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USCIPI Report 780

UNIVERSITY OF SOUTHERN CALIFORNIA

THE USC - IMAGE PROCESSING INSTITUTE
DATA BASE

REVISION 1

by

Ray Schmidt
Laboratory Manager

DDC
REPRODUCED
NOV 9 1977
FBI/DOJ

Original Issue: October 1976
Revision #1 Issue: October 1977

Image Processing Institute
University of Southern California
University Park
Los Angeles, California 90007

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6 THE USC - IMAGE PROCESSING INSTITUTE
DATA BASE,
REVISION #1.

by 9 Technical repts

10 Ray/Schmidt
Laboratory Manager

12 43p.

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13. ABSTRACT			
<p>This report represents effort expended in attempting to meet the needs of the ARPA-IPTO Image Understanding community in providing the availability of a digital image data base. The data base will never be complete as it is the intention of the USC-IMAGE Processing Institute to update and maintain the base as long as the sponsor and scientific community indicates a need for same. The picture files are individually or collectively accessible either over the ARPANET or via the U.S. mails. For such administrative details, contact:</p> <p style="text-align: center;">The Director Image Processing Institute Powell Hall University of Southern California Los Angeles, California 90007</p>			

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Abstract

This report represents the first revision effort expended in attempting to meet the needs of the ARPA-IPTO Image Understanding community in providing the availability of a digital image data base. The data base will never be complete as it is the intention of the USC-Image Processing Institute to update and maintain the base as long as the sponsor and scientific community indicates a need for same. The picture files are individually or collectively accessible either over the ARPANET or via the U.S. mails. For such administrative details, contact:

The Director
Image Processing Institute
Powell Hall
University of Southern California
Los Angeles, California 90007

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The USC - Image Processing Institute

Data Base

Introduction

The objective of developing the digital picture data base is primarily in support of the DoD - ARPA - IPTO Image Understanding program. The data base is primarily available to this community but will be distributed to other individuals upon request. Naturally no data base is ever complete and we expect this set to expand as time and interest dictate. For those individuals interested in contributing to the base, provisions can be made for inclusion of such imagery.

The organization of the base and character of the imagery included is motivated by the objectives of the Image Understanding program. Various areas of military activity are addressed by this program examples of which include:

Cartography

Surveillance/Reconnaissance

Tactical Cueing

Terminal Guidance

Therefore, an initial suggestion for the organizational structure of the data was parallel to these above areas of military activity. However, this approach soon led to frustration and a new attempt at organization was proposed. Specifically image sensor characteristics were suggested as

a possible organizational method for the data such that the sensor that gathered the imagery would define the category into which such imagery was placed. Typical sensors of interest might include:

- visible monochrome
- visible color
- infrared monochrome
- infrared color
- narrowband multispectral
- forward looking infrared
- side look radar
- synthetic aperture radar
- stereo visible monochrome
- time sequential frames (T.V. movie)
- etc.

As can be seen by this list, the category of sensor can itself become an unnecessarily cumbersome task which does not lend itself to convenient data base categorization.

Finally, a very simple classification method was chosen to avoid categorically limiting the data base due to current military mission and/or state of the art sensor design. This new method of organization is to simply develop a numbering scheme which represents the computer description of the imagery at hand. For simplicity all images are square. If they are monochrome, they are labeled with a "B". If they are color, they are labeled with a "C". If they are part of a motion

picture, they are labeled with an "MP". Typical examples of categories might be:

- a) B1288 - 7
- b) B2566 - 21
- c) B5128 - 3
- d) C5128 - 5

referring to:

- a) monochrome (black and white) 128 x 128 pixels at 8 bits/pixel, file 7.
- b) monochrome (black and white) 256 x 256 pixels at 6 bits/pixel, file 21.
- c) monochrome (black and white) 512 x 512 pixels at 8 bits/pixel, file 3.
- d) color 512 x 512 pixels at 8 bits/pixel, file 5.

Larger data bases (1024 x 1024) are available and are included in this update of this document. Similarly, time (movies and television) sequences have been digitized and are available in this update of this document.

The IPI data base is divided into categories based on the basic characteristics of the pictures. Each category heading reveals the size of the picture (always square), the number of bits of information per pixel, and whether the picture is black and white or color. The following chart identifies the various categories:

B1288	Black & White	128 pixels per record, 128 records per file, 8 bits per pixel
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B2566	Black & White	256 pixels per record, 256 records per file, 6 bits per pixel
C2568	Color	256 pixels per record, 256 records per file, 8 bits per pixel
B5128	Black & White	512 pixels per record, 512 records per file, 8 bits per pixel
C5128	Color	512 pixels per record, 512 records per file, 8 bits per pixel
B10248	Black & White	1024 pixels per record, 1024 records per file, 8 bits per pixel

Copies of the IPI data base are supplied on magnetic tape, 9 track, 800 BPI, on 2400-ft. reels. Each file is terminated by one end-of-file mark, and there are no other marks or headers before or between files. Color pictures are written as three files per picture, each file containing data for the red, green, or blue (in that order) element of the picture. A color picture that this book identifies as file 9 would have the red data on file 7, green on file 8, and blue on file 9.

Data is recorded on tape in binary form. If the pictures are 6 or 8 bit, the pixels will be recorded as consecutive bytes, with no blank bytes between pixels. Thus, a file from the B2566 group would be written as 256 records, each with 256 bytes, followed by an end-of-file mark. The first record read represents the first (top) line of the picture.

This revision of USCIPI Report 710 Data Base includes some time (movie) sequences with a sample of the images available.

represented by the pictures B2568 56 through B2568 63. The first of these images are in reality, frames 1, 16, 32, 48, and 64 of a 76-frame segment of motion picture film. The last three pictures (61, 62, 63) are frames 1, 8, and 16 of a 16-frame segment of motion picture film. Since in both cases, images are sequential motion pictures, the above images were selected as representative. The entire sequence of images are available to those users who desire them. They are identified as MPC 1-16 and MPR 1-76 in the following index of categories. Please note that these images also fall into the B2568 category.

The data in this data base is available in its entirety or by individual categories, such as C2568 only. Random images will not be available as the time and effort involved would be prohibitive. In some instances, data from two categories, i.e. B1288 and B2566 may be combined on one tape.

The index of this updated data base, USCIPI Report 780 Revised, with a magnetic tape requirement, reads as follows:

B1288	90 pictures on 90 files on (1) tape
B2566	26 pictures on 26 files on (1) tape
C2568	18 pictures on 54 files on (1) tape
B2568	63 pictures on 63 files on (1) tape
C5128	36 pictures on 109 files on (3) tapes*
B5128	54 pictures on 54 files on (2) tapes
B10248	9 pictures on 9 files on (1) tape
MPR 1-76	76 pictures on 76 files on (1) tape

MPC 1-16

16 pictures on 16 files on (1) tape

*Please note: C5128 16 is a multispectral image and therefore
is recorded on (4) files.

Acknowledgements

The Image Processing Institute is pleased to acknowledge
the enthusiastic support in developing this data base from
the following individuals.

Mr. Ray Schmidt - Laboratory Manager

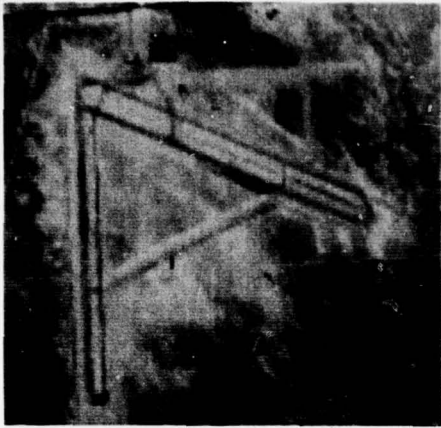
Mr. Behnam Ashjari - Graduate Student

Mr. Gary Edwards - Operator

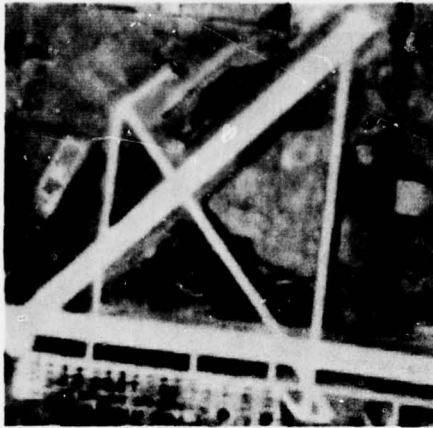
Mr. David Nagai - Photographer

Mr. Clay Olmstead - Operator

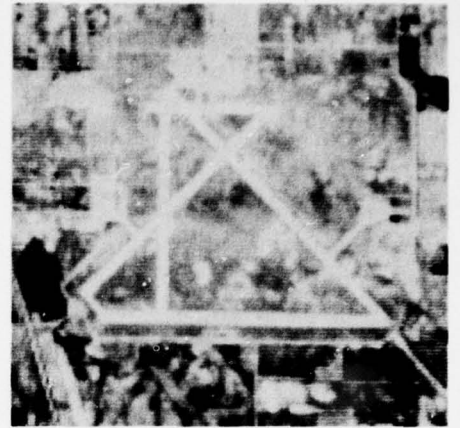
Miss Beverly Sanders - Operator



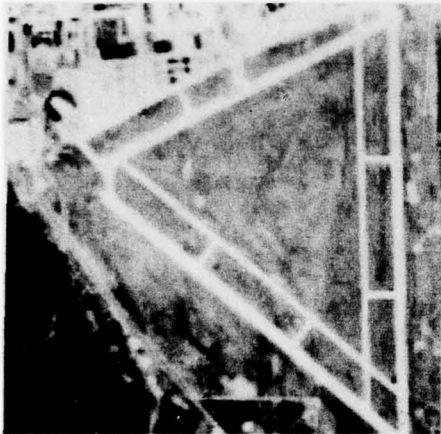
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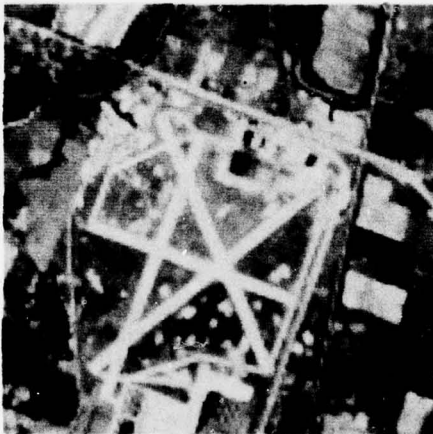
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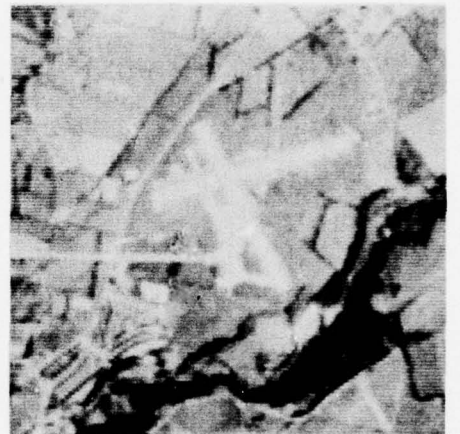
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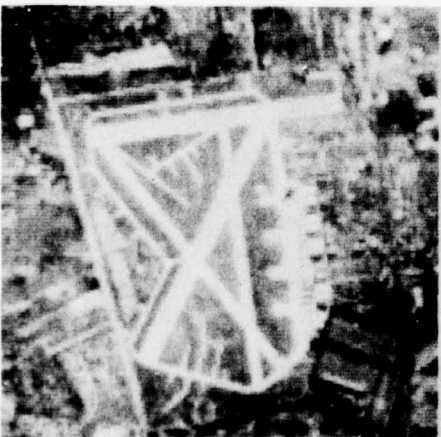
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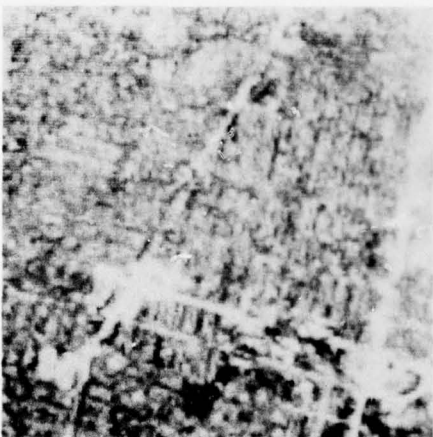
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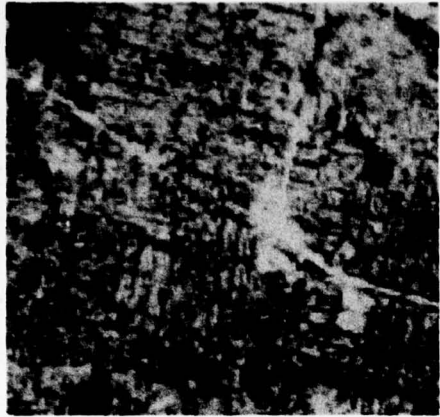
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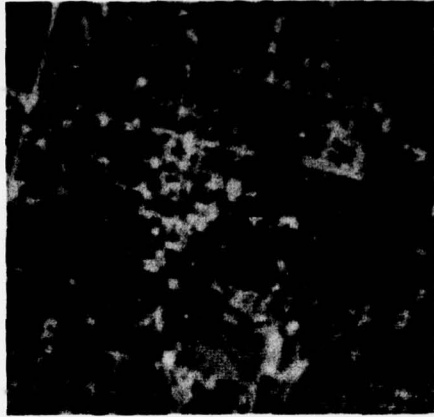
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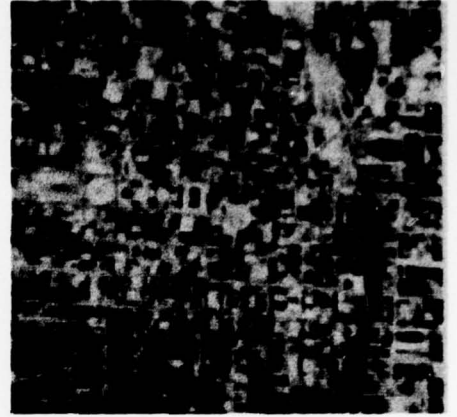
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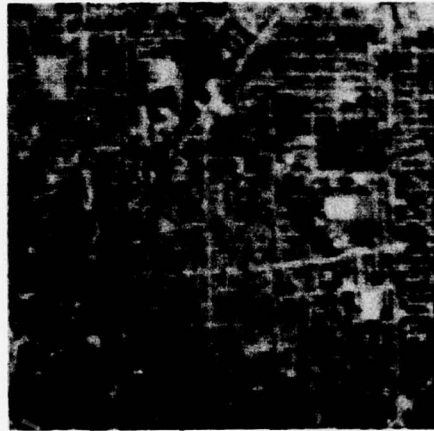
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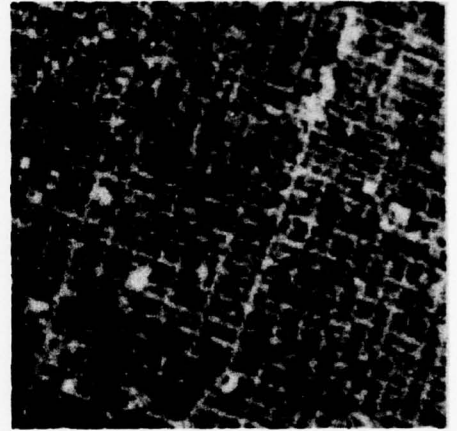
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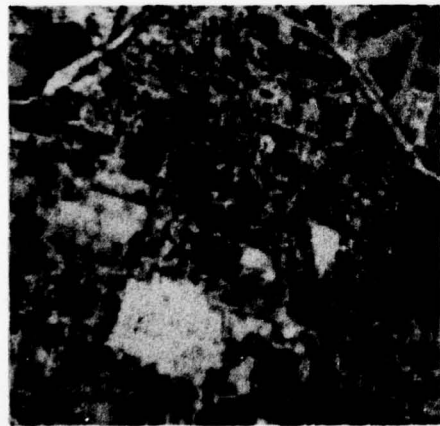
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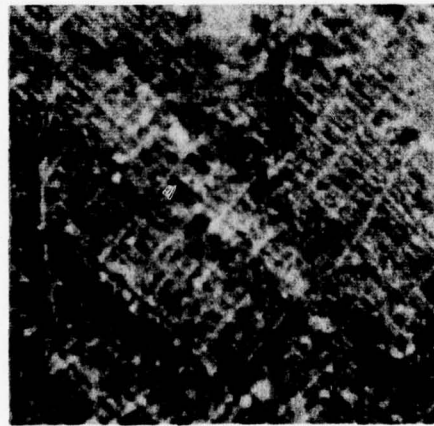
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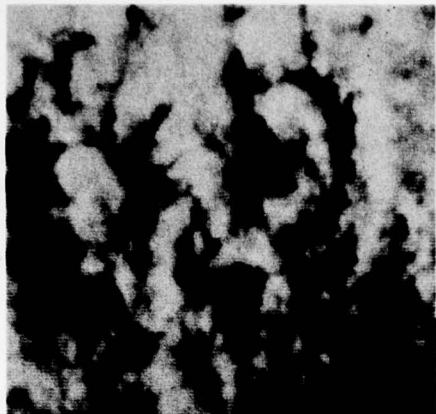
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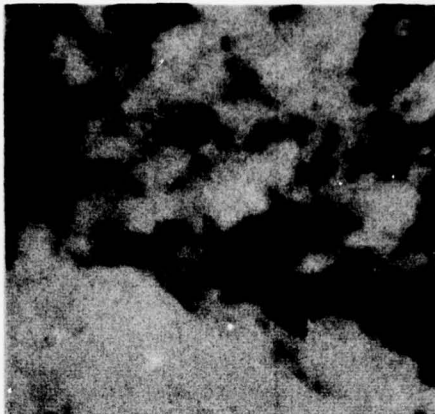
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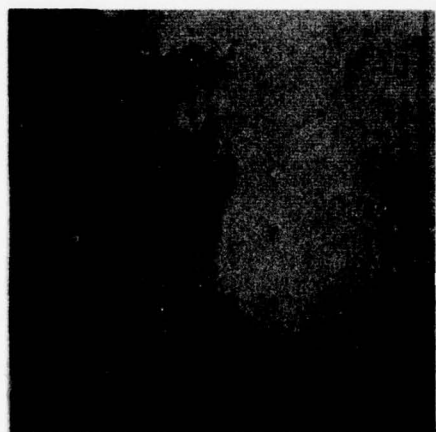
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B1288 20



