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Supporting Research

"AS-BUILT" DESIGN SPECIFICATION FOR SEGMENT
MAP (SGMAP) PROGRAM

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"AS-BUILT" DESIGN SPECIFICATION
FOR
SEGMENT MAP (SGMAP) PROGRAM

Job Order 71-308

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16. Abstract
This document is the "As-Built" Design Specification for Segment Map (SGMAP) Program which is part of the CLASFY1 package.

This program is designed to output symbolic maps or numerical dumps from Cluster/Classification files or ground truth/processed ground truth files which are in 'Universal' format.

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- Numerical Dump
- Classification file
- Ground Truth file

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</tr>
</tbody>
</table>
SGMAP PROGRAM

1.0 SCOPE

This document contains the description of the SGMAP Program. This program produces as output either a numeric dump or a symbolic map from an input Landsat Segment Cluster/Classification file or a digitized aircraft Ground Truth/Processed Ground Truth file.
2.0 APPLICABLE DOCUMENTS

The following documents form a part of this specification:
AD 63-2457-3308-01 Transferring Badhwar Software.
AD NAS 9-15200 Technical Memorandum Format Specifications for LACIE (Phase III) and Accuracy Assessment Computer Data Products.
3.0 SYSTEM DESCRIPTION

3.1 SYSTEM FLOWCHART

The system flowcharts for processing ground truth and cluster/classification data files are depicted in Figures 3.1.1 and 3.1.2, respectively.
Figure 3.1.1 System Flow for Ground/Processed Ground Truth Input Data File
Figure 3.1.2 System Flow for Cluster/Classification Input Data File
Figure 3.1.3 SGMAP Hierarchy
3.2 HARDWARE DESCRIPTION

The software for the SGMAP Program is operational on the IBM 3031 computer at Purdue.

3.3 SOFTWARE DESCRIPTION

This program produces numeric dumps or symbolic maps of two kinds of files: namely, (1) cluster or classification files and (2) ground truth files.

Cluster or classification files are single channel universal format image files produced by several different clustering and classification programs. They are "pixel level" files, i.e., they consist of 117 lines with 196 pixels per line. (See Section 3.4.1 for a complete file description).

Ground truth files are single channel universal format image files that are similar to the cluster or classification files except that they are at the sub-pixel level, i.e., they have six sub-pixels corresponding to each pixel on a cluster or classification file. They have 351 (3x117) lines with 392 (2x196) sub-pixels per line. (See Section 3.4.1 for a complete file description).

If a cluster or classification file is input, then the output numeric dump or symbolic map is necessarily at the pixel level also. However if the input is a ground truth file, then the output can be either sub-pixel level or pixel level. In the latter case the program combines the six sub-pixels that correspond to each pixel and determines the label for that pixel by majority rule. A numeric dump or symbolic map is then produced of this pixel data.

The valid range of sample values is 1-256.
3.4 FILE DESCRIPTION

3.4.1 INPUT DATA FILE

The two acceptable forms of input data are:

Cluster or Classification Files: These pixel level files are in universal format with one channel per physical record. There are 117 records, each having 360 8-bit bytes.

Ground Truth Files: These sub-pixel level files are in universal format with one channel per physical record. There are 351 records, each having 540 8-bit bytes. The contents of each byte have been biased with -128 and are stored in 8-bit two's-complement notation.
3.4.2 USER DEFINED FILE (SYMBOL FILE NAME) (SYMBOL FILE TYPE) A

For output maps, the symbol file defines a corresponding symbol for each of the 256 crop code values in the universal format input file. The user defines symbols for each crop code or crop code range; i.e., if only one crop code is mapped to a symbol, the beginning and ending of the range are the same. The usual procedure followed is that the user (1) defines all 256 codes to one symbol and (2) redefines any codes which merit unique symbols. The last entry in the file must be 0 0 0.

For output numeric dump the only entry is 0 0 N.

This file provides inputs in the given formats to the SGMAP program.

<table>
<thead>
<tr>
<th>Columns</th>
<th>Format</th>
<th>start</th>
<th>end</th>
<th>symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>I5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-10</td>
<td>I5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>A1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Define the start and end of a range of sample values assigned to any one symbol (MAP only).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0 0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Signifies the end of SYMBOL input for a MAP.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0 0 N</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Signifies the end of SYMBOL input for a NUMERIC DUMP.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following is an example of a symbol file for an OUTPUT Numeric Dump.

0 0 N

The following is an example of a symbol file for an OUTPUT Map.

1 256 (blank)
1 1 *
40 40 C
127 127 B
50 50 W
0 0 0

3-7
### 3.4.3 USER DEFINED FILE (FILE NAME) CC A

This file is used to specify a number of parameters mainly related to output description. It is composed of card records which are input to the SGMAP routine.

The first six cards have a keyword beginning in column 1 followed by parameters in columns 11 through 72. Blanks are optional. The following description lists the keywords and describes the corresponding inputs.

<table>
<thead>
<tr>
<th>KEYWORD</th>
<th>ACCEPTABLE INPUTS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TYPE</strong></td>
<td>GROUND TRUTH, SUB-PIXEL, CLASS/CLUSTER</td>
<td>This card defines the type of run. In the case where the output symbolic map is a classification or cluster map, the entry on this card is &quot;Class/Cluster&quot;. In the case where the output symbolic map is a ground truth map there are two possible entries; namely, (1) &quot;Ground Truth&quot; if pixel level output is desired and (2) &quot;Sub-Pixel&quot; if sub-pixel output is desired.</td>
</tr>
<tr>
<td><strong>OUTPUT</strong></td>
<td>MAP, NUMERIC</td>
<td>This card specifies whether the output will be a numeric dump or a symbolic map. The corresponding entries are &quot;Numeric&quot; and &quot;Map&quot;.</td>
</tr>
<tr>
<td><strong>RECSKP</strong></td>
<td>Positive number</td>
<td>This card specifies a number of records to skip following the header record. Normally no skipping is required. However, some input files do require it. If missing, the default is 0.</td>
</tr>
<tr>
<td><strong>DATE</strong></td>
<td>Free form</td>
<td>This card gives the date (in free-form) for report identification.</td>
</tr>
<tr>
<td><strong>SEGMENT</strong></td>
<td>Segment number</td>
<td>This card specifies the segment number for report identification.</td>
</tr>
<tr>
<td><strong>AI</strong></td>
<td>Analyst's name</td>
<td>This card specifies the analyst's name for report identification.</td>
</tr>
<tr>
<td>*<strong>END</strong></td>
<td>Ignored</td>
<td>This card identifies the end of the user defined cards.</td>
</tr>
</tbody>
</table>

| Optional Input |
Next there are one or more cards which specify the part of the image which is to be dumped or mapped. Each card specifies the PIXEL (never sub-pixel) coordinates of the upper left corner of the area to be dumped or mapped. The output always begins at this corner and produces a display that is 117 lines by 196 samples. If pixel level output has been specified, these lines and samples are pixels; if sub-pixel output has been specified, they are sub-pixels. When pixel level output is desired, the vertex 1,1 will cause all of the image to be output. However, when sub-pixel output is desired, six vertices are required to output the entire image. Of course, fewer vertices can be used if only part of the image is desired. The vertices (line, sample) are entered one to a card and may begin in any column 1 through 72. Leading, trailing and embedded blanks on these cards are ignored. The range of values permitted is 1 through 79 for lines and 1 through 99 for samples. A maximum of six vertex cards may be used.

