LogicSimulator.doc

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REVISION HISTORY

NUMBER	DATE	DESCRIPTION	NAME

Contents

Chapter 1

LogicSimulator.doc

1.1   main

```
                              Logic Simulator

                  A program to simulate logic circuits

                            Version 1.1

                  Copyright (c) 1995/96 by Andreas Tetzl




          Introduction
             What is it ?

          Distribution
             Legal stuff

          System requirements
             What do you need

          Installation
             How to install it on Harddisk


          Gates
             The supported Gates

          Menus
             The Menus

          Gadgets
             The Buttons
```

```
                  The Scope

                 ToDo
                    The future

                 Hints
                    Please read this !

                 The Author
                    How to contact the author

                 Keyboard equivalents
                    Shortcuts

                 Credits
                    Acknowledgements
```

1.2   introduction

```
                 LogicSim is a program to simulate digital logic circuits.
It has a full graphic user interface to design and edit
the circuits.



Features:

    *
                 Scope
                  with unlimited number of channels
    * grid
  - unlimited number of gates
  - user definable
                 work space
                     -
                 AND
                 ,
                 OR
                 ,
                 NAND
                 ,
                 NOR
                  and
                 XOR
                  gates with 2, 3 or 5 inputs
  -
                 RS
                 ,
                 JK
                 ,
                 JKMS
                 ,
                 T
                  and
```

                       D
                        flip flops
–
                       JKMS
                        and
                       T
                        FlipFlops with independent Set and Reset inputs
– user definable Timer:
                       Clock
                       ,
                       Monoflop
                       ,
                       turn on delay
                        and

                       turn off delay
                           – saving the circuit as
                       iff
                        or
                       print
                        it
–
                       input inverter
                            –
                       traffic light model
                              –
                       7 segment display
                        in HEX or decimal
–
                       highlighting
                        of wires with HIGH while simulating
– replacing "compatible" gates without removing them first
– you can
                       label
                        your gates with selectable position and font
– all windows are font sensitive and resizable
–
                       UNDO
                        function
– AmigaGuide online help with diagrams
– it's localized (currently English, German, Swedish and Spanish)
–
                       copy
                       /
                       cut
                       /
                       insert
                        function

   * New for version 1.1

1.3   distribution

LogicSimulator is written and copyright (c) 1995/1996 by
Andreas Tetzl.

The Swedish catalog is copyright 1996 by
Stefan Blixth <develin@kd.qd.se>.

The Spanish catalog is copyright 1996 by
Juan Antonio Rodriguez Artamendi <Juan-Antonio.Rodriguez@cs.us.es>.

This program is mail-ware !
Please write
                me
                 your opinion about the
program, suggestions or bug reports.

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as long as no files of the archive are changed or removed.

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copying or downloading.

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is explicitly prohibited without the permission of the author !

Contact
                me
                 , if you want to use it in any
commercial way !

No warranties are made for this program. Use it at your own risk !

1.4 requirements

Minimum requirements:

    - Amiga OS 2.04 or higher
    - 1 MB chip RAM
    - installed ReqTools.library

I recommend a faster CPU, additional fast memory and OS 3.0 for

serious use.

If present, LogicSim uses many features of OS 3.0 (pen-sharing,
locale support).

I've tested LogicSim on the following systems:

    AMIGA 4000/040 14MB CyberGfx
    AMIGA 600 1MB
    CDTV 1MB

    I also tried it successfully on a PENTIUM PC with UAE
    (Unuseable/UNIX Amiga Emulator, dos port) - NO JOKE !

1.5 installation

The program is useable without any installation.

But the best way is to use the supplied
installer script.
It will copy the main program, the docs, the font,
the catalog and example circuits to your harddisk
and it creates the show script for the documentation.

No changes are made to s:user-startup.

The configuration is saved in the same directory as the
main program, not in ENVARC or S:.

LogicSim can be started from Shell or Workbench.

From Workbench it is also started when you double
click a icon of a circuit in the Circuits directory.
It will open the selected circuit.

1.6 gates

                    basic gates

AND

Timer

NAND

OR

Clock

XOR

MonoFlop

NOR

turn on delay

NOT

turn off delay

Switch

LED

Special

traffic light
   Flip Flops
numeric display

input inverter

RS

HIGH

JK

LOW

JKMS

JKMS (S/R)

Scope Start

T

Scope Stop

T (S/R)

D

1.7 menus

```
Project          Edit               Simulate              Settings  ↩
                 Help

New

basic gates »

Start

ScreenMode...

Help

Load...

Flip-Flops  »

Stop

Work area...

Contents

Save

Timer        »

 Pause

 Use Workbench

Save as...

Special      »

 highlight HIGH
    show grid

Save IFF...

Input        »

Scope          »

 edit window open

Print...

-------------

 save with icon

Comment...
```

```
                Connect

                Save settings

                About...

                Remove gate

                Redraw

                Remove wire

                Quit

                Add node

                Remove node

                Move Circuit

                Label

                Undo

                -------------

                Copy

                Cut

                Insert
```

1.8   gadgets

```
                "Edit-Window"
```

The gadgets in this window are used to open and close
the other windows below.

If you have all other windows opened, you can close this
window. You can reopen it in the settings menu.

```
"Actions-Window"
```

```
                 Connect

                 Remove gate

                 Remove wire

                 Start
```

Stop

Undo
"basic gates"

AND

NAND

OR

NOR

XOR

NOT

Switch

LED

2

3

5
"FlipFlops"

RS-FlipFlop

JK-FlipFlop

JKMS-FlipFlop

JKMS-FlipFlop (S/R)

D-FlipFlop

T-FlipFlop

T-FlipFlop (S/R)
"Timer"

Clock

Monoflop

turn on delay

turn off delay
"Special"

```
traffic light

numeric display

input inverter

HIGH

LOW
```

1.9 menu_gates

```
Select one of the menu items to place a gate in your circuit.
```

```
basic gates    FlipFlops        Timer

          AND

          RS
              Monoflop

          NAND

          JK

          Clock

          OR

          JKMS
              turn on delay

          NOR

          JKMS (S/R)
              turn off delay

          XOR

          D

          NOT

          T

          Switch

          T (S/R)

          LED

          ----------
```

2 inputs

3 inputs

5 inputs
Special   Input

traffic light

input inverter

numeric display

HIGH

Scope start

LOW

Scope stop

1.10 menu_scope

The
Scope
submenu.

New channel

Remove channel

Remove all channels

Record

Stop record

Show scope

1.11 scope

The Scope

The scope of LogicSim can have unlimited number of channels.

To use the scope you have to place the probes to the gates
you want to scope. Do this with the function
New channel
.

The scope can't be showed while simulating, so you have to
record the scope and display it after simulation.

                Start
                 the simulation and select
                Record
                 from
the Scope menu. "Scope active" is shown in the window title and the scope is
recording.
To stop the recording select
                Stop record
                 from the scope menu.
It is also stopped when you abort the simulation.

You can also start and stop the recording by the two special gates

                Scope Start
                 and
                Scope Stop
                .
See the example circuit "Scope".

Now, you can display the scope with the menu item
                Show scope
                .
You can scale the scope with the scale gadget.

You can save the scope graphics with the menu item "Save iff ...".

1.12 new

Delete the old circuit and begin a new one.

You will be asked to save the circuit first.

1.13 load

                Load a circuit from disk.
The old circuit will be deleted.

You will be asked to save the old circuit first.

If the size of the loaded circuit is greater than your
current

```
           work area
            size, the wor area
size will be increased.
```

1.14 save

Save a circuit to disk.

If no filename was given before, a filerequester will be opened.

1.15 saveas

```
           This equals the
           Save
            menu, but you will be
asked for a filename first.
```

1.16 saveiff

This allows you to save your circuit as IFF-ILBM picture.

The circuit is saved as uncompressed ILBM. I hope all programs
are able to load this.

1.17 print

```
           This allows you to print your circuit.
```

You will be asked to open the GfxPrefs-Editor.
You can also print an additional
           Comment
            .

1.18 comment

You can enter an additional comment, author and date to your
circuit. This comment can be printed with the circuit.

1.19   about

This shows some information about the program.

If you have OS3.0+ and at least 32 colors, a picture
is shown in the about requester. The picture is stored
in LSAboutPic. If you have no OS3, not enough colors or
LogicSim can't find the picture file, an internal picture
is shown.

