LARGE-SCALE TEST OF A VIDEO DIGITIZING PROCEDURE FOR GROUND-DATA LABELING OF LANDSAT PIXELS

BY

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U.S. DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C.

1984
TOPICS

SRS CROP-ACREAGE ESTIMATION PROCEDURES
- WITHOUT LANDSAT DATA
- WITH LANDSAT DATA

DIGITIZATION REQUIREMENTS

MANUAL DIGITIZATION CHARACTERISTICS

VIDEO DIGITIZATION
- APPROACH
- EQUIPMENT
- FEASIBILITY STUDY
- LARGE-SCALE TEST
AREA FRAME SAMPLING

'AREA FRAME CONSTRUCTION

-LAND-USE STRATIFICATION

Intensively Cultivated,
Extensively Cultivated,
Residential, Urban,
Rangeland, Water

-DETERMINATION OF

\[ N_H = \text{potential number of area sample units in stratum } H \]

'SAMPLE SELECTION

\[ N_H = \text{sampled number of area sample units (segments) in stratum } H \]

'ORDER SEGMENT AERIAL PHOTOGRAPHS

'INTERVIEWS WITH SEGMENT FARM OPERATORS

'KEYPUNCH QUESTIONNAIRE DATA
<table>
<thead>
<tr>
<th>STRATUM</th>
<th>POPULATION SIZE</th>
<th>SAMPLE SIZE</th>
<th>AVERAGE SEGMENT SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>25028</td>
<td>170</td>
<td>1.00 sq. mile</td>
</tr>
<tr>
<td>12</td>
<td>21704</td>
<td>120</td>
<td>1.00 sq. mile</td>
</tr>
<tr>
<td>20</td>
<td>21286</td>
<td>100</td>
<td>1.00 sq. mile</td>
</tr>
<tr>
<td>31</td>
<td>2774</td>
<td>12</td>
<td>.25 sq. mile</td>
</tr>
<tr>
<td>32</td>
<td>2941</td>
<td>12</td>
<td>.10 sq. mile</td>
</tr>
<tr>
<td>33</td>
<td>247</td>
<td>2</td>
<td>.25 sq. mile</td>
</tr>
<tr>
<td>40</td>
<td>3147</td>
<td>15</td>
<td>4.00 sq. mile</td>
</tr>
<tr>
<td>50</td>
<td>294</td>
<td>2</td>
<td>1.00 sq. mile</td>
</tr>
<tr>
<td>61</td>
<td>29</td>
<td>2</td>
<td>.50 sq. mile</td>
</tr>
<tr>
<td>62</td>
<td>231</td>
<td>0</td>
<td>1.00 sq. mile</td>
</tr>
<tr>
<td>TOTAL</td>
<td>77,681</td>
<td>435</td>
<td></td>
</tr>
</tbody>
</table>
## SECTION A - ACREAGES OF FIELDS AND CROPS INSIDE BLUE TRACT BOUNDARY

### TOTAL ACREAGES

<table>
<thead>
<tr>
<th>FIELD NUMBER</th>
<th>027 1</th>
<th>027 2</th>
<th>027 3</th>
<th>027 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ACRES IN FIELD</td>
<td>45.0</td>
<td>10.0</td>
<td>1.0</td>
<td>56.0</td>
</tr>
</tbody>
</table>

### CROP OR LAND USE (Specify)

| WOODS, WASTE, IDLE LAND, ROADS, DITCHES, ETC. (Less than 5.0 acres) | 2.5 | 2.5 | 2.5 | 2.5 |
| WASTE, IDLE LAND, ROADS, DITCHES, ETC. (5.0 acres or more) | 10.0 | 10.0 | 10.0 | 10.0 |
| WOODS, (Including grazed wood land) (10.0 acres or more) | 1.0 | 1.0 | 1.0 | 1.0 |

### OCCUPIED FARMSTEAD OR DWELLING

<table>
<thead>
<tr>
<th>PASTURE</th>
<th>NO</th>
<th>NO</th>
<th>NO</th>
<th>NO</th>
</tr>
</thead>
</table>

### TWO CROPS PLANTED IN THIS FIELD for harvest this year or two uses of the same crop?

| ACRES LEFT TO BE PLANTED? | 61.0 | 61.0 | 61.0 | 61.0 |

### DURUM WHEAT - Planted and to be planted

<table>
<thead>
<tr>
<th>WINTER WHEAT</th>
<th>Planted</th>
<th>For Grain</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLEY</td>
<td>Planted and to be planted</td>
<td>For Grain</td>
</tr>
<tr>
<td>CORN</td>
<td>Planted and to be planted</td>
<td>For Grain</td>
</tr>
<tr>
<td>SORGHUM (Excl. cresses)</td>
<td>Planted and to be planted</td>
<td>For Grain</td>
</tr>
</tbody>
</table>

### OTHER USES OF GRAINS PLANTED

#### Use

- Acres abandoned, cut for hay, silage, etc.
- Cut and to be cut HAY
- OTHER HAY Kind
- Acres

#### Use

- ALFALFA and ALFALFA MIXTURES
- OTHER CROPS
- Land in summer fallow

#### Ingredient

- COTTON UPLAND
- SUGAR BEETS
- POTATOES
- OTHER CROPS Acres planted or in use

### Field Numbers

<table>
<thead>
<tr>
<th>FIELD NUMBER</th>
<th>027 1</th>
<th>027 2</th>
<th>027 3</th>
<th>027 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ACRES IN FIELD</td>
<td>45.0</td>
<td>10.0</td>
<td>1.0</td>
<td>56.0</td>
</tr>
</tbody>
</table>

