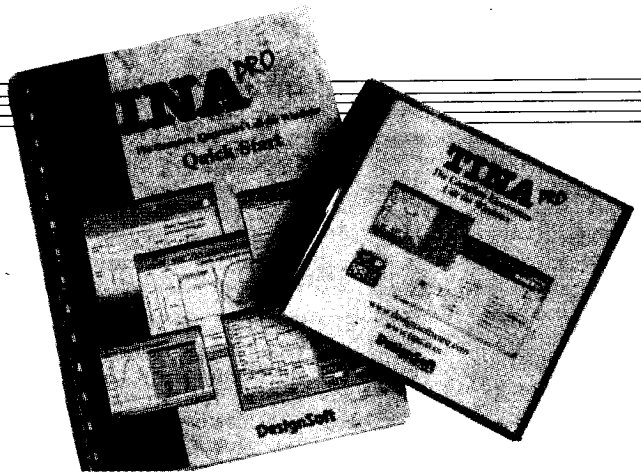


# TINA PRO REVIEW

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DesignSoft's TINA PRO is the latest version of two extremely popular programs; TINA for Windows and TINA Plus for Windows. Founded in 1992, DesignSoft is based in Budapest, Hungary, and the company's stated mission is to develop high-tech engineering and educational software including electronics, physics, architectural design, multimedia and 3D-graphics. DesignSoft currently has distributors in 22 countries including the well known UK electronics design software house, Quickroute Systems. DesignSoft describes TINA PRO as a "Complete Electronics Lab for Windows". Mike Tooley sets out to investigate this claim.

**T**INA PRO is a powerful yet affordable software package for designing, simulating, and analysing analogue, digital and mixed (analogue/digital) electronic circuits. Results of circuit analysis can be displayed in various ways, including displays produced by TINA PRO's virtual instruments. A comprehensive range of desktop publishing tools are available with which you can easily produce professional-looking reports and publications. Cutting and pasting TINA PRO's output into a Windows application program (such as Microsoft Word or Microsoft Publisher) is also quick and simple.

TINA PRO is available in several different versions, including a trial/demo version containing a selection of self-demonstrating examples (but with save and print disabled), a single user version (licensed for use on a single computer), and a network version suitable for use with Novell Netware (version 3.12 or later) and Windows NT (version 4.0 or later).

It also includes unique tools for testing students' knowledge, monitoring progress and introducing troubleshooting techniques. With optional hardware it can be used to test real circuits for comparison with the results obtained from simulation. Teachers and lecturers will be delighted with TINA PRO's training and examination modes that allow the package to be used as a powerful tool in the classroom or as a standalone training aid in the school/college open-learning centre.

DesignSoft has placed TINA PRO in the middle of the market, between Electronics Workbench EDA (at the professional end of the market) and Crocodile Clips (at the student end of the market). Despite its simplicity – the program really is easy to learn and use – TINA PRO is extremely powerful and should easily satisfy the requirements of the hobbyist and enthusiast as well as the professional user wishing to carry out in-depth circuit analysis.

## SYSTEM REQUIREMENTS

TINA PRO is a 32-bit application that will run well on virtually any modern Windows-compatible PC. However, for the benefit of those readers who may be unsure of whether or not their hardware will support TINA PRO, the basic requirements are:

- Microsoft Windows 95/98 (or Windows NT 4.0, or later)
- IBM PC/AT compatible computer with a '486 (or later) processor
- 16 Mbyte RAM
- 20 Mbyte hard disk space
- Mouse (or equivalent pointing device)

## INSTALLATION

Installation is quite straightforward and TINA PRO's CD-ROM installer will auto run on a system configured for autorunning applications from CDs placed in the CD-ROM drive. Once started, the set-up program will display a menu offering users the choice of:

- Installing Internet Explorer
- Installing TINA PRO
- Viewing a tutorial covering the most important features of the program
- Obtaining information on upgrading and ordering

A full TINA PRO installation requires 22,189 Kbyte of space on a local hard disk drive. With modern multi-Gbyte hard drives this should not place too many demands on your system!

