COMMODORE DISKETTE DIAGNOSTIC MANUAL 1571 VERSION 1.0

Preliminary

PN 314055-01

commodore COMPUTERS

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VERSION 1.0 TEST DISKETTE INTRODUCTION

THIS MANUAL AND THE DISK BASED TESTS ARE PRELIMINARY. WHEN FINAL TESTS ARE COMPLETED THEY WILL BE RELEASED ALONG WITH ANY NECESSARY UPDATES TO THE MANUAL.

This manual was developed to aid you in the use of the Diagnostics available for Repair Troubleshooting of the 1571 Single Disk Drive.

The below listing is the directory of the Version 1.0 Test Diskette and a brief explanation of each program. More detailed information is contained inside this manual.

Disk Name — 1571 Test V1.0

PGM 1 — "Menu"	** Diagnostic Test Menu for 1571 Test V 1.0 Disk
PGM 2 — "Logic Bin"	** Binary File Loaded Prior to the Logic Diagnostic
PGM 3 — "Logic Diagnostic"	** Logic Test and Flash Code for 1571
PGM 4 — "System Test"	** System Test for the 1571
PGM 5 — "System Test Bin1"	** Binary File Loaded Prior to the System Test
PGM 6 — "System Test Bin2"	** Binary File Loaded Prior to the System Test
PGM 7 — "Performance Test"	** Performance Read/Write Test for the 1571
PGM 8 — "Performance Bin"	** Binary File Loaded Prior to Performance Test
PGM 9 — "Read/Write Test"	** Read/Write Test for the 1571
PGM 10 — "Read/Write Bin"	** Binary File Loaded Prior to Read/Write Test
PGM 11 — "Final Test"	** Final Test for the 1571
PGM 12 — "Final Test Bin"	** Binary File Loaded Prior to the Final Test
PGM 13 — "R/W Burn-in"	** Extended Read/Write Test for the 1571
PGM 14 — "Alignment Inst"	** Instructions to Run the Alignment Test
PGM 15 — "Disk Alignment"	** Alignment Test — C-64/1541 Mode Only

MENU VERSION 1.0

DESIGNED TO AUTO-BOOT THE DIAGNOSTIC TESTS.

REQUIRED EQUIPMENT: C-128 COMPUTER
1571 SINGLE DISK DRIVE
40 OR 80 COLUMN MONITOR OR TV SET
VERSION 1.0 TEST PROGRAM DISKETTE

> YOU **MUST** USE DOUBLE SIDED — DOUBLE DENSITY DISKETTES FOR ALL TESTS

To LOAD the diagnostic menu the following steps must be implemented:

1. Insert the test program disk version 1.0 into the 1571.
2. Hold down the 'SHIFT KEY' and press the 'RUN/STOP KEY'.

When the MENU is loaded, select the following:

Press '1' to load the LOGIC DIAGNOSTIC — See Page 2
Press '2' to load the SYSTEM TEST — See Page 3
Press '3' to load the PERFORMANCE TEST — See Page 6
Press '4' to load the READ/WRITE TEST — See Page 8
Press '5' to load the FINAL TEST — See Page 10
Press '6' to load the READ/WRITE BURN-IN — See Page 12
Press '7' to load the ALIGNMENT TEST — See Page 15

LOGIC DIAGNOSTIC

DESIGNED TO TEST THE 1571 SINGLE DISK DRIVE.

REQUIRED EQUIPMENT: C-128 COMPUTER
1571 SINGLE DISK DRIVE
40 OR 80 COLUMN MONITOR OR TV SET
VERSION 1.0 TEST PROGRAM DISKETTE

ESTIMATED TEST TIME: 1 MINUTE

When the program is loaded, press 'F1' to begin testing.

- A diskette is not needed for this test.

When 'F1' has been pressed, the LOGIC DIAGNOSTIC CODE is downloaded to the 1571.

When the download is complete, the ACTIVITY LED BLINKING prompt is displayed:

Press 'F3' if LED is not blinking

- Download has failed — Reset 1571 and retry download

or

Press 'F1' if LED is blinking

When 'F1' is selected, an error flash code chart is displayed. The status of the 1571 logic is indicated by short blinks of the activity LED, followed by a long time interval, per the following chart:

1	FLASH	—	LOGIC IS OK		
2	FLASHES	—	REPLACE DOS ROM	—	PCB LOCATION U02
3	FLASHES	—	REPLACE RAM IC	—	PCB LOCATION U03
4	FLASHES	—	REPLACE 6522 IC	—	PCB LOCATION U04
5	FLASHES	—	REPLACE 6522 IC	—	PCB LOCATION U09
6	FLASHES	—	REPLACE 6526/8520	—	PCB LOCATION U20
7	FLASHES	—	REPLACE WD1770	—	PCB LOCATION U11

When the download is complete, the Logic Diagnostic is executing entirely from the 1571 DOS and the C-128 may be disconnected.

