

Addendum
to
CC-432
User's Manual

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ADDENDUM TO THE CC-432 USER'S MANUAL

This addendum provides instructions for building a loopback plug so the board does not need to be modified to run the C432TEST diagnostic. This addendum also corrects information regarding hardware interrupt lines. Please replace the original pages with the updated pages from this addendum as follows:

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iii through vi
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SECTION 5

THE C432TEST DIAGNOSTIC

C432TEST is a standalone diagnostic for the AST Research CC-432 communication board. C432TEST tests the board by looping transmitted data back to the board's receiver through an external synchronous modem or a loopback plug. C432TEST checks the Data Carrier Detect (DCD) signal, but does not check Clear To Send (CTS) or Data Set Ready (DSR). This section tells you how to use the C432TEST.COM diagnostic with the AST Research CC-432 advanced communication board (up to and including board revision level C).

5.1 Hardware Requirements

The C432TEST diagnostic requires the following hardware:

1. An IBM PC or PC-XT with one disk drive and a minimum of 64 KB of system memory.
2. An AST Research CC-432 advanced communication board.
3. A synchronous modem with the digital loopback feature (the Universal Data Systems 208A/B, for example) or A loopback plug (included with all AST Research communications packages that use the CC-432 board); you can also order the loopback plug individually (AST Research part number 202034-001); Section 5 tells you how to build your own loopback plug.

5.2 Software Requirements

The C432TEST diagnostic requires the following software:

1. An IBM Disk Operating System (DOS) diskette (version 1.1 or later).
2. An AST Research C432TEST.COM diskette; if your CC-432 board is part of an AST Research communications package, the C432TEST.COM program is included on its software diskette.

5.3 Setup

This section shows you how to build your own loopback plug if you do not have a synchronous modem with an digital loopback feature. You do not need to modify the board from its normal operational configuration to run the C432TEST diagnostic. You can use the loopback plug that was shipped with your CC-432 board or you can build your own.

5.3.1 Loopback Plug Configuration

All AST Research communications packages that use the CC-432 board include a loopback plug. You can order the loopback plug separately (AST Research part number 202034-002), or you can build your own according to the instructions in this topic. The loopback plug can substitute for a synchronous modem with the digital loopback feature. To build your own loopback plug, use a standard DB-255 female connector. Jumper its pins as follows:

1. Connect pin 2 to pin 3.
2. Connect pin 8 to pin 20.
3. Connect pin 15 to pin 17 to pin 24.

5.3.2 Install the Modem or Loopback Plug

Install your CC-432 board into your PC, then install the modem or loopback plug onto the board's J1 connector. Section 3 of this manual tells you how to install the board. Now you are ready to run the C432TEST diagnostic.

5.4 Diagnostic Operation

Once you have configured and installed the CC-432 board and the modem or loopback plug, you are ready to run the C432TEST diagnostic.

NOTE

It is very important to back up your AST C432TEST master diskette right away! That way you still have the master diskette to work with if your backup diskette is damaged.

CAUTION

No other background interrupt processing programs such as keyboard enhancement programs may be executed concurrently with the C432TEST diagnostic. Timing loop failures and subsequent error messages may result if the interrupt processing time of these programs is too great.

Load the C432TEST diagnostic as follows:

1. Boot up your PC with a DOS (version 1.1 or later) diskette.
2. Insert the AST diskette that contains the C432TEST.COM program into a diskette drive. Enter this command to load the diagnostic:

A>x:C432TEST<Enter>

where **A>** is the default drive, **x:** is the drive that contains the C432TEST diskette, and **<Enter>** is the Carriage Return (CR) key.

Once the diagnostic is loaded, the PC screen looks like this:

```
AST Research, Inc.  
CC432 Board Modem Loop-back Test  
Version U1.10  
To run this test:  
  - Set board address to 300  
  - Set interrupt request to line 2  
  - Set local or remote modem to loop-back mode  
Press CR to start or ESC to end:
```

To start the diagnostic, press the carriage return. The diagnostic will run four tests (described in Section 5.5). As each test begins, the diagnostic displays each test's title:

Running SIO register WRITE/READ test

Running INTERRUPT test

Running LOOP-BACK test in SDLC mode, NRZI disabled

Running LOOP-BASIC test in SDLC mode, NRZI enable

Once each test has completed a pass, the screen displays the number of passes and errors:

Pass = x Error = x Total Error = x

where *Pass* is the current number of test passes, *Error* is the number of errors in the most recent pass, and *Total Error* is the sum of all the errors encountered in all the passes.

The diagnostic loops through all three tests indefinitely.

If there is an error: Testing stops when an error is detected, and the screen displays an error message (Subsection 5.6 explains the error messages).

To continue testing: Press the carriage return key to continue testing after an error is detected.

To stop testing: Press the <Esc> key then <Enter> key ; this aborts the current test and returns control to the C432TEST instruction menu. Press the <Esc> key again to go from the diagnostic instruction menu to the DOS prompt.