Having selected the option to install TINA PRO, you are next offered the choice of either American (ANSI) or European symbols. Installation takes just a few seconds, thereafter you are presented with a message that informs you that the "Trial Installation" is valid for "15 runs". In common with most well-behaved applications these days, TINA PRO provides its own uninstaller. This program cleans up the

Windows system files and removes all of the TINA PRO files without removing any user-created data files.

For the educational user, TINA PRO may be installed on a network (Novell 3.x, Novell 4.x or Windows NT) and configured for multiple user access. After running the network set-up utility, users will be able to run TINA simultaneously, just as though each workstation had a single user version installed.

Unfortunately, TINA PRO registration is a little cumbersome. Program branding not only involves a "Registration Code" but it also requires a "Site Code", and a "Site Key" (supplied as part of the registration process). Doubtless there are good reasons for this somewhat complicated process.

## FEATURES

TINA PRO provides more than 10,000 built in components. Component selection is based on a simple "Component Bar" with tabs that are used to arrange components in manageable groups. The program also provides more than 1,000 manufacturer made components in Spice sub-circuit format. Compared with earlier TINA versions, a number of new component models, including nonlinear coils, transformers, relays, Darlington transistors, opto-couplers, voltage regulators, fuses, comparators, and CMOS logic i.c.s, are provided. Other useful features include:

- Analogue, digital and mixed (analogue/digital) mode simulation
- Powerful editing tools (schematic, netlist, text, equation, and waveform editors)
- Customizable presentations of Bode plots, Nyquist diagrams, transient responses, or use of virtual instruments in order to produce conventional instrument displays.
- Spice library manager
- Symbolic analysis (results appear as closed form expressions)

- Fourier analysis (Fourier spectrum, Fourier series and distortion)
- Noise analysis (including noise spectrum and signal-to-noise ratio)
- Tolerance analysis (Monte Carlo and worst-case scenario)
- HTML-based component help
- Sub-circuits which may include both spice macros or schematics
- Schematic symbol editor for creating custom sub-circuit components
- Average and r.m.s. value determination for arbitrary periodic waveforms

## TINA PRO SCREEN

The TINA PRO screen format is shown in Fig.1. The screen comprises a conventional Windows menu bar that provides access to all of the main program functions, such as File, Edit, Insert, View, Analysis, etc. Below this is a toolbar that provides access to some of the most commonly used editing features, such as cut, paste and zoom.

The component bar is located beneath the toolbar. The component bar provides access to the extensive library of components that is supported by TINA PRO. Components are arranged in groups, named by the tabs on the Component Bar. Once a particular group has been selected, the available components appear as a row of symbols immediately above the component tabs.

When you click on a particular component in the toolbar (and release the mouse button), the cursor changes to show the currently selected component. The component can be moved anywhere within the circuit drawing area of the screen. The component can then be rotated (by pressing the + and - keys) or mirrored (using the \* key). Once you have selected the position and orientation for the component you can simply press the left mouse button to lock the symbol in place.

The Task bar appears at the bottom of the screen and provides rapid access to the various tools or test/measuring instruments currently in use. Each tool or instrument operates in its own window and can be made active by clicking on the respective Task bar button. Finally, TINA PRO provides a single line of help text at the bottom edge of the screen.

## INTERACTIVE MODE

The ultimate test of a circuit simulation is to try it in a "real life" situation using interactive controls (such as keypads and switches) whilst watching displays and other indicators. Fortunately, TINA PRO provides you with an interactive mode that will allow you to do just this!

Not only can you play with the controls but you can also change component values and even add or delete components while the analysis is in progress.

