COMMODORE DISKETTE

DIAGNOSTIC MANUAL

1571 — VERSION 1.1

commodore
COMPUTERS

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VERSION 1.1
DIAGNOSTIC DISKETTE INTRODUCTION

This manual was developed to aid you in the use of the Diagnostics available for Repair Troubleshooting of the CBM C-128 Consumer Product Line.

The manual is separated into four (4) sections.

SECTION 1: This section contains Diagnostic and Test Programs to assist in troubleshooting of the CBM 1571 Single Disk Drives.

SECTION 2: This section contains Diagnostic and Test Programs to assist in troubleshooting the C-64 and 80-Column Modes of the C-128 along with the External Ram Expansion Cartridges.

SECTION 3: This section contains some user friendly Disk Utility Programs which should help you with day to day operations.

SECTION 4: This section contains some of the most used Basic Commands of the C-128 Computer System.

The below listing is the directory of the Version 1.1 Test Diskette and a brief explanation of each program. More detailed information is contained inside this manual.

Disk Name — 1571 Version 1.1

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PGM  1 — "Diagnostic Menu  " ** Diagnostic Test Option Menu.
PGM  2 — "System Test      " ** System Test for the 1571.
PGM  3 — "GCR Soft Error   " ** Final GCR Soft Error Test for the 1571.
PGM  4 — "MFM Soft Error   " ** Final MEM Soft Error Test for the 1571.
PGM  5 — "Alignment/Repair " ** Alignment and Repair Tests for the 1571.
PGM  6 — "C-64 Mode Test   " ** Diagnostic Test for the C-64 Mode of the C-128.
PGM  7 — "C-128 80-Column  " ** C-128 80-Column Mode Test.
PGM  8 — "RAM Expansion    " ** C-128 RAM Expansion Test.
PGM  9 — "Disk Copy        " ** Disk Utility to Copy Files from Drive to Drive.
PGM 10 — "Disk Formatter   " ** Disk Format Utility for the 1571.
PGM 11 — "File Scratcher    " ** Disk File Scratch Utility for the 1571.
PGM 12 — "File Unscratcher  " ** Disk Utility to Revive Scratched Files.
PGM 13 — "System BIN1      " ** Binary Data Used in the System Test.
PGM 14 — "System BIN2      " ** Binary Data Used in the System Test.
PGM 15 — "System BIN3      " ** Binary Data Used in the System Test.
PGM 16 — "GCR BIN1         " ** Binary Data Used in the GCR Soft Error Test.
PGM 17 — "GCR BIN2         " ** Binary Data Used in the GCR Soft Error Test.
PGM 18 — "MFM BIN1         " ** Binary Data Used in the MEM Soft Error Test.
PGM 19 — "MEM BIN2         " ** Binary Data Used in the MEM Soft Error Test.
PGM 20 — "MFM BIN3         " ** Binary Data Used in the MEM Soft Error Test.
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SECTION ONE

DISK DIAGNOSTIC
AND TEST PROGRAMS

1571 DIAGNOSTIC MENU

DESIGNED TO LOAD 1571 DIAGNOSTIC PROGRAMS

REQUIRED EQUIPMENT: C-128 Computer
1571 Single Disk Drie (Device 8)
40 Column Monitor or TV Set
Version 1.1 Diagnostic Diskette

The 1571 Menu program is used to load diagnostic tests and utilities from the 1571 Version 1.1 Diagnostic Diskette. The menu will auto-boot on power up or may be loaded directly. Because many of the diagnostic tests use binary data, all tests should be loaded through the menu program.

1571 TEST MENU — VERSION 1.1

>*Press '1' — Load System Test*

>*Press '2' — Load GCR Soft Error Test*

>*Press '3' — Load MFM Soft Error Test*

>*Press '4' — Load Alignment/Repair Test*

>*Press 'U' — Display Utility Menu*

1571 UTILITY MENU — VERSION 1.1

>*Press '5' — Load C-64 Mode Test*

>*Press '6' — Load C-128/80 Column Test*

>*Press '7' — Load RAM Expansion Test*

>*Press '8' — Load Disk Copy*
>   *Two Drives Required*

>*Press '9' — Load Disk Formatter*

>*Press 'A' — Load File Scratcher*

>*Press 'B' — Load File Unscratcher*

>*Press 'T' — Display Test Menu*

**DOUBLE SIDED — DOUBLE DENSITY DISKETTE
REQUIRED FOR ALL DIAGNOSTIC TESTING**

1571 SYSTEM TEST

DESIGNED TO TEST THE 1571 SINGLE DISK DRIVE.

REQUIRED EQUIPMENT: C-128 Computer
1571 Single Disk Drive (Device 8)
1571 Single Disk Drive (Device 8-9) — Optional
40 Column Monitor or TV Set
Formatted (Write-Protected) Diskette
Blank Test Diskette
Version 1.1 Diagnostic Diskette

SYSTEM TEST OPTION MENU

Press '1' — Zero Stop Sensor Test

Press '2' — Write Protect Sensor Test

Press '3' — Read/Write Head Bump Test

Press 'R' — Read/Write Tests

Press 'A' — All Above Tests

Press 'L' — Load Diagnostic Menu

SYSTEM TEST OPTION ONE — ZERO STOP SENSOR TEST

Insert a formatted write-protected diskette

Press 'SPACE' — Start Test

The ZERO STOP SENSOR TEST checks for the proper adjustment of the Zero Track Sensor by loop-ing, (5 times), through the sensor to Zero Track and reading a pre-written sync mark on the diskette.

FAILURE — DEFECTIVE, UN-FORMATTED OR UN-WRITE-PROTECTED DISKETTE

MISADJUSTED ZERO STOP OR DRIVE ALIGNMENT ·

DEFECTIVE ZERO STOP SENSOR OR CONTROL LOGIC

Press 'SPACE' — Return to Menu

SYSTEM TEST OPTION TWO — WRITE PROTECT SENSOR TEST

Insert a formatted write-protected diskette

Press 'SPACE' — Start Test

The WRITE PROTECT SENSOR TEST checks for proper operation of the Write Protect Sensor by at-tempting a format operation on the write-protected diskette and reading the error channel.

FAILURE — DEFECTIVE, UN-FORMATTED OR UN-WRITE-PROTECTED DISKETTE

MISADJUSTED ZERO STOP OR DRIVE ALIGNMENT

DEFECTIVE WRITE-PROTECT SENSOR OR CONTROL LOGIC

Press 'SPACE' — Return to Menu

1571 SYSTEM TEST (continued)

SYSTEM TEST OPTION THREE — READ/WRITE HEAD BUMP TEST

Insert a formatted write-protected diskette

Press 'SPACE' — Start Test

The READ/WRITE HEAD BUMP TEST checks for proper adjustment of the Zero Track Stop by bumping the read/write head, (5 times), against the zero stop and verifying proper read/write head positioning.

FAILURE — DEFECTIVE, UN-FORMATTED OR UN-WRITE-PROTECTED DISKETTE

MISADJUSTED ZERO STOP OR DRIVE ALIGNMENT

DEFECTIVE STEPPER MOTOR OR CONTOL LOGIC

Press 'SPACE' — Retun to Menu

SYSTEM TEST OPTION FOUR — READ/WRITE TEST

Insert the blank test diskette

Press 'F' — Diskette is formatted

Press 'U' — Diskette is not formatted

If the 'U' Option is selected:

The Format Operation of the drive is checked by executing a GCR Format to all tracks (Upper and Lower), with an ID written to all sectors.

The GCR READ/WRITE OPERATIONS are checked by:

1. Opening a write file — writing data to the file — closing the file.

2. Opening a read file — reading and verifying the written data — closing the file.

3. Scratching the file.

FAILURE — DEFECTIVE DISKETTE

MISADJUSTED ZERO STOP OR ALIGNMENT

DEFECTIVE DRIVE ASSEMBLY

DEFECTIVE READ/WRITE LOGIC

The GCR 1541 SLOW MODE is checked by:

1. Writing data to tracks 5, 15, 25, 35.

2. Reading and verifying written data from tracks 35, 25, 15, 5.

The GCR 1571 FAST MODE is checked by:

1. Writing data to tracks 40, 50, 60, 70.

2. Reading and verifying written data from tracks 70, 60, 50, 40.

1571 SYSTEM TEST (continued)

FAILURE — DEFECTIVE OR NOT A DOUBLE SIDED — DOUBLE DENSITY DISKETTE

MISADJUSTED ZERO STOP OR ALIGNMENT

DEFECTIVE DRIVE ASSEMBLY

The MFM BURST FORMAT is checked by executing a MFM Format to:

TRACK	BYTES/SECTOR
1	128
2	512
36	1024
37	256
38	512
39	128

The MFM BURST READ/WRITE OPERATION is checked by:

1. Writing, Reading and Comparing Data on:

TRACK	BYTES/SECTOR
1	128
2	512
36	1024
37	256
38	512
39	128
79	128
78	512
77	256
76	1024
42	512
41	128

FAILURE — DEFECTIVE OR NOT A DOUBLE SIDED — DOUBLE DENSITY DISKETTE

MISADJUSTED ZERO STOP OR ALIGNMENT

DEFECTIVE DRIVE ASSEMBLY

DEFECTIVE READ/WRITE LOGIC

COMPATIBILITY TEST

COMPATIBILITY TEST OPTION MENU

Press '8' — Second Drive — Device (8)

Press '9' — Second Drive — Device (9)

Press 'S' — Skip Compatibility Test

COMPATIBILITY TEST OPTION — SECOND DRIVE — DEVICE (8)

COMPATIBILITY TEST OPTION TWO — SECOND DRIVE — DEVICE (9)

1571 SYSTEM TEST (continued)

These options allow the data written during the Read/Write Test to be verified on a second drive which is set to either device number (8) or device number (9). This helps determine if data written on the drive under test can be read by other drives.

