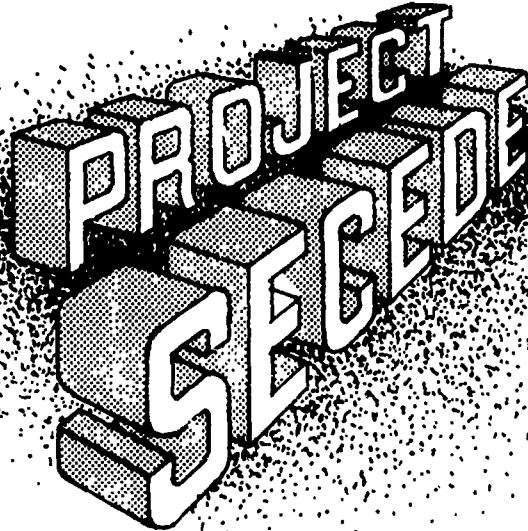


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Final Technical Report  
January 1972



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A COMPENDIUM OF OPTICAL INTERFEROMETER RESULTS ON SECEDE II

General Electric

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| 1. ORIGINATING ACTIVITY (Corporate author)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                             | 2a. REPORT SECURITY CLASSIFICATION                           |  |
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| FINAL REPORT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                             |                                                              |  |
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| Irwin M. Pikus<br>Gerald Liebling                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                             |                                                              |  |
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| 8a. CONTRACT OR GRANT NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 9a. ORIGINATOR'S REPORT NUMBER(S)                                           |                                                              |  |
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| <p>Project Secede is an ARPA program aimed at solving certain defense related problems through the study of chemical releases in the ionosphere. The chemical of primary interest has been barium. The aspects of the release which are of most interest include the growth of the cloud and the evolution of its striated structure. Several test series of releases have been conducted the latest of which was Secede II.</p> <p>The present report concerns data obtained during Secede II by an optical interferometer built and operated by M. A. biondi, R. Hake, and D. Sipler of the University of Pittsburgh with the support of R. Lambert and the General Electric Space Sciences Laboratory. The report consists of a number of data volumes and this one summary textual volume. Only the summary volume will receive general circulation; the data volumes will be distributed to only a few users and additional copies may be requested from the contracting officer. Data volumes exist for events Spruce, Olive, Redwood, and Plum.</p> <p>Interferometer data on events Spruce, Olive, Redwood and Plum has been reduced and photographs of representative IO records on Spruce have been made IO records of other events are absent presumably because of non-optimum adjustment of the system during those events. The interferometer data is presented in detail in the Event Data Books published separately while the IO records on Spruce are reproduced in this volume.</p> <p style="text-align: center;">Details of Illustrations in<br/>this document may be found<br/>in studies on microfilm</p> |                                                                             |                                                              |  |

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| SECEDE II<br>INTERFEROMETER<br>BARIUM CLOUDS<br>DIGITAL DATA REDUCTION<br>IMAGE ORTHICON CLOUD RECORDS<br>GNCMONIC PROJECTIONS |        |    |        |    |        |    |

**A COMPENDIUM OF OPTICAL INTERFEROMETER RESULTS ON SECEDE II**

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**Contractor: General Electric  
Contract Number: F30602-71-C-0064  
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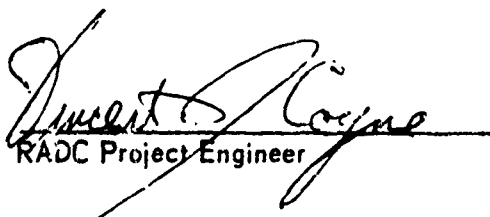
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# PUBLICATION REVIEW

This technical report has been reviewed and is approved.

  
RADC Project Engineer

  
RADC Contract Engineer

## I. BACKGROUND AND PERSPECTIVES

Project Secede is an ARPA program aimed at solving certain defense related problems through the study of chemical releases in the ionosphere. The chemical of primary interest has been barium. The aspects of the release which are of most interest include the growth of the cloud and the evolution of its striated structure. Several test series of releases have been conducted the latest of which was Secede II.

The present report concerns data obtained during Secede II by an optical interferometer built and operated by M. A. Biondi, R. Hake, and D. Sipler of the University of Pittsburgh with the support of R. Lambert and the General Electric Space Sciences Laboratory. The report consists of a number of data volumes and this one summary textual volume. Only the summary volume will receive general circulation; the data volumes will be distributed to only a few users and additional copies may be requested from the contracting officer. Data volumes exist for events Spruce, Olive, Redwood, and Plum.

Briefly, the series was held in the vicinity of Eglin Air Force Base, Florida, during January and early February 1971. The test matrix is shown in Table 1.

TABLE 1  
SECEDE II TEST MATRIX (U)

| EVENT   | DATE      | RELEASE TIME<br>(CST) | ALTITUDE<br>(km) | PAYLOAD<br>WEIGHT<br>(kg) |
|---------|-----------|-----------------------|------------------|---------------------------|
| NUTMEG  | 16 Jan 71 | 1734:40               | 150              | 48                        |
| OLIVE   | 29 Jan 71 | 1753:57               | 185              | 352                       |
| PLUM    | 20 Jan 71 | 1747:06               | 185              | 48                        |
| QUINCE  | 2 Feb 71  | 1034:06               | 185              | 48                        |
| REDWOOD | 20 Jan 71 | 1752:08               | 250              | 48                        |
| SPRUCE  | 1 Feb 71  | 1752:04               | 185              | 48                        |

The instrument complex has been described in detail in Reference 1 and 2, but the salient characteristics are summarized as follows. Instrumentation consisted of three major devices: a two channel Fabry-Perot Interferometer (FP); a filter photometer; and an image orthicon system. The FP was used to obtain spectral line profiles by scanning wavelength (by changing driving gas pressure) while viewing in a fixed direction and to obtain spatial intensity profiles by scanning the cloud while maintaining a constant wavelength. The filter photometer was used to obtain light intensity over a relatively wide field of view integrated over an entire spectral line. Normally the photometer viewed the 4934A feature but had the capability of viewing the 5535, 6111, and 6142 lines as well. The IO system is described in Reference 2.

## II. DATA REDUCTION

Interferometer data on events Spruce, Olive, Redwood and Plum has been reduced and photographs of representative IO records on Spruce have been made. IO records of other events are absent presumably because of non-optimum adjustment of the system during those events. The interferometer data is presented in detail in the Event Data Books published separately while the IO records on Spruce are reproduced in the next section of this volume.

The first element of the reduced interferometer data is a plot of azimuth and elevation for each scan. Instead of merely presenting a rectilinear presentation it was decided that the pointing information could better be arranged as a scan line which could be laid over a photograph of the cloud so to facilitate identification of structural features and comparison of digital records and densitometric results. A photograph is a representation of the projection of a 3-d scene on the plane (assuming no distortion) normal to the optical axis of the system. To compare the interferometer scan line with such a photograph it is necessary: a) to have had the camera and interferometer sufficiently close to each other that they viewed the cloud from nearly the same aspect and b) to present the scan line as a projection upon the same plane that is represented by the photograph. To accomplish this the scan line is presented in the gnomonic projection.

The gnomonic projection is the projection of a sphere upon a plane tangent to the sphere at a given point, as seen from the center of the sphere. An important property of this projection is the fact that all great circles are represented by straight lines.

In Figure 1 let the circle represent the meridional plane of the sphere (i. e. constant azimuth) on which the projection plane is tangent. Let the radius of the sphere be  $R$ . The point  $A$ , located an angular distance  $\alpha$  from the radius vector to the projection plane.  $A'$  is located at a distance  $\rho = R \tan \alpha$  from the point of tangency  $P$ . All points located at an angle of  $\alpha$  from the radius  $\overline{OP}$  project onto a circle of radius  $R \tan \alpha$  on the projection plane, as shown in Figure 2. In that figure the  $Y$  axis is taken to be the projection of the meridian through the point of tangency while the  $X$  axis is the projection of the orthogonal great circle going through the same point. If we let

$\Phi$  = elevation of the mount (with the equator identical with horizon)

$\lambda$  = azimuth measured from the meridian of tangency.

and  $\Phi_0$  = the elevation of the point of tangency

Then a point located at  $(\Phi, \lambda)$  on the sphere will be mapped into a point located at  $(x, y)$  on the plane of Figure 2 where

$$\frac{X}{R} = \frac{\sin \lambda \cos \Phi}{\sin \Phi_0 \sin \Phi + \cos \Phi_0 \cos \lambda \cos \Phi}$$

and 
$$\frac{Y}{R} = \frac{\cos \Phi_0 \sin \Phi - \sin \Phi_0 \cos \lambda \cos \Phi}{\sin \Phi \sin \Phi_0 + \cos \Phi \cos \Phi_0 \cos \lambda}$$

Using these equations, points on a sphere can be mapped onto the plane tangent at elevation  $\Phi_0$  and azimuth  $\lambda = 0$ . Hence the series of points, specified by their azimuth and elevation values, at which optical data exist can be plotted on a plane representing the plane of tangency.

To compare the projected scan line with a photograph of the cloud it is necessary to know the azimuth and elevation of the point of tangency and the scale size

(i. e. the value of R in the above equations). From this information cloud photographs should be able to be reproduced which can be directly compared with the scan lines.

It will be noticed in the data books that the configuration of the scan grid varies with reference elevation. This preserves the scale factor, which bears a direct relationship to the magnification factor, so that a constant magnification can be achieved. That is, a given azimuthal interval will take less linear space at higher elevations than at low.

The scan line is presented at several scale factors, depending on the angular extent of the scan. The grid sizes used are:  $6^{\circ}$  azimuth x  $6^{\circ}$  elevation;  $10^{\circ}$  x  $10^{\circ}$ , and  $14^{\circ}$  x  $14^{\circ}$ . As plotted, the scale factors are:

6 x 6 grid;  $1'' = 1^{\circ}$  subtense

10 x 10 grid;  $1'' = 1.67$  subtense

14 x 14 grid;  $1'' = 2.33$  subtense

### III. IMAGE ORTHICON RECORDS

Photographs of 18 frames of the IO record on event Spruce follow. Although the quality of the originals has been degraded through the reproduction process, the striated structure of the developed cloud is apparent. The first line of the data block contains the time in hours, minutes, and seconds. These records can be compared with the digital records on Spruce although no attempt has been made for this summary report to render the scale accurately. Densitometric studies on these photographs are very difficult because of the non-linear transfer function involved in their reproduction. However, point values of intensity can be deduced from intensities on the video tape.

### IV. FORM OF THE REDUCED DATA

As a sample, the reduced data from record 101 of event Spruce is included as Appendix 2. Although in the appendix the several frames of the record are separate sheets, the data books contain each record as an integral folded sheet which can be removed for detailed work. This particular record is shown as representative of many of the features of the reduced data which may be of interest.

First, the scan line is plotted on a  $6^{\circ} \times 6^{\circ}$  grid. On this record the scan line extends beyond the acceptable limits for the  $6^{\circ} \times 6^{\circ}$  grid thus it is next plotted on the  $10^{\circ} \times 10^{\circ}$  grid. The beginning of the scan is denoted by a square. Each 75th point is overstruck with an X. The data block contains the event name, record number, and time at the beginning and end of the record. It also contains other features which need some explanation. The reference coordinates given are the azimuth and elevation of the record point at the center of the scan line rounded off to the nearest degree. The point count contains the total number of points in the record and the number of points plotted. The number of points plotted is always smaller than the total number because: a) the first and last points are always discarded to avoid a commonly observed spurious deviation and b) those points for which the pressure setting of the FP interferometer deviate significantly from the mean pressure for the record are discarded. The

mean pressure is determined by averaging the last ten points of the record left after the very last point is discarded.

On succeeding frames the measured data is plotted against path distance from the initial point measured in subtended degrees along the path. This has the effect of straightening out a linear scan. A specific point can be located roughly by estimating its position between two X marks or accurately by counting the points from the nearest X mark.

In the integral folded version of the record the data from specific channels are presented together so that, for example, the data from the 4934A channel of the FP are along the top half of the first part of the record. This means that in the appendix these data appear on the top half of each of the first 4 pages of the data presentation.

Data are presented for the FP 4934 channel the FP 6142 channel, the photometer channel, and for the point by point ratio of 4934 to photometer intensities.

The left hand axis of each plot is the intensity relative to the maximum intensity in that channel for the specific record. This has the effect of spreading the data more nearly over the entire useable area. The right hand axis is the absolute intensity as derived from calibration. The calibration procedure is described in detail below. The ratio of FP 4934 to the photometer intensity has no readily useable significance by itself but variations in this ratio over the scan are of some interest. For this reason the scale applied has no quantitative significance but is effectively arbitrary.

For each channel the maximum number of counts is printed out. This is the number of counts associated with the highest intensity point. Its main significance is to give an indication of the statistical ( $\sqrt{n}$ ) fluctuation expected.

The data plotted have been reduced by the channel dark count determined during the specific event. For the second FP channel and for the late cloud developments in all channels, the data count ratio is not very much greater than the dark count rate.

Hence the significance of the data under such conditions is highly questionable.

## V. APPLICATION OF THE REDUCED DATA

Many uses of the reduced data have been planned and others suggest themselves. The primary use will probably be a comparison of interferometer data with intensities derived densitometrically from photographs of the cloud. To accomplish such a comparison it is necessary to determine the points on the photograph to which the interferometer data apply. This can be done by using the overlays supplied in conjunction with photographs reproduced at the appropriate scale.

In many cases a series of spatial scans covers a nearly constant portion of the cloud and such a series can be useful in performing frame to frame correlations of structure. A preliminary examination of frames 68 to 71 of event Spruce, done before the reduced data were available in the present format, has yielded the qualitative conclusion that certain features do correlate from frame to frame over a period of a few minutes while certain other features may appear in one or two frames but shortly vanish from view. With the data in its present format more detailed study of the evolution of striae and their short term behavior, at least within the plane normal to the line of sight, is possible.

The cloud expansion in its early stages can be studied and non-symmetric models for the expansion process can be matched against the observed intensities over the various scans and scan directions used. Edge steepening can be further studied by using the data plots.

## VI. CALIBRATION

The calibration in the field was accomplished using both a low brightness radioactive phosphor (LBS) which had been calibrated against a standard at ESSA some 6 months before use (Reference 3 ) and an electroluminescent source (ELS) of considerably greater brightness which was calibrated against the LBS on each run.

Calibration was accomplished at the end of each event (with the exception of Plum) and consisted of taking dark counts on all channels, photometer response to LBS, photometer response to ELS, and Fabry-Perot response to ELS.

The LBS was not large enough to fill the entire photometer aperture, so the effective LBS brightness for full aperture was reduced by the ratio of the areas. The LBS had a 2.75 inch active diameter, and the photometer aperture was 4.30 inches in diameter, so the ratio factor is 2.44.

The radiance of the cloud (above the atmosphere) as seen by the photometer can then be written:

$$I_C = \frac{(N_{PC} - N_{PD})}{(N_{PL} - N_{PD})} \times \frac{I_L}{2.44 T_A}$$

where  $I_L$  is the LBS intensity, and  $T_A$  is the atmospheric transmission (in which the effect of the plate-glass observation window are included), and the subscripts on  $N$  indicate counting rates of the photometer (P) when looking at the clouds (C), the LBS source (L) or dark (D). The LBS intensity incident on the photometer is determined by multiplying the measured continuum radiance of the LBS per angstrom,  $i_L$ , by the full-width-at-half-height of the particular interference filter,  $W_F$ , in angstroms. The intensity then becomes

$$I_C = \frac{(N_{PC} - N_{PD})}{(N_{PL} - N_{PD})} \times \frac{i_L W_F}{2.44 T_A}$$

Intensities derived thusly should be directly comparable with (filter) photographically derived cloud radiances if both correspond to the same viewing aspect of the cloud.

As Hake et al have pointed out (Reference 3), calculation of the radiance of the cloud from the FP signals is a more complicated matter because the continuum emission from the ELS is further attenuated by the action of the FP. For the purposes of this calibration it is assumed that the portion of the continuum emission passing

the FP is determined by the FP finesse  $F$  [ $F$  = free spectral range (FSR) divided by the the instrumental full-width-at-half-height] in the relation:

$$i_E = \frac{I_E}{F}$$

where  $i_E$  and  $I_E$  are ELS intensities. The lower case  $i_E$ , as mentioned above, denotes intensity in some frequency interval. In the case above, the frequency interval is one FP passband:

$$W_{FP} = FSR/F$$

or

$$W_{FP}(\text{Hz}) = cW_{FP}$$

where  $FSR = (1/2)t$  is the free spectral range of the FP,  $t$  is the spacer length, and  $c$  is the speed of light. (The equation) is dimensionally correct only if it is realized that the ELS intensity  $I_E$  is effectively distributed over one FSR of the FP--i. e.,  $I_E = \text{intensity}/FSR$  (Hz).