## SUB-CIRCUITS AND MACROS

As with other SPICE programs, TINA PRO allows you to simplify a complex circuit schematic by turning portions of it into a sub-circuit. In addition, you can create new TINA PRO components from any SPICE sub-circuit, whether created by yourself, downloaded from the Internet, or

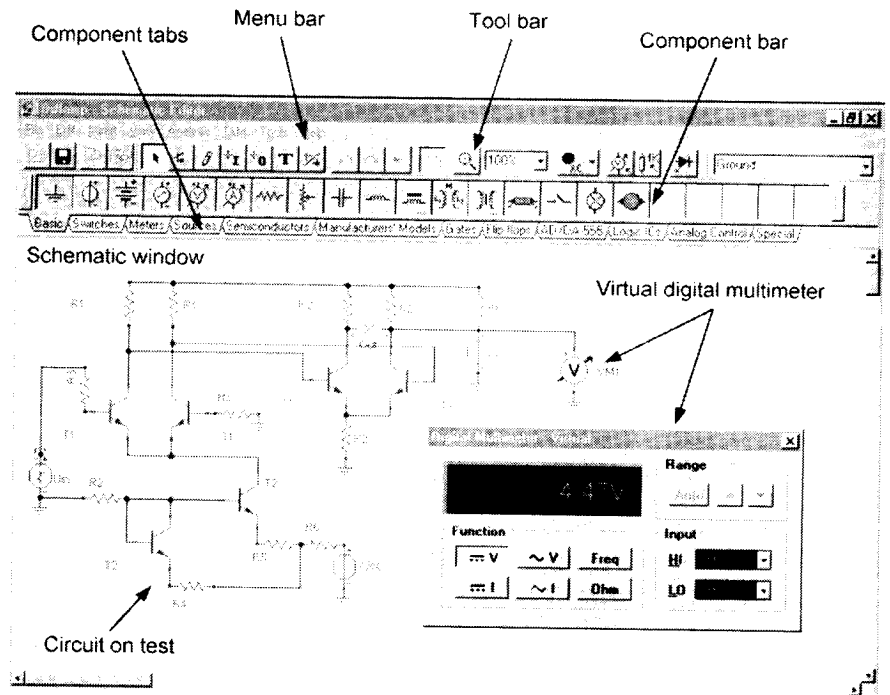


Fig.1. The TINA PRO screen.

obtained from a manufacturer or component supplier's CD. A typical example of where you might wish to use a sub-circuit is that of a half-adder, replacing the five discrete gates with just one "black box" subsystem. Once the subsystem has been created (and tested) it can be used over and over again.

## TINA IN THE CLASSROOM

TINA has two special modes for educational purposes. In examination mode, the student has to solve a series of problems (a problem set) either by traditional pencil-and-paper methods or by using the TINA Interpreter and analysis functions. When the student finds the answer, the program sends it immediately to the teacher's machine, where it is promptly displayed by the TSuper supervision utility. Operation is similar in training mode, except that TINA gives the student feedback about the correctness of his or her answer. In training mode, the student may turn to the Advisor to get help prepared by the teacher.

TINA PRO can be set into one of the special educational modes by the use of a command line switch, the general format of which is:

**TINA [MODE SWITCH] [FILENAME]**

where [mode switch] is either /EXAM or /TRAIN, and the [filename] is the relative path and filename (with the optional .EXA extension) of the problem set descriptor file. This file must have been prepared using the TTask program, and should give the names of the problems in the set, along with their train/exam options. This path is always relative to the TINA home directory; that is, the descriptor file must reside in the TINA directory (where TINA was installed) or one of its subdirectories. If this is all beginning to sound a little complex, here's an example:

Assume that you have a descriptor file TEST\_B.EXA that resides in the TEST subdirectory, the program can be started with the commands:

**TINA /EXAM TEST\TEST\_B or TINA /TRAIN TEST\TEST\_B**

The TINA PRO installation program actually provides you with two icons in the TINA program group that can be used to start the program in training/examination mode. You then only need to click on the required icon in order to start the program in either training or examination mode. TINA will then prompt you for the name of the descriptor file. When the program is started, it will request the student's name. The student can then select a problem using the Tasks List on the Examination/Training Panel.

