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Fisheries Center

National Marine
Fisheries Service

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User's Guide
to the (RACE0010)
Map Program

May 1983

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USER'S GUIDE TO THE (RACE0010) MAP PROGRAM

by

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ABSTRACT

The (RACE0010) MAP program is used extensively at the Northwest and Alaska Fisheries Center for graphic presentation of data on maps. The maps are drawn on CalComp (and other) plotters that are connected to the Center's computer system and network.

This document includes actual maps that illustrate the numerous options available to the user of the program:

- different sizes of maps,
- coastline coverage in each hemisphere,
- resolution of coastline,
- inclusion of details,
- coastline, islands, and lakes,
- ivers,
- national and state boundaries,
- depth contours
- borders and labels,
- decimal places for superimposed station data,
- trace values and zero values,
- track lines,
- variable character sizes,
- superimposed external lines,
- multiple pens,
- Mercator and polyconic projections,
- overplotting
- resolution of overplotting,
- and a shaded density map.

Each section, devoted to a particular option, contains a reference map illustrating the default values. Subsequent maps in each section illustrate variations for that option. The parameters for generating each map are also shown.

Appendices contain the MAP program documentation (current as of May, 1983), brief descriptions of programs that are frequently used in conjunction with MAP, and tables of CalComp and Tektronix plotter symbols that may be used to represent stations.

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INTRODUCTION

The (RACE0010) MAP program is but one of over 200 programs used by the Resource Assessment and Conservation Engineering Division (RACE) at the Northwest and Alaska Fisheries Center in the normal course of accomplishing the Division's work. An overview of the resource assessment survey data base and software system was presented in a prior report (Mintel and Smith 1981) in which brief mention was made of the MAP program.

The MAP program is one of the fundamental and more frequently used programs, because of its broad range of applications of presenting data and results on maps.

People who have not used the MAP program may find this document helpful in rapidly understanding some of the possibilities for graphical presentation of their data.

Other people who have been using the MAP program may see options illustrated that they have not used before. Numerous options have been added to the program since it was first available. Some people may find the illustrations more explanatory than the textual documentation.

Since no programming is required to produce maps, the options are invoked by making a simple parameter file with the text editor (CANDE) on the computer system and by running the MAP program.

The approach taken for mapping has been to have a single main program. Numerous options allow the user to specify the size of the map, the resolution, and kind of coastline features to be included. Other data may be superimposed on the map by means of a plot work file. Such plot work files are produced by various analytical programs, e.g., CPUE, STATION, TAXA, and LLF/40.

By isolating mapping from other application programs, programming is simplified. Graphics capabilities are easily and rapidly extended to many programs without the need for graphics programming, i.e., programs simply write a plot work file. Each record on a plot work file has latitude, longitude, station symbol, and a station value.

The plot work file is routed into the MAP program. The station symbol and station value are plotted by MAP at the specified latitude and longitude. Station values may represent sample numbers, catch per unit effort (CPUE) values for a species, bottom depths, temperatures, vessel codes, or almost anything that is contained in, or can be derived from, the user's data base.

Other programs frequently used in conjunction with the MAP program are described briefly in Appendix C. Of these programs, LIST/PLOTWORK lists a plot work file, and program UNDER/PLOT is used for resolving overplotting of stations.

Although a copy of the MAP program documentation is included in Appendix A, users should always reference the current computer-based documentation on (RACE0360)DOC/MAP ON RACE. Users may write or list that file for a copy of the documentation. The computer-based documentation will be the up-to-date official documentation of the MAP program. The illustrations contained herein are considered auxiliary documentation, and will not be updated as changes are made to the MAP program.

Extensions to the MAP program in progress as of April, 1983, but not illustrated in this document, include additional and higher resolution depth contours, and the 200-mile fishery conservation zone line from California through Alaska.

Enhancements to this program, as well as news of other RACE software systems, are announced on (RACE0010)NEWS ON RACE, which may be listed by any user.

Users within the RACE division may refer their questions about the MAP program to their project data managers. People outside the RACE division may refer their questions to Ken Weinberg, the RACE Data Manager, (206) 442-7796, or FTS 399-7796.

SECTION 1. SIZES OF MAPS

Unless the map sizes are specified, the defaults are 10 inches high, 12 inches wide. If only a height is specified, the computer will calculate a width, using a Mercator projection. Similarly, if only a width is given, a height will be calculated. Both height and width may be specified to any number of decimal places.

Often, when both dimensions are specified, the resulting maps are described as "distorted". All two-dimensional representations of the earth are abnormal in some respect. For additional information on map projections and representations, see the map section in the Encyclopedia Britannica.

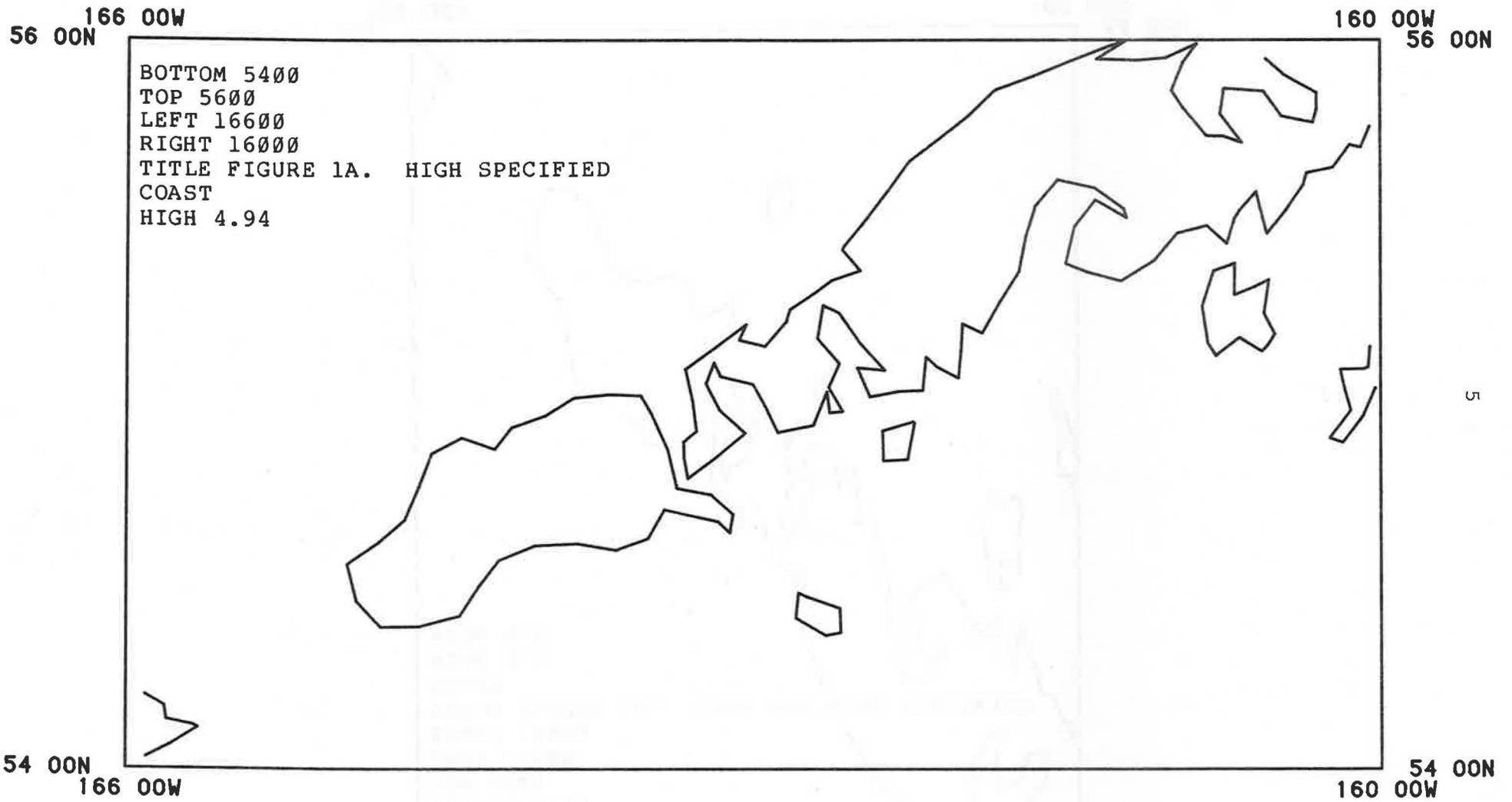


FIGURE 1A. HIGH SPECIFIED

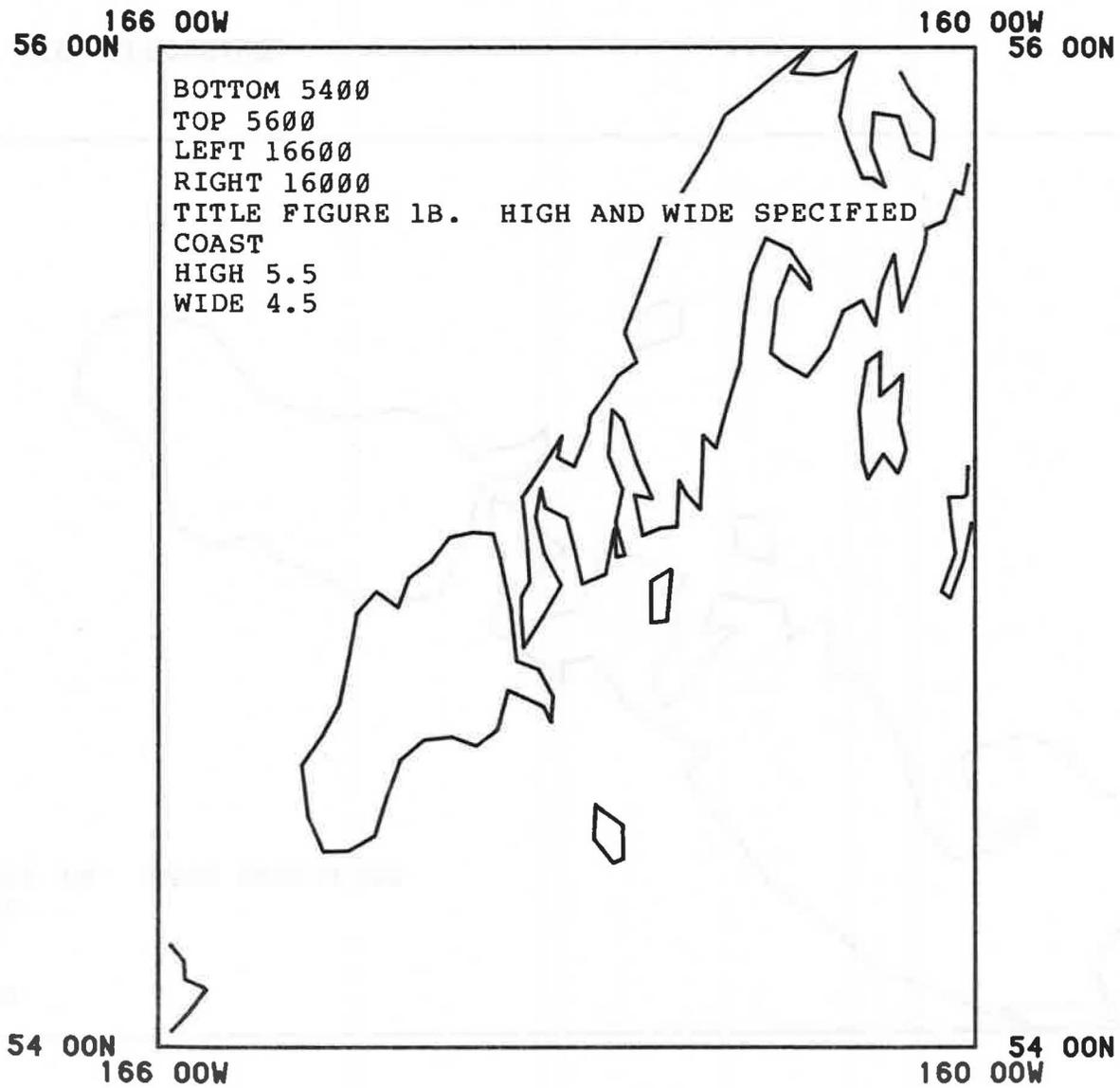


FIGURE 1B. HIGH AND WIDE SPECIFIED

SECTION 2. HEMISPHERES

The defaults are that maps are in the Northern and Western Hemispheres. South and east may be specified, however.



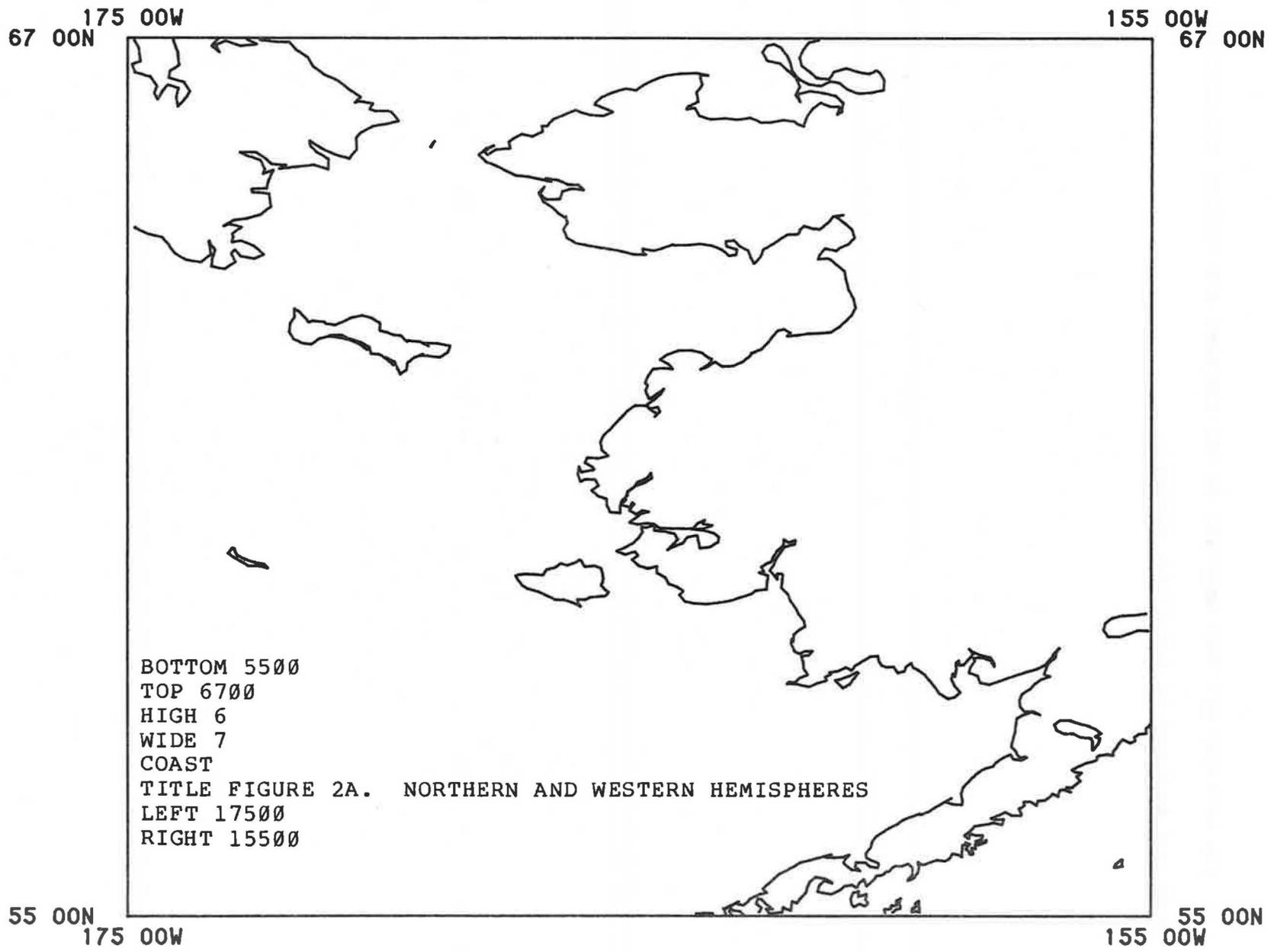


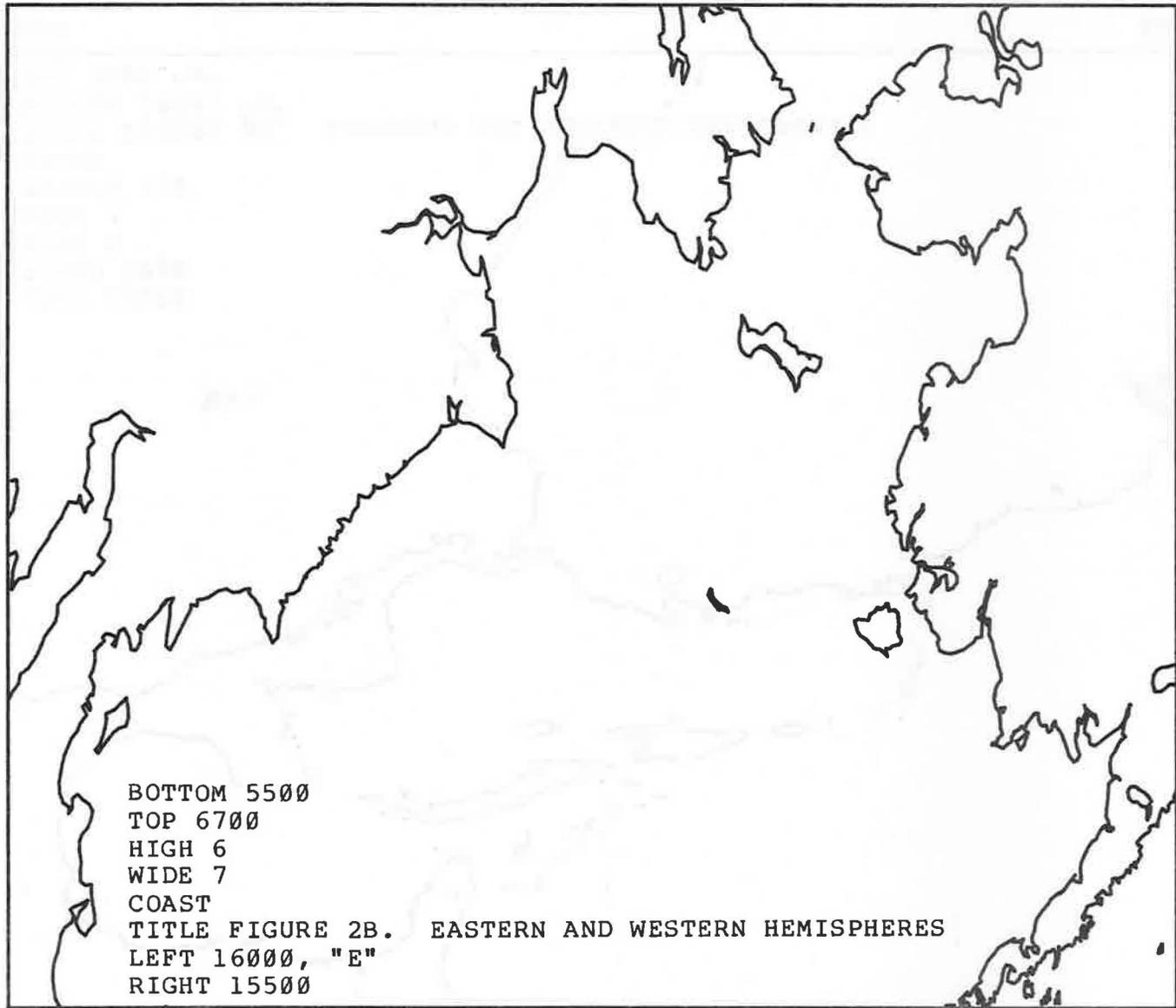
FIGURE 2A. NORTHERN AND WESTERN HEMISPHERES

160 00E
67 00N

155 00W
67 00N

55 00N
160 00E

155 00W
55 00N



BOTTOM 5500
TOP 6700
HIGH 6
WIDE 7
COAST
TITLE FIGURE 2B. EASTERN AND WESTERN HEMISPHERES
LEFT 16000, "E"
RIGHT 15500

FIGURE 2B. EASTERN AND WESTERN HEMISPHERES

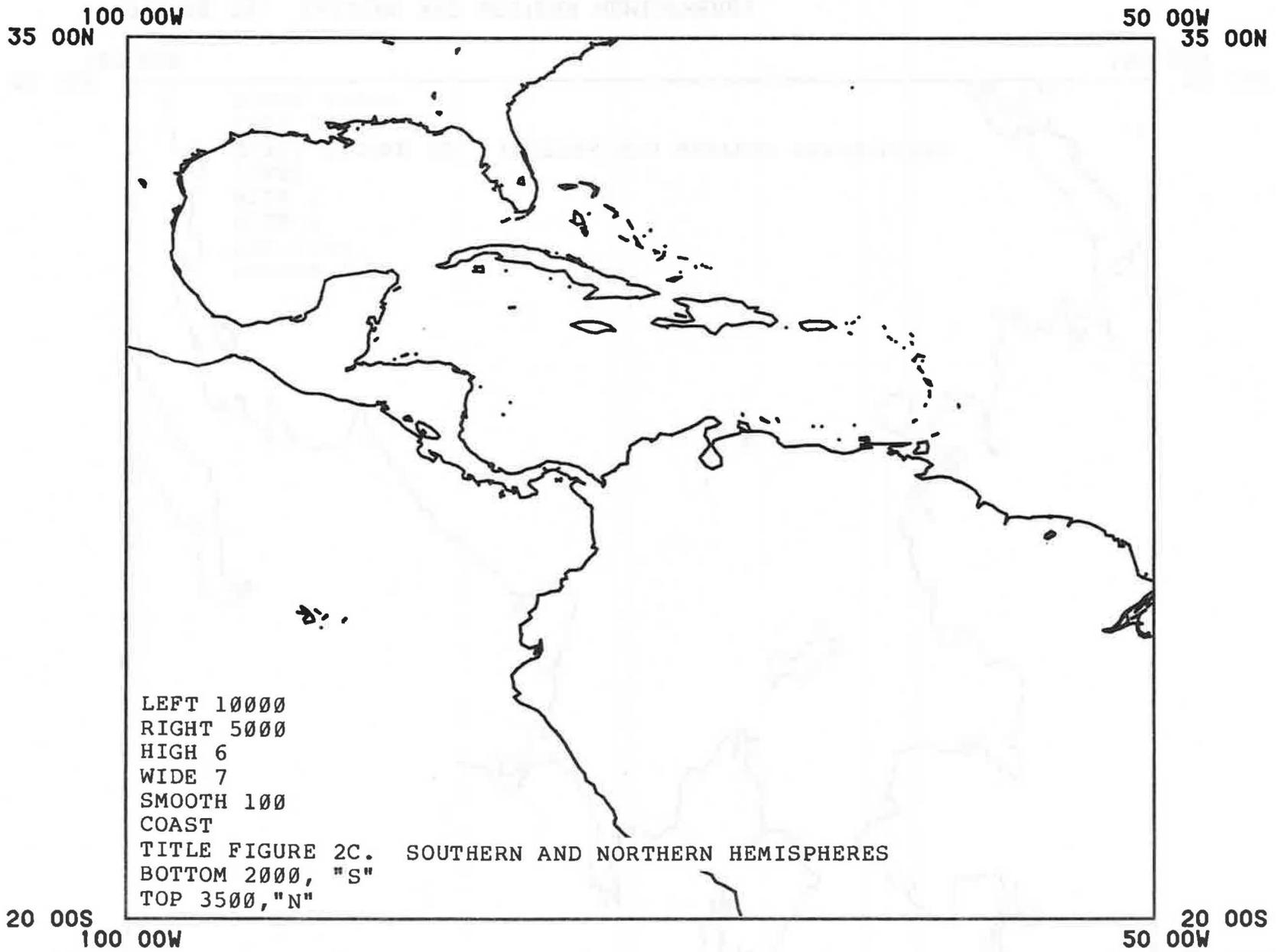


FIGURE 2C. SOUTHERN AND NORTHERN HEMISPHERES

SECTION 3. COVERAGE

Coastline is currently available for the entire North and South American continents. The Asian coast, from approximately Hong Kong north through Siberia is present, as is the Antarctic. Figure 3D shows only a portion of the Antarctic.



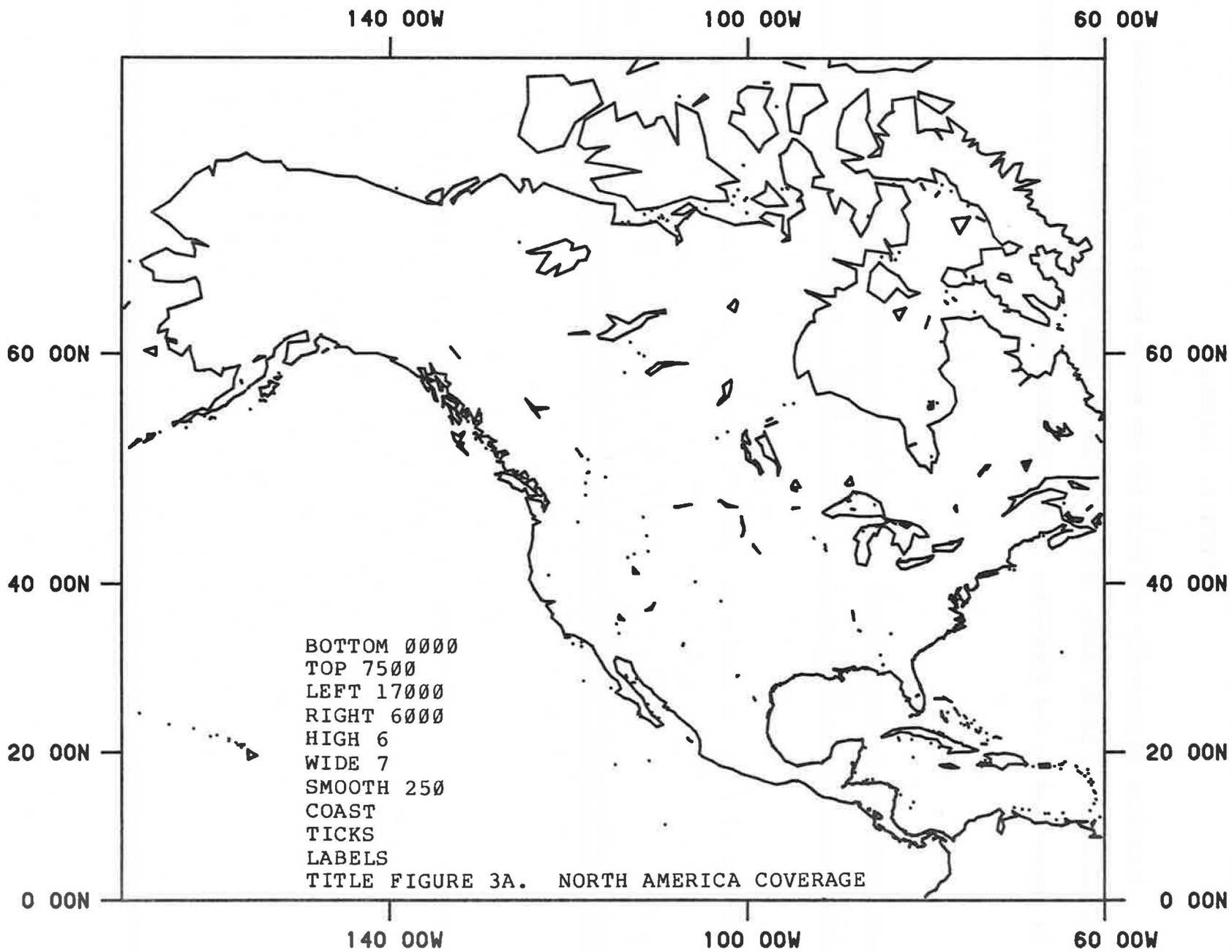


FIGURE 3A. NORTH AMERICA COVERAGE

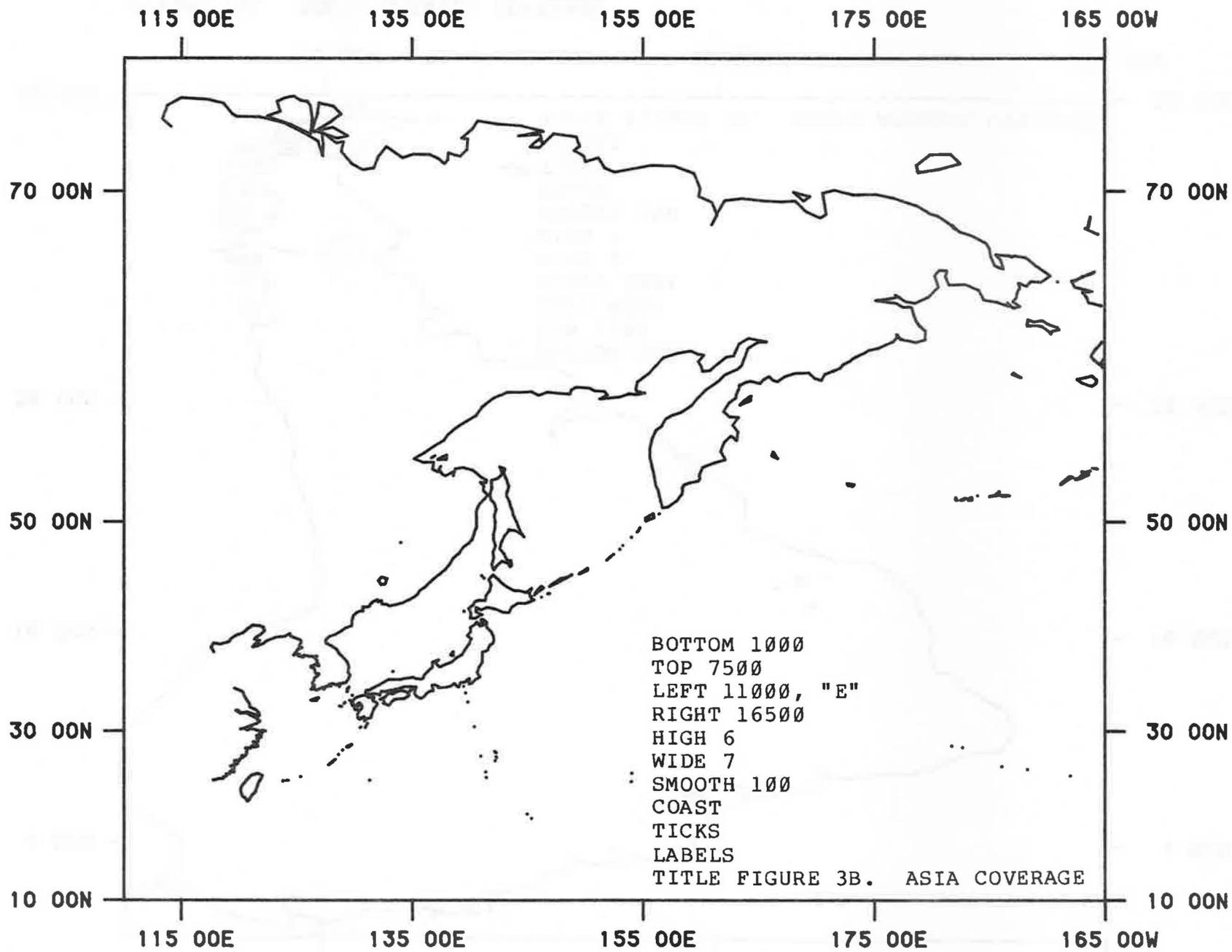


FIGURE 3B. ASIA COVERAGE

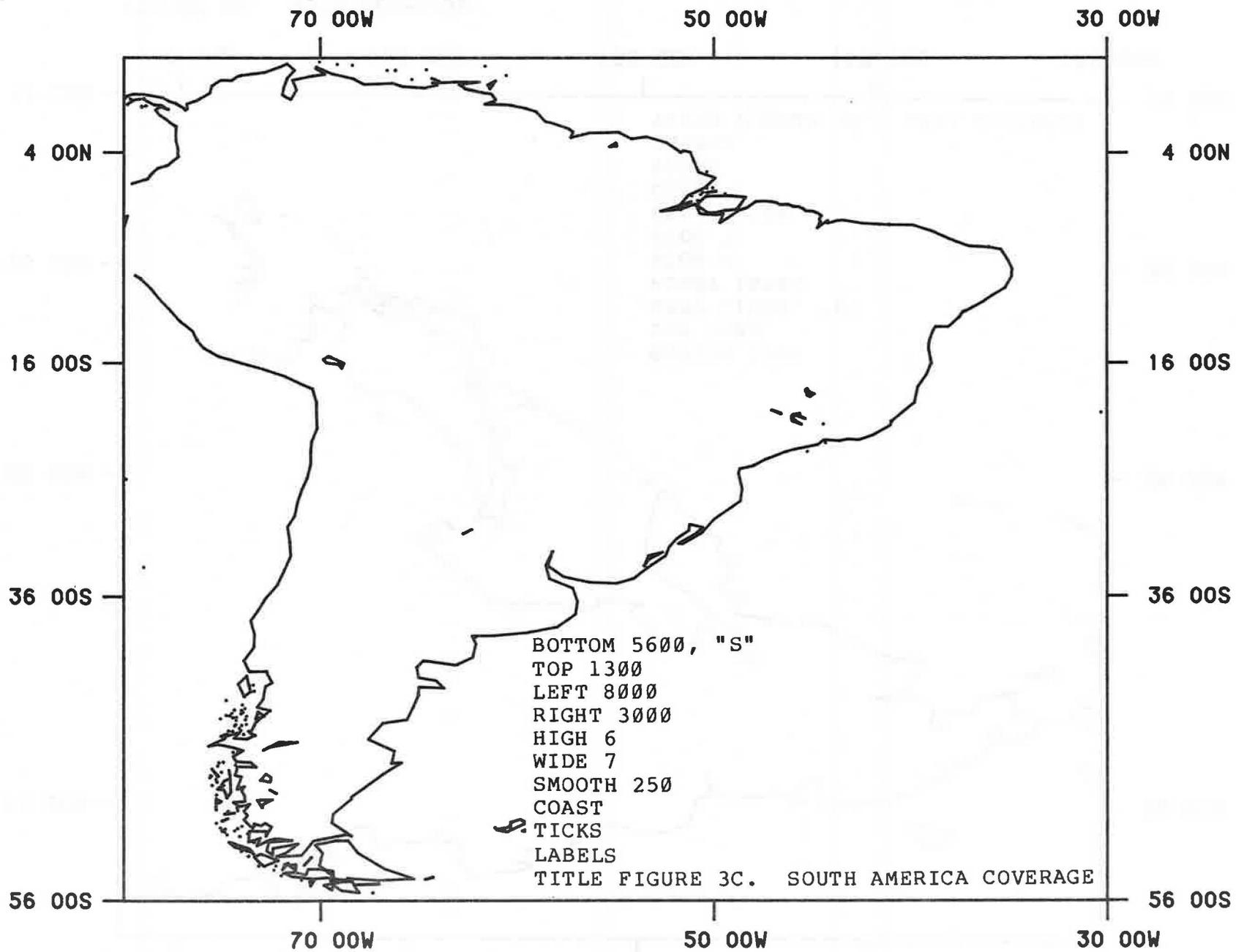


FIGURE 3C. SOUTH AMERICA COVERAGE

SECTION 4. RESOLUTION

There are currently a few hundred thousand data points in the coastline file. If all of these points were to be included in a map, an extraordinary amount of computer and plotting time would be required.

The "SMOOTH" command allows control of how many of these points will be used. The default is that every 20th point is used for coastline features. This means that only every 20th point of the available coastline points will be used in drawing the map.

For more detailed maps of small areas, e.g., Kodiak Island or Puget Sound, more points may be included by giving a smaller smoothing number, e.g., "SMOOTH 2."

For less detailed maps, and especially maps of extremely large areas, e.g., continents, use a large smoothing number, e.g., "SMOOTH 200", to conserve computer resources, and to avoid producing a resolution that is finer than the eye can detect.

The default smoothing for other features, such as state and national boundaries, is different. A table is printed when the MAP program runs showing the features included on the map and the smoothing used. Also shown is a count of how many coastline, and other, points are included on the map.

As a general guideline, a map that is 20 by 20 inches should contain fewer than 2,000 points. If your maps include many thousands of points, you probably should use a larger SMOOTH command to reduce the number of points on subsequent maps.

Another situation in which the "SMOOTH" command would be used is in extending the coastline to the border of the map. The program presently does not draw partial line segments if one of the two end points is outside the boundary of the map.

Whereas with the default smoothing (e.g., "SMOOTH 20"), a gap may appear between the coastline and the border, the gap would be diminished by including more points on the map (e.g., "SMOOTH 10" or "SMOOTH 5").

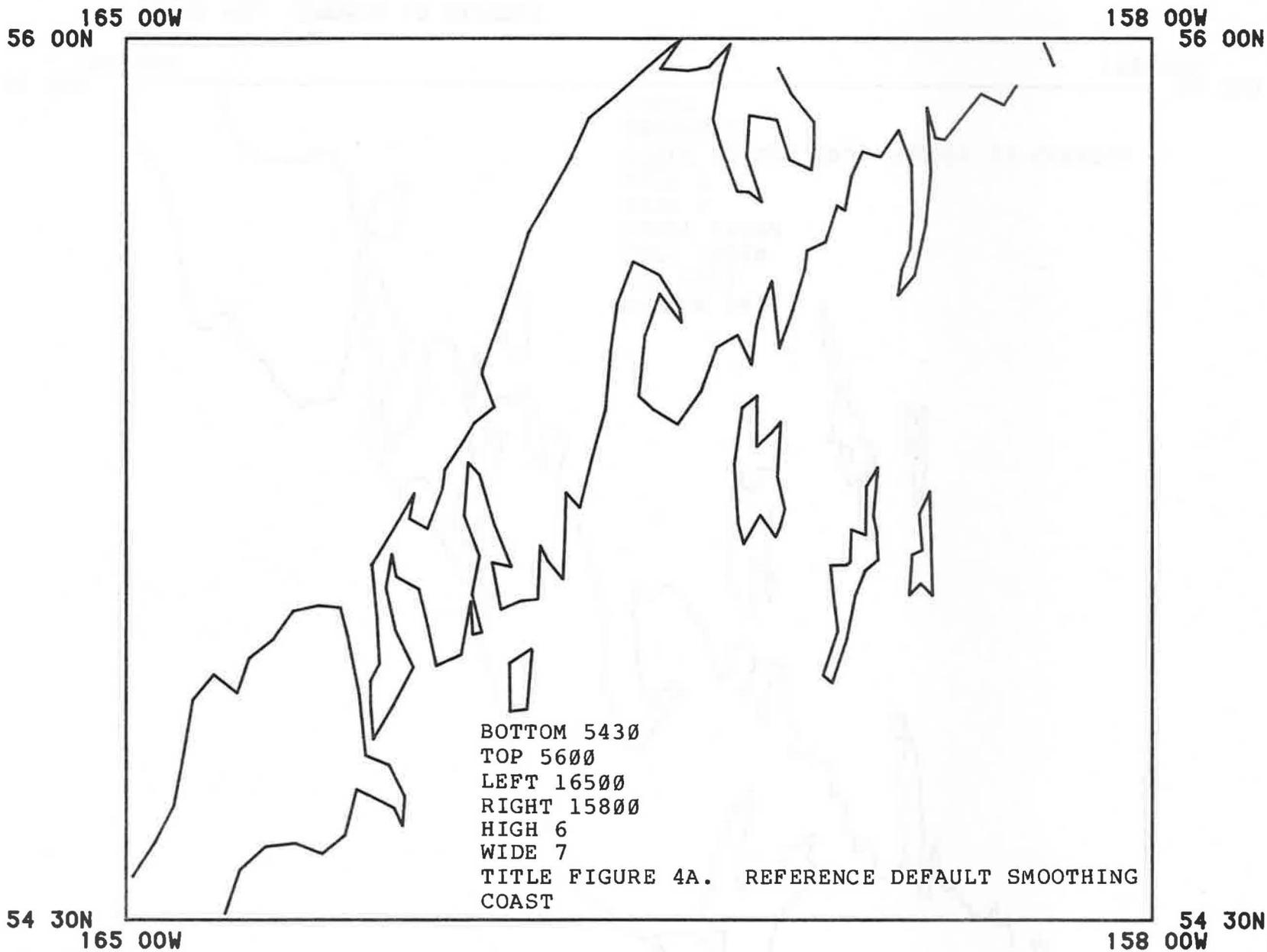


FIGURE 4A. REFERENCE DEFAULT SMOOTHING

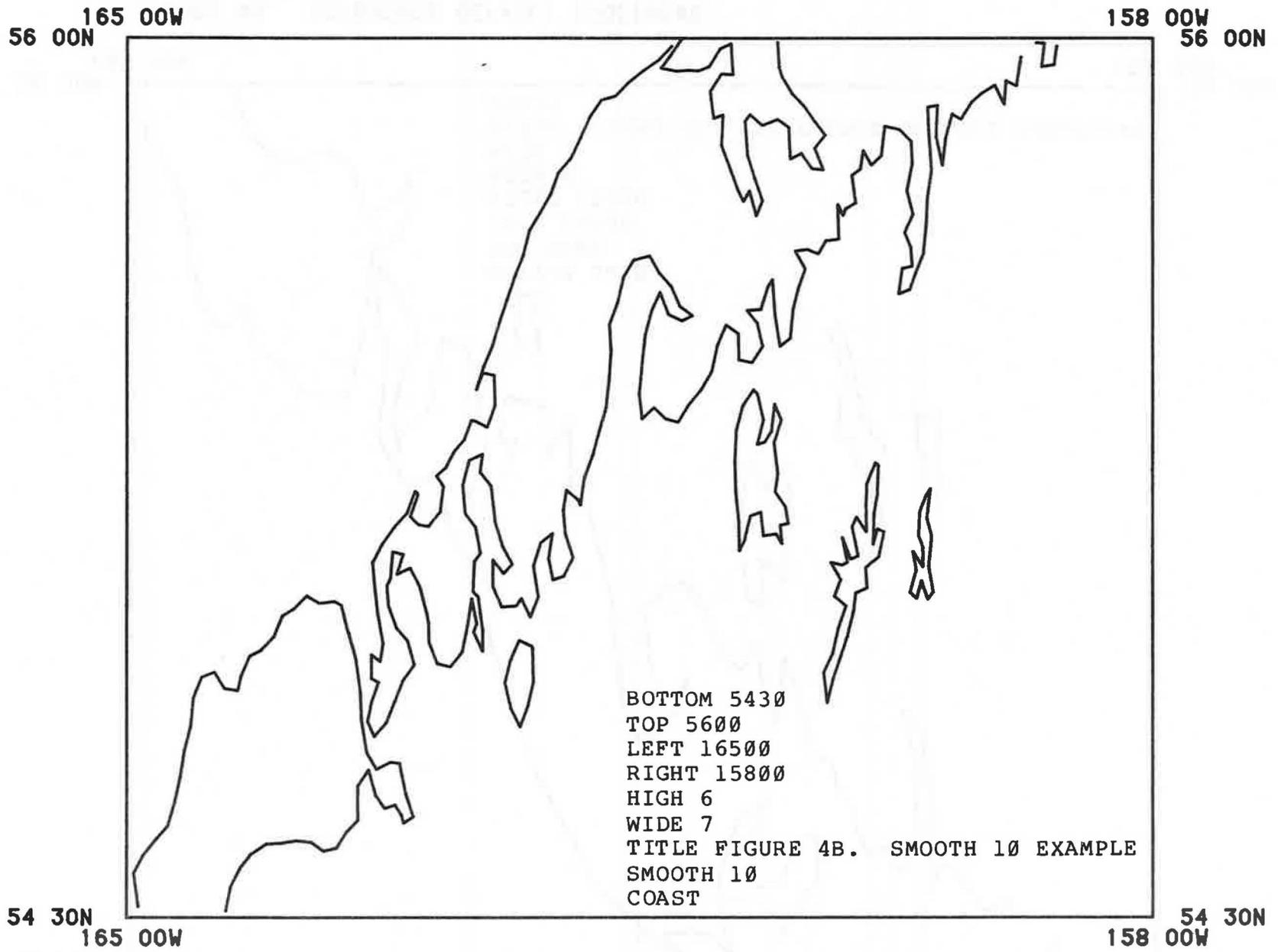


FIGURE 4B. SMOOTH 10 EXAMPLE

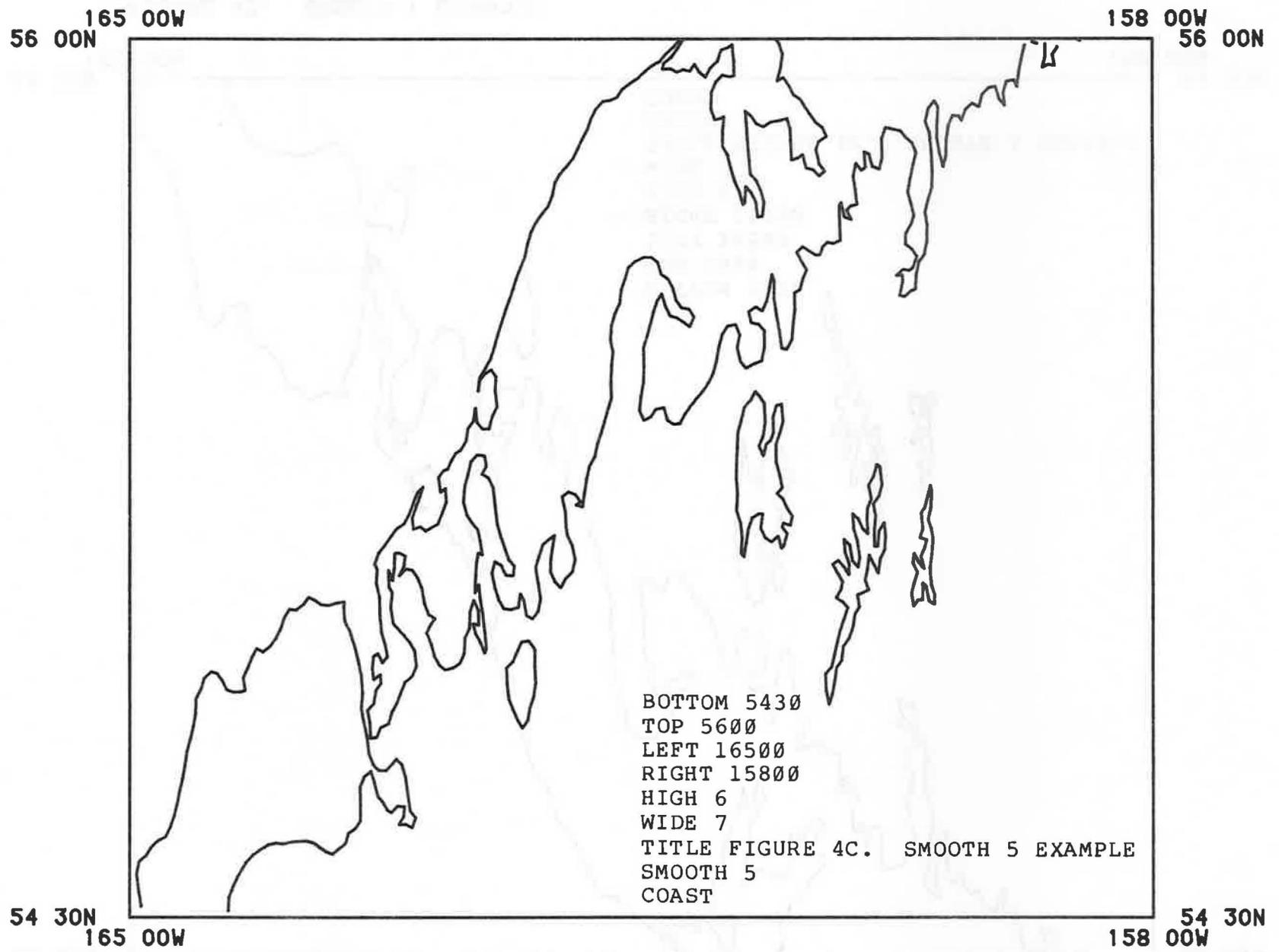


FIGURE 4C. SMOOTH 5 EXAMPLE

56 00N 165 00W

158 00W 56 00N

54 30N 165 00W

158 00W 54 30N

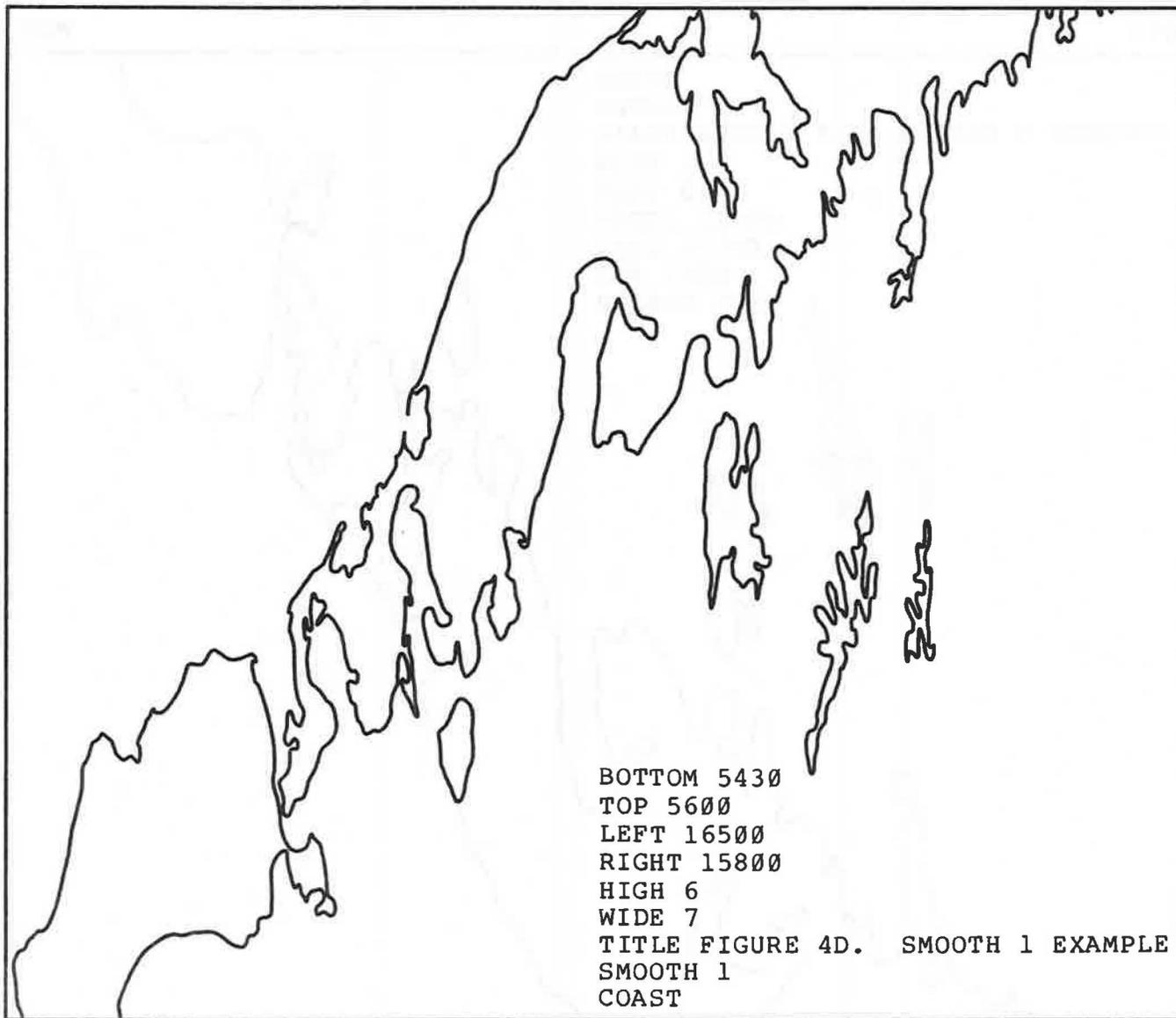


FIGURE 4D. SMOOTH 1 EXAMPLE

SECTION 5. COAST, ISLANDS, AND LAKES

The coastline, islands, and lakes (and other features) are classified by size as major, intermediate, and minor. The default "COAST" command includes the major items. Options are available to include the intermediate and minor features.

