003bfed8-0

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REVISION HISTORY

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Chapter 1

003bfed8-0

1.1 PHENOMENA docs

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                                    PHENOMENA v1.0
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                         ©1994 Avi Pilosof
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```
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         Introduction
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                 For those who hate reading docs :)


         Docs
                        Detailed instructions & info.


         Render~Tips
                 On using this with rendering programs


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```

```
                               Thanks to...


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                        Who am I?
```

1.2 Introduction

```
   INTRODUCTION
   ------------
```

  Phenomena is a program which creates random pictures of natural phenomena
(hence the name). Currently (in the first version) electricity and firey
explosions are supported.

  I saw a magazine cover a few weeks ago, and it had a great picture on the
front of it, created by one Jarrod Pudsey (sp?). The picture was created in
LightWave®, and depicted a swirling vortex with lightning in it. It was so
pretty, that I immediately set out to copy it :)
  Unfortunately, I didn't have any pictures of lightning, and I wasn't about to
draw animation frames in DPaint. I had just begun to learn the E programming
language, and I thought to myself that it would be a good experiment to write a
program which drew pictures of lightning.
  I sat down, messing around with different methods, but I wasn't getting
anywhere. So the next day, I went and asked a mathematics professor at uni
about it. Unfortunately, he had no idea, but he was quite interested. So we sat
for half an hour, and discussed various possible methods, until he finally came
up with a seed which was to be the building block of Phenomena's lightning
engine. I went home, and within an hour, I was getting about 5 lightning's per
second on a hires screen. Past that, not much modification was made, other than
adding forks to the lightning.
  As for the explosion, that was much harder. I visited the office of another
professor at uni, who specialised in this type of thing, but he knew nothing
about simulating explosions which could help me. He did, however, know alot
about lightning – turns out that the algorithm that we had made up on the spot
actually simulated (pretty closely) the "dielectric breakdown of air in the
surrounding region" or something...:)
  I was pretty disappointed, but determined to find a way. I emailed many
people both at uni and outside (going as far as the Australian Defence Force
Academy, which were doing research on fire propagation) but got no replies.
Eventually, I started experimenting at home. I began with a system which was
based on Conway's Game of Life. That was progressing quite well, but my
algorithms were quite slow, and I was getting frustrated waiting for frames to
update in order to see the effects.
  I put explosions aside for a while, and started trying to create a realistic
rising-smoke effect. After several hours in total, I managed to create quite a
good one. And then it hit me that this same method could be used for fast
explosions. And it can be – as you can see.
  The smoke effect was not included in this release, since it used colours
which were very close to black in order to create a good effect. This limited
their use in rendering programs (unless you were rendering onto a black
background). Later versions of Phenomena will probably include smoke, using
alpha channels.

  That's the basic story – just thought I'd mention it :)

Back to business...

1.3 Quickstart

```
QUICKSTART
----------
```

  The only reason I included this bit was because I know it's the first thing I
would look at if I were you :)

  Okay - the program is quite simple, but I'll take you through it, in about 20
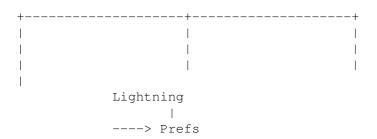seconds.

  a) Load it.

  b) [optional] Choose one of the "---> Prefs" icons; either the lightning
              or explosion one, and mess with the settings which show up.

  c) Click on either "Lightning" or "Explosion", to render them.
     Now some requestors come up:
       PAL or NTSC - Changes the vertical height
       The screen size to which you want to render
         - need I say more?
       An ASL requester for the filename you'd like.
         - this is a base filename, so enter something like "Phenomena.",
since
           a number with leading zero's will be added automatically.

  d) Watch, wait, hang...whatever :)

1.4 FullDocs

```
              USAGE -----
```

  Since this is my first programming effort, and when I started I knew nothing
about the Amiga OS, I left the GUI pretty bare to save me time and pain.
However, this makes the program stupidly easy to use, so everybody benefits in
one way or another.

The window is arranged like this:

```
    +------------------+------------------+
    |                  |                  |
    |                  |                  |
    |                  |                  |
    |
            Lightning
                 |
            ----> Prefs
```

```
                             |
       |                     |                         |
       |                     |                         |
       |                     |                         |
       +---------------------+-------------------------+
       |                     |                         |
       |                     |                         |
       |                     |                         |
       |
                    Explosion
                         |
                  ----> Prefs
                         |
       |                     |                         |
       |                     |                         |
       |                     |                         |
       +---------------------+-------------------------+
       |                                               |
       |                                               |
       |                     About                     |
       |                                               |
       |                                               |
       +---------------------+-------------------------+
       |                                               |
       |                                               |
       |                     Quit                      |
       |                                               |
       |                                               |
       +---------------------+-------------------------+
```

    Click on the top 4 to find out what they do.

    About will pop up a window with credits, etc.
    Quit will leave the program.

