

Kansas Geological Survey

Open File Report 99-48

Users Guide for the LEO System

Version 3.9

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by

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Disclaimer

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input1b -- file with footages from implied or specified corner
arranged from smallest to largest descriptors

variables: FTNS,FTEW,CORN,SUBD(4),SECT,TSHP,RANG,EW

format (2f8.0) , 1x, A2, 4 (1x, A2) , 3 (1x, I2) , 1x, A1)

-1320.	-2343.	NE	16	22	5	E
1322.	603.	SW	34	21	4	E
1660.	669.		15	19	4	E
346.	2644.	SW	17	17	4	E
1971.	-2010.	SE	20	17	4	E
992.	-338.		16	17	2	E
-2287.	1328.	NW	3	17	2	E
653.	2.	SW	4	17	1	E

output1b

96.88490	38.14019
96.98458	38.17682
96.98253	38.39639
97.01306	38.56670
97.01069	38.55673
97.20695	38.56861
97.20132	38.60314
97.33422	38.59675

input2a -- file with subdivisions arranged from largest to
smallest location descriptors

variables: TSHP,RANG,EW,SECT,SUBD(4),CORN,FTNS,FTEW

format (2 (1x, I2) , 1x, A1, 1x, I2, 4 (1x, a2) , 1x, a2, 2f8.0)

20	3	E	21	NE	SW	NE	SE	N
11	20	W	14	NE	NE	SE	SE	
11	20	W	14	NE	NE	SE	SE	c
11	20	W	14	NE	NE	SE	SE	N
11	20	W	14	NE	NE	SE	SE	SW
33	41	W	26	NW	SE	SW	NW	SW

output2a

97.10028	38.30005		
99.50088	39.10014	99.49973	39.10015
99.50089	39.09924	99.49974	39.09924
99.50031	39.09969		
99.50031	39.10015		
99.50089	39.09924		
101.75004	37.14978		

input2b -- file with subdivisions arranged from smallest to largest location descriptors

variables: FTNS,FTEW,CORN,SUBD(4),SECT,TSHP,RANG,EW

format (2f8.0) , 1x, A2, 4 (1x, A2) , 3 (1x, I2) , 1x, A1)

```
  N  SE NE SW NE 21 20  3 E
 NE SE SE NE NE 14 11 20 W
 SW NW SW SE NW 26 33 41 W
```

output2b -- LEO3.9 determines UTM zone and corresponding X,Y coordinates

```
336683.00  4240243.15 15
456787.75  4327801.22 14
764549.08  4115397.21 13
```

input2b14 -- file with subdivisions arranged from smallest to largest location descriptors (same as input2b)

variables: FTNS,FTEW,CORN,SUBD(4),SECT,TSHP,RANG,EW

format (2f8.0) , 1x, A2, 4 (1x, A2) , 3 (1x, I2) , 1x, A1)

```
  N  SE NE SW NE 21 20  3 E
 NE SE SE NE NE 14 11 20 W
 SW NW SW SE NW 26 33 41 W
```

output2b14 -- LEO3.9 determines X,Y coordinates for user specified zone (e.g., zone = 14)

```
861426.58  4246678.70 14
456787.75  4327801.22 14
231659.45  4115517.21 14
```

input3 -- file with decimal degrees

variables: PLON,PLAT; (longitude,latitude)

format: comma or space delimited, longitude positive or negative (output format, which is: (1x,F11.5,F9.5), may be used for input)

```
-96.88510,38.13997
-96.98501,38.17687
-96.98219,38.39632
-97.01253,38.56678
97.01103,38.55632
97.20639,38.56860
97.20162,38.60349
97.33399,38.59667
```

output3

```
22  5  E 16          NE  -1400.  -2401.
21  4  E 34          SW   1341.    480.
19  4  E 15          SW   1635.    766.
17  4  E 17          SE    342.   -2496.
17  4  E 20          SE   1823.  -2108.
17  2  E 16          SE    988.   -179.
17  2  E  3          NW  -2160.  1240.
17  1  E  4          SW    624.    68.
```