Press 'F1' to test more drives

Press 'F3' to exit from the test

ONCE THE LOGIC DIAGNOSTIC HAS BEEN DOWNLOADED TO A 1571, IT IS NECESSARY TO RESET (TURN OFF AND ON) THE 1571 BEFORE IT CAN BE ACCESSED.

SYSTEM TEST

DESIGNED TO TEST THE ZERO STOP, ACTIVITY LED, WRITE-PROTECT, HEAD BUMP, FORMAT OPERATION, R/W OPERATION AND DRIVE COMPATIBILITY OF THE 1571 SINGLE DISK DRIVE.

REQUIRED EQUIPMENT: **C-128 COMPUTER**
1571 SINGLE DISK DRIVE (DEVICE 8)
1571 SINGLE DISK DRIVE (DEVICE 9) — OPTIONAL
40 OR 80 COLUMN MONITOR OR TV SET
FORMATTED (WRITE-PROTECTED) DISKETTE
BLANK DISKETTE
VERSION 1.0 TEST PROGRAM DISKETTE

ESTIMATED TEST TIME: 6 MINUTES

The instructions are displayed:

1. Insert FORMATTED, WRITE-PROTECTED diskette.

2. Press 'SPACE' to begin test.

The ZERO STOP is checked by executing a 5 count loop to zero track and reading a pre-written sync mark on the diskette.

The WRITE PROTECT is checked by attempting to format the write-protected diskette and reading back the error channel.

When the 'Activity LED Blinking Rapidly' prompt is displayed:

- Press 'F3' if LED is NOT rapidly blinking
  * SYSTEM FAILS — Bad Write-Protect Sensor

  or

- Press 'F1' if LED is rapidly blinking
  * The BUMP TEST is downloaded

The BUMP TEST checks track 1 by bumping the head against the zero stop 5 times and checking that the head comes back on track.

Pass/Fail Messages will appear and instructions are displayed:

1. Remove write-protected diskette.

2. Insert BLANK disk.

3. Press 'SPACE' to continue test.

The FORMAT OPERATION is checked by executing a GCR Format to all tracks with an ID written to all sectors.

- The OK message will appear

APPROXIMATELY 3 MINUTES

When the GCR format is complete the following tests are executed:

- A file is opened — a data file is written — file is closed.
- A file is opened — the data file is read and verified — file is closed.
- The data file is scratched.

The 1541 SLOW MODE is checked by:

- Writing data to tracks 5,15,25,35
- Reading and verifying written data from tracks 35,25,15,5

The 1571 FAST MODE is checked by:

- Writing data to tracks 40,50,60,70
- Reading and verifying written data from tracks 70,60,50,40.

The MFM BURST FORMAT is checked by formatting:

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

The BURST READ/WRITE is checked by writing, reading and comparing data on:

Tracks — 01,02,36,37,38,39 — Side 0
Tracks — 79,78,77,76,42,41 — Side 1

When the BURST OPERATIONS are complete the COMPATIBILITY TEST options will be given:

1. Remove disk from device #8.
2. Insert in device #9.
3. Press 'R' if no device #9 is present.
   * Skips compatibility test
4. Press 'SPACE' to begin compatibility test.

The 1541 SLOW MODE COMPATIBILITY is tested by:

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

The 1571 FAST MODE COMPATIBILITY is tested by:

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

The BURST READ COMPATIBILITY is checked by reading and verifying data from:

Tracks — 01,02,36,37,38,39 — Side 0
Tracks — 79,78,77,76,42,41 — Side 1

The PASS/FAIL Message appears.

An OPTION MENU is given:

Press C TEST ANOTHER DRIVE
Press D DONE TESTING
Press R RETURN TO MAIN MENU

PERFORMANCE TEST

DESIGNED TO TEST THE FORMAT, FAST/SLOW MODE AND READ/WRITE OPERATION OF THE 1571 SINGLE DISK DRIVE.

REQUIRED EQUIPMENT: **C-128 COMPUTER**
1571 SINGLE DISK DRIVE
40 OR 80 COLUMN MONITOR OR TV SET
FORMATTED OR BLANK DISKETTE
VERSION 1.0 TEST PROGRAM DISKETTE

ESTIMATED TEST TIME: 4 MINUTES

When the program is loaded, select the following:

Press 'F' if the diskette being used for the test is already formatted.

Press 'U' if the diskette being used for the test is not formatted.

If the 'F' (FORMATTED) option was selected:

1. Remove program disk and insert a FORMATTED diskette.
2. Press 'SPACE' to begin the test.
3. A QUICK FORMAT command is executed.
   - Only the HEADER is written to the diskette.

