

TT

**Field Diagnostics
ver 1.4**

TT030 FIELD DIAGNOSTICS

OVERVIEW

The TT030® Diagnostic Cartridge is used to detect and isolate component failures in the TT030 computers. This document refers to revision 1.4. Users of earlier versions should refer to the appropriate Troubleshooting Guide. This section gives a brief guide to use with a description of each test, error codes or pass/fail criteria, and recommendations on repair.

POWER-UP

With the power switch off, install the Diagnostic Cartridge with the label facing up.

IMPORTANT--IF THE CARTRIDGE DOES NOT HAVE THE PLASTIC ENCLOSURE, BE SURE THE CARTRIDGE IS INSTALLED WITH THE CHIPS FACING DOWN).

Power on the unit. The diagnostic program performs several tests on power-up. The screen will appear scrambled for a few seconds and several messages will be displayed before the menu is printed. These messages are provided to help troubleshooting in case the system crashes during initialization without displaying an error code. The messages are "Hello World", "STr RAM Size Checked", "Looking for VME RAM", "No VME RAM", "Looking for FPU", and "Checking Bus Error Handling". The screen will turn red (dark background in monochrome) if an error occurs in the initial testing, with a message indicating the failure.

The lowest 2 Kbytes of RAM is tested on power-up; if a location fails, the error will be printed to the RS-232 device. It is assumed that if RAM is failing, the screen may not be readable and program execution will fail because there is no stack or system variables. The program will continue to test RAM and print errors, but no screen will be displayed (the screen may turn red). Repair RAM. TOS ROM wait states are tested at power up and during the ROM diagnostic. If the wait state test fails an error will be displayed and the screen will turn red. Three failures can occur at power up and during the ROM test.

They are (1) the bit in MCU used to toggle wait states to zero could not be set, (2) the bit in MCU was set but the time to read the TOS ROM remained the same, and (3) the ROM failed the checksum before or after the wait states were changed. If any of these failures occur replace the MCU or TOS ROMs and power up the unit again.

If the keyboard fails, it will be inactivated. The user must connect a terminal to the RS-232 port. The diagnostic program looks for keystrokes from the RS-232 device. If the display is unreadable, the RS-232 terminal should be used. All messages are printed to the RS-232 port as well as the screen.

POWER-UP INITIALIZATION ERRORS

The TT030 Diagnostic Cartridge is used to detect and isolate component failures in the TT030 computers. This document refers to revision 1.3. Users of earlier versions should refer to the appropriate Troubleshooting Guide. This section gives a brief guide to use with a description of each test, error codes or pass/fail criteria, and recommendations on repair.

INITIALIZATION (ERRORS OCCURRING BEFORE THE TITLE AND MENU APPEAR.)

- I1 RAM data line is stuck.
- I2 RAM disturbance. Location is altered by write to another location.
- I3 RAM addressing. Wrong location is being addressed.
- I4 MMU error. No DSACK after RAM access.
- I5 RAM sizing error. Uppermost address fails.
- I6 Bus Error handling failed. Bus Error occurred (on purpose), but caused a crash (e.g. system was unable to read the vector from RAM).
- I7 Bus Error not detected. PAL U112 not asserting Bus Error or the signal is not reaching the 68030.
- T0 MFP timers failed.
- T1 Vertical sync timing failed.

- T2 Horizontal sync timing failed.
- T3 Display Enable Interrupt failed.
- T4 Memory Controller video address counter failed.
- T5 PSG Bus test. PSG chip is causing a bus error by staying on the data bus too long.
- T6 Floppy Disk Controller Bus test. FDC chip is causing a bus error by staying on the data bus too long.
- K0 Stuck key
- K1 Keyboard controller is not responding.
- X2 Keyboard controller reports error.

TEST MENU

The normal screen will be dark blue with white letters. The test title and revision number are displayed at the top, with the amount of RAM and keyboard controller revision below, and a test menu below that. To select tests, the user types the keys corresponding to those tests, and then the RETURN key. After the operator selects a test, the program will not proceed until the key break is detected (when the operator releases the key).

TT Field Service Diagnostic Test Rev. 1.4

(c) 1991, Atari Corp.

4M ST RAM

Keyboard revision 2

4M TT RAM

TOS Version 3.1 USA

R RAM Test	O O.S. ROM	C Color
K Keyboard	M MIDI	S Serial Port
A Audio	T Timing	D DMA Port
F Floppy Disk	P Printer/Mouse/Joy Ports	H High Resolution
I SCSI Bus	J SCC	L Real-Time Clock
V VME		

Q Run Auto Mode Long (R,O,L,T,F,I,V,M,D,P,S,J)

Z Run Unattended Internal tests (R,O,L,T,F,I,V)

E Examine/Modify memory

B Set RS232 rate

? Help

Enter Letter(s), and Return

The RAM size, keyboard revision, O.S. version, and country (or language) are shown. The 'Q' selection sequences through all the tests except for Audio, Keyboard, Color, and High resolution monitor. The 'Z' selection sequences through RAM, ROM, Real-Time Clock, Timing, Floppy, SCC, and VME. Selection 'E' enables the operator to examine or modify RAM or hardware registers.

'B' enables the operator to change the baud rate on the RS-232 port. Pressing the up arrow increases it, pressing the down arrow decreases it. Multiple tests can be run at one time by typing in the tests and number of passes to run.

For example T M2 L3 V0 <ENTER> would result in the Timing test being run once, MIDI test twice, Real-Time Clock test three times, and VME indefinitely or until the <ESC> key is pressed.

