

DIAGNOSTIC MANUAL

PC10

MAY 1988

PN-314984-04

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PC10 DIAGNOSTICS

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PC10 DIAGNOSTICS

OVERVIEW

The information in this manual is both introductory and for reference. A considerable amount of attention has been given to providing information and instructions of the system's display to aid in the use of PC10 Diagnostics and to minimize the need for extensive documentation.

The PC10 Diagnostics, Professional Level Personal Computer Diagnostics System, consists of ...

- (1) SYSTEM DISKETTE (COPY PROTECTED)
- (2) TEST DISKETTES (SPECIALLY FORMATTED)
- (1) PARALLEL PORT TEST PLUG
- (1) SERIAL PORT TEST PLUG
- (1) PC10 DIAGNOSTICS MANUAL
- (1) RUGGED CARRYING CASE

PC10 Diagnostics is intended to assist you in certifying the operation of the system and testing to locate and diagnose hardware failures. In addition, to the certification and diagnostic features, PC10 Diagnostics includes features to assist in determining the system's configuration.

Primary uses of PC10 Diagnostics are in initial system setup and burnin, testing and diagnosis of a malfunctioning system and recertification after repair. PC10 Diagnostics enables you to quickly test a system's hardware devices and components to determine the nature of a reported problem without disassembly of the system. When a hardware failure is detected, PC10 Diagnostics allows you to identify the failing device and in many cases localize the failure to the component or address level.

COMMODORE PC10 DIAGNOSTICS

LOADING PC10 DIAGNOSTICS

- 1) INSERT PC10 DIAGNOSTICS SYSTEM DISKETTE INTO DRIVE A:
- 2) POWER ON THE SYSTEM AND ALL EXTERNALLY ATTACHED DEVICES
OR
RESET THE SYSTEM BY HOLDING THE [CTRL] AND [ALT] KEYS
AND PRESS [DEL] KEY

PC10 DIAGNOSTICS MAY TAKE AS LONG AS 60 SECONDS TO LOAD
DEPENDING ON THE SYSTEM CONFIGURATION

DURING THE LOAD PHASE, GENERAL TESTS ARE MADE TO INSURE
THAT THE SYSTEM HARDWARE, (ESPECIALLY MEMORY), IS
FUNCTIONING SUFFICIENTLY TO ALLOW PC10 DIAGNOSTICS TO BE
LOADED AND OPERATED.

IF THE INITIAL MEMORY ERROR, (16K TO 70K), CONTAINS A
FAILING IC, AN ERROR MESSAGE IS DISPLAYED AS ...

** MEMORY ERROR - LOCATION XXXX:0
SEARCHING FOR GOOD MEMORY

THE PC10 DIAGNOSTICS WILL THEN CONTINUE LOOKING FOR
CONTINUOUS MEMORY IN WHICH TO LOAD.

THE PROGRAM IS THEN LOADED FROM THE TOP SIDE OF THE SYSTEM
DISKETTE. IF THE UPPER READ/WRITE HEAD OF THE DRIVE FAILS
TO OPERATE CORRECTLY, AN ERROR MESSAGE IS DISPLAYED AS ...

** READ ERROR - HEAD 0 (TOP SIDE)
ATTEMPTING TO READ FROM HEAD 1 (BOTTOM SIDE)

IF THE LOWER READ/WRITE HEAD OF THE DRIVE FAILS TO OPERATE
CORRECTLY, AN ERROR MESSAGE IS DISPLAYED AS ...

** FAILURE TO READ FROM HEAD 1 (BOTTOM SIDE)
TERMINATING LOADING OPERATION

IF THE MAIN MENU IS DISPLAYED CONTINUE PAGE 1
***** PC10 DIAGNOSTICS OPERATION INSTRUCTIONS *****

IF AN ERROR IS ENCOUNTERED

- 1) REMOVE THE DISKETTE AND VERIFY THAT ...
 - A) IS THE PC10 DIAGNOSTICS SYSTEM DISKETTE
 - B) WAS INSERTED CORRECTLY INTO THE DRIVE
- 2) RETRY THE LOADING PROCESS AGAIN USING THE KEYBOARD
RESET SEQUENCE, HOLD [CTRL] AND [ALT], PRESS [DEL]
- 3) IF THE PC10 DIAGNOSTICS STILL DOES NOT LOAD ...
A DEFECTIVE DRIVE ASSEMBLY OR PCB IS INDICATED.

PC10 DIAGNOSTICS

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**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

MAIN MENU

- [F2] - Configuration Menu
- [F3] - Certification Menu
- [F5] - Diagnostics Menu
- [F10] - Help Menu

[F2] - CONFIGURATION MENU

This option allows the ability to display System Configuration and verify all installed devices are recognized.

A) Current Configuration

* System Type	Displayed as Commodore PC10
* 8087 Math Co-Processor	Installed or Not Installed
* Amount of Main Memory	512 or 640 Kbytes
* Number of Serial Ports	Standard = 1 -- A2000 = 0
* Number of Parallel Ports	Standard = 1
* Number of Diskette Drives	Normally = 1 or 2
* Number of Fixed Disk Drives	If Hard Disk is Installed
	* Drive #
	* Number of Cylinders
	* Number of Heads
* Type of Video Interface	Normally 40 x 25 Color or 80 x 25 Mono

B) Configuration History

Displays the Current Configuration of the Test System and allows this information to be saved to disk and recalled for future reference.

C) Switch Positions

VALID FOR PC10-I AND PC10-II ONLY

Displays the status of the System Configuration Switches by number and current state, (ON or OFF).