input4a -- file with UTM coordinates (metric)

variables: UTMx, UTMy, zone

UTM zones in Kansas:

zone 15 -- 90-96 degrees west longitude

zone 14 -- 96-102 degrees west longitude

zone 13 -- 102-108 degrees west longitude

format: comma or space delimited, longitude positive or negative
(UTM output format: (2f12.2,1x,i2), may be used for input)

```
320749.72 4353651.00 15
504100.03 4297504.00 14
240466.00 4264165.50 14
```

output4a -- three subdivisions arranged largest to smallest

```
8 21 E 33 NW NE SW NE
14 15 W 14 SE SW SE C
18 42 W 17 NE SE NE C
```

Input4b -- file with UTM coordinates (metric) same as last two
coordinate pairs from input4a

variables: UTMx,UTMy (requires user identification of zone)

```
504100.03 4297504.00
240466.00,4264165.50
```

Output4b14 -- four subdivisions arranged largest to smallest with correct
zone identification (zone = 14)

```
14 15 W 14 SE SW SE SW NE
18 42 W 17 NE SE NE SW NE
```

Output4b15 -- four subdivisions arranged largest to smallest with incorrect
zone identification (zone = 15)

```
18 13 E 16 NE NW SW NE C -10 [invalid longitude]
```

CAUTION:

The conversion programs contained in LEO3, and earlier versions of LEO, are normally discussed in terms of conversions between 'legal' and geographic reference systems (and now the projected UTM map coordinate system). 'Legal' in this context refers only to the fact that the format of location descriptions conform to the nomenclature of the Public Land Survey System (PLSS) which is used in actual LEGAL descriptions of surveyed property. LEO3 is NOT intended for use in determining such locations for use in actual legal proceedings.

There are many irregular section (not accurately described by a four sided polygon) for which the LEO system can only produce gross approximations of the correct conversion. The conversion procedures for many partial sections or sections which otherwise have PLSS subdivisions described as 'lots' remain inadequate. The most significant errors of this type will be associated with locations in the western parts of the western tier of sections in Range 8 East (increasing with each Township south), the western tier of sections in Townships 31-35 of Range 17 East, the western tier of sections in Townships 1-5 of Range 9 West, and the western tier of sections in Townships 1-5 of Range 25 West; or with locations in the northern parts of the northern tier of sections in Township 26 of Ranges 3-41 West.

However, for the vast majority of sections in Kansas, the LEO3 system will provide conversions which are satisfactory for many applications.

LEO3 provides (longitude,latitude) coordinates with a precision of five decimal places in decimal degree notation. This is comparable to approximately one meter precision (i.e., plus or minus three feet). Section corner locations used in LEO3BASE are derived from USGS 7.5' topographic maps at a scale of 1:24,000. Location accuracy, consistent with National Map Accuracy Standards plus repeatability constraints of the Survey's digitizing equipment, are on the order of 40-50 feet of true ground position.

The BEST results in use of LEO3 will be obtained if input data is taken from differential processing of Global Positioning Satellite data which is then converted using LEO3 to footages from surveyed corners of the Public Land Survey System. The reverse process can be used to relocate positions originally located by surveyed footages from a PLSS section corner. Using geographic coordinates output from LEO3 as input to GPS equipment, the GPS equipment can then be used as a navigating device to find the location in the field.

The user is advised that Public Land Survey descriptions other than footage measurements from surveyed section corners are not generally designed for the purpose of determining a point location. Therefore, descriptions such as those commonly used in older oil and gas records relating to well locations must be considered to be approximations of the true location.

For example, "the center of the SW quarter of the NE quarter of the NW quarter of the NW quarter of section 27, Township 15 South, Range 29 West," which would be entered as:

15 29 W 27 NW NW NE SW C

is located at:

(lon,lat) = (100.53822,38.72758)

If this geographic coordinate is input to LEO3 with output option 2, the resulting location will be:

15 29 W 27 NW -496. 827.

which is 496 feet south and 827 feet east of the NW corner of section 27.