$F$  was measured pre and post event at the laser wavelength,  $\lambda 6328 \text{ \AA}$ , and must be computed for the other wavelengths using FP parameters (plate flatness, primarily) established by the  $\lambda 6328 \text{ \AA}$  measurement. If the pre and post event values differ significantly ( $> 1$  unit), then linear interpolation should be used to give  $F$  for a particular time. The values determined for  $F$  are:

| Wavelength ( $\text{\AA}$ ) | SPRUCE          |          | REDWOOD         |          | OLIVE           |          |
|-----------------------------|-----------------|----------|-----------------|----------|-----------------|----------|
|                             | $F(W_{FP}/FSR)$ |          | $F(W_{FP}/FSR)$ |          | $F(W_{FP}/FSR)$ |          |
| 6328                        | 17.0            | measured | 17.3            | measured | 19.0            | measured |
| 6142                        | 18.4            | computed | 18.9            | computed | 20.3            | computed |
| 5535                        | 18.4            | computed | 18.9            | computed | 20.4            | computed |
| 4934                        | 16.6            | computed | 16.0            | computed | 17.7            | computed |

The effective ELS intensity for the FP is determined by calibration against the LBS using the photometer. The relationship is

$$I_E = \frac{I_L W_F}{2.05} \times \frac{(N_{PE} - N_{PD})}{(N_{PL} - N_{PD})}$$

The factor 2.05 results from the aperture diameter of the FP being 100 mm instead of the 4.30 inches appropriate to the photometer.

The cloud radiance (above the atmosphere) as determined by FP at a particular point in the spectral line is

$$i_C = i_E \times \frac{(N_{FC} - N_{FD})}{(N_{FE} - N_{FD})} \times \frac{1}{T_A T_{FP}}$$

where  $i_C$  is again the cloud radiance in a limited spectral width, the passband of the FP.  $T_{FP}$  is an FP transmission factor, that arises because the FP was calibrated through the wide field port (no telescope) but the cloud was observed through the telescope.  $T_{FP}$  has been taken to be 0.74, from an estimate that includes the obstruction by the secondary mirror and reflection losses from the two additional mirrors in the light path.

The dark counts have been determined to be

| <u>EVENT</u> | <u>PHOTOMETER</u> | <u>FP 1</u> | <u>FP 2</u> |
|--------------|-------------------|-------------|-------------|
| Spruce       | 5.67              | 4.91        | 25.2 (15)   |
| Olive        | 4.28              | 4.62        | 21.1 (15)   |
| Redwood      | 3.09              | 3.58        | 17.08 (10)  |

On FP 2 the dark counts were so large and the signals generally so small that much of the data, after the dark count is subtracted, ends up negative and thus does not appear on the data plots. To avoid this loss of data points the dark count actually subtracted is arbitrarily chosen to be the values in parentheses above.

The radiancy values have been determined absolutely according to the following relationships.

**Spruce:**

|            |                                |
|------------|--------------------------------|
| Photometer | $I = 8.25 \times 10^{-6} N^*$  |
| FP 1       | $I = 2.47 \times 10^{-15} N^*$ |
| FP 2       | $I = 1.1 \times 10^{-13} N^*$  |

**Redwood:**

|            |                                |
|------------|--------------------------------|
| Photometer | $I = 8.45 \times 10^{-6} N^*$  |
| FP 1       | $I = 2.84 \times 10^{-15} N^*$ |
| FP 2       | $I = 1.89 \times 10^{-13} N^*$ |

**Olive:**

|            |                                |
|------------|--------------------------------|
| Photometer | $I = 8.98 \times 10^{-6} N^*$  |
| FP 1       | $I = 2.62 \times 10^{-15} N^*$ |
| FP 2       | $I = 7.25 \times 10^{-13} N^*$ |

The units are for I (photometer),  $\text{erg/cm}^2 \text{ sec sr.}$  and for I (FP),  $\text{erg/cm}^2 \text{ sec sr. Hz.}$   $N^*$  is the difference between actual counts and dark counts each 0.1 sec

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1. R. D. Hake, Jr., D. Sipler, M. A. Biondi, "Preliminary Optical Interferometer Results from Secede II", (U), Delivered at Preliminary Data Review Meeting at SRI, May 1971.
2. R. Lambert, "Secode II Interferometer: Interim Report", GE Report, to be published 1972.
3. R. D. Hake, Jr., D. P. Sipler, M. A. Biondi, "Absolute Calibration of the Fabry-Perot Interferometer for Secede II", SRI Project Secede Technical Memo 9, 22 September 1971.

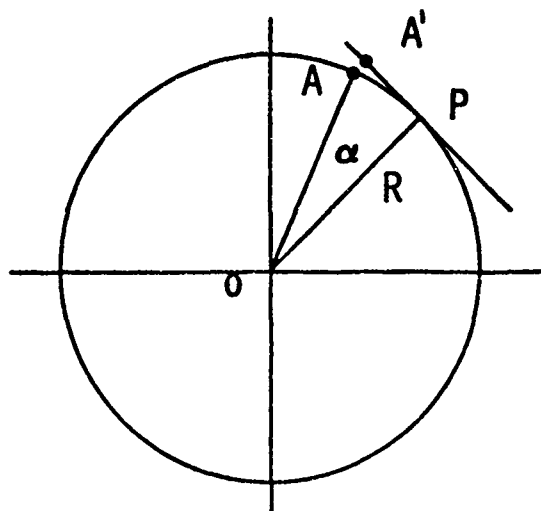


Figure 1

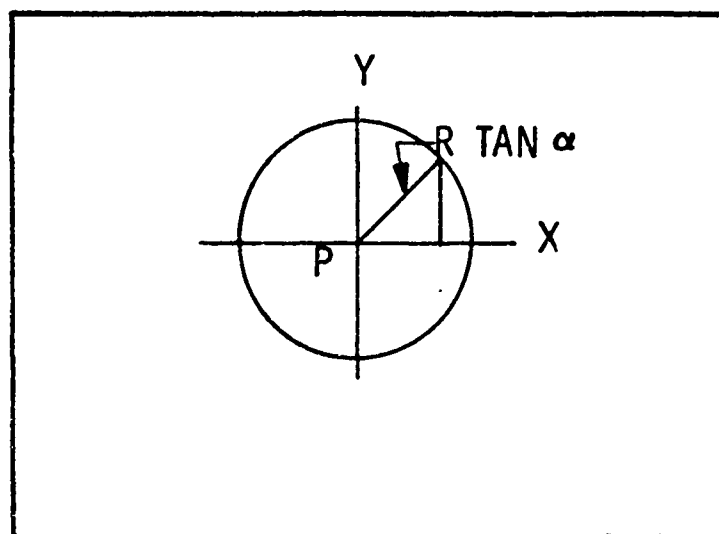


Figure 2

APPENDIX I

IMAGE ORTHICON PRINTS ON SPRUCE



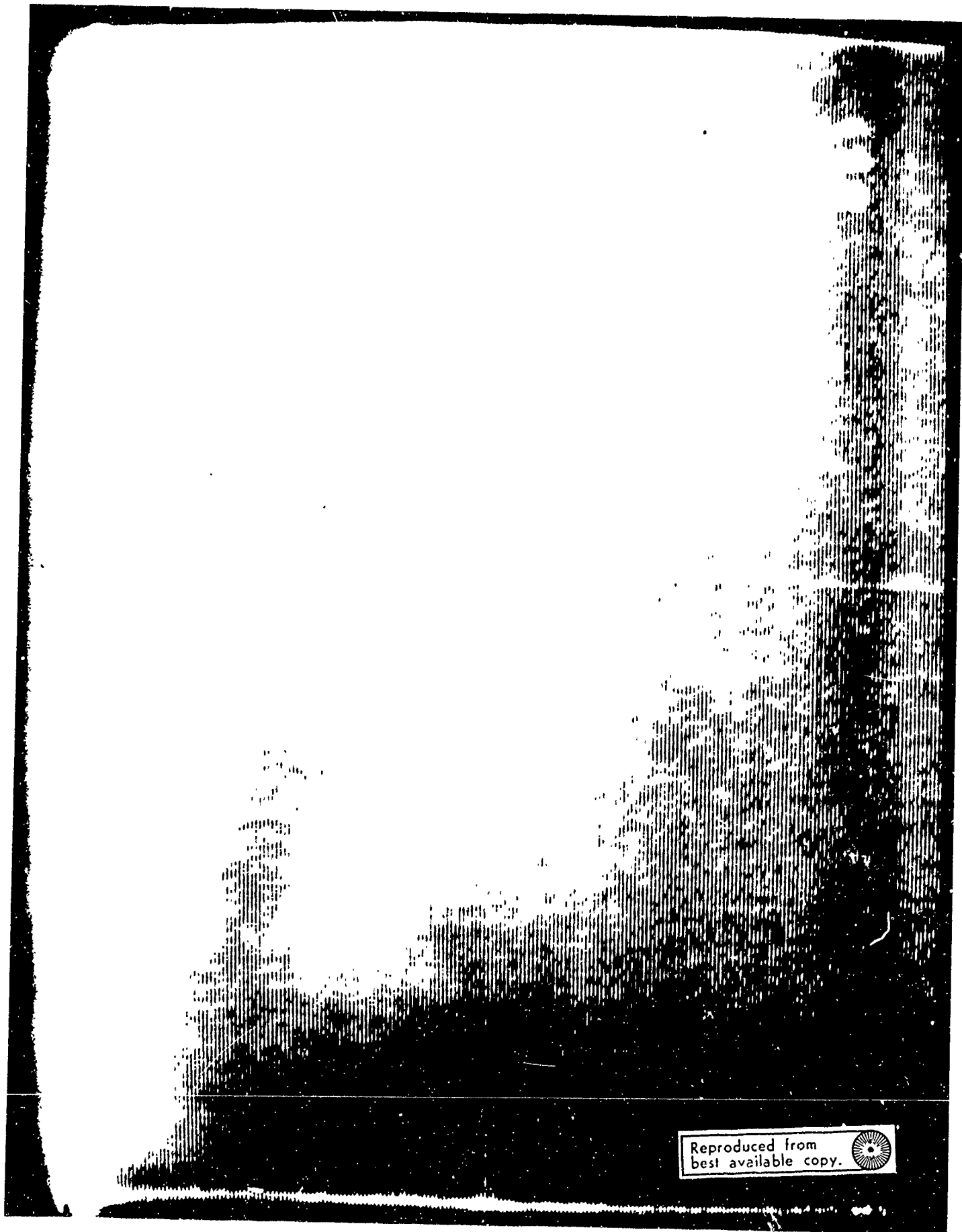
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11  
12  
13  
14  
15

100  
 100  
 100

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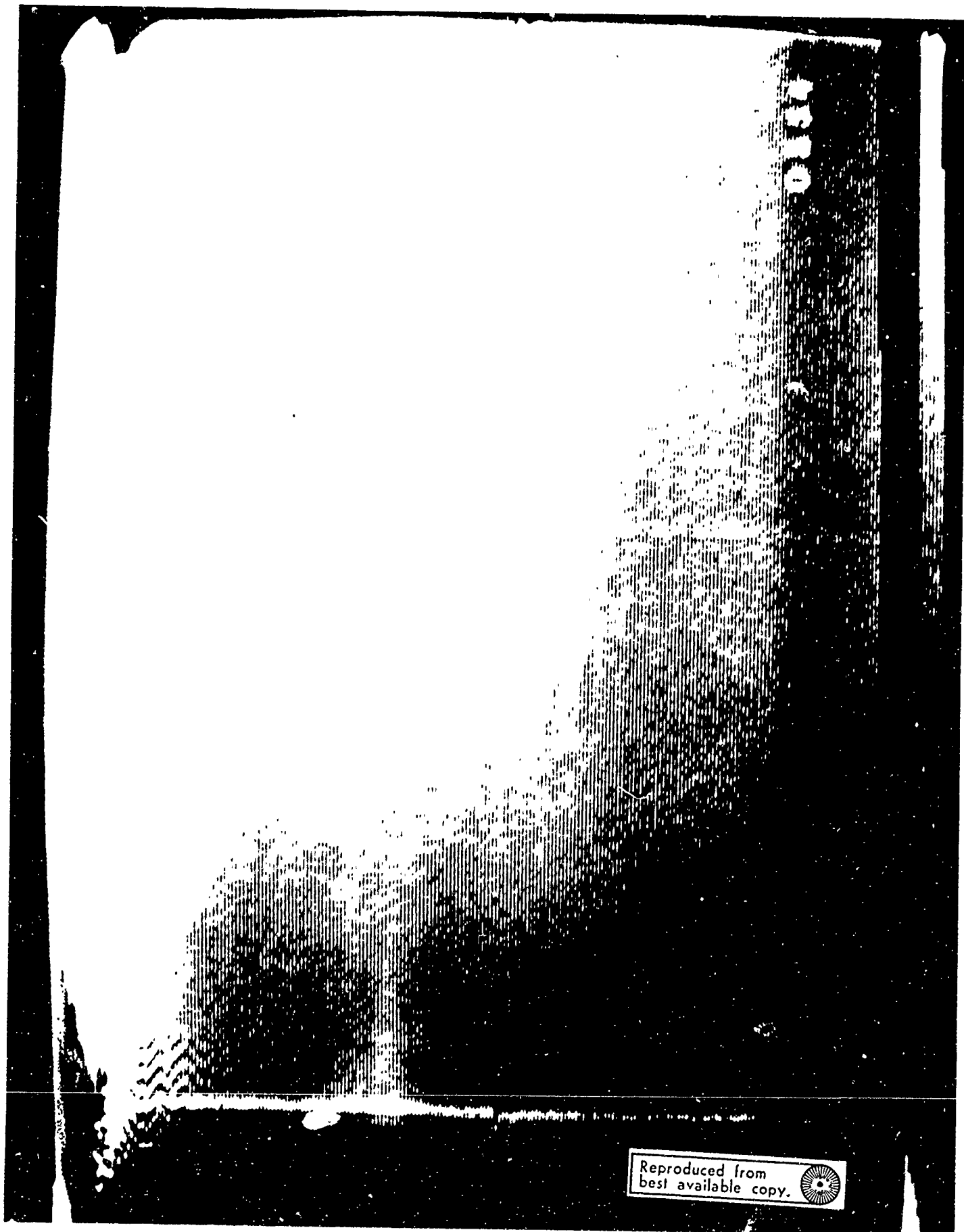




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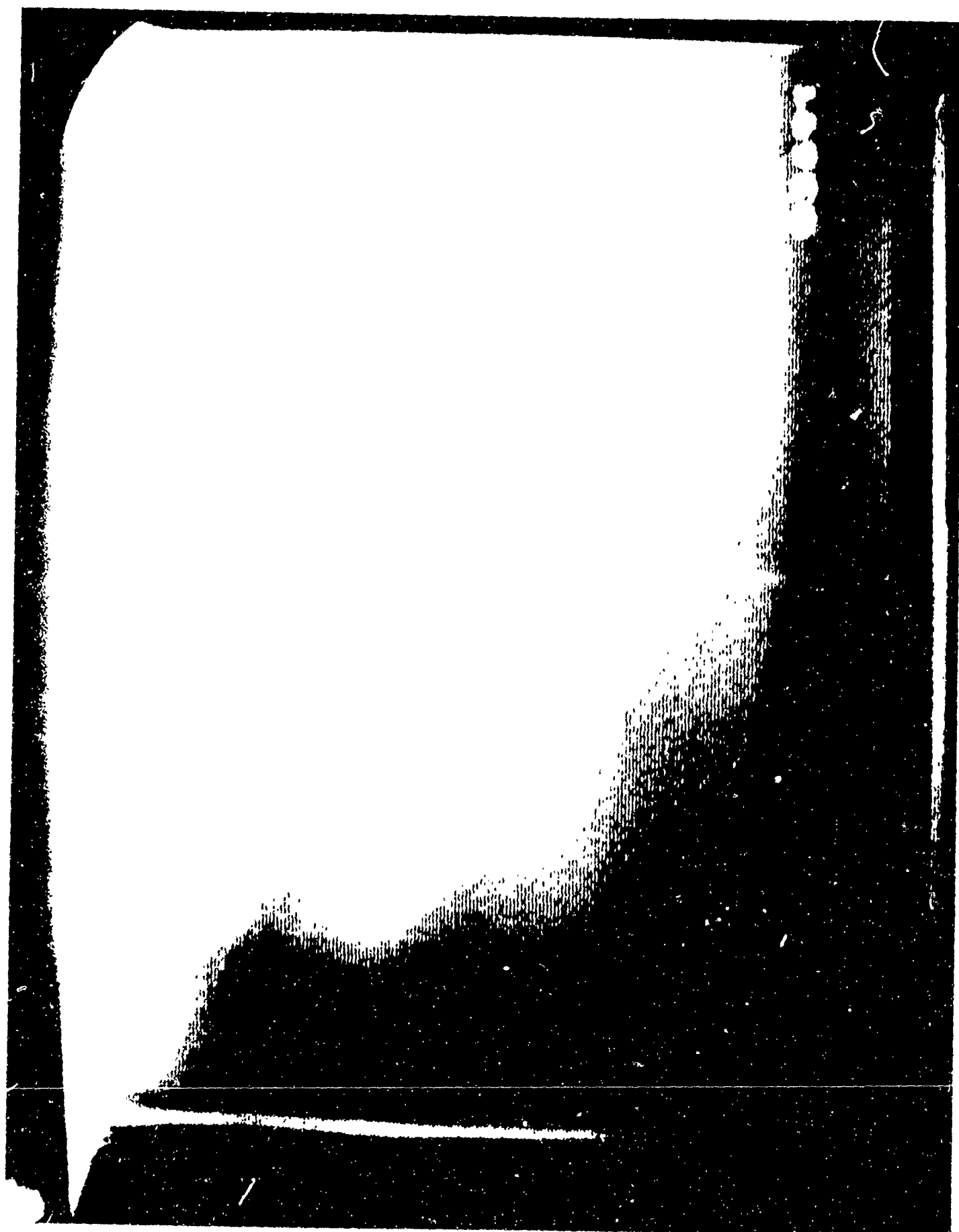