IF THE '8' OPTION IS USED, THE SECOND DRIVE CANNOT BE CONNECTED UNTIL ALL TESTS ARE COMPLETE AND THE COMPATIBILITY SECTION OF THE READ/WRITE TEST IS REACHED.

IF THE '9' OPTION IS USED, THE SECOND DRIVE MAY BE CONNECTED DURING THE TESTS AND USED WHEN THE COMPATIBILITY SECTION OF THE READ/WRITE TEST IS REACHED.

The GCR 1541 SLOW MODE COMPATIBILITY is checked by:
1. Reading and verifying GCR Data, written during the Read/Write Test, from Tracks 5, 15, 25, 35.

The GCR 1571 FAST MODE COMPATIBILITY is checked by:
1. Reading and verifying GCR Data, written during the Read/Write Test, from Tracks 40, 50, 60, 70.

The BURST MFM MODE COMPATIBILITY is checked by:
1. Reading and verifying MFM Data, written during the Read/Write Test, from..

TRACK	BYTES/SECTOR
1	128
2	512
36	1024
37	256
38	512
39	128
79	128
78	512
77	256
76	1024
42	512
41	128

COMPATIBILITY TEST OPTION THREE — SKIP COMPATIBILITY TEST

This option allows the Compatibility Section of the Read/Write Test to be skipped if a second drive is not available.

SYSTEM TEST RESULTS

System Test — Passed/Failed

Compatiblity — Passed/Skipped

Press 'R' — Return to menu

SYSTEM TEST OPTION FIVE — ALL ABOVE TESTS

This option executes options (1-4), with a countdown between tests.

SYSTEM TEST OPTION SIX — LOAD DIAGNOSTIC MENU

Insert the Version 1.1 Diagnostic Diskette.

Press 'SPACE' — Load Diagnostic Menu

Press 'R' — Return to Main Menu

1571 GCR/MFM SOFT ERROR TEST

DESIGNED TO TEST THE 1571 SINGLE DISK DRIVE.

REQUIRED EQUIPMENT: C-128 Computer
1571 Single Disk Drive
40 Column Monitor or TV Set
Blank Test Diskette
Version 1.1 Diagnostic Diskette

The Soft Error Test is designed to do an extended read/write performance test on the 1571 Single Disk Drive.

The two (2) Soft Error Tests on the Version 1.1 Diagnostic Test Menu are used to test both the GCR and MFM modes of operation.

> BOTH SOFT ERROR TESTS SHOULD BE RUN ON ALL UNITS IN FOR REPAIR

Insert the Blank Test Diskette before selecting any options

GCR/MFM SOFT ERROR TEST OPTION MENU

> *Press 'RETURN' — Start Test (100 Pass)*
>
> *Press 'X' — Preliminary Test (2 Pass)*
>
> *Press 'M' — Modified Tests*
>
> *Press 'C' — Alter System Address (8)*
>
> *Press 'O' — Read Test Results*
>
> *Press 'L' — Load Diagnostic Menu*

SOFT ERROR TEST OPTION ONE — START TEST (100 PASS)

This option is used for Final Soft Error Testing. At the end of 100 passes, the test will terminate and the drive will be reset. All test results will be stored on the test diskette and will be read at test end using Soft Error Test Option Five (Read Test Results). To save time this option should be run only after the unit has passed the 2 Pass Preliminary Test (Soft Error Test Option Two).

> WHEN DOWNLOADING IS COMPLETE AND THE SOFT ERROR TEST OPTION MENU IS DISPLAYED, THE TEST WILL RUN INTERNAL TO THE DRIVE AND THE C-128 NEED NO LONGER BE CONNECTED UNTIL THE TEST IS COMPLETE AND THE TEST RESULTS ARE READ.

SOFT ERROR TEST OPTION TWO — PRELIMINARY TEST (2 PASS)

PRELIMINARY SOFT ERROR TEST OPTION MENU

> *Press 'RETURN' — Start Test (2)*
>
> *Press 'A' — Alter Pass Number (2)*
>
> *Press 'O' — Read Test Results*
>
> *Press 'X' — Return to Menu*

1571 GCR/MFM SOFT ERROR TEST (continued)

PRELIMINARY SOFT ERROR TEST OPTION ONE — START TEST (2)

This option is used for Preliminary Soft Error Testing. At the end of the designated number of passes, displayed in parenthesis next to the option, the test will terminate and the drive will be reset. All test results will be stored on the test diskette and will be read at test end using Preliminary Soft Error Test Option Three (Read Test Results). If the drive passes this Preliminary Test, the 100 Pass Test (Soft Error Test Option One), should be run.

> WHEN DOWNLOADING IS COMPLETE AND THE SOFT ERROR TEST OPTION MENU IS DISPLAYED, THE TEST WILL RUN INTERNAL TO THE DRIVE AND THE C-128 NEED NO LONGER BE CONNECTED UNTIL THE TEST IS COMPLETE AND THE TEST RESULTS ARE READ.

PRELIMINARY SOFT ERROR TEST OPTION TWO — ALTER PASS NUMBER (2)

This option is used to change the designated number of passes, displayed in parenthesis next to the option, the Preliminary Soft Error Test will execute.

PRELIMINARY SOFT ERROR TEST OPTION THREE — READ TEST RESULTS

This option is used to read and display Soft Error Test Results when the designated number of passes are complete. Complete Error Reporting and Pass/Fail Status is displayed.

Refer to Soft Error Test Result Summary — Page 1-9

PRELIMINARY SOFT ERROR TEST OPTION FOUR — RETURN TO MENU

Press 'X' — Return to Menu

SOFT ERROR TEST OPTION THREE — MODIFIED TESTS

MODIFIED SOFT ERROR TEST OPTION MENU

Press 'C' — Create Custom Error Test

Press 'R' — Reset Drive at Test End

Press 'B' — Blink LED at Test End

Press 'SPACE' — Return to Menu

MODIFIED SOFT ERROR TEST OPTION ONE — CREATE CUSTOM ERROR TEST

This option allows the operator the ability to select special parameters to create a Custom Soft Error Test. The parameters are as follows:

1. *NEW OR CONTINUOUS TEST*
   When 'N'ew is selected, the Error Log is cleared at the start of test. When 'C"ontinuous is selected, the existing Error Log is used as the starting condition and the test will continue from this point.
   IF THE DISKETTE HAS NOT PREVIOUSLY BEEN USED IN THE SOFT ERROR TEST, THE 'N'EW OPTION MUST BE SELECTED.

2. *SPECIFY PASS TYPE*
   The test may be set to write only, read only or read with a rewrite of data per the selected Read to Write Pass Ratio. This ratio represents the number of Read Passes per each Write Pass. MAXIMUM READ TO WRITE RATIO = 127

1571 GCR/MFM SOFT ERROR TEST (continued)

3. *NUMBER OF PASSES*
   The total number of passes the Soft Error Test is to execute.
   IF THE TEST IS TO CONCLUDE ITSELF, A MAXIMUM OF 500 PASSES MAY BE ENTERED
   IF '0' IS ENTERED, THE TEST WILL RUN FOREVER.

4. *WANT FORMATTING*
   If 'Y'es is selected, the diskette will be formatted by the test. If 'N'o is selected, the test will start without formatting.
   IF THE 'N'EW OPTION WAS PREVIOUSLY SELECTED, 'Y'ES MUST BE SELECTED HERE.