1.20   redraw

This refreshes the circuit graphics.
Not really needed, but I used it while developing.

1.21   quit

This item leaves the program.

You will be asked to save the circuit first.

1.22   movecirc

You can move the circuit in the work area.

A frame is drawn around the circuit while moving it.
You can move this frame to the new position and press
the left mouse button. The circuit will be moved to the
new position.

1.23   connect

Shortcut: c

Connect a output of a gate or a node with the
input of a gate.

First you have to click on a output of gate or on
a node. Then you can draw a wire to an input of a
gate. By pressing SPACE you can add a node to the
last position of the wire, by pressing 'u' you can
remove the last drawn part of the wire.

You can exit the connect mode by pressing ESC or selecting
an other menu item.

1.24   addnode

You can add a node to a previous drawn wire.

Click on the wire where you want to add the node.
If you click near to an edge, the node will be added to this edge.

1.25   removenode

You can remove a node from a wire by clicking on the
node to delete.

1.26   removegate

Shortcut: d

You can remove a gate from your circuit by calling this
function and clicking on the gate to remove.

All wires connected to the removed gate will also be removed.

You can undo this action by pressing 'u' or the 'undo' button.

1.27   removewire

Shortcut: w

You can remove a wire from your circuit by calling this
function and clicking on the wire to remove.

You can undo this action by pressing 'u' or the 'undo' button.

1.28   undo

Shortcut: u

With the UNDO function you can undo the last action
(remove gate, remove wire...).

Using UNDO again will redo the action.

In future versions of LogicSim I'll make more undo-steps.

1.29 label

This menu item starts the label mode.

In this mode you can click on a gate to open the

label-requester

.

In this requester you can input a text, select its
position and select a font for the text.

After this the gate will be labeled with your text.

You can exit the label mode by pressing the ESC-key.

1.30 copy

You can copy a part of your circuit to
insert
 it later
at another position or in a new circuit.
This function is similar to to the copy function in text editors.

All wires which are with beginning and end in the area you selected
will be copied, too.

1.31 cut

This function is similar to the
copy
 function, but
all copied gates and wires are removed from your circuit afterwards.

1.32   start

This will start the simulation of your circuit.

You can pause the simulation with
                Pause
                .
The simulation can be stopped with ESC or
                Stop
                .

Select the
                hightlight HIGH wire
                 menu, if you want
to 'debug' your circuit.

1.33   stop

This will exit the simulation mode. It is the same as pressing
the ESC key while simulating.

1.34   pause

Whit this menu item, you can halt your simulation in the current
state. To run it again, turn this menu item off.

You can also use this menu item before starting the simulation
with
                Start
                . NOTHING will be simulated, when you start
the simulation in that case, until you turn the pause-item off.

1.35   highlight

When using this function, all wires with HIGH will be drawn
white in simulation mode.
This is useful if you want to 'debug' your circuit.

This menu-item must be turned on/off BEFORE starting the
simulation mode.

1.36   newchannel

New channel for the
Scope
.

You have to place the probe to an output of a gate or a node.

1.37   removechan

Remove an channel of the
Scope
.

You have to input the number of the probe/channel to remove.

1.38   remallchan

Remove ALL channels of the
Scope
.

See

Remove channel
.

1.39   record

Start the record of scope data.

See

Scope

1.40   stoprecord

Stop the record of scope data.

See

Scope

1.41 showscope

Open the
Scope
 window.

1.42 insert

With this function you can insert a previously
copied
 or
cutted
part of a circuit in your actual circuit.

1.43 screenmode

You can select a ScreenMode in the ASL/ReqTools ScreenMode- ←↩
        Requester,
LogicSim will run on.

Pressing the OK button in the requester will open a screen in the
selected mode. You can move LogicSim back on the Workbench Screen
by turning the menu
            use workbench
             on.

1.44 workarea

You can select the width and height of the work area (the area
where you draw your circuits, it can be scrolled around).

Note: Big sizes will need *MUCH* chip-memory.
      You can calclulate the chip-mem needed by mem=width*height/4.
      If you set values which are bigger than your free chip-mem,
      the size will be decreased.

1.45 usewb

The display mode of LogicSim is changed from custom screen to
Workbench screen and back.

1.46 grid

```
    Turn the grid on/off.

    You need a fast CPU for the grid !
```

1.47 ewinopen

```
                If you have closed the edit-window (->
                Windows
                ), you can
reopen it with this menu.
```

1.48 savewithicon

```
This lets LogicSim save your circuits with additional icons.

When you click these icons on workbench, LogicSim will
be started and loads the circuit.
```

1.49 saveset

```
This will save your settings and window positions
in the file LogicSim.config.
```

1.50 help

```
This tells you that the program has an online help system,
if you don't know it. :-)
```

1.51 contents

```
This loads the contents page of this AmigaGuide document.
```

1.52 gate_xinputs

                    Shortcut: 2, 3, 5

Here you can set the number of inputs for
                    AND
                    ,
                    NAND
                    ,

                    OR
                    ,
                    NOR
                    , and
                    XOR
                     gates.

Possible numbers of inputs are 2, 3 and 5.

1.53 gate_switch

                    Switch

Shortcut: s

This is an element for user inputs.

It can be used as switch or key. If you use it as switch,
you can click on it (in simulation mode) to turn it on
(output=HIGH) and click again to turn it off (output=LOW).
If you use it as key, clicking on it turns it on and releasing
the button after this turns it off.

     Show Gate

Click on the gate to open the
                switch requester
                .

1.54 gate_led

LED

Shortcut: l

This is an output element, it is colored if HIGH and
transparent if LOW.

Show Gate

1.55   gate_and

AND

Shortcut: a

The output is only HIGH when ALL inputs are HIGH.

You can choose the number of inputs (2, 3 or 5) in the
menu or the "basic gates"-window.

Click on the gate to replace it with
NAND
,
OR
,
NOR
,
XOR
.

```
   A | B | Q
  ---+---+---
   0 | 0 | 0          A - input 1
   0 | 1 | 0          B - input 2
   1 | 0 | 0          Q - output
   1 | 1 | 1
```

Show Gate
Show diagram

```
   ^
 A|
  |     ____        ____
  |    |    |      |    |
  |    |    |      |    |
  |____|    |____| |    |____
  +------------------------------>
                               t

   ^
 B|
```

```
 |         _____
 |         |        |        |
 |         |        |        |
 |_____|        |____
 +------------------------------>
                           t


   ^
 Q|
  |         ____
  |         |   |    |
  |         |   |    |
  |_____|    |____
  +------------------------------>
                           t
```

1.56 gate_nand

                   NAND

Shortcut: A

This is an
                   AND
                    with inverted output

You can choose the number of inputs (2, 3 or 5) in the
menu or the "basic gates"-window.

Click on the gate to replace it with
                   AND
                   ,
                   OR
                   ,
                   NOR
                   ,
                   XOR
                   .

     A | B | Q
    ---+---+---
     0 | 0 | 1   A - input 1
     0 | 1 | 1   B - input 2
     1 | 0 | 1   Q - output
     1 | 1 | 0

   Show Gate
   Show diagram

```
    ^
  A|
   |      ____        ____
   |     |    |      |    |      |
   |     |    |      |    |      |
   |_____|    |_____|    |_____
   +------------------------------>
                                 t
```

```
    ^
  B|
   |          _____
   |         |          |          |
   |         |          |          |
   |_____|          |_____
   +------------------------------>
                                 t
```

```
    ^
  Q|
   |_____      ____
   |                |    |
   |                |    |
   |                |____|
   +------------------------------>
                                 t
```

1.57 gate_or

                    OR

Shortcut: o

The output is HIGH when at least one of the inputs is HIGH.

You can choose the number of inputs (2, 3 or 5) in the
menu or the "basic gates"-window.

