

SERVICE LETTER

DATE: 4-1-74

NUMBER: DK3013

SUBJECT: POSITIONER OPTIC CHECKLIST

I. SCOPE

This procedure is designed as a service aid for D3000 Disk Drives. It outlines the interrelated symptoms and causes of the X+90 drift phenomenon as well as providing a checklist. This checklist provides the necessary information required to identify the cause of X+90 and X+0 signal drift as well as corrective action guidelines.

II. CUSTOMER SERVICE REPORT PROCEDURES

It is essential to the success of this program for certain "Readings" noted during the use of this checklist to be feedback to Engineering. A simplified technique has been devised using the existing CSR. To do this, Customer Service has added two (2) new code numbers to the present CSR code card. The use of these numbers, along with items asked for in the comment section, will supply the necessary information. Following is a description of the new numbers along with a short outline on procedures.

(See sample CSR attached.)

A. New numbers to be added to CSR code card.

1. Under "Reason for Service" codes add:
 - a. 715 = Positioner Optics Program
2. Under "Key Area" codes add:
 - a. 351 = Positioner Reticle

B. CSR Procedures

1. Use existing codes in "Reason for Service" area to describe D3000 problems regarding service which may result in the application of the Positioner Optics Program. Use the 715 code when the primary reason for service is to apply the Positioner Optic Program.
2. Use 351 code in key area only when the reticle is adj or checked.

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3. Enter in the area provided for comments the information asked for on Pages 3 and 4 of the checklist using the following format:

C1 _____.
C2 _____.
C3 _____.
C4 _____.
C5 _____.
C6 _____.

III. SYMPTOMS OF X+90/X+0 DRIFT

- A. Loss of Quadrature clocks (X+90) when loading heads, reveals itself in so much as the positioner does not stop at Track \emptyset , resulting in an emergency unload.
- B. While performing one-track repetitive seeks, the X+0 waveform (TP20 Servo PCBA) reveals excessive overshoots or undershoots, but the seek times are within specifications.

IV. CAUSES OF X+90/X+0 DRIFT

- A. Flexure of Mylar Reticle

This problem is caused by the difference in the coefficient of expansion of the mylar reticle and the photocell assembly resulting from variations in ambient temperature.

(1) SYMPTOM

A symptom of this problem is a sudden, gross change in X+90 and X+0 amplitudes caused by the mylar reticle suddenly deforming, "popping" out of flatness (oil-can effect). This condition normally occurs during large temperature changes within the disk drive.

NOTE

If the amplitude of the waveforms decreases, this is an indication that the mylar has deflected inward forming a concave surface. An outward deflection will cause an increase in the X+90 and X+0 analog waveform amplitudes.

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B. Blackening of the Position Transducer Lamp

This problem is normally caused by operating the lamp at a higher than rated voltage conditions. The exact value of

voltage required to cause a lamp to blacken is not known and will vary from lamp to lamp. However, a lamp operating at a voltage exceeding 5.2V should be suspected.

(1) SYMPTOM

The symptoms of lamp blackening are as follows:

- a. The amplitudes of X+90 and X+0 have been decreasing slowly and have required several adjustments of R79 and R69 over extended periods of time (weeks or months)
- b. A lamp voltage, as measured between TP21 and the lower lead of R128 on the servo PCBA, greater than 5.2 VDC will decrease lamp life. (See Fig. 1, Page 4)
- c. A lamp voltage, as measured between TP21 and R128 on the Servo PCBA, is 4.6V or less is an indication that blackening has already occurred.

C. Positioner Scale Movement

The positioner scale is mounted to the positioner carriage assembly with three Allen head screws. The scale to reticle spacing ($.005" \pm .001"$) is adjusted by loosening the scale mounting screws and moving the scale into position using a piece of paper or mylar .005" thick then retightening these three screws. Should these screws become loose, the scale will shift position, changing the scale to reticle spacing, causing the X+90 and X+0 signal amplitudes to change. The normal failure mode is an increase in scale to reticle spacing resulting in a decrease in X+90 and X+0 signal amplitudes.

