

**RES2DINVx64 ver. 4.07**  
*with multi-core & 64-bit support*

*for Windows XP/Vista/7/8/10*

**Installation and getting  
started users guide**

**August 2017**

**Rapid 2-D Resistivity & I.P. inversion  
using the least-squares method**

Wenner ( $\alpha, \beta, \gamma$ ), inline dipole-dipole, pole-pole,  
pole-dipole, equatorial dipole-dipole, Wenner-Schlumberger, gradient and non-  
conventional arrays

*On land, aquatic, cross-borehole  
and time-lapse surveys*

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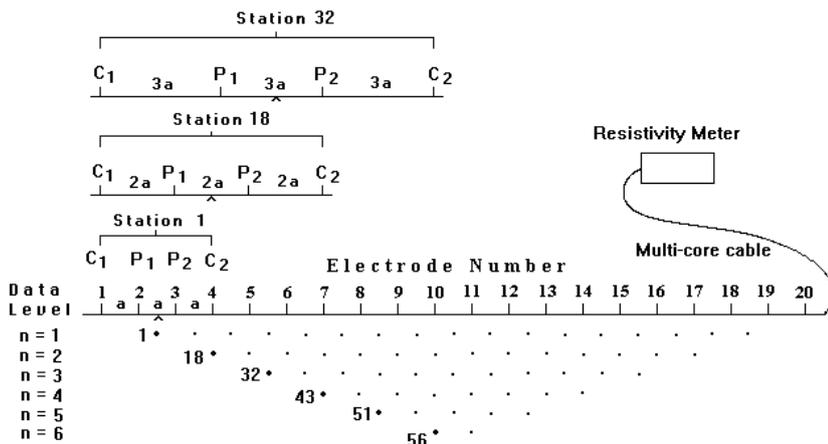
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## 1 Introduction

This is a very brief guide to help you in installing and getting started with the program. The Res2dinvx32x64.pdf file has detailed instructions for using the software and should be used as the manual.

RES2DINVx64 is a computer program that will automatically determine a two-dimensional (2-D) resistivity model for the subsurface for the data obtained from electrical imaging surveys (Dahlin 1996; Loke et al. 2013). It is a Windows based program that also supports multi-core CPUs.

Figure 1 shows an example of the electrodes arrangement and measurement sequence that can be used for a 2-D electrical imaging survey. Many different multi-electrode systems have been developed over the past 25 years using different arrangements of the cables and measurement strategies (Loke 2014). The survey is usually carried out with a system where the electrodes are arranged along a line with a constant spacing between adjacent electrodes. However, the program can also handle data sets with a non-uniform electrode spacing.



Sequence of measurements to build up a pseudosection

Figure 1. Sequence of measurements to build up a pseudosection using a computer controlled multi-electrode survey setup.

A finite-difference or finite-element modeling subroutine is used to calculate the apparent resistivity values, and a non-linear smoothness-constrained least-squares optimization technique is used to calculate the resistivity of the model blocks (deGroot-Hedlin and Constable 1990; Loke et al. 2003). If topography is present, the program uses a distorted finite-element grid so that the surface of the grid matches the topography (Loke 2000). If I.P. data is also present, the program will also generate an I.P. model together with the resistivity model using the complex resistivity method (Kenma et al. 2000).

This program can be used for surveys using the Wenner, pole-pole, dipole-dipole, pole-dipole, Wenner-Schlumberger, multiple-gradient and equatorial dipole-dipole (rectangular) arrays. In addition to these common arrays, the program even supports non-conventional arrays with an almost unlimited number of possible electrode configurations (Loke 2014). You can process pseudosections with up to 16000 electrode positions and 100000 data points at a single time on a computer with 8 gigabytes (GB) of RAM using the Res2dinvx64 program. Besides normal surveys carried out with the electrodes on the ground surface, the program also supports aquatic and cross-borehole surveys.

## 2 Computer system requirements

This program is designed to run on microcomputers using the Windows XP/Vista/7/8/10 operating systems. On a modern multi-core PC, it will take less than a half a minute to invert the data set obtained from a survey with 100 electrodes.

Requirements : A PC with a 64-bit multi-core CPU, at least 4 GB RAM and a 64-bit version of Windows is required. The program can access more than 4 GB GAM. This greatly increases the data and model size that can be processed.

