Xoper

COLLABORATORS

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Contents

Chapter 1

Xoper

1.1 Xoper Documentation - Contents

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                         Xoper 2.6

                   A powerful system monitor
         Copyright © 1988/95 by Werner Günther and Gunther Nikl
                     All Rights Reserved.
```

1.2 Xoper Documentation - Introduction

```
Introduction
************
```

      Xoper is a system monitor to display various system lists, eg. it
can show all running tasks with their cpu-usage. Xoper does not only
display a list of all tasks but it can show other system lists from
Exec, Dos or Intuition as well eg. the port list, available windows

```
and screens or Dos-devices.

Xoper is FREEWARE.
```

1.3   Xoper Documentation - Requirements

```
Requirements
************
```

```
Xoper has no special requirements to run. To use Xoper an Amiga with at
least 512KB RAM and Kickstart 1.2 (V33) is sufficient. It works with any
amiga system upto Kickstart 3.1 (V40). No problems should arise with
68020, 68030, 68040 and 68060 (?) processors.
```

1.4   Xoper Documentation - Installation

```
Installation
************
```

```
Installing Xoper is fairly easy. Copy the program including its info
file to a location on your harddisk. If you want you can then add this
location to the global search path using the 'path' command, but this
is not required. Thats all :-)
```

1.5   Xoper Documentation - Usage

```
Usage
*****
```

```
Xoper can be started either from CLI/Shell or Workbench. To start Xoper
from the Workbench doubleclick on its icon. To start Xoper from the shell
simply type:

  1> Xoper

followed by a return. This should start Xoper provided that it could be
located somewhere in your search path.

Xoper can be started with several options. If you run it from the shell
with a questionmark (?) as argument you'll get the argument template:

    "CMD/K,KEEPIO/S,NOSCRIPT/S,CX_POPUP/K,CX_POPKEY/K,CX_PRIORITY/N/K"

 - CMD
     used to specify which system list Xoper shall show by default
      or
     used to remove Xoper from memory -> CMD=kill

  - KEEPIO
     This switch tells Xoper not to create a background process when
```

            called from CLI. Instead it will block its shell unless you used
            'run' to launch the program.
            By default Xoper 'detaches' itself from the CLI.

     - NOSCRIPT
            Specifying this option disables the execution of Xopers startup
            script.

     - CX_POPUP
            This switch decides whether to open Xopers window at startup or not
            by specifying ON or OFF. It replaces the '-b' switch prior to v2.4.
            The default is to open Xopers main window. Please note, this argument
            will be used even with Kickstart 1.2/1.3!

     - CX_POPKEY
            This specifies which hotkey Xoper shall use. The format of this string
            has to be a valid commodity string description. Its necessary to quote
            the description, eg.

              CX_POPKEY="lalt lshift numpad *"

            This argument affects only the *commodity* hotkey not the inputhandler
            hotkey. That one is hard-coded into Xoper and its always "Amiga-Amiga-x ←
              ".
            Because the commodity.library is only available with Kickstart 2.0 or
            higher CX_POPKEY will be ignored with older Kickstart revisions.

     - CX_PRIORITY
            This argument is used to specify the priority for Xopers commodity ←
               broker.
            It has to be between -128 and +127. Here applies the same as with ←
               CX_POPKEY:
            this switch will be ignored under Kickstart 1.2/1.3.

All those arguments can also be specified when running Xoper from Workbench ←
   by
adding tooltypes to Xopers icon. An exception is 'KEEPIO' but its useless ←
   for
the workbench start anyway. If you place Xoper in the WBStartup-drawer ←
   available
with OS2.0 or higher please add the tooltype "DONOTWAIT" or the system will ←
   wait
until Xoper ends...

At startup Xoper loads and executes a file named 'Xoper.Startup'. That file ←
   can
be placed in various locations. First Xoper tries to open the script in the
current directory, then in env: and last in s:. This startup-script is used ←
   to
set default values, the window size or the initial default list to be ←
   displayed.
Xopers window will be opened after the startup-script has been processed (if ←
    one
was found of course).
NOTE: Please make sure that the startup script is not bigger than 2400 bytes
       since Xoper only reads that amount of data! I really think this size ←
          is

```
        sufficient.

  Xoper can be controlled via 'Exchange' - the commodity master control  ←
     program.
  With Exchange its possible to force Xoper to show/hide its window or to  ←
     remove
  Xoper from memory. Removing can also be done by sending Xoper a Ctrl-C. Its  ←
     not
  possible to deactivate Xopers commodity broker. It stays always active - I  ←
     feel
  that a hotkey has always to be present.
```

1.6 Xoper Documentation - Keys

```
Keys
****

  Xoper has to be controlled over the keyboard. The only exceptions there the  ←
     mouse
  can be used are:

    - the slider gadget to scroll in the output window up or down
    - the dragbar to move Xopers window around
    - the various gadgets to control the window size, to depth arrange the  ←
       window
      or the screen.

All commands, however, have to be entered via the keyboard. This may seem to  ←
   be
a little bit ancient, but its in no way a restriction. There are not many  ←
   keys
that need to be remembered. :-)

Xopers window (or screen, but even then its the window) is devided into two
sections: an very small input line on the bottom and a large output area on
the top. If the output exceeds the size of the window you may scroll or 'page  ←
   '
through the text using the num-pad keys:

        A1000   others
           7     Home              Top of display
           1     End               Bottom
           9     Pg Up             one page up
           3     Pg Dn             one page down
           8     Up Arrow          one line up
           2     Down Arrow        one line down
           4     Left Arrow        one page left
           6     Right Arrow       one page right

For up and down scrolling you can also use the slider gadget, but this sould  ←
   be
obvious.

The input section has some line editing facilities and a history buffer
controllable with the following keys:
```

```
Cursor left              cursor one character left
Shift  left              cursor to the start of the next word
Cursor right             one character right
Shift  right             previous word
Cursor Up                previous line in history buffer
Shift  Up                top of buffer
Cursor Down              next line in history buffer
Shift  Down              bottom of buffer
DEL                      delete char under the cursor
BS                       delete char left from the cursor
Ctrl   X                 delete the entire line
Ctrl   K                 delete EOL
Ins   (numpad '0')       toggles insert mode (default is 'on')
Del   (numpad '.')       same as DEL


Tab                      Command line completion
                         Example: press <c>, hit <tab> several times.