After a test or series of tests completes, the pass/fail status and error report, if any, will be displayed. When the selected test(s) have passed the screen will turn green accompanied by a short beep. If the selected test(s) fails the screen will turn red accompanied by an audible tone which oscillates. This allows the user to perform other troubleshooting functions while the running diagnostics without having to look directly at the screen for an indication of a Pass or Fail status. Press the space bar to return to the menu.

If multiple tests are selected, the sequence can be halted before completion by pressing the ESC key. At the completion of the current test, the sequence will halt, with the options of either continuing or returning to the menu. In some cases there will be a considerable delay before the current test completes and the keystroke is detected.

SUMMARY OF TESTS

RAM TEST (R)

System RAM is tested in three stages: low 2 kbytes, middle (up to 64k), and from 64k to top. The test patterns used are: all 1s, all 0s, a counting pattern (data=low word of the address), reverse counting pattern (data=complement of address low word). The counting pattern is copied from the top and bottom of a 32 Kbyte buffer into the current 32 Kbytes of video RAM, then shifts video RAM to a new area, verifies the pattern, and repeats the test, until the top of RAM is reached. Finally, addressing at 64k boundaries is checked by writing unique pattern in last 256 bytes of each 64k block.

If an error occurs, the display turns red accompanied by an oscillating tone and the error code is displayed, followed by the address, data written, data read, and the bits which did not agree.

For example: " R2 45603E W:603E R:613C bad bits: 1,8".

The address as well as the bit position must be used to find the correct RAM chip.
The following table gives a correspondence between the addresses and banks:

ST RAM ON MAIN PCB (FIRST MEGABYTE):

<u>Address</u>	<u>Bad Bit(s)</u>	<u>RAM Chip</u>
0-0FFFFFF	0-3	U500
	4-7	U501
	8-11	U502
	12-15	U503
	16-19	U504
	20-23	U505
	24-27	U506
	28-31	U507

ST RAM ON MAIN PCB (SECOND MEGABYTE):

<u>Address</u>	<u>Bad Bit(s)</u>	<u>RAM Chip</u>
100000-1FFFFFF	0-3	U508
	4-7	U509
	8-11	U510
	12-15	U511
	16-19	U512
	20-23	U513
	24-27	U514
	28-31	U515

2/8 MEGABYTE STR RAM EXPANSION BOARD:

<u>LSB OF Address</u>	<u>Bad Bit(s)</u>	<u>RAM Chip</u>
0 or B	0-3	U17
	4-7	U18
	8-11	U19
	12-15	U20
2 or A	0-3	U10
	4-7	U11
	8-11	U14
	12-15	U15
4 or C	0-3	U5
	4-7	U6
	8-11	U7
	12-15	U8
6 or E	0-3	U1
	4-7	U2
	8-11	U3
	12-15	U4

4/16 MEGABYTE TT RAM EXPANSION BOARD

<u>LSB OF Address</u>	<u>Bad Bit(s)</u>	<u>RAM Chip</u>
0, 4, B, or C	0-7	U104
	8-15	U105
2, 6, A, or E	0-7	U102
	8-15	U103

RAM ERROR CODES

Except where noted, repair by replacing the chip corresponding to the indicated bit(s).

- R0 Error in low memory, possibly affecting program execution.
- R1 Error in chip.
- R2 Address error. Bad chip or memory controller. Address line not working.
- R3 Address error at 64k boundary.

R4 Error during video RAM test. Bad chip.

ROM TEST (O)

This test reads the configuration bytes of the operating system to determine the version and language/country. All bytes from operating system ROMs are then read and the checksums are calculated and displayed. A CRC is then calculated for each EPROM.

The test fails if the CRC calculated does not match the CRC located in the last location for each EPROM (e.g. Version 2, French). Incorrect CRCs are indicated by the display turning red and an oscillating tone followed by a message. If an error is displayed, replace the corresponding ROM.

COLOR TEST (C)

This test verifies the TTVIDEO chip. First, seven color bands are displayed: red, green, blue, cyan, magenta, yellow, and white. Each band consists of 8 levels of intensity. All 16 color palettes are represented, each palette is a vertical strip across the screen (strips should not be discernable, but each color should be a straight line across the screen). Because of the tight timing involved, keystroke interrupts will cause the display to jitter.

Second, a dark gray V shape will be displayed in the center of the screen. The background of the screen should be solid black.

Third, sixteen rows of sixteen color squares are displayed. Each row consists of 16 levels of intensity. All 256 color palettes are represented, each palette is a square on the screen.

The operator should see that there are no gaps or missing scan lines in the display. If lines are missing, check the four outputs on the TTVIDEO chip for that color, and verify the output. Too low a brightness setting on the monitor will cause the monitor not to distinguish between fine levels, making it appear there are only four levels being output.

The TTVIDEO chip has three color outputs. One for red (RED), green (GRN) and blue (BLU). Each of these outputs give 16 levels of intensity for each color, depending on which of the outputs are on.

This allows us to get 16 equal steps on the outputs. These signals then pass through a transistor amplifier, and from there to the video monitor connector.

