

Installation Guide for ATP-Related Programs

Software and installation recommendations for Windows 7 computers.

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Bonneville Power Administration

Brief Introduction

ATP-EMTP

The original EMTP (ElectroMagnetic Transient Program) was developed at Bonneville Power Administration (BPA) in the 1970's and 80's primarily for modeling power system transients. The primary EMTP developers were Dr. Hermann Dommel, Dr. Scott Meyer and Dr. Tsu-huei Liu. The development on the EMTP was discontinued in the 1980's. The terms EMTP and EMT programs are now generic terms that refer to a number of similar transient programs such as: ATP, EMTP-RV, EMTDC, PSCAD and RSCAD-RTDS.

The ATP (Alternate Transients Program) is a widely-used version of EMTP and available to most individuals around the world essentially free of charge. The ATP solves linearized differential equations of system components with numerical integration using the trapezoidal method. It can perform time-domain simulations or frequency scans.

The EEUG or European EMTP-ATP User Group provides the following program description:

“ATP is a universal program system for digital simulation of transient phenomena of electromagnetic as well as electromechanical nature. With this digital program, complex networks and control systems of arbitrary structure can be simulated. ATP has extensive modelling capabilities and additional important features besides the computation of transients. It has been continuously developed through international contributions over the past 20 years.”

Regarding licensing the following is an excerpt from the EEUG:

“ATP is a royalty-free EMTP (Electromagnetic Transients Program), but not a public domain program. Each potential user of ATP must agree not to disclose any ATP information to unauthorized persons and / or organizations. A non-disclosure agreement (ATP License Form) to this effect must be signed by each user and approved by the user group, before access to ATP information will be granted.”

Two often-used versions of ATP include MingW32 and Watcom. MingW32 is a Win32 native application and as such the recommended version for Windows systems.

The beginning of an ATP simulation, when running the tpbig.exe file, is shown in Figure 1. The ATP then reads in “card images” with formatted data describing the electrical network or control system. These card images may either be created by using a text editor or through a GUI such as ATP Draw. The ATP Rule Book provides a description of how the case must be assembled, along with each card image type and its format.



Figure 1 Simulation Start using a MingW32 ATP version

ATP GUI's

ATPDraw

Although a number of Graphical User Interfaces (GUIs) are available to run ATP, often a new ATP user will use ATPDraw since it is easier to learn and does not generally require that card images be manually created.

The ATPDRAW.net web page describes the program as follows:

“ATPDraw is a graphical pre-processor to ATP and is used to create and edit circuit files. The output of ATPDraw is a file you can use as input to the ATP program. The program is developed by Dr. Hans Kr. Høidalen at SINTEF Energy Research/Norwegian University of Science and Technology in Norway, sponsored by Bonneville Power Administration, Portland-Oregon-USA. Multi-phase developments and Vector Graphics in the v5 version is sponsored the EEUG organization. The developers are not responsible for any erroneous results produced by ATPDraw. This 32-bit Windows program runs under MS-Windows 9x/NT/2000/XP/Vista/Windows7.”

Figure 2 shows a typical ATPDraw window and circuit diagram following execution of the Atpdraw.exe and creation of a new case.

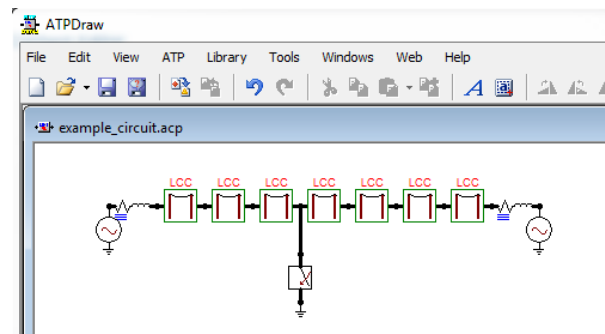


Figure 2 ATPDraw Example Circuit

Plotting Programs

There are a number of programs for plotting the time-dependent waveform outputs or frequency scan outputs of the ATP, each with its own features and limitations. PlotXY can be used for quick examination of a case immediately follow execution and ATP Analyzer can be used for detailed analysis.

