

CHAPTER 6 PORTRAYAL OF GRIDS ON MAPS AT 1:100,000 SCALE AND LARGER

6-1 GENERAL.

6-1.1 Requirements for grid data and grid formats on maps prepared for the DoD at 1:100,000 scale and larger are essentially the same for Universal Transverse Mercator grids, Universal Polar Stereographic grids and nonstandard grids.

6-1.2 The grid data for DoD maps usually include the major grid, a declination diagram, a grid reference box, and notes identifying the grid.

6-1.3 The adjacent grid is provided as an overlapping grid when a map lies within approximately 40 kilometers of a grid junction line or a datum junction boundary. A separate declination diagram and notes identifying the overlapping grid appear in the margin for grid junctions, and may or may not appear for datum junctions, depending on grid alignments.

6-1.4 A map may show a secondary grid which occurs in the area. The secondary grid is identified by margin notes.

6-1.5 Normally, no single map of a foreign area in this scale category ever shows more than three grids. When a sheet covers an area which includes more than three grids (either major, overlapping, or secondary), those omitted are the ones which are considered of least military importance. Major grids are never omitted. When choice lies between two overlapping grids, the one retained usually is the one which occurs most frequently on the sheets in the general area. Domestic maps may show up to five grids.

6-1.6 Specific dimensions, size and style of type, and placement of margin data relating to grids and grid formats at 1:100,000 scale and larger are contained in DMA product specifications.

<H36>2 THE MAJOR GRID

6-2.1 The major grid is indicated by full lines at 1,000-unit intervals. Every 10,000-unit grid line is accentuated in weight.

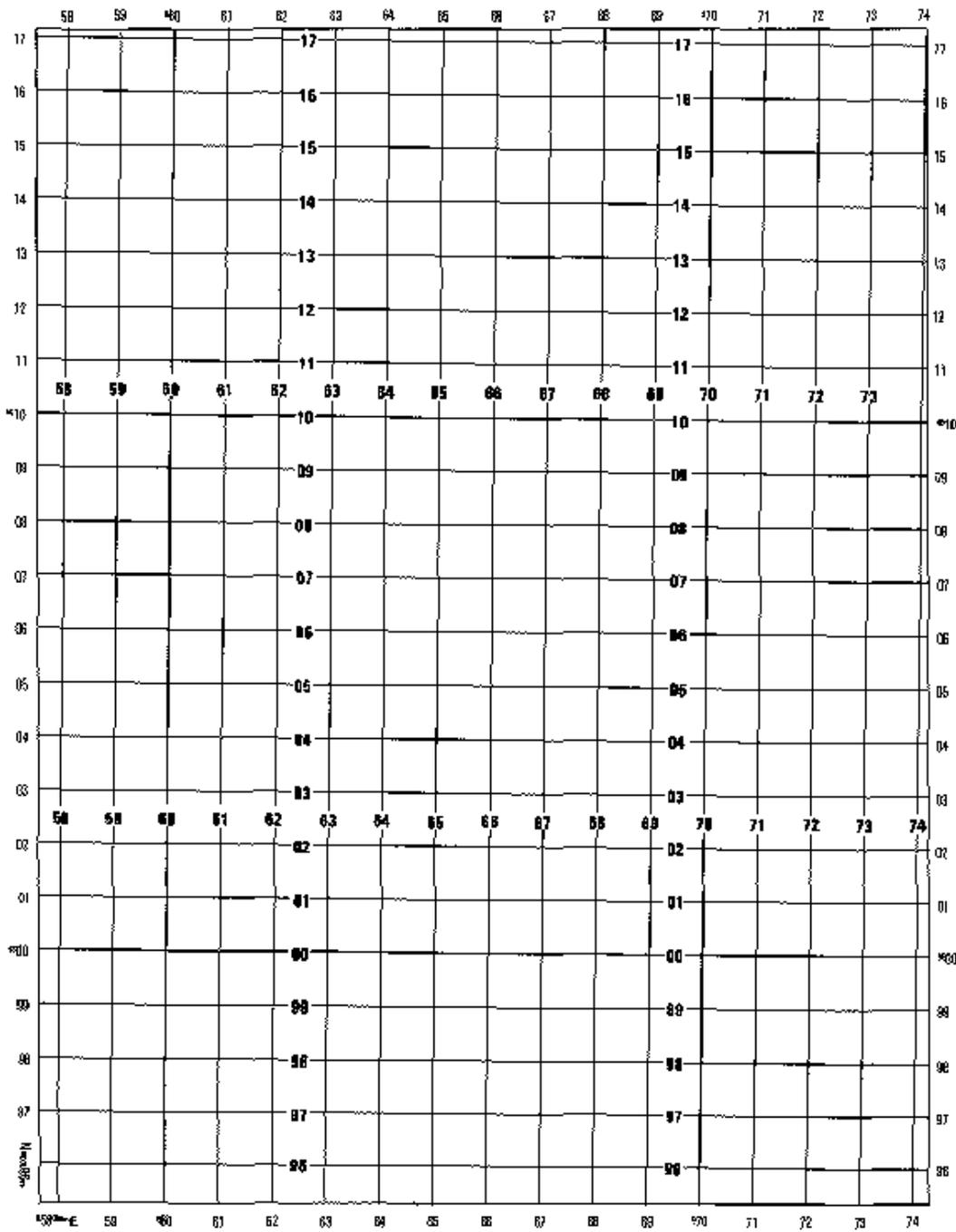
6-2.2 Grid numbers appear outside the neatline on all four sides of the sheet, labeling each grid line. Where a grid line coincides with a neatline of the map, the grid line is omitted, but the neatline is labeled in the margin with the values for the grid line.

6-2.3 Basically, all grid lines are labeled with two principal digits which represent the 10,000- and 1,000-unit values of the grid line, respectively. Some variations to this basic labeling are:

6-2.3.1 On all 10,000-unit grid lines, the basic two principal digits are preceded by the 100,000-unit digits. See figures 13 and 14.

6-2.3.2 On sheets with one major grid, only the first grid lines in each direction from the southwest corner are given full coordinate values. See figures 13 and 14.

6-2.3.3 On sheets containing grid zone junctions, junctions of major grids, or datum junctions, the first grid lines in each direction from all four corners are given full coordinate values. See figures 15, 16, and 18.



ELLIPSOID WORLD GEODETIC SYSTEM
 GRID 1,000 METER UTM ZONE 48

Scale 1:50,000 (in miniature)

Figure 13. The Major Grid as Shown on a 1:50,000 Scale Map.

6-2.3.4 On sheets showing the major and overlapping grids, the first grid line and grid tick in each direction from the southwest corner are given the full coordinate values for both grids. See figure 17.

- 6-2.3.5 On the Madagascar grid and the Lambert grids of northwest Africa, use three principal digits to represent the 100,000-, 10,000-, and 1,000-meter values of the grid lines.
- 6-2.4 The grid lines in the map interior contain a pattern of grid value labels (principal digits) designed to assist in position referencing on a folded map. The pattern, referred to as a grid ladder, may appear in either of two forms:
 - 6-2.4.1 One row (easting) and one column (northing) intersecting at the approximate center of the sheet.
 - 6-2.4.2 Two rows (easting) and two columns (northing) intersecting at approximate one- third intervals across the sheet. The principal digits are centered between adjacent horizontal (northing) and vertical (easting) grid lines. The digits may be displaced or omitted if they impair the legibility of important map detail. Omissions are held to a minimum. Grid ladder treatments are illustrated in figures 13 and 14.
- 6-2.5 The color of the grid values is governed by the grid system.
 - 6-2.5.1 Black (blue for 1:100,000 scale) is used when the major grid is the Universal Transverse Mercator or the Universal Polar Stereographic.
 - 6-2.5.2 With nonstandard grids, the color varies. It may be black, blue, or red-brown. The color to be used with each particular nonstandard grid is specified in Chapter 4.
- 6-2.6 A note identifying the grid and ellipsoid appears in the lower margin of a sheet. The note is modeled after one of the following:

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ELLIPSOID.....BESSEL
GRID.....1,000 METER UTM ZONE 53
              (BLACK NUMBERED LINES)

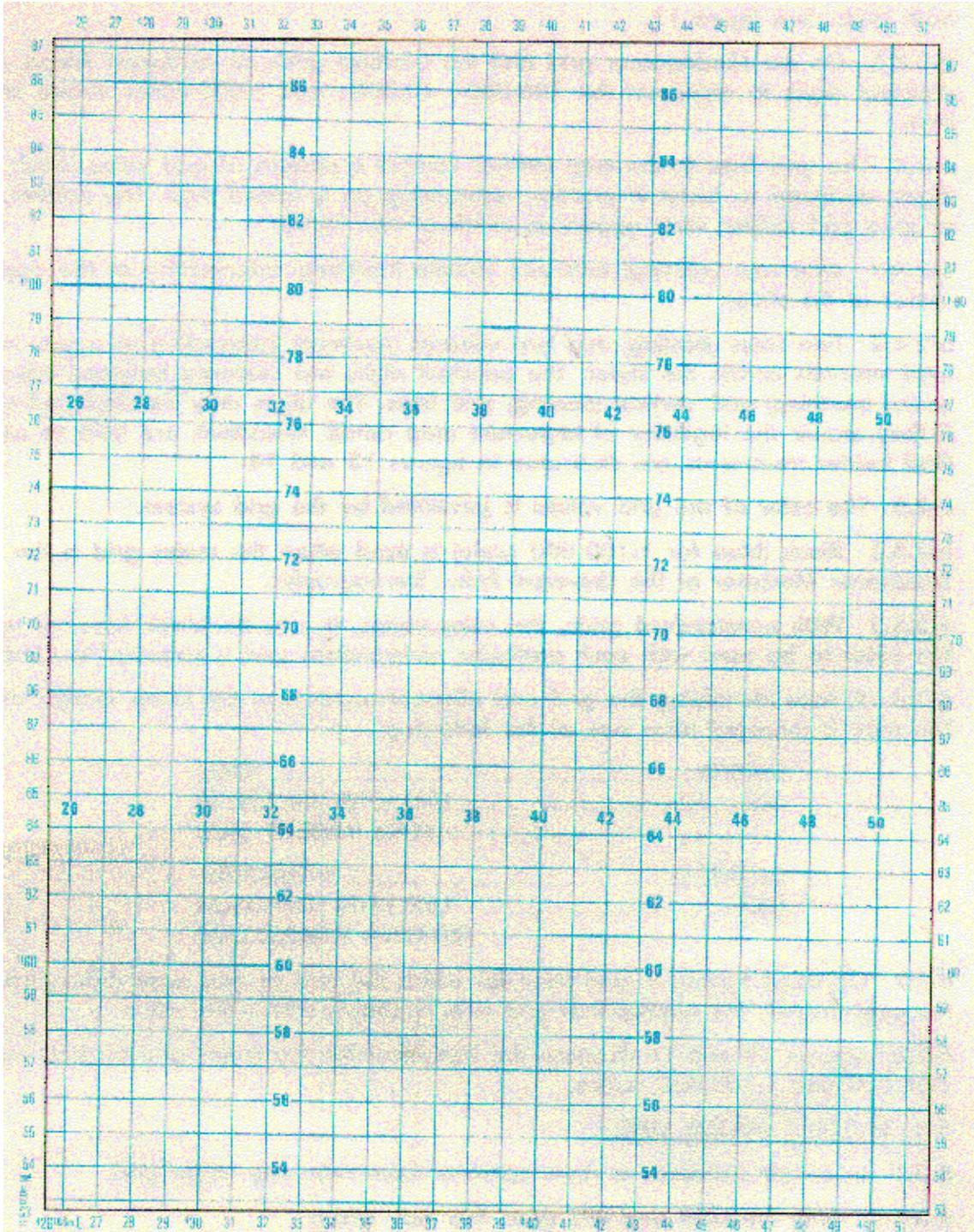
ELLIPISOID.....INTERNATIONAL
GRID.....1,000 METER MADAGASCAR
              (RED-BROWN NUMBERED LINES)

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- 6-2.7 On maps having a land inset for which the grid or grid zone differs from that of the map proper, the appropriate grid note is shown within the inset.
- 6-2.8 Figures 13 and 14 illustrate the treatment for the major grid on DoD mapping at 1:50,000 and 1:100,000 scales.

6-3 MULTIPLE MAJOR GRIDS.

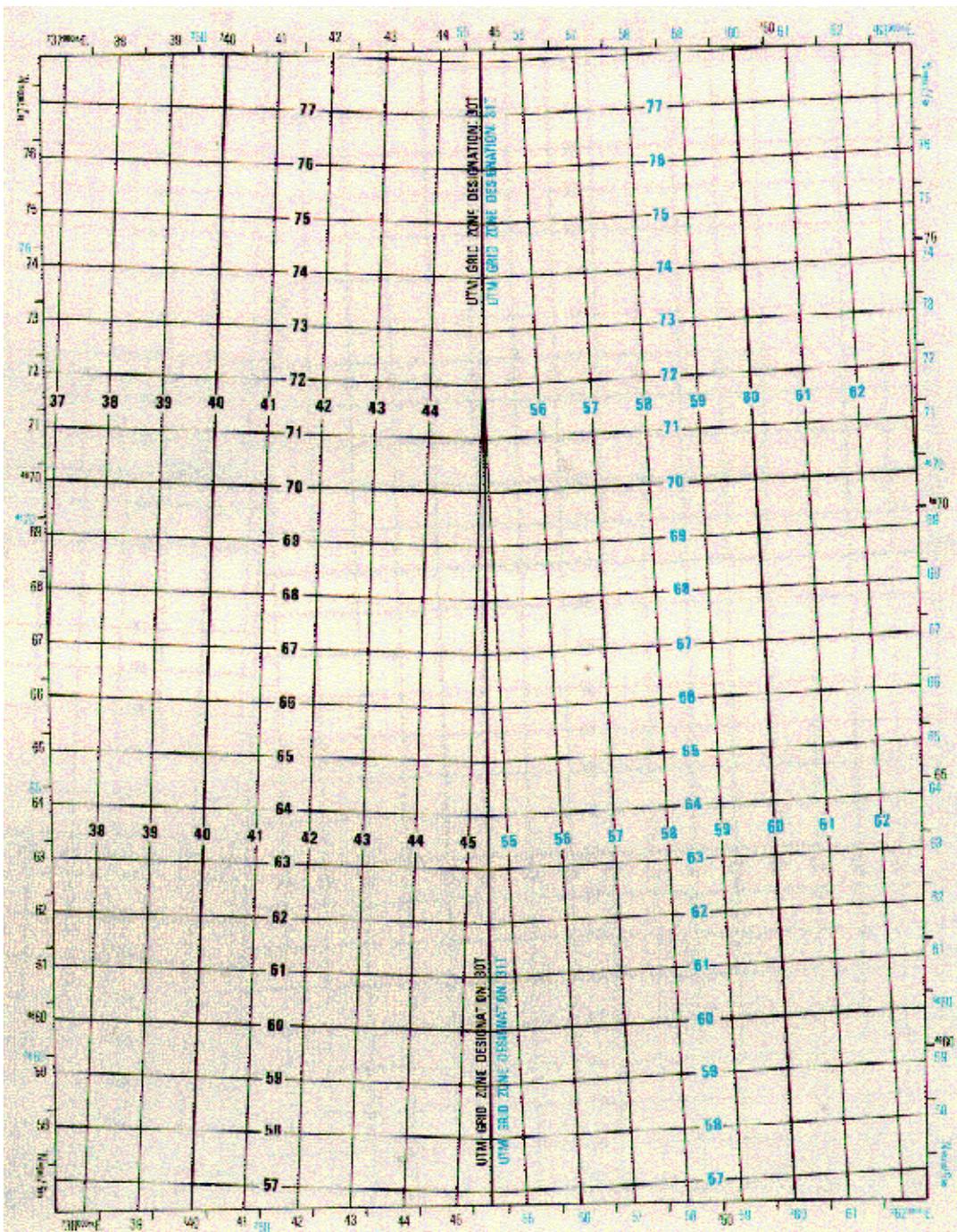
- 6-3.1 In certain instances a sheet contains more than one major grid.
 - 6-3.1.1 With the UTM and UPS grids this may occur:
 - 6-3.1.1.1 Where original sheet lines are retained as established by a mapping agency of a foreign country.
 - 6-3.1.1.2 Where a sheet is shifted from the normal position to avoid making additional sheets.
 - 6-3.1.2 With nonstandard grids, this condition occurs more frequently since, in addition to the above cases, grid junctions are sometimes loxodromes or are grid lines.