ESC                      moves the input area from the bottom into the  ←
   output
                         section. Entering a command here (i.e overwriting  ←
                            an
                         output line), will cause Xoper to add the address  ←
                            of
                         that node to your command line.
                         Example: Show the hunks of a 'File.System' process ←
                            :
                         type 'T' to get a list of all tasks, press <esc>,  ←
                            move
                         the cursor to the line displaying the File.System
                         process and type 'Hunks <enter>'. Press <enter>  ←
                            once
                         more to return to the usual Xoper display.

   HELP                  displays the help panel (may be pressed at any  ←
      time)
```

1.7 Xoper Documentation - Commands

```
Commands
********

     Commands have to be entered in the input line at the bottom of the window.
     These are devided into several groups:

      Exec lists
      Other system lists
      Commands with parameter
      Commands without parameter
      Toggles and options
      Dangerous commands
```

1.8 Xoper Documentation - Viewing Exec lists

```
- EXEC lists
  ----------

These are always single character entries and may be specified in any  ←
    order,
upper or lower case, after the prompt or from CLI/WB as parameters. If  ←
    more
than one list has to be displayed, you may enter several commands in one
line. Separating them with blanks displays the list one by one instead of
showing them all at once.

T = Tasks (default if Xoper is started without parameters)

   Shows some essential values for tasks (this includes dos processes).  ←
       The
   display contains the address of the tasknode, task type, task state,
   task priority in decimal , CPU usage in percent, the process number (  ←
       only
   dos processes started from CLI), and task name.


F = Task Flags

   Shows also the task list but with some other information than the 'T'  ←
       command.
   Lists the task node in HEX, task state, allocated signals, signals the  ←
        task
   is waiting for, so far received signals, the address of the next  ←
       instruction to
   be executed - usually refered as the program counter (pc) -, for  ←
       amigas equiped
   with a FPU the fpu-state and task name.


U = CPU Usage

   Shows again the task list but also with other information than the 'T'  ←
        or 'F'
   command.
   Lists the task node in HEX, task state, a tasks run time and its total  ←
        amount
   of cpu time it used so far (both values since Xoper was started!), the  ←
        process
   number and task name.


C = CLI Commands

   Shows a list of all CLI commands.
   Displays the task node in HEX, task state, type, mode, cli number, cli  ←
        name
   (the process name) and command (the actual executed command).
```

```
     L = Libraries
     D = Devices
     R = Resources

       Shows a list of all currently loaded libraries, devices or resources.  ←
          They are
       explained together because all have the same basic structure.
       Displays the base address, open count, version and revison, flags and  ←
          name


     E = Resident

       Shows a list of all resident modules of the system.
       Displays the base address, priority, flags, version, type and name for ←
            every
       resident module found.


     M = Memory

       Shows all available memory types
       Displays the lower and upper bound, free bytes, memory attributes,  ←
          priority
       and hunkname for all memory regions


     P = Ports

       Shows a list of all public ports in the system.
       Displays the port address, port name, port flags, signal bit, queue  ←
          length
       (number of messages) and taskname of the owner.


     I = Interrupts

       Shows a lists of all interrupts.
       Displays the interrupts node address, pointer to interrupt data,  ←
          pointer to
       interrupt code, priority, interrupt type ([S]erver/[H]andler),  ←
          interrupt
       interrupt state ([E]nabled/[D]isabled), another type (interrupt queue  ←
          the
       interrupt belongs to) and interrupt name.


     S = Stack

       Shows information about task stacks.
       Displays the lower limit, the actual stack size, the currently used  ←
          stacksize
       and taskname. If the current stackpointer is not within the tasks  ←
          stackbounds
       this function displays "----" as used stacksize (possible candidates  ←
          for this
       are programs launched with ixemuls vfork() call)
```

```
            CAUTION: if you want to minimize your stack using this utility, please
                     note that dos-functions prior Kickstart 2.0 use 1500 bytes at
                     the bottom of the stack frame for their own purpose and note
                     that the stacksize is only checked *one* time per second by
                     this command.


     A = Semaphores

        Shows information about public semaphores.
        Displays the semaphores base address, current owner, queuecount,  ←
           nesting count
        and semaphore name.


  Example: Entering TPM would display Tasks, Ports and Memory. The display  ←
     would
            be updated after a few seconds (5 by default, may be changed with ←
               the
            'time' command)
```

1.9   Xoper Documentation - Viewing other system lists

```
  - Other system lists
    ------------------

    Windows

      Here you get a list of all existing windows. For every window will be
      displayed its address, its ownertask, its location relative to its
      screen, its size and finally the windowtitle.


    Screens

      This lists all existing screens. The information diplayed will contain
      for every screen the screen address, the screen size, its depth (how
      many bitplanes) and the screen title. If Kickstart 2.0 or higher is
      available the next line shows the screens modeid and if possible also
      the mode name. If a mode name couldn't be retrieved '???' will be
      displayed.


    PubScreens

      Only useful with Kickstart 2.0 or higher. Shows for all pubscreen nodes
      the node address, the screen name, the actual state (public or private) ←
         ,
      the use count (how many visitors), the attached signal and the  ←
         ownertask.