You will need a microcomputer with a multi-core Intel CPU to run this program. It is recommended that you use a PC with an Intel (rather than an AMD) CPU as the RES2DINVx64 program is optimized for this type of CPU. These optimizations can significantly reduce the calculation time for large data sets. The program uses the hard-disk to store temporary swap files. If you have more than one hard-disk drive, the program will automatically select the drive with the largest amount of free space as the drive to store the swap files. The amount of free hard-disk space should be at least 6 times the RAM.

Practically all computers have an in-built power management system that slows down and eventually shuts down the computer system if the keyboard or mouse is not accessed after a certain time limit. This can interfere with the operation of the RES2DINV program if you are inverting a large data set or using the batch mode to invert a large number of data files. Windows also has an in-built screen saver functions that replaces the contents of the screen with a screen saver program. Before running the RES2DINV program, you will need to disable both the power management and screen saver programs.

### 3 Copy protection

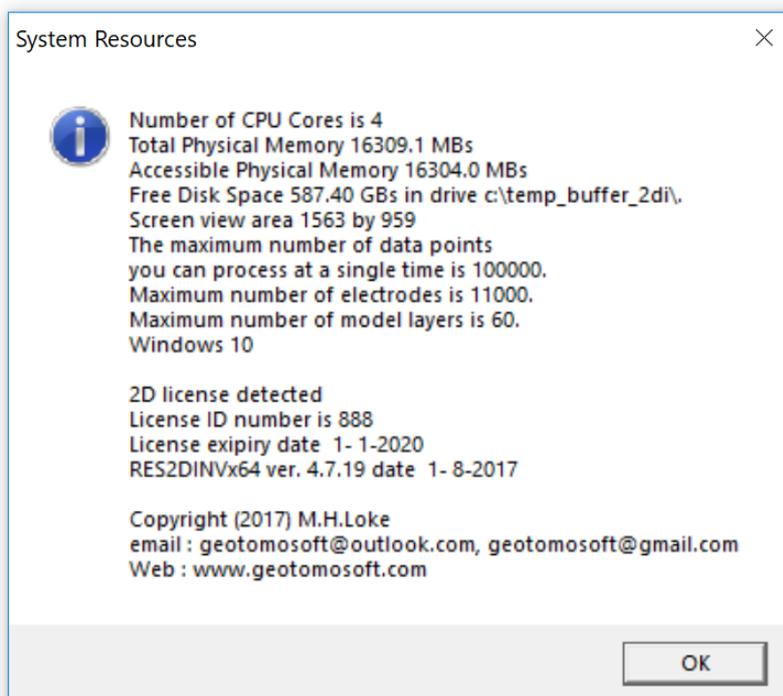
The program uses the Aarhus Geosoftware Internet based digital copy protections system for copy protection. Without the digital license, you can use the program to invert data sets with up to 84 electrodes (with a limit of 4 iterations in the inversion routine). With a license that has the RES2DINVx64 software license, the restrictions are removed. When the program is launched for the first time the user is prompted to supply a license code supplied by the company when you purchased the license. Please refer to the full manual for the Res2dinvx64 program for more details.

### 4 Software installation

You can download the programs from the [www.aarhusgeosoftware.dk](http://www.aarhusgeosoftware.dk) website. The RES2DINVx64 package comes in a single compressed installation file SETUP.EXE. It is a Windows-based installation program that will install the program files. The default folder for the program is C:\Program Files (x86)\Geotomo\_Software\Res2dinvx64.

