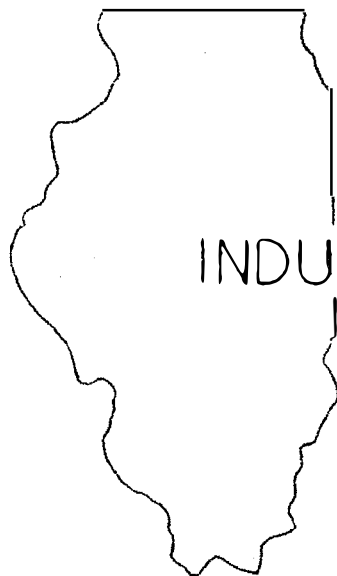


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ILLINOIS STATE GEOLOGICAL SURVEY

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# INDUSTRIAL MINERALS NOTES 35

## COMPUTER-CALCULATED LAMBERT CONFORMAL CONIC PROJECTION TABLES FOR ILLINOIS (7.5-Minute Intersections)

Paul B. DuMontelle, Paul C. Heigold,  
Manoutchehr Heidari, and David H. Swann

### ABSTRACT

A Lambert Conformal Conic Projection for Illinois provides a single map base for computer systems. Two tables show coordinates and conversion factors for all 7.5 - minute intersections of latitude and longitude in Illinois. The tables can be used to convert manually points located on U. S. Geological Survey maps.

The coordinate system simplifies filing and plotting of geographically oriented data.

COMPUTER-CALCULATED LAMBERT CONFORMAL  
CONIC PROJECTION TABLES FOR ILLINOIS

(7.5-Minute Intersections)

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INTRODUCTION

Most records used by the Illinois State Geological Survey are filed geographically. Well logs, descriptions of outcrops, mine records, chemical and physical analyses, and geophysical measurements are generally arranged by county, township, and section. Excluding duplications, more than 200,000 geographic locations are now in various Survey files. The research and service activities of the Survey require interpretation of the information in these files and its presentation to industry and to the public in convenient, practical form.

LAMBERT CONFORMAL CONIC PROJECTIONS

At some stage in nearly every project, data are plotted on maps. Plotting by hand is tedious, time consuming, and prone to error. Plotting by machine is more accurate, much faster, and in the long run, less expensive. A Lambert Conformal Conic Projection for the state of Illinois was developed for use with computer systems to simplify production of base maps and plotting of data at the Survey by providing a single projection for the state. The word "conformal", when used in reference to map projections, indicates an attempt to retain original shape.

A Lambert Conformal Conic Projection may be described as a cone fitted over the earth's surface, the cone and the earth having a common axis (fig. 1, view A). The line of contact between the cone and the earth corresponds to a small circle of latitude. A projection is produced by passing an imaginary ray of light from the center of the earth through the earth's

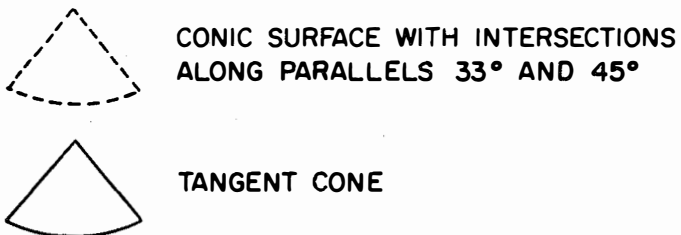
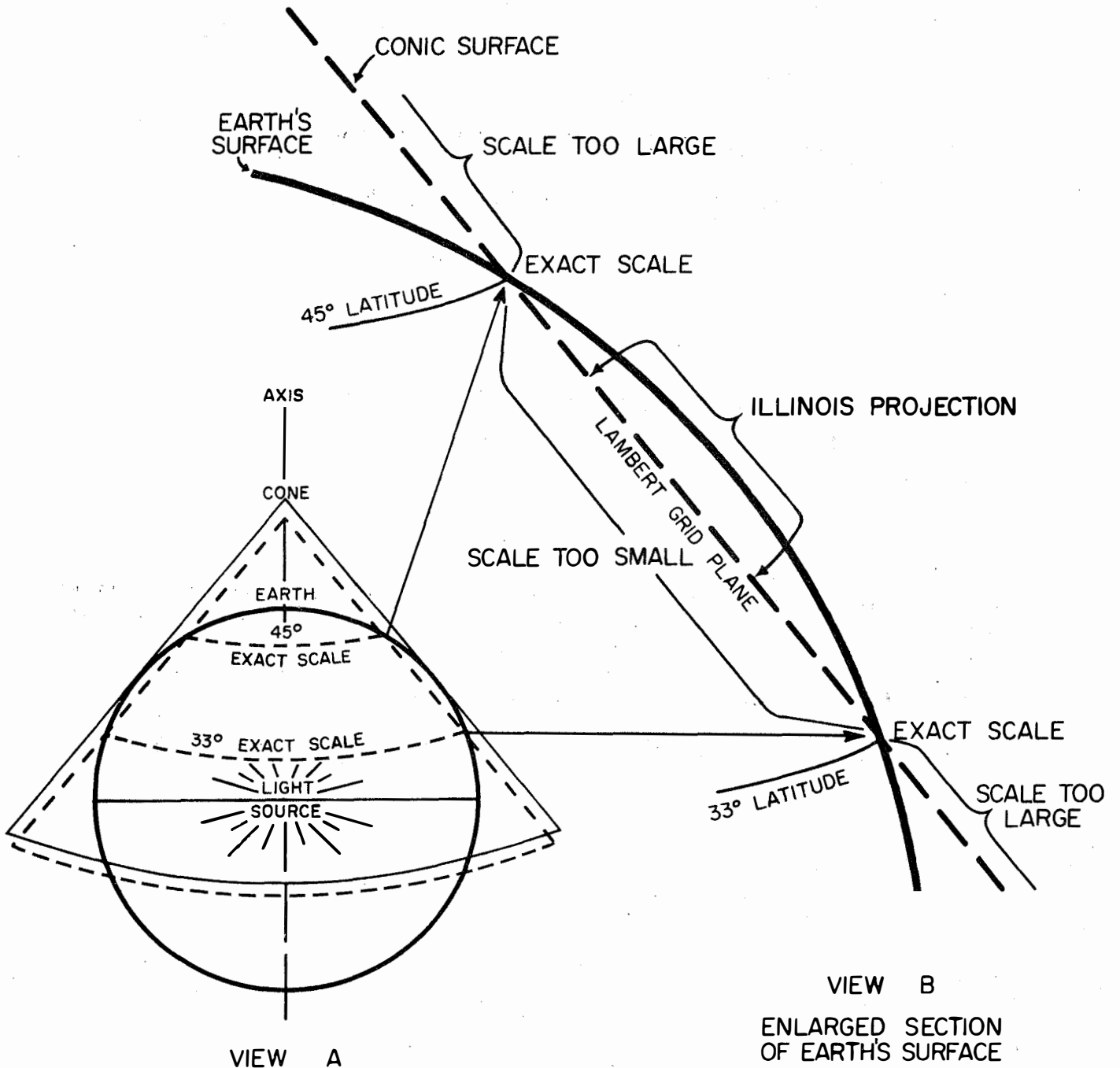


Fig. 1 - Lambert Conformal Conic Projection diagram.

surface and onto the cone, which is acting as a screen. Any part of this cone, or screen, may be cut out and spread flat to produce a map. When large areas are projected, the imaginary cone is often allowed to sink below the earth's surface, producing two latitudes of intersection. The conic surface, as shown in view A of figure 1, is projected smaller or larger than the earth's surface, depending upon the position of the intersection parallels.

The U. S. Coast and Geodetic Survey Lambert Conformal Conic Projection for the United States and the Lambert Conformal Conic Projection for Illinois both use parallels 33° N and 45° N as their parallels of intersection. As can be seen from view B of figure 1, parallels 33° N and 45° N lie well beyond the north and south borders of Illinois; hence the Lambert grid scale is reduced slightly by the projection.

#### DESCRIPTION OF COORDINATE TABLES

Table 1 (p. 7) assigns x-y coordinates, measured in feet, to all 7.5-minute intersections of latitude and longitude found on U. S. Geological Survey topographic maps for Illinois. The projection establishes the origin of this coordinate system 3,000,000 feet west of meridian 89° 30' W and coincident with parallel 33° N, which assures all x and y coordinates within the grid base will be positive. The projection achieves a degree of plotting accuracy suitable for mapping on a single-plane rectangular coordinate base.

Table 1 may be used with the quadrangle topographic maps available for Illinois (List of Publications of the Illinois State Geological Survey, p. 58). Coordinate values are listed for each 7.5-minute intersection of latitude and longitude associated with the quadrangle maps, beginning with the northwest corner of the Dubuque North 7.5-minute quadrangle map (42° 37' 30" latitude) and reading from west to east to the northeast corner of the Brodhead West 7.5-minute quadrangle map. The second series begins with latitude 42° N 30', listing the meridians and parallels and coordinates for those intersections, beginning with the southwest corner of the Dubuque North 7.5-minute quadrangle map and ending with the northeast corner of the Waukegan 15-minute quadrangle map.