A $END card is placed after the last vertex card.

All cards following the $END card are considered comments and are printed.

The following is an example of an user's CC file where the input data is in SUB-PIXEL structure. Maps giving complete coverage of all lines and samples are desired.

```
AI      MARY ANN TOMPKINS
DATE    DECEMBER 25, 1980
SEGMENT 1981
TYPE    SUB-PIXEL
OUTPUT  MAP
*END
  1,1
  40,1
  79,1
  1,99
  40,99
  79,99
$END
```
3.5 SOFTWARE DESCRIPTION

3.5.1 SGMAP PROGRAM

Purpose

SGMAP produces either a numeric dump or a symbolic map from an input Landsat Segment Cluster/Classification file or a digitized aircraft Ground Truth/Processed Ground Truth file.

Linkages

SGMAP calls CRD2IN, CPTIME, GTMAP, KUSKLA, and SPMAP.

Interface

Calling sequence:

N/A (A description for SGMAP EXEC which can be use to load and execute SGMAP is found in Section 4.0).

Calling sequence parameters:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Function value:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

Labeled COMMON parameters:

Full description of labeled COMMON blocks are contained in Appendix A.

<table>
<thead>
<tr>
<th>Label</th>
<th>Variable</th>
<th>Element Position</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/MAP/</td>
<td>IXLBUF(3060)</td>
<td>1</td>
<td>0</td>
<td>Pixel/subpixel input buffer.</td>
</tr>
<tr>
<td></td>
<td>IXLTRN(256)</td>
<td>3</td>
<td>0</td>
<td>Transformations for a sample value.</td>
</tr>
<tr>
<td></td>
<td>IXLTRN(256)</td>
<td>3</td>
<td>0</td>
<td>Output transformed data line.</td>
</tr>
</tbody>
</table>
Blank COMMON parameters:

Full description of blank COMMON is contained in Appendix A.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Element</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>None</td>
</tr>
</tbody>
</table>

Inputs

<table>
<thead>
<tr>
<th>Unit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>seq. data</td>
<td>Universal formatted ground truth, classification, or cluster file (See section 3.4.1).</td>
</tr>
<tr>
<td>13</td>
<td>seq. data</td>
<td>Symbolic mapping information (See section 3.4.2).</td>
</tr>
</tbody>
</table>

Outputs

<table>
<thead>
<tr>
<th>Unit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Report</td>
<td>Printout of the user defined control cards.</td>
</tr>
<tr>
<td>14</td>
<td>Report</td>
<td>Symbolic map or numeric dump of input data.</td>
</tr>
</tbody>
</table>

Storage requirement

Not applicable.

Description

SGMAP, according to user specification and type of input data file, produces symbolic maps or dumps in pixel or subpixel form (See Appendix C).

Flowchart

Not applicable.

Listing

See Appendix B for program listing.
3.5.2 SOFTWARE COMPONENT NO. 1 (CRD2IN)

Purpose

Subroutine CRD2IN reads, decodes, and writes to a printer file the user supplied card control file.

Linkages

CRD2IN is called by SGMAP.
CRD2IN calls INTPAR and NUMB.

Interface

Calling sequence:

CALL CRD2IN (MTYPE, KOUT, NRECSK, LFTCRS, IERR).

Calling sequence parameters:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTYPE</td>
<td>0</td>
<td>Identifies the type of conversion of input structure to output structure.</td>
</tr>
<tr>
<td>KOUT</td>
<td>0</td>
<td>Identifies the format of output.</td>
</tr>
<tr>
<td>NRECSK</td>
<td>0</td>
<td>Number of records to skip.</td>
</tr>
<tr>
<td>LFTCRS(6)</td>
<td>0</td>
<td>Identifies the upper left corner of output.</td>
</tr>
<tr>
<td>IERR</td>
<td>0</td>
<td>Input error indicator flag.</td>
</tr>
</tbody>
</table>

Function value:

N/A.

Labeled COMMON parameters:

Full description of labeled COMMON blocks are contained in Appendix A.

None.

Blank COMMON parameters:

Full description of blank COMMON is contained in Appendix A.

None.
**Inputs**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>seq. data</td>
<td>Control card file (See Section 3.4.3).</td>
</tr>
</tbody>
</table>

**Outputs**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Printer</td>
<td>File contains copy of report summary of user defined cards.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Used as a reread file.</td>
</tr>
</tbody>
</table>

**Storage requirement**

Not applicable.

**Description**

CRD2IN reads the key word (first four bytes) on the Control Card and then outputs the card. If the key word is not recognized, an error message is printed and execution continues. If the key word is recognized, the appropriate action regarding the card's parameter is taken. The routine determines if all required cards are present and if the parameters are acceptable. If either test fails, an error flag is set.

**Flowchart**

Not applicable.

**Listing**

See Appendix B for routine listing.
3.5.3 SOFTWARE COMPONENT NO. 2 (NUMB)

Purpose

NUMB decodes character information into numerical information.

Linkages

NUMB is called by CRD2IN.

Interface

Calling sequence:

CALL NUMB (KCHAR, NUMBER, ICOR).

Calling sequence parameters:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KCHAR(80)</td>
<td>I</td>
<td>Card image.</td>
</tr>
<tr>
<td>NUMBER</td>
<td>I</td>
<td>Decoded number.</td>
</tr>
<tr>
<td>ICOL</td>
<td>I</td>
<td>Column to start decode procedure</td>
</tr>
</tbody>
</table>

Function value:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

Labeled COMMON parameters:

Full description of labeled COMMON blocks are contained in Appendix A.

<table>
<thead>
<tr>
<th>Label</th>
<th>Variable</th>
<th>Element Position</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Blank COMMON parameters:

Full description of blank COMMON is contained in Appendix A.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Element Position</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Inputs**
None.

**Outputs**
None.

**Storage requirement**
Not applicable.

**Description**
Decodes a number on a user supplied control card starting with the first non-blank character in the control card parameter field (ICOL) and ending with the first non-blank, non-numeric character.