5.5 Test Descriptions

This section describes the four C432TEST diagnostic tests.

5.5.1 SIO Register Write/Read Test

This test verifies the CC-432 board's address decode and enable, I/O read/write, and Send Input/Output (SIO) chip select. The test writes SIO channel B, register 2, with several data patterns (55, AA, FF, and 00), then reads and verifies the data.

5.5.2 SIO Interrupt Test

This test checks for correct interrupt operation, and ignores any data transmissions to the line. The test initializes SIO channel A to transmit with its interrupt turned on. The test then loads a character into SIO channel A to generate an interrupt. If the PC system board receives the interrupt, the test sends an abort to the SIO to stop further interrupts. Otherwise, the SIO times out and an error message is displayed.

To prevent a system "crash", this test traps any interrupt requests other than those tested. Once the test is complete or aborted, the interrupt vectors are restored to normal.

5.5.3 SDLC Loopback Tests

This test checks the SIO chip's operation and verifies the integrity of the communication line in both non return to zero inverted (NRZI) disable and enable mode. To run this test successfully, you must install a modem with loopback or a loopback plug on the CC-432 board's J1 connector.

If you are using a Universal Systems 208 A/B synchronous modem, or another synchronous modem with digital loopback, configure your CC-432 board as follows:

1. Install a shorting plug at positions 2, 4, and 8.
2. Install a shorting plug at position 4800 on the baud rate jumper block.
3. Set your modem to digital loopback mode.

The test initializes the SIO to transmit and receive in synchronous data link control (SDLC) mode, and enables the SIO's transmitter and receiver interrupts. The test then sends and receives a message of about 201 characters; data received is compared to data sent. The test checks the DCD signal, and checks for cyclic redundancy check (CRC) and overrun errors.

5.6 Error Messages

This subsection explains the error messages that your PC displays if the C432TEST diagnostic detects an error.

Register Write/Read, Expected = 00xx Actual = 00xx
Data read from the SIO register (the "actual" value) was not the same as data written (the "expected" value). Possible cause: incorrect switch setting for board address (check DIP switch S1).

NOTE

Occasionally switches become dirty and do not make the proper connections. If the switch does not seem to set the address correctly, flip it back and forth a few times.

No interrupt, Time-out

Explanation: Interrupt not received at all. IRQ line not selected.

Action: Check DIP switch S1.

Wrong Interrupt Vector

Explanation: Interrupt received at incorrect interrupt location. Incorrect switch setting for IRQ line.

Action: Check DIP switch S1.

Unexpected interrupt

Explanation: Interrupt received when SIO was not enabled for interrupt. Possibly caused by a defective SIO chip, or another board in the PC using the same interrupt line (IRQ2).

Action: Check for an IRQ conflict then replace the SIO chip.

Lost DCD

Explanation: Data carrier detect signal was not active. Possibly caused by defective RS-232C drivers, defective loopback plug, or defective modem loopback.

Action: Replace the defective items one-by-one until you find the defective part.

Parity/Overrun

Explanation: SIO status register indicates a parity or overrun error. Possibly caused by a defective SIO chip or baud rate faster than 19.2K.

Action: Reset the baud rate then replace the defective SIO chip.

Data Mismatched

Explanation: Data received by the SIO was not compared with the data transmitted after the correct number of characters were received. Possibly caused by a defective SIO chip or RS-232C drivers.

Action: Replace the defective items.

CRC

Explanation: A Cyclic Redundancy Check (CRC) error was set in the SIO register. Possibly caused by a defective SIO chip or RS-232C drivers.

Action: Replace the defective items.

Receiving Incomplete, Timeout

Explanation: SIO received too few or no data characters after the transmitter was disabled. Possibly caused by a defective SIO chip.

Action: Replace the defective chip.

No. of bytes received greater than transmitted

Explanation: SIO still received data characters after the transmitter was disabled. Possibly caused by a defective SIO chip.

Action: Replace the defective chip.

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APPENDIX B

HARDWARE INTERRUPT LINES

Appendix B gives the standard IBM-assigned hardware interrupt listing for the IBM PC. To avoid conflicts with installed devices, do not use their corresponding interrupt lines.

NOTE

AST Research communications packages normally use IRQ2. Consult your user's manual for information on other available interrupt options where applicable.

Only **one** IRQ switch position (positions 3 through 8 on DIP switch S1) on the CC-432 can be ON at any time.

IRQ Line	Application
NMI*	Parity
0	Timer
1	Keyboard
2	Reserved
3	Asynchronous Communications (COM2) IBM SDLC communications products IBM BSC (secondary) products Non-IBM hard disks (standard)
4	Asynchronous Communications (COM1) IBM SDLC communications products IBM BSC (primary) products
5	IBM fixed disk
6	Diskette adaptor board
7	Printer

*Non Maskable Interrupt

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