USC-SIPI REPORT #101

Image Data Base

by

Allan G. Weber

Signal and Image Processing Institute
UNIVERSITY OF SOUTHERN CALIFORNIA
Department of Electrical Engineering-Building
University Park/MC-2564
Los Angeles, CA 90089 U.S.A.

1 Introduction

The USC-SIPI image data base is maintained primarily to support research in image processing, image analysis, and machine vision. The data base is divided into categories based on the basic character of the pictures. Images in each category are of various sizes such as 256 × 256 pixels, 512 × 512 pixels, or 1024 × 1024 pixels. All images are 8 bits/pixel for black and white images, 24 bits/pixel for color images. The following categories are currently available:

1. **Textures** – 58 images in 58 files on 3 tapes (33 512 × 512, 25 1024 × 1024).
2. **Aerial images (color)** – 36 images in 108 files on 5 tapes (12 512 × 512, 24 1024 × 1024).
3. **Aerial images (black and white)** – 37 images in 37 files on 2 tapes (12 512 × 512, 25 1024 × 1024).
4. **Miscellaneous (color)** – 15 images in 45 files on 1 tape (8 256 × 256, 7 512 × 512).
5. **Miscellaneous (black and white)** – 26 images in 26 files on 1 tape (14 256 × 256, 10 512 × 512, 2 1024 × 1024).
6. **Motion picture sequences** – 59 images in 59 files on 1 tape (3 sequences of 16, 32, and 11 256 × 256 images).
7. **Military equipment** – 12 images in 12 files on 1 tape (11 512 × 512, 1 1024 × 1024).

The data base may be purchased in its entirety or by individual category. Random images are not available due to the time and effort involved for extraction. The data base is copyrighted and may only be used by the original purchaser.

2 Data Format

Copies of the SIPI image data base are only supplied on computer-compatible magnetic tape (9 track, 1600 BPI, 2400-ft. reels). All USC-SIPI magnetic tapes used for storing and transferring images are written using the same format described below. The format used is the simplest possible in hopes that this will make it easy to read and write on a variety of machines and operating systems.

> **Note:** It is the data base purchaser's responsibility to figure out how to read the images into whatever computer they will be using, and how to access the files from within application programs. USC-SIPI does not have the resources to provide assistance in these areas. If you are in doubt about whether or not you will be able to read the images on your computer, please check with your system managers and show them the following description of the tape and image formats.

The tapes are written in an unlabeled, binary format that contains only image data. There are no volume-ids, filenames, or other extraneous information on the tape. The data for a single image (or color component of a color image) is entirely contained within one logical file on tape. The files are separated by End-of-File (EOF) marks. A tape containing 3 monochrome images would consist of the following:

BOT→ Start of image 1
⇓
End of image 1
EOF
Start of image 2
⇓
End of image 2
EOF
Start of image 3
⇓
End of image 3
EOF
EOF

Color images are recorded with the three component colors in three consecutive files. The order of the colors is red, green, blue. The contents of a tape containing two color images would be as follows:

BOT→ Image 1 (red)
EOF
Image 1 (green)
EOF
Image 1 (blue)
EOF
Image 2 (red)
EOF
Image 2 (green)
EOF
Image 2 (blue)
EOF
EOF

The last image file on the tape will always be followed by two or more EOFs.

Within a single image file, the data is recorded with one image line in each record of the file. The first (top) line of the image will be the first record, the second line will be the second record, etc. The last (bottom) record is followed by an EOF mark. Each byte in a tape record contains the brightness value of one pixel. The first byte represents the leftmost pixel in the line, the last byte represents the rightmost pixel. The pixel brightness is an eight-bit, unsigned, binary quantity where zero is black and 255 is full brightness.

In summary: one pixel per byte, one image line per tape record, and one image per tape file.

3 Ordering Information

Price information is available from USC-SIPI at the address shown below or telephone (213) 743-5506. To order part or all of the USC-SIPI image data base, send purchase orders or checks to:

Signal and Image Processing Institute
University of Southern California
Powell Hall Room 306, MC-0272
Los Angeles, California 90089-0272

Checks should be payable to the Signal and Image Processing Institute.

Note: Shipping charges and sales taxes (if applicable) will be added to prices.

It is the policy of USC-SIPI that all foreign orders must be pre-paid in full, including shipping costs, before the order can be processed. Amounts under $100 must be paid with a check drawn on a U.S. bank. Orders of $100 or more may be paid with a check from a non-U.S. bank.

4 Table of Contents

The following pages list the contents of all tapes in the data base. Each image in the table of contents is listed along with the following information:

Image number: This code number relates to the picture in the catalog and is used to identify the image. For example image 1.3.4 is the fourth image in group 3 of volume 1 (Textures).

Image description: A brief description of the image contents.

Old data base number: If this image was in the previous IPI data base the identification number used in the old data base is given in parenthesis. For example (C2568-14).