- * Refer to System Configuration Chart -- Page 2
for detailed configuration information

D) Memory Size

Displays System Memory Configuration

- * System - Actual Memory Installed (512 or 640K)
- * POST - Lower Value of either (512 or 640K)
 - * Configuration Switch Settings or
 - * Upper Limit of the last 64K Block of
Contiguous Good Memory as tested by POST

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

SYSTEM CONFIGURATION CHART PC10-I / PC10-II				
SWITCH	POSITION	FUNCTION	POSITION	FUNCTION
1	OFF	NORMAL BOOT	ON	SYSTEM DIAGNOSTIC
2	OFF	8087 INSTALLED	ON	8087 NOT INSTALLED
3,4	ON,ON	RAM SIZE = 128K	OFF,ON	RAM SIZE = 256K
	ON,OFF	RAM SIZE = 512K	OFF,OFF	RAM SIZE = 640K
5,6	ON,ON	MONO 40X25	OFF,ON	COLOR 40X25
	ON,OFF	COLOR 80X25	OFF,OFF	MONO 80X25
7,8	ON,ON	FLOPPY DRIVES = 1	OFF,ON	FLOPPY DRIVES = 3
	ON,OFF	FLOPPY DRIVES = 3	OFF,OFF	FLOPPY DRIVES = 4

Commodore PC10-III, PC20-III and PC COLT Video Control Dip Switches are located in the back of the system. The Positions can be interpreted as ...

SYSTEM CONFIGURATION CHART PC10-III / PC20-III / PC COLT				
SWITCH	POSITION	FUNCTION	POSITION	FUNCTION
1	OFF	CHARACTER SET USA/EUROPE	ON	CHARACTER SET SCANDDINAVIAN
2	OFF	ONBOARD VIDEO MONOCROME	ON	ONBOARD VIDEO COLOR
3,4	OFF,OFF	MONO VIDEO	OFF,ON	80X25 COLOR VIDEO
	ON,OFF	40X25 COLOR VIDEO CARD INSTALLED	ON,ON	NO VIDEO CARD INSTALLED

Commodore PC10-III, PC20-III and PC COLT Hard Drive Control and Composite Video Jumpers are located on the Main PCB of the system and the Positions can be interpreted as ...

JUMPER	POSITION	FUNCTION
JMP208	A	COMMODORE HARD DISK NOT INSTALLED OR HARD DISK INSTALLED IN EXPANSION SLOT
JMP614	B	COMMODORE HARD DISK INSTALLED
	IN	COMPOSITE COLOR OUTPUT
	OUT	MONOCROME VIDEO OUTPUT

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

[F3] - CERTIFICATION MENU

This option provides Two (2) System Level Tests to certify System Hardware Operation.

- A) Fast System Test**
- B) Extended System Test**

Both options require PC10 Diagnostics Test Diskettes to be inserted in all Floppy Drives installed and Serial (RS232) and Parallel Interface Test Plugs to be plugged in to all ports.

The following Diagnostic Tests are executed

- | | |
|----------------------|---------------------------------------|
| 1) System Board | |
| 2) Math Co-Processor | Normally Not Installed |
| 3) Memory = (Size) | All Memory Tests Executed |
| 4) Diskette Drive | Read/Write To All Floppy Drives |
| 5) Fixed Disk | Hard Drive Verification |
| | * If Installed |
| 6) Serial I/O | Serial RS232 Data and Interface Tests |
| | * Not Valid For A2000 |
| 7) Parallel I/O | Parallel Data and Interface Tests |
| | * Not Valid For A2000 |

A) FAST SYSTEM TEST

Used to quickly certify correct Hardware Operation. This test may run from 30 to 90 seconds depending on the amount of System RAM.

B) EXTENDED SYSTEM TEST

Used to perform a Continuous Loop Test to detect Intermittent Hardware Failures. This test will continue to execute until interrupted by Pressing [ESC]. The Number of Passes is displayed during run time.

If an error occurs during any of these tests, **Select [F5] Option, Diagnostic Menu**, from the Main Menu for Extensive Testing of the Failure.

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

[F5] - DIAGNOSTIC MENU

This option provides Six (6) Component Level Option Menus to assist in locating and troubleshooting failures detected during the Certification Tests.

- [F2] - Keyboard**
- [F3] - Display**
- [F4] - Parallel Interface**
- [F5] - Diskette and Fixed Disk Drives**
- [F6] - Serial Interface**
- [F7] - Memory**

The available tests in these menus perform extensive testing of the System Component in question to verify correct operation as well as reporting the error condition and location/address.

[F2] - KEYBOARD TEST

Two (2) Keyboard Configurations are supported by the PC10 System Diagnostics.

- A) Standard Keyboard**
- B) Enhanced Keyboard**

**ALTHOUGH THE AVAILABLE KEYBOARD CONFIGURATIONS DO NOT
MATCH THE A2000 KEYBOARD LAYOUT, THE DISPLAYED KEY
BEING PRESSED IS STILL CORRECTLY DISPLAYED**

When the Keyboard Configuration has been selected the correct keyboard layout is displayed. As each key is depressed, the corresponding key location will be reversed verifying proper keyboard operation. The Character, (Alpha and Numeric Keys Only), Hex Code and Scan Code of each key are also displayed.

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

[F3] - DISPLAY TEST

This option allows Two (2) separate display functions.

- 1) Alignment Aids
- 2) Display Tests

1) ALIGNMENT AIDS

- A) Cross-Hatch Pattern
- B) Dot Pattern
- C) Vertical Bars
- D) Horizontal Bars
- E) Color Chart

These options are used to adjust the monitor for correct alignment, both vertical and horizontal, as well as color sharpness and tint.

2) DISPLAY TESTS

- F) Verify Screen Memory
- G) Character Set
- H) Video Attributes
- I) Fill Display With a Character
- J) Test Cursor Addressing

These options are used to test System Video Operations such as Screen Memory, Attributes, (Blinking, Intensity, etc), and Cursor Addressing.

COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS

[F4] - PARALLEL INTERFACE

VALID FOR PC10 ONLY - A FAILURE WILL OCCUR ON THE A2000
A TEST PLUG MUST BE CONNECTED TO EACH PARALLEL PORT TO BE
TESTED OR A FAILURE WILL OCCUR DURING THE STATUS TEST

A) Verify Parallel Printer Port(s)

This option is used to verify correct operation of the Internally Installed Parallel Printer Port, (LPT1), and can also be used to test optionally installed cards.

Three (3) separate tests are executed during the Parallel Test.

- 1) Data
- 2) Control
- 3) Status

If a failure occurs during this test, an error code will be displayed and can be interpreted as ...