Click on the gate to replace it with
                    AND
                    ,
                    NAND
                    ,
                    NOR
                    ,
                    XOR
                    .

```
     A | B | Q
    ---+---+---
     0 | 0 | 0          A - input 1
     0 | 1 | 1          B - input 2
     1 | 0 | 1          Q - output
     1 | 1 | 1
```

```
  Show Gate
  Show diagram
```

```
  ^
A|
 |       ____        ____
 |      |    |      |    |
 |      |    |      |    |
 |_____|    |_____|    |____
 +-----------------------------> 
                              t
```

```
  ^
B|
 |          _____
 |         |          |
 |         |          |
 |_____|          |____
 +-----------------------------> 
                              t
```

```
  ^
Q|
 |      _____
 |     |                |
 |     |                |
 |_____|                |____
 +-----------------------------> 
                              t
```
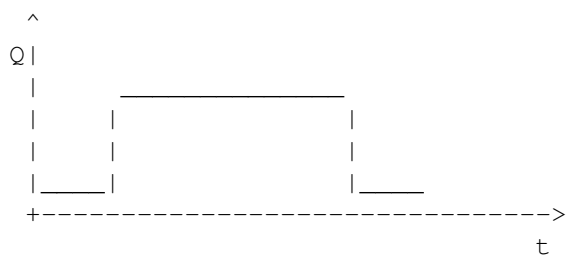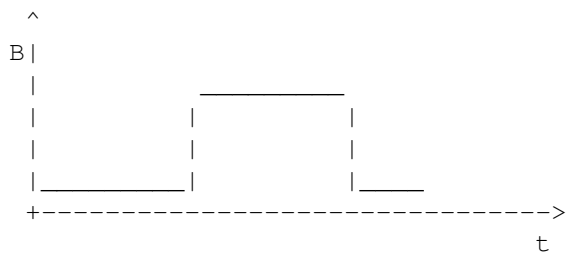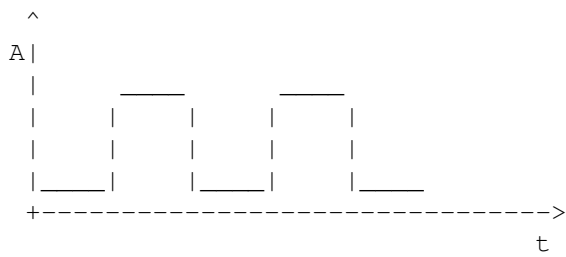
1.58 gate_nor

                    NOR

Shortcut: O

This is an
                 OR

                         with inverted output.
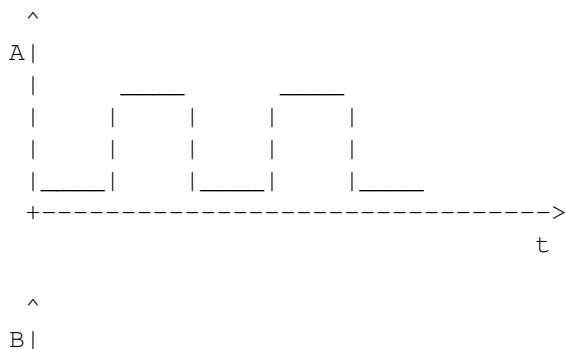

You can choose the number of inputs (2, 3 or 5) in the
menu or the "basic gates"-window.
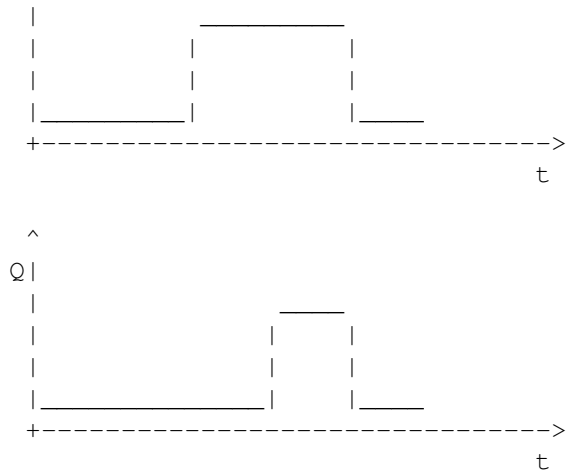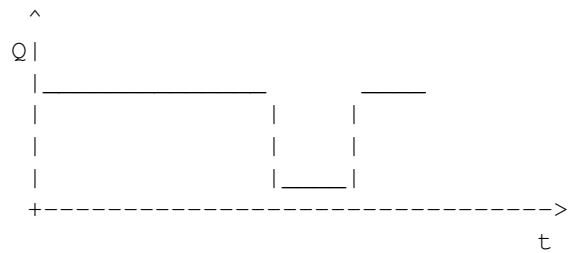
Click on the gate to replace it with
                      AND
                      ,
                      NAND
                      ,
                      OR
                      ,
                      XOR
                      .

      A | B | Q
     ---+---+---
      0 | 0 | 1   A - input 1
      0 | 1 | 0   B - input 2
      1 | 0 | 0   Q - output
      1 | 1 | 0

    Show Gate
    Show diagram

    ^
  A|
   | ____   ____
   | | | | | |
   | | | | | |
   |_____| |____| |____
   +------------------------------>
                                 t

    ^
  B|
   | _____
   | | | |
   | | | |
   |_____| |____
   +------------------------------>
                                 t

    ^
  Q|
   |____   ____
	_____
   +------------------------------>
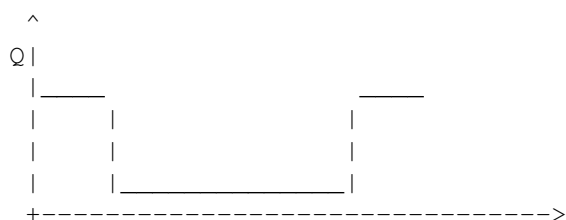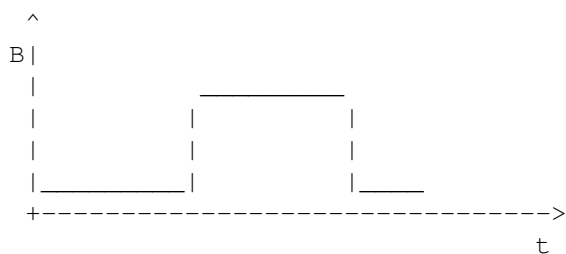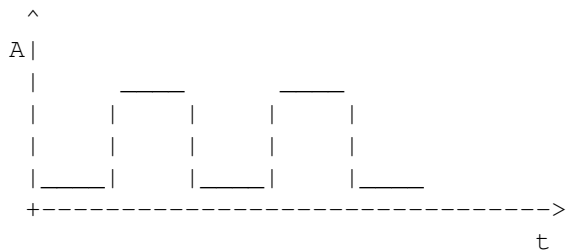
```
                                    t
```

1.59 gate_xor

```
              XOR
```

eXclusive OR

Shortcut: x

The output is HIGH when only ONE of the inputs is HIGH.

You can choose the number of inputs (2, 3 or 5) in the
menu or the "basic gates"-window.

Click on the gate to replace it with
              AND
              ,
              NAND
              ,
              OR
              ,
              NOR
              .


```
    A | B | Q
   ---+---+---
    0 | 0 | 0        A - input 1
    0 | 1 | 1        B - input 2
    1 | 0 | 1        Q - output
    1 | 1 | 0
```


```
   Show Gate
   Show diagram
```


```
   ^
  A|
   |      ____       ____
   |     |    |     |    |
   |     |    |     |    |
   |_____|    |____|     |____
   +------------------------------>
                          t
```

```
  ^
 B|
  |
  |            _____
  |          |          |        |
  |          |          |        |
  |_____|          |_____|____
  +------------------------------>
                                 t


  ^
 Q|
  |          _____
  |        |          |            |
  |        |          |            |
  |_____|          |_____|_____
  +------------------------------>
                                 t
```

1.60 gate_not

NOT

Shortcut: n

The output is an inverted input.
If input is LOW, output is HIGH.
If input is HIGH, output is LOW.


```
     A | Q
    ---+---
     0 | 1          A - input
     1 | 0          Q - output
```


    Show Gate
    Show diagram


```
  ^
 A|
  |       ____      ____
  |     |    |    |    |    |
  |     |    |    |    |    |
  |_____|    |____|    |____|____
  +------------------------------>
```

```
                                          t
      ^
    Q|
     |____        ____        ____
     |    |      |    |      |    |
     |    |      |    |      |    |
     |    |____| |____| |____|
     +------------------------------->
                                       t
```
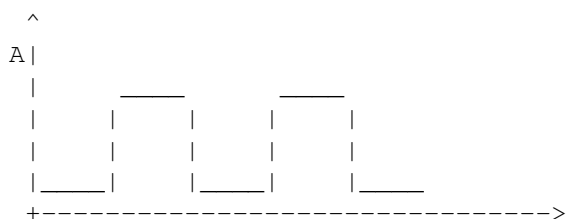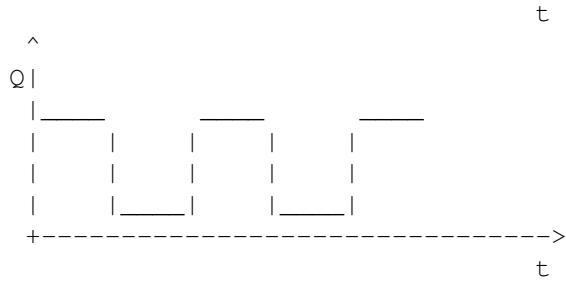

1.61 gate_rsff

                        RS FlipFlop

S = Set
R = Reset
Q = Output
/Q= inverted Output

The output Q is set to HIGH by S=HIGH and reset to LOW
by R=HIGH.
The output state is kept even if S or R go back to LOW.

