United States Department of the Interior
Geological Survey

National Center for Earthquake Research
345 Middlefield Road
Menlo Park, California 94025

USER'S MANUAL FOR MAPLOT

by
Robert Nowack

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Contents

I. Introduction

1. brief description

The purpose of the Maplot program is to construct plots of seismic location data. The program has been designed for use on the USGS Multics computer using the advanced graphics package Disspla.

Maplot has been written for the novice computer user. It has two different forms of input. There is a detailed interactive driver which prompts for the relevant input information. It can also be run with a formatted control segment.

There are a variety of ways to plot tabular seismic data. Maplot provides a number of ways but is not meant to be all inclusive.

Maplot has the capibility of plotting:

maps (earthquakes, stations, other symbols)

cross sections

time-distance plots

magnitude-frequency plots (semi-log)

cumulative moments plots

histograms of number or

summed moments with an axis (time distance depth)

time-frequency plots (log-log)

Maplot follows a very classical approach to plotting seismic data. A number of good examples to these sorts of plots can be found in (Utsu, 1961).

For very simple interactive plotting, users with specific plots other than those included here should consider using Geolab which is inexpensive and easy to use.

An important feature of maplot, as a result of using the graphics package Disspla, is the device independence of the plots constructed. The user can output his plots on any of the output devices currently available with the USGS Multics computer. At Menlo Park, these include:

Tektronix

Benson Lehner (pen plotter)

Houston Instruments (pen plotter)

Versatec

In addition, the user can direct his plot to the Disspla post processor which allows the user to output the same plot file to several different output devices.

The ability to interactively construct and preview plots allows for a wide variety of user interaction and experimentation.

II. Getting Started

1. The multics environment

It is important for maplot users to have some familiarity with the multics computer. This includes login procedures, locating segments, and using one of the Multics text editors. This manual doesn't attempt to

explain all the basic commands, although useful commands will be noted. A good reference to getting started on multics is the USGS Multics User's Manual. This can be obtained from the computer systems administrator.

Once the user is logged on, he must be able to locate various segments on public disk. A pathname is used to locate a particular segment. The entire storage space on Multics is organized into an inverted tree hierarchy. In pathnames, " > " signs are used to separate different levels of the storage hierachy, for example in user disk space,the hierarchy would be, user disk directory (udd), project directories, person directories, and further sub-directories, etc. The pathname that locates the executable object segment of maplot is >udd > Caldata>RNowack > map_dir>maplot2. There are several convenient ways on multics for remembering segment locations. The first is to construct a link in your working directory such as

lk >udd > Caldata > RNowack > map_dir>maplot2

Your links are saved in a table for each directory and are only applicable within that directory. Thus, when Maplot2 is called, the links for your working directory will be searched for an entry which specifies the particular location for Maplot2. For a particular directory, the links may be listed using command "ls -lk".

Another way to remember the location of a segment in public disk is with the abbreviation processor. This allows the user to construct abreviations for commands or complicated pathname locations. The abbrev processor is turned on by typing the command; "ab", An abbrev is saved in the processor with the command. ".ab maplot2 >udd >Caldata> RNowack > map_dir > maplot2."

With the abbrev processor turned on, the abbrev "maplot2" is expanded out to the full pathname anytime it is typed at command level at the beginning of a line. The advantage of using the abbrev processor is that it is not tied to the particular directory you may be in. These abbrevs are saved in a segment in your home directory called USER_profile, and can be listed using the command ".l".

On Multics, to execute a program at command level, simply type the segment name. Once the appropriate link or abbreviation for the pathname of Maplot2 has been made, then by typing "maplot2", the user starts to execute the program.

Maplot2 does require several other user created segments. These segments contain the earthquakes, stations, or other type of data the user wants to plot. When prompted by the interactive part of the program, the user should specify the pathname location for these data files in public disk (abbreviations won't be expanded by the fortran program). These segments must contain only one type of data with no imbedded blank lines.

A program for selecting earthquake data called "select2" can be used to construct earthquake segments from master earthquake files. This is located at:

> udd > Caldata > RNowack > select2

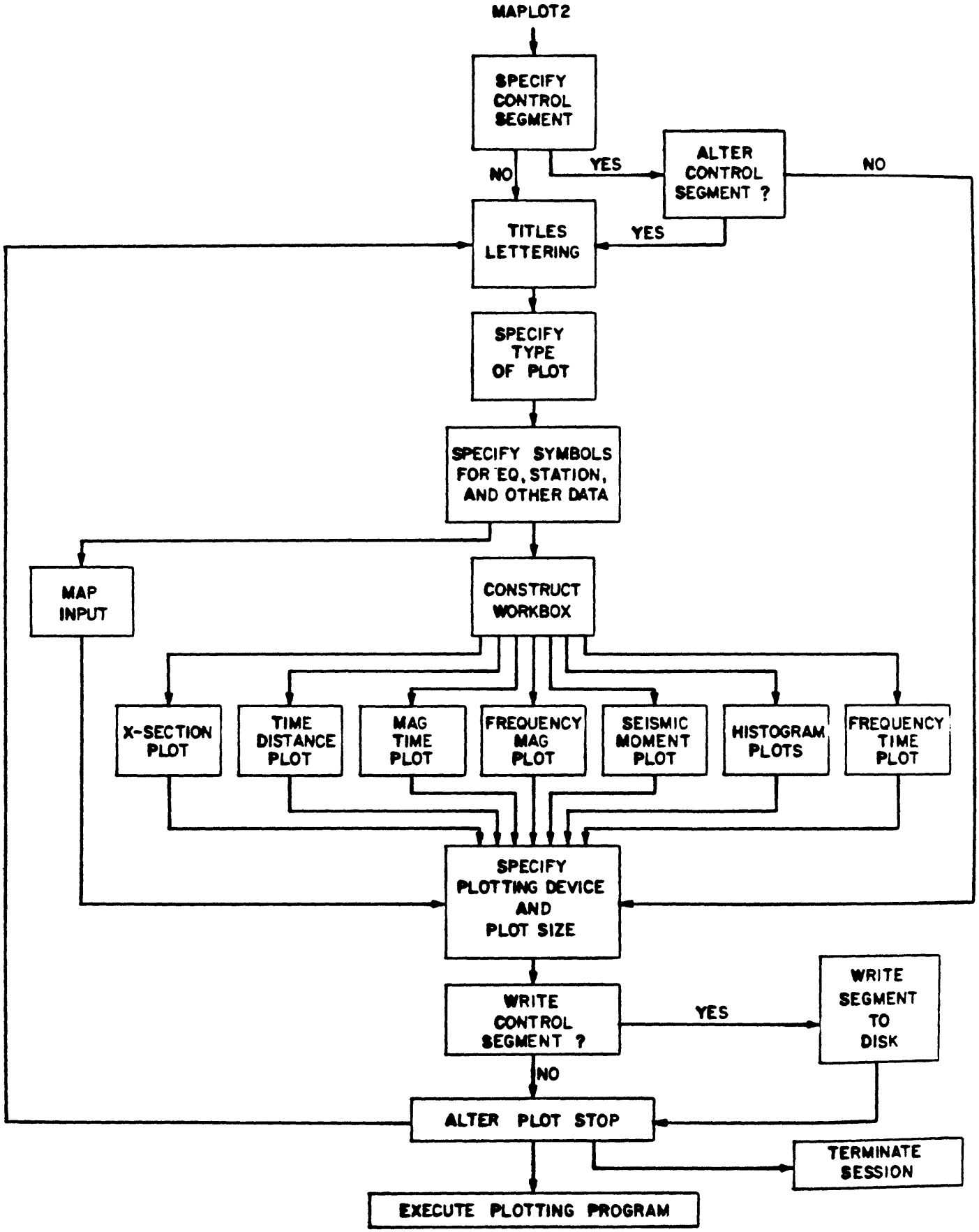
2. Interactive Input

Once the program has been started, the interactive section will prompt for various parameters. A flow chart for the interactive section is given in Figure 1. First, the input prompts the users for a control segment. If the user types no, it assumes the user wants to create a plot from input at the terminal. After typing in the plot parameters, the user has the option to write these parameters to a formatted control segment. To avoid typing in parameters a number of times, it is important to write input out to control segments. The control segments can be overwritten. Finally the user can either execute the plot, terminate the session, or go back and alter parameters. In executing the plot, the program calls the particular plotting subroutines. The user may wish to terminate the program if he is simply creating various control segments to be used later. If an input error has been made, he may wish to go back and alter parameters. The driver doesn't repeat all the questions the second time. It asks whether the user wants to change various parameters for each block of input. If the user doesn't want to change the parameters in a particular block of input, this block of input questions will be skipped. In this way, one can skip thru the driver to the block of parameters which needs modification. The input then drops down again to the (plot-terminate-alter) branch.

The user can specify a control segment at the start of Maplot session and then either alter these control parameters or branch down to the plotting device block. If the user does not want to alter control segment parameters, the input will ask for changes in the plotting device, then branch down to the

INTERACTIVE DRIVER FLOW CHART

figure 1



plot-terminate-alter point. If the user does want to interactively alter the control segment, the input will go down thru the block asking for any changes.

When using the interactive input, make sure to remember the decimal points for real numbers. The program often gives examples of possible input. Follow the input type in these examples.

The interactive input is long so be patient when going through from the beginning. If you make an error and want to quit, hit break. This will stop execution. Then type "rl" to purge the job and type "maplot2" to start again. If you make an error while reading in data, type "new_proc" and start again.

3. Control Segments

Control segments can be written during an interactive session. This will allow the user to execute the program at some future time without answering all the interactive questions again.

The control segments can be modified in two ways. First, they can be modified by the interactive input. This is the same as altering parameters in the driver. The user can also modify the control segment with the text editor. Sample control segments are shown in appendix B.

Because these are read and written by formatted I/O, the column spacing is important when making changes with the text editor. Any accidental changes of column fields when editing may cause a formatted read error.

In the control segments, the variable names are written along with the input numbers to help in text editing. A description of these different variables is given in appendix A. Because variables do interrelate with regard to making specific types of plots, it is important to compare your control segment with sample control segments for particular plots in appendix B.

The sample control segments in appendix B can be found in public disk with the pathnames

>udd > Caldata > RNowack > map_dir > control.1
control.2

These are set up to create plots on a Tektronix terminal. When prompted for a control segment, give the pathname as above. A sample run using a test control segment would be:

-- login to tektronix graphics terminal --

```
maplot2
Welcome to Maplot
maplot info. read?  no
do you want to specify an input control segment?  yes
specify input control segment
> udd > Caldata > RNowack > map_dir > control.1
do you want to modify the parameters
in the control segment?  no
do you want to change the output device or
plot size in inches?  no
do you want these input parameters written to
an output control segment for future use?  no
do you want to 1-plot, 2-terminate session,
or 3-alter input parameters again.   1
```

There also exists and "ec" which allows the user to say the program name and the control segment name in one line.

First make an abbreviation for the "ec":

.ab maplot2a ec >udd > Caldata > RNowack > map_dir > maplot2a

Now type:

maplot2a >udd > Caldata > RNowack > map_dir > control.1

This assumes that no changes are required to the control segment.

An equivalent batch job for a control segment set up to plot on an external plotter would look like:

```
ted
a
maplot2a >udd > Caldata > RNowack > map_dir > control.1
yes
w plop.absin
\f
q
```

This is an absentee segment and can be executed without the user being logged in at the terminal. This would be executed using the command

ear plop - rt -q 1

"ear" means enter absintee request.

"-rt" signifies that the computation should be restarted in case of a computer crash.

"-q 1" signifies that the queue should be 1 which is daytime from 8:00 a.m. to 5:00 p.m.

4. Output Devices

When the user specifies an output device other than tektronix, Maplot2 will write out a segment to disk. This segment contains the plot information in a form compatible with the external plotting device. The user must then use an additional command which copies this plot segment to tape for plotting. For the tektronix, the plot information is sent directly to the screen and is not saved on disk.

In addition, Disspla has a post-processor which can be used to create device independent plot segments on disk. The post processor can be used to send the plot information to any of the plotting devices.

For Tektronix plotting, the vectors are plotted directly on the screen. The screen of the graphics terminal will be flashed several times to clear the screen for plotting.

Plots will not be plotted in absolute inches on the Tektronix screen. For plots less than 8-1/2 by 11 inches, the plot is scaled to screen units. For plots larger than 8-1/2 by 11 inches, the y dimension of the plot will be scaled to just fit the screen. The x axis of the plot may be truncated.

When previewing a plot, it is important to specify the plot size on the Tektronix to be the same as that for the external plotting device which plots in absolute inches. This is to ensure the proper proportions of the symbols, labels, and plot size for the final copy. Making the plot size on the Tektronix larger than 8 1/2 by 11, will have the unusual effect of changing titles and symbol sizes, but not the size of the plot on the screen.

When using the Tektronix, you must specify the information rate for the graphics terminal. For direct ports to multics, the rate of the tektronix terminals is 9600 baud. This baud rate must be specified when prompted in maplot2.

For Versatec plotting, maplot2 writes a plot segment to disk named "vplt*00* " in the user's working directory. After exiting Maplot2, this segment should be renamed to avoid overwriting it in subsequent runs of Maplot2. Use the command:

rn vplt*00* vploti

i = 1,2...

This plot segment must now be written to tape for plotting.

To generate a versatic plot, first link to;

lk > iml > v_plot > gpt

Now, type "gpt" and the system will prompt for the necessary information. A nine digit USGS account number is needed for an external plot. A sample run of gpt which writes several plot segments to the same tape would be;

```
* * * * * * * * * *
gpt
Enter tape volume name (for defult hit newline):
Enter account number:      100234509
Do you wish to specify a wait interval in case no tape handlers are now
available?  yes
Enter wait time in minutes(-1 for unlimited):      -1
Please enter file names to be placed in plot tape (separated by blanks):
vplot1 vplot2
**********************
```

It is convenient to use one tape to plot several plot segments on versatec. Plots are limited to 43 inches in the y direction on Versatec.

For Benson Lehner pen plots, a segment will be written to the users working directory with the same "bl_plot". After exiting Maplot2, rename it so it won't get overwritten the next time a Benson Lehner plot segment is generated. Use the command

```
rn      bl_plot      bploti
                     i = 1,2....
```

To generate a benson lehner plot, first

```
lk  > iml  >  bl_lib  >  plotter.ec
```

The following command can then be used to plot a single plot segment.

```
ec plotter bplot1 30   1 100089051
```

where 30 is the paper size in inches (10 or 30), 1 is the pen size (00-4), 100089051 is a valid USGS account number. Plots are limited to 30 inches in the y direction on the Benson Lehner. This plotter is somewhat awkward for multiple plots because a separate tape must be used for each plot segment.

For Houston pen plots, a file will be written to the user's working directory with the name "hous_plot". Rename this segment after exiting the program to avoid overwriting it.

```
rn hous_plot hploti
                i = 1,2...
```

To write these segments to tape for plotting, first:

```
lk >iml > houston > multi_houston .ec
```

To make a plot, type:

ec multi_houston

This will prompt for the relevant information including a valid USGS account number and the plot segments to be plotted. Multiple plot segments can be written to the same tape for plotting. Houston plots have a maximum size of 36 inches in the y direction. Because of a bug in the Houston software, a new_proc must be done between consecutive runs of Maplot which create Houston plots.

Pen plotters are much faster in computation time on Multics than the Versatec which must rasterize the entire plot area into tiny areas of light and dark. But once the plot segment is made, Versatec plots can be plotted in several minutes, while complicated pen plots may take several hours. There is a flat rate of $19. per hour for plotting time on an external plotter regardless of the device (Oct 79). Thus, there is a trade off in expense between computation of rasterized plot segments for the Versatec on the computer and straight plotting time of complicated plots for the pen plotters. The Houston Instruments is a better bargain in speed and its ability to write multiple plot segments tapes than the Benson Lehner pen plotter.

Thus to choose between the Versatec and the Houston Instruments depends on the ratio of plot area and the number of vectors plotted since;

Versatec computer time $\propto$ plot area $\propto$ length^2

pen plotter time $\propto$ number of vectors plotted $\propto$ plot time

Thus for large plots with only a few symbols drawn, it will be much more economical to use a pen plotter. But for a plot with a large number of vectors drawn, it will be more economical to use the Versatec.

Finally, for slides and final graphs, it is important that plots be kept small (less than 12" square). Large plots, which aren't redrafted, don't seem to photograph well. Also, make all titles and labels fairly large.

Section III Input Data

Various forms of input data are allowed for maps. This includes earthquake data, station data, other types of symbols (for example, cities), and boundary or fault data. For plots other than maps, only earthquake symbols may be plotted. The data segments for these types of symbols must be prepared before the execution of Maplot2.

1. Earthquake Data

The formats allowed for earthquake data are:

Hypo71

Hypoellipse

Hypoellipse (no regression info.)

user defined

The variables on the read statement for the user defined are;

kdate (AG), khrmn (A4), lat (integer degrees),
"s" or blank (A1), xlat (real minutes), lon (integer degrees),
"e" or blank (A1), xlon (real minutes), depth, xmag,
quality (A1)

By using the fortran "t" format, almost any earthquake format could be simulated. The Hypoellipse format has two magnitude spaces on the summary card. The first is for amplitude magnitude, and the second is for duration magnitude. The user must specify one or the other depending on where the relevant magnitude information is punched on the card.

There is a limit of 10,000 earthquakes which can be read in by Maplot2. This could be redimensioned in the program if the need arose. If a segment has more events, only the first 10,000 will be read in for further processing. The earthquake segment should only have earthquake cards and no other types of data.

There are various kinds of symbols that can be used to plot earthquake data. These include:

1)A marker with no scaling. The allowed markers are shown in figure 2.

2)A marker with magnitude scaling. The markers allowed are shown in figure 2. A particular marker is scaled in size with increasing magnitude. The smallest magnitude symbol size must be given. Also, the magnitude increment and the increase in marker size in inches between consecutive magnitude increments must be given.

for example, given:

smallest magnitude - 1.0

magnitude increment - .5

largest magnitude - 3.0

smallest marker size - .10 inches

size increment - .05 inches

Then;

magnitude	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.50 - 2.99
marker size in inches	.1	.15	.2	.25

Note that the smallest magnitude, 1.0, will be plotted, but the largest magnitude, 3.0, will not.

Also, an integral number of magnitude increments should fit in the total magnitude range.

3) A different marker with depth scaled with magnitude

There is a shallowest and deepest depth used to sift earthquakes in depth. The user must specify a depth increment starting from the shallowest allowed depth. Different markers will be used for progressively greater depth increments down to the maximum depth cutoff. The markers always start with marker 0 in figure 2 and increase. There should be less than 15 depth increments in the depth range to allow for a distinct symbol 0-14 in figure 2.

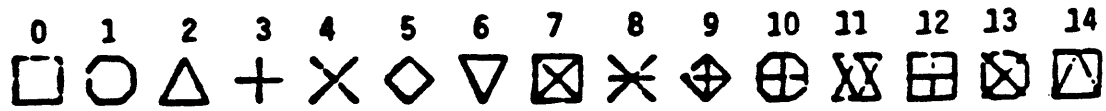
For example, given;

shallowest depth - 20. km

greatest depth - 40. km

depth increment - 5. km

figure 2



then;

event depth	20.00 - 24.99	25. - 29.99	30. - 34.99	35. - 39.99
marker type in figure 2	0	1	2	3

Note that shallowest depth, 20., is plotted but the greatest depth, 40. km, is not plotted.

These markers are scaled with magnitudes as described in symbol type 2.

4) A number representing magntidue - no scaling. This symbol simply converts the magnitude to an integer by truncating and plots this integer. No magnitude scaling is done.

5) A number or letter representing depth down to 35. km - scaled with magnitude.

This symbol converts the depth to an integer by truncating. The symbol plotted then are related to depth by:

symbol plotted	0,1,...,	9,a,b,..., y,z,*
depth in km	0,1,...,	9,10,11..., 34,35, greater than 35 km

These symbols are then scaled with magntitude.

6) A letter representing quality - scaled with magnitude. A quality of solution letter A-D is plotted. These letters are then scaled with magnitude.

2) Station Data

Station data can only be plotted on maps. The formats allowed by Maplot2 are:

1) Hypo71 (delay model)

2) Hypo71 (variable first layer)

3) Hypoellise

4) user defined

The variables in the user defined input list are;
lstat (A4), lat (integer degrees), "s" or blank,
xlat (real minutes), lon (integer degrees), "e" blank, xlon (real minutes)

Using the fortran "t" format will allow the user to construct a format appropriate to his data.