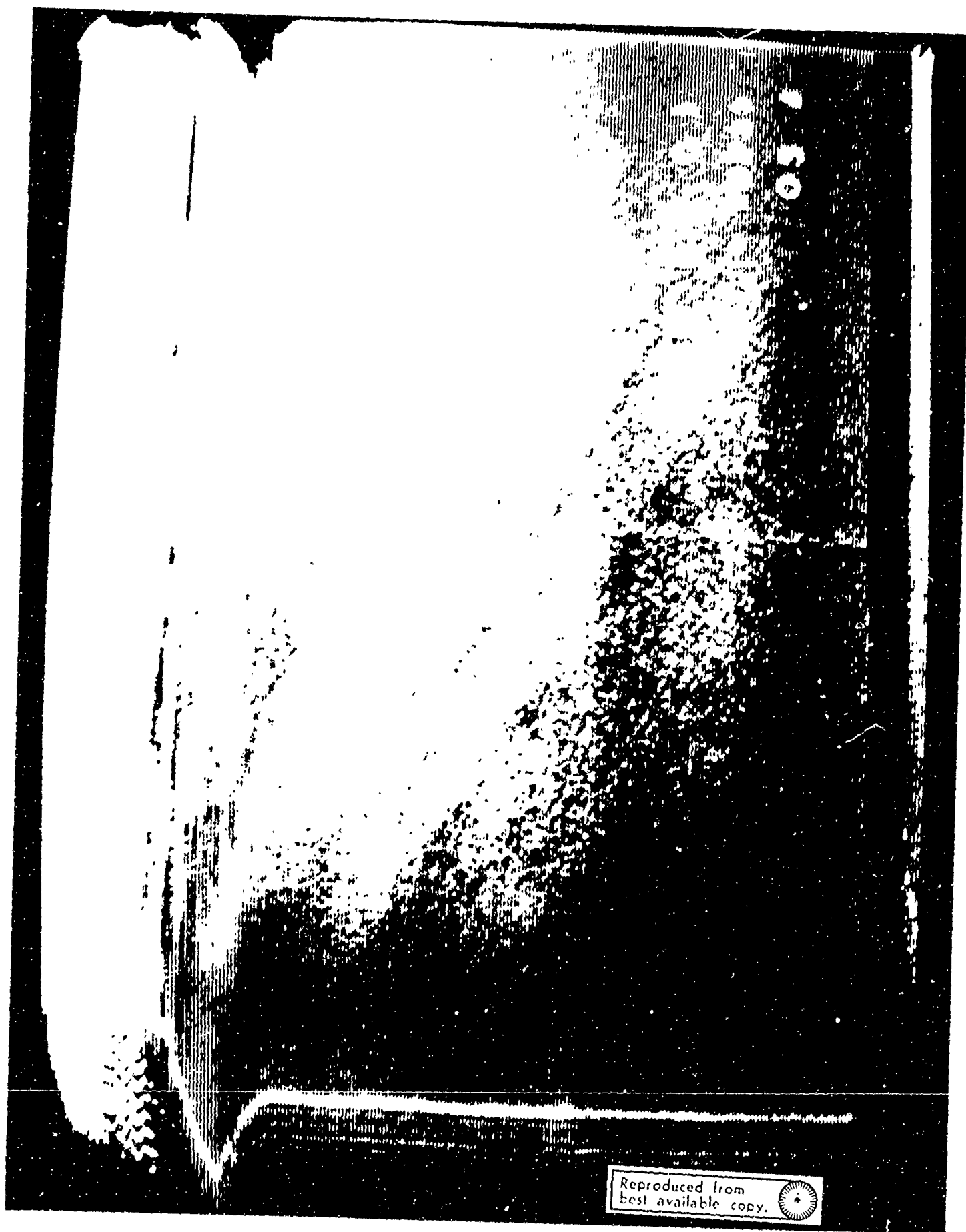
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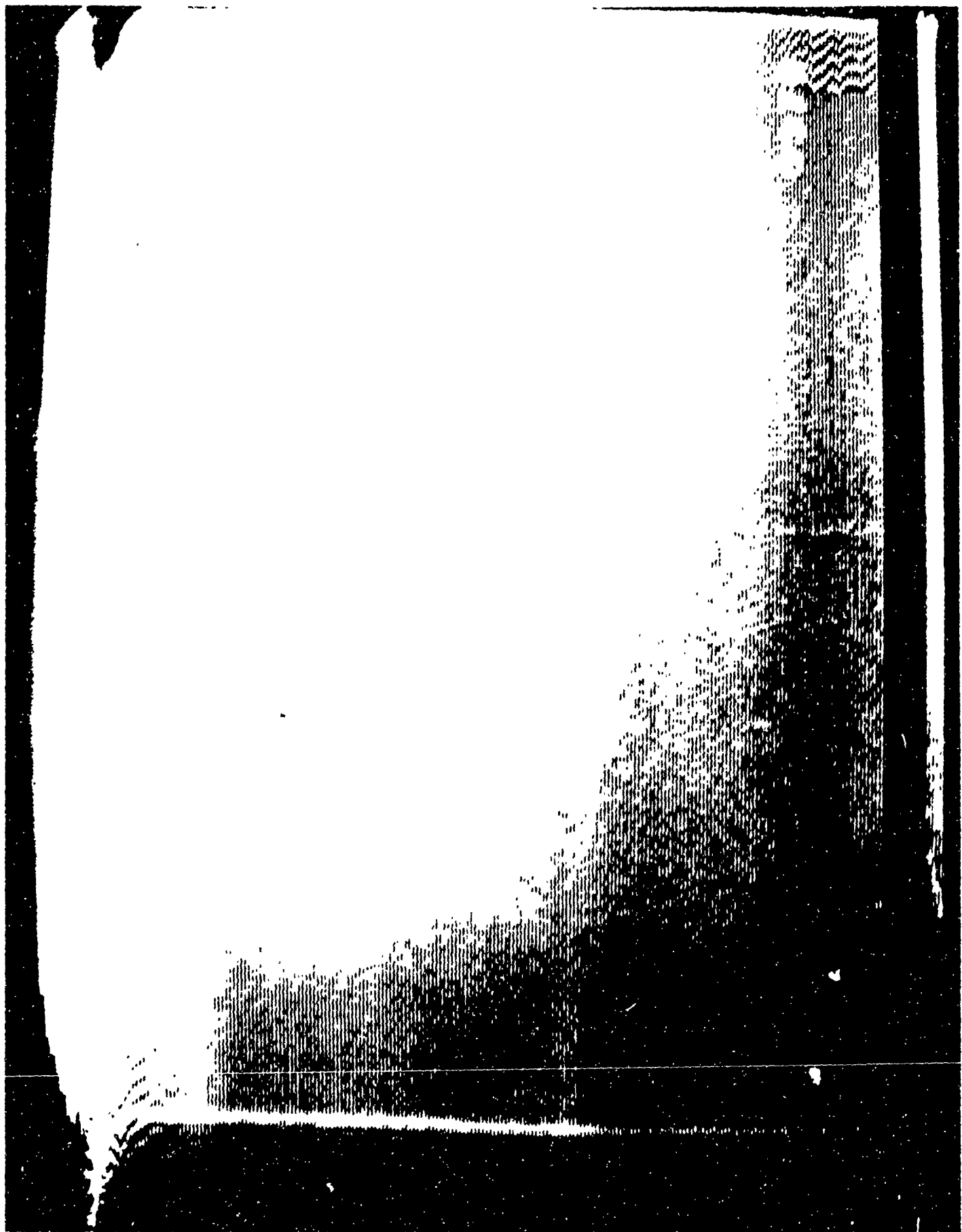




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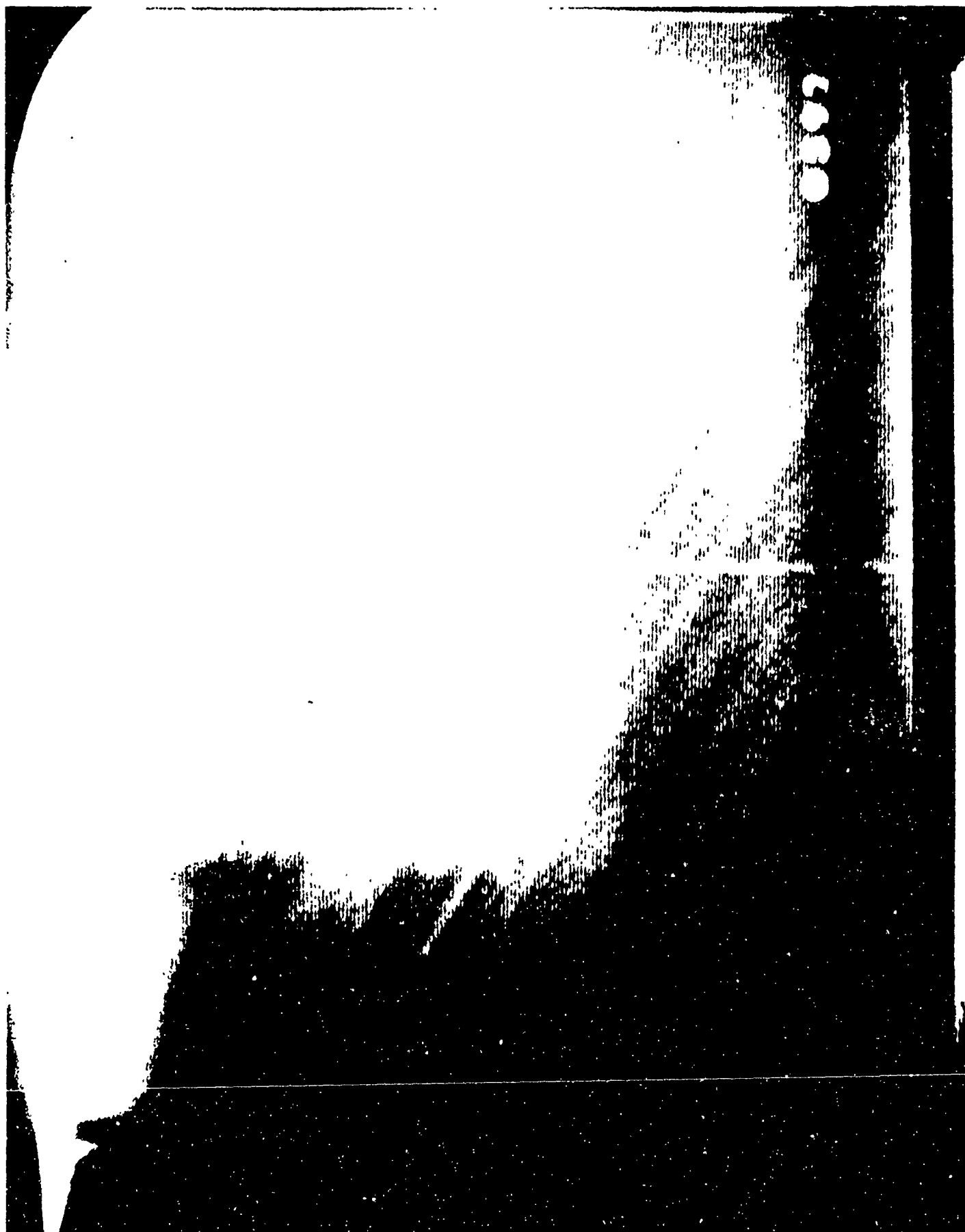






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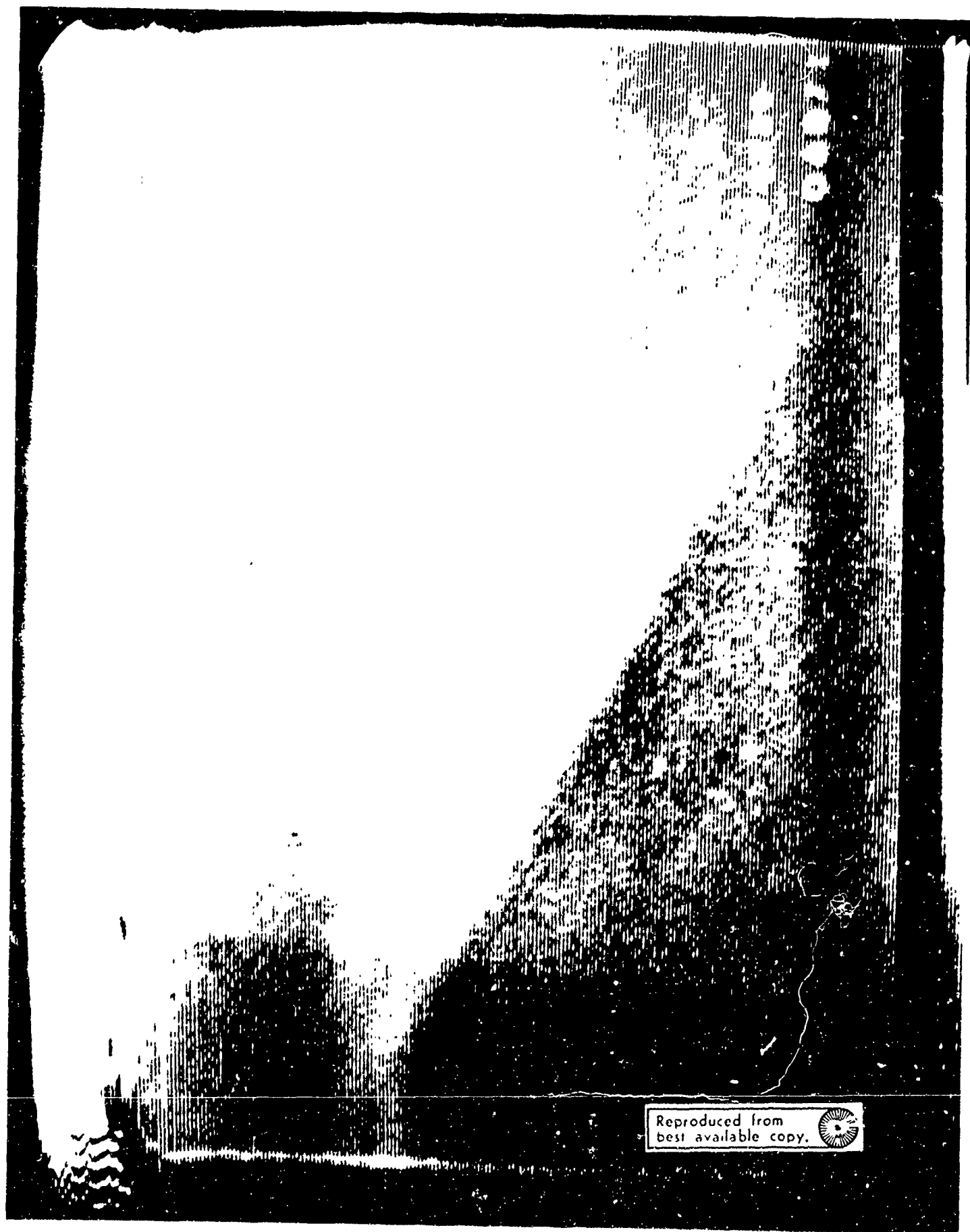