/Q is an inverted output Q.

S=R=HIGH is NOT allowed, because it produces an illegal
output state Q=/Q=HIGH. Have a look at
                JK-FlipFlop
                    .

    Show Gate
    Show diagram


```
    ^
   S|
    |   __        __        _____
    |  |  |      |  |      |        |
    |  |  |      |  |      |        |
    |__|  |_____|  |_____|          |___
    +--------------------------------------->
                                         t
    ^
   R|
    |      ___        ___        ___
    |     |   |      |   |      |   |
    |     |   |      |   |      |   |
```

```
    |_____|  |_____|  |_____|  |_____
    +------------------------------------->
                                          t

   ^
  Q|
   |      __        ____        _____
   |   |  |  |     |    |      |          |
   |   |  |  |     |    |      |          |
   |__|  |____|    |____|      |
   +------------------------------------->
                                          t

   ^
 /Q|                              (!)
   |__      ____        ____        __
   |  |  |  |    |     |    |     |  |  |
   |  |  |  |    |     |    |     |  |  |
   |  |__|  |____|     |____|     |__|  |_____
   +------------------------------------->
                                          t
```
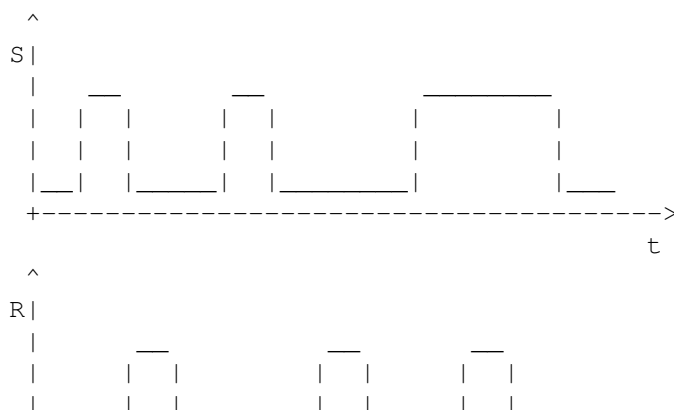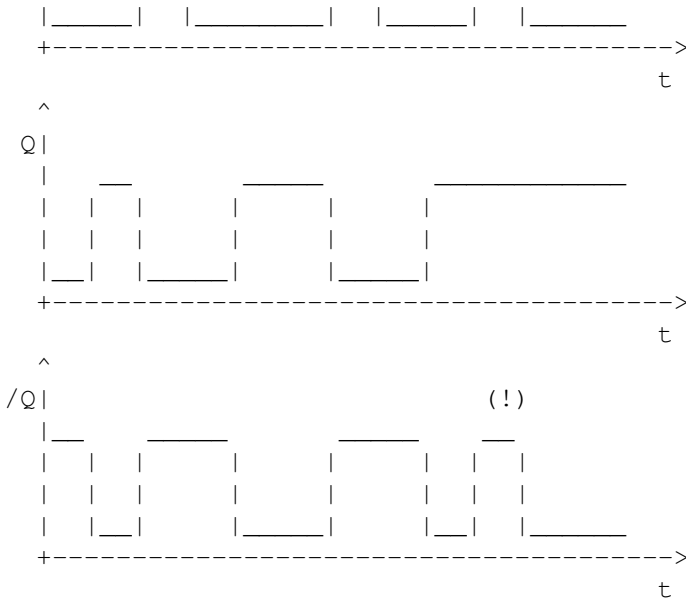
1.62 gate_jkff

                   JK FlipFlop

J = Set
K = Reset
Q = Output
/Q= inverted Output

This FlipFlop is similar to the
                 RS-FlipFlop
                   but the problem
with R=S=HIGH is solved.

    Show Gate
    Show diagram

   ^
  S|
   | __   __   _____
   | | | | | | | |
   | | | | | | | |
   |__| |____| |_____| |___
   +------------------------------------->
                                          t
   ^
```

```
R|
 |
 |        __          __          __
 |       |  |        |  |        |  |
 |       |  |        |  |        |  |
 |_____|  |_____|  |_____|  |_____
 +------------------------------------------>
                                           t

 ^
Q|
 |      __          _____          _____
 |     |  |        |     |        |            |
 |     |  |        |     |        |            |
 |_____|  |_____|     |_____|
 +------------------------------------------>
                                           t
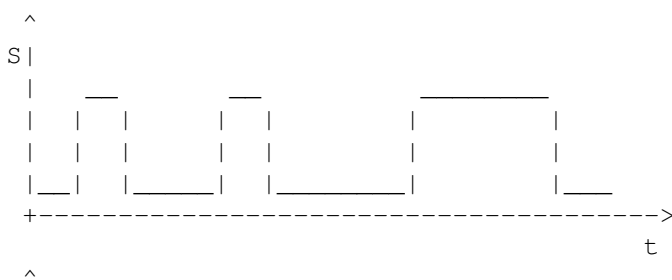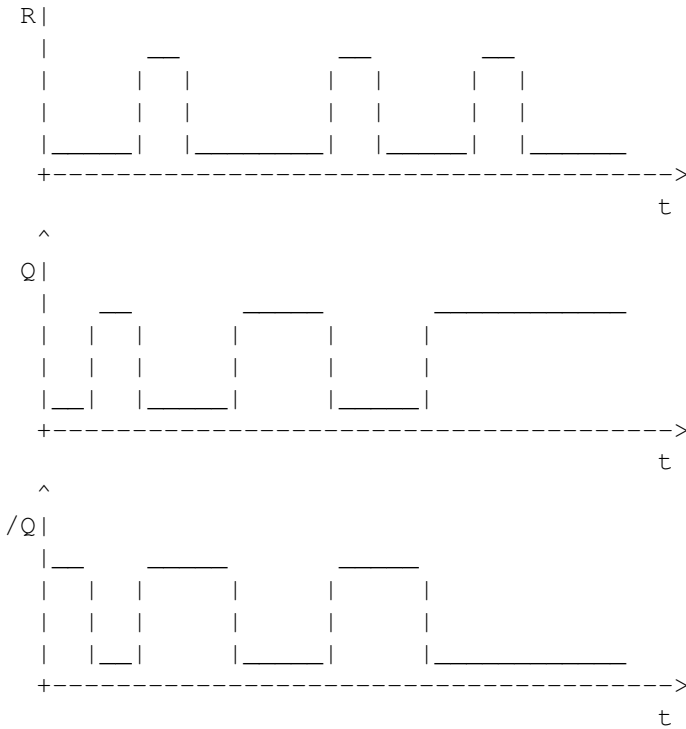
 ^
/Q|
 |__        _____          _____
 |  |      |     |        |     |
 |  |      |     |        |     |
 |  |_____|     |_____|     |_____
 +------------------------------------------>
                                           t
```

1.63 gate_jkmsff

                    JKMS FlipFlop

JK-Master-Slave FlipFlop

J = Set
K = Reset
C = Clock
Q = Output
/Q= inverted Output

This type of FlipFlop consists internally of two
                JK-FlipFlops
                    .
The output is only changed when clock jumps from HIGH to LOW.

     Show Gate
     Show diagram

   ^
  C|
   | __   __   __   __   __   __
   | | | | | | | | | | | | |
   | | | | | | | | | | | | |
```

```
  |__|   |__|   |__|   |__|   |__|   |__|   |
   +------------------------------------>
                                        t

  ^
 J|
  |       ____
  |      |    |
  |      |    |
  |_____|    |_____
   +------------------------------------>
                                        t

  ^
 K|
  |              _____
  |             |
  |             |
  |_____|
   +------------------------------------>
                                        t

  ^
 Q|
  |       _____
  |      |     |
  |      |     |
  |_____|     |_____
   +------------------------------------>
                                        t

  ^
/Q|
  |_____        _____
  |          |       |
  |          |       |
  |          |_____|
   +------------------------------------>
                                        t
```
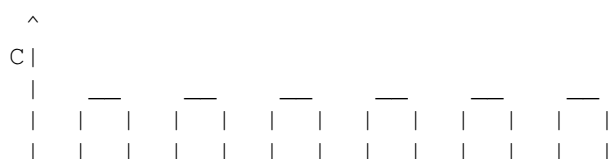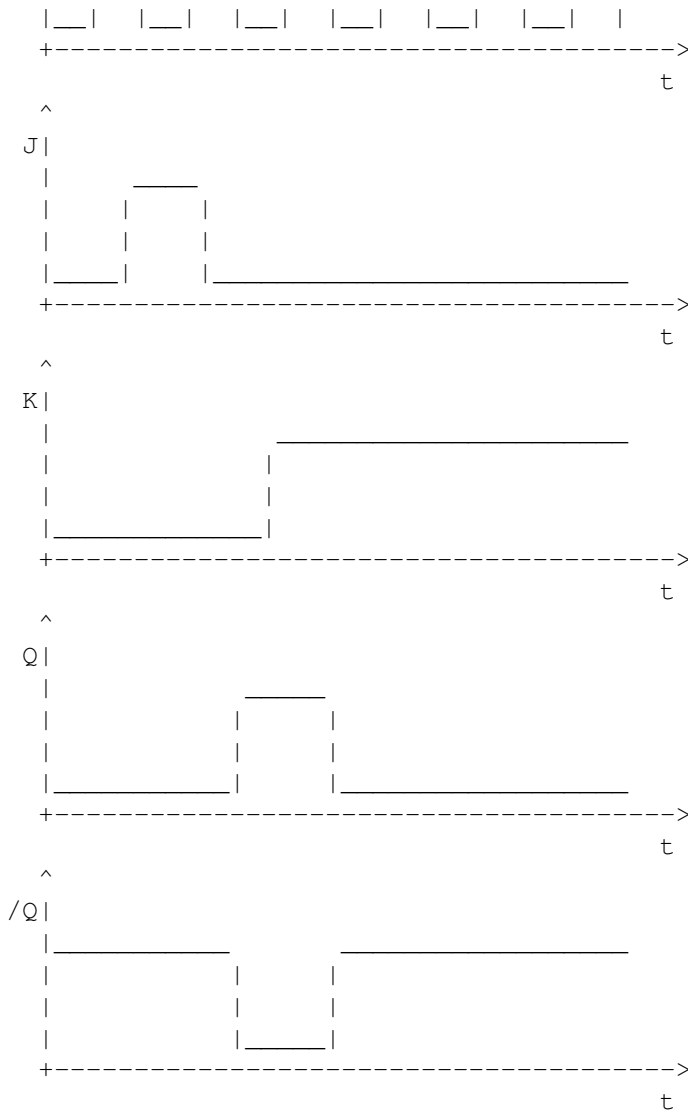
1.64 gate_jkmsrsff

