Universal Sounding Format

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ABSTRACT

A Universal Sounding Format is proposed to facilitate the exchange of all types of electrical and electromagnetic sounding data. It is hoped that instrument manufacturers and software developers will adopt such a format so that export and import of electromagnetic soundings will become much simpler because of a standardized format. The format is ASCII with main header, sounding headers and data blocks. All data are specified by combinations of keywords and numbers and the format is designed to accommodate all kinds of data thought of to date. Additional keywords can be added in the future to accommodate additional developments or existing data which were overlooked in the initial specification.

Forward and backward compatibility are maintained by having software skip data it does not recognize.

Numbers are separated from other numbers by commas. Double commas cannot be used to denote a missing value. To denote a missing value, the character string specified by the DUMMY keyword must be used. Note that the DUMMY character string can look like a number, but is treated as a character string and not read as a number. For instance, if the DUMMY character string is specified as “-999.”, then the number “-999.0” would be read as a number, rather than a dummy value.

SPECIFICATION

The universal sounding format shall have the extension **USF** for file names. It shall be an ASCII file with lines delimited by <CR>, <LF> (for Windows as well as for Unix). It shall consist of a main header and several data sets. Each data set shall contain a sounding header with one parameter per line and a data section with a data description line and many lines of sounding points.

In the following discussion, the term “white space” shall mean one or more tab or space characters. The notation E and N shall mean Easting and Northing, upper case Z shall mean elevation, not the z-coordinate which can point up or downwards.

Comment lines are lines beginning with the exclamation mark (“!”) and can occur anywhere. These lines are ignored when reading the file with software except that they may be displayed for user information. Blank lines are also ignored and may be inserted anywhere.

All data shall be in SI units, except that FEET shall be allowed for length measurements and IP measurements and intrinsic values retain their traditional units (msec, PFE, milliradians).

Main headers shall contain one parameter per line. Each line shall begin with two forward slashes ("//"), followed by a keyword and a value. Keywords shall be in English and in upper case and shall not contain imbedded spaces, but the underscore ("_") shall be used in place of a space if required. The keyword and value shall be delimited by a colon and white space. Data values which are not numbers, dummy values or ARRAY specification must be enclosed in single or double quotation marks ("'") if they contain embedded blanks and can be in any language that uses the ASCII alphabet.

The END keyword shall terminate the main header.

Sounding header items shall begin with a forward slash ("/"), followed by a keyword and a value. Keywords shall be in English and in upper case and shall not contain imbedded spaces, but the underscore ("_") shall be used in place of a space if required. The keyword and value shall be delimited by a colon and white space. Data values which are not numbers or ARRAY specification must be enclosed in single or double quotation marks ("'") if they contain embedded blanks and can be in any language that uses the ASCII alphabet. If there are multiple numbers or quoted data values on a single line, they must be separated by commas.

The END keyword shall terminate the sounding header.

The data descriptor line shall immediately follow the sounding header. This line shall consist of keywords only. Each keyword shall denote a column of data in the following data block. Keywords shall be in upper case English and shall be separated by white space.

Data lines shall immediately follow the data descriptor line. Data values shall be separated by commas and white space if desired.. The END keyword or End of File (EOF) shall terminate the data.

A single file can contain several types of soundings. It can also contain several types of data pertaining to a single sounding or a single sounding type. For instance, a TRANSMITTER LOOP SPECIFICATION, TRANSMITTER CURRENT WAVEFORM, SYSTEM IMPULSE RESPONSE, NOISE and FIXED LOOP TEM DATA can all be contained in the same file.

Parameters are listed here in alphabetical order. File contents do not necessarily need to be in that order.