If the 'U' (UNFORMATTED) option was selected:

1. Remove program disk and insert a BLANK diskette.
2. Press 'SPACE' to begin the test.
3. A LONG FORMAT command is executed.
   - ALL tracks are formatted with an ID written to all sectors.

When the FORMAT option is complete, the following tests are executed:

- A file is opened — a data file is written — the file is closed.
- A file is opened — the data file is read and verified — the file is closed.
- The data file is scratched from the diskette.

The 1541 SLOW MODE is checked by:

- Writing data to tracks 5 and 35.
- Reading and verifying the written data from tracks 35 and 5.

The 1571 FAST MODE is checked by:

- Writing data to tracks 40 and 70.
- Reading and verifying written data from tracks 70 and 40.

The MFM BURST FORMAT is checked by formatting:

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

The BURST READ/WRITE is checked by writing, reading and comparing data on:

Tracks — 01,02,36,37,38,39 — Side 0
Tracks — 79,78,77,76,42,41 — Side 1

** A failure during burst operations is often due to a bad diskette or a double-sided, double-density diskette not being used.

The PASS/FAIL Message will be displayed.

- An OK message will appear at various points thoughout the test. When a failure is encountered it will be displayed or the test will halt.

An OPTION MENU is given:

Press C TEST ANOTHER DRIVE
Press D DONE TESTING
Press R RETURN TO MAIN MENU

READ/WRITE TEST

DESIGNED TO TEST THE READ/WRITE OPERATION OF THE 1571 SINGLE DISK DRIVE. (SOFT-ERROR TESTING)

REQUIRED EQUIPMENT: C-128 COMPUTER
1571 SINGLE DISK DRIVE
40 OR 80 COLUMN MONITOR OR TV SET
PRINTER (OPTIONAL)
FORMATTED DISKETTE
VERSION 1.0 TEST PROGRAM DISKETTE

ESTIMATED TEST TIME: 10 MINUTES

When the program is loaded:

1. Remove the TEST PROGRAM diskette.
2. Insert a FORMATTED diskette.
3. Press 'RETURN' to begin the test.

The MFM FORMAT is checked by formatting:

APPROXIMATELY 3 MINUTES

TRACKS	BYTES/SECTOR
00-09	128
10-19	256
20-29	512
30-39	1024

The READ/WRITE operation is checked by:

APPROXIMATELY 5 MINUTES

- Randomly writing data to tracks 0-39.
- Randomly reading data from tracks 0-39. The data being read is displayed as "reverse field" S on the screen.

When the READ/WRITE TEST is complete, the test results are displayed in the following format:

NUMBER OF PASSES: The total number of passes completed on the system. A pass is a read or write to 1 sector on all tracks. The number of passes is preset to 4.

TOTAL ERRORS: The total number of errors that were encountered during the test.

COUNTABLE ERRORS: The total number of errors that were encountered that required more than one (1) retry to recover. This value is obtained by TOTAL ERRORS minus RECOVERED ERRORS.

PASS/ERROR RATIO: The number of passes versus the number of encountered errors. This value is obtained by NUMBER OF PASSES divided by NUMBER OF COUNTABLE ERRORS.

FIRST PASS RETRIES: The total number of retries that were not successful.

- This value is obtained by NUMBER OF RETRIES minus FIRST RETRIES. These are determined for the first pass only.

If an ERROR is encountered, the following information is also displayed:

TRACK, ERROR, FIRST PASS RETRIES: This listing breaks down the errors on a per track basis. A bad diskette is indicated by errors concentrated on the same track or adjacent tracks.

ERROR TYPE: This listing breaks down the errors according to the type as shown below:

A. NHRD — Block Header Not Found
B. NADM — Address Mark Not Found
C. DCRC — Data CRC Error
D. VRFY — Verify Error (Read after Write Failed)
E. HCKS — Checksum Error in Header Field

RECOVERY COUNT: Total number of retries required to recover errors.

Once the test results are displayed, an OPTION MENU is given:

Press C TEST ANOTHER DRIVE
Press D DONE TESTING
Press R RETURN TO MAIN MENU

FINAL TEST

DESIGNED TO TEST THE FORMAT AND READ/WRITE OPERATION OF THE 1571 SINGLE DISK DRIVE.

REQUIRED EQUIPMENT: **C-128 COMPUTER**
1571 SINGLE DISK DRIVE (DEVICE 8)
1571 SINGLE DISK DRIVE (DEVICE 9) — OPTIONAL
40 OR 80 COLUMN MONITOR OR TV SET
FORMATTED DISKETTE
BLANK DISKETTE
VERSION 1.0 TEST PROGRAM DISKETTE

ESTIMATED TEST TIME: 6 MINUTES

When the program is loaded, select the following:

REMOVE PROGRAM DISK

Press '1' to select FORMAT option.