**Flowchart**
Not applicable.

**Listing**
See Appendix B for routine listing.
3.5.4 SOFTWARE COMPONENT NO. 3 (INTPAR)

Purpose
Read and decode user defined control cards consisting of a pair of numbers.

Linkages
INTPAR is called by CRD2IN.

Interface
Calling sequence:

CALL INTPAR (LFTCRS, IERR).

Calling sequence parameters:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFTCRS(6)</td>
<td>0</td>
<td>Identifies upper left corner of output.</td>
</tr>
<tr>
<td>IERR</td>
<td>0</td>
<td>Identifies input error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IERR = 0 OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IERR = 1 Error</td>
</tr>
</tbody>
</table>

Function value:
N/A

Labeled COMMON parameters:
Full description of labeled COMMON blocks are contained in Appendix A.
None.

Blank COMMON parameters:
Full description of blank COMMON is contained in Appendix A.
None.

Inputs

<table>
<thead>
<tr>
<th>Unit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Seq. data</td>
<td>Control c-rd file (See Section 3.4.3).</td>
</tr>
</tbody>
</table>
### Outputs

<table>
<thead>
<tr>
<th>Unit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Printer</td>
<td>File contains copy of report summary of user defined control cards.</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>Used as a reread file.</td>
</tr>
</tbody>
</table>

#### Storage requirement

Not applicable.

#### Description

INTPAR reads and decodes number pairs, input one to a card, separated by a comma.

#### Flowchart

Not applicable.

#### Listing

See Appendix B for routine listing.
3.5.5 SOFTWARE COMPONENT NO. 4 (SPMAP)

Purpose
SPMAP reads input data in pixel structure and transforms the data into output form.

Linkages
SPMAP is called by SGMAP.

Interface
Calling sequence:
CALL SPMAP (PIXPRO, MOFFS, LINE, LNS).

Calling sequence parameters:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIXPRO</td>
<td>0</td>
<td>Current number of pixels processed.</td>
</tr>
<tr>
<td>MOFFS</td>
<td>I</td>
<td>Output pixel offset.</td>
</tr>
<tr>
<td>LINE</td>
<td>I</td>
<td>Starting line of pass.</td>
</tr>
<tr>
<td>LNS</td>
<td>I</td>
<td>Current line.</td>
</tr>
</tbody>
</table>

Function value:
N/A.

Labeled COMMON parameters:
Full description of labeled COMMON blocks are contained in Appendix A.

<table>
<thead>
<tr>
<th>Label</th>
<th>Variable</th>
<th>Element Position</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/MAP/</td>
<td>IXLBUF(3060)</td>
<td>1</td>
<td>0</td>
<td>Subpixel input buffer.</td>
</tr>
<tr>
<td></td>
<td>IXLTRN(256)</td>
<td>3</td>
<td>1</td>
<td>Transformations for a sample value.</td>
</tr>
<tr>
<td></td>
<td>IXLTRN(98)</td>
<td>2</td>
<td>0</td>
<td>Transformed data line.</td>
</tr>
</tbody>
</table>
Blank COMMON parameters:

Full description of blank COMMON is contained in Appendix A.
None.

Inputs

<table>
<thead>
<tr>
<th>Unit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Seq. data</td>
<td>Universal formatted ground truth file (See Section 3.4.1).</td>
</tr>
</tbody>
</table>

Outputs

None.

Storage requirement

Not applicable.

Description

SPMAP reads one line of data into an internal buffer beginning with the first requested line. Each pixel is assigned an output symbol by using the pixel value to index into the pixel transformation buffer which contains a user defined symbol. This symbol is then stored into an output buffer for eventual output.

Flowchart

Not applicable.

Listing

See Appendix B for routine listing.
3.5.6 SOFTWARE COMPONENT NO. 5 (KUSKLA)

Purpose

KUSKLA reads input data in pixel structure and transforms the data into output form.

Linkages

KUSKLA is called by SGMAP.

Interface

Calling sequence:

CALL KUSKLA (MOFFS).

Calling sequence parameters:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOFFS</td>
<td>I</td>
<td>Output pixel offset.</td>
</tr>
</tbody>
</table>

Function value:

N/A.

Labeled COMMON parameters:

Full description of labeled COMMON blocks are contained in Appendix A.

<table>
<thead>
<tr>
<th>Label</th>
<th>Variable</th>
<th>Element Position</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/MAP/</td>
<td>IXLBUF(3060)</td>
<td>1</td>
<td>0</td>
<td>Pixel input buffer.</td>
</tr>
<tr>
<td></td>
<td>IXLINE(98)</td>
<td>2</td>
<td>0</td>
<td>Transformed data line.</td>
</tr>
<tr>
<td></td>
<td>IXLTRN(256)</td>
<td>3</td>
<td>I</td>
<td>Transformations for a sample value.</td>
</tr>
</tbody>
</table>

Blank COMMON parameters:

Full description of blank COMMON is contained in Appendix A.

None.
Inputs

<table>
<thead>
<tr>
<th>Unit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Seq. data</td>
<td>Universal formatted classification or cluster file (See Section 3.4.1).</td>
</tr>
</tbody>
</table>

Outputs

None.

Storage requirement

Not applicable.

Description

KUSKLA reads one line of data into an internal buffer, transforms each pixel into an output symbol, and stores the pixel into an output buffer for eventual output.

Flowchart

Not applicable.

Listing

See Appendix B for routine listing.
3.5.7 SOFTWARE COMPONENT NO. 6 (GTMAP)

Purpose

GTMAP reads input data in subpixel structure and converts the data to a pixel value.

Linkages

GTMAP is called by SGMAP.
GTMAP calls CROPP.

Interface

Calling sequence:

CALL GTMAP (PIXPRO, MCFFS).

Calling sequence parameters:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIXPRO</td>
<td>0</td>
<td>Current number of pixels processed.</td>
</tr>
<tr>
<td>MOFFS</td>
<td>I</td>
<td>Output pixel offset.</td>
</tr>
</tbody>
</table>

Function value:

None.

Labeled COMMON parameters:

Full description of labeled COMMON blocks are contained in Appendix A.

<table>
<thead>
<tr>
<th>Label</th>
<th>Variable</th>
<th>Element Position</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/MAP/</td>
<td>IXLBUF(3060)</td>
<td>1</td>
<td>0</td>
<td>Subpixel input buffer.</td>
</tr>
<tr>
<td></td>
<td>IXLIN(98)</td>
<td>2</td>
<td>0</td>
<td>Output transformed data line.</td>
</tr>
<tr>
<td></td>
<td>IXLTRN(256)</td>
<td>3</td>
<td>I</td>
<td>Transformations for a sample value.</td>
</tr>
<tr>
<td>/NSBIXL/</td>
<td>NSUBPX(6)</td>
<td>1</td>
<td></td>
<td>Subpixel that map to a pixel.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Blank COMMON parameters:

Full description of blank COMMON is contained in Appendix A.
N/A.

