

44

AD
A094R22AD
A094R2.2

ADA 084822

DDC FILE COPY

(18) (19) REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER DRXTH TD-CR-80062	2. GOVT ACCESSION NO. AD-AC84799	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Map Coordinate Conversion.		5. TYPE OF REPORT & PERIOD COVERED Final Dec-Mar 78
6. AUTHOR(s) H.O. Eberhart		6. PERFORMING ORG. REPORT NUMBER 79.01
7. PERFORMING ORGANIZATION NAME AND ADDRESS Potomac Research, Inc. McLean, Virginia 22101		8. CONTRACT OR GRANT NUMBER(s) DAAK11-77-C-0112
11. CONTROLLING OFFICE NAME AND ADDRESS US Army Toxic and Hazardous Material Agency Aberdeen Proving Ground, Maryland 21010		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 722896.R
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Chemical Systems Laboratories Aberdeen Proving Ground, Maryland 21005		12. REPORT DATE March 1978
		13. NUMBER OF PAGES 106
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Cleared for public release; distribution unlimited.		
This document has been approved for public release and sale; its distribution is unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES (14) STR-IR78.01		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Map Coordinates Coordinate Conversion Installation Restoration		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This set of twelve FORTRAN subroutines will convert the coordinates of a point given in geographic, military, state planar, or Universal Transverse Mercator form to coordinates represented in a second form chosen from the four coordinate types.		

POTOMAC RESEARCH, INCORPORATED
MCLEAN, VIRGINIA 22101

SPECIAL TECHNICAL REPORT IR 78.01 (MARCH 1978)

MAP COORDINATE CONVERSION

By H. O. EBERHART

Prepared For:

Department of the Army
Chemical Systems Laboratory
Development Support Division
Scientific & Engineering Applications Branch

Contract Number: DAAK11-77-C-0112
Installation Restoration Data Base Management

APPROVED FOR PUBLIC RELEASE
Distribution Unlimited

80 5 22 0 47

POTOMAC RESEARCH, INCORPORATED

Abstract:

This set of twelve FORTRAN subroutines will convert the coordinates of a point given in geographic, military, state planar, or Universal Transverse Mercator form to coordinates represented in a second form chosen from these four coordinates types.

THE VIEWS, OPINIONS AND/OR FINDINGS
CONTAINED IN THIS REPORT ARE THOSE
OF THE AUTHOR(S) AND SHOULD NOT BE
CONSTRUED AS AN OFFICIAL POSITION
OF THE ARMY ENGINEER, TRUCE, OR
DECISION, UNLESS SO DESIGNATED BY
OTHER DOCUMENTS

Accession For	
WPIS GRA&I	
DEC TAB	
Unannounced	
Justification	
By	
Distribution/	
Availability Codes	
Dist.	Avail and/or special
A	

Current Changes to Special Technical Report IR 78.01 (MARCH 1978)

October 4, 1978

Please make the indicated changes to this manual; then file this change sheet before the table of contents and destroy all others.

<u>New Pages</u>	<u>Date</u>
8 - 9*	October 4, 1978
18 - 18a*	October 4, 1978
unpaged (2)* (Appendix B)	

*New pages

TABLE OF CONTENTS

	Page
1. INTRODUCTION	1
2. LOCATING POINTS	2
2.0 General	2
2.1 Geographic Coordinates	3
2.2 State Planar Coordinates	3
2.3 Universal Transverse Mercator Coordinates	4
2.4 Military Coordinates	6
3. USER PROCEDURES	8
3.0 General	8
3.1 Geographic to Military Coordinates	10
3.2 Geographic to State Planar Coordinates	10
3.3 Geographic to UTM Coordinates	10
3.4 Military to Geographic Coordinates	11
3.5 Military to State Planar Coordinates	11
3.6 Military to UTM Coordinates	11
3.7 State Planar to Geographic Coordinates	12
3.8 State Planar to Military Coordinates	12
3.9 State Planar to UTM Coordinates	12
3.10 UTM to Geographic Coordinates	13
3.11 UTM to Military Coordinates	13
3.12 UTM to State Planar Coordinates	13
3.13 Example	14
4. TEST PLAN	17
5. PROGRAMMING NOTES	19
5.0 General	19
5.1 Modifying the Subroutines	21

APPENDICES

- A Bibliography
- B Computer Program Source Listings

1.0 INTRODUCTION

In the Installation Restoration (IR) program measurements of variables such as depth to top of interval in a coring must be related to a specific location on the earth's surface. This is accomplished through the use of coordinates: geographic, state planar, Universal Transverse Mercator, and military. Each installation will use that coordinate system which is most convenient; therefore, the programmer will be concerned with conversion from one coordinate system to another. This manual will show you how to use the subroutine package. If you understand the above coordinate systems, you may skip section 2.

Note: Your comments on this manual can help improve it; please direct all comments to Potomac Research, Inc., at our Edgewood Area office.

2. LOCATING POINTS

2.0 General

The earth's surface is considered to result from the rotation of an ellipse about the north-south polar axis. This solid is called the spheroid. The Clarke 1866 spheroid is currently used for the continental United States. Dimensions are shown below:

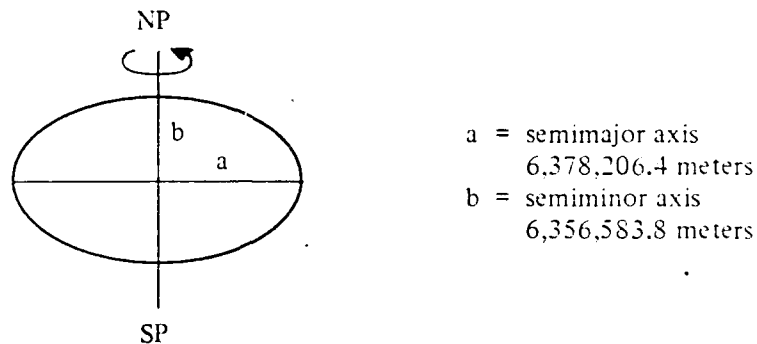


Figure 1. Clarke 1866 Spheroid

A point such as position A in Figure 2 is located by describing it in terms of two numbers called coordinates.

Geographic coordinates can be related to the spheroid alone by means of the formulae of geodesy. For the other coordinate systems, the point A has been transferred from the spheroid to a map projection. The map projection is a flattening of the surface upon which the spheroid is projected according to the projection type. We desire a flat surface because it is easier to work with than a curved surface.

To locate that point A in Figure 2, we measure its signed distances from two lines called axes and record the numbers in order as the coordinates of A. Our x and y axes will always intersect at an angle of 90° .

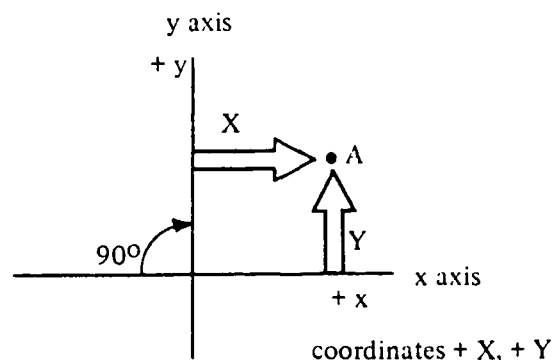


Figure 2. General Coordinate System

2.1 Geographic Coordinates

On the spheroid the axes are curved lines. The x axis is the circle equidistant from the North and South Poles named the Equator. The y axis is that half-ellipse through the North and South Poles that passes through Greenwich, England, named the Prime Meridian. Distances are measured in degrees, minutes, and seconds of arc. We shall measure from 0 to 90° north or south of the Equator and shall call this coordinate latitude. We shall measure from 0 to 180° west or east of the Prime Meridian and shall call this coordinate longitude. The precision of our measurements shall be to the nearest 0.01 second.

Geographic coordinates of point A are written like the following example:

39° 23' 51.37"N 76° 18' 06.63" W

Sometimes, you will see these symbols:

ϕ , latitude

λ , longitude

Also, geographic coordinates may be called geodetic.

2.2 State Planar Coordinates

Two types of projections are used in the state planar coordinate system:

Lambert projection – “wide” state such as Connecticut

Transverse Mercator projection – “tall” state such as Vermont

It may require more than one projection to cover a state, as the width is limited to 158 miles. Thus, a state may be divided into areas of coverage called zones, which have been coded as four-digit numbers in subroutine FLALFA and ZONE2. The y axis is the central meridian of the projection; it is assigned a large positive number so that no coordinate will have a negative value. Its equation is $x = p$. The x axis is a line perpendicular to the y axis and it is sufficiently south of the zone so that no y coordinate will have a negative value. Its equation is $y = 0$. We shall measure distance in feet from the y axis to point A; call this distance X' . X coordinate is

$$X = p \pm X'$$

Note: Use + if point A is east of the central meridian; use - if point is west.

We shall measure distance in feet from the x axis to point A and shall call this coordinate Y.

State planar coordinates of point A are written like the following example:

Zone 4126 X = 997,307 Y = 570,443

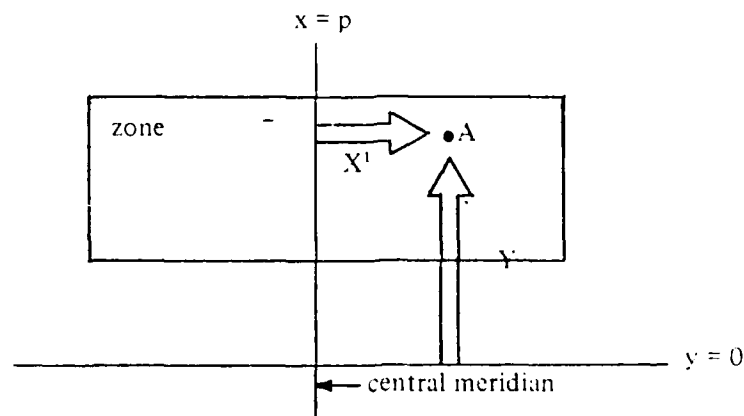


Figure 3. State Planar Coordinate System

2.3 Universal Transverse Mercator Coordinates

The Universal Transverse Mercator (UTM) projection is used from 80°S through 84°N latitude. The earth is divided into 60 zones 6° wide starting at 180°W longitude and proceeding east. Zones are numbered from 1 to 60 as in Figure 4.

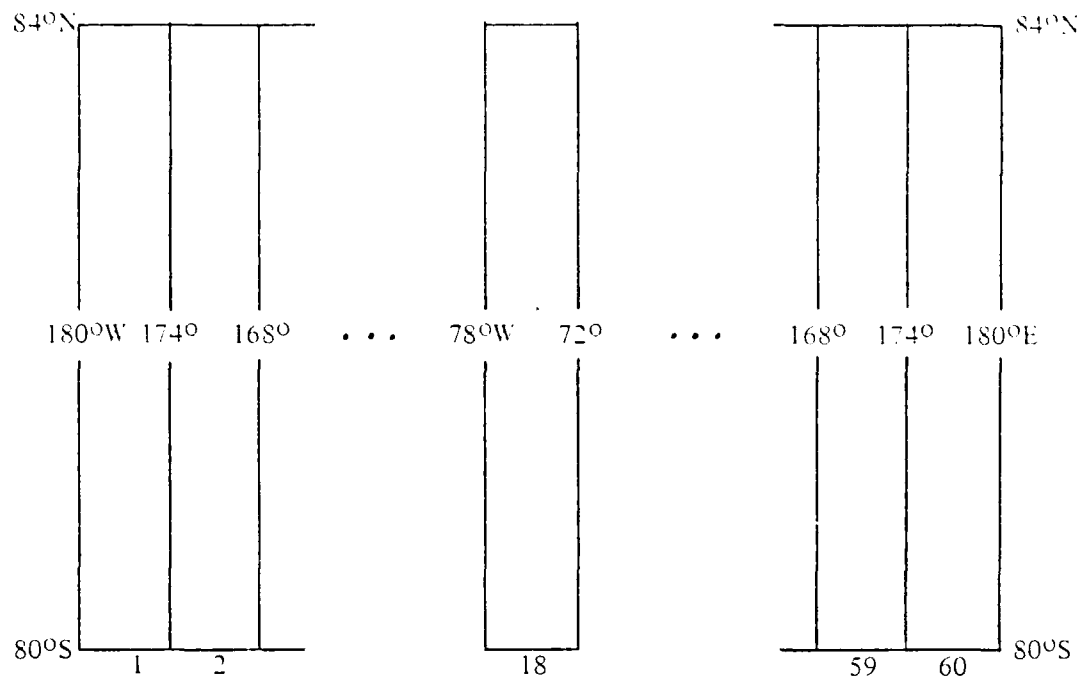


Figure 4. UTM Zones

The y axis of each zone is its central meridian; it is assigned a value of 500,000 meters. Its equation is $E = 500,000$.

The x axis of each zone is the Equator; in the northern hemisphere, it is assigned a value of 0 meters; in the southern hemisphere, 10,000,000 meters. Its equation is $N = 0$ (northern); $N = 10,000,000$ (southern). We shall measure distance in meters from the y axis to point A; call this distance E^1 . The false easting coordinate is

$$E = 500,000 \pm E^1$$

Note: Use + if point A is east of central meridian; use - if point A is west.

We shall measure distance in meters from the x axis to point A and shall call this northing distance N^1 . The false northing coordinate is

$$\begin{aligned} N &= N^1 && \text{(northern hemisphere)} \\ \text{or } N &= 10,000,000 - N^1 && \text{(southern hemisphere)} \end{aligned}$$

UTM coordinates of point A are written like the following example:

$$\text{Zone } +18 \quad E = 387,900 \quad N = 4,361,500$$

Note: + zone means northern hemisphere
- zone means southern hemisphere

2.4 Military Coordinates

Military coordinates are based on the UTM system described in section 2.3. Each zone is divided into 8° high areas called quadrangles except from 72°N to 84°N where the quadrangle is $6^\circ \times 12^\circ$. The row dimension of a quadrangle is lettered from C through X (omitting I and O) as in Figure 5. A quadrangle is identified by zone number and row,

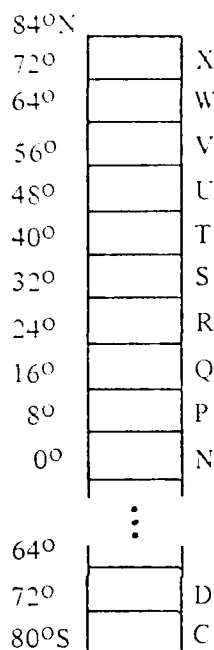
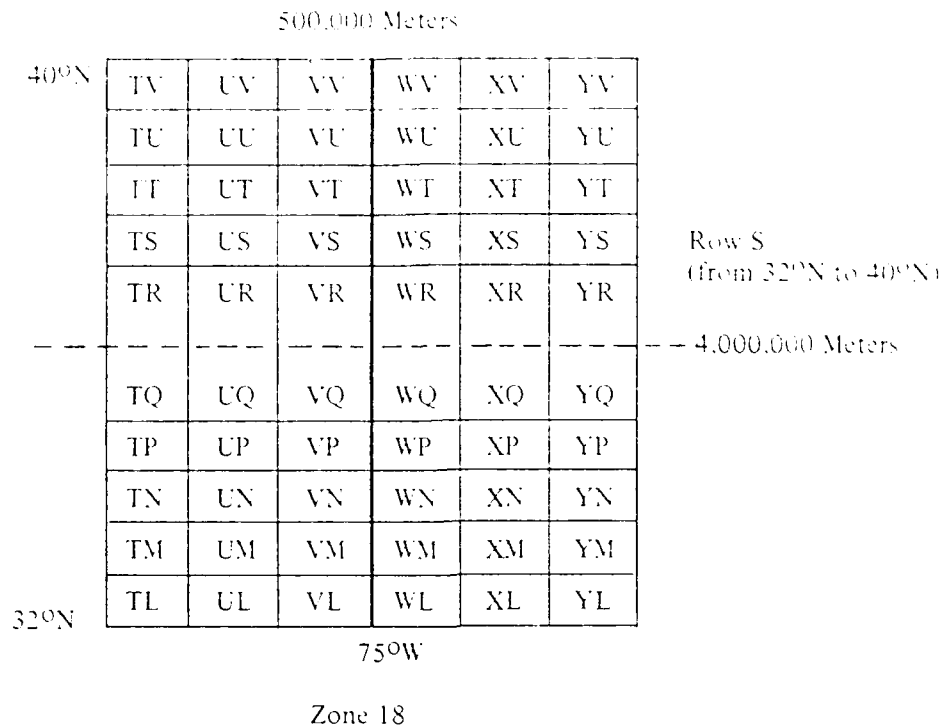


Figure 5. Quadrangles of a UTM Zone

These quadrangles are then divided into squares which have 100,000 meters on each side. A 100,000-meter square is identified by two letters: x designator, y designator. Compute $r = \text{MOD}(\text{zone}, 3)^*$. If r equals 0, then the x designator is lettered S through Z proceeding east; if r equals 1, then it is lettered A through H; if r equals 2, then it is lettered J through R (omitting O).

If the UTM zone is odd, then the y designator is lettered L through V, A through K (omitting I and O) starting at a multiple of 2,000,000 meters and proceeding north; if the UTM zone is even, then it is lettered R through V, A through Q (omitting I and O) as in Figure 6.

*Fortran MOD function.



Note: Because of convergence of the meridians, letters S and Z have been cut off.

Figure 6. 100,000-Meter Squares of an Even Zone

Since the point A has been located within 100,000 meters by means of zone number, quadrangle row, and 100,000-meter square, we use only part of the easting and northing coordinates; viz., the rightmost five digits of each.

Military coordinates of point A are written as a character string using the elements discussed above from left to right like the following example:

18SUU8790061500

For readability, the coordinates above may be separated:

18 SUU 8790061500

Note: + UTM zone means northern hemisphere
 - UTM zone means southern hemisphere

This sign is returned as a bonus from the appropriate subroutine; it is not needed except in level 2 and 3 subroutines.

3. USER PROCEDURES

3.0 General

For each type of coordinate conversion, one subroutine has been provided so that the subroutine call will be shorter than that arising from one general purpose subroutine.

- a. Use this UNIVAC control statement:

LIB IR*CVCOORD. (with @MAP)

- b. Name the subroutine which you desire to call:

COORxy

where COORxy will convert from type x to y

x, y is one of the letters G, S, M, U

(G = geographic, S = state planar, M = military, U = UTM).

- c. Check the calling sequence in sections 3.1 through 3.12. Be sure that your input data conform to the formats shown therein: e.g. *, longitude LAM is one double precision number formed from degrees, minutes, and seconds:

76°18'6.63"W 0761806.63D0

(longitude format = dddmmss.ssD0)

- d. Use Table I to get your installation input code (INST).
- e. After each subroutine call, test the error code (JERR) returned. If JERR equals 0, then the conversion has been successful; if JERR does not equal 0, then use Table III to find your error.

*Also, these variables must be in the correct format: latitude PHI (similar to LAM), quadrangle row and 100,000-meter square QSQ (3 letters), military coordinate string XYMIL (10 digits D.P.).

Table I. Installation Codes

<u>Code</u>	<u>Installation</u>
AL	Alabama Army Ammunition Plant
BA	Badger Army Ammunition Plant
EA	Edgewood Area
FA	Frankford Arsenal
HA	Hawthorne Naval Ammunition Depot
LS	Lone Star Army Ammunition Plant
PB	Pine Bluff Arsenal
RA	Redstone Arsenal
RM	Rocky Mountain Arsenal
VO	Volunteer Army Ammunitions Plant
WS	Weldon Spring Chemical Plant

Table II. Zone Numbers (provided in subroutine ZONE2)

<u>Installation</u>	<u>State Zone</u>	<u>UTM Zone</u>
AL	3101	+16
BA	5751	+16
EA	4126	+18
FA	5151	+18
HA	4651	+11
LS	5351	+15
PB	3251	+15
RA	3101	+16
RM	3451	+13
VO	5301	+16
WS	4401	+15

Note. 1 = input variable, 0 = output variable

3.1 Geographic to Military Coordinates.

CALL COORGM (INST, PHI, LAM, UZONE, QSQ, XYMIL, JERR)

INST	--	1	HOLLERITH INSTALLATION (Table I, page 9)
PHI	--	1	D. P. LATITUDE
LAM	--	1	D. P. LONGITUDE

UZONE	--	0	INTEGER + OR - UTM ZONE NUMBER
QSQ	--	0	HOLLERITH QUADRANGLE ROW & 100,000-M. SQUARE
XYMIL	--	0	D. P. COORDINATE STRING, MIL.
JERR	--	0	INTEGER ERROR CODE (Table III, page 15)

3.2 Geographic to State Planar Coordinates

CALL COORGS (INST, PHI, LAM, SZONE, XSTP, YSTP, JERR)

INST	--	1	HOLLERITH INSTALLATION (Table I, page 9)
PHI	--	1	D. P. LATITUDE
LAM	--	1	D. P. LONGITUDE

SZONE	--	0	INTEGER STATE ZONE NUMBER
XSTP	--	0	D. P. X COORDINATE, STATE
YSTP	--	0	D. P. Y COORDINATE, STATE
JERR	--	0	INTEGER ERROR CODE (Table III, page 15)

3.3 Geographic to UTM Coordinates.

CALL COORGU (INST, PHI, LAM, UZONE, EAST, NORTH, JERR)

INST	--	1	HOLLERITH INSTALLATION (Table I, page 9)
PHI	--	1	D. P. LATITUDE
LAM	--	1	D. P. LONGITUDE

UZONE	--	0	INTEGER + OR - UTM ZONE NUMBER
EAST	--	0	D. P. EASTING
NORTH	--	0	D. P. NORTHING
JERR	--	0	INTEGER ERROR CODE (Table III, page 15)

3.4 Military to Geographic Coordinates.

CALL COORMG (INST, QSQ, XYMIL, H1, PH1, H2, LAM, JERR)

INST	--	1 HOLLERITH	INSTALLATION (Table I, page 9)
QSQ	--	1 HOLLERITH	QUADRANGLE ROW & 100,000-M. SQUARE
XYMIL	--	1 D. P.	COORDINATE STRING, MIL.

H1	--	0 HOLLERITH	HEMISPHERE (N or S)
PH1	--	0 D. P.	LATITUDE
H2	--	0 HOLLERITH	HEMISPHERE (W or E)
LAM	--	0 D. P.	LONGITUDE
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.5 Military to State Planar Coordinates.

CALL COORMS (INST, QSQ, XYMIL, SZONE, XSTP, YSTP, JERR)

INST	--	1 HOLLERITH	INSTALLATION (Table I, page 9)
QSQ	--	1 HOLLERITH	QUADRANGLE ROW & 100,000-M. SQUARE
XYMIL	--	1 D. P.	COORDINATE STRING, MIL.

SZONE	--	0 INTEGER	STATE ZONE NUMBER
XSTP	--	0 D. P.	X COORDINATE, STATE
YSTP	--	0 D. P.	Y COORDINATE, STATE
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.6 Military to UTM Coordinates.

CALL COORMU (INST, QSQ, XYMIL, UZONE, EAST, NORTH, JERR)

INST	--	1 HOLLERITH	INSTALLATION (Table I, page 9)
QSQ	--	1 HOLLERITH	QUADRANGLE ROW & 100,000-M. SQUARE
XYMIL	--	1 D. P.	COORDINATE STRING, MIL.

UZONE	--	0 INTEGER	+ OR - UTM ZONE NUMBER
EAST	--	0 D. P.	EASTING
NORTH	--	0 D. P.	NORTHING
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.7 State Planar to Geographic Coordinates.

CALL COORSG (INST, XSTP, YSTP, H1, PH1, H2, LAM, JERR)

INST	--	1 HOLLERITH	INSTALLATION (Table I, page 9)
XSTP	--	1 D. P.	X COORDINATE, STATE
YSTP	--	1 D. P.	Y COORDINATE, STATE

H1	--	0 HOLLERITH	HEMISPHERE (N or S)
PH1	--	0 D. P.	LATITUDE
H2	--	0 HOLLERITH	HEMISPHERE (W or E)
LAM	--	0 D. P.	LONGITUDE
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.8 State Planar to Military Coordinates.

CALL COORSM (INST, XSTP, YSTP, UZONE, QSQ, XYMIL, JERR)

INST	--	1 HOLLERITH	INSTALLATION (Table I, page 9)
XSTP	--	1 D. P.	X COORDINATE, STATE
YSTP	--	1 D. P.	Y COORDINATE, STATE

UZONE	--	0 INTEGER	+ OR - UTM ZONE NUMBER
QSQ	--	0 HOLLERITH	QUADRANGLE ROW & 100,000-M. SQUARE
XYMIL	--	0 D. P.	COORDINATE STRING, MIL.
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.9 State Planar to UTM Coordinates.

CALL COORSU (INST, XSTP, YSTP, UZONE, EAST, NORTH, JERR)

INST	--	1 HOLLERITH	INSTALLATION (Table I, page 9)
XSTP	--	1 D. P.	X COORDINATE, STATE
YSTP	--	1 D. P.	Y COORDINATE, STATE

UZONE	--	0 INTEGER	+ OR - UTM ZONE NUMBER
EAST	--	0 D. P.	EASTING
NORTH	--	0 D. P.	NORTHING
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.10 UTM to Geographic Coordinates.

CALL COORUG (INST, EAST, NORTH, H1, PHI, H2, LAM, JERR)

INST	--	1 HOLLERITH	INSTALLATION (Table I, page 9)
EAST	--	1 D. P.	EASTING
NORTH	--	1 D. P.	NORTHING

H1	--	0 HOLLERITH	HEMISPHERE (N or S)
PHI	--	0 D. P.	LATITUDE
H2	--	0 HOLLERITH	HEMISPHERE (W or E)
LAM	--	0 D. P.	LONGITUDE
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.11 UTM to Military Coordinates.