ELLIPSOID WORLD GEODETIC SYSTEM
 GRID 1,000 METER UTM ZONE 47

Scale 1:100,000 (in miniature)

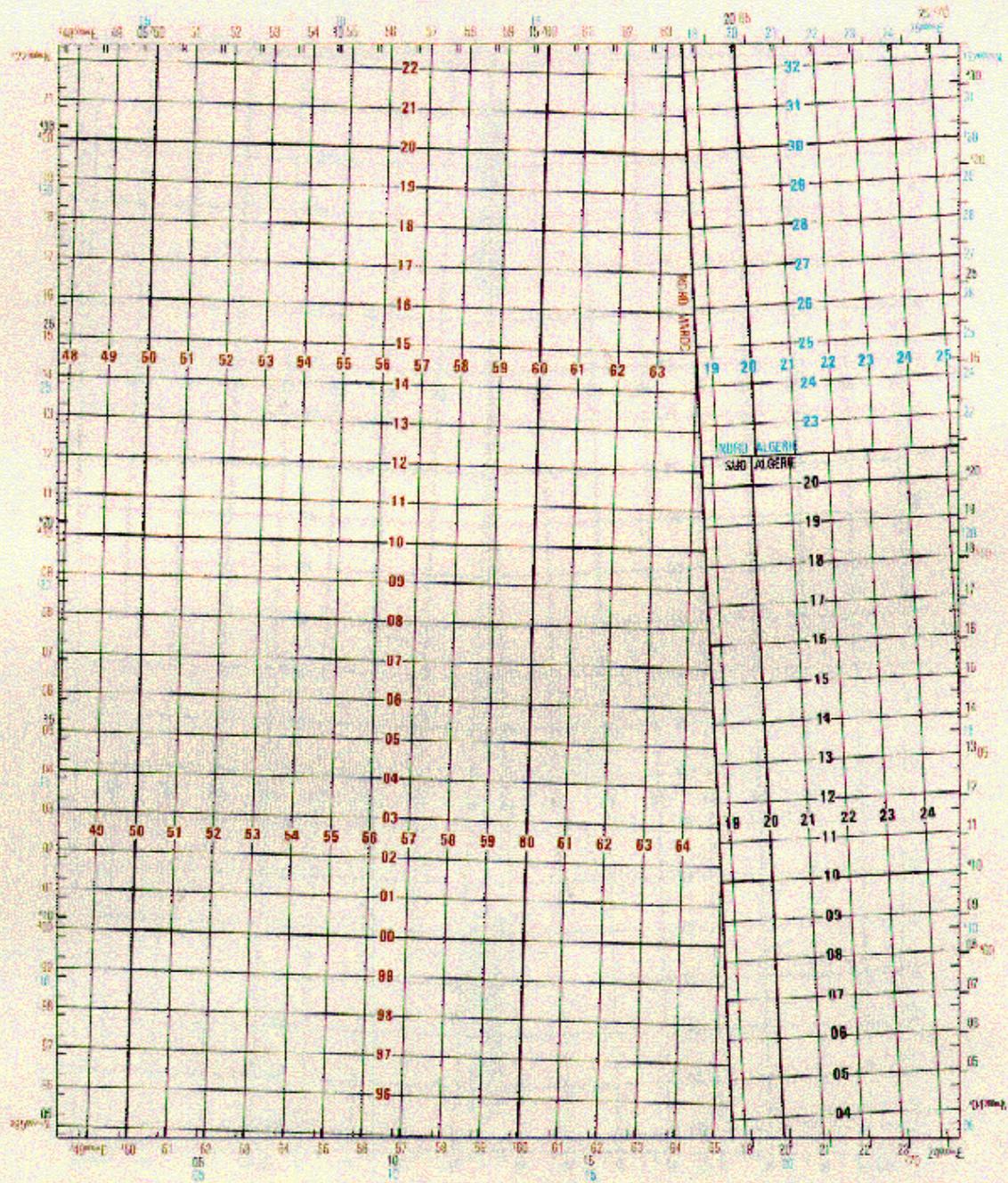
Figure 14. The Major Grid as Shown on a 1:100,000 Scale Map.



ELLIPSOID INTERNATIONAL
 GRID 1,000 METER UTM ZONE 30 (BLACK NUMBERED LINES AND TICKS)
 1,000 METER UTM ZONE 31 (BLUE NUMBERED LINES AND TICKS)

Scale 1:50,000 (in miniature)

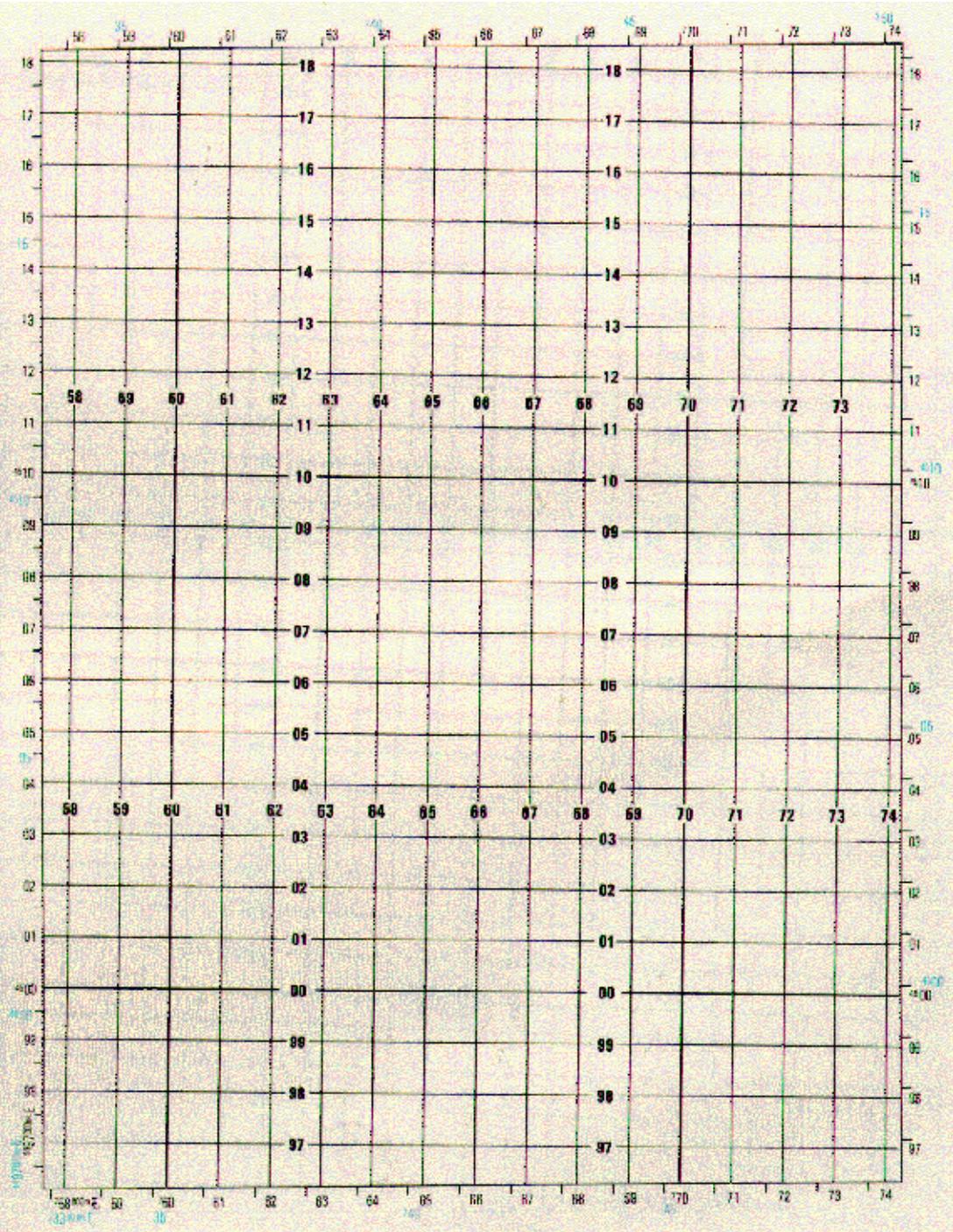
Figure 15. Two Major Grids (In this case, Zones of the UTM) Separated by a Grid Junction as Shown on a Large Scale Map.



ELLIPSOID CLARKE 1880
 GRID 1,000 METER NORD MAROC (RED/BROWN NUMBERED LINES AND TICKS)
 1,000 METER NORD ALGERIE (BLACK NUMBERED LINES AND TICKS)
 1,000 METER NORD ALGERIE (BLUE NUMBERED LINES AND TICKS)

Scale 1:50,000 (in miniature)

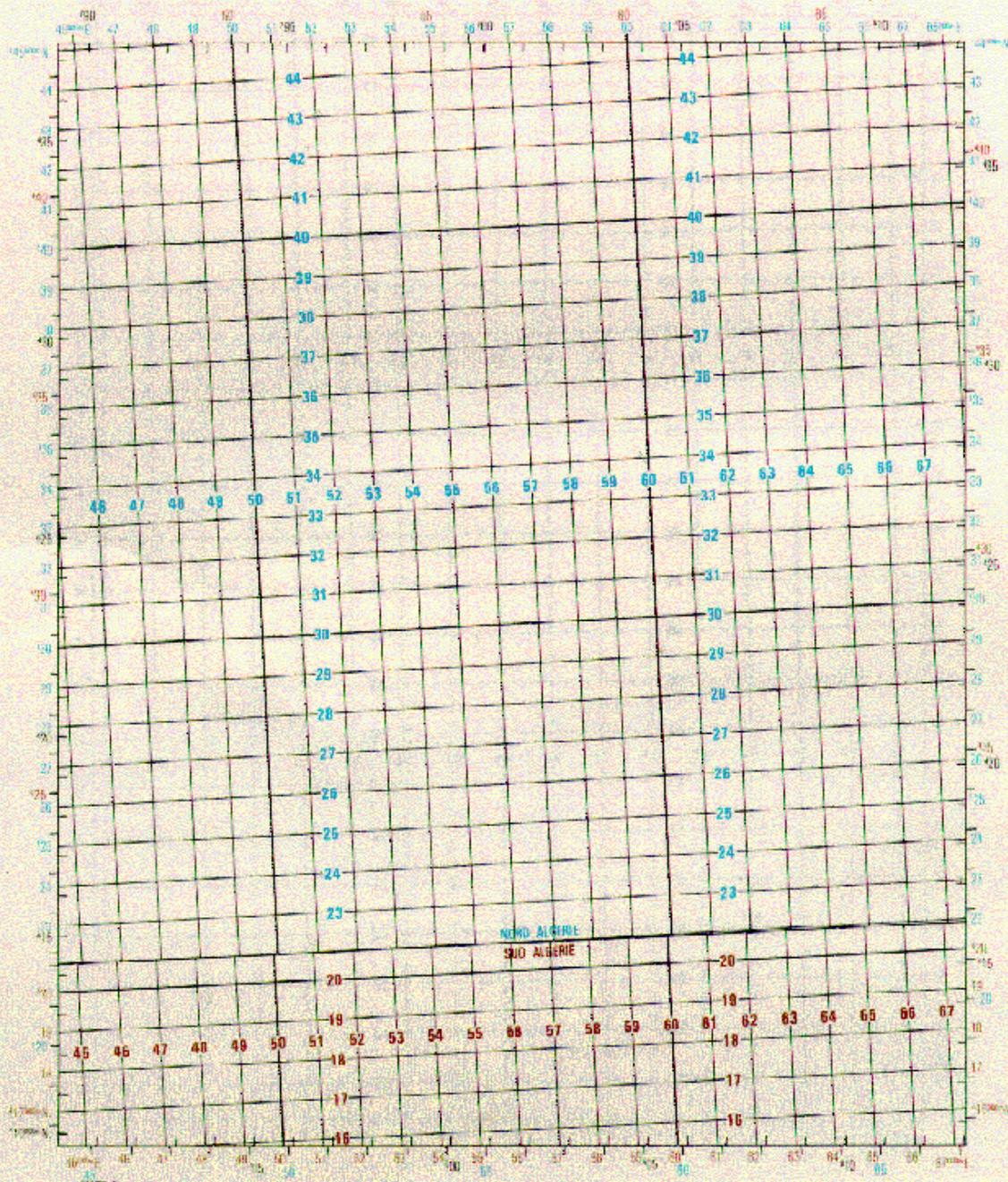
Figure 16. Three Major Nonstandard Grids as Shown on a Large Scale Map.



ELLIPSOID WORLD GEODETIC SYSTEM
 GRID 1,000 METER, UTM ZONE 47 (BLACK NUMBERED LINES)
 1,000 METER, UTM ZONE 48 (BLUE NUMBERED TICKS)

Scale 1:50,000 (in miniature)

Figure 17. Major and Overlapping Grids as Shown on a Large Scale Map.