                    JKMS FlipFlop (S/R)

JK-Master-Slave FlipFlop with Set/Reset

This is the same as
              JKMS-FlipFlop
              , but it
has special inputs to set and reset the output independent from
the J, K and CLK inputs.

This can be used for example with counters that reset after the
10th impulse.

    Show Gate
    Show diagram

```
   ^
 C |
   |
   |    __      __      __      __      __      __
   |   |  |    |  |    |  |    |  |    |  |    |  |    |
   |   |  |    |  |    |  |    |  |    |  |    |  |    |
   |__|  |__|  |__|  |__|  |__|  |__|  |
   +-----------------------------------------> 
                                             t
   ^
 J |
   |       _____
   |      |     |
   |      |     |
   |_____|     |_____
   +-----------------------------------------> 
                                             t
   ^
 K |
   |            _____
   |           |
   |           |
   |_____|
   +-----------------------------------------> 
                                             t
   ^
 S |
   |                         _____
   |                        |     |
   |                        |     |
   |_____|     |_____
   +-----------------------------------------> 
                                             t
   ^
 R |
   |                             _____
   |                            |     |
   |                            |     |
   |_____|     |__
   +-----------------------------------------> 
                                             t
   ^
 Q |
   |          _____         __
   |         |     |       |  |
   |         |     |       |  |
   |_____|     |_____|  |_____
   +-----------------------------------------> 
                                             t
   ^
/Q |
```

```
    |_____         _____        _____
    |          |         |     |        |     |
    |          |         |     |        |     |
    |          |_____|        |__|
    +------------------------------------>
                                        t
```
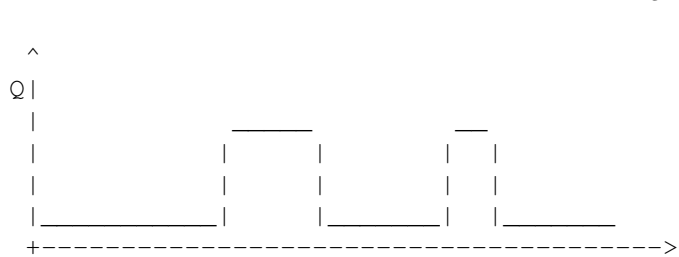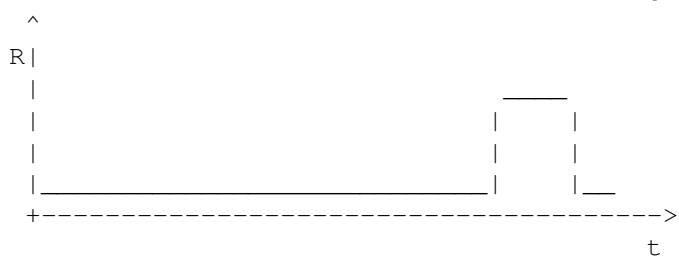
1.65 gate_tff

```
                T FlipFlop
```

C = Clock
Q = Output
/Q= inverted Output

This FlipFlop equals a
                JKMS-FlipFlop
                 with J=K=HIGH.
The output is changed on each HIGH-LOW-jump of the clock impulse.

    Show Gate
    Show diagram


```
   ^
  C|
   |    __    __    __    __    __    __
   |   |  |  |  |  |  |  |  |  |  |  |  |  |
   |   |  |  |  |  |  |  |  |  |  |  |  |  |
   |__|  |__|  |__|  |__|  |__|  |__|  |
   +------------------------------------>
                                        t
   ^
  Q|
   |       _____        _____        _____
   |      |     |        |     |        |     |
   |      |     |        |     |        |     |
   |_____|     |_____|     |_____|     |
   +------------------------------------>
                                        t
   ^
 /Q|
   |_____        _____        _____
   |      |       |     |       |     |
   |      |       |     |       |     |
   |      |_____|     |_____|     |_____|
   +------------------------------------>
                                        t
```

1.66 gate_trsff

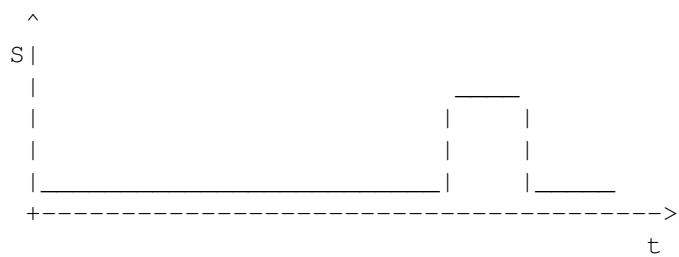   T FlipFlop (S/R)
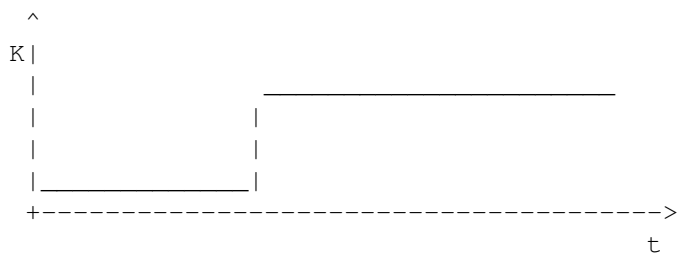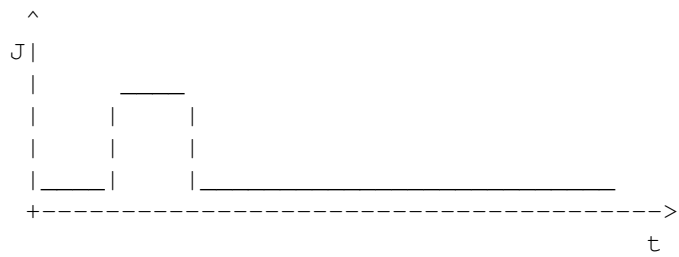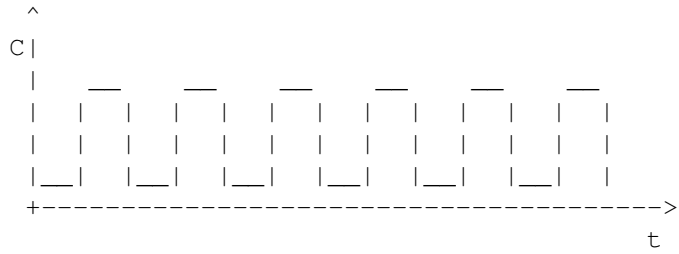
T FlipFlop with Set/Reset