At present, there is a limit of 900 stations which can be read in. If there are more stations than 900 in the input segment, they will be ignored. Other sorts of data in the station segment will cause the program to bomb out.

There are two types of symbols allowed for stations. The first is just a marker as in figure 2. The second type of symbol uses a marker with a four letter station name to the upper right of the marker. Both the marker size and the label size can be varied independently.

3) Other Data for maps

Another type of symbol can also be plotted on maps. This may be cities, ranches, or other sorts of data. The only format for this is user defined. The variables in the read statement are

loth(A20), lat(integer degrees), "s" or blank for north(A1),

xlat(real minutes), lon(interger degrees), "e" or blank for west(A1),

xlon(real minutes)

A maximum of 500 cards can be read in.

4) Boundary or fault data

There are various boundary files which can be used with Maplot2. These include the Disspla boundary files and user defined boundary segments.

The Disspla files don't require any format or input segment from the user. These Disspla files include;

1. mapdta .5 degree resolution
2. hershey

3. africa	10. pafrica	
4. antarctic	11. pasia	
5. asia	12. paustralia	.1 - .5 degree
6. australia	13. peurope	resolution
7. europe	14. pnorth america	
8. north america	15. psouth america	
9. south america	16. coastlines - combined coastlines	
	17. political - combined political	

18. usa low resolution
19. usa med resolution
20. usa high resolution

For user defined files, a particular form for the data is required. First, a card with blanks in the first three columns signifies that the pen should be lifted and the remainder of that card is ignored.

The variables in the read statement are (test (A3), t1, idline (alat (decimal degrees), alon (decimal degrees))). The "test" variable tests to see if the line is blank. The "t1" tabs back to column 1. The line then has "idline" pairs of latitude and longitude in decimal degrees. A sample format would be:

(A3, t1, 6(f5.2,f6.2))

This is the format for the fault map of central California digitized by Rick Lester. This is located in:

> udd > Caldata > RNowack > map_dir > calif2

Section III Earthquake Sifting

Maplot2 has the capability to do simple earthquake sifting. For all plots, the user can plot earthquakes in a depth range and a magnitude range. The smallest and largest magnitude and the shallowest and greatest depth allowed must be specified. The largest magnitude limit and the greatest depth are not included in the interval. That is

$$xmag1 \leqslant magnitude < xmag2$$

$$xdep1 \leqslant depth < xdep2$$

For maps, this is the only earthquake sifting done. Also for maps, no earthquake outside of the map area will be plotted.

For all other types of plots, further sifting is done in addition to magnitude and depth. For all other plots, a work box is constructed as in figure 3.

The points A and A' are specified in latitude and longitude. The variables xwid1 and xwid2 are in km and specify the maximum distances away from the line A - A' to accept earthquakes. The variables xdep1 and xdep2 are the depth ranges as before. For all plots other than maps, earthquakes must be in this workbox and be in the proper magnitude range to be plotted.

For all plots other than maps, earthquake latitude and longitude are converted to distance in km and azimuth clockwise from north from the point A. This conversion is shown in figure 4.

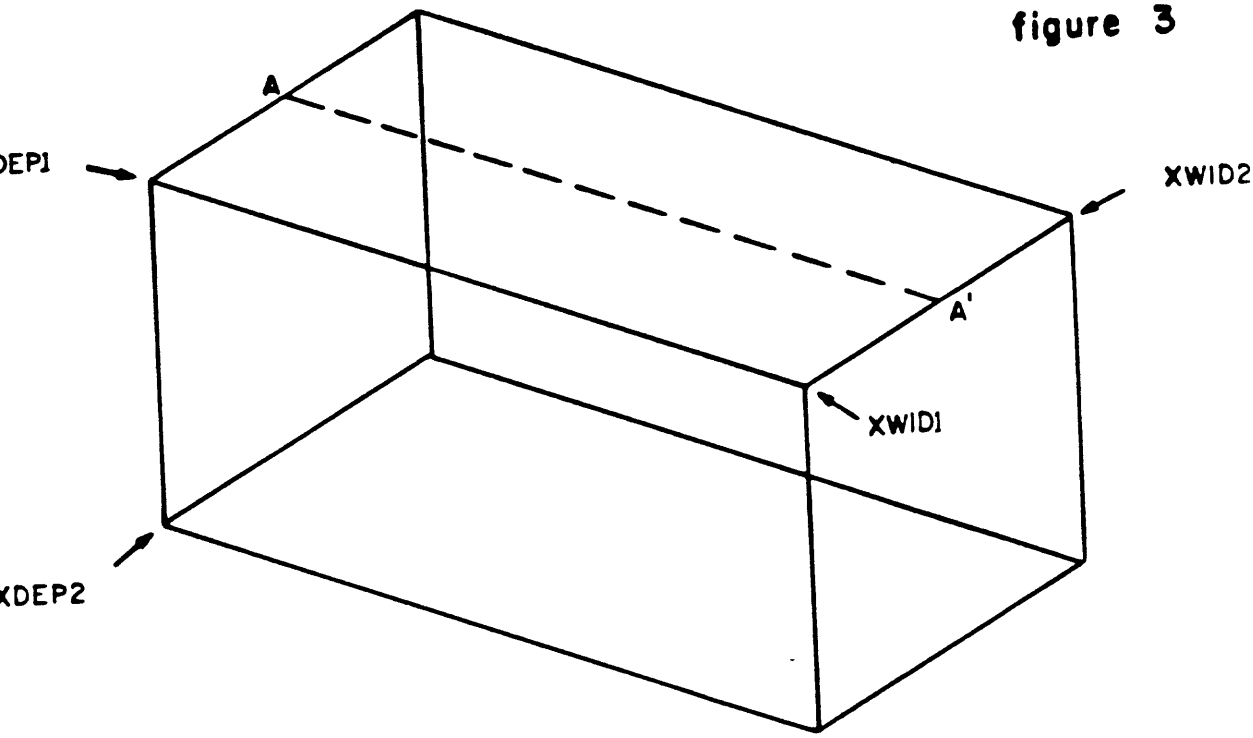
The subroutine DELAZ is used to convert latitude and longitude on a sphere corrected for ellipticity to distance and azimuth. These values are then converted to x' and y' in km along A - A' and perpendicular to A - A'. The values (x', y') for each earthquake used must lie in the range:

$$0.\ km \leq x' \leq (\text{DISTANCE FROM A to A'})$$

$$XWID1 \leq y' < XWID2$$

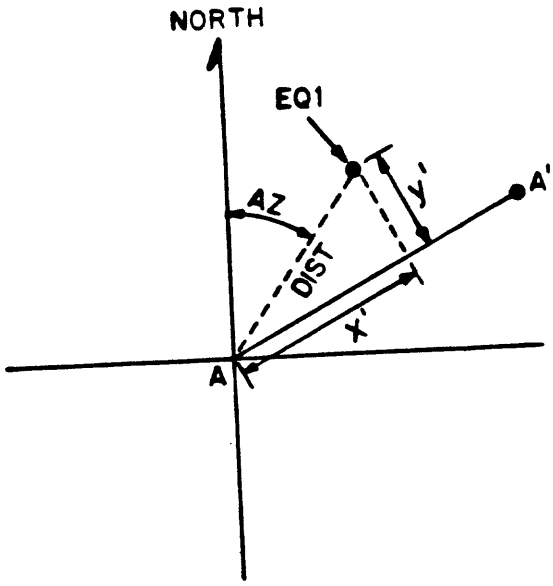
For all time plots, a beginning and ending time for the time axis must be specified. For time plots, earthquakes must have times within the ranges to be plotted. For other plots, no time sifting is done.

figure 3



THE WORKBOX USED TO
SELECT EARTHQUAKES
(FOR ALL PLOTS OTHER THAN MAPS)

figure 4



DIST- DISTANCE IN KM
BETWEEN EQ1 AND
POINT A

AZ- AZIMUTH FROM A
TO EQ1 MEASURED
CLOCKWISE FROM
NORTH

The beginning and ending times must be specified as valid dates. Thus

740101 1845 is correct while 740400 1845 is incorrect.

The time axis can be specified in the following time units; 1 - hours, 2 - days, 3 - month (approx), 4 - years (approx). The subroutine CALJUL is used to convert the time differences between the axis beginning time and the earthquake times into real numbers in the time units specified. For example, the time difference between

730101 0000 740101 0000

in years would 1.00, in months would be 12.00, and in days would be 365.00.

Section V Specific Plots

The following section give specific information on particular plots.

1) Maps

Earthquakes, station data, other symbols, boundary data, or any combination of these can be plotted on maps. Symbols lying outside of the map area will not be plotted. In addition, earthquakes must be in specific magnitude and depth ranges.

The map area is specified by YORIG and YMAX which are the lower and upper latitide and XORIG and XMAX which are the left most and right most longitude. It is important to keep in mind that west longitude and south latitude are negative.

In the interactive input section, all map coordinates should be given in integer degrees and real minutes. These are then converted to decimal degrees by the program. The control segments also use decimal degrees.

For example:

Interactive input	Program computation
XORIG -122 15.00	and control segments -122.25

For maps, scaling is done by specifying the length in inches of the central meridian between the lower and upper latitude limits of the map. The map is then adjusted so that the latitude range of the central meridian just fits in the number of inches specified. The length in inches of the x-axis has no effect on map scaling. It is important to allow enough space on the x-axis to avoid truncating the longitude range on either side of the map. The length required on the x-axis in relation to the y-axis length is dependent on the map projection. As a preliminary rule, always specify more inches on the x-axis than that on the y-axis.

At present, there is no specific scaling factor in the mapping section of DISSPLA which determines map scale. This deficiency may soon be changed by DISSPLA themselves or by using our own projections. Another source of problems is the interaction between the multics environment and DISSPLA map projections. DISSPLA projections are only single precision which may result in loss of significant digits. Also, Multics has a restricted exponent range between 10^{-38} - 10^{+38}. This may cause unforeseen exponent overflow or underflow conditions when using certain latitude ranges with specific projections. In addition, certain coarsely sampled user boundary files may cause overflow conditions near edges of certain map projections. Specific projections will be discussed below.

There are a wide variety of DISSPLA map projections. These all have particular latitude and longitude ranges as well as specific types of input.

Several definitions first may be appropriate. First, when a map preserves shapes of small parts of mapped surfaces, even though it can't preserve shape over a large area, such as an entire continent, it is considered CONFORMAL. If the relative area of all features of a globe is maintained during projection, the projection is said to be EQUAL AREA. A flat map of a globe can't be both equal area and conformal.

Although no map projection offers uniform scale, some have uniform scale in preferred directions.

A) Cylindrical Projections

1) Cylindrical and Exact Cylindrical. The Cylindrical projection doesn't transform the data, it simply displays the coordinates as they are. The Exact Cylindrical corrects for the earth's ellipticity. There is one standard parallel at the equator. These projections are neither conformal or equal area. The latitude range is -180s to +180N but must not span more than 180. x and y are scaled independently.

2) Mercator and Exact Mercator. The Mercator projection is a cylindrical projection with the line of tangency with the globe being the equator and the axis of the cylinder coinciding with the globes N-S pole. This is a conformal projection which preserves local shape but not area. Parallels and meridians are straight lines at right angles. The Exact Mercator corrects for the earth's ellipticity. Lines of constant bearing plot as straight lines but great circles don't.

The latitude range is

$$-85. \leq \text{lat} \leq 85.$$

The map may appear anywhere in the longitude -540. to +540., but the total map span must be less than 720o or 2 cycles.

3. The Transverse mercator

The Transverse Mercator is projected onto a cylinder widh the axis on the equator and the line of tangency being a line of longitude. This line of longitude, which is picked as the center longitude of the map, has no distortion.

4. The Universal Transverse Mercator

The UTM projection was developed by the U.S. Army as a world wide grid system. The world is divided into N-S zones of longitude with each zone being 6 degrees wide and having its own central meridian. In California, the zones go from -126 to -120 degrees and -120 degrees to -114.00 degrees. The central meridians are -123 and -117 degrees.

B. Conic Projections

Conic projections involve projecting onto imaginary cones fit over the globe. All Disspla conic projections have two standard reference parallels. The conics supplied by Disspla have a cone axis coincident with the north or south pole.

1) Bi-parallel Conic Conformal (Lambert). The meridians are straight line which intersect when extrapolated to either the north or south pole, depending on the hemisphere of the map. True shapes are depicted at local scales. The parallels are spaced at increasing intervals the farther north or south from the reference parallel. See below for ranges.

2) Bi-parallel Equal Area conic (albers). The parallels are spaced at decreasing intervals the farther north or south of the standard parallels so as to preserve area. see below for ranges.

3) Polyconic on an infinitesimal-graticule. This is an extension of a simple conic using many tangent cones instead of just one. The polyconic is conformal and also adjacent maps can be matched with no discrepency. This is used extensively for topographic maps.

Notes for conic projections

a) The reference parallels are assumed to be at 1/4 the latitude span from the top and bottom of the map unless otherwise specified.

b) The latitude limits must not span the equator. Thus the latitude limits must lie in the range. -90 -0 or 0.0-90o.

c) The longitude must not span more than 360o.

C) Azimuthal Projections

All azimuthal projections are based on the concept of the globe tangent to a plane. The map pole is defined to be the point at which the globe touches the plane of projection. The map pole is at 0o latitude and 0o longitude unless otherwise given. The characteristic of azimuthal projections is that directions to all points from the map pole are not distorted during projection.

1) Gnomonic. This projection is neither conformal or equal area. Also, the map distorts badly at the corners. It does have the important feature that great circles on the globe project as straight lines on the map. The latitude and longitude limits must not exceed 85o from the map pole.

2) Orthographic Projection. This is a true projective view of the globe as seen from infinity. It is neither conformal or equal area. See below for ranges.

3) Stereographic. This is a conformal projection sometimes used for large area maps of the entire hemisphere. See below for ranges.

4) Azimuthal Equidistant. This projection is neither conformal or equal area. It has the feature that lengths from the map pole on the map correspond to lengths on the surface of the sphere. See below for ranges.

5) Azimuthal Equal Area (Lambert). This is an equal area projection. It preserves the area of concentric rings about the map pole. See below for ranges.

Except for the Gnomonic, the azimuthal projections can have latitude and longitude limits up to 90° around the map pole. Even larger limits may be set with the warning that the map may fold back on itself.

D) Elliptical Projections

These projections are sometimes desirable for maps of the entire globe. Several of these projections have important area preserving properties.

1) Molleweide. This is an equal area projection with lines of constant latitude being parallel. This projection distorts at the poles.

2) Aitoff's (Hammer's) projection. This is also equal area, but lines of latitude are not parallel.

3) Sanson (Flamsteed) projection. This projection has lines of constant latitude straight and equally spaced. It has a somewhat unusual shape and is distorted at the edges and poles.

4) Simple Elliptical. This is not truly equal area but somewhat resembles the Molleweide projection. It has a very simple projecting equation.

For the elliptical projections, the longitude may span up to 360° in the range -360° to +360°. The longitude must be in the range -90° to +90°.

2) Cross Sections

The cross sections are defined by the map coordinates A and A', the maximum distance away from A-A' in km, and the depth ranges. Only earthquakes in the workbox will be plotted. The x axis goes from point A (0. km) to point A' (xx km). The distance xx is calculated from the coordinates of A and A'. The user must specify the x-axis increment. The x-axis will draw out an integral number of increments from point A. Thus the x-axis will terminate an integral number of increments with a length less than or equal to the total axis length of xx km. Earthquakes will still be plotted out to xx.

The depth range is given by xdep1 and xdep2. The user must also specify the y-axis increment. The y-axis will be drawn out in an integral number of increments.

As described in the earthquake sifting section, the coordinates of the earthquakes have been transformed into workbox units along A-A' (x'), perpendicular to A-A' (y'), and depth (z). For cross sections along A-A', the coordinates (x', z) are plotted. For perpendicular views of A-A', the coordinates (y', z) are plotted.

3) Time Distance Plot

In addition to workbox sifting, earthquakes must lie in the prescribed time range.

The y-axis is the distance from point A in km in transformed workbox coordinates (x'). The user must enter the distance increment in km. Time is plotted along the x-axis starting at the specified beginning time. The time can be plotted in hours, days, months (approx), or years (approx). The beginning and ending times are given in the form;

690101 1605 79031 2340

where the first 6 digits are (yr, month, day) and the last four digits are (hour, min). The earthquake times are then transformed into a time from the beginning time in the specified time units.

4) Magnitude-time plots

This is a very simple plot which plots spikes with time. The length of the spike is proportional to the magnitude of the event. The time is in user defined units of hours, days, months (approx), or years (approx). Earthquakes must be located in the workbox to be plotted.

5) Magnitude Frequency

This will plot cumulative or incremental (density) numbers of earthquakes with magnitude on a semi-log plot. The summing increment must be specified on the magnitude axis.

A symbol is drawn in the center of each summing interval. For the density plot, each symbol represents the number of events in that interval. For the cumulative number plot, each symbol represents the cumulative number of events with magnitudes greater or equal to the summing increment. In both plots, a line is drawn connecting the symbols.

For the cumulative number plots, the resulting b-value for the event distribution can be calculated. "b" is the slope in the Gutenberg-Richter formula for cumulative number of events with magnitude;

$$\log N \text{ (cumulative)} = a + b \text{ Mag}$$

A smallest magnitude must be specified for calculation of b.

The maximum likelihood estimate of "b" as discussed by Aki (1965) is given by:

$$\hat{b} = \frac{\log_{10} e}{\bar{M} - M_{min}}$$

where M is the average magnitude of the earthquake population and M_{min} is the minimum magnitude. Confidence intervals for this estimate can be found in Aki (1965). The values for b and M_{MIN} are written at the top of the cumulative frequency plot.

For these semi-log plots, a minimum number (y-value) and the number of cycles on the y-axis must be given. The user must also specify the magnitude increment for labeling the x-axis. Xmag1 and Xmag2 are used as the smallest and largest magnitude on the x-axis. Xmag1 and the value M_{min} used in the value computation must be specified separately.

6) Cumulative moment plot

In addition to workbox sifting, the events must lie in the specified time range. The earthquake times are converted into times from the beginning time in the user specified time units.

The seismic moment is a source dependent parameter whereas magnitude depends on the source, instrument and propagation path. For a particular region and instrument, approximate relations between magnitude and moment can be empirically constructed. These relations have the form:

$$M_o = 10^{(a + b\ Mag)}$$

where M_o is the seismic moment in dyne-cm and a,b are constants. For example, in southern California, Thatcher and Hanks (1973) found the following relations:

$$M_o = 10^{(16. + 1.5\ mag)}$$

With this relation the moment corresponding to particular magnitudes would be:

Magnitude	Seismic Moment (dyne-cm)
1	3.16×10^{17}
2	1.0×10^{19}
3	3.16×10^{20}
4	1.0×10^{22}
5	3.16×10^{23}
6	1.0×10^{25}

The program requires the user to specify values of "a" and "b" relevant to the region where his events are located.

The resultant seismic moments are then summed with time to obtain a cumulative plot. The y-axis is self scaling to the data. The events must be chronological in time in the earthquake data segment.

7) Histogram plots

This is a whole series of different plots which represent the data as histograms. The number of events or the summed moment can be plotted with time, distance along A-A', distance perpendicular to A-A', or depth. The summing increment for the appropriate x-axis units must be specified. The y-axis is linear and portrays either numbers or summed moment. For simplicity, the y-axis is self scaling to the data.

8) Frequency time-plot

This is a log-log plot of the frequency of events in time increments after the beginning time. For aftershock sequences, the number of events in a unit time interval at a time from the main shock follow an emperical relation;

$$n(t) = \frac{A}{(t+C)^P}$$

where A,C and P are constants for the sequence. For many sequences, P is found to be slightly greater than 1 (Utsu, 1961). This formula is known as Omori's law.

On a log-log plot, a frequency time plot of an aftershock sequence with P = 1.00 would have a slope of -1. In order to have equally spaced points in time on a log scale, the summing window increases with time. The number of events is then divided by the time length of the summing window. The summing window is specified by the user in fractions of a log-cycle. For an increment equal to one cycle, a symbol is plotted in the geometric center of each log-cycle.

Appendix A

This appendix gives an explanation of the variables in the control segment. The control segment has 30 lines of input parameters. The variable names are listed to the left of each variable number. This segment is read and written with formatted I/O statements and thus the columns are important.