SYMPTOMS AND FIXES:

1. Missing primary color. Check the output of the transistor amplifier. Q203 is blue, Q202 is green, Q201 is red. Look for a staircase pattern (sixteen levels of intensity). If the signal is there, trace forward to the video connector, if not, trace backward to the TTVIDEO chip, until the faulty component is found.
2. Primary colors present, secondaries missing or incorrect. Replace the TTVIDEO chip (U204).
3. Coarse change in intensity (not a smooth dark to light transition). Replace TTVIDEO chip (U204) or look for a short on the output of one of the three color outputs for the appropriate color.
4. Specks or lines on the screen. This can be caused by bad RAM; if RAM has been tested and is good, replace the TTVIDEO chip (U204).
5. Wavering display, horizontal lines not occurring in the same place every time. The probable causes for this type of failure are MCU (U206), TTVIDEO (U204), MFP (U303), or SCU (U805).

NOTE: IF THE KEYBOARD IS NOT CONNECTED, THE INPUT TO THE 6850 WILL BE LOW, CAUSING CONTINUAL INTERRUPTS.

KEYBOARD TEST (K)

Two types of test are run. The keyboard self-test is done first, and if this passes, a screen is displayed representing the keyboard. The operator presses keys and observes that the corresponding character on the screen changes (reverses background color). The key will also be displayed in the lower half of the screen. The mouse buttons and four directions are also shown on the screen. Connect the mouse and move in any direction and the arrow will flicker. Any key clicks while the mouse is moving indicates a short.

NOTE: IT IS POSSIBLE, IF PRESSING KEYS VERY RAPIDLY, TO LEAVE THE REPRESENTATION OF THE KEY ON SCREEN IN A DEPRESSED STATE. THIS DOES NOT INDICATE A PROBLEM WITH THE HARDWARE.

The self-test checks communication between the CPU and the keyboard microcomputer, and checks RAM and ROM in the keyboard microcomputer, and scans the keyboard for stuck keys.

KEYBOARD ERROR CODES

- K0 Stuck key. A key closure was detected while the keyboard self test was executing.
- K1 Keyboard not responding. A command was sent to the keyboard processor and no status was returned within the allowed time. The keyboard needs to be replaced or the communication channel through the 6850 (U301) is not functional.
- K2 Keyboard status error. The self test command was sent to the keyboard, on completion of the test, the keyboard sent an error status. Replace the keyboard.

MIDI TESTS (M) (REQUIRES MIDI LOOPBACK CABLE)

This test sends data out the MIDI port, (data loops back through the cable) and reads from the input and verifies the data is correct. This also tests the interrupt from the 6850 through the MFP chip. The LED in the loopback cable will blink as data is sent (not all cables have the LED).

MIDI ERROR CODES

- M0 Data not received. Trace the signal from the output of the 6850 (U300), through the drivers (U206), loopback cable, and receivers to the input of the 6850 (U300). Replace the defective component.
- M1 Write/Read data mismatch. The data written was not the same as the data read. Replace 6850 (U300).
- M2 Input frame error. Bad 6850 (U300) or bad driver (U206) or receiver causing noisy signal.
- M3 Input parity error. Bad 6850 (U300) or bad driver (U206) or receiver causing noisy signal.
- M4 Input data overrun. The 6850 received a byte before the previous byte was read. Probable bad 6850 (U300), also can be caused by the MFP (U303) not responding to the interrupt request.

SERIAL PORT TEST (S) (REQUIRES RS-232 LOOPBACK CONNECTORS)

NOTE: DO NOT INSTALL THE RS-232 LOOPBACK CONNECTOR UNTIL AFTER THE MAIN MENU IS DISPLAYED.

First the RS-232 control lines are tested (which are tied together by the loopback connector), then the data loopback is tested. Data is checked transmitting/receiving using a polling method first, then using interrupts.

Data is transmitted at 300, 600, 1200...19200 bps. Data transmission is performed by the MFP (U303) and the 1488 and 1489 driver and receiver chips (U307, U308). Interrupts are a function of the MFP (U303). Control lines are output by the PSG chip (U302) and input on the MFP. Note that this test does not thoroughly test the drive capability of the port. If the test passes, but the unit fails in use, it is likely that the 1488 (U307) or 1489 (U308) chips are bad.

SERIAL PORT ERROR CODES

Data transmission error:

- S0 Data not received. Check signal path: MFP (U303) pin 9 to 1488 (U307) pin 5 to J304 pin 3 to J304 pin 2 to 1489 (U308) pin 1 to MFP (U303) pin 10.
- S1 Data mismatch. Data read was not what was sent. Check integrity of the signal. May be bad driver (U307), receiver (U308), or MFP (U303).
- S2 Input frame error. Incorrect time between start and stop bits. Probable MFP failure (U303).
- S3 Input parity error. Input data had incorrect parity. Probable MFP failure (U303).
- S4 Input data overrun. A byte was received before the CPU read the previous byte. MFP failure (U303) or, less likely, MCU (U206) failure.
- S5 No IRQ. CPU did not detect an interrupt by the MFP. MFP (U303) or MCU (U206) failure.
- S6 Transmit error. MFP (U303) transmitter failed.
- S7 Transmit error interrupt. An error condition was created intentionally to cause an interrupt, and the MFP did not respond.
- S8 Receive error interrupt. An error condition was created intentionally to cause an interrupt, and the MFP did not respond.
- S9 RI/DTR connection. Signal sent at DTR is not detected at RI.
- SA DCD/DTR connection. Signal sent at DTR is not detected at DCD.
- SB RTS/CTS connection. Signal sent at RTS is not detected at CTS.
- SC RS-232 input shorted to output. The input and outputs of the MFP serial port are shorted together.