1.5 Render

    RENDERING

When you click on either "Lightning" or "Explosion", a series of requesters
will pop up to finalise some settings:

        The first requester will ask you to choose
      a video mode (PAL or NTSC). This decides
      the size of the image which will be rendered.

        PAL = 256/512,
        NTSC = 200/400 (vertical).

        The second requester will let you choose
      between two different render-screen sizes,
      either:

```
   low-resolution:   320 x 200/256, or
   high-resolution   640 x 400/512.

   The vertical height will be determined
based on your selection in the first
requester.

   The third requester will prompt you for
a filename which is to be the BASE filename
for the frames. Here, use the ASL requester
to select a directory and a filename.
   The filename should be a new one, and should
end with a ".". To this name, the program will
append "0001","0002"..."000n" depending on
how many frames you select.

(Note: it is not necessary to add a fullstop
 to the file, it just makes it easier to
 read)
```

Once these have been chosen, the program will open a screen and begin to
render. If you have the unregistered version, files will not be saved.

1.6 Elec

```
            ELECTRICITY SETTINGS -------------------


            Electricity~Type

            Starting~Position
                Bolt Colour                 - Self explanatory


            Amount~of~forking

            Random~seed
                Number of frames            - Obvious


            Save~black~frames
                Ok                          - Keep changes and close window

    Cancel                     - Cancel all changes
```

1.7 Exp

```
            EXPLOSION SETTINGS ------------------


            Vertical~squeeze
```

```
        Explosion~Violence
                Random seed                      - As for electricity.
```

```
        (NOTE: I did not include an option for the number of frames
                that an explosion uses. Meanwhile, it is set to a
                small number of frames which should look good when played
                back in real time. If requests are made, I will change this).
```

1.8 elec_saveblack

```
* Save black Frames:  In both the Bolt and the Storm effects, if this is
                      activated, then after every frame, a random number of
                      black frames will be saved in order to create the
                      impression of a random pause between bolts. The
                      random number is limited to 25 frames, or one (PAL)
                      second.
```

1.9 elec_type

```
* Electricity Type:  The program supports 3 types of electricity:
                     Spark, Bolt, and Storm.
                       Spark will create a bolt of lightning which
                     stays in one general area, and "dances" on
                     the spot. This is most useful for creating
                     weapons on ships/robots :)
                       Bolt will save a different bolt of lightning
                     on each frame (including forked lightning).
                     This is good for representing a mild electrical
                     storm.
                       Storm is much like Bolt, but it will save
                     one or more bolts per frame. This is good for
                     creating severe storms, or for wrapping around
                     objects for psychedelic effects.
```

1.10 elec_forking

```
* Amount of Forking:  The higher this slider is set, the higher the chance
                      that a fork will branch from a rod of electricity.
                      The default value of 15 creates quite pleasing results.
                        I have limited the slider's value to 25, as values
                      above this can lead to a huge amount of recursion
                      (the function calls itself) and really ugly results :)
```

1.11   elec_pos

* Starting Position: This decides whether the stroke of lightning will
                       have its origin at the (top) centre of the window,
                       or be randomly placed along the top of the window.
                         When used in conjunction with the Spark effect,
                       this will create a spark which dances either at
                       the point where it ends, or at both start and
                       end points. When you have a spark between two
                       plates of metal, both ends should be moving; but
                       if you're using it as a "weapon" effect, it'll
                       look better if only one end is moving.

1.12   elec_rnd

* Random Seed: This sets the global random seed. Basically, if you
                       use the same number you'll get the same effect every
                       time. I haven't actually tried this, but in theory
                       it is so.

1.13   exp_squeeze

* Vertical Squeeze: The higher this value, the more the explosion's
                       aspect ratio will be changed, to make it wider
                       than it is high. I included this because many
                       of the good looking explosions you see on
                       television start off thin, and blow up sideways
                       more than they do vertically.
                         The default is a round explosion, which (not
                       counting random factors) is as wide as it is
                       high.

1.14   exp_violence

* Explosion Violence: The higher this value, the more "violent" the
                       explosion will be. A high violence means that
                       it will expand faster, and fill more of the
                       screen. The current value of 8 is such that
                       the explosion fills about 1/2 of the window
                       in each dimension. Experiment with this.

1.15   tips

USING PHENOMENA WITH A RENDERING PROGRAM:

     Phenomena will save pictures with a black background, so that they can be
used with all popular (and even unpopular) rendering programs. All you have to

do is set your program to use a SEQUENCE as a brushmap, instead of a single
image, and make sure that the 0 colour (black) is selected as transparent.
   Clip mapping is the best way to achieve this. I can't be of help here in many
programs – actually, just Real3D:

      In the materials window, create a material called "Explosion". for the
brushmap, enter the filename you chose (without the extension which was
appended by Phenomena) with full path, and append the string "%04d" to it. This
tells Real3D to search for that filename, with an extension of 4 0's.
Furthermore, turn on CLIP mapping, TRANSPARENT colour (make sure it is 0,0,0).
Lastly, in the INDEX handler at the bottom, let a=1 and b equal the number of
frames you have, so that Real searches for xxx.0001 rather than xxx.0000 to
begin with.