The variables and formats for each line of the control segment will be given

line 1 - format (7x, i1, 7x, i4, 7x, i1, 8x, i1, 6x, i1, 5x, i1, 5x, i1).

device - output plotting device

1 - Tektronix

2 - Versatec

3 - Benson Lehner

4 - Calcomp (Reston)

5 - Disspla post processor

6 - Houston plotter

nbaud - baud rate of Tektronix graphics terminal i.e. 9600

iplot - type of plot to be output

1 - map

2 - cross section

3 - perpendicular view of cross section

4 - time-distance plot

5 - magnitude time plot

6 - magnitude frequency plot

7 - cumulative moment plot

8 - number or moment histogram plot

9 - frequency-time plot

nstyle - type of lettering style

1- cartographic

2 - complex

3 - duplex

4 - gothic

5 - scmplx

6 - simplx

7 - triplex

nalf - type of character set

1 - standard

2 - lower case standard

3 - itallic

4 - lower case itallic

5 - script

6 - lower case script

line 2 format (3x, i1, 4x, i1, 4x, i1, 7x, i1, 7x, i1, 7x, i1, 8x, i1)

ne - control for coding in earthquakes

0 - no earthquake data read in

1 - eq data will be read in

ns - control for reading in station data

0 - no station data reading

1 - station data will be reading

no - control for reading in other data

0 - no other data read in

1 - read in other type of data

netyp - type of earthquake data read in

1 - Hypo71

2 - Hypoellipse

3 - Hypoellypse (no regression info)

4 - user defined (if this is specified, a format must be given on line 4)

nstyp - type of station data read in

1 - Hypo71 (delay model)

2 - Hypo71 (variable first layer)

3 - Hypoellipse

4 - user defined (if this is specified, a format must be given on line 6)

hotyp - type of other data to be read in

1 - user defined (a format must be specified on line 8)

magtyp - magnitude type for hypoellipse earthquake format.

1 - amplitude magnitude

2 - duration magnitude

irot - orientation of plot

1 - y axis perpendicular to motion of paper of output device

2 - y axis parallel to motion of paper

irec -

1 - maps restricted to rectangular plot area

2 - maps not restricted to rectangular plot area

line 3 format (11x,a60)

equake seg - This field is used to specify the segment containing the earthquake data.

line 4 format (A80)

This line is used to specify the user defined format for reading earthquake data.

The symbols in the read statement are kdate (A6), khrmn (A4), lat (integer degrees), "s" in blank (A1), xlat(real minutes), xdepth, xmag, quality (A1).

example; (A6, A4, I2, A1, F5.2, I3, A1, F5.2,2f7.2, 34x, A1)

line 5 (12x, A60)

station seg - This field is used to specify the segment containing the station data.

line 6 (A80)

This line is used to specify the user defined station format

The variables in the read stations are

name (A4), lat (integer degrees), "s" in blank (A1), xlat (decimal minutes), lon (integer degrees), "e" in blank (A1), xlon (decimal minutes).

example format; (A4, I2, A1, f5.2, I3, A1, f5.2)

line 7 (10x, A60)

other seg - This field is used to specify the segment that the other data is in.

line 8 (A80)

This line is used to specify the user defined format for the other data.

The variables in the read statement are:

name (A20), lat (integer degrees), "s" or blank

xlat (decimal minutes), lon (integer degrees), "e" or blank,

xlon (decimal minutes)

line 9 (10x, A60)

digit seg - This field is used to specify the segment used for the user defined boundary file when mfil = 2.

line 10 (A80)

This is the format for the user defined boundary segment.

variables in the read statement are (test (A3), idline (Alat, A lon)).

where test (A3) is used to test whether to lift the pen. idline is the number of (lat, lon) pairs on each line. ALAT and ALON are decimal deegrees.

line 11 (6x, A5, 7x, i1, 7x, i1, 6x, i1, 6x, i1, 5x, i1, 8x, i1, 7x, A4)

dproj - map projection

(cylin) 1 - cylindrical

(merca) 2 - mercator

(exact) 3 - exact cylindrical

(corre) 4 - corrected mercator

(mollw) 5 - molleweide

(aitof) 6 - aitoff

(sanso) 7 - sansom

(ellip) 8 - elliptical

(confo) 9 - conic conformal

(alber)10 - Albers conic equal area

(polyc)11 - polyconic

(mypr2)12 - myproj2(transverse mercator)

(gnomo)13 - gnomic

(ortho)14 - orthographic

(stere)15 - stereographic

(azimu)16 - Azimuthal equidistant

(lambe)17 - lambert azimuthal equal area

(mypr3)18 - Transverse mercator sphericod (CAM UTM)

(mypr1)19 - Universal transverse mercator

ifram - frame for map

0- no frame

1-frame

mgrid - 0- no grid for map

1- grid & frame for map

mfil 0- no boundary file for map

1- Disspla map file

2- user defined map file

mref 0- let Disspla pick reference parallels for conic projection

1-specify standard parallels for conic projection by yllat and yulat on line 12.

mpol 0- point of tangency for azimuthal projections at (0.,0.)

1- specify a point of tangency for azimuthal projections at point (xpole, ypole)

idline- for a user-defined boundary file (mfil = 2), this is the number of (lat-lon) pairs per line of input.

dmpda- for mfil = 1, this is the Disspla boundary segment (A4)

1 - mapdta (mapd)

2 - hershey (hers)

3 - africa (afri)

4 - antarctic (anti)

5 - asia (asia)

6 - australia (aust)

7 - europe (euro)

8 - north america (nort)

9 - south america (sout)

10- pafrica (pafr)

11- pasia (pasi)

12- paustralia (paus)

13- peurope (peur)

14- pnorth america (pnor)

15- psouth america (psou)

16- combined coastlines (coas)

17- combined political (poli)

18- low resolution usa (usal)

19- medium resolution usa (usam)

20- high resolution usa (usah)

line 12 (6x, f8.3, 7x, f8.2, 7x, f8.3, 7x, F8.3)

xpole, ypole - with mpol = 1, these define the point of tangency for azimuthal projection in decimal degress

for example: 30.95, -121.37

yllat, yulat - with mref=1, these define the user-specified standard parallels for conic projections in decimal degrees

i.e. i.e. (+45.90, +65.10)

line 13 (6x, f8.3, 6x, f8.3)

ympol, xmpol - for dproj = "mypro", these specify the cylinder axis direction for the transverse mercator in decimal degrees

ympol should be equal to 0.0 for cylinder axis on equator.

xmpol is the central longitude for the projection.

line 14 (6x, f10.5, 7x, f10.5, 7x, f10.5, 7x, f10.5)

alono, alato - longitude and latitude of the point A in decimal degrees

alonp, alatp - longitude and latitude of the point A' in decimal degrees

These points help define the workbox used for all plots other than maps.

line 15 (6x, F7.3, 6x, I1, 7x, F10.3)

enaap - height of symbols A-A' on map in inches i.e. .21 inches

naap - 0 no symbols A,A' on map

1 draw symbols A,A' on map

Xwid1 - This is the left most distance from A-A' used to define the workbox.

Xwid2 - This is the right most distance from A-A' used to define the workbox.

line 16 (8x, f4.2, 1x, f4.2, 13x, A40)

hite(1) - This is height of the main heading in inches.

hite(2) - Height of the subheading and axis labels in inches.

main heading - This is the main heading for the plot. This must be centered in the 40 character field in order to be centered on the plot.

line 17 (16x, A40)

subheading - This is the subheading for the plot. It must be centered in the 40 character field in order to be centered on the plot.

line 18 (6x, f10.3, 7x, f10.3)

xaxis, yaxis - These define the plot size in inches.

For maps, the plot is expanded to fill the y-axis in inches. The x-axis must be large enough to avoid chopping the latitude range.

For other plots, the x and y axis scale independently.

line 19 (6x, e15.8, 6x, e15.8, 6x, e15.8)

line 20 (6x, e15.8, 6x, e15.8, 6x, 315.8)

line 19 xorig, xstp, xmax

line 20 yorig, ystp, ymax

These are the plot limits and step sizes in axis units. The meaning of these will be explained briefly for each type of plot.

a. maps These variables will be decimal degrees. where

xorig - left most longitude

xstp - longitude increment

xmax - right most longitude

yorig - lower latidude

ystp - latitude increment

ymax - upper latitude

An integral number of intervals should fit in the latitude and longitude range.

b. cross sections For cross sections along A-A';

xorig - 0.0 km (at point A). need not be given

xstp - xaxis increment in km

xmax - xx km where xx is the distance in km between A and A'. This is calculated in maplot2 and need not be given.

For perpendiculer views of A-A':

xorig - (xwid1) in km. Need not be specified here.

xstp - x-axis increment in km

xmax - xwid2 in km. Need not be specified here.

for both type of cross sections:

yorig - xdep1 in km. Need not be specified here.

ystp - depth increment in km.

ymax - xdep2 in km. Need not be specified here.

c. time distance plots The x-axis is in time from the beginning time to the ending time as given on line 27. The time units are also specified on line 27.

The x-axis goes from 0.0 to TT in user defined time units. xorig and xmax need not be specified here. The time increment, xstp, in user time units must be specified. (i.e. 5 months)

The y-axis goes along A-A' from 0.0 km to xx km at point A'. yorig and ymax need not be given, but ystp, the distance increment in km, must be specified (i.e. 2 km)

d. magnitude time plots The x-axis is time from 0.0 to TT in user defined time units. xorig and xmax need not be specified. The time increment must be specified (i.e. 5 days). The y-axis is magnitude and goes from xmag1 to xmag2 as specified on line 21. Yorig and ymax need not be specified, but ystp, the magnitude increment, must be specified.

e. magnitude-frequency plot This is a semi-log plot. The x-axis goes from xmag1 and xmag2 as specified on line 21. Xorig and xmax need not be specified, but the magnitude increment xstp, must be specified. The y-axis is log-number. The smallest number, yorig, must be specified (i.e., 1.).
ystp is the number of cycles on the y-axis (i.e. 2 cycles). Ymax is not used here.

f. cumulative moment plot The x-axis is time from 0.0 to TT in used defined units. Xorig and xmax need not be specified, but xstp, the time increment, must be specified.
The y-axis is cumulative seismic moment in dyne-cm. This axis is self-scaling to the data. Thus, yorig, ystp, and ymax need not be specified.

g. histogram plots The x-axis is time, distance, or depth. Xorig and ymax need not be specified. Xstp must be specified as the increment in the relevant axis units. The y-axis is either number or summed moment. This axis is self scaling. Thus, yorig, ystp, and ymax need not be specified.

h. time-frequency plot This is a log-log plot. The start time after the beginning time must be given, xorig (i.e. .001). This must be given in user defined time units. xstp is the number of cycles to draw on the time axis.

Yorig is the smallest frequency (greater than 0.0) for the y-axis. Ystp is the number of Log cycles to draw (i.e. 2.).

line 21 (6x, f6.3, 7x, f6.3, 8x, f6.3)

xmag1 - this is the small magnitude cutoff

xmag2 - This is the large magnitude cutoff where

xmag1 $\leq$ mag $<$ xmag2

delmag - This is the magnitude increment starting from xmag1 used for different symbol types scaled with magnitude.

line 22 (6x, f7.2, 7x, f7.2, 8x, f7.2)

xdep1 - this is the shallow depth cutoff

xdep2 - this is the deep depth cutoff where

xdep1 $\leq$ depth $<$ xdep1

deldep - This is the depth increment starting from xdep1 used for symbol type 3 which has a different marker for each depth increment.

line 23 (7x, i1, 8x, i1, 8x, i1)

iestyp - type of earthquake symbol

1 - symbol with no scaling

2 - symbol with magnitude scaling

3 - different symbol with each depth increment scaled with magnitude

4 - a number representing magnitude - no scaling

5 - a number or letter representing depth down to 35 km, scaled with magnitude

6 - a letter representing quality, scaled with magnitude

isstyp - type of station symbol

1 - symbol with no label

2 - symbol with station name to the upper right

iostyp - type of OTHER symbol

1 - symbol with no label

2 - symbol with name to the upper right

line 24 (5x, f7.4, 7x, f7.4, 5x, i1)

esiz - a) for earthquake symbol with no scaling, this is the symbol size in inches (i.e. .14 inches)

b) for symbol with magnitude scaling, this is the size of the smallest magnitude symbol allowed.

esdel - a) for symbol with no magnitude scaling this is ignored

b) for symbols with scaling, this is the increase in size between two consecutive magnitude increments (i.e. 0.5 inches)

iem - This is an integer between 0-14 which signifies the marker type. (see figure 2).

line 25 (5x, f7.4, 6x, f7.4, 5x, i2)

ssiz - station symbol size in inches (i.e. .14 inches)

slet - lettering size for station name (i.e. .14 inches)

ism - this is an integer between 0-14 which signifies the marker type (see fig. 2)

line 26 (5x, f7.4, 6x, f7.4, 5x, i2)

osiz - The OTHER marker size in inches (i.e. .14 inches)

olet - lettering size for the OTHER name (i.e. .14 inches)

ism - this is an integer between 0-14 which signifies the marker type. (see fig. 2)

line 27 (7x, A6, 8x, a4, 8x, a6, 8x, a4, 7x, i1)

itmind-(yr, month, day) for beginning time

itminh-(hr, min.) for beginning time

itmaxd-(yr, month, day) for ending time

itmaxh-(hr, min.) for ending time

For all plot other than time plots, these are ignored.

itime - user defined time units for time axis labeling

1 - hours

2 - days

3 - months (approx)

4 - years (approx)

line 28 (6x, f6.3, 7x, 01, 7x, f8.4, 6x, f6.3, 5x, i1, 8x, i1)

This line is for the magnitude frequency plots. For all other plots, this line is ignored.

xbstp - magnitude increment for summing earthquakes

ibsym - a marker between 0-14 for plot symbol (see fig. 2)

bsize - marker size in inches (re .14 inches)

smag - smallest magnitude used for calculation of b-value

ibv -

0 - cumulative frequency with no calculation of b-value

1 - cumulative frequency with calculation of b-value

2 - incremented density plot

ibgrid -

0 - no grid for mag-frequency plot

1 - grid for mag-frequency plot

line 29 (6x, f10.3, 7x, f10.3, 7x, i1, 9x, f10.3)

This line is ignored for all plots other than cumulative moment and histogram plots.

aseis - "a" value in magnitude moment formula

bseis - "b" value in magnitude-moment formula

$$\text{Log } M = a + b \text{ (Mag)}$$

iseis - for histogram plot

1 - earthquake number histogram

2 - summed moment histogram

xmagmin - minimum magnitude in conversion from magnitude to moment

line 30 (7x, i1, 8x, f10.3)

This line is ignored for all plots other than histograms and frequency time plots

itimax - for histogram plots, plot number of events with:

1 - time

2 - distance along a-a'

3 - perpendicular distance from a-a'

4 - depth

xaxinc -

a) for histograms, increment on the x-axis for summing earthquakes in the appropriate units

b) for frequency time plots, the fraction of a log cycle in time used in summing earthquakes.

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UTSU, T., 1961: A statistical study on the occurrence of aftershocks. Geophysical Magazine, vol. 30, no. 4, 521-605.

THATCHER, W., and HANKS, T., 1973: Source parameters of Southern California earthquakes. J. Geophys. Res., Vol. 78, 8547-8576.

```
maplot2
Not You again!!
maplot info. read?  no
do you want to specify an input control segment?  no
do you want to change the default character
sets and sizes? no
specify main heading for this plot; less than 40 char
world map
specify the subheading for the plot.
 less than 40 char.
sanson projection
you have the option to plot:
1-map projection, 2-cross section, 3-a perpendicular
view of the cross section,  4-time/distance plot
5-magnitude-time plot, 6-magnitude-frequency plot,
7-cumulative moment plot, 8-number or moment plot
9-frequency of quakes with time plot  1
do you want to plot eq symbols?  no
do you want to plot stations?  no
do you want to plot another type of symbol?  no
the projections available are;
1-cylindrical, 2- mercator, 3-exact cylindrical,
4-corrected mercator, 5-molleweide, 6-aitoff,
7-sanson, 8-elliptical, 9-conic conformal, 10-albers
equal area conic,11-polyconic,12-transverse mercator
13-gnomonic, 14-orthographic, 15-stereographic
16-azimuthal, 17-lambert equal area
18- trans merc spheroid, 19- universal trans merc
specify the projection desired, 1-19.  7
do you want to specify a coastal or political
boundary?  yes
specify 1-disspla mapfiles 2-user defined.  1
the disspla mapfiles to choose from are;
1-mapda(0.5 deg), 2-hershey(.5 deg), 3-africa(.1deg)
4-antarctica, 5-asia , 6-australasia, 7-europe
8-n america, 9-s america, 10-pafrica(political),
11-pasia, 12-paustraliasia, 13-peurope, 14-pn america
15-ps america, 16-combined coastlines, 17-combined
political boundaries, 18- low res usa state
boundaries, 19- med res usa states, 20- high res
usa states
type a number 1-20.  1
specify the lower lat. ie 36 59.00
-70 00.00
specify the upper lat. ie 39 55.00
70 00.00
specify the latitude increment. be sure that
an integral number of these can fit in the lat range
ie 00 45.00
20 00.00
specify the left most longitude. ie -122 45.00
-270 00.00
specify the right most longitude. ie -120 55.00
90.890 00.00
specify the long increment.  be sure that an
integral number can fit in the longitude range.
ie 00 45.00
60 00.00
do you want the map gridded?  yes
do you want the letters a and ap, endpoints
for a future cross sections on the map?  no
please specify the output device.
1-tektronix, 2-versatec, 3-benson_lehner(menlo)
4-calcomp(reston), 5-disspla post-processor
6- houston plotter.  1
please specify the baud rate of the terminal;
the program normalizes this by 10.
ie  9600 ;  9600
specify the length of the y-axis in inches
the plot will be expanded such that the
latitude range of the central meridian
of the map just fits in the number of inches.
example; 6.
6.
specify the number of inches on the x-axis
this doesnt affect map scaling.
example; 8.0
15.
do you want these input parameters written to
an output control segment for future use?  yes
specify the output control segment
control.10
do you want to 1-plot, 2-terminate session,
or 3-alter input parameters again.  1
```