ATP Analyzer – Recommended plotting program

The ATP Analyzer program was written by Glen Fortner (now at PacifiCorp) between about 1999 and 2011. It has since been updated by Joe Matsuoka of BPA. As stated in the ATP Analyzer Instruction Manual:

“The ATP Analyzer program is royalty free. The proprietary rights of ATP Analyzer belong to the Bonneville Power Administration USA, which financed program development.”

For additional details please refer to the Instruction Book and Quick User Guide.

Features:

- Can plot pl4 files (native output of transient ATP cases), COMTRADES, ASCII Table files and more
- Plots in a single window: XY, multiple axes waveforms, multiple axes overlaid waveforms, and digital signals to work well for ATP or digital fault recorder files
- Extensive built-in analysis tools for mathematical, waveform modifications, calculations (power, impedance...), FFT, Boolean, relay characteristics
- Can combine and compare different waveform files, resample, truncate, write out
- Lacks the ability to easily copy figures for reports, so a print screen application needs to be used
- Newest version – can save channel selections for multiple overlay plots from one file to the next, reducing time required for repetitive plotting

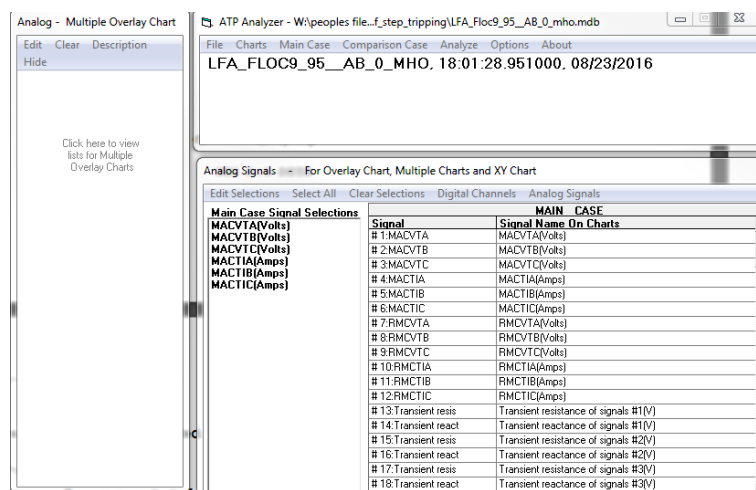


Figure 3 ATP Analyzer

Plot XY

The program documentation provides the following history:

“PlotXY was created initially in 1998 as an answer to the need of the community that used the well-known electromagnetic transients program EMPT/ATP to have a Windows-based fast and practical program to make plots. The programs available at those times were mainly based on old Microsoft DOS and were, in the opinion of the writer, either too slow or a bit tricky to use.”

Features:

- Can view binary pl4 files (native output of transient ATP cases), COMTRADES, Open Modelica and more
- Is quick to open and plot files for review
- Easy to copy out figures for reports
- Plots up to four windows with single-axis, overlaid plots
- Does not have extensive analysis tools like ATP Analyzer

User Groups & Program Sources

For licensing, software and support.

Canadian American User Group (CAUG)

www.emtp.org (currently down, use EEUG)

European EMTP-ATP Users Group (EEUG)

www.eeug.org

Japanese ATP User Group (JAUG)

<http://gundam.eei.eng.osaka-u.ac.jp/atpwww/index-e.htm>

List Server

The ATP list server uses e-mail as a forum to ask, answer, and inform. It is recommended to join the list server as an ATP user.

ATPDraw

www.atpdraw.net

ATPDraw can be obtained directly from Hans Høidalen's atpdraw.net website. You will need to register, and pass an EMTP quiz, to download a copy for free.

