BASF Aktiengesellschaft	**Spezifikation** and Description	
Titel Title BASF CE - FlexyDisk 5.25 130 mm for track adjustment, amplitude control and index sensor alignment	Nr. No. VMT/EMF 78 001	Seite 1 von 11 Sheet of
	Ausgabe II Issue	Datum Nov. 80 Date

The BASF CE-FlexyDisk is a selected disk for optimum geometrical behaviour. It is prewritten on tracks 0,16 and 34 with a special pattern for precise and easy adjustment procedures.

I. General description

I.1. Track 16 -Recording for track adjustment-

Track 16 is recorded on a precision drive with a special pattern as follows:

Recorded pattern on disk surface

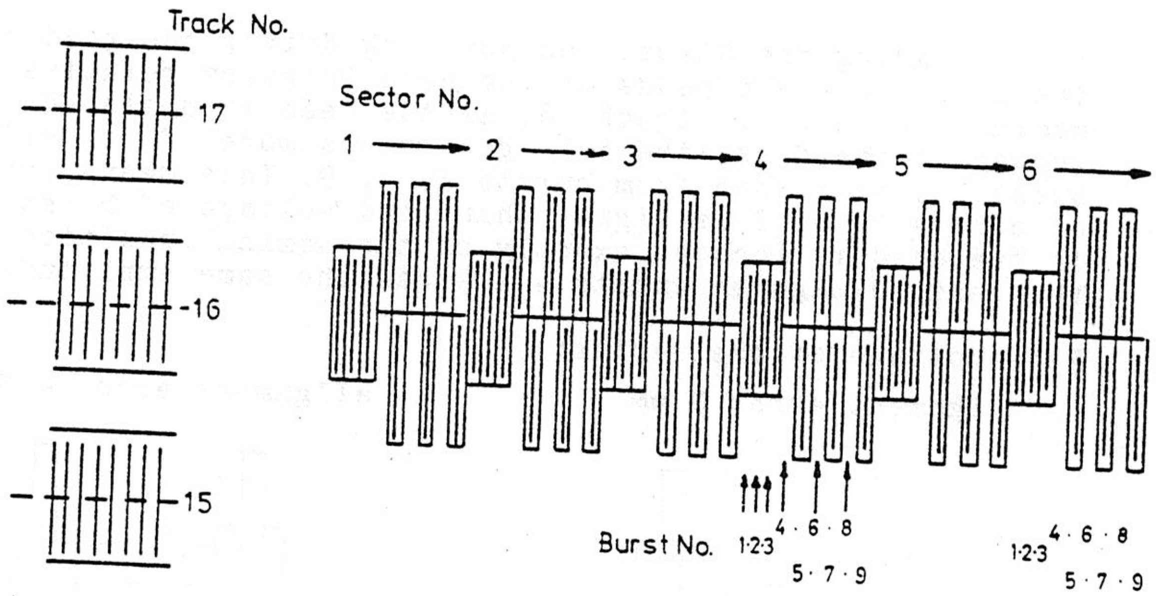


Fig.1

9 Bursts are recorded on every sector, 6 sectors on one circumference of track 16. Track adjustment bursts (No 4-9) are recorded off center of nominal location, alternately displaced towards the disks centerhole and towards the disk outside diameter. For easy measurement, track displacement is choosen so that those bursts are touching with one side the centerline of track 16. Orientation bursts (No 1-3) are recorded on nominal track center line.

Burst No	Recording	Description
1, 3	2 f, c	recorded at centerline of track 16 with 2 f frequency.
2	1 f, c	recorded at centerline of track 16 with 1 f frequency.
4, 6, 8	1 f, i	recording is moved towards the inner diameter, 1 f frequency.
5, 7, 9	1 f, o	recording is moved towards the outer diameter.

1 f : 125 000 frps at 300 rpm
2 f : 250 000 frps at 300 rpm.

After loading the CE-Disk on any disk drive, the read voltage of the bursts 1 - 9 depends on the head location relative to the nominal position of track 16. If the head is deplaced towards the center of the disk, the read gap covers more of the width of bursts 4, 6, 8 than from bursts 5, 7, 9. This means, read voltage of bursts 4, 6, 8 is higher than read voltage of bursts 5, 7, 9. If the head is located exactly on the nominal position of track 16, the read voltage on bursts 4 - 9 has the same amplitude.