The Examination/Training Panel appears automatically when TINA is started in examination or training mode. The current mode (Training or Examination) is displayed at the top of the panel. Beneath the mode display is the total accumulated time display. This starts counting when the student selects the first task.

## ADVISOR

An Advisor Panel gives access to the hints prepared by the teacher. Some advice items carry a penalty, in which case the student will be warned that a penalty applies. The Current Task panel allows the student to prepare and submit a solution to the problem. The contents of this panel are dependent on the type of the problem.

The Interpreter standard button will launch the built-in TINA PRO interpreter. The Submit standard button will validate the solution and file it in the student records.

It is important to note that TINA PRO will only accept as correct those solutions that are formally valid; e.g. in d.c. problems both the numerical value and the units must be correct. If the answer is a

numerical/symbolic expression, the correct units *must* also be given. When using the training mode, TINA will either confirm the answer or tell the student how the solution is incorrect (e.g. missing units, syntax problems, etc.).

Doubtless this will be music in the ears for long suffering teachers and lecturers who, like me, find that students are all too often hazy about the units that they are working in or are simply too lazy to state the answer in full!

## SUPPLEMENTARY HARDWARE

DesignSoft has developed a variety of external hardware modules that can be attached to a PC for use with TINA PRO. This includes:

- TINALab, a data acquisition card with multimeter, oscilloscope, and signal generator functions
- ExtBox, an experimenter box that allows users to assemble prototype circuits as well as making measurements on up to 16 external modules
- FaultGen, an expansion card (for use in conjunction with the experimenter box) that allows faults to be placed in tested circuits
- DigiCard, an expansion card (for use in conjunction with the experimenter box)

that facilitates measurements on digital circuits

- Experiment modules, a series of modules that can be used to demonstrate the operation of basic electronic circuits. The modules are automatically recognized and displayed when they are connected to the experiment box.

## IMPROVING THE OUTPUT

Having designed and analysed your circuit, you will, at some point, probably want to disseminate your results to others in the form of a paper or technical article. TINA PRO will help you to do this – at least by providing you with all of the graphical content – in the form of Bode plots, Nyquist diagrams, transient responses, digital waveforms, etc. You can create, edit and print documents from within TINA PRO or cut and paste the results into another Windows application using the Windows clipboard.

A particularly useful feature is that TINA PRO's graphics editing facilities allow you to add your own information to the results of a circuit analysis. It makes it easy to add markers, special annotation, and circuit schematics to the results of any circuit analysis. This facility is a real boon for students as it can save hours of graph plotting, drawing and sketching.

## VIRTUAL INSTRUMENTS

TINA PRO provides you with a Function Generator, Digital Multimeter, Frequency Analyser, Logic Analyser and a dual-channel Oscilloscope. These instruments provide the same displays and control as found on real instruments and will help you make measurements in just the same way as you would in a real laboratory.

As an added bonus, if you have TINA PRO's supplementary hardware, the program will allow you to switch to "Real Measurement" mode. This facility lets you work with the same on-screen instruments and settings when making real measurements on a real circuit.

## HELP!

The "Quick Start" manual comprises around 70 pages in A5 spiral bound format. The manual is divided into four sections; Welcome, Introduction, Installation and Start-Up, and Getting Started. Of these, the last section is by far the largest (comprising 43 pages). On its own, the manual is not particularly extensive. However, TINA PRO's help system provides a wealth of reference information (including a comprehensive description of the SPICE models). One unfortunate omission from the manual is the lack of an index.