Plot XY

Dipartimento Di Sistemi Elettrici E Automazione (DSEA)

<http://www.dsea.unipi.it/Members/ceraolow/Software/plotxy/plotxy-april-2014/view>

PlotXY is available from Massimo Ceraolo's web site provided above.

ATP Analyzer

Contact Christine Goldsworthy via e-mail, at cegoldsworthy@bpa.gov.

ATP Program

www.eeug.org

Prior to installation, obtain a free ATP license by following instructions from your local User Group. When obtaining the free ATP license, you can also request software copies and documentation. There is usually a fee for this. Another source for the software, after a license is obtained, is from another licensed user.

“Everyone who is licensed can use the program free of royalty, but the program is not in the public domain and it is not available via anonymous FTP. The program disks and printed materials (Rule Book, Theory Book, User Manuals) can be ordered from the EEUG by filling out the appropriate Order Form.”

“Alternatively you also have right asking that materials from any other [licensed] ATP users, if he or she is willing to share it with you, as it is stated in the license form: (“...The sharing of ATP materials among authorized users is encouraged. If one authorized user has newer or better materials than a second, the first user is encouraged to share with the second...”).”

– EEUG.org, September 2016

Installation

Program Installation

Determining which method to use depends on the programs you are using. If you have the InstallShield versions of ATPDraw with ATP, then method two is recommended. If you do not, use method one. Examples of program versions:

 ATP Engine - MingW 10-29-2015.zip	9/29/2016 10:31 AM	Compressed (zipp...	4,309 KB
 runATP_MingW32.bat2	6/22/2014 7:39 PM	BAT2 File	1 KB

Figure 4 ATP Program Files


















	armafit.zip	Compressed (zipped) Fol...	104 KB
	atb.bat	Windows Batch File	1 KB
	atg.bat	Windows Batch File	1 KB
	graphics	File	1 KB
	graphics.aux	aux Files	3 KB
	graphics.std	STD File	3 KB
	halfhigh.aux	aux Files	1 KB
	halfwide.aux	aux Files	1 KB
	higher80.aux	aux Files	1 KB
	higher93.aux	aux Files	1 KB
	listsize.big	BIG File	1 KB
	quarter.aux	aux Files	1 KB
	sixteen.aux	aux Files	1 KB
	startup	File	2 KB
	thirty2.aux	aux Files	1 KB
	tpbig.exe	Application	2,098 KB
	tpgig.exe	Application	2,099 KB

Figure 5 ATP Engine - MingW 10-29-2015.zip Opened




	ATP Analyzer - New Installation - V4_70.exe	Application	32,917 KB
	ATP Analyzer - Revisions_readme - V4_70.docx	Microsoft Word Document	15 KB
	readme_InstallShieldHowto.doc	Microsoft Word 97 - 2003 ...	364 KB

Figure 6 ATP Analyzer InstallShield Version 4.70




	Pls_Install_ATP Analyzer_First	12/10/2013 8:34 AM
	readme.docx	12/16/2013 7:39 AM
	setup.exe	11/13/2013 2:25 PM

Figure 7 ATPDraw InstallShield Version 5.8


	setup.exe	Application	3,474 KB
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Figure 8 ATPDraw Install Version 6.1

ATP	File folder	
Bct	File folder	
Grp	File folder	
Hlp	File folder	
LCC	File folder	
Mod	File folder	
Projects	File folder	
usp	File folder	
ATPDraw.chm	Compiled HTML Help file	1,165 KB
Atpdraw.exe	Application	1,931 KB
ATPDraw.scl	SCL File	247 KB
Readme.pdf	Adobe Acrobat Document	80 KB
runAF.bat	Windows Batch File	1 KB
runATP_G.bat	Windows Batch File	1 KB
runATP_W.bat	Windows Batch File	1 KB

Figure 9 ATPDraw Image Version 6.1

Installation Method 1 – Manually

Manually install ATPDraw, ATP Analyzer and ATP in the recommended folder locations, then point ATPDraw to the applications. Note that there are multiple ways and places to install. This is just one tested and recommended method.