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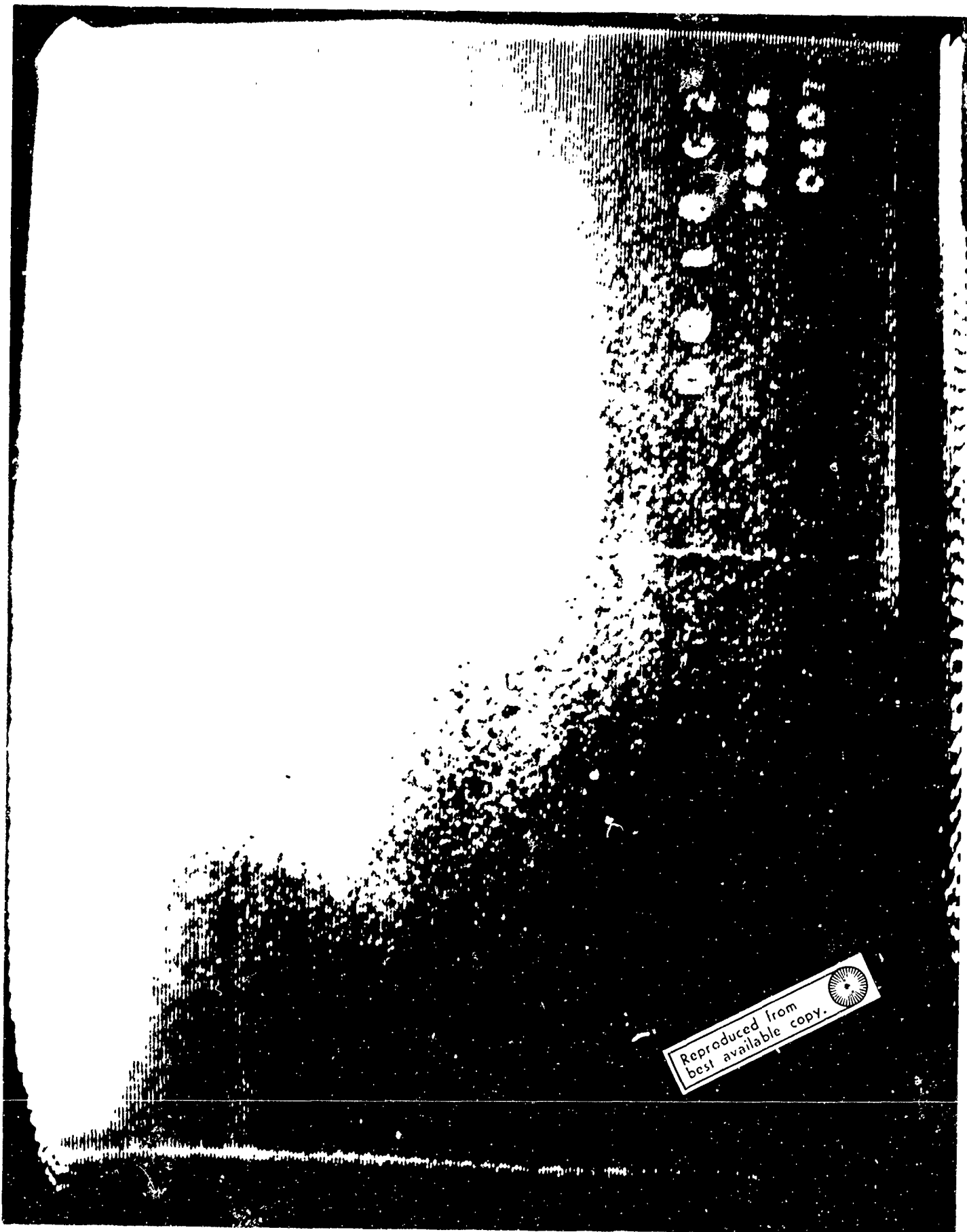






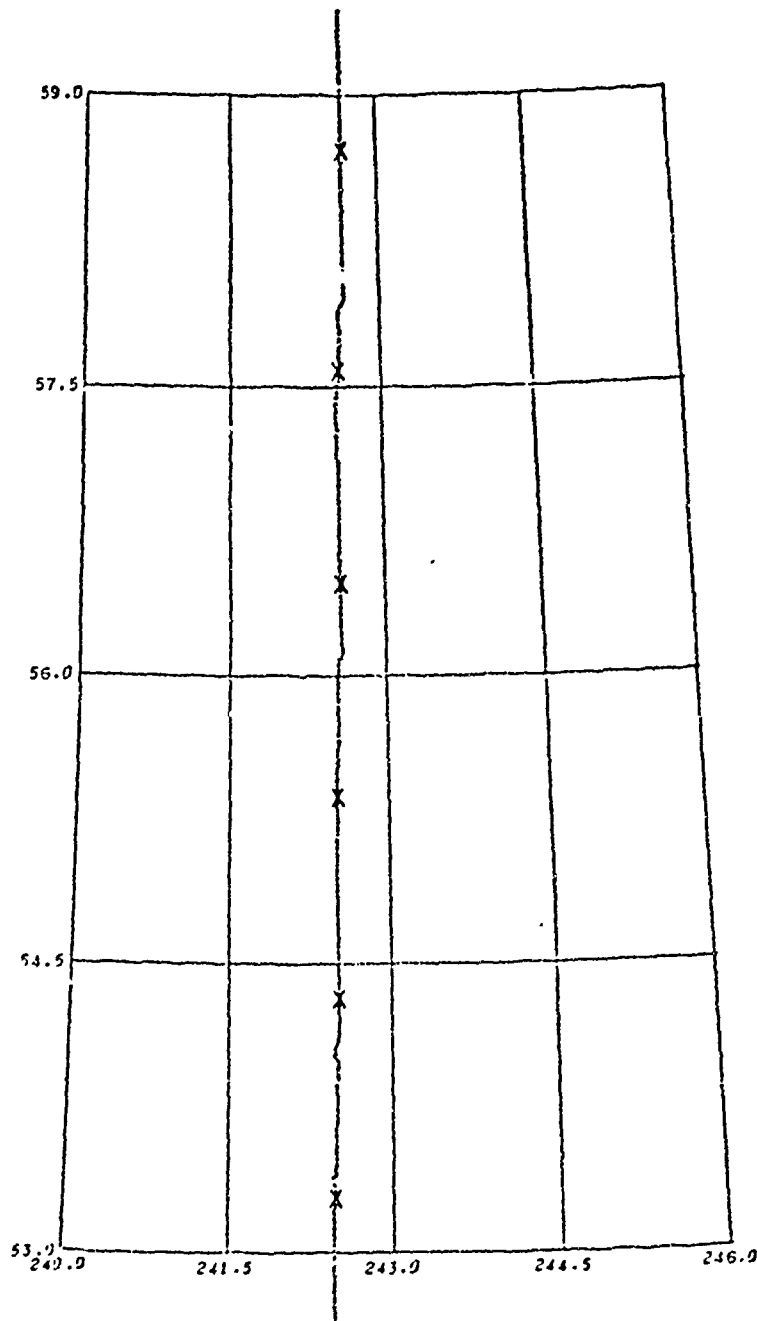
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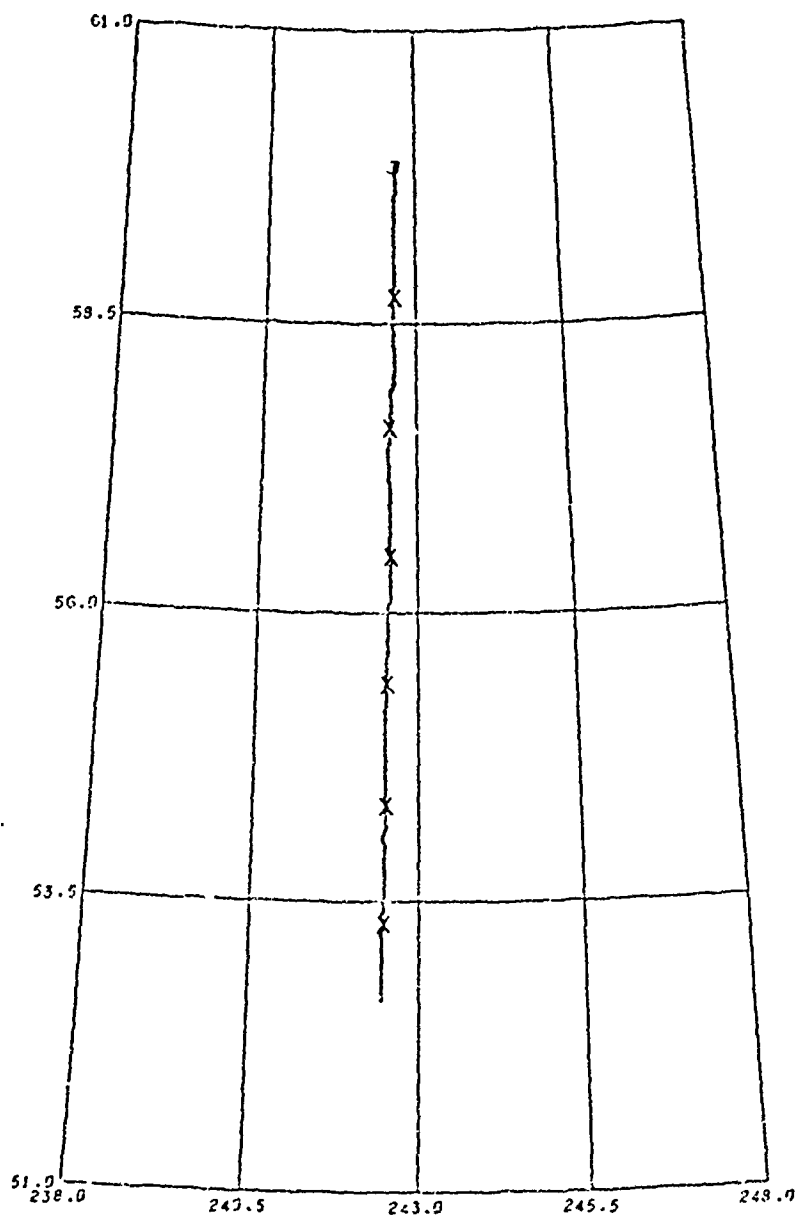
## APPENDIX II

SAMPLE DATA SPRUCE - #101



EVENT SPRUCE  
RECORD NO. - 101  
REF COORD -  
AZ 243  
EL 56  
TIME  
START 18M 5.13S  
STOP 18M 54.44S  
POINT COUNT -  
TOTAL 498  
PLOTTED 196  
AVERAGE PRESSURE -  
353

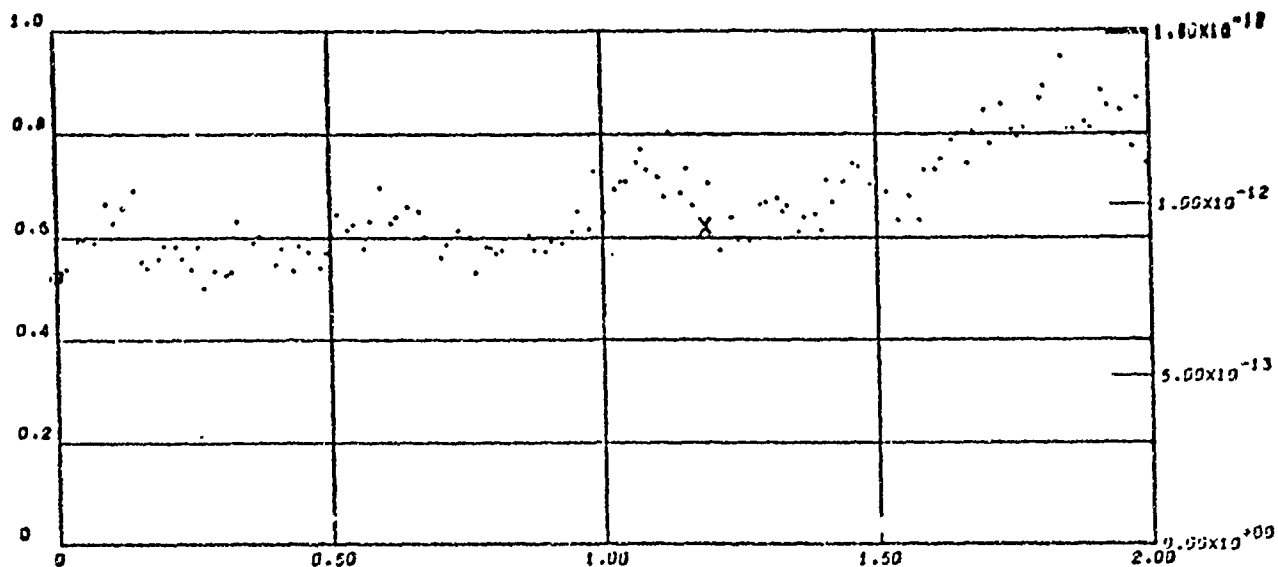
EVENT SPRUCE  
 RECORD NO. - 101  
 REF COORD -  
 AZ 243  
 EL 56  
 TIME  
 START 16M 5.13S  
 STOP 16M 54.44S  
 POINT COUNT -  
 TOTAL 498  
 PLOTTED 496  
 AVERAGE PRESSURE -  
 353