<<<<< CONTROL.11 >>>>>

```
maplot2
OH NO! Another space cadet!
maplot info. read?  no
do you want to specify an input control segment?  no
do you want to change the default character
sets and sizes? no
specify main heading for this plot; less than 40 char
central california earthquakes
specify the subheading for the plot.
 less than 40 char.
740101-740401
you have the option to plot:
1-map projection, 2-cross section, 3-a perpendicular
view of the cross section,  4-time/distance plot
5-magnitude-time plot, 6-magnitude-frequency plot,
7-cumulative moment plot, 8-number or moment plot
9-frequency of quakes with time plot  1
do you want to plot eq symbols?  yes
specify the segment to read eq data from
                >UDD>Caldata>RNowack>map_dir>santuis.test
specify the eq format 1-4
1- hypo71, 2-hypoellipse,
3- hypoellipse(no regression info), 4- user defined
1
specify the lower mag cutoff for eq selection
the lower limit is included
0.
specify the upper mag cutoff for eq selection
the upper limit is not included in interval
5.
specify a shallow depth for eq selection
0.
specify a deeper cutoff in depth for eq selection
the deep limit is not included in the selection
30.
various eq symbols can be plotted
1-symbol no scaling  2-symbol with magnitude scaling
3-different symbol with depth-with mag scaling
4-a number representing mag- no scaling
5- a number or letter for depth down to 35 km.
     scaled with magnitude.
6-letter representing quality- with mag scaling
2
specify the number 0-14 for the symbol desired
see page 33 of the disspla pocket manual
1
specify the magnitude increment used in
symbol scaling. ie 1.
1.
specify the symbol size for the lower mag
cutoff. ie .05 (inches)
.1
specify the increase in size between consecutive
magnitude increments in inches. ie .05
.05
do you want to plot stations?  no
do you want to plot another type of symbol?  no
the projections available are;
1-cylindrical, 2- mercator, 3-exact cylindrical,
4-corrected mercator, 5-molleweide, 6-aitoff,
7-sanson, 8-elliptical, 9-conic conformal, 10-albers
equal area conic,11-polyconic,12-transverse mercator
13-gnomonic, 14-orthographic, 15-stereographic
16-azimuthal, 17-lambert equal area
18- trans merc spheroid, 19- universal trans merc
specify the projection desired, 1-19.  11
do you wish to specify the reference parallels
disspla will otherwise choose them for you.
no
do you want to specify a coastal or political
boundary?  yes
specify 1-disspla mapfiles 2-user defined.  2
specify the segment for boundary data
>udd>Caldata>RNowack>map_dir>calif2
the variables of the read statement are;
test(a3),t1,idline*(lat(dec deg),lon(dec deg))
if test is blank, then the line is ignored and
 the pen is lifted.

enter the number of lat-lon pairs per line.  6
specify the format for reading the (lat-lon) pairs
ie (a3,t1,3(f10.2,f10.2))
(a3,t1,6(f5.2,f6.2))
specify the lower lat. ie 36 59.00
36 30.00
specify the upper lat. ie 39 55.00
37 30.00
specify the latitude increment. be sure that
an integral number of these can fit in the lat range
ie 00 45.00
00 15.00
specify the left most longitude. ie -122 45.00
-121 45.00
specify the right most longitude. ie -120 55.00
-120 30.00
specify the long increment.  be sure that an
integral number can fit in the longitude range.
ie 00 45.00
00 15.00
```

```
do you want the map gridded?  yes
do you want the letters a and ap, endpoints
for a future cross sections on the map?  no
please specify the output device.
1-tektronix, 2-versatec, 3-benson_lehner(menlo)
4-calcomp(reston), 5-disspla post-processor
6- houston plotter.  1
please specify the baud rate of the terminal;
the program normalizes this by 10.
ie  9600 ;  9600
specify the length of the y-axis in inches
the plot will be expanded such that the
latitude range of the central meridian
of the map just fits in the number of inches.
example; 6.
7.
specify the number of inches on the x-axis
this doesnt affect map scaling.
example; 8.0
8.
do you want these input parameters written to
an output control segment for future use?  yes
specify the output control segment
control.11
do you want to 1-plot, 2-terminate session,
or 3-alter input parameters again.  1
```

```
&&&&& CONTROL.12A &&&&&
maplot2
Welcome to maplot2
maplot info. read?  no
do you want to specify an input control segment?  no
do you want to change the default character
sets and sizes? no
specify main heading for this plot; less than 40 char
wwssn stations for continental us
specify the subheading for the plot.
 less than 40 char.
albers equal area projection
you have the option to plot:
1-map projection, 2-cross section, 3-a perpendicular
view of the cross section,  4-time/distance plot
5-magnitude-time plot, 6-magnitude-frequency plot,
7-cumulative moment plot, 8-number or moment plot
9-frequency of quakes with time plot  1
do you want to plot eq symbols?  no
do you want to plot stations?  yes
specify the segment to read station data from
>udd>Caldata>RNowack>map_dir>wwssn.stations
specify the station format 1-4
1-hypo71 (delay model), 2-hypo71 (variable first
 layer) 3-hypoellipse, 4-user defined format
4
specify input station format
the variables in the read statement are;
name(a4),lat(deg),(s) or blank,xlat(min),
lon(deg),(e)or blank,xlon(min)
(2x,a4,i2,a1,f5.2,1x,i3,a1,f5.2)
specify a number 0-14 for the station symbol desired
see page 33 of disspla pocket manual
2
specify the symbol size in inches. ie .14
.08
do you want the name(a4) next to the symbol?  yes
specify the lettering height of the name
in inches.  ie .14
.08
do you want to plot another type of symbol?  no
the projections available are;
1-cylindrical, 2- mercator, 3-exact cylindrical,
4-corrected mercator, 5-molleweide, 6-aitoff,
7-sanson, 8-elliptical, 9-conic conformal, 10-albers
equal area conic,11-polyconic,12-transverse mercator
13-gnomonic, 14-orthographic, 15-stereographic
16-azimuthal, 17-lambert equal area
18- trans merc spheroid, 19- universal trans merc
specify the projection desired, 1-19.  10
do you wish to specify the reference parallels
disspla will otherwise choose them for you.
no
do you want to specify a coastal or political
boundary?  yes
specify 1-disspla mapfiles 2-user defined.  1
the disspla mapfiles to choose from are;
1-mapda(0.5 deg), 2-hershey(.5 deg), 3-africa(.1deg)
4-antarctica, 5-asia , 6-australasia, 7-europe
8-n america, 9-s america, 10-pafrica(political),
11-pasia, 12-paustraliasia, 13-peurope, 14-pn america
15-ps america, 16-combined coastlines, 17-combined
political boundaries, 18- low res usa state
boundaries, 19- med res usa states, 20- high res
usa states
type a number 1-20.  8
specify the lower lat. ie 36 59.00
20 00.00
specify the upper lat. ie 39 55.00
50 00.00
specify the latitude increment. be sure that
an integral number of these can fit in the lat range
ie 00 45.00
10 00.00
specify the left most longitude. ie -122 45.00
-130 00.00
specify the right most longitude. ie -120 55.00
-60 00.00
specify the long increment.  be sure that an
integral number can fit in the longitude range.
ie 00 45.00
10 00.00
do you want the map gridded?  yes
do you want the letters a and ap, endpoints
for a future cross sections on the map?  no
please specify the output device.
1-tektronix, 2-versatec, 3-benson_lehner(menlo)
4-calcomp(reston), 5-disspla post-processor
6- houston plotter.  1
please specify the baud rate of the terminal;
the program normalizes this by 10.
ie  9600 ;  9600
specify the length of the y-axis in inches
the plot will be expanded such that the
latitude range of the central meridian
of the map just fits in the number of inches.
example; 6.
6.00
```

```
specify the number of inches on the x-axis
this doesnt affect map scaling.
example; 8.0
10.00
do you want these input parameters written to
an output control segment for future use?  yes
specify the output control segment
control.12a
do you want to 1-plot, 2-terminate session,
or 3-alter input parameters again.  1
```

```
&&&&& CONTROL.1 &&&&&
maplot2
Happy Easter from maplot2
maplot info. read?  no
do you want to specify an input control segment?  no
do you want to change the default character
sets and sizes? no
specify main heading for this plot; less than 40 char
parkfield earthquakes
specify the subheading for the plot.
 less than 40 char.
771201-780901
you have the option to plot:
1-map projection, 2-cross section, 3-a perpendicular
view of the cross section, 4-time/distance plot
5-magnitude-time plot, 6-magnitude-frequency plot,
7-cumulative moment plot, 8-number or moment plot
9-frequency of quakes with time plot  1
do you want to plot eq symbols?  yes
specify the segment to read eq data from
>udd>Caldata>RNowack>map_dir>mapdata.eq1
specify the eq format 1-4
1- hypo71, 2-hypoellipse,
3- hypoellipse(no regression info), 4- user defined
2
for hypoellipse format, do you want
0-ampl magnitude, 1-duration mag.  0
specify the lower mag cutoff for eq selection
the lower limit is included
0.
specify the upper mag cutoff for eq selection
the upper limit is not included in interval
5.
specify a shallow depth for eq selection
0.
specify a deeper cutoff in depth for eq selection
the deep limit is not included in the selection
20.
various eq symbols can be plotted
1-symbol no scaling  2-symbol with magnitude scaling
3-different symbol with depth-with mag scaling
4-a number representing mag- no scaling
5- a number or letter for depth down to 35 km.
     scaled with magnitude.
6-letter representing quality- with mag scaling
2
specify the number 0-14 for the symbol desired
see page 33 of the disspla pocket manual
1
specify the magnitude increment used in
symbol scaling. ie 1.
1.
specify the symbol size for the lower mag
cutoff. ie .05 (inches)
.05
specify the increase in size between consecutive
magnitude increments in inches. ie .05
.05
do you want to plot stations?  no
do you want to plot another type of symbol?  no
the projections available are;
1-cylindrical, 2- mercator, 3-exact cylindrical,
4-corrected mercator, 5-molleweide, 6-aitoff,
7-sanson, 8-elliptical, 9-conic conformal, 10-albers
equal area conic,11-polyconic,12-transverse mercator
13-gnomonic, 14-orthographic, 15-stereographic
16-azimuthal, 17-lambert equal area
18- trans merc spheroid, 19- universal trans merc
specify the projection desired, 1-19.  11
do you wish to specify the reference parallels
disspla will otherwise choose them for you.
no
do you want to specify a coastal or political
boundary?  no
specify the lower lat. ie 36 59.00
35 30.00
specify the upper lat. ie 39 55.00
36 15.00
specify the latitude increment. be sure that
an integral number of these can fit in the lat range
ie 00 45.00
00 15.00
specify the left most longitude. ie -122 45.00
-120 45.00
specify the right most longitude. ie -120 55.00
-120 00.00
specify the long increment.  be sure that an
integral number can fit in the longitude range.
ie 00 45.00
00 15.00
do you want the map gridded?  yes
do you want the letters a and ap, endpoints
for a future cross sections on the map?  yes
```

```
specify the height of the letters a and ap on
the map. ie .14
.14
specify the lat and long of point a.
ie -36 59.00 -122 55.00
36 7.20 -120 42.00
specify the lat and long of point ap.
ie -37 55.00 -119 45.00
35 33.00 -120 6.00
the distance in km between a and ap is
    83.301 km
please specify the output device.
1-tektronix, 2-versatec, 3-benson_lehner(menlo)
4-calcomp(reston), 5-disspla post-processor
6- houston plotter.  1
please specify the baud rate of the terminal;
the program normalizes this by 10.
ie  9600 ;  9600
specify the length of the y-axis in inches
the plot will be expanded such that the
latitude range of the central meridian
of the map just fits in the number of inches.
example; 6.
7.0
specify the number of inches on the x-axis
this doesnt affect map scaling.
example; 8.0
70#.0
do you want these input parameters written to
an output control segment for future use?  yes
specify the output control segment
control.1
do you want to 1-plot, 2-terminate session,
or 3-alter input parameters again.  1
```

&&&&& CONTROL.2 &&&&&

```
maplot2
Not You again!!
maplot info. read?  no
do you want to specify an input control segment?  no
do you want to change the default character
sets and sizes? no
specify main heading for this plot; less than 40 char
parkfield earthquakes
specify the subheading for the plot.
 less than 40 char.
771201-780801
you have the option to plot:
1-map projection, 2-cross section, 3-a perpendicular
view of the cross section,  4-time/distance plot
5-magnitude-time plot, 6-magnitude-frequency plot,
7-cumulative moment plot, 8-number or moment plot
9-frequency of quakes with time plot  2
specify the segment to read eq data from
>udd>Caldata>RNowack>map_dir>mapdata.eq1
specify the eq format 1-4
1- hypo71, 2-hypoellipse,
3- hypoellipse(no regression info), 4- user defined
2
for hypoellipse format, do you want
0-ampl magnitude, 1-duration mag.  0
specify the lower mag cutoff for eq selection
the lower limit is included
0.
specify the upper mag cutoff for eq selection
the upper limit is not included in interval
5.
specify a shallow depth for eq selection
0.
specify a deeper cutoff in depth for eq selection
the deep limit is not included in the selection
20.
various eq symbols can be plotted
1-symbol no scaling  2-symbol with magnitude scaling
3-different symbol with depth-with mag scaling
4-a number representing mag- no scaling
5- a number or letter for depth down to 35 km.
     scaled with magnitude.
6-letter representing quality- with mag scaling
2
specify the number 0-14 for the symbol desired
see page 33 of the disspla pocket manual
1
specify the magnitude increment used in
symbol scaling. ie 1.
1.
specify the symbol size for the lower mag
cutoff. ie .05 (inches)
.05
specify the increase in size between consecutive
magnitude increments in inches. ie .05
.05
specify the lat and long of point a.
ie -36 59.00 -122 55.00
36 7.2 -120 42.00
specify the lat and long of point ap.
ie -37 55.00 -119 45.00
35 33.00 -120 6.00
the distance in km between a and ap is
     83.301 km
specify the max distance away from the line
a-ap in km for which eqs will be included.
20.
the distance goes from 0.00 to  83.30 in km
specify the distance increment in km on the x-axis
20.
the depth goes from  0.00 to 20.00 in km
specify the depth increment in km
5.
please specify the output device.
1-tektronix, 2-versatec, 3-benson_lehner(menlo)
4-calcomp(reston), 5-disspla post-processor
6- houston plotter.  1
please specify the baud rate of the terminal;
the program normalizes this by 10.
ie  9600 ;  9600
for the cross sections, do you want the distance
 and depth plotted at the same scale?  yes
specify the length of the x-axis in inches.
8.
the length of the y-axis is    1.921
do you want these input parameters written to
an output control segment for future use?  yes
specify the output control segment
control.2
do you want to 1-plot, 2-terminate session,
or 3-alter input parameters again.  1
```

```
maplot2
Welcome to maplot2
maplot info. read?  no
do you want to specify an input control segment?  no
do you want to change the default character
sets and sizes? no
specify main heading for this plot; less than 40 char
parkfield earthquakes
specify the subheading for the plot.
 less than 40 char.
771201-790901
you have the option to plot:
1-map projection, 2-cross section, 3-a perpendicular
view of the cross section,  4-time/distance plot
5-magnitude-time plot, 6-magnitude-frequency plot,
7-cumulative moment plot, 8-number or moment plot
9-frequency of quakes with time plot  3
specify the segment to read eq data from
>udd>Caldata>RNowack>map_dir>mapdata.eq1
specify the eq format 1-4
1- hypo71, 2-hypoellipse,
3- hypoellipse(no regression info), 4- user defined
2
for hypoellipse format, do you want
0-ampl magnitude, 1-duration mag.  0
specify the lower mag cutoff for eq selection
the lower limit is included
0.
specify the upper mag cutoff for eq selection
the upper limit is not included in interval
5.
specify a shallow depth for eq selection
0.
specify a deeper cutoff in depth for eq selection
the deep limit is not included in the selection
20.
various eq symbols can be plotted
1-symbol no scaling  2-symbol with magnitude scaling
3-different symbol with depth-with mag scaling
4-a number representing mag- no scaling
5- a number or letter for depth down to 35 km.
     scaled with magnitude.
6-letter representing quality- with mag scaling
2
specify the number 0-14 for the symbol desired
see page 33 of the dissplа pocket manual
1
specify the magnitude increment used in
symbol scaling. ie 1.
1.
specify the symbol size for the lower mag
cutoff. ie .05 (inches)
.05
specify the increase in size between consecutive
magnitude increments in inches. ie .05
.05
specify the lat and long of point a.
ie -36 50.00 -122 55.00
36 7.20 -120 42.00
specify the lat and long of point ap.
ie -37 55.00 -119 45.00
35 33.00 -120 6.00
the distance in km between a and ap is
    83.301 km
specify the max distance away from the line
a-ap in km for which eqs will be included.
20.
the x axis goes from -20.00 to  20.00 in km
specify the  distance increment in km
10.
the depth goes from  0.00 to  20.00 in km
specify the depth increment in km
5.
please specify the output device.
1-tektronix, 2-versatec, 3-benson_lehner(menlo)
4-calcomp(reston), 5-dissplа post-processor
6- houston plotter.  1
please specify the baud rate of the terminal;
the program normalizes this by 10.
ie  9600 ;  9600
for the cross sections, do you want the distance
 and depth plotted at the same scale?  yes
specify the length of the x-axis in inches.
7.
the length of the y-axis is   3.500
do you want these input parameters written to
an output control segment for future use?  yes

specify the output control segment
control.3
do you wa t to 1-plot, 2-terminate session,
or 3-alter input parameters again.  1
```

```
maplot2
Not You again!!
maplot info. read?  no
do you want to specify an input control segment?  no
do you want to change the default character
sets and sizes? no
specify main heading for this plot; less than 40 char
parkfield earthquakes
specify the subheading for the plot.
 less than 40 char.
771201-780901
you have the option to plot:
1-map projection, 2-cross section, 3-a perpendicular
view of the cross section,  4-time/distance plot
5-magnitude-time plot, 6-magnitude-frequency plot,
7-cumulative moment plot, 8-number or moment plot
9-frequency of quakes with time plot  4
specify the segment to read eq data from
>udd>Caldata>RNOwack>map_dir>mapdata.eq1
specify the eq format 1-4
1- hypo71, 2-hypoellipse,
3- hypoellipse(no regression info), 4- user defined
2
for hypoellipse format, do you want
0-ampl magnitude, 1-duration mag.  0
specify the lower mag cutoff for eq selection
the lower limit is included
0.
specify the upper mag cutoff for eq selection
the upper limit is not included in interval
5.
specify a shallow depth for eq selection
0.
specify a deeper cutoff in depth for eq selection
the deep limit is not included in the selection
20.
various eq symbols can be plotted
1-symbol no scaling  2-symbol with magnitude scaling
3-different symbol with depth-with mag scaling
4-a number representing mag- no scaling
5- a number or letter for depth down to 35 km.
     scaled with magnitude.
6-letter representing quality- with mag scaling
2
specify the number 0-14 for the symbol desired
see page 33 of the dissplа pocket manual
1
specify the magnitude increment used in
symbol scaling. ie 1.
1.
specify the symbol size for the lower mag
cutoff. ie .05 (inches)
.05
specify the increase in size between consecutive
magnitude increments in inches. ie .05
.05
specify the lat and long of point a.
ie -36 59.00 -122 55.00
36 7.2 -120 42.00
specify the lat and long of point ap.
ie -37 55.00 -119 45.00
35 33.00 -120 6.00
the distance in km between a and ap is
    83.301 km
specify the max distance away from the line
a-ap in km for which eqs will be included.
20.
do you want to specify the time axis in 1-hours
2-days, 3-months(aprox), 4-years(aprox)?  3
specify the beginning time in years,months,
days, and hours.
specify the beginning time in (16,1x,14) format;
ie 761123 1812
771201 0000
specify the ending time in (16,1x,14) format;
ie 770112 0024
780901 0000
the distance goes from 0.00 to  93.30 in km
specify the distance increment on the y-axis in km
20.
specify the time increment in the time units
desired. ie 5. (days)
1
please specify the output device.
1-tektronix, 2-versatec, 3-benson_lehner(menlo)
4-calcomp(reston), 5-dissplа post-processor
6- houston plotter.  1
```

```
please specify the baud rate of the terminal;
the program normalizes this by 10.
ie  9600 ;  9600
specify the length of the y-axis in inches
example; 6.
5.
specify the number of inches on the x-axis
example; 8.0
7.
do you want these input parameters written to
an output control segment for future use?  yes
specify the output control segment
control.4
do you want to 1-plot, 2-terminate session,
or 3-alter input parameters again.  1
```

```
&&&&& CONTROL.5 &&&&&

maplot2
buenos dias from maplot2
maplot info. read?  no
do you want to specify an input control segment?  no
do you want to change the default character
sets and sizes? no
specify main heading for this plot; less than 40 char
parkfile##eld earthquakes
specify the subheading for the plot.
 less than 40 char.
771201-780801
you have the option to plot:
1-map projection, 2-cross section, 3-a perpendicular
view of the cross section,  4-time/distance plot
5-magnitude-time plot, 6-magnitude-frequency plot,
7-cumulative moment plot, 8-number or moment plot
9-frequency of quakes with time plot  5
specify the segment to read eq data from
>udd>Caldata>RNowack>map_die#r>mapdata.eq1
specify the eq format 1-4
1- hypo71, 2-hypoellipse,
3- hypoellipse(no regression info), 4- user defined
2
for hypoellipse format, do you want
0-ampl magnitude, 1-duration mag.  0
specify the lower mag cutoff for eq selection
the lower limit is included
0.
specify the upper mag cutoff for eq selection
the upper limit is not included in interval
5.
specify a shallow depth for eq selection
0.
specify a deeper cutoff in depth for eq selection
the deep limit is not included in the selection
20.
specify the lat and long of point a.
ie -36 59.00 -122 55.00
36 7.2 -120 42.00
specify the lat and long of point ap.
ie -37 55.00 -119 45.00
35 33.00 -120 6.00
the distance in km between a and ap is
     83.301 km
specify the max distance away from the line
a-ap in km for which eqs will be included.
20.
do you want to specify the time axis in 1-hours
2-days, 3-months(aprox), 4-years(aprox)?  3
specify the beginning time in years,months,
days, and hours.
specify the beginning time in (i6,1x,i4) format;
ie 761123 1812
771201 0000
specify the ending time in (i6,1x,i4) format;
ie 770112 0024
780801 0000
specify the smallest magnitude to plot
for the mag-time plot. ie 2.00
0.0
specify the largest magnitude to plot.  ie 5.0
5.0
specify the magnitude increment on the axis.
1.
specify the time increment for the y-axis
in the time units chosen. ie 5.(days)
1.
please specify the output device.
1-tektronix, 2-versatec, 3-benson_lehner(menlo)
4-calcomp(reston), 5-dissp1a post-processor
6- houston plotter.  1
please specify the baud rate of the terminal;
the program normalizes this by 10.
ie  9600 ;  9600
specify the length of the y-axis in inches
example; 6.
5.
specify the number of inches on the x-axis
example; 8.0
7.
do you want these input parameters written to
an output control segment for future use?  yes
specify the output control segment
control.5
do you want to 1-plot, 2-terminate session,
or 3-alter input parameters again.  1
```