5. *TRACK SEQUENCE*
   This option allows selection of the track testing sequence. If 'S'equential is selected, the tracks are tested in sequential order.
   GCR — TRACKS 1 THRU 70 — MFM — TRACKS 1 THRU 79
   If 'R'andom is selected, the tracks are tested in a random fashion allowing complete exercise of the stepper mechanics.
   If 'A'lternating is selected, the track testing sequence will alternate between Sequential and Random after each pass.

6. *RESET OR BLINK*
   If 'R'eset is selected, the drive will be reset after the designated number of passes have been executed.
   AFTER RESET, ALL DRIVE ACTIVITY, INCLUDING THE FLASHING DRIVE LED WILL CEASE.
   If 'B'link is selected, the drive LED will blink in a series of (1) Flash Codes when the test is complete.
   IF THE 'B'LINK OPTION IS SELECTED, THE UNIT MUST BE RESET (TURNED OFF AND ON), BEFORE THE TEST RESULTS ARE READ.

> WHEN DOWNLOADING IS COMPLETE AND THE SOFT ERROR TEST OPTION MENU IS DISPLAYED, THE TEST WILL RUN INTERNAL TO THE DRIVE AND THE C-128 NEED NO LONGER BE CONNECTED UNTIL THE TEST IS COMPLETE AND THE TEST RESULTS ARE READ.

MODIFIED SOFT ERROR TEST OPTION TWO — RESET DRIVE AT TEST END

This option will cause the drive to be reset after the designated number of passes are complete.
THIS IS A PRESET TEST OPTION AND, UNDER NORMAL TESTING, NEED NOT BE SELECTED.

MODIFIED SOFT ERROR TEST OPTION THREE — BLINK LED AT TEST END

This option will cause the drive LED to blink in a series of (1) Flash Codes when the test is complete.
IF THE 'B'LINK OPTION IS SELECTED, THE UNIT MUST BE RESET (TURNED OFF AND ON), BEFORE THE TEST RESULTS ARE READ.

MODIFIED SOFT ERROR TEST OPTION FOUR — RETURN TO MENU

   Press 'SPACE' — Return to Menu

SOFT ERROR TEST OPTION FOUR — ALTER SYSTEM ADDRESS (8)

This option allows the Soft Error Test to be run on a unit where the device number has been changed from device (8). (Factory Setting).
ALLOWABLE DEVICE NUMBERS ON THE 1571 ARE DEVICE NUMBER 8 THRU DEVICE NUMBER 11.

1571 GCR/MFM SOFT ERROR TEST (continued)

SOFT ERROR TEST OPTION FIVE — READ TEST RESULTS

> IF A PRINTER IS CONNECTED, THE TEST RESULTS WILL BE PRINTED TO HARD-COPY — THIS PRINTOUT SHOULD BE RETURNED TO THE CUSTOMER WITH THE UNIT TO SHOW THE RESULTS OF FINAL TESTING.

This option reads and displays the results of the Soft Error Test. These results are stored on the test diskette and are updated at the end of each completed pass. Complete Error Reporting and Pass/Fail Status are displayed as follows:

SOFT ERROR TEST RESULTS SUMMARY

1. **NUMBER OF PASSES**
   The total number of passes run. A pass is testing all tracks on the diskette.
   MINIMUM NUMBER OF PASSES = ONE COMPLETE PASS.

2. **TOTAL ERRORS**
   The total number of errors that were encountered during the test. This count is incremented only once for each error regardless of the number of retries necessary to recover the error. If this count reaches (1024), the test will terminate.
   MAXIMUM ERRORS = TOTAL PASSES divided by a SET VALUE.

3. **COUNTABLE ERRORS**
   The total number of encountered errors that required more than one (1) retry to recover.
   COUNTABLE ERRORS = TOTAL ERRORS minus RECOVERED ERRORS.
   MAXIMUM COUNTABLE ERRORS = TOTAL PASSES divided by a SET VALUE.

4. **PASS/ERROR RATIO**
   The number of passes versus the number of encountered errors.
   PASS/ERROR RATIO = NUMBER OF PASSES divided by COUNTABLE ERRORS.
   MINIMUM PASS/ERROR RATIO = NUMBER OF PASSES divided by a SET VALUE.

5. **FIRST PASS RETRIES**
   The total number of retries that were not successful. This value is a measure of diskette quality, as it will show how many persistant errors were encountered. If this value reaches five (5), a defective diskette is indicated and the test will halt.
   FIRST PASS RETRIES = NUMBER OF RETIRES minus FIRST RETRIES.
   These are determined for the first pass only.

6. **TRACK, ERRORS, FIRST PASS RETRIES**
   This listing breaks down all encountered errors on a per track basis. A defective diskette is indicated by errors concentrated on the same track or adjacent tracks.
   DISPLAYED ONLY IF AT LEAST ONE ERROR WAS ENCOUNTERED DURING TEST RUN TIME.

1571 GCR/MFM SOFT ERROR TEST (continued)

7. *ERROR TYPE, OPERATION, ERRORS*
This listing breaks down the errors according to the type of error, operation being performed when the error occurred and the number of errors encountered per type as follows:

ERROR TYPE

HEADER BLOCK NOT FOUND
The Header Block Identifier could not be found.

NO SYNC CHARACTER
A Sync Mark (10 or more consecutive 1 bits), on a given track could not be found within a predetermined amount of time and a time out occurred.

DATA BLOCK NOT FOUND
A decoded 8-bit byte which was read from the diskette did not compare to a preset block identifier.

DATA BLOCK CHECKSUM ERROR
The calculated checksum of a 256 byte data block did not match the actual checksum that was read from the diskette.

VERIFY ERROR AFTER WRITE
The data just written to a sector of the diskette when read back, does not verify with data stored in disk memory.

WRITE PROTECT ERROR
A write operation cannot be done to the diskette due to a write-protect tab on the diskette or a defective write-protect sensor.
DISPLAYED ONLY DURING THE MFM SOFT ERROR TEST.

HEADER CHECKSUM ERROR
The header checksum stored in disk memory, when EORed with an independent checksum does not compare.

ID MISMATCH ERROR
The Disk IDs, read from the header block, did not compare with the Disk IDs stored in disk memory.
DISPLAYED ONLY DURING THE MFM SOFT ERROR TEST.

DATE DECODE ERROR
The GCR Bytes, when converted to their original binary form, did not compare to the original binary code that was written.
DISPLAYED ONLY DURING THE GCR SOFT ERROR TEST.

DATA BLOCK CHECKSUM ERRORS AND DATA DECODE ERRORS ARE NORMALLY CAUSED BY RANDOM ELECTRICAL NOISE AND WILL USUALLY RECOVER IN ONE (1) RETRY.

1571 GCR/MFM SOFT ERROR TEST (continued)

OPERATION

READ — Data is read and verified against expected data.

WRITE — Data is written, stored in disk memory, read back and compared to disk memory data.

SEEK — The read/write head is moved to a predetermined track.

8. *ERROR TIME*
The total number of errors per each 20 passes. An increasing error rate indicates a bad diskette or a gradually failing drive.

9. *RECOVERY COUNT*
The total number of retries required to recover encountered errors.
MAXIMUM RETRIES = TEN (10) BEFORE AN ERROR IS CONSIDERED A HARD ERROR AND THE UNIT FAILS THE SOFT ERROR TEST.
A PERSISTANT ERROR, ONE REQUIRING MORE THAN ONE (1) RETRY, OR MORE THAN TWENTY (20) ERRORS RECOVERED IN THE FIRST RETRY, IS NORMALLY A SIGN OF A DEFECTIVE DRIVE MECHANISM OR MARGINAL COMPONENTS.

10. *PASS/FAIL*
The BOTTOM LINE whether or not the unit has passed the Soft Error Test for the allotted number of passes and a final status of test results.

SOFT ERROR TEST OPTION SIX — LOAD DIAGNOSTIC MENU

Insert the Version 1.1 Diagnostic Diskette

Press 'SPACE' — Load Diagnostic Menu

Press 'R' — Return to Main Menu

1571 ALIGNMENT/REPAIR TEST

DESIGNED TO TEST THE 1571 SINGLE DISK DRIVE.

