



## Version 1.0

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## Overview

LASER! is a "fix the machine" puzzle game. However, this machine is a "laser light" optics bench. You've potentially got a variety of laser beam filters, splitters, combiners, mirrors and other parts to work with. However, the exact type and quantity of parts available for use on a given puzzle is set by the puzzle design. Your ultimate goal is to get one or more laser beams of the appropriate color to shine on one or more targets.

You work by dragging parts from the parts shelf to the workbench. However, the parts that were already on the workbench can't be moved. You can only move the loose parts on the parts shelf.

In addition to solving already created puzzles, you can create your own puzzles and puzzle groups for others to solve. While creating a puzzle, you've got a large parts catalog available. You can drag an unlimited number of any part from the catalog to the workbench or parts shelf. You can also use the puzzle create mode as an experimental workbench to learn what the various parts do.

## Hardware Requirements

LASER! will run on any PC that is capable of running Windows 3.1. Approximately 2 MEG of free memory must be available. VGA graphics is recommended as an absolute minimum, with higher resolutions adding greatly to the ease of use. Sixteen-color graphics mode is OK for now, but future component libraries may benefit from 256-color mode.

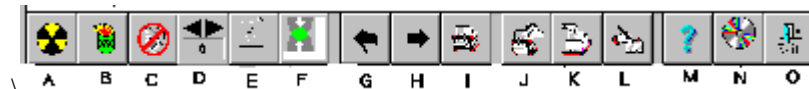
# The Game Board

## Five Easy Pieces



The Game Board is divided into five sections, as illustrated above.. The icon bar allows access to virtually all of LASER!'s functions. The status bar keeps you informed as to which puzzle you're working on.. The parts shelf is where the parts available to solve a puzzle are stored. The workbench is where the puzzle is actually solved. When in puzzle design mode, the parts catalog section will appear. This gives you access to all available parts.

## The Icon Bar



- |                                  |                               |
|----------------------------------|-------------------------------|
| A: Turn lasers on/off            | I: Start/Stop puzzle sequence |
| B: Reset workbench               | J: Solve a puzzle             |
| C: Turn sound on/off             | K: Edit a puzzle              |
| D: Set / Display animation speed | L: Design a new puzzle        |
| E: Set magnification mode        | M: Help                       |
| F: Current object                | N: Play CD                    |
| G: Previous puzzle               | O: Exit LASER!                |
| H: Next puzzle                   |                               |

## Turn lasers on/off

Press to turn on the light sources. While the laser system is running, the icon in this button will spin. When all the targets in the puzzle are successfully hit, the lasers will turn

off by themselves. If all targets aren't hit, the lasers will continue to fire. Press this button again to cancel the test.

### **Reset workbench**

When in puzzle solve mode, pressing this button will return all free pieces to the parts shelf. When in puzzle design mode, the reset button will behave like a NEW -- all pieces will be cleared from the workbench and the parts shelf.

### **Turn sound on/off**

Turns sound on & off.

### **Set/Display animation speed**

The up/down arrow will raise or lower the animation speed while the lasers are turned on. The indicator displays the current speed setting. The available speeds range from 1 (slowest) to 10 (fastest).

### **Set magnification mode**

This button will toggle between "full-size" and "full-puzzle" magnification. In the full-size setting, you'll see the components in full size. You'll use the scrollbars to get to various parts of the workbench. In the full-puzzle setting, the size of the pieces will be reduced so that the entire 25x25 puzzle grid is visible on the workbench no matter what size the LASER! screen is.

### **Current object**

Whenever you're dragging an object from one place to another, the Current Object window will show you what kind of piece you're moving.

### **Previous puzzle**

When solving a puzzle sequence (see below), this button will move you to the Previous puzzle.

### **Next puzzle**

When solving a puzzle sequence, this button will move you to the Next puzzle.