Press '2' to select READ/WRITE option.

Press '3' to display TEST RESULTS — AFTER Read/Write Test is complete.

Press 'A' to execute ALL the listed options.

If '1' is selected, the MFM FORMAT is checked by formatting:

TRACKS	BYTES/SECTOR
00-09	128
10-19	256
20-29	512
30-39	1024

APPROXIMATELY 3 MINUTES

If '2' is selected, the READ/WRITE TEST is downloaded to the 1571.

APPROXIMATELY 1 MINUTE

- When the download is complete, the Read/Write Test executes entirely from DOS and the 1571 may be disconnected.

- If the 'A' (All Options) is selected do not disconnect the 1571.

APPROXIMATELY 2.5 MINUTES

Press 'C' if the C-128 is disconnected.

Press 'R' to return to the option menu.

If '3' is selected, the test RESULTS are displayed in the following format:

FIRST PASS ERRORS — Displays errors per track for the first test pass

SECOND PASS ERRORS — Displays errors per track for the second test pass

RETRY ERROR COUNT — Displays number of necessary retries

ERROR TYPE — Displays types of errors encountered:

CRC — Data CRC Error
RNF — Retry Count Not Found
ADM — Address Mark Not Found

When all test results are displayed, the OPTION MENU will appear:

Press C TEST ANOTHER DRIVE
Press D DONE TESTING
Press R RETURN TO MAIN MENU

READ/WRITE BURN-IN

DESIGNED TO TEST THE FORMAT, READ/WRITE AND VERIFY OPERATIONS OF THE 1571 SINGLE DISK DRIVE IN 1 OR 2 MHZ MODE.

REQUIRED EQUIPMENT: **C-128 COMPUTER**
1571 SINGLE DISK DRIVE
40 OR 80 COLUMN MONITOR OR TV SET
FORMATTED OR BLANK DISKETTE
VERSION 1.0 TEST PROGRAM DISKETTE

When the program is loaded, select the following:

Press '4' if you are using a 40 column monitor or a TV set.

Press '8' if you are using an 80 column monitor.

When the monitor selection has been made, the OPTION MENU is displayed:

Press 'F' to select the FAST test. **APPROXIMATELY 2 MIN. PER PASS**

Press 'S' to select the SLOW (burn-in) test. **APPROXIMATELY 35 MIN. PER PASS**

When the type of test has been selected, the following options are offered:

1. Select the SPEED MODE of the test:

   Press '1' to run the test in the 1 MHz Mode.

   Press '2' to run the test in the 2 MHz Mode.

   - An 80 Column Monitor is required for 2 MHz Mode.

2. Select the DRIVE MODE of the test:

   Press '4' to run the test in the 1541 Mode.

   Press '7' to run the test in the 1571 Mode.

3. Select the NUMBER of passes the test is to run:

   10 Passes is suggested for the Fast Test
   2 Passes is suggested for the Slow Test

The FORMAT operation of the drive is checked by:

MFM — MFM Format at 128, 256, 512 and 1024 Bytes/Sector.

- MFM Format is done in the 1571 Mode only.

GCR — GCR Format writing a header only with no ID written — Fast Test.

GCR Format of all tracks with an ID written to all sectors — Slow Test.

- GCR Format is done in both 1541 and 1571 Modes.

The WRITE operation of the drive is checked by:

Three files are saved to the diskette.

- The files are saved in both 1541 and 1571 Modes.

The write operation is VERIFIED by:

Reading the directory to ensure the three files were properly saved.

The READ/WRITE operation of the drive is tested by:

Reading — Writing — Reading and Verifying — per the following:

Fast Test —	1541 Mode —	Tracks	— 01,05,10,15,20,25,30,35
		Sectors	— 00,08,16
Slow Test —	1541 Mode —	Tracks	— 01 thru 35
		Sectors	— 00 thru 16
Fast Test —	1571 Mode —	Tracks	— 01,10,20,30,40,50,60,70
		Sectors	— 00,08,16
Slow Test —	1571 Mode —	Tracks	— 01 thru 70
		Sectors	— 00 thru 16

The test RESULTS are displayed at the end of the test in the following format:

PASSES — Total number of passes run.

TOTAL ERRORS — Total errors encountered during all operations.

The error list displays all errors on a per operation basis as:

MFM 128 BYTE — Number of errors encountered during the 128 Byte/Sector MFM Format Operation.

MFM 256 BYTE — Number of errors encountered during the 256 Byte/Sector MFM Format Operation.