ERROR CODE FORMAT = Pptxx

P = Parallel Interface Failure
p = Interface Port Where Failure Occurred
 1 = LPT1
 2 = LPT2
 3 = LPT3
t = Test Where Failure Occurred
 0 = Data Test
 1 = Control Test
 2 = Status Test
xx = Data Bits Which Failed
 * Refer To Data/Control/Status Bit Chart -- Page 8

The [xx] Error Codes for each test is ...

DATA TEST - Each bit in the error code represents a data bit in the internal circuitry.

	1st [x]				2nd [x]			
	7	6	5	4	3	2	1	0
Bits	-----	-----	-----	-----	-----	-----	-----	-----

EXAMPLE ERROR CODE - [xx] = 01 Data Bit 0 Failure
 [xx] = 80 Data Bit 7 Failure
 [xx] = FF All Data Bits Failed

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

[F5] - DISK DRIVE

This option supports testing of both Fixed Disk, (Hard Drive), and Standard Floppy Drives, (5 1/4" A and B).

- A) Fixed Disk Test**
- B) Diskette Drive Test**

A) FIXED DISK TEST

This test contains Eight (8) options for Hard Drive.

- A) Select Drive For Testing**

<p>A DRIVE MUST BE SELECTED BEFORE ANY OF THE OTHER AVAILABLE OPTIONS ARE USED</p>

This option allows selection of the drive to be tested, either Drive 0, (C), or Drive 1, (D).

If only one (1) Hard Drive is installed, Drive 0 is selected by default.

The Drive Number, Number of Cylinders, Number of Heads and Number of Sectors Per Track is displayed for all Hard Drives Installed.

- B) Controller Test**
- C) Seek (Hysteresis) Test**
- D) Write/Read Verify Test**
- E) Read (CRC) Test**
- * F) Format Fixed Disk**
- * G) Unconditional Format Fixed Disk**

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

If a failure occurs during any of these tests, an error code will be displayed and can be interpreted as ...

ERROR CODE FORMAT = Fdxx

F = Fixed Disk Failure
d = Drive Number Where Failure Occurred
 0 = Drive 0 (Drive C)
 1 = Drive 1 (Drive D)
xx = Type of Error Encountered
 00 = OK No Error
 01 = Bad Command
 02 = Address Mark Not Found
 04 = Requested Sector Not Found
 05 = Reset Failed
 07 = Drive Parameter Activity Failed
 09 = DMA Boundary Error
 0B = Bad Track Flag Detected
 10 = Read Error, Bad ECC
 11 = Error Corrected by ECC
 20 = Controller Failure
 40 = Seek Operation Failure
 80 = Attachment (Board) Failed To Respond
 Time Out Error
 BB = Undefined Error Occurred
 FF = Sense Operation Failed

**EXAMPLE ERROR CODE - F040 = Seek Operation Failure
 on Drive 0 (Drive C)**

B) CONTROLLER TEST

This option performs three (3) tests on the Hard Drive Controller

* PC10-I - PC10-II --- Optional Controller Card
* PC10-III - PC20-III - PC COLT --- Built In Controller
* A2000 --- Built In Controller On
 The A2088 Bridge Card

- 1) Controller Internal Diagnostic
- 2) Controller RAM Diagnostic
- 3) Controller Drive Diagnostic

C) SEEK (HYSTERESIS) TEST

When this option is selected, select the test type mode by ...

- 1) Press [Y] - Test will continue running until interrupted
- 2) Press [N] - Test will conclude after one (1) Pass
- 3) Press [ESC] - Abort Test Mode Selection

This option tests the seek capabilities of the Hard Drive by seeking each cylinder consecutively, (0-614). Hysteresis is checked by seeking cylinder 0 between each Cylinder Seek.

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

When cylinder 614 is reached, a seek is performed on each cylinder consecutively, (614-0). Hysteresis is checked by seeking cylinder 614 between each Cylinder Seek..

The Drive, Head and Cylinder being tested as well as the Number of Passes and Total Errors Encountered are displayed.

D) WRITE/READ VERIFY TEST

This test allows two (2) test option selections

- A) Test The Entire Fixed Disk Surface**
- B) Test Only The Service Cylinder**

A) TEST THE ENTIRE FIXED DISK SURFACE

ALL DATA STORED ON THE SELECTED HARD DRIVE WILL BE DESTROYED

If this option is selected, a confirmation menu is displayed.

- 1) Press [Y] - Yes, Continue**
**** ALL STORED DATA WILL BE LOST !!!!!**
- 2) Press [N] - No, Exit Test**
- 3) Press [ESC] - Exit Test**

When the [Y] option is selected, select the test type mode by ...

- 1) Press [Y] - Test will continue running until interrupted**
- 2) Press [N] - Test will conclude after one (1) Pass**
- 3) Press [ESC] - Abort Test Mode Selection**

This option tests the Write capability of the Hard Drive by Writing Data to each cylinder, (0-614), on all Heads.

When Data has been written, the Read capability of the Hard Drive is tested by Reading and Verifying the Written Data.

The Drive, Head and Cylinder being tested as well as the Number of Passes and Total Errors Encountered are displayed.

B) TEST ONLY THE SERVICE CYLINDER

STORED DATA IS NOT EFFECTED BY THIS TEST

When this option is selected, select the test type mode by ...

- 1) Press [Y] - Test will continue running until interrupted**
- 2) Press [N] - Test will conclude after one (1) Pass**
- 3) Press [ESC] - Abort Test Mode Selection**

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

This option tests the Write capability of the Hard Drive by Writing Data to cylinder (614 Only), on all Heads.

When Data has been written, the Read capability of the Hard Drive is tested by Reading and Verifying the Written Data.

The Drive, Head and Cylinder being tested as well as the Number of Passes and Total Errors Encountered are displayed.

E) READ (CRC) TEST

STORED DATA IS NOT EFFECTED BY THIS TEST

When this option is selected, select the test type mode by ...

- 1) Press [Y] - Test will continue running until interrupted
- 2) Press [N] - Test will conclude after one (1) Pass
- 3) Press [ESC] - Abort Test Mode Selection

This option tests the Read capability of the installed Hard Drive by Reading all cylinders, (0-614), on all Heads.

The Drive, Head and Cylinder being tested as well as the Number of Passes and Total Errors Encountered are displayed.