This is the same as
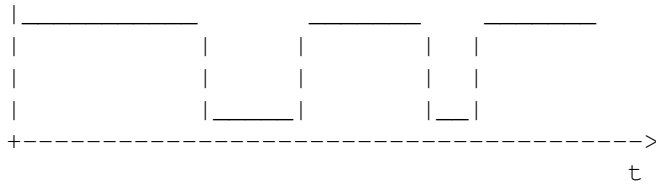   T-FlipFlop
                , but it
has special inputs to set and reset the output independent from
the J, K and CLK inputs.

This can be used for example with counters that reset after the
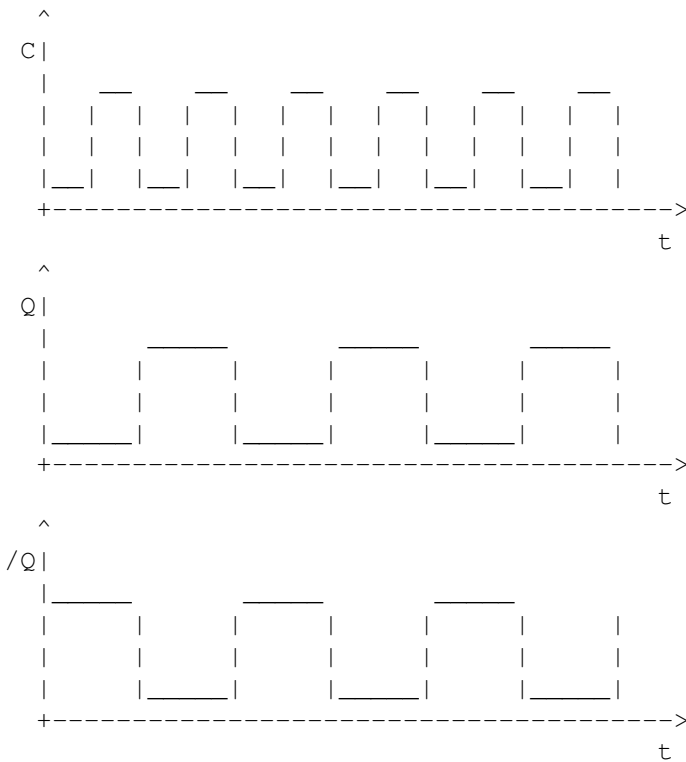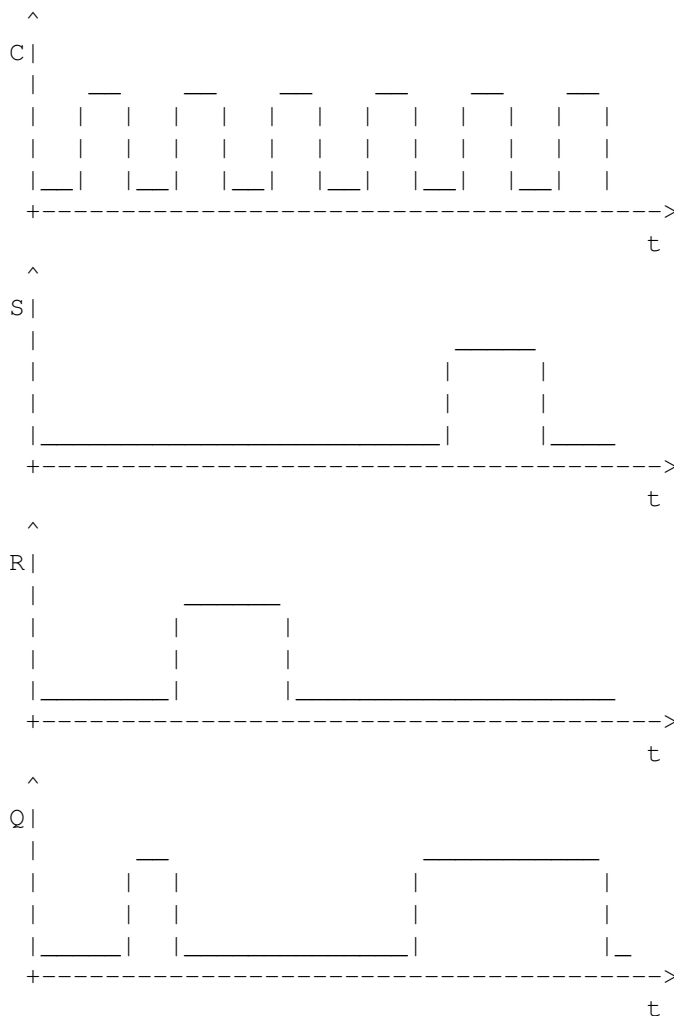10th impulse.