Read voltage of one sector:

alignment error 0 μm

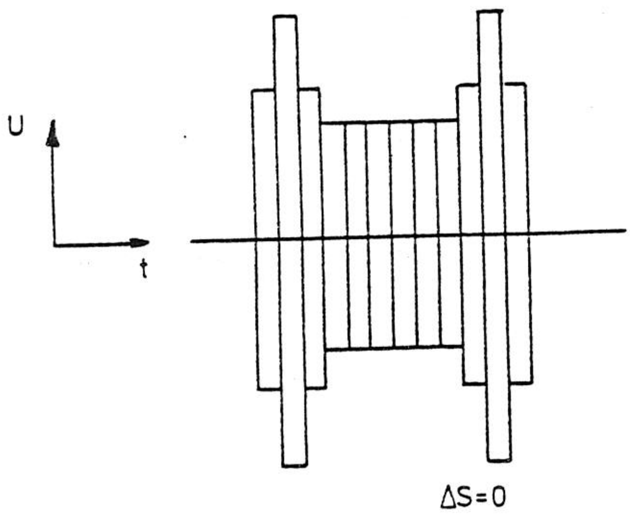


Fig. 2

alignment error + 30 μm

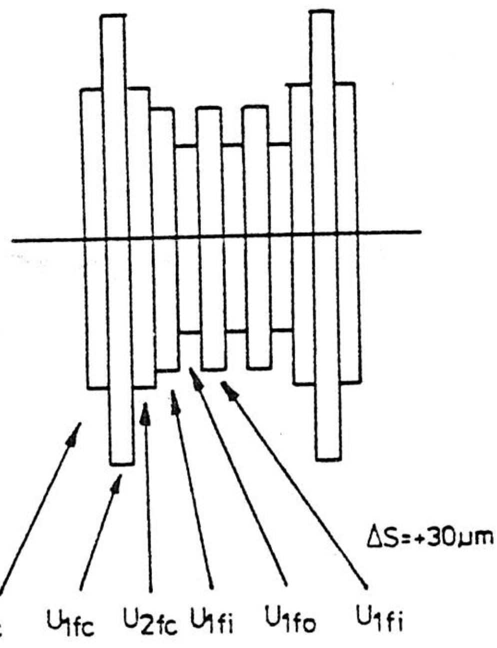


Fig. 3

Due to the special recording, it is possible to calculate the actual head displacement based on the oscillograph-reading according to fig. 3 when the read-gap-width is known.

$$\triangle s = \frac{U1fi - U1fo}{U1fi + U1fo} \cdot \frac{S}{2}$$

$\triangle s$	head displacement (μm)
U1fi, Uifo	signal amplitudes, see fig. 3
S	track width of read head (μm)

Orientation bursts 1, 2, 3 are recorded after every 6 track adjustment bursts. They can be used to check the proper function of the head and amplifier at 1 f and 2 f. They are intended to be a service aid, not a reference amplitude.

Eccentricity:

When loading the Flexible Disk, the clamping of the disk or the spindle can be slightly eccentric. With the BASF CE-Flexible Disk it is almost possible to eliminate adjustment errors caused by eccentricity.. If we have track misalignment and eccentricity, the oscillogram is as shown in fig. 4.

