PPLOT
DOCUMENTATION

ZONGE Data Processing
Spectral Pseudosection Plot Program
version 7.0x

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PPLOT Program Documentation

PPLOT generates Spectral Pseudosection plots. These plots provide a visual comparison of data measured at several frequencies for a line of dipole-dipole data. Changes in data quality may be observable, as well as general trends in the data.

A dipole-dipole pseudosection format is used to place plot-points at each measured data-point. Data for each plot-point is assumed to consist of real and imaginary components for a range of frequencies. A real-versus-imaginary plot is generated for each data-point, at a uniform scale. Each plot is placed on the pseudosection, with the coordinate (1.,0.) placed at the plot-point.

INPUT FILES

Data files read by PPLOT include a data file (.P-file) and optionally a mode file (.MDE-file).

The data file is usually the result of using the SHRED program to read a GDP data dump file (.RAW-file), which writes a data file (.FLD-file). The RPAVG (single frequency) or CRAVG (harmonic frequencies) program averages the data, and writes an averaged data file (.S-file). The CRRED program provides a choice of curve types to be written to a data file (.P-file), for use by either the PPLOT or LPLOT programs.

CRRED offers decoupling that assumes an environment with generally horizontal layering. The GDPHM program offers decoupling for a general environment, and includes decoupling parameters in the averaged data file for use by CRRED. Various component curves may be selected within CRRED, to be written to the data file (.P-file).

An optional mode file includes entries that modify mode values defined by Zonge DATPRO programs. A mode name is specified for several program variables that a user may wish to modify. Each line in a mode file includes the program name, mode name, and value. When running PPLOT, help text and mode descriptions are also available at the MODE prompt. This manual also includes a description for each variable that may be modified in PPLOT, and includes an appendix that describes modes in more detail.

OUTPUT FILES

The Log file (.LOG-file) includes much of the information that was displayed to the user while running PPLOT. It is useful when reviewing the operation of the program.

The Plot file (.X01-file) includes HPGL (Hewlett-Packard Graphics Language) commands. They may be printed on paper by using the FPLOT utility program to rasterize the plot files.

SURVEY LOCATION CONVENTIONS

Zonge DATPRO programs assume that survey locations for the Dipole-Dipole configuration are entered by the GDP operator in a specific manner. First, the N-Spacing for each channel is entered for each channel. Then, the Tx and Rx entries indicate the dipoles for the channel with the SMALLEST N-Spacing. Also, Dipoles extend between two adjacent stations with the LOWEST numbered station entered for each dipole.

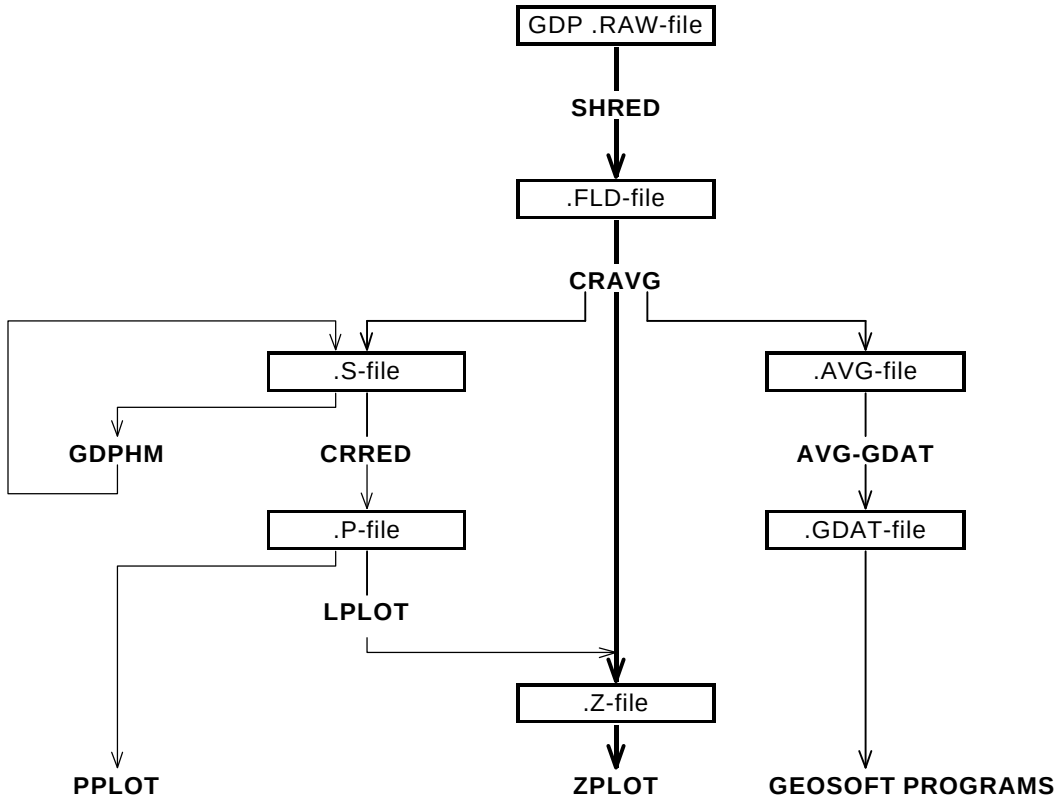
Station numbers are assumed to increase towards the north or east, and decrease towards the south or west (negative values when the station is south or west of the zero coordinate). Therefore, the Tx and Rx entries reflect the south or west end of each dipole.

CR DATA PROCESSING FLOW

August, 1993

Program names are **CAPITALIZED**
File names are Boxed

Bold lines ═══ show standard GDP data processing flow.



Other files read or written:

.MDE-file | .LOG-file | .Xnn-files

PPLOT Usage

The GENERAL DATA PROCESSING DOCUMENTATION includes many details that are common to data processing programs.

Start the averaging program by typing "PPLOT" <RETURN>. Respond to the prompt with the name of the data file (.P-file). Command line execution also allows the user to type "PPLOT" followed by the .P-filename <RETURN> to automatically load the data file.

Several variable parameters called "MODES" influence the operation of PPLOT. A brief explanation of each mode, as well as its current value, can be listed within the program. An appendix to this manual summarizes the use of mode variables and includes a description of each mode defined by PPLOT.

PPLOT MODE DISPLAY

```
PROCESSING MODE LIST:   (Type MENU for assistance)
+==============+=========+=========+=========+=========+=========+
|OPTION MODES  |AutoRun  |FreqLimit|Lengths  |Vertical |         |
|   mode names | AUTO    |  FMAX   | SIZEX   | HITE    |         |
|  mode values |    NO   |   NONE  |  1.60cm |  19.0cm |         |
+==============+=========+=========+=========+=========+=========|
|PLOT MODES    |A-Space  |Asp/SUnit|HomoGrid |Screen   |         |
|   mode names | ASPACE  | ASPSU   |  HOMO   | VIEW    |         |
|  mode values |   NONE  | default |    NO   |   NONE  |         |
+==============+=========+=========+=========+=========+=========+
```

PPLOT ERROR MESSAGES

If errors or inconsistencies arise within the program, PPLOT may type a "NOTE" or an "ERROR" message. A "NOTE" message usually indicates some irregularity in the data file that is not fatal to program operation. Depending on the severity of the problem, an "ERROR" message may allow the program to continue to run or cause it to interrupt and wait for a response to a prompt to continue, restart the program, or to end. These messages are also included in a .LOG-file, which provides documentation of the program operation, which is especially useful when running several programs automatically from a batch file.