### Crop or Land Use (Specify)

| WOODS, WASTE, IDLE LAND, ROADS, DITCHES, ETC. (Less than 5.0 acres) | 2.5 | 2.5 | 2.5 | 2.5 |
| WASTE, IDLE LAND, ROADS, DITCHES, ETC. (5.0 acres or more) | 10.0 | 10.0 | 10.0 | 10.0 |
| WOODS, (Including grazed wood land) (10.0 acres or more) | 1.0 | 1.0 | 1.0 | 1.0 |

### Occupied Farmstead or Dwelling

<table>
<thead>
<tr>
<th>PASTURE</th>
<th>NO</th>
<th>NO</th>
<th>NO</th>
<th>NO</th>
</tr>
</thead>
</table>

### Two Crops Planted in This Field for Harvest this Year or Two Uses of the Same Crop?

| Acres Left to Be Planted? | 61.0 | 61.0 | 61.0 | 61.0 |

### Durum Wheat - Planted and to Be Planted

<table>
<thead>
<tr>
<th>Winter Wheat</th>
<th>Planted</th>
<th>For Grain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rley</td>
<td>Planted and to be planted</td>
<td>For Grain</td>
</tr>
<tr>
<td>Corn</td>
<td>Planted and to be planted</td>
<td>For Grain</td>
</tr>
<tr>
<td>Sorghum (Excl. cresses)</td>
<td>Planted and to be planted</td>
<td>For Grain</td>
</tr>
</tbody>
</table>

### Other Uses of Grains Planted

#### Use

- Acres abandoned, cut for hay, silage, etc.
- Cut and to be cut HAY
- Other Hay Kind
- Acres

#### Use

- Alfalfa and Alfalfa Mixtures
- Other Crops
- Land in summer fallow
CROP AREA ESTIMATION

WITHOUT LANDSAT DATA

1. Area Frame Sampling

2. Estimates based on ground data only

WITH LANDSAT DATA

1. Area Frame Sampling

2. Landsat data registered scene-to-map

3. Segment Landsat and ground data used to develop per-pixel classifier (This step requires digitized ground data.)

4. Regression relationship developed between ground data and classification results

5. Entire Landsat scene classified

6. Estimates based on ground data, classification results, regression relationship
- Soybeans

SEGMENT= 5029

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1851</td>
<td></td>
</tr>
<tr>
<td>1852</td>
<td></td>
</tr>
<tr>
<td>1853</td>
<td></td>
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<tr>
<td>1854</td>
<td></td>
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<td>1855</td>
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<td>1856</td>
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<td>1857</td>
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<td>1858</td>
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<td>1860</td>
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<td>1861</td>
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<td>1862</td>
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<td>1863</td>
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<td>1864</td>
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<td>1865</td>
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<td>1867</td>
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<td>1868</td>
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<td>1869</td>
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<td>1870</td>
<td></td>
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<tr>
<td>1871</td>
<td></td>
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<tr>
<td>1872</td>
<td></td>
</tr>
<tr>
<td>1873</td>
<td></td>
</tr>
<tr>
<td>1874</td>
<td></td>
</tr>
</tbody>
</table>
LANDSAT image

registration (every scene)

Map

photo calibration
(first project year + new segs)

photo

digitization (every year)

digitized TES segment
DIGITIZATION REQUIREMENTS

PHOTO CHARACTERISTICS

24" x 24", 8"/MILE

<table>
<thead>
<tr>
<th>Digitized Data</th>
<th>Mean ± S.D</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertices/Photo</td>
<td>90 ± 47</td>
<td>9</td>
<td>225</td>
</tr>
<tr>
<td>Fields/Photo</td>
<td>14 ± 6</td>
<td>3</td>
<td>27</td>
</tr>
</tbody>
</table>

QUANTITY

3 Winter Wheat States: 850 photos
4 Summer Planted States: 1350 photos

TIMETABLE

<table>
<thead>
<tr>
<th></th>
<th>Start</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter Wheat States</td>
<td>Mid-June</td>
<td>Mid-Aug</td>
</tr>
<tr>
<td>Summer Planted States</td>
<td>Mid-June</td>
<td>Mid-Sept</td>
</tr>
</tbody>
</table>
MANUAL DIGITIZATION

EQUIPMENT

'42" x 60" DIGITIZING TABLET CONNECTED TO MICROCOMPUTER
'TERMAL PLOTTER CONNECTED TO MICROCOMPUTER
'MODEM

PROCEDURE

PREPARATION (ONE TIME)
-CALIBRATION VIA TABLET DIGITIZATION OF MAP AND PHOTO CORRESPONDING POINTS

PRODUCTION (ANNUAL)
-OVERLAY WITH ACETATE AND MARK VERTICES
-DIGITIZE VERTICES OF EACH FIELD IN CLOCKWISE DIRECTION
   (DIGITIZE HOLES IN COUNTER-CLOCKWISE DIRECTION).
-CHECK BY PLOTTING AT BOTH SOURCE AND MAP SCALES.