    WindowFonts
```

This retrieves information which font is used in which window. You will
see the window address, the ownertask of a window, the window location
on its screen and the windowtitle. The next line will show the node
address off the window font, the use count of this font, its X and Y
size, its type (rom or diskfont, fixed or proportinal), the lo and hi
character and finally the font name.

Fonts

This command display a list of all currently loaded fonts (its not a ←
    list
of all *available* fonts). The displays contains (as always) the node
address, the font use count, its X and Y dimension, its type, the lo ←
    and
hi character, the font name.

Capture

Displays the values for some entries in the ExecBase structure.

  -> Cold capture, Cool Capture, Warm Capture and KickMemPtr

These entries can be used to install recoverable programs that survive
resets. Using Cold or Cool capture is somewhat a 'dirty' method (in ←
    ancient
times often used by viri). As far as I know Warm Capture has never and
can never be used. The system conform way of installing programs that
survive a reset is the usage of KickMemPtr. The display for those ←
    entries
will contain the start and end location for an entry and its size.

TimerIO

Displays pending timer requests. It shows the address of the IORequest
structure, the unit number (MICROHZ or VBLANK), the time to complete ←
    and
the task submitting the request.
Now fixed to work with Kickstart 2.0 and higher (not totally accurate ←
    though).
Its somewhat "magic".

DiskChange

Shows all installed diskchange interrupts. It displays the node, data ←
    and
code field of the interrupt, the device it is attached to (df0:-df3:) ←
    and
the task that added the interrupt (if available). The main purpose of ←
    this
command was to check for a virus, as the diskchange interrupt is ←
    wonderful
place to install them.

To retrieve this information in a legal way a diskchange interrupt ↩
    should
be installed. Unfortunately the trackdisk.device prior Kickstart 2.0 ↩
    had
a bug that prevented installed interrupts from being removed. Therefore
this function used some internal knowledge of the trackdisk.device. ↩
    Thats
the reason why its not working with OS2.0 anymore and has been disabled ↩
    .
I was to lazy to correct this for OS2.0, sorry.

InputHandler

  Displays the node, the priority and name (if any) of all input handlers
  currently installed.
  This was the usual way of implementing hotkeys or intercepting the ↩
      input
  stream prior Kickstart 2.0. Xopers hotkey facility itself was based on
  an inputhandler. Since OS2.0 there exists a commodity.library, that
  provides functions to deal with input events and to easily add a hotkey
  to a program. Its much more flexible than the old method.

Devices

  Displays the name, heads, sectors, tracks, buffers (if appropriative),
  the state (loaded or not) and the handler-process of every dos-device
  Note: DOS-Devices are totally different to exec devices!

Files

  List the lock, access type, size and the name of all open files.
  CAUTION! This may not work for all devices, but it works for C= ↩
      Handlers
          upto 3.1 ...

Locks

  List any lock
  BUG: Trying to lock a Volume "RAM Disk" crashes the machine sometimes. ↩
      If
        a voulume "RAM Disk" is found it will be replaced by the ↩
            devicename
        "RAM:". Make sure you don't have a disk labeled "RAM Disk" or you ↩
            will
        never see its locks :-)
        (The problem affected only V33 of the operating system)
  CAUTION! Here applies the same as with 'Files'. It works for all C= ↩
      Handlers
          but others may fail (eg AmiCDROM) The problem is not a bug in ↩
              the
          handler but of an illegal assumption Xoper makes about a lock!

CurrentDir

  List current directory settings of all processes

Low-Memory Handler

  Displays the node, the priority and name (if any) of all lowmemory ←
    handlers
  currently installed.
  Only available with v39 or up.

Frags

  Counts free memory hunks by size. Displays the size in hex and decimal,
  number of hunks and the largest available hunk.

1.10 Xoper Documentation - Commands with parameter

  - Commands with parameter

  These commands may be entered in upper or lower case. Parameters enclosed
  in '<>' must be, enclosed '[]' may be specified. Names are usally entred
  as ascii strings, it can however happen that two or more nodes of the ←
    same
  name exit. On task you may specify the dos-processnumber to sort them out ←
    .
  If everything fails, you can enter the node-address with a leading '$'. ←
    This
  address will be checked first before the command is being executed. If ←
    the
  check fails you'll get an error message or a warning aor a prompt, ←
    depending
  omn what went wrong. Names are always the last parameter to enter. This ←
    may
  seem strange, but this is the simplest way to get rid of embedded blanks.

  Time <seconds>

    Set time between updates. Minimum is 0.1 seconds, maximum 255.9, ←
      default
    is 5 seconds. "Time 0" stops any autoamtic update and waits for a ←
      keypress.
    Values < 0.5 are nor recommended.

      Example: Time 1.5

  Mypri <priority>

    Shortcut for "Taskpri Xoper <priority>"

Example: mypri 2

Taskpri <priority> [processnumber] <taskname>

  Change the priority of a task. Values may range from -128 to 127, ←
     better
  use values between -5 and 5

    Example: Taskpri 1 Shell Process

Break [processnumber] <taskname>

  Set break signals. Useful for tasks running in background or from ←
     Workbench.

    Example: Break 3 TolleUhr

Freeze [processnumber] <taskname>

  Halt a Task. The task should be READY or WAITING. Frozen tasks are ←
     queued
  in a new list called FROZEN (this is a private list of Xoper itself!). ←
     When
  you leave Xoper, halted Task will be released automatically.

    Example: Freeze Killer Graphics Task

Warm [processnum] <taskname>

  Restart a halted Task. Task must be FROZEN.

    Example: Warm Killer Graphics Task

SnoopMem [processnumber] <taskname>

  Track memory allocation/deallocation of a task. Press break (CTRL-C) to
  stop. List includes: action (alloc/free), memory requirements (CHIP/ ←
     FAST/
  PUBLIC/ etc.), memory size, memory location (start, end) and the ←
     address
  from where AllocMem() was called.

TraceOpen/TraceLock

  Monitors dos calls to Open() and Lock(). Press break to stop.

Zerotimer [processnumber] <taskname>

  Reset the used time counter on the cpu usage display. This is useful if

benchmarking a cli command.

Hide <taskname>

  The task-list tends to be longer than the window size. You may inhibit ←
      the
  output of some tasks you are not interested in using this command.

   Example: Hide trackdisk.device

Pri <priority> <nodename>

  Change the priority of any other node. If the specified node has been ←
      found,
  the entire list the node belongs to will be resorted.
  This command does not work for tasks.

     Example: Pri 50 chip memory   (try to allocate memory in CHIP first)

Info <librarynode | devicenode>

  Show additional information stored in the lib_IdString field. This can ←
      be
  useful for libraries, devices or resources.
  NOTE: Some programs dont follow the rules! That can cause an Enforcer ←
      hit.

     Example: Info arp.library

RemResident <resident module name>

  Kicks a resident module out of the ResModules-List. It does not free ←
      the
  module itself, but only makes sure it won't be reactivated during the ←
      next
  reset. Removing a ROM-based module does not have any effect.

Clear [longword]

  Fill unused memory chunks with pattern, default is 0. Handy for ←
      debuggers.

     Example: Clear $66726565

Hunks [processnumber] <processname>

  Show location, BCPL-Pointers and length of memory blocks the process ←
      uses.
  Note: If the process has only only one hunk with length zero the ←
      process has
      usally been created by the dos-function 'CreateNewProc()'

```
      Example: Hunks RAM


  Openlib <libraryname>

    Open a library. This is useful if you don't want a specified library  ←
        being
    'flushed' out.