PPLOT OUTPUT SELECTIONS

PPLOT will write a plot file (.X01-file) containing HPGL plot commands. A .LOG-file is also automatically created by PPLOT.

PPLOT Sample Run

Input files: SAMRPIP.P, SAMRPIP.MDE
Output files: SAMRPIP.LOG, SAMRPIP.X01

```
*** Bold text: user input and comments ***

C: > PPLOT SAMRPIP              *** Start program, specify data file ***

ZONGE ENGINEERING: 3322 E. Fort Lowell, Tucson AZ 85716, USA
PPLOT 7.01: SPECTRAL PSEUDOSECTION PLOT Program
   MS-DOS version implemented 25 November, 1992.

MODE COMPANY =Zonge Engineering *** Modes included in SAMRPIP.MDE    ***
MODE CLIENT  =ZONGE ENGINEERING
MODE PROJECT =Test Data
MODE JOBNUMB =9000
MODE JOBDATE =Aug 90
MODE JOBLINE =2
MODE BRGLINE =S 90 W
MODE BRGBACK =N 90 E
MODE STNLO   =     7.0
MODE STNHI   =    21.0
MODE UNITS   =  FEET

(Type MENU for assistance with MODEs.)

MODE Change [name?, name= value] : <RETURN>             *** Continue ***

WAIT: reading .P-file to define limits . . .

 +-------------------------------------------------------+
 |     60 points were successfully read.                 |
 |     60 points were processed as requested.            |
 |      0 points were not processable as requested.      |
 |    422 lines were read from the .P-file.              |
 | In-phase   component: Min=     0.040, Max=     1.000  |
 | Quadrature component: Min=    -0.488, Max=     0.020  |
 | Minimal scale for this data file:     1.042 A-Sp/S.U. |
 +-------------------------------------------------------+
A-sp per Spectral unit, SCALE  [   1.000]: <RETURN>     *** Continue ***
MODE ASPSU =   1.000

MODE Change [name?, name= value] : <RETURN>             *** Continue ***

Processing . . .

Files used: "SAMRPIP.P" and "SAMRPIP.MDE"

 +-------------------------------------------------------+
 | Array dimensions: A(141, 36)                          |
 | Raw limits:  K=  70 , 210     J=   5 ,  40            |
 | Data limits: X=  7.0, 21.0    Y=  1.0,  8.0           |
 | Plot size:   x= 22.4cm, y=  5.6cm                     |
 +-------------------------------------------------------+

Rx=  15.  , Tx=  11.  , N-Sp=  3.0 : plotting
Rx=  16.  , Tx=  11.  , N-Sp=  4.0 : plotting
Rx=  17.  , Tx=  11.  , N-Sp=  5.0 : plotting
Rx=  18.  , Tx=  11.  , N-Sp=  6.0 : plotting
   :
   :
Rx=   9.  , Tx=  11.  , N-Sp=  1.0 : plotting
Rx=   8.  , Tx=  11.  , N-Sp=  2.0 : plotting
Rx=   7.  , Tx=  11.  , N-Sp=  3.0 : plotting


File: "SAMRPIP.X01"      7451 bytes, ready for rasterizing.
Files ready for rasterizing:
SAMRPIP.X01    7451

Log file "SAMRPIP.LOG" closed.
```

Appendix A ... MODE VARIABLES

Control of various aspects of many data processing programs is provided by names called "Modes". Each name refers to a specific program function. For example, the Mode name "AUTO" refers to the automatic mode of program operation, which the user may enable.

Mode changes are recognized when prompted by a program, when read from a Mode file, or when included in an input data file.

MODE PROMPTS, Manual entry

The first prompt after a data filename is requested is commonly a mode prompt. In the following example, user requests are in BOLD type, and the results are typical responses.

```
(Type MENU for assistance with MODEs.)

MODE Change [name?, name= value] : MENU

PROCESSING MODE MENU:   Review and changing of mode values.
Change value: type "NAME= value", where NAME is the variable
              name, followed by "= ", then the value to be
              assigned to the variable called NAME.
Description : type "NAME?" for description of value.
This menu   : type "MENU", or "M", to list this menu.
List globals: type "GLOBL" or "G", to list global mode values.
List values : type "LOCAL" or "L", to list local mode values.
Version info: type "VRSN", or "V", for program version info.
Back up     : type <CRTL><Z> to back up in program.
All done    : type <RETURN>.

MODE Change [name?, name= value] : LIST

   PROCESSING MODE LIST:   (Type MENU for assistance)
```

CONTROL MODES	AutoRun	LowFreq	InitGain	GridOrgX	GridOrgY
mode names	AUTO	FMIN	(not yet)	GORX	GORY
mode values	YES	1/16 Hz	NONE	NONE	NONE

```
MODE Change [name?, name= value] : AUTO?

AUTO mode will automatically delete existing output files (if
any), not prompt for MODE changes (if AUTO= YES is included in the
.MDE-file, and exit when completed.  Plots will be done as
specified by entries in the .MDE-file (MODE PLOT and VIEW).
Enter: AUTO= No, or Yes.

MODE Change [name?, name= value] : AUTO= yes

MODE Change [name?, name= value] : <RETURN>

(the program continues ...)
```

Display a definition of any Mode by typing the variable name and a question mark (as shown for Mode AUTO). Each program manual includes an appendix of mode definitions defined by that program.

Change the value of a Mode by typing the variable name, an equals sign, and a valid value. Press <RETURN> to indicate that the program should continue.

MODE CHANGE PRIORITIES

Mode changes may be manually entered, added to mode files or to input data files. Mode statements in files include the program name (optional), the Mode name, and the Mode value. Include a dollar sign ($) in the first column, a colon (:) after the program name (if any), and an equal sign after the Mode name such as:

```
$ ZPLOT: AUTO= yes
```

Modes will NOT be changed unless they are from a source with the same or higher priority as the entry to be replaced:

1: default mode values
2: Mode lines in input data files
3: Mode lines in Mode files (global or local)
4: Mode changes made at a MODE prompt

LOCAL MODE FILES

The program will read a Mode file (if it exists) with the same name as the data file and an extension of ".MDE" (like LINE10.MDE). Specify a different Mode file from the DOS prompt, by entering the program name, data file name, then Mode file name. Include the filename extension if not the same as the default. For example:

Start ZPLOT by:			ZPLOT looks for files named:	
C:> ZPLOT	LINE10		LINE10.Z	LINE10.MDE
C:> ZPLOT	LINE10	PROJECT	LINE10.Z	PROJECT.MDE
C:> ZPLOT	LINE10.ZZ	PROJECT.MOD	LINE10.ZZ	PROJECT.MOD

GLOBAL MODE FILES

Frequently used Mode statements may be included in a file named "DATPRO.MDE" and located in any subdirectory included on your PATH. Or, the environment variable DATMDE may specify any Mode file located anywhere on your computer. One of these files will be used automatically by the program, in addition to any local mode file. Your MS-DOS manuals describe environment variables and PATH.