Most sounding data can be specified using the following:

Main Header
Sounding Header
Data
Sounding Header
Data
…

Data consisting of sweeps is intended mostly for TEM data sets where several transmitter frequencies are used. In fact, the sweep concept could be used for other data types, for instance, Schlumberger data where several MN spacings are used or for dipole-dipole data where several dipole lengths are used. However, in these and in similar cases, there are enough variations of this additional parameter that it is just as well to list it with the data instead of creating sweeps. For TEM data, however, it is possible and even common for several other parameters, such as ramp time, current, receiver coil area and even loop size to vary along with the Tx frequency and there are sufficient numbers of data recorded for each frequency that it becomes more useful to group the data into several sweeps.

This sort of data would be better specified using a system that has Sweep Headers before each sweep after the first, as in the following:

Main Header
Sounding Header (also specifying the first sweep)
Data for first sweep
Second sweep Header
Data for second sweep
Third sweep Header
Data for third sweep
….

In the case of TEM data utilizing multiple sweeps, the data for the first sweep is in the Sounding Header and the data for subsequent sweeps is in a header which takes the same form as the sounding header, but contains only the sweep number and the data pertaining to that sweep.

Because the use of sweeps complicates the software that reads and handles the data, we will limit the use of sweeps to TEM data.

All data pertinent to a sounding, including time, date and similar data items, should always be “required”. For contemporary data, all available information specified in this format specification must be written. However, it is up to the software which reads the data to enforce this and allowances may sometimes be necessary for historical data when certain data items are not available.

Main Header

Main header keywords shall be as follows:

First line in the file and also the first line in the main header shall be
//USF: Universal Sounding Format
in order to identify the file as a USF file.
SOUNDINGS: the number of soundings in the file. If absent or if the main header is absent, the file shall be assumed to contain only one sounding.
Any of the Header items can be included in the main header instead of in the sounding header. In this case, they become the default values. If an item appears in both the main header and the sounding header, the value in the sounding header overrides the one in the main header, for data occurring below that point in the file.

Sounding Header

Sounding header keywords shall be as follows:

ARRAY: the type of sounding array or auxiliary data (required). This must be the first line in any header:

- SCHLUMBERGER
- WENNER
- DIPOLE-DIPOLE
- POLE-DIPOLE
- DIPOLE-POLE
- PERPENDICULAR
- POLE-POLE
- HORIZONTAL COPLANAR
- VERTICAL COPLANAR
- VERTICAL COAXIAL
- SQUARE
- BIPOLE-DIPOLE
- COLLINEAR DIPOLE-DIPOLE
- AXIAL DIPOLE-DIPOLE
- RADIAL
- MAGNETOTELLURICS
- EM CONDUCTIVITY
- CENTRAL LOOP TEM
- COINCIDENT LOOP TEM
- FIXED LOOP TEM
- GROUNDED WIRE TEM

- TRANSMITTER LOOP SPECIFICATION
  Series of E, N or E, N, Z specifying a transmitter loop as a polygon. It is

assumed that the first point is used twice to close the loop. For example, a square loop would consist of four points, the corners of the loop.

- TRANSMITTER WIRE SPECIFICATION
  Series of E, N or E, N, Z specifying a grounded transmitter wire as a poly line.
- TRANSMITTER CURRENT WAVEFORM
  Series of time and current values specifying the waveform.
- SYSTEM IMPULSE RESPONSE
  Series of time and voltage values specifying the response of the recording system.
- NOISE
  Series of time and voltage values recorded in the absence of a transmitter.
- LAYERED RESISTIVITY MODEL
  Model used to generate a synthetic data set. Not intended to be a model obtained by inversion of data.
- LAYERED RESISTIVITY/IP MODEL
  Model used to generate a synthetic data set. Not intended to be a model obtained by inversion of data.