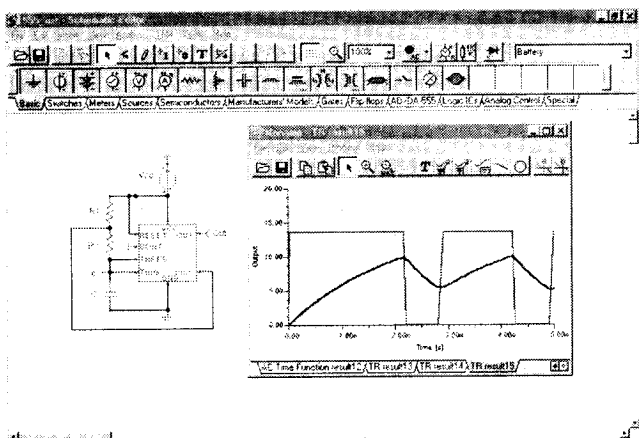


Fig.2. Using TINA PRO to analyse the operation of a simple astable oscillator based on a 555 timer.

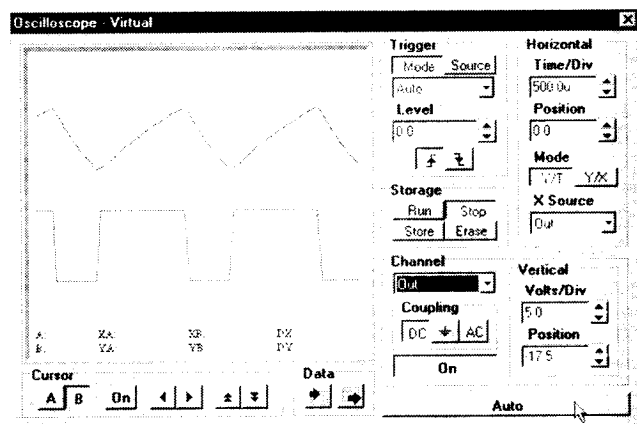


Fig.3. Using TINA PRO's virtual oscilloscope to view the output waveforms produced by the astable oscillator in Fig.2.

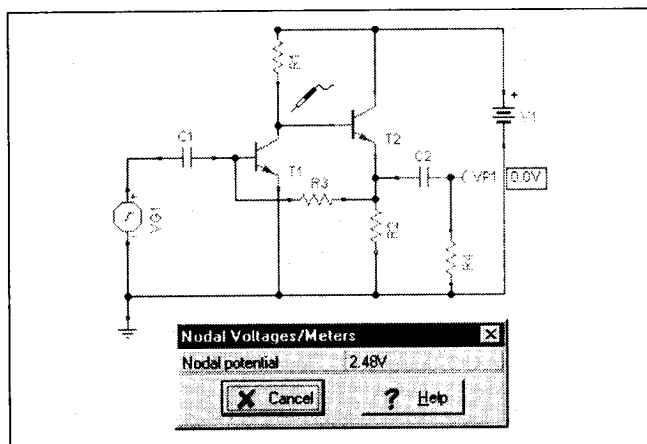


Fig.4. The first attempt using TINA PRO involved "building" and testing this simple two-stage amplifier. Having assembled the components in the schematic window TINA PRO's nodal voltage analysis tool is being used to check the bias conditions (note the test probe at the collector of TR1).

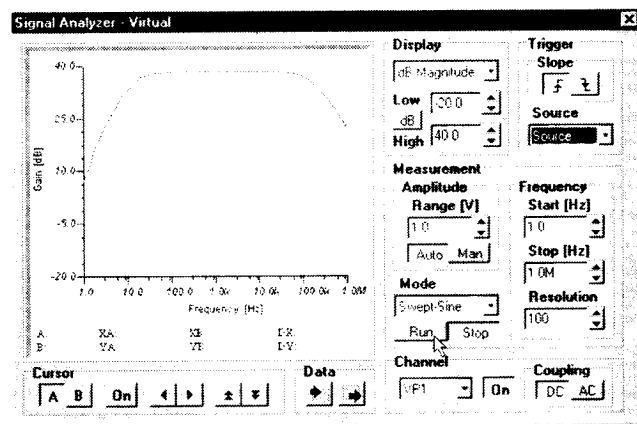


Fig.5. Frequency response of the two stage amplifier using TINA PRO's virtual frequency analyser (the amplifier's upper cut-off frequency has been limited to about 100kHz by applying some h.f. negative feedback).