RELATIVE INTENSITY

FABRY PEROT 4934 CHANNEL

MAX COUNT = 609

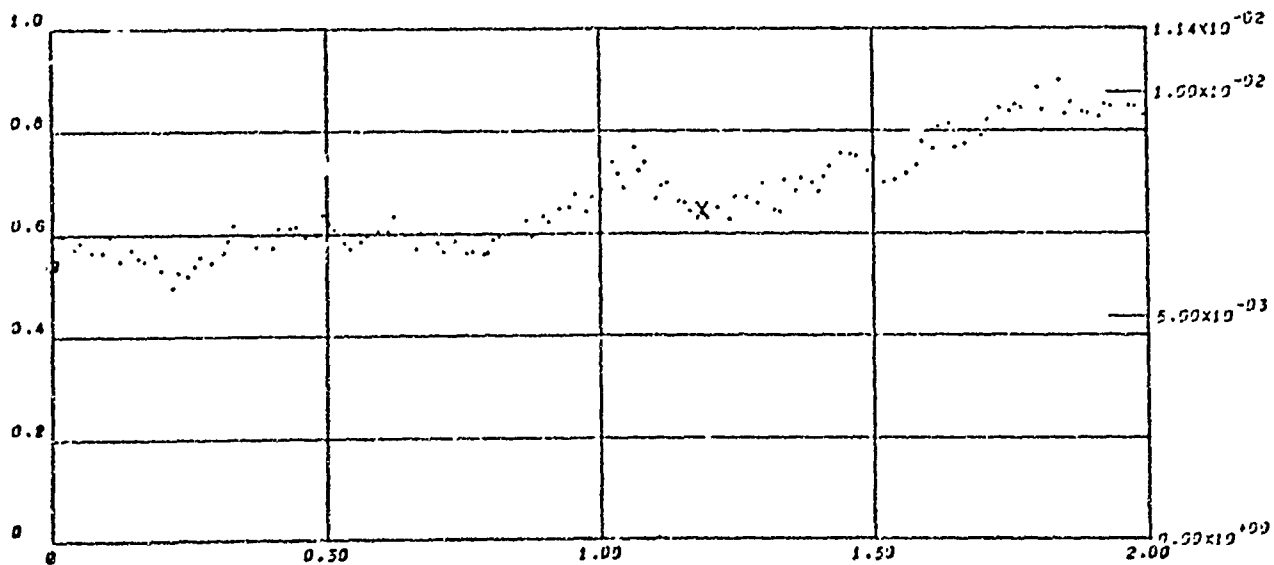


INTENSITY - ERG/CM\*\*2-SEC-SR-HZ

RELATIVE INTENSITY

PHOTOMETER CHANNEL

MAX COUNT = 1382



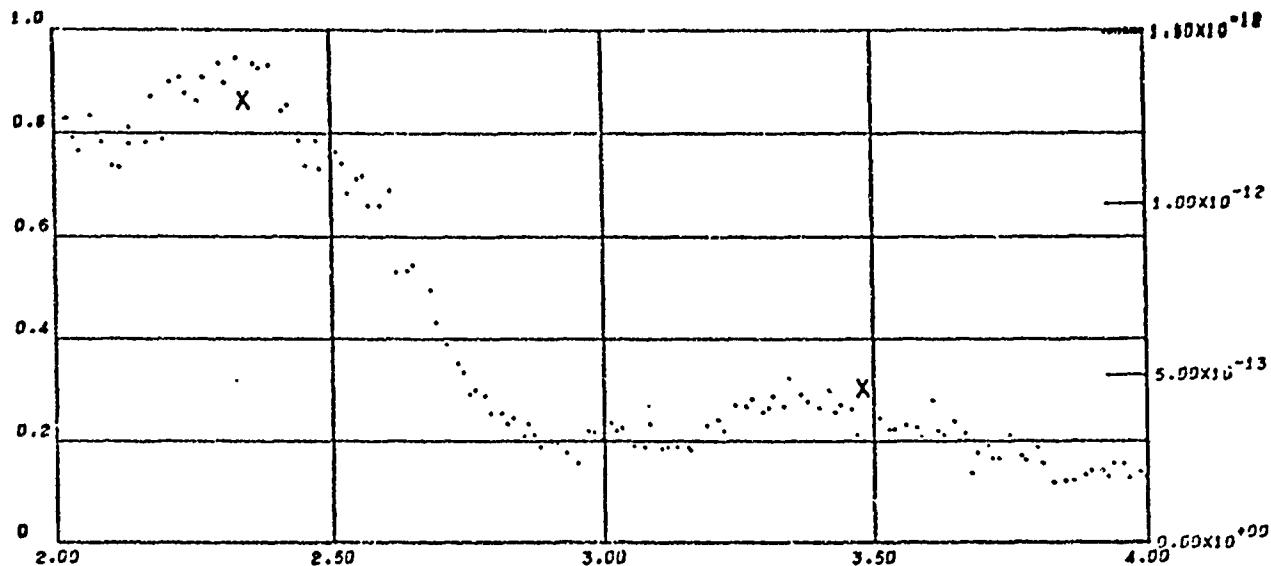
INTENSITY - ERG/CM\*\*2-SEC-SR

PATH DISTANCE - SUBTENDED DEGREES  
INTENSITY VS. PATH DISTANCE

RELATIVE INTENSITY

FABRY PEROT 4934 CHANNEL

MAX COUNT = 609

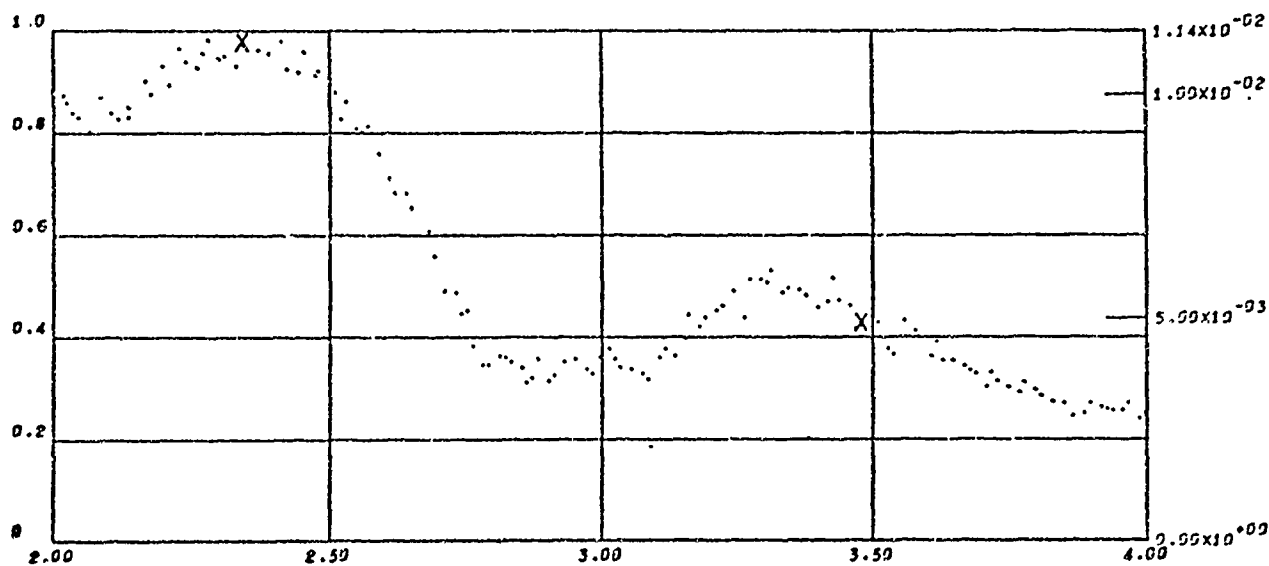


INTENSITY - ERG/CM\*\*2-SEC-SR-HZ

RELATIVE INTENSITY

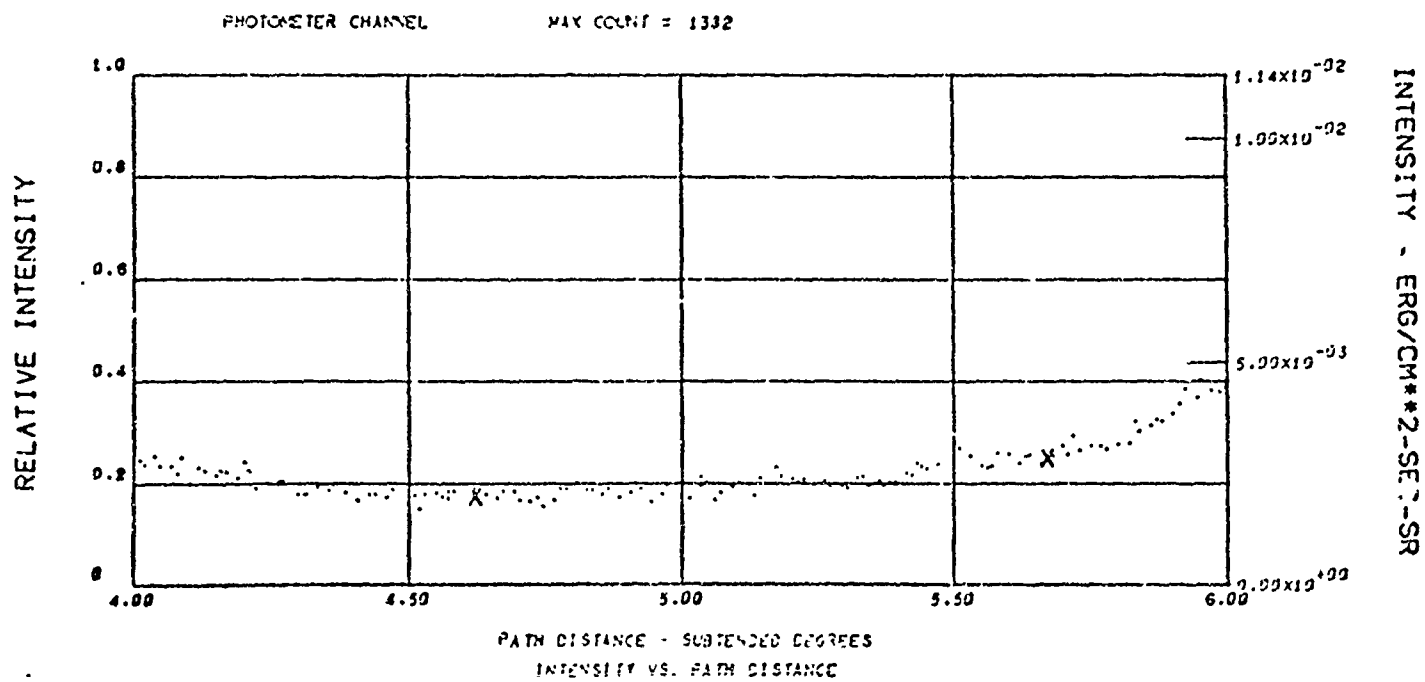
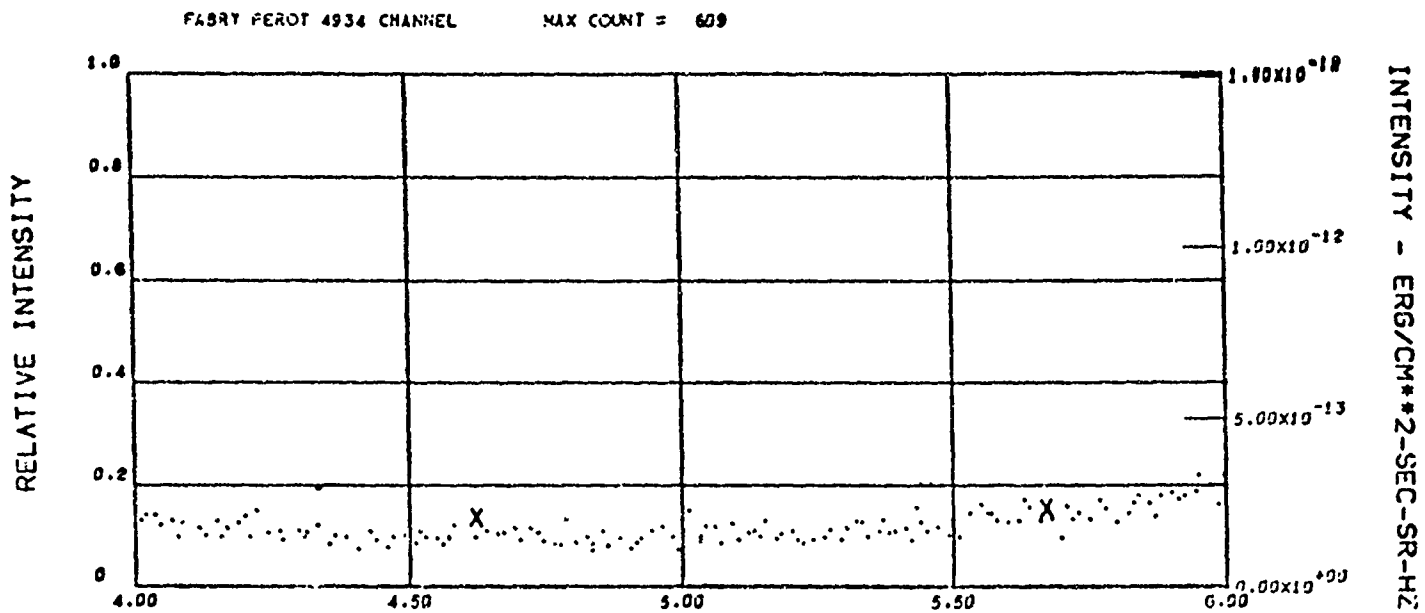
PHOTOMETER CHANNEL

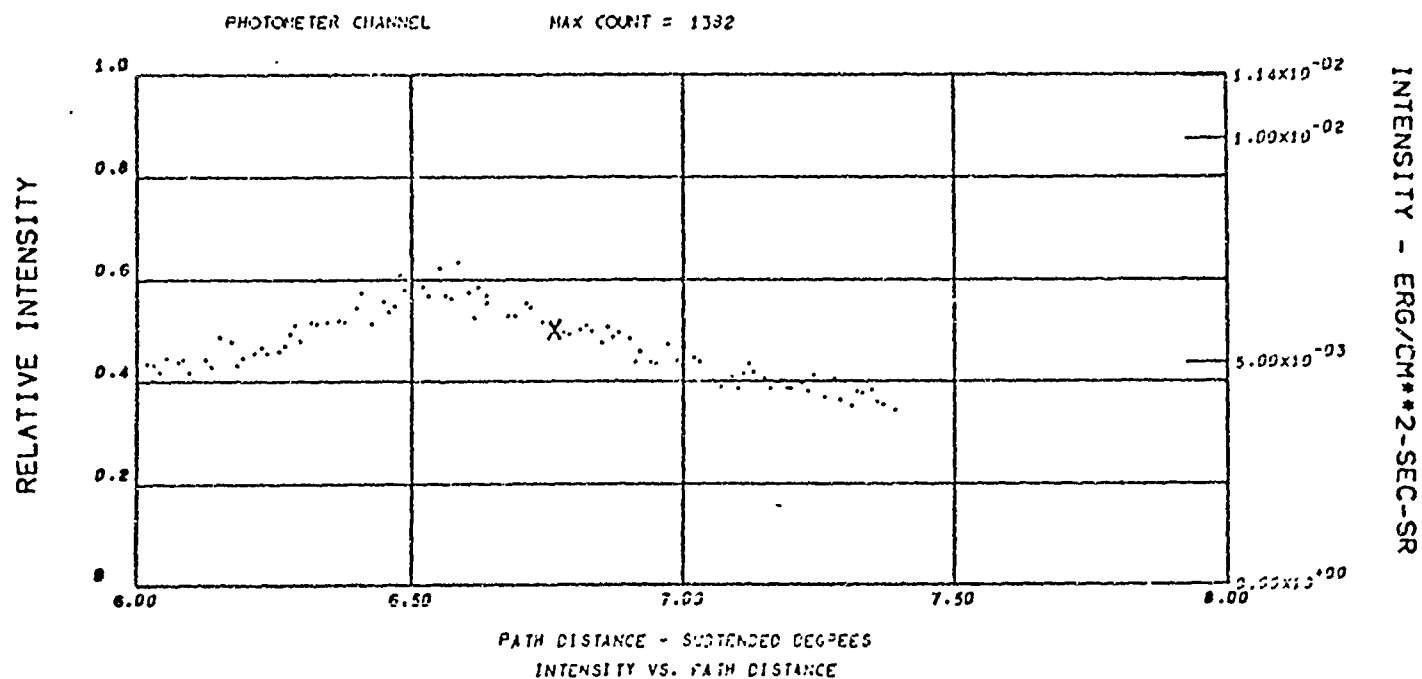
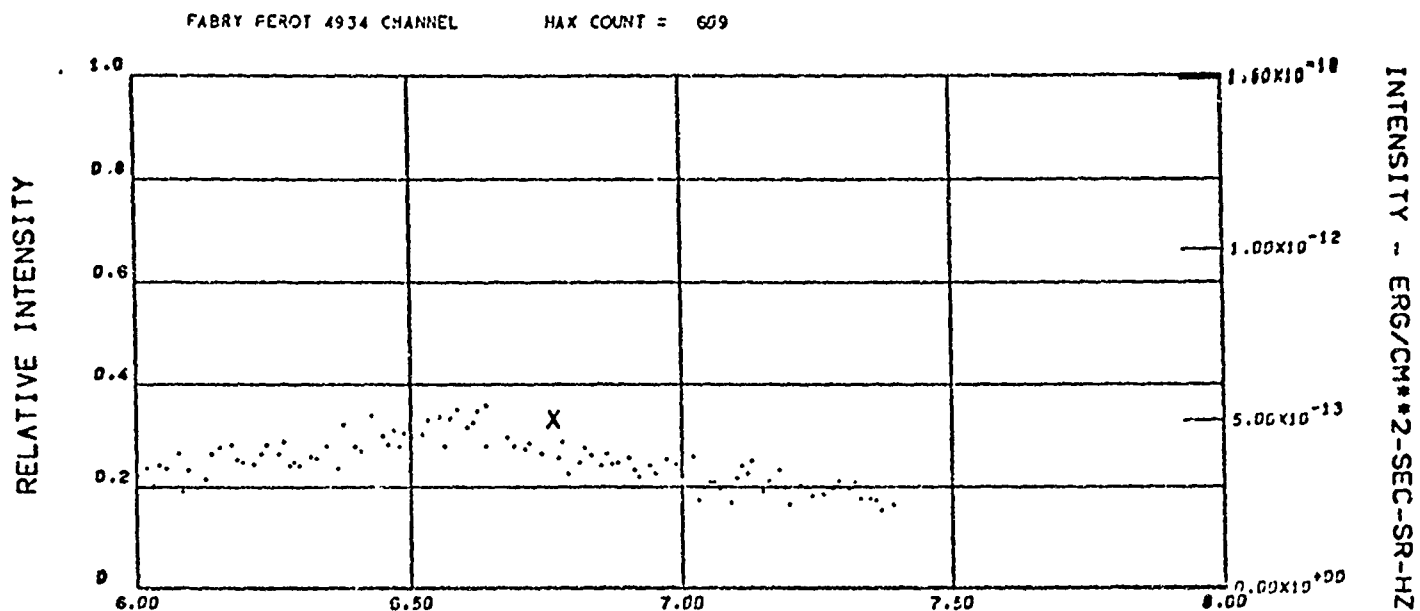
MAX COUNT = 1392