#### ASSIGNING 7.5-MINUTE MAP COORDINATES

To assign Lambert coordinate values for a particular quadrangle, the latitude and longitude intersection values for each of the four corners of the quadrangle map are noted and an x and y Lambert coordinate footage value from the table is assigned. If the map is a 15-minute quadrangle, coordinate values may be assigned to the midpoints of all four sidelines as well as to the center of the map. For example, the latitude and longitude values of the four corners of the Maroa 15-minute quadrangle (fig. 2) are as follows:

NW	40° 15' 00"	89° 00' 00"
NE	40° 15' 00"	88° 45' 00"
SW	40° 00' 00"	89° 00' 00"
SE	40° 00' 00"	88° 45' 00"

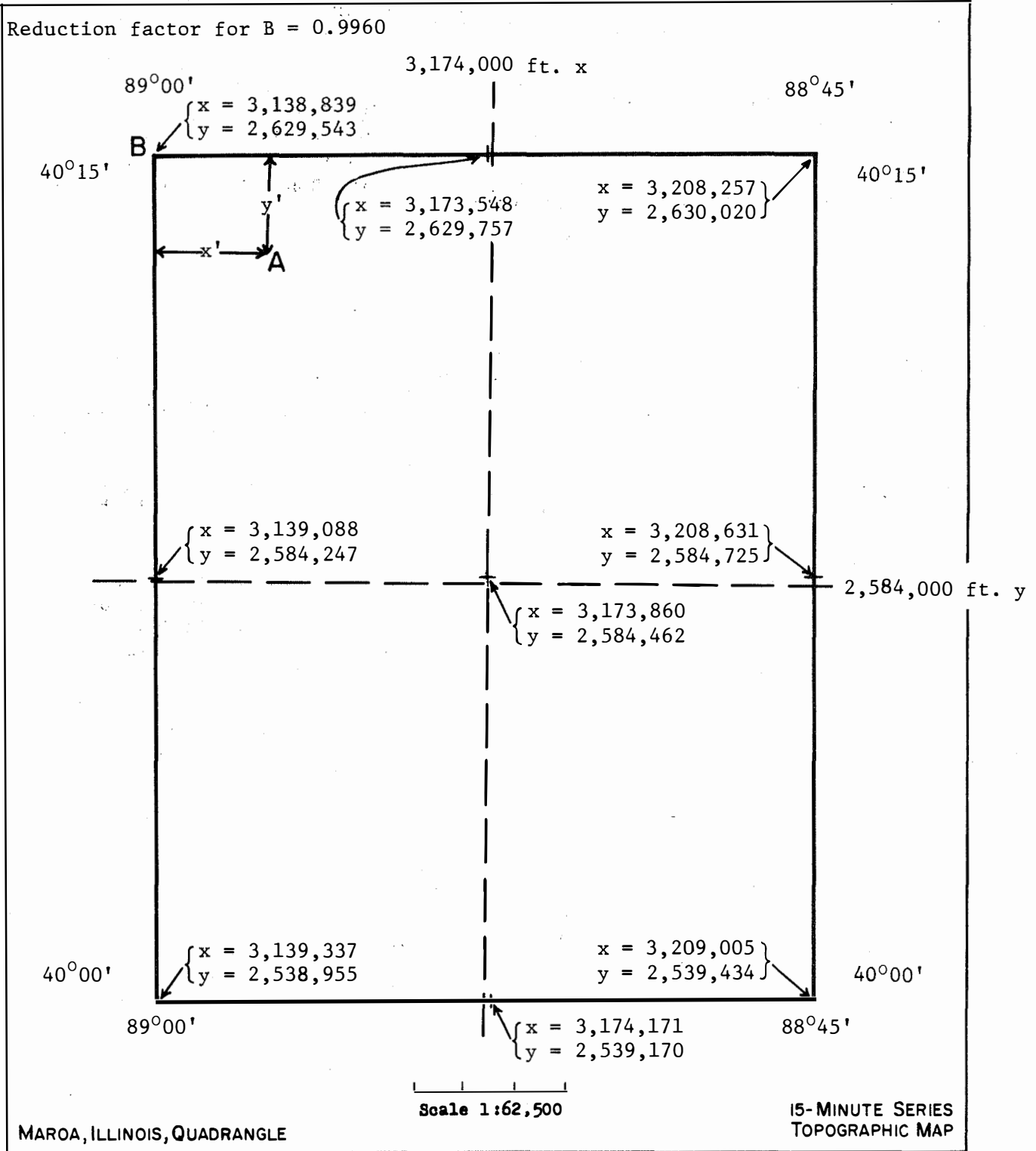


Fig. 2 - Reference points and grid orientation for sample quadrangle.

Their respective Lambert x-y coordinate values in feet are as follows:

	x	y
NW	3,138,839	2,629,543
NE	3,208,257	2,630,020
SW	3,139,337	2,538,955
SE	3,209,005	2,539,434

The 7.5-minute intersections and their x-y coordinates of midpoints of the north, east, south, and west sidelines and of the center of the Maroa 15-minute map are as follows:

	x	y
North	3,173,548	2,629,757
East	3,139,088	2,584,247
South	3,174,171	2,539,170
West	3,208,631	2,584,725
Center	3,173,860	2,584,462

U. S. Geological Survey topographic maps are individually constructed on a polyconic projection base. Because of the curvature of the earth, meridians converge slightly toward the center of the map. The Lambert Projection is similar, but all meridians converge toward the meridian 89° 30'. The angular difference between these two projections systems increases from this central meridian. A location on the map to be converted to Lambert x-y coordinates must be determined by using grid directions. Lambert grid north is easily constructed for any quadrangle map (fig. 2). Convenient even-thousand x and y measurements are selected (in this case 3,174,000 and 2,584,000) and aligned according to our established x-y reference points.

The great advantage of the Lambert projection is that maps prepared with it will be compatible and fit with the most common maps of Illinois, of adjacent states, and of the United States. One disadvantage is that the change in scale across the map is greater than for some other projections. Inasmuch as the grid scale is reduced slightly by the Lambert projection, topographic map measurements must be reduced by this factor to attain true grid position. Table 2 (p. 23) lists the reduction factor to be used with the appropriate latitude.

#### MANUAL CONVERSION OF MAP LOCATIONS

The two tables are specifically designed for use by a draftsman or map maker to determine the coordinates of a point located on one of the quadrangle maps of Illinois. For example, the Lambert coordinates of a specific point on the Maroa 15-minute quadrangle map, designated A, are determined by the following process:

1. Determine grid directions as explained above.
2. From table 1, determine Lambert coordinates for the 7.5-minute latitude-longitude intersection, designated B, nearest to point A.

3. Determine distance in feet between point A and intersection B, measuring parallel to Lambert grid lines (fig. 2) in both the x and the y directions.
4. Determine from table 2 the reduction factor for the latitude of intersection B.
5. Determine the Lambert grid distance by multiplying both the x and y measured distances by the reduction factor. (The sign of the x Lambert grid distance will be positive if the point lies east of intersection B; the sign will be negative if the point lies west of intersection B. The sign of the y Lambert grid distance will be positive if the point lies north of intersection B, and negative if the point lies south of intersection B.)
6. Determine the Lambert coordinates of point A by adding the x value determined for A to the x value determined for B and the y value determined for A to the y value determined for B.

Table 2 also lists expansion factors for each latitude. These are used when a point of known Lambert coordinates is to be plotted on a specific quadrangle map. The procedure to follow is the reverse of steps 1 through 6. Note that the point is thus converted back to the projection of the original map, and the advantages of the plane coordinate system are lost.

When x and y coordinates are determined for a location in Illinois, they become a unique 14-digit number (x footage and y footage) suitable for filing and plotting purposes. This number may also be converted to geodetic coordinates of latitude and longitude or to coordinates of any other projection system. If other projection systems are used in the filing or locating of data, these data may also be converted to the Illinois Lambert Coordinate System.

#### CONCLUSION

In conclusion, the importance of including geographic locations with geologic information is appreciated by all geologists. A standard coordinate system permits this, as well as making possible convenient filing and plotting systems. In most organizations the coordinates written as a series of numbers become the file reference number of the data being filed. Data filed in this manner may be retrieved for a specified area by the input of the proper coordinate parameter. Any data involving geographic position may be located by using the Lambert Coordinate Tables for Illinois (tables 1 and 2), thus establishing a single reference number for both filing and plotting data.

#### Acknowledgments

The Illinois Lambert Conformal Conic Projection was developed from formulas and constants established by the U. S. Coast and Geodetic Survey for the Lambert Conformal Conic Projection of the United States (table 3, p. 25), and we are grateful to B. K. Meade, chief of the Triangulation Branch of that Survey for providing these data.

TABLE 1-- LAMBERT CONFORMAL CONIC PROJECTION FOR ILLINOIS  
(7½-Minute Intersections)

LATITUDE		LONGITUDE		x	y	LATITUDE		LONGITUDE		x	y				
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
42	37	30	90	45	00	2664761	3492913	42	22	30	90	37	30	2697159	3401707
42	37	30	90	37	30	2698283	3492475	42	22	30	90	30	00	2730807	3401313
42	37	30	90	30	00	2731806	3492083	42	22	30	90	22	30	2764455	3400966
42	37	30	90	22	30	2765329	3491737	42	22	30	90	15	00	2798103	3400665
42	37	30	90	15	00	2798853	3491437	42	22	30	90	07	30	2831752	3400410
42	37	30	90	07	30	2832377	3491184	42	22	30	90	00	00	2865401	3400202
42	37	30	90	00	00	2865901	3490976	42	22	30	89	52	30	2899051	3400040
42	37	30	89	52	30	2899425	3490815	42	22	30	89	45	00	2932700	3399924
42	37	30	89	45	00	2932950	3490700	42	22	30	89	37	30	2966350	3399855
42	37	30	89	37	30	2966475	3490630	42	22	30	89	30	00	3000000	3399832
42	37	30	89	30	00	3000000	3490607	42	22	30	89	22	30	3033650	3399855
42	37	30	89	22	30	3033525	3490630	42	22	30	89	15	00	3067299	3399924
42	37	30	89	15	00	3067050	3490700	42	22	30	89	07	30	3100949	3400040
42	30	00	90	45	00	2664137	3447526	42	22	30	89	00	00	3134598	3400203
42	30	00	90	37	30	2697721	3447087	42	22	30	88	52	30	3168248	3400411
42	30	00	90	30	00	2731306	3446695	42	22	30	88	45	00	3201896	3400665
42	30	00	90	22	30	2764892	3446348	42	22	30	88	37	30	3235545	3400966
42	30	00	90	15	00	2798478	3446048	42	22	30	88	30	00	3269193	3401313
42	30	00	90	07	30	2832064	3445794	42	22	30	88	22	30	3302840	3401707
42	30	00	90	00	00	2865651	3445586	42	22	30	88	15	00	3336487	3402146
42	30	00	89	52	30	2899238	3445424	42	22	30	88	07	30	3370133	3402632
42	30	00	89	45	00	2932825	3445309	42	22	30	88	00	00	3403779	3403165
42	30	00	89	37	30	2966413	3445239	42	22	30	87	52	30	3437424	3403743
42	30	00	89	30	00	3000000	3445216	42	22	30	87	45	00	3471068	3404368
42	30	00	89	22	30	3033587	3445239	42	15	00	90	45	00	2662888	3356773
42	30	00	89	15	00	3067175	3445309	42	15	00	90	37	30	2696598	3356333
42	30	00	89	07	30	3100761	3445424	42	15	00	90	30	00	2730308	3355939
42	30	00	89	00	00	3134349	3445586	42	15	00	90	22	30	2764018	3355591
42	30	00	88	52	30	3167936	3445794	42	15	00	90	15	00	2797729	3355289
42	30	00	88	45	00	3201522	3446048	42	15	00	90	07	30	2831440	3355034
42	30	00	88	37	30	3235108	3446348	42	15	00	90	00	00	2865152	3354826
42	30	00	88	30	00	3268693	3446695	42	15	00	89	52	30	2898864	3354663
42	30	00	88	22	30	3302279	3447087	42	15	00	89	45	00	2932576	3354548
42	30	00	88	15	00	3335863	3447526	42	15	00	89	37	30	2966288	3354478
42	30	00	88	07	30	3369447	3448011	42	15	00	89	30	00	3000000	3354455
42	30	00	88	00	00	3403030	3448543	42	15	00	89	22	30	3033712	3354478
42	30	00	87	52	30	3436612	3449120	42	15	00	89	15	00	3067424	3354548
42	30	00	87	45	00	3470194	3449744	42	15	00	89	07	30	3101136	3354663
42	22	30	90	45	00	2663512	3402146	42	15	00	89	00	00	3134848	3354826