      Example: Openlib arp.library


  Myfont [size] <fontname> | default

    This command changes the font for Xopers window. Since version 2.4  ←
        Xoper
    is no longer restricted to topaz/8. Every fixed width font any size can ←
         be
    used. For fontname the suffix '.font' can be omitted. This will be  ←
        added
    automatically. This command can also be used to reenable the system  ←
        default
    font for Xopers window by specifying "default" as fontname.

      Examples: myfont 8 macintosh
                     or
                 myfont default


  SetFont [size] <fontname> <window>

    Change the default font of a window. To avoid confusion, you should use ←
         a
    font with the same font size as the original font, as many programs  ←
        rely
    on the point size.

      Example: Windows
               Press <esc>, move the cursor to the Xoper window line and  ←
                  type
               Setfont diamond.font
               (now you know what I mean by 'relying on a font size' :-))


  Lockdrive <drivename:>

    Prevent DOS, Workbench and Disk-Validator from cluttering on the drive.
    This command isn't very useful, but I needed it myself. Please note  ←
        that
    the drivename is case sensitive and has to end with a ':'.


  Freedrive <drivename:>

    Re-enable a drive.
```

Window <leftedge> [toptedge [width [height]]]

  Works only in script files. Defines the window to be opened.

    Example: Window 0 0 550 190

IconPos <leftedge> [toptedge [width [height]]]

  Defines the initial position of Xoper's icon. Used in the startup ←
      script.
  Only useful prior Kickstart 2.0.

OutputLines <number of lines>

  Set the maximum number of lines the output buffer may hold. If the ←
      buffer
  overflows, a line from the top of the buffer will be deleted for each ←
      new
  line.
  The default value is 500, using a maximum of 500 * 104 = 52000 bytes.

HistoryLines <number of lines>

  Set the maximum number of input lines the history buffer should hold.
  Default is 10 lines.

MinimumChars <number of characters>

  Set the minimum number of characters an inputline should have to be ←
      added
  to the history buffer.
  Default is 2 characters.

SaveOutput <filename>

  Write the contents of the output buffer to a file. If the file already
  exists, the output will be appended.

PopKey <description>

  Change the hotkey description for our commodity. With the hotkey you ←
      can
  popup Xoper if it is in sleep mode or simply pop it's window (including
  screen) to front. See for instance 'Toolmanger.doc' for a complete key
  description (sorry!) The actual hotkey is always displayed in the ←
      window
  title.
  The default hotkey is 'lcommand - rcommand - X' (means press left amiga ←
      ,
  right amiga and x at the same time).

```
Repeat <Command string>

  Repeats the command string at the current refresh rate (see 'Time').
  However, commands not producing any output won't be repeated, but only
  executed once. Press <enter> to stop.

     Example: Time 1
              Repeat TimerIO


SetFKey <key number> <string>

  Assign a string to a funktion key. 'Key number' is a value between  ←
     1-20,
  10-20 denotes shifted keys. Use '^' to simulate a <return> and '_' for
  space (the parser strips leading/trailing blanks).

     Example: SetFKey 1 Hunks^
              enter t <return>, press <escape>, move the cursor to a  ←
                 process,
              press F1


Alias <AliasName> <CommandName>

  Defines a new name to be used along with the original command name. The ←
     new
  name should not contain any blanks. To delete an existing alias use the
  <AliasName> without a commandname.

     Example: Alias ih InputHandler
```

1.11   Xoper Documentation - Commands without parameter

```
- Commands without parameter
  --------------------------


  Alert

    Show last Guru Xoper caught.


  Lastalert

    Show last Guru Meditation code or rubbish. (information obtained by
    exec). Doesn't work when Enforcer is running, as it needs to peek  ←
       memory
    location $100.


ClrCool,ClrCold,ClrWarm
```

Clear one of those pointers.

TrapGuru

  Activates a trap handler similar to GOMF. It only works with a 68000
  processor, as it relys on a specified stack frame (at least I think so,
  couldn't check it out). If an exception occurs (i.e. GURU) Xoper will
  stop (or popup, if running in background) and display some information
  about what happened (the taskname causing the error, its program ←
     counter,
  the alert number etc.) and you'll be asked if you want to (K)ill the ←
     task
  or (I)gnore the exception. Choosing (i)gnore will do nothing at all if ←
     the
  erroneous program was a process (as it will stop itself displaying a
  'Task held...' requester), but force a task to execute a 'Wait(0L)' (i. ←
     e.
  wait forever) as tasks do directly display an alert box.

Flush

  Clean up memory, flush unused libraries, devices and fonts.

ShowHistory

  Show the history buffer. (quite useless, I know)

KillHistory

  Delete all lines from the history buffer. (still useless)

ColdReboot

  destroys first execbase to force a "coldreboot" and then executes a ←
     normal
  reboot

Reboot

  Reboot the machine by either the "official reset code" or by Execs ←
     ColdReboot()

[Q]uit or Hold

  Exit Xoper but stay in background. When Xoper pops up window settings ←
     and the
  selected display are restored.
  NOTE: When Xopers window is closed with the WINDOWCLOSE-Gadget, Xoper ←
     doesn't

```
                          exit - it goes to sleep. This behavior is *needed* for a  ←
                              commodity,
                          because it has to *hide* its window only.
```

```
        Exit
```

```
          Clean up and quit.
```

1.12   Xoper Documentation - Toggles and Options

```
        - Toggles and Options
          -------------------
```

```
          All options can be entered with either on or off. If a option is entered
          alone it acts as toggle.
          (Exeptions are usescreen/usewindow, those are the toggles itself)
```

```
        Sort
```

```
          The tasks listing is sorted to avoid 'jumping' of the display. Sort  ←
              toggles
          this feature on/off. (Stupid command, but was easy to implement).
```

```
        CLICmd
```

```
          Toggles between showing the loaded command and the taskname of CLI  ←
              processes
          in the tasks listing.
```

```
        TaskInfo
```

```
          Toggles additional process information (unitnumber, stdio, devicename)  ←
              on
          and off.
```

```
        Taskports
```

```
          Disable / enable a listing of taskports if ports are displayed.
```