B1288 21



B1288 22



B1288 23



B1288 24



B1288 25



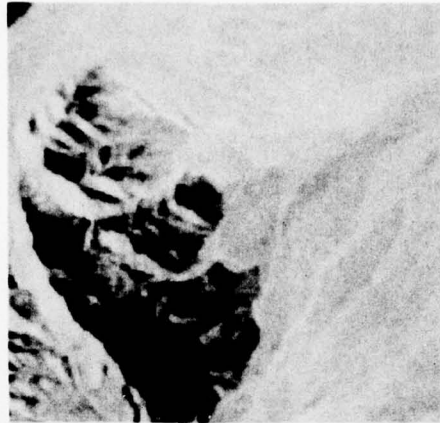
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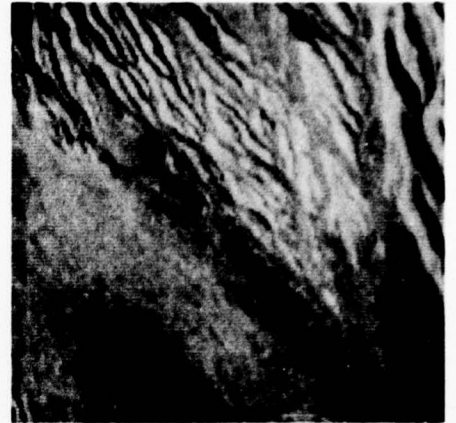
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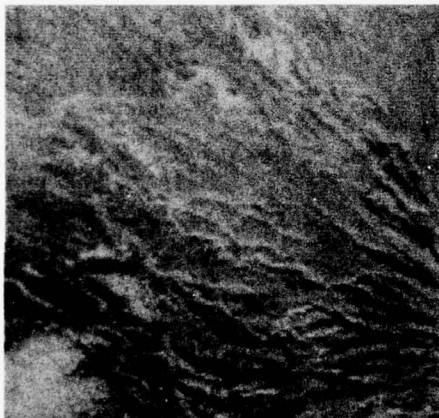
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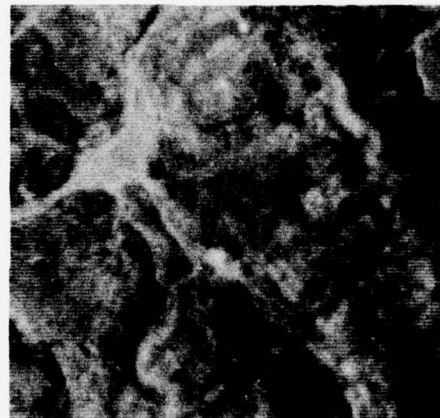
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B1288 31