### **Start/Stop puzzle group**

Press this button to start solving a puzzle group. You'll then choose the group from a normal file dialog box. When a group is being solved, the icon in this button will change to a stop sign. Press the stop sign to exit group mode and return to single-puzzle mode.

### **Solve puzzle**

When in single-puzzle mode, press this button to pick any puzzle to solve. This button will not work when in puzzle group mode. While solving a puzzle group, you're limited to working on puzzles contained in the group.

### **Edit puzzle**

Press this button to edit any puzzle. If you're in solve mode, you'll be placed into design mode. This button will not work when solving a puzzle group.

### **Design a new puzzle**

Press to start designing a new puzzle. You'll be placed in design mode and given an empty workbench and parts shelf.

## **Help**

There are two ways to use the Help button. If you click on Help, your mouse cursor will turn into a question mark. You can then click on virtually anything in the LASER! window for help on that object, region, or button. If you're dragging a component, you can drop it onto the help button for information on what the component is and does. All components that are dropped on the Help button are returned to the Parts Shelf.

## **Play CD**

Play CD will open an audio CD control panel if you have audio CD capability on your computer. Complete details on how to use the control panel can be found later in the manual.

## **Exit LASER!**

Exits the LASER! game.

## **The Workbench**

The workbench is where the puzzle is actually created or solved. It consists of a 25x25 grid. Each block on the grid can hold one part. If you're viewing the workbench in full-size mode, the scroll bars will move your viewing area around the physical workbench grid. If you're in full-puzzle mode, you don't have to scroll. The grid is reduced in size so that the entire grid and its contents can be viewed. When in full-puzzle mode, you can still drag pieces to and from the workbench. However, the smaller the workbench window, the more difficult it'll be to see what you're doing.

While in puzzle create mode, you can drag parts to the workbench from either the parts catalog or the parts shelf. You can also move any part on the workbench to either another workbench location, the parts shelf, or the parts catalog.

While in puzzle solve mode, only parts that start on the parts shelf can be moved to somewhere else on the workbench or back to the parts shelf. If a part starts on the workbench, it's locked in position. Since you're trying to solve a puzzle with supplied parts, you don't have access to the parts catalog while in this mode.

In all operating modes, whenever you drop a part on top of one already on the workbench, the dropped part will return to the parts shelf. Note: You MUST NOT drop parts outside of the LASER! window! If you do, you WILL LOSE the part!! This may be OK while designing a puzzle, because you can get another one from the catalog. However, while solving a puzzle, you'll be short of that part. To get it back, you'll have to re-load the puzzle! BE CAREFUL!!!!

## **The Catalog**

The parts catalog window is an unlimited supply of every part available that you can access while designing a puzzle. It's not available while solving a puzzle. The scrollbar on

the right side of the catalog window will let you scroll through all the parts.

## **The Parts Shelf**

The parts shelf is where all the parts needed to solve a puzzle are stored.

## **The Status Bar**

The status bar displays the filename and name of the puzzle that you're currently solving or working on. While solving a puzzle group, it also displays the group name and puzzle number.

# **Solving A Puzzle**

## **Solving an Individual Puzzle**

To solve any puzzle, just press the Solve Puzzle button on the toolbar or select Solve Puzzle from the menu. Then, select the desired puzzle from the file selection dialog box.

The parts that you can use are on the Parts Shelf. Simply drag the part from the parts shelf to the work bench and drop it on any open square.

Press the Run/Stop button to test the system. If all the targets are hit, the system will turn off by itself and display a message indicating success. If the system doesn't work, you'll have to turn it off yourself by pressing the Run/Stop button again. A message will indicate how many targets were successfully hit.

## **Solving a Puzzle Group**

To solve a puzzle group, press the Start/Stop Puzzle Group button. Then, pick the group you'd like to work on.

A puzzle in a group is solved the same as an individual puzzle. However, you can get to the next puzzle by simply pressing the Right Arrow button.