Tape and file number: This is in the form T-F where T is the tape number within the volume and F is the file number on that tape. For example image 1.3.4 has number 1-30 (tape 1, file 30). In the case of single reel categories only the file number is given. For color images the file number for the red image is listed. The green and blue images would be in the next two files.

Image size: This is the image size in pixels. All images are square unless indicated otherwise.

For additional technical information contact the USC Signal and Image Processing Institute, telephone (213) 743-5506.

Volume 1. – TEXTURES

Image	Description	Tape-File	Size
1.1.1	Brodatz - Grass (D9)	1-1	512
1.1.2	Brodatz - Bark (D12)	1-2	512
1.1.3	Brodatz - Straw (D15)	1-3	512
1.1.4	Brodatz - Herringbone weave (D15)	1-4	512
1.1.5	Brodatz - Woolen cloth (D19)	1-5	512
1.1.6	Brodatz - Pressed calf leather (D24)	1-6	512
1.1.7	Brodatz - Beach sand (D29)	1-7	512
1.1.8	Brodatz - Water (D38)	1-8	512
1.1.9	Brodatz - Wood grain (D68)	1-9	512
1.1.10	Brodatz - Raffia (D84)	1-10	512
1.1.11	Brodatz - Pigskin (D92)	1-11	512
1.1.12	Brodatz - Brick wall (D94)	1-12	512
1.1.13	Brodatz - Plastic bubbles (D112)	1-13	512
1.2.1	Brodatz - Grass (D9) *	1-14	512
1.2.2	Brodatz - Bark (D12) *	1-15	512
1.2.3	Brodatz - Straw (D15) *	1-16	512
1.2.4	Brodatz - Herringbone weave (D16) *	1-17	512
1.2.5	Brodatz - Woolen cloth (D19) *	1-18	512
1.2.6	Brodatz - Pressed calf leather (D24) *	1-19	512
1.2.7	Brodatz - Beach sand (D29) *	1-20	512
1.2.8	Brodatz - Water (D38) *	1-21	512
1.2.9	Brodatz - Wood grain (D68) *	1-22	512
1.2.10	Brodatz - Raffia (D84) *	1-23	512
1.2.11	Brodatz - Pigskin (D92) *	1-24	512
1.2.12	Brodatz - Brick wall (D94) *	1-25	512
1.2.13	Brodatz - Plastic bubbles (D112) *	1-26	512
1.3.1	Brodatz - Grass (D9)	1-27	1024
1.3.2	Brodatz - Bark (D12)	1-28	1024
1.3.3	Brodatz - Straw (D15)	1-29	1024
1.3.4	Brodatz - Woolen cloth (D19)	1-30	1024
1.3.5	Brodatz - Herringbone weave (D16)	1-31	1024
1.3.6	Brodatz - Pressed calf leather (D24)	1-32	1024
1.3.7	Brodatz - Beach sand (D29)	2-1	1024
1.3.8	Brodatz - Water (D38)	2-2	1024
1.3.9	Brodatz - Wood grain (D68)	2-3	1024
1.3.10	Brodatz - Raffia (D84)	2-4	1024
1.3.11	Brodatz - Pigskin (D92)	2-5	1024
1.3.12	Brodatz - Brick wall (D94)	2-6	1024
1.3.13	Brodatz - Plastic bubbles (D112)	2-7	1024

* - These images have been histogram equalized

Volume 1. – TEXTURES (continued)

Image	Description	Tape-File	Size
1.4.1	Brick wall	2-8	1024
1.4.2	Wood shingle roof	2-9	1024
1.4.3	Wood shingle roof	2-10	1024
1.4.4	Brick wall	2-11	1024
1.4.5	Tile roof	2-12	1024
1.4.6	Wood fence	2-13	1024
1.4.7	Metal grates	2-14	1024
1.4.8	Brick wall	3-1	1024
1.4.9	Brick wall	3-2	1024
1.4.10	Grass	3-3	1024
1.4.11	Sand	3-4	1024
1.4.12	Sand	3-5	1024
1.5.1	Brick wall	3-6	512
1.5.2	Hexagonal hole array	3-7	512
1.5.3	Rough wall	3-8	512
1.5.4	Sand	3-9	512
1.5.5	Gravel	3-10	512
1.5.6	Brick wall	3-11	512
1.5.7	Grass	3-12	512

For the Brodatz texture images, the number in parenthesis (i.e. D12) is the page number in the Brodatz texture book that the image came from (P. Brodatz, *Textures: A Photographic Album for Artists and Designers*, Dover Publications, New York, 1966).