PRODUCTION RATE

6 TO 8 PHOTOS/DAY
A diagram showing the flow of a system:

- **Vidicon Camera**
  - 1" vidicon
  - 25 mm lens
  - red filter

- **Grinnell Image Processor**

- **Joy stick**

- **Monitor**

- **PDP-11/44**

- **9-track Tape**

- **Printed Printer**
VIDEO DIGITIZATION PROCEDURE

PREPARATION (ONE TIME)

'Placement of calibration marks (C.M.'s) on photos

'Photo calibration via tablet digitization of map and photo corresponding points

'Tablet digitization of C.M.'s

PRODUCTION (ANNUAL)

'Overlay with acetate and prepare segment tracing

- Tract boundaries: blue
- All other boundaries: black
- Letters, numbers: red
- C.M.'s: black
VIDEO DIGITIZATION PROCEDURE (CONT)

SCANNING (INTERACTIVE)
- VIDEO IMAGING
- INTERACTIVE THRESHOLDING
- WRITE TO DISK

CONNECTIVITY ANALYSIS AND THINNING (BATCH)

PRINT THINNED IMAGE AND CHECK AGAINST TRACING

FIELD LABELING
- OPERATOR Assigns TRACT AND FIELD IDENTIFIERS TO DISPLAYED POLYGONS

MASK GENERATION (BATCH)
- INPUT: Labeled scan data,
  C.M. calibration data,
  Scene-to-map registration coefficients
- OUTPUT: Run-length encoded field labels for Landsat pixels
  I.E. A MASK
VIDEO DIGITIZATION CONCEPTS

- PIXEL-TO-PIXEL MAPPING
- CALIBRATION MARKS (C.M.'s)

PIXEL-TO-PIXEL MAPPING

SEVERAL SCAN PIXELS MAP INTO ONE LANDSAT PIXEL
CALIBRATION MARKS

photo calibration
and tablet
digitization of C.M.'s

C.M.'s in map coords

coordinate transformation
using scene-to-map
registration coefficients

C.M.'s in LANDSAT COORDS

processing of scan data

C.M.'s in SCAN COORDS

PERMITS TRANSFORMATION BETWEEN SCAN AND LANDSAT COORDS
RESULTS

Feasibility Study

"Proof-of-concept processing
- Scanning at University of Maryland
- Scan data written to tape
- Mask generation on DEC-10

"5 Segments

"Video digitization labels fewer Landsat pixels as being pure pixels
than does tablet digitization:

\[
\frac{\text{\# Video Pure Pixels}}{\text{\# Tablet Pure Pixels}} = 75\% - 95\%
\]
RESULTS

LARGE-SCALE TEST

IN-HOUSE SCANNING AND PROCESSING

1983

- Three states (CO, AR, IL) - 676 photos
- Daily Operation:
  8-10: Labeling; check plots
  10-12: Scanning
  12-1: Thinning
  1-3: Scanning
  3→: Thinning
- Averages
  Scanning: 3 min/photo
  Labeling: 6 min/photo
  Completed segments: 18 segments/day
- Major difficulty: file transfer
- Successful test for Thematic Mapper resolution

1984

- Five states (1983 + OK, IA) - 1335 photos
- Goals
  - Average 26 completed segments/day
  - Simultaneous scan and label
PROGRAM AND FILE FLOW COMPARISON

**TABLET**

```
| Tablet | Digitization of 5 Cal Marks! |
```

```
| SVCAL | prog. | PHOTOS |
```

```
| SEGNET | files | Tablet | Digitization |
```

```
| SVCAL | pgm to Network | files |
```

```
| SEGMENT | Network | files |
```

```
| $CHVERT | (file transfer to 11-44) |
```}

**VIDEO**

```
| Calibration | Mark Network |
```

```
| for BACK- | files |
```

```
| EDITOR | CALIBRATION |
```

```
| CREATION (NEW!) |
```

```
| CALIBRATION MARK | COORDINATES |
```

```
| FILES (CMC) bundle |
```

```
| >RUN |
```

```
| \sszzzz.1CM |
```
@<SRS>EDITOR

EDITOR VERSION 5.65, DECEMBER 26, 1983

TODAY IS Friday, January 27, 1984 15:39:43-EST

!LOG
2: NUMBER
2: IDENTIFIER
2: null... (EOF)... LOGGING IDENTIFIER=VD
1: REGISTRATION AND DIGITIZATION FUNCTIONS
2: VIDEO DIGITIZATION FUNCTIONS
3: CALIBRATION CREATION

"ENTER STATE AND YEAR ID OR URL ONLY FOR NON-STANDARD: IL83"

SEG CAL MARK output file is TEST.SCM [New file]
USE OTHER DIRECTORIES? N
SELECT REGION? (Y OR N) N
SEGMENT NUMBER: 181

SEGMENT 181, PART 1 OF 2
1 FIELDS, 5 EDGES, 5 Vertices.
TOTAL SEGMENT ACREAGE: 1790.0 ACRES.
SEGMENT SCALE IS 1: 7968
(ONE INCH TO 0.13 MILES.)

SEGMENT 181, PART 2 OF 2
1 FIELDS, 5 EDGES, 5 Vertices.
TOTAL SEGMENT ACREAGE: 1414.1 ACRES.