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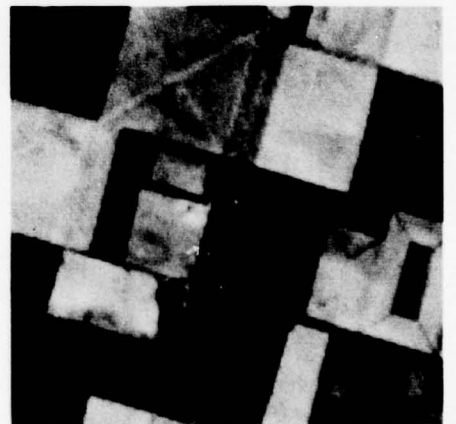
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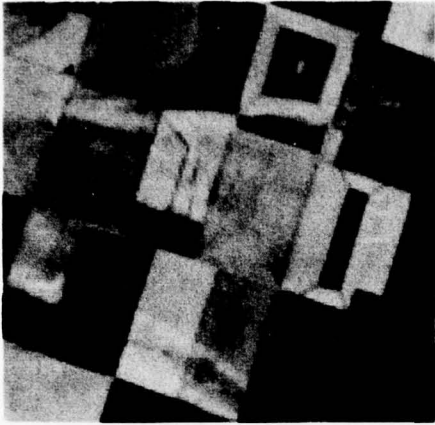
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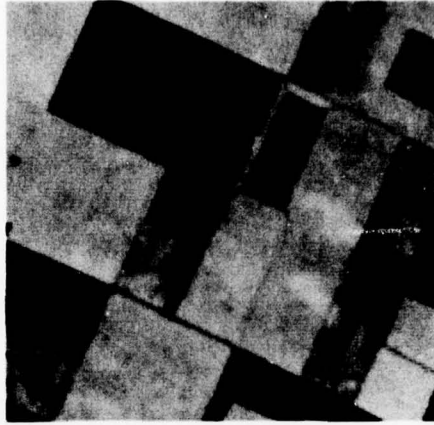
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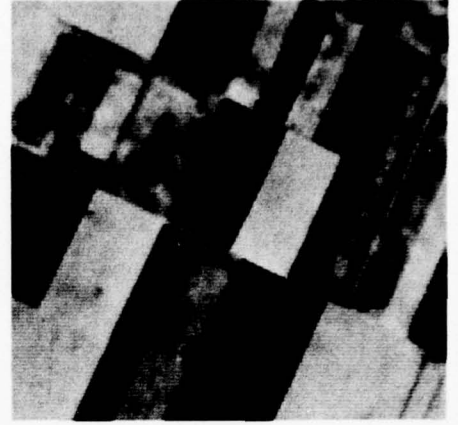
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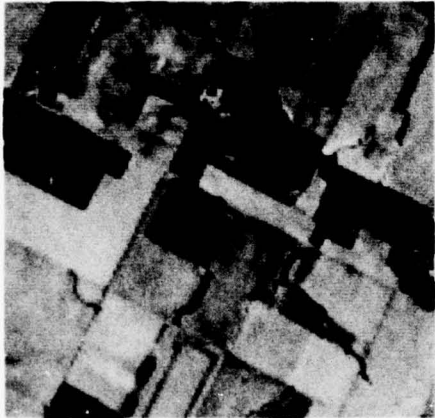
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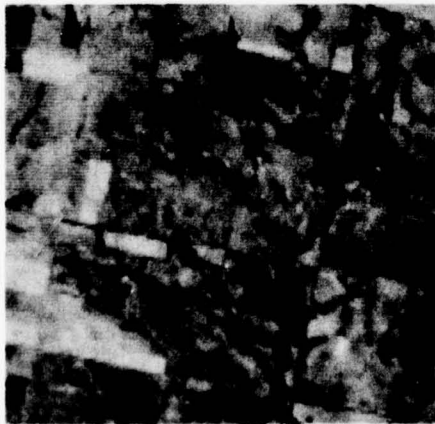
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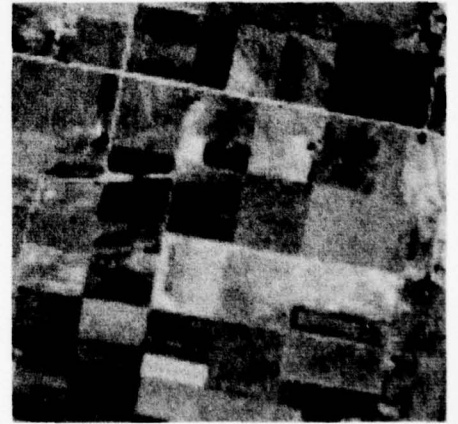
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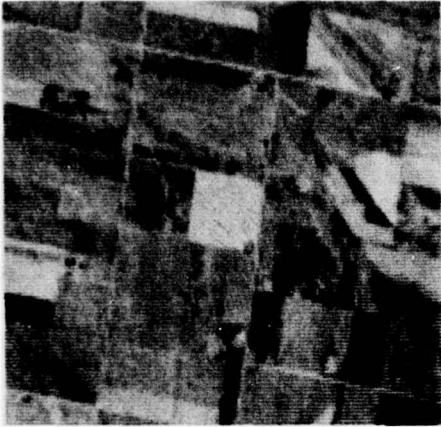
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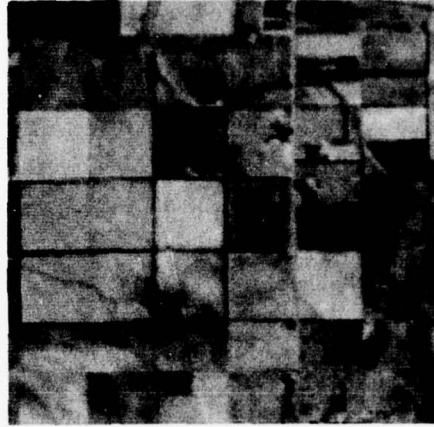
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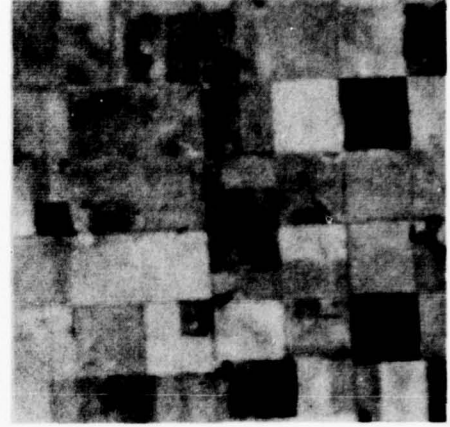
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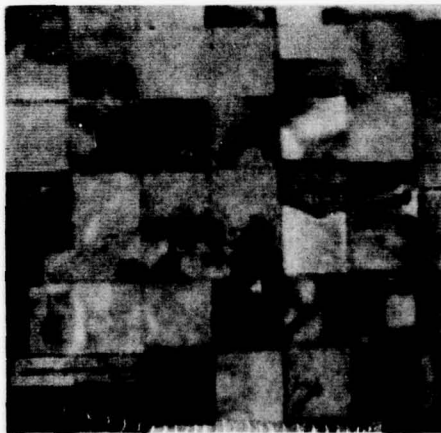
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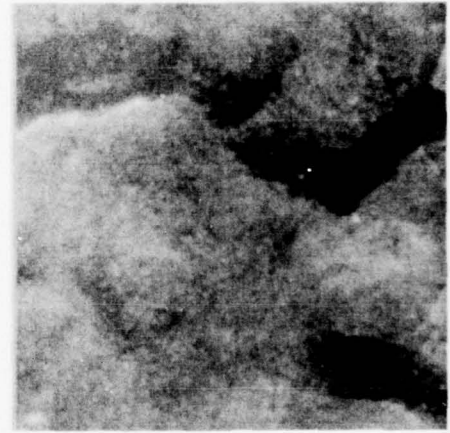
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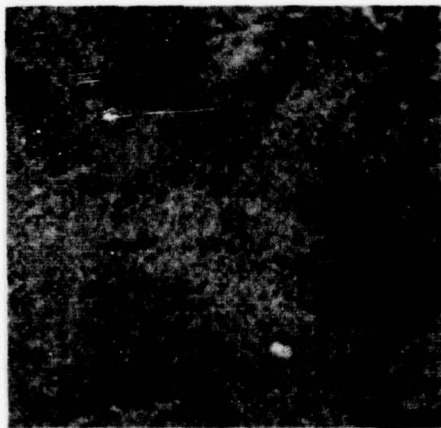
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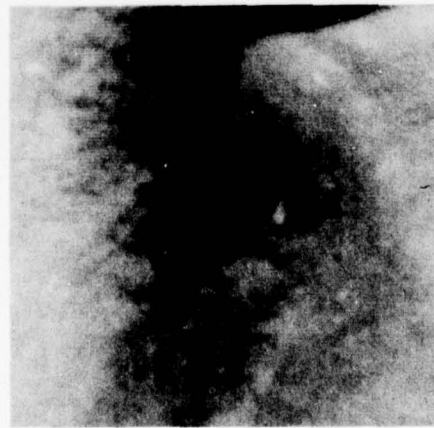
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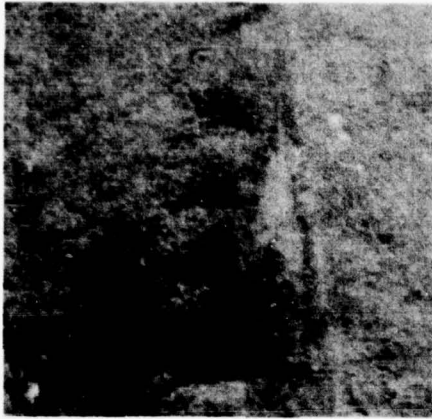
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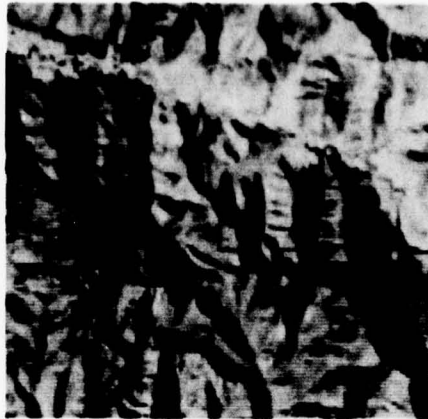
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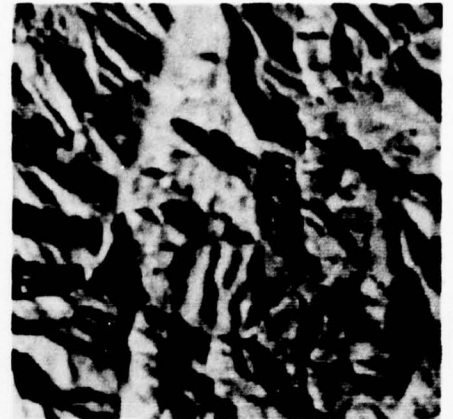
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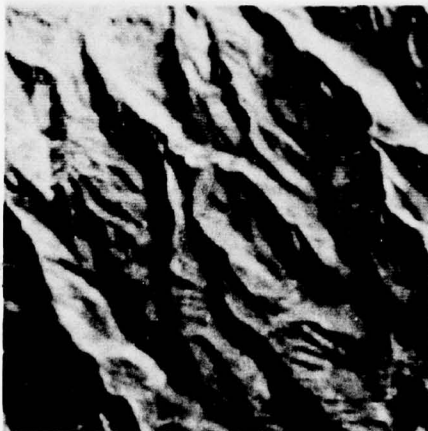
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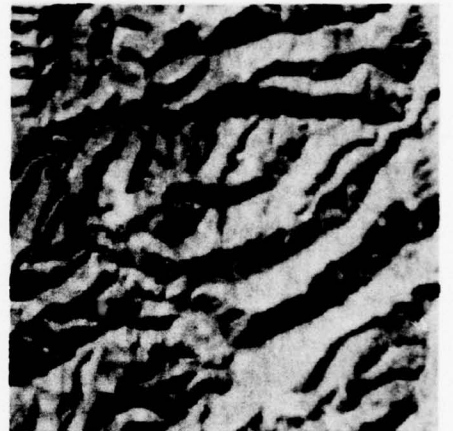
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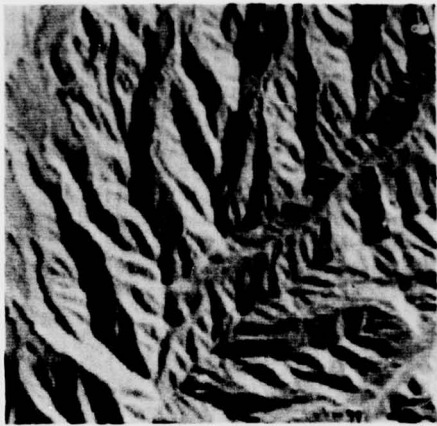
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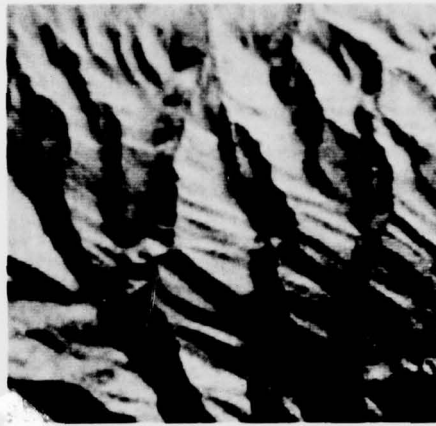
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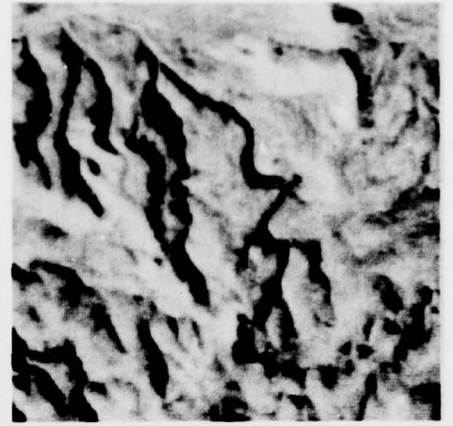
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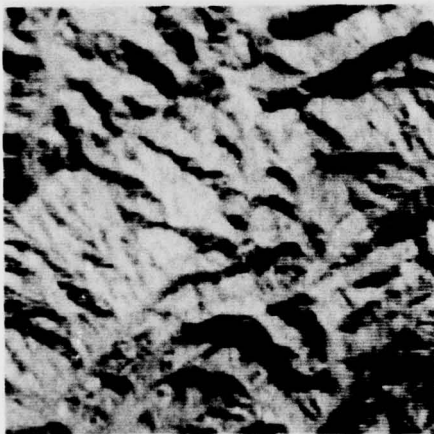
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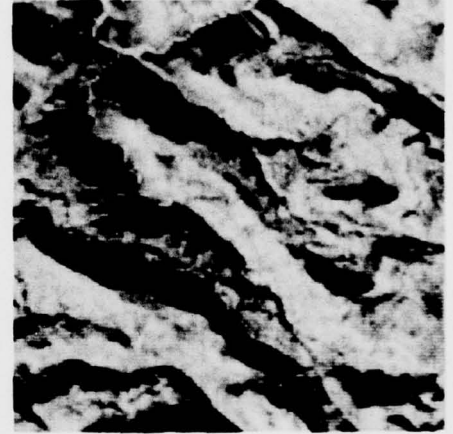
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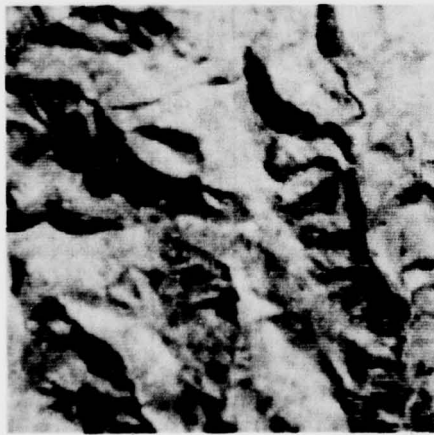
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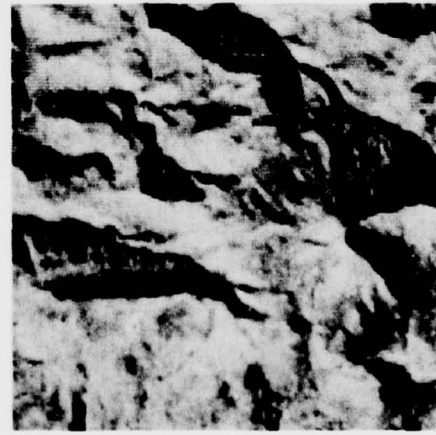
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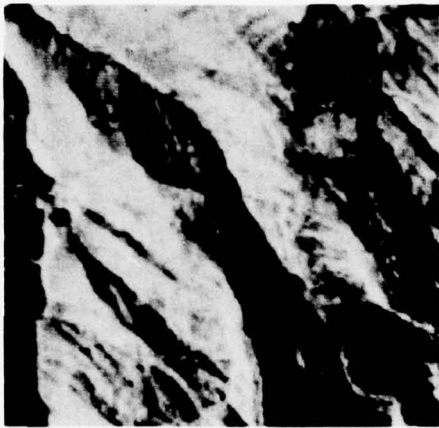
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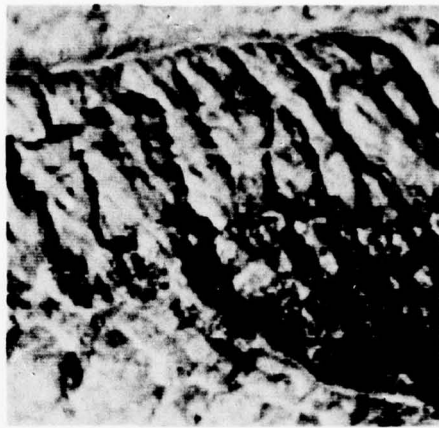
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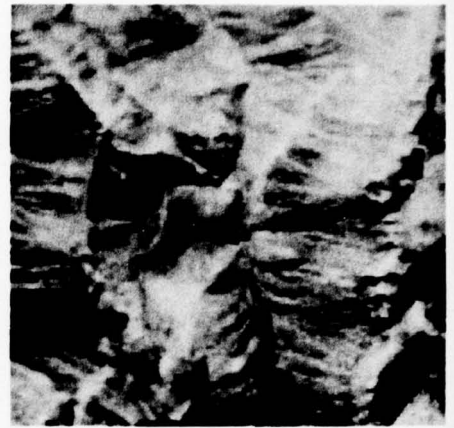
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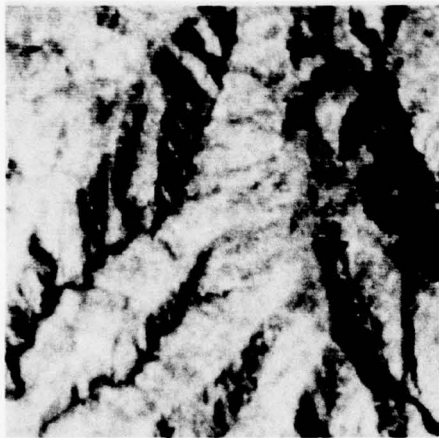
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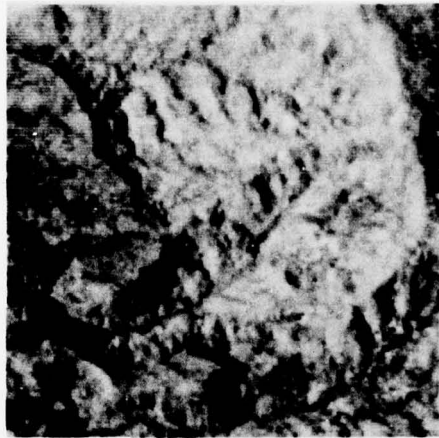
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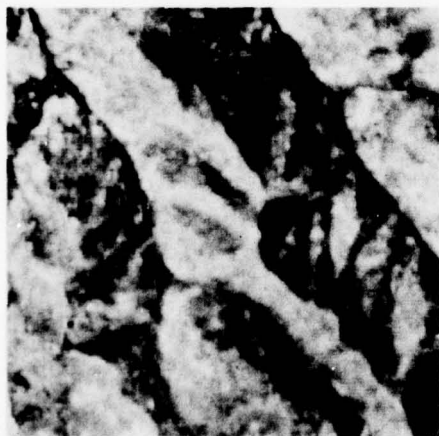
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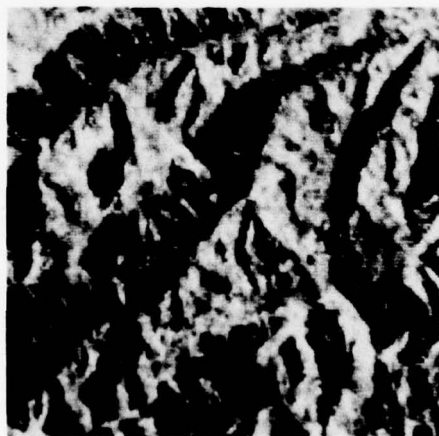
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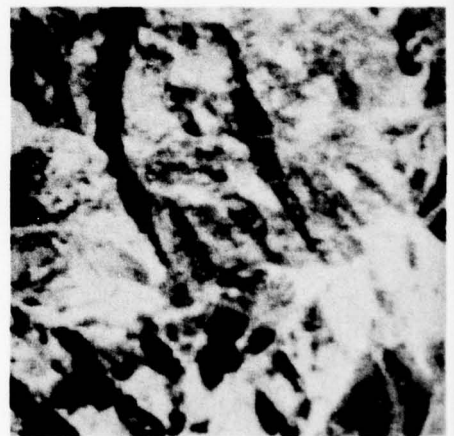
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B1288 79



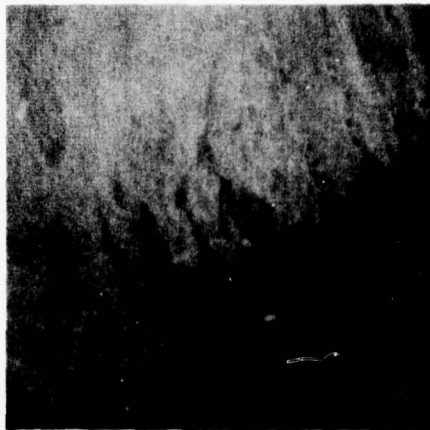
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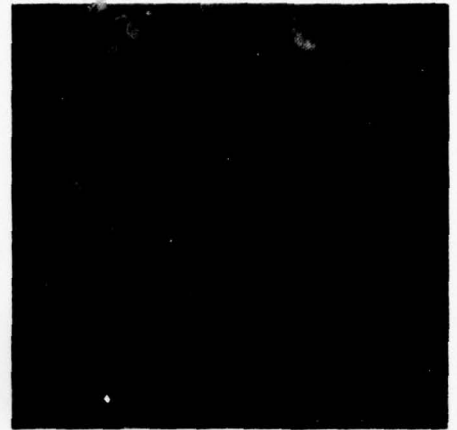
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B1288 82