Inputs

<table>
<thead>
<tr>
<th>Unit</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Seq. data</td>
<td>Universal formatted ground truth file.</td>
</tr>
</tbody>
</table>

Outputs

None.

Storage requirement

Not applicable.

Description

GTMAP reads three lines of subpixel structure data into an internal buffer. The sub-pixels are divided into sub-pixel sets (2 sub-pixel across x 3 lines down) and CROPP is called to rule on a pixel value for the set. Each pixel is assigned an output symbol by using the pixel value to index into the pixel transformation buffer which contains a user defined symbol. This symbol is then stored into an output buffer for eventual output.

Flowchart

Not applicable.

Listing

See Appendix B for routine listing.
3.5.8 SOFTWARE COMPONENT NO. 7 (CROPP)

Purpose
CROPP accepts six subpixels as input and outputs a pixel value representative of the subpixels.

Linkages
CROPP is called by GRMAP.

Interface
Calling sequence:
CALL CROPP (KROP, IXLCNT).

Calling sequence parameters:

<table>
<thead>
<tr>
<th>Argument</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KROP</td>
<td>0</td>
<td>Majority crop code.</td>
</tr>
<tr>
<td>IXLCNT</td>
<td>0</td>
<td>Count of number subpixels that match the majority code.</td>
</tr>
</tbody>
</table>

Function value:
N/A.

Labeled COMMON parameters:
Full description of labeled COMMON blocks are contained in Appendix A.

<table>
<thead>
<tr>
<th>Label</th>
<th>Variable</th>
<th>Element Position</th>
<th>Input/Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/NSBIXL/</td>
<td>NSUBPX(6)</td>
<td>1</td>
<td>I</td>
<td>Subpixels that map to a pixel.</td>
</tr>
</tbody>
</table>

Blank COMMON parameters:
Full description of blank COMMON is contained in Appendix A.
None.
Inputs
None.

Outputs
None.

Storage requirement
Not applicable.

Description
The first sub-pixel value upon entry is considered to be the majority pixel (KROP) value. The NSUBPX array is traversed and the number of codes equal to KROP counted. This procedure continues until a count of each unique code is made. If at anytime a count becomes greater than the count of KROP this code becomes KROP's value.

Flowchart
Not applicable.

Listing
See Appendix B for routine listing.
4.0 OPERATION

4.1 OPERATING INSTRUCTIONS

SGMAP is operational on the IBM 3031 computer at LARS, West Lafayette, Indiana.

This program requires the use of a D disk which is assigned as a temporary disk. This disk will be assigned by the SGMAP EXEC; and the user, therefore, should not assign a disk to his machine using a MODE D.

Prior to invoking the SGMAP EXEC, the user must establish on his A disk a SYMBOL file as described in section 3.4.3 and a USER CONTROL file as described in section 3.4.4.

4.2 COMMANDS DESCRIPTION

To execute SGMAP, the user enters the following series of commands which invoke the JOB CONTROL SOFTWARE.

START

SGMAP......

END

The following sections describe each of these commands in detail. Input fields are separated by blanks. If more than one word is required to describe an input field, the description is enclosed in pointed brackets <> . If an input is optional the field is enclosed in square brackets [ ]. Do not include these explanatory characters <> [] when actually submitting input to the computer. To enter a command, the user types one input per defined input field and separates each field with a blank.
4.2.1 START

The START command spools the user's console file. The use of this command alone with the END command will provide a listing of all information appearing on the user's console file. (If running an interactive job, this is the terminal; if running a batch job, this is a system defined device). The START command is invoked by the user typing the following:

START

4.2.2 SGMAP

The SGMAP command executes the program. The SGMAP has the following as forms and is invoked by typing one of the following, according to the user's requirement.

SGMAP <SYMBOL FILE> <SYMBOL FILE> <CC FILE> TAPE# FILE# [TAPE DENSITY]
< NAME > < TYPE > < NAME >

If the file is on disk -

SGMAP <SYMBOL FILE> <SYMBOL FILE> <CC FILE> <FILENAME> <FILETYPE> <FILEMODE>
< NAME > < TYPE > < NAME >

The output from the SGMAP program is spooled to the HOUSTON line printer. The output consists of a MAP and the USER IDENTIFICATION file.

4.2.3 END

This command closes the user's console file and causes a copy to be sent to the printer. This command has no effect if the START command was not previously issued. The END command is invoked by the user typing the following:

END
4.3 OPERATING EXAMPLE

For our example we will assume the following:

The user's symbol file is established as required on his A disk under the file description:

880 79082 A

The user's information file is established as required on his A disk under the filename of his choice and the required filetype (CC). (For our example we will use SYM880 CC A for our complete file description.)

The user has a 1600 BPI tape# 2645 which contains the file (17) he wishes to map.

<table>
<thead>
<tr>
<th>COMMAND</th>
<th>EXPLANATION OR ACTION TAKEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>START</td>
<td>Spools the console file.</td>
</tr>
</tbody>
</table>
| SGMAP 880 79082 SYM880 2645 17 | Executes the SGMAP PROGRAM  
The user's tape is 1600 BPI; therefore, the user inputs tape#,file#,exercising the option of using the defined default of 1600 BPI. |
| END           | Closes the user's console file and spools the file to the HOUSTON printer.                  |
APPENDIX A
COMMON BLOCKS
COMMON BLOCKS

COMMON/MAP/IXLBUF(3060),IXLINE(98),IXLTRN(256)
IXLBUF  PIXEL/SUB-PIXEL INPUT BUFFER
IXLINE  OUTPUT TRANSFORMED DATA
IXLTRN  TRANSFORMATIONS FOR SAMPLE VALUE