WARNING, NSCALE 1: 7940, VSSCALE 1: 8037, DIFFER BY MORE THAN 1 PERCENT
SEGMENT SCALE IS 1: 7988
(ONE INCH TO 0.13 MILES.)
(THIS IS LAST PART OF SEGMENT FILE.)

SEGMENT NUMBER=

ACCESS OTHER FILES? (y or n) N
181 1 2 ILS3 SE -
5
4.674905E6,730350.4,42.1543,90.21027
4.674651E6,726724.4,42.19308,90.25423
4.676505E6,72654.8,42.20981,90.25565
4.676872E6,730371.3,42.21199,90.20923
4.678975E6,730474.4,42.21199,90.20759
161 2 2 ILS3 SE -
5
4.678275E6,730386.3,42.18508,90.21064
4.673752E6,726810.9,42.18455,90.25232
4.675494E6,726899.1,42.20081,90.25179
4.675544E6,730078.5,42.20013,90.2133
4.675546E6,730181.7,42.20015,90.21205

HEL ZUTT
Password:

RSX-11M BL32 [1,54] System RSX11M
27-JAN-84 15:15:1 Logged on Terminal TT3:

RUN #1 TRANS
REMOTE TTY DEVICE NUMBER = 6
TALK: (ENTER !! FOR HELP)

(enter a "B"
BBN-------BANNER
(enter E)

string

...
BEN-TENEX 1.35.13, BBN-SYSTEM-B EXEC 1.54.2

LOGIN ZUTTERMEISTER (PASSWORD) (ACCOUNT #) 2112421

pre

width 80

END FORMFEED

@ JOB 21 ON TTY12 27-Jan-84 16:05

PREVIOUS LOGIN: 27-Jan-84 15:36

<SRS2>TM1.SAV:83165

NAME OF FILE TO BE TRANSFERRED: TEST.SCM

(old version)

BYTE SIZE OF FILE: 7

AIR

LOCAL FILE NAME = TEST.SCM

ASK

TALK. (ENTER?! FOR HELP)

NAME OF FILE TO BE TRANSFERRED:

COUT

TENEX will go down Sat 1-28-84 0755 til Sat 1-28-84 0830
due to scheduled hardware work by CPRTR

KILLED JOB 21. USER ZUTTERMEISTER, ACCT !2112421, TTY 12, AT 1/27/84 1607

USED 0:0:4 IN 0:1:49

!G

TTY -- STOP

RUN $CMVRY

INPUT SEGMENT CAN-MARK FILE: TEST.SCM

CM FILE IL181.1CM OPENED AND CLOSED

CM FILE IL181.2CM OPENED AND CLOSED

PROCESS ANOTHER INPUT FILE? (Y OR N) - N

>TYPE IL181.1CM

181 1 2 IL83

-4.674905E6,730350.4,42.1943,90.2112
-4.674651E6,725724.4,42.19308,90.25423
-4.67505E6,728546.9,42.20981,90.25565
-4.67872E6,730371.3,42.21199,90.20923
-4.676875E6,730474.4,42.21189,90.20782

>
In the event that not all Ses/Cal Network files can be found at BBN, there is a way to convert existing *.pcm files on the 11/44 to the new format. File transfer the appropriate PCAL-3 file from BBN to 11/44, make sure that the *.pcm files are on line in the appropriate directory, and execute

">RUN $CMFIXIT"

An example follows:

>RUN $CMFIXIT
ENTER TWO LETTER STATE CODE-IL {IL,IA,CO,AR,OK--only are allowed}
INPUT P-CAL FILE IS----.----.---- {11/44 file name of the PCAL-3 file.}
GIMME A FILE NAME CRLF TO QUIT-xxxx.pcm {xxxx=seq num; p=part; local 11/44 name}
GIMME A FILE NAME CRLF TO QUIT- {enter more file names if appropriate--they must be in same scene PCAL-3 area}

>TYPE 5144.1CM
5144 1 1
40421-16050
5
4.427967E6, 304517.7, 2295.6, 1243.081
4.428162E6, 301624.8, 2302.737, 1192.653
4.43135E6, 301517, 2248.228, 1179.11
4.431211E6, 304213.8, 2240.975, 1225.984
4.43206E6, 304310.2, 2240.705, 1227.638
2240, 1179, 2303, 1244

>TYPE IL5144.1CM
5144 1 1"IL83
{This is the old format file with
UTM and row/col info which depended
on the particular PCAL-3 used.)

>TYPE 5144.1CM
5144 1 1
40421-16050
5
4.427967E6+06, 3.045177E+05, 3.998125E+01, 8.928884E+01
4.428162E6+06, 3.016248E+05, 3.998233E+01, 8.932272E+01
4.431350E+06, 3.015170E+05, 4.001099E+01, 8.932504E+01
4.431211E+06, 3.042138E+05, 4.001037E+01, 8.929344E+01
4.431206E+06, 3.043102E+05, 4.001035E+01, 8.929232E+01

{This is the new format which has
UTM and Lat/Long both independent
of the PCAL-3 used.)
FILE TRANSFER FROM BBN TO THE 11-44

>HELLO ZUTTERMEISTER
Password:

RSX-11M BL32 [1,54] System RSX11M
21-JUN-83 10:19 Logged on Terminal TT3:

Good Morning

@LOGIN.CMD
>SET /MCR=TI:
>SET /BUF=TI:80.
>SET /ECHO=TI:
>SET /LOWER=TI:
>SET /HFILL=TI:5
>SET /DCL=TI:
>^E <EDF>
>RUN $FTRANS
REMOTE TTY DEVICE NUMBER = 6
TALK. (ENTER !! FOR HELP)
^C
Trying

BBN-TENEX 1.35.12, BBN-SYSTEM-B EXEC 1.54.2
@LOGIN ZUTTERMEISTER (PASSWORD) (ACCOUNT 0) 2112421
@raise
@width 80
@formfeed
@ JOB 20 ON TTY20 21-Jun-83 10:23
PREVIOUS LOGIN: 21-Jun-83 08:07
@<SRS2>T011.SAV;83165

NAME OF FILE TO BE TRANSFERRED:AD35G.SEG-CALMARK/C082
[Old version]

BYTE SIZE OF FILE:7
AAA!
LOCAL FILE NAME = AD35G.SCH
ANAAAAAW
{ FOR YOUR A= ACKNOWLEDGE; N= NOT ACKNOWLEDGE}
{ INFORMATION W= WRITE BLOCK}
TALK. (ENTER !! FOR HELP) {TRANSFER HAS ENDED FOR FIRST FILE}

NAME OF FILE TO BE TRANSFERRED: {SPECIFY ANOTHER OF CRLF TO QUIT}
@LOGOUT {YOU NEED TO REMEMBER TO LOGOUT FROM BBN BEFORE CONTINUING}

KILLED JOB 10, USER ZUTTERMEISTER, ACCT 2112421, TTY 20, AT 6/21/83 1039
USED 0:0:6 IN 0:4:0
!Q {STOPS THE FTRANS PROGRAM AT THE 11-44}
)
TT3 -- STOP
we see that...

Scan mask files are generated by the SCAN prog. Segment number/part provides info for file naming. Video camera, monitors, "Joy stick", and the acetates are used in this program.

Thinned mask files are generated by the THIN prog. No video equipment is needed to run this prog.

Fully or partially labeled masks are gotten from LABEL. It uses the monitor and acetates and the "Joy stick." Several labeling options are available.

Fully labeled all fields have been given id's.
SCAN MASK GENERATION

RUN $SCAN
DO YOU WISH ME TO GO INTO PRODUCTION MODE?
Y
DIGITIZE
CR> TO CONTINUE OR "Q" TO STOP DIG>
THRESHOLD
USE CURSOR 1 JOYSTICK UP=DARKER; DOWN=LIGHTER
"ENTER" AND "FUN B" TO CAPTURE IMAGE

CR> TO BOX OR "@" TO RESCAN
DIGITIZE
CR> TO CONTINUE OR "Q" TO STOP DIG>
THRESHOLD
USE CURSOR 1 JOYSTICK UP=DARKER; DOWN=LIGHTER
"ENTER" AND "FUN B" TO CAPTURE IMAGE

CR> TO BOX OR "@" TO RESCAN
BOX
USE JOYSTICK NOW CURSOR 1 IN LOWER LEFT AND CURSOR 2 IN UPPER RIGHT
USE "ENTER" ONLY TO DRAW BOX; "ENTER & FUN B" TO CAPTURE

SEGMENT NUMBER/PART(IF MULTI-PART eg "3121/2") = 6101
THE FILE OF MASK FILE NAMES IS N897.NMS
THE OUTPUT SM (SCAN MASK) FILE IS ILI:[300,364]6101.1SM4

DIGITIZE
CR> TO CONTINUE OR "Q" TO STOP DIG>
THE INPUT FILE FOR THE THINNING PGM FROM THIS SESSION OF SCANNING IS N897.NMS
THIN MASK GENERATION

> RUN $THIN
"INPUT".NMS" FILE OF SCAN MASK FILE NAMES=N665.NMS
SEGMENT=6101 NO. OF ROWS=360 NO. OF COLUMNS=338
CONNECTIVITY
TEMPORARY FILE=C2757.TMP
ADJUST
17 TOTAL FIELDS FOUND: 7 BOUNDARY AND 10 NON-BOUNDARY
FINICAL
CALIBRATION MARKS ARE:
1: X-CENTER=313.60 Y-CENTER=9.72 QUAD=UPPER RIGHT
2: X-CENTER=328.13 Y-CENTER=9.56 QUAD=UPPER RIGHT
3: X-CENTER=7.77 Y-CENTER=18.12 QUAD=UPPER LEFT
4: X-CENTER=7.78 Y-CENTER=334.46 QUAD=LOWER LEFT
5: X-CENTER=313.86 Y-CENTER=354.39 QUAD=LOWER RIGHT
THINNING
LEFT DELETE=1875
RIGHT DELETE=1854
BOTTOM DELETE=3157
TOP DELETE=3916
DELETED 10002 BOUNDARY PIXELS ON CYCLE 1
LEFT DELETE=9
RIGHT DELETE=16
BOTTOM DELETE=18
TOP DELETE=18
DELETED 61 BOUNDARY PIXELS ON CYCLE 2
LEFT DELETE=0
RIGHT DELETE=0
BOTTOM DELETE=0
TOP DELETE=0
DELETED 0 BOUNDARY PIXELS ON CYCLE 3
NO SMALL NON-BOUNDARY FIELDS DELETED
HIGHEST WORD USED IN MASK=2607
THE OUTPUT MASK FILE WILL BE 6101.1TM
ELAPSED TIME=4:50
>
LABEL MASK GENERATION