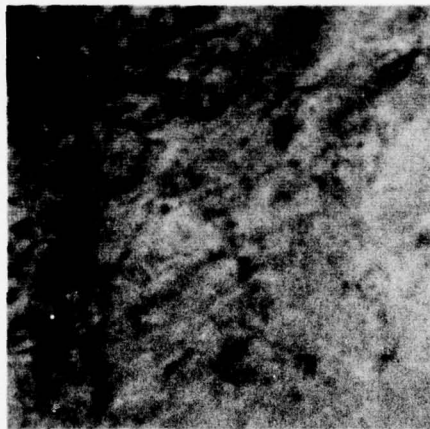
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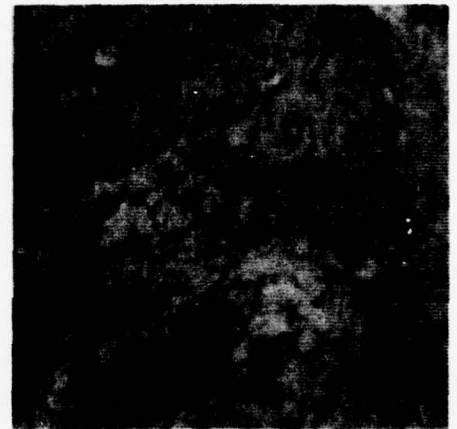
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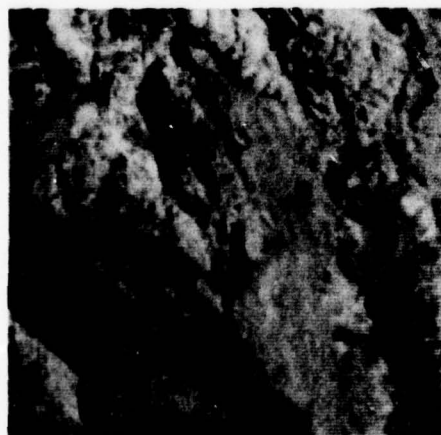
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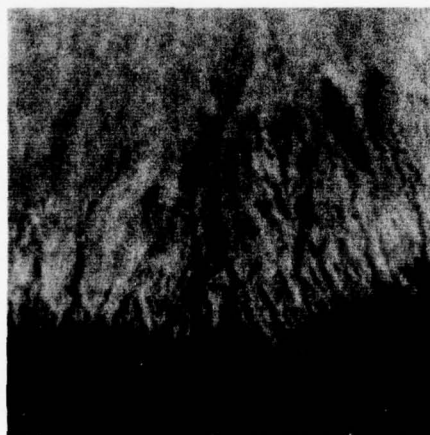
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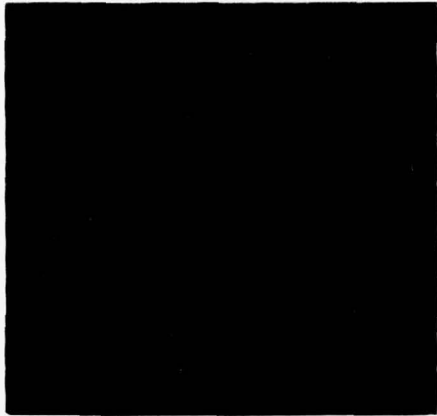
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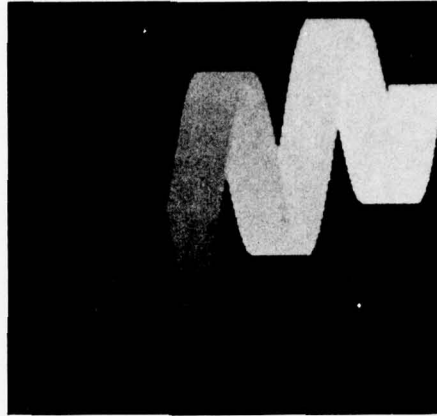
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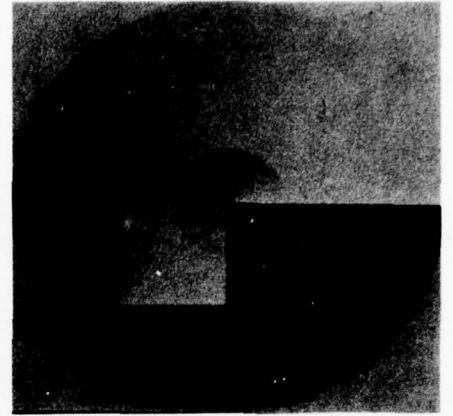
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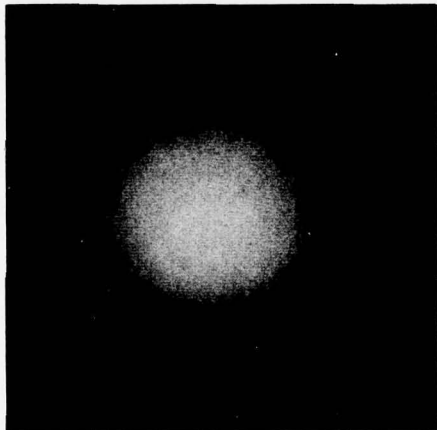
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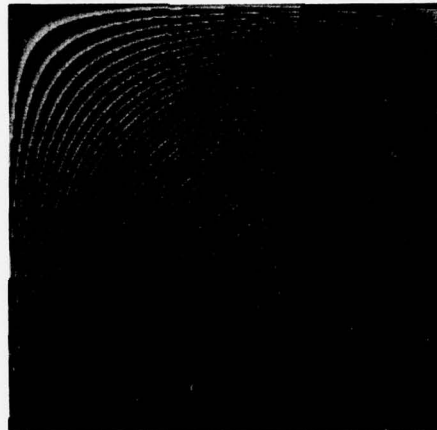
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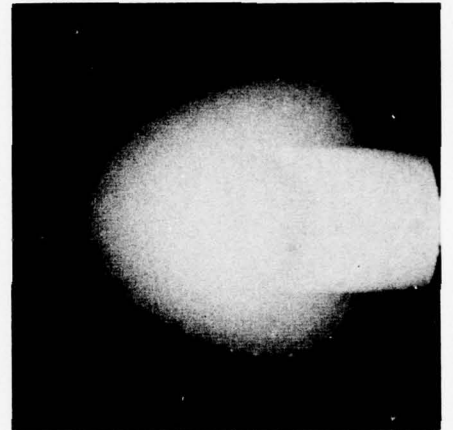
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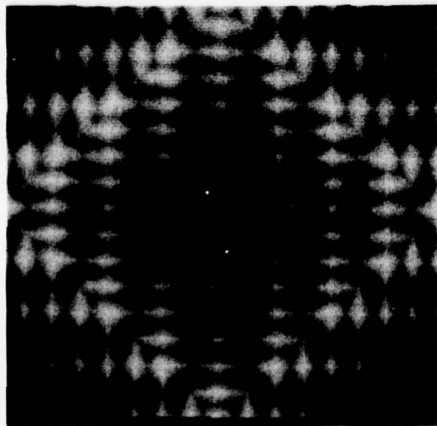
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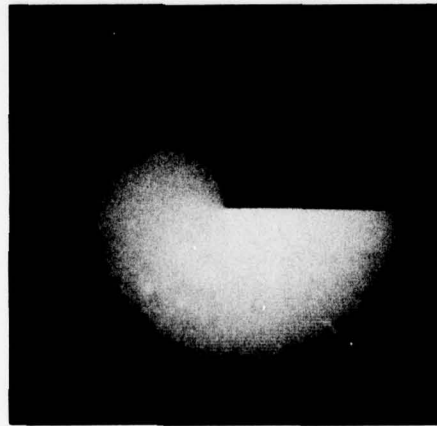
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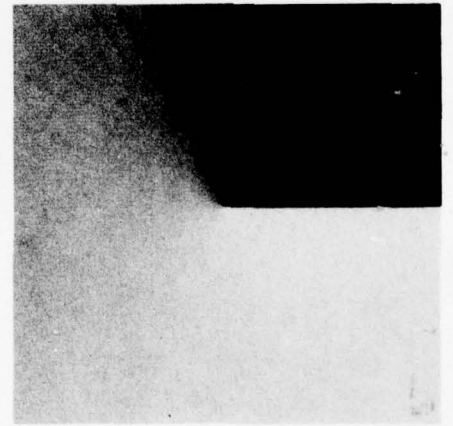
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B2566 7



B2566 8



B2566 9



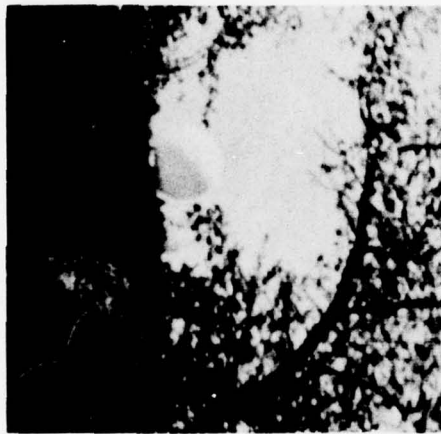
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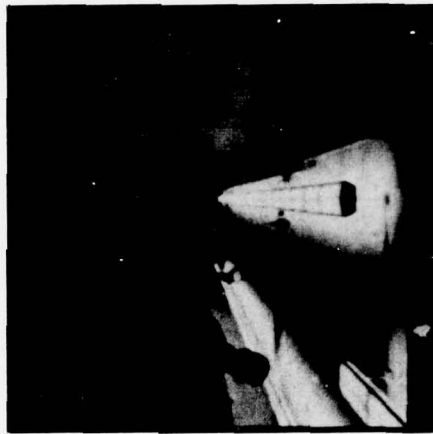
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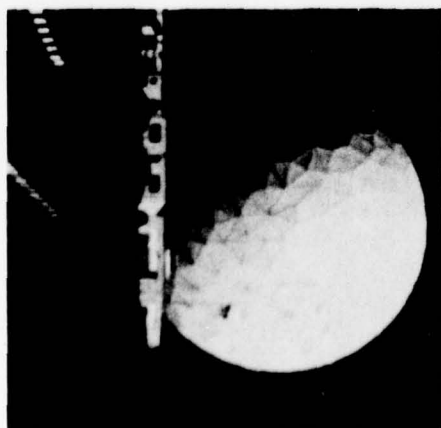
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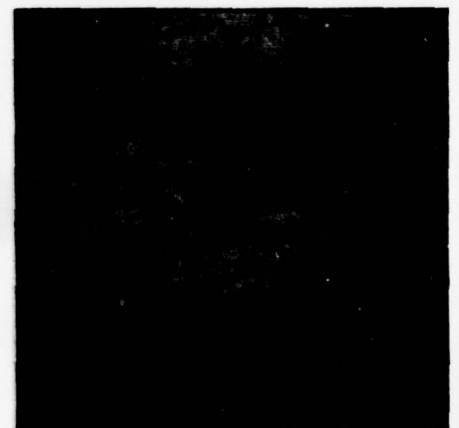
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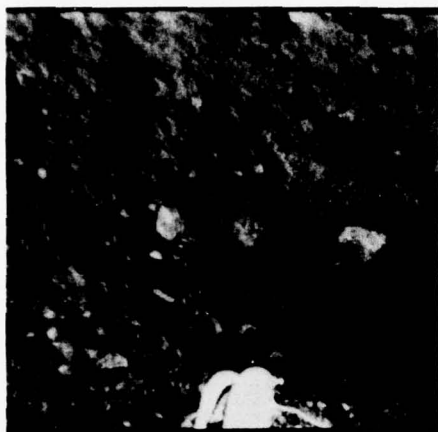
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B2566 17



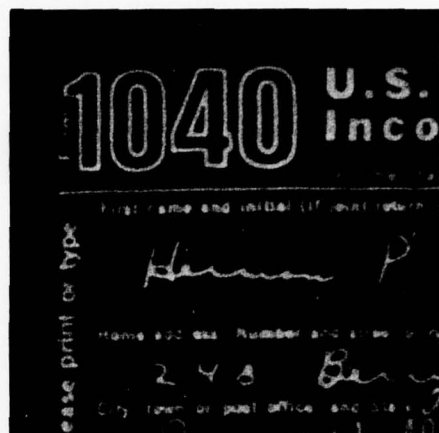
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B2566 19



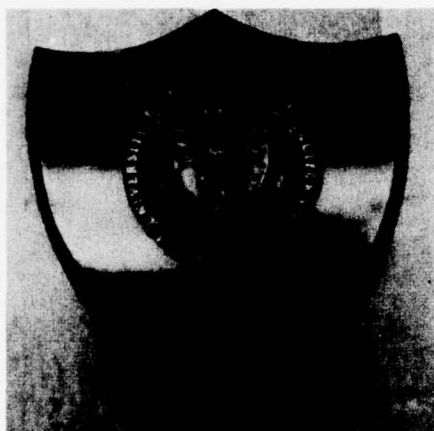
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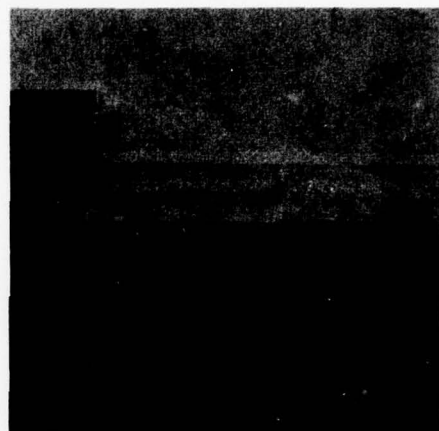
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B2566 22



B2566 23



B2566 24



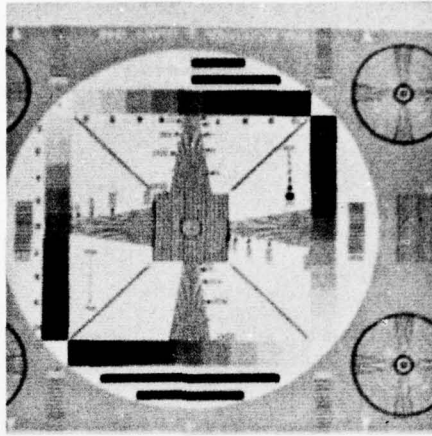
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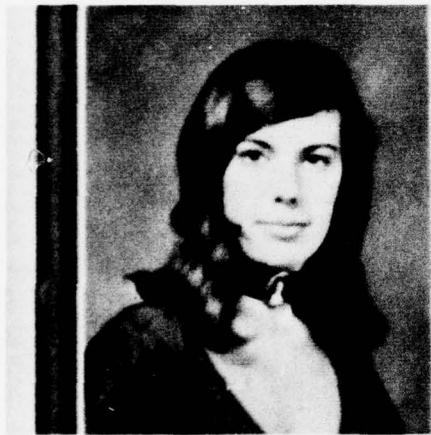
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C2568 6



C2568 9



C2568 12



C2568 15



C2568 18



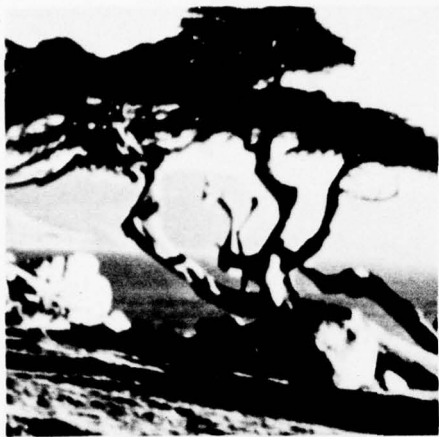
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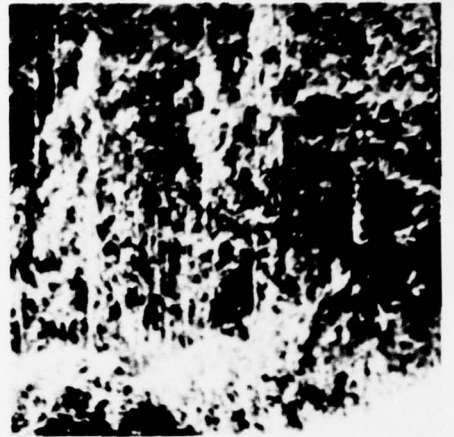
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C2568 30