F) FORMAT FIXED DISK

This is the recommended option for Hard Disk Drive Low Level Formatting and should work on most standard drives.

* If an error occurs during this format, the Hard Drive being used may be Non-Standard and the [G] UNCONDITIONAL FORMAT Option should be attempted.

G) UNCONDITIONAL FORMAT FIXED .DISK

This is a Last Resort Option for Hard Disk Drive Low Level Formatting and should be used ONLY if the [F] FORMAT FIXED DISK Option Fails.

ALL DATA STORED ON THE SELECTED HARD DRIVE WILL BE DESTROYED.

These options display the number of Hard Drives installed and allow selection of drive to be formatted.

** C = Drive 0 ** D = Drive 1

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

When the drive has been selected, the Interleave Value, (1-16), of the drive must be entered.

* Default = 6 (Most Hard Drives)

**IF NECESSARY, REFER TO THE HARD DRIVE
SPECIFICATIONS TO OBTAIN THIS VALUE**

When the Interleave Value has been entered, a confirmation menu is displayed.

- 1) Press [Y] - Yes, The Drive Will Be Formatted
** ALL STORED DATA WILL BE LOST !!!!!
- 2) Press [N] - No, The Drive Will NOT Be Formatted

If [Y] - Yes is selected, a Low-Level Format is performed on the Hard Drive. A Flashing FORMATTING Message is displayed while the format is be executed.

H) PARK HEADS

This option is used to park the heads of the Hard Drive on the Last Cylinder, (Service Cylinder).

To help insure against damage to the hard drive which may result in lost data, the heads should be parked whenever the system is to be moved.

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

B) DISKETTE DRIVE TEST

This test contains Seven (7) options for Floppy Drive Testing

A) Specify Diskette Drive to Test

**A DRIVE MUST BE SELECTED BEFORE ANY OF THE OTHER AVAILABLE
OPTIONS ARE USED**

This option allows selection of the drive to be tested, either Drive A, Drive B, Drive C or Drive D.

When the drive has been selected Press [RETURN] to Continue

**ALL OPTIONS [B-G] REQUIRE THE PC10 TEST DISKETTES
BE INSERTED IN THE DRIVE UNDER TEST**

**IF THESE DISKETTES ARE DAMAGED OR NOT AVAILABLE, NEW TEST
DISKETTES MAY BE MADE BY FORMATTING BLANK DISKETTES USING
OPTION [G] - FORMAT TEST**

- B) Rotational Timing Test**
- C) Seek/Read Test**
- D) Write Protect Verification Test**
- E) Read Only Test**
- F) Format Test**
- G) Write/Read Verify Test**

COMMODORE PC10 DIAGNOSTICS OPERATION INSTRUCTIONS

If a failure occurs during any of these tests, an error code will be displayed and can be interpreted as ...

ERROR CODE FORMAT = Ddxx

D = Disk Drive Failure
d = Drive Number Where Failure Occurred
 0 = Drive A
 1 = Drive B
 2 = Drive C
 3 = Drive D
xx = Type of Error Encountered
 00 = OK No Error
 01 = Controller Status Error
 02 = Drive Start Failure
 04 = Controller Ready Failure
 05 = Controller Direction Error
 06 = Recalibrate Error
 07 = Reset Error
 08 = Read Error
 09 = Start Error
 0A = Write Error
 0B = Data Error
 0C = System Diskette Installed in Drive
 0D = Incorrect Test Diskette Installed in Drive
 0E = Diskette is Write Protected

EXAMPLE ERROR CODE - D109 = Start Error on Drive B
 D008 = Read Error on Drive A

B) ROTATIONAL TIMING TEST

This option is used to measure the speed of the drive. Speed is measured in RPMs with Current Speed, Slowest Measured Speed and Fastest Measured Speed displayed.

*** Optimal Speed is 300 RPM**

If the speed reading is OFF, the speed should be adjusted until the displayed reading = 300 RPM.

*** Speed is adjusted by turning a Variable POT on the drive**

**** The location of this POT may vary from Drive to Drive but is normally located on the Drive Servo PCB and accessed from the bottom of the drive assembly.**

C) SEEK/READ TEST

This option is used to test the Seek and Read Operations of the Drive by seeking random tracks, First Side 1 then Side 2, and reading the worst case data pattern written on the test diskette.

If a Seek Error is encountered, an 'S' will be displayed designating the Track, (0-39), and Side, (1 or 2), where the error occurred. Total Seek Errors are also displayed.

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

D) WRITE PROTECT VERIFICATION TEST

This option is used to test the Write Protect Sensor on the Drive as well as the Write Protect Circuitry on the PCB.

- 1) **Insert a Write Protected Test Diskette** -- Press [RETURN]
* Write Protected = Write Protect Tab ON
- 2) **Insert a Un-Write Protected Test Diskette** -- Press [RETURN]
* Un-Write Protected = Write Protect Tab OFF

Write Protect Pass/Fail Status is displayed.

E) READ ONLY TEST

This Option is used to test the Read Capabilities of the Drive by Reading and Verifying the Data from the Test Diskette. Data is read from all Tracks, (0-39), and all Sectors, (0-9), on both sides, (0-1), of the Test Diskette.

If a Read Error is encountered, either an 'S', (Soft Error), or 'H', (Hard Error), will be displayed designating the Track, (0-39), and Sector, (1-9), where the error occurred. Total Read Errors are also displayed.

- * Soft Error = A Recoverable Error
- * Hard Error = An Unrecoverable Error (4 Soft Errors)

F) FORMAT TEST

This Option is used to test the Format and Write Operations of the drive by First Formatting a Track then Writing a Worst Case Data Pattern to the Formatted Track.

When the Data Pattern has been written to all Sectors, (1-9), of all Tracks, (0-39), the Data Pattern is read and compared to the written data pattern.

This procedure is done on Side 0 then repeated for Side 1.

If an Error is encountered, either an 'F', (Format Error), 'S', (Soft Error), 'H', (Hard Error) or 'C', (Compare Error) will be displayed indicating the Track, (0-39), and Sector, (1-9), where the error occurred.