COMMON/NSBIXL/NSUBPX(6)
NSUBPX  6 GROUND TRUTH SUB-PIXELS THAT ARE ASSOCIATED WITH
        A CORRESPONDING LACIE PIXEL
APPENDIX B
PROGRAM LISTINGS
```
<table>
<thead>
<tr>
<th>NAME</th>
<th>TAG</th>
<th>TYPE</th>
<th>ADDR</th>
<th>NAME</th>
<th>TAG</th>
<th>TYPE</th>
<th>ADDR</th>
<th>NAME</th>
<th>TAG</th>
<th>TYPE</th>
<th>ADDR</th>
</tr>
</thead>
<tbody>
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<td>IXLS</td>
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<tr>
<td>SPMAP</td>
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<td>IRLK</td>
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<tr>
<td>WIPKO</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***** COMMON INFORMATION *****

VAR. NAME | TYPE | REL. ADDR. | VAR. NAME | TYPE | REL. ADDR. | VAR. NAME | TYPE | REL. ADDR. | VAR. NAME | TYPE | REL. ADDR. |
|----------|------|------------|----------|------|------------|----------|------|------------|----------|------|------------|

SOURCE STATEMENT LABELS

<table>
<thead>
<tr>
<th>LABEL</th>
<th>ISN</th>
<th>ADDR</th>
<th>LABEL</th>
<th>ISN</th>
<th>ADDR</th>
<th>LABEL</th>
<th>ISN</th>
<th>ADDR</th>
<th>LABEL</th>
<th>ISN</th>
<th>ADDR</th>
</tr>
</thead>
</table>

COMPILED GENERATED LABELS

<table>
<thead>
<tr>
<th>LABEL</th>
<th>ISN</th>
<th>ADDR</th>
<th>LABEL</th>
<th>ISN</th>
<th>ADDR</th>
<th>LABEL</th>
<th>ISN</th>
<th>ADDR</th>
<th>LABEL</th>
<th>ISN</th>
<th>ADDR</th>
</tr>
</thead>
</table>

FORMAT STATEMENT LABELS

<table>
<thead>
<tr>
<th>LABEL</th>
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<th>ADDR</th>
<th>LABEL</th>
<th>ISN</th>
<th>ADDR</th>
<th>LABEL</th>
<th>ISN</th>
<th>ADDR</th>
<th>LABEL</th>
<th>ISN</th>
<th>ADDR</th>
</tr>
</thead>
</table>
SUBROUTINE C acompaniment

INTEGER MTYPE

TYPE OF OUTPUT REQUESTED

INTEGER KOUT

KIND OF OUTPUT

INTEGER NCESC

NUMBER OF RECORDS TO SKIP WITHIN FILE

INTEGER LFTCHS(4,2)

UPPER LEFT CORNER(S) OF OUTPUT

INTEGER ERR

ERROR FLAG

0 = NO ERROR(S)

1 = ERROR(S)

HISTORY

MARY TOMPKINS LEMSCO 10/30/80 ORIGINAL CODE

PURPOSE

HEAD AND ANALYZE CARDS DESCRIBING THE FOLLOWING:

FILE - DOCUMENTATION LIST OF INPUT FILES

TYPE - INPUT: FIRST NON-BLANK CHARACTER AFTER COLUMN 10

ACCEPTABLE INPUTS:

G = GROUND TRUTH

S = SUB PLEX

C = CLASSIFICATION

OUTPUT - INPUT: KIND OF OUTPUT

ACCEPTABLE INPUTS:

M = MAP

N = NUMERICAL DUMP

RECSKP - INPUT: NUMBER OF RECORDS TO SKIP WITHIN FILE

DEFAULT 01

DATE - DOCUMENTATION CURRENT DATE

SEGMENT - DOCUMENTATION SEGMENT NUMBER

AI - DOCUMENTATION ANALYST'S NAME

*END - SPECIFY THE END OF USER-DEFINED RECORDS.

EXTERNAL REFERENCES

NUMBER OF CARDS TO READ

INPAR DECLARE INTEGER PAIR(S)

EXTERNAL DECLARATIONS

INTEGER CARD

CARD READ AT A TIME

INTEGER KM

CARD HEAD CHARACTER AT A TIME

INTEGER KOUT

COUNT OF NUMBERS RETURNED FROM FUNCTION NNUM

INTEGER NDEC

DECODED NUMBER

INTEGER INC

ALLOWABLE CARD TYPES

INTEGER KAND

CARD TYPE

CRD0010

CRD1020

CRD1040

CRD1000

CRD1070

CRD1080

CRD1090

CRD1100

CRD1120

CRD0130

CRD0140

CRD0090

CRD0050

CRD0060

CRD0060

CRD0070

CRD0080

CRD0090

CRD0100

CRD0110

CRD0130

CRD0140
REQUESTED OPTIONS: NOT ECHO

OPTIONS IN EFFECT:

NAME (MAIN) OPTIM (C1) LINESCOUT (NO) SIZE (MAX) AUTONUM (NONE)
SOURCE EXODIC NOLIST NODATE OBJECT MAP NOFORMAT NUGOISTMT AHEF ALC NUNANSF NOLISTM IBM FLAG (I)

SUBROUTINE CHOPPER(INC, INCP4) RETURN

INTEGER KROP KROP CODE - MAJORITY HOLE ON FIRST IN
INTEGER IXLNT COUNT OF CODE USED AS CHOP CODE

HISTORY

CALM BBLENS LEC
MANY TOMPINS LEMSCO 11/21/80 ORIGIINAL CODE (MOP)
REDU (IBM)

PURPOSE

THIS ROUTINE IS CALLED TO MAKE THE MAJORITY HOLE DECISION
FOR THE 6 SUB-PIAFS.

EXTERNAL REFERENCES

NONE.

EXCEPTIONS

NONE.

LOCAL DECLARATIONS

INTEGER KOUNT COUNT OF CURRENT TYPE CHOP CODE

PROCEDURE

ISN 0003 C COMM/NSH/IL/NSHPX(I)
ISN 0004 C IXLNT = 0
ISN 0005 DO 20 I = 1,6
ISN 0006 KOPHT = 0
ISN 0007 IF(NSHFX(I)).EQ.NSHPX(J))KOUNT = KOUNT + 1
ISN 0008 CONTINUE
ISN 0010 IF(IKOUNT.GT.IXLNT) GO TO 20
ISN 0011 IXLNT = KOUNT
ISN 0012 KROP = NSHPX(I)
ISN 0013 IF(I XLNT.EQ.GT.3)RETURN
ISN 0014 20 CONTINUE
ISN 0015 KRETURN
ISN 0016 END

SYMBOL INTRNATIONAL STATEMENT NUMBERS

I 0005 0006 0014
J 0007 0008
KROP 0006 0014
CHKPP 0002
KOUNT 0006 0008 0008 0011 0013
IXLNT 0002 0004 0011 0013 0015
NSHPX 0003 0004 0004 0014

****FORTRAN CROSS REFERENCES LISTING****

LAREL DEFINED REFERENCES
### FORTRAN CROSS REFERENCE LISTING

<table>
<thead>
<tr>
<th>NAME</th>
<th>TAG</th>
<th>TYPE</th>
<th>ADD</th>
<th>NAME</th>
<th>TAG</th>
<th>TYPE</th>
<th>ADD</th>
<th>NAME</th>
<th>TAG</th>
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<th>NAME</th>
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#### COMMON INFORMATION

NAME OF COMMON BLOCK: *NSHPX*  SIZE OF BLOCK: 000018 HEXADECIMAL BYTES

VAR. NAME TYPE HEL. AUDH. VAR. NAME TYPE HEL. AUDH. VAR. NAME TYPE HEL. AUDH. VAR. NAME TYPE HEL. AUDH.

**SOURCE STATEMENT LABELS**

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**COMPILER GENERATED LABELS**

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**OPTIONS IN EFFECT**

- NAME(MAIN)  OPTIMIZE(1)  LINECOUNT(H)  SIZE(MAX)  AUTOBL(NONE)
- SOURCE EBCDIC NOLIST NODOCK OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NUANSP NOTERM IBM FLAG(1)
- STATISTICS*  SOURCE STATEMENTS = 18, PROGRAM SIZE = 404, SUBPROGRAM NAME = CHUMP
- STATISTICS*  NO DIAGNOSTICS GENERATED

***** END OF COMPILED *****

294K BYTES OF CODE NOT USED
OPTIONS IN EFFECT:
NAME (MAIN), OPTIMIZE (1), LINE COUNT (199), SIZE (MAX), AUTOFIX (NONE)
SOURCE PREFERENCES: LIST, INCLUDE, OBJECT MAP, RENAME, NAGSYNF, XREF, ALL.

ISN 0002
SUBROUTINE CTMAP (PIXEL MAP Offset)

---

REAL PLOXP
INTEGER MPP

---

HISTORY

CAV LAKBPS LECC

---

PURPOSE

THIS ROUTINE PROCESSES PIXEL MAPS FROM UNIVERSAL TAPES IN SIMPIXL FORM (2X45 SIM-PIXELS X 30117 LINES). THE CROP CODES HAVE ALPHANUMERIC VALUES INCORPORATED IN THEM. THE SYMBOL TO BE PROCESSED IS ACCORDING TO THE SPECIFIED OPTION.

EXTERNAL REFERENCES

CROPP EVALUATES SIMPIXL CROP CODES FOR PIXEL CODE.

---

CROPP

---

PROCEDURE

---

ISN 0003 COMMON/MAP/IXHUF(3060), IXLINE(98), IXLTAN(256)