Copy ATPDraw, ATP Analyzer and ATP install files to your local computer before starting. Extract zipped files as necessary.

Install ATPDraw

ATPDraw typically comes in an install and image format. The install version will run an installation wizard and automatically install the application. The image version allows you to copy and paste the new files and overwrite the older version. Both methods will work for installation. The install version is recommended for first time installations.

The only caution is to not embed ATPDraw in too many folders. ATP will be stored in the same location, and has limited characters in file names. Similarly, the file and folder names cannot contain any spaces. If this is a problem, ATP will not run.

The recommended file location for ATPDraw is at the root level: “C:\ATPDraw\”.

Install ATP Analyzer – InstallShield Version

ATP Analyzer has been added to a custom InstallShield for properly installing on a Windows 7 machine.

Follow the instructions with the InstallShield for installation. The location for ATP Analyzer is not important and can be in “Program Files” because it will be linked in ATPDraw.

Install ATP & Link Applications in ATPDraw

1. Extract atpmingw.zip to "c:\ATPDraw\ATP_MingW32". You will need to create the folder.
2. Copy the batch file "runATP_MingW32.bat2" to "C:\ATPDraw\ATP_MingW32".
3. Change the extension to .bat, "runATP_MingW32.bat". Depending on the method you received the batch file, renaming may not be necessary.
4. When you open ATPDraw for the first time it will inform that there are folders missing that it is by default linked to. You can click yes to all of the defaults and let the program create those folders for you.
5. In ATPDraw, go to "Tools > Options > Preferences".
6. Under the Programs section, "ATP:" browse to the "runATP_MingW32.bat" file, "C:\ATPDraw\ATP_MingW32\runATP_MingW32.bat".
7. Under the Programs section, "Plot Program:" browse to ATP Analyzer, "C:\Program Files (x86)\ATP Analyzer\ATPAnalyzer.exe". If the browse button is not working, type directly into the text area.
8. Your options should look similar to Figure 10 below when complete. Hit Save, and OK.

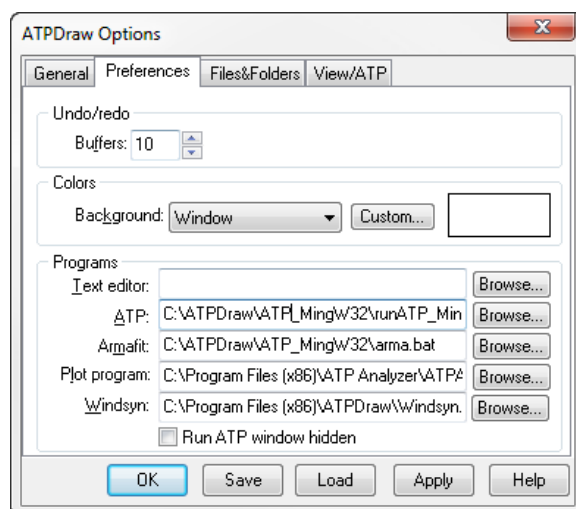


Figure 10

9. Other recommended File&Folders options. Check the "Results in current project folder" checkbox.

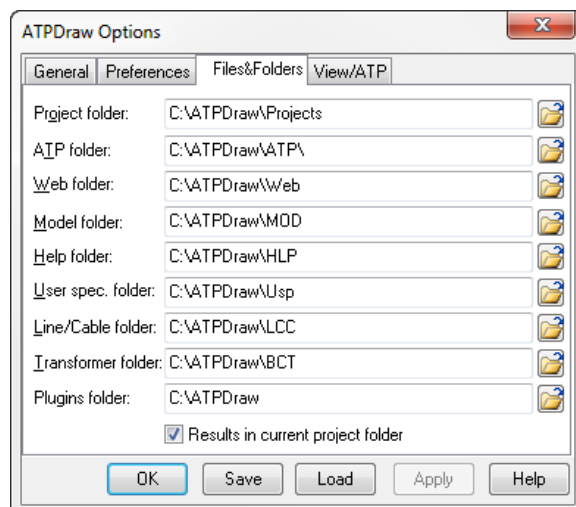


Figure 11

10. In ATPDraw, save a second time by selecting "Tools > Save Options". This second save has been found to be necessary at times to insure ATPDraw actually does save the changes.

