HEWLETT PACKARD

Systems Modem On-Line Diagnostic

Reference Manual

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PRINTING HISTORY

The Printing History below identifies the Edition of this Manual and any Updates that are included. Periodically, Update packages are distributed which contain replacement pages to be merged into the manual, including an updated copy of this Printing History page. Also, the update may contain write-in instructions.

Each reprinting of this manual will incorporate all past Updates, however, no new information will be added. Thus, the reprinted copy will be identical in content to prior printings of the same edition with its user-inserted update information. New editions of this manual will contain new information, as well as all Updates.

To determine what software manual edition and update is compatible with your current software revision code, refer to the appropriate Software Numbering Catalog, Software Product Catalog, or Diagnostic Configurator Manual.

First Edition ..... Jan 1983
Second Edition ..... Dec 1983

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Chapter 1
INTRODUCTION

The Systems Modem Diagnostic is part of the HP 24398A and 24398B diagnostic packages which are sets of diagnostic and verification programs. The HP 24398A and HP 24398B, respectively, are for the HP 1000 L-Series with XL memory and HP 1000 A-Series computers and peripheral devices.

This reference manual covers the use and application of the diagnostic for the HP 12040B Multiplexer (MUX) Subsystem under RTE-XL and RTE-A. This subsystem can be used as a diagnostic and verification of the HP 37213A Modem Card that is used in the HP 37214A Systems Modem Panel and the HP 37222A Modem Card.

The stand-alone diagnostic is run under the control of a pre-generated RTE-XL or RTE-A Operating System included in the 24398A/B software and manual material list.

Chapter 2
MEDIA CONFIGURATION

The 24398A/B product, including the MUX diagnostics, is available on 2645/48 Display Terminal minicartridge tapes, flexible discs, magnetic tape (24398B only), and integrated cartridge tapes for the following CS/80 disc drives: 7908/11/12/14 disc drives.

Required Hardware

1. An L-Series computer with XL memory or A-Series computer.

2. A diagnostic input device.

3. A Virtual Control Panel (VCP) Interface:

   a. 12005A/B Asynchronous Serial Interface, or 12007A/12044A HDLC Interface Card connected to a 26xx Display Terminal.

   b. 12040B MUX Interface Card connected to a 37214A Systems Modem and a 26xx Display Terminal connected to port 0 of this Systems Modem.

4. 12040B MUX Interface Card connected to a 37214A Systems Modem, if VCP terminal is connected to 12005A/B or 12007A/12044A.

5. 37214A Systems Modem with one or more 37213A Modem cards or a 37222A Modem Card.

6. A minimum of 64k words of memory.

Required Software

The software to run the diagnostics is available in a choice of the following media options: flexible disc, 264x Display Terminal minicartridge tape, CS/80 disc drive integrated cartridge tape, and magnetic tape (24398B only). The part numbers for both the L- and A- Series are given below:

Media	24398A (L-Series)	24398B (A-Series)	
		ASIC as VCP	MUX as VCP
3.5" Flexible Disc	NA	24398-13417	24398-13425
5.25" Flexible Disc	24398-13406	24398-13411	24398-13422
8" Flexible Disc	24398-13401	24398-13407	24398-13419
Minicartridge (Terminal)	24398-13335	24398-13337	NA
Cartridge Tape (Disc Drive)	24398-13301	24398-13318 or 02196-13301*	24398-13318 or 02196-13301*
1600 BPI Magnetic Tape	NA	24398-13501	24309-13501

* Supplied with CS/80 disc based systems.

Chapter 3
LOADING

The diagnostic, TESTM, is a stand-alone RTE-XL or RTE-A system and can be loaded as an absolute program using the appropriate Loader ROM for the diagnostic media selected.

Configuration With VCP

The configuration procedure is as follows:

1. Turn off the power to the computer and terminal.

2. Set the processor card switches to enter the VCP routine on power-up:

Processor Switch U1 No.	--	1	2	3	4	5	6	7	8
Setting	--	1	0	0	0	0	0	0	1

   where 1 = open (up) and 0 = closed (down).

3. If the diagnostic is to be loaded into memory from minicartridge tape, skip to step 4. If the diagnostic is to be loaded into memory from flexible disc or CS/80 integrated cartridge tape, set the U1 switches on the HP 12009A HP-IB Interface that is connected to the flexible disc drive unit as follows (U1 is the switch pack facing the rear of the computer card cage):

HP 12009A Switch U1 No.	--	1	2	3	4	5	6	7	8
Setting	--	1	0	0	1	0	1	1	1

   where 1 = open (up) and 0 = closed (down).