DATA FILE MODE STATEMENTS

Mode statements may be included in an input data file (near the top of the file). Some programs will include Mode statements in output data files, for use by subsequent programs.

PPLOT MODE LIST
(v 7.0x)

PROCESSING MODE DEFAULT VALUES:

PROCESS MODES	AutoRun	FreqLimit	Lengths	Vertical		
mode names	AUTO	FMAX	SIZEX	HITE		
mode values	NO	NONE	1.60cm	19.0cm		
DISPLAY MODES	A-Space	Asp/Sunit	HomoGrid	Screen		
mode names	ASPACE	ASPSU	HOMO	VIEW		
mode values	NONE	Default	NO	NONE		

COMPANY
Company name (40 chr max)

Values: COMPANY= Name of survey company
Default: COMPANY= (blank)

CLIENT
Client name (40 chr max)

Values: CLIENT= Company requesting the survey
Default: CLIENT= (blank)

PROJECT
Project name (40 chr max)

Values: PROJECT= Name of the survey project.
Default: PROJECT= (blank)

JOBNUMBER
Company job number (10 chr max)

Values: JOBNUMBER= Survey Job Number.
Default: JOBNUMBER= (blank)

JOBDATE
Survey date (10 chr max)

Values: JOBDATE= Date of Survey.
Default: JOBDATE= (blank)

JOBLINE
Survey line number (10 chr max)

Values: JOBLINE= Survey Line Number.
Default: JOBLINE= (blank)

BRGLINE
Line forward bearing (10 chr max)

Values: BRGLINE= Line Bearing, to high stn.
Default: BRGLINE= (blank)

BRGBACK
Line back bearing (10 chr max)

Values: BRGBACK= Back Bearing, to low stn.
Default: BRGBACK= (blank)

STNLOW
Low station number, plot limit

Values: STNLOW= X-axis low station limit.
Default: STNLOW= NONE

STNHIGH
High station number, plot limit

Values: STNHIGH= X-axis high station limit.
Default: STNHIGH= NONE

STNDELT
Station number increment, plot scale

Values: STNDELT= X-axis station increment.
Default: STNDELT= 1.0

LBLFRST
Low station number, axis label

Values: LBLFRST= X-axis low station label.
Default: LBLFRST= mode STNLOW value.

LBLDELT
Station number increment, axis label

Values: LBLDELT= X-axis station label increment.
Default: LBLDELT= 1.0

FRQLO
Low frequency, plot limit

Values: FRQLO= None, or low frequency limit, Hz.
Default: FRQLO= NONE

FRQHI
High frequency, plot limit

Values: FRQHI= None, or high frequency limit, Hz.
Default: FRQHI= NONE

TXLEN
CSAMT Transmitter length (10 chr max)

Values: TXLEN= CSAMT Transmitter Length
Default: TXLEN= (blank)

TXBRG
CSAMT Transmitter bearing (10 chr max)

Values: TXBRG= CSAMT Transmitter Bearing
Default: TXBRG= (blank)

TXDIS
CSAMT Transmitter distance from survey line (10 chr max)

Values: TXDIS= Distance from Rx Line to Tx
Default: TXDIS= (blank)

TXCX
CSAMT Transmitter center, X-coordinate
If units in feet or meters are not included, mode UNITS will be used.

Values: TXCX=
X-coordinate of center of Tx dipole.(10 chr max)
Default: TXCX= (blank)

TXCY
CSAMT Transmitter center, Y-coordinate
If units in feet or meters are not included, mode UNITS will be used.

Values: TXCY=
Y-coordinate of center of Tx dipole.(10 chr max)
Default: TXCY= (blank)

RX2TX
CSAMT Receiver to Transmitter direction

Values: RX2TX=
Direction from Rx Line to Tx(10 chr max)
Default: RX2TX= (blank)

RXBRG
Receive dipole bearing, usually same as survey line orientation

Values: RXBRG=
Receiver Dipole Bearing (10 chr max)
Default: RXBRG= (blank)

COMWIRE
Communications wire type, used for decalibration of GDP-12 data

Values: COMWIRE= NONE,
1WHITE, 2WHITE, or BLACK.
Default: COMWIRE= NONE

PLTREV
Plot X-axis reverse selection

Values: PLTREV= No, or Yes.
Default: PLTREV= NO

UNITS
Units for listed values, such as A-Spacing. Feet or meters.

Values: UNITS= Feet or Meters.
Default: UNITS= Meters

AUTO
AUTO mode will automatically delete existing output files (if any), not prompt for MODE changes (if AUTO= YES is included in the .MDE-file) and exit when completed.

Prompts will not be made when AUTO is specified. If AUTO is set in the mode file (.MDE-file) or input .Z-file, and the program is started by "PPLOT filename", then no prompts will occur at all.

Values: AUTO= No, or Yes.
Default: AUTO= No

FMAX
High frequency noisy data will not be plotted when mode FMAX is set to a cutoff frequency. FMAX = NONE is the default value, and all data will be included in the plots. Otherwise only data below the frequency specified by FMAX will be included.

Values: FMAX= NONE or frequency limit in Hz.
Default: FMAX= NONE

SIZEX
The horizontal spacing between stations is specified by mode SIZEX. SIZEY is the vertical spacing between N-spacings, and is 1/2 SIZEX.

Useful values for this variable are from 0.5 to 5.0 cm.

Values: SIZEX= value, about 0.01 to 25.00.
Default: SIZEX= 1.6

HITE
Mode HITE specifies the vertical height used by the plot. The default value is 19.0 cm. Wide paper may use about 32.5 cm. Changes in HITE do not change the scale of the plot (text included). Larger values just give the plot more room.

Values: HITE= value, between 15.0 cm and 32.5 cm.
Default: HITE= 19.0

AXSTN
Set AXSTN = HORIZONTAL to plot the X-axis labels (stations) parallel to to the axis (default). Set AXSTN = VERTICAL to plot the X-axis labels perpendicular to the axis.

Values: AXSTN= HORIZONTAL or VERTICAL.
Default: AXSTN= HORIZONTAL

ASPACE
The survey line A-Spacing is specified by mode ASPACE. If the value is not included in the data file definition, the program writing the file should include a mode line with the value, for use by other programs.

The value may be entered in feet or meters. Meters will be assumed if the units are not included, as "1000.Ft". The value will be displayed in meters (converted from feet if needed). The value that is plotted depends upon the value of mode UNITS (Feet or Meters).

Values: ASPACE= A-Space for survey line.
Default: ASPACE= None

ASPSU
Each pseudosection plot point is indicated with a "+" symbol. This symbol marks the coordinates (1.0, 0.0) for each Spectral Plot. The scale of all Spectral Plots is specified by mode ASPSU, indicating the number of A-spacings per unit of Spectral Plot.

For example, when ASPSU = 1.0, the "+" symbol for each plot point marks the Spectral Plot coordinates (1.0, 0.0), and a point one A-spacing to the left marks the origin of that Spectral Plot. In this case, the origin would be marked by the "+" symbol for a plot point that is one A-spacing to the left.

By default, mode ASPSU is set to a negative value, and the scale will be set according to the type of data being plotted. If the user specifies a positive value, it will be used instead. If manual mode (AUTO = No) is used, the user will be advised of the current value, and be able to modify the value.