AZIMUTH: The orientation of the sounding line, in degrees clockwise from true North. For most data, this is the line along which the electrodes or Tx Rx system are laid out. For TEM data, it is the direction of the x-axis of the Tx loop or the direction of the Tx wire. For MT it is the strike direction (direction used in rotating into xy and yx data).
COIL_LOCATION: location of the receiver coil for FIXED LOOP TEM soundings (required). Followed by 2 numbers: x- and y-coordinates. Not used for coincident loop data.
COIL_SIZE: Effective area of coil used for TEM receiver in square meters. Not used for coincident loop data. Must come after SWEEPS
CURRENT: Current in Amperes for TEM soundings (required) or for DC resistivity soundings in cases where it does not vary from point to point (optional: current can still be specified in the Data block even if constant). Must come after SWEEPS
DATA_TYPE: Type of sounding data. Can be either MEASURED or SYNTHETIC. If not specified, MEASURED is assumed. Not applicable to auxiliary data such as system response or models.
DATE: Integer field for date, specified as a single integer: yyyymmdd, such as 20030307 for 7 March 2003 (required except for historical data)
DAYTIME: Integer field for time of day, specified as a single floating point number which is the decimal 24 hour time. This number would be greater than or equal to 0.0 and less than 24.0, such as 18.50417 for 6:30:15 PM. (required except for historical data)
DEPTH: Depth below the ground for soundings taken in a borehole. Always positive downwards.

DIPOLE_LENGTH: length of the dipole(s) for dipole-dipole or pole-dipole data.
DUMMY: Specifies an ASCII String (not a number) which is used to specify unknown values in the data. Most useful for data which have two or more values (e.g. resistivity and IP) where one of the values is unknown. String can look like a number or be a non-numerical character string.
END: used without parameters to terminate a block.
FREQUENCY: Frequency for EM Frequency soundings (required except for parametric soundings).
Also Tx repetition frequency for TEM soundings (required). In Hz. Must come after SWEEPS
HEIGHT: Instrument height for EM Frequency soundings (required except for height soundings).
HIGH_PASS: Frequency in Hz and slope in db/octave for high pass filter. Can be repeated if more than one high pass filter is used. Band pass filters are specified by combining low- and high-pass filters.
LENGTH_UNITS: M or FT. If omitted, M is assumed.
LOCATION: followed by 3 numbers: Easting, Northing and Elevation coordinates.
LOOP_SIZE: Size of the Tx loop for TEM soundings (required). Followed by 2 numbers: x- and y-sizes.
LOOP_TURNS: Number of turns in the Tx Loop. Must come after SWEEPS
LOW_PASS: Frequency in Hz and slope in db/octave for low pass filter. Can be repeated if more than one low pass filter is used. Band pass filters are specified by combining low- and high-pass filters.
MODE: For MT data, this gives the mode of data listed as RESISTIVITY or PHASE. Possible values are YX, XY, INVARIANT.
NOTCH: Frequency in Hz and slope in db/octave for notch filter. Can be repeated if more than one low pass filter is used.
POINTS: the number of points in the sounding (required).
PROFILE: Name of the profile or line to which the sounding belongs.
RAMP_TIME: Time of current turn off for TEM transmitter in Seconds. Must come after SWEEPS
RESISTIVITY_UNITS: Must be “OHM-M” or “OHM-FT”. Ohm-m is assumed if this parameter is not specified.
RX_FRONTGATE: Time from beginning of ramp to the opening of the front gate in TEM receiver electronics.
RX_REMOTE_LOCATION: Easting, Northing and elevation location of the remote (at virtual infinity) electrode when a pole receiver is used. Also used for the remote reference in Magnetotellurics.
SOUNDING_NUMBER: The sequence number of this sounding in the file. Used for informational purposes only as this keyword and data are ignored on reading and sounding numbers are according to the order or occurrence in the file.
SOUNDING_NAME: The number or name of this sounding.
SPACING: coil spacing for EM Frequency soundings (required except for geometric soundings).