   Set the HP-IB address for the HP-IB Interface with the U16 switches S4 through S8 (U16 is the switch pack facing the side of the computer card cage). S4 is the most significant bit (msb) and S8 is the least significant bit (lsb). Identify the switches with the labels on U16, not on the card.

   Attach the flexible disc drive unit to the HP 12009A HP-IB Interface using an HP-IB cable. Note the flexible disc drive HP-IB address and unit number. These numbers are required for the boot command string.

   The HP-IB card must have the correct load resistors installed for the HP-IB devices attached to the card. Refer to the HP 12009A HP-IB Interface Reference Manual (part no. 12009-90001).

4. If the diagnostic is to be loaded into memory from minicartridge tape, set the U1 switches on the HP 12005A/B Interface that is connected to the minicartridge tape input device as follows (U1 is the switch pack which faces the rear of the computer card cage):

```
HP 12005A/B Switch U1 No. -- 1  2  3  4  5  6  7  8
Setting                   -- x  0  0  1  0  0  0  0
```

where x = 0 if VCP
x = 1 if not VCP
1 = open (up)
0 = closed (down)

5. MUX (12040B) Card or 37222A Modem Card Switches:

```
Switch No.              -- 1  2  3  4  5  6  7  8
Setting (L-Series)      -- x  0  0  1  0  0  0  1
        (A-Series)      -- x  0  0  1  0  0  1  1
```

where x = 0 if VCP
x = 1 if not VCP
1 = open (up)
2 = closed (down)

Loading The Diagnostic

To load the diagnostic into memory, first turn on the power to the terminal, then to the computer and tape drive, if used. The diagnostic assumes the computer and terminal self-tests have passed.

NOTE

The bootable diagnostic file name is TESTM when the ASIC card is used as VCP and TESTMM when the MUX card is used as VCP. If the diagnostic is booted via the MUX, drop the final "M" when running the program; for example, use RU,TESTM and not RU,TESTMM.

Load the diagnostic from the specified input device as follows:

Booting from Minicartridge Tape

NOTE

The diagnostic cannot be booted from minicartridge tape when the VCP terminal is connected to port 0 of the MUX card. In order to boot the diagnostic from minicartridge tape, connect the VCP terminal to a 12005A/B ASIC card.

1. Insert the minicartridge tape into the left tape unit of an HP 264X terminal.

2. Hit the break key to get the VCP prompt, then enter the following VCP command:

   VCP>%BCT10020 (for terminal connected to ASIC card with select code 20B.)

   If loading from the right tape drive unit enter %BCT10120.

The diagnostic will be loaded into memory. During execution all the test messages will be printed on the console for operator reference.

Booting from Flexible Disc

This procedure only works for those diagnostics on flexible disc with revision code 2340 or later.

8-inch Floppy

1. Insert the 8-inch floppy into the left or right disc drive unit.

2. Hit the break key to get the VCP prompt, then enter the following VCP command:

   VCP>%BDCbuscfile

   where:

   b - the HP-IB address of the flexible disc drive unit (0-7).
   u - the flexible disc drive unit number:
   0 - if the floppy is in the left disc drive unit or if there is only one disc drive unit.
   1 - if the floppy is in the right disc drive unit.
   sc - the octal select code of the HP 12009A HP-IB interface to which the flexible disc drive is connected.
   file - name of the diagnostic to be loaded:
   TESTM - for terminal connected to ASIC card.
   TESTMM - for terminal connected to port 0 of MUX card.

The diagnostic will be loaded into memory. During execution all the test messages will be printed on the console for operator reference.

5.25-inch Minifloppy and 3.5-inch Microfloppy

1. Insert the minifloppy or microfloppy into the left or right disc drive unit.

2. Hit the break key to get the VCP prompt, then enter the following VCP command:

```
VCP>%BDCffbusc
```

where:

```
ff - file number (=2 for TESTM and TESTMM.)
b  - the HP-IB address of the flexible disc drive unit (0-7).
u  - the flexible disc drive unit number:
        0 if the floppy is in the left disc drive unit or if there is
          only one disc drive unit.
        1 if the floppy is in the right disc drive unit.
sc - the octal select code of the HP 12009A HP-IB interface to which
     the flexible disc drive is connected.
```

The diagnostic will be loaded into memory. During execution all the test messages will be printed on the console for operator reference.