Volume 2. – AERIALS (color)

Image	Description	Tape-File	Size
2.1.1	San Diego (Miramar NAS)	1-1	512
2.1.2	San Diego	1-4	512
2.1.3	San Francisco (Golden Gate)	1-7	512
2.1.4	Oakland	1-10	512
2.1.5	San Diego (North Island NAS)	1-13	512
2.1.6	Woodland Hills, Ca.	1-16	512
2.1.7	Foster City, Ca.	1-19	512
2.1.8	San Diego	1-22	512
2.1.9	San Diego (Point Loma)	1-25	512
2.1.10	San Diego (Shelter Island)	1-28	512
2.1.11	Earth from space	1-31	512
2.1.12	San Diego (Downtown)	1-34	512
2.2.1	San Diego	2-1	1024
2.2.2	San Diego	2-4	1024
2.2.3	San Diego	2-7	1024
2.2.4	Richmond, Ca.	2-10	1024
2.2.5	San Diego (Miramar NAS)	2-13	1024
2.2.6	San Francisco (Bay Bridge)	2-16	1024
2.2.7	Oakland	2-19	1024
2.2.8	San Diego	3-1	1024
2.2.9	San Francisco	3-4	1024
2.2.10	Richmond and San Rafael	3-7	1024
2.2.11	Stockton	3-10	1024
2.2.12	San Francisco and Oakland	3-13	1024
2.2.13	Stockton	3-16	1024
2.2.14	Shreveport	3-19	1024
2.2.15	San Francisco	4-1	1024
2.2.16	San Francisco	4-4	1024
2.2.17	San Francisco	4-7	1024
2.2.18	Stockton	4-10	1024
2.2.19	Stockton	4-13	1024
2.2.20	Stockton	4-16	1024
2.2.21	San Francisco	4-19	1024
2.2.22	San Francisco and Oakland	5-1	1024
2.2.23	San Diego	5-4	1024
2.2.24	Stockton	5-7	1024

Volume 3. – AERIALS (black and white)

Image	Description	Tape-File	Size
3.1.1	San Diego (Miramar)	1-1	512
3.1.2	San Diego	1-2	512
3.1.3	San Francisco (Golden Gate)	1-3	512
3.1.4	Oakland	1-4	512
3.1.5	San Diego (North Island NAS)	1-5	512
3.1.6	Woodland Hills, Ca.	1-6	512
3.1.7	Foster City, Ca.	1-7	512
3.1.8	San Diego	1-8	512
3.1.9	San Diego (Point Loma)	1-9	512
3.1.10	San Diego (Shelter Island)	1-10	512
3.1.11	Earth from space	1-11	512
3.1.12	San Diego (Downtown)	1-12	512
3.2.1	San Diego	1-13	1024
3.2.2	San Diego	1-14	1024
3.2.3	San Diego	1-15	1024
3.2.4	Richmond, Ca.	1-16	1024
3.2.5	San Diego (Miramar NAS)	1-17	1024
3.2.6	San Francisco (Bay Bridge)	1-18	1024
3.2.7	Oakland	1-19	1024
3.2.8	San Diego	2-1	1024
3.2.9	San Francisco	2-2	1024
3.2.10	Richmond and San Rafael	2-3	1024
3.2.11	Stockton	2-4	1024
3.2.12	San Francisco and Oakland	2-5	1024
3.2.13	Stockton	2-6	1024
3.2.14	Shreveport	2-7	1024
3.2.15	San Francisco	2-8	1024
3.2.16	San Francisco	2-9	1024
3.2.17	San Francisco	2-10	1024
3.2.18	Stockton	2-11	1024
3.2.19	Stockton	2-12	1024
3.2.20	Stockton	2-13	1024
3.2.21	San Francisco	2-14	1024
3.2.22	San Francisco and Oakland	2-15	1024
3.2.23	San Diego	2-16	1024
3.2.24	Stockton	2-17	1024
3.2.25	Pentagon	2-18	1024

Note: Images 3.1.1 through 3.2.24 are the same as the green component of color images 2.1.1 through 2.2.24, respectively.

Volume 4. – MISCELLANEOUS (color)

Image	Description		File	Size
4.1.1	Girl	(C2568-15)	1	256
4.1.2	Couple	(C2568-18)	4	256
4.1.3	Girl	(C2568-3)	7	256
4.1.4	Girl	(C2568-21)	10	256
4.1.5	House	(C2568-27)	13	256
4.1.6	Tree	(C2568-30)	16	256
4.1.7	Jelly beans	(C2568-48)	19	256
4.1.8	Jelly beans	(C2568-51)	22	256
4.2.1	Splash	(C5128-3)	25	512
4.2.2	Girl (Tiffany)	(C5128-6)	28	512
4.2.3	Baboon	(C5128-19)	31	512
4.2.4	Girl (Lenna)	(C5128-22)	34	512
4.2.5	Airplane (F-16)	(C5128-55)	37	512
4.2.6	Sailboat on lake	(C5128-58)	40	512
4.2.7	Peppers	(C5128-61)	43	512

Volume 5. – MISCELLANEOUS (black and white)