```
        Hidden
```

```
          Turn those hidden Tasks back on. It is actually a toggle.
```

```
        Usage
```

```
          Toggle CPUSE field on the task display between usage relative to all
          possible dispatches and usage relative to actually dispatched tasks.
          Ahem...not very clear I think. Well, let me try again...
```

If you add all CPUSE fields together you get 100 % (more or less 1%). ←
    After
entering "Usage" adding the fields together will give you the same ←
    value as
shown in the 'CPU Activity field'. (I HATE having to write docs)

Header

  Toggle the (rather long) header on the task display on/off.

UseScreen

  Opens Xopers window on a screen. The new screen will take its data (←
    width,
  colors, viewmodes, etc.) from the Workbench screen prior to Kickstart ←
    2.0
  and will use tags with kick 2.0. Xoper opens a borderless backdrop ←
    window on
  the new screen. With V37+ of the oerating system the screen will be a ←
    public
  screen, so other programs may open their windows there. Actually, thats ←
     a bad
  idea because Xoper uses only a two colour screen, so other programs ←
    window
  may look a bit strange ...

UseWindow

  Opens Xoper on a window. The window will appear on the default public ←
    screen
  (usually the Workbech screen, but this can be changed eg. with " ←
    ScreenManager"
   by Bernhard Möllemann)

UseTopaz

  Sets Xopers window font to topaz/8 or to the with 'myfont' selected one ←
    .
  This command has been implemented to quickly flip to topaz/8 because ←
    its
  fast for the window display.

PropGad

  Turns the scrollbar on or off (as you like) The scrollbar with is ←
    always
  adapted to the right border size.

Iconify

```
         Turns the iconify on or off. A small window or appicon will appear if  ←
             iconify
         is on. The iconify window is always the fallback if the installation of ←
              the
         appicon fails. The reason for this is in most cases that the workbench  ←
             has
         not been started yet (sigh!)



      BackDropIcon

         Puts the Xoper icon behind all other windows, instead of creating it on ←
             top
         of them.



      SmartPatch

         Xoper has to patch some system functions. If Xoper is forced to quit it
         checks that no other program patched the same functions. In this case  ←
             we
         have to wait until the other program(s) end for safe restoring the  ←
             patched
         library vectors. But if you use 'SaferPatches' or 'SetMan' you can quit ←
             ,
         though the vectors are patched again, because those programs keep track ←
              of
         the right order functions have been changed. This works only if library
         vectors are changed via Execs SetFunction(). DO NOT alter library  ←
             vector
         by yourself !!!.
         Xoper knows 'SetMan' internally and switches SmartPatch off regardless
         what is entered.



      CxHandler

         Prior Kickstart 2.0 the hotkey facility was realized with a lowlevel
         inputhandler. Since Kickstart 2.0 there exist a much more flexible way
         to cope with hotkeys. The commodities.library provides an easy method
         to implement a hotkey facility where the hotkey itself can easily be
         changed. Changing the key combination for the inputhandler is rather
         difficult (its hard-coded ;-(). But the inputhandler has one advantage:
         it gets all input events *before* the handler of the commodities. ←
             library
         in the input stream.
         This command enables you to switch between the lowlevel inputhandler  ←
             and
         the commodity hotkey.
         With Kickstart 2.0 and above the commodity hotkey facility is on by
         default. The command has no effect with Kickstarts prior 2.0!
```

1.13 Xoper Documentation - Dangerous Commands

- Dangerous commands (for experienced users only!)

!!!!! WARNING: The next few commands are dangerous and 'dirty' !!!!!
!!!!!!!!!!!! don't use them if not strictly necessary !!!!!!!!!!!!!!

Kill [processnumber] <taskname> (cancel is a synonym or vice versa ...)

  Kill a task or a process. If the task has been called from CLI, the ←
     Task
  itself and the CLI will be killed. Hunks, Windows, Screens and the
  teminal-window will be freed. Simple tasks are just RemTask()'ed. If it ←
      is
  not a CLI Task you'll be asked if it is a Workbench task, if the answer ←
      is
  'Yes' unloading will be done by the Workbench. If not, you will be ←
     prompted
  if Xoper should unload the code. Enter 'No' if you don't know how the ←
     task
  has been started. A good example for tasks that should NEVER be ←
     unloaded
  are programs started by ARP'S ASyncRun (or ARun).
  Unloading of workbench tasks is no longer possible because the ←
     Workbench
  port is since OS2.0 no longer a public port!

Closelib <libraryname>

  This is exactly the same as CloseLibrary().

Closewindow <title>

  Closes a Window. Please, use it only if the corresponding Task has been
  'Cancel'ed. Use the Window-Structure address if the window has no name.

Closescreen <title>

  same as above, but for screens. If a screen will be closed first all
  its windows will be removed.

Unlock <lock>

  Unlock a file. *** VERY DIRTY *** (not the way how the lock will be ←
     removed
                                      but the way Xoper gets the lock)

CD [processnumber] <processname>

  Change the current directory of a process. You are prompted if the old
  directory lock should be unlocked.

```
RemNode <node address>

  remove a node from a list.


RemPort <port address>

  remove a port from exec's port list.


RemIntServer <interrupt address>

  Remove a interrupt server.


Signal <mask> [processnumber] <taskname>

  Set any task-signal. Mask is a hexadecimal value with or w/o leading '$ ←
    '.
  See task's SIGWAIT field for sensible values. Tasks normally do not  ←
    wait
  for signals only, but for messages, that's why this command may not  ←
    have
  the desired effect, but it is quite useful for tasks hanging around and
  waiting for events that may never happen. Warning: Using Signal without
  any knowledge about what you are going to signal may cause a system- ←
    crash!

    Example: Signal 10000000 PopCLI III
```

1.14   Xoper Documentation - Bugs and Limitations

```
Bugs and Limitations
********************

        There are no severe bugs known at the moment, however Xoper has some  ←
           limitations and
        problems.

        Enforcer hits may happen due to accesses to the low memory area ($100.W,  ←
           $180.W) but
        these are not dangerous (read accesses). Other Enforcer hits may be  ←
           caused by examing
        system structures that are not initialized properly (eg. the "keymap. ←
           resource" with
        OS3.x for lib_IdString, but may be it can be nethertheless Xopers fault: ←
           if resources
        are no "real" libraries).

        it has been reported that with Kickstart 3.1 (v40) the system freezes  ←
           when attempting
        to mount PC0: if Xoper is already running :( I tried to reproduce that  ←
           behavior on my
        system, but it didn't happen. My program versions which worked:
```

```
                  - mount 40.3 (27.5.93)
                  - mfm.device 40.9 (21.5.93)
                  - CrossDOSFileSystem 40.19 (9.6.93)
        Please note, that I fixed bugs with mfm.device (trashed d3 with  ←
           OpenDevice()) and
        mount (didn't recognize tooltypes), but that shouldn't be the solution.