Values: ASPSU= A-sp per Spectral Unit.
Default: ASPSU= default

HOMO
The maximum quadrature (imaginary) limit for data measured over homogeneous earth may be included for reference, plotted as a horizontal line above the X-axis for each N-spacing. The limit varies from 0.247 at n=1 to 0.266 at n=6.

Values: HOMO= No, or Yes.
Default: HOMO= No

VIEW
A rough screen plot may be selected by mode VIEW. The plot is scaled to fit on one screen.

Values: VIEW= NONE or SCREEN.
Default: VIEW= None

Appendix B ... SAMPLE FILES

Sample .LOG-file (partial)

```
PPLOT 7.01, Processed: 25 Nov 92

 +-----------------------------------------------------+
 |     60 points were successfully read.               |
 |     60 points were processed as requested.          |
 |      0 points were not processable as requested.    |
 |    422 lines were read from the .P-file.            |
 | In-phase   component: Min=     0.040, Max=     1.000 |
 | Quadrature component: Min=    -0.488, Max=     0.020 |
 | Minimal scale for this data file:     1.042 A-Sp/S.U.|
 +-----------------------------------------------------+

GLOBAL MODE LIST:
+=============================================+==============+==============+
|  COMPANY                                    |  JOBNUMB     | CSAMT XMTR   |
| Zonge Engineering                           | 9000         |              |
|  CLIENT                                     |  JOBDATE     |  TXLEN       |
| ZONGE ENGINEERING                           | Aug 90       |              |
|  PROJECT                                    |  JOBLINE     |  TXBRG       |
| Test Data                                   | 2            |              |
+==============+==============+==============+==============|              |
|  BRGBACK     |  RXBRG       |  BRGLINE     |  FRQLO       |  TXDIS       |
| N 90 E       | East         | S 90 W       |     1/8 Hz   |              |
|  STNLO       |  STNDELT     |  STNHI       |  FRQHI       |  RX2TX       |
|      7.0     |      1.0     |     21.0     |     8.0 Hz   |              |
|  LBLFRST     |  LBLDELT     |  PLTREV      |  UNITS       |              |
|  STNLO       |      1.0     |    NO        |   FEET       |              |
+==============+==============+==============+==============+==============+

PROCESSING MODES USED:
+==============+=========+=========+=========+=========+=========+=========+
|OPTION MODES  |AutoRun  |FreqLimit|Lengths  |Vertical |AxisLabel|         |
|   mode names | AUTO    |  FMAX   | SIZEX   | HITE    | AXSTN   |         |
|  mode values |    NO   |   NONE  |  1.60cm |  19.0cm |   HORIZ |         |
+==============+=========+=========+=========+=========+=========+=========|
|PLOT MODES    |A-Space  |Asp/SUnit|HomoGrid |Screen   |         |         |
|   mode names | ASPACE  | ASPSU   |  HOMO   | VIEW    |         |         |
|  mode values |    182.9| 1.      |    NO   |   NONE  |         |         |
+==============+=========+=========+=========+=========+=========+=========+

Files used: "SAMRPIP.P" and "SAMRPIP.MDE"
 +-----------------------------------------------------+
 | Array dimensions: A(141, 36)                        |
 | Raw limits:  K=  70 , 210     J=   5 ,  40          |
 | Data limits: X=  7.0, 21.0    Y=  1.0,  8.0         |
 | Plot size:   x= 22.4cm, y=  5.6cm                   |
 +-----------------------------------------------------+

Files ready for rasterizing:
SAMRPIP.X01    7451

Log file "SAMRPIP.LOG" closed.
```

Sample .P-file

```
$ ASPACE=   600.ft
 "SAMRPIP.P", from CRRED 7.01
 PLOT FILE FOR LPLOT      1 0
 Rx:  15.  Tx:  11.  NSp: 3.
 1 0 0  3     4.      1.4   0.
   -6.4   0.    0.    0.    0.
    1.2   4.8   0.    0.    0.
  0.125 1.0000E+00-6.4200E-03
      1 9.8580E-01-2.5440E-02
      8 7.9742E-01-1.8675E-01
 Rx:  16.  Tx:  11.  NSp: 4.
 1 0 0  3     4.      3.2   0.
   -5.6   0.    0.    0.    0.
    2.    9.2   0.    0.    0.
  0.125 1.0000E+00-5.5800E-03
      1 9.6862E-01-3.3697E-02
      8 5.7658E-01-3.4815E-01
 Rx:  17.  Tx:  11.  NSp: 5.
 1 0 0  3     4.5     3.6   0.
    2.6   0.    0.    0.    0.
    3.8  11.9   0.    0.    0.
  0.125 1.0000E+00 2.6001E-03
      1 9.6283E-01-6.2164E-02
      8 2.8045E-01-4.8576E-01
 Rx:  18.  Tx:  11.  NSp: 6.
 1 0 0  3     6.9     5.4   0.
    1.    0.    0.    0.    0.
    5.6  14.1   0.    0.    0.
  0.125 1.0000E+00 1.0000E-03
      1 9.4634E-01-7.1085E-02
      8 1.5087E-01-4.1067E-01
 Rx:  19.  Tx:  11.  NSp: 7.
 1 0 0  3     9.1     5.9   0.
  -51.6   0.    0.    0.    0.
   25.   48.1   0.    0.    0.
  0.125 1.0000E+00-5.1644E-02
      1 9.4491E-01-4.0325E-02
      8 3.9986E-02-3.4377E-01
 Rx:  20.  Tx:  11.  NSp: 8.
 1 0 0  2     9.5     0.    0.
-198.5   0.    0.    0.    0.
  29.4  39.9   0.    0.    0.
      1 1.0000E+00-2.0111E-01
      8 2.2908E-01-4.1645E-01
 Rx:  15.  Tx:  12.  NSp: 2.
 1 0 0  3     3.6     1.    0.
   -3.9   0.    0.    0.    0.
    0.4   0.8   0.    0.    0.
  0.125 1.0000E+00-3.8800E-03
      1 9.8961E-01-6.1604E-03
      8 8.9575E-01-9.0297E-02
 Rx:  16.  Tx:  12.  NSp: 3.
 1 0 0  3     3.6     1.7   0.
   -2.    0.    0.    0.    0.
    1.1   1.3   0.    0.    0.
  0.125 1.0000E+00-1.9800E-03
      1 9.8309E-01-1.1946E-02
      8 7.7744E-01-1.8902E-01
 Rx:  17.  Tx:  12.  NSp: 4.
 1 0 0  3     4.      2.2   0.
   -7.7   0.    0.    0.    0.
   12.4  15.4   0.    0.    0.
  0.125 1.0000E+00-7.6753E-03
      1 9.7800E-01-1.0269E-02
      8 5.4954E-01-4.6802E-01
 Rx:  18.  Tx:  12.  NSp: 5.
 1 0 0  3     5.5     3.8   0.
   20.1   0.    0.    0.    0.
    9.2  15.8   0.    0.    0.
  0.125 1.0000E+00 2.0103E-02
      1 9.6246E-01-4.3003E-02
      8 2.0019E-01-4.6835E-01
```