Booting from CS/80 Cartridge Tape

1. Insert the CS/80 cartridge tape into the cartridge tape drive.

2. Hit the break key to get the VCP prompt, then enter the following VCP command:

```
VCP>%BDCffbusc
```

where:

```
ff - file number.
      Diagnostic on 24398B Diagnostic tape
       TESTM = 16B
       TESTMM = 36B
      Diagnostic on RTE-A Primary/Diag/Master
       TESTM = 32B
       TESTMM = 52B
b  - the HP-IB address of the CS/80 tape drive unit (0-7).
u  - the cartridge tape drive unit number.
sc - the octal select code of the HP 12009A HP-IB interface to which
     the disc drive is connected.
```

The diagnostic will be loaded into memory. During execution all the test messages will be printed on the console for operator reference.

Booting from Magnetic Tape

1. Mount the magnetic tape.

2. Hit the break key to get the VCP prompt, then enter the following VCP command:

```
VCP>%BMTffbusc
```

where:

```
ff - file number.
     TESTM = 10B
     TESTMM = 20B
b  - the HP-IB address of the magnetic tape drive unit (0-7).
u  - the magnetic tape drive unit number.
sc - the octal select code of the HP 12009A HP-IB interface to which
     the magnetic tape drive is connected.
```

The diagnostic will be loaded into memory. During execution all the test messages will be printed on the console for operator reference.

Booting from CS/80 Disc

1. Hit the break key to get the VCP prompt, then enter the following VCP command:

```
VCP>%BDCbuscfile
```

where:

```
b    - the HP-IB address of the CS/80 drive.
u    - the CS/80 drive unit number.
sc   - the octal select code of the HP 12009A HP-IB interface to
       which the CS/80 drive is connected.
file - name of the diagnostic to be loaded:
       TESTM - for terminal connected to ASIC card.
       TESTMM - for terminal connected to port 0 of MUX card.
```

The diagnostic will be loaded into memory. During execution all the test messages will be printed on the console for operator reference.

Program Execution

Before execution of the diagnostic program it is necessary to initialize the port. Program CN must be used for this purpose since on a memory based system, only RTE is available (only disc based systems with FMGR or CI can perform the :CN command). Thus to initialize the port, enter the following run program command string:

```
:RU,CN,P1,P2,P3
```

where:

P1 = modem lu (must be 10-17).

The LUs connected to the MUX card for the system's modem are:

MUX Port	XL	VCP connected to ASIC/HDLC	VCP connected to MUX
0	10	50	1
1	11	51	51
2	12	52	52
3	13	53	53
4	14	54	54
5	15	55	55
6	16	56	56
7	17	57	57

P2 = 30B.

P3 = port configuration word (refer to IDM00 Control Request section, FNC 30B of the RTE-A or RTE-XL Driver Reference Manual).

Bits 15-14 Number of bits/char (binary code):
- 00 = 5 bits/char
- 01 = 7 bits/char
- 10 = 6 bits/char
- 11 = 8 bits/char

Bit 13 Set to 1 (specifies modem port).

Bit 12 Baud rate generator used for MUX:
- 1 for gen. #1 or
- 0 for gen. #0.

Refer to the 12040B Installation Manual for cable connection that determines this number.

Bits 11-10 Number of stop bits:

All data transfers to and from the interface card require a delay between each character. For all asynchronous transfers there is always at least one stop bit.

00 = reserved
01 = 1 bit
10 = 1-1/2 bits
11 = 2 bits

Bits 9-8 Parity select:
00 = none
01 = odd
10 = none
11 = even

Bit 7 ENQ/ACK handshake: 1 = enable; 0 = disable.

Bits 6-3 BAUD rate:

00 = no change	10 = 1800
01 = 50	11 = 2400
02 = 75	12 = 4800
03 = 110	13 = 9600
04 = 134.5	14 = 19200
05 = 150	15 = reserved
06 = 300	16 = reserved
07 = 1200	17 = reserved

NOTE

All ports on a Baud Rate Generator must be initialized to the same baud rate. The user should be certain that all ports have their baud rate set using this function, regardless of the baud rate at which the terminal is strapped. In addition, 19200 baud is not supported on 8 channels simultaneously since it would exceed the maximum throughput of the card (78600 baud). A baud rate parameter of zero will not change any of the port's parameters (baud rate, parity, stop bits, etc.)