If the islands that you expected did not appear on the map, use the next more detailed category, e.g., "COAST 2" or "COAST 3".

172 00W
60 00N

160 00W
60 00N

BOTTOM 5400
TOP 6000
LEFT 17200
RIGHT 16000
HIGH 6
WIDE 7
TITLE FIGURE 5A. REFERENCE COAST OPTIONS
COAST

54 00N
172 00W

54 00N
160 00W

FIGURE 5A. REFERENCE COAST OPTIONS

172 00W
60 00N

160 00W
60 00N

BOTTOM 5400
TOP 6000
LEFT 17200
RIGHT 16000
HIGH 6
WIDE 7
TITLE FIGURE 5B. COAST 2 OPTION
COAST 2

54 00N
172 00W

54 00N
160 00W

FIGURE 5B. COAST 2 OPTION

172 00W
60 00N

160 00W
60 00N

BOTTOM 5400
TOP 6000
LEFT 17200
RIGHT 16000
HIGH 6
WIDE 7
TITLE FIGURE 5C. COAST 3 OPTION
COAST 3

54 00N
172 00W

54 00N
160 00W

FIGURE 5C. COAST 3 OPTION

SECTION 6. RIVERS

Major, intermediate, and minor rivers may be included similarly to the coastline features.

Presently, there are some discontinuities in the rivers. Various segments of the same river have been classified at different levels of detail in the World Data Bank-II coastline files, the source of our data. If undesirable gaps appear in the rivers, specify a more detailed level, e.g., "RIVERS 2" or "RIVERS 3." In some cases, specifying 4 or 5 may be necessary.

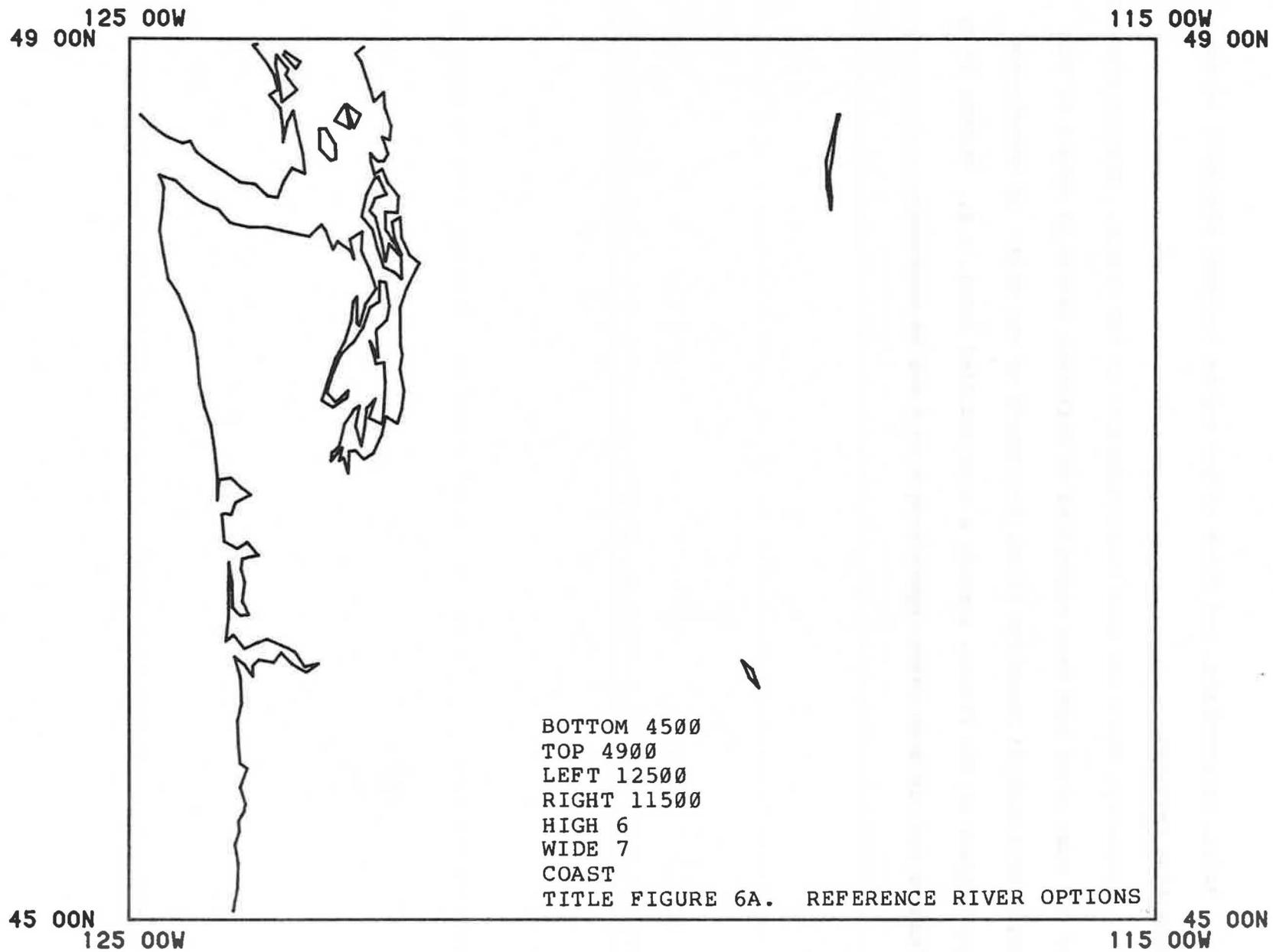


FIGURE 6A. REFERENCE RIVER OPTIONS

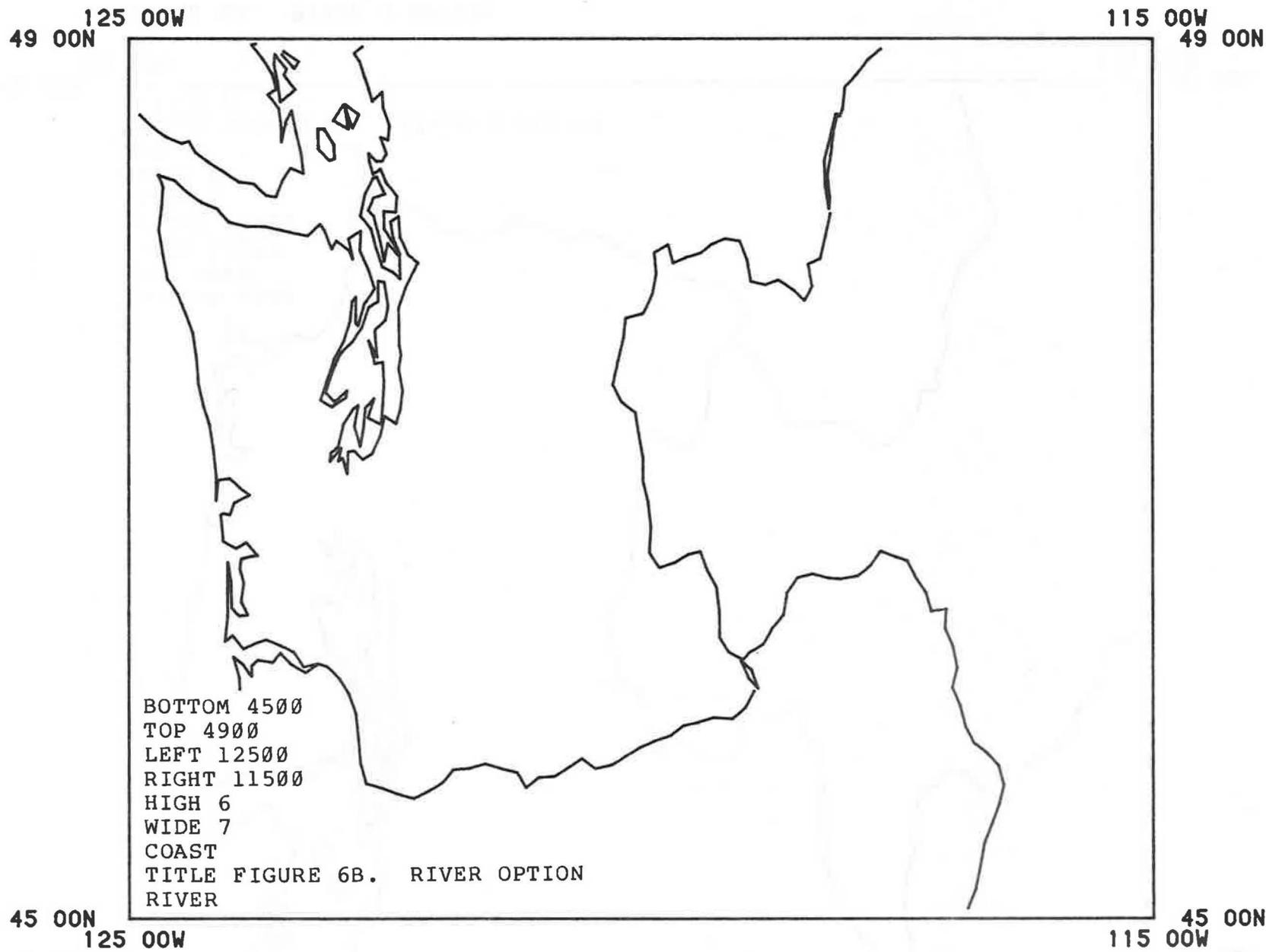


FIGURE 6B. RIVER OPTION

49 00N 125 00W

115 00W 49 00N

45 00N 125 00W

115 00W 45 00N

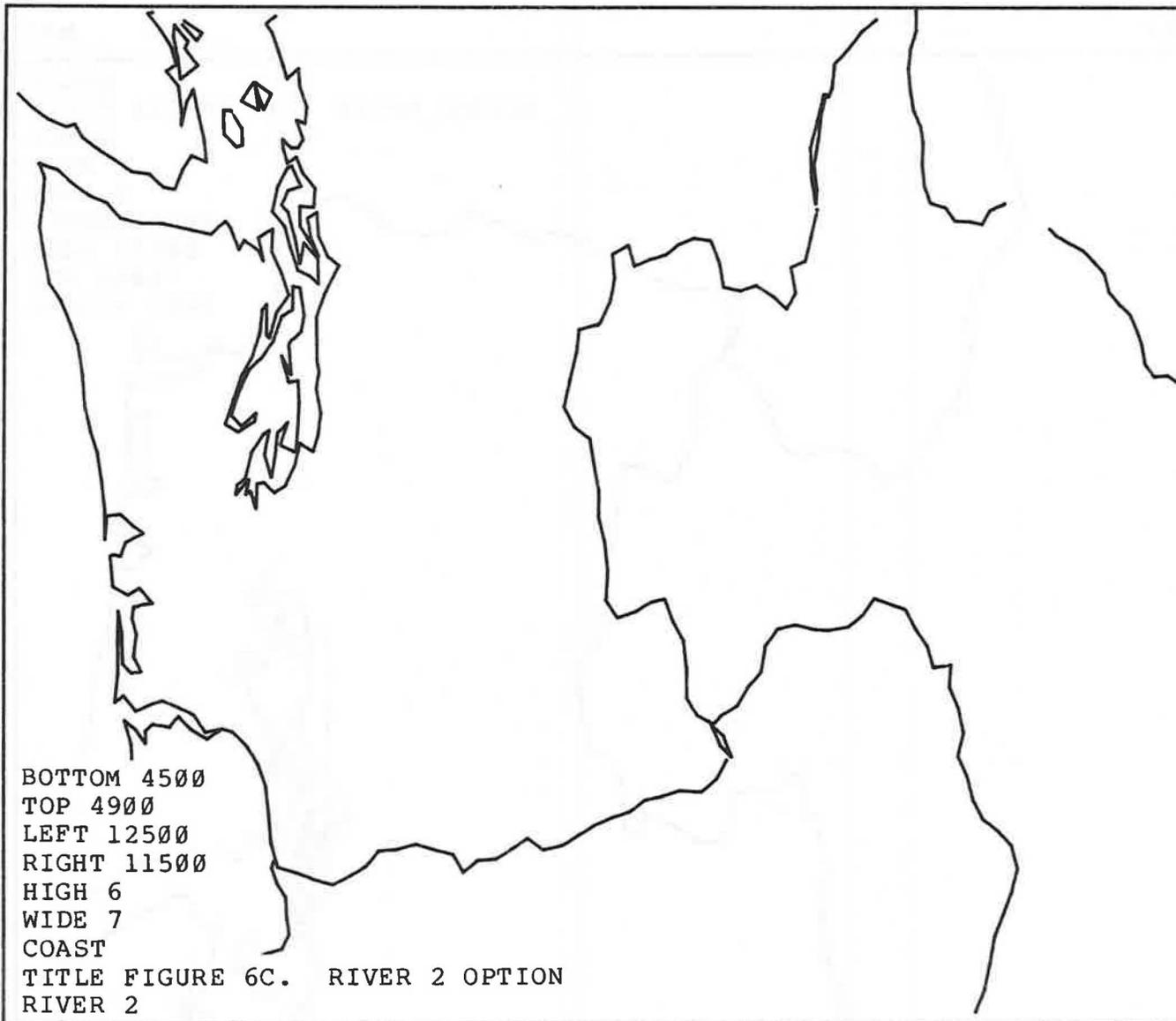
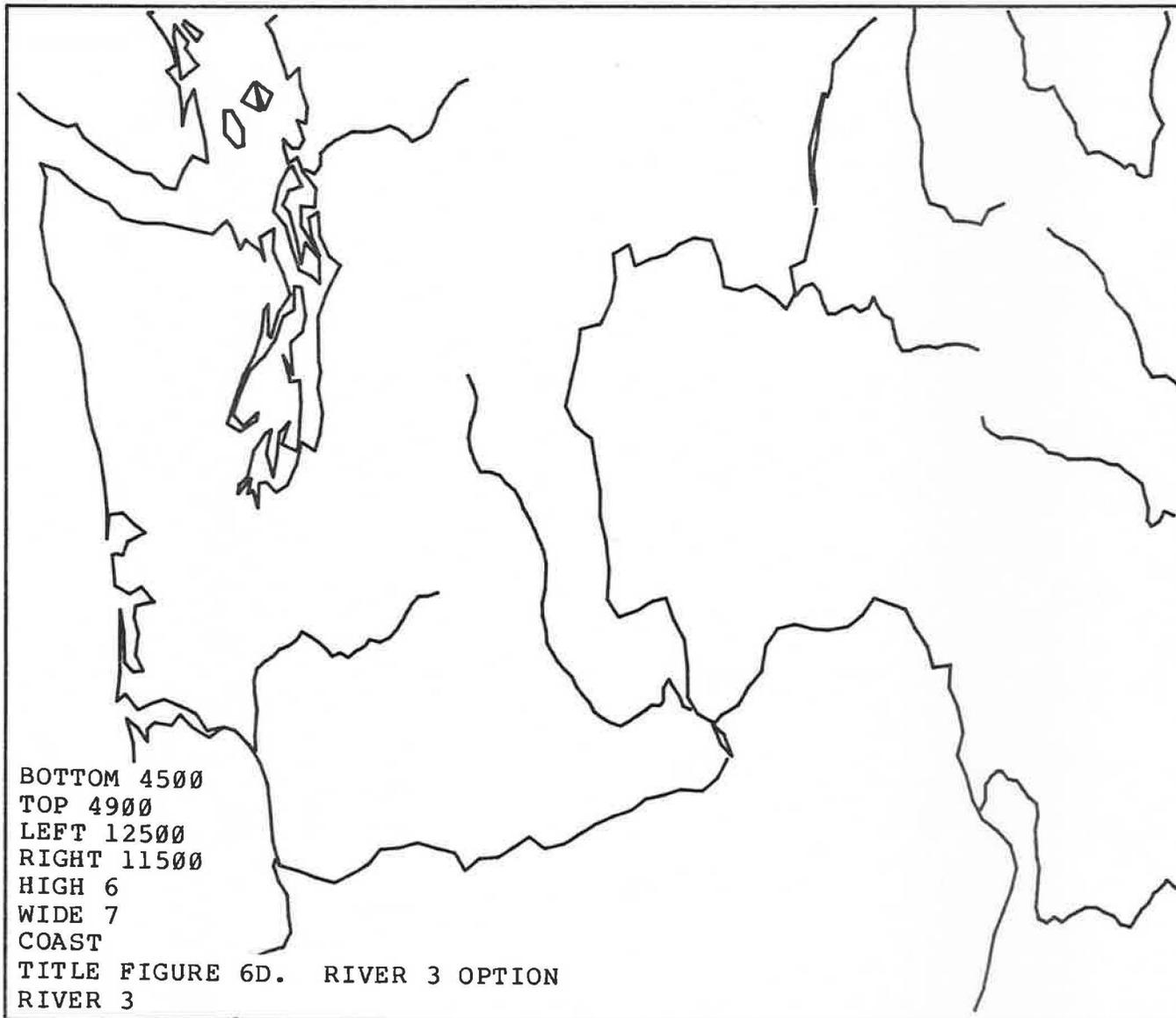


FIGURE 6C. RIVER 2 OPTION

125 00W
49 00N

115 00W
49 00N



45 00N
125 00W

115 00W
45 00N

FIGURE 6D. RIVER 3 OPTION

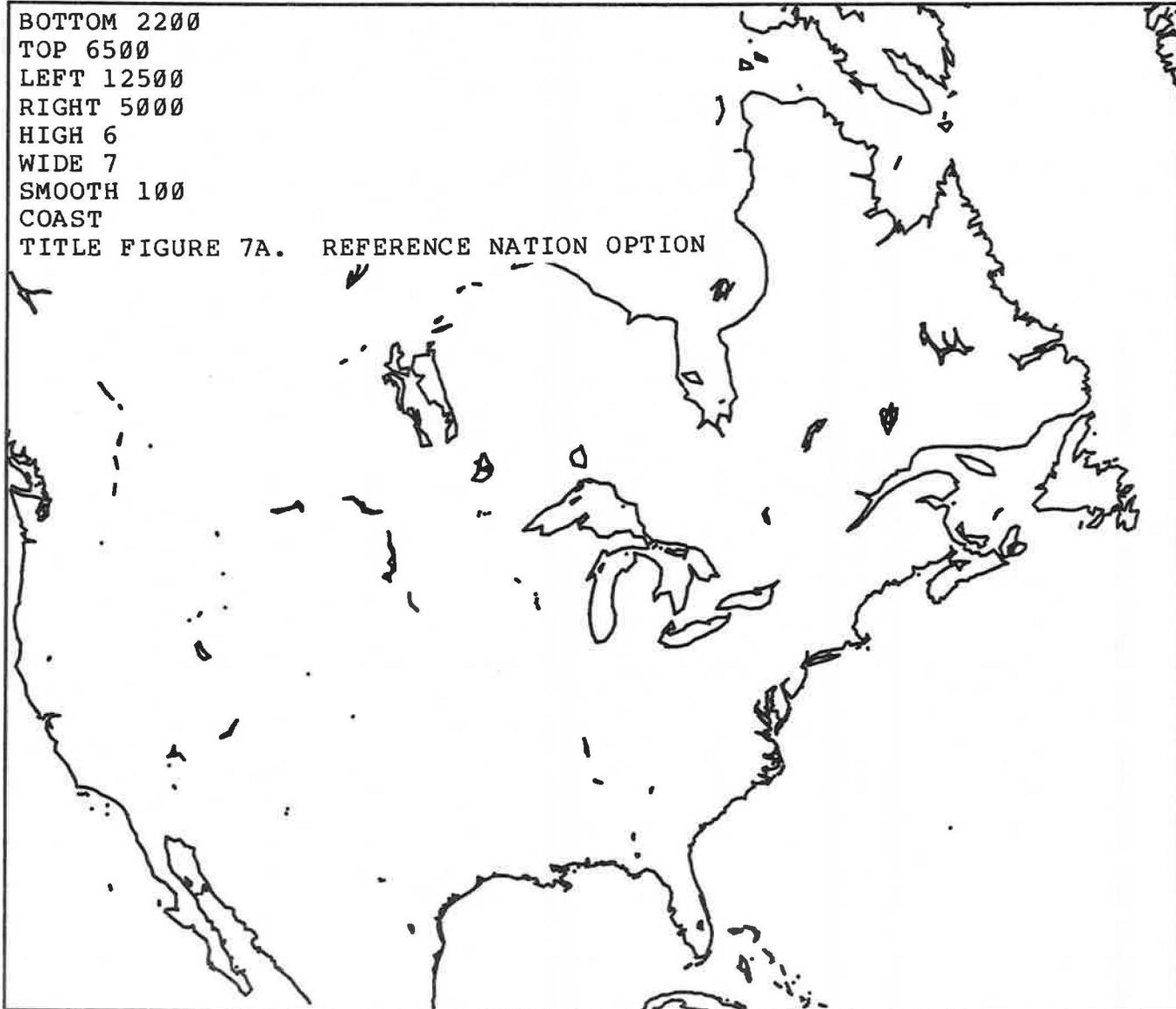
SECTION 7. NATIONAL BOUNDARIES

National boundaries may be included on maps. The boundary between Alaska and Canada is classified as a national, not state, boundary. Currently national boundaries are included for North and South America.



65 00N 125 00W

50 00W 65 00N



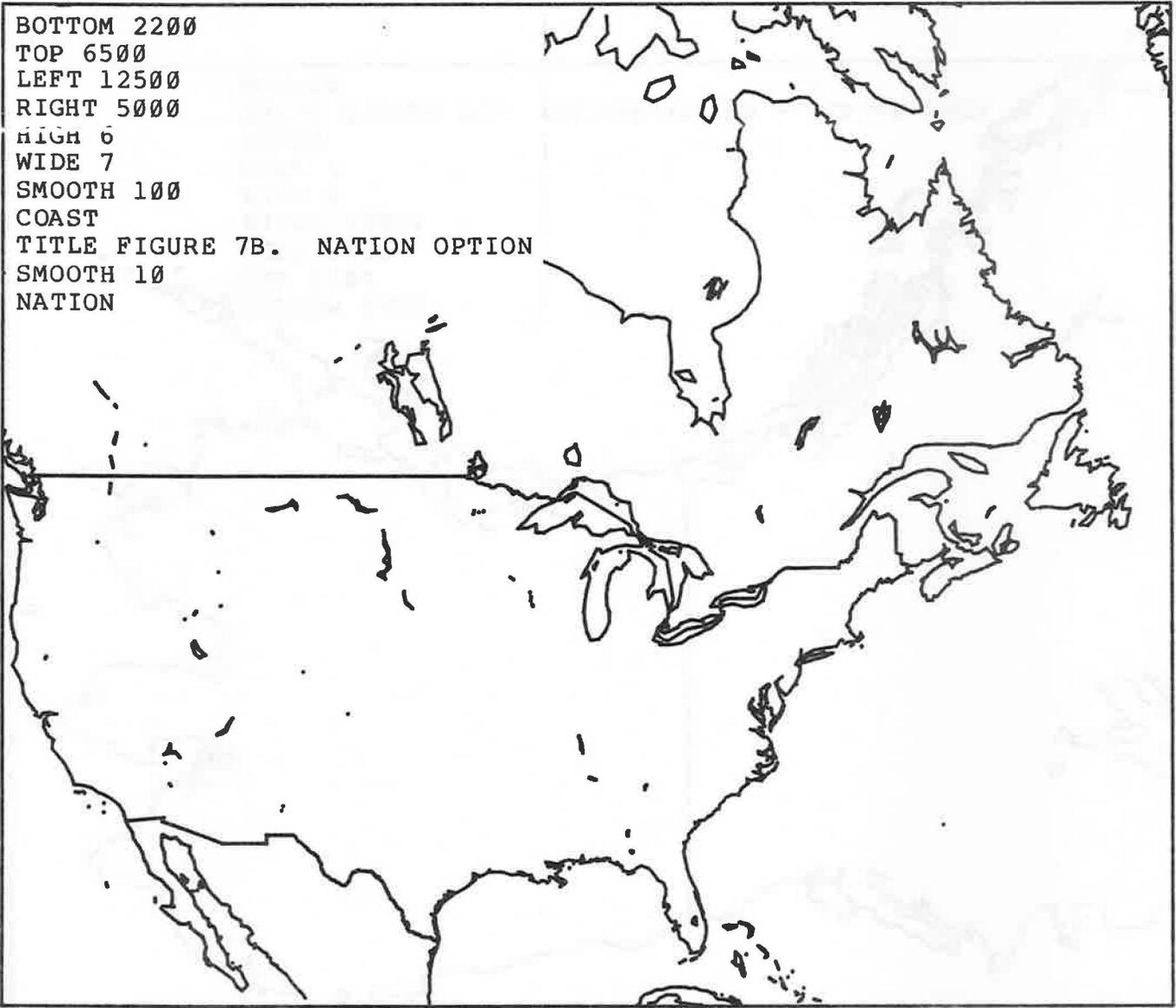
22 00N 125 00W

22 00N 50 00W

FIGURE 7A. REFERENCE NATION OPTION

125 00W
65 00N

50 00W
65 00N



BOTTOM 2200
TOP 6500
LEFT 12500
RIGHT 5000
HIGH 6
WIDE 7
SMOOTH 100
COAST
TITLE FIGURE 7B. NATION OPTION
SMOOTH 10
NATION

22 00N
125 00W

22 00N
50 00W

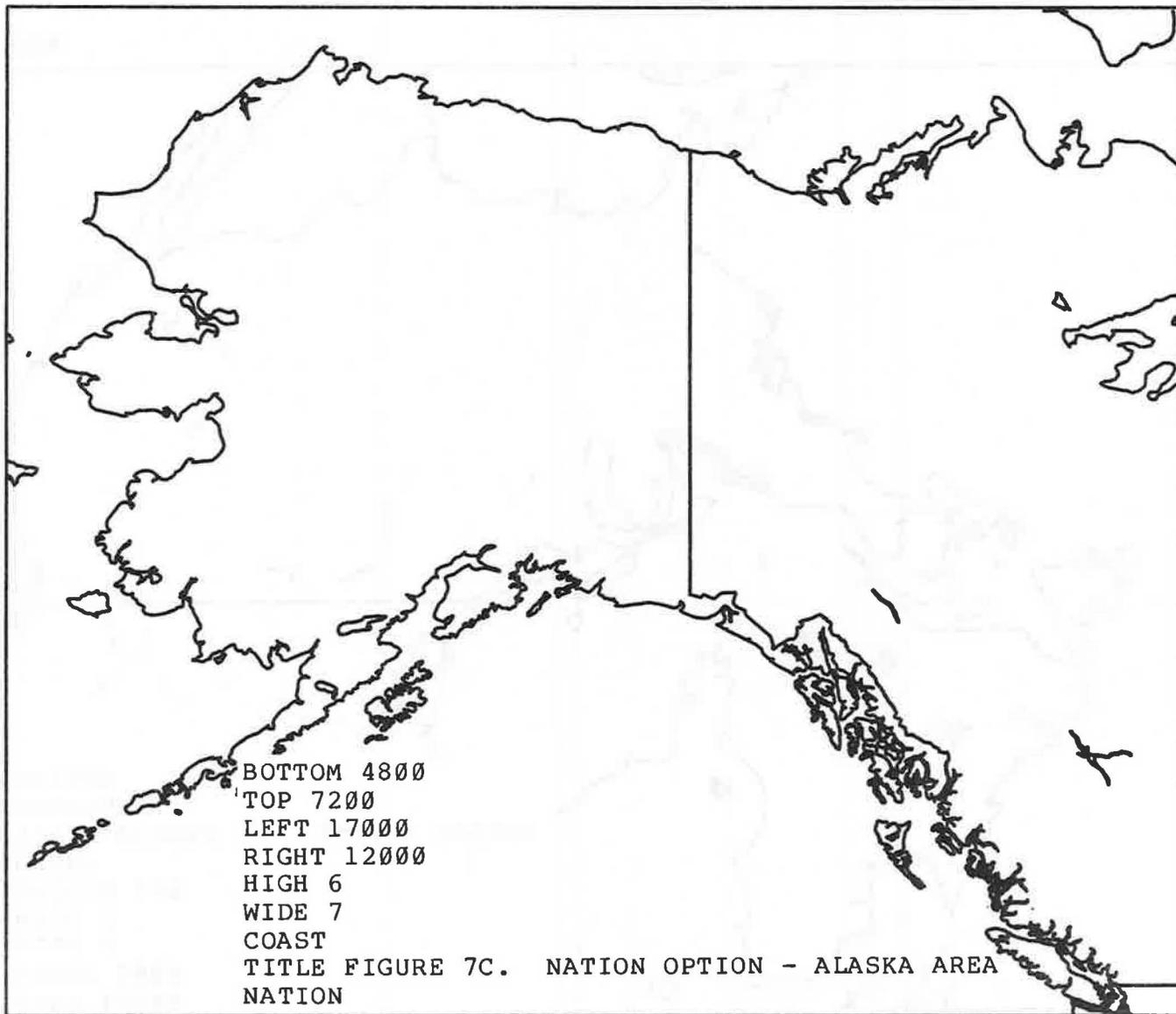
FIGURE 7B. NATION OPTION

170 00W
72 00N

120 00W
72 00N

48 00N
170 00W

48 00N
120 00W



BOTTOM 4800
TOP 7200
LEFT 17000
RIGHT 12000
HIGH 6
WIDE 7
COAST
TITLE FIGURE 7C. NATION OPTION - ALASKA AREA
NATION

FIGURE 7C. NATION OPTION - ALASKA AREA

SECTION 8. STATE BOUNDARIES

State boundaries may be included on maps of the United States and Canada. The "STATES" command draws the provincial boundaries in Canada and the state lines in the United States. Note that the boundary between Alaska and Canada is classified as a national, not state boundary.

When multiple features are included on a map where portions of the features are coincident (e.g., where a river is also a state boundary), multiple lines are drawn if both features are requested.

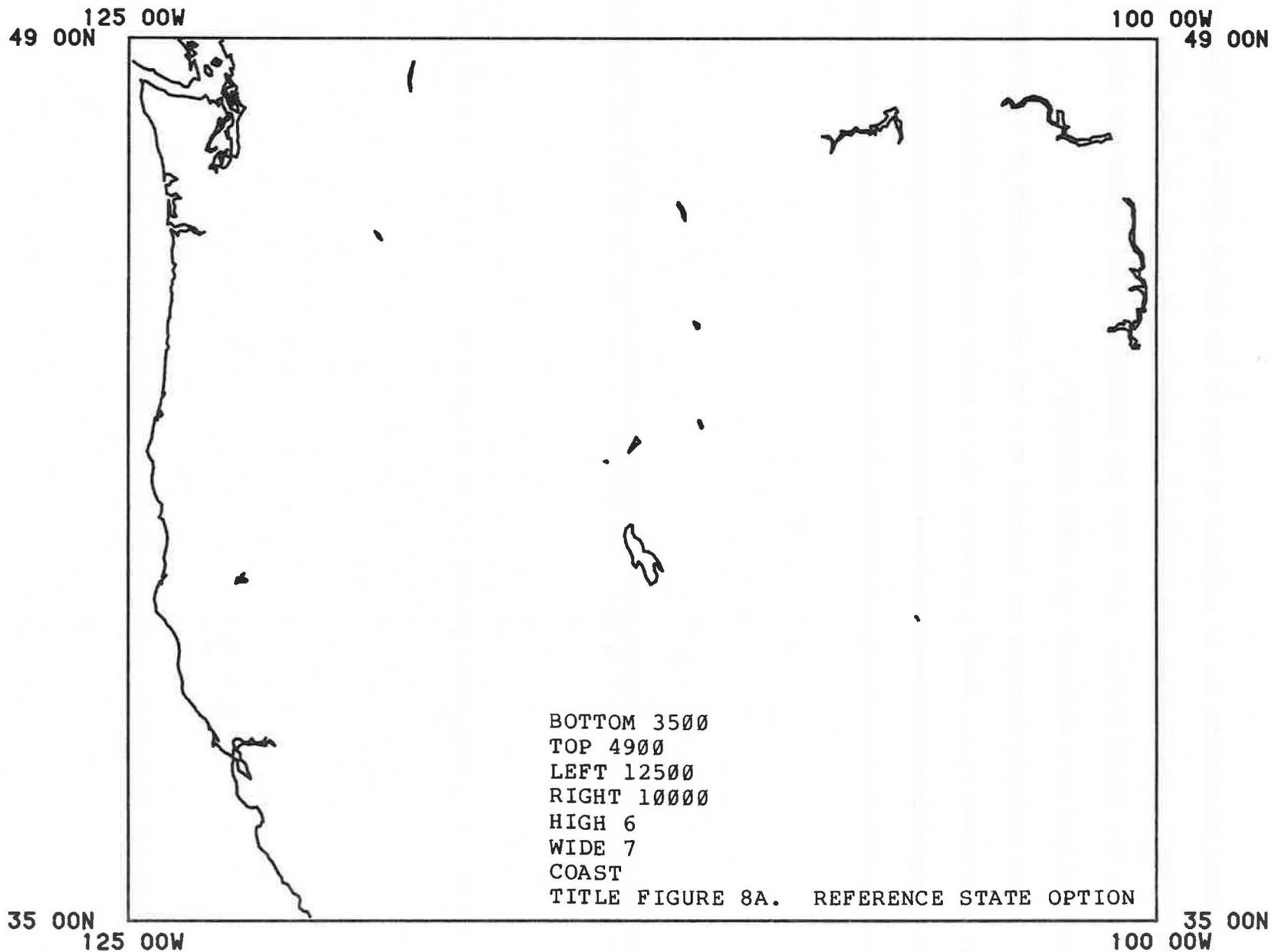


FIGURE 8A. REFERENCE STATE OPTION

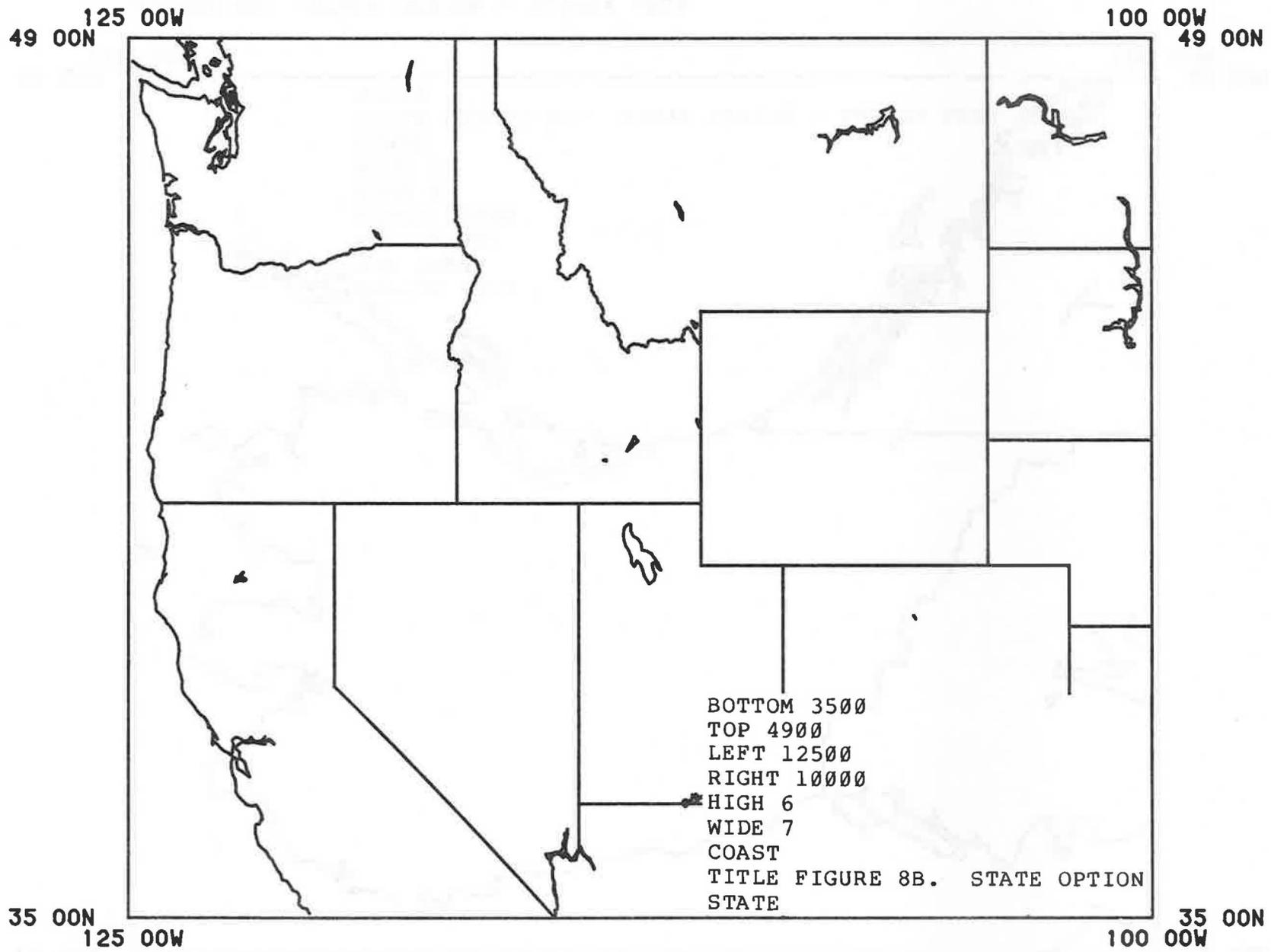


FIGURE 8B. STATE OPTION

72 00N 170 00W

120 00W 72 00N

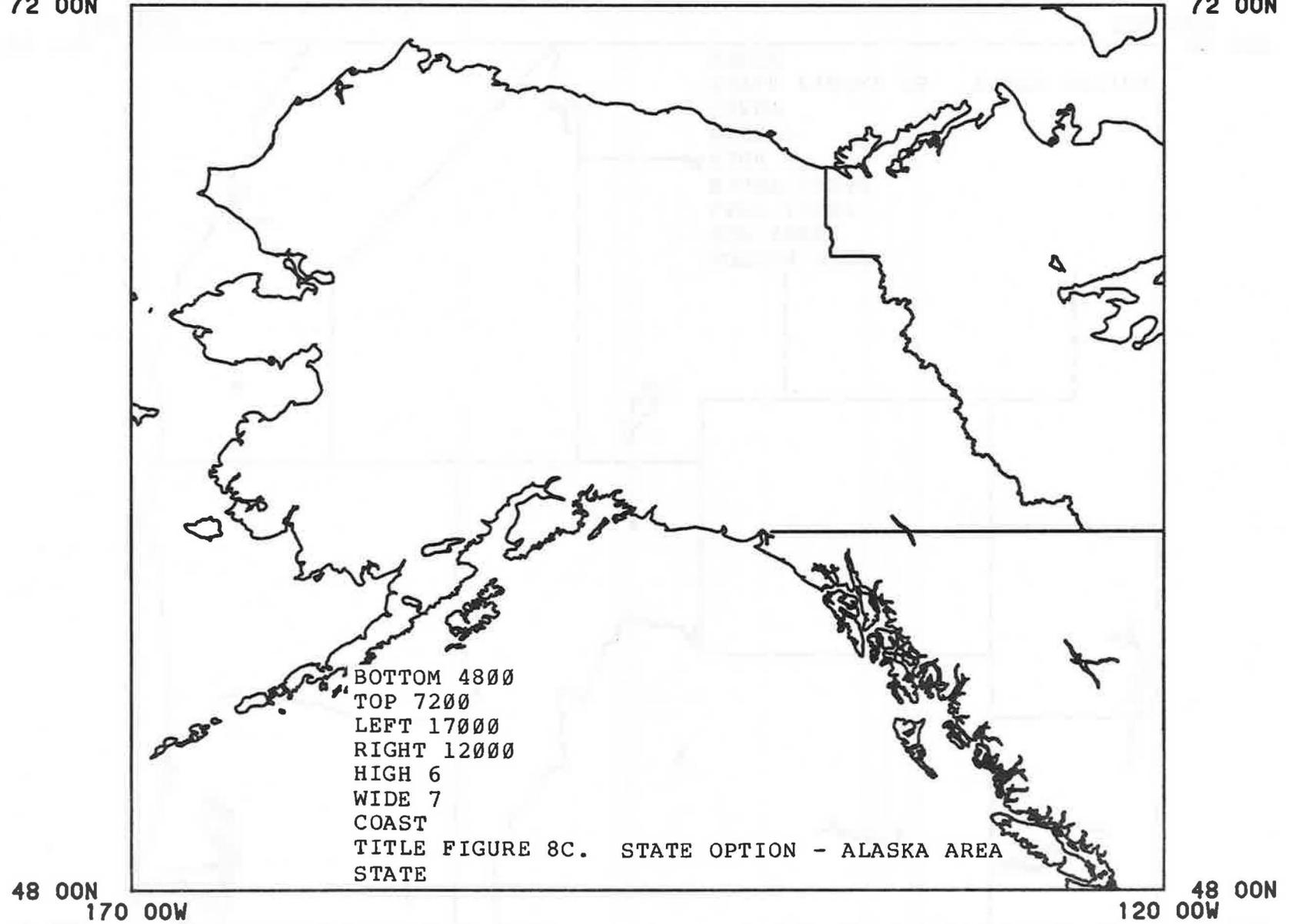


FIGURE 8C. STATE OPTION - ALASKA AREA

SECTION 9. DEPTH CONTOURS

Depth contours may be included on maps. Multiple contours may be specified. Different pens, and hence, different colors, may be used for the coastline and the depth contours (or any other features).