STATIC: Static correction in m used for Magnetotellurics.
SWEEP_NUMBER: the number of this sweep (TEM data only). Sweeps will be read in increasing order, so the sweep number itself is not used when reading.. For second and subsequent sweeps, this keyword must be specified in the first line of the sweep header, as this is what terminates reading of the present sweep and initiates the reading of the sweep parameters for the next sweep. Can be omitted from sounding header – first sweep data is assumed to be part of the sounding header.
SWEEPS: the number of sweeps contained in this sounding (TEM data only). Must precede COIL_SIZE, CURRENT, LOOP_SIZE, RAMP_TIME, FREQUENCY and TIME_DELAY
TIME_DELAY: time is normally measured from the beginning of the ramp or from the beginning of the waveform for current waveforms or system impulse response. This delay (which can be negative) is added to time values to correct for time measurements measured from a different start point. In seconds. Must come after SWEEPS
TX_ELECTRODES: locations E, N, Z (East, North, Elevation) of first electrode, followed by E, N, Z locations of second electrode for Tx bipoles used in Grounded Wire TEM.
TX_REMOTE_LOCATION: Easting, Northing and elevation location of the remote (at virtual infinity) electrode when a pole transmitter is used.
VOLTAGE_UNITS: For TEM only: one of V/AMP (volts per Ampere), V/AM2 (volts/Ampere-square meter), V/M2 (volts/square meter), T/SEC (Teslas/second, which is numerically equivalent to V/M2).
WINDOW: width of the time gate for TEM data in seconds.
Z_DIRECTION: The direction in which the positive Z-axis points. Values can be UP or DOWN. Right-hand coordinate systems are always used.

Note: TRANSMITTER LOOP SPECIFICATION, TRANSMITTER WIRE SPECIFICATION and SYSTEM IMPULSE RESPONSE data are applied to all soundings following the last specification, if they are applicable. A null TRANSMITTER LOOP SPECIFICATION, TRANSMITTER WIRE SPECIFICATION or SYSTEM IMPULSE RESPONSE can be specified by a data header followed by no data and the /END keyword.

Note: Use of TRANSMITTER LOOP SPECIFICATION does not replace the specification of LOOP SIZE. LOOP SIZE must still be specified in case the software reading the data cannot deal with loops specified as polygons or cannot convert a polygonal loop to an equivalent rectangular loop.

Note: Use of TRANSMITTER WIRE SPECIFICATION does not replace the specification of TX_ELECTRODES. TX_ELECTRODES must still be specified in case the software reading the data cannot deal with wires specified as multiple segments or cannot convert a multi-segment wire to an equivalent single segment.

Data Descriptor

Data descriptor keywords shall be as follows:

CHARGEABILITY: As measured in IP soundings in ms or intrinsic IP response of layer.
CONDUCTIVITY: Apparent conductivity for EM Conductivity soundings or intrinsic conductivity of a layer. Always in Siemens per m.
CURRENT: in A for DC resistivity soundings or for Transmitter Current Waveform.
DIPOLE_LENGTH: length of the dipole(s) for dipole-dipole or pole-dipole data. If it is specified in the data, this overrides any value specified in the Sounding Header.
DEPTH: Depth below ground for layered models. Last layer is always semi-infinite.
EASTING: Easting coordinate location of Tx loop corner (used with TRANSMTTER LOOP SPECIFICATION).
ELEVATON: Z or Elevation coordinate location of Tx loop corner (Optional: Assumed zero if not supplied) (used with TRANSMTTER LOOP SPECIFICATION).
ERROR_BAR: This field would give the uncertainty (standard error) for the column of measurements directly preceding it. For impedance phase data the values would be in degrees, for in-phase and quadrature data it would be expressed in percent of the primary field (same as data values) for other data (voltage, resistivity, IP values) it would be in percent of the data value.
This Data Descriptor can be used more than once because it refers to the field preceding it.
If not present, it is assumed the data uncertainty is not known.
FREQUENCY: in Hz for EM Conductivity, Magneto telluric or Frequency domain soundings
HEIGHT: instrument height for EM Conductivity or Frequency domain soundings
HMD: Apparent conductivity in S/m for HMD or Vertical Coplanar EM Conductivity data.
INDEX: Index number of the sounding point (optional and not used when reading the file)
INPHASE: In-phase component of the secondary field for Frequency domain soundings, expressed as percent of the primary field.
MASK: 0 if the data point is masked, 1 if not masked. Must follow each measurement field; for instance, if Resistivity/IP data are being tabulated, header should show RESISTIVITY, MASK, PFE, MASK. Applies to datum in previous column. If Error Bar is also specified, it should come before Mask.
If Mask is not specified, all data are assumed to be un-masked.
This Data Descriptor can be used more than once because it refers to the field(s) preceding it.
MN: MN spacing for Schlumberger.