If this location is provided as input to LEO3 as:

15 29 W 27 NW -496. 827.

the conversion to geographic coordinates will again produce (using option 2):

(lon,lat) = (100.53822,38.72758)

These geographic coordinates, converted to PLSS format using option 0, will give the original description:

15 29 W 27 NW NW NE SW C

However, a different location:

15 29 W 27 NW -420. 750.

or

(lon,lat) = (100.53849,38.72779)

if entered in LEO3 as (lon,lat) using option 0 will also return:

15 29 W 27 NW NW NE SW C

as the approximate location.

```

C                               Variables:
C                               -----
C
C SOURCE CODES
C   (provided interactively in all cases)
C
C   SOURCE and RESULT = indicate the direction of the conversion:
C       1=Legal; Public Land Survey location reference
C       2=Geographic; longitude,latitude coordinates
C       3=UTM; Universal Transverse Mercator (x,y) in meters
C
C PUBLIC LAND SURVEY (PLSS) LOCATION DESCRIPTION
C
C   TSHP = Township number, 1-35
C   RANG = RANG number, 1-25 if EW='E', 1-43 if EW='W'
C   EW = RANG direction from central meridian 'E' or 'e'= East,
C       'W' or 'w'= West
C   SECT = Section number, 1-36, =0 to specify the township
C       as the area for corner/side midpoint selection or as
C       the four corner locations for the 4-corner option
C
C   SUBD = from 1-4 subdivisions of the section, each applied to
C   the result of the previous ones. Subdivisions are defined as
C   selection of a half or quarter of the area being divided, and
C   are specified by letters representing points of the compass:
C
C   1/4 Area....   NE or Ab....Northeast   (b=blank)
C                   NW or Bb....Northwest
C                   SW or Cb....Southwest
C                   SE or Db....Southeast
C                   bb....Unused
C   1/2 Area..... Nb or N2.....North
C                   Sb or S2....South
C                   Eb or E2....East
C                   Wb or W2....West
C                   bb....Unused
C
C   SUBD(1)=The largest (1/n section) subdivision,and the one
C           that is applied first (to the whole section).
C   SUBD(2)=The second largest (1/n-1/n section) subdivision.
C   SUBD(3)=The second smallest (1/n-1/n-1/n section) subdivision
C   SUBD(4)=The smallest (by area 1/n-1/n-1/n-1/n section) and the
C           last subdivision to be applied to the result of the
C           preceding three subdivisions in SUBD(1-3)
C           (where each 1/n represents either 1/2 or 1/4)
C
C   CORNR = If SOURC=1 (Legal), CORNR specifies, in the same form
C           as the SUBD values, one of nine points in the target
C           area defined by the legal description,including the
C           subdivisions in SUBD. The nine points are the four
C           corners,the side midpoints (S,N...) and the center.
C           When SOURCE=2 (Geographic) and OPTION = 0, CORNR is
C           set to indicate the closest one of the nine points
C           within the fourth subdivision to the point described
C           in PLON,PLAT
C