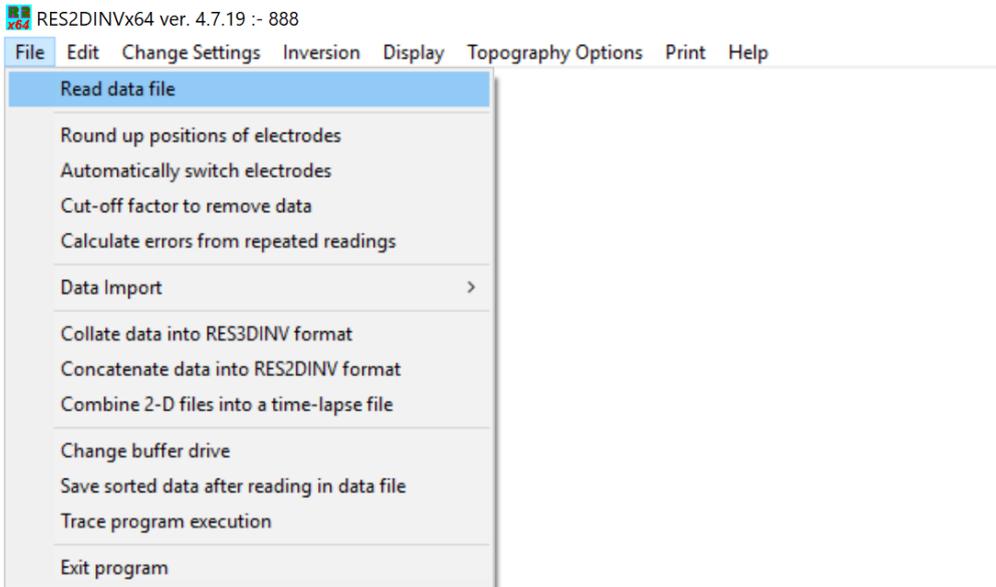
### 5 Using the program – a quick start

Click the RES2DINVx64 icon to start the program. The program will first check the computer system to ensure that it has the necessary resources (such as memory and hard-disk space) that it requires. As an example, below is a typical initial information box displayed by the program.



In this case, the computer system has a single 4-core CPU and 16 GB RAM, and a hard-disk with 587GB free space as the buffer drive. Note the licensee ID number 888 is displayed if the program detects the digital license.

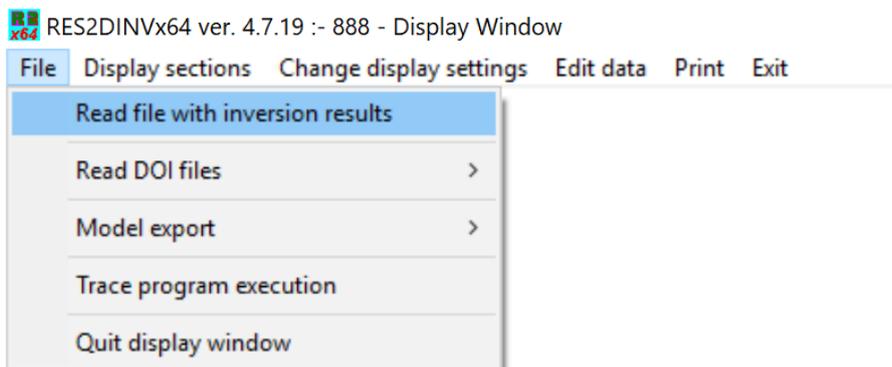
After checking the computer configuration, the program will then display the following Main Menu bar near the top of the screen.



You can select an option by clicking it with the mouse cursor. If this is the first time you are using the program, try reading in one of the smaller files such as the BLOCKDIP.DAT provided with the program. Click the "File" choice, followed by the "Read data file" menu choice. After that, if necessary, navigate to the folder where the RES2DINV program is installed. After reading in the file, go to the "Inversion" option, and then choose the "Carry out inversion" option. The inversion subroutine will start. Wait for about a second for the data to be inverted. If you need to stop the inversion routine at any time, just click the 'Next' sub-window at the bottom-right of the screen, and wait for a short while. By default, the program will carry out 6 iterations that can be increased if necessary.

It is assumed that the input data is in the format used by this program. A detailed description of the data format is given in the Res2dinvx32x64.pdf file. Most multi-electrode resistivity equipment manufacturers supply a program to convert data from the native format used by the equipment to the format used by Res2dinv.

After the inversion process has been completed, click the "Display" option that will open up a new window. The program will automatically read in the file containing the results from the most recent inversion run. To view the results from a file containing results from previous inversions of other data files, click the 'File – Read file with inversion results' sub-option.



In the 'Display' window, click the "Display sections - Display data and model sections" sub-option.

You will then be asked to select the iteration number and type of contour intervals. After you have made the appropriate choices, the program will then display the apparent resistivity and inversion model sections. Figure 2 shows an example of the displayed section from an inversion of the LANDFILL.DAT example data file installed with the software.

This window also has options to export the model values to formats used by other programs such as Geosoft xyz and Surfer dat files under the 'File – Model export' menu option.