Bits 2-0 Port number must be 0-6 (port 7 is control card) in binary:

000 = port 0
001 = port 1
010 = port 2
011 = port 3
100 = port 4
101 = port 5
110 = port 6

For example: :RU,CN,12,30B,172072B

will initialize LU 12, port 2 to 8 bits/char, modem port, BRG 1, 1 stop bit, no parity, no ENQ/ACK, 1200 Baud.

After the port has been initialized, then TESTM can be executed.

:RU,TESTM,LOGLU,LOCSC,LOCCP,#TEST,IOPT,REMNO,LOCNO

where:

LOGLU = Log Device (Default = Terminal).

LOCSC = Local Modem Select Code; i.e., MUX card select code, (end with B for octal).

LOCCP = Local Modem Card Cage Port (Default = 0).

#TEST = Number of Tests (Default = 1).

IOPT = Run Option (Default = 0).

iopt = 0 for test 1 high-speed local analog loop, and test 2 for low-speed local analog loop.

iopt = 1 for test 1 high-speed local analog loop, test 2 low-speed local analog loop, and test 3 remote digital loop.

REMNO = Remote Telephone Number*

LOCNO = Local Telephone Number*

* Add prefix "P" for pulsed (dial) telephones or "T" for Touch-Tone (A Registered Trademark of the American Telephone and Telegraph Co.).

***Note:** If using the 37222A Modem Card, it must be configured as port 0, for example (test option 1 for 37222A):*

```
:RU,CN,10,30B,172070B

:RU,TESTM,1,21B,0,1,0
```

The following applies to verifying the 37213A Modem Card which plugs into the 37214A Systems Modem Panel:

If the standard MUX cable is used, i.e., port 0 on BRG 0 and ports 1-7 on BRG 1, then it is mandatory to initialize one of ports 1-6 first before initializing port 0. The reason for this is that the firmware uses port 7 to communicate to the Systems Modem Controller at 1200 baud which will be activated when one of ports 1-6 is initialized with bit 13 set. Refer to the "Examples of Diagnostic Testing" section for an actual sample execution of TESTM.

If you cannot get TESTM to run, execute the self-test and status requests directly on the 37214A Systems Modem Controller as follows:

1. Power off the 37214A Modem Card Cage.
2. Connect a terminal (such as a 264X or 262X) to the diagnostic port (the upper port) directly on the 37214A Systems Modem Controller card.
3. Set the baud rate on the terminal to 2400, CAPS LOCK on.
4. Power on the 37214A Modem Card Cage.
5. Press RETURN.
6. The prompt character ">" should immediately appear.
7. Type in Z and hit RETURN. This will invoke the self-test.
8. The date code of the firmware and the letter "P" will indicate successful completion of the self-test, e.g. of steps 5-8:

```
>Z
Th 2 Sep 1982
P
>
```

9. To display the status of all ports type in "?N".
10. Successful completion of these two tests indicates that the Modem Controller card is good.

Test Information Messages

Test information messages that may be returned to the console are the following:

LOCAL ANALOG LOOP TEST	begin local analog loop test
passed Tx Rx test .. U,L	passed local loop test (low speed)
passed Tx Rx test .. U,H	passed local loop test (high speed)
REMOTE DIGITAL LOOP TEST	begin remote digital loop test
passed Tx Rx test .. V,H	passed remote loop test (high speed low speed test N.A.)
PASSED ALL TESTS	tests successfully completed

Examples of Diagnostic Testing

1. Example of test option 0 (local analog loop test) with MUX select code = 21B, 37213A Modem card in port 2, and the test executed once.

```
:RU,CN,12,30B,172072B
:RU,TESTM,1,21B,2,1,0
running TESTM
TESTM  .. 37213A MODEM DIAGNOSTIC AND VERIFICATION PROGRAM

LU  12 DRIVER RESPONSE RECONFIGURED (CONTROL 33B)
OLD CONFIGURATION 000000B     NEW CONFIGURATION 122500B
(REFER TO DRIVER IDM00, CONTROL 33B IN DRIVER REFERENCE MANUAL)

LU  12 TIMEOUT CHANGED TO 100 msec

LOCAL  ANALOG LOOP  TEST LU  12 TRANSMITTED  177377B RECEIVED  177377B
passed Tx Rx  test ..  U,H LU 12 TRANSMITTED  177377B RECEIVED 177377B
passed Tx Rx test .. U,L PASSED ALL TESTS
```