GRID 1,000 METER, NORD ALGERIE, CLARKE 1880 ELLIPSOID
 (BLUE NUMBERED LINES AND TICKS)
 1,000 METER, SUD ALGERIE, CLARKE 1880 ELLIPSOID
 (RED / BROWN NUMBERED LINES AND TICKS)
 1,000 METER, NORD MAROC, CLARKE 1880 ELLIPSOID
 (BLACK NUMBERED TICKS)

Scale 1:50,000 (in miniature)

**Figure 18. Overlapping Grid in Combination with Two Major Grids
 Separated by a Grid Junction as Shown on a Large Scale Map.**

6-3.2 Grid, datum, ellipsoid, and zone junctions are indicated by accentuated lines, printed in black (blue for 1:100,000 scale). Labels identifying the junction appear parallel to and on each side of the junction line.

The label may be shown more than once to facilitate identification. Each label is printed in the color designated for the particular grid system. When a grid, datum, ellipsoid, or zone junction line is coincident with a neatline, both the junction line and the identifying labels are omitted. If the junction line falls within 2.5 mm (0.10 inch) of the neatline, the junction line is not shown; it is considered as being coincident with the neatline.

6-3.2.1 For nonstandard grids, the label is modeled after the following:

WEST MALAYSIAN RSO GRID
SUD MAROC GRID
 NORD TUNISIE GRID
 MADAGASCAR GRID

6-3.2.2 The label for a UTM grid junction, or a UPS grid junction, includes the identification of the Grid Zone Designation and is written in MGRS terms as:

UTM GRID ZONE DESIGNATION: 47T
 UPS GRID ZONE DESIGNATION: B

6-3.3 Each grid is shown by full lines Within its own area only, being represented at 1,000-unit intervals with every 10,000-unit line accentuated in weight.

6-3.3.1 On maps bearing two major grids, the extension of either grid into the area of the other (overlapping grid) is shown by outside ticks emanating from the neatline correctly aligned with its respective major grid. The even 10,000-unit ticks are accentuated in weight.

6-3.3.2 On maps bearing three major grids, a similar practice is followed, except that outside ticks are used to indicate the extension of the grid which occupies the major part of the sheet, and inside ticks are used to indicate the extensions of the others.

6-3.4 Grid values appear on all four sides of the sheet labeling each grid line and those grid ticks whose values are multiples of 5,000. Full values appear at each corner, labeling the first grid line in each direction from the corner.

6-3.4.1 For the UTM and UPS grids, the values for the different grids appear in black and blue. Black is reserved for the grid which covers the greater portion of the sheet. If the grid junction divides the sheet equally, black is used for the grid which occurs most frequently on the sheets in the general area. On maps at 1:100,000 scale, blue is used for the dominant grid and red-brown for the other grid.

6-3.4.2 For nonstandard grids, the values appear in the colors designated for the grid system. Where the designated colors are the same, one or more substitutions are made to emphasize distinction, with the order of preference as follows: black, blue, red-brown (or blue, red-brown, black at 1:100,000 scale).

6-3.4.3 Black is used for the UTM or UPS grids when either appears in combination with nonstandard grids. In such cases, if the conventional color for a nonstandard grid is black, a substitution is made for the nonstandard grid with blue, or red-brown being used. On maps at 1:100,000 scale, the order of colors is blue, red-brown, black.

6-3.5 Grid values, expressed in principal digits only, appear on the face of the map labeling each grid line. Refer to figures 15, 16, and 18 for sample treatments of the grid ladder numbers when a sheet contains more than one major grid.

6-3.6 Notes identifying each grid appear in the lower margin of the sheet. The notes are modeled after the following:

ELLIPSOID.....	WORLD GEODETIC
SYSTEM	
GRID.....	1,000 METER UTM
ZONE 47	(BLACK NUMBERED LINES AND
TICKS)	
	1,000 METER UTM
ZONE 48	(BLUE NUMBERED LINES AND
TICKS)	

6-3.7 When the ellipsoid is not the same for each of the grids shown on the map, the ellipsoids are included with the grid notes. The notes are patterned after the following:

GRID.....1,000 METER UTM ZONE 31, INTERNATIONAL
ELLIPSOID
TICKS) (BLACK NUMBERED LINES AND
1,000 METER UTM ZONE 32, CLARKE 1880
ELLIPSOID
TICKS) (BLUE NUMBERED LINES AND

6-3.8 Figures 15 and 16 illustrate the treatments described for sheets containing more than one major grid.

6-4 OVERLAPPING GRIDS.

- 6-4.1 An overlapping is generally required within approximately 40 kilometers of a grid, zone, or ellipsoid junction. The overlapping grid may be omitted if there are no land bodies within the 40 kilometer overlap area. See table 8.
- 6-4.2 The overlapping grid is shown by ticks printed in black (blue for 1:100,000 scale) emanating from the neatline correctly aligned with its respective grid and spaced at 1,000- unit intervals. The even 10,000-unit ticks are accentuated in weight. The direction of the ticks from the neatline (i.e., inside or outside) is dependent on the other grids shown on the map.
- 6-4.2.1 If the sheet contains one major grid, outside ticks are used.
- 6-4.2.2 If the sheet contains two major grids, inside ticks are used.
- 6-4.2.3 If a sheet contains two overlapping grids in conjunction with a single major grid, outside ticks are used for the overlapping grid which occurs most frequently on the sheets in the general area. Inside ticks are used for the other.
- 6-4.3 Values, similar in composition to those labeling the major grid lines, appear on all four sides of the sheet. The first grid tick in each direction from the southwest corner of the sheet whose values are multiples of 5,000 are labeled.
- 6-4.4 The color of the overlapping grid values is governed by the grid system. Where the prescribed color for two overlapping grids is the same, the color of the grid which occurs more frequently on the sheets in the general area is retained, and a substitution of black, blue, or red-brown, in that order of preference, is made for the other. (The order of preference for 1:100,000 scale is blue, red-brown, or black.) A similar substitution is made when the color of an overlapping grid is the same as the major grid.
- 6-4.5 Notes identifying overlapping grids appear in the lower margin of each sheet.

0°	21'41"	30°	25'01"	60°	43'16"
1°	21'41"	31°	25'17"	61°	44'37"
2°	21'42"	32°	25'33"	62°	46'04"
3°	21'43"	33°	25'50"	63°	47'38"
4°	21'44"	34°	26'08"	64°	49'20"
5°	21'46"	35°	26'27"	65°	51'10"
6°	21'48"	36°	26'46"	66°	53'10"
7°	21'51"	37°	27'07"	67°	55'20"
8°	21'54"	38°	27'29"	68°	57'43"
9°	21'57"	39°	27'52"	69°	1°00'20"
10°	22'01"	40°	28'16"	70°	1°03'13"
11°	22'05"	41°	28'41"	71°	1°06'24"
12°	22'10"	42°	29'08"	72°	1°09'58"
13°	22'15"	43°	29'36"	73°	1°13'56"
14°	22'21"	44°	30'06"	74°	1°18'26"
15°	22'27"	45°	30'37"	75°	1°23'36"
16°	22'33"	46°	31'10"	76°	1°29'21"
17°	22'40"	47°	31'44"	77°	1°36'05"
18°	22'48"	48°	32'21"	78°	1°43'58"
19°	22'56"	49°	32'59"	79°	1°53'17"
20°	23'04"	50°	33'40"	80°	2°04'28"
21°	23'13"	51°	34'23"	81°	2°18'10"
22°	23'23"	52°	35'09"	82°	2°35'18"
23°	23'33"	53°	35'57"	83°	2°57'21"
24°	23'43"	54°	36'49"	84°	3°26'46"
25°	23'55"	55°	37'43"	85°	4°08'58"
26°	24'07"	56°	38'41"	86°	5°09'49"
27°	24'19"	57°	39'43"	87°	6°52'57"
28°	24'32"	58°	40'49"	88°	10°19'15"
29°	24'46"	59°	42'00"	89°	20°38'19"

THE EQUIVALENT OF 40 KILOMETERS IS GIVEN AS 22 MINUTES OF LATITUDE WHEN MEASURED AT ANY POINT ALONG A MERIDIAN.

TABLE 8. The equivalents of 40 kilometers when measured along a given parallel of latitude expressed in degrees, minutes, and seconds of longitude.

6-4.6 When the ellipsoid is not the same for the overlapping grid and the major grid, the ellipsoids are included with the grid notes. The notes are patterned after the following:

GRIDS.....1,000 METER UTM ZONE 42, WORLD GEODETIC
SYSTEM
ELLIPSOID (BLACK NUMBERED
LINES)
1,000 METER UTM ZONE 41,
INTERNATIONAL
ELLIPSOID (BLUE NUMBERED
TICKS)

6-4.7 Figures 17 and 18 illustrate the treatments described for sheets containing major and overlapping grids.

6-5 SECONDARY GRIDS.

6-5.1 Secondary grids are temporary grids whose purpose is to provide a common grid to adjacent maps and on companion maps of different scales. Generally, after one printing of the secondary grid, it will be discontinued. Excepted are those instances where mapping arrangements with cooperating foreign agencies specify the showing of a secondary grid. No more than one secondary grid is shown.

6-5.2 When required, the secondary grid is shown by inside ticks, printed in black (blue for 1:100,000 scale), emanating from the neatline in their correct alignment and spaced at -1,000-unit intervals. The even 10,000-unit ticks are accentuated in weight.

6-5.3 Values, similar in composition to those labeling the major grid lines, appear on all four sides of the sheet. The first grid tick. In each direction from the southwest corner of the sheet is labeled with full values. Thereafter, only those grid ticks whose values are multiples of 5,000 are labeled. If the secondary grid has a prescribed color, the color is used for the numbers unless there is conflict with another grid shown on the map. In that event, substitutions are made in the established order of preference.

6-5.4 A grid note, identifying the secondary grid, appears in the margin of the sheet.

6-5.5 When a secondary grid differs uniformly from the major grid, a coordinate shift note may be used in lieu of showing the secondary grid. The note should be patterned after the following:

COORDINATE CONVERSION WGS 84 TO ED
Grid Add 30m.E., Subtract 9m.N.
Geographic: Add 1.1" Long., Subtract 0.1" Lat.

6-5.6 Figure 19 illustrates the treatment described for sheets containing major and secondary grids.

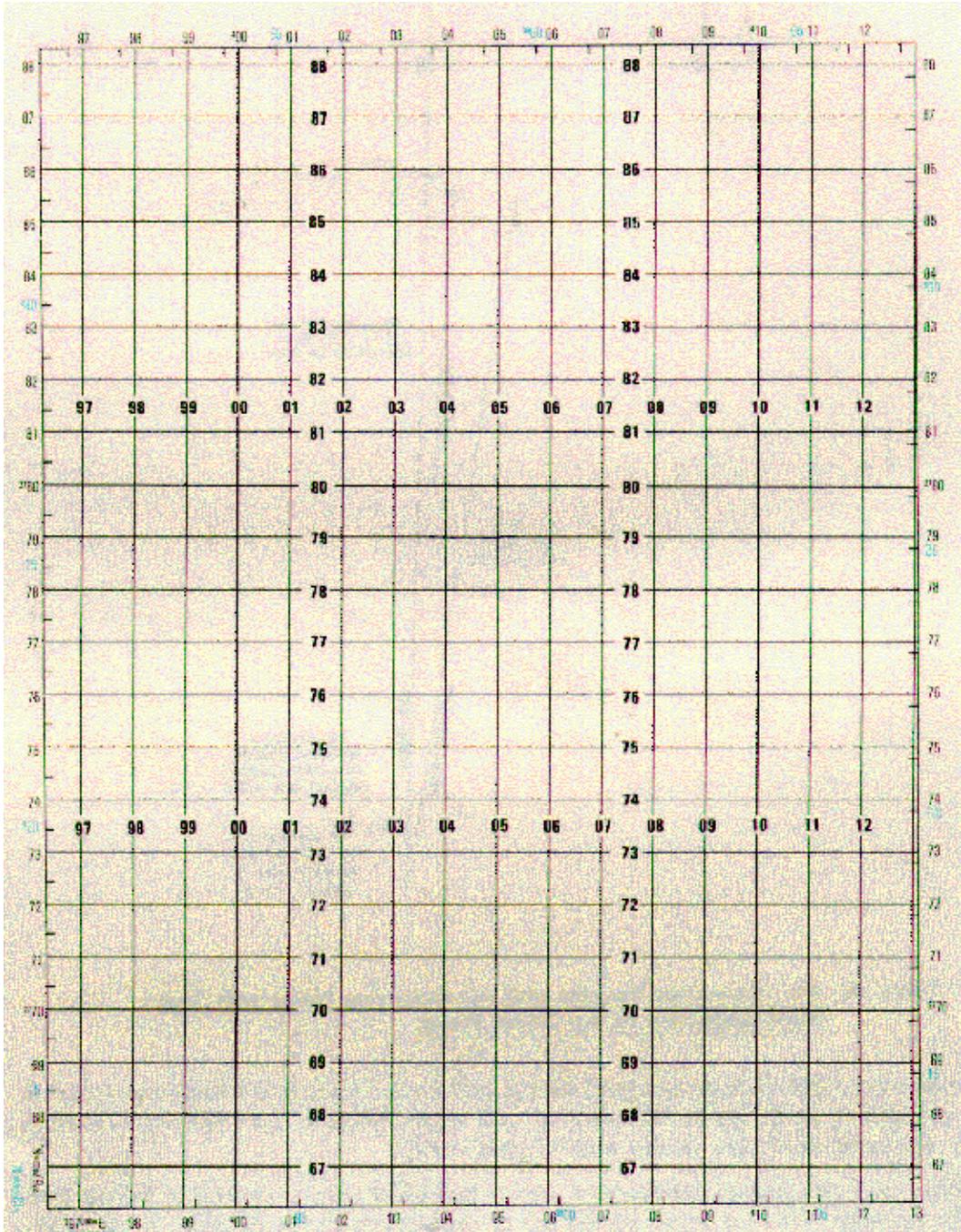
6-6 THE DECLINATION DIAGRAM (ONE GRID).

6-6.1 A declination diagram appears in the margin of each sheet. The diagram shows the relationship of magnetic north and true north to grid north at the center of the sheet. It also provides information regarding the use of this data. See figures 20 and 21.

6-6.2 The diagram contains three prongs which emanate from a central point. These represent grid north, magnetic north, and true north, and are appropriately labeled.

6-6.2.1 The grid north prong is an extension of an easting (vertical) grid line; the extension is a continuous line, which stops at the central point near the bottom work limits of the sheet. The prong is broken for the letters GN.