NORTHING: Y or Northing coordinate location of Tx loop corner (used with TRANSMTTER LOOP SPECIFICATION).
PFE: Percent Frequency Effect IP data or intrinsic IP response of layer.
PHASE: for MT soundings (degrees) and for IP soundings where Phase is measured (in milliradians). Also intrinsic IP response of layer.
PHASEINV: MT impedance phase for the invariant mode.
PHASEXY: MT impedance phase for the xy mode.
PHASEYX: MT impedance phase for the yx mode.
QUADRATURE: for Frequency domain soundings, expressed as percent of the primary field (note primary field is in-phase).
RESISTANCE: V/I for DC resistivity soundings.
RESISTIVITY: Apparent Resistivity for DC and MT soundings, layer resistivity for models.
RESPONSE: impulse response value for a system response. It is in 1seconds since the impulse response is generally normalized so that the area under the curve is dimensionless and one.
RHOINV: MT apparent resistivity for the invariant mode.
RHOXY: MT apparent resistivity for the xy mode.
RHOYX: MT apparent resistivity for the yx mode.
SPACING: AB/2 for Schlumberger, A for Wenner or Pole-pole, N for Dipole-dipole or Pole-Dipole, coil separation for Frequency domain soundings..
THICKNESS: Layer thickness for layered model specification. Last layer is always semi-infinite.
TIME: in seconds for TEM soundings, system impulse response or current waveform. Times are measured from the beginning of the current turn-off ramp to the arithmetic center of the time window.
VMD: Apparent conductivity in S/m for VMD or Horizontal Coplanar EM Conductivity data.
VOLTAGE: in V for DC resistivity soundings. In Volts for DC soundings, in the units specified by the keyword VOLTAGE_UNITS for TEM soundings.
VX: x-component of received response for multi-component TEM soundings.
VY: y-component of received response for multi-component TEM soundings.
VZ: z-component of received response for multi-component TEM soundings.
WIDTH: This is the width of the time window for TEM data in seconds.

Numerical Data:

Numerical data are listed as comma-separated values. White space may be used for clarity. Double commas must not be used to indicate a value is missing, rather the character string specified using the DUMMY keyword in the Sounding Header must be used to specify an unknown value. Note that the DUMMY character string can look like a number, but is treated as a character string and not read as a number. For instance, if the DUMMY character string is specified as “-999.”, then the number “-999.0” would be read as a number, rather than as an invalid value.

For each keyword in the data descriptor, there shall be one valid number or a dummy value. A dummy value shall indicate the value as unknown or missing. Valid numbers are represented by standard floating point formats. Floating point numbers must contain a decimal point. Exponential notation is allowed. Only the decimal point (“.”) is allowed. Commas (“,”) are not allowed but are used to separate numerical or dummy values from each other. For instance, a positive one could be represented by strings such as

+1.
1.
1.0
1.0E0

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Sample File (ONESAMPLE.USF):

```
//USF: Universal Sounding Format
//END

/ARRAY:       SCHLUMBERGER
```