ISN 0004 COMMON/NSIX/IXSNHFX(6)

---

READ 3 LINES INTO BUFFER

---

ISN 0005 00 00 L = 11620, 540
ISN 0006 LINEND = L + 530
ISN 0007 READ(1), 1000, END=4900 (IXHUF(K) = L: LINEND)
ISN 0008 1000 FORMAT(T1R81811))
ISN 0009 70 CONTINUE
ISN 0010 C IXLNB = -470 + MPP
ISN 0011 C LOOP FOR EACH PIXEL IN LINE
ISN 0012 C MPPVL = 1
*LEVEL 2.3.0 (JHFF 79)*

| ISN 0013 | 00 100 I = 1#4 |
| ISN 0014 | IXCAN = 0 |
| ISN 0015 | IXADJ = IXLANJ + 2 |

**COMPILERS ON EACH LINE**

| ISN 0016 | ( ) |
| ISN 0017 | IXCT2 = IXLANJ + J |
| ISN 0018 | IXCT1 = IXCT2 |

**SUPRIMES FROM ALL LINES -- RESTORE CROP CODES**

| ISN 0019 | 00 40 K = 13 |
| ISN 0020 | IXCT1 = IXCT3 & 540 |
| ISN 0021 | IXMN = IXMN(IXCT1) |
| ISN 0022 | KROP = KROP + 128 |

**IAM ADJUSTMENT**

| ISN 0023 | IF(KROP,GT,45)KROP = KROP - 256 |
| ISN 0024 | IF(KROP,NE,0)KROPV = KROP |
| ISN 0025 | IXCAN = IXCAN + 1 |
| ISN 0026 | NSUPRIM(IXCAN) = IXMN(KROPV) |
| ISN 0027 | 40 CONTINUE |

**CALL KROP FOR THE MAJORITY RULE CONVERSION**

| ISN 0028 | CALL KROP(KROP,IXLCT) |
| ISN 0029 | IXMN(1) = KROPV |
| ISN 0030 | 900 RTURN |

**FORTRAN CROSS REFERENCE LISTING**

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<td>K</td>
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**** COMMON INFORMATION ****

NAME OF COMMON BLOCK * MAP* SIZE OF BLOCK 00117C HEXADECIMAL BYTES

NAME OF COMMON BLOCK *NSPIXL* SIZE OF BLOCK 00001H HEXADECIMAL BYTES

SOURCE STATEMENT LABELS

LABEL ISN ADDR LABEL ISN ADDR LABEL ISN ADDR LABEL ISN ADDR
90 10 000140 40 11 000234 96 32 00023E 100 35 000260

COMPILER GENERATED LABELS

LABEL ISN ADDR LABEL ISN ADDR LABEL ISN ADDR LABEL ISN ADDR
100001 7 00012C 100002 7 00014C 100003 8 000158 100004 8 00016C
100007 11 000154 100008 12 000176 100009 17 0001FC 100010 20 00020A
100011 24 0001E2 100012 25 0001FC 100013 26 00021F 100014 29 00020B
100015 24 00020F 100016 29 000212 100017 33 000248

FORMAT STATEMENT LABELS

LABEL ISN ADDR LABEL ISN ADDR LABEL ISN ADDR
1000 10 0002A8

*OPTIONS IN EFFECT: NAME (MAIN) OPTIMIZE (2) LINECOUNT (NO) SIZE (MAX) AUTOOMIT (NONE)

*OPTIONS IN EFFECT: SOURCE FODIC VOLIST NODS OBJECT MAP NOFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG (I)

*STATISTICS* SOURCE STATEMENTS = 34, PROGRAM SIZE = 706, SUBPROGRAM NAME = GMAP

*STATISTICS* NO DIAGNOSTICS GENERATED

***** END OF COMPILATION *****
SUBROUTINE INTPAR(LETTERS,IFPAR)

INTEGER LETTERS(100,10)  \* LEFT CORNER(S) OF OUTPUT ERROR FLAG
INTEGER IFPAR

I - NO ERROR(S)  \* 1 - ERROR(S)

HISTORY

MARY TOMPKINS  \* LEMSCU  10/27/80  \* ORIGINAL CODE

PURPOSE

READ AND INTERPRET CARDS CONSISTING OF A PAIR OF NUMBERS SEPARATED BY COMAS.

EXTERNAL REFERENCES

NONE.

EXCEPTIONS

IF A NON-NUMERIC CHARACTER OTHER THAN A BLANK WHICH IS
IGNORRED OR A COMMA WHICH IS USED AS A SEPARATOR IS
FOUND A MESSAGE IS ISSUED AND IFPAR = 1.

LOCAL DECLARATIONS

INTEGER KARO  \* CARD HEAD WORD AT A TIME
INTEGER KHAM  \* CARD KIND CHARACTER AT A TIME
INTEGER TYPE  \* TYPE OF OUTPUT REQUESTED
INTEGER KOUT  \* KIND OF OUTPUT
INTEGER UNIT  \* POWER OF 10 UNIT
INTEGER NUMER  \* DIGIT VALUE OF CHARACTER
INTEGER INT(1)  \* CHARACTER DIGITS

DATA (BLANK,'/','KOMMA','/','IND','SEND')/

ZERO FILL LEFT CORNER ARRAY

D) J = 1
D) J = 1\*2
LETTERS(J,J) = 0
CONTINUE
IS CONTINUE

READ CARDS AND PLACE CARD IN RHEAD BUFFER

DO 30 NOV = 1,12
READ(12,1000)FIND(1,1)=1,20
IS NOV
1000 FORMAT(26A1)
IS NOV
READ NOV
30 CONTINUE

IF CARD IS NOT SEND ASSUME IT CONTAINS A PAIR OF NUMBERS

*LEVEL 7.3A (JUNE 78)  \* 05/360 FORTAN IV EXTENDED

DATE 81,139/13,25,09  \* PAGE 1
REQUEST EXECUTION OPTIONS: NOTERM
OPTIONS IN EFFECT: NAME(HX001) OPTIMIZE(1) LINECOUNT(80) SIZE(MAX) AUTOUNIT(NONE)
SOURCE ENDIC NO LSTM NDECK OBJECT MAP NFORMAT NOGOSTMT XREF ALC NOANSF NOTERM IBM FLAG(1)

ISN 0002

SUBROUTINE KUSKLA(MOFFS)

INTEGER MOFFS OUTPUT OFFSET

HISTORY

CARL KLERS LEC 11/21/80 ORIGNL CODE (PDP)
MARY TOMPKINS LEMSCO 11/21/80 REDO (IBM)

PURPOSE

REFERENCES

EXTERNAL REFERENCES

NONE.

EXTERNAL NAMESPACE

NONE.

LOCAL DECLARATIONS

INTEGER KALRYT, IXNUM, PIXEL NUMBER

PROCEDURE

ISN 0003

LOGICAL IXLBUF
COMMON/IAXL/IXLBUF(3060),IXLNUMBER(3060)

ISN 0004

READ ONE LINE OF SEGMENT

ISN 0005

READ(I1,10000)(IXLBUF(I1),I = 1,3060)

ISN 0006

GET PIXEL TRANSFORMATION FOR OUTPUT

ISN 0007

KALRYT = 72 * MOFFS

ISN 0008

DO 100 I = 1,98

ISN 0009

IXLNUMBER = I

ISN 0010

IF(IXLBUF(I1),I1 = IXLNUMBER)

ISN 0011

100 CONTINUE

ISN 0012

RETURN

ISN 0015

*** FORTRAN CROSS REFERENCE LISTING *******

SYMBOL INTERNAL STATEMENT NUMBERS

MOFFS 0005 0007 0010 0011
IXLBUF 0003 0004 0005 0010 0011
IXLINE 0004 0010 0011
IXLNUMBER 0008 0010 0011
IXLTRAN 0004 0010
*LEVEL 2.3.0 (JUNE 78)  KUSKLA  05/360  FOWTHAN M EXTENDED  DATE 11.139/13.25.73  PAGE 2

### SYMBOL INTERNAL STATEMENT NUMBERS

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#### NUMBER FIELD LEVEL

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*THE EXPRESSION USES A LOGICAL VARIABLE WITH A RELATIONAL OPERATOR.*

#### OPTIONS

- OPTIONS IN EFFECT: NAME (MAIN) OPTIMIZE (LINECOUNT) (NO) SIZE (MAX) AUTODATE (NONE)
- OPTIONS IN EFFECT: SOURCE ERROR NO OTHEK OBJECT MAP INFORMAT NOGRSTXT XREF LAC NOANSF NOTEHM IBM FL/G (I)
- STATISTICS: SOURCE STATEMENTS = 14 PROGRAM SIZE = 390 SUBPROGRAM NAME = KUSKLA
- STATISTICS: 1 DIAGNOSTICS GENERATED: HIGHEST SEVERITY CODE IS 4

#### END OF COMPILATION

292K BYTES OF CORE NOT USED
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<td>4000021</td>
<td>4000021</td>
<td>4000021</td>
<td>4000021</td>
</tr>
</tbody>
</table>

*OPTIONS IN EFFECT: NAME = MAIN, OPTIMIZE = 1, LINECOUNT = NO, SIZE = MAX, AUTORUN = NONE.*

*OPTIONS IN EFFECT: SOURCE = EDC, MOLIST = NODECK, OBJECT = MAP, INFORMAT = 1, XREF = ALC, MODNSF = NOTERM, IBM = FLAG.*

*STANDARD STATISTICS = 1, FILESTATEMENTS = 21, PROGRAM SIZE = 500 +, SUBPROGRAM NAME = NAME.*

*STANDARD STATISTICS = NO, DIAGNOSTICS = GENERATED.*

***** END OF COMPILATION *****

54K BYTES OF CORE NOT USED
**LEVEL 2.3.0 (JUN 78)**

**SPMAP**

03/160 FORTRAN M EXTENDED

**DATE 01.139/13.30.12**

**PAGE 2**

---