```

C FTNS = Footage applied to the north if > 0, south (if < 0)
 C FTEW = Footage applied to the east if > 0, west if < 0
 C NOTE: footages are applied from the section or township
 C corner implied by the signs of the footage values,
 C unless a corner is identified explicitly by CORNR.
 C Implicit: FTNS<0 and FTEW<0 imply CORNR=NE
 C FTNS<0 and FTEW>0 imply CORNR=NW
 C FTNS>0 and FTEW>0 imply CORNR=SW
 C FTNS>0 and FTEW<0 imply CORNR=SE
 C Explicit: If the section is not laid out on
 C true NS-EW lines, then (as an example)
 C some locations in the section may lie
 C to the north and east of the SE corner.
 C To calculate the geographic coordinates
 C of such a point, set:
 C FTNS>0 and FTEW>0, and
 C CORNR=SE (to over-ride implicit SW)
 C NOTE: when both footages are 0, the lengths of the section
 C sides (in feet) are returned in LONX (1-4,1)
 C
 C OPTIONS WHEN INPUTING PLSS LOCATION DESCRIPTIONS
 C (currently required with each location record in batch input)
 C
 C OPT = Specifies method of locating point in the target area
 C within the section (see Subdivision). When SORCE=1,
 C the option implied by the OPT value is:
 C
 C 0=return four corners of the smallest area specified
 C by SUBD or, if requested, its center, a corner or
 C a side midpoint (must use CORNR to select closest
 C significant point)
 C 1=select the corner/side midpoint specified in SUBD
 C of a selected section (SECT) or township (SECT=0)
 C 2=apply given footages from implied section corner
 C (or return section side lengths when footages=0)
 C 3=return the locations of the four corners of the
 C specified section or the township (SECT=0)
 C 4=select the center (as in 0), but in degrees, minutes,
 C and seconds of lon/lat, the DMS option (must use
 C CORNR to select closest significant point)
 C 5=(as in 1) select the specified corner or side
 C midpoint of a section, but return in DMS form
 C 6=apply footages from the implied section or township
 C corner, but return in DMS form in LONX (1,1-3)
 C and LATX (1,1-3)
 C 7=return the section or township four corners,
 C but in the DMS form
 C
 C Options 0/4 will return four corners if a point location
 C (i.e., center, corner or side mid-point) is not explicitly
 C requested. With these options, "C" means 'CENTER.'
 C
 C Options 1/5 will return four corners if a point location
 C (i.e., center, corner or side mid-point) is not explicitly
 C requested. With these options, "C" means 'SW CORNER.'
 C Options 1/5 will NOT return a CENTER location.
 C
 C Options 3/7 will only return section or township corners.
 C No subdivisions are considered in these option.
 C
 C NOTE: For OPT=0-2, the geographic location is returned via PLON
 C and PLAT with a positive longitude. All other options use
 C LONX and LATX to return 1 or 4 values, (all in DMS except
 C the basic 4-corners option=3), with positive longitude(s)
 C

C OPTIONS WHEN INPUTTING GEOGRAPHIC LOCATION COORDINATES
C (currently sets OPT=0 if batch processing)
C
C OPT=Specifies method of locating point in the target area
C within the section. When SORCE=2, the option implied by
C the OPT value is:
C
C 0=Input is in decimal degrees (in PLON < 0, PLAT)
C 1=Input is in the DMS form (in LONX > 0, LATX)
C

C GEOGRAPHIC LOCATION DESCRIPTIONS
C
C PLON = Longitude of Point for or from conversion (positive)
C PLAT = Latitude of Point
C
C LONX, LATX = longitude, latitude in degrees, minutes, seconds for
C the DMS option, if SORCE=2, the geographic location is
C stored in LONX and LATX with degrees of longitude in
C LONX(1,1) and minutes and seconds in LONX(1,2-3). The
C corresponding degrees, minutes, and seconds of latitude
C are stored in LATX(1,1-3). When SORCE=1 (Legal), the
C converted output location is stored in the same manner,
C as well as in PLON and PLAT. For the 4 corners option,
C the 4 corner locations are stored similarly with the NW
C corner in LON/LATX(1,1-3), the NE corner in (2,*)
C the SW in (3,*) and the SE in (4,*).
C