&&&&& CONTROL.6 &&&&&

```
maplot2
Greetings from maplot2
maplot info. read?  no
do you want to specify an input control segment?  no
do you want to change the default character
sets and sizes? no
specify main heading for this plot; less than 40 char
parkfield earthquakes
specify the subheading for the plot.
 less than 40 char.
771201-780801
you have the option to plot:
1-map projection, 2-cross section, 3-a perpendicular
view of the cross section,  4-time/distance plot
5-magnitude-time plot, 6-magnitude-frequency plot,
7-cumulative moment plot, 8-number or moment plot
9-frequency of quakes with time plot  6
specify the segment to read eq data from
>udd>Caldata>RNowack>map_dir>mapdata.eq1
specify the eq format 1-4
1- hypo71, 2-hypoellipse,
3- hypoellipse(no regression info), 4- user defined
2
for hypoellipse format, do you want
0-ampl magnitude, 1-duration mag.  0
specify the lower mag cutoff for eq selection
the lower limit is included
0.
specify the upper mag cutoff for eq selection
the upper limit is not included in interval
5.
specify a shallow depth for eq selection
0.
specify a deeper cutoff in depth for eq selection
the deep limit is not included in the selection
20.
specify the lat and long of point a.
ie -36 59.00 -122 55.00
36 7.2 -120 6.00
specify the lat and long of point ap.
ie -37 55.00 -119 45.00
35 33.00 -120 6.00
the distance in km between a and ap is
    63.245 km
specify the max distance away from the line
a-ap in km for which eqs will be included.
20.
do you want to specify the time axis in 1-hours
2-days, 3-months(aprox), 4-years(aprox)?  3
specify the beginning time in years,months,
days, and hours.
specify the beginning time in (i6,1x,i4) format;
ie 761123 1812
771201  0000
specify the ending time in (i6,1x,i4) format;
ie 770112 0024
780801 0000
the magnitude on the x-axis goes from
 0.00 to 5.00
specify the magnitude increment to plot on the x-axis
1.
specify the magnitude increment used
for summing earthquakes. ie (.25 mag units)
.25
do you want to plot 1) cumulative function,
2) density histogram function 1
specify the smallest y-value for the
semi-log plot. ie 10. (number of quakes)
1.
specify the number of cycles for the y-axis
2.
specify the symbol number (0-14) for plotting
frequency-magnitude data points.
1
specify the symbol size in inches.
.14
do you want the semi-log plot gridded?  yes
do you want the b-value computed ? yes
specify the smallest magnitude used in calculating
the b-value. ie (1.5)
1.5
please specify the output device.
1-tektronix, 2-versatec, 3-benson_lehner(menlo)
4-calcomp(reston), 5-dissplа post-processor
6- houston plotter.  1
please specify the baud rate of the terminal;
the program normalizes this by 10.
ie  9600 ;  9600
specify the length of the y-axis in inches
example; 6.
7.
specify the number of inches on the x-axis
example; 8.0
7.
do you want these input parameters written to
an output control segment for future use?  yes
specify the output control segment
control.6
do you want to 1-plot, 2-terminate session,
or 3-alter input parameters again.  1
```

```
 maplot2
Welcome to maplot2
maplot info. read?  no
do you want to specify an input control segment?  no
do you want to change the default character
sets and sizes? m#no
specify main heading for this plot; less than 40 char
parkfield earthquakes
specify the subheading for the plot.
 less than 40 char.
771201-780901
you have the option to plot:
1-map projection, 2-cross section, 3-a perpendicular
view of the cross section,  4-time/distance plot
5-magnitude-time plot, 6-magnitude-frequency plot,
7-cumulative moment plot, 8-number or moment plot
9-frequency of quakes with time plot  7
specify the segment to read eq data from
>udd>Caldata>RNowack>map_dir>mapdata.eq1
specify the eq format 1-4
1- hypo71, 2-hypoellipse,
3- hypoellipse(no regression info), 4- user defined
2
for hypoellipse format, do you want
0-ampl magnitude, 1-duration mag.  0
specify the lower mag cutoff for eq selection
the lower limit is included
0.
specify the upper mag cutoff for eq selection
the upper limit is not included in interval
5.
specify a shallow depth for eq selection
0.
specify a deeper cutoff in depth for eq selection
the deep limit is not included in the selection
20.
specify the lat and long of point a.
ie -36 59.00 -122 55.00
36 7.2 -120 42.00
specify the lat and long of point ap.
ie -37 55.00 -119 45.00
35 33.00 -120 6.00
the distance in km between a and ap is
    83.301 km
specify the max distance away from the line
a-ap in km for which eqs will be included.
20.
do you want to specify the time axis in 1-hours
2-days, 3-months(aprox), 4-years(aprox)?  3
specify the beginning time in years,months,
days, and hours.
specify the beginning time in (i6,1x,i4) format;
ie 761123 1812
771201 0000
specify the ending time in (i6,1x,i4) format;
ie 770112 0024
780901 0000
the seismic moment can be defined from the
magnitude from a regional and size dependent
relation;
    moment=10**(a+b*magnitude)
the hanks and thatcher relation has
 a=16.  and b=1.5 .
for example, with these values;
magnitude      moment(dyne-cm)
   1             3.16e17
   2             1.0e19
   3             3.16e20
   4             1.0e22
   5             3.16e23
   6             1.0e25
specify the value for b in the moment-mag relation
1.5
specify the value for a in the moment-mag relation
16.0
specify the smallest magnitude used in
calculating the moment
2.
specify the x-axis length increment
 for axis labelling.
ie 5.   (days),  etc.,
1.
please specify the output device.
1-tektronix, 2-versatec, 3-benson_lehner(menlo)
4-calcomp(reston), 5-disspla post-processor
6- houston plotter.  1
please specify the baud rate of the terminal;
the program normalizes this by 10.
ie  9600 ;  9600
specify the length of the y-axis in inches
example; 6.
5.
```

```
specify the number of inches on the x-axis
example; 8.0
7.
do you want these input parameters written to
an output control segment for future use?  yes
specify the output control segment
control.7
do you wa t to 1-plot, 2-terminate session,
or 3-alter input parameters again.  1
```

```
 maplot2
Greetings from maplot2
maplot info. read?  no
do you want to specify an input control segment?  no
do you want to change the default character
sets and sizes? no
specify main heading for this plot; less than 40 char
parkfield earthquakes
specify the subheading for the plot.
 less than 40 char.
771201-780901
you have the option to plot:
1-map projection, 2-cross section, 3-a perpendicular
view of the cross section,  4-time/distance plot
5-magnitude-time plot, 6-magnitude-frequency plot,
7-cumulative moment plot, 8-number or moment plot
9-frequency of quakes with time plot  8
specify the segment to read eq data from
>udd>Caldata>RNowack>map_dir>mapdata.eq1
specify the eq format 1-4
1- hypo71, 2-hypoellipse,
3- hypoellipse(no regression info), 4- user defined
2
for hypoellipse format, do you want
0-ampl magnitude, 1-duration mag.  0
specify the lower mag cutoff for eq selection
the lower limit is included
0.
specify the upper mag cutoff for eq selection
the upper limit is not included in interval
5.
specify a shallow depth for eq selection
0.
specify a deeper cutoff in depth for eq selection
the deep limit is not included in the selection
20.
specify the lat and long of point a.
ie -36 59.00 -122 55.00
36 7.2 -120 42.00
specify the lat and long of point ap.
ie -37 55.00 -119 45.00
35 33.00 -120 6.00
the distance in km between a and ap is
    83.201 km
specify the max distance away from the line
a-ap in km for which eqs will be included.
20.
do you want to plot the number of earthquakes
with 1-time, 2-distance from a-ap, 3- perpendicular
distance from a-ap, 4-depth
1
do you want to specify the time axis in 1-hours
2-days, 3-months(aprox), 4-years(aprox)?  3
specify the beginning time in years,months,
days, and hours.
specify the beginning time in (i6,1x,i4) format;
ie 761123 1812
771201 0000
specify the ending time in (i6,1x,i4) format;
ie 770112 0024
780901 0000
do you want to sum 1-equake numbers or
2-equake moments.  1
specify the x-axis plotting increment
in the desired units. ie 5. (km) or (days) etc.
1.
specify the x-axis increment used for summing
earthquakes in the desired units. ie 2. (km) etc.
.20
please specify the output device.
1-tektronix, 2-versatec, 3-benson_lehner(menlo)
4-calcomp(reston), 5-disspla post-processor
6- houston plotter.  1
please specify the baud rate of the terminal;
the program normalizes this by 10.
ie  9600 ;  9600
specify the length of the y-axis in inches
example; 6.
5.
specify the number of inches on the x-axis
example; 8.0
7.
do you want these input parameters written to
an output control segment for future use?  yes
specify the output control segment
control.8a
do you want to 1-plot, 2-terminate session,
or 3-alter input parameters again.  1
```

```
maplot2
Welcome to maplot2
maplot info. read?  no
do you want to specify an input control segment?  no
do you want to change the default character
sets and sizes? no
specify main heading for this plot; less than 40 char
parkfield earthquakes
specify the subheading for the plot.
 less than 40 char.
771201-780901
you have the option to plot:
1-map projection, 2-cross section, 3-a perpendicular
view of the cross section,  4-time/distance plot
5-magnitude-time plot, 6-magnitude-frequency plot,
7-cumulative moment plot, 8-number or moment plot
9-frequency of quakes with time plot  8
specify the segment to read eq data from
>udd>Caldata>RHowack>map_dir>mapdata.eq1
specify the eq format 1-4
1- hypo71, 2-hypoellipse,
3- hypoellipse(no regression info), 4- user defined
2
for hypoellipse format, do you want
0-ampl magnitude, 1-duration mag.  0
specify the lower mag cutoff for eq selection
the lower limit is included
0.
specify the upper mag cutoff for eq selection
the upper limit is not included in interval
5.
specify a shallow depth for eq selection
0.
specify a deeper cutoff in depth for eq selection
the deep limit is not included in the selection
20.
specify the lat and long of point a.
ie -36 59.00 -122 55.00
36 7.2 -120 42.00
specify the lat and long of point ap.
ie -37 55.00 -119 45.00
35 33.00 -120 6.00
the distance in km between a and ap is
    93.301 km
specify the max distance away from the line
a-ap in km for which eqs will be included.
20.
do you want to plot the number of earthquakes
with 1-time, 2-distance from a-ap, 3- perpendicular
distance from a-ap, 4-depth
2
do you want to sum 1-equake numbers or
2-equake moments.  1
the x-axis goes along a-ap from 0.00 to   93.301
specify the x-axis plotting increment
in the desired units. ie 5. (km) or (days) etc.
20.
specify the x-axis increment used for summing
earthquakes in the desired units. ie 2. (km) etc.
2.
please specify the output device.
1-tektronix, 2-versatec, 3-benson_lehner(menlo)
4-calcomp(reston), 5-disspla post-processor
6- houston plotter.  1
please specify the baud rate of the terminal;
the program normalizes this by 10.
ie  9600 ;  9600
specify the length of the y-axis in inches
example; 6.
5.
specify the number of inches on the x-axis
example; 8.0
7.
do you want these input parameters written to
an output control segment for future use?  yes
specify the output control segment
control.8b
do you want to 1-plot, 2-terminate session,
or 3-alter input parameters again.  1
```

```
&&&&&&&&&& CONTROL.10 &&&&&&&&&&

 1    idevice=1,nbaud=9600,iplot=1,nstyle=5,nalf=1,irot=1,irec=1;
 2    ne=0,ns=0,not=0,netyp=0,nstyp=0,notyp=0,magtyp=0;
 3    equake seg:
 4
 5    station seg:
 6
 7    other seg:
 8
 9    digit seg:
10
11    dproj=sanso,ifram=0,mgrid=1,mfil=1,mref=0mpol=0,idline=0,dmpda=mapd;
12    xpole=   0.000,ypole=   0.000,yllat=   0.000,yulat=   0.000;
13    xmpol=   0.000,ympol=   0.000;
14    alono=   0.00000,alato=   0.00000,alonp=   0.00000,alatp=   0.00000;
15    enaap=  0.140,naap=1,xwid1 =   -20.000,xwid2 =    20.000;
16    hite(i)=0.21,0.14,main heading:                world map
17    plot subheading:            sanson projection
18    xaxis=    16.000,yaxis=     6.000,
19    xorig=-0.27000000e+03,xstp= 0.60000000e+02,xmax= 0.90000000e+02,
20    yorig=-0.70000000e+02,ystp= 0.20000000e+02,ymax= 0.70000000e+02,
21    xmag1= 0.000,xmag2= 0.000,delmag= 0.000,
22    xdep1=   0.00,xdep2=   0.00,deldep=   0.00;
23    iestyp=0,isstyp=0,iostyp=0;
24    esiz= 0.0000,isdel= 0.0000,iem= 0;
25    ssiz= 0.0000,slet= 0.0000,ism= 0;
26    osiz= 0.0000,olet= 0.0000,iom= 0;
27    itmind=      ,itminh=     ,itmaxd=      ,itmaxh=     ,itime=0;
28    xbstp= 0.000,ibsym=0,bsize=  0.0000,smag= 0.000,ibv=0,ibgrid=0,
29    aseis=     0.000,bseis=     0.000,iseis=0,xmagmin=     0.000,
30    itimax=0,xaxinc=     0.000,
```

&&&&&&&&&& CONTROL.12A &&&&&&&&&&

```
 1    idevice=1,nbaud=9600,iplot=1,nstyle=5,nalf=1,irot=1,irec=1;
 2    ne=0,ns=1,not=0,netyp=0,nstyp=4,notyp=0,magtyp=0;
 3    equake seg:
 4
 5    station seg:>udd>Caldata>RNowack>map_dir>wwssn.stations
 6    (2x,a4,i2,a1,f5.2,1x,i3,a1,f5.2)
 7    other seg:
 8
 9    digit seg:
10
11    dproj=alber,ifram=0,mgrid=1,mfil=1,mref=0mpol=0,idline=0,dmpda=nort;
12    xpole=   0.000,ypole=   0.000,yllat=   0.000,yulat=   0.000;
13    xmpol=   0.000,ympol=   0.000;
14    alono=   0.00000,alato=   0.00000,alonp=   0.00000,alatp=   0.00000;
15    enaap=  0.140,naap=1,xwid1 =   -20.000,xwid2 =    20.000;
16    hite(i)=0.21,0.14,main heading:   wwssn stations for continental us
17    plot subheading:      albers equal area projection
18    xaxis=    18.000,yaxis=     6.000,
19    xorig=-0.13000000e+03,xstp= 0.10000000e+02,xmax=-0.60000000e+02,
20    yorig= 0.20000000e+02,ystp= 0.10000000e+02,ymax= 0.50000000e+02,
21    xmag1= 0.000,xmag2= 0.000,delmag= 0.000,
22    xdep1=   0.00,xdep2=   0.00,deldep=   0.00;
23    iestyp=0,isstyp=2,iostyp=0;
24    esiz= 0.0000,isdel= 0.0000,iem= 0;
25    ssiz= 0.0800,slet= 0.0800,ism= 2;
26    osiz= 0.0000,olet= 0.0000,iom= 0;
27    itmind=      ,itminh=    ,itmaxd=      ,itmaxh=    ,itime=0;
28    xbstp= 0.000,ibsym=0,bsize=  0.0000,smag= 0.000,ibv=0,ibgrid=0,
29    aseis=     0.000,bseis=     0.000,iseis=0,xmagmin=     0.000,
30    itimax=0,xaxinc=     0.000,
```

&&&&&&&&&& CONTROL.11 &&&&&&&&&&

```
 1    idevice=1,nbaud=9600,iplot=1,nstyle=5,nalf=1,irot=1,irec=1;
 2    ne=1,ns=0,not=0,netyp=1,nstyp=0,notyp=0,magtyp=0;
 3    equake seg:>udd>Caldata>RNowack>map_dir>sanluis.test
 4
 5    station seg:
 6
 7    other seg:
 8
 9    digit seg:>udd>Caldata>RNowack>map_dir>calif2
10    (a3,t1,6(f5.2,f6.2))
11    dproj=polyc,ifram=0,mgrid=1,mfil=2,mref=0mpol=0,idline=6,dmpda=    ;
12    xpole=   0.000,ypole=   0.000,yllat=   0.000,yulat=   0.000;
13    xmpol=   0.000,ympol=   0.000;
14    alono=   0.00000,alato=   0.00000,alonp=   0.00000,alatp=   0.00000;
15    enaap=  0.140,naap=1,xwid1 =   -20.000,xwid2 =    20.000;
16    hite(i)=0.21,0.14,main heading:     central california earthquakes
17    plot subheading:              740101-747401
18    xaxis=     8.000,yaxis=     7.000,
19    xorig=-0.12175000e+03,xstp= 0.25000000e+00,xmax=-0.12050000e+03,
20    yorig= 0.36500000e+02,ystp= 0.25000000e+00,ymax= 0.37500000e+02,
21    xmag1= 0.000,xmag2= 5.000,delmag= 1.000,
22    xdep1=   0.00,xdep2=  30.00,deldep=   0.00;
23    iestyp=2,isstyp=0,iostyp=0;
24    esiz= 0.0500,isdel= 0.0500,iem= 1;
25    ssiz= 0.0000,slet= 0.0000,ism= 0;
26    osiz= 0.0000,olet= 0.0000,iom= 0;
27    itmind=      ,itminh=    ,itmaxd=      ,itmaxh=    ,itime=0;
28    xbstp= 0.000,ibsym=0,bsize=  0.0000,smag= 0.000,ibv=0,ibgrid=0,
29    aseis=     0.000,bseis=     0.000,iseis=0,xmagmin=     0.000,
30    itimax=0,xaxinc=     0.000,
```

```
                    &&&&&&&&&& CONTROL.1 &&&&&&&&&&
 1    idevice=1,nbaud=9600,iplot=1,nstyle=5,nalf=1,irot=1,irec=1;
 2    ne=1,ns=0,not=0,netyp=2,nstyp=0,notyp=0,magtyp=0;
 3    equake seg:>udd>Caldata>RNowack>map_dir>mapdata.eq1
 4
 5    station seg:
 6
 7    other seg:
 8
 9    digit seg
10
11    dproj=polyc,ifram=0,mgrid=1,mfil=0,mref=0mpol=0,idline=0,dmpda=    ;
12    xpole=   0.000,ypole=   0.000,yllat=   0.000,yulat=  0.000 ;
13    xmpol=   0.000,ympol=   0.000;
14    alono=-120.70000,alato=  36.12000,alonp=-120.10000 alatp=  35.55000;
15    enaap=  0.140,naap=1,xwid1 =     0.000;
16    hite(i)=0.21,0 14,main heading:          parkfield earthquakes
17    plot subheading:              771201-780801
18    xaxis=     7.000,yaxis=     7.000,
19    xorig=-0.12075000e+03,xstp= 0.25000000e+00,xmax=-0.12000000e+03,
20    yorig= 0.35500000e+02,ystp= 0.25000000e+00,ymax= 0.36250000e+02,
21    xmag1= 0.000,xmag2= 5.000,delmag= 1.000,
22    xdep1=   0 00,xdep2=  20.00,deldep=   0.00;
23    iestyp=2,isstyp=0,iostyp=0;
24    esiz= 0.0500,isdel= 0.0500,iem= 1;
25    ssiz= 0.0000,slet= 0.0000,ism= 0;
26    osiz= 0.0000,olet= 0.0000,iom= 0;
27    itmind=      ,itminh=    ,itmaxd=       ,itmaxh=    ,itime=0;
28    xbstp= 0.000,ibsym=0,bsize=  0.0000,smag= 0.000,ibv=0,ibgrid=0,
29    aseis=     0.000,bseis=     0.000,iseis=0,xmagmin=     0.000,
30    itimax=0,xaxinc=     0.000,
```