TABLE 1—Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
42	15	00	88	52	30	3168560	3355034	42	00	00	89	52	30	2898489	3263929
42	15	00	88	45	00	3202271	3355289	42	00	00	89	45	00	2932326	3263813
42	15	00	88	37	30	3235982	3355591	42	00	00	89	37	30	2966163	3263743
42	15	00	88	30	00	3269692	3355939	42	00	00	89	30	00	3000000	3263720
42	15	00	88	22	30	3303402	3356333	42	00	00	89	22	30	3033837	3263743
42	15	00	88	15	00	3337111	3356773	42	00	00	89	15	00	3067674	3263813
42	15	00	88	07	30	3370820	3357260	42	00	00	89	07	30	3101511	3263929
42	15	00	88	00	00	3404528	3357794	42	00	00	89	00	00	3135347	3264092
42	15	00	87	52	30	3438235	3358373	42	00	00	88	52	30	3169184	3264302
42	15	00	87	45	00	3471942	3358999	42	00	00	88	45	00	3203020	3264558
42	07	30	90	30	00	2729808	3310570	42	00	00	88	37	30	3236855	3264860
42	07	30	90	22	30	2763581	3310222	42	00	00	88	30	00	3270691	3265209
42	07	30	90	15	00	2797355	3309920	42	00	00	88	22	30	3304525	3265605
42	07	30	90	07	30	2831128	3309664	42	00	00	88	15	00	3338360	3266047
42	07	30	90	00	00	2864902	3309455	42	00	00	88	07	30	3372193	3266536
42	07	30	89	52	30	2898676	3309293	42	00	00	88	00	00	3406026	3267071
42	07	30	89	45	00	2932451	3309177	42	00	00	87	52	30	3439858	3267653
42	07	30	89	37	30	2966225	3309107	42	00	00	87	45	00	3473689	3268281
42	07	30	89	30	00	3000000	3309084	42	00	00	87	37	30	3507519	3268956
42	07	30	89	22	30	3033774	3309107	42	00	00	87	30	00	3541348	3269677
42	07	30	89	15	00	3067549	3309177	41	52	30	90	30	00	2728810	3219854
42	07	30	89	07	30	3101323	3309293	41	52	30	90	22	30	2762708	3219504
42	07	30	89	00	00	3135098	3309455	41	52	30	90	15	00	2796606	3219201
42	07	30	88	52	30	3168872	3309664	41	52	30	90	07	30	2830504	3218944
42	07	30	88	45	00	3202645	3309920	41	52	30	90	00	00	2864403	3218735
42	07	30	88	37	30	3236419	3310222	41	52	30	89	52	30	2898302	3218571
42	07	30	88	30	00	3270191	3310570	41	52	30	89	45	00	2932201	3218455
42	07	30	88	22	30	3303964	3310965	41	52	30	89	37	30	2966101	3218385
42	07	30	88	15	00	3337736	3311407	41	52	30	89	30	00	3000000	3218362
42	07	30	88	07	30	3371506	3311894	41	52	30	89	22	30	3033899	3218385
42	07	30	88	00	00	3405277	3312429	41	52	30	89	15	00	3067799	3218455
42	07	30	87	52	30	3439047	3313009	41	52	30	89	07	30	3101698	3218571
42	07	30	87	45	00	3472815	3313637	41	52	30	89	00	00	3135597	3218735
42	07	30	87	37	30	3506583	3314310	41	52	30	88	52	30	3169496	3218944
42	07	30	87	30	00	3540350	3315030	41	52	30	88	45	00	3203394	3219201
42	00	00	90	30	00	2729309	3265209	41	52	30	88	37	30	3237292	3219504
42	00	00	90	22	30	2763144	3264860	41	52	30	88	30	00	3271190	3219854
42	00	00	90	15	00	2796980	3264558	41	52	30	88	22	30	3305087	3220250
42	00	00	90	07	30	2830816	3264302	41	52	30	88	15	00	3338983	3220693
42	00	00	90	00	00	2864652	3264092	41	52	30	88	07	30	3372879	3221183

TABLE 1—Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
41	52	30	88	00	00	3406774	3221719	41	37	30	89	22	30	3034024	3127686
41	52	30	87	52	30	3440669	3222302	41	37	30	89	15	00	3068048	3127756
41	52	30	87	45	00	3474562	3222931	41	37	30	89	07	30	3102072	3127873
41	52	30	87	37	30	3508455	3223607	41	37	30	89	00	00	3136096	3128037
41	52	30	87	30	00	3542347	3224330	41	37	30	88	52	30	3170120	3128248
41	45	00	90	30	00	2728311	3174504	41	37	30	88	45	00	3204143	3128505
41	45	00	90	22	30	2762271	3174154	41	37	30	88	37	30	3238166	3128809
41	45	00	90	15	00	2796231	3173850	41	37	30	88	30	00	3272188	3129160
41	45	00	90	07	30	2830192	3173593	41	37	30	88	22	30	3306210	3129558
41	45	00	90	00	00	2864153	3173383	41	37	30	88	15	00	3340231	3130003
41	45	00	89	52	30	2898115	3173220	41	37	30	88	07	30	3374252	3130494
41	45	00	89	45	00	2932076	3173103	41	37	30	88	00	00	3408272	3131032
41	45	00	89	37	30	2966038	3173033	41	37	30	87	52	30	3442291	3131617
41	45	00	89	30	00	3000000	3173009	41	37	30	87	45	00	3476309	3132249
41	45	00	89	22	30	3033962	3173033	41	37	30	87	37	30	3510327	3132927
41	45	00	89	15	00	3067923	3173103	41	37	30	87	30	00	3544343	3133653
41	45	00	89	07	30	3101885	3173220	41	30	00	91	15	00	2522818	3086916
41	45	00	89	00	00	3135846	3173383	41	30	00	91	07	30	2556898	3086283
41	45	00	88	52	30	3169808	3173593	41	30	00	91	00	00	2590980	3085697
41	45	00	88	45	00	3203768	3173850	41	30	00	90	52	30	2625062	3085158
41	45	00	88	37	30	3237729	3174154	41	30	00	90	45	00	2659145	3084666
41	45	00	88	30	00	3271689	3174504	41	30	00	90	37	30	2693229	3084220
41	45	00	88	22	30	3305648	3174901	41	30	00	90	30	00	2727313	3083822
41	45	00	88	15	00	3339607	3175345	41	30	00	90	22	30	2761398	3083470
41	45	00	88	07	30	3373565	3175836	41	30	00	90	15	00	2795483	3083165
41	45	00	88	00	00	3407523	3176373	41	30	00	90	07	30	2829569	3082907
41	45	00	87	52	30	3441480	3176957	41	30	00	90	00	00	2863654	3082696
41	45	00	87	45	00	3475436	3177587	41	30	00	89	52	30	2897741	3082532
41	45	00	87	37	30	3509391	3178265	41	30	00	89	45	00	2931827	3082415
41	45	00	87	30	00	3543345	3178989	41	30	00	89	37	30	2965913	3082345
41	37	30	90	37	30	2693790	3129558	41	30	00	89	30	00	3000000	3082321
41	37	30	90	30	00	2727812	3129160	41	30	00	89	22	30	3034086	3082345
41	37	30	90	22	30	2761835	3128809	41	30	00	89	15	00	3068173	3082415
41	37	30	90	15	00	2795857	3128505	41	30	00	89	07	30	3102259	3082532
41	37	30	90	07	30	2829881	3128248	41	30	00	89	00	00	3136345	3082696
41	37	30	90	00	00	2863904	3128037	41	30	00	88	52	30	3170431	3082907
41	37	30	89	52	30	2897928	3127873	41	30	00	88	45	00	3204517	3083165
41	37	30	89	45	00	2931952	3127756	41	30	00	88	37	30	3238602	3083470
41	37	30	89	37	30	2965976	3127686	41	30	00	88	30	00	3272687	3083822
41	37	30	89	30	00	3000000	3127662	41	30	00	88	22	30	3306771	3084220