- * Format Error = Hard Error During Format Operation
- * Soft Error = A Recoverable Error
- * Hard Error = An Unrecoverable Error (4 Soft Errors)
- * Compare Error = Data Read <> Data Written

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

The results of this test can also be interpreted as a measure of Diskette Quality as a failure here caused by a diskette is an indication of either a defective or sub-standard diskette.

**IF AN ERROR OCCURS DURING TESTING, THE TEST SHOULD BE RERUN
USING A KNOWN GOOD HIGH QUALITY DISKETTE**

**DISKETTES WHICH PASS THIS TEST BECOME PC10 DIAGNOSTICS TEST
DISKETTES AND MAY BE USED FOR ALL TESTS REQUIRING THEM**

G) READ/WRITE VERIFY TEST

This Option is used to test the Read and Write Operations of the drive by Writing a Worst Case Data Pattern to all Tracks, (0-39), and all Sectors, (1-9).

When the Data Pattern has been written the Data is read and compared to the written data pattern.

This procedure is done on Side 0 then repeated for Side 1.

If an Error is encountered, either a 'W', (Write Error), 'S', (Soft Error), 'H', (Hard Error) or 'C', (Compare Error) will be displayed indicating the Track, (0-39), and Sector, (1-9), where the error occurred.

- * Write Error = Hard Error During Write Operation
- * Soft Error = A Recoverable Error
- * Hard Error = An Unrecoverable Error (4 Soft Errors)
- * Compare Error = Data Read <> Data Written

A total of encountered errors by type is displayed.

COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS

[F6] - SERIAL INTERFACE

VALID FOR PC10 AND PC20 ONLY - NO TEST IS EXECUTED ON A2000

This option is used to verify correct operation of the Internally Installed Serial, (RS232), Port, (COM1), and can also be used to test optionally installed cards.

Two (2) Serial Port Tests are supported by this option.

- A) Test Internal Operation
 - * Test Plug Not Required
- B) Test Interface (Recommended)
 - * Test Plug Required

Three (3) separate tests are executed during each Serial Test.

- 1) Transmitter Test - Both Serial Tests
- 2) Receiver Test - Both Serial Tests
- 3) Data Test - Internal Serial Test
- 4) Interface Test - Interface Serial Test

If a failure occurs during this test, an error code will be displayed and can be interpreted as ...

ERROR CODE FORMAT = Sptxx

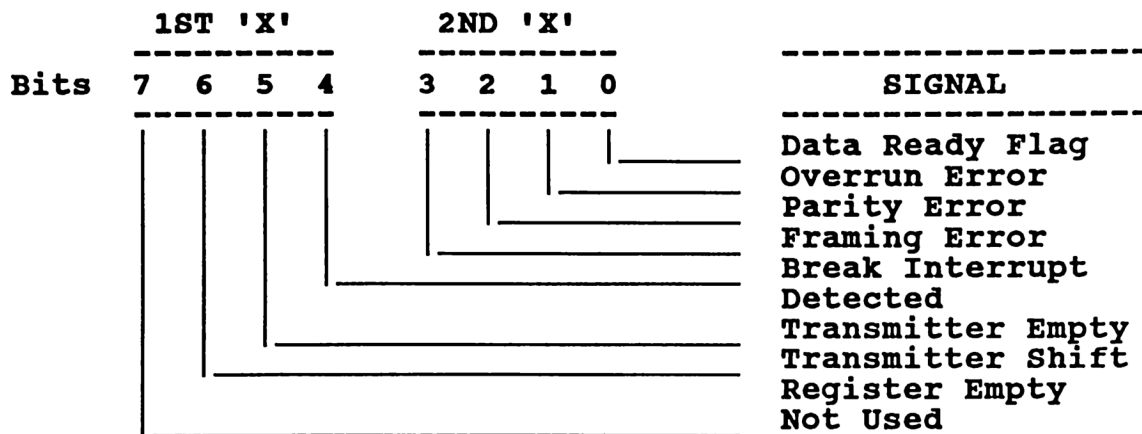
S = Serial Interface Failure
p = Interface Port Where Failure Occurred
 1 = COM1
 2 = COM2
t = Test Where Failure Occurred
 1 = Transmitter Test
 2 = Receiver Test
 3 = Data Test
 4 = Interface Test
xx = Either a Status Code or an Error Code
 Depending on Selected Test Option

- * A) Test Internal Operation - Data Error Code
- * B) Test Interface - Status Error Code
- ** Refer To Data/Control/Status Bit Chart - Page 20

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

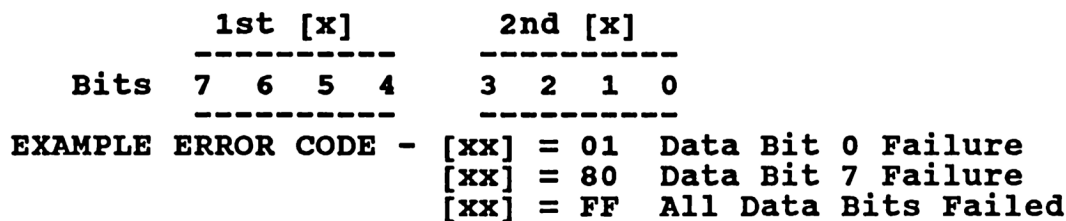
The [xx] Error Codes for each test are ...

TRANSMITTER AND RECEIVER TEST - Each bit in the Error Code indicates the Status of the UART Circuitry.

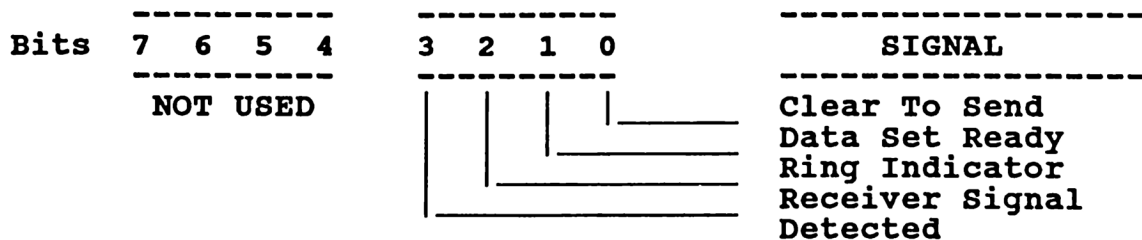


EXAMPLE ERROR CODE - [xx] = 01 Data Ready Flag Error
 [xx] = 20 Transmitter Empty Error
 [xx] = FF All Control Signals Failed

DATA TEST - (INTERNAL TEST ONLY) Each bit in the error code represents a data bit in the internal circuitry.