&&&&&&&&&& CONTROL.2 &&&&&&&&&&

```
 1    idevice=1,nbaud=9600,iplot=2,nstyle=5,nalf=1,irot=1,irec=1;
 2    ne=1 ns=0,not=0,netyp=2,nstyp=0,notyp=0,magtyp=0;
 3    equake seg:>udd>Caldata>RNowack>map_dir>mapdata.eq1
 4
 5    station seg:
 6
 7    other seg:
 8
 9    digit seg:
10
11    dproj=polyc,ifram=0,mgrid=1,mfil=0,mref=0mpol=0,idline=0,dmpda=    ;
12    xpole=   0.000,ypole=   0.000,yllat=   0.000,yulat=  0.000 ;
13    xmpol=   0.000,ympol=   0.000;
14    alono=-120.70000,alato=  36.12000,alonp=-120.10000,alatp=  35.55000;
15    enaap=  0.140,naap=1,xwid1 =   -20.000,xwid2 =    20.000;
16    hite(i)=0.21,0.14,main heading:          parkfield earthquakes
17    plot subheading:              771201-780801
18    xaxis=     8.000,yaxis=     1.921,
19    xorig= 0.00000000e+00,xstp= 0.20000000e+02,xmax= 0.83300901e+02,
20    yorig= 0.00000000e+00,ystp= 0.50000000e+01,ymax= 0.20000000e+02,
21    xmag1= 0.000,xmag2= 5.000,delmag= 1.000,
22    xdep1=   0.00,xdep2=  20.00,deldep=   0.00;
23    iestyp=2,isstyp=0,iostyp=0;
24    esiz= 0.0500,isdel= 0.0500,iem= 1;
25    ssiz= 0.0000,slet= 0.0000,ism= 0;
26    osiz= 0.0000,olet= 0.0000,iom= 0;
27    itmind=      ,itminh=    ,itmaxd=      ,itmaxh=    ,itime=0;
28    xbstp= 0.000,ibsym=0,bsize=  0.0000,smag= 0.000,ibv=0,ibgrid=0,
29    aseis=     0.000,bseis=     0.000,iseis=0,xmagmin=     0.000,
30    itimax=0,xaxinc=     0.000,
```

```
 1    idevice=1,nbaud=9600,iplot=3,nstyle=5,nalf=1,irot=1,irec=1;
 2    ne=1,ns=0,not=0,netyp=2,nstyp=0,notyp=0,magtyp=0;
 3    equake seg:>udd>Caldata>RNowack>map_dir>mapdata.eq1
 4
 5    station seg:
 6
 7    other seg:
 8
 9    digit seg:
10
11    dproj=polyc,ifram=0,mgrid=1,mfil=0,mref=0mpol=0,idline=0,dmpda=    ;
12    xpole=   0.000,ypole=   0.000,yllat=   0.000,yulat=  0.000 ;
13    xmpol=   0.000,ympol=   0.000;
14    alono= 120.70000,alato=  36.12000,alonp=-120.10000,alatp=  35.55000;
15    enaap=  0.140,naap=1,xwid1 =   -20.000,xwid2 =    20.000;
16    hite(i)=0.21,0.14,main heading:          parkfield earthquakes
17    plot subheading:              771201-780801
18    xaxis=     7.000,yaxis=     3.500,
19    xorig=-0.20000000e+02,xstp= 0.10000000e+02,xmax= 0.20000000e+02,
20    yorig= 0.00000000e+00,ystp= 0.50000000e+01,ymax= 0.20000000e+02,
21    xmag1= 0.000,xmag2= 5.000,delmag= 1.000,
22    xdep1=   0.00,xdep2=  20.00,deldep=   0.00;
23    iestyp=2,isstyp=0,iostyp=0;
24    esiz= 0.0500,isdel= 0.0500,iem= 1;
25    ssiz= 0.0000,slet= 0.0000,ism= 0;
26    osiz= 0.0000,olet= 0.0000,iom= 0;
27    itmind=      ,itminh=    ,itmaxd=      ,itmaxh=    ,itime=0;
28    xbstp= 0.000,ibsym=0,bsize=  0.0000,smag= 0.000,ibv=0,ibgrid=0,
29    aseis=     0.000,bseis=     0.000,iseis=0,xmagmin=     0.000,
30    itimax=0,xaxinc=     0.000,
```

&&&&&&&&&& CONTROL.4 &&&&&&&&&&

```
 1    idevice=1,nbaud=9600,iplot=4,nstyle=5,nalf=1,irot=1,irec=1;
 2    ne=1,ns=0,not=0,netyp=2,nstyp=0,notyp=0,magtyp=0;
 3    equake seg:>udd>Caldata>RNowack>map_dir>mapdata.eq1
 4
 5    station seg:
 6
 7    other seg:
 8
 9    digit seg:
10
11    dproj=polyc,ifram=0,mgrid=1,mfil=0,mref=0mpol=0,idline=0,dmpda=    ;
12    xpole=   0.000,ypole=   0.000,yllat=   0.000,yulat=  0.000 ;
13    xmpol=   0.000,ympol=   0.000;
14    alono=-120.70000,alato=  36.12000,alonp=-120.10000,alatp=  35.55000;
15    enaap=  0.140,naap=1,xwid1 =   -20.000,xwid2 =    20.000;
16    hite(i)=0.21,0.14,main heading:          parkfield earthquakes
17    plot subheading:              771201-780801
18    xaxis=     7.000,yaxis=     5.000,
19    xorig= 0.00000000e+00,xstp= 0.10000000e+01,xmax= 0.20000000e+02,
20    yorig= 0.00000000e+00,ystp= 0.20000000e+02,ymax= 0.83300901e+02,
21    xmag1= 0.000,xmag2= 5.000,delmag= 1.000,
22    xdep1=   0.00,xdep2=  20.00,deldep=   0.00;
23    iestyp=2,isstyp=0,iostyp=0;
24    esiz= 0.0500,isdel= 0.0500,iem= 1;
25    ssiz= 0.0000,slet= 0.0000,ism= 0;
26    osiz= 0.0000,olet= 0.0000,iom= 0;
27    itmind=771201,itminh=0000,itmaxd=780801,itmaxh=0000,itime=3;
28    xbstp= 0.000,ibsym=0,bsize=  0.0000,smag= 0.000,ibv=0,ibgrid=0,
29    aseis=     0.000,bseis=     0.000,iseis=0,xmagmin=     0.000,
30    itimax=0,xaxinc=     0.000,
```

```
 1    idevice=1,nbaud=9600,iplot=5,nstyle=5,nalf=1,irot=1,irec=1;
 2    ne=1,ns=0,not=0,netyp=2,nstyp=0,notyp=0,magtyp=0;
 3    equake seg:>udd>Caldata>RNowack>map_dir>mapdata.eq1
 4
 5    station seg:
 6
 7    other seg:
 8
 9    digit seg:
10
11    dproj=polyc,ifram=0,mgrid=1,mfil=0,mref=0mpol=0,idline=0,dmpda=    ;
12    xpole=   0.000,ypole=   0.000,yllat=   0.000,yulat=  0.000 ;
13    xmpol=   0.000,ympol=   0.000;
14    alono=-120.70000,alato=  36.12000,alonp=-120.10000,alatp=  35.55000;
15    enaap=  0.140,naap=1,xwid1 =   -20.000,xwid2 =    20.000;
16    hite(i)=0.21,0.14,main heading:          parkfield earthquakes
17    plot subheading:              771201-780801
18    xaxis=     7.000,yaxis=     5.000,
19    xorig= 0.00000000e+00,xstp= 0.10000000e+01,xmax= 0.20000000e+02,
20    yorig= 0.00000000e+00,ystp= 0.10000000e+01,ymax= 0.50000000e+01,
21    xmag1= 0.000,xmag2= 5.000,delmag= 1.000,
22    xdep1=   0.00,xdep2=  20.00,deldep=   0.00;
23    iestyp=2,isstyp=0,iostyp=0;
24    esiz= 0.0500,isdel= 0.0500,iem= 1;
25    ssiz= 0.0000,slet= 0.0000,ism= 0;
26    osiz= 0.0000,olet= 0.0000,iom= 0;
27    itmind=771201,itminh=0000,itmaxd=780801,itmaxh=0000,itime=3;
28    xbstp= 0.000,ibsym=0,bsize=  0.0000,smag= 0.000,ibv=0,ibgrid=0,
29    aseis=     0.000,bseis=     0.000,iseis=0,xmagmin=     0.000,
30    itimax=0,xaxinc=     0.000,
```

&&&&&&&&&& CONTROL.6 %%%%%%%%%%

```
 1    idevice=1,nbaud=9600,iplot=6,nstyle=5,nalf=1,irot=1,irec=1;
 2    ne=1,ns=0,not=0,netyp=2,nstyp=0,notyp=0,magtyp=0;
 3    equake seg:>udd>Caldata>RNowack>map_dir>mapdata.eq1
 4
 5    station seg:
 6
 7   'other seg:
 8
 9    digit seg:
10
11    dproj=polyc,ifram=0,mgrid=1,mfil=0,mref=0mpol=0,idline=0,dmpda=    ;
12    xpole=   0.000,ypole=   0.000,yllat=   0.000,yulat=  0.000 ;
13    xmpol=   0.000,ympol=   0.000;
14    alono=-120.70000,alato=  36.12000,alonp=-120.10000,alatp=  35.55000;
15    enaap=  0.140,naap=1,xwid1 =   -20.000,xwid2 =    20.000;
16    hite(i)=0.21,0.14,main heading:          parkfield earthquakes
17    plot subheading:              771201-780801
18    xaxis=     7.000,yaxis=     7.000,
19    xorig= 0.00000000e+00,xstp= 0.10000000e+01,xmax= 0.20000000e+02,
20    yorig= 0.10000000e+01,ystp= 0.20000000e+01,ymax= 0.83300901e+02,
21    xmag1= 0.000,xmag2= 5.000,delmag= 1.000,
22    xdep1=   0.00,xdep2=  20.00,deldep=   0.00;
23    iestyp=2,isstyp=0,iostyp=0;
24    esiz= 0.0500,isdel= 0.0500,iem= 1;
25    ssiz= 0.0000,slet= 0.0000,ism= 0;
26    osiz= 0.0000,olet= 0.0000,iom= 0;
27    itmind=771201,itminh=0000,itmaxd=780801,itmaxh=0000,itime=3;
28    xbstp= 0.250,ibsym=1,bsize=  0.1400,smag= 1.500,ibv=1,ibgrid=1,
29    aseis=     0.000,bseis=     0.000,iseis=0,xmagmin=     0.000,
30    itimax=0,xaxinc=     0.000,
```

&&&&&&&&&& CONTROL.7 &&&&&&&&&&

```
 1    idevice=1,nbaud=9600,iplot=7,nstyle=5,nalf=1,irot=1,irec=1;
 2    ne=1,ns=0,not=0,netyp=2,nstyp=0,notyp=0,magtyp=0;
 3    equake seg:>udd>Caldata>RNowack>map_dir>mapdata.eq1
 4
 5    station seg:
 6
 7    other seg:
 8
 9    digit seg:
10
11    dproj=polyc,ifram=0,mgrid=1,mfil=0,mref=0mpol=0,idline=0,dmpda=    ;
12    xpole=   0.000,ypole=   0.000,yllat=   0.000,yulat=  0.000  ;
13    xmpol=   0.000,ympol=   0.000;
14    alono=-120.70000,alato=  36.12000,alonp=-120.10000,alatp=  35.55000;
15    enaap=  0.140,naap=1,xwid1 =   -20.000,xwid2 =    20.000;
16    hite(i)=0.21,0.14,main heading:          parkfield earthquakes
17    plot subheading:              771201-780801
18    xaxis=     7.000,yaxis=     5.000,
19    xorig= 0.00000000e+00,xstp= 0.10000000e+01,xmax= 0.20000000e+02,
20    yorig= 0.10000000e+01,ystp= 0.20000000e+01,ymax= 0.83300901e+02,
21    xmag1= 0.000,xmag2= 5.000,delmag= 1.000,
22    xdep1=   0.00,xdep2=  20.00,deldep=   0.00;
23    iestyp=2,isstyp=0,iostyp=0;
24    esiz= 0.0500,isdel= 0.0500,iem= 1;
25    ssiz= 0.0000,slet= 0.0000,ism= 0;
26    osiz= 0.0000,olet= 0.0000,iom= 0;
27    itmind=771201,itminh=0000,itmaxd=780801,itmaxh=0000,itime=3;
28    xbstp= 0.250,ibsym=1,bsize=  0.0500,smag= 1.500,ibv=1,ibgrid=1,
29    aseis=    16.000,bseis=     1.500,iseis=0,xmagmin=     2.000,
30    itimax=0,xaxinc=     0.000,
```

```
                    &&&&&&&&&& CONTROL.8a &&&&&&&&&&
 1    idevice=1,nbaud=9600,iplot=8,nstyle=5,nalf=1,irot=1,irec=1;
 2    ne=1,ns=0,not=0,netyp=2,nstyp=0,notyp=0,magtyp=0;
 3    equake seg:>udd>Caldata>RNowack>map_dir>mapdata.eq1
 4
 5    station seg:
 6
 7    other seg:
 8
 9    'digit seg:
10
11    dproj=polyc,ifram=0,mgrid=1,mfil=0,mref=0mpol=0,idline=0,dmpda=    ;
12    xpole=   0.000,ypole=   0.000,yllat=   0.000,yulat=  0.000 ;
13    xmpol=   0.000,ympol=   0.000;
14    alono=-120.70000,alato=  36.12000,alonp=-120.10000,alatp=  35.55000;
15    enaap=  0.140,naap=1,xwid1 =   -20.000,xwid2 =    20.000;
16    hite(i)=0.21,0.14,main heading:          parkfield earthquakes
17    plot subheading:              771201-780801
18    xaxis=     7.000,yaxis=     5.000,
19    xorig= 0.00000000e+00,xstp= 0.10000000e+01,xmax= 0.20000000e+02,
20    yorig= 0.10000000e+01,ystp= 0.20000000e+01,ymax= 0.83300901e+02,
21    xmag1= 0.000,xmag2= 5.000,delmag= 1.000,
22    xdep1=   0.00,xdep2=  20.00,deldep=   0.00;
23    iestyp=2,isstyp=0,iostyp=0;
24    esiz= 0.0500,isdel= 0.0500,iem= 1;
25    ssiz= 0.0000,slet= 0.0000,ism= 0;
26    osiz= 0.0000,olet= 0.0000,iom= 0;
27    itmind=771201,itminh=0000,itmaxd=780801,itmaxh=0000,itime=3;
28    xbstp= 0.250,ibsym=1,bsize=  0.0500,smag= 1.500,ibv=1,ibgrid=1,
29    aseis=    16.000,bseis=     1.500,iseis=1,xmagmin=     2.000,
30    itimax=1,xaxinc=     0.200,
```

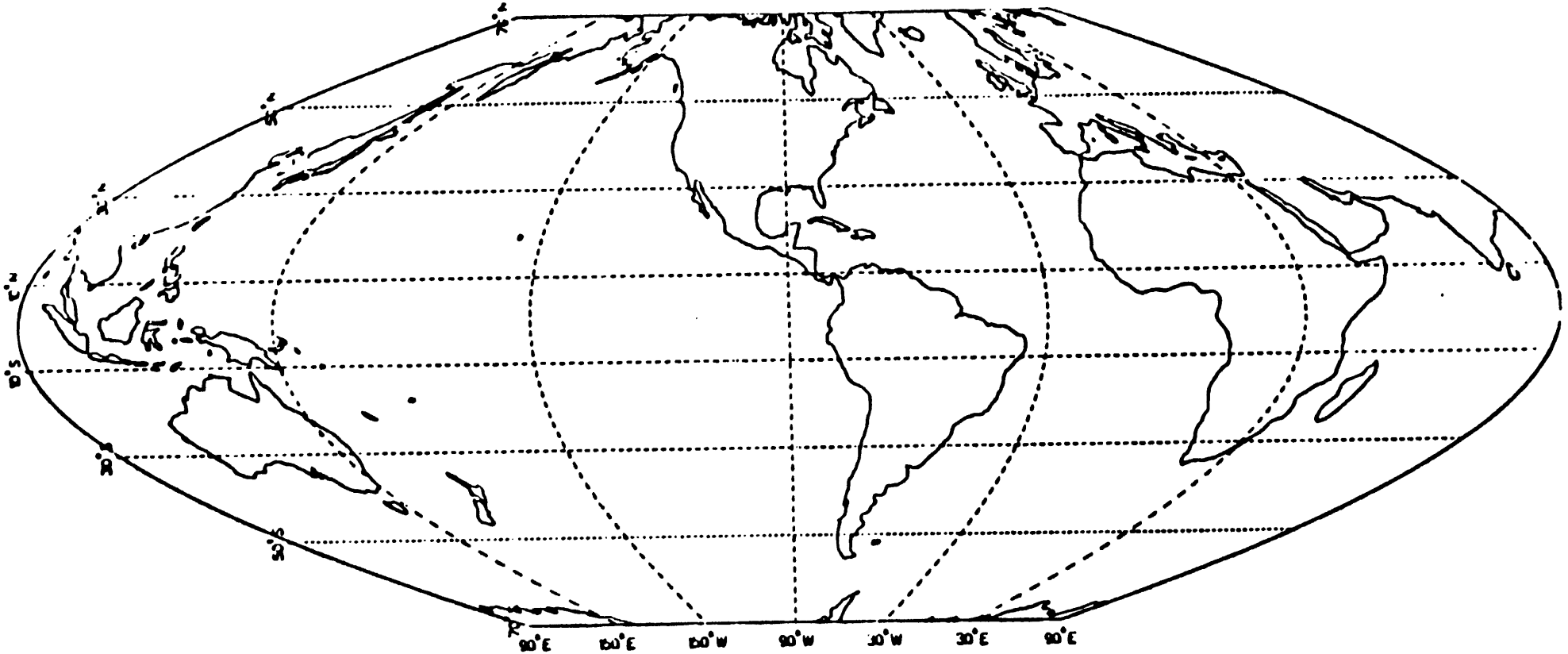
&&&&&&&&&& CONTROL.8b &&&&&&&&&&

```
 1    idevice=1,nbaud=9600,iplot=8,nstyle=5,nalf=1,irot=1,irec=1;
 2    ne=1,ns=0,not=0,netyp=2,nstyp=0,notyp=0,magtyp=0;
 3    equake seg:>udd>Caldata>RNowack>map_dir>mapdata.eq1
 4
 5    station seg:
 6
 7    other seg:
 8
 9    digit seg:
10
11    dproj=polyc,ifram=0,mgrid=1,mfil=0,mref=0mpol=0,idline=0,dmpda=    ;
12    xpole=   0.000,ypole=   0.000,yllat=   0.000,yulat=  0.000 ;
13    xmpol=   0.000,ympol=   0.000;
14    alono=-120.70000,alato=  36.12000,alonp=-120.10000,alatp=  35.55000;
15    enaap=  0.140,naap=1,xwid1 =   -20.000,xwid2 =    20.000;
16    hite(i)=0.21,0.14,main heading:          parkfield earthquakes
17    plot subheading:              771201-780801
18    xaxis=     7.000,yaxis=     5.000,
19    xorig= 0.00000000e+00,xstp= 0.20000000e+02,xmax= 0.83300901e+02,
20    yorig= 0.10000000e+01,ystp= 0.20000000e+01,ymax= 0.83300901e+02,
21    xmag1= 0.000,xmag2= 5.000,delmag= 1.000,
22    xdep1=   0.00,xdep2=  20.00,deldep=   0.00;
23    iestyp=2,isstyp=0,iostyp=0;
24    esiz= 0.0500,isdel= 0.0500,iem= 1;
25    ssiz= 0.0000,slet= 0.0000,ism= 0;
26    osiz= 0.0000,olet= 0.0000,iom= 0;
27    itmind=771201,itminh=0000,itmaxd=780801,itmaxh=0000,itime=3;
28    xbstp= 0.250,ibsym=1,bsize=  0.0500,smag= 1.500,ibv=1,ibgrid=1,
29    aseis=    16.000,bseis=     1.500,iseis=1,xmagmin=     2.000,
30    itimax=2,xaxinc=     2.000,
```