Another way to produce visual contrast between the coastline and a depth contour is to use a wet ink pen for the coastline and a liquid ballpoint pen for the depth contour.

The availability, source, and coverage of the depth contours is given in the program documentation. Additional depth contours are presently being digitized. When these are available, the program documentation will be updated.

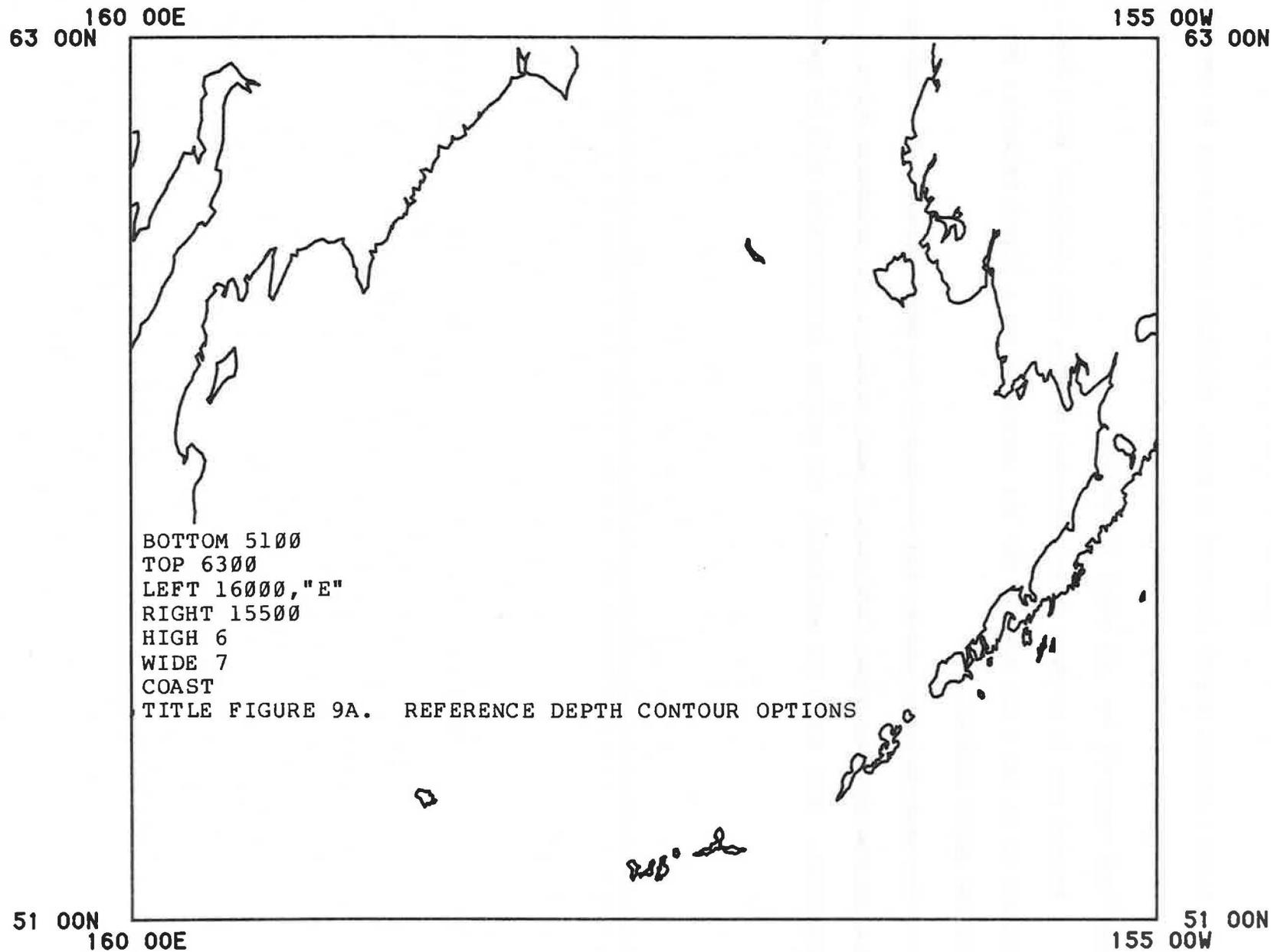


FIGURE 9A. REFERENCE DEPTH CONTOUR OPTIONS

160 00E
63 00N

155 00W
63 00N

51 00N
160 00E

51 00N
155 00W

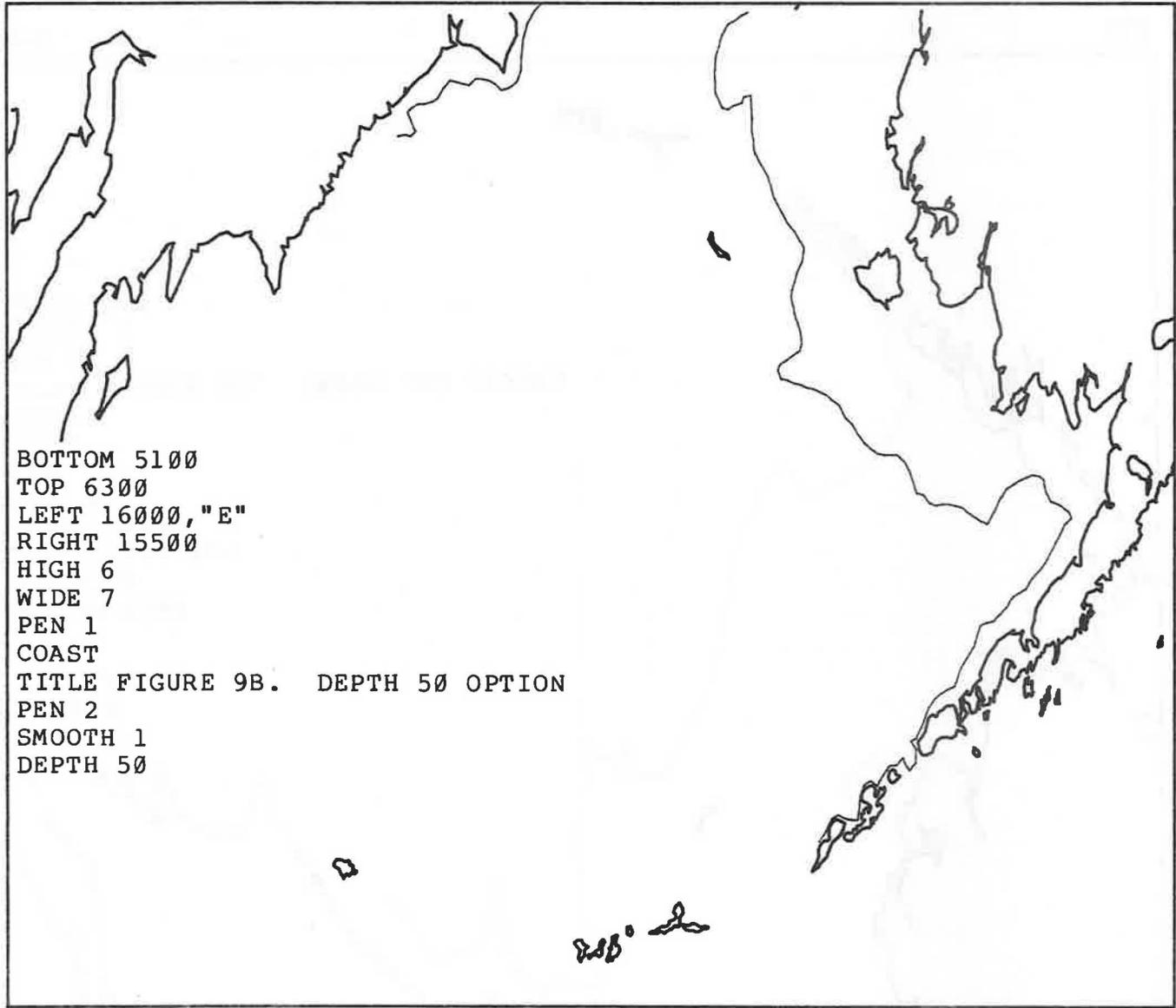
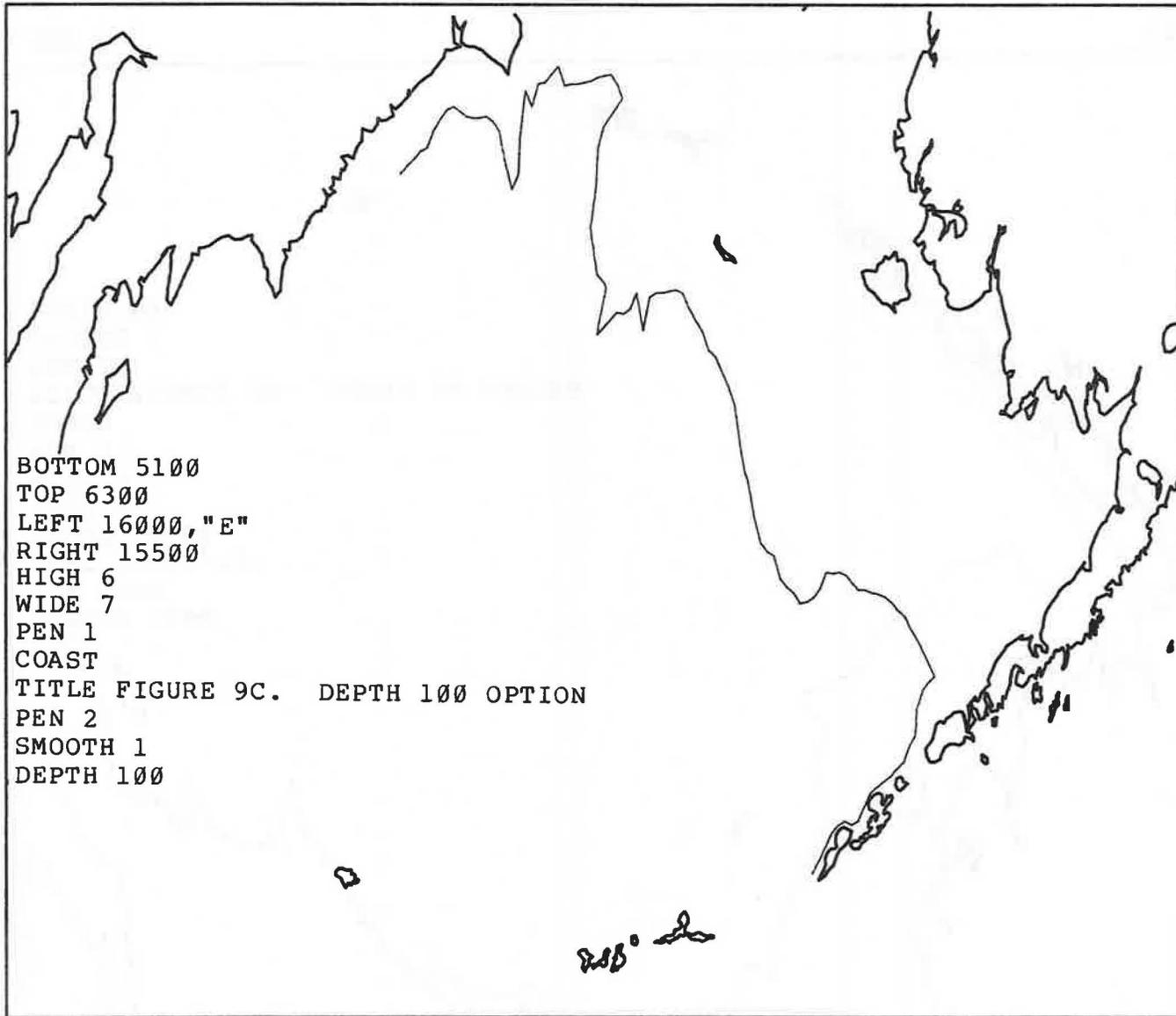


FIGURE 9B. DEPTH 50 OPTION

160 00E
63 00N

155 00W
63 00N



BOTTOM 5100
TOP 6300
LEFT 16000, "E"
RIGHT 15500
HIGH 6
WIDE 7
PEN 1
COAST
TITLE FIGURE 9C. DEPTH 100 OPTION
PEN 2
SMOOTH 1
DEPTH 100

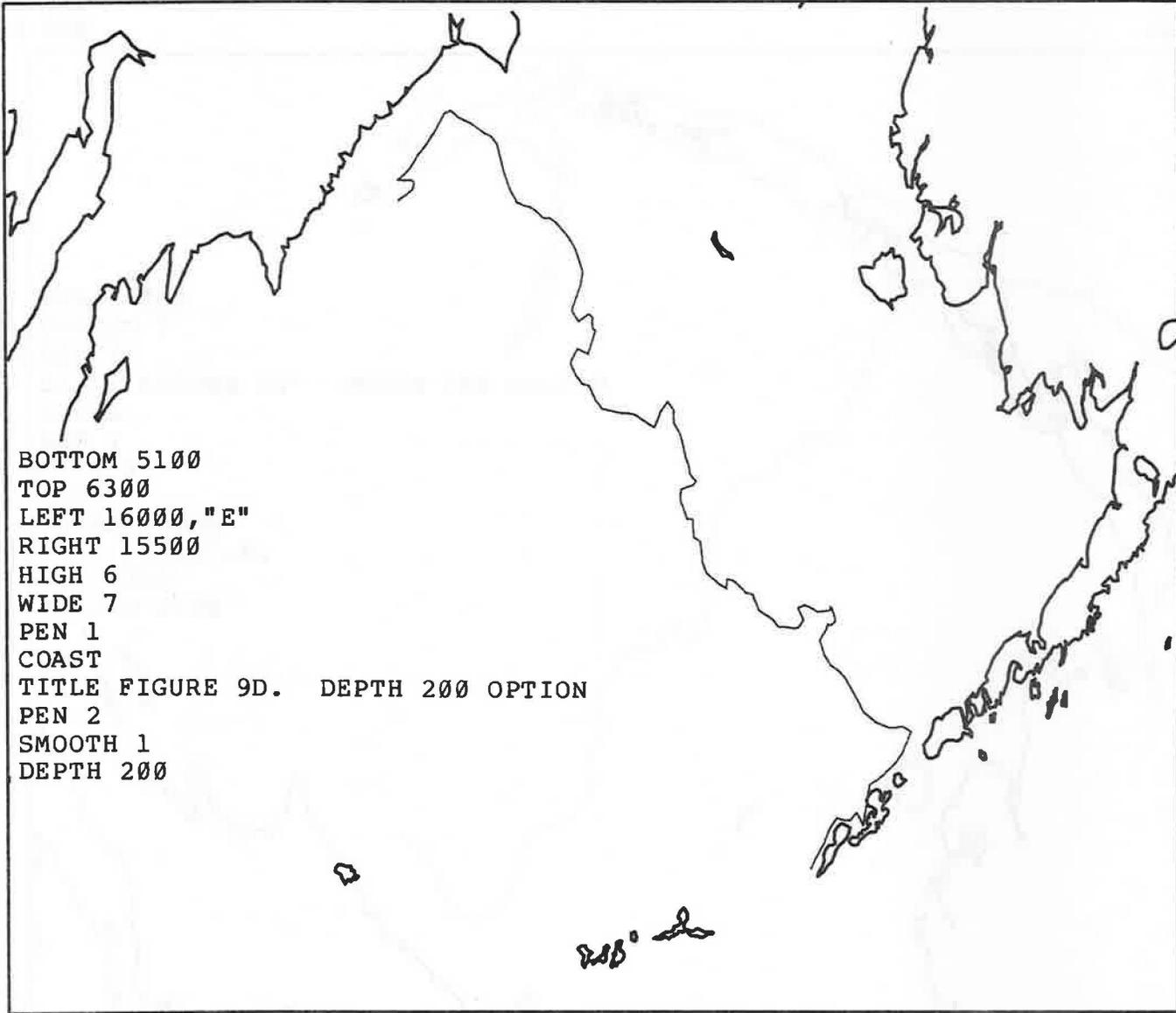
51 00N
160 00E

51 00N
155 00W

FIGURE 9C. DEPTH 100 OPTION

160 00E
63 00N

155 00W
63 00N



BOTTOM 5100
TOP 6300
LEFT 16000, "E"
RIGHT 15500
HIGH 6
WIDE 7
PEN 1
COAST
TITLE FIGURE 9D. DEPTH 200 OPTION
PEN 2
SMOOTH 1
DEPTH 200

51 00N
160 00E

51 00N
155 00W

FIGURE 9D. DEPTH 200 OPTION

160 00E
63 00N

155 00W
63 00N

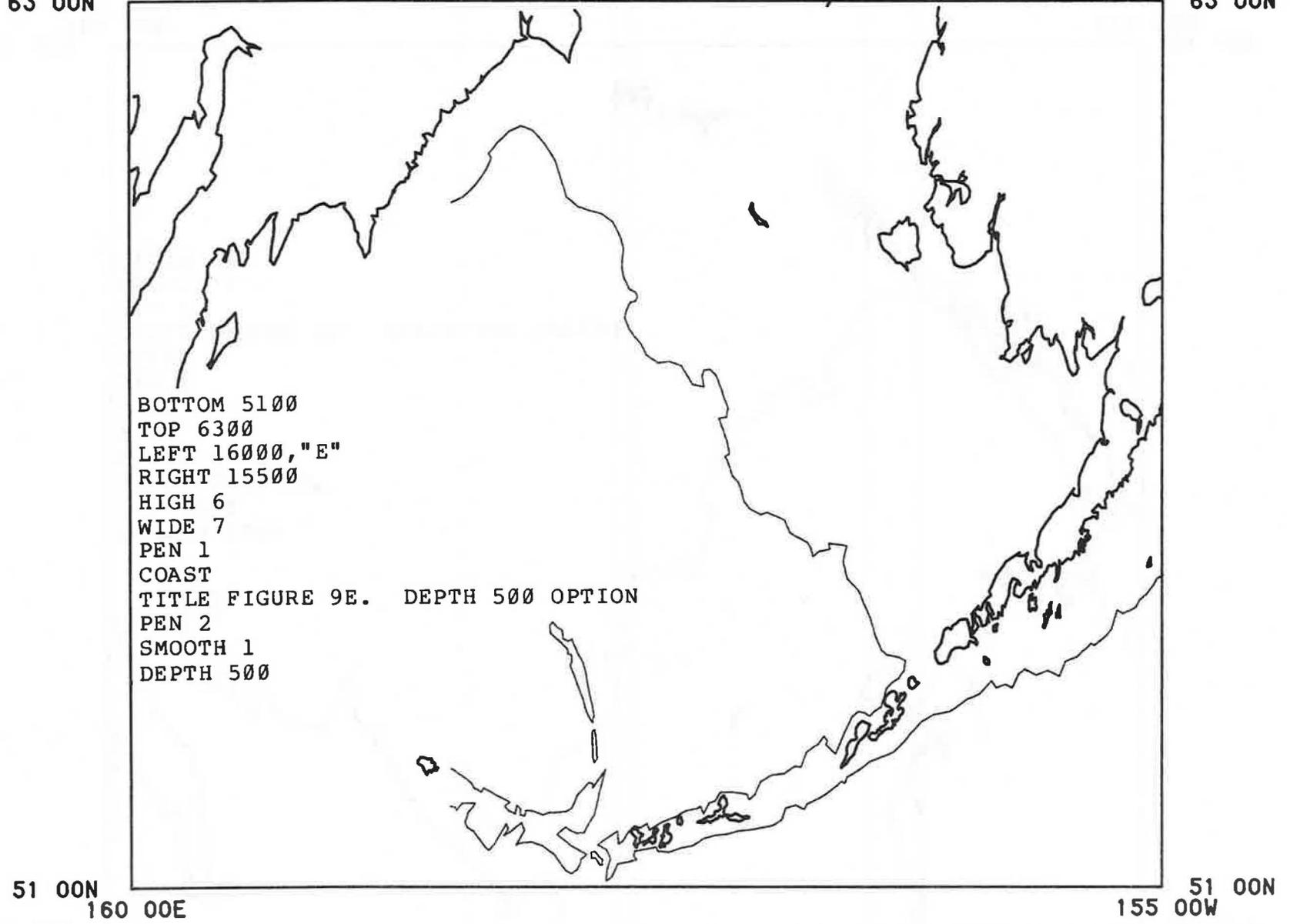


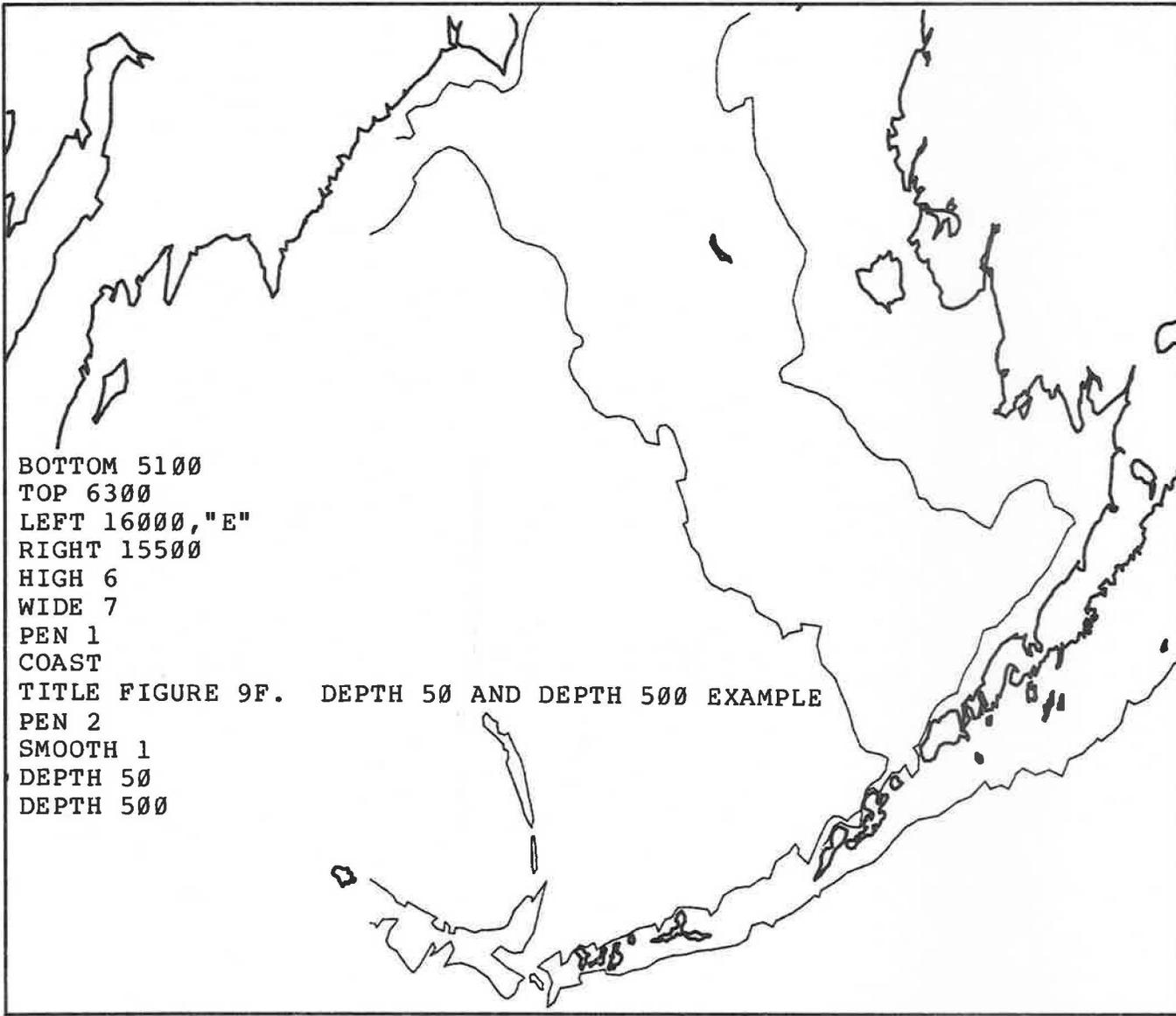
FIGURE 9E. DEPTH 500 OPTION

160 00E
63 00N

155 00W
63 00N

51 00N
160 00E

51 00N
155 00W



BOTTOM 5100
TOP 6300
LEFT 16000, "E"
RIGHT 15500
HIGH 6
WIDE 7
PEN 1
COAST
TITLE FIGURE 9F. DEPTH 50 AND DEPTH 500 EXAMPLE
PEN 2
SMOOTH 1
DEPTH 50
DEPTH 500

FIGURE 9F. DEPTH 50 AND DEPTH 500 EXAMPLE

SECTION 10. BORDERS

A simple one-line border is the default. A fancy three-line border may be specified.



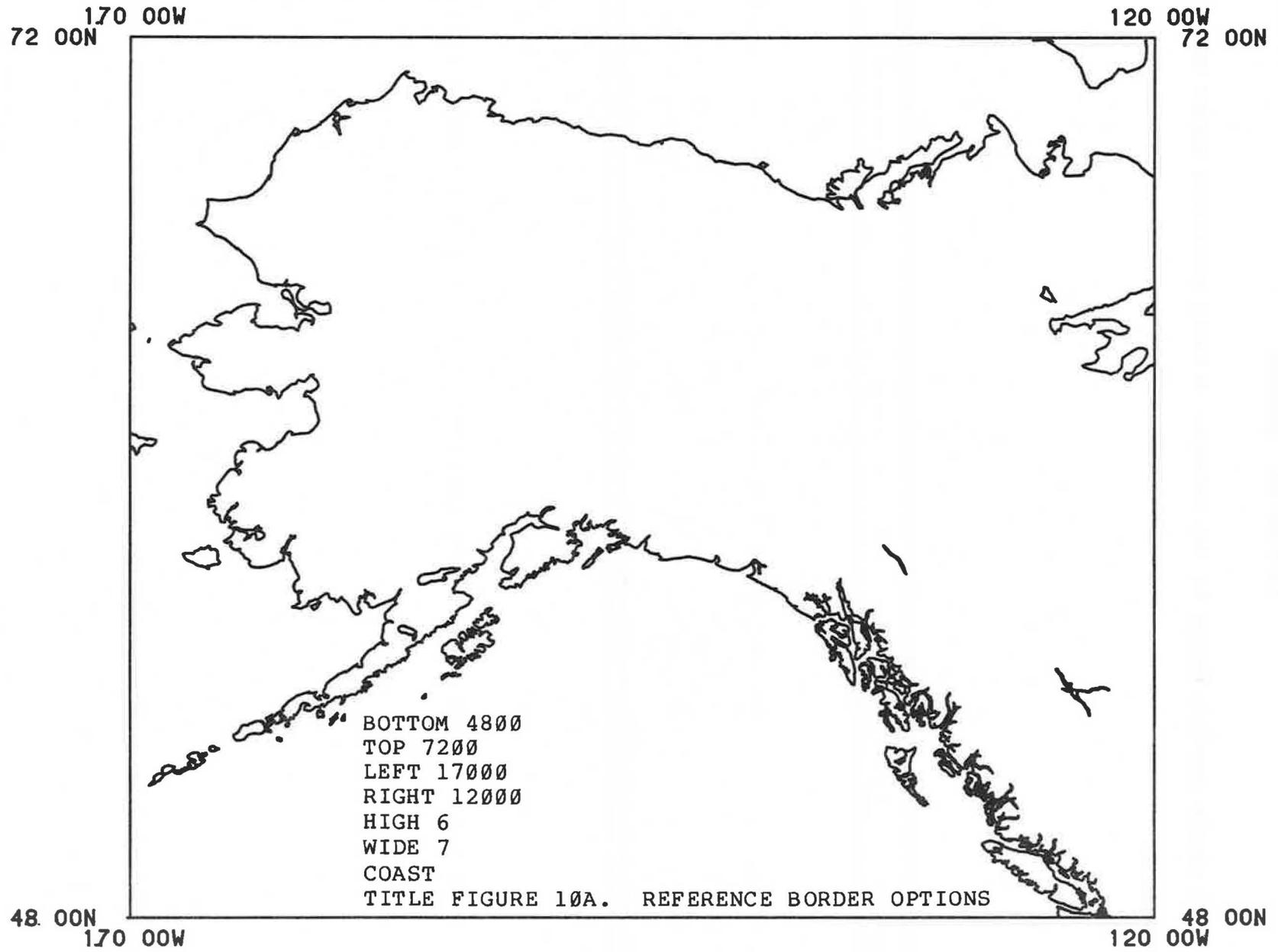


FIGURE 10A. REFERENCE BORDER OPTIONS

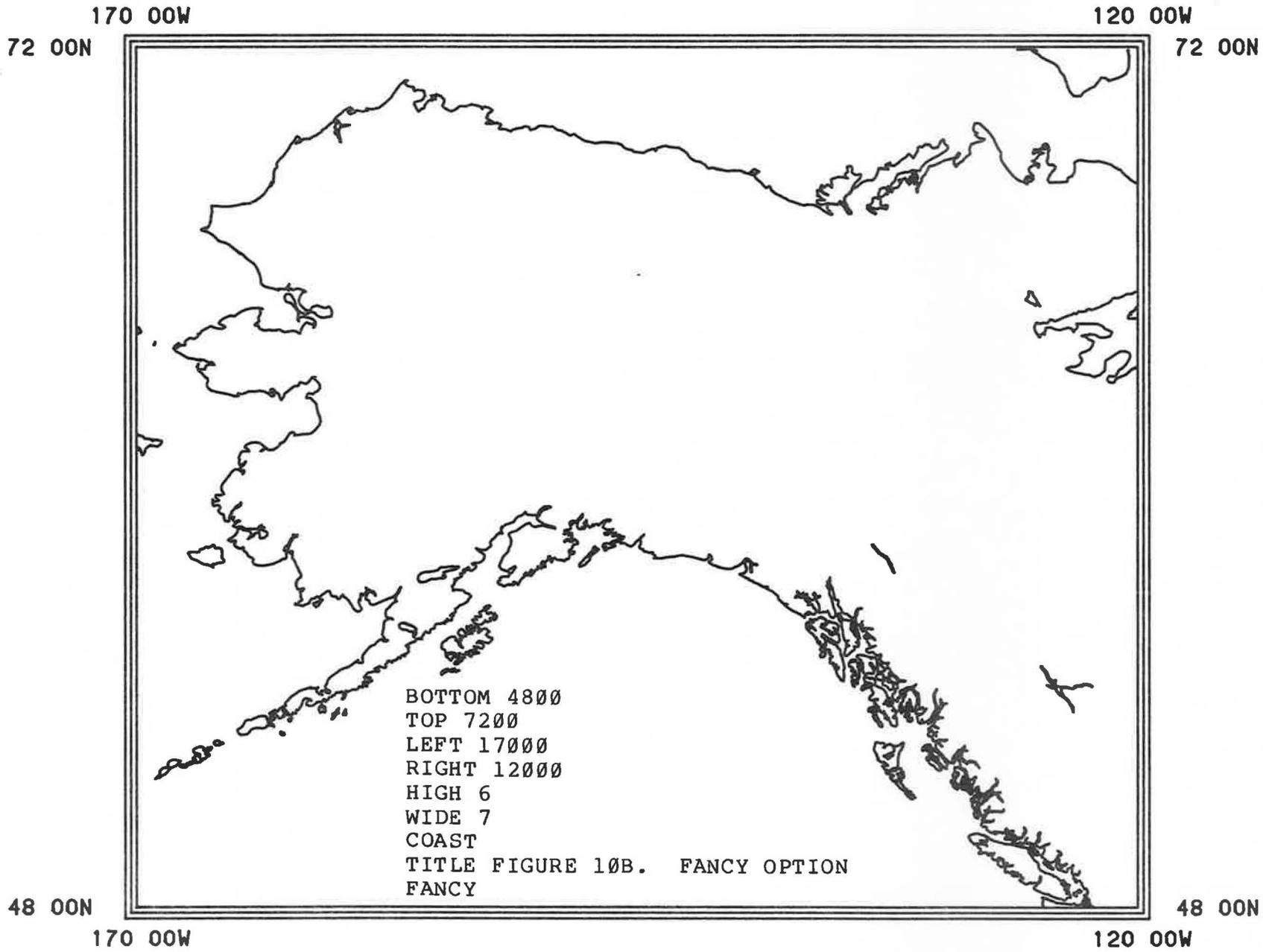
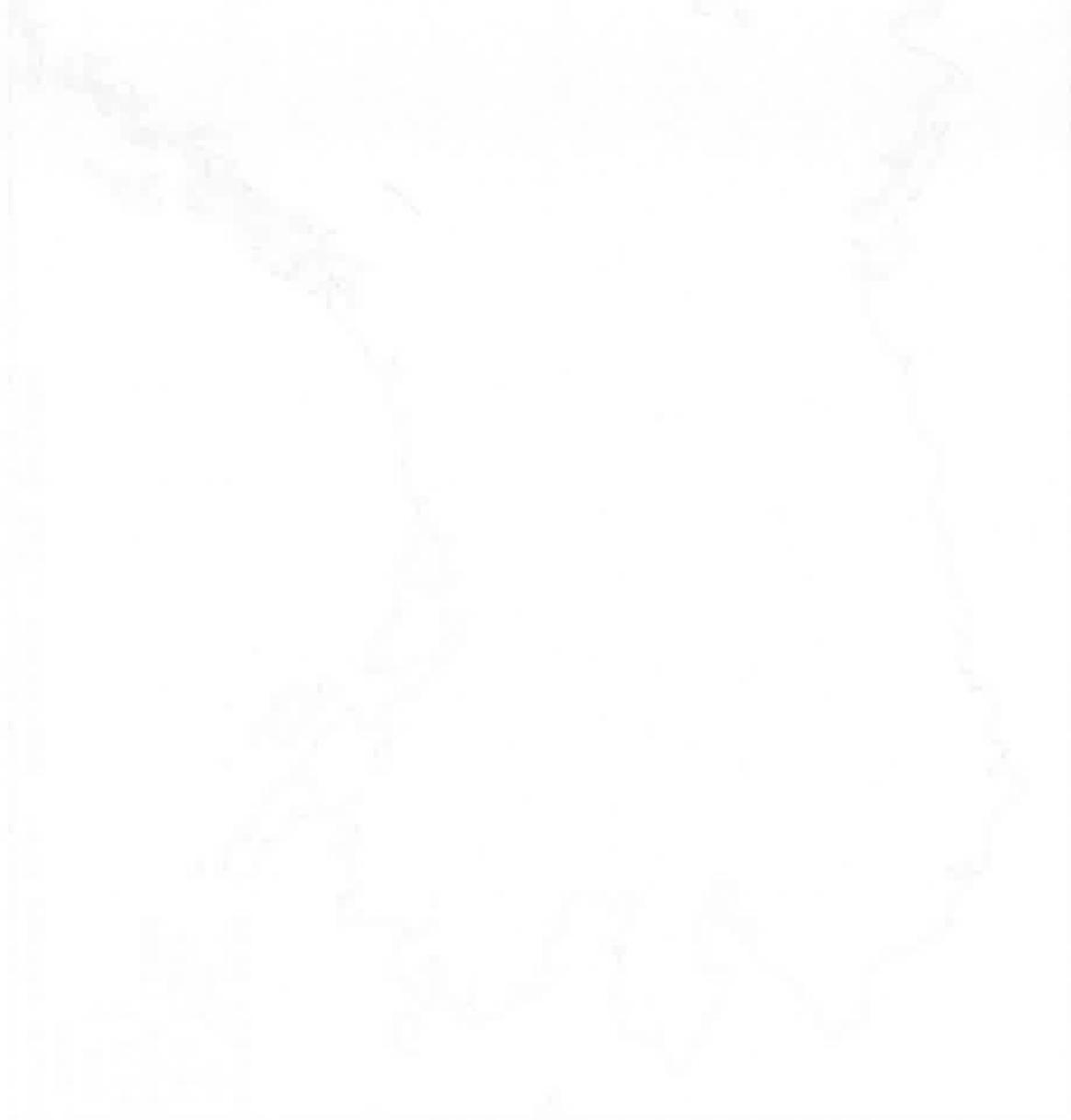


FIGURE 10B. FANCY OPTION

SECTION 11. TICK MARKS

The default is that no tick marks are drawn around the border. A simple "TICKS" command will cause the program to automatically generate tick marks at appropriate intervals.



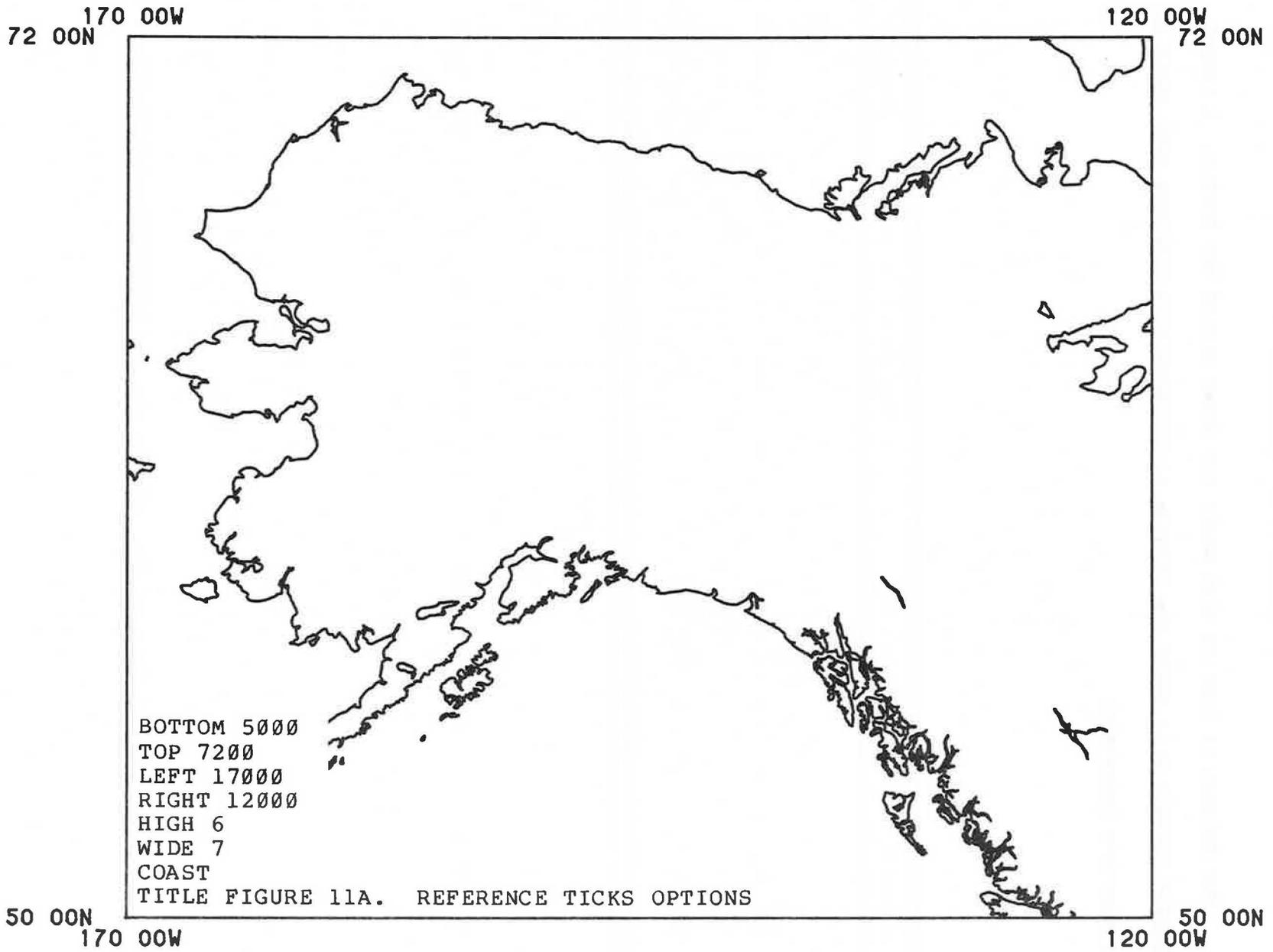


FIGURE 11A. REFERENCE TICKS OPTIONS

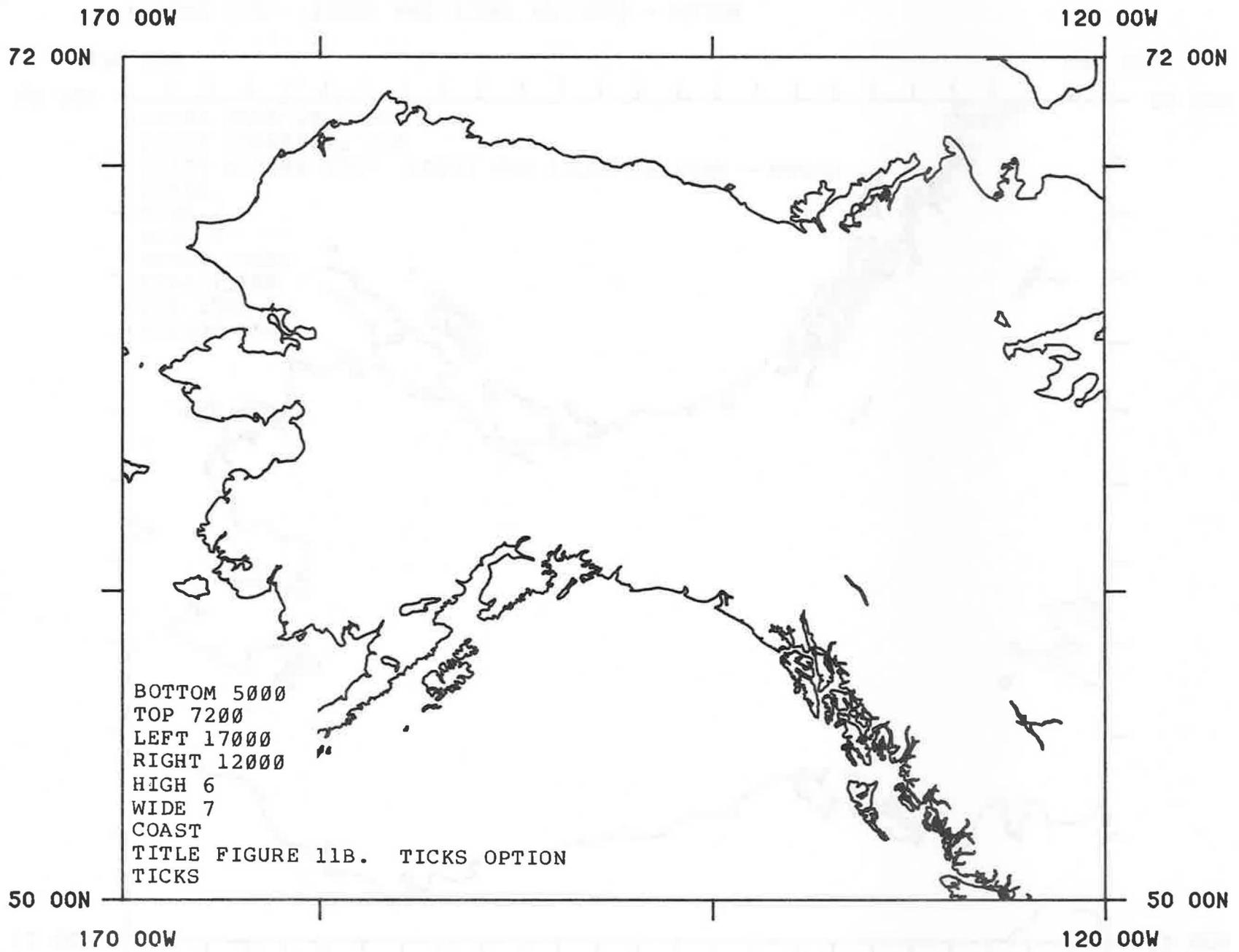


FIGURE 11B. TICKS OPTION

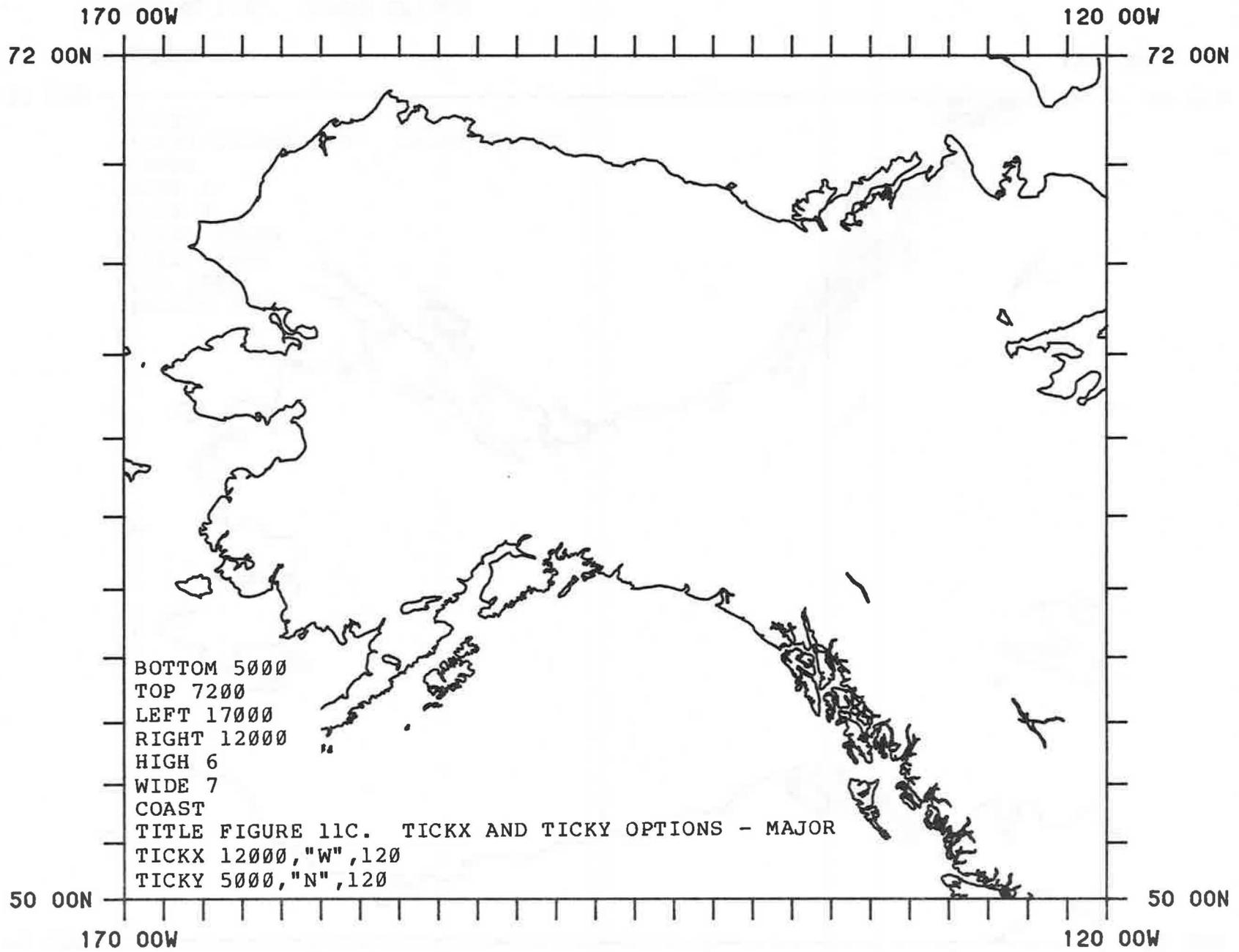


FIGURE 11C. TICKX AND TICKY OPTIONS - MAJOR

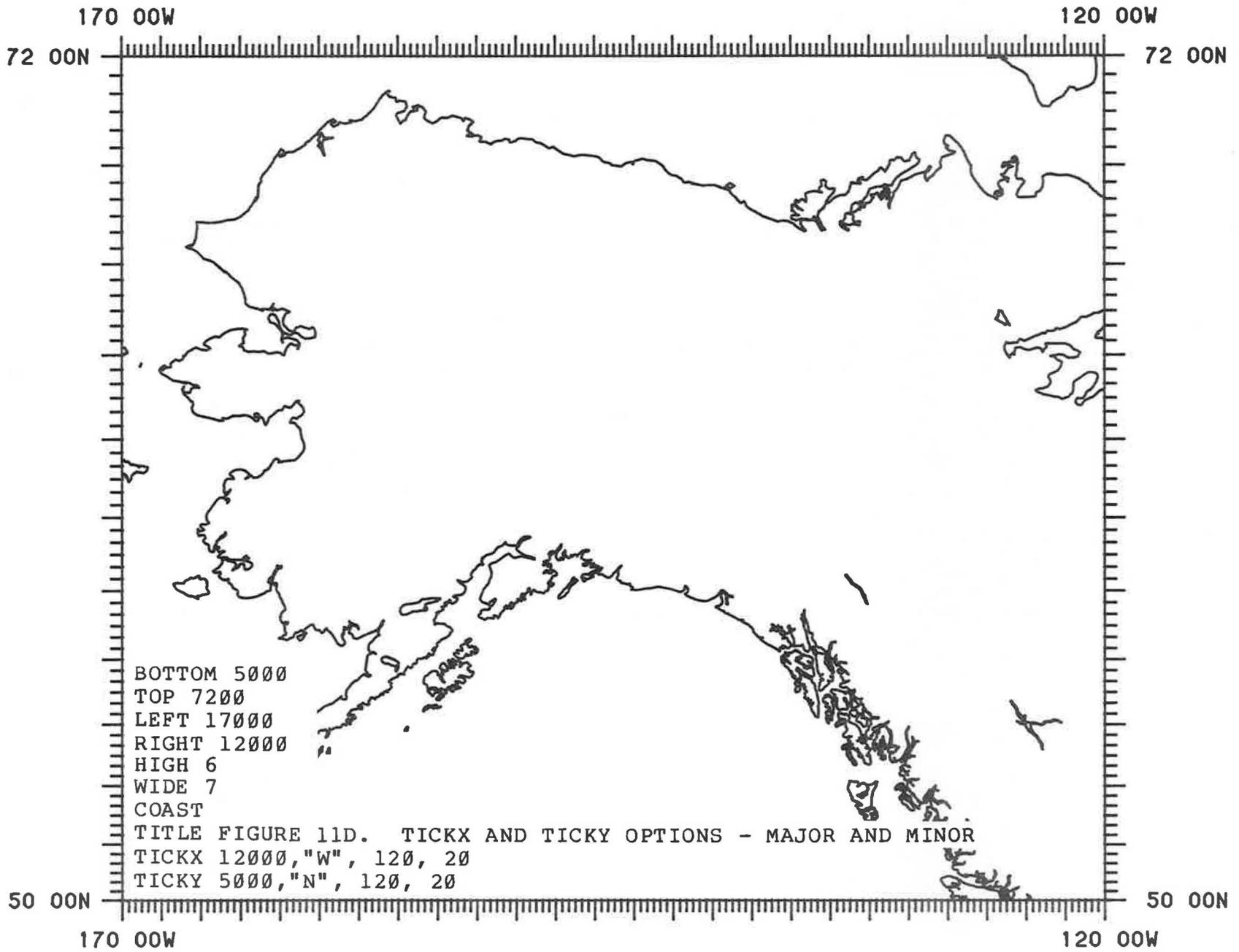


FIGURE 11D. TICKX AND TICKY OPTIONS - MAJOR AND MINOR

SECTION 12. LABELS

The default is that just the four corners of the map will be labeled with latitude and longitude. A simple "LABELS" command will cause the program to generate labels around the border.