Image	Description		File	Size
5.1.1	Girl	(C2568-14)	1	256
5.1.2	Couple	(C2568-17)	2	256
5.1.3	Girl	(C2568-2)	3	256
5.1.4	Girl	(C2568-20)	4	256
5.1.5	House	(C2568-26)	5	256
5.1.6	Tree	(C2568-29)	6	256
5.1.7	Jelly beans	(C2568-47)	7	256
5.1.8	Jelly beans	(C2568-50)	8	256
5.1.9	Moon surface	(B2568-40)	9	256
5.1.10	Aerial	(B2568-41)	10	256
5.1.11	Airplane	(B2568-43)	11	256
5.1.12	Clock	(B2568-49)	12	256
5.1.13	Resolution chart	(B2568-50)	13	256
5.1.14	Chemical plant	(B2568-57)	14	256
5.2.1	Splash	(C5128-2)	15	512
5.2.2	Girl (Tiffany)	(C5128-5)	16	512
5.2.3	Baboon	(C5128-18)	17	512
5.2.4	Girl (Lenna)	(C5128-21)	18	512
5.2.5	Airplane (F-16)	(C5128-54)	19	512
5.2.6	Sailboat on lake	(C5128-57)	20	512
5.2.7	Peppers	(C5128-60)	21	512
5.2.8	Couple	(B5128-6)	22	512
5.2.9	Aerial	(B5128-22)	23	512
5.2.10	Stream and bridge	(B5128-53)	24	512
5.3.1	Man	(B10248-3)	25	1024
5.3.2	Airport	(B10248-9)	26	1024

Note: Images 5.1.1 through 5.1.8 and 5.2.1 through 5.2.7 are the same as the green component of color images 4.1.1 through 4.1.8 and 4.2.1 through 4.2.7, respectively.

Volume 6. – MOTION PICTURE SEQUENCE

Image	Description		File	Size
6.1.1-16	Walter Cronkite	(MPC 1-16)	1..16	256
6.2.1-32	Chem. plant (close view)	(MPR 1-32)	17..48	256
6.3.1-11	Chem. plant (far view)	(MPR 65-75)	49..59	256

Volume 7. – MILITARY EQUIPMENT

Image	Description		File	Size
7.1.1	Truck	(B5128-12)	1	512
7.1.2	Airplane	(B5128-13)	2	512
7.1.3	Tank	(B5128-14)	3	512
7.1.4	Car and APCs	(B5128-15)	4	512
7.1.5	Truck and APCs	(B5128-16)	5	512
7.1.6	Truck and APCs	(B5128-17)	6	512
7.1.7	Tank	(B5128-18)	7	512
7.1.8	APC	(B5128-19)	8	512
7.1.9	Tank	(B5128-20)	9	512
7.1.10	Car and APCs	(B5128-21)	10	512
7.1.11	Airplane (F-16)	(C5128-54)	11	512
7.2.1	Airplane (U-2)	(B10248-4)	12	1024

5 Data Base Images

The following catalog pages were reproduced using a standard photocopier in order to reduce the cost of this document. As a result, the quality of the image reproductions is significantly lower than that of the corresponding images in the data base.