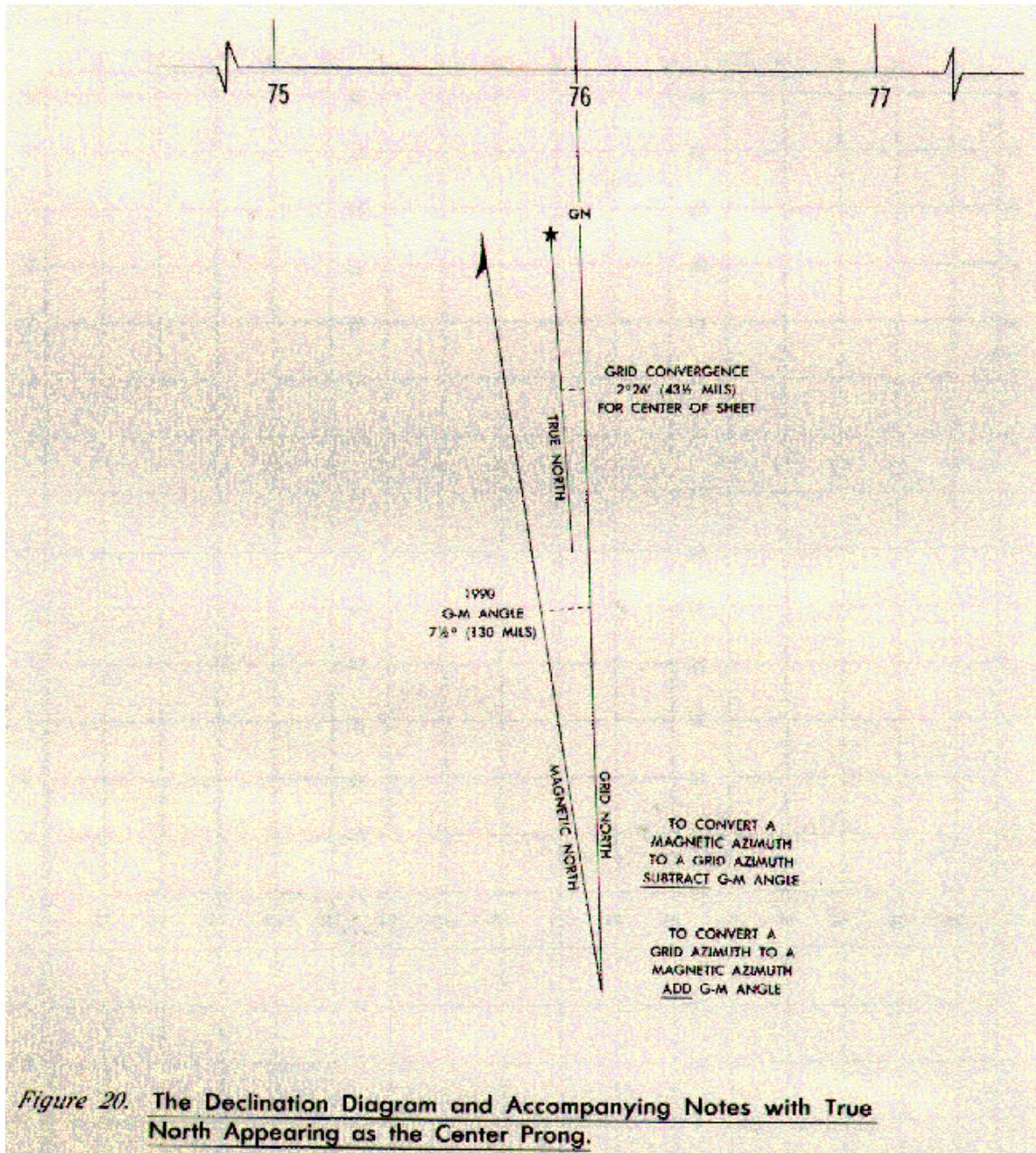
6-6.2.2 The magnetic north prong emanates from the central point to the approximate extent of the letters GN. It is surmounted with a half-arrowhead; a left half-arrowhead is used when magnetic north lies to the west of grid north, while a right half-arrowhead is used when magnetic north lies to the east of grid north.



GRID 1,000 METER UTM, ZONE 47, WORLD GEODETIC SYSTEM
 1972 ELLIPSOID (BLACK NUMBERED LINES)
 1,000 YARD INDIA II B, EVEREST ELLIPSOID
 (BLUE NUMBERED TICKS)

Scale 1:50,000 (in miniature)

Figure 19. Major and Secondary (Obsolete) Grids as Shown on a Large Scale Map



6-6.2.3 The true north prong, surmounted with a five-point star, is shorter in length than the other two prongs. When it occurs as the left or right prong of the diagram, it emanates from the central point. When true north occurs as the middle prong, its characteristic star appears at the approximate height of the magnetic north arrowhead; the prong is shown as an extension from the central point.

6-6.2.4 Angles between the prongs are approximately represented. The magnetic north and true north prongs are plotted within 30 minutes of their given angular position from grid north, except that the magnetic prong is never shown within three degrees of the grid north prong. In maintaining relative symmetry between prongs, the characteristic star of the true north prong must never touch another prong. When there is no declination between prongs, a single prong represents the coincidence, and distinguishing characteristics (star, full arrowhead, or letters GN) of each are shown on the composite prong.

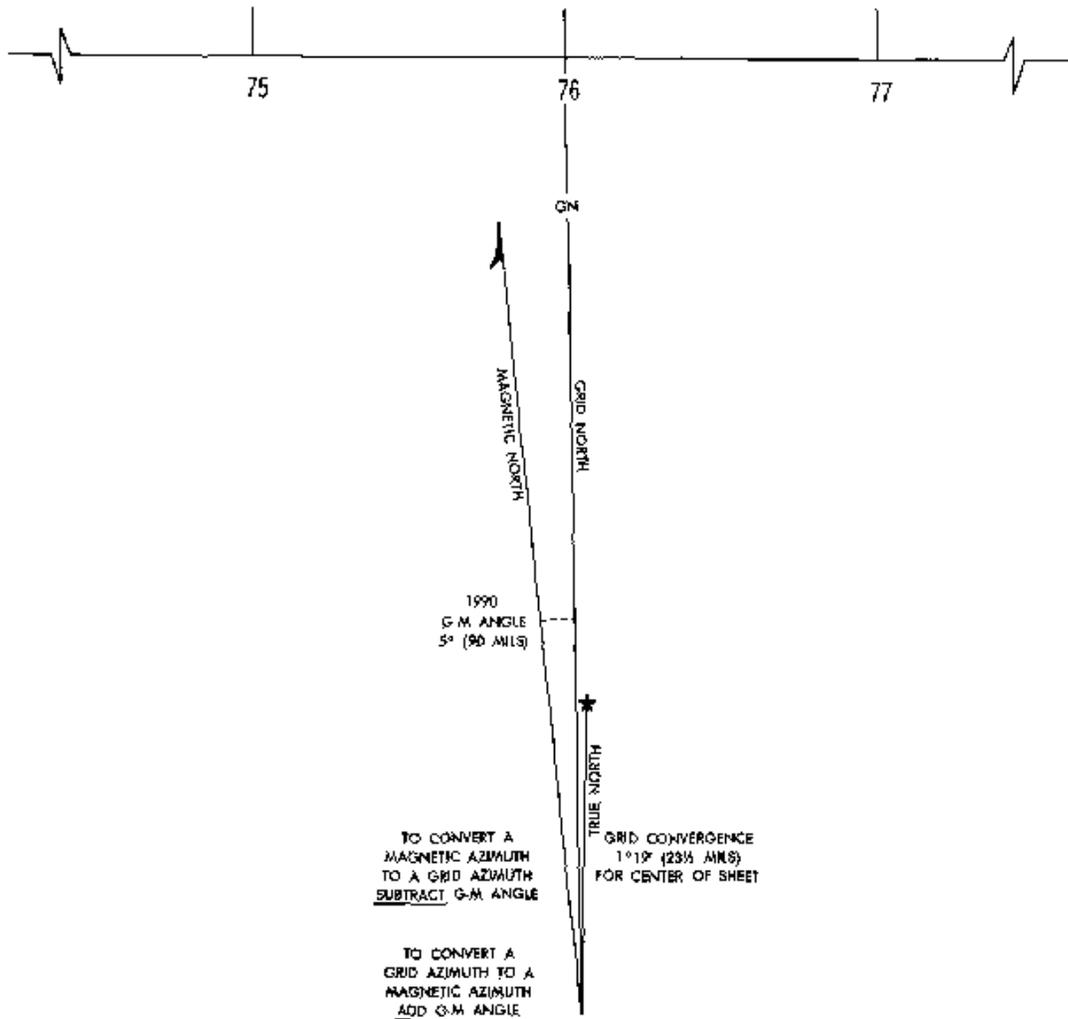


Figure 21 The Declination Diagram and Accompanying Notes with True North Appearing as an Outside Prong.

6-6.3 The grid-magnetic angle (G-M Angle) is expressed by a note alongside a dashed arc connecting the grid north and magnetic north prongs. The value of this angle is derived from the latest isogonic data for a standard epoch; i.e., a year that is divisible by five, such as 1990, 1995, etc. The value of the grid-magnetic angle is given to the nearest one-half degree with mil equivalent to the nearest ten mils. See Appendix A for a table of mil equivalents. 6-6.3.1 The grid-magnetic note is modeled after the following:

1990
G-M ANGLE
7 1/2° (130 MILS)

6-6.3.2 For sheets with 0° grid-magnetic angle the note is shown as follows:

1990

G-M ANGLE
0 (0 MILS)

6-6.3.3 For land insets, grid-magnetic data are shown only when the angle is different from that for the map proper. A diagram is not shown. The grid-magnetic data are shown by a note modeled after the following:

GRID TO MAGNETIC DECLINATION
FOR 1990 IS 1 1/2° (30 MILS)
WESTERLY OVER THE ENTIRE INSET

6-6.4 The grid convergence is the angle between grid north and true north. The value of the angle is expressed to the nearest full minute, with the mils equivalent to the nearest one-half mil.

6-6.4.1 In the diagram, the grid convergence is indicated by a note alongside a dashed arc which connects the grid north and true north prongs. The convergence angle is given for the center of the sheet and is modeled after the following:

GRID CONVERGENCE
1° 19' (23 1/2 MILS)
FOR CENTER OF SHEET

6-6.4.2 In land insets, a diagram is not shown. The grid convergence is shown only when the angle is different from that on the map proper. The convergence angle is given for the center of the inset and is modeled after the following:

GRID TO TRUE NORTH CONVERGENCE
FOR THE CENTER OF THE INSET IS
1° 54' (34 MILS) EASTERLY

6-6.5 Notes appear in conjunction with the diagram explaining the use of the G-M Angle.

6-6.5.1 When the magnetic north prong of the diagram is east of the grid north prong, the notes read as follows:

TO CONVERT A
MAGNETIC AZIMUTH
TO A GRID AZIMUTH
ADD G-M ANGLE

TO CONVERT A
GRID AZIMUTH TO A
MAGNETIC AZIMUTH
SUBTRACT G-M ANGLE

6-6.5.2 When the magnetic north prong of the diagram is West of the grid north prong, the notes read as follows:

TO CONVERT A
MAGNETIC AZIMUTH
TO A GRID AZIMUTH
SUBTRACT G-M ANGLE

TO CONVERT A
GRID AZIMUTH TO A
MAGNETIC AZIMUTH
ADD G-M ANGLE

6-6.5.3 When the magnetic north and grid north prongs are coincident, azimuth conversion notes are omitted.

6-6.5.4 Azimuth conversion notes are not shown for insets.

6-6.6 The diagram and related notes are printed in the same color as the grid values.

6-7 THE DECLINATION DIAGRAM (MORE THAN ONE GRID).

6-7.1 When a sheet bears more than one major grid, or major and overlapping grids, a separate diagram appears for each grid shown on the map. Declination data are not shown for secondary grids. Figure 22 illustrates the declination data shown on a sheet which contains more than one grid.

6-7.2 The grid north prong of each diagram is aligned with the easting (vertical) grid lines or grid ticks of the grid to which it pertains. No connection is shown between the grid north prong and any grid line or grid tick.

6-7.3 The composition of each diagram is the same as described in paragraph 6-6, except:

6-7.3.1 The diagram is miniaturized, and the three prongs are shown as full lines of the same length.

6-7.3.2 The minimum plotted angle between any two prongs is three degrees with relative symmetry maintained.

6-7.3.3 Each diagram bears the identification of the grid to which it pertains.

6-7.3.4 Each diagram and its related notes are printed in the same color as the grid values to which they pertain.

6-8 THE GRID REFERENCE BOX.

6-8.1 A grid reference box appears in the margin of each sheet. The box contains instructions and attendant data to enable the user to compose standard grid references.

6-8.2 The grid system(s) in use on the map dictates the referencing instructions contained in the grid reference box. The grid reference boxes most commonly used on maps, 1:100,000 scale and larger, are illustrated in figure 23. The boxes are subject to modifications.

6-8.3 The grid reference box also contains diagrams identifying applicable grid zone designations and grid square identifications.