Other commands control the intervals for the labels on the X and Y axes. In cases where the labels are explicitly controlled by the user, there may be overlapping of the longitude (and possibly latitude) labels. This overlap is a function of the size of the map, the interval specified for the labels, and the size of the characters used for the border labels.

As such, overlap can be eliminated by increasing the size of the map, increasing the label interval, and/or reducing the size of the characters in the labels.

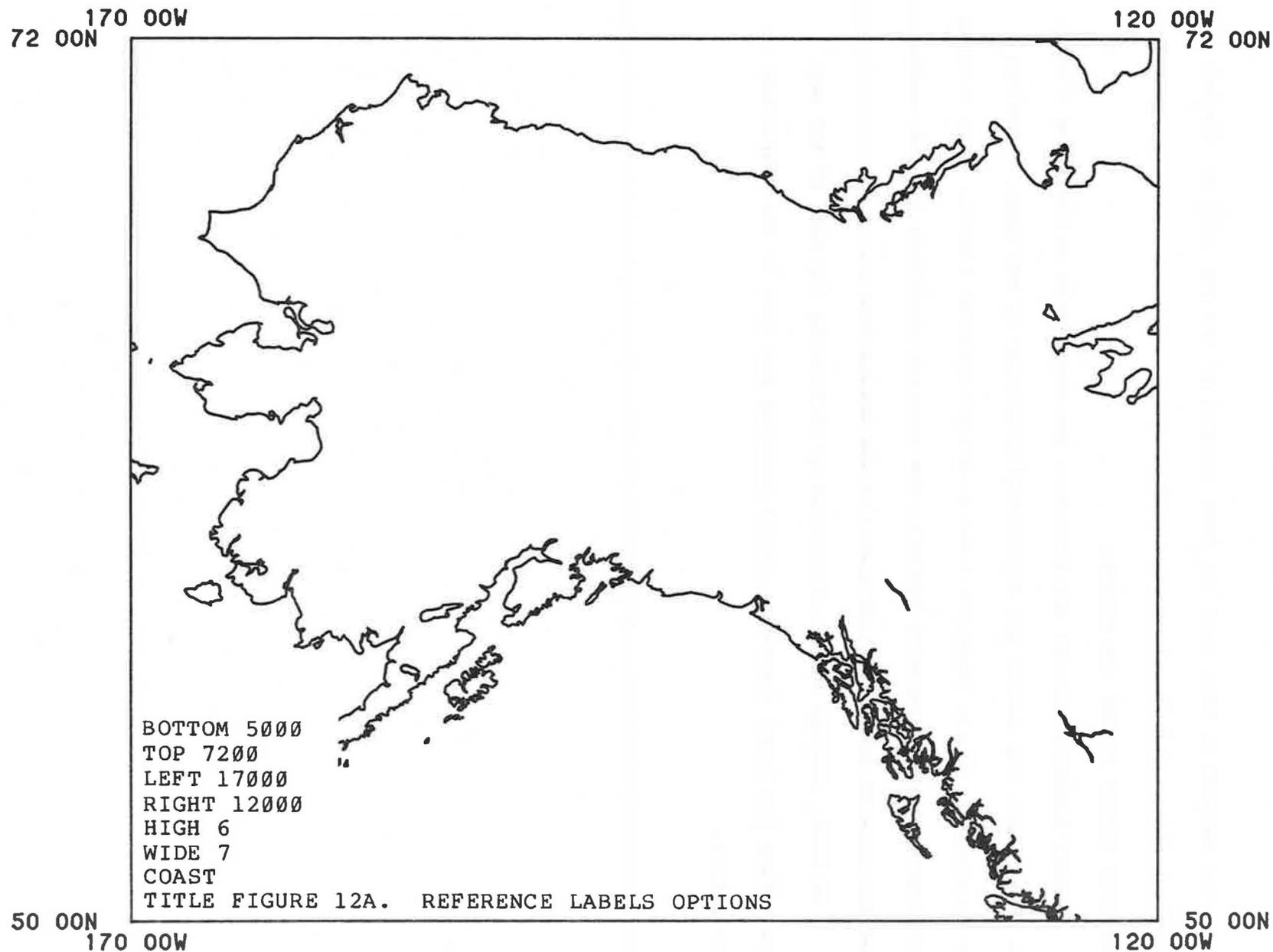


FIGURE 12A. REFERENCE LABELS OPTIONS

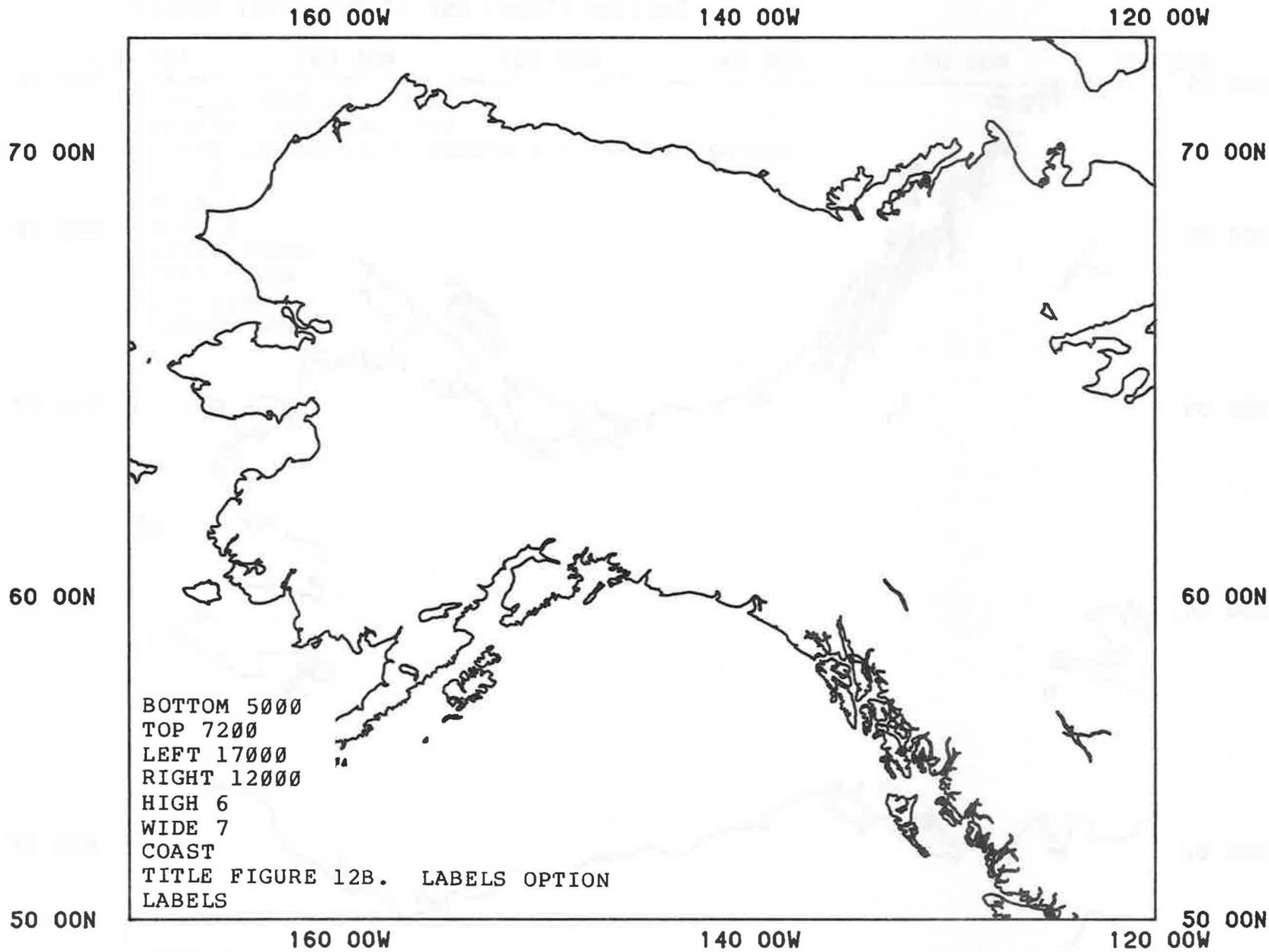


FIGURE 12B. LABELS OPTION

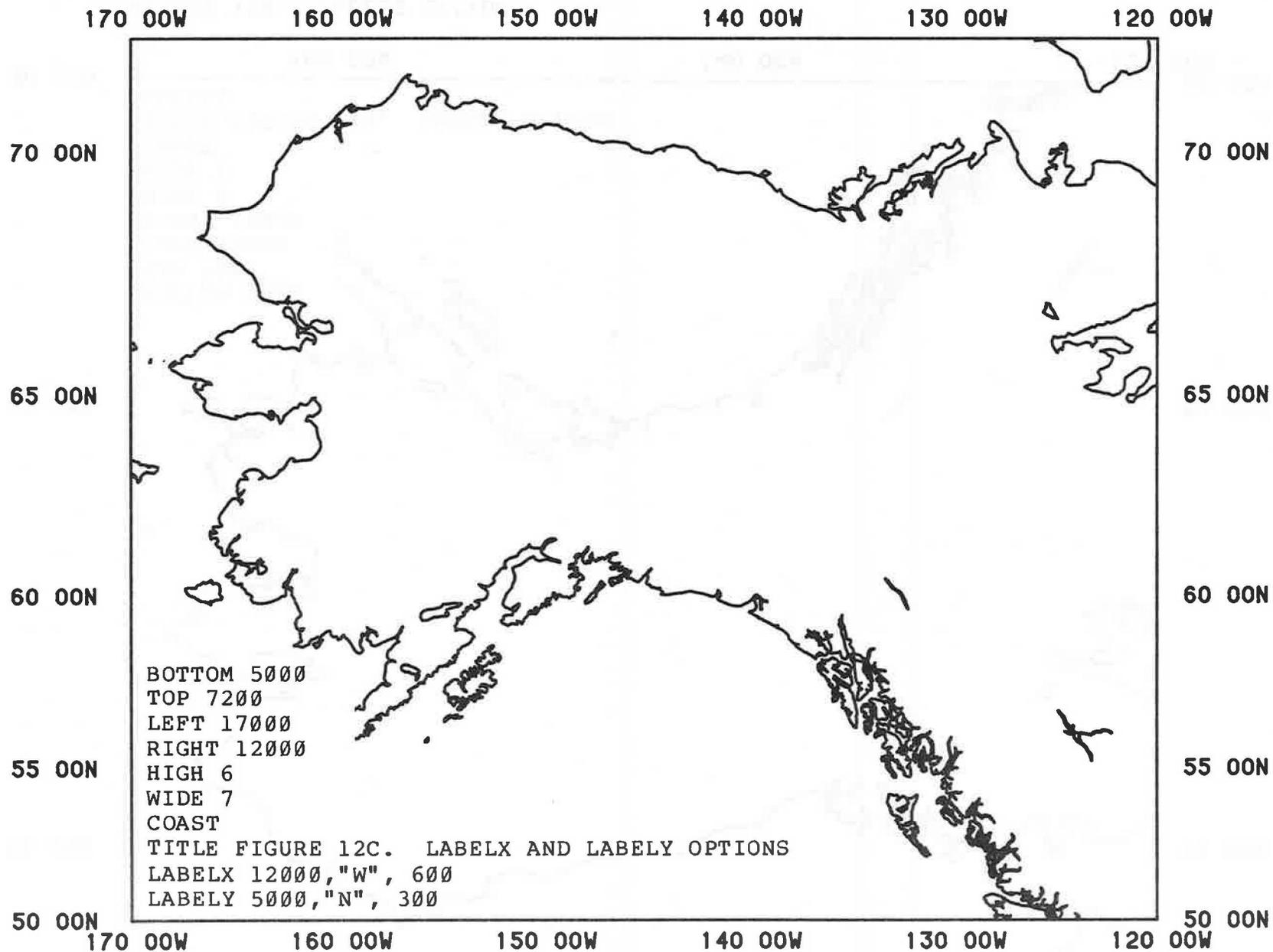


FIGURE 12C. LABELX AND LABELY OPTIONS

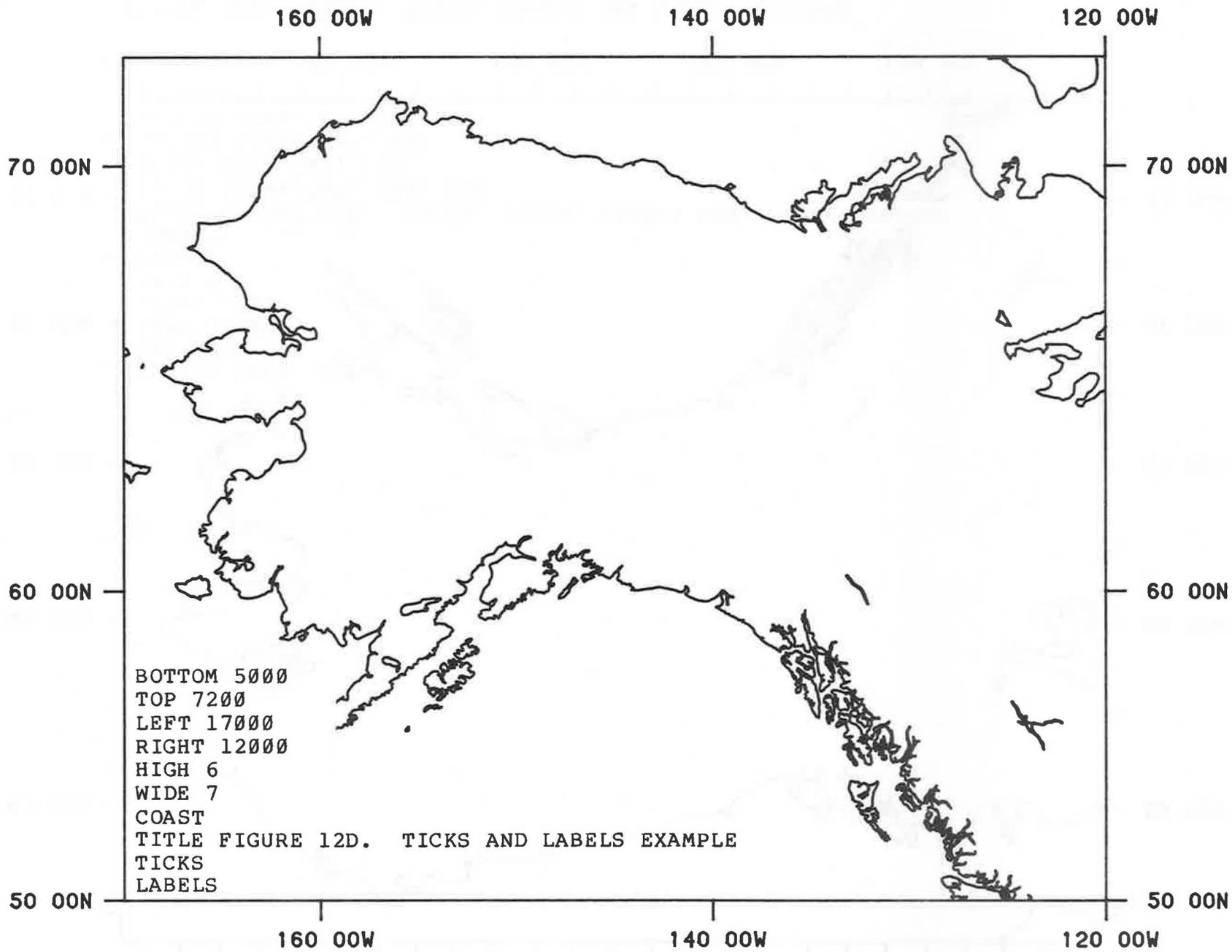


FIGURE 12D. TICKS AND LABELS EXAMPLE

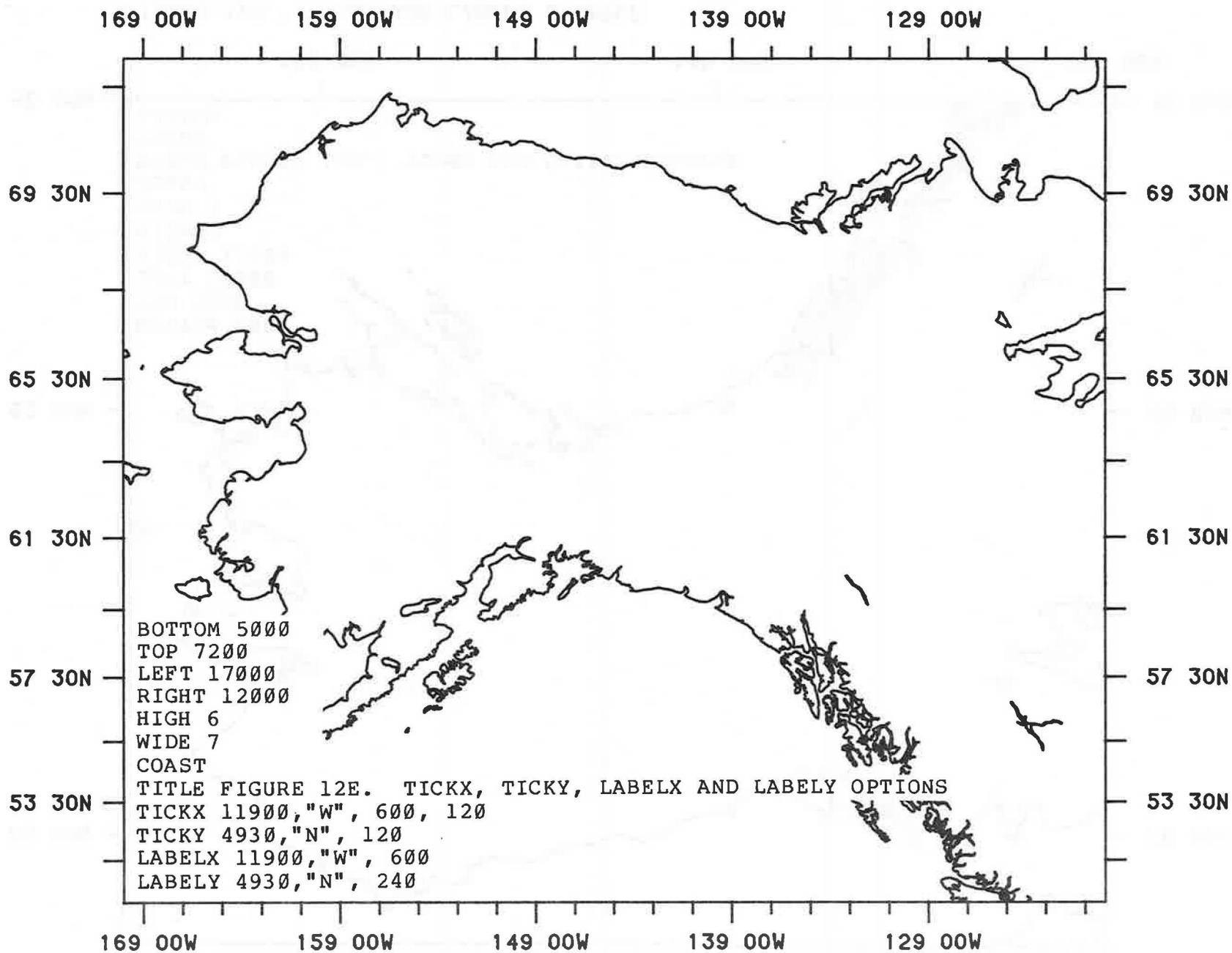


FIGURE 12E. TICKX, TICKY, LABELX AND LABELY OPTIONS

SECTION 13. DECIMAL PLACES

A simple plot work file containing station values may be routed into the MAP program. These values are superimposed on the plot. For decimal data, the default is that three decimal places will be plotted.

Various options control the number of decimal places.

Integer and alphabetic values may be plotted by appropriately coding the plot work file records. The format of the plot work file is in Appendix B, and is also contained within (RACE0360)DOC/A/FORMATS ON RACE.

For all of the maps in this section, the same plot work file containing the station values was used.

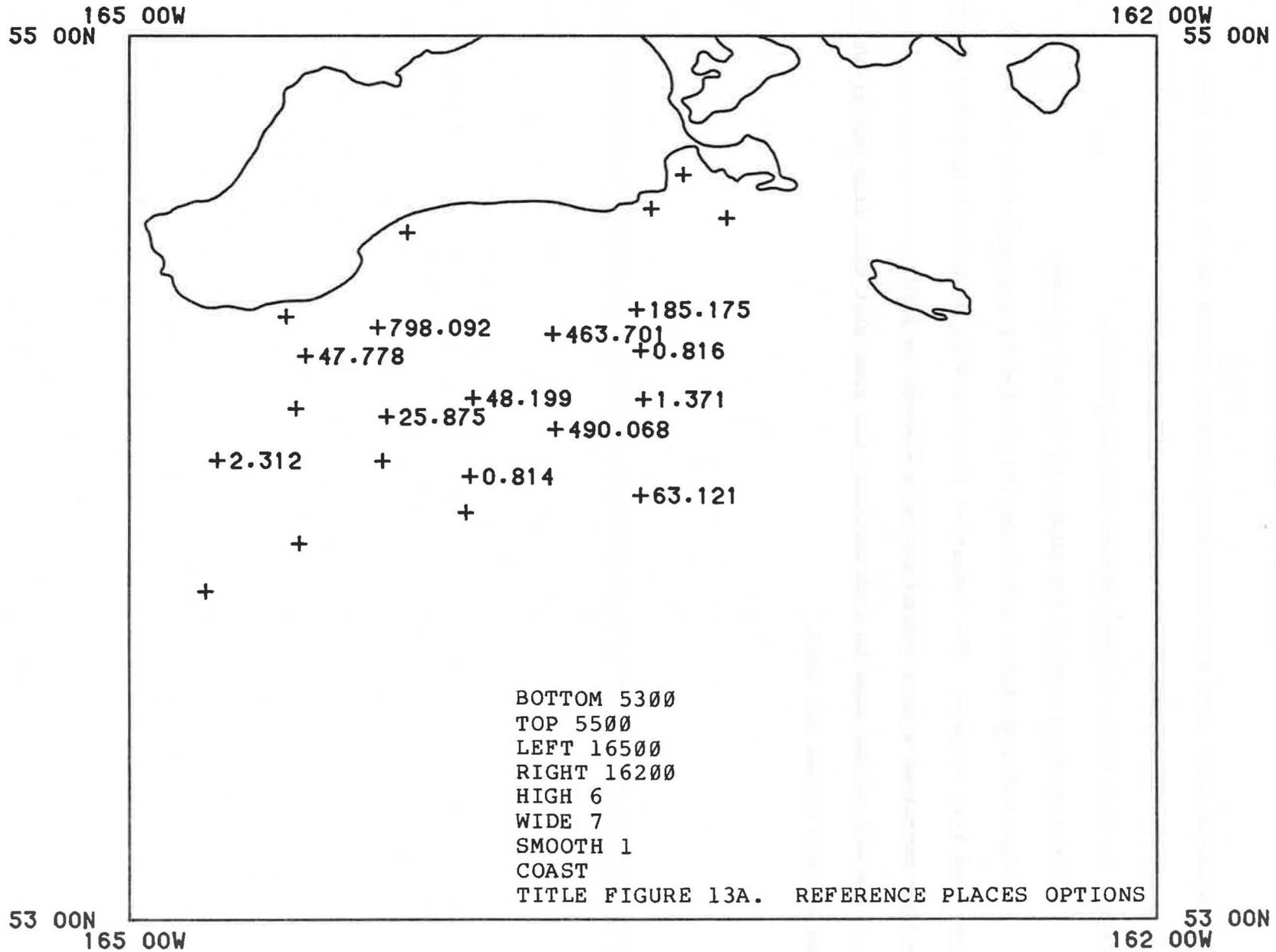


FIGURE 13A. REFERENCE PLACES OPTIONS

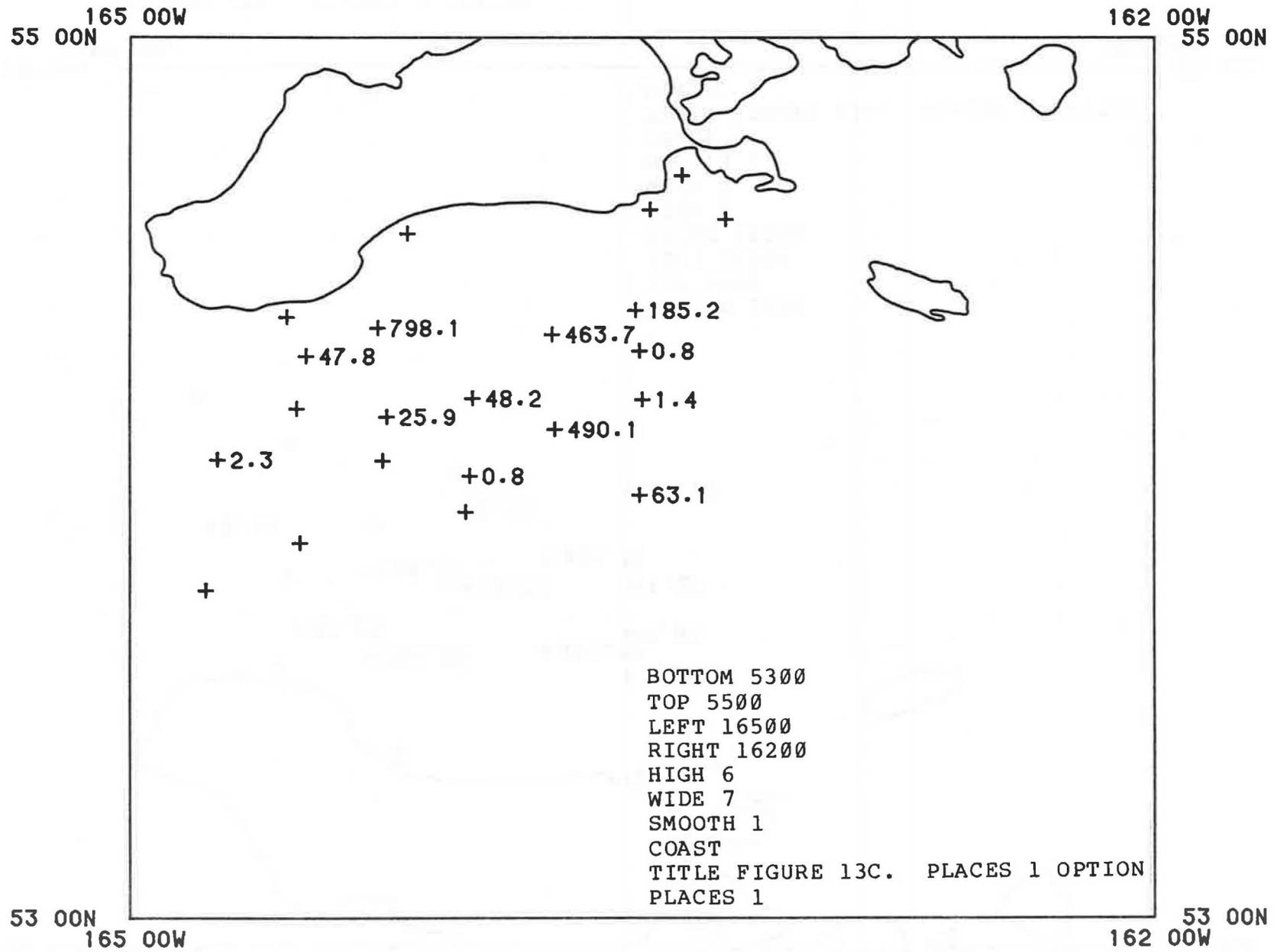


FIGURE 13C. PLACES 1 OPTION

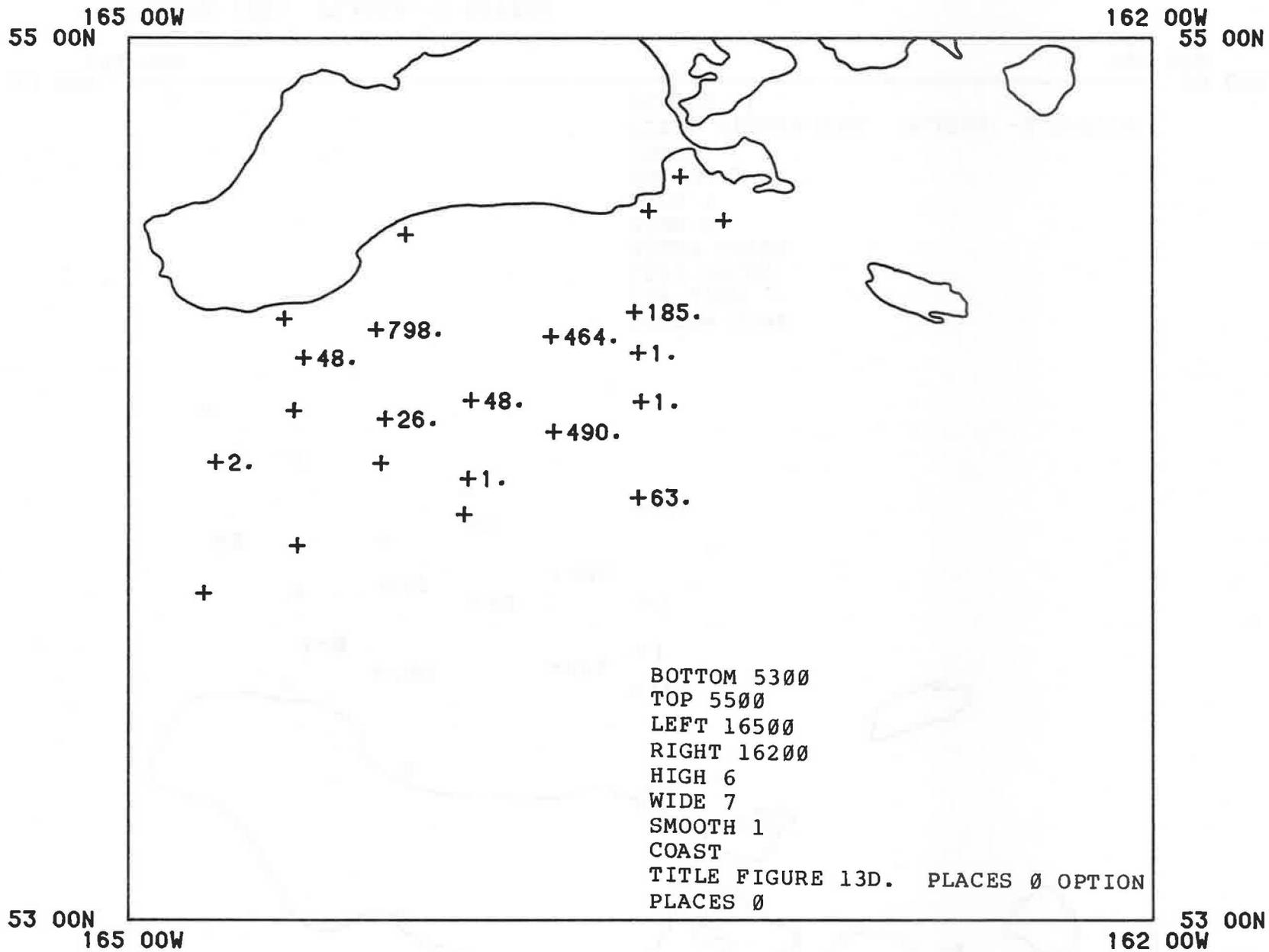


FIGURE 13D. PLACES 0 OPTION

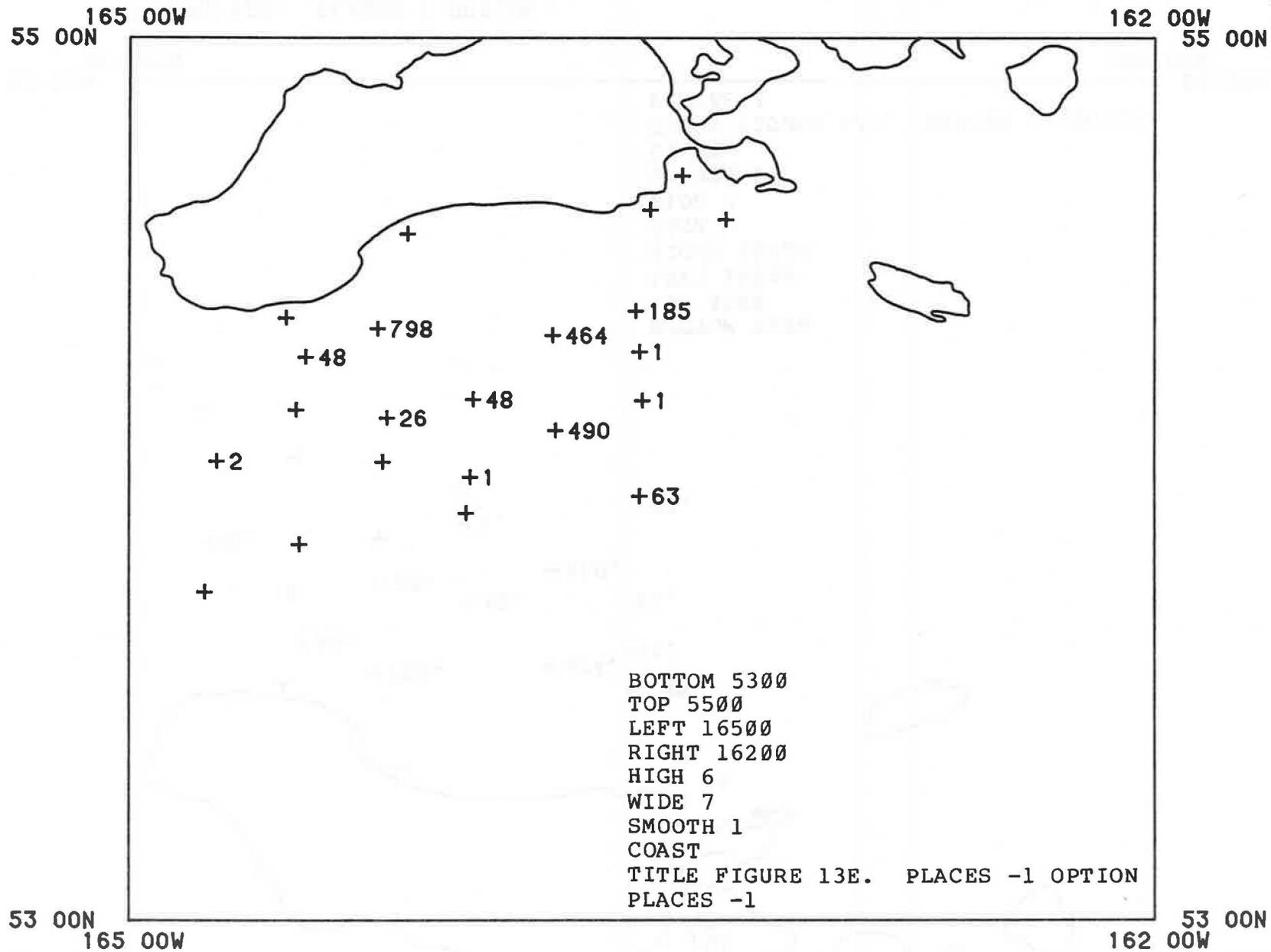


FIGURE 13E. PLACES -1 OPTION

SECTION 14. TRACE VALUES

Often it is desirable to differentiate between significant station values and trace values. The "TRACE" command defines the threshold and also controls the station symbol that will be used to represent trace values.

Another less convenient way of differentiating trace values is by changing the programs that generate the plot work file containing the station values.

Figure 14B represents trace value stations with a triangle. Figure 14C is nearly identical, but the trace value stations are represented with a "Y" instead of a triangle. In Figures 14B and 14C, no differentiation is made between zero values and trace values: both are considered trace values because zero is below the specified threshold. Zero values and trace values can be differentiated, though, by using the "OMITZERO" command as illustrated in Figure 15D in the next section.

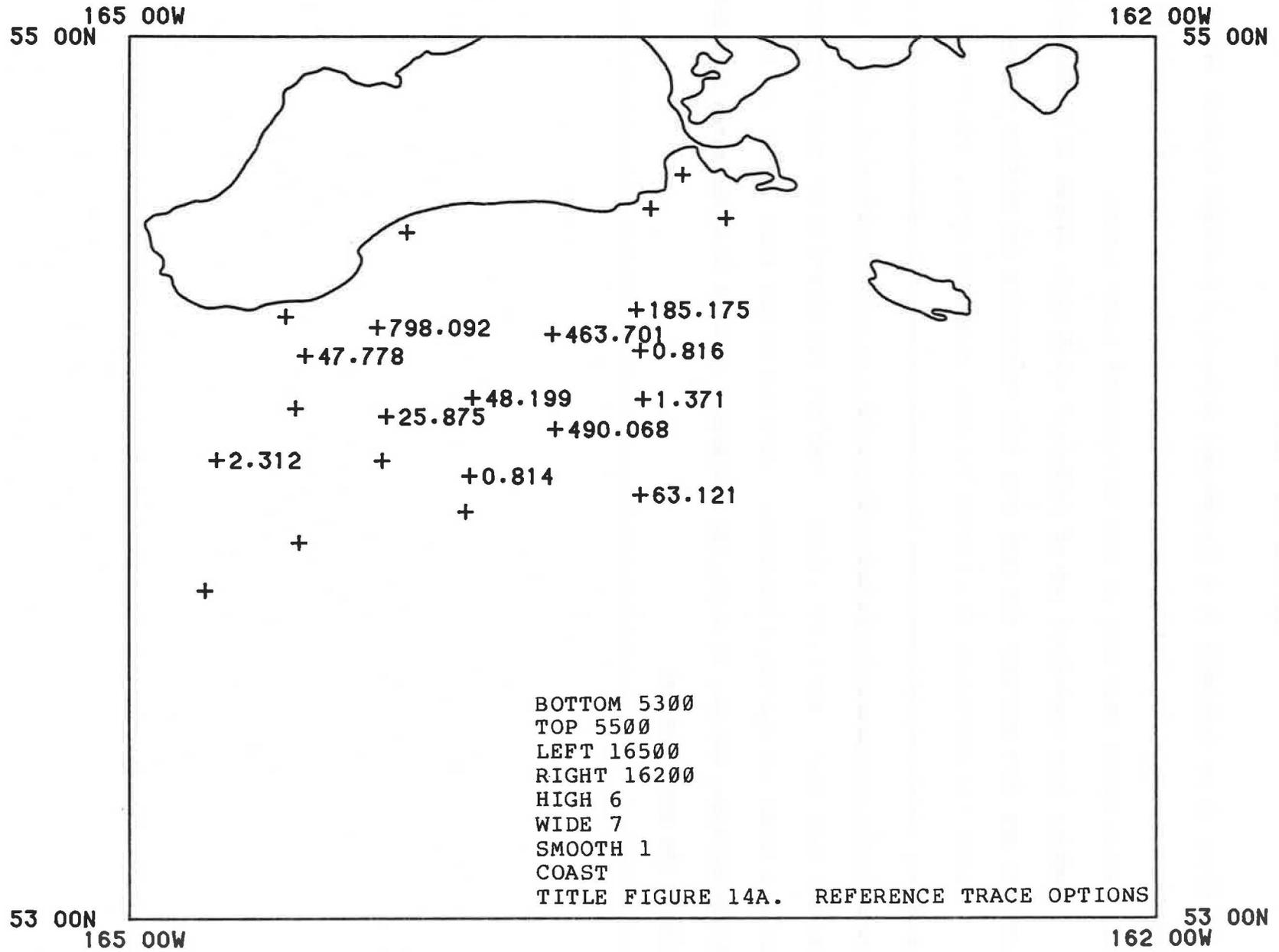


FIGURE 14A. REFERENCE TRACE OPTIONS

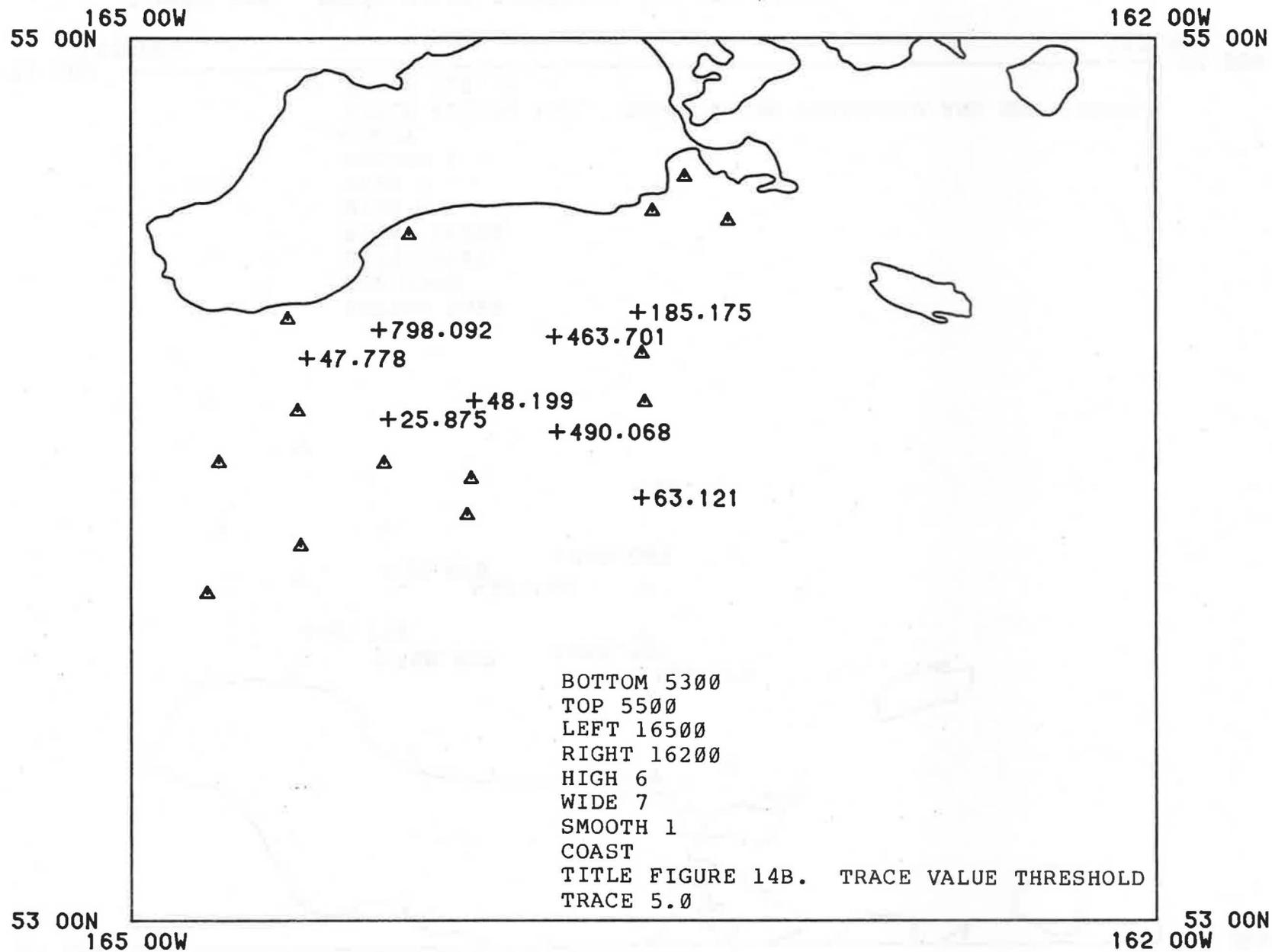


FIGURE 14B. TRACE VALUE THRESHOLD

SECTION 15. ZERO DATA

When a station value is zero, by default just a station symbol will appear on the map. The "ZERO" option will plot a zero next to the station symbol (e.g., as would be desired for temperatures).