SCC TEST (J) (REQUIRES LOOPBACK CONNECTORS)

The SCC diagnostic tests the SCC chip for several functions. Internal loopback polled (asynch), break (test ext loopback), external loopback polled (asynch), modem control lines, and external loopback interrupt (asynch). Ports A, B, and D are tested in RS-232 mode, and the LAN at port A is also tested.

SCC ERROR CODES

Port A Errors:

SCC A internal loopback: Transmitter time-out Transmitter failed.

SCC A internal loopback: Receiver time-out Receiver failed.

SCC A internal loopback: Overrun A byte was received before the CPU read the previous byte.

SCC A internal loopback: Framing error Incorrect time between start and stop bits.

SCC A internal loopback: Parity error Input data had incorrect parity.

SCC A internal loopback: Data compare Data read was not what was sent.

Port A has no loopback connector The loopback connector is not installed on Port A.

LAN has no loopback connector The loopback connector is not installed on the LAN Port.

LAN ERROR: DCD IS ACTIVE WITHOUT RTS ON

The Carrier detect signal is active without a request to send.

LAN ERROR: RTS IS ACTIVE BUT DCD IS NOT RESPONDING

The request to send signal is on but no carrier is active.

Port A asynch mode: Transmitter time-out Transmitter failed.

Port A asynch mode: Receiver time-out Receiver failed.

Port A async mode: Overrun	A byte was received before the CPU read the previous byte.
Port A async mode: Framing error	Incorrect time between start and stop bits.
Port A async mode: Parity error	Input data had incorrect parity.
Port A async mode: Data compare	Data read was not what was sent.
Port A modem control error: DTR-DCD	Signal sent at DTR is not detected at DCD.
Port A modem control error: DTR-DSR	Signal sent at DTR is not detected at DSR.
Port A modem control error: RTS-CTS	Signal sent at RTS is not detected at CTS.
Port B Errors:	
SCC B internal loopback: Transmitter time-out	Transmitter failed.
SCC B internal loopback: Receiver time-out	Receiver failed.
SCC B internal loopback: Overrun	A byte was received before the CPU read the previous byte.
SCC B internal loopback: Framing error	Incorrect time between start and stop bits.
SCC B internal loopback: Parity error	Input data had incorrect parity.
SCC B internal loopback: Data compare	Data read was not what was sent.
Port B has no loopback connector	The loopback connector is not installed on Port B.
Port B async mode: Transmitter time-out	Transmitter failed.
Port B async mode: Receiver time-out	Receiver failed.
Port B async mode: Overrun	A byte was received before the CPU read the previous byte.

Port B async mode: Framing error	Incorrect time between start and stop bits.
Port B async mode: Parity error	Input data had incorrect parity.
Port B async mode: Data compare	Data read was not what was sent.
Port B modem control error: DTR-DCD	Signal sent at DTR is not detected at DCD.
Port B modem control error: DTR-DSR	Signal sent at DTR is not detected at DSR.
Port B modem control error: RTS-CTS	Signal sent at RTS is not detected at CTS.
Port D Error Codes:	
NOT ABLE TO CLEAR D PORT REGISTERS	An attempt to clear the port registers for port D failed.
Transmitter time out on D port	Transmitter failed.
Port D has no loopback connector	The loopback connector is not installed on Port B.
RECEIVE STATUS ERROR ON D PORT	Receiver failed.
DATA COMPARE ERROR ON D PORT	Data read was not what was sent.
SCC Interrupt Errors:	
SCC interrupt error: Transmitter time-out	Transmitter failed.
SCC interrupt error: Receiver time-out	Receiver failed.
SCC interrupt error: Overrun	A byte was received before the CPU read the previous byte.
SCC interrupt error: Framing error	Incorrect time between start and stop bits.
SCC interrupt error: Parity error	Input data had incorrect parity.
SCC interrupt error: Data compare	Data read was not what was sent.

No Tx interrupt

A transmit command was issued but no interrupt occurred.

No Rx interrupt

A receive command was issued but no interrupt occurred.

AUDIO TEST (A)

This test requires the operator to subjectively decide if the test passes or fails.

PSG SOUND

A sound is output on each of the three sound generator channels. The 5/8 sound is a sweep from low to high frequency. Verify that the sound can be heard throughout the range with no drop in audio level.

DMA SOUND

Connect an oscilloscope at the stereo output jacks. Set the oscilloscope to 1 ms/division and 5 volts/division. There are four parts to this test. After observing the signals in each part of the test, proceed to the next part of the test by pressing the space bar. In each case the output signal amplitude should go from 0 volts to maximum amplitude in steps. The four parts of this test are as follows:

- a. Mono 1 kHz. Both channels will output the same signal and it should approximate a sine wave of 5-6 volts in amplitude.
- b. Stereo 1 kHz/500 kHz. Verify that the right and left channels have the correct frequency. As one channel increases in amplitude, the other channel decreases. Maximum amplitude is 5-6 volts.
- c. Treble. A 12.5 kHz signal is output on both channels. Maximum amplitude is about 6 volts.
- d. Bass. a 50 kHz is output on both channels. Maximum amplitude is about 6 volts.

TIMING TESTS (T)

These tests are run at power-up as well as being selectable from the menu. The MFP timers, the MCU timing for VSYNC and HSYNC, and video display counters are tested. The video display test redirects display memory throughout RAM and verifies that the correct addresses are generated. Odd patterns may flash on screen as this test is run. There are two tests which check the bus timing for the Floppy Disk Controller and PSG chips. An error message is printed to the screen, then the test is run. If the test passes, the message is erased. If not, a Bus Error will occur and the message will remain. If a terminal is connected to the RS-232 port, the message will not be erased, but "Pass" will be printed.