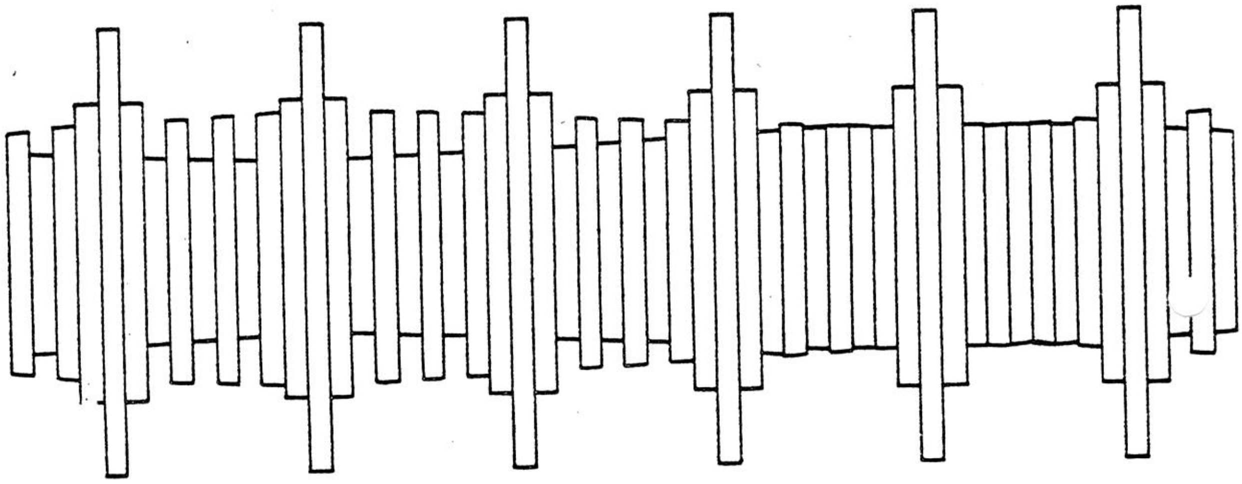


Fig. 4 - Track-misalignment and eccentricity

Track-misalignment alone will cause the waveform shown in fig. 5.

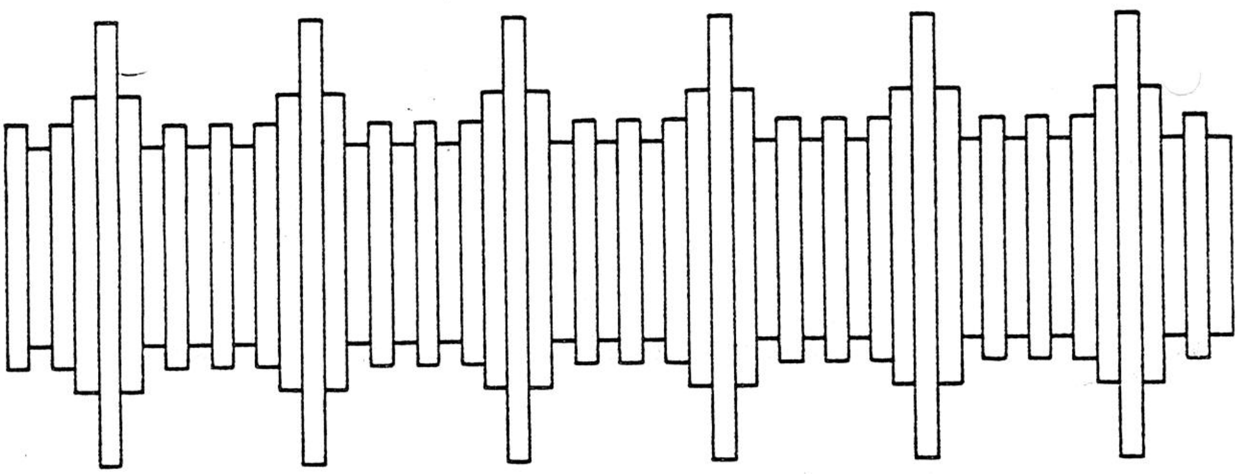
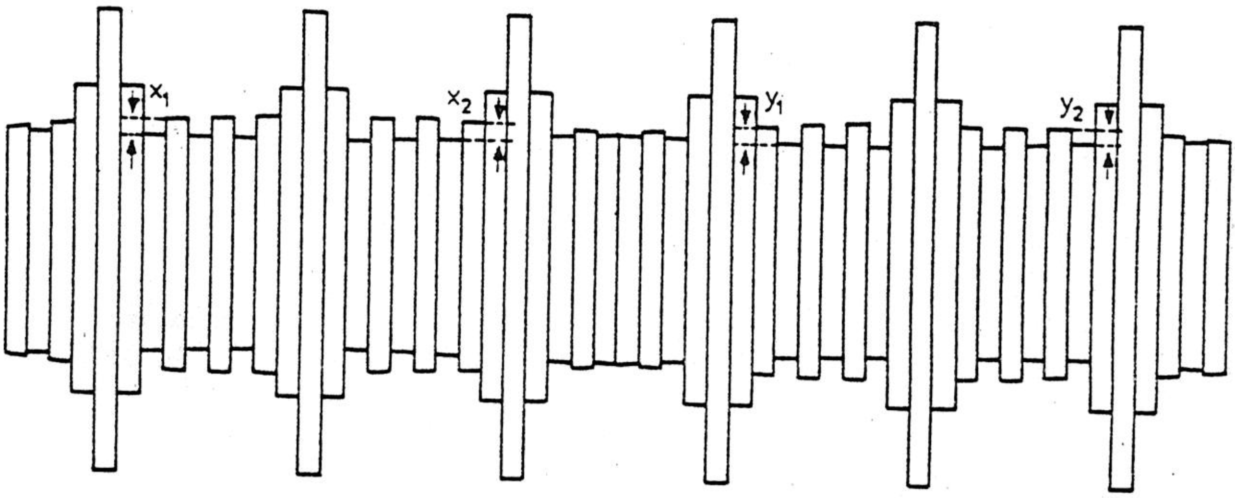