TABLE 1--Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
41	30	00	88	15	00	3340855	3084666	41	15	00	91	00	00	2589483	2995043
41	30	00	88	07	30	3374937	3085158	41	15	00	90	52	30	2623690	2994502
41	30	00	88	00	00	3409020	3085697	41	15	00	90	45	00	2657898	2994007
41	30	00	87	52	30	3443101	3086283	41	15	00	90	37	30	2692106	2993560
41	30	00	87	45	00	3477182	3086916	41	15	00	90	30	00	2726315	2993160
41	30	00	87	37	30	3511262	3087596	41	15	00	90	22	30	2760525	2992807
41	30	00	87	30	00	3545340	3088323	41	15	00	90	15	00	2794735	2992502
41	22	30	91	15	00	2521945	3041589	41	15	00	90	07	30	2828945	2992243
41	22	30	91	07	30	2556088	3040955	41	15	00	90	00	00	2863155	2992031
41	22	30	91	00	00	2590232	3040368	41	15	00	89	52	30	2897366	2991866
41	22	30	90	52	30	2624376	3039827	41	15	00	89	45	00	2931577	2991749
41	22	30	90	45	00	2658522	3039334	41	15	00	89	37	30	2965789	2991678
41	22	30	90	37	30	2692668	3038888	41	15	00	89	30	00	3000000	2991655
41	22	30	90	30	00	2726814	3038489	41	15	00	89	22	30	3034211	2991678
41	22	30	90	22	30	2760961	3038136	41	15	00	89	15	00	3068422	2991749
41	22	30	90	15	00	2795109	3037831	41	15	00	89	07	30	3102633	2991866
41	22	30	90	07	30	2829257	3037573	41	15	00	89	00	00	3136844	2992031
41	22	30	90	00	00	2863405	3037361	41	15	00	88	52	30	3171055	2992243
41	22	30	89	52	30	2897553	3037197	41	15	00	88	45	00	3205265	2992502
41	22	30	89	45	00	2931702	3037080	41	15	00	88	37	30	3239475	2992807
41	22	30	89	37	30	2965851	3037009	41	15	00	88	30	00	3273684	2993160
41	22	30	89	30	00	3000000	3036986	41	15	00	88	22	30	3307893	2993560
41	22	30	89	22	30	3034149	3037009	41	15	00	88	15	00	3342102	2994007
41	22	30	89	15	00	3068298	3037080	41	15	00	88	07	30	3376309	2994502
41	22	30	89	07	30	3102446	3037197	41	15	00	88	00	00	3410516	2995043
41	22	30	89	00	00	3136595	3037361	41	15	00	87	52	30	3444723	2995631
41	22	30	88	52	30	3170743	3037573	41	15	00	87	45	00	3478928	2996266
41	22	30	88	45	00	3204891	3037831	41	15	00	87	37	30	3513132	2996948
41	22	30	88	37	30	3239038	3038136	41	15	00	87	30	00	3547336	2997678
41	22	30	88	30	00	3273186	3038489	41	07	30	91	15	00	2520199	2950948
41	22	30	88	22	30	3307332	3038888	41	07	30	91	07	30	2554467	2950312
41	22	30	88	15	00	3341478	3039334	41	07	30	91	00	00	2588735	2949722
41	22	30	88	07	30	3375623	3039827	41	07	30	90	52	30	2623005	2949180
41	22	30	88	00	00	3409768	3040368	41	07	30	90	45	00	2657275	2948685
41	22	30	87	52	30	3443912	3040955	41	07	30	90	37	30	2691545	2948237
41	22	30	87	45	00	3478055	3041589	41	07	30	90	30	00	2725817	2947837
41	22	30	87	37	30	3512197	3042270	41	07	30	90	22	30	2760088	2947483
41	22	30	87	30	00	3546338	3042998	41	07	30	90	15	00	2794361	2947177
41	15	00	91	15	00	2521072	2996266	41	07	30	90	07	30	2828633	2946917
41	15	00	91	07	30	2555277	2995631	41	07	30	90	00	00	2862906	2946705

TABLE 1—Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
41	07	30	89	52	30	2897179	2946540	41	00	00	88	45	00	3206013	2901857
41	07	30	89	45	00	2931453	2946422	41	00	00	88	37	30	3240348	2902164
41	07	30	89	37	30	2965726	2946352	41	00	00	88	30	00	3274682	2902518
41	07	30	89	30	00	3000000	2946328	41	00	00	88	22	30	3309016	2902920
41	07	30	89	22	30	3034273	2946352	41	00	00	88	15	00	3343349	2903368
41	07	30	89	15	00	3068547	2946422	41	00	00	88	07	30	3377681	2903864
41	07	30	89	07	30	3102820	2946540	41	00	00	88	00	00	3412012	2904407
41	07	30	89	00	00	3137094	2946705	41	00	00	87	52	30	3446343	2904998
41	07	30	88	52	30	3171367	2946917	41	00	00	87	45	00	3480673	2905635
41	07	30	88	45	00	3205639	2947177	41	00	00	87	37	30	3515003	2906320
41	07	30	88	37	30	3239911	2947483	41	00	00	87	30	00	3549331	2907052
41	07	30	88	30	00	3274183	2947837	40	52	30	91	15	00	2518454	2860326
41	07	30	88	22	30	3308455	2948237	40	52	30	91	07	30	2552846	2859688
41	07	30	88	15	00	3342725	2948685	40	52	30	91	00	00	2587239	2859096
41	07	30	88	07	30	3376995	2949180	40	52	30	90	52	30	2621633	2858552
41	07	30	88	00	00	3411264	2949722	40	52	30	90	45	00	2656028	2858055
41	07	30	87	52	30	3445533	2950312	40	52	30	90	37	30	2690423	2857606
41	07	30	87	45	00	3479801	2950948	40	52	30	90	30	00	2724819	2857203
41	07	30	87	37	30	3514068	2951632	40	52	30	90	22	30	2759216	2856849
41	07	30	87	30	00	3548333	2952362	40	52	30	90	15	00	2793613	2856541
41	00	00	91	15	00	2519326	2905635	40	52	30	90	07	30	2828010	2856281
41	00	00	91	07	30	2553656	2904998	40	52	30	90	00	00	2862407	2856068
41	00	00	91	00	00	2587987	2904407	40	52	30	89	52	30	2896805	2855902
41	00	00	90	52	30	2622319	2903864	40	52	30	89	45	00	2931203	2855784
41	00	00	90	45	00	2656651	2903368	40	52	30	89	37	30	2965602	2855713
41	00	00	90	37	30	2690984	2902920	40	52	30	89	30	00	3000000	2855689
41	00	00	90	30	00	2725318	2902518	40	52	30	89	22	30	3034398	2855713
41	00	00	90	22	30	2759652	2902164	40	52	30	89	15	00	3068796	2855784
41	00	00	90	15	00	2793987	2901857	40	52	30	89	07	30	3103194	2855902
41	00	00	90	07	30	2828322	2901597	40	52	30	89	00	00	3137592	2856068
41	00	00	90	00	00	2862657	2901385	40	52	30	88	52	30	3171990	2856281
41	00	00	89	52	30	2896992	2901219	40	52	30	88	45	00	3206387	2856541
41	00	00	89	45	00	2931328	2901101	40	52	30	88	37	30	3240784	2856849
41	00	00	89	37	30	2965664	2901031	40	52	30	88	30	00	3275181	2857203
41	00	00	89	30	00	3000000	2901007	40	52	30	88	22	30	3309577	2857606
41	00	00	89	22	30	3034336	2901031	40	52	30	88	15	00	3343972	2858055
41	00	00	89	15	00	3068672	2901101	40	52	30	88	07	30	3378366	2858552
41	00	00	89	07	30	3103007	2901219	40	52	30	88	00	00	3412760	2859096
41	00	00	89	00	00	3137343	2901385	40	52	30	87	52	30	3447154	2859687
41	00	00	88	52	30	3171678	2901597	40	52	30	87	45	00	3481546	2860326

TABLE 1—Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
40	52	30	87	37	30	3515938	2861012	40	37	30	90	45	00	2654781	2767441
40	52	30	87	30	00	3550328	2861746	40	37	30	90	37	30	2689301	2766990
40	45	00	91	22	30	2483128	2815709	40	37	30	90	30	00	2723822	2766587
40	45	00	91	15	00	2517581	2815022	40	37	30	90	22	30	2758343	2766230
40	45	00	91	07	30	2552036	2814382	40	37	30	90	15	00	2792865	2765922
40	45	00	91	00	00	2586492	2813789	40	37	30	90	07	30	2827387	2765661
40	45	00	90	52	30	2620948	2813244	40	37	30	90	00	00	2861909	2765447
40	45	00	90	45	00	2655405	2812746	40	37	30	89	52	30	2896431	2765281
40	45	00	90	37	30	2689862	2812296	40	37	30	89	45	00	2930954	2765162
40	45	00	90	30	00	2724321	2811893	40	37	30	89	37	30	2965477	2765091
40	45	00	90	22	30	2758780	2811538	40	37	30	89	30	00	3000000	2765067
40	45	00	90	15	00	2793239	2811230	40	37	30	89	22	30	3034523	2765091
40	45	00	90	07	30	2827699	2810969	40	37	30	89	15	00	3069046	2765162
40	45	00	90	00	00	2862158	2810756	40	37	30	89	07	30	3103568	2765281
40	45	00	89	52	30	2896619	2810590	40	37	30	89	00	00	3138091	2765447
40	45	00	89	45	00	2931079	2810471	40	37	30	88	52	30	3172613	2765661
40	45	00	89	37	30	2965540	2810400	40	37	30	88	45	00	3207135	2765922
40	45	00	89	30	00	3000000	2810376	40	37	30	88	37	30	3241657	2766230
40	45	00	89	22	30	3034461	2810400	40	37	30	88	30	00	3276178	2766587
40	45	00	89	15	00	3068921	2810471	40	37	30	88	22	30	3310698	2766990
40	45	00	89	07	30	3103382	2810590	40	37	30	88	15	00	3345218	2767441
40	45	00	89	00	00	3137842	2810756	40	37	30	88	07	30	3379738	2767940
40	45	00	88	52	30	3172302	2810969	40	37	30	88	00	00	3414256	2768486
40	45	00	88	45	00	3206762	2811230	40	37	30	87	52	30	3448774	2769080
40	45	00	88	37	30	3241221	2811538	40	37	30	87	45	00	3483291	2769721
40	45	00	88	30	00	3275679	2811893	40	37	30	87	37	30	3517807	2779409
40	45	00	88	22	30	3310138	2812296	40	37	30	87	30	00	3552322	2771145
40	45	00	88	15	00	3344595	2812746	40	30	00	91	30	00	2446681	2725850
40	45	00	88	07	30	3379053	2813244	40	30	00	91	22	30	2481258	2725113
40	45	00	88	00	00	3413509	2813789	40	30	00	91	15	00	2515836	2724423
40	45	00	87	52	30	3447964	2814382	40	30	00	91	07	30	2550415	2723781
40	45	00	87	45	00	3482419	2815022	40	30	00	91	00	00	2584996	2723186
40	45	00	87	37	30	3516873	2815707	40	30	00	90	52	30	2619577	2722639
40	45	00	87	30	00	3551326	2816444	40	30	00	90	45	00	2654158	2722140
40	37	30	91	30	00	2447678	2771145	40	30	00	90	37	30	2688740	2721688
40	37	30	91	22	30	2482192	2770409	40	30	00	90	30	00	2723323	2721284
40	37	30	91	15	00	2516709	2769721	40	30	00	90	22	30	2757907	2720927
40	37	30	91	07	30	2551226	2769080	40	30	00	90	15	00	2792491	2720618
40	37	30	91	00	00	2585743	2768486	40	30	00	90	07	30	2827075	2720356
40	37	30	90	52	30	2620262	2767940	40	30	00	90	00	00	2861659	2720142