/DATE: “20020214”
/DAYTIME: 16.76
/POINTS: 22

INDEX,	SPACING,	RESISTIVITY,	MN
1,	4.0000,	159.9000,	0.8000
2,	5.0000,	84.5000,	0.8000
3,	7.0000,	68.5000,	0.8000
4,	10.0000,	61.6000,	0.8000
5,	10.0000,	58.0000,	1.5000
6,	15.0000,	74.4000,	1.5000
7,	20.0000,	73.2000,	1.5000
8,	30.0000,	98.7000,	1.5000
9,	40.0000,	100.5000,	1.5000
10,	40.0000,	81.9000,	7.6000
11,	50.0000,	85.6000,	7.6000
12,	70.0000,	89.0000,	7.6000
13,	100.0000,	94.1000,	7.6000
14,	150.0000,	69.7000,	7.6000
15,	200.0000,	49.6000,	7.6000
16,	200.0000,	48.7000,	30.3000
17,	300.0000,	36.7000,	30.3000
18,	400.0000,	26.2000,	30.3000
19,	500.0000,	20.9000,	30.3000
20,	500.0000,	25.4000,	60.6000
21,	700.0000,	27.6000,	60.6000
22,	909.0000,	37.0000,	60.6000

Sample File (TWOSAMPLE.USF):

//USF: Universal Sounding Format
//SOUNDINGS: 2
//ARRAY: SCHLUMBERGER
//DATE: “20020214”
//POINTS: 22

/SOUNDING_NUMBER: 1
/DAYTIME: 16.76

INDEX,	SPACING,	RESISTIVITY,	MN
1,	4.0000,	159.9000,	0.8000
2,	5.0000,	84.5000,	0.8000
3,	7.0000,	68.5000,	0.8000
4,	10.0000,	61.6000,	0.8000
5,	10.0000,	58.0000,	1.5000
6,	15.0000,	74.4000,	1.5000

7,	20.0000,	73.2000,	1.5000
8,	30.0000,	98.7000,	1.5000
9,	40.0000,	100.5000,	1.5000
10,	40.0000,	81.9000,	7.6000
11,	50.0000,	85.6000,	7.6000
12,	70.0000,	89.0000,	7.6000
13,	100.0000,	94.1000,	7.6000
14,	150.0000,	69.7000,	7.6000
15,	200.0000,	49.6000,	7.6000
16,	200.0000,	48.7000,	30.3000
17,	300.0000,	36.7000,	30.3000
18,	400.0000,	26.2000,	30.3000
19,	500.0000,	20.9000,	30.3000
20,	500.0000,	25.4000,	60.6000
21,	700.0000,	27.6000,	60.6000
22,	909.0000,	37.0000,	60.6000

/SOUNDING_NUMBER: 2
/DAYTIME: 18.44

INDEX,	SPACING,	RESISTIVITY,	MN
1,	4.0000,	159.9000,	0.8000
2,	5.0000,	84.5000,	0.8000
3,	7.0000,	68.5000,	0.8000
4,	10.0000,	61.6000,	0.8000
5,	10.0000,	58.0000,	1.5000
6,	15.0000,	74.4000,	1.5000
7,	20.0000,	73.2000,	1.5000
8,	30.0000,	98.7000,	1.5000
9,	40.0000,	100.5000,	1.5000
10,	40.0000,	81.9000,	7.6000
11,	50.0000,	85.6000,	7.6000
12,	70.0000,	89.0000,	7.6000
13,	100.0000,	94.1000,	7.6000
14,	150.0000,	69.7000,	7.6000
15,	200.0000,	49.6000,	7.6000
16,	200.0000,	48.7000,	30.3000
17,	300.0000,	36.7000,	30.3000
18,	400.0000,	26.2000,	30.3000
19,	500.0000,	20.9000,	30.3000
20,	500.0000,	25.4000,	60.6000
21,	700.0000,	27.6000,	60.6000
22,	909.0000,	37.0000,	60.6000