RUN $LABEL
MONITOR TO USE=A
SEGMENT NUMBER/PART(IF MULTI-PART E.G. "3121/2") = 6101
SEGMENT = 6101  NO. FIELDS = 9  NO. ROWS = 360  NO. COLS = 336
THIN JDAY/TIME: 175/278

L=LABEL FIELDS AS SELECTED BY THE PROGRAM
R=RENAME FIELDS
S=SHADE ALL LABELLED FIELDS
T=TEST FIELD LABELLING
U=USER FIELD ADDITION AND DELETION
V=VIEW A LABELLED FIELD
Q=QUIT

NO FIELDS HAVE BEEN LABELLED

FIELD=A1
FIELD=A2
FIELD=D1
FIELD=E4
FIELD=D2
FIELD=E2
FIELD=A3
FIELD=E3
FIELD=E1

VIEW AND RENAME FIELDS
FIELD=A3
RENAME TO D3
FIELD=D3

THE OUTPUT MASK FILE WILL BE 6101.1LB
As the moment of truth approaches

**VIDEO MASK GENERATION**

- List of Segs file (optional)
  - Coords file? yes
  - no
  - S = B or P format? B
  - P
  - 1/6,7 pixel plot video masks
    - xxxx.PMS
    - yyyy.PMS
  - >RUN $SHFILE
  - >PFL u-name-it.PLX
- Segment Window
  - Coordinates file
    - "xxxx", yyyy, xxxx, yyyy
  - 1/2 pixel
    - video mask
      - xxxx.MSK
      - yyyy.MSK
  - Produces Pseudo masks (just header) to use
    For Ground Truth Edit (GTE)
    In Corn/Soybean
    States when no
    PCAL exists at the
    Time of GTE.
The following is an example of the new (Jan '84) MASK generation program on the 11/44. If "S" mask type is requested, no PCAL file is needed nor is a coordinates file generated. Note that if "B" or "P" types are requested—the list of segments must be only segments in the scene corresponding to the PCAL file specified. Segments in multi-scene analysis districts must be kept in separate list-of-segs files up thru this point in the processing.

RUN $MASK

ENTER MASK TYPE (B FOR BBN, P FOR PRINTER, S FOR PSEUDO): B

ENTER TWO LETTER STATE CODE-IL

INPUT PCAL FILE IS-<!--LOCAL PCAL file name-->

OUTPUT FILE OF WINDOW COORDINATES (CRLF FOR NONE)=<!--LOCAL file name-->

BORDER IN PIXELS=20

FILE OF SEGMENTS IN FRAME 40412-16104 (CRLF FOR NONE)=<!--LOCAL file name-->

USE OTHER DIRECTORIES? (Y OR N) Y

ENTER UP TO 5 ADDITIONAL DIRECTORIES—ONE PER LINE "(nnn,nnn)". CRLF TO QUIT.

*300,220

*300,374 {<-------This directory will contain all the CM files for all

* states and nothing else is to be put in this directory but CM

* files.}

USING [300,374]IL181.1CM USING [300,220]IL181.1LB FOR MASK GENERATION.

SEGMENT=181 PART=1 NO. ROWS=474 NO. COLS=247 NO. FIELDS=24

CALIBRATION MARKS ARE:

1 X=17.87 Y=21.33 FROM QUAD UPPER LEFT MAPPED TO UPPER RIGHT

2 X=223.40 Y=37.58 FROM QUAD UPPER RIGHT MAPPED TO LOWER RIGHT

3 X=227.91 Y=451.86 FROM QUAD LOWER RIGHT MAPPED TO LOWER LEFT

4 X=18.19 Y=9.93 FROM QUAD EXTRA MAPPED TO EXTRA
LANDSAT WINDOW (HALF PIXEL) = 1149.3968, 1224.4058

THE OUTPUT HALF PIXEL MASK FILE IS 1120.MSK

---------------------------------------------------
USING [300,374], 1.3071.1CM USING [300,220] 3071.1LB FOR MASK GENERATION.

SEGMENT = 3071 PART = 1 NO. ROWS = 331 NO. COLS = 288 NO. FIELDS = 20
CALIBRATION MARKS ARE:
1 X=278.12 Y=18.34 FROM QUAD UPPER RIGHT MAPPED TO UPPER LEFT
2 X=10.92 Y=25.16 FROM QUAD UPPER LEFT MAPPED TO LOWER LEFT
3 X=280.00 Y=274.44 FROM QUAD LOWER RIGHT MAPPED TO UPPER RIGHT
4 X=280.61 Y=297.28 FROM QUAD EXTRA MAPPED TO EXTRA
5 X=13.44 Y=314.28 FROM QUAD LOWER LEFT MAPPED TO LOWER RIGHT

FINAL CALIBRATION MARK INFORMATION:
UPPER LEFT IX=278.1 IY=18.3 COL=2347.2 ROW=1819.3 UX=287125.3 UY=4601712.0
UPPER RIGHT IX=280.0 IY=274.4 COL=2376.6 ROW=1814.1 UX=288525.8 UY=4601628.0
LOWER LEFT IX=10.9 IY=25.2 COL=2353.9 ROW=1852.9 UX=287072.7 UY=4599758.0
LOWER RIGHT IX=13.4 IY=314.3 COL=2387.0 ROW=1846.8 UX=285584.6 UY=4599672.0
EXTRA IX=280.6 IY=297.3 COL=2378.2 ROW=1613.6 UX=288980.0 UY=4601620.0