continued next column ...

```
 Rx:  19.  Tx:  12.  NSp: 6.
 1 0 0  3     7.8     3.9   0.
  -89.7   0.    0.    0.    0.
   23.3  32.3   0.    0.    0.
  0.125 1.0000E+00-8.9977E-02
      1 9.6534E-01-3.5299E-02
      8 2.1359E-01-4.8784E-01
 Rx:  20.  Tx:  12.  NSp: 7.
 1 0 0  2     7.9     0.    0.
  -66.    0.    0.    0.    0.
   27.4  41.9   0.    0.    0.
      1 1.0000E+00-6.6046E-02
      8 4.8391E-01-4.7373E-01
 Rx:  15.  Tx:  13.  NSp: 1.
 1 0 0  3     8.5     0.3   0.
   -1.1   0.    0.    0.    0.
    0.    0.    0.    0.    0.
  0.125 1.0000E+00-1.1001E-03
      1 9.9681E-01-2.4920E-03
      8 9.6500E-01-2.4355E-02
 Rx:  16.  Tx:  13.  NSp: 2.
 1 0 0  3     8.3     0.8   0.
   -2.1   0.    0.    0.    0.
    0.    0.    0.    0.    0.
  0.125 1.0000E+00-2.1001E-03
      1 9.9167E-01-5.7187E-03
      8 8.9322E-01-7.2240E-02
 Rx:  17.  Tx:  13.  NSp: 3.
 1 0 0  3     7.5     2.1   0.
   -4.5   0.    0.    0.    0.
    0.1   0.1   0.    0.    0.
  0.125 1.0000E+00-4.4669E-03
      1 9.7982E-01-1.3980E-02
      8 7.2669E-01-2.2772E-01
 Rx:  18.  Tx:  13.  NSp: 4.
 1 0 0  3     9.7     4.    0.
   -4.7   0.    0.    0.    0.
    0.2   0.2   0.    0.    0.
  0.125 1.0000E+00-4.6669E-03
      1 9.6145E-01-2.6350E-02
      8 4.0679E-01-4.3173E-01
 Rx:  19.  Tx:  13.  NSp: 5.
 1 0 0  3    13.3     5.6   0.
   -7.1   0.    0.    0.    0.
    0.4   0.5   0.    0.    0.
  0.125 1.0000E+00-7.1333E-03
      1 9.4643E-01-3.7688E-02
      8 2.4192E-01-4.5294E-01
 Rx:  20.  Tx:  13.  NSp: 6.
 1 0 0  3    13.5     6.8   0.
   -6.9   0.    0.    0.    0.
    1.    2.    0.    0.    0.
  0.125 1.0000E+00-6.8666E-03
      1 9.3467E-01-4.9615E-02
      8 1.9655E-01-4.4677E-01
 Rx:  16.  Tx:  14.  NSp: 1.
 1 0 0  3     6.8     0.3   0.
   -1.6   0.    0.    0.    0.
    0.    0.    0.    0.    0.
  0.125 1.0000E+00-1.6250E-03
      1 9.9711E-01-2.8584E-03
      8 9.5874E-01-2.4581E-02
 Rx:  17.  Tx:  14.  NSp: 2.
 1 0 0  3     5.9     1.1   0.
   -2.1   0.    0.    0.    0.
    0.1   0.1   0.    0.    0.
  0.125 1.0000E+00-2.1000E-03
      1 9.8951E-01-7.2235E-03
      8 8.5729E-01-8.5208E-02
```

continued next column ...

```
 Rx:  18.  Tx:  14.  NSp: 3.
 1 0 0  3     6.5     2.8   0.
   -1.7   0.    0.    0.    0.
    0.2   0.5   0.    0.    0.
  0.125 1.0000E+00-1.7500E-03
      1 9.7295E-01-1.6445E-02
      8 6.2652E-01-2.6699E-01
 Rx:  19.  Tx:  14.  NSp: 4.
 1 0 0  3     9.      4.2   0.
  -18.    0.    0.    0.    0.
    2.3   2.4   0.    0.    0.
  0.125 1.0000E+00-1.8026E-02
      1 9.5997E-01-2.1219E-02
      8 4.3270E-01-3.8798E-01
 Rx:  20.  Tx:  14.  NSp: 5.
 1 0 0  3     9.2     6.    0.
   -2.6   0.    0.    0.    0.
    2.8   6.1   0.    0.    0.
  0.125 1.0000E+00-2.5749E-03
      1 9.4340E-01-2.0853E-02
      8 3.0492E-01-4.2317E-01
 Rx:  17.  Tx:  15.  NSp: 1.
 1 0 0  3     3.7     0.7   0.
   -3.1   0.    0.    0.    0.
    0.    0.    0.    0.    0.
  0.125 1.0000E+00-3.0749E-03
      1 9.9334E-01-3.8740E-03
      8 9.5365E-01-2.5945E-02
 Rx:  18.  Tx:  15.  NSp: 2.
 1 0 0  3     2.5     1.9   0.
   -3.2   0.    0.    0.    0.
    0.1   0.1   0.    0.    0.
  0.125 1.0000E+00-3.2250E-03
      1 9.8087E-01-1.2017E-02
      8 7.7645E-01-1.7252E-01
 Rx:  19.  Tx:  15.  NSp: 3.
 1 0 0  3     3.5     3.1   0.
  -13.6   0.    0.    0.    0.
    0.4   0.5   0.    0.    0.
  0.125 1.0000E+00-1.3551E-02
      1 9.7003E-01-1.9500E-02
      8 6.2248E-01-2.9371E-01
 Rx:  20.  Tx:  15.  NSp: 4.
 1 0 0  3     3.7     3.7   0.
  -21.7   0.    0.    0.    0.
    0.7   1.2   0.    0.    0.
  0.125 1.0000E+00-2.1654E-02
      1 9.6441E-01-2.3440E-02
      8 4.9181E-01-3.7533E-01
 Rx:  18.  Tx:  16.  NSp: 1.
 1 0 0  3     2.3     0.7   0.
   -1.6   0.    0.    0.    0.
    0.    0.    0.    0.    0.
  0.125 1.0000E+00-1.6332E-03
      1 9.9285E-01-3.9714E-03
      8 8.9756E-01-7.6612E-02
 Rx:  19.  Tx:  16.  NSp: 2.
 1 0 0  3     3.1     1.8   0.
   -1.9   0.    0.    0.    0.
    0.2   0.2   0.    0.    0.
  0.125 1.0000E+00-1.9334E-03
      1 9.8193E-01-1.0507E-02
      8 7.2878E-01-2.2576E-01
 Rx:  20.  Tx:  16.  NSp: 3.
 1 0 0  3     3.4     2.9   0.
   -3.9   0.    0.    0.    0.
    0.5   0.5   0.    0.    0.
  0.125 1.0000E+00-3.9335E-03
      1 9.7182E-01-1.9342E-02
      8 5.6417E-01-3.4168E-01
```

continued next page ...