Fig. 5 - Track-misalignment alone

It is now possible to adjust the head position to the proper location by averaging the positive and negative positioning error of the different sectors. This means, the head has to be moved until sector n and sector n+3 shows the same absolute alignment error but with different polarity. Fig. 6 shows the oscillogram after the track displacement in fig. 4 has been elimitated.



$$/x_1/ = /y_1/$$
$$/x_2/ = /y_2/$$

Fig. 6 - Final waveform after track adjustment

A practical adjustment procedure is prescribed in section III. Fig. 9 shows the oscillogram for defined head-track misalignment, assuming a read track width of 360 /um.

Note: If the read head position does not conform to the CE-Disk track position, the amplitudes of bursts 1, 2, 3 do not reach their nominal value. This effect has been disregarded in the given drawings.

I.2. Track 00 and 34 - Recording for Index sensor alignment -

Index sensor alignment

The tracks 00 and 34 are prewritten with 1 f containing an index alignment gap at the beginning of track.

II. Specification

II.1. Head alignment

Nominal radius of track 16	48,683 mm
Track location error of track 16 on CE-Disk disregarding eccentricity	± 10 /um

II.2. Index sensor alignment

Because of the lack of a precise international definition, BASF choose a reasonable location for the index gap.

Recording tolerance from CE-Disk to CE-Disk	± 30 /usec

II.3. Tolerances are valid within the Testing Environment

Temperature	23 ° ± 2 °C
RH	40 % - 60 %

II.4. For proper data interchange, drive calibration tolerances are recommended as stated in the drive manufacturer's literature.

Best accuracy for drive calibration is obtained when drive is adjusted at Testing Environment. Adjustments at very different Temperature and RH will decrease data interchange reliability and should be avoided.

III. Drive calibration procedure

III.1. Head alignment

1. Make sure that the write condition of the drive is off.
2. Insert CE-Disk into the drive. Load the cone slowly when the drive motor is running.
3. Load the head.
4. Connect an oscilloscope to the read voltage line, where the signal is proportional to the head voltage. Horizontal display. 20 m sec/scale-unit, Trigger: index pulse.
5. Move the head to track 16.
6. The screen shows a burst of signals similar to figure 3 or 4.
7. Move the track alignment fixture until you get roughly the maximum amplitude for the highest bursts U 1 f.
8. Turn the variable gain potentiometer until the mean amplitude of U1fi and U1fo reaches k = 30 scale units.
9. Move the track alignment fixture precisely until the amplitude difference of the bursts x on sector n corresponds to the amplitude difference of bursts y on sector n + 3. In the ideal case, all bursts 4-9 should have the same amplitude. Due to eccentricity, this is not always reached.
10. Tighten the head alignment screws.
11. Check the head alignment accuracy as follows.