TIMING TEST ERROR CODES

- T0 MFP timer error. One or more of the four timers in the MFP (U303) did not generate an interrupt on counting down .
- T1 Vertical Sync. MCU (U206) is not generating vertical sync in the required time period.
- T2 Horizontal Sync. MCU (U206) is not generating horizontal sync in the required time period.
- T3 Display Enable. MCU (U206) is not generating DE output or the MFP (U303) is not generating an interrupt.
- T4 Video Counter in Memory Controller. The MCU chip (U206) is not generating the correct addresses for the display. This will result in a broken-up display in some or all display modes.
- T5 PSG Bus Test. The PSG chip (U302) is defective.
- T6 1772 Bus Test. The Floppy Disk Controller chip (U409) is defective.

DMA TESTS (D) (REQUIRES ST DMA PORT TEST FIXTURE)

Four sectors (2048 bytes) of data are written to the RAM on the port test fixture via high speed DMA, then read back and verified. This test is repeated many times for RAM addresses throughout the range of RAM.

DMA TEST ERROR CODES

- D0 DMA time-out. No DMA occurred due to faulty DMA Controller (U408), MCU (U206), or the XHDINT interrupt was not processed by the MFP (U303). The failure can be isolated by seeing if the DMA Controller responds to HDRQ from the test fixture with ACK. Verify the MFP by seeing that the XHDINT input causes an INTR output from the MFP.
- D1 DMA count error. the number of bytes transferred was incorrect. The MCU chip (U206) or DMA Controller (U408) is bad.
- D2 Data data mismatch. The data received from the DMA port was not the same as the data sent. Replace the DMA Controller (U408). If the problem persists, check the data lines to the port for opens and shorts. A third possibility is that a defective Floppy Disk Controller (U409) is loading the bus.
- D3 DMA not responding. Replace the DMA Controller (U408).

FLOPPY DISK TESTS (F)

In single test mode, a menu is displayed showing seven options:

1. Quick test. For each disk installed, formats, writes, and reads tracks 0, 1, and 79 of side 0. If double sided, formats and writes track 79 of side 1 and verifies that side 0 was not overwritten. If no disks are installed, checks to see what drives are on-line and if they are double or single sided. To assure that the drive are correctly tested, the operator should install (menu option 7) before calling the test. Once the test is run, the drives become installed, and will be displayed on the menu screen (below the RAM size).
2. Read Alignment Disk. Continuously reads a track, for checking alignment with an analog alignment diskette. The track to be read may be input by the operator. If "Return" is pressed without entering a number, the default is track 40.
3. Disk Interchange Test. Checks to see if diskettes from two disk drives each can be read by the other disk drive.
4. Disk Exerciser. A more thorough disk test; tests all sectors on the disk for an indefinite period of time.
5. Copy protect tracks (80-82). Tests tracks 80-82, which are used by some software companies for copy protection). Not all manufacturers disk drives will write these tracks. NOTE: this test is for information only and should not be used to reject a mechanism.

6. Test Speed. The rotational speed of the drive is tested and displayed on the screen as the period of rotation. The acceptable range is 196-204 milliseconds. The highest and lowest values measured are displayed. The test stops when any key is pressed.
7. Install disk drives. Specify how many and what type of disks to test. Allows testing of 360K, 720K, and 1.44 MB drives.

One additional test which can be performed is testing the write protect detection. Slide the write protect tab to the protected position, and run test #1. You should see "F5 Write protected" displayed if the drive has been installed, or "Unable to write disk" displayed if the drive has not been installed.

If more than one test is selected from the main menu, the floppy menu will not appear, but the Quick Test will be selected automatically.

FLOPPY TEST ERROR CODES

No floppies connected

The controller cannot read index pulses. The cable may be improperly connected, or the drive has no power, or the drive is faulty.

- F0 Drive not selected. Drive was installed, but failed attempting restore (seek to track 0). Check connection of cables, power to drive. Verify the light on the front of the drive goes on. Listen for the sound of the head seeking (the slide on the diskette should open). If all this occurs, TR00 (pin 23 on the Floppy Disk Controller U409) should go low. If so, check for an interrupt on pin 28 of the Floppy Disk Controller. If none, replace the Floppy Disk Controller (U409). Else trace the interrupt to the MFP (U303), verify that the MFP responds by asserting INTR. If the drive is not being selected (no light), check the PSG chip (U302). Pin 20 should go low when drive A is selected, and pin 19 should go low when drive B is selected. If not, replace the PSG (U302).

Error Writing, Error Reading, Error Formatting

Displays a more specific error message along with one of the above message such as "Error Writing F9 CRC error".

- F4 Seek error. Verify that the STEP, MO, and DIRC outputs from the Floppy Disk Controller are sent to the drive. Probable failure in the Floppy Disk Controller (U409), but the drive is also suspect.