```fortran
C FOR USE ON 144 IF HH NOT BEEN SET.
C INCH W 72 * MROFS
ISN 0011
C KINHT = 72 * MROFS
KINHT = 72
ISN 0014
C
ISN 0015
C IF(KN HT, GT, 255) KNOF = KN0F - 256
ISN 0016
C IF(KHAF, NE, 0) P1XROF = PXROF + 1
ISN 0021
C
ISN 0025
C INCR(I) = INC(I) + 1
ISN 0029
C 20 CONTINUE
ISN 0057
C RETURN
ISN 0028
C
SYMBOL
INTERNAL STATEMENT NUMBER
I 0008 0012 0012 0015 0016 0025
J 0009 0004 0009
KNS 0002 0005
LNS 0007 0004
LNF 0007 0004
KNP 0017 0016 0014 0014 0014 0021 0021
LNF 0002 0004 0007
MROFS 0002 0013
CMAP 0005
ILNHT 0003 0015 0009 0012 0017
XLNHT 0004 0025
XLNID 0006 0017
XLPY 0004 0035
XLPY 0004 0014
XLPY 0004 0036
XLPY 0004 0014
XLPY 0004 0021 0025
PXROF 0002 0024 0021
```

---

**FORTRAN CROSS REFERENCE LISTING**

---

**LABEL DEFINED REFERENCES**

10 0011 0004
20 0026 0015
100 0012 0009
1000 0010 0009 0012

---

**SPMAP / SIZE OF PROGRAM 00257 HEXADECIMAL BYTES**