INTERFACE TEST - (INTERFACE TEST ONLY) Each bit in the error code represents a Status Bit in the External Interface by reading the Modem Status Register. The Four (4) Most Significant Bits are not used in this error code allowing Valid Codes from 01 thru 08 Only.



EXAMPLE ERROR CODE - [xx] = 08 Receiver Detect Error
 [xx] = 01 Clear To Send Error
 [xx] = 0F All Status Signals Failed

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

[F7] - MEMORY

These options are used to verify correct system memory operation. Tests are available to detect both Hard RAM Failures as well as Intermittent or Parity Errors.

- A) Fast System Test**
- B) Extended System Test**

A) FAST SYSTEM TEST

This Option is used as a quick memory test to detect Hard RAM Failures. Four (4) types of RAM Tests are executed. This option will execute one complete pass then halt.

- 1) All Zeros - Check for Bits Stuck High**
- 2) All Ones - Check for Bits Stuck Low**
- 3) Checkerboard - Check for Alternating Bits**
- 4) Address - Check for HIGH Parity Errors**
 - * The above RAM Tests, (1-3), Produce a Data Pattern which has an EVEN Parity. If a Parity Chip is failing in a HIGH State or is not installed, a Parity Error would be detected ONLY by the Address Test.**

B) EXTENDED SYSTEM TEST

This Option is used as a Burn-In Memory Test to detect Hard RAM Failures or Intermittent Failures. Five (5) types of RAM Tests are executed. This test will continue to execute until manually interrupted by Pressing [ESC].

- 1) All Zeros - Check for Bits Stuck High**
- 2) All Ones - Check for Bits Stuck Low**
- 3) Checkerboard - Check for Alternating Bits**
- 4) Address - Check for HIGH Parity Errors**
 - * The above RAM Tests, (1-3), Produce a Data Pattern which has an EVEN Parity. If a Parity Chip is failing in a HIGH State or is not installed, a Parity Error would be detected ONLY by the Address Test.**
- 5) Marching Ones - Check for Stuck Bits**
 - * A '1' Bit is rolled through each Memory Location within the specified address range.**

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

If a failure occurs during these tests, an error code will be displayed and can be interpreted as ...

ERROR CODE FORMAT = MtblPxx

M = Memory Failure
t = Test Which Indicated the Failure
 0 = ALL ZEROS Test **3 = ADDRESS Test**
 1 = ALL ONES Test **4 = MARCHING ONES Test**
 2 = CHECKERBOARD Test **5 = BANK Test**
b = Memory Bank, (0-9), Containing Failure
l = Position of Error relating to 16K Block
 A = 00K thru 16K **C = 32K thru 48K**
 B = 16K thru 32K **D = 48K thru 64K**
P = Parity Bit Failure
 *** Blank Space if Parity Test Passes**
xx = Physical Location of Failed RAM
 *** Refer To Memory Location Failure Chart - Page 27-29**

EXAMPLE ERROR CODE = M10A 02

**M10A = Memory Failure During ALL ONES Test in
Bank 0 of Memory Block 00-16K**
02 = Error Code 0000 00FO

*** Failure U28 - PC10-I/PC10-II MAIN PCB**
*** Failure U311 - PC10/20-III/PC COLT**
*** Failure U13 - A2088 BRIDGE BOARD**

EXAMPLE ERROR CODE = M25D F0

**M25D = Memory Failure During CHECKERBOARD Test
in Bank 5 of Memory Block 48-64K**
F0 = Error Code F000 0000

*** Failure U1 - PC10-I/PC10-II EXPANDER**
*** Failure U313 - PC10/20-III/PC COLT**
*** Failure U27 - A2088 BRIDGE BOARD**

C) ALLZERO Memory Test
D) ALLONES Memory Test
E) CHECKERBOARD Memory Test
F) ADDRESS Memory Test
G) MARCH Memory Test

These options allow Individual Memory Tests to be executed for assistance in detailed component troubleshooting.

The Memory Bank under test, Test Results, Failed Range and Failed Bit Position is displayed during these tests.

These tests will continue to execute until manually interrupted by Pressing [ESC].

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

Note that during all Memory Test Options, (A thru G), the 64K Memory Block, 00000-0FFFF, Bank 0 and part of the 64K Memory Block, 10000-1FFFF, Bank 1 is not tested. This is the area of memory where the PC Diagnostics Program resides.

If all Memory Banks, (1 - 7) PC10-I, A2000, (1 - 9) PC10-II, PC10-III, PC20-III, PC COLT, pass the Diagnostic Tests, Bank 0 is tested by selecting option [H] - Select Memory Testing Range and entering a **STARTING ADDRESS OF 0600** and **ENDING ADDRESS OF 2000**. This insures that selected tests are executed on all RAM skipped by standard testing.

H) Select Memory Testing Range

This option allows selected tests to be executed on a specific area of memory. This is very useful when it becomes necessary to isolate or verify a certain area of System Memory.

**EXAMPLE - Enter Starting Address of 2000
 Enter Ending Address of 3000**

*** Executes Selected Tests on Memory Bank 2, 20000 - 2FFFF Only**

If an error is detected during individual Memory Tests, Options (C thru H), the Failure Range and Bit Failure Code is displayed indicating the location of the failing memory bit.