Sample .P-file (page 2)

```
 Rx:  12.  Tx:  16.  NSp: 3.
1 0 0  3     3.7    11.8   0.
   0.5   0.    0.    0.    0.
   1.5   2.5   0.    0.    0.
 0.125 1.0000E+00 5.1666E-04
     1 8.9413E-01-9.9472E-03
     8 6.8758E-01-2.0318E-01
 Rx:  11.  Tx:  16.  NSp: 4.
1 0 0  3     4.     13.2   0.
 -10.7   0.    0.    0.    0.
   1.5   6.2   0.    0.    0.
 0.125 1.0000E+00-1.0684E-02
     1 8.8347E-01-2.0125E-02
     8 5.4572E-01-3.3918E-01
 Rx:  10.  Tx:  16.  NSp: 5.
1 0 0  3     4.8    14.8   0.
 -34.2   0.    0.    0.    0.
   3.3   9.2   0.    0.    0.
 0.125 1.0000E+00-3.4230E-02
     1 8.7161E-01-2.2297E-02
     8 3.4545E-01-4.3327E-01
 Rx:   9.  Tx:  16.  NSp: 6.
1 0 0  3     6.5    16.9   0.
 -33.2   0.    0.    0.    0.
   6.7  12.    0.    0.    0.
 0.125 1.0000E+00-3.3229E-02
     1 8.5521E-01-4.1253E-02
     8 2.3507E-01-4.3466E-01
 Rx:   8.  Tx:  16.  NSp: 7.
1 0 0  3     5.9    17.    0.
 -42.4   0.    0.    0.    0.
   2.8   4.3   0.    0.    0.
 0.125 1.0000E+00-4.2410E-02
     1 8.5441E-01-4.1750E-02
     8 1.7401E-01-4.2290E-01
 Rx:   7.  Tx:  16.  NSp: 8.
1 0 0  3     5.1    16.7   0.
 -11.7   0.    0.    0.    0.
   3.7   9.1   0.    0.    0.
 0.125 1.0000E+00-1.1683E-02
     1 8.5587E-01-4.8988E-02
     8 5.2872E-02-4.2537E-01
 Rx:  12.  Tx:  15.  NSp: 2.
1 0 0  3     3.7     0.5   0.
  -7.6   0.    0.    0.    0.
   0.7   1.2   0.    0.    0.
 0.125 1.0000E+00-7.5751E-03
     1 9.9502E-01-4.3532E-03
     8 8.9388E-01-8.9056E-02
 Rx:  11.  Tx:  15.  NSp: 3.
1 0 0  3     4.      1.3   0.
  -4.3   0.    0.    0.    0.
   0.6   1.2   0.    0.    0.
 0.125 1.0000E+00-4.2502E-03
     1 9.8668E-01-1.1125E-02
     8 8.0039E-01-1.6965E-01
 Rx:  10.  Tx:  15.  NSp: 4.
1 0 0  3     4.8     2.1   0.
  -6.4   0.    0.    0.    0.
   1.9   3.    0.    0.    0.
 0.125 1.0000E+00-6.3750E-03
     1 9.7924E-01-1.9245E-02
     8 6.4510E-01-3.2048E-01
 Rx:   9.  Tx:  15.  NSp: 5.
1 0 0  3     6.1     4.2   0.
  -4.2   0.    0.    0.    0.
   2.2   4.7   0.    0.    0.
 0.125 1.0000E+00-4.2249E-03
     1 9.5905E-01-4.4316E-02
     8 4.4666E-01-4.1791E-01
```

continued next column ...

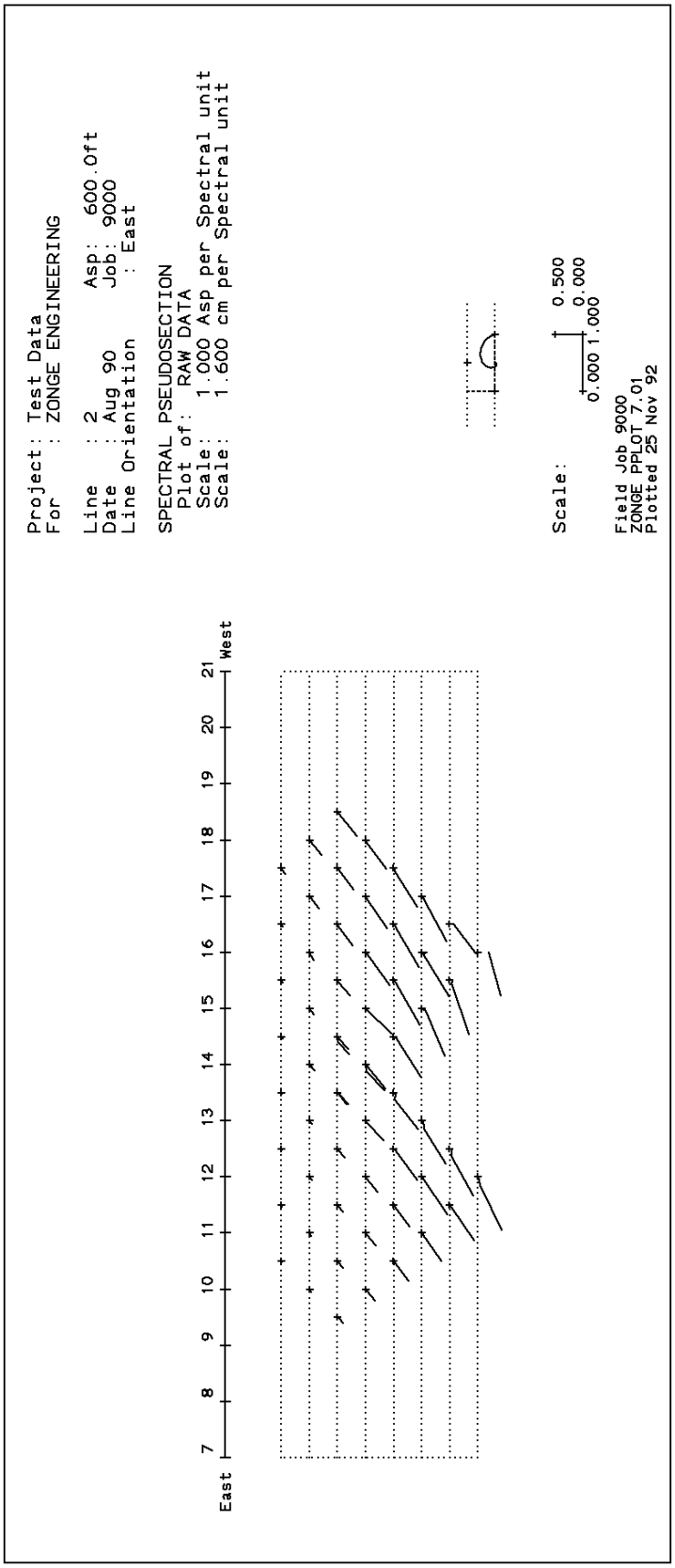
```
 Rx:   8.  Tx:  15.  NSp: 6.
1 0 0  3     5.5     5.5   0.
  -5.4   0.    0.    0.    0.
   2.9   4.3   0.    0.    0.
 0.125 1.0000E+00-5.3501E-03
     1 9.4733E-01-3.9740E-02
     8 3.2665E-01-4.5459E-01
 Rx:   7.  Tx:  15.  NSp: 7.
1 0 0  3     5.4     4.5   0.
 -10.4   0.    0.    0.    0.
   2.9   4.3   0.    0.    0.
 0.125 1.0000E+00-1.0401E-02
     1 9.5602E-01-3.5844E-02
     8 3.6402E-01-4.4376E-01
 Rx:  12.  Tx:  14.  NSp: 1.
1 0 0  3    15.8     0.6   0.
  -2.3   0.    0.    0.    0.
   0.    0.    0.    0.    0.
 0.125 1.0000E+00-2.2667E-03
     1 9.9394E-01-3.7108E-03
     8 9.7133E-01-1.8750E-02
 Rx:  11.  Tx:  14.  NSp: 2.
1 0 0  3    16.4     1.    0.
  -3.1   0.    0.    0.    0.
   0.    0.1   0.    0.    0.
 0.125 1.0000E+00-3.0667E-03
     1 9.9049E-01-6.1411E-03
     8 9.3398E-01-5.1983E-02
 Rx:  10.  Tx:  14.  NSp: 3.
1 0 0  3    14.7     1.8   0.
  -4.4   0.    0.    0.    0.
   0.1   0.1   0.    0.    0.
 0.125 1.0000E+00-4.4334E-03
     1 9.8184E-01-1.2241E-02
     8 8.3597E-01-1.3423E-01
 Rx:   9.  Tx:  14.  NSp: 4.
1 0 0  3    18.1     2.7   0.
  -4.8   0.    0.    0.    0.
   0.2   0.2   0.    0.    0.
 0.125 1.0000E+00-4.8336E-03
     1 9.7333E-01-1.8431E-02
     8 7.3351E-01-2.1116E-01
 Rx:   8.  Tx:  14.  NSp: 5.
1 0 0  3    15.8     4.    0.
  -7.3   0.    0.    0.    0.
   0.3   0.3   0.    0.    0.
 0.125 1.0000E+00-7.3001E-03
     1 9.6163E-01-2.6740E-02
     8 6.1499E-01-2.8462E-01
 Rx:   7.  Tx:  14.  NSp: 6.
1 0 0  3    13.7     4.7   0.
  -7.    0.    0.    0.    0.
   0.4   0.5   0.    0.    0.
 0.125 1.0000E+00-7.0004E-03
     1 9.5475E-01-3.2760E-02
     8 5.0129E-01-3.5806E-01
 Rx:  11.  Tx:  13.  NSp: 1.
1 0 0  3    37.5     0.4   0.
  -2.    0.    0.    0.    0.
   0.    0.    0.    0.    0.
 0.125 1.0000E+00-2.0333E-03
     1 9.9631E-01-3.0554E-03
     8 9.8322E-01-9.8982E-03
 Rx:  10.  Tx:  13.  NSp: 2.
1 0 0  3    27.2     0.8   0.
  -3.    0.    0.    0.    0.
   0.    0.    0.    0.    0.
 0.125 1.0000E+00-2.9999E-03
     1 9.9226E-01-5.7883E-03
     8 9.4342E-01-4.3806E-02
```