CALL COORUM (INST, EAST, NORTH, UZONE, QSQ, XYMIL, JERR)

INST	--	1 HOLLERITH	INSTALLATION (Table I, page 9)
EAST	--	1 D. P.	EASTING
NORTH	--	1 D. P.	NORTHING

UZONE	--	0 INTEGER	+ OR - UTM ZONE NUMBER
QSQ	--	0 HOLLERITH	QUADRANGLE ROW & 100,000-M. SQUARE
XYMIL	--	0 D. P.	COORDINATE STRING, MIL.
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.12 UTM to State Planar Coordinates

CALL COORUS (INST, EAST, NORTH, SZONE, XSTP, YSTP, JERR)

INST	--	1 HOLLERITH	INSTALLATION (Table I, page 9)
EAST	--	1 D. P.	EASTING
NORTH	--	1 D. P.	NORTHING

SZONE	--	0 INTEGER	STATE ZONE NUMBER
XSTP	--	0 D. P.	X COORDINATE, STATE
YSTP	--	0 D. P.	Y COORDINATE, STATE
JERR	--	0 INTEGER	ERROR CODE (Table III, page 15)

3.13 Example.

You have an input file of well locations in state planar coordinates from Rocky Mountain Arsenal. The following program fragment will convert them to UTM coordinates:

```
INTEGER                                UZONE
DOUBLE PRECISION                      E, N, XSTP, YSTP
200 READ (5,3177, END=9000) XSTP, YSTP
WRITE (6,3105) XSTP, YSTP
CALL COORSU (2HRM, XSTP, YSTP, UZONE, E, N, JERR)
IF (JERR, EQ, 0) WRITE (6,3105) E, N
GOTO 200
9000 CONTINUE
```

Table III. Error Codes Returned by Subroutine

<u>Error Code</u> <u>(JERR)</u>	<u>Explanation</u>	<u>In</u> <u>Subroutine:</u>
0	No errors!	COOR__
1	INVALID INSTALLATION	COOR__
2	MISSING INPUT COORDINATES	COOR__
3	MISSING 3 LETTERS -- QUADRANGLE ROW & 100,000-M. SQUARE	COOR__
10	UTM ZONE NUMBER > 22 WITH CLARKE 1866 SPHEROID	CONVMU
11	INVALID ROW LETTER OF 6° X 8° QUAD- RANGLE (MUST BE N THROUGH X)	CONVMU
12	INVALID X DESIGNATOR OF 100,000-M. SQUARE (SEE PAGE 6)	CONVMU
13	INVALID Y DESIGNATOR OF 100,000-M. SQUARE (SEE PAGE 6)	CONVMU
14	INVALID NORTHING WITH CLARKE 1866 SPHEROID	CONVMU
15	LATITUDE > 84°	TMFWD
16	LONGITUDE > 0.16 RADIANS	TMFWD
17	GRID DISTANCE FROM CENTRAL MERIDIAN > 0.2a WHERE a = semimajor axis of spheroid	TMINV

Table III. Error Codes Returned by Subroutine - Continued

18	RECTIFYING LATITUDE > 1.47 RADIANS	TMINV
19	INVALID STATE ZONE NUMBER	CONVGS
20	LATITUDE $\geq 80^{\circ} 30'$	UTMEFW
21	NORTHING > 8,942,900 M.	UTMIVS

4. TEST PLAN

The twelve subroutines were tested separately on one point within each installation.

Results were then compared with the coordinates measured from the map for that installation. Results were in agreement.

Additionally, cycles of forward and backward conversions such as G to S, S to G, etc., were tested. Results agreed within accuracies of 0.0005 meter, 1.2 feet, or 0.02 seconds.

TEST POINTS

(Coordinates are listed in the order geographic, state, UTM, military.)

Aberdeen Proving Ground (Edgewood Area)

39° 23' 51.37"N	76° 18' 6.63"W	
State zone 4126	X = 997,307	Y = 570,443
UTM Zone + 18	E = 387,900	N = 4,361,500
+ 18 SUU	8790061500	

Badger Army Ammunition Plant

43° 22' 0.08"N	89° 45' 7.92"W	
State zone 5751	X = 2,065,894	Y = 498,207
UTM Zone +16	E = 277,000	N = 4,805,000
+16 TBD	7700005000	-

Frankford Arsenal

40° 1' 3.31"N	75° 2' 48.74"W	
State zone 5151	X = 2,757,015	Y = 260,846
UTM Zone +18	E = 496,000	N = 4,429,500
+18 TVV	9600029500	

Pine Bluff Arsenal

34° 19' 0"N	92° 6' 0"W	
State zone 3251	X = 1,969,804	Y = 600,410
UTM Zone +15	E = 582,806	N = 3,797,439
+15 SWH	8280697439	

Redstone Arsenal

34° 40' 0"N 86° 38' 0"W
State zone 3101 X = 259,433 Y = 1,516,828
UTM Zone +16 E = 533,595 N = 3,835,943
+16 SEP 3359535943

Rocky Mountain Arsenal

39° 47' 54.99"N 104° 54' 10.98"W
State zone 3451 X = 2,167,734 Y = 170,047
UTM Zone +13 E = 508,300 N = 4,405,200
+13 SEQ 0830005200

Weldon Spring Chemical Plant

38° 41' 49.40"N 90° 43' 44.49"W
State zone 4401 X = 434,636 Y = 1,042,715
UTM Zone +15 E = 697,500 N = 4,285,400
+15SXN 9750085400

Alabama Army Ammunition Plant

33° 19' 59.99" N 86° 19' 0" W
State zone 3101 X = 352,369 Y = 1,031,023
UTM zone +16 E = 563,595 N = 3,688,257
+16 SEM 6359588257

Hawthorne Naval Ammunition Depot

38° 34' 9.13" N 118° 36' 49.97"W
State zone 4651 X = 491,266 Y = 1,390,319
UTM zone +11 E = 359,400 N = 4,270,000
+11 SLN 5940070000

Lone Star Army Ammunition Plant

33° 26' 0" N 94° 13' 0" W
State zone 5351 X = 3,001,488 Y = 658,370
UTM zone +15 E = 386.897 N = 3,699,797
+15 SUG 8689799797

Volunteer Army Ammunition Plant

35° 5' 10.90" N 85° 8' 34.41" W

State zone 5301 X = 2,256,446 Y = 253,889

UTM zone +16 E = 669,300 N = 3,884,000

+16 SFP 6930084000

5. PROGRAMMING NOTES

5.0 General

The twelve basic subroutines use subroutines adapted from program DO154 and JDS-1 written by the U. S. Geological Survey. Subroutine CONVMU was developed by Potomac Research, Incorporated.

Subroutines are organized into three hierarchical levels as follows:

Level 1:

COORGM	COORGS	COORGU	COORMG
COORMS	COORMU	COORSG	COORMS
COORSU	COORUG	COORUM	COORSU

Level 2:

CONVGU	CONVGS	CONVMU	ZONF2
--------	--------	--------	-------

Level 3:

TMCOF	FLALFA	STOD	OBMER
TMINV	FILA	UTMFW	OBMINV
TMFWD	FILLA	UTMIVS	GTPLAM
	FILLAA	LAMFRD	PTGLAM
	FILLBB	LAMINV	

Subroutines with the name COOR - - perform the conversion in one direction; subroutines with the name CONV - - , in two directions.

Subroutine functions are as follows:

<u>Subroutine Name</u>	<u>Function</u>
COORGM	Convert geographic to military coord.
COORGS	Convert geographic to state coord.
COORGU	Convert geographic to UTM coord.
COORMG	Convert military to geographic coord.
COORMS	Convert military to state coord.
COORMU	Convert military to UTM coord.

Subroutine Name	Function
COORSG	Convert state to geographic coord.
COORSM	Convert state to military coord.
COORSU	Convert state to UTM coord.
COORUG	Convert UTM to geographic coord.
COORUM	Convert UTM to military coord.
COORUS	Convert UTM to state coord.
CONVGS	Convert geographic to state coord. and vice versa
CONVGU	Convert geographic to UTM coord. and vice versa
CONVMU	Convert military to UTM coord. and vice versa
GTPLAM	Convert geographic to state coord. (Michigan Lambert)
PTGLAM	Convert state to geographic coord. (Michigan Lambert)
FLALFA	Fill ALPHA () array with state zone info
FILA	Fill A () array - 2 dim
FILLA	Fill A () array - 2 dim
FILLAA	Fill A () array - 3 dim
FILLBB	Fill B () array - 3 dim
LAMFRD	Convert geographic to state coord. (Lambert)
LAMINV	Convert state to geographic coord. (Lambert)
OBFMR	Convert geographic to state coord. (Oblique Mercator)
OBFINV	Convert state to geographic coord. (Oblique Mercator)
STOD	Convert seconds to deg-min-sec
TMCOF	Compute coefficients in A () array
TMFWD	Convert geographic to UTM coord.
TMINV	Convert UTM to geographic coord.

Subroutine Name	Function
UTMFW	Convert geographic to state coord. (trans. Mercator)
UTMIVS	Convert state to geographic coord. (trans. Mercator)
ZONE2	Find state and UTM zones, hemisphere indicators.

Conventions adhered to within these subroutines:

Clarke 1866 spheroid

- + LATITUDE NORTHERN HEMISPHERE
- LATITUDE SOUTHERN HEMISPHERE
- + LONGITUDE WESTERN HEMISPHERE
- LONGITUDE EASTERN HEMISPHERE
- + UTM ZONE NORTHERN HEMISPHERE
- UTM ZONE SOUTHERN HEMISPHERE

5.1 Modifying the Subroutines.

(* means a moderate programming effort is required.)

- a. To add another installation: Add installation code to IALF (), hemisphere indicators to HSIGN1 () and HSIGN2 (), state zone number from subroutine FLALFA to ISZ (), and the UTM zone to IUZ (). The above arrays are contained in subroutine ZONE2.
- b. To add a spheroid*: Change each subroutine COORxy so that it will have a new argument, JSPHER (spheroid type). Use the spheroid types contained in subroutine CONVGU. Subroutine

CONVGS will have to be changed to recognize spheroid type. Apparently, numerical information concerning the spheroid is stored in arrays called A (2 dim), A (3 dim), and B (3 dim).

<u>Array</u>	<u>In Labeled Common</u>	<u>In Subroutine</u>
A (2 dim)	CONST	FILA, FILLA
A (3 dim)	OMF	FILLAA
B (3 dim)	OMI	FILLBB

APPENDIX A

BIBLIOGRAPHY

1. McGraw-Hill Encyclopedia of Science & Technology (1977 Ed.)
 "Coordinate Systems, Terrestrial"
 "Geodesy"
 "Map Projections"
2. Department of Defense
 Defense Mapping Agency
 Topographic Center, Washington, DC 20315
 Index of Grids, Datums, and Spheroids
3. Department of the Army
 Field Manual 21-26, Map Reading
 Technical Manual 5-241-1, Grids and Grid References
 Technical Manual 5-241-8, Universal Transverse Mercator Grid
 Technical Manual 5-241-9, Universal Polar Stereographic Grid Tables
4. Department of Commerce
 National Oceanic and Atmospheric Administration
 National Geodetic Survey, Rockville, MD 20852
 C&GS Special Publication 235, The State Coordinate Systems (Rev. 1974)
5. C. E. Ewing & M. M. Mitchell, Introduction to Geodesy, Elsevier (1970).

APPENDIX B

COMPUTER PROGRAM SOURCE LISTINGS

FILE LISTER 05/17/78 08:29:22
END FLIST 67 CARDS GENERATED.

HDG.P ***** CONVG\$ *****

FOR S CVCOORD.CONVG\$.TPFS.CONVG\$
FOR 50E3-05/17/78-08:29:41 (0.)

SUBROUTINE CONVG\$ ENTRY POINT 000552

STORAGE USED: CODE(1) 000676; DATA(0) 000152; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 CONST 010150
0004 BLK1 003636

EXTERNAL REFERENCES (BLOCK, NAME)

0005 FILA
0006 FLALFA
0007 FILLA
0010 LAMFRD
0011 GTPLAM
0012 FILLAA
0013 UTMFW
0014 OWNER
0015 LAMINV
0016 FILLB8
0017 UTMIVS
0020 ORMINV
0021 PTGLAM
0022 STOD
0023 NERR2\$
0024 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000213	100L	0001	000240	115L	0001	000257	120L	0001	000316	140L	0001	000325	160L
0001	000336	170L	0001	000336	180L	0001	000377	190L	0001	000435	210L	0001	000451	213L
0001	000453	220L	0001	000127	50L	0001	000133	60L	0001	000507	800L	0001	000517	8040L
0001	000522	8060L	0001	000525	9200L	0001	000531	9300L	0001	000541	9509L	0003	D	100000 A
0000	R	000113 ADG	0000	R	000023 ALF3	0000	R	000066 ALF4	0004	R	000000 ALPHA	0000	R	000114 AVIN
0000	R	000104 EAST	0000	R	000077 EF	0000	R	000100 EM	0000	D	000000 FAC	0000	R	000073 FIL
0000	R	000074 FT2	0000	D	000002 IL	0000	000137	INUPS	0000	I	000107 IZ2	0000	I	000106 J
0000	I	000105 K	0000	I	000110 KK	0000	D	000010 LAM	0000	D	000014 LATR	0000	R	000000 LBT
0000	R	000001 MINUS	0000	R	000102 OBL	0000	D	000006 PHI	0000	D	000012 PHIR	0000	R	000075 RRI
0000	R	000076 RR2	0000	R	000103 SOUTH	0000	R	000111 UNT1	0000	R	000112 UNT2	0000	R	000101 UTM
0000	D	000016 XM	0000	D	000022 XXX	0000	D	000020 YH	0000	D	000024 YYY			

```

SUBROUTINE CONVS (CFLAG,S1,DP,MP,SP,S2,DL,ML,SL,IZONE,X,Y,JERR)
THIS SUBROUTINE PERFORMS THE FOLLOWING COMPUTATIONS--
1.  GEOGRAPHIC TO STATE COORDINATES
2.  STATE TO GEOGRAPHIC COORDINATES

VARIABLES:
-----
      IZZ  -- ZONE SUBSCRIPT USED WITH ARRAYS A ( ) & ALPHA ( )
      KK   -- PROJECTION TYPE

CONVENTIONS:
      + LATITUDE  NORTHERN HEMISPHERE
      - LATITUDE  SOUTHERN
      + LONGITUDE WESTERN
      - LONGITUDE EASTERN
      + UTM ZONE  NORTHERN HEMISPHERE
      - UTM ZONE  SOUTHERN

INTEGER CFLAG,DP,DL
REAL LBT,MINUS
DOUBLE PRECISION IL,FAC,PHI,LAM,PHIR,LAMR,X,Y,XM,YM,XXX,YYY
DOUBLE PRECISION CONVRT,SP,SL
DOUBLE PRECISION A(150,14)
DIMENSION ALPHA(13,150)
COMMON /CONST/ALPHA,ALPHA
DATA FT1,FT2,RR1,RR2,'FEET','METER','RS' /
DATA EF,EM,'F','M' /
DATA ALF3 /
DATA ALF1,'SVER','SE M','ERCA','TOR','PROJ','ECTI','ON' /
DATA ALF2,'UE M','ERCA','TOR','PROJ','ECTI','ON' /
DATA ALF4,'ICHI','CAN','LAMB','ERT','PROJ','ECTI','ON' /
DATA ALF5,'GRID','CCO','RDIN','ATES' /
DATA LBT,UTM,OBL /LBT','UTM','OBL' /
DATA MINUS,SOUTH,EAST /'-','S','E' /

CONVRT(DG,AMIN,SEC)
      = (DBLE(DG)+3600.000)+(DBLE(AMIN)+60.000)+DBLE(SEC)

JERR=0

```

```

00101 1*
00101 2*
00101 3*
00101 4*
00101 5*
00101 6*
00101 7*
00101 8*
00101 9*
00101 10*
00101 11*
00101 12*
00101 13*
00101 14*
00101 15*
00101 16*
00101 17*
00101 18*
00101 19*
00101 20*
00101 21*
00101 22*
00101 23*
00101 24*
00101 25*
00101 26*
00101 27*
00101 28*
00101 29*
00101 30*
00101 31*
00101 32*
00103 33*
00104 34*
00105 35*
00106 36*
00107 37*
00110 38*
00111 39*
00112 40*
00113 41*
00120 42*
00123 43*
00123 44*
00123 45*
00123 46*
00125 47*
00127 48*
00133 49*
00133 50*
00137 51*
00137 52*
00137 53*
00137 54*
00137 55*
00140 56*
00140 57*

```

.....	CONVUS	*****	CALL FILA	DATE	05:777
58*	00141				
59*	00141	C		GCC	021
60*	00142		CALL FLALFA		
61*	00142	C		GCC	022
62*	00142	C			
63*	00142	C	CHECK FOR VALID STATE ZONE NUMBER (IZONE)		
64*	00142	C	LAST TWO DIGITS OF IZONE MUST BE 01, 26, 51, OR 76		
65*	00142	C			
66*	00142	C	K=((100*IZONE-307600)/25		
67*	00143		J=((IZONE-3076)/25)*100		
68*	00144	C	IF (K.NE.J) GOTO 8000		
69*	00145				
70*	00145	C			
71*	00145				
72*	00147		IZZ=((IZONE-3076)/25		
73*	00150		IF ((IZZ.LT.1).OR.(IZZ.GT.150)) GOTO 8000		
74*	00152		IF (ALPHA(2,IZZ).EQ.LBT) KK=1		
75*	00154		IF (ALPHA(2,IZZ).EQ.UTM) KK=2		
76*	00156		IF (ALPHA(2,IZZ).EQ.CBL) KK=3		
77*	00156	C			
78*	00156	C	TEST ZONE (IZZ) = MICHIGAN LAMBERT		
79*	00156	C			
80*	00160		IF ((IZZ.EQ.131).OR.(IZZ.EQ.132).OR.(IZZ.EQ.133)) KK = 4		
81*	00162		IF (ALPHA(3,IZZ).EQ.EM) GOTO 50		
82*	00164		UNT1=F*1		
83*	00165		UNT2=FT2		
84*	00166		GOTO 60		
85*	00167		UNT1 = RR1		
86*	00170		UNT2 = RR2		
87*	00171		60 CONTINUE		
88*	00171	C			
89*	00172		ADG=DP		
90*	00173		AMIN=MP		
91*	00174		PHI=CONVRT(ADG,AMIN,SP)		
92*	00175		ADG=DL		
93*	00176		AMIN=ML		
94*	00177		LAM=CONVRT(ADG,AMIN,SL)		
95*	00177	C			
96*	00177	C	TEST CFLAG FOR TYPE OF CONVERSION		
97*	00177	C	CFLAG = 1 GEOGRAPHIC TO STATE		
98*	00177	C	CFLAG = 2 STATE TO GEOGRAPHIC		
99*	00177	C			
100*	00177	C	IF (CFLAG.EQ.2) GOTO 160		
101*	00200				
102*	00200	C	CFLAG = 1 AT THIS POINT *		
103*	00200	C			
104*	00200	C			
105*	00202		IF (S1.EQ.MINUS) PHI=PHI*(-1.000)		
106*	00204		IF (S2.EQ.MINUS) LAM=LAM*(-1.000)		
107*	00204	C			
108*	00206		GOTO (100,120,140,115),KK		
109*	00207		100 CONTINUE		
110*	00207	C			
111*	00210		CALL FILLA		
112*	00210	C			
113*	00210	C			
114*	00211		110 CALL LAMFRD (PHI,LAM,X,Y,IZONE)		
115*	00211	C			

```

00212 116* IF (ALPHA(3,IZZ).NE.EM) GOTO 220
00214 117* X = X/3.280833333333333D0
00215 118* Y = Y/3.280833333333333D0
00216 119* GOTO 220
00216 120* C
00216 121* C MICHIGAN LAMBERT PROJECTION
00216 122* C
00217 123* 115 IZONE=IZZ-130
00220 124* PHIR = PHI
00221 125* LAMR = LAM
00221 126* C
00222 127* CALL GTPLAM (PHIR,LAMR,IZONE,X,Y)
00222 128* C
00223 129* GOTO 220
00224 130* 120 CONTINUE
00224 131* C
00225 132* CALL FILLAA
00225 133* C
00226 134* 130 IL=A(IZZ,2)-LAM
00226 135* C
00227 136* CALL UTMFW (PHI,IL,Y,X,$8040)
00227 137* C
00230 138* FAC=3.280833333333333D0*(A(IZZ,3)/.9996D0)
00231 139* X=FAC*X+A(IZZ,1)
00232 140* YM=A(IZZ,4)+.9996D0
00233 141* Y=FAC*(Y-YM)
00234 142* GOTO 220
00234 143* C
00235 144* 140 CALL OSWER (PHI,LAM,X,Y)
00235 145* C
00236 146* GOTO 220
00236 147* C-----
00236 148* C
00236 149* C CFLAG = 2 AT THIS POINT *
00236 150* C
00237 151* 160 CONTINUE
00240 152* GOTO (170,190,210,213).KK
00241 153* 170 CONTINUE
00241 154* C
00242 155* CALL FILLAA
00242 156* C
00243 157* XXX = X
00244 158* YYY = Y
00245 159* IF (ALPHA(3,IZZ).NE.EM) GOTO 180
00247 160* X = X/3.280833333333333D0
00250 161* Y = Y/3.280833333333333D0
00250 162* C
00251 163* 180 CALL LAMINV (X,Y,PHI,LAM,IZONE)
00251 164* C
00252 165* IF (ALPHA(3,IZZ).NE.EM) GOTO 220
00254 166* X = XXX
00255 167* Y = YYY
00256 168* GOTO 220
00257 169* 190 CONTINUE
00257 170* C
00260 171* CALL FILLB9
00260 172* C
00261 173* FAC=3.280833333333333D0*(A(IZZ,3)/0.9996D0)

```

```

GCC B133 000223
GCC C133 000230
GCC C133 000233
GCC C133 000236
GCC C133 000239
GCC C133 000242
GCC C133 000244
GCC C133 000246
GCC C133 000248
GCC C133 000251
GCC C133 000253
GCC C133 000256
GCC C133 000259
GCC C133 000262
GCC C133 000265
GCC C133 000268
GCC C133 000271
GCC C133 000274
GCC C133 000277
GCC C133 000280
GCC C133 000283
GCC C133 000286
GCC C133 000289
GCC C133 000292
GCC C133 000295
GCC C133 000298
GCC C133 000301
GCC C133 000304
GCC C133 000307
GCC C133 000310
GCC C133 000313
GCC C133 000316
GCC C133 000319
GCC C133 000322
GCC C133 000325
GCC C133 000328
GCC C133 000331
GCC C133 000334
GCC C133 000337
GCC C133 000340
GCC C133 000343
GCC C133 000346
GCC C133 000349
GCC C133 000352
GCC C133 000355
GCC C133 000358
GCC C133 000361
GCC C133 000364
GCC C133 000367
GCC C133 000370
GCC C133 000373
GCC C133 000376
GCC C133 000379
GCC C133 000382
GCC C133 000385
GCC C133 000388
GCC C133 000391
GCC C133 000394
GCC C133 000397
GCC C133 000400
GCC C133 000403

```

.....	CUNVUS		DATE	051778
174*	00262	XN=(X-A(IZZ.1))/FAC	GCC	167
175*	00263	YN=(Y/FAC)+(A(IZZ.4)*.999600)	GCC	168
176*	00263			
177*	00264	CALL UTNRVS (YM,XM,PHI,I.L,\$8060)		
178*	00264			
179*	00265	LAM=A(IZZ.2)-IL	GCC	170
180*	00266	GOTO 220		
181*	00267	210 XN=X		
182*	00270	YN=Y		
183*	00270			
184*	00271	CALL OBMINV(XM,YM,PHI,LAM)	GCC	173
185*	00271			
186*	00272	GOTO 220	GCC	174
187*	00272			
188*	00272	MICHIGAN LAMBERT PROJECTION		
189*	00272			
190*	00273	213 IZONE=IZZ-130		
191*	00273			
192*	00274	CALL PTGLAM(X,Y,IZONE,PHI,LAM)	GCC	177
193*	00274			
194*	00275	220 CONTINUE		
195*	00275			
196*	00275			
197*	00276	IF (LAM.GT.6.48D5) LAM=LAM-1.296D6		
198*	00276		GCC	179
199*	00276	CONVERT SECONDS TO DEG-MIN-SEC		
200*	00276			
201*	00300	CALL STOD (PHI,DP,MP,SP)		
202*	00301	CALL STOD (LAM,DL,ML,SL)		
203*	00301			
204*	00302	GOTO 9999		
205*	00302	C-----		
206*	00302			
207*	00302	SET ERROR CODES		
208*	00302			
209*	00302			
210*	00302	INVALID STATE ZONE NUMBER		
211*	00302			
212*	00303	8000 JERR=19		
213*	00304	IF (FLAG.EQ.1) GOTO 9200		
214*	00305	IF (FLAG.EQ.2) GOTO 9300		
215*	00306			
216*	00306	LATITUDE >= 80 DEG. 30 MIN.		
217*	00306			
218*	00310	8040 JERR=20		
219*	00311	GOTO 9200		
220*	00311			
221*	00311	NORTHING > 8,942,900 M.		
222*	00311			
223*	00312	8060 JERR=21		
224*	00313	GOTO 9300		
225*	00313			
226*	00314	9200 X=0.0D0		
227*	00315	Y=0.0D0		
228*	00316	GOTO 9999		
229*	00316			
230*	00317	9300 DP=0		
231*	00320	MP=0		

DATE 051778

LUNVUU

```

00101 13* C
00101 14* C
00101 15* C
00101 16* C
00101 17* C
00101 18* C
00101 19* C
00101 20* C
00101 21* C
00101 22* C
00101 23* C
00103 24*
00104 25*
00105 26*
00105 27*
00106 28*
00106 29*
00106 30*
00106 31*
00106 32*
00106 33*
00106 34*
00106 35*
00106 36*
00106 37*
00106 38*
00106 39*
00106 40*
00106 41*
00106 42*
00106 43*
00106 44*
00106 45*
00106 46*
00106 47*
00106 48*
00111 49*
00111 50*
00112 51*
00112 52*
00112 53*
00113 54*
00114 55*
00115 56*
00117 57*
00121 58*
00122 59*
00123 60*
00125 61*
00125 62*
00126 63*
00127 64*
00130 65*
00130 66*
00131 67*
00132 68*
00133 69*
00133 70*

+ LATITUDE NORTHERN HEMISPHERE
- LATITUDE SOUTHERN
+ LONGITUDE WESTERN
- LONGITUDE EASTERN
+ UTM ZONE NORTHERN HEMISPHERE
- UTM ZONE SOUTHERN

INTEGER CFLAG
REAL MINUS,BLANK
DOUBLE PRECISION SLAT,SLON,NORTH,EAST,A(16),B(4),SECLAT,SECLON,
* UTZ,SK,THET
DATA MINUS,BLANK/1H-,1H /

SPHEROID PARAMETERS:
0=CLARKE 1866 (DEFAULT)
1=CLARKE 1880
2=BESSEL
3=MODIFIED MERCURY 1968
4=INTERNATIONAL

A(5) -- FALSE EASTING
A(6) -- FALSE NORTHING
A(15) -- SEMIMAJOR AXIS
A(16) -- ECCENTRICITY**2
B(1) -- SEMIMINOR AXIS

JERR=0
ISPHER=0
-----
A(5)=5.005
A(6)=0.000
IF(FLAG1.EQ.MINUS)A(6)=10.006
IF(IZONE.LT.0)A(6)=10.006
A(7)=0.000
A(8)=0.999990
IF(ISPHER.EQ.0) GO TO 5
GOTO (11,12,13,14),ISPHER

5 A(15)=6378206.400
B(1)=6356583.800
GO TO 20

11 A(15)=6378249.145000
B(1)=6356514.8695500
GO TO 20

UTM 33
UTM 37
UTM 43
UTM 47
UTM 48
UTM 49
UTM 54
UTM 55
UTM 56
UTM 57
UTM 58
UTM 59
UTM 60
UTM 62
UTM 63
UTM 64
UTM 65
UTM 67