When used in conjunction with the "TRACE" command, the "OMITZERO" command is used to differentiate between trace values and original values of zero.

In Figure 15A, the station values of zero are represented with a plus sign. Use of the "ZERO" command, as in Figure 15B, causes the zeros to be plotted next to the plus sign.

In Figure 15D, station values of zero (which might be "no catch" stations) are represented with a plus sign only. Stations with trace values are represented with triangles.

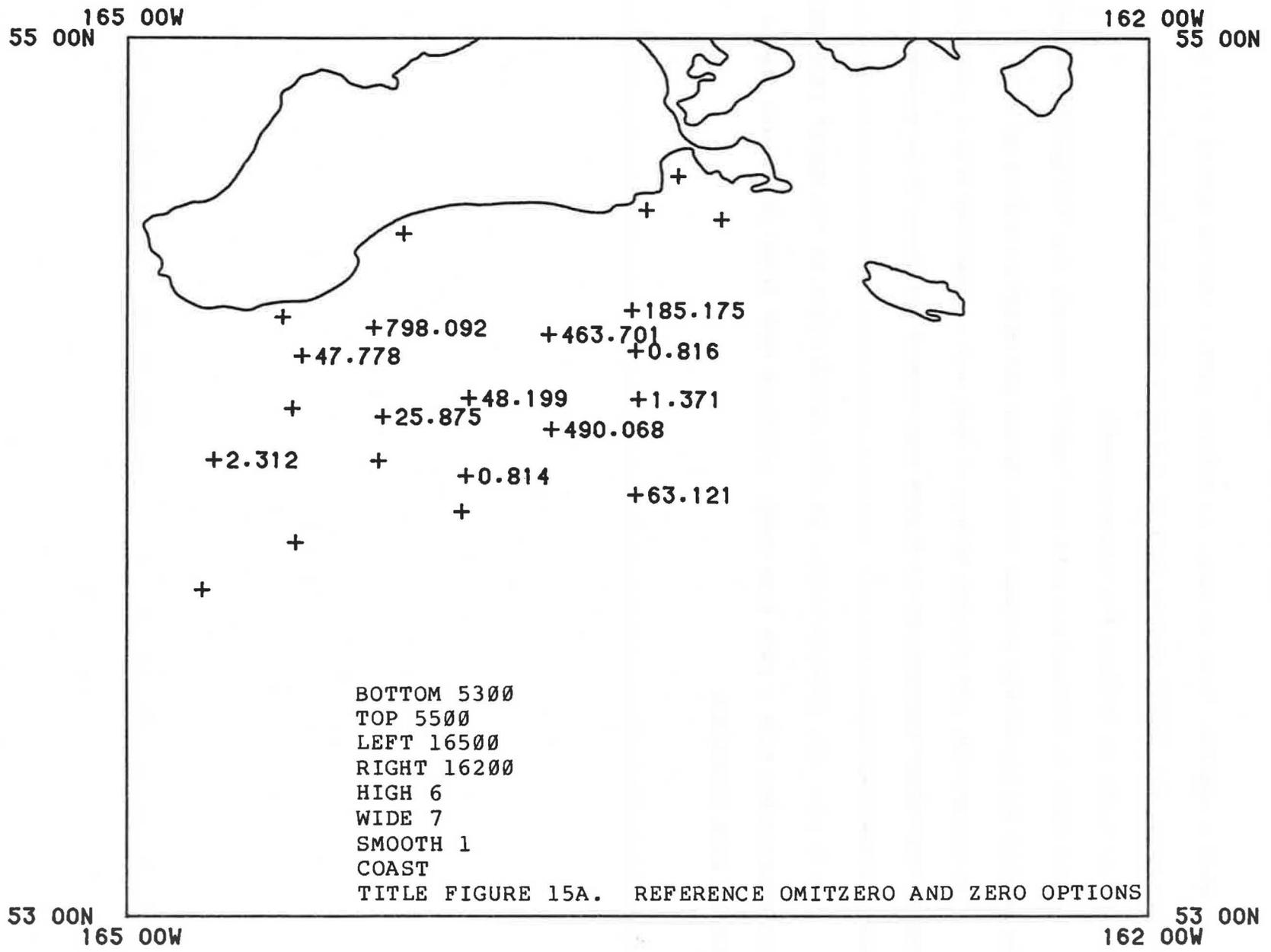


FIGURE 15A. REFERENCE OMITZERO AND ZERO OPTIONS

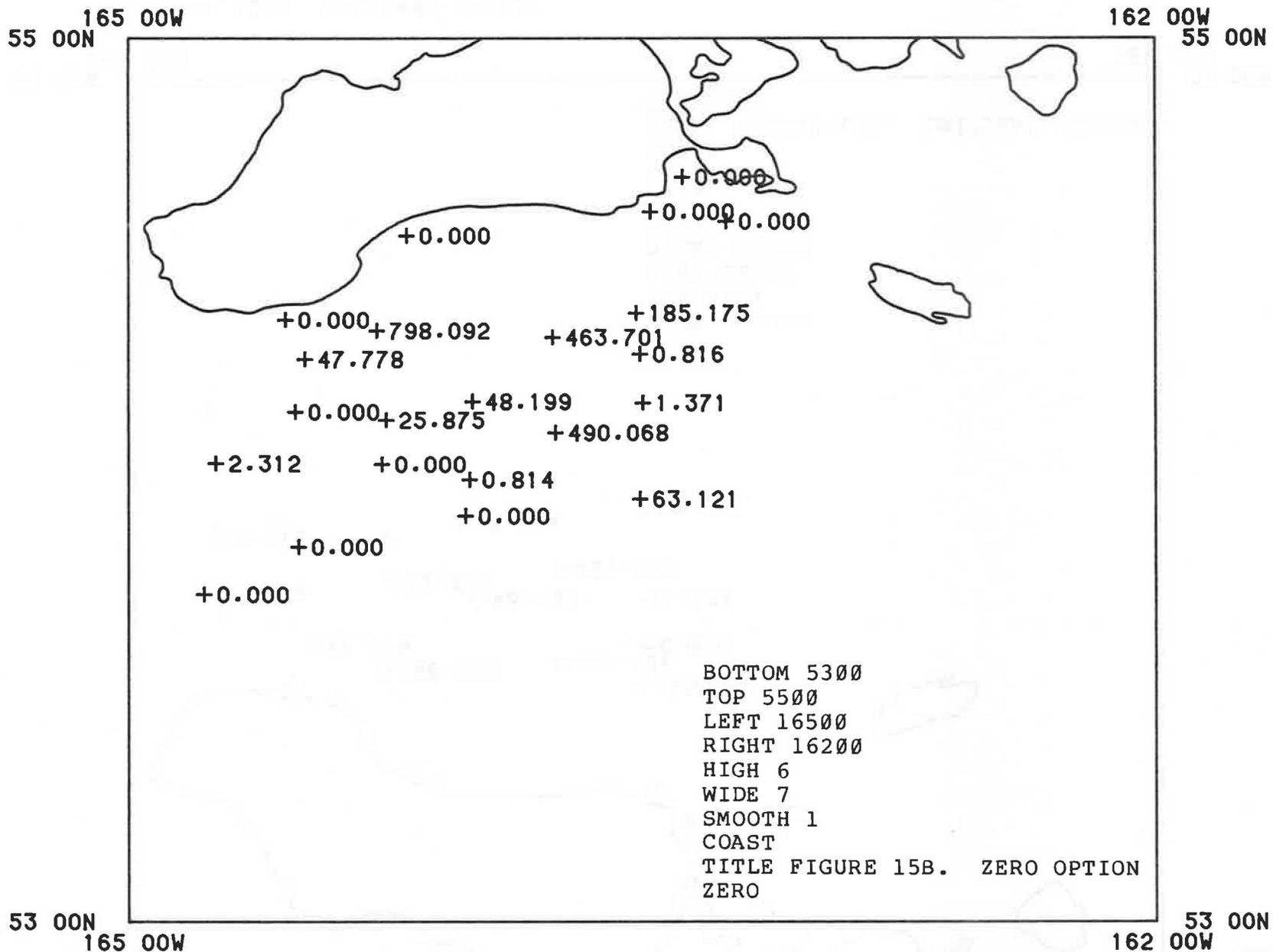


FIGURE 15B. ZERO OPTION

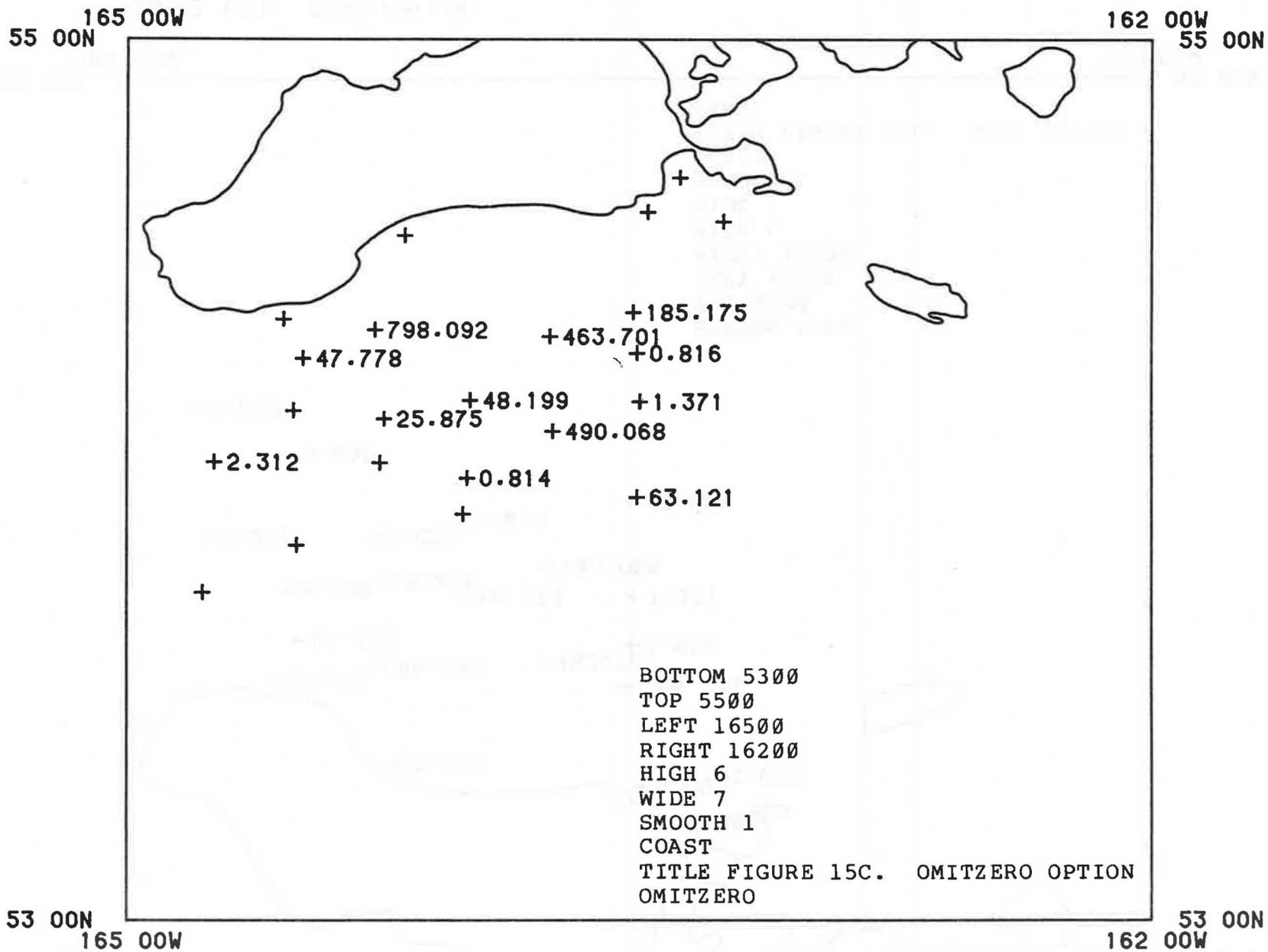


FIGURE 15C. OMITZERO OPTION

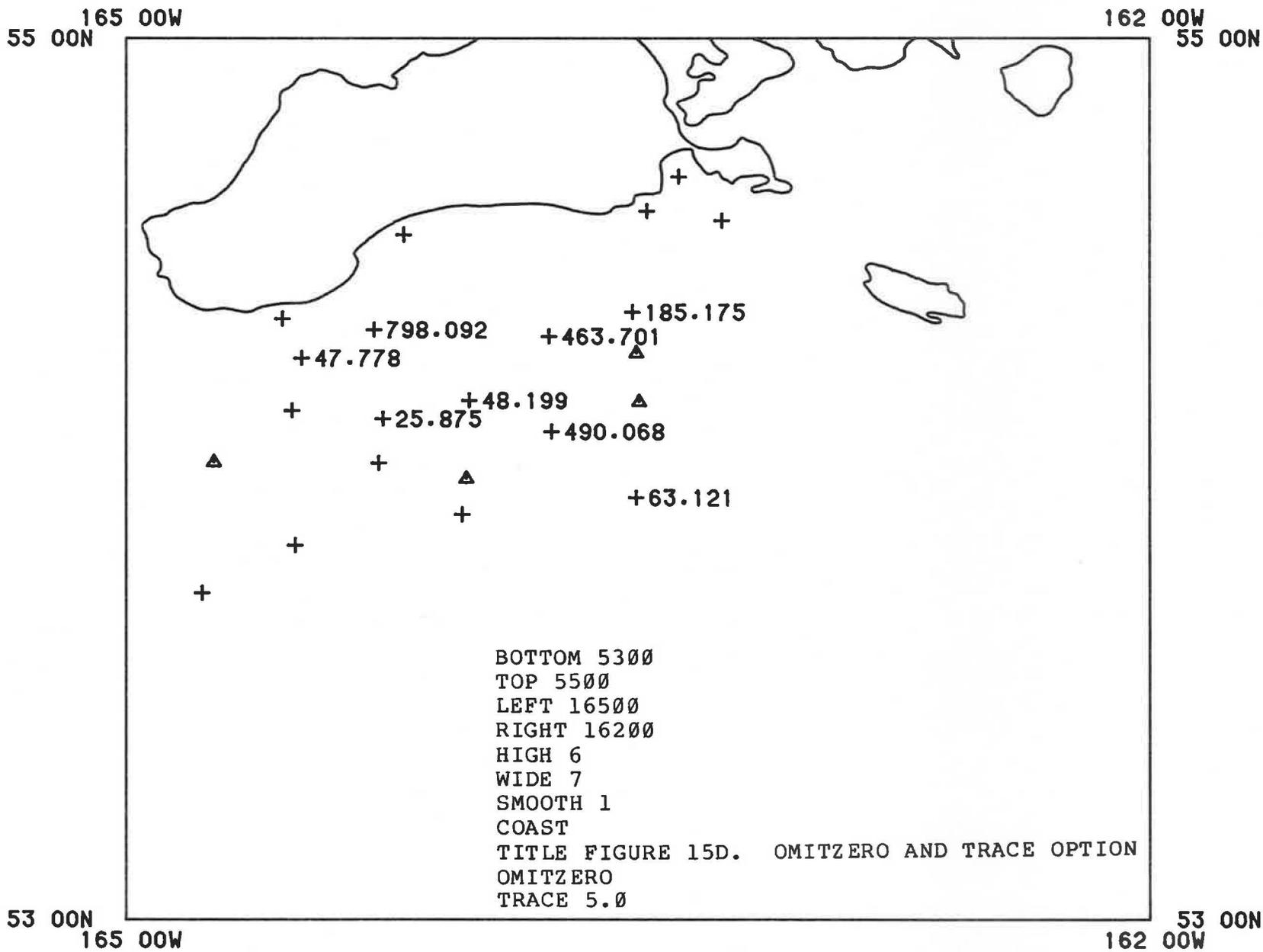


FIGURE 15D. OMITZERO AND TRACE OPTION

SECTION 16. TRACK LINES

Track lines may be drawn between stations that are on the plot work file. Uniform continuity of the track line may be controlled by a parameter on the "TRACK" command.

If, however, there are multiple track lines with differing numbers of stations in each track line, then the continuity of the line segments needs to be controlled in the program that generates the plot work file. This is accomplished by inserting a dummy station at the end of each track line that is off the map (say at 0,0, or 90,0).

Another way of handling track lines, instead of via the plot work file, is to create a binary lines file and use the "LINES" command.

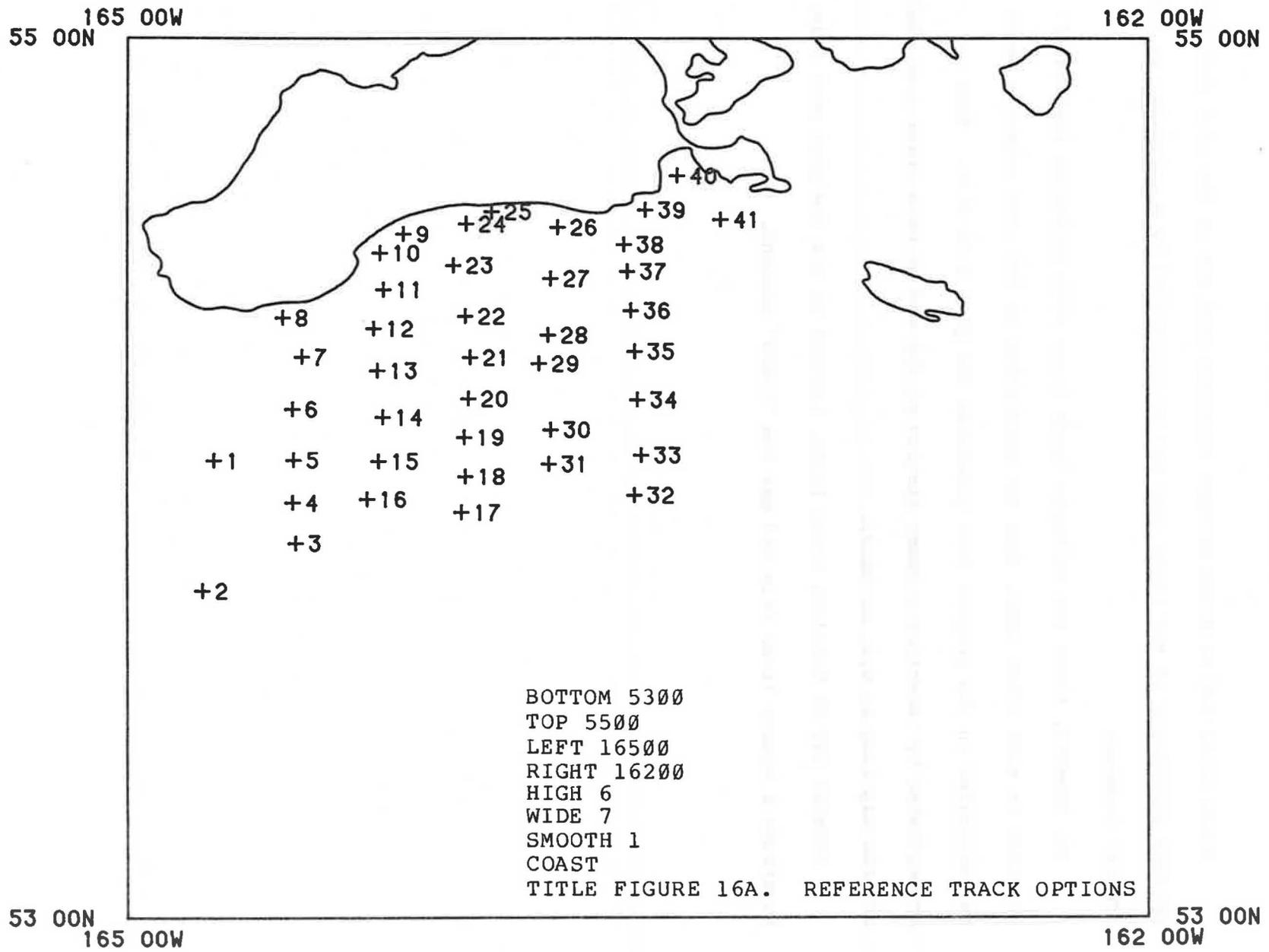


FIGURE 16A. REFERENCE TRACK OPTIONS

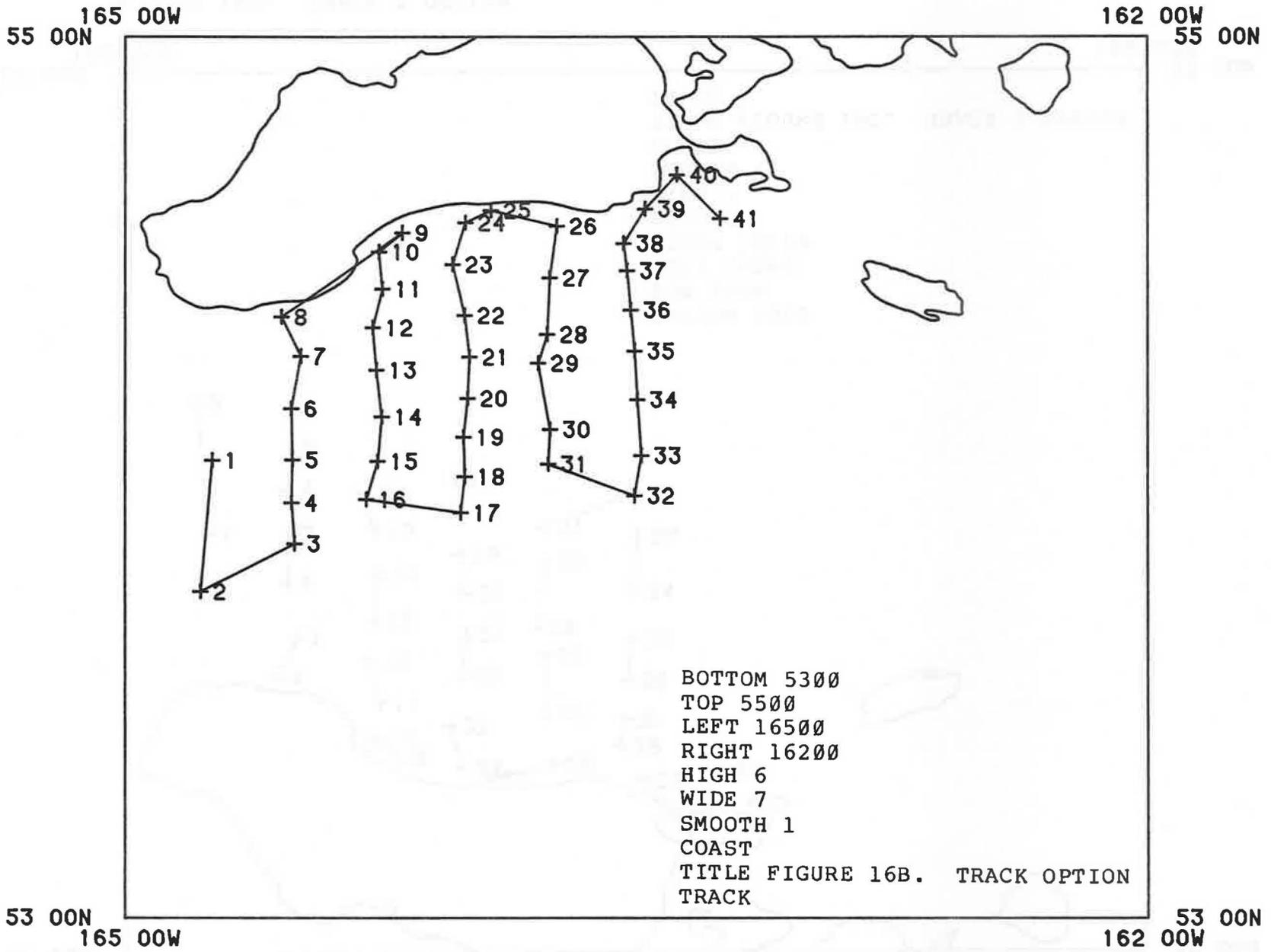
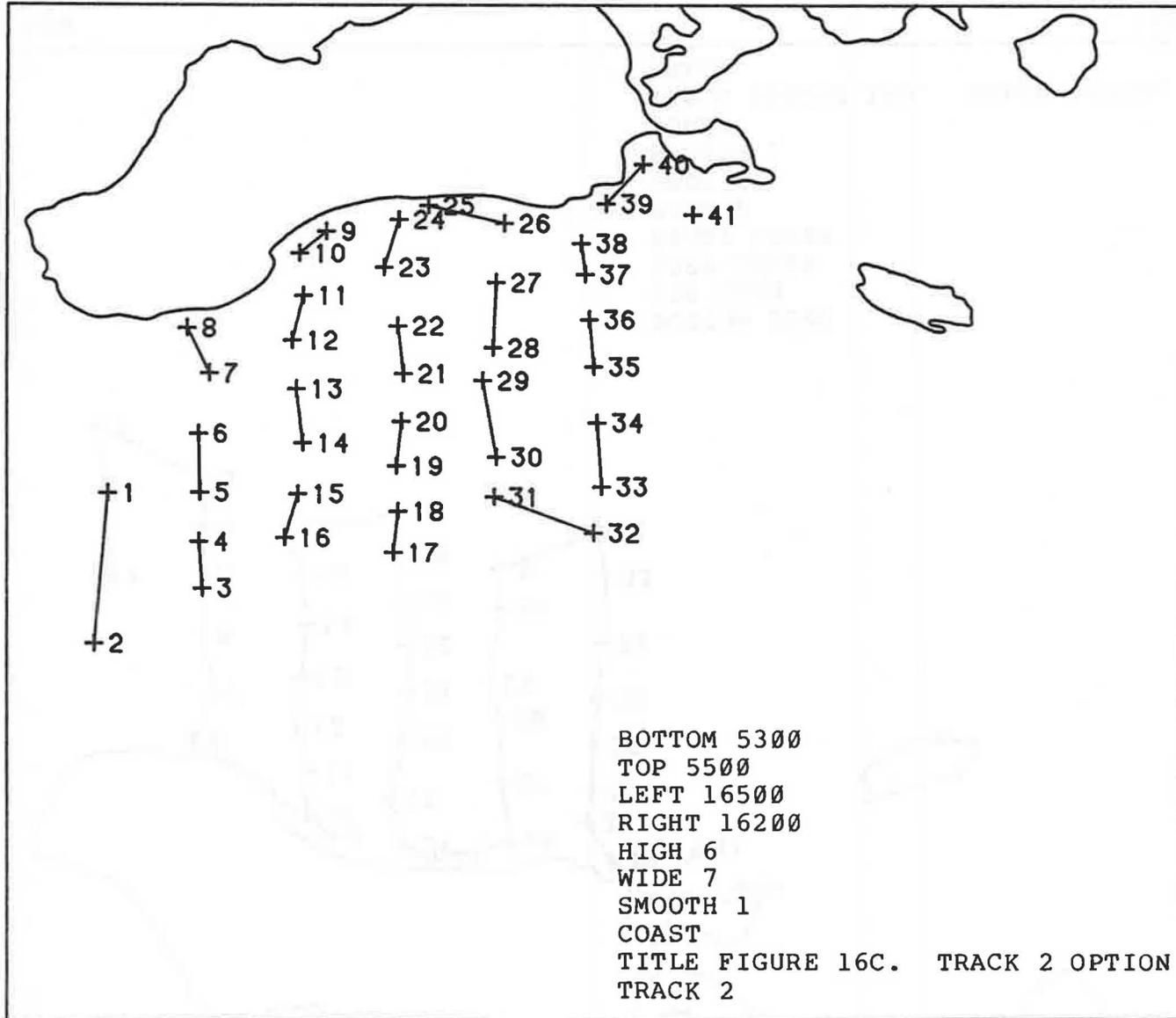


FIGURE 16B. TRACK OPTION

55 00N 165 00W

162 00W 55 00N



53 00N 165 00W

162 00W 53 00N

FIGURE 16C. TRACK 2 OPTION

165 00W
55 00N

162 00W
55 00N

53 00N
165 00W

53 00N
162 00W

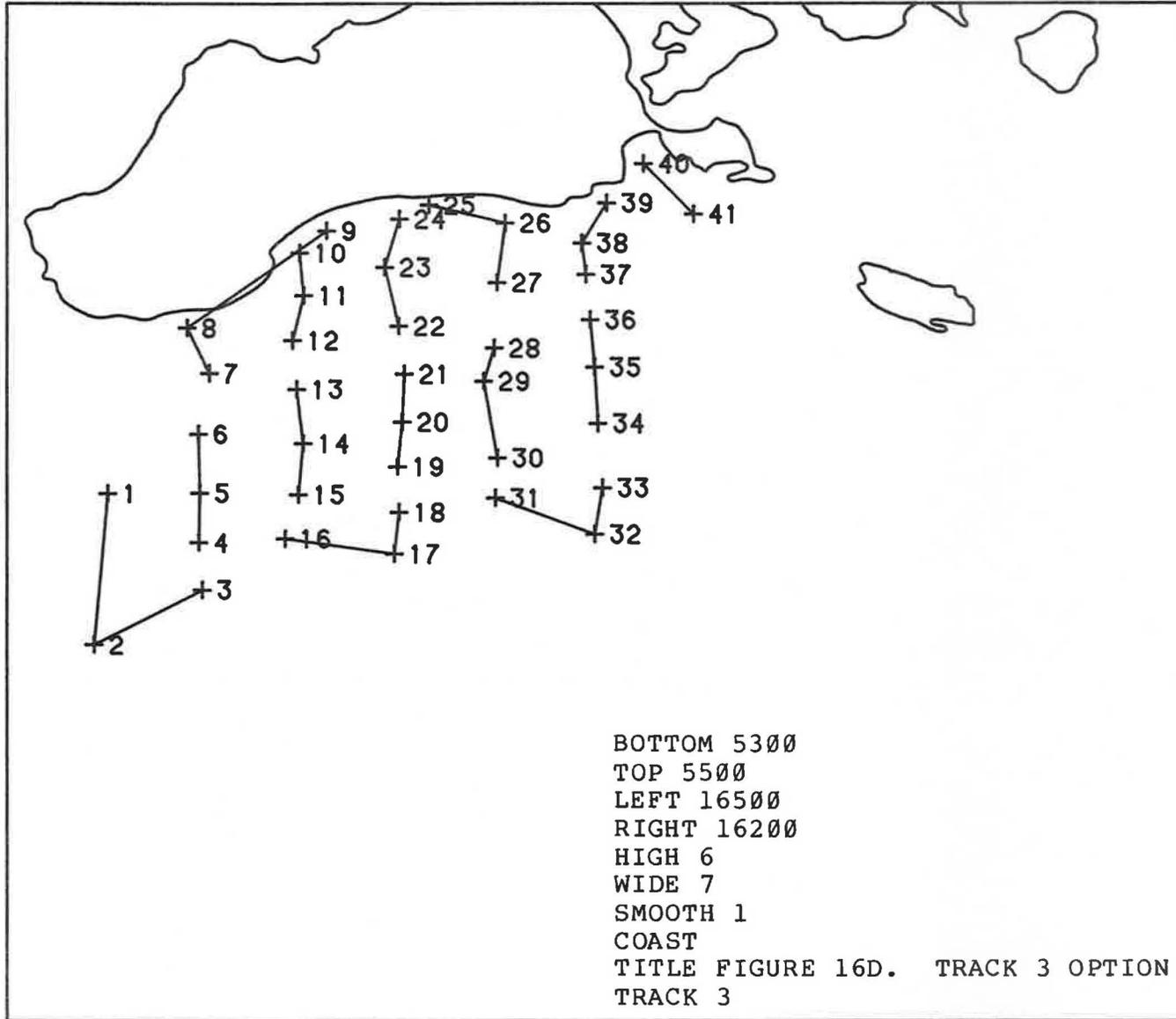


FIGURE 16D. TRACK 3 OPTION

SECTION 17. TYPE SIZES

Three character sets are used on maps: one for the title, a second for the border labels, and the third for the station symbols and values.

Usually the default character sizes are acceptable, but the sizes can be changed for any, or all, of the character sets.



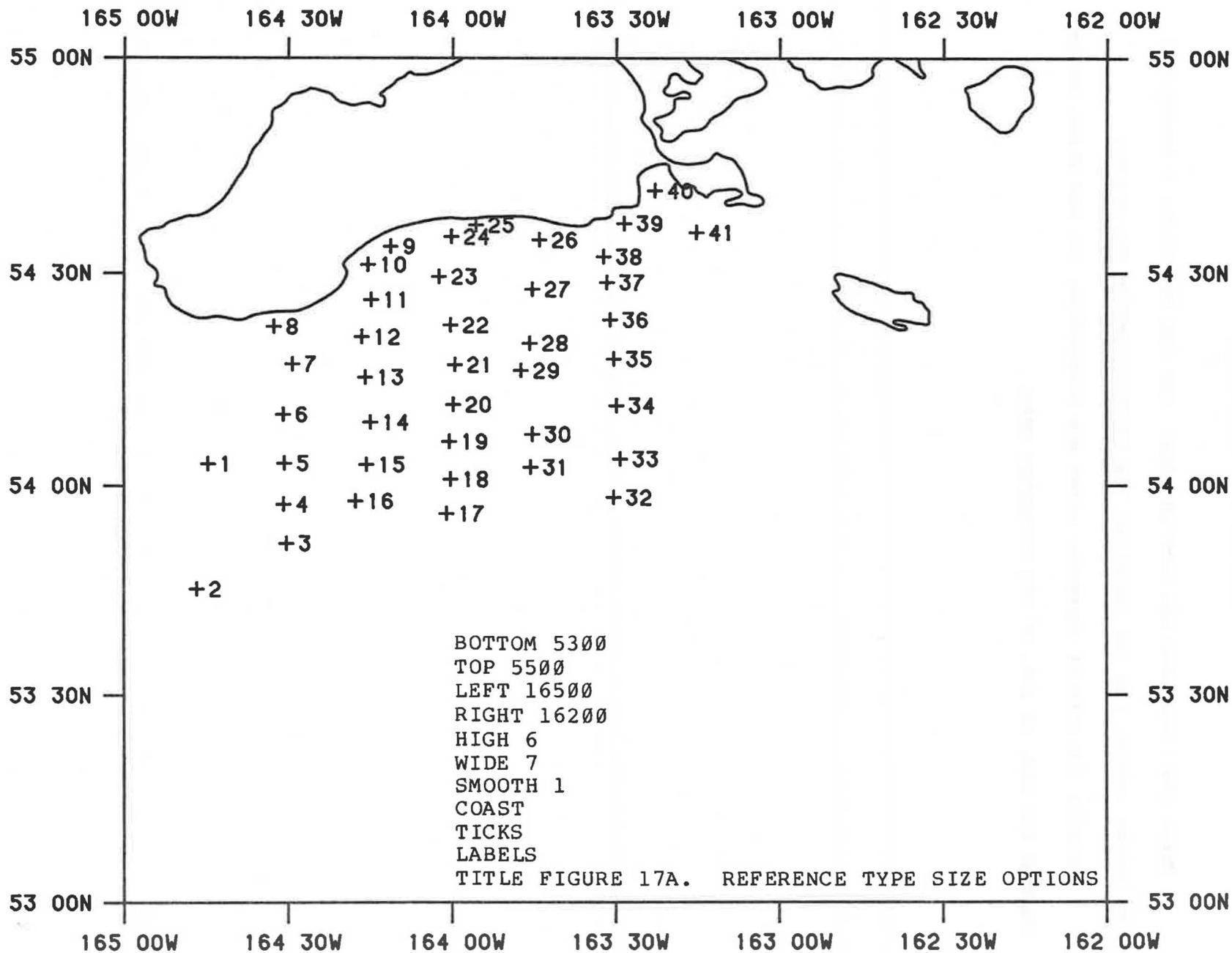


FIGURE 17A. REFERENCE TYPE SIZE OPTIONS

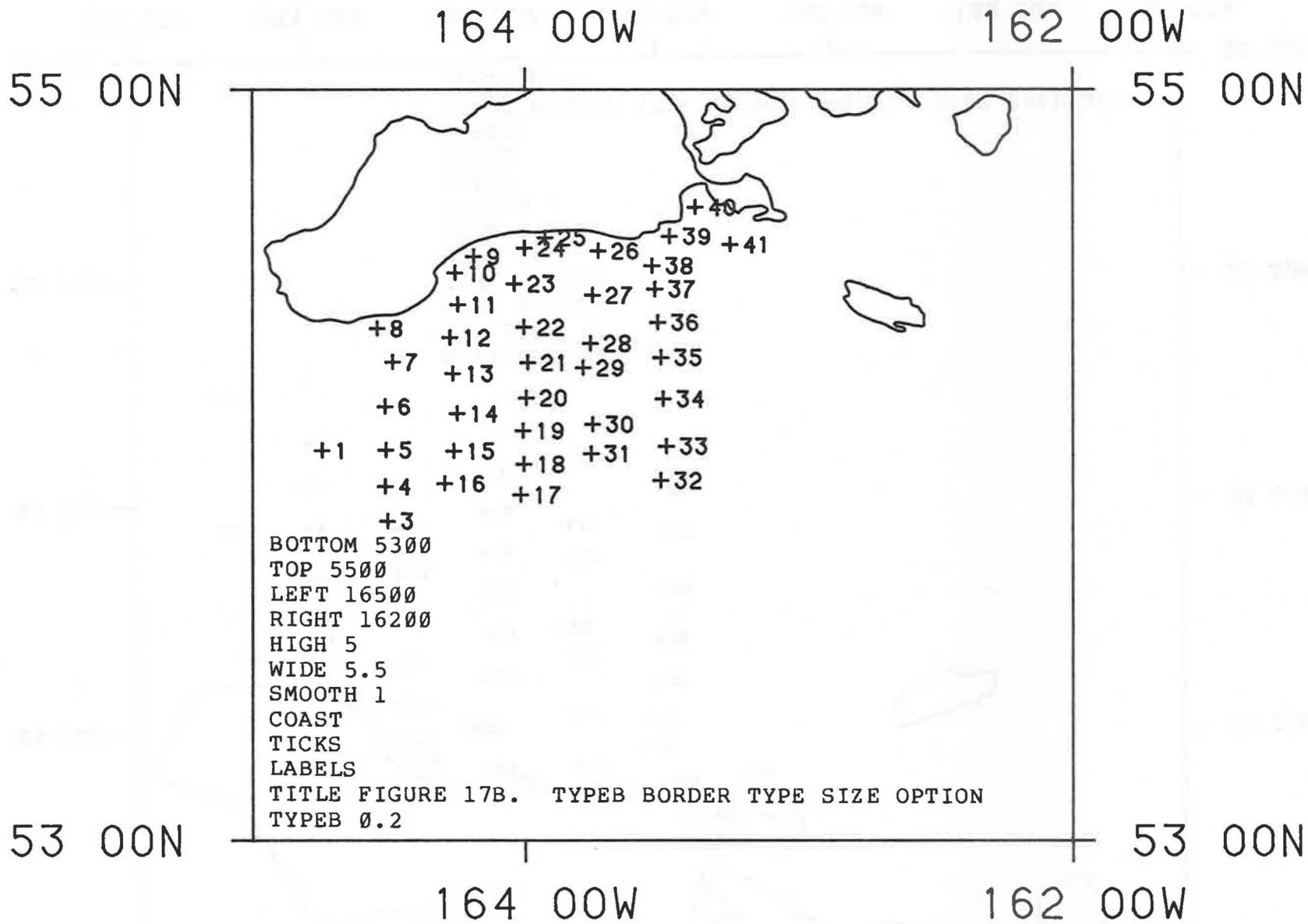


FIGURE 17B. TYPEB BORDER TYPE SIZE OPTION

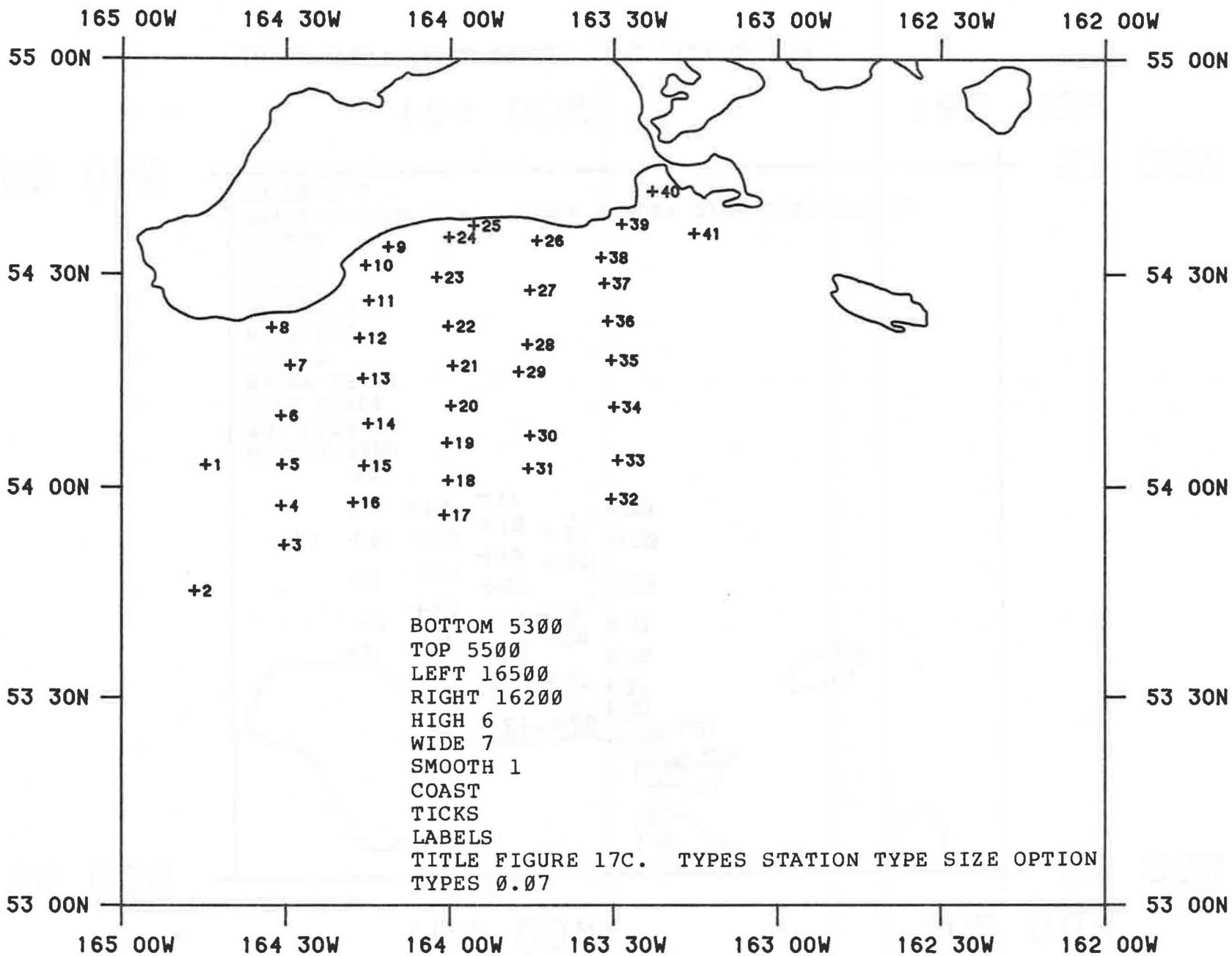


FIGURE 17C. TYPES STATION TYPE SIZE OPTION

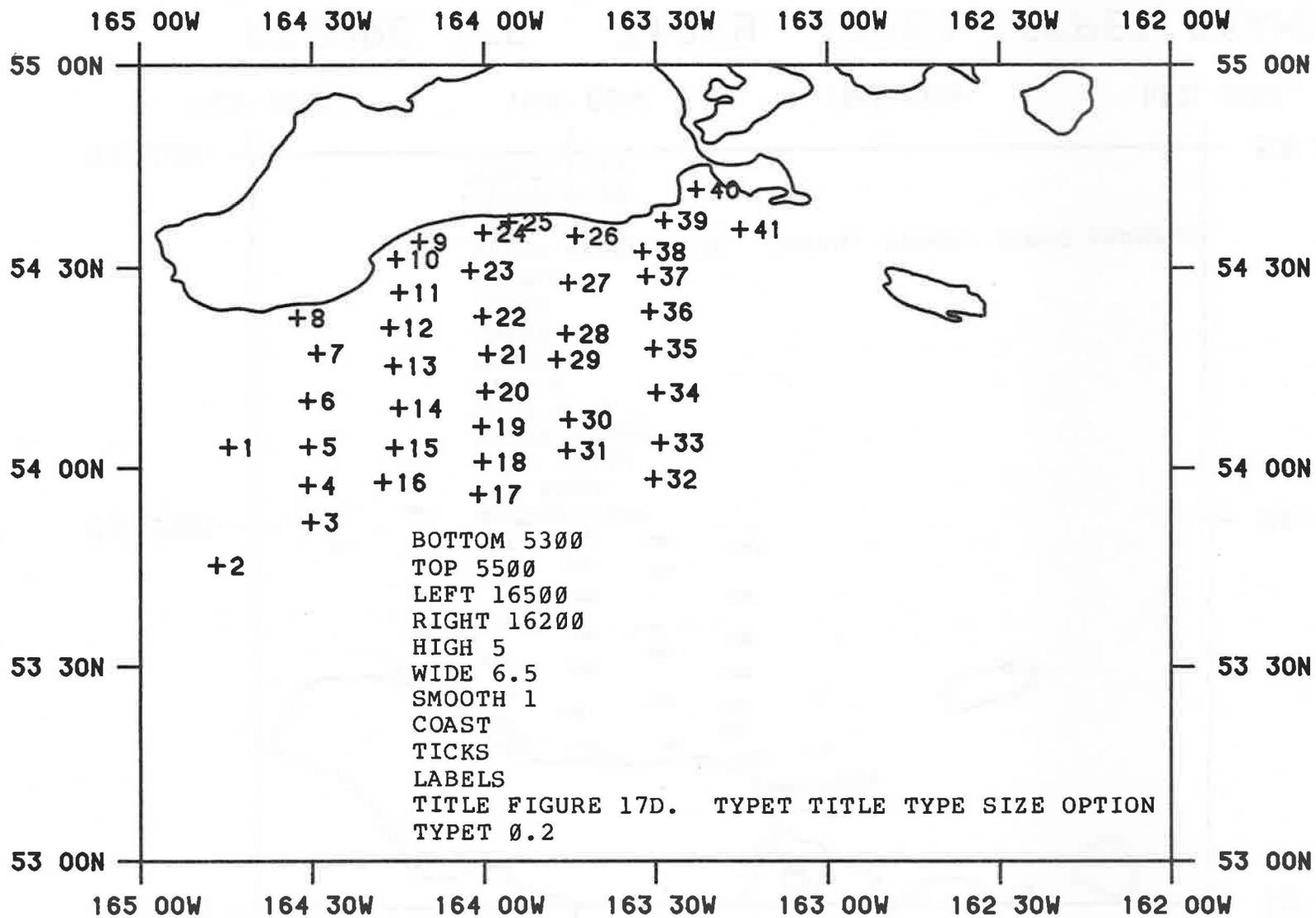


FIGURE 17D. TYPET TITLE TYPE SIZE OPTION

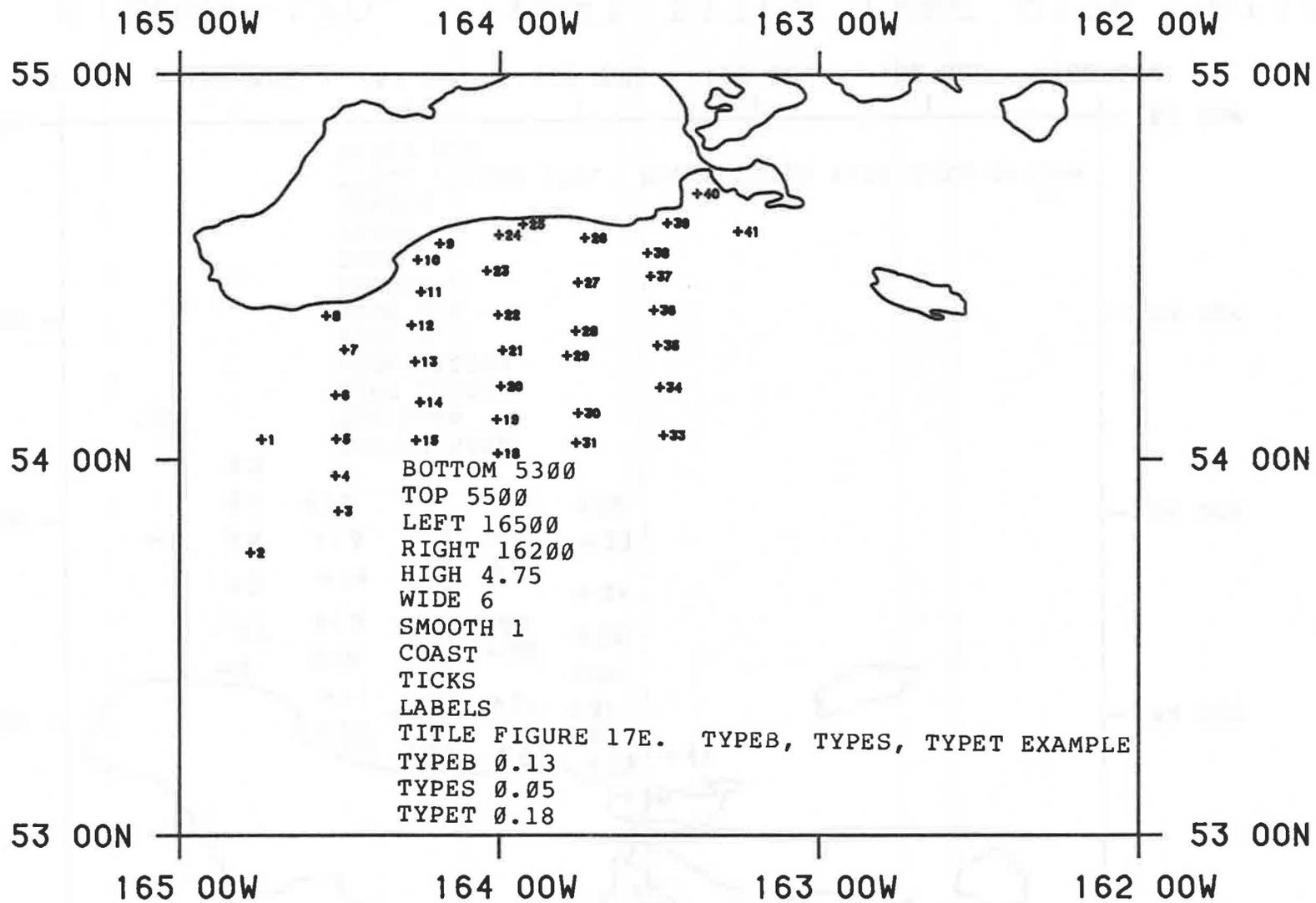


FIGURE 17E. TYPEB, TYPES, TYPET EXAMPLE

SECTION 18. SUPERIMPOSED LINES

An external binary lines file, such as might be generated by the (RACE0010) GENERATE/LINES program, may be routed into the MAP program.