C2568 33



C2568 36



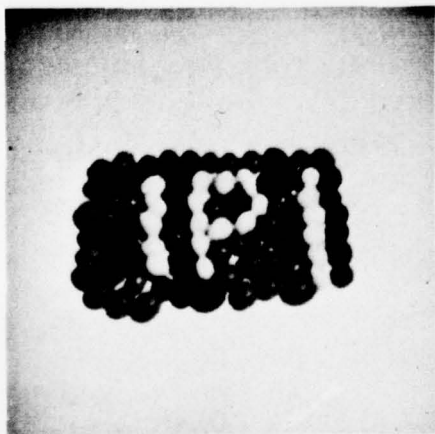
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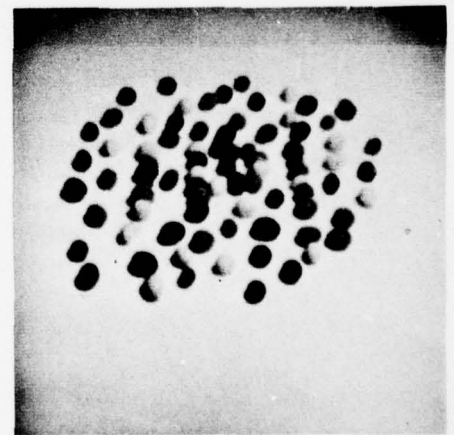
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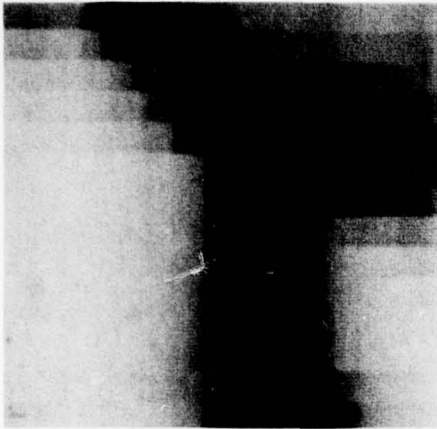
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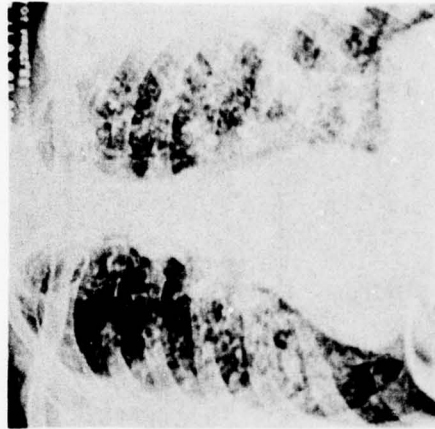
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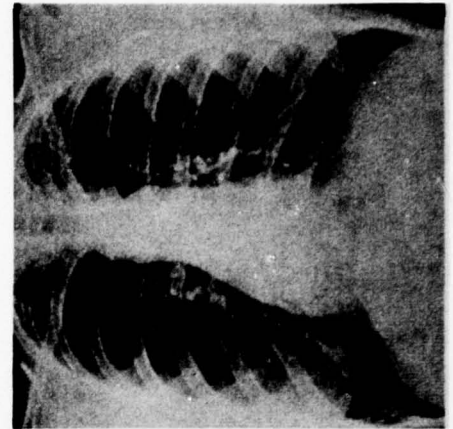
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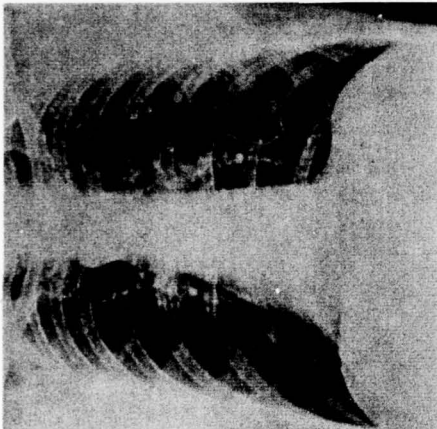
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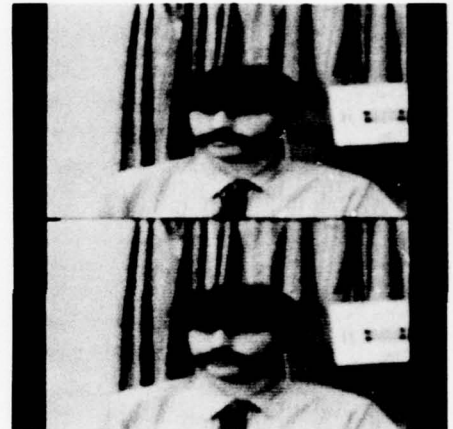
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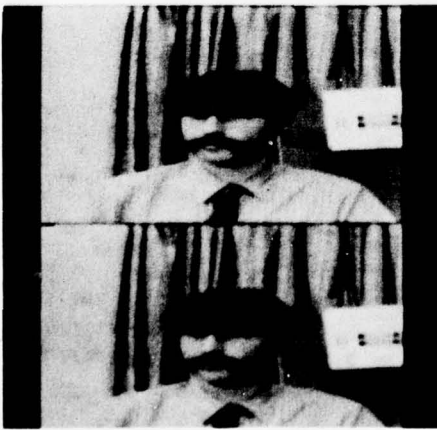
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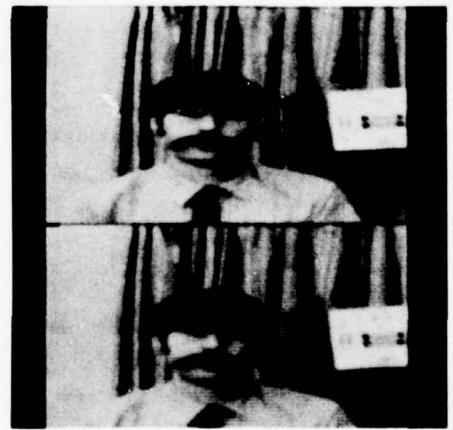
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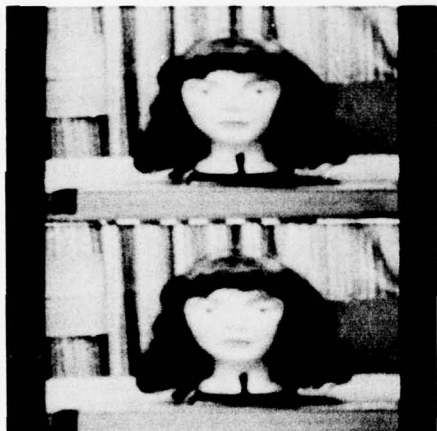
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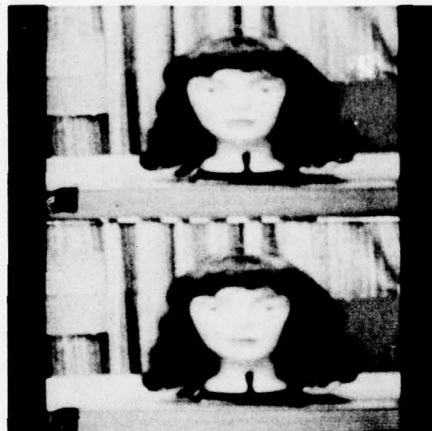
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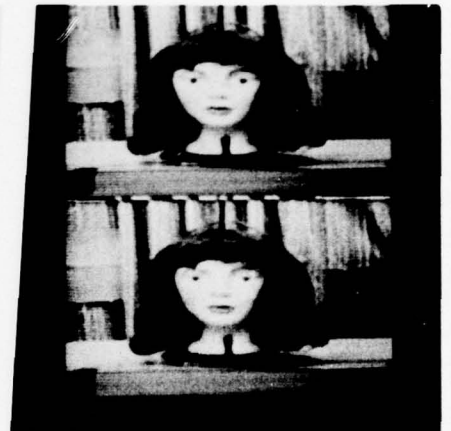
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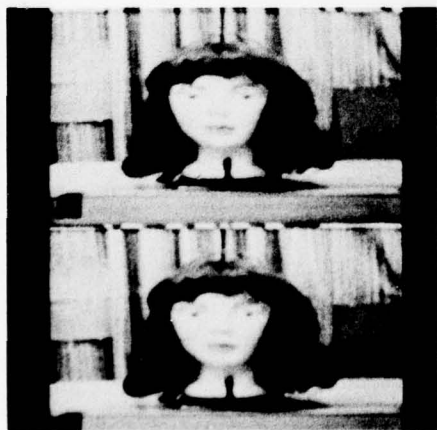
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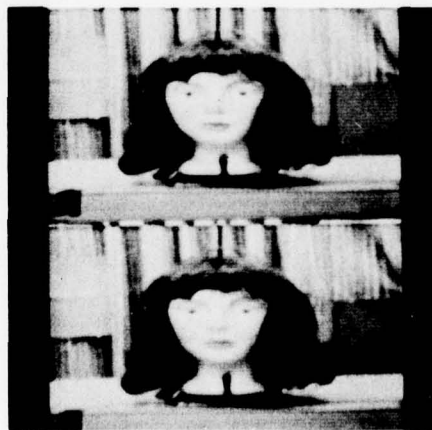
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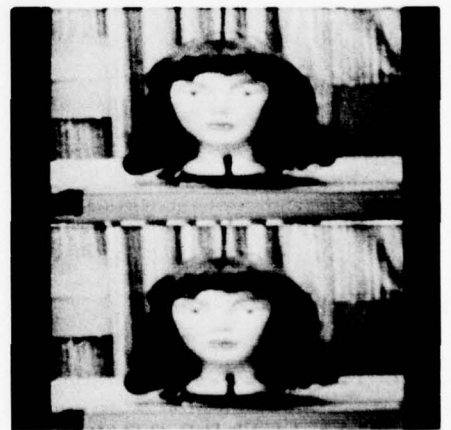
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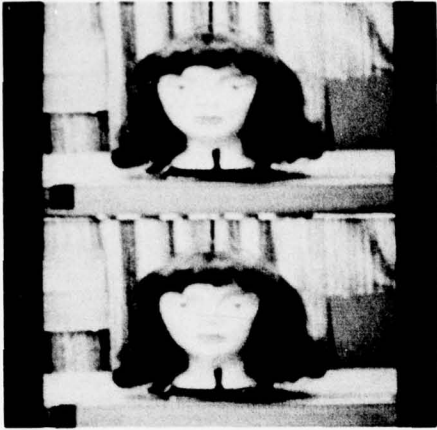
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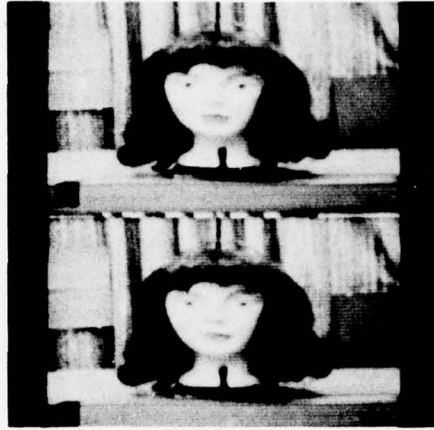
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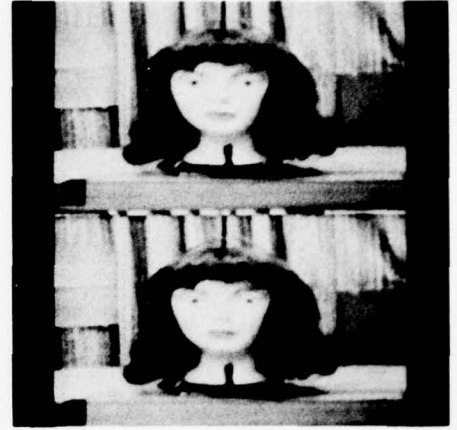
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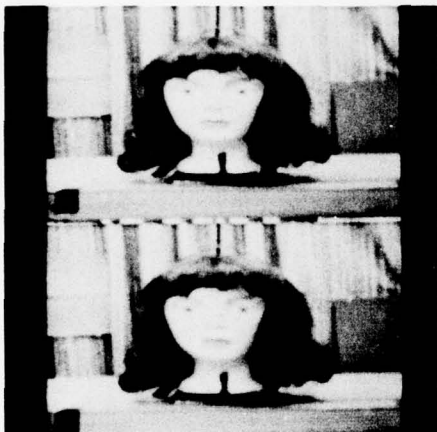
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B2568 21



B2568 22



B2568 23



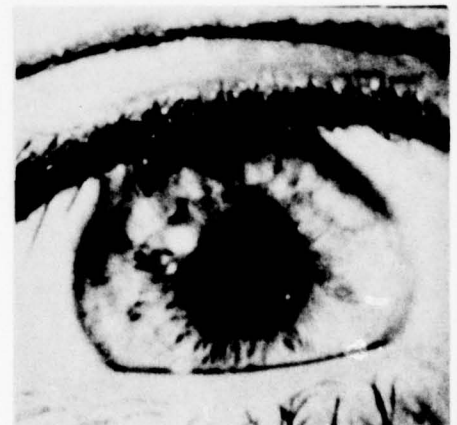
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This typewritten passage was scanned and digitized into a 256x256 binary array for experiments in facimile coding using the digital image-processing facilities at USC. Both linear and nonlinear bandwidth reduction techniques will be attempted, including vector decomposition, binary reconstruction and phase only coding.

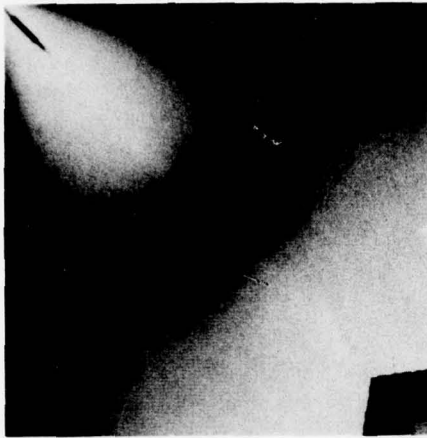
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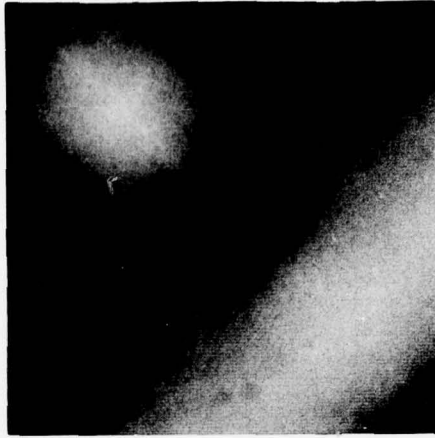
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B2568 28



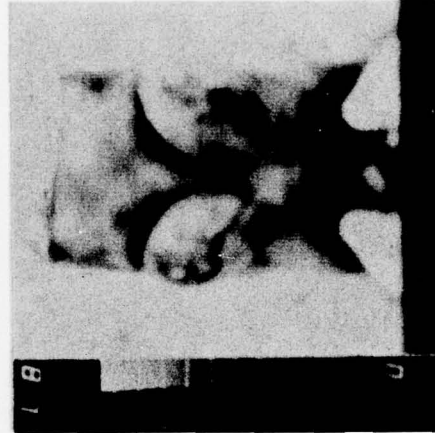
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B2568 30