```

```

***** CURVCO *****
00134 71* 12 A(15)=6377397.15500
00135 72* B(1)=6355911.9461300
00136 73* GO TO 20
00137 74* C
00138 75* 13 A(15)=6378150.000
00139 76* B(1)=6356769.33700
00140 77* GO TO 20
00141 78* C
00142 79* 14 A(15)=6378388.000
00143 80* B(1)=6355911.9461300
00144 81* C
00145 82* 20 A(16)= ((A(15)-B(1))/A(15))*((A(15)+3(1))/A(15))
00146 83* COMPUTE COEFFICIENTS FOR CONVERSION
00147 84* CALL TMOF (A)
00148 85*
00149 86* TEST CFLAG FOR TYPE OF CONVERSION
00150 87* C
00151 88* CFLAG = 1 GEOGRAPHIC TO UTM
00152 89* CFLAG = 2 UTM TO GEOGRAPHIC
00153 90* C
00154 91* IF (CFLAG.EQ.2) GOTO 100
00155 92* C
00156 93* CFLAG = 1 AT THIS POINT
00157 94* C
00158 95* TEST FOR IZONE INPUT WITH GEOGRAPHIC COORDINATES
00159 96* C
00160 97* IF (IZONE.EQ.0) GOTO 35
00161 98* C
00162 99* COMPUTE CENTRAL MERIDIAN IN SECONDS -- FORCED ZONE
00163 100* C
00164 101* GOTO 30
00165 102* C
00166 103* 22 IF (IABS(IZONE).GT.30) GOTO 30
00167 104* UTM=30.000-IABS(IZONE)
00168 105* A(9)=((UTM-6.000)+3.000)*3600.000
00169 106* GO TO 40
00170 107* 30 UTM=IABS(IZONE)-30.000
00171 108* A(9)=((UTM-6.000)-3.000)*(-3600.000)
00172 109* GO TO 40
00173 110* C
00174 111* COMPUTE IZONE
00175 112* CENTRAL MERIDIAN IN SECONDS
00176 113* WHERE IZONE IS NOT INPUT
00177 114* C
00178 115* 35 IZONE=30-(IDLON/6)
00179 116* IF(FLAG2.EQ.MINUS) IZONE=IDLON/6+31
00180 117* UTM=30.000-IZONE
00181 118* A(9)=((UTM-6.000)+3.000)*3600.000
00182 119* C
00183 120* CONVERT LATITUDE
00184 121* LONGITUDE TO SECONDS
00185 122* C
00186 123* 40 SLAT=IDLAT+3600.00+IDLAT*60.00+SECLAT
00187 124* IF(FLAG1.EQ.MINUS) SLAT=SLAT*(-1.000)
00188 125* SLOM=IDLON+3600.00+IDLON*60.00+SECLON
00189 126* IF(FLAG2.EQ.MINUS) SLOM=SLOM*(-1.000)
00190 127* C
00191 128* CONVERT GEOGRAPHIC TO UTM COORDINATES
00192 129* C
00193 130*
00194 131*
00195 132*
00196 133*
00197 134*
00198 135*
00199 136*
00200 137*
00201 138*
00202 139*
00203 140*
00204 141*
00205 142*
00206 143*
00207 144*
00208 145*
00209 146*
00210 147*
00211 148*
00212 149*
00213 150*
00214 151*
00215 152*
00216 153*
00217 154*
00218 155*
00219 156*
00220 157*
00221 158*
00222 159*
00223 160*
00224 161*
00225 162*
00226 163*
00227 164*
00228 165*
00229 166*
00230 167*
00231 168*
00232 169*
00233 170*
00234 171*
00235 172*
00236 173*
00237 174*
00238 175*
00239 176*
00240 177*
00241 178*
00242 179*
00243 180*
00244 181*
00245 182*
00246 183*
00247 184*
00248 185*
00249 186*
00250 187*
00251 188*
00252 189*
00253 190*
00254 191*
00255 192*
00256 193*
00257 194*
00258 195*
00259 196*
00260 197*
00261 198*
00262 199*
00263 200*
00264 201*
00265 202*
00266 203*
00267 204*
00268 205*
00269 206*
00270 207*
00271 208*
00272 209*
00273 210*
00274 211*
00275 212*
00276 213*
00277 214*
00278 215*
00279 216*
00280 217*
00281 218*
00282 219*
00283 220*
00284 221*
00285 222*
00286 223*
00287 224*
00288 225*
00289 226*
00290 227*
00291 228*
00292 229*
00293 230*
00294 231*
00295 232*
00296 233*
00297 234*
00298 235*
00299 236*
00300 237*
00301 238*
00302 239*
00303 240*
00304 241*
00305 242*
00306 243*
00307 244*
00308 245*
00309 246*
00310 247*
00311 248*
00312 249*
00313 250*
00314 251*
00315 252*
00316 253*
00317 254*
00318 255*
00319 256*
00320 257*
00321 258*
00322 259*
00323 260*
00324 261*
00325 262*
00326 263*
00327 264*
00328 265*
00329 266*
00330 267*
00331 268*
00332 269*
00333 270*
00334 271*
00335 272*
00336 273*
00337 274*
00338 275*
00339 276*
00340 277*
00341 278*
00342 279*
00343 280*
00344 281*
00345 282*
00346 283*
00347 284*
00348 285*
00349 286*
00350 287*
00351 288*
00352 289*
00353 290*
00354 291*
00355 292*
00356 293*
00357 294*
00358 295*
00359 296*
00360 297*
00361 298*
00362 299*
00363 300*
00364 301*
00365 302*
00366 303*
00367 304*
00368 305*
00369 306*
00370 307*
00371 308*
00372 309*
00373 310*
00374 311*
00375 312*
00376 313*
00377 314*
00378 315*
00379 316*
00380 317*
00381 318*
00382 319*
00383 320*
00384 321*
00385 322*
00386 323*
00387 324*
00388 325*
00389 326*
00390 327*
00391 328*
00392 329*
00393 330*
00394 331*
00395 332*
00396 333*
00397 334*
00398 335*
00399 336*
00400 337*
00401 338*
00402 339*
00403 340*
00404 341*
00405 342*
00406 343*
00407 344*
00408 345*
00409 346*
00410 347*
00411 348*
00412 349*
00413 350*
00414 351*
00415 352*
00416 353*
00417 354*
00418 355*
00419 356*
00420 357*
00421 358*
00422 359*
00423 360*
00424 361*
00425 362*
00426 363*
00427 364*
00428 365*
00429 366*
00430 367*
00431 368*
00432 369*
00433 370*
00434 371*
00435 372*
00436 373*
00437 374*
00438 375*
00439 376*
00440 377*
00441 378*
00442 379*
00443 380*
00444 381*
00445 382*
00446 383*
00447 384*
00448 385*
00449 386*
00450 387*
00451 388*
00452 389*
00453 390*
00454 391*
00455 392*
00456 393*
00457 394*
00458 395*
00459 396*
00460 397*
00461 398*
00462 399*
00463 400*
00464 401*
00465 402*
00466 403*
00467 404*
00468 405*
00469 406*
00470 407*
00471 408*
00472 409*
00473 410*
00474 411*
00475 412*
00476 413*
00477 414*
00478 415*
00479 416*
00480 417*
00481 418*
00482 419*
00483 420*
00484 421*
00485 422*
00486 423*
00487 424*
00488 425*
00489 426*
00490 427*
00491 428*
00492 429*
00493 430*
00494 431*
00495 432*
00496 433*
00497 434*
00498 435*
00499 436*
00500 437*
00501 438*
00502 439*
00503 440*
00504 441*
00505 442*
00506 443*
00507 444*
00508 445*
00509 446*
00510 447*
00511 448*
00512 449*
00513 450*
00514 451*
00515 452*
00516 453*
00517 454*
00518 455*
00519 456*
00520 457*
00521 458*
00522 459*
00523 460*
00524 461*
00525 462*
00526 463*
00527 464*
00528 465*
00529 466*
00530 467*
00531 468*
00532 469*
00533 470*
00534 471*
00535 472*
00536 473*
00537 474*
00538 475*
00539 476*
00540 477*
00541 478*
00542 479*
00543 480*
00544 481*
00545 482*
00546 483*
00547 484*
00548 485*
00549 486*
00550 487*
00551 488*
00552 489*
00553 490*
00554 491*
00555 492*
00556 493*
00557 494*
00558 495*
00559 496*
00560 497*
00561 498*
00562 499*
00563 500*
00564 501*
00565 502*
00566 503*
00567 504*
00568 505*
00569 506*
00570 507*
00571 508*
00572 509*
00573 510*
00574 511*
00575 512*
00576 513*
00577 514*
00578 515*
00579 516*
00580 517*
00581 518*
00582 519*
00583 520*
00584 521*
00585 522*
00586 523*
00587 524*
00588 525*
00589 526*
00590 527*
00591 528*
00592 529*
00593 530*
00594 531*
00595 532*
00596 533*
00597 534*
00598 535*
00599 536*
00600 537*
00601 538*
00602 539*
00603 540*
00604 541*
00605 542*
00606 543*
00607 544*
00608 545*
00609 546*
00610 547*
00611 548*
00612 549*
00613 550*
00614 551*
00615 552*
00616 553*
00617 554*
00618 555*
00619 556*
00620 557*
00621 558*
00622 559*
00623 560*
00624 561*
00625 562*
00626 563*
00627 564*
00628 565*
00629 566*
00630 567*
00631 568*
00632 569*
00633 570*
00634 571*
00635 572*
00636 573*
00637 574*
00638 575*
00639 576*
00640 577*
00641 578*
00642 579*
00643 580*
00644 581*
00645 582*
00646 583*
00647 584*
00648 585*
00649 586*
00650 587*
00651 588*
00652 589*
00653 590*
00654 591*
00655 592*
00656 593*
00657 594*
00658 595*
00659 596*
00660 597*
00661 598*
00662 599*
00663 600*
00664 601*
00665 602*
00666 603*
00667 604*
00668 605*
00669 606*
00670 607*
00671 608*
00672 609*
00673 610*
00674 611*
00675 612*
00676 613*
00677 614*
00678 615*
00679 616*
00680 617*
00681 618*
00682 619*
00683 620*
00684 621*
00685 622*
00686 623*
00687 624*
00688 625*
00689 626*
00690 627*
00691 628*
00692 629*
00693 630*
00694 631*
00695 632*
00696 633*
00697 634*
00698 635*
00699 636*
00700 637*
00701 638*
00702 639*
00703 640*
00704 641*
00705 642*
00706 643*
00707 644*
00708 645*
00709 646*
00710 647*
00711 648*
00712 649*
00713 650*
00714 651*
00715 652*
00716 653*
00717 654*
00718 655*
00719 656*
00720 657*
00721 658*
00722 659*
00723 660*
00724 661*
00725 662*
00726 663*
00727 664*
00728 665*
00729 666*
00730 667*
00731 668*
00732 669*
00733 670*
00734 671*
00735 672*
00736 673*
00737 674*
00738 675*
00739 676*
00740 677*
00741 678*
00742 679*
00743 680*
00744 681*
00745 682*
00746 683*
00747 684*
00748 685*
00749 686*
00750 687*
00751 688*
00752 689*
00753 690*
00754 691*
00755 692*
00756 693*
00757 694*
00758 695*
00759 696*
00760 697*
00761 698*
00762 699*
00763 700*
00764 701*
00765 702*
00766 703*
00767 704*
00768 705*
00769 706*
00770 707*
00771 708*
00772 709*
00773 710*
00774 711*
00775 712*
00776 713*
00777 714*
00778 715*
00779 716*
00780 717*
00781 718*
00782 719*
00783 720*
00784 721*
00785 722*
00786 723*
00787 724*
00788 725*
00789 726*
00790 727*
00791 728*
00792 729*
00793 730*
00794 731*
00795 732*
00796 733*
00797 734*
00798 735*
00799 736*
00800 737*
00801 738*
00802 739*
00803 740*
00804 741*
00805 742*
00806 743*
00807 744*
00808 745*
00809 746*
00810 747*
00811 748*
00812 749*
00813 750*
00814 751*
00815 752*
00816 753*
00817 754*
00818 755*
00819 756*
00820 757*
00821 758*
00822 759*
00823 760*
00824 761*
00825 762*
00826 763*
00827 764*
00828 765*
00829 766*
00830 767*
00831 768*
00832 769*
00833 770*
00834 771*
00835 772*
00836 773*
00837 774*
00838 775*
00839 776*
00840 777*
00841 778*
00842 779*
00843 780*
00844 781*
00845 782*
00846 783*
00847 784*
00848 785*
00849 786*
00850 787*
00851 788*
00852 789*
00853 790*
00854 791*
00855 792*
00856 793*
00857 794*
00858 795*
00859 796*
00860 797*
00861 798*
00862 799*
00863 800*
00864 801*
00865 802*
00866 803*
00867 804*
00868 805*
00869 806*
00870 807*
00871 808*
00872 809*
00873 810*
00874 811*
00875 812*
00876 813*
00877 814*
00878 815*
00879 816*
00880 817*
00881 818*
00882 819*
00883 820*
00884 821*
00885 822*
00886 823*
00887 824*
00888 825*
00889 826*
00890 827*
00891 828*
00892 829*
00893 830*
00894 831*
00895 832*
00896 833*
00897 834*
00898 835*
00899 836*
00900 837*
00901 838*
00902 839*
00903 840*
00904 841*
00905 842*
00906 843*
00907 844*
00908 845*
00909 846*
00910 847*
00911 848*
00912 849*
00913 850*
00914 851*
00915 852*
00916 853*
00917 854*
00918 855*
00919 856*
00920 857*
00921 858*
00922 859*
00923 860*
00924 861*
00925 862*
00926 863*
00927 864*
00928 865*
00929 866*
00930 867*
00931 868*
00932 869*
00933 870*
00934 871*
00935 872*
00936 873*
00937 874*
00938 875*
00939 876*
00940 877*
00941 878*
00942 879*
00943 880*
00944 881*
00945 882*
00946 883*
00947 884*
00948 885*
00949 886*
00950 887*
00951 888*
00952 889*
00953 890*
00954 891*
00955 892*
00956 893*
00957 894*
00958 895*
00959 896*
00960 897*
00961 898*
00962 899*
00963 900*
00964 901*
00965 902*
00966 903*
00967 904*
00968 905*
00969 906*
00970 907*
00971 908*
00972 909*
00973 910*
00974 911*
00975 912*
00976 913*
00977 914*
00978 915*
00979 916*
00980 917*
00981 918*
00982 919*
00983 920*
00984 921*
00985 922*
00986 923*
00987 924*
00988 925*
00989 926*
00990 927*
00991 928*
00992 929*
00993 930*
00994 931*
00995 932*
00996 933*
00997 934*
00998 935*
00999 936*
01000 937*

```

LINE	CODE	TEXT	UTM
129*	00173		
130*	00175		
131*	00175		
132*	00176		
133*	00200		
134*	00202		
135*	00202		
136*	00202		
137*	00202		
138*	00202		
139*	00202		
140*	00202		
141*	00202		
142*	00203		
143*	00204		
144*	00204		
145*	00204		
146*	00204		
147*	00205		
148*	00205		
149*	00206		
150*	00206		
151*	00206		
152*	00206		
153*	00206		
154*	00210		
155*	00212		
156*	00214		
157*	00216		
158*	00217		
159*	00220		
160*	00221		
161*	00223		
162*	00225		
163*	00226		
164*	00227		
165*	00227		
166*	00227		
167*	00230		
168*	00231		

END OF COMPILATION: NO DIAGNOSTICS.

 CONVMU

 @HDG.P

@FCR.S CVCOORD.CONVMU.TPFS.CONVMU
FOR SOE3-05/17/78-08:30:36 (1.)

SUBROUTINE CONVMU ENTRY POINT 001367

STORAGE USED: CODE(1) 001563: DATA(0) 000436: BLANK COMMON(2) 000000

LINE	ADDRESS	INSTR	OPERAND	COMMENT
92*	00161			
93*	00162			
94*	00162			
95*	00162			
96*	00162			
97*	00163			
98*	00164			
99*	00165			
100*	00166			
101*	00167			
102*	00167			
103*	00167			
104*	00167			
105*	00170			
106*	00171			
107*	00172			
108*	00173			
109*	00174			
110*	00174			
111*	00174			
112*	00174			
113*	00175			
114*	00176			
115*	00177			
116*	00200			
117*	00201			
118*	00201			
119*	00201			
120*	00201			
121*	00202			
122*	00203			
123*	00204			
124*	00205			
125*	00205			
126*	00206			
127*	00207			
128*	00210			
129*	00212			
130*	00212			
131*	00212			
132*	00212			
133*	00214			
134*	00217			
135*	00221			
136*	00221			
137*	00223			
138*	00224			
139*	00224			
140*	00224			
141*	00224			
142*	00225			
143*	00230			
144*	00232			
145*	00232			
146*	00234			
147*	00234			
148*	00234			
149*	00234			

DATE 051774

```

00235 150*
00236 151*
00237 152*
00238 153*
00239 154*
00240 155*
00241 156*
00242 157*
00243 158*
00244 159*
00245 160*
00246 161*
00247 162*
00248 163*
00249 164*
00250 165*
00251 166*
00252 167*
00253 168*
00254 169*
00255 170*
00256 171*
00257 172*
00258 173*
00259 174*
00260 175*
00261 176*
00262 177*
00263 178*
00264 179*
00265 180*
00266 181*
00267 182*
00268 183*
00269 184*
00270 185*
00271 186*
00272 187*
00273 188*
00274 189*
00275 190*
00276 191*
00277 192*
00278 193*
00279 194*
00280 195*
00281 196*
00282 197*
00283 198*
00284 199*
00285 200*
00286 201*
00287 202*
00288 203*
00289 204*
00290 205*
00291 206*
00292 207*

155 NORTH=NORTH+DFLOAT(LL-1)*1.D5
   IF (Q.EQ.1HK) GOTO 170
   DO 160 CROW=1,9
   IF (Q.EQ.QL(CROW)) GOTO 163
160 CONTINUE
   C
   GOTO 7060
163 IF (CROW.EQ.3.OR.CROW.EQ.5.OR.CROW.EQ.7)
   *
   GOTO 172
   C
   ADD MULTIPLE OF 2 MILLION METERS TO NORTHING
   C
   NORTH=NORTH+ADDN(CROW)
   GOTO 178
   C
   6 X 8 QUADRANGLE WITH LETTER X
   C
170 IF (JZ.EQ.1.AND.T.GT.1HK.AND.T.LT.1HK)
   *
   NORTH=NORTH+8.D6
   IF (JZ.EQ.1.AND.T.EQ.1HK)
   *
   NORTH=NORTH+6.D6
   IF (JZ.EQ.1.AND.T.GE.1HA.AND.T.LT.1HE)
   *
   NORTH=NORTH+8.D6
   IF (JZ.EQ.2.AND.((T.GT.1HQ.AND.T.LT.1HW)
   *
   .OR.(T.GE.1HA.AND.T.LT.1HE)))
   *
   NORTH=NORTH+8.D6
   IF (JZ.EQ.2.AND.T.EQ.1HQ)
   *
   NORTH=NORTH+6.D6
   IF (JZ.EQ.2.AND.T.GE.1HF.AND.T.LT.1HK)
   *
   NORTH=NORTH+8.D6
   GOTO 178
172 IF (CROW.EQ.5) GOTO 174
   IF (CROW.EQ.7) GOTO 176
   C
   6 X 8 QUADRANGLE WITH LETTER Q
   C
   IF (LL.GE.18.AND.LL.LE.20)
   *
   GOTO 173
   NORTH=NORTH+2.D6
   GOTO 178
173 NORTH=NORTH+0.D6
   GOTO 178
   C
   6 X 8 QUADRANGLE WITH LETTER S
   C
174 IF (LL.GE.16.AND.LL.LE.20)
   *
   GOTO 175
   NORTH=NORTH+4.D6
   GOTO 178
175 NORTH=NORTH+2.D6
   GOTO 178
   C
   6 X 8 QUADRANGLE WITH LETTER U
   C
176 IF (LL.GE.14.AND.LL.LE.20)
   *
   GOTO 177
   NORTH=NORTH+6.D6
   GOTO 178
00314 207*

```



```

00367 266* IEAST=IEAST/10
00370 267* 300 CONTINUE
00372 268* INORTH=IDINT((10.00*NORTH+5.00)/10.00)
00373 269* YZ=0.00
00374 270* DO 320 KK=1,5
00377 271* IDIGIT=INORTH-10*(INORTH/10)
00400 272* YY=YZ+DFLOAT(IDIGIT)*10.00*(KK-1)
00401 273* INORTH=INORTH/10
00402 274* 320 CONTINUE
00402 275* C
00402 276* C CONCATENATE RIGHTMOST 5 DIGITS OF EASTING AND NORTHING
00402 277* C
00405 278* XYMIL=XX*1.05+YY
00405 279* GOTO 9999
00405 280* C-----
00405 281* C
00405 282* C SET ERROR CODES
00405 283* C
00405 284* C
00405 285* C UTM ZONE NUMBER > 22 WITH CLARKE 1866 SPHEROID
00405 286* C
00405 287* 7000 JERR=10
00407 288* IF (CFLAG.EQ.1) GOTO 9200
00411 289* IF (CFLAG.EQ.2) GOTO 9300
00411 290* C
00411 291* C INVALID Y DESIGNATOR OF 100,000 M. SQUARE
00411 292* C
00413 293* 7040 JERR=13
00414 294* GOTO 9200
00414 295* C
00414 296* C INVALID ROW LETTER OF 6 X 8 QUADRANGLE
00414 297* C
00415 298* 7060 JERR=11
00416 299* GOTO 9200
00416 300* C
00416 301* C INVALID X DESIGNATOR OF 100,000 M. SQUARE
00416 302* C
00417 303* 7080 JERR=12
00420 304* GOTO 9200
00420 305* C
00420 306* C INVALID NORTHING WITH CLARKE 1866 SPHEROID
00420 307* C
00421 308* 7200 JERR=14
00422 309* GOTO 9300
00422 310* C
00423 311* 9200 EAST=0.000
00424 312* NORTH=0.000
00425 313* GOTO 9999
00426 314* 9300 XYMIL=0.000
00427 315* GOTO 9999
00427 316* C
00427 317* C
00430 318* 9999 RETURN
00431 319* END

```

END OF COMPILATION: NO DIAGNOSTICS.

DATE 051778

000200
000201
000203
000212
000212
000212
000214
000254

00151 84* 9500 QSO=6H
00152 85* FLD(0.6,QSO) =FLD(0.6,0)
00153 86* FLD(6.12,QSO)=FLD(0.12,SQ)
00154 87* GOTO 9999
00154 88* C
00154 89* C
00155 90* 9999 RETURN
00156 91* END

END OF COMPILATION: NO DIAGNOSTICS.

ENDG.P ***** COORGS *****

FOR S CVCOORD.COORGS.TPF\$.COORGS
FOR SOE3-05/17/78-08:31:29 (2.)

SUBROUTINE COORGS ENTRY POINT 000171

STORAGE USED: CODE(1) 000216: DATA(0) 000046: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003 ZONE2
0004 CONVGS
0005 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000153	8000L	0001	000156	9100L	0001	000162	9999L	0000	R	000016	BLANK
0000	I	000001	DL	0000	I	000000	DP	0000	R	000017	H1	0000
0000	R	000006	LETTE	0000	R	000033	LETTN	0000	R	000020	H2	0000
0000	I	000024	ML	0000	I	000023	MP	0000	R	000005	LETTW	0000
0000	R	000021	S1	0000	R	000022	S2	0000	R	000013	SL	0000
				0000	I	000002	UZONE		D	000011	SP	

00101	1*												
00101	2*	C											000000
00101	3*	C											000000
00101	4*	C											000000
00101	5*	C											000000
00101	6*	C											000000
00101	7*	C											000000
00101	8*	C											000000
00101	9*	C											000000
00101	10*	C											000000
00101	11*	C											000000
00101	12*	C											000000
00101	13*	C											000000
00101	14*	C											000000

SUBROUTINE COORGS (INST, PHI, LAM, SZONE, XSTP, YSTP, JERR)

SUBROUTINE COORGS

H.O. EBERHART - DECEMBER 1977

TEL (301) 671 3125

POTOMAC RESEARCH, INC.

THIS SUBROUTINE CONVERTS
GEOGRAPHIC TO STATE COORDINATES

DATE 051778

***** COURSES *****		
00141	73*	C 3000
00142	74*	
00143	75*	C 9100
00143	76*	
00144	77*	
00145	78*	
00146	79*	
00146	80*	C
00146	81*	C 9999
00147	82*	
00150	83*	

END OF COMPILATION: NO DIAGNOSTICS.

PHDG, P ***** COORGU *****

FOR.S CVCOORD.COORGU.TPFS.COORGU
FOR SCE3-05/17/78-C9:31:45 (2.)

SUBROUTINE COORU ENTRY POINT 000173

STORAGE USED: CODE(1) 000220: DATA(0) 000052: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK. NAME)

0003	ZONE2
0004	CONV'GU
0005	NERR3\$

 STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME) |

0001	000155	8000L	0001	000150	9150L	0001	000164	9999L	0000	R	000021	ASTER	0000	R	000022	BLANK			
0000	I	000001	DL	0000	I	000000	DP	0000	R	000023	H1	0000	R	000024	H2	0000	I	000042	INJPS
0000	I	000006	LFITE	0000	R	000003	LETH	0000	R	000004	LETT	0000	R	000005	LETTM	0000	R	000010	MINUS
0000	I	000030	ML	0000	I	000007	MP	0000	R	000007	PLUS	0000	D	000011	SK	0000	D	000017	SL
0000	D	000015	SP	0000	I	000002	SZONE	0000	R	000025	S1	0000	D	000026	S2	0000	D	000013	THET

000101	1*
000101	2*
000101	3*
000101	4*
000101	5*
000101	6*
000101	7*
000101	8*
000101	9*
000101	10*
000101	11*

SUBROUTINE COORGU (INST.PHI,LAM,UZONE,EAST,NORTH,JERR)

SUBROUTINE COORGU
H.O. EDERHART - DECEMBER 1977
TEL (301) 671 3125

POTOMAC RESEARCH, INC.