**** Refer to Memory Bit Failure Chart -- Pages 30-32**

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

PC10-I / PC10-II STANDARD MEMORY CONFIGURATION CHART					
SYSTEM TYPE	RAM	MAIN PCB	BANKS	EXPANSION PCB	BANKS
PC10-I	512K	256K	0 - 3	256K	4 - 7
PC10-II	640K	256K	0 - 3	384K	4 - 9

MAIN PCB BANKS 0 - 3 RAM ICs = 41256 (256K x 1)

U22	U23	U24	U25	U26	U27	U28	U29	U30
BIT 0	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7	BIT P
: _____ 1ST [X] _____ :			: _____ 2ND [X] _____ :			: _____ Parity _____ :		

RAM EXPANSION PCB BANKS 4 - 7 RAM ICs = 41256 (256K x 1)

U1	U2	U3	U4	U5	U6	U7	U8
BIT 0	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7
: _____ 1ST 'X' _____ :			: _____ 2ND 'X' _____ :				

RAM EXPANSION PCB BANKS 8 - 9 RAM ICs = 41464 (64K x 4)

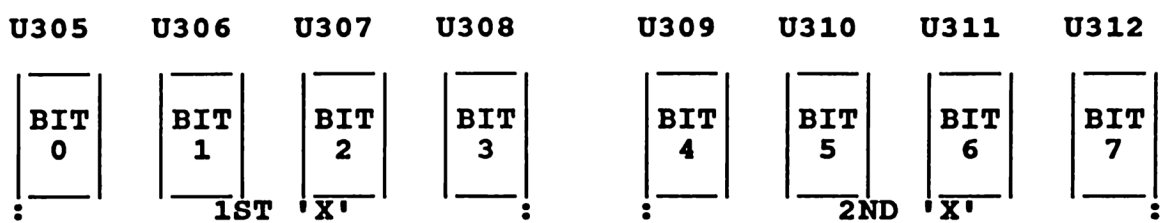
INSTALLED IN 640K SYSTEM ONLY

U9	: U10	U11	U12	U13	U14	U15:
BIT P	BIT P	BIT P	BIT 0-3	BIT 4-7	BIT 0-3	BIT 4-7
Parity	: Parity :		: BANK :	: BANK :	: BANK :	: BANK :
BANKS 4 - 7	: 8 9 :		: 8 :	: 9 :	: 8 :	: 9 :
	: Parity _:		: 1ST 'X' _:	: 2ND 'X' _:		

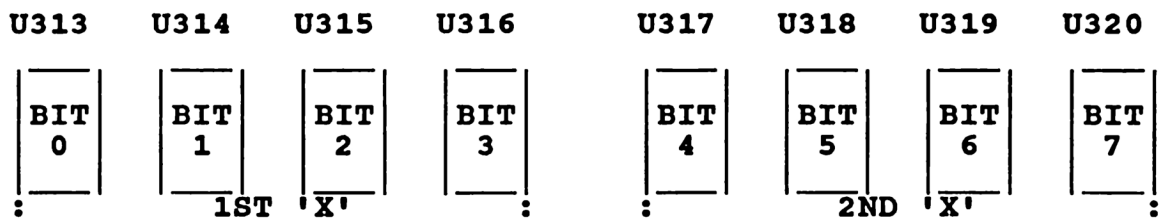
**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

PC10/20-III / PC COLT STANDARD MEMORY CONFIGURATION CHART					
SYSTEM TYPE	RAM	MAIN PCB	BANKS	EXPANSION PCB	BANKS
PC10-III	640K	640K	0-9		
PC20-III	640K	640K	0-9		
PC COLT	640K	640K	0-9		

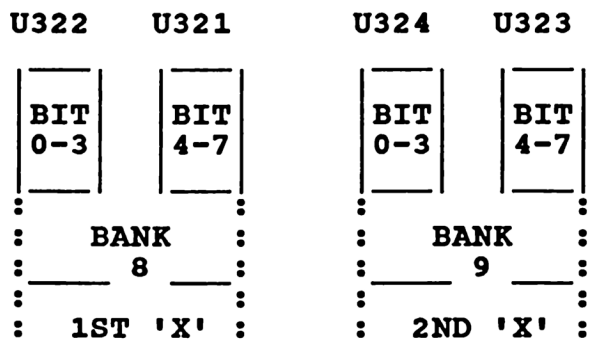
MAIN PCB BANKS 0 - 3 RAM ICs = 41256 (256K x 1)



MAIN PCB BANKS 4 - 7 RAM ICs = 41256 (256K x 1)



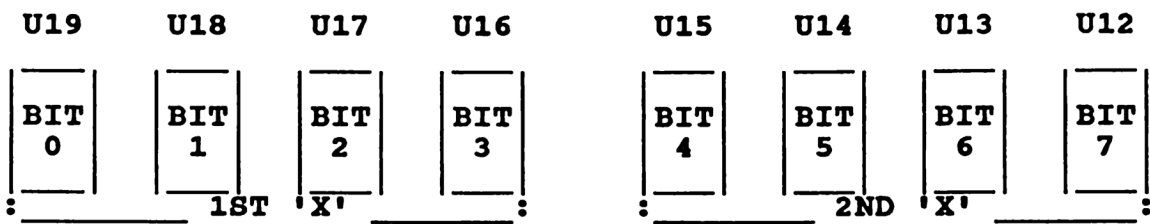
MAIN PCB BANKS 8 - 9 RAM ICs = 41464 (64K x 4)



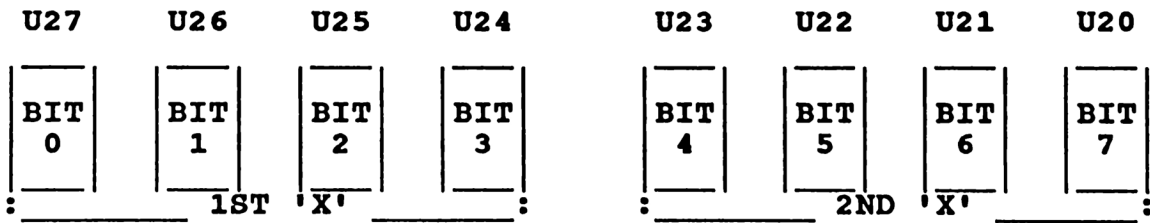
**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

A2000 PC MODE STANDARD MEMORY CONFIGURATION CHART					
SYSTEM TYPE	RAM	MAIN PCB	BANKS	BRIDGE BOARD	BANKS
A2000	512K			512K	0-7

A2088 BRIDGE BOARD BANKS 0 - 3 RAM ICs = 41256 (256K x 1)