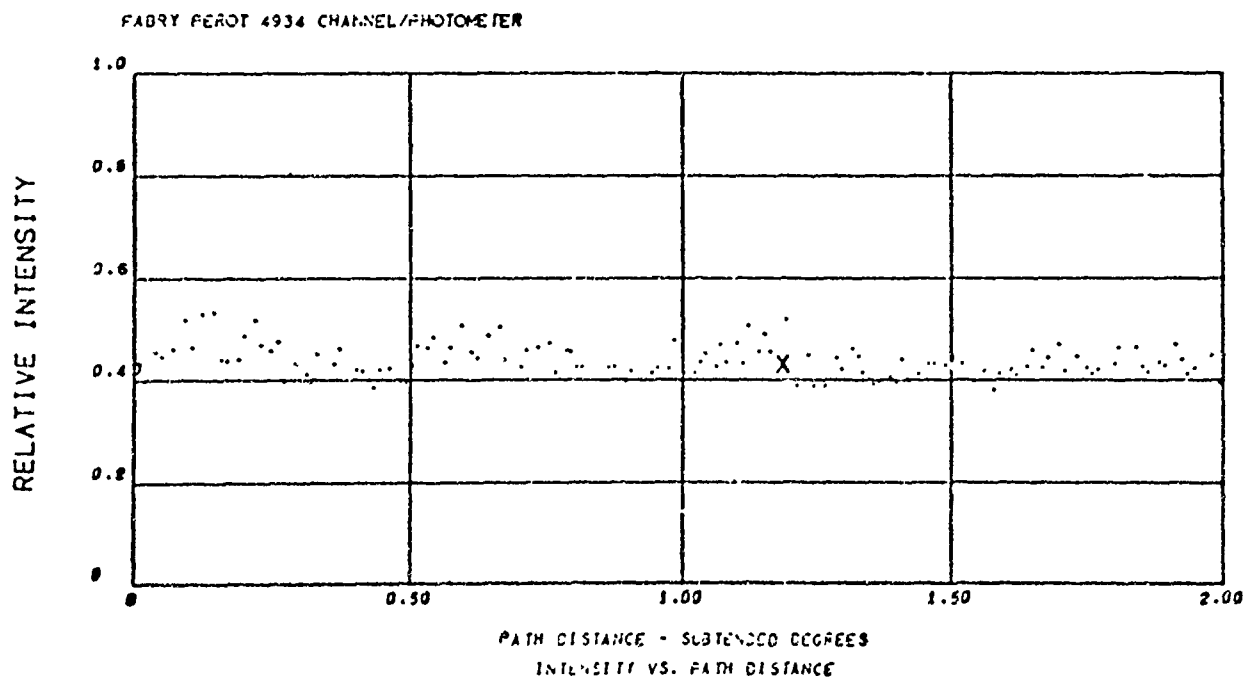
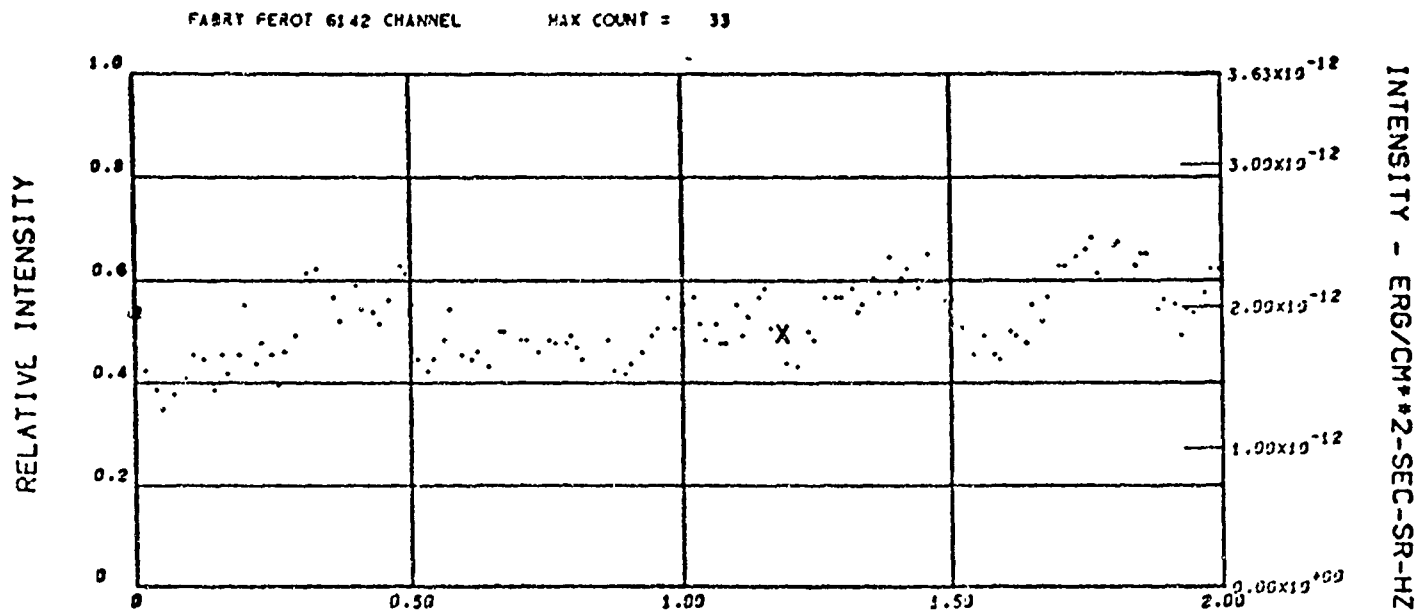


INTENSITY - ERG/CM\*\*2-SEC-SR

PATH DISTANCE - SUSPENDED DEGREES  
INTENSITY VS. PATH DISTANCE



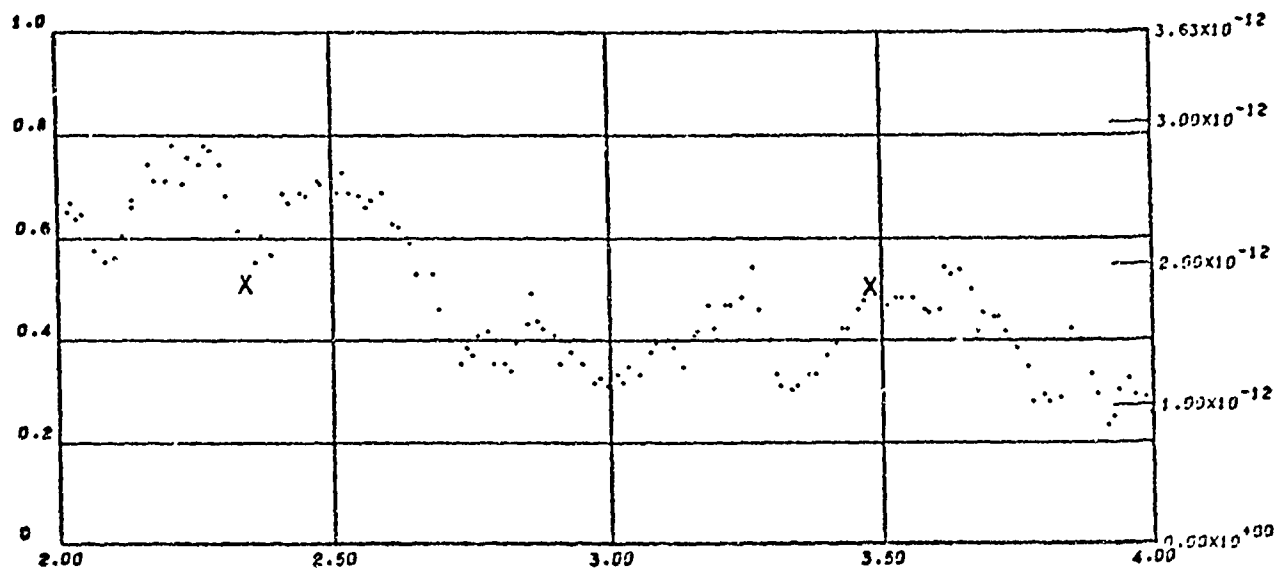




RELATIVE INTENSITY

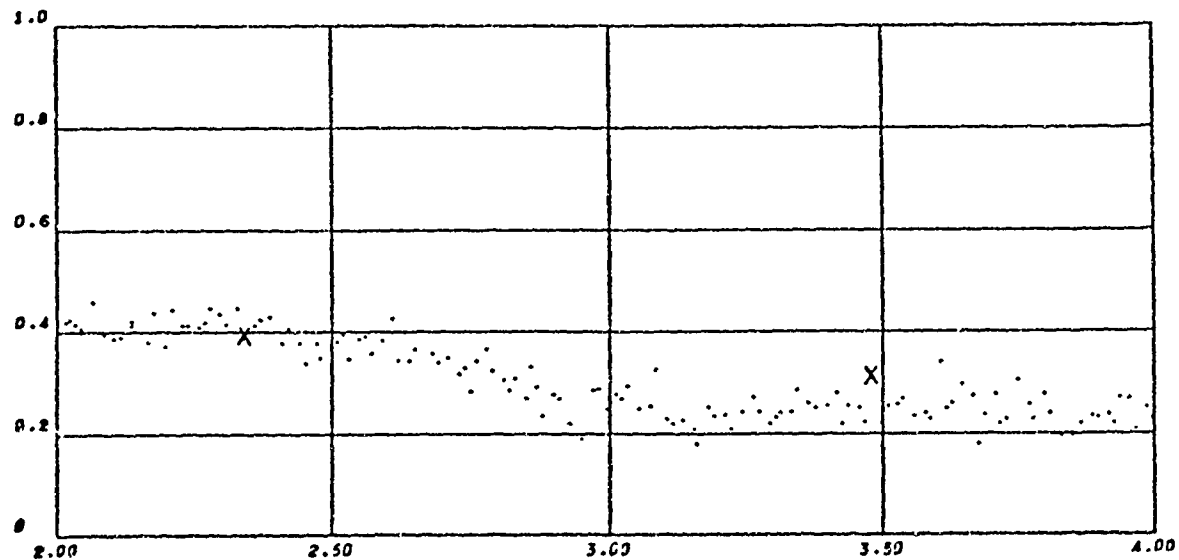
FABRY PEROT 6142 CHANNEL

MAX COUNT = 33

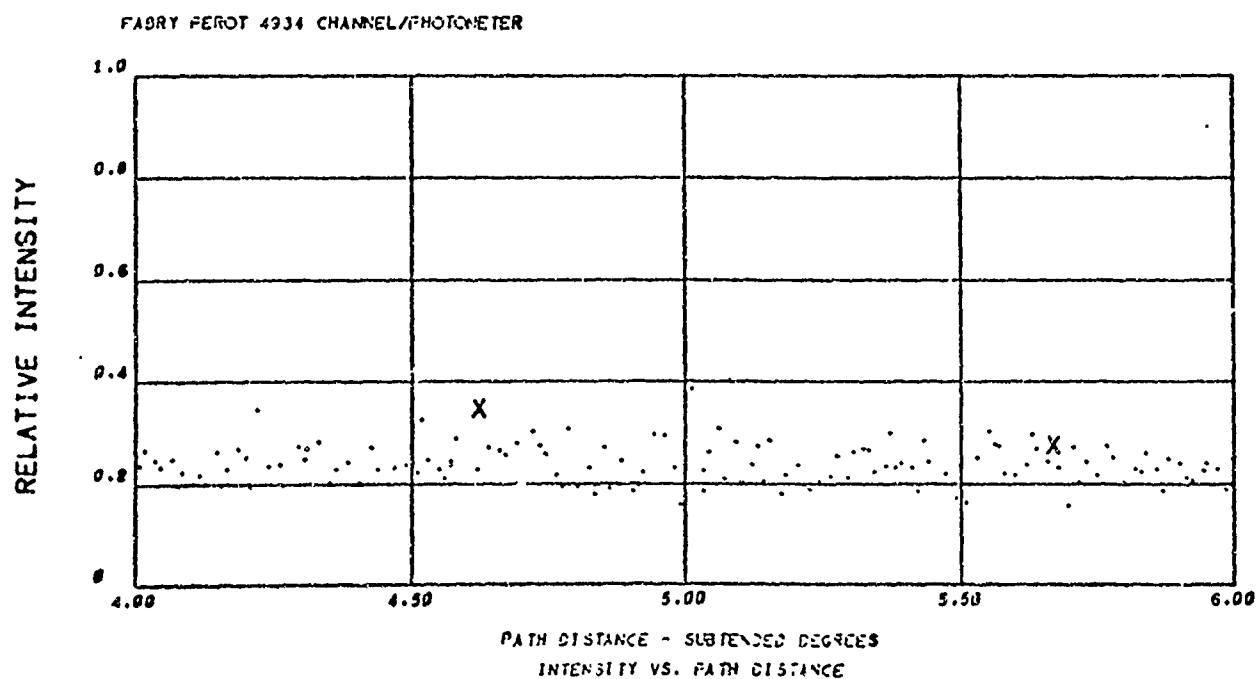
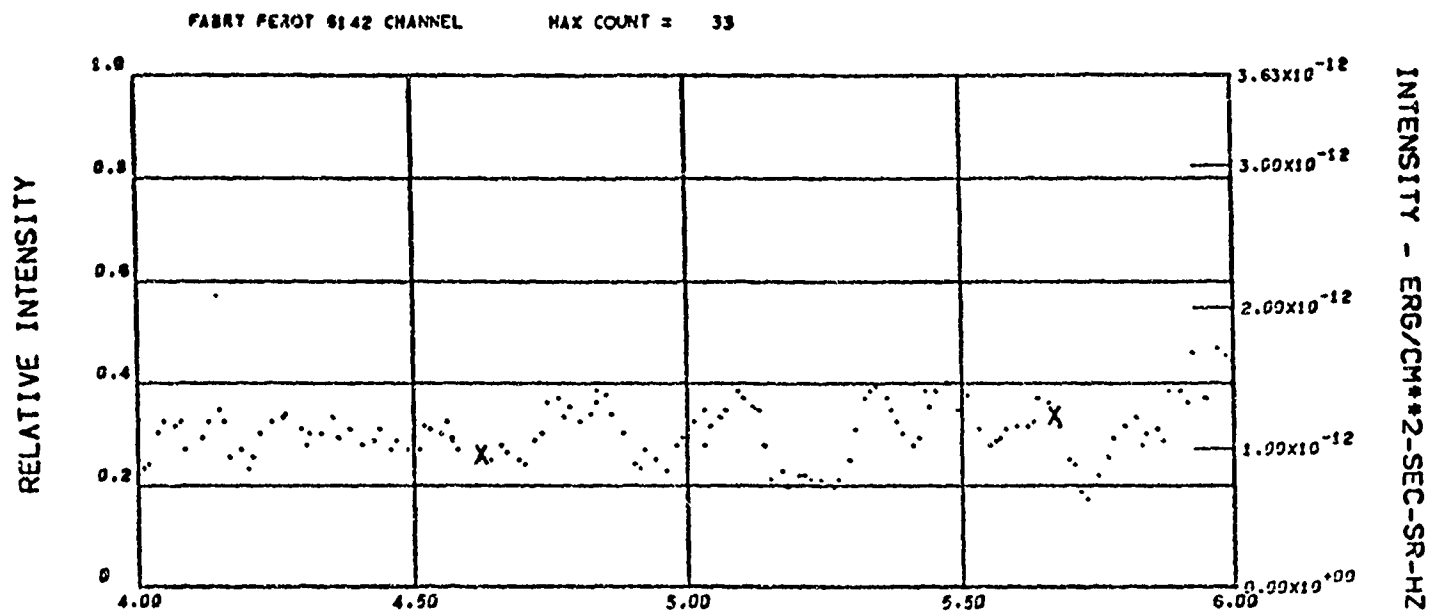