THIS SUBROUTINE CONVERTS
GEOGRAPHIC TO UTM COORDINATES

DATE	051778
CALLING SEQUENCE:	
* CALL COORGU (INST,PHI,LAM,UZONE,EAST,NORTH,JERR)	
INST -- I HOLLERITH INSTALLATION	
PHI -- I D.P. LATITUDE	
LAM -- I D.P. LONGITUDE	
UZONE -- O INTEGER + OR - UTM ZONE NUMBER	
EAST -- O D.P. EASTING	
NORTH -- O D.P. NORTHING	
JERR -- O INTEGER ERROR CODE	
*	
CONVENTIONS:	
+ LATITUDE NORTHERN HEMISPHERE	
- LATITUDE SOUTHERN	
+ LONGITUDE WESTERN	
- LONGITUDE EASTERN	
+ UTM ZONE NORTHERN HEMISPHERE	
- UTM ZONE SOUTHERN	
CLARKE 1866 SPHEROID	
INTEGER DP,OL,SZONE,UZONE	
REAL LETTN,LETTIS,LETTW,LETTE,PPLUS,MINUS	
DOUBLE PRECISION SK,THET,SP,SL,EAST,NORTH,PHI,LAM	
DATA ASTER,BLANK,PPLUS,MINUS/1H .1H+ .1H-/	
DATA LETTN,LETTIS,LETTW,LETTE/1HN,1HS,1HW,1HE/	
JERR=O	
GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE	
50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,\$B000)	
IF (H1.EQ.LETTN) S1=PLUS	
IF (H1.EQ.LETTIS) S1=MINUS	
IF (H2.EQ.LETTW) S2=PLUS	
IF (H2.EQ.LETTE) S2=MINUS	
60 DP=IDINT(PHI/1.D4)	
MP=IDINT(PHI/1.D2)-100*OP	
SP=PHI-DFLOAT(DP*10000)-DFLOAT(MP*100)	
OL=IDINT(LAM/1.D4)	
ML=IDINT(LAM/1.D2)-100*OL	
SL=LAM-DFLOAT(OL*10000)-DFLOAT(ML*100)	
CALL CONVGU (1,S1,DP,MP,SP,S2,DL,ML,SL,UZONE,EAST,NORTH,SK,THET, JERR)	
*	

```

00141 70*          GOTO 9999
00141 71*          C-----
00141 72*          C
00141 73*          C      INVALID INSTALLATION -- 2 ALPHABETIC
00141 74*          C
00142 75*          8000 JERR=1
00143 76*          GOTO 9150
00143 77*          C
00144 78*          9150 EAST =0.000
00145 79*          NORTH=0.000
00146 80*          GOTO 9999
00146 81*          C
00146 82*          C
00147 83*          9999 RETURN
00150 84*          END

```

END OF COMPILATION: NO DIAGNOSTICS.

PHDG.P ***** COORMG *****

FOR S. S. CVCOORD. COORMG. TPFS. COORMG
FOR SOE3-05/17/78-08:32:01 (1.)

SUBROUTINE COORMG ENTRY POINT 000205

STORAGE USED: CODE(1) 000244; DATA(0) 000052; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK. NAME)

```

0003 ZONE2
0004 CONVNU
0005 CONVGU
0006 NERR3$

```

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION. NAME)

```

0001 000116 8000L 0001 000121 8040L 0001 000124 8060L 0001 000127 9000L 0001 000123 9540L
0001 000176 9999L 0000 R 000030 ASTER 0000 R 000031 BLANK 0000 I 000000 DP
0000 D 000024 EAST 0000 000045 INJPS 0000 R 000007 LETTE 0000 R 000004 LETTN 0000 R 000005 LETTS
0000 R 000006 LETTW 0000 R 000011 MINUS 0000 I 000035 ML 0000 I 000034 NP 0000 D 000025 NORTH
0000 R 000010 PLUS 0000 R 000012 Q 0000 D 000014 SK 0000 D 000022 SL 0000 D 000020 SP
0000 R 000013 SQ 0000 I 000002 SZONE 0000 R 000032 S1 0000 R 000033 S2 0000 D 000016 THET
0000 I 000003 UZONE

```

```

00101 1*          SUBROUTINE COORMG (INST.QSO.XYML,H1,PHI,H2,LAM,JERR)
00101 2*          C
00101 3*          SUBROUTINE COORMG
00101 4*          H.O. EBERHART - DECEMBER 1977

```

```

000000
000000
000000

```

TEL (301) 671 3125

POTOMAC RESEARCH, INC.

THIS SUBROUTINE CONVERTS

MILITARY TO GEOGRAPHIC COORDINATES

CALLING SEQUENCE:

```
CALL COORM3 (INST,OSQ,XYMIL,H1,PHI,H2,LAM,JERR)
INST -- I HOLLERITH INSTALLATION
OSQ -- I HOLLERITH QUADRANGLE ROW &
      100,000 M. SQUARE
XYMIL -- I D.P. COORDINATE STRING MIL.
H1 -- O HOLLERITH HEMISPHERE (N.S)
PHI -- O D.P. LATITUDE
H2 -- O HOLLERITH HEMISPHERE (W.E)
LAM -- O D.P. LONGITUDE
JERR -- O INTEGER ERROR CODE
```

CONVENTIONS:

```
+ LATITUDE NORTHERN HEMISPHERE
- LATITUDE SOUTHERN
+ LONGITUDE WESTERN
- LONGITUDE EASTERN
+ UTM ZONE NORTHERN HEMISPHERE
- UTM ZONE SOUTHERN
CLARKE 1866 SPHEROID
```

```
INTEGER DP,DL,SZONE,UZONE
REAL LETTN,LETTN,LETTW,LETTE,PLUS,MINUS,Q,SQ
DOUBLE PRECISION SK,THET,SP,SL,EAST,NORTH,PHI,LAM,XYMIL
DATA ASTER,BLANK,PLUS,MINUS,1H+,1H-,1H-,1H-/
DATA LETTN,LETTN,LETTW,LETTE,1HN,1HS,1HW,1HE/
```

JERR=0

GET HEMISPHERE INDICATORS. UTM ZONE, STATE ZONE

50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,\$0000)

```
IF (H1.EQ.LETTN) S1=PLUS
IF (H1.EQ.LETTN) S1=MINUS
IF (H2.EQ.LETTW) S2=PLUS
IF (H2.EQ.LETTW) S2=MINUS
```

00101	5*	C	00000
00102	6*	C	00000
00103	7*	C	00000
00104	8*	C	00000
00105	9*	C	00000
00106	10*	C	00000
00107	11*	C	00000
00108	12*	C	00000
00109	13*	C	00000
00110	14*	C	00000
00111	15*	C	00000
00112	16*	C	00000
00113	17*	C	00000
00114	18*	C	00000
00115	19*	C	00000
00116	20*	C	00000
00117	21*	C	00000
00118	22*	C	00000
00119	23*	C	00000
00120	24*	C	00000
00121	25*	C	00000
00122	26*	C	00000
00123	27*	C	00000
00124	28*	C	00000
00125	29*	C	00000
00126	30*	C	00000
00127	31*	C	00000
00128	32*	C	00000
00129	33*	C	00000
00130	34*	C	00000
00131	35*	C	00000
00132	36*	C	00000
00133	37*	C	00000
00134	38*	C	00000
00135	39*	C	00000
00136	40*	C	00000
00137	41*	C	00000
00138	42*	C	00000
00139	43*	C	00000
00140	44*	C	00000
00141	45*	C	00000
00142	46*	C	00000
00143	47*	C	00000
00144	48*	C	00000
00145	49*	C	00000
00146	50*	C	00000
00147	51*	C	00000
00148	52*	C	00000
00149	53*	C	00000
00150	54*	C	00000
00151	55*	C	00000
00152	56*	C	00000
00153	57*	C	00000
00154	58*	C	00000
00155	59*	C	00000
00156	60*	C	00000
00157	61*	C	00000
00158	62*	C	00000

```

00132 63* 70 Q =6H 00034
00133 64* SQ=6H 00035
00134 65* FLD(0.6,Q) =FLD(0.6,QSQ) 00036
00135 66* FLD(0.12,SQ)=FLD(0.12,QSQ) 00037
00136 67* C 00038
00137 68* IF (XYMIL.EQ.0.000) GOTO 8040 00039
00138 69* IF (CSQ.EQ.0.000) GOTO 8060 00040
00139 70* CALL CONVQU (1,UZONE,EAST,NORTH,Q,SQ,XYMIL,JERR) 00041
00140 71* IF (JERR.GT.0) GOTO 9999 00042
00141 72* CALL CONVQU (2,S1,DP,MP,S2,DL,ML,SL,UZONE,EAST,NORTH,SK,THET, 00043
00142 73* * JERR) 00044
00143 74* GOTO 9540 00045
00144 75* C----- 00046
00145 76* C 00047
00146 77* C INVALID INSTALLATION -- 2 ALPHASETIC 00048
00147 78* C 00049
00148 79* 8000 JERR=1 00050
00149 80* GOTO 9000 00051
00150 81* C 00052
00151 82* C MISSING INPUT COORDINATES 00053
00152 83* C 00054
00153 84* 9040 JERR=2 00055
00154 85* GOTO 9000 00056
00155 86* C 00057
00156 87* C MISSING 3 LETTERS -- QUADRANGLE & 100.000 M. SQUARE 00058
00157 88* C 00059
00158 89* 8060 JERR=3 00060
00159 90* GOTO 9000 00061
00160 91* C 00062
00161 92* 9000 PHI=0.000 00063
00162 93* LAM=0.000 00064
00163 94* GOTO 9999 00065
00164 95* C 00066
00165 96* 9540 PHI=DFLOAT(DP*10000)+DFLOAT(MP*100)+SP 00067
00166 97* LAM=DFLOAT(DL*10000)+DFLOAT(ML*100)+SL 00068
00167 98* GOTO 9999 00069
00168 99* C 00070
00169 100* C 00071
00170 101* 9999 RETURN 00072
00171 102* END 00073

```

END OF COMPILATION: NO DIAGNOSTICS.

@HDG.P ***** COORMS *****

@FOR.S CVCOORD.COORMS,TPFS.COORMS
FOR 50E3-05/17/78-08:32:18 (2.)

SUBROUTINE COORMS ENTRY POINT 000164

STORAGE USED: CODE(1) 000220: DATA(0) 000051: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003 ZONE2
0004 CON/MU
0005 CON/UG
0006 CON/VS
0007 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001 000140 8000L 0001 000143 8040L 0001 000146 8060L 0001 000151 9100L 0001 000155 9099L
0000 R 000027 ASTER 0000 R 000030 BLANK 0000 I 000001 DL 0000 I 000000 DP 0000 D 000023 EAST
0000 R 000031 H1 0000 R 000032 H2 0000 000044 INJP\$ 0000 R 000006 LETTE 0000 R 000033 LETTN
0000 R 000034 LETTS 0000 R 000035 LETTW 0000 R 000010 MINUS 0000 I 000036 ML 0000 I 000035 MP
0000 D 000025 NORTH 0000 R 000007 PLUS 0000 R 000011 Q 0000 D 000013 SK 0000 D 000021 SL
0000 D 000017 SP 0000 R 000012 SQ 0000 R 000033 S1 0000 R 000014 SK 0000 D 000015 THET
0000 I 000002 UZONE 0000 R 000034 S2

SUBROUTINE COORMS (INST,OSQ,XYMIL,SZONE,XSTP,YSTP,JERR)

SUBROUTINE COORMS
H.O. EBERHART - DECEMBER 1977
TEL (301) 671 3125
POTOMAC RESEARCH, INC.

THIS SUBROUTINE CONVERTS

MILITARY TO STATE COORDINATES

CALLING SEQUENCE:

*
CALL COORMS (INST,OSQ,XYMIL,SZONE,XSTP,YSTP,JERR)
INST -- I HOLLERITH INSTALLATION
OSQ -- I HOLLERITH QUADRANGLE ROW &
XYMIL -- I D.P. 100,000 M. SQUARE
SZONE -- O INTEGER COORDINATE STRING MIL.
XSTP -- O D.P. STATE ZONE NUMBER
YSTP -- O D.P. X COORDINATE STATE
JERR -- O D.P. Y COORDINATE STATE
*
JERR -- O INTEGER ERROR CODE

CONVENTIONS:

+ LATITUDE NORTHERN HEMISPHERE
- LATITUDE SOUTHERN
+ LONGITUDE WESTERN
- LONGITUDE EASTERN

00101	1*	C	000000
00101	2*	C	000000
00101	3*	C	000000
00101	4*	C	000000
00101	5*	C	000000
00101	6*	C	000000
00101	7*	C	000000
00101	8*	C	000000
00101	9*	C	000000
00101	10*	C	000000
00101	11*	C	000000
00101	12*	C	000000
00101	13*	C	000000
00101	14*	C	000000
00101	15*	C	000000
00101	16*	C	000000
00101	17*	C	000000
00101	18*	C	000000
00101	19*	C	000000
00101	20*	C	000000
00101	21*	C	000000
00101	22*	C	000000
00101	23*	C	000000
00101	24*	C	000000
00101	25*	C	000000
00101	26*	C	000000
00101	27*	C	000000
00101	28*	C	000000
00101	29*	C	000000
00101	30*	C	000000
00101	31*	C	000000
00101	32*	C	000000
00101	33*	C	000000
00101	34*	C	000000
00101	35*	C	000000
00101	36*	C	000000


```

00101 18* C
00101 19* C
00101 20* C
00101 21* C
00101 22* C
00101 23* C
00101 24* C
00101 25* C
00101 26* C
00101 27* C
00101 28* C
00101 29* C
00101 30* C
00101 31* C
00101 32* C
00101 33* C
00101 34* C
00101 35* C
00101 36* C
00101 37* C
00101 38* C
00101 39* C
00101 40* C
00101 41* C
00101 42* C
00103 43* C
00104 44* C
00105 45* C
00106 46* C
00113 47* C
00113 48* C
00113 49* C
00113 50* C
00120 51* C
00120 52* C
00120 53* C
00120 54* C
00121 55* C
00121 56* C
00122 57* C
00124 58* C
00126 59* C
00130 60* C
00130 61* C
00132 62* C
00133 63* C
00134 64* C
00135 65* C
00135 66* C
00136 67* C
00140 68* C
00142 69* C
00143 70* C
00143 71* C
00143 72* C
00143 73* C
00143 74* C
00144 75* C

*****

C 18* INST -- I HOLLERITH INSTALLATION
C 19* QSQ -- I HOLLERITH QUADRANGLE ROW &
C 20* 100,000 M. SQUARE
C 21* XYMIL -- I D.P. COORDINATE STRING MIL.
C 22* UZONE -- O INTEGER + OR - UTM ZONE NUMBER
C 23* EAST -- O D.P. EASTING
C 24* NORTH -- O D.P. NORTHING
C 25* JERR -- O INTEGER ERROR CODE
C 26*
C 27*
C 28*
C 29*
C 30*
C 31*
C 32*
C 33*
C 34*
C 35*
C 36*
C 37*
C 38*
C 39*
C 40*
C 41*
C 42*
C 43*
C 44*
C 45*
C 46*
C 47*
C 48*
C 49*
C 50*
C 51*
C 52*
C 53*
C 54*
C 55*
C 56*
C 57*
C 58*
C 59*
C 60*
C 61*
C 62*
C 63*
C 64*
C 65*
C 66*
C 67*
C 68*
C 69*
C 70*
C 71*
C 72*
C 73*
C 74*
C 75*

CONVENTIONS:
+ LATITUDE NORTHERN HEMISPHERE
- LATITUDE SOUTHERN
+ LONGITUDE WESTERN
- LONGITUDE EASTERN
+ UTM ZONE NORTHERN HEMISPHERE
- UTM ZONE SOUTHERN
CLARKE 1866 SPHEROID

INTEGER SZONE,UZONE
REAL LETTN,LETTS,LETTW,LETTE,PLUS,MINUS,Q,SQ
DOUBLE PRECISION EAST,NORTH,XYMIL
DATA ASTER,BLANK,PLUS,MINUS/1H*,1H*,1H*,1H-/
DATA LETTN,LETTS,LETTW,LETTE/1HN,1HS,1HW,1HE/

JERR=0

GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE

50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,$8000)

IF (H1.EQ.LETTN) S1=PLUS
IF (H1.EQ.LETTS) S1=MINUS
IF (H2.EQ.LETTW) S2=PLUS
IF (H2.EQ.LETTE) S2=MINUS

70 Q=6H
SQ=6H
FLD(0,6,Q)=FLD(0,6,QSQ)
FLD(0,12,SQ)=FLD(6,12,QSQ)

IF (XYMIL.EQ.0.000) GOTO 8040
IF (QSQ.EQ.BLANK) GOTO 8050
CALL CORVNU (1,UZONE,EAST,NORTH,Q,SQ,XYMIL,JERR)
GOTO 9999
-----
C INVALID INSTALLATION -- 2 ALPHABETIC
C 8000 JERR=1

```

```

***** LOGGING *****
00145 76* GOTO 9150
00146 77* C
00147 78* C MISSING INPUT COORDINATES
00148 79* C
00149 80* 8040 JERR=2
00150 81* GOTO 9150
00151 82* C
00152 83* C MISSING 3 LETTERS --- QUADRANGLE & 100,000 M. SQUARE
00153 84* C
00154 85* 8060 JERR=3
00155 86* GOTO 9150
00156 87* C
00157 88* 9150 EAST =0.000
00158 89* NORTH=0.000
00159 90* GOTO 9999
00160 91* C
00161 92* C
00162 93* 9999 RETURN
00163 94* END

```

END OF COMPILATION: NO DIAGNOSTICS.

ENDG.P ***** COORSG *****

@FOR S CVCOORD.COORSG.TPFS.COORSG
FOR 50E3-05/17/78-08:32:52 (2.)

SUBROUTINE COORSG ENTRY POINT 000144

STORAGE USED: CODE(1) 000200: DATA(0) 000035: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003 ZONE2
0004 COORSG
0005 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000060	8000L	0001	000063	8040L	0001	000066	9000L			
0000	R	000016	ASTER	0000	R	000017	BLANK	0000	I	000001	DL
0000	R	000007	LETTE	0000	R	000004	LETTN	0000	R	000005	LETTN
0000	I	000023	ML	0000	I	000022	MP	0000	R	000010	PLUS
0000	I	000002	SZONE	0000	R	000020	S1	0000	R	000021	S2
0001	000072	9540L		0001	000072	9540L		0000	I	000000	DP
0000	000031	1111P3		0000	000031	1111P3		0000	R	000011	MINUS
0000	000012	SP		0000	000012	SP		0000	I	000003	UZONE

00101	1*		
00101	2*	C	SUBROUTINE COORSG (INST,XSTP,YSTP,H1,PHI,H2,LAM,JERR)
00101	3*	C	SUBROUTINE COORSG

000000
000000
000000

H.O. EBERHART - DECEMBER 1977
TEL (301) 671 3125

POTOMAC RESEARCH, INC.

THIS SUBROUTINE CONVERTS STATE TO GEOGRAPHIC COORDINATES

CALLING SEQUENCE:

```

*
CALL COORSG (INST,XSTP,YSTP,H1,PHI,H2,LAM,JERR)
INST -- I HOLLERITH INSTALLATION
XSTP -- I D.P. X COORDINATE STATE
YSTP -- I D.P. Y COORDINATE STATE
H1 -- O HOLLERITH HEMISPHERE (N.S)
PHI -- O D.P. LATITUDE
H2 -- O HOLLERITH HEMISPHERE (W.E)
LAM -- O D.P. LONGITUDE
JERR -- O INTEGER ERROR CODE
    
```

CONVENTIONS:

```

+ LATITUDE NORTHERN HEMISPHERE
- LATITUDE SOUTHERN
+ LONGITUDE WESTERN
- LONGITUDE EASTERN
+ UTM ZONE NORTHERN HEMISPHERE
- UTM ZONE SOUTHERN
CLARKE 1866 SPHEROID
    
```

```

INTEGER DP,DL,SZONE,UZONE
REAL LETTN,LETTN,LETTW,LETTE,PLUS,MINUS
DOUBLE PRECISION DP,SL,XSTP,YSTP,PHI,LAM
DATA ASTER,BLANK,PLUS,MINUS/1H*,1H,1H*,1H*,1H-/,
DATA LETTN,LETTN,LETTW,LETTE/1HN,1HS,1HW,1HE/
    
```

JERR=0

GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE

50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,S0000)

```

IF (H1.EQ.LETTN) S1=PLUS
IF (H1.EQ.LETTN) S1=MINUS
IF (H2.EQ.LETTW) S2=PLUS
IF (H2.EQ.LETTW) S2=MINUS
    
```

00101	4*	C
00101	5*	C
00101	6*	C
00101	7*	C
00101	8*	C
00101	9*	C
00101	10*	C
00101	11*	C
00101	12*	C
00101	13*	C
00101	14*	C
00101	15*	C
00101	16*	C
00101	17*	C
00101	18*	C
00101	19*	C
00101	20*	C
00101	21*	C
00101	22*	C
00101	23*	C
00101	24*	C
00101	25*	C
00101	26*	C
00101	27*	C
00101	28*	C
00101	29*	C
00101	30*	C
00101	31*	C
00101	32*	C
00101	33*	C
00101	34*	C
00101	35*	C
00101	36*	C
00101	37*	C
00101	38*	C
00101	39*	C
00101	40*	C
00101	41*	C
00101	42*	C
00103	43*	
00104	44*	
00105	45*	
00106	46*	
00113	47*	C
00113	48*	C
00113	49*	C
00113	50*	C
00120	51*	C
00120	52*	C
00120	53*	C
00120	54*	C
00121	55*	C
00121	56*	
00122	57*	
00124	58*	
00126	59*	
00130	60*	
00130	61*	C

0000 R 000004 LETTS
0000 D 000035 NP
0000 D 000021 SL
0000 R 000034 S2

0000 R 000005 LETTW
0000 R 000007 PLUS
0000 R 000012 SQ
0000 R 000010 MINUS
0000 R 000011 Q
0000 I 000002 SZONE
0000 I 000033 S1

0000 R 000005 LETTW
0000 R 000007 PLUS
0000 R 000012 SQ
0000 R 000010 MINUS
0000 R 000011 Q
0000 I 000002 SZONE
0000 I 000033 S1

0000 R 000005 LETTW
0000 R 000007 PLUS
0000 R 000012 SQ
0000 R 000010 MINUS
0000 R 000011 Q
0000 I 000002 SZONE
0000 I 000033 S1

0000 R 000004 LETTS
0000 D 000035 NP
0000 D 000021 SP
0000 D 000015 THET

SUBROUTINE COORSM (INST,XSTP,YSTP,UZONE,OSQ,XYMIL,JERR)

SUBROUTINE COORSM (INST,XSTP,YSTP,UZONE,OSQ,XYMIL,JERR)

H.O. EBERHART - DECEMBER 1977

TEL (301) 671 3125

POTOMAC RESEARCH, INC.

THIS SUBROUTINE CONVERTS STATE TO MILITARY COORDINATES

CALLING SEQUENCE:

* CALL COORSM (INST,XSTP,YSTP,UZONE,OSQ,XYMIL,JERR)
INST -- I HOLLERITH INSTALLATION
XSTP -- I D.P. X COORDINATE STATE
YSTP -- I D.P. Y COORDINATE STATE
UZONE -- O INTEGER + CR - UTM ZONE NUMBER
OSQ -- O HOLLERITH QUADRANGLE ROW &
100,000 M. SQUARE
XYMIL -- O D.P. COORDINATE STRING MIL.
JERR -- O INTEGER ERROR CODE

CONVENTIONS:

+ LATITUDE NORTHERN HEMISPHERE
- LATITUDE SOUTHERN
+ LONGITUDE WESTERN
- LONGITUDE EASTERN
+ UTM ZONE NORTHERN HEMISPHERE
- UTM ZONE SOUTHERN
CLARKE 1866 SPHEROID

INTEGER DP,OL,SZONE,UZONE
REAL LETTN,LETTS,LETTW,LETTE,PLUS,MINUS,Q,SO
DOUBLE PRECISION SA,THEY,SP,SL,EAST,NORTH,XYMIL,XSTP,YSTP
DATA ASTER,BLANK,PLUS,MINUS/1H+.1H+.1H-/

DATA LETTN,LETTS,LETTW,LETTE/1HN,1HS,1HW,1HE/

00101 1* C
00101 2* C
00101 3* C
00101 4* C
00101 5* C
00101 6* C
00101 7* C
00101 8* C
00101 9* C
00101 10* C
00101 11* C
00101 12* C
00101 13* C
00101 14* C
00101 15* C
00101 16* C
00101 17* C
00101 18* C
00101 19* C
00101 20* C
00101 21* C
00101 22* C
00101 23* C
00101 24* C
00101 25* C
00101 26* C
00101 27* C
00101 28* C
00101 29* C
00101 30* C
00101 31* C
00101 32* C
00101 33* C
00101 34* C
00101 35* C
00101 36* C
00101 37* C
00101 38* C
00101 39* C
00101 40* C
00101 41* C
00101 42* C
00101 43* C
00101 44* C
00101 45* C
00101 46* C
00101 47* C
00101 48* C
00101 49* C
00101 50* C

```

00120 51* JERR=0
00120 52* C
00120 53* C GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE
00120 54* C
00121 55* 50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,S=0000)
00121 56* C
00122 57* IF (H1.EQ.LETTR) S1=PLUS
00124 58* IF (H1.EQ.LETTS) S1=MINUS
00126 59* IF (H2.EQ.LETTR) S2=PLUS
00130 60* IF (H2.EQ.LETTE) S2=MINUS
00130 61* C
00132 62* IF (XSTP.EQ.0.000) GOTO 8040
00134 63* CALL CONVGS (2,S1,DP,MP,SP,S2,DL,ML,SL,SZONE,XSTP,YSTP,JERR)
00135 64* IF (JERR.GT.0) GOTO 9999
00137 65* CALL CONVGU (1,S1,DP,MP,SP,S2,DL,ML,SL,UZONE,EAST,NORTH,SK,THET,
00137 66* JERR)
00140 67* IF (JERR.GT.0) GOTO 9999
00142 68* CALL CONVBU (2,UZONE,EAST,NORTH,Q,SQ,XYMIL,JERR)
00143 69* GOTO 9500
00143 70* C-----
00143 71* C
00143 72* C INVALID INSTALLATION -- 2 ALPHABETIC
00143 73* C
00144 74* 8000 JERR=1
00145 75* GOTO 9500
00145 76* C
00145 77* C MISSING INPUT COORDINATES
00145 78* C
00145 79* 8040 JERR=2
00147 80* GOTO 9050
00147 81* C
00150 82* 9050 XYMIL=0.000
00151 83* GOTO 9999
00151 84* C
00152 85* 9500 QSO=6H
00153 86* FLD(0.6,QSO) =FLD(0.6,0)
00154 87* FLD(6.12,QSO)=FLD(0.12,SQ)
00155 88* GOTO 9999
00155 89* C
00156 90* 9999 RETURN
00156 91* END
00157 92*

```

END OF COMPILATION: NO DIAGNOSTICS.

@HDG.P ***** COORSU *****

@FOR.S CVCOORD.COORSU.TPFS.COORSU
FOR S0E3-05/17/78-08:33:25 (2.)