TABLE 1—Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
40	30	00	89	52	30	2896244	2719975	40	22	30	89	00	00	3138590	2674841
40	30	00	89	45	00	2930829	2719856	40	22	30	88	52	30	3173236	2675055
40	30	00	89	37	30	2965415	2719785	40	22	30	88	45	00	3207883	2675317
40	30	00	89	30	00	3000000	2719761	40	22	30	88	37	30	3242529	2675627
40	30	00	89	22	30	3034585	2719785	40	22	30	88	30	00	3277175	2675984
40	30	00	89	15	00	3069170	2719856	40	22	30	88	22	30	3311820	2676389
40	30	00	89	07	30	3103755	2719975	40	22	30	88	15	00	3346465	2676842
40	30	00	89	00	00	3138340	2720142	40	22	30	88	07	30	3381109	2677343
40	30	00	88	52	30	3172925	2720356	40	22	30	88	00	00	3415752	2677891
40	30	00	88	45	00	3207509	2720618	40	22	30	87	52	30	3450394	2678486
40	30	00	88	37	30	3242093	2720927	40	22	30	87	45	00	3485036	2679130
40	30	00	88	30	00	3276676	2721284	40	22	30	87	37	30	3519677	2679821
40	30	00	88	22	30	3311259	2721688	40	22	30	87	30	00	3554316	2680559
40	30	00	88	15	00	3345842	2722140	40	15	00	91	37	30	2409986	2636059
40	30	00	88	07	30	3380423	2722639	40	15	00	91	30	00	2444687	2635272
40	30	00	88	00	00	3415004	2723186	40	15	00	91	22	30	2479389	2634532
40	30	00	87	52	30	3449584	2723781	40	15	00	91	15	00	2514092	2633839
40	30	00	87	45	00	3484164	2724423	40	15	00	91	07	30	2548796	2633195
40	30	00	87	37	30	3518742	2725113	40	15	00	91	00	00	2583500	2632598
40	30	00	87	30	00	3553319	2725850	40	15	00	90	52	30	2618206	2632049
40	22	30	91	30	00	2445684	2680559	40	15	00	90	45	00	2652912	2631548
40	22	30	91	22	30	2480323	2679821	40	15	00	90	37	30	2687619	2631094
40	22	30	91	15	00	2514964	2679130	40	15	00	90	30	00	2722327	2630688
40	22	30	91	07	30	2549605	2678486	40	15	00	90	22	30	2757035	2630330
40	22	30	91	00	00	2584248	2677891	40	15	00	90	15	00	2791743	2630020
40	22	30	90	52	30	2618891	2677343	40	15	00	90	07	30	2826452	2629757
40	22	30	90	45	00	2653535	2676842	40	15	00	90	00	00	2861161	2629543
40	22	30	90	37	30	2688180	2676389	40	15	00	89	52	30	2895871	2629375
40	22	30	90	30	00	2722825	2675984	40	15	00	89	45	00	2930580	2629256
40	22	30	90	22	30	2757471	2675627	40	15	00	89	37	30	2965290	2629184
40	22	30	90	15	00	2792117	2675317	40	15	00	89	30	00	3000000	2629161
40	22	30	90	07	30	2826764	2675055	40	15	00	89	22	30	3034710	2629184
40	22	30	90	00	00	2861410	2674841	40	15	00	89	15	00	3069420	2629256
40	22	30	89	52	30	2896057	2674674	40	15	00	89	07	30	3104129	2629375
40	22	30	89	45	00	2930705	2674555	40	15	00	89	00	00	3138839	2629543
40	22	30	89	37	30	2965352	2674483	40	15	00	88	52	30	3173548	2629757
40	22	30	89	30	00	3000000	2674459	40	15	00	88	45	00	3208257	2630020
40	22	30	89	22	30	3034647	2674483	40	15	00	88	37	30	3242966	2630330
40	22	30	89	15	00	3069295	2674555	40	15	00	88	30	00	3277674	2630688
40	22	30	89	07	30	3103942	2674674	40	15	00	88	22	30	3312381	2631094

TABLE 1—Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
40	15	00	88	15	00	3347088	2631548	40	07	30	87	30	00	3556310	2589986
40	15	00	88	07	30	3381794	2632049	40	00	00	91	37	30	2407867	2545495
40	15	00	88	00	00	3416500	2632598	40	00	00	91	30	00	2442693	2544704
40	15	00	87	52	30	3451205	2633195	40	00	00	91	22	30	2477519	2543962
40	15	00	87	45	00	3485908	2633839	40	00	00	91	15	00	2512347	2543267
40	15	00	87	37	30	3520612	2634532	40	00	00	91	07	30	2547175	2542620
40	15	00	87	30	00	3555314	2635272	40	00	00	91	00	00	2582005	2542021
40	07	30	91	37	30	2408927	2590775	40	00	00	90	52	30	2616835	2541470
40	07	30	91	30	00	2443690	2589986	40	00	00	90	45	00	2651666	2540967
40	07	30	91	22	30	2478454	2589245	40	00	00	90	37	30	2686497	2540512
40	07	30	91	15	00	2513220	2588551	40	00	00	90	30	00	2721329	2540105
40	07	30	91	07	30	2547986	2587906	40	00	00	90	22	30	2756162	2539745
40	07	30	91	00	00	2582753	2587308	40	00	00	90	15	00	2790995	2539434
40	07	30	90	52	30	2617521	2586758	40	00	00	90	07	30	2825829	2539170
40	07	30	90	45	00	2652289	2586256	40	00	00	90	00	00	2860662	2538955
40	07	30	90	37	30	2687058	2585801	40	00	00	89	52	30	2895496	2538787
40	07	30	90	30	00	2721828	2585395	40	00	00	89	45	00	2930331	2538667
40	07	30	90	22	30	2756599	2585036	40	00	00	89	37	30	2965165	2538595
40	07	30	90	15	00	2791369	2584725	40	00	00	89	30	00	3000000	2538571
40	07	30	90	07	30	2826141	2584462	40	00	00	89	22	30	3034834	2538595
40	07	30	90	00	00	2860912	2584247	40	00	00	89	15	00	3069668	2538667
40	07	30	89	52	30	2895684	2584079	40	00	00	89	07	30	3104503	2538787
40	07	30	89	45	00	2930456	2583960	40	00	00	89	00	00	3139337	2538955
40	07	30	89	37	30	2965228	2583888	40	00	00	88	52	30	3174171	2539170
40	07	30	89	30	00	3000000	2583864	40	00	00	88	45	00	3209005	2539434
40	07	30	89	22	30	3034772	2583888	40	00	00	88	37	30	3243838	2539745
40	07	30	89	15	00	3069544	2583960	40	00	00	88	30	00	3278670	2540105
40	07	30	89	07	30	3104316	2584079	40	00	00	88	22	30	3313503	2540512
40	07	30	89	00	00	3139088	2584247	40	00	00	88	15	00	3348334	2540967
40	07	30	88	52	30	3173860	2584462	40	00	00	88	07	30	3383165	2541470
40	07	30	88	45	00	3208631	2584725	40	00	00	88	00	00	3417995	2542021
40	07	30	88	37	30	3243402	2585036	40	00	00	87	52	30	3452824	2542620
40	07	30	88	30	00	3278172	2585395	40	00	00	87	45	00	3487653	2543267
40	07	30	88	22	30	3312942	2585801	40	00	00	87	37	30	3522481	2543962
40	07	30	88	15	00	3347711	2586256	40	00	00	87	30	00	3557307	2544704
40	07	30	88	07	30	3382480	2586758	39	52	30	91	30	00	2441696	2499424
40	07	30	88	00	00	3417247	2587308	39	52	30	91	22	30	2476585	2498680
40	07	30	87	52	30	3452014	2587906	39	52	30	91	15	00	2511475	2497984
40	07	30	87	45	00	3486781	2588551	39	52	30	91	07	30	2546366	2497336
40	07	30	87	37	30	3521546	2589245	39	52	30	91	00	00	2581257	2496736