MFM 512 BYTE	— Number of errors encountered during the 512 Byte/Sector MFM Format Operation.
MFM 1024 BYTE	— Number of errors encountered during the 1024 Byte/Sector MFM Format Operation.
GCR FORMAT	— Number of errors encountered during the GCR Standard Format Operation.
FILE SAVE	— Number of errors encountered during the Saving File Operation.
DIRECTORY	— Number of errors encountered during the Directory Read Operation.
READ	— Number of errors encountered during the Read Operation. * Includes both Read and Read and Verify Operations.
WRITE	— Number of errors encountered during the Write Operation.
COUNTABLE	— Number of Read and Write errors that required more than one (1) retry to recover.
TOTAL RUN TIME	— Total elapsed time since test started.
BOTTOM LINE	— Final determination if the system Passes or Fails the test.

ALIGNMENT TEST

DESIGNED TO TEST THE LED, WRITE-PROTECT, DRIVE BELT, MOTOR SPEED AND HEAD ALIGNMENT OF THE 1571 SINGLE DISK DRIVE.

REQUIRED EQUIPMENT: **C-128 COMPUTER**
1571 SINGLE DISK DRIVE
MONITOR OR TV SET
DUAL TRACE SCOPE
ALIGNMENT DISKETTE (CBM P/N 970016-01)
FORMATTED DISKETTE
VERSION 1.0 TEST PROGRAM DISKETTE

NOTE

THE 1.0 VERSION OF THE ALIGNMENT TEST MUST BE LOADED AND RUN WITH THE C-128 IN THE C-64 MODE AND THE 1571 IN THE 1541 MODE.

Press 7 to load the program from the menu.

Instructions will be displayed to enter the 64 mode:

1 — Type *GO 64* Press *RETURN*

2— When the "Are you sure?" prompt appears:

Type *Y* Press *RETURN*

3 — When the C-64 screen appears:

Type *LOAD "DISK ALIGNMENT", 8*
Press *RETURN*

4 — When the program is loaded:

Type *RUN*

* **NOTE:** The NUMERIC KEYPAD of the 128 is NOT operational in 64 mode.

When the program is run, the following options will be available:

1. Press 'SPACE' to run ALL AVAILABLE tests.
   - This is the recommended option.
2. Press '1' to test for proper drive LED operation. (GREEN ACTIVITY LED)
3. Press '2' to test for proper WRITE PROTECT SENSOR operation.

4. Press '3' to test for proper STEPPER MOTOR.

5. Press '4' to check DRIVE BELT status and display the current MOTOR SPEED.

   - The motor speed is out-of-tolerance if the indicated reading is different than −1ms, Oms or +1ms.

6. Press '5' to allow for monitoring of the CATS EYE SIGNAL for evenness, correct amplitude and to adjust if necessary. Rotate the stepper motor to obtain maximum display per Figure 1-1 and 1-2.

   - This option requires a special 48 TPI alignment diskette. (Commodore part number 970016-01).

   - A dual trace scope, with external sync capabilities, will be necessary for proper alignment. The probes are to be connected as follows:

     PROBE 1 — Pin 17 — IC U7 — TP1
     PROBE 2 — Pin 18 — IC U7 — TP2
     EXT SYNC — Pin 17 — IC U6

   - Scope should be set at 20mS and .1v/div. Add channel 1 and 2, press invert and adjust for the best possible display of the Cats Eye Signal.

   - ONLY the lower head can be tested for alignment at this time. The final version will include upper head capabilities.

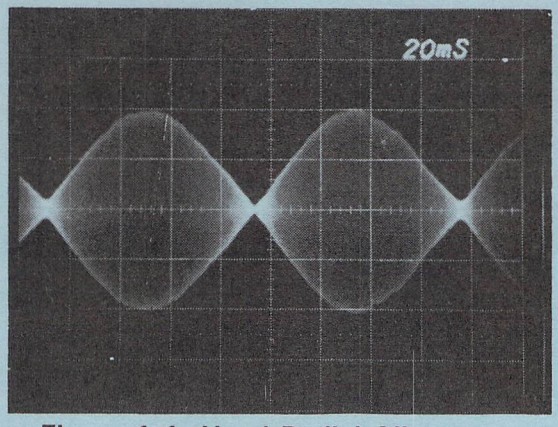


Figure 1-1. Head Radial Alignment

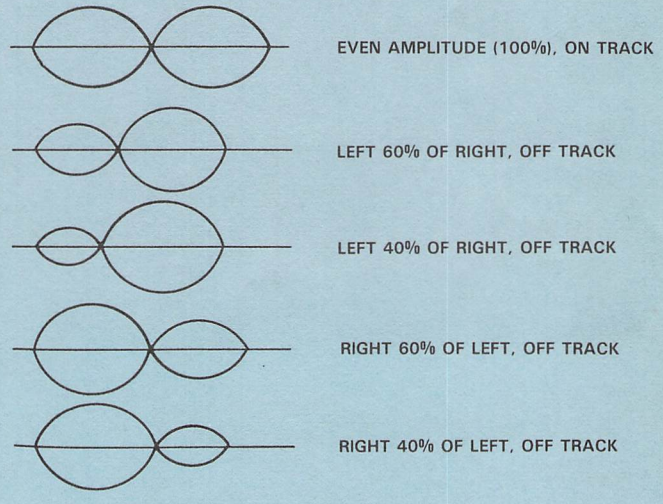


Figure 1-2. R/W Head Radial Alignment

7. Press '6' to do the final READ/WRITE test on the 1571.

   - This test reads, writes and verifies data to random tracks on the diskette.