SUBROUTINE COORSU ENTRY POINT 000125

STORAGE USED: CODE(1) 000156; DATA(0) 000041; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003 ZONE2
0004 CONVGS
0005 CONVGU
0006 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001 000104 8000L 0001 000107 8040L 0001 000112 9150L 0001 000116 9999L
0000 R 000022 BLANK 0000 I 000001 DL 0000 I 000000 DP 0000 R 000023 H1
0000 000035 INJPS 0000 R 000006 LETTE 0000 R 000003 LETTN 0000 R 000004 LETTS
0000 R 000010 MINUS 0000 I 000030 ML 0000 I 000027 MP 0000 R 000007 PLUS
0000 D 000017 SL 0000 D 000015 SP 0000 I 000002 SZONE 0000 R 000025 S1
0000 D 000013 THET

SUBROUTINE COORSU (INST,XSTP,YSTP,UZONE,EAST,NORTH,JERR)

SUBROUTINE COORSU
H.O. EBERHART - DECEMBER 1977
TEL (301) 671 3125
POTOMAC RESEARCH, INC.

THIS SUBROUTINE CONVERTS STATE TO UTM COORDINATES

CALLING SEQUENCE:

* CALL COORSU (INST,XSTP,YSTP,UZONE,EAST,NORTH,JERR)
INST -- I HOLLERITH INSTALLATION
XSTP -- I D.P. X COORDINATE STATE
YSTP -- I D.P. Y COORDINATE STATE
UZONE -- O INTEGER + OR - UTM ZONE NUMBER
EAST -- O D.P. EASTING
NORTH -- O D.P. NORTHING
JERR -- O INTEGER ERROR CODE

CONVENTIONS:

+ LATITUDE NORTHERN HEMISPHERE
- LATITUDE SOUTHERN
+ LONGITUDE WESTERN
- LONGITUDE EASTERN
+ UTM ZONE NORTHERN HEMISPHERE
- UTM ZONE SOUTHERN

00101	1*	C	000000
00101	2*	C	000000
00101	3*	C	000000
00101	4*	C	000000
00101	5*	C	000000
00101	6*	C	000000
00101	7*	C	000000
00101	8*	C	000000
00101	9*	C	000000
00101	10*	C	000000
00101	11*	C	000000
00101	12*	C	000000
00101	13*	C	000000
00101	14*	C	000000
00101	15*	C	000000
00101	16*	C	000000
00101	17*	C	000000
00101	18*	C	000000
00101	19*	C	000000
00101	20*	C	000000
00101	21*	C	000000
00101	22*	C	000000
00101	23*	C	000000
00101	24*	C	000000
00101	25*	C	000000
00101	26*	C	000000
00101	27*	C	000000
00101	28*	C	000000
00101	29*	C	000000
00101	30*	C	000000
00101	31*	C	000000
00101	32*	C	000000
00101	33*	C	000000
00101	34*	C	000000
00101	35*	C	000000
00101	36*	C	000000
00101	37*	C	000000
00101	38*	C	000000

DATE	051778
34*	+ LONGITUDE WESTERN
35*	- LONGITUDE EASTERN
36*	+ UTM ZONE NORTHERN HEMISPHERE
37*	- UTM ZONE SOUTHERN
38*	CLARKE 1866 SPHEROID
39*	
40*	
41*	
42*	
43*	INTEGER DP,DL,SZONE,UZONE
44*	REAL LETTN,LETTN,LETTN,LETTN,LETTN,PLUS,MINUS
45*	DOUBLE PRECISION SK,THET,SP,SL,EAST,NORTH,PHI,LAM
46*	DATA ASTER,BLANK,PLUS,MINUS/1H*,1H*,1H*,1H*/
47*	DATA LETTN,LETTN,LETTN,LETTN,LETTN,1HN,1HS,1HW,1HE/
48*	
49*	
50*	
51*	JERR=0
52*	GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE
53*	
54*	
55*	50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,\$8000)
56*	
57*	IF (H1.EQ.LETTN) S1=PLUS
58*	IF (H1.EQ.LETTN) S1=MINUS
59*	IF (H2.EQ.LETTN) S2=PLUS
60*	IF (H2.EQ.LETTN) S2=MINUS
61*	
62*	IF (EAST.EQ.0.0D0) GOTO 8040
63*	CALL CONVGU (2,S1,DP,MP,SP,S2,DL,ML,SL,UZONE,EAST,NORTH,SK,THET,
64*	* JERR)
65*	GOTO 9540
66*	C-----
67*	C INVALID INSTALLATION - -- 2 ALPHABETIC
68*	
69*	8000 JERR=1
70*	GOTO 9000
71*	
72*	C MISSING INPUT COORDINATES
73*	
74*	8040 JERR=2
75*	GOTO 9000
76*	
77*	9000 PHI=0.0D0
78*	LAM=0.0D0
79*	GOTO 9999
80*	
81*	9540 PHI=DFLOAT(DP*10000)+DFLOAT(MP*100)+SP
82*	LAM=DFLOAT(DL*10000)+DFLOAT(ML*100)+SL
83*	GOTO 9999
84*	
85*	C
86*	9999 RETURN
87*	END
88*	

END OF COMPILATION: NO DIAGNOSTICS.

***** COORD *****

@HDG.P ***** COORD *****

@FOR S CVCOORD,COORD,TPFS,COORD
FOR S0E3-05/17778-08:33:57 (1.)

SUBROUTINE COORD ENTRY POINT 000107

STORAGE USED: CODE(1) 000140: DATA(0) 000027: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003 ZONE2
0004 CONVMU
0005 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001 000053 8000L 0001 000056 R040L 0001 000061 9050L 0001 000100 9999L
0000 R 000011 ASTER 0000 R 000012 BLANK 0000 R 000013 H1 0000 000023 INJPS
0000 R 000004 LETT 0000 R 000001 LETN 0000 R 000002 LETTS 0000 R 000014 H2
0000 R 000005 PLUS 0000 R 000007 Q 0000 R 000010 SQ 0000 R 000003 LETTW
0000 R 000016 S2 0000 I 000000 SZONE 0000 R 000015 S1

00101 1* C
00101 2* C
00101 3* C
00101 4* C
00101 5* C
00101 6* C
00101 7* C
00101 8* C
00101 9* C
00101 10* C
00101 11* C
00101 12* C
00101 13* C
00101 14* C
00101 15* C
00101 16* C
00101 17* C
00101 18* C
00101 19* C
00101 20* C
00101 21* C
00101 22* C
00101 23* C
00101 24* C
00101 25* C
00101 26* C
00101 27* C

SUBROUTINE COORD (INST,EAST,NORTH,UZONE,QSQ,XYMIL,JERR)

SUBROUTINE COORD
H.O. EBERHART - DECEMBER 1977
TEL (301) 671 3125
POTOMAC RESEARCH, INC.

THIS SUBROUTINE CONVERTS UTM TO MILITARY COORDINATES

CALLING SEQUENCE:
*
CALL COORD (INST,EAST,NORTH,UZONE,QSQ,XYMIL,JERR)
INST -- I HOLLERITH INSTALLATION
EAST -- I D.P. EASTING
NORTH -- I D.P. NORTHING
UZONE -- O INTEGER + OR - UTM ZONE NUMBER
QSQ -- O HOLLERITH QUADRANGLE ROW & 100,000 M. SQUARE
XYMIL -- O D.P. COORDINATE STRING MIL.
JERR -- O INTEGER ERROR CODE

.....

Line	Column 1-5	Column 6-10	Column 11-15	Column 16-20	Column 21-25	Column 26-30	Column 31-35	Column 36-40	Column 41-45	Column 46-50	Column 51-55	Column 56-60	Column 61-65	Column 66-70	Column 71-75	Column 76-80	Column 81-85	Column 86-90	Column 91-95	Column 96-100
28*	00101																			000000
29*	00101																			000000
30*	00101																			000000
31*	00101																			000000
32*	00101																			000000
33*	00101																			000000
34*	00101																			000000
35*	00101																			000000
36*	00101																			000000
37*	00101																			000000
38*	00101																			000000
39*	00101																			000000
40*	00101																			000000
41*	00101																			000000
42*	00101																			000000
43*	00103																			000000
44*	00104																			000000
45*	00105																			000000
46*	00106																			000000
47*	00113																			000000
48*	00113																			000000
49*	00113																			000000
50*	00113																			000000
51*	00120																			000000
52*	00120																			000000
53*	00120																			000000
54*	00120																			000000
55*	00121																			000000
56*	00121																			000000
57*	00122																			000000
58*	00124																			000000
59*	00126																			000000
60*	00130																			000000
61*	00130																			000000
62*	00132																			000000
63*	00132																			000000
64*	00134																			

DATE 051778

000076
000100
000137

***** COORDINATE *****

00147 86* C
00150 87* 3599 RETURN
00151 88* END

END OF COMPILATION: NO DIAGNOSTICS.

00H0G.P ***** COORUS *****

00FOR.S CVCOORD.COORUS.TPFS.COORUS
FOR 50E3-05/1778-08:34:09 (2.)

SUBROUTINE COORUS ENTRY POINT 000125

STORAGE USED: CODE(1) 000156; DATA(0) 000041; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK NAME)

0003 ZONE2
0004 CONV/GU
0005 CONV/GS
0006 NERR3\$

STORAGE ASSIGNMENT (BLOCK TYPE, RELATIVE LOCATION, NAME)

0001	000104	8000L	0001	000107	8040L	0001	000112	9100L	0001	000116	9993L	0000	R	000021	ASTER
0000	R	000022	BLANK	0000	I	000001	DL	0000	I	000000	DP	0000	R	000024	H2
0000	000035	INUP\$	0000	R	000006	LETTE	0000	R	000003	LETTN	0000	R	000005	LETTM	
0000	R	000010	MINUS	0000	I	000030	ML	0000	I	000027	MP	0000	R	000007	PLUS
0000	D	000017	SL	0000	D	000015	SP	0000	R	000025	S1	0000	D	000011	SK
0000	I	000002	UZONE									0000	D	000013	THET

SUBROUTINE COORUS (INST,EAST,NORTH,SZONE,XSTP,YSTP,JERR)

SUBROUTINE COORUS
H.O. ESERHART - DECEMBER 1977
TEL (301) 671 3125

POTOMAC RESEARCH, INC.

THIS SUBROUTINE CONVERTS
UTM TO STATE COORDINATES

CALLING SEQUENCE:

* CALL COORUS (INST,EAST,NORTH,SZONE,XSTP,YSTP,JERR)

00101	1*	C	000000
00101	2*	C	000000
00101	3*	C	000000
00101	4*	C	000000
00101	5*	C	000000
00101	6*	C	000000
00101	7*	C	000000
00101	8*	C	000000
00101	9*	C	000000
00101	10*	C	000000
00101	11*	C	000000
00101	12*	C	000000
00101	13*	C	000000
00101	14*	C	000000
00101	15*	C	000000
00101	16*	C	000000
00101	17*	C	000000

	DATE	051778
C	INST	-- I HOLLERITH INSTALLATION
C	EAST	-- I D.P. EASTING
C	NORTH	-- I D.P. NORTHING
C	SZONE	-- O INTEGER STATE ZONE NUMBER
C	XSTP	-- O D.P. X COORDINATE STATE
C	YSTP	-- O D.P. Y COORDINATE STATE
C	JERR	-- O INTEGER ERROR CODE
C	*	
C	CONVENTIONS:	
C	+ LATITUDE	NORTHERN HEMISPHERE
C	- LATITUDE	SOUTHERN
C	+ LONGITUDE	WESTERN
C	- LONGITUDE	EASTERN
C	+ UTM ZONE	NORTHERN HEMISPHERE
C	- UTM ZONE	SOUTHERN
C	CLARKE 1866 SPHEROID	
C	INTEGER DP.DL,SZONE,UZONE	
C	REAL LETTN,LETTX,LETTY,LETTE,PLUS,MINUS	
C	DOUBLE PRECISION SK,THET,SP,SL,EAST,NORTH,XSTP,YSTP	
C	DATA ASTER,BLANK,PLUS,MINUS/1H*.1H .1H+.1H-/	
C	DATA LETTN,LETTX,LETTY,LETTE/1HN,1HS,1HW,1HE/	
C	JERR=0	
C	GET HEMISPHERE INDICATORS, UTM ZONE, STATE ZONE	
C	50 CALL ZONE2 (INST,H1,H2,UZONE,SZONE,\$8000)	
C	IF (H1.EQ.LETTN) S1=PLUS	
C	IF (H1.EQ.LETTX) S1=MINUS	
C	IF (H2.EQ.LETTY) S2=PLUS	
C	IF (H2.EQ.LETTE) S2=MINUS	
C	IF (EAST.EQ.O.OO0) GOTO 8040	
C	CALL CONVUGU (2,S1,DP,MP,SP,S2,DL,ML,SL,UZONE,EAST,NORTH,SK,THET, JERR)	
C	* IF (JERR.GT.O) GOTO 9999	
C	CALL CONVGVS (1,S1,DP,MP,SP,S2,DL,ML,SL,SZONE,XSTP,YSTP,JERR) GOTO 9999	
C	C-----	
C	INVALID INSTALLATION -- 2 ALPHABETIC	
C	8000 JERR=1	
C	GOTO 9100	
C	MISSING INPUT COORDINATES	

DATE 051778

000107
000110
000112
000113
000114
000115
000116
000155

00143 76* 8040 JERR=2
00144 77* GOTO 9100
00145 78* C
00146 79* 9100 XSTP=0.000
00147 80* YSTP=0.000
00148 81* GOTO 9999
00149 82* C
00150 83* C
00151 84* 9999 RETURN
00152 85* END

END OF COMPILATION: NO DIAGNOSTICS.

@HDL.P ***** FILE *****

@FOR.S CVCOORD.FILE.TPFS.FILE
FOR 50E3-05/17/78-08:34:25 (0.)

SUBROUTINE FILE ENTRY POINT 000:40

STORAGE USED: CODE(1) 000147: DATA(0) 001120: BLANK:COMMON(2) 000000

COMMON BLOCKS:

0003 CONST 010150

EXTERNAL REFERENCES (BLOCK. NAME)

0004 NE TS

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION. NAME)

0001 000003 114G	0001 000017 120G	0001 000037 127G	0001 000053 133G	0001 000073 142G
0001 000107 146G	0003 D 000000 A	0000 D 000000 A1	0000 D 000276 A2	0000 D 000574 A3
0000 I 001072 I	0000 001120 INJDS	0000 I 001073 IZ	0000 I 001074 J	0000 I 001075 K

00101 1*	SUBROUTINE FILE	LA 001	000003
00103 2*	DOUBLE PRECISION A1(5.19).A2(5.19).A3(5.19).A(150.14)	LA 002	000003
00104 3*	COMMON /CONST. A	LA 003	000003
00105 4*	DATA A1	LA 004	000003
00105 5*	1 0.310101.500000.000.309000.000.0.999960000000.3375359.66200.	LA 005	000003
00105 6*	2 0.312601.500000.000.315000.000.0.999933333300.3319333.20000.	LA 006	000003
00105 7*	3 0.315101.500000.000.320000.000.0.999900000000.3430746.39400.	LA 007	000003
00105 8*	4 0.317601.500000.000.325000.000.0.999866666600.3430746.39400.	LA 008	000003
00105 9*	5 0.320101.500000.000.330000.000.0.999833333300.3430746.39400.	LA 009	000003
00105 10*	6 0.322601.500000.000.335000.000.0.999800000000.3430746.39400.	LA 010	000003
00105 11*	7 0.325101.500000.000.340000.000.0.999766666600.3430746.39400.	LA 011	000003
00105 12*	0.327601.500000.000.345000.000.0.999733333300.3430746.39400.	LA 012	000003

00132 71* DO 2 J=2.5
 00133 72* K=J-1
 00136 73* 2 A(12,K)=A2(J,I)
 00141 74* DO 3 I=1.19
 00144 75* IZ=(A3(1,I)-3076.0D0)/25.0D0
 00145 76* DO 3 J=2.5
 00150 77* K=J-1
 00151 78* 3 A(12,K)=A3(J,I)
 00154 79* RETURN
 00155 80* END

END OF COMPILATION: NO DIAGNOSTICS.

0H0G.P ***** FILLA *****

0FOR.S CVCOORD.FILLA.TPFS.FILLA
 FOR 50E3-05/17/78-08:34:46 (0.)

SUBROUTINE FILLA ENTRY POINT 000715

STORAGE USED: CODE(1) 000723: DATA(0) 003771: BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 CONST 010150

EXTERNAL REFERENCES (BLOCK. NAME)

0004 NERR3\$

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION. NAME)

0001	000233	10L	0001	000310	12L	0001	000315	13L	0001	000034	134G	0001	000372	15L
0001	000115	154C	0001	000377	16L	0001	000200	174G	0001	000454	18L	0001	000451	19L
0001	000005	2L	0001	000576	21L	0001	000262	214G	0001	000543	22L	0001	000344	234G
0001	000620	24L	0001	000625	25L	0001	000425	254G	0001	000702	27L	0001	000310	274G
0001	000062	3L	0001	000572	314G	0001	000454	334G	0001	000667	4L	0001	000144	6L
0001	000151	7L	0001	000226	9L	0003	D 000000	A	0000	D 000022	A1	0000	D 000340	A2
0000	D 000700	A3	0000	D 001240	A4	0000	D 001600	A5	0000	D 002140	A6	0000	D 002500	A7
0000	D 003040	A8	0000	D 003400	A9	0000	I 003744	I	0000	C03755	INUP\$	0000	I 003743	I2
0000	I 003740	K	0000	I 003745	KK	0000	I 003741	L	0000	I 003742	N			

00101	1*	SUBROUTINE FILLA	LLA	001	000000
00103	2*	DOUBLE PRECISION A(150.14),A1(112),A2(112),A3(112),A4(112),A5(112),A6(112),A7(112),A8(112),A9(112)	LLA	002	000000
00103	3*	*.A6(112),A7(112),A8(112),A9(112)	LLA	003	000000
00104	4*	COMMON/COST/A	LLA	004	000000
00105	5*	DATA A1 /3226.000,2.006,3.3125,29277593.61D0,29732882.87D0,99993LLA	LLA	005	000000
00105	6*	*5937D0,5818991407D0,2126.000,46.35636D0,3.81452D0,3.26432D0,45528LLA	LLA	006	000000

00105	7*	*9.2600.1.00006406700.1.71851097300.3251.000.2.006.3.31205.310140391LLA	007	000000
00105	8*	*2300.31511224.3000.9991846900.5969087100.2033.000.	008	000000
00105	9*	*56.9471100.3.81550.0.3.622600.497081.9700.1.0000815300.1.78670111LLA	009	000000
00105	10*	*6000.3275.000.2.000.4.39205.2424538.1000.24792436.2300.999994635LLA	010	000000
00105	11*	*800.633834319200.2441.000.26.7564700.3.8299200.3.9357100.547078.11LLA	011	000000
00105	12*	*800.1.00010537500.1.52932249700.3301.000.2.006.4.39205.2379850.311LLA	012	000000
00105	13*	*00.26312257.6500.99914379300.63047973300.2335.000.30.8106400. LLA	013	000000
00105	14*	*3.8114700.3.7311450.516407.3400.1.00098532800.1.5801.2338200. LLA	014	000000
00105	15*	*3325.000.2.006.4.31805.47057475.8500.2751202.0400.999929179200. LLA	015	000000
00105	16*	*512231042700.2256.000.35.5201800.3.812650.3.5299800.455516.1900. LLA	016	000000
00105	17*	*1.00001092600.1.633376200.3351.000.2.006.4.28405.2812400.3300. LLA	017	000000
00105	18*	*28652231.9920.99914078200.59050714300.2189.000.10.854500. LLA	018	000000
00105	19*	*3.8135200.3.3302000.470526.6300.1.00065924100.1.67620105400. LLA	019	000000
00105	20*	*3376.000.2.006.4.21805.3109145.5400.30654324.2700.999922127700. LLA	020	000000
00105	21*	*570011921900.2076.000.57.1030500.3.6152300.3.1659300.455278.7320. LLA	021	000000
00105	22*	*1.00007787800.1.75134927200.3401.000.2.006.4.18505.31816570.9200. LLA	022	000000
00105	23*	*32271267.7200.99994514300.54351754200.1992.000.1.633500.3.8164LLA	023	000000
00105	24*	*250.3.0029200.424336.8000.1.00004595.00.1.81977793500. LLA	024	000000
00107	25*	DATA A2 /3426.000.4.1865325600.4.2600.30651332.1000.35055328.3100. LLA	025	000000
00107	26*	*99999955000.56123207100.2040.000.22.809000.3.8157200.3.09520LLA	026	000000
00107	27*	*0.4164014.2100.1.00001143500.1.7817537500.3451.000.2.006.3.79800. LLA	027	000000
00107	28*	*24751847.6000.25089068.2000.999959817500.646133482900.2406.000. LLA	028	000000
00107	29*	*24.6233000.3.814400.3.8561000.334170.5200.1.00004315400.1.5476678LLA	029	000000
00107	30*	*2200.3175.000.2.006.3.79405.25781376.9100.26243952.7400.999935911LLA	030	000000
00107	31*	*700.610689577300.2337.000.29.6516200.3.8114600.3.7032400.461675.8LLA	031	000000
00107	32*	*350.1.00006105200.1.5235560700.3501.000.2.006.3.79800.2637133.8LLA	032	000000
00107	33*	*900.2740231.8200.999943399500.613378053300.2261.000.34.2666200. LLA	033	000000
00107	34*	*3.8125700.3.5430400.4253.7.9300.1.00005460300.1.63031591300. LLA	034	000000
00107	35*	*3526.000.6.6005.24059233.5600.23314369.0200.99993140500. LLA	035	000000
00107	36*	*663059114700.2483.000.19.6799000.3.8092900.4.0327800.265155.4600. LLA	036	000000
00107	37*	*00001636000.1.50816047200.3576.000.7.006.3.04205.36029443.6500.35LLA	037	000000
00107	38*	*454096.6700.99994334300.502525900000.1302.000.26.1170100.3.8189LLA	038	000000
00107	39*	*800.2.6564300.424341.4800.1.00005156.00.1.98994718500. LLA	039	000000
00107	40*	*3876.000.2.006.3.31005.23736230.3400.23162461.5900.999945369600. LLA	040	000000
00107	41*	*677744551800.2.55103.20.1220500.3.60.2700.4.1947900.424511.2500.1LLA	041	000000
00107	42*	*00005403400.1.47543016700.3901.000.2.006.3.36605.23035155.1100.243LLA	042	000000
00107	43*	*74096.6700.999943370500.658701021300.2473.000.22.5939500.3.80959LLA	043	000000
00107	44*	*00.3.9883000.437511.5600.1.0000516320.1.5181344100. LLA	044	000000
00111	45*	DATA A3 /3226.000.2.006.3.52805.25644059.1200.25979968.5700.9999LLA	045	000000
00111	46*	*56955600.64271465600.2346.000.27.9121500.3.8113300.3.7237500. LLA	046	000000
00111	47*	*334109.4500.1.00001314500.1.58045076300.2291.000.2.006.3.54505. LLA	047	000000
00111	48*	*2403024.4800.2725452.15000.9999000.0000.5142810500.2245.000.31LLA	048	000000
00111	49*	*4.4102000.3.8125000.3.5510200.455497.6200.1.00005409400.1.52720437LLA	049	000000
00111	50*	*000.3576.000.2.006.3.03305.26371820.800.26724051.8200.99994620317LLA	050	000000
00111	51*	*00.622067267100.2289.000.30.6336400.3.8120200.3.6211300.352231.14LLA	051	000000
00111	52*	*00.1.00003732000.1.6075431200.4001.000.2.006.3.08705.27457600.750LLA	052	000000
00111	53*	*0.27832235.6400.999945310800.606467371850.2231.000.38.5757400.3LLA	053	000000
00111	54*	*8130100.3.4777100.304374.8900.1.000046220.1.648906091700.4026.000LLA	054	000000
00111	55*	*2.006.3.3305.33621569.3000.34079623.2300. LLA	055	000000
00111	56*	*999914741700.528705673400.1907.000.12.6851500.3.8175800LLA	056	000000
00111	57*	*2.8451100.455060.9700.1.00005026500.1.8914243500.4091.000.2.006LLA	057	000000
00111	58*	*3.23805.36271369.3300.36756553.4500.99992574500.560912637100.17LLA	058	000000
00111	59*	*92.000.28.550600.3.8191100.2.628300.445154.1000.1.00007426300.1LLA	059	000000
00111	60*	*99994921300.4126.000.8.005.2.77205.2428474.9900.26369112.7000.99LLA	060	000000
00111	61*	*9949844500.627634119600.2323.000.53.6935500.3.8116600.3.6739200.3LLA	061	000000
00111	62*	*79637.7700.1.00005015400.1.59328495500.4151.000.6.015.2.57435.2311LLA	062	000000
00111	63*	*1975.1400.23549477.3200.99994550600.671728056100.2523.000.19.53LLA	063	000000
00111	64*	*13800.3.8087000.4.127800.437502.1800.1.00003545100.1.48866635200/LLA	064	000000