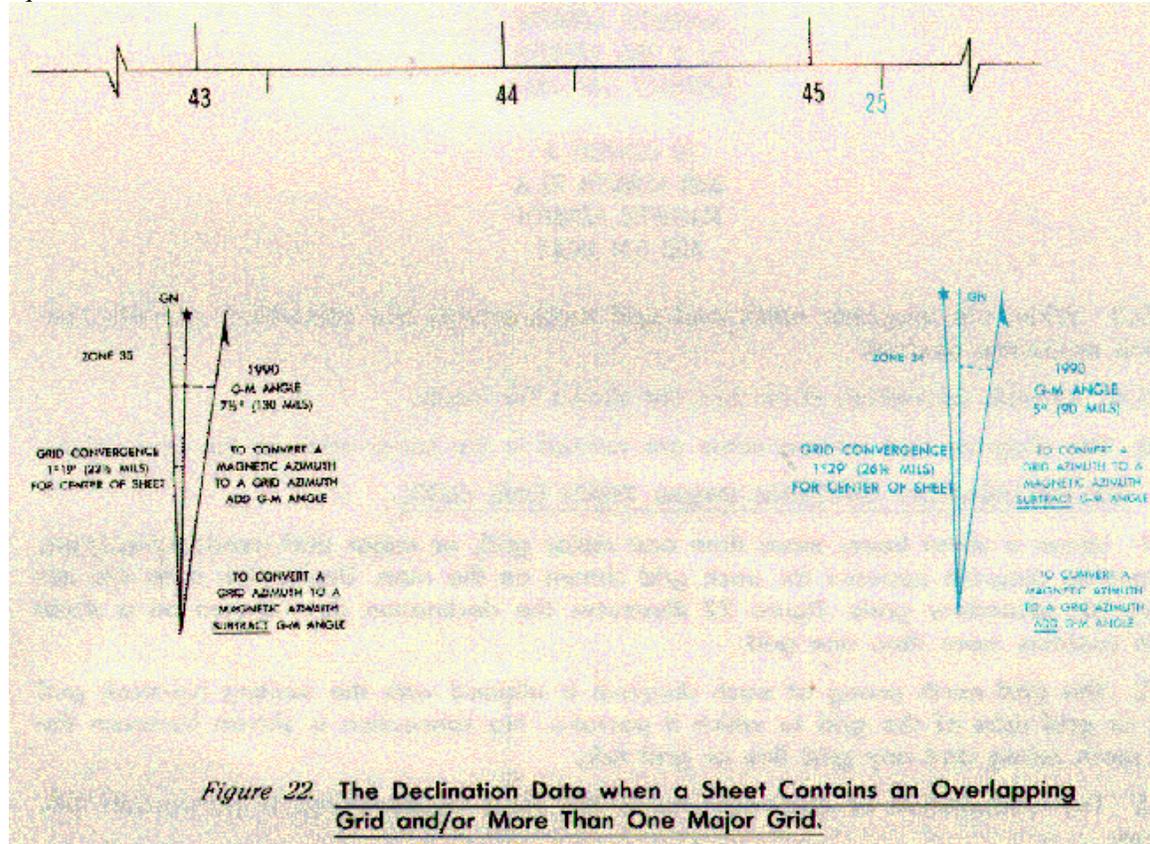
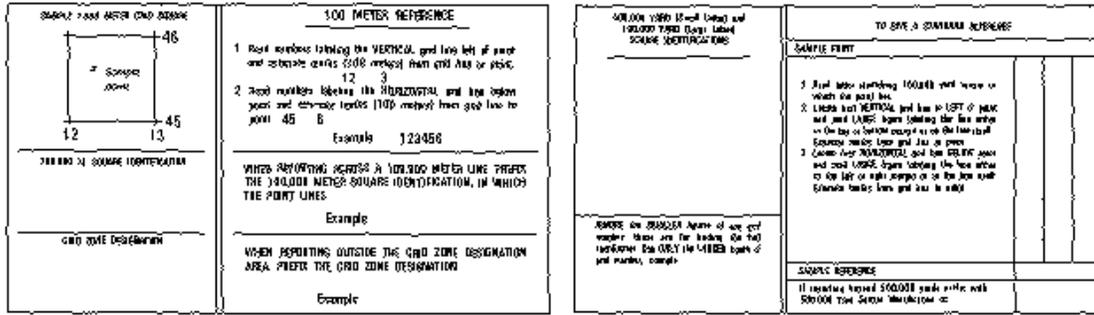


Figure 22. The Declination Data when a Sheet Contains an Overlapping Grid and/or More Than One Major Grid.

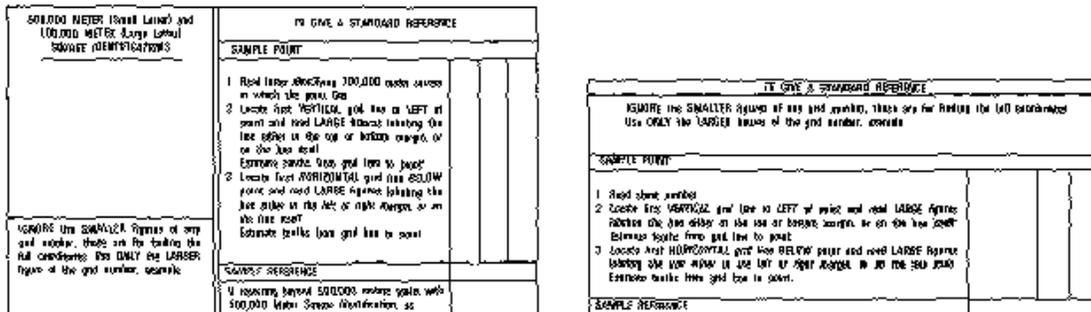
6-8.3.1 For the UTM and UPS grids, the diagrams show the grid zone designation, the 100,000-meter grid lines and their values in abbreviated form, and the 100,000-meter square identifications). Figure 24 illustrates the composition of the diagrams under various conditions.

6-8.3.2 For nonstandard grids, the diagram shows the 100,000-unit square identifications and the values of the 100,000-unit grid lines in abbreviated form. These data are printed in the same color as the grid values to which they pertain. If the grid system identifies larger squares, their identifications are shown in smaller type just preceding the 100,000-unit identifications. The 100,000-unit grid lines and grid junction lines are printed in black (blue at 1:100,000 scale). If a junction is a grid line, its value is shown in abbreviated form and printed in the same color as the grid values to which it pertains. Loxodromes are not labeled. Figure 25 illustrates the composition of this information under various conditions.



For use with UTM and UPS Grids.

For use with nonstandard grids which identify the 500,000 and 100,000 yard squares.



For use with nonstandard grids which identify the 500,000 and 100,000 meter squares.

For use with nonstandard grids which do not identify the 100,000 unit squares.

Figure 23. Grid Reference Boxes Most Commonly Used on Maps at Scales of 1:100,000 and Larger.

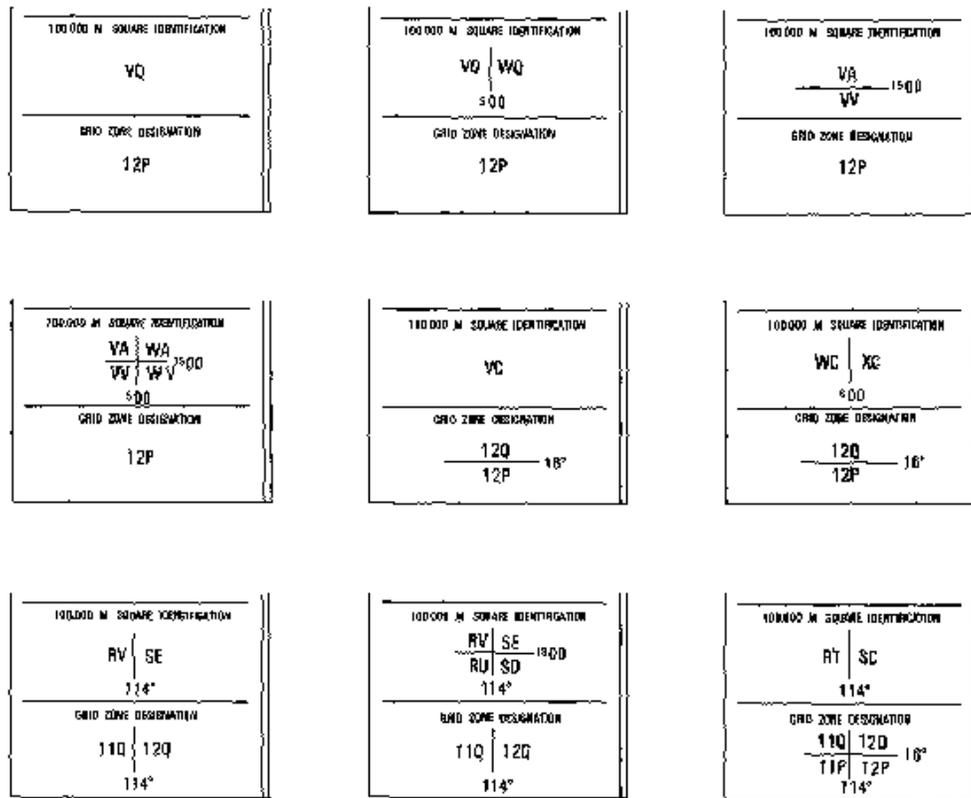


Figure 24. Methods of Showing Grid Zone Designations and 100,000-meter Squares of the UTM in the Grid Reference Boxes of Large Scale Maps.

6-8.3.3 For sheets that have a land inset whose 100,00-unit square identification letters differ from those of the map proper, the identification letters are shown in the interior of the inset, rather than in the grid reference box.

6-8.4 When more than one major grid appears on a sheet and the method for giving a reference is the same for all the grids, a common reference box is used.

6-8.5 When more than one major grid appears on a sheet and the method for giving a reference varies with the grids, circumstances control the treatment of the grid reference boxes.

6-8.5.1 A grid reference box is shown in the margin for each grid. Over each box appears a note limiting the use of the box to the grid or grids concerned.

6-8.5.1.1 When each box describes the method of referencing for one grid only, the note is printed in the same color as the values for its respective grid and is modeled after the following:

USE THIS BOX FOR GIVING REFERENCES ON THE
UNIVERSAL TRANSVERSE MERCATOR GRID

USE THIS BOX FOR GIVING REFERENCES ON THE
MADAGASCAR GRID

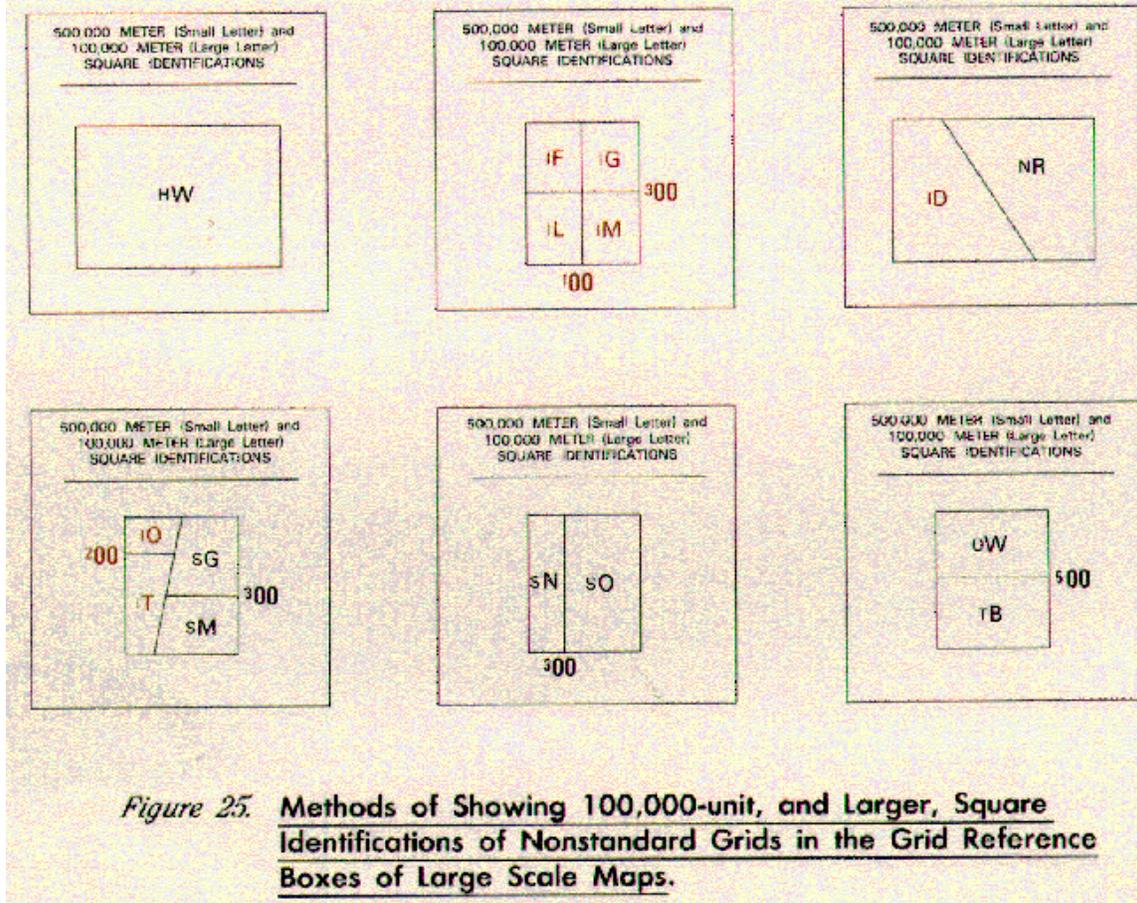


Figure 25. Methods of Showing 100,000-unit, and Larger, Square Identifications of Nonstandard Grids in the Grid Reference Boxes of Large Scale Maps.

6-8.5.1.2 When the same system of referencing is used for two grids occurring in the same sheet with a third grid which uses a different reference system, the note for the common reference box is printed in black and modeled after the following:

USE THIS BOX FOR GIVING REFERENCES ON THE
SUD ALGERIE AND SUD TUNISIE GRIDS

6-8.5.2 When all reference boxes cannot be accommodated in the margin, the excess is shown in expanses of open water on the face of the map. When this is not practicable, a note which refers the user to an adjacent sheet is added to a reference box in the margin. The notes are modeled after the following:

USE THIS BOX FOR GIVING REFERENCES ON THE
UNIVERSAL TRANSVERSE MERCATOR GRID

SEE SHEET 3987 I FOR GIVING REFERENCES ON
THE NORD MAROC GRID

USE THIS BOX FOR GIVING REFERENCES ON THE
UNIVERSAL TRANSVERSE MERCATOR GRID

SEE SHEET 1285 III FOR GIVING REFERENCES ON
THE SUD ALGERIE AND SUD TUNISIE GRIDS

CHAPTER 7 PORTRAYAL OF GRIDS ON MAPS AT 1:250,000 AND 1:500,000 SCALE

7-1 GENERAL.

7-1.1 Grid data and grid format for maps at scales of 1:250,000 and 1:500,000 are essentially the same for Universal Transverse Mercator grids, Universal Polar Stereographic grids, and nonstandard grids. When possible, sheet lines of maps at these scales are planned to coincide with grid junctions and ellipsoid junctions.

7-1.2 Grids added on reprints of maps of other origin adhere as closely as possible to these standards. There may be minor changes in limits of grid zones and variations in the color of grid lines and grid values. The changes and variations or are explained, as necessary, in the margin of the map.

7-1.3 The grid data consist of grid lines and values, grid reference boxes, notes identifying the grids, and notes giving the range of magnetic declination over the sheet. Overlapping and extended grids are not shown.

7-1.4 Descriptions and illustrations are keyed to 1:250,000 scale, unless otherwise indicated. Specific dimensions, size and style of type, and placement of margin data relating to grids and grid formats at 1:250,000 scale are shown on DMA style sheets.

7-2 THE MAJOR GRID.

7-2.1 The major grid is shown by full lines printed in blue, at 10,000-unit intervals. The unit is predominately meters; yards are used for some nonstandard grids. Every 100,000-unit grid line is accentuated in weight and definitive designations are shown at their intersections in the map interior.

7-2.2 Grid values appear outside the neatline on all four sides of the sheet, labeling each grid line.