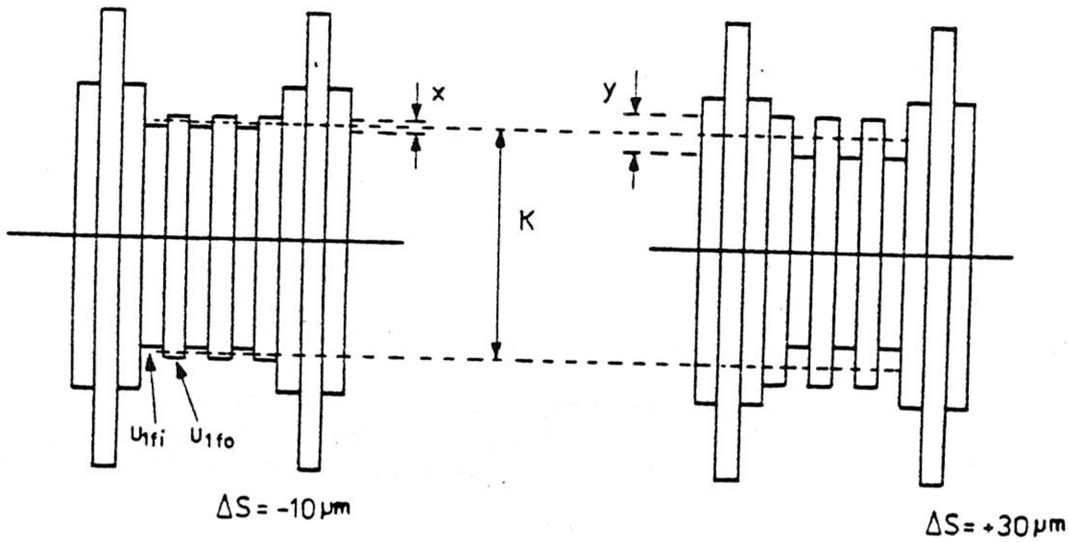


Fig. 7

a) According to step 8. K should read 30 scale units, readjust oscilloscope, if necessary.

b) Determine x and y . Check polarity.

in Fig. 7 x is negative
y is positive

c) Calculate Z, Z : Deviation of actual head position to average CE-Track position (read track width 360 µm)

$$Z = \frac{X + Y}{K} \cdot 90 = 3\,(x + y)\ \mu m$$

d) Check:

ideal setting: x = y for all corresponding burst pairs, then Z = 0

practical setting: x + y ≤ 5 scale units then /Z/ ≤ 15 µm

e) If /x+y/ ≤ 5 scale units is not true, repeat step 9 until drive manufacturer's requirement is full filled.

III.2. Index sensor alignment

Calibration procedure

1. - 4. same as in track adjustment procedure with 0,1 m sec/scale-unit

5. synchronize the oscilloscope sweep with the leading edge of index pulse

6. move the head to track 00

7. adjust the phototransistor assembly to obtain the time relationship of fig. 8. t_d is defined in the drive manufacturer's literature.

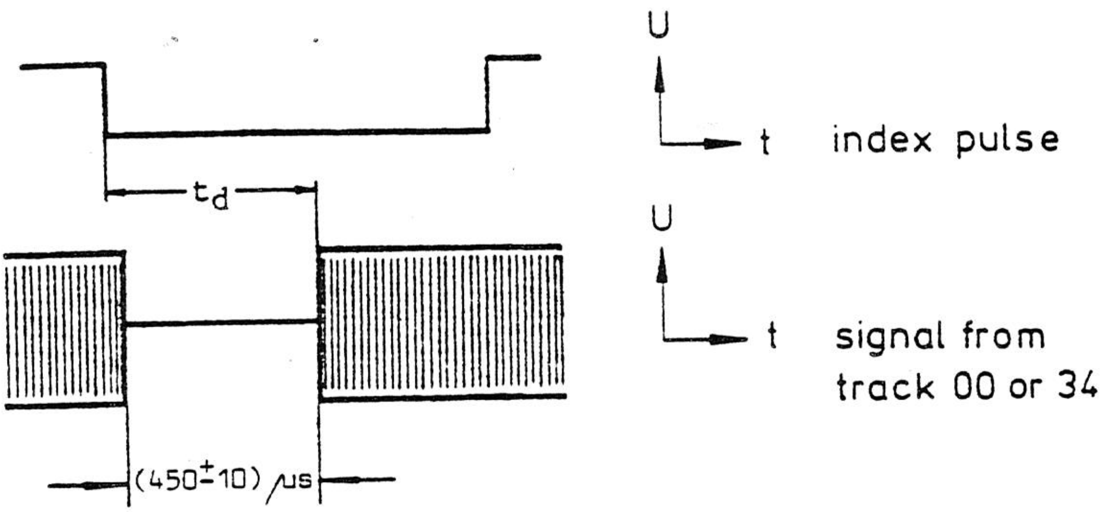


Fig. 8

Appendix:

Figure 9 shows the correlation between oscilloscope reading and track displacement. For simplification, bursts 1, 2, 3 are drawn, not conforming to reality, with the same amplitude for different track displacements.