00113	65*	DATA A1 /4176.000,2.005,2.53825,2378.1678,4400,23924399,0200,999999,LLA	065	000000
00113	66*	*949400,1.661000000,2.171,000,19,4740000,3.804300,4.0117400,1297LLA	066	000000
00113	67*	*19,5800,1.0000151,00,1.512640000,4276,000,2.008,3.351005,189243,LLA	067	000000
00113	68*	*19,6200,19471399,7500,999920216600,1.741219663750,2361,000,124,6301LLA	068	000000
00113	69*	*100,3.4036200,5.0100000,487079,1300,1.0000919300,1.3491272700,43LLA	069	000000
00113	70*	*01,000,2.006,3.39375,20006679,7250,29493457,1500,99992202300,72LLA	070	000000
00113	71*	*3389070200,2771,000,120,8074700,3.804700,4.7619700,485777,400,1.00LLA	071	000000
00113	72*	*0007794100,1.38238387000,4326,000,2.006,3.38405,21327006,6500,2187LLA	072	000000
00113	73*	*4349,1400,999922014800,1.700927782400,2651,000,20,1251700,3.806620LLA	073	000000
00113	74*	*0,4,46,5000,547343,0000,1.00007796100,1.42602050100,4476,000,2.006LLA	074	000000
00113	75*	*3,94205,18919493,4000,19157874,2000,999,7140500,1.4845126800,2LLA	075	000000
00113	76*	*848,000,20,1268500,3.8032000,5,0049070,426375,8500,1.0000281500,1LLA	076	000000
00113	77*	*339,7121400,1.501,000,2.006,3.94205,19422339,7600,19919806,3600,9LLA	077	000000
00113	78*	*99322015100,1.73333827800,2821,000,21,9577000,3.8042200,4,9013500,LLA	078	000000
00113	79*	*486366,0000,1.00007799100,1.3635925100,4526,000,2.006,3.94205,LLA	079	000000
00113	80*	*20506540,5100,21093820,9300,999921070100,714901244200,2729,000,2LLA	080	000000
00113	81*	*1,158200,3.805600,4,6481400,596170,4100,1.00008923800,1.393794000LLA	081	000000
00113	82*	*0,4551,000,2.006,3.605,23004346,2900,23366977,4500,999964550100,LLA	082	000000
00113	83*	*673450790600,2531,000,19,3050400,3.8185800,4,1455300,364631,1700,1LLA	083	000000
00113	84*	*.00003345100,1.3439948400/	084	000000
00115	85*	DATA A5 /4576.000,2.006,3.58205,24101561,0000,24590781,2600,999922LLA	085	000000
00115	86*	*2072500,1.6500764000,2431,000,124,6813000,3.8097700,3.6586500,4812LLA	086	000000
00115	87*	*20,8000,1.0000793400,1.52421272800,4976,000,2.006,2.66405,2423500LLA	087	000000
00115	88*	*0,8000,2416255,3000,999924930000,1.654082095000,2442,000,20,64240LLA	088	000000
00115	89*	*00,3.8099000,3.937300,277544,5000,1.00000510000,1.52886007400,490LLA	089	000000
00115	90*	*1,000,2.006,2.84205,23637659,4700,3018351,2500,999872551000,577LLA	090	000000
00115	91*	*17077000,2106,000,51,6935300,3.8148300,3,2249300,548551,7800,1.00LLA	091	000000
00115	92*	*01274500,1.73258917300,4926,000,2.016,3.61805,18819839,0500,19215LLA	092	000000
00115	93*	*516,0100,999925847600,1.744133326100,2876,000,22,5795000,3.8033900LLA	093	000000
00115	94*	*5,0597200,395656,9000,1.00003416200,1.34394507500,4931,000,2.006LLA	094	000000
00115	95*	*3,61805,19561027,7400,20996977,1800,9999235852300,729382604000,28LLA	095	000000
00115	96*	*01,000,20,454500,3.8045000,4,8450400,428349,3900,1.00906415200,1LLA	096	000000
00115	97*	*3710255300,4376,010,2.006,2.9705,24048739,5100,24559158,4700,999LLA	097	000000
00115	98*	*939141100,456950312350,2455,000,23,181200,3.8097100,3.9572300,51LLA	098	000000
00115	99*	*0419,9400,1.00006079300,1.52218511900,5001,000,2.006,2.9705,255223LLA	099	000000
00115	100*	*75,8150,2602701,1400,999923533600,1.634519543300,2351,000,28,6370LLA	100	000000
00115	101*	*500,3.8112100,3.7404800,1504193,3100,1.000006407000,1.5759955500,LLA	101	000000
00115	102*	*5026,000,2.006,3.52905,24657871,6600,29083831,7000,999945410100,LLA	102	000000
00115	103*	*590147074400,2161,000,42,5668700,3.8140200,3.3344000,424960,0400,1LLA	103	000000
00115	104*	*.00005159300,1.6944923500/	104	000000
00117	105*	DATA A6 /5051.000,2.005,3.52805,30382831,0600,30838032,9600,LLA	105	000000
00117	106*	*93939343200,1.567316882750,2066,000,52,4593500,3.8153700,LLA	106	000000
00117	107*	*3,1464500,455001,9000,1.00006406100,1.76175230700,5073,000,2.006,LLA	107	000000
00117	108*	*4,33805,20810350,9400,21383852,4800,9999234581000,703186022200,LLA	108	000000
00117	109*	*2701,03,22,0865800,3.8069200,4,573220,5476001,5400,1.00010343000,LLA	109	000000
00117	110*	*1,4100672720,5101,000,2.006,4.33805,22341309,4300,22846657,1500,LLA	110	000000
00117	111*	*99989100500,1.68414738300,2581,000,22,7410400,3.8078200,LLA	111	000000
00117	112*	*4,2682300,517357,7200,1.00010540500,1.46167335300,5126,000,2.006,LLA	112	000000
00117	113*	*2,79903,23754551,2750,24211050,3700,999956841000,661539736300,LLA	113	000000
00117	114*	*2476,000,21,5755300,3.8094000,4,0175300,455093,11000,1.00004316100,LLA	114	000000
00117	115*	*1,51162499400,5151,000,2.006,2.79905,24577800,6700,24994826,4300,LLA	115	000000
00117	116*	*999952501200,1.648193166400,2418,000,23,8797900,3.8102300,LLA	116	000000
00117	117*	*3,8831900,407025,7000,1.000040500,1.54132327000,5201,000,2.006,LLA	117	000000
00117	118*	*2,91605,30630125,5300,31127724,7500,999935420700,564397380000,LLA	118	000000
00117	119*	*2053,000,53,4409900,3.8155500,3,1212700,437599,2200,1.00005458200,LLA	119	000000
00117	120*	*1,77148740700,5226,000,2.006,2.91605,32252126,3000,3267687,6500,LLA	120	000000
00117	121*	*999932628400,1.5446515700,1972,000,3,5783300,3.8166900,2,9438100,LLA	121	000000
00117	122*	*424761,3500,1.00000673600,1.83603620200,5251,000,2.006,3.605,20922LLA	122	000000

DATE 05/17/8

00117	123*	*704.0900.21366697.0200..9999331111600..707738181100.2594.000.18.933LLA	123	000000
00117	124*	*5200.3.6001200.1.535200.443002.9400.1.0000000000.1.41295188300/LLA	124	000000
00121	125*	DATA A7 /5276.000.2.006.3.61205.21931575.5100.22161937.0500..999900LLA	125	000000
00121	126*	*9933100..693851957.00.2068.000.21.5437000.3.8074700.4.3351900..LLA	126	000000
00121	127*	*468351.4400.1.000031100.1.4456863700.5301.000.2.006.3.09605..LLA	127	000000
00121	128*	*29010231.0000.29531.49.9100..3999483000..56543972900.2141.00..LLA	128	000000
00121	129*	*44.2831300.3.8113100.3.242200.52491.0000.1.00000160000..LLA	129	000000
00121	130*	*1.70811776100.5326.000.2.006.3.65405.29435907.2900.29472959.9400..LLA	130	000000
00121	131*	*99931747700.1.57935585400.2116.000.3645.54300.3.8159600..LLA	131	000000
00121	132*	*3.245700.514352.000.1.00000013100.1.7255187400.5351.000.2.006..LLA	132	000000
00121	133*	*3.5155.32147609.59.0.32511654.5400.1.49373622400..545394414600..LLA	133	000000
00121	134*	*1.83351946200.5376.000.2.006.3.61205.34351703.4600.3537121.2300..LLA	134	000000
00121	135*	*99931744300.1.51535585500.1952.000.21.6218100.3.8183700.2.745500LLA	135	000000
00121	136*	*0.48317.7700.1.0001162700.1.041525.7700.5401.000.2.006.3.56405..LLA	136	000000
00121	137*	*37261500.2000.37307440.3.800.1.00003321.500.1.48901264000.1752.000..LLA	137	000000
00121	138*	*37.150400.3.81962.0.2.593900.545031.000.1.00013677500.2.0411802LLA	138	000000
00121	139*	*3600.5420.000.2.006.3.54305.41021743.5400.41570762.3400..999394795LLA	139	000000
00121	140*	*000..49400651900.1612.000.59.3034200.3.8121300.2.3300100..LLA	140	000000
00121	141*	*5.3500.27432812.68..094651213900..12637342400.2258.000.34.16878LLA	141	000000
00121	142*	*00.3.8126200.3.5341400.406857.5300.1.0000000000.1.63215394200..LLA	142	000000
00121	143*	*5551.000.2.006.2.87055.26230200.0900.20575444.4500.999394335900..LLA	143	000000
00121	144*	*624117859700.2308.000.30.7859200.3.118100.3.6404700.365244.3600..LLA	144	000000
00121	145*	*1.00005161700.1.60226147100.5576.000.2.006.2.82605.2743800.0700..LLA	145	000000
00121	146*	*27811312.7100..999945402700..6069248.4000.2233.000.36.4107200..LLA	146	000000
00121	147*	*37.6700.1.00010161..2331.000.29.307000.3.8109100.3.8002400.5483LLA	147	000000
00121	148*	*5.3500.27432812.68..094651213900..12637342400.2258.000.34.16878LLA	148	000000
00121	149*	*00.3.8126200.3.5341400.406857.5300.1.0000000000.1.63215394200..LLA	149	000000
00121	150*	*5551.000.2.006.2.87055.26230200.0900.20575444.4500.999394335900..LLA	150	000000
00121	151*	*624117859700.2308.000.30.7859200.3.118100.3.6404700.365244.3600..LLA	151	000000
00121	152*	*1.00005161700.1.60226147100.5576.000.2.006.2.82605.2743800.0700..LLA	152	000000
00121	153*	*27811312.7100..999945402700..6069248.4000.2233.000.36.4107200..LLA	153	000000
00121	154*	*3.8129400.3.4818700.376512.6500.1.0000000000.1.64763061500..LLA	154	000000
00121	155*	*5601.000.2.006.4.3565.1875800.1.6700.1226353.4300..999342255100..LLA	155	000000
00121	156*	*74452033900.0.2878.000.22.1571100.3.8033400.5.0535600.407781.7600..LLA	156	000000
00121	157*	*1.0000577430.1.34314605400.5626.000.2.006.4.33805.1982653.5200..LLA	157	000000
00121	158*	*20289.19.6000..999914587500..726335714700.2786.000.21.7212100.3.80LLA	158	000000
00121	159*	*47400.4.8033400.454466.0800.1.0000000000.1.37859955200.5651.000..LLA	159	000000
00121	160*	*2.006.2.86205.25305029.1200.25715125.5500..9993940746000..637772369LLA	160	000000
00121	161*	*600.2368.000.57.5247800.3.8105900.3.7724500.410397.4300.1.00005925LLA	161	000000
00121	162*	*800.1.5679507200.5675.000.2.006.2.91605.36639323.4500.27070620.78LLA	162	000000
00121	163*	*00..999925592500..18189393500.2292.000.33.5220700.3.812700.35.84LLA	163	000000
00121	164*	*9100.431297.3300.1.00007431300.1.61781153600/LLA	164	000000
00121	165*	DATA A9 /5701.000.2.006.3.2405.20124133.0500.20489179.6700..999945LLA	165	000000
00121	166*	*346100..72137091300.2761.000.19.0404400.3.8051100.4.7345100.36504LLA	166	000000
00121	167*	*6.6200.1.00005465700.1.34624953000.5726.000.2.006.3.2405.21050745..LLA	167	000000
00121	168*	*9900.21430013.9100..99991070500..701576631200.2683.000.48.8136300LLA	168	000000
00121	169*	*3.8052800.4.5278200.380166.9200.1.00005929800.1.41728049900..LLA	169	000000
00121	170*	*5751.000.2.006.3.2105.22161432.2500.22672134.6000..999332547400..LLA	170	000000
00121	171*	*687103242300.2395.000.20.01631500.3.8076100.4.3027400.510792.4100..LLA	171	000000
00121	172*	*1.00006745700.1.45532535100.6601.000.5.005.2.391605.63542221.6600..LLA	172	000000
00121	173*	*63687479.4400..999939344000..31288828100.1088.000.48.4493300.3.82LLA	173	000000
00121	174*	*69900.1.510300.143257.7300.1.0000000000.3.19002947700.6026.000.5LLA	174	000000
00121	175*	*.005.2.391605.63542221.6600.63687479.4400..999939344000..3128883228LLA	175	000000
00121	176*	*100.1088.000.48.4493300.3.8269900.1.5103000.145257.7800.1.00000005LLA	176	000000
00121	177*	*500.3.19602947700.6051.000.5.005.2.391605.63542221.6600.63787479.4LLA	177	000000
00121	178*	*400..999939344000..312888228100.1088.000.48.4493300.3.8269900.1.51LLA	178	000000
00121	179*	*03000.245257.7800.1.00000000500.3.19002947700.6076.000.5.005.2.3916LLA	179	000000
00125	180*	*05.63542221.6600.63787479.4400..999939344000..312888228100.1088.00LLA	180	000000

```

***** FILL *****
00125 181* *0.48.4193300.3.8269900.1.5103000.245257.7800.1.000006055D0.3.19602LLA 181 000000
00125 182* *94700.6326.000.3.056.6.33605.15893950.3600.16564628.7700..9998480LLA 182 000000
00125 183* *64100..79692239400.3161.000.47.8706300.3.7991900.5.9155000.670678LLA 183 000000
00125 184* *.4100.1.00015195900.1.25482733000/ LLA 184 000000
00127 185* K=0 LLA 185 000000
00130 186* L=1 LLA 186 000000
00131 187* N=14 LLA 187 000000
00132 188* 2 IZ=(A1(L)-3076)/25 LLA 188 000000
00133 189* DO 1 I=L,N LLA 189 000000
00136 190* KK=I-(K*14) LLA 190 000000
00137 191* 1 A(IZ,KK)=A1(I) LLA 191 000000
00141 192* K=K+1 LLA 192 000000
00142 193* L=L+14 LLA 193 000000
00143 194* N=N+14 LLA 194 000000
00144 195* IF(K.EQ.8) GO TO 3 LLA 195 000000
00145 196* GO TO 2 LLA 196 000000
00147 197* 3 K=0 LLA 197 000000
00150 198* L=1 LLA 198 000000
00151 199* N=14 LLA 199 000000
00152 200* 4 IZ=(A2(L)-3076)/25 LLA 200 000000
00153 201* DO 5 I=L,N LLA 201 000000
00150 202* KK=I-(K*14) LLA 202 000000
00157 203* 5 A(IZ,KK)=A2(I) LLA 203 000000
00161 204* K=K+1 LLA 204 000000
00162 205* L=L+14 LLA 205 000000
00163 206* N=N+14 LLA 206 000000
00164 207* IF(K.EQ.8) GO TO 6 LLA 207 000000
00166 208* GO TO 4 LLA 208 000000
00167 209* 6 K=0 LLA 209 000000
00170 210* L=1 LLA 210 000000
00171 211* N=14 LLA 211 000000
00172 212* 7 IZ=(A3(L)-3076)/25 LLA 212 000000
00173 213* DO 8 I=L,N LLA 213 000000
00176 214* KK=I-(K*14) LLA 214 000000
00177 215* 8 A(IZ,KK)=A3(I) LLA 215 000000
00201 216* K=K+1 LLA 216 000000
00202 217* L=L+14 LLA 217 000000
00203 218* N=N+14 LLA 218 000000
00204 219* IF(K.EQ.8) GO TO 9 LLA 219 000000
00206 220* GO TO 7 LLA 220 000000
00207 221* 9 K=0 LLA 221 000000
00210 222* L=1 LLA 222 000000
00211 223* N=14 LLA 223 000000
00212 224* 10 IZ=(A4(L)-3076)/25 LLA 224 000000
00213 225* DO 11 I=L,N LLA 225 000000
00216 226* KK=I-(K*14) LLA 226 000000
00217 227* 11 A(IZ,KK)=A4(I) LLA 227 000000
00221 228* K=K+1 LLA 228 000000
00222 229* L=L+14 LLA 229 000000
00223 230* N=N+14 LLA 230 000000
00224 231* IF(K.EQ.8) GO TO 12 LLA 231 000000
00226 232* GO TO 10 LLA 232 000000
00227 233* 12 K=0 LLA 233 000000
00230 234* L=1 LLA 234 000000
00231 235* N=14 LLA 235 000000
00232 236* 13 IZ=(A5(L)-3076)/25 LLA 236 000000
00233 237* DO 14 I=L,N LLA 237 000000
00236 238* KK=I-(K*14) LLA 238 000000

```

	DATE	051778			
00237	239*		14 A(IZ, KK)=A5(I)	LLA	239
00241	240*		K=K+1	LLA	240
00242	241*		L=L+14	LLA	241
00243	242*		N=N+14	LLA	242
00244	243*		IF(IK.EQ.8) GO TO 15	LLA	243
00246	244*		GO TO 13	LLA	244
00247	245*		15 K=0	LLA	245
00250	246*		L=1	LLA	246
00251	247*		N=14	LLA	247
00252	248*		16 IZ=(A6(L)-3076)/25	LLA	248
00253	249*		DO 17 I=L,N	LLA	249
00256	250*		KK=I-(K+14)	LLA	250
00257	251*		17 A(IZ, KK)=A6(I)	LLA	251
00261	252*		K=K+1	LLA	252
00262	253*		L=L+14	LLA	253
00263	254*		N=N+14	LLA	254
00264	255*		IF(IK.EQ.8) GO TO 18	LLA	255
00266	256*		GO TO 16	LLA	256
00267	257*		18 K=0	LLA	257
00270	258*		L=1	LLA	258
00271	259*		N=14	LLA	259
00272	260*		19 IZ=(A7(L)-3076)/25	LLA	260
00273	261*		DO 20 I=L,N	LLA	261
00276	262*		KK=I-(K+14)	LLA	262
00277	263*		20 A(IZ, KK)=A7(I)	LLA	263
00301	264*		K=K+1	LLA	264
00302	265*		L=L+14	LLA	265
00303	266*		N=N+14	LLA	266
00304	267*		IF(IK.EQ.8) GO TO 21	LLA	267
00306	268*		GO TO 19	LLA	268
00307	269*		21 K=0	LLA	269
00310	270*		L=1	LLA	270
00311	271*		N=14	LLA	271
00312	272*		22 IZ=(A8(L)-3076)/25	LLA	272
00313	273*		DO 23 I=L,N	LLA	273
00316	274*		KK=I-(K+14)	LLA	274
00317	275*		23 A(IZ, KK)=A8(I)	LLA	275
00321	276*		K=K+1	LLA	276
00322	277*		L=L+14	LLA	277
00323	278*		N=N+14	LLA	278
00324	279*		IF(IK.EQ.8) GO TO 24	LLA	279
00326	280*		GO TO 22	LLA	280
00327	281*		24 K=0	LLA	281
00330	282*		L=1	LLA	282
00331	283*		N=14	LLA	283
00332	284*		25 IZ=(A9(L)-3076)/25	LLA	284
00333	285*		DO 26 I=L,N	LLA	285
00336	286*		KK=I-(K+14)	LLA	286
00337	287*		26 A(IZ, KK)=A9(I)	LLA	287
00341	288*		K=K+1	LLA	288
00342	289*		L=L+14	LLA	289
00343	290*		N=N+14	LLA	290
00344	291*		IF(IK.EQ.8) GO TO 27	LLA	291
00346	292*		GO TO 25	LLA	292
00347	293*		27 CONTINUE	LLA	293
00350	294*		RETURN	LLA	294
00351	295*		END	LLA	295

END OF COMPILATION: NO DIAGNOSTICS.

*HDC.P ***** FILLAA *****

*FOR.S CVCOORD.FILLAA.TPFS.FILLAA
FOR 50E3-05/17/78-08:35:22 (0.)

SUBROUTINE FILLAA ENTRY POINT 000027

STORAGE USED: CODE(1) 000035: DATA(0) 001015: BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 OMF 001000

EXTERNAL REFERENCES (BLOCK. NAME)

0004 NERR3\$

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION NAME)

0001 000003 116G 0001 000003 121G 0003 D 000000 A 0000 D 000000 A1 0000 D 000200 A2
0000 D 000400 A3 0000 D 000600 A4 0000 I 001001 I 0000 001004 INUPS 0000 I 001000 J

00101	1*	SUBROUTINE FILLAA	LLAA 001	000003
00103	2*	DOUBLE PRECISION A1(8.8),A2(8.8),A3(8.8),A4(8.8),A(4.8.8)	LLAA 002	000003
00104	3*	CORRECT / OFF / A	LLAA 003	000003
00105	4*	DATA A1 / 1105343.100300,3044356.210630,128147.62700,112831.9800,	LLAA 004	000003
00105	5*	*12341.2600,5902.000,1127.000,342.000,3071223.015200,-2.8540,25200,	LLAA 005	000003
00105	6*	*341460.95800,-29393.9600,30071.000,-221.500,2416.000,-820.000,	LLAA 006	000003
00105	7*	*2505.60400,-355647.82700,-59853.250,-62.07.7800,-15001.900,	LLAA 007	000003
00105	8*	*-7607.000,-2801.000,-710.000,2298.45100,9.35.56300,-53283.8200,	LLAA 008	000003
00105	9*	*15803.800,-12516.300,4942.000,-1.8103.9.002,-197.74200,6592.2300,	LLAA 009	000003
00105	10*	*4607.6100,9.61.000,4.4503.2.6103,1.5003.4.002,-105.80100,-50.4800,	LLAA 010	000003
00105	11*	*2463.300,-1.6503.2.00203,-1.2803.0.000,0.000,5.600,-24.700,	LLAA 011	000003
00105	12*	*-133.500,-6.9302,-5.502,-4.102,0.000,0.000,2.1700,-2.700,-5.201,	LLAA 012	000003
00105	13*	*8.301,0.000,0.000,0.000,0.000/	LLAA 013	000003
00107	14*	DATA A2 / 3318605.325800,2679156.443800,324722.92500,52879.0300,2	LLAA 014	000003
00107	15*	*2481.1800,-635.600,1.19403,-2.3802,3077892.015900,-746102.07900,	LLAA 015	000003
00107	16*	*182246.83700,-103308.0900,-3.65203,-231.200,-1.91503,-3.432.6571,	LLAA 016	000003
00107	17*	*40500,-314852.09100,-152259.4500,-6214.300,-24156.800,5.43203,-1.6	LLAA 017	000003
00107	18*	*1803.9.702,1241.84500,28035.0500,-28701.1200,31784.300,5712.500,	LLAA 018	000003
00107	19*	*4.4203.2.3403.0.000,-508.27300,6163.0400,11807.300,121.600,6.15103	LLAA 019	000003
00107	20*	*-2.7503.4.402,-7.002,-59.81700,-234.0400,1375.900,-3.30753,-1.250	LLAA 020	000003
00107	21*	*3.59.402.0.000,0.000,15.100,-47.500,-355.200,-1.000,-7.322.5.102,	LLAA 021	000003
00107	22*	*0.000,0.000,1.4600,-5.100,-3.301,1.6002,0.000,0.000,0.000,0.000/	LLAA 022	000003
00111	23*	DATA A3 / 5538411.778500,1990817.312500,369683.65300,-13451.8100,	LLAA 023	000003
00111	24*	*10785.7600,-2932.300,-1.9302,-9.501,3088465.720200,-1147021.65900,	LLAA 024	000003
00111	25*	*-62605.62300,-66930.1800,-22745.300,1.79603,-1.03403,4.102,7515.56	LLAA 025	000003

DATE 051778

FILLBA *****

```

00111 26* *100.-236090.40400.-173936.4200.51126.2200.357.700.5.33703.1.95103.LLAA 026 000003
00111 27* *-1.602.-407.99500.44328.02400.9536.4100.16490.500.13000.900. LLAA 027 000003
00111 28* *-3.91703.8.001.-5.002.-591.37902.4931.6212.13574.6100.-9735.700. LLAA 028 000003
00111 29* *-1.75303.-1.003.-1.2003.4.002.16.39103.-459.5700.-398.700.-1.66103.LLAA 029 000003
00111 30* *-2.39103.1.3333.0.000.0.000.18.8400.-05.400.-434.500.6.9202.2.802.LLAA 030 000003
00111 31* *-2.402.0.000.0.000.-0.1200.-0.900.4.000.8.301.0.000.0.000.0.000. LLAA 031 000003
00111 32* *0.000/ LLAA 032 000003
00111 33* DATA A4 / 7755697.715200.1063359.481300.241537.0800.-31816.5200. LLAA 033 000003
00111 34* *-1406.1900.-435.900.-1.6302.2.701.3047814.206600.-1411289.30600. LLAA 034 000003
00111 35* *-27853.56500.16433.1600.-7243.400.2459.450.5.6102.-5.001.4930.206.LLAA 035 000003
00111 36* *100.-120762.5500.-113987.6300.53286.000.16052.300.-3.01203.-1.452.LLAA 036 000003
00111 37* *-1.302.-1890.32600.5832.6800.43744.9800.-14512.500.-600.600. LLAA 037 000003
00111 38* *-1.75203.-1.0103.3.002.-393.61200.234.2700.9070.3200.-9778.2000. LLAA 038 000003
00111 39* *-6.05703.2.4703.6.402.0.000.89.35600.-719.6300.-2065.600.1.63703. LLAA 039 000003
00111 40* *3.7702.13.402.0.000.0.000.13.300.-49.900.-301.600.6.9202.7.802. LLAA 040 000003
00111 41* *-5.502.0.000.0.000.-2.0400.7.200.4.701.-8.301.0.000.0.000.0.000. LLAA 041 000003
00111 42* *0.000/ LLAA 042 000003
00111 43* DO 1 J=1.8 LLAA 043 000003
00111 44* DO 1 I=1.8 LLAA 044 000003
00111 45* A(1.I.J)=A1(I.J) LLAA 045 000003
00111 46* A(2.I.J)=A2(I.J) LLAA 046 000003
00111 47* A(3.I.J)=A3(I.J) LLAA 047 000003
00111 48* A(4.I.J)=A4(I.J) LLAA 048 000003
00111 49* RETURN LLAA 049 000003
00111 50* END LLAA 050 000003

```

END OF COMPILATION: NO DIAGNOSTICS.

@HDS.P ***** FILLBB *****

@FOR.S CVCOORD.FILLBB.TPFS.FILLBB
FOR S0E3-05/17/78-08:35:43 (0.)

SUBROUTINE FILLBB ENTRY POINT 000035

STORAGE USED: CODE(1) 000045: DATA(0) 003431: BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 OMI 003410

EXTERNAL REFERENCES (BLOCK. NAME)

0004 NERR3\$

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION. NAME)

```

0001 000003 122G 0001 000003 125G 0003 D 000000 B 0000 D 000000 B1 0000 D 000354 B2
0000 D 001130 B3 0000 D 001604 B4 0000 D 002260 B5 0000 ; 003411 ;
0000 003414 INUP$ 0000 I 003410 J

```



```

00117 116*
00117 117*
00117 118*
00117 119*
00117 120*
00117 121*
00117 122*
00121 123*
00124 124*
00127 125*
00130 126*
00131 127*
00132 128*
00133 129*
00134 130*
00137 131*
00140 132*

*0.10279.4500.-803.400.-7.918204.4.6433.2.68405.-1.304.-.605.0.000.LL58 116
*0.000.0.000.7365.400.-5.7602.-6.93604.4.103.2.7805.0.000.0.000.0.000.LL58 117
*0.0.000.0.000.5273.800.-4.1302.-5.91404.0.000.0.000.0.000.LL58 118
*0.000.0.000.0.000.3.78303.-.303.-5.0534.0.000.0.000.0.000.0.000.LL58 119
*0.000.0.000.0.000.2.71103.0.000.-4.2354.0.000.0.000.0.000.0.000.LL58 120
*0.000.0.000.0.000.1.9403.0.000.0.000.0.000.0.000.0.000.0.000.LL58 121
*0.000.0.000.1.3903.0.000.0.000.0.000.0.000.0.000.0.000.0.000.LL58 122
DO 1 J=1,15
DO 1 I=1,10
B(1,I,J)=B(1,I,J)
B(2,I,J)=B(2,I,J)
B(3,I,J)=B(3,I,J)
B(4,I,J)=B(4,I,J)
B(5,I,J)=B(5,I,J)
1 B(6,I,J)=B(6,I,J)
RETURN
END

```

END OF COMPILATION: NO DIAGNOSTICS.