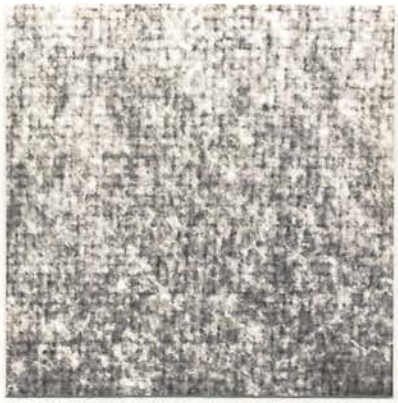
Section 1.1 Brodatz textures, 512×512

1.1.1

1.1.2

1.1.3

1.1.4

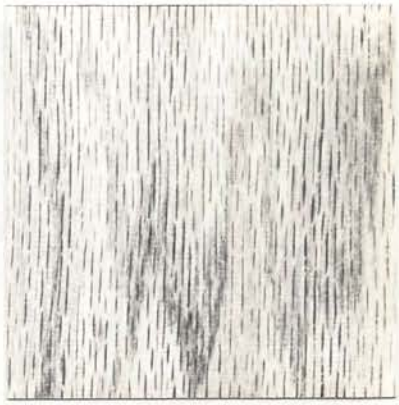


1.1.5

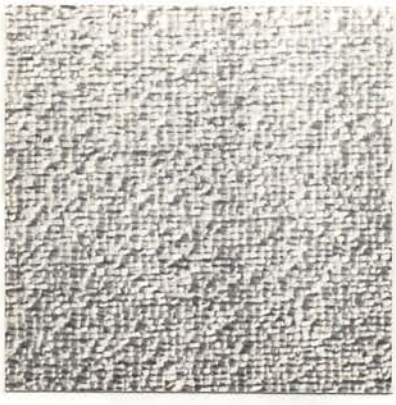
1.1.6

1.1.7

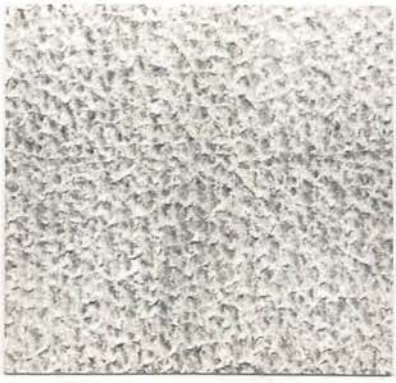
1.1.8



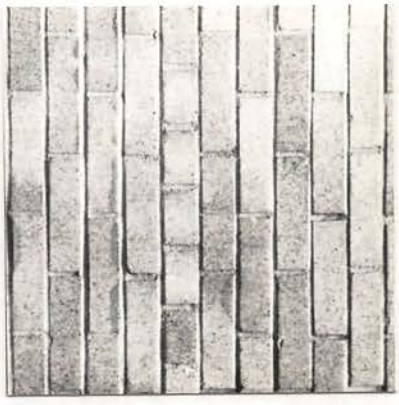
1.1.9



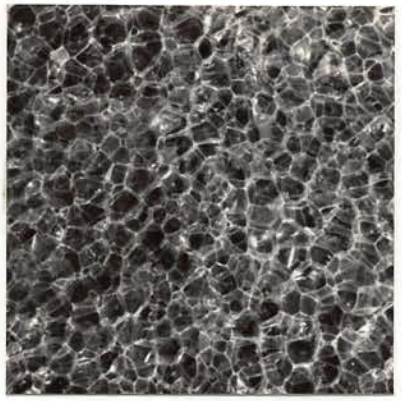
1.1.10



1.1.11



1.1.12



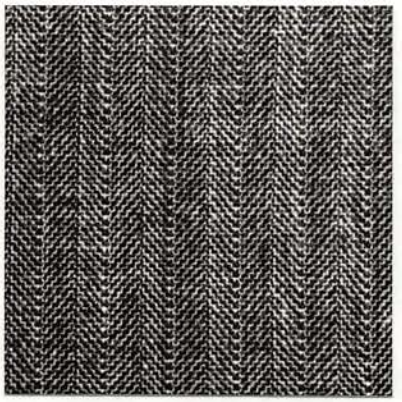
1.1.13

Section 1.2 Brodatz textures, 512 × 512, histogram equalized

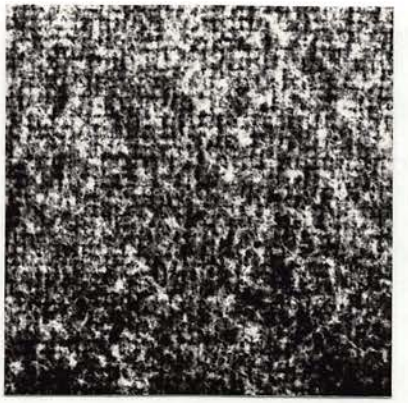
1.2.1

1.2.2

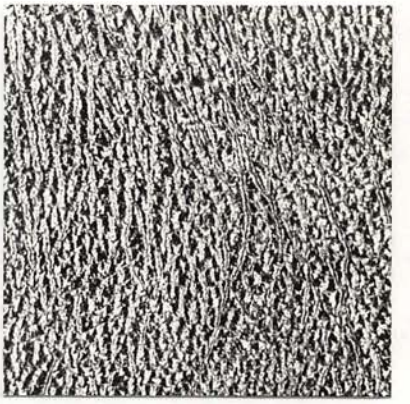
1.2.3



1.2.4

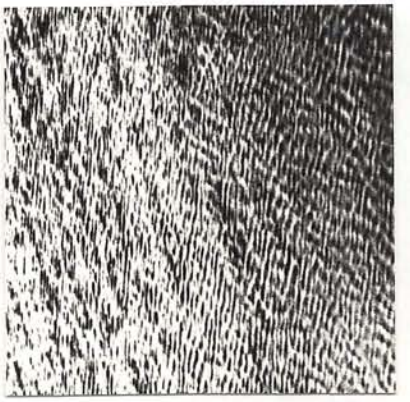


1.2.5

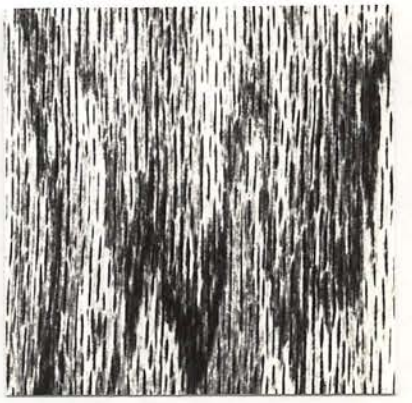


1.2.6

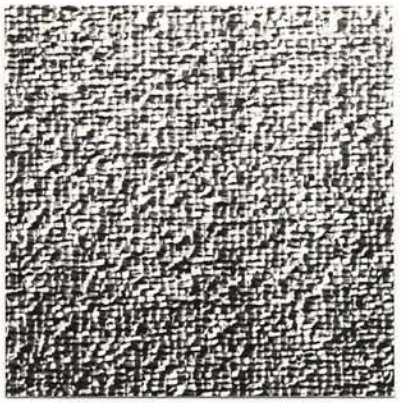
1.2.7



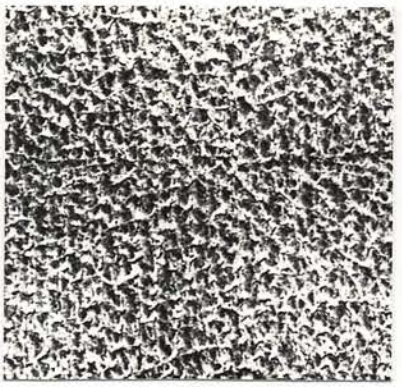
1.2.8



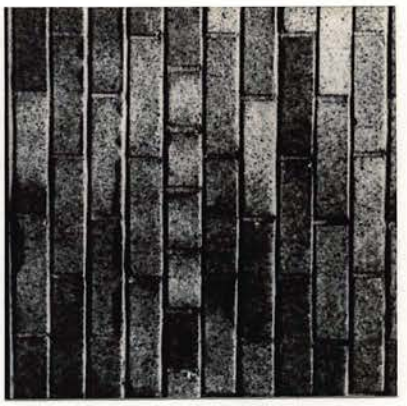
1.2.9