C OPERATION STATUS CODES
C
C STAT = code indicating success or failure of the requested
C operation. The codes are:
C
C 1=SUCCESS
C 10=Warning: Footage is measured from a protracted
C corner. No PLSS corners are available for this
C section if option searched for closest corner.
C 16=Warning: N-S footage exceeds average distance
C between north and south section corners.
C 17=Warning: E-W footage exceeds average distance
C between east and west section corners.
C 34=Part of the requested subdivision lies outside the
C state. Information is provided for the portion of
C the subdivision in Kansas.
C 35=Part of the requested subdivision lies outside the
C state. The requested point in that subdivision is
C in Kansas.
C 36=Part of the requested subdivision lies outside the
C state. The requested point in that subdivision also
C lies outside Kansas. Information is provided for
C the corresponding point in the partial subdivision.
C 41=Footage is measured from protracted (NE)
C section corner.
C 42=Footage is measured from protracted (NW)
C section corner.
C 43=Footage is measured from protracted (SW)
C section corner.
C 44=Footage is measured from protracted (SE)
C section corner.
C 45=Combination of STAT=16 and STAT=41
C 46=Combination of STAT=17 and STAT=41
C 47=Combination of STAT=16 and STAT=42
C 48=Combination of STAT=17 and STAT=42
C 49=Combination of STAT=16 and STAT=43
C 50=Combination of STAT=17 and STAT=43
C

C 51=Combination of STAT=16 and STAT=44
 C 52=Combination of STAT=17 and STAT=44
 C
 C -1=Township number not permitted
 C -2=Range number not permitted
 C -3=RANG direction (EW) not 'E' or 'W'
 C -4=Section number not permitted
 C -5=Illegal/unrecognized subdivision spec #1
 C -6= " " " " #2
 C -7= " " " " #3
 C -8= " " " " #4
 C -9=Illegal conversion direction (SORCE) value
 C -10=Invalid Longitude for LEO/KGS
 C -11=Invalid Latitude for LEO/KGS
 C -12=Invalid value for OPT
 C -13=Database (LEOBASE) I/O error
 C -14=Thrashing error on the Township level
 C -15=Thrashing error on the Section level
 C -16=Illegal footages from explicit corner
 C -17=Error in degrees, minutes, or seconds value
 C -18=Missing SUBD value for OPT=1 or 5
 C -19=Township record has no usable sections
 C -20=Point-in-Polygon Error
 C -21=One township corner missing from the Kansas PLSS
 C -22=Two township corners missing from the Kansas PLSS
 C -23=Three township corners missing from the Kansas PLSS
 C -24=All four township corners missing from the Kansas
 C PLSS
 C -25=Illegal or unrecognized CORNER specification
 C -26=Option is not allowed for townships
 C -27=Illegal record # in township search
 C -28=Failed search within incomplete township
 C -31=One or more section corner protracted or now in
 C Missouri
 C -32=Section is not within the Kansas PLSS or no longer
 C in Kansas
 C -33=Requested subdivision is entirely outside the state
 C -37=The requested point lies outside the state.
 C Only one corner of the specified subdivision lies
 C in Kansas.
 C -51=Implied corner of origin for footage measurement is
 C ambiguous. Location could be due north of SE or SW
 C corner.
 C -52=Implied corner of origin for footage measurement is
 C ambiguous. Location could be due south of NE or NW
 C corner.
 C -53=Implied corner of origin for footage measurement is
 C ambiguous. Location could be due east of SW or NW
 C corner.
 C -54=Implied corner of origin for footage measurement is
 C ambiguous. Location could be due west of NE or SE