   I know that Lightwave uses clip mapping, and that Imagine should have a way
of doing this, but I'm not as familiar with those programs as I am with Real,
so I rather not give advice which will confuse.

1.16   author

      ABOUT THE AUTHOR

   I'm a 1st year computer science student at the University of New South Wales
in Sydney, Australia.
   Originally, I wanted to be a 3D animator, now I'm leaning more towards being
a programmer of 3D effects/programs. I'll probably end up in consulting, anyway
– so it doesn't matter :)

If you want to contact me, to offer suggestions (or for any other reason), mail
me at

      s2156114@cse.unsw.edu.au

   If for some reason there's a problem with the uni server
   (it's happened once), and your mail gets rejected, then
   try this address, which is checked less often:

     avi@triode.apana.org.au

Alternatively, snail–mail:

      Avi Pilosof,
      106 Onslow St,
      Rose Bay, Sydney,
      NSW, Australia,
      2029.

Have fun with Phenomena!

Avi Pilosof.

1.17   credits

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   CREDITS
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   The person I want to thank most is Colin Bell, the sysop of a local BBS
called Twister. If it were not for him, I would never have even heard of E,
not would I have learned how to program (other than the stuff they teach us in
1st yeat uni) for a while...Colin, thanks for the advice and for all the help.

   I also want to thank the "gang" at Twister BBS, who had some good suggestions
to make.
   Of course – the beta testers; Tom Ellard, Nik Vukovljak, and Andy Jones.

   Last, and most definitely least, I'd like to thank Wayne Lockhart – local
goon, holder of the record for getting banned from BBS's – Whose suggestions
for me to quit programming and go mess with Dpaint (said in a less gentle
away) inspired me to finish Phenomena ;)

1.18   reg

```
   REGISTRATION
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   Phenomena is shareware. This means that you can distribute the complete
non-registered archive to anyone you want, as long as it IS the complete
archive.

   I claim all copyrights (and any other rights I may not know of) to this
program.

   In the unregistered shareware version, the program will not save iff pics of
the scenes you render, it will simply render them to the screen and continue.

   This is what I propose: :)

   In order to register the program, you send me US$20 in an agreed upon way
(see later), and I will send you back a full version of Phenomena, fully
personalised (well, it'll have your name in it somewhere) :)

   I know sending money in any way is a bastard – I'm having the same trouble
myself with another piece of s/w – but here's what I can come up with:

       a) Cash. This is illegal here in Australia, so I wouldn't
          recommend it. The reason being that if it gets eaten on
          the way here, neither of us knows what's going on...
          ie; Don't send cash, coz I'm not responsible.

       b) Transferring to my bank account directly. I don't know
          how it is in your country, but around here the thieves
          won't let you send less than AUS$100, and it costs you
          $20! (compare that to a phone call overseas, which would
          take longer...).

Anyway, the account number is:

2236-1002 5545
At the Commonwealth Bank of Australia, the Rose Bay
Branch, in Sydney. The branch number is the first
4-digit number of the account number (2236).

When you use this system, you can leave a small message
with the transfer. I don't know how small it is,
however. Leave your name and address, and tell them to
inform me that the money has been deposited. If, however,
the message space is too small (I have no idea), then
you'll have to just leave your name (MUST!) and send
me your address otherwise.

c) Bank draft. I just spoke to the bank about this. It
costs me $5 to cash this – but don't worry, I'll
take it from the $20. Realise that it'll probably cost
you to send this – here it costs $8 (AUST) – about US$6.

d) Postal money order – Seems to be a good method. Just
go to your post office and do what needs to be done :)

I think that the best method for both of us is the postal order, followed
by either the bank draft, or direct xfer – depending on how much it costs you.

Note that I can send the program to you in one of two ways: Firstly, by
normal post.

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+------------------------------------------------------+
| NOTE!: If you want me to send it to you via normal post, |
| then send $25 instead of $20. This goes towards postage  |
| and a disk.                                              |
+------------------------------------------------------+
```

Secondly, I can send you the uuencoded archive by e-mail, if you have an
internet account. This is MUCH handier, since it saves both of us alot of time
(you'll get it within a day or two, most likely). It also saves you $5.

Make sure you tell me which method you would like,
and don't forget the extra $5 for postage & disk.

Alternatively, if you have any other methods, email me (or even snail-mail if
you so dare) and we'll discuss it. My e-mailbox gets answered very often.

Internet address: s2156114@cse.unsw.edu.au
or: avi@triode.apana.org.au

<more info in "About the Author">

1.19 requ

INSTALLATION/REQUIREMENTS

  As for requirements, you must be running WB2 or higher, since
Gadtools.library is needed, ASL is needed.
 Furthermore, this program uses the time-saving IFF.library (which I'll
include with the archive if I'm allowed to).
  Lastly, you need ReqTools.library.

  Once the required libraries are in your libs: directory, just drag the icon
to wherever you want, and double click it.