WINDOW COORDS = 1813, 2347 : 1853, 2397
TOTAL ACRES = 971.60 TOTAL SCAN PIXELS = 72803.55 SCALE = 0.012
19 FIELDS REMAIN AFTER COMBINING FIELDS FROM AN ORIGINAL 20
4095 MASK WORDS USED
LANDSAT WINDOW = 1816, 2349, 1850, 2384
LANDSAT WINDOW (HALF PIXEL) = 3631, 4687, 3700, 4768

THE OUTPUT HALF PIXEL MASK FILE IS 3071.MSK

---------------------------------------------------

>TYPE 16104.CRD
721, 1081.780, 1161, 181
231, 1087.784, 1177, 181
555.19 72, 2049.1120
1970.2 1970.2 2004.2 2071
FOR MASK GENERATION.

NOTE THIS IS A MULTI-PART SEGMENT:

PART: 2 NO. ROWS=310 NO. COLS=486 NO. FIELDS=29

CALIBRATION MARKS ARE:

1 X=15.24 Y=30.55 FROM QUAD UPPER LEFT MAPPED TO UPPER LEFT
2 X=483.29 Y=263.76 FROM QUAD LOWER RIGHT MAPPED TO LOWER RIGHT
3 X=11.73 Y=291.61 FROM QUAD LOWER LEFT MAPPED TO LOWER LEFT

FINAL CALIBRATION MARK INFORMATION:

UPPER LEFT IX=15.2 IY=30.5 COL=1098.7 ROW=752.7 UX=726899.1 UY=4675484.0
UPPER RIGHT IX=453.2 IY=16.6 COL=1153.8 ROW=743.3 UX=730078.5 UY=4675544.0
LOWER LEFT IX=11.7 IX=291.6 COL=1103.7 ROW=782.7 UX=726910.9 UY=4673752.0
LOWER RIGHT IX=483.3 IY=263.8 COL=1162.8 ROW=771.3 UX=730335.3 UY=4673879.0
EXTRA IX=466.6 IY=15.9 COL=1155.6 ROW=742.9 UX=730181.7 UY=4675548.0

WINDOW COORDS=742,1098: 783,1163
TOTAL ACRES=1392.84 TOTAL SCAN PIXELS=115832.90 SCALE=0.012
25 FIELDS REMAIN AFTER COMBINING FIELDS FROM AN ORIGINAL 294150 MASK WORDS USED

SAT WINDOW=751.11107.774.1157
SAT WINDOW (HALF PIXEL)=1501.2213,1548.2314
THE OUTPUT HALF PIXEL MASK FILE IS 181.MSK

---------------------------------------------------

USING [300,374)1120,1CM USJ[NG [300,220]1120.1LB FOR MASK GENERATION.

SEGMENT=1120 PART= 1 NO. ROWS=395 NO. COLS=456 NO. FIELDS=45

CALIBRATION MARKS ARE:

1 X=418.15 Y=7.90 FROM QUAD UPPER RIGHT MAPPED TO UPPER RIGHT
2 X=445.71 Y=7.76 FROM QUAD EXTRA MAPPED TO EXTRA
3 X=5.08 Y=28.98 FROM QUAD UPPER LEFT MAPPED TO UPPER LEFT
4 X=421.04 Y=364.43 FROM QUAD LOWER RIGHT MAPPED TO LOWER RIGHT
5 X=20.67 Y=384.41 FROM QUAD LOWER LEFT MAPPED TO LOWER LEFT

FINAL CALIBRATION MARK INFORMATION:

UPPER LEFT IX=5.1 IY=29.0 COL=1977.2 ROW=579.4 UX=282432.7 UY=4675476.0
UPPER RIGHT IX=418.1 IY=7.9 COL=2029.0 ROW=567.7 UX=285455.6 UY=4675471.0
LOWER LEFT IX=20.7 IY=384.4 COL=1986.4 ROW=619.0 UX=282436.1 UY=4673146.0
LOWER RIGHT IX=421.0 IY=364.4 COL=2036.7 ROW=608.1 UX=285371.5 UY=4673113.0
EXTRA IX=445.7 IY=7.8 COL=2032.5 ROW=587.0 UX=285661.1 UY=4675487.0

ROW COORDS=566,1977 : 619,2037
TOTAL ACRES=1725.64 TOTAL SCAN PIXELS=144972.10 SCALE=0.012
44 FIELDS REMAIN AFTER COMBINING FIELDS FROM AN ORIGINAL 45

5493 MASK WORDS USED
FILE TRANSFER FROM THE 11-44 TO BBN

{Info within brackets is for user note and not part of program dialog}

RUN *TRANS  {The "*" is shorthand for specifying system directory}
REMOTE TTY DEVICE NUMBER = 6  {6 is a 2400 baud line; 2, 3 = 1200 baud line}
TALK. {ENTER !! FOR HELP}
<C>  {No prompt here--the control-C gets BBN's attention}
Trying

BBN-TENEX 1.35.12, BBN-SYSTEM-B EXEC 1.54.2
@LOGIN ZUTTERMEISTER etc, etc, etc

@<SRS2>FROM11.SAV;S3165
TYPE OF FILE=?
COMMANDS ARE:
ASCII
BINARY
TYPE OF FILE=BINARY
OUTPUT FILE=6211.MSK  {The name as you want it to appear at BBN}

{There is no prompt here}
!
LOCAL FILE NAME = 6211.MSK  {Preceding the file name with the "*"}
LOCK LENGTH = 500  {allows specification of block length.}
{Default is 1000 but the first file sent}
{should use a smaller block size.}
AWAWAWAWNWAWAWA  {As before A=acknowledge, W=write block,}
{N=not acknowledge}

This Program is not reliable
For Transferring binary files
As of 1 Jan '84.

Before Mask Transfer begins
June '84 more development work
is necessary.
BBN MASK CONVERSION TO EDITOR FORMAT

REGISTRATION AND DIGITIZATION FUNCTIONS
VIDEO DIGITIZATION FUNCTIONS
CALIBRATION CREATION
MASK CONVERSION
QUIT
MASK CONVERSION

LOG ENTRY #14893
VIDEO TO EDITOR MASK CONVERSION; VERSION 1.0
ENTER DIRECTORIES, CRLF ONLY TO QUIT

NO DIRECTORIES SPECIFIED
STATE AND YEAR IDENTIFIER (CRLF FOR NONE)=C082
MASK DATE (CRLF FOR NONE)=JUNE 17, 1983
INPUT FILE OF SHIFTS (CRLF FOR NONE)=AD35G.PSEUDO/SHIFTS:1 [Old version]

SEGMENT 6096 PART 1 OF 1
INPUT HALF-PIXEL WINDOW=2060,4618,2121,4706
NUMBER OF FIELDS=4
OUTPUT WINDOW=1030,2309,1061,2353
EXPANDED INPUT WINDOW=2059,4617,2122,4706
FRAME=31504-16590
OUTPUT MASK FILE=<ZUTTERMEISTER>6096.MASK/31504-16590/C082:1

SEGMENT 6097 PART 1 OF 1
INPUT HALF-PIXEL WINDOW=2408,5873,2474,5942
NUMBER OF FIELDS=6
OUTPUT WINDOW=1204,2936,1237,2971
EXPANDED INPUT WINDOW=2407,5871,2474,5942
FRAME=31504-16590
OUTPUT MASK FILE=<ZUTTERMEISTER>6097.MASK/31504-16590/C082:1

SEGMENT 6101 PART 1 OF 1
INPUT HALF-PIXEL WINDOW=3654,4157,3723,4228
NUMBER OF FIELDS=9
OUTPUT WINDOW=1827,2078,1862,2114
EXPANDED INPUT WINDOW=3653,4155,3724,4228
FRAME=31504-16590
OUTPUT MASK FILE=<ZUTTERMEISTER>6101.MASK/31504-16590/C082:1

SEGMENT 6102 PART 1 OF 1
INPUT HALF-PIXEL WINDOW=4293,3853,4359,3942
NUMBER OF FIELDS=7
OUTPUT WINDOW=2146,1926,2180,1971
EXPANDED INPUT WINDOW=4291,3851,4360,3942
FRAME=31504-16590
OUTPUT MASK FILE=<ZUTTERMEISTER>6102.MASK/31504-16590/C082:1

SEGMENT 6103 PART 1 OF 1
INPUT HALF-PIXEL WINDOW=4791,4100,4866,4185
NUMBER OF FIELDS=4
OUTPUT WINDOW=2395,2050,2433,2093
EXPANDED INPUT WINDOW=4789,4099,4866,4186
FRAME=31504-16590
OUTPUT MASK FILE=<ZUTTERMEISTER>6103.MASK/31504-16590/C082:1

LOG ENTRY #14893
QUIT
WINDOW COORDINATES FILE OUTPUT

TYPE AD35G.CRD
10,2288,1082,2374,6096
1183,2916,1258,2992,6097
1806,2058,1883,2135,6101
2126,1905,2200,1992,6102
2375,2030,2454,2115,6103
1834,2696,1912,2773,6106
2070,2690,2146,2766,6107
1598,2024,1687,2094,7100
1733,2907,1814,2986,7105
979,1913,1073,1993,7110
1986,419,2062,495,7190
2065,410,2129,485,7190

{These coordinates are used to pull windows at BBN:}
{The file can be FTRANSed up or info can be entered:}
{directly via XED or TECO}

CREATING PLOTS OF VIDEO MASK FILES

> RUN # MASK request "P" type output

PLT 11
> RUN *.SH*FILE
OUTPUT LISTING FILE=SEGPLT.PLX
SEGMENT NUMBER OR MASK FILE=6096
SEGMENT=6096 PART 1 OF 1
LANDSAT MASK WINDOW: 1030,2308,1062,2354
SEGMENT NUMBER OR MASK FILE=6097
SEGMENT=6097 PART 1 OF 1
LANDSAT MASK WINDOW: 1203,2936,1238,2972
SEGMENT NUMBER OR MASK FILE=6101

> "PFL" is a system command--PRINT FILE
>PFL SEGPLT.PLX {Always use the ".PLX" extension on plot files}
>
{otherwise the Printronix/Northstar get hung up}
{and have to be reset.}