Sample File (TEMSAMPLE.USF):

```
//USF: Universal Sounding Format
// SOUNDINGS: 1
//END

/ARRAY: CENTRAL LOOP TEM DATA
/COIL_LOCATION: 523454.4 4824657.3
/COIL_SIZE: 31.4
/CURRENT: .5
/DATE: 19921212
/FREQUENCY: 285.0
/LOCATION: 523454, 4824657, 230
/LOOP SIZE: 76.0,     76.0
/POINTS: 53
/RAMP_TIME: 4.2E-6
/SOUNDING_NAME: DEFAULT
/SOUNDING_NUMBER:      1
/SWEEPS: 3
/SWEEP: 1
/VOLTAGE_UNITS: V/AM2

 INDEX,    TIME,        VOLTAGE
    1,   6.8500E-06,   1.1483E-04
    2,   8.9500E-06,   6.8977E-05
    3,   1.2000E-05,   7.5662E-05
    4,   1.5700E-05,   6.9376E-05
    5,   2.0000E-05,   7.6021E-05
    6,   2.6100E-05,   6.3330E-05
    7,   3.3400E-05,   5.5508E-05
    8,   4.2100E-05,   5.0172E-05
    9,   5.4100E-05,   4.3830E-05
   10,   6.8200E-05,   3.5800E-05
   11,   8.3800E-05,   2.9909E-05
   12,   1.0400E-04,   2.3738E-05
   13,   1.3500E-04,   1.7195E-05
   14,   1.7200E-04,   1.1815E-05
   15,   2.1400E-04,   7.9437E-06
   16,   2.7500E-04,   5.2943E-06
   17,   3.4900E-04,   2.8627E-06
   18,   4.3600E-04,   1.6040E-06
   19,   5.5500E-04,   8.1340E-07
   20,   7.0100E-04,   3.9270E-07

/SWEEP: 2
/COIL_SIZE: 100.0
```

/CURRENT: 22.
/FREQUENCY: 30.0
/RAMP_TIME: 75.0E-6

INDEX,	TIME,	VOLTAGE
21,	1.7500E-04,	4.0147E-04
22,	2.1800E-04,	2.7854E-04
23,	2.7800E-04,	1.7159E-04
24,	3.5100E-04,	1.0230E-04
25,	4.3800E-04,	6.0175E-05
26,	5.5800E-04,	3.2129E-05
27,	7.0200E-04,	1.6383E-05
28,	8.5800E-04,	9.0068E-06
29,	1.0600E-03,	4.6562E-06
30,	1.3700E-03,	2.1577E-06
31,	1.7400E-03,	1.0351E-06
32,	2.1700E-03,	5.4930E-07
33,	2.7700E-03,	2.8220E-07
34,	3.5000E-03,	1.4900E-07
35,	4.3700E-03,	8.3090E-08
36,	5.5600E-03,	4.3180E-08
37,	7.0300E-03,	2.2230E-08

/SWEEP: 3
/COIL_SIZE: 100.0
/CURRENT: 22.
/FREQUENCY: 3.0
/RAMP_TIME: 75.0E-6

INDEX,	TIME,	VOLTAGE
38,	8.5700E-04,	9.5574E-06
39,	1.0600E-03,	4.9617E-06
40,	1.3700E-03,	3.3195E-06
41,	1.7400E-03,	1.3600E-06
42,	2.1700E-03,	6.5560E-07
43,	2.7700E-03,	3.3030E-07
44,	3.5000E-03,	1.7450E-07
45,	4.3700E-03,	9.8540E-08
46,	5.5600E-03,	5.4220E-08
47,	6.9800E-03,	2.9120E-08
48,	8.5600E-03,	1.7700E-08
49,	1.0640E-02,	1.0480E-08
50,	1.3700E-02,	5.7200E-09
51,	1.7400E-02,	3.2000E-09
52,	2.1700E-02,	1.6100E-09
53,	2.7700E-02,	9.2100E-10