TABLE 1—Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
39	52	30	90	52	30	2616150	2496184	39	45	00	90	00	00	2860164	2448377
39	52	30	90	45	00	2651043	2495680	39	45	00	89	52	30	2895123	2448209
39	52	30	90	37	30	2685937	2495224	39	45	00	89	45	00	2930082	2448089
39	52	30	90	30	00	2720831	2494816	39	45	00	89	37	30	2965041	2448017
39	52	30	90	22	30	2755726	2494456	39	45	00	89	30	00	3000000	2447993
39	52	30	90	15	00	2790622	2494144	39	45	00	89	22	30	3034959	2448017
39	52	30	90	07	30	2825517	2493880	39	45	00	89	15	00	3069918	2448089
39	52	30	90	00	00	2860413	2493664	39	45	00	89	07	30	3104877	2448209
39	52	30	89	52	30	2895310	2493496	39	45	00	89	00	00	3139836	2448377
39	52	30	89	45	00	2930206	2493376	39	45	00	88	52	30	3174794	2448594
39	52	30	89	37	30	2965103	2493304	39	45	00	88	45	00	3209752	2448858
39	52	30	89	30	00	3000000	2493280	39	45	00	88	37	30	3244710	2449171
39	52	30	89	22	30	3034897	2493304	39	45	00	88	30	00	3279667	2449532
39	52	30	89	15	00	3069793	2493376	39	45	00	88	22	30	3314624	2449940
39	52	30	89	07	30	3104690	2493496	39	45	00	88	15	00	3349580	2450397
39	52	30	89	00	00	3139586	2493664	39	45	00	88	07	30	3384535	2450902
39	52	30	88	52	30	3174483	2493880	39	45	00	88	00	00	3419490	2451455
39	52	30	88	45	00	3209378	2494144	39	45	00	87	52	30	3454444	2452056
39	52	30	88	37	30	3244274	2494456	39	45	00	87	45	00	3489397	2452705
39	52	30	88	30	00	3279169	2494816	39	45	00	87	37	30	3524349	2453402
39	52	30	88	22	30	3314063	2495224	39	45	00	87	30	00	3559200	2454148
39	52	30	88	15	00	3348957	2495680	39	37	30	91	30	00	2439703	2408872
39	52	30	88	07	30	3383850	2496184	39	37	30	91	22	30	2474716	2408125
39	52	30	88	00	00	3418742	2496736	39	37	30	91	15	00	2509731	2407427
39	52	30	87	52	30	3453634	2497336	39	37	30	91	07	30	2544746	2406776
39	52	30	87	45	00	3488525	2497984	39	37	30	91	00	00	2579762	2406174
39	52	30	87	37	30	3523415	2498680	39	37	30	90	52	30	2614780	2405620
39	52	30	87	30	00	3558303	2499424	39	37	30	90	45	00	2649797	2405115
39	45	00	91	30	00	2440700	2454148	39	37	30	90	37	30	2684815	2404657
39	45	00	91	22	30	2475651	2453402	39	37	30	90	30	00	2719834	2404247
39	45	00	91	15	00	2510603	2452705	39	37	30	90	22	30	2754854	2403886
39	45	00	91	07	30	2545556	2452056	39	37	30	90	15	00	2789874	2403573
39	45	00	91	00	00	2580510	2451455	39	37	30	90	07	30	2824894	2403308
39	45	00	90	52	30	2615465	2450902	39	37	30	90	00	00	2859915	2403091
39	45	00	90	45	00	2650420	2450397	39	37	30	89	52	30	2894936	2402923
39	45	00	90	37	30	2685376	2449940	39	37	30	89	45	00	2929957	2402802
39	45	00	90	30	00	2720333	2449532	39	37	30	89	37	30	2964979	2402730
39	45	00	90	22	30	2755290	2449171	39	37	30	89	30	00	3000000	2402706
39	45	00	90	15	00	2790248	2448858	39	37	30	89	22	30	3035021	2402730
39	45	00	90	07	30	2825206	2448594	39	37	30	89	15	00	3070042	2402802



TABLE 1--Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
39	37	30	89	07	30	3105064	2402923	39	30	00	88	15	00	3350826	2359835
39	37	30	89	00	00	3140085	2403091	39	30	00	88	07	30	3385905	2360341
39	37	30	88	52	30	3175106	2403308	39	30	00	88	00	00	3420985	2360896
39	37	30	88	45	00	3210126	2403573	39	30	00	87	52	30	3456063	2361500
39	37	30	88	37	30	3245146	2403886	39	30	00	87	45	00	3491141	2362151
39	37	30	88	30	00	3280165	2404247	39	30	00	87	37	30	3526218	2362851
39	37	30	88	22	30	3315184	2404657	39	30	00	87	30	00	3561293	2363599
39	37	30	88	15	00	3350203	2405115	39	22	30	91	15	00	2507987	2316877
39	37	30	88	07	30	3385220	2405620	39	22	30	91	07	30	2543127	2316225
39	37	30	88	00	00	3420237	2406174	39	22	30	91	00	00	2578268	2315620
39	37	30	87	52	30	3455254	2406776	39	22	30	90	52	30	2613409	2315064
39	37	30	87	45	00	3490269	2407427	39	22	30	90	45	00	2648551	2314557
39	37	30	87	37	30	3525283	2408125	39	22	30	90	37	30	2683694	2314098
39	37	30	87	30	00	3560297	2408872	39	22	30	90	30	00	2718838	2313687
39	30	00	91	30	00	2438707	2363599	39	22	30	90	22	30	2753982	2313324
39	30	00	91	22	30	2473782	2362851	39	22	30	90	15	00	2789127	2313010
39	30	00	91	15	00	2508859	2362151	39	22	30	90	07	30	2824272	2312744
39	30	00	91	07	30	2543936	2361500	39	22	30	90	00	00	2859417	2312526
39	30	00	91	00	00	2579015	2360896	39	22	30	89	52	30	2894562	2312357
39	30	00	90	52	30	2614094	2360341	39	22	30	89	45	00	2929708	2312236
39	30	00	90	45	00	2649174	2359835	39	22	30	89	37	30	2964854	2312164
39	30	00	90	37	30	2684255	2359376	39	22	30	89	30	00	3000000	2312140
39	30	00	90	30	00	2719336	2358966	39	22	30	89	22	30	3035146	2312164
39	30	00	90	22	30	2754418	2358604	39	22	30	89	15	00	3070292	2312236
39	30	00	90	15	00	2789500	2358291	39	22	30	89	07	30	3105437	2312357
39	30	00	90	07	30	2824583	2358025	39	22	30	89	00	00	3140583	2312526
39	30	00	90	00	00	2859666	2357808	39	22	30	88	52	30	3175728	2312744
39	30	00	89	52	30	2894749	2357639	39	22	30	88	45	00	3210873	2313010
39	30	00	89	45	00	2929833	2357518	39	22	30	88	37	30	3246018	2313324
39	30	00	89	37	30	2964916	2357446	39	22	30	88	30	00	3281162	2313687
39	30	00	89	30	00	3000000	2357422	39	22	30	88	22	30	3316305	2314098
39	30	00	89	22	30	3035083	2357446	39	22	30	88	15	00	3351448	2314557
39	30	00	89	15	00	3070167	2357518	39	22	30	88	07	30	3386591	2315064
39	30	00	89	07	30	3105251	2357639	39	22	30	88	00	00	3421732	2315620
39	30	00	89	00	00	3140334	2357808	39	22	30	87	52	30	3456873	2316225
39	30	00	88	52	30	3175417	2358025	39	22	30	87	45	00	3492013	2316877
39	30	00	88	45	00	3210499	2358291	39	22	30	87	37	30	3527152	2317578
39	30	00	88	37	30	3245582	2358604	39	22	30	87	30	00	3562290	2318327
39	30	00	88	30	00	3280664	2358966	39	15	00	91	15	00	2507115	2271605
39	30	00	88	22	30	3315745	2359376	39	15	00	91	07	30	2542317	2270951

TABLE 1—Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
39	15	00	91	00	00	2577520	2270345	39	07	30	89	22	30	3035270	2221603
39	15	00	90	52	30	2612724	2269789	39	07	30	89	15	00	3070541	2221676
39	15	00	90	45	00	2647928	2269280	39	07	30	89	07	30	3105811	2221797
39	15	00	90	37	30	2683134	2268820	39	07	30	89	00	00	3141081	2221967
39	15	00	90	30	00	2718340	2268408	39	07	30	88	52	30	3176351	2222185
39	15	00	90	22	30	2753546	2268045	39	07	30	88	45	00	3211621	2222452
39	15	00	90	15	00	2788753	2267730	39	07	30	88	37	30	3246890	2222768
39	15	00	90	07	30	2823960	2267464	39	07	30	88	30	00	3282158	2223131
39	15	00	90	00	00	2859168	2267246	39	07	30	88	22	30	3317427	2223544
39	15	00	89	52	30	2894375	2267076	39	07	30	88	15	00	3352694	2224005
39	15	00	89	45	00	2929584	2266955	39	07	30	88	07	30	3387961	2224514
39	15	00	89	37	30	2964792	2266883	39	07	30	88	00	00	3423227	2225072
39	15	00	89	30	00	3000000	2266859	39	07	30	87	52	30	3458492	2225678
39	15	00	89	22	30	3035208	2266883	39	07	30	87	45	00	3493757	2226333
39	15	00	89	15	00	3070416	2266955	39	07	30	87	37	30	3529020	2227037
39	15	00	89	07	30	3105624	2267076	39	07	30	87	30	00	3564283	2227789
39	15	00	89	00	00	3140832	2267246	39	00	00	90	45	00	2646683	2178730
39	15	00	88	52	30	3176040	2267464	39	00	00	90	37	30	2682013	2178268
39	15	00	88	45	00	3211247	2267730	39	00	00	90	30	00	2717343	2177855
39	15	00	88	37	30	3246454	2268045	39	00	00	90	22	30	2752674	2177491
39	15	00	88	30	00	3281660	2268408	39	00	00	90	15	00	2788006	2177175
39	15	00	88	22	30	3316866	2268820	39	00	00	90	07	30	2823337	2176907
39	15	00	88	15	00	3352071	2269280	39	00	00	90	00	00	2858669	2176689
39	15	00	88	07	30	3387276	2269789	39	00	00	89	52	30	2894002	2176519
39	15	00	88	00	00	3422480	2270345	39	00	00	89	45	00	2929334	2176397
39	15	00	87	52	30	3457683	2270951	39	00	00	89	37	30	2964667	2176324
39	15	00	87	45	00	3492885	2271605	39	00	00	89	30	00	3000000	2176300
39	15	00	87	37	30	3528086	2272307	39	00	00	89	22	30	3035333	2176324
39	15	00	87	30	00	3563286	2273057	39	00	00	89	15	00	3070665	2176397
39	07	30	90	45	00	2647306	2224005	39	00	00	89	07	30	3105998	2176519
39	07	30	90	37	30	2682573	2223544	39	00	00	89	00	00	3141330	2176689
39	07	30	90	30	00	2717841	2223131	39	00	00	88	52	30	3176663	2176907
39	07	30	90	22	30	2753110	2222768	39	00	00	88	45	00	3211994	2177175
39	07	30	90	15	00	2788379	2222452	39	00	00	88	37	30	3247326	2177491
39	07	30	90	07	30	2823649	2222185	39	00	00	88	30	00	3282657	2177855
39	07	30	90	00	00	2858918	2221967	39	00	00	88	22	30	3317987	2178268
39	07	30	89	52	30	2894189	2221797	39	00	00	88	15	00	3353317	2178730
39	07	30	89	45	00	2929459	2221676	39	00	00	88	07	30	3388646	2179240
39	07	30	89	37	30	2964729	2221603	39	00	00	88	00	00	3423974	2179799
39	07	30	89	30	00	3000000	2221579	39	00	00	87	52	30	3459302	2180407