&&&&&&&&&& CONTROL.10 &&&&&&&&&&&&

WORLD MAP

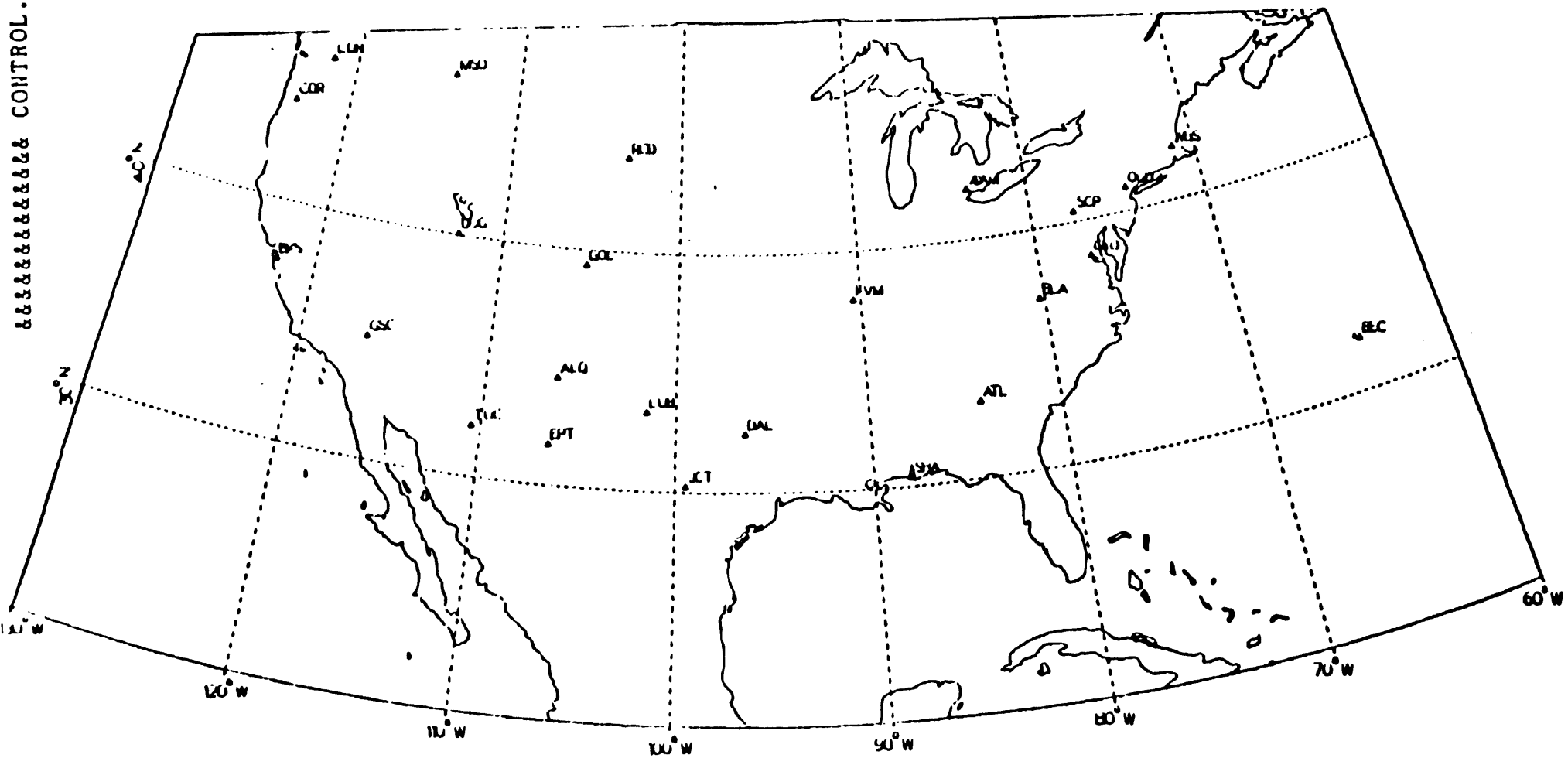
SANSON PROJECTION



&&&&&&&&&& CONTROL.12a &&&&&&&&&&

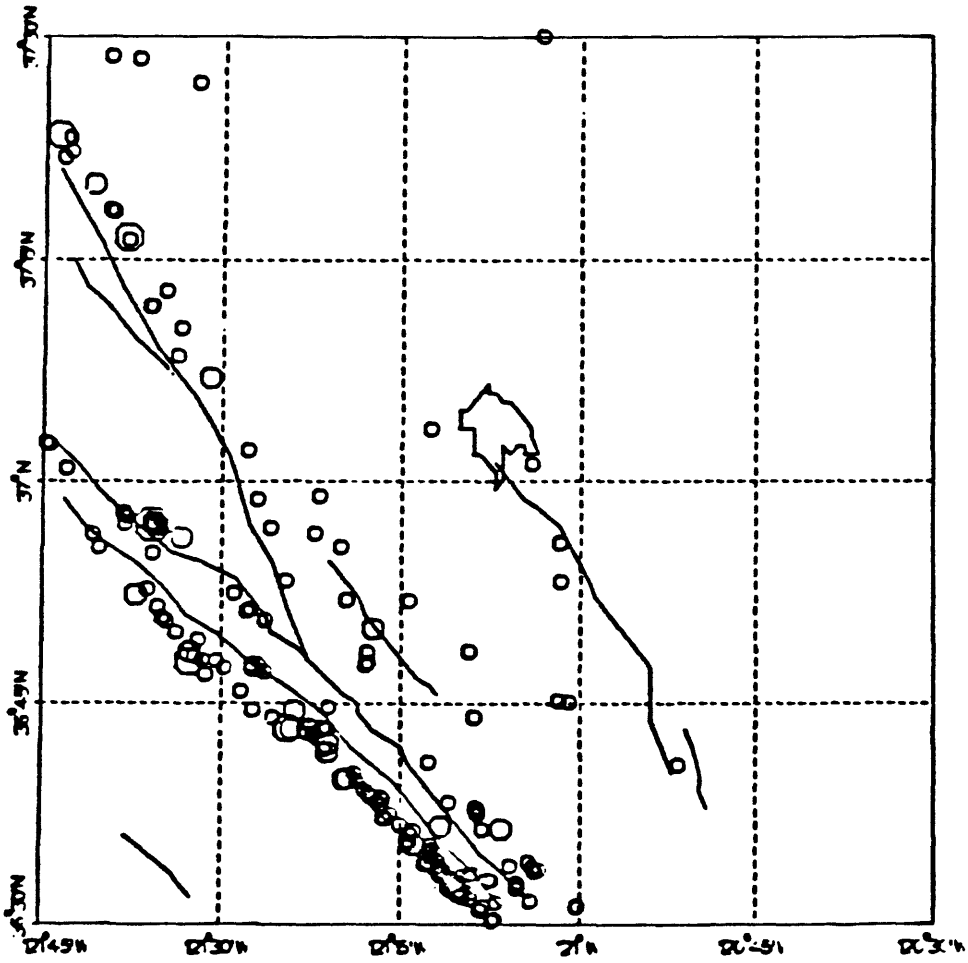
WWSSN STATIONS FOR CONTINENTAL US

ALBERS EQUAL AREA PROJECTION



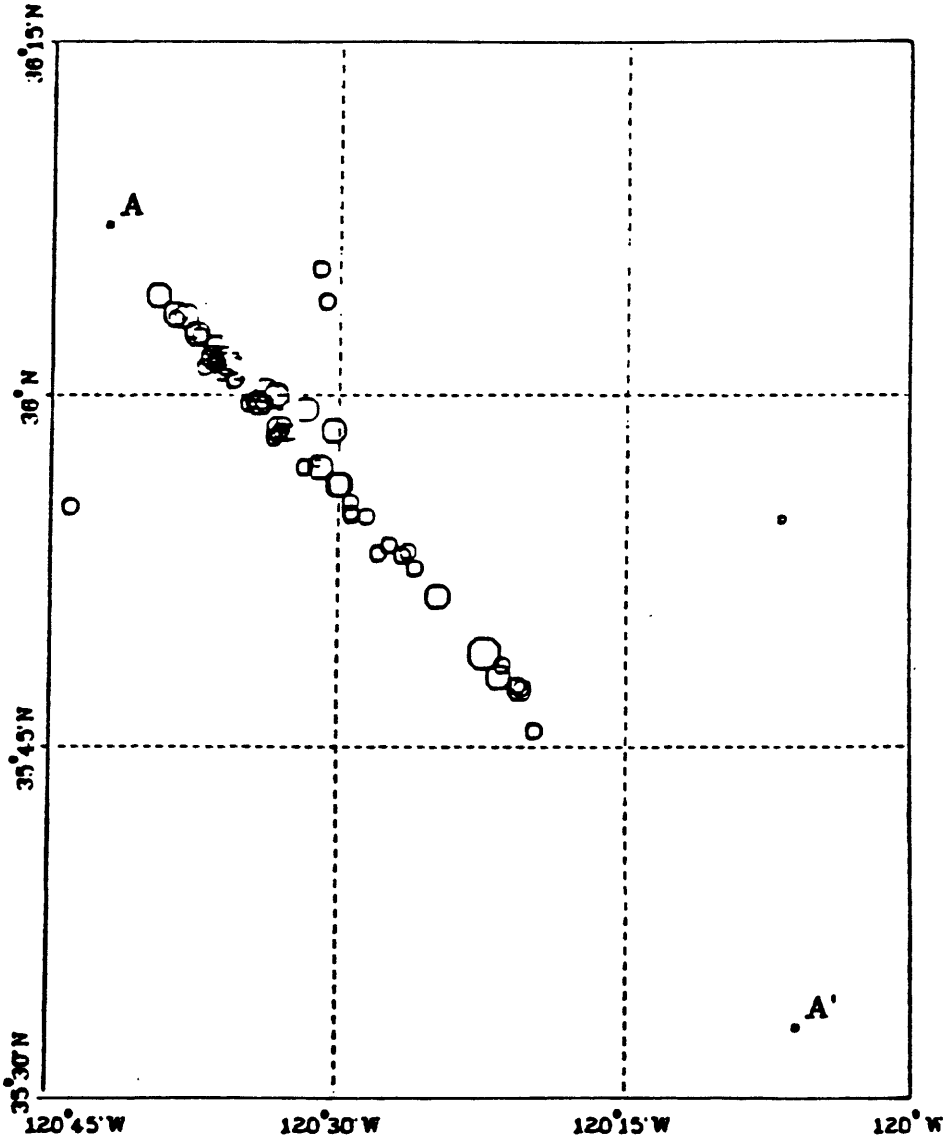
CENTRAL CALIFORNIA EARTHQUAKES

740101-747401

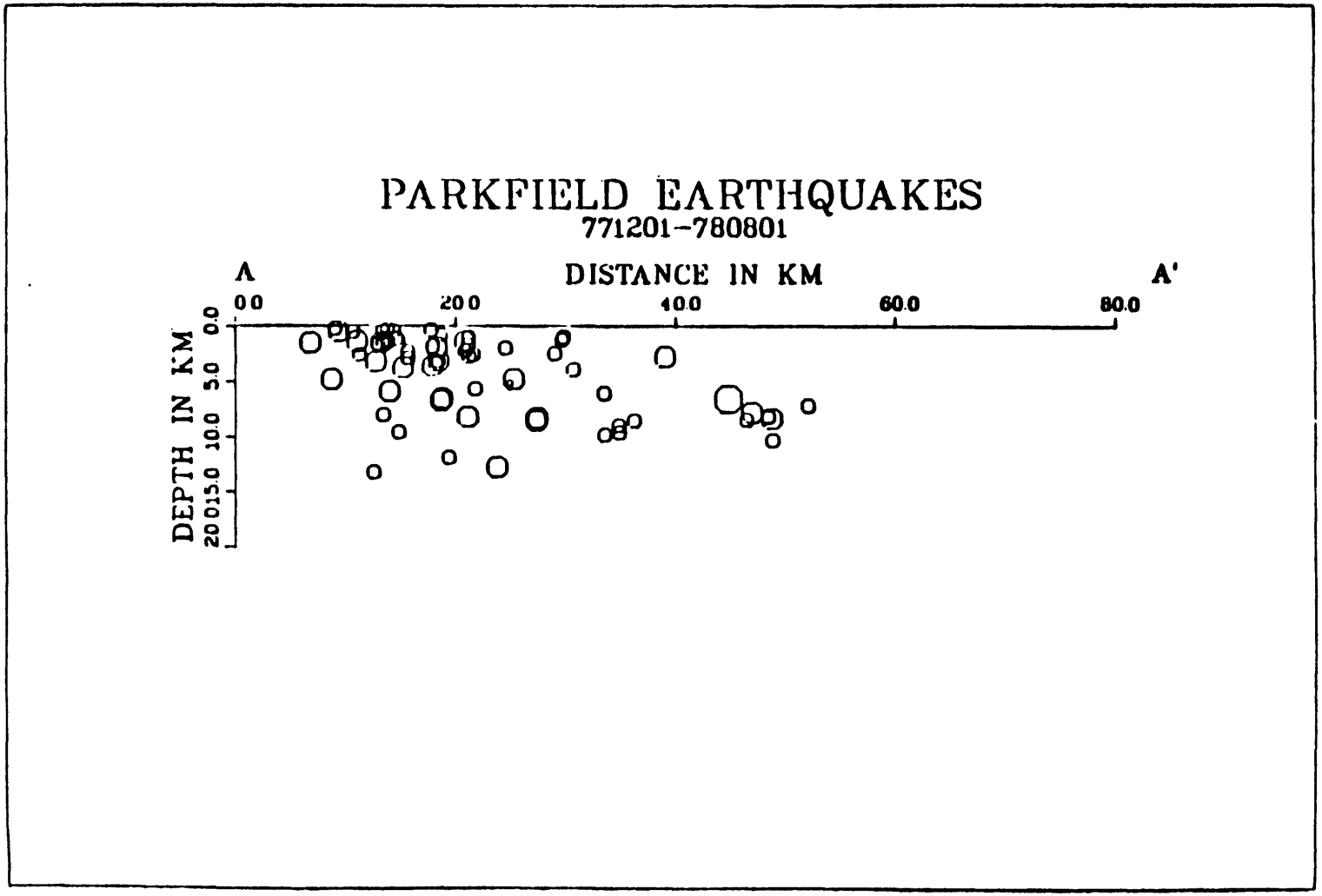


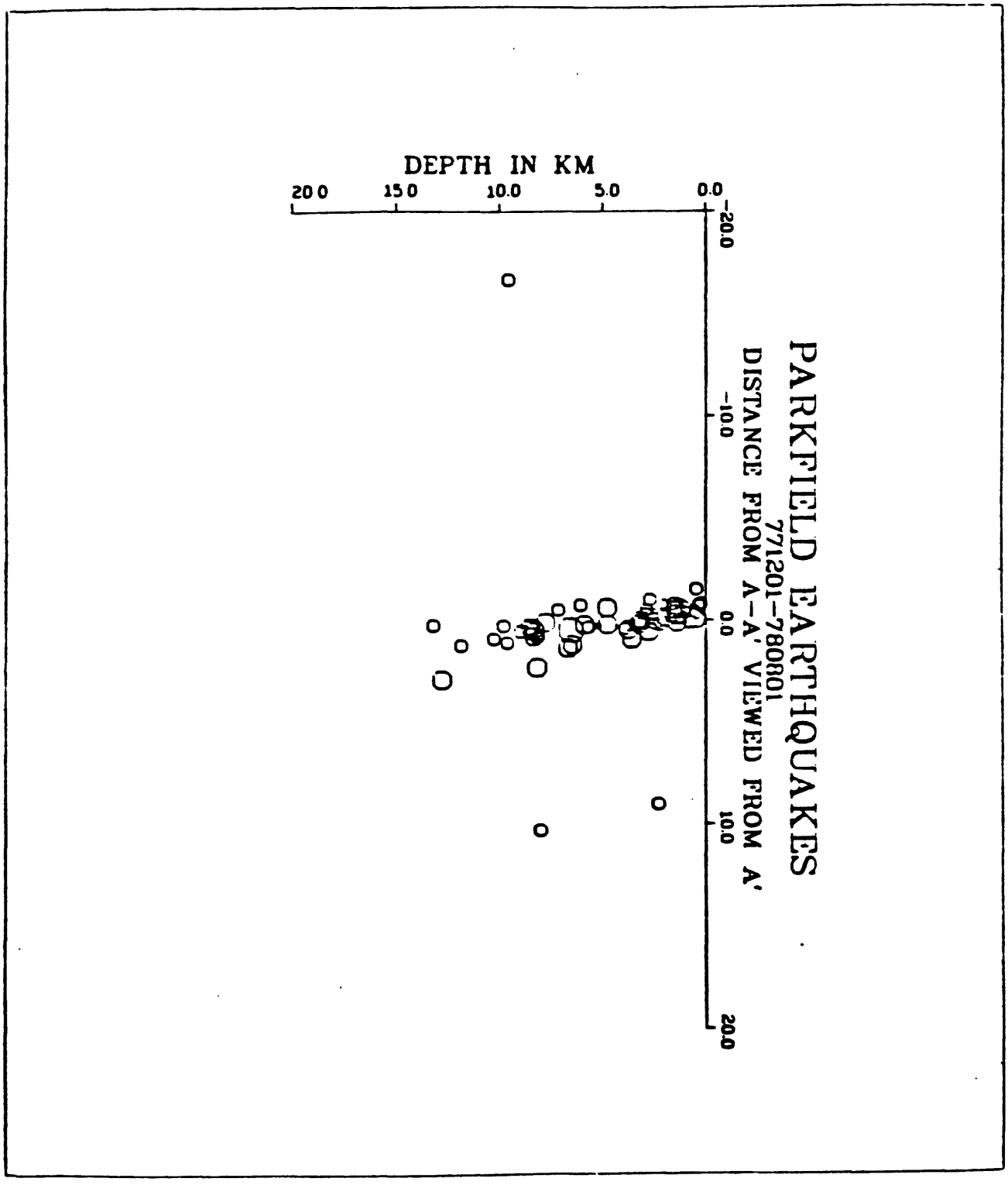
PARKFIELD EARTHQUAKES

771201-780801



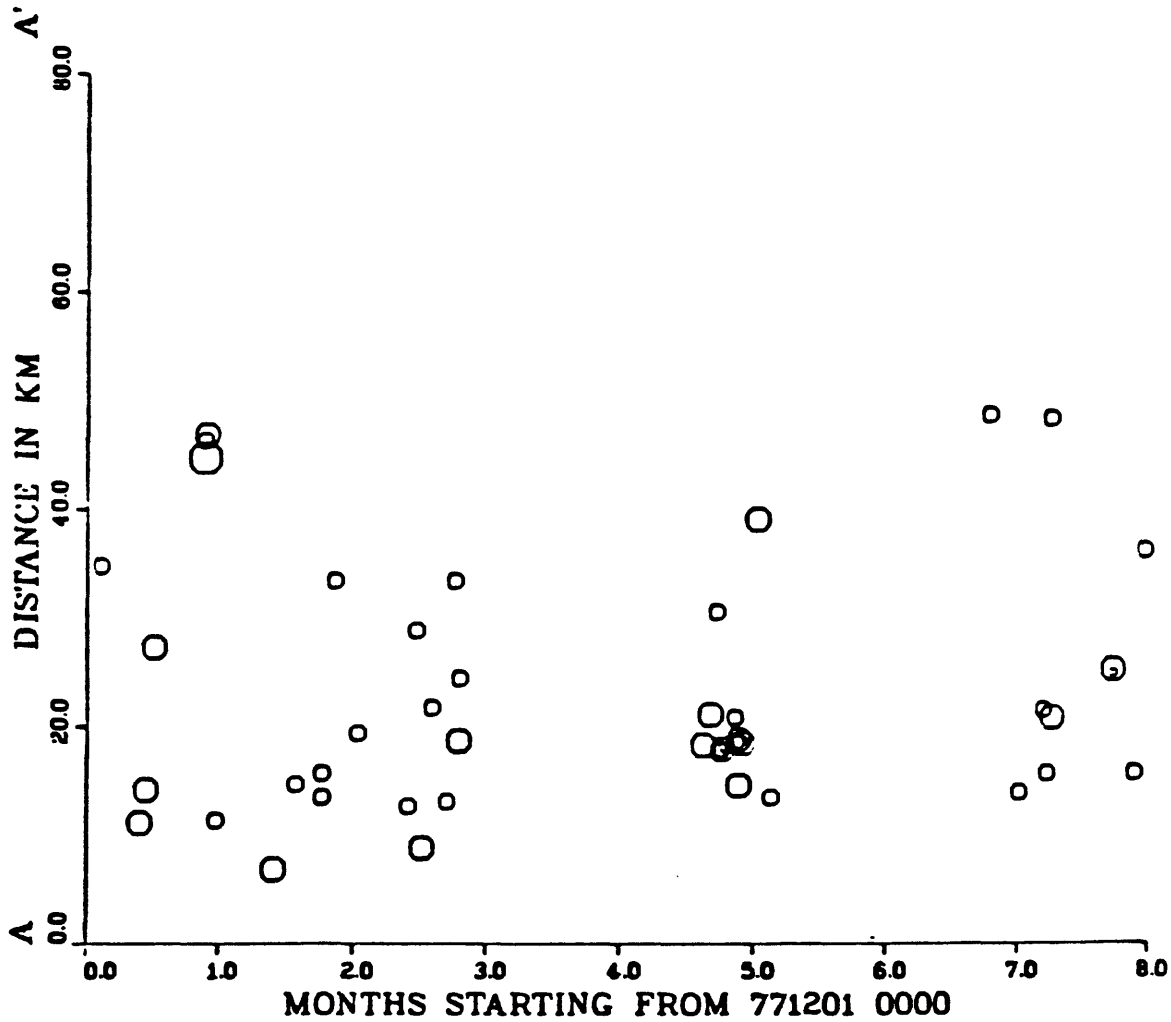
&&&&&&&&& CONTROL.2 &&&&&&&&&

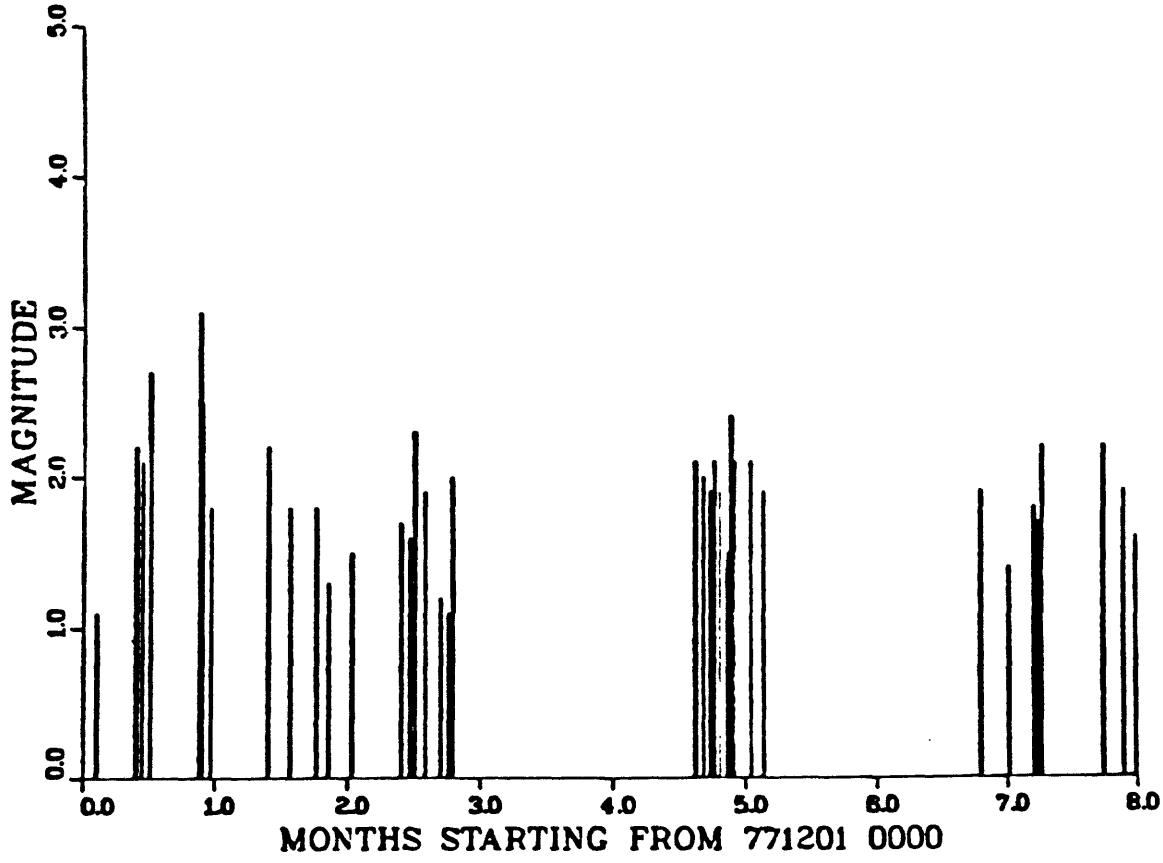

PARKFIELD EARTHQUAKES
771201-780801
A
DISTANCE IN KM
A'
0.0
20.0
40.0
60.0
80.0
DEPTH IN KM
0.0
5.0
10.0
15.0
20.0


DEPTH IN KM
20.0
15.0
10.0
5.0
0.0
-20.0
-10.0
0.0
10.0
20.0
PARKFIELD EARTHQUAKES
771201-780801
DISTANCE FROM A-A', VIEWED FROM A'

PARKFIELD EARTHQUAKES