@HDL.P ***** FLALFA *****

@FOR.S CVCOORD.FLALFA.TPFS.FLALFA
FOR 50E3-05/17/78-08:36:03 (0.)

SUBROUTINE FLALFA ENTRY POINT 000377

STORAGE USED: CODE(1) 000406: DATA(0) 003336: BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 BLK1 003636

EXTERNAL REFERENCES (BLOCK. NAME)

0004 NERR3\$

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION. NAME)

0001	000002	144G	0001	000002	147G	0001	000010	155G	0001	000021	161G	0001	000031	167G
0001	000042	173G	0001	000052	201G	0001	000053	205G	0001	000073	213G	0001	000104	217G
0001	000114	225G	0001	000125	231G	0001	000135	237G	0001	000146	243G	0001	000156	251G
0001	000167	255G	0001	000177	263G	0001	000210	267G	0001	000220	275G	0001	000231	281G
0001	000241	307G	0001	000252	313G	0001	000262	321G	0001	000273	325G	0001	000303	333G
0001	000314	337G	0001	000324	345G	0001	000335	351G	0001	000345	357G	0001	000356	363G
0003	R	000000	ALPHA	0000	R	000000	ALP10	0000	R	000352	ALP12	0000	R	000357
0000	R	000724	ALP14	0000	R	001111	ALP15	0000	R	001276	ALP16	0000	R	001450
0000	R	002035	ALP19	0000	R	002222	ALP20	0000	R	002407	ALP21	0000	R	002574
0000	R	003146	ALP24	0000	I	003301	I	0000	I	003324	INUP\$	0000	I	003303


```

00172 348*
00175 349*
00200 350*
00203 351*
00204 352*
00207 353*
00212 354*
00215 355*
00216 356*
00221 357*
00224 358*
00227 359*
00230 360*
00233 361*
00236 362*
00241 363*
00242 364*
00245 365*
00250 366*
00253 367*
00254 368*
00257 369*
00262 370*
00265 371*
00266 372*
00271 373*
00274 374*
00277 375*
00300 376*
00303 377*
00306 378*
00311 379*
00312 380*
00315 381*
00320 382*
00323 383*
00324 384*
00327 385*
00332 386*
00335 387*
00336 388*
00341 389*
00344 390*
00347 391*
00350 392*
00353 393*
00356 394*
00361 395*
00362 396*
00365 397*
00365 398*
00365 399*
00365 400*
00365 401*
00370 402*
00371 403*

DO 3 J=1,13
3 ALPHA(J,I)=ALP12(J,K)
DO 4 I=26,36
K=I-27
DO 4 J=1,13
4 ALPHA(J,I)=ALP13(J,K)
DO 5 I=37,45
K=I-36
DO 5 J=1,13
5 ALPHA(J,I)=ALP14(J,K)
DO 6 I=46,54
K=I-45
DO 6 J=1,13
6 ALPHA(J,I)=ALP15(J,K)
DO 7 I=55,63
K=I-54
DO 7 J=1,13
7 ALPHA(J,I)=ALP16(J,K)
DO 8 I=64,72
K=I-63
DO 8 J=1,13
8 ALPHA(J,I)=ALP17(J,K)
DO 9 I=73,81
K=I-72
DO 9 J=1,13
9 ALPHA(J,I)=ALP18(J,K)
DO 10 I=82,90
K=I-81
DO 10 J=1,13
10 ALPHA(J,I)=ALP19(J,K)
DO 11 I=91,99
K=I-90
DO 11 J=1,13
11 ALPHA(J,I)=ALP20(J,K)
DO 12 I=100,108
K=I-99
DO 12 J=1,13
12 ALPHA(J,I)=ALP21(J,K)
DO 13 I=109,117
K=I-108
DO 13 J=1,13
13 ALPHA(J,I)=ALP22(J,K)
DO 14 I=118,126
K=I-117
DO 14 J=1,13
14 ALPHA(J,I)=ALP23(J,K)
DO 15 I=127,133
K=I-126
DO 15 J=1,13
15 ALPHA(J,I)=ALP24(J,K)

C
C ADD DO LOOP FOR NEW ZONES
C
C
C RETURN
C END

```

```

FLFA 297 000334
FLFA 298 000342
FLFA 299 000352
FLFA 300 000352
FLFA 301 000355
FLFA 302 000354
FLFA 303 000373
FLFA 304 000373
FLFA 305 000376
FLFA 306 000364
FLFA 307 000314
FLFA 308 000314
FLFA 309 000317
FLFA 310 000325
FLFA 311 000335
FLFA 312 000335
FLFA 313 000340
FLFA 314 000346
FLFA 315 000355
FLFA 316 000355
FLFA 317 000351
FLFA 318 000367
FLFA 319 000377
FLFA 320 000377
FLFA 321 000392
FLFA 322 000315
FLFA 323 000320
FLFA 324 000320
FLFA 325 000323
FLFA 326 000331
FLFA 327 000331
FLFA 328 000331
FLFA 329 000334
FLFA 330 000332
FLFA 331 000332
FLFA 332 000332
FLFA 333 000335
FLFA 334 000333
FLFA 335 000333
FLFA 336 000333
FLFA 337 000335
FLFA 338 000331
FLFA 339 000334
FLFA 340 000334
FLFA 341 000337
FLFA 342 000335
FLFA 343 000335
FLFA 344 000335
FLFA 345 000335
FLFA 346 000335

```

GTPLAM

OHOG.P

●FOR.S CVCOORD.GTPLAM.TPF\$.GTPLAM
FOR S0E3-05/17/78-08:36:40 (0.)

SUBROUTINE GTPLAM ENTRY POINT 000173

STORAGE USED: CODE(1) 000217: DATA(0) 000132: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK NAME)

0003	NERR2\$
0004	DTAN
0005	DCOS
0006	XPDD
0007	DSIN
0010	NERR3\$

 STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME) |

	0001	00032	1L	0001	00045	2L	0001	00060	3L	0001	00072	4L	0000	D	00020	AL
	0000	D	00002	C	0000	D	00004	CFD	0000	D	00006	CFM	0000	D	00016	CFM
	0000	D	00026	CNR	0000	D	00032	COLAT	0000	D	00010	E	0000	D	00012	ED2
	0000	D	00000	P102	0000	D	00040	R	0000	D	00022	RB	0000	D	00024	RK
	0000	D	00000	P102	0000	D	00040	R	0000	D	00022	RB	0000	D	00030	THETA

00101	1 *	SUBROUTINE GTPAM(APHR,ALBDR,IZONE,X,Y)
00101	2 *	CONVERTS GEOCEITIC COORDINATES TO PLANE FOR LAMBERT PROJECTION
00101	3 *	MICHIGAN(800 FEET ABOVE SEA-LEVEL)
00101	4 *	APHR AND ALBDR ARE RADIAN VALUES FOR LATITUDE AND LONGITUDE OF
00101	5 *	POINT BEING TRANSFORMED
00103	6 *	IMPLICIT REAL*8(A-E,R-Z)
00104	7 *	REAL*8 PI02
00104	8 *	C IS X VALUE ALONG CENTRAL MERIDIAN
00105	9 *	ALBDR = ALBDR * 4.84813681109535D-6
00106	10 *	APHR = APHR * 4.84813681109535D-6
00107	11 *	C=2.06
00110	12 *	CFD=1.7453292519943296D-2
00111	13 *	CFM=2.90899208657216D-4
00111	14 *	E IS ECCENTRICITY OF CLARK SPHEROID 1866 AT 800 FEET ABOVE SEA-
00111	15 *	LEVEL (FOR MICHIGAN ONLY)
00112	16 *	E=.0822718542230038D0
00113	17 *	E02=E/2.00
00113	18 *	PI02 IS RADIAN VALUE OF
00113	19 *	PI02 IS RADIAN VALUE OF 90 DEGREES
00114	20 *	5 PI02=1.570796326794896D0
00114	21 *	C IZONE DESIGNATES PROJECTION ZONE. 1=NORTH 2=CENTRAL 3=SOUTH

DATE 051778

GTP 022 000021
GTP 023 000032
GTP 024 000033
GTP 025 000035
GTP 026 000037
GTP 027 000041
GTP 028 000043
GTP 029 000045
GTP 030 000046
GTP 031 000050
GTP 032 000052
GTP 033 000054
GTP 034 000056
GTP 035 000059
GTP 036 000061
GTP 037 000063
GTP 038 000065
GTP 039 000067
GTP 040 000067
GTP 041 000067
GTP 042 000072
GTP 043 000077
GTP 044 000077
GTP 045 000102
GTP 046 000105
GTP 047 000113
GTP 048 000134
GTP 049 000142
GTP 050 000150
GTP 051 000157
GTP 052 000216

```

00115 22* GO TO(1,2,3), IZONE
00116 23* 1 CMD=87.000
00117 24* CMM=00.000
00120 25* AL=.7277899380886 D0
00121 26* RB=20538420.095 D0
00122 27* RK=38648850.296 D0
00123 28* GO TO 4
00124 29* 2 CMD=84.000
00125 30* CMM=20.000
00126 31* AL=.7001074099527 D0
00127 32* RB=21534768.403 D0
00130 33* RK=34972037.039 D0
00131 34* GO TO 4
00132 35* 3 CMD=84.000
00133 36* CMM=20.000
00134 37* AL=.680522633145000
00135 38* RB=23059597.224 D0
00136 39* RK=39573595.97500
00136 40* C CMD AND CMM ARE DEGREES AND MINUTES OF LONGITUDE OF CENTRAL
00136 41* C MERIDIAN
00137 42* 4 CMB=CMD*CFD+CMM*CEM
00140 43* THETA=AL*(CMB-ALBCK)
00140 44* COLAT IS COLATITUDE IN RADIAN OF POINT BEING TRANSFORMED
00141 45* COLAT=PI02-APHR
00142 46* Z1=DTA((COLAT/2.000)
00143 47* Z2=Z1*((1.000+E*DCOS(COLAT)))/((1.000-E*DCOS(COLAT)))*E02
00144 48* R=RK-(Z2)*AL
00145 49* X=R*DSIN(THETA)+C
00146 50* Y=RB-R*DCOS(THETA)
00147 51* RETURN
00150 52* END

```

END OF COMPILATION: NO DIAGNOSTICS.

@HDS.P ***** LAMFRD *****

@FOR.S CVCOORD.LAMFRD.TPFS.LAMFRD
FOR 50E3-05/17/78-08:36:51 (0.)

SUBROUTINE LAMFRD ENTRY POINT 000301

STORAGE USED: CODE(1) 000325; DATA(0) 000155; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 CONST 010150

EXTERNAL REFERENCES (BLOCK, NAME)

0004 DSIN
0005 XPDD
0006 DSQRT

0007 DTAN
0010 CCOS
0011 NERR35

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001 000175 4L 0001 C00221 5L 0003 D 000000 A 0000 D 000035 COSPHI
0000 D 000036 C1 0000 D 000030 C2 0000 D 000032 C3 0000 D 000034 C4 0000 D 000036 E2
0000 I 000046 I 0000 C00124 INJPS 0000 D 000014 K 0000 D 000022 LA 0000 D 000024 DME2
0000 D 000012 PHA 0000 D 000040 PHA2 0000 D 000016 PHINOT 0000 D 000006 R 0000 D 000010 S
0000 D 000042 V1 0000 D 000044 V2 0000 D 000002 X 0000 D 000004 Y

00001 1* SUBROUTINE LAMFRD (PHO, LAO, XO, YO, IZQ, IE)
00103 2* DOUBLE PRECISION A(150,14), ARCCONE, X,Y, PHO, R, YO, S, PHA, K, XO, LAO, PHIN, LAMF C02
00104 3* *OT, E2, LA, DME2, C1, C2, C3, C4, COSPHI, PHA2
00105 4* DOUBLE PRECISION: V1, V2
00106 5* COMMON/CONST/A
00107 6* ARCCONE=4.844136811D-6
00108 7* I=(IZQIE-3076)/25
00109 8* PHINOT=((60.000*A(I,8))+A(I,9))
00110 9* E2=6.73505797291D-3
00111 10* LA=20925832.1619D0
00112 11* C1=101.2794065D0
00113 12* C2=1052.893682D0
00114 13* DME2=1.000-IE2*DSIN(PHINOT*ARCCONE)**2)
00115 14* X=LA*(1.000-E2)/DME2**1.5D0
00116 15* Y=LA/DSQRT(DME2)
00117 16* K=15.000*(3.000*DTAN(PHINOT*ARCCONE)**2))/(120.000*X*Y**3)
00118 17* COSPHI=CCOS(PHO*ARCCONE)
00119 18* C3=4.43334D0
00120 19* C4=2.352D-2
00121 20* 1 S=C1*(PHINOT-PHO*DSIN(PHO*ARCCONE)*COSPHI*(C2-COSPHI**2*(C3-(C4*CCOS
00122 21* *PHI**2))))
00123 22* 7 IF (IZQ, NE, 6326) GO TO 4
00124 23* V1 = 1.000 / (5.000*X*Y)
00125 24* V2 = ((15.000*X) - (4.000*Y)) * DTAN(PHINOT*ARCCONE) /
00126 25* * (24.000 * (X**2) * (Y**2))
00127 26* R=A(I,4)+S*A(I,6)*(1.000*S**2*(V1-S*V2+K*S**2))
00128 27* GO TO 5
00129 28* 4 V1=A(I,10)*1.0D-16
00130 29* V2=A(I,11)*1.0D-24
00131 30* R=A(I,4)+S*A(I,6)*(1.000*S**2*(V1-S*V2))
00132 31* 5 IF (LAO, LT, 0.000) LAO=LAO+1.296D6
00133 32* PHA=(A(I,7)-(A(I,3)-LAO))
00134 33* XO=R*DSIN(PHA*ARCCONE)+A(I,2)
00135 34* PHA2=(PHA/2.000)*ARCCONE
00136 35* YO=A(I,5)+R*(2.000*DSIN(PHA2)**2-1.0D0)
00137 36* 300 RETURN
00138 37* END

END OF COMPILATION: NO DIAGNOSTICS.

AD-A084 822 POTOMAC RESEARCH INC ALEXANDRIA VA
MAP COORDINATE CONVERSION.(U)

POTOMAC RESEARCH INC ALEXANDRIA VA
MAP COORDINATE CONVERSION.(U)

MAP COORDINATE CONVERSION. (U)

MAR 78 H O EBERHART

F/G 8/5

DAK11-77-C-0112

NL

UNCLASSIFIED

DRXTH -TD-CR-00062

 $2_{\text{HF}}2$

AD
AD+AR??

END
DATE
FILMED
6-80
DTIC

0003 DSIN
0004 DLOG
0005 DCOS
0006 XPDD
0007 DATAN
0010 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000 D 000016 AKCB 0000 D 000020 ARCCNE 0000 D 000010 B 0000 D 000030 BL 0000 D 000012 C
0000 D 000024 CALFO 0000 D 000002 CASH 0000 D 000006 E 0000 D 000040 EA 0000 D 000042 EB
0000 D 000112 INUP\$ 0000 D 000014 LAMC 0000 D 000034 NU 0000 D 000026 SALFO 0000 D 000044 V
0000 D 000022 SINPHI 0000 D 000042 TANB 0000 D 000004 TANH 0000 D 000046 V
0000 D 000032 VA 0000 D 000036 VB

00101 1* SUBROUTINE OBER(PHI,LAM,X,Y) 000000
00103 2* DOUBLE PRECISION E,B,C,LAM0,AKCB,ARCCNE,SINPHI,CALFO,SALFO,BL,VA, 000000
00104 3* *MU,VB,EB,COSH,SINH,TANB,U,TANH,V,EA,PHI,LAM,X,Y 000000
00105 4* E=.082271854200 000000
00106 5* B=1.000293772700 000000
00107 6* C=4.47593131D-3 000000
00110 7* LAM0=365450.513200 000000
00111 8* EA=2.71828182800 000000
00112 9* AKCB=633352.67000 000000
00113 10* ARCCNE=4.842126811D-6 000000
00114 11* SINPHI=DSIN(PHI*ARCCNE) 000000
00115 12* CALFO=0.945018968900 000000
00116 13* SALFO=-0.327015517200 000000
00117 14* BL=B*(LAM-LAM0) 000000
00118 15* VA=(1.6205+(PHI/2.000))*ARCCNE 000000
00120 16* VB=E*SINPHI 000000
00121 17* MU=DLOG(DSIN(VA)/DCOS(VA))-((E/2.000)*DLOG((1.000+VB)/(1.000-VB))) 000000
00122 18* EB=EA*(EB*U+C) 000000
00123 19* COSH=(EB*(1.000/EB))/2.000 000000
00124 20* SINH=(EB-(1.000/EB))/2.000 000000
00125 21* TANB=((CALFO*SINH)-(SALFO*DSIN(BL*ARCCNE)))/DCOS(BL*ARCCNE) 000000
00126 22* U=AKCB*((1.6205*ARCCNE)+DATAN((TANB-1.000)/(TANB+1.000))) 000000
00127 23* TANH=((1-CALFO*DSIN(BL*ARCCNE))-(SALFO*SINH))/COSH 000000
00130 24* V=AKCB*0.500*DLOG((1.000-TANH)/(1.000+TANH)) 000000
00131 25* X=(-0.600*U)+(0.800*V)+5.006 000000
00132 26* Y=(0.800*U)+(0.600*V)-5.006 000000
00133 27* X=X*3.28083333300 000000
00134 28* Y=Y*3.28083333300 000000
00135 29* RETURN 000000
00136 30* END 000000

END OF COMPILATION: NO DIAGNOSTICS.

@HDG.P ***** OBMINV *****

@FOR.S CVCOORD.OBMINV.TPFS.OBMINV

FOR 50E3-05/17/78-08:37:25 (0.)

SUBROUTINE OBMINV ENTRY POINT 000305

STORAGE USED: CODE(1) 000333; DATA(0) 000174; BLANK COMM'D(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003 XPDD
0004 DSIN
0005 DLOG
0006 DATAN
0007 DCOS
0010 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0000 D 000042 ARCON	0000 D 000032 B	0000 D 000016 BAKC	0000 D 000036 BM	0000 D 000072 BU
0000 D 000020 BV	0000 D 000026 C	0000 D 000012 CALFO	0000 D 000002 COSH	0000 D 000070 COSZ
0000 D 000054 CO	0000 D 000056 C1	0000 D 000063 C2	0000 D 000062 C3	0000 D 000364 C4
0000 D 000030 E	0000 D 000022 EBV	0000 D 000024 E2B	0000 D 000034 E2BM	0000 D 000150 INUPS
0000 D 000044 LAM	0000 D 000040 MU	0000 D 000014 SALFO	0000 D 000000 SINH	0000 D 000046 SINZ
0000 D 000066 TANBL	0000 D 000004 TANH	0000 D 000050 TANZ	0000 D 000006 U	0000 D 000010 V
0000 D 000052 Z				

00101 1* SUBROUTINE OBMINV(X,Y,PHI,LAM)
00101 2* C OBLIQUE MERCATOR INVERSE

00103 3* DOUBLE PRECISION X,Y,PHI,LAM,U,V,CALFO,SALFO,BAKC,BV,EBV,SINH,
00103 4* *COSH,TANH,E2B,C,E,B,E2BM,BM,MU,ARCON,LAM,SINZ,TANZ,Z,CO,C1,C2,
00103 5* *C3,C4,TANGL,COSZ, BU

00104 6* X=X/3.28083333300
00104 7* Y=Y/3.28083333300

00106 8* U=(-0.600-X)+(0.600-Y)+7.0D6
00107 9* V=(0.500-X)+(0.500-Y)-1.0D6

00110 10* CALFO=0.945018975900
00111 11* BAKC=-0.327015517200

00112 12* SALFO=1.000/5366352.67000
00113 13* ARCON=4.9131368110-6

00114 14* LAM=365450.513200
00115 15* E=2.71828182800

00116 16* BU=V*BAKC
00117 17* BV=V*BAKC

00120 18* EBV=E*(BV)
00121 19* SINH=(EBV-(1.000/EBV))/2.000

00122 20* COSH=(EBV+(1.000/EBV))/2.000
00123 21* TANH=((CALFO*DSIN(BU))-(SALFO*SINH))/COSH

00124 22* E2B= (1.000+TANH)/(1.000-TANH)
00125 23* C=4.475991310-3

00126 24* B=1.00029972700
00127 25* E2BM=E2B/(E*(2.000*(B+C)))

00130 26* BM=0.500*DLOG(E2BM)

000000	000000	000000	000000
000100	000100	000100	000100
000200	000200	000200	000200
000300	000300	000300	000300
000400	000400	000400	000400
000500	000500	000500	000500
000600	000600	000600	000600
000700	000700	000700	000700
000800	000800	000800	000800
000900	000900	000900	000900
001000	001000	001000	001000
001100	001100	001100	001100
001200	001200	001200	001200
001300	001300	001300	001300
001400	001400	001400	001400
001500	001500	001500	001500
001600	001600	001600	001600
001700	001700	001700	001700
001800	001800	001800	001800
001900	001900	001900	001900
002000	002000	002000	002000
002100	002100	002100	002100
002200	002200	002200	002200
002300	002300	002300	002300
002400	002400	002400	002400
002500	002500	002500	002500
002600	002600	002600	002600

DATE 051773

00131 27* MU=(BM*B)+1.000
00132 28* SINZ=(E*(2.000*MU)-1.000)/(E*(2.000*MU)+1.000)
00133 29* COSZ=(2.000*(E*MU))/(E*(MU*2.000)+1.000)
00134 30* TANZ=SINZ/COSZ
00135 31* Z=(1.6205*ARCONE)+DATAN((TANZ-1.000)/(TANZ+1.000))
00136 32* C0=5.91473435D-3
00137 33* C1=-5.133975D-5
00140 34* C2=5.9408D-7
00141 35* C3=-7.40D-9
00142 36* C4=9.0D-11
00143 37* PHI=Z+(SINZ*COSZ*(C0+(C1*SINZ**2)+(C2*SINZ**4)+(C3*SINZ**6)+(C4*SINZ**8)))
00144 39* PHI=PHI/ARCONE
00145 40* TANBL=(((-CALFO*SINH)-(SALFO*DSIN(BU)))/DCOS(BU)
00146 41* LAN=LANC+((1.000/B)-(1.6205-(DATAN((1.000-TANBL)/(1.000+TANBL))
00147 42* */ARCONE)))
00147 43* RETURN
00150 44* END

END OF COMPILATION: NO DIAGNOSTICS.

@HDL.P ***** PTGLAM *****

@FOR.S CVCOORD.PTGLAM.TPF\$.PTGLAM
FOR S E3-05/17/78-08:37:45 (0.)

SUBROUTINE PTGLAM ENTRY POINT 000212

STORAGE USED: CODE(1) 000233: DATA(0) 000136: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003 NERR2\$
0004 DATAN
0005 DCOS
0006 XDCO
0007 NERR3\$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000017 1L	0001	000034 2L	0001	000051 3L	0001	000065 4L	0001	000123 5L
0001	000173 6L	0000 D	000010 AL	0000 D	000014 CWD	0000 D	000016 CMM	0000 D	000000 E
0000 D	000004 EKS	0000 D	000002 EO2	0000	000114 INUP\$	0000 D	000020 P	0000 D	000026 Q
0000 D	000024 R	0000 D	000006 RB	0000 D	000012 RK	0000 D	000022 THETA		

00101	1*		SUBROUTINE PTGLAM(X,Y,IZONE,APHIR,ALBDR)	PTG	001	000000
00101	2*	C	PROGRAM =A339 M.V. THOMPSON MARCH,1969	PTG	002	000000
00101	3*	C	PLANE TO GEODETIC. MICHIGAN, LAMBERT (SUBROUTINE PTGLAM)	PTG	003	000000

```

***** PROGRAM *****
00101 4* C THIS SUBROUTINE CONVERTS THE X AND Y COORDINATES FOR MICHIGAN
00102 5* C (LAMBERT PROJECTION) INTO LATITUDE AND LONGITUDE (SECONDS)
00103 6* C 1ZONE IS ZONE CODE 1=NORTH 2=CENTRAL 3=SOUTH
00104 7* C APHR AND ALBOR ARE OUTPUT LATITUDE AND LONGITUDE, RESPECTIVELY.
00105 8* C IN SECONDS
00106 9* C IMPLICIT REAL*8(A-H,O-Z)
00107 10* E=.082271854223003700
00108 11* EO2=E/2.000
00109 12* EKS=X-2000000.0000
00110 13* GO TO(1,2,3),1ZONE
00111 14* 1 RB=20539420.09500
00112 15* AL=.7227829388895600
00113 16* RK=39518850.29600
00114 17* CND=87.0000
00115 18* CMM=00.0000
00116 19* P=0.807800
00117 20* GO TO 4
00118 21* 2 RB=21594768.40300
00119 22* AL=.706407409527100
00120 23* RK=39972037.03900
00121 24* CND=84.000
00122 25* CMM=20.000
00123 26* P=0.784400
00124 27* GO TO 4
00125 28* 3 RB=23039597.22400
00126 29* AL=.6835292633144900
00127 30* RK=39573595.97500
00128 31* CND=84.0
00129 32* CMM=20.0
00130 33* P=0.743500
00131 34* 4 THETA=DATAN(EKS/(RB-Y))
00132 35* R=(RB-Y)/DCOS(THETA)
00133 36* CND=(CND*1.745329251994330-2)+(CMM*2.908882086657220-4)
00134 37* ALBOR=CND-THETA/AL
00135 38* ALBOR=ALBOR*2.06264806247096305
00136 39* 5 Q=2.000*DATAN((R/RK)*((1.000/AL)*((1.000-E*DCOS(P))/(1.000+E*DCOS(P))))/(1.000+E*DCOS(P)))
00137 40* XP)))**EO2
00138 41* IF(DABS(P-Q).LE.(5.00-10))GO TO 6
00139 42* P=Q
00140 43* GO TO 5
00141 44* 6 APHR=1.5707963267949000-Q
00142 45* APHR=APHR*2.06264806247096305
00143 46* RETURN
00144 47* END

```

END OF COMPILATION: NO DIAGNOSTICS.

CHDG.P ***** STOD *****

FOR S CVCOORD.STOD.TPFS.STOD
 FOR S0E3-05/17/78-08:37:57 (0.)