continued next column ...

```
 Rx:   9.  Tx:  13.  NSp: 3.
1 0 0  3    27.7     1.2   0.
  -2.7   0.    0.    0.    0.
   0.1   0.1   0.    0.    0.
 0.125 1.0000E+00-2.6668E-03
     1 9.8824E-01-8.5979E-03
     8 8.7417E-01-1.0295E-01
 Rx:   8.  Tx:  13.  NSp: 4.
1 0 0  3    22.      2.    0.
  -4.4   0.    0.    0.    0.
   0.2   0.2   0.    0.    0.
 0.125 1.0000E+00-4.4333E-03
     1 9.7982E-01-1.4796E-02
     8 7.7137E-01-1.8591E-01
 Rx:   7.  Tx:  13.  NSp: 5.
1 0 0  3    18.5     3.4   0.
  -6.6   0.    0.    0.    0.
   0.3   0.3   0.    0.    0.
 0.125 1.0000E+00-6.5998E-03
     1 9.6721E-01-2.1088E-02
     8 6.4305E-01-2.6828E-01
 Rx:  10.  Tx:  12.  NSp: 1.
1 0 0  3    17.7     1.    0.
  -2.5   0.    0.    0.    0.
   0.2   0.3   0.    0.    0.
 0.125 1.0000E+00-2.4750E-03
     1 9.9010E-01-4.5297E-03
     8 9.6660E-01-1.2566E-02
 Rx:   9.  Tx:  12.  NSp: 2.
1 0 0  3    18.      0.8   0.
  -2.1   0.    0.    0.    0.
   0.3   0.4   0.    0.    0.
 0.125 1.0000E+00-2.1000E-03
     1 9.9177E-01-3.0497E-03
     8 9.4609E-01-3.5661E-02
 Rx:   8.  Tx:  12.  NSp: 3.
1 0 0  3    12.7     1.5   0.
  -5.    0.    0.    0.    0.
   1.    1.2   0.    0.    0.
 0.125 1.0000E+00-5.0252E-03
     1 9.8474E-01-8.2720E-03
     8 8.7955E-01-9.6475E-02
 Rx:   7.  Tx:  12.  NSp: 4.
1 0 0  3     9.8     2.4   0.
  -7.4   0.    0.    0.    0.
   1.8   8.3   0.    0.    0.
 0.125 1.0000E+00-7.3502E-03
     1 9.7647E-01-9.3744E-03
     8 7.8742E-01-1.6936E-01
 Rx:   9.  Tx:  11.  NSp: 1.
1 0 0  3    21.7     0.6   0.
  -2.1   0.    0.    0.    0.
   0.1   0.2   0.    0.    0.
 0.125 1.0000E+00-2.1000E-03
     1 9.9404E-01-4.1998E-03
     8 9.7843E-01-1.2965E-02
 Rx:   8.  Tx:  11.  NSp: 2.
1 0 0  3    15.6     0.7   0.
  -3.    0.    0.    0.    0.
   0.4   0.7   0.    0.    0.
 0.125 1.0000E+00-2.9500E-03
     1 9.9334E-01-6.2830E-03
     8 9.5131E-01-3.8168E-02
 Rx:   7.  Tx:  11.  NSp: 3.
1 0 0  3    11.2     1.1   0.
 -11.9   0.    0.    0.    0.
   1.6   3.6   0.    0.    0.
 0.125 1.0000E+00-1.1901E-02
     1 9.8941E-01-1.7391E-02
     8 8.8940E-01-9.9129E-02
```

*** end of file ***

Sample .Xnn-file SAMRPIP.X01



Appendix C ... FILE DOCUMENTATION

.P-file Format (v2.0) CR / RPIP Processed Data File

CRRED will create a .P-file as shown below with decoupling parameters if the .S-file has been decoupled. Otherwise, lines 8, 9, 10, and 11 will not be included in the .P-file.

.P-file EXPLANATIONS

The .P-file is composed of blocks of data, each containing data for one pseudosection data point. Each block is composed of a line to indicate the specific point, several lines of parameters, followed by an array of data that includes frequency, real and imaginary components for a number of points that describe a curve.

Two flags appear on lines 3 and 5 - MSF and MZF ("9 1" in this file). They define the type of data in the array. They are duplicated in each block (as line 5).

The MSF flag describes the type of curve shown in the .P-file. Four columns appear in the description below. The first column shows the number that appears in the .P-file. The second column describes the option. The third column indicates whether this option is available with manual decoupling. The fourth column indicates whether this option is available with AUTO decoupling.