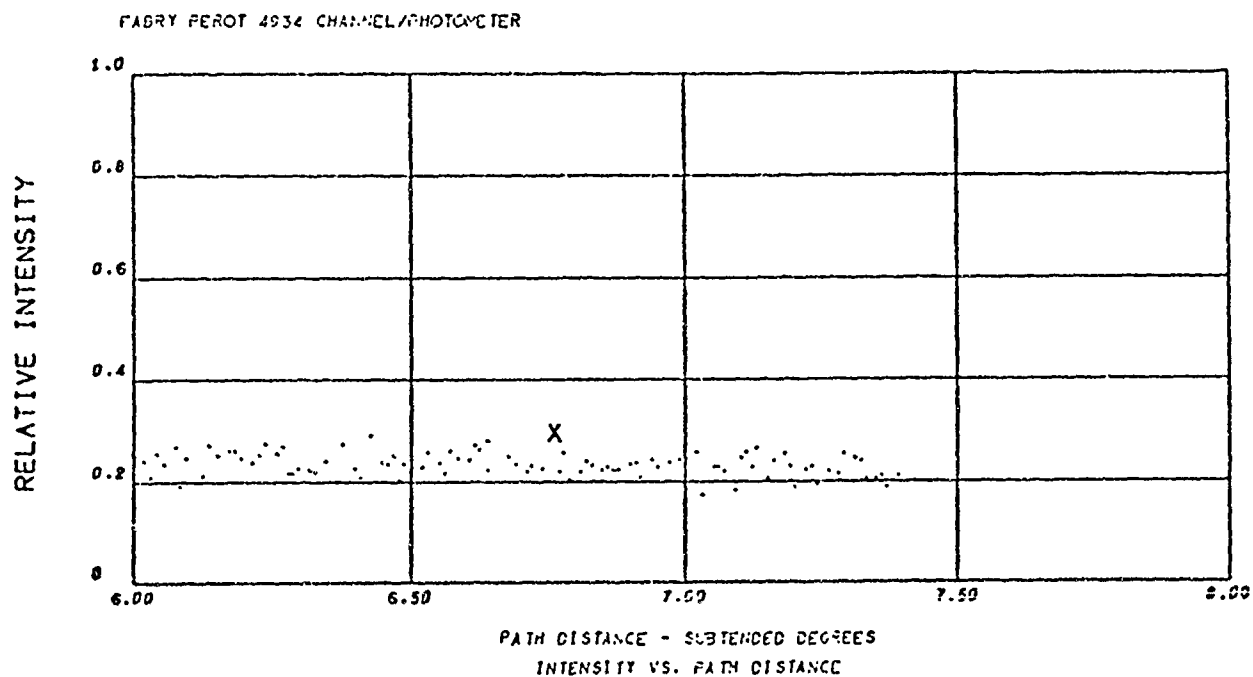
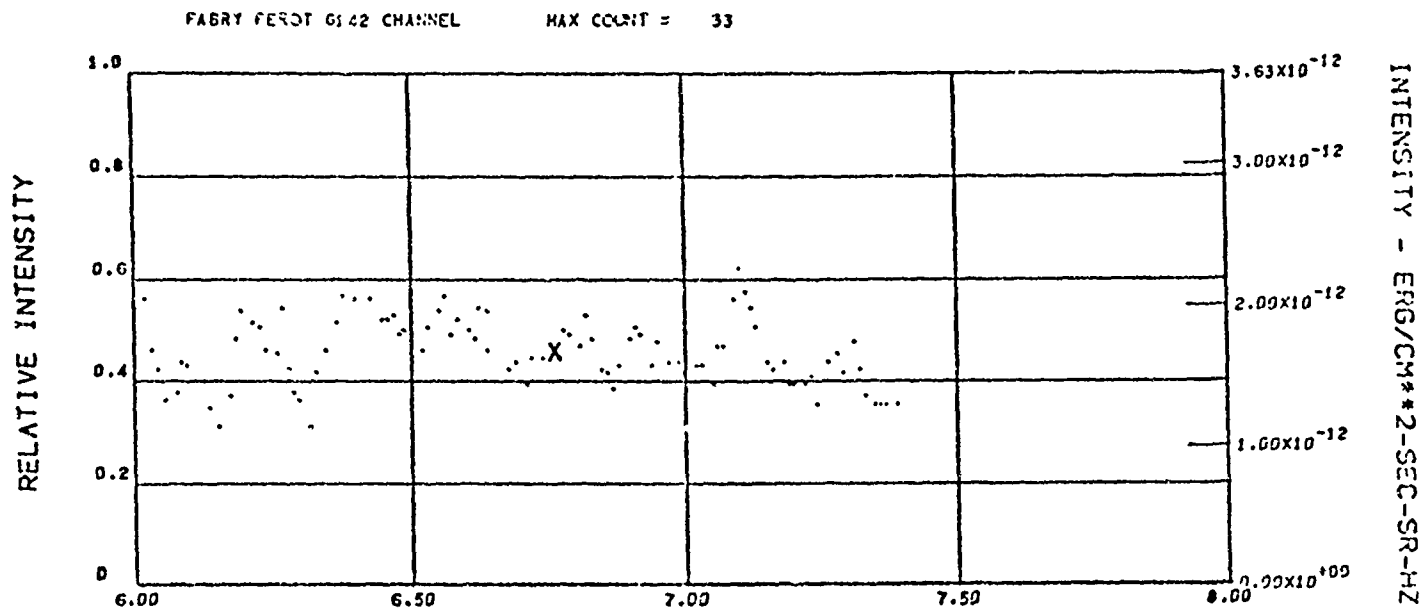
RELATIVE INTENSITY

FABRY PEROT 4934 CHANNEL/PHOTOMETER



PATH DISTANCE - SUBTENDED DEGREES  
INTENSITY VS. PATH DISTANCE





APPENDIX III

PLOTTING PROGRAM

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01-05-72 13,724

# PROGRAM TO PLOT SEBBDE DATA TAPES

WRITTEN BY G.LIEBLING - GENERAL ELECTRIC - AUG 1971

CSFCD

## PROGRAM TO PLOT SECEDE DATA TAPES

WRITTEN BY G.LIEBLING - GENERAL ELECTRIC - AUG 1971

C  
C

```

EXTERNAL TABL1V
DIMENSION TITLE(12), LABEL(6,4), NQR(100), IDATA(26),
2 PRES(700), SEC(700), THIN(700),
1 AZ(700), EL(700), FMON(700), FP1(700), FP2(700),
3 RAZ(700), REL(700), RMON(700), RFP1(700), RFP2(700),
4 RSEC(700), RMIN(700), RATS(700),
5 PARRAY(700,4), NAME(3)
DIMENSION IXTAB(50), IYTAB(50), DIS(700), XTAB(700), YTAB(700)
DIMENSION ASCALE(3), FMAX(3), MARTOP(3), MARBOT(3), NTIC(3),
1 TVAL(10,3), ILAB(6,3)
EQUIVALENCE (PARRAY(1,1), RFP1(1)), (PARRAY(1,3), RFP2(1)),
1 (PARRAY(1,2), RMON(1)), (PARRAY(1,4), RATS(1))
EQUIVALENCE (IDATA(1), IDAT1), (IDATA(2), IDAT2),
1 (IDATA(3), IDAT3), (IDATA(4), IDAT4), (IDATA(5), IDAT5),
2 (IDATA(6), IDAT6), (IDATA(7), IDAT7), (IDATA(8), IDAT8),
3 (IDATA(9), IDAT9), (IDATA(10), IDAT10), (IDATA(11), IDAT11)
DATA ((LABEL(I,J), I = 1,6), J = 1,4)
1 /6H , 6HFABRY , 6HPEROT , 6H4934 C, 6HHANNEL, 6H
2 6H , 6H PHO, 6HTOMETE, 6H9 CHAN, 6HNEL , 6H
3 6H , 6HFABRY , 6HPEROT , 6H6142 C, 6HHANNEL, 6H
4 6HFABRY , 6HPEROT , 6H4934 C, 6HHANNEL, 6H/PHOTO, 6HMETER /
DATA ((ILAB(I,J), I = 1,6), J = 1,3)
1 /6HINTENS, 6HITY - , 6HERG/CM, 6H**2-SE, 6HC-SR-W, 6HZ
2 6HINTENS, 6HITY - , 6HERG/CM, 6H**2-SE, 6HC-SR , 6H
3 6HINTENS, 6HITY - , 6HERG/CM, 6H**2-SE, 6HC-SR-W, 6HZ
DATA PADS/0.0174533/
DATA IN, IOUT, ITP / 5, 6, 10 /
SCALE FACTORS FOR GRIDS
SCALEF1 = 0.020
DEL1 = 3.0
DEL2 = 5.0
DEL3 = 7.0
MARG = 60
LINC = 30
LDRAW = LINC + 1
FLINC = LINC
ONE = 1.00
CALL CHSIZV (2, 2)
CALL RITSTV (12, 20, TABL1V)

C
READ (IN, 5050) TITLE
WRITE(IOUT, 6010) TITLE
READ (IN, 5050) NAME
READ (IN, 5140) DARKF1, DARKF2, DARKPH
READ (IN, 5160) ASCALE(1), ASCALE(3), ASCALE(2)

```

C

01-05-72 13.724

PROGRAM TO PLOT SEEBDE DATA TAPES

WRITTEN BY G.LIEBLING - GENERAL ELECTRIC - AUG 1971

```
C      READ FILE NUMBER OF DESIRED FILE
      READ (IN, 5100) NFILE
C      READ NUMBER OF RECORDS TO BE PROCESSED
C      AND INDEX NUMBER OF EACH RECORD-MAXIMUM 100 RECORDS
      READ (IN, 5120) NRECS
      READ (IN, 5120) (NOR(I), I = 1, NRECS)

C
C      SET UP LOOP TO PROCESS EACH RECORD
      READ (ITP) IDATA
      DO 750 NR = 1, NRECS
      NREC = NOR(NR)
      GO TO 205
C      READ ID FRAME
200  READ (ITP) IDATA
205  IF (IDAT1 = 97) 200, 210, 200
C      CHECK IF DESIRED FILE
C      CHECK IF DESIRED RECORD
210  IF (IDAT2 = NFILE) 200, 220, 215
C
C      FILE HAS BEEN BYPASSED- ABORT JOB
215  WRITE (IOUT, 6100) NFILE, IDAT2
      REWIND ITP
      STOP

C
220  IF (IDAT3 = NREC) 200, 230, 225
C      DESIRED RECORD HAS BEEN PASSED- TRY NEXT RECORD
225  WRITE (IOUT, 6050) NREC
      GO TO 750
C      DESIRED RECORD FOUND- START READING FRAMES
230  DO 300 NF = 1, 700
240  READ (ITP) IDATA
      IF (IDAT1 = 97) 260, 250, 250
C      ENTIRE RECORD READ - NOW PROCESS DATA
250  NWDS = NF = 1
      IF (NWDS .GE. 15) GO TO 320
      WRITE (IOUT, 6040) NREC
      GO TO 750
C      STILL READING RECORD - CONTINUE
260  TEMP1 = IDAT4
      TEMP2 = IDAT5
      AZ(NF) = TEMP1 + (TEMP2 / 100.0)
      TEMP1 = IDAT6
      TEMP2 = IDAT7
      EL(NF) = TEMP1 + (TEMP2 / 100.0)
      FMON(NF) = IDAT8
      FP1(NF) = IDAT9
      FP2(NF) = IDAT10
      PRES(NF) = IDAT11
      TEMP1 = IDAT3
      TEMP2 = IDAT2
```

01-05-72 13.724

# PROGRAM TO PLOT SEGEDE DATA TAPES

WRITTEN BY G.LIEBLING - GENERAL ELECTRIC - AUG 1971

```

SEC(NF) = TEMP2 + (TEMP1 / 100.0)
TMIN(NF) = IDAT1
300 CONTINUE
C IF THIS LOOP COMPLETED MUST HAVE READ 700 POINTS
C TOO MANY - DISREGARD RECORD
WRITE (IOUT, 6060) NREC
GO TO 750
C INVERT RECORD AND EXTRACT CONSTANT PRESSURE PART
C GET AVERAGE OF LAST TEN PRESSURE POINTS
320 N11 = NWDS - 10
N1 = NWDS - 1
N2 = NWDS - 2
APRES = 0.0
DO 330 I = N11, N1
330 APRES = APRES + PRES(I)
APRES = APRES / 10.0
C INVERT RECORD - REJECT FIRST AND LAST POINTS
NREJ = 0
NREV = 0
DO 370 IV = 1, N2
IREV = NWDS - IV
IF (ABS(PRES(IREV) - APRES) .LE. 4.0) GO TO 350
C IF 5 CONSECUTIVE POINTS REJECTED DISREGARD REST OF RECORD
NREJ = NREJ + 1
IF (NREJ - 5) 370, 400, 400
350 NREV = 0
NREV = NREV + 1
RSEC(NREV) = SEC(IREV)
RMIN(NREV) = TMIN(IREV)
RAZ(NREV) = AZ(IREV)
REL(NREV) = EL(IREV)
RMON(NREV) = FMON(IREV) - DARKPH
RFP1(NREV) = FP1(IREV) - DARKF1
RFP2(NREV) = FP2(IREV) - DARKF2
370 CONTINUE
400 IF (NREV .GT. 5) GO TO 405
WRITE (IOUT, 6040) NREC
GO TO 750
C
C NORMALIZE FABRY-PEROT INTENSITIES AND MONITOR
C FIRST FIND MAX VALUES
405 F1MAX = RFP1(1)
F2MAX = RFP2(1)
FMMAX = RMON(1)
DO 410 I = 2, NREV
IF (RMON(I) .GT. FMMAX) FMMAX = RMON(I)
IF (RFP1(I) .GT. F1MAX) F1MAX = RFP1(I)
410 IF (RFP2(I) .GT. F2MAX) F2MAX = RFP2(I)
FMAX(1) = F1MAX
FMAX(2) = FMMAX

```

01-05-72 13.724

# PROGRAM TO PLOT SEEDE DATA TAPES

WRITTEN BY G.LIEBLING - GENERAL ELECTRIC - AUG 1971

```

FMAX(3) * F2MAX
C
C   ABSOLUTE INTENSITY SCALE
DO 413 I = 1,3
  ABSMAX = FMAX(I) * ASCALE(I)
  ITEN = INT( ALOG10(ABSMAX) - 1.0)
  UNITS = ABSMAX / 10.0 ** ITEN
  SINC = 2.0
  IF (UNITS .LT. 6.0) SINC = 1.0
  IF (UNITS .LT. 3.0) SINC = 0.5
  NTIC(I) = UNITS / SINC + 2.0
  SINC = SINC * 10.0 ** ITEN
  NTICR = NTIC(I)
  NTIC1 = NTICR - 1
  TVAL(1, I) = 0.0
  TVAL(NTICR, I) = ABSMAX
DO 413 J = 2, NTIC1
  TVAL(J, I) = TVAL(J-1, I) + SINC
413
C
C   REINVERT ARRAYS
NREV2 = NREV / 2
DO 415 I = 1, NREV2
  NFW = NREV + 1 - I
  TEMP = RAZ(I)
  RAZ(I) = RAZ(NFW)
  RAZ(NFW) = TEMP
  TEMP = REL(I)
  REL(I) = REL(NFW)
  REL(NFW) = TEMP
DO 415 J = 1, 3
  TEMP = PARRAY(I, J)
  PARRAY(I, J) = PARRAY(NFW, J)
  PARRAY(NFW, J) = TEMP
415
C
C   NOW NORMALIZE. ALSO GET RATIO OF MONITOR TO FP1
DO 420 I = 1, NREV
  RATS(I) = RFP1(I) / RMON(I)
  RMON(I) = RMON(I) / FMAX
  RFP1(I) = RFP1(I) / F1MAX
420
  RFP2(I) = RFP2(I) / F2MAX
C
C   TAKE APPROPRIATE AVERAGE OF FP2 CHANNEL
NAVG = 5
IF (F2MAX .GE. 25.0) NAVG = 4
IF (F2MAX .GE. 50.0) NAVG = 3
IF (F2MAX .GE. 100.0) NAVG = 2
IF (F2MAX .GE. 200.0) NAVG = 1
IF (NAVG .EQ. 1) GO TO 424
FAVG = NAVG
NREVA = NREV - NAVG + 1

```

01-05-72 13.724

PROGRAM TO PLOT SECEDE DATA TAPES

WRITTEN BY G.LIEBLING - GENERAL ELECTRIC - AUG 1971

```
DO 422 I = 1, NREVA
SUM = 0.0
DO 421 J = 1, NAVG
IJ = I + J - 1
421 SUM = SUM + RFP2(IJ)
422 RFP2(I) = SUM / FAVG
NREVA = NREVA + 1
DO 423 I = NREVA, NREV
423 RFP2(I) = RFP2(I-1)
424 CONTINUE
C
C READY TO SET UP AZ EL PLOT ON 'GNOMONIC' PROJECTION
C DETERMINE CENTER COORD
IPASS = 1
NHALF = NREV / 2
AZCENT = AINT(RAZ(NHALF))
ELCENT = AINT(REL(NHALF))
IF ((RAZ(NHALF) - AZCENT) .GT. 0.5) AZCENT = AZCENT + 1.0
IF ((REL(NHALF) - ELCENT) .GT. 0.5) ELCENT = ELCENT + 1.0
AZCENR = AZCENT * RADS
ELCENR = ELCENT * RADS
C
C DETERMINE MIN AND MAX ANGLES AND DELTAS
AZMAX = 0.0
AZMIN = 0.0
ELMAX = 0.0
ELMIN = 0.0
DO 470 I = 1, NREV
TEMP = RAZ(I) - AZCENT
IF (TEMP - AZMAX) 430, 450, 425
425 AZMAX = TEMP
GO TO 450
430 IF (TEMP - AZMIN) 440, 450, 450
440 AZMIN = TEMP
TEMP = REL(I) - ELCENT
IF (TEMP - ELMAX) 460, 470, 455
455 ELMAX = TEMP
GO TO 470
460 IF (TEMP - ELMIN) 465, 470, 470
465 ELMIN = TEMP
470 CONTINUE
DELAZ = AZMAX - AZMIN
DELEL = ELMAX - ELMIN
DELANG = DELAZ
IF (DELEL .GT. DELAZ) DELANG = DELEL
C
C FIRST PLOT ON 6X6 DEG SCALE
SCALE = SCALE1
DEL = DEL1
C INSERT BLANK FRAME
```