The lines defined therein will be superimposed on the map. Note that both endpoints of each line segment must be within the bounds of the map for the line segment to appear.

These generated lines might be grid lines, partial grid lines, strata boundaries, contour lines, or any other demarcation lines defined by the user.

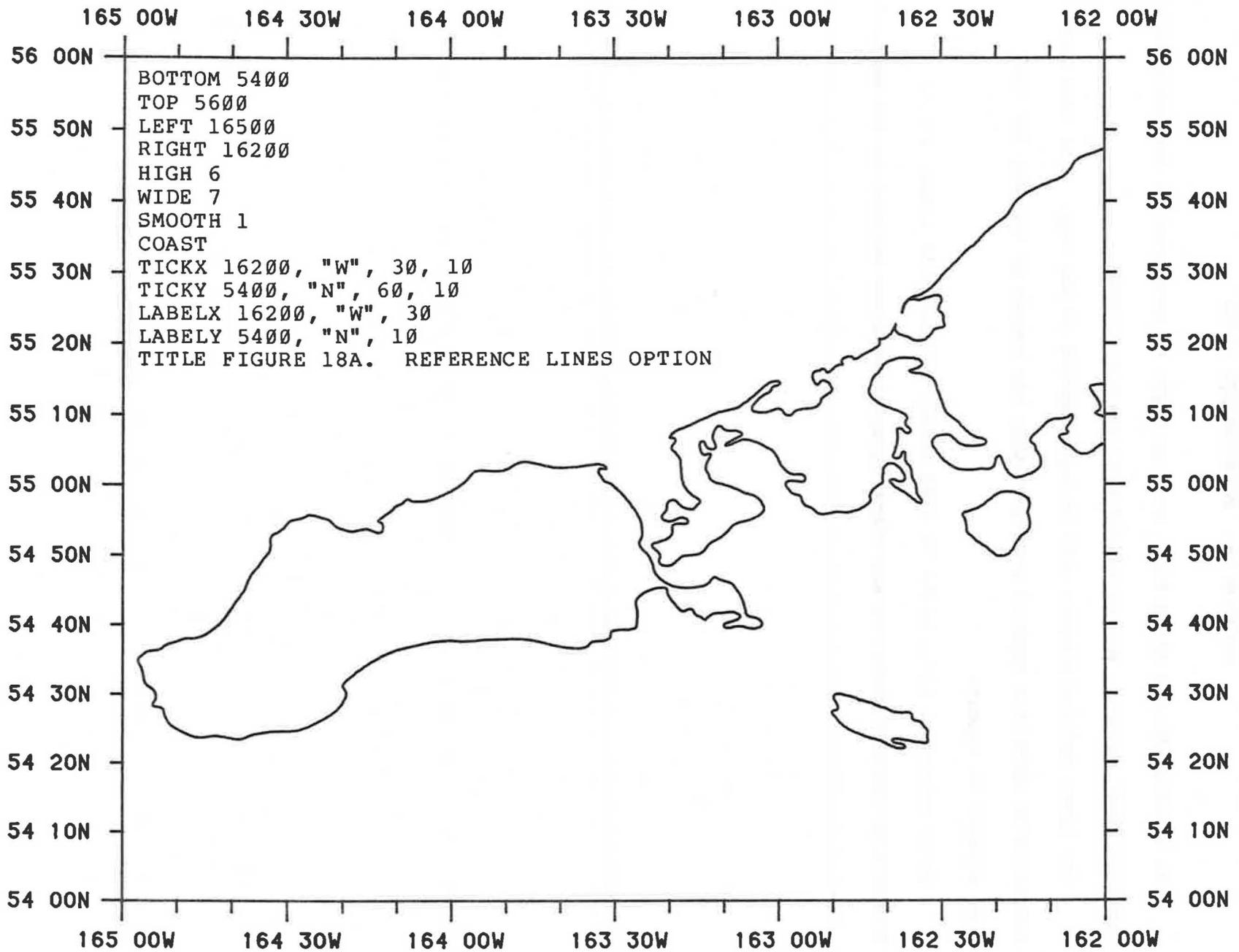


FIGURE 18A. REFERENCE LINES OPTION

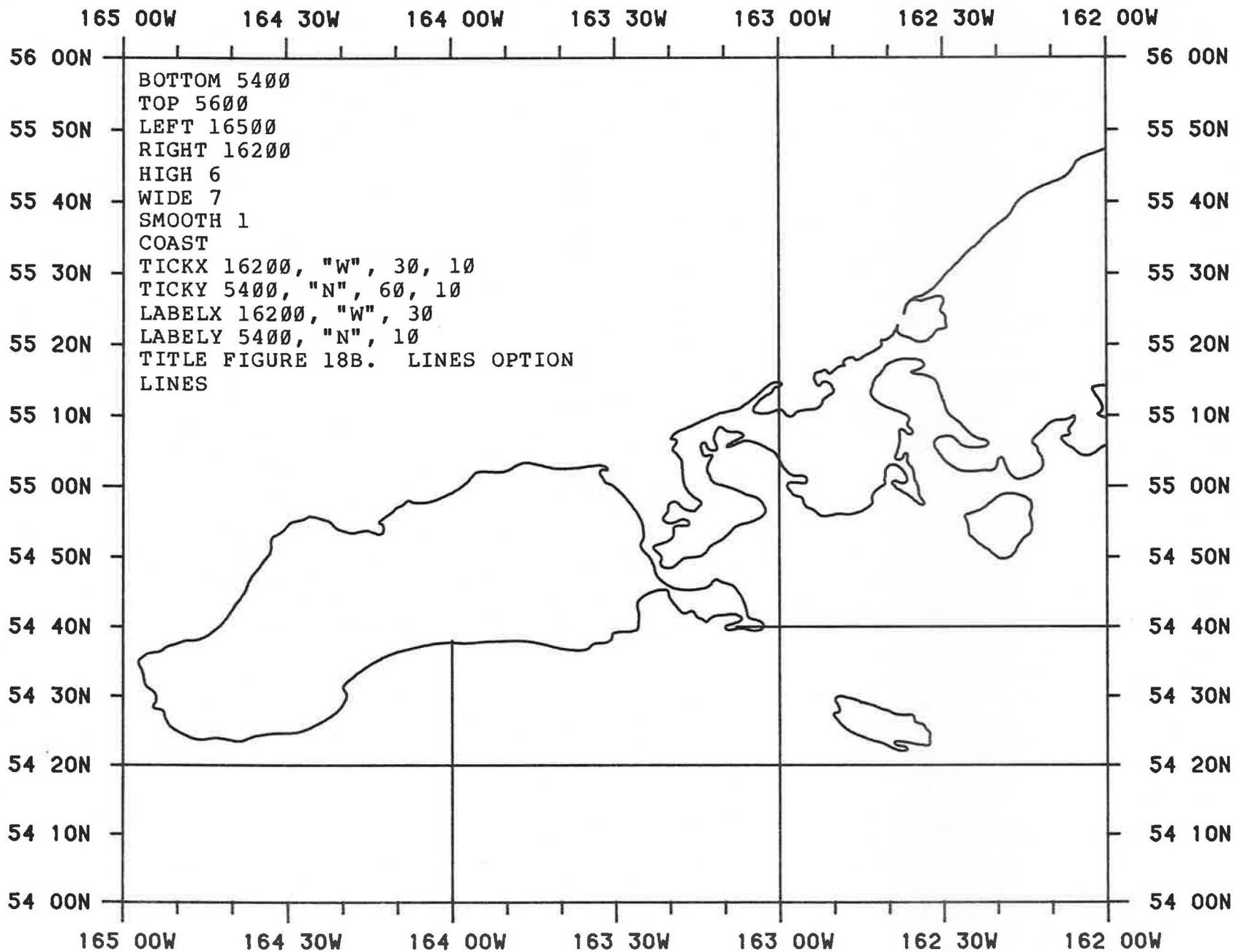


FIGURE 18B. LINES OPTION

SECTION 19. MULTIPLE PENS

The CalComp^{1/} plotter in Seattle is equipped with four pens, each of which can have a different kind of pen (wet ink or liquid ballpoint) and a different color of ink (e.g., black, red, blue, green).

The "PEN" command in the MAP Program specifies which pen to use for all subsequent map features until another "PEN" command is given.

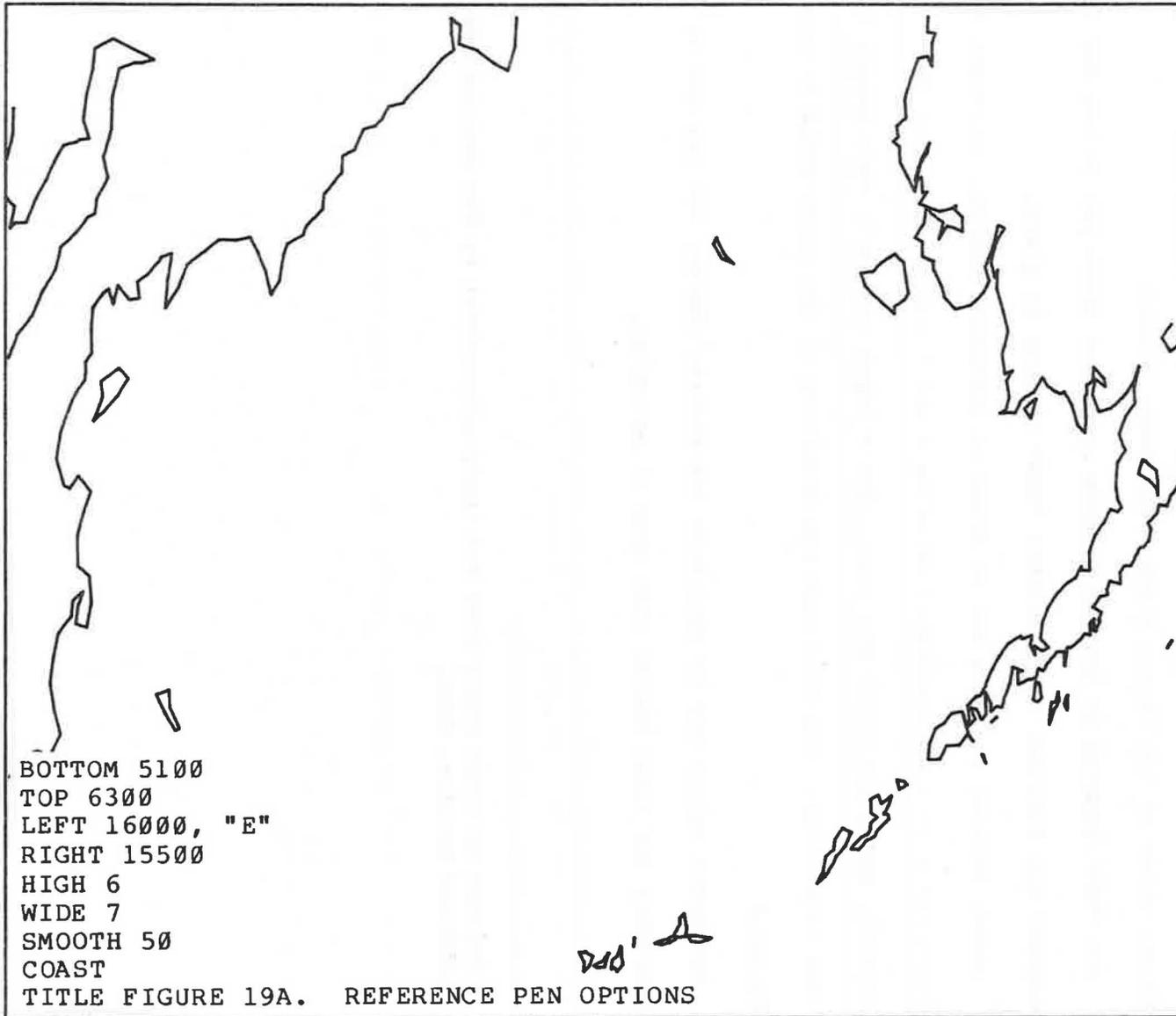
Hence, various features may be drawn in different colors. Contrast between features can also be accomplished by using a wet ink pen (e.g., for the coastline), and a ballpoint pen (e.g., for a depth contour), even though they are the same color. (In this case the densities of the lines would be obviously different.)

Different colors may be desirable for working charts, but may not be satisfactory for final charts that need to be copied.

^{1/} Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

160 00E
63 00N

155 00W
63 00N



51 00N
160 00E

51 00N
155 00W

FIGURE 19A. REFERENCE PEN OPTIONS

160 00E
63 00N

155 00W
63 00N

51 00N
160 00E

51 00N
155 00W

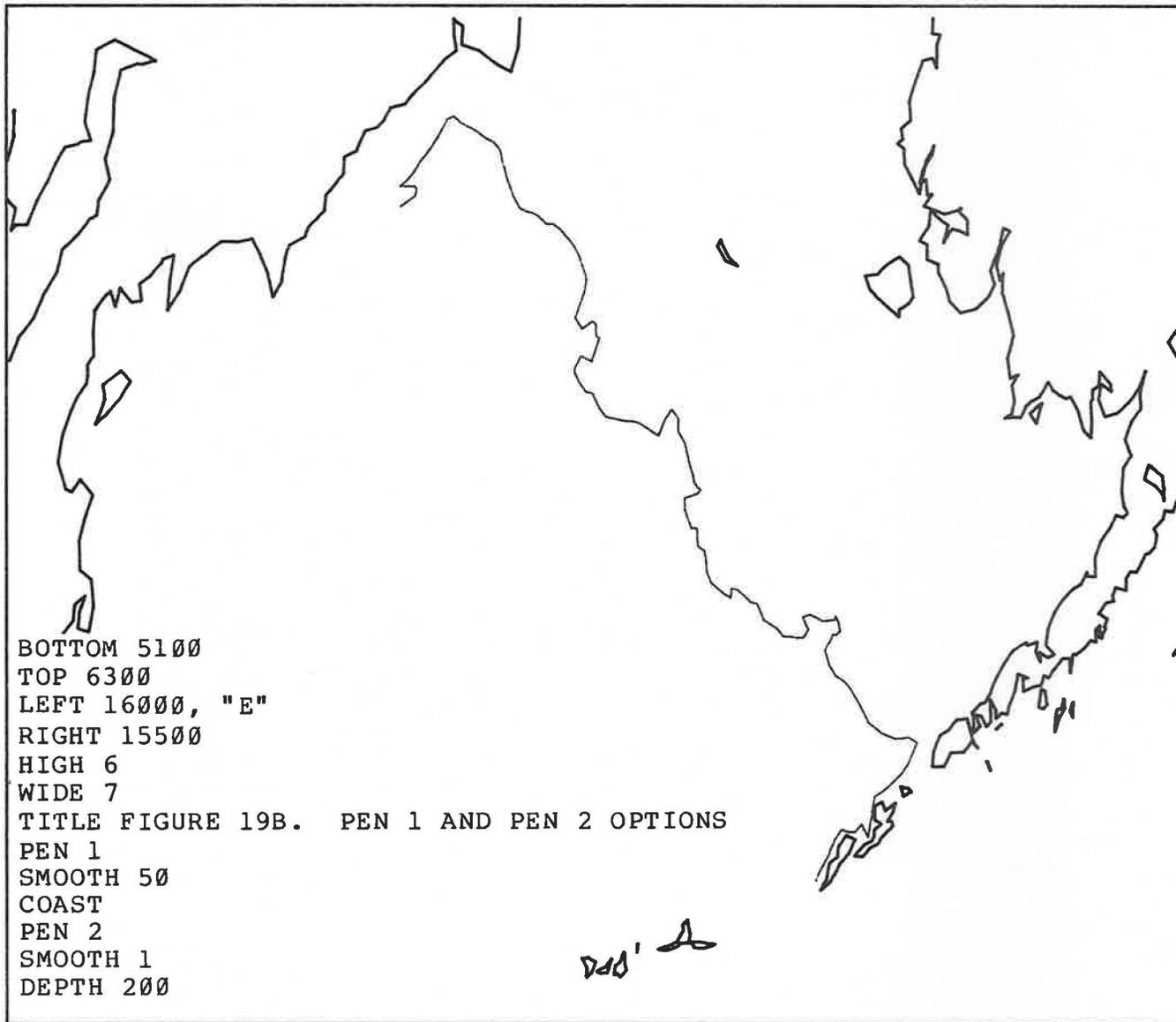


FIGURE 19B. PEN 1 AND PEN 2 OPTIONS

SECTION 20. PROJECTIONS

Two projections are presently available. Mercator, the default, is the projection commonly used on hydrographic charts.

Polyconic, also known as equal area, projection is available. Unlike a Mercator projection, the polyconic projection uniformly represents the same number of square nautical miles per square inch of map. Polyconic maps should be used in any situation where area is measured from the map (using a digitizer or a planimeter).

Another use of polyconic projection is in producing output in (x, y) coordinates, instead of (latitude, longitude) coordinates (via the "DUMP" command in the MAP Program). The (x, y) output could then be routed into contouring programs, e.g., where isopleths or averages are a function of the surrounding points' values and their distances. Polyconic projection assures proper calculation of distances in such applications.

For additional information on projections, see "Maps" in the Encyclopedia Brittanica.

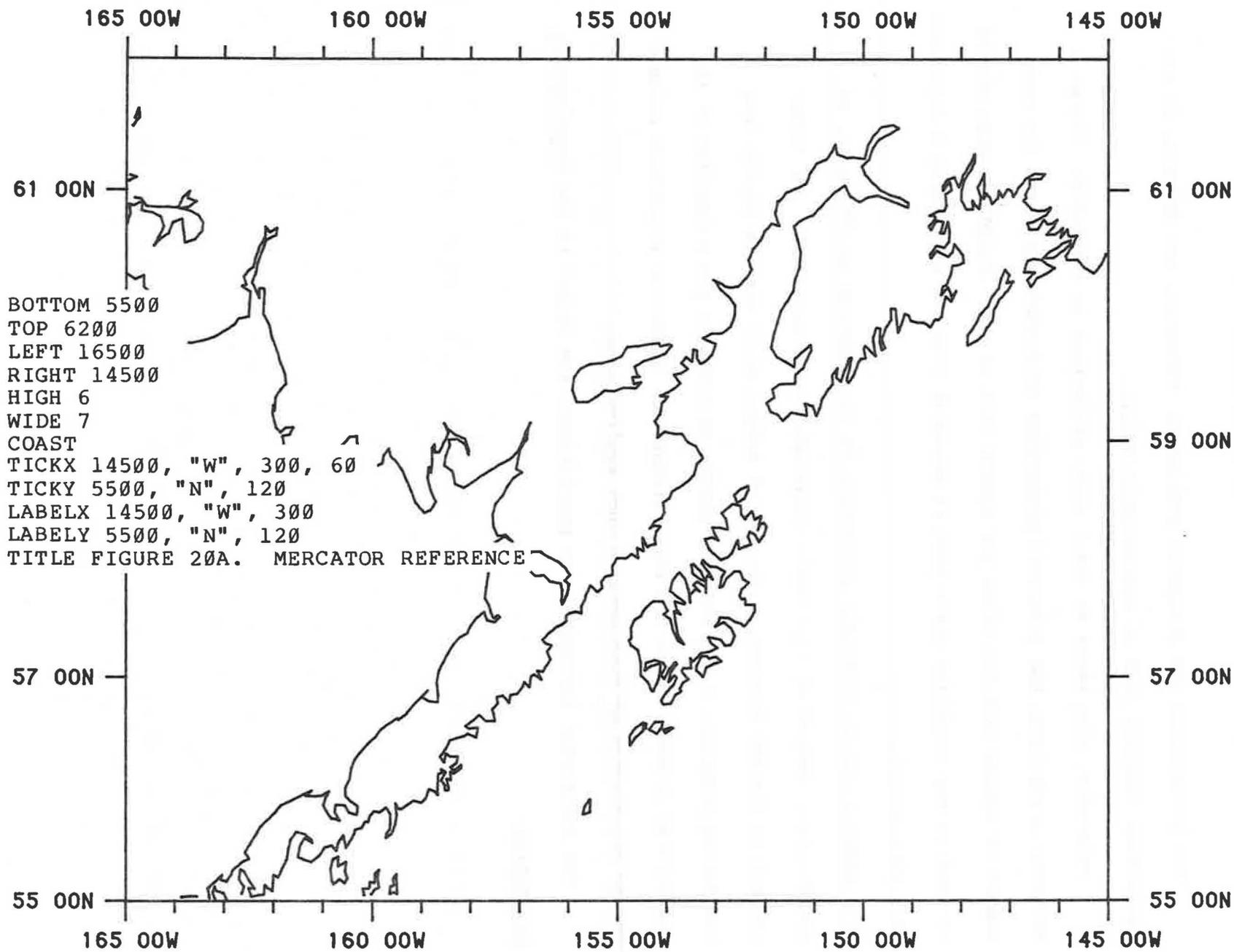


FIGURE 20A. MERCATOR REFERENCE

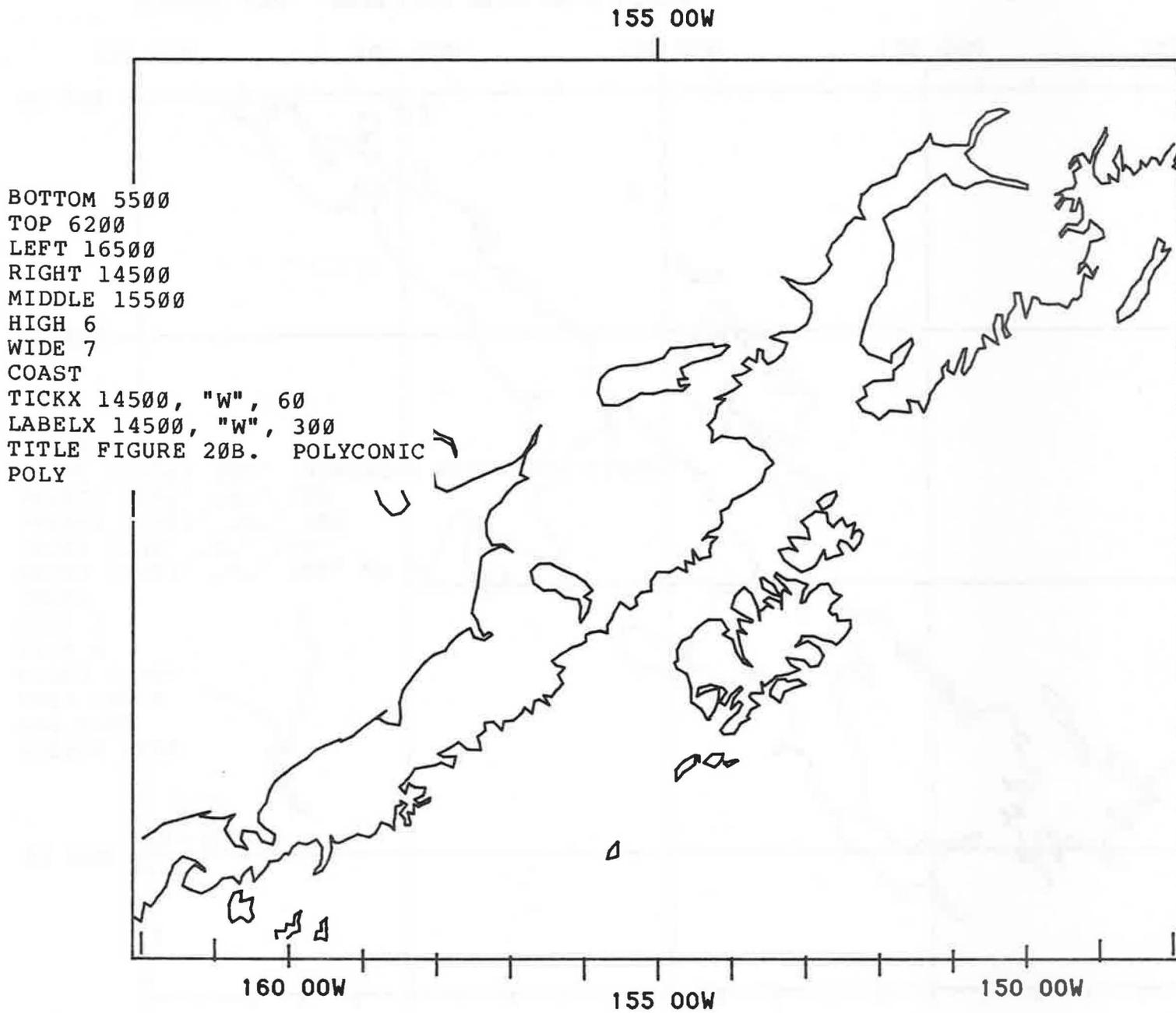


FIGURE 20B. POLYCONIC

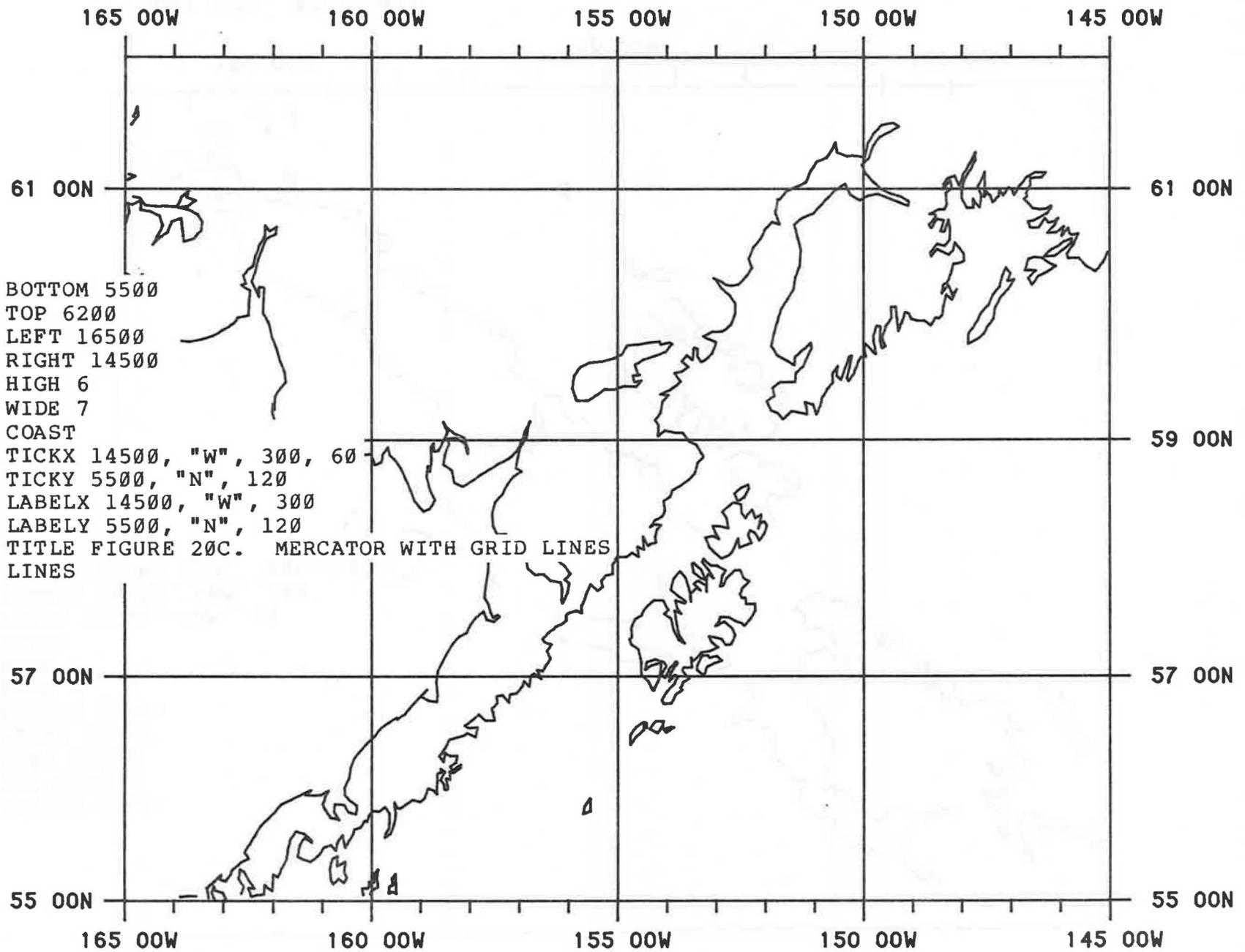


FIGURE 20C. MERCATOR WITH GRID LINES

BOTTOM 5500
TOP 6200
LEFT 16500
RIGHT 14500
MIDDLE 15500
HIGH 6
WIDE 7
COAST
TICKX 14500, "W", 300, 60
LABELX 14500, "W", 300
TITLE FIGURE 20D. POLYCONIC WITH GRID LINES
LINES
POLY

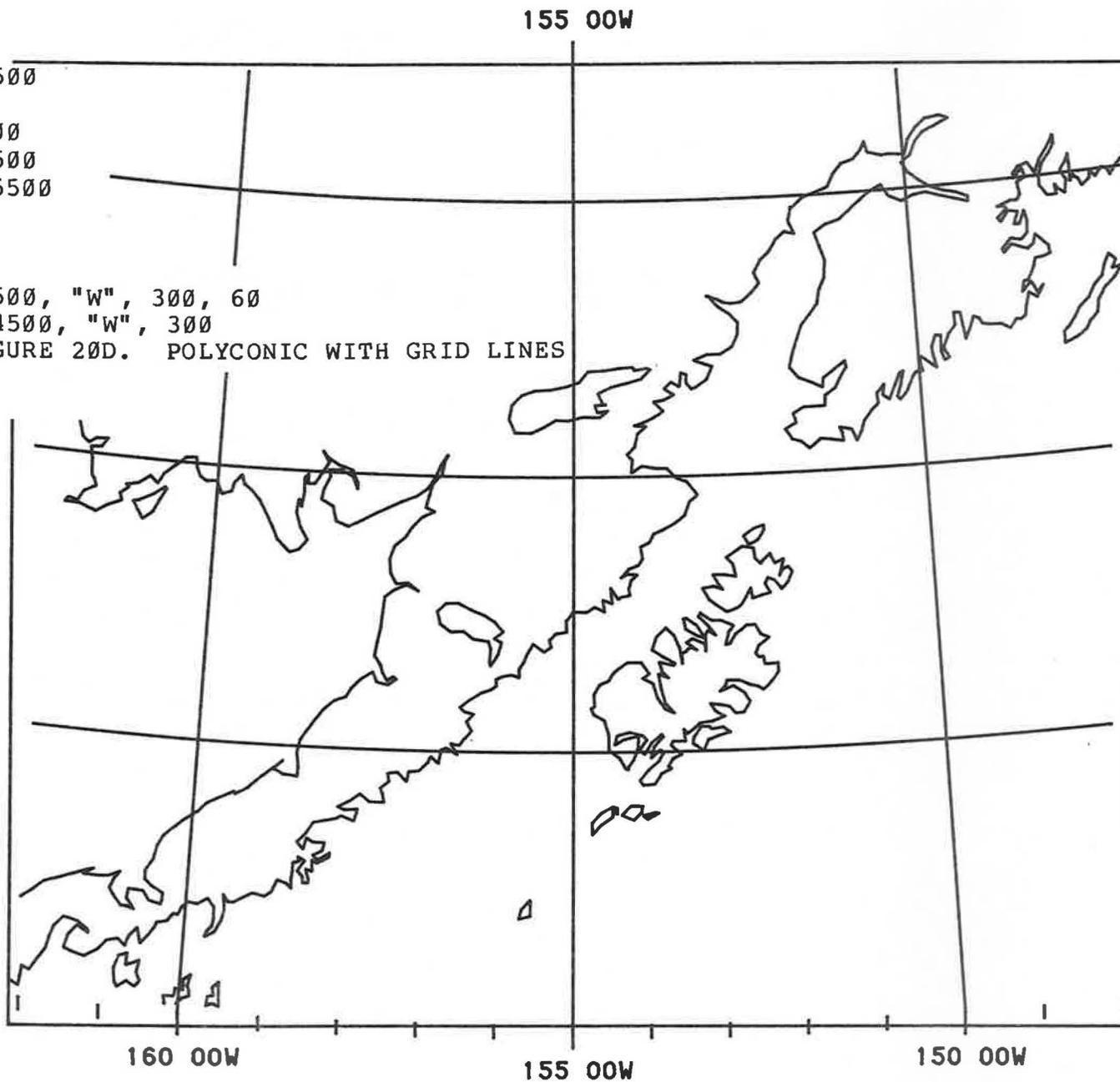


FIGURE 20D. POLYCONIC WITH GRID LINES

SECTION 21. OVERPLOTING

Often when stations are plotted on a map, they may be so numerous or so close together that the result is an unreadable plot. This may be desirable in cases where densities are presented in a relative, but nonquantitative manner.

In most cases, however, the overplotting is undesirable. There are numerous techniques available for resolution of the overplotting. First, stations that overplot can be removed from the data (on the plot work file).

The size of the map can be increased, which has the effect of spreading the stations farther apart.

The size of the characters used for the station symbols and values can be decreased to give more space between stations ("TYPES" command). A subarea in which overplotting occurs can be enlarged to spread out the stations, and presented as an inset to or supplementary to the original map.

Station symbols and values may be replaced with a single station symbol to represent magnitude of value. (See the (RACE0010)PLOTWORK/RANK program.)

Another technique is to subdivide the map into statistical blocks, and represent each statistical block with a single summary value, such as is done by the (RACE0010)UNDER/PLOT program and illustrated in Figure 21B. Numerous summary options are available, such as minimum, maximum, average, and count.

After the statistical blocks are summarized with program UNDER/PLOT, they may, if desired, be shaded with a character pattern, as illustrated in Figure 21C, by running the SHADES program prior to running the MAP program. Options in the SHADES program allow defining the threshold levels, the shading character to use, and the horizontal and vertical pattern density corresponding to the specified threshold.

When the UNDER/PLOT and SHADES programs are used, some statistical blocks may overlap land areas, as can be detected in Figures 21B and 21C.

Other contouring processes, external to the MAP program, might also be used to resolve overplotting.

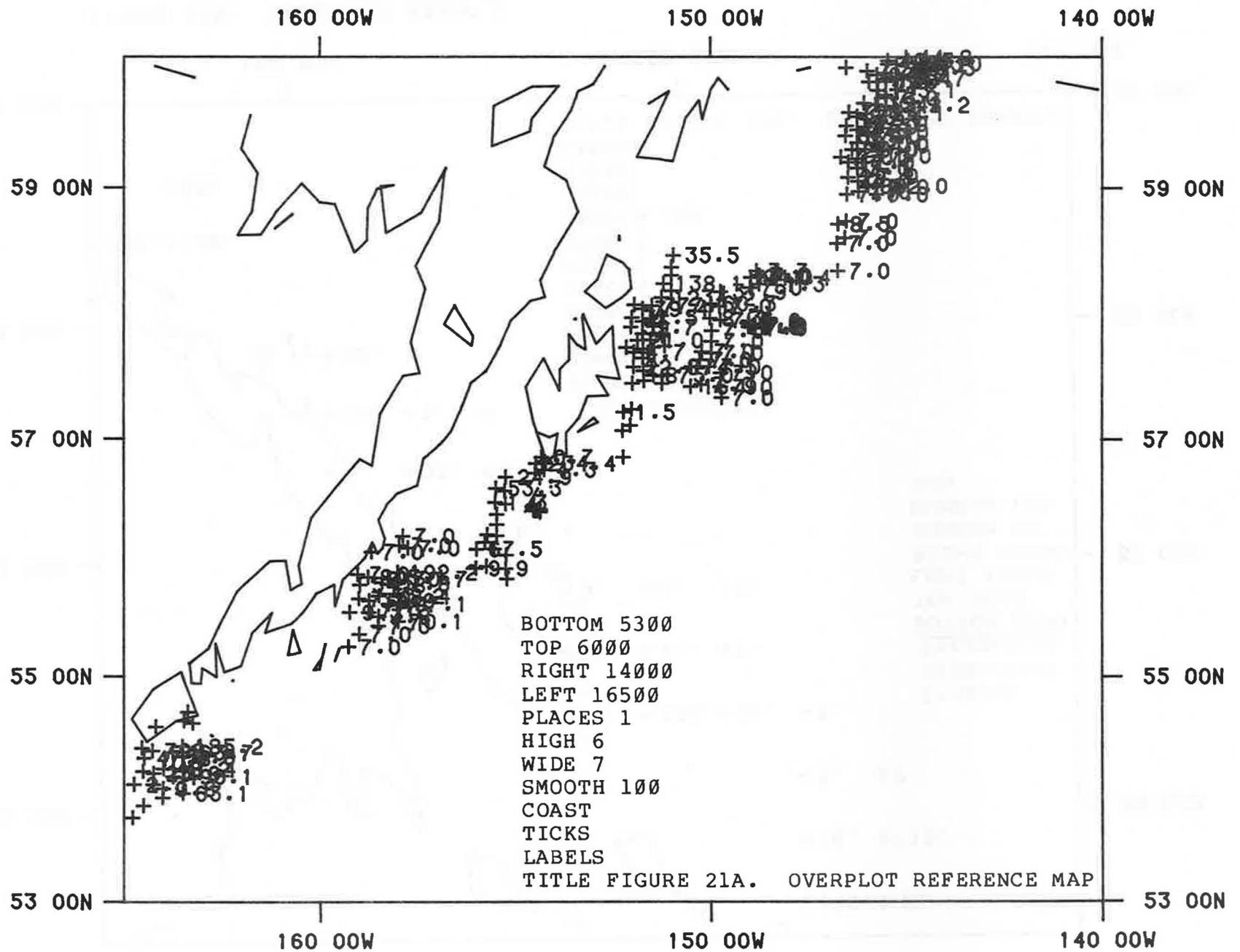


FIGURE 21A. OVERPLOT REFERENCE MAP

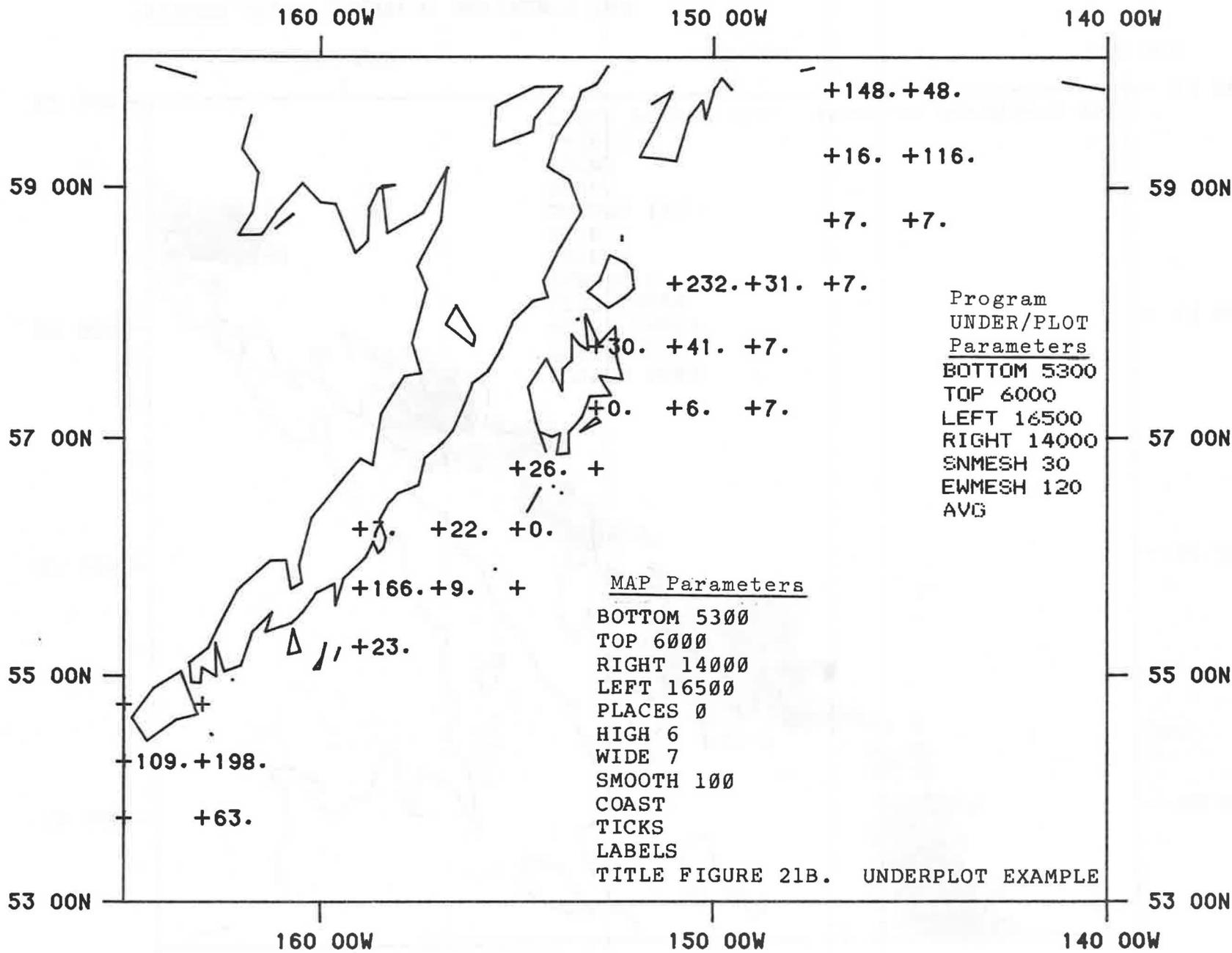


FIGURE 21B. UNDERPLOT EXAMPLE

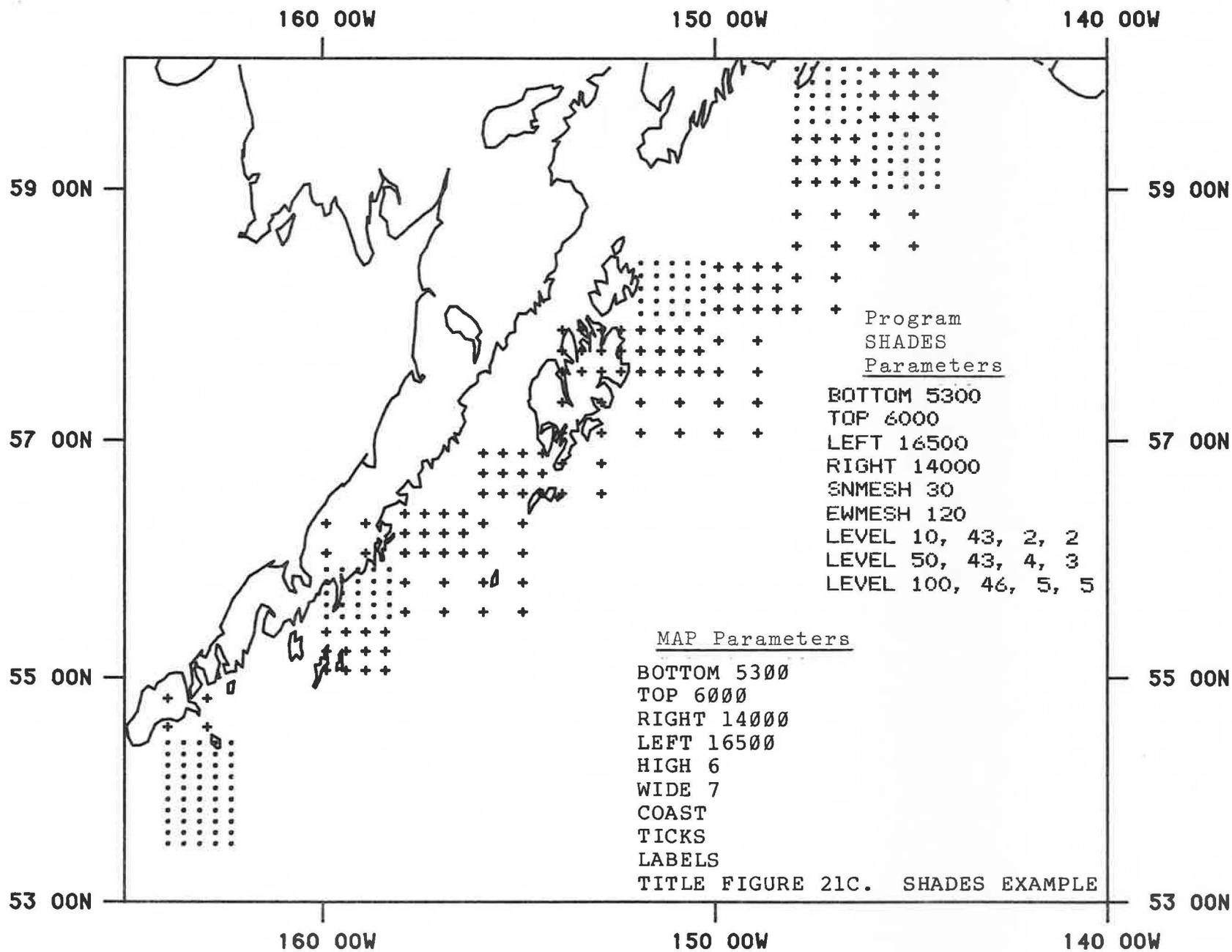


FIGURE 21C. SHADES EXAMPLE

ACKNOWLEDGEMENTS

The present MAP program is a result of the evolutionary development of a mapping program originally implemented by Murray Amos on the Northwest and Alaska Fisheries Center's old mini-computer.