- F5 Write protected. Check the write protect tab on the diskette. If OK, verify that the WP input (Floppy Disk Controller U409 pin 25) is going low during the test; if it is, then the Floppy Disk Controller is defective; if not, the problem is with the disk drive.
- F6 Read compare error. Data read from the disk was not what was supposed to be written. Check in the following order: diskette, disk drive, Floppy Disk Controller (U409), and DMA Controller (U408).
- F7 DMA error. DMA Controller could not respond to a request for DMA. Replace the DMA Controller (U408). If error persists, check FDRQ while running the test. It should normally be low and go high with each data byte transferred. If stuck high, push the reset button and verify that MR (Floppy Disk Controller U409 pin 13) goes low. If not, trace RESET to its source. If MR is OK, but FDRQ is still stuck, replace the Floppy Disk Controller (U409).
- F8 DMA count error. Replace the MCU (U206), if that does not fix it, replace the DMA Controller (U408).
- F9 CRC error. The diskette or disk drive may be bad, else replace the Floppy Disk Controller (U409).
- FA Record not found. The Floppy Disk Controller could not read a sector header. May be a bad diskette, drive or Floppy Disk Controller (U409). If the test fails drive A but not drive B, the Floppy Disk Controller is not at fault (likewise fails B not A).
- FB Lost data. Data was transferred to the Floppy Disk Controller faster than the Floppy Disk Controller could transfer to the DMA Controller. If DMA Port test passes, the Floppy Disk Controller is probably bad (U409). The DMA Controller (U408) could also be at fault.
- FC Side select error - single sided drive. The test tried to write both sides of the diskette, but writing side 1 caused side 0 to be overwritten.
- FD Drive not ready. The format/write/read operation timed-out. Probably a bad disk drive. Verify by checking another drive. Could also be a faulty Floppy Disk Controller (U409).

PRINTER AND JOYSTICK PORT TESTS (P) (REQUIRES ST DMA PORT TEST FIXTURE)

The port test fixture is used to test the parallel printer port and joystick ports. The parallel port test writes to a latch on the test fixture and reads back data. The joystick port test outputs data on the parallel port, which is directed through the test fixture to the joystick ports. The keyboard reads the joystick data in response to commands from the CPU. The cables connecting the joystick ports to the test fixture must not be reversed, or the printer and joystick tests will fail.

PRINTER/JOYSTICK ERROR CODES

- P0 Printer port error. Data read from the printer port was not what was written. Verify that the data lines on the PSG chip (U302 pins 6-13) are toggling when the test is run. If not, run the RS232 test. If the RI-DTR and DCD-DTR errors occur, the chip is probably not being selected. Check if the chip selects are being activated and the 2MHz clock is present. If the PSG is selected and not outputting signals, replace it (U302). If the data lines toggle, verify continuity. Also verify that J11 (Joystick 0) pin 3 is pulled up. Verify the test fixture is good by testing another computer. If it is OK, replace the PSG (U302).
- P1 Busy input error. The input to the MFP is not being read, or the STROBE output from the PSG is not functioning, or Joystick 0 pin 3 is not connected. If the P0 error also occurs, see handling for that. Otherwise, look for a signal arriving at MFP (U303) pin 25 from J304 pin 11. If no signal at J5, the test fixture may be bad. Verify with another computer.
- J0 Joystick Port 0. The keyboard input is not functioning. If the Busy input error occurs, fix that first. Otherwise, replace the keyboard. If error persists, check continuity from J11 pins 1,2,3,4 to J12 pins 12,10,9,8 respectively.
- J1 Joystick Port 1. The keyboard input is not functioning. If the Busy input error occurs, fix that first. Otherwise, replace the keyboard. If error persists, check continuity from J11 pins 1,2,3,4 to J12 pins 7,5,4,3 respectively.
- J2 Joystick time-out. Joystick inputs were simulated by outputting data on the printer port and routing it via the test fixture to the joystick ports. Joystick inputs are detected by the keyboard and sent to the CPU via the 6850. This error can be caused by printer port failure (code P0), keyboard failure, keyboard-CPU communication line, or a faulty test fixture. If the power-up keyboard test passes, this eliminates any problem with keyboard-CPU communication.

- J3 Left button input. If P1 error occurs, fix that first. Otherwise replace the keyboard.
- J4 Right button input. If P1 error occurs, fix that first. Otherwise replace the keyboard.

REAL-TIME CLOCK (L)

The test saves the current time and date, and writes a new time, waits one second, and verifies that hours, minutes, seconds, etc. have all rolled over. This procedure is repeated for another date to verify all registers.

VME CONNECTOR (V) (REQUIRES VME MEMORY AND SERIAL BOARDS)

This test is performed in two parts. The test is designed to check the bus connected to VME option cards, not the VME cards themselves. One part of the test requires that a XYCOM 4-port serial adapter be installed. The test is run and then the system is powered down and the board removed. The other part of the test requires that a Greenspring VME memory card be installed. The switches on the card must be set to 2-8 on. The system is then powered up and the VME test run again. Failures during this test are most likely to show up as bad address or data errors.

SCSI TEST (I) (REQUIRES SCSI DRIVE)

This tests the hard disk interface by writing and reading one complete track of the hard disk. It is not intended to test the hard disk drive. It does test the computer DMA circuitry. The test has been found to be more effective than the DMA test for some types of failures. These failures normally show up as "Data Compare" errors.

The test program will save the data on the cylinder used for testing and restore the data when the test has completed. (Quit or Park Heads is selected).

The test will run until the operator presses the ESC key. There is no pass condition. A failure will normally show up within a few seconds if it is going to occur.

SCSI TEST ERROR MESSAGES

ERROR - SCSI STATUS CODE -

An error has been detected in the SCSI drive. The status code is returned by the diagnostic.

ERROR - CANNOT SELECT SCSI DISK-

The diagnostic cannot select the SCSI disk for operations.