TABLE 1--Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
39	00	00	87	45	00	3494629	2181063	38	45	00	89	37	30	2964543	2085770
39	00	00	87	37	30	3529955	2181767	38	45	00	89	30	00	3000000	2085745
39	00	00	87	30	00	3565279	2182521	38	45	00	89	22	30	3035457	2085770
38	52	30	90	45	00	2646060	2133456	38	45	00	89	15	00	3070915	2085843
38	52	30	90	37	30	2681452	2132994	38	45	00	89	07	30	3106372	2085965
38	52	30	90	30	00	2716845	2132580	38	45	00	89	00	00	3141829	2086135
38	52	30	90	22	30	2752238	2132215	38	45	00	88	52	30	3177285	2086355
38	52	30	90	15	00	2787632	2131898	38	45	00	88	45	00	3212742	2086623
38	52	30	90	07	30	2823026	2131631	38	45	00	88	37	30	3248198	2086940
38	52	30	90	00	00	2858420	2131412	38	45	00	88	30	00	3283653	2087306
38	52	30	89	52	30	2893815	2131241	38	45	00	88	22	30	3319108	2087721
38	52	30	89	45	00	2929210	2131119	38	45	00	88	15	00	3354563	2088184
38	52	30	89	37	30	2964605	2131046	38	45	00	88	07	30	3390016	2088696
38	52	30	89	30	00	3000000	2131022	38	45	00	88	00	00	3425469	2089257
38	52	30	89	22	30	3035395	2131046	38	45	00	87	52	30	3460921	2089866
38	52	30	89	15	00	3070790	2131119	38	45	00	87	45	00	3496372	2090525
38	52	30	89	07	30	3106185	2131241	38	45	00	87	37	30	3531823	2091232
38	52	30	89	00	00	3141580	2131412	38	45	00	87	30	00	3567272	2091988
38	52	30	88	52	30	3176974	2131631	38	45	00	87	22	30	3602720	2092793
38	52	30	88	45	00	3212368	2131898	38	37	30	90	22	30	2751366	2041665
38	52	30	88	37	30	3247762	2132215	38	37	30	90	15	00	2786885	2041348
38	52	30	88	30	00	3283155	2132580	38	37	30	90	07	30	2822403	2041079
38	52	30	88	22	30	3318548	2132994	38	37	30	90	00	00	2857922	2040859
38	52	30	88	15	00	3353940	2133456	38	37	30	89	52	30	2893441	2040688
38	52	30	88	07	30	3389331	2133968	38	37	30	89	45	00	2928961	2040566
38	52	30	88	00	00	3424722	2134527	38	37	30	89	37	30	2964481	2040493
38	52	30	87	52	30	3460112	2135136	38	37	30	89	30	00	3000000	2040468
38	52	30	87	45	00	3495501	2135793	38	37	30	89	22	30	3035520	2040493
38	52	30	87	37	30	3530889	2136499	38	37	30	89	15	00	3071039	2040566
38	52	30	87	30	00	3566276	2137254	38	37	30	89	07	30	3106559	2040688
38	52	30	87	22	30	3601662	2138057	38	37	30	89	00	00	3142078	2040859
38	45	00	90	45	00	2645437	2088184	38	37	30	88	52	30	3177597	2041079
38	45	00	90	37	30	2680892	2087721	38	37	30	88	45	00	3213116	2041348
38	45	00	90	30	00	2716347	2087306	38	37	30	88	37	30	3248634	2041665
38	45	00	90	22	30	2751802	2086940	38	37	30	88	30	00	3284152	2042032
38	45	00	90	15	00	2787258	2086623	38	37	30	88	22	30	3319669	2042447
38	45	00	90	07	30	2822715	2086355	38	37	30	88	15	00	3355186	2042911
38	45	00	90	00	00	2858171	2086135	38	37	30	88	07	30	3390702	2043424
38	45	00	89	52	30	2893628	2085965	38	37	30	88	00	00	3426217	2043986
38	45	00	89	45	00	2929085	2085843	38	37	30	87	52	30	3461731	2044597

TABLE 1--Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
38	37	30	87	45	00	3497245	2045256	38	22	30	89	07	30	3106932	1950136
38	37	30	87	37	30	3532757	2045965	38	22	30	89	00	00	3142576	1950307
38	37	30	87	30	00	3568269	2046722	38	22	30	88	52	30	3178220	1950528
38	37	30	87	22	30	3603779	2047528	38	22	30	88	45	00	3213863	1950797
38	30	00	90	30	00	2715350	1996758	38	22	30	88	37	30	3249505	1951116
38	30	00	90	22	30	2750930	1996391	38	22	30	88	30	00	3285148	1951484
38	30	00	90	15	00	2786511	1996073	38	22	30	88	22	30	3320790	1951901
38	30	00	90	07	30	2822092	1995804	38	22	30	88	15	00	3356431	1952366
38	30	00	90	00	00	2857673	1995584	38	22	30	88	07	30	3392071	1952881
38	30	00	89	52	30	2893254	1995412	38	22	30	88	00	00	3427711	1953445
38	30	00	89	45	00	2928836	1995290	38	22	30	87	52	30	3463350	1954058
38	30	00	89	37	30	2964418	1995216	38	22	30	87	45	00	3498988	1954720
38	30	00	89	30	00	3000000	1995192	38	22	30	87	37	30	3534625	1955431
38	30	00	89	22	30	3035582	1995216	38	22	30	87	30	00	3570261	1956190
38	30	00	89	15	00	3071164	1995290	38	15	00	90	30	00	2714354	1906210
38	30	00	89	07	30	3106745	1995412	38	15	00	90	22	30	2750058	1905841
38	30	00	89	00	00	3142327	1995584	38	15	00	90	15	00	2785763	1905522
38	30	00	88	52	30	3177908	1995804	38	15	00	90	07	30	2821469	1905252
38	30	00	88	45	00	3213489	1996073	38	15	00	90	00	00	2857175	1905031
38	30	00	88	37	30	3249069	1996391	38	15	00	89	52	30	2892881	1904859
38	30	00	88	30	00	3284650	1996758	38	15	00	89	45	00	2928587	1904736
38	30	00	88	22	30	3320229	1997174	38	15	00	89	37	30	2964293	1904663
38	30	00	88	15	00	3355808	1997639	38	15	00	89	30	00	3000000	1904638
38	30	00	88	07	30	3391386	1998153	38	15	00	89	22	30	3035706	1904663
38	30	00	88	00	00	3426964	1998716	38	15	00	89	15	00	3071413	1904736
38	30	00	87	52	30	3462540	1999328	38	15	00	89	07	30	3107119	1904859
38	30	00	87	45	00	3498116	1999988	38	15	00	89	00	00	3142825	1905031
38	30	00	87	37	30	3533691	2000698	38	15	00	88	52	30	3178531	1905252
38	30	00	87	30	00	3569265	2001457	38	15	00	88	45	00	3214236	1905522
38	22	30	90	30	00	2714852	1951484	38	15	00	88	37	30	3249941	1905841
38	22	30	90	22	30	2750494	1951116	38	15	00	88	30	00	3285646	1906210
38	22	30	90	15	00	2786137	1950797	38	15	00	88	22	30	3321350	1906627
38	22	30	90	07	30	2821780	1950528	38	15	00	88	15	00	3357054	1907094
38	22	30	90	00	00	2857424	1950307	38	15	00	88	07	30	3392756	1907609
38	22	30	89	52	30	2893068	1950136	38	15	00	88	00	00	3428458	1908174
38	22	30	89	45	00	2928712	1950013	38	15	00	87	52	30	3464160	1908788
38	22	30	89	37	30	2964356	1949939	38	15	00	87	45	00	3499860	1909451
38	22	30	89	30	00	3000000	1949915	38	15	00	87	37	30	3535559	1910163
38	22	30	89	22	30	3035644	1949939	38	15	00	87	30	00	3571257	1910924
38	22	30	89	15	00	3071288	1950013	38	07	30	90	30	00	2713855	1860935