771201-780801

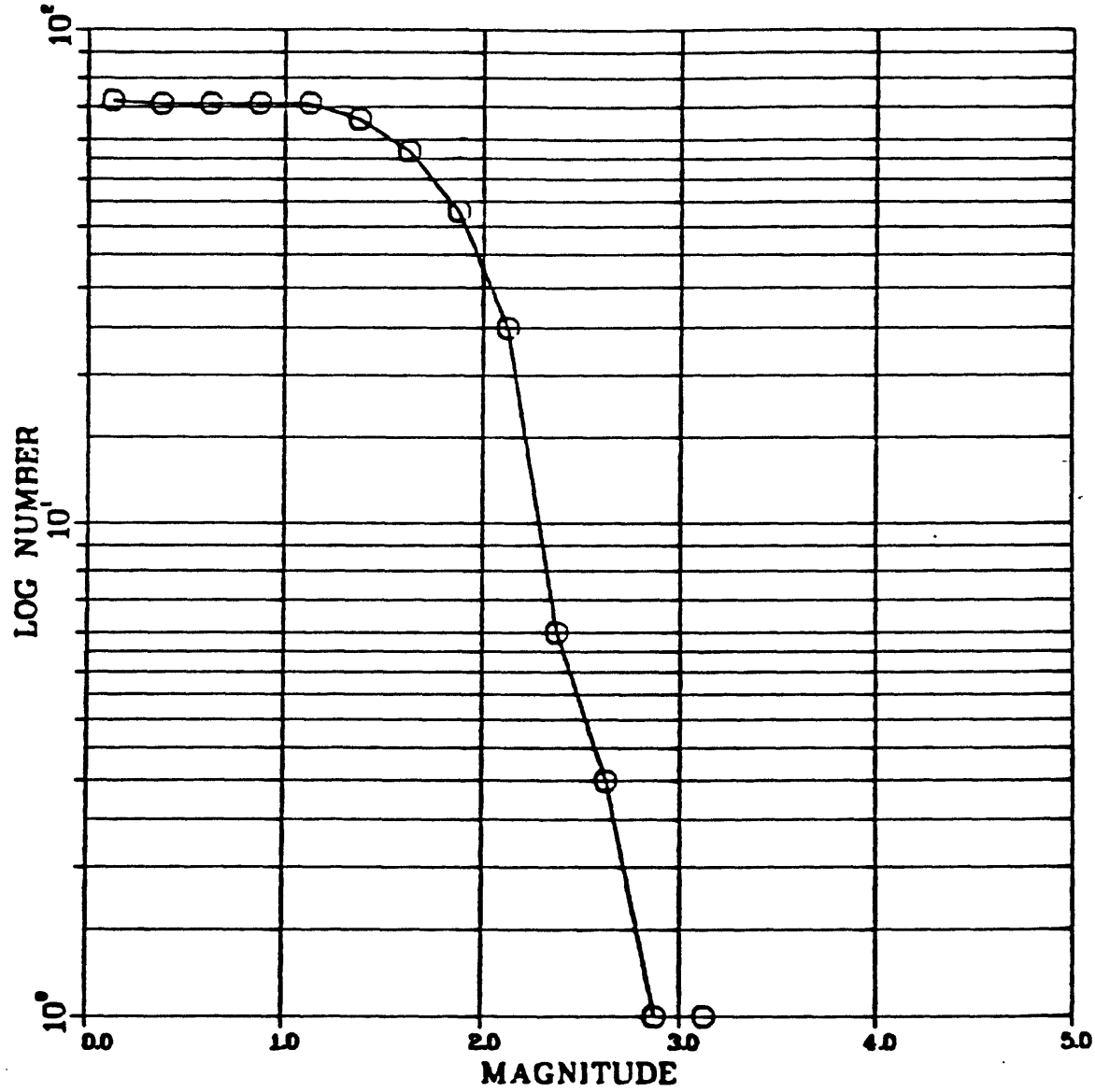


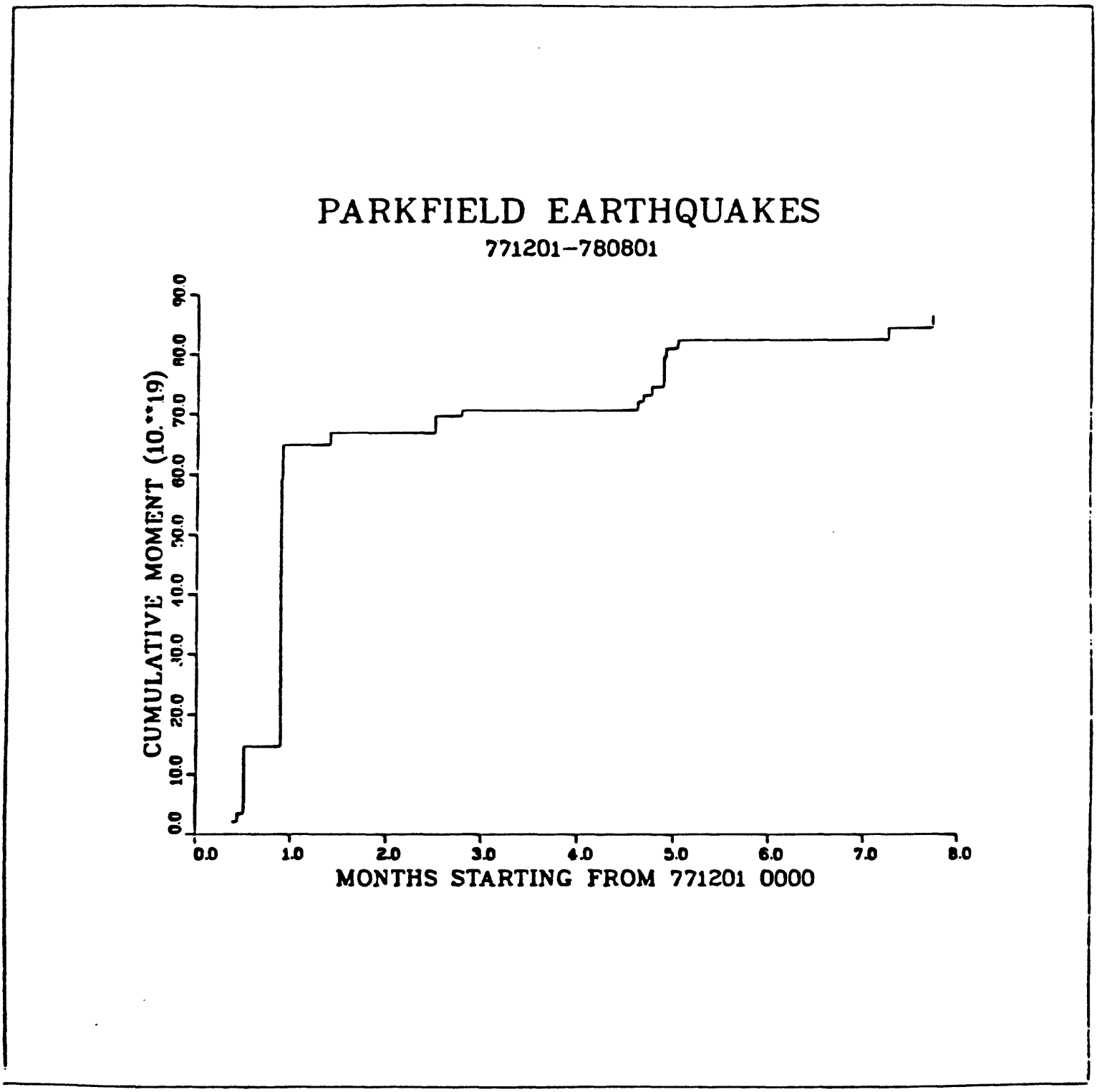

PARKFIELD EARTHQUAKES
771201-780801
MAGNITUDE
0.0
1.0
2.0
3.0
4.0
5.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
MONTHS STARTING FROM 771201 0000

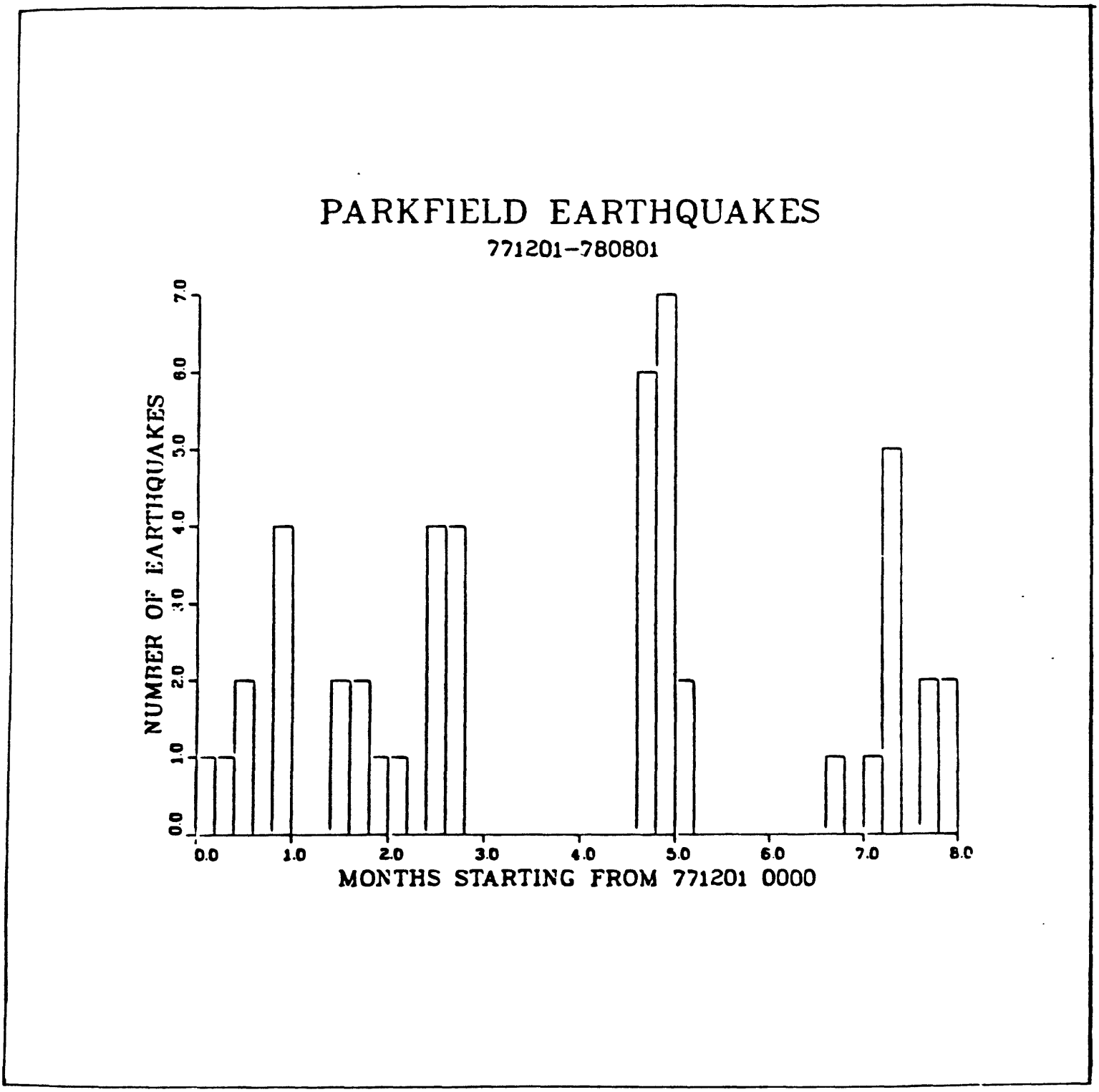
PARKFIELD EARTHQUAKES

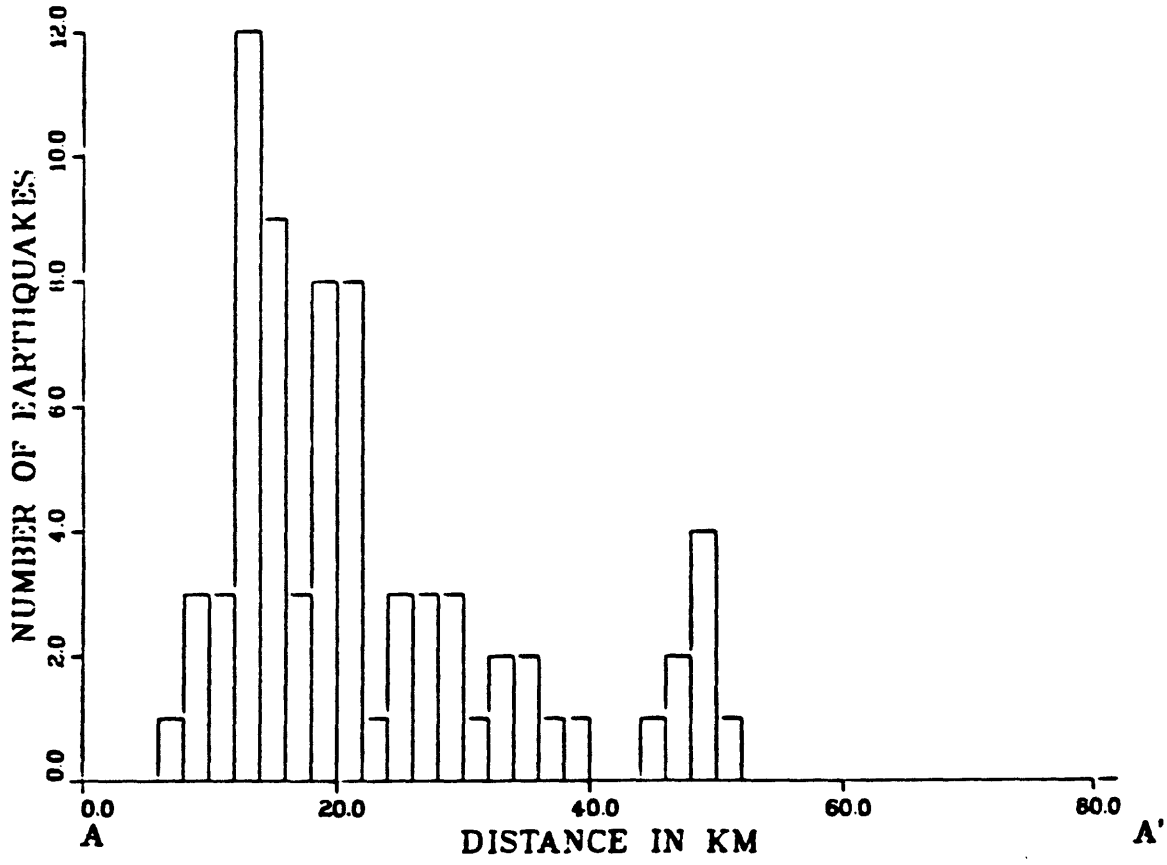
771201-780801

THE B VALUE IS 0.948, FOR MAG GREATER THAN 1.50




PARKFIELD EARTHQUAKES
771201-780801
CUMULATIVE MOMENT (10.**19)
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
MONTHS STARTING FROM 771201 0000


PARKFIELD EARTHQUAKES
771201-780801
NUMBER OF EARTHQUAKES
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
MONTHS STARTING FROM 771201 0000


PARKFIELD EARTHQUAKES
771201-780801
NUMBER OF EARTHQUAKES
0.0
2.0
4.0
6.0
8.0
10.0
12.0
0.0
20.0
40.0
60.0
80.0
A
A'
DISTANCE IN KM