B2568 31



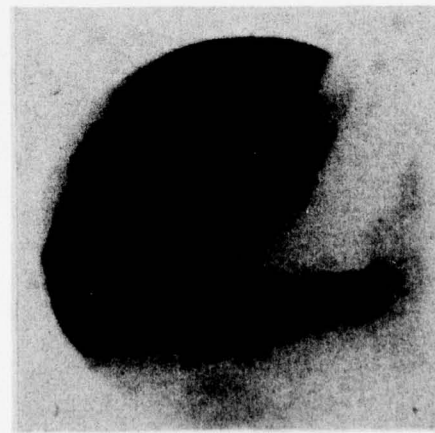
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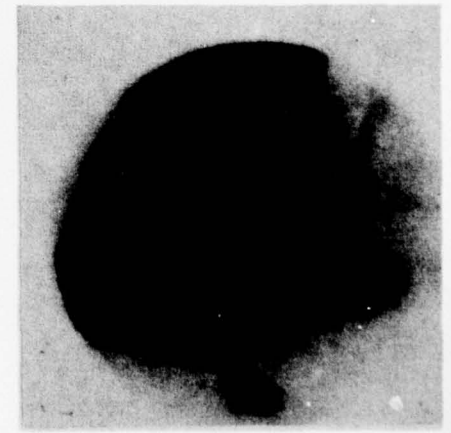
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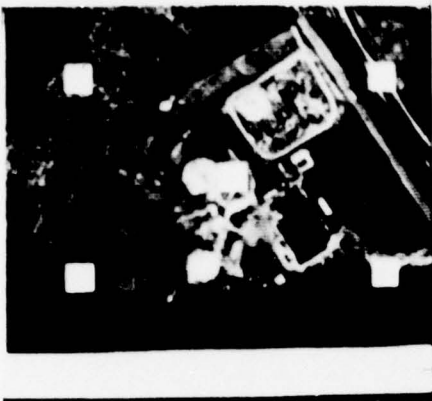
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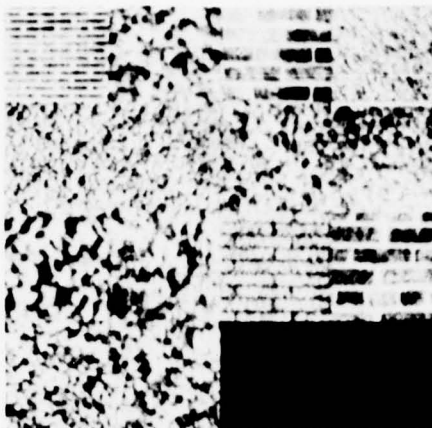
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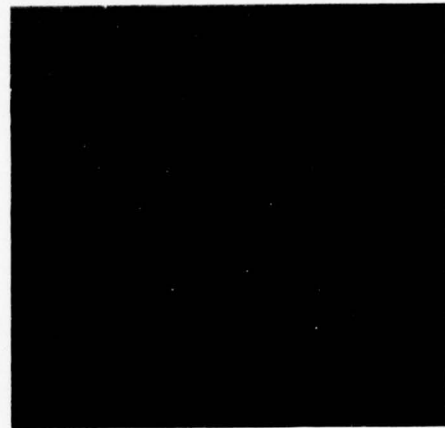
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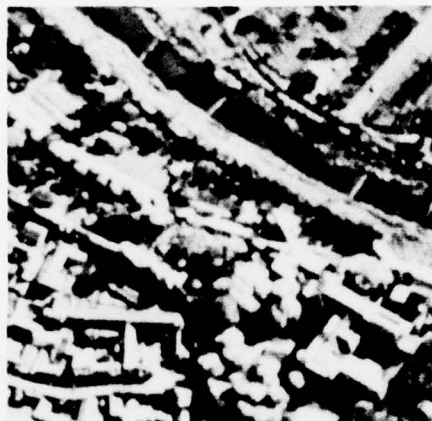
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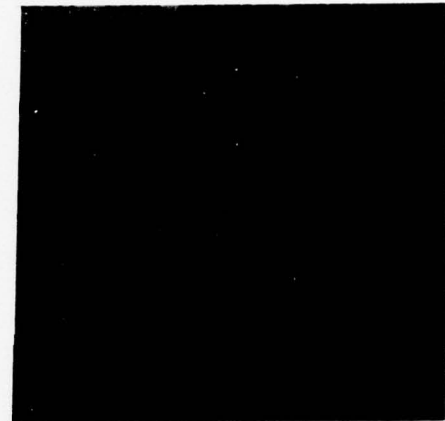
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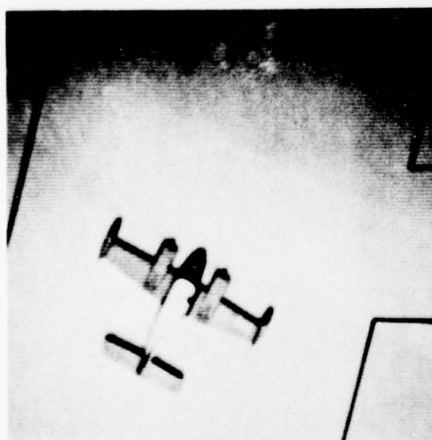
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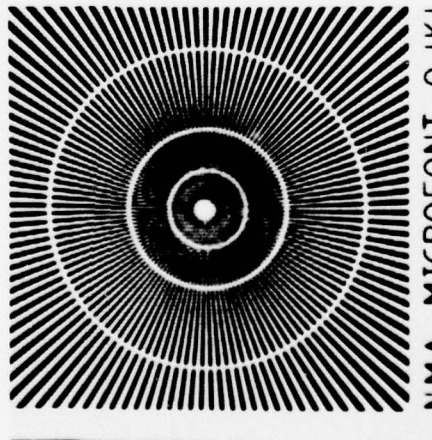
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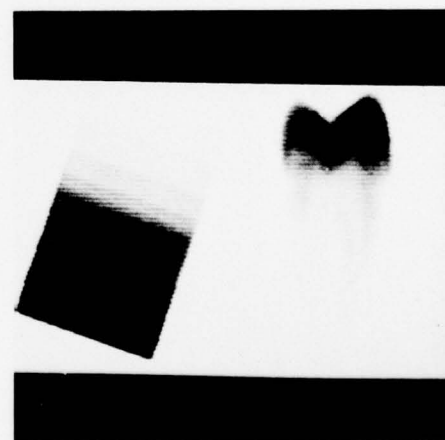
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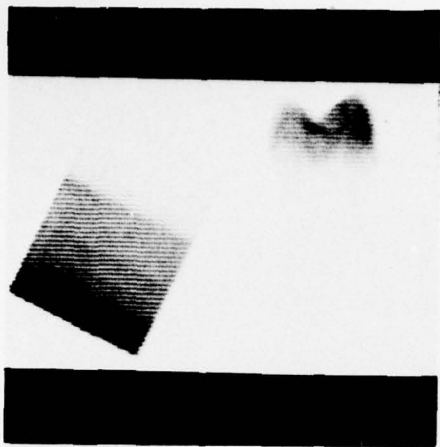
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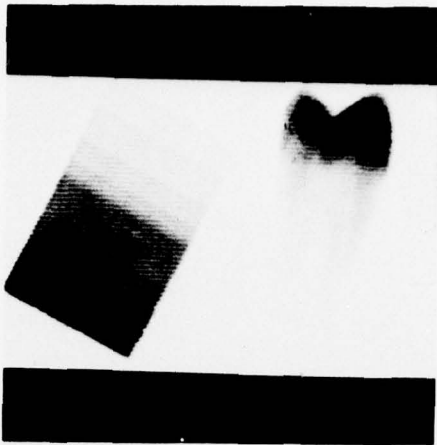
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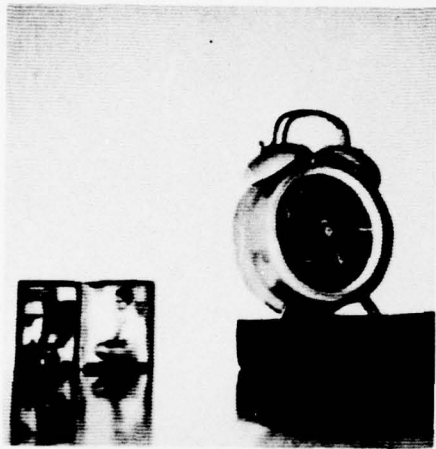
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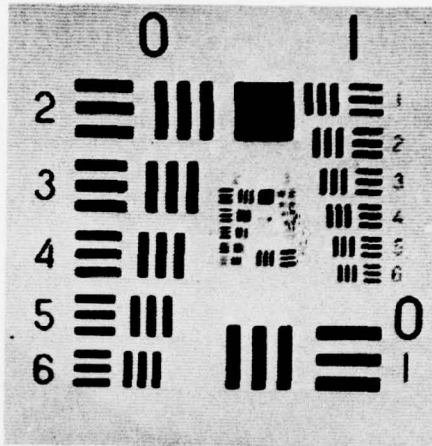
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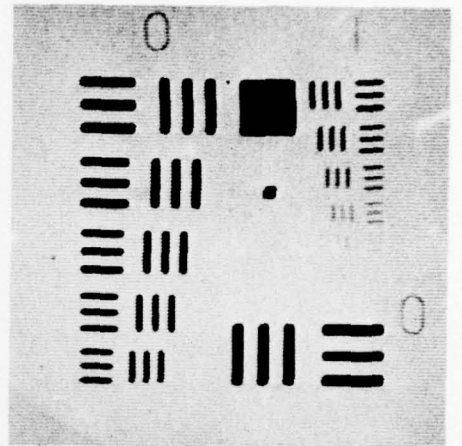
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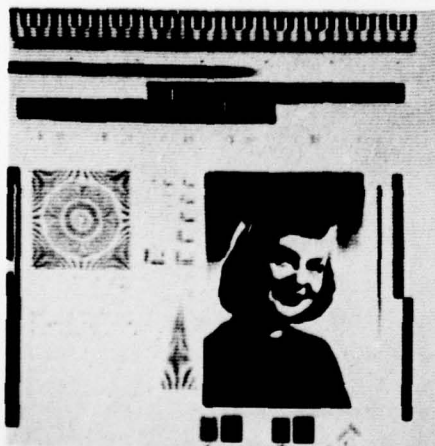
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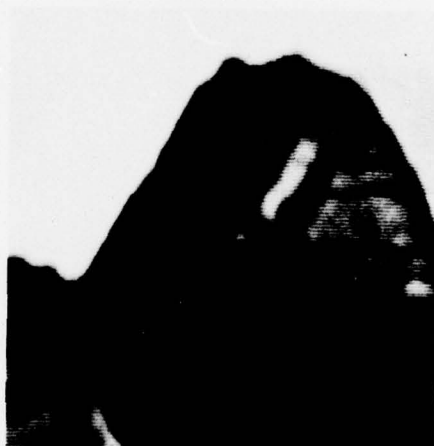
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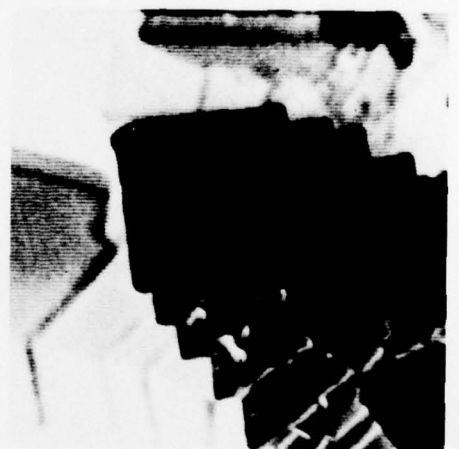
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B2568 52



B2568 53



B2568 54



B2568 55



B2568 56



B2568 57



B2568 58



B2568 59



B2568 60



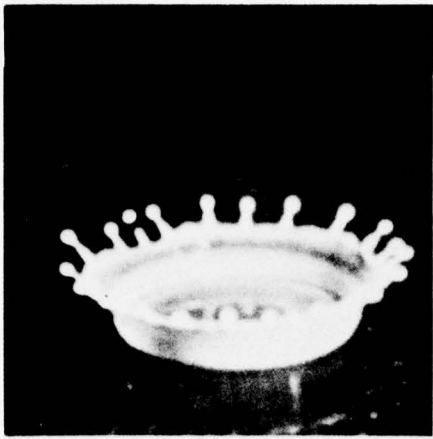
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B2568 62



B2568 63



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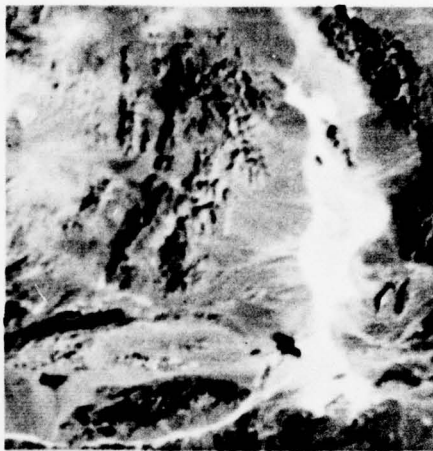
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C5128 9



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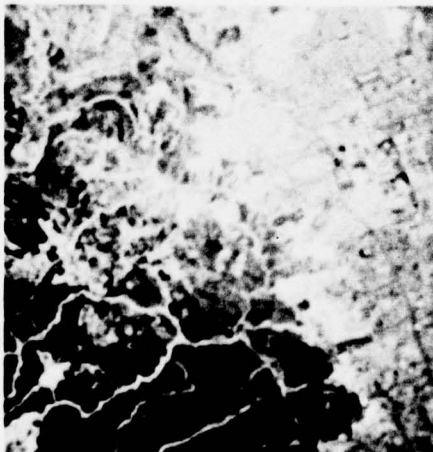
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C5128 19



C5128 22



C5128 25



C5128 28



C5128 31



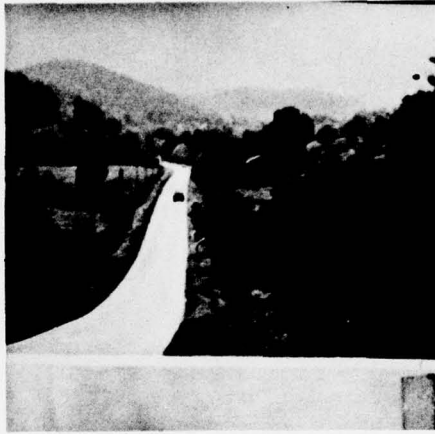
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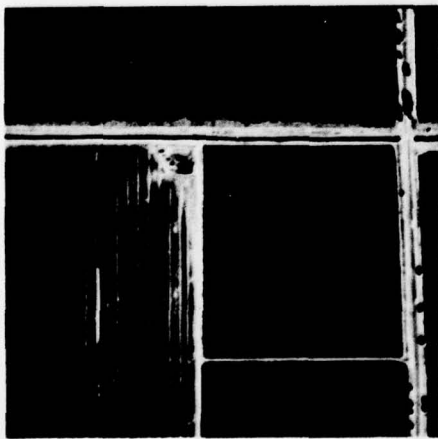
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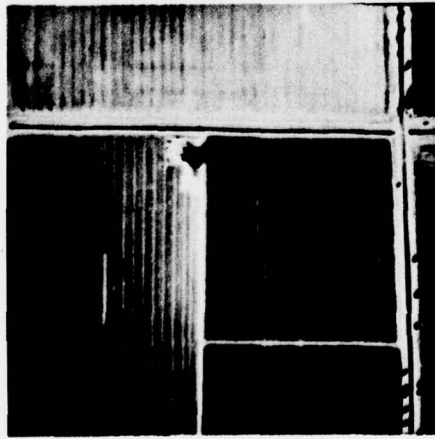
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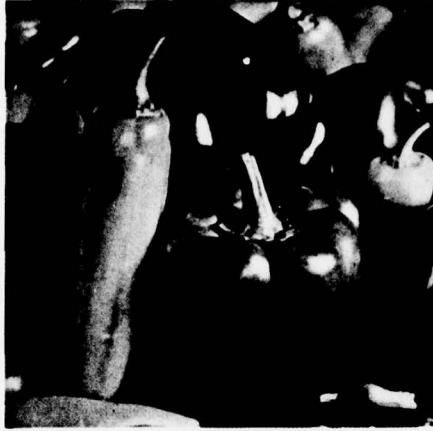
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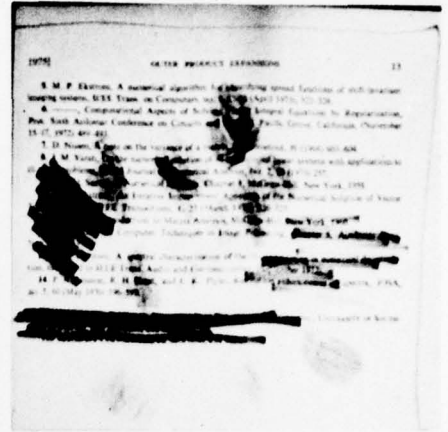
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C5128 58