REQUIRED EQUIPMENT: **C-128 Computer**
1571 Single Disk Drive
Dual Trace Scope
Volt Meter (Optional)
40 Column Monitor or TV Set
48 TPI Alignment Diskette (P/N 970016-01)
Version 1.1 Diagnostic Diskette

ALIGNMENT/REPAIR TEST — OPTION MENU

Press '1' — Drive Alignment

Press '2' — Zero Track Test/Adjust

Press '3' — Stepper Motor Slew Test

Press '4' — Stepper Motor Control Logic Test

Press '5' — Data Bus Write Test

Press '6' — Drive Motor Control Logic Test

Press '7' — Load Diagnostic Menu

ALIGNMENT/REPAIR TEST OPTION ONE — DRIVE ALIGNMENT

Press 'D' — Display Scope Settings

Press 'A' — Begin Radial Alignment

DISPLAY SCOPE SETTINGS

RADIAL ALIGNMENT SCOPE SETTINGS — PAGE 1

1. Set both channels to AC scale

2. Set both channels to 50 mv/div

3. Invert channel 2

4. Add both channels

5. Set sweep to 20 ms/div

6. Set trigger to auto mode

7. Make sure drive power is OFF

   Press 'SPACE' — Display Page 2

RADIAL ALIGNMENT SCOPE SETTINGS — PAGE 2

8. Remove Drive Power Supply and set it alongside the unit

9. Connect Scope Probes as follows:

   Probe 1 — Pin 13 — Hybrid IC (PCB Location U7)
   Probe 2 — Pin 14 — Hybrid IC (PCB Location U7)

1571 ALIGNMENT/REPAIR TEST (continued)

10. Insert 48 TPI Alignment Diskette
    Commodore Part Number - 970016-01

11. Turn drive power ON

   Press 'SPACE' — Begin Radial Alignment

   Press '1' — Page 1

BEGIN RADIAL ALIGNMENT

The Read/Write Head steps to Track 1

FAILURE —

DEFECTIVE DRIVE MECHANISM — (STEPPER MOTOR)

DEFECTIVE STEPPER MOTOR CONTROL LOGIC

   Press 'SPACE' — Step to Track 17

RADIAL ALIGNMENT TEST OPTIONS

   Press '+' — Step Head In

   Press '−' — Step Head Out

   Press '0' — Align Lower Head

   Press '1' — Align Upper Head

   Press 'M' — Return to Menu

RADIAL ALIGNMENT TEST OPTION ONE — STEP HEAD IN

This option will step the read/write head in (towards center of diskette), one track at a time.

RADIAL ALIGNMENT TEST OPTION TWO — STEP HEAD OUT

This option will step the read/write head out (towards outside of diskette), one track at a time.

RADIAL ALIGNMENT TEST OPTION THREE — LOWER HEAD ALIGNMENT CHECK

The CAT EYES should be visible and within 10% Amplitude of each other.

If the CAT EYES are not visible

   Press '+' — Step the Read/Write Head IN

   Press '−' — Step the Read/Write Head OUT

If the CAT EYES are not visible within two (2) track steps either way

   Refer to Upper Head Alignment — Page 1-14

If the CAT EYES are visible but not within 10% amplitude of each other

   Refer to Radial Alignment Procedures — Page 1-14

1571 ALIGNMENT/REPAIR TEST (continued)

If the CAT EYES are visible and within 10% amplitude of each other

> *Refer to Upper Head Alignment*

RADIAL ALIGNMENT TEST OPTION FOUR — UPPER HEAD ALIGNMENT CHECK

> *Remove the Alignment Diskette — Re-insert the disk upside down*
>
> *Press 'SPACE' — Step to Track 13*

The CAT EYES should be visible and within 10% amplitude of each other.

If the CAT EYES are not visible

> *Press '+' — Step the Read/Write Head IN*
>
> *Press '−' — Step the Read/Write Head OUT*

If the CAT EYES are not visible within two (2) track steps either way, but the CAT EYES were visible on the lower head alignment check

FAILURE —

> DEFECTIVE DRIVE MECHANISM — (READ/WRITE HEAD)
>
> If the CAT EYES are not visible within two (2) track steps either way, and the CAT EYES were not visible on the lower head alignment check

FAILURE —

> DEFECTIVE ALIGNMENT DISKETTE
>
> DEFECTIVE READ/WRITE CONTROL LOGIC
>
> DEFECTIVE DRIVE MECHANISM — (READ/WRITE HEAD)

If the CAT EYES are visible but not within 10% amplitude of each other

> *Refer to Radial Alignment Procedures*

If the CAT EYES are visible and within 10% amplitude of each other

> *Alignment is OK*

RADIAL ALIGNMENT OPTION FIVE — RETURN TO MAIN MENU

> *Press 'M' — Return to Main Menu*

RADIAL ALIGNMENT PROCEDURES

1. If the Alignment/Repair Main Menu is not displayed on the monitor, pressing 'M' should display the menu.

2. Remove any diskette that is installed in the unit.

1571 ALIGNMENT/REPAIR TEST (continued)

3. Turn the Disk Drive Power OFF.

4. If the Power Supply is not already removed, remove it and set it beside the unit.

5. Remove the Diskette Locking Lever. Remove the Drive Faceplate Assembly and re-install the Locking Lever back on the drive.

6. NEWTRONICS ONLY — Remove the Drive Assembly and set it on end at the front of the unit. It may be necessary to remove the plastic ties around the drive wires in order to get the drive assembly to set on end.

7. Insert the 48 TPI Alignment Diskette.

8. Select Alignment/Repair Test Option One (Drive Alignment), from the Alignment/Repair Main Menu.

9. Make sure all scope adjustments are correct and the probes are connected per the Radial Alignment Scope Settings Instructions — Page 1-12.

10. Turn the Disk Drive Power ON.

11. Begin Radial Alignment Test Option Three

    LOWER HEAD ALIGNMENT CHECK — Page 1-13

12. If the CAT EYES are not within 10% amplitude of each other:

    A. Loosen the two (2) Stepper Motor Mounting Screws and:
    NEWTRONICS — Turn the Stepper Motor while observing the CAT EYES signal
    ALPS — Slide the Stepper Motor while observing the CAT EYES signal.

13. When the CAT EYES are the same size:

    A. Hold the Stepper Motor in place and tighten the Stepper Motor Mounting Screws.

    If the CAT EYES do not stay the same, the Stepper Motor has moved when the Mounting Screws were tightened and it must be re-adjusted.

14. Begin Radial Alignment Test Option Four

    UPPER HEAD ALIGNMENT CHECK — Page 1-14.

15. If the CAT EYES are not within 10% amplitude of each other:

    A. Loosen the two (2) Stepper Motor Mounting Screws and:
    NEWTRONICS — Turn the Stepper Motor while observing the CAT EYES signal
    ALPS — Slide the Stepper Motor while observing the CAT EYES signal.

16. When the CAT EYES are the same size:

    A. Hold the Stepper Motor in place and tighten the Stepper Motor Mounting Screws.

    If the CAT EYES do not stay the same, the Stepper Motor has moved when the Mounting Screws were tightened and it must be re-adjusted.

17. Re-check the lower head alignment.

    If the Lower Head alignment is off, it may be necessary to adjust the Stepper Motor to get the best possible results of both the upper and lower head CAT EYES signals.

18. When alignment of both heads is complete, begin Alignment/Repair Test Option Two (Zero Track Stop Test/Adjust) — Page 1-16.

1571 ALIGNMENT/REPAIR TEST (continued)

ALIGNMENT/REPAIR TEST OPTION TWO — ZERO TRACK STOP TEST/ADJUST

> *Press 'C' — Check Zero Stop*

> *Press 'L' — Check Radial Alignment*

CHECK ZERO STOP ADJUSTMENT

Insert a Formatted Write-Protected Diskette

> *Press 'RETURN' — Check Zero Stop*

The Stepper Pulley rotates and bumps the Read/Write Head against the Zero Stop five (5) times.

FAILURE — DEFECTIVE DISKETTE

          ALIGNMENT OFF

          MISADJUSTED ZERO STOP

          DEFECTIVE TRACK ZERO SENSOR

If the Zero Stop Test Passes:

> *Press 'RETURN' — Return to Main Menu*

If the Zero Stop Test Fails:

> *Press 'R' — Retry Test*

> *Press 'A' — Adjustment Options*

> *Press 'RETURN' — Return to Main Menu*

ADJUSTMENT OPTIONS

> *Press 'A' — Adjust Zero Stop (ALPS)*

> *Press 'N' — Adjust Zero Stop (NEWT)*

> *Press 'L' — Check Radial Alignment*

ADJUST ZERO STOP (ALPS) — ALPS DRIVE ASSEMBLY

> DO NOT ADJUST THE STOP UNTIL RADIAL ALIGNMENT IS CHECKED

1. Loosen the two (2) Stop Fixing Screws and rotate the stop plate toward the rear of the drive.

   > *Press 'SPACE' — Set Zero Stop*

2. The Stepper Pulley should rotate to the adjustment position.

3. Gently press down at the Top Center of the Stop Plate until it stops.

4. Tighten the two (2) Stop Fixing Screws. (REAR SCREW FIRST)
   THE HEAD MUST NOT MOVE WHEN THESE SCREWS ARE TIGHTENED.

   > *Press 'SPACE' — Re-check Stop Adjust*

1571 ALIGNMENT/REPAIR TEST (continued)

ADJUST ZERO STOP (NEWT) — NEWTRONICS DRIVE ASSEMBLY

> DO NOT ADJUST THE STOP UNTIL RADIAL ALIGNMENT IS CHECKED
>
> IT IS VERY IMPORTANT THAT THE STOP GAP BE WITHIN THE ALLOWED LIMITS
>
> THE OPTIMAL SETTING FOR THE STOP GAP IS .008 OF AN INCH

1. Loosen the two (2) Stop Fixing Screws and slide the stop to the rear.

    Press 'SPACE' — Set Zero Stop

2. The Stepper Pulley should rotate to the adjustment position.

3. Slide the stop forward and use a Standard Feeler Gauge, to adjust the stop to .006 — .010 of an inch — (.008 optimal).