01-05-72 13.724

# PROGRAM TO PLOT SEGEDE DATA TAPES

WRITTEN BY G.LIEBLING - GENERAL ELECTRIC - AUG 1971

```

CALL FRAMEV (3)
475  ELBOT = ELCENT - DEL
    FLTOP = ELCENT + DFL
    AZLFT = AZCENT - DEL
    AZRGT = AZCENT + DEL
C    ADVANCE FILM
    CALL FRAMEV (2)
    DSCALE = DEL * SCALE
    ESCALE = - DSCALE
C    SCALE GRID PAPER- LEAVE 50 UNIT MARGINS
    CALL XSCALV ( ESCALE, DSCALE, MARG, MARG)
    CALL YSCALV ( -SCALE, DSCALE, MARG, MARG)
C
C    DRAW LONGITUDE LINES
    DINC = DEL / 2.0
    AZLINE = AZLFT
    DO 480 I = 1, 5
    CALL COORD (XL1, YL1, AZCENR, ELCENR, AZLINE, ELBOT)
    CALL COORD ( XL2, YL2, AZCENR, ELCENR, AZLINE, ELTOP)
    IXL1 = IXV (XL1)
    IXL2 = IXV (XL2)
    IYL1 = IYV (YL1)
    IYL2 = IYV (YL2)
    CALL LINEV ( IXL1, IYL1, IXL2, IYL2)
C    DETERMINE LIMITS FOR USE IN INTENSITY PLOTS
    IF (I.NE, 3) GO TO 477
    DFLY = YL2 - YL1
    DSCL = (2.0 * DEL) / DELY
C    LABEL LINE
477  IXL1 = IXL1 - 24
    IYL1 = IYL1 - 10
    CALL LABLV (AZLINE, IXL1, IYL1, 6, 1, 4 )
480  AZLINE = AZLINE + DINC
C
C    DRAW LATITUDE LINES
C    SINCE LATITUDE LINES ARE ARCS MUST TRACE OUT IN STRAIGHT SEGMENTS
    AINC = DEL * 2.0 / FLINC
    ELLINE = ELBOT
    DO 520 I = 1, 5
    AZLINE = AZLFT
    DO 490 J = 1, LDRAW
    CALL COORD ( XL1, YL1, AZCENR, ELCENR, AZLINE, ELLINE)
    IXTAB(J) = IXV (XL1)
    IYTAB(J) = IYV (YL1)
490  AZLINE = AZLINE + AINC
C    TABLE OF COORDINATES FOR LATITUDE LINE COMPUTED - NOW DRAW LINE
    DO 500 J = 2, LDRAW
500  CALL LINEV ( IXTAB(J-1), IYTAB(J-1), IXTAB(J), IYTAB(J))
C    LABEL LAT LINE
    IXL1 = IXTAB(1) - 46

```

WRITTEN BY G.LIEBLING - GENERAL ELECTRIC - AUG 1971

```

CALL LABLV (ELLINE, IXL1, IYTAB(1), 6, 1, 4 )
520 ELLINE = ELLINE + DINC
C   WRITE INFO BLOCK
CALL DBLOCK ( NAME, NREV, AZCENT, ELCENT, RMIN(NREV), RSEC(NREV),
1      RMIN(1), RSEC(1), NWDS, NREV, NRES)
C
C   GRID DRAWN AND LABELED
C   CONVERT POINTS TO X - Y COORDINATES FOR PLOTTING
C
DO 560 I = 1, NREV
560 CALL COORD (XTAB(I), YTAB(I), AZCENR, ELCENR, RAZ(I), REL(I) )
C   NOW PLOT
CALL APLOTV ( NREV, XTAB, YTAB, 1, 1, 1, 42, IERR)
C   PLOT EVERY 75TH POINT WITH SPECIAL SYMBOL
CALL APLOTV ( 1, XTAB, YTAB, 1, 1, 1, 63, IERR)
IF (NREV .LT. 75) GO TO 567
DO 565 I = 75, NREV, 75
IX = NXV ( XTAB(I))
IY = NYV ( YTAB(I))
565 CALL RITE2V ( IX, IY, 1000, 90, 1, 1, -1, 1HX, IERR)
C
C   PLOT FINISHED - REPLOT IF NECESSARY ON COMPRESSED SCALE
567 GO TO ( 570, 590, 590 ), IPASS
570 IF (DELANG .LE. (2.0 * DEL1) ) GO TO 590
IF (DELANG .GT. (2.0 * DEL2) , ) GO TO 580
DEL = DEL2
IPASS = 2
GO TO 475
580 DEL = DEL3
IPASS = 3
GO TO 475
590 CONTINUE
C
C   PLOTTING OF GNOMONIC PROJECTIONS COMPLETED
C
C   NOW PLOT INTENSITIES
C
C   GENERATE TABLE OF LINEAR DISTANCES FROM FIRST POINT
DIS(1) = 0.0
DO 620 I = 2, NREV
DINC = SQRT( (XTAB(I) - XTAB(I-1)) ** 2 +
1      (YTAB(I) - YTAB(I-1)) ** 2 ) * DSCL
620 DIS(I) = DIS(I-1) + DINC
C   NUMBER OF FRAMES / ARRAY = 2 DEG / FRAME
FRM = DIS(NREV) / 2.0
IF ((FRM - INT(FRM)) .GT. 0.0) FRM = FRM + 1.0
NFRAME = FRM
C
C   MARGINS

```

01-05-72 13.724

# PROGRAM TO PLOT SEGBDE DATA TAPES

WRITTEN BY G.LIEBLING - GENERAL ELECTRIC - AUG 1971

```

C      TOP HALF
      MARTOP(1) = 1023 - 924
      MARBOT(1) = 544
C      BOTTOM HALF
      MARTOP(2) = 1023 - 462
      MARBOT(2) = 82
      MARLFT = 66
      MARRGT = 1023 - 891
      DO 690 IFM = 1,3,2
C      2 DEGREES / FRAME
      DO 680 IFRAM = 1, NFRAME
      CALL FRAMEV (2)
      FRM = IFRAM
      DLEFT = (FRM - 1.0) * 2.0
      DRGHT = FRM * 2.0
      CALL PRINTV (33, 33, PATH DISTANCE - SUBTENDED DEGREES, 364, 60)
      CALL PRINTV (27, 27, INTENSITY VS. PATH DISTANCE, 388, 40)
C      2 ARRAYS / FRAME
      DO 680 IPL = 1,2
C      DRAW GRID
      CALL SETMIV ( MARLFT, MARRGT, MARBOT(IPL), MARTOP(IPL) )
      CALL GRIDIV ( 2, DLEFT, DRGHT, 0.0, ONE, 0.50, 0.20, 0, 0,
1          1, 1, 4, 3 )
      LINE = MARBOT(IPL) + 86
      CALL RITE2V (30, LINE, 1000, 180, 1, 18, 1,
1          18, RELATIVE INTENSITY, IERR )
      LINE = 1044 - MARTOP(IPL)
      IGR = IFM + IPL - 1
      CALL PRINTV ( 36, LABEL(1, IGR), 100, LINE )
      IF (IGR .EQ. 4) GO TO 630
      CALL PRINTV ( 12, 12, MAX COUNT = , 400, LINE )
      CALL LABLV ( FMAX(IGR), 500, LINE, 4, 1, 4 )
      LINE = 1008 - MARTOP(IPL)
      CALL RITE2V ( , 000, LINE, 50, 0, 1, 31, 1, ILAB(1, IGR), IERR)
C      DRAW ABSOLUTE INTENSITY TIC MARKS
      LSTOP = IXV(DRGHT)
      LSTART = LSTOP - 30
      LCHAR = LSTOP + 10
      NTICR = NTIC(IGR)
      DO 625 NT = 1, NTICR
      POS = TVAL(NT, IGR) / TVAL(NTICR, IGR)
      IPOS = NYV(POS)
      CALL LINEV ( LSTART, IPOS, LSTOP, IPOS )
625 CALL LABLV ( TVAL(NT, IGR), LCHAR, IPOS, -3, 1, 1 )
630 CONTINUE
C
C      PLOT POINTS
      CALL APLOTV (NREV, DIS, PARRAY(1, IGR), 1, 1, 1, 42, IERR)
      CALL APLOTV ( 1, DIS, PARRAY(1, IGR), 1, 1, 1, 63, IERR)
      IF (NREV .LT. 75) GO TO 680

```

01-05-72 13.724

PROGRAM TO PLOT SEEBDE DATA TAPES

WRITTEN BY G.LIEBLING - GENERAL ELECTRIC - AUG 1971

```
DO 670 I = 75,NREV,75
IX = NXV ( DIS(I))
IY = NYV ( PARRAY(I,IGR))
IF (IX.EQ. 0 .OR. IY.EQ. 0) GO TO 670
CALL RIPE2V ( IX, IY, 1000, 90, 1, 1, -1, 1HX, IERR)
670 CONTINUE
680 CONTINUE
690 CONTINUE
700 CONTINUE
C END LOOP FOR ONE SCAN FRAME
WRITE (IOUT, 6070) NREC
750 CONTINUE
REWIND ITP
STOP

C
5050 FORMAT (12A6)
5100 FORMAT (I2)
5120 FORMAT (10I5)
5140 FORMAT (3F10.3)
5160 FORMAT (3E10.3)
6010 FORMAT (1H1, 30X, 12A6, / )
6040 FORMAT ( / 35X 7HRECORD , I3, 30H SKIPPED - INSUFFICIENT POINTS )
6050 FORMAT ( / 35X 7HRECORD , I3, 28H SKIPPED - NOT FOUND ON TAPE )
6060 FORMAT ( / 35X 7HRECORD , I3, 26H SKIPPED - TOO MANY POINTS )
6070 FORMAT ( / 35X 7HRECORD , I3, 8H PLOTTED )
6100 FORMAT ( /// 6H FILE , I2, 17H BYPASSED - FILE , I2, 6H FOUND;
1 / 12H JOB ABORTED )
END
```

566 WORDS OF MEMORY USED BY THIS COMPILATION

01-05-72 13.749 SUBROUTINE TO COMPUTE GNOMONIC PROJECTION COORDINATES  
FROM INPUT AZ AND EL

```
CCORD      SUBROUTINE TO COMPUTE GNOMONIC PROJECTION COORDINATES
C          FROM INPUT AZ AND EL
SUBROUTINE COORD ( X, Y, AZCENR, ELCENR, AZ, EL)
DATA RADS/0.01745331/
AZR = AZ * RADS
ELR = EL * RADS
SINL = SIN(AZR - AZCENR)
COSL = COS(AZR - AZCENR)
SINP = SIN(ELR)
COSP = COS(ELR)
SINPO = SIN(ELCENR)
COSPO = COS(ELCENR)
DENOM = SINPO * SINP + COSPO * COSP * COSL
X = ( SINL * COSP ) / DENOM
Y = ( COSPO * SINP - SINPO * COSL * COSP ) / DENOM
RETURN
END
```

546 WORDS OF MEMORY USED BY THIS COMPILATION

01-05-72 13.751 SUBROUTINE TO PRINT HOUSEKEEPING DATA BLOCK

ON GNOMONIC PROJECTION PLOTS

```
CDHLK      SUBROUTINE TO PRINT HOUSEKEEPING DATA BLOCK
C          ON GNOMONIC PROJECTION PLOTS
C          USES VECTOR CHARACTERS FOR LARGER LETTERS
1          SUBROUTINE DBLOCK (NAME, NREC, AZCENT, ELCENT, RMSRT, RSSRT,
          RMSTP, RSSTP, NWDS, NREV, APRES)
          EXTERNAL TABL1V
          DIMENSION NAME(3)
          ILF = 790
          IH = 980
          IDEL = 20
          MAR = 1023
          CALL CHSIZV (2, 2)
          CALL RITSTV (12, 20, TABL1V)
          CALL RITE2V (ILF, IH, MAR, 90, 1, 18, 1, NAME, IERR)
          IH = IH - IDEL
          CALL RITE2V (ILF, IH, MAR, 90, 1, 13, -1, 13HRECORD NO. , IERR)
          TEMP = NREC
          CALL BNBCDV (TEMP, BCD, NDS)
          CALL RITE2V (946, IH, MAR, 90, 1, NDS, 1, BCD, IERR)
          IH = IH - IDEL
          CALL RITE2V (ILF, IH, MAR, 90, 1, 11, -1, 11HREF COORD - , IERR)
          IH = IH - IDEL
          CALL RITE2V (ILF, IH, MAR, 90, 1, 5, -1, 5H AZ , IERR)
          CALL BNBCDV (AZCENT, BCD, NDS)
          CALL RITE2V (950, IH, MAR, 90, 1, NDS, 1, BCD, IERR)
          IH = IH - IDEL
          CALL RITE2V (ILF, IH, MAR, 90, 1, 5, -1, 5H EL , IERR)
          CALL BNBCDV (ELCENT, BCD, NDS)
          CALL RITE2V (950, IH, MAR, 90, 1, NDS, 1, BCD, IERR)
          IH = IH - IDEL
          CALL RITE2V (ILF, IH, MAR, 90, 1, 4, -1, 4HTIME, IERR)
          IH = IH - IDEL
          CALL RITE2V (ILF, IH, MAR, 90, 1, 18, -1, 18H START M . S;
          IERR)
1          CALL BNBCDV (RMSRT, BCD, NDS)
          IST = 886
          IF (NDS .EQ. 1) IST = 898
          CALL RITE2V (IST, IH, MAR, 90, 1, NDS, 1, BCD, IERR)
          TEMP = AINT (RSSRT)
          CALL BNBCDV (TEMP, BCD, NDS)
          IST = 934
          IF (NDS .EQ. 1) IST = 946
          CALL RITE2V (IST, IH, MAR, 90, 1, NDS, 1, BCD, IERR)
          TEMP = RSSRT - TEMP
          CALL BNBCDV (TEMP, BCD, NDS)
          CALL RITE2V (970, IH, MAR, 90, 1, 2, 1, BCD, IERR)
          IH = IH - IDEL
          CALL RITE2V (ILF, IH, MAR, 90, 1, 18, -1, 18H STOP M . S;
          IERR)
1          CALL BNBCDV (RMSTP, BCD, NDS)
```

01-05-72 13.754 SUBROUTINE TO PRINT HOUSEKEEPING DATA BLOCK  
ON GNOMONIC PROJECTION PLOTS

```

IST = 886
IF (NDS .EQ. 1) IST = 898
CALL RITE2V ( IST, IH, MAR, 90, 1, NDS, 1, BCD, IERR)
TEMP = AINT (RSSTP)
CALL BNBCDV ( TEMP, BCD, NDS)
IST = 934
IF (NDS .EQ. 1) IST = 946
CALL RITE2V ( IST, IH, MAR, 90, 1, NDS, 1, BCD, IERR)
TEMP = RSSTP - TEMP
CALL BNBCDV ( TEMP, BCD, NDS)
CALL RITE2V ( 970, IH, MAR, 90, 1, 2, 1, BCD, IERR)
IH = IH - IDEL
CALL RITE2V ( ILF, IH, MAR, 90, 1, 13, -1, 13HPOINT COUNT -, IERR)
IH = IH - IDEL
CALL RITE2V ( ILF, IH, MAR, 90, 1, 7, -1, 7H TOTAL, IERR)
TEMP = NWDS
CALL BNBCDV ( TEMP, BCD, NDS)
CALL RITE2V ( 922, IH, MAR, 90, 1, NDS, 1, BCD, IERR)
IH = IH - IDEL
CALL RITE2V ( ILF, IH, MAR, 90, 1, 9, -1, 9H PLOTTED, IERR)
TEMP = NREV
CALL BNBCDV ( TEMP, BCD, NDS)
CALL RITE2V ( 922, IH, MAR, 90, 1, NDS, 1, BCD, IERR)
IH = IH - IDEL
CALL RITE2V ( ILF, IH, MAR, 90, 1, 18, -1, 18HAVERAGE PRESSURE -,
1 IERR)
IH = IH - IDEL
CALL BNBCDV ( APRES, BCD, NDS)
CALL RITE2V ( 826, IH, MAR, 90, 1, NDS, 1, BCD, IERR)
RETURN
END

```

745 WORDS OF MEMORY USED BY THIS COMPILATION