SUBROUTINE STOD ENTRY POINT 000070

STORAGE USED: CODE(1) 000111: DATA(0) 000025: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK. NAME)

0003 NERR3\$

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION. NAME)

0001 000060 10L 0000 1 000000 IDGA 0000 000014 INJPS

```

00101 1* SUBROUTINE STOD(SECI, IDG, MN, SECO)
00103 2* DOUBLE PRECISION SECI, SECO
00104 3* IDG=SECI/3600.0D0
00105 4* IDGA=IABS(IDG)
00106 5* MN= (DABS(SECI)-FLOAT(IDGA)*3600.0)/60.0
00107 6* SECO= DABS(SECI)-FLOAT(IDGA)*3600.0 -(FLOAT(MN)*60.0)
00110 7* IF (SECO-59.9995) 10,10.6
00113 8* 6 SECO=0.0
00114 9* MN=MN+1
00115 10* IF (MN-60) 10.8.8
00120 11* 8 MN=0
00121 12* IDG=IDG+1
00122 13* 10 RETURN
00123 14* END

```

```

STOD 001 000000
STOD 003 000000
STOD 004 000000
STOD 005 000000
STOD 006 000000
STOD 007 000000
STOD 008 000000
STOD 009 000000
STOD 010 000000
STOD 011 000000
STOD 012 000000
STOD 013 000000
STOD 014 000000

```

END OF COMPILATION: NO DIAGNOSTICS.

@HOG.P ***** TMCOF *****

@FOR.S CVCOORD.TMCOF.TPF\$.TMCOF
FOR 50E3-05/17/78-08:38:16 (0.)

SUBROUTINE TMCOF ENTRY POINT 000143

STORAGE USED: CODE(1) 000150: DATA(0) 000070: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK. NAME)

0003 NERR3\$

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION. NAME)

0000 D 000000 FAC 0000 000062 INJPS

```

00101 1* SUBROUTINE TMCOF(A)
00101 2* C SETS UP COEFFICIENTS FOR CONVERTING GEODETTIC TO RECTIFYING LATITUDE
00101 3* C AND CONVERSELY
00103 4* DOUBLE PRECISION A(16),FAC
00104 5* 6 A(10)=((A(16))*(7.0D0/3.2D1)+(5.0D0/1.6D1))*A(16)+0.5D0*A(16)
00104 6* *+1.0D0)*A(16)+0.25D0
00105 7* A(1)=((A(10))*((1.95D2/6.4D1)+3.25D0)*A(10)+3.75D0)*A(10)+3.0D0)*
00105 8* *A(10)
00106 9* A(2)=((1.455D3/3.2D1)*A(10)+(7.0D1/3.0D0))*A(10)+7.5D0*A(10)**2
00107 10* A(3)=((7.0D1/3.0D0)*A(10)+(9.45D2/8.0D0))*A(10)**3
00110 11* A(4)=(3.15D2/4.0D0)*A(10)**4
00111 12* A(11)=((17.75D0-(6.57D2/6.4D1)*A(10))+A(10)-5.25D0)*A(10)+3.0D0)*
00111 13* *A(10)
00112 14* A(12)=((5.045D3/3.2D1)*A(10)-(1.51D2/3.0D0))*A(10)+10.5D0)*
00112 15* *A(10)**2
00113 16* A(13)=((1.51D2/3.0D0)-(3.291D3/8.0D0))*A(10)+A(10)**3
00114 17* A(14)=((1.037D3/4.0D0)*A(10)**4
00114 18* C A(1) TO A(4) ARE FOR GEODETTIC TO RECTIFYING LATITUDE
00114 19* C CONVERSION WHILE A(11) TO A(14) ARE COEFFICIENTS FOR
00114 20* C RECTIFYING TO GEODETTIC CONVERSION.
00115 21* FAC=A(10)*A(10)
00116 22* A(10)=((2.25D2/6.4D1)*FAC+2.25D0)*FAC+1.0D0)*(1.0D0-FAC)*
00116 23* *(1.0D0-A(10))*A(15)
00116 24* C A(10) IS NOW SET TO RADIUS OF SPHERE WITH GREAT CIRCLE LENGTH
00116 25* C EQUAL TO SPHEROID MERIDIAN LENGTH.
00117 26* RETURN
00120 27* END

```

END OF COMPILATION: NO DIAGNOSTICS.

*HOG.P ***** TMFWD *****

*FOR S CVCOORD.TMFWD.TPFS.TMFWD
FOR S0E3-05/1778-08:38:36 (0.)

SUBROUTINE TMFWD ENTRY POINT 000371

STORAGE USED: CODE(1) 000417; DATA(0) 000167; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK. NAME)

```

0003 DSIN
0004 DCOS
0005 DSORT
0006 NERR3$

```

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION. NAME)

```

0001 000345 8000L 0001 000350 8020L 0001 000353 9000L 0000 D 000000 5 0000 D 000034 COSP
0000 D 000030 ETAS 0000 000150 INJPS 0000 D 000036 RN 0000 D 000032 SINP 0000 D 000040 T

```


DATE 051718

```

00131 54* B(4)=(ETAS*(9.000+4.000*ETAS)+5.000-TS)*B(2)*B(11)/12.000
00132 55* C:G1=((-TS-56.000)*TS+61.000+(276.000-336.000*TS)*ETAS)*B(2)*
00133 56* * B(11)*B(11)/360.000
00134 57* B(8)=(((543.000-TS)*TS-3111.000)*TS+1385.000)*B(2)*B(11)**3/
00135 58* * 20160.000
00136 59* NORTH=(((B(8)*B(12)+B(6))*B(12)+B(4))*B(12)+B(2))*B(12)+
00137 60* * (((A(4)*3(11)+A(3))*B(11)+A(2))*B(11)+A(1))*SINP*COSP+B(9))
00138 61* * *A(10)
00139 62* NORTH=(NORTH-A(7))*A(8)+A(6)
00140 63* C
00141 64* C COMPUTE SCALE FACTOR (SK)
00142 65* C
00143 66* SK=(((1-24.000*ETAS-48.000)*ETAS-28.000)*ETAS-4.000)*TS)+
00144 67* X((14.000*ETAS+13.000)*ETAS+14.000)*ETAS+5.000))*((B(10)**4)/24.000)
00145 68* X)*B(11))*B(11)+(1.000*ETAS)*B(11))*B(10)*B(10))/2.000+1.000
00146 69* SK=SK*A(8)
00147 70* C
00148 71* C COMPUTE CONVERGENCE ANGLE (THET)
00149 72* C
00150 73* THET=((B(10)*SINP*(1.000+((B(10)**2)*B(11)/3.000)*(1.000+3.000
00151 74* X*ETAS+2.000*ETAS**2)+(B(10)**4))*((B(11)**2)/15.000)*(2.000-TS)))*
00152 75* X206264.806247096400
00153 76* 99 RETURN
00154 77* C
00155 78* C SET ERROR CODES
00156 79* C
00157 80* C LATITUDE > 84 DEG.
00158 81* C
00159 82* C
00160 83* C
00161 84* 8000 JERR=15
00162 85* GOTO 9000
00163 86* C
00164 87* C LONGITUDE > 0.16 RAD.
00165 88* C
00166 89* 8020 JERR=16
00167 90* GOTO 9000
00168 91* C
00169 92* 9000 EAST=0.000
00170 93* NORTH=0.000
00171 94* C
00172 95* C
00173 96* 9999 RETURN
00174 97* END

```

END OF COMPILATION: NO DIAGNOSTICS.

@HGD.P ***** TMINV *****

@FOR.S CVCOORD.TMINV.TPFS.TMINV
FOR 50E3-05/17/78-08:39:01 (0.)

SUBROUTINE TMINV ENTRY POINT 000517

STORAGE USED: CODE(1) 000550: DATA(0) 000217: BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

0003	DSIN
0004	DCOS
0005	DSURT
0006	NERR3\$

 STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME) |

0001	000472	8000L
0000	D 000044	BN
0000	D 000046	BNS
0000	D 000032	SINW
0000	C 000052	V
0001	000475	8020L
0001	000500	9000L
0000	D 000034	CSW
0000	D 000040	T
0001	000503	9999L
0000	D 000030	EAS
0000	D 000042	TS
0000	D 000000	D
0000	D 000176	IUNPS
0000	D 000050	X

```

SUBROUTINE TWINV (NORTH,EAST,SLAT,SLON,A,SK,THET,JERR)
C
C THIS SUBROUTINE PERFORMS THE FOLLOWING COMPUTATIONS--
C      UTM TO GEOGRAPHIC COORDINATES
C
C      A(1) - A(4) -- COEFFICIENTS TO CONVERT GEODETIC LAT. TO
C                   RECTIFYING LAT.
C      A(5) -- FALSE EASTING
C      A(6) -- FALSE NORTHING
C      A(8) -- SCALE FACTOR AT CENTRAL MERIDIAN
C      A(9) -- CENTRAL MERIDIAN IN SEC.
C      A(10) -- RADIUS OF SPHERE HAVING GREAT CIRCLE LENGTH
C              = SPHEROID MERIDIAN LENGTH
C      A(11) TO A(14) -- COEFFICIENTS TO CONVERT RECTIFYING LAT. TO
C                     GEODETIC LAT.
C      A(15) -- SEMIMAJOR AXIS OF SPHEROID
C      A(16) -- ECCENTRICITY**2
C
C      DOUBLE PRECISION A(16),B(12),SLAT,SLON,NORTH,EAST,SK,THET.
C      ETAS,SINW,COSW,RN,T,TS,BN,BNS,X,Y
C
C      JERR=0
C
C      Y=NORTH
C      X=EAST
C      B(9)=((A(5)-X)*1.0D-6)/A(8)
C      IF (DABS(B(9)).GT.1.0D-7).A(15)=2.0D0
C      *      GOT0 8000
C      B(10)=((Y-A(6))/A(8)+A(7))/A(10)
C

```

DATE 05:778

LINE	TEXT	LINE	TEXT	LINE	TEXT
38	IF (DABS(B(10)).GT.1.47D0)	38	IF (DABS(B(10)).GT.1.47D0)	38	IF (DABS(B(10)).GT.1.47D0)
39	GOTO 8020	39	GOTO 8020	39	GOTO 8020
40	SINW=DSIN(B(10))	40	SINW=DSIN(B(10))	40	SINW=DSIN(B(10))
41	COSW=DCOS(B(10))	41	COSW=DCOS(B(10))	41	COSW=DCOS(B(10))
42	B(12)=COSW/COSW	42	B(12)=COSW/COSW	42	B(12)=COSW/COSW
43	B(11)=((A(14)*3(12)+A(13))*B(12)+A(12))*B(12)+A(11))*SINW=COSW	43	B(11)=((A(14)*3(12)+A(13))*B(12)+A(12))*B(12)+A(11))*SINW=COSW	43	B(11)=((A(14)*3(12)+A(13))*B(12)+A(12))*B(12)+A(11))*SINW=COSW
44	*B(10)	44	*B(10)	44	*B(10)
45	SINW=DSIN(B(11))	45	SINW=DSIN(B(11))	45	SINW=DSIN(B(11))
46	COSW=DCOS(B(11))	46	COSW=DCOS(B(11))	46	COSW=DCOS(B(11))
47	RN=DSORT(1.0D0-A(16)*SINW*SINW)*1.0D6/A(15)	47	RN=DSORT(1.0D0-A(16)*SINW*SINW)*1.0D6/A(15)	47	RN=DSORT(1.0D0-A(16)*SINW*SINW)*1.0D6/A(15)
48	T=SINW/COSW	48	T=SINW/COSW	48	T=SINW/COSW
49	TS=T*T	49	TS=T*T	49	TS=T*T
50	B(12)=COSW/COSW	50	B(12)=COSW/COSW	50	B(12)=COSW/COSW
51	ETAS=A(16)*B(12)/(1.0D0-A(16))	51	ETAS=A(16)*B(12)/(1.0D0-A(16))	51	ETAS=A(16)*B(12)/(1.0D0-A(16))
52	B(1)=R/COSW	52	B(1)=R/COSW	52	B(1)=R/COSW
53	B(2)=T*(1.0D0+ETAS)*RN*RN/2.0D0	53	B(2)=T*(1.0D0+ETAS)*RN*RN/2.0D0	53	B(2)=T*(1.0D0+ETAS)*RN*RN/2.0D0
54	B(3)=(-1.0D0+2.0D0*TS+ETAS)*B(1)*RN*RN/6.0D0	54	B(3)=(-1.0D0+2.0D0*TS+ETAS)*B(1)*RN*RN/6.0D0	54	B(3)=(-1.0D0+2.0D0*TS+ETAS)*B(1)*RN*RN/6.0D0
55	B(4)=((-6.0D0-ETAS*9.0D0)*ETAS+3.0D0)*TS+(6.0D0-ETAS*3.0D0)*ETAS	55	B(4)=((-6.0D0-ETAS*9.0D0)*ETAS+3.0D0)*TS+(6.0D0-ETAS*3.0D0)*ETAS	55	B(4)=((-6.0D0-ETAS*9.0D0)*ETAS+3.0D0)*TS+(6.0D0-ETAS*3.0D0)*ETAS
56	+5.0D0)*T*RN*4.2*4.0D0	56	+5.0D0)*T*RN*4.2*4.0D0	56	+5.0D0)*T*RN*4.2*4.0D0
57	B(5)=(TS*21.0D0+ETAS*8.0D0+28.0D0)*TS+ETAS*6.0D0+5.0D0)*B(1)*	57	B(5)=(TS*21.0D0+ETAS*8.0D0+28.0D0)*TS+ETAS*6.0D0+5.0D0)*B(1)*	57	B(5)=(TS*21.0D0+ETAS*8.0D0+28.0D0)*TS+ETAS*6.0D0+5.0D0)*B(1)*
58	RN*4.12D0*0D0	58	RN*4.12D0*0D0	58	RN*4.12D0*0D0
59	B(6)=((ETAS*45.0D0-45.0D0)*TS+ETAS*162.0D0-90.0D0)*TS	59	B(6)=((ETAS*45.0D0-45.0D0)*TS+ETAS*162.0D0-90.0D0)*TS	59	B(6)=((ETAS*45.0D0-45.0D0)*TS+ETAS*162.0D0-90.0D0)*TS
60	-ETAS*107.0D0-61.0D0)*T*RN*6/720.0D0	60	-ETAS*107.0D0-61.0D0)*T*RN*6/720.0D0	60	-ETAS*107.0D0-61.0D0)*T*RN*6/720.0D0
61	B(7)=((-TS*720.0D0+1320.0D0)*TS+662.0D0)*TS+61.0D0)*B(1)*RN**6/	61	B(7)=((-TS*720.0D0+1320.0D0)*TS+662.0D0)*TS+61.0D0)*B(1)*RN**6/	61	B(7)=((-TS*720.0D0+1320.0D0)*TS+662.0D0)*TS+61.0D0)*B(1)*RN**6/
62	5040.0D0	62	5040.0D0	62	5040.0D0
63	B(8)=((TS*1575.0D0+4095.0D0)*TS+3633.0D0)*TS+1385.0D0)*T*RN**8/	63	B(8)=((TS*1575.0D0+4095.0D0)*TS+3633.0D0)*TS+1385.0D0)*T*RN**8/	63	B(8)=((TS*1575.0D0+4095.0D0)*TS+3633.0D0)*TS+1385.0D0)*T*RN**8/
64	40320.0D0	64	40320.0D0	64	40320.0D0
65	B(10)=3(9)*5(9)	65	B(10)=3(9)*5(9)	65	B(10)=3(9)*5(9)
66	SLAT=((B(6)*5(10)+B(6))*B(10)+B(4))*B(10)+B(2))*B(10)+B(11))*	66	SLAT=((B(6)*5(10)+B(6))*B(10)+B(4))*B(10)+B(2))*B(10)+B(11))*	66	SLAT=((B(6)*5(10)+B(6))*B(10)+B(4))*B(10)+B(2))*B(10)+B(11))*
67	206264.8062470964D0	67	206264.8062470964D0	67	206264.8062470964D0
68	SLOCN=((B(7)*5(10)+B(5))*B(10)+B(3))*B(10)+B(1))*B(9)*	68	SLOCN=((B(7)*5(10)+B(5))*B(10)+B(3))*B(10)+B(1))*B(9)*	68	SLOCN=((B(7)*5(10)+B(5))*B(10)+B(3))*B(10)+B(1))*B(9)*
69	206264.8062470964D0 + A(9)	69	206264.8062470964D0 + A(9)	69	206264.8062470964D0 + A(9)
70	COMPUTE SCALE FACTOR (SK)	70	COMPUTE SCALE FACTOR (SK)	70	COMPUTE SCALE FACTOR (SK)
71	BN=B(9)*RN	71	BN=B(9)*RN	71	BN=B(9)*RN
72	BNS=BN**2	72	BNS=BN**2	72	BNS=BN**2
73	SK=1.0D0+((1.0D0+ETAS)/2.0D0)*BNS*(1.0D0+6.0D0*ETAS+9.0D0	73	SK=1.0D0+((1.0D0+ETAS)/2.0D0)*BNS*(1.0D0+6.0D0*ETAS+9.0D0	73	

000472
000473
000473
000473
000473
000475
000476
000476
000500
000501
000501
000501
000503
000547

00152 96* 8000 JERR=17
00153 97* GU10 9000
00153 98* C
00153 99* C RECTIFYING LATITUDE > 1.47 RAD.
00153 100* C
00154 101* 8020 JERR=18
00155 102* GOTG 9000
00155 103* C
00156 104* 9000 SLAT=0.000
00157 105* SLON=0.000
00157 106* C
00157 107* C
00160 108* 9999 RETURN
00161 109* END

END OF COMPILATION: NO DIAGNOSTICS.

@HOG.P ***** UTMFW *****

@FOR.S CVCOORD.UTMFW.TPFS.UTMFW
FOR 50E3-05/17/78-08:39:22 (0.)

SUBROUTINE JTMFW ENTRY POINT 000436

STORAGE USED: CODE(1) 000471: DATA(0) 000074: BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 DMF 001000

EXTERNAL REFERENCES (BLOCK. NAME)

0004 NERR4\$
0005 NERR3\$

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION, NAME)

0001 000414 100L 0001 000257 2L 0001 000271 3L 0001 000075 4L 0001 000102 5L
0001 000107 6L 0001 000114 7L 0001 000120 8L 0003 D 000030 4 0000 D 000006 IL2
0000 D 000010 IL3 0000 D 000012 IL4 0000 D 000014 IL5 0000 D 000016 IL6 0000 D 000020 IL7
0000 000047 INUP\$ 0000 D 000004 IP 0000 I 000022 K 0000 D 000000 PHIA 0000 D 000002 PHINOT

00101 1* SUBROUTINE UTMFW (PHI,IL,N,INCE,\$)
00103 2* DOUBLE PRECISION A(4,8,B),PHI,IL,N,INCE,PHIA,PHINOT,IP,IL2,IL3, UTMF 002
00103 3* *IL4,IL5,IL6,IL7 UTMF 003
00104 4* COMMON /DMF/ A UTMF 004
00105 5* PHIA=DABS(PHI) UTMF 005
00106 6* IF((PHIA.GE.0.000).AND.(PHIA.LT.7200.001)) GO TO 4 UTMF 006

```

00110 7* IF (PHIA.GE.7200.001).AND.(PHIA.LT.14000.000)) GO TO 5
00112 8* IF (PHIA.GE.14405).AND.(PHIA.LT.2.16D5)) GO TO 6
00114 9* IF (PHIA.GE.2.16D3).AND.(PHIA.LT.2.69D35)) GO TO 7
00116 10* IF (PHIA.GE.2.89D35)
00120 11*   K=1
00121 12*   PHINOT=3.6D4
00122 13*   GO TO 8
00123 14*   K=2
00124 15*   PHINOT=1.09D5
00125 16*   GO TO 8
00126 17*   K=3
00127 18*   PHINOT=1.80D5
00130 19*   GO TO 8
00131 20*   K=4
00132 21*   PHINOT=2.52D5
00133 22*   IL=IL-10.00D*(-5)
00134 23*   IP=PHIA-PHINOT
00135 24*   IL2=IL-2
00136 25*   IL3=IL-3
00137 26*   IL4=IL-4
00140 27*   IL5=IL-5
00141 28*   IL6=IL-6
00142 29*   IL7=IL-7
00143 30*   IP=IP-10.00D*(-5)
00144 31*   IF (PH.EQ.0.CD0)
00146 32*   N=A(K,1)+IP*(A(K,1,2)+IP*(A(K,1,3)+IP*(A(K,1,4)+IP*(A(K,1,5)+
00146 33*   *IP*(A(K,1,6)+IP*(A(K,1,7)+IP*(A(K,1,8)))))+A(K,3,1)+IL2-IP*(A(K,3,6)+
00146 34*   *A(K,3,2)+IP*(A(K,3,3)+IP*(A(K,3,4)+IP*(A(K,3,5)+IP*(A(K,3,6)+
00146 35*   *IP*(A(K,3,7)+IP*(A(K,3,8)))))+A(K,5,1)+IL4+IP*(A(K,5,2)+IL4+
00146 36*   *IP*(A(K,5,3)+IL4+IP*(A(K,5,4)+IL4+IP*(A(K,5,5)+IP*(A(K,5,6)+
00146 37*   *IP*(A(K,5,7)))))+A(K,7,1)+IL6+IP*(A(K,7,2)+IP*(A(K,7,3)+
00146 38*   *IP*(A(K,7,4)+IP*(A(K,7,5))))))
00147 39*   GO TO 3
00150 40*   2 N=0.000
00151 41*   3 INCE=A(K,2,1)+IL*(IP*(A(K,2,2)+IP*(A(K,2,3)+IP*(A(K,2,4)+IP*
00151 42*   *(A(K,2,5)+IP*(A(K,2,6)+IP*(A(K,2,7)+IP*(A(K,2,8)))))+
00151 43*   *A(K,4,1)+IL3+IP*(A(K,4,2)+IP*(A(K,4,3)+IP*(A(K,4,4)+IP*
00151 44*   *(A(K,4,5)+IP*(A(K,4,6)+IP*(A(K,4,7)+IP*(A(K,4,8)))))+A(K,6,1)+
00151 45*   *IL5+IP*(A(K,6,2)+IP*(A(K,6,3)+IP*(A(K,6,4)+IP*(A(K,6,5)+IP*
00151 46*   *(A(K,6,6)+IP*(A(K,6,7)))))+A(K,8,1)+IL7+IP*(A(K,8,2)+IP*
00151 47*   *(A(K,8,3)+IP*(A(K,8,4)+IP*(A(K,8,5))))))
00152 48*   IF (PHI.LT.0.0D0) N=-N
00154 49*   RETURN
00155 50*   100 RETURN 5
00156 51*   END

```

END OF COMPILATION: NO DIAGNOSTICS.

@HDG.P ***** UTMIVS *****

@FDR.S CVCOORD.UTMIVS.TPFS.UTMIVS
FOR S0E3-05/17/78-08:39:46 (0.)

SUBROUTINE UTMIVS ENTRY POINT 000000

```

DATE 001 73
UTMF 007 000216
UTMF 008 000234
UTMF 009 000252
UTMF 011 000270
UTMF 012 000288
UTMF 013 000306
UTMF 014 000324
UTMF 015 000342
UTMF 016 000360
UTMF 017 000378
UTMF 018 000396
UTMF 019 000414
UTMF 020 000432
UTMF 021 000450
UTMF 022 000468
UTMF 023 000486
UTMF 024 000504
UTMF 025 000522
UTMF 026 000540
UTMF 027 000558
UTMF 028 000576
UTMF 029 000594
UTMF 030 000612
UTMF 031 000630
UTMF 032 000648
UTMF 033 000666
UTMF 034 000684
UTMF 035 000702
UTMF 036 000720
UTMF 037 000738
UTMF 038 000756
UTMF 039 000774
UTMF 040 000792
UTMF 041 000810
UTMF 042 000828
UTMF 043 000846
UTMF 044 000864
UTMF 045 000882
UTMF 046 000900
UTMF 047 000918
UTMF 048 000936
UTMF 049 000954
UTMF 051 000972

```

***** UIMIVS
 @MISD-LIBS.LFOR.S CVCOORD.UIMIVS.TPFS.
 FOR 00E3-05/17/78-17:50:50 (3.)

SUBROUTINE UTMIVS ENTRY POINT 000572

STORAGE USED: CODE(1) 000623; DATA(0) 000064; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 OMI 003410

EXTERNAL REFERENCES (BLOCK. NAME)

0004 NERR4\$
 0005 NERR3\$

STORAGE ASSIGNMENT (BLOCK. TYPE. RELATIVE LOCATION. NAME)

0001	000131 1L	0001	000350 10L	0001	000551 100L	0001	000136 2L	0001	000143 3L
0001	000150 4L	0001	000155 5L	0001	000162 6L	0001	000166 8L	0001	000346 9L
0003	D 000000 B	0000	D 000004 DN	0000	000043 INJP\$	0000	I 000006 K	0000	D 000000 NA
0000	D 000002 NAD								

00101	1*	SUBROUTINE UTMIVS (N,IE,PHI,ILAM,\$)							
00103	2*	DOUBLE PRECISION N,IE,PHI,ILAM,B(6,10,15),NA,NAO,DN							
00104	3*	COMMON /OMI/ B							
00105	4*	NA=DABS(N)							
00106	5*	IF ((NA.GE.0.000).AND.(NA.LE.2.2167D6))							
00110	6*	IF ((NA.GT.2.2167D6).AND.(NA.LE.4.5468D6))							
00112	7*	IF ((NA.GT.4.5468D6).AND.(NA.LE.6.2137D6))							
00114	8*	IF ((NA.GT.6.2137D6).AND.(NA.LE.7.4930D6))							
00116	9*	IF ((NA.GT.7.4930D6).AND.(NA.LE.8.3835D6))							
00120	10*	IF ((NA.GT.8.3835D6).AND.(NA.LE.8.9429D6))							
00122	11*	IF ((NA.GT.8.9429D6) GOTO 100							
00124	12*	1 K=1							
00125	13*	NAO=1105343.10D0							
00126	14*								
00127	15*	2 K=2							
00130	16*	NAO=3318605.326D0							
00131	17*								
00132	18*	3 K=3							
00133	19*	NAO=5316081.344D0							
00134	20*								
00135	21*	4 K=4							
00136	22*	NAO=6790430.383D0							
00137	23*								
00140	24*	5 K=5							
00141	25*	NAO=7877225.327D0							
00142	26*								
00143	27*	6 K=6							
00144	28*	NAO=8602427.796D0							


```

INTEGER IALF(11),ISZ(11),IUZ(11),SZONE,UZONE
REAL HSIGN1(11),HSIGN2(11)
DATA HSIGN1/11*1HW/
DATA HSIGN2/11*1HW/
DATA IALF/2H3A,2HEA,2HFA,2HHA,2HP3,2HRA,2HRM,2HWS,2HAL,2HLS,
      2HYO/
DATA ISZ/5751,4126,5151,4651,3251,3101,3451,4401,3101,5351,
      5301/

```

RESUME, P XEROX, 8