        Many internal buffers have a fixed length:
           - input buffer can only hold a maximum of 120 characters
           - task buffer can only handle a maximum of 125 task (should be enough  ←
              anyway)

        The trapguru function works only for 68000 processors. It may sometimes  ←
           work also
        for higher cpus, but better don't rely on this. Every 680x0 processor has ←
            a special
        stackframe format for exceptions and I do not know much about this.

        Killing a task is a very dirty and dangerous thing on the amiga. So using ←
            this
        command may led to a system crash, so beware! Also, prior Kickstart 2.0  ←
           the
        workbench replyport was a public port. This is no longer true for OS3.x  ←
           or even
        OS2.0! That makes it impossible to simulate a workbench exit :-(

        The diskchange command works only with Kickstart 1.2/1.3. Please refer to ←
            the
        description of that command for the reasons.


        And now the very dirty part:

        All dos related functions make a special assumptions about one value in a ←
            filelock
        structure (nethertheless it works upto 3.1 ;-(). Those functions are  ←
           likely to produce
        strange results, eg. if AmiCDROM is used as handler for a cdrom-drive ( ←
           only with an
        inserted medium)
        I left the functions in the program because they were often useful though ←
             (eg. PasTeX
        MUI-Specialhost did not unlock newly created directories)
```

1.15 Xoper Documentation - Technical Info

```
Technical Info
**************

        Xoper was written entirely in assembler, but that is not a quality sign.  ←
           In fact, if you
        look at the source, you will notice, that it doesn't follow the rules.  ←
           Parameters are
        not passed in the regular registers and results don't come in "d0".  ←
           Common non-scratch
```

register are not saved in subroutines or sometimes a subroutine will be ↩
    entered on a
different location than the main entry. All these facts make it very hard ↩
    to change
Xoper due to unpredictable side effects. The source is not commented very ↩
    well either.

First A68k v2.71 was used to assemble Xoper, later then SNMA (you need at ↩
    least v1.95).
Other assemblers may have problems with the source code (eg. PhxAss does ↩
    not like "."
in labels and has problems with some expressions).

Xoper uses a combined data/bbs segment. This avoids lots of relocations ↩
    because even
bss entries can be accessed over the base register. Many c-compilers use ↩
    this to keep
its programs short (GCC,SAS/C,DICE,Aztec). To create such a "short" ↩
    executable you
need a linker that suppresses all zeros at the end of a hunk. I recommend ↩
    PhxLnk
because its free and fast. You need at least V4 of that linker!

Xoper v2.4 and up were developed on an A4000/030 with Kickstart 3.0. It ↩
    has also
been tested with a softkicked 1.2 (V33).

Xoper is a system monitor and offers some information about the cpu usage ↩
    of tasks.
To get those information Xoper patches two functions in the Exec library: ↩
    Switch()
and AddTask(). The latter is well documented and in no way a secret. ↩
    However, the
Switch() entry in the Exec library seems to be "secret". This functions ↩
    has never
been documented but until v37 of the os the exec fd-file contained the ↩
    name of this
function. The only things Xoper "knows" about Switch() is its name, ↩
    offset within
the Exec library and purpose. Whether this function has arguments or not ↩
    does in no
way affect Xopers work. All that Xopers is doing in its patch function, ↩
    is to add
the current task (SysBase->ThisTask) to an internal buffer and to update ↩
    an internal
timer value for that task. After that the original function will be ↩
    executed with
the original registers settings. There is no magic how Xoper gets the cpu ↩
    usage for
each task! (at least almost ;-)

1.16 Xoper Documentation - History

History
****

```
--------------------------------
versions developed by Gunther Nikl
--------------------------------
```

2.6 - failed to start from shell if pr_CurrentDir was the ZERO lock :(
     - unnecessary setupscreen() for received pubsig removed
     - better error handling in gettooltypes() - no more enforcer hits
       if no icon.library available (was it ever possible for a wb start?)
     - uses Input() for reading instead of Output()
     - does recognize the mc68060 now + better fpu check for >= 68040
     - reads startup-script with a single Read() (no more one byte reads
       causing long startup time if the system is very busy)
     - cursor should be visible now on graphic-cards (tested on a Retina Z3)
     - displaying dos-devices could cause enforcer hits (dol_Startup)
     - removed a silly BCPL check for locks (can it ever be an APTR !?)
     - safety check when scanning for locks, not waterproof but better
       than nothing
     - does now copy the commandline before modifying it (guru book)
     - startup code partially rewritten
     - new detach technique (only CLI, no 'seglist' splitting but will
       use segment list from cli_Module -> hi Manx ;-)
     - new commandline option 'keepio' preventing detaching from CLI
     - does now make sanity checks during initialization...
     - corrected CreateTask() for V37+ of the OS (return code of AddTask()
       is valid now)
     - does free all resources now (including signals - wasn't a problem
       before since Xoper always created an own process and signals are
       local for a task, so...)
     - fixed a bug in the FPU code (could show wrong PC sometimes)
     - better seglist search when displaying hunks
     - found another bug in dos-devices: 'dol_Task' can be a normal
       message port (FIFO: device, don't know if that's legal)

2.5 - cpuse dropped down to 0.0% for all tasks because of incorrect overflow
       handling in the switch function (Vogt, Bill Best)
     - window and iconpos examined only the first argument caused by not
       handling trailing blanks (Thomas Schwartz)
     - didn't recognize all floppy drives when one was missing eg DF0: -> DF2:
     - Enforcer hit in iconify() caused by using a null pointer instead of
       a pointer to a string with len zero - I should buy includes&autodocs
       (Jörg-Cyril Höhle)
     - crash due to killing Xoper twice or killing Xoper when it was waiting
       to restore the patched library vectors
     - exec list of libraries, devices and resources now show the correct
       values for opencount, version && revision (word instead lower byte)
       (Gary Duncan)
     - zip gadget behavior for kick2.0+ corrected, switches now between two
       different sizes (Jörg-Cyril Höhle)
     - checks first if a resource to be freed/deallocated is owned by Xoper
       eg. for windows, screens, ports and interrupt-servers.
       a problem is still how to validate a remnode() ?
     - system crash when 'cxhandler' was specified in the startup-script due to
       trying to set the windowtitle for the noexisting! window (Stefan Becker)
     - new command 'myfont' to change Xopers window font
     - font handling improved. checks that the font returned by OpenFont() has
       the requested size, otherwise a OpenDiskFont() is performed. When a