     A known good formatted diskette is necessary here.

8. Press '7' to END.

STEPPER MOTOR CONTROL LOGIC CHART

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

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

STEPPER MOTOR CONTROL LOGIC CHART

CHECK IC PINS	EXPECTED SIGNAL	INCORRECT SIGNAL PROBABLE FAILURE
U13 - 4	Ø VDC LEVEL TO +5 VOLT POSITIVE PULSES	U13 - U22
U16 - 13	Ø VDC LEVEL TO +5 VOLT POSITIVE PULSES	U22 - U16
U16 - 12	+12 VDC LEVEL TO Ø VOLT NEGATIVE PULSES	U16 - Q1
CHECK CN5 PINS	EXPECTED SIGNAL	INCORRECT SIGNAL PROBABLE FAILURE
1	+5 VDC LEVEL TO +12 VOLT POSITIVE PULSES	Q1 - CR1Ø

STEPPER MOTOR CIRCUIT TEST OPTION THREE - RETURN TO MAIN MENU

***** PRESS 'M' - RETURN TO MENU

ALIGNMENT REPAIR TEST OPTION FIVE - DATA BUS WRITE TEST

***** INPUT A TWO (2) CHARACTER HEX CODE - (ØØ thru FF)
FOLLOWED BY A DRIVE SIDE SELECTION - (Ø or 1)
***** PRESS 'M--' - RETURN TO MENU

DATA BUS WRITE CHECK

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. (Ø = Low -- 1 = High) Using a scope, verify the measured data with the expected data from the Data Bus Write Chart. -- Pages 1-22 - 1-23

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 APPROXIMENTLY 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

CHECK FOR ALTERNATING DATA LINES -- INPUT HEX CODE '55'

NOTE: HEX (55) DATA IS APPROXIMENTLY 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'

NOTE: HEX (AA) DATA IS APPROXIMENTLY HALF THE FREQUENCY OF HEX (FF) DATA

DATA BUS DISPLAY	CHECK IC PIN	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 PIN	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

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 'Ø' - 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. — Page 21

DRIVE MOTOR CONTROL LOGIC CHART

DRIVE MOTOR DISPLAY	CHECK IC PIN	EXPECTED SIGNAL	INCORRECT SIGNAL PROBABLE FAILURE
OFF	U4 - 12	DIGITAL LOW	U4 - U16
OFF	U16 - 1Ø	DIGITAL HIGH	U16
ON	U4 - 12	DIGITAL HIGH	U4 - U16
ON	U16 - 1Ø	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

REVISIONS		
LTR	DESCRIPTION	DATE (YR/MO/DA)
N	REDRAWN PER ECO 2059	77/11/17

HEAD 1

HEAD 3

P9

P10

WDA

WDB

WDC

WDD

WDE

WDF

WDG

WDH

WDJ

WDK

WDL

WDM

WDN

WDP

WDR

WDS

WDT

WDU

WDV

WDW

WDX

WDY

WDZ

WDAA

WDBB

WDCC

WDDD

WDEE

WDFF

WDHH

WDJJ

WDKK

WDLL

WDMM

WDNN

WDPP

WDRR

WDSS

WDTT

WDUU

WDVV

WDWW

WDXX

WDYY

WDZZ

WDAAA

WDBBB

WDCCC

WDDDD

WDEEE

WDFFF

WDHHH

WDJJJ

WDKKK

WDLLL

WDMMM

WDNNN

WDPPP

WDRRR

WDSSS

WDTTT

WDUUU

WDVVV

WDWWW

WDXXX

WDYYY

WDZZZ

TO DICKS

P1

P2

P3

P4

P5

P6

P7

P8

P9

P10

P11

P12

P13

P14

P15

P16

P17

P18

P19

P20

P21

P22

P23

P24

P25

P26

P27

P28

P29

P30

P31

P32

P33

P34

P35

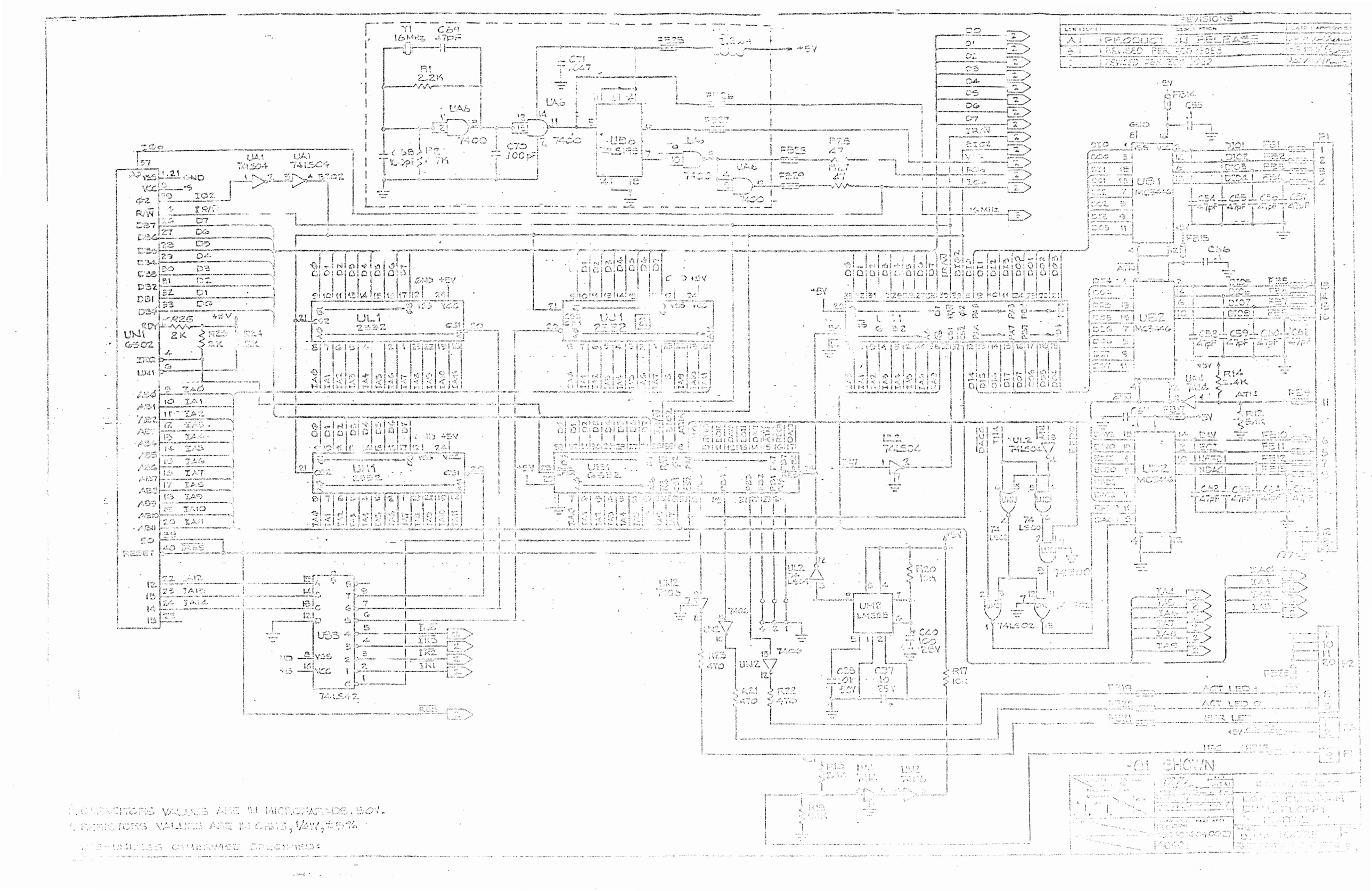
P36

P37

P38

P39

P40


REVISIONS
1. CAPACITORS VALUES ARE IN MICROFARADS, 50V.
2. RESISTORS VALUES ARE IN OHMS, 1/4W, ±5%
-01 SHOWN

REVISIONS

DESCRIPTION	DATE	APPROVED
ECO-00215		
BASIC DIAGRAM - DUAL FLOPPY		
PCB#		
COMMERCIAL PRODUCTS		

C4-8,12,18,17,19,20,21
22-26,32-36,94,
41-44,87-90,72
+5V

U4 6522

U1 74LS04

U2 74LS42

U3 74LS157

U5 74LS42

UCE 2114

UDE 2114

UDC 2114

UDB 2114

UDA 2114

UCA 2114

UCB 2114

UCC 2114

UDC 2114

UDD 2114

UCD 2114

UDE 2114

UCE 2114

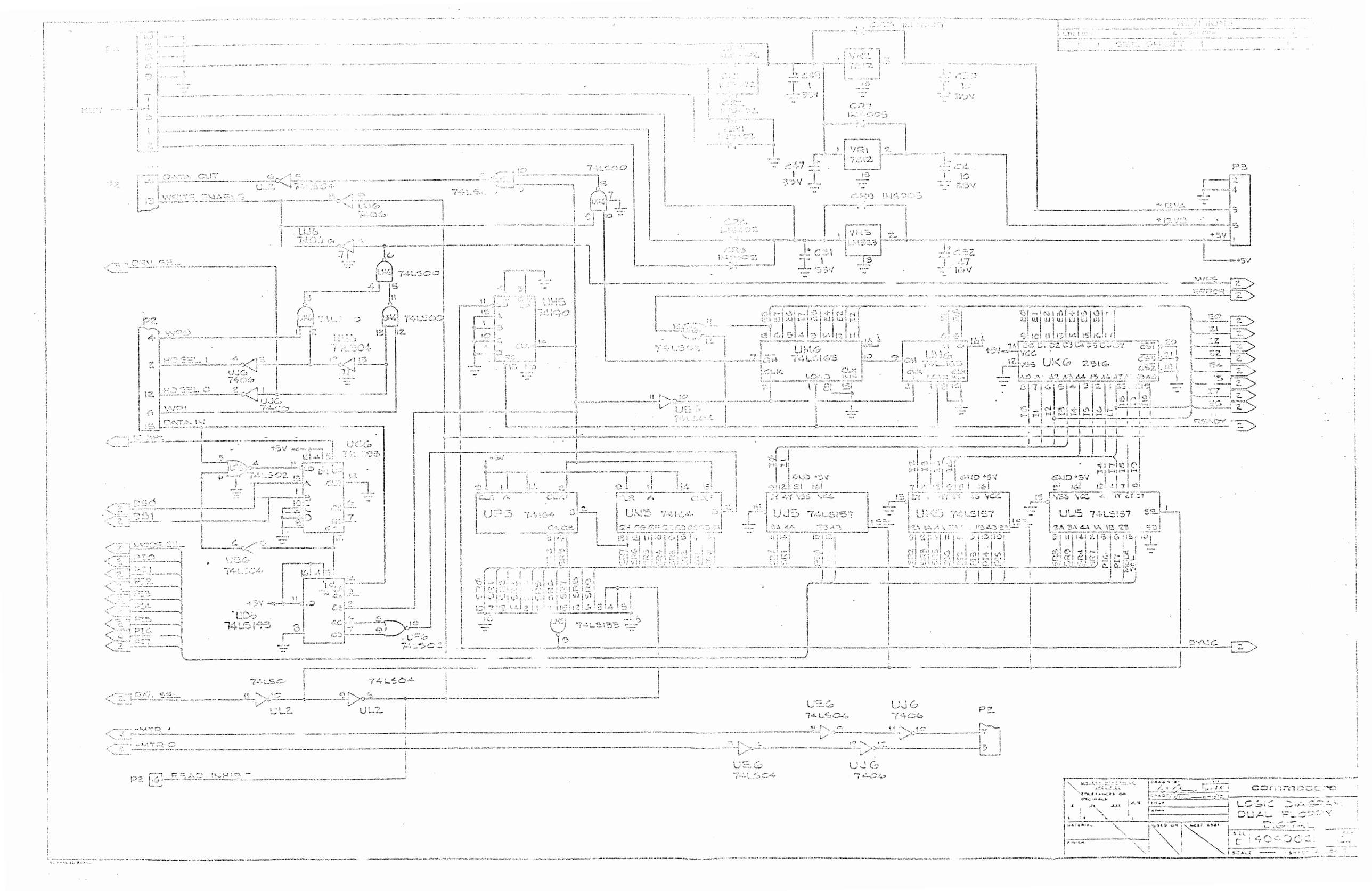
UDA 2114

UCA 2114

UCB 2114

UCC 2114

UDB



REVISIONS
SEE SHEET
KEY
P2
DATA OUT
WRITE ENABLE
DRV SEL
WP0
HD SEL 1
HD SEL 0
WP1
DATA IN
UL2
74LS04
UJ6
7406
74LS00
UH5
74190
UM6
74LS163
UN6
74LS163
UK6
2816
UE6
74LS04
UC6
74LS193
74LS02
UD6
74LS193
UF6
74LS02
UP5
74164
UN5
74164
UJ5
74LS157
UK5
74LS157
UL5
74LS157
74LS133
GND +5V
VR2
7812
VR1
7812
VR3
LM323
CR7
1N4005
CR8
1N4005
C47
35V
C49
1
35V
C50
10
25V
C51
1
35V
C52
47
16V
P3
+12VA
+12VB
+5V
WPS
ERROR
READY
SYNC
DS0
DS1
MODE SEL
RAT SEL
MTR 1
MTR 0
READ INHIB
commodore
LOGIC DIAGRAM
DUAL FLOPPY
DIGITAL
D
1404002
SCALE

commodore COMPUTERS

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