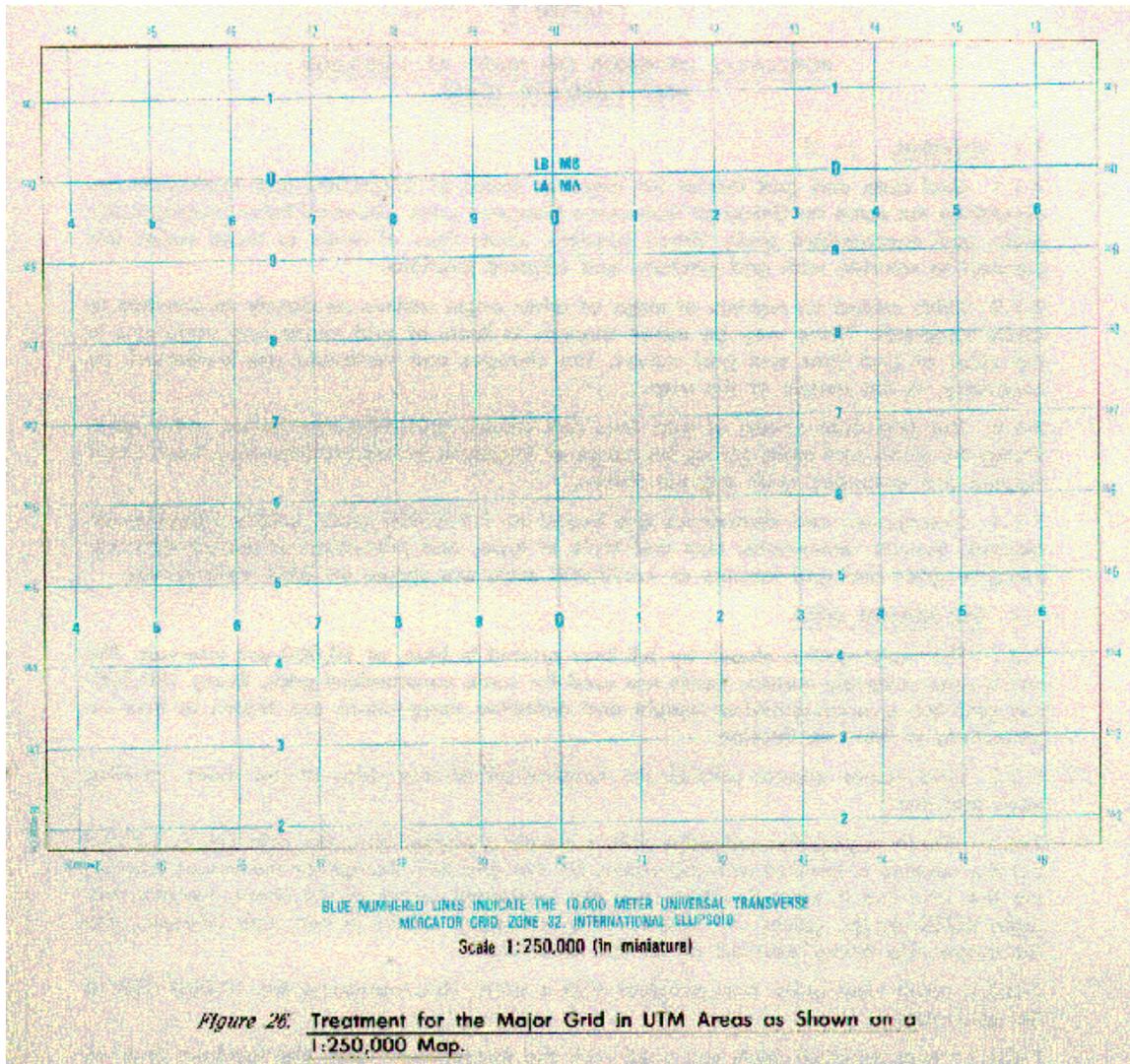
7-2.3 Where a grid line coincides with a neatline of the map, the grid line is omitted but the neatline is labeled with the values for the grid line. Except for the values labeling the first grid line in each direction from the southwest corner of the sheet, the last four digits (0000) of the values are omitted. The values are shown in two sizes of type, with the larger size being reserved for the principal digits.

7-2.3.1 With most grids, one principal digit is used. This represents the 10,000 digit of the grid values.

7-2.3.2 Two principal digits are used with the Madagascar grid, the Lambert grids of northwest Africa, and the Ceylon Belt. These represent the 100,000 and 10,000 digits of the grid values.

7-2.4 At 1:250,000 scale, a grid ladder is shown in the interior of the map. The grid ladder is an established pattern of columns and rows of grid values, expressed in principal digits only. Positioning of the columns and rows is illustrated in figure 26. In areas of dense detail, a ladder number may be moved along a grid line a maximum of one-fourth of the grid interval, or omitted if it impairs legibility of map detail.

Omissions are held to a minimum.



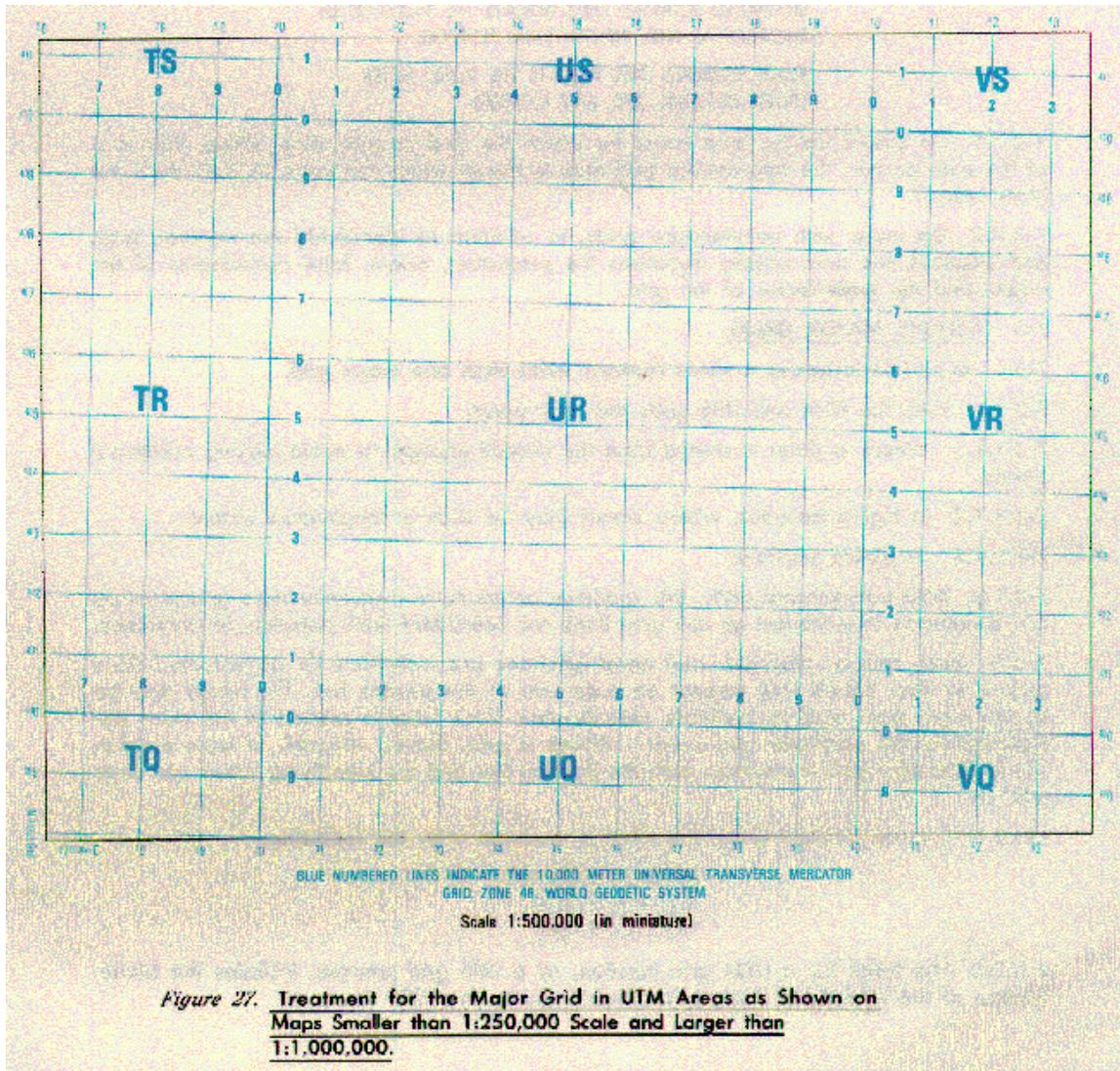
7-2.4.1 At the intersection of two 100,000-unit grid lines, the appropriate unit square identification letters are always shown. When this intersection coincides with a neatline, only those identification letters failing inside the neatline are shown. Identification letters are similarly shown - inside the neatline - when the intersection of a 100,000-unit line with a grid or ellipsoid junction line coincides with a neatline. Both sides of the neatline to the north and east on a Joint Operations Graphic (JOG) should be labeled, however, to show the different identification in the overlap area.

7-2.4.2 For nonstandard grids which identify 100,000-unit and 500,000-unit squares, the 500,000-unit identification letter appears in smaller size immediately before the 100,000-unit square identification letter.

7-2.5 At the 1:500,000 scale, the grid ladder is designed to treat each specific 100,000-unit square. Figure 27 illustrates the treatment. Note the relationship of the ladder to the accentuated 100,000-unit lines. For non-standard grids which also identify larger grid squares - such as the 500,000-unit squares - the additional identifications appear in smaller type immediately before each 100,000-unit square identification.

7-2.6 The color of the grid values and ladder values is governed by the grid system.

7-2.6.1 Blue is used when the grid system is either the Universal Transverse Mercator or the Universal Polar Stereographic.



7-2.6.2 With nonstandard grids, the color varies - black, blue, or red-brown - as specified in Chapter 4. Sheets with nonstandard grids adhere to these color conventions. (For a JOG, black is substituted for red.)

7-2.7 A grid note printed in the same color as the values for the major grid appears in the lower margin of each sheet to identify the grid. The note is modeled after the following:

BLUE NUMBERED LINES INDICATE THE 10,000 METER
UNIVERSAL TRANSVERSE MERCATOR GRID, ZONE 53,
BESSEL ELLIPSOID

RED-BROWN NUMBERED LINES INDICATE THE 10,000 METER
MADAGASCAR GRID, INTERNATIONAL ELLIPSOID

BLACK NUMBERED LINES INDICATE THE 10,000 METER
BRITISH NATIONAL GRID, AIRY ELLIPSOID

7-2.7.1 On sheets having land insets for which the grid or grid zone differs from that of the map proper, the appropriate grid note is shown within the inset. (A JOG does not have insets.)

7-2.7.2 On maps with nonstandard grids, in addition to identifying the interval, grid, and ellipsoid, the note usually describes the projection, origin, false coordinates of the origin, and the scale factor of the grid.

7-3 MULTIPLE MAJOR GRIDS.

7-3.1 In certain instances a sheet contains more than one major grid.

7-3.1.1 With the UTM and UPS grids this may occur:

7-3.1.1.1 Where a sheet is shifted from the normal position to avoid making additional sheets.

7-3.1.1.2 In higher latitudes, where sheets may be wide in longitudinal extent.

7-3.1.1.3 At datum junctions.

7-3.1.2 With nonstandard grids, this condition occurs more frequently since grid junctions are sometimes loxodromes or are grid lines not coincident with parallels or meridians.

7-3.2 Grid, datum, ellipsoid, and zone junctions are indicated by accentuated lines printed in blue. Labels may appear on each side of the junction line. The labels may be shown more than once to facilitate identification. Each label is printed in the color designated for the particular grid system. Where a grid, datum, ellipsoid, or zone junction line is coincident with a neatline, both the junction line and the identifying labels are omitted.

7-3.2.1 For nonstandard grids, the label is modeled after the following:

BRITISH NATIONAL GRID

NORD ALGERIE GRID

MADAGASCAR GRID

7-3.2.2 The label for a UTM grid junction, or a UPS grid junction, includes the identification of the Grid Zone Designation and is written in MGRS terms as:

UTM GRID ZONE DESIGNATION: 47T

UPS GRID ZONE DESIGNATION: B

7-3.3 Each grid is shown by full lines within its own area only, being represented in the normal manner at 10,000-unit intervals with every 100,000-unit line accentuated in weight. All grid lines are printed in blue.

7-3.4 Grid values appear on all four sides of the sheet (outside the neatline) labeling each grid line. The composition of the number is similar to that described in paragraph 7-2.3, except that full grid values label the first grid line in each direction from each corner of the sheet.

7-3.5 On maps at 1:250,000 scale, the grid ladder values are shown as described in paragraph 7-2.4.

Departures in labeling are often necessary when two or more major grids are shown. At least one row and one column of identifications are shown within the areal extent of each grid; the normal labeling plan is followed when practical.

7-3.6 Where appropriate for the grid, at 1:250,000 scale, identification of 100,000-unit squares and larger unit squares appear on the face of the map at all 100,000-unit grid line intersections as described in paragraph 7-2.4. The unit-square identifications appear in the same color as the grid values.

7-3.7 The colors of the grid values vary with different grids.

7-3.7.1 The UTM and UPS grid values are shown in blue when either grid appears alone or with another grid. When both the UTM and UPS grids appear on the same sheet, the grid values are shown in blue for whichever of the two grids occurs most frequently on the sheets in the general area. The values for the other grid are shown in red-brown.

7-3.7.2 For nonstandard grids, the values appear in the colors specified for the grid system as described in paragraph 7-2.6.2. Where the designated colors are the same, one or more substitutions are made to emphasize distinction. Usually, the conventional color is retained for the grid which occurs most frequently on the sheets in the general area. In general, the order of preference is black, blue, red-brown. (For a JOG, black is substituted for red.)

7-3.7.3 Blue usually is used for the UTM or UPS grids when either appears in combination with nonstandard grids. In such cases, if the conventional color for a nonstandard grid is blue, a substitution is made for the nonstandard grid with black or red-brown being used.

7-3.8 Notes identifying each grid appear in the lower margin of the sheet. These are printed in the same color as that used for the values for the grid each identifies.

7-3.8.1 When the grids are different zones of the UTM grid, the note is modeled after the following:

BLUE NUMBERED LINES INDICATE THE 10,000 METER

UNIVERSAL TRANSVERSE MERCATOR GRID, ZONE 50
AND 51, CLARKE 1866 ELLIPSOID

7-3.8.2 When more than one grid is involved, the notes are modeled after the following:

BLUE NUMBERED LINES INDICATE THE 10,000 METER
UNIVERSAL TRANSVERSE MERCATOR GRID, ZONE 37,
INTERNATIONAL ELLIPSOID

RED-BROWN NUMBERED LINES INDICATE THE 10,000 METER
UNIVERSAL POLAR STEREOGRAPHIC GRID, NORTH,
ZONE Z, INTERNATIONAL ELLIPSOID

BLUE NUMBERED LINES INDICATE THE 10,000 METER
UNIVERSAL TRANSVERSE MERCATOR GRID, ZONE 37,
CLARKE 1880 ELLIPSOID

RED-BROWN NUMBERED LINES INDICATE THE 10,000 METER
MADAGASCAR GRID, INTERNATIONAL ELLIPSOID

7.3.8.3 A separate marginal note is not shown for the grid in the north or east overlap of a JOG. Such a grid is identified on the face of the map only.

