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JSC-16438

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TEXAS NATURAL RESOURCES

NASA CR-
160533

INVENTORY AND MONITORING SYSTEM

(TNRIMS)

APPLICATIONS SYSTEM

VERIFICATION AND TRANSFER (ASVT)

REMOTE SENSING INFORMATION SUBSYSTEM (RSIS)

ACCEPTANCE TEST PROCEDURES

TNRIS Task Force
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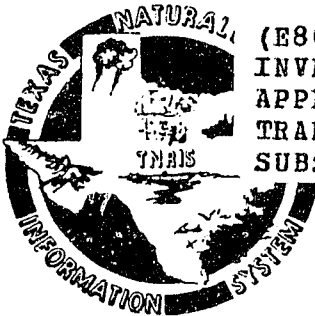SYSTEM & SERVICES DIV.
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NASA

TEXAS NATURAL RESOURCES INVENTORY AND MONITORING SYSTEM (TNRIMS) APPLICATIONS SYSTEM VERIFICATION AND TRANSFER (ASVT)

REMOTE SENSING INFORMATION SUBSYSTEM (RSIS) ACCEPTANCE TEST PROCEDURES

Job Order 75-562
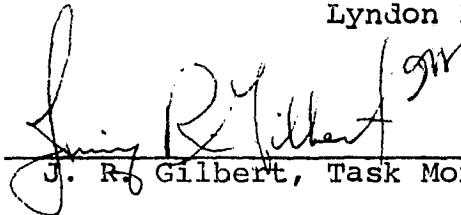
PREPARED BY

M. L. Brown, M. V. Martin, and A. S. Story

Lockheed Electronics Company, Inc.
Systems and Services Division
Houston, Texas

APPROVED BY

National Aeronautics and Space Administration
Lyndon B. Johnson Space Center

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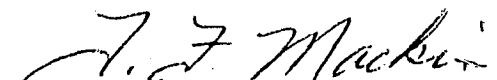J. R. Gilbert, Task Monitor   G. E. McKain, Deputy
                                               Project Manager, Texas ASVT

Lockheed Electronics Company, Inc.
Systems and Services Division

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T. F. Mackin, Supervisor
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GENERAL INFORMATION

This document provides a plan for testing of software developed
for the Remote Sensing Information Subsystem (RSIS) as it applies
to the Texas Natural Resources Information System (TNRIS). This
system provides capabilities for the processing of remotely
sensed Landsat data, the handling of geographic information, the
preparation of information assessment routines and the displaying
of the processed data on an interactive CRT terminal screen. The
complete RSIS system constitutes an interactive system for the
screening of Landsat data, area-of-interest determination, data
classification, and display for analysis.

Specific constraints of the system center around the use of the
Detection and Mapping software for subsystem control and the use
of ISOCLS/ELLTAB for classification of image data. The RSIS
software as designed uses raw Landsat data from tape, density
and radiance data files, and class files output from the existing
ISOCLS/ELLTAB modules as input to the software modules being
tested.

The RSIS subsystem phase "A" provides the following functions.

a. Reading raw data from Landsat in the old CCT format.

b. Obtaining classification results from radiance or detection
    files created by the processing of TEXAS' ISOCLS/ELLTAB
    classification programs.

c. Obtaining radiance and density detection files from the
    DAM package program CLASSIFY.

d. Contrast stretching or contracting of the range of radiance
    values of an image.

e. Band or channel ratioing.

f. Applying geometric corrections as determined from control
    points selected by the analyst analogous to current use of
    the Detection and Mapping package.

g. Applying either a gradient or Laplacian sharpening filter to
    the data to enhance the image.

h. Image enhancement by selection of hue and intensity of colors.

i. Changing color assignment data.

j. Reduction of a displayed area of interest by deletion of
    pixels or lines.

OVERVIEW OF ACCEPTANCE TEST

The Acceptance Test will be conducted in three phases. The first phase is a CLASSIFICATION TEST of a pre-determined area via an ISOCLS/ELLTAB batch run to be performed by TNRIS personnel on the Univac 1100/41 at Austin, Texas. Output from this run will be loaded into a class detection file in ELLTAB format as defined in document (LEC 14201). The DAM package programs CONTROL and CLASSIFY must also be run by TNRIS personnel for the same scene. These programs will provide density detection files and registration parameters for subsequent use by RSIS programs. The second phase will consist of complete exercise of the RSIS software resident in the Univac in the UNIVAC SOFTWARE TEST. Two test series will be conducted, a functional test and a working environment test. The third phase will be the IIGS SOFTWARE TEST of software resident on the INTERDATA 7/32 and RAMTEK display system.

CLASSIFICATION TEST

TNRIS analysts will validate the classification results generated by ISOCLS/ELLTAB. Density detection files generated by CONTROL and CLASSIFY will be validated by TNRIS analysts through use of the PRTCLASS program. The Landsat data used by these runs and by RSIS programs will constitute the test data for the entire Acceptance Test described in this document.

UNIVAC SOFTWARE TEST

Functional Test

There will be one functional test performed to exercise all modules in RSIS UNIVAC software. The purpose of this test is to determine if all modules function in a normal manner. TNRIS analysts will provide Landsat, detection file and ELLTAB class data. TNRIS analysts will work from a computer terminal, exercising the various user options of RSIS in order to exercise all major modules interactively. Further instructions for running this test are provided in Table 1.

Working Environment Test

This test will exercise the RSIS in its working environment.
Further explanations and procedures are described in Table 2.

IIGS SOFTWARE TEST

TNRIS analysts will run IIGS software with a display tape provided
for the purpose. This tape will contain standard color and image
files which will be loaded into the INTERDATA 7/32 for use during
the IIGS SOFTWARE TEST. Procedures for saving a color file and
an image file after display of the preliminay window on the color
graphics can be found in the IIGS INTERIM INTERACTIVE GRAPHICS
SUBSYSTEM USER's GUIDE.

IIGS software will receive as input for the acceptance test a
tape created by the RSIS Univac software during the working
environment test. This tape contains all the information con-
cerning each display or map generated by RSIS UNIVAC software.
The IIGS will display these windows on the RAMTEK color graphics
display device. Procedures for displaying the various windows stored
on the RSIS Univac software output tape on the RAMTEK color
graphics CRT will be found in the RSIS INTERIM GRAPHICS SUBSYSTEM
USER's GUIDE.

IIGS software will also output cursor coordinates; make changes
to the video lookup table; change the colors appearing on the
screen; produce a color table report; output the contents of the
video lookup table to a standard color file on disk; output
the contents of an image data file to disk; and will output an
image data file on tape similar to the tape output by the RSIS
UNIVAC software. This tape file can be read by the IIGS and
produce a color display similar to displays generated from the
RSIS univac software tape. All the above mentioned features of
the IIGS will be exercised by TNRIS analysts. Procedures for exer-
cising these options will be found in the RSIS INTERIM GRAPHICS
SUBSYSTEM USER'S GUIDE.

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PART I

RSIS ACCEPTANCE TEST PROCEDURES

UNIVAC SOFTWARE

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TABLE 1

UNIVAC SOFTWARE FUNCTIONAL TEST INSTRUCTIONS

To bring up the RSIS UNIVAC software on the UNIVAC series 1100 computer, follow the system generation procedures outlined in DAM package Appendix K.

Below are listed the UNIVAC control language commands and RSIS commands necessary to exercise all RSIS UNIVAC software modules.

```
@RUN run-id, accounting-information, qualifier

@ASG,A RSIS-program-file-name.

@USE DAM., RSIS-program-file-name.

@ASG,T 2., 16N, reel-number
    This tape is used for output to Interdata/Ramtek display

@REWIND 2.

@USE 25.,qualifier*filename.
    ELLTAB class file for the first strip

@ASG,A 25.

@ASG,T 3., 16N, reel-number
    Landsat tape for first strip

@REWIND 3.

@ADD DAM.SETUP
```

Table 1-a

PART A

CLRTAB

1. To test most of the modules used in the output of CRT color displays
   the following execution is done.

	MODULES EXERCISED
@XQT CLRTAB	
	CLRTAB 2.7
	CLRXQT 2.7.1
	CLR000 2.7.2

RSIS COMMANDS

OVERALL DEFAULT COMMANDS

ON,CONFIRM,LEGEND,PROMPT,,CRT,RES,511,511,,CRT, SCREEN,19	KMDØN	
SATURATION, 62 COLOR CHANNEL, 31 INTENSITY CHANNEL	KMDSAT	2.7.2.15
INTENSITY, 0 1ST FACTR, 0 LOW VALUE, 100 2ND FACTR, 31 HIGH VALUE	KMDINT	2.7.2.13
GRAPHICS, DELETE	KMDGRA	2.7.2.14
***NOTE: DELETED COLOR FILE AND IMAGE FILE NAMES		
WINDOW, PRINT,	KMDWIN	2.7.2.9
-255 LINE, -255 COLUMN,		
255 LINE, 255 COLUMN		
SPACING, 1 LINE, 1 SAMPLES	KMDSPA	2.7.2.7
CHANNEL, RAW, 4	KMDCHA	2.7.2.2
RADIANCE, 0, 35	KMDRAD	2.7.2.6
TICK, SCAN, 2400 LINES, 3300 SAMPLES PRIMARY	KMDTIC	2.7.2.8
SCAN, 100 LINES, 100 SAMPLES SECONDARY		
ZONE, ** (UTM CENTRAL MERIDIAN****** DEG)	KMDZON	2.7.2.10

a. User commands for radiance data:

>ORIGIN,SCAN,1100,561	KMDORI	2.7.2.5
>HEADING,1,RSIS FUNCTIONAL TEST 1	KMDHEA	2.10.2.2
>DIS1,RAD		

The macro command:

>DIS1,RAD calls up the following default commands:		
>COLOR,DELETE	KMDCOL	2.7.2.3
>SATURATION,62,31	KMDSAT	2.7.2.15
>INTENSITY,0,0,100,31		

Table 1 - b

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```
>COLOR,C01,0,C02,10,,,COLOR,C03,20,C04,23

>COLOR,C05,24,C06,26,,,COLOR,C07,27,C08,30

>COLOR,C09,33,C10,35

>DISPLAY, RAD                                           CLRDIS     2.7.3
```

b. User commands for gradient: CLRDI3   2.7.3.1

```
>DIS1,GRA                                               CLRDIS     2.7.3

                                                       CLRDI4     2.7.3.2
```

The macro .command DIS1,GRA calls up the following
   default commands:

```
>COLOR,DELETE                                           KMDCOL     2.7.2.3

>SATURATION,62,31                                       KMDSAT     2.7.2.15

>INTENSITY,0,0,100,31                                   KMDINT     2.7.2.13

>COLOR,C01,0,C02,10                                     KMDCOL     2.7.2.3

>COLOR,C03,20,C04,23,,,COLOR,C05,24,C06,26

>COLOR,C07,27,C08,30,,,COLOR,C09,33,C10,35

>DISPLAY,GRA                                            CLRDIS     2.7.3

                                                       CLRDI4     2.7.3.2
```

c. User commands for Laplacian:

```
>DIS1,LAP
```

The macro command DIS1,LAP calls for the following
   default commands :

```
>COLOR,DELETE                                           KMDCOL     2.7.2.3

>SATURATION,62,31                                       KMDSAT     2.7.2.15

>INTENSITY,0,0,100,31                                   KMDINT     2.7.2.13

>COLOR,C01,0,C02,10                                     KMDCOL     2.7.2.3

>COLOR,C03,20,C04,23

>COLOR,C05,24,C06,26,,,COLOR,C07,27,C08,30

>COLOR,C09,33,C10,35

>DISPLAY,LAP                                            CLRDIS     2.7.3

                                                       CLRDI6     2.7.3.4
```

d. User commands for class   KMDORI   2.7.2.5

```
>ORIGIN,SCAN,1100,306

>DIS1,CLA
```

The macro command DIS1,CLA calls up the following
   default commands:

Table 1-c

DEFAULT COMMANDS (Cont.)	MODULES EXERCISED	
>COLOR,DELETE	KMDCOL	2.7.2.3
>RADIANCE,1,18	KMDRAD	2.7.2.6
>SATURATION,62,31	KMDSAT	2.7.2.15
>INTENSITY,100,0,100,0	KMDINT	2.7.2.13
>COLOR,C01,10,C02,11,,,COLOR,C03,12,C04,13	KMDCOL	2.7.2.3
>COLOR,C05,14,C06,15,,,COLOR,C07,16,C08,17		
>COLOR,C09,18,C10,19		
>DISPLAY,CLA	CLRDIS	2.7.3
	CLRDI5	2.7.3.3

2. In order to exercise some remaining modules, execute CLRTAB again using some macro commands from the DAM package.

RSIS COMMANDS	MODULES EXERCISED	

Overall default commands as in first CLRTAB execution

User commands:

a. >ORIGIN,SCAN,1100,561

>COLOR,DELETE

>COLOR,C01,0,C02,10,,,COLOR,C03,20,C04,30

>COLOR,C05,40,C06,50

>@ADD DAM.WATER-NESS/2B

The WATER-NESS transform invokes the following commands:

SHARPENING, 1, SAMPLE, .0000, .0000	KMDSHA	2.7.2.12
SHARPENING, 4, SAMPLE, .0000, .00000		
LINEAR, 1,WEIGHTS, -1.0000, .0000, .0000, 2.1600	KMDLIN	2.7.2.4
LINEAR, 1, GAIN, 1.000		
LINEAR, 1, BIAS, 35,420		
LINEAR, 2, WEIGHTS, .0000, .0000, .0000, 1.0000		
LINEAR, 2, GAIN, 1.000		
LINEAR, 2, BIAS, .000		
CHANNEL, LINEAR, 1, 2		
RADIANCE, 0, 36, 0, 19		

Table 1 - d

```
SYMBOLS,   0.000,   0.020
SYMBOLS,   1.021,   9.029
SYMBOLS,   A.030,   T.049
SYMBOLS,  11.050,   7.127


   (016)::  **
   (017)::  **   SYMBOLS      MEANING  (LANDSAT-2B)
   (018)::  **   '0' - '7'  = WATER
   (019)::  **   '8' - '9'  = MOSTLY WATER
   (020)::  **   'A' - 'G'  = PARTLY WATER
   (021)::  **
```

User commands:	MODULES	EXERCISED
>DISPLAY, RADIANCE	CLRDIS	2.7.3
>DISPLAY, RADIANCE	CLRDI3	2.7.3.1
	CALCOL	2.7.3.6
>TABULATE	DISTB	2.7.4
>FACTOR	CLRFAC	2.7.5
>ROTATE	PICROT	2.7.6

b. In order to exercise the POLAR command invoke the
    macro command

>MARSH-LIM-2B,44	KMDPOL	2.

This macro command invokes the following commands:

```
NAME, MARSH-LIM-2B,44 TEST1
SHARPENING, 1, SAMPLE,   .0000,   .0000
SHARPENING, 4, SAMPLE,   .0000,   .0000
LINEAR, 2, WEIGHTS,   .0000,   .0000,   .0000,   1.00000
LINEAR, 2, GAIN,   1.000
LINEAR, 2, BIAS,   1.000
LINEAR, 1,WEIGHTS,  1.0000,   .0000,   .0000
LINEAR, 1, GAIN,   1.000
LINEAR, 1, BIAS,   -5.260
POLAR,2 (ANGLE), GAIN,   57.296
POLAR,2 (ANGLE), BIAS,      .000
POLAR,1 (RADIUS), GAIN,   1.000
POLAR,1 (RADIUS), BIAS,      .000
CHANNEL, POLAR,   2,  1
RADIANCE,  0,  44,   0,  33
```

Table 1 - e

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User commands:

>DISPLAY,RADIANCE

>EXIT

@FREE 2.

@FREE 25.

PART B

CRTCLASS and CRLCLASS

To test the modules used in the output of a CRT color map, enter the following:

@ASG,T 2., 16N, W9127R

@USE DAMDET-1., DEN-1.

@USE DAMDET-2., DEN-2.

@USE DAMDET-3., DEN-3.

@USE DAMDET-4., DEN-4.

@ASG,A DAMDET-1.

@ASG,A DAMDET-2.

@ASG,A DAMDET-3.

@ASG,A DAMDET-4.

RSIS COMMANDS	MODULES EXERCISED	
	CRTCLASS	2.13
	CRTXQT	2.13.1
	CRT000	2.13.2
Default commands for density file:		
>DENSITY,10,18	KMDDEN	2.10.2.1
>COUNT,1	KMDCOU	
>SATURATION,18	KMDSAT	
>SCALE,1/24000	KMDSCA	2.10.2.4
>WINDOW,PRINT,500,500	KMDWIN	2.7.2.9
>TICK,MIN,1,1,	KMDTIC	2.7.2.8
>ZONE,14	KMDZON	2.7.2.10
>CRT,RES,511,511	KMDCRT	2.13.2.1
>CRT,SCR,19 inches diagonal		
>GRAPHICS,DELETE	KMDGRA	
>COLOR,C$\emptyset$1,0,C$\emptyset$2,5	KMDCOL	2.7.2.3
>COLOR,C$\emptyset$3,10,C$\emptyset$4,18		

Table 1-f

```
User commands:

    >ORIGIN,SCAN,800,1800                           KMDORI      2.7.2.5

    >HEA,1,RSIS FUNCTIONAL TEST                      KMDHEA      2.10.2.2

    >MAP                                             CRTMAP      2.1.3.3

                                                     CRTPRT      2.13.3.1

                                                     REGCRT      2.13.3.1.1

                                                     LINOUT      2.13.3.1.2

                                                     SENDRE

    >TABULATE                                        CRTTAB      2.7.4

    >EXIT                                            CRTEXI      2.13.6

Do you want detection files saved:

    >NO

    @COPY RAD-1., DAMDET-1.

    @COPY RAD-2., DAMDET-2.

    @COPY RAD-3., DAMDET-3.

    @COPY RAD-4., DAMDET-4.

    >@XQT CRTCLASS


                    RSIS COMMANDS                       MODULES EXERCISED

                                                     CRTCLASS    2.13

                                                     CRTXQT      2.13.1

                                                     CRT000      2.13.2

Default commands for radiance file:

    >RADIANCE,0,61                                   KMDRAD      2.7.2.6

    >COUNT,0                                         KMDCOU

    >SATURATION,61                                   KMDSAT

    >SCALE, 1/24000                                  KMDSCA      2.10.2.4

    >WINDOW,PRINT,500,500                            KMDWIN      2.7.2.9

    >TICK,MIN,1,1                                    KMDTIC      2.7.2.8

    >ZONE,14                                         KMDZON      2.7.2.10

    >CRT,RES,511,511                                 KMDCRT      2.13.2.1

    >CRT,SCR,19 inches diagonal

    >GRAPHICS,DELETE                                 KMDGRA      2.7.2.14

    >COLOR,CØ1,0,CØ2,10                              KMDCOL      2.7.2.3

    >COLOR,CØ3,20,CØ4,50

    >COLOR,CØ5,55,CØ6,61
```

Table 1-g

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User commands for radiance file:

>ORIGIN,SCAN,800,1800	KMDORI	2.7.2.5
>HEA,1,RSIS FUNCTIONAL TEST	KMDHEA	2.10.2.2
>MAP	CRTMAP	2.1.3.3
	CRTPRT	2.13.3.1
	REGCRT	2.13.3.1.1
	LINOUT	2.13.3.1.2
	SENDRE	
>TABULATE	CRTTAB	2.7.4
>EXIT	CRTEXI	2.13.6

Do you want detection files saved?

>YES

@ASG,T 25., F40///500

@COPY CLASS-1., 25.

@ASG,T 26., F40///500

@COPY CLASS-2., 26.

@ASG,T 27., F40///500

@COPY CLASS-3., 27.

@ASG,T 28., F40///500

@COPY CLASS-4., 28.

@XQT CRLCLASS

CRLCLASS monitor

CRLXQT - initiate CRLCLASS

CRL000 - get user commands

RSIS COMMANDS	MODULES EXERCISED	
Default commands for class file:		
>RADIANCE,0,61	KMDRAD	2.7.2.6
>COUNT,0	KMDCOU	
>SATURATION,61	KMDSAT	
>SCALE, 1/24000	KMDSCA	2.10.2.4
>WINDOW,PRINT,500,500	KMDWIN	2.7.2.9
>TICK,MIN,1,1	KMDTIC	2.7.2.8
>ZONE,14	KMDZON	2.7.2.10
>CRT,RES,511,511	KMDCRT	2.13.2.1
>GRAPHICS,DELETE	KMDGRA	
>COLOR,C07,0,C02,5	KMDCOL	2.7.2.3
>COLOR,C03,10,C04,15		
>COLOR,C05,20,C06,61		

Table 1-h   13

User commands:

>ORIGIN,SCAN,300,1800	KMDORI	2.7.2.5
>HEADING,1,RSIS FUNCTIONAL TEST	KMDHEA	2.10.2.2
>MAP	CRLMAP	
	CRLPRT	
	REGCRL	
	LINOUT	
	SENDRE	
>TABULATE	CRZTAB	2.7.4
>EXIT	CRLEXI	

Do you want detection files saved?

>NO

Table 1-1 14

TABLE 2

UNIVAC SOFTWARE WORKING ENVIRONMENT TEST

PART A - CLRTAB

RADIANCE DISPLAYS

Initiate program CLRTAB by procedures similar to those in Table 1.
Use a variation of the following user commands* for the working environment test
for radiance displays.

```
SATURATION,....
INTENSITY,1,....
COLOR,....
WINDOW,....
ORIGIN,....
TICKS,....
SPACING,....
HEADING,....
GRAPHICS,....
CHANNEL,....
RADIANCE,....
ZONE,....
POLAR,....
LINEAR,....
FACTOR,....
ROTATE,....
DISPLAY,RADIANCE
TABULATE,RADIANCE
```

*A description of these commands and their variations are in Appendix J
 in the RSIS User's Guide.

GRADIENT DISPLAYS

Use the same commands or variations as for radiance displays except use:

```
DISPLAY,GRADIENT
TABULATE,GRADIENT
```

Table 2-a   15

LAPLACIAN DISPLAYS

Use the same commands or variations as for radiance displays except use

    DISPLAY,LAPLACIAN
    TABULATE,LAPLACIAN

CLASS DISPLAYS

Use the same commands or variations as for the radiance displays except use

    DISPLAY,CLASS
    TABULATE,CLASS

UNIVAC SOFTWARE WORKING ENVIRONMENT TEST

PART B - CRTCLASS

RADIANCE DATA

Initiate program CRTCLASS by procedures similar to those in Table 1. Have present at least one RADIANCE detection file.

Use and variation of the following commands is suggested for the working environment test:

    COLOR,....
    COUNT,....
    SCALE,....
    WINDOW,....
    ORIGIN,....
    TICKS,....
    HEADING,1,....
    RADIANCE,....
    TABULATE,....

Use of the GRAPHICS command is also suggested, specifying the names of default color and image files resident on the INTERDATA.

The following commands may also be varied, but normally are used only as default commands:

    SATURATION,....
    GRAPHICS,....
    CRT,....

Table 2-b   16

DENSITY DATA

Initiate program CRTCLASS by procedures similar to those in Table 1. Have present at least one DENSITY detection file.

Use and variation of the following commands is suggested for the working environment test:

    COLOR,....
    COUNT,....
    SCALE,....
    WINDOW,....
    ORIGIN,....
    TICKS,....
    HEADING,1,....
    RADIANCE,....
    TABULATE,....

CLASS DATA

Initiate program CRLCLASS by procedures similar to those in Table 1. Have present at least one ELLTAB class file and one detection file of any type for the same scene.

Use and variation of the following commands is suggested for the working environment test.

    COLOR,....
    COUNT,....
    SCALE,....
    WINDOW,....
    ORIGIN,....
    TICKS,....
    HEADING,1,....
    RADIANCE,....
    TABULATE

Use of the GRAPHICS command is also suggested, specifying the names of default color and image files resident on the INTERDATA.

Table 2-c   17

The following commands may also be varied, but normally are used only as default commands:

        SATURATION,....
        GRAPHICS,....
        CRT,....

Table 2-d

PART II

RSIS ACCEPTANCE TEST PROCEDURES

INTERDATA/RAMTEK DISPLAY PROCESSOR

1. PURPOSE AND SCOPE

The Interim Interactive Graphics Subsystem (IIGS) is an integral
part of the RSIS and its general purpose is to allow a user to
visually analyze image data on a color cathode ray tube (CRT).
The software developed for the IIGS allows the user to perform
analysis in an interactive mode on the INTERDATA 7/32 computer
using the RAMTEK 9351 processor for the image display. The anal-
ysis performed by the user utilizing the IIGS is limited as
all calculations done on the raw image pixel data will be done
in the pre-processing software of the RSIS version of the DAM
package.

2. OVERVIEW

The IIGS software performs the following task:

● Display of an image window (512 pixels by 512 lines maximum)

● Report of CRT coordinates of the cursor positioned at a point
  of interest

● Color Table Report containing colors being used in current
  image

● Color changes of colors in the existing color table

● Interactive user menu/query capabilities to provide user
  control of the software functions.

1

PART II
RSIS ACCEPTANCE TEST PROCEDURES
INTERDATA/RAMTEK DISPLAY PROCESSOR

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part of the RSIS and its general purpose is to allow a user to
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analysis in an interactive mode on the INTERDATA 7/32 computer
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ysis performed by the user utilizing the IIGS is limited as
all calculations done on the raw image pixel data will be done
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2. OVERVIEW

The IIGS software performs the following task:

● Display of an image window (512 pixels by 512 lines maximum)

● Report of CRT coordinates of the cursor positioned at a point
  of interest

● Color Table Report containing colors being used in current
  image

● Color changes of colors in the existing color table

● Interactive user menu/query capabilities to provide user
  control of the software functions.

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The IIGS does not interactively interface with any other applications system. However, its use is dependent upon pre-processing of raw Landsat data or other forms of raw image data by the RSIS version of the DAM package. The IIGS utilizes software modules from the RAMTEK Fortran Image and Plot Package (FIPP), the INTER-DATA Run Time Library and the RAMTEK supplied RAMTEK/INTERDATA software interface drivers.

The IIGS will also accept as a form of input data a computer compatible tape (CCT) that was output by the IIGS in a RAMTEK/ INTERDATA compatible format in a previous execution of the IIGS.

The IIGS software operates in the interactive mode on the INTER-DATA 7/32 under the control of the INTERDATA OS/32 operating system. Figure 1 presents the general operational data flow for the IIGS.
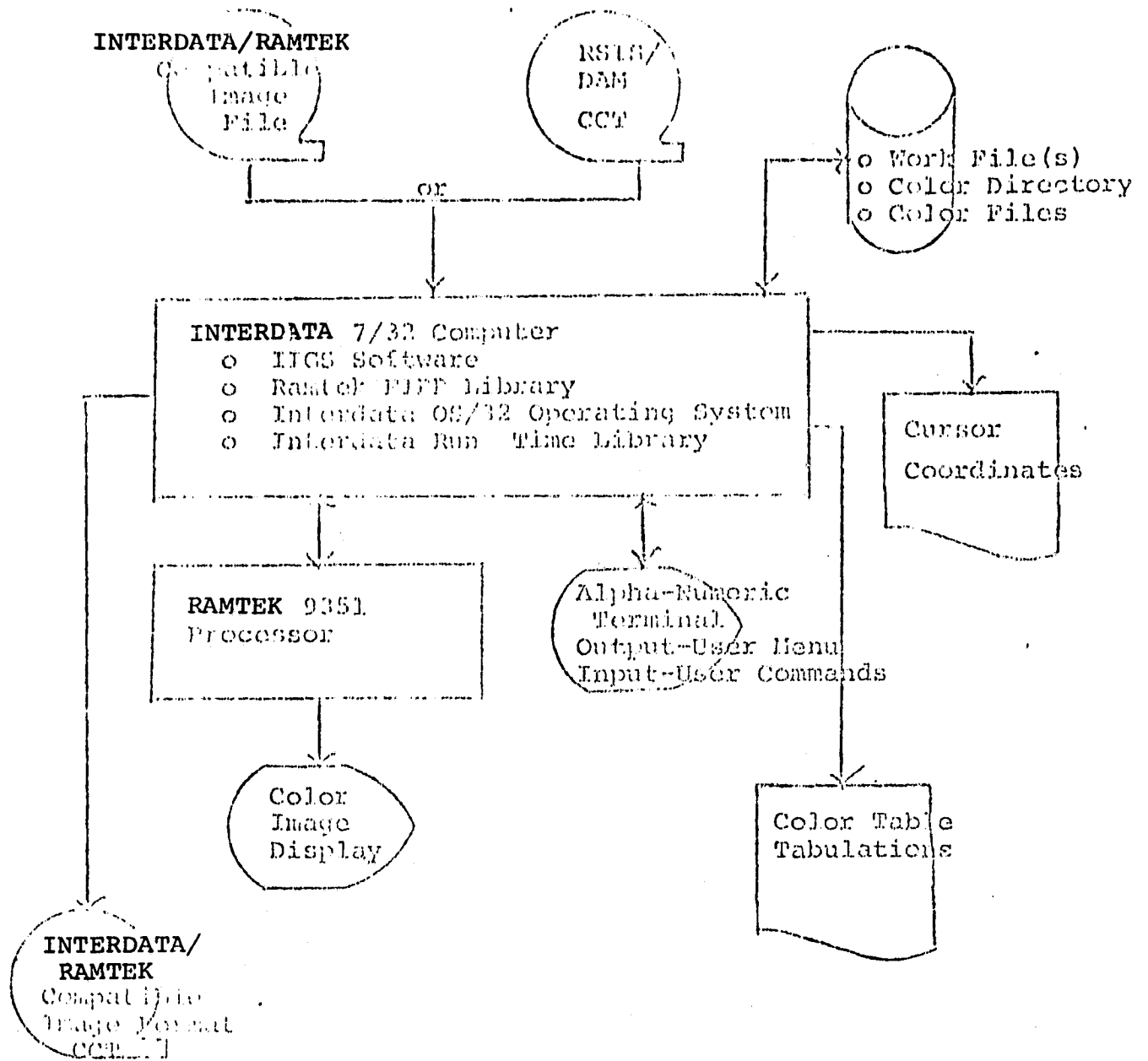
2

2/

Figure 1. IICS Flow Diagram

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3. OPERATING PROCEDURES

All image data input to the IIGS will either be contained on a
CCT output by the RSIS version of the NASA DAM Package Software
or will be contained on an INTERDATA/RAMTEK compatible CCT
created during a previous IIGS execution. Both types of input
CCTs are recorded on a nine-track 1600 bits per inch (bpi) digital
CCT. The format of the RSIS CCT output by the RSIS version of
DAM is detailed in Appendix A of this document. The INTERDATA/
RAMTEK compatible CCT format is detailed in Appendix B of the
User's Guide.

In the normal operations of the IIGS, the user will have control
of the IIGS to perform all operations supplied by the IIGS software.
The user controls the IIGS software by entry of an appropriate
response to queries or menus output by the IIGS. The queries and
menus output by the IIGS are detailed in section 3.2 of this
document. This section also contains information describing the
results of any user response.

3.1 PRE-OPERATING PROCEDURE

In order to execute the IIGS software on the INTERDATA 7/32
computer, the IIGS software must be compiled, a load module
built and the load module linked with the INTERDATA 7/32 Run
Time Library routines, the RAMTEK FIPP object modules and the
RAMTEK/INTERDATA software. Appendix D of the User's Guide details
the files that build the load modules, link the modules and the
job file to execute the IIGS software.

The user must perform the following steps in order to begin the
IIGS processing:

1. Mount the input CCT on the INTERDATA 7/32 tape drive and
    ready the tape drive.

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2. Turn the RAMTEK processor power on.

3. Depress the reset switch on the RAMTEK.

4. Turn the RAMTEK CRT on.

5. Make sure the INTERDATA 7/32 is running and is ready to
    execute the IIGS software.

6. Load the IIGS executable file into the INTERDATA 7/32.

3.2   PROCEDURES FOR OPERATING THE IIGS

The IIGS menus, queries, and user responses are detailed in the
following paragraphs. This test procedure deals with the queries
and responses that are required to operate the IIGS when the
input is on a RSIS CCT generated by the RSIS version of
the NASA DAM software package. This form of input is referred
to as the standard input.

All diagnostics (error messages, warning messages, and user
diagnostic options) are detailed in Appendix C of the IIGS
User's Guide.

3.2.1   RSIS CCT PROCESSING

In the following paragraphs each query is numbered for documenta-
tion purposes. In actual operation of the IIGS the query numbers
do not appear.

Query 1 - Begin Processing

The IIGS begins processing image data by outputting* the
following:

RSIS INTERIM INTERACTIVE GRAPHICS SUBSYSTEM

*All input and output described in this section of the document
refers to input from and output to the IIGS alpha-numeric terminal
or operator's console.

INPUT DATA IN RSIS UNIVAC FORMAT (Y or N)?

The IIGS outputs Query 1 in order to determine the proper IIGS processing branch to take. This subsection deals with the standard form of input, an RSIS UNIVAC written CCT. Therefore, the user will input either a "Y" or a "YES" response to the above query.

Query 2 - Determination of Input Medium

Following the user response to Query 1, the IIGS will output:

INITIALIZE THE IIGS FOR RSIS CCT PROCESSING

IS THE STANDARD INPUT ON A DISC FILE (Y or N)?

The standard input will normally be on a CCT. Therefore, the normal response to Query 2 is a user input of an "N" or "NO." However, if the input image data is stored in a disc file on the Interdata 7/32, then the user will enter a "Y" or "YES" following Query 2. If a "Y" or "YES"* response is input, then IIGS will output:

FILE NAME =

The user will then input the name of the file on the INTERDATA 7/32 disc that contains the image data to be processed.

Query 3 - Obtaining Image Data File Number

Following the user interaction with Query 2, the IIGS will output:

ENTER THE FILE NUMBER ON THE RSIS CCT TO BE PROCESSED.

FILE NUMBER =

*In the following paragraphs when an input of a "Y" is noted a "YES" can also be input to obtain the same result. Similarly, when "N" can be input a "NO" can also be input for the same result.

The user will then input the file number on the RSIS CCT which contains the image data to be processed during the current pass (execution) in the IIGS. The input RSIS CCT can contain multiple image data files and the above query provides the user the capability to select any file on the input RSIS CCT for processing. The above entry is expected to be input in a Fortran "I2" format. This means if the user inputs a single integer value, then this single integer must be preceded by a zero or a blank character, e.g., the user wants to process data in the fourth file, therefore the user responds to Query 3 with an input of either "04" or "ᶀ4" (ᶀ symbolizing the blank character).

The IIGS will then begin to search for the selected file on the input RSIS CCT.

Query 4 - User Selection of Mode of RAMTEK Initialization

Upon finding the selected image data file, the first record (the UNIVAC header record) will be read into core storage. If the read is successful, the following will be output:

> DOES THE USER WANT TO INPUT THE TYPE OF INITIALIZATION (Y or N)?

If the user does not want to select the type of initialization, then an "N" is input following the above query. The type of initialization for the RAMTEK common blocks stored in word 4 of the UNIVAC header record will be used and the following queries, Query 3 and the queries described in Tables 1 and 2, will be skipped.

If the user wants to choose the type of initialization to be performed for the RAMTEK common blocks in the IIGS, then the user will input a "Y" following Query 4.

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Query 5 - User Selection of Type of Initialization

If the user inputs a "Y" following Query 4, then IIGS will output
the following query/menu =

WHAT TYPE OF INITIALIZATION IF REQUIRED?

0 = TERMINATE THE CURRENT EXECUTION

1 = TERMINAL INPUT

2 = STANDARD INITIALIZATION

3 = NON-STANDARD INITIALIZATION

4 = USER TYPE OF INITIALIZATION IN RSIS HEADER
    ENTER TYPE -

The user will then input the integer number which represents the
option that the user wants to exercise. In all cases, except
response equal to 0 or 4, the type of initialization in the UNIVAC
header record, record 1 in the current image file, will be ignored.
The following paragraphs explain the above options:

Initialization Option 0 - Terminate the Current Execution

If the user inputs a "0" (zero) following the "ENTER TYPE-"
query, then the following will be output:

TERMINATION OF CURRENT EXECUTION REQUESTED BY THE USER.

The IIGS will then end the current pass (execution) and begin
another pass starting again with Query 1. The output of Query 1
signifies that the IIGS software has been restarted.

Initialization Option 1 - Terminal Input

If the user input a "1" (one) following the "ENTER TYPE-"
query, then the IIGS will expect the user to manually enter all
RAMTEK common block variable initialization values via the alpha-
numeric terminal. The manual inputs will be detailed in Tables
1 and 2.

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Initialization Option 2 - Standard Initialization

If the user inputs a "2" (two) following the "ENTER TYPE-" query, then the IIGS will set all RAMTEK common block initialization variables to standard settings hard coded into the IIGS software. The hard coded initialization values are detailed in Table 3.

Initialization Option 3 - Non-Standard Initialization

If the user inputs a "3" (three) following the "ENTER TYPE-" query, then the IIGS will initialize all RAMTEK common block variables that are to be initialized for RAMTEK Level 3 and Level 4 modules with values stored words 5 through 82 in the UNIVAC header record, record one of the image file. See Appendix A Record 1 - UNIVAC to RAMTEK HEADER RECORD for details of words 5 through 82.

Initialization Option 4 - Use Type of Initialization in RSIS Header

If the user inputs a "4" (four) following the "ENTER TYPE-" query, then the IIGS will use the type of initialization option stored in word 4 of the UNIVAC header record. In essence this is the same as if the user had entered a response of "N" following Query 4.

Illegal Option

If the user inputs a value less than zero or greater than four, then the IIGS will output the initialization menu/query again.

Initialization Message Output Following Query 4 or Query 5

Following the user selection of initialization type or using the type of initialization code stored in the UNIVAC header record, IIGS will output:

RAMTEK LEVEL 3 and 4 INITIALIZATION

If the type of initialization is type 1, the initialization of the RAMTEK Level 3 and Level 4 common block variables will be done manually, via input from the alpha-numeric terminal, by the user. The IIGS, in this case, will output:

INITIALIZATION INPUT FROM THE USER VIA TERMINAL
REQUESTED, USER MUST MAKE AN ENTRY FOR EACH REQUESTED
ENTRY. BEGIN LEVEL 3 INITIALIZATION

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The initialization menu for Level 3 initialization will then be output. The entries in this menu are detailed in Table 1. After the user has made all the required Level 3 entries, the IIGS will output:

BEGIN LEVEL 4 INITIALIZATION

The initialization menu for Level 4 initialization will then be output. The entries in this menu are detailed in Table 2.

Table 1 - RAMTEK LEVEL 3 COMMON BLOCK NON-STANDARD INITIALIZATION MENU

The IIGS will output the following query prior to outputting the Level 3 initialization menu.

STANDARD LEVEL 3 INITIALIZATION (Y OR N)?

If the user inputs a "Y" or a "YES", then the IIGS will use the standard initialization values detailed in Table 3 for level 3 initialization and the following menu will not be output.

If the user inputs on "N" or a "NO" response, then the following menu will be output. If an integer value is to be input for any of the following entries, then the entry must be compatible with a FORTRAN "I10" format. That is to say if a user wants to input a single integer value, then he must enter nine **preceding** zeros or nine preceding blanks, etc., e.g., if a user wants to enter a value of 2048, then he must input either "0000002048" or "ЪЪЪЪЪ2048."

RAMTEK LEVEL 3 INITIALIZATION MENU

RAMTEK LOGICAL UNIT = User inputs the required logical unit number. Normally a 6 will be input.

PAPER PROCESSING LOGICAL UNIT = User inputs the required logical unit number. Normally a 7 will be input.

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EVENT FLAG FOR QIO = User inputs the required event flag number. Normally a 1 will be input.

X RESOLUTION = User will input the horizontal resolution of the **RAMTEK** CRT. Normally 512 will be input.

X RESOLUTION = User will input the vertical resolution of the **RAMTEK** CRT. Normally 512 will be input.

NO. OF MEMORY PLANES = User will input the number of memory planes existing in the **RAMTEK** 9351 processor. In the Texas RSTS **RAMTEK** 12 will always be input.

VLT WIDTH IN BITS = User will input a 13 as there are 13 bits in each Video Lookup Table (VLT) storage location.

VLT LENGTH IN WORDS = User will input the value 2048 as there are 2048 storage locations in the VLT.

BLINK (Y or N)? If the user wants the video to blink, a "Y" or "YES" will be input. Otherwise input an "N" or a "NO".

FIRMWARE OPTIONS (Y or N)

INTERACTIVE PERIPHERALS? User should enter a "Y" or "YES" as there are graphics interactive peripherals in the Texas RSIS **RAMTEK**.

GRAPHICS? User should enter a "Y" or "YES" as there are graphic capabilities in the Texas RSIS **RAMTEK**.

SCROLL? User should enter an "N" or "NO" as the **RAMTEK** series 93XX has no scrolling capability.

STATUS MANAGEMENT? User should enter an "N" or "NO" as this capability is not supported on the Texas RSIS **RAMTEK**.

PROGRAMMABLE FONT? User should enter an "N" or "NO" as the Ramtek Programmable **Font** support firmware does not exist on the Texas RSIS **RAMTEK**.

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TABLE 1 - Concluded

USER SUBROUTINE? User should enter an "N" as a "user subroutine"
does not replace any of the existing RAMTEK
FIPP modules.

RT-11 MODE (Y OR N)? User should enter an "N" or "NO" as the
Texas RSIS host processor is an INTERDATA
7/32 not a DEC processor with the RT-11
Operating System.

TRACE FLAG ON (Y OR N)? Normally the user will enter an "N"
or "NO". However, if an error occurs
the user might want to enter a "Y"
or "YES" to force a walk back through
RAMTEK modular associated with the error.

DEBUG FLAGS ON (Y OR N)? Normally the user will enter an "N"
or "NO". However, if an error is
encountered the user could input a
"Y" or "YES" to force some debug in-
formation to be output by the RAMTEK
FIPP modules.

TABLE 2 - RAMTEK LEVEL 4 COMMON BLOCK NON-STANDARD INITIALIZATON MENU

The IIGS will output the following query prior to outputting the level 4 initialization menu.

STANDARD LEVEL 4 INITIALIZATION (Y OR N)?

If the user inputs a "Y" or a "YES", then the IIGS will use the standard initialization values detailed in Table 3 for level 4 initialization and the following menu will not be output.

If the user inputs an "N" or a "NO" response then the following menu will be output. If an integer value is to be input for any of the following entries, then the entry must be compatible with the FORTRAN I/O "I10" format. That is, if a user wants to input a two integer value, say 10, then the user must input eight preceding zeros or eight preceding blanks, e.g., if the user wants to enter a value of ten, 10, then the user must input either "0000000010" or "10".

RAMTEK LEVEL 4 INITIALIZATION MENU

IMAGE LOGICAL UNIT = The user enters the required logical unit number. Normally the user will input a 4 (four).

REVERSE PACKING FOR WT & WR (Y OR N)?

The user will normally enter an "N" or "NO" as the data used with the Write Text (WT) or Write Roster (WR) will not be packed in reverse order.

CT BIAS = The user will input the bias to add to the VLT index to obtain external or displayed CT values to colors. Normally, the user will enter a zero (0).

CT SCALE FACTOR = The user will input a scale factor to multiply the VLT index by to obtain external or displayed CT values to colors. Normally the user will enter a one (1).

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VLT DEVICE NUMBER = The user will input the video lookup table
(VLT) device number. Normally the user will
input a zero (0).

NUMBER OF RESERVED VLT ENTRIES - The user will enter the required
value. In normal processing, 2 entries are
reserved. Therefore, normally the user will
input a value of two (2).

CURSOR DEVICE NUMBER - The user will input the cursor device number
for the Texas RSIS system; this value will be
zero (0).

KEYBOARD DEVICE NUMBER - The Texas RSIS RAMTEK does not have a
RAMTEK keyboard device. However, for software
compatibility the user will input a zero (0).

ENTER NAME OF TEMPORARY IMAGE WORK FILE - The user will input the
name of the file that will be used by various
RAMTEK FIPP modules for temporary storage.
The normal input is "0532:WRKFIL.WRK."

CURSOR WAIT TIME IN CLOCK TICS - The user will input in clock
tics (tic = 1/60 sec) the time delay to be
used in waiting between cursor polling.
Normally the user will enter a 30 (thirty).

NUMBER OF OVERLAY CHANNELS - The user will enter the number of
channels (memory planes) that are to be used
in the overlay mode. Normally a 2 (two) will
be input.

If a number >0 is entered for the number of overlay channels,
then the following will be output:

CHANNEL 1 BIT NUMBER = The user inputs the bit number (0-11)
·   associated with overlay channel 1. Normally,
·   if used, an 11 (eleven) will be input.
·

CHANNEL 4 BIT NUMBER =   ·
                                          ·
                                          ·
                                          ·

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If the type of initialization is type 2, then initialization of
the RAMTEK Level 3 and Level 4 common block variables will be done
using values for the common block variables that have been hard
coded into the IIGS software. Table 3 contains the variables
and the hard coded standard settings for these variables when
standard initialization is done. IIGS will output:

STANDARD RAMTEK LEVEL 3 AND 4 INITIALIZATION SELECTED.

If the type initialization is type 3, then initialization of the
RAMTEK Level 3 and Level 4 common block variables will be done
using the values stored in words 5 through 83 of the UNIVAC
header record. See Appendix A record 1 for details. When
initialization type 3 begins, IIGS will output:

NON-STANDARD RAMTEK LEVEL 3 INITIALIZATION SELECTED.

QUERY 6 - COLOR INITIALIZATION WITH STANDARD COLOR FILE

If the information in the UNIVAC header record indicates that a
standard color file is to be used with the current image display,
then the IIGS will output:

A COLOR FILE IS TO BE USED IN THE CURRENT DISPLAY.   THE NAME
OF THE INTERDATA COLOR FILE IS: <:FILE NAME:>   IS THIS THE
CORRECT NAME (Y or N)?

The user will then verify the file name as read from the UNIVAC
header record. If the name is correct, then the user will input
a "Y."

If the name is incorrect or the user wants to use another file,
then the user will input an "N." IIGS will then output:

USER WANTS TO CHANGE COLOR FILE NAME.
ENTER NEW NAME -

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TABLE 3 RAMTEK LEVEL 3 AND LEVEL 4 COMMON BLOCK VARIABLES
STANDARD SETTINGS

RAMTEK LEVEL 3 COMMON BLOCK VARIABLES INITIAL SETTINGS

Variable Name	Common Block	Description	Initial Value
XRES	DEVCHR	X, Horizontal, resolution of the RAMTEK CRT. less one	511
YRES	DEVCHR	Y, vertical, resolution of the RAMTEK CRT less one	511
NPLANE	DEVCHR	Number of memory planes available to hold an image value	12
MAXMSK	DEVCHR	Maximum number that can fit in NPLANE bits plus 1	
XYMAX	DEVCHR	Greater of the two resolutions XRES or YRES	511
FRMOPT	DEVCHR	Array of flags identifying the firmware available in the display device.	
		FRMOPT(1) = Interactive Peripherals	True
		FRMOPT(2) = Graphics	True
		FRMOPT(3) = Scroll	False
		FRMOPT(4) = Status management	False
		FRMOPT(5) = Programmable font	False
		FRMOPT(6) = User subroutine	False
		FRMOPT(7) = Conics	False
		FRMOPT(8), ...FRMOPT(10) = SPARE	False
RMLUN	INTERN	Logical unit number of the RAMTEK display device	6
ERRLUN	INTERN	Logical unit number of the error report disc file.	7
EVNFLG	INTERN	Event flag used for operating system to inform Level 3 modules that I/O has completed	1
IOSB	INTERN	I/O status block. The low byte of the first I/O status block (ISOB(1)) entry contains a code indicating the status of the I/O. A zero value indicates the I/O is pending. A 1 indicates sucessful I/O completion. A value indicates an error	
		IOSB(1)	1
		IOSB(2)	0

TABLE 3

RAMTEK LEVEL 3 COMMON BLOCK VARIABLES INITIAL SETTINGS

Variable Name	Common Block	Description	Initial Value
IDS	INTERN	Directive status word. Indicates whether the I/O was accepted and queued by the operations system. IDS = 0; I/O request pending IDS = 1; I/O request accepted IDS = -1; I/O request rejected	1
OPTPLG	OPTS	Flag for whether there are any options or parameters that need to be sent with the next Ramtek instruction word.	False
		OPT(1) = Address mode option	False
		OPT(2) = Additive write option	False
		OPT(3) = Reverse background option	False
		OPT(4) = Reverse packing option	False
		OPT(5) = Operand (parameter) option	False
		OPT(6) = Data option	False
SUBMKS	PARAMS	Subchannel mask parameter	4095
FGDCOL		Foreground parameter value	4095
BGDCOL		Background parameter value	0
IX1X		Index register 1 parameter X	0
IX1Y		Index register 1 parameter Y	0
IX2X		Index register 2 parameter X	0
IX2Y		Index register 2 parameter Y	0
ORGX		Origin parameter X value	0
ORGY		Origin parameter Y value	0
WINSX		Window parameter start X value	0
WINSY		Window parameter start Y value	0
WINEX		Window parameter stop X value	511
WINEY		Window parameter stop Y value	511
SCAN		Scan mode parameter value	0
DIMW		Dimension parameter width value	7
DIMH		Dimension parameter height value	9
SPACEH		Horizontal space parameter value	7
SPACEV		Veritcal space parameter value	9
FUNC		Logical/arithmetic function parameter value	0
SCALE		Scale parameter value	0
BASEL		Baseline parameter value	0
SCRCNT		Scroll Count parameter value	0
COPX		Current Operating Point X Value	0
COPY		Current Operating Point Y value	0
PARM	PARMS	A flag array of 16 entries with each entry corresponding to 1 of the 16 possible parameters. (PARAM(1), ..., PARAM(16) =	False

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Variable Name	Common Block	Description	Initial Value
RT11	TEST	Flag for whether the package is running in the RT-11 mode or the RSX-11M mode. As the Texas RSIS is utilizing an INTERDATA 7/32 computer as the host processor and not a DEC machine, then this flag will always be set FALSE.	False
TRACE	TEST	Flag for whether RAMTEK module "ERROR" is to intentionally perform a divide by zero in order to produce a traceback by subroutine and line number when an error is detected.	False
BWRK	TEST	Flag for whether module "BUILD" is to dump its built-up normal format instruction stream	False
BOPT	TEST	Flag for whether RAMTEK module "BUILD" is to dump the array "OPT" and whether the Ramtek module "INST" is to dump the operation code.	
INLUN	TEST	Console or analyst alpha-numberic terminal logical unit number (input)	5
OUTLUN	TEST	Console or analyst alpha-numeric terminal output logical unit number	7
DBGLUN	TEST	Debug output logical unit number	8
VLTW	VLTDAT	Video Lookup Table width in bits	13
VLTL	VLTDAT	Video Lookup Table size (number of entries that can be stored in the VLT).	48
BLNR13	VLTDAT	Flag for setting blink bit in the VLT	False

TABLE 3 (Continued)

RAMTEK LEVEL 4 COMMON BLOCK VARIABLES INITIAL SETTINGS

Variable Name	Common Block	Description	Initial Value
IMBLUN	L4COM	Logical unit on which to read and write images	4
REVPAL	L4COM	Flag for automatically setting reverse packing option when writing text strings	False
BIASS	L4COM	Bias to add to the VLT index to obtain external or dispalyed CT values $CT = SCALEF*VLT$ index + BIASS	0
SCALEF	L4COM	Scale factor to multiply VLT index by to obtain the external or displayed CT values	1
PICUP	L4COM	Flag for whether an image has been displayed successfully on the RAMTEK CRT	False
CURNO	L4COM	Cursor device number	0
KBNO	L4COM	Keyboard device number	0
WRKFIL	L4COM	An array of 10 entries (20 characters) identifying the name to be used for a temporary work file. Initial set to: OS32:WRKFIL. WRK	
CURSWT	L4COM	Time delay in clock tics (1 tic = 1/60 sec) to wait between cursor polling. Cursor movement does not generate intempts in the RAMTEK FIPP package. Cursor movement is detected by repeatedly polling the cursor.	30
LWRKNM	L4COM	Number of characters in array "WRKFIL"	15
NUMOUR	OVRLAY	Number of overlay channels	2
OVRBIT	OVRLAY	Array of up to 4 entries containing the bit number associated with each overlay channel. OVRBIT(1) OVRBIT(2) OVERBIT(3) = OVRBIT(4)	11 10 0
OVRFLG	OVRLAY	Flag for whether the RAMTEK overlay mode has been selected	False

Table 3(continued)

RAMTEK LEVEL 4 COMMON BLOCK VARIABLES INITIAL SETTINGS

Variable Name	Common Block	Description	Initial Value
OLDMSK	OVRLAY	Mask parameter at time the overlay mode was selected. This mask parameter will be restored when the overlay mode is terminated.	0
NAMDIR	STDCOL	Name of the color directory file which contains the name of the standard color files OS32: COLOR.DIR	
LNMDIR	STDCOL	The number of characters in the color directory name	14
MAXCOL	STDCOL	The maximum number of names of standard color files that can exist in the color directory	200
COLLUN	STDCOL	The logical unit number of color directory	4
VLTNO	VLTDAT	Video Lookup Table device number	0
UPLIM	VLTDAT	Last usable entry in the LVT. Entries above the UPLIM in the LVT have been reserved for RAMTEK FIPP module usage such as storage of text color. UPLIM = VLTL - NRES	2047
VLTUP	VLTDAT	Flag for whether the VLT data has successfully been loaded into the RAMTEK display device	False
BW	VLTDAT	Flag for whether the image displayed is black and white or color	False

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The user will then input the file name of the INTERDATA 7/32
disc file which contains the standard color data needed for the
current image display.

QUERY 7 - <u>COLOR INITIALIZATION-NO STANDARD COLOR FILE</u>

If the information in the UNIVAC header record, word 52, indicates
that a standard color file is not to be used with the current image
display, then the IIGS will output the following query:

DOES THE USER WANT TO USE A STANDARD COLOR FILE   (Y or N)?
The purpose of this query is to allow the user to override the
standard color file flag in the RSIS UNIVAC header record if the
user wants to.

If the user does not want to use a color file, then he will input
an "N" following query 7. If the user does want to use a standard
color file, a "Y" will be input IIGS will output:

ENTER NAME OF THE STANDARD COLOR FILE TO BE USED.
FILE NAME =
The user will then input the name of the desired standard color
file.

QUERY 8 - <u>LOADING COLOR ARRAYS IF THE INPUT FILE CONTAINS A B/W VLT</u>

The following query will be output only on the special occasion
when the input RSIS CCT contains no color VLT record and does
contain a B/W Video Lookup Table record and color/level records
(see appendix A IIGS User's Guide records type 5 and 6). If this
condition exists then, IIGS will output:

A B/W VLT HAS BEEN LOADED INTO THE RAMTEK.
DOES THE USER WANT TO BUILD AND LOAD A COLOR VLT FROM
DATA IN ARRAYS "COLOR" AND "LEVEL" (Y or N)?
The user will input a "Y" if he wishes to load these color data
values into the RAMTEK VLT for this special circumstances. If
the user does not want to change the VLT, he will input an "N"
following query 8.

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Following the user response to Query 7 or Query 8 if it is output, the IIGS will begin reading the image records from the image data file on the RSIS and transmitting the data to the RAMTEK for display. This process will continue until all data is displayed on the RAMTEK CRT, unless an error is encountered. The system will then output query/menu 9.

QUERY 9 - USER SELECTION OF ACTION TO BE DONE AFTER IMAGE DISPLAY

Following the initial display of the image data on the CRT, the IIGS will output the following menu/query:

    ENTER NEXT ACTION CODE
        1 = CURSOR COORDINATES REQUIRED
        2 = COLOR TABLE REPORT/CHANGES REQUIRED
        3 = RE-STORE LAST SCENE ON DISPLAY CRT
        4 = DISPLAY PROCESSING COMPLETE

    IF THE USER WANTS TO CONTINUE CURRENT IMAGE ANALYSIS THEN
    MAKE NO ENTRY UNTIL ONE OF THE ABOVE ACTIONS IS REQUIRED.
    ACTION =

The user then performs an analysis on the image developed on the CRT. The user, upon completion of the initial analysis, will choose an action for IIGS from the above menu/query.

QUERY 10 - ACTION = 1 - CURSOR COORDINATES REQUIRED

If the user inputs a "1" (one) following Query 9, then the IIGS will begin collecting cursor coordinates for the user. The IIGS will then output:

    RSIS CRT CURSOR COORDINATE REPORT
    THE IMAGE TITLE IS: < title >
    DOES THE USER WANT THE CURSOR COORDINATES OUTPUT TO A PRINT
    FILE (Y OR N)?

If the user wants the CRT coordinates written to a tabulation disc file, then the user will input a "Y". The IIGS will then dynamically open a file named: "0S32:CURSOR.DAT". The file will receive all cursor coordinates that the user has indicated he wants reported and all be available for outputting on the INTERDATA printer at a

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later printing time. If the user does not want to store
coordinates in a tabulation file, then the user will enter an
"N" following the above query. Following the above input response,
the IIGS will output:

IS THE CURSOR POSITIONED TO THE POINT OF INTEREST (Y or N)?

The IIGS will then wait for the user to select a point on the
RAMTEK CRT. The point is selected by the user positioning the
cursor over a point of interest in the current image display.
Once the user has positioned the cursor, he will then input a
"Y" response to the above query. The IIGS will then read the
cursor coordinates from the RAMTEK and output the following:

THE HORIZONTAL COORDINATE X (NNN) = XXX   NNN = COORDINATE NUMBER
THE VERTICAL COORDINATE Y (NNN) = XXX   XXX = INTEGER NUMBER

If the user has requested coordinates to be output to the print file,
then these lines will also be output to the designated disc file.
Following the above output, IIGS will then output:

DOES THE USER WANT TO CONTINUE COORDINATE COLLECTING (Y or N)?

The user will input a "Y" response if more coordinates are to be
output and the above query:

IS THE CURSOR POSITIONED TO THE POINT OF INTEREST (Y or N)?

Will be output again. The user will again position the cursor and
enter a "Y." The coordinates will be output following the "Y" input
response. The user will continue the above actions until all the
required cursor coordinates have been reported. Upon completion of
collecting and reporting the cursor coordinates, the user will input
an "N" response following the query asking if more coordinates are
to be collected. The IIGS will then output the action menu/query,
Query 9, to allow the user to exercise one of the other action
options supplied by the IIGS.

QUERY 11 - ACTION - 2 COLOR TABLE REPORT/CHANGES REQUIRED

If the user inputs a "2" (two) following Query 9, then the IIGS

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will begin the color table report/color changing process. The
color report is diagrammed on page 19 of the User's Guide.
Upon entry of the "2", IIGS will output:

   IIGS COLOR REPORT

  COLOR REPORT IS BEING OUTPUT ON THE CRT - WAIT FOR THE NEXT
  MESSAGE.

The IIGS will then clear the bottom portion of the RAMTEK CRT
(the color report window on page 19 of the User's Guide) and
begin outputting the current color table bar and the title
information. If there are more than two, color bars will be
output containing the current colors. IIGS will never report
more than 1024 colors. Upon displaying the color bar(s) on the
RAMTEK CRT, IIGS will output:

   DOES THE USER WANT THE CURRENT COLOR TABLE OUTPUT TO A PRINT
   FILE (Y OR N)?

If the user does not want the colors output in a tabular format
to a disc file, then the user will input an "N" response. If
the user does want to output the color information for the colors
being currently used to display the image data, then the user
will input a "Y" response.

If the user inputs a "Y" response, the IIGS will dynamically open
a file named: "0S32:COLOR.DAT" and the color table data will be
written to this file.

Following the above query, IIGS will output:

DOES THE USER WANT TO CHANGE ANY COLORS IN THE EXISTING SCENE
(Y OR N)?

If the user does not want to charge any colors, then the user
will enter an "N". The IIGS will then output the action
menu/query, Query 9, and the user can take some other course
of action.

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If the user wants to change colors, then the user will enter a "Y" response following the above query. The IIGS will then output the spectrum of colors for color changes color bars and its associated sub-title. The IIGS will then output:

DOES THE USER WANT MORE COLORS DISPLAYED IN THE SPECTRUM OF COLORS (Y or N)?

If the user wants IIGS to display more than 128 colors, then the user will input a "Y" response. The IIGS will then output a spectrum of color bars that contain 512 colors. If the user is satisfied with the original 128 color spectrum, then the user will input a "N" response following the previous query.

The following is then output by the IIGS:

DOES THE USER REQUIRE THE COLOR CHANGING PROCEDURE TO BE OUTPUT ON THE ALPHA-NUMERIC TERMINAL (Y OR N)?

If the user does not need instructions on the process of changing colors, then the user will input an "N" following the above query. However, if the user needs the color changing procedure to be detailed then he will input a "Y" response and the IIGS will then output the following detailed instructions:

RSIS COLOR CHANGING INSTRUCTIONS

THERE ARE CURRENTLY TWO SETS OF COLOR BARS BEING DISPLAYED ON THE RAMTEK CRT. THE TOP SET OF BARS CONTAIN THE COLORS CURRENTLY BEING USED IN THE IMAGE. THE BOTTOM SET OF BARS CONTAIN A SPECTRUM OF COLORS WHICH WILL BE USED WHEN CHANGING THE PRESENT COLOR TABLE. THE USER IS TO SELECT THE COLOR TO BE CHANGED BY POSITIONING THE CRT CURSOR OVER THE COLOR TO BE CHANGED ON THE TOP SET OF COLOR BARS AND DEPRESSING THE "ENTER" SWITCH ON THE CURSOR CONTROLLER. THE USER MUST THEN POSITION THE CURSOR OVER THE COLOR THAT IS TO BE USED AS A REPLACEMENT COLOR ON THE BOTTOM SET OF COLOR BARS AND THEN TURN THE "ENTER" SWITCH ON. THE CHOOSEN COLOR WILL REPLACE THE OLD COLOR IN THE VIDEO LOOKUP TABLE

THE USER WILL CONTINUE THE PROCESS DESCRIBED IN THE PREVIOUS PARAGRAPH UNTIL ALL COLOR CHANGES HAVE BEEN MADE. WHEN THE USER IS SATISFIED WITH THE NEW COLOR SCHEME, THE USER MUST MOMENTARILY TURN THE "VISIBLE" SWITCH OFF.

The user then will follow the procedure described above. When
the visible switch has momentarily been turned off, the IIGS
will then output the action menu/query, Query 9, to allow the
user to exercise one of the other actions detailed in Query 9.

QUERY 12- ACTION – 3 – RE-STORE LAST SCENE ON DISPLAY CRT

This action can only be performed following action 2, color
report/change action. When action 2 was chosen, the IIGS wrote
the image data that was in the color report window to a disc
file. When the user exercises action B, than the user wants
the stored data restored on the RAMTEK CRT.

If the previous action code was not a "2" and the user enters
a "3" following Query 9, than the IIGS will output:

USER REQUIRED TO RESTORE LAST SCENE AND THE LAST SCENE IS STILL
AVAILABLE.

This message is output to inform the user that the IIGS has taken
no action to re-store the scene as the scene is still intact on
the CRT. The user has input the wrong action code.

If the previous action code was a "2", output of a color report,
then the IIGS will output the following if color changes have
been made:

DOES THE USER WANT THE ORIGINAL COLOR TABLE, PRIOR TO CHANGES,
RESTORED (Y OR N)?

The above query will give the user the capability to display the
image scene with the original colors if the user is not satisfied
with the new color scheme. If the user is satisfied with the
new colors, then the user will enter "Y" response. Otherwise,
the user will input an "N" response.

The IIGS will then restore the missing portion of the image that
was saved when a color report was output. Upon completion of
restoring the image scene the IIGS will output the action menu/query,
Query 9.

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QUERY 13 - ACTION 4 - DISPLAY PROCESSING COMPLETE

Once the user is finished image analysis, and he does not want to exercise any of the other action options provided by Query 9, the user will input a "4" four following Query 9. IIGS will output:

USER HAS REQUESTED TERMINATION OF CURRENT DISPLAY.

The completion process of the current execution (pass) of the IIGS will then begin.

If the user inputs a response less than 1 or greater than 4 following Query 9, the IIGS will output Query 9 again in order that the user can enter a legal action code.

QUERY 14 - FILE SAVING

Before the current pass in the IIGS is completed, the user is given the option to save the image file in an INTERDATA/RAMTEK compatible format and/or to save the colors currently being used in the image display in a standard color file stored on the INTERDATA 7/32 disc pack. The IIGS will output:

ARE ANY FILES TO BE SAVED (Y or N)?

If the user does not want to save any files, then the user will input a "N" response following the above query and the rest of the queries noted in this section will be skipped.

If the user wants to save one or both of the aforementioned files, then the user will input a "Y" response. IIGS will output:

IS THE IMAGE DATA TO BE SAVED (Y or N)?

If the user wants the image data saved in an INTERDATA/RAMTEK compatible format, then the user will input a "Y" response, Otherwise, the user will input an "N" response. If the user inputs a "Y" response, then IIGS will rewind and unload the CCT that is currently mounted on the INTERDATA tape drive. The IIGS will then output the following message:

MOUNT A SCRATCH TAPE ON THE INTERDATA TAPE DRIVE.

WHEN READY TO CONTINUE ENTER A 1.

When a scratch tape has been mounted and the user is ready to begin having the image data output to the CCT, the user will then input a "1" (one). The IIGS will then output:

THE TITLE OUTPUT ON THIS CCT IS: < title >

The image data will then be written to the CCT and upon completion the IIGS will output:

IF IMAGE PROCESSING IS TO CONTINUE MOUNT THE INPUT

CCT ON THE INTERDATA TAPE DRIVE.

WHEN READY TO CONTINUE ENTER A 1.

The above will cause the IIGS processing to pause until the user has mounted an input CCT if IIGS is to perform another pass on another set of data. When the user is ready, he will input a "1" (one).

The IIGS will then output:

IS THE COLOR TABLE USED IN THE CURRENT IMAGE PROCESSING TO BE SAVED (Y or N)?

If the user does not want the color table output to a standard disc color file, the user will input an "N" response.

If the user does not want the color table data saved on a disc file, then the user will input a "Y" response. The IIGS will then output :

FILE NAME =

The user will then input the name of the file that is to contain the current color table data. The IIGS will then begin to output the color table data to the named file.

QUERY 15 - IIGS PROCESSING CONTINUATION/COMPLETION

The following is the last query output in any pass in the IIGS:

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IIGS PROCESSING COMPLETE (Y or N)?

If all IIGS processing has been completed, then the user will
input a "Y" response. The IIGS will then close all files and
terminate processing on the INTERDATA 7/32.

If there is more image data to be processed, then the user will
input an "N" response. The IIGS will then begin setting up for
another pass through the IIGS software and Query 1 will be
output again.

3.2.2 INTERDATA/RAMTEK COMPATIBLE CCT PROCESSING

The processing described in the following paragraph is the
branch of IIGS processing performed when the input data is in
an INTERDATA/RAMTEK compatible format as described in Appendix
B of the User's Guide. Each query is numbered for documentation
purposes. In actual operation of the IIGS the query numbers
do not appear.

QUERY 1 - BEGIN PROCESSING

The IIGS begins processing image data by outputting the following:

> RSIS INTERIM INTERACTIVE GRAPHICS SUBSYSTEM
> INPUT DATA IN RSTS UNIVAC FORMAT (Y or N)?

The IIGS outputs Query 1 in order to determine the proper
processing branch to take. This sub-section of the user's guide
deals with the non-standard form of input, an INTERDATA/RAMTEK
compatible CCT. Therefore the user will input an "N" response
to the above query.

QUERY 15 - ASSURANCE OF TYPE OF INPUT

The IIGS will begin the non-standard input processing and will
output:

> INITIALIZE THE IIGS FOR PROCESSING DATA FROM A
> RAMTEK/INTERDATA COMPATIBLE FILE.

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ABBREVIATIONS AND ACRONYMS

bpi	Bytes per inch
CCT	Computer Compatible Tape
CRT	Cathode Ray Tube
CT	Computer Tomography
DEC	Digital Equipment Corporation
FIPP	(RAMTEK) Fortran Image and Plot Package
IIGS	Interim Interactive Graphics Subsystem
I/O	Input/Output
LUN	Logical Unit Number
OS/32	Interdata 7/32 Operating System
Pixel	Picture Element
RSIS	Remote Sensing Information System
VLT	Video Lookup Table