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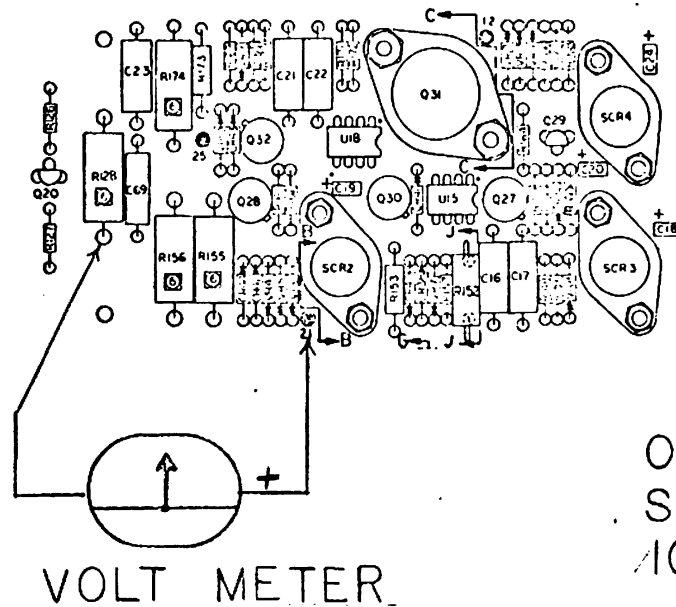
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(1) SYMPTOMS OF POSITIONER SCALE MOVEMENT:

- (a) One or more of the scale mounting screws are loose.
- (b) The X+90 analog signal amplitude is less than 6V peak-to-peak. (Similar to Blackening)
- (c) The X+90 and X+0 signal amplitudes vary significantly (more than 10%) as the positioner is moved, manually, through its full stroke.

FIGURE 1



ONLY PART OF
SERVO BOARD
102811 IS SHOWN

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V. X+90/X+0 DRIFT CHECKLIST

A. Setup

- (1) Establish service status.
 - a. Power Off
 - b. Remove Dust Cover
 - c. Extend circuit boards to the service position.
- (2) Observation of X+90 and X+0 analog waveforms.
 - a. Disconnect connectors J205 and J206 from servo PCBA.
 - b. Connect oscilloscope to observe X+90 waveform at TP2 of servo PCBA.
 - c. A.C. power ON and observe illumination of safe indicator.
 - d. Load disk cartridge in drive, then depress RUN/STOP switch. Observe that the disk drive comes up to speed.
 - e. Approximately 33 seconds after depressing RUN/STOP switch, manually load heads onto the disk at about Track 000.
 - f. Move positioner carriage, by hand, between Track 000 and Track 202 and observe the X+90 analog waveform, at TP2 on the oscilloscope.
 - g. The X+90 analog waveform should have a peak-to-peak amplitude of $\geq 6V$ (negative peak may be clipped) Record reading C1 _____. and list C1 on C.S.R. in area provided for comments.
 - h. The X+90 analog positive peak should be approximately +3V or greater above ground. Record reading C2 _____. and list at C2 on C.S.R. in area provided for comments.
 - i. Move probe to TP 20.

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- j. Move positioner carriage through its full stroke (Track 000 to Track 202) and observe analog waveform.
- k. The peak-to-peak amplitude should be 12V peak-to-peak centered about ground.
Record reading C3 _____. and list at C3 on CSR in area provided for comments.
- l. Neither end of the X+Ø waveform should be clipped.
- m. Should any of the above mentioned items not be within specifications, drift is apparent, and the following pages should be utilized for corrective action.

B. Positioner Lamp Checklist and Corrective Action Procedure.

(1) Measure the position transducer lamp voltage.

- a. On the Servo PCBA, use TP21 as the positive terminal and the lower lead of R128 as the return (SEE Fig. 1, Pg. 3)
- b. An initial lamp voltage of 4.6V or lower indicates blackening has probably already occurred. Recommended action is replacement of the lamp assembly and incorporation of FCN DK3006.
- c. If the voltage across the lamp exceeds +5.21 VDC, the lamp voltage shall be considered excessive and FCN DK3006, Lamp Portion, Section V-A should be incorporated into the Servo PCBA. The lamp voltage measured prior to FCN DK3006, or lamp assembly replacement, was C4 _____. and list C4 on CSR in area provided for comments.
- d. Should Section V-A of FCN DK3006 be incorporated, recheck the lamp voltage after rework. The lamp voltage shall be between +4.3VDC and +5.2VDC. The lamp voltage is C5 _____. and list C5 on CSR in area provided for comments.
- e. If the lamp voltage exceeds 5.2 VDC after Section V-A of FCN DK3006 is incorporated, then replacement of the positioner lamp is required. (Reference Service Letter DK3016).

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If after Section V-A of FCN DK3006 is incorporated, an insufficient amplitude X+90 analog signal is evident, lamp blackening or improper scale to reticle spacing is indicated.

