CALLBACK, is displayed on line 2 of the remote K450B screen. During CALLBACK Mode, the keyboard is locked, except for the F1 key.

When the remote K450B data transfer is complete, the remote K450B dials the callback number and attempts to make a connection. If this is unsuccessful after five retries, the message, CALLBACK FAILED 4 RETRIES EXCEEDED, is displayed on line 2 of the screen. The remote K450B then sets Bit 3 of the GPIB Status Byte and returns to normal operation.

CONVENTIONS FOR RECORD SYNTAX

The Equal Symbol (=) must be inserted between the RANGE INDEX and DATA fields for Input/Output records. All records must end with an End-of- Line (EOL) character.

The following symbols are used in the syntax:

SYMBOL	DESCRIPTION
,	Comma is a string delimiter which separates data fields in the entry (e.g., User Name and Phone Number in Directory entry).
{ }	Braces indicate required entries. (The braces are not entered.)
( )	Parenthesis enclose a required field when the specified entry is sent. (Parenthesis must be entered.)
NA	N/A means Not Applicable when it appears under a heading in a record type.
<A/B>	Memories A or B can be selected for setup data by prefixing the letter, A or B. If omitted, Memory M is used.

A superscript number outside an entry enclosed in braces indicates the number of times the selected entry will be sent. The total amount of entries consist of a combination of desired entries.

I/O COMMAND SYNTAX

This section describes the syntax for I/O Commands used with the TeleDiagnosis communications feature. The following commands are presented :

- AUTO DIAL SELECT

- CALLBACK COMMAND

- CALLBACK SELECT

- PHONE DIRECTORY

- SWITCH TO VOICE COMMAND

- USER/DEVICE IDENTIFICATION

Each command is presented on a separate page for ease of location by the reader.

AUTO DIAL SELECT

Syntax

MEMORY	SELECT	RECORD ID	RANGE	INDEX	DATA
NA		DN	NA	= {0-8}	EOL

The data choice specifies the Phone Directory entry for the AUTO DIAL command.

CALLBACK COMMAND

Syntax

MEMORY SELECT	RECORD ID	RANGE	INDEX	DATA	38
NA	DI	NA		= ALPHA NUMERIC	EOL

The data choice is 38 characters representing the User Name (eight characters) and Phone Number (30 characters) for the local K450B to dial after completion of the data transfer.

On receipt of a CALLBACK COMMAND input record, the K450B disconnects the modem and pauses until the data transfer is complete. After data transfer, the K450B dials the CALLBACK COMMAND and attempts to make a connection. If this is unsuccessful after five retries, the K450B sets Bit 3 of the GPIB Status Byte. An example is:

(Host to K450B) QQ = A

(Remote K450B starts acquisition))

(Host to K450B) DI = GOULD T14089886800

(K450B disconnects / Waits for end of data transfer/ Dials 1-408-988-6800)

CALLBACK SELECT

Syntax

MEMORY	SELECT	RECORD ID	RANGE	INDEX	DATA
NA		DB	NA	= {0-8}	EOL

The data choice specifies the Phone Directory entry for the REMOTE ARM w/CALLBACK command.

PHONE DIRECTORY

Syntax

MEMORY	SELECT	RECORD ID	RANGE	INDEX	DATA	38
NA	DD		(0-8)		= ALPHA NUMERIC	EOL

The data choice has 38 characters representing the User Name (eight characters) and Phone Number (30 characters) for each directory entry numbered 0 through 8. An example is:

DD (0) = GOULD T1,4089886800

(Use tone dialing /dial 1 / pause 2 seconds / dial 4089886800)

SWITCH TO VOICE COMMAND

Syntax

MEMORY	SELECT	RECORD	ID	RANGE	INDEX	DATA
NA		DV	NA			EOL

This command tells the receiving K450B that Voice Mode is requested.

USER/DEVICE IDENTIFICATION

Syntax

MEMORY SELECT	RECORD ID	RANGE	INDEX	DATA	8
NA	SI	NA		= ALPHA NUMERIC	EOL

The data choice has eight characters for the USER/DEVICE IDENTIFICATION. This identification is the User Name in the Phone Directory for entry 0. An example is:

SI = GOULDDTD