A2088 BRIDGE BOARD BANKS 4 - 7 RAM ICs = 41256 (256K x 1)



**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

PC10-I / PC10-II MEMORY LOCATION FAILURE CHART											
V A L U E O F 1ST [X]	B A N K S	PCB LOCATIONS MAIN PCB PC10-I/PC10-II				V A L U E O F 2ND [X]	B A N K S	PCB LOCATIONS MAIN PCB PC10-I/PC10-II			
		-U-	-U-	-U-	-U-			-U-	-U-	-U-	-U-
	0,1,2,3	22	23	24	25	0,1,2,3	26	27	28	29	
	B A N K S	PCB LOCATIONS EXPANSION PCB PC10-I/PC10-II				B A N K S	PCB LOCATIONS EXPANSION PCB PC10-I/PC10-II				
		-U-	-U-	-U-	-U-			-U-	-U-	-U-	-U-
	4,5,6,7 8 9	1 12 14	2 12 14	3 12 14	4 12 14		4,5,6,7 8 9	5 13 15	6 13 15	7 13 15	8 13 15
0		O	O	O	O	0		O	O	O	O
1		O	O	O	F	1		O	O	O	F
2		O	O	O	F	2		O	O	O	F
3		O	O	O	F	3		O	O	O	F
4		O	F	O	O	4		O	F	O	O
5		O	F	O	O	5		O	F	O	O
6		O	F	F	O	6		O	F	F	O
7		O	F	F	F	7		O	F	F	F
8		F	O	O	O	8		F	O	O	O
9		F	O	O	O	9		F	O	O	O
A		F	O	F	O	A		F	O	F	O
B		F	O	F	O	B		F	O	F	O
C		F	F	O	O	C		F	F	O	O
D		F	F	O	O	D		F	F	O	O
E		F	F	F	O	E		F	F	F	O
F		F	F	F	F	F		F	F	F	F

O = PASS (OK) F = FAIL

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

PC10-III / PC20-III / PC COLT MEMORY LOCATION FAILURE CHART											
V A L U E O F 1ST [X]	B A N K S 0,1,2,3 4,5,6,7 8 9	PCB LOCATIONS MAIN PCB PC10/20-III PC COLT				V A L U E O F 2ND [X]	B A N K S 0,1,2,3 4,5,6,7 8 9	PCB LOCATIONS MAIN PCB PC10/20-III PC COLT			
		-U-	-U-	-U-	-U-			-U-	-U-	-U-	-U-
		305 313 322 324	306 314 322 324	307 315 322 324	308 316 322 324			309 317 321 323	310 318 321 323	311 319 321 323	312 320 321 323
0		O	O	O	O	0		O	O	O	O
1		O	O	O	F	1		O	O	O	F
2		O	O	O	F	2		O	O	F	F
3		O	O	O	F	3		O	O	F	F
4		O	F	O	F	4		O	F	O	F
5		O	F	O	F	5		O	F	O	F
6		O	F	F	F	6		O	F	F	F
7		O	F	F	F	7		O	F	F	F
8		F	O	O	O	8		F	O	O	F
9		F	O	O	F	9		F	O	O	F
A		F	O	F	F	A		F	O	F	F
B		F	O	F	F	B		F	O	F	F
C		F	F	O	F	C		F	F	O	F
D		F	F	O	F	D		F	F	O	F
E		F	F	F	O	E		F	F	F	O
F		F	F	F	F	F		F	F	F	F

O = PASS (OK) F = FAIL

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

A2000 PC MODE MEMORY LOCATION FAILURE CHART											
V A L U E O F 1ST [X]	B A N K S 0,1,2,3 4,5,6,7	PCB LOCATIONS FOR A2088 BRIDGE BOARD				V A L U E O F 2ND [X]	B A N K S 0,1,2,3 4,5,6,7	PCB LOCATIONS FOR A2088 BRIDGE BOARD			
		-U-	-U-	-U-	-U-			-U-	-U-	-U-	-U-
		19	18	17	16		15	14	13	12	
		27	26	25	24		23	22	21	20	
0		O	O	O	O	0		O	O	O	O
1		O	O	O	O	1		O	O	O	O
2		O	O	O	O	2		O	O	O	O
3		O	O	O	O	3		O	O	O	O
4		O	F	O	O	4		O	F	O	O
5		O	F	O	O	5		O	F	O	O
6		O	F	O	O	6		O	F	O	O
7		O	F	O	O	7		O	F	O	O
8		O	F	O	O	8		O	F	O	O
9		F	O	O	O	9		F	O	O	O
A		F	O	O	O	A		F	O	O	O
B		F	O	O	O	B		F	O	O	O
C		F	O	O	O	C		F	O	O	O
D		F	F	O	O	D		F	F	O	O
E		F	F	O	O	E		F	F	O	O
F		F	F	O	O	F		F	F	O	O

O = PASS (OK) F = FAIL

**COMMODORE PC10 DIAGNOSTICS
OPERATION INSTRUCTIONS**

PC10-III / PC20-III / PC COLT MEMORY BIT FAILURE CHART											
MAIN PCB				BANKS 0 - 3				RAM ICs = 41256 (256K x 1)			
U305	U306	U307	U308	U309	U310	U311	U312				
BIT 0	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7				
MAIN PCB				BANKS 4 - 7				RAM ICs = 41256 (256K x 1)			
U313	U314	U315	U316	U317	U318	U319	U320				
BIT 0	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7				
MAIN PCB				BANKS 8 - 9				RAM ICs = 41464 (64K x 4)			
		U322	U321	U324	U323						
		BIT 0-3	BIT 4-7	BIT 0-3	BIT 4-7						
		: BANK :	: BANK :	: BANK :	: BANK :						
		: 8 :	: 8 :	: 9 :	: 9 :						

EXAMPLE ERROR CODE = FAILURE RANGE = 50000-5FFFF -- BANK 5
 FAILURE CODE = 0000 FO00 -- BIT 3
 U316 ON MAIN PCB

FAILURE RANGE = 90000-9FFFF -- BANK 9
 FAILURE CODE = OFFO OF00 -- BITS 2,5,6
 U324,U323 ON MAIN PCB