TABLE 1—Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
38	07	30	90	22	30	2749622	1860566	38	00	00	88	15	00	3358299	1816547
38	07	30	90	15	00	2785390	1860246	38	00	00	88	07	30	3394126	1817065
38	07	30	90	07	30	2821158	1859976	38	00	00	88	00	00	3429953	1817631
38	07	30	90	00	00	2856925	1859754	38	00	00	87	52	30	3465779	1818247
38	07	30	89	52	30	2892694	1859582	38	00	00	87	45	00	3501604	1818913
38	07	30	89	45	00	2928462	1859459	37	52	30	90	15	00	2784642	1769692
38	07	30	89	37	30	2964231	1859385	37	52	30	90	07	30	2820535	1769421
38	07	30	89	30	00	3000000	1859361	37	52	30	90	00	00	2856427	1769199
38	07	30	89	22	30	3035769	1859385	37	52	30	89	52	30	2892320	1769026
38	07	30	89	15	00	3071537	1859459	37	52	30	89	45	00	2928213	1768902
38	07	30	89	07	30	3107306	1859582	37	52	30	89	37	30	2964107	1768828
38	07	30	89	00	00	3143074	1859754	37	52	30	89	30	00	3000000	1768804
38	07	30	88	52	30	3178842	1859976	37	52	30	89	22	30	3035893	1768828
38	07	30	88	45	00	3214610	1860246	37	52	30	89	15	00	3071786	1768902
38	07	30	88	37	30	3250377	1860566	37	52	30	89	07	30	3107680	1769026
38	07	30	88	30	00	3286144	1860935	37	52	30	89	00	00	3143573	1769199
38	07	30	88	22	30	3321911	1861353	37	52	30	88	52	30	3179465	1769421
38	07	30	88	15	00	3357676	1861821	37	52	30	88	45	00	3215357	1769692
38	07	30	88	07	30	3393441	1862337	37	52	30	88	37	30	3251249	1770013
38	07	30	88	00	00	3429206	1862903	37	52	30	88	30	00	3287141	1770384
38	07	30	87	52	30	3464969	1863518	37	52	30	88	22	30	3323032	1770803
38	07	30	87	45	00	3500732	1864182	37	52	30	88	15	00	3358922	1771272
38	00	00	90	30	00	2713357	1815660	37	52	30	88	07	30	3394811	1771791
38	00	00	90	22	30	2749186	1815290	37	52	30	88	00	00	3430700	1772358
38	00	00	90	15	00	2785016	1814970	37	45	00	90	15	00	2784269	1724414
38	00	00	90	07	30	2820846	1814699	37	45	00	90	07	30	2820223	1724142
38	00	00	90	00	00	2856676	1814477	37	45	00	90	00	00	2856178	1723920
38	00	00	89	52	30	2892507	1814305	37	45	00	89	52	30	2892133	1723746
38	00	00	89	45	00	2928338	1814181	37	45	00	89	45	00	2928089	1723623
38	00	00	89	37	30	2964169	1814107	37	45	00	89	37	30	2964044	1723549
38	00	00	89	30	00	3000000	1814083	37	45	00	89	30	00	3000000	1723524
38	00	00	89	22	30	3035831	1814107	37	45	00	89	22	30	3035955	1723549
38	00	00	89	15	00	3071662	1814181	37	45	00	89	15	00	3071911	1723623
38	00	00	89	07	30	3107493	1814305	37	45	00	89	07	30	3107866	1723746
38	00	00	89	00	00	3143323	1814477	37	45	00	89	00	00	3143822	1723920
38	00	00	88	52	30	3179154	1814699	37	45	00	88	52	30	3179777	1724142
38	00	00	88	45	00	3214984	1814970	37	45	00	88	45	00	3215731	1724414
38	00	00	88	37	30	3250813	1815290	37	45	00	88	37	30	3251685	1724736
38	00	00	88	30	00	3286643	1815660	37	45	00	88	30	00	3287639	1725107
38	00	00	88	22	30	3322471	1816079	37	45	00	88	22	30	3323592	1725527

TABLE 1—Continued

LATITUDE			LONGITUDE			x	y	LATITUDE			LONGITUDE			x	y
deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)	deg.	min.	sec.	deg.	min.	sec.	(ft)	(ft)
37	45	00	88	15	00	3359545	1725997	37	22	30	88	52	30	3180711	1588297
37	45	00	88	07	30	3395497	1726516	37	22	30	88	45	00	3216852	1588570
37	45	00	88	00	00	3431448	1727085	37	22	30	88	37	30	3252993	1588893
37	37	30	89	45	00	2927964	1678342	37	22	30	88	30	00	3289134	1589266
37	37	30	89	37	30	2963982	1678268	37	22	30	88	22	30	3325274	1589689
37	37	30	89	30	00	3000000	1678243	37	22	30	88	15	00	3361413	1590161
37	37	30	89	22	30	3036018	1678268	37	22	30	88	07	30	3397552	1590683
37	37	30	89	15	00	3072036	1678342	37	22	30	88	00	00	3433690	1591255
37	37	30	89	07	30	3108053	1678466	37	15	00	89	45	00	2927590	1542488
37	37	30	89	00	00	3144071	1678639	37	15	00	89	37	30	2963795	1542414
37	37	30	88	52	30	3180088	1678862	37	15	00	89	30	00	3000000	1542389
37	37	30	88	45	00	3216105	1679135	37	15	00	89	22	30	3036205	1542414
37	37	30	88	37	30	3252121	1679457	37	15	00	89	15	00	3072409	1542488
37	37	30	88	30	00	3288137	1679828	37	15	00	89	07	30	3108614	1542613
37	37	30	88	22	30	3324153	1680249	37	15	00	89	00	00	3144818	1542787
37	37	30	88	15	00	3360168	1680720	37	15	00	88	52	30	3181022	1543011
37	37	30	88	07	30	3396182	1681240	37	15	00	88	45	00	3217226	1543285
37	37	30	88	00	00	3432195	1681810	37	15	00	88	37	30	3253429	1543609
37	30	00	89	45	00	2927840	1633059	37	15	00	88	30	00	3289632	1543982
37	30	00	89	37	30	2963920	1632985	37	15	00	88	22	30	3325835	1544406
37	30	00	89	30	00	3000000	1632960	37	15	00	88	15	00	3362036	1544879
37	30	00	89	22	30	3036080	1632985	37	15	00	88	07	30	3398237	1545402
37	30	00	89	15	00	3072160	1633059	37	15	00	88	00	00	3434437	1545974
37	30	00	89	07	30	3108240	1633183	37	07	30	89	30	00	3000000	1497100
37	30	00	89	00	00	3144320	1633357	37	07	30	89	22	30	3036267	1497125
37	30	00	88	52	30	3180400	1633580	37	07	30	89	15	00	3072534	1497200
37	30	00	88	45	00	3216478	1633853	37	07	30	89	07	30	3108801	1497325
37	30	00	88	37	30	3252557	1634176	37	07	30	89	00	00	3145068	1497499
37	30	00	88	30	00	3288636	1634548	37	07	30	88	52	30	3181334	1497724
37	30	00	88	22	30	3324713	1634970	37	07	30	88	45	00	3217600	1497998
37	30	00	88	15	00	3360791	1635441	37	07	30	88	37	30	3253865	1498322
37	30	00	88	07	30	3396867	1635962	37	07	30	88	30	00	3290131	1498697
37	30	00	88	00	00	3432942	1636533	37	07	30	88	22	30	3326395	1499121
37	22	30	89	45	00	2927715	1587775	37	07	30	88	15	00	3362659	1499595
37	22	30	89	37	30	2963857	1587700	37	00	00	89	30	00	3000000	1451809
37	22	30	89	30	00	3000000	1587675	37	00	00	89	22	30	3036329	1451834
37	22	30	89	22	30	3036142	1587700	37	00	00	89	15	00	3072659	1451909
37	22	30	89	15	00	3072285	1587775	37	00	00	89	07	30	3108988	1452034
37	22	30	89	07	30	3108427	1587899	37	00	00	89	00	00	3145317	1452209
37	22	30	89	00	00	3144569	1588073	37	00	00	88	52	30	3181645	1452434



TABLE 2—LATITUDE SCALE REDUCTION AND EXPANSION FACTORS

Deg.	Min.	Sec.	Reduction	Expansion
42	37	30	0.9981	1.0019
42	30	00	0.9980	1.0020
42	22	30	0.9978	1.0022
42	15	00	0.9977	1.0024
42	7	30	0.9975	1.0025
42	00	00	0.9974	1.0026
41	52	30	0.9972	1.0028
41	45	00	0.9971	1.0029
41	37	30	0.9970	1.0030
41	30	00	0.9969	1.0031
41	22	30	0.9968	1.0033
41	15	00	0.9967	1.0034
41	7	30	0.9966	1.0035
41	00	00	0.9965	1.0036
40	52	30	0.9964	1.0036
40	45	00	0.9963	1.0037
40	37	30	0.9962	1.0038
40	30	00	0.9961	1.0039
40	22	30	0.9961	1.0040
40	15	00	0.9960	1.0040
40	7	30	0.9960	1.0042
40	00	00	0.9959	1.0042
39	52	30	0.9958	1.0042
39	45	00	0.9957	1.0043
39	37	30	0.9957	1.0043
39	30	00	0.9957	1.0044
39	22	30	0.9956	1.0044
39	15	00	0.9956	1.0044
39	7	30	0.9956	1.0044
39	00	00	0.9956	1.0045
38	52	30	0.9955	1.0045
38	45	00	0.9955	1.0045
38	37	30	0.9955	1.0045
38	30	00	0.9955	1.0045
38	22	30	0.9955	1.0045
38	15	00	0.9955	1.0045
38	7	30	0.9956	1.0045
38	00	00	0.9956	1.0045
37	52	30	0.9956	1.0045
37	45	00	0.9956	1.0044

(Continued on next page)



TABLE 2—Continued

Deg.	Min.	Sec.	Reduction	Expansion
37	37	30	0.9956	1.0044
37	30	00	0.9957	1.0044
37	22	30	0.9957	1.0043
37	15	00	0.9958	1.0043
37	7	30	0.9958	1.0042
37	00	00	0.9959	1.0042
36	52	30	0.9959	1.0041
36	45	00	0.9960	1.0040

TABLE 3—FORMULAE USED IN CONSTRUCTION OF LAMBERT CONFORMAL CONIC PROJECTION TABLES FOR ILLINOIS

$$\ell = \frac{\log_e \cos \phi_1 - \log_e \cos \phi_2 + \log_e N_1 - \log_e N_2}{\log_e \tan \frac{\xi_1}{2} - \log_e \tan \frac{\xi_2}{2}}$$

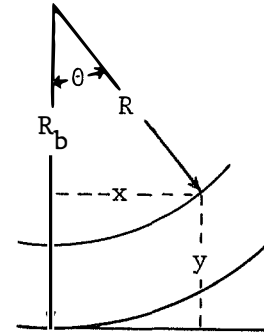
$$K = \frac{N_1 \cos \phi_1}{\ell \tan^{\ell} \frac{\xi_1}{2}} = \frac{N_2 \cos \phi_2}{\ell \tan^{\ell} \frac{\xi_2}{2}}$$

$$R = K \tan^{\ell} \frac{\xi}{2}$$

$$\Theta = \ell (\Delta\lambda) = \ell (89^{\circ}30' - \lambda)$$

$$X = R \sin \Theta$$

$$Y = R_b - R \cos \Theta$$



Central  
meridian

where

$\phi$  = Geodetic latitude

$\lambda$  = Geodetic longitude

$N$  = Radius of curvature perpendicular to the meridian

$\xi$  = Isometric colatitude

$\ell$  = 0.63049996

$K$  = 12452654.312

$R_b$  = 9,829,278 meters

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