ERROR DMA MODE -DMAC HAS ZERO COUNT-MFP2 SEES NO INTERRUPTS-

The SCSI DMA controller has reached zero count but has not generated an interrupt. The DMA controller or SCSI controller may be bad. Another possibility is that the MFP2 chip is bad.

ERROR DMA MODE -DMAC HAS ZERO COUNT-MFP2 SEES DMAC IRQ-

Possible failure of DMA or SCSI chip.

ERROR DMA MODE -DMAC HAS ZERO COUNT-MFP2 SEES SCSI IRQ-

Possible failure of DMA or SCSI chip.

ERROR DMA MODE -DMAC HAS NOT COUNTED TO ZERO-MFP2 SEES BOTH CSI AND DMAC INTERRUPTS-

DMA or SCSI chip have initiated another operation before the current DMA transfer was complete.

ERROR DMA MODE -DMAC HAS NOT COUNTED TO ZERO-MFP2 SEES DMAC INTERRUPT-

DMA chip or MFP2 could be failing generating an interrupt before the current operation is complete.

ERROR DMA MODE -DMAC HAS NOT COUNTED TO ZERO-MFP2 SEES SCSI INTERRUPT-

DMA chip or MFP2 could be failing generating an interrupt before the current operation is complete.

ERROR DMA MODE -DMAC HAS NOT CLEARED COUNT ZERO-

DMA chip should be at zero count but is not.

ERROR DMA MODE -5380 OR SCSI DISK IS NOT RESPONDING-

An attempt to poll the SCSI drive failed.

ERROR DMA MODE -BUS ERROR-

An attempt to access the bus by the DMA chip has failed.

ERROR DMA MODE -READ AND WRITE BUFFERS DO NOT COMPARE-

The data written in DMA mode to the SCSI drive buffers does not compare with the data read.

ERROR PRG MODE -READ AND WRITE BUFFERS DO NOT COMPARE-

The data written in DMA mode to the SCSI drive buffers does not compare with the data read.

ERROR CODES QUICK REFERENCE

This is a brief summary of all error code which may occur when running the diagnostic.

INITIALIZATION (ERRORS OCCURRING BEFORE THE TITLE AND MENU APPEAR.)

- I1 RAM data line is stuck.
- I2 RAM disturbance. Location is altered by write to another location.
- I3 RAM addressing. Wrong location is being addressed.
- I4 MMU error. No DSACK after RAM access.
- I5 RAM sizing error. Uppermost address fails.
- I6 Bus Error handling failed. Bus Error occurred (on purpose), but caused a crash (e.g. system was unable to read the vector from RAM).
- I7 Bus Error not detected. MCU not asserting Bus Error or the signal is not reaching the 68030.

EXCEPTIONS (MAY OCCUR AT ANY TIME)

E1-E5 not used

- E6 Autovector error. IPL0 is grounded or 68030 is bad.
- E7 Spurious interrupt. Bus error during exception processing. Device interrupted, but did not provide interrupt vector.
- E8 Internal Exception (generated by 68030).
- E9 Bad Instruction Fetch.
- EA Address error. Tried to read an instruction from an odd address or read or write word or long word at an odd address. Usually this error is preceded by a bus error or bad instruction fetch.

EB Bus error. Generated internally by the 68030 or externally by MCU. Usually caused by device not responding. Displays the address of the device being accessed.

RAM

R0 Error in low memory, possibly affecting program execution.

R1 Error in RAM chip.

R2 Address error. Bad RAM chip or memory controller. Address line not working.

R3 Address error at 64k boundary.

R4 Error during video RAM test. Bad RAM chip.

KEYBOARD

K0 Stuck key

K1 Keyboard controller is not responding.

K2 Keyboard controller reports error.

MIDI

M0 Data not received.

M1 Data received is not what was sent.

M2 Data input framing error.

M3 Parity error.

M4 Data overrun. Byte was not read from the 6850 before next byte arrived.

RS232

S0 Data not received.

- S1 Data received is not what was sent.
- S2 Data input framing error.
- S3 Parity error.
- S4 Data overrun. Byte was not read from the MFP before the next byte arrived.
- S5 IRQ. The MFP is not generating interrupts for transmit or receive.
- S6 Transmitter error - MFP.
- S7 No interrupt from transmit error (MFP).
- S8 No interrupt from receive error (MFP).
- S9 DTR - RI. These signals are connected by the loopback connector. Changing DTR does not cause change in RI.
- SA DTR - DCD. Same as S9 for these signals.
- SB RTS - CTS. Same as S9 for these signals.
- SC RS232 input shorted to output. The input and outputs of the MFP serial port are shorted together.

SCC

PORT A ERRORS:

- SCC A internal loopback: Transmitter time-out Transmitter failed.
- SCC A internal loopback: Receiver time-out Receiver failed.
- SCC A internal loopback: Overrun A byte was received before the CPU read the previous byte.
- SCC A internal loopback: Framing error Incorrect time between start and stop bits.
- SCC A internal loopback: Parity error Input data had incorrect parity.
- SCC A internal loopback: Data compare Data read was not what was sent.

Port A has no loopback connector

The loopback connector is not installed on Port A.

LAN has no loopback connector

The loopback connector is not installed on the LAN Port.

LAN ERROR: DCD IS ACTIVE WITHOUT RTS ON

The Carrier detect signal is active without a request to send.

LAN ERROR: RTS IS ACTIVE BUT DCD IS NOT RESPONDING

The request to send signal is on but no carrier is active.