REFERENCES

MINTEL, R. J., and SMITH, G. B.

November, 1981. "A Description of the Resource Survey Data-Base System of the Northwest and Alaska Fisheries Center, 1981", NOAA Technical Memorandum NMFS F/NWC-18.

1976. "Maps and Mapping", Encyclopedia Brittanica, p. 470-484.

APPENDIX A

MAP Program Documentation

ALTHOUGH THIS DOCUMENTATION IS CURRENT AS OF MAY, 1983,
THE USER SHOULD REFERENCE THE COMPUTER-BASED DOCUMENTATION ON

(RACE0360)DOC/MAP ON RACE.

FOR EXAMPLE, TO OBTAIN A CURRENT COPY OF THE DOCUMENTATION, USE
THE FOLLOWING CANDE COMMAND FROM A TERMINAL:

WRITE (RACE0360)DOC/MAP ON RACE

PROGRAM MAP DRAWS A MERCATOR, "SKEWED" MERCATOR, OR POLYCONIC
PROJECTION MAP ON THE CALCOMP PLOTTER.

VARIOUS COASTLINE, RIVER, STATE, AND NATIONAL BOUNDARIES MAY
BE INCLUDED IN THE PLOT.

DEPTH CONTOURS FOR THE BERING SEA MAY BE INCLUDED, TOO.

STATIONS THAT HAVE BEEN DEFINED PREVIOUSLY ON A PLOT WORK FILE
MAY BE SUPERIMPOSED ON THE PLOT. STATION VALUES ARE SHOWN
BESIDE EACH STATION SYMBOL.

PREVIOUSLY DEFINED LINES MAY ALSO BE SUPERIMPOSED ON THE MAP.

FILES

1 = PLOT WORK FILE (OPTIONAL).

THE STATIONS ON THIS FILE WILL BE SUPERIMPOSED
ON THE MAP.

IF YOU WANT JUST A MAP WITHOUT STATION DATA,
OMIT THIS FILE.

IF YOU ARE EXECUTING THE PROGRAM FROM A NON-RACE
USERCODE, INCLUDE "ON FAMILYNAME" IN ALL OF YOUR
DISK FILE ASSIGNMENTS, E. G. ,

FILE 1=MY/PLOT/WORK ON NWAFC;
FILE 1=MY/PLOT/WORK ON REFM;
FILE 1=MY/PLOT/WORK ON RACEBASE;
FILE 11=MY/BINE/LINES ON NMML;
FILE 5=MY/PARMS ON SEFC;

ALSO, PLEASE NOTE THAT IF ANY OF YOUR INPUT
FILES (1, 2, 3, 4, 5, OR 11) IS ON ANY PACK
OTHER THAN RACE, INCLUDE THE "ON FAMILYNAME"
IN THE DISK FILE ASSIGNMENTS.

2 = PLOT TITLE FILE (OPTIONAL AND NORMALLY OMITTED).

THE PLOT TITLE NORMALLY IS DEFINED VIA THE
'TITLE' KEYWORD COMMAND ON THE PARAMETER FILE 5.
AS SUCH, FILE 2 IS NORMALLY OMITTED.

IF, HOWEVER, THIS FILE IS ASSIGNED,

THE 'TITLE' COMMAND 104
ON THIS FILE WILL BE THE TITLE
OF THE PLOT.

IF FILE 2 IS ASSIGNED, IT MIGHT BE, E. G.,
A FILE CREATED BY THE CPUE PROGRAM AND
PASSED TO THE MAP PROGRAM.

- 3 = BINARY COASTLINE FILE (OPTIONAL, SELDOM ASSIGNED)
- 4 = BINARY COASTLINE INDEX FILE (OPTIONAL, SELDOM ASSIGNED)

FILES 3 AND 4 WOULD ONLY BE REASSIGNED
WHEN A NON-STANDARD COASTLINE FILE IS USED.

5 = PARAMETER FILE (REQUIRED)

6 = PRINTER (DEFAULT)

USUALLY ONLY FILES 1 AND 5 ARE ASSIGNED BY THE USER.

7 = OPTIONAL OUTPUT BINARY FILE OF (X,Y) COORDINATES, IN INCHES.
THIS FILE IS ASSIGNED ONLY IF THE 'DUMP' COMMAND
IS INCLUDED IN YOUR PARAMETERS ON FILE 5.
THIS FILE MAY INCLUDE PLOT WORK FILE STATIONS,
COASTLINE, AND/OR OTHER LINES.
THIS OUTPUT DATA MIGHT BE ROUTED INTO CONTOURING PROGRAMS.

11 = OPTIONAL INPUT BINARY LINES FILE.
THIS FILE MIGHT HAVE BEEN CREATED WITH THE
GENERATE/LINES PROGRAM, AND THESE LINES WILL BE
SUPERIMPOSED ON YOUR MAP.
(SEE NOTES AT END FOR FORMAT OF THIS FILE.)

PARAMETERS

THE PARAMETERS ARE FREE-FORMAT AND MAY START IN ANY COLUMN.
WHEN A LIST OF ITEMS MAY BE SPECIFIED FOR A PARTICULAR
COMMAND, THE ITEMS ARE FREE FORMAT, AND SEPARATED BY COMMAS.

THE MORE FREQUENTLY USED KEYWORD COMMANDS ARE.....

BOTTOM
TOP
LEFT
RIGHT
HIGH AND/OR WIDE
TITLE
COAST
TICKS
LABELS
PLACES 1 (FOR CPUE PLOTS)

KEYWORD

COMMAND FORMAT AND DESCRIPTION

MERC (OPTIONAL, DEFAULT)
 SPECIFIES A MERCATOR PROJECTION MAP.

POLY (OPTIONAL)
 SPECIFIES A POLYCONIC (EQUAL AREA) PROJECTION MAP.

WHEN THE 'POLY' COMMAND IS GIVEN, THE
BOTTOM, TOP, LEFT, RIGHT, MIDDLE, HIGH, AND WIDE
COMMANDS MUST ALSO BE GIVEN.

FOR MORE INFORMATION REGARDING MAPS AND PROJECTIONS,
CONSULT THE ENCYCLOPEDIA BRITANNICA (MAPS SECTION).

MAPS FROM WHICH YOU MIGHT BE CONTOURING SHOULD
BE POLYCONIC PROJECTIONS INSTEAD OF MERCATOR.

WHEN USING THE POLYCONIC PROJECTION, YOU SHOULD
AVOID THE FANCY, 3-LINE BORDER, ESPECIALLY IF TICKS
OR LABELS ARE REQUESTED.
ALSO, TICKS AND LABELS WILL NOT APPEAR AROUND THE
RECTANGULAR BORDER (AS IN THE MERCATOR PROJECTION).
INSTEAD, THEY WILL APPEAR AT THEIR PROPER LATITUDES/
LONGITUDES ACCORDING TO THE POLYCONIC PROJECTION.

BOTTOM DDMM (REQUIRED)

WHERE DD=DEGREES, MM=MINUTES.

THE BOTTOM BOUNDARY OF THE MAP IS DEFINED
IN DEGREES AND MINUTES.

E. G. ,

BOTTOM 5045
SPECIFIES A BOTTOM BOUNDARY OF 50 DEGREES, 45 MINUTES.

THE DEFAULT HEMISPHERE IS "N". IF SOUTHERN HEMISPHERE
IS DESIRED, SPECIFY BOTTOM DDMM, "S", E. G. ,
BOTTOM 1000, "S"

NOTE - THE MINUTES MAY BE SPECIFIED TO ANY
NUMBER OF DECIMAL POINTS, E. G. ,
BOTTOM 5240.2500 (52 DEG. , 40.25 MINUTES)
(OR 52 DEG. , 40 MIN. , 15 SEC.)
THE FRACTIONAL MINUTES CAN SIMILARLY BE SPECIFIED
ON ALL OTHER COMMANDS.

EXAMPLES

BOTTOM 5000
BOTTOM 5530, "N"
BOTTOM 2000, "S"

TOP DDMM (REQUIRED)

THE TOP BOUNDARY OF THE MAP.
DD=DEGREES, MM=MINUTES.

DEFAULT HEMISPHERE IS "N"; FOR SOUTH, SPECIFY
TOP DDMM, "S".

EXAMPLES.

TOP 5800
TOP 5815, "N"
TOP 2000, "N"
TOP 1500, "S"

LEFT DDDMM (REQUIRED)

THE LEFT BOUNDARY OF THE MAP.
DDD=DEGREES, MM=MINUTES.

THE DEFAULT HEMISPHERE IS "W".
FOR EAST, SPECIFY LEFT DDDMM, "E".

EXAMPLES.....

LEFT 17000
LEFT 17030, "W"
LEFT 17500, "E"

RIGHT DDDMM (REQUIRED)

THE RIGHT BOUNDARY OF THE MAP.
DDD=DEGREES, MM=MINUTES

THE DEFAULT HEMISPHERE IS "W".
FOR EAST, SPECIFY RIGHT DDDMM, "E".

EXAMPLES.....

RIGHT 14000
RIGHT 14000, "W"
RIGHT 17030, "E"

**MIDDLE DDDMM (REQUIRED ON POLYCONIC PROJECTION MAPS)
(OMIT THIS COMMAND FOR MERCATOR PROJECTION MAPS.)**

DEFINES THE CENTRAL MERIDIAN OF THE POLYCONIC
PROJECTION MAP.
DDD = DEGREES, MM=MINUTES.

THE LEFT AND RIGHT BOUNDS MUST BE WITHIN A
30 DEGREE RANGE OF THIS CENTRAL MERIDIAN.

DEFAULT HEMISPHERE IS "W"; FOR EAST,
SPECIFY MIDDLE DDDMM, "E"

EXAMPLES.....

MIDDLE 14000 (LEFT MIGHT BE 16000, RIGHT 12000)
MIDDLE 17800, "E" (LEFT MIGHT BE 17000, "E", RIGHT 17400, "W")

**HIGH HH.HH (OPTIONAL, BUT SEE NOTE FOLLOWING "WIDE")
(REQUIRED FOR POLYCONIC PROJECTION MAPS.)**

THE HEIGHT OF THE MAP, IN INCHES, FROM
THE BOTTOM TO THE TOP OF THE MAP BOUNDARY.
(FOR POLYCONIC PROJECTION MAPS, THE HEIGHT IS
ALONG THE CENTRAL MERIDIAN, FROM BOTTOM TO TOP.)

THE ACCEPTABLE RANGE FOR HH.HH IS 3.0 TO 35.0,
INCLUSIVE.
AS MANY DECIMAL PLACES AS DESIRED MAY BE SPECIFIED.

EXAMPLES.....

HIGH 8
HIGH 8.0
HIGH 8.000

HIGH 10.333
HIGH 28.995
HIGH 35.0

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WIDE

WW.WW (OPTIONAL)
(REQUIRED FOR POLYCONIC PROJECTION MAPS.)

THE WIDTH OF THE MAP, IN INCHES, FROM THE LEFT
TO THE RIGHT BOUNDARY.

THE ACCEPTABLE RANGE IS 3.0 TO 90.0, INCLUSIVE.

EXAMPLES.....

WIDE 10
WIDE 10.0
WIDE 24.785

HIGH AND WIDE ARE BOTH OPTIONAL.
IF NEITHER IS SPECIFIED, THE MAP WILL BE
10 INCHES HIGH AND 12 INCHES WIDE BY DEFAULT
(AND MOST LIKELY WILL NOT BE A "STANDARD" MERCATOR
PROJECTION - I. E., IT WILL BE "SKEWED").

IF ONLY ONE OF THE SIZES IS SPECIFIED,
I. E., EITHER HIGH OR WIDE, BUT NOT BOTH,
THE COMPUTER WILL CALCULATE THE OTHER SIZE
BASED ON THE MAP BOUNDARIES AND THE MERCATOR
PROJECTION FORMULA.

IF BOTH HIGH AND WIDE ARE SPECIFIED, THE MAP
WILL MOST LIKELY NOT BE A STANDARD MERCATOR PROJECTION
(UNLESS YOU HAVE TAKEN YOUR MEASUREMENTS FROM A
STANDARD MERCATOR PROJECTION CHART).

IF YOU WANT HYDROGRAPHIC CHART OVERLAY MAPS,
YOU SHOULD SPECIFY BOTH HIGH AND WIDE AS MEASURED
FROM YOUR REFERENCE CHART AT LEAST TO THE NEAREST
HUNDREDTH OF AN INCH.

TITLE

ANY TEXT (OPTIONAL)

THE TEXT STARTING AFTER THE KEYWORD "TITLE"
IS THE TITLE THAT WILL APPEAR AT THE BOTTOM OF THE
MAP.

A MAXIMUM OF 66 CHARACTERS OF TEXT MAY BE GIVEN.

IF THIS IS OMITTED, NO TITLE WILL BE PLOTTED.

EXAMPLES.....

TITLE FIGURE 1. DISTRIBUTION OF ROCK SOLE, 1981.
TITLE CATCH PER UNIT EFFORT OF YELLOWFIN SOLE, 1981.
TITLE C. P. U. E. PACIFIC OCEAN PERCH

(AN ALTERNATIVE WAY OF ASSIGNING THE TITLE IS
BY OMITTING THE TITLE COMMAND FROM THE PARAMETER
FILE 5, BY ASSIGNING FILE 2, AND HAVING A TITLE COMMAND
ON FILE 2.)

THE TITLE COMMAND SPECIFIED IN FILE 5 TAKES
PRECEDENCE OVER THE ALTERNATIVE TITLE VIA FILE 2.

SMOOTH N (OPTIONAL)

THE SMOOTHING OF THE SUBSEQUENT COASTLINE, ETC., FEATURES IS DEFINED.

N IS AN INTEGER, 0 TO ANY NUMBER (A PRACTICAL UPPER LIMIT FOR N IS, SAY, 100).

FOR YOUR FIRST MAP OF A PARTICULAR AREA, YOU PROBABLY WOULD OMIT THE SMOOTH COMMAND.

SMOOTHING REFERS TO HOW MANY POINTS ARE INCLUDED (AND, BY INFERENCE, SKIPPED) ON THE PLOTTED FEATURES. THE PROGRAM ASSUMES A DEFAULT SMOOTHING FOR THE VARIOUS FEATURES. TO OVERRIDE THE DEFAULT, THE SMOOTH COMMAND IS USED. "N" REFERS TO INCLUDING ONLY EVERY "NTH" POINT IN THE FEATURE.

THE SMALLER N IS, THE MORE POINTS THERE WILL BE IN THE MAP FEATURE, AND THE MORE TIME IT WILL TAKE TO DRAW THE MAP.

THE LARGER N IS, THE FEWER POINTS WILL BE INCLUDED, AND THE FASTER THE MAP WILL BE DRAWN, AND THE MORE "BOXY" THE FEATURES WILL BE.

MULTIPLE SMOOTH COMMANDS MAY BE USED, AND "SMOOTH 0" REVERTS TO THE DEFAULT SMOOTHING.

THE SMOOTH COMMAND MUST PRECEDE THE FEATURE(S) TO WHICH IT APPLIES.

SOME GUIDELINES FOR SMOOTH. . . .
GENERALLY, 10 OR 20 IS APPROPRIATE.
FOR A MAP OF A LARGE AREA, SAY THE EQUATOR THROUGH ALASKA, SMOOTH 60 WOULD BE APPROPRIATE.

FOR A MAP OF A SMALL AREA, E. G., KODIAK ISLAND OR PUGET SOUND, SMOOTH 1 OR 2 WOULD BE USED.

EXAMPLE

```
-----
SMOOTH 5
STATE
SMOOTH 2
RIVERS
SMOOTH 0
COAST
NATION
```

IN THE ABOVE EXAMPLE, EVERY 5TH POINT OF THE STATE BOUNDS WOULD BE INCLUDED, EVERY 2ND POINT OF THE RIVERS WOULD BE INCLUDED, AND THE DEFAULT SMOOTHING WOULD BE USED FOR THE COASTLINE AND THE NATIONAL BOUNDS.

THE MAP PROGRAM PRINTS A TABLE OF THE SMOOTHING THAT IS USED FOR EACH FEATURE WHEN THE PROGRAM IS EXECUTED.

COAST N

COASTLINE FEATURES ARE TO BE INCLUDED.
 N CAN RANGE FROM 0 TO 3.
 COAST, COAST 0, AND COAST 1 ARE EQUIVALENT.

COAST 1 MEANS THAT COASTLINE AND
 MAJOR ISLANDS AND LAKES ARE INCLUDED.

COAST 2 INCLUDES EVERYTHING THAT COAST 1 INCLUDES
 AND ADDITIONAL NOT-SO-MAJOR ISLANDS AND LAKES.

COAST 3 INCLUDES THE ABOVE PLUS
 INTERMEDIATE ISLANDS AND LAKES.

NOTE - THE PRIBILOF ISLANDS ARE CLASSIFIED AS "COAST 2".

EXAMPLES.....

COAST

COAST 0

COAST 1 (THESE FIRST 3 ARE EQUIVALENT)

COAST 2 (MORE, AND SMALLER, ISLANDS & LAKES)

COAST 3 (STILL MORE, AND SMALLER, ISLANDS & LAKES)

RIVER N (OPTIONAL)

TO INCLUDE RIVERS.
 SIMILAR TO THE COAST COMMAND.

RIVER 1 (MAJOR RIVERS)

RIVER 2 (MAJOR PLUS NOT-SO-MAJOR RIVERS)

RIVER 3 (THE ABOVE PLUS INTERMEDIATE RIVERS)

RIVER 4 (THE ABOVE PLUS SMALLER RIVERS)

RIVER 5 (THE ABOVE PLUS STILL SMALLER RIVERS)

NOTE - RIVER 4 AND 5 OPTIONS MAY BE REMOVED
 LATER. THEY ARE PROVIDED NOW AS A TEMPORARY
 SOLUTION FOR DISCONTINUITIES IN THE RIVERS.
 (VARIOUS SEGMENTS OF THE SAME RIVER HAD BEEN
 CLASSIFIED AT DIFFERENT WORLD DATA BANK-II "RANK"
 LEVELS.)

"RIVERS" IS AN ACCEPTABLE SYNONYM FOR "RIVER".

EXAMPLES.....

RIVER

RIVER 0

RIVER 1

RIVERS

RIVERS 0

RIVERS 1 (ALL OF THE ABOVE ARE EQUIVALENT)

RIVERS 2

RIVER 3

NATION (OPTIONAL)

TO INCLUDE NATIONAL BOUNDS.

STATE

(OPTIONAL)

TO INCLUDE STATE BOUNDS.

"STATES" IS AN ACCEPTABLE KEYWORD SYNONYM FOR "STATE".

DEPTH

N (OPTIONAL)

TO INCLUDE DEPTH CONTOURS.

N SPECIFIES THE DEPTH, IN METERS.

N MUST BE 30, 50, 100, 200, 500, 1000, OR 2000.

THE POSSIBLE DEPTH CONTOUR COMMANDS ARE GIVEN IN THE FOLLOWING TABLE. ALSO INCLUDED IN THE TABLE IS THE '200 MILE' COMMAND, ALTHOUGH THAT COMMAND IS DESCRIBED LATER IN THE DOCUMENTATION.

THE ABBREVIATIONS FOR AREAS IN WHICH THE CONTOURS ARE AVAILABLE ARE. . . .

BS - BERING SEA

GOA - GULF OF ALASKA

WC - U. S. WEST COAST (WASHINGTON-CALIF.)

THE SMOOTHING IS SUGGESTED FOR MAPS OF LARGE AREAS, E. G., THE BERING SEA. FOR MAPS OF SMALLER AREAS, YOU MIGHT USE A SMALLER SMOOTHING NUMBER FOR THE DEPTH CONTOURS.

THE DEFAULT SMOOTHING FOR DEPTH CONTOURS IS 10.

EXAMPLES	AREAS	CHART SOURCE	APPROXIMATE RESOLUTION 1 POINT PER	RECOMMENDED SMOOTHING
=====	=====	=====	=====	=====
DEPTH 30	NORTH BS	INT 514 APRIL 81	. 5 MILE	SMOOTH 5
	SOUTH BS	INT 513 OCT. 80		
DEPTH 50	BS	16006 JUNE 1978 INT 513, 514 APRIL 1979	15 MILES	SMOOTH 1
		*** INTERPOLATED DATA ***		
DEPTH 100	BS	16006 APRIL 81 INT 513, 514 OCT. 80	15 MILES	SMOOTH 1
		*** INTERPOLATED DATA ***		
DEPTH 200	NORTH BS	INT 514 APRIL 81	. 5 MILE	SMOOTH 5
	SOUTH BS	INT 513 OCT. 80		
	GOA	INT 500 NOV. 80		
	WC	INT 501 FEB. 79		
DEPTH 500	BS	16006 JUNE 1978	15 MILES	SMOOTH 1

111 INT 513, 514
APRIL 1979
*** INTERPOLATED DATA ***

DEPTH 1000	NORTH BS	INT 514	. 5 MILE	SMOOTH 5
		APRIL 81		
	SOUTH BS	INT 513		
		OCT. 80		
	GOA	INT 500		
		NOV. 80		
	WC	INT 501		
		FEB. 79		
DEPTH 2000	NORTH BS	INT 514	. 5 MILE	SMOOTH 5
		APRIL 81		
	SOUTH BS	INT 513		
		OCT. 80		
	GOA	INT 500		
		NOV. 80		
	WC	INT 501		
		FEB. 79		
200 MILE	NORTH BS	INT 514	. 5 MILE	SMOOTH 5
		APRIL 81		
	SOUTH BS	INT 513		
		OCT. 80		
	GOA	INT 500		
		NOV. 80		
	WC	INT 501		
		FEB. 79		

THE 50, 100, AND 500 METER LINES WERE INTERPOLATED FROM THE DEPTH SOUNDINGS ON THE CHARTS.

THE OTHER CONTOURS WERE DIGITIZED FROM LINES PRINTED ON THE CHARTS.

WHEN CONTOURS OF DIFFERENT RESOLUTIONS AND TYPES (INTERPOLATED VS. PRINTED LINES) ARE REQUESTED ON THE SAME PLOT, THE LINES MAY APPEAR TO CROSS EACH OTHER IN PLACES.

WHEN YOU INCLUDE DEPTH CONTOURS, YOU PROBABLY WANT TO USE THE SMOOTH COMMAND, AS WELL AS DIFFERENT PENS.

EXAMPLE

COAST 1
SMOOTH 1
PEN 2
DEPTH 50
PEN 3
DEPTH 100
SMOOTH 5
PEN 4
DEPTH 200
PEN 2
SMOOTH 1
DEPTH 500

200 MILE (OPTIONAL)
TO INCLUDE THE 200-MILE FISHERY CONSERVATION

ZONE LINE.

AVAILABLE FOR THE U. S. WEST COAST, CALIFORNIA
THROUGH THE GULF OF ALASKA AND THE BERING SEA.

NOTE - CURRENTLY (APRIL, 1983) THERE IS A GAP IN THE
200 MILE LINE, SOUTH OF THE ALEUTIANS FROM APPROXIMATELY
175 DEGREES EAST TO 175 DEGREES WEST, 45 TO 50 DEGREES
NORTH. (WHEN THE CHARTS ARE AVAILABLE FOR THIS GAP, THE
DATA WILL BE ADDED TO THE EXISTING FILES.)

EXAMPLE

COAST
SMOOTH 5
200 MILE

RANK N (OPTIONAL, SELDOM USED)

TO INCLUDE OTHER WORLD-DATA-BASE RERANKED
SEGMENTS. FOR SPECIAL MAPS ONLY, AND
USUALLY ONLY WITH SPECIAL COASTLINE FILES.

N IS THE RERANKED NUMBER OF THE FEATURE TO
BE INCLUDED.

A MAXIMUM OF 15 FEATURES MAY BE INCLUDED.
(AND HENCE A MAXIMUM OF 15 RANK COMMANDS.)

EXAMPLE.....

RANK 22
RANK 24
SMOOTH 5
RANK 41
RANK 42

FANCY (OPTIONAL)

BY DEFAULT, A SINGLE LINE IS DRAWN AS THE BORDER
OF THE MAP. IF YOU WANT A 3-LINE BORDER, SPECIFY
THE "FANCY" COMMAND. THE INNER-MOST LINE IS THE
BORDER OF THE MAP.

THE 3 LINES ARE SPACED 0.04 INCHES APART.

YOU PROBABLY SHOULD OMIT THE "FANCY" COMMAND ON
POLYCONIC PROJECTION MAPS THAT ALSO HAVE TICKS
OR LABELS.

PLAIN (OPTIONAL)

DEFAULT. A SINGLE LINE IS DRAWN AS THE BORDER
OF THE MAP.

TICKS (OPTIONAL)

THE DEFAULT IS THAT NO TICK MARKS WILL BE
DRAWN AROUND THE BORDER.

TO INCLUDE AUTOMATICALLY SPACED TICK MARKS,
SPECIFY THE "TICKS" COMMAND.

THE COMPUTER WILL SELECT THE SPACING OF THE TICKS.

TO CONTROL SPACING OF TICK MARKS,
USE THE "TICKX" AND "TICKY" COMMANDS, BELOW.

LABELS (OPTIONAL)

THE DEFAULT IS THAT NO LATITUDE/LONGITUDE LABELS
WILL BE PLOTTED - JUST THE CORNERS OF THE MAP
WILL BE LABELLED.

TO OVERRIDE THIS DEFAULT, THE LABELS COMMAND
WILL PLACE LATITUDE/LONGITUDE LABELS
AROUND THE BORDER. THE COMPUTER WILL SELECT THE
SPACING OF THE LABELS.

TO CONTROL SPACING OF LABELS, USE THE
"LABELX" AND "LABELY" COMMANDS, BELOW.

TICKX DDDMM, HEMISPHERE, MAJOR INCREMENT, MINOR INCREMENT,
MAJOR SIZE, MINOR SIZE

(OPTIONAL)

THE SPACING AND SIZES OF THE TICK MARKS ALONG THE
TOP AND BOTTOM OF THE MAP CAN BE SPECIFIED.

DDD = DEGREES. STARTING POSITION OF THE FIRST TICK.
MM = MINUTES
HEMISPHERE = "W" OR "E" FOR THE RIGHT-MOST TICK MARK.

TICKS ARE REFERENCED FROM RIGHT TO LEFT.

MAJOR INCREMENT = INCREMENT IN MINUTES TO THE
NEXT MAJOR TICK MARK.

MINOR INCREMENT = INCREMENT IN MINUTES TO THE
NEXT MINOR TICK MARK.
(OPTIONAL. IF OMITTED, NO MINOR TICKS WILL BE
DRAWN.)

MAJOR SIZE = SIZE IN FRACTIONS OF AN INCH
FOR MAJOR TICKS (OPTIONAL).
(IF OMITTED, 0.14 INCHES ASSUMED. RANGE IS 0 TO 1.0)

MINOR SIZE = SIZE IN FRACTIONS OF AN INCH
FOR MINOR TICKS (OPTIONAL).
(IF OMITTED, 0.08 INCHES ASSUMED. RANGE IS 0 TO 1.0)

EXAMPLES.....

TICKX 13500, "W", 120 (FOR MAJOR TICKS STARTING
AT 13500 "W", AND THEN EVERY 2 DEGREES
TO THE LEFT.

TICKX 17000, "E", 60, 10 (FOR MAJOR TICKS STARTING
AT 17000 "E" EVERY 1 DEGREE AND MINOR TICKS
EVERY 10 MINUTES)

TICKX 12000, "W", 60, 10, 0.25, 0.125
(FOR MAJOR TICKS EVERY DEGREE, MINOR TICKS EVERY
10 MINUTES. MAJOR TICKS ARE 0.25 INCHES LONG,

114

AND MINOR TICKS ARE 0.125 INCHES LONG.)

NOTE THAT TICKS MAY BE SPECIFIED TO START OUTSIDE THE BOUNDS OF THE MAP (I.E., TO THE RIGHT OF THE SPECIFIED RIGHT BOUNDARY). THE TICKS THAT ARE OUTSIDE THE BOUNDS OF THE MAP WILL NOT BE PLOTTED, OF COURSE. BUT THE TICKS WILL COMMENCE AT OR NEAR THE BOUNDARY OF THE MAP.

THIS FEATURE WOULD BE USED IF THE BOUNDARY OF THE MAP DOES NOT COINCIDE WITH THE STARTING LOCATION FOR MAJOR TICK MARKS, AND YOU WANT MINOR TICKS BETWEEN THE BOUNDARY OF THE MAP AND THE FIRST MAJOR TICK MARK.

SYNONYMS FOR THE "TICKX" KEYWORD ARE
"XTICK", "XTICKS", "HTICK", "TICKSX", "HTICKS".

TICKY DDMM, HEMISPHERE, MAJOR INCREMENT, MINOR INCREMENT,
MAJOR SIZE, MINOR SIZE

(OPTIONAL)

THE SPACING AND SIZES OF THE TICK MARKS ALONG THE LEFT AND RIGHT OF THE MAP CAN BE SPECIFIED.

DD = DEGREES. STARTING POSITION OF THE FIRST TICK.
MM = MINUTES
HEMISPHERE = "N" OR "S" FOR THE BOTTOM-MOST TICK MARK.

TICKS ARE REFERENCED FROM BOTTOM TO TOP.

MAJOR INCREMENT = INCREMENT IN MINUTES TO THE NEXT MAJOR TICK MARK.

MINOR INCREMENT = INCREMENT IN MINUTES TO THE NEXT MINOR TICK MARK.
(OPTIONAL. IF OMITTED, NO MINOR TICKS WILL BE DRAWN.)

MAJOR SIZE = SIZE IN FRACTIONS OF AN INCH FOR MAJOR TICKS (OPTIONAL).
(IF OMITTED, 0.14 INCHES ASSUMED. RANGE IS 0 TO 1.0)

MINOR SIZE = SIZE IN FRACTIONS OF AN INCH FOR MINOR TICKS (OPTIONAL).
(IF OMITTED, 0.08 INCHES ASSUMED. RANGE IS 0 TO 1.0)

EXAMPLES.....

TICKY 4800, "N", 120 (FOR MAJOR TICKS STARTING AT 4800 "N", AND THEN EVERY 2 DEGREES TO THE TOP.

TICKY 4800, "N", 60, 10 (FOR MAJOR TICKS STARTING AT 4800 "N" EVERY 1 DEGREE AND MINOR TICKS EVERY 10 MINUTES)

TICKY 4800, "N", 60, 10, 0.25, 0.125
(FOR MAJOR TICKS EVERY DEGREE, MINOR TICKS EVERY

115
10 MINUTES. MAJOR TICKS ARE 0.25 INCHES LONG,
AND MINOR TICKS ARE 0.125 INCHES LONG.)

NOTE THAT TICKS MAY BE SPECIFIED TO START OUTSIDE
THE BOUNDS OF THE MAP (I.E., BELOW
THE BOTTOM BOUNDARY). THE TICKS THAT
ARE OUTSIDE THE BOUNDS OF THE MAP WILL NOT BE
PLOTTED, OF COURSE. BUT THE TICKS WILL COMMENCE AT
OR NEAR THE BOUNDARY OF THE MAP.

THIS FEATURE WOULD BE USED IF THE BOUNDARY OF THE
MAP DOES NOT COINCIDE WITH THE STARTING
LOCATION FOR MAJOR TICK MARKS, AND YOU
WANT MINOR TICKS BETWEEN THE BOUNDARY OF
THE MAP AND THE FIRST MAJOR TICK MARK.

SYNONYMS FOR THE "TICKY" KEYWORD ARE
"YTICK", "YTICKS", "VTICK", "VTICKS".

LABELX DDDMM, HEMISPHERE, MINUTES INCREMENT

(OPTIONAL)
TO CONTROL SPACING OF LONGITUDE LABELS
ACROSS THE TOP AND BOTTOM OF THE MAP.

DDD = DEGREES FOR RIGHT-MOST LABEL,
MM = MINUTES,
HEMISPHERE = "W" OR "E"

MINUTES INCREMENT = MINUTES TO THE NEXT
LABEL TO THE LEFT.

EXAMPLE. . . .
LABELX 14000, "W", 120 (LABELS STARTING AT 14000, "W",
AND EVERY 2 DEGREES TO THE LEFT.)

SYNONYMS FOR THE "LABELX" KEYWORD ARE "XLABEL"
AND "HLABEL".

LABELY DDMM, HEMISPHERE, MINUTES INCREMENT

(OPTIONAL)
TO CONTROL SPACING OF LATITUDE LABELS
UP AND DOWN THE LEFT AND RIGHT SIDES OF THE MAP.

DD = DEGREES FOR BOTTOM-MOST LABEL,
MM = MINUTES,
HEMISPHERE = "N" OR "S"

MINUTES INCREMENT = MINUTES TO THE NEXT
LABEL TO THE TOP.

EXAMPLE. . . .
LABELY 4800, "N", 120 (LABELS STARTING AT 4800, "N",
AND EVERY 2 DEGREES TO THE LEFT.)

SYNONYMS FOR THE "LABELY" KEYWORD ARE "YLABEL"
AND "VLABEL".

LABELS NEED TO BE SPACED FAR ENOUGH APART

SO THAT THEY WILL NOT OVERLAP EACH OTHER.
SUCH OVERLAPPING IS A FUNCTION OF THE INCREMENT
BETWEEN LABELS, THE SIZE OF THE LETTERING,
AND THE DIMENSIONS OF THE PLOT.

PLACES N (OPTIONAL. DEFAULT IS 3).

TO CONTROL THE NUMBER OF DECIMAL PLACES THAT
WILL BE PLOTTED FOR REAL VALUES ON THE
PLOT WORK FILE.

(REAL VALUES ARE NUMERICAL VALUES THAT HAVE
DECIMAL POINTS AND DECIMAL PLACES.)

N CAN RANGE FROM -1 TO 9.

PLACES -1 MEANS THAT NO DECIMAL POINT WILL BE
PLOTTED. THE NUMBER WILL BE ROUNDED TO AN INTEGER.

PLACES 0 ROUNDS THE NUMBER AND PLOTS A DECIMAL POINT.

PLACES 1 THROUGH PLACES 9 SHOWS THE RESPECTIVE
NUMBER OF DIGITS FOLLOWING THE DECIMAL POINT.
THE PLOTTED NUMBER IS ROUNDED TO THE SPECIFIED
NUMBER OF DECIMAL PLACES.

FOR CATCH PER UNIT EFFORT PLOTS, YOU PROBABLY
WANT TO SPECIFY "PLACES 1" TO OVERRIDE THE
DEFAULT OF 3.

EXAMPLES.

PLACES -1
PLACES 0
PLACES 1
PLACES 2
PLACES 5

TRACE THRESHOLD, SYMBOL

(OPTIONAL)

NUMERICAL STATION VALUES BELOW THE THRESHOLD VALUE ARE
CONVERTED TO ZERO AND REPRESENTED WITH A
NEW STATION SYMBOL.

THRESHOLD = A NUMERICAL VALUE.

SYMBOL (OPTIONAL) = A NUMBER IN THE RANGE OF
1-127 FOR THE NEW STATION SYMBOL.
THE NUMBER CORRESPONDS TO THE LIST OF
CALCOMP PLOTTER SYMBOLS.

THE DEFAULT TRACE SYMBOL IS 2, A SMALL TRIANGLE.

EXAMPLES.

TRACE 0.5
TRACE 0.5, 2
TRACE 0.5, 9
TRACE 10.0, 9

(SEE FOLLOWING NOTES ON "ZERO" COMMAND.
 "TRACE" AND "ZERO" ARE MUTUALLY EXCLUSIVE.)
 (ALSO SEE THE "OMITZERO" COMMAND, FOLLOWING.)

OMITZERO (OPTIONAL)

TO DIFFERENTIATE BETWEEN LEGITIMATE VALUES OF ZERO (SUCH AS A NO CATCH STATION) AND TRACE VALUES (THAT HAVE BEEN CONVERTED TO ZERO BY THE TRACE COMMAND).

THIS COMMAND IS USUALLY USED IN CONJUNCTION WITH THE TRACE COMMAND.

WHEN "OMITZERO" IS SPECIFIED, STATIONS WITH A VALUE OF ZERO (E.G., STATIONS WITH NO CATCH) WILL NOT BE CONSIDERED TO BE TRACE VALUES, AND HENCE WILL NOT BE REPRESENTED WITH THE TRACE STATION SYMBOL.

WHEN USING THE OMITZERO AND THE TRACE VALUE COMMANDS, BE SURE THAT THE TRACE VALUE THRESHOLD IS 0.5 OR LARGER SO THAT VALUES ABOVE THE TRACE THRESHOLD, BUT SMALLER THAN 1.0 WHEN ROUNDED, WILL NOT BE CONFUSED WITH NO-CATCH STATIONS ON THE PLOT.

IN OTHER WORDS, WHEN OMITZERO IS SPECIFIED, STATIONS WITH ZERO VALUES WILL BE REPRESENTED WITH THEIR ORIGINAL STATION SYMBOLS RATHER THAN WITH THE TRACE VALUE STATION SYMBOL.

EXAMPLES.....

TRACE 0.5, 9

OMITZERO

ZERO (OPTIONAL)

TO PLOT A ZERO NEXT TO THE STATION SYMBOL FOR ZERO VALUES.

THE DEFAULT IS THAT ZERO VALUES WILL HAVE A STATION SYMBOL ONLY. IF YOU WANT THE ZERO TO APPEAR ON THE PLOT, SPECIFY THE "ZERO" COMMAND.

NOTE THAT THE USE OF THE "ZERO" COMMAND AND THE "TRACE" COMMAND ARE MUTUALLY EXCLUSIVE. BOTH SHOULD NOT APPEAR IN YOUR PARAMETER FILE. THE REASON IS THAT VALUES BELOW THE TRACE THRESHOLD ARE CONVERTED TO ZERO, AND IF YOU ALSO SPECIFY THE "ZERO" COMMAND, THEN ZEROES WILL APPEAR ON THE PLOT FOR VALUES THAT ARE REALLY TRACE VALUES.

TRACK N (OPTIONAL)

FOR TRACK LINES BETWEEN STATIONS.

N (OPTIONAL) - TO CONNECT N-TUPLES OF STATIONS.

"TRACK" WILL DRAW LINES CONNECTING ALL STATIONS IN THE SEQUENCE IN WHICH THEY APPEAR IN THE PLOT WORK FILE.

"TRACK N" DRAWS TRACK LINES BETWEEN N-TUPLES OF STATIONS ON THE PLOT WORK FILE. VALUES FOR N MAY BE 2 OR LARGER. NO LINES ARE DRAWN BETWEEN GROUPS OF N-TUPLES.

IF ANY STATIONS ARE OUTSIDE THE BOUNDS OF THE MAP, NO TRACK LINES (OR PARTIAL LINES) ARE DRAWN FROM THE PREVIOUS POINT TO THE OUT OF BOUNDS POINT, AND NO LINES (OR PARTIAL LINES) ARE DRAWN FROM AN OUT OF BOUNDS POINT TO A SUBSEQUENT IN-BOUNDS POINT.

EXAMPLES.....

TRACK (CONNECTS ALL STATIONS)

TRACK 2 (CONNECTS STATION 1 TO 2, 3 TO 4, ETC.)

TRACK 3 (CONNECTS STATIONS 1-2-3, 4-5-6, ETC.)

TYPED BB.BB (OPTIONAL)

TO DEFINE THE SIZE OF THE LETTERING TO BE USED FOR THE BORDER LABELS.

BB.BB = SIZE IN INCHES. RANGE IS 0.05 TO 0.50.

DEFAULT IS 0.1 INCHES.

EXAMPLE

TYPED 0.1666

TYPES SS.SS (OPTIONAL)

TO DEFINE THE SIZE OF THE LETTERING TO BE USED FOR THE STATIONS.

SS.SS = SIZE IN INCHES. RANGE IS 0.05 TO 0.30.

DEFAULT IS 0.1 INCHES.

EXAMPLES

TYPES 0.1

TYPES 0.13333

TYPES .0666666

TYPET TT.TT (OPTIONAL)

TO DEFINE THE SIZE OF THE LETTERING TO BE USED FOR THE TITLE.

TT.TT = SIZE IN INCHES. RANGE IS 0.10 TO 1.0.

DEFAULT IS 0.1 INCHES.

EXAMPLE

TYPET 0.25

LINES (OPTIONAL)

TO SUPERIMPOSE ADDITIONAL LINES ON THE MAP.

THE LINES ARE ON INPUT FILE 11, AND MIGHT, FOR EXAMPLE,

HAVE BEEN GENERATED WITH THE GENERATE/LINES PROGRAM.

DUMP

(OPTIONAL)

TO WRITE (X,Y) COORDINATES ONTO OUTPUT FILE 7.
THE OUTPUT DATA MIGHT THEN BE ROUTED INTO CONTOURING
PROGRAMS.

DATA ON THIS FILE MAY INCLUDE PLOT WORK FILE STATIONS,
COASTLINE, AND OTHER LINES (FROM FILE 11).

THE (X,Y) COORDINATES ON THE OUTPUT FILE ARE IN
INCHES, RELATIVE TO (0,0), THE LOWER, LEFT CORNER OF
THE MAP.

TO GET PLOT WORK FILE STATIONS ONLY ON THIS OUTPUT
FILE 7, DO NOT SPECIFY 'COAST' (OR RIVERS, ETC.), AND
DO NOT SPECIFY 'LINES'.

TO GET COASTLINE DATA ONLY ON THIS OUTPUT FILE 7,
DO NOT ASSIGN FILE 1 (THE PLOT WORK FILE STATIONS),
AND DO NOT SPECIFY 'LINES'.