4. Tighten the two (2) Stop Fixing Screws.
    THE STOP MUST NOT MOVE WHEN THESE SCREWS ARE TIGHTENED.

    Press 'SPACE' — Re-check Stop Adjusted

ALIGNMENT/REPAIR TEST OPTION THREE — STEPPER MOTOR SLEW TEST

   Press 'O' — Step Head Tracks 1-35

   Press 'M' — Return to Menu

STEPPER MOTOR SLEW CHECK

The STEPPER MOTOR SLEW TEST checks for proper operation of the stepper motor by slewing the read/write head between track 1 and track 35 (Inner and Outer Tracks). The head should move smoothly and freely with no sticking or binding of the stepper mechanism.

FAILURE —

DEFECTIVE DRIVE ASSEMBLY — (STEPPER MOTOR)

DEFECTIVE STEPPER MOTOR CONTROL LOGIC

   Press 'M' — Return to Main Menu

ALIGNMENT/REPAIR TEST OPTION FOUR — STEPPER MOTOR CONTROL LOGIC TEST

STEPPER MOTOR CONTROL LOGIC TEST OPTIONS

   Press '+' — Step the Read/Write Head IN

   Press '-' — Step the Read/Write Head OUT

   Press 'M' — Return to Main Menu

1571 ALIGNMENT/REPAIR TEST (continued)

STEPPER MOTOR CONTROL LOGIC TEST OPTION ONE — STEP THE READ/WRITE IN

STEPPER MOTOR CONTROL LOGIC TEST OPTION TWO — STEP THE READ/WRITE HEAD OUT

These options will step the read/write head in/out one track at a time. When the head is stepped, the status of the STP 0 and STP 1 signals (0 or 1), will be displayed. Using a scope or meter, verify the measured signal with the expected signal from the Stepper Motor Control Logic Chart.

ANY INCORRECT SIGNAL NORMALLY INDICATES A DEFECTIVE COMPONENT

STEPPER MOTOR CONTROL LOGIC — BASIC CHART 1

STP 0 DISPLAY	STP 1 DISPLAY	CHECK IC PINS	EXPECTED SIGNAL	INCORRECT SIGNAL SEE ADVANCED CHART
0	0	U7 - 25, 28	0 VDC	
0	0	U7 - 24, 27	+5 VDC	
0	1	U7 - 25, 28	+5 VDC	
0	1	U7 - 24, 27	0 VDC	
1	0	U7 - 25	0 VDC	
1	0	U7 - 28	+5 VDC	
1	0	U7 - 24	0 VDC	
1	0	U7 - 27	+5 VDC	
1	1	U7 - 25	+5 VDC	
1	1	U7 - 28	0 VDC	
1	1	U7 - 24	+5 VDC	
1	1	U7 - 27	0 VDC	

STEPPER MOTOR CONTROL LOGIC — BASIC CHART 2

These signals must be measured while one of the keys (+ / −), is being held down and the head is being stepped either in or out.

CHECK IC PINS	EXPECTED SIGNAL	INCORRECT SIGNAL PROBABLE FAILURE
U13 - 4	0 VDC LEVEL TO +5 VOLT POSITIVE PULSES	U13 - U22
U16 - 13	0 VDC LEVEL TO +5 VOLT POSITIVE PULSES	U22 - U16
U16 - 12	+12 VDC LEVEL TO 0 VOLT NEGATIVE PULSES	U16 - Q1

CHECK CN5 PINS	EXPECTED SIGNAL	INCORRECT SIGNAL PROBABLE FAILURE
1	+5 VDC LEVEL TO +12 VOLT POSITIVE PULSES	Q1 - CR10

1571 ALIGNMENT/REPAIR TEST (continued)

STEPPER MOTOR CONTROL LOGIC — ADVANCED CHART

STP 0 DISPLAY	STP 1 DISPLAY	CHECK IC PINS	EXPECTED SIGNAL	INCORRECT SIGNAL PROBABLE FAILURE
0	0	U4 - 10	0 VDC	U4 - U13 - U17
0	0	U4 - 11	0 VDC	U4 - U13 - U14 - U8
0	0	U13 - 3	+5 VDC	U13 - U6
0	0	U7 - 23	0 VDC	U6 - U7
0	0	U7- 30	0 VDC	U13 - U7
0	0	U7 - 29	$1 VDC	U6 - U7
0	0	U7 - 31	+1 VDC	U8 - U7
0	0	U7 - 25, 28	0 VDC	U7
0	0	U7 - 24, 27	+5 VDC	U7
0	1	U4 - 10	0 VDC	U4 - U13 - U17
0	1	U4 - 11	+5 VDC	U4 - U13 - U14 - U8
0	1	U13 - 3	0 VDC	U13 - U6
0	1	U7 - 23	+1 VDC	U6 - U7
0	1	U7 - 30	+1 VDC	U13 - U7
0	1	U7 - 29	0 VDC	U6 - U7
0	1	U7 - 31	0 VDC	U8 - U7
0	1	U7 - 25, 28	+5 VDC	U7
0	1	U7 - 24, 27	0 VDC	U7
1	0	U4 - 10	+5 VDC	U4 - U13 - U17
1	0	U4 - 11	0 VDC	U4 - U13 - U14 - U8
1	0	U13 - 3	0 VDC	U13 - U6
1	0	U7 - 23	+1 VDC	U6 - U7
1	0	U7 - 30	0 VDC	U13 - U7
1	0	U7 - 29	0 VDC	U6 - U7
1	0	U7 - 31	+1 VDC	U8 - U7
1	0	U7 - 25	0 VDC	U7
1	0	U7 - 28	+5 VDC	U7
1	0	U7 - 24	0 VDC	U7
1	0	U7 - 27	+5 VDC	U7
1	1	U4 - 10	+5 VDC	U4 - U13 - U17
1	1	U4 - 11	+5 VDC	U4 - U13 - U14 - U8
1	1	U13 - 3	+5 VDC	U13 - U6
1	1	U7 - 23	0 VDC	U6 - U7
1	1	U7 - 30	+5 VDC	U13 - U7
1	1	U7 - 29	+5 VDC	U6 - U7
1	1	U7 - 31	0 VDC	U8 - U7
1	1	U7 - 25	+5 VDC	U7
1	1	U7 - 28	0 VDC	U7
1	1	U7 - 24	+5 VDC	U7
1	1	U7 - 27	0 VDC	U7

STEPPER MOTOR CIRCUIT TEST OPTION THREE — RETURN TO MAIN MENU

Press 'M' — Return to Menu

1571 ALIGNMENT/REPAIR TEST (continued)

ALIGNMENT REPAIR TEST OPTION FIVE — DATA BUS WRITE TEST

Input a two (2) character hex code - (00 thru FF)
Followed by a drive side selection — (0 or 1)

Press 'M' — Return to Menu

DATA BUS WRITE CHECK

WARNING
REMOVE DISKETTE FROM THE DRIVE BEFORE RUNNING THIS TEST

The DATA BUS WRITE TEST checks for proper Data Bus and IC Operation by forcing the data lines to a known condition. When a HEX Code is input the status of the data bus is displayed in Binary Form. (0 = Low — 1 = High). Using a scope, verify the measured data with the expected data from the Data Bus Write Chart.