Puzzle groups also keep track of which puzzles were solved and which weren't. When solving a puzzle group, you'll notice a window on the status bar which indicates whether or not the current puzzle was solved.

To return to solving individual puzzles or to creating puzzles, press the Start/Stop Puzzle group button again. To start another group, you must stop the current group and then load another group as above.

# **Light Theory**

Light consists of three primary colors -- red, green, and blue. When two of the primary colors are combined, a secondary color is formed. The three secondary colors are cyan, violet, and yellow. Combining all three primary colors, either directly or indirectly, will result in white light. The following table will clearly illustrate what primary components make up each of the seven colors available in LASER!.

|        | <b>RED</b> | <b>GREEN</b> | <b>BLUE</b> |
|--------|------------|--------------|-------------|
| Red    | X          |              |             |
| Green  |            | X            |             |
| Blue   |            |              | X           |
| Cyan   |            | X            | X           |
| Violet | X          |              | X           |
| Yellow | X          | X            |             |
| White  | X          | X            | X           |

In real life, if a beam of light is split, each resulting beam is half as intense as the original. In addition to the split, a small portion would be lost in the splitting device. Likewise, if white light consisting of equal parts of red, green, and blue light passes through a perfect red filter (no such filter exists, as far as I know), the resulting light is one third as intense (two thirds, the blue and the green components, are absorbed by the filter).

Variable color intensities add yet another problem. A full-power red beam combined with a very weak blue beam won't produce violet -- at least, not as violet as the color should be. It'll be more red, depending on the power ratio between the red and blue beams.

Currently, LASER! doesn't add the complexity caused by variable power levels. All light beams in LASER! are of equal power. When any red, no matter where it came from, is combined with any blue, a full-strength violet is generated.

If you think adding variable beam power along with a spectrum analyzer tool to see exactly what a beam consists of would make for a more enjoyable and challenging game, please let me know. On the other hand, if you think it'd make the game far too complicated to be enjoyable, let me know that too. Your comments will help me to decide whether or not to add that level to a future version.

# The Components

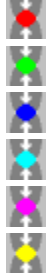
## Filters

Horizontal filters:





**Vertical filters:**



**Filter Operation**

A filter will allow only its own light components to pass through. All other components will be absorbed. For example, a red filter passes only the red component of light. Any blue and green components are absorbed. A cyan filter passes blue and green components. Any red component in the light is absorbed. The following chart shows the results of passing each available color of light through each available filter:

| LIGHT \ FLTR  | RED    | GREEN  | BLUE   | CYAN   | VIOLET | YELLOW |
|---------------|--------|--------|--------|--------|--------|--------|
| <b>RED</b>    | Red    | -NONE- | -NONE- | -NONE- | Red    | Red    |
| <b>GREEN</b>  | -NONE- | Green  | -NONE  | Green  | -NONE- | Green  |
| <b>BLUE</b>   | -NONE- | -NONE- | Blue   | Blue   | Blue   | -NONE  |
| <b>CYAN</b>   | -NONE- | Green  | Blue   | Cyan   | Blue   | Green  |
| <b>VIOLET</b> | Red    | -NONE- | Blue   | Blue   | Violet | Red    |
| <b>YELLOW</b> | Red    | Green  | Green  | Green  | Red    | Yellow |
| <b>WHITE</b>  | Red    | Green  | Blue   | Cyan   | Violet | Yellow |

In addition to color, direction plays a part in whether or not light will get through a filter. The vertical filters only filter light that enters from the top or bottom. Horizontal filters only accept light from the left and right sides. Any light hitting the wrong side of a filter is absorbed.

**Phosphors**

**Left-Firing Phosphors**







### Right-Firing Phosphors



### Upward-Firing Phosphors:



### Downward-Firing Phosphors



### Phosphor Operation:

The phosphor produces light of its output color regardless of what color light enters its input. There's only one input port and one output port on the phosphor. All light that hits the phosphor on any side other than the input is absorbed.

### Combiners





### **Combiner Operation:**

The combiner has three inputs and one output. All light entering all inputs is added together and sent through the output. For example, if red light enters one port and blue enters another, violet light (red + blue) comes from the output. Any light that hits the output side of the Combiner is absorbed.

### **Light Sources**

#### **Left-Firing Sources:**



#### **Right-Firing Sources**



#### **Upward-Firing Sources**



#### **Downward-Firing Sources**





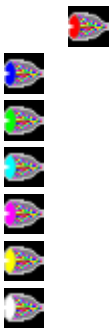
### **Light Source Operation:**

The Light Sources are the source of all light rays in LASER!. A light source produces a beam of light in its output color and in its output direction. The light beam starts immediately when the system is turned on and remains constant until the system is turned off.

Any light that hits a light source is absorbed.

### **Targets**

#### **Left-Facing Targets**



#### **Right-Facing Targets**

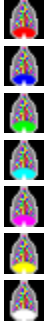


#### **Upward-Facing Targets**





### **Downward-Facing Targets**



### **Target Operation:**

The targets are what you must get the light to hit to solve the puzzle. A target is activated only if it's hit with the proper color light. Targets are sensitive on only one side. All light that hits the other three sides is absorbed. Likewise, if the active side of a target is hit with the wrong color, that light is absorbed too.

### **Multi-Targets**

#### **Left-Facing Multi-Targets**



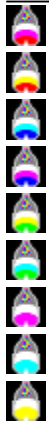
#### **Right-Facing Multi-Targets**



### Upward-Facing Multi-Targets



### Downward-Facing Multi-Targets



### Multi-Target Operation:

The Multi-Target is a form of Target. However, the Multi-Target must be hit by two or more different colors of light in sequence to be activated. On the above targets, note that the front of the target consists of two or three bands of color. The color bands indicate the exact order of colors that must hit the target to activate it. For example, the red - violet - white target must be hit by first red, then violet, and finally white.

In all other respects, the Multi-Target behaves like a standard target. It has only one active side. All light hitting the other sides is absorbed. Likewise, light of the incorrect color hitting the active side is absorbed.

### **Blocker**



Blocker Operation:

A blocker simply absorbs light. It doesn't emit or reflect any light at all.

### **Mirrors**



### Mirror Operation:

A mirror reflects all light that hits it. The new direction is exactly what you'd expect based on the direction of the incoming light and the angle of the mirror. Both sides of the mirror are silvered and are equally reflective.

### Half-Mirrors

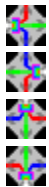


### Half-Mirror Operation:

The half-mirror is a mirror whose silver coating is so thin that only half the light is reflected. The other half passes right through the mirror. The result of this is two beams of light -- one traveling in the original direction and the other traveling in the reflected direction.

As in the mirror, both sides of the half-mirror are reflective. Because of this property, the half-mirror can be used as a simple beam combiner. There's an example of this in the Tutorial puzzle group.

### Prisms



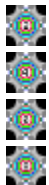
### Prism Operation:

The Prism accepts light at its input port, breaks it into components, and sends them out as separate beams. The colored arrows indicate the colors of the output ports.

Only colors available at the input will come from an output port. For instance, white light at the input produces red, green, and blue output beams. However, violet light at the input only produces red and blue output beams.

The prism is a one-way device. All light hitting the output ports is absorbed.

### Delay Lines



### Delay Line Operation:

The Delay Line will pass all light. It won't alter the color or direction. However, it will delay the light by either 2, 4, 6, or 8 clock cycles. The delay time is printed in the center of the delay line.

## Vari-Filter



### Vari-Filter Operation:

The Vari-Filter is a "variable" filter. The VariFilter takes on the filter properties of the first beam of colored light to strike it. For instance, if it's hit by a violet beam traveling horizontally, the VariFilter turns into a violet horizontal filter.

There's one major exception to this rule: If the Vari-Filter is first hit by a beam of white light from any direction, it turns into a blocker.

Once the Vari-Filter turns into another part, it becomes completely stable and will not change again.

## Creating a Puzzle

To begin creating a new puzzle, press the Design New Puzzle button on the icon bar. Then, simply drag parts from the parts catalog onto the workbench.

While designing the puzzle, you can test it at any time by pressing the Turn Lasers On button. When all the targets are hit, you'll be notified like when solving a puzzle. When you turn off the lasers, you'll be told how many targets were hit.

The easiest way to design a puzzle is probably to get a complete system running on the workbench with all targets being hit. Then, drag several key pieces from the workbench to the parts shelf and save the result as a puzzle.

## Creating a Puzzle Group

To create a puzzle group, select Build Group... from the File menu. Then, using the drive and directory controls, move to the subdirectory where your puzzle files are located. Next, select the puzzles IN ORDER from the file box. You'll notice that they appear in the Selected list as you choose them. Finally, enter a n eight character (or less) file name in the Group Name edit field and click on OK. If no errors are reported, the group file will be built and the Build Group window will go away.

The group file will be placed in the same subdirectory as the puzzle files used for the group. When in use, a group file **MUST ALWAYS** be in the same subdirectory as its puzzle files! There is **NO PATH INFORMATION AT ALL** stored in the group file! The puzzles are expected to be where the group file is.

## Playing an Audio CD

To play an audio CD, place a CD into the drive and click on the Play CD button on the

tool bar. If all is well with the CD disk and drive, the CD Player window will appear. The motion controls across the bottom are, from left to right, Previous Song, NExt Song, Play, Pause, Stop, and Eject. The Track display shows which track number is playing. The two bar graphs, Song and Disk, show the progress of the current song and disk respectively.

If the CD Player window can't access your CD drive or disk for some reason, an error message will be displayed rather than the CD Player window.

## Critical Errors and Problems

The only problems you should run into with Laser! are memory-related, since Laser! is quite sensitive to free internal object resources and (when run with a screen color depth greater than 256 colors) system memory. With this current version, you're limited to about 250 components on the workbench before object resources become depleted. The Count display on the icon bar to the right of the Exit button will help you keep track of how many objects you're already using. When you hit 250, you should plan to finish up your puzzle very soon.

If you get the message "Too many objects!", there were not enough resources available to place the object. When this happens, available resources are very low indeed. Since this is a non-fatal error, you should save the current puzzle and exit Laser! Continued use of Laser! may result in a fatal "Out of memory" error, which will automatically terminate Laser! without giving you the chance to save your puzzle.

If you should get any other fatal error messages, please let me know exactly what they say, along with a description of what you were doing when the error occurred.

If, while designing or solving a puzzle, you find that a component or light beam doesn't operate as stated in the documentation, please send me a description of the problem and, if possible, a puzzle which illustrates the problem. Although several of us have tested the Laser! components, it is a very complex system. Some combinations of components just might interact with each other in an incorrect way.

## Comments & Tech Support

Comments and suggestions are always welcome, whether you're a registered user or not. However, I will not respond to comments or questions from non-registered users unless a stamped, self-addressed envelope is included.

If you have any technical problems or questions about Laser!, I'll be glad to try to answer them as well. As stated above, non-registered users must include a SASE if they want a reply.

Please limit your questions to Laser! related subjects. If your problem concerns an aspect of Windows setup or operation, I'll simply direct you to your Windows manuals -- Microsoft can hire real authors to write their manuals, so their explanation will be a lot better than mine anyway.

Please note that only registered users can get new copies of Laser! directly from me. If



your problem is a Laser! bug or you give me a suggestion that finds its way into Laser! and you're not a registered user, you'll simply have to wait for a new copy with the bug fix or new feature to show up on a BBS or in a Shareware vendor's catalog. It has always been and will always be my firm policy to provide the best tech support and inexpensive upgrades to those who pay for and deserve the service -- my registered users.

All comments and questions can be sent to:

**Ron Balewski**

**412 E. Ridge St.**

**Nanticoke, PA 18634-2915**

## **Puzzle Library**

As a service to Laser! users, I hope to assemble a library of puzzles (or puzzle groups) contributed by other Laser! users. I will assemble, catalog, and distribute them on high density disks.

If you contribute a puzzle or puzzle group to the library, I'll send you one or two (depending on availability) puzzle disks as a thank you. This offer is available to both registered and non-registered users alike. If you're one of the first to take advantage of this offer, please be patient for your puzzle disk. I'll wait until I have enough puzzles to make it worthwhile before sending the disks.

Registered users only can also order puzzle disks for a \$3 per disk copying / handling / shipping charge. If you're interested in this offer, please inquire how many disks are available when you register -- this number will hopefully climb.

## **Customizing LASER!**

### **Modifying Part Images**

All part images are stored in file STANDARD.PTZ. This is a normal Windows bitmap (.BMP) type file. If you have an image editing program which can load any suffix, you can load this file in directly after telling the software that it's a Windows bitmap file. If your editing software requires a .BMP suffix, you can re-name the file, edit it, and re-name it back to STANDARD.PTZ.

Note that each part is a 32-pixel square region. The parts **MUST** remain in the same relative location within the bitmap and **MUST** be 32x32 to work properly. The current STANDARD.PTZ is stored as a 256-color bitmap, but uses only the sixteen default colors for compatibility with 16-color installations of Windows. You can use the entire 256-color palette for part images, but be aware that part files using anything but the default colors won't appear properly on a 16-color system. I personally don't consider this a problem

considering all the inexpensive 256-color-capable video cards on the market and will probably do my own 256-color parts file in the near future.

If you should re-draw the Parts image file, I'd appreciate a copy. If there's enough interest in this aspect of the game, I'll assemble a collection of parts image files and make them available to registered users from me and non-registered users through BBS's and shareware vendors. I'll also consider allowing the user to change parts image files on-the-fly and to default to some parts image file other than the standard one when the game loads. As an added "thank you" for your contribution, I'll send a disk or two of parts files contributed by other users.

## Changing Sounds

There are three sound files associated with LASER! They are POOF.WAV, BING.WAV, and HUMM.MID. The first two are digitized wave files the last is a MIDI file.

HUMM.MID is the background hummmm present whenever the lasers are turned on. The file is repeatedly played until the lasers are turned off. BING.WAV is the bell-like sound heard whenever a target is hit by valid light. POOF.WAV is the explosive sound heard whenever a previously-valid target is hit by incorrect light and rendered invalid.

You can substitute any other wave and MIDI file for these as long as you re-name the new file to the above name. Remember that you can only substitute wave files for wave files and MIDI files for the MIDI file and NOT intermix them!

# Shareware



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The Author does not warrant that this version of Laser! will work with puzzles or component images created with or for any previous or future version of Laser!. Furthermore, the Author does not guarantee that a way will be provided to port puzzles or component images from one version of Laser! to another.

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- 2: You must charge no more than \$5 for a complete LASER! disk set unless you receive written permission to do so from the author
- 3: You must not include any other software packages on the LASER! disk unless you receive written permission to do so from the author
- 4: You must include all files, including documentation and registration information, on the LASER! disk(s).
- 5: You must in no way alter any LASER! file

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You have my permission to distribute this copy of LASER! If you wish to receive a copy of the latest version, or simply a "clean" copy, directly from the author, you **\*MUST\*** include a stamped self-addressed return mailer and a blank, formatted high-density disk (any size). Alternatively, you can include a \$3 check to cover processing costs and I will provide all the above. You must also make the request on your shareware company's letterhead. If you fail to meet any of the above requirements, you will **NOT** receive the copy of LASER! that you requested. Your request **WILL GO DIRECTLY INTO THE TRASH**. There will be **NO EXCEPTIONS** to this policy!!!