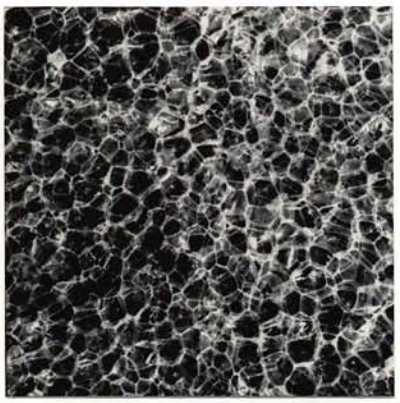
1.2.10



1.2.11



1.2.12



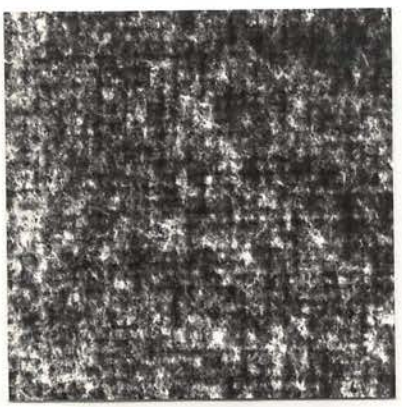
1.2.13

Section 1.3 Brodatz textures, 1024×1024

1.3.1

1.3.2

1.3.3

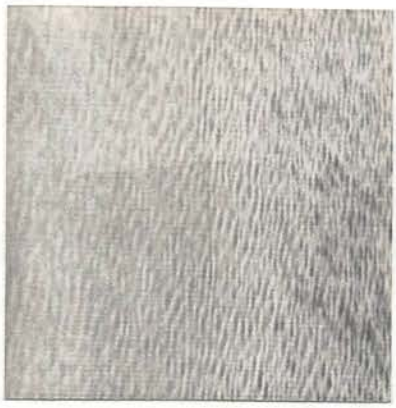


1.3.4

1.3.5

1.3.6

1.3.7

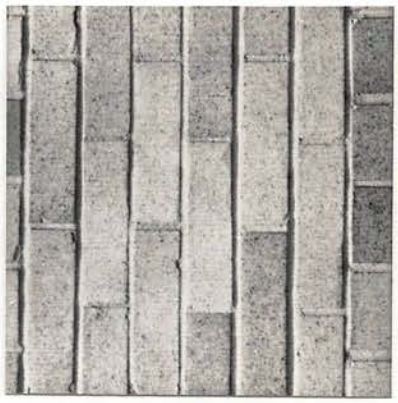


1.3.8

1.3.9

1.3.10

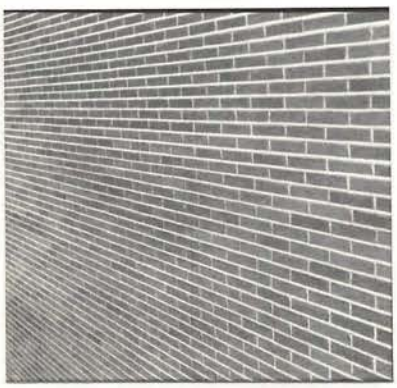
1.3.11



1.3.12

1.3.13

Section 1.4 Miscellaneous textures, 1024 × 1024



1.4.1

1.4.2

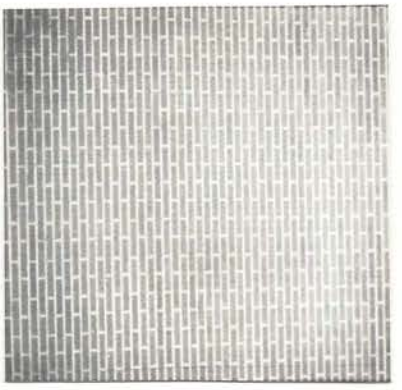
1.4.3

1.4.4

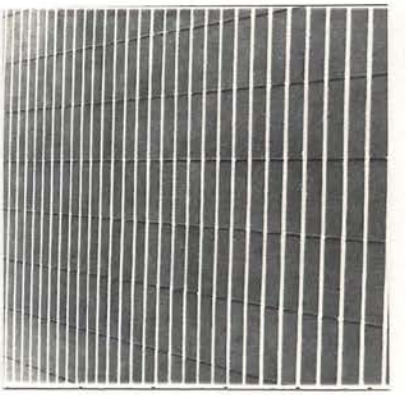
1.4.5

1.4.6

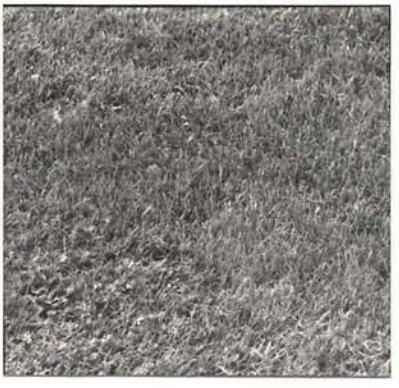
1.4.7



1.4.8



1.4.9



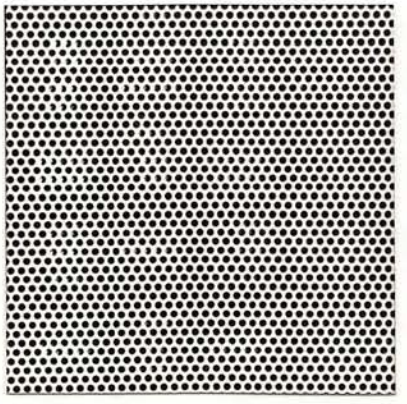
1.4.10

1.4.11

1.4.12

Section 1.5 Miscellaneous textures, 512 × 512

1.5.1



1.5.2

1.5.3

1.5.4

1.5.5

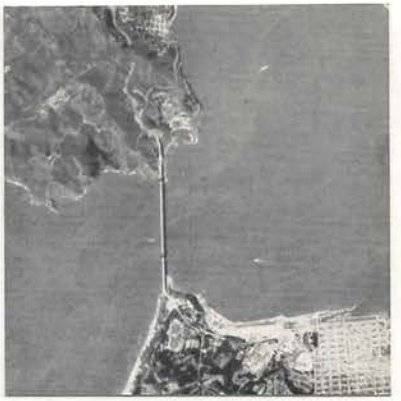
1.5.6

1.5.7

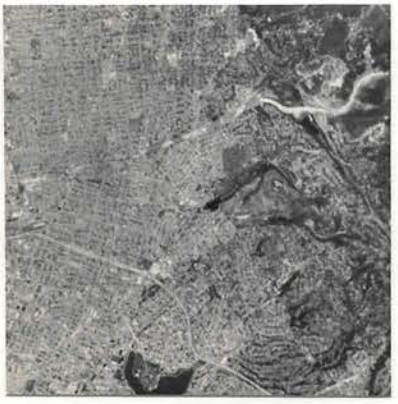