 C corner.
 C -99=Special section requires non-standard subdivision
 C

```

C CODES REFLECTING BASIS FOR NONSTANDARD SUBDIVISION OF SECTION IN PLSS
C (even if subdivided in four equal parts by LEO3)
C These codes are not yet fully implemented in LEO3.9
C The code is provided as output based on evaluation of the
C section flag (see SFLAG). Therefore, a section code of '1111'
C may exist in LEO3BASE which will eventually be changed to permit
C more appropriate (and hopefully more accurate conversion between
C PLSS style location descriptions and geographic coordinates.
C
C Standard section subdivision (for full sections) in the Public
C Land Survey System (PLSS) was accomplished by bisecting sides of
C sections to establish quarter corners and then connecting
C opposite quarter corners to establish boundaries of the quarter
C sections. The process would then be repeated to establish
C quarter-quarters, etc. If a standard section could not be
C surveyed because of the existence of excluded water bodies
C (RIVER), indian lands (TREATY), military reserves or land grants
C (RESERVE), state boundaries (STLINE) or survey adjustment --
C normally along sections at the north or west edge of each
C township (SLACK*)
C
C NONSTD = 2, if STLINE = 1
C          = 4, if RIVER = 1
C          = 6, if STLINE = 1, and RIVER = 1
C          = 8, if RESERVE = 1
C          = 10, if STLINE = 1, and RESERVE = 1
C          = 12, if RIVER = 1, and RESERVE = 1
C          = 14, if STLINE = 1, and RIVER = 1, and RESERVE = 1
C          = 16, if TREATY = 1
C          = 18, if STLINE = 1, and TREATY = 1
C          = 20, if RIVER = 1, and TREATY = 1
C          = 22, if STLINE = 1, and RIVER = 1, and TREATY = 1
C          = 24, if RESERVE = 1, and TREATY = 1
C          = 26, if STLINE = 1, and RESERVE = 1, and TREATY = 1
C          = 28, if RIVER = 1, and RESERVE = 1, and TREATY = 1
C          = 30, if STLINE = 1, and RIVER = 1, and RESERVE = 1,
C                    and TREATY = 1
C          = 32, if SLACKN = 1, or SLACKW = 1, or SLACKNW =1
C          = 34, if STLINE = 1 & SLACK
C          = 36, if RIVER = 1 & SLACK
C          = 38, if STLINE = 1, and RIVER = 1 & SLACK
C          = 40, if RESERVE = 1 & SLACK
C          = 42, if STLINE = 1, and RESERVE = 1 & SLACK
C          = 44, if RIVER = 1, and RESERVE = 1 & SLACK
C          = 46, if STLINE=1, and RIVER=1, and RESERVE=1 & SLACK
C          = 48, if TREATY = 1 & SLACK
C          = 50, if STLINE = 1, and TREATY = 1 & SLACK
C          = 52, if RIVER = 1, and TREATY = 1 & SLACK
C          = 54, if STLINE=1, and RIVER=1, and TREATY=1 & SLACK
C          = 56, if RESERVE = 1, and TREATY = 1 & SLACK
C          = 58, if STLINE=1, and RESERVE=1, and TREATY=1 & SLACK
C          = 60, if RIVER=1, and RESERVE=1, and TREATY=1 & SLACK
C          = 62, if STLINE = 1, and RIVER = 1, and RESERVE = 1,
C                    and TREATY = 1 & SLACK
C          = NONSTD+100, if one or more corners of the section
C          must be redefined from the values given in LEO3BASE.
C          = NONSTD+200, if the section involved in either
C          conversion is in some way irregular, requiring that
C          subdivision of the section be performed in a non-std
C          manner (i.e. other than the standard four equal parts
C          subd.)
C          = 0,if the section is subdivided in the Public Land
C          Survey in the standard fashion
C
C FLAGS GIVING INFORMATION ABOUT TOWNSHIPS, SECTIONS OR SECTION CORNERS