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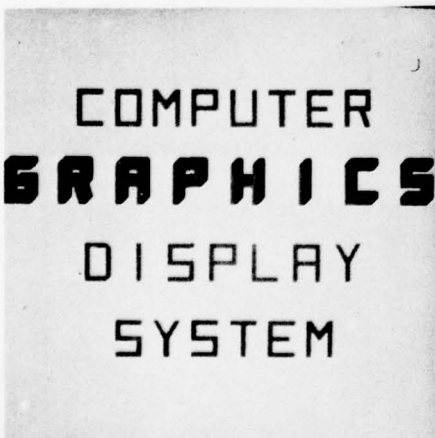
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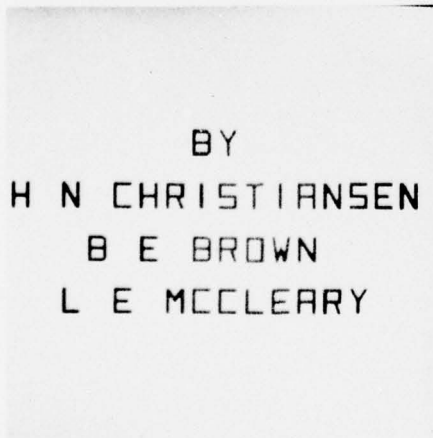
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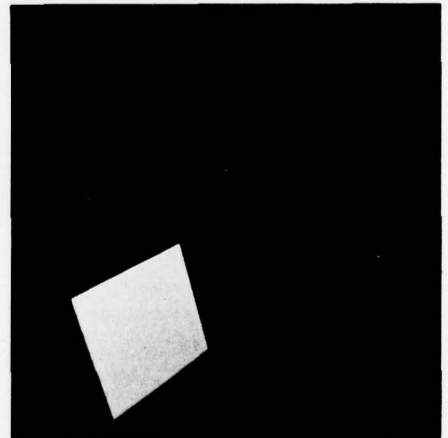
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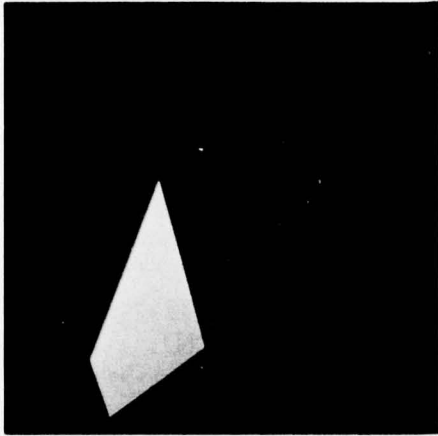
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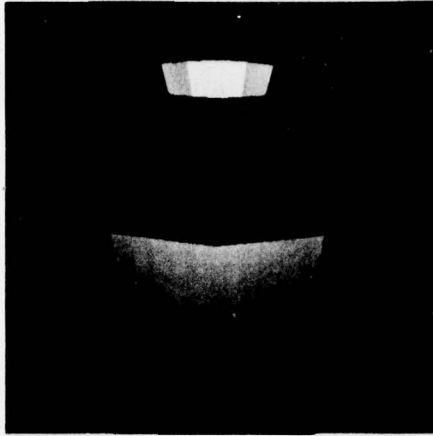
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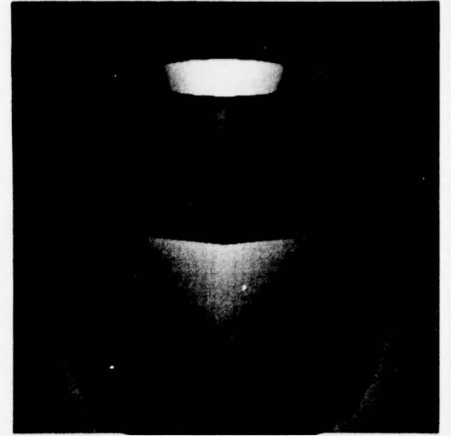
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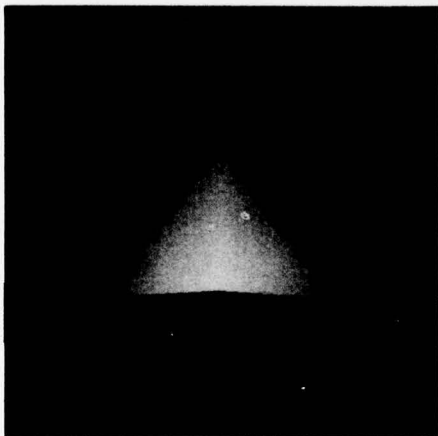
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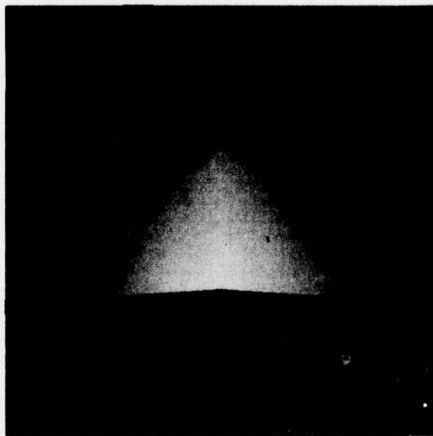
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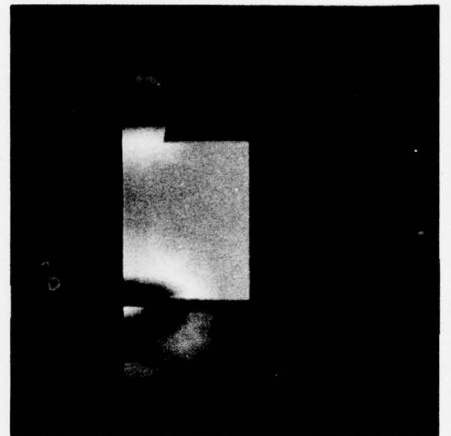
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C5128 94



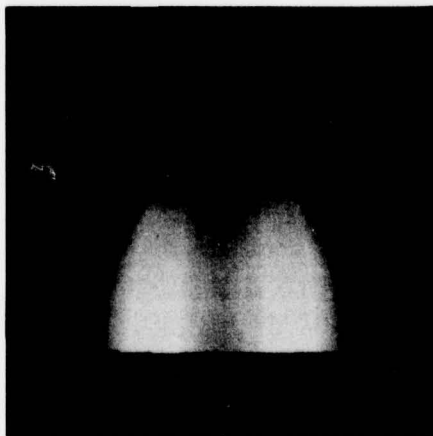
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C5128 103



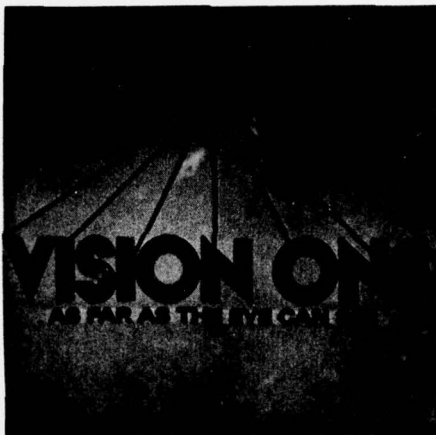
C5128 106



C5128 109



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B5128 2

ing to which a talented engineering student could relate. I was suffering from the mental I wanted to describe an engineering student. I actively became isolated a rest of the institution of learning by the very strict the engineering curriculum general attitudes about engineering. I found it difficult to a non-engineering aspects of diversity. As with the rest engineering class I had been removed from the climate of a culture during my fresh diploma, seats and as into the total technical space of the engineering. With the arrival of my year I found myself not I with taking a philosophy rational relations course of sociology. I was studying one and amplifiers. or of literature it was digital. The space around me was technical. And as I be accustomed to this totality using my free electives to one and more engineering instead of a change of outside activities. Once in awhile he may take in a sporting event or a movie. But most of the time he amuse himself with study, a good technical discussion, or by tinkering with some gadget.

By his senior year, what the student engineer thinks, dreams, liberally talks and draws in engineering. Thoughts have shifted from the principles behind protests, the ultimate of man's existence, or the effects of slums on their occupants to symbols, equations, and systems. The abstract of thought evolves to the specifics in theory. The mirage of existence is transformed into worries about the boundaries conditions of a problem. social concern takes the form of making sure that your lab neighbor doesn't run your experiment. It's the lab, not the world. Rumors have it that the reason engineers are not included in the Dean's list printing in the school newspaper every semester is because the course material covered is too technically oriented and therefore cannot be compared with liberal arts studies. Some LAS people have even been heard to say that engineers are