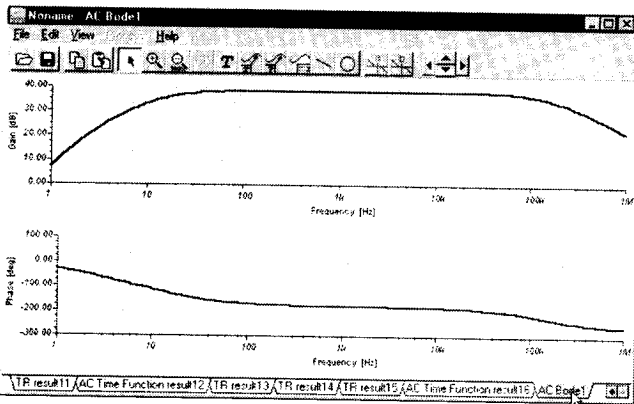


Fig.6. An alternative to using one of TINA PRO's virtual instruments is that of using one of the built-in analysis tools. This shows the alternative gain and phase versus frequency display (without the controls and adjustments that would be present with the signal analyser virtual instruments).

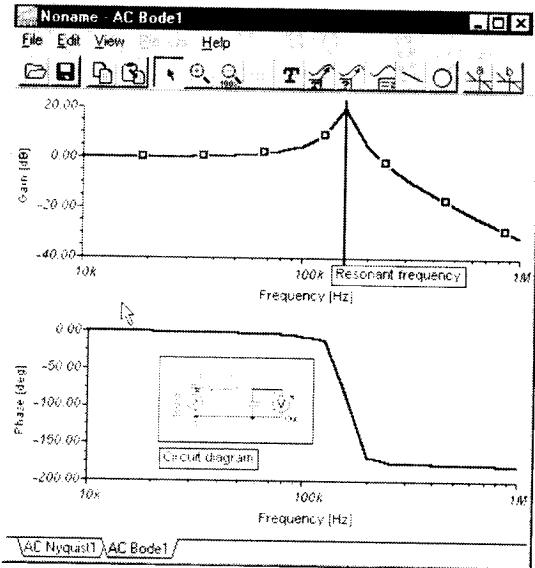


Fig.7. The graphic displays produced by TINA PRO can be enhanced and customized by the user. Here some captions, markers and a circuit diagram have been added to a basic Bode plot that shows the gain and phase response of a simple L-C-R series resonant circuit.

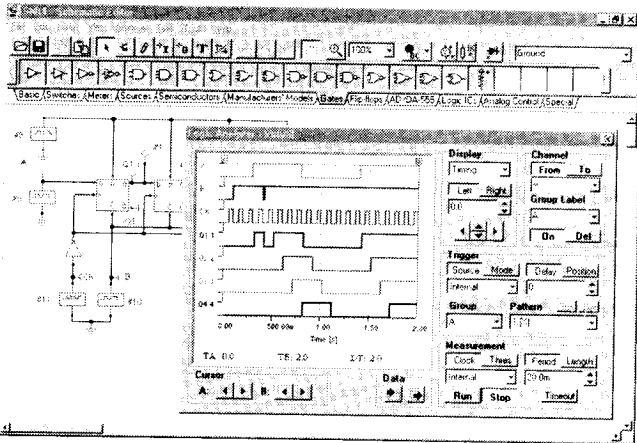


Fig.8. TINA PRO is equally at home analysing digital circuits. Here we are displaying the output of a four-stage shift register using TINA PRO's logic analyser virtual instrument.