Perform the X+0 and X+90 servo adjustments per the D3000 manual 102780, Section 6 - If Section V-A of FCN DK3006 was incorporated.

(2) Scale to Reticle Spacing Checklist.

Removal of the READ/WRITE PCBA and the scale protection shield is required to make these checks. USE CARE WHEN REMOVING SCALE SHIELD SO AS NOT TO SCRATCH THE SCALE.

- a. Are the three scale bracket mounting screws tight?
- b. Check for proper scale to reticle spacing using a piece of paper or mylar .005" thick.

CAUTION: STEEL FEELER GAUGES MUST NOT BE USED UNDER ANY CIRCUMSTANCES!

- c. Readjust the reticle to scale spacing as required, The proper spacing is $.005 \pm .001$ inches. Insure that the scale mounting bracket screws are tight.
- d. Recheck X+0 and X+90 adjustments.

(3) Reticle Assembly Checks

If the X+0 and X+90 signals are still improper, checking of the reticle is required.

- a. Using a piece of masking tape or scribe, mark the position of the reticle in the holder.
- b. Loosen the two reticle assembly mounting screws and remove the reticle assembly from the position transducer body.
- c. Observe the flatness of the mylar reticle.
Is reticle flat? (Y) _____ (N) _____ C6 _____. List as C6 on area provided on C.S.R. for comments.
- d. If the mylar reticle surface is distorted (concave or convex surface), remove the mylar reticle using the procedures outlined in Service Letter DK 3014. Make necessary servo adjustments per Section 6 of the D3000 manual.

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- e. If the mylar reticle surface appears flat, remount the reticle assembly into position transducer assembly body. Use alignment as marked in Step "a". as the initial setting. Readjust if necessary using D3000 Manual, Section 6, Reticle Adjustment Procedures.
- (4) Position Transducer Lamp Replacement.
- Should the positioner lamp have to be replaced for insufficient amplitude of X+0 of X+90, or the lamp voltage is still too high after FCN 3006 Section I was incorporated, reference Service Letter DK 3016 for Removal and Replacement procedures.

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PERTEC PERIPHERAL EQUIPMENT

9600 IRONDALE AVENUE · CHATSWORTH, CALIFORNIA 91311
PHONE (213) 882-0000 · TWX (910) 494-2093

CUSTOMER SERVICE REPORT

Refer to this number on all correspondence. **CS 07852**

Region Associated Reports:

SERVICE TYPES												CUSTOMER SERVICED				INVOICE TO				Reason for Service			
Checked Unit OK (Provide Comment)	Cleaned/Lubricate	Adjust/Align	FCN or SIN Installed (Provide Comment or SIN No.)	Repaired (Explain in Comments)	Replaced	Sold Spare	Exchange	Name	Address	City	State	Zip	Name	Address	City	State	Zip	Reason for Service	Trouble A	Trouble Int			
								Date Serviced	Time *	Area	Rep.	Product	Serial Number	7 1 5									
								Month	Day	Year													
KEY AREA	LOCATION DESIGNATOR(S)	PART NUMBER	R _v	O _v	Vendor	REPAIRED ASSEMBLY P/N	R _o	UNIT PRICE	EXTENDED														
3 5 1																							
USE ONLY IF RETICLE WAS CHECKED OR ADJUSTED.										ONLY WHEN PRIMARY REASON FOR SERVICE IS TO APPLY POSITIONER OPTICS PROGRAM.													
Stock from Inv.	DIV.	ACCOUNT	Stock to Project	DIV.	ACCOUNT	REGION	PROJECT / W.O. / OTHER	WARRANTY		BILLABLE		If yes, see charges listed below.											
2	1	3 6 - 0	2	2		7 3		No	Yes	No	Yes	PO											
Return Call Required:	FCN or SIN #:	COMMENTS:					C1	Air Fare	Travel Miles @ /mi														
NORMAL COMMENTS.						C2	Auto Rental	Travel Labor Hrs. @ /hr															
						C3	Taxi	Service Labor Hrs. @ /hr															
						C4	Tolls	Parts															
						C5	Parking	Tax															
						C6	Per Diem	Other															
							BILLABLE TOTAL																
Field Copies						Service Representative:						Customer Acknowledgement:											
Canary - Customer Goldenrod - Region												By _____											
Home Office																							
White - Customer Service Green - Accounting																							
Copies Pink - Cost Accounting/Data Processing																							

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*Nearest Hour, 24 Hour Clock.

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