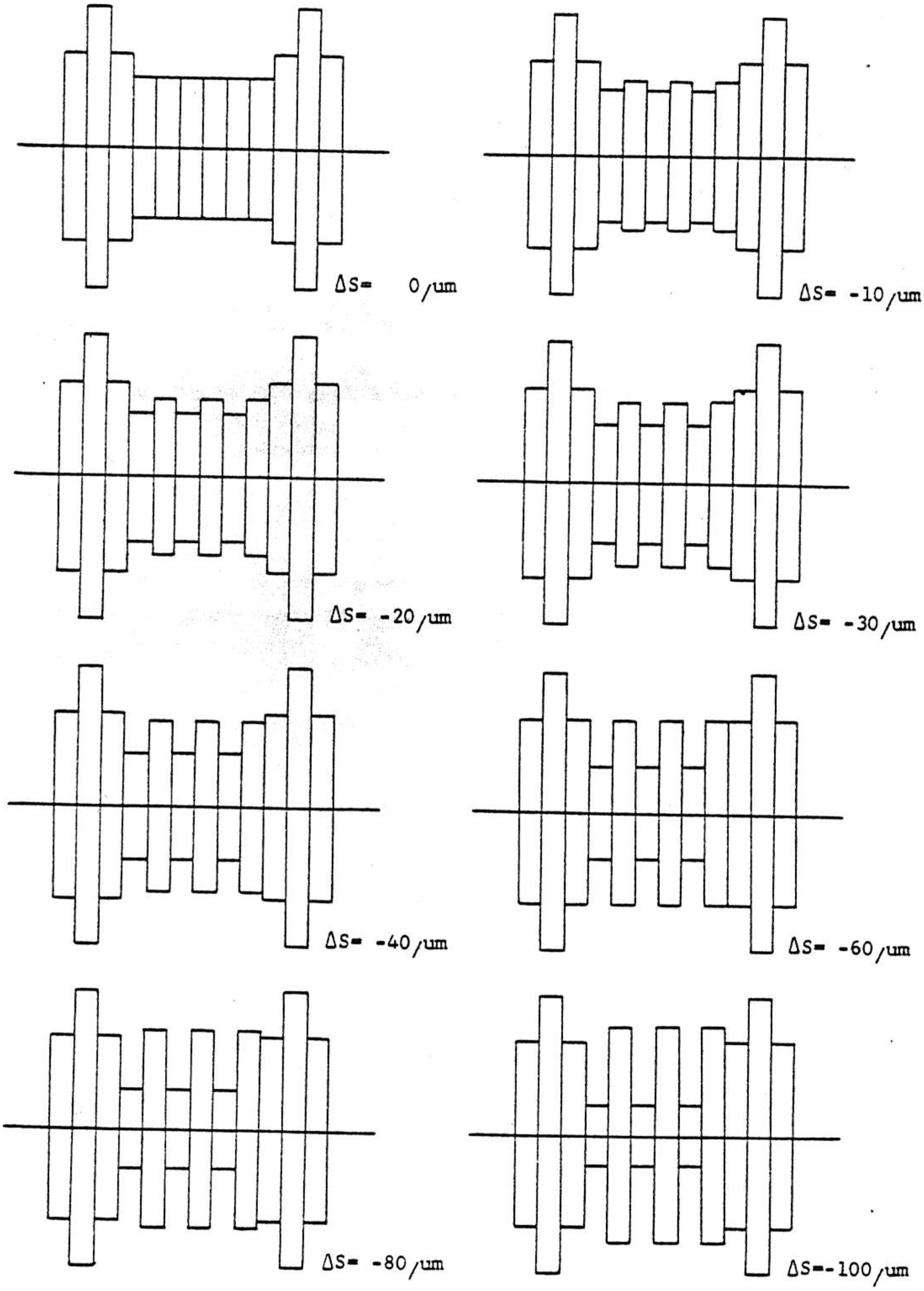


Fig. 9