## IN USE

In use, I found TINA PRO extremely intuitive. My first task was to "build" and test a simple two-stage amplifier. This was accomplished quickly and easily and without having to refer to either the manual or the help text. Next, I put TINA PRO to work solving some network problems that form the basis of assignments carried out by my HND students. Once again, TINA PRO excelled at the task, delivering not only the response curves required but also formulae required to produce the transient response for each circuit.

TINA PRO incorporates a number of features that make it a real pleasure to use. These include the orthogonal wiring tool, the multiple undo facility, and the automatic component numbering. The various output displays produced by the program are excellent, as are the virtual instruments.

There are two features that I would like to see in the next version of TINA PRO. The first is a menu option that will allow users to open a selection of the most recently used files (*Since this review was written we have been advised by Quickroute Systems that this request has been implemented. Users can now open a selection of the most recently used files.* - Ed) whilst the second is a facility that will allow me to print the virtual instrument displays and settings (I use this facility regularly in

Electronics Workbench to keep a record of circuit performance as I make changes to circuit parameters, component values, etc). That said, I have very few other concerns and niggles!

## IN CONCLUSION

TINA PRO is packed with features, simple to use and represents really good value. So, if you are thinking of moving up to a Windows SPICE package (or are planning to upgrade your current SPICE software) you should take a serious look at DesignSoft's latest offering - it can be highly recommended!

DesignSoft can be contacted at: [www.designsoftware.com](http://www.designsoftware.com)

The TINA website is at: [www.tina.com](http://www.tina.com)  
Note that a demonstration version of TINA PRO can be downloaded from this site. The site also features a Students' Forum and a downloadable "Student Contest" with a chance to win a free upgrade to the full version of TINA.

In the UK, TINA PRO is available from: Quickroute Systems (Dept EPE), Regent House, Heaton Lane, Stockport SK4 1BS. Phone: 0161-476-0202. Fax: 0161-476-0505. (Please mention this review when contacting Quickroute.)

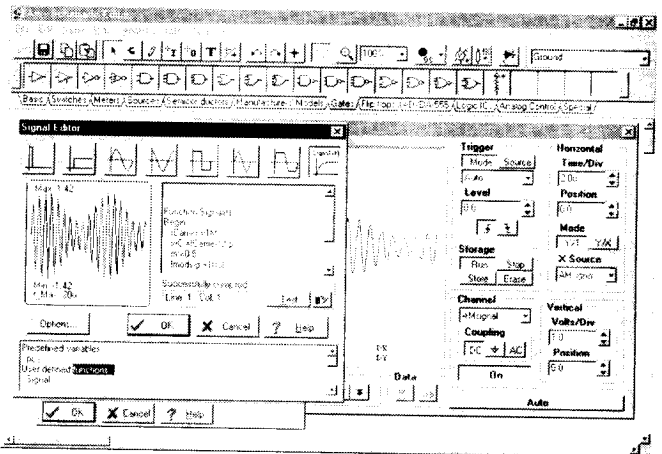


Fig.9. TINA PRO has many advanced features, including signal and equation editors. This screen shows how the signal editor can be programmed to produce an amplitude modulated signal (part of the resulting signal appears in the virtual oscilloscope window below the signal editor window).

## PRICES

There is a wide range of TINA PRO software available, together with various different site licences for those that need them (prices on request from Quickroute Systems).

**TINA PRO Basic** - a cut down starter version suitable for hobbyists and students (particularly helpful for students who have access to a full version at college etc): £57.58 including VAT and p&p.

**TINA PRO Educational** - includes full Teacher Pack: £204.45 including VAT and p&p.

**TINA PRO Industrial Classic Edition** - similar to the full Industrial Edition but without the SPICE library, a symbol designer, or the ability to form component models from manufacturers' data. £204.45 including VAT and p&p.

**TINA PRO Industrial Edition** - the full version with all the options. £363.08 including VAT and p&p.

Further information on the various versions is available from Quickroute Systems, also see their web site at: [www.quickroute.co.uk](http://www.quickroute.co.uk).