MSF	CURVE TYPE	MANUAL DECOUPLING	AUTO DECOUPLING
0	RP parameters only (no curve data)	YES	YES
1	Raw data (decalibrated)	YES	NO
2	IP response	YES	NO
3	Hilbert IP response	YES	NO
4	Undefined	N/A	N/A
5	Raw partial EM	YES	NO
6	Normalized partial EM	YES	NO
7	Total EM	YES	NO
8	Raw Residual EM	YES	NO
9	Normalized Residual EM	YES	YES
10	Experimental REM	NO	YES

NOTE: Undecoupled data points do not appear in this file.

The MZF flag describes the DC phase used during decoupling.

1: determined by manual decoupling program
2: 3PT LOW
3: 3PT HIGH
4: 4PT
5: Constant, specified by operator

Numbers 2-5 are used by the AUTO decoupling program.

.P-file Format (v2.0) (Continued)

SAMPLE .P-FILE

```
LINE 1:  $ ASPACE= 200.0
     2:   "Sample.P", from CRRED 7.00
     3:   PLOT FILE FOR LPLOT      9 1
     4:   Rx:  2.0  Tx:  4.0  NSP: 1.0
     5:   9 1 4 18      82.7   0.9   0.5
     6:      5.7   2.5   0.0   0.0   2.3
     7:      0.0   0.0   0.0   5.0   3.1
     8:      1.422   0.069  171.
     9:      0.075   0.228  15.7
    10:      0.043   0.413  4.80
    11:     -0.003   1.478 0.375
    12:      2.955  -0.306   0.719
    13:     -0.349  -0.287  -0.098   C C b
    14:     -0.338  -0.228  -0.080
    15:    0.125  6.538E+01 -1.868E+02
           0.375  5.208E+01 -1.553E+02
           0.625  3.188E+01 -1.348E+02
```

DOCUMENTATION OF DATA FILE BY LINE NUMBER:

LINE:	EXPLANATION:
`1: $ ASPACE= 200.0`	:MODE line, defining A-Spacing in meters.
`2: "Sample.P", from CRRED 7.00`	:Original name of .P-file and data processing program name and version number
`3: PLOT FILE FOR LPLOT`	:Header
`9`	:MSF flag (Normalized Residual EM curve)
`1`	:MZF flag (manual decoupling)
`4: Rx: 2.0`	:Receiver location designator
`Tx: 4.0`	:Transmitter location designator

Dipoles extend between two adjacent stations, with the lowest numbered station entered for each dipole.

The 2 in this file indicates that the receiver dipole was positioned between stations 2 and 3. The 4 in this file indicates that the transmitter dipole was positioned between stations 4 and 5.

-3 would indicate that the dipole was positioned between stations -3 and -2.

.P-file Format (v2.0) (Cont'd)

```
   NSP: 1.0      :N-spacing (number of a-spacings between receiver and transmit dipoles)


5:      9        :MSF flag

        1        :MZF flag

        4        :Number of lines of coupling coefficients.

       18        :Number of lines of harmonics.

     82.7        :Apparent resistivity, in ohm-meters.
```

Dipole-dipole resistivity calculation:

$$\left(\frac{MG1}{4/\pi} * \frac{C}{FPGAIN}\right) * \frac{ASPACING}{CRT} * \pi * NSP * (NSP + 1) * (NSP + 2)$$

where MG1 = raw Fourier magnitude, in volts
4/π corrects MG1 from the magnitude measured at the Fourier harmonic to the actual square-wave magnitude
** C = communications-wire attenuation factor (see below) This corrects for the voltage drop which occurs along the wire between the field preamp and the GDP
** FPGAIN = field pre-amp gain
ASPACING = the a-spacing used, in meters
CRT = current, in amps
NSP = n-spacing

The first two terms in the expression correct for the Fourier magnitude, comm-wire resistance, and field preamplification. The product of these terms is the actual square-wave voltage of the received waveform.

The rest of the equation corrects for the transmitted current and the electrode geometry. For arrays other than dipole-dipole, the apparent resistivity must be calculated by hand.

** Comm-wire attenuation factors at 0.125 Hz (W21C wire)

Number of reels=		
0	1.0000	= Attenuation factor
1	0.9519	
2	0.9070	
3	0.8664	
4	0.8285	
5	0.7946	
6	0.7624	
7	0.7334	
8	0.7062	

NOTE: RHO has been corrected to DC for decoupled data.

** applies to referenced CR data.

.P-file Format (v2.0) (Continued)

`0.9` :Raw percent frequency effect (PFE).

Percent Frequency Effect Calculation

`PFE= 100 * (Mag1-Mag8) / Mag8`

`where Mag1` = 1st harmonic magnitude

`Mag8` = average magnitude of 7th + 9th harmonics, in volts.

`Mag8 = (Mag7 + Mag9)/2`

`where Mag7` = 7th harmonic magnitude
`Mag9` = 9th harmonic magnitude

`0.5` :IP PFE.

`6:` `5.7` :Raw low frequency phase,

`2.5` :3pt low DC phase,

`0.0` :3pt high DC phase,

`0.0` :4pt DC phase.

The latter two values are determined for AUTO decoupling, not for manual.

`2.3` :Calculated 3-point DC phase (ϕ_{3pt}):

$\phi_{3pt} = (15/8) * \phi_1 - (10/8) * \phi_3 + (3/8) * \phi_5$

where ϕ_1 = harmonic phase at fundamental frequency

ϕ_3 = harmonic phase at third harmonic

ϕ_5 = harmonic phase at fifth harmonic

`7:` `0.0` :Minimum SEM

`0.0` :Maximum SEM

`0.0` :undefined

`5.0` :1.00 Hz IP phase, in milliradians

`3.1` :0.125 Hz IP phase, in milliradians

.P-file Format (v2.0) (Continued)

`8,9,10,11` : Coupling coefficients, levels 1, 2, 3, 4 respectively. The number of levels varies according to the third value on line 5, as determined during manual decoupling. If the number on line 5 is zero, the station has not been decoupled.

`12: 2.955` :Hilbert response parameters: phase

`-0.306` : slope 1

`0.719` : slope 2

`13: -0.349` :Spectral type values (.125-1.000 Hz)

`-0.287` : (1.0-8.0 Hz)

`-0.080` : (8.0-88.0 Hz)

`C C b` : Spectral type characters for these frequency blocks. These values represent the slopes of curve segments in the frequency vs. imaginary plane for the decoupled IP response.

Curve types are defined as follows:

type	slope
A	≥ 20%
a	10 to 20%
B	0 to 20%
b	-10 to 0%
c	-20 to -10%
C	≤ -20%

`14: -0.338` :Derivatives (.125-1.0 Hz)

`-0.228` (1.0-8.0 Hz)

`-0.080` (8.0-88.0 Hz)

These values represent the slopes of curve segments in the real vs imaginary plane for the decoupled IP response.

Harmonic data:
The type of data is determined by the MSF and MZF flags as described above. The number of lines varies according to the fourth value on line 5.

`15: 0.125` :Frequency, in hertz

`6.538E+01` :Real component

`-1.868E+02` :Imaginary component