Installation Method 2 – InstallShield with Updating Method

Use the two InstallShield executables that will automatically install ATPDraw with ATP, and ATP Analyzer in the correct folder locations, and point ATPDraw to the applications for you. The only downside to this method is that the installer is not always updated as new versions of the software comes out, so after the installer is complete the ATPDraw, ATP or ATP Analyzer executables may need to be replaced with more recent versions. The benefit of this automatic method is that you do not have to worry about folder locations or linking applications – the InstallShield will do that for you.

Copy ATP Analyzer InstallShield, ATPDraw InstallShield, and any later versions of ATPDraw, ATP or ATP Analyzer to your local computer. Extract zipped files as needed.

1. Install the ATP Analyzer InstallShield first following the instructions that come with it.
2. Install the ATPDraw InstallShield version following the instructions that come with it. This is the version that will also install ATP, and link the three applications. If all of the applications are the most recent the installation instructions would stop here.
3. If needed, update ATPDraw to the latest version by copying the highlighted files in Figure 12, that are included with the "image" version, and pasting them to your local hard drive under C:\ATPDraw\. The remaining non-highlighted folder contents can be copied over individually as needed. It is recommended to back up the current version into an archive folder prior to updating.

ATP	10/12/2016 10:06 ...	File folder	
Bct	10/12/2016 10:06 ...	File folder	
Grp	10/12/2016 10:06 ...	File folder	
Hlp	10/12/2016 10:06 ...	File folder	
LCC	10/12/2016 10:06 ...	File folder	
Mod	10/12/2016 10:06 ...	File folder	
Projects	10/12/2016 10:06 ...	File folder	
usp	10/12/2016 10:06 ...	File folder	
ATPDraw.chm	4/3/2016 9:21 PM	Compiled HTML ...	1,178 KB
Atpdraw.exe	4/3/2016 9:23 PM	Application	4,839 KB
ATPDraw.scl	4/3/2016 5:12 PM	SCL File	267 KB
Readme.pdf	4/3/2016 9:46 PM	Adobe Acrobat D...	87 KB
runAF.bat	11/19/2001 10:27 ...	Windows Batch File	1 KB
runATP_G.bat	12/22/2010 7:44 PM	Windows Batch File	1 KB
runATP_W.bat	12/22/2010 7:44 PM	Windows Batch File	1 KB

Figure 12

- If needed, update programs by replacing the ATP executable (e.g. tpbig.exe) and/or the ATP Analyzer executable (ATPAnalyzer.exe) with newer versions in their appropriate folders. It is recommended to back up the current version into an archive fold prior to updating.

Testing Applications after Installation

At this point, the ATP can be executed in ATPDraw when the user has a project file open, and selects the "Run ATP (F2)" command in ATPDraw.