```
               diskfont couldn't be opened the result of OpenFont() will be used
        - setprop now scans message list correctly, looked one to far - oops
          (Jörg Cyril Höhle)
        - no more (partial) overwriting of the delimiter line if window size was
          unsuitable (really fixed?)
        - when not running on an own custom screen adapts progadget size to the
          window border size (suggested by Jörg-Cyril Höhle)
        - largest value that can be converted to decimal is now 10^9-1, should be
          enough for virtual memory :-) (Jörg-Cyril Höhle)
        - timerio finally works with kick2.0+, converts _eclockval_ to _timeval_!
          (Jörg-Cyril Höhle)
        - division function uses a 68020 instruction (if appropriate)
        - startup-code revised (better lock handling)
        - 'stack' command rewritten (according to the book),
        - stack now displays "----" if current stackpointer is not within the
          tasks stack bounds (suggested by Jörg-Cyril Höhle)
        - crash if 'exit' was specified in the startup-script (tried to remove
          the noninstalled! inputhandler)
        - new commandline option 'noscript'
        - EOL is now con:-default ctrl-k (suggested by Jörg-Cyril Höhle)
        - fatal taskend if GUI-hiding was requested with pubscreen still used
        - new command 'lowmemhandler'
        - if iconify was off a hide-message erroneously caused a 'wakeup'

  2.4   - major code cleanup and lots of bugs removed
        - non-proportinal fonts different than 8x8 pixels are now handled
          correctly
        - new command 'usetopaz' to force Xoper to use the "default" topaz/8
        - takes care of the screens barheight and window borders width
        - commandline completion now works at every! position of the inputline
          and cycles instantly
        - when running under Kickstart 2.0+ Xoper clones the default public
          screen (size, modeid,...)
        - Xopers own screen is a pulic screen called 'Xoper' (2.0+)
        - uses commodity and appicon feature of Kickstart 2.0+
        - searches startupscript at various locations (currentdir, env:, s:)
        - older commands (cancel, alert, remnode, remintserver) displayed in
          the help page
        - input-handler (checking for Amiga-Amiga-X) now installed permantly
        - new command 'pubscreens'
        - screen display shows modeid (only when running under 2.0 or higher)
        - removed all selfmodifying code
        - system conform and safe patching of library vectors
        - IconifyOff and PropGadOff replaced with the options 'Iconify' and
          'PropGad' that turn the corresponding feature on or off
        - startup code completely rewritten

  -----------------------------------
  versions developed by Werner Günther
  -----------------------------------


  2.3   - general fixes for WB2.0x, FPU and 680x0 processors
        - 'task usage' section completely redesigned, including a new
          display showing the total amount of cpu-time by task
        - added new fields to the task,fonts, screen and cli dsiplay
        - added a scrollbar (why not use the keyboard :)
        - open files and filelocks can now be logged
```

```
          - added a 'frags' like display
          - 'saveoutput' appends its output to a file if it exists
          - toggling commands may be followed by 'on' or 'off' for
            clearer startup-scripts
          - 68881 code was done by Lothar English


   2.2   - 'KillXoper' integrated into Xoper's main program
          - loaded CLI commands are now always displayed, not only in the
            tasklist


   2.1   - KS1.3 dependancy removed
          - fixed a crash with 'usescreen' in startup script if Xoper was
            started with the '-b' flag
          - s (stack) command wasn't robust enough
          - removed some strangness in the 'kill' routine
          - iconizing routine couldn't distinguish between multiple drags and
            doubleclicks
          - 'time' now accepts values < 1
          - 'windows' shows owner task (if available)
          - task display shows name of the loaded command (enclosed in[])
            instead of the name, if the task is a CLI.
            'clicmd' toggles this feature on/off
          - commandline completion using <tab>
          - added a new command (setfkey)
          - a new program 'KillXoper' has been added to remove Xoper from
            memory in case it loops or freezes (I hope it won't be needed)


   2.0   - user interface (what user interface ?) rewritten from scratch
          - added a small iconify routine
          - added again a few new commands to customize the whole thing a
            little bit
            (minimumchars, historylines, showhistory, killhistory, outputlines,
             iconifyoff, backdropicon, usescreen, usewindow)
          - other new commands
            (timerio, remresident, repeat, trapguru, setfont, diskchange,
             alias, saveoutput)
          - addresses now shown as 32-bit values for 68020 compatibility
          - 'more' command was obsolete and has been removed
          - 'interrupt list' has two new fields
          - 'time' w/o parameters shows current setting
          - 'display commands' separated by blanks will display the list one
            by one, instead of displaying them all at once



   1.3b  - added 'C' information on CLI-tasks
          - 'time 0' stops any update
          - system requesters are now handeled correctly (affects 'kill'
            and 'closewindow')


   1.3   - added new commands (stack, sort, hide, hidden, header, window,
            inputhandler)
          - added support for a startup-script
          - added I/O interrupts/second
          - added 'kill' as an alias for 'cancel'

          - fixed bug in the port-display that caused a GURU if more than
            32 ports did exist
```

```
        - the cli Xoper has been started did act like having a priority
          of 127
        - unlock didn't unlock sometimes
        - interrupt/priority field did contain rubbish
        - currentdir didn't examine all processes
        - some more bugs (hopefully) removed

  1.2   - added new commands (snoop, capture, clrcold, clrcool, clrwarm)
        - added cpu usage by task
        - cancel command rewritten
        - some minor bugs removed
```

1.17 Xoper Documentation - Acknowledgments

```
Acknowledgments
***************
```

```
        Thanks to all who submitted bugreports ;-( or suggestions that kept me  ←
          working
        on Xoper. Without their help there would be no new version.


          Werner Günther - for writing the original program :-)

          Jörg-Cyril Höhle - for bugreports, useful suggestions and demanding ' ←
            fixes' :-)

          Stefan Becker - for bugreports and his excellent 'ToolManager'

          Ralph Babel - for his great "Amiga Guru Book"

          Samu Nuojua - for creating SNMA (a very good assembler)

          Vogt (france), Thomas Schwarz, Bill Best, Oliver Jeannet,
          Gary Duncan - for bugreports

          Suzanne Ciani - for her 'Private Music'
```

1.18 Xoper Documentation - Disclaimer

```
Disclaimer
**********
```

```
Standard disclaimer:

THERE IS NO WARRANTY FOR THIS PROGRAM TO THE EXTENT PERMITTED BY APPLICABLE
LAW.  EXCEPT WHERE OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDER AND/OR
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OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF
SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH
DAMAGES.