7-3.9 Figures 28 and 29 illustrate these principles.

7-3.10 When an ellipsoid junction occurs on a map sheet, the UTM grid treatment is the same as that followed when a sheet straddles a grid junction. The ellipsoids are identified on each side of the junction line. See figure 30. A note, printed in the same color as the grid values, appears in the lower margin of the sheet identifying the grids, zone(s), and ellipsoids.

BLUE NUMBERED LINES INDICATE THE 10,000 METER
UNIVERSAL TRANSVERSE MERCATOR GRID, ZONE 52,
WGS ELLIPSOID, AND ZONE 52, BESSEL ELLIPSOID

7-3.11 In certain cases, a sheet bearing the UTM grid may straddle a parallel which marks the division between different grid zone designations. The grid and corresponding labeling appear as previous described. A continuous line in black indicates the dividing parallel. The proper gridzone designations, printed in the same color as the grid values, appear on each side of the line. The dividing parallel is omitted when it falls within 2.5 mm (0.10inch) of the north or south neatlines. Figure 31 illustrates these principles.

7-4 OVERLAPPING AND EXTENDED GRIDS

Overlapping and extended grids are not shown on maps at these scales.

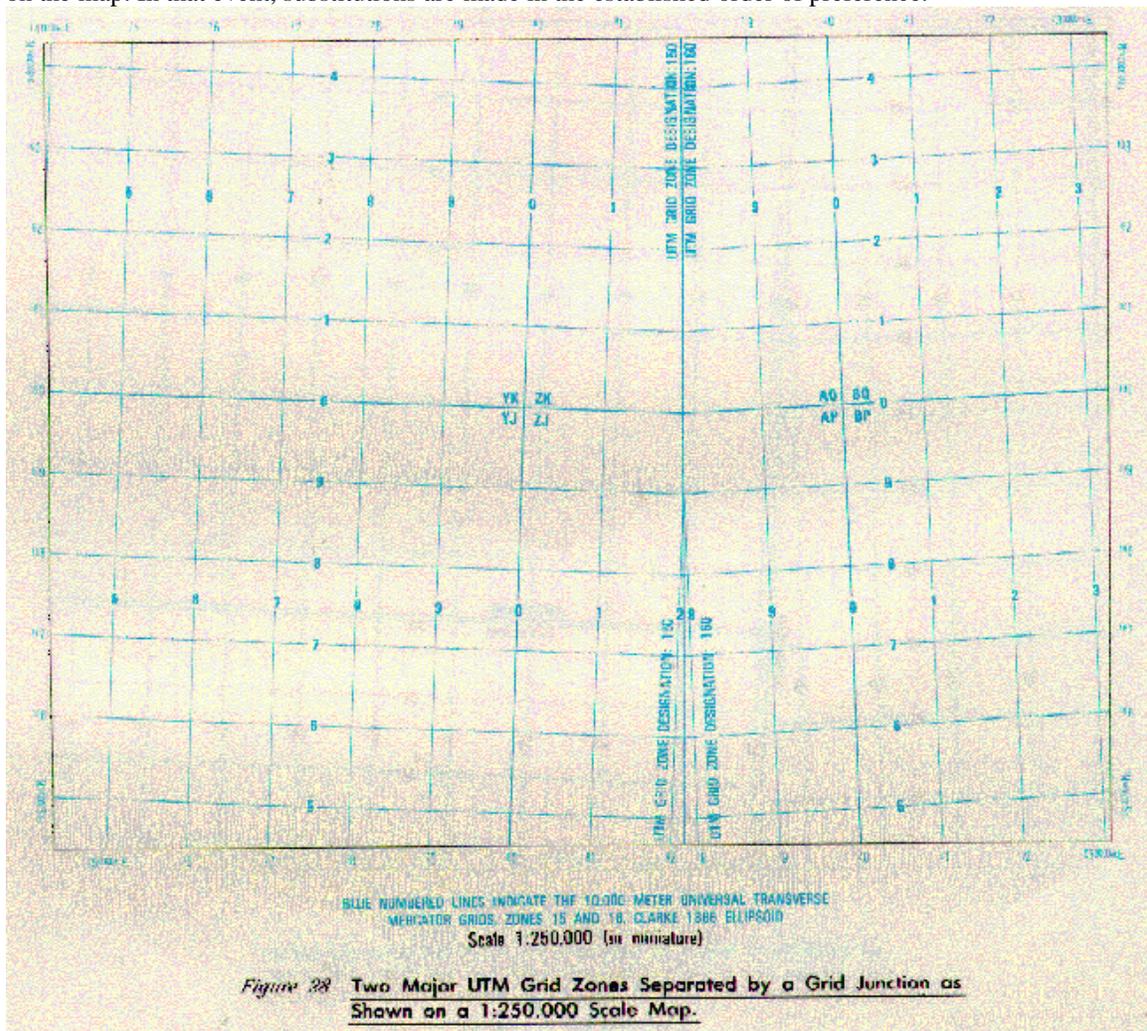
7-5 SECONDARY GRIDS

7-5.1 Secondary grids are seldom shown on JOGs. As a general rule, secondary grids are no longer required on military topographic maps. Excepted are those instances where mapping arrangements with cooperating foreign agencies specify the showing of a secondary grid. No more than one secondary grid is shown.

7-5.2 When required, the secondary grid is shown by inside ticks, printed in blue, emanating from the neatline in their correct alignment and spaced at 10,000-unit intervals. The even 100,000-unit ticks are accentuated in weight.

7-5.3 Values, similar in composition to those labeling the major grid lines, appear on all four sides of the sheet. The first grid tick in each direction from the southwest corner of the sheet is labeled with full values. Thereafter, only those grid ticks whose values are multiples of 50,000 are labeled. If the secondary grid is a

nonstandard grid, prescribed colors are used (para. 7-1.6-2), unless there is conflict with another grid shown on the map. In that event, substitutions are made in the established order of preference.

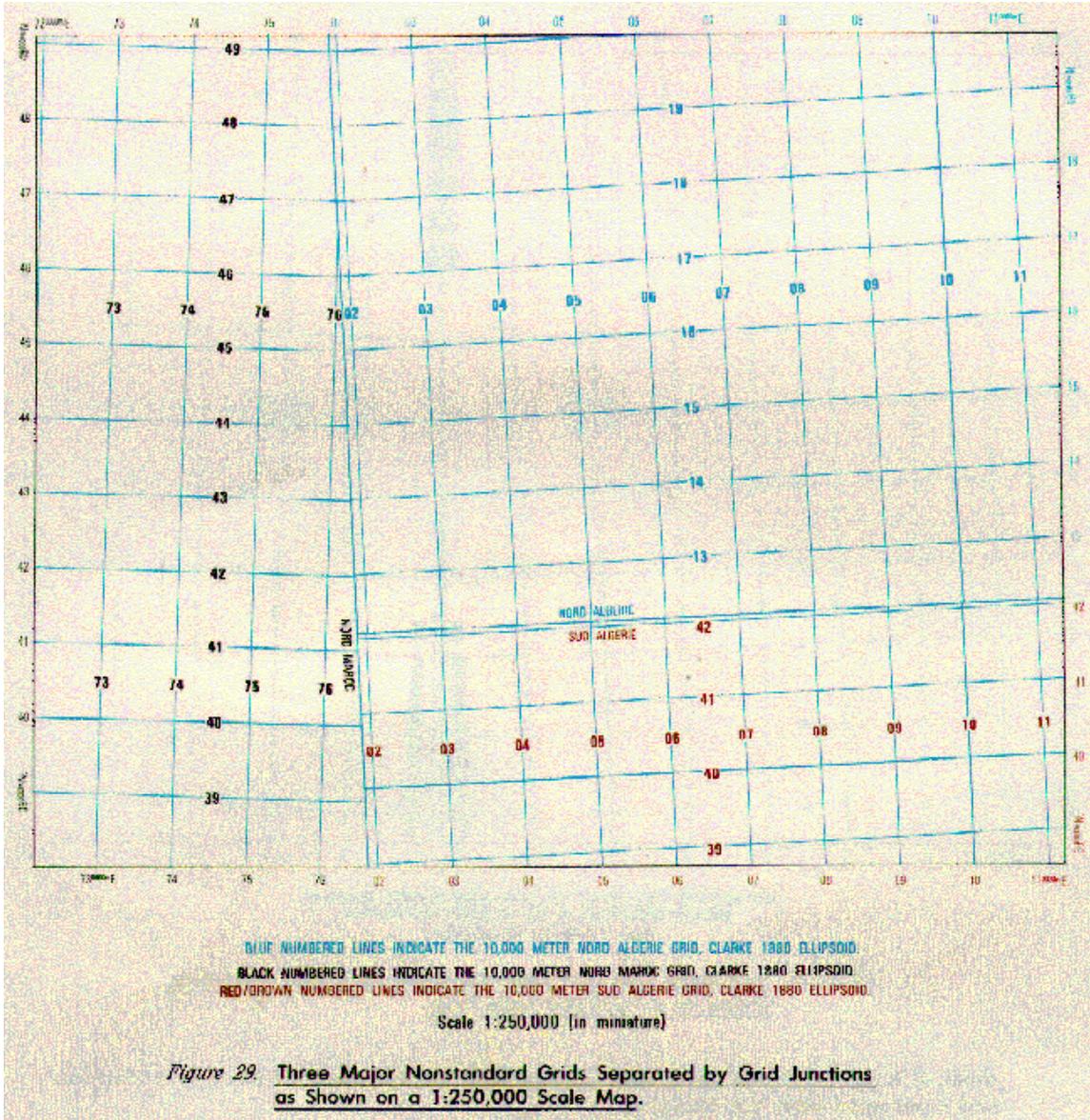


7-5.4 A grid note, identifying the secondary grid, appears in the lower margin of the sheet. It is printed in the same color as that used for the values of the grid it identifies and is modeled after the following:

BLACK NUMBERED TICKS INSIDE THE NEATLINE
INDICATE THE 10,000 METER LEVANT ZONE
GRID, CLARK 1880 ELLIPSOID

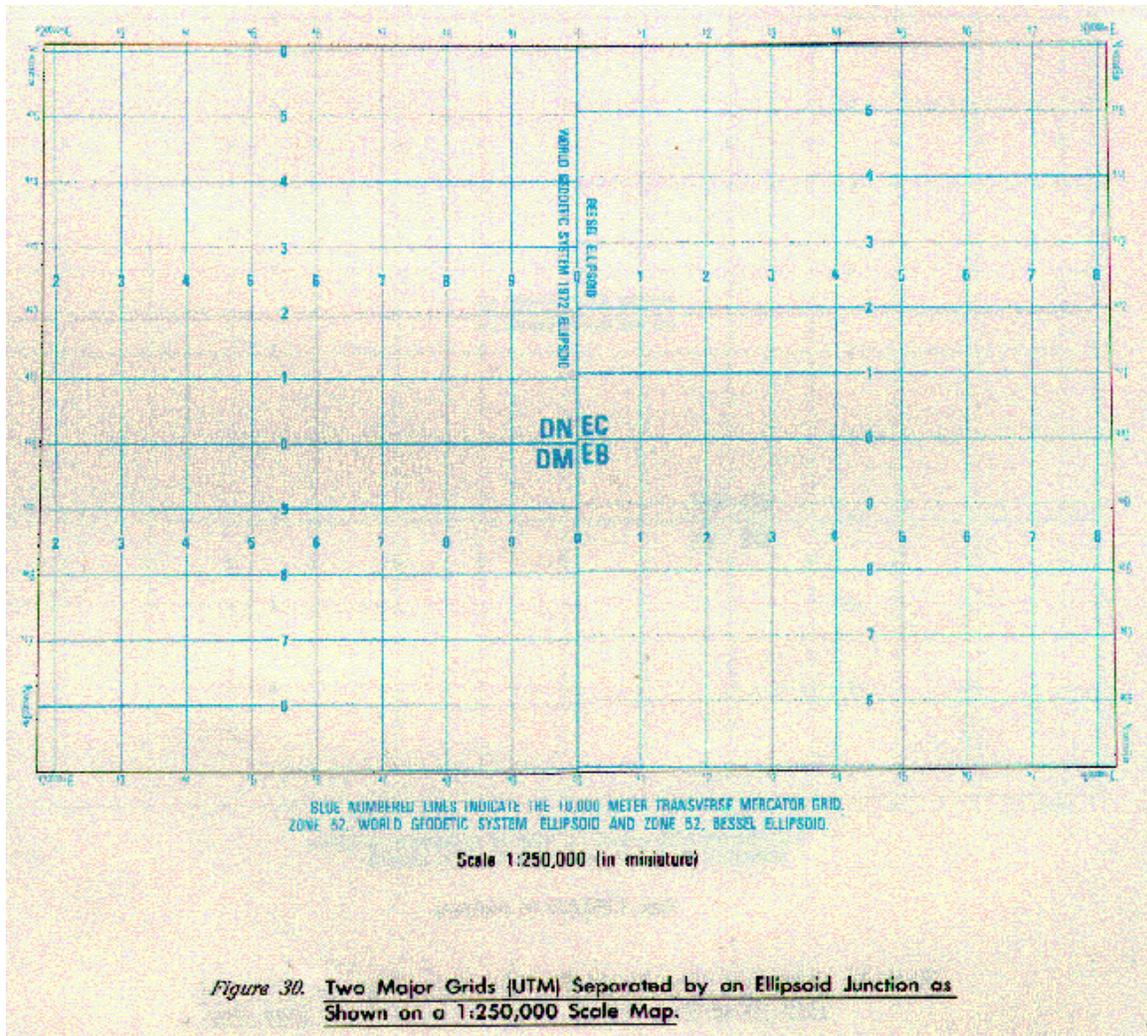
7-5.5 The principles outlined above are illustrated in figure 32.

7-5.6 If a sheet includes areas of more than one secondary grid, only one secondary grid is shown. This is extended over the entire sheet. Usually, the secondary grid shown is that which covers the major portion of the sheet. If the sheet is divided equally by more than one secondary grid, the one shown is that which occurs on most of the sheets in the area.



7-6 GRID DECLINATION.

Grid declinations from, true north are not shown on maps at these scales.