```

C
C TFLAG = township flag, = 36 if all 36 sections have 4 defined
C corners, = 0 if no sections have 4 defined corners, or = n,
C 0 < n < 36, n = number of sections with 4 defined corners
C
C
C SFLAG = Section flag
C For sections with 4 defined corners in LEO3BASE which are
C sufficient for subdivided by standard procedures:
C SFLAG = four digit code (>0) with each digit having
C a value of 1, 2, 3, or 4. The digits reflect the
C source status of each of the four corners as follows:
C 1 = corner surveyed in PLSS, with location in KS.
C 2 = corner not surveyed in Kansas PLSS. LEO3BASE
C uses protracted location inside Kansas borders.
C 3 = corner not surveyed in Kansas PLSS. LEO3BASE
C uses protracted location outside Kansas borders.
C 4 = corner surveyed in Kansas PLSS, with location
C now in Missouri due to shift in state boundary
C associated with shift in location of Missouri
C River.
C The digits refer, in order (left to right), to the NE,
C NW, SW, and SE corner locations (similar to the USGS
C use of 'a-b-c-d' with 'NE-NW-SW-SE.' Therefore, SFLAG
C for sections which LEO3 will subdivide by standerd
C procedures will have non-sero digits with values from
C 1 to 4 and at least one digit with a value of 1 or 2.
C For example:
C Section flag Meaning
C 1111 all corners surveyed and in Kansas
C 1311 the NW corner location is protracted
C into Missouri.
C 1121 the SW corner location is protracted
C into excluded areas in Kansas.
C 4111 the NE corner is a surveyed location
C of the Kansas Public Land Survey
C System which is now in Missouri.
C
C For partial sections falling along the Missouri, Oklahoma
C or Missouri borders (other than the Missouri River):
C SFLAG = 5000 + normal code
C On the Missouri line, 3113 becomes 8113.
C The section at the SE corner of Kansas has SFLAG=8133.
C On the Oklahoma line, 1133 becomes 6133.
C The section at the SW corner of Kansas has SFLAG=6333.
C On the Colorado line, 1331 becomes 6331.
C
C For partial sections resulting from areas excluded from the
C PLSS by water (major rivers):
C SFLAG = 500 + normal code
C
C For partial sections resulting from areas excluded from
C the PLSS by milirary reserves (e.g., Ft. Riley and Ft.
C Leavenworth) or prior land grants (e.g., the Half-Breed
C Lands north of the Kansas River between Topeka and
C Lawrence, or the Republican River Bridge Company Lands on
C the south side of the Ft. Riley Reserve):
C SFLAG = 50 + normal code
C

C For sections in which the PLSS was completed in two stages
 C as the result of lands originally excluded from the PLSS
 C (primarily as Indian lands with a few land grants):
 C SFLAG = 5 + normal code
 C In most cases these sections are complete
 C (i.e., they are approximately 640 acres - one
 C square mile). Due to the separate surveys on
 C either side of old Indian boundaries, these
 C sections have a mixture of standard and
 C nonstandard subdivisions and may require care
 C in the interpretation of legal descriptions
 C of locations within the sections. Footage
 C measurements would generally be preferable.
 C
 C For sections which do not exist because the area where they
 C would be located falls completely within lands excluded
 C from the Kansas Public Land Survey System):
 C SFLAG = 0, or -n as defined below (when some form of
 C processing or comment is deemed appropriate)
 C
 C For sections which require some nonstandard treatment for
 C accurate subdivision:
 C SFLAG = -n, where n is the normal code for SFLAG.
 C When SFLAG<0 the system calls FEDX, a subroutine
 C for special handling. Within FEDX, the process
 C is directed to a statement number which matches
 C the township record number in LEO3BASE of the
 C township which contains that section. The
 C township record number is based on Township,
 C Range, and Range direction (E or W) as follows:
 C If range direction is east:
 C TRECBL = (TSHIP - 1) * 68 + RANGE + 43
 C If range direction is west:
 C TRECBL = (TSHIP - 1) * 68 + 44 - RANGE
 C Routines for any sections which require special
 C handling within a township will be found in FEDX
 C after the statement number matching that
 C township's record number in LEO3BASE.
 C
 C SCOR = corner flag
 C If the absolute value of SFLAG = abcd (non-zero), then:
 C SCOR(1) = a, or SCOR(1) = a-5 if a>5
 C SCOR(2) = b, or SCOR(2) = b-5 if b>5
 C SCOR(3) = c, or SCOR(3) = c-5 if c>5
 C SCOR(4) = d, or SCOR(4) = d-5 if d>5
 C The value of SCOR reflects the source status of each
 C section corner as described for SFLAG. This source
 C status is based on the corner's representation on USGS
 C 7.5' quadrangle maps or, where that is unclear, on
 C information obtained from county surveyor's or the
 C original plats of the PLSS maintained by the Kansas
 C Historical Society in Topeka, Kansas.
 C