TO GET THE (X,Y) COORDINATES FOR YOUR OTHER LINES ONLY,
DO NOT ASSIGN FILE 1, DO NOT SPECIFY 'COAST', BUT
DO SPECIFY 'LINES'.

SEE NOTES, BELOW, FOR FORMAT OF THIS OUTPUT FILE 7.

NO PLOT

(OPTIONAL)

TO EXERCISE THE PROGRAM WITHOUT DRAWING A MAP,
THE "NO PLOT" COMMAND CAN BE INCLUDED IN YOUR
PARAMETER FILE.

THE DEFAULT IS THAT A PLOT WILL BE DRAWN.

ONE USE OF THE NO PLOT OPTION IS TO DIAGNOSE THE
PARAMETERS PRIOR TO SUBMITTING A PLOT JOB.

WHEN THE NO PLOT COMMAND IS INCLUDED, THE MAP
PROGRAM MAY BE RUN VIA A CANDE RUN COMMAND,
WITH PRINTED OUTPUT (FILE 6) ROUTED TO YOUR
TERMINAL.

FOR ALL OTHER USES, THOUGH, THE MAP PROGRAM MUST
BE RUN VIA A WFL JOB.

PEN

N

(OPTIONAL)

SPECIFIES WHICH PEN TO USE FOR SUBSEQUENT FEATURES.
N CAN BE 1-4.

THE DEFAULT IS PEN 1.

IF THE PEN COMMAND IS USED, YOUR INSTRUCTION BLOCK
IN YOUR WFL JOB MUST SPECIFY THE PROPER PEN SETUP.

EXAMPLES

PEN 1
COAST
PEN 2
RIVERS

PEN 3
STATIONS
PEN 4
TRACK
LINES
PEN 1
FANCY
TICKS
LABELS

TITLE THE BORDER, TICKS, LABELS & THIS TITLE WILL USE PEN 1.

CARE MUST BE EXERCISED WHEN USING THE PEN COMMAND.
THE PEN SPECIFIED WILL BE USED FOR ALL SUBSEQUENT ITEMS
ON THE MAP UNTIL ANOTHER PEN COMMAND IS GIVEN.

HENCE, IF YOU ONLY WANT TO DIFFERENTIATE ONE FEATURE,
FOR EXAMPLE, THE COASTLINE,
THEN THAT SHOULD BE THE LAST ITEM IN YOUR PARAMETERS,
AND SHOULD BE IMMEDIATELY AFTER THE PEN COMMAND.

BOTTOM
(ETC.)

FANCY
TITLE XXXXX
TICKS
LABELS
PEN 2

STATIONS

COMMENT IN THIS EXAMPLE, ALL FEATURES (EXCEPT THE STATIONS)
COMMENT WILL BE DRAWN WITH THE DEFAULT PEN 1.
COMMENT PEN 2 WILL BE USED FOR THE STATIONS.

STATIONS

(OPTIONAL)

WHEN USED AFTER A PEN COMMAND, SPECIFIES THE PEN
TO BE USED FOR THE STATIONS.

EXAMPLE

PEN 3
STATIONS
PEN 4
COAST

TEXTURE N

(OPTIONAL)

VARIOUS LINE PATTERNS (SOLID, DOTTED, DASHED, ETC.) MAY
BE USED FOR MAP FEATURES SUCH AS COASTLINE, DEPTH CONTOURS,
STATE AND NATIONAL BOUNDARIES, 200 MILE LIMIT LINES, AND
THE LINES ON THE BINARY LINES FILE 11.

N IS THE LINE TEXTURE TO USE FOR SUBSEQUENT MAP FEATURES.
N MUST BE 0-9.

PATTERN (BUT SEE NOTES FOLLOWING REGARDING
N APPEARANCE OF PATTERN)

= =====

0 SOLID LINE (* RECOMMENDED *)

- 1 DOTTED LINE (* RECOMMENDED *)
- 2 DASH, DOT (* RECOMMENDED *)
- 3 DASHED (* RECOMMENDED *)
- 4 LONG DASHES
- 5 DOT, DOT, LONG DASH
- 6 LONG DASH, SHORT DASH (* RECOMMENDED *)
- 7 DOT, DOT, SHORT DASH
- 8 LONG DASH
- 9 DOTTED, SPARSE

THE DEFAULT PATTERNS MAY BE CHANGED WITH THE 'DEFINE' COMMAND, DESCRIBED BELOW.

EXAMPLE

```
-----
COAST
TEXTURE 1
200 MILE
```

IN THE ABOVE EXAMPLE, THE COASTLINE WILL BE A SOLID LINE. THE 200 MILE LIMIT LINE WILL BE DRAWN IN TEXTURE 1.

EXAMPLE

```
-----
COAST
TEXTURE 1
200 MILE
TEXTURE 2
DEPTH 30
TEXTURE 3
DEPTH 200
TEXTURE 6
DEPTH 2000
```

HOW THE LINE PATTERNS APPEAR ON YOUR MAP IS A FUNCTION OF THE MAP BOUNDARIES, THE HEIGHT AND WIDTH OF THE MAP, THE ORIGINAL DENSITY OF THE POINTS COMPRISING THE MAP FEATURE, THE SMOOTHING FACTOR APPLIED TO THE MAP FEATURE, AND THE LINE TEXTURE DEFINITION.

THEREFORE, SOME EXPERIMENTING WITH COMBINATIONS OF PARAMETERS MAY BE NEEDED TO OBTAIN A SATISFACTORY RESULT. THE BEST RESULT MAY BE OBTAINED INITIALLY BY USING THE 'SMOOTH' COMMAND IN CONJUNCTION WITH THE 'TEXTURE' COMMAND.

FOR EXAMPLE, IF YOU SPECIFIED...

```
COAST
SMOOTH 10
TEXTURE 3
200 MILE
```

AND THE DASHES IN THE 200 MILE LINE WERE TOO LONG, TRY A SMALLER SMOOTHING NUMBER, WHICH INCLUDES MORE POINTS AND HENCE SHORTENS THE DASHES...

```
COAST
SMOOTH 5
```

TEXTURE 3
200 MILE

IF YOUR DASHED LINES ARE TOO CLOSE TOGETHER, OR APPEAR TO BE A CONNECTED LINE, INCREASING THE SMOOTH FACTOR WILL LENGTHEN THE DASHED LINES AND THE SPACES BETWEEN THEM...

COAST
SMOOTH 20
TEXTURE 3
200 MILE

WHEN THE 'TEXTURE' COMMAND IS ENTERED, THE CURRENT LINE TEXTURE DEFINITION IS LISTED ON THE PRINTED OUTPUT.

DEFINE LT, DRAW(1), SKIP(1), DRAW(2), ..., DRAW(5), SKIP(5)
(OPTIONAL)
SELDOM USED.
CHANGES THE DEFAULT DEFINITIONS FOR LINE PATTERNS.
TO INVOKE THE DEFINITION, THE 'TEXTURE' COMMAND MUST BE SPECIFIED FOLLOWING THE 'DEFINE' COMMAND.

LT - THE LINE TEXTURE NUMBER. MUST BE 1-9.

UP TO 5 PAIRS OF DRAW, SKIP NUMBERS MAY BE GIVEN TO DEFINE THE LINE PATTERN.
THE LINE WILL BE CONSTRUCTED BY CONNECTING THE FIRST "DRAW(1)" POINTS, SKIPPING THE NEXT "SKIP(1)" POINTS, CONNECTING THE NEXT "DRAW(2)" POINTS, ETC.

EXAMPLES

DEFINE 1, 10, 5
DEFINES LINE TEXTURE 1.
ALL LINES TO BE DRAWN WITH LINE TEXTURE 1 WILL BE CONSTRUCTED BY CONNECTING THE FIRST 10 POINTS, SKIPPING 5 POINTS, CONNECTING 10 POINTS, SKIPPING 5, ETC.

DEFINE 2, 4, 8, 12, 4
DEFINES LINE TEXTURE 2.
CONNECT 4 POINTS, SKIP 8, CONNECT 12, SKIP 4, AND REPEAT.

THE NUMBER OF POINTS CONNECTED, OR DRAWN, MUST BE AT LEAST 2.

IF A LINE TEXTURE IS DEFINED MORE THAN ONCE, THE LAST DEFINITION ENTERED IS THE ONE USED TO CONSTRUCT ALL LINES FOR THAT TEXTURE, REGARDLESS OF PREVIOUS DEFINITIONS.

EXAMPLE OF INAPPROPRIATE USE OF MULTIPLE DEFINITIONS

TEXTURE 0
COAST
DEFINE 1, 2, 4 % FIRST DEFINITION FOR LINE 1.
 % SHORT DASHES

```

123
TEXTURE 1
DEPTH 200          % BUT THIS CONTOUR WILL BE
                   % DRAWN WITH LONG DASHES
                   % BECAUSE LINE 1 IS DEFINED AGAIN...
                   %
DEFINE 1, 20, 5    % SECOND DEFINITION FOR LINE 1.
                   % LONG DASHES

TEXTURE 1
200 MILE          % THE 200 MILE LINE WILL ALSO
                  % BE DRAWN WITH LONG DASHES

```

TO AVOID PROBLEMS, DO NOT USE MULTIPLE DEFINITIONS FOR THE SAME LINE TEXTURE NUMBER.

YOU MAY USE MULTIPLE DEFINITIONS FOR DIFFERENT LINE TEXTURE NUMBERS, THOUGH.

EXAMPLE OF APPROPRIATE USE OF MULTIPLE DEFINITIONS

```

-----
COAST                % SOLID LINE
DEFINE 1, 2, 4      % 1 = SHORT DASHES
TEXTURE 1
DEPTH 200           % THIS CONTOUR SHORT DASHES.
DEFINE 2, 20, 5    % 2 = LONG DASHES
TEXTURE 2
200 MILE           % THIS LINE - LONG DASHES.

```

THE DEFINITIONS FOR THE VARIOUS LINE TEXTURES ARE PRINTED WHEN THE TEXTURE COMMAND IS USED. FOR A CURRENT LISTING, RUN THE MAP PROGRAM WITH THE FOLLOWING PARAMETERS...

```

NO PLOT
TEXTURE 0
TEXTURE 1

```

```

TEXTURE 9

```

REMEMBER THAT YOU MIGHT GET FASTER RESULTS BY CHANGING THE SMOOTH COMMAND RATHER THAN REDEFINING THE LINE PATTERNS. OFTEN WHEN REDEFINING THE LINE PATTERNS, IT IS NECESSARY TO ALSO ADJUST THE SMOOTH PARAMETER.

COMMENT (ANY TEXT) (OPTIONAL)

THE "COMMENT" COMMAND HAS NO EFFECT ON THE COURSE OF THE PROGRAM. IT MAY BE INCLUDED TO DOCUMENT THE PARAMETER FILE.

EXAMPLE.....

COMMENT THIS IS WHAT WE USED FOR THE 1981 CHARTS.

DEBUG (OPTIONAL - SELDOM USED)

PRIMARILY FOR USE BY PROGRAMMERS, THE DEBUG OPTION PRINTS A TRACE OF THE PROGRAM AS IT RUNS.

WHEN USED IN CONJUNCTION WITH THE "NOPLOT" OPTION, IT IS PARTICULARLY USEFUL FOR TESTING PROGRAM MODIFICATIONS AND NEW FEATURES.

EXECUTION EXAMPLES - WFL

WFL EXAMPLE 1 - NEW OFFLINE CALCOMP PLOTTER:

```
?BEGIN JOB PLOT;
  QUEUE = 61;
  FETCH = "PLEASE REFER TO JOB INSTRUCTIONS";
  INSTRUCTION 1
    JOE USER, USERCODE=RACE9999, ROOM 777, PHONE 442-8888.
    MARGIN = 1"
    PEN #1=LB/BLK (LIQUID BALLPOINT, BLACK INK)
    PRODUCING 1 PLOT, APPRX 12"/PLOT.
  THANK YOU;
?RUN (RACE0010)OBJECT/MAP ON RACE;
  FILE 5=MAP/PARMS;
?END JOB.
```

PARAMETER FILE FOR WFL EXAMPLE 1:
(FILE)MAP/PARMS

```
COAST
NATION
HIGH 9.0
BOTTOM 5000
TOP 6300
LEFT 15000
RIGHT 13500
TICKS
LABELS
TITLE THIS IS MY TEST PLOT.
```

WFL EXAMPLE 2 - NEW OFFLINE CALCOMP PLOTTER:

```
?BEGIN JOB PLOT;
  QUEUE = 61;
  FETCH = "PLEASE REFER TO INSTRUCTION BLOCK";
  INSTRUCTION 1
    JOE USER, USERCODE=OFIS9999, ROOM 987, PHONE 442-1234.
    MARGIN = 1"
    PEN #1=WI (WET INK, BLACK)
    PRODUCING 1 PLOT, APPRX 30"/PLOT.
  THANKS;
?RUN (RACE0010)OBJECT/MAP ON RACE;
  FILE 1=PWORK ON NWAFC;
  FILE 2=PTITLE ON NWAFC;
  FILE 5(READER);
?DATA
SMOOTH 20
COAST
SMOOTH 10
RIVER
HIGH 18.62
WIDE 28.35
```

TOP 6100
 BOTTOM 5400
 LEFT 17600, "E"
 RIGHT 15600
 TYPES 0.05
 FANCY
 TICKX 15600, "W", 60, 10, 0.10, 0.05
 TICKY 5400, "N", 30, 5
 LABELX 15600, "W", 300
 LABELY 5400, "N", 150
 PLACES 1
 ?END JOB.

THIS SECOND WFL EXAMPLE USES FILES CREATED BY THE CPUE PROGRAM CALLED PWORK AND PTITLE ON THE NWAFC PACK.

EVERY 20TH POINT IN THE COASTLINE WILL BE INCLUDED.
 EVERY 10TH POINT IN MAJOR RIVERS WILL BE INCLUDED.

THE MAP WILL BE 18.62 INCHES HIGH, 28.35 INCHES WIDE.

THE TOP IS 61 DEGREES NORTH, BOTTOM IS 54 DEGREES NORTH.
 THE LEFT SIDE IS 176 DEGREES EAST, RIGHT IS 156 DEGREES WEST.

THE STATION LETTERING WILL BE .05 INCHES (HEIGHT AND WIDTH).

A 3-LINE BORDER WILL BE DRAWN.

MAJOR TICK MARKS BEGIN AT 156 DEGREES WEST AND WILL APPEAR EVERY DEGREE.
 MINOR TICK MARKS WILL APPEAR EVERY 10 MINUTES.
 MAJOR TICK MARKS WILL BE .10 INCHES LONG, MINOR .05 INCHES.

TICK MARKS ALONG THE LEFT AND RIGHT SIDES BEGIN AT
 54 DEGREES NORTH.
 MAJOR TICKS WILL APPEAR EVERY 1/2 DEGREE, MINOR TICKS EVERY
 5 MINUTES.

LONGITUDE LABELS START AT 156 WEST AND APPEAR EVERY 5 DEGREES.
 LATITUDE LABELS START AT 54 NORTH AND APPEAR EVERY 2-1/2 DEGREES.

ONE DECIMAL PLACE IS TO BE PLOTTED FOR THE STATION VALUES.

SAMPLE PARAMETER FILE FOR POLYCONIC PROJECTION:

POLY
 BOTTOM 5400
 TOP 6000
 LEFT 17000
 RIGHT 15000
 MIDDLE 16000
 HIGH 10.0
 WIDE 20.0
 COAST
 TITLE POLYCONIC PROJECTION EXAMPLE

WFL EXAMPLE 3 - MULTIPLE PENS

 ?BEGIN JOB PLOT;

```

QUEUE = 61;
FETCH = "PLEASE REFER TO INSTRUCTION BLOCK";
INSTRUCTION 1
  JOE USER, USERCODE=OFIS9999, ROOM 987, PHONE 442-1234.
  MARGIN = 1"
  PEN #1=WI, PEN #2=LB/BLK, PEN #3=LB/RED
  (PEN 1 IS WET INK, PEN 2 BLACK BALLPOINT, PEN 3 RED BALLPOINT)
  PRODUCING 1 PLOT, APPROX. 30"/PLOT.
  THANKS;
?RUN (RACE0010)OBJECT/MAP ON RACE;
  FILE 1=PWORK ON NWAFC;
  FILE 11=MY/BINE/LINES ON NWAFC;
  FILE 5(READER);
?DATA
PEN 1
SMOOTH 20
COAST
SMOOTH 10
RIVER
HIGH 18.62
WIDE 28.35
TOP 6100
BOTTOM 5400
LEFT 17600, "E"
RIGHT 15600
TICKS
LABELS
FANCY
TITLE ANOTHER TEST WITH MANY OPTIONS.
PEN 2
STATIONS
PEN 3
LINES
?END JOB.

```

FOR MORE DETAILS REGARDING THE WFL JOB SETUP AND INSTRUCTION BLOCK FOR THE OFFLINE PLOTTER, SEE "A USERS' GUIDE FOR USING THE CALCOMP MODEL 1055 HIGH SPEED PLOTTER ON THE BURROUGHS 87800 COMPUTER AT THE NORTHWEST AND ALASKA FISHERIES CENTER COMPUTER FACILITY" BY FRANK M. KIKUCHI, OCT. 1, 1981.

IGNORE ANY "NO FILE 99 (MT)" MESSAGES WHEN RUNNING THE OFFLINE PLOTTER JOBS. THOSE ARE SYSTEM MESSAGES THAT INFORM THE COMPUTER OPERATOR TO MOUNT A MAGNETIC TAPE FOR THE PLOT OUTPUT.

EXECUTION EXAMPLE, FROM CANDE

```

*****
***** THIS MAY BE USED ONLY IF THE NOPLOT OPTION
***** IS SPECIFIED.
***** NO PLOT WILL BE DRAWN, BUT THE PARAMETERS
***** WILL BE DIAGNOSED. PRINTED MESSAGES ARE
***** DIRECTED BACK TO YOUR TERMINAL.
*****

```

CONT==

RUN (RACE0010)MAP ON RACE; -¹²⁷
FILE 1=MY/PLOTWORK; -
FILE 5=MY/PARMS; - (MUST INCLUDE 'NO PLOT' OPTION)
FILE 6(REMOTE)
CONT

NOTES

1. REGISTRATION MARKS.

PLOT REGISTRATION MARKS ARE DRAWN BY THE PROGRAM AT THE BEGINNING AND END OF THE PLOT TO INDICATE A MECHANICALLY SUCCESSFUL PLOT.

THE MARKS ARE TWO INVERTED RIGHT ANGLES SHARING A COMMON VERTEX, AND APPEAR TO THE LOWER, RIGHT OF THE MAP.

A SUCCESSFUL PLOT IS INDICATED BY THE REGISTRATION MARK APPEARING AS A PLUS SIGN ("+").

IF THE PLOTTER LOST REGISTRATION DURING THE PLOT, WHAT SHOULD BE A PLUS SIGN WILL APPEAR AS A SINGLE RIGHT ANGLE, OR AS 2 SEPARATE RIGHT ANGLES WITH TWO DISTINCT VERTICES.

RESUBMIT ANY JOBS IN WHICH THE REGISTRATION MARK IS NOT A PERFECT (OR NEARLY PERFECT) PLUS SIGN. IN SOME CASES, YOU MAY HAVE TO DECREASE THE SIZE OF YOUR MAP IF THE CAUSE OF THE LOST REGISTRATION IS A 35 INCH MAP (WITH A 1 INCH MARGIN AND 1 INCH TITLE LETTERING, ETC.) ON A 36-INCH PLOTTER.

2. POLYCONIC PROJECTION MAPS FOR THE SOUTHERN HEMISPHERE AND THAT CROSS THE 360-DEGREE LINE ARE UNTESTED.
3. MAPS MUST NOT SPAN MORE THAN HALF THE EARTH IN WIDTH.
4. THE MERCATOR PROJECTION FORMULA USED ASSUMES THAT THE EARTH IS A PERFECT SPHERE. AS SUCH, THERE IS A SLIGHT DIFFERENCE BETWEEN THESE MAPS AND THOSE PRODUCED USING A DIFFERENT REFERENCE SPHEROID.
5. THE MERCATOR PROJECTION IS NOT THE SAME AS A "UNIVERSAL TRANSVERSE MERCATOR" PROJECTION. FOR MORE INFORMATION REGARDING MAPS AND PROJECTIONS, CONSULT THE ENCYCLOPEDIA BRITANNICA (MAPS SECTION).
6. IF YOU DO NOT WANT A STATION SYMBOL TO BE PLOTTED, THERE ARE TWO WAYS TO ACCOMPLISH THIS.

ONE IS TO SET THE STATION SYMBOL (WORD 3 IN THE PLOT WORK FILE RECORD) TO A NEGATIVE VALUE, E. G., -1.

NO STATION SYMBOL WILL BE PLOTTED.

THE STATION VALUE WILL BE PLOTTED, STARTING WHERE THE STATION SYMBOL WOULD HAVE BEEN, BUT THE VALUE SYMBOLS WILL NOT BE LOWERED BY ONE-HALF THE TYPE SIZE AS THEY ARE WHEN APPEARING

NEXT TO A CENTERED STATION SYMBOL (0-13).

ANOTHER WAY IS TO SET THE STATION SYMBOL TO 17 ON THE PLOT WORK FILE.

A BLANK SPACE WILL BE USED IN PLACE OF A STATION SYMBOL. ANY VALUE FIELD WILL BE OFFSET ONE SPACE TO THE RIGHT OF THIS BLANK STATION SYMBOL.

7. SPSS PLOT WORK FILES.

WHEN A PLOT WORK FILE IS CREATED BY SPSS, IT IS NECESSARY TO RECODE THE FLAG FIELD ON THE BINARY PLOT WORK FILE BY RUNNING THE (RACE0010)MATH PROGRAM.

A PARAMETER FILE OF

5, "C", "I", 0

FOR THE MATH PROGRAM WILL SET THE FLAG FIELD, WORD 5, OR THE PLOT WORK FILE TO A CONSTANT OF THE CHARACTER STRING "I-BLANK-BLANK-BLANK-BLANK-BLANK".

8. THE FORMAT OF THE BINARY PLOT WORK FILE IS.....

WORD CONTENTS

- 1 LATITUDE, IN DEGREES & FRACTIONS.
N IS +, S IS -. E.G. 47 DEGREES 45 MINUTES NORTH IS REPRESENTED AS 47.7500.
- 2 LONGITUDE, IN DEGREES & FRACTIONS.
W IS +, E IS + AND > 180.
E.G., 142 DEGREES 15 MINUTES WEST IS REPRESENTED AS 142.250
175 DEGREES 45 MINUTES EAST IS REPRESENTED AS 184.250.
- 3 STATION SYMBOL.
USUALLY IS A VALUE FROM 0 TO 127 CORRESPONDING TO THE CALCOMP OR TEKTRONIX PLOTTER SYMBOLS.
- 4 VALUE.
THE VALUE TO BE PLOTTED TO THE RIGHT OF THE STATION SYMBOL.
THE VALUE MAY BE INTEGER, REAL, OR ALPHA.
- 5 FLAG. A1 FORMAT.
'I' - WORD 4 IS AN INTEGER VALUE.
'R' - WORD 4 IS A REAL VALUE.
'A' - WORD 4 IS AN ALPHA VALUE.

PLOT WORK FILES MAY BE LISTED WITH THE (RACE0010)LIST/PLOTWORK PROGRAM.

A SAMPLE FORTRAN PROGRAM THAT GENERATES A PLOT WORK FILE IS SHOWN BELOW. NOTE THAT THE FILE ATTRIBUTES FOR THE OUTPUT PLOT WORK FILE MUST INCLUDE A MAXRECSIZE=5 (OR HOWEVER LONG YOUR RECORDS ARE, IN WORDS)...

```
FILE 1(TITLE="PWORK", KIND=DISK, FILETYPE=7, INTNAME="1",
- MAXRECSIZE=5, BLOCKSIZE=150)
```

C-

C- BE SURE TO SPECIFY THE MAXRECSIZE=5, BLOCKSIZE=150

C- IN THE FILE ATTRIBUTES, ABOVE.

C-

```

RLAT = 37.5
RLON = 130.
ISYM = 0
IVAL = 0
FLAG = "I"

```

C- GENERATE 4 SETS

```

DO 50 I=1,4
RLAT = 37.5

```

C- OF 32 STATIONS EACH.....

```

DO 60 J=1,32
WRITE (1) RLAT, RLON, ISYM, IVAL, FLAG
ISYM = ISYM + 1
IVAL = IVAL + 1
60 RLAT = RLAT + 0.1
30 RLON = RLON + 1.0
CLOSE (1, DISP = CRUNCH)
CALL EXIT
END

```

9. WHEN THE RIVER OPTION IS USED, SEGMENTS OF VARIOUS RIVERS MAY NOT APPEAR ON THE MAPS. THIS HAPPENS BECAUSE DIFFERENT SEGMENTS OF THE SAME RIVER HAD BEEN CLASSIFIED AT DIFFERENT LEVELS, OR RANKS IN WDB-II TERMINOLOGY. AS A TEMPORARY WAY AROUND THIS, THE COMMANDS 'RIVER 4' OR 'RIVER 5' MAY BE USED, ALTHOUGH YOU WILL GET A LOT OF MINOR RIVERS THAT YOU MAY NOT WANT.

ALSO THE 'RANK 24' OR 'RANK 25' (... OR 'RANK 32') COMMANDS MAY BE USED IN CONJUNCTION WITH THE 'RIVER 1' OR 'RIVER 2' OR 'RIVER 3' COMMANDS.

10. IN SOME CASES THE ACCURACY OF THE PRESENT WORLD DATA BASE COASTLINE FAILS TO MEET DESIRABLE TOLERANCES. THIS IS PARTICULARLY TRUE OF LARGE MAPS (E.G. 24 INCHES) OF A VERY SMALL AREA (E.G., BAINBRIDGE ISLAND OR LOWER PUGET SOUND).

SOME DIFFERENCES OF 1/2 MILE BETWEEN THE EXISTING DATA AND HYDROGRAPHIC CHARTS HAVE BEEN NOTICED.

IN SUCH CASES WHERE A MORE ACCURATE AND HIGHER RESOLUTION MAP IS NEEDED, IT IS NECESSARY TO DIGITIZE THE DESIRED INFORMATION AND CONSTRUCT NEW COASTLINE AND COASTLINE INDEX FILES, A LENGTHY AND INVOLVED PROCESS.

11. ON SOME RUNS OF THE NEW OFFLINE PLOTTER VERSION OF THE PROGRAM, THE COST, DUE TO I/O TIME, HAS BEEN APPROXIMATELY 20 (TWENTY) TIMES THE COST OF THE OLD ON-LINE VERSION. OTHER TEST RUNS, HOWEVER, HAVE SHOWN COST TO BE SOMEWHAT LOWER THAN THE OLD ON-LINE PLOTTER VERSION. ALTHOUGH THE ANOMALIES HAVE BEEN ATTRIBUTED TO 'BUGS IN THE BURROUGHS ACCOUNTING SYSTEM', THE USER IS CAUTIONED TO BE AWARE OF RANDOM, ABNORMAL COSTS ASSOCIATED WITH THE NEW OFFLINE VERSION.
12. NOTE THAT THE STATION SYMBOLS FOR THE NEW OFFLINE PLOTTER ARE DIFFERENT FROM THE SYMBOLS FOR THE

OLD ON-LINE PLOTTER. SYMBOLS 0-15, HOWEVER, ARE THE SAME ON BOTH PLOTTERS. FOR ADDITIONAL INFORMATION REGARDING SYMBOLS, SEE PAGES 10-11 IN "A USERS' GUIDE FOR USING THE CALCOMP MODEL 1055 HIGH SPEED PLOTTER ON THE BURROUGHS B7800 COMPUTER AT THE NORTHWEST AND ALASKA FISHERIES CENTER COMPUTER FACILITY", 1981, BY FRANK KIKUCHI.

13. WHEN YOU ARE USING THE NEW OFFLINE PLOTTER VERSION, THE SYSTEM WILL DISPLAY A MESSAGE "NO FILE 99 (MT)" (OR SIMILAR MESSAGE). IGNORE SUCH MESSAGES. THIS IS A MESSAGE FOR THE COMPUTER OPERATOR TO MOUNT A MAGNETIC TAPE FOR THE PLOT OUTPUT. THE COMPUTER WRITES THE MAGNETIC TAPE, AND SOMETIME LATER THE OPERATORS TRANSFER THE TAPE FROM THE COMPUTER TO THE OFFLINE CALCOMP PLOTTER.

13. SIZES OF POLYCONIC PROJECTION MAPS. WHEN THE POLYCONIC PROJECTION IS SPECIFIED, THE LEFT AND RIGHT LONGITUDES MUST BE WITHIN 30 DEGREES OF THE CENTRAL MERIDIAN. WHETHER OR NOT THESE LEFT AND RIGHT LONGITUDES ACTUALLY ARE WITHIN THE MAP BOUNDS DEPENDS ON THE SPECIFIED HEIGHT AND WIDTH OF THE MAP.

THE PROGRAM CALCULATES THE NUMBER OF NAUTICAL MILES PER INCH OF MAP AS = (TOP - BOTTOM)/HIGH. POINTS THAT ARE WITHIN A (WIDE/2.) INCH RANGE FROM THE CENTRAL MERIDIAN WILL BE INCLUDED IN THE MAP.

THE CLARKE 1866 REFERENCE SPHEROID IS USED FOR POLYCONIC PROJECTIONS.

14. OUTPUT DUMP FILE 7 FORMAT - BINARY FILE OF (X,Y) COORDINATES, IN INCHES.

WORD CONTENTS

**** *****

- 1 LATITUDE, DEGREES & FRACTIONS
 2 LONGITUDE, DEGREES & FRACTIONS
 3 STATION SYMBOL VALUE, -RANK (COASTLINE), OR -7 (LINES)
 4 STATION VALUE (0 FOR COASTLINE OR LINES)
 5 FLAG, A1 FORMAT, DENOTING TYPE OF VALUE
 'I'=INTEGER STATION VALUE (OR FOR COASTLINE OR LINES)
 'R'=REAL STATION VALUE
 'A'=ALPHA STATION VALUE
 6 X COORDINATE, IN INCHES. (LONGITUDE)
 7 Y COORDINATE, IN INCHES. (LATITUDE)
 (0,0) IS THE LOWER LEFT CORNER OF THE MAP.
 8 ERROR FLAG.
 0=THE X,Y COORDINATE IS ON THE MAP.
 1=THE STATION IS OUTSIDE THE MAP (LAT, LONG) BOUNDS
 2=THE STATION IS OUTSIDE THE MAP (HIGH, WIDE) BOUNDS

NOTE THAT ONE OUTPUT RECORD IS GENERATED FOR EACH INPUT STATION, COASTLINE POINT, OR LINE SEGMENT POINT.

IF A STATION IS OUTSIDE THE MAP BOUNDS, THE ERROR FLAG WILL BE SET (TO 1 OR 2) ON THE OUTPUT RECORD, AND THE X,Y COORDINATES WILL BE (0,0) FOR THAT STATION. THE ERROR FLAG IS THE ONLY WAY TO

DISTINGUISH STATIONS THAT ARE LEGITIMATELY ON THE LOWER, LEFT CORNER OF THE MAP FROM STATIONS THAT ARE TRULY OUT OF BOUNDS. HENCE, IT MAY BE NECESSARY TO RUN THE (RACE0010) SELECT PROGRAM AFTER RUNNING THIS PROGRAM TO SELECT RECORDS WITH WORD 8 EQUAL TO ZERO, E. G., WB EQ 0.

AFTER RUNNING THIS PROGRAM, YOU MIGHT RUN THE SELECT PROGRAM, AND THEN THE (RACE0010)MAKE PROGRAM TO CONVERT THE BINARY FILE TO CHARACTER.

THE SUGGESTED PARAMETERS FOR THE 'MAKE' PROGRAM ARE.....

```
OUTPUT 84
FORMAT (2F10.4, I3, F10.4, 1X, A1, 2F10.5, I5)
```

THE SPECIFIC FORMAT THAT YOU USE DEPENDS ON HOW YOU WANT YOUR OUTPUT FORMATTED FOR SUBSEQUENT USE.

15. INPUT BINARY LINES FILE 11 FORMAT.

WORD CONTENTS

**** *****

- 1 LATITUDE, DEGREES & FRACTIONS. N+, S-.
- 2 LONGITUDE, W+, E+>180.
- 3 2=PLOTTER PEN WILL BE DOWN IN MOVING TO THIS POINT.
3=PEN WILL BE UP IN MOVING TO THIS POINT.

16. FOR THE LINES ON FILE 11, NO PARTIAL LINES ARE DRAWN IF ONE OF THE SEGMENT ENDPOINTS IS OUT OF THE BOUNDS OF THE MAP.

17. THE 50, 100, & 500-METER BERING SEA DEPTH CONTOURS WERE CONTRIBUTED BY JIM INGRAHAM, REFM DIVISION, WHO HAD DIGITIZED THEM FROM CHARTS 16006 (JUNE 24, 1978), 513 (APRIL 14, 1979), AND 514 (APRIL 28, 1979).

THESE CONTOURS, DIGITIZED BY HAND, CONTAIN A POINT APPROXIMATELY EVERY 15 MINUTES (7-15 MILES). AS SUCH, THE USER SHOULD EXPECT SOME LIMITATIONS IN THE DATA.

HISTORY

81-01-05 LATITUDE/LONGITUDE TICKS AND LABELS ADDED.

81-08-08 TICK-XY, LABEL-XY, FANCY, AND PLACES OPTIONS ADDED.

81-01-14 TERMINATE PROGRAM WITHOUT PLOT IF PLOT WORK FILE IS NOT RESIDENT.
TRACE VALUE THRESHOLD & SYMBOL OPTIONS ADDED.

81-03-03 CORRECT ERROR ON INCLUSION OF TOP BORDER TICKS & LABELS.
ELIMINATE SLIGHT OVERPLOTING OF CORNER LABELS.

81-03-05 STATION SYMBOL ERROR CORRECTED.
TRACK LINES OPTION ADDED.
PLOT ZERO OPTION ADDED.
RANGE OF PLOTTED DECIMAL PLACES EXTENDED TO -1 THRU 9.
OMIT STATION SYMBOL FEATURE ADDED.

81-04-30 OMITZERO OPTION ADDED.

EXTEND MAXIMUM WIDTH FROM 60 TO 90 INCHES.

- 81-10-08 NOTES ON HIGH AND/OR WIDE & MERCATOR PROJECTION.
PORTION OF YUKON RIVER MISSING.
- 82-01-05 OFFLINE PLOTTER VERSION & DOCUMENTATION.
- 82-02-11 NOTES ABOUT DIFFERENT STATION SYMBOLS FOR NEW PLOTTER.
- 82-05-17 POLYCONIC PROJECTION, LINES, & DUMP OPTIONS ADDED.
- 82-07-06 DEPTH CONTOURS FOR BERING SEA ADDED.
- 82-07-14 CORRECT PEN DOWN ERROR WHEN PLOTTING BINARY LINES FILE
- 82-07-19 RECORD USE & USE OF NOPLOT OPTION
- 82-09-16 INCREASE SPACING BETWEEN TITLE, LABELS & BORDER.
- 82-09-27 NEW COASTLINE FILE - NORTH & SOUTH AMER., ASIA
& MAP/HP VERSION FOR HEWLETT-PACKARD 7240A PLOTTER
- 83-01-12 DOCUMENTATION UPDATE ON RIVERS & MISSING SEGMENTS.
PROGRAM UPDATE FOR E & W HEMISPHERE MAPS CROSSING 360.
- 83-01-31 ADDITIONAL CORRECTIONS FOR MAPS CROSSING 360.
- 83-02-04 DOCUMENTATION CORRECTION FOR PEN UP/DOWN CONTROL
ON BINARY LINES FILE 11.
- 83-02-09 DOCUMENTATION ADDITION FOR PLOT WORK FILE FORMATS
& SAMPLE PROGRAM FOR GENERATING PLOT WORK FILE.
- 83-04-18 30, 200, 1000, 2000 METER DEPTH CONTOURS & 200-MILE LINE
- 83-05-04 LINE TEXTURE & DEFINITION OPTIONS ADDED.
KEYWORD MAY START IN ANY COLUMN.

APPENDIX B

PLOT WORK FILE FORMAT AND BINARY LINES FILE FORMAT

PLOT WORK FILE

BINARY WORD	CONTENTS	INTERNAL FORMAT
-----	-----	-----
1	LATITUDE, IN DEGREES & FRACTIONS NORTH IS +, SOUTH IS -. E. G., 58 DEGREES 45 MINUTES NORTH IS REPRESENTED WITH A VALUE OF 58.75	REAL
2	LONGITUDE, IN DEGREES & FRACTIONS WEST IS +. EAST IS +, AND OVER 180. E. G., 140 DEGREES 45 MINUTES WEST IS REPRESENTED BY A VALUE OF 140.75 172 DEGREES 15 MINUTES EAST IS REPRESENTED BY A VALUE OF 187.750 FRACTIONS OF A DEGREE MAY BE TO ANY NUMBER OF DECIMAL PLACES.	REAL
3	STATION SYMBOL. IF NEGATIVE, NO STATION SYMBOL WILL BE DRAWN. FOR APPROPRIATE STATION SYMBOL VALUES CONSULT TABLE OF PLOTTER SYMBOLS FOR YOUR PLOTTER (APPENDIX D).	INTEGER
4	VALUE. THE VALUE TO BE PLOTTED.	REAL, INTEGER, OR ALPHA.
5	FLAG. DESCRIBES THE FORMAT OF THE VALUE IN WORD 4. 'R' = REAL 'I' = INTEGER 'A' = ALPHA	A1

ONLY THE FIRST 5 WORDS OF THE PLOT WORK FILE RECORDS
ARE USED BY THE MAP PROGRAM. ADDITIONAL WORDS MAY BE
USED BY YOU FOR ANY OTHER INFORMATION.
(IT IS OFTEN HANDY TO CARRY ADDITIONAL IDENTIFICATION ON
EACH RECORD, SUCH AS VESSEL, CRUISE, AND HAUL NUMBERS.)

BINARY LINES FILE

BINARY WORD	CONTENTS	INTERNAL FORMAT
1	LATITUDE, IN DEGREES & FRACTIONS NORTH IS +, SOUTH IS -. NORTH IS +, SOUTH IS -. E. G., 58 DEGREES 45 MINUTES NORTH IS REPRESENTED WITH A VALUE OF 58.75	REAL
2	LONGITUDE, IN DEGREES & FRACTIONS WEST IS +. EAST IS +, AND OVER 180. E. G., 140 DEGREES 45 MINUTES WEST IS REPRESENTED BY A VALUE OF 140.75 172 DEGREES 15 MINUTES EAST IS REPRESENTED BY A VALUE OF 187.750 FRACTIONS OF A DEGREE MAY BE TO ANY NUMBER OF DECIMAL PLACES.	REAL
3	CALCOMP PEN UP/DOWN. 3=START NEW LINE SEGMENT (I. E., RAISE PEN BEFORE MOVING TO THE SPECIFIED LATITUDE, LONGITUDE) 2=CONTINUE LINE SEGMENT WITH PEN DOWN.	INTEGER

APPENDIX C. AUXILIARY PROGRAMS

Numerous other programs may be used in conjunction with the MAP Program. For additional information on these programs, read the program documentation, which is available on the computer. All documentation files are on the "RACE" disk family. For example, use the following command for a copy of the MAP documentation:

```
WRITE (RACE0360)DOC/MAP ON RACE.
```

All RACE documentation files are maintained on usercode (RACE0360) and are prefixed by "(RACE0360)DOC/" in any CANDE command.

<u>PROGRAM</u>	<u>DESCRIPTION</u>
MAP	The mapping program, the subject of this document.
LIST/PLOTWORK	Lists the contents of a binary plot work file. Since the plot work files are binary, they cannot be listed with CANDE. This program is especially useful for checking programs that generate a plot work file.
UNDER/PLOT	<p>Resolves overplotting of stations. For example, stations may be so close to each other that, when plotted, they overlap each other to the extent that the plot is unreadable. Sometimes the user may manually remove stations from the appropriate files, rerun the analytical programs, and redraw the map.</p> <p>Where appropriate, though, UNDER/PLOT can be used to impose a conceptual grid on the plot work file and resolve multiple stations within a grid block to a single station. Parameters specify the grid sizes and boundaries and the resolution action desired, such as average, minimum, maximum, or count. The result is a new plot work file with a maximum of one record per grid block. The new plot work file can then be routed into the MAP program.</p> <p>After running UNDER/PLOT, the user may elect to run the SHADES program and then run MAP to produce a shaded density map. Each statistical block will be shaded with a pattern of characters, the density of which is determined by thresholds set by the user.</p>

S SHADES Generates a shaded density pattern for each statistical block. Used after UNDER/PLOT and before MAP.

PLOTWORK/RANK Replaces stations symbols and values with a single station symbol. Used to reduce overplotting. Threshold levels can be specified for the new symbols.

GENERATE/PLOTWORK Used to generate a binary plot work file. Useful if there are only a few stations. Usually a person would run other programs, such as CPUE, to generate a plot work file, or a person might write a special program that is tailored to particular data.

GENERATE/LINES Used to generate lines, such as grid lines, that are to be superimposed on the map.

MAP/PREVIEW Generates a map on a graphics terminal (and possibly on a Tektronix plotter) instead of on the Center's CalComp Plotter.

MAP/SEFC Generates a map on the Southeast Fisheries Center's on-line CalComp Plotter.

MAP/HP Generates a map on the Southeast Fisheries Center's Hewlett-Packard Plotter.

MAP/SUBROUTINE The map program available as a subroutine to those programmers who need features not present in MAP.

INVERSE/MAP Converts (x, y) coordinates in inches back into (latitude, longitude) coordinates. Used in conjunction with digitizing and possibly with contouring.

DIGITIZER Stores (x,y) coordinates from the Tektronix digitizer on a disk file.

APPENDIX D

Plotter Symbols

Symbols Available on the Off-Line CalComp
Plotter At NWAFC, Seattle:

	134 00W	133 00W	132 00W	131 00W	
50 OON					50 OON
49 OON	□0	32	•64	196	49 OON
	○1	133	A65	(97	
	△2	*34	B66	μ98	
	+3	#35	C67	τ99	
48 OON	X4	\$36	D68	♠100	48 OON
	◇5	X37	E69	♠101	
	↑6	Δ38	F70	♣102	
	X7	'39	G71	103	
47 OON	Z8	(40	H72	•104	47 OON
	Y9	)41	I73	λ105	
	X10	*42	J74	α106	
	*11	+43	K75	♠107	
46 OON	X12	.44	L76	108	46 OON
	113	-45	M77	109	
	*14	.46	N78	110	
	_15	/47	O79	111	
45 OON	.16	048	P80	Σ112	45 OON
	17	149	Q81	+113	
	^18	250	R82	≤114	
	■19	351	S83	≥115	
44 OON	-20	452	T84	▲116	44 OON
	21	553	U85	⌈117	
	#22	654	V86	⌋118	
	*23	755	W87	\119	
43 OON	_24	856	X88	⌈120	43 OON
	_25	957	Y89	⌋121	
	_26	158	Z90	122	
	/27	159	[91	123	
42 OON	>28	<60	\92	-124	42 OON
	√29	=61	⌋93	×125	
	~30	>62	^94	1126	
41 OON	~31	763	-95	1127	41 OON
40 OON					40 OON
	134 00W	133 00W	132 00W	131 00W	

Symbols Available on the Tektronix 4663
Plotter, via the MAP/PREVIEW Program:

	134 00W	133 00W	132 00W	131 00W	
49 00N	- 0	32	064	'96	49 00N
	□ 1	133	A65	a07	
	□ 2	"34	B68	b98	
	△ 3	#35	C67	c99	
48 00N	+ 4	\$36	D68	d100	48 00N
	◇ 5	%37	E69	e101	
	■ 6	£38	F70	f102	
	⊠ 7	'39	G71	g103	
47 00N	⊞ 8	<40	H72	h104	47 00N
	⊟ 9	)41	I73	i105	
	▽ 10	*42	J74	j106	
	* 11	+43	K75	k107	
46 00N	* 12	,44	L76	l108	46 00N
	× 13	-45	M77	m109	
	† 14	.46	N78	n110	
	‡ 15	/47	O79	o111	
45 00N	■ 16	048	P80	p112	45 00N
	■ 17	149	Q81	q113	
	■ 18	250	R82	r114	
	■ 19	351	S83	s115	
44 00N	■ 20	452	T84	t116	44 00N
	■ 21	553	U85	u117	
	■ 22	654	V86	v118	
	■ 23	755	W87	w119	
43 00N	■ 24	856	X88	x120	43 00N
	■ 25	957	Y89	y121	
	■ 26	:58	Z90	z122	
	■ 27	;59	[91	{123	
42 00N	■ 28	<60	\92	|124	42 00N
	■ 29	=61	]93	}125	
	■ 30	>62	^94	~126	
41 00N	■ 31	763	_95	■127	41 00N
	134 00W	133 00W	132 00W	131 00W	

(This table courtesy of Lysander NG,
Southeast Fisheries Center.)

Symbols Available on On-Line CalComp Plotter
At The Southeast Fisheries Center, Miami:

CHARACTERS AVAILABLE IN SYMBOL ROUTINE FOR MODEL 563 PLOTTER USING THE B-7800

0		16		32	0	48	@	64	P	80	°	96	p
1		17	!	33	1	49	A	65	Q	81	a	97	q
2		18	"	34	2	50	B	66	R	82	b	98	r
3		19	#	35	3	51	C	67	S	83	c	99	s
4		20	\$	36	4	52	D	68	T	84	d	100	t
5		21	%	37	5	53	E	69	U	85	e	101	u
6		22	&	38	6	54	F	70	V	86	f	102	v
7		23	'	39	7	55	G	71	W	87	g	103	w
8		24	(	40	8	56	H	72	X	88	h	104	x
9		25	)	41	9	57	I	73	Y	89	i	105	y
10		26	*	42	⋮	58	J	74	Z	90	j	106	z
11		27	+	43	⋮	59	K	75	[	91	k	107	{
12		28	,	44	<	60	L	76	\	92	l	108	|
13		29	-	45	=	61	M	77	]	93	m	109	}
14		30	.	46	>	62	N	78	↑	94	n	110	~
15		31	/	47	?	63	O	79	←	95	o	111	

INTEGER FOR USE IN SYMBOL CALL SHOWN TO LEFT OF EACH SYMBOL

(This table was copied from "A Users' Guide for Using the CalComp Model 1055 High Speed Plotter on the Burroughs B7800 Computer at the Northwest and Alaska Fisheries Center Computer Facility" by Frank M. Kikuchi.)