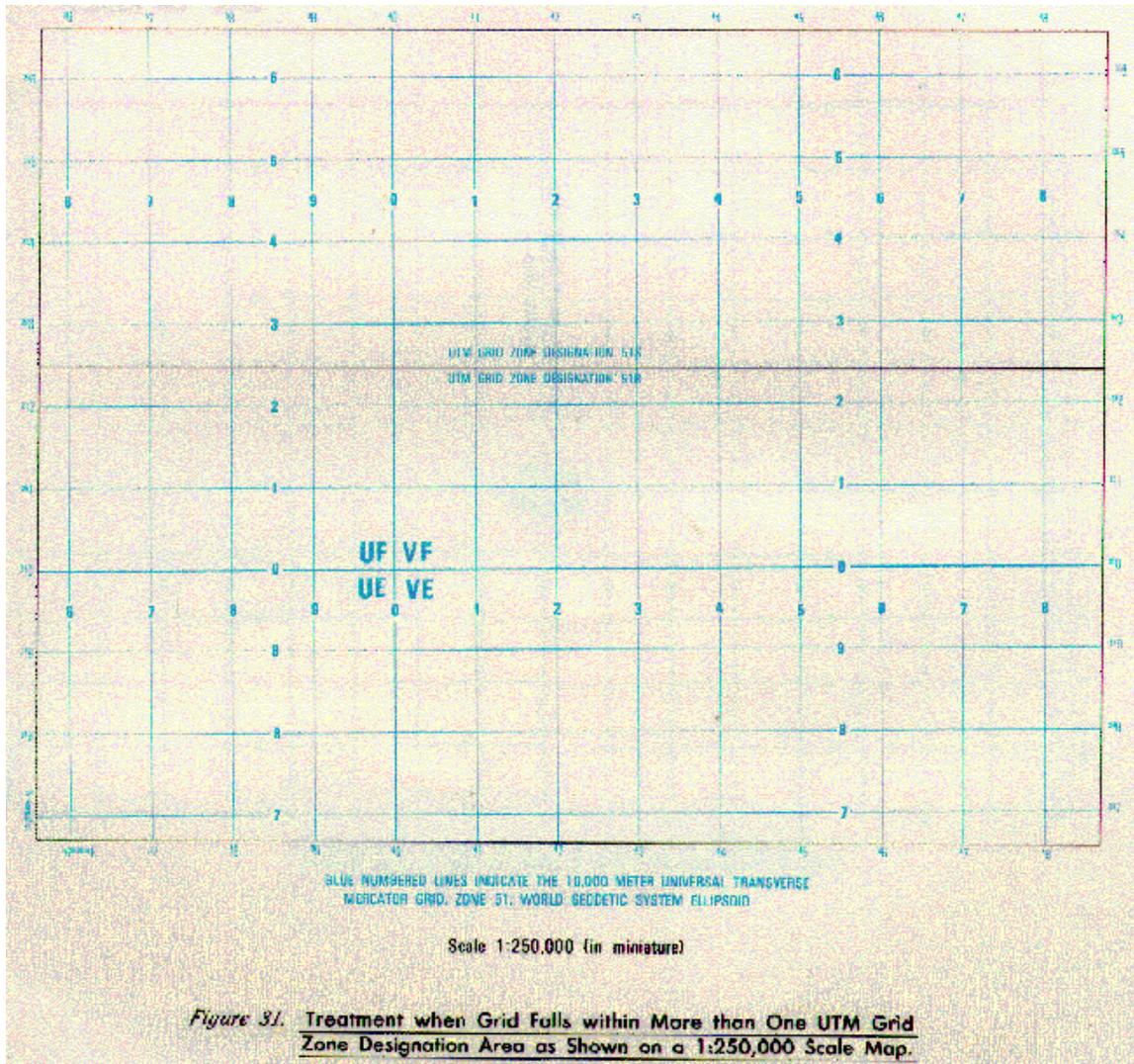
7.7 MAGNETIC DECLINATION.

7.7.1 In the margin of each sheet a note is shown to give the magnetic declination, usually for the centers of the west and east edges of the sheet. The declination is expressed to the nearest 1/2 degree, with mil equivalents to the nearest 10 mils.

7-7.1.1 The declination is obtained from the latest isogonic data for a standard epoch (i.e., a year that is divisible by five, such as 1990, 1995).

7-7.1.2 No reference is made to the annual magnetic change.

7-7.2 The note is usually printed in purple and is modeled after the following:



1990 MAGNETIC DECLINATION FROM TRUE NORTH VARIES FROM 1 1/2° (30 MILS) WESTERLY FOR THE CENTER OF THE WEST EDGE TO 2° (40 MILS) WESTERLY FOR THE CENTER OF THE EAST EDGE

7-7.3 On sheets where the declination is the same over the entire sheet, the note is modeled after the following:

MAGNETIC DECLINATION FOR 1990 IS 1 1/2° (30 MILS) WESTERLY OVER THE ENTIRE AREA

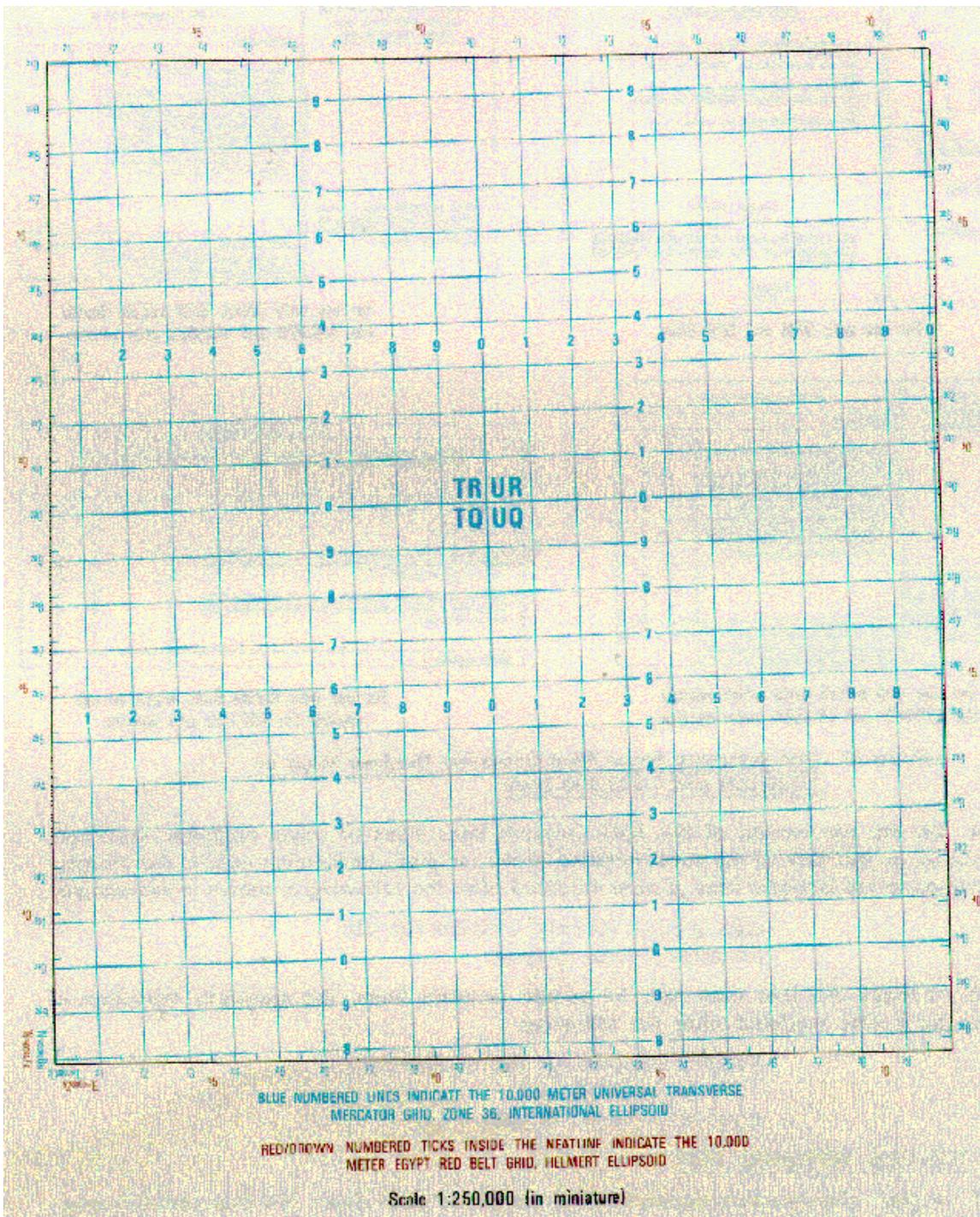


Figure 32 Major and Secondary (Obsolete) Grids as Shown on a 1:250,000 Scale Map.

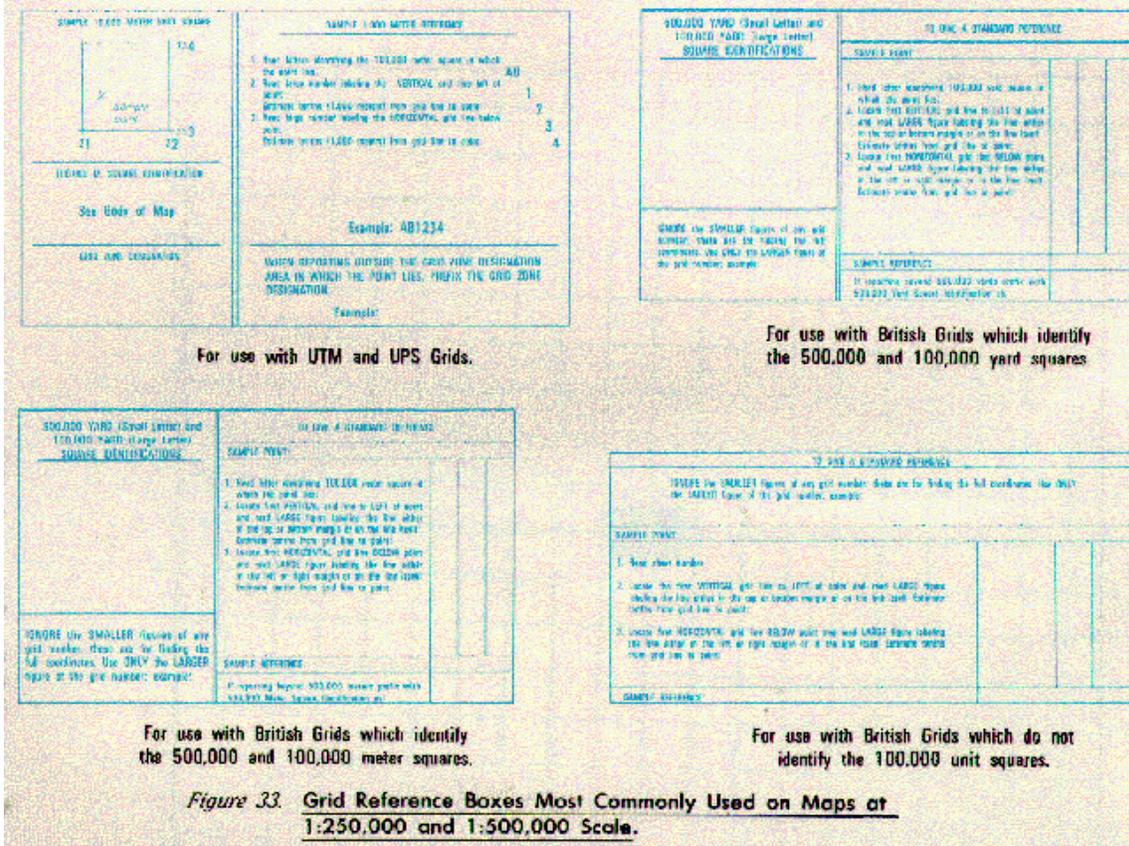


Figure 33. Grid Reference Boxes Most Commonly Used on Maps at 1:250,000 and 1:500,000 Scale.

7-7.4 On the Air version of the JOG, isogonic lines (lines of equal magnetic variation) are shown on the face of the sheet in place of the magnetic declination note in the margin. In addition to the isogonic lines, a note modeled after the following is shown in the margin:

LINES OF EQUAL MAGNETIC VARIATION FOR 1990
(Annual rate of change, no change)

7-7.5 If there are less than two 15 minute isogonic lines, the magnetic variation is shown by a note modeled after the following:

MAGNETIC VARIATION FOR 1990 IS APPRIXIMATELY
1° W OVER THE ENTIRE AREA
(Annual rate of change 7' decrease)

7-8 THE GRID REFERENCE BOX.

7-8.1 A grid reference box appears in the margin of each sheet. The box contains step- by-step instructions for composing a grid reference. For examples, see figure 33. The applicable grid zone designation is also identified in the box.

7-8.2 The grid system(s) in use on the map dictates the referencing instructions contained in the grid reference box.

7-8.3 When more than one major grid appears on a sheet and the method for giving a reference is the same for all the grids, a common reference box is used.

7-8.4 When more than one major grid appears on a sheet and the method for giving a reference varies with the grids, circumstances control the treatment of the grid reference boxes.

7-8.4.1 A grid reference box is shown in the margin for each grid, except those failing completely in open water area. Over each box appears a note limiting the use of the box to the grid or grids concerned.

7-8.4.1.1 When each box describes the method of referencing for one grid only, the note is printed in the same color as the values for its respective grid and is modeled after the following:

USE THIS BOX FOR GIVING REFERENCES ON THE
UNIVERSAL TRANSVERSE MERCATOR GRID

USE THIS BOX FOR GIVING REFERENCES ON THE
MADAGASCAR GRID

7-8.4.1.2 When the same system of referencing is used for two grids occurring on the same sheet along with a third grid using a different reference system, the note for the common reference box is printed in blue and modeled after the following:

USE THIS BOX FOR GIVING REFERENCES ON THE SUD
ALGERIE AND SUD TUNISIE GRIDS

7-8.4.2 When all reference boxes cannot be accommodated in the margin, the excess is shown in expanses of open water on the face of the map. When this is not practicable, a note which refers the user to an adjacent sheet is added to a reference box in the margin. This note is positioned below the note described in paragraph 7-8.4.1.2, above. If only one grid is involved, the note is printed in the same color as the values for that grid. If more than one grid is involved, the note is printed in blue. The notes are modeled after the following:

USE THIS BOX FOR GIVING REFERENCES ON THE
UNIVERSAL TRANSVERSE MERCATOR GRID

SEE SHEET NI 30-06 FOR GIVING REFERENCES ON
THE NORD MAROC GRID

USE THIS BOX FOR GIVING REFERENCES ON THE
UNIVERSAL TRANSVERSE MERCATOR GRID

SEE SHEET NI 32-10 FOR GIVING REFERENCES ON
THE SUD ALGERIE AND SUD TUNISIE GRIDS