Sections 2.1 and 3.1 Aerials, 512×512

2.1.1 & 3.1.1

2.1.2 & 3.1.2



2.1.3 & 3.1.3



2.1.4 & 3.1.4

2.1.5 & 3.1.5

2.1.6 & 3.1.6

2.1.7 & 3.1.7

2.1.8 & 3.1.8

2.1.9 & 3.1.9

2.1.10 & 3.1.10

2.1.11 & 3.1.11

2.1.12 & 3.1.12

Sections 2.2 and 3.2 Aerials, 1024 × 1024

2.2.1 & 3.2.1

2.2.2 & 3.2.2

2.2.3 & 3.2.3

2.2.4 & 3.2.4

2.2.5 & 3.2.5

2.2.6 & 3.2.6

2.2.7 & 3.2.7

2.2.8 & 3.2.8

2.2.9 & 3.2.9

2.2.10 & 3.2.10

2.2.11 & 3.2.11

2.2.12 & 3.2.12

2.2.13 & 3.2.13

2.2.14 & 3.2.14

2.2.15 & 3.2.15

2.2.16 & 3.2.16

2.2.17 & 3.2.17

2.2.18 & 3.2.18

2.2.19 & 3.2.19

2.2.20 & 3.2.20

2.2.21 & 3.2.21

2.2.22 & 3.2.22

2.2.23 & 3.2.23

2.2.24 & 3.2.24

3.2.25

Sections 4.1 and 5.1 Miscellaneous, 256 × 256

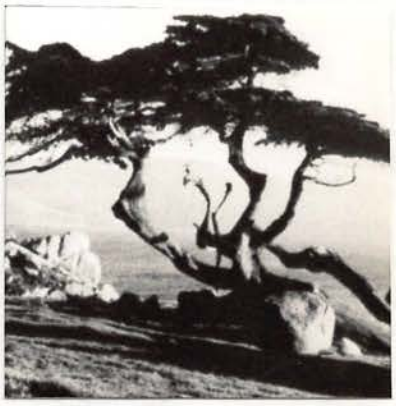
4.1.1 & 5.1.1

4.1.2 & 5.1.2

4.1.3 & 5.1.3

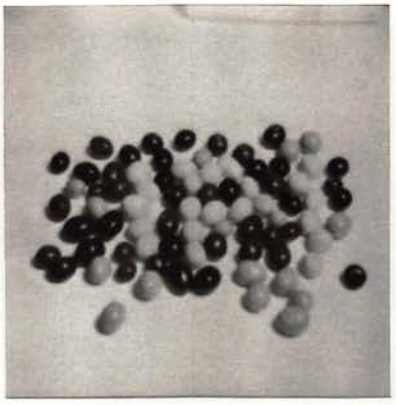
4.1.4 & 5.1.4