DATA BUS WRITE CHART			
CHECK FOR DATA LINES HELD HIGH — INPUT HEX CODE '00'			
DATA BUS DISPLAY	CHECK IC PINS	EXPECTED SIGNAL	INCORRECT SIGNAL PROBABLE FAILURE
00000000	U4 - 2, 3, 4, 5 6, 7, 8, 9	DIGITAL LOW	U4 - U6
00000000	U6 - 37	DIGITAL LOW	U6 - U14
00000000	U6 - 38	DIGITAL HIGH	U6 - U14
00000000	U7 - 9	DIGITAL LOW	U14 - U7
00000000	U7 - 10	DIGITAL HIGH	U14 - U7
00000000	U7 - 6	ANALOG LOW	U7 - CR3 - CR4
00000000	U7 - 8	ANALOG LOW	U7 - CR7 - CR8

CHECK FOR DATA LINES HELD LOW — INPUT HEX CODE 'FF'			
NOTE: HEX (FF) DATA IS APPROXIMATELY TWICE THE FREQUENCY OF HEX (55) DATA			
DATA BUS DISPLAY	CHECK IC PINS	EXPECTED SIGNAL	INCORRECT SIGNAL PROBABLE FAILURE
11111111	U4 - 2, 3, 4, 5 6, 7, 8, 9	DIGITAL HIGH	U4 - U6
11111111	U6 - 37, 38	SERIAL DATA (FF)	U6 - U14
11111111	U7 - 9, 10	SERIAL DATA (FF)	U14 - U7
11111111	U7 - 6	ANALOG DATA (FF)	U7 - CR3 - CR4
11111111	U7 - 8	ANALOG DATA (FF)	U7 - CR7 - CR8

1571 ALIGNMENT/REPAIR TEST (continued)

CHECK FOR ALTERNATING DATA LINES — INPUT HEX CODE '55'
NOTE: HEX (55) DATA IS APPROXIMATELY HALF THE FREQUENCY OF HEX (FF) DATA

DATA BUS DISPLAY	CHECK IC PIN	EXPECTED SIGNAL	INCORRECT SIGNAL PROBABLE FAILURE
01010101	U4 - 2, 4, 6, 8	DIGITAL HIGH	U4 - U6
01010101	U4 - 3, 5, 7, 9	DIGITAL LOW	U4 - U6
01010101	U6 - 37, 38	SERIAL DATA (55)	U6 - U14
01010101	U7 - 9, 10	SERIAL DATA (55)	U14 - U7
01010101	U7 - 6	ANALOG DATA (55)	U7 - CR3 - CR4
01010101	U7 - 8	ANALOG DATA (55)	U7 - CR7 - CR8

DATA BUS WRITE CHART			
CHECK FOR ALTERNATING DATA LINES — INPUT HEX CODE 'AA'			
DATA BUS DISPLAY	CHECK IC PINS	EXPECTED SIGNAL	INCORRECT SIGNAL PROBABLE FAILURE
10101010	U4 - 2, 4, 6, 8	DIGITAL LOW	U4 - U6
10101010	U4 - 3, 5, 7, 9	DIGITAL HIGH	U4 - U6
10101010	U6 - 37, 38	SERIAL DATA (AA)	U6 - U14
10101010	U7 - 9, 10	SERIAL DATA (AA)	U14 - U7
10101010	U7 - 6	ANALOG DATA (AA)	U7 - CR3 - CR4
10101010	U7 - 8	ANALOG DATA	U7 - CR7 - CR8

CHECK FOR ALTERNATING DOUBLE ADDRESS LINES — INPUT HEX CODE '66'
NOTE: HEX (66) DATA IS DIRECTLY INVERSE TO HEX (99) DATA

DATA BUS DISPLAY	CHECK IC PINS	EXPECTED SIGNAL	INCORRECT SIGNAL PROBABLE FAILURE
01100110	U4 - 2, 5, 6, 9	DIGITAL LOW	U4 - U6
01100110	U4 - 3, 4, 7, 8	DIGITAL HIGH	U4 - U6
01100110	U6 - 37, 38	SERIAL DATA (66)	U6 - U14
01100110	U7 - 9, 10	SERIAL DATA (66)	U14 - U7
01100110	U7 - 6	ANALOG DATA (66)	U7 - CR3 - CR4
01100110	U7 - 8	ANALOG DATA (66)	U7 - CR7 - CR8

1571 ALIGNMENT/REPAIR TEST (continued)

CHECK FOR ALTERNATING DOUBLE ADDRESS LINES — INPUT HEX CODE '99'			
NOTE: HEX (99) DATA IS DIRECTLY INVERSE TO HEX (66) DATA			
DATA BUS DISPLAY	**CHECK IC PIN**	**EXPECTED SIGNAL**	**INCORRECT SIGNAL PROBABLE FAILURE**
10011001	U4 - 2, 5, 6, 9	DIGITAL HIGH	U4 - U6
10011001	U4 - 3, 4, 7, 8	DIGITAL LOW	U4 - U6
10011001	U4 - 37, 38	SERIAL DATA (99)	U6 - U14
10011001	U4 - 9, 10	SERIAL DATA (99)	U14 - U7
10011001	U4 - 6	ANALOG DATA (99)	U7 - CR3 - CR4
10011001	U4 - 8	ANALOG DATA (99)	U7 - CR7 - CR8

ALIGNMENT/REPAIR TEST OPTION SIX — DRIVE MOTOR CONTROL LOGIC TEST

DRIVE MOTOR CONTROL LOGIC TEST OPTIONS

> *Press '1' — Turn Motor ON*

> *Press '0' — Turn Motor OFF*

> *Press 'M' — Return to Main Menu*

DRIVE MOTOR CONTROL LOGIC TEST OPTION ONE — TURN DRIVE MOTOR ON

DRIVE MOTOR CONTROL LOGIC TEST OPTION TWO — TURN DRIVE MOTOR OFF

These options will force the drive motor into a known condition and display the expected status (ON/OFF). Using a scope or meter, verify the measured signal with the expected signal from the Drive Motor Control Logic Chart.

DRIVE MOTOR CONTROL LOGIC CHART			
DRIVE MOTOR DISPLAY	**CHECK IC PINS**	**EXPECTED SIGNAL**	**INCORRECT SIGNAL PROBABLE FAILURE**
OFF	U4 - 12	DIGITAL LOW	U4 - U16
OFF	U16 - 10	DIGITAL HIGH	U16
ON	U4 - 12	DIGITAL HIGH	U4 - U16
ON	U16 - 10	DIGITAL LOW	U16

DRIVE MOTOR CONTROL LOGIC OPTION THREE — RETURN TO MAIN MENU

> *Press 'M' — Return to Main Menu*

ALIGNMENT/REPAIR TEST OPTION SEVEN — LOAD DIAGNOSTIC MENU

Insert the Version 1.1 Diagnostic Diskette

> *Press 'SPACE' — Load Diagnostic Menu*

> *Press 'R' — Return to Menu*

SECTION TWO

COMPUTER DIAGNOSTIC
AND TEST PROGRAMS

C-64 MODE TEST

DESIGNED TO TEST THE C-64 MODE OF THE C-128

REQUIRED EQUIPMENT: **C-128 Computer**
1571 Single Disk Drive
40 Column Monitor or TV Set
Version 1.1 Diagnostic Diskette

The C-64 Mode Test is used as a burn-in diagnostic to test the C-64 Mode of the C-128. The test will switch the C-128 to C-64 Mode and auto execute when loaded.

Rows of Squares are displayed simulating IC's and Numbers representing their location on the PCB.

DEFECTIVE IC'S ARE INDICATED BY LOCATIONS BLACKED OUT ON THE DISPLAY

TESTING OF THE SID IC IS DONE BY AUDIBLE TONES ONLY

FOR MORE DETAILED TESTING THE C-128 DIAGNOSTIC CARTRIDGE SHOULD BE USED.

C-128/80 COLUMN

DESIGNED TO TEST THE 80 COLUMN MODE OF THE C-128

REQUIRED EQUIPMENT: **C-128 Computer**
1571 Single Disk Drive
40 Column Monitor or TV Set
Version 1.1 Diagnostic Diskette

TO BE COMPLETED AT A LATER DATE

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RAM EXPANSION

DESIGNED TO TEST THE 1700 OR 1750 EXTERNAL RAM EXPANDER

REQUIRED EQUIPMENT: **C-128 Computer**
1571 Single Disk Drive
Model 1700 or 1750 RAM Expansion Module
40 Column Monitor or TV Set
Version 1.1 Diagnostic Diskette

NOTE

THE 1700/1750 RAM EXPANDER WILL NOT OPERATE PROPERLY WITH THE REV 6 PCB INSTALLED IN THE C-128. IF THIS PROBLEM ARISES, THE PCB MUST BE REPLACED WITH A REV 7 PCB OR HIGHER.

THE RAM EXPANSION MODULE MUST BE INSERTED IN THE C-128 BEFORE POWER IS APPLIED TO THE SYSTEM AND THE RAM EXPANSION TEST RUN.

The RAM EXPANSION TEST is used to diagnose failures of the REC (RAM EXPANSION CONTROLLER), RAM IC's and any ROM which may be installed in the CBM Model 1700 (128K) or 1750 (512K) RAM Expansion Modules.

The RAM Expansion Test auto-executes when loaded from the Diagnostic Menu and displays a picture of the RAM Expansion Module on the screen. If a failure occurs during run time, the IC Location displays in reverse field and a 'BD' (BAD), message is displayed in the Defective IC Location. If no failure is detected, an 'OK' is displayed.