     Show Gate
     Show diagram


```
   ^
 C|
  |    __     __      __      __      __      __
  |   |  |   |  |    |  |    |  |    |  |    |  |    |
  |   |  |   |  |    |  |    |  |    |  |    |  |    |
  |__|  |__|  |__|   |__|   |__|   |__|   |
  +-------------------------------------->
                                        t
   ^
 S|
  |                        _____
  |                       |      |
  |                       |      |
  |_____|      |____
  +-------------------------------------->
                                        t
   ^
 R|
  |         _____
  |        |      |
  |        |      |
  |_____|      |_____
  +-------------------------------------->
                                        t
   ^
 Q|
  |     __                 _____
  |    |  |               |            |
  |    |  |               |            |
  |____|  |_____|            |_
  +-------------------------------------->
                                        t
```

```
    ^
 /Q|
   |_____      _____                 _
   |     |    |               |               |
   |     |    |               |               |
   |     |__|                 |_____|
   +-----------------------------------------------> 
                                              t
```
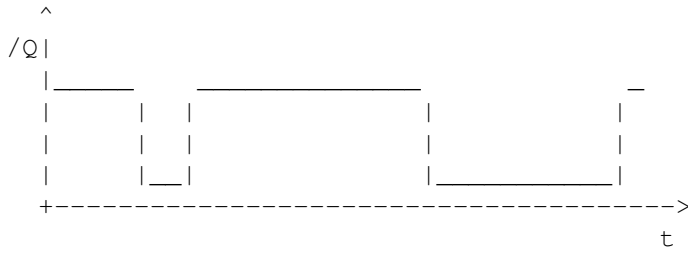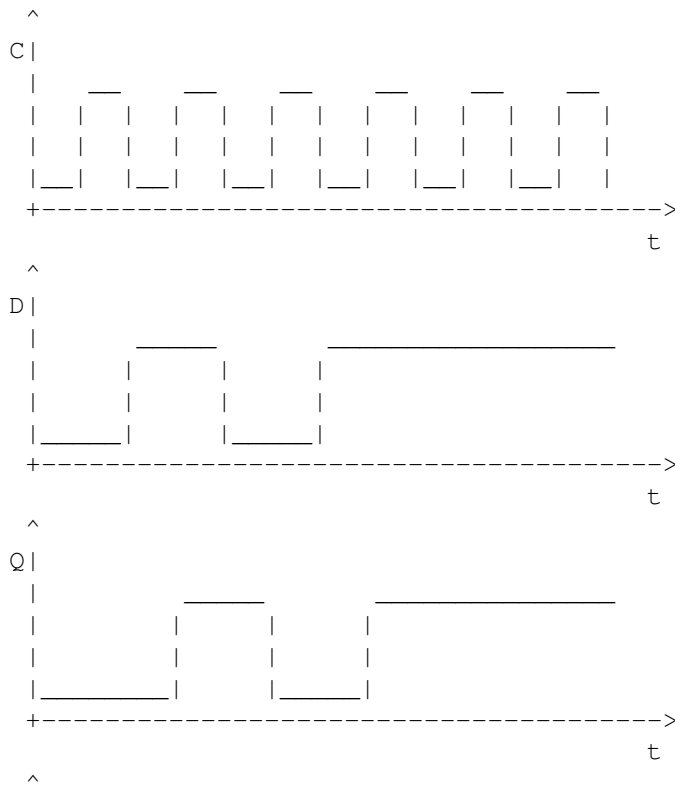
1.67 gate_dff

```
Delay FlipFlop

C = Clock
D = Input
Q = Output
/Q= inverted Output
```
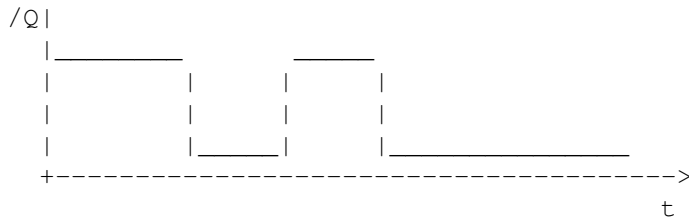
The input is taken delayed to the output at the next positive clock.


```
     Show Gate
     Show diagram
```


```
   ^
  C|
   |     __    __     __     __     __     __
   |    |  |  |  |   |  |   |  |   |  |   |  |   |
   |    |  |  |  |   |  |   |  |   |  |   |  |   |
   |__|  |__|  |__|  |__|  |__|  |__|   |
   +-----------------------------------------> 
                                       t
   ^
  D|
   |        _____        _____
   |       |     |      |       |
   |       |     |      |       |
   |_____|       |_____|
   +-----------------------------------------> 
                                       t
   ^
  Q|
   |          _____        _____
   |         |     |      |       |
   |         |     |      |       |
   |_____|       |_____|
   +-----------------------------------------> 
                                       t
   ^
```

```
/Q|
  |_____          _____
  |        |        |     |
  |        |        |     |
  |        |_____|     |_____
  +--------------------------------------->
                                        t
```

1.68 gate_clock

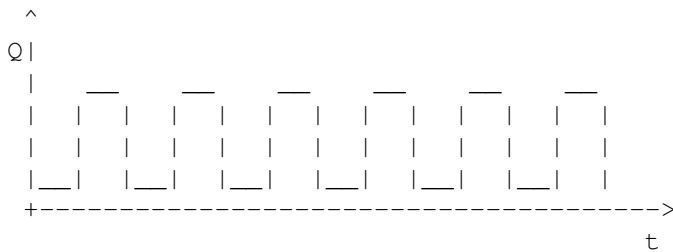   Clock

This is a user adjustable clock generator. Click on the gate
to open the
                    time-requester
                     where you can adjust impulse-time,
pause-time the start level.

    Show Gate
    Show diagram


```
  ^
  Q|
   |     __      __      __      __      __      __
   |    |  |    |  |    |  |    |  |    |  |    |  |    |
   |    |  |    |  |    |  |    |  |    |  |    |  |    |
   |__|  |__|  |__|  |__|  |__|  |__|  |
   +--------------------------------------->
                                        t
```


1.69 gate_mono

                    Monoflop

This is a user adjustable Monoflop.
The output goes to HIGH at the LOW-HIGH jump of the input.
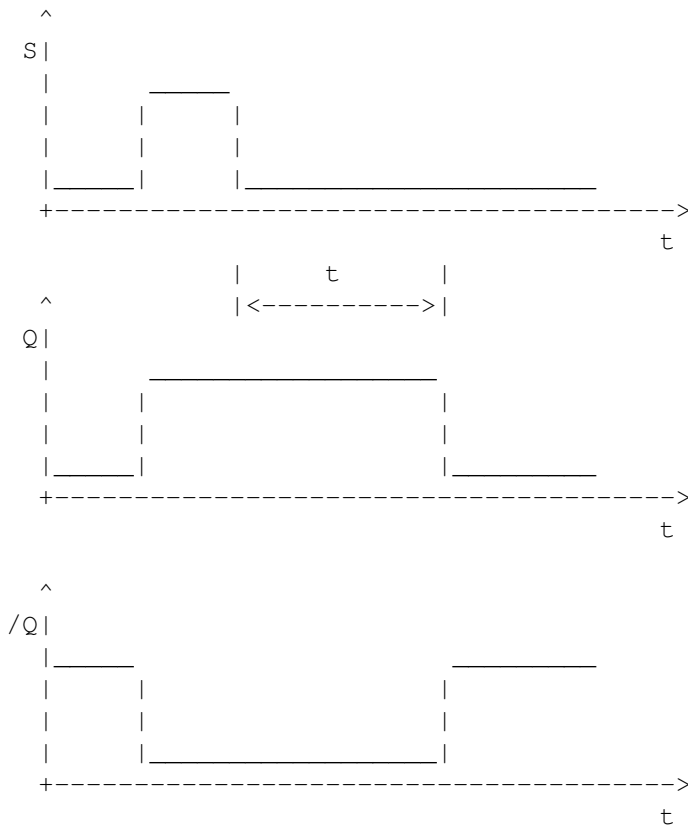It falls back to low after the specified time is elapsed.

Click on the gate to open the
                    time-requester
                     where you
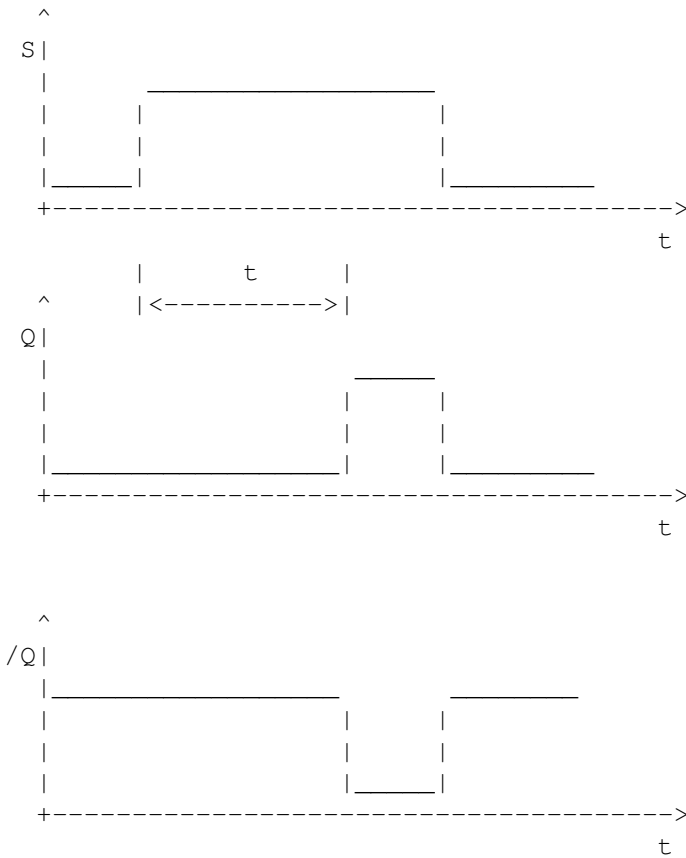can adjust the time.

```
    Show Gate
    Show diagram



  ^
 S|
  |        _____
  |      |      |
  |      |      |
  |_____|      |_____
  +-----------------------------------------> 
                                            t
               |     t     |
  ^            |<--------->|
 Q|
  |      _____
  |      |                 |
  |      |                 |
  |_____|                 |_____
  +-----------------------------------------> 
                                            t

  ^
/Q|
  |_____              _____
  |    |             |
  |    |             |
  |    |_____|
  +-----------------------------------------> 
                                            t
```


1.70 gate_tond

                    turn on delay

The output goes to HIGH after a specified time.

Click on the gate to open the
                time-requester
                 where you
can adjust the time.