4.1.5 & 5.1.5



4.1.6 & 5.1.6

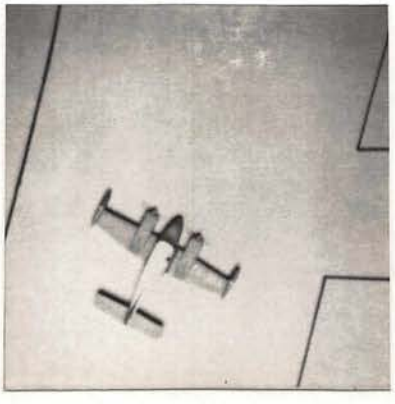
4.1.7 & 5.1.7



4.1.8 & 5.1.8

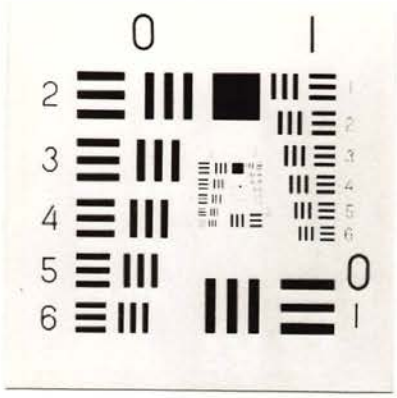
5.1.9

5.1.10



5.1.11

5.1.12



5.1.13

5.1.14

Section 4.2 and 5.2 Miscellaneous, 512 × 512

4.2.1 & 5.2.1

4.2.2 & 5.2.2

4.2.3 & 5.2.3

4.2.4 & 5.2.4

4.2.5 & 5.2.5

4.2.6 & 5.2.6

4.2.7 & 5.2.7

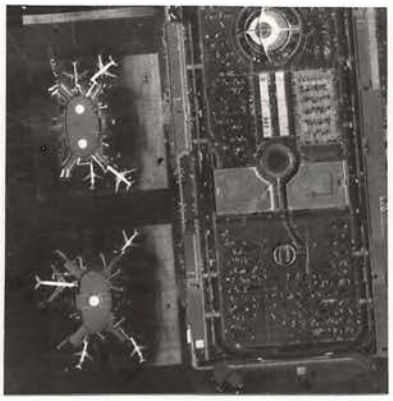
5.2.8

5.2.9

5.1.10

Section 5.3 Miscellaneous, 1024×1024

5.3.1



5.3.2

Section 6.1 Motion Picture Sequence #1, 256 × 256

6.1.1

6.1.8

6.1.16

Section 6.2 Motion Picture Sequence #2, 256 × 256

6.2.1

6.2.8

6.2.16

Section 6.3 Motion Picture Sequence #3, 256 × 256

6.3.1

6.3.6

6.3.11

Section 7.1 Military Equipment, 512×512

7.1.1

7.1.2

7.1.3

7.1.4

7.1.5

7.1.6

7.1.7

7.1.8

7.1.9

7.1.10

7.1.11

Section 7.2 Military Equipment, 1024 × 1024

7.2.1