The number displayed in the upper left hand corner of the screen is the RAM Expansion Test Version and does not effect diagnostic testing.

The size of the Expansion Module (1700 - 128K/1750 - 512K), is determined by the program and is displayed in the upper right hand corner of the screen.

If the incorrect size is displayed, it may indicate a defective REC.

The number of completed cycles, 'COUNT', is displayed in the lower left hand corner of the screen. The length for a completed pass is dependent on the size of the Expansion Module.

Two (2) clocks (AM/PM), are displayed in the bottom right hand corner of the screen. The AM Clock corresponds to the Time-Of-Day-Clock of the 6526 CIA at U1, and the PM Clock corresponds to the Time-Of-Day-Clock of the 6526 CIA at U4. Both U1 and U4 are located on the C-128 PCB.

These two (2) clocks must display the EXACT SAME TIME during diagnostic run time and increment as diagnostic testing continues.

TIME-OF-DAY-CLOCK FAILURES

Incorrect AM Clock — Possible 6526 CIA Failure — U1

Incorrect PM Clock — Possible 6526 CIA Failure — U4

Incorrect Both Clocks — Possible 60HZ TOD Input Failure

8726 REC (RAM EXPANSION CONTROLLER)

The REC is a DMA device used to transfer blocks of data between the C-128 and the Expansion RAM. The majority of REC failures are detected by testing the Verify Option of the REC first. This is done

RAM EXPANSION (continued)

by testing both VERIFY and VERIFY ERROR conditions with the Interrupts ON. If either test fails the REC is 'BAD'. If both Verify Conditions are met the test continues. The SWAP option is tested by loading the Expansion RAM with a Preselected Random Pattern, clearing the Host RAM, and Swapping RAM. The two RAM areas are then compared. If either RAM area fails to compare with the pattern the REC is 'BAD'. If both RAM Areas compare with the pattern the REC is 'OK'.

Some REC Failures are not so easily detected but may be determined by the overall test results, e.g. BAD RAM Patterns for BANK 0 match BANK 1.

C-128 HOST RAM

The architecture of the 1700/1750 RAM Expansion Module requires an area of RAM within the C-128 to be allocated. This RAM is referred to as 'HOST RAM'. Since the test data is first placed in this area and transferred to the RAM Expander for testing and back again, it is necessary to insure that the 'HOST RAM' functions properly. The C-128 Diagnostic Cartridge is used for this purpose. A failure in the Host RAM will cause incorrect results during the RAM Expansion Test.

RAM EXPANDER TEST

A Test Pattern is placed in the first Memory Location at Host RAM where it is duplicated to fill the remaining area. When this is complete the Host RAM is transferred to Expansion RAM. This transfer procedure is duplicated until all banks of the Expansion RAM are filled. After a set time, to allow for refresh, the data is transferred back to Host RAM and compared to the Test Byte. If DATA READ = DATA WRITTEN, RAM is 'OK'. If DATA READ ≠ DATA WRITTEN, RAM is 'BAD'.

DYNAMIC RAM

Because the 1700/1750 RAM Expander uses Dynamic RAM, a Refresh Cycle must occur at least every two (2) milliseconds. This is the time most RAM failures occur. Each RAM Test in the RAM Expansion Diagnostic allows for RAM Refresh. Displayed failures are valid only for the first pass after which defective IC's should be replaced and the test restarted. Further testing will display incorrect results.

CUSTOM TEST PATTERN TESTING

The RAM Test Pattern Table is located between HEX 2261 and HEX 2274 (inclusive). This table contains the Bit Patterns used for Expansion RAM Testing. If a different Test Pattern is desired, the following steps must be utilized:

1. Type DLOAD"RAM EXPANDER" — Press (RETURN)

2. Type POKE 8801 (Enter Decimal Test Pattern) — Press (RETURN)

3. Type RUN — Press (RETURN)

The RAM Expander Test will now be executed using the selected Test Pattern.

EXTERNAL ROM TEST

Although the External ROM Location (U18 of Expansion PCB), is not currently used, the RAM Expansion Diagnostic includes a test to detect a failure of any ROM which may be used in the future. The ROM is tested by adding the contents of each address to a value equal to the sum of the data in all the preceding addresses. This is referred to as a 'CHECKSUM' and the value is displayed in a HEX Format. The displayed checksum may change from one pass to another as only an empty slot is being read at the current time, however, it should be consistant between different RAM Expanders. A Checksum which is consistent between different RAM Expanders may be an indication of a defective PLA on the C-128 PCB.

SECTION THREE

DISK DRIVE
UTILITY PROGRAMS

1571 DISK COPY

3-1

DESIGNED TO COPY FILES FROM ONE 1571 TO ANOTHER.

REQUIRED EQUIPMENT: C-128 Computer
(2) 1571 Single Disk Drive
40 Column Monitor or TV Set
Data Diskette
Blank Test Diskette
Version 1.1 Diagnostic Diskette

THE UNITS BEING USED MUST BE SET AT DIFFERENT DEVICE NUMBERS

CHANGE DEVICE NUMBER OPTION

If 'Y'es is selected:

1. Input the original device number.

2. Input new device number.

3. Turn OFF power to all drives except the one to be changed.

   Press 'SPACE' — Change Device Number.

If 'N'o is selected:

1. Select File Transfer Options.

FILE TRANSFER OPTION

1. Input Copy from Unit (Source Drive Device Number).

2. Input Drive Number (0 or 1) — Always '0' for the 1571.

3. Input Copy to Unit (Destination Drive Device Number).

4. Input Drive Number (0 or 1) — Always '0' for the 1571.

NAME-SEARCH PATTERN OPTION

1. If a File Name is entered, only that file will be displayed for the File Copy Selection Option.

2. If selected characters are entered, only files which begin with these characters will be displayed for the File Copy Selection Option.

3. If 'RETURN' is selected, all files will be displayed for the File Copy Selection Option.

1571 DISK COPY (continued)

FILE COPY SELECTION OPTION

The files will be displayed in the following format:

FILE SIZE   FILE NAME   FILE TYPE

1. Press 'Y'es if the displayed file is to be copied.

2. Pressing 'Y'es followed by 'RETURN' at any file will copy all the remaining files.

3. Press 'N'o if the displayed file is to be skipped.

4. Pressing 'N'o followed by 'RETURN' at any file will skip all the remaining files.

DESTINATION DISKETTE NEW OPTION

If the Destination Diskette is Blank or the Information Contained is no longer required a 'Y'es should be selected.

If the Destination Diskette Contains Valid Data and Files are to be added, a 'N'o should be selected.

If 'Y'es is selected:

1. Enter the Name and ID to be assigned the Destination Diskette.

The Name Assigned to the Destination Diskette is limited to a length of (16) Characters, and may be either Alpha, Numeric or a Combination.

The ID Assigned to the Destination Diskette is limited to a length of (2) Characters, and may be either Alpha or Numeric but Not a Combination.

When the Destination Diskette has been Formatted, the Blocks Free on the Destination Diskette are displayed and the Disk Copy begins.

If 'N'o is selected:

The Blocks Free on the Destination Diskette will be displayed and the Disk Copy beigns.

DISK COPY

The files being copied are displayed in the following format:

SOURCE FILE SIZE   SOURCE FILE NAME   SOURCE FILE TYPE   DESTINATION FILE SIZE

The Source File Size and the Destination File Size represent the number of blocks the file takes up on the diskette.

IF SOURCE FILE SIZE   DESTINATION FILE SIZE after the file has been copied, an error has occurred during the copy.

ANOTHER COPY OPTION

1. If 'Y'es is selected, the Disk Copy restarts and another diskette may be copied.

2. If 'N'o is selected, the Disk Copy is terminated.

1571 DISK FORMATTER

DESIGNED TO FORMAT A BLANK DISKETTE.

REQUIRED EQUIPMENT: C-128 Computer   **Blank Test Diskette**
                       1571 Single Disk Drive   **Version 1.1 Diagnostic Diskette**
                       40 Column Monitor or TV Set

SELECT DEVICE NUMBER OPTION MENU

> *Press '8' — Device (8)*
>
> *Press '9' — Device (9)*
>
> *Press 'A' — Device (10)*
>
> *Press 'B' — Device (11)*
>
> *Press 'L' — Load Diagnostic Menu*

SELECT DRIVE TYPE OPTION MENU

> *Press '4' — Format as a 1541 (Single Side)*
>
> *Press '7' — Format as a 1571 (Double Side)*

FORMAT INFORMATION OPTION

    1. Enter a Name to be Assigned to the Blank Diskette.
The Assigned Name is limited to a length of (16) Characters and may be either Alpha, Numeric or a Combination.