2. Example of test option 1 (local & remote loopback) with MUX in select code 21B, 37213A Modem card in port 2, execute test once, local phone (touch tone) number 3360, and remote phone number 996-2178.

```
:RU,CN,12,30B,172072B
:RU,TESTM,1,21B,2,1,1,T9962178,T3360
running TESTM
TESTM  .. 37213A MODEM DIAGNOSTIC AND VERIFICATION PROGRAM

LU  12 DRIVER RESPONSE RECONFIGURED (CONTROL 33B)
OLD CONFIGURATION 000000B     NEW CONFIGURATION 122500B
(REFER TO DRIVER IDM00, CONTROL 33B IN DRIVER REFERENCE MANUAL)

LU  12 TIMEOUT CHANGED TO 100 msec

LOCAL ANALOG LOOP TEST
LU  12 TRANSMITTED 177377B     RECEIVED 177377B
passed Tx Rx test .. U,H
LU  12 TRANSMITTED 177377B     RECEIVED 177377B
passed Tx Rx test .. U,L
REMOTE DIGITAL LOOP TEST

LU  12 TRANSMITTED 177377B     RECEIVED 177377B
passed Tx Rx test .. V,H

PASSED ALL TESTS
```

3. Example of test option 0, testing 37213A Modem card in port 0. If using the standard MUX cable, one of ports 1-6 must be initialized first.

```
:RU,CN,11,30B,172071B
:RU,CN,10,30B,162070B
:RU,TESTM,1,21B,0,1,0
running TESTM
TESTM  .. 37213A MODEM DIAGNOSTIC AND VERIFICATION PROGRAM

LU  10 DRIVER RESPONSE RECONFIGURED (CONTROL 33B)
OLD CONFIGURATION 000000B     NEW CONFIGURATION 122500B
(REFER TO DRIVER IDM00, CONTROL 33B IN DRIVER REFERENCE MANUAL)

LU  10 TIMEOUT CHANGED TO 100 msec

LOCAL ANALOG LOOP TEST LU 10 TRANSMITTED  177377B RECEIVED 177377B
passed Tx Rx test .. U,H LU 10 TRANSMITTED  177377B RECEIVED 177377B
passed Tx Rx test .. U,L PASSED ALL TESTS
```

Test Error Messages

The following Test Error Messages may be returned to the console:

BAD PARAMETERS	illegal runstring parameters
BAD TRANSMISSION	a transmission error has occurred between the modem controller and a modem
ERRORS - SEE LOG DEVICE	see log device for system errors
EXEC CALL ERROR DURING TX/RX TEST	EXEC call error during a transmit or receive
EXEC ERROR ON STATUS REQUEST ...	EXEC call error on status request
EXEC ERROR !	error occurred on an EXEC call
failed to auto answer	remote modem did not answer
failed to disable loop tests .. U,H	cannot disable loopback test
failed to disconnect line	couldn't disconnect line after completing tests
failed to enable loop test U,H	unable to initiate high speed local loopback test
failed to enable loop test .. U,L	cannot enable low speed, local loopback test
failed Tx Rx test .. U,H	high speed local loopback failed
modem not present	remote modem not present
NO LU FOUND	lu at specified port & SC does not exist
NOT ENOUGH PARAMETERS	insufficient runstring parameters
PORT NOT CONFIGURED AS MODEM	port specified is not initialized as a modem lu

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LOADING YOUR 24389B DIAGNOSTICS FROM MAGNETIC TAPE (OPTION 051) (24398-90006)

To load the diagnostics from magnetic tape into memory, first turn on the power to the terminal, then to the computer and tape drive. Self test for the computer and terminal must have passed before the diagnostics can operate correctly. Mount the tape (24398-13501) on the tape drive; press LOAD and ON-LINE. While in VCP mode use the following boot string to bring the selected diagnostic into memory.

%BMTffbusc

Where:

ff = 0 for EXR1 diagnostic (CS/80 external exerciser diagnostic)
ff = 2 for TAPE diagnostic (CS/80 tape exerciser)
ff = 4 for OPER diagnostic (operator designed CS/80 program set)
ff = 6 for MTVER diagnostic (7970E HP-IB magnetic tape verifier)
ff = 10 for DIAG diagnostic (HP-IB disc diagnostic)
ff = 12 for ERT diagnostic (HP-IB disc error rate test)
ff = 14 for DISCZ diagnostic (HP-IB disc analyzer)
ff = 16 for TESTM diagnostic (modem diagnostic)

b = HP-IB address of the magnetic tape drive

u = magnetic tape drive unit number

sc = select code for 12009A card connected to magnetic tape drive

Refer to the appropriate 24398B diagnostic manual for operation for the selected diagnostic.

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