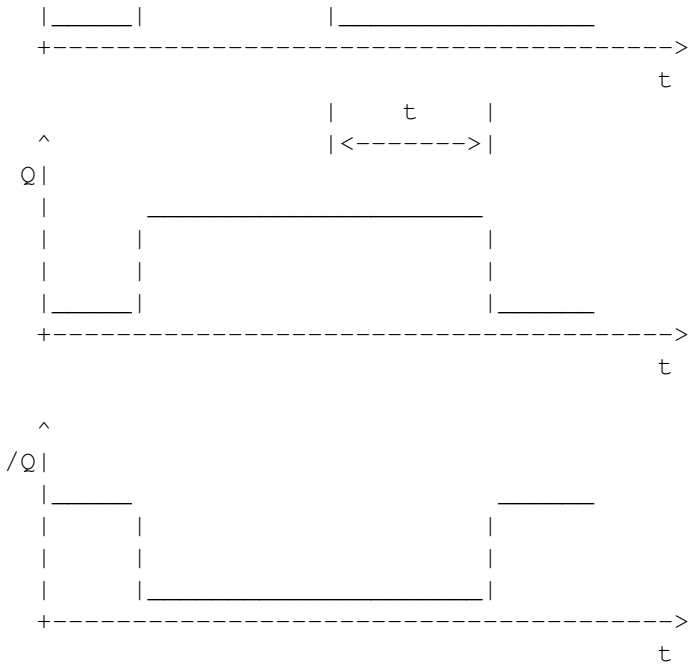   Show Gate
    Show diagram
```

```
   ^
  S|
   |        _____
   |     |                     |
   |     |                     |
   |_____|                     |_____
   +------------------------------------->
                                        t

          |       t       |
   ^      |<---------->|
  Q|
   |                      _____
   |                   |      |
   |                   |      |
   |_____|      |_____
   +------------------------------------->
                                        t



   ^
 /Q|
   |_____       _____
   |                   |     |
   |                   |     |
   |                   |_____|
   +------------------------------------->
                                        t
```

1.71 gate_toffd

                     turn off delay

The output goes back to LOW after a specified time after
the HIGH-LOW jump of the input.

Click on the gate to open the
                time-requester
                 where you
can adjust the time.

    Show Gate
    Show diagram

   ^
  S|
   | _____
   | | |
   | | |
```

```
  |_____|                 |_____
   +----------------------------------------->
                                             t
                     |    t     |
    ^                |<------>|
   Q|
    |
    |        _____
    |      |                          |
    |      |                          |
    |_____|                          |_____
   +----------------------------------------->
                                             t

    ^
  /Q|
    |_____                       _____
    |      |                    |
    |      |                    |
    |      |_____|
   +----------------------------------------->
                                             t
```

1.72 gate_trafficlight

                    traffic light model

This is a model of a traffic light with red, yellow and green
lights.

     Show Gate

Per default the color of each light is blue. Click on the
gate to open the
                traffic light requester
                 where
you can select the color for each light.

1.73 gate_numdisplay

                    7 segment display model

This is an model of a 7 segment numeric display. It shows decimal
numbers from 0 to 31 or HEX numbers from $0 to $1F. It has 5 inputs
that represent the binaries 2^0 ... 2^4. If you only want number
up to 15 or 8, you should set the inputs 2^5, 2^4 ... to
                      LOW
                       .

     Show Gate

Click on the gate to open a
                    requester
                     where you can choose
between decimal and hexadecimal format.

1.74 gate_inputinv

                  input inverter

This is the same as the
                  NOT
                   gate, but with
graphically differences.

This gate is placed directly to an input of a gate.
So the level on input is first inverted before it goes
to the input of the 'big' gate.

     Show Gate

1.75 gate_low

LOW

This is to permanently set an input of a gate to LOW.
For example, if you need a OR with 4 inputs,
take one with 5 inputs and set one input to LOW.

     Show Gate

1.76   gate_high

HIGH

This is to permanently set an input of a gate
to HIGH. For example, if you need a AND with 4 inputs,
take one with 5 inputs and set one input to HIGH.

    Show Gate

1.77   gate_scopestart

                  Scope Start

This starts the scope recording on the LOW-HIGH jump of the input.
It is the same as the menu item
                  Record
                     .

The scope is only started once, more LOW-HIGH jumps are ignored.

You can place only one of this gate.

    Show Gate

1.78   gate_scopestop

                  Scope Stop

This stops the scope recording on the LOW-HIGH jump of the input.
It is the same as the menu item
                  Stop Record
                     .

You can place only one of this gate.

    Show Gate

1.79 timerequester

This is the requester to set the time values of
Clock

,

Monoflop

,
turn on delay
 and
turn off delay

.

You can set the impulse and pause time for Clock and only one time
for the other gates.

All times are millisecond values.

You can set the initial level for Clock.
With set to HIGH the Clock pulse will start with HIGH, otherwise with LOW.

Note: Under OS2.0 the initial level gadgets are'nt disabled for gates other
      than Clock. Using this gadget won't effect anything in this case.

1.80 switchrequester

This requester appears when you click on a
switch

.

You can set the color of the switch when it is on/HIGH, the initial level
and the type of the switch.

Per default a switch is turned off at start, with initial
level set to HIGH the switch is turned on at start and you
turn it off with first click.

With the type gadgets you can choose a real switch or
a key.
If you use it as switch, you can click on it (in simulation mode)
to turn it on (output=HIGH) and click again to turn it off (output=LOW).
If you use it as key, clicking on it turns it on and releasing
the button after this turns it off.

1.81   ledrequester

This requester appears when you click on a
LED
.

In this requester you can only set the color of the LED when it is on.

1.82   trafficlightrequester

This requester appears when you click on a
traffic light
.

Here you can select the screen-color for each light (red, yellow, green).
Per default all colors are blue.

If you select "find best color", the program tries to allocate
colors that match red, yellow and green. This feature is only
available for OS3.0 and above.

You should use a worbench or custom screen with at least 8
colors for correct red, yellow and green color.

1.83   numdisplayrequester

This requester appears when you click on a
numeric display
.

Here you can set the mode for display (hex or decimal).
You can also turn off the leading 0. For example, with leading 0 off
the number 7 is shown as " 7", not as "07".

1.84   labelrequester

In the string-gadget you can input the label-text with
max. 16 letters.

You can choose the text position above or below.

"Select font" opens a font requester where you can
select a font for the label text. This font is used
for ALL label texts, not just for this gate.
The default font is TinyTxt.font supplied in the
LogicSim archive.

1.85 todo

   – vertical scroller for scope

   – user definable gates

   – user definable HotKeys

   – external Prefs editor

   – external programs for gates

   More ideas welcome !

1.86 author

If you want to write me or have questions, bug-reports or
suggestions, please use one of the following addresses.
I will reply on every mail.

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You can find program-updates and beta versions
on my Homepage (http://www.sax.de/~atetzl).

1.87 credits

1.88 keyboard

                These are only the shortcuts reachable without pressing the amiga
key. You can find the shortcuts for menu items in the menus themselves.

    gates
    -----

    a -
            AND
                                A -
            NAND
        o -
            OR
                            O -
            NOR
        x -
            XOR
                            n -
            NOT
        s -

```
            switch
                          l -
            LED
                1 -
            HIGH
                              0 -
            LOW
                editing
    -------

    c -
            connect
                          d -
            remove gate
                r -
            Start (run)
                        w -
            remove wire
                u -
            undo
                          2 -
            2 inputs
                3 - 3 inputs              5 -
            5 inputs
                SPACE - repeat last action



    drawing wires  (
            connect
            )
    -------------

    SPACE - set node to last point
    u - remove last part of wire (undo last click)
    ESC - abort drawing



    simulation
    ----------

    SPACE or p -
            pause
             simulation
    ESC - abort simulation
```

1.89   hints

```
                - Press space to repeat the last action.

 - To follow long wires, you can click on the wire to
   highlight it.
```

- To 'debug'~circuits, turn the 'highlight HIGH wire'
  item on. All wires with HIGH will be drawn white in
  simulation mode, so you can easily check if your
  circuit works as you want.

- If you want to print your circuit, I recommend that you
  save it as iff and import it in your word processor.
  You will probably get a much better printing and you are
  able to include some text.

- Click on a "basic gate" like
            AND
            ,
            NAND
            ,
            OR
            ,
            NOR
            ,
            XOR
              to replace it with another one.