    2. Enter an ID to be Assigned to the Blank Diskette.
The Assigned ID is limited to a length of (2) Characters and may be either Alpha or Numeric but Not a Combination.

FORMATTING DESTROYS ALL DATA STORED ON THE DISKETTE

> *Press 'F' — Start Disk Format (All Information Correct)*
>
> *Press 'A' — Abort Disk Format (Wrong Information Entered)*
>
> *Press 'L' — Load Diagnostic Menu*

SCREEN DISPLAY

During Formatting, the complete format information is displayed as:

DISK NAME — Name assigned to the diskette

DISK TYPE — 1541 or 1571

ID CODE — ID assigned to the diskette

DEVICE NUMBER — Device 8 thru 11

When formatting is Complete, the Disk Status (GOOD/BAD), is displayed.

> *Press 'SPACE' — Restart Disk Formatter*
>
> *Press 'E' — End Program*
>
> *Press 'L' — Load Diagnostic Menu*

1571 FILE SCRATCHER

DESIGNED TO SCRATCH FILES FROM A DATA DISKETTE

REQUIRED EQUIPMENT: C-128 Computer
1571 Single Disk Drive
40 Column Monitor or TV Set
Data Diskette
Version 1.1 Diagnostic Diskette

SELECT DEVICE NUMBER OPTION MENU

> *Press '8' — Device (8)*
>
> *Press '9' — Device (9)*
>
> *Press 'A' — Device (10)*
>
> *Press 'B' — Device (11)*
>
> *Press 'L' — Load Diagnostic Menu*

SCRATCH INFORMATION OPTION

1. Enter the name of the file to be scratched.

The File Name is limited to a length of (16) Characters and may be either Alpha, Numeric or a Combination.

> *Press 'S' — Scratch File (All Information Correct)*
>
> *Press 'A' — Abort Scratch (Wrong Information Entered)*
>
> *Press 'L' — Load Diagnostic Menu*

SCREEN DISPLAY

During Scratching, the complete scratch information is displayed as:

SCRATCHING FILE — Name of the file being scratched

DEVICE NUMBE R — Device 8 thru 11

When the scratch is Complete, the Disk Status (GOOD/BAD) is displayed.

> *Press 'SPACE' — Restart File Scratcher*
>
> *Press 'L' — Load Diagnostic Menu*
>
> *Press 'E' — End Program*

If the 'L' or 'E' options are selected, the BAM is updated by the program.

1571 FILE UNSCRATCHER

DESIGNED TO RECOVER SCRATCHED FILES FROM A DATA DISKETTE

REQUIRED EQUIPMENT: C-128 Computer   **Data Diskette**
                              1571 Single Disk Drive   **Version 1.1 Diagnostic Diskette**
                              40 Column Monitor or TV Set

Occasionally a file may be scratched from a data diskette by mistake. The File Unscratcher may be used to restore this file back to it's original condition.

> IF ANY TYPE OF DISK WRITE OPERATION, SUCH AS SAVING A FILE OR BAM UPDATING, IS DONE ON THE DISKETTE AFTER THE FILE IS SCRATCHED, THE FILE MAY NO LONGER BE ABLE TO BE RESTORED.

SELECT DEVICE NUMBER OPTION MENU

> *Press '8' — Device (8)*
>
> *Press '9' — Device (9)*
>
> *Press 'A' — Device (10)*
>
> *Press 'B' — Device (11)*
>
> *Press 'L' — Load Diagnostic Menu*

Insert Source Diskette.

> *Press 'SPACE' — Diskette inserted.*

UNSCRATCH INFORMATION OPTION

> 1. Enter the name of the file to be restored.

The File Name is limited to a length of (16) Characters and may be either Alpha, Numeric or a Combination.
If a file name is entered, only that file will be restored.
If selected characters are entered, all files which begin with these characters will be restored.
If 'STOP' is selected the program will terminate.

SCREEN DISPLAY

If the file entered has been scratched from the data diskette, the track and sector locations of the file are displayed.

> *Press 'S' — Restore File (All Information Correct)*
>
> *Press 'A' — Abort Unscratcher (Wrong Information Entered)*
>
> *Press 'L' — Load Diagnostic Menu*

When the file has been restored:

> *Press 'SPACE' — Unscratch More Files*
>
> *Press 'R' — Restart File Unscratcher*
>
> *Press 'L' — Load Diagnostic Menu*
>
> *Press 'E' — End Program*

If the 'L' or 'E' options are selected, the BAM is updated by the program.

SECTION FOUR

BASIC COMMANDS
C-128

BASIC C-128 COMMANDS

The following are some of the most common Basic Commands used in the operation of the C-128 Computer. Also listed is a format example of each command. For more detailed information please refer to the C-128 System Guide.

COMMAND FUNCTION	COMMAND FORMAT
'FORMAT' or 'NEW' *a blank diskette*	header"disk name",dX,iID,uDN * DISK NAME = any combination of digits or letters. (up to 16 characters) * X = drive number (always 0 on 1571) Not necessary on the 1571 Single Disk Drive * ID = any 2 digits or 2 letters. * DN = device number Not necessary if the device nmber is set at (8)

Example: To format a diskette called (commodore) with the ID (bm) in drive (0) of device number (8).
 	
      header "commodore",d0,ibm — (PRESS RETURN)
      at the (are you sure?) prompt — PRESS 'Y' — RETURN
 	
Example: To format a diskette called (commodore) with the ID (bm) in drive (0) of device number (9).
 	
      header "commodore", d0,ibm,u9 at the
      at the (are you sure?) prompt — PRESS 'Y' — RETURN	

'SAVE' a program on *a diskette*	dsave"program name",dX,uDN * PROGRAM NAME = any combination of digits or letters. (up to 16 characters) * X = drive number (always 0 on 1571) Not necessary on the 1571 Single Disk Drive * DN = device number Not necessary if the device number is set at (8)

Example: To save a program called (commodore) to drive (0) of device number (8).
 	
      dsave"commodore" — (PRESS RETURN)
 	
Example: To save a program called (commodore) to drive (0) of device number (9).
 	
      dsave"commodore",u9 — (PRESS RETURN)	

BASIC C-128 COMMANDS (continued)

COMMAND FUNCTION	COMMAND FORMAT
'LOAD' a program from disk	dload"program name",dX,uDN * PROGRAM NAME = name of the program to be loaded. (Spelling must be exactly as it is on the diskette) * X = drive number (always 0 on 1571) Not necessary on the 1571 Single Disk Drive * DN = device number Not necessary if the device number is set at (8)
Example: Load a program called (commodore) from drive (0) of device number (8).	dload"commodore",d0 — (PRESS RETURN)
Example: Load a program called (commodore) from drive (0) of device number (9).	dload"commodore",d0,u9 — (PRESS RETURN)
'RENAME' a file to another name	renamedX,"old program"to"new program",uDN * X = drive number (always 0 on 1571) * OLD PROGRAM = original name of the file * NEW PROGRAM = new name of the file * DN = device number Not necessary if the device number is set to (8)
Example: To change the name of a file called (commodore) to (cbm) on drive (0) of device number (8).	renamed0,"commodore"to"cbm" — (PRESS RETURN)
Example: To change the name of a file called (commodore) to (cbm) on drive (0) of device number (9).	renamed0"commodore"to"cbm",u9 - (PRESS RETURN)
'INITIALIZE' the disk drive	open1,DN,15:print#1,"iX" close 1 * DN = device number * X = drive number (always 0 on 1571)
Example: To initialize drive (0) of device number (8).	open 1,8,15:print#1,"i0" - (PRESS RETURN) close 1 — (PRESS RETURN)
Example: To initialize drive (0) of device number (9).	open 1,9,15:print#1,"i0" — (PRESS RETURN) close 1 — (PRESS RETURN)

BASIC C-128 COMMANDS (continued)

COMMAND FUNCTION	COMMAND FORMAT
'READ' diskette directory	directory dX,uDN * X = drive number (always 0 on 1571) * DN = device number Not necessary if device number is set at (8)
	Example: To read the directory from drive (0) of device number (8). directory d0 — (PRESS RETURN) *Example: To read the directory from drive (0) of device number (9).* directory d0,u9 — (PRESS RETURN)
'SCRATCH' a file from a diskette	scratch"program name",dX,uDN * PROGRAM NAME = any combination of digits or letters. (up to 16 characters) * X = drive number (always 0 on 1571)) * DN = device number Not always necessary if device number is set at (8)
	Example: To scratch a file named (commodore) from drive (0) of device number (8). scratch"commodore",d0 — (PRESS RETURN) *Example: To scratch a file named (commodore) from drive (0) of device number (9).* scratch"commodore",d0,u9 — (PRESS RETURN)

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