1.19 Xoper Documentation - Copyright

Copyright
****

        Xoper may be freely distributed for non-commercial purposes, as long as ←
           all the
        files in the original archive are present and have not been modified in ←
           any way.

        It is illegal to distribute this program on disks which cost more than US ←
           $5 per
        floppy disk, or more than US $20 per CD.

1.20 Xoper Documentation - Author

Author
******

        Since v2.4 Xoper is maintained and enhanced by Gunther Nikl. If you find ←
           any bugs,
        have some suggestions to enhance or improve the program, please contact ←
           me:

            email: gnikl@informatik.uni-rostock.de   (prefered)

                      or

            smail: Gunther Nikl
                   Ziegendorfer Chaussee 96
                   Parchim
                   19370
                   GERMANY

        The original program was written and developed upto v2.3 by Werner Günther ←
            .

                email: x41@sun0.urz.uni-heidelberg.de

Thanks to him that he made the program (some people disagree - I know :)

PLEASE NOTE: He is no longer involved in the further development of Xoper,
             so please don't contact him - it would be the wrong address!

1.21   Xoper Documentation - Task Types

A so called "task" can be either a simple exec-task or dos-process. A ←
   process is
a extension of an exec task. Only processes are allowed - with some ←
   exceptions -
to call functions in the dos.library.
To create an exec-task one can use the Exec function AddTask() or the ←
   Exec support
function CreateTask() (that also uses AddTask()). All programs started ←
   from CLI or
Workbench are processes. One can create processes manually with the DOS ←
   functions
CreateProc() or with the 2.0 version CreateNewProc(). These functions ←
   cannot be
used from simple tasks!

For more information about this topic please consult The Amiga Guru Book.

1.22   Xoper Documentation - Task States

The task state indicates what a task is currently doing. The state can be ←
    :

     INVALID   - ???
     ADDED   - a newly created task
     RUNNING   - a task that has the processor (only one possible!)
     READY   - a task that lost the processor and requests it ←
         again
     WAITING   - a task waiting for an event (better: for signal(s))
     EXCEPTION   - a task exception (not processor exception!) has ←
         happened
     REMOVED   - a task that has ended

     FROZEN   - a task has been frozen by Xoper meaning it has been ←
          removed

                      either from the ready or waiting queue
                      (this in no way a system state!)

Usually you will only see tasks that are in a running (always Xoper!), a ←
   ready
or a waiting state. If a task is permanent in a ready state, this ←
   indicates that
the task is either heavily working or it makes "busy waiting" (very bad ←
   programming
habit). To lower the system load you can decrease the taskpriority of ←
   this task with

```
the 'taskpri' command. That doesn't hurt the task until no other task  ←
   requests the
processor.
To see ADDED or REMOVED is rather unlikely as well as EXCEPTION. Using  ←
   task
exceptions should be avoided due to some severe bugs within exec for  ←
   handling
those exceptions.
```

1.23 Xoper Documentation - Task Names

```
The taskname will be the name of the loaded command if the task is a CLI  ←
   command.
The loaded command name is then enclosed in [].
Additional information displayed can be:

  - stdin and stdout enclosed in ()
  - devicename enclosed in {} if the process is a handler
  - unit number if the process is a device
```

1.24 Xoper Documentation - CLI Infos

```
The type field indicates whether the cli is an interactive or a batch one  ←
   (script
files).
The mode for a CLI can be either foreground or background, meaning if the  ←
   program
was started by Run or Execute().

For more information about this topic please consult The Amiga Guru Book.
```

1.25 Xoper Documentation - Base Address

```
This value will be usually the result of a call to OpenLibrary() or  ←
   OpenResource(),
but this may be wrong for multiple base libraries (means for libraries  ←
   that provide
every user a fresh data area. Those libraries cannot be SetFunction()ed!)
To get the base address of a device you have to open that device properly ←
    by
a call to OpenDevice() and extract the device pointer from the io_Device  ←
   entry
in the IORequest.
This is a hexadecimal value.
```

1.26 Xoper Documentation - Open Count

```
The open count shows how many users a resource has. This value indicates  ←
    if the
resource can removed in a low-memory situation. A non-zero open count  ←
    means that
a resource is still in use.
Its displayed as decimal.
```

1.27 Xoper Documentation - Version and Revision

```
The version of system libraries is usually a hint which version of the  ←
    operating
system is installed, eg. v33 indicates OS1.2, v37 OS2.04, etc. The  ←
    revision field
shows how often the resource has been changed during the development  ←
    cycle.
Programs that require a certain version of the operating system simply  ←
    submit the
at least needed library version to a call of OpenLibrary().
Both values re displayed as decimal.
```

1.28 Xoper Documentation - Flags

```
The flags indicate the current state of a resource or what shall happen  ←
    if a
certain state will arise, eg. an alert if the library checksum doesn't  ←
    match
the one stored in the library base.
The value will be display as binary.
```

1.29 Xoper Documentation - Name

```
This field will be used if a certain library has to be opened. The name  ←
    is
case-sesitiv, so "Name" is not "name". It is also important that for  ←
    transient
resources its diskname matches excatly the internal name otherwise the  ←
    system
refuses loading those resources.
```

1.30 Xoper Documentation - The Amiga Guru Book

```
##### #   # #####
  #   #   # # #
  #   ##### ####
  #   #   # # #
  #   #   # #####
```

```
          ###  #    # ###  ####  ###
          #    # ## ## #  #      #   #
          ##### # #  # #  #  ## #####
          #    # #    # #  #  # # #   #
          #    # #    # ###  #### #   #

     #### #   # ####  #   #  ####   ###   ###  #    #
     #     # #  # #  # #   #  #  #  #   # #   # #    #
     #  ## #   #  # #### #   #  ####  #   # #   # # ###
     #   # #   # # # # #  #  #   #  # #   # # # # #  #
      ####  ###  #   # ###    ####   ###   ###  #    #
```

The Amiga Guru Book – a reference manual – by Ralph Babel