B5128 3



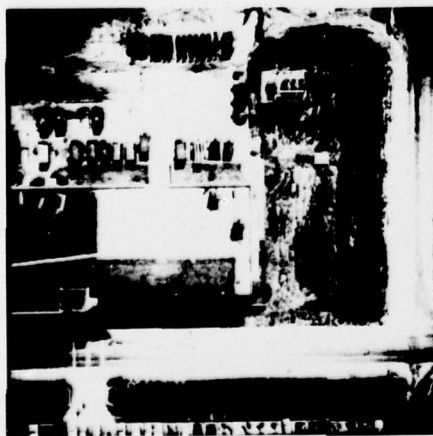
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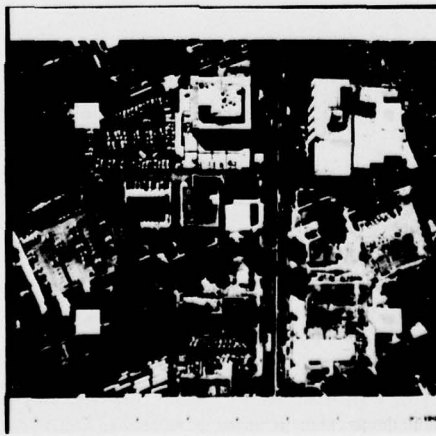
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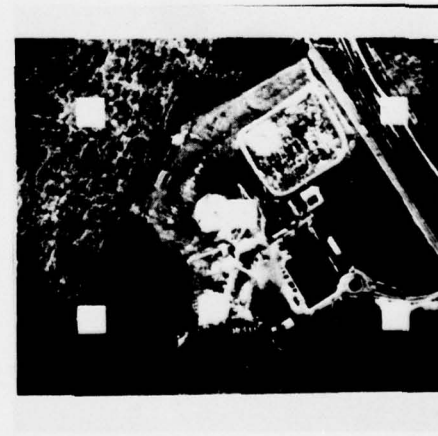
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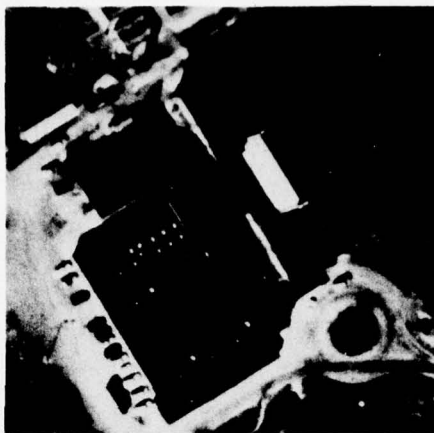
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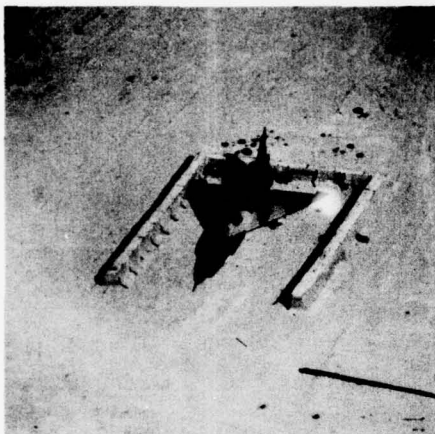
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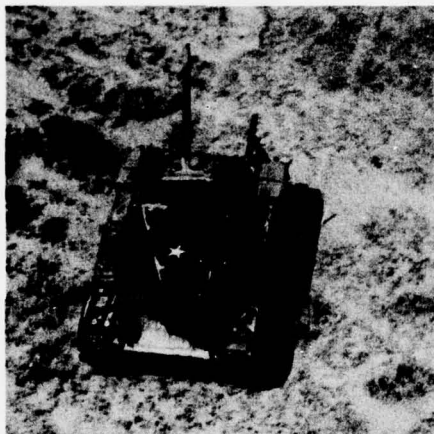
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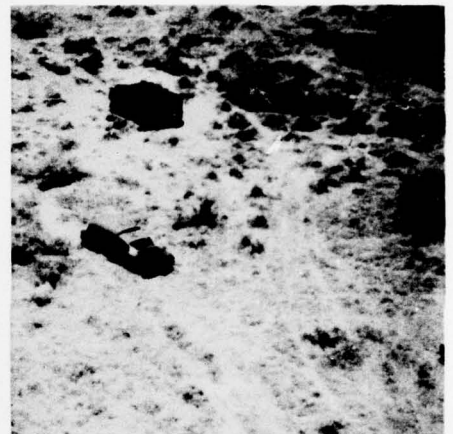
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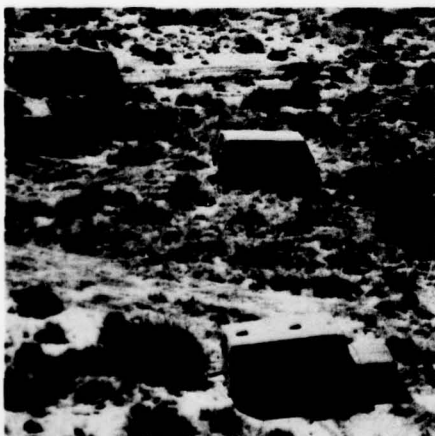
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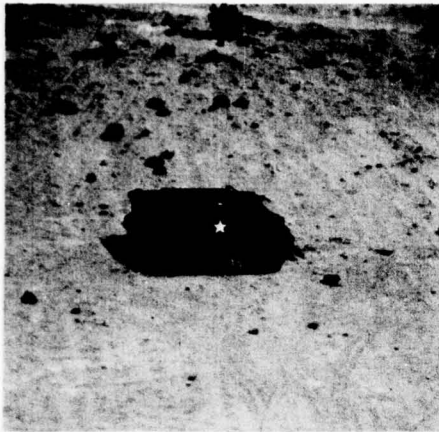
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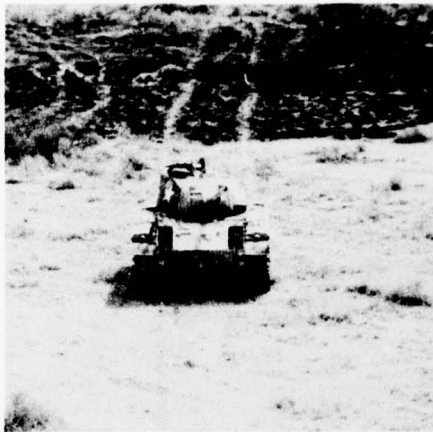
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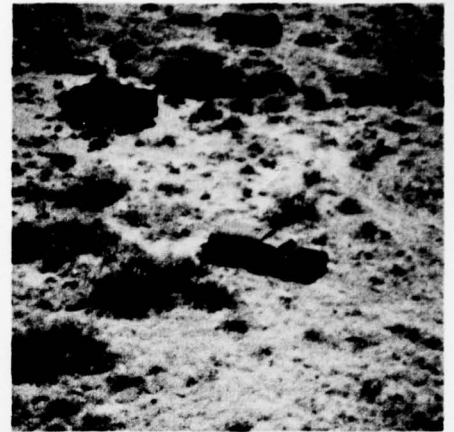
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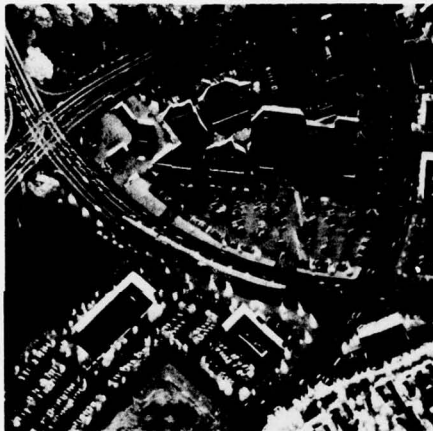
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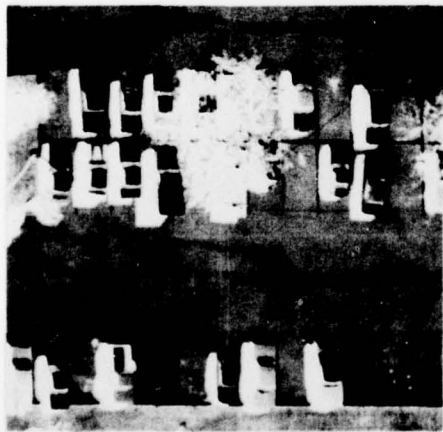
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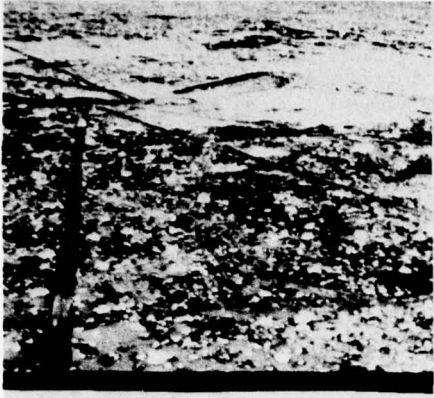
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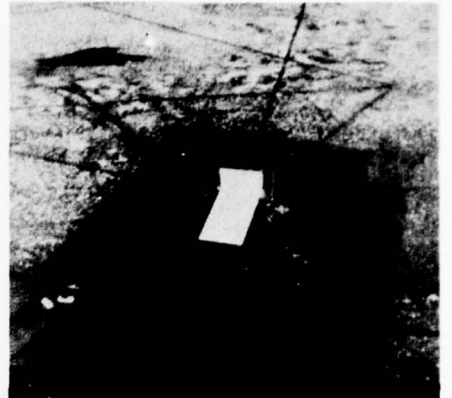
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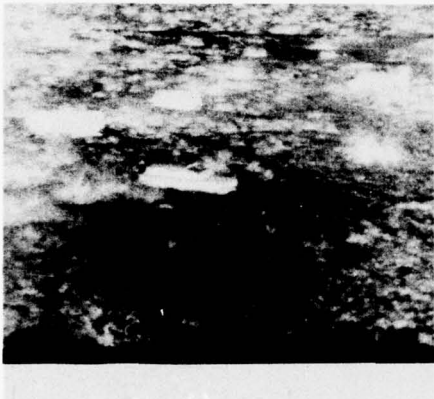
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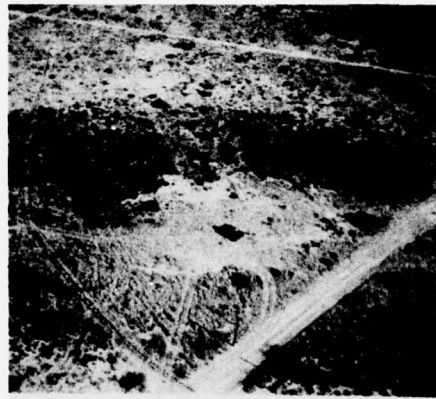
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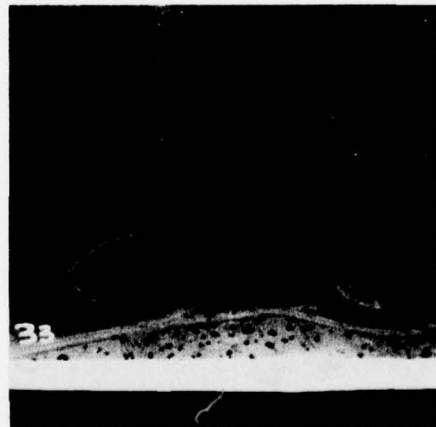
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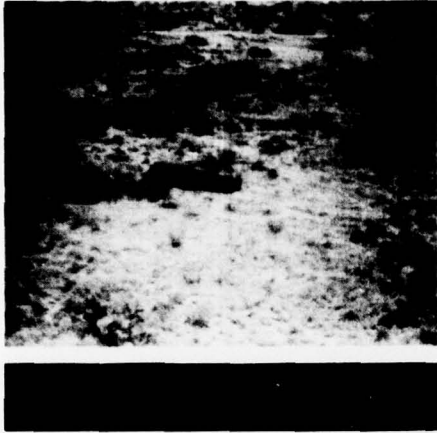
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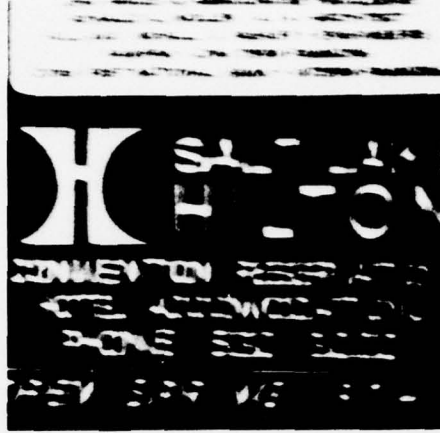
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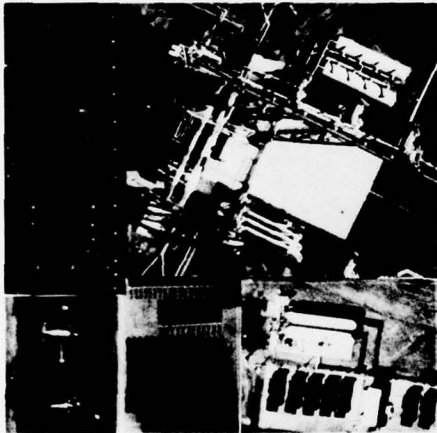
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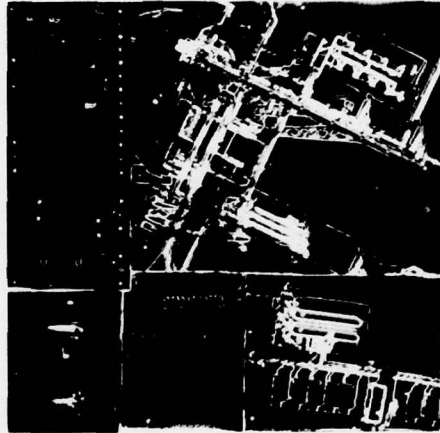
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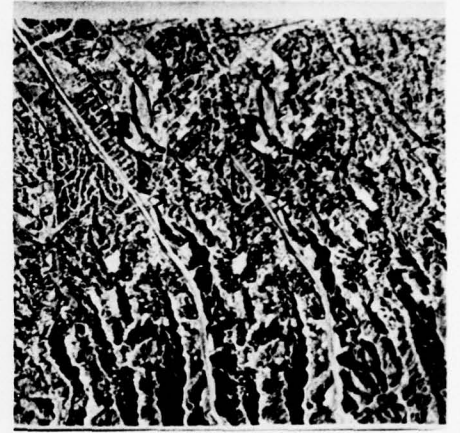
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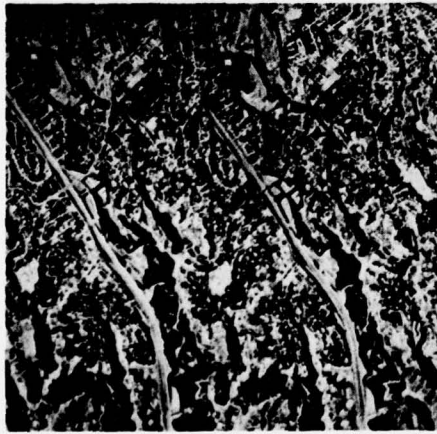
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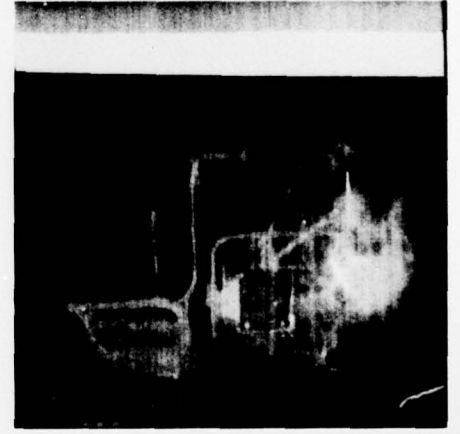
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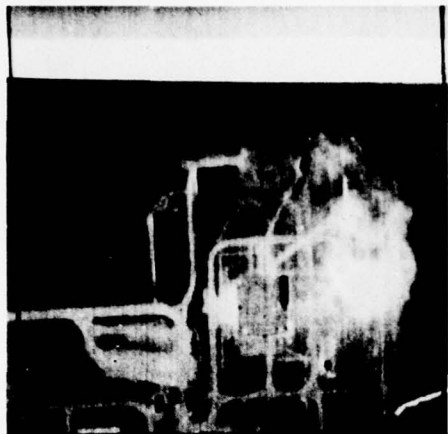
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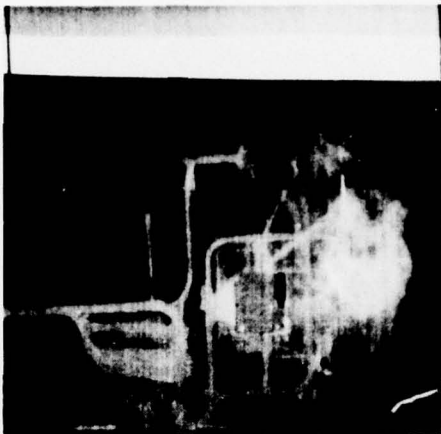
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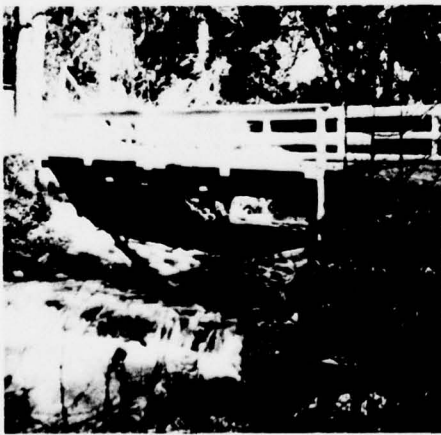
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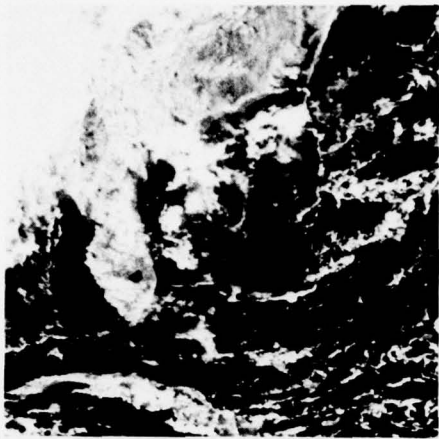
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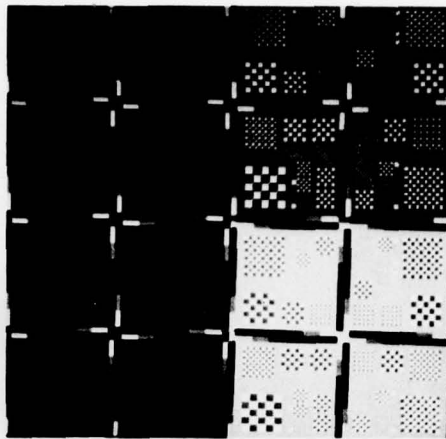
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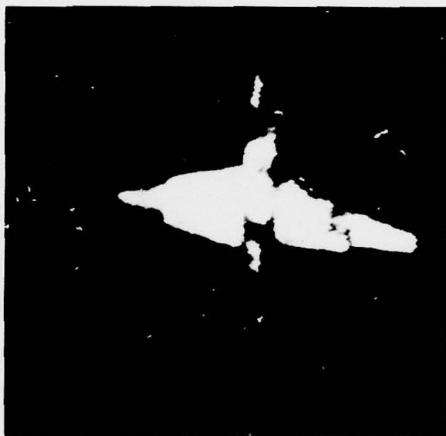
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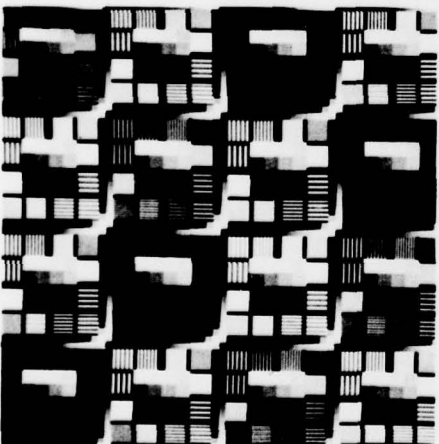
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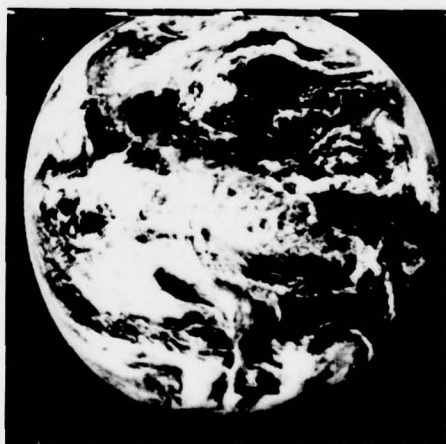
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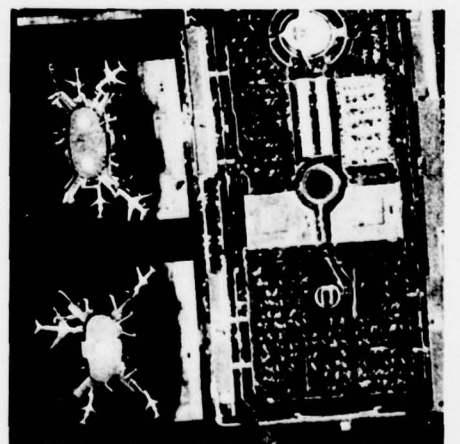
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