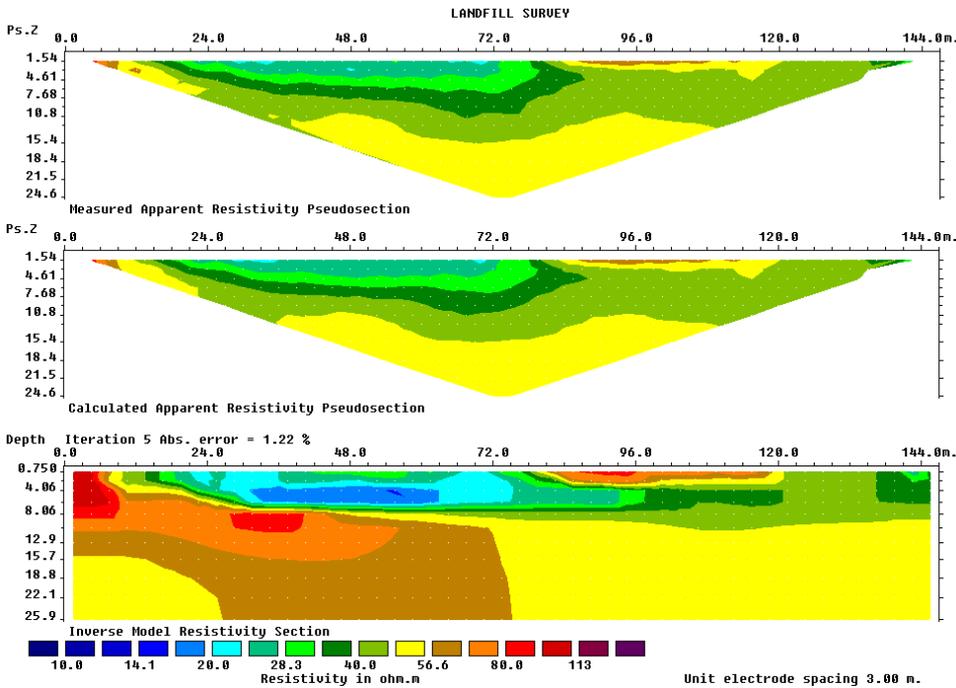


Figure 2. Typical display output showing the measured and calculated apparent resistivity pseudosections, and the inversion model section.

## 6 Detailed instruction manual

This manual is a very brief guide to help you in installing, and getting started in using the Res2dinv program. The detailed instructions for using the programs are given in electronic form as the Res2dinvx32x64.pdf file. There is a copy of this file in the same folder whether the program was installed. This manual has detailed instructions on the input data format and on using the different options in the software. When you install the program, a copy of this PDF file will also be copied into the program folder. Online help files are also installed with the programs. A copy of the online help file is also given in the Res2dinv.chm file in the same folder was the program. The latest version of the program, as well as the manual, can be downloaded from the [www.geotomosoft.com](http://www.geotomosoft.com) website.

**DISCLAIMER**

This software is provided "as is" without any express or implied warranties including its suitability for a particular purpose. Neither this company nor the subagent will assume responsibility for any damage or loss caused by the use of this program. In the event of program bugs, every effort will be made to correct the bugs. Registered users are entitled to free software updates and support for the first year. After the first year, there is an annual fee for software updates and technical support. However, the original software version provided and downloaded updates released up to one year after the software purchase can still be used indefinitely if the user chooses not to upgrade. Please contact Geotomo Software Sdn Bhd (geotomosoft@gmail.com), or refer to the 'Ordering & Enquires' page on the [www.geotomosoft.com](http://www.geotomosoft.com) website, for the annual fee that is applicable to your license.

**SUPPORT**

Please contact your distributor if you have any questions concerning this program. A frequent source of queries is when the results obtained are not what you expect, or the program refuses to accept your data file. In such a case, support will only be provided if a copy of the data file is sent together as an attachment with your email, preferably compressed into a ZIP file. The most common causes of problems are (a) the data in the DAT file is not given in the correct RES2DINV format (b) excessive noise in the data set (particularly for dipole-dipole surveys and/or IP data sets) (c) instrument malfunction or field survey errors. It is only possible to trace the source of the problem if a copy of the data file is provided. Support is only available for registered users of the full version of the program. Technical support is not provided for users of the demo version of this software. For technical support, you can contact the software provider by email at the following addresses. Please attach a copy of your data file to your email.

geotomosoft@gmail.com, support@geotomosoft.com

The following information will be required before for technical support.

- 1). Your license ID number. This ID number is displayed near the middle of the initial information box when the RES2DINV program starts up if the user has a valid license.
- 2). The name of your company or institution.
- 3). Approximate date your company/institution purchased the software.

If you purchased the software more than one year ago, please contact Geotomo Software Sdn Bhd (geotomosoft@gmail.com) on renewing the support.

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