```plaintext
/  SPMAP /  SIZE OF PROGRAM 00257 HEXADECIMAL BYTES

---

**COMMON INFORMATION**

**NAME OF COMMON BLOCK * MAP SIZE OF BLOCK 00117C HEXADECIMAL BYTES**

VAR. NAME TYPE REL. ADDR. VAR. NAME TYPE REL. ADDR. VAR. NAME TYPE REL. ADDR.

---

**SOURCE STATEMENT LABELS**

LARFL ISN ADDR LARFL ISN ADDR LARFL ISN ADDR LARFL ISN ADDR LARFL ISN ADDR
10 11 00015C 100 12 00016 20 25 0001NC

---

**COMPILER GENERATED LABELS**

LARFL ISN ADDR LARFL ISN ADDR LARFL ISN ADDR LARFL ISN ADDR
FILE: SGMAP EXEC

HISTORY
----------
MADY TOMPSON 11/24/73 ORIGINAL CODE

METHOD
--------
THIS EXEC IS USED TO EXECUTE THE SGMAP PROGRAM. THE ACCEPTABLE
ARGUMENTS TO THE EXEC ARE:

ARGUMENT   DATA ON DISK   DATA ON TAPE
A1  SYMBOL FILE NAME   SYMBOL FILE NAME
A2  SYMBOL FILE TYPE   SYMBOL FILE TYPE
A3  CC FILE NAME       CC FILE NAME
A4  INTRO DATA FILENAME TAPE NUMBER
A5  DATA FILE TYPE     FILE # ON TAPE
A6  DATA FILE NAME     TAPE INTEGRITY (OPTIONAL)

BOTH CC FILE AND SYMBOL FILE ARE REQUIRED TO BE ON THE USERS A DISK.

EXCEPTIONS
----------
ERROR MESSAGES FOLLOWED BY PROGRAM TERMINATION ARE FOR
FOLLOWING REASONS:
1. NO TEMP DISK AVAILABLE.
2. WRONG PARAMETER COUNT.
3. NON-NUMERIC TAPE NAME.
4. UNSUCCESSFUL TAPE MOUNT.
5. UNEXPECTED INPUT.

PROCEDURE
----------
TAG OFF PRINTED INPUT.
SGMAP INIT WANTS CONTROL AND TO RCS
GLOBAL TLTH CMLTH FTPMMD.
CP QUERY VIRTUAL 192
LTF AGETC0DF NE 0 GFDISK TEMP 2M CLEAR
CP QUERY VIRTUAL 192
LIF AGETC0DF NE 0 ATYPE NO TEMP DISK AVAILABLE.
LIF AGETC0DF NE 0 EXIT 1

ASPACE 5
ATYPE SYMBOL FILE: A1 A2 A
ATYPE CC FILE: A3 A4 A
ATYPE INPUT DATA: A5 A6 A
ETAPRN = 1000

CHECK FOR ACCEPTABLE PARAMETER COUNT.
LIF LNTOPY FO 5 AQUITO -TAPE
LIF LNTOPY FO 6 AQUITO -CONT
ATYPE TOO MANY = TOO FEW INPUTS
EXIT 2

-CONT LIF A4 FO 600 AQUITO -TAPE
LIF A4 FO 1200 AQUITO -TAPE
LIFST = APTATYPE A4
LIF LIFST EO CHAK AQUITO -DISC
ATYPE A4 NOT THE INPUT EXPECTED.
EXIT 3

DATA IS ON TAPE - TEST LIF TAPE NAME IS NUMERIC
- TAPE LTEST = APTATYPE A4
LIF LTEST EO NUM AQUITP 2
ATYPE ILLLEGAL TAPE NUMBER A4

-
EXIT 0

IF AK = NULL THEN SET TAPDEN = AK
IF KINDEF EO = TAPDEN = AK

IF TAP HAS NOT BEEN USED IN A PREVIOUS RUN A DISK FILE WILL
EXIST. DO NOT MOUNT AND TRANSFER DATA.

AKN = COMCAT AK AS
STATE LDM DATA 0
IF LOFTCONF NE 0 SKIP 0
AK = AKN
AK = DATA
AK = 0
AGOTO = DISC

IF NO DISC FILE EXIST THEN MOUNT TAPE - TRANSFER TAPE FILE TO
DISK.

TAPMOUNT AK TAP 0 TAPDEN
IF LOFTCONF NE 0 TAPMOUNT NOT MADE
IF LOFTCONF NE 0 EXIT 0
AK = AK
TAPMOUNT 0
IF AK = 0 AGOT 2
TAPE 0
FILEDEF INMOVE TAP 0 (HLSIZE 3060 RECFS U PERM 0 TAPDEN
FILEDEF OUTFIND DISK AKN DATA 0 (HLSIZE 3060 RECFS U PERM
HOLDFILE
DEF 141
AK = AKN
AK = DATA
AK = 0

GENERATE FILEDEF:

UNIT 0 FILE DEFINITION
UNIT 1 OUTPUT FROM CC FILE SYMBOL TABLE
UNIT 2 INPUT DATA
UNIT 3 INPUT CC FILE
UNIT 4 INPUT SYMBOL TABLE
UNIT 5 CAP OUTPUT
UNIT 6 NEW DATA UNIT

-DISC CONTINUING
FILEDEF FT10F01 DISK AK AKN DATA 0 (HLSIZE 3060 RECFS U PERM
FILEDEF FT10F01 DISK AK AKN DATA 0 (HLSIZE 3060 RECFS U PERM
FILEDEF FT10F01 DISK OUT CC O (HLSIZE 133 RECFS U PERM
FILEDEF FT10F01 DISK OUT DATA O (HLSIZE 133 RECFS U PERM
FILEDEF FT10F01 DISK FILE FT10F01 O (HLSIZE 133 RECFS U PERM

BEGIN EXECUTION

LOAD SIMAP (FILES SIMAP START

EXECUTION COMPLETE -- WRAP-UP

PRINT OUT CC O LCC
PRINT OUT DATA O LCC
SPool PRINTN EV LCC
EXIT

END
APPENDIX D
SAMPLE OUTPUT
ORIGINAL PAGE IS
OF POOR QUALITY