Port A async mode: Transmitter time-out

Transmitter failed.

Port A async mode: Receiver time-out

Receiver failed.

Port A async mode: Overrun

A byte was received before the CPU read the previous byte.

Port A async mode: Framing error

Incorrect time between start and stop bits.

Port A async mode: Parity error

Input data had incorrect parity.

Port A async mode: Data compare

Data read was not what was sent.

Port A modem control error: DTR-DCD

Signal sent at DTR is not detected at DCD.

Port A modem control error: DTR-DSR

Signal sent at DTR is not detected at DSR.

Port A modem control error: RTS-CTS

Signal sent at RTS is not detected at CTS.

PORT B ERRORS:

SCC B internal loopback: Transmitter time-out Transmitter failed.

SCC B internal loopback: Receiver time-out	Receiver failed.
SCC B internal loopback: Overrun	A byte was received before the CPU read the previous byte.
SCC B internal loopback: Framing error	Incorrect time between start and stop bits.
SCC B internal loopback: Parity error	Input data had incorrect parity.
SCC B internal loopback: Data compare	Data read was not what was sent.
Port B has no loopback connector	The loopback connector is not installed on Port B.
Port B async mode: Transmitter time-out	Transmitter failed.
Port B async mode: Receiver time-out	Receiver failed.
Port B async mode: Overrun	A byte was received before the CPU read the previous byte.
Port B async mode: Framing error	Incorrect time between start and stop bits.
Port B async mode: Parity error	Input data had incorrect parity.
Port B async mode: Data compare	Data read was not what was sent.
Port B modem control error: DTR-DCD	Signal sent at DTR is not detected at DCD.
Port B modem control error: DTR-DSR	Signal sent at DTR is not detected at DSR.
Port B modem control error: RTS-CTS	Signal sent at RTS is not detected at CTS.

PORT D ERROR CODES:

NOT ABLE TO CLEAR D PORT REGISTERS	An attempt to clear the port registers for port D failed.
Transmitter time out on D port	Transmitter failed.

Port D has no loopback connector

The loopback connector is not installed on Port B.

RECEIVE STATUS ERROR ON D PORT

Receiver failed.

DATA COMPARE ERROR ON D PORT

Data read was not what was sent.

SCC INTERRUPT ERRORS:

SCC interrupt error: Transmitter time-out

Transmitter failed.

SCC interrupt error: Receiver time-out

Receiver failed.

SCC interrupt error: Overrun

A byte was received before the CPU read the previous byte.

SCC interrupt error: Framing error

Incorrect time between start and stop bits.

SCC interrupt error: Parity error

Input data had incorrect parity.

SCC interrupt error: Data compare

Data read was not what was sent.

No Tx interrupt

A transmit command was issued but no interrupt occurred.

No Rx interrupt

A receive command was issued but no interrupt occurred.

DMA

D0 Time-out. DMA did not take place, or interrupt not detected.

D1 DMA count error. Not all bytes arrived. Possible MCU error.

D3 DMA Controller not responding.

TIMING

T0 MFP timers failed.

- T1 Vertical sync timing failed.
- T2 Horizontal sync timing failed.
- T3 Display Enable Interrupt failed.
- T4 Memory Controller video address counter failed.
- T5 PSG Bus test. PSG chip is causing a bus error by staying on the data bus too long.
- T6 Floppy Disk Controller Bus test. Floppy Disk Controller chip is causing a bus error by staying on the data bus too long.

PRINTER AND JOYSTICK PORTS

- P0 Printer port error.
- P1 Busy (printer port input) failed.
- J0 Joystick port 0 failed.
- J1 Joystick port 1 failed.
- J2 Joystick (keyboard controller) timed-out.
- J3 Left button line failed.
- J4 Right button line failed.

FLOPPY DISK DRIVE

- F0 Drive off-line. Not responding to restore (seek track 0).

Former F1, F2, and F3 write and read errors are deleted. The message now will say "error writing", error reading, or error formatting and display the specific error found.)

- F4 Seek error.
- F5 Write protected.
- F6 Data compare. (Data read not equal to data written.)

- F7 DMA error.
- F8 DMA count error (Memory Controller counter.)
- F9 CRC error.
- FA Record not found.
- FB Lost data.
- FC Side select error.
- FD Drive not ready. Timed-out performing the command.

SCSI

ERROR - SCSI STATUS CODE -

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ERROR DMA MODE -DMAC HAS NOT COUNTED TO ZERO-MFP2 SEES BOTH SCSI AND DMAC INTERRUPTS-

DMA or SCSI chip have initiated another operation before the current DMA transfer was complete.

ERROR DMA MODE -DMAC HAS NOT COUNTED TO ZERO-MFP2 SEES DMAC INTERRUPT-

DMA chip or MFP2 could be failing generating an interrupt before the current operation is complete.

ERROR DMA MODE -DMAC HAS NOT COUNTED TO ZERO-MFP2 SEES SCSI INTERRUPT-

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ERROR DMA MODE -5380 OR SCSI DISK IS NOT RESPONDING-

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ERROR DMA MODE -BUS ERROR-

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ERROR DMA MODE -READ AND WRITE BUFFERS DO NOT COMPARE-

The data written in DMA mode to the SCSI drive buffers does not compare with the data read.

ERROR PRG MODE -READ AND WRITE BUFFERS DO NOT COMPARE-

The data written in DMA mode to the SCSI drive buffers does not compare with the data read.

REAL-TIME CLOCK

C0 no real-time clock

C1 increment error