A successful ATP run will look similar to this:

```

Blank card terminating all plot cards.          1BLANK PLOT
Memory storage figures for the preceding, non-completed data case. 29-Sep-16 08:37:04
A value of "-9999" indicates that no figure is available.
Size List 1. Number of electric network nodes. 165 6000 (LDBUS)
Size List 2. Number of electric network branches. 152 10000 (LBRANCH)
Size List 3. Number of data values in R, L, C tables. 281 192000 (LDBATA)
Size List 4. Number of electric network sources. 12 900 (LSECT)
Size List 5. Storage for IV1 and triangulated IV1. No. times = 11 Factors = 470 1000 420000 (LCPMT)
Size List 6. Number of entries in switch table. 45 1200 (LSWITCH)
Size List 7. Number of distinct ALPHANUMERIC data names plus program SPY variables. 256 15000 (LSIZE27)
Size List 8. History points of distributed lines. 1275 120000 (LPHST)
Size List 9. Number of nonlinear elements. 6 2250 (LNONL)
Size List 10. Points of nonlinear characteristics. 14 3000 (LCHARP)
Size List 11. Number of Type-59 S.M. outputs. 0 720 (LSMOUT)
Size List 12. Total number of EMTP output variables. 113 2000 (LSIZ12)
Size List 13. Working space for batch/SPY plotting. -9999 72000 (LSIZ13)
Size List 14. S.H./O.H. connections to IACS. -9999 510 (LBSIAC)
Size List 15. Character storage in bytes for MODELS. -9999 90000 (LCTACS)
Size List 16. Total number of Type-59 S.M. masses. 0 000 (LIMASS)
Size List 17. Number of Type-59 Synchronous machines. 0 90 (LSYN)
Size List 18. Branch and switch power/energy outputs. 6 254 (LMAXPE)
Size List 19. Total floating-point IACS table space. 1135662 120000 (LITACS1)
IACS table number 1 2 3 4 5 6 7 8
Present figure 1426 6417 2130 652 2139 17825 24955 4278
Program limit 1 2 3 4 5 6 7 8
Size List 20. Non-copied recursive convolution data. 0 100000 (LRFSEM)
Size List 21. Total modal/phase (I) matrix storage. 9 3000 (LFD)
Size List 22. Total recursive convolution history. 0 15000 (LHIST)
Size List 23. Giant vectors for renumbering, phasors; also extrema accumulation. 1115 192000 (LSIZ23)
Size List 24. Peak phases of compensation for data. 3 120 (LCOMP)
Size List 25. Total table space for all U.H. usage. -9999 45000 (LSPCHM)
Size List 26. Square of max number of coupled phases. 9 260000 (LSIZ26)
Size List 27. Maximum number of MODELS top variables. -9999 600 (LSIZ27)
Size List 28. MODELS. Total work space is divided into INTEGER and REAL. 1st, REAL: -9999 210000 (LITACS)
Second and last, statistics for INTEGER work space. 0 0 (LITACS)
Size List 29. RAM disk used by "TAPSAU" table saving (limit is "LABCOM" size LILABL). -9999 1100 (LSIZ29)
Timing figures characterizing central processor (CP) solution speed. CP sec Wait sec Real sec
Data input time (through blank card ending branches) .... 0.031 0.000 0.031
Mode renumbering and phasor solution .... 0.000 0.000 0.000
After phasor solution, but before time-step loop .... 0.000 0.000 0.000
Integration of equations (time-step loop) .... 0.359 0.000 0.359
Plotting or STATISTICS termination overlays .... 0.000 0.000 0.000
Totals 0.390 0.000 0.390
ATP Finished at 08:37:04 on Thursday, 29 September 2016
Total Execution Time was 0.39 cpu seconds
Press any key to continue . . .

```

Figure 13

An unsuccessful ATP run will look similar to this, usually with error messages and likely insults included:

[illegible]

Figure 14

To test ATP Analyzer, after a successful ATP time-dependent execution and plot file creation, hit “run Plot (F8)”. ATP Analyzer should automatically open and read in the new pl4 file ready to plot. ATP Analyzer can also be tested with other file types such as COMTRADE files.

References

ATP Analyzer 4_12 Manual [DOC] (2007, February).

European EMTP-ATP Users Group. Sep. 2016. <www.eeug.org>.

Hoidalen, Hans K. *ATPDraw*. Sep. 2016. <www.atpdraw.net>.

PlotXY History and Road Map [PDF]. (2015, May).

Rifaldi, A., & Lastra, R. B., ATP Rulebook [PDF]. (2001, December).