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# AgRISTARS

SR-L1-00301  
JSC-17389

NASA-CR-161060

**A Joint Program for  
Agriculture and  
Resources Inventory  
Surveys Through  
Aerospace  
Remote Sensing**

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## Supporting Research

June 1981

~~E82-10085~~

**"AS-BUILT" DESIGN SPECIFICATION FOR UNIV4VEC** CR-161060

M. A. Tompkins  
C. A. Sivillo

(E82-10085) AS-BUILT DESIGN SPECIFICATION  
FOR UNIV4VEC (Lockheed Engineering and  
Management) 32 p HC A03/MF A01 CSCL 02C

#82-21637

Unclas  
G3/43 00085

Lockheed Engineering and Management Services Company, Inc.  
1830 NASA Road 1, Houston, Texas 77058



Lyndon B. Johnson Space Center  
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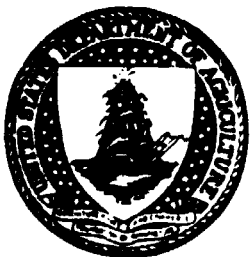
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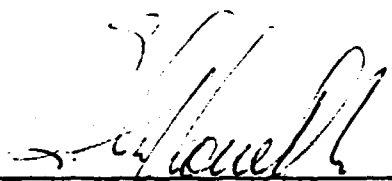
"AS-BUILT" DESIGN SPECIFICATION  
FOR UNIV4VEC

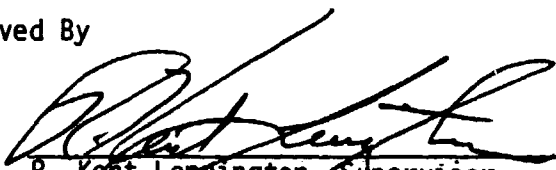
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
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## UNIV4VEC PROGRAM

### 1.0 SCOPE

This document describes the UNIV4VEC Program which is one of the BADHWAR SYSTEM programs. Included in this system are the CLASFYT, CLASFYG, PARPLT, PARHIS, PARCLAS and MISMAP programs.

The UNIV4VEC program reads a CLASFYG vector parameter file and converts it to a four channel universal formatted file. This universal formatted file is primarily used as input to the CLASSY processor.



## 2.0 APPLICABLE DOCUMENTS

The following documents form a part of this specification:

AD 63-3308-03 Transferring Badhwar Software.

AD NAS 9-15200 Technical Memorandum Format Specifications for LACIE (Phase III) and Accuracy Assessment Computer Data Products.

### 3.0 SYSTEM DESCRIPTION

#### 3.1 SYSTEM FLOWCHART

The system level data flow diagram for the UNIV4VEC Program is depicted in Figure 3.1.1.

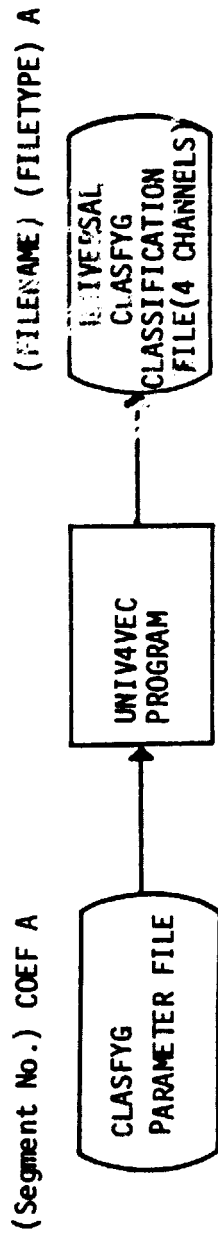


Figure 3.3.1 System level flow diagram for the UNIV4VEC Program.

### 3.2 HARDWARE DESCRIPTION

The software for the UNIV4VEC Program is operational on the IBM 3031 computer at Purdue, LARS.

### 3.3 SOFTWARE DESCRIPTION

The UNIV4VEC Program reads a CLASFYG vector parameter file header and sets the appropriate bytes to indicate a four channel universal file with 196 bytes per channel. The data records from the parameter file are read. Each of the pixel vector coefficients within the parameter file are assumed to be within the range 0 to 9999, therefore, all coefficients are divided by forty to insure that the resulting coefficient value is less than 256 and will store in a byte. After division, the element is stored in the output buffer. When all elements in the line are processed, the buffer is written.

### 3.4 FILE DESCRIPTIONS

#### 3.4.1 INPUT FILE

UNIV4VEC accepts as input, a parameter file output from the CLASFYG Program. This parameter file consists of 118 records. The first record is a header record consisting of 3060 bytes. The header record follows universal format requirements. Records 2-118 contain data records. Each data record consists of 196 pixel vectors. Each pixel vector consists of four coefficients:  $\alpha$ ,  $\beta$ ,  $t_0$  and  $\chi^2$ . Each coefficient contains a signed integer value stored in a thirty-two bit full word. (For a complete description of this file see "AS-BUILT" DESIGN SPECIFICATION FOR CLASFYG LEMSCO-16649/JSC-17369).

#### 3.4.2 OUTPUT FILE

The output file is in universal format and contains the following records:

##### Header Record

The header record contains all information from the CLASFYG header. In addition, the following bytes are assigned so that the resulting header conforms to the universal format standards:

<u>BYTE(S)</u>		<u>CONTENTS (DECIMAL)</u>	<u>DESCRIPTION</u>
81	=	240	First four bits on to indicate four channels
89	=	1	Processing flag
90	=	4	Number of channels per physical record
91	=	8	Number of bits in pixel (always = 8)
92-93	=	1	Start of the video data (always = 1)
96-97	=	196	Number of pixels per scan line
100-101	=	900	Physical record size in bytes (multiple of 180 bytes)
104	=	1	Number of records in a data set
105-106	=	70	Length of ancillary block
108-109	=	1	Beginning pixel within the channel
110-111	=	196	Last pixel within the channel
753	=	32	Word size of machine in bits
1778	=	1	Number of data sets in record
1786	=	4	Number of channels within the first physical record of the data set

### Data Records

There are 117 four channel data records of length 900 eight bit-bytes. Each data record contains seventy-two bytes of ancillary data followed by 196 bytes representing the  $\alpha$  coefficient, 196 bytes representing the  $\beta$  coefficient, 196 bytes representing the  $t_0$  coefficient, and 196 bytes representing the  $\chi^2$  coefficient. The remaining forty-four bytes are zero filled to complete the 900 bytes. All coefficients from the parameter file are divided by forty to insure that the resulting number will store in a byte.

(For a complete description of the universal file format see Earth Resources Data Format Book, Volume 1, PHØ-TR543.

### 3.5 SOFTWARE DESCRIPTION

#### 3.5.1 UNIV4VEC

##### Purpose

The UNIV4VEC Program reformats a universal file from a CLASFYG vector file.

##### Linkages

None.

##### Interface

Calling sequence:

Not applicable. (UNIV4VEC EXEC which can be used to load and execute UNIV4VEC is described in Section 4.0).

Calling sequence parameters:

Not applicable.

Function value:

Not applicable.

Labeled common parameters:

None.

Blank Common parameters:

None.

##### Inputs

<u>Unit</u>	<u>Type</u>	<u>Description</u>
10	Sequential data	Input classification file in vector form (See Section 3.4.1).

### Output

<u>Unit</u>	<u>Type</u>	<u>Description</u>
5	Terminal	Report
29	Sequential data; Disk	Output classification file in universal format. (See Section 3.4.2)

### Storage Requirement

Not applicable.

### Description

The UNIV4VEC Program reads a CLASFYG vector parameter file header and sets the appropriate bytes to indicate a four channel universal file with 196 bytes per channel. The data records from the parameter file are read and each pixel vector coefficient is divided by forty. This insures that each coefficient value is less than 255 and will store in a byte. After division, the element is stored in the output buffer. When all elements in the line are processed, the buffer is written.

### Flowchart

Not applicable.

### Listing

Not applicable.



### 3.5.2 PROGRAM CLSRCL

#### Purpose

CLSRCL reads information necessary to define (FILEDEF) the classification file for the UNIV4VEC program.

#### Linkages

CLSRCL is executed by UNIV4VEC EXEC.

#### Interface

None.

#### Inputs

<u>Unit</u>	<u>Type</u>	<u>Description</u>
23	Sequential	Unit number associated with classification file and classification file name.

#### Outputs

None.

#### Storage requirement

Not applicable.

#### Description

The CLSRCL subroutine reads from file 23 to recall the classification file name and unit number. If the file is empty, an error message is written and the program terminates. If the file is not empty, the EXEC to FILEDEF (define the file to the system) the classification file is written. This is necessary because of the possibility of the file definition being lost due to a system error on one of the program executions.

#### Flowchart

Not applicable.

#### Listing

See Appendix A for routine listing.

## 4.0 OPERATION

### 4.1 OPERATING DESCRIPTION

UNIV4VEC is operational on the IBM 3031 computer at LARS, West Lafayette, Indiana.

The UNIV4VEC program is one of the programs of the BADHWAR SYSTEM which includes the programs CLASFYT, CLASFYG, MISMAP, PARPLT, PARHIS, and PARCLS.

### 4.2 COMMANDS DESCRIPTION

To execute UNIV4VEC, the user enters a series of commands which invoke the JOB CONTROL SOFTWARE. These commands are divided into two classes namely (1) FUNCTION commands and (2) PROGRAM commands. The FUNCTION commands, which perform all the functions except executing the program are reusable; i.e., once they are invoked they remain in effect until reentered. The PROGRAM commands, which execute the program, must be reentered each time the program is to be executed.

The following list gives the commands required to execute the UNIV4VEC program. They are all FUNCTION commands except the PROGRAM command UNIV4VEC. These commands must be given in the listed order.

START

DEFCLAS.....

UNIV4VEC.....

END

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

#### 4.2.1 START

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

The START command is invoked by the user typing the following:

```
START
```

#### 4.2.2 DEFCLAS

The DEFCLAS command defines the input Classification file. The user can use this command to define a Classification file on tape or disk. The DEFCLAS command has the following forms and is invoked by typing one of the following, according to the user's requirement.

If the file is on tape -

```
DEFCLAS TAPE# FILE# (TAPE DENSITY)
```

If the file is on disk -

```
DEFCLAS FILENAME FILETYPE FILEMODE
```

This command remains in effect for the use of any of the BADHWAR SYSTEM PROGRAM commands and does not have to be reissued unless the user wishes to redefine the input Classification File.

### 4.2.3 UNIV4VEC

The UNIV4VEC command is a PROGRAM command and is used to invoke the execution of the UNIV4VEC program. This command must not be used unless the DEFCLAS command has been previously issued. The UNIV4VEC command is invoked by the user typing the following:

```
UNIV4VEC <OUTPUT FILENAME> <OUTPUT FILETYPE>
```

The output file from the UNIV4VEC program is written on the user A disk under the name specified in the EXEC arguments.

### 4.2.4 END

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

```
END
```

## 4.3 OPERATING EXAMPLE

For our example we will assume the following:

The user has executed the CLASFYG program and its output file is named 0123 COEF.

COMMAND	EXPLANATION OR ACTION TAKEN
START	Spool the users console
DEFCLAS 0123 COEF B	Defines a Class file on the users B disk. This data is on a disk which the user has previously attached to his disk using a B mode.
UNIV4VEC 0123 UNIVCOEF	Executes the UNIV4VEC PROGRAM.
END	Closes the user's console file and spools the files to the HOUSTON printer.

**APPENDIX A**  
**PROGRAM LISTING**

REQUESTED OPTIONS: NUTEM4  
 OPTIONS IN EFFECT: NAME(MAIN) OPTIMIZE(F) LINECOUNT(00) SIZE(4AX) AUTUMPL(INONE)  
 SOURCE EXECUTIVE HULLIN UNPACK OBJECT MAP NUPUMHAT HUBUSTMT XREF ALC NUANSR NUTEMH LHM FLAG(1)

```

C PROGRAM UNIV4VFC DEFORMAT UNIVERSAL FILE FROM VECTOR FILE
C-----
C HISTORY
C-----
C M A JEWKINS LFNSCO 05/06/78 DESIGNS
C A STILLER LFNSCO 05/07/78 CODE
C-----
C METHOD
C-----
C HEAD PARAMETER FILE RECORD
C UNLIF COMPACTED PARAMETER FILE RECORD
C READ DATA RECORDS FROM PARAMETER FILE
C WRITE EACH PIXEL 4X 40
C WRITE LINE IN UNIVERSAL FORMAT
C-----
C EXTERNAL REFERENCE
C-----
C INTEGER OPEN COMMENTS TO SEE IF FILE CONTAINS INFORMATION.
C-----
C EXCEPTION
C-----
C IF CLASSIFICATION FILE IS UNDEFINED, THEN INSURE ERROR MESSAGE
C AND STOP
C-----
C LOCAL VARIABLES
C-----
C INTEGER ISEG SEGMENT NUMBER
C INTEGER LIPFCT LINE COUNT
C INTEGER KOFF(1:6) ALPHA COEFFICIENT OF PARAMETER FILE
C INTEGER KOFF(1:6) META COEFFICIENT OF PARAMETER FILE
C INTEGER KOFF(1:6) TO COEFFICIENT OF PARAMETER FILE
C INTEGER KOFF(1:6) COUSON COEFFICIENT OF PARAMETER FILE
C INTEGER KOFF(1:6) ALPHA+META+TOUSON PARAM FILE (DATA MECS)
C LOGICAL 91 LIND(1:6) INPUT BUFFER
C INTEGER LIND LINE OF DATA
C INTEGER TAL PIXEL WITHIN A LINE
C-----
C EQUIVALENCE (KOFF(1:6))=KOFF(1:6) (KOFF(1:6))=KOFF(1:6)
C (LIND(1:6))=LIND(1:6) (LIND(1:6))=LIND(1:6)
C-----
C PROCEDURE
C-----
C COMMENT TO SEE IF CLASSIFICATION FILE CONTAINS INFORMATION
C IF (LHM(41)) .AND. (LHM(42)) .AND. (LHM(43))
C 50 FLOWCHART CLASSIFICATION FILE IS UNDEFIN(0.0)
C IF (LHM(41)) .AND. (LHM(42)) .AND. (LHM(43))
  
```

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**APPENDIX B**  
**JOB CONTROL SOFTWARE**

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FILE: FND F1EC H LAM / MICHIGAN UNIVERSITY

ACONTROL OFF

END EREC

PURPOSE

THIS EREC WILL CLOSE CONSOLE FILE AND PRINT THE FILE

PROCEDURE

SPROG CONSOLE STOP CLOSE

LFM)

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SCUMTINL OFF  
START EREC  
-----  
PURPOSE  
-----  
THIS EREC WILL ALLOW THE USER TO SHOW ALL ANSWERS TO THE  
CONSOLF. THIS IS TO BE USED TO PREPARE A SUMMARY FILE.  
-----  
PROCEDURE  
-----  
TAB DEV CONS WIMPSON  
SPOR CONS START WIMPID TO WICK  
AFAT  
LFWD

FILE: UNIV4VFC EXEC R LARS / MINNIE UNIVERSITY

CONTROL OFF

UNIV4VFC

HISTORY

CAROL STIVILLO LEMSCO R5204/R1 CUMR

PURPOSE

THIS EXEC EXECUTES THE UNIV4VFC PROGRAM

ARGUMENTS TO THIS EXEC ARE: <INPUT FILETYPE>  
<OUTPUT FILENAME>

FILE DEFINITION DESCRIPTION FOR ALL FILES USED IN MAINBODY  
PROGRAMS AND EXEC ARE AS FOLLOWS:  
UNIT IN SCOPE UNIT  
2-4 MAINBODY SYSTEM  
4-9 MAINBODY SYSTEM  
10 UNIT CLASSIFICATION FILE IN VECTOR FORM  
11-20 MAINBODY SYSTEM  
20 UNIT CLASSIFICATION FILE IN UNIVERSAL FORM

NOTE: THESE FILES USED BY MAINBODY SYSTEM CAN BE USED IN THIS  
PROGRAM TO THIS IS JUST A WARNING THAT OUR SPECIAL CAREFUL HELPME  
NOTING SO IF WE INTENDS TO HAVE A MAINBODY SYSTEM FOR.

RECEPTION

THE FOLLOWING ERRORS CAUSE IMMEDIATE TERMINATION:  
1. INSUFFICIENT PARAMETERS INPUT TO PROGRAM

PROCEDURE

SPACE 1  
CTYPE UNIV4VFC A 1

CHECK TO SEE IF TEMPORARY FILE IS AVAILABLE

CP QUERY VIRTUAL I/O  
IF ANYTHING TO A FILED -YES  
CTYPE CLASS FILE NOT YET DEFINED.  
ACRT 1  
-YES

CHECK FOR SUFFICIENT MEMORY

IF DIMER PG 2 P001 -JOB  
CTYPE EXEC NEEDS AN ENTRY FOR FILE AND NOT FILETYPE.  
ACRT 2  
-JOB

FILEDEF F12P001 USE CLASSIC FILE TO FULL NO LINK NO PERM  
FILEDEF F12P001 TEMPORARY  
FILEDEF F12P001 USE CLASSIC FILE TO FULL NO LINK NO PERM  
FILEDEF F12P001 USE CLASSIC FILE TO FULL NO LINK NO PERM

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```

* RECALL INFORMATION FOR FILEDEF
* LOAD CLSHCL (CLEAR OUTPUT STAGE)
*
* LOAD E1EC TO FILEDEF CLASS FILE
* EXEC CLASSCL.D
* LOAD WANSK1.FMW
* STOP ERR FOR EXIT 3
*
* LOAD PROGRAM
*
* LOAD UNIT4VECI.CLEAR (0min) Start
* EXIT 4

```

REQUESTED OPTIONS: NONE

OPTIONS IN EFFECT: NAME(MAN) OPTIMIZE(1) LINECOUNT(90) SIZE(MAX) AUTOJCL(M) SOURCE EXECUTE(0) CHECK OBJECT MAP NORM(4) AREF ALC NDAARSF NUTERM IBM FLAG(1)

PROGRAM CLASSCL READ FILE J110 FOR UNIVREC FILE.

HISTORY

M A THAKINS LFNSCO 05/26/68 FILCALL (ORIG CODE)
C A STIVELL LFNSCO 05/26/68 CODE

METHOD

READ FROM RECALL FILE 23 FOR CLASSIFICATION FILE INFO;
IF FILE IS EMPTY WRITE AN EXEC WITH THE ERROR FLAG SET TO
IS FALSE; WRITE EXEC TO FILE; THE CLASS FILE; THIS IS NECESSARY
ONLY BECAUSE OF THE POSSIBILITY OF THE FILE DEFINITION BEING
LOST BY A SYSTEM ERROR ON ONE OF THE PROGRAM EXECUTIONS.

EXTERNAL REFERENCES

NONE.

EXCEPTIONS

1. IF RECALL FILE IS EMPTY ISSUE DIAGNOSTIC MSG AND WRITE
ERROR EXEC.

LOCAL DECLARATIONS

INTEGER JUNIT UNIT FOR GROUP TRUTH -- 10
INTEGER NMPC(12) CLASS FILE NAME
INTEGER NMCT(12) CLASS FILE TYPE
INTEGER ADDRCL CLASS FILE MODE

PARAMETERS

START JUNIT, RECALL EXEC
WRITE(23,0)
FOR EXECUTE(CORRECTED) OFF

READ FROM RECALL FILE FOR CLASSIFICATION DATA

400 JUNIT = 0
IF NMPC(12) = 0 (NMCT(12) = 410) ADDRCL (NMCT(12)) = 1,2)
405 FOR NMCT(12) = 1,2) ADDRCL
410 IF NMCT(12) = 0 GO TO 410
420 FOR NMCT(12) = 1,2) ADDRCL
GO TO 400

WRITE EXEC

430 WRITE EXEC

CLS00010
CLS00020
CLS00030
CLS00040
CLS00050
CLS00060
CLS00070
CLS00080
CLS00090
CLS00100
CLS00110
CLS00120
CLS00130
CLS00140
CLS00150
CLS00160
CLS00170
CLS00180
CLS00190
CLS00200
CLS00210
CLS00220
CLS00230
CLS00240
CLS00250
CLS00260
CLS00270
CLS00280
CLS00290
CLS00300
CLS00310
CLS00320
CLS00330
CLS00340
CLS00350
CLS00360
CLS00370
CLS00380
CLS00390
CLS00400
CLS00410
CLS00420
CLS00430
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CLS00450
CLS00460
CLS00470
CLS00480
CLS00490
CLS00500
CLS00510
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CLS00580
CLS00590
CLS00600
CLS00610
CLS00620
CLS00630
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CLS00650
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CLS00670
CLS00680
CLS00690
CLS00700
CLS00710
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CLS00730

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APPENDIX C  
OUTPUT LISTING

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RJN  
DEFCLAS 0123 CONF R  
DEV 192 DOPS NOT EXIST  
DMLINK 0123 TERN 151 NOT LINKED P/W BY VAMHINT  
192 HAS BEEN ATTACHED AS 192. (0003.00 MEGABYTES)  
EXECUTION 149114...  
01000041N  
UNIV4VFC 0123 TEST

UNIV4VEC 0123 TEST  
DASD 192 130 MPM004 P/W 15 C/M  
EXECUTION 149114...  
EXECUTION 149114...

THE ACTUAL NO OF LINES PROCESSED = 118 FOR SEGMENT NUMBER 123  
END