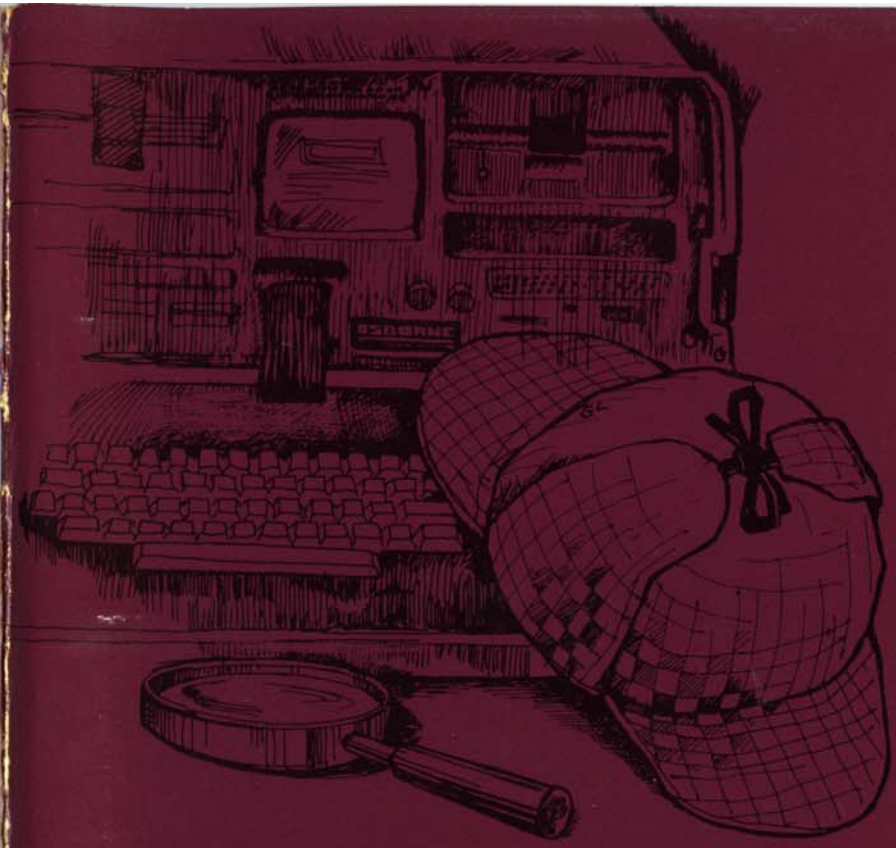
INTERROGATOR™

DRIVE DIAGNOSTIC PROGRAM FOR THE OSBORNE 1

CE Division

Dysan® CORPORATION



INTERROGATOR™

drive diagnostic program for the Osborne 1 computer

INSTRUCTION MANUAL

dysan® CORPORATION
CE Division

Limited Warranty

The Dysan INTERROGATOR program and the *Digital Diagnostic Diskette* (*DDD*) are warranted by Dysan to be free from defects in title, materials, and manufacturing workmanship for a period of thirty (30) days from the date of shipment to the purchaser first using the program. Dysan's obligations under this warranty are limited to replacement or restoration of the INTERROGATOR program.

All units returned to *Dysan Corporation* **POSTPAID** during the warranty period with written notice of a defect which is confirmed by Dysan, will be replaced or restored to proper operating condition and returned to the sender without charge. In any event, Dysan's liability shall not exceed the original purchase price of the INTERROGATOR program and the *DDD* involved.

NOTE: THIS WARRANTY DOES NOT APPLY TO NORMAL WEAR OR DAMAGE RESULTING FROM MISHANDLING, MISUSE, NEGLECT, IMPROPER STORAGE OR INSTALLATION, ACCIDENTS, REPAIR OR ALTERATION; OR TO DAMAGE TO ANY PERIPHERAL DEVICE OR OTHER EQUIPMENT AS A RESULT OF ANY OF THESE AFOREMENTIONED OCCURRENCES. FURTHER, THE EXPRESS WARRANTIES ARE IN LIEU OF ANY OTHER WARRANTY WHETHER ORAL, WRITTEN, IMPLIED, OR STATUTORY INCLUDING WARRANTY OF MERCHANTABILITY AND FITNESS FOR A SPECIAL PURPOSE. IN NO EVENT WILL *DYSAN CORPORATION* BE LIABLE TO ANYONE FOR ANY DAMAGES WHETHER INCIDENTAL, CONSEQUENTIAL OR OTHERWISE.

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INTERROGATOR™

drive diagnostic program
for the Osborne 1 computer

INSTRUCTION MANUAL

Dysan® CORPORATION
CE Division

Have a Question?

Call the Dysan CE Division Technical Hotline

To ask questions about the INTERROGATOR package, or to report a problem.

CALL THESE TOLL-FREE NUMBERS

(800) 321-2325
(inside California)
(800) 538-2406
(outside California)

Hours: 8:00 AM to 5:00 PM (PST/PDST) M-F

Sorry, we cannot give you information or instructions to repair or align specific disc drives.

Preface

This manual is designed as a reference for your use with the INTERROGATOR drive diagnostic program for the Osborne 1 computer.

Each chapter of the manual gives you instructions for working with the software you will use as a diagnostic tool in testing flexible disc drives.

Throughout this manual "disc" has the same meaning as "disk" and "diskette."

GLOSSARY

AZIMUTH	indicates if the head is aligned tangent to the test track.
CENTERING	determines if the drive can correctly clamp the disc on its spindle.
DELTA	is the difference between two values.
HYSTERESIS	checks the ability of the head to position itself to the same location on the test track after a seek operation.
INDEX	determines the time from the leading edge of the index pulse to a given point on the disc.
RADIAL	indicates how well the head is positioned over the track centerline (generally referred to as head alignment).

CONTENTS

TABLE 4. Azimuth rotation

The data is written on the track centerline. Track and sector ID information fields are written at zero azimuth. Data fields are written with the head angle shown below.

DDD #	SECTOR #	AZIMUTH IN MINUTES
508-100	1	+ 21
&	2	– 21
508-200	3	+ 24
	4	– 24
	5	+ 27
	6	– 27
	7	+ 30
	8	– 30
	9	+ 33
	10	– 33
	11	+ 36
	12	– 36
	13	+ 39
	14	– 39
	15	+ 42
	16	– 42

TABLE 2. Progressive offset

Tracks are written with track and sector ID information on the track centerline. Data fields are radially displaced from the track centerline. A [+] value indicates an offset toward the spindle; a [–] value indicates an offset away from the spindle.

DDD #	SECTOR #	OFFSET IN MILLI-INCHES
508-100	1	+ 6
&	2	– 6
508-200	3	+ 7
	4	– 7
	5	+ 8
	6	– 8
	7	+ 9
	8	– 9
	9	+ 10
	10	– 10
	11	+ 11
	12	– 11
	13	+ 12
	14	– 12
	15	+ 13
	16	– 13

TABLE 3. Alternate offset

Tracks are written with track and sector ID information on the track centerline. Data fields are alternately offset an equal distance toward [+] and away from [–] the spindle.

DDD #	OFFSET #	OFFSET IN MILLI-INCHES
508-100 & 508-200	(1)	Odd sectors + 7 Even sectors – 7
	(2)	Odd sectors + 8 Even sectors – 8
	(3)	Odd sectors + 9 Even sectors – 9

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APPENDIX A

Use *DDD* Model 508–100 (single density) or 508–200 (double density) with INTERROGATOR to test the 5¼" 48 TPI, 1-sided flexible disc drives controlled by the Osborne 1 computer.

Table 1 of this appendix lists the format for *DDD* Models 508–100 and 508–200.

Table 2 of this appendix lists the Progressive Offset track numbers and sector offset values for 5¼" 48 TPI drives.

Table 3 of this appendix lists the Alternate Offset track numbers and sector offset values for 5¼" 48 TPI drives.

Table 4 of this appendix lists Azimuth Rotation track numbers and head azimuth angle for 5¼" 48 TPI drives.

TABLE 1. DDD format information

DDD MODEL #	TRACK #
508-100 & 508-200	Track 0—Progressive Offset Track 3—Timing Track Track 5—Progressive Offset Track 16—Progressive Offset Track 19—Progressive Offset Track 21—Alternate Offset (1) Track 24—Alternate Offset (2) Track 27—Alternate Offset (3) Track 30—Progressive Offset Track 34—Azimuth Rotation Track 36—Timing Track Track 39—Progressive Offset

Read/Write Tests

MESSAGE: **DRIVE NOT READY**
USE ESC TO EXIT

Refer to "Common Errors" in this chapter of the manual.

Common Errors

The following errors occur commonly throughout the system.

MESSAGE: **DRIVE NOT READY**

The drive door is open. Close it.

You selected a drive that is not controlled by your Osborne 1 computer.

There is no disc in the drive; you did not put the disc into the drive properly; or you are not using the correct *DDD* for the drive you are testing.

WHEN THE MESSAGE IS A **READ ERROR:**

Make sure you are on the correct track. Check the *DDD* specifications. Check the drive manufacturer's specifications. Are the selected track and parameters correct? Retry the test.

Utilities

MESSAGE: **EXCEEDED DELAY LIMITS!!!**

You entered a number outside the delay range (0–999).

MESSAGE: **EXCEEDED TRACK LIMITS!!!**

You specified a track number greater than the maximum number of tracks for your drive or the disc you are using.

MESSAGE: **INVALID ENTRY!!!**

You entered an incorrect number when you selected a track.

You pressed a key other than the **RETURN** key to execute your entry.

APPENDIX A

GLOSSARY

4) Radial Alignment Check

MESSAGE: **UNABLE TO READ RADIAL TRACK**

The drive controller could not read any data from the selected track.

Refer to "Common Errors" in this chapter of the manual.

5) Spindle Speed Check

MESSAGE: **EXCEEDED RANGE OF THE SCALE**

The drive's spindle speed was outside the parameters of the scale display.

6) Hysteresis Check

MESSAGE: **NOT ABLE TO COMPUTE HYSTERESIS**

The hysteresis error could not be calculated.

MESSAGE: **NOT ABLE TO READ TRACK**

The drive controller could not read any data from the selected track.

Refer to "Common Errors" in this chapter of the manual.

Auto Sequence Tests

MESSAGE: **DRIVE NOT READY**
USE ESC TO EXIT

Refer to "Common Errors" in this chapter of the manual.

MESSAGE: **NO DATA TO PRINT**
ESC KEY TO EXIT

You did not run the Auto Sequence Tests before you pressed the **D** key for a hard copy of the test results.

Run the Auto Sequence Tests. When INTERROGATOR displays the test results on the CRT, press the **D** key to obtain a hard copy.

MESSAGE: **NOT ABLE TO ID DDD**
USE ESC TO EXIT

The disc in the drive is not the *DDD* model number that INTERROGATOR requires for the test (508–100 or 508–200). Put the correct *DDD* into the drive and retry the test.

Alignment Tests

1) Azimuth Alignment Check

MESSAGE: **NOT ABLE TO READ TRACK**

The drive controller could not read any data from the selected track.

Refer to "Common Errors" in this chapter of the manual.

2) Disc Centering Check

MESSAGE: **CHECK RADIAL ALIGNMENT**

The drive read only one side of the track centerline during the test. This indicates radial error and therefore, centering cannot be tested.

Run the Radial Alignment Test on the drive head.

MESSAGE: **NOT ABLE TO DETERMINE CLAMPING ERROR**

The specific cause of the clamping error cannot be determined.

MESSAGE: **NOT ABLE TO READ TRACK**

The drive controller could not read any data from the selected track.

Refer to "Common Errors" in this chapter of the manual.

MESSAGE: **RECLAMP DDD**

The *DDD* was not centered correctly. Remove the *DDD*, reinsert it into the drive, and retry the test.

3) Index to Data Check

MESSAGE: **EXCEEDED SCALE LIMITS**

The Index reading was outside the scale display.

MESSAGE: **NOT ABLE TO COMPUTE TIME**

INTERROGATOR read data from the *DDD*, but the data was outside the range limits for Index timing. Therefore, Index Time could not be calculated.

CHAPTER 1 Before You Start

Introduction

The INTERROGATOR is a menu-driven software program designed for use with the Dysan *Digital Diagnostic Diskette* (*DDD*). Together, they can evaluate the performance of flexible disc drives controlled by the Osborne 1 computer.

Test modes allow you to check a drive's head alignment, as well as its ability to read and write data without errors. You can also check spindle speed and disc centering.

Neither the INTERROGATOR program nor this manual, however, provides step-by-step instructions for repair or alignment of a malfunctioning disc drive.

The DDD

The *Digital Diagnostic Diskette* (*DDD*) is a reference disc that INTERROGATOR uses to measure drive alignment and read/write performance. The *DDD* contains information organized as test data fields. These test data fields are precisely recorded on tracks with sectors that are intentionally misaligned by known values. A read-back of this information during diagnostic testing can measure the amount of alignment error and determine the performance level of a drive's signal processing electronics.

With INTERROGATOR, the *DDD* offers these unique advantages over other test methods:

- System disassembly is not required.
- No other test equipment is necessary.

- Levels of testing vary from simple to detailed.
- Quick, repeatable feedback is valuable for inspection or field service applications.

Periodic use of INTERROGATOR measures degradation of a drive's performance. The measurements collected and presented by INTERROGATOR allow you to schedule preventive maintenance more efficiently.

What You Need (Hardware)

In order to use INTERROGATOR with your Osborne 1 computer, you must have one working flexible disc drive that can load the INTERROGATOR program.

If you have a printer, you can copy the test results displayed on the CRT. Hard copy may be useful for comparative analysis or as a permanent record.

What You Need (Software)

Your INTERROGATOR package contains two discs that are designed to work together. The INTERROGATOR *program disc* contains the interpreting and display program that operates your Osborne 1 while you are evaluating drives. INTERROGATOR uses the *Digital Diagnostic Diskette* (*DDD*) to make a detailed diagnosis of drive alignment. As you prepare to run tests with your software, INTERROGATOR displays a prompt reminding you to use your *DDD*.

Four types of discs can be used with INTERROGATOR.

1. The *program disc* (supplied in your package) loads the INTERROGATOR program into the Osborne 1.
2. A standard *DDD* (supplied in your package) is a reference tool that INTERROGATOR uses to evaluate the overall alignment of the drive you are testing.
3. A *data disc* (not supplied) is required for the Read/Write Tests, which tell you if the drive reads and writes data correctly. You can use any normal, error-free disc as your data disc.

CHAPTER 8 Error Messages

Introduction

This chapter of the manual organizes error messages

- FIRST, by grouping error messages in alphabetized categories that correspond to the chapters in this manual
- SECOND, by listing error messages alphabetically within a category
- THIRD, by explaining a possible cause of an error message
- FOURTH, by suggesting a correction for an error message

Unless you have turned off the sound switch (see "Program Parameters" in Chapter 7 of this manual), INTERROGATOR sounds a "beep"

- When you press the wrong key
- When a test results in a Fail message
- When your attention is required

4 The *Analog Alignment Diskette* (*AAD*) (not supplied) is used for precision geometric alignment applications. The *AAD* requires a standard oscilloscope for testing. Dysan does not recommend the *AAD* to non-technical users. The Utilities (see Chapter 6 of this manual) provide the experienced service technician with two useful options: (1) SEEK TO TRACK positions the drive head to the correct *AAD* track locations; (2) ALTERNATE TRACK moves the head between any two tracks selected.

INTERROGATOR is available only as a package. The *DDD*, the *AAD*, and the *data disc* are available individually from Dysan. To order *DDD*s, *AAD*s, and *data discs*, dial this toll-free number: (800) 551-9000. Call Monday through Friday between 8:00 AM and 5:00 PM (PST/PDST).

Questions and Answers

Call the Dysan CE Division Technical Hotline

- If you have a question about INTERROGATOR
- If you need to report a problem with INTERROGATOR

Dial toll-free, M–F, 8:00 AM to 5:00 PM (PST/PDST)

(800) 321-2325 (inside California)
(800) 538-2406 (outside California)

For CE Division products only

We can help you with your INTERROGATOR package. We cannot give you information or instructions to repair or align specific disc drives.

DDD Testing Summary

You can perform more diagnostics in less time with Dysan's *Digital Diagnostic Diskette* than you can with more conventional testing techniques. The *DDD*, used with Dysan's INTERROGATOR program, is different from other alignment discs because it allows you to perform a greater variety of tests under actual operating conditions.

Some of the drive's performance parameters that you can evaluate are:

- Head Radial Alignment
- Head Positioner Linearity
- Head Positioner Hysteresis
- Disc Eccentricity
- Index/Sector Photo-detector Timing
- Head Positioner Skew
- Disc Rotational Speed
- Head Azimuth Alignment

Dysan uses only the highest quality materials in its *Digital Diagnostic Diskettes*. All *DDD*s are screened for physical and electrical properties, acclimated, recorded, and verified to ensure precision and reliability in drive diagnosis.

Special data field test patterns are recorded on each *DDD* to detect failures, misalignment, and other degradation. The *DDD* includes the following data field test patterns:

1) Progressive Offset Track

For radial alignment testing, the ID information for each sector is written normally, with data fields progressively offset from the track centerline both toward and away from the disc drive spindle.

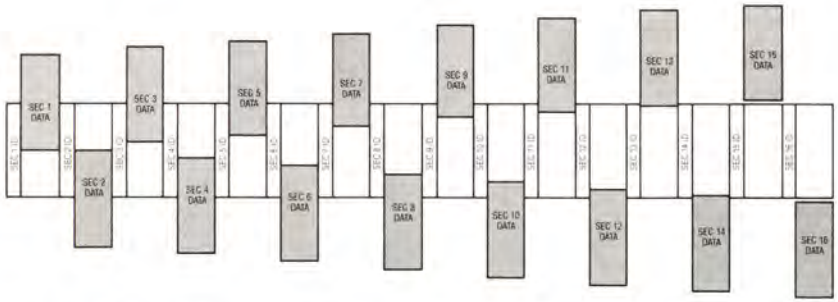


FIGURE 1. Radial alignment track (displacement of data fields is not to scale)

On read-back, a perfectly aligned head receives an evenly diminishing signal.

Use the **RIGHT ARROW** key (⇨) on your Osborne 1 keyboard to select the parameter(s) you want to change.

- You can set the number of READ/WRITE RETRIES from 0 to 9, using the **UP** (⇧) and **DOWN** (⇩) **ARROW** keys.
- You can change the STEP RATE value from 6 milliseconds to 30 milliseconds per track. The step rate indicates how fast the drive head moves from track to track while seeking from one track to another.
- INTERROGATOR sounds a beep to indicate an error or to draw your attention to the display. You can turn the sound switch off by pressing the **UP** (⇧) **ARROW** key.

Press the **ESC** key to return to the PARAMETER SETUP MENU.

Save

When you modify INTERROGATOR's programmed parameters to suit your applications, "save" your changes to your INTERROGATOR backup disc (see "Backup" in Chapter 2 of this manual).

Put your INTERROGATOR backup disc into Drive A. From the **PARAMETER SETUP MENU**, select option **D.** The CRT displays this message: **WAITING FOR SELECTION. . . D**

When the **D** disappears from the Selection prompt line, your INTERROGATOR "program disc" (the disc in Drive A) contains your new parameter(s). The next tests you run will use the default values you "saved."

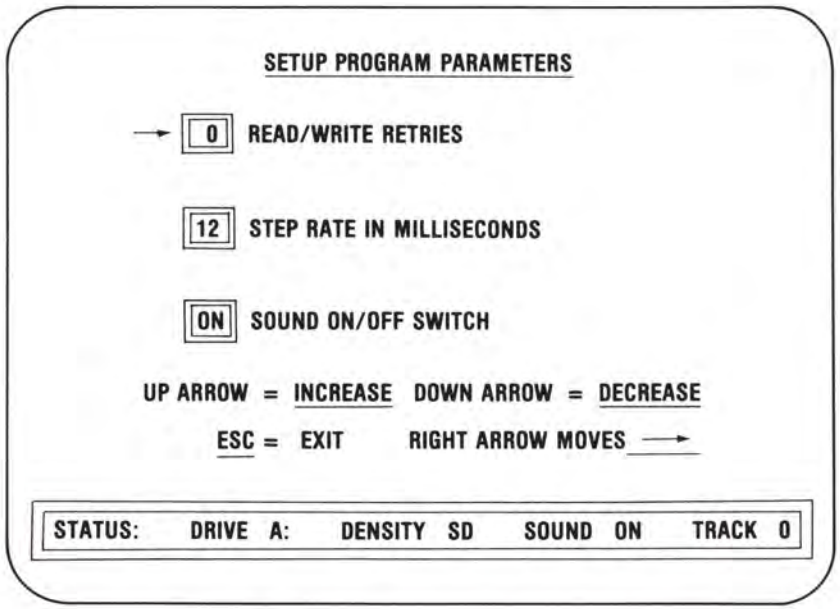
maximum delta allowed between the negative and positive radial offset values. For example, if the test results report a –9 and a +12, the radial offset is +3. If your delta value is set at 2, the test reports a failure.

- You can change the minimum azimuth rotation value from ±21 to ±42 minutes. The drive must successfully read the value selected in order to pass this test.
- You can change the allowable index timing error from the nominal value of 200 microseconds. Consult the drive manufacturer's specifications for tolerances.

Press the **ESC** key to return to the PARAMETER SETUP MENU.

Program Parameters

When you select option **B** from the **PARAMETER SETUP MENU**, the CRT displays this screen:



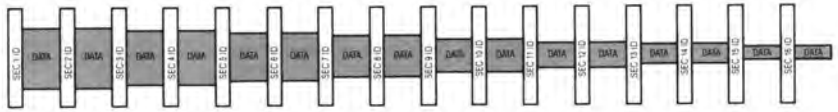


FIGURE 2. Radial alignment playback signal (perfect alignment)

2) Alternate Offset Track

For the disc centering test, the ID information for track and sector is written normally on the track centerline, with data fields alternately offset an equal distance toward and away from the disc drive spindle.

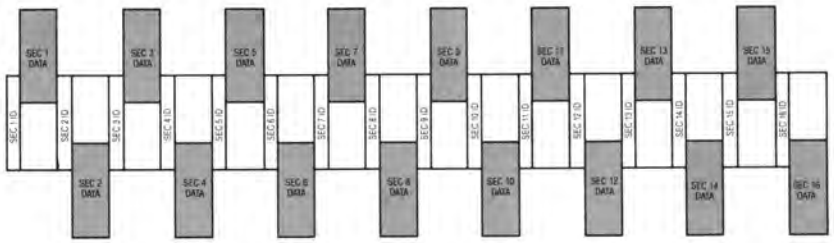


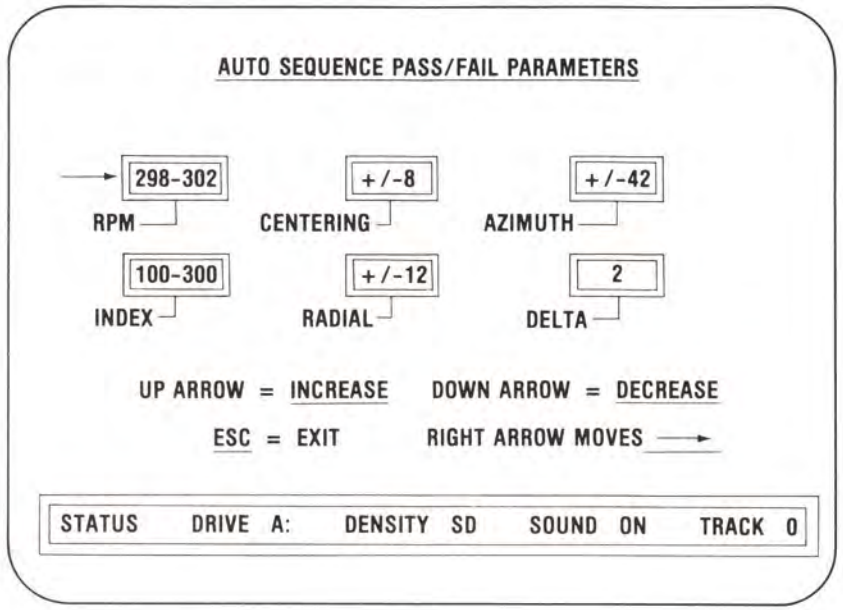
FIGURE 3. Alternate Offset Track (displacement of data fields is not to scale)

3) Azimuth Rotation Track

For head azimuth alignment testing, the ID information for track and sector is written correctly on track centerline. The data fields are written with increasing azimuth angles.

FIGURE 4. Azimuth Track (displacement and rotation of data fields are not to scale)

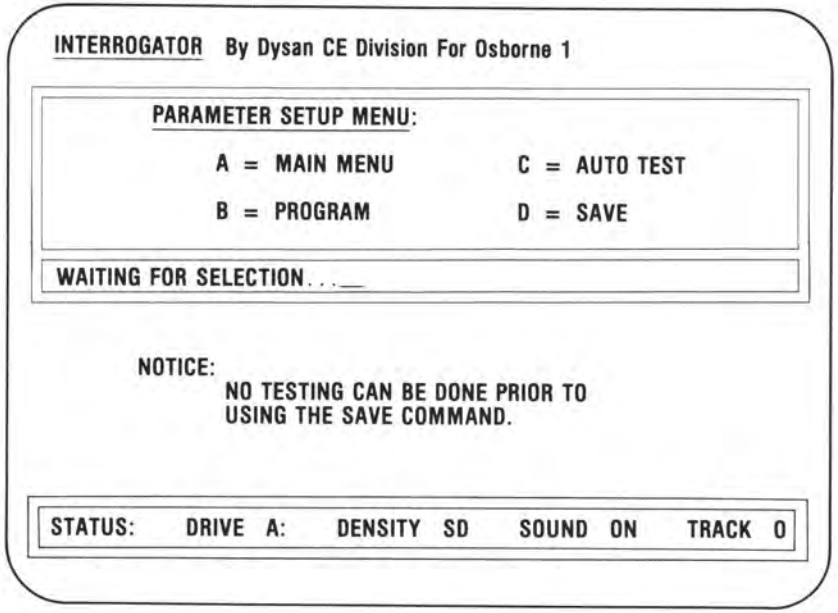
Appendix A of this manual contains additional information about the *DDD* test data fields.



*DDD*s 508–100 and 508–200 contain specific Auto Sequence Test default values. However, INTERROGATOR allows you to change these values to suit your applications.

Use the **RIGHT ARROW** key (⇨) on your Osborne 1 keyboard to select the parameter(s) you want to modify. Use the **UP ARROW** key (⇧) to increase values; use the **DOWN ARROW** key (⇩) to decrease values.

- You can change RPM to allow a maximum spindle speed variation as high as ±20 RPM.
- You can change the minimum centering offset value from ±7 to ±9 milli-inches. If the disc is not centered correctly, the Radial and Azimuth Tests can fail.
- You can change the minimum radial offset value from ±6 to ±13 milli-inches. To pass the Radial Test, the head must read this value of track offset from the center of the track being tested.
- You can allow a maximum radial delta value from 0 to 4. This value sets the



Auto Sequence Pass/Fail Parameters

When you select option **C** from the PARAMETER SETUP MENU, the CRT displays the **AUTO SEQUENCE PASS/FAIL PARAMETERS.**

CHAPTER 2 Getting Started

Introduction

This chapter explains how to backup your INTERROGATOR *program disc*, and how to load and use INTERROGATOR.

Backup

As insurance against damage or loss, backup your INTERROGATOR *program disc*, using the PIP Utility under your Osborne 1 CP/M operating system. Follow these steps:

Step 1 Put your working copy of your Osborne 1 "CP/M System" disc into Drive A.

Step 2 Put your INTERROGATOR *program disc* into Drive B.

Step 3 When the CRT displays the A > prompt, type **PIP A:=B:INTGR.COM[VO]** (INTGR.COM is the file name, and [VO] means "verify operation.")

The disc in Drive A now contains a copy of the INTERROGATOR program.

Dysan distributes the INTERROGATOR *program disc* in single density mode only. If you PIP the INTERROGATOR command file to a double density drive, remove the disc in Drive A and reboot according to the loading instructions.

Loading the INTERROGATOR Program

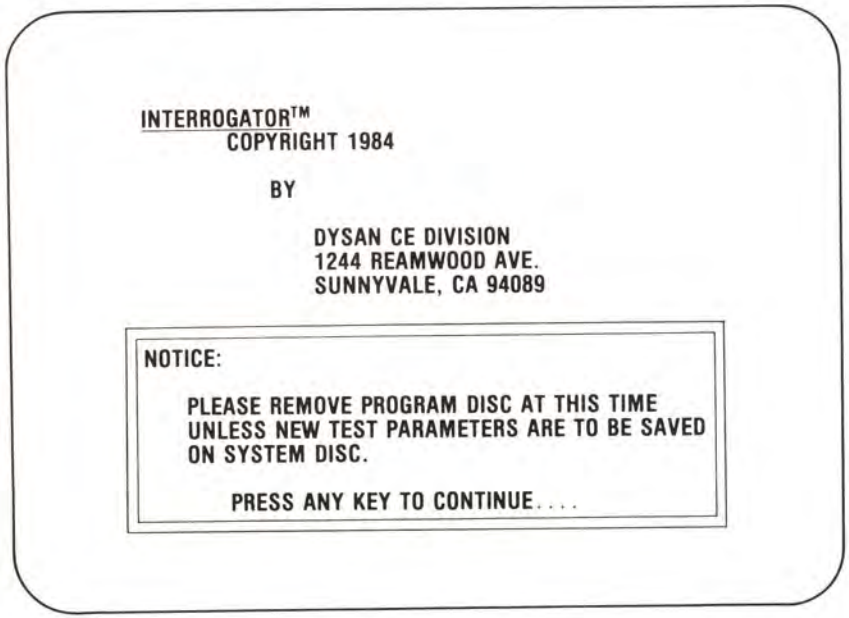
To load the INTERROGATOR program, follow these steps:

Step 1 Turn on the power switch for the Osborne 1. If your computer is running already, reset the system by pressing the **RESET** button.

Step 2 The CRT displays this message: **Insert disk in Drive A and press RETURN.** Put the INTERROGATOR *program disc* (or your backup disc) into Drive A. Press the **RETURN** key.

Step 3 The CRT displays the A > prompt. Type **INTGR** and press the **RETURN** key.

Step 4 When INTERROGATOR loads correctly, the CRT displays Dysan's INTERROGATOR trademark, and a Notice to "Remove Program Disc At This Time Unless New Test Parameters Are To Be Saved On System Disc."



CHAPTER 7 Setup Parameters

Introduction

The Setup Parameters give you access to INTERROGATOR's Program Parameters and the Pass/Fail Parameters for the Auto Sequence Tests. These Setup Commands allow you to modify INTERROGATOR's programmed parameters. The SAVE Command allows you to "save" new parameters to your INTERROGATOR program backup disc.

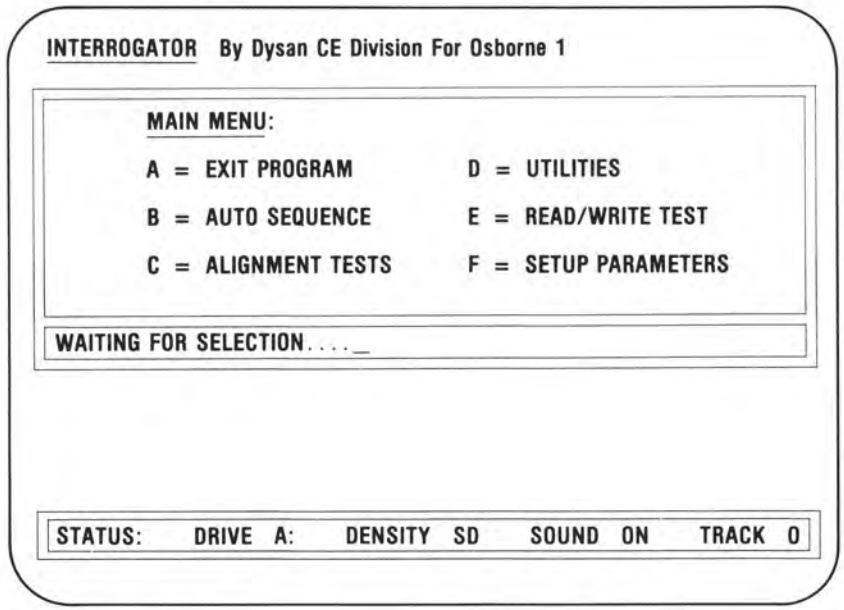
Select option **F** from the **MAIN MENU.** The CRT displays the **PARAMETER SETUP MENU.**

If you are using INTERROGATOR for the first time, proceed to Step 5 below. If you want to save new test parameters, read "Setup Parameters" (Chapter 7 of this manual).

Step 5 Remove the INTERROGATOR *program disc* (or your backup disc).

Step 6 Press any key to continue. The next screen displays the Main Menu.

Main Menu



Key	Command	Function
A	EXIT PROGRAM	Displays the Exit Menu. Be sure to install your "CP/M system" disc (your operating system) before you exit the INTERROGATOR program.
B	AUTO SEQUENCE	Displays the Auto Sequence Tests. This testing checks the overall alignment of the flexible disc drive selected.
C	ALIGNMENT TESTS	Displays the Alignment Tests Menu. You can select and run these tests one at a time.
D	UTILITIES	Displays the Utilities Menu. The Utilities contain commands the service technician can use to repair flexible disc drives.
E	READ/WRITE TEST	Displays the Random Read/Write Test. This test is useful for checking the overall performance of the drive.
F	SETUP PARAMETERS	Displays the Parameter Setup Menu for the Osborne 1 computer.

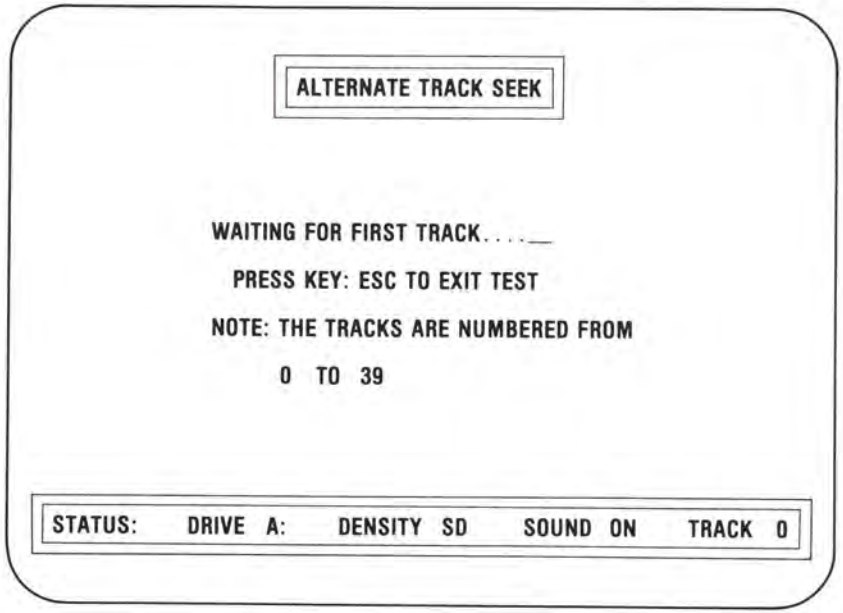
The STATUS line, which appears at the bottom of each screen display, gives you the following information.

DRIVE	Indicates the drive in use (A or B).
DENSITY	Indicates whether you are using single density (SD) or double density (DD) discs.
SOUND ON OR OFF	Indicates whether or not the "beep" is activated. The "Program Parameters" (see Chapter 7 of this manual) let you turn the sound on or off.

The delay is measured in increments of one millisecond within a range from 0–999 milliseconds. The higher the number, the longer the delay. Enter your delay number and press the **RETURN** key. The STATUS line at the bottom of the display screen shows the toggling activity between Drives A and B.

Press the **ESC** key to return to the UTILITIES MENU.

From the **UTILITIES MENU**, choose **ALTERNATE TRACK** by pressing the **E** key. The CRT displays this screen:



To position the drive head on the first track you select, enter the track number and press the **RETURN** key. A new message appears on the screen: **WAITING FOR SECOND TRACK...** Select the second track, enter the track number, and press the **RETURN** key. Do not exceed the maximum track number for the drive.

The STATUS line shows that the drive head is alternating between the first and second tracks you specified.

Use the **ESC** key to return to the UTILITIES MENU.

Toggle Drive Selects

The Toggle Drive Selects Utility lets you toggle between Drives A and B. From the **UTILITIES MENU**, choose the **TOGGLE SELECTS** option by pressing the **F** key.

INTERROGATOR displays this message: **WAITING FOR DELAY BETWEEN SELECTS...**

TRACK — Indicates the current track on which the drive head is positioned. A 5¼" 48 TPI formatted disc has 40 tracks that are numbered from 0 (the furthest from the spindle) to 39 (the nearest to the spindle).

How to Use the INTERROGATOR

Dysan recommends that you use the INTERROGATOR as follows.

1 Run the AUTO SEQUENCE TESTS to determine the overall condition of the drive.

In Auto Sequence testing, INTERROGATOR uses the *DDD* to quickly check the drive's alignment by performing a Centering Test, a Radial Alignment Test, an Azimuth Alignment Test, an Index Test, and an RPM Test. The sequence begins with the Centering Test because centering errors may cause failure in the tests that follow.

2 Run the READ/WRITE TESTS to check the overall data handling performance of the drive.

In Read/Write test mode, the drive randomly seeks a track, selects a random sector within that track, then reads from and writes to that sector. Errors are displayed and totaled by type.

If you suspect a Read/Write problem that could destroy the *DDD*, run the Read/Write Tests first.

3 Run ALIGNMENT TESTS on a drive that has failed the Auto Sequence Tests. Alignment test mode allows you to select and run tests one at a time, so that you can check specific parameters of a drive's performance with the *DDD*.

INTERROGATOR offers two additional capabilities.

UTILITIES can help an experienced technician, using an oscilloscope and an *Analog Alignment Diskette* (*AAD*), to troubleshoot and make critical adjustments to a drive.

PROGRAM SETUP lets you access the Auto Sequence Pass/Fail Parameters and general configuration of the INTERROGATOR program. You can select any value and "save" your selection to your INTERROGATOR program backup disc. (Use the SAVE Command before you run tests. Refer to Chapter 7 of this manual.)

Printer Setup

If you intend to use a printer to obtain copies of test results displayed on the CRT, prepare your printer by:

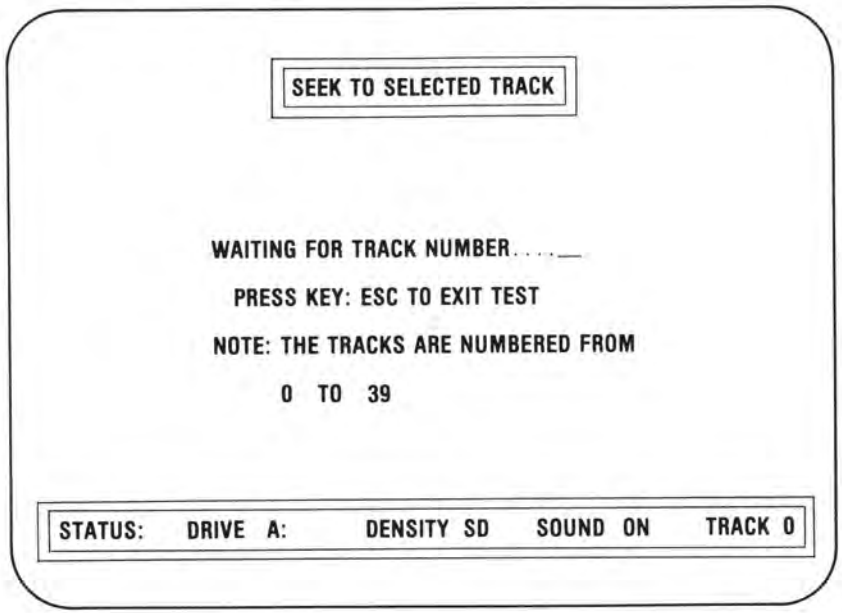
- ☐ Connecting the printer cable
- ☐ Loading the printer with paper
- ☐ Turning the power on
- ☐ Setting the printer on-line

All printer output is passed through the CP/M operating system. (Refer to the Setup in your *Osborne 1 User's Reference Guide.)*

Seek To Track

Seek To Selected Track lets you move the drive head to any track you specify on a disc. *Use an Analog Alignment Diskette (AAD) with this Utility.* Put the *AAD* into the drive you are using. Next, check the Drive Status Report.

From the **UTILITIES MENU**, select **SEEK TO TRACK** by pressing the **D** key. The CRT displays this screen:



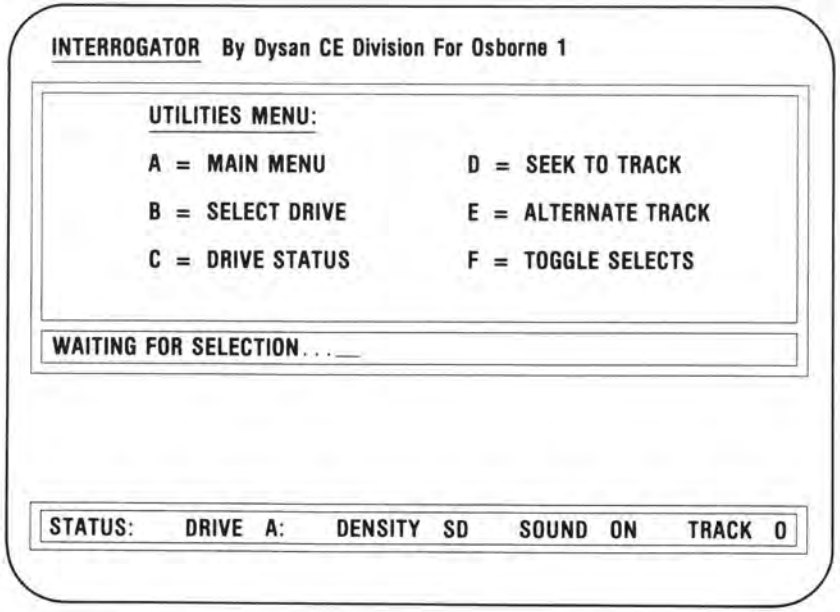
To position the drive head on any track, enter the track number and press the **RETURN** key. Each time you enter a track number, the drive steps the head to the track you specify.

Enter any track number from 0 to 39. If you try to specify a track number greater than 39, INTERROGATOR displays this error message: **EXCEEDED TRACK LIMITS!!!**

Press the **ESC** key to return to the UTILITIES MENU.

Alternate Track Seek

Alternate Track Seek lets you select any two tracks on a disc, and move the drive head back and forth between them. This Utility is a useful tool for adjusting the track zero detector.



(The illustrations in this chapter are examples of screens for a drive that requires single density discs.)

Select Drive Menu

Use option **B** to select the drive to exercise (A = Drive A; B = Drive B). If you decide not to change the drive, press the **ESC** key to return to the UTILITIES MENU.

Drive Status Report

Prior to using the Seek To Track and Alternate Track Utilities, check the Drive Status Report.

From the **UTILITIES MENU**, choose option **C**. The DRIVE STATUS display answers the following questions:

1. DRIVE READY TO USE (YES OR NO)
2. DISC WRITE PROTECTED (YES OR NO)
3. HEAD AT TRACK ZERO (YES OR NO)

Press the **ESC** key to return to the UTILITIES MENU.

CHAPTER 3 Auto Sequence Tests

Introduction

In Auto Sequence mode, INTERROGATOR uses the *DDD* to automatically check the overall condition of the flexible disc drive you are testing. Five separate, preselected tests are performed.

CENTERING	checks the drive's ability to clamp a disc and rotate it accurately.
RADIAL	checks track alignment of the head.
AZIMUTH	checks angular alignment of the head.
INDEX	checks photo-index timing.
RPM	checks disc rotational speed.

Test Results

The CRT displays the numeric results of each Auto Sequence Test, along with a Pass/Fail (P/F) message. Pass/Fail results are based on the Pass/Fail Parameters set in your current version of the INTERROGATOR program.

If you are running the INTERROGATOR program for the first time, use the Pass/Fail Parameters it contains. Once you are familiar with INTERROGATOR and have experience testing drive performance, you can change these parameters to suit your purpose.

The Program Setup (see Chapter 7 of this manual) lets you change the Pass/Fail Parameters for the Auto Sequence Tests.

When a test fails in Auto Sequence test mode, run the test individually in Alignment test mode. Alignment Tests allow in-depth analysis of a problem area.

Test Screens

From the **MAIN MENU**, select **AUTO SEQUENCE** by pressing the **B** key. The CRT displays the Auto Sequence Test screen. (The illustrations in this chapter are examples of test screens for a drive that requires single density discs.)

```
INTERROGATOR By Dysan CE Division For Osborne 1
DYSAN 508-100 DIGITAL DIAGNOSTIC DISC REQUIRED

TESTS          TRK    DATA    RANGE        DELTA      P/F
CENTERING                     -/+ 8        NA
RADIAL                        -/+ 12       1
RADIAL                        -/+ 12       1
RADIAL                        -/+ 12       1
AZIMUTH                       -/+ 42       NA
INDEX                         100-300      100
INDEX                         100-300      100
RPM            NA             298-302      2

ENTER TODAY'S DATE (e.g., 5/20/84)...__

NOTE: CENTERING AND RADIAL DISPLAYED IN MILLI-INCHES,
      AZIMUTH IN MINUTES, INDEX IN MICROSECONDS.

STATUS:  DRIVE A:  DENSITY SD  SOUND ON  TRACK 0
```

You cannot run the Auto Sequence Tests without the *DDD*. INTERROGATOR prompts you to use the correct *DDD* model number. Use *DDD* Model 508-100 with drives that require single density discs. Use *DDD* Model 508-200 with drives that require double density discs. Put the *DDD* into the drive you want to test.

To run the Auto Sequence Tests, follow these steps:

Step **1** Enter the date (M/D/YR).
To skip entering the date, go directly to Step 2.

CHAPTER 6 Utilities

Introduction

This chapter of the manual describes the Utilities and explains how to use them. The Utilities let you exercise a flexible disc drive by setting up the head carriage to seek to a specific track, or to seek alternately between two tracks. These options can help you test drives and make adjustments. While changes in drive operation occur, INTERROGATOR displays the drive's status.

The Utilities are an aid to experienced service technicians who know how to use the *Analog Alignment Diskette (AAD)*. The *AAD* evaluates geometric alignment. It does not measure performance under actual operating conditions.

From the **MAIN MENU**, select the **UTILITIES** by pressing the **D** key. The CRT displays the UTILITIES MENU.

Step 2 Press the **RETURN** key.
The date line disappears, and in its place the CRT displays the following command line:

A = EXIT B = RUN C = SELECT DRIVE D = HARD COPY

Step 3 Press the **C** key to select the drive to test.
If you did not put the *DDD* into the drive selected, the screen displays this error message: **Selected Drive Is Not Ready! ESC To Exit**

Step 4 Check the STATUS line to be sure the drive selection is correct.

Step 5 Press the **B** key to run tests.

While the tests are running, this message appears: **BUSY TESTING. USE ESC KEY TO STOP TEST.** It takes about one minute for the CRT to display test results. The screen looks similar to this:

INTERROGATOR By Dysan CE Division For Osborne 1
DYSAN 508-100 DIGITAL DIAGNOSTIC DISC REQUIRED

TESTS	TRK	DATA	RANGE	DELTA	P/F
CENTERING	24	-/+ 8	-/+ 8	NA	PASS
RADIAL	0	-12 +10	-/+ 12	1	FAIL
RADIAL	16	-12 +12	-/+ 12	1	PASS
RADIAL	30	-12 +12	-/+ 12	1	PASS
AZIMUTH	34	-42 +42	-/+ 42	NA	PASS
INDEX	0	182	100-300	100	PASS
INDEX	34	187	100-300	100	PASS
RPM	NA	300	298-302	2	PASS

A = EXIT B = RUN C = SELECT DRIVE D = HARD COPY

NOTE: CENTERING AND RADIAL DISPLAYED IN MILLI-INCHES, AZIMUTH IN MINUTES, INDEX IN MICROSECONDS.

STATUS: DRIVE A: DENSITY SD SOUND ON TRACK 34

The values indicated in the Range column represent the Pass/Fail Parameters.

Printing Test Results

If you want a hard copy of the Auto Sequence test results displayed on the CRT, press the **D** key. Before directing the results to the printer, the INTERROGATOR program prompts you to type a comment. The comment line lets you input personalized information, or any other information you want included on the printed copy. The hard copy also indicates the *DDD* model number, the drive tested, and the test date (if you entered the date in Step 1).

Enter your comment. Press the **RETURN** key.

If your printer is NOT ready, the screen displays this error message: **USE ESC KEY TO STOP HARD COPY OUTPUT**

Be sure that your printer is ready. (See "Printer Setup" in Chapter 2 of this manual.)

Once you stop the printer output, you lose the test results that are displayed on the CRT. To obtain a hard copy of test results, you must run the tests again.

INTERROGATOR begins the Hysteresis Check by locating the drive head on the *DDD* radial reference track (track 16). Next, INTERROGATOR steps the head 10 tracks away from the spindle (to track 6), then repositions the head on the radial reference track (track 16). INTERROGATOR performs a read of the radial reference track (track 16) and computes the radial delta.

Next, INTERROGATOR steps the head 10 tracks toward the spindle (to track 26), then repositions the head on the radial reference track (track 16). INTERROGATOR again performs a read of the radial reference track (track 16) and computes the radial delta. The difference between the two radial deltas is the hysteresis error value that INTERROGATOR reports in milli-inches.

INTERROGATOR reports two error messages for the Hysteresis Check:

NOT ABLE TO READ TRACK
NOT ABLE TO DETERMINE HYSTERESIS

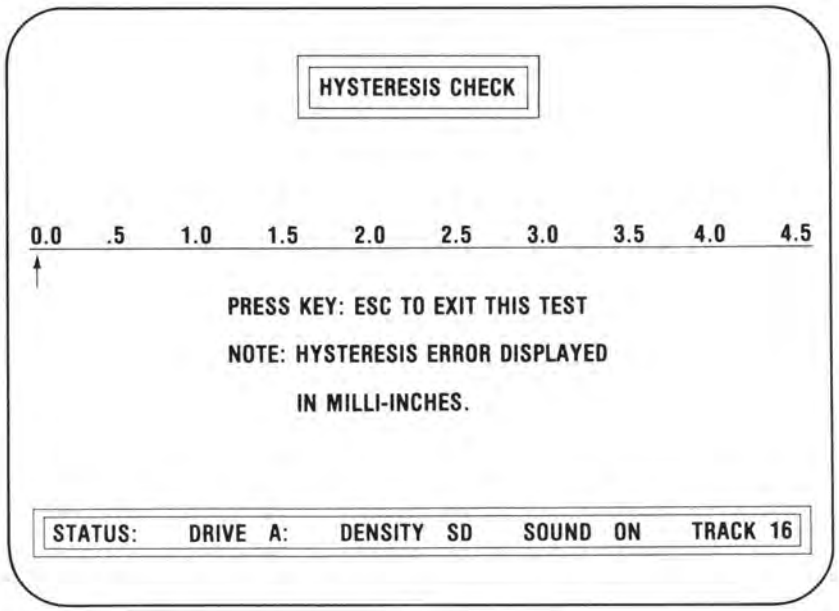
Refer to "Error Messages" (Chapter 8 of this manual) for a brief discussion of these messages.

Press the **ESC** key to return to the ALIGNMENT MENU.

Hysteresis Check

This test checks the drive's ability to step the head accurately to the same location on the reference track after seeking to the track from opposite directions.

Put the *DDD* into the drive you are testing. From the **ALIGNMENT MENU**, select the **HYSTERESIS CHECK** by pressing the **H** key. The CRT displays this screen:



The STATUS line displays the number of the reference track in use.

INTERROGATOR displays hysteresis error in milli-inches. The arrow below the error display points to the error result.

An ideal Hysteresis Check reports a zero (0) error result. An error result other than zero indicates that the drive cannot reseek the same track location after being offset toward or away from the spindle.

INTERROGATOR performs the Hysteresis Check using a radial reference track on the *DDD*. The radial reference track for the Osborne 1 drives is track 16.

CHAPTER 4 Read/Write Tests

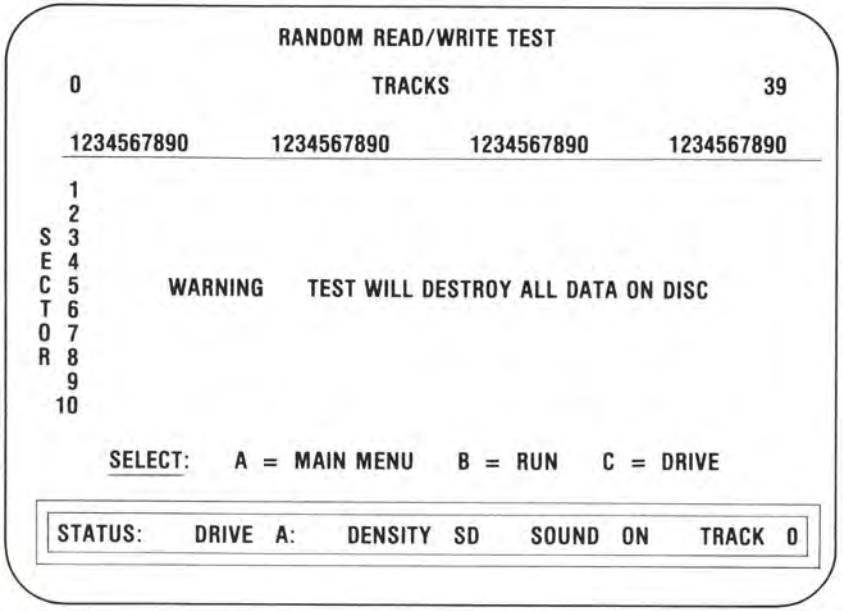
Introduction

Read/Write Tests check the overall data handling performance of the flexible disc drives controlled by the Osborne 1 computer.

To run these tests, you need a data disc. (A normal, error-free disc is suitable.)

Running the Tests

From the **MAIN MENU** select option **E.** The CRT displays the Random Read/Write Test screen. (The illustrations in this chapter are examples of test screens for a drive requiring single density discs.)



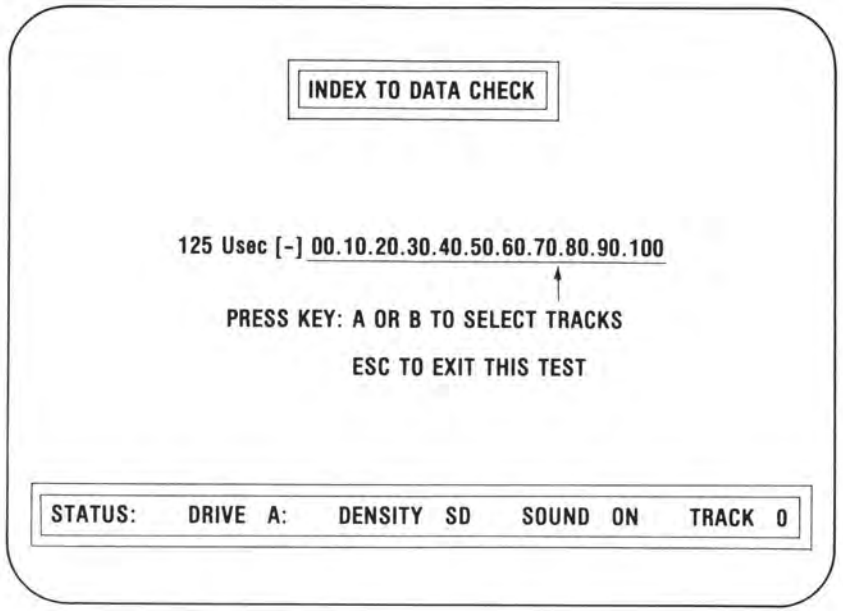
Press the **C** key to select the drive (A or B) to test.

Put your data disc into the drive you are testing. Carefully check the disc you use for the Read/Write Test. This test writes and erases data on the disc. To prevent the loss of important data,

- Do not insert the INTERROGATOR *program disc*
- Do not insert the *DDD*
- Do not insert a disc containing data you want to keep.

Press the **B** key to start the test. INTERROGATOR displays this message: **BUSY FORMATTING DATA DISC**

After formatting the test disc, INTERROGATOR starts the test.



Use the **A** and **B** keys to select the *DDD* reference tracks (track 0 and track 34).

The drive sends an index signal once per revolution of a disc. Consult the manufacturer's specifications for tolerances. For a 5¼" 48 TPI drive, the nominal time is 200 microseconds.

INTERROGATOR displays an average (in microseconds) of several Index To Data readings. As INTERROGATOR updates the average of readings, this value shows slight variations.

Index To Data checks the time period from the index pulse to the start of the data. The values INTERROGATOR displays indicate whether the Index reading is above [+] or below [–] the nominal time value.

INTERROGATOR displays two error messages for the Index To Data Check:

EXCEEDED SCALE LIMITS
NOT ABLE TO COMPUTE TIME

Chapter 8 of this manual contains a brief discussion of Index To Data Check error messages.

Press the **ESC** key to return to the ALIGNMENT MENU.

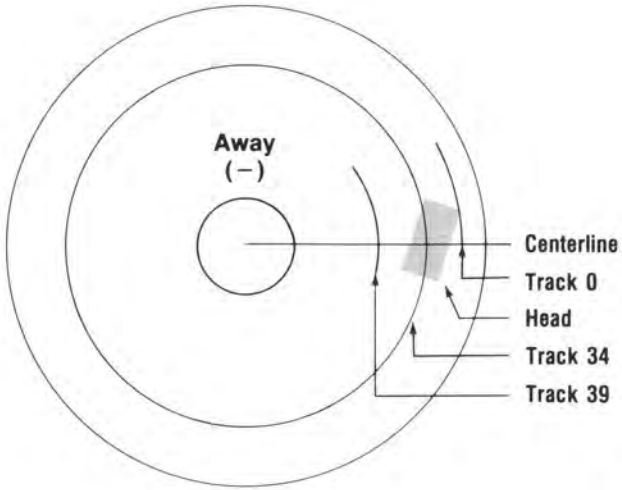


FIGURE 8. Improper azimuth alignment

INTERROGATOR displays only one error message for the Azimuth Alignment Check: **NOT ABLE TO READ TRACK**

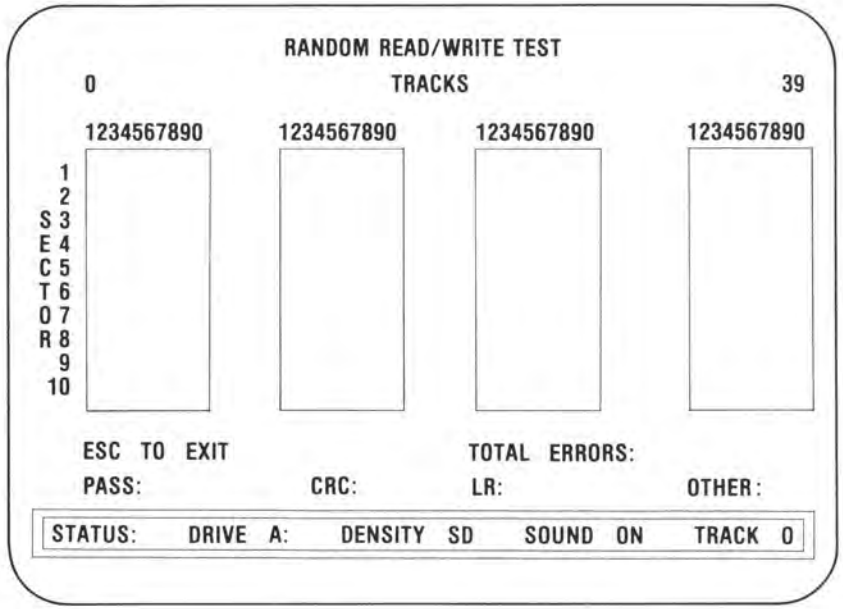
(Refer to "Error Messages," Chapter 8 of this manual.)

Press the **ESC** key to return to the ALIGNMENT MENU.

Index to Data Check

Index timing measures the index pulse (a timing signal) relative to a reference point on the *DDD*. Index test mode lets you check *head positioner skew*. After selecting the Index Test, press the **A** key for a reading of the outside diameter reference track. Next, press the **B** key for a reading of the inside diameter reference track. The difference between the two readings gives an indication of the head positioner skew.

To start the Index Test, put the *DDD* into the drive you are testing. From the **ALIGNMENT MENU**, select the **INDEX TO DATA CHECK** by pressing the **G** key. The CRT displays the Index To Data test screen.



The CRT displays a map of tracks and sectors. There are 40 tracks with ten sectors per track. Tracks and sectors are marked on the map as they are tested.

INTERROGATOR randomly selects a track, selects a random sector within that track, reads that sector, then rewrites it. The STATUS line at the bottom of the screen displays the track number that INTERROGATOR is testing. While it tests tracks and sectors, INTERROGATOR also keeps an error count. Errors are totaled and displayed.

The Random Read/Write Test screen displays

- The number of read/write passes (PASS) made. (Passes = complete test sequences run.)
- Total errors found.
- The number of errors found during the Cyclic Redundancy Check (CRC).
- The number of Lost Record (L/R) errors found.

- The number of all other errors found during the test. The errors grouped in the OTHER category are controller errors. DRIVE NOT READY is an example of this type of error.

INTERROGATOR continues to run the Read/Write Test until you press the **ESC** key to stop the test.

Read/Write Retries

The Read/Write retries value (see "Program Parameters" in Chapter 7 of this manual) sets the number of times a drive head reads and writes a sector before an error is reported. INTERROGATOR allows you to set the retries value from 0 to 9.

Read/Write Errors

You can avoid media-related errors by using a good quality data disc as your test disc. A damaged or contaminated disc can damage the drive's read/write heads. INTERROGATOR assumes that you are using an error-free data disc that is compatible with the drive you are testing.

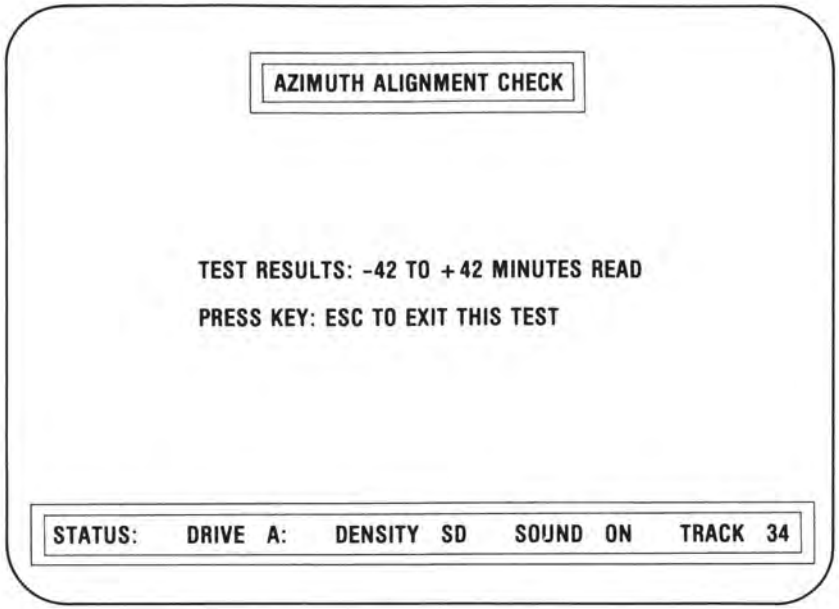
Dysan recommends the following as suitable for test discs.

- A 5¼" 48 TPI 1-sided, single density data disc (such as the Dysan 104/1D).
- A 5¼" 48 TPI 1-sided, double density data disc (such as the Dysan 104/2D).

Use the Read/Write Test results that INTERROGATOR displays to identify error patterns.

- ☐ Do the errors occur continually or occasionally?
- ☐ Do the errors occur if you use a different data disc?
- ☐ Does the same type of error occur on both drives in the system?
- ☐ Does the drive fail when you first turn it on, or after it has run awhile?

Asking the questions listed above may help you determine the causes of errors reported during read/write testing.



INTERROGATOR displays the test results in minutes. (1 minute = 1/60 of a degree.)

When a drive is properly aligned, the [–] and [+] values displayed on the Azimuth Alignment test screen are balanced or nearly balanced.

The values displayed represent the maximum angular offset which the drive head was able to read away from [–] and toward [+] the spindle.

Figure 8 below illustrates an example of improper azimuth alignment.

Figure 7 below illustrates an example of radial misalignment toward the center spindle hole.

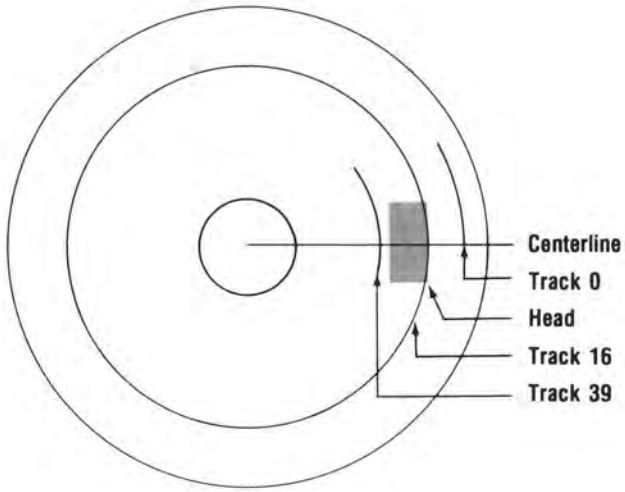


FIGURE 7. Radial misalignment toward (+) center

Chapter 8 of this manual contains a brief discussion of the Radial Alignment Check error messages.

Press the **ESC** key to return to the ALIGNMENT MENU.

Azimuth Alignment Check

This test verifies that the head angle is positioned tangent to the test track. The Azimuth Rotation Track for the Osborne 1 drives is track 34.

Put the *DDD* into the drive you are testing. From the **ALIGNMENT MENU**, select the **AZIMUTH ALIGNMENT CHECK** by pressing the **F** key. The CRT displays the Azimuth Alignment test screen.

CHAPTER 5 Alignment Tests

Introduction

Alignment test mode allows you to run specific tests to check spindle speed, disc centering, radial alignment, azimuth alignment, index timing, and hysteresis.

You can manually choose any individual test and run that test continuously, while INTERROGATOR displays the results.

It is not recommended that you run one test on the same test track for a long period of time. The normal wear from a drive head contacting the disc's surface could ruin a reference track on the *DDD*. Unless it is necessary, you should not leave the *DDD* in a drive for long periods of time.

From the **MAIN MENU**, select **ALIGNMENT TESTS** by pressing the **C** key. The CRT displays the Alignment Test Selection Menu. (The illustrations in this chapter are examples of test screens for a drive that requires single density discs.)

```
INTERROGATOR By Dysan CE Division For Osborne 1

ALIGNMENT MENU:

        A = MAIN MENU              E = RADIAL
        B = SELECT DRIVE           F = AZIMUTH
        C = SPEED                  G = INDEX
        D = CENTERING              H = HYSTERESIS

WAITING FOR SELECTION..._

DYSAN DY/508-100 DIGITAL DIAGNOSTIC DISC REQUIRED

STATUS:   DRIVE A:   DENSITY SD   SOUND ON   TRACK 0
```

Run Alignment Tests on a drive that has failed Auto Sequence testing.

Before you run an Alignment Test, press the **B** key to select the drive to test (A = Drive A; B = Drive B). If you decide not to change the drive, press the **ESC** key to return to the ALIGNMENT MENU.

Spindle Speed Check

This test checks the spindle's rotational speed.

Put the *DDD* into the drive you are testing. From the **ALIGNMENT MENU**, select the **SPINDLE SPEED CHECK** by pressing the **C** key. The CRT displays this screen:

Figure 6 below illustrates an example of radial misalignment away from the center spindle hole.

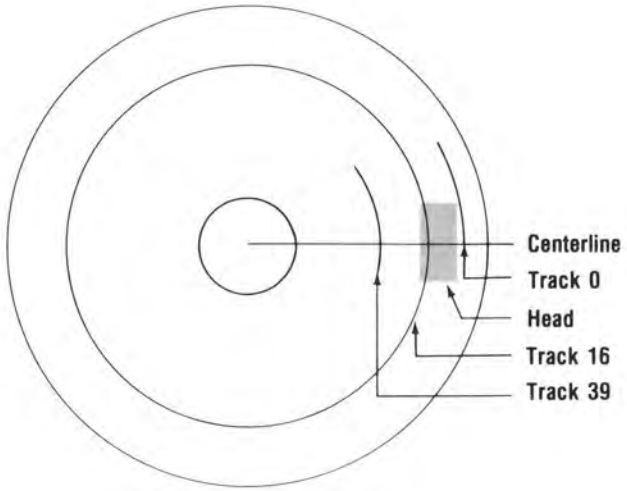


FIGURE 6. Radial misalignment away (–) from center

When a drive is properly aligned, the numbers displayed on the Radial Alignment test screen are balanced or nearly balanced.

To get an indication of *head positioner linearity*, read the six radial reference tracks and note the error difference across all the tracks. If the error difference is the same for each track, the head positioner is linear.

The Radial Alignment Check measures the drive's head alignment in relation to the track it is reading. The test makes the measurement by attempting to read sectors that are progressively offset from the track centerline. A properly aligned drive can read sectors that are equally offset away from [–] and toward [+] the spindle. Non-symmetrical readings indicate radial misalignment.

Figure 5 below illustrates an example of proper radial alignment.

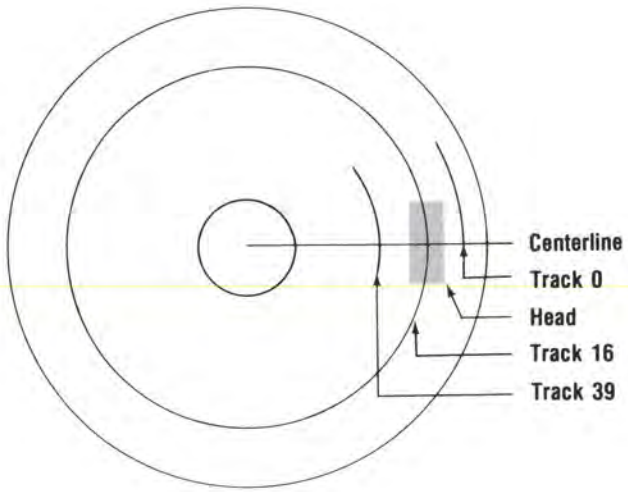
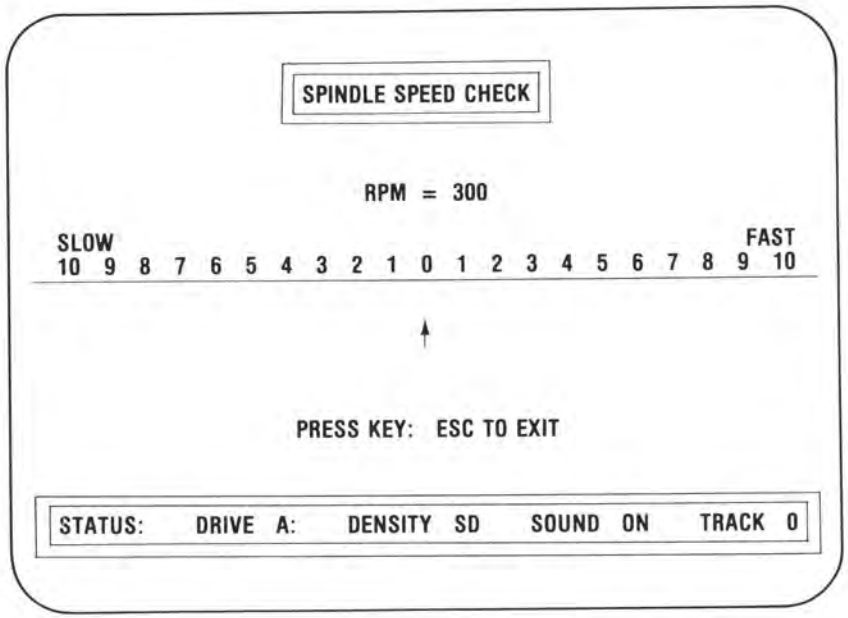


FIGURE 5. Proper radial alignment



INTERROGATOR displays spindle speed in revolutions per minute and updates the RPM value each time the speed is calculated. Spindle speed must be within the drive manufacturer's specifications. If the speed is too far out of the specified range for RPM, data errors can occur.

INTERROGATOR also displays spindle speed graphically. [(0) represents specified nominal RPM; SLOW represents speed deviation below specified RPM; and FAST represents speed deviation above specified RPM.]

The arrow movement below the graphic display indicates slight variations in spindle speed, which correspond with the RPM value displayed above.

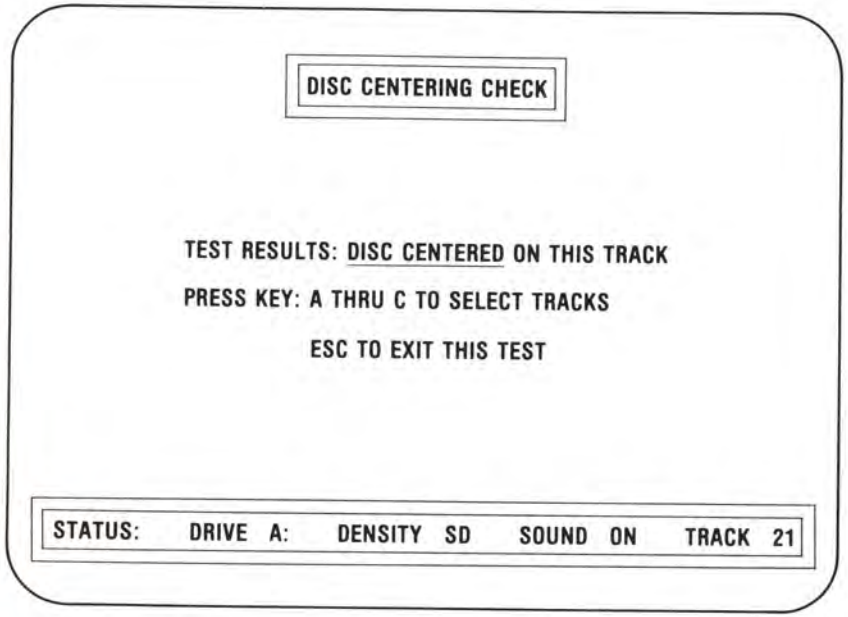
Press the **ESC** key to return to the ALIGNMENT MENU.

Disc Centering Check

This test checks the drive hub's ability to center and clamp a disc properly. Run this test to ensure a good clamp before you run other Alignment Tests.

Use the *DDD* for the Disc Centering Check. Although the centering operation requires clamping and reclamping of the *DDD*, both should be minimized to avoid excessive wear on the disc spindle hole.

Put the *DDD* into the drive you are testing. From the **ALIGNMENT MENU**, select the **DISC CENTERING CHECK** by pressing the **D** key. The CRT displays this screen:



Use keys **A** through **C** to select tracks for testing.

The Centering Check runs on three different track locations, known as the Alternate Offset Tracks. (See "DDD Testing Summary" in Chapter 1 of this manual.) Appendix A of this manual lists the Alternate Offset track numbers and sector offset values for the Osborne 1 drives.

INTERROGATOR displays one of the following test result messages:

- **DISC CENTERED ON THIS TRACK**
- **CHECK RADIAL ALIGNMENT**
- **RECLAMP DDD**
- **NOT ABLE TO DETERMINE CLAMPING ERROR**
- **NOT ABLE TO READ TRACK**

The CHECK RADIAL message indicates that the test read only one side of the track centerline. Run the Radial Alignment Check on the drive head.

The RECLAMP DISC message indicates that you should reclamp the *DDD* and run the Centering Check again. If the second test does not produce a DISC CENTERED message, the drive has a centering problem.

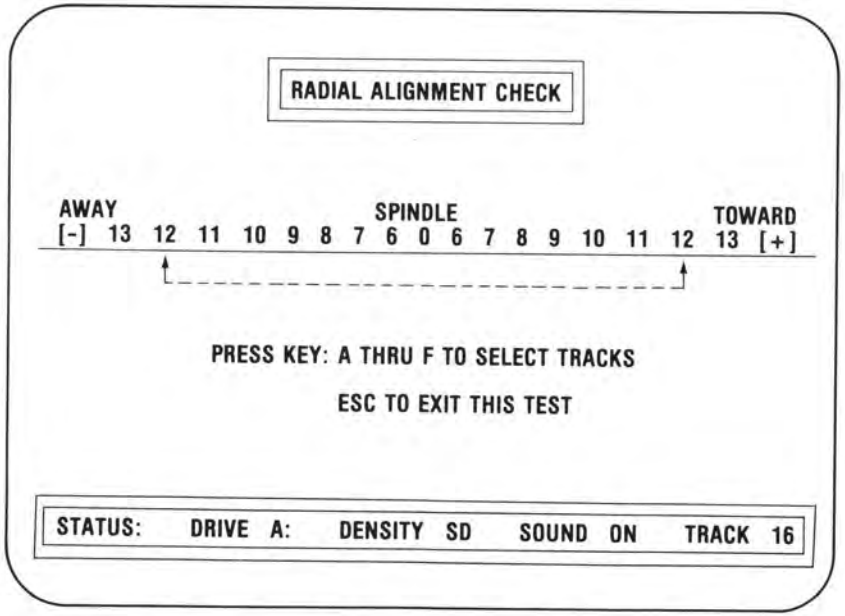
Chapter 8 of this manual contains a brief discussion of the Disk Centering Check error messages.

To exit Disc Centering test mode, press the **ESC** key. INTERROGATOR returns you to the ALIGNMENT MENU.

Radial Alignment Check

This test checks the drive's ability to position the head on the track centerline.

Put the *DDD* into the drive you are testing. From the **ALIGNMENT MENU,** select the **RADIAL ALIGNMENT CHECK** by pressing the **E** key. The CRT displays this screen:



Keys **A** through **F** select tracks for testing. The *DDD* contains several Progressive Offset Tracks. (See "DDD Testing Summary" in Chapter 1 of this manual.) Appendix A of this manual lists Progressive